Maintenance Manual

Spectrum Master™ MS2720T

High Performance Handheld Spectrum Analyzer

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
http://www.anritsu.com

P/N: 10580-00342
Revision F
Published: September 2021
Copyright 2021 Anritsu Company

Table of Contents

Chapter 1—General Information

1-1 Introduction 1-1
1-2 Contacting Anritsu 1-1
1-3 Product Information, Compliance, and Safety 1-1
1-4 Recommended Test Equipment 1-2
1-5 Replaceable Parts 1-5

Chapter 2—Spectrum Analyzer Verification

2-1 Introduction 2-1
2-2 Frequency Accuracy Verification 2-2
2-3 Internal Reference Frequency Adjustment 2-3
2-4 Single Side Band (SSB) Phase Noise Verification 2-5
2-5 Spurious Response Verification 2-7
2-6 Input Related Spurious (IRS) Signals Verification 2-9
1000 MHz Input Related Spurious Check 2-9
3273 MHz Input Related Spurious Check 2-10
8000 MHz Input Related Spurious Check 2-10
2-7 Resolution Bandwidth Accuracy Verification 2-12
2-8 Absolute Amplitude Accuracy Verification 2-14
50 MHz Amplitude Accuracy Verification 2-14
Amplitude Accuracy Across Frequency Verification 2-17
Measuring Amplitude Accuracy Across Frequency 2-18
2-9 Residual Spurious Response Verification 2-20
Residual Spurious Response Test with Preamp Off 2-20
Residual Spurious Response Test with Preamp On 2-21
Procedure 2-21
2-10 Displayed Average Noise Level (DANL) 2-22
Preamp On Procedure 2-22
Preamp Off Procedure 2-22
2-11 Third Order Intercept (TOI) 2-23
2400 MHz TOI Test 2-23

Chapter 3—Options Verification

3-1 Introduction 3-1
3-2 Option 31, GPS Frequency Accuracy Verification 3-2
GPS Option Bias-Tee Voltage Verification (Option 31) 3-4
3-3 Option 809, 813 or 820 Tracking Generator Verification 3-5
Tracking Generator Frequency Accuracy Verification 3-5
Tracking Generator Power Accuracy Verification 3-6
3-4 Option 880, GSM/GPRS/EDGE Signal Analyzer Verification 3-7
GSM Burst Power, Frequency Error, and Phase Error Tests 3-8
EDGE Burst Power, Frequency Error and Residual Error Tests 3-10

3-5 Option 881 WCDMA/HSDPA Signal Analyzer Verification . . . 3-12
WCDMA Absolute Power Accuracy Verification . . . 3-12
WCDMA Occupied Bandwidth (OBW) Verification . . . 3-17
WCDMA RF Channel Power Accuracy . . . 3-19
HSDPA RF Channel Power Accuracy . . . 3-20
Error Vector Magnitude (EVM) Verification . . . 3-21
3-6 Option 882, TDSCDMA Signal Analyzer Option Verification . . . 3-23
TDSCDMA Channel Power, Frequency Error, EVM, and Tau Test Procedure . . . 3-24
3-7 Option 883, LTE Signal Analyzer Verification . . . 3-25
LTE Channel Power Accuracy Tests . . . 3-26
LTE Frequency Error Tests . . . 3-27
3-8 Option 883, TD-LTE Signal Analyzer Verification . . . 3-29
TD-LTE Channel Power Accuracy Tests . . . 3-30
TD-LTE Frequency Error Tests . . . 3-32
3-9 Option 884, CDMA Signal Analyzer Verification . . . 3-34
cdmaOne Channel Power, Frequency Error, Rho and Tau Tests . . . 3-35
CDMA2000 Channel Power, Frequency Error, Rho and Tau Tests . . . 3-36
3-10 Option 884, EVDO Signal Analyzer Option Verification . . . 3-37
8PSK Modulation Channel Power, Frequency Error, Rho, and Tau Tests . . . 3-38
QPSK Modulation Channel Power, Frequency Error, Rho, and Tau Tests . . . 3-39
16QAM Modulation Channel Power, Frequency Error, Rho, and Tau Tests . . . 3-39
Idle Slot Channel Power, Frequency Error, Rho, and Tau Tests . . . 3-39
3-11 Option 885, Fixed WiMAX Signal Analyzer Verification . . . 3-41
Fixed WiMAX Channel Power Accuracy Tests . . . 3-41
Fixed WiMAX Residual EVM and Frequency Error Tests . . . 3-43
3-12 Option 885, Mobile WiMAX Signal Analyzer Verification . . . 3-45
Mobile WiMAX Channel Power Accuracy Tests . . . 3-45
Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length) . . . 3-46
Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length) . . . 3-47
Mobile WiMAX Residual EVM and Frequency Error Tests (Option 885) . . . 3-49
Residual EVM and Frequency Error (10 MHz Bandwidth and 10 ms Frame Length) . . . 3-50
Residual EVM and Frequency Error (5 MHz Bandwidth and 5 ms Frame Length) . . . 3-51

Chapter 4—Battery Information

4-1 General Information . . . 4-1
4-2 Battery Pack Removal and Replacement . . . 4-2

Chapter 5—Assembly Replacement

5-1 Introduction . . . 5-1
5-2 Replaceable Parts List . . . 5-1
5-3 Opening the Spectrum Master Case . . . 5-2
5-4 Tracking Generator Module Assembly Replacement . . . 5-6
5-5 Spectrum Analyzer Module Assembly Replacement . . . 5-7
5-6 Main PCB Assembly Replacement . . . 5-8
5-7 GPS (Option 31) Module Replacement . . . 5-10

5-8 Fan Assembly Replacement 5-10
5-9 LCD Assembly Replacement 5-10
5-10 Keypad Membrane and Main Keypad PCB Replacement 5-13
5-11 Touch Screen Replacement 5-16

Chapter 6—Troubleshooting

6-1 Introduction 6-1
6-2 Turn-on Problems 6-1
6-3 Other Problems 6-2

Appendix A—Test Records

A-1 Introduction A-1
A-2 Test Records for Spectrum Analyzer Verification A-2
A-3 Test Records for Options Verification A-34
Option 31 GPS Receiver A-34
Option 809, 813, 820 Tracking Generator A-34
Option 880, GSM/GPRS/EDGE RF Measurements A-36
Option 880, GSM/GPRS/EDGE RF Measurements (Continued) A-37
Option 880, GSM/GPRS/EDGE RF Measurements (Continued) A-38
Option 880, GSM/GPRS/EDGE Demodulator A-39
Option 880, GSM/GPRS/EDGE Demodulator (Continued) A-40
Option 881 WCDMA and HSDPA RF Measurements A-41
Option 881 WCDMA and HSDPA RF Measurements (Continued) A-42
Option 881 WCDMA and HSDPA RF Measurements (Continued) A-43
Option 882, TDSCDMA Signal Analyzer Option Verification A-44
Option 883 LTE Measurements A-45
Option 883, LTE Measurements A-46
Option 883 TD-LTE Measurements A-47
Option 883, TD-LTE Measurements A-48
Option 884 CDMA RF Measurements A-49
Option 884 cdmaOne and CDMA2000 1xRTT Demodulator A-50
Option 884, EVDO RF Measurements A-51
Option 884, EVDO RF Measurements (Continued) A-52
Option 884 EVDO Demodulator A-52
Option 884 EVDO Demodulator (Continued) A-53
Option 885 Fixed WiMAX RF Measurements A-54
Option 885 Fixed WiMAX Demodulator A-55
Option 885 Mobile WiMAX RF Measurements A-56
Option 885 Mobile WiMAX RF Measurements (Continued) A-57
Option 885 Mobile WiMAX Demodulator A-58

Chapter 1 — General Information

1-1 Introduction

This manual provides maintenance instructions for Anritsu Spectrum Master Model MS2720T. It provides a list of recommended test equipment, performance verification procedures, parts replacement procedures, replaceable parts list, and test records.

Familiarity with the basic operation of the front panel keys is assumed (for example, how to change measurement mode, how to preset the instrument, or the meaning of "submenu key"). Before making any measurement, ensure that all equipment has warmed up for at least 30 minutes.

The manual includes:

- General information in this chapter, including:
  - Lists of necessary test equipment to perform verification testing (Table 1-1, Table 1-2, and Table 1-3)
  - Replaceable parts list (Table 1-4)
- Performance verification procedures:
  - Chapter 2, "Spectrum Analyzer Verification"
  - Chapter 3, "Options Verification"
- Battery pack information (Chapter 4, "Battery Information")
- Parts replacement procedures (Chapter 5, "Assembly Replacement")
- Troubleshooting problems (Chapter 6, "Troubleshooting")
- Blank test records are included in Appendix A.
  - Copy the blank test records from Appendix A and use them to record measured values. These test records form a record of the performance of your instrument. Anritsu recommends that you make a copy of the blank test records to document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

Caution	Before making any measurement, verify that all equipment has warmed up for at least 30 minutes.

1-2 Contacting Anritsu

To contact Anritsu, visit the following URL and select the services in your region: http://www.anritsu.com/contact-us.

1-3 Product Information, Compliance, and Safety

Read the Handheld Instruments Product Information, Compliance, and Safety Guide (PN: 10100-00065) for important safety, legal, and regulatory notices before operating the equipment. For additional information and literature covering your product, visit the product page of your instrument and select the Library tab.

1-4 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining Anritsu Model MS2720T with option MS2720T/709, MS2720T/713, MS2720T/720, MS2720T/732, or MS2720T/743.

- Table 1-1 is a list of test equipment that is required for verifying the spectrum analyzer functions on Model MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720.
- Table 1-2 is a list of test equipment that is required for verifying the spectrum analyzer functions on Model MS2720T with option MS2720T/732 or MS2720T/743.
- Table 1-3 is a list of test equipment that is required for verifying the functions of installed options on any MS2720T Model.
- Table 1-4 is a list of replaceable parts for the MS2720T Spectrum Master.

Table 1-1. Test Equipment Required for Verifying Spectrum Analyzer Functions up to 20 GHz

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 0.1 Hz to 20 GHz Power Output: +16 dBm Step attenuator installed	Anritsu Model MG3692A, MG3692B, or MG3692C with Options 2A, 3, 4, 22, 15x[a]
Power Meter	Power Range: −70 to +20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 100 kHz to 18 GHz Power Range: −67 to +20 dB	Anritsu Model MA2421D or SC7400 (Qty 2)
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
Adapter	Frequency: DC to 20 GHz N(m)-N(m), 50 ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz K(m)-N(f), 50 ohm	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 18 GHz N(m)-N(f), 50 ohm	Anritsu Model 15NN50-1.5B (Qty 2)
Lowpass Filter	Frequency: 50 MHz	Anritsu Part Number 1030-96
Frequency Reference	Frequency: 10 MHz	Symmetricom RubiSource T&M
Signal Generator		Agilent Model 8648D with Options 1ES and 1EA
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10 (Qty 2)
Fixed Attenuator	20 dB Attenuation	Aeroflex/Weinschel Model 44-20 (Qty 2)
Fixed Attenuator	6 dB Attenuation	Aeroflex/Weinschel Model 44-6 (Qty 2)
Fixed Attenuator	2 dB Attenuation	Aeroflex/Weinschel Model 44-2 (Qty 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Any (Qty 2)

a. Note that MG3692A models require Option 15 to achieve power of +16 dBm at 3.5 GHz. MG3692B and MG3692C models do not require Option 15 to achieve power of +16 dBm at 3.5 GHz.

Caution	Factory tests have shown that the equipment that is listed above will provide satisfactory results at 20 GHz (the upper limit of the MS2720T/720) even though the chart above specifies 18 GHz (per manufacturers specifications). Many Type N cables have excessive loss for testing the spectrum analyzer section of the instrument up to 20 GHz. An SMA cable or K cable should therefore be installed on the MG synthesizer for all spectrum analyzer tests on MS2720T with option MS2720T/720.

Table 1-2. Test Equipment Required for Verifying Spectrum Analyzer Functions up to 40 GHz

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 0.1 Hz to 20 GHz, Power Output: +16 dBm, Step attenuator installed	Anritsu Model MG3692A, MG3692B, or MG3692C with Options 2A, 3, 4, 22, 15x[b]
Synthesized Signal Generator	Frequency: 0.1 Hz to 50 GHz, Power Output: +16 dBm, Step attenuator installed	Anritsu Model MG3695C with Options 2A, 3, 4, 22, 15x[b]
Power Meter	Power Range: –70 to +20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 100 kHz to 40 GHz Power Range: –70 to +20 dB	Anritsu Model SC7413 (Qty 2) K type
50 ohm Termination	Frequency: DC to 40 GHz	Anritsu Model 28KF50-2
Adapter	Frequency: DC to 40 GHz K(m)-K(m), 50 ohm	Anritsu Model K220B
Adapter	Frequency: DC to 40 GHz K(f)-K(f), 50 ohm	Anritsu Model K222B
RF Coaxial Cable	Frequency: DC to 40 GHz K(m)-K(f), 50 ohm	Anritsu Model 3670K50-2 (Qty 2)
Lowpass Filter	Frequency: 50 MHz	Anritsu Part Number 1030-96
Frequency Reference	Frequency: 10 MHz	Symmetricom RubiSource T&M
Signal Generator		Agilent Model 8648D with Options 1ES and 1EA
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10 (Qty 2)
Fixed Attenuator	10 dB Attenuation	Anritsu Model 41KC-10
Fixed Attenuator	20 dB Attenuation	Aeroflex/Weinschel Model 44-20 (Qty 2)
Fixed Attenuator	6 dB Attenuation	Aeroflex/Weinschel Model 44-6 (Qty 2)
Fixed Attenuator	2 dB Attenuation	Aeroflex/Weinschel Model 44-2 (Qty 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Power Splitter	Frequency: DC to 40 GHz	Anritsu Model K241C
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Any (Qty 2)
Adapter	K(f) to N(f), 50 ohms, Ruggedized	Anritsu Model 71693-R

b. Note that MG3692A models require Option 15 to achieve power of +16 dBm at 3.5 GHz. MG3692B and MG3692C models do not require Option 15 to achieve power of +16 dBm at 3.5 GHz.

Caution	Factory tests have shown that the equipment that is listed above will provide satisfactory results at 43 GHz (the upper limit of the MS2720T with option MS2720T/743) even though the chart above specifies 40 GHz (per manufacturers specifications).

Table 1-3. Test Equipment Required for Verifying Functions of Installed Options (1 of 2)

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 0.1 Hz to 20 GHz, +16 dBm power	Anritsu Model MG3692A, MG3692B or MG3692C with options 2A, 3, 4, 15, and 22[c]
Vector Signal Generator	Frequency: 100 kHz to 6 GHz	Anritsu Model MG3700A with Options MG3700A-002, MG3700A-021[d], and MG3700A-011
Power Meter	Power Range: −70 to + 20 dBm	Anritsu Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: −60 to +20 dBm	Anritsu Model MA2482D with Option 1 (Qty 2)
Frequency Counter	Frequency: 20 GHz	Anritsu Model MF2412B
Programmable Attenuator	Frequency: DC to 2 GHz Attenuation: 100 dB (1 and 10 dB steps)	Anritsu Model MN63A
Fixed Attenuator	Frequency: DC to 18 GHz Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10 (Qty 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
RF Power Amplifier	Frequency: 100 to 1000 MHz Gain: 35 dB min	Mini Circuits Model TIA-1000-1R8 (Qty 2 BNC(m) to N(f) Adapters required)
Adapter	Frequency: DC to 20 GHz N(m)-N(m), 50 ohm	Maury Microwave Model 8828B Quantity: 2 each [One each required only if Anritsu Coupler and Circulator are used]
Adapter	Frequency: DC to 20 GHz K(m)-N(f), 50 ohm	Anritsu Model 34RKNF50
Adapter	Frequency: 881.5 MHz BNC(m) to N(f), 50 ohm	Midwest Microwave Model ADT-2615-NF-BNM-02 (Qty 2)
Adapter	Frequency: 881.5 MHz SMA(m) to N(f), 50 ohm	Midwest Microwave Model ADT-2582-NF-SMM-02 (Qty: 4) [Required only if Anritsu Coupler and Circulator are used.]
Adapter	Frequency: 881.5 MHz SMA(m) to SMA(m), 50 ohm	Midwest Microwave Model ADT-2594-MM-SMA-02 [Required only if Anritsu Coupler and Circulator are used.]
50 ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
High Power Load	DC to 18 GHz, 10W	Aeroflex/Weinschel Model M1418
Coupler	Frequency: 881.5 MHz Coupling Factor: 30 dB	Midwest Microwave Model CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05 Alternative: Anritsu part number 1091-307 [Two SMA(m) to N(f) adapters required.]
Circulator	Frequency: 800 to 1000 MHz Isolation: 20 dB min	Meca Electronics, Inc. part number CN-0.900 Alternative: Anritsu part number 1000-50 [Two SMA(m) to N(f) adapter and one SMA(m) to SMA(m) Adapter required.]
RF Coaxial Cable	Frequency: DC to 18 GHz N(m)-N(m), 50 ohm	Anritsu Model 15NN50-1.5B (Qty 3)

Table 1-3. Test Equipment Required for Verifying Functions of Installed Options (2 of 2)

Instrument	Critical Specification	Recommended Manufacturer/Model
GPS Antenna		Anritsu 2000-1410
Coaxial Cable	BNC(m) to BNC(m), 50 ohm	Any
Adapter	K(f) to N(f), 50 ohms, Ruggedized	Anritsu Model 71693-R

c. Note that MG3692A models require Option 15 to achieve power of +13 dBm. MG3692B and MG3692C models do not require Option 15 to achieve +13 dBm power.

d. Note that the MG3700A requires that several factory custom test pattern files be installed into its memory.

1-5 Replaceable Parts

Table 1-4. List of Replaceable Parts (1 of 2)

Part Number	Description
ND75313<R>[e]	MS2720T Main PCB Assembly with Option 9 for s/n < 1543111 or s/n 1544002, 1544004, 1544015, 1544026, 1544028, 1545047, and 1545050
3-ND81975<R>[e]	MS2720T Main PCB Assembly with Option 9 for s/n > 1543110 with the following exceptions: s/n 1544002, 1544004, 1544015, 1544026, 1544028, 1545047, and 1545050
ND75315<R>	MS2720T-0709 Spectrum Analyzer PCB Assembly for s/n < 1504014
3-ND81238<R>	MS2720T-0709 Spectrum Analyzer PCB Assembly for s/n > 1504013
ND75316<R>	MS2720T-0713 Spectrum Analyzer PCB Assembly for s/n <1428059
ND80636<R>	MS2720T-0713 Spectrum Analyzer PCB Assembly for s/n >1428058 through 1630012
3-ND82859<R>	MS2720T-0713 Spectrum Analyzer PCB Assembly for s/n >1630012
ND75317<R>	MS2720T-0720 Spectrum Analyzer PCB Assembly for s/n < 1501076 and s/n 1503029, 1503034, 1503175, 1503181, 1504076, 1505111, and 1505124
ND80637<R>	MS2720T-0720 Spectrum Analyzer PCB Assembly for s/n > 1422036 through 1501075 Including 1420076, 1503029, 1503034, 1503175, 1503181, 1504076, 1505111, 1505124
3-ND81240<R>	MS2720T-0720 Spectrum Analyzer PCB Assembly for s/n > 1505146 and s/n 1501076, 1503077, 1503185, 1504019, 1504029, 1504044, 1504046, 1504047, 1504082, 1504141, 1504144, 1504145, 1504147, 1504149, 1504151, 1504152, 1504157, 1504160, 1504165, 1505002, 1505003, 1505004,1505005, and 1505147
ND75318<R>	MS2720T-0732 and MS2720T-0743 Spectrum Analyzer PCB Assembly for MS2720T-0732 s/n < 1451132 and for MS2720T-0743 s/n < 1501051
ND80638<R>	MS2720T-0732 and MS2720T-0743 for s/n >1422034 through 1451131
3-ND81080<R>	MS2720T-0732 Spectrum Analyzer PCB Assembly for s/n > 1451131
3-ND82204<R>	MS2720T-0743 Spectrum Analyzer PCB Assembly for s/n > 1501050
3-ND75314<R>	MS2720T GPS Receiver PCB (Option 31)
3-ND75319<R>	MS2720T-0809 and MS2720T-0813 Tracking Generator
ND75320<R>	MS2720T-0820 Tracking Generator for unit s/n < 1612000
3-ND75320<R>	MS2720T-0820 Tracking Generator for unit s/n > 1612000
3-790-661	Gasket material for case edge

Table 1-4. List of Replaceable Parts (2 of 2)

Part Number	Description
3-15-165	LCD Display for s/n < 1543111 or s/n 1544002, 1544004, 1544015, 1544026, 1544028, 1545047, and 1545050
3-15-174	LCD Display for s/n > 1543110 with the following exceptions: s/n 1544002, 1544004, 1544015, 1544026, 1544028, 1545047, and 1545050
ND73867	Touch Screen with Gasket (replaced by ND80480)
3-ND80480	Touch Screen with Gasket and Protection (replaced ND73867)
2000-1685-R	Soft Carrying Case
3-71650-1	Case Top Only (excludes model ID Label, LCD, Touch screen, rotary switch, speaker and keypad items)
3-61365-1	Old Case Bottom with Metal Tilt Bail (excludes all Tilt Bail components)
3-65314	Left and Right Tilt Bail (Plastic) Holders for old case
3-65316	Tilt Bail Stand (Metal) for old case
3-65684	Tilt Bail (Plastic) Clip for old case
ND75322	New Case Bottom Assembly with Plastic Tilt Bail
3-73312-9	Model MS2720T with 9 kHz - 9 GHz ID Label (option 709)
3-73312-13	Model MS2720T with 9 kHz - 13 GHz ID Label (option 713)
3-73312-20	Model MS2720T with 9 kHz - 20 GHz ID Label (option 720)
3-73312-32	Model MS2720T with 9 kHz - 32 GHz ID Label (option 732)
3-73312-43	Model MS2720T with 9 kHz - 43 GHz ID Label (option 743)
3-61379-1	Battery Door
633-75	Li-ion Battery Pack 7.5 Ah
3-67146	Type N RF Input connector (N JACK-SMA JACK)
3-71353	Type K(m) Rugged RF Input connector
3-ND70948	Fan Assy
40-187-R	AC to DC Power Converter
3-74999-3	Main Keypad PCB
3-71641	Main Keypad (Rubber)
3-ND75321	Speaker Assy with Gaskets
3-410-103	Rotary Encoder (excluding knob)
3-61360-2	Encoder Knob (excluding encoder)
3-61470	Hand Strap
3-61571	Plastic, Ring Holder

e. When ordering the Main PCB Assembly, in order to ensure installation of correct options, all options that are installed on the instrument must be declared on the order. This should include all the hardware and software options that make up the respective unit. The options are listed on a label on the back of the MS2720T and are also shown in the **System** (Shift 8) / Status display.

Chapter 2 — Spectrum Analyzer Verification

2-1 Introduction

This chapter describes the verification process for the spectrum analyzer options in the MS2720T Spectrum Master. Verification tests that are associated with other instrument options are described in Chapter 3.

The following tests are in this chapter:

- "Frequency Accuracy Verification" on page 2-2
- "Single Side Band (SSB) Phase Noise Verification" on page 2-5
- "Spurious Response Verification" on page 2-7
- "Input Related Spurious (IRS) Signals Verification" on page 2-9
- "Resolution Bandwidth Accuracy Verification" on page 2-12
- "Absolute Amplitude Accuracy Verification" on page 2-14
- "Residual Spurious Response Verification" on page 2-20
- "Displayed Average Noise Level (DANL)" on page 2-22
- "Third Order Intercept (TOI)" on page 2-23

2-2 Frequency Accuracy Verification

The following test is used to verify the CW frequency accuracy of the Spectrum Analyzer in the MS2720T Spectrum Master.

Equipment Required for MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option MS2720T/732 or MS2720T/743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz Reference source to the Anritsu MG3692x or MG3695C Synthesized Signal Source.

Note	Do not connect the external 10 MHz Reference to the Spectrum Master.

2. Turn on the 10 MHz Reference Standard and the Anritsu MG3692x or MG3695C Synthesized Signal Source.
3. Set the MG3692x or MG3695C output to 1 GHz CW, with an RF Output Level of –30 dBm.
4. Connect the output of the source to the RF Input of the Spectrum Master.
5. Turn on the Spectrum Master.

Note	Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.

6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset the instrument to the default starting conditions. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
8. Press the **Amplitude** main menu key and then press the Reference Level submenu key.
9. Use the keypad to enter –10 and select the dBm submenu key.
10. Press the **Span** main menu key, use the keypad to enter 10, and select the kHz submenu key.
11. Press the **BW** main menu key and select the RBW submenu key.
12. Use the keypad to enter 100 and select the Hz submenu key.
13. Press the VBW submenu key, use the keypad to enter 30 and then select the Hz submenu key.
14. Press the **Freq** main menu key and select the Center Freq submenu key.
15. Use the keypad to enter 1 and select the GHz submenu key.

16. Press the **Marker** main menu key, select the More submenu key, set Counter Marker to On, select the Back submenu key and select the Peak Search submenu key.
17. Verify that the marker frequency is within specification (see test record in Table A-1, "Spectrum Analyzer Frequency Accuracy" on page A-2.)
18. Set the MG3692x or MG3695C frequency to 7 GHz.
19. Set the MS2720T center frequency to 7 GHz.
20. Press the **Marker** main menu key, and select the Peak Search submenu key.
21. Verify that the marker frequency is within specification.
22. Record the results in the test records in Table A-1.

2-3 Internal Reference Frequency Adjustment

Use this procedure to adjust the frequency if the unit fails the Spectrum Analyzer Frequency Accuracy verification test.

> **Note** The MS2720T firmware must be greater than v1.10.

Equipment Required for MS2720T with option 709, 713, or 720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692x or MG3695C Synthesized Signal Source.

> **Note** Do not connect the external 10 MHz Reference to the Spectrum Master.

2. Connect the output of the MG3692x or MG3695C Synthesized Signal Source to the RF In connector of the Spectrum Master.
3. Connect the external power supply (Anritsu part number 40-168-R) to the Spectrum Master.
4. Press the **ON/OFF** key to turn on the Spectrum Master.
5. Press the Shift key, the **Preset** key (1), and then press **Preset** to reset the instrument to the default starting conditions.
6. Turn on the 10 MHz reference source and the Anritsu MG3692x or MG3695C Synthesized Signal Source.
7. On the MG3692x or MG3695C Synthesized Signal Source press the **System** key, then press the key below **Reset** to reset the instrument to the default starting conditions.

8. Set the MG3692x or MG3695C output to 7 GHz with an RF output level of –30 dBm.

Note	Before continuing, allow a 30-minute warm up for the internal circuitry to stabilize.

9. Press the **Shift** key and then the **Sweep (3)** key, and then press the Sweep Mode soft key. Select the Performance soft key to set the instrument to Performance Sweep mode.
10. Press the **Amplitude**, then the **Reference Level** keys and use the keypad to enter **–10**, and then press dBm.
11. Press **Atten Lvl** and then use the keypad to enter **0**, and then press **dB**.
12. Press **Freq**, then **Center Freq** and use the keypad to enter **7**, and then press **GHz**.
13. Press **Span** and use the keypad to enter **10**, and then press **kHz**.
14. Press **BW**, then **RBW** and use the keypad to enter **100**, and then press **Hz**.
15. Press **VBW** and use the keypad to enter **30**, and then press **Hz**.
16. Press and hold the **Shift** key and then press the **9**, **5**, and **3** keys together to enter the Spectrum Master's System Service Mode.

Note	If the above step fails, verify that the MS2720T firmware is greater than v1.10.

17. Press **Frequency Calibration** and then press **10 MHz Ref**.
18. Use the Up and Down arrow keys or the rotary knob to slowly adjust the displayed signal to the center of the display. Allow the signal to stabilize between adjustments, and repeat as necessary.

Note	For large changes, enter the value using the number pad and then press Decimal.

19. Power cycle the Spectrum Master to exit System Service Mode.

If the unit fails the Spectrum Analyzer Frequency Accuracy adjustment, replace the SPA PCB assembly.

2-4 Single Side Band (SSB) Phase Noise Verification

This test is used to verify the single side band (SSB) phase noise of the spectrum analyzer in the MS2720T Spectrum Master.

Equipment Required for MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692x or MG3695C Synthesized Signal Source.
2. Turn on the 10 MHz reference source and the Anritsu MG3692x or MG3695C Synthesized Signal Source.
3. Set the MG3692x or MG3695C output to 1.0 GHz CW with an RF output level of –2 dBm (–3 dBm for MS2720T with Option 709).
4. Connect the output of the MG3692x or MG3695C Synthesized Signal Source to the RF In connector of the Spectrum Master.
5. Turn on the Spectrum Master.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions. Press the **Shift** key, the **Sweep** (3) key, press the Sweep Mode submenu key and then the Performance submenu key.
8. Press the **Amplitude** main menu key, then press the Reference Level submenu key.
9. Use keypad to enter –2 dBm (–3 dBm for units with Option 709) and select the dBm submenu key.
10. Press the **Freq** main menu key and select the Center Freq submenu key.
11. Use the keypad to enter 1.0 and press the GHz submenu key.
12. Press the **Span** main menu key, use the keypad to enter 21, and select the kHz submenu key.
13. Press the **BW** main menu key and select the RBW submenu key.
14. Use the keypad to enter 1 and select the kHz submenu key.
15. Press the VBW submenu key and use the keypad to enter 3, then select the Hz submenu key.
16. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
17. Press the # of Averages submenu key, use the keypad to enter 3, then press the **Enter** key.
18. Wait until the Trace Count displays 3/3.
19. Press the **Marker** main menu key and select the Peak Search submenu key.
20. Press the Delta On/Off submenu key to turn Delta on.

21. Use the keypad to enter 10 and press the kHz submenu key.
22. Enter the measured value into Table A-2, "Spectrum Analyzer 1.0 GHz SSB Phase Noise Verification" on page A-2.
23. Subtract 30 dB from the average value and record the Calculated Value results in Table A-2 and verify that the result is less than the specification for 10 kHz Offset.

    For example: –70 dBc measured – 30 dB = –100 dBc/Hz
24. Press the **Span** main menu key, use the keypad to enter 210, and select the kHz submenu key.
25. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
26. Press the # of Averages submenu key, use the keypad to enter 3, then press the **Enter** key.
27. Wait until the Trace Count displays 3/3.
28. Press the **Marker** main menu key and select the Peak Search submenu key.
29. Press the Delta On/Off submenu key to turn Delta on.
30. Use the keypad to enter 100 and press the kHz submenu key.
31. Enter the measured value into Table A-2.
32. Subtract 30 dB from the average value and record the Calculated Value results in Table A-2 and verify that the result is less than the specification for 100 kHz Offset.

    For example: –70 dBc measured – 30 dB = –100 dBc/Hz
33. Press the **Span** main menu key, use the keypad to enter 2.2, and select the MHz submenu key.
34. Press the VBW submenu key and use the keypad to enter 30, then select the Hz submenu key.
35. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
36. Press the # of Averages submenu key, use the keypad to enter 3, then press the **Enter** key.
37. Wait until the Trace Count displays 3/3.
38. Press the **Marker** main menu key and select the Peak Search submenu key.
39. Press the Delta On/Off submenu key to turn on Delta.
40. Use the keypad to enter 1 and press the MHz submenu key.
41. Enter the measured value into Table A-2.
42. Subtract 30 dB from the average value and record the Calculated Value results in Table A-2 and verify that the result is less than the specification for 1 MHz Offset.

    For example: –70 dBc measured – 30 dB = –100 dBc/Hz
43. Press the **Span** main menu key, use the keypad to enter 22, and select the MHz submenu key.
44. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
45. Press the # of Averages submenu key, use the keypad to enter 3, then press the **Enter** key.
46. Wait until the Trace Count displays 3/3.
47. Press the **Marker** main menu key and select the Peak Search submenu key.
48. Press the Delta On/Off submenu key to turn on Delta.
49. Use the keypad to enter 10 and press the MHz submenu key.
50. Enter the measured value into Table A-2.
51. Subtract 30 dB from the average value and record the Calculated Value results in Table A-2 of the test records and verify that the result is less than the specification for 10 MHz Offset.

    For example: –70 dBc measured – 30 dB = –100 dBc/Hz

2-5 Spurious Response Verification (Second Harmonic Distortion)

The following test is used to verify the input related spurious response of the spectrum analyzer in the MS2720T Spectrum Master.

Equipment Required for MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 1030-96 50 MHz Low Pass Filter
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Procedure

1. Connect the 10 MHz reference source to the Anritsu MG3692x or MS3695B Synthesized Signal Source.
2. Turn on the 10 MHz reference source and the Anritsu MG3692x or MS3695B Synthesized Signal Source.
3. Set the MG3692x output to 50.1 MHz CW, with an RF Output Level of –30 dBm.
4. Connect one end of the 50 MHz Low Pass Filter to the output of the source and the other end to the MS2720T RF Input with the coaxial cable.
5. Turn on the MS2720T.
6. Press the **Shift** key and then the **Mode** (9) key. Rotate the knob to highlight Spectrum Analyzer and then press the **Enter** key to switch to Spectrum Analyzer mode.
7. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key to reset to the default starting conditions. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
8. Press the **Amplitude** main menu key and then press the Reference Level submenu key.
9. Use the keypad to enter –27 and press the dBm submenu key.
10. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
11. Press the **Freq** main menu key and select the Center Freq submenu key.
12. Use the keypad to enter 50.1 and press the MHz submenu key.
13. Press the **Span** main menu key, use the keypad to enter 100, and select the kHz submenu key.
14. Press the **BW** main menu key and select the RBW submenu key.
15. Use the keypad to enter 1 and select the kHz submenu key.
16. Press the VBW submenu key. Use the keypad to enter 10 and then select the Hz submenu key.
17. Press the **Amplitude** main menu key.
18. Press the Detection submenu key, and then the Peak submenu key.
19. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
20. Press the # of Averages submenu key, use the keypad to enter 5 and then press the **Enter** key.
21. Wait until the Trace Count displays 5/5.

22. Press the **Marker** main menu key and select the Peak Search submenu key.
23. Record the amplitude for 50.1 MHz. Use Table A-3, "Spectrum Analyzer Second Harmonic Distortion" on page A-2.
24. Press the **Freq** main menu key and select the Center Freq submenu key.
25. Use the keypad to enter 100.2 and press the MHz submenu key.
26. Press the **Shift** key and then press the **Trace** (5) key, then select the Trace A Operations submenu key.
27. Press the # of Averages submenu key, use the keypad to enter 5 and then press the **Enter** key.
28. Wait until the Trace Count displays 5/5.
29. Press the **Marker** main menu key and select the Peak Search submenu key.
30. Record the amplitude for 100.2 MHz in the test records. Use Table A-3.
31. Calculate the second Harmonic level in dBc by subtracting the 50.1 MHz amplitude from the 100.2 MHz amplitude using this formula:

    Second Harmonic Level Amplitude @ 100.2 MHz = 100.2 MHz amplitude – 50.1 MHz amplitude = _____ dBc

32. Verify that the calculated Second Harmonic Level is within the specs listed below for the applicable model under test and record in the test records. Use Table A-3.
    - For MS2720T ≤ –54 dBc

2-6 Input Related Spurious (IRS) Signals Verification

The following test is used to verify the input related spurious signals of the spectrum analyzer in the MS2720T at different frequencies.

Equipment Required for MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34KFKF50 50 ohm Adapter
- Anritsu 3670K50-2 RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Procedure

1. Connect the 10 MHz reference source to the MG3692x or MG3695C Synthesized Signal Generator.
2. Connect the output of the Signal Generator to the Spectrum Analyzer RF In connector.

1000 MHz Input Related Spurious Check

3. Set the MG3692x or MG3695C output to 1000 MHz CW, with an RF output level of –30 dBm.
4. Set the MS2720T to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
5. Press the **Amplitude** key, then press the Reference Level submenu key.
6. Use the keypad to enter –27, and press the dBm submenu key.
7. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
8. Press the Detection submenu key and the Peak submenu key.
9. Press the **Freq** key and press the Center Freq submenu key.
10. Use the keypad to enter 1000, and press the MHz submenu key.
11. Press the **Span** key, use the keypad to enter 2, and press the MHz submenu key.
12. Press the **BW** key and press the RBW submenu key.
13. Use the keypad to enter 1, and press the kHz submenu key.
14. Press the VBW submenu key and use the keypad to enter 100, then press the Hz submenu key.
15. Wait until one sweep is completed.
16. Press the **Marker** main menu key and press the Peak Search submenu key.
17. Record the Marker 1 amplitude reading for 1000 MHz into the “Measured Spur Level” column of Table A-4, “Measured Input Signal Level at 1000 MHz” on page A-3.
18. Press the **Freq** key and press the Start Freq submenu key.
19. Use the keypad to enter 719, and press the MHz submenu key.
20. Press Stop Freq submenu key, enter 721, and press the MHz submenu key.

21. Press the **Marker** main menu key and press the Peak Search submenu key.
22. Record the Marker 1 amplitude reading into the "Measured Spur Level" column of Table A-4.
23. Calculate the input related spurious level by subtracting the Marker 1 reading in Step 17 from the Marker 1 reading in Step 22. Record the result into the "Calculated IRS" column of Table A-4.
24. Verify that the calculated result is ≤ –60 dBc.

3273 MHz Input Related Spurious Check

25. Set the MG3692x or MG3695C output to 3273 MHz, with an RF output level of –30 dBm.
26. On the MS2720T, press the **Freq** key and press the Center Freq submenu key.
27. Use the keypad to enter 3273, and press the MHz submenu key.
28. Press the **BW** key and press the RBW submenu key.
29. Use the keypad to enter 10, and press the kHz submenu key.
30. Press the VBW submenu key and use the keypad to enter 1, then press the kHz submenu key.
31. Wait until one sweep is completed.
32. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.
33. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.
34. Wait until the Trace Count displays 5/5.
35. Press the **Marker** main menu key and press the Peak Search submenu key.
36. Record the amplitude at 3273 MHz into the "Measured Spur Level" column of Table A-5, "Measured Input Signal Level at 3273 MHz" on page A-3.
37. Press the **Freq** key and press the Start Freq submenu key.
38. Use the keypad to enter 2423, and press the MHz submenu key.
39. Press Stop Freq submenu key, enter 3271, and press the MHz submenu key.
40. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.
41. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.
42. Wait until the Trace Count displays 5/5.
43. Press the **Marker** main menu key and press the Peak Search submenu key.
44. Record the Marker 1 amplitude reading into the "Measured Spur Level" column of Table A-5.
45. Calculate the input related spurious level by subtracting the Marker 1 reading in Step 36 from the Marker 1 reading in Step 44. Record the result into the "Calculated IRS" column of Table A-5.
46. Verify that the calculated result is ≤ –60 dBc.
47. Repeat Step 37 through Step 45, setting a start frequency of 3275 MHz and a stop frequency of 4123 MHz.

8000 MHz Input Related Spurious Check

48. Set the MG3692x or MG3695C output to 8000 MHz, with an RF output level of –30 dBm.
49. Press the **Freq** key and press the Center Freq submenu key.
50. Use the keypad to enter 8000, and press the MHz submenu key.
51. Press the **BW** key and press the RBW submenu key.
52. Use the keypad to enter 1, and press the kHz submenu key.
53. Press the VBW submenu key and use the keypad to enter 100, then press the Hz submenu key.
54. Wait until one sweep is completed.

55. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.

56. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.

57. Wait until the Trace Count displays 5/5.

58. Press the **Marker** main menu key and press the Peak Search submenu key.

59. Record the amplitude at 8000 MHz into the "Measured Spur Level" column of Table A-6, "Measured Input Signal Level at 8000 MHz" on page A-3.

60. Press the **Freq** key and press the Start Freq submenu key.

61. Use the keypad to enter 7719, and press the MHz submenu key.

62. Press Stop Freq submenu key, enter 7721, and press the MHz submenu key.

63. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.

64. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.

65. Wait until the Trace Count displays 5/5.

66. Press the **Marker** main menu key and press the Peak Search submenu key.

67. Record the Marker 1 amplitude reading into the "Measured Spur Level" column of Table A-6.

68. Calculate the input related spurious level by subtracting the Marker 1 reading in Step 59 from the Marker 1 reading in Step 67. Record the result into the "Calculated IRS" column of Table A-6.

69. Verify that the calculated result is ≤ −60 dBc.

15000 MHz Input Related Spurious Check (for MS2720T with option 720, 732 or 743 only):

70. Set the MG3692x or MG3695C output to 15000 MHz, with an RF output level of −30 dBm.

71. Press the **Freq** key and press the Center Freq submenu key.

72. Use the keypad to enter 15000, and press the MHz submenu key.

73. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.

74. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.

75. Wait until the Trace Count displays 5/5.

76. Press the **Marker** main menu key and press the Peak Search submenu key.

77. Record the amplitude at 15000 MHz into the "Measured Spur Level" column of Table A-7, "Measured Input Signal Level at 15000 MHz" on page A-3.

78. Press the **Freq** key and press the Start Freq submenu key.

79. Use the keypad to enter 14719, and press the MHz submenu key.

80. Press Stop Freq submenu key, enter 14721, and press the MHz submenu key.

81. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations submenu key.

82. Press the # of Averages submenu key, use the keypad to enter 5, and then press the **Enter** key.

83. Wait until the Trace Count displays 5/5.

84. Press the **Marker** main menu key and press the Peak Search submenu key.

85. Record the Marker 1 amplitude reading into the "Measured Spur Level" column of Table A-7.

86. Calculate the input related spurious level by subtracting the Marker 1 reading in Step 77 from the Marker 1 reading in Step 85. Record the result into the "Calculated IRS" column of Table A-7.

87. Verify that the calculated result is ≤ −60 dBc.

2-7 Resolution Bandwidth Accuracy Verification

The following test is used to verify the resolution bandwidth accuracy of the spectrum analyzer in the MS2720T Spectrum Master.

Equipment Required for MS2720T with option MS2720T/709, MS2720T/713, or MS2720T/720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Setup

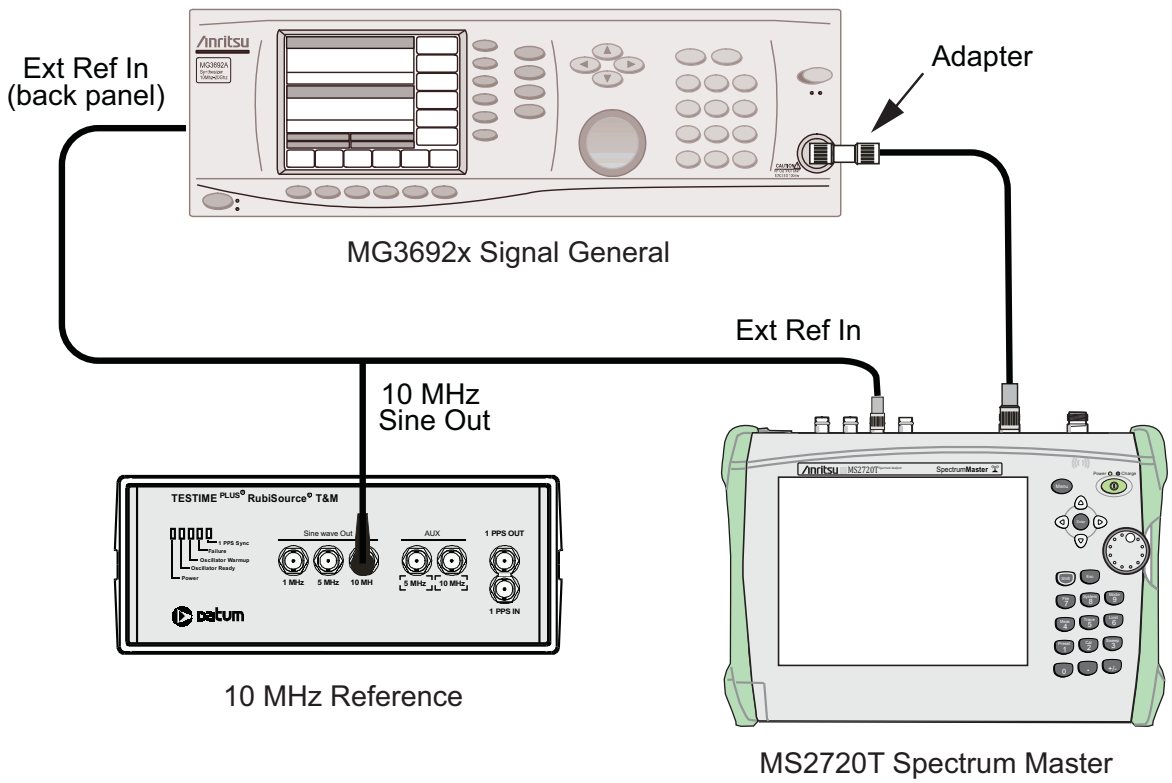


Figure 2-1. Resolution Bandwidth Accuracy Test Setup

Procedure

1. Connect the external 10 MHz Reference both to the MG3692x or MG3695C Synthesized Signal Generator and to the Spectrum Master MS2720T, as shown in Figure 2-1.
2. Set the MS2720T to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
3. Set the MS2720T as follows:

   Center Frequency: 1.0 GHz
   Reference Level: –10 dBm
   Atten Lvl: 0 dB
4. Set the MG3692x or MG3695C to 1 GHz CW, with an output level of –30 dBm. Apply the signal to the Spectrum Analyzer RF In connector of the MS2720T.
5. On the MS2720T, set the Span to 20 MHz.
6. Press the **BW** main menu key and set the RBW to 10 MHz.
7. Press the VBW submenu key set to 1 MHz.
8. Under the **Measure** menu, press (**Shift** (4), press Power and Bandwidth, press OCC BW and set it to On.
9. Press the dBc submenu key and enter 3.
10. Record the occupied bandwidth in Table A-8, "Spectrum Analyzer Resolution Bandwidth Accuracy" on page A-4 and verify that it is within specification.
11. Repeat Step 5 through Step 10 for all other settings in Table A-8 and record the occupied bandwidth in Table A-8.

2-8 Absolute Amplitude Accuracy Verification

The tests in the following two sections verify the absolute amplitude accuracy of the Spectrum Analyzer in the MS2720T Spectrum Master. The two parts of this test are "50 MHz Amplitude Accuracy Verification" immediately below and "Amplitude Accuracy Across Frequency Verification" on page 2-17.

50 MHz Amplitude Accuracy Verification

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3692x Synthesized Signal Generator (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- (2) Power Sensor, Anritsu Model SC7400
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410
- (2) Adapter, Anritsu Model 34NN50A
- Coaxial Cable, BNC(m) to BNC(m), 50 ohm
- RF Coaxial Cable, N(m) to N(f), Anritsu Model 15NNF50-1.5C

Setup

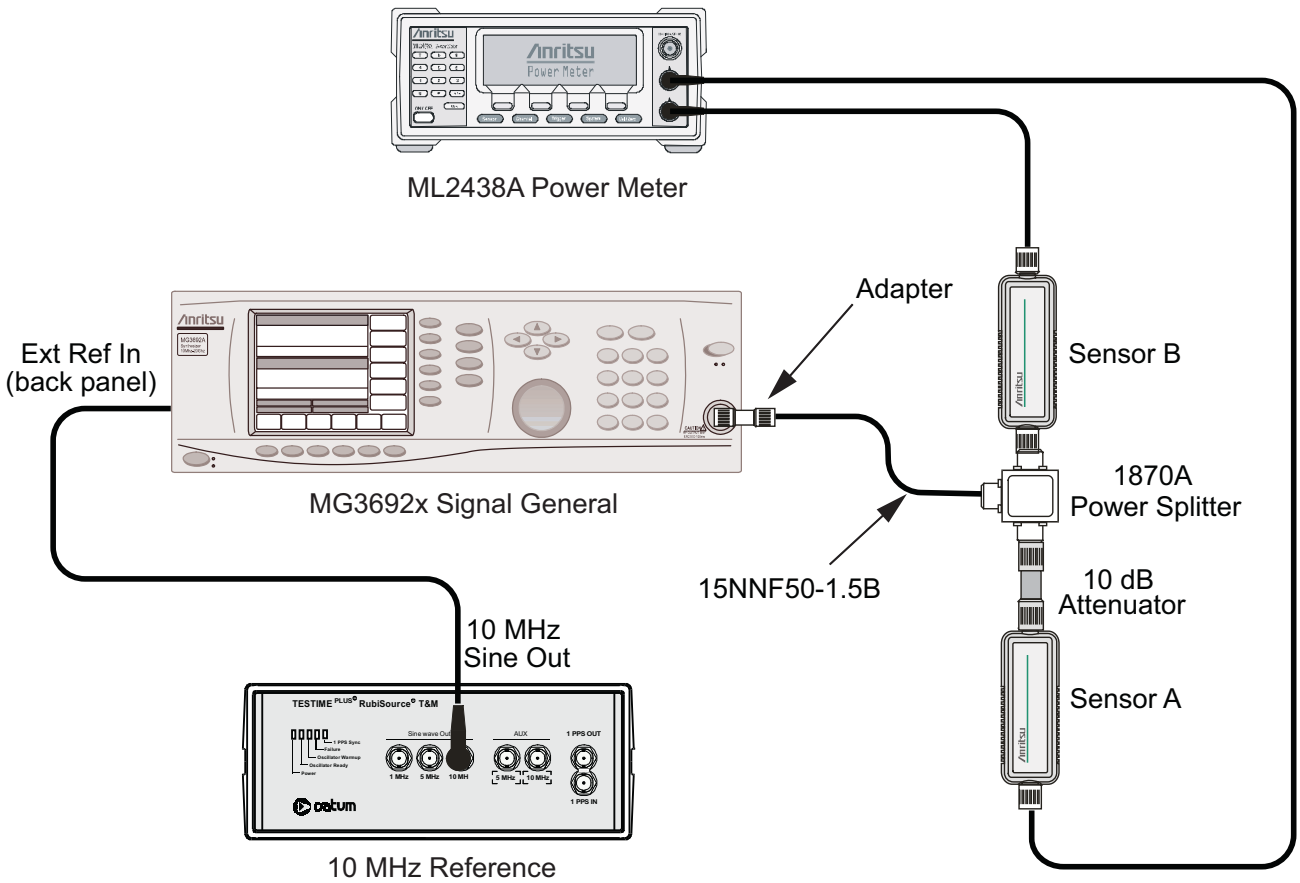


Figure 2-2. 50 MHz Amplitude Accuracy Verification for Models with N Connectors

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 K RF
- Coaxial cable, BNC(m) to BNC(m), 50 ohm
- Power Meter, Anritsu Model ML2438A
- (2) Power Sensor, Anritsu Model SC7413
- Power Splitter Anritsu Model K241C
- Fixed Attenuator, Anritsu Model 41KC-10

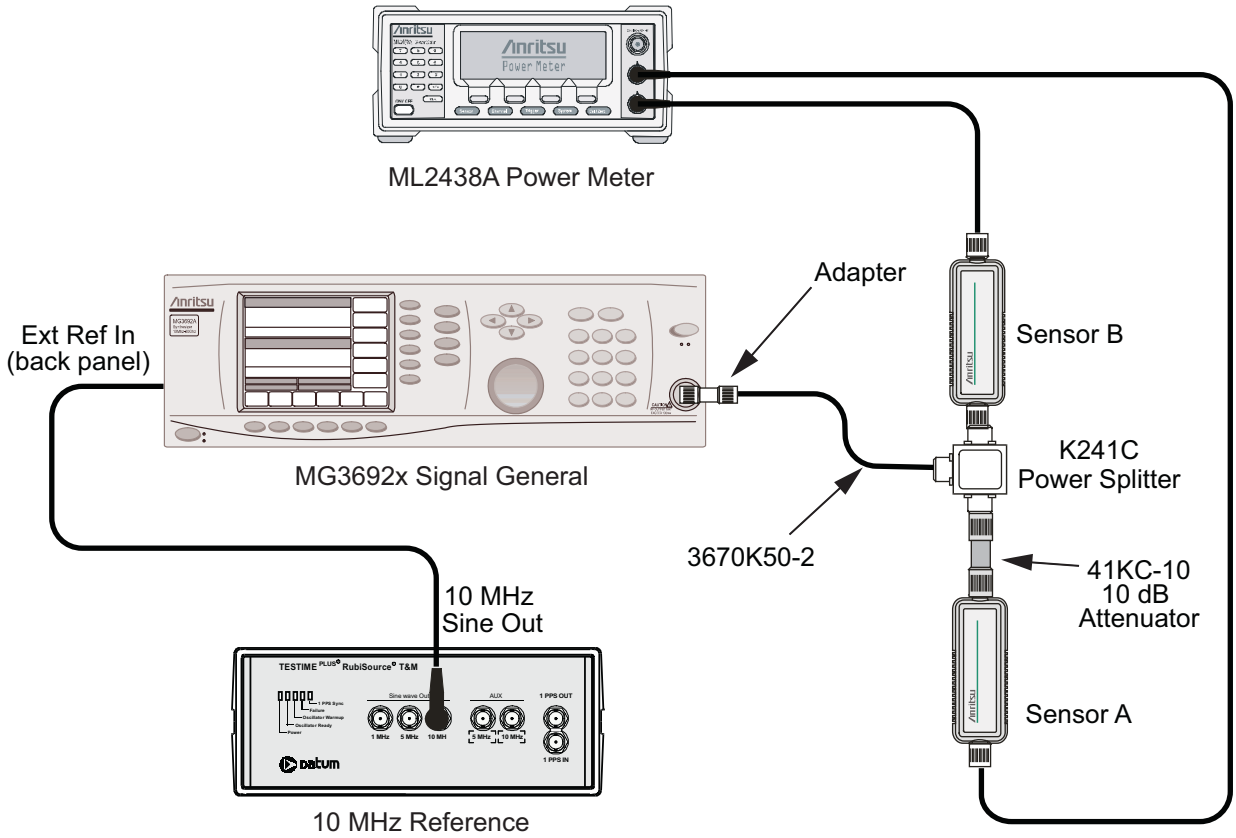


Figure 2-3. 50 MHz Amplitude Accuracy Verification for Models with K Connectors

Component Characterization

1. Connect both power sensors to the power meter, and then zero the sensors.
2. Connect the 10 MHz Reference source to the 10 MHz Ref In connector of the MG3692x or MG3695C Synthesized Signal Generator.
3. Connect the Model 1870A or K241C power splitter to the MG3692x or MG3695C output via the 34NN50A or 34VKF50 adapter, and connect Sensor B to one of the power splitter output connections (refer to Figure 2-3).
4. Install the 10 dB Fixed Attenuator to the other power splitter output, and then connect Sensor A to the end of the Attenuator.
5. Set the frequency of the MG3692x or MG3695C to 50 MHz.

6. Set the power meter to display both Channel A and Channel B. Press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter the value matching the frequency of MG3692x or MG3695C as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Repeat for Channel B. Press the **System** key to display the power reading.
7. Adjust the power level of the MG3692x or MG3695C to get a reading on Sensor A that matches the test power level in the first column of Table A-9, "Characterization Chart for 50 MHz Amplitude Accuracy Verification" on page A-5.
8. Record the Sensor B reading in the "Required Sensor B Reading" column of Table A-9.
9. Repeat Step 7 and Step 8 for the other power levels in the first column of Table A-9, and record the Sensor B readings in the second column.

Note	Before continuing, allow a 30 minute warm-up period for the internal circuitry to stabilize. The listed Amplitude Accuracy specifications in Appendix A apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Measuring the Unit for 50 MHz Amplitude Accuracy

1. Connect the equipment as shown in Figure 2-4, disconnecting Sensor A from the Attenuator, and connecting the RF In port of the MS2720T to the splitter output via the Attenuator.

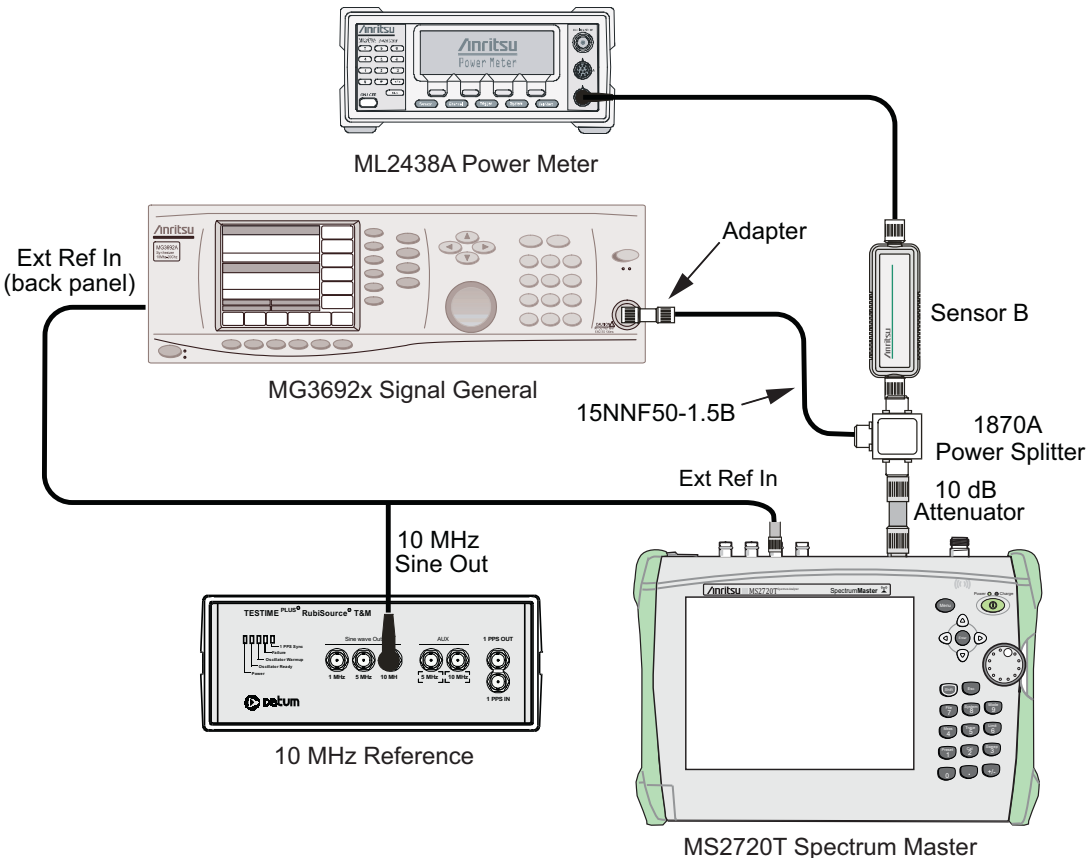


Figure 2-4. 50 MHz Amplitude Accuracy Verification, Test Setup

Note	To maintain test setup integrity, do not disconnect Sensor B, the power splitter, or the fixed attenuator.

2. Set the MS2720T to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key, and then the Performance submenu key.
3. Set the MS2720T center frequency to 50 MHz.
4. Set the span to 10 kHz.
5. Press the **BW** main menu key and set the VBW to 10 Hz.
6. Set the RBW to 1 kHz.
7. Press the **Amplitude** main menu key and set the Reference Level to 10 dBm.
8. Set the Atten Lvl to 30 dB.
9. Adjust the MG3692x or MG3695C power level so that the power meter Sensor B matches the Sensor B value (Required Sensor B Reading) that is shown on the characterization chart (Table A-9) that was used in the previous section,"Component Characterization" on page 2-15.
10. Press the **Marker** main menu key and press the Peak Search submenu key.
11. Record the Marker 1 amplitude reading into the "Measured Reading" column of Table A-10, "50 MHz Amplitude Accuracy Verification, Specification = ± 1.3 dB" on page A-5.
12. Repeat Step 9 to Step 11 for each Input Power Level in Table A-10, change the "Reference Level" and "Atten Lvl" settings as required. for the other power levels in Table A-10.

Amplitude Accuracy Across Frequency Verification

This procedure is the second test used to verify the absolute amplitude accuracy of the Spectrum Analyzer in the MS2720T Spectrum Master. The first procedure test is described above in "50 MHz Amplitude Accuracy Verification" on page 2-14.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3692x Synthesized Signal Generator (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- (2) Power Sensor, Anritsu Model SC7400
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410
- (2) Adapter, Anritsu Model 34NN50A
- Coaxial Cable, BNC(m) to BNC(m), 50 ohm
- RF Coaxial Cable, N(m) to N(f), Anritsu Model 15NNF50-1.5C

Equipment Required for MS2720T with option 732 or 743

- Anritsu MG3695C Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34VKF50 50 ohm Adapter
- Anritsu 3670K50-2 K RF Coaxial Cable
- BNC male to BNC male Coaxial Cable
- Power Meter, Anritsu Model ML2438A
- (2) Power Sensor, Anritsu Model SC7413
- Power Splitter Anritsu Model K241C

- Fixed Attenuator, Anritsu Model 41KC-10

Component Characterization

1. Connect both of the power sensors to the power meter and zero the sensors.
2. Connect the equipment as shown in Figure 2-2 on page 2-14.
3. Set the MG3692x Frequency to 100 kHz.
4. Set the power meter to display both Channel A and Channel B. Press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter the value matching the frequency of MG3692x or MG3695C as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the MG3692x or MG3695C output level so that the Sensor A reading is –2 dBm ± 0.1 dB or –5 dBm ± 0.1 dB.
6. Record the Sensor B reading into the "–2 dBm" or "–5 dBm" column in Table A-11, "Characterization Chart for Fixed Level with Varying Frequency" on page A-6.
7. Adjust the MG3692x or MG3695C output level so that the Sensor A reading is –30 dBm ± 0.1 dB.
8. Record the Sensor B reading into the "–30 dBm" column in Table A-11.
9. Repeat Step 3 through Step 8 for all of the frequencies that are listed in Table A-11 that are pertinent to the model you are verifying as indicated below.
   - Up through 8950.1 MHz for MS2720T with option 709
   - Up through 12999.99 MHz for MS2720T with option 713
   - Up through 18030.1 MHz for MS2720T with option 720
   - Up through 31999.1 MHz for MS2720T with option 732
   - Up through 39999.1 MHz for MS2720T with option 743

Note	Before continuing, allow a 30 minute warm-up for the internal circuitry to stabilize. The listed Amplitude Accuracy specifications in Appendix A apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Measuring Amplitude Accuracy Across Frequency

Procedure

1. Connect the equipment as shown in Figure 2-2 on page 2-14.

Note	To maintain test setup integrity, Do Not Disconnect Sensor B, the power splitter, or the fixed attenuator.

2. Set the MS2720T to Spectrum Analyzer mode and then preset the Spectrum Master. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key, and then the Performance submenu key.
3. Press the **BW** main menu key. Then set the RBW to 1 kHz, and set the VBW to 10 Hz.
4. Press the **Span** main menu key, set the span to 10 kHz.
5. Set the MG3692x or MG3695C frequency to 100 kHz CW.
6. Set the MG3692x or MG3695C output to –20 dBm.

7. Set the power meter to display Channel B. Press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter the value matching the frequency of MG3692x or MG3695C as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Adjust the MG3692x or MG3695C output power so that the power meter displays a reading that matches the Sensor B reading for –30 dBm in Table A-11**.**
9. On the MS2720T, press the **Amplitude** main menu key, then set the Reference Level to –20 dBm.
10. Press the **Freq** main menu key and press the Center Freq submenu key.
11. Enter 100 kHz (or the next frequency).
12. Press the **Amplitude** main menu key, then set the Atten Lvl to 0 dB.
13. Press the **Marker** main menu key and press the Peak Search submenu key.
14. Record the Marker 1 amplitude reading (in units of dBm) into Table A-12.
15. Verify that the Marker 1 amplitude reading is within the specification.
16. Repeat Step 12 through Step 14 for Attenuation Levels of 5 dB, 10 dB, and 20 dB.
17. Adjust the MG3692x or MG3695C output power so that the power meter displays a reading that matches the Sensor B reading for –2 dBm or –5 dBm in Table A-11**.**
18. On the MS2720T, press the **Amplitude** main menu key, then set the Reference Level to 10 dBm.
19. Repeat Step 12 through Step 14 for Attenuation Levels of 30 dB, 40 dB, 50 dB, and 60 dB.
20. Repeat Step 5 through Step 19. Set the MG3692x or MG3695C frequency to each of the frequencies in Table A-12, “Verification at 100 kHz, Specification = ± 1.3 dB” on page A-8 through Table A-57, “Verification at 39999.1 GHz, Specification = ± 2.3 dB” on page A-30.
21. Stop at the applicable frequency for the model under test as listed below:
    - 8950.1 MHz for MS2720T with option 709 (Table A-23)
    - 12999.99 MHz for MS2720T with option 713 (Table A-28)
    - 18030.1 MHz for MS2720T with option 720 (Table A-33)
    - 31999.99 MHz for MS2720T with option 732 (Table A-48)
    - 39999.1 MHz for MS2720T with option 743 (Table A-57)

2-9 Residual Spurious Response Verification

The following two tests are used to verify the residual spurious response of the Spectrum Analyzer of the MS2720T Spectrum Master and is performed using the positive peak detection mode. The two parts to this test are the "Residual Spurious Response Test with Preamp Off" immediately below and the "Residual Spurious Response Test with Preamp On" on page 2-21.

Residual Spurious Response Test with Preamp Off

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu 28N50-2 50 ohm Termination

Equipment Required for MS2720T with option 732 or 743

- Anritsu 28KF50 50 ohm Termination

Procedure

1. Connect the 50 ohm termination to the Spectrum Analyzer RF In connector.
2. Set the MS27xC to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
3. Press the **Amplitude** key, then press the Reference Level submenu key.
4. Use the keypad to enter –40 and press the dBm submenu key.
5. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
6. Confirm that the Pre Amp On/Off submenu key is in the Off position. If the preamp is On, then press the Pre Amp On/Off submenu key to turn it Off.
7. Press the Detection submenu key and then the Peak submenu key.
8. Press the **Freq** main menu key and press the Start Freq submenu key.
9. Use the keypad to enter 9, and press the kHz submenu key.
10. Press the Stop Freq submenu key, enter 100, and press the kHz submenu key.
11. Press the **BW** main menu key and press the RBW submenu key.
12. Use the keypad to enter 300, and press the Hz submenu key.
13. Press the VBW submenu key and use the keypad to enter 10, then press the Hz submenu key.
14. Wait until one sweep is completed.
15. Press the **Marker** main menu key and press the Peak Search submenu key.
16. Record the Marker 1 amplitude reading and verify that it is ≤ –90 dBm in Table A-58, "Spectrum Analyzer Residual Spurious (Preamp Off)" on page A-31.

Note	If a spur with an amplitude larger than –90 dBm occurs, wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

17. Repeat Step 8 through Step 16 for the other Start and Stop frequencies with the RBW and VBW as listed in Table A-58 and verify that the readings are within the listed specifications. Note to stop at the applicable frequency limit of the model under test as listed below:
    - 9 GHz for MS2720T with option 709
    - 13 GHz for MS2720T with option 713
    - 20 GHz for MS2720T with option 720
    - 32 GHz for MS2720T with option 732
    - 43 GHz for MS2720T with option 743

Residual Spurious Response Test with Preamp On

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu 28N50-2 50 ohm Termination

Equipment Required for MS2720T with option 732 or 743

- Anritsu 28KF50 50 ohm Termination

Procedure

1. Connect the 50 ohm termination to the Spectrum Analyzer RF In connector.
2. Set the MS2720T to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
3. Press the **Amplitude** key, then press the Reference Level submenu key.
4. Use the keypad to enter –50 and press the dBm submenu key.
5. Press the Atten Lvl submenu key and enter 0, then press the dB submenu key.
6. Ensure that the Pre Amp On/Off submenu key is in the On position. If the preamp is Off, then press the Pre Amp On/Off submenu key to turn it On.
7. Press the **Shift** key and then press the **Sweep** (3) key, then press Detection and then the Peak submenu key.
8. Press the **BW** main menu key and press the RBW submenu key.
9. Use the keypad to enter 3, and press the kHz submenu key.
10. Press the VBW submenu key and use the keypad to enter 300, then press the Hz submenu key.
11. Press the **Freq** main menu key, and press the Start Freq submenu key.
12. Use the keypad to enter 1, and press the MHz submenu key.
13. Press the Stop Freq submenu key, enter 30, and press the MHz submenu key.
14. Wait until one sweep is completed.
15. Press the **Marker** main menu key, and press the Peak Search submenu key.
16. Verify that the Marker 1 amplitude reading is ≤ –100 dBm and record it in Table A-59, “Spectrum Analyzer Residual Spurious (Preamp On)” on page A-31.

Note	If a spur with an amplitude larger than –100 dBm occurs, wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

17. Repeat Step 8 through Step 16 for the other Start and Stop frequencies with the RBW and VBW as listed in Table A-59. Note to stop at the applicable frequency limit of the model under test as listed below:
    - 9 GHz for MS2720T with option 709
    - 13 GHz for MS2720T with option 713
    - 20 GHz for MS2720T with option 720
    - 32 GHz for MS2720T with option 732
    - 43 GHz for MS2720T with option 743

2-10 Displayed Average Noise Level (DANL) Verification

The following test is used to verify the Displayed Average Noise Level (DANL) of the spectrum analyzer systems in the MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu 28N50-2 50 ohm Termination

Equipment Required for MS2720T with option 732 or 743

- Anritsu 28KF50 50 ohm Termination

Preamp On Procedure

1. Connect the 28N50-2 or 28KF50-2 50 ohm termination to the MS2720T Spectrum Analyzer RF In.
2. Set the MS2720T to Spectrum Analyzer mode and then preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
3. Press the **Amplitude** main menu key and set Atten Lvl to 0 dB and Reference Level to –50 dBm.
4. Press the Pre Amp On/Off submenu key to turn it On.
5. Press the Detection submenu key, then press RMS/Avg (red dot appears on the RMS/Avg label).
6. Press the **BW** main menu key and select RBW of 1 MHz. Press the VBW submenu key and select VBW of 1 kHz. Toggle the VBW/Average Type submenu key and ensure Log is selected.
7. Press the Freq submenu key and enter into the MS2720T the Start and Stop frequencies from Table A-60, “Spectrum Analyzer DANL (Preamp On)” on page A-32.
8. Wait until one sweep has been completed.
9. Press the **Marker** main menu key, and press Peak Search.
10. Record the marker reading in the “Measured dBm (MHz RBW)” column in Table A-60.
11. Repeat Step 7 through Step 10 for the preamp On measurements, using the Start and Stop frequencies listed in Table A-60.
12. For each measured 1 MHz value inTable A-60, convert the value to 1 Hz RBW value by subtracting 60 dB. (For example, if the marker shows a value of –105 dBm at 1 MHz RBW, then the calculated value at 1 Hz RBW is –165 dBm.) Enter the calculated values in Table A-60. Example equation:

```
(10 * Log( Ref RBW / Convert RBW) / Log(10))
Where Ref RBW is 1 Hz and the Convert RBW is 1,000,000 Hz
(–105 dBm) – (60 dB) = –165 dBm (For 1 MHz RBW)
(–105 dBm) – (64.7712 dB) = –164.7712 dBm (For 3 MHz RBW)
```

Preamp Off Procedure

13. Press the **Amplitude** main menu key.
14. Set Reference Level to –20 dBm, and ensure the preamp is set to Off.
15. Repeat Step 7 through Step 12 for the preamp Off measurements, using Start and Stop frequencies that are listed in Table A-61, “Spectrum Analyzer DANL (Preamp Off)” on page A-33.
16. Enter the Measured dBm and calculated 1 Hz RBW values in Table A-61.
17. Stop at the applicable frequency limit of the model under test as listed below:
    - 8 GHz for MS2720T with option 709
    - 13 GHz for MS2720T with option 713
    - 18 GHz for MS2720T with option 720

- 32 GHz for MS2720T with option 732
- 43 GHz for MS2720T with option 743

2-11 Third Order Intercept (TOI) Verification

The following test verifies the Third Order Intercept point (also known as TOI or IP3) of the spectrum analyzer in Spectrum Master Model MS2720T.

2400 MHz TOI Test

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3692x Synthesized Signal Generator (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Adapter, Anritsu Model 34NN50A
- Spectrum Master: MS2720T
- Power Meter, Anritsu Model ML2438A
- Signal Generator, Agilent Model 8648D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Power Sensor, Anritsu Model MA2442D (10 MHz to 18 GHz, –67 dB to +20 dB)
- Fixed Attenuator, Aeroflex/Weinschel Model 442
- Fixed Attenuator, Aeroflex/Weinschel Model 446
- Fixed Attenuator, Aeroflex/Weinschel Model 4420
- RF Coaxial Cable, N(m) to N(f), Anritsu Model 15NNF50-1.5C (3)

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

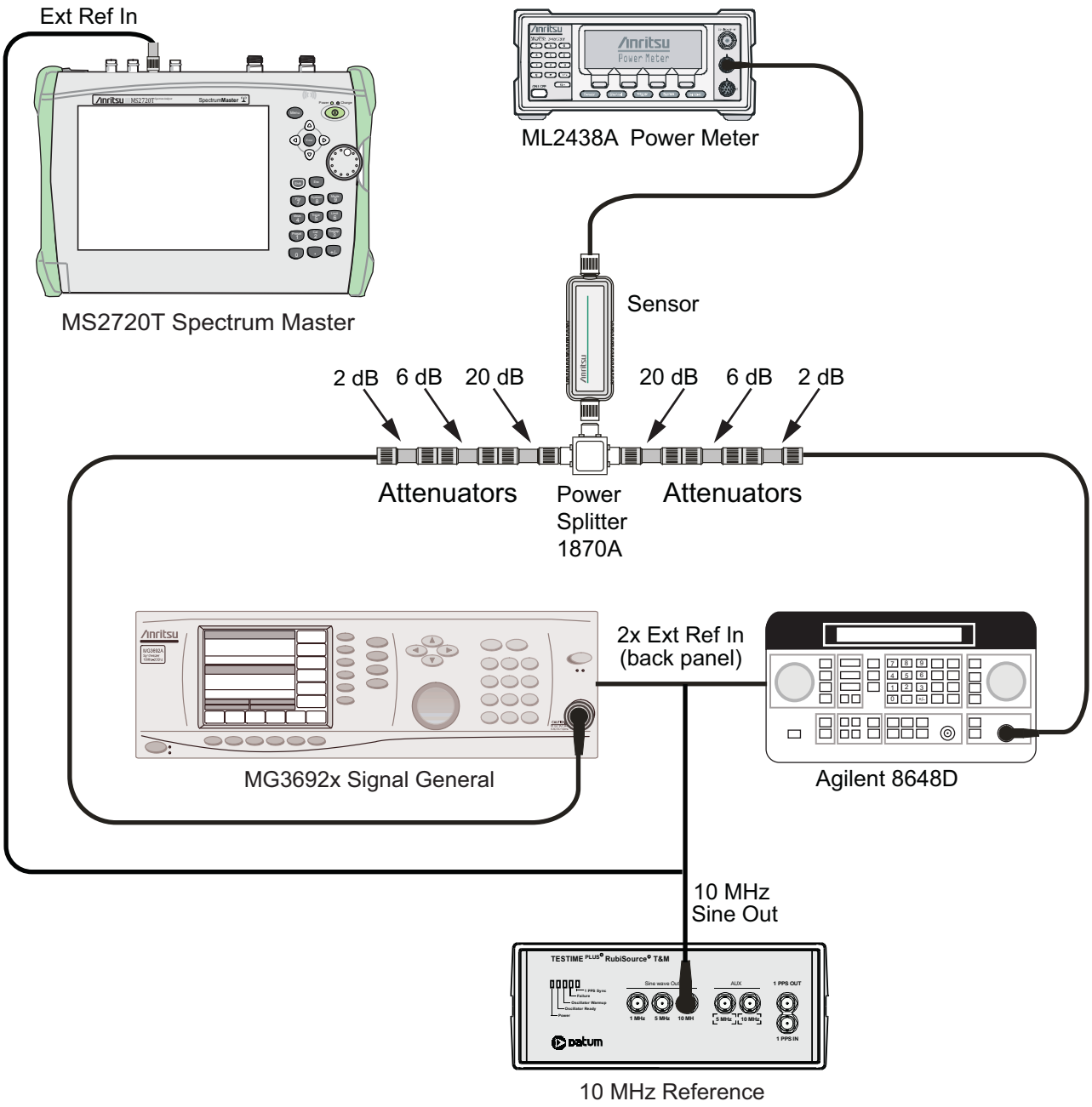


Figure 2-5. 2400 MHz TOI Verification Characterization, Component Characterization Setup

Procedure

1. Connect the equipment as shown in Figure 2-5. The splitter will be used as an RF combiner (the normal RF outputs will become inputs, and the normal input will become the RF output).
2. Set the MG3692x Synthesized Signal Generator to 2399.951 MHz CW, and set the Agilent 8648D Signal Generator to 2400.051 MHz.
3. Set the Agilent 8648D Signal Generator RF to OFF ("RF OFF" appears on the right side of the display).
4. On the ML2438A power meter, zero the sensor and set the calibration factor to 2.4 GHz.
5. Connect the power sensor to the splitter output and adjust the power of the MG3692x so that –20 dBm appears at the splitter output (approximately +16 dBm).
6. Turn Off the RF of the MG3692x Synthesized Signal Generator.
7. On the Agilent 8648D Signal Generator, turn the RF On, and adjust the RF amplitude so that –20 dBm appears at the splitter output (approximately +16 dBm).
8. Set the MS2720T to Spectrum Analyzer mode and then Preset the instrument. Press the **Shift** key, the **Sweep** (3) key, Sweep Mode submenu key and then the Performance submenu key.
9. Set the MS2720T as follows:

   Center Frequency: 2400.151 MHz
   Span: 100 Hz
   RBW: 30 Hz
   VBW: 1 Hz
   Reference Level: –15 dBm
   Atten Lvl: 0 dB
   Preamp: Off

10. Press the **Shift** key and the **Sweep** (3) key. Press Detection, and press RMS (a red dot appears on the label).
11. Disconnect the power sensor from the output of the splitter and connect the splitter output to the MS2720T Spectrum Analyzer RF In connector through the Anritsu Model 34NN50A or 71693-R adapter (Figure 2-6 on page 2-26).
12. Turn On the RF of the MG3692x and the 8648D.
13. Press the **Shift** key and then the **Trace** (5) key. Press Trace A Operations, and set # of Averages to 2.
14. After two sweeps have occurred (Trace Count 2/2 appears on the left of the display), turn on a marker, and press Peak Search. Record the amplitude of the signal at 2400.151 MHz in Table A-62, "Spectrum Analyzer Third Order Intercept" on page A-33.
15. Change the Center Frequency of the MS2720T to 2399.851 MHz. Record the amplitude of this signal in Table A-62.
16. Determine which signal is larger (the 2399.851 MHz signal or the 2400.151 MHz signal). Use the larger value for max in the following formula to calculate the TOI for 2400 MHz (refer to the example calculation below the formula):

    `TOI = -20 + [(-20 - max) / 2] dBm`

    Example: Assume `max = -90 dBm`

    Then: `TOI = -20 + [(-20 - (-90))/2] = +15 dBm`

17. Record the calculated 2400 MHz TOI measurement in Table A-62.

.

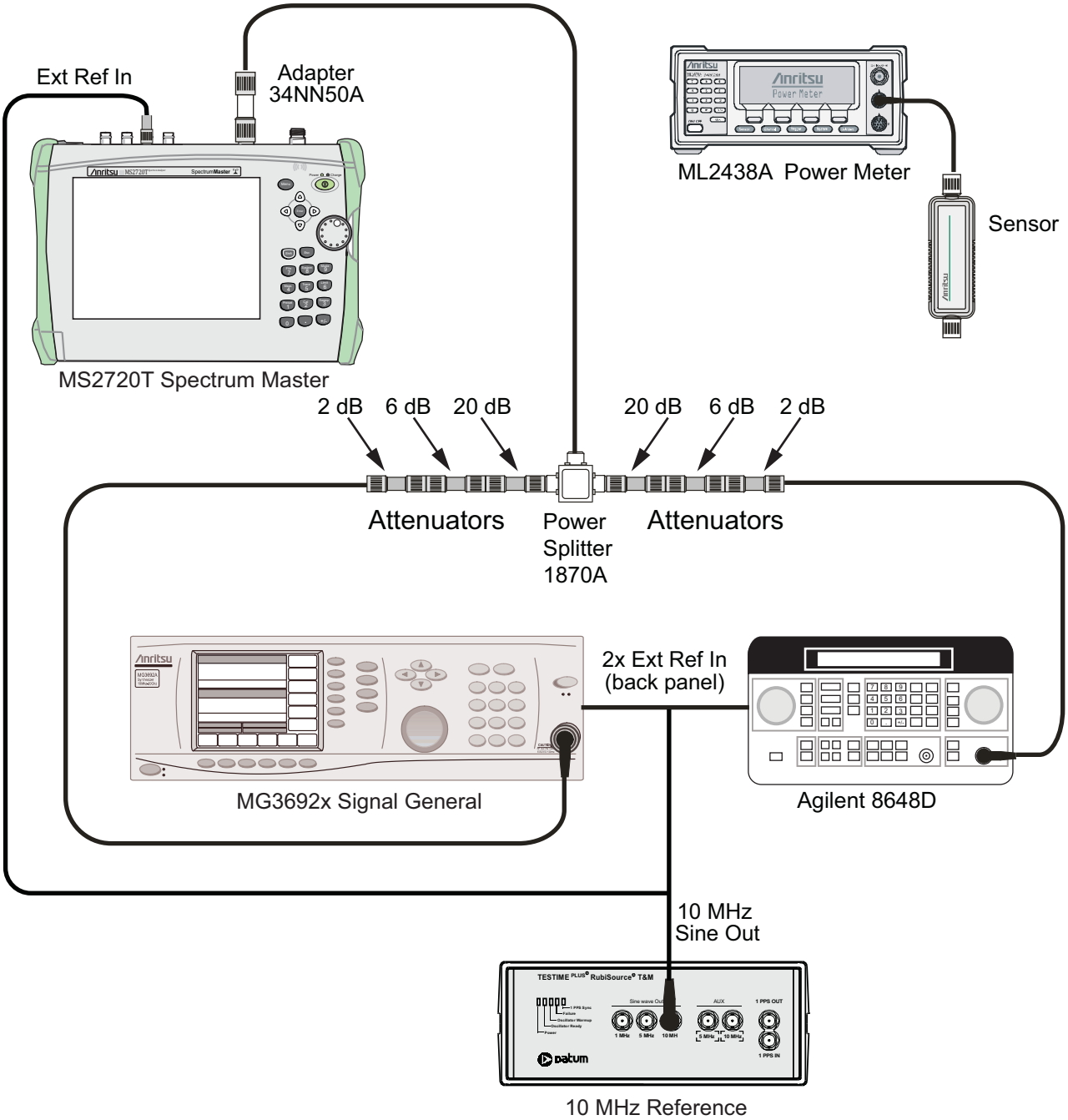


Figure 2-6. 2400 MHz TOI Verification, Test Setup

Chapter 3 — Options Verification

3-1 Introduction

This chapter describes the verification process for all of the options that are available for the MS2720T Spectrum Master. The following tests are in this chapter:

- "Option 31, GPS Frequency Accuracy Verification" on page 3-2
- "Option 809, 813 or 820 Tracking Generator Verification" on page 3-5
- "Option 880, GSM/GPRS/EDGE Signal Analyzer Verification" on page 3-7
- "Option 881 WCDMA/HSDPA Signal Analyzer Verification" on page 3-12
- "Option 882, TDSCDMA Signal Analyzer Option Verification" on page 3-23
- "Option 883, LTE Signal Analyzer Verification" on page 3-25
- "Option 883, TD-LTE Signal Analyzer Verification" on page 3-29
- "Option 884, CDMA Signal Analyzer Verification" on page 3-34
- "Option 884, EVDO Signal Analyzer Option Verification" on page 3-37
- "Option 885, Fixed WiMAX Signal Analyzer Verification" on page 3-41
- "Option 885, Mobile WiMAX Signal Analyzer Verification" on page 3-45

3-2 Option 31, GPS Frequency Accuracy Verification

The following test verifies the Spectrum Analyzer Frequency Accuracy with GPS (Option 31) in the model MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3692x Synthesized Signal Source (see equipment list for required options)
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34RKNF50 50 ohm Adapter
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable
- GPS Antenna, Anritsu 2000-1528-R

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

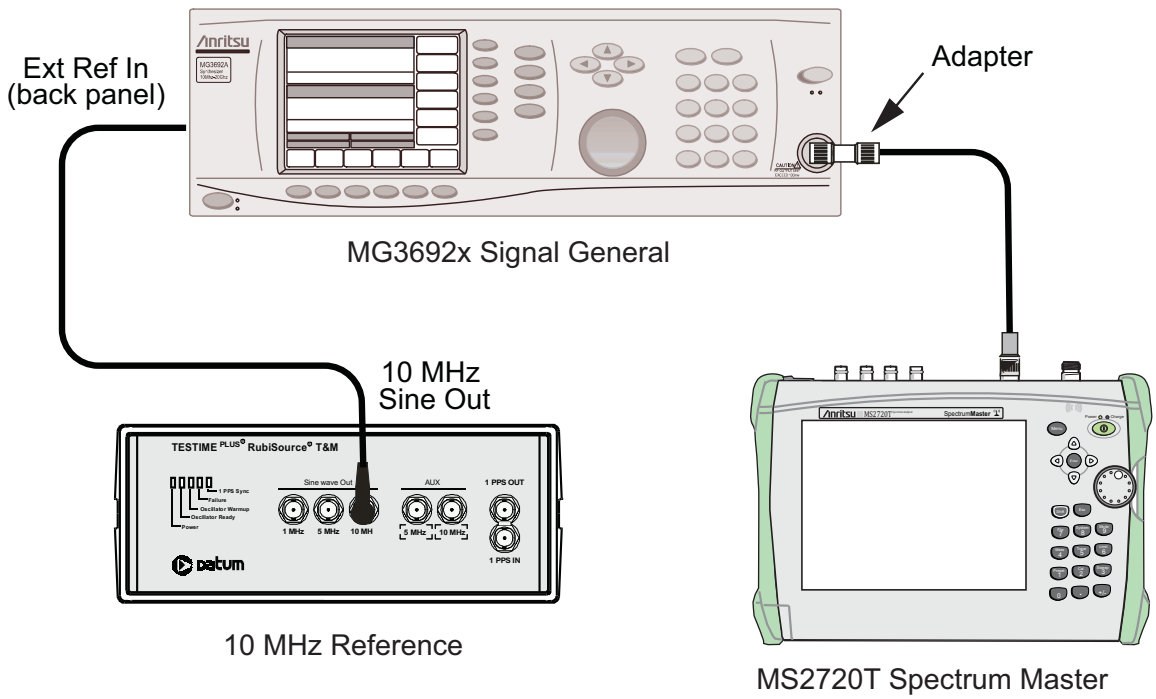


Figure 3-1. Frequency Accuracy Verification by Synthesized Signal Generator

Setup Procedure

1. Connect the GPS antenna to the GPS Antenna connector on the MS2720T.

Note	If a fixed GPS antenna is not available, the Anritsu 2000-1528-R GPS antenna can be used for this test. Ensure that the Anritsu 2000-1528-R GPS antenna is in a direct line of sight relationship to the satellites or that the antenna is placed outside with no obstructions.

2. Press the **Shift** key and then the **System** (8) key.
3. Press the GPS submenu key, then press the GPS On/Off submenu key to turn on the GPS.
4. When the GPS fix is acquired, the GPS indicator at the top of the LCD display turns green. The latitude and the longitude are displayed next to the GPS indicator.
5. After about three minutes, the Reference Source indicator in the lower left corner of the LCD display changes to *GPS High Accy*.
6. If the GPS fix is acquired using the Anritsu 2000-1528-R GPS antenna outside, then bringing the instrument inside causes a loss of satellite tracking. A red cross appears on the green GPS indicator, and the Reference Source indicator changes to *Int Hi Accy*.

Note The following test can be used to verify frequency accuracy to either specification.

Test Procedure

1. Connect the external 10 MHz Reference to the Anritsu MG3692x Synthesized Signal Generator.

Note Do not connect the external 10 MHz Reference to the MS2720T Spectrum Master.

2. Connect the output of the Synthesized Signal Generator to the Spectrum Analyzer RF In of the MS2720T, as shown in Figure 3-1.
3. On the MS2720T, change the mode to Spectrum Analyzer and preset the instrument.
4. Select Sweep (Shift-3), select Sweep Mode, select Performance.
5. Set the MG3692x output to 7 GHz CW, with an RF output level of –30 dBm.
6. On the MS2720T, press the **Amplitude** main menu key, and set the Ref Lvl to –10 dBm.
7. Press the **Freq** main menu key and set the Center Freq to 7.0 GHz.
8. Press the **Span** main menu key and set the Span to 10 kHz.
9. Press the **BW** main menu key and set RBW to 100 Hz.
10. Press the VBW submenu key and set VBW to 30 Hz.
11. Press the **Marker** main menu key, press the More submenu key, then set Counter Marker to On and press the Back key.
12. Press the Peak Search submenu key.
13. Note the Reference Source display and use the appropriate row to record the data in the following steps.
14. Record the marker frequency into the "Measured Value" column of Table A-63, "Option 31, GPS Receiver Frequency Accuracy" on page A-34.
15. Subtract the marker value from 7 GHz, record the result into the Error column of Table A-63, and verify that it is within specification.
16. If the value of Reference Source indicates *GPS High Accuracy*, then remove the GPS antenna and wait until the Reference Source indicates *Int Hi Accy* and repeat Step 11 through Step 15 if necessary.

GPS Option Bias-Tee Voltage Verification (Option 31)

The following test verifies the GPS Antenna Bias-Tee Voltages of Option 31 in the model MS2720T Spectrum Master.

Equipment Required for MS2720T

- Adapter SMA to BNC(f), Pomona 4290 or equivalent
- Adapter GPS Terminator, Amphenol B1004A1-ND3G-93R-0.05-1W or equivalent

Procedure

1. Connect the external power supply (Anritsu PN 40-168-R) to the MS2720T Spectrum Master.
2. Press the **On/Off** key to turn on the MS2720T.
3. Set the MS2720T to Spectrum Analyzer mode and preset the instrument.
4. Press the **Shift** key, and then the **System** (3) key.

3.3 V Test

5. Connect the 4290 Adapter to the GPS Antenna SMA connector.
6. Connect the GPS Terminator to the 4290 Adapter.
7. Ensure the 3.3V setting on the GPS Voltage submenu key is selected (underlined)
8. Turn GPS On by toggling the GPS submenu key so that the On text is underlined.
9. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the "Measured Current Value" column of Table 3-1, "Option 31, GPS Receiver Bias-Tee Verification" on page 3-4 and verify that it is within specification.

5V Test

10. Press the **Escape** key to dismiss the GPS Info dialog box.
11. Press the GPS Voltage submenu key and select 5V.
12. Select the GPS Info submenu key. Record the GPS Antenna Current reading in the "Measured Current Value" column of Table 3-1 and verify that it is within specification.

Table 3-1. Option 31, GPS Receiver Bias-Tee Verification

Voltage	Measured Current Value	Specification
3.3 V	mA	32 mA ±15% (27.2 mA to 36.8 mA)
5.0 V	mA	55.6 mA ±15% (47.3 mA to 63.9 mA)

3-3 Option 809, 813 or 820 Tracking Generator Verification

The tests in this section verify the performance of the built-in tracking generator in the Model MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709 and 809 or 713 and 813 or 720 and 820

- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2442D
- Frequency Counter, Anritsu Model MF2412B

Setup

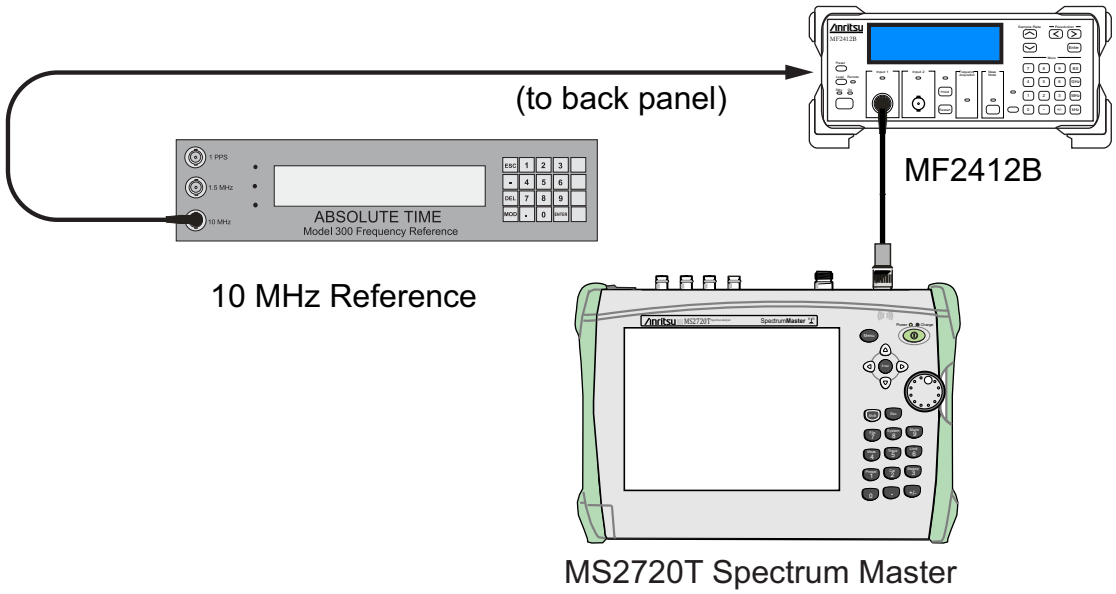


Figure 3-2. Tracking Generator Frequency Verification

Tracking Generator Frequency Accuracy Verification

1. Connect the external 10 MHz Reference to the frequency counter. Do not connect the external 10 MHz signal to the MS2720T.
2. Connect the frequency counter to the Generator RF Output connector of the MS2720T.
3. Set the MS2720T to Spectrum Analyzer mode and then preset the instrument.
4. Press **Shift**, then press the **Measure** (4) key, and then press Generator.
5. Ensure CW Frequency is 1.000 GHz.
6. Press the Output Power soft key to set the tracking generator to 0 dBm.
7. Ensure the Generator Mode is set to CW.
8. Press Generator Output to toggle the tracking generator ON.
9. Record the frequency of the tracking generator in the "Table A-64, "Tracking Generator Frequency Accuracy" on page A-34
10. Verify that the frequency is within specification.
11. Repeat Steps 4 through 10 for the next frequency in Table A-64.

Tracking Generator Power Accuracy Verification

Setup

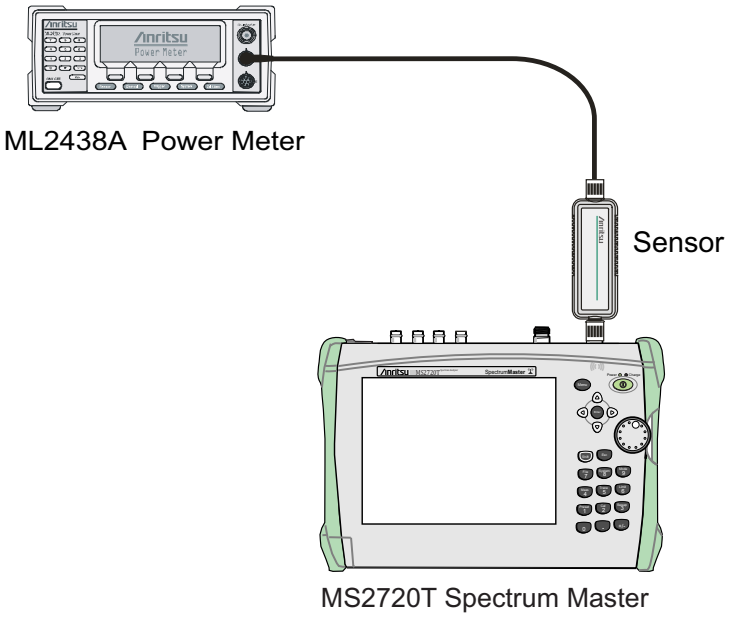


Figure 3-3. Tracking Generator Power Verification

Setup

1. Install the MA2442D power sensor to the power meter and calibrate the sensor.
2. Connect the MA2442D power sensor to the Generator RF Output connector of the MS2720T.
3. Set the sensor calibration factor frequency to 50 MHz.
4. Set the MS2720T to Spectrum Analyzer mode and then preset the instrument
5. Press **Shift**, then press the **Measure** (4) key, and then press Generator.
6. Ensure the Generator Mode is set to CW.
7. Press the Output Power soft key to set the tracking generator to 0 dBm.
8. Press CW Frequency and enter 50 MHz.
9. Press Generator Output to toggle the tracking generator ON.
10. Record the power sensor reading into the "Measured Power" column of Table A-65, "Tracking Generator Level Accuracy" on page A-34
11. Verify that the sensor reading is within specification.
12. Reduce the Output Power (Test Level) setting of the tracking generator to the next power level in Table A-65 on page A-34.
13. Repeat the power measurement for every Output Power (Test Level) in Table A-65.
14. Change the MS2720T CW Center Frequency to match the Frequency in the next test record in Appendix A, which is Table A-65, "Tracking Generator Level Accuracy" on page A-34.
15. Set the power sensor calibration factor frequency to the same frequency.
16. Repeat the measurements for all frequencies and power levels shown in the test records of Table A-65, for units with Option 809 the last test point is at 8950 MHz @ -40 dBm, for units with Option 813 the last test point is at 12950 MHz @ -40 dBm and for units with Option 820 the last test point is at 17950 MHz @ -40 dBm.

3-4 Option 880, GSM/GPRS/EDGE Signal Analyzer Verification

The tests in this section verify the optional GSM/GPRS/EDGE Signal Analyzer functions in Model MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable
- Power Splitter, Aeroflex/Weinschel Model 1870A

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

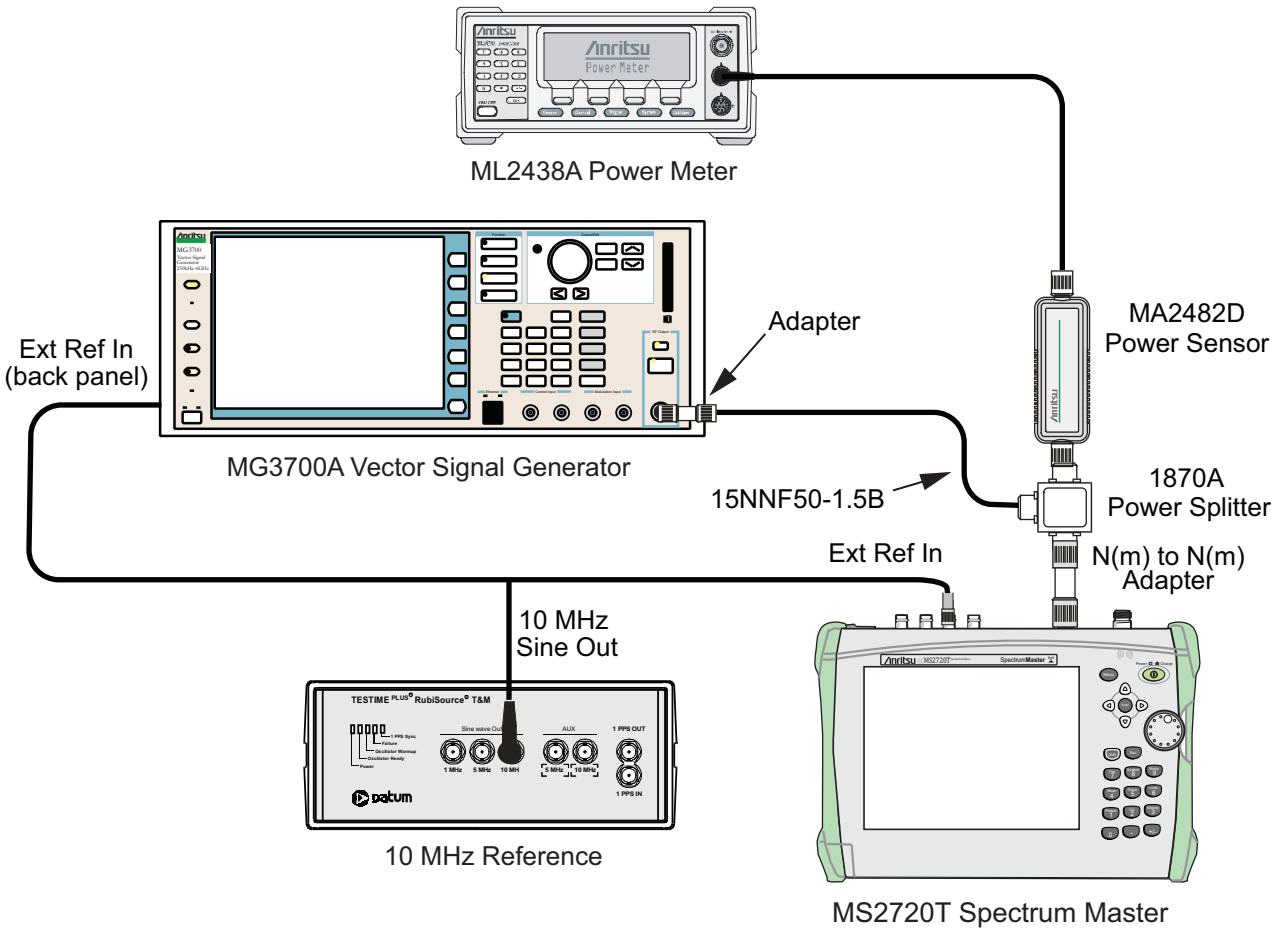


Figure 3-4. GSM/GPRS/EDGE, Test Setup

Set up Procedure

1. Zero the power sensor prior to connecting to the power splitter.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to **256**.
3. Connect the equipment as shown in Figure 3-4
4. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the **Freq** submenu key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
5. Set the MS2720T mode to GSM/GPRS/EDGE Signal Analyzer. Preset the instrument.

GSM Burst Power, Frequency Error, and Phase Error Tests

Test Procedure

1. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
2. Press the **Down Arrow** key, or turn the knob to press Yes.
3. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
4. Press the (F1) submenu key to select "Load File to Memory".
5. Press the (F1) submenu key again to select "Select Package".
6. Using the **Down Arrow** key, step through the selection list until the GSM option is highlighted.
7. Press the **Set** key.
8. Press the (F6) submenu key, Return.
9. Press the **Set** key. The Select Package box appears. Use the rotary knob to highlight GSM and press the **Set** key to select.
10. Another File List appears. Use the rotary knob to select GsmBurst_1slot, and press the **Set** key to select.
11. Press the **MOD On/Off** key to turn on the Modulation LED, and verify the Playing indicator in the center of the LCD is flashing.
12. Press the **Frequency** key, and enter 850 MHz.
13. Press the **Level** key, enter –10, and press the **dBm** key.
14. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-66, "RF Measurements, At 850 MHz, –10 dBm Level, GsmBurst_1slot Pattern (GSM)" on page A-36**.**
15. On the MS2720T, press the **Freq** main menu key and enter 850 MHz as Center Freq.
16. Press the **Measurements** main menu key, and press GSM/EDGE Summary (a red dot is displayed on the label).
17. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-66, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 14. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-66.
18. Record the displayed Phase Err RMS (deg) into Table A-74, "Demodulation, At 850 MHz, –10 dBm Level, GsmBurst_1slot Pattern (GSM)" on page A-39**.**
19. Verify that the measured values in Step 17 and Step 18 are within specifications.
20. On the MG3700A, change the selected signal pattern to GsmBurst_8slot.

21. Adjust the Level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-67, "RF Measurements, At 850 MHz, –50 dBm Level, GsmBurst_8slot Pattern (GSM)" on page A-36. Then wait 15 seconds to allow the MS2720T to update its measured results.

22. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-67, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 21. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-67.

23. Record the displayed Phase Err RMS (deg) into Table A-75, "Demodulation1, At 850 MHz, –50 dBm Level, GsmBurst_8slot Pattern (GSM)" on page A-39.

24. Verify that the measured values in Step 22 and Step 23 are within specifications.

25. Change the frequency of MG3700A to 1800 MHz.

26. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu. Use the keypad to enter 1800 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.

27. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-68, "RF Measurements, At 1800 MHz, –10 dBm Level, GsmBurst_8slot Pattern (GSM)" on page A-37.

28. On the MS2720T, set the Center Freq to 1800 MHz. Then wait 15 seconds to allow the MS2720T to update its measured results.

29. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-68, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 27. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-68.

30. Record the displayed Phase Err RMS (deg) into Table A-76, "Demodulation, At 1800 MHz, –10 dBm Level, GsmBurst_8slot Pattern (GSM)" on page A-39.

31. Verify that the measured values in Step 29 or Step 30 or both are within specifications.

32. On the MG3700A, change the selected pattern to GsmBurst_1slot.

33. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-69, "RF Measurements, At 1800 MHz, –50 dBm Level, GsmBurst_1slot Pattern (GSM)" on page A-37. Then wait 15 seconds to allow the MS2720T to update its measured results.

34. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-69, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 33. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-69.

35. Record the displayed Phase Err RMS (deg) into Table A-77, "Demodulation, At 1800 MHz, –50 dBm Level, GsmBurst_1slot Pattern (GSM)" on page A-39.

36. Verify that the measured values in Step 34 or Step 35 or both are within specifications.

EDGE Burst Power, Frequency Error and Residual Error Tests

Test Procedure

1. Verify that the equipment settings are unchanged from the previous test.
2. On the MG3700A, change the selected pattern to EdgeBurst_4slot.
3. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-70, "RF Measurements, At 1800 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-37. Then wait 15 seconds to allow the MS2720T to update its measured results.
4. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-70, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 3. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-70.
5. Record the displayed EVM(rms) into Table A-78, "Demodulation, At 1800 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-39.
6. Verify that the measured values in Step 4 and Step 5 are within specifications.
7. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-71, "RF Measurements, At 1800 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-37. Then wait 15 seconds to allow the MS2720T to update its measured results.
8. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-71, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 7. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-71.
9. Record the displayed EVM(rms) into Table A-79, "Demodulation, At 1800 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-39.
10. Verify that the measured values in Step 8 and Step 9 are within specifications.
11. Change the frequency of MG3700A to 850 MHz.
12. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
13. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-72, "RF Measurements, At 850 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-38.
14. On the MS2720T, set the Center Freq to 850 MHz. Then wait 15 seconds to allow the MS2720T to update its measured results.
15. Record the measured "Burst Power" value into the "Displayed Burst Power" row of Table A-72, then subtract the "Displayed Burst Power" value from the "Adjusted Output Power" reading that was obtained in Step 13. Then record the "Calculated Burst Power Error" and the displayed value of "Frequency Error" into Table A-72.
16. Record the displayed EVM(rms) into Table A-80, "Demodulation, At 850 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-40.
17. Verify that the measured values in Step 15 and Step 16 are within specifications.
18. On the MG3700A, change the selected pattern to EdgeBurst_1slot.
19. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dB. Record the adjusted power reading into the "Adjusted Output Power" row of Table A-73, "RF Measurements, At 850 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)" on page A-38. Then wait 15 seconds to allow the MS2720T to update its measured results.

20. Record the measured “Burst Power” value into the “Displayed Burst Power” row of Table A-73, then subtract the “Displayed Burst Power” value from the “Adjusted Output Power” reading that was obtained in Step 19. Then record the “Calculated Burst Power Error” and the displayed value of “Frequency Error” into Table A-73.

21. Record the displayed EVM(rms) into Table A-81, “Demodulation, At 850 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)” on page A-40

22. Verify that the measured values in Step 20 and Step 21 are within specifications.

3-5 Option 881 WCDMA/HSDPA Signal Analyzer Verification

The tests in this section can be used to verify the functionality of the WCDMA/HSDPA Signal Analyzer mode of the MS2720T Spectrum Master. The tests include:

- "WCDMA Absolute Power Accuracy Verification"
- "WCDMA Occupied Bandwidth (OBW) Verification" on page 3-17
- "WCDMA RF Channel Power Accuracy" on page 3-19
- "HSDPA RF Channel Power Accuracy" on page 3-20
- "Error Vector Magnitude (EVM) Verification" on page 3-21

WCDMA Absolute Power Accuracy Verification

This test verifies the WCDMA absolute power accuracy in WCDMA/HSDPA Signal Analyzer Mode.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Mini Circuits Model TIA10001R8 RF Power Amplifier
- Programmable Attenuator, Anritsu Model MN63A
- Circulator (refer to Table 1-3 on page 1-4)
- High Power Load, Aeroflex/Weinschel Model M1418
- Coupler (refer to Table 1-3)
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model SC7400 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

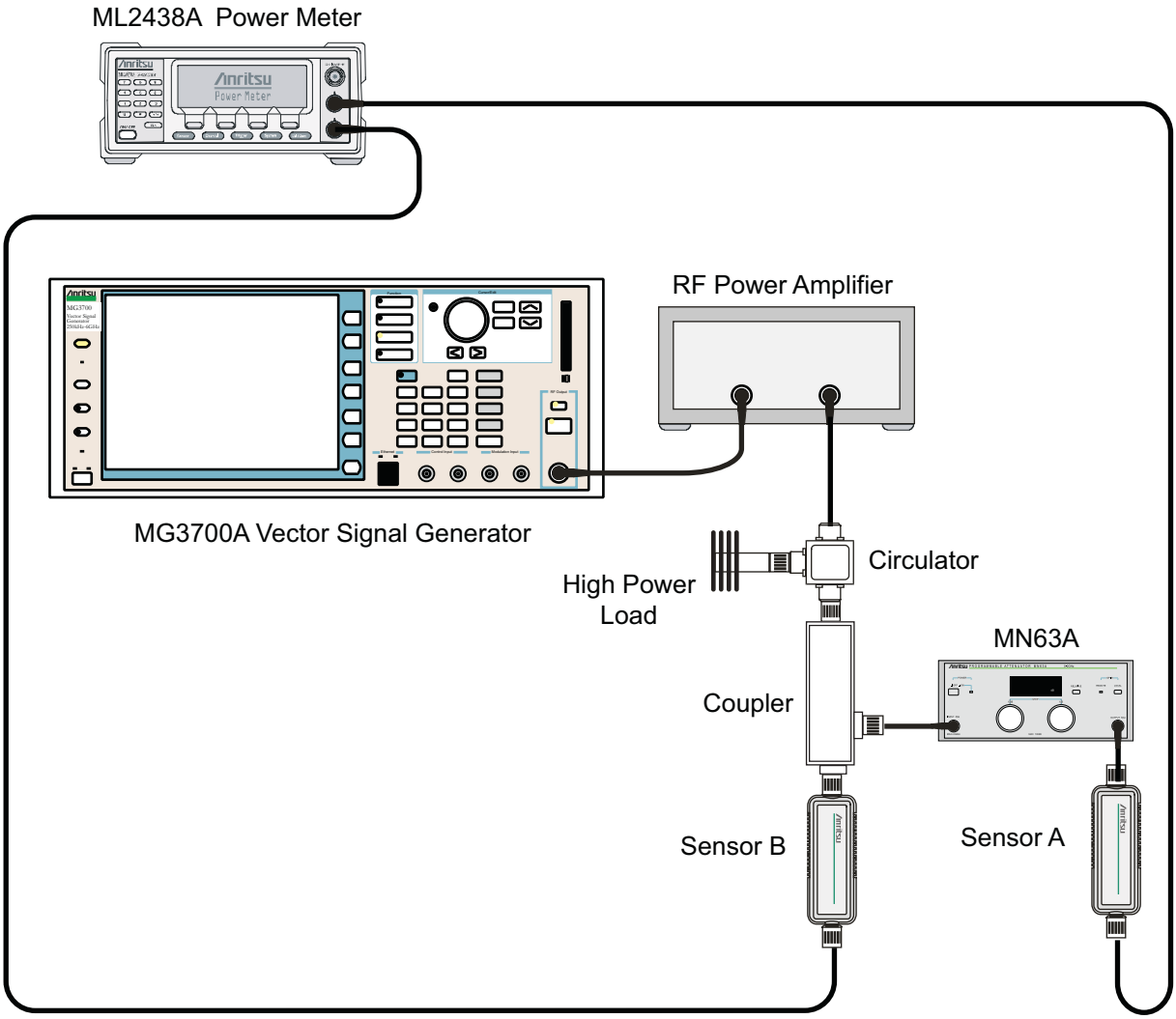


Figure 3-5. WCDMA/HSDPA Signal Analyzer, Characterization Setup

Procedure

1. Connect the MG3700A, RF power amplifier, circulator, load, coupler, and programmable attenuator as shown in Figure 3-5.
2. Turn on the MG3700A, RF amplifier, attenuator, and the power meter.
3. Connect the power sensors to the power meter and then zero the sensors. Then connect the sensors as shown in Figure 3-5.
4. Press the **On/Off** key to turn on the MS2720T and wait until the measurement display appears. Then press the **Shift** key, and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA, and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left corner).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).

10. Press the (F1) submenu key to select "Load File to Memory"
11. Press the (F1) submenu key again to select "Select Package"
12. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) submenu key, Return.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModle_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, enter 881.5, then press the **MHz** key.
20. Press the **Level** key, enter –28, and press the **dBm** key.
21. Use the knob to adjust the power level so that Sensor B reads +10 dBm.
22. Set the MN63A attenuator to 0 dB.
23. Record the Sensor A reading (PMA.10) in Table A-82, "RF Measurements, Sensor A and Sensor B Readings, Components Characterization" on page A-41. This should be approximately –20 dBm.
24. Record the Sensor B reading (PMB.10) in Table A-82.
25. Calculate Delta 1 (Δ1), which is the error of the coupler output port deviation from ideal + 10 dBm, by using the following formula:

    Delta 1 (dBm) = (10 dBm – PMB.10)

26. Record the Delta 1 (Δ1) value in Table A-82.
27. Calculate the accurate value of the Sensor A reading for coupler port output of +10 dBm (PMA.10C) by using the following formula:

    PMA.10C = PMA.10 + Δ1

28. Record the calculated value (PMA.10C) in Table A-82.
29. Set the MN63A attenuator to 18 dB, and record the Sensor A reading (PMA.18) in Table A-82.
30. Calculate the accurate attenuation value by using the following formula:

    ATT.18 = (PMA.10 – PMA.18)

31. Record the calculated value (ATT.18) in Table A-82.
32. Turn off the RF output of the MG3700A.
33. Disconnect the coupler from Sensor B and connect the coupler to the MS2720T, refer to Figure 3-6 on page 3-15.
34. Set the MN63A attenuator to 0 dB.
35. On the MS2720T, press the Center Freq submenu key, enter 881.5, and then press the **Enter** key.
36. Press the **Measurements** main menu key, then the RF Measurement submenu key, then the Spectrum submenu key.
37. On the MG3700A, turn on the RF output and use the knob to adjust power level to read the value of PMA.10C on Sensor A (refer to Table A-82).
38. Record the MG3700A power level setting (MG3700A.10) in Table A-83, "RF Measurements, Power Level Setting, Components Characterization" on page A-41.

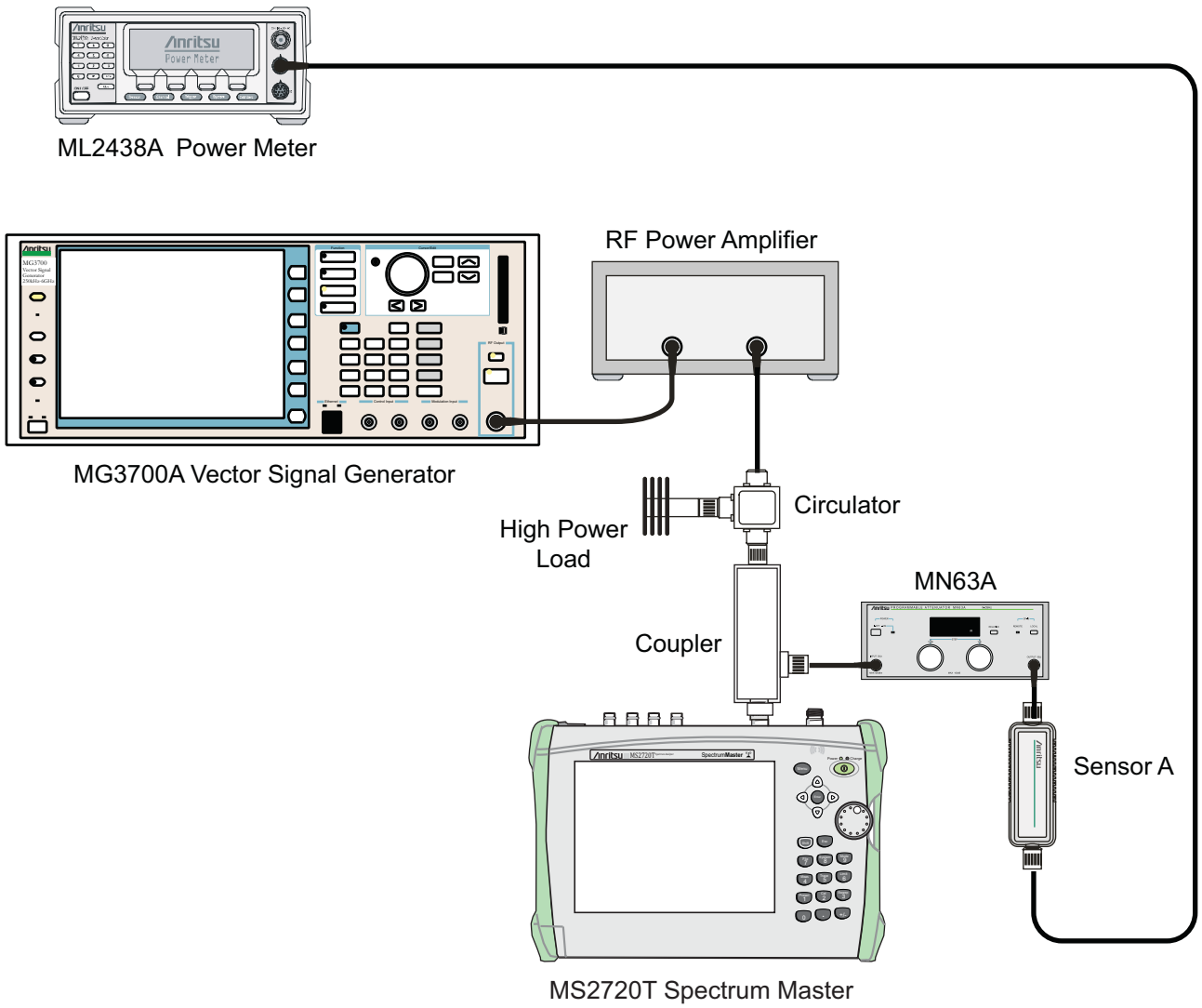


Figure 3-6. WCDMA/HSDPA Signal Analyzer, Test Setup for Spectrum Master

39. On the MS2720T, press the **Amplitude** main menu key and then press the Adjust Range submenu key.

40. Record the channel power reading into the "Measured Power" column of Table A-84, "RF Measurements, WCDMA Absolute Power Accuracy" on page A-41.

41. Use the following formula to calculate the Error value for the absolute power accuracy of the MS2720T at +10 dBm:

Error = Measured Power –10

42. Record the calculated Error value into the "Error" column of Table A-84, and verify that it is within the listed specification.

43. Turn Off the RF output of the MG3700A.

44. Set the MN63A attenuator to 18 dB.

45. Calculate the value of the MG3700A setting (MG3700A.28) for +28 dBm Test Level by using the following formula:

MG3700A.28 = MG3700A.10 + ATT.18

46. Record the calculated value (MG3700A.28) in Table A-83, "RF Measurements, Power Level Setting, Components Characterization" on page A-41.

47. On the MG3700A, turn on the RF output and use the knob to adjust power level to the recorded MG3700A.28 value in Table A-83.

48. On the MS2720T, press the **Amplitude** main menu key and then press the Adjust Range submenu key.

49. Record channel power reading in the "Measured Power" column of Table A-84.

50. Use the following formula to calculate the absolute power accuracy of the MS2720T at +28 dBm:

Error = Measured Power –28

51. Record the calculated value in the "Error" column of Table A-84, and verify that it is within the listed specification.

52. Turn off the RF output of the MG3700A.

53. Set the MN63A attenuator to 0 dB.

54. Set power level of the MG3700A to –38 dBm.

55. Calculate the value of the Sensor A reading (PMA – 10) for –10 dBm Test Level by using the following formula:

PMA–10 = PMA.10C–20

56. Record the calculated value (PMA – 10) in Table A-83.

57. Turn on the RF output and use the knob to adjust power level to read the value of PMA – 10 on Sensor A.

58. On the MS2720T, press the **Amplitude** main menu key and then press the Adjust Range submenu key.

59. Record channel power reading in the "Measured Power" column of Table A-84.

60. Use the following formula to calculate the absolute power accuracy of the MS2720Tat –10 dBm:

Error = Measured Power – (–10)

61. Record the calculated value in the "Error" column of Table A-84, and verify that it is within the listed specification.

62. Turn Off the RF output of the MG3700A.

63. Set the MN63A attenuator to 0 dB.

64. Decrease power level of the MG3700A by 10 dB.

65. Calculate the value of the Sensor A reading (PMA – 20) for –20 dBm Test Level by using the following formula:

PMA–20 = PMA.10C–30

66. Record the calculated value (PMA – 20) in Table A-83.

67. Turn on the RF output and use the knob to adjust power level to read the value of PMA – 20 on Sensor A.

68. On the MS2720T, press the **Amplitude** main menu key and then press the Adjust Range submenu key.

69. Record channel power reading in the "Measured Power" column of Table A-84.

70. Turn off the RF output of the MG3700A.

71. Use the following formula to calculate the absolute power accuracy of MS2720T at –20 dBm:

Error = Measured Power – (–20)

72. Record the calculated value in the "Error" column of Table A-84, and verify that it is within the listed specification.

WCDMA Occupied Bandwidth (OBW) Verification

The tests in this section can be used to verify the WCDMA occupied bandwidth in WCDMA/HSDPA Signal Analyzer Mode.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model SC7400
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

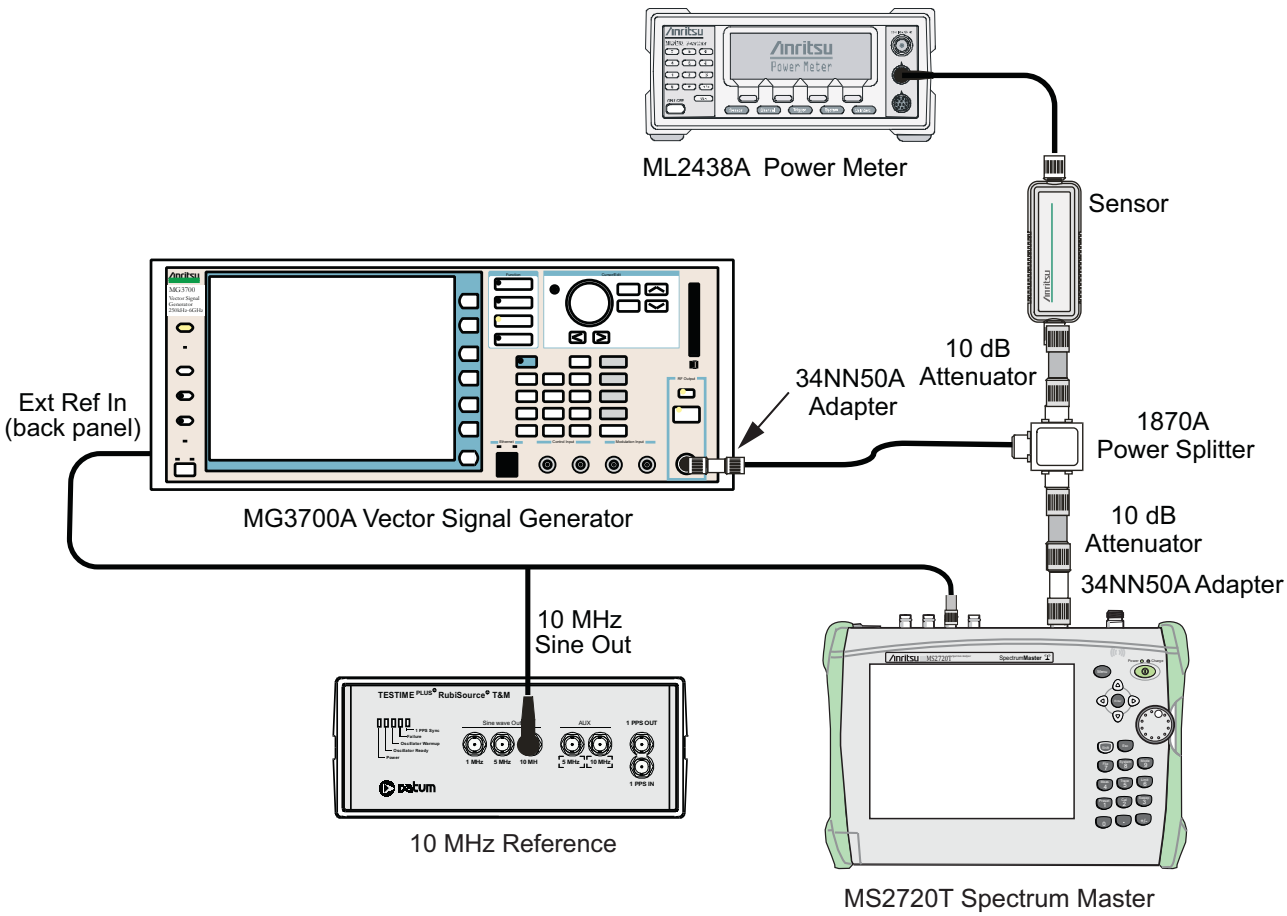


Figure 3-7. WCDMA Occupied Bandwidth, Test Setup

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 3-7.
4. Press the **On/Off** key to turn on the MS2720T and wait until the measurement display appears. Then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
10. Press the (F1) submenu key to select "Load File to Memory"
11. Press the (F1) submenu key again to select "Select Package"
12. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) submenu key, Return.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModle_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter the frequencies from Table A-85, "RF Measurements, WCDMA Occupied Bandwidth (OBW)" on page A-41, starting with 881.5, and press the **MHz** key.
20. Press the **Level** key, then enter –2, and press the **dBm** key.
21. Use the knob to adjust the power level so that the power meter reads –20 dBm. Record the reading in the "Power Meter Reading" column of Table A-85.
22. On MS2720T, press the Center Freq submenu key, and enter the frequencies from Table A-85, starting with 881.5 MHz, then press the **Enter** key.
23. Press the **Measurements** main menu key, then the RF Measurement submenu key, and press Channel Spectrum submenu key.
24. Press the **Amplitude** main menu key, then press the Adjust Range submenu key.
25. Record the OBW reading in the "OBW" column of Table A-85 and verify that it is within 4.2 MHz ± 100 kHz.
26. Repeat Step 19 through Step 25 for the other frequencies in Table A-85.

WCDMA RF Channel Power Accuracy

The tests in this section can be used to verify the WCDMA RF Channel Power Accuracy in WCDMA/HSDPA Signal Analyzer Mode.

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and zero the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 3-7.
4. Press the **On/Off** key to turn on the MS2720T and wait until the measurement display appears. Then press the **Shift** key, and then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA, and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
10. Press the (F1) submenu key to select "Load File to Memory".
11. Press the (F1) submenu key again to select "Select Package".
12. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) submenu key, Return.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key, and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 881.5, and press the **MHz** key.
20. Press the **Level** key, then enter –2, and press the **dBm** key.
21. Use the knob to adjust the power meter to read –20 dBm, and record the Power Meter reading in the "Power Meter Reading" column of Table A-86, "RF Measurements, WCDMA RF Channel Power Accuracy" on page A-42.
22. On the MS2720T, press the Center Freq submenu key, enter 881.5, and then press the **Enter** key.
23. Press the **Measurements** main menu key, then the RF Measurement submenu key, and press ACLR.
24. Press the **Amplitude** main menu key, then press the Adjust Range submenu key.
25. Record the measured CH 1 power into the "Measured RF Channel Power" column of Table A-86.
26. Calculate the RF Channel Power Error using the following formula:

    RF Channel Power Error (dB) = Measured RF Channel Power – 0.246 – Power Meter reading
27. Record calculated value to the "RF Channel Power Error" column of Table A-86, and verify that it is within specifications (± 1.25 dB).
28. Repeat Step 19 through Step 27 for the other frequencies.

HSDPA RF Channel Power Accuracy

The tests in this section can be used to verify the RF Channel Power Accuracy and Adjacent Channel Leakage Ratio (ACLR) Accuracy for HSDPA signals in WCDMA/HSDPA Signal Analyzer Mode.

Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and zero the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to
4. Press the **On/Off** key to turn on the MS2720T, and wait until the measurement display appears. Then press the **Shift** key, and then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA, and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
10. Press the (F1) submenu key to select “Load File to Memory”
11. Press the (F1) submenu key again to select “Select Package”
12. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) submenu key, Return.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_5_8HSPDSCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 2680.5, and press the **MHz** key.
20. Press the **Level** key, then enter –2, and press the **dBm** key.
21. Use the knob to adjust the power meter to read –20 dBm, and record the Power Meter reading in the “Power Meter Reading” column of Table A-87, “RF Measurements, HSDPA RF Channel Power Accuracy” on page A-42.
22. On the MS2720T, press the Center Freq submenu key, enter 2680.5, and then press the **Enter** key.
23. Press the **Measurements** main menu key, then the RF Measurement submenu key, and press ACLR.
24. Press the **Amplitude** main menu key, then press the Adjust Range submenu key.
25. Record the measured CH 1 power in dBm to the “Measured RF Channel Power” column of Table A-87.
26. Calculate the RF Channel Power Error using the following formula:

    RF Channel Power Error (dB) = Measured RF Channel Power – 0.246 – Power Meter reading
27. Record the calculated value into the “RF Channel Power Error” column in Table A-87 and verify that it is within specifications (± 1.25 dB).

Error Vector Magnitude (EVM) Verification

The tests in this section can be used to verify the functionality of the WCDMA Demodulator or the HSDPA Demodulator (or both) of the WCDMA/HSDPA Signal Analyzer in the MS2720T Spectrum Master.

WCDMA EVM Verification Procedure

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and zero the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 3-7.
4. Press the **On/Off** key to turn on the MS2720T, and wait until the measurement display appears. Then press the **Shift** key, and then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA, and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset submenu key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
10. Press the (F1) submenu key to select “Load File to Memory”.
11. Press the (F1) submenu key again to select “Select Package”.
12. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) submenu key, Return.
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_4_opt option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, then enter 1962.5, and press the **MHz** key.
20. Press the **Level** key, then enter –2, and press the **dBm** key.
21. Use the knob to adjust the power meter to read –20 dBm.
22. On the MS2720T, press the Center **Freq** main menu, enter 1962.5, and then press the MHz submenu key.
23. Press the **Measurements** main menu key, then press the Demodulator submenu key and press the Modulation Summary submenu key.
24. Press the **Setup** main menu key, then press the Auto Scrambling submenu key to turn it On.
25. Press the Max Spreading Factor submenu key to set it to 512.
26. Press the **Amplitude** main menu key, then press the Adjust Range submenu key.
27. Record the EVM reading into Table A-88, “Demodulation, WCDMA Error Vector Magnitude (Test Model 4)” on page A-43 and verify that it is within ±2.5%.

HSDPA EVM Verification Procedure

1. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
2. Press the **Down Arrow** key to select Yes.
3. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
4. Press the (F1) submenu key to select “Load File to Memory”.

5. Press the (F1) submenu key again to select "Select Package".
6. Using the **Down Arrow** key, step through the selection list until the WCDMA(BS Tx test) option is highlighted.
7. Press the **Set** key.
8. Press the (F6) submenu key, Return.
9. Press the **Set** key.
10. Using the **Down Arrow** key, step through the selection list until the TestModel_5_8HSPDSCH option is highlighted.
11. Press the **Set** key.
12. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
13. Press the **Frequency** key, then enter 1962.5, and press the **MHz** key.
14. Press the **Level** key, then enter –2, and press the **dBm** key.
15. Use the knob to adjust the power meter to read –20 dBm.
16. On the MS2720T, press the Center Freq submenu key, enter 1962.5, and then press the MHz submenu key.
17. Press the **Measurements** main menu key, then press the Demodulator submenu key, and press the Modulation Summary submenu key.
18. Press the **Setup** main menu key, then press the Auto Scrambling submenu key to turn it On.
19. Press the Max Spreading Factor submenu key to set it to 512.
20. Press the **Amplitude** main menu key, then press the Adjust Range submenu key.
21. Record the EVM reading into Table A-89, "Demodulation, HSDPA Error Vector Magnitude (Test Model 5)" on page A-43 and verify that it is within 2.5%.

3-6 Option 882, TDSCDMA Signal Analyzer Option Verification

The tests in this section verify the function of the optional TDSCDMA Signal Analyzer in Models MS2720T Spectrum Master. Option 882 is TDSCDMA RF measurements andTDSCDMA Demodulator measurements.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

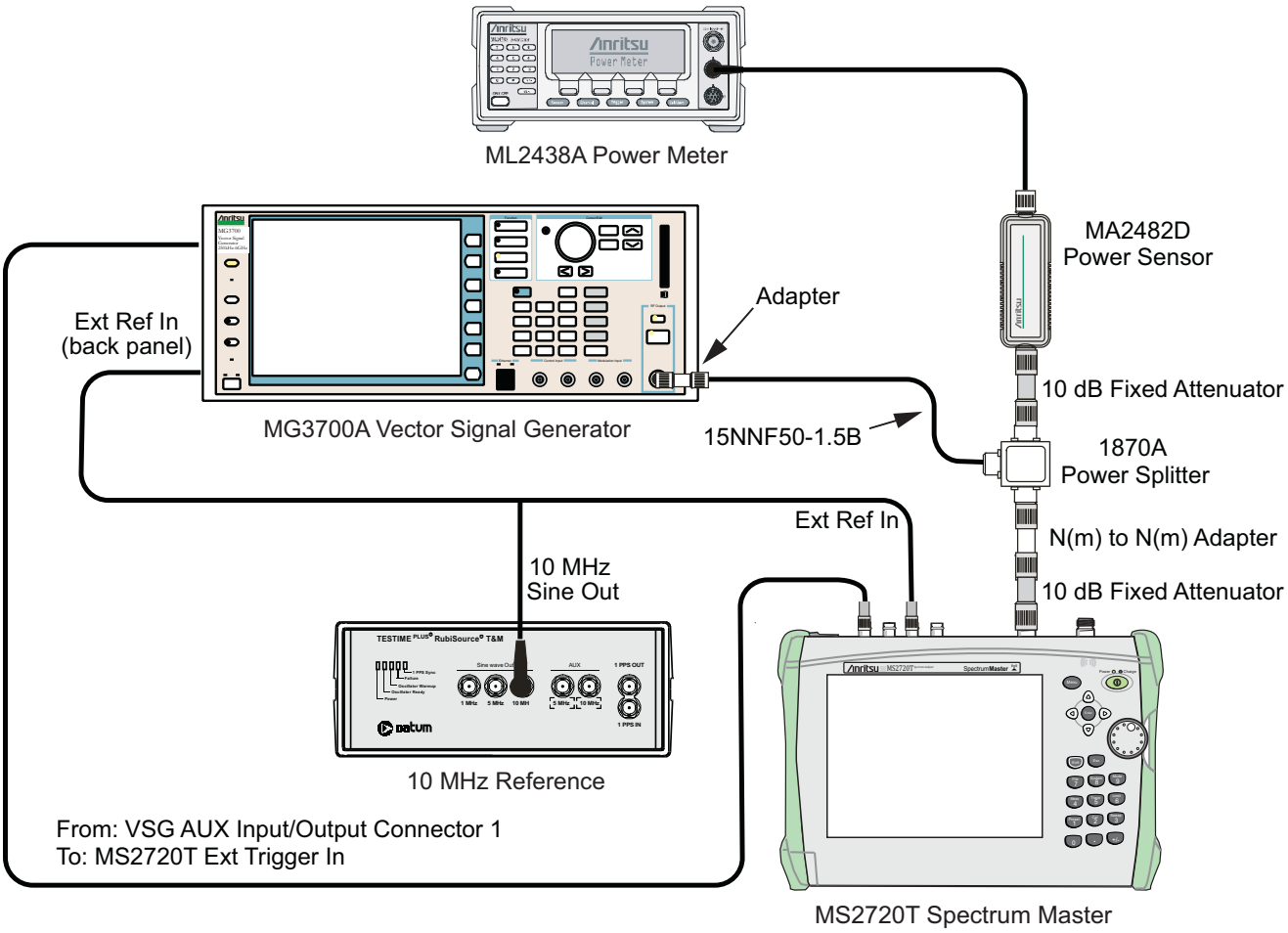


Figure 3-8. TDSCDMA Signal Analyzer Option Verification, Test Setup

Setup Procedure

1. Zero the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 3-8.
3. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 2010 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the power meter to Averaging, Moving, and 256 samples.
5. Set the MS2720T to TDSCDMA Signal Analyzer mode and Preset the instrument.

TDSCDMA Channel Power, Frequency Error, EVM, and Tau Test Procedure

Note	The TDSCDMA pattern requires a Waveform Data license (MX370001A) that must be purchased.

6. On the MG3700A, press the **Preset** key (yellow key on the upper-left corner).
7. Press the **Down Arrow** key or turn the knob to select Yes.
8. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
9. Press the (F1) submenu key to select "Load File to Memory".
10. Press the (F1) submenu key again to select "Select Package".
11. Press the **Down Arrow** key to step through the selection list until the TDSCDMA(MX370001A) option is highlighted.
12. Press the **Set** key.
13. Press the Return (F6) submenu key.
14. Press the **Set** key. The Select Package dialog box appears. Use the rotary knob to highlight TDSCDMA(MX370001A) and press the **Set** key to select.
15. Another file list appears. Use the rotary knob to select rmc-P-CCPCH_bs_dl and press the **Set** key to select.
16. Press the MOD On/Off key to turn the Modulation LED On and verify that the "Playing" indicator is flashing in the center of the LCD.
17. Press the **Frequency** key and enter 2010 MHz.
18. Press the **Level** key, enter –20, and press the dBm key.
19. Adjust the MG3700A output so that the power meter reads –45 dBm ± 0.5 dB, and record the actual reading into the "Power Meter Reading" row of Table A-90, "Option 882, TDSCDMA (at 2010 MHz, –45 dBm Level)" on page A-44.
20. On the MS2720T, press the **Freq** main menu key, then press the Center Freq submenu key and enter 2010 MHz as center frequency.
21. Press the **Measurements** main menu key and press the TDSCDMA Summary submenu key (a red dot is displayed on the label).
22. Press the **Setup** hard key and press the Trigger submenu key. Then change Trigger Type to Ext by pressing the Trigger Type submenu key twice (or until Ext is underlined). Then wait 15 seconds to allow the MS2720T to update its measured results.
23. Record the "Displayed Channel Power" into Table A-90, then subtract the "Displayed Channel Power" value from the "Power Meter Reading" in Step 19. Then record the "Calculated Channel Power Error" into Table A-90.
24. Record the Displayed Frequency Error and Tau into Table A-90.
25. Verify that the measured values in Step 23 or Step 24 (or both) are within specifications.

3-7 Option 883, LTE Signal Analyzer Verification

The tests in this section verify the functionality of the FD-LTE Signal Analyzer of the MS2720T Spectrum Master. There are tests for LTE Channel Power Accuracy Tests and Frequency Error Tests

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

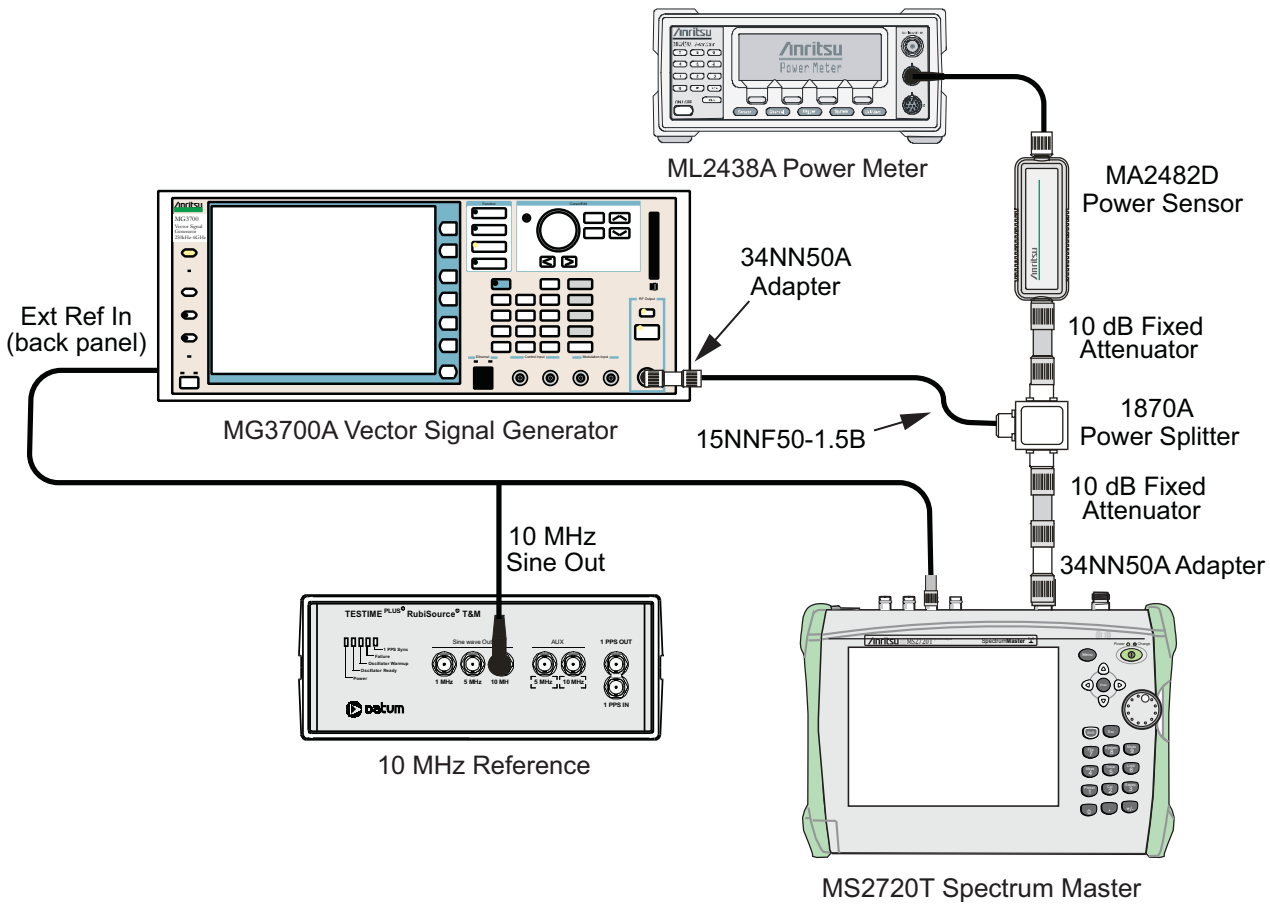


Figure 3-9. LTE Signal Analyzer Option Verification

LTE Channel Power Accuracy Tests

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MS2720T.

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in Figure 3-9.

Note	The LTE pattern requires a Waveform Data license MX370108A that must be purchased.

5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key. Note: Both **Set** keys on the MG3700A perform the same function.
   c. Press the (F1) submenu key to select "Load File to Memory"
   d. Press the (F1) submenu key again to select "Select Package"
   e. Using the Down Arrow key step through the selection list until LTE_DL_E-TM is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key "Return"
   h. Press the **Set** key. The "Select Package" list box will appear. Again select LTE_DL_E-TM and then the **Set** key.
   i. Another file list will appear. Select (highlight) E-TM_3-1_10M.
   j. Press the **Set** key.
   k. Press the MOD On/Off key and verify that the LED is on. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 750 MHz.
   m. Press the **Level** key, then enter 2 dBm.
   n. Turn the output on.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.5 dB.
7. Set the MS2720T to LTE Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the **Measurements** main menu key and select RF, then select Channel Spectrum.
9. Record the MS2720T Channel Power reading into the column labeled "Measured Channel Power" (row labeled 750 MHz, –15 dBm) in Table A-91, "RF Measurements, LTE Channel Power Accuracy" on page A-45.
10. Calculate the Channel Power Error by subtracting the MS2720T "Channel Power" reading from the power meter reading in Step 6. Record the result into the test record in the column labeled "Error" (row labeled 750 MHz, –15 dBm) in Table A-91.
11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.

13. Record the MS2720T Channel Power reading into the test record in the column labeled "Measured Channel Power" (row labeled 750 MHz, –50 dBm) in Table A-91.
14. Calculate the Channel Power Error by subtracting the MS2720T "Channel Power" reading from the power meter reading that was recorded in Step 12. Record the result into the test record in the column labeled "Error" (row labeled 750 MHz, –50 dBm) in Table A-91.
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 2150 MHz.
17. Set MG3700A Frequency to 2150 MHz. Press the **Set** key.
18. Change the Center Frequency of the MS2720T to 2150 MHz.
19. Measure the Channel Power for –10 dBm and –50 dBm and then record the measured result and the calculated error into the test record in the column labeled "Measured Channel Power" and in the column labeled "Error" (rows labeled 2150 MHz) in Table A-91.
20. For instruments with option 543, press the **Setup** main menu key and set the BW to 20 MHz then repeat Step 5a through Step 19 using the E-TM_3-1_20M pattern for Step 5i.

LTE Frequency Error Tests

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MS2720T Spectrum Master.

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in Figure 3-9.

Note	The LTE pattern requires a Waveform Data license MX370108A that must be purchased.

5. Set the MG3700A as follows:
   a. Press the yellow Preset button (answer yes to the question).
   b. Press the **Set** key. Note: Both **Set** keys on the MG3700A perform the same function.
   c. Press the (F1) submenu key to select "Load File to Memory"
   d. Press the (F1) submenu key again to select "Select Package"
   e. Using the **Down Arrow** key step through the selection list until LTE_DL_E-TM is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key "Return"
   h. Press the **Set** key. The "Select Package" list box will appear. Again select LTE_DL_E-TM and **Set**.
   i. Another file list will appear. Select (highlight) E-TM_3-1_10M.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 750 MHz.
   m. Press the Level key, then enter 2 dBm.
   n. Turn the output On.

6. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.5 dB.
7. Set the MS2720T to LTE Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the **Measurements** main menu key and select Modulation.
   c. Press the Constellation submenu key.
9. Record the MS2720T Frequency Error reading into the section "750 MHz, –15 dBm" in Table A-92, "Demodulation, LTE Frequency Accuracy" on page A-46.
10. Verify that the values are within specification.
11. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.
12. Record the MS2720T Frequency Error reading into the section "750 MHz, –50 dBm" in Table A-92.
13. Verify that the values are within specification.
14. Set the calibration factor frequency of the power sensor to 2150 MHz.
15. Set MG3700A Frequency to 2150 MHz. Press the **Set** key.
16. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.5 dB.
17. Change the Center Frequency of the MS2720T to 2150 MHz.
18. Record the MS2720T Frequency Error reading into the section "2150 MHz, –15 dBm" in Table A-92.
19. Verify that the values are within specification.
20. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.5 dB.
21. Record the MS2720T Frequency Error reading into the section "2150 MHz, –50 dBm" in Table A-92.
22. xxVerify that the values are within specification.
23. Press the **Setup** main menu key and set the BW to 20 MHz then repeat Step 5 Substep a through Step 22 using the E-TM_3-1_20M pattern for Step 5 Substep i.

3-8 Option 883, TD-LTE Signal Analyzer Verification

The tests in this section verify the functionality of the TD-LTE Signal Analyzer of the MS2720T Spectrum Master. Tests are established for TD-LTE Channel Power Accuracy Tests and Frequency Error Tests

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 44-6 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

TD-LTE Channel Power Accuracy Tests

The tests in this section verify the function of the optional TD-LTE Signal Analyzer in Model MS2720T.

Setup

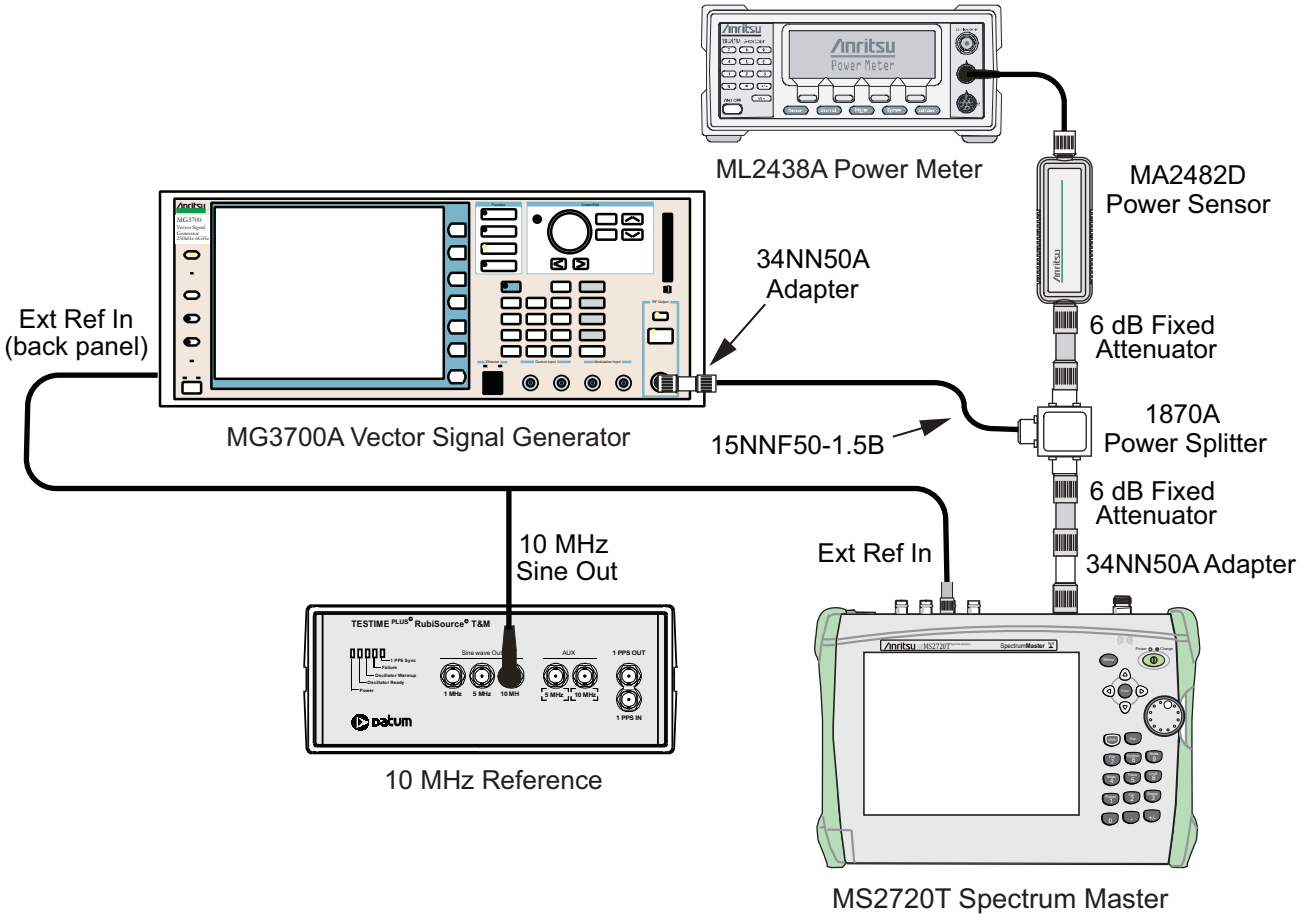


Figure 3-10. TD-LTE Signal Analyzer Option Verification

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 6 dB attenuators (quantity 2), as shown in Figure 3-10.

Note	The TD-LTE pattern requires a Waveform Data license MX370110A that must be purchased.

5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key. **Note:** Both **Set** keys on the MG3700A perform the same function.
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the Down Arrow key, step through the selection list until LTE_TDD is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key "Return".
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select LTE_TDD and then the **Set** key.
   i. Another file list is displayed. Select (highlight) TDLTE-E-TM-1-1_10M.
   j. Press the **Set** key.
   k. Press the MOD On/Off key and verify that the LED is on. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 750 MHz.
   m. Press the **Level** key, then enter 2 dBm.
   n. Turn on the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –12.0 dBm ± 0.5 dB.
7. Set the MS2720T to TD-LTE Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the **Measurements** main menu key and select RF, then select Channel Spectrum.
9. Record the MS2720T Channel Power reading into the column labeled "Measured Channel Power" (row labeled 750 MHz, –12 dBm) in Table A-93, "RF Measurements, TD-LTE Channel Power Accuracy" on page A-47.
10. Calculate the Channel Power Error by subtracting the MS2720T "Channel Power" reading from the power meter reading in Step 6. Record the result into the test record in the column labeled "Error" (row labeled 750 MHz, –12 dBm) in Table A-93.
11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately –18 dBm so that the power meter reads –30.0 dBm ± 0.5 dB.
13. Record the MS2720T Channel Power reading into the test record in the column labeled "Measured Channel Power" (row labeled 750 MHz, –30 dBm) in Table A-93.
14. Calculate the Channel Power Error by subtracting the MS2720T "Channel Power" reading from the power meter reading that was recorded in Step 12. Record the result into the test record in the column labeled "Error" (row labeled 750 MHz, –30 dBm) in Table A-93.
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 2350 MHz.
17. Set MG3700A Frequency to 2350 MHz. Press the **Set** key.
18. Change the Center Frequency of the MS2720T to 2350 MHz.
19. Measure the Channel Power for –12 dBm and –30 dBm and then record the measured result and the calculated error into the test record in the column labeled "Measured Channel Power" and in the column labeled "Error" (rows labeled 2350 MHz) in Table A-93.

20. Press the **Setup** main menu key and set the BW to 20 MHz. Then repeat Step 5 Substep a through Step 19 by using the TDLTE-E-TM-1-1_20M pattern for Step 5 Substep i.

TD-LTE Frequency Error Tests

The tests in this section verify the function of the optional LTE Signal Analyzer in Model MS2720T Spectrum Master.

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Set the calibration factor frequency of the power sensor to 750 MHz.
4. Connect the Power Sensor, 1870A splitter, 6 dB attenuators (quantity 2), as shown in Figure 3-10.

Note	The TD-LTE pattern requires a Waveform Data license MX370110A that must be purchased.

5. Set the MG3700A as follows:
   a. Press the yellow Preset button (answer yes to the question).
   b. Press the **Set** key. **Note:** Both **Set** keys on the MG3700A perform the same function.
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the **Down Arrow** key, step through the selection list until LTE_TDD is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key "Return".
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select LTE_TDD and **Set**.
   i. Another file list is displayed. Select (highlight) TDLTE-E-TM-3-3_10M.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 750 MHz.
   m. Press the Level key, then enter 2 dBm.
   n. Turn on the output.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –12.0 dBm ± 0.5 dB.
7. Set the MS2720T to TD-LTE Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 750 MHz.
   b. Press the **Measurements** main menu key and select Modulation.
   c. Press the Constellation submenu key.
9. Record the MS2720T Frequency Error reading into the section "750 MHz, –12 dBm" in Table A-94, "Demodulation, TD-LTE Frequency Accuracy" on page A-48.
10. Verify that the values are within specification.
11. Adjust the MG3700A Level setting to approximately –15 dBm so that the power meter reads –30.0 dBm ± 0.5 dB.

12. Record the MS2720T Frequency Error reading into the section "750 MHz, –30 dBm" in Table A-94.

13. Verify that the values are within specification.

14. Set the calibration factor frequency of the power sensor to 2350 MHz.

15. Set MG3700A Frequency to 2350 MHz. Press the **Set** key.

16. Adjust the MG3700A Level setting with the knob so that the power meter reads –12.0 dBm ± 0.5 dB.

17. Change the Center Frequency of the MS2720T to 2350 MHz.

18. Record the MS2720T Frequency Error reading into the section "2350 MHz, –12 dBm" in Table A-94.

19. Verify that the values are within specification.

20. Adjust the MG3700A Level setting to approximately –18 dBm so that the power meter reads –30.0 dBm ± 0.5 dB.

21. Record the MS2720T Frequency Error reading into the section "2350 MHz, –30 dBm" in Table A-94.

22. Verify that the values are within specification.

23. Press the **Setup** main menu key and set the BW to 20 MHz. Then repeat Step 5 Substep a through Step 22 by using the TDLTE-E-TM-3-3_20M pattern for Step 5 Substep i.

3-9 Option 884, CDMA Signal Analyzer Verification

The tests in this section verify the optional CDMA Signal Analyzer functions in Model MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model SC7400
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable
- Power Splitter, Aeroflex/Weinschel Model 1870A

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

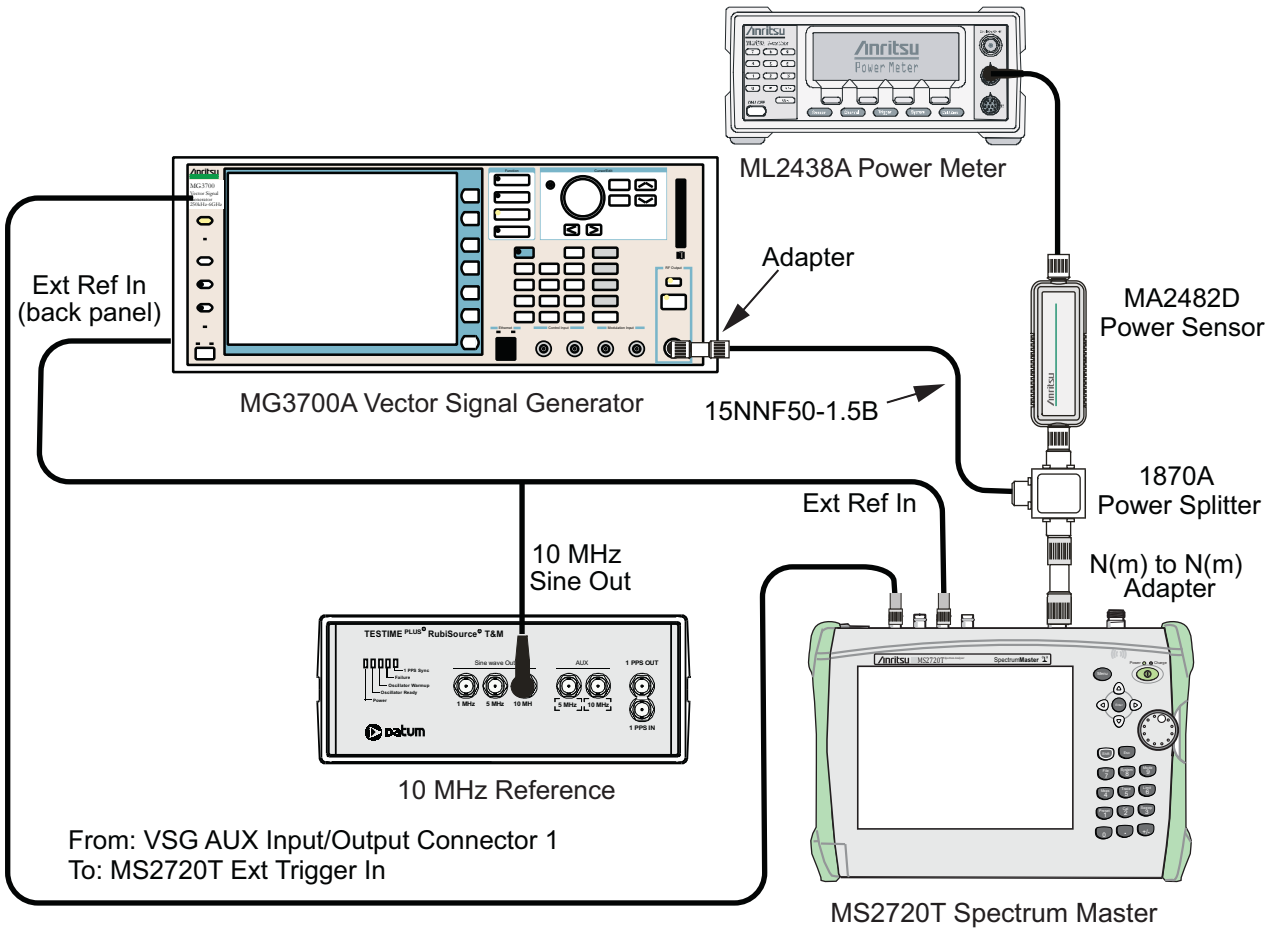


Figure 3-11. CDMA Signal Analyzer, Test Setup

Set up Procedure

1. Zero the power sensor prior to connecting it to the power splitter.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to 256.
3. Connect the equipment as shown in Figure 3-11.
4. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
5. Set the MS2720T mode to CDMA Signal Analyzer. Preset the instrument.

cdmaOne Channel Power, Frequency Error, Rho and Tau Tests

Test Procedure

1. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
2. Press the **Down Arrow** key or turn the knob to select Yes.
3. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
4. Press the (F1) submenu key to select "Load File to Memory".
5. Press the (F1) submenu key again to select "Select Package".
6. Using the **Down Arrow** key, step through the selection list until the CDMA2000 option is highlighted.
7. Press the **Set** key.
8. Press the (F6) submenu key Return.
9. Press the **Set** key. The "Select Package" box is displayed. Use the rotary knob to highlight CDMA2000 and press the **Set** key to select.
10. Another File List is displayed. Use the rotary knob to select FWD_RC1-2_9channel and press the **Set** key to select.
11. Press the **MOD On/Off** key to turn the Modulation LED On and verify that the "Playing" indicator in the center of the LCD is flashing.
12. Press the Frequency key, enter 870.03 MHz.
13. Press the **Level** key, enter –30, and press the **dBm** key.
14. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the adjusted "Power Meter Reading" into Table A-95, "RF Measurements, At 870.03 MHz, –30 dBm Level, cdmaOne" on page A-49.
15. On the MS2720T, press the **Freq** main menu key and enter 870.03 MHz as Center Freq.
16. Press the **Measurements** main menu key and press CDMA Summary (a red dot is displayed on the label).
17. Press the **Setup** main menu key and press PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger submenu key twice. Wait 15 seconds to allow the MS2720T to update its measured results.
18. Record the "Channel Power Value" into Table A-95, and subtract the displayed "Channel Power Value" from the adjusted "Power Meter Reading" in Step 14. Then record the calculated "Channel Power Error" into Table A-95.
19. Record the displayed Freq Error, Rho, and Tau into Table A-99, "Demodulation, At 870.03 MHz, –30 dBm Level, cdmaOne" on page A-50**.**
20. Verify that the measured values in Step 18 and Step 19 are within specifications.
21. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.

22. Set the MG3700A Frequency to 1930.05 MHz.
23. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the adjusted "Power Meter Reading" into Table A-96, "RF Measurements, At 1930.05 MHz, –30 dBm Level, cdmaOne" on page A-49.
24. On the MS2720T, press the **Freq** main menu key, and enter 1930.05 MHz as Center Freq. Then wait 15 seconds to allow the MS2720T to update its measured results.
25. Record the "Channel Power Value" into Table A-96, and subtract the displayed "Channel Power Value" from the adjusted "Power Meter Reading" in Step 23. Then record the calculated "Channel Power Error" into Table A-96.
26. Record the displayed Freq Error, Rho, and Tau into Table A-100, "Demodulation, At 1930.05 MHz, –30 dBm Level, cdmaOne" on page A-50.
27. Verify that the measured values in Step 25 and Step 26 are within specifications.

CDMA2000 Channel Power, Frequency Error, Rho and Tau Tests

Test Procedure

1. Verify that the equipment settings are unchanged from the previous test.
2. On the MG3700A, change the selected pattern to "FWD_RC3-5_9channel".
3. Adjust the level of the MG3700A so that the power meter reads –30 dBm ± 0.2 dB. Record the adjusted "Power Meter Reading" into Table A-97, "RF Measurements, At 1930.05, –30 dBm Level, CDMA2000" on page A-49. Then wait 15 seconds to allow the MS2720Tto update its measured results.
4. Record the "Channel Power Value" into Table A-97, and subtract the displayed "Channel Power Value" from the adjusted "Power Meter Reading" in Step 3. Then record the calculated "Channel Power Error" into Table A-97.
5. Record the displayed Freq Error, Rho and Tau into Table A-101, "Demodulation, At 1930.05 MHz, –30 dBm Level, CDMA2000" on page A-50.
6. Verify that the measured values in Step 4 and Step 5 are within specifications.
7. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Set the MG3700A Frequency to 870.03 MHz.
9. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB. Record the adjusted "Power Meter Reading" into Table A-98, "RF Measurements, At 870.03 MHz, –30 dBm Level, CDMA2000" on page A-49.
10. On the MS2720T, press the **Freq** main menu key, and enter 870.03 MHz as Center Freq. Then wait 15 seconds to allow the MS2720T to update its measured results.
11. Record the "Channel Power Value" into Table A-98, and subtract the displayed "Channel Power Value" from the adjusted "Power Meter Reading" in Step 9. Then record the calculated "Channel Power Error" into Table A-98.
12. Record the displayed Freq Error, Rho and Tau into Table A-102, "Demodulation, At 870.03 MHz, –30 dBm Level, CDMA2000" on page A-50.
13. Verify that the measured values in Step 11 and Step 12 are within specifications.

3-10 Option 884, EVDO Signal Analyzer Option Verification

The tests in this section verify the optional EVDO Signal Analyzer functions in Model MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

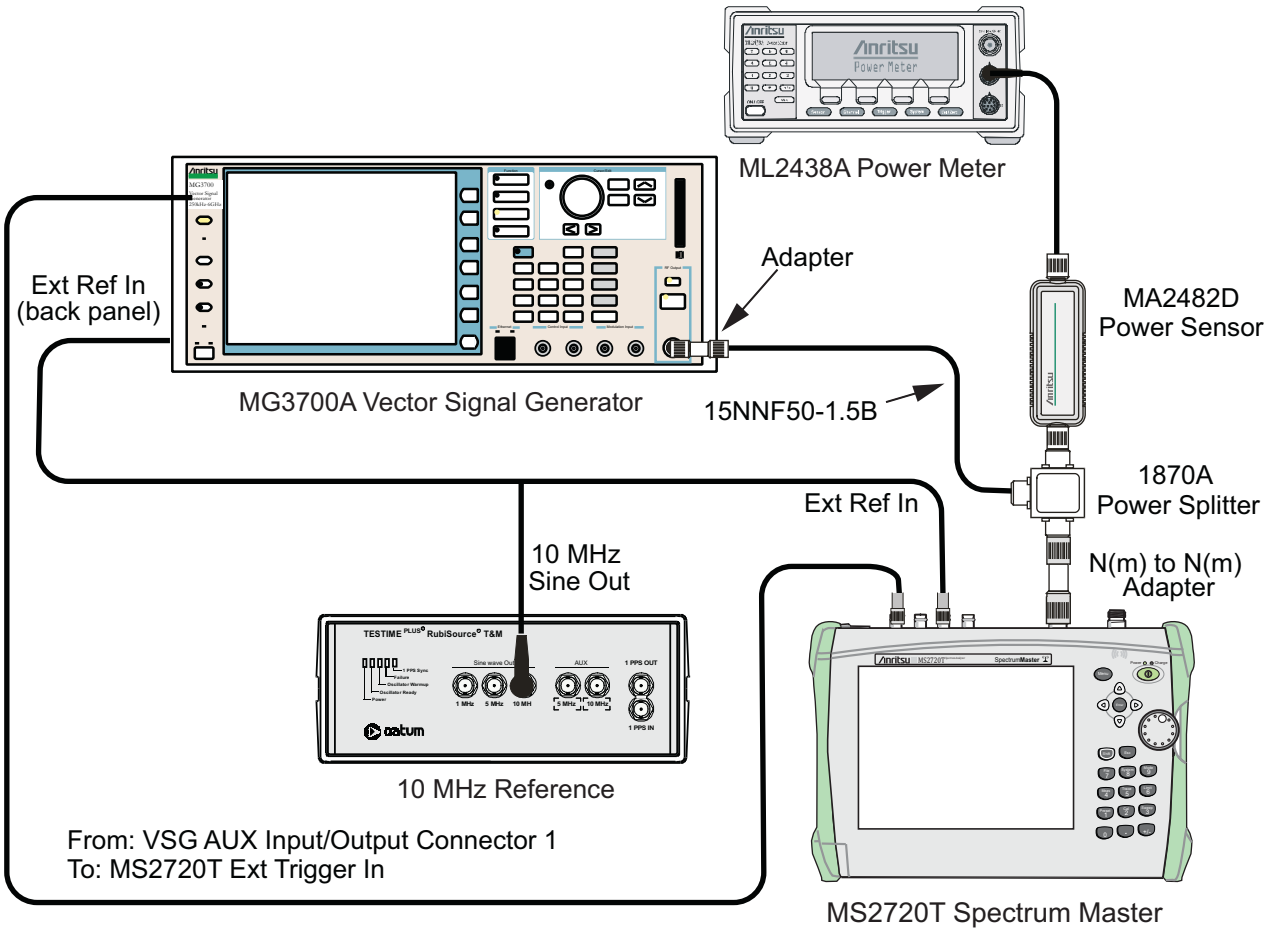


Figure 3-12. EVDO Signal Analyzer, Test Setup

Set up Procedure

1. Zero the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 3-12.
3. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MS2720T mode to EVDO Signal Analyzer. Preset the instrument.

8PSK Modulation Channel Power, Frequency Error, Rho, and Tau Tests

Test Procedure

1. On the MG3700A, press the **Preset** key (Yellow key on the upper-left corner).
2. Press the **Down Arrow** key or turn the knob to select Yes.
3. Press the **Set** key (Note that two Set keys are available, and they both do the same thing).
4. Press the (F1) submenu key to select "Load File to Memory".
5. Press the (F1) submenu key again to select "Select Package".
6. Using the **Down Arrow** key, step through the selection list until the CDMA2000_1xEVDO option is highlighted.
7. Press the **Set** key.
8. Press the (F6) submenu key, Return.
9. Press the **Set** key. The Select Package box is displayed. Use the rotary knob to highlight CDMA2000_1xEVDO and press the **Set** key to select.
10. Another File List is displayed. Use the rotary knob to select FWD_921_6KBPS_2SLOT and press the **Set** key to select.
11. Press the **MOD On/Off** key to turn the Modulation LED On, and verify that the "Playing" indicator in the center of the LCD is flashing.
12. Press the **Frequency** key, and enter 870.03 MHz.
13. Press the **Level** key, enter –30, and press the **dBm** key.
14. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-103, "RF Measurements, At 870.03 MHz, –50 dBm Level, 921.6 kps 8PSK Modulation" on page A-51.
15. On the MS2720T, press the **Freq** main menu key, and enter 870.03 MHz as Center Freq.
16. Press the **Measurements** main menu key, and press EVDO Summary (a red dot is displayed on the label).
17. Press the **Setup** main menu key and press PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger submenu key twice. Then wait 15 seconds to allow the MS2720T to update its measured results.
18. Record the "MS2720T Reading", the displayed Channel Power value, into Table A-103.
19. Subtract the "MS2720T Reading" of displayed Channel Power value from the "Power Meter Reading" in Step 14. Then record the "Calculated Channel Power Error" into Table A-103.
20. Record the displayed Freq Error, Rho Pilot and Tau into Table A-108, "Demodulation, At 870.03 MHz, –50 dBm Level, 921.6 kps 8PSK Modulation" on page A-52.
21. Verify that the measured values in Step 19 and Step 20 are within specifications.

QPSK Modulation Channel Power, Frequency Error, Rho, and Tau Tests

Test Procedure

1. Ensure that the equipment settings are unchanged from the previous test.
2. On the MG3700A, change the selected pattern to FWD_38_4KBPS_16SLOT.
3. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MG3700A Frequency to 1930.05 MHz.
5. Adjust the MG3700A output so that the power meter reads 0 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-104, "RF Measurements, At 1930.05 MHz, 0 dBm Level, 38.4 kps QPSK Modulation" on page A-51.
6. On the MS2720T, press the **Freq** main menu key and enter 1930.05 MHz as Center Freq. Then wait 15 seconds to allow the MS2720T to update its measured results.
7. Record the "MS2720T Reading", the displayed Channel Power value, into Table A-104.
8. Subtract the "MS2720T Reading" of displayed Channel Power value from the "Power Meter Reading" in Step 5. Then record the "Calculated Channel Power Error" into Table A-104.
9. Record the displayed Freq Error, Rho Pilot and Tau into Table A-109, "Demodulation, At 1930.05 MHz, 0 dBm Level, 38.4 kps QPSK Modulation" on page A-52.
10. Verify that the measured values in Step 8 and Step 9 are within specifications.

16QAM Modulation Channel Power, Frequency Error, Rho, and Tau Tests

Test Procedure

1. Ensure that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, and the MG3700A frequency and MS2720T Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD_2457_6KBPS_1SLOT.
3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-105, "RF Measurements, At 1930.05 MHz, –50 dBm Level, 2457.6 kps 16QAM Modulation" on page A-51.
4. Then wait 15 seconds to allow the MS2720T to update its measured results.
5. Record the "MS2720T Reading", the displayed Channel Power value, into Table A-105.
6. Subtract the "MS2720T Reading" of displayed Channel Power value from the "Power Meter Reading" in Step 3. Then record the "Calculated Channel Power Error" into Table A-105.
7. Record the displayed Freq Error, Rho Pilot and Tau into Table A-110, "Demodulation, At 1930.05 MHz, –50 dBm Level, 2457.6 kps 16QAM Modulation" on page A-53.
8. Verify that the measured values in Step 6 and Step 7 are within specifications.

Idle Slot Channel Power, Frequency Error, Rho, and Tau Tests

Test Procedure

1. Ensure that the equipment settings are unchanged from the previous test. The power sensor Cal Factor frequency should still be at 1930 MHz, and the MG3700A frequency and MS2720T Center Frequency should still be at 1930.05 MHz.
2. On the MG3700A, change the selected pattern to FWD_IDLE.

3. Adjust the MG3700A output so that the power meter reads –50 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-106, "RF Measurements, At 1930.05 MHz, –50 dBm Level, Idle Slot" on page A-51
4. Then wait 15 seconds to allow the MS2720T to update its measured results.
5. Record the "MS2720T Reading", the displayed Channel Power value, into Table A-106.
6. Subtract the "MS2720T Reading" of displayed Channel Power value from the "Power Meter Reading" in Step 3. Then record the "Calculated Channel Power Error" into Table A-106.
7. Record the displayed Freq Error, Rho Pilot and Tau into Table A-111, "Demodulation, At 1930.05 MHz, –50 dBm Level, Idle Slot" on page A-53.
8. Verify that the measured values in Step 6 and Step 7 are within specifications.
9. On the power meter, press the **Sensor** key, the Cal Factor submenu key, and then the Freq submenu key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
10. Set the MG3700A Frequency to 870.03 MHz.
11. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-107, "RF Measurements, At 870.03 MHz, –10 dBm Level, Idle Slot" on page A-52.
12. On the MS2720T, press the **Freq** main menu key, and enter 870.03 MHz as Center Freq. Then wait 15 seconds to allow the MS2720T to update its measured results.
13. Record the MS2720T displayed Channel Power value into Table A-107.
14. Subtract the "MS2720T Reading" of displayed Channel Power value from the "Power Meter Reading" in Step 11. Then record the "Calculated Channel Power Error" intoTable A-107.
15. Record the displayed Freq Error, Rho Pilot and Tau into Table A-112, "Demodulation, At 870.03 MHz, –10 dBm Level, Idle Slot" on page A-53.
16. Verify that the measured values in Step 14 and Step 15 are within specifications.

3-11 Option 885, Fixed WiMAX Signal Analyzer Verification

The tests in this section verify the functionality of the Fixed WiMAX Signal Analyzer of the MS2720T.

Fixed WiMAX Channel Power Accuracy Tests

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

Setup

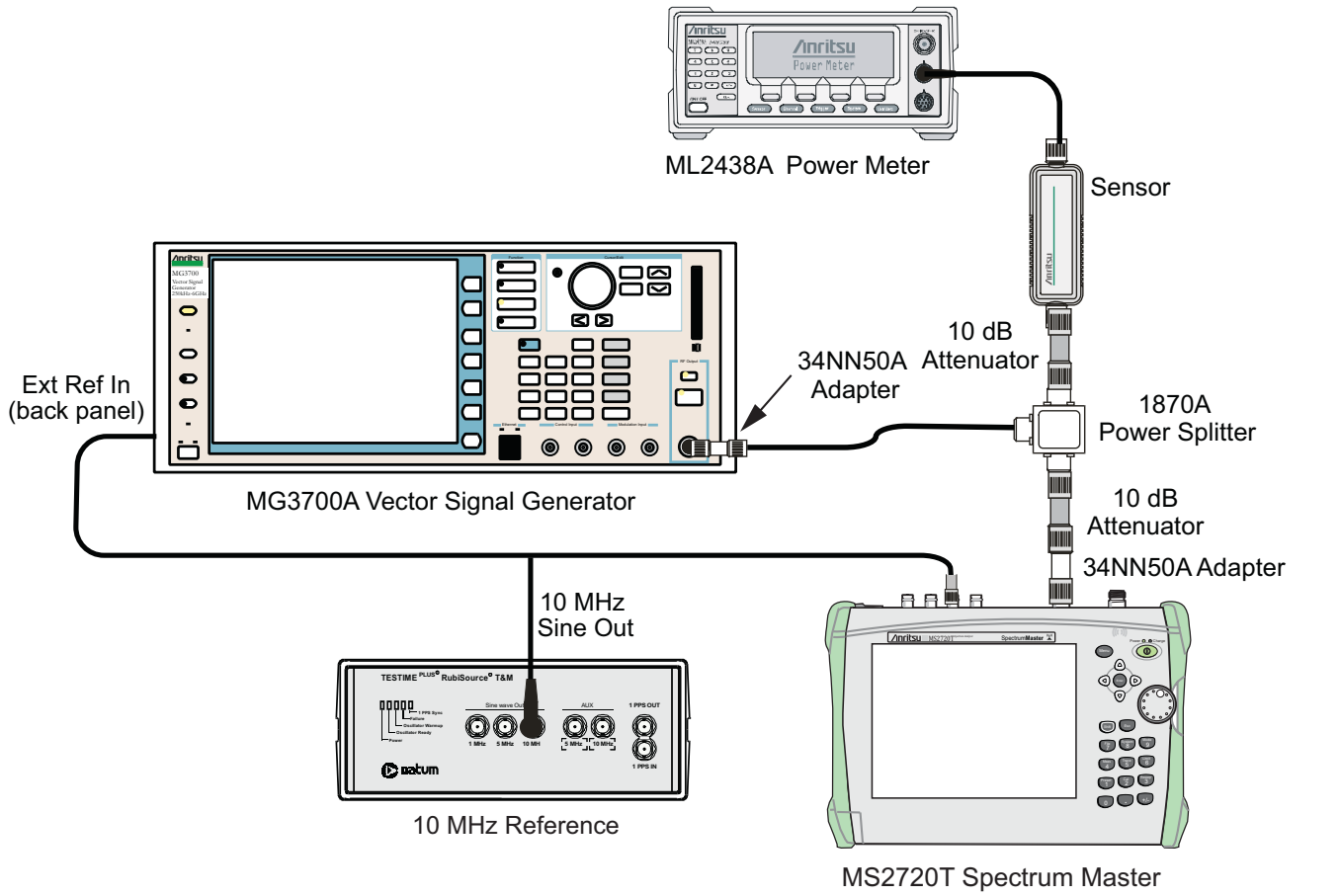


Figure 3-13. Fixed WiMAX Signal Analyzer, Test Setup

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to "True RMS", set Averaging MODE to "Moving", and set Averaging NUMBER to "256".
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect the Power Sensor, 1870A splitter, and 10 dB attenuators (quantity 2) as shown in Figure 3-13.
5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key.
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the **Down Arrow** key, step through the selection list until WiMAX is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key, Return.
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select WiMAX and press **Set**.
   i. Another file list is displayed. Select (highlight) Mx10g32.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB, and record the actual power meter reading into the "Input Power Reading" column of Table A-113, "RF Measurements, Fixed WiMAX Channel Power Accuracy Adjusted MG3700A Level Settings" on page A-54.
7. Set the MS2720T to Fixed WiMAX Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu and set the Center Freq to 2600.5 MHz.
   b. Press the **Setup** main menu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the **Setup** main menu key) and set the CP Ratio to 1/32.
   d. Press the **Measurements** main menu key and press RF Measurements, then press Power vs. Time.
9. Record the MS2720T Channel Power (RSSI) reading into the "Measured Channel Power (RSSI)" column in Table A-114, "RF Measurements, Fixed WiMAX Channel Power Accuracy" on page A-54.
10. Calculate the Channel Power Error by subtracting the MS2720T "Measured Channel Power (RSSI)" reading from the power meter reading in Step 6 (Table A-113). Record the result into the "Error" column in Table A-114.
11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm, and record the actual power meter reading into the "Input Power Reading" column of Table A-113.
13. Record the MS2720T Channel Power (RSSI) reading into the "Measured Channel Power (RSSI)" column in Table A-114.
14. Calculate the Channel Power Error by subtracting the MS2720T "Measured Channel Power (RSSI)" reading from the power meter reading in Step 12 (Table A-113). Record the result to the "Error" column in Table A-114.

15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
17. Set MG3700A frequency to 3600.5 MHz.
18. Change the center frequency of the MS2720T to 3600.5 MHz.
19. Repeat Step 6 through Step 15 using the 3600.5 MHz setting.
20. Verify that the errors are within specification.
21. Set the calibration factor frequency of the power sensor to 5600.5 MHz.
22. Set MG3700A frequency to 5600.5 MHz.
23. Change the center frequency of the MS2720T to 5600.5 MHz.
24. Repeat Step 6 through Step 15 using the 5600.5 MHz setting.

Fixed WiMAX Residual EVM and Frequency Error Tests

Procedure

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to “True RMS”, set Averaging MODE to “Moving”, and set Averaging NUMBER to “256”.
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect the Power Sensor, 1870A splitter, and 10 dB attenuators as shown in Figure 3-13.
5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) submenu key to select “Load File to Memory”.
   d. Press the (F1) submenu key again to select “Select Package”.
   e. Using the **Down Arrow** key, step through the selection list until WiMAX is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key, Return.
   h. Press the **Set** key. The “Select Package” list box is displayed. Again select WiMAX and press **Set**.
   i. Another file list is displayed. Select (highlight) Mx10g32.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the “Playing” indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.
7. Set the MS2720T to Fixed WiMAX Signal Analyzer mode and Preset the instrument.
8. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the **Setup** main menu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the **Setup** main menu key) and set the CP Ratio to 1/32.
   d. Press the **Measurements** main menu key, and press Demodulator, then press Modulation Summary.

9. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-115, "Demodulation, Fixed WiMAX Residual EVM" on page A-55.
10. Verify that the measured EVM is within specification.
11. Adjust the MG3700A Level setting to approximately –13 dBm so that the power meter reads –30.0 dBm ± 0.2 dB.
12. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-115.
13. Verify that the measured EVM is within specification.
14. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB.
15. Record the MS2720T Frequency Error reading into Table A-116, "Demodulation, Fixed WiMAX Frequency Error" on page A-55.
16. Verify that the measured Frequency Error is within specification.
17. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
18. Set MG3700A frequency to 3600.5 MHz.
19. Change the center frequency of MS2720T to 3600.5 MHz.
20. Measure the EVM (rms) for both –15 dBm and –30 dBm, and then record the measured results into Table A-115.
21. Verify that the measured EVM is within specification.
22. Set the calibration factor frequency of the power sensor to 5600.5 MHz.
23. Set MG3700A Frequency to 5600.5 MHz.
24. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB.
25. Change the center frequency of the MS2720T to 5600.5 MHz.
26. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-115.
27. Verify that the measured EVM is within specification.
28. Adjust the MG3700A Level setting to approximately –13 dBm so that the power meter reads –30.0 dBm ± 0.2 dB.
29. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-115.
30. Verify that the measured EVM is within specification.
31. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB.
32. Record the MS2720T Frequency Error reading into Table A-116.
33. Verify that the measured Frequency Error is within Specification.

3-12 Option 885, Mobile WiMAX Signal Analyzer Verification

Mobile WiMAX Channel Power Accuracy Tests

The tests in this section verify the functionality of the Mobile WiMAX Signal Analyzer of the MS2720T Spectrum Master.

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Power Meter, Anritsu Model ML2438A
- Power Sensor, Anritsu Model MA2482D
- Power Splitter, Aeroflex/Weinschel Model 1870A
- Fixed Attenuator, Aeroflex/Weinschel Model 4410 (2)
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

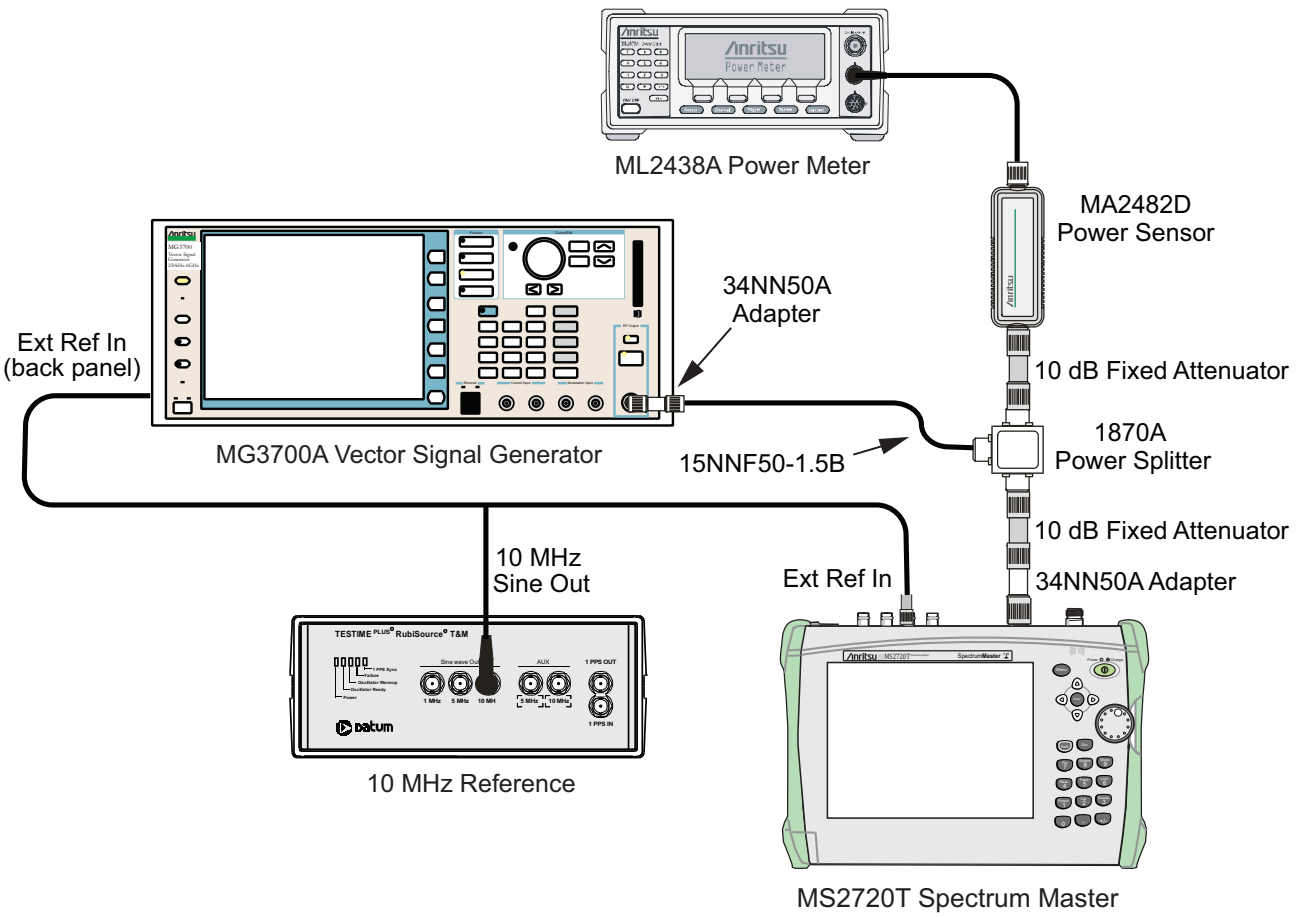


Figure 3-14. Mobile WiMAX Channel Power Accuracy Test Setup

Setup

1. Connect the Power Sensor to the power meter and zero the sensor.
2. Set the Power Meter Measurement MODE to True RMS, set Averaging MODE to Moving, and set Averaging NUMBER to **256**.
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect all of the test equipment as shown in Figure 3-14.

Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

Procedure

1. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the **Down Arrow** key, step through the selection list until mWiMAX is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key, Return.
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select mWiMAX and press **Set**.
   i. Another file list is displayed. Select (highlight) "10m1024g8_0_10_cap".
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
2. Adjust the MG3700A Level setting with the knob so that the power meter reads – 15.0 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-117, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –15.0 dBm)" on page A-56.
3. Set the MS2720T to Mobile WiMAX Signal Analyzer mode and Preset the instrument.
4. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the **Setup** main menu key and set the Bandwidth to 10 MHz.
   c. Press the Frame Length submenu key and set the Frame Length to 10 ms.
   d. Press the **Measurements** main menu key, press RF, and then press Power vs. Time.
5. Record the "MS2720T Reading", the displayed Channel Power (RSSI) value, into Table A-117.
6. Calculate the Channel Power Error by subtracting the "MS2720T reading" from the "Power Meter Reading" in Step 2. Record the result into Table A-117.
7. Verify that the error is within specification.
8. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-118, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –50.0 dBm)" on page A-56.
9. Record the "MS2720T Reading", the displayed Channel Power (RSSI) value, into Table A-118.

10. Calculate the Channel Power Error by subtracting the "MS2720T Reading" of Channel Power (RSSI) from the "Power Meter Reading" in Step 8. Record the "Calculated Channel Power Error" into Table A-118.
11. Verify that the error is within specification.
12. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
13. Set MG3700A Frequency to 3600.5 MHz.
14. Change the center frequency of MS2720T to 3600.5 MHz.
15. Measure the Channel Power (RSSI) for both –15 dBm and –50 dBm, and then record the measured results and calculated errors into Table A-119, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –15.0 dBm)" on page A-56 and Table A-120, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –50.0 dBm)" on page A-56.
16. Verify that the errors are within specification.

Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

Procedure

1. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the **Down Arrow** key, step through the selection list until "mWiMAX" is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key, Return.
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select mWiMAX and press **Set**.
   i. Another file list is displayed. Select (highlight) 5m512g8_2_5_cap.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On.
2. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-121, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –15.0 dBm)" on page A-57.
3. Set the MS2720T to Mobile WiMAX Signal Analyzer mode and preset the instrument.
4. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the **Setup** main menu key and set the Bandwidth to 5 MHz.
   c. Press the Frame Length submenu key and set the Frame Length to 5 ms.
   d. Press the **Measurements** main menu key, press RF, then press Power vs. Time.
5. Record the "MS2720T Reading", the displayed Channel Power (RSSI) value, into Table A-121.
6. Calculate the Channel Power Error by subtracting the "MS2720T reading" from the "Power Meter Reading" in Step 2. Record the result into Table A-121.

7. Verify that the error is within specification.
8. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dB, and record the actual value as shown on the power meter into Table A-122, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –50.0 dBm)" on page A-57.
9. Record the "MS2720T Reading", the displayed Channel Power (RSSI) value, into Table A-122.
10. Calculate the Channel Power Error by subtracting the "MS2720T Reading" of Channel Power (RSSI) from the "Power Meter Reading" in Step 8. Record the "Calculated Channel Power Error" into Table A-122.
11. Verify that the error is within specification.
12. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
13. Set MG3700A Frequency to 3600.5 MHz.
14. Change the Center Frequency of MS2720T to 3600.5 MHz.
15. Measure the Channel Power (RSSI) for both –15 dBm and –50 dBm, and then record the measured results and calculated errors into Table A-123, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –15.0 dBm)" on page A-57 and Table A-124, "RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –50.0 dBm)" on page A-57.
16. Verify that the errors are within specification.

Mobile WiMAX Residual EVM and Frequency Error Tests (Option 885)

Equipment Required for MS2720T with option 709, 713 or 720

- Anritsu MG3700A Vector Signal Generator
- Frequency Reference Symmetricom Rubisource T&M
- Anritsu 34NN50A 50 ohm Adapter (2)
- Anritsu 15NN50-1.5C RF Coaxial Cable
- BNC male to BNC male Coaxial Cable

Equipment Required for MS2720T with option 732 or 743

- All of the above, plus
- Anritsu 71693-R Ruggedized K(f) to N(f) Adapter

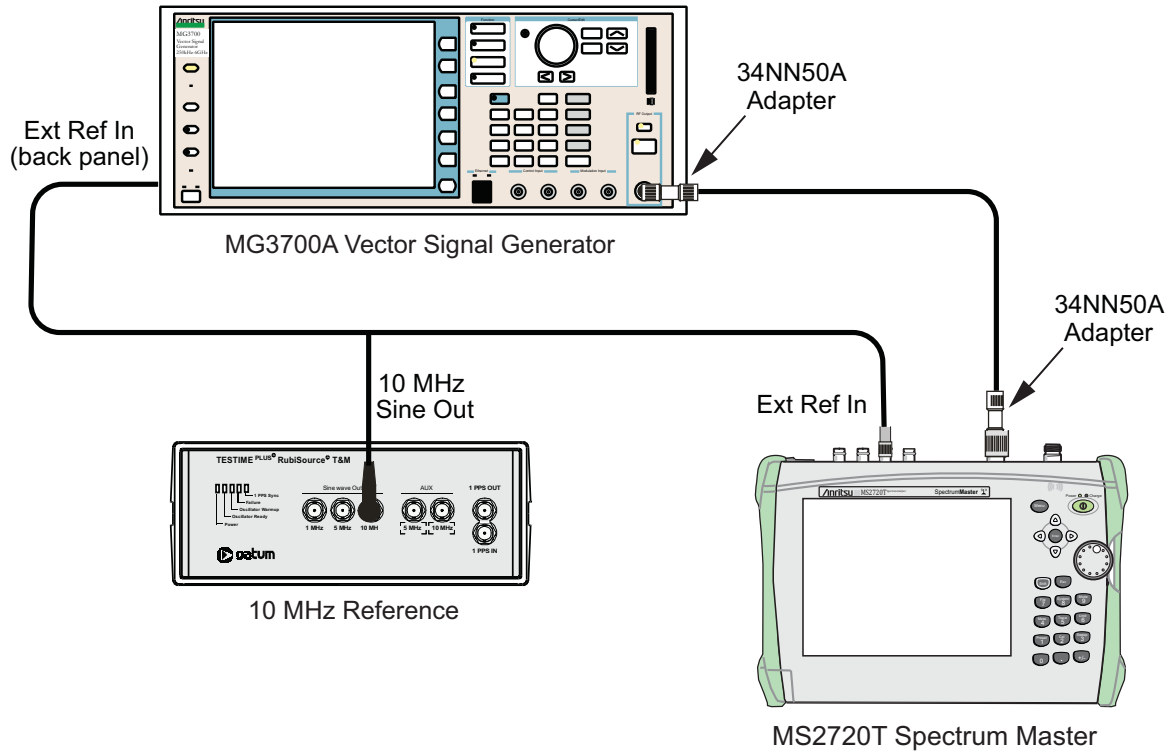


Figure 3-15. Mobile WiMAX Residual EVM Test Setup

Setup Procedure

1. Connect the 10 MHz Reference to the 10 MHz/5 MHz Ref Input of the MG3700A and the Ext Ref In of the MS2720T as shown in Figure 3-15.
2. Connect the RF Out of the MG3700A to the Spectrum Analyzer RF In connector of the MS2720T.

Residual EVM and Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

3. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) submenu key to select "Load File to Memory".
   d. Press the (F1) submenu key again to select "Select Package".
   e. Using the **Down Arrow** key, step through the selection list until mWiMAX is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) submenu key, Return.
   h. Press the **Set** key. The "Select Package" list box is displayed. Again select mWiMAX and press **Set**.
   i. Another file list is displayed. Select (highlight) 10m1024g8_0_10_cap.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output On then adjust the level until the power meter reads –15.0 dBm ± 0.2 dB.
4. Set the MS2720T to Mobile WiMAX Signal Analyzer mode and Preset the instrument.
5. Set the MS2720T as follows:
   a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
   b. Press the **Setup** main menu key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio submenu key (under the **Setup** main menu key) and set the CP Ratio to 1/8.
   d. Press the Frame Length submenu key and set the Frame Length to 10 ms.
   e. Press the Demod submenu key and set Demod to FCH.
   f. Press the **Measurements** main menu key and press Demodulator, then press Modulation Summary.
6. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-125, "Demodulation, Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)" on page A-58.
7. Verify that the measured EVM is within specification.
8. Adjust the MG3700A Level until the power meter reaqds –30.0 dBm ± 0.2 dB.
9. Record the MS2720T EVM (rms) reading into the "EVM (rms)" column in Table A-125.
10. Verify that the measured EVM is within specification.
11. On the MS2720T, press the **Setup** main menu key, and set Demod to Auto.
12. Adjust the MG3700A Level until the power meter reaqds –50.0 dBm ± 0.2 dB.
13. Record the MS2720T frequency error reading to the "Frequency Error" column in Table A-126, "Demodulation, Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)" on page A-58.
14. Verify that the measured Frequency Error is within specification.
15. Set MG3700A Frequency to 3600.5 MHz.
16. On the MS2720T, change the Center Frequency to 3600.5 MHz.
17. Press the **Setup** main menu key and set Demod to FCH.

18. Measure the EVM(rms) for both –15 dBm and –30 dBm, and then record the measured results into Table A-125.
19. Verify that the measured EVM is within specification.
20. Repeat Step 11 through Step 14 to measure the Frequency Error at 3600.5 MHz.

Residual EVM and Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

21. Set the MG3700A as follows:
    a. Press the yellow **Preset** button (answer yes to the question).
    b. Press the **Set** key
    c. Press the (F1) submenu key to select "Load File to Memory".
    d. Press the (F1) submenu key again to select "Select Package".
    e. Using the **Down Arrow** key, step through the selection list until "mWiMAX" is highlighted.
    f. Press the **Set** key.
    g. Press the (F6) submenu key, Return.
    h. Press the **Set** key. The "Select Package" list box is displayed. Again select mWiMAX and press **Set**.
    i. Another file list is displayed. Select (highlight) 5m512g8_2_5_cap.
    j. Press the **Set** key.
    k. Press the **MOD On/Off** key and verify that the LED is On. Ensure that the "Playing" indicator is displaying the moving pattern.
    l. Press the **Frequency** key, then enter 2600.5 MHz.
    m. Press the **Level** key, then enter –15 dBm adjust the level until the power meter reads –15 dBm ± 0.2 dB. Turn the output On.
22. Set the MS2720T as follows:
    a. Press the **Freq** main menu key and set the Center Freq to 2600.5 MHz.
    b. Press the **Setup** main menu key and set the Bandwidth to 5 MHz.
    c. Press the CP Ratio submenu key (under the **Setup** main menu key) and set the CP Ratio to 1/8.
    d. Press the Frame Length submenu key and set the Frame Length to 5 ms.
    e. Press the Demod submenu key and set Demod to FCH.
    f. Press the **Measurements** main menu key, press Demodulator, then press Modulation Summary.
23. Repeat Step 6 through Step 20, recording the results into Table A-127, "Demodulation, Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)" on page A-58 and Table A-128, "Demodulation, Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)" on page A-58.

Chapter 4 — Battery Information

4-1 General Information

The following information relates to the care and handling of the Anritsu 633-75 battery pack and Lithium-Ion batteries.

- The battery supplied with the Spectrum Master may need charging before use. Before using the Spectrum Master, the internal battery may be charged either in the unit using the AC-DC Adapter (40-187-R) or the 12-Volt DC adapter (806-62), or separately in the optional Dual Battery Charger (2000-1374).
- Use only Anritsu approved battery packs.
- Recharge the battery only in the Spectrum Master or in an Anritsu approved charger.
- When the Spectrum Master or the charger is not in use, disconnect it from the power source.
- Do not charge batteries for longer than 24 hours; overcharging may shorten battery life.
- If left unused a fully charged battery will discharge itself over time.
- Temperature extremes affect the ability of the battery to charge: allow the battery to cool down or warm up as necessary before use or charging.
- Discharge the battery from time to time to improve battery performance and battery life.
- The battery can be charged and discharged hundreds of times, but it will eventually wear out.
- The battery may need to be replaced when the operating time between charging becomes noticeably shorter than normal.
- Never use a damaged or worn out charger or battery.
- Storing the battery in extreme hot or cold places will reduce the capacity and lifetime of the battery.
- Never short-circuit the battery terminals.
- Do not drop, mutilate or attempt to disassemble the battery.
- Do not dispose of batteries in a fire!
- Batteries must be recycled or disposed of properly. Do not place batteries in household garbage.
- Always use the battery for its intended purpose only.

Warning



This equipment is supplied with a rechargeable battery that could potentially leak hazardous compounds into the environment. These hazardous compounds present a risk of injury or loss due to exposure. Anritsu Company recommends removing the battery for long-term storage of the instrument and storing the battery in a leak-proof, plastic container. Follow the environmental storage requirements specified in the product data sheet.

4-2 Battery Pack Removal and Replacement

This section provides instructions for the removal and replacement of the Spectrum Master battery pack.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the Spectrum Master.

1. Locate the battery access door illustrated in Figure 4-1.

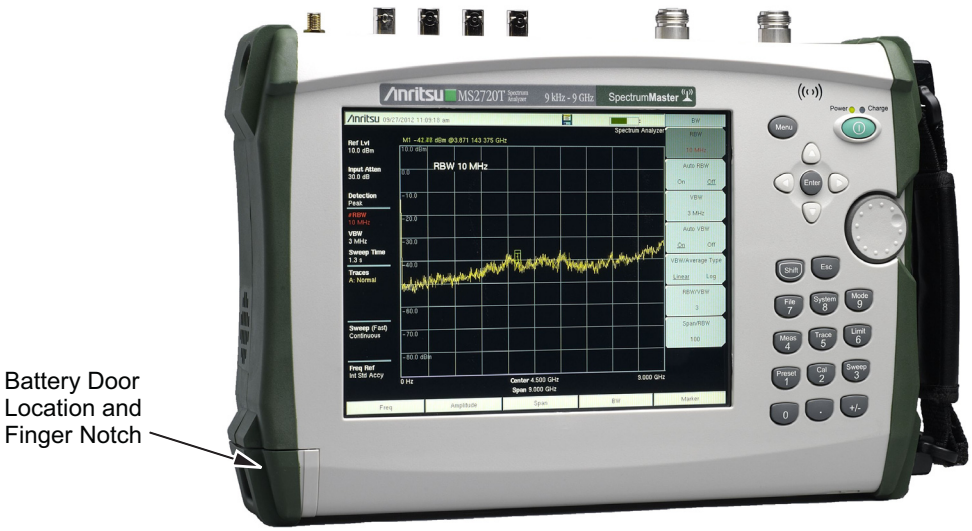


Figure 4-1. Battery Access Door Location and Finger Notch

2. With the Spectrum Master laying flat and face up on a stable surface, grab the battery access door notch and pull the battery door down towards the bottom of the instrument as shown in Figure 4-2.



Figure 4-2. Opening the Battery Access Door

3. Remove the battery access door as shown Figure 4-3.

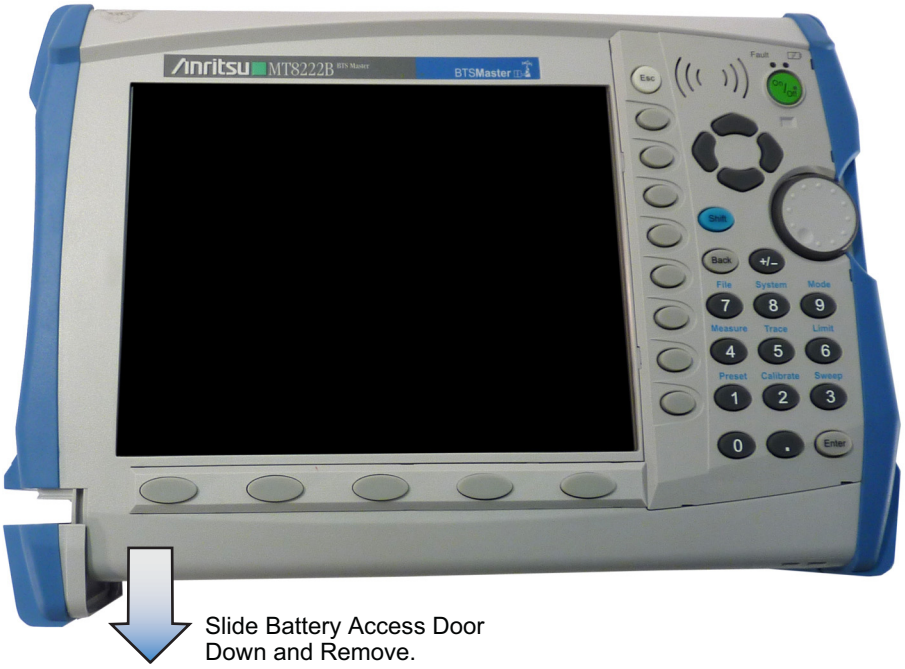


Figure 4-3. Removing the Battery Access Door

4. With the battery access door completely removed, grasp the battery lanyard and pull the battery straight out of the unit, as illustrated in Figure 4-4.



Figure 4-4. Removing the Battery

5. Replacement is the opposite of removal. Note the orientation of the battery contacts, and be sure to insert the battery with the contacts facing the bottom of the unit, refer to Figure 4-5.

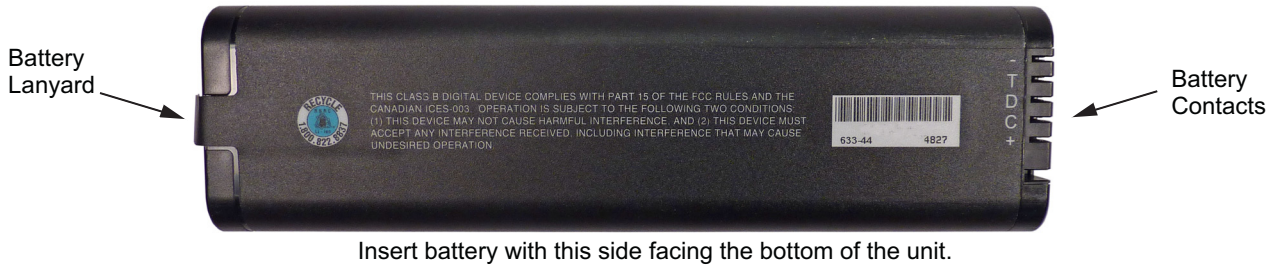


Figure 4-5. Battery Contacts and Orientation

Chapter 5 — Assembly Replacement

5-1 Introduction

This chapter describes opening and closing the Spectrum Master case along with basic parts replacement steps. The sections are as follows:

- "Replaceable Parts List" on page 5-1
- "Opening the Spectrum Master Case" on page 5-2
- "Tracking Generator Module Assembly Replacement" on page 5-6
- "Spectrum Analyzer Module Assembly Replacement" on page 5-7
- "Main PCB Assembly Replacement" on page 5-8
- "GPS (Option 31) Module Replacement" on page 5-10
- "Fan Assembly Replacement" on page 5-10
- "LCD Assembly Replacement" on page 5-10
- "Keypad Membrane and Main Keypad PCB Replacement" on page 5-13
- "Touch Screen Replacement" on page 5-16

5-2 Replaceable Parts List

Refer to Table 1-4, "List of Replaceable Parts" on page 1-5 for the list of replaceable parts. Refer to the following sections for basic replacement instructions.

Note	Many of the procedures in this section are generic, and apply to many similar instruments. Photos and illustrations used are representative and may show instruments other than the Spectrum Master.

Caution	Only qualified personnel should open the case and replace internal assemblies. Assemblies shown in Table 1-4 are typically the only items that may be replaced. As they are high;y fragile, items that must be soldered may not be replaced without specialized training. Removing RF shield from PC boards or adjustment of screws on or near the shields may detune sinsitive RF circuits and will result in degraded performance. All work should be performed in a static-safe work area.

5-3 Opening the Spectrum Master Case

Caution	Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. The Spectrum Master contains components that can easily be damaged by electrostatic discharge (ESD). An ESD safe work area and proper ESD handling procedures that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007 is mandatory to avoid ESD damage when handling subassemblies or components found in the instrument. Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

This procedure provides instructions for opening the Spectrum Master case. With the case opened, the internal assemblies can be removed and replaced, as detailed in the following sections.

1. Remove the battery door and battery as shown in Section 4-2 “Battery Pack Removal and Replacement” on page 4-2.
2. **Units with Option 31:** The GPS SMA connector is now attached to front case and is no longer required to be removed to open up the Spectrum Master case. (Figure 5-1).



Figure 5-1. Option 31 Connector

3. Place the Spectrum Master face down on a stable work surface that will not scratch the display.

4. Use a Torx T10 screwdriver to remove the four screws securing the two halves of the Spectrum Master case together (Figure 5-2).



Figure 5-2. Remove the Four Screws

5. Carefully lift up on the side of the case shown and begin to separate the two halves.

Caution	Do not force or pull the two halves of the case apart completely, there are delicate cables attached between the two halves that must be disconnected first. Refer to Figure 5-3 and Figure 5-4. Note the position and routing of the cables, they should be similarly routed when the unit is reassembled.

6. Partially open the case and carefully disconnect the ribbon cable that connects the Spectrum Analyzer Assembly to the Main PCB Assembly. The cable is attached between the two sides of the Spectrum Master.

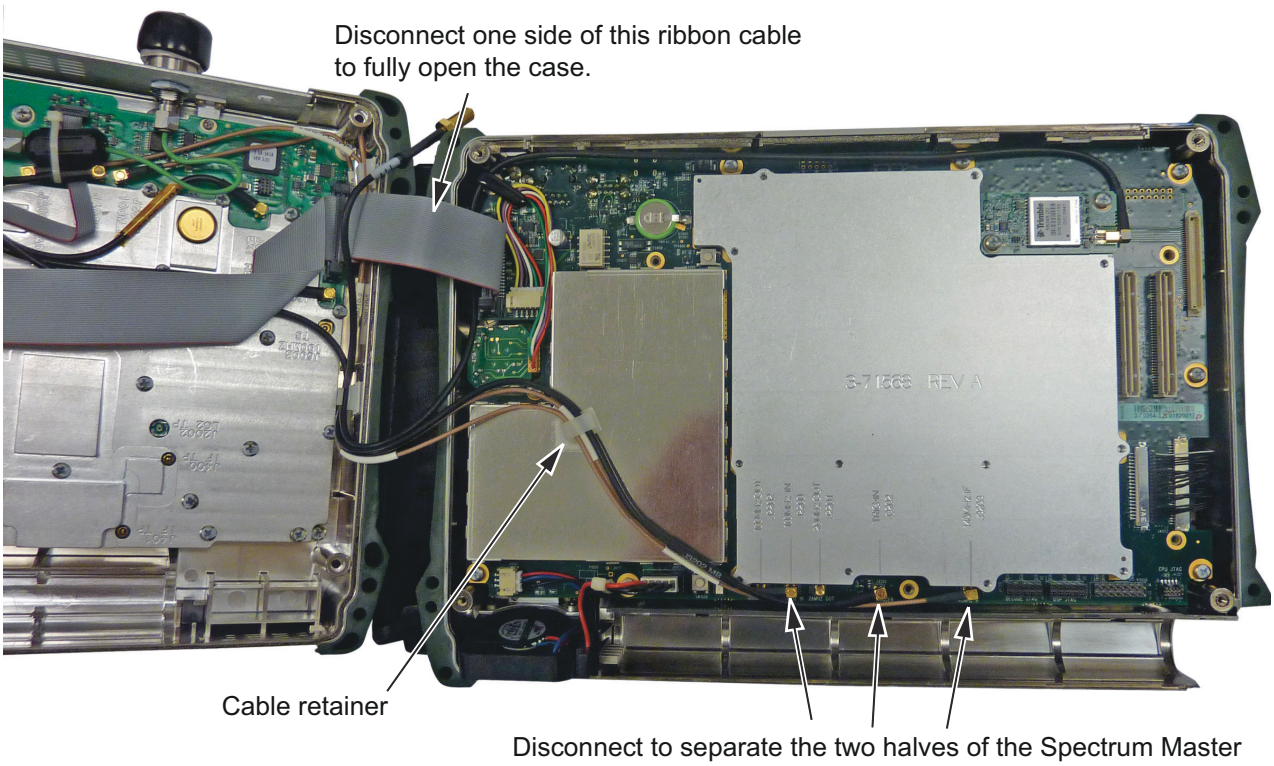


Figure 5-3. Disconnect the Cables Between the Two Halves of the Spectrum Master

7. The Spectrum Master can now be fully opened and laid flat.

8. Carefully remove the 3 connectors at the bottom of the Main PCB Assembly. Note the cable routing in the cable retainer and the location where each cable is connected.

9. The two halves of the instrument can now be safely separated (Figure 5-4). Refer to the following sections of this chapter to remove and replace specific components of the instrument.

Note	Proper routing of the cables is important for instrument performance. Note the cable routing.

10. Reverse the above steps to reassemble the case.

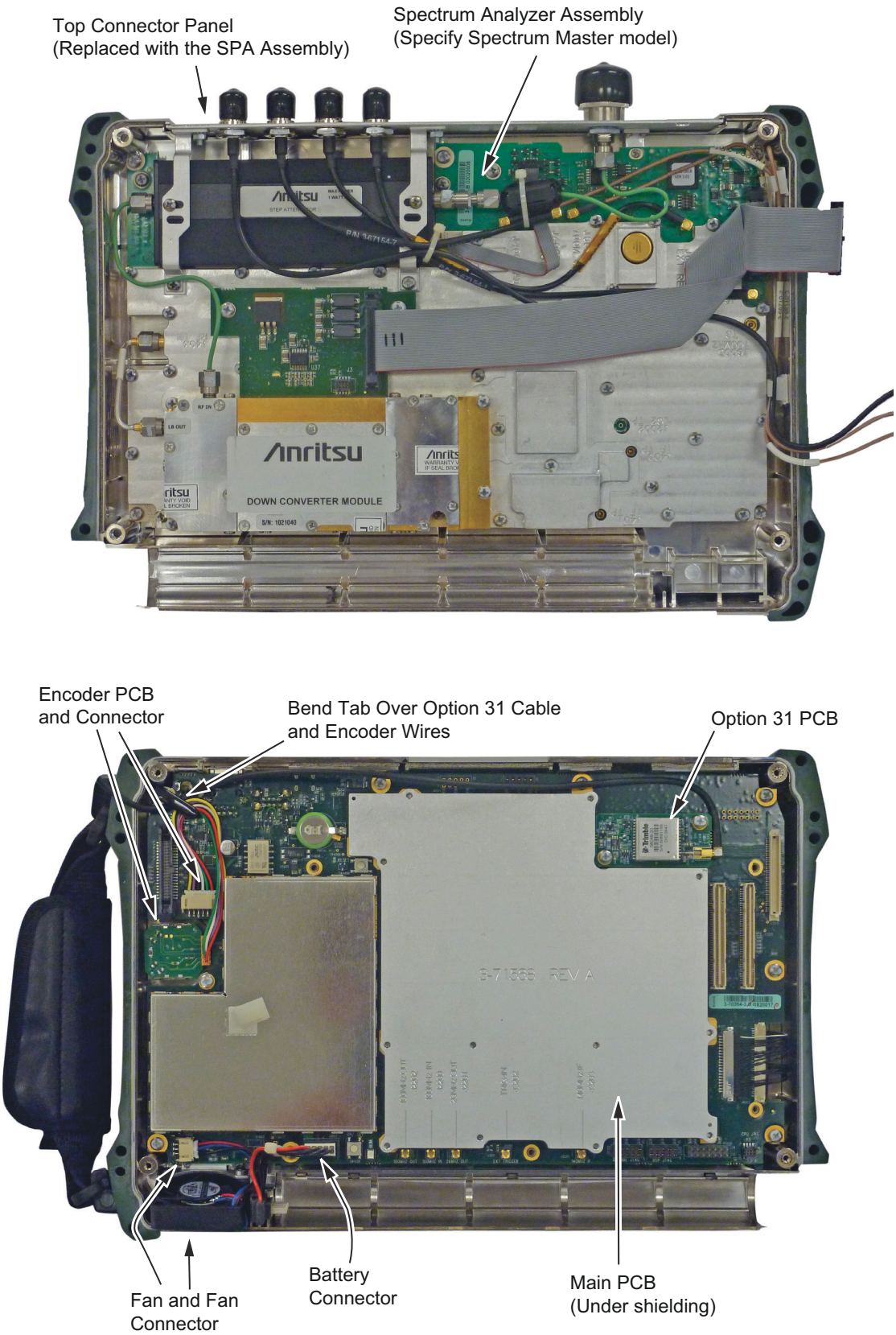


Figure 5-4. SPA Analyzer PCB Assembly (Top) and Main PCB Assembly (Bottom)

5-4 Tracking Generator Module Assembly Replacement

This procedure provides instructions for removing and replacing the Tracking Generator Module Assembly. The Tracking Generator Module Assembly is mounted on top of the Spectrum Analyzer Module Assembly which are located in the back half of the case and includes the Top Connector Panel.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the ribbon cable attached to the Tracking Genrator Module Assembly.
3. Remove the SMA cable attached at the J2 location on the Tracking Generator.
4. Using a 5/16 torque wrench (8 in/lbs) loosen the semi rigid cable connection on the Tracking Generator.
5. Use a Torx T10 driver to remove the six screws, denoted by the M3 x 20 MMstamping on the shield, securing the Tracking Generator to the Spectrum Analyzer Module Assembly (Figure 5-5).
6. Carefully lift up the Tracking Generator Module Assembly and remove the semi rigid cable loosened in step 4 to allow the complete removal of the Tracking Generator Module Assembly.

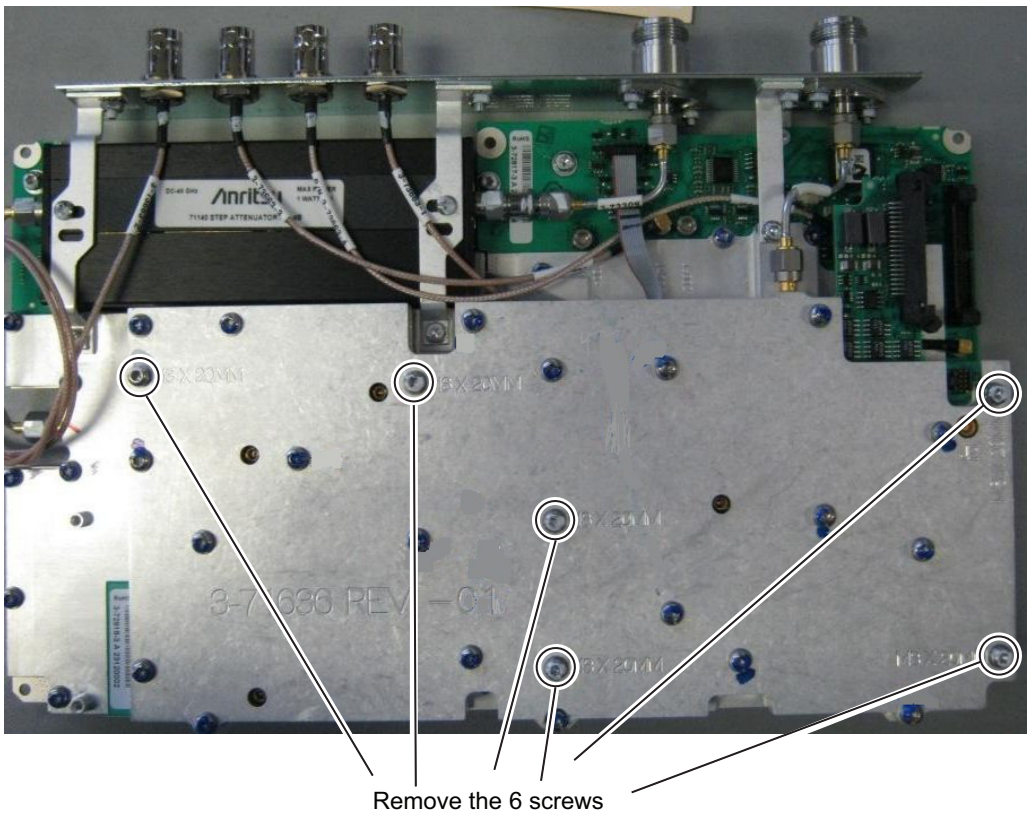


Figure 5-5. Tracking Generator ModuleAssembly

7. Reverse the above steps to install the new Tracking Generator Module Assembly. Take note that there are bosses on the Tracking Generator shield that must line up with the bosses on the Spectrum Anaylzer shield.

Note	There is an RF gasket material between the two halves of the case, and in the connector panel grooves. Take care not to remove or damage this material when removing or replacing the Spectrum Analyzer Module and connector panel assembly.

5-5 Spectrum Analyzer Module Assembly Replacement

This procedure provides instructions for removing and replacing the Spectrum Analyzer PCB Assembly. The Spectrum Analyzer Module Assembly is located in the back half of the case and includes the Top Connector Panel.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. If the unit has Option 809 or 813 or 820 then remove the Tracking Generator Module Assembly as described in Section 5-4 “Tracking Generator Module Assembly Replacement”.
3. Use a Torx T10 screwdriver to remove the six screws securing the Spectrum Analyzer Module Assembly to the back half of the instrument case (Figure 5-6).
4. Carefully lift up and remove the Spectrum Analyzer PCB Assembly and attached Top Connector Panel.

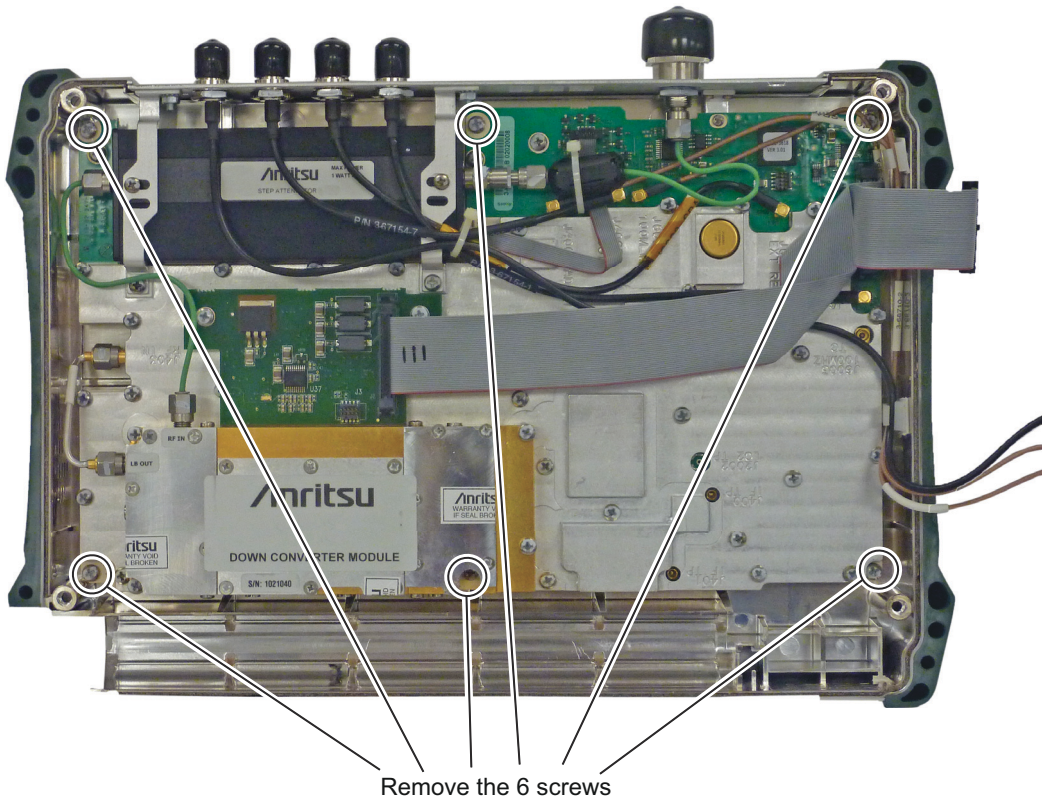


Figure 5-6. Spectrum Analyzer PCB Assembly

5. Reverse the above steps to install the new Spectrum Analyzer PCB Assembly.
6. You will need to transfer the top connector panel RF Out N connector in addition to the Tracking Generator Module Assembly on units that have Option 809 or 813 or 820 installed.

Note	There is an RF gasket material between the two halves of the case, and in the connector panel grooves. Take care not to remove or damage this material when removing or replacing the Spectrum Analyzer Module and connector panel assembly.

5-6 Main PCB Assembly Replacement

This procedure provides instructions for replacing the Main PCB assembly. The Main PCB assembly is located in the front panel half of the instrument.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. For Main PCB Assembly replacement of units with Option 31. Remove the two screws holding the GPS PCB to the Main PCB Assembly. Remove the GPS PCB board and cable from the Main PCB. Reattach the GPS PCB and reroute the cable on the replacement Main PCB Assembly.
3. Disconnect the Fan connector on the Main PCB Assembly (Figure 5-7).
4. Disconnect the Keypad connector on the Main PCB Assembly.
5. Disconnect the Battery connector on the Main PCB Assembly.
6. Disconnect the LCD connector on the Main PCB Assembly.

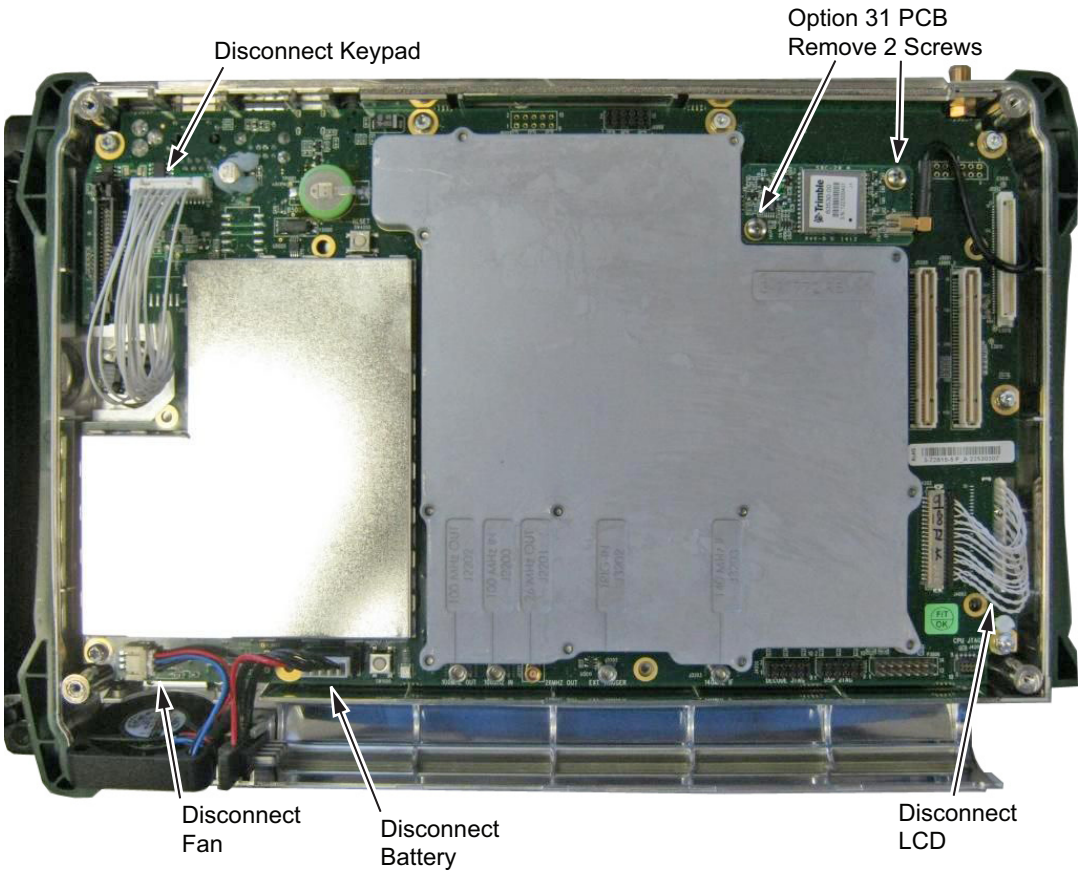


Figure 5-7. Disconnect the Cable Connectors on the Main PCB Assembly

7. Remove the 7 Torx (T10) screws retaining the Main PCB Assembly to the Spectrum Master case (Figure 5-8).

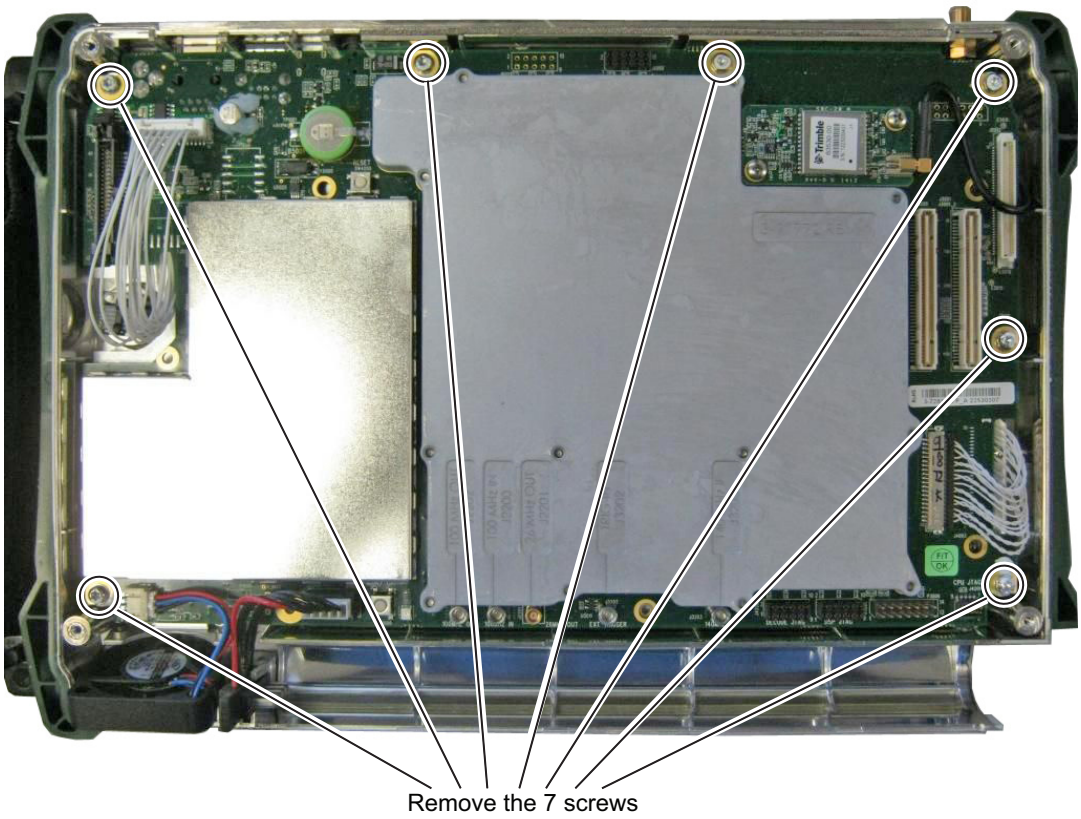


Figure 5-8. Remove the 7 Screws Retaining the Main PCB Assembly

8. Pull the Main PCB assembly out of the Front Panel section.

9. Replacement is the reverse of removal.

5-7 GPS (Option 31) Module Replacement

This procedure provides instructions for removing and replacing the GPS module from the Spectrum Master.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the SMA cable attached to the side of the GPS module.
3. Remove the 2 screws securing the GPS Module to the Main PCB Assembly .
4. Carefully lift straight up on the GPS module to remove it. The back of the GPS module is directly connected to the Main PCB Assembly.
5. Replacement is the reverse of the removal. If you need to replace the GPS cable assembly continue with the following steps.
6. Remove the SMA cable attached to the side of the GPS module.
7. Remove the Main PCB assembly from the front panel as described in Section 5-6 “Main PCB Assembly Replacement”.
8. Use a 5/16 inch wrench (~ 8 mm) to remove the nut and washer holding the GPS SMA connector to the front case.
9. Pull the GPS SMA connector out of the hole in the front case.
10. Replacement is the reverse of the removal. Torque the SMA connector nut to 7.5 in/lbs (0.85 Nm).

5-8 Fan Assembly Replacement

This procedure provides instructions for removing and replacing the FanAssembly from the Spectrum Master.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the fan cable assembly attached to the Main PCB Assembly.
3. Remove the 2 screws securing the Fan Assembly to the top case .
4. Carefully tilt and lift out the Fan Assembly module to remove it.
5. Replacement is the reverse of the removal.

5-9 LCD Assembly Replacement

This procedure provides instructions for removing and replacing the Liquid Crystal Display (LCD) once the Main PCB assembly has been separated from the Spectrum Master.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the Main PCB assembly from the front panel as described in Section 5-6 “Main PCB Assembly Replacement”.

3. Remove the 6 screws securing the LCD Bracket to the front case.

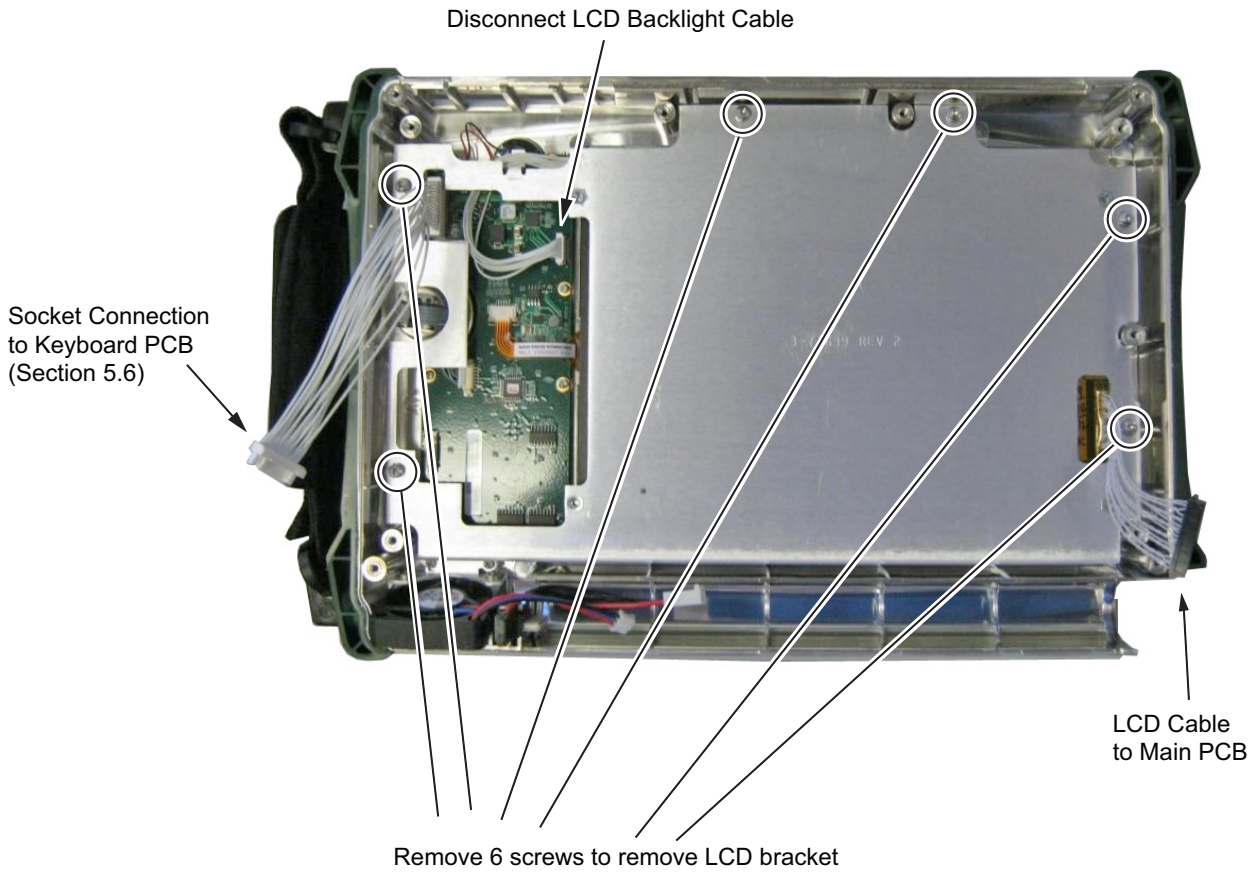


Figure 5-9. Remove LCD Bracket Screws

5. Remove the LCD bracket assembly and turn the LCD bracket assembly.

6. Remove the four screws securing the LCD Display to the bracket assembly (Figure 5-10).

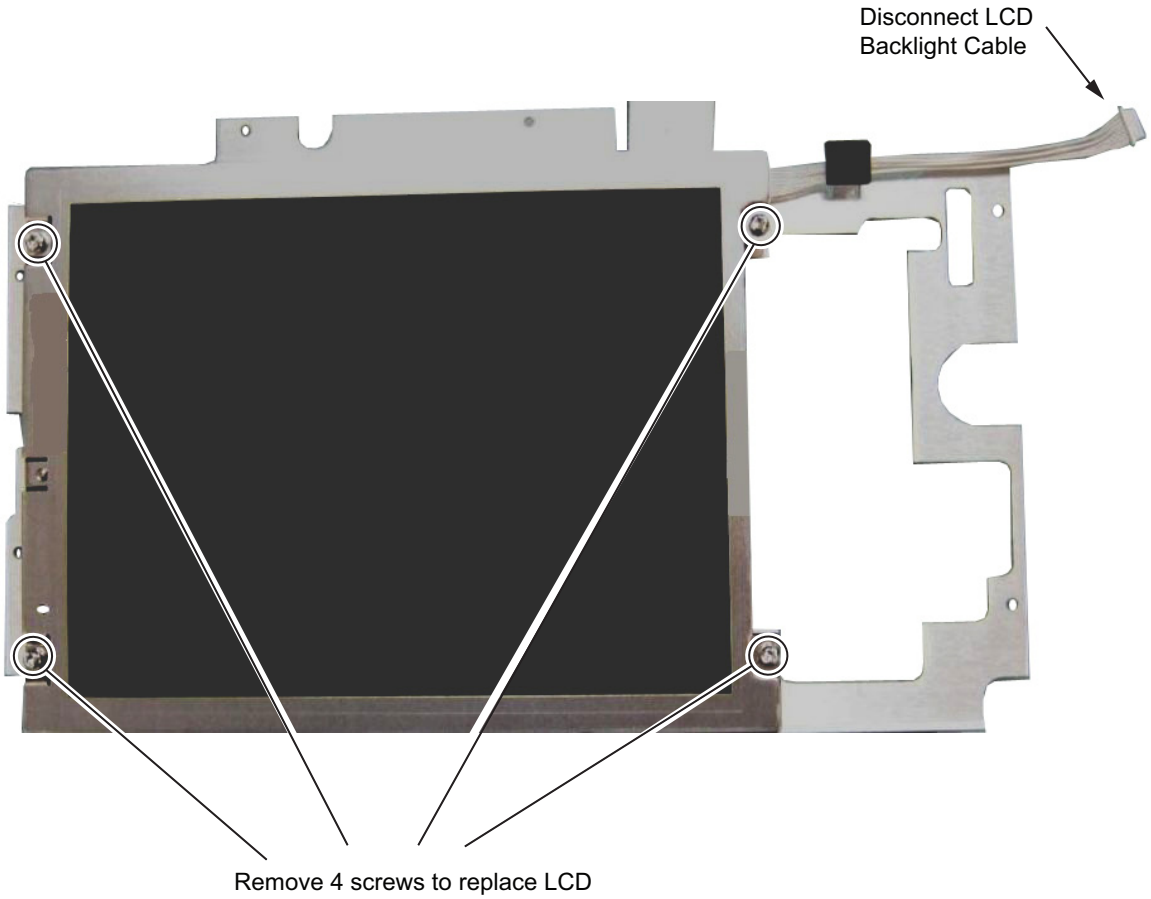


Figure 5-10. Replacing the LCD

7. Carefully remove the LCD, and disconnect the LCD backlight cable and the LCD cable from the LCD.

8. Reverse the above steps to install the replacement LCD.

Note	Pay attention to the routing of the LCD Backlight Cable. The cable must be positioned so it is not pinched when the assembly is reattached to the front panel.

5-10 Keypad Membrane and Main Keypad PCB Replacement

This procedure provides instructions for removing and replacing the keypad membrane and PCB.

Note	The keypad PCB and membrane can be replaced without opening the Spectrum Master case.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the Main PCB assembly from the front panel as described in Section 5-6 “Main PCB Assembly Replacement”.
3. Remove the LCD bracket assembly from the front panel as described in Section 5-9 “LCD Assembly Replacement”.

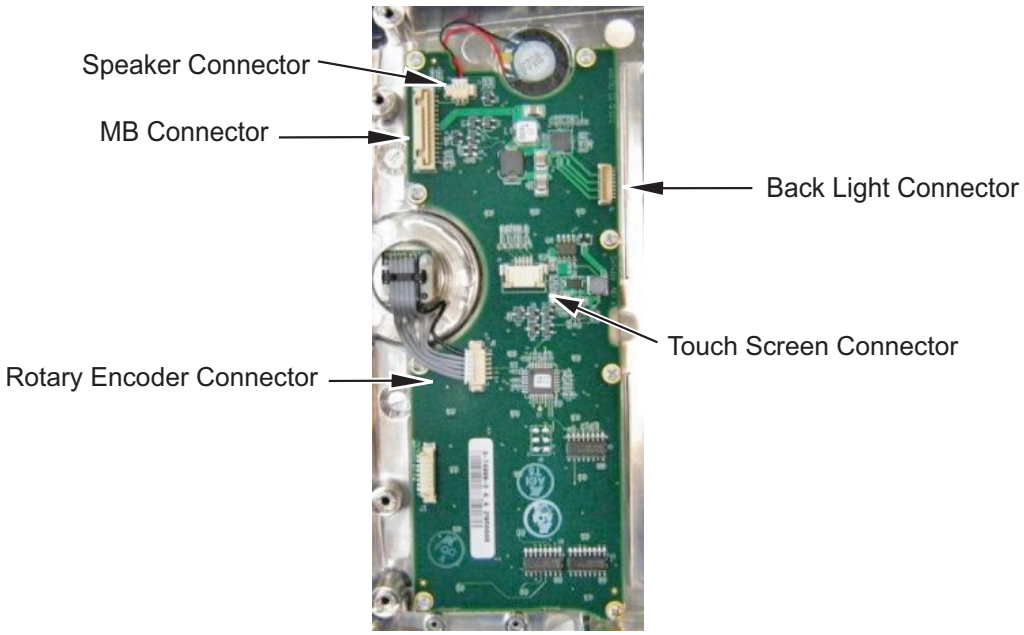


Figure 5-11. Keypad PCB Connectors

4. Remove the Rotary Encoder, Speaker, Touch Screen and Main Board connectors from the Keypad PCB. Note that the Touch Screen connector has two locking tabs that must be pulled down (out) before removing the connector from the Keypad PCB. See Figure 5-13 for Touch Screen cable connection.

5. Remove the 8 screws securing the Keypad PCB to the front panel and carefully lift it out. The rubber Keypad Membrane is located under the Keypad PCB (Figure 5-12).

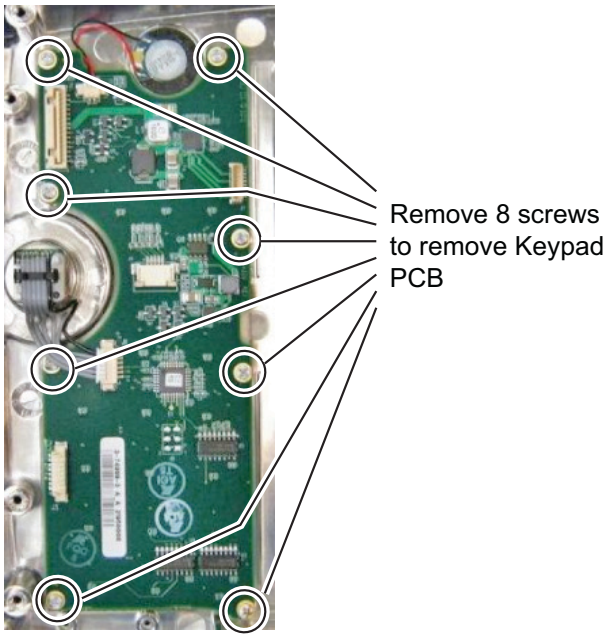


Figure 5-12. Keypad PCB

6. Reverse the above steps to install the replacement assembly, with the following cautions:

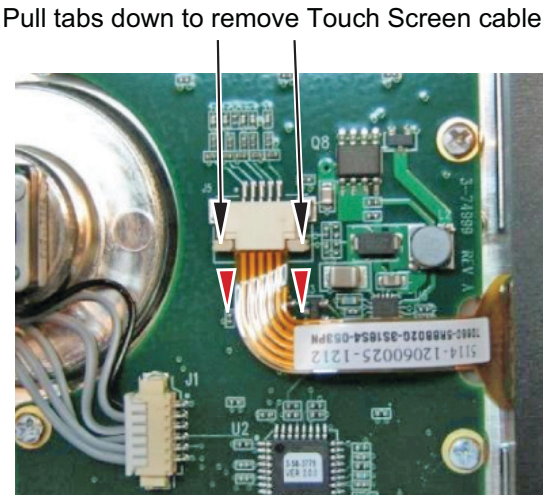


Figure 5-13. Keypad Touch Screen Connector

- Carefully close the locking tab on connector J5 to secure the flexible Touch Screen connection. The tab should “snap” into position when fully closed.
- The Keypad PCB stores the touch screen calibration data. If the Keypad PCB is replaced, then a touch screen calibration must be performed. If no touch screen calibration data is stored in the new Keypad PCB when powering on an instrument, it will stay at the boot up screen with the Anritsu logo shown and a message at the bottom of the screen stating: “Failed to load touch screen calibration data. Please re boot the instrument.” If this message is displayed, power off the instrument and simultaneously holding down the **Shift-4-0** keys while pressing the power on button. Now the instrument will boot up in bootstrap mode and prompt you to perform a touch-screen calibration. After following the on-screen calibration directions, power the instrument off and it will boot up correctly on the next power on cycle.

- If the Keypad PCB was replaced with a PCB that has touch screen calibration data, the instrument will boot up correctly, but the touch-screen calibration data will be invalid. Perform a touch-screen calibration by pressing the **Shift** key and then the **0** key, follow the on-screen directions.

5-11 Touch Screen Replacement

This procedure provides instructions for replacing the touch screen.

1. Open the case as described in Section 5-3 “Opening the Spectrum Master Case”.
2. Remove the Main PCB assembly from the front panel as described in Section 5-6 “Main PCB Assembly Replacement”.
3. Remove the LCD bracket assembly from the front panel as described in Section 5-9 “LCD Assembly Replacement”.
4. Remove the touch screen flex circuit connector from the Keypad PCB by pulling the tabs on each side of the connector away from the connector and in the direction of the flex circuit, Refer to Figure 5-13.

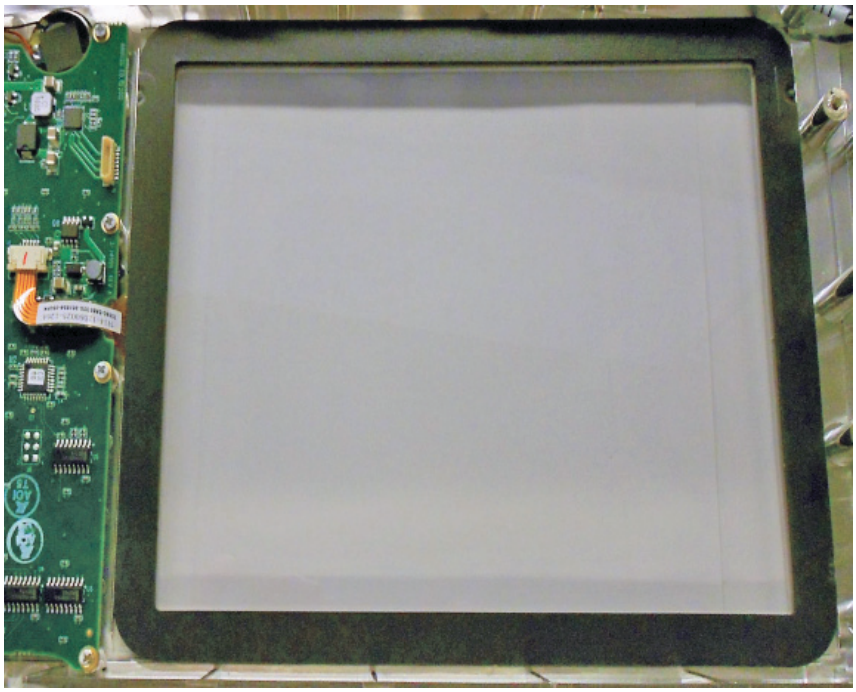


Figure 5-14. Touch Screen

5. Pull the flex circuit out of the connector housing.
6. Remove the touch screen from the bezel by pulling it straight up. (You may push the touch screen up from the front of the front case to help get it off the gasket material on the bezel.)
7. Reverse the above steps to install the replacement touch screen.
    - Carefully close the locking tab on connector J2 to secure the flexible switch pad connection. The tab should “snap” into position when fully closed.
    - Perform a touch screen calibration by pressing the **Shift** key and then the **0** key, follow the on-screen directions.

Chapter 6 — Troubleshooting

6-1 Introduction

This chapter describes the primary troubleshooting operations that can be performed by all Anritsu Service Centers. Perform the troubleshooting suggestions in the order they are listed. Operators of the Spectrum Master MS2720T should refer to the User Guide for troubleshooting help.

Only qualified Anritsu personnel should replace internal assemblies. Major subassemblies shown in Table 1-4, "List of Replaceable Parts" on page 1-5 are typically the items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without special training. Removal of RF shields from PC boards or adjustment of screws on or near the shields will detune sensitive RF circuits and will result in degraded instrument performance.

6-2 Turn-on Problems

Unit cannot boot-up, no activity occurs when the On/Off key is pressed:

1. Battery may be fully discharged. Use an external charger (Anritsu part number 2000-1374) to charge a completely discharged battery.
2. Battery may be the wrong type. Use only Anritsu approved battery packs. Some non-approved battery packs will fit into the MS272xC, but are electrically incompatible and will not charge correctly.
3. External power supply may have failed or be the wrong type. Replace the external power supply.
4. On/Off switch is damaged. Replace the keypad PCB or rubber keypad.
5. Main PCB has failed. Replace the Main PCB assembly.

Unit begins the boot process, but does not complete boot-up:

1. Boot up process gets stuck with "Application Running" on the bottom left hand corner, power the unit off and press the Esc key while pressing the Power on switch. This performs a factory defaults restart.
2. Boot up process gets stuck at "Anritsu" splash screen, using Bootstrap mode and a USB memory device prepared with the current instrument firmware, perform the Load All procedure.
3. During boot-up process, the instrument stops with the message: "Failed to load touch screen calibration data. Please reboot the instrument". Boot up the instrument in boot strap mode, the instrument will prompt you to perform a touch screen calibration.
4. Main PCB has failed. Replace the Main PCB assembly.

Unit makes normal boot-up sounds, but the display has a problem:

1. If the display is dim, check the brightness setting under the System Menu / System Options.
2. Replace the LCD assembly.
3. The Main PCB has failed. Replace the Main PCB assembly.

Boot-up Self Test fails:

1. Perform a Master Reset. Be advised that a Master Reset will delete all user saved setups, jpgs and measurement files, ensure you have backups of these before performing a Master Reset.

   If the message relates to the RTC battery, replace the Main PCB.
2. The Main PCB has failed. Replace the Main PCB assembly.

6-3 Other Problems

Battery Pack Charging Problems: refer to Chapter 4, "Battery Information".

Touch Screen Issues:

1. The Touch Screen may have lost its calibration data. Perform a Touch Screen Calibration from the System(Shift-8) menu.
2. Check the firmware version installed on the instrument and ensure it is the latest. If not install hte latest firmware and re-do the touch screen calibration as described above.
3. Touch screen has been damaged or has failed, replace the touch screen.

Lock Error messages:

1. This message normally appears for 2 to 3 seconds when an external 10 MHz Reference is applied.
2. Spectrum Analyzer PCB has failed. Replace the Spectrum Analyzer PCB assembly.

Spectrum Analyzer Problems:

1. Inspect the Spectrum Analyzer RF In connector for damage.
2. Refer to the User Guide, run the Application Selftest.
3. Update system software using a USB memory device prepared with the current instrument firmware via the System(Shift-8), System Options, Reset menu.
4. Spectrum Analyzer PCB has failed. Replace the Spectrum Analyzer PCB assembly.

Other Issues:

1. Perform a Factory Defaults Reset first, if issue is still present then perform a Master Reset. Be advised that a Master Reset will delete all user saved setups, jpgs and measurement files, ensure you have backups of these before performing a Master Reset.
2. Refer to the User Guide.
3. Update system software using a USB memory device prepared with the current instrument firmware via the System(Shift-8), System Options, Reset menu.
4. Replace the Main Spectrum Analyzer PCB assembly.

Appendix A — Test Records

A-1 Introduction

This appendix provides test records that can be used to record the performance of the MS2720T Spectrum Master. Anritsu recommends that you make a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed provides a detailed history of instrument performance, which can allow you to observe trends.

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-2 Test Records for Spectrum Analyzer Verification

Table A-1. Spectrum Analyzer Frequency Accuracy

Frequency	Measured Value	Error	Specification
1 GHz	GHz	Hz	± 1300 Hz
7 GHz	GHz	Hz	± 9100 Hz

Table A-2. Spectrum Analyzer 1.0 GHz SSB Phase Noise Verification

Frequency Offset	Calculated Value	Specification For Opt. 709 / For Opt. 713 to 743)
10 kHz	dBc/Hz	–108 dBc/Hz max / –102 dBc/Hz max
100 kHz	dBc/Hz	–110 dBc/Hz max / –106 dBc/Hz max
1000 kHz	dBc/Hz	–118 dBc/Hz max / –111 dBc/Hz max
10 MHz	dBc/Hz	–129 dBc/Hz max / –123 dBc/Hz max

Table A-3. Spectrum Analyzer Second Harmonic Distortion

Frequency	Measured Value	Second Harmonic Distortion	Specification
50.1 MHz	dBm		
100.2 MHz	dBm	dBc	–54 dBc max

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Input Related Spurs for –30 dBm Input at 1000 MHz

Table A-4. Measured Input Signal Level at 1000 MHz

Start Freq	Stop Freq	Measured Spur Level	Calculated IRS	Specification
1000 MHz Center Frequency		dBm		
719 MHz	721 MHz	dBm	dBc	≤ –60 dBc

Input Related Spurs for –30 dBm Input at 3273 MHz

Table A-5. Measured Input Signal Level at 3273 MHz

Start Freq	Stop Freq	Measured Spur Level	Calculated IRS	Specification
3275 MHz Center Frequency		dBm		
2423 MHz	3271 MHz	dBm	dBc	≤ –60 dBc
3275 MHz	4123 MHz	dBm	dBc	≤ –60 dBc

Input Related Spurs for –30 dBm Input at 8000 MHz

Table A-6. Measured Input Signal Level at 8000 MHz

Start Freq	Stop Freq	Measured Spur Level	Calculated IRS	Specification
8000 MHz Center Frequency		dBm		
7719 MHz	7721 MHz	dBm	dBc	≤ –60 dBc

Input Related Spurs for –30 dBm Input at 15000 MHz

Table A-7. Measured Input Signal Level at 15000 MHz

Start Freq	Stop Freq	Measured Spur Level	Calculated IRS	Specification
15000 MHz Center Frequency		dBm		
14719 MHz	14721 MHz	dBm	dBc	≤ –60 dBc

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-8. Spectrum Analyzer Resolution Bandwidth Accuracy

RBW Setting	Span	VBW	Measured Value	Specification
10 MHz	20 MHz	1 MHz	MHz	9 MHz to 11 MHz
3 MHz	6 MHz	300 kHz	MHz	2.7 MHz to 3.3 MHz
1 MHz	2 MHz	100 kHz	MHz	900 kHz to 1.1 MHz
300 kHz	600 kHz	30 kHz	kHz	270 kHz to 330 kHz
100 kHz	200 kHz	10 kHz	kHz	90 kHz to 110 kHz
30 kHz	60 kHz	3 kHz	kHz	27 kHz to 33 kHz
10 kHz	20 kHz	1 kHz	kHz	9 kHz to 11 kHz
3 kHz	6 kHz	300 Hz	kHz	2.7 kHz to 3.3 kHz
1 kHz	2 kHz	100 Hz	Hz	900 Hz to 1.1 kHz
300 Hz	600 Hz	30 Hz	Hz	270 Hz to 330 Hz
100 Hz	200 Hz	10 Hz	Hz	90 Hz to 110 Hz
30 Hz	60 Hz	3 Hz	Hz	27 Hz to 33 Hz
10 Hz	20 Hz	1 Hz	Hz	9 Hz to 11 Hz
3 Hz	10 Hz	1 Hz	Hz	2.7 Hz to 3.3 Hz
1 Hz	10 Hz	1 Hz	Hz	0.9 Hz to 1.1 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-9. Characterization Chart for 50 MHz Amplitude Accuracy Verification

Test Power Level at 50 MHz	Required Sensor B Reading
0 dBm	dBm
–4 dBm	dBm
–10 dBm	dBm
–14 dBm	dBm
–20 dBm	dBm
–24 dBm	dBm
–30 dBm	dBm
–34 dBm	dBm
–40 dBm	dBm
–44 dBm	dBm
–50 dBm	dBm

Note The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-10. 50 MHz Amplitude Accuracy Verification, Specification = ± 1.3 dB

Input Power Level	Reference Level	Input Atten. Level	Measured Reading
0 dBm	10 dBm	30 dB	dBm
–4 dBm	10 dBm	30 dB	dBm
–10 dBm	0 dBm	20 dB	dBm
–14 dBm	0 dBm	20 dB	dBm
–20 dBm	–10 dBm	10 dB	dBm
–24 dBm	–10 dBm	10 dB	dBm
–30 dBm	–20 dBm	0 dB	dBm
–34 dBm	–20 dBm	0 dB	dBm
–40 dBm	–30 dBm	0 dB	dBm
–44 dBm	–30 dBm	0 dB	dBm
–50 dBm	–40 dBm	0 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-11. Characterization Chart for Fixed Level with Varying Frequency (1 of 2)

Frequency	−2 dBm (Options 709, 713 or 720) −5 dBm (Options 732 or 743)	−30 dBm
100 kHz	dBm	dBm
10.1 MHz	dBm	dBm
470.1 MHz	dBm	dBm
1070.1 MHz	dBm	dBm
2012.6 MHz	dBm	dBm
3030.1 MHz	dBm	dBm
4030.1 MHz	dBm	dBm
5030.1 MHz	dBm	dBm
6055.1 MHz	dBm	dBm
7035.1 MHz	dBm	dBm
8030.1 MHz	dBm	dBm
8950.1 MHz	dBm	dBm
9070.1 MHz	dBm	dBm
10015.1 MHz	dBm	dBm
11510.1 MHz	dBm	dBm
12070.1 MHz	dBm	dBm
12999.99 MHz	dBm	dBm
13005.05 MHz	dBm	dBm
14000 MHz	dBm	dBm
15030.1 MHz	dBm	dBm
16030.1 MHz	dBm	dBm
17030.1 MHz	dBm	dBm
18030.1 MHz	dBm	dBm
19950.1 MHz	dBm	dBm
20001.1 MHz	dBm	dBm
21001.1 MHz	dBm	dBm
22001.1 MHz	dBm	dBm

Table A-11. Characterization Chart for Fixed Level with Varying Frequency (2 of 2)

Frequency	−2 dBm (Options 709, 713 or 720) −5 dBm (Options 732 or 743)	−30 dBm
23001.1 MHz	dBm	dBm
24001.1 MHz	dBm	dBm
25001.1 MHz	dBm	dBm
26001.1 MHz	dBm	dBm
27001.1 MHz	dBm	dBm
28001.1 MHz	dBm	dBm
29001.1 MHz	dBm	dBm
30001.1 MHz	dBm	dBm
31001.1 MHz	dBm	dBm
31999.1 MHz	dBm	dBm
32499.1 MHz	dBm	dBm
33499.1 MHz	dBm	dBm
34499.1 MHz	dBm	dBm
35499.1 MHz	dBm	dBm
36499.1 MHz	dBm	dBm
37499.1 MHz	dBm	dBm
384991 MHz	dBm	dBm
39999.1 MHz	dBm	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-12. Verification at 100 kHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-13. Verification at 10.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-14. Verification at 470.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-15. Verification at 1070.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-16. Verification at 2012.6 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-17. Verification at 3030.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-18. Verification at 4030.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-19. Verification at 5030.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-20. Verification at 6055.1 MHz, Specification = ± 1.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-21. Verification at 7035.1 MHz, Specification = ± 1.3 dB for Opt.713 to 743, ± 1.8 dB for Opt. 709

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-22. Verification at 8030.1 MHz, Specification = ± 1.3 dB for Opt.713 to 743, ± 1.8 dB for Opt. 709

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-23. Verification at 8950.1 MHz, Specification = ± 1.3 dB for Opt.713 to 743, ± 1.8 dB for Opt. 709

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-24. Verification at 9070.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-25. Verification at 10015.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-26. Verification at 11510.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-27. Verification at 12070.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-28. Verification at 12999.99 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-29. Verification at 13005.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-30. Verification at 15030.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-31. Verification at 16030.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-32. Verification at 17030.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-33. Verification at 18030.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-34. Verification at 19950.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-35. Verification at 20001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-36. Verification at 21001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

Table A-37. Verification at 22001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–2 dBm or –5 dBm	30 dB	dBm
–2 dBm or –5 dBm	40 dB	dBm
–2 dBm or –5 dBm	50 dB	dBm
–2 dBm or –5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-38. Verification at 22001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-39. Verification at 23001.1 GHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-40. Verification at 24001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-41. Verification at 25001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-42. Verification at 26001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-43. Verification at 27001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-44. Verification at 28001.1 GHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-45. Verification at 29001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-46. Verification at 30001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-47. Verification at 31001.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-48. Verification at 31999.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-49. Verification at 32499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-50. Verification at 33499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-51. Verification at 34499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-52. Verification at 35499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-53. Verification at 36499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-54. Verification at 37499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-55. Verification at 38499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between –10°C and 55°C and after a 60 minute warm-up, add ± 1 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 40 GHz.

Table A-56. Verification at 39499.1 MHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

Table A-57. Verification at 39999.1 GHz, Specification = ± 2.3 dB

Input Power	Atten Lvl	Marker 1 Reading
–30 dBm	0 dB	dBm
–30 dBm	5 dB	dBm
–30 dBm	10 dB	dBm
–30 dBm	20 dB	dBm
–5 dBm	30 dB	dBm
–5 dBm	40 dB	dBm
–5 dBm	50 dB	dBm
–5 dBm	60 dB	dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-58. Spectrum Analyzer Residual Spurious (Preamp Off)

Start Freq	Stop Freq	RBW	VBW	Measured Values (Marker 1)	Specification
9 kHz	100 kHz	300 Hz	10 Hz	dBm	≤ –90 dBm
100 kHz	30 MHz	1 kHz	100 Hz	dBm	≤ –90 dBm
30 MHz	5.35 GHz	3 kHz	300 Hz	dBm	≤ –90 dBm
5.35 GHz	9 GHz	3 kHz	100 Hz	dBm	≤ –90 dBm
9 GHz	11.11 GHz	1 kHz	100 Hz	dBm	≤ –90 dBm
11.11 GHz	13 GHz	3 kHz	300 Hz	dBm	≤ –90 dBm
13 GHz	16.5 GHz	1 kHz	300 Hz	dBm	≤ –85 dBm
16.5 GHz	20 GHz	1 kHz	100 Hz	dBm	≤ –85 dBm
20 GHz	26 GHz	3 kHz	300 Hz	dBm	≤ –80 dBm
26 GHz	32 GHz	3 kHz	300 Hz	dBm	≤ –80 dBm
32 GHz	43 GHz	3 kHz	300 Hz	dBm	≤ –80 dBm

Table A-59. Spectrum Analyzer Residual Spurious (Preamp On)

Start Freq	Stop Freq	RBW	VBW	Measured Values (Marker 1)	Specification
1 MHz	30 MHz	3 kHz	300 Hz	dBm	≤ –100 dBm
30 MHz	9 GHz	3 kHz	300 Hz	dBm	≤ –100 dBm
9 GHz	13 GHz	10 kHz	1 kHz	dBm	≤ –100 dBm
13 GHz	16.5 GHz	10 kHz	1 kHz	dBm	≤ –100 dBm
16.5 GHz	20 GHz	1 kHz	100 Hz	dBm	≤ –100 dBm
20 GHz	28 GHz	3 kHz	300 Hz	dBm	≤ –100 dBm
28 GHz	32 GHz	3 kHz	300 Hz	dBm	≤ –100 dBm
32 GHz	43 GHz	3 kHz	300 Hz	dBm	≤ –95 dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-60. Spectrum Analyzer DANL (Preamp On)

Frequency Start / Stop	RBW (MHz)	VBW (kHz)	Measured dBm (MHz RBW)	Calculated dBm (1 Hz RBW)	1 Hz Specification
For MS2720T with Opt. 709					
10 MHz to 3.0 GHz	3	1	dBm	dBm	≥ –160 dBm
>3.0 GHz to 8.0 GHz	3	1	dBm	dBm	≥ –152 dBm
For MS2720T with Opt. 713, 720, 732 or 743					
10 MHz to 4.0 GHz	3	1	dBm	dBm	≥ –161 dBm
>4.0 GHz to 9.0 GHz	3	1	dBm	dBm	≥ –159 dBm
>9.0 GHz to 13 GHz	3	1	dBm	dBm	≥ –156 dBm
For MS2720T with Opt. 720					
>13 GHz to 20 GHz	3	1	dBm	dBm	≥ –157 dBm
For MS2720T with Opt. 732 or 740					
>13 GHz to 32 GHz	1	1	dBm	dBm	≥ –154 dBm
>32 GHz to 40 GHz	1	1	dBm	dBm	≥ –148 dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-61. Spectrum Analyzer DANL (Preamp Off)

Frequency Start / Stop	RBW (MHz)	VBW (kHz)	Measured dBm (MHz RBW)	Calculated dBm (1 Hz RBW)	1 Hz Specification
For MS2720T with Opt. 709					
10 MHz to 3.0 GHz	3	1	dBm	dBm	≥ –146 dBm
>3.0 GHz to 8.0 GHz	3	1	dBm	dBm	≥ –140 dBm
For MS2720T with Opt. 713, 720, 732 or 743					
10 MHz to 4.0 GHz	3	1	dBm	dBm	≥ –145 dBm
>4.0 GHz to 9.0 GHz	3	1	dBm	dBm	≥ –142 dBm
>9.0 GHz to 13 GHz	3	1	dBm	dBm	≥ –136 dBm
For MS2720T with Opt. 720					
>13 GHz to 20 GHz	3	1	dBm	dBm	≥ –138 dBm
For MS2720T with Opt. 732 or 740					
>13 GHz to 32 GHz	1	1	dBm	dBm	≥ –135 dBm
>32 GHz to 40 GHz	1	1	dBm	dBm	≥ –127 dBm

Table A-62. Spectrum Analyzer Third Order Intercept

Third Order Intercept at Center Frequency	Measured Value	Specification
2400.151 MHz	dBm	
2399.851 MHz	dBm	
Calculated TOI at 2400 MHz	dBm	≥ +14 dBm

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

A-3 Test Records for Options Verification

Option 31 GPS Receiver

Table A-63. Option 31, GPS Receiver Frequency Accuracy

Frequency	Measured Value	Error	Specification
7 GHz	GHz	Hz	±175 Hz (±25 ppb) with “GPS Hi Accy”
7 GHz	GHz	Hz	±350 Hz (±50 ppb) with “Int Hi Accy”

Option 809, 813, 820 Tracking Generator

Table A-64. Tracking Generator Frequency Accuracy

Frequency	Measured Value	Error	Specification
1 GHz	GHz	Hz	±1300 Hz (±1.3 ppm)
7 GHz	GHz	Hz	±9100 Hz (±1.3 ppm)

Table A-65. Tracking Generator Level Accuracy

Note	The listed Amplitude Accuracy specifications apply when the instrument is being verified in an environment between 20°C and 30°C after a 30 minute warm-up period. For an instrument that is not being verified in a temperature controlled environment, but within a temperature range between 0°C and 55°C and after a 60 minute warm-up, add ± 0.5 dB to the Amplitude Accuracy specification for frequencies from 100 kHz to 18 GHz.

Test Level	Measured Value	Error	Specification
50 MHz @ 0 dBm	dBm	dB	±1.5 dB
50 MHz @ -19.5 dBm	dBm	dB	±1.5 dB
50 MHz @ -40 dBm	dBm	dB	±1.5 dB
450 MHz @ 0 dBm	dBm	dB	±1.5 dB
450 MHz @ -19.5 dBm	dBm	dB	±1.5 dB
450 MHz @ -40 dBm	dBm	dB	±1.5 dB

Test Level	Measured Value	Error	Specification
1050 MHz @ 0 dBm	dBm	dB	±1.5 dB
1050 MHz @ -19.5 dBm	dBm	dB	±1.5 dB
1050 MHz @ -40 dBm	dBm	dB	±1.5 dB
8950 MHz @ 0 dBm	dBm	dB	±1.5 dB
8950 MHz @ -19.5 dBm	dBm	dB	±1.5 dB
8950 MHz @ -40 dBm	dBm	dB	±1.5 dB
9050 MHz @ 0 dBm	dBm	dB	±1.6 dB
9050 MHz @ -19.5 dBm	dBm	dB	±1.6 dB
9050 MHz @ -40 dBm	dBm	dB	±1.6 dB
10450 MHz @ 0 dBm	dBm	dB	±1.6 dB
10450 MHz @ -19.5 dBm	dBm	dB	±1.6 dB
10450 MHz @ -40 dBm	dBm	dB	±1.6 dB
12950 MHz @ 0 dBm	dBm	dB	±1.6 dB
12950 MHz @ -19.5 dBm	dBm	dB	±1.6 dB
12950 MHz @ -40 dBm	dBm	dB	±1.6 dB
13050 MHz @ 0 dBm	dBm	dB	±2.0 dB
13050 MHz @ -19.5 dBm	dBm	dB	±2.0 dB
13050 MHz @ -40 dBm	dBm	dB	±2.0 dB
15950 MHz @ 0 dBm	dBm	dB	±2.0 dB
15950 MHz @ -19.5 dBm	dBm	dB	±2.0 dB
15950 MHz @ -40 dBm	dBm	dB	±2.0 dB
17950 MHz @ 0 dBm	dBm	dB	±2.0 dB
17950 MHz @ -19.5 dBm	dBm	dB	±2.0 dB
17950 MHz @ -40 dBm	dBm	dB	±2.0 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 880, GSM/GPRS/EDGE RF Measurements

Table A-66. RF Measurements, At 850 MHz, –10 dBm Level, GsmBurst_1slot Pattern (GSM)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

Table A-67. RF Measurements, At 850 MHz, –50 dBm Level, GsmBurst_8slot Pattern (GSM)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 880, GSM/GPRS/EDGE RF Measurements (Continued)

Table A-68. RF Measurements, At 1800 MHz, –10 dBm Level, GsmBurst_8slot Pattern (GSM)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

Table A-69. RF Measurements, At 1800 MHz, –50 dBm Level, GsmBurst_1slot Pattern (GSM)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

Table A-70. RF Measurements, At 1800 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

Table A-71. RF Measurements, At 1800 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 880, GSM/GPRS/EDGE RF Measurements (Continued)

Table A-72. RF Measurements, At 850 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

Table A-73. RF Measurements, At 850 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Adjusted Output Power	dBm	–10 dBm ± 0.2 dB
Displayed Burst Power	dBm	
Calculated Burst Power Error	dBm	± 1.5 dB
Frequency Error	Hz	± 10 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 880, GSM/GPRS/EDGE Demodulator

Table A-74. Demodulation, At 850 MHz, –10 dBm Level, GsmBurst_1slot Pattern (GSM)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-75. Demodulation1, At 850 MHz, –50 dBm Level, GsmBurst_8slot Pattern (GSM)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-76. Demodulation, At 1800 MHz, –10 dBm Level, GsmBurst_8slot Pattern (GSM)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-77. Demodulation, At 1800 MHz, –50 dBm Level, GsmBurst_1slot Pattern (GSM)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-78. Demodulation, At 1800 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-79. Demodulation, At 1800 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 880, GSM/GPRS/EDGE Demodulator (Continued)

Table A-80. Demodulation, At 850 MHz, –50 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

Table A-81. Demodulation, At 850 MHz, –10 dBm Level, EdgeBurst_4slot Pattern (EDGE)

Measurement	Measured Value	Specification
Phase Err RMS (Deg)	Deg	≤ 1 Deg

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 881 WCDMA and HSDPA RF Measurements

Table A-82. RF Measurements, Sensor A and Sensor B Readings, Components Characterization

Frequency	PMA.10	PMB.10	Delta 1 (Δ1)	PMA.10C	PMA.18	ATT.18
881.5 MHz	dBm	dBm	dBm	dBm	dBm	dB

Table A-83. RF Measurements, Power Level Setting, Components Characterization

Frequency	MG3700A.10 Setting	MG3700A.28 Setting	PMA – 10	PMA – 20
881.5 MHz	dBm	dBm	dBm	dBm

Table A-84. RF Measurements, WCDMA Absolute Power Accuracy

Test Level	Measured Power	Error	Specification
+28 dBm	dBm	dB	± 1.25 dB
+10 dBm	dBm	dB	± 1.25 dB
–10 dBm	dBm	dB	± 1.25 dB
–20 dBm	dBm	dB	± 1.25 dB
Test Level	dBm	dB	± 1.25 dB

Table A-85. RF Measurements, WCDMA Occupied Bandwidth (OBW)

Frequency	Power Meter Reading	OBW	Specification
881.5 MHz	dBm	MHz	4.2 MHz ± 100 kHz
1962.5 MHz	dBm	MHz	4.2 MHz ± 100 kHz
2680.5 MHz	dBm	MHz	4.2 MHz ± 100 kHz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 881 WCDMA and HSDPA RF Measurements (Continued)

Table A-86. RF Measurements, WCDMA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Error	Specification
881.5 MHz	dBm	dBm	dBm	± 1.25 dBm max
1962.5 MHz	dBm	dBm	dBm	± 1.25 dBm max
2680.5 MHz	dBm	dBm	dBm	± 1.25 dBm max

Table A-87. RF Measurements, HSDPA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF Channel Power Error	Specification
2680.5 MHz				± 1.25 dB max

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 881 WCDMA and HSDPA RF Measurements (Continued)

Table A-88. Demodulation, WCDMA Error Vector Magnitude (Test Model 4)

Frequency	EVM	Specification
1962.5 MHz	%	± 2.5%

Table A-89. Demodulation, HSDPA Error Vector Magnitude (Test Model 5)

Frequency	EVM	Specification
1962.5 MHz	%	± 2.5%

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 882, TDSCDMA Signal Analyzer Option Verification

Table A-90. Option 882, TDSCDMA (at 2010 MHz, –45 dBm Level)

Measurement Type	Measured Value	Specification
Power Meter Reading	dBm	–45 dBm ± 0.5 dB
Displayed Channel Power	dBm	
Calculated Channel Power Error	dB	± 1.5 dB
Frequency Error	Hz	± 10 Hz
Tau	µs	± 0.2 µs

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 883 LTE Measurements

Table A-91. RF Measurements, LTE Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
For 10 MHz BW ,Pattern E-TM_3-1_10M				
750	–15	dBm	dB	± 1.5 dB
750	–50	dBm	dB	± 1.5 dB
2150	–15	dBm	dB	± 1.5 dB
2150	–50	dBm	dB	± 1.5 dB
For 20 MHz BW, Pattern E-TM_3-1_20M				
750	–15	dBm	dB	± 1.5 dB
750	–50	dBm	dB	± 1.5 dB
2150	–15	dBm	dB	± 1.5 dB
2150	–50	dBm	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 883, LTE Measurements

Table A-92. Demodulation, LTE Frequency Accuracy

Measurement	Measured Value	Specification
For 10 MHz BW, Pattern E-TM_3-1_10M		
750 MHz at –15 dBm		
Frequency Error	Hz	± 10 Hz
750 MHz at –50 dBm		
Frequency Error	Hz	± 10 Hz
2150 MHz at –15 dBm		
Frequency Error	Hz	± 10 Hz
2150 MHz at –50 dBm		
Frequency Error	Hz	± 10 Hz
For 20 MHz BW, Pattern E-TM_3-1_20M		
750 MHz at –15 dBm		
Frequency Error	Hz	± 10 Hz
750 MHz at –50 dBm		
Frequency Error	Hz	± 10 Hz
2150 MHz at –15 dBm		
Frequency Error	Hz	± 10 Hz
2150 MHz at –50 dBm		
Frequency Error	Hz	± 10 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 883 TD-LTE Measurements

Table A-93. RF Measurements, TD-LTE Channel Power Accuracy

Frequency (MHz)	Input Power (dBm)	Measured Channel Power	Error	Specification
For 10 MHz BW ,Pattern TDLTE-E-TM_1-1_10M				
750	–12	dBm	dB	± 1.5 dB
750	–30	dBm	dB	± 1.5 dB
2350	–12	dBm	dB	± 1.5 dB
2350	–30	dBm	dB	± 1.5 dB
For 20 MHz BW, Pattern TDLTE-E-TM_1-1_20M				
750	–12	dBm	dB	± 1.5 dB
750	–30	dBm	dB	± 1.5 dB
2350	–12	dBm	dB	± 1.5 dB
2350	–30	dBm	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 883, TD-LTE Measurements

Table A-94. Demodulation, TD-LTE Frequency Accuracy

Measurement	Measured Value	Specification
For 10 MHz BW, Pattern TDLTE-E-TM_1-1_10M		
750 MHz at –12 dBm		
Frequency Error	Hz	± 10 Hz
750 MHz at –30 dBm		
Frequency Error	Hz	± 10 Hz
2350 MHz at –12 dBm		
Frequency Error	Hz	± 10 Hz
2350 MHz at –30 dBm		
Frequency Error	Hz	± 10 Hz
For 20 MHz BW, Pattern TDLTE-E-TM_1-1_20M		
750 MHz at –12 dBm		
Frequency Error	Hz	± 10 Hz
750 MHz at –30 dBm		
Frequency Error	Hz	± 10 Hz
2350 MHz at –12 dBm		
Frequency Error	Hz	± 10 Hz
2350 MHz at –30 dBm		
Frequency Error	Hz	± 10 Hz

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 884 CDMA RF Measurements

Table A-95. RF Measurements, At 870.03 MHz, –30 dBm Level, cdmaOne

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–30 dBm ± 0.2 dB
Channel Power Value	dBm	
Channel Power Error	dBm	± 1.5 dB

Table A-96. RF Measurements, At 1930.05 MHz, –30 dBm Level, cdmaOne

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–30 dBm ± 0.2 dB
Channel Power Value	dBm	
Channel Power Error	dBm	± 1.5 dB

Table A-97. RF Measurements, At 1930.05, –30 dBm Level, CDMA2000

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–30 dBm ± 0.2 dB
Channel Power Value	dBm	
Channel Power Error	dBm	± 1.5 dB

Table A-98. RF Measurements, At 870.03 MHz, –30 dBm Level, CDMA2000

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–30 dBm ± 0.2 dB
Channel Power Value	dBm	
Channel Power Error	dBm	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 884 cdmaOne and CDMA2000 1xRTT Demodulator

Table A-99. Demodulation, At 870.03 MHz, –30 dBm Level, cdmaOne

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

Table A-100. Demodulation, At 1930.05 MHz, –30 dBm Level, cdmaOne

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

Table A-101. Demodulation, At 1930.05 MHz, –30 dBm Level, CDMA2000

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

Table A-102. Demodulation, At 870.03 MHz, –30 dBm Level, CDMA2000

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 884, EVDO RF Measurements

Table A-103. RF Measurements, At 870.03 MHz, –50 dBm Level, 921.6 kps 8PSK Modulation

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-104. RF Measurements, At 1930.05 MHz, 0 dBm Level, 38.4 kps QPSK Modulation

Measurement	Measured Value	Specification
Power Meter Reading	dBm	0 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-105. RF Measurements, At 1930.05 MHz, –50 dBm Level, 2457.6 kps 16QAM Modulation

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-106. RF Measurements, At 1930.05 MHz, –50 dBm Level, Idle Slot

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 884, EVDO RF Measurements (Continued)

Table A-107. RF Measurements, At 870.03 MHz, –10 dBm Level, Idle Slot

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–10 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Option 884 EVDO Demodulator

Table A-108. Demodulation, At 870.03 MHz, –50 dBm Level, 921.6 kps 8PSK Modulation

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho Pilot		$0.99 \leq x \leq 1$
Tau	µs	± 1 µs

Table A-109. Demodulation, At 1930.05 MHz, 0 dBm Level, 38.4 kps QPSK Modulation

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho Pilot		$0.99 \leq x \leq 1$
Tau	µs	± 1 µs

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 884 EVDO Demodulator (Continued)

Table A-110. Demodulation, At 1930.05 MHz, –50 dBm Level, 2457.6 kps 16QAM Modulation

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

Table A-111. Demodulation, At 1930.05 MHz, –50 dBm Level, Idle Slot

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

Table A-112. Demodulation, At 870.03 MHz, –10 dBm Level, Idle Slot

Measurement	Measured Value	Specification
Frequency Error	Hz	± 10 Hz
Rho Pilot		0.99 ≤ x ≤ 1
Tau	µs	± 1 µs

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 885 Fixed WiMAX RF Measurements

Table A-113. RF Measurements, Fixed WiMAX Channel Power Accuracy Adjusted MG3700A Level Settings

Frequency	Input Power Setting	Input Power Reading
2600.5 MHz	–15 dBm	dBm
2600.5 MHz	–50 dBm	dBm
3600.5 MHz	–15 dBm	dBm
3600.5 MHz	–50 dBm	dBm
5600.5 MHz	–15 dBm	dBm
5600.5 MHz	–50 dBm	dBm

Table A-114. RF Measurements, Fixed WiMAX Channel Power Accuracy

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Specification
2600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
2600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB
3600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
3600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB
5600.5 MHz	–15 dBm	dBm	dB	± 1.5 dB
5600.5 MHz	–50 dBm	dBm	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 885 Fixed WiMAX Demodulator

Table A-115. Demodulation, Fixed WiMAX Residual EVM

Frequency	Power	BW	EVM (RMS)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
2600.5 MHz	–30 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–30 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–30 dBm	10 MHz	%	≤ 3.5%

Table A-116. Demodulation, Fixed WiMAX Frequency Error

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	± 182.035 Hz (± 0.07 ppm)
5600.5 MHz	–50 dBm	Hz	± 392.035 Hz (± 0.07 ppm)

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 885 Mobile WiMAX RF Measurements

Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

Table A-117. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –15.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–15 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-118. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –50.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-119. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –15.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–15 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-120. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –50.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 885 Mobile WiMAX RF Measurements (Continued)

Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

Table A-121. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –15.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–15 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-122. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (2600.5 MHz and –50.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-123. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –15.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–15 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

Table A-124. RF Measurements, Mobile WiMAX Channel Power Accuracy Power Error (3600.5 MHz and –50.0 dBm)

Measurement	Measured Value	Specification
Power Meter Reading	dBm	–50 dBm ± 0.2 dB
MS2720T Reading	dBm	
Calculated Channel Power Error	dB	± 1.5 dB

MS2720T **Firmware Rev:** _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Option 885 Mobile WiMAX Demodulator

Table A-125. Demodulation, Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)

Frequency	Power	BW	EVM (rms)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤ 3.0 %
2600.5 MHz	–30 dBm	10 MHz	%	≤ 3.0 %
3600.5 MHz	–15 dBm	10 MHz	%	≤ 3.0 %
3600.5 MHz	–30 dBm	10 MHz	%	≤ 3.0 %

Table A-126. Demodulation, Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	± 52.01 Hz (± 0.02 ppm)
5600.5 MHz	–50 dBm	Hz	± 112.01 Hz (± 0.02 ppm)

Table A-127. Demodulation, Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)

Frequency	Power	BW	EVM (rms)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤ 3.0%
2600.5 MHz	–30 dBm	10 MHz	%	≤ 3.0%
3600.5 MHz	–15 dBm	10 MHz	%	≤ 3.0%
3600.5 MHz	–30 dBm	10 MHz	%	≤ 3.0%

Table A-128. Demodulation, Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	± 52.01 Hz (± 0.02 ppm)
5600.5 MHz	–50 dBm	Hz	± 112.01 Hz (± 0.02 ppm)

Anritsu

10580-00342 F

Anritsu utilizes recycled paper and environmentally conscious inks and toner.

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA
http://www.anritsu.com