FCC TEST REPORT

for

Product: Proximity switch

Model: BIL, BIM, BML, BMM, BXL, BXM, BYL, BYM, BCL, BCM, BTL, BTM, BKL, BKM, UBX

Report No.: KEYS24043021002FC-02

Issued for

Yueqing Binxuan Electric Co., Ltd

Qitou Yi Village, Liushi Town, Yueqing City, Wenzhou City, Zhejiang Province

Issued by

Guangdong KEYS Testing Technology Co., Ltd.

Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China

No.4, Fumin Street, Shilong, Dongguan, Guangdong, China

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1. TEST CERTIFICATION

Product:	Proximity switch
Trade mark:	N/A
Model:	BIL, BIM, BML, BMM, BXL, BXM, BYL, BYM, BCL, BCM, BTL, BTM, BKL, BKM, UBX
Applicant :	Yueqing Binxuan Electric Co., Ltd
Address:	Qitou Yi Village, Liushi Town, Yueqing City, Wenzhou City, Zhejiang Province
Manufacturer:	Yueqing Binxuan Electric Co., Ltd
Address:	Qitou Yi Village, Liushi Town, Yueqing City, Wenzhou City, Zhejiang Province
Test Date:	April 29, 2024 to May 07, 2024
Issued Date:	May 07, 2024
Test Voltage:	AC/DC20V~250V AC/DC90V~250V
Applicable Standards:	FCC Part 15, Subpart B Class B ANSI C63.4:2014

The above equipment has been tested by Guangdong KEYS Testing Technology Co., Ltd. and found compliance with the requirements in the technical standards mentioned above. The test results presented in this report only relate to the product/system tested. The Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test Engineer:

Technical Manager:

Sunny Li / Engineer

Jason Zhan /Manager

2. TEST SUMMARY

EMISSION			
Standard	**Item**	**Result**	**Remarks**
FCC 47 CFR Part 15 Class B	Conducted Emission (Main Port)	PASS	Complied with limit
	Radiated Emission	PASS	Complied with limit

Note: 1) The test result verdict is decided by the limit of test standard.

2) The information of measurement uncertainty is available upon the customer's request.

3. TEST SITE

3.1. TEST FACILITY

Guangdong KEYS Testing Technology Co., Ltd.
Address: Building 1, No.18, Shihuan Road, Dongcheng Subdistrict, Dongguan, Guangdong, China
104, No.4, Fumin Street, Shilong, Dongguan, Guangdong, China

3.2. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Temperature	±1° C
Humidity	±5%
DC and Low Frequency Voltages	±3%
Conducted Emission(150KHz-30MHz)	±3.60dB
Radiated Emission(30MHz-1GHz)	±4.76dB
Radiated Emission (1GHz-18GHz)	±4.44dB

Note 1: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.3. LIST OF TEST AND MEASUREMENT INSTRUMENTS

3.3.1. For conducted emission at the mains terminals test

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI7	KEYS-E-005	July 2, 2024
Pulse limiter	Rohde&Schwarz	ESH3-Z2	KEYS-E-003	July 2, 2024
LISN impedance network TWO-LINE V-WORK	Rohde&Schwarz	ENV216	KEYS-E-004	July 2, 2024
Screened room	AUDIX	6*3*3	KEYS-E-001	July 23, 2024

3.3.2. For radiated emission test (30MHz-1GHz)

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI7	KEYS-E-005	July 2, 2024
Composite antenna	Schwarzbeck	VULB9168	KEYS-E-013	July 9,2024
Preamplifier	AUDIX	EM330	KEYS-E-014	July 2, 2024
3m standard semi-anechoic chamber	AUDIX	9*6*6	KEYS-E-002	July 23, 2024

3.3.3. For radiated emission test (1GHz above)

Name of Equipment	Manufacturer	Model	Serial No.	Calibration Due
EMI Test Receiver	Rohde&Schwarz	ESCI7	KEYS-E-005	July 2, 2024
Multiple aerial	Schwarzbeck	9120D	KEYS-E-012	July 9,2024
Preamplifier	AUDIX	EM01G18G	KEYS-E-015	July 2, 2024
3m standard semi-anechoic chamber	AUDIX	9*6*6	KEYS-E-002	July 23, 2024

4. EUT DESCRIPTION

Product	Proximity switch
Model	BIL
Supplied Voltage	AC110V (Test Voltage)
Power	--

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
AC Port	1	☒
DC Port	1	☐

Models Difference

N/A

5. TEST METHODOLOGY

5.1. TEST MODE

The EUT was tested together with the thereinafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were assessed.

Test Items		Test Mode
Emission	Conducted Emission	Working
	Radiated Emission	Working

5.2. EUT SYSTEM OPERATION

1. Set up EUT with the support equipment.
2. Make sure the EUT work normally during the test.

6. SETUP OF EQUIPMENT UNDER TEST

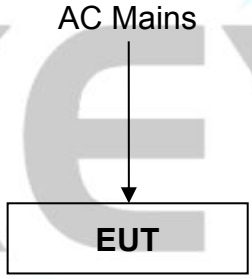
6.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model	Serial No.	Trade Name
1.	N/A	N/A	N/A	N/A

Note: 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.2. BLOCK DIAGRAM OF EUT CONFIGURATION



(EUT: Proximity switch)

7. CONDUCTED EMISSION MEASUREMENT

7.1. LIMITS

FREQUENCY (MHz)	Class A		Class B	
	Quasi-peak dB(μV)	Average dB(μV)	Quasi-peak dB(μV)	Average dB(μV)
0.15 - 0.5	79	66	66-56*	56-46*
0.5 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note: 1) *Decreasing linearly with logarithm of frequency.

2) The lower limit shall apply at the transition frequencies.

3) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

7.2. TEST PROCEDURES

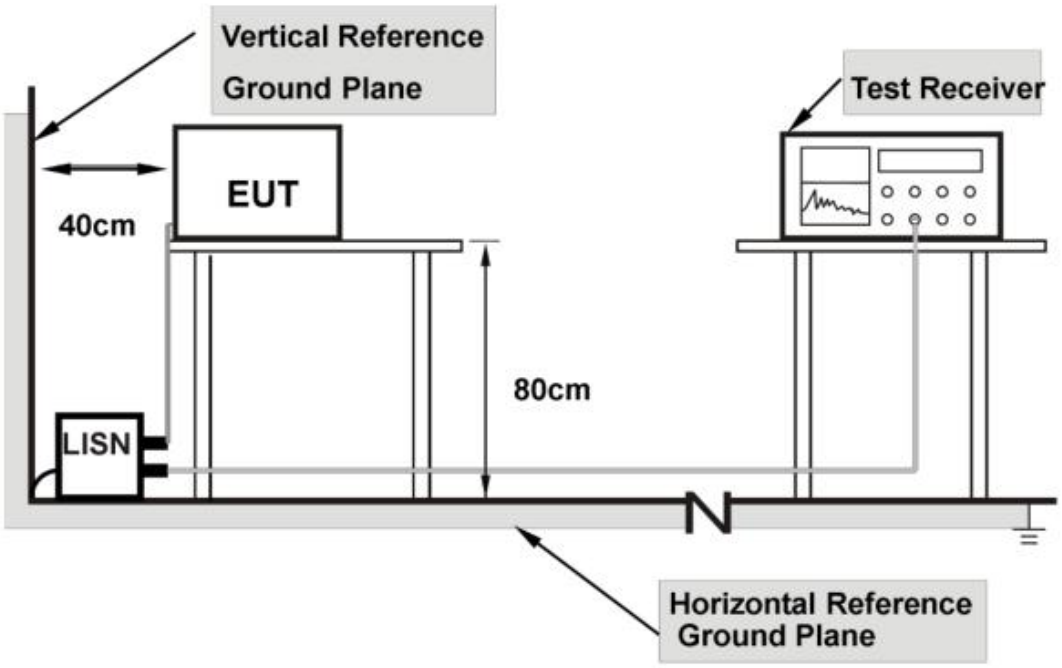
The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. When the EUT is floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane. The EUT should be 0.8 m apart from the AMN, where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, Details please refer to test setup photography.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
During the above scans, the emissions were maximized by cable manipulation.

A scan was taken on both of the power lines, Line and neutral, recording the highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

Note: Test Software Name: e3, Software Version: 1.0.0.0.

7.3. TEST SETUP



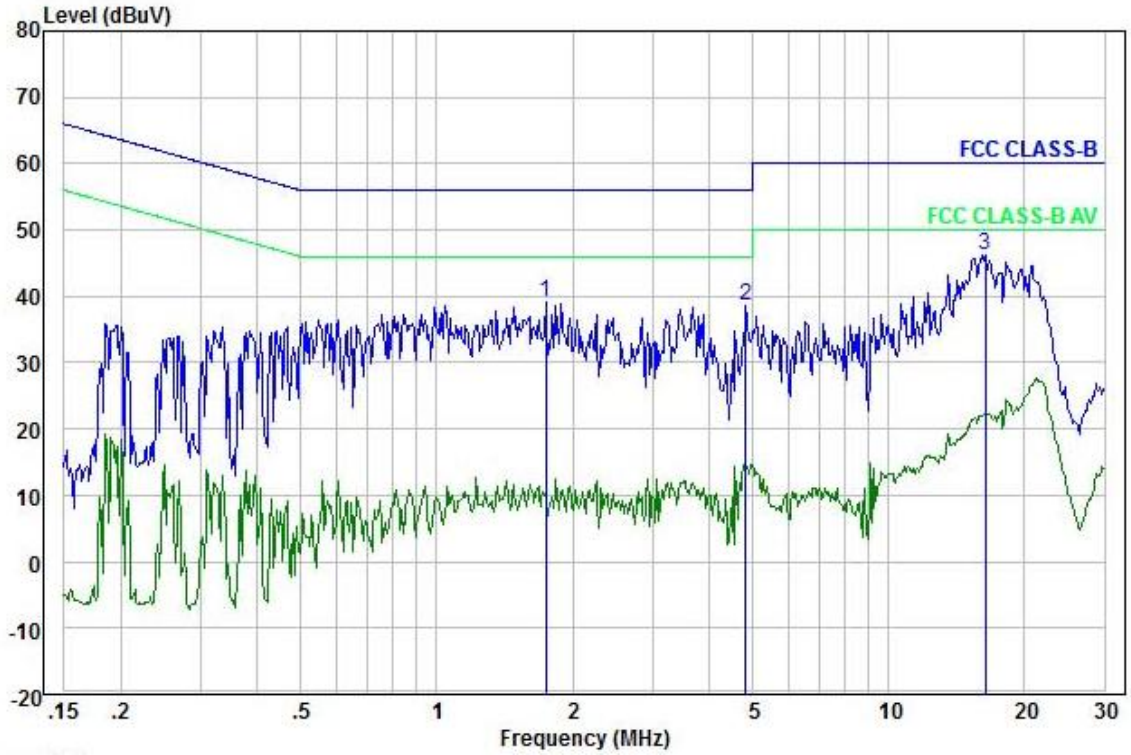
Note: 1.Support units were connected to second LISN.
2.Both of LISNs(AMN) are 80 cm from EUT and at least 80 from other units and other metal planes.

7.4. TEST RESULT

Product name	Proximity switch	Tested By	Brian
Model	BIL	Detector Function	Peak / Quasi-peak/AV
Test Mode	Working	6 dB Bandwidth	9 kHz
Environmental Conditions	24.0℃, 55.1 % RH, 101.2 kPa	Test Result	Pass

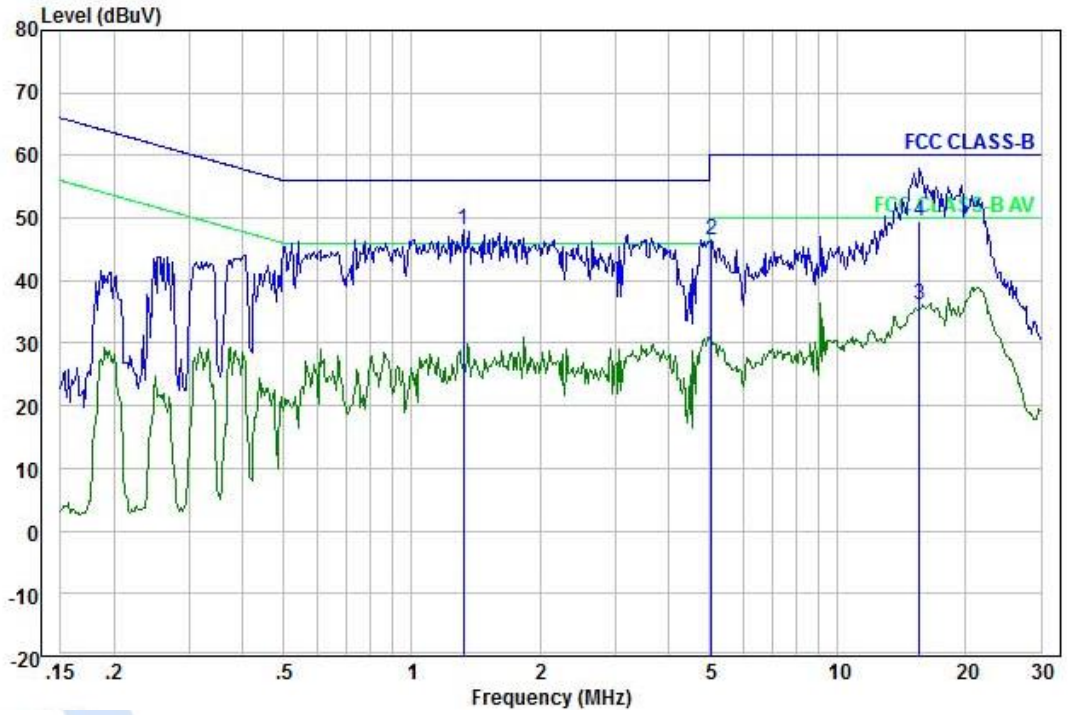
Note:
L = Line Line, N = Neutral Line
Freq. = Emission frequency in MHz
Reading level (dBμV) = Receiver reading
Corr. Factor (dB) = attenuator + Cable loss
Level (dBμV) = Reading level (dBμV) + Corr. Factor (dB)
Limit (dBμV) = Limit stated in standard
Over Limit (dB) = Level (dBμV) – Limit (dBμV)
QP = Quasi-Peak
AV = Average

Please refer to the following diagram:
Line:



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	1.74	39.10	29.10	10.00	56.00	-16.90	0.00	10.00	Peak
2	4.82	38.62	28.62	10.00	56.00	-17.38	0.00	10.00	Peak
3	16.40	46.26	36.26	10.00	60.00	-13.74	0.00	10.00	Peak

Neutral:



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	1.32	48.11	28.71	19.40	56.00	-7.89	9.40	10.00	Peak
2	5.06	46.51	26.93	19.58	60.00	-13.49	9.58	10.00	Peak
3	15.55	36.05	16.01	20.04	50.00	-13.95	10.04	10.00	Average
4	15.55	49.57	29.53	20.04	60.00	-10.43	10.04	10.00	QP

8. RADIATED EMISSION MEASUREMENT

8.1. LIMITS

Maximum permissible level of Radiated Emission measured at 3 meter distance.

FREQUENCY (MHz)	dBμV/m (At 3m)	
	Class A digital device	Class B digital device
30~88	49.00	40.00
88~216	53.50	43.50
216~960	56.40	46.00
960~1000	59.50	54.00

Note: 1) The lower limit shall apply at the transition frequencies.

2) Emission level (dBμV/m) = 20 log Emission level (μV/m).

8.2. TEST PROCEDURE

The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is floor standing equipment, it is placed on the ground plane which has a 0.1 m non-conductive covering to insulate the EUT from the ground plane.

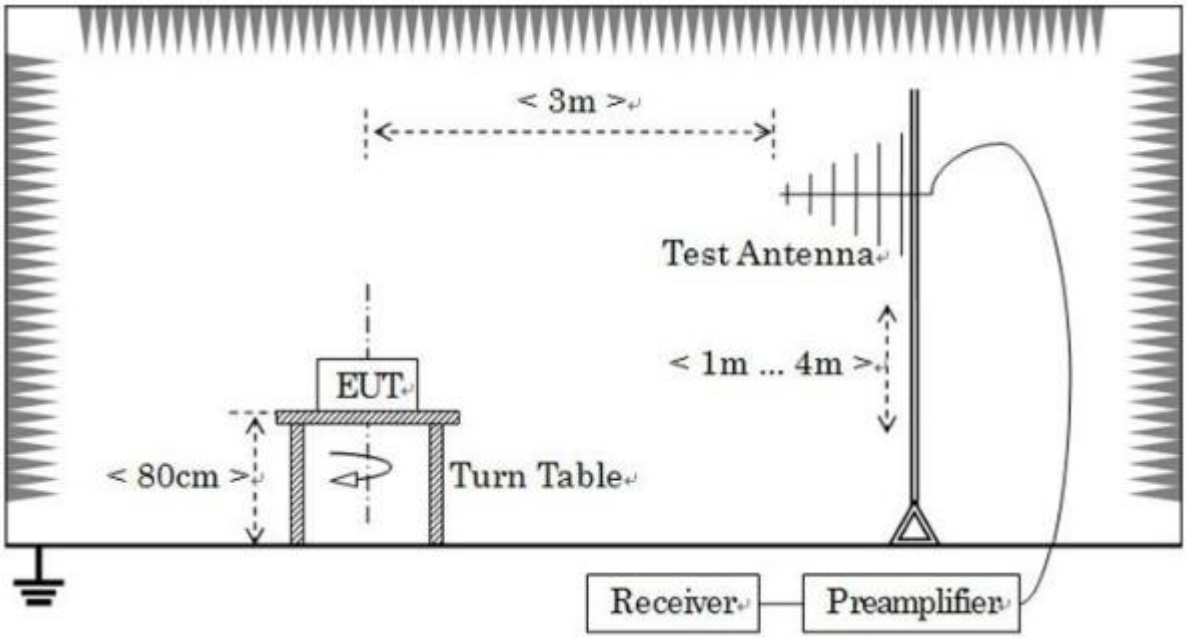
The antenna was placed at 3 meter away from the EUT. The antenna connected to the spectrum analyzer via a cable and at times a pre-amplifier would be used.

The analyzer / receiver quickly scanned from 30 MHz to 1000 MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

During the above scans, the emissions were maximized by cable manipulation. Each modes is measured, recorded the highest emissions. The emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.
The test data of the worst-case condition(s) was recorded.

Note: Test Software Name: e3, Software Version: 8.2.1.0.

8.3. TEST SETUP



Note: For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

8.4. TEST RESULT

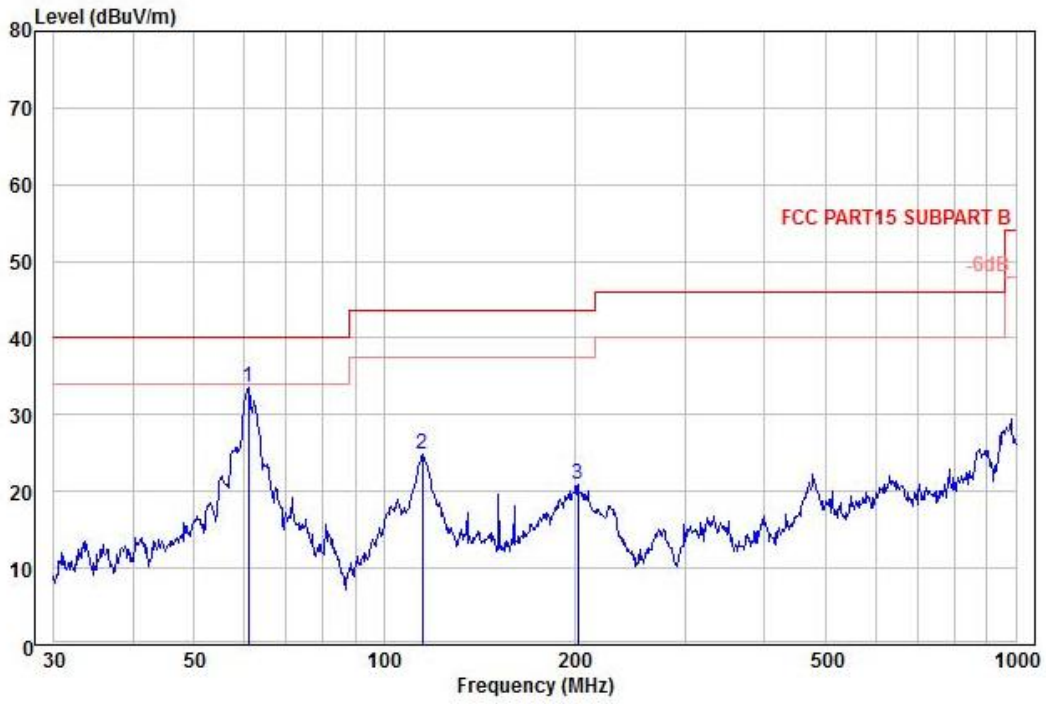
Product name	Proximity switch	Antenna Distance	3 m
Model	BIL	Antenna Pole	Vertical / Horizontal
Test Mode	Working	Detector Function	Peak / Quasi-peak
Environmental Conditions	24.0℃, 55.1 % RH, 101.2 kPa	6 dB Bandwidth	120 kHz
Tested by	Brian	Test Result	Pass

Note:
Freq. = Emission frequency in MHz
Reading level (dBμV) = Receiver reading(dBμV)
Corr.Factor (dB/m)=Antenna factor(dB/m)+Cable loss(dB)-Preamp Factor(dB)
Measurement (dBμV/m)=Reading level(dBμV)+ Corr. Factor (dB/m)
Limit (dBμV/m) = Limit stated in standard
Over Limit (dB) = Measurement (dBμV/m) – Limit (dBμV/m)
QP = Quasi-Peak

The highest frequency of the internal sources of the EUT was less than 108 MHz, so the measurement was only made up to 1 GHz.

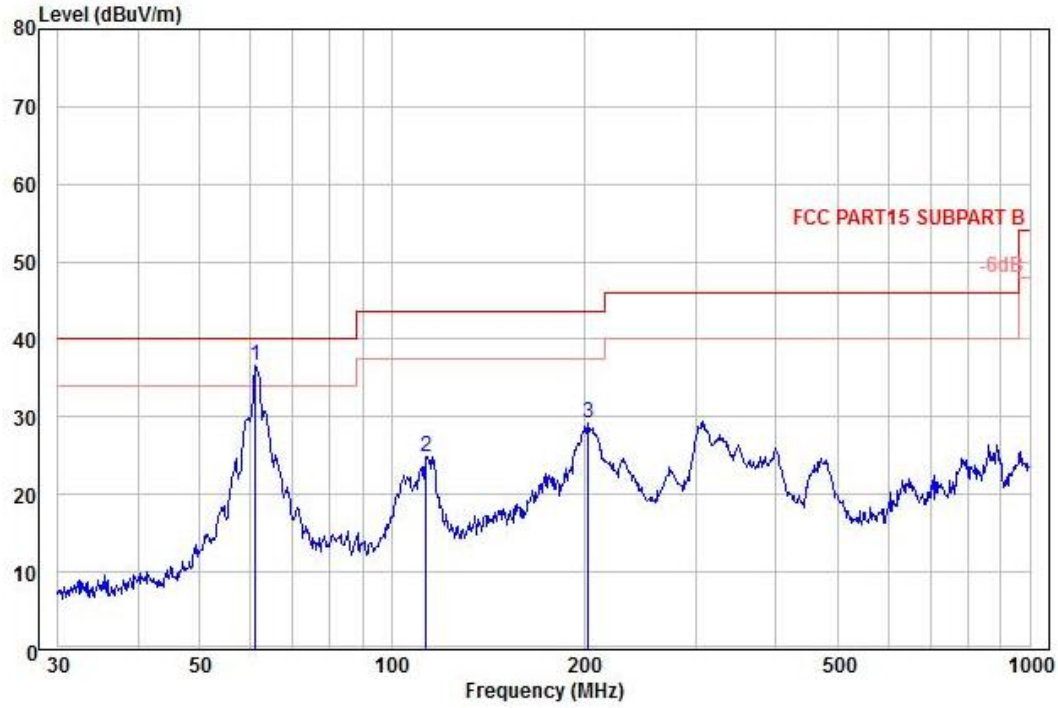
Please refer to the following diagram:

Vertical:



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Factor	Cable Loss	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB/m	dB	
1	60.92	33.49	50.67	-17.18	40.00	-6.51	12.67	0.61	Peak
2	114.92	24.77	43.92	-19.15	43.50	-18.73	10.59	0.79	Peak
3	202.81	21.03	40.77	-19.74	43.50	-22.47	9.59	1.06	Peak

Horizontal:



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Factor	Cable Loss	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	dB/m	dB	
1 !	61.13	36.54	53.72	-17.18	40.00	-3.46	12.67	0.61	Peak
2	113.32	24.91	43.89	-18.98	43.50	-18.59	10.77	0.78	Peak
3	203.52	29.18	48.95	-19.77	43.50	-14.32	9.56	1.06	Peak

9. PHOTOGRAPHS OF THE TEST CONFIGURATION

N/A

10. PHOTOGRAPHS OF EUT



11. SUPPLEMENTARY INFORMATION FOR THE USER MANUAL, LABELING REQUIREMENTS

1. Devices subject to FCC part 15 Subpart B must be labelled with the following statement. The label can be affixed at any space external to the product except the battery door or detachable parts.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2)this device must accept any Interference received, including interference that may cause undesired operation.

2. In addition, for a Class B digital device or peripheral, the instructions furnished the user shall include the following statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with The instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: -- Reorient or relocate the receiving antenna. -- Increase the separation between the equipment and receiver. -- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. -- Consult the dealer or an experienced radio/TV technician for help.
Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the use's authority to operate the equipment

Note: If shielded cables or other specialized accessories are necessary for the unit to achieve compliance, a statement similar to the following should be added:

Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.

— End of report —