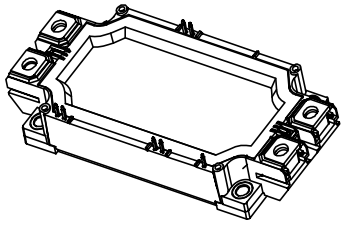
Silicon Carbide (SiC)
1700V 1.3 mohm Half-Bridge MOSFET Module Edual3
EDSC900X17K



PIM11, 152.00 x 62.15 x 20.80
CASE 180HT

The EDSC900X17K is a power module containing 1.3 mΩ /1700V SiC MOSFET half−bridge and a thermistor with Si_3N_4 AMB in an Edual3 package.

Features
- 1.3 mΩ / 1700V SiC MOSFET Half−Bridge
- Si_3N_4 AMB
- NTC Thermistor
- Low Inductive Layout
- Solderable Pins
- Isolated Base Plate
- SwiftSiC™

Typical Applications
- Motor Drives
- Servo Drives
- Solar Drives
- Uninterruptible Power Supply Systems (UPS)

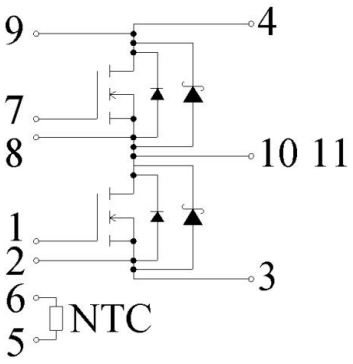
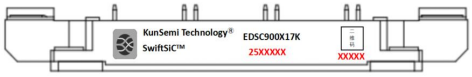


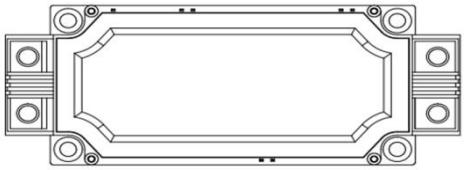
Figure 1. Schematic

MARKING DIAGRAM



EDSC900X17K = Device Code
25XXXX = Year and Work Week Code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package
EDSC900X17K	Edual3

PIN DESCRIPTION

Pin	Name	Description
1	G2	T2 Gate
2	S2	T2 Source
3	DC-	DC Negative Bus Connection
4	DC+	DC Positive Bus Connection
5	TH2	Thermistor Connection 2
6	TH1	Thermistor Connection 1
7	G1	T1 Gate
8	S1	T1 Source
9	DS1	T1 Drain Sensing
10	OUT	Center Point of Half Bridge
11	OUT	Center Point of Half Bridge

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
SiC MOSFET			
Drain−Source Voltage	V_{DSS}	1700	V
Gate−Source Voltage	V_{GS}	−10/+20	V
Continuous Drain Current @ T_c = 80°C (T_J = 175°C)	I_{DS}	900	A
Pulsed Drain Current (T_J = 175°C)	I_{DPulse}	1800	A
Maximum Power Dissipation @ T_c = 80°C (T_J = 175°C)	Ptot	2215	W
Minimum Operating Junction Temperature	T_{JMIN}	−40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
SiC MOSFET CHARACTERISTICS						
Zero Gate Voltage Drain Current	V_{GS} = 0V, V_{DS} = 1700V	I_{DSS}	-	-	200	nA
Drain−Source On Resistance	V_{GS} = 18V, I_{DS} = 900A, T_J = 25°C	$R_{DS(ON)}$	-	1.25		mΩ
	V_{GS} = 18V, I_{DS} = 900A, T_J = 125°C		-	1.62	-	
	V_{GS} = 18V, I_{DS} = 900A, T_J = 175°C		-	2.29	-	
Gate−Source Threshold Voltage	V_{GS} = V_{DS}, I_{DS} = 224mA	$V_{GS(TH)}$		2.71		V
Gate Resistance	V_{GS} = 0V, f = 1MHz	R_g	-	0.23	-	Ω
Gate Leakage Current	V_{GS} = −10V / 20V, V_{DS} = 0V	I_{GSS}	-800	-	+800	nA
Input Capacitance	V_{DS} = 900V, V_{GS} = 0V, f = 100kHz	C_{iss}	-	56.4	-	nF
Output Capacitance		C_{oss}	-	3.71	-	nF
Reverse Transfer Capacitance		C_{rss}	-	75.9	-	pF

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
SiC MOSFET CHARACTERISTICS						
Total Gate Charge	V_{DS} = 900V, V_{GS} = −5V / 18V, I_D = 900A	$Q_{G(TOTAL)}$	-	2.76	-	uC
Gate−Source Charge		Q_{GS}	-	1.17	-	uC
Gate−Drain Charge		Q_{GD}	-	0.948	-	uC
Turn−on Delay Time	V_{DS} = 900V, I_{DS} = 900A V_{GS} = −5V / 18V, R_G = 6.8Ω Ls = 2uH, T_J = 25°C	$T_{d(on)}$	-	189.52	-	ns
Rise Time		t_r	-	241.88	-	ns
Turn−off Delay Time		$T_{d(off)}$	-	468.35	-	ns
Fall Time		t_f	-	89.88	-	ns
Turn−on Switching Loss per Pulse		E_{ON}	-	21.20	-	mJ
Turn−off Switching Loss per Pulse		E_{OFF}	-	48.17	-	mJ
Turn−on Delay Time	V_{DS} = 900V, I_{DS} = 900A V_{GS} = −5V / 18V, R_G = 6.8Ω Ls = 2uH, T_J = 125°C	$T_{d(on)}$	-	151.68	-	ns
Rise Time		t_r	-	235.52	-	ns
Turn−off Delay Time		$T_{d(off)}$	-	523.09	-	ns
Fall Time		t_f	-	92.59	-	ns
Turn−on Switching Loss per Pulse		E_{ON}	-	20.81	-	mJ
Turn−off Switching Loss per Pulse		E_{OFF}	-	50.07	-	mJ
Turn−on Delay Time	V_{DS} = 900V, I_{DS} = 900A V_{GS} = −5V / 18V, R_G = 6.8Ω Ls = 2uH, T_J = 175°C	$T_{d(on)}$	-	136.71	-	ns
Rise Time		t_r	-	223.89	-	ns
Turn−off Delay Time		$T_{d(off)}$	-	563.67	-	ns
Fall Time		t_f	-	96.89	-	ns
Turn−on Switching Loss per Pulse		E_{ON}	-	20.16	-	mJ
Turn−off Switching Loss per Pulse		E_{OFF}	-	49.71	-	mJ
Thermal Resistance, Junction to Case (MOSFET)		R_{thJC}		0.0519		°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
SiC MOSFET CHARACTERISTICS						
Diode Forward Voltage	I_{SD} = 900A, T_J = 25°C	V_{SD}	-	2.68		V
	I_{SD} = 900A, T_J = 125°C		-	3.02		
	I_{SD} = 900A, T_J = 175°C		-	3.02		
THERMISTOR CHARACTERISTICS						
Rated Resistance		R_{25}	-	5.0	-	K Ω
Deviation of R_{100}	T_C = 100°C, R_{100} = 493.3Ω	ΔR/R	-5	-	5	%
Power Dissipation		P_{25}	-	-	20.0	mW
B-value	$R_2 = R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	$B_{25/50}$	-	3375	-	K
B-value	$R_2 = R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	$B_{25/80}$	-	3411	-	K

MODULE

Storage Temperature Range	T_{stg}	−40 to 150	°C
Module Operating Junction Temperature	T_J	−40 to 150	°C
Isolation Test Voltage, t = 1 s, 50 Hz	Viso	2500	V
Mounting torque to main terminals(M6 screw)	M_T	6.0	N.m
Mounting torque to main terminals(M5 screw)	M_H	6.0	N.m
Stray Inductance	L_{DS}	20	nH
Weight of Module	G	350	g

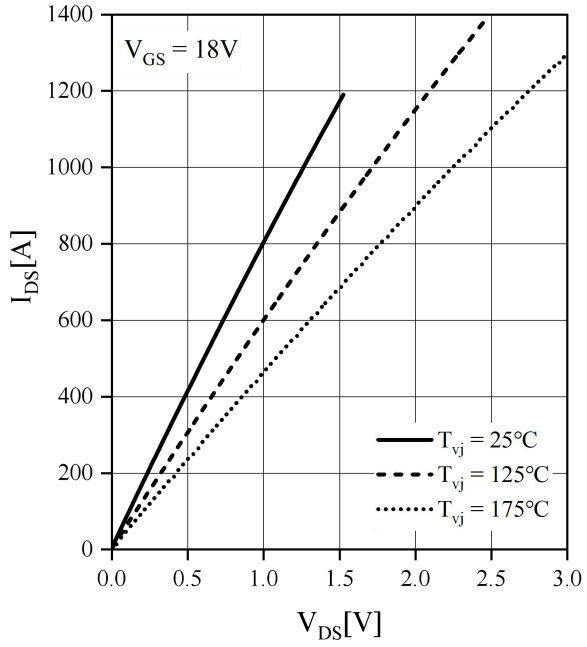


Figure 2. MOSFET Typical Output Characteristic

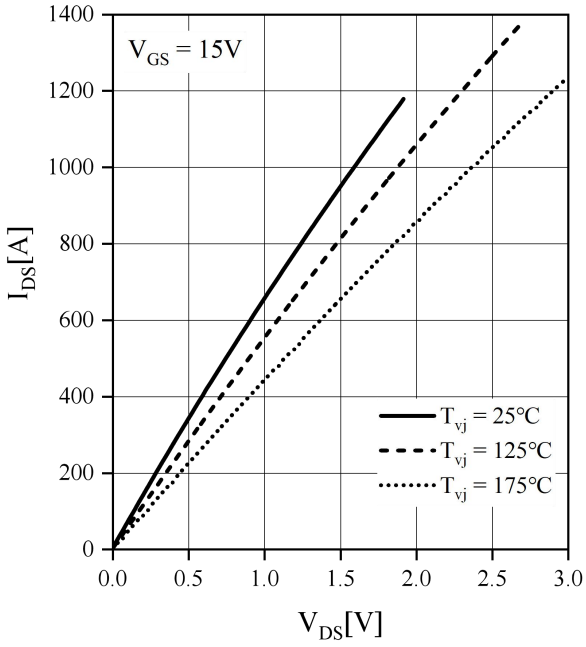


Figure 3. MOSFET Typical Output Characteristic

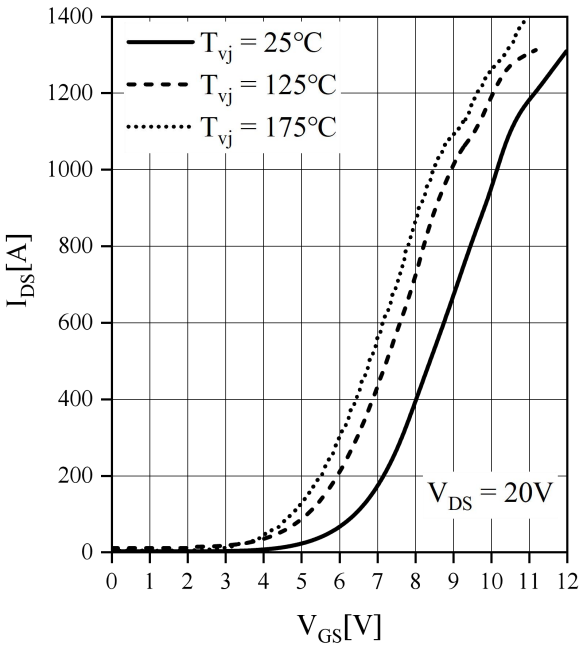


Figure 4. MOSFET Typical Transfer Characteristic

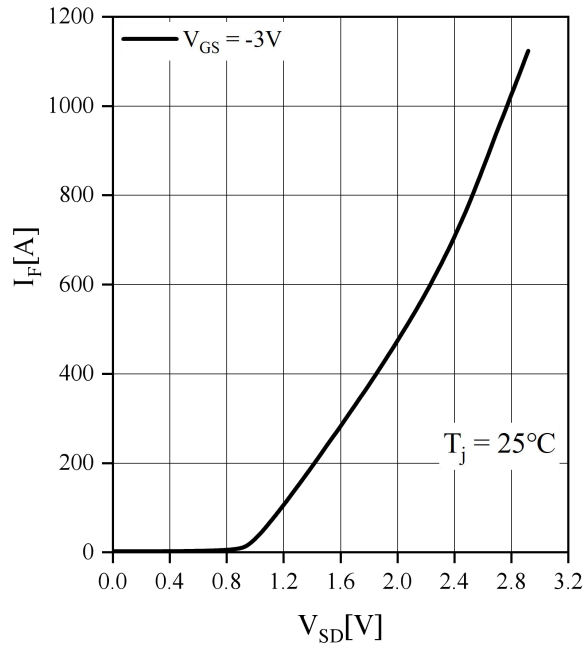


Figure 5. Reverse bias safe operating area

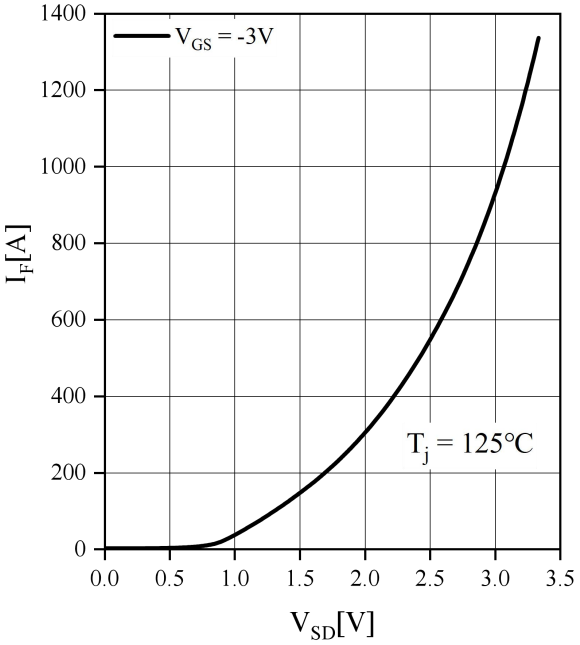


Figure 6. Reverse bias safe operating area

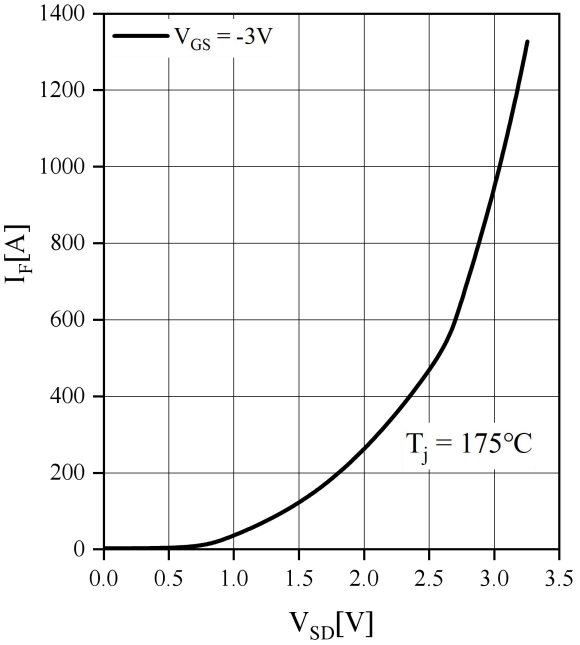


Figure 7. Reverse bias safe operating area

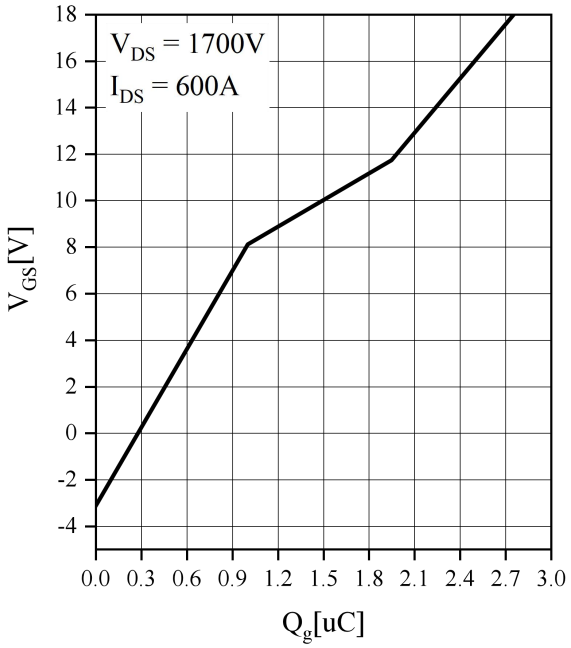


Figure 8. Gate−to−Source Voltage vs. Total Charge

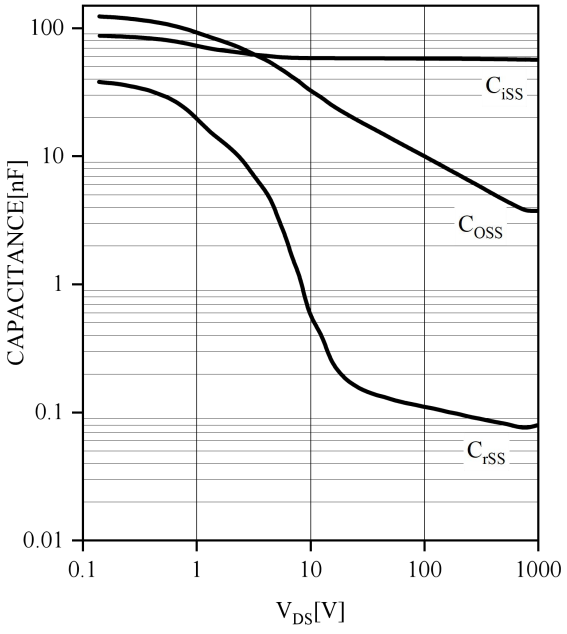


Figure 9. Capacitance vs. Drain−to−Source Voltage

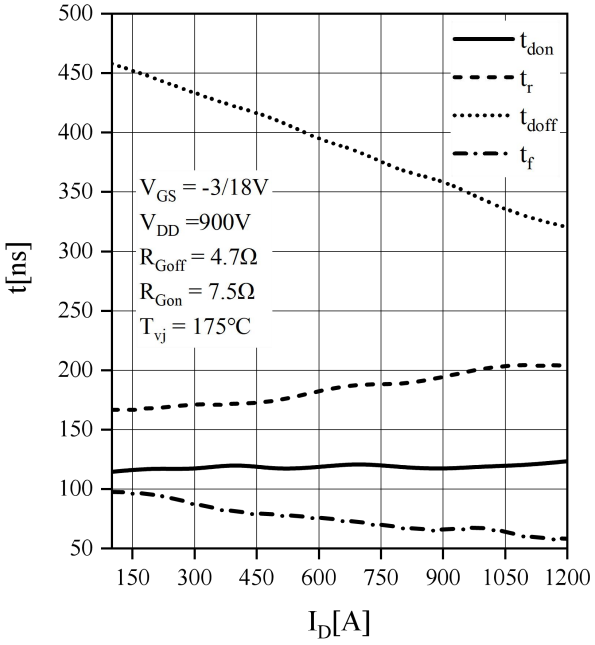


Figure 10. Typical Switching times Vs. ID

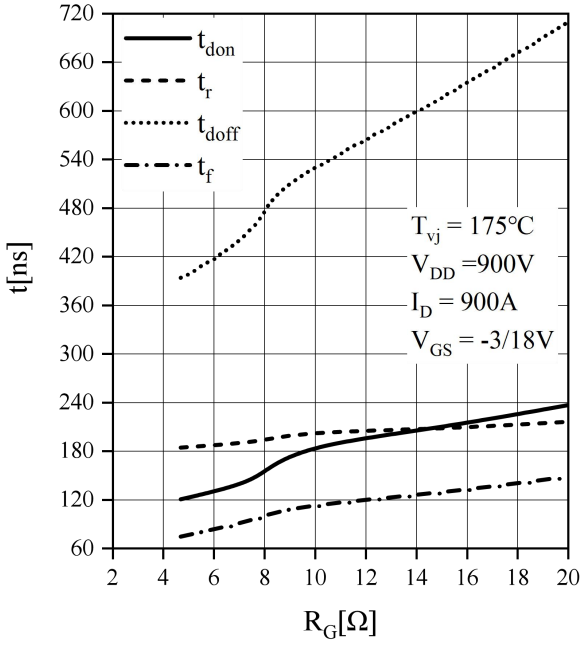


Figure 11. Typical Switching times Vs. R_G

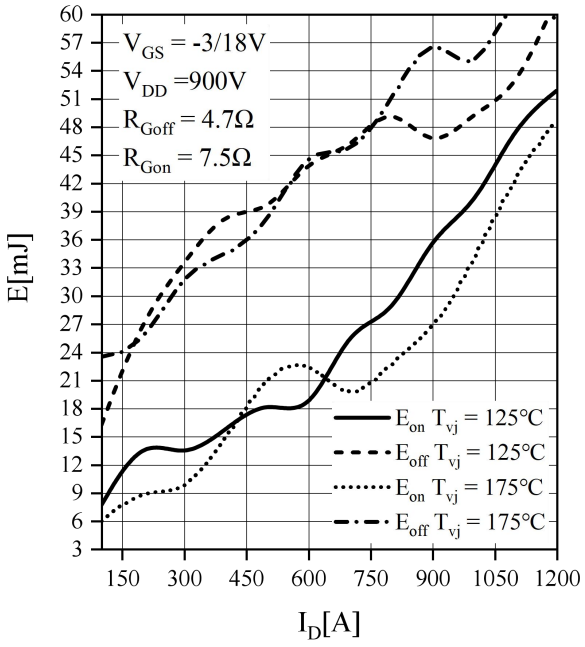


Figure 12. Typical Switching Loss vs. ID

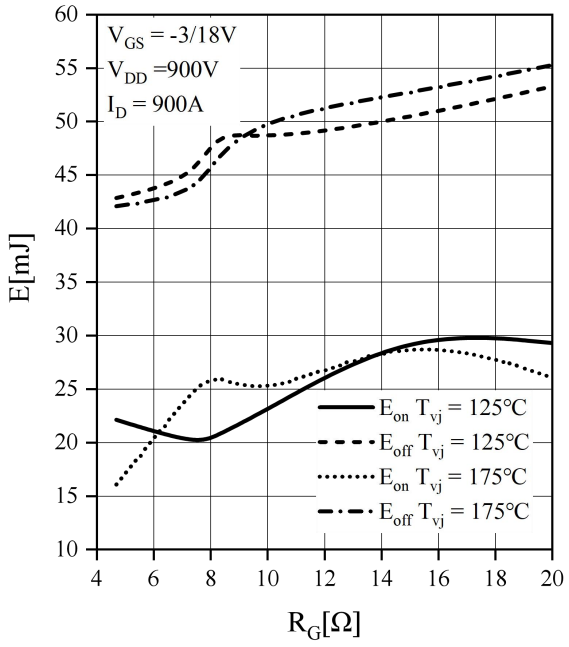


Figure 13. Typical Switching Loss vs. R_G

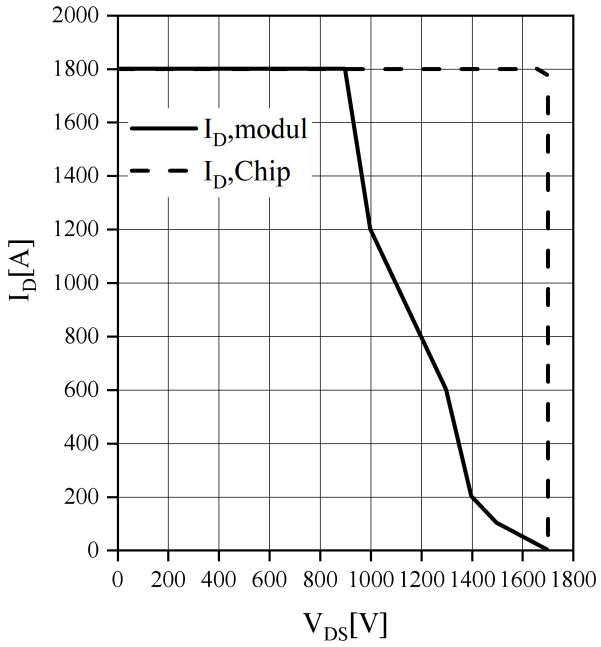


Figure 14. Reverse bias safe operating area

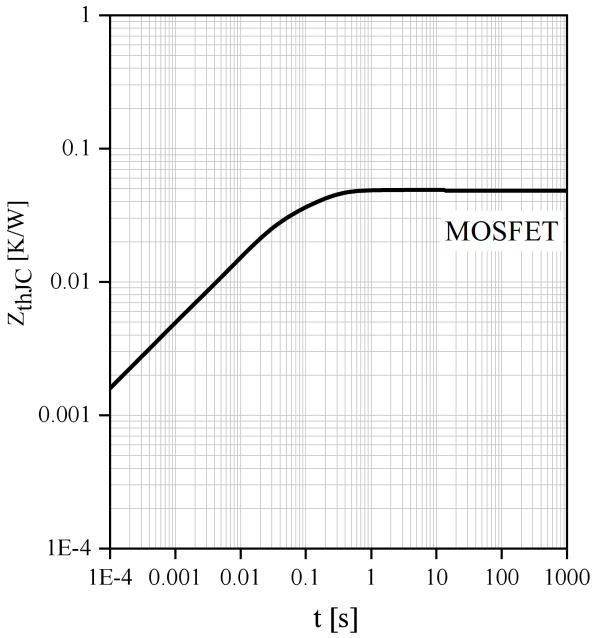
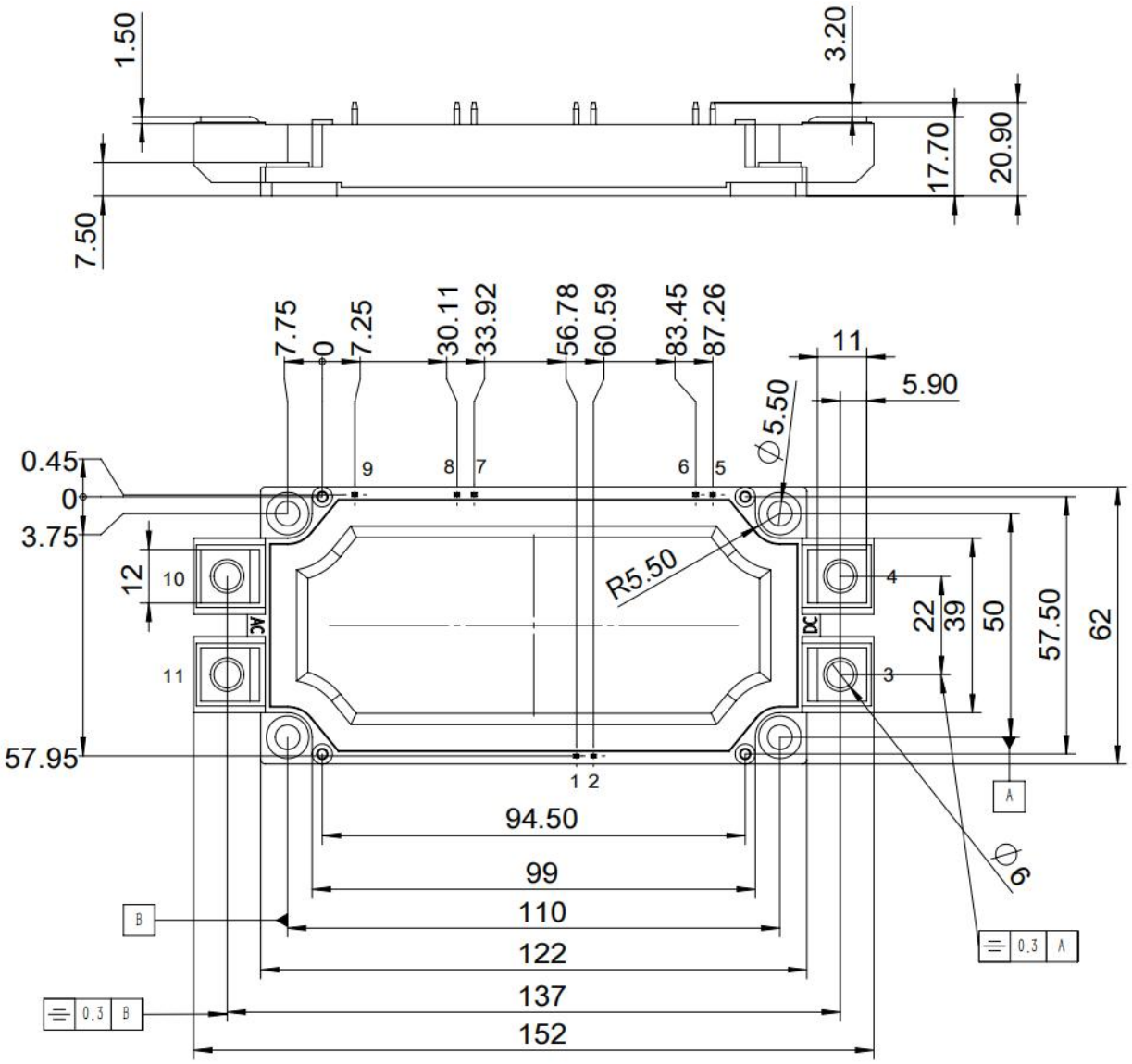


Figure 15. Transient thermal impedance

Package Drawing



UNIT:mm