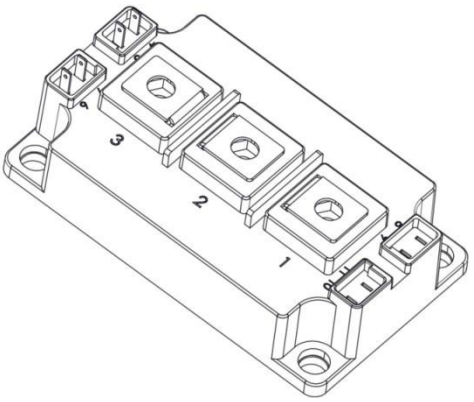
Silicon Carbide (SiC)
1200V 1.8mohm Brake-Chopper MOSFET Module 62mm SC600SL12C1K



106.10 × 61.00 × 30.85

The SC600SL12C1K is a power module containing 1.8mΩ / 1200V SiC MOSFET Brake-Chopper and a thermistor with Si_3N_4 AMB in an 62mm package.

Features

- 1.8mΩ / 1200V SiC MOSFET Brake-Chopper
- Si_3N_4 AMB
- Low Inductive Layout
- Solderable Pins
- Isolated Base Plate

Typical Applications

- Motor Drives
- Vehicle Fast Chargers
- Renewable energy
- Uninterruptible Power Supply Systems (UPS)

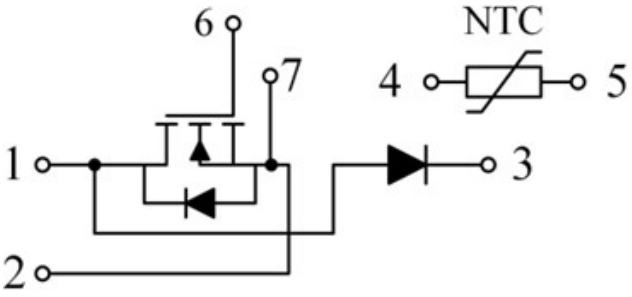
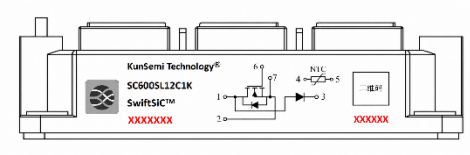


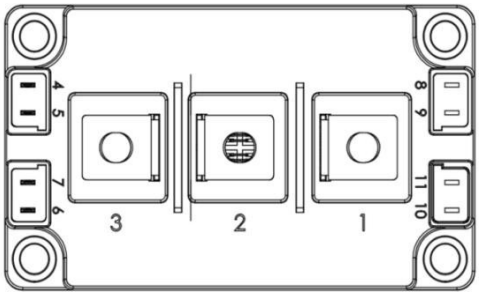
Figure 1. Schematic

MARKING DIAGRAM



SC600SL12C1K = Device Code
XXXXXXX = Year, week and batch Code
XXXXX = Flow code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package
SC600SL12C1K	62mm

PIN DESCRIPTION

Pin	Name	Description
1	OUT	Center Point of Switching Node
2	DC-	DC Negative Bus Connection
3	DC+	DC Positive Bus Connection
4、5	NTC	NTC
6	G1	T1 Gate
7	S1	T1 Source

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
SiC MOSFET			
Drain−Source Voltage	V_{DSS}	1200	V
Gate−Source Voltage	V_{GS}	+20/-10	V
Continuous Drain Current @ T_C = 80 °C (T_j = 175 °C)	I_{DS}	600	A
Pulsed Drain Current (T_j = 175°C)	I_{Dpulse}	1200	A
Maximum Power Dissipation @ T_C = 80°C (T_j = 175 °C)	P_{tol}	1043	W
Minimum Operating Junction Temperature	T_{JMIN}	-40	°C
Maximum Operating Junction Temperature	T_{JMAX}	175	°C

ELECTRICAL CHARACTERISTICS (T_j = 25℃ unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
SiC MOSFET CHARACTERISTICS							
Zero Gate Voltage Drain Current	V_{GS} = 0V, V_{DS} = 1200V		I_{DSS}	-	-	1	mA
Drain−Source On Resistance	V_{GS} = 18V, I_{DS} = 600A, T_j = 25°C		$R_{DS(ON)}$	-	1.85		mΩ
	V_{GS} = 18V, I_{DS} = 600A, T_j = 125°C			-	2.58	-	
	V_{GS} = 18V, I_{DS} = 600A, T_j = 175°C			-	3.27	-	
Gate−Source Threshold Voltage	V_{GS} = V_{DS}, I_{DS} = 168mA, T_j = 25°C		$V_{GS(TH)}$		2.84		V
Gate Resistance	V_{GS} = 0V, f = 100kHz		R_g	-	0.39	-	Ω
Gate Leakage Current	V_{GS} = -10 / 20V,V_{DS} = 0V		I_{GSS}	-400	-	+400	nA
Input Capacitance	V_{DS} = 600V, V_{GS} = 0V, f = 100kHz		C_{iss}	-	45.3	-	nF
Output Capacitance			C_{oss}	-	2.97	-	nF
Reverse Transfer Capacitance			C_{rss}	-	70.9	-	pF
Total Gate Charge	V_{DS} = 600V, V_{GS} = -4 /18V, I_D = 600A		$Q_{G(TOTAL)}$	-	1.23	-	uC
Turn−on Delay Time	V_{DS} = 600V, I_{DS} = 600A, V_{GS} = -3/18V, R_G = 7.5Ω	T_j = 25°C	$T_{d(on)}$	-	142.14	-	ns
		T_j = 125°C		-	113.76	-	ns
		T_j = 175°C		-	102.53	-	ns
Rise Time		T_j = 25°C	t_r	-	181.41	-	ns
		T_j = 125°C		-	176.64	-	ns
		T_j = 175°C		-	167.92	-	ns
Turn−off Delay Time	V_{DS} = 600V, I_{DS} = 600A, V_{GS} = -3/18V, R_G = 4.7Ω	T_j = 25°C	$T_{d(off)}$	-	351.26	-	ns
		T_j = 125°C		-	392.32	-	ns
		T_j = 175°C		-	422.75	-	ns
Fall Time		T_j = 25°C	t_f	-	67.41	-	ns
		T_j = 125°C		-	69.44	-	ns
		T_j = 175°C		-	72.67	-	ns
Turn−on Switching Loss per Pulse	V_{DS} = 600V, I_{DS} = 600A, V_{GS} = -3/18V, R_G = 7.5Ω	T_j = 25°C	E_{on}	-	15.90	-	mJ
		T_j = 125°C		-	15.61	-	mJ
		T_j = 175°C		-	15.12	-	mJ
Turn−off Switching Loss per Pulse	V_{DS} = 600V, I_{DS} = 600A, V_{GS} = -3/18V, R_G = 4.7Ω	T_j = 25°C	E_{off}	-	36.13	-	mJ
		T_j = 125°C		-	37.55	-	mJ
		T_j = 175°C		-	37.28	-	mJ
Thermal Resistance, Junction to Case (MOSFET)			R_{thJC}	-	0.091	-	°C/W

ELECTRICAL CHARACTERISTICS (T_j = 25℃ unless otherwise noted) (continued)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	I_{SD} = 600 A, T_j = 25 ℃	V_{SD}	-	2.61		V
	I_{SD} = 600 A, T_j = 125 ℃		-	3.04	-	
	I_{SD} = 600 A, T_j = 175 ℃		-	3.11	-	
Diode Reverse Recovery Charge	V_R = 600 V, I_{SD} = 600 A V_{GS} = -5/+18 V, R_G = 4.7 Ω L_S = 7 uH, T_J = 25 ℃	Q_r	-	5.3	-	uC
Peak Reverse Recovery Current		I_{rrm}	-	168	-	A
Reverse Recovery Time		t_{rr}		55		ns
Reverse Recovery Energy		E_{rr}	-	3	-	mJ
MODULE						
Storage Temperature Range		T_{stg}	-40 to 150			℃
Module Operating Junction Temperature		T_j	-40 to 175			℃
Isolation Test Voltage, t = 1 s, 50 Hz		V_{iso}	4000			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}	13.5			nH
Weight of Module		G	320			g

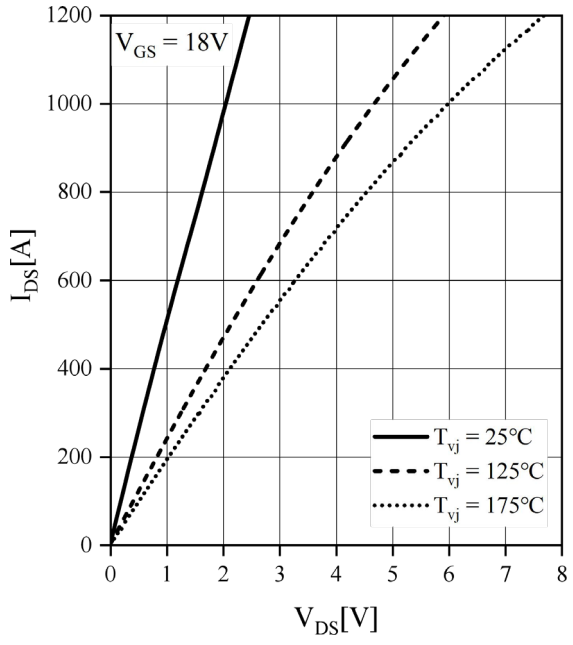


Figure 2. MOSFET Typical Output Characteristic

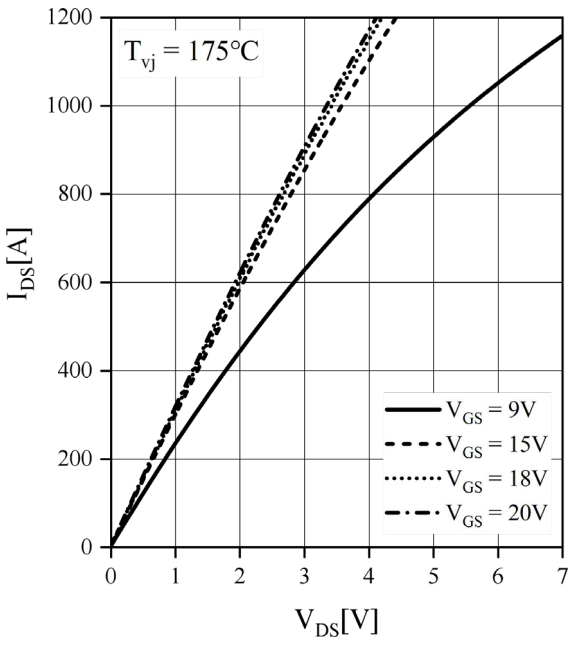


Figure 3. MOSFET Typical Output Characteristic

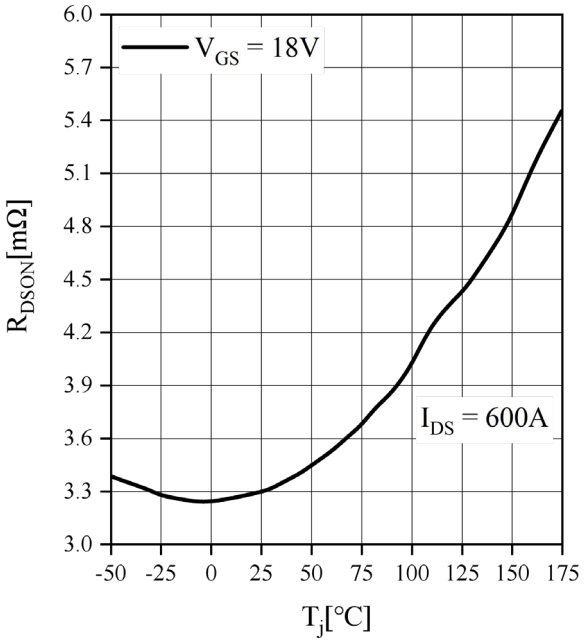


Figure 4. Drain source on-resistance

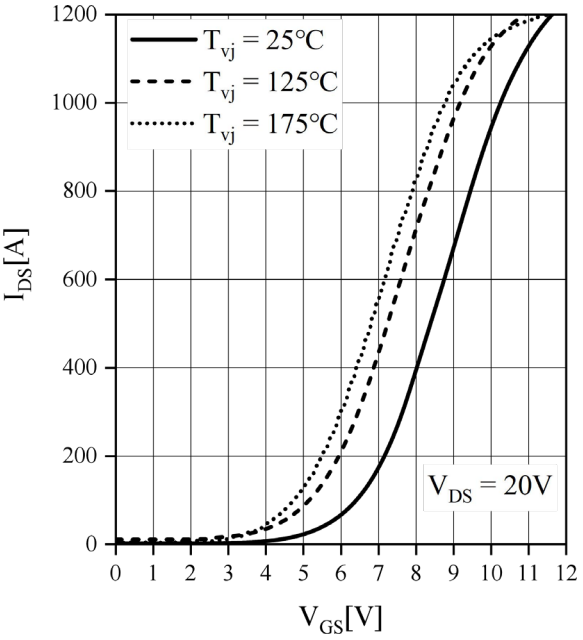


Figure 5.MOSFET Typical Transfer Characteristic

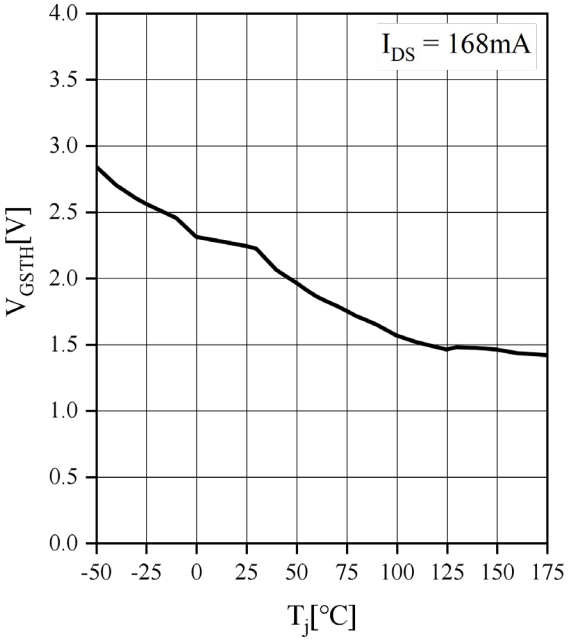


Figure 6. Gate-source threshold voltage

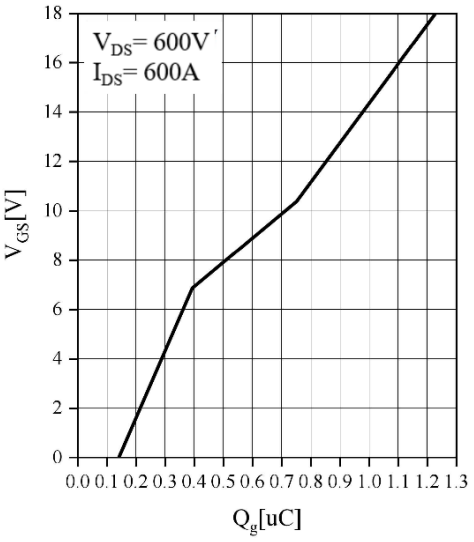


Figure 7. Gate charge characteristic

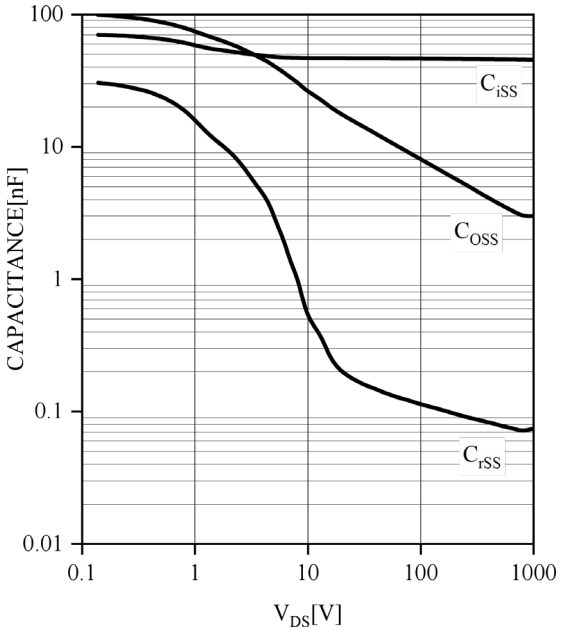


Figure 8. Capacity characteristic

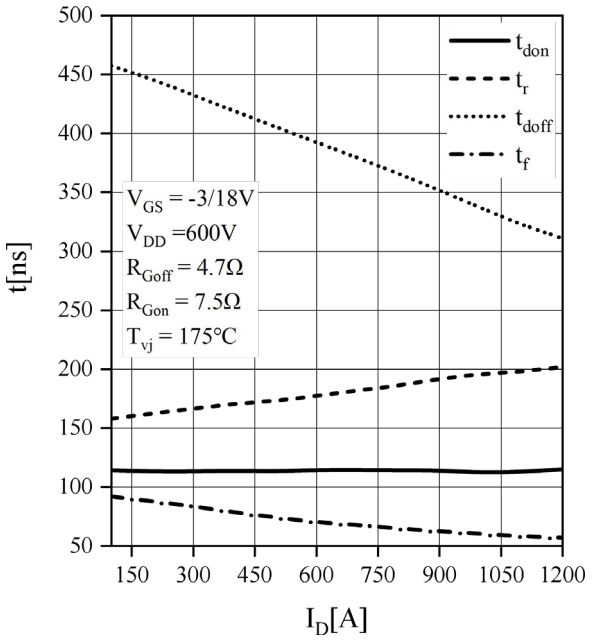


Figure 9. Switching times

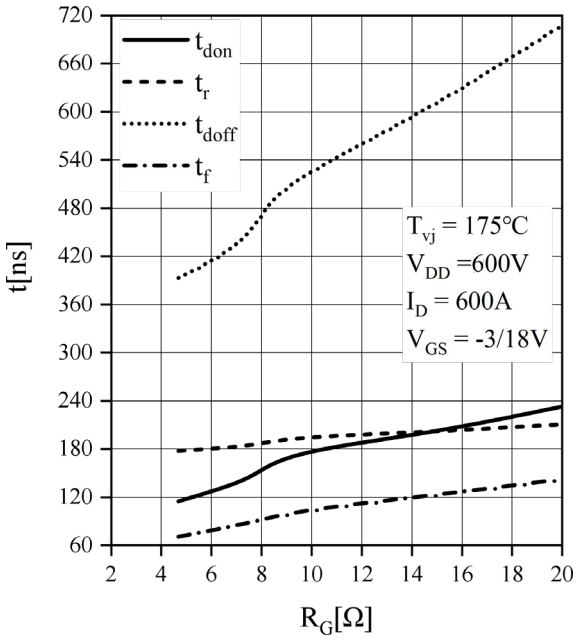


Figure 10. Switching times

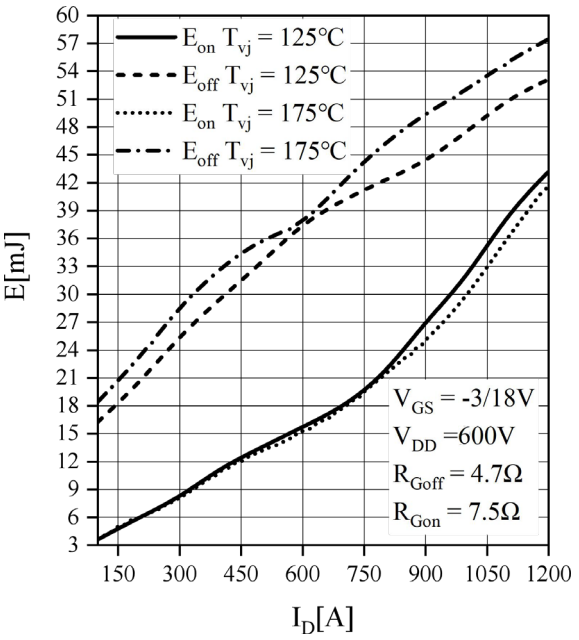


Figure 11.Switching losses

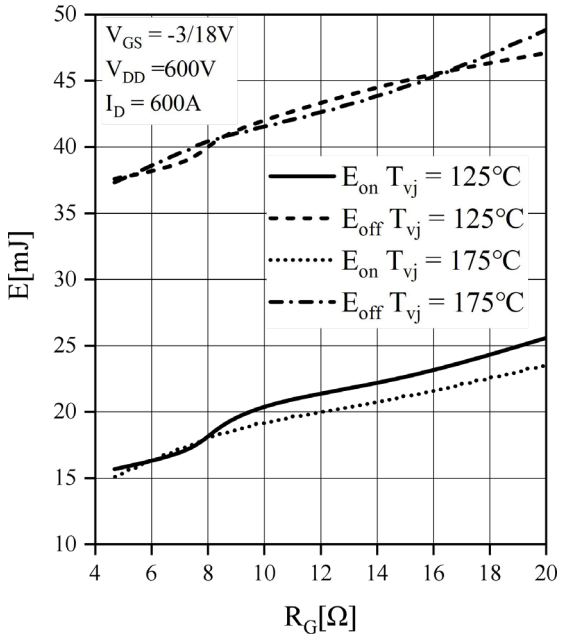


Figure 12. Switching losses

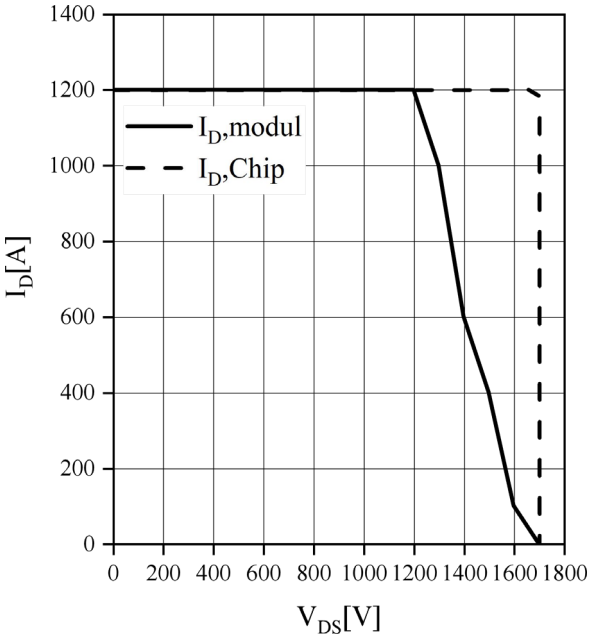


Figure 13. Reverse bias safe operating area

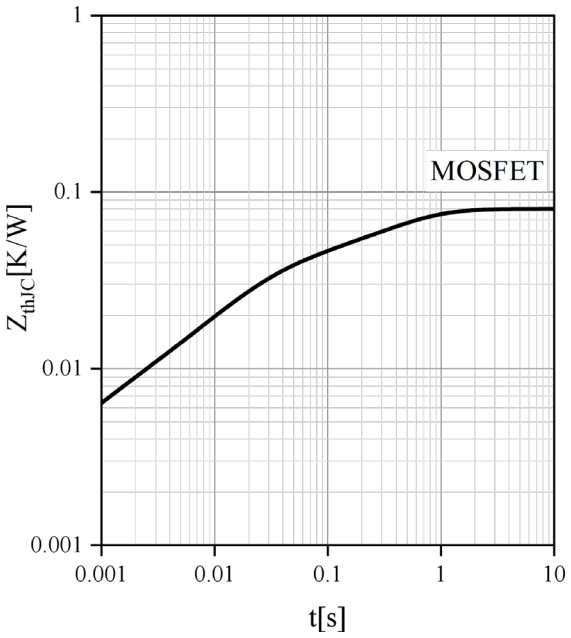


Figure 14. Transient thermal impedance

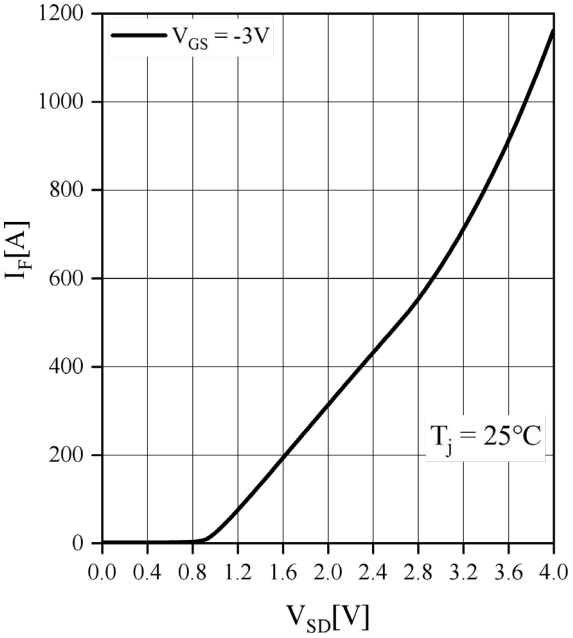
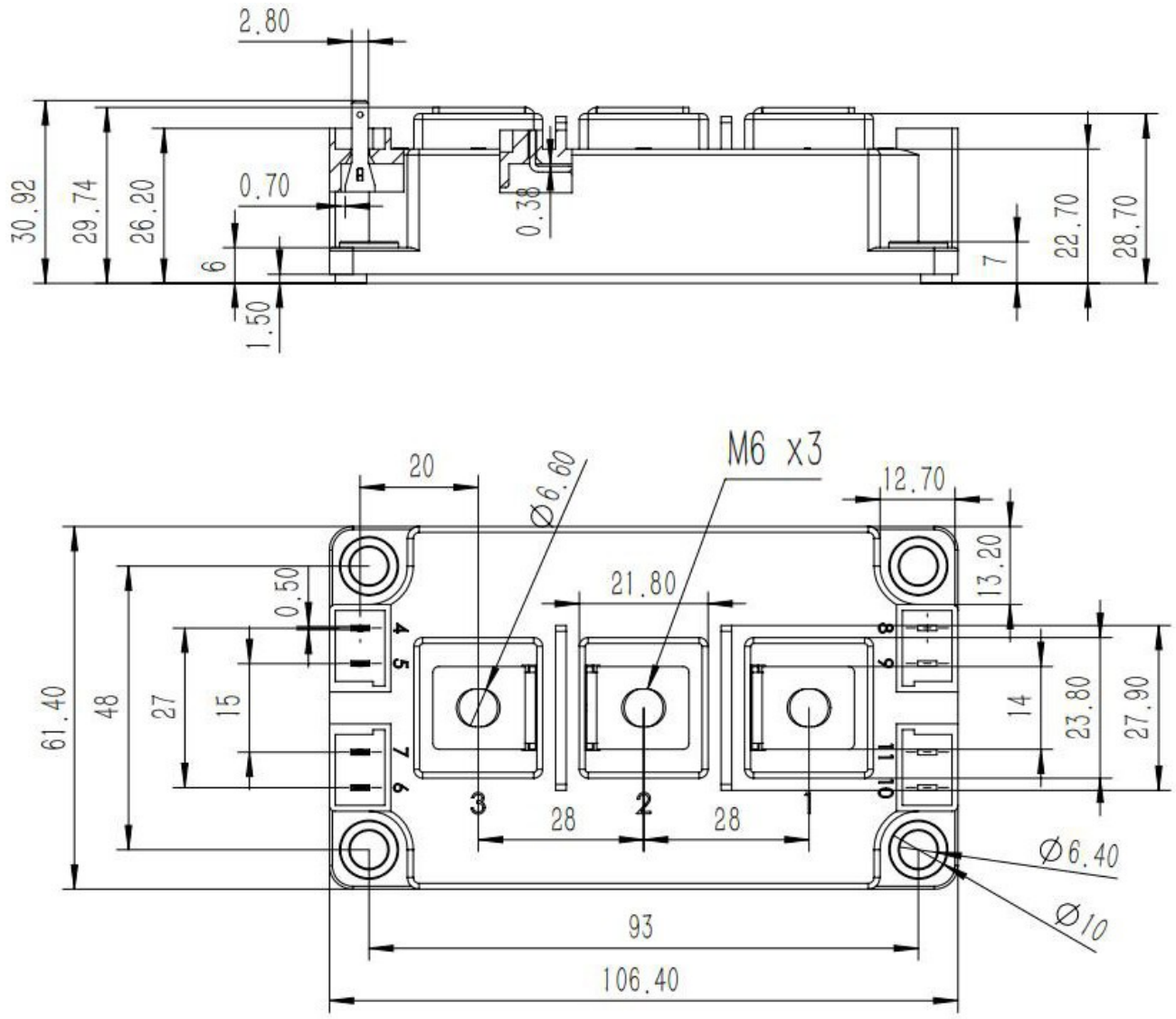


Figure 15. Forward characteristic body diode

Package Drawing



UNIT:mm