Silicon Carbide (SiC)
2200V 7mohm
Half-Bridge MOSFET Module
62mm
SC200HB22C1

The SC200HB22C1 is a power module containing 7mΩ / 2200V SiC MOSFET half-bridge and a thermistor with Si_3N_4 AMB in an 62mm package.

Features

- 7mΩ / 2200 V SiC MOSFET Half−Bridge
- Si_3N_4 NAMB
- NTC Thermistor
- Low Inductive Layout
- Solderable Pins
- Isolated Base Plate

Typical Applications

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

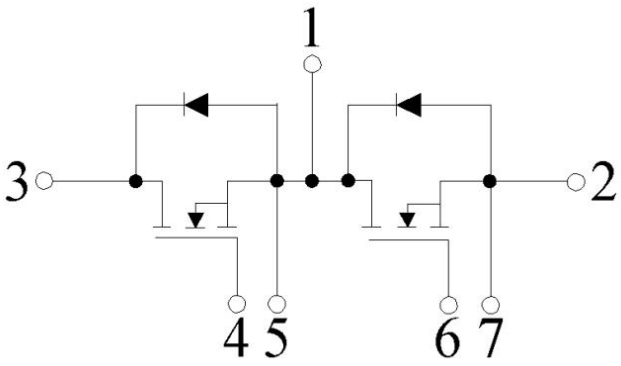
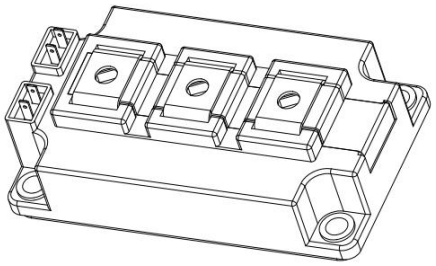
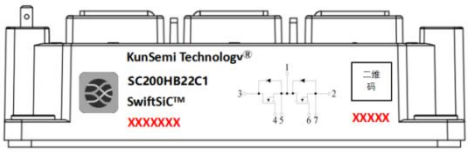


Figure 1. Schematic



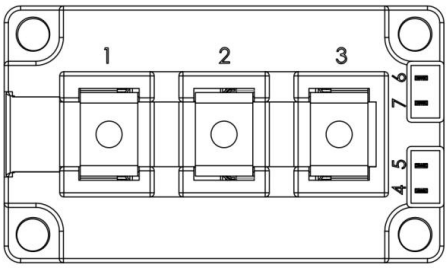
PIM7, 106.10 × 61.00 × 30.85

MARKING DIAGRAM



SC200HB22C1 = Device Code
XXXXXXX = Year, week and batch Code
XXXXX = Flow code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package
SC200HB22C1	62mm

PIN DESCRIPTION

Pin	Name	Description
1	OUT	Center Point of Half Bridge
2	DC-	DC Negative Bus Connection
3	DC+	DC Positive Bus Connection
4	G1	T1 Gate
5	S1	T1 Source
6	G2	T2 Gate
7	S2	T2 Source

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
SiC MOSFET			
Drain−Source Voltage	V_{DSS}	2200	V
Gate−Source Voltage	V_{GS}	+20/-4	V
Continuous Drain Current @ T_C = 80 °C (T_j = 175 °C)	I_{DS}	200	A
Pulsed Drain Current (T_j = 175°C)	I_{Dpluse}	400	A
Maximum Power Dissipation @ T_C = 80°C (T_j = 175 °C)	P_{tol}	904	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} = 0 V, V_{DS} = 2200 V		I_{DSS}	-	-	1	mA
Drain−Source On Resistance	V_{GS} = 18 V, I_{DS} = 200A, T_j = 25°C		$R_{DS(ON)}$	-	7.01	7.40	mΩ
	V_{GS} = 18 V, I_{DS} = 200A, T_j = 125°C			-	10.11	-	
	V_{GS} = 18 V, I_{DS} = 200A, T_j = 175°C			-	13.40	-	
Gate−Source Threshold Voltage	V_{GS} = V_{DS} , I_{DS} = 112 mA, T_j = 25°C		$V_{GS(TH)}$	2.32	2.89	3.50	V
Gate Resistance	V_{GS} = 0V, f = 100kHz		R_g	-	1.6	-	Ω
Gate Leakage Current	V_{GS} = -10 / 20V,V_{DS} = 0V		I_{GSS}	-400	-	+400	nA
Input Capacitance	V_{DS} = 1200V, V_{GS} = 0V, f = 100kHz		C_{iss}	-	21.2	-	nF
Reverse Transfer Capacitance			C_{rss}	-	49.9	-	pF
Output Capacitance			C_{oss}	-	0.81	-	nF
Total Gate Charge	V_{DS} = 1200V, V_{GS} = -4 /18V, I_D = 200A		$Q_{G(TOTAL)}$	-	0.97	-	uC
Turn−on Delay Time	V_{DS} = 1200V, I_{DS} = 200A, V_{GS} = -3/18V, R_G = 7.5Ω	T_j = 25°C	$T_{d(on)}$	-	82.2	-	ns
		T_j = 125°C		-	74.5	-	ns
		T_j = 175°C		-	64.1	-	ns
Rise Time		T_j = 25°C	t_r	-	156.1	-	ns
		T_j = 125°C		-	123.8	-	ns
		T_j = 175°C		-	140.4	-	ns
Turn−off Delay Time	V_{DS} = 1200V, I_{DS} = 200A, V_{GS} = -3/18V, R_G = 4.7Ω	T_j = 25°C	$T_{d(off)}$	-	218.5	-	ns
		T_j = 125°C		-	267.5	-	ns
		T_j = 175°C		-	235.8	-	ns
Fall Time		T_j = 25°C	t_f	-	150.1	-	ns
		T_j = 125°C		-	151.6	-	ns
		T_j = 175°C		-	153.2	-	ns
Turn−on Switching Loss per Pulse	V_{DS} = 1200V, I_{DS} = 200A, V_{GS} = -3/18V, R_G = 7.5Ω	T_j = 25°C	E_{on}	-	4.1	-	mJ
		T_j = 125°C		-	3.4	-	mJ
		T_j = 175°C		-	3.8	-	mJ
Turn−off Switching Loss per Pulse	V_{DS} = 1200V, I_{DS} = 200A, V_{GS} = -3/18V, R_G = 4.7Ω	T_j = 25°C	E_{off}	-	2.2	-	mJ
		T_j = 125°C		-	2.6	-	mJ
		T_j = 175°C		-	2.9	-	mJ
Thermal Resistance, Junction to Case (MOSFET)			R_{thJC}	-	0.105	-	°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} = 200 A, T_j = 25 °C	V_{SD}	-	4.10	4.30	V
	I_{SD} = 200 A, T_j = 125 °C		-	3.65	-	
	I_{SD} = 200 A, T_j = 175 °C		-	3.49	-	
MODULE						
Storage Temperature Range		T_{stg}	-40 to 150			°C
Module Operating Junction Temperature		T_j	-40 to 175			°C
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

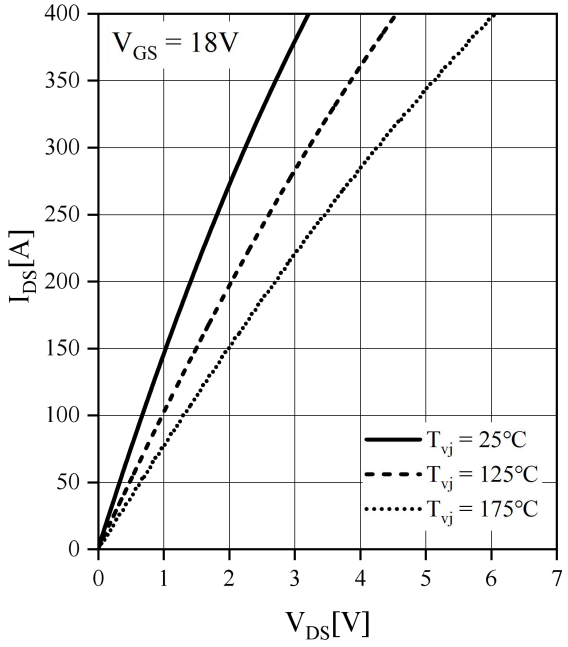


Figure 2. MOSFET Typical Output Characteristic

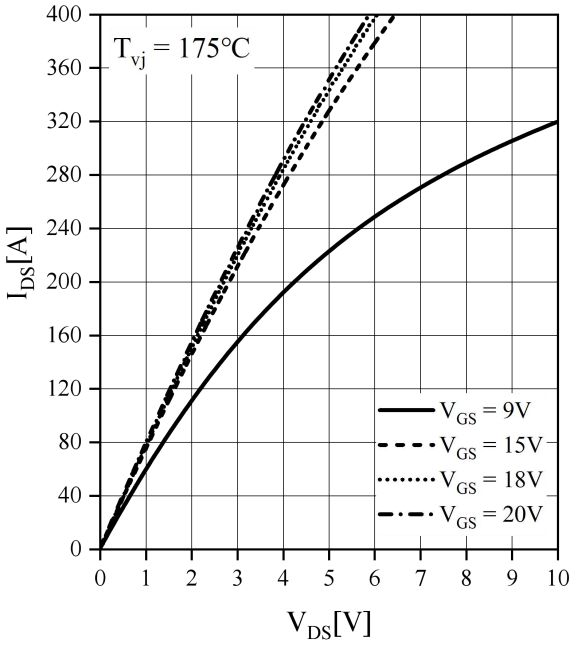


Figure 3. MOSFET Typical Output Characteristic

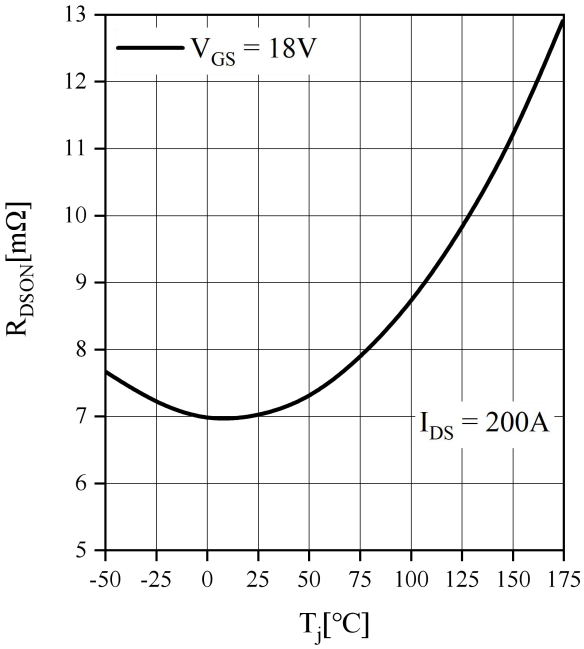


Figure 4. Drain source on-resistance

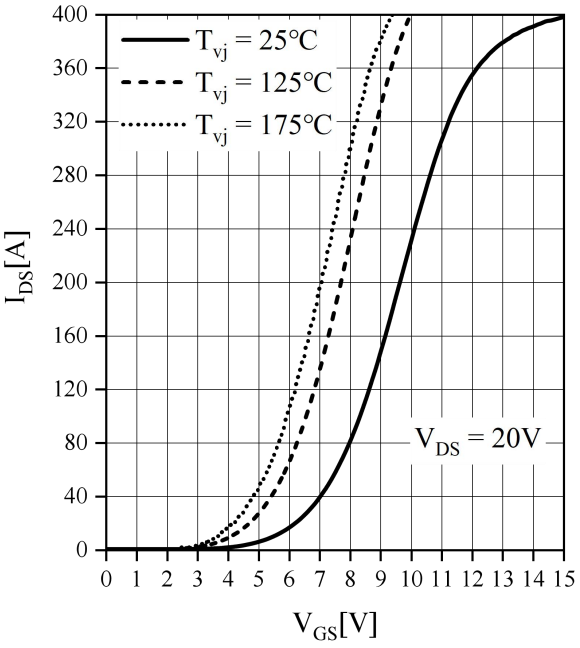


Figure 5.MOSFET Typical Transfer Characteristic

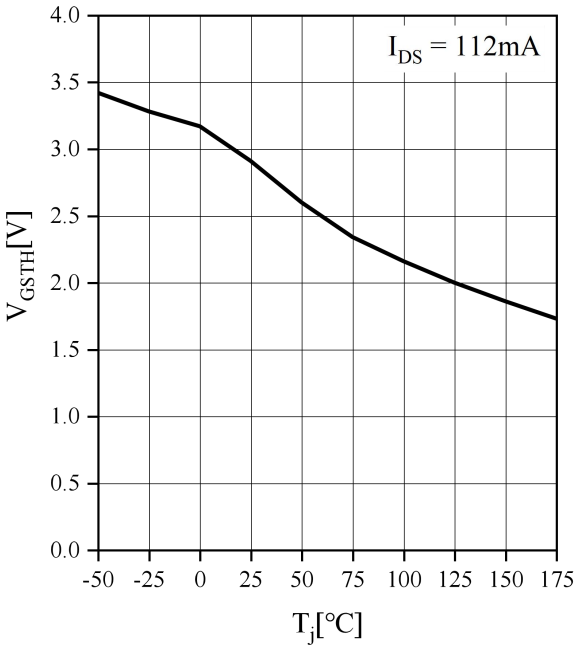


Figure 6. Gate-source threshold voltage

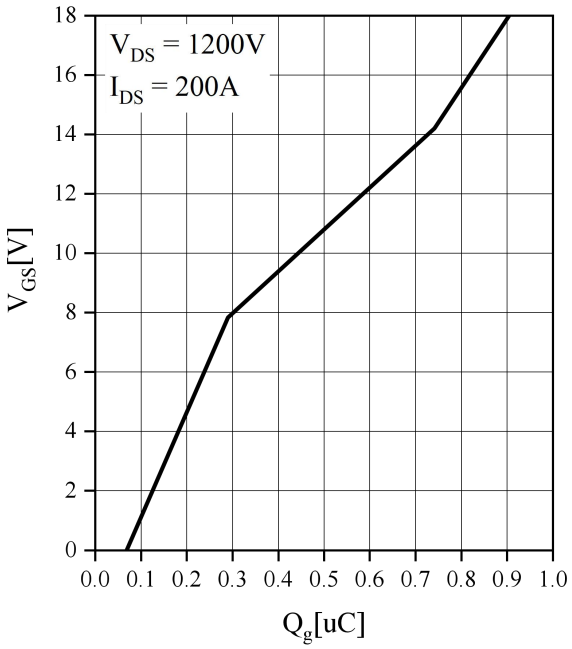


Figure 7. Gate charge characteristic

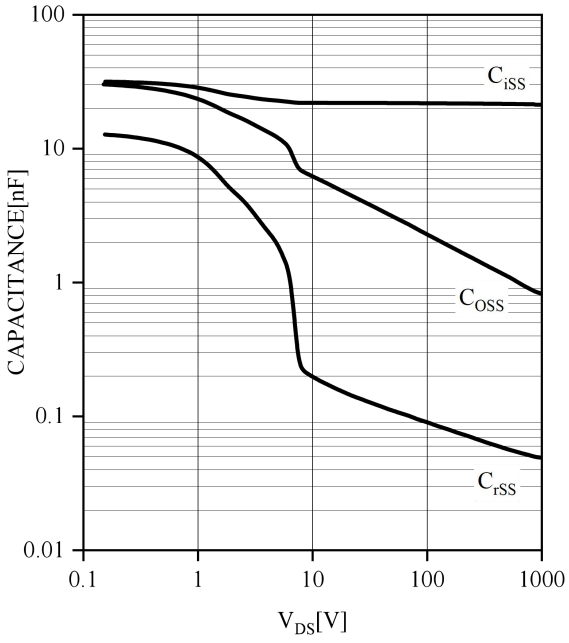


Figure 8. Capacity characteristic

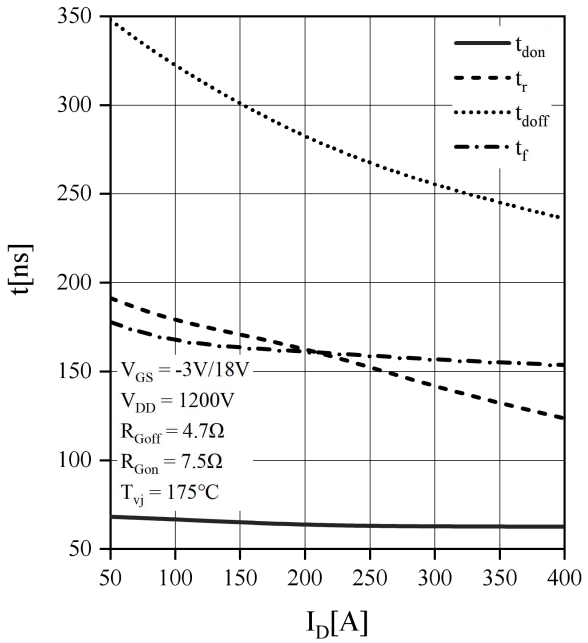


Figure 9. Switching times

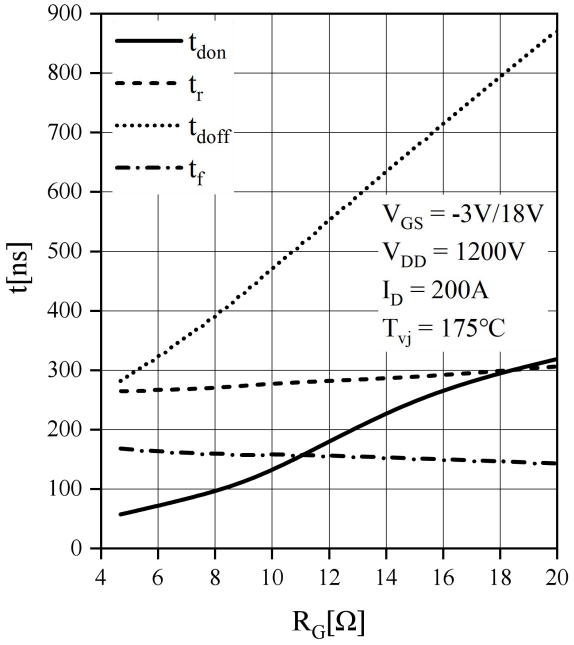


Figure 10. Switching times

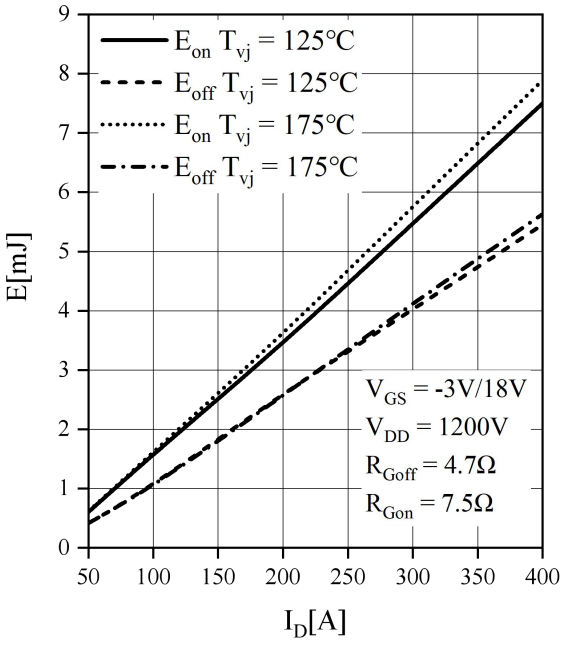


Figure 11.Switching losses

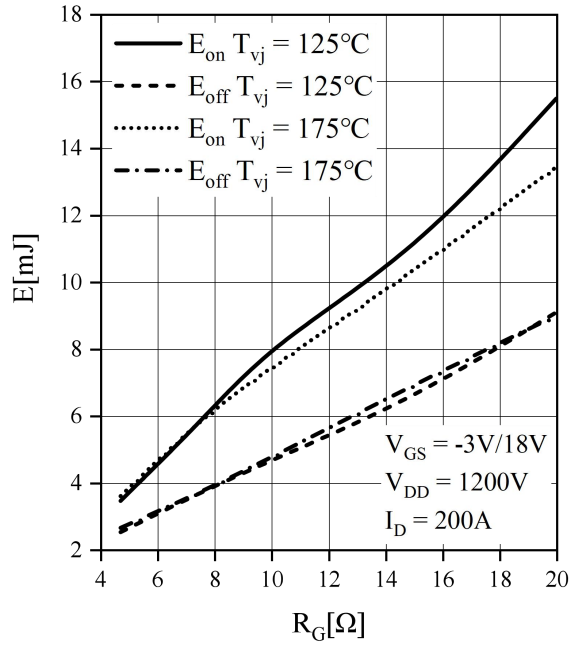


Figure 12. Switching losses

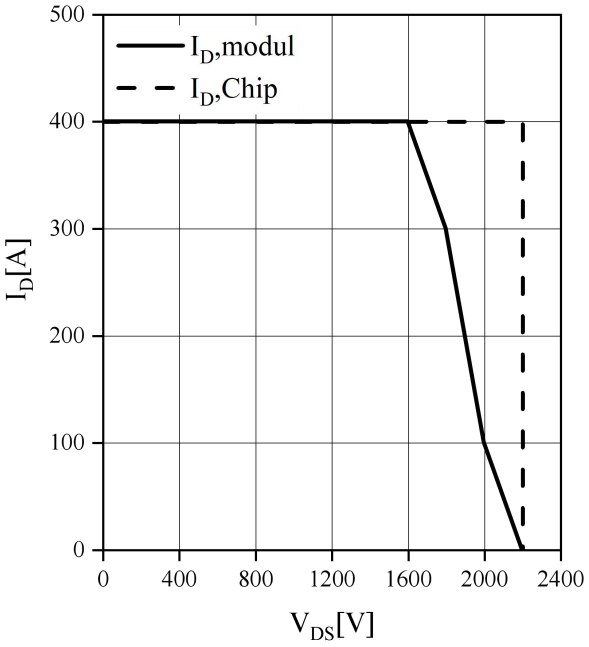


Figure 13. Reverse bias safe operating area

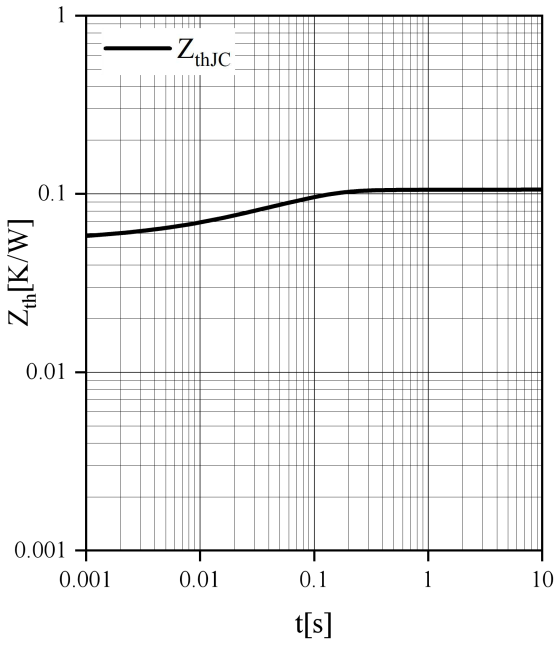


Figure 14. Transient thermal impedance

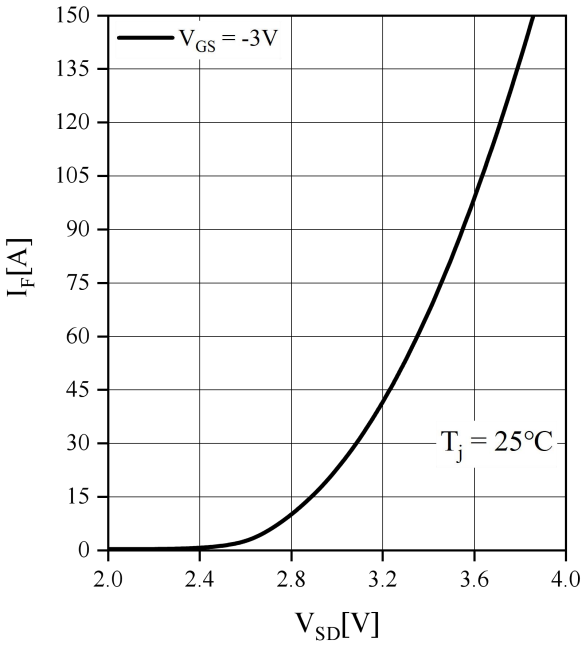
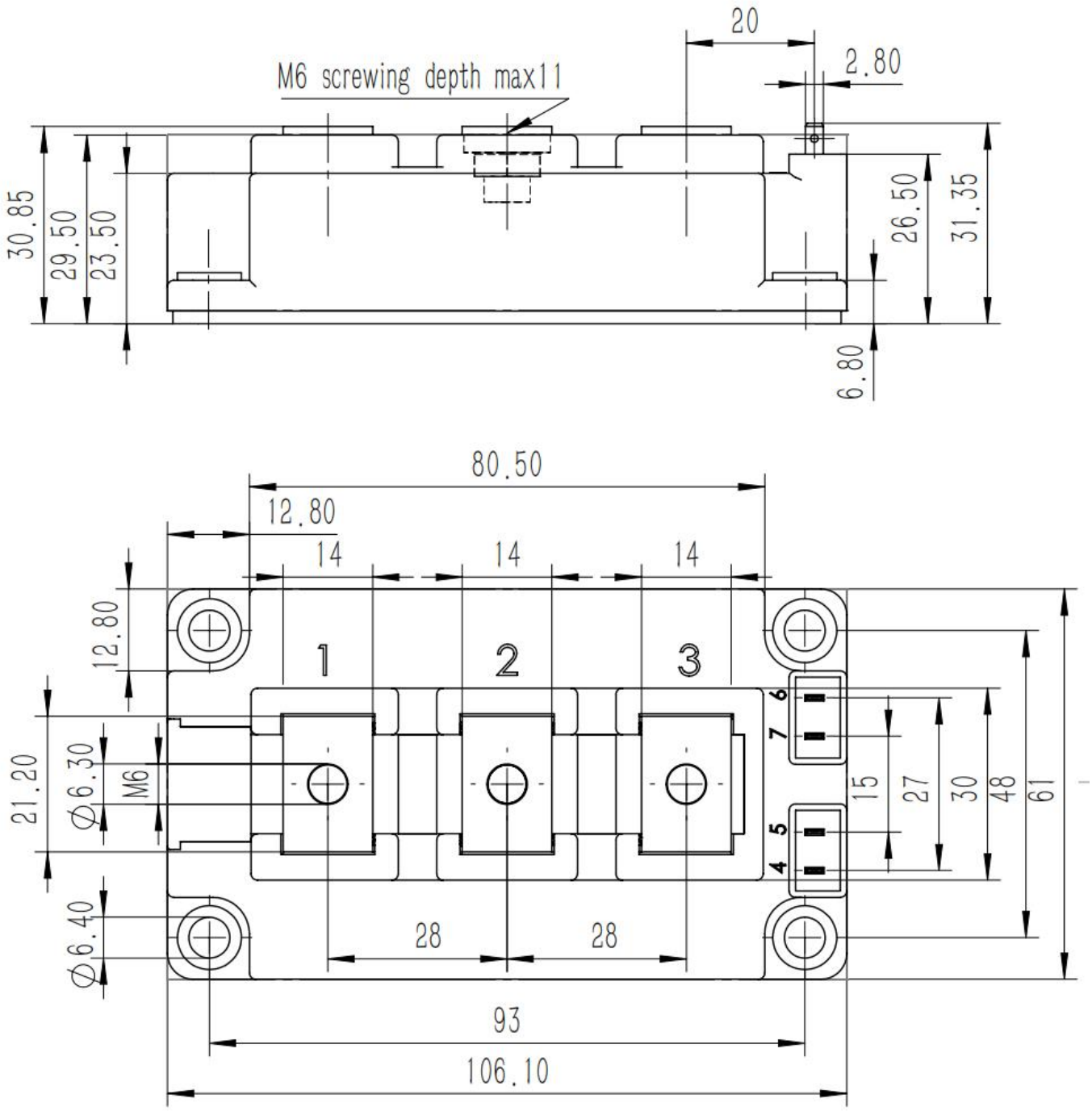


Figure 15. Forward characteristic body diode

Package Drawing



UNIT:mm