Silicon Carbide (SiC)
1200V 8 mohm
Half-Bridge MOSFET Module
62mm
SC200HB12C1

The SC200HB12C1 is a power module containing 8 mΩ / 1200 V SiC MOSFET half-bridge and a thermistor with Si_3N_4 AMB in an 62mm package.

Features

- 8 mΩ / 1200 V SiC MOSFET Half−Bridge
- Si_3N_4 AMB
- NTC Thermistor
- Low Inductive Layout
- Solderable Pins
- Isolated Base Plate

Typical Applications

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

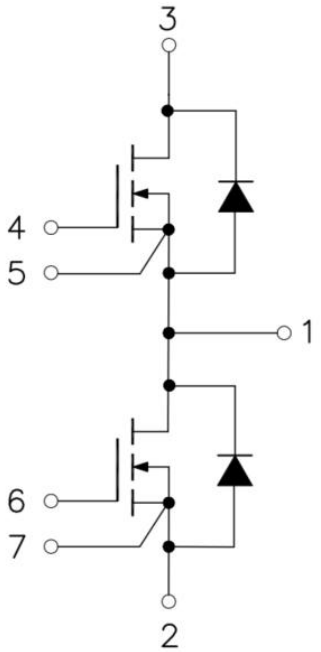
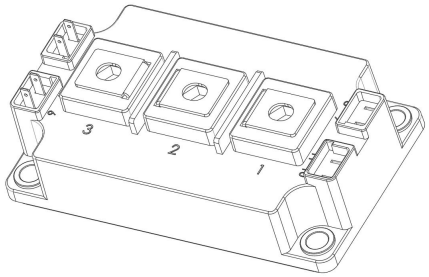
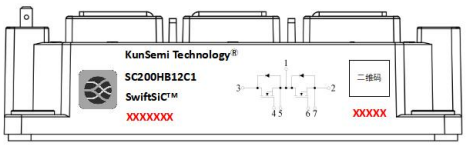


Figure 1. Schematic



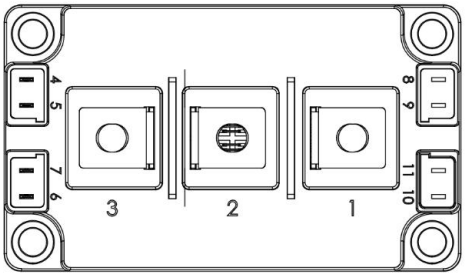
PIM7, 106.5 × 61.5 × 30.9

MARKING DIAGRAM



SC200HB12C1 = Device Code
XXXXXXX = Year, week and batch Code
XXXXX = Flow code

PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package
SC200HB12C1	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}	1200	V
Gate−Source Voltage	V_{GS}	+ 22 / -10	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}	880	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} = 1200 V	I_{DSS}	-	62	-	uA
Drain−Source On Resistance	V_{GS} = 15 V, I_{DS} = 200 A, T_J = 25°C	$R_{DS(ON)}$	-	11.1	-	mΩ
	V_{GS} = 15 V, I_{DS} = 200 A,T_J = 175°C		-	15.9	-	
	V_{GS} = 18 V, I_{DS} = 200 A, T_J = 25°C			8.4	-	
	V_{GS} = 18 V, I_{DS} = 200 A, T_J = 175°C		-	14.9	-	
Gate−Source Threshold Voltage	V_{GS} = V_{DS} , I_{DS} = 70 mA, T_J = 25°C	$V_{GS(TH)}$	1.8	2.4	-	V
	V_{GS} = V_{DS} , I_{DS} = 70 mA, T_J = 175°C			1.5	-	
Gate Resistance	V_{GS} = 0V, f = 100 kHz	R_g	-	3.4	-	ohm
Gate Leakage Current	V_{GS} = 20 V,V_{DS} = 0 V	I_{GSS}	-	-	200	nA
Input Capacitance	V_{DS} = 800 V, V_{GS} = 0 V, f = 100 kHz	C_{ISS}	-	9260	-	pF
Reverse Transfer Capacitance		C_{RSS}	-	82	-	pF
Output Capacitance		C_{OSS}	-	697	-	pF
Total Gate Charge	V_{DS} = 800 V, V_{GS} = -4 / 18 V, I_D = 120 A	$Q_{G(TOTAL)}$	-	445	-	nC
Turn−on Delay Time	V_{DS} = 600 V, I_{DS} = 200 A V_{GS} = -4 / 18 V, R_G = 4.7 Ω Inductive load, T_J = 25 °C	$T_{d(on)}$	-	53	-	ns
Rise Time		t_r	-	55	-	ns
Turn−off Delay Time		$T_{d(off)}$	-	114	-	ns
Fall Time		t_f	-	35	-	ns
Turn−on Switching Loss per Pulse		E_{ON}	-	1.7	-	mJ
Turn−off Switching Loss per Pulse		E_{OFF}	-	5.5	-	mJ
Turn−on Delay Time	V_{DS} = 600 V, I_{DS} = 200 A V_{GS} = -4 / 18 V, R_G = 4.7 Ω Inductive load, T_J = 150 °C	$T_{d(on)}$	-	45	-	ns
Rise Time		t_r	-	55	-	ns
Turn−off Delay Time		$T_{d(off)}$	-	136	-	ns
Fall Time		t_f	-	37	-	ns
Turn−on Switching Loss per Pulse		E_{ON}	-	1.7	-	mJ
Turn−off Switching Loss per Pulse		E_{OFF}	-	5.9	-	mJ
Thermal Resistance, Junction to Case (MOSFET)		R_{thJC}	-	0.17	-	°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	-	V
	I_{SD} = 200 A, T_J = 150 °C		-	3.65	-	
Diode Reverse Recovery Charge	V_R = 600 V, I_{SD} = 200 A V_{GS} = -4 V, R_G = 4.7 Ω Inductive load, T_J = 25 °C	Q_r	-	0.9	-	uC
Peak Reverse Recovery Current		I_{rrm}	-	68	-	A
Reverse Recovery Time		t_{rr}	-	22	-	ns
Reverse Recovery Energy		E_{rr}	-	0.40	-	mJ
Diode Reverse Recovery Charge	V_R = 600 V, I_{SD} = 200 A V_{GS} = -4 V, R_G = 4.7 Ω Inductive load, T_J = 150 °C	Q_r	-	2.3	-	uC
Peak Reverse Recovery Current		I_{rrm}	-	137	-	A
Reverse Recovery Time		t_{rr}	-	28	-	ns
Reverse Recovery Energy		E_{rr}	-	1.14	-	mJ
Thermal Resistance, Junction to Case (Body Diode)		R_{thJC}	-	0.17	-	°C/W

MODULE

Storage Temperature Range	T_{stg}	-40 to 125	°C
Module Operating Junction Temperature	T_J	-40 to 150	°C
Isolation Test Voltage, t = 1 s, 50 Hz	V_{iso}	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}	13.5	nH
Weight of Module	G	320	g

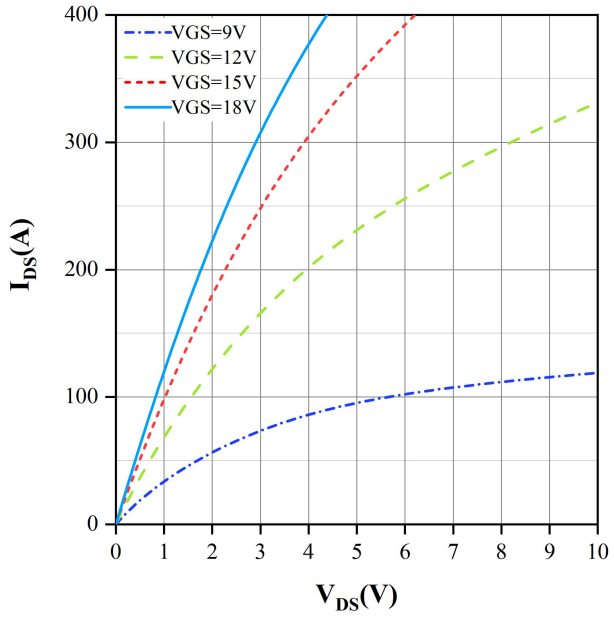


Figure 2. MOSFET Typical Output Characteristic

(T_J = 25 ℃)

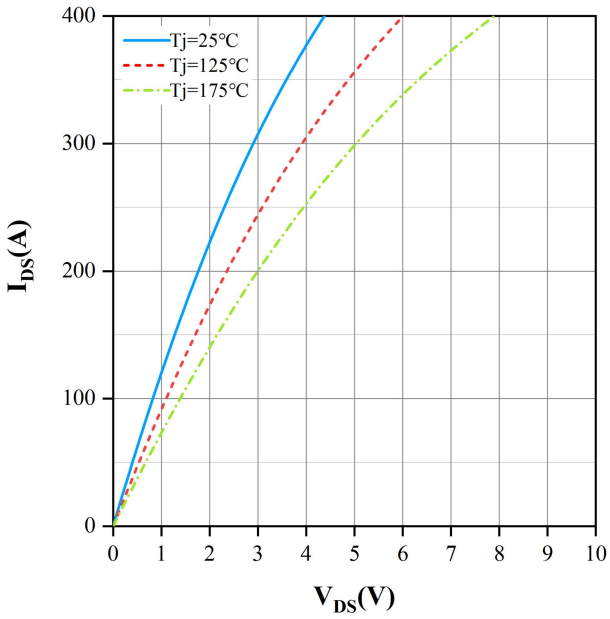


Figure 3. MOSFET Typical Output Characteristic

(V_{GS} = 18 V)

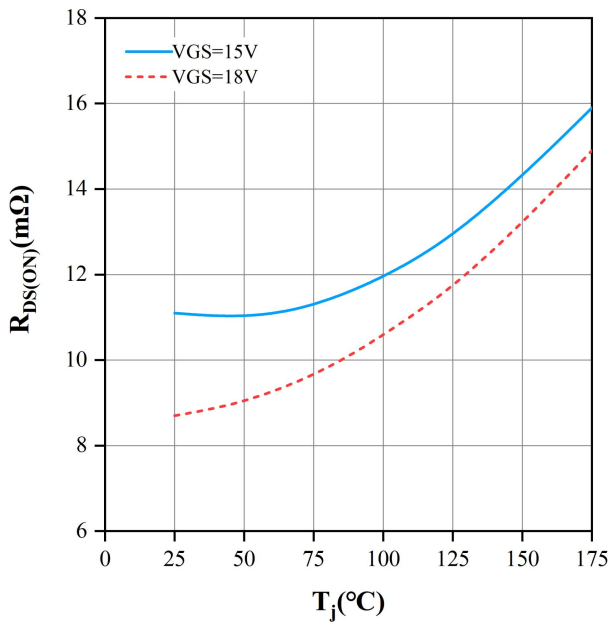


Figure 4. $R_{DS(ON)}$ vs T_J

V_{GS} = 15 V / 18 V, I_D = 200 A

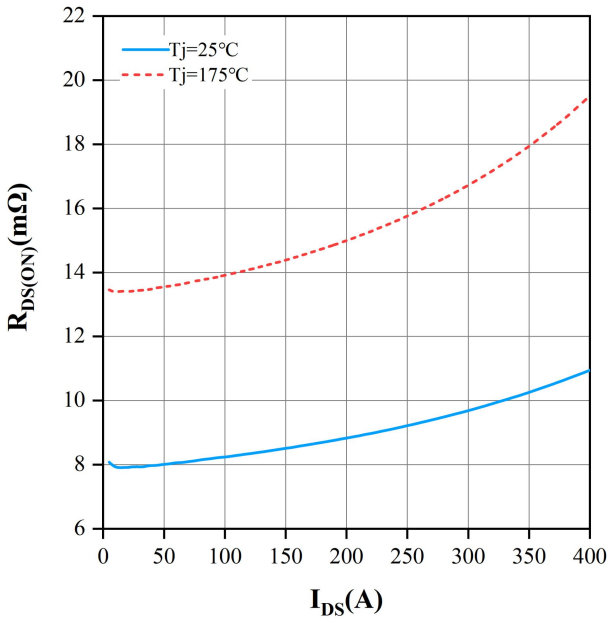


Figure 5. $R_{DS(ON)}$ vs I_{DS}

V_{GS} = +18 V

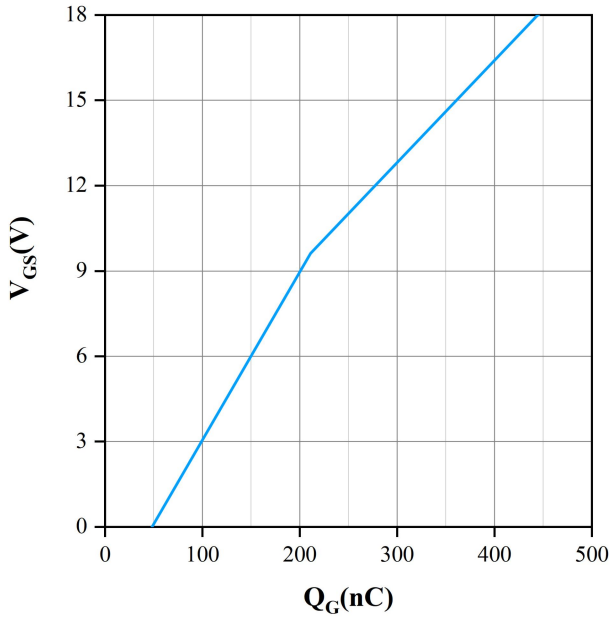


Figure 6. V_{GS} vs Q_G

V_{DS} = 800 V, I_D = 120 A, T_J = 25 ℃

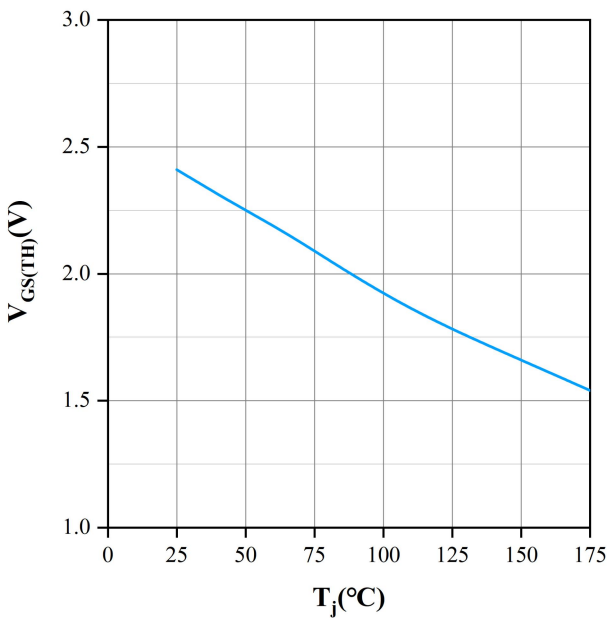


Figure 7. $V_{GS(TH)}$ vs T_J

V_{GS} = V_{DS}, I_D = 70 mA

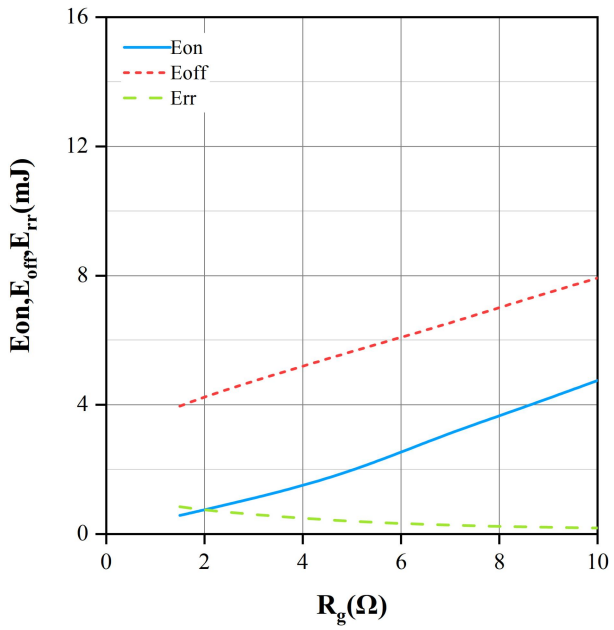


Figure 8. Typical Switching Loss vs. R_g

V_{DD} = 600 V, V_{GS} = 18 V / -4 V, I_D = 200 A

T_J = 25 ℃, Inductive Load

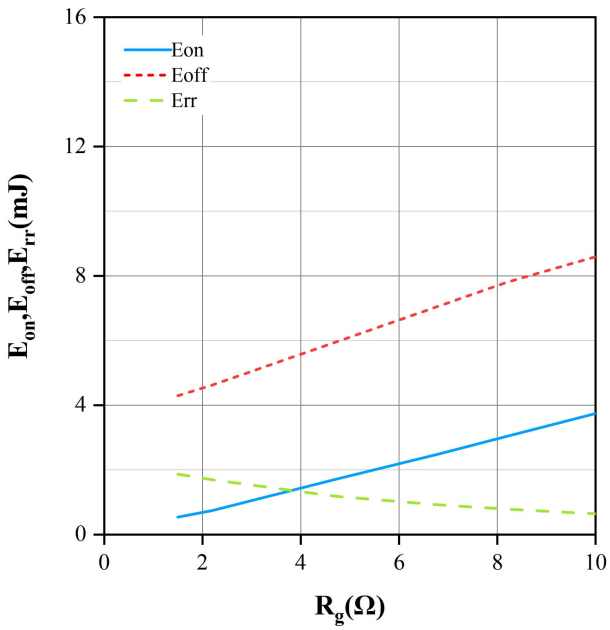


Figure 9. Typical Switching Loss vs. R_g

V_{DD} = 600 V, V_{GS} = 18 V / -4 V, I_D = 200 A

T_J = 150 ℃, Inductive Load

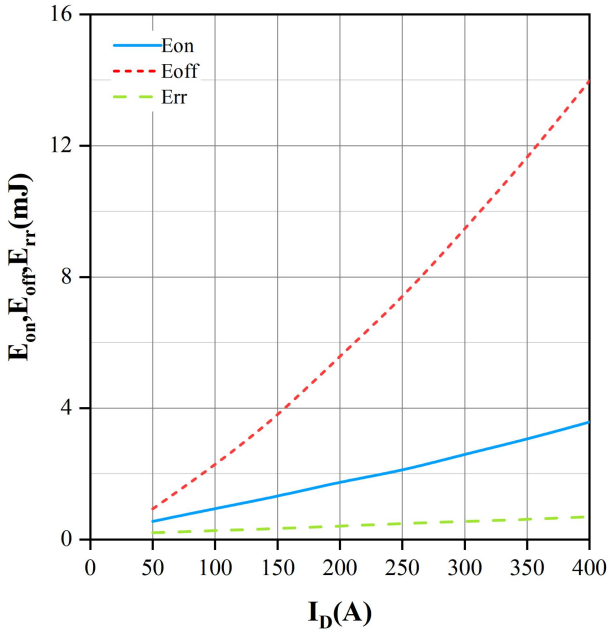


Figure 10. Typical Switching Loss vs I_D

V_{DD} = 600 V, V_{GS} = +18 V / -4 V, T_J = 25 ℃

R_g = 4.7 Ω, Inductive Load

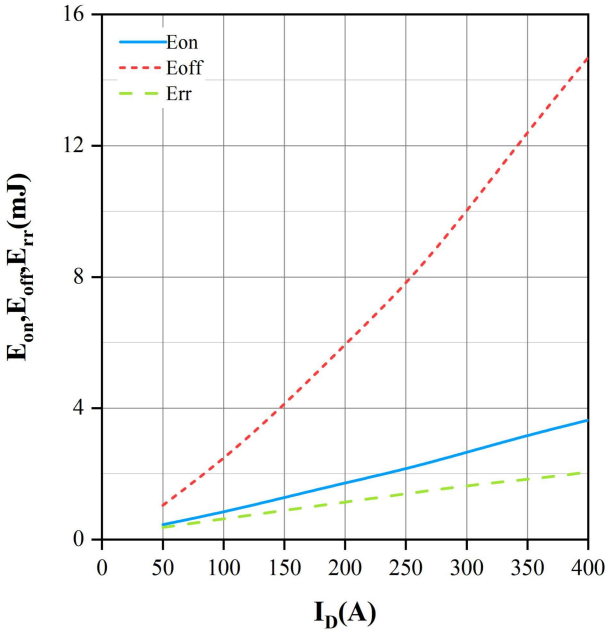


Figure 11.Typical Switching Loss vs. I_D

V_{DD} = 600 V, V_{GS} = +18 V / -4 V, T_J = 150 ℃

R_g = 4.7 Ω, Inductive Load

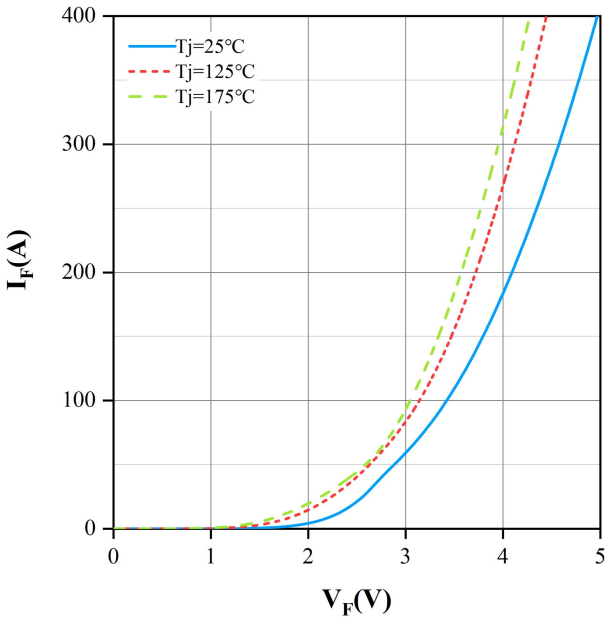
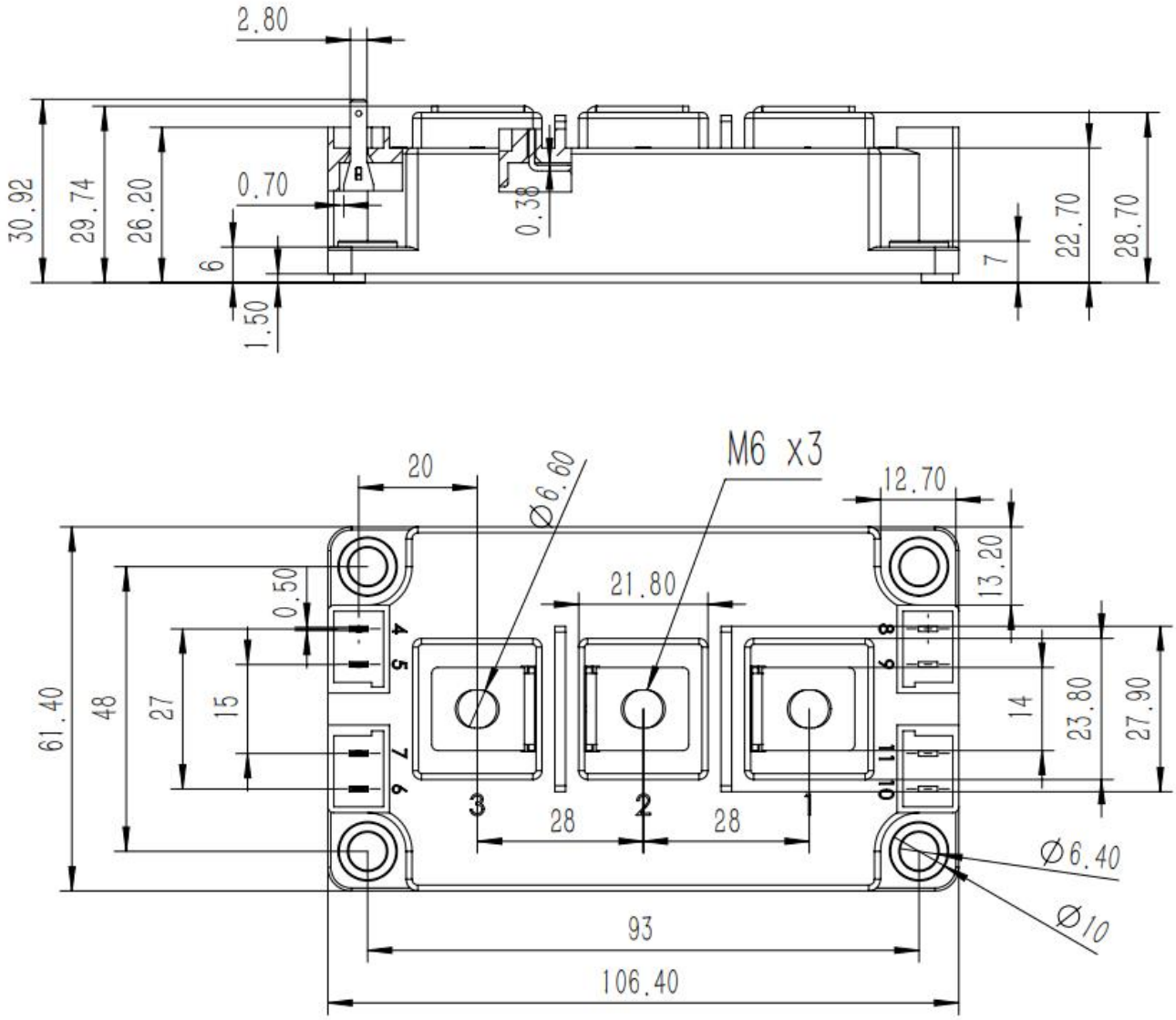


Figure 12. I_F vs V_F

V_{GS} = 0 V

Package Drawing



UNIT:mm