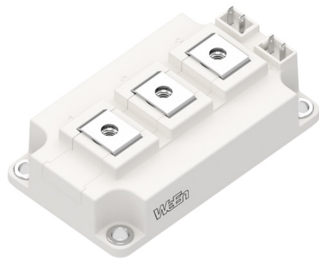
WMG200H12T2S

Module

Rev.01 - 10 February 2025 — Product data sheet

1. General description

WMG200H12T2S is a Half Bridge module consisting of two 200A, 1200 V IGBTs with inverse diodes, which excels in providing high current density. The integrated field stop trench IGBTs and FRDs provide lower conduction losses and switching losses, enabling designers to achieve high efficiency and superior reliability.



2. Features and benefits

- Half Bridge topology
- Low switching losses
- Low Vcesat
- Compact design
- Fast & soft reverse recovery anti-paralle FWD
- Isolated copper baseplate using DBC technology

3. Applications

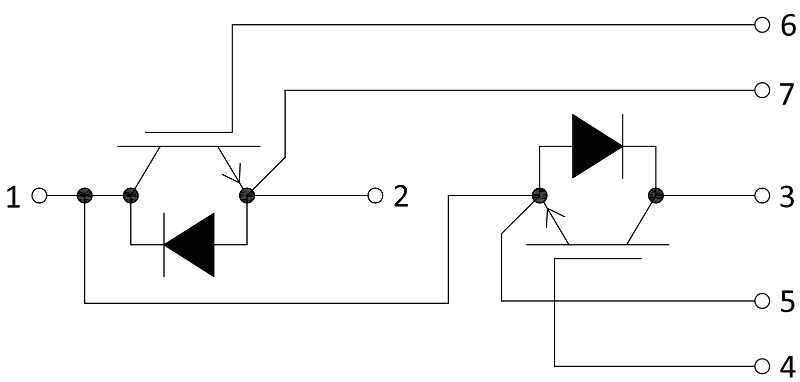
- Motor Drives
- Servo Drives
- Electronic welder Systems

4. Ordering information

Table 1. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WMG200H12T2S	WeEnPACK-62mm	WMG200H12T2ST	Tray	10	WeEnPACK-62mmPHB-A	10-Feb-2025

5. Circuit diagram



6. Limiting values

Table 2. Limiting values

Symbol	Parameter	Test Condition	Value	Unit
IGBT				
V_{CE}	Collector-emitter voltage		1200	V
V_{GE}	Gate-emitter voltage		±20	V
I_{CN}	Implemented collector current		400	A
I_C	Continous collector current	T_C = 80 °C, limited by T_{jmax}	200	A
I_{Cpulse}	Pulsed collector current	tp limited by T_{jmax}	600	A
P_{tot}	Total power dissipation	T_C = 80 °C	950	W
t_{sc}	Short circuit withstand time	V_{GE} = 15 V; V_{CC} = 600 V; T_j = 150 °C	10	µs
T_{jmax}	Maximum junction temperature		175	°C
Diode				
V_{RRM}	Diode repetitive peak reverse voltage		1200	V
I_{FN}	Diode Implemented collector current		400	A
I_F	Diode continous forward current	T_C = 80 °C, limited by T_{jmax}	200	A
I_{FRM}	Diode repetitive reak forward current	tp limited by T_{jmax}	600	A
P_{tot}	Total power dissipation	T_C = 80 °C	559	W
T_{jmax}	Maximum junction temperature		175	°C

7. Module package thermal & insulation properties

Table 3. Thermal & Insulation properties

Symbol	Parameter	Test Condition	Value	Unit
V_{ISOL}	RMS isolation voltage	T_j = 25 °C, all terminals shorted, f = 50 Hz, t = 1 min	2500	V
d_{Creep}	Creepage distance	terminal to heatsink	11.5	mm
d_{Clear}	Clearance	terminal to heatsink	10	mm
CTI	Comperative tracking index		> 200	
T_{stg}	Storage temperature		-40 to 125	°C

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8. Electrical characteristics

Table 4. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IGBT characteristics						
V_{CEsat}	Collector-emitter saturation voltage	V_{GE} = 15 V; I_C = 200 A; T_j = 25 °C	-	2.3	-	V
		V_{GE} = 15 V; I_C = 200 A; T_j = 150 °C	-	3.1	-	V
$V_{GE(th)}$	Gate-emitter threhold voltage	I_C = 2.5 mA; V_{CE} = V_{GE}; T_j = 25 °C	4.2	5.3	6.4	V
I_{CES}	Zero gate voltage collector current	V_{CE} = 1200 V; V_{GE} = 0 V; T_j = 25 °C	-	-	1	mA
I_{GES}	Gate leakage current	V_{GE} = 20 V; V_{CE} = 0 V; T_j = 25 °C	-	-	400	nA
Q_G	Gate charge	V_{CC} = 600 V; I_C = 200 A; V_{GE} = ±15 V	-	1	-	μC
C_{ies}	Input capacitance	V_{CE} = 25 V; V_{GE} = 0V; f = 1 MHz; T_j = 25 °C	-	33	-	nF
C_{oes}	Output capacitance		-	0.5	-	nF
C_{res}	Reverse transfer capacitance		-	0.1	-	nF
$t_{d(on)}$	Turn-on delay time	T_j = 25 °C V_{CC} = 600 V; I_C = 200 A; V_{GE} = ±15 V; R_g = 1.8 Ω	-	31	-	nS
t_r	Rise time		-	24	-	nS
$t_{d(off)}$	Turn-off delay time		-	180	-	nS
t_f	Fall time		-	35	-	nS
E_{on}	Turn-on energy		-	5.05	-	mJ
E_{off}	Turn-off energy		-	5.5	-	mJ
$t_{d(on)}$	Turn-on delay time	T_j =150 °C V_{CC} = 600 V; I_C = 200 A; V_{GE} = ±15 V; R_g = 1.8 Ω	-	30	-	nS
t_r	Rise time		-	28	-	nS
$t_{d(off)}$	Turn-off delay time		-	203	-	nS
t_f	Fall time		-	103	-	nS
E_{on}	Turn-on energy		-	9.15	-	mJ
E_{off}	Turn-off energy		-	8.25	-	mJ
R_{thJC}	Thermal resistance, junction to case		-	0.1	-	K/W
T_{jop}	Operation temperature		-40	-	150	°C
Inverter Diode characteristics						
V_F	Diode forward voltage	I_F = 200 A; T_j = 25 °C	-	2.4	-	V
		I_F = 200 A; T_j = 150 °C	-	2.2	-	V
Q_{rr}	Reverse recovery charge	T_j = 25 °C V_R = 600 V; I_F = 200 A; di/dt = 7000 A/μs;	-	12364	-	nC
I_{rrm}	Peak reverse recovery current		-	270	-	A
E_{rr}	Reverse recovery energy		-	6.5	-	mJ
Q_{rr}	Reverse recovery charge	T_j = 150 °C V_R = 600 V; I_F = 200 A; di/dt = 6000 A/μs;	-	21121	-	nC
I_{rrm}	Peak reverse recovery current		-	313	-	A
E_{rr}	Reverse recovery energy		-	14.2	-	mJ
R_{thJC}	Thermal resistance, junction to case		-	0.17	-	K/W
T_{jop}	Operation temperature		-40	-	150	°C

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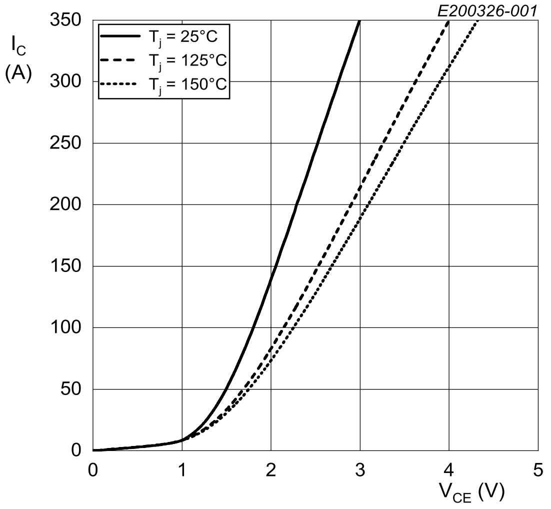
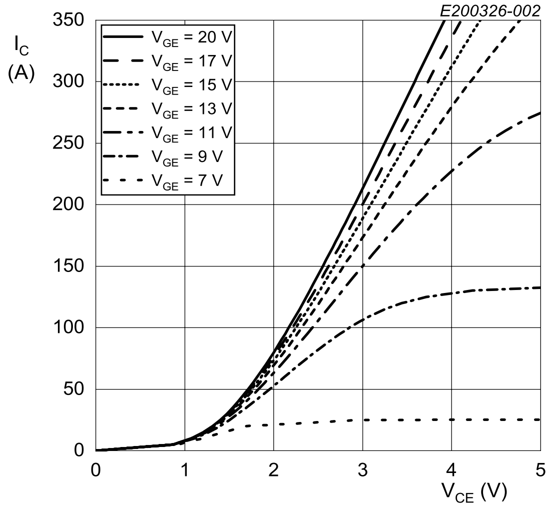


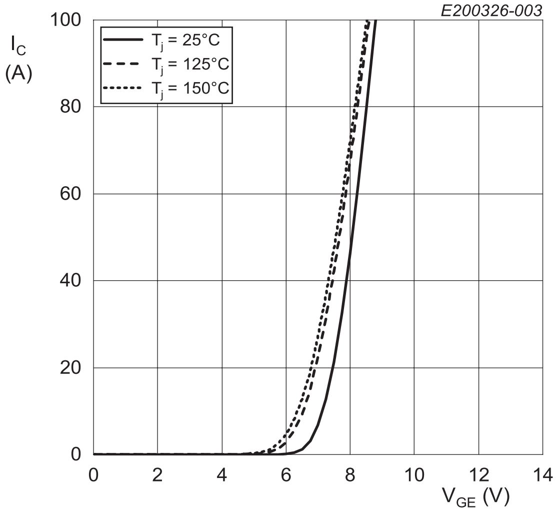
V_{GE} = 15V

Fig. 1. IGBT typical output characteristics



T_j = 150 °C

Fig. 2. IGBT typical output characteristics



V_{CE} = 20 V

Fig. 3. IGBT typical transfer characteristics

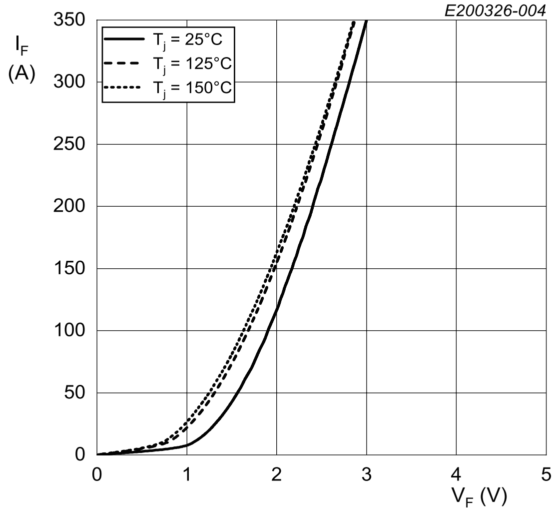


Fig. 4. Diode typical forward characteristics

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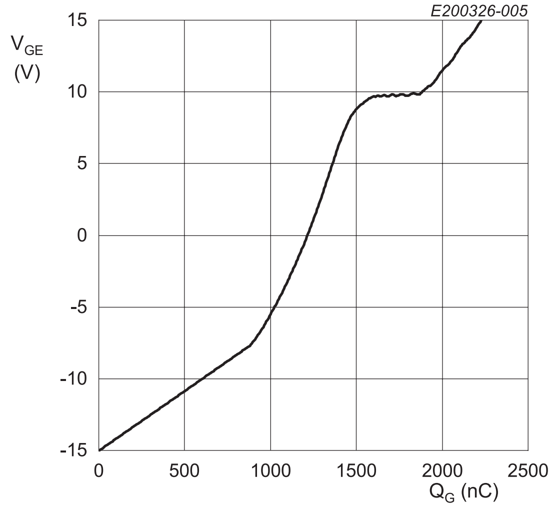
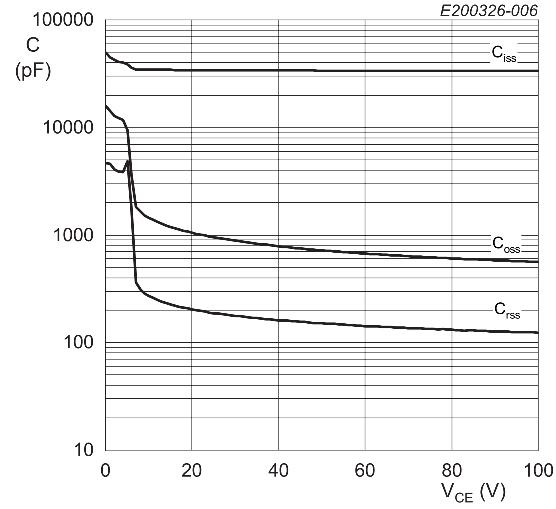


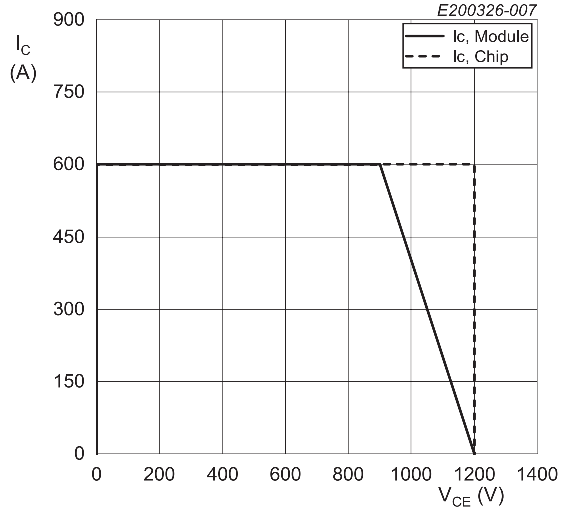
I_C = 200 A; V_{CC} = 600 V; T_j = 25 °C

Fig. 5. Typical gate charge



V_{GE} = 0V; f = 1 MHz; T_j = 25 °C

Fig. 6. Typical capacitance as a function of collector emitter voltage



R_g = 1.8 Ω; V_{GE} = ±15V; T_j = 150 °C

Fig. 7. Reverse bias safe operating area

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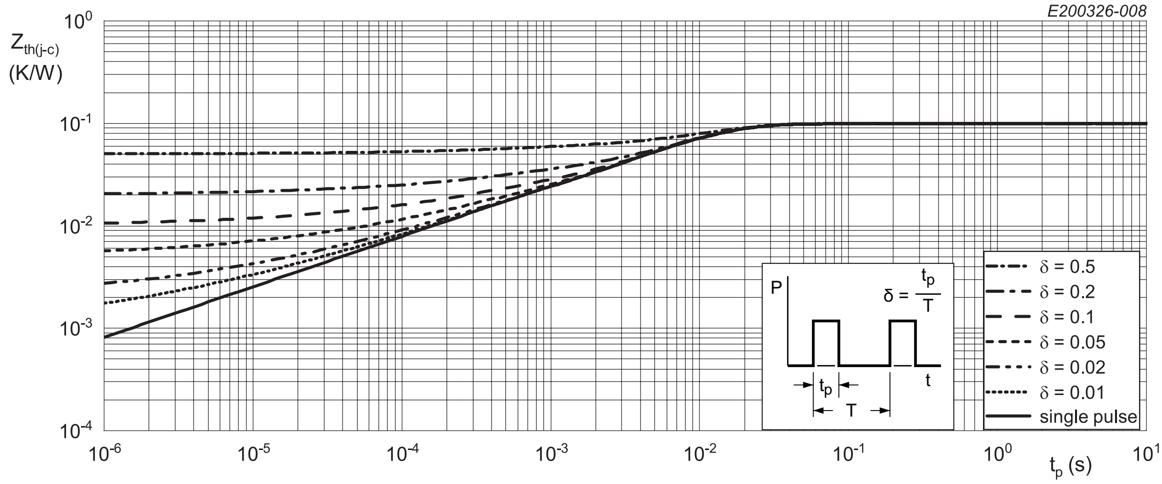

Fig. 8. Typical Transient thermal impedance IGBT

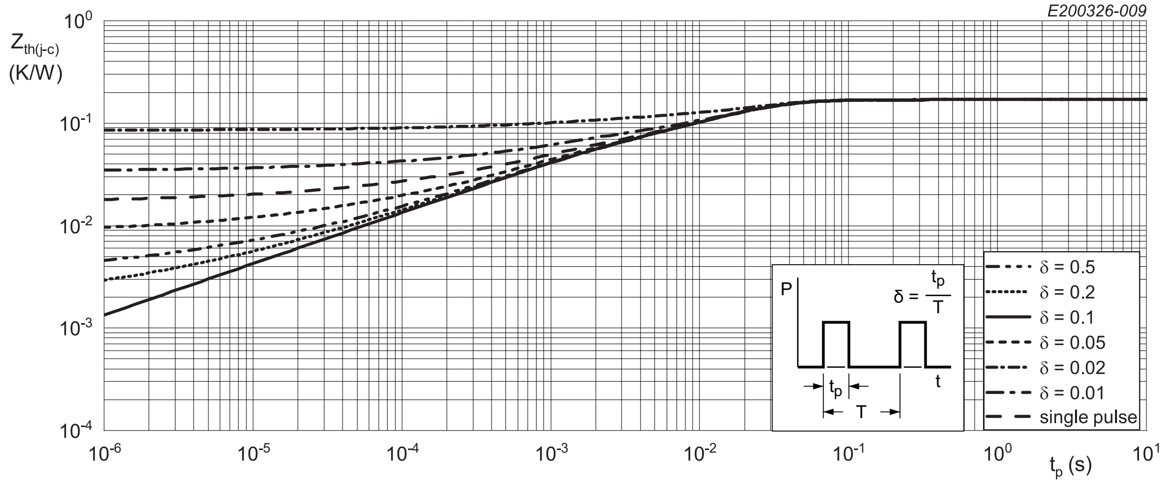

Fig. 9. Typical Transient thermal impedance Diode

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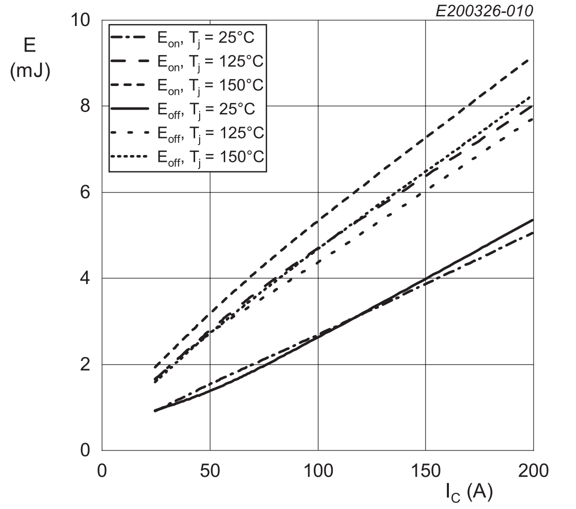
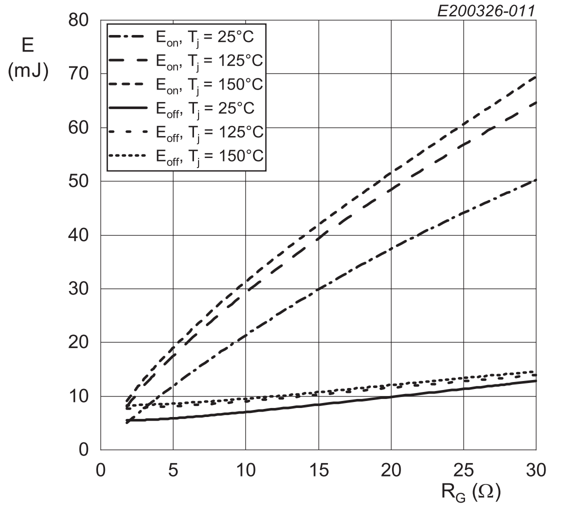


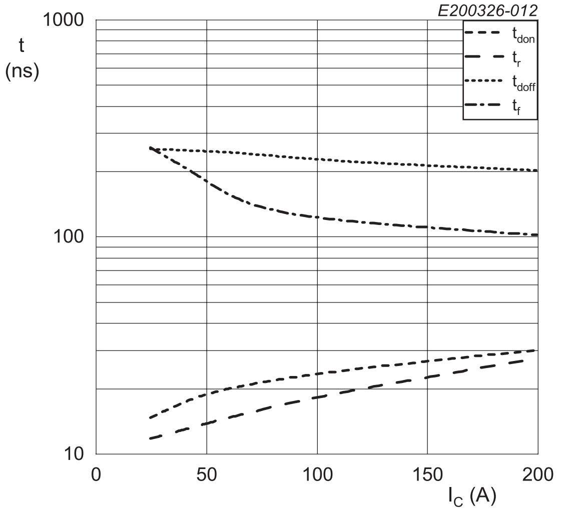
R_g = 1.8 Ω; V_{GE} = ±15V;
V_{CE} = 600 V; inductive load

Fig. 10. Typical switching energy loss as a function of collector current



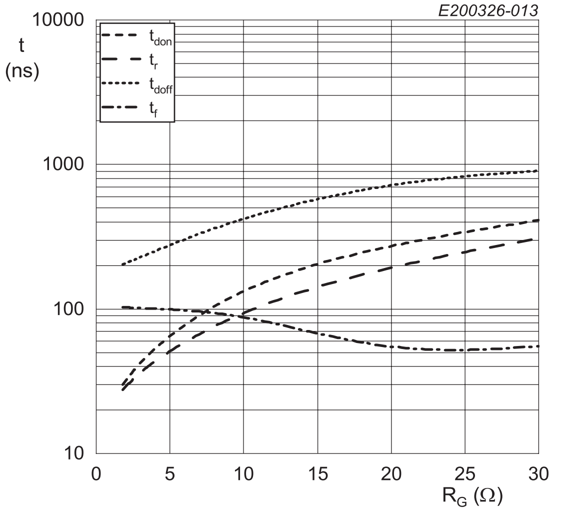
I_C = 200 A; V_{GE} = ±15V;
V_{CE} = 600 V; inductive load

Fig. 11. Typical switching energy loss as a function of gate resistance



R_g = 1.8 Ω; V_{GE} = ±15V; T_j = 150 °C;
V_{CE} = 600 V; inductive load

Fig. 12. Typical switching times as a function of collector current



I_C = 200 A; V_{GE} = ±15V; T_j = 150 °C;
V_{CE} = 600 V; inductive load

Fig. 13. Typical switching times as a function of gate resistance

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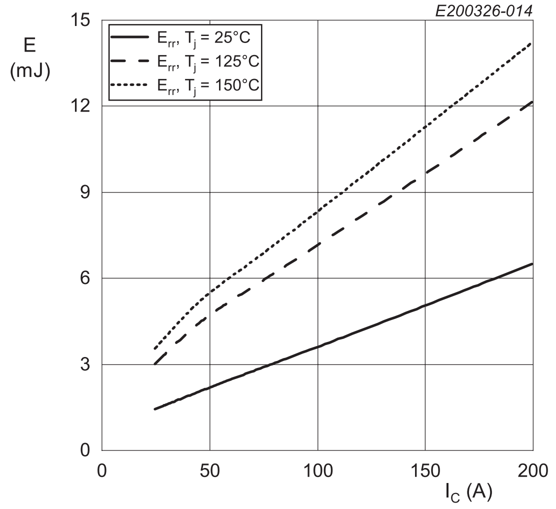
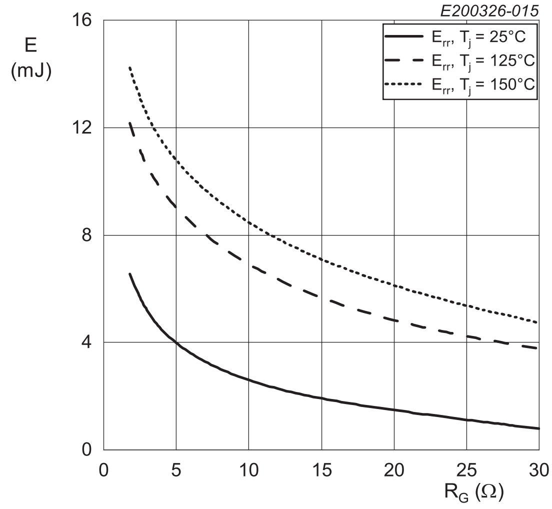


R_g = 1.8 Ω; V_{CE} = 600 V;
inductive load

Fig. 14. Typical reverse recovered energy loss as a function of collector current



I_F = 200 A; V_{CE} = 600 V;
inductive load

Fig. 15. Typical reverse recovered energy loss as a function of gate resistance

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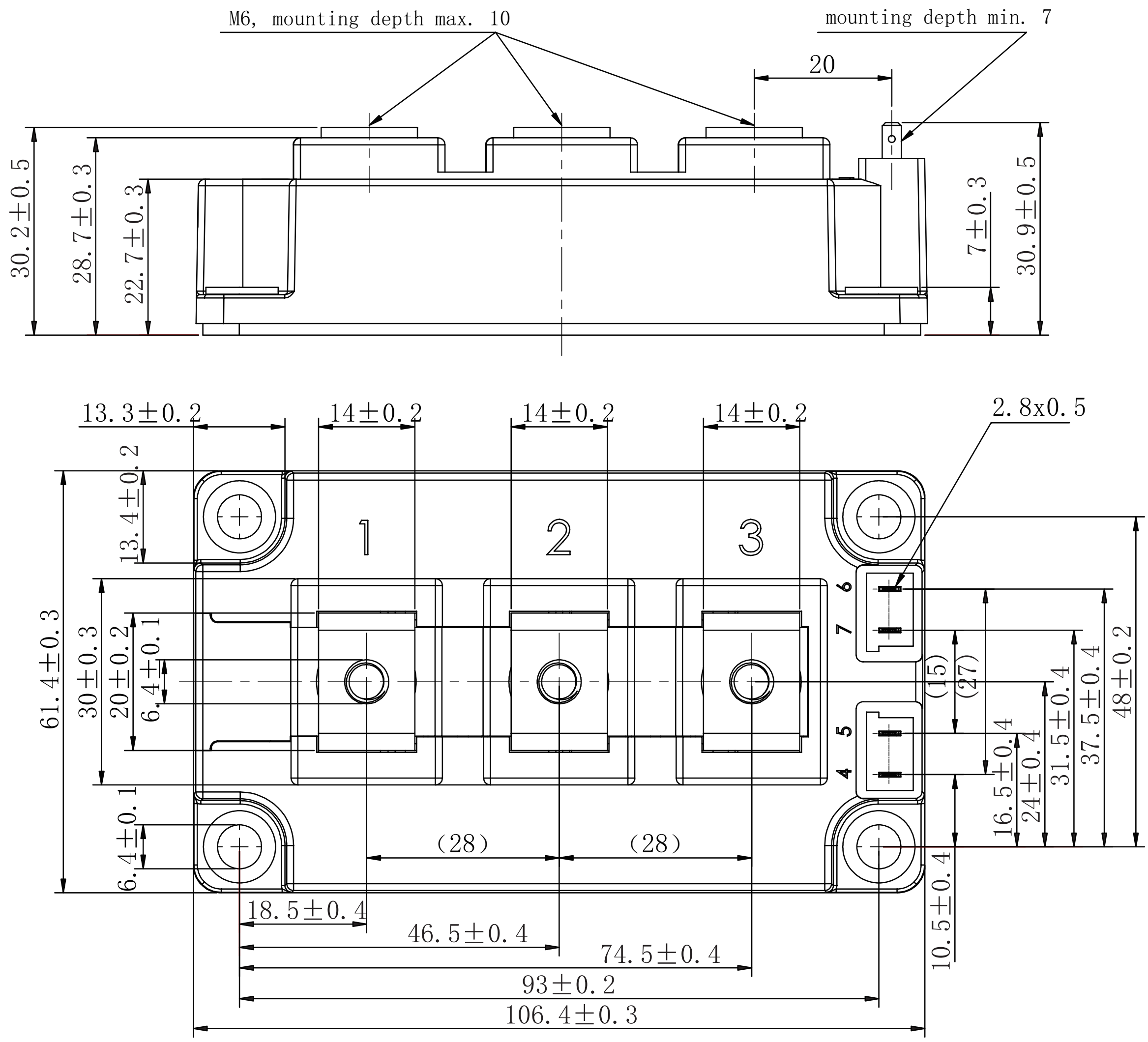
10. Package outline

Package Outline

Dimensions in mm



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