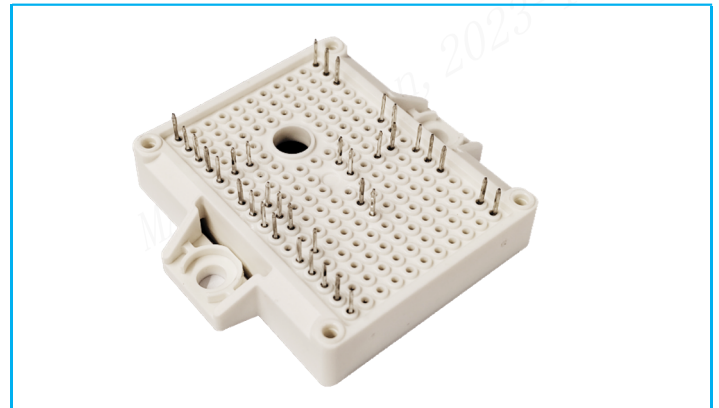


PRODUCT FEATURES

- ☐ 650V IGBT CHIP(Trench+Field Stop technology)
- ☐ Low saturation voltage and positive temperature coefficient
- ☐ Low switching losses and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Temperature sense included

APPLICATIONS

- ☐ 3-Level-Applications
- ☐ Solar Applications
- ☐ UPS Systems



IGBT(T1、T2、T3、T4)

ABSOLUTE MAXIMUM RATINGS($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	650	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	200	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	400	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	588	W

Diode(D1、D2、D3、D4)

ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	650	V
$I_{F(AV)}$	Average Forward Current		150	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	300	
I_{FSM}		$T_J=125^{\circ}\text{C}, t=10\text{ms}, 50\text{Hz}$	633	A
I^2t			2000	A^2s

Diode(D5、D6)

ABSOLUTE MAXIMUM RATINGS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	650	V
$I_{F(AV)}$	Average Forward Current		120	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	450	
I_{FSM}		$T_J=125^{\circ}\text{C}, t=10\text{ms}, 50\text{Hz}$	480	A
I^2t			1152	A^2s

MacMic Science & Technology Co., Ltd.

Add: #18, Hua Shan Zhong Lu, New District, Changzhou City, Jiangsu Province, P. R .of China

Tel.: +86-519-85163708 Fax: +86-519-85162291 Post Code: 213022 Website: www.macmicst.com

MMG200CE065PD6T5N

IGBT(T1、T4)

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =2.4mA	3.25	4.00	4.75	V
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =100A, V _{GE} =15V, T _J =25℃		1.2	1.41	
		I _C =100A, V _{GE} =15V, T _J =125℃		1.25		
		I _C =100A, V _{GE} =15V, T _J =150℃		1.28		
I _{CES}	Collector Leakage Current	V _{CE} =650V, V _{GE} =0V, T _J =25℃			1	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±20V, T _J =25℃	-400		400	nA
R _{Gint}	Integrated Gate Resistor			0		Ω
Q _G	Gate Charge	V _{CE} =400V, I _C =100A , V _{GE} =15V		0.45		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =100kHz		14		nF
C _{res}	Reverse Transfer Capacitance			90		pF
t _{d(on)}	Turn on Delay Time	V _{CC} =300V,I _C =100A R _{Gon} =5.1Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		20	ns
			T _J =125℃		22	ns
			T _J =150℃		22	ns
t _r	Rise Time		T _J =25℃		15	ns
			T _J =125℃		20	ns
			T _J =150℃		20	ns
t _{d(off)}	Turn off Delay Time	V _{CC} =300V,I _C =100A R _{Goff} =39Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		500	ns
			T _J =125℃		570	ns
			T _J =150℃		600	ns
t _f	Fall Time		T _J =25℃		50	ns
			T _J =125℃		55	ns
			T _J =150℃		58	ns
E _{on}	Turn on Energy	V _{CC} =300V,I _C =100A R _{Gon} =5.1Ω, R _{Gon} =39Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		0.75	mJ
			T _J =125℃		0.79	mJ
			T _J =150℃		0.81	mJ
E _{off}	Turn off Energy		T _J =25℃		1.2	mJ
			T _J =125℃		1.7	mJ
			T _J =150℃		2	mJ
I _{SC}	Short Circuit Current	tpsc≤0μs , V _{GE} =15V T _J =150℃,V _{CC} =360V		1600		A
R _{thJC}	Junction to Case Thermal Resistance （ Per IGBT ）				0.255	K /W
R _{thJH}	Junction to heatsink with SE8117 （ Per IGBT ）			0.497		K /W

MMG200CE065PD6T5N

IGBT(T2、T3)

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V _{GE(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =2.4mA	3.25	4.00	4.75	V
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =100A, V _{GE} =15V, T _J =25℃		1.2	1.41	
		I _C =100A, V _{GE} =15V, T _J =125℃		1.25		
		I _C =100A, V _{GE} =15V, T _J =150℃		1.28		
I _{CES}	Collector Leakage Current	V _{CE} =650V, V _{GE} =0V, T _J =25℃			1	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±20V, T _J =25℃	-400		400	nA
R _{Gint}	Integrated Gate Resistor			0		Ω
Q _G	Gate Charge	V _{CE} =400V, I _C =100A , V _{GE} =15V		0.45		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =100kHz		14		nF
C _{res}	Reverse Transfer Capacitance			90		pF
t _{d(on)}	Turn on Delay Time	V _{CC} =300V,I _C =100A R _{Gon} =5.1Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		20	ns
			T _J =125℃		22	ns
			T _J =150℃		22	ns
t _r	Rise Time		T _J =25℃		15	ns
			T _J =125℃		20	ns
			T _J =150℃		20	ns
t _{d(off)}	Turn off Delay Time	V _{CC} =300V,I _C =100A R _{Goff} =39Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		500	ns
			T _J =125℃		570	ns
			T _J =150℃		600	ns
t _f	Fall Time		T _J =25℃		50	ns
			T _J =125℃		55	ns
			T _J =150℃		58	ns
E _{on}	Turn on Energy	V _{CC} =300V,I _C =100A R _{Gon} =5.1Ω, R _{Goff} =39Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		0.6	mJ
			T _J =125℃		1.1	mJ
			T _J =150℃		1.17	mJ
E _{off}	Turn off Energy		T _J =25℃		1.3	mJ
			T _J =125℃		1.7	mJ
			T _J =150℃		1.77	mJ
I _{SC}	Short Circuit Current	tpsc≤0μs , V _{GE} =15V T _J =150℃,V _{CC} =360V		1600		A
R _{thJC}	Junction to Case Thermal Resistance （ Per IGBT ）				0.255	K /W
R _{thJH}	Junction to heatsink with SE8117 （ Per IGBT ）			0.497		K /W

Diode(D1、D2、D3、D4)

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^{\circ}\text{C}$	1.85	2.5	V
		$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^{\circ}\text{C}$	1.5		
		$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=150^{\circ}\text{C}$	1.41		
t_{rr}	Reverse Recovery Time	$I_F=100\text{A}$, $V_R=300\text{V}$ $dI_F/dt=-3800\text{A}/\mu\text{s}$ $T_J=150^{\circ}\text{C}$	120		ns
I_{RRM}	Max. Reverse Recovery Current		130		A
Q_{RR}	Reverse Recovery Charge		7.5		μC
E_{rec}	Reverse Recovery Energy		2.15		mJ
R_{thJC}	Junction to Case Thermal Resistance (Per Diode)			0.426	K/W
R_{thJH}	Junction to heatsink with SE8117 (Per IGBT)		0.677		K/W

Diode(D5、D6)

ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^{\circ}\text{C}$	1.35	2.2	V
		$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^{\circ}\text{C}$	1.5		
		$I_F=100\text{A}$, $V_{GE}=0\text{V}$, $T_J=150^{\circ}\text{C}$	1.55		
t_{rr}	Reverse Recovery Time	$I_F=100\text{A}$, $V_R=300\text{V}$ $dI_F/dt=-3500\text{A}/\mu\text{s}$ $T_J=150^{\circ}\text{C}$	25		ns
I_{RRM}	Max. Reverse Recovery Current		36		A
Q_{RR}	Reverse Recovery Charge		1		μC
E_{rec}	Reverse Recovery Energy		1.3		mJ
R_{thJC}	Junction to Case Thermal Resistance (Per Diode)			0.447	K/W
R_{thJH}	Junction to heatsink with SE8117 (Per IGBT)		0.742		K/W

NTC CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Resistance $T_C=25^{\circ}\text{C}$		5		k Ω
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$		3375		K

MODULE CHARACTERISTICS ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
T _{Jmax}	Max. Junction Temperature		175	℃
T _{Jop}	Operating Temperature		-40~150	
T _{stg}	Storage Temperature		-40~125	
V _{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
internal isolation		basic insulation	ZTA	
external metal coating of DBC		special protection	Ni	
Creepage distance		terminaltoheatsink	11.5	mm
		terminaltoterminalel	5.5	mm
Clearance		terminaltoheatsink	10	mm
		terminaltoterminalel	5	mm
RTI	RTI Elec.	housing	140	℃
LsCE	Strayinductancemodule		20	nH
CTI	Comparative Tracking Index		> 200	
F	Mounting Force Per Clamp		40~80	N
Weight			42.5	g
UL			E332185	

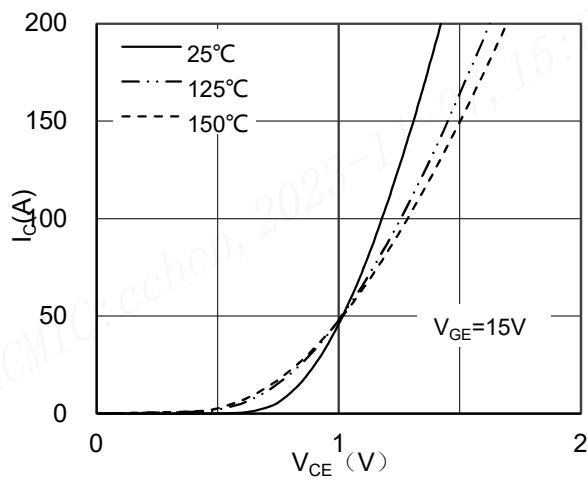


Figure 1. Typical Output Characteristics IGBT

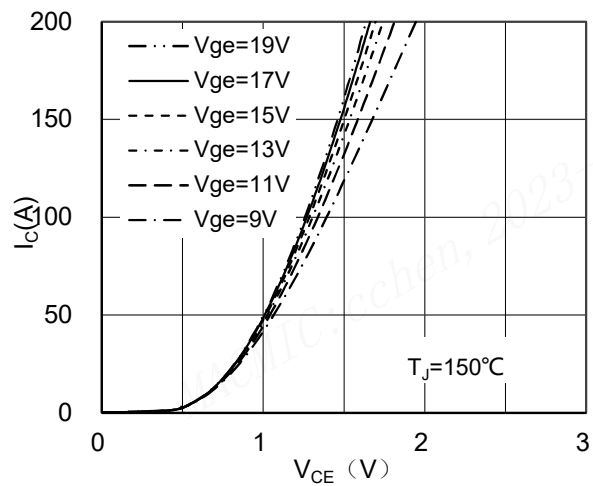


Figure 2. Typical Output Characteristics IGBT

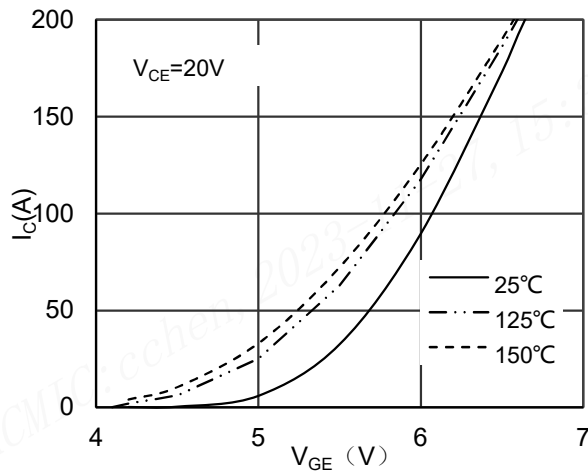
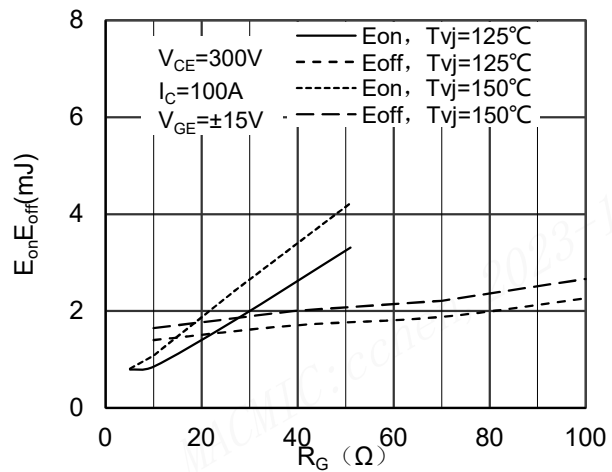
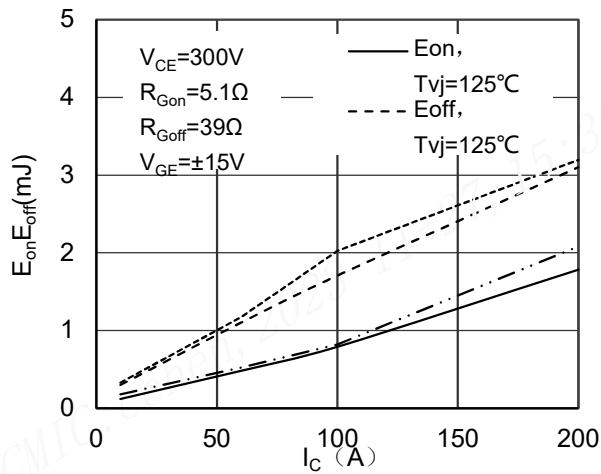
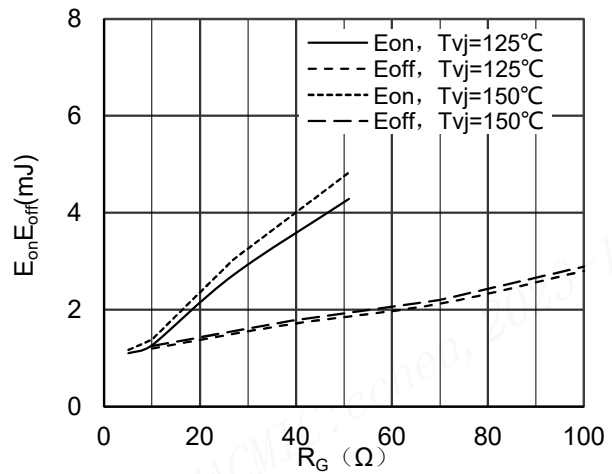


Figure 3. Typical Transfer characteristics IGBT

Figure 4. Switching Energy vs Gate Resistor IGBT
(T1, T4)Figure 5. Switching Energy vs Collector Current IGBT
(T1, T4)Figure 6. Switching Energy vs Gate Resistor IGBT
(T2, T3)

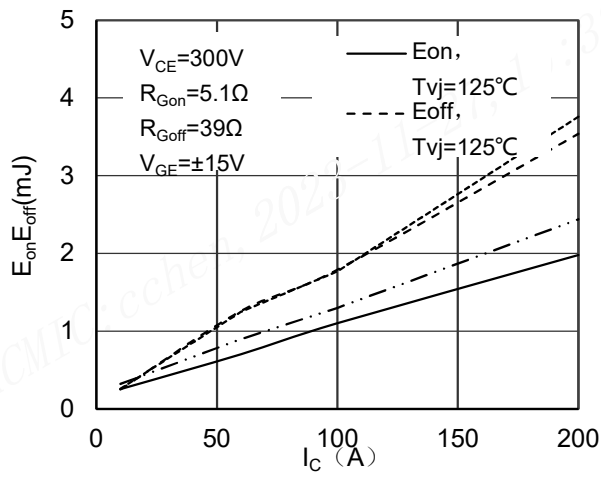


Figure 7. Switching Energy vs Collector Current IGBT
(T2, T3)

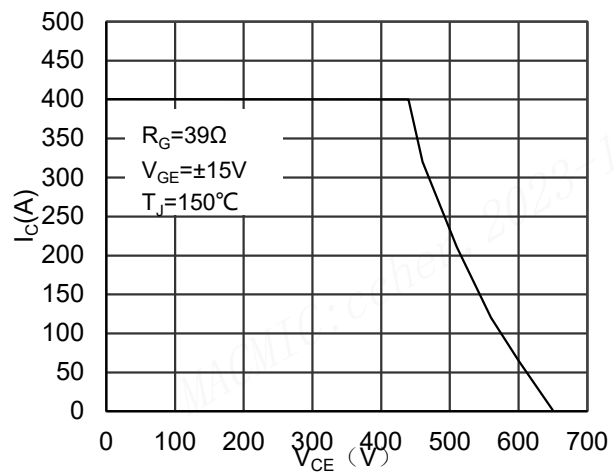


Figure 8. Reverse Biased Safe Operating Area IGBT-inverter

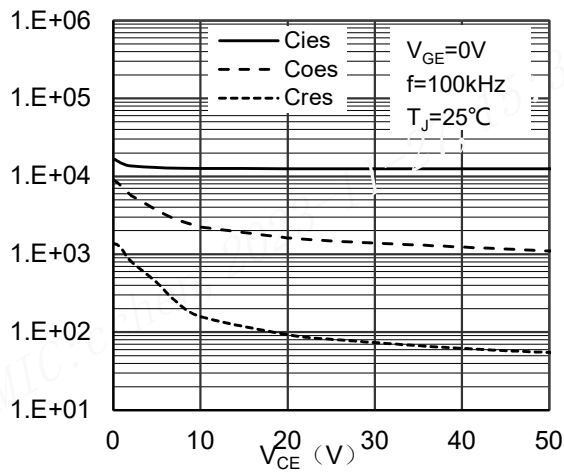


Figure 9. Typical capacitance

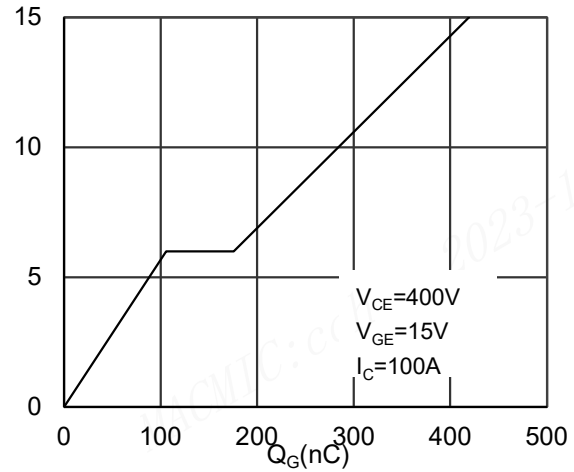


Figure 10. Typical Gate Charge

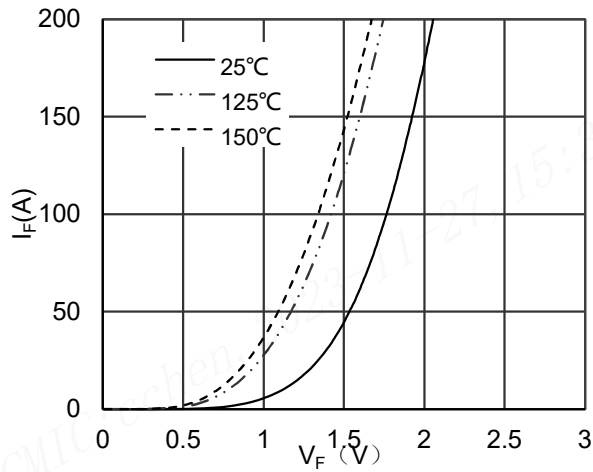


Figure 11. Diode Forward Characteristics Diode
(D1, D2, D3, D4)

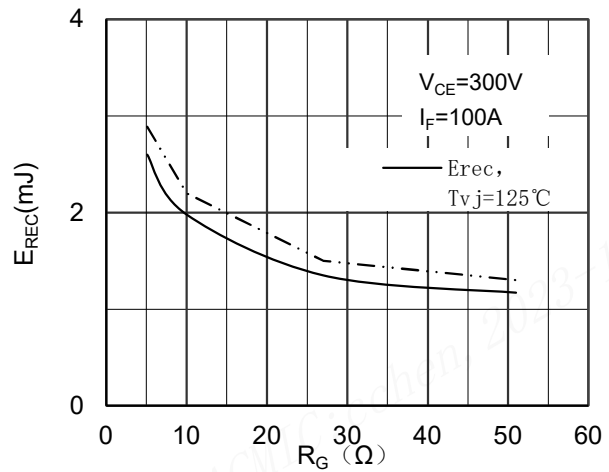


Figure 12. Switching Energy vs Gate Resistor Diode
(D1, D2, D3, D4)

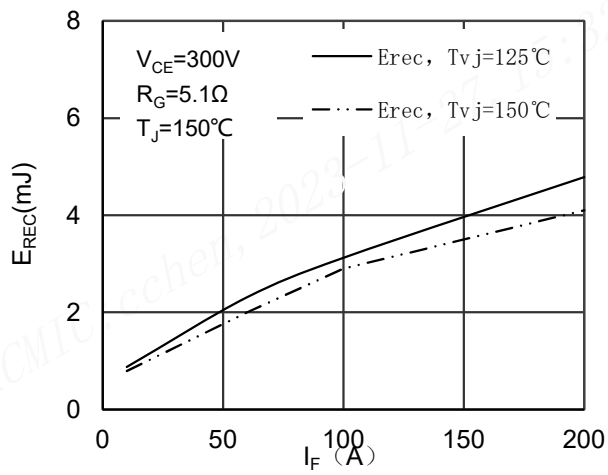


Figure 13. Switching Energy vs Forward Current Diode (D1, D2, D3, D4)

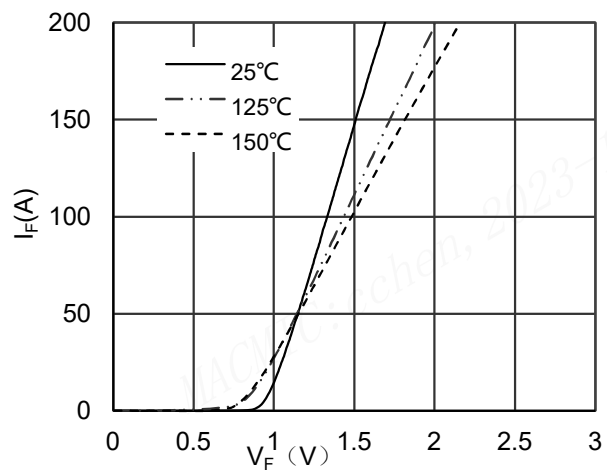


Figure 14. Diode Forward Characteristics Diode (D5, D6)

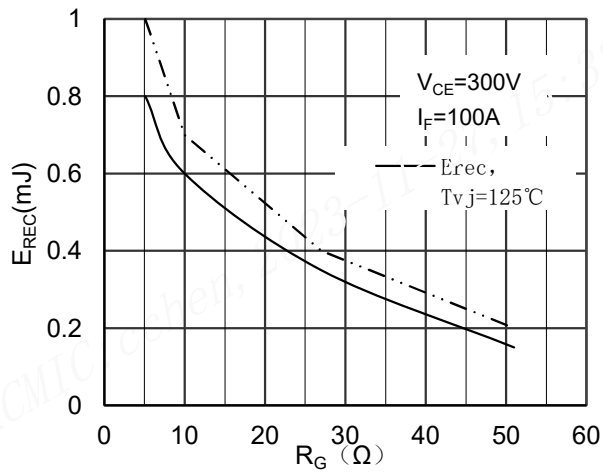


Figure 15. Switching Energy vs Gate Resistor Diode (D5, D6)

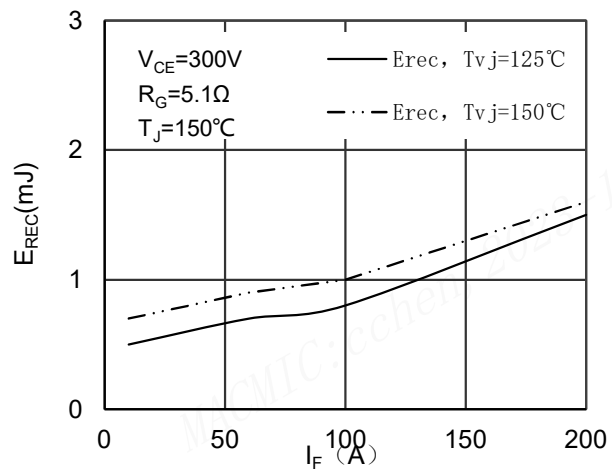


Figure 16. Switching Energy vs Forward Current Diode (D5, D6)

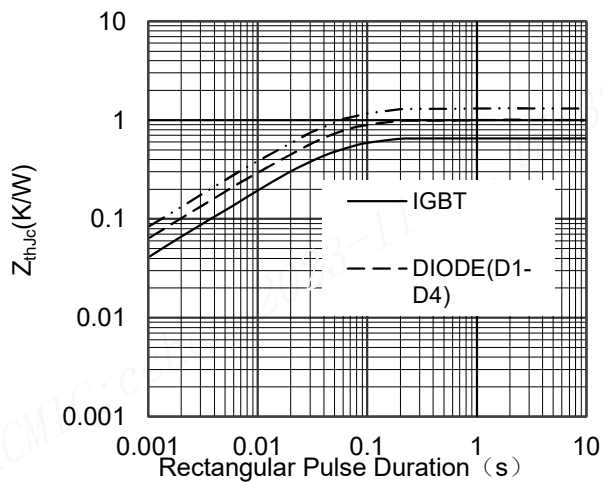


Figure 17. Transient Thermal Impedance of Diode and IGBT

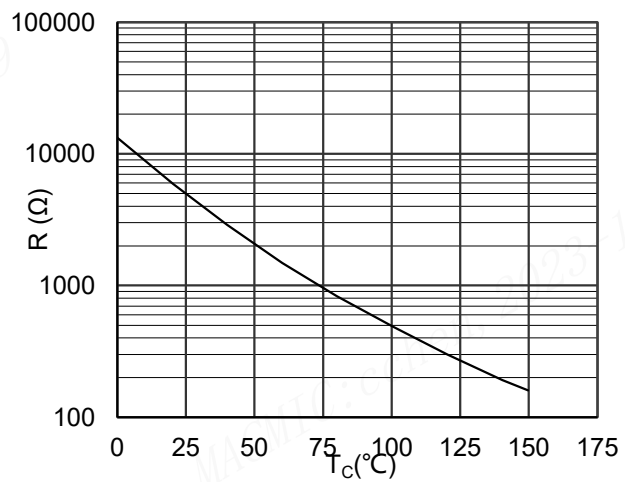


Figure 18. NTC Characteristics

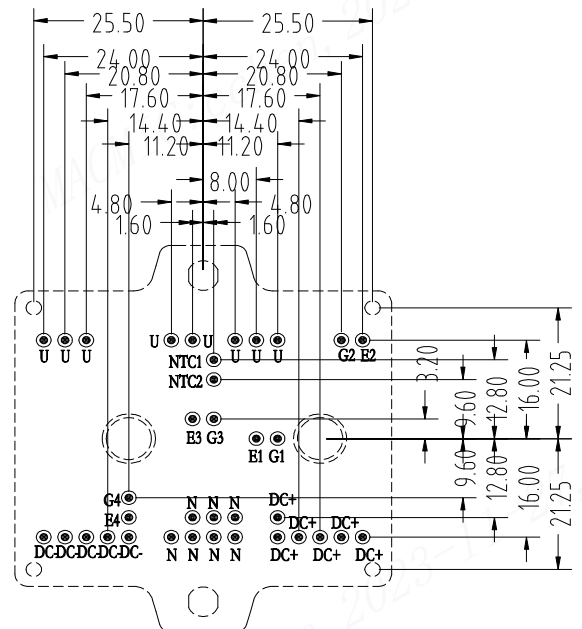


Figure 20. Package Outline

MMG200CE065PD6T5N

Marking

part1	logo		
part2	specifications of the products		
part3	Weekly batch number (with BOM version number)		
part4	DMcode (specifications_lot number_)		
	cont	digit	example
	specifications of the products	1-17	MMG200CE065PD6T5N
	separator	18	—
	Production site	19	X—xinzhu; null—huashan
	product type	20	P—project; V—verify; null—mass
	Packaging type	21-23	GCE
	production year	24-25	23
	lot number	26-29	0001
	serial number	30-32	001
part5	lot number+serial number		
part6	UL mark		

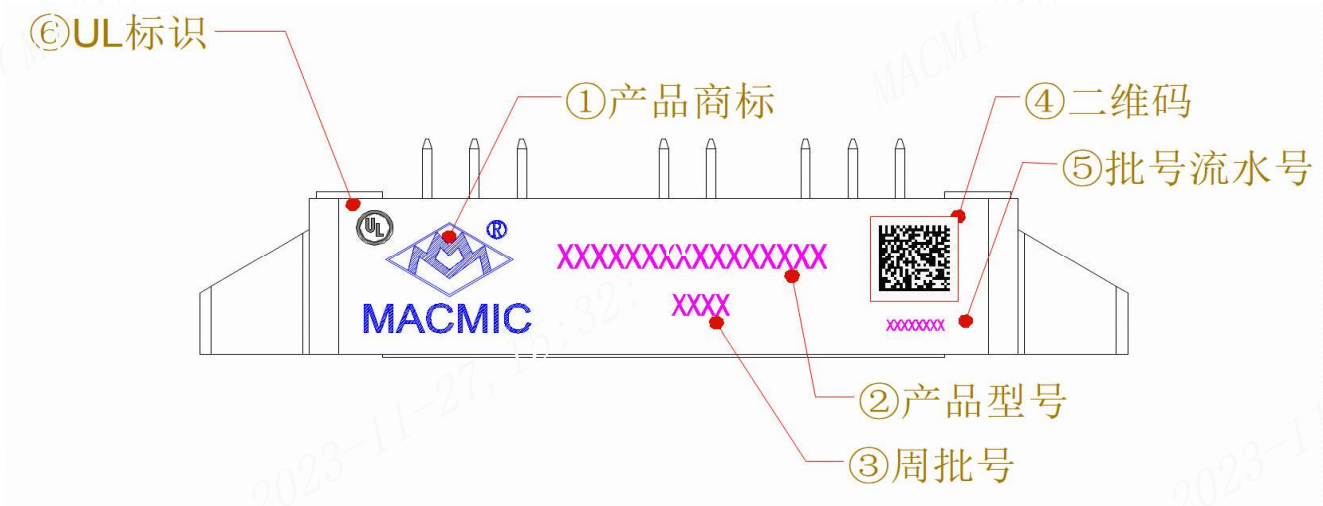


Figure 21. Marking instructions