MMG75H065XB6TC

600V 75A PIM Module

September 2022 Version 01 RoHS Compliant

PRODUCT FEATURES

☐ High level of integration

☐ 650V IGBT^3 CHIP(Trench+Field Stop technology)

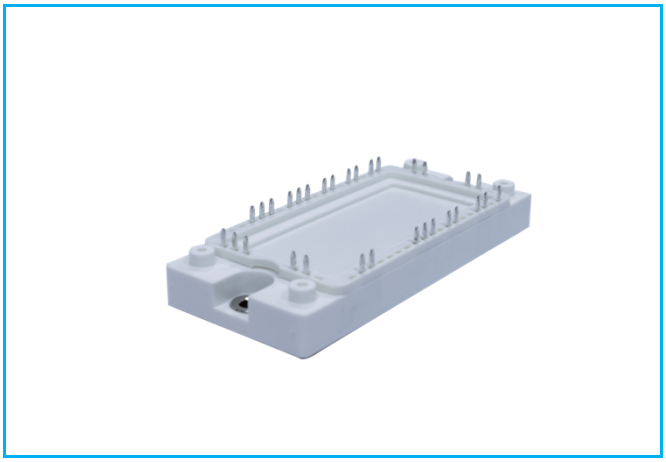
☐ Low saturation voltage and positive temperature coefficient

☐ Fast switching and short tail current

☐ Free wheeling diodes with fast and soft reverse recovery

☐ Industry standard package with insulated copper base plate and soldering pins for PCB mounting

☐ Temperature sense included



Rectifier+Brake+Inverter

APPLICATIONS

☐ AC motor control

☐ Motion/servo control

☐ Inverter and power supplies

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS(T_C *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	650	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃, T_{Jmax}=175℃	95	A
		T_C=70℃, T_{Jmax}=175℃	75	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	150	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃, T_{Jmax}=175℃	250	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS (T_C *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	650	V
$I_{F(AV)}$	Average Forward Current		75	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	150	
I^2t		T_J=125℃, t=10ms, V_R=0V	1012	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

IGBT-inverter

ELECTRICAL CHARACTERISTICS *(T_C =25°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=3mA		4.7	5.5	6.2	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=75A, V_{GE}=15V, T_J=25℃			1.35	2.0	
		I_C=75A, V_{GE}=15V, T_J=125℃			1.55		
		I_C=75A, V_{GE}=15V, T_J=150℃			1.6		
I_{CES}	Collector Leakage Current	V_{CE}=600V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=600V, V_{GE}=0V, T_J=150℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-400		400	nA
R_{Gint}	Integrated Gate Resistor				2.1		Ω
Q_G	Gate Charge	V_{CE}=300V, I_C=75A , V_{GE}=±15V			0.32		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			4.5		nF
C_{res}	Reverse Transfer Capacitance				750		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=300V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		15		ns
			T_J=150℃		20		ns
t_r	Rise Time		T_J=25℃		30		ns
			T_J=150℃		32		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=300V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		250		ns
			T_J=150℃		300		ns
t_f	Fall Time		T_J=25℃		140		ns
			T_J=150℃		160		ns
E_{on}	Turn on Energy	V_{CC}=300V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		2.2		mJ
			T_J=125℃		3		mJ
			T_J=150℃		3.2		mJ
E_{off}	Turn off Energy		T_J=25℃		1.6		mJ
			T_J=125℃		2.15		mJ
			T_J=150℃		2.25		mJ
I_{SC}	Short Circuit Current	tpsc≤6μs , V_{GE}=15V T_J=150℃,V_{CC}=360V			400		A
R_{thJC}	Junction to Case Thermal Resistance （ Per IGBT）					0.6	K /W

Diode-inverter

ELECTRICAL CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , V_{GE}=0V, T_J=25℃		1.9	2.4	V
		I_F=75A , V_{GE}=0V, T_J=125℃		1.65		
		I_F=75A , V_{GE}=0V, T_J=150℃		1.60		
I_{RRM}	Max. Reverse Recovery Current	I_F=75A , V_R=300V dI_F/dt=-1500A/μs T_J =150℃		40		A
Q_{RR}	Reverse Recovery Charge			4		μC
E_{rec}	Reverse Recovery Energy			0.95		mJ
R_{thJCD}	Junction to Case Thermal Resistance （ Per Diode）				0.95	K /W

Diode-RECTIFIER

ABSOLUTE MAXIMUM RATINGS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	800	V
$I_{F(AV)}$	Average Forward Current Per Diode	T_C=80℃	75	A
I_{FRMS}	R.M.S. Forward Current Per Diode		125	
I_{RMS}	R.M.S. Current at rectifier output		150	
I_{FSM}	Non Repetitive Surge Forward Current	T_J=45℃, t=10ms, 50Hz	700	
		T_J=45℃, t=8.3ms, 60Hz	782	
I^2t		T_J=45℃, t=10ms, 50Hz	2450	A^2s
		T_J=45℃, t=8.3ms, 60Hz	2450	

Diode-RECTIFIER

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , T_J=25℃		1.05	1.25	V
		I_F=75A , T_J=150℃		0.98		V
I_R	Reverse Leakage Current	V_R=800V, T_J=25℃			50	μA
		V_R=800V, T_J=150℃			1	mA
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.73	K /W

IGBT-Brake chopper

ABSOLUTE MAXIMUM RATINGS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	650	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃, T_{Jmax}=175℃	60	A
		T_C=80℃, T_{Jmax}=175℃	50	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	100	
P_{tot}	Power Dissipation Per IGBT	T_C=25℃, T_{Jmax}=175℃	190	W

Diode-Brake chopper

ABSOLUTE MAXIMUM RATINGS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	650	V
$I_{F(AV)}$	Average Forward Current		50	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	100	
I^2t		T_J=125℃, t=10ms, V_R=0V	392	A^2s

IGBT-Brake chopper

ELECTRICAL CHARACTERISTICS *(T_C =25°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=0.8mA		4.6	5.2	5.8	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=50A, V_{GE}=15V, T_J=25℃			1.65	2.0	
		I_C=50A, V_{GE}=15V, T_J=125℃			1.9		
		I_C=50A, V_{GE}=15V, T_J=150℃			1.95		
I_{CES}	Collector Leakage Current	V_{CE}=600V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=600V, V_{GE}=0V, T_J=150℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±15V, T_J=25℃		-200		200	nA
R_{Gint}	Integrated Gate Resistor				1		Ω
Q_G	Gate Charge	V_{CE}=300V, I_C=50A , V_{GE}=±15V			350		nC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			2.9		nF
C_{res}	Reverse Transfer Capacitance				132		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=300V,I_C=50A R_G =43Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		90		ns
			T_J=150℃		80		ns
t_r	Rise Time		T_J=25℃		120		ns
			T_J=150℃		120		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=300V,I_C=50A R_G =43Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		380		ns
			T_J=150℃		400		ns
t_f	Fall Time		T_J=25℃		34		ns
			T_J=150℃		38		ns
E_{on}	Turn on Energy	V_{CC}=300V,I_C=50A R_G =43Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		3.2		mJ
			T_J=125℃		3.6		mJ
			T_J=150℃		3.7		mJ
E_{off}	Turn off Energy		T_J=25℃		1.1		mJ
			T_J=125℃		1.35		mJ
			T_J=150℃		1.4		mJ
I_{SC}	Short Circuit Current	tpsc≤6μS , V_{GE}=15V T_J=150℃,V_{CC}=360V			150		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)					0.8	K /W

Diode-Brake chopper

ELECTRICAL CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=50A , V_{GE}=0V, T_J=25℃		1.70	2.20	V
		I_F=50A , V_{GE}=0V, T_J=125℃		1.55		
		I_F=50A , V_{GE}=0V, T_J=150℃		1.50		
I_{RRM}	Max. Reverse Recovery Current	I_F=50A , V_R=300V dI_F/dt=-1000A/μs T_J =150℃		30		A
Q_{RR}	Reverse Recovery Charge			2.85		μC
E_{rec}	Reverse Recovery Energy			0.6		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				1.3	K /W

NTC CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

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

MODULE CHARACTERISTICS *(T_C =25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature	Inverter, Brake-Chopper	175	℃
		Rectifier	150	
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
CTI	Comparative Tracking Index		>200	
Md	Mounting Torque	Recommended（M5）	2.5~5	Nm
Weight			180	g

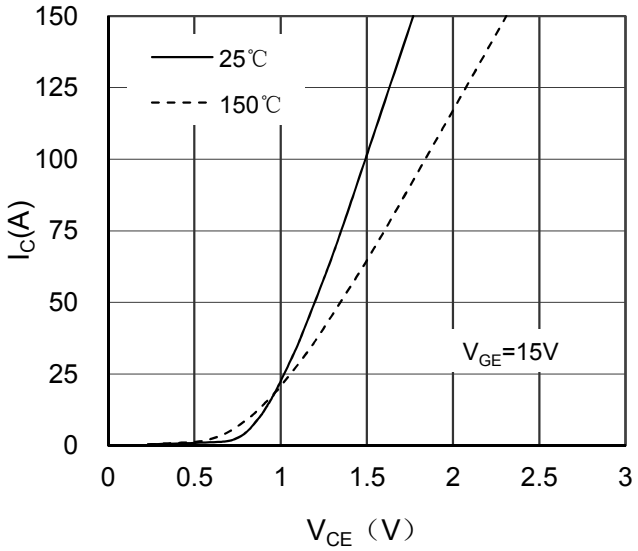


Figure 1. Typical Output Characteristics IGBT-inverter

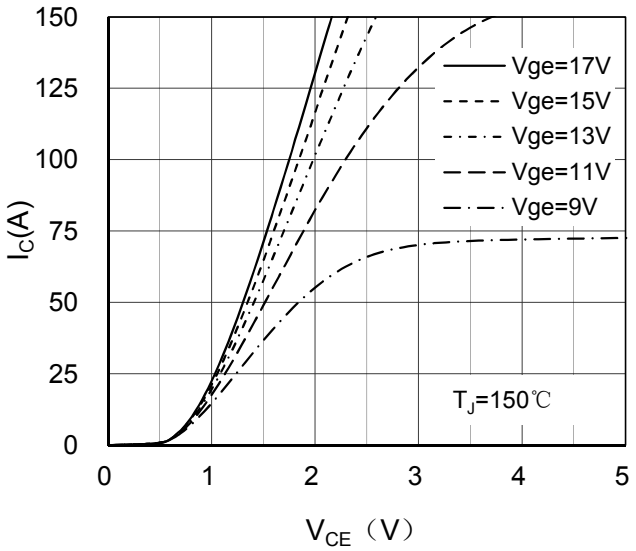


Figure 2. Typical Output Characteristics IGBT-inverter

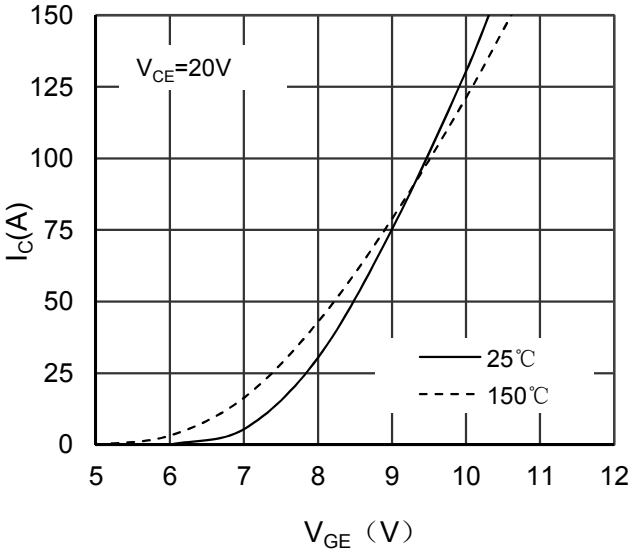


Figure 3. Typical Transfer characteristics IGBT-inverter

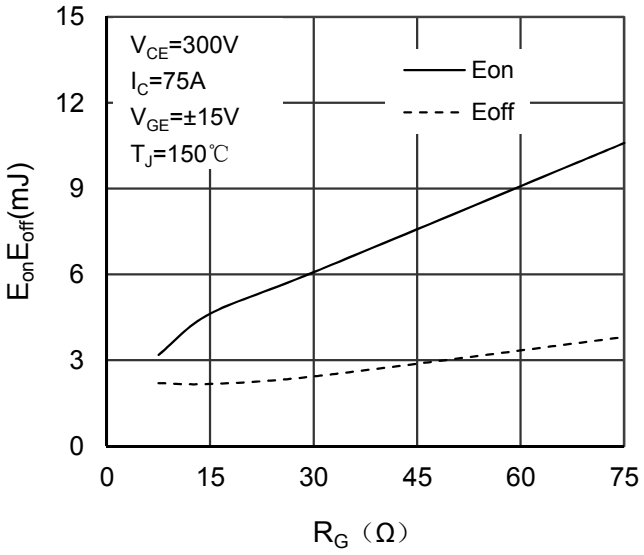


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

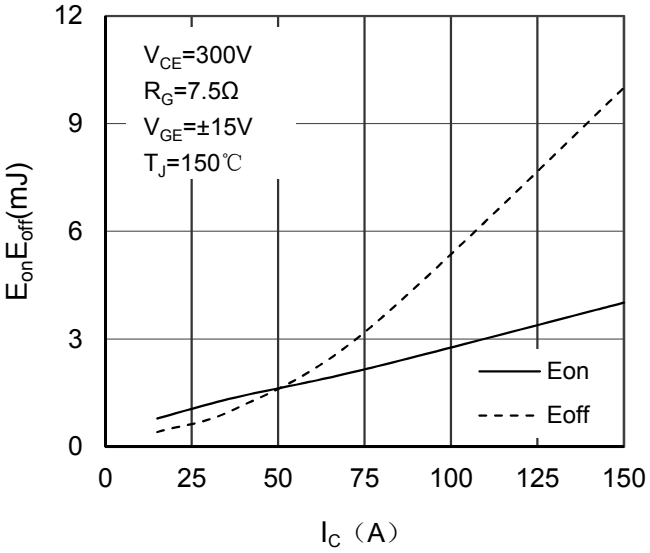


Figure 5. Switching Energy vs Collector Current IGBT-inverter

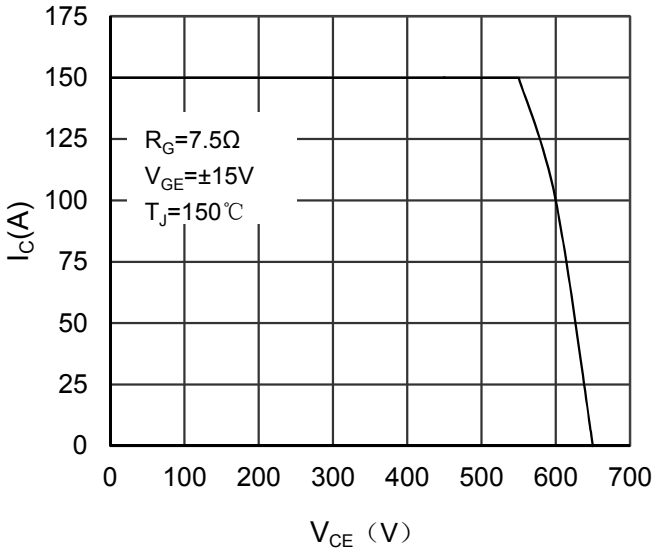


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

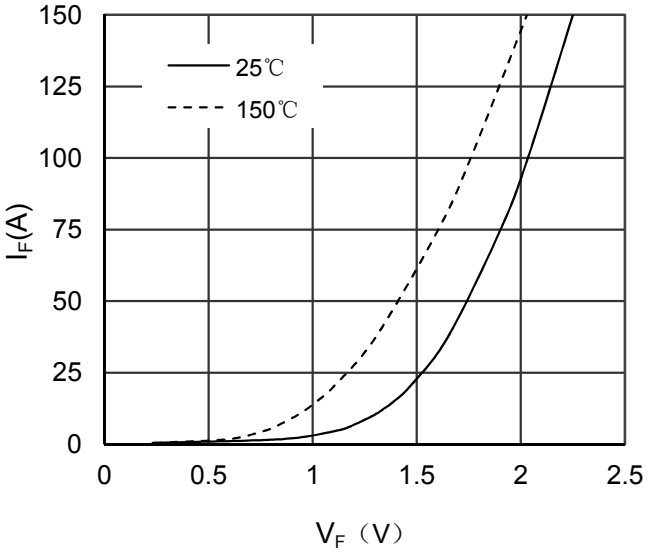


Figure 7. Diode Forward Characteristics Diode -inverter

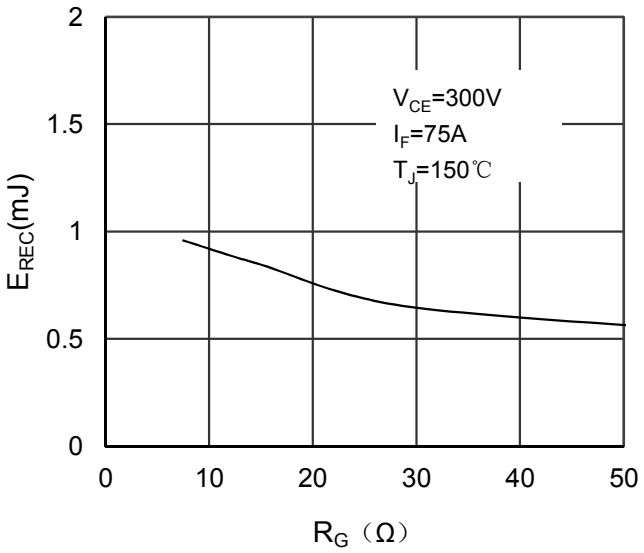


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

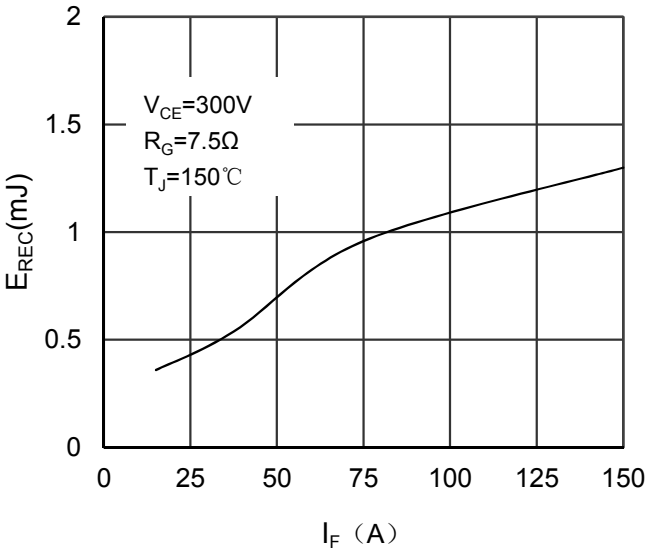


Figure 9. Switching Energy vs Forward Current Diode-inverter

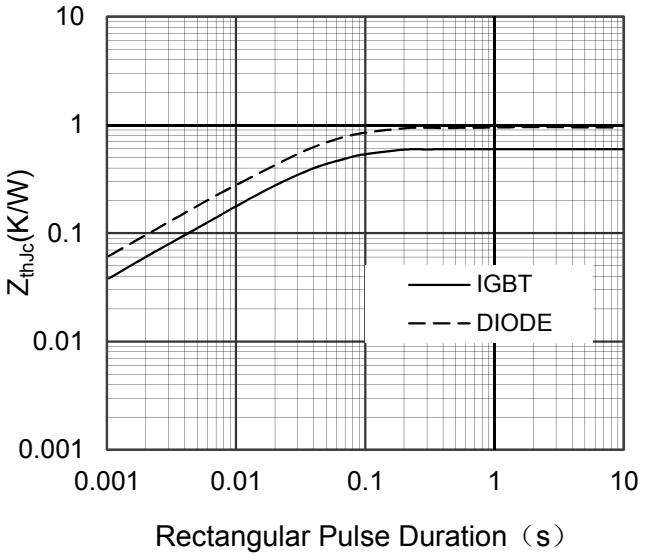


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

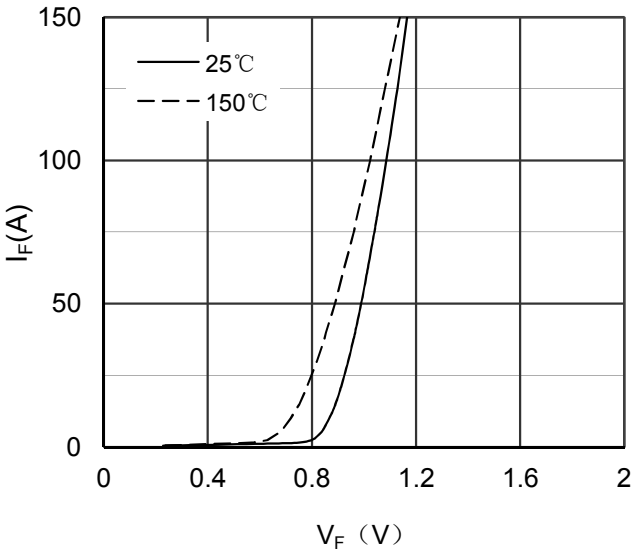


Figure 11. Diode Forward Characteristics Diode- rectifier

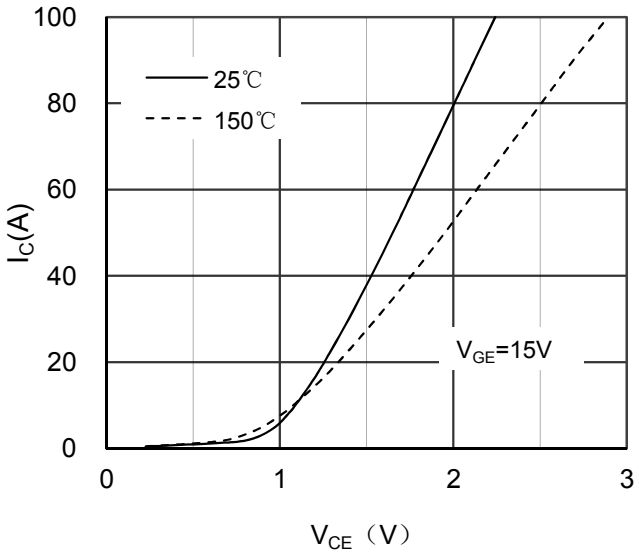


Figure 12. Typical Output Characteristics IGBT- brake chopper

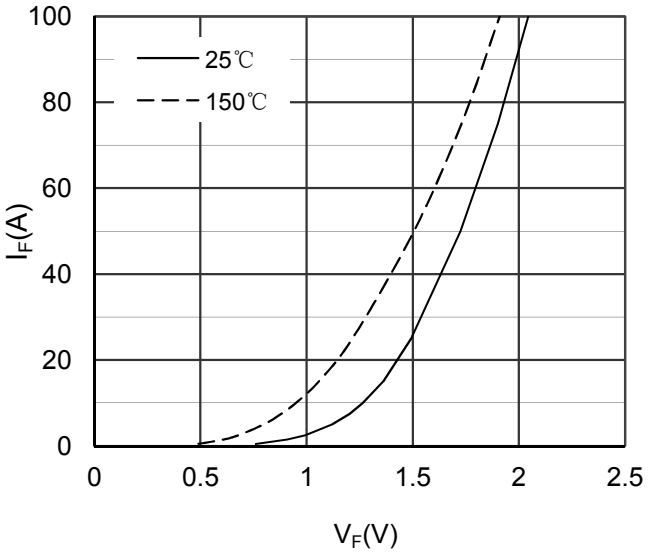


Figure 13. Diode Forward Characteristics Diode - brake chopper

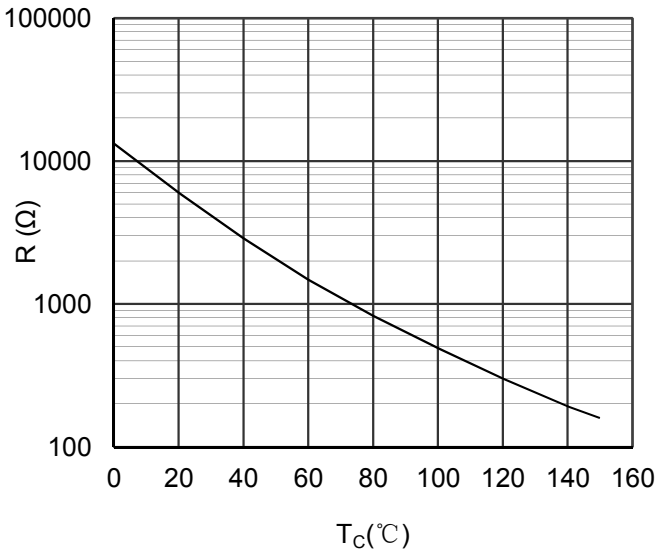


Figure 14. NTC Characteristics

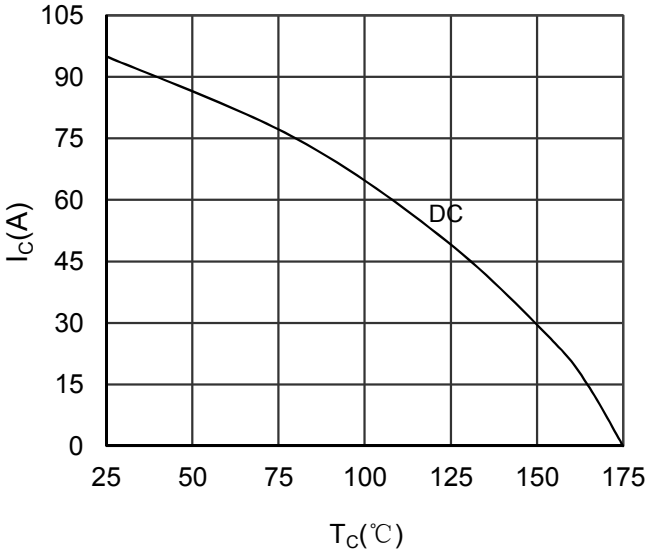


Figure 15. Collector Current vs Case temperature
IGBT -inverter

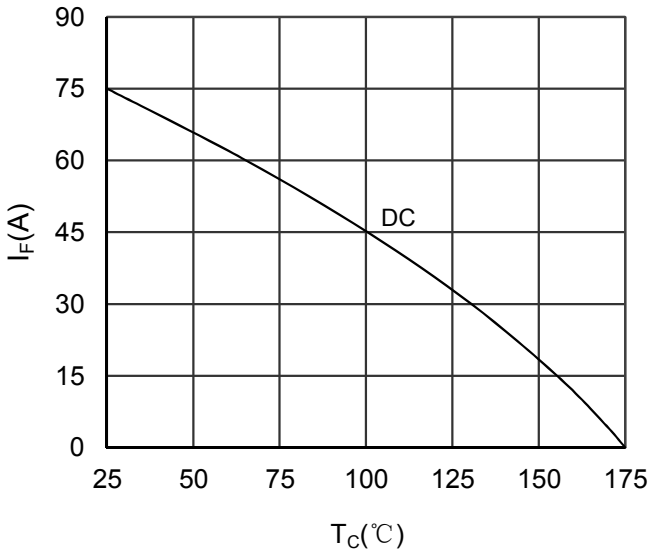


Figure 16. Forward current vs Case temperature
Diode -inverter

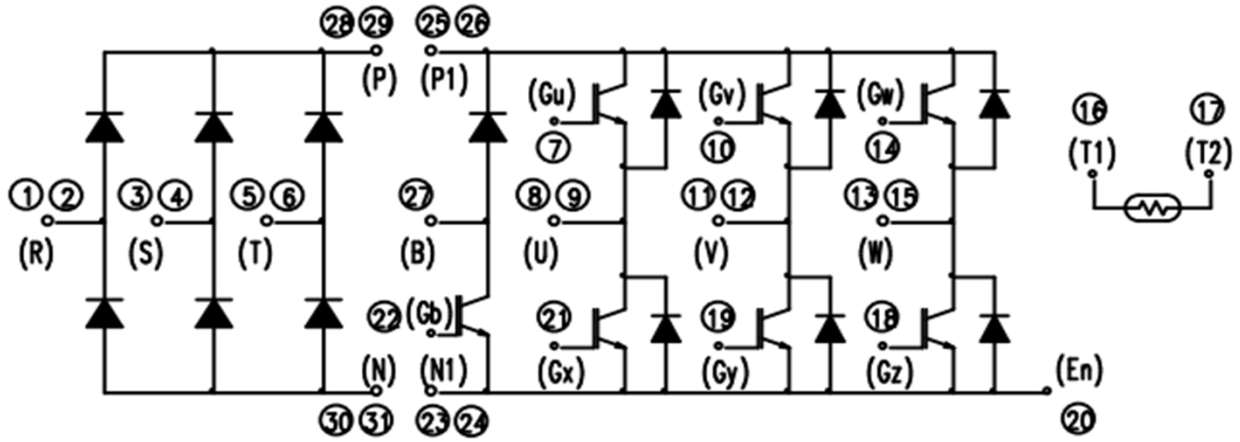
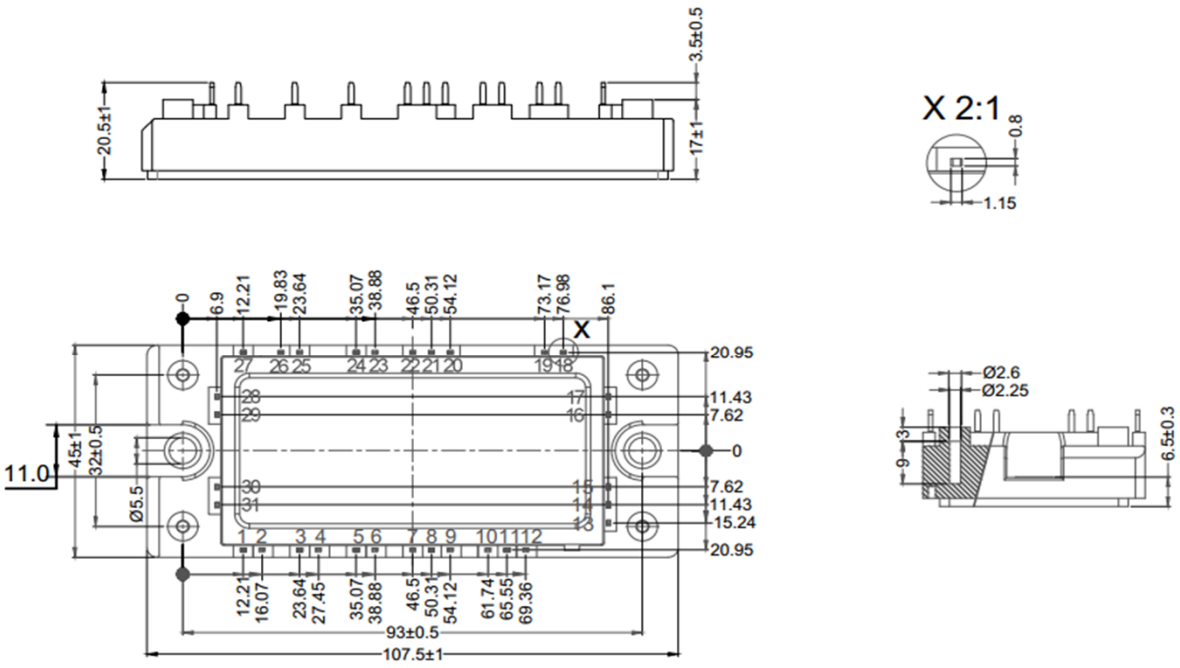


Figure 17. Circuit Diagram



Dimensions in (mm)

Figure 18. Package Outline