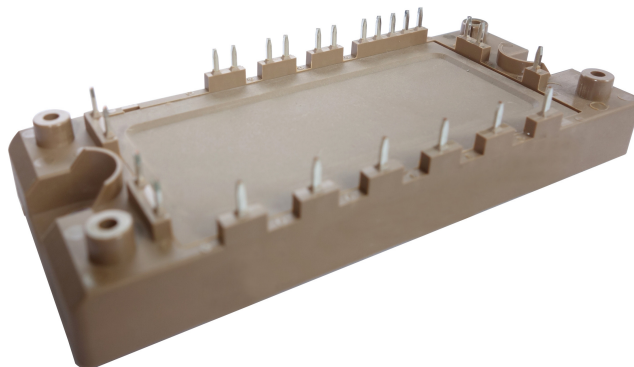


PRODUCT FEATURES

- ☐ High level of integration
- ☐ IGBT 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($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}$	60	A
		$T_C=100^{\circ}\text{C}$	40	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	80	
P_{tot}	Power Dissipation Per IGBT		258	W

Diode-inverter

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	40	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	80	
i^2t		$T_J=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	392	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 ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
V _{GE(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =1.6mA	5.0	5.8	6.5	V	
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =25℃		1.85	2.3		
		I _C =40A, V _{GE} =15V, T _J =125℃		2.15			
		I _C =40A, V _{GE} =15V, T _J =150℃		2.25			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			100	μA	
		V _{CE} =1200V, 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			0		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =40A , V _{GE} =15V		0.21		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		5.65		nF	
C _{res}	Reverse Transfer Capacitance			53		pF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V, I _C =40A R _G =15Ω, V _{GE} =±15V, Inductive Load	T _J =25℃	50		ns	
			T _J =125℃	60		ns	
			T _J =150℃	60		ns	
t _r	Rise Time		T _J =25℃	40		ns	
			T _J =125℃	45		ns	
			T _J =150℃	50		ns	
t _{d(off)}	Turn off Delay Time		T _J =25℃	220		ns	
			T _J =125℃	250		ns	
			T _J =150℃	260		ns	
t _f	Fall Time	T _J =25℃	80		ns		
		T _J =125℃	150		ns		
		T _J =150℃	170		ns		
E _{on}	Turn on Energy	V _{CC} =600V, I _C =40A R _G =15Ω, V _{GE} =±15V, Inductive Load	T _J =125℃	4.2		mJ	
			T _J =150℃	4.5		mJ	
E _{off}	Turn off Energy		T _J =125℃	3.4		mJ	
			T _J =150℃	3.6		mJ	
I _{sc}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _J =125℃, V _{CC} =600V		240		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.58	K /W	

Diode-inverter

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 =40A , V _{GE} =0V, T _J =25℃		1.9	2.4	V
		I _F =40A , V _{GE} =0V, T _J =125℃		1.65		
		I _F =40A , V _{GE} =0V, T _J =150℃		1.6		
t _{rr}	Reverse Recovery Time	I _F =40A , V _R =600V dI _F /dt=-1000A/μs T _J =150℃		300		ns
I _{RRM}	Max. Reverse Recovery Current			54		A
Q _{RR}	Reverse Recovery Charge			8		μC
E _{rec}	Reverse Recovery Energy			3		mJ
R _{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.95	K /W

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	1600	V
$I_{F(AV)}$	Average Forward Current Per Diode	$T_C=80^{\circ}\text{C}$	40	A
I_{FRMS}	R.M.S. Forward Current Per Diode		60	
I_{RMS}	R.M.S. Current at rectifier output		80	
I_{FSM}	Non Repetitive Surge Forward Current	$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	500	
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	550	
I^2t		$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	1250	A^2S
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	1255	

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=40\text{A}$, $T_J=25^{\circ}\text{C}$		1.04		V
		$I_F=40\text{A}$, $T_J=150^{\circ}\text{C}$		0.98		V
I_R	Reverse Leakage Current	$V_R=1600\text{V}$, $T_J=25^{\circ}\text{C}$			50	μA
		$V_R=1600\text{V}$, $T_J=150^{\circ}\text{C}$			1	mA
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.8	K /W

IGBT-Brake chopper**ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}$	40	A
		$T_C=100^{\circ}\text{C}$	25	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	50	
P_{tot}	Power Dissipation Per IGBT		192	W

Diode-Brake chopper**ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	25	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	50	
I^2t		$T_J=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	200	A^2S

IGBT-Brake chopper

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 =1mA	5.0	5.8	6.5	V	
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =25A, V _{GE} =15V, T _J =25℃		1.85	2.3		
		I _C =25A, V _{GE} =15V, T _J =125℃		2.15			
		I _C =25A, V _{GE} =15V, T _J =150℃		2.25			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			100	μA	
		V _{CE} =1200V, 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			0		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =25A , V _{GE} =15V		0.145		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		3.5		nF	
C _{res}	Reverse Transfer Capacitance			40		pF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V, I _C =25A R _G =20Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		30		ns
			T _J =125℃		40		ns
			T _J =150℃		45		ns
t _r	Rise Time		T _J =25℃		35		ns
			T _J =125℃		40		ns
			T _J =150℃		45		ns
t _{d(off)}	Turn off Delay Time		T _J =25℃		200		ns
			T _J =125℃		240		ns
			T _J =150℃		260		ns
t _f	Fall Time	T _J =25℃		80		ns	
		T _J =125℃		150		ns	
		T _J =150℃		170		ns	
E _{on}	Turn on Energy	V _{CC} =600V, I _C =25A R _G =20Ω, V _{GE} =±15V, Inductive Load	T _J =125℃		2.6		mJ
			T _J =150℃		2.8		mJ
E _{off}	Turn off Energy		T _J =125℃		2		mJ
			T _J =150℃		2.2		mJ
I _{sc}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _J =125℃, V _{CC} =600V		150		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.78	K /W	

IGBT-Brake chopper

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=25\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.9	2.4	V
		$I_F=25\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.65		
		$I_F=25\text{A}, V_{GE}=0\text{V}, T_J=150^\circ\text{C}$		1.6		
t_{rr}	Reverse Recovery Time	$I_F=25\text{A}, V_R=600\text{V}$		260		ns
I_{RRM}	Max. Reverse Recovery Current	$di_F/dt=-900\text{A}/\mu\text{s}$		40		A
E_{rec}	Reverse Recovery Energy	$T_J=150^\circ\text{C}$		1.9		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				1.2	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		$\text{K}\Omega$
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$			3375		K

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

Symbol	Parameter/Test Conditions		Values	Unit
$T_{J\max}$	Max. Junction Temperature	Inverter, Brake-Chopper	175	$^{\circ}\text{C}$
		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

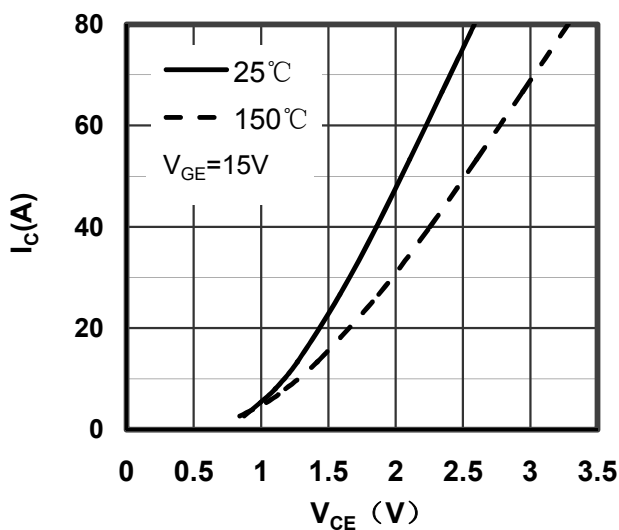


Figure 1. Typical Output Characteristics
IGBT-inverter

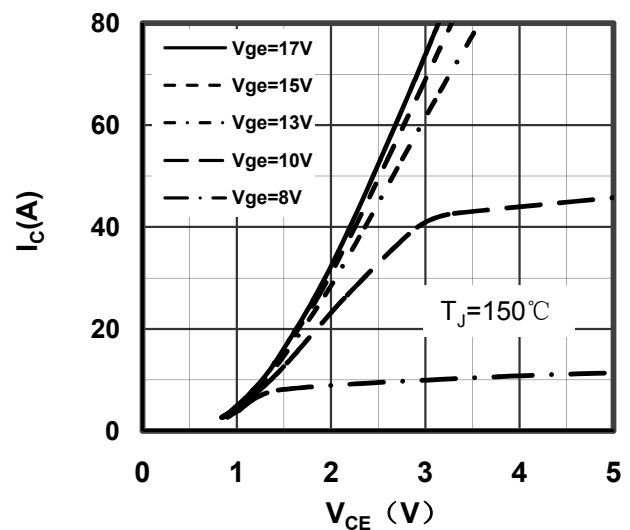


Figure 2. Typical Output Characteristics
IGBT-inverter

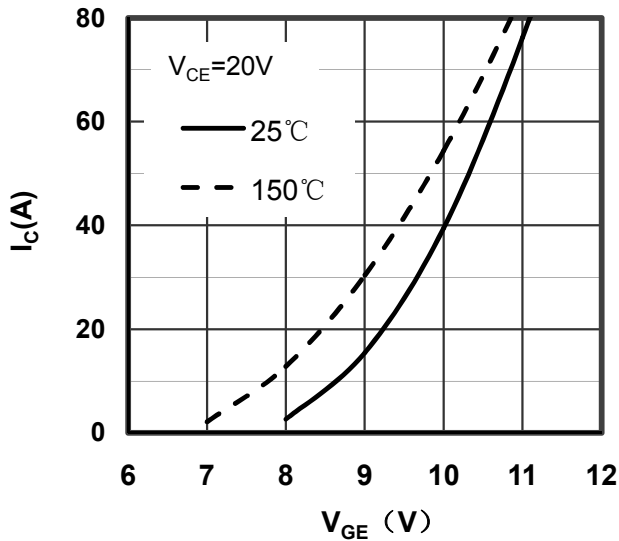


Figure 3. Typical Transfer Characteristics IGBT-inverter

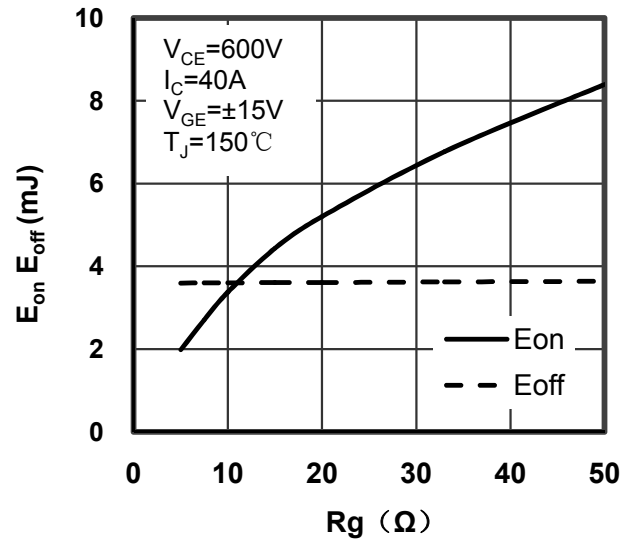


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

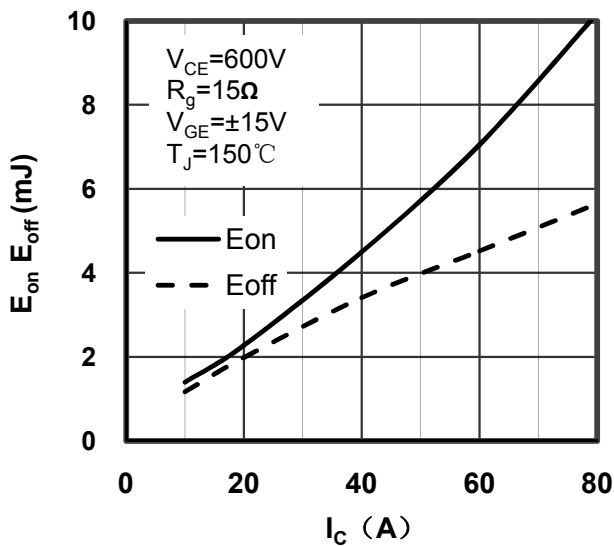


Figure 5. Switching Energy vs Collector Current IGBT-inverter

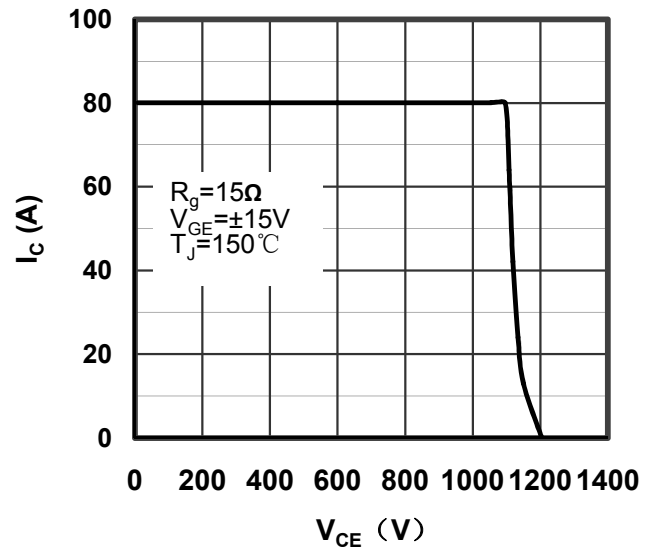


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

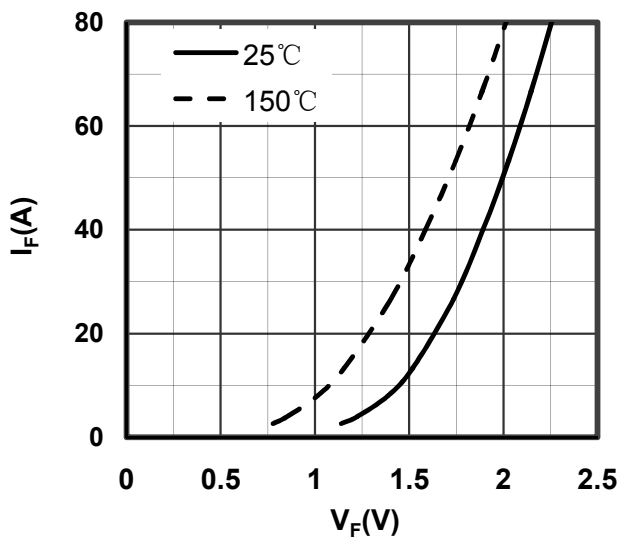


Figure 7. Diode Forward Characteristics Diode -inverter

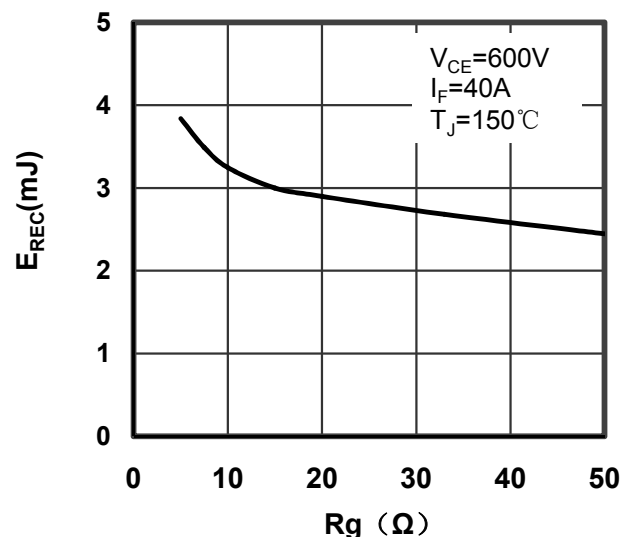


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

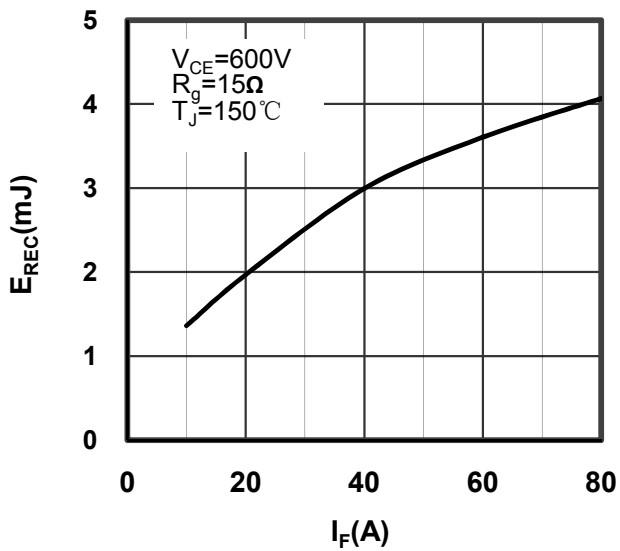


Figure 9. Switching Energy vs Forward Current Diode-inverter

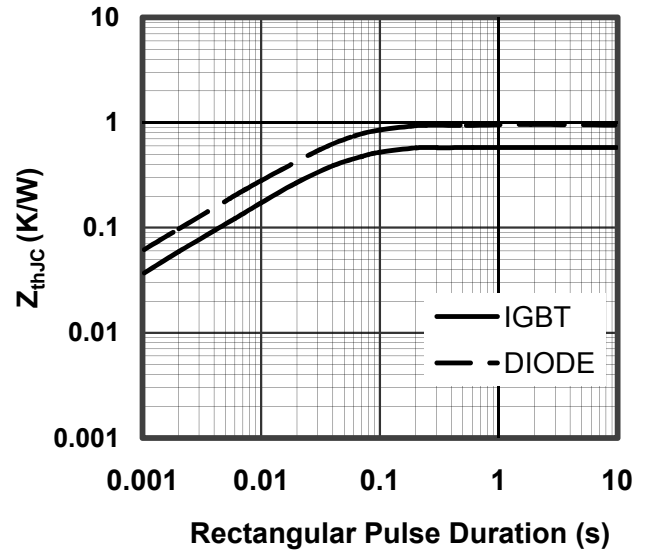


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

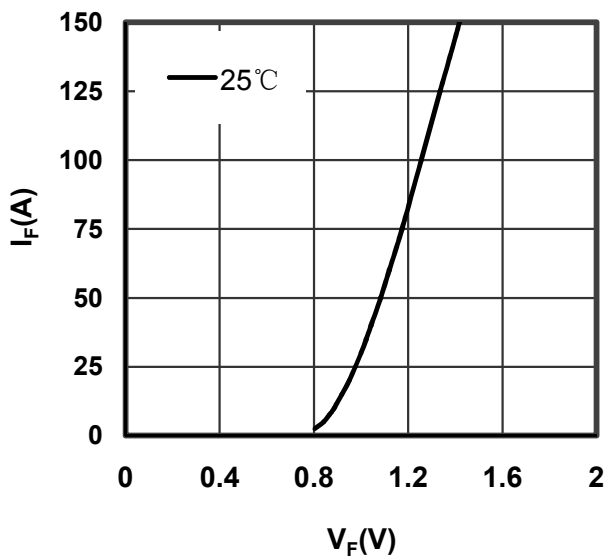


Figure 11. Diode Forward Characteristics Diode- rectifier

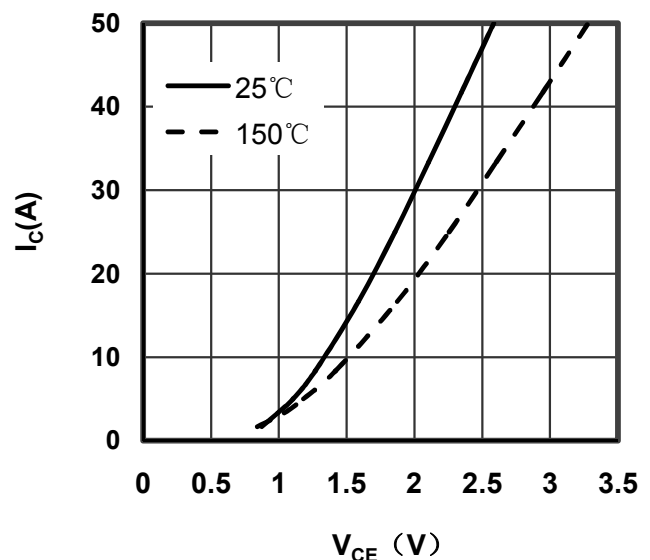


Figure 12. Typical Output Characteristics IGBT- brake chopper

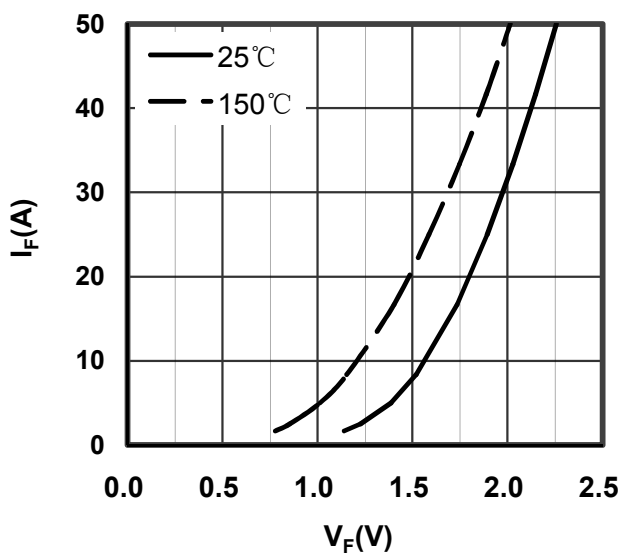


Figure 13. Diode Forward Characteristics Diode - brake chopper

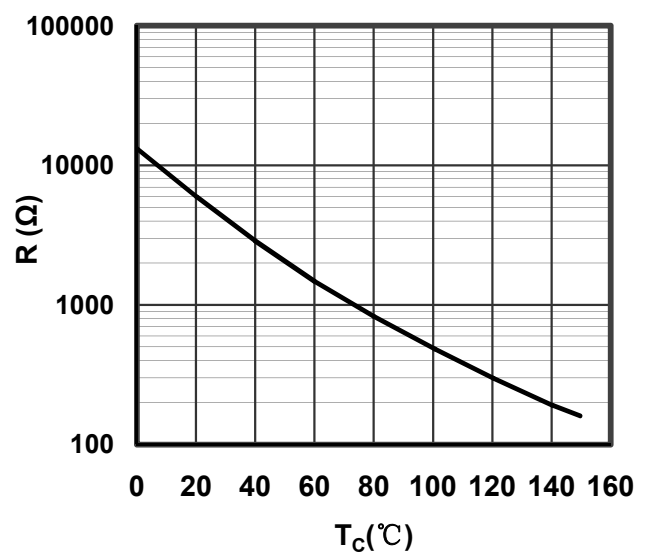


Figure 14. NTC Characteristics

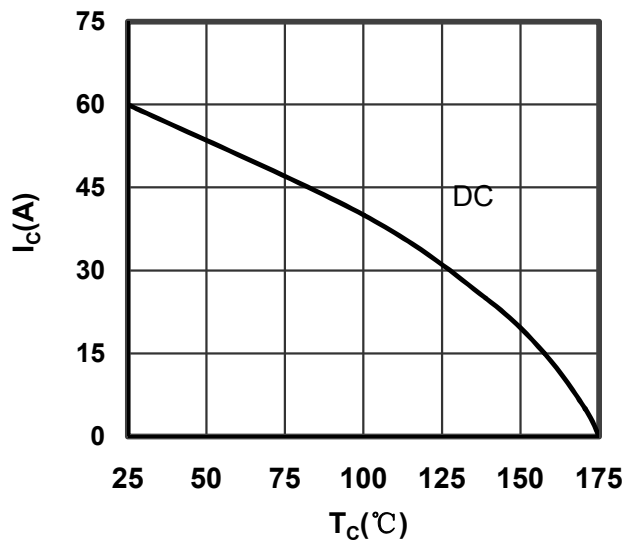


Figure 15. Collector Current vs Case temperature
IGBT -inverter

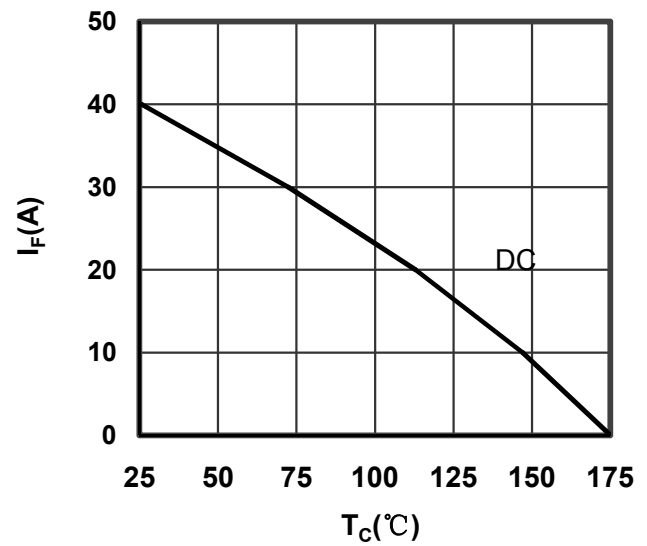


Figure 16. Forward current vs Case temperature
Diode -inverter

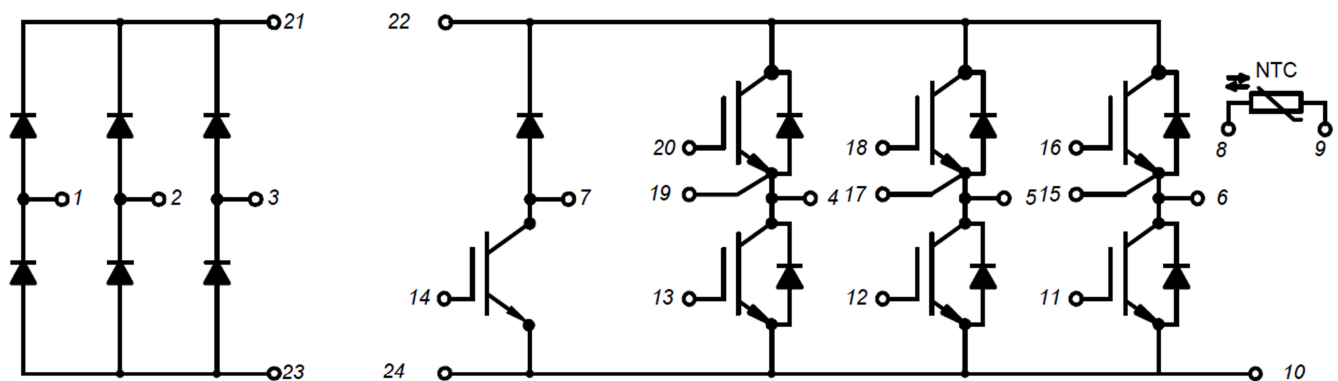
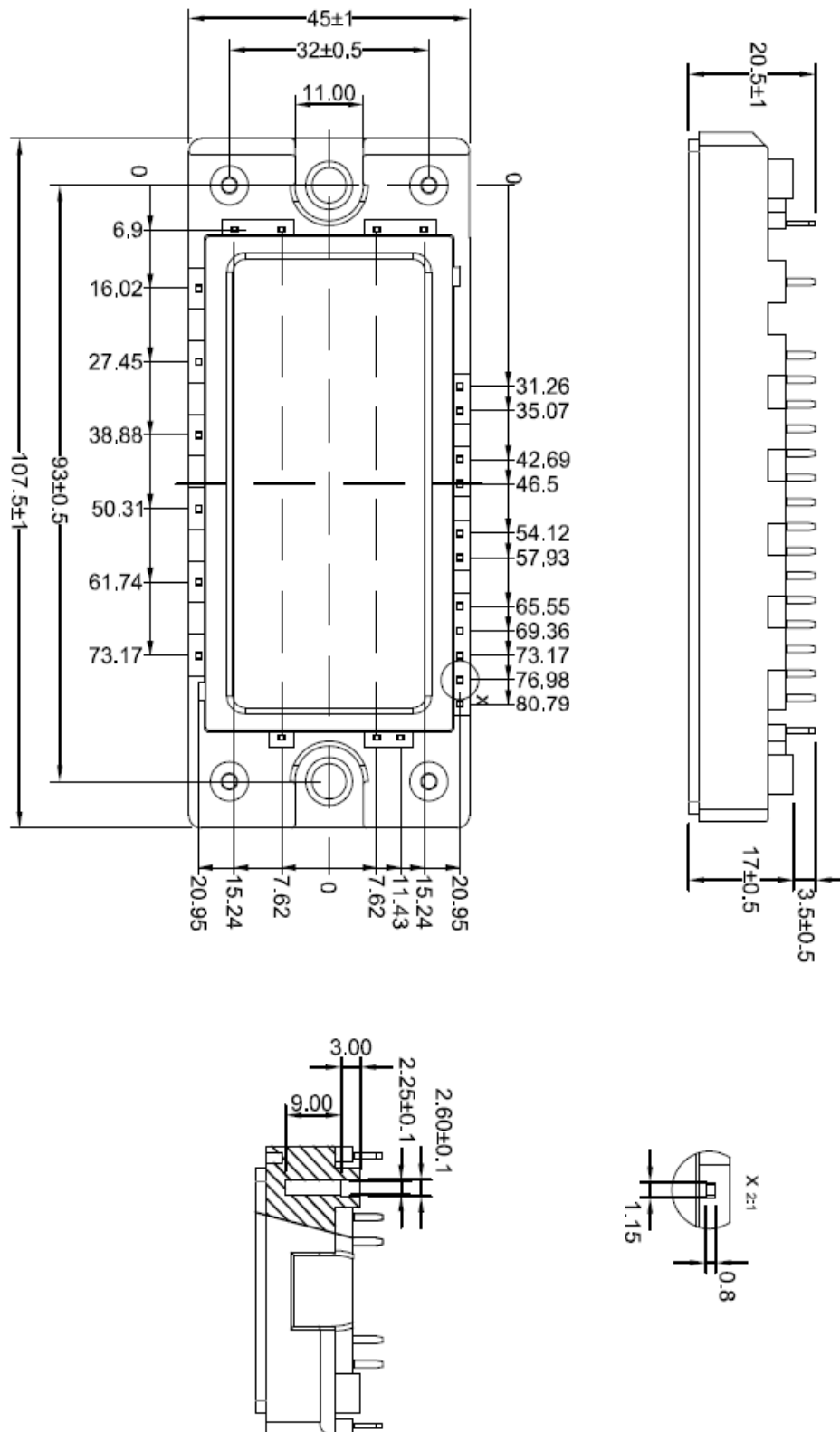


Figure 17. Circuit Diagram



Dimensions in (mm)
Figure 18. Package Outline