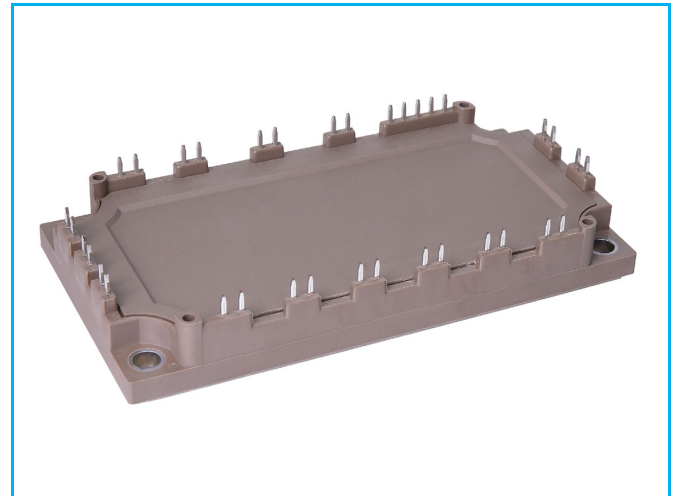


PRODUCT FEATURES

- ☐ 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

APPLICATIONS

- ☐ AC motor control
- ☐ Motion/servo control
- ☐ Inverter and power supplies



Rectifier+Brake+Inverter

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	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	75	A
		$T_C=100^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	50	
I_{CM}	Repetitive Peak Collector Current	$tp=1\text{ms}$	100	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	340	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		50	A
I_{FRM}	Repetitive Peak Forward Current	$tp=1\text{ms}$	100	
I^2t		$T_J=125^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	800	A^2S

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MMGT50W120XB6C

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 =2mA	5.0	5.8	6.5	V	
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =50A, V _{GE} =15V, T _J =25℃		1.85	2.3		
		I _C =50A, V _{GE} =15V, T _J =125℃		2.15			
		I _C =50A, 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			4		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =50A , V _{GE} =15V		0.27		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		7.5		nF	
C _{res}	Reverse Transfer Capacitance			66		pF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V, I _C =50A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		95	ns	
			T _J =125℃		100	ns	
			T _J =150℃		100	ns	
t _r	Rise Time		T _J =25℃		50	ns	
			T _J =125℃		54	ns	
			T _J =150℃		58	ns	
t _{d(off)}	Turn off Delay Time		T _J =25℃		250	ns	
			T _J =125℃		280	ns	
			T _J =150℃		290	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 =50A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =125℃		5.6	mJ	
			T _J =150℃		6.5	mJ	
E _{off}	Turn off Energy		T _J =125℃		4.5	mJ	
			T _J =150℃		4.8	mJ	
I _{SC}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _J =150℃, V _{CC} =600V		230		A
R _{thJC}	Junction to Case Thermal Resistance （ Per IGBT ）				0.44	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 =50A , V _{GE} =0V, T _J =25°C		1.9	2.4	V
		I _F =50A , V _{GE} =0V, T _J =125°C		1.65		
		I _F =50A , V _{GE} =0V, T _J = 150°C		1.6		
t _{rr}	Reverse Recovery Time	I _F =50A , V _R =600V dI _F /dt=-1200A/μs T _J =150°C		270		ns
I _{RRM}	Max. Reverse Recovery Current			70		A
Q _{RR}	Reverse Recovery Charge			9.6		μC
E _{rec}	Reverse Recovery Energy			3.6		mJ
R _{thJCD}	Junction to Case Thermal Resistance （ Per Diode ）				0.72	K /W

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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_{FRMS}	R.M.S. Forward Current Per Diode	$T_C=80^{\circ}\text{C}$	80	A
I_{RMS}	R.M.S. Current at rectifier output		140	
I_{FSM}	Non Repetitive Surge Forward Current	$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	1000	
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	1100	
I^2t		$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	5000	A^2S
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	5021	

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	$I_F=50\text{A}$, $T_J=25^{\circ}\text{C}$		0.99		V
		$I_F=50\text{A}$, $T_J=150^{\circ}\text{C}$		0.95		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)				0.5	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	$T_C=25^{\circ}\text{C}$, $T_{Jmax}=175^{\circ}\text{C}$	60	A
		$T_C=100^{\circ}\text{C}$, $T_{Jmax}=175^{\circ}\text{C}$	40	
I_{CM}	Repetitive Peak Collector Current	$tp=1\text{ms}$	80	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}\text{C}$, $T_{Jmax}=175^{\circ}\text{C}$	258	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		40	A
I_{FRM}	Repetitive Peak Forward Current	$tp=1\text{ms}$	80	
I^2t		$T_J=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	392	A^2S

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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 =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 =150℃ ,V _{CC} =600V		185		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.58	K /W	

Diode-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	$I_F=40\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.9	2.4	V
		$I_F=40\text{A}, V_{GE}=0\text{V}, T_J=125^{\circ}\text{C}$		1.65		
		$I_F=40\text{A}, V_{GE}=0\text{V}, T_J=150^{\circ}\text{C}$		1.6		
t_{rr}	Reverse Recovery Time	$I_F=40\text{A}, V_R=600\text{V}$		300		ns
I_{RRM}	Max. Reverse Recovery Current	$dI_F/dt=-1000\text{A}/\mu\text{s}$		54		A
E_{rec}	Reverse Recovery Energy	$T_J=150^{\circ}\text{C}$		3		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.95	K /W

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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	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			300	g

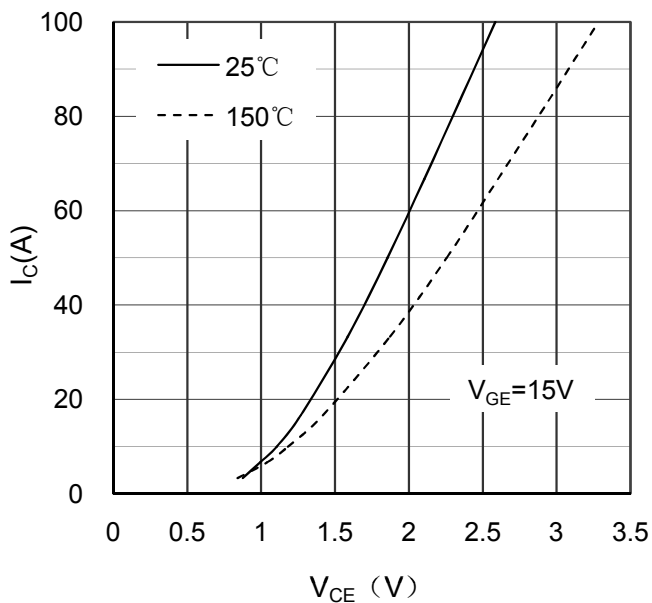


Figure 1. Typical Output Characteristics IGBT-inverter

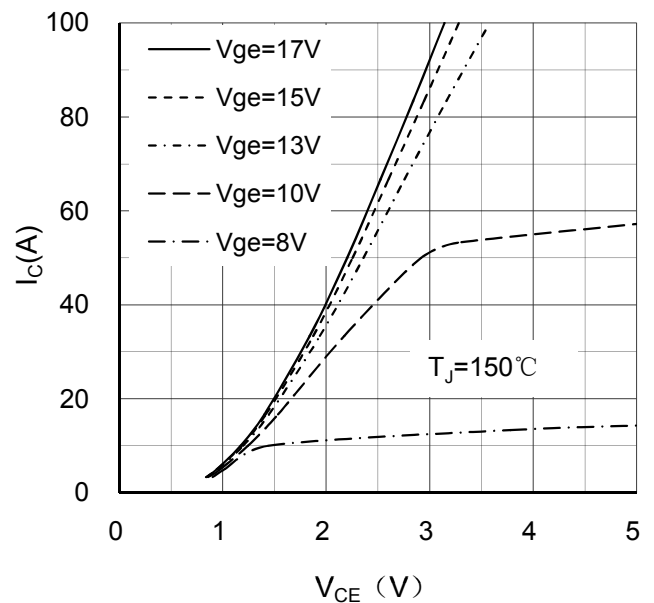


Figure 2. Typical Output Characteristics IGBT-inverter

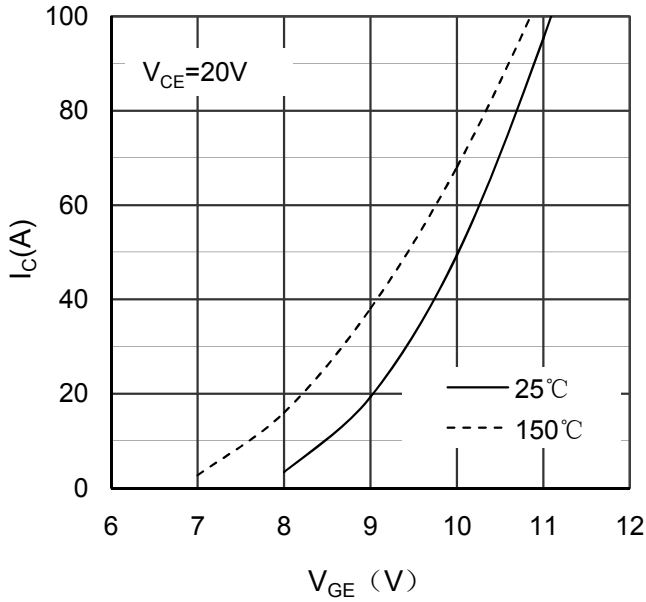


Figure 3. Typical Transfer characteristics IGBT-inverter

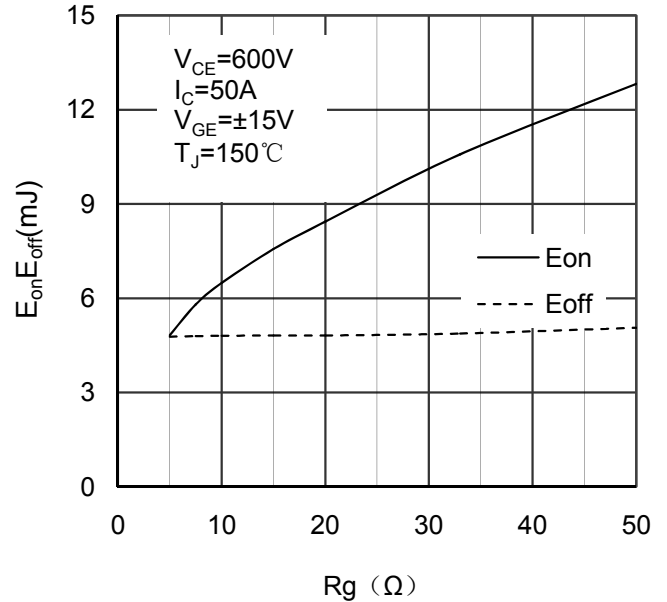


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

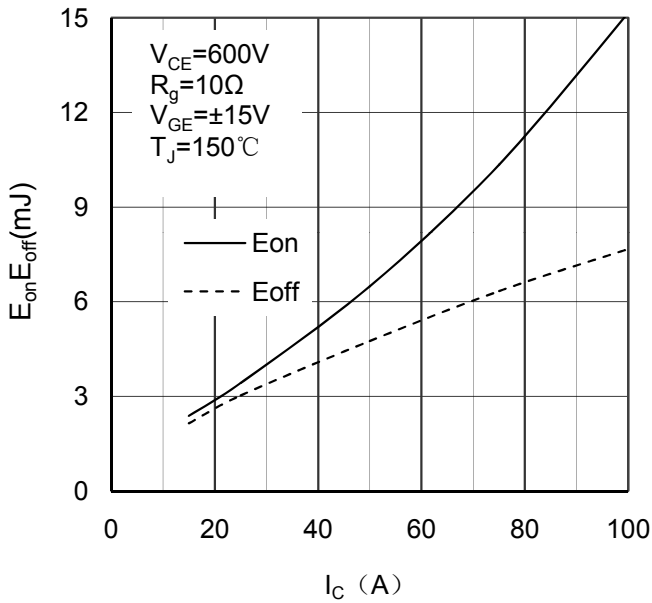


Figure 5. Switching Energy vs Collector Current IGBT-inverter

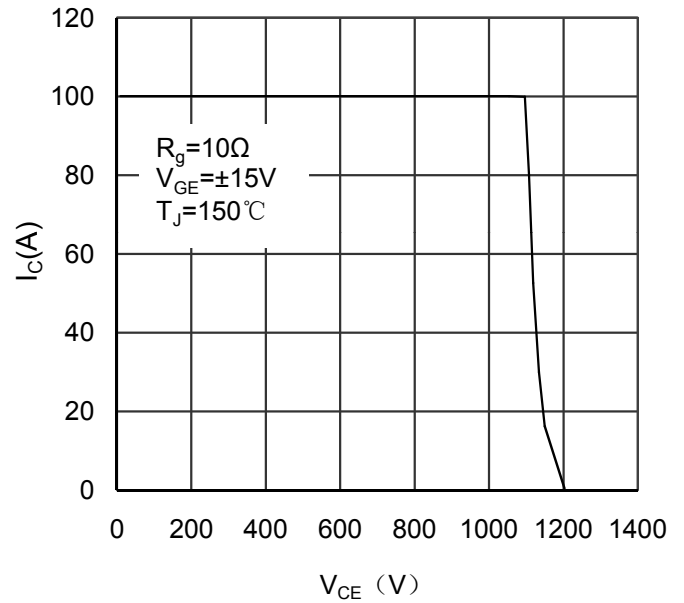


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

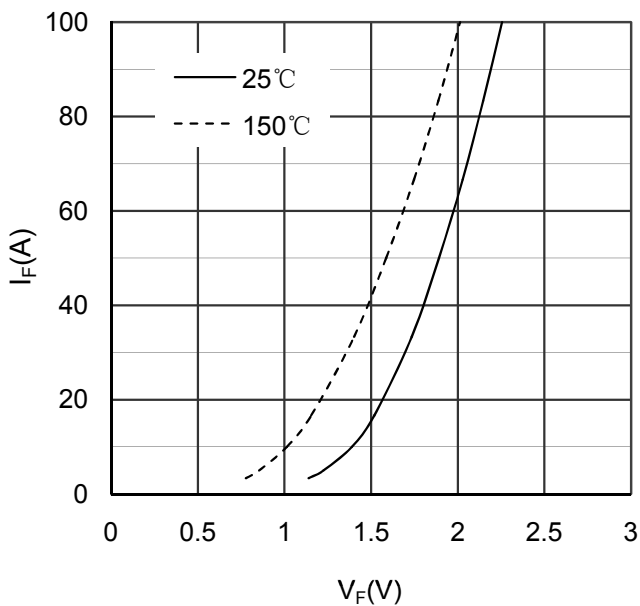


Figure 7. Diode Forward Characteristics Diode -inverter

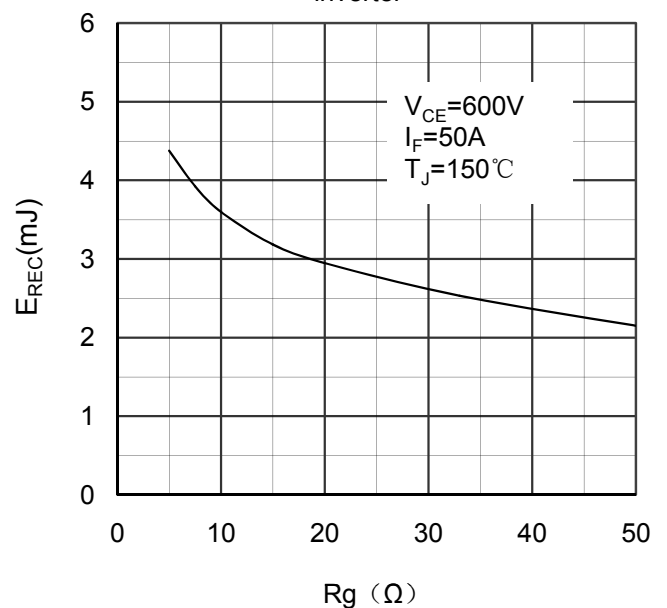


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

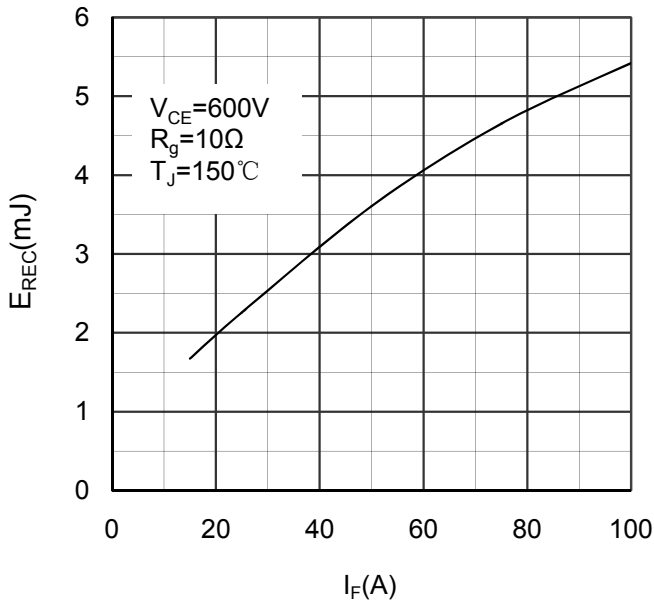


Figure 9. Switching Energy vs Forward Current Diode-inverter

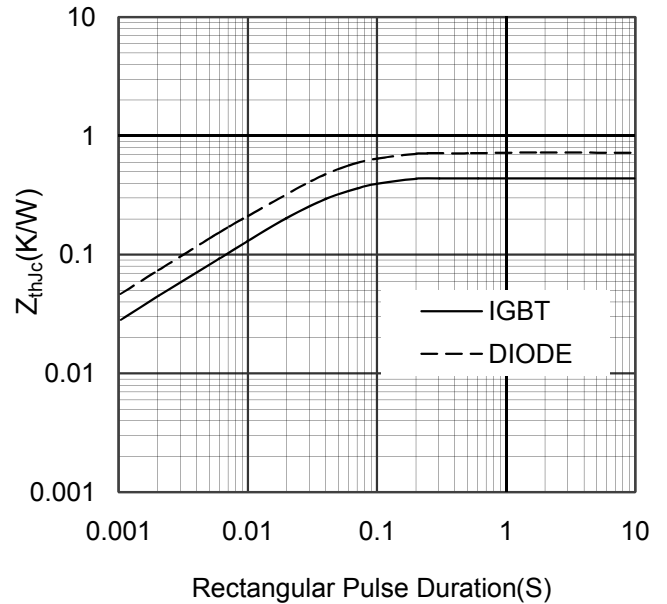


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

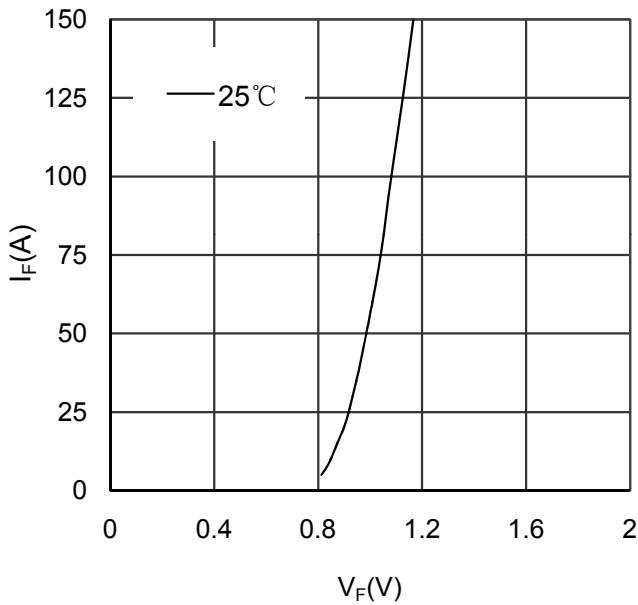


Figure 11. Diode Forward Characteristics Diode- rectifier

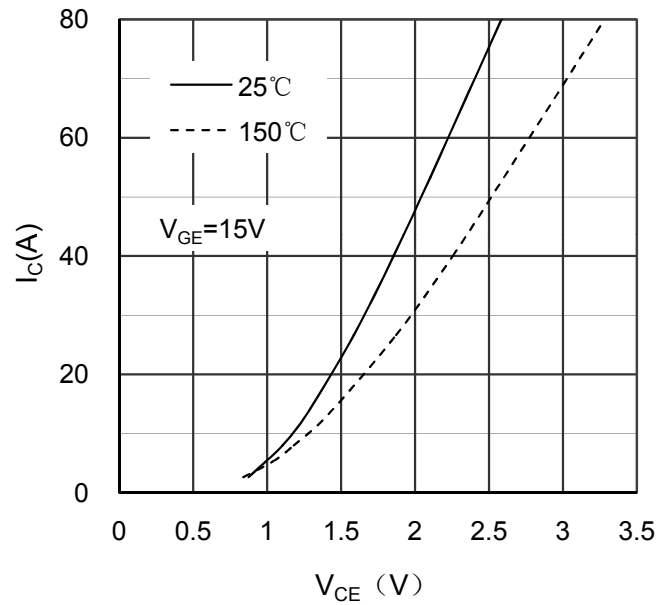


Figure 12. Typical Output Characteristics IGBT- brake chopper

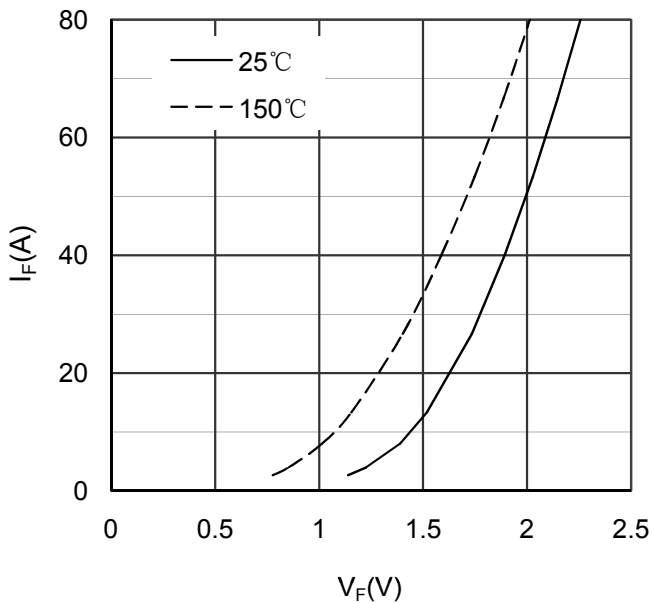


Figure 13. Diode Forward Characteristics Diode - brake chopper

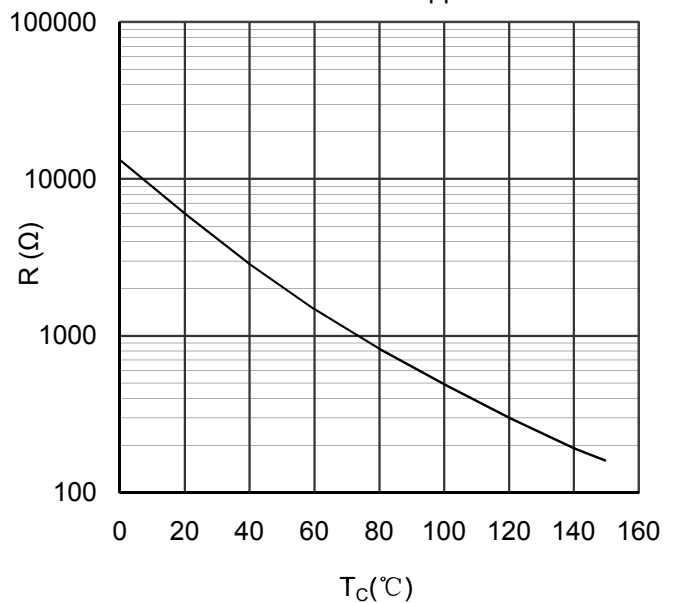


Figure 14. NTC Characteristics

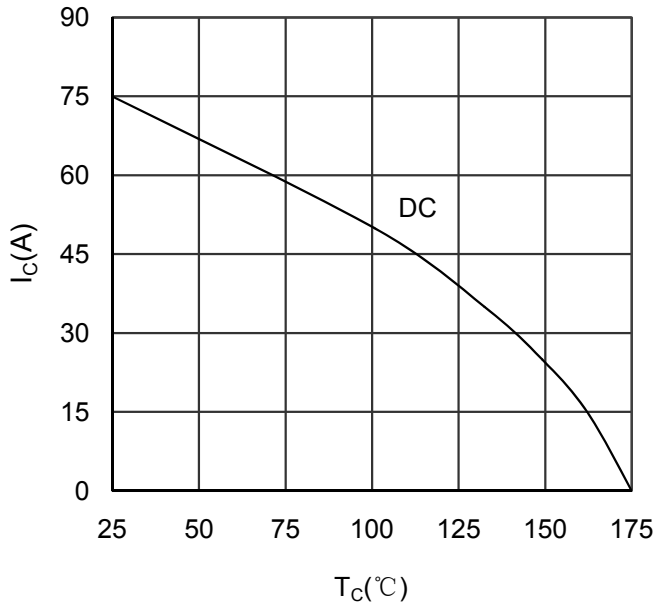


Figure 15. Collector Current vs Case temperature
IGBT -inverter

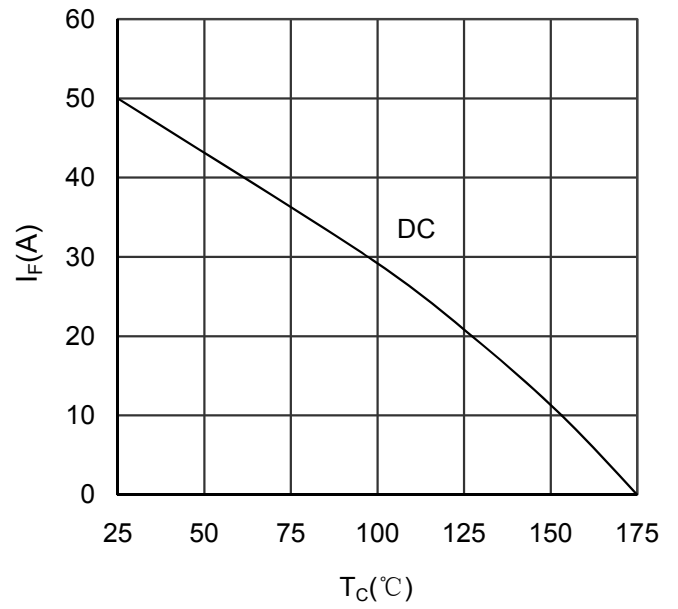


Figure 16. Forward current vs Case temperature
Diode -inverter

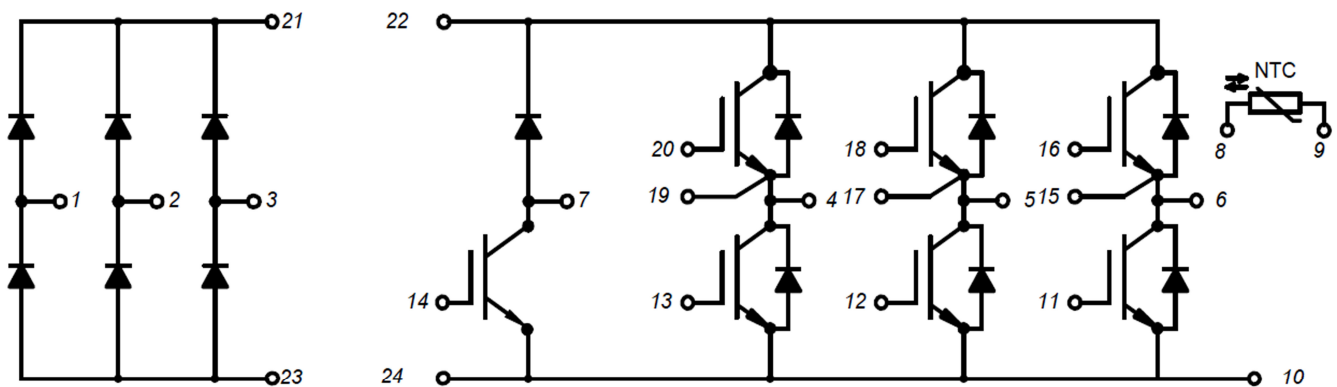
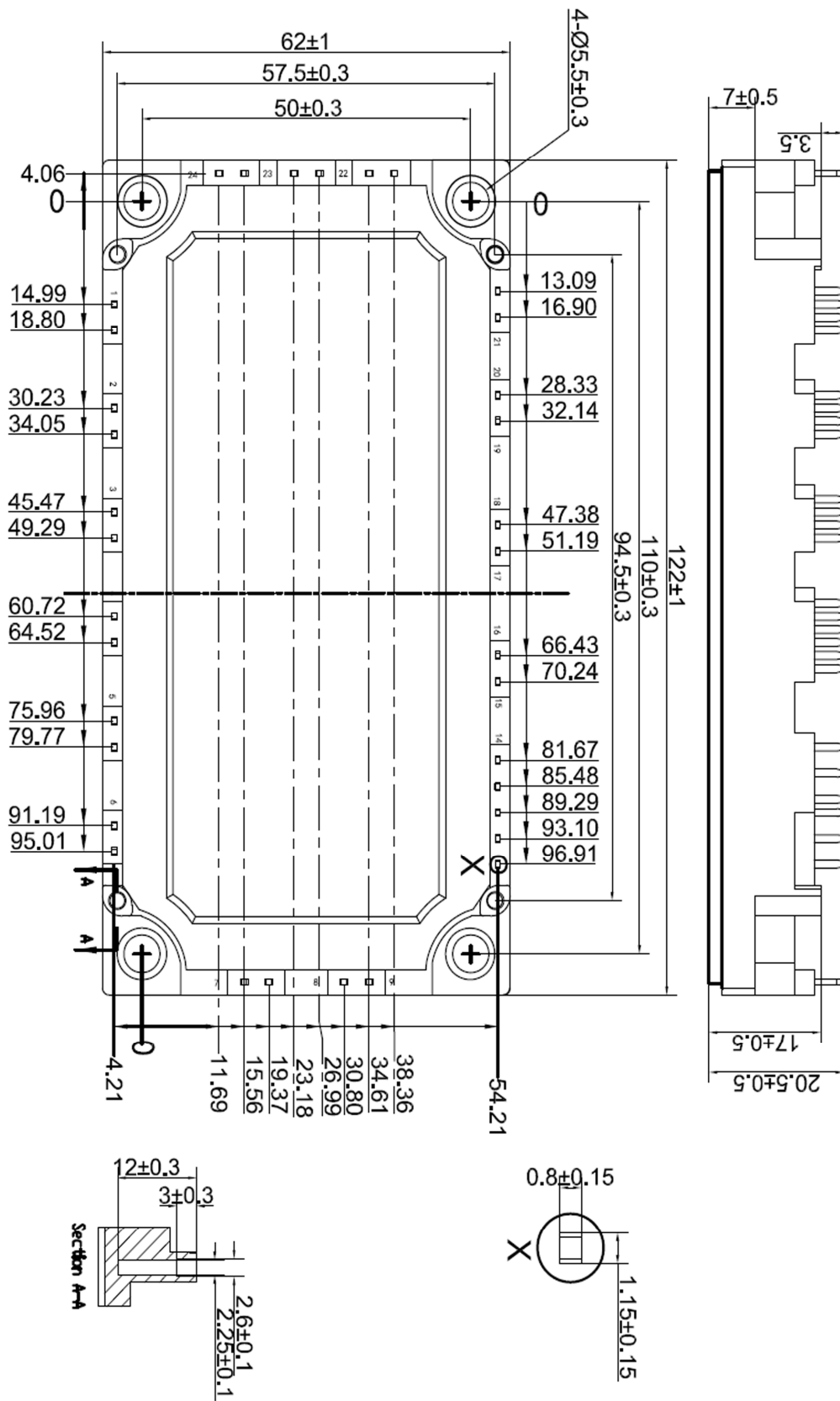


Figure 17. Circuit Diagram



Dimensions in (mm)
Figure 18. Package Outline