

PRODUCT FEATURES

- ☐ Substrate for Low Thermal Resistance
- ☐ Low saturation voltage and positive temperature coefficient
- ☐ Fast switching and short tail current
- ☐ Free wheeling diodes with fast and soft reverse recovery
- ☐ Solder Contact Technology, Rugged mounting due to integrated Mounting clamps
- ☐ Temperature sense included

APPLICATIONS

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



Rectifier+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	$T_C=25^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	86	A
		$T_C=110^{\circ}\text{C}, T_{Jmax}=175^{\circ}\text{C}$	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		$T_J=150^{\circ}\text{C}, t=10\text{ms}, V_R=0\text{V}$	784	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

MMG50W120XT6TC_W11

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 =3mA	5.5	6.1	6.8	V	
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =50A, V _{GE} =15V, T _J =25℃		1.85			
		I _C =50A, V _{GE} =15V, T _J =125℃		2.14			
		I _C =50A, V _{GE} =15V, T _J =150℃		2.19			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			100	μA	
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±20V, T _J =25℃	-400		400	nA	
R _{Gint}	Integrated Gate Resistor			3.3		Ω	
Q _G	Gate Charge	V _{CE} =600V, I _C =50A , V _{GE} =15V		1.04		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =100kHz		3.46		nF	
C _{oes}	Output Capacitance			0.758		nF	
C _{res}	Reverse Transfer Capacitance			0.166		nF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V,I _C =50A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =25℃	33		ns	
			T _J =125℃	33		ns	
			T _J =150℃	35		ns	
t _r	Rise Time		T _J =25℃	28		ns	
			T _J =125℃	30		ns	
			T _J =150℃	30		ns	
t _{d(off)}	Turn off Delay Time		T _J =25℃	270		ns	
			T _J =125℃	320		ns	
			T _J =150℃	330		ns	
t _f	Fall Time	T _J =25℃	125		ns		
		T _J =125℃	235		ns		
		T _J =150℃	260		ns		
E _{on}	Turn on Energy	V _{CC} =600V,I _C =50A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =25℃	2.81		mJ	
			T _J =125℃	5.27		mJ	
			T _J =150℃	6.08		mJ	
E _{off}	Turn off Energy		T _J =25℃	2.92		mJ	
			T _J =125℃	4.75		mJ	
			T _J =150℃	5.25		mJ	
I _{SC}	Short Circuit Current		tpsc≤10μs , V _{GE} =15V T _J =150℃ ,V _{CC} =800V		220		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.44	K /W	

MMG50W120XT6TC_W11

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℃		2	2.3	V
		I _F =50A , V _{GE} =0V, T _J =125℃		1.65		
		I _F =50A , V _{GE} =0V, T _J =150℃		1.56		
t _{rr}	Reverse Recovery Time	I _F =50A , V _R =600V dI _F /dt=-1830A/μs T _J =25℃		65		ns
I _{RRM}	Max. Reverse Recovery Current			60		A
Q _{RR}	Reverse Recovery Charge			2		μC
E _{rec}	Reverse Recovery Energy			1.78		mJ
t _{rr}	Reverse Recovery Time	I _F =50A , V _R =600V dI _F /dt=-1710A/μs T _J =125℃		255		ns
I _{RRM}	Max. Reverse Recovery Current			80		A
Q _{RR}	Reverse Recovery Charge			7.8		μC
E _{rec}	Reverse Recovery Energy			4.28		mJ
t _{rr}	Reverse Recovery Time	I _F =50A , V _R =600V dI _F /dt=-1700A/μs T _J =150℃		265		ns
I _{RRM}	Max. Reverse Recovery Current			85		A
Q _{RR}	Reverse Recovery Charge			9.1		μC
E _{rec}	Reverse Recovery Energy			5.07		mJ
R _{thJCD}	Junction to Case Thermal Resistance （ Per Diode ）				0.69	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_{FRMS}	R.M.S. Forward Current Per Diode	$T_C=80^{\circ}\text{C}$	100	A
I_{RMS}	R.M.S. Current at rectifier output		150	
I_{FSM}	Non Repetitive Surge Forward Current	$T_J=150^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	730	
I^2t		$T_J=150^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	2664	A^2s

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	$I_F=50\text{A}$, $T_J=25^{\circ}\text{C}$		1.05	1.2	V
		$I_F=50\text{A}$, $T_J=150^{\circ}\text{C}$		0.97		V
I_R	Reverse Leakage Current	$V_R=1600\text{V}$, $T_J=25^{\circ}\text{C}$			100	μA
		$V_R=1600\text{V}$, $T_J=150^{\circ}\text{C}$			1	mA
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.63	K /W

MMG50W120XT6TC_W11

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	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

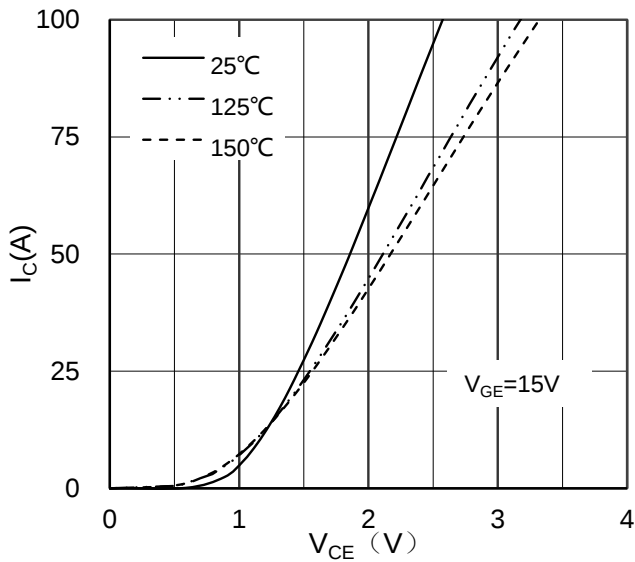


Figure 1. Typical Output Characteristics IGBT-inverter

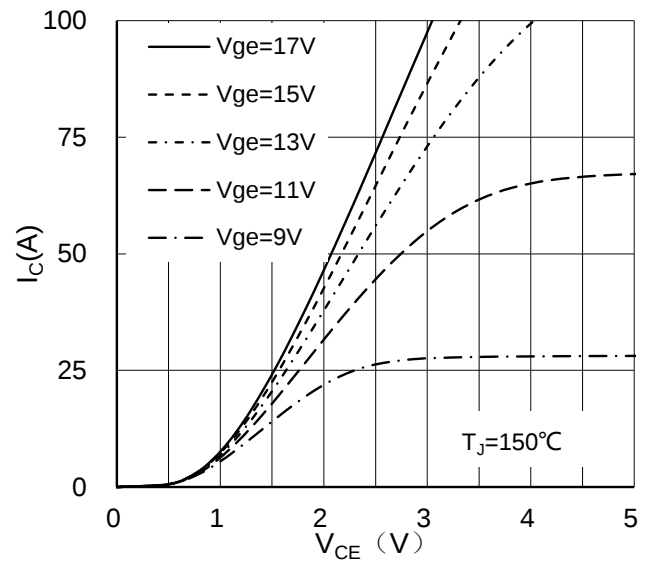


Figure 2. Typical Output Characteristics IGBT-inverter

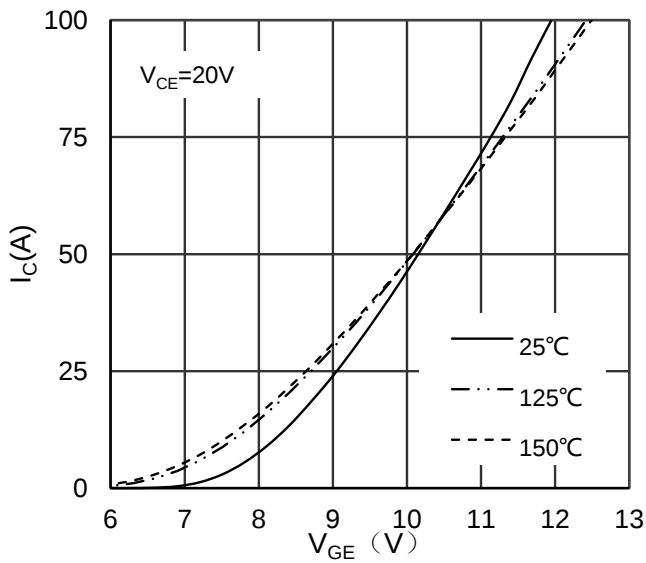


Figure 3. Typical Transfer characteristics IGBT-inverter

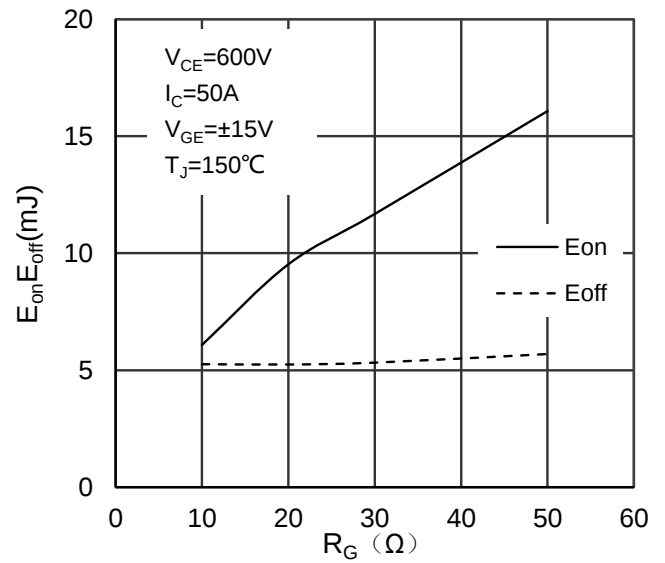


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

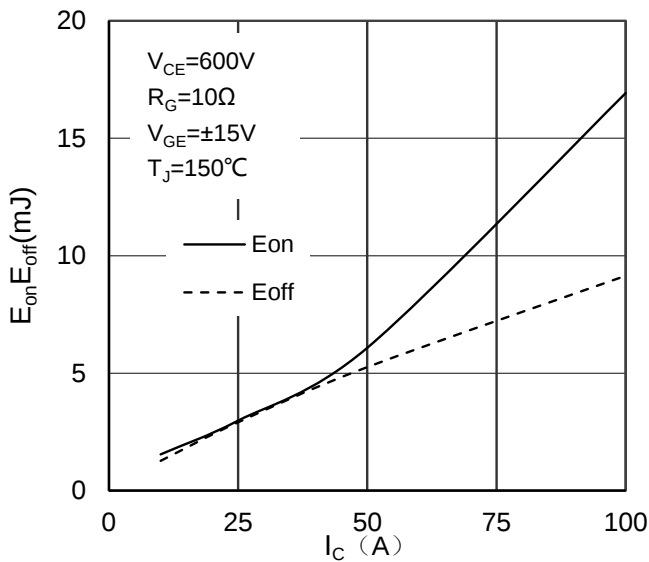


Figure 5. Switching Energy vs Collector Current IGBT-inverter

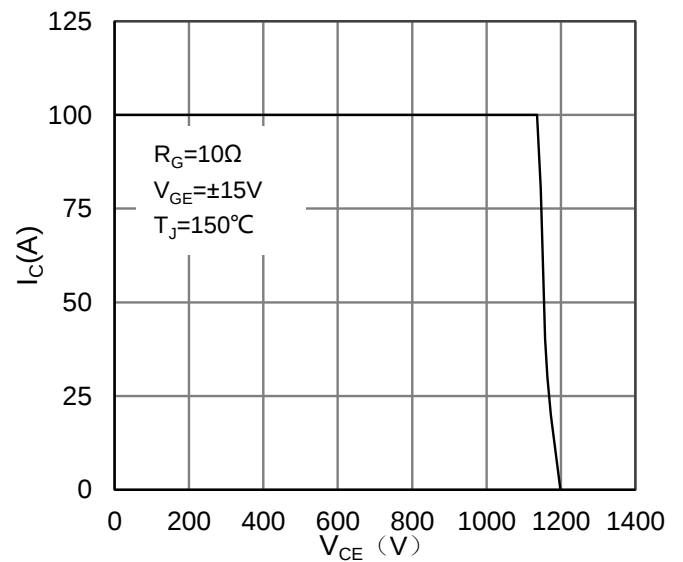


Figure 6. Reverse Bias Safe Operating Area IGBT-inverter

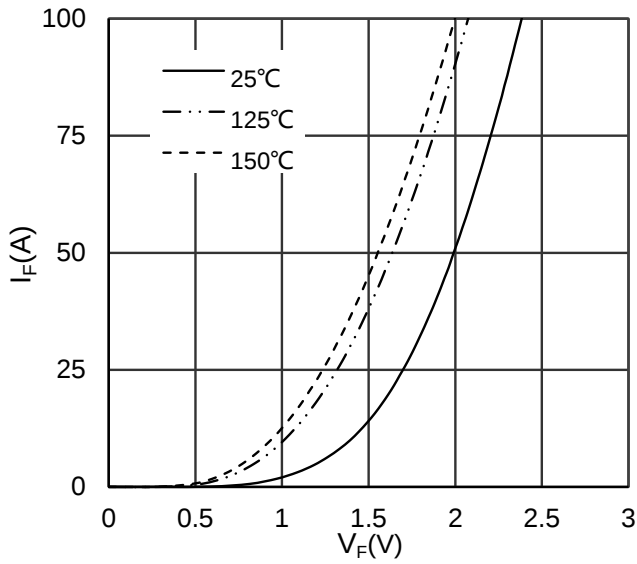


Figure 7. Diode Forward Characteristics Diode -inverter

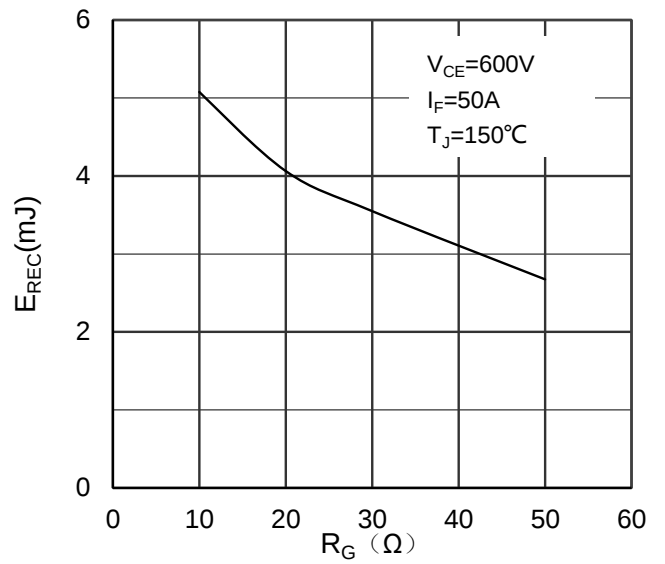


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

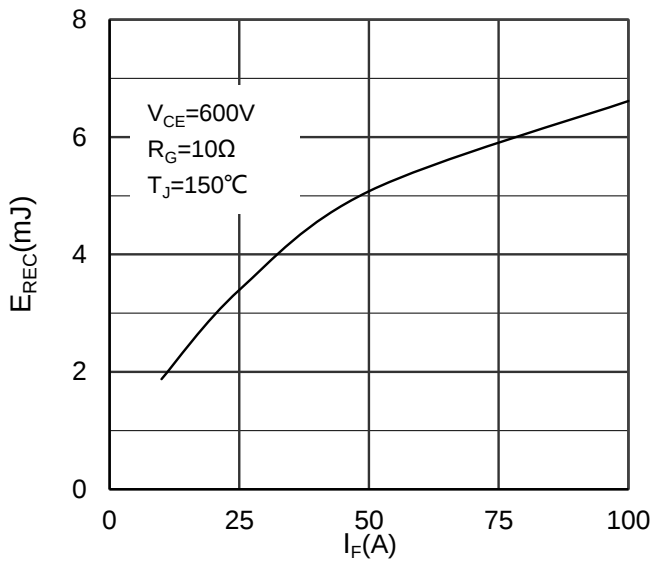


Figure 9. Switching Energy vs Forward Current Diode-inverter

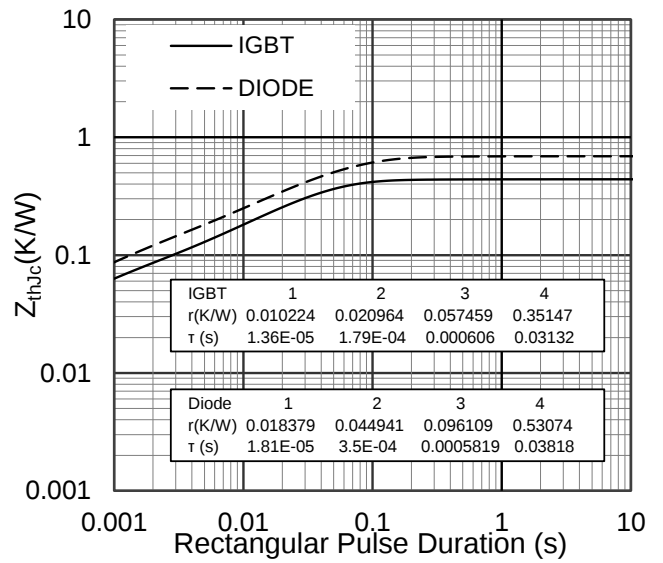


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

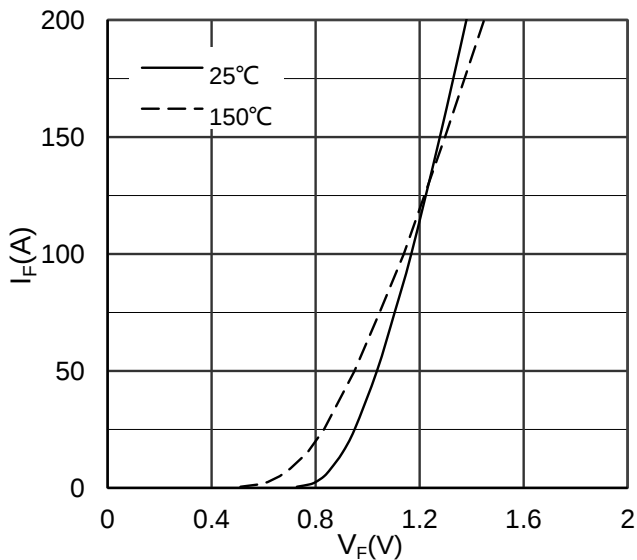


Figure 11. Diode Forward Characteristics Diode- rectifier

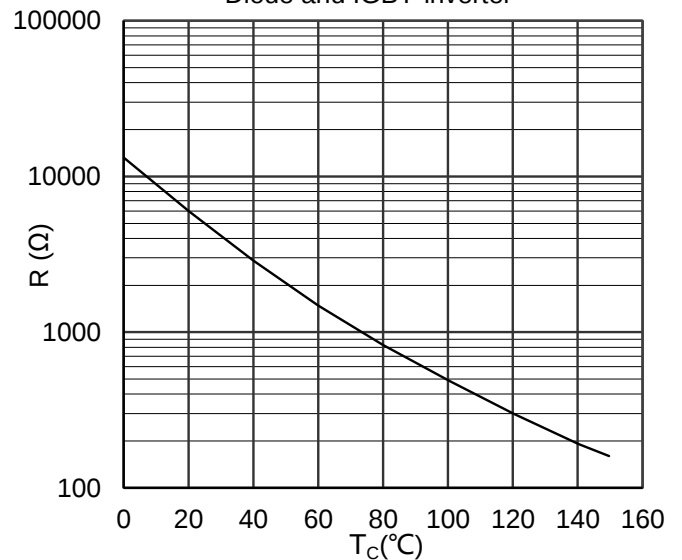


Figure 12. NTC Characteristics

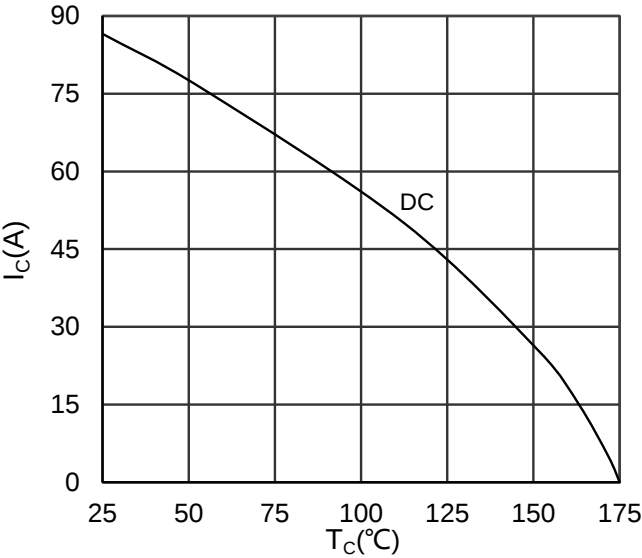


Figure 13. Collector Current vs Case temperature
IGBT -inverter

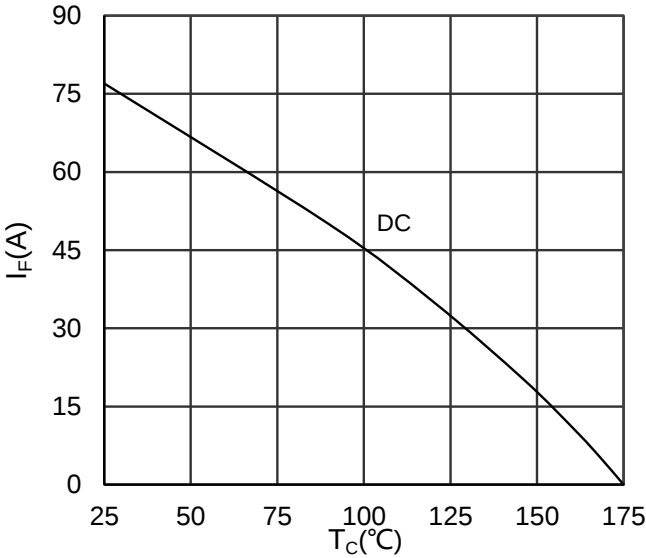


Figure 14. Forward current vs Case temperature
Diode -inverter

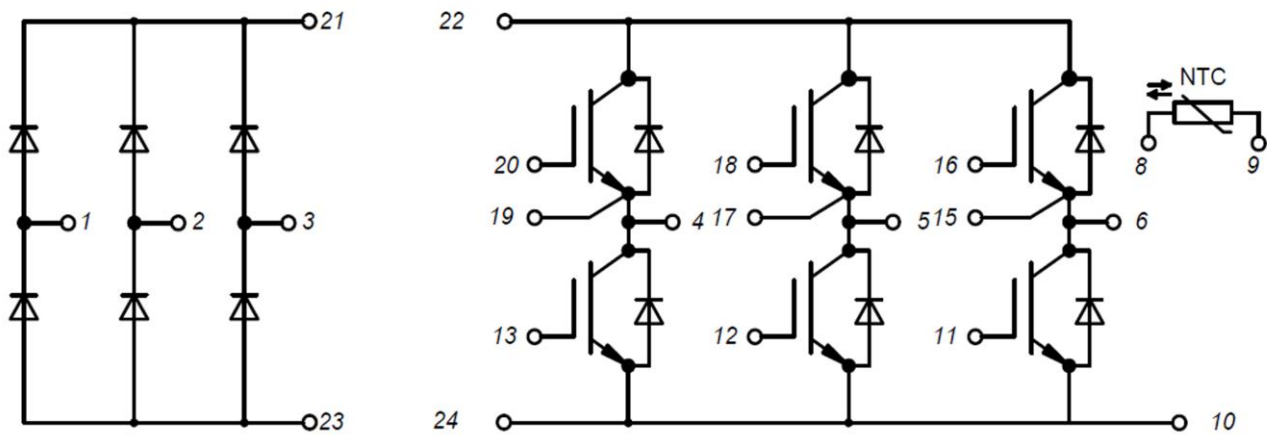


Figure 15. Circuit Diagram

