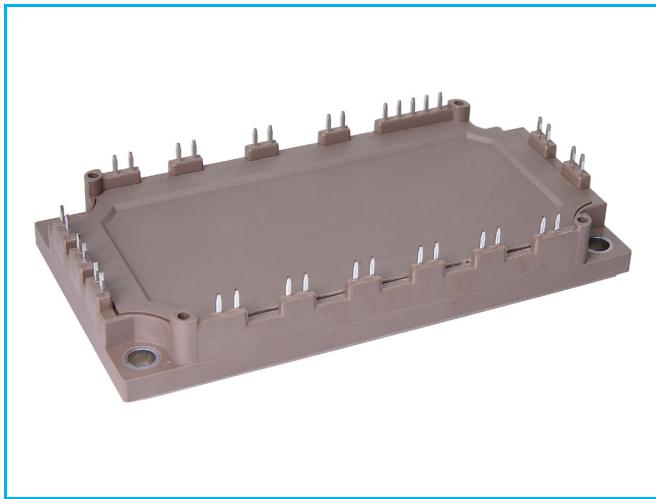


PRODUCT FEATURES

- High level of integration
- IGBT³ 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	$T_C=25^\circ\text{C}, T_{Jmax}=150^\circ\text{C}$	105	A
		$T_C=80^\circ\text{C}, T_{Jmax}=150^\circ\text{C}$	75	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	150	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=150^\circ\text{C}$	368	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		75	
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	150	A
I^2t		$T_J=125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	1150	

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IGBT-inverter

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
$V_{GE(\text{th})}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=3\text{mA}$	5.0	5.8	6.5	V	
$V_{CE(\text{sat})}$	Collector Emitter Saturation Voltage	$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^\circ\text{C}$		1.7	2.15		
		$I_C=75\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^\circ\text{C}$		1.9			
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$			100	μA	
		$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$			10	mA	
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}$, $V_{GE}=\pm 15\text{V}$, $T_J=25^\circ\text{C}$	-400		400	nA	
R_{gint}	Integrated Gate Resistor			10		Ω	
Q_g	Gate Charge	$V_{CE}=600\text{V}$, $I_C=75\text{A}$, $V_{GE}=\pm 15\text{V}$		0.7		μC	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		5.3		nF	
C_{res}	Reverse Transfer Capacitance			0.2		nF	
$t_{d(\text{on})}$	Turn on Delay Time	$V_{CC}=600\text{V}$, $I_C=75\text{A}$ $R_G = 4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	260		ns	
			$T_J=125^\circ\text{C}$	290		ns	
t_r	Rise Time		$T_J=25^\circ\text{C}$	30		ns	
			$T_J=125^\circ\text{C}$	50		ns	
$t_{d(\text{off})}$	Turn off Delay Time	$V_{CC}=600\text{V}$, $I_C=75\text{A}$ $R_G = 4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	420		ns	
			$T_J=125^\circ\text{C}$	520		ns	
t_f	Fall Time		$T_J=25^\circ\text{C}$	70		ns	
			$T_J=125^\circ\text{C}$	90		ns	
E_{on}	Turn on Energy	$V_{CC}=600\text{V}$, $I_C=75\text{A}$ $R_G = 4.7\Omega$, $V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	6.6		mJ	
			$T_J=125^\circ\text{C}$	9.4		mJ	
E_{off}	Turn off Energy		$T_J=25^\circ\text{C}$	6.8		mJ	
			$T_J=125^\circ\text{C}$	8.0		mJ	
I_{sc}	Short Circuit Current	$\text{tpsc} \leq 10\mu\text{s}$, $V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}$, $V_{CC}=900\text{V}$		300		A	
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.34	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	$I_F=75\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$		1.65	2.15	V
		$I_F=75\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$		1.65		
t_{rr}	Reverse Recovery Time			300		ns
I_{RRM}	Max. Reverse Recovery Current	$I_F=75\text{A}$, $V_R=600\text{V}$ $dI_F/dt=-2000\text{A}/\mu\text{s}$ $T_J=125^\circ\text{C}$		85		A
Q_{RR}	Reverse Recovery Charge			13		μC
E_{rec}	Reverse Recovery Energy			6.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				0.56	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
$I_{F(AV)}$	Average Forward Current Per Diode	$T_c=80^\circ\text{C}$	80	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	$T_J=45^\circ\text{C}$, $t=10\text{ms}$, 50Hz	1050	
		$T_J=45^\circ\text{C}$, $t=8.3\text{ms}$, 60Hz	1151	
I^2t		$T_J=45^\circ\text{C}$, $t=10\text{ms}$, 50Hz	5510	A^2S
		$T_J=45^\circ\text{C}$, $t=8.3\text{ms}$, 60Hz	5508	

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	$I_F=75\text{A}$, $T_J=25^\circ\text{C}$		1.05	1.25	V
		$I_F=75\text{A}$, $T_J=150^\circ\text{C}$		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)				0.46	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	$T_c=25^\circ\text{C}$, $T_{Jmax}=150^\circ\text{C}$	55	A
		$T_c=80^\circ\text{C}$, $T_{Jmax}=150^\circ\text{C}$	40	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	80	
P_{tot}	Power Dissipation Per IGBT	$T_c=25^\circ\text{C}$, $T_{Jmax}=150^\circ\text{C}$	195	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		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

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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
$V_{GE(\text{th})}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=1.5\text{mA}$	5.2	5.8	6.4	V
$V_{CE(\text{sat})}$	Collector - Emitter Saturation Voltage	$I_C=40\text{A}$, $V_{GE}=15\text{V}$, $T_J=25^\circ\text{C}$		1.8	2.3	
		$I_C=40\text{A}$, $V_{GE}=15\text{V}$, $T_J=125^\circ\text{C}$		2.05		
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$			100	μA
		$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}$, $V_{GE}=\pm 15\text{V}$, $T_J=25^\circ\text{C}$	-400		400	nA
R_{gint}	Integrated Gate Resistor			6		Ω
Q_g	Gate Charge	$V_{CE}=600\text{V}$, $I_C=40\text{A}$, $V_{GE}=\pm 15\text{V}$		0.33		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		2.5		nF
C_{res}	Reverse Transfer Capacitance			0.11		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=600\text{V}$, $I_C=40\text{A}$, $R_G=27\Omega$,	$T_J=25^\circ\text{C}$	90		ns
			$T_J=125^\circ\text{C}$	90		ns
t_r	Rise Time	$V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	30		ns
			$T_J=125^\circ\text{C}$	50		ns
$t_{d(off)}$	Turn off Delay Time	$V_{CC}=600\text{V}$, $I_C=40\text{A}$, $R_G=27\Omega$,	$T_J=25^\circ\text{C}$	420		ns
			$T_J=125^\circ\text{C}$	520		ns
t_f	Fall Time	$V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	70		ns
			$T_J=125^\circ\text{C}$	90		ns
E_{on}	Turn on Energy	$V_{CC}=600\text{V}$, $I_C=40\text{A}$, $R_G=27\Omega$,	$T_J=25^\circ\text{C}$	4.1		mJ
			$T_J=125^\circ\text{C}$	6		mJ
E_{off}	Turn off Energy	$V_{GE}=\pm 15\text{V}$, Inductive Load	$T_J=25^\circ\text{C}$	3.1		mJ
			$T_J=125^\circ\text{C}$	3.6		mJ
I_{sc}	Short Circuit Current	$t_{psc} \leq 10\mu\text{s}$, $V_{GE}=15\text{V}$ $T_J=125^\circ\text{C}$, $V_{CC}=900\text{V}$		160		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.64	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	$I_F=25\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$		1.55	2	V
		$I_F=25\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$		1.54		
t_{rr}	Reverse Recovery Time	$I_F=25\text{A}$, $V_R=600\text{V}$ $di_F/dt=-400\text{A}/\mu\text{s}$		200		ns
I_{RRM}	Max. Reverse Recovery Current			20		A
E_{rec}	Reverse Recovery Energy	$T_J=125^\circ\text{C}$		1.5		mJ
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)				1.22	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		$\text{k}\Omega$
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$			3375		K

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

Symbol	Parameter/Test Conditions	Values	Unit
T_{Jmax}	Max. Junction Temperature	150	$^\circ\text{C}$
T_{Jop}	Operating Temperature	-40~125	
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

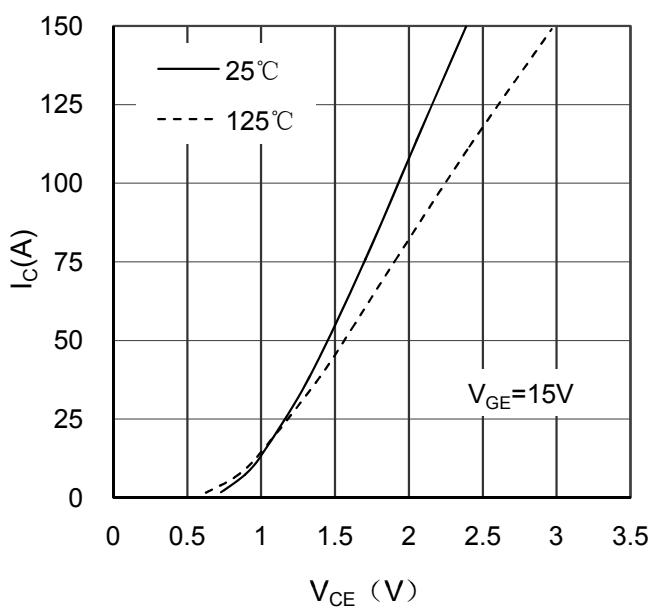


Figure 1. Typical Output Characteristics IGBT-inverter

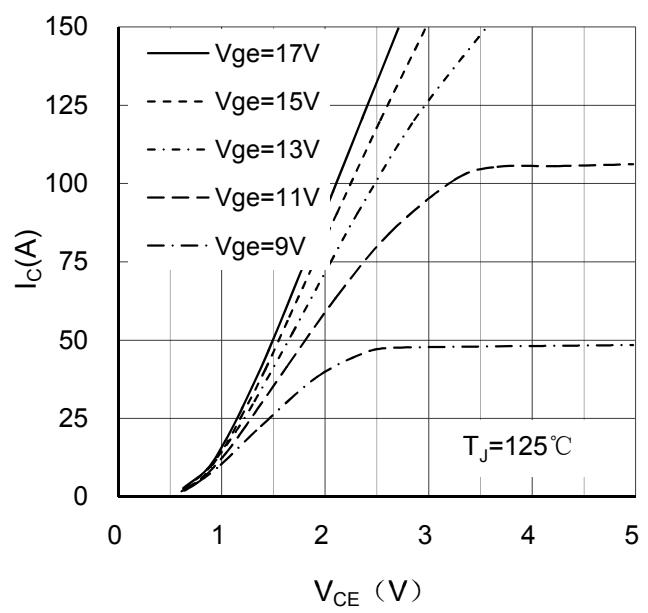


Figure 2. Typical Output Characteristics IGBT-inverter

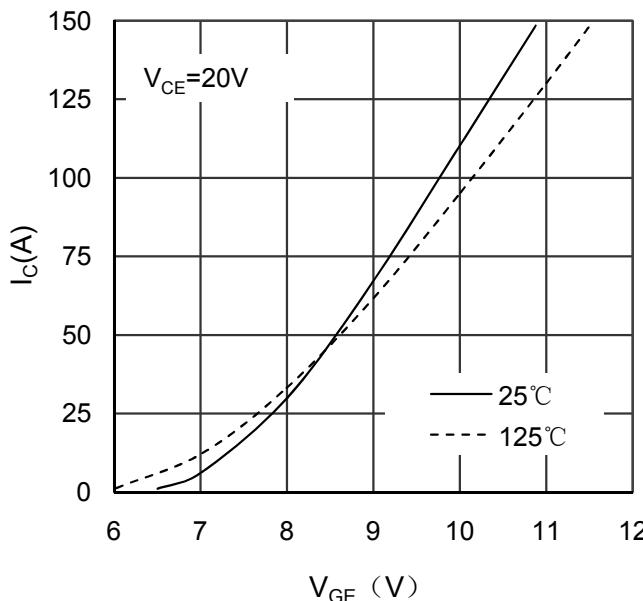


Figure 3. Typical Transfer characteristics IGBT-inverter

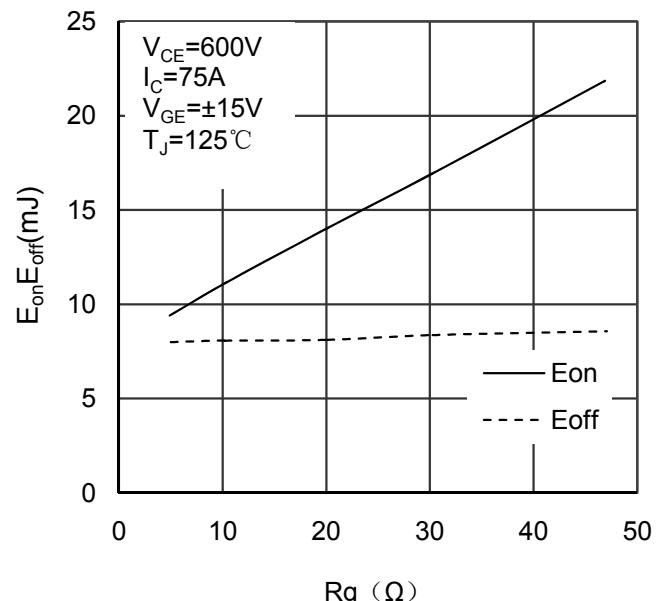


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

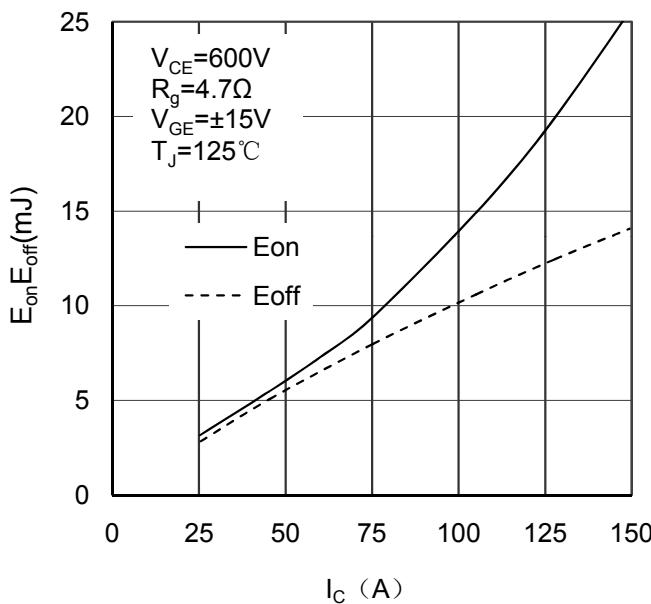


Figure 5. Switching Energy vs Collector Current IGBT-inverter

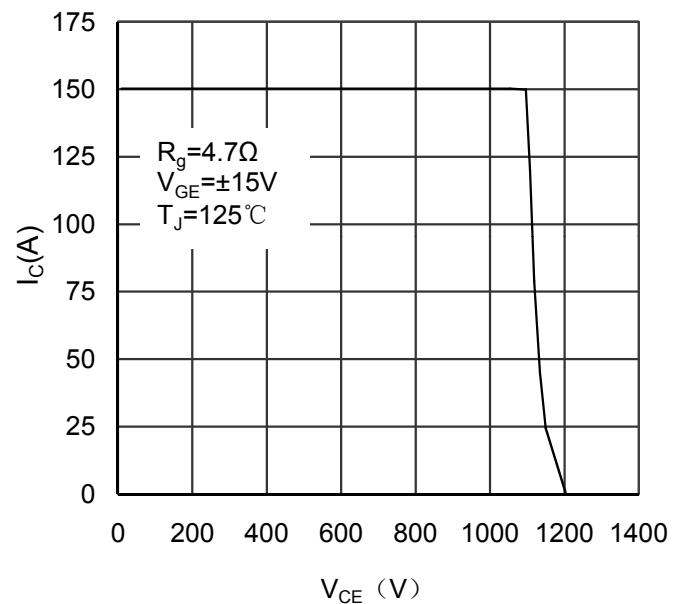


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

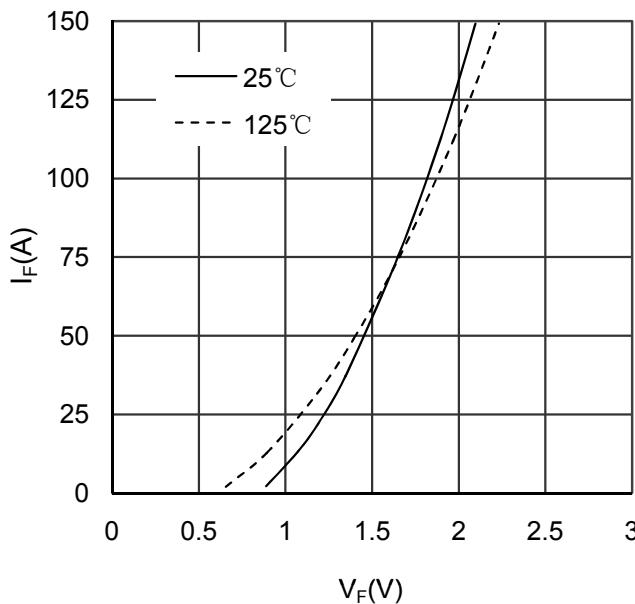


Figure 7. Diode Forward Characteristics Diode -inverter

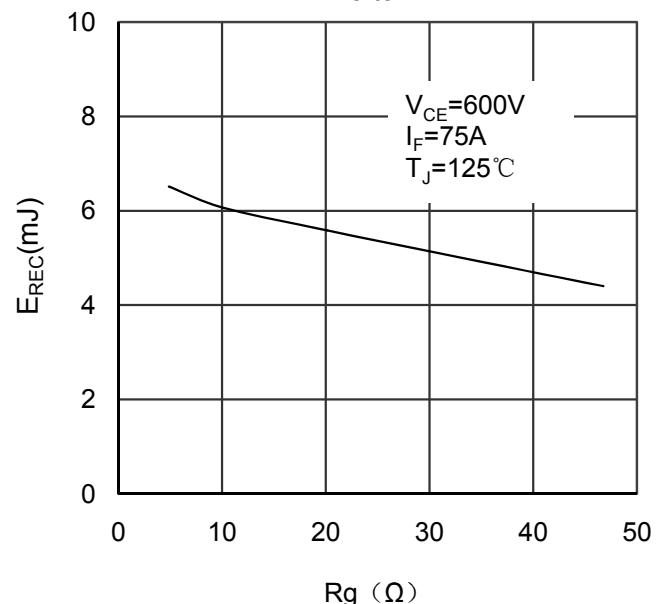


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

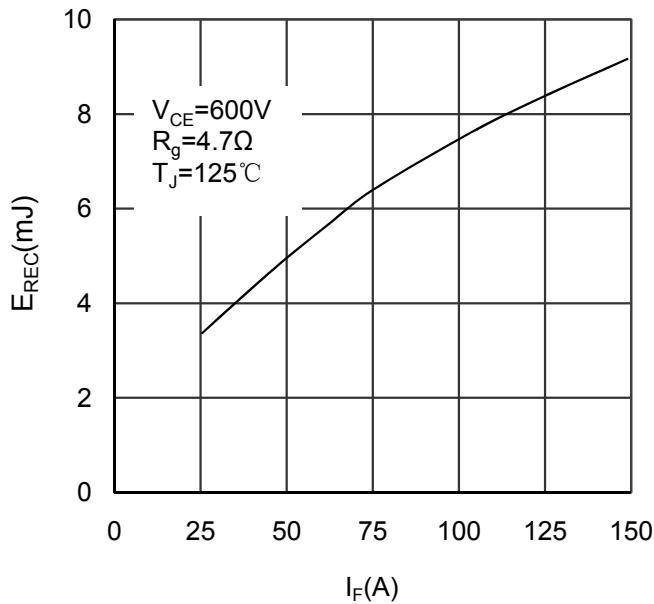


Figure 9. Switching Energy vs Forward Current Diode-inverter

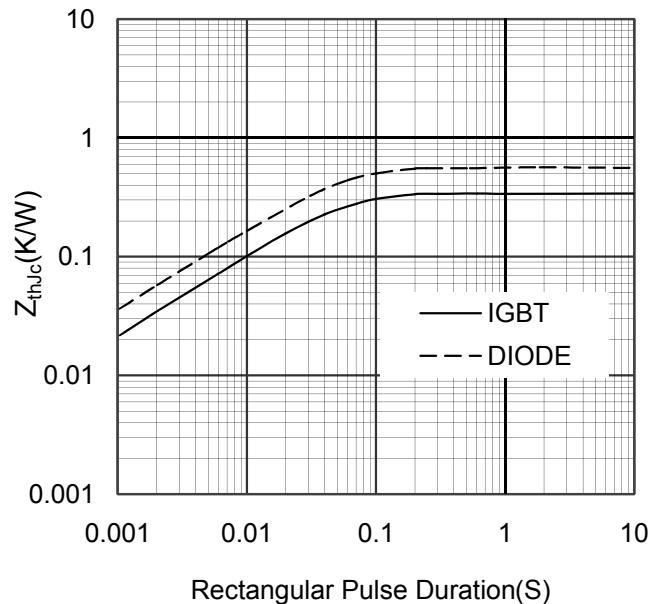


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

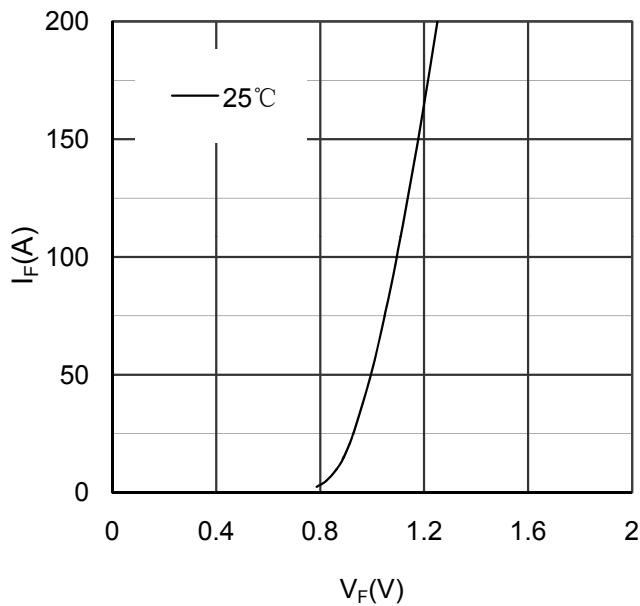


Figure 11. Diode Forward Characteristics Diode- rectifier

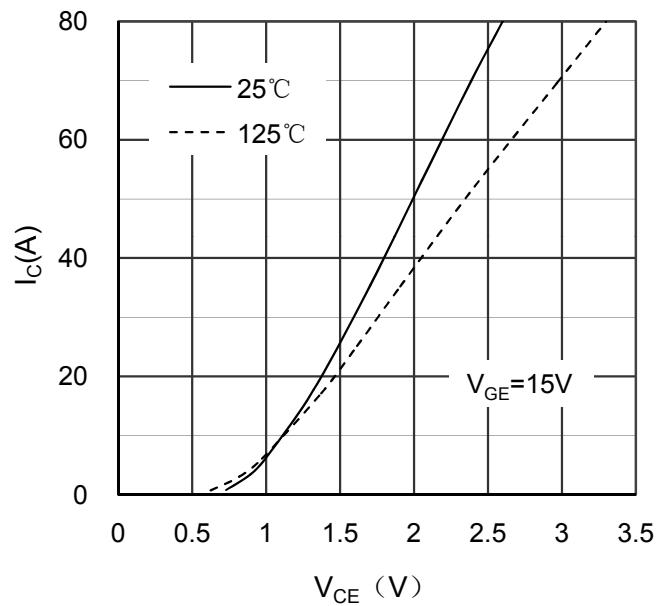


Figure 12. Typical Output Characteristics IGBT- brake chopper

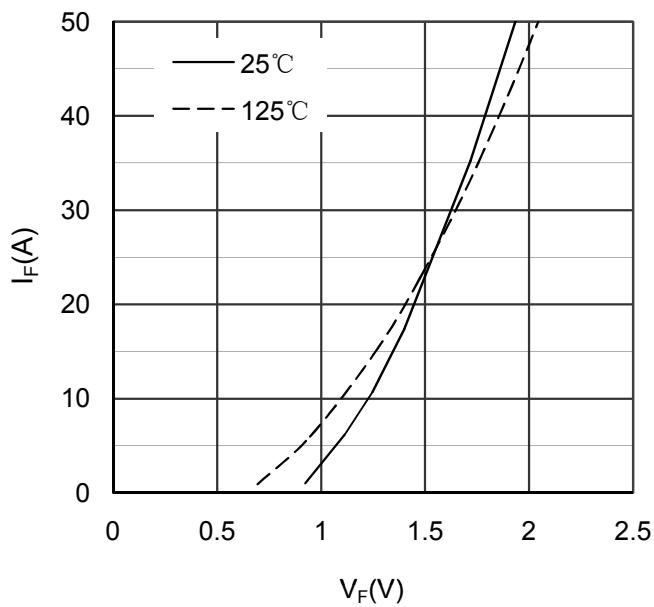


Figure 13. Diode Forward Characteristics Diode - brake chopper

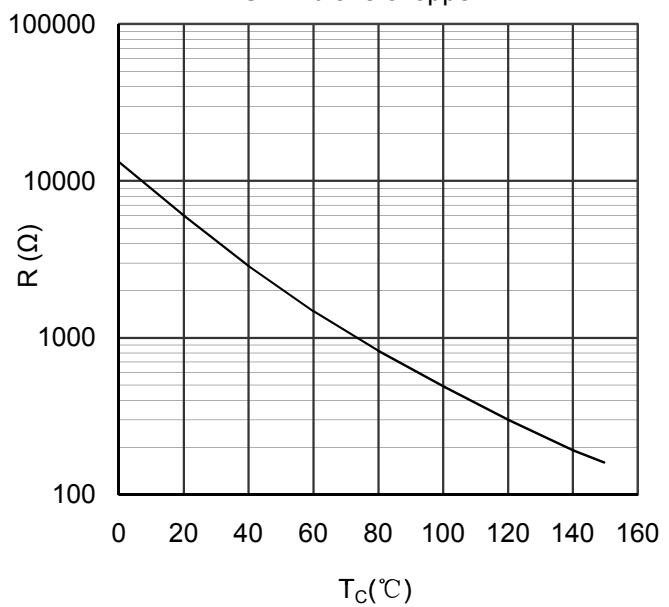


Figure 14. NTC Characteristics

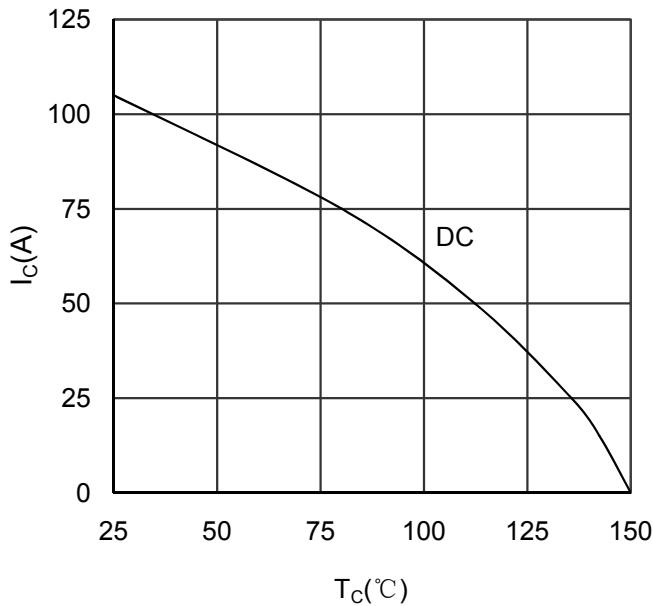


Figure 15. Collector Current vs Case temperature
IGBT -inverter

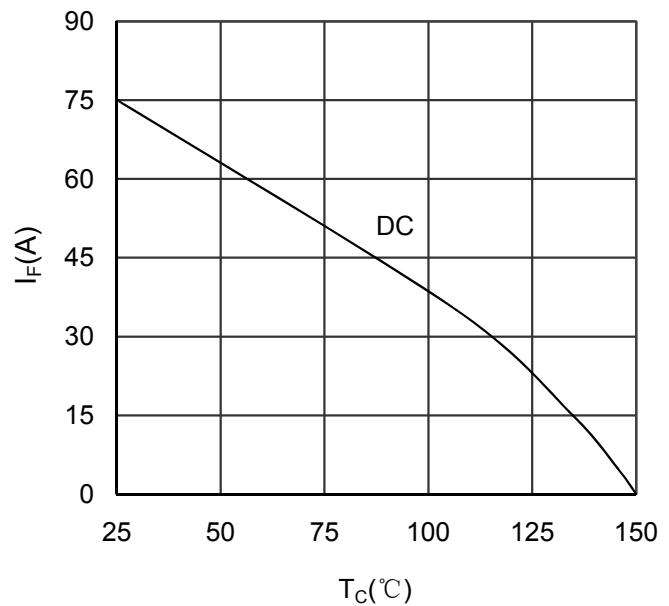


Figure 16. Forward current vs Case temperature
Diode -inverter

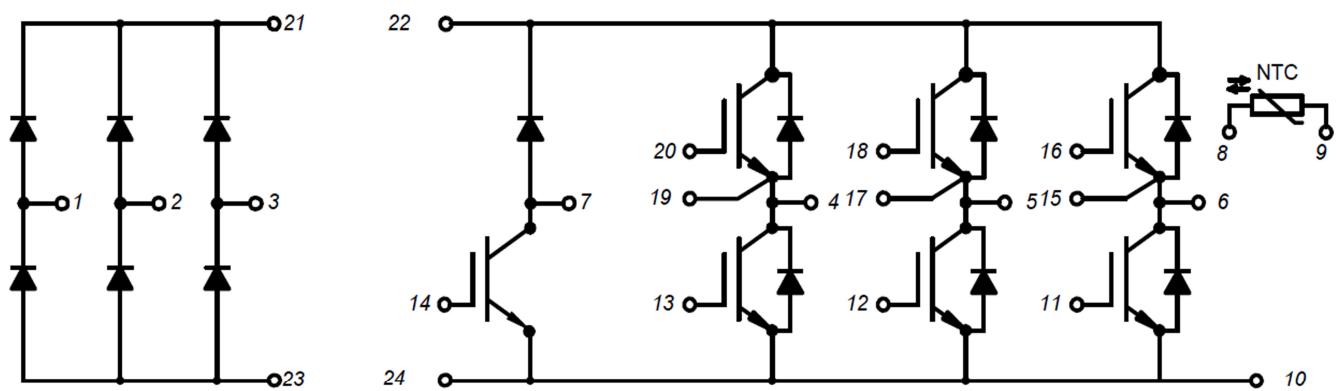
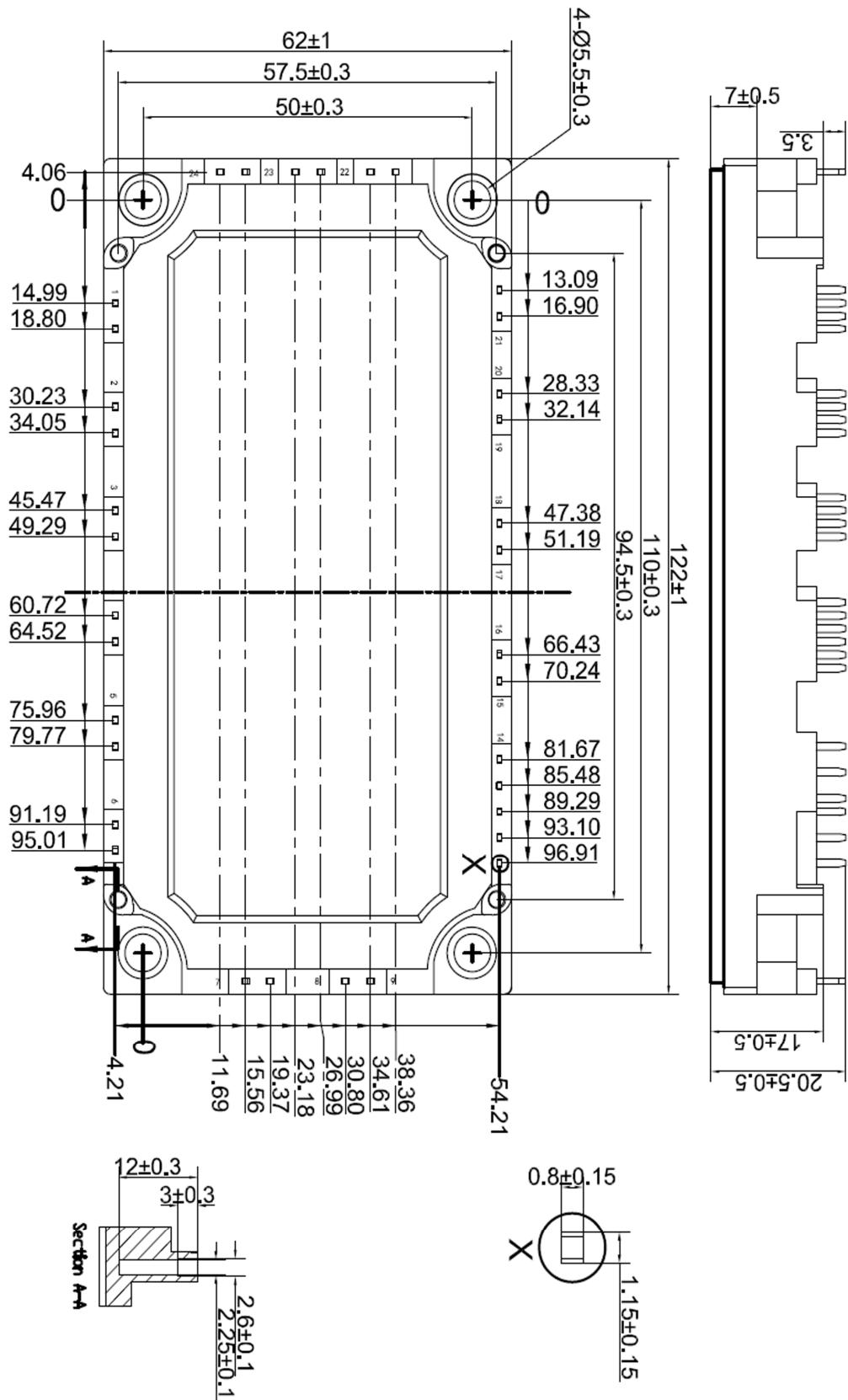


Figure 17. Circuit Diagram



Dimensions in (mm)

Figure 18. Package Outline