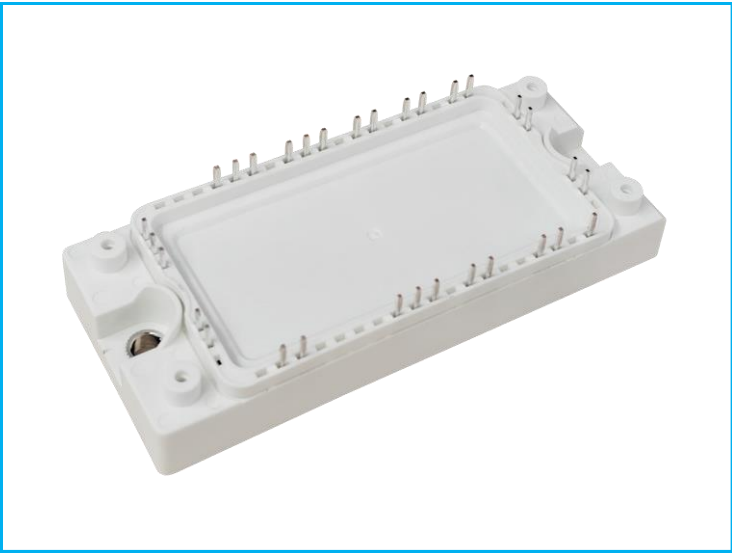


PRODUCT FEATURES

- ☐ Substrate for Low Thermal Resistance
- ☐ Low saturation voltage and positive temperature coefficient
- ☐ Solder Contact Technology, Rugged mounting due to integrated Mounting clamps
- ☐ High power density



Rectifier+Brake+Inverter

APPLICATIONS

- ☐ Air conditioning
- ☐ Auxiliary inverters
- ☐ Motor drives

IGBT-inverter

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}C$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=105^{\circ}C, T_{Jmax}=175^{\circ}C$	75	A
I_{CM}	Repetitive Peak Collector Current	$tp=1ms$	150	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	340	W

Diode-inverter

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200	V
I_F	Continue Forward Current	$T_C=90^{\circ}C, T_{Jmax}=175^{\circ}C$	75	A
I_{FRM}	Repetitive Peak Forward Current	$tp=1ms$	150	
I_{FSM}	Non Repetitive Peak Forward Current	$T_J=150^{\circ}C, t=10ms, V_R=0V$	520	
I^2t			1350	A ² s

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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(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =3mA	5.6	6.35	6.8	V
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =75A, V _{GE} =15V, T _J =25℃		1.48		
		I _C =75A, V _{GE} =15V, T _J =125℃		1.70		
		I _C =75A, V _{GE} =15V, T _J =175℃		1.82		
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			1	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±20V, T _J =25℃	-200		200	nA
R _{Gint}	Integrated Gate Resistor			4.4		Ω
Q _G	Gate Charge	V _{CE} =600V, I _C =75A , V _{GE} =15V		0.38		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =100kHz		10.5		nF
C _{oes}	Output Capacitance			0.67		nF
C _{res}	Reverse Transfer Capacitance			0.04		nF
t _{d(on)}	Turn on Delay Time	V _{CC} =600V,I _C =75A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		130	ns
			T _J =125℃		140	ns
			T _J =175℃		145	ns
t _r	Rise Time		T _J =25℃		128	ns
			T _J =125℃		130	ns
			T _J =175℃		130	ns
t _{d(off)}	Turn off Delay Time	T _J =25℃		410	ns	
		T _J =125℃		470	ns	
		T _J =175℃		540	ns	
t _f	Fall Time	V _{GE} =±15V, Inductive Load	T _J =25℃		112	ns
		T _J =125℃		158	ns	
		T _J =175℃		176	ns	
E _{on}	Turn on Energy	V _{CC} =600V,I _C =75A R _G =10Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		10.8	mJ
			T _J =125℃		15.1	mJ
			T _J =175℃		17.9	mJ
E _{off}	Turn off Energy	T _J =25℃		6.25	mJ	
		T _J =125℃		8.1	mJ	
		T _J =175℃		8.9	mJ	
I _{SC}	Short Circuit Current	tpsc≤8μs , V _{GE} =15V T _J =150℃,V _{CC} =800V		190		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.44	K /W

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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 =75A , V _{GE} =0V, T _J =25℃		2.10		V
		I _F =75A , V _{GE} =0V, T _J =125℃		1.80		
		I _F =75A , V _{GE} =0V, T _J =175℃		1.65		
t _{rr}	Reverse Recovery Time	I _F =75A , V _R =600V dI _F /dt=-340A/μs T _J =175℃		550		ns
I _{RRM}	Max. Reverse Recovery Current			30.6		A
Q _{RR}	Reverse Recovery Charge			9.47		μC
E _{rec}	Reverse Recovery Energy			3.2		mJ
R _{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.63	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	$T_C=85^{\circ}\text{C}$	75	A
I_{FSM}	Non Repetitive Surge Forward Current	$T_J=150^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	600	
I^2t		$T_J=150^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	1800	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	$I_F=75\text{A}$, $T_J=25^{\circ}\text{C}$		1.10	1.5	V
		$I_F=75\text{A}$, $T_J=150^{\circ}\text{C}$		1.04		
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)				0.66	K /W

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IGBT-Brake chopper

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^{\circ}C$	1200	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=115^{\circ}C, T_{Jmax}=175^{\circ}C$	50	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1ms$	100	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^{\circ}C, T_{Jmax}=175^{\circ}C$	250	W

Diode-Brake chopper

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}C$	1200	V
I_F	Continue Forward Current		25	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1ms$	50	
I^2t		$T_J=125^{\circ}C, t=10ms, V_R=0V$	162	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 =3mA	5.5	6.4	7.0	V	
V _{CE(sat)}	Collector Emitter Saturation Voltage	I _C =50A, V _{GE} =15V, T _J =25℃		1.45			
		I _C =50A, V _{GE} =15V, T _J =125℃		1.66			
		I _C =50A, V _{GE} =15V, T _J =175℃		1.75			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃			100	mA	
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±20V, T _J =25℃	-400		400	nA	
Q _G	Gate Charge	V _{CE} =600V, I _C =50A , V _{GE} =15V		0.3		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		6.75		nF	
C _{oes}	Output Capacitance			1.85		nF	
C _{res}	Reverse Transfer Capacitance			0.04		pF	
t _{d(on)}	Turn on Delay Time	V _{CC} =600V,I _C =50A R _G =7.5Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		70		ns
			T _J =125℃		74		ns
			T _J =175℃		74		ns
t _r	Rise Time		T _J =25℃		26		ns
			T _J =125℃		34		ns
			T _J =175℃		38		ns
t _{d(off)}	Turn off Delay Time		T _J =25℃		366		ns
			T _J =125℃		418		ns
			T _J =175℃		436		ns
t _f	Fall Time	T _J =25℃		124		ns	
		T _J =125℃		168		ns	
		T _J =175℃		190		ns	
E _{on}	Turn on Energy	V _{CC} =600V,I _C =50A R _G =7.5Ω, V _{GE} =±15V, Inductive Load	T _J =25℃		2.6		mJ
			T _J =125℃		4.7		mJ
			T _J =175℃		5.8		mJ
E _{off}	Turn off Energy		T _J =25℃		4.1		mJ
			T _J =125℃		5.4		mJ
			T _J =175℃		5.9		mJ
I _{SC}	Short Circuit Current		tpsc≤8μs , V _{GE} =15V T _J =150℃,V _{CC} =800V		180		A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)				0.6	K /W	

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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 =25A , V _{GE} =0V, T _J =25℃		1.8		V
		I _F =25A , V _{GE} =0V, T _J =125℃		1.55		
		I _F =25A , V _{GE} =0V, T _J =175℃		1.45		
t _{rr}	Reverse Recovery Time	I _F =50A , V _R =600V dI _F /dt=-1400A/μs T _J =175℃		680		ns
I _{RRM}	Max. Reverse Recovery Current			45		A
Q _{RR}	Reverse Recovery Charge			11.4		μC
E _{rec}	Reverse Recovery Energy			6.7		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		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		-40~175	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	2500	V
CTI	Comparative Tracking Index		≥ 200	
Md	Mounting Torque	Recommended (M5)	2.5~5	Nm
Weight			180	g

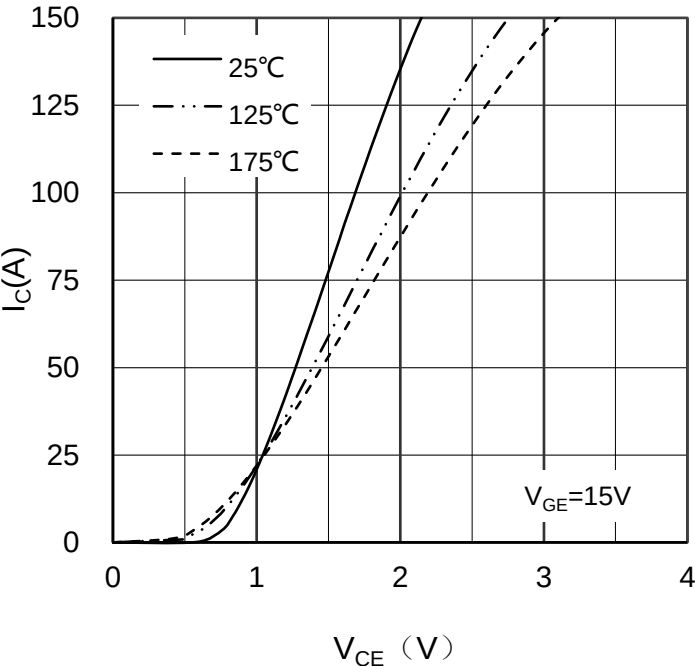


Figure 1. Typical Output Characteristics IGBT-inverter

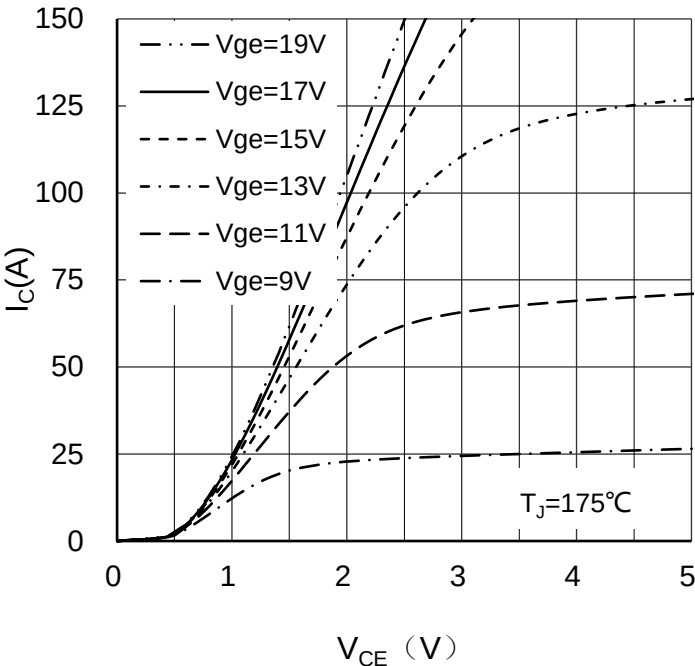


Figure 2. Typical Output Characteristics IGBT-inverter

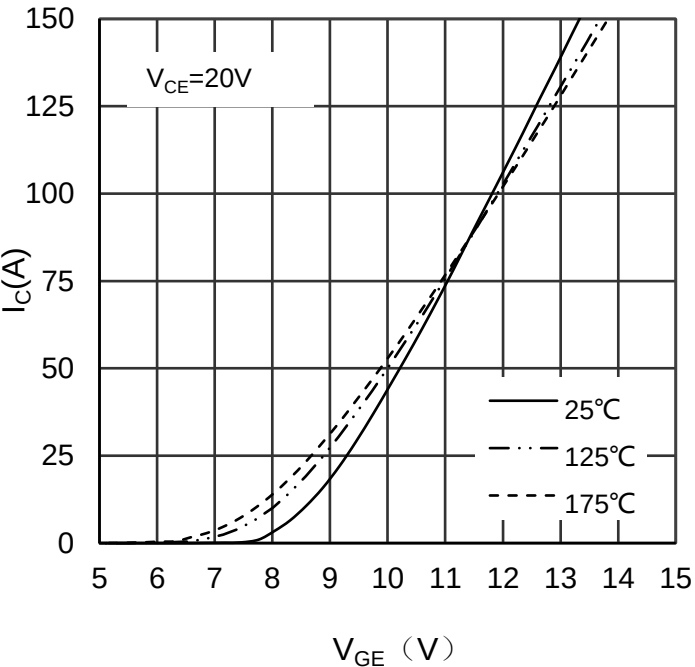


Figure 3. Typical Transfer characteristics IGBT-inverter

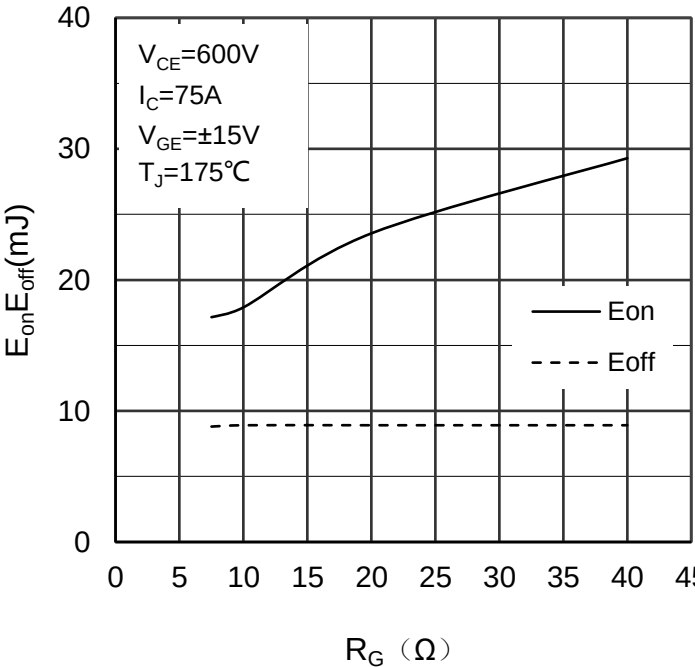


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

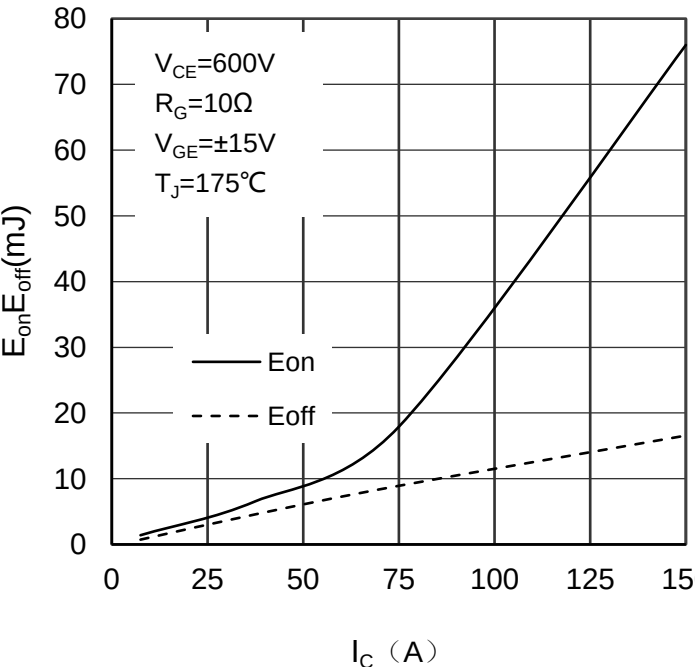


Figure 5. Switching Energy vs Collector Current IGBT-inverter

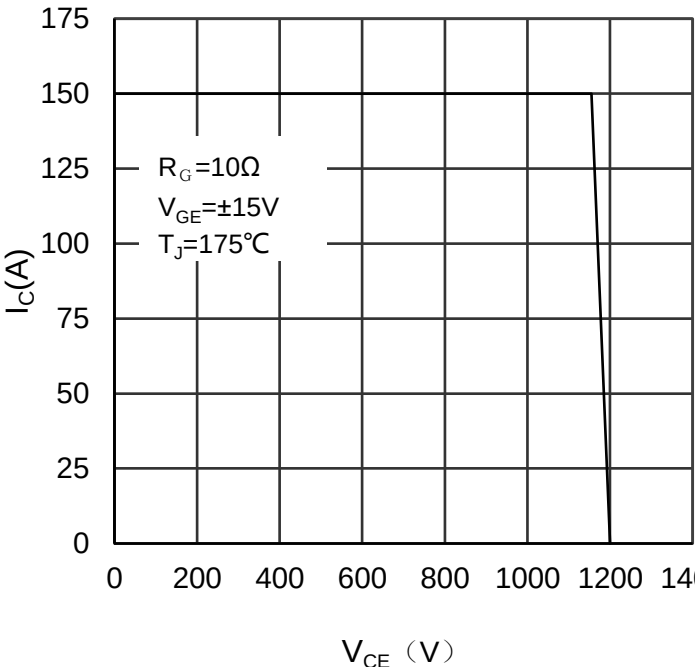


Figure 6. Reverse Biased Safe Operating Area IGBT-

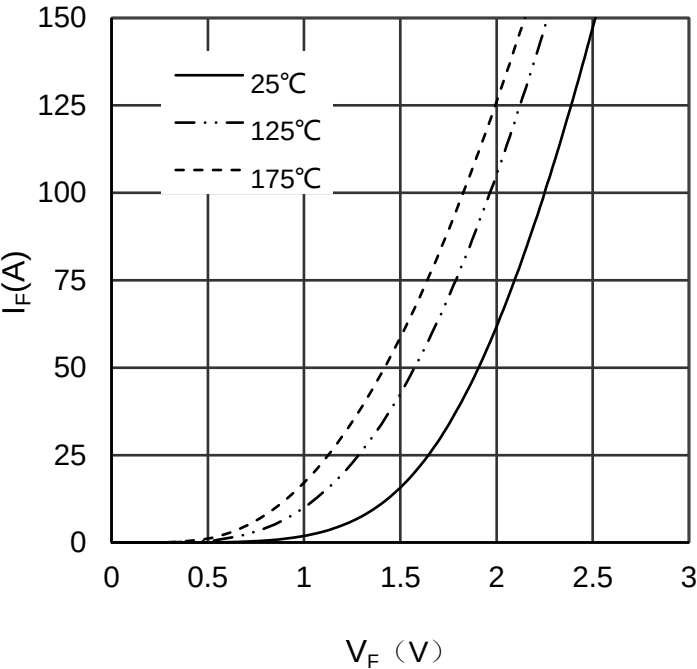


Figure 7. Diode Forward Characteristics Diode -inverter

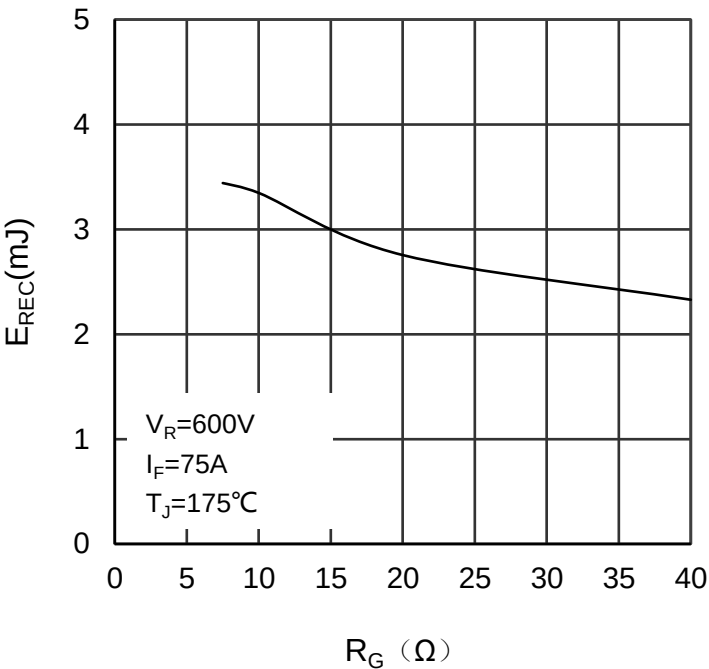


Figure 8. Switching Energy vs Gate Resistor Diode -inverter

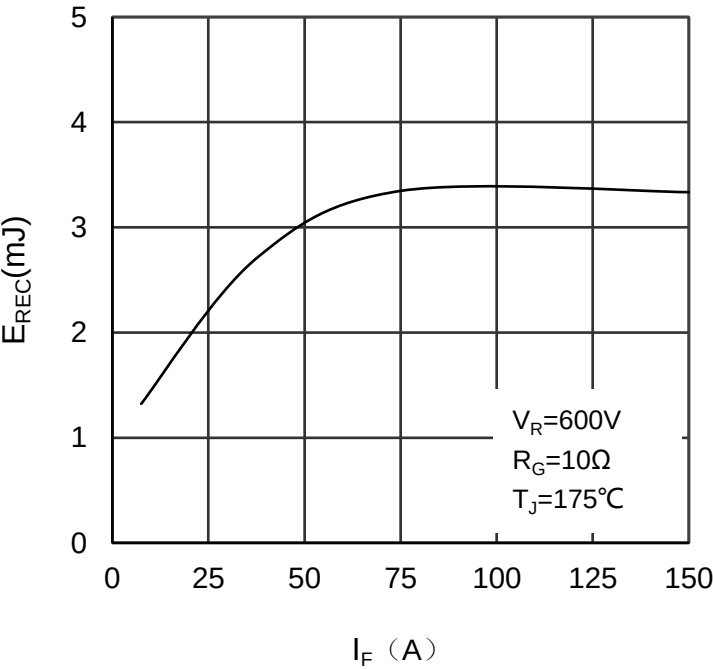


Figure 9. Switching Energy vs Forward Current Diode-inverter

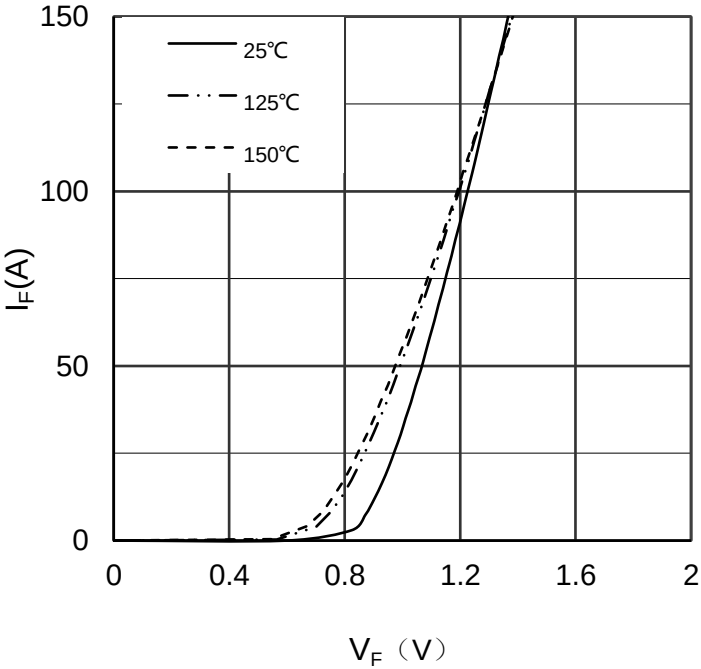


Figure 10. Diode Forward Characteristics Diode- rectifier

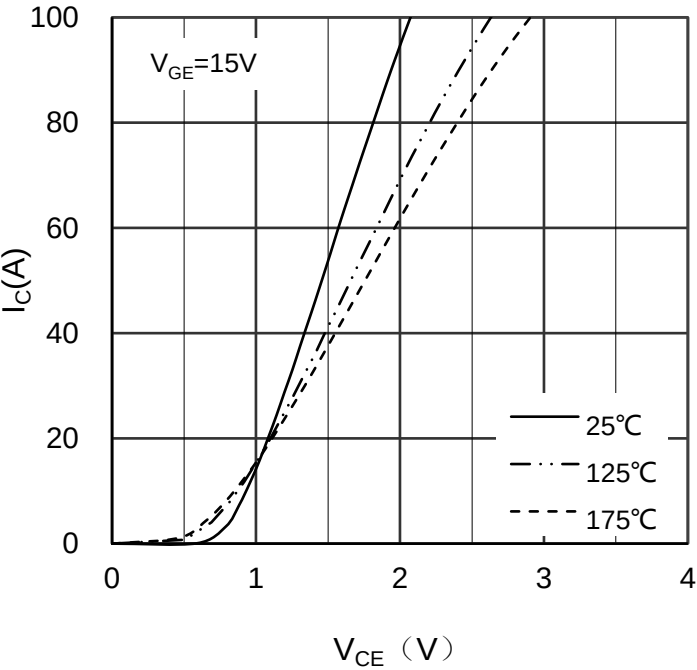


Figure 11. Typical Output Characteristics IGBT- brake chopper

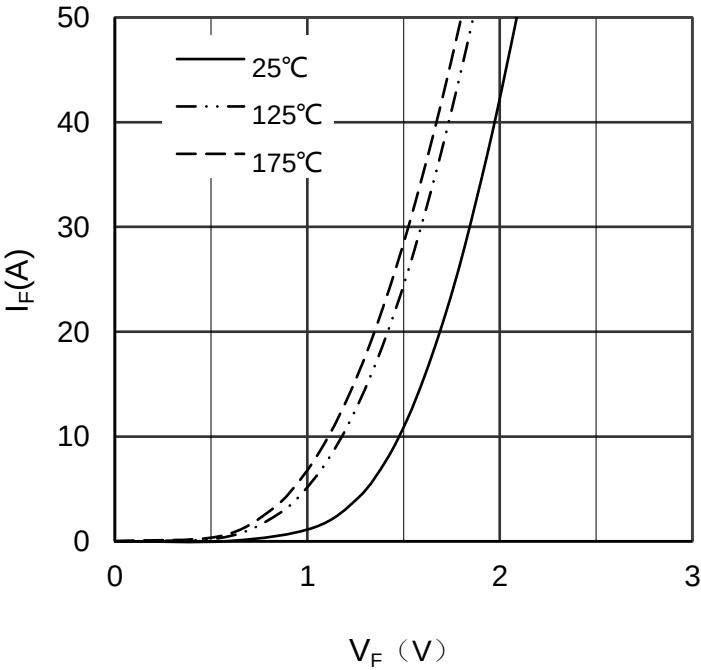


Figure 12. Diode Forward Characteristics Diode - brake chopper

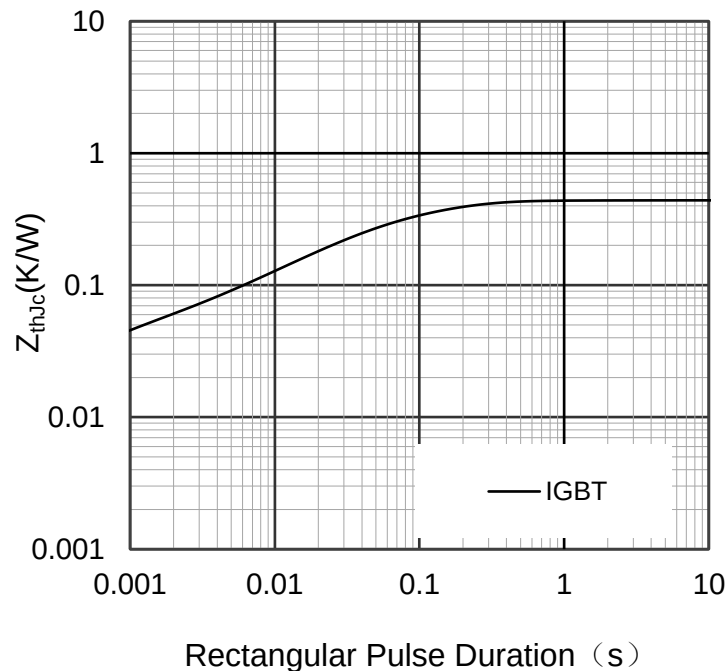


Figure 13. Transient Thermal Impedance of IGBT-inverter

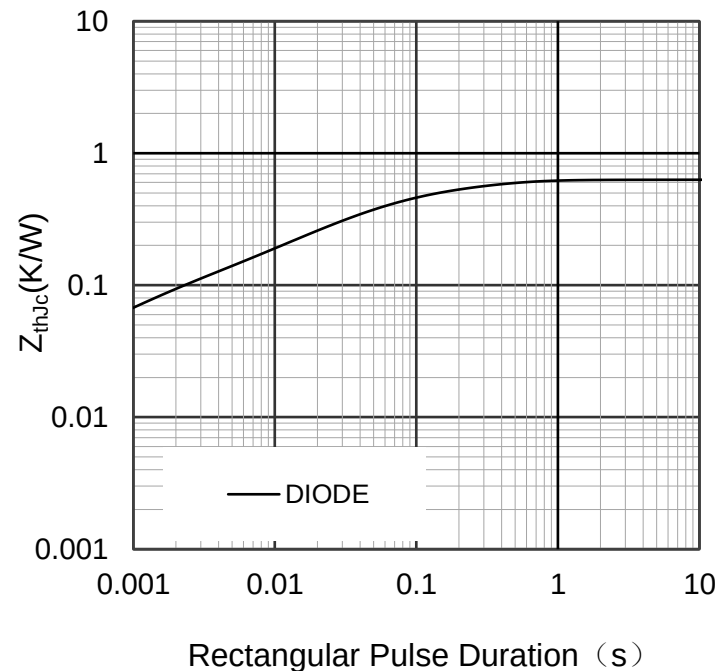


Figure 14. Transient Thermal Impedance of Diode-inverter

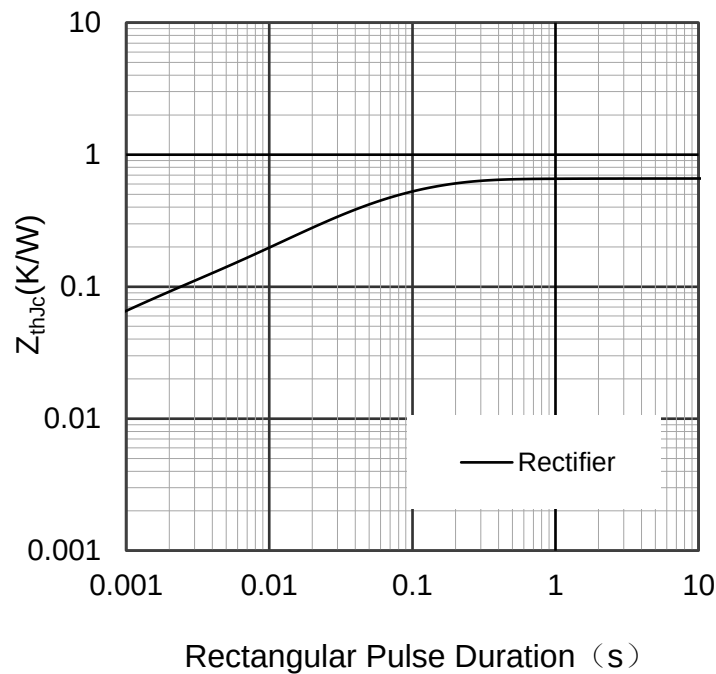


Figure 15. Transient Thermal Impedance of Rectifier

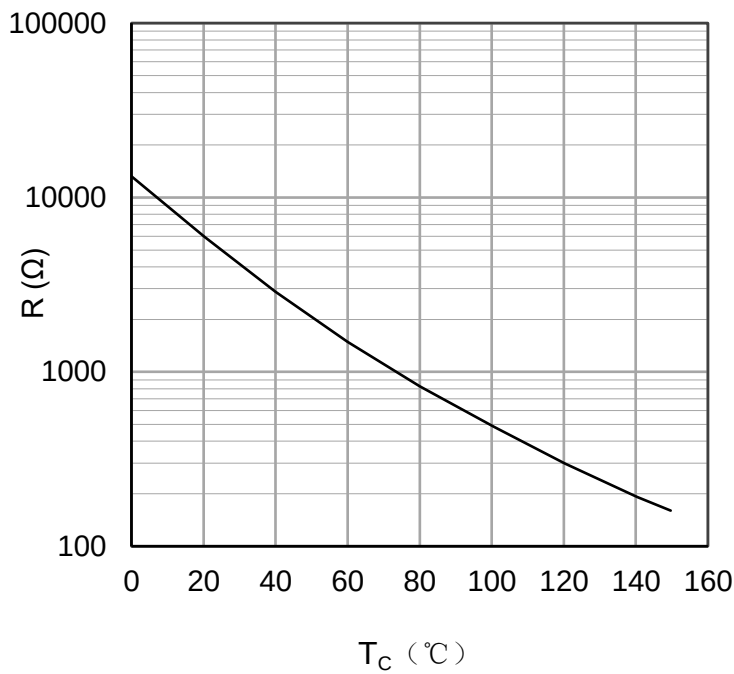


Figure 16. NTC Characteristics

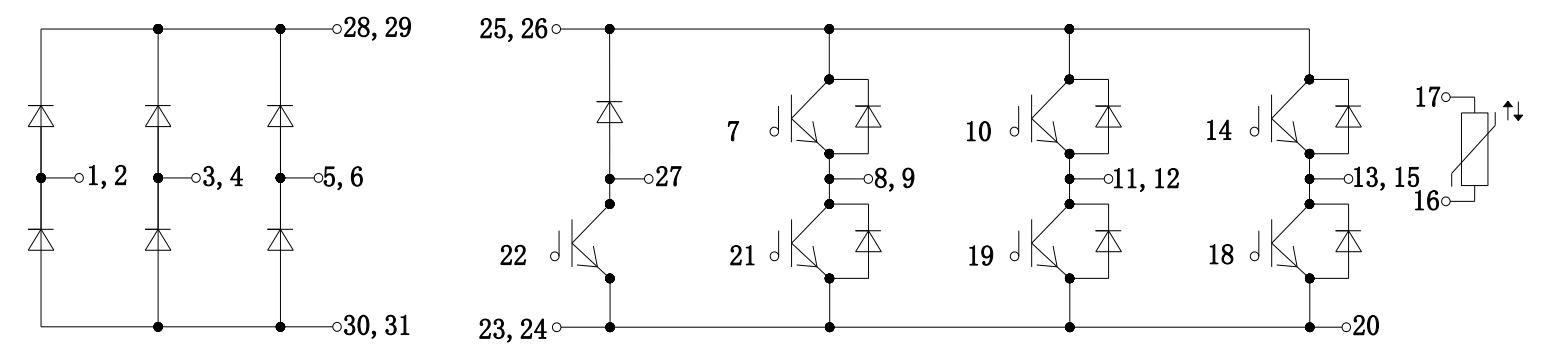
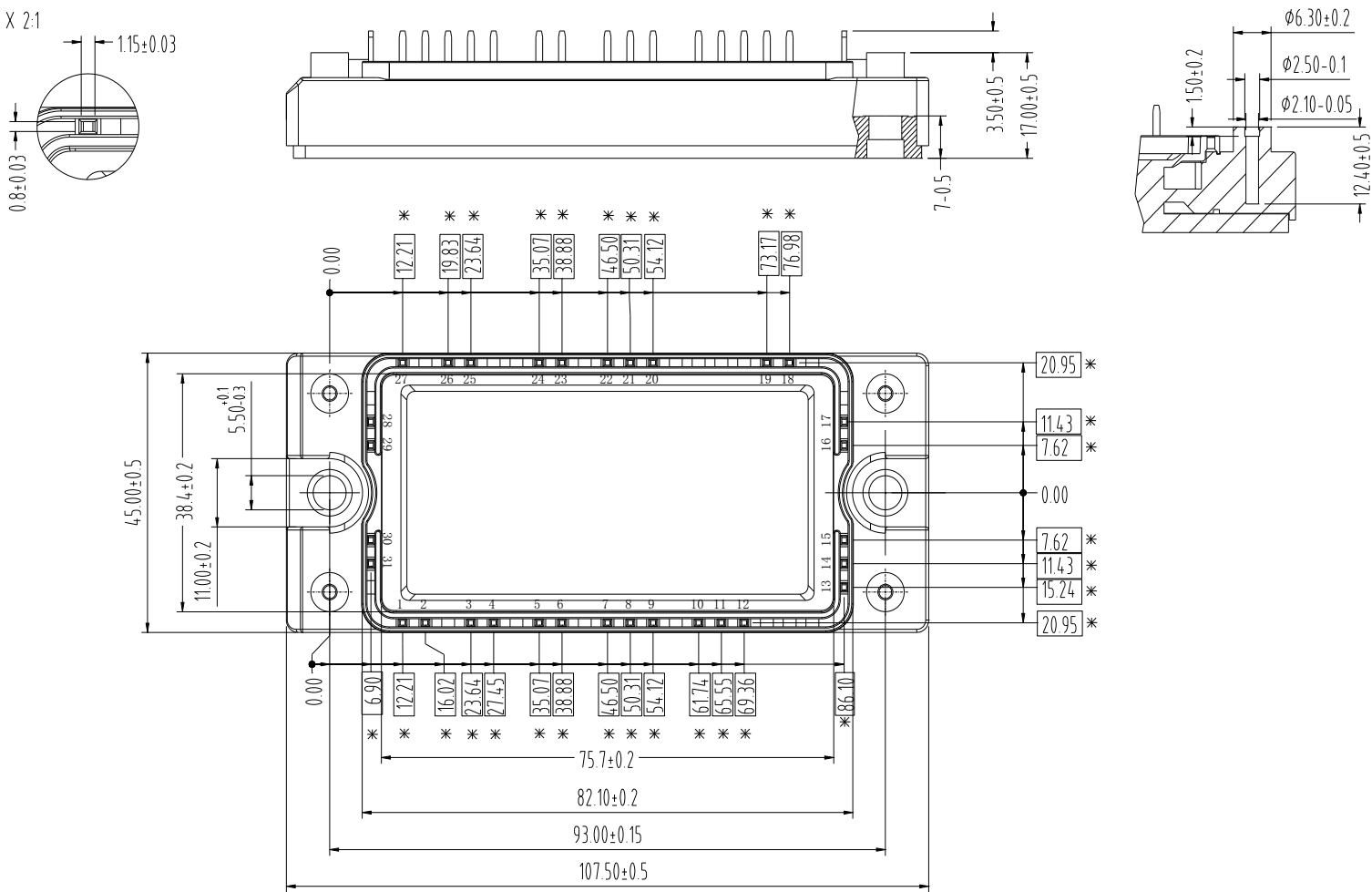


Figure 17. Circuit Diagram



*=alle Maße mit einer Toleranz von ± 0.4
*=all dimensions with tolerance of ± 0.4

Dimensions in (mm)
Figure 18. Package Outline