

PRODUCT FEATURES

- ☐ IGBT Chip(Trench technology and switching losses)
- ☐ Low saturation voltage and positive temperature coefficient
- ☐ 10 μ S Short circuit current capability
- ☐ IGBT-Maximum junction temperature 175 $^{\circ}$ C
- ☐ 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	$T_C=25^{\circ}\text{C}$	60	A
		$T_C=95^{\circ}\text{C}$	40	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	80	
P_{tot}	Power Dissipation Per IGBT		278	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		$T_J=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	320	A^2S

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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 =1.7mA	5	5.8	7.5	V	
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =25°C		2	2.5		
		I _C =40A, V _{GE} =15V, T _J =125°C		2.40			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25°C			100	μA	
		V _{CE} =1200V, V _{GE} =0V, T _J =125°C			1	mA	
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _J =125°C	-200		200	nA	
R _{gint}	Integrated Gate Resistor			0		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =40A , V _{GE} =15V		0.18		μC	
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f =1MHz		4.15		nF	
C _{res}	Reverse Transfer Capacitance				0.1		nF
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V, I _C =40A, R _G =20Ω, V _{GE} =±15V, Inductive Load	T _J =25°C	55		ns	
			T _J =125°C	60		ns	
t _r	Rise Time		T _J =25°C	75		ns	
			T _J =125°C	80		ns	
t _{d(off)}	Turn - off Delay Time		T _J =25°C	230		ns	
			T _J =125°C	250		ns	
t _f	Fall Time		T _J =25°C	70		ns	
			T _J =125°C	180		ns	
E _{on}	Turn - on Energy	V _{CC} =600V, I _C =40A, R _G =20Ω, V _{GE} =±15V, Inductive Load	T _J =25°C	3		mj	
			T _J =125°C	3.8		mj	
E _{off}	Turn - off Energy		T _J =25°C	2.4		mj	
			T _J =125°C	3.3		mj	
I _{sc}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _J =125°C, V _{CC} =900V		160		A
R _{thJC}	Junction-to-Case Thermal Resistance （ Per IGBT ）				0.54	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	$I_F=40\text{A}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$		1.75	2.3	V
		$I_F=40\text{A}, V_{GE}=0\text{V}, T_J=125^\circ\text{C}$		1.75		
I_{RRM}	Max. Reverse Recovery Current	$I_F=40\text{A}, V_R=600\text{V}$		28		A
Q_{RR}	Reverse Recovery Charge	$di_F/dt=-450\text{A}/\mu\text{s}, T_J=125^\circ\text{C}$		7.6		μC
E_{rec}	Reverse Recovery Energy			2.9		mj
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.0	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	$T_C=80^{\circ}\text{C}$	50	A
I_{RMS}	R.M.S. Current at rectifier output		60	
I_{FSM}	Non-Repetitive Surge Forward Current	$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	320	
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	360	
I^2t		$T_J=45^{\circ}\text{C}$, $t=10\text{ms}$, 50Hz	512	A^2S
		$T_J=45^{\circ}\text{C}$, $t=8.3\text{ms}$, 60Hz	537	

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	$I_F=40\text{A}$, $T_J=25^{\circ}\text{C}$		1.15	1.45	V
		$I_F=40\text{A}$, $T_J=125^{\circ}\text{C}$		1.10		
I_R	Reverse Leakage Current	$V_R=1600\text{V}$, $T_J=25^{\circ}\text{C}$			50	μA
		$V_R=1600\text{V}$, $T_J=125^{\circ}\text{C}$			1	mA
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.0	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	$T_C=25^{\circ}\text{C}$	20	A
		$T_C=95^{\circ}\text{C}$	15	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	30	
P_{tot}	Power Dissipation Per IGBT		176	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	$T_C=25^{\circ}\text{C}$	15	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	30	
I^2t		$T_J=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	60	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 =0.72mA	5	5.8	7.5	V	
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =15A, V _{GE} =15V, T _j =25°C		1.9	2.3		
		I _C =15A, V _{GE} =15V, T _j =125°C		2.30			
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _j =25°C			50	μA	
		V _{CE} =1200V, V _{GE} =0V, T _j =125°C			1	mA	
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _j =125°C	-200		200	nA	
R _{gint}	Integrated Gate Resistor			0		Ω	
Q _g	Gate Charge	V _{CE} =600V, I _C =15A , V _{GE} =±15V		0.08		μC	
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f =1MHz		1.95		nF	
C _{res}	Reverse Transfer Capacitance			0.05		nF	
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V, I _C =15A, R _G =40Ω, V _{GE} =±15V, Inductive Load	T _j =25°C	40		ns	
			T _j =125°C	45		ns	
t _r	Rise Time		T _j =25°C	45		ns	
			T _j =125°C	50		ns	
t _{d(off)}	Turn - off Delay Time		T _j =25°C	190		ns	
			T _j =125°C	210		ns	
t _f	Fall Time		T _j =25°C	70		ns	
			T _j =125°C	180		ns	
E _{on}	Turn - on Energy	V _{CC} =600V, I _C =15A, R _G =40Ω, V _{GE} =±15V, Inductive Load	T _j =25°C	0.85		mj	
			T _j =125°C	1.2		mj	
E _{off}	Turn - off Energy		T _j =25°C	0.7		mj	
			T _j =125°C	1		mj	
I _{sc}	Short Circuit Current		tpsc≤10μS , V _{GE} =15V T _j =125°C, V _{CC} =900V		60		A
R _{thJC}	Junction-to-Case Thermal Resistance （ Per IGBT ）				0.85	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	$I_F=15\text{A}, V_{GE}=0\text{V}, T_J=25^{\circ}\text{C}$		1.65	2.15	V
		$I_F=15\text{A}, V_{GE}=0\text{V}, T_J=125^{\circ}\text{C}$		1.65		
I_{RRM}	Max. Reverse Recovery Current	$I_F=15\text{A}, V_R=600\text{V}$		14		A
Q_{RR}	Reverse Recovery Charge	$di_F/dt=-250\text{A}/\mu\text{s}, T_J=125^{\circ}\text{C}$		2.8		μC
E_{rec}	Reverse Recovery Energy			1.1		mj
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.5	K/W

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R25	Resistance	$T_C=25^{\circ}\text{C}$		5		K Ω
B25/50				3375		K

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

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$T_{j\max}$	Max. Junction Temperature	Inverter, Brake-Chopper			175	$^{\circ}\text{C}$
		Rectifier			150	
$T_{j\text{op}}$	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	N•m
Weight				180		g

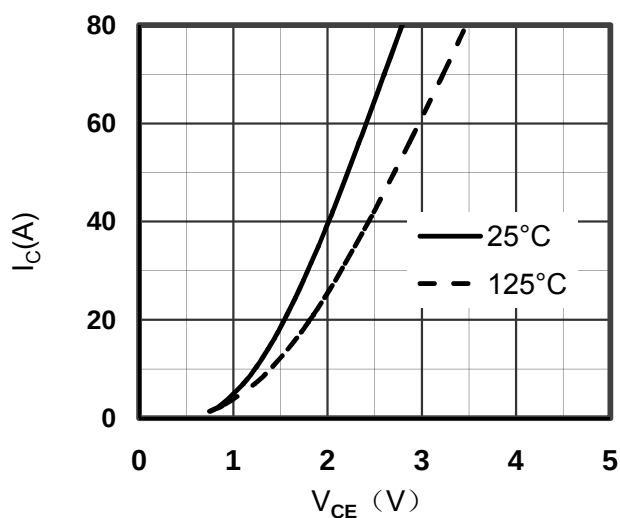


Figure1. Typical Output Characteristics
IGBT-inverter

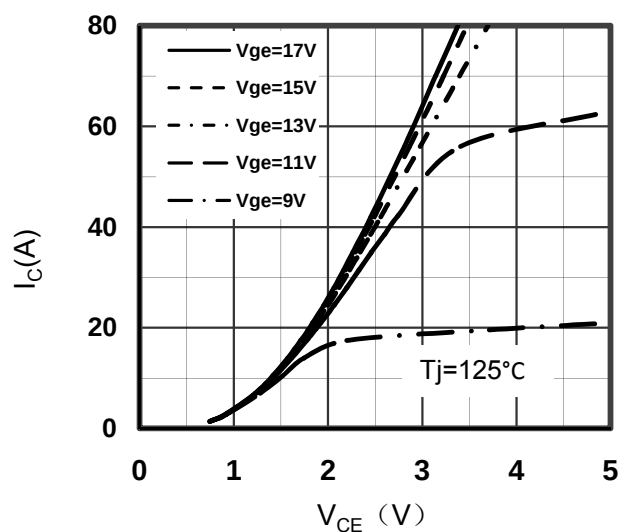


Figure2. Typical Output Characteristics
IGBT-inverter

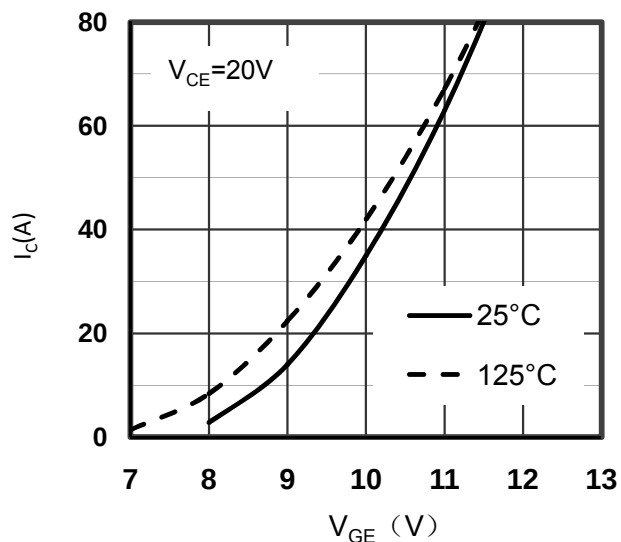


Figure3. Typical Transfer characteristics
IGBT-inverter

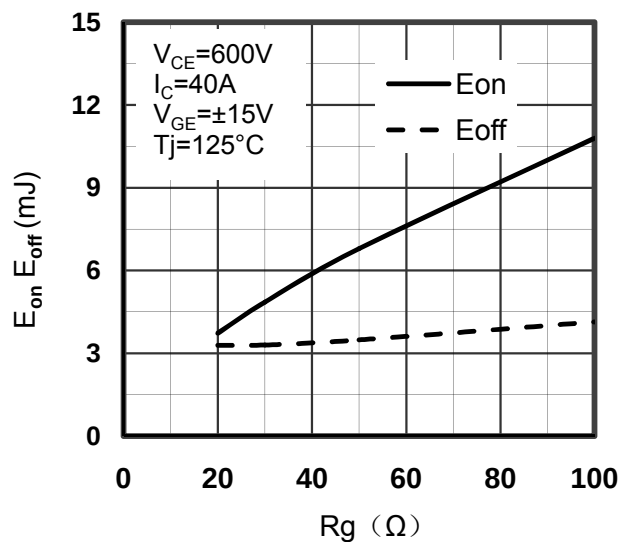


Figure4. Switching Energy vs. Gate Resistor
IGBT-inverter

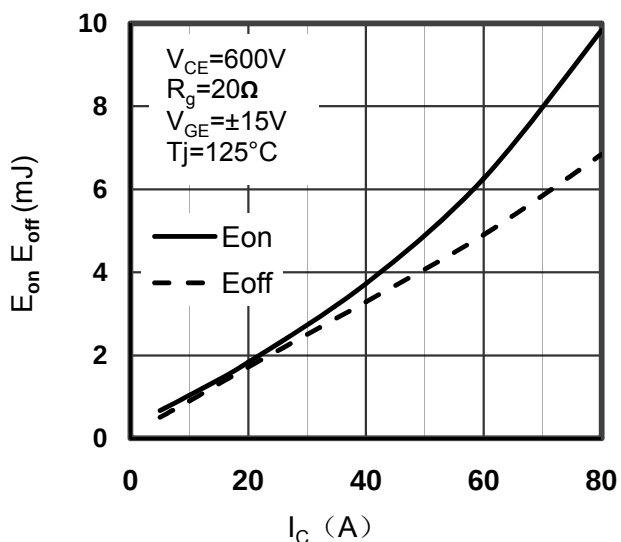


Figure5. Switching Energy vs. Collector Current
IGBT-inverter

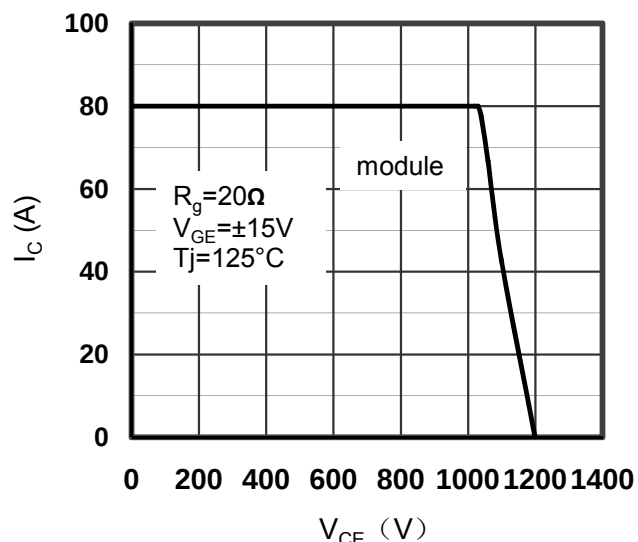


Figure6. Reverse Biased Safe Operating Area
IGBT-inverter

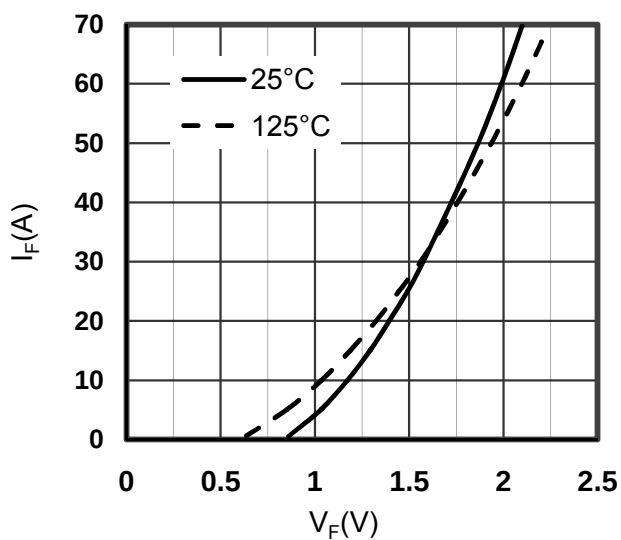


Figure7. Diode Forward Characteristics
Diode -inverter

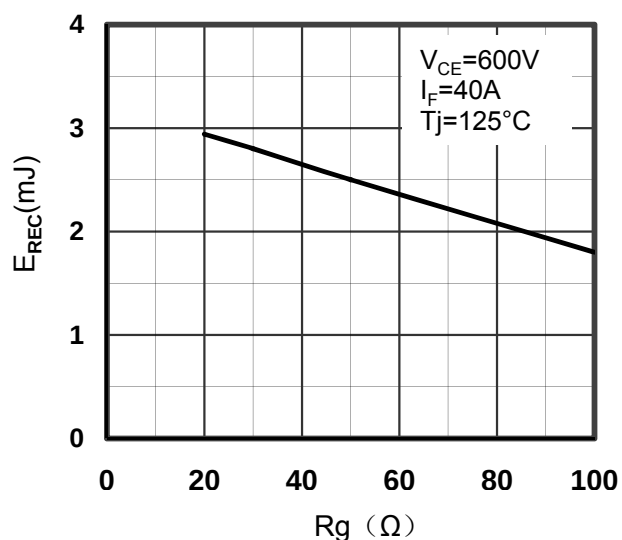


Figure8. Switching Energy vs. Gate Resistor
Diode -inverter

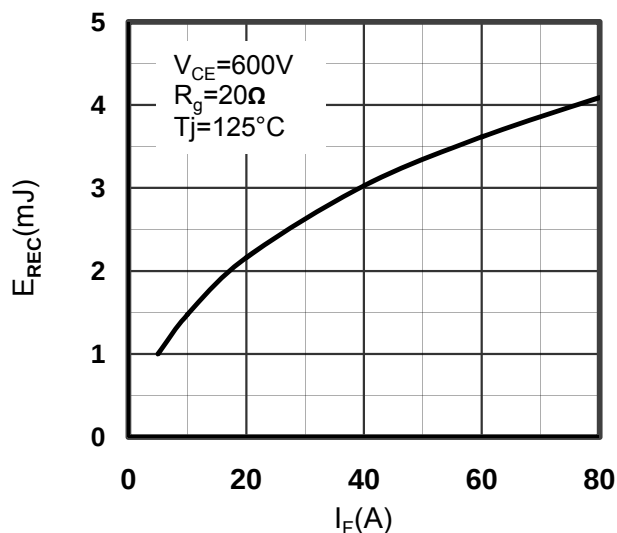


Figure9. Switching Energy vs. Forward Current
Diode-inverter

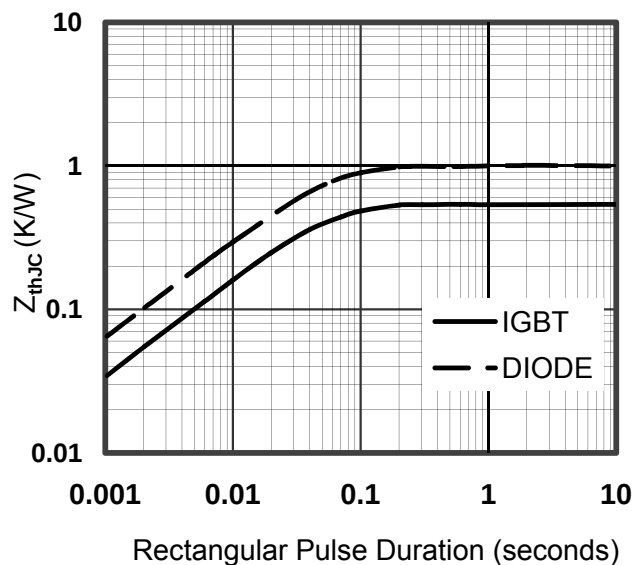


Figure10. Transient Thermal Impedance of
Diode and IGBT-inverter

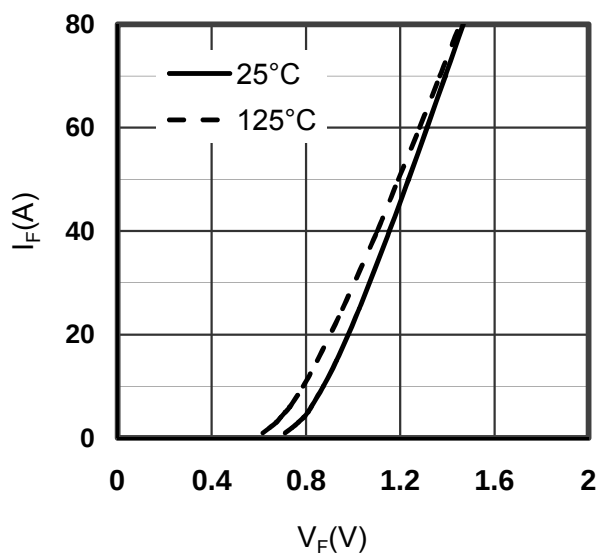


Figure11. Diode Forward Characteristics
Diode- rectifier

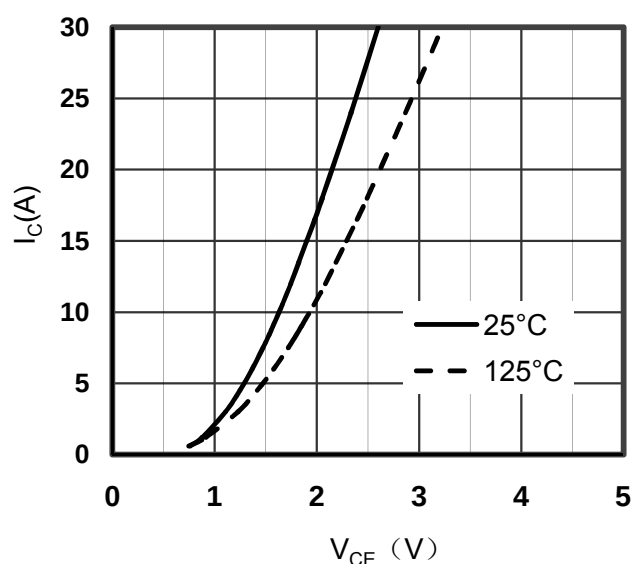


Figure12. Typical Output Characteristics
IGBT- brake chopper

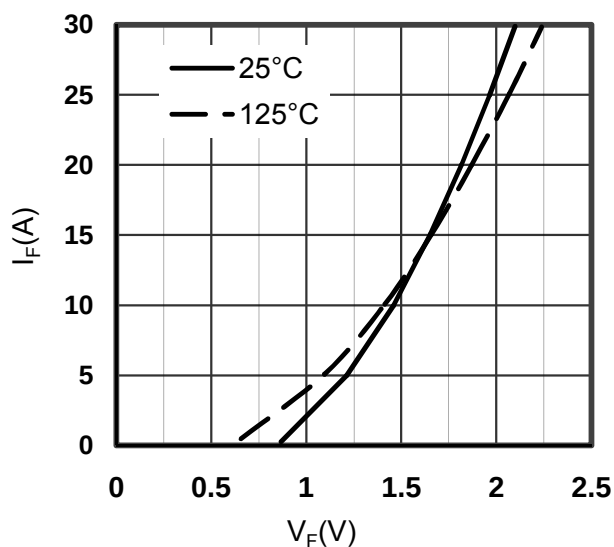


Figure13. Diode Forward Characteristics
Diode - brake chopper

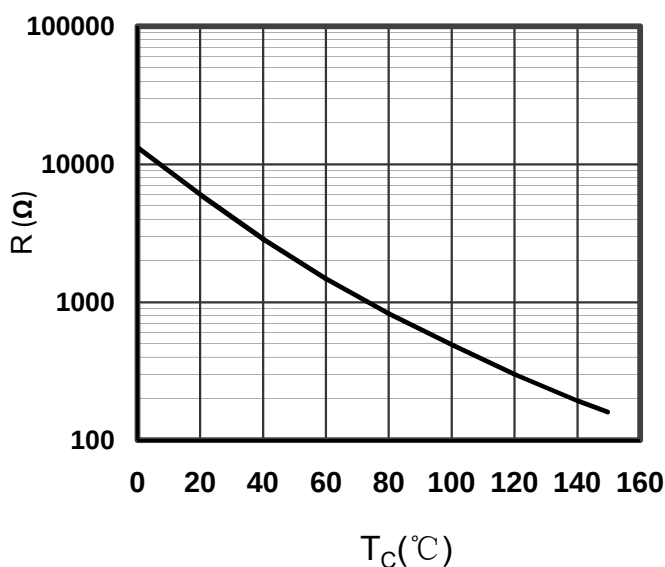


Figure14. NTC Characteristics

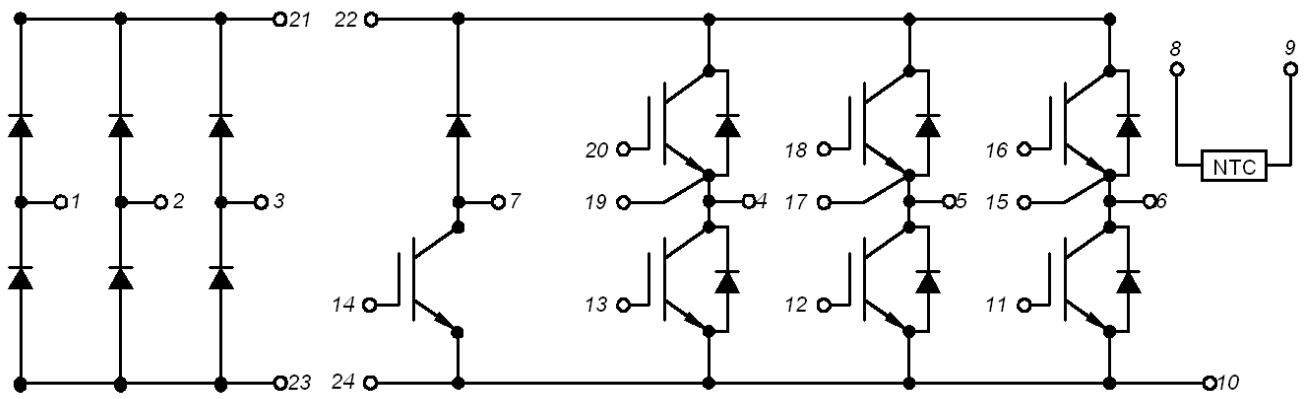
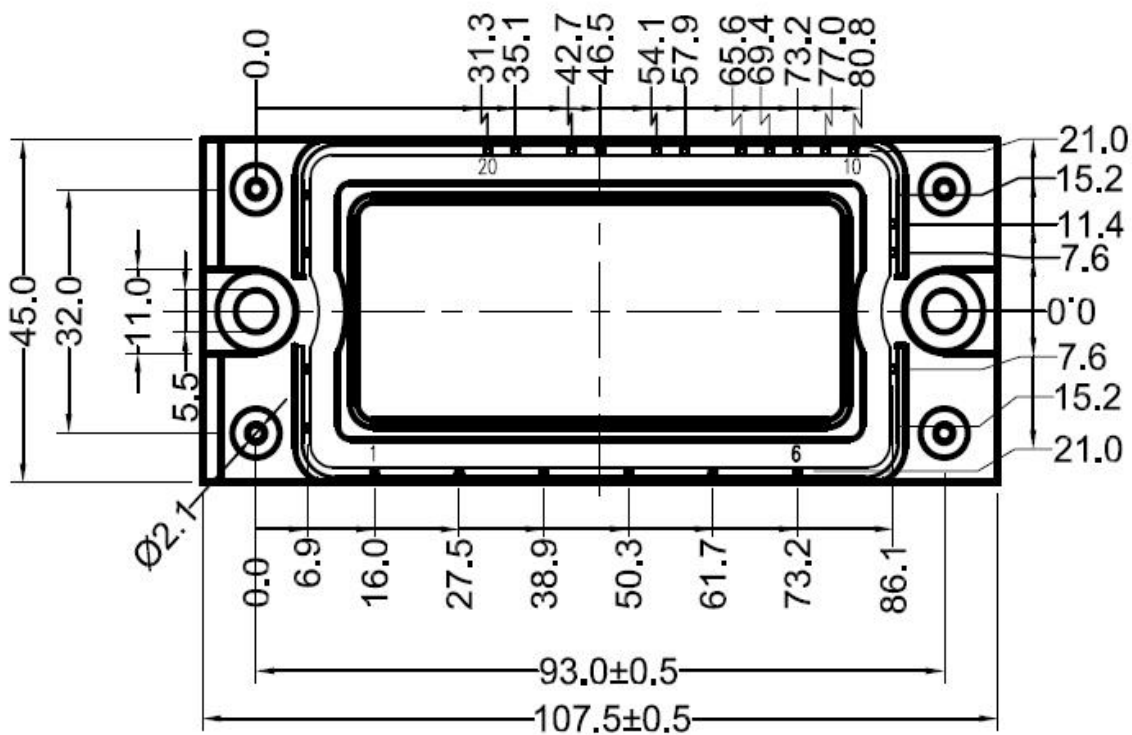
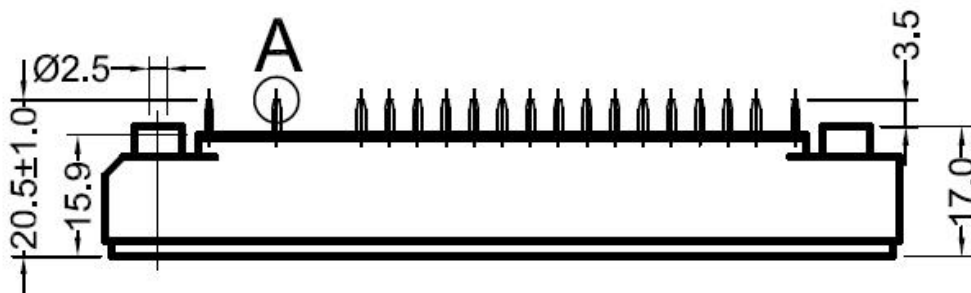


Figure15. Circuit Diagram



Dimensions in Millimeters
Figure16. Package Outline