

Key Parameters

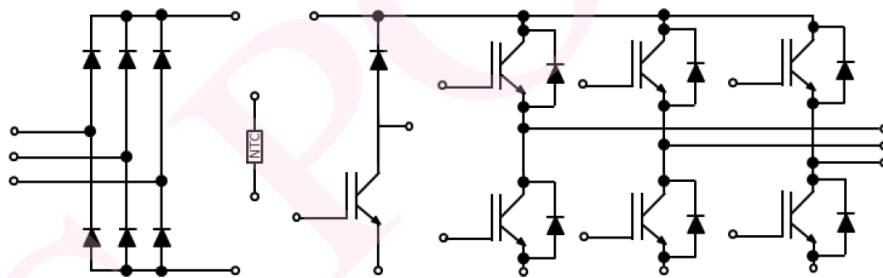
V_{CES} = 1200V
 I_c = 25A

Features

- Low $V_{ce(sat)}$
- Fast switching
- High ruggedness
- High short circuit capability

Applications

- Inverter for motor drive
- Frequency converters
- UPS
- General purpose Inverters



Equivalent Circuit Schematic

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Absolute Maximum Ratings: IGBT, Inverter							
Symbol	Characteristic	Value	Unit				
V _{CEs}	Collector-Emitter Voltage	1200	V				
I _{CDC}	Continuous DC Collector Current (T _C =90°C, T _J =175°C)	25	A				
I _{CRM}	Peak Collector Current (tp=1ms)	50	A				
V _{GES}	Gate-Emitter Voltage	±20	V				
IGBT Characteristics							
Symbol	Characteristic	Conditions	Value			Unit	
			Min.	Typ.	Max.		
BV _{CEs}	Collector-Emitter breakdown Voltage	V _{GE} =0V, I _C =250μA, T _{vj} =25°C	1200			V	
I _{CEs}	Collector-Emitter leakage Current	V _{CE} =1200V, V _{GE} =0V, T _{vj} =25°C			1.0	mA	
I _{GES}	Gate-Emitter leakage Current	V _{CE} =0V, V _{GE} =±20V, T _{vj} =25°C			100	ηA	
V _{GE(th)}	Gate-emitter Threshold Voltage	V _{GE} =V _{CE} , I _C =600μA, T _{vj} =25°C	5.5	6.5	7.5	V	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =25A, V _{GE} =15V, T _{vj} =25°C		1.85	2.2	V	
		I _C =25A, V _{GE} =15V, T _{vj} =125°C		2.3		V	
		I _C =25A, V _{GE} =15V, T _{vj} =150°C		2.4		V	
Q _G	Gate Charge	V _{CC} =600V, V _{GE} =15V, I _C =25A T _{vj} =25°C		105		ηC	
C _{iss}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz, T _{vj} =25°C		1980		pF	
C _{oss}	Output Capacitance			110		pF	
C _{rss}	Reverse Transfer Capacitance			20		pF	
t _{d(on)}	Turn-on Delay Time	I _C =25A V _{CE} = 600 V V _{GE} =±15V R _G = 10Ω T _{vj} =25°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		22		ηs	
t _r	Rise Time			33		ηs	
t _{d(off)}	Turn-off Delay Time			130		ηs	
t _f	Fall Time			150		ηs	
E _{on}	Energy Dissipation During Turn-on Time			1.67		mJ	
E _{off}	Energy Dissipation During Turn-off Time			1.16		mJ	
t _{d(on)}	Turn-on Delay Time		I _C =25A V _{CE} = 600 V V _{GE} =±15V R _G = 10Ω T _{vj} =150°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		20		ηs
t _r	Rise Time				34		ηs
t _{d(off)}	Turn-off Delay Time			156		ηs	
t _f	Fall Time			212		ηs	
E _{on}	Energy Dissipation During Turn-on Time			3.08		mJ	
E _{off}	Energy Dissipation During Turn-off Time			1.64		mJ	
I _{C(SC)}	SC Data	t _{sc} ≤10μs, V _{GE} =15V, T _{vj} =25°C, V _{CC} ≤600V,			85		A
Absolute Maximum Ratings: Diode, Inverter							
Symbol	Characteristic	Value	Unit				
V _{RRM}	Repetitive peak reverse voltage	1200	V				
I _F	Continuous DC forward current	25	A				
I _{FRM}	Repetitive peak forward current (tp=1ms)	50	A				
Diode Characteristics							
Symbol	Characteristic	Conditions	Value			Unit	
			Min.	Typ.	Max.		
V _F	Forward Voltage	I _F =25A, T _{vj} =25°C		2.1	2.5	V	
		I _F =25A, T _{vj} =125°C		1.75		V	
		I _F =25A, T _{vj} =150°C		1.70		V	
Q _{rr}	Recovered Charge	I _F =25A		1.1		μC	
I _{rrm}	Peak Reverse Recovery Current	V _R =600V		15		A	
E _{rr}	Reverse Recovery Energy	-di _F /dt =600A/μs T _{vj} =25°C		0.25		mJ	
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Absolute Maximum Ratings: IGBT, Break-Chopper						
Symbol	Characteristic	Value	Unit			
V _{CEs}	Collector-Emitter Voltage	1200	V			
I _{CDC}	Continuous DC Collector Current (T _C =90°C, T _J =175°C)	25	A			
I _{CRM}	Peak Collector Current (tp=1ms)	50	A			
V _{GES}	Gate-Emitter Voltage	±20	V			
IGBT Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV _{CEs}	Collector-Emitter breakdown Voltage	V _{GE} =0V, I _C =250μA, T _{vj} =25°C	1200			V
I _{CEs}	Collector-Emitter leakage Current	V _{CE} =1200V, V _{GE} =0V, T _{vj} =25°C			1.0	mA
I _{GES}	Gate-Emitter leakage Current	V _{CE} =0V, V _{GE} =±20V, T _{vj} =25°C			100	ηA
V _{GE(th)}	Gate-emitter Threshold Voltage	V _{GE} =V _{CE} , I _C =600μA, T _{vj} =25°C	5.5	6.5	7.5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =25A, V _{GE} =15V, T _{vj} =25°C		1.85	2.2	V
		I _C =25A, V _{GE} =15V, T _{vj} =125°C		2.3		V
		I _C =25A, V _{GE} =15V, T _{vj} =150°C		2.4		V
Q _G	Gate Charge	V _{CC} =600V, V _{GE} =15V, I _C =25A T _{vj} =25°C		105		ηC
C _{iss}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz, T _{vj} =25°C		1980		pF
C _{oss}	Output Capacitance			110		pF
C _{rss}	Reverse Transfer Capacitance			20		pF
t _{d(on)}	Turn-on Delay Time		I _C =25A		22	
t _r	Rise Time	V _{CE} = 600 V		48		ηs
t _{d(off)}	Turn-off Delay Time	V _{GE} =±15V		135		ηs
t _f	Fall Time	R _G = 10Ω		132		ηs
E _{on}	Energy Dissipation During Turn-on Time	T _{vj} =25°C , L _{load} =0.82mH		1.68		mJ
E _{off}	Energy Dissipation During Turn-off Time	Energy loss include tail and diode reverse recovery		1.17		mJ
t _{d(on)}	Turn-on Delay Time	I _C =25A		20		ηs
t _r	Rise Time	V _{CE} = 600 V		46		ηs
t _{d(off)}	Turn-off Delay Time	V _{GE} =±15V		157		ηs
t _f	Fall Time	R _G = 10Ω		203		ηs
E _{on}	Energy Dissipation During Turn-on Time	T _{vj} =150°C , L _{load} =0.82mH		2.49		mJ
E _{off}	Energy Dissipation During Turn-off Time	Energy loss include tail and diode reverse recovery		1.63		mJ
I _{C(SC)}	SC Data	t _{sc} ≤10μs, V _{GE} =15V, T _{vj} =25°C, V _{CE} ≤600V,		85		A
Absolute Maximum Ratings: Diode, Break-Chopper						
Symbol	Characteristic	Value	Unit			
V _{RRM}	Repetitive peak reverse voltage	1200	V			
I _F	Continuous DC forward current	10	A			
I _{FRM}	Repetitive peak forward current (tp=1ms)	20	A			
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _F	Forward Voltage	I _F =10A, T _{vj} =25°C		1.95	2.35	V
		I _F =10A, T _{vj} =150°C		1.55		V
Q _{rr}	Recovered Charge	I _F =10A		1		μC
I _{rrm}	Peak Reverse Recovery Current	V _R =600V		10		A
E _{rr}	Reverse Recovery Energy	-di _F /dt =588A/μs T _{vj} =25°C		0.2		mJ
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Absolute Maximum Ratings: Diode, Rectifier						
Symbol	Characteristic	Value				Unit
V_{RRM}	Repetitive peak reverse voltage	1600				V
$I_{F(AV)}$	Average output current 50/60Hz, sine wave ($T_C=100^\circ\text{C}$)	25				A
I_{RMSM}	Maximum RMS current at rectifier output ($T_C=100^\circ\text{C}$)	50				A
I_{FSM}	Surge forward current ($V_R=0V$, $t_p=10\text{msec}$)	270				A
I^2t	I^2t value ($V_R=0V$, $t_p=10\text{msec}$)	360				A^2s
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	$I_F=25A, T_{vj}=150^\circ\text{C}$		0.90		V
I_R	Diode reverse current	$V_R=1600V, T_j=150^\circ\text{C}$			1.0	mA
Module Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{isol}	Isolation voltage	$t=1\text{min}, f=50\text{Hz}$	2500			V
T_{jmax}	Maximum Junction Temperature				175	$^\circ\text{C}$
T_{vjop}	Operating Junction Temperature		-40		150	$^\circ\text{C}$
T_{stg}	Storage Temperature		-40		150	$^\circ\text{C}$
$R_{CC'+EE'}$	Module lead resistance terminal to chip			5.0		m Ω
$R_{AA'+CC'}$	Module lead resistance terminal to chip			6.0		m Ω
L_{SCE}	Stray Inductance, Module			30		nH
$R_{\theta jc}$	Junction-to Case	per IGBT-inverter		0.83		$^\circ\text{C}/\text{W}$
		per Diode-inverter		1.35		$^\circ\text{C}/\text{W}$
		per IGBT-Break Chopper		0.83		$^\circ\text{C}/\text{W}$
		per Diode- Break Chopper		2.0		$^\circ\text{C}/\text{W}$
		per Diode- Rectifier		1.07		$^\circ\text{C}/\text{W}$
$R_{\theta cs}$	Case to Sink	per IGBT-inverter		0.60		$^\circ\text{C}/\text{W}$
		per Diode-inverter		0.75		$^\circ\text{C}/\text{W}$
		per IGBT-Break Chopper		0.80		$^\circ\text{C}/\text{W}$
		per Diode- Break Chopper		1.05		$^\circ\text{C}/\text{W}$
		per Diode- Rectifier		0.95		$^\circ\text{C}/\text{W}$
		per Module		0.037		$^\circ\text{C}/\text{W}$
M_t	Mounting force per clamp		30		80	N
G	Weight of Module			45		g
NTC thermistors Characteristics						
Symbol	Characteristic	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance			5.0		k Ω
$\Delta R/R$	Deviation of R100	$T_C=100^\circ\text{C}, R_{100}=493.3\Omega$	-5		5	%
P_{25}	Power Dissipation				20.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
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• Typical Electrical Characteristics

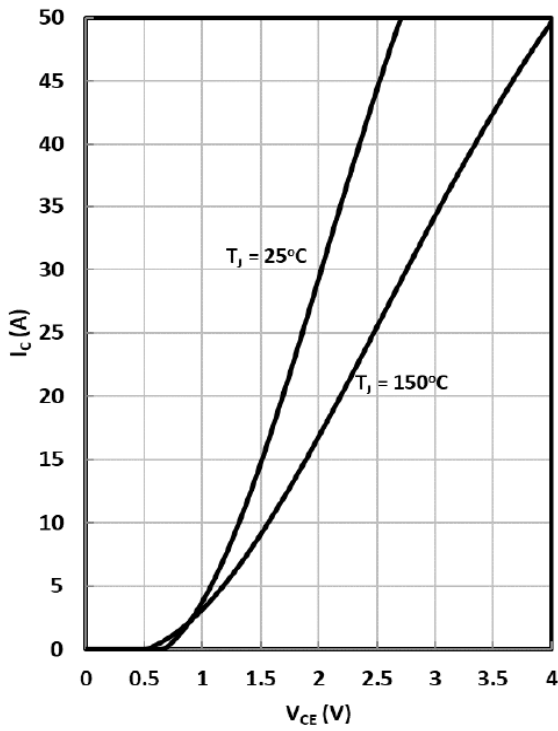


Fig. 1 IGBT (Inverter) Output Characteristics

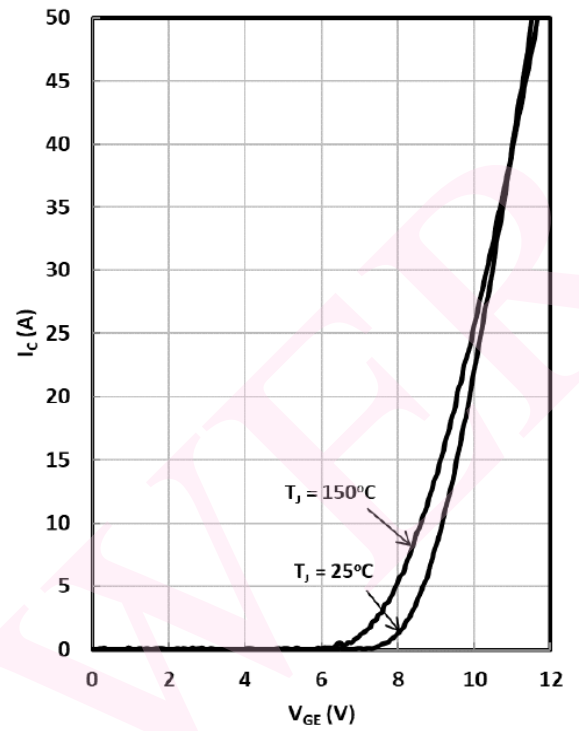


Fig. 2 IGBT (Inverter) Transfer Characteristics

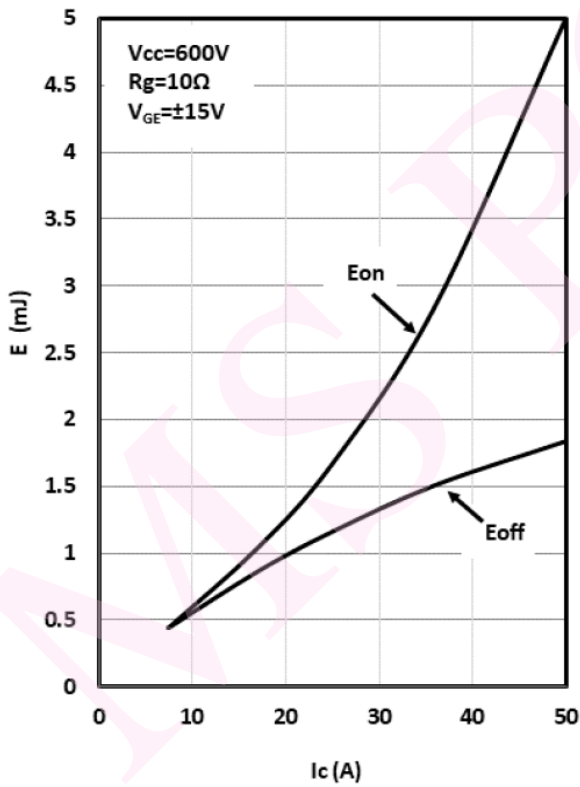


Fig. 3 IGBT (Inverter) Switching Loss vs. Ic

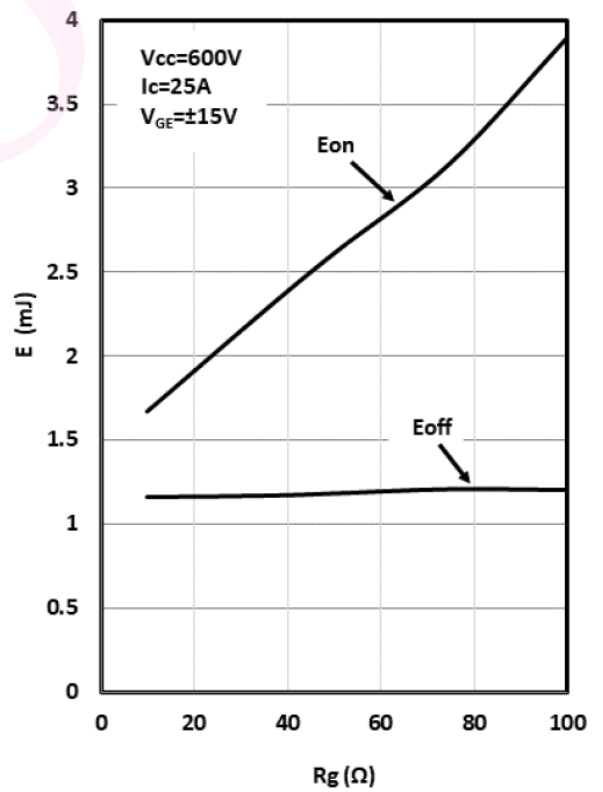


Fig. 4 IGBT (Inverter) Switching Loss vs. Rg

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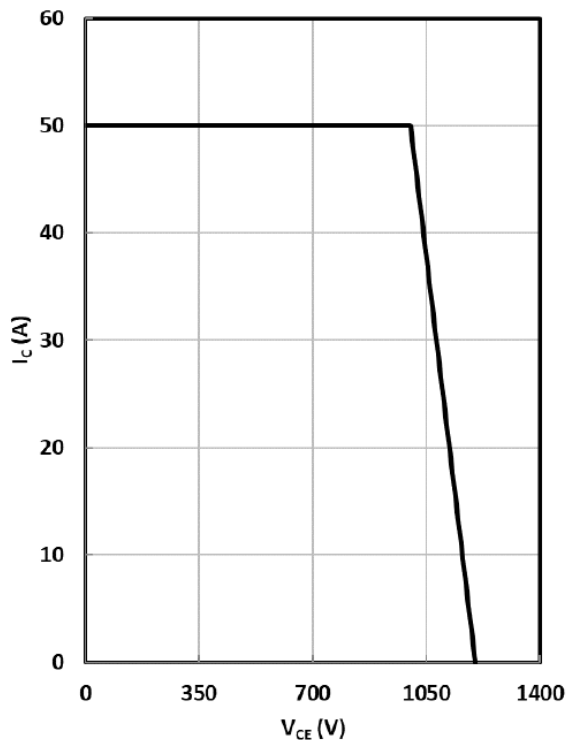


Fig. 5 RBSOA

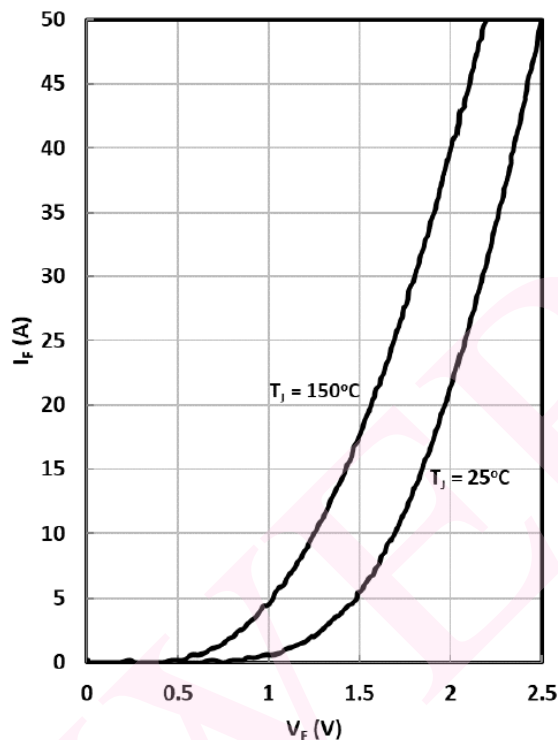


Fig. 6 Diode (Inverter) Forward Characteristics

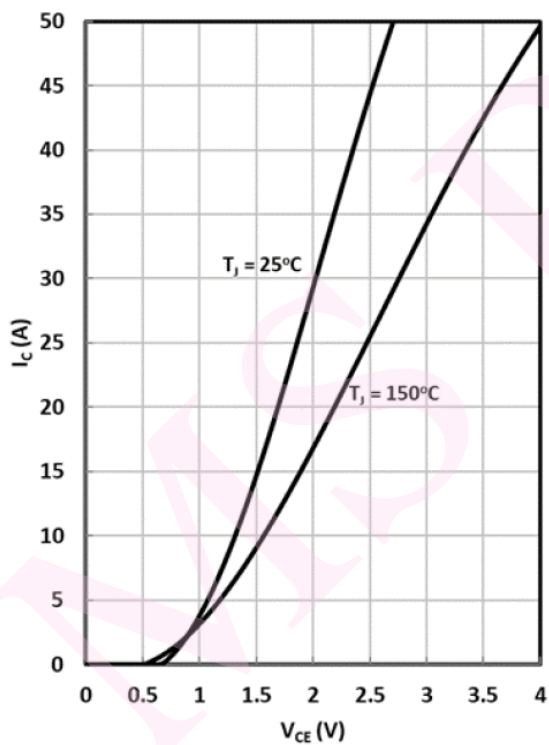


Fig. 7 IGBT (Brake-Chopper) Output Characteristics

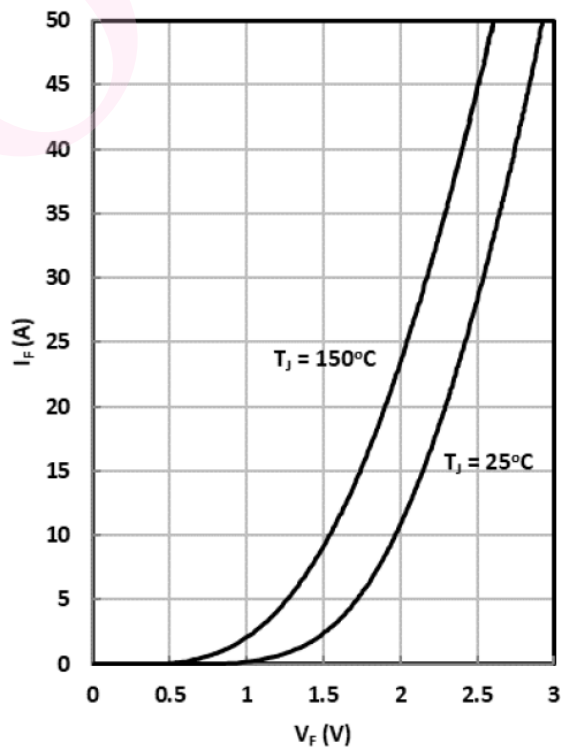


Fig. 8 Diode (Brake-Chopper) Forward Characteristics

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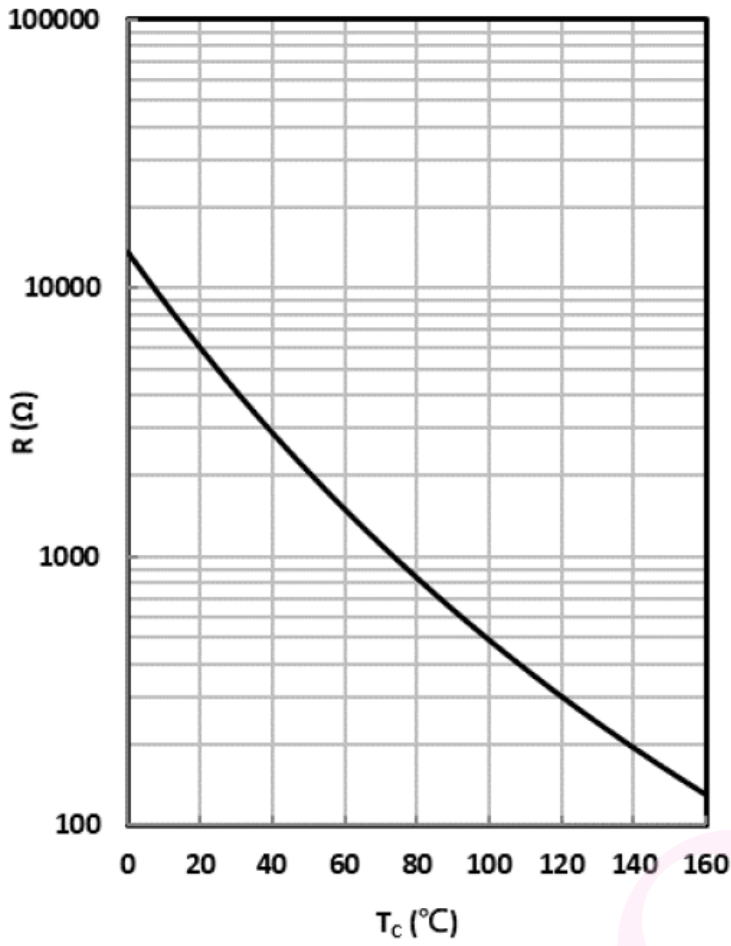
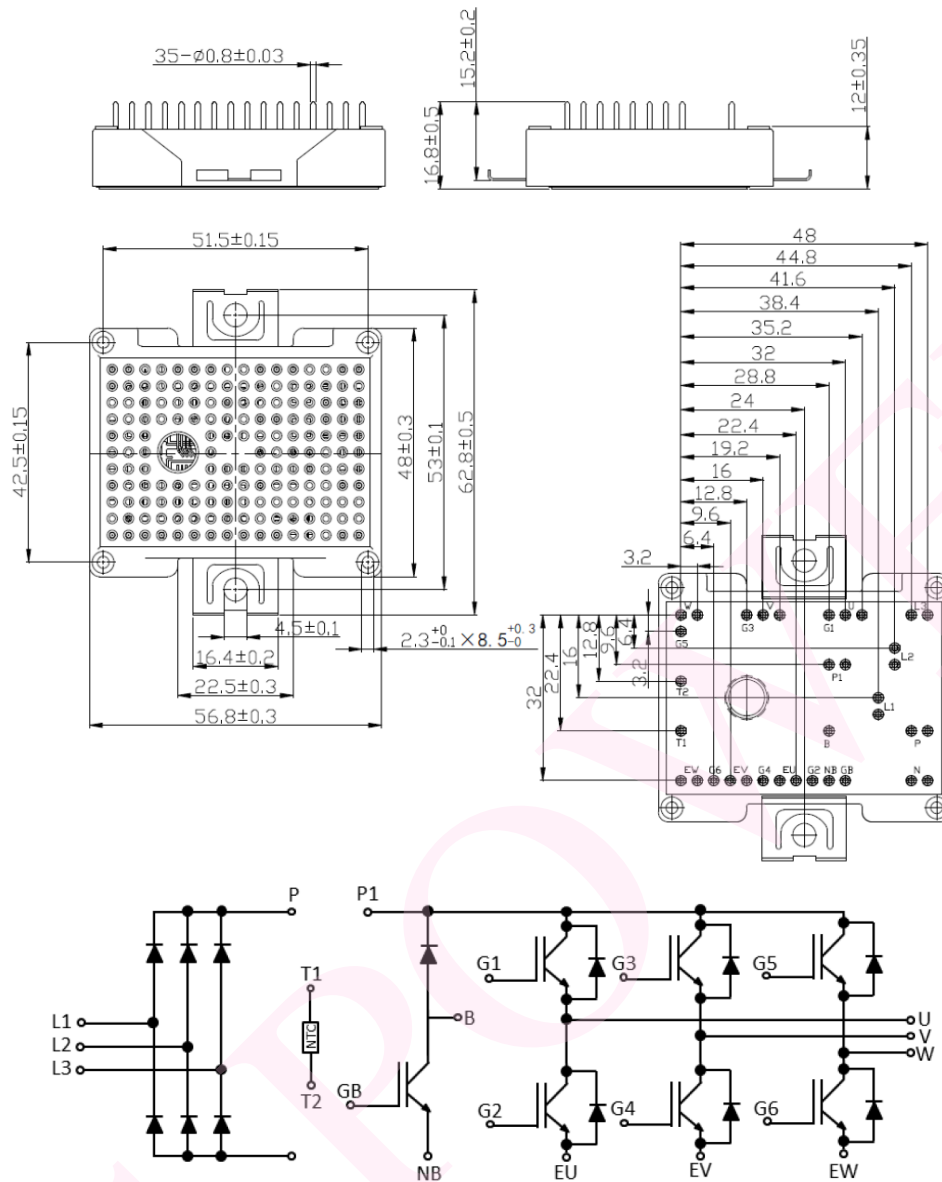


Fig. 9 NTC Temperature Characteristics

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