

Key Parameters

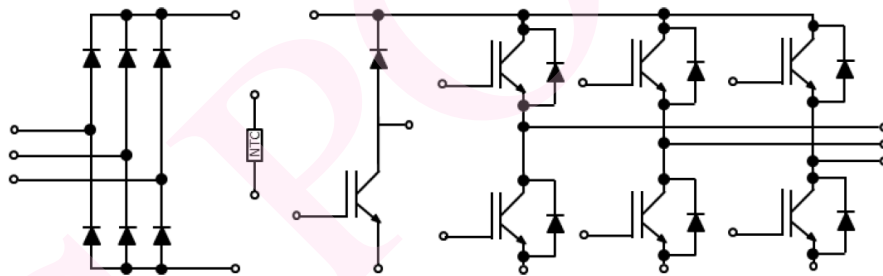
V_{CES} = 1200V
 I_c = 15A

Features

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

Applications

- Inverter for motor drive
- Frequency converters
- Servos
- 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 =100°C, T _J =175°C)	15	A			
I _{CRM}	Peak Collector Current (tp=1ms)	30	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 =15A, V _{GE} =15V, T _{vj} =25°C		1.5	1.8	V
		I _C =15A, V _{GE} =15V, T _{vj} =125°C		1.75		V
		I _C =15A, V _{GE} =15V, T _{vj} =150°C		1.85		V
Q _G	Gate Charge	V _{CC} =600V, V _{GE} =15V, I _C =15A 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 =15A		36		ηs
t _r	Rise Time	V _{CE} = 600 V		40		ηs
t _{d(off)}	Turn-off Delay Time	V _{GE} =±15V		180		ηs
t _f	Fall Time	R _G = 15Ω		98		ηs
E _{on}	Energy Dissipation During Turn-on Time	T _{vj} =25°C , L _{load} =0.82mH		0.96		mJ
E _{off}	Energy Dissipation During Turn-off Time	Energy loss include tail and diode reverse recovery		0.75		mJ
t _{d(on)}	Turn-on Delay Time	I _C =15A		40		ηs
t _r	Rise Time	V _{CE} = 600 V		43		ηs
t _{d(off)}	Turn-off Delay Time	V _{GE} =±15V		225		ηs
t _f	Fall Time	R _G = 15Ω		150		ηs
E _{on}	Energy Dissipation During Turn-on Time	T _{vj} =150°C , L _{load} =0.82mH		1.54		mJ
E _{off}	Energy Dissipation During Turn-off Time	Energy loss include tail and diode reverse recovery		1.01		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	15	A			
I _{FRM}	Repetitive peak forward current (tp=1ms)	30	A			
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _F	Forward Voltage	I _F =15A, T _{vj} =25°C		2.25	2.7	V
		I _F =15A, T _{vj} =125°C		1.85		V
		I _F =15A, T _{vj} =150°C		1.75		V
Q _{rr}	Recovered Charge	I _F =15A		1.2		μC
I _{rrm}	Peak Reverse Recovery Current	V _R =600V		14		A
E _{rr}	Reverse Recovery Energy	-di _F /dt =526A/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 =100°C, T _J =175°C)	15	A				
I _{CRM}	Peak Collector Current (tp=1ms)	30	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 =15A, V _{GE} =15V, T _{vj} =25°C		1.5	1.8	V	
		I _C =15A, V _{GE} =15V, T _{vj} =125°C		1.75		V	
		I _C =15A, V _{GE} =15V, T _{vj} =150°C		1.85		V	
Q _G	Gate Charge	V _{CC} =600V, V _{GE} =15V, I _C =15A 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 =15A V _{CE} = 600 V V _{GE} =±15V R _G = 15Ω T _{vj} =25°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		36		ηs	
t _r	Rise Time			40		ηs	
t _{d(off)}	Turn-off Delay Time			180		ηs	
t _f	Fall Time			98		ηs	
E _{on}	Energy Dissipation During Turn-on Time			0.96		mJ	
E _{off}	Energy Dissipation During Turn-off Time			0.75		mJ	
t _{d(on)}	Turn-on Delay Time		I _C =15A V _{CE} = 600 V V _{GE} =±15V R _G = 15Ω T _{vj} =150°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		40		ηs
t _r	Rise Time				43		ηs
t _{d(off)}	Turn-off Delay Time			225		ηs	
t _f	Fall Time			150		ηs	
E _{on}	Energy Dissipation During Turn-on Time			1.54		mJ	
E _{off}	Energy Dissipation During Turn-off Time			1.01		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		2.05	2.40	V	
		I _F =10A, T _{vj} =125°C		1.6		V	
		I _F =10A, T _{vj} =150°C		1.5		V	
Q _{rr}	Recovered Charge	I _F =10A		0.65		μC	
I _{rrm}	Peak Reverse Recovery Current	V _R =600V		13		A	
E _{rr}	Reverse Recovery Energy	-di _F /dt =540A/μs T _{vj} =25°C		0.1		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°C)	15				A
I _{RMSM}	Maximum RMS current at rectifier output (T _C =100°C)	30				A
I _{FSM}	Surge forward current (V _R =0V, t _p =10msec)	220				A
I ² t	I ² t value (V _R =0V, t _p =10msec)	242				A ² s
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _F	Forward Voltage	I _F =15A, T _{vj} =150°C		1.1		V
I _R	Diode reverse current	V _R =1600V, T _j =150°C			1.0	mA
Module Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _{isol}	Isolation voltage	t=1min, f=50Hz	2500			V
T _{jmax}	Maximum Junction Temperature				175	°C
T _{vj op}	Operating Junction Temperature		-40		150	°C
T _{stg}	Storage Temperature		-40		150	°C
R _{CC'+EE'}	Module lead resistance terminal to chip			8.0		mΩ
R _{AA'+CC'}	Module lead resistance terminal to chip			6.0		mΩ
L _{SCE}	Stray Inductance, Module			30		nH
R _{θjc}	Junction-to Case	per IGBT-inverter		0.95		°C/W
		per Diode-inverter		1.75		°C/W
		per IGBT-Break Chopper		0.95		°C/W
		per Diode- Break Chopper		1.75		°C/W
		per Diode- Rectifier		1.10		°C/W
R _{θcs}	Case to Sink	per IGBT-inverter		0.95		°C/W
		per Diode-inverter		1.30		°C/W
		per IGBT-Break Chopper		0.95		°C/W
		per Diode- Break Chopper		1.30		°C/W
		per Diode- Rectifier		1.20		°C/W
		per Module		0.058		°C/W
M _t	Mounting force per clamp		20		50	N
G	Weight of Module			25		g
NTC thermistors Characteristics						
Symbol	Characteristic	Conditions	Min.	Typ.	Max.	Unit
R ₂₅	Rated resistance			5.0		kΩ
ΔR/R	Deviation of R100	T _C =100°C, R ₁₀₀ =493.3Ω	-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

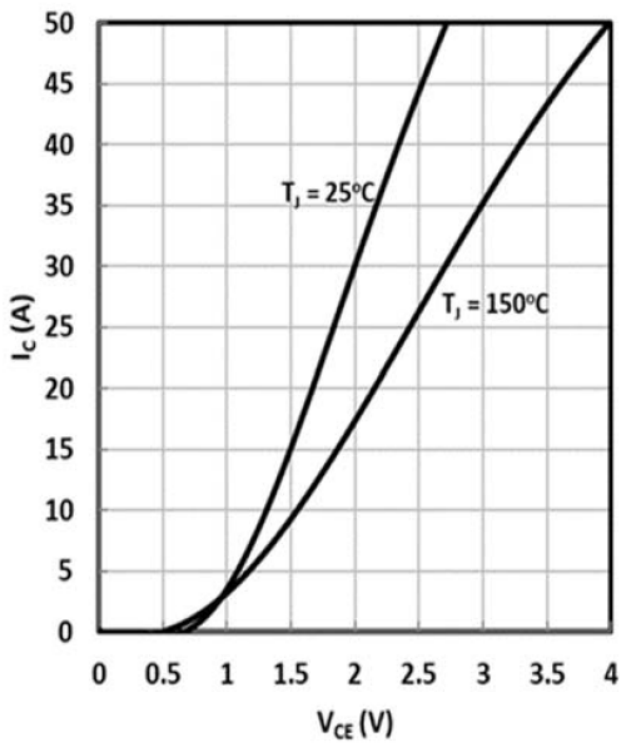


Fig. 1 IGBT (Inverter) Output Characteristics

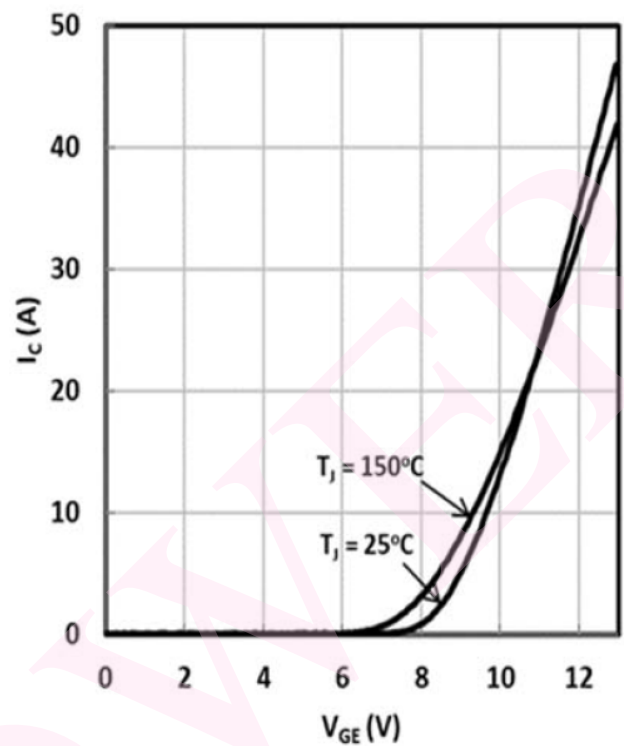


Fig. 2 IGBT (Inverter) Transfer Characteristics

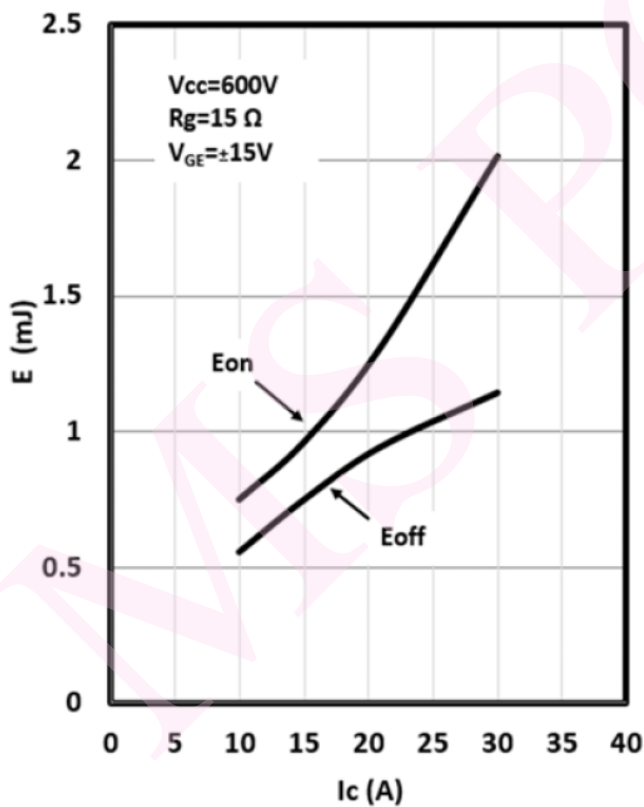


Fig. 3 IGBT (Inverter) Switching Loss vs. Ic

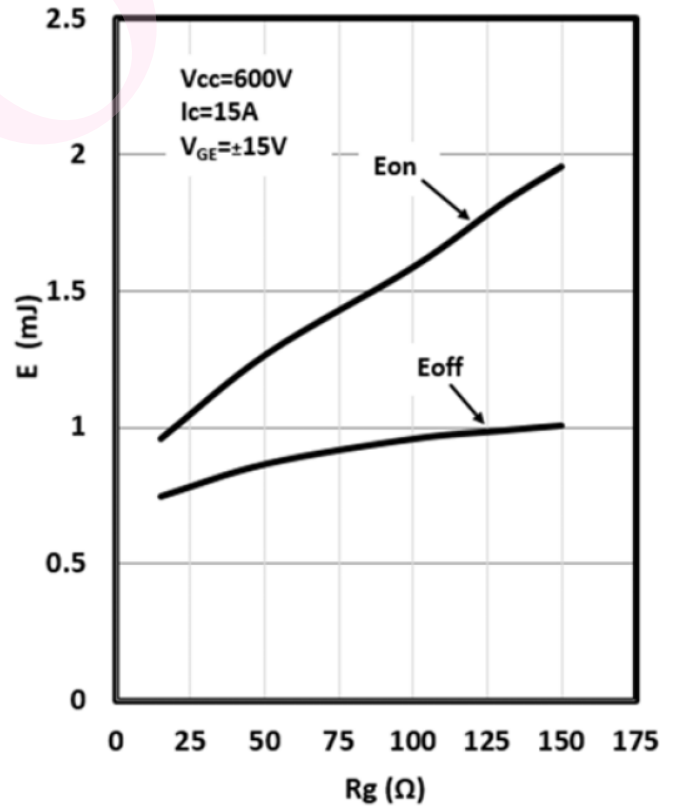


Fig. 4 IGBT (Inverter) Switching Loss vs. Rg

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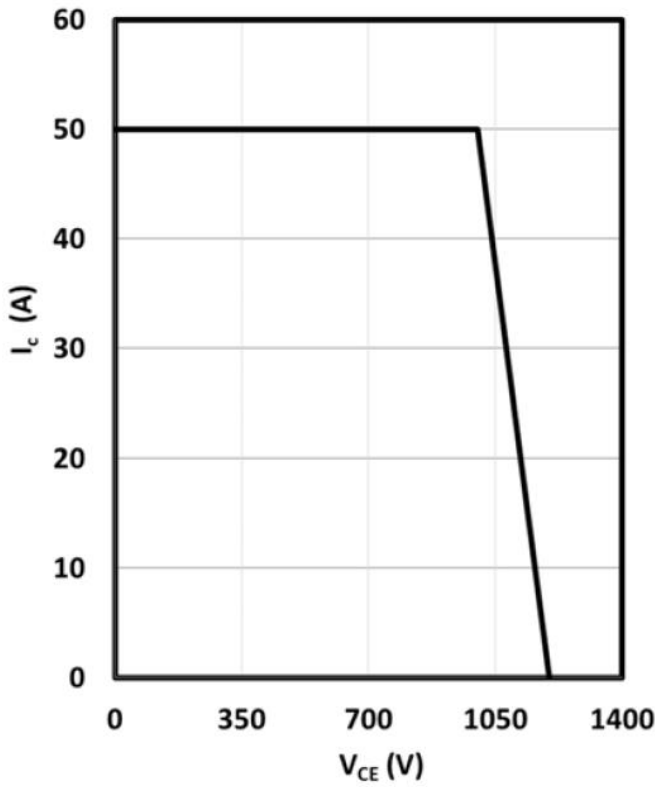


Fig. 5 RBSOA

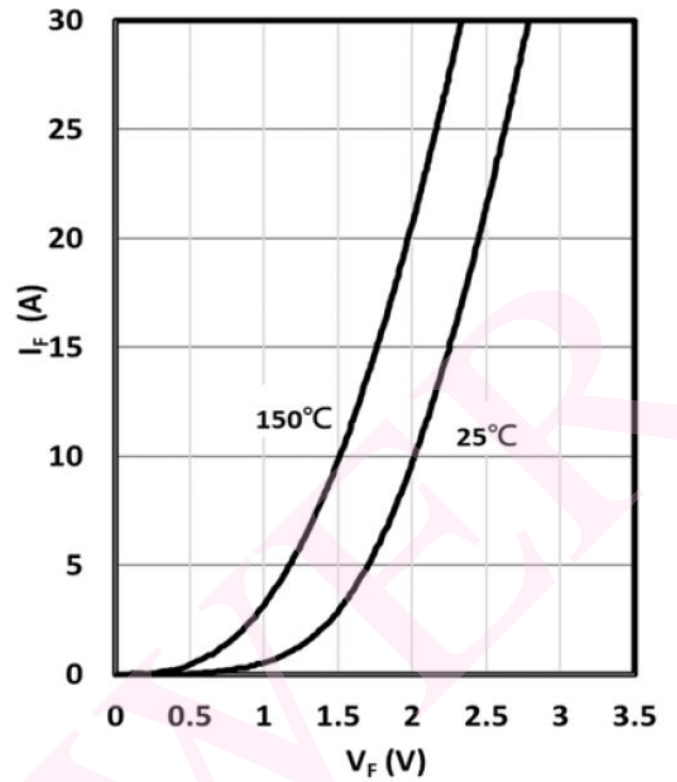


Fig. 6 Diode (Inverter) Forward Characteristics

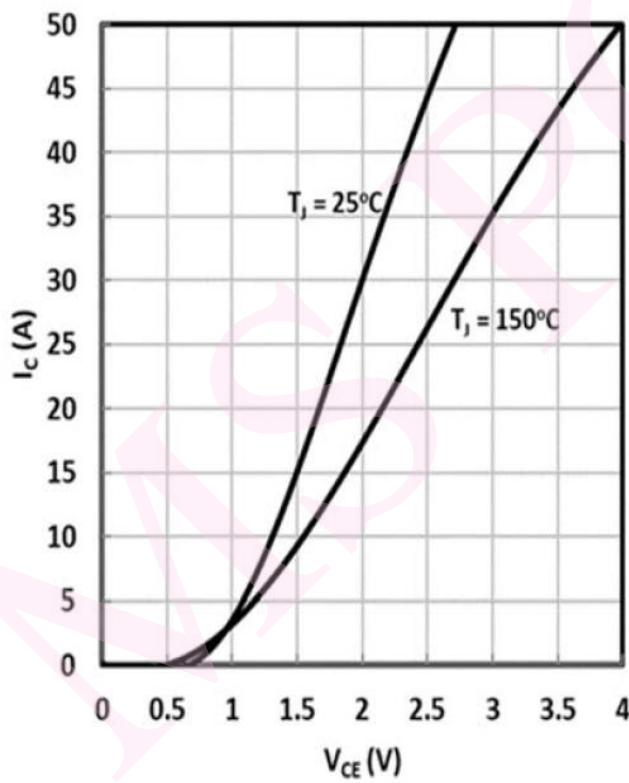


Fig. 7 IGBT (Brake-Chopper) Output Characteristics

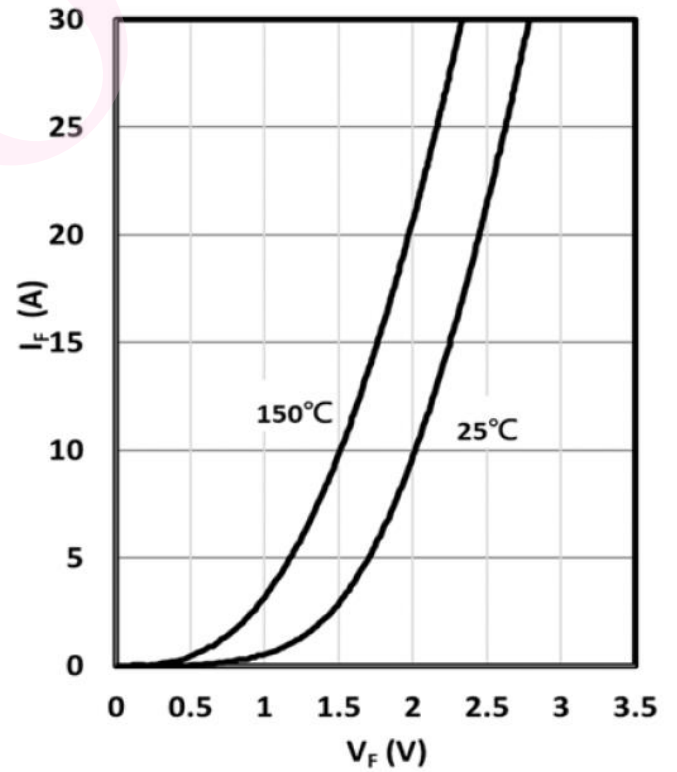


Fig. 8 Diode (Brake-Chopper) Output Characteristics

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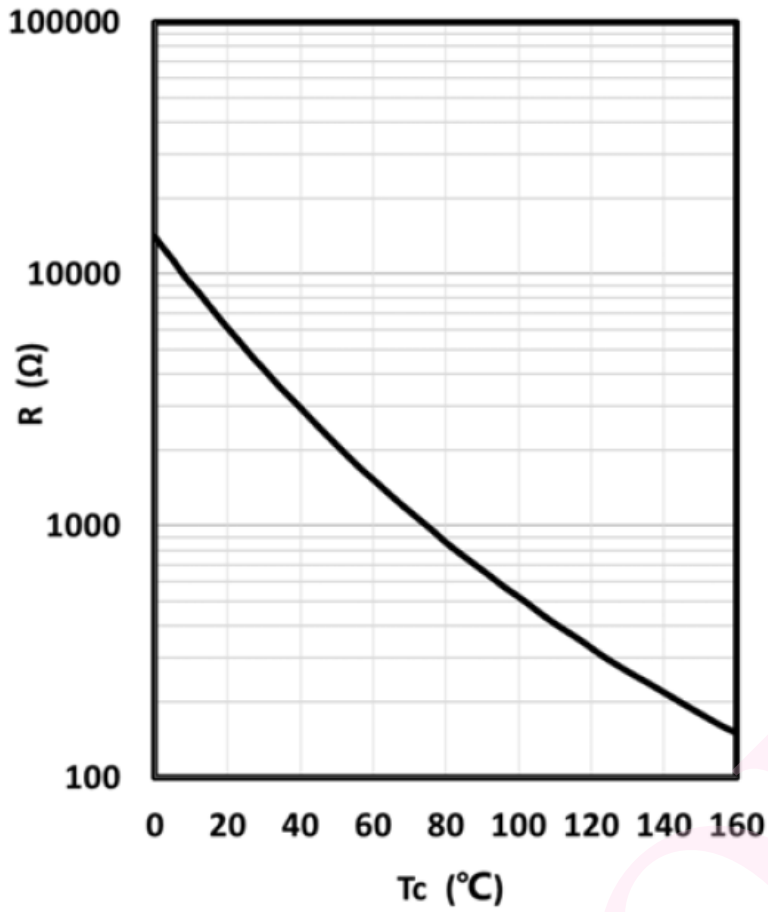
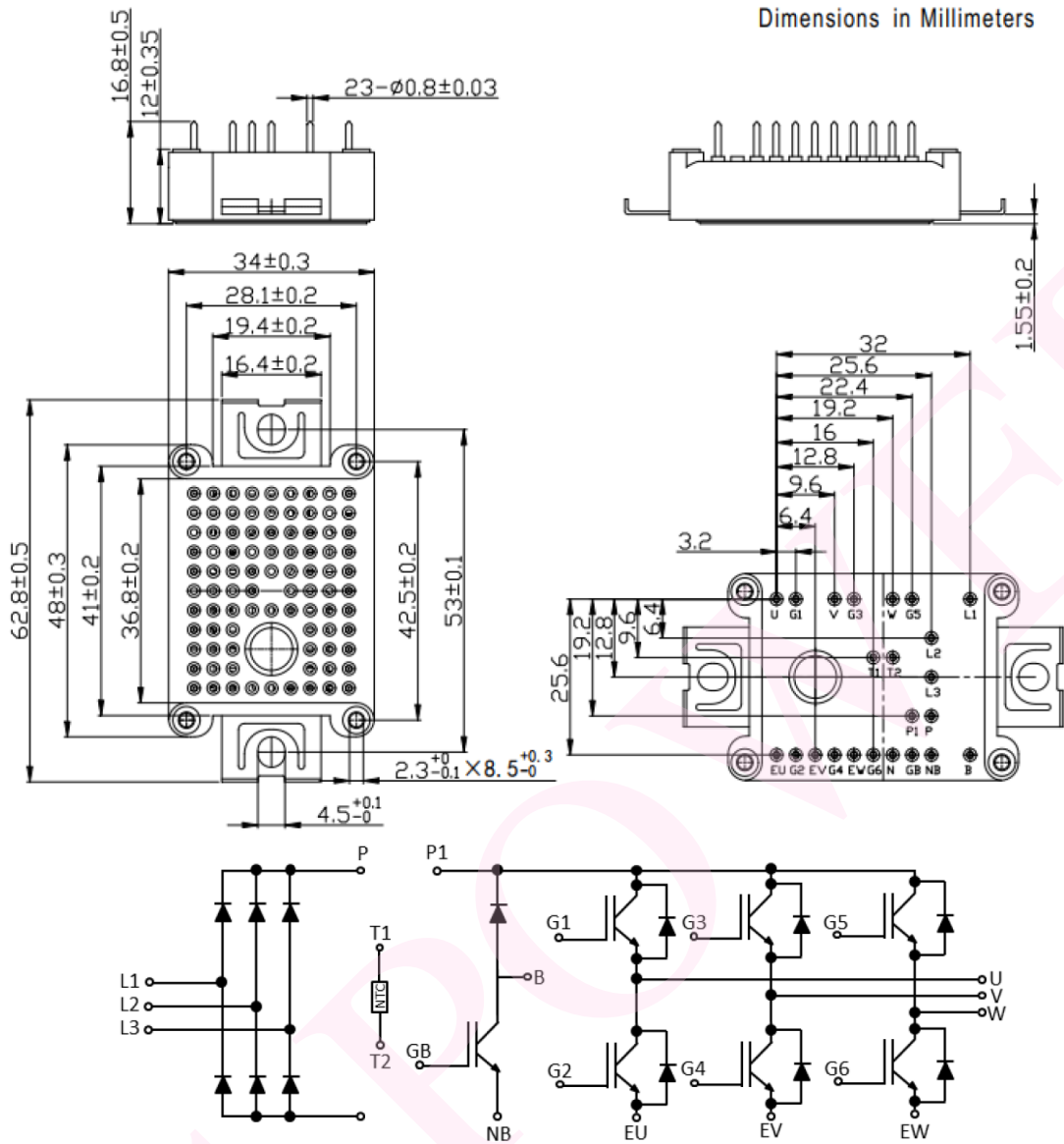


Fig. 9 NTC Temperature Characteristics

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