

Key Parameters

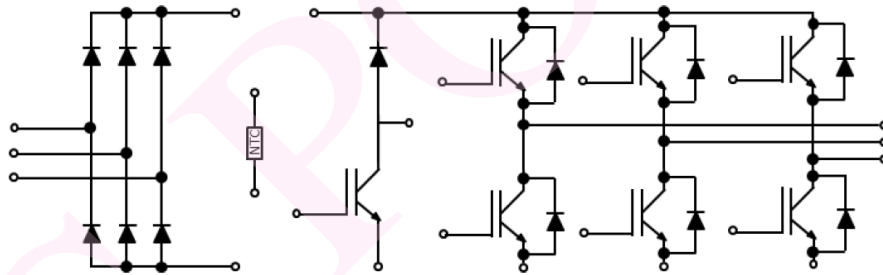
V_{CES} = 1200V
 I_c = 35A

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 ($T_C=100^{\circ}C, T_J=175^{\circ}C$)	35	A			
I_{CRM}	Peak Collector Current ($t_p=1ms$)	70	A			
V_{GES}	Gate-Emitter Voltage	± 20	V			
IGBT Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV_{CES}	Collector-Emitter breakdown Voltage	$V_{GE}=0V, I_C=250\mu A, T_{vj}=25^{\circ}C$	1200			V
I_{CES}	Collector-Emitter leakage Current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
I_{GES}	Gate-Emitter leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V, T_{vj}=25^{\circ}C$			100	μA
$V_{GE(th)}$	Gate-emitter Threshold Voltage	$V_{GE}=V_{CE}, I_C=1.5mA, T_{vj}=25^{\circ}C$	5.5	6.5	7.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=35A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.65	2.0	V
		$I_C=35A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.0		V
		$I_C=35A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.1		V
Q_G	Gate Charge	$V_{CC}=600V, V_{GE}=15V, I_C=35A, T_{vj}=25^{\circ}C$		148		μC
C_{iss}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25^{\circ}C$		3460		pF
C_{oss}	Output Capacitance			154		pF
C_{rss}	Reverse Transfer Capacitance			41		pF
$t_{d(on)}$	Turn-on Delay Time	$I_C=35A, V_{CE}=600V, V_{GE}=0/15V, R_G=10\Omega, T_{vj}=25^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		55		ns
t_r	Rise Time			58		ns
$t_{d(off)}$	Turn-off Delay Time			300		ns
t_f	Fall Time			110		ns
E_{on}	Energy Dissipation During Turn-on Time			2.8		mJ
E_{off}	Energy Dissipation During Turn-off Time			1.6		mJ
$t_{d(on)}$	Turn-on Delay Time		$I_C=35A, V_{CE}=600V, V_{GE}=0/15V, R_G=10\Omega, T_{vj}=150^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		57	
t_r	Rise Time			60		ns
$t_{d(off)}$	Turn-off Delay Time			320		ns
t_f	Fall Time			136		ns
E_{on}	Energy Dissipation During Turn-on Time			4.95		mJ
E_{off}	Energy Dissipation During Turn-off Time			2.15		mJ
$I_{C(SC)}$	SC Data	$t_{sc}\leq 10\mu s, V_{GE}=15V, T_{vj}=25^{\circ}C, V_{CC}\leq 600V,$			160	
Absolute Maximum Ratings: Diode, Inverter						
Symbol	Characteristic	Value	Unit			
V_{RRM}	Repetitive peak reverse voltage	1200	V			
I_F	Continuous DC forward current ($T_C=100^{\circ}C, T_J=150^{\circ}C$)	35	A			
I_{FRM}	Repetitive peak forward current ($t_p=1ms$)	75	A			
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	$I_F=35A, T_{vj}=25^{\circ}C$		2.05	2.45	V
		$I_F=35A, T_{vj}=125^{\circ}C$		1.75		V
		$I_F=35A, T_{vj}=150^{\circ}C$		1.68		V
Q_{rr}	Recovered Charge	$I_F=35A, V_R=600V$		2.15		μC
I_{rrm}	Peak Reverse Recovery Current	$-di_F/dt=500A/\mu s, T_{vj}=25^{\circ}C$		18		A
E_{rr}	Reverse Recovery Energy			0.75		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 ($T_C=100^{\circ}C, T_j=175^{\circ}C$)	25	A			
I_{CRM}	Peak Collector Current ($t_p=1ms$)	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	$V_{GE}=0V, I_C=250\mu A, T_{vj}=25^{\circ}C$	1200			V
I_{CES}	Collector-Emitter leakage Current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
I_{GES}	Gate-Emitter leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V, T_{vj}=25^{\circ}C$			100	ηA
$V_{GE(th)}$	Gate-emitter Threshold Voltage	$V_{GE}=V_{CE}, I_C=600\mu A, T_{vj}=25^{\circ}C$	5.5	6.5	7.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.2	V
		$I_C=25A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.3		V
		$I_C=25A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.4		V
Q_G	Gate Charge	$V_{CC}=600V, V_{GE}=15V, I_C=25A, T_{vj}=25^{\circ}C$		105		ηC
C_{iss}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25^{\circ}C$		1980		pF
C_{oss}	Output Capacitance			110		pF
C_{rss}	Reverse Transfer Capacitance			20		pF
$t_{d(on)}$	Turn-on Delay Time	$I_C=25A, V_{CE}=600V, V_{GE}=0/15V, R_G=15\Omega, T_{vj}=25^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		40		ηs
t_r	Rise Time			45		ηs
$t_{d(off)}$	Turn-off Delay Time			190		ηs
t_f	Fall Time			120		ηs
E_{on}	Energy Dissipation During Turn-on Time			1.75		mJ
E_{off}	Energy Dissipation During Turn-off Time			1.15		mJ
$t_{d(on)}$	Turn-on Delay Time		$I_C=25A, V_{CE}=600V, V_{GE}=0/15V, R_G=15\Omega, T_{vj}=150^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		45	
t_r	Rise Time			48		ηs
$t_{d(off)}$	Turn-off Delay Time			240		ηs
t_f	Fall Time			170		ηs
E_{on}	Energy Dissipation During Turn-on Time			2.9		mJ
E_{off}	Energy Dissipation During Turn-off Time			1.45		mJ
Absolute Maximum Ratings: Diode, Break-Chopper						
Symbol	Characteristic	Value	Unit			
V_{RRM}	Repetitive peak reverse voltage	1200	V			
I_F	Continuous DC forward current ($T_C=100^{\circ}C, T_j=150^{\circ}C$)	15	A			
I_{FRM}	Repetitive peak forward current ($t_p=1ms$)	30	A			
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	$I_F=15A, T_{vj}=25^{\circ}C$		2.0	2.40	V
		$I_F=15A, T_{vj}=125^{\circ}C$		1.75		V
		$I_F=15A, T_{vj}=150^{\circ}C$		1.65		V
Q_{rr}	Recovered Charge	$I_F=15A, V_R=600V, -di_F/dt=600A/\mu s, T_{vj}=25^{\circ}C$		1.2		μC
I_{rrm}	Peak Reverse Recovery Current			14.5		A
E_{rr}	Reverse Recovery Energy			0.4		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)	35				A
I _{RMSM}	Maximum RMS current at rectifier output (T _C =100°C)	60				A
I _{FSM}	Surge forward current (V _R =0V, t _p =10msec)	320				A
I ² t	I ² t value (V _R =0V, t _p =10msec)	510				A ² s
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _F	Forward Voltage	I _F =35A, T _{vj} =150°C		1.12		V
I _R	Diode reverse current	V _R =1600V, T _j =150°C			2.0	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			5.0		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		0.60		°C/W
		per Diode-inverter		0.80		°C/W
		per IGBT-Break Chopper		0.95		°C/W
		per Diode- Break Chopper		1.30		°C/W
		per Diode- Rectifier		0.90		°C/W
R _{θcs}	Case to Sink	per IGBT-inverter		0.60		°C/W
		per Diode-inverter		0.75		°C/W
		per IGBT-Break Chopper		0.80		°C/W
		per Diode- Break Chopper		1.05		°C/W
		per Diode- Rectifier		0.95		°C/W
		per Module		0.037		°C/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		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

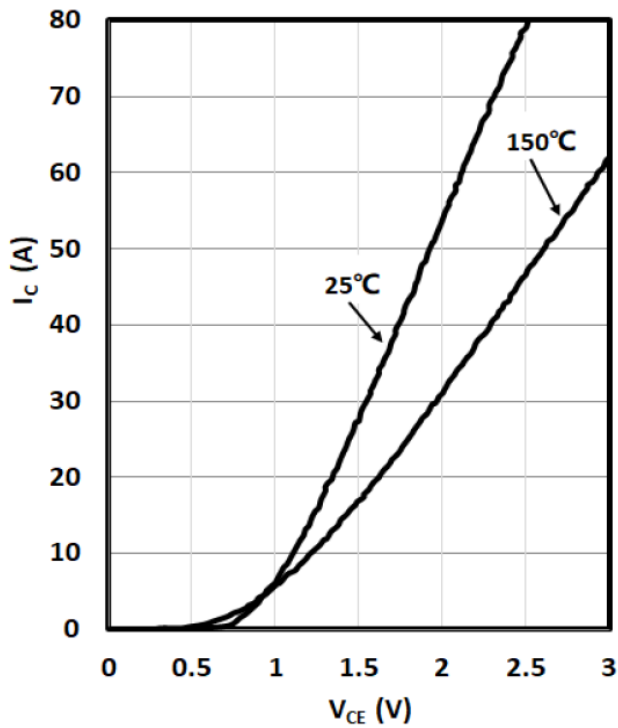


Fig. 1 IGBT (Inverter) Output Characteristics

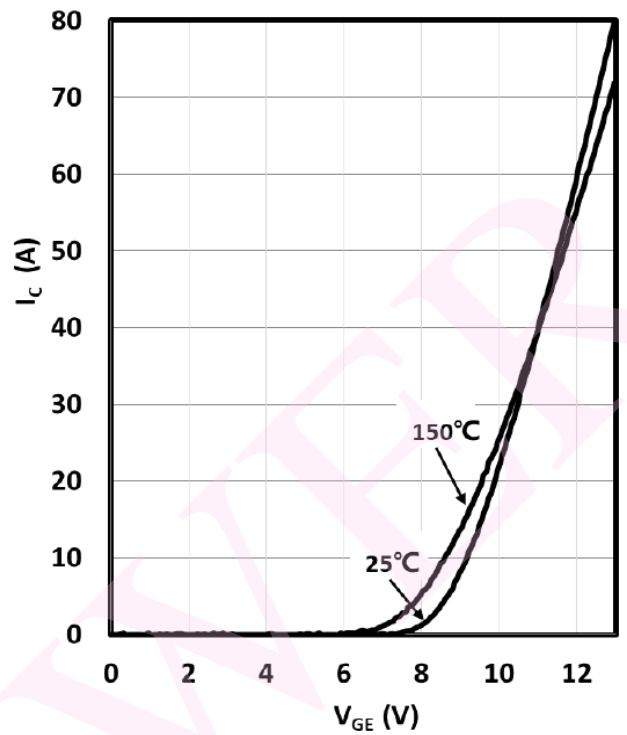


Fig. 2 IGBT (Inverter) Transfer Characteristics

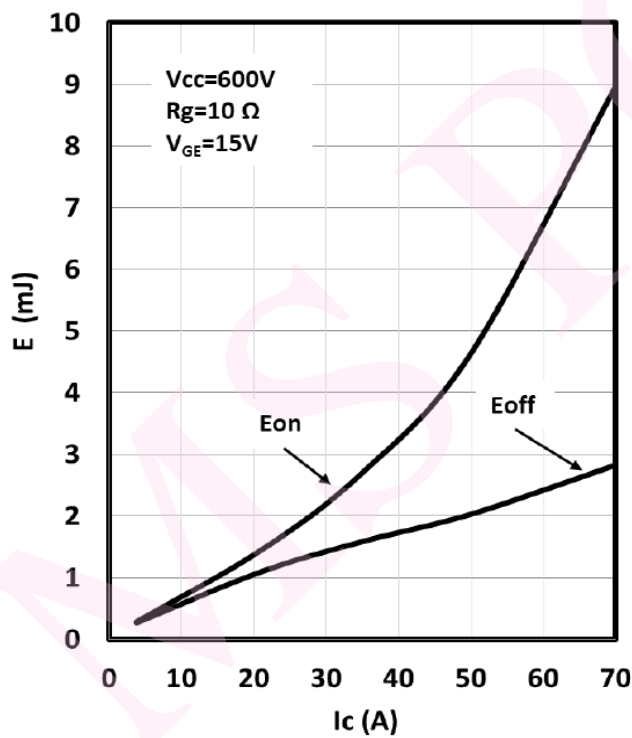


Fig. 3 IGBT (Inverter) Switching Loss vs. I_c

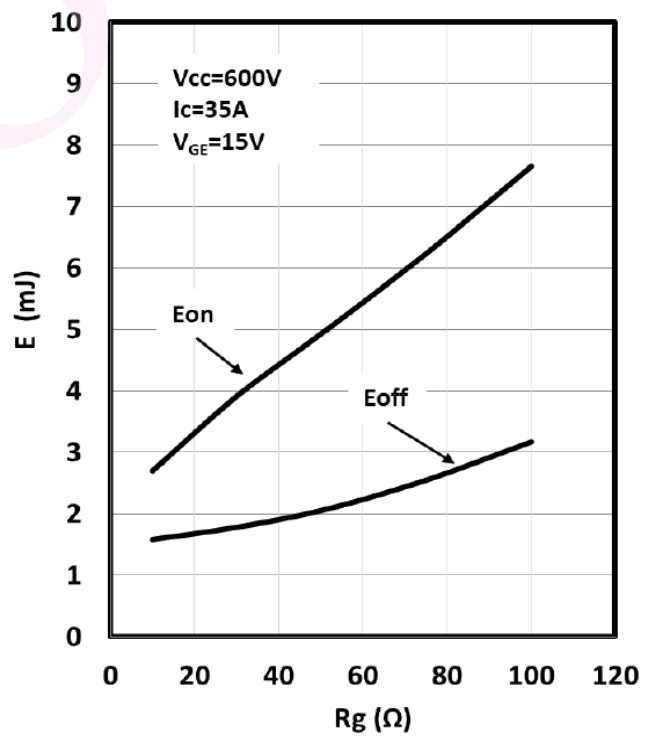


Fig. 4 IGBT (Inverter) Switching Loss vs. R_g

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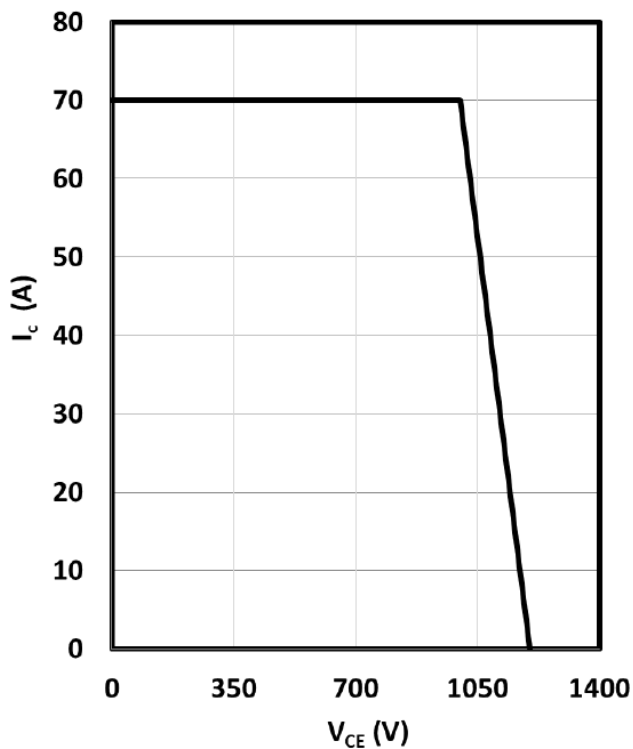


Fig. 5 RBSOA

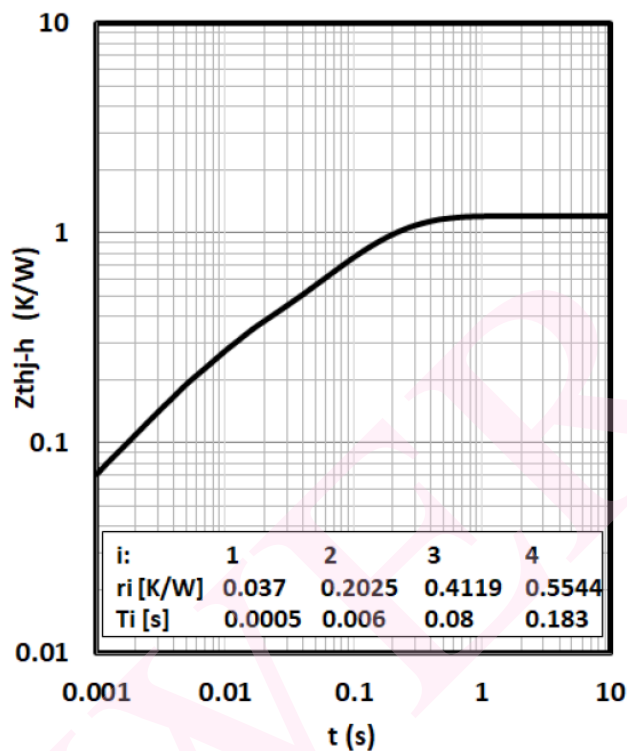


Fig. 6 IGBT (Inverter) Transient Thermal Impedance

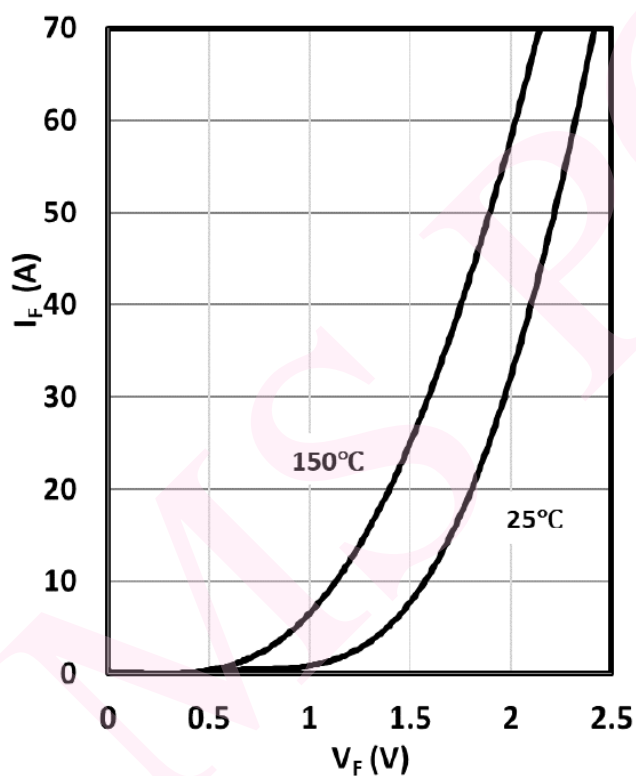


Fig. 7 Diode (Inverter) Forward Characteristics

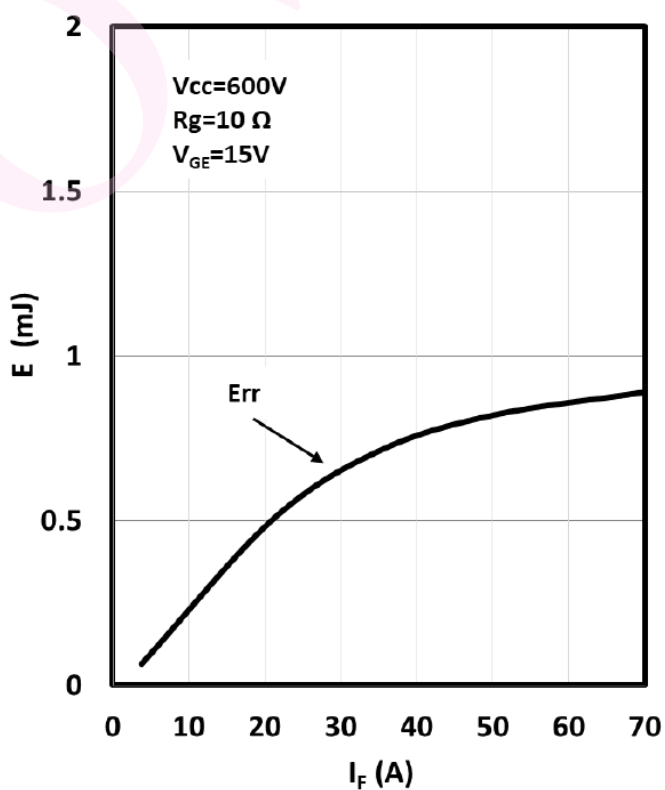


Fig. 8 Diode (Inverter) Reverse-Recovery Loss vs. I_F

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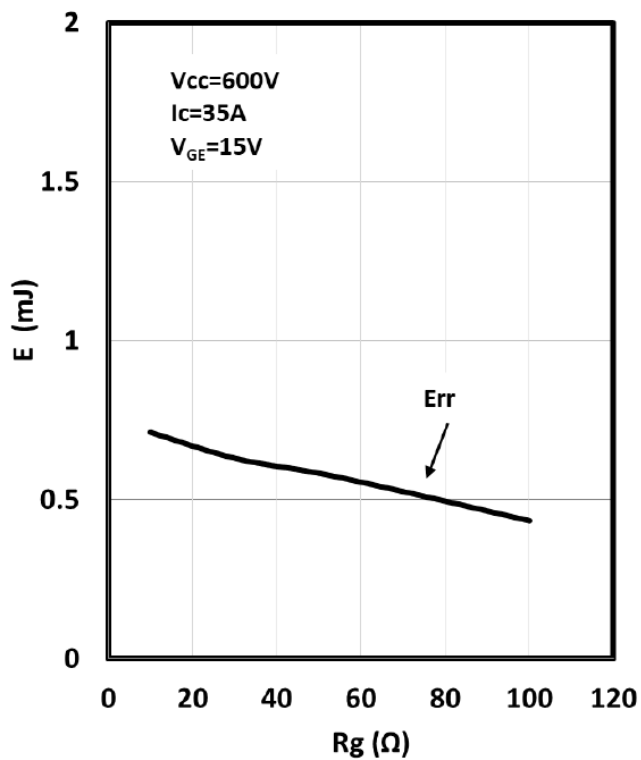


Fig. 9 Diode (Inverter) Reverse-Recovery Loss vs. R_g

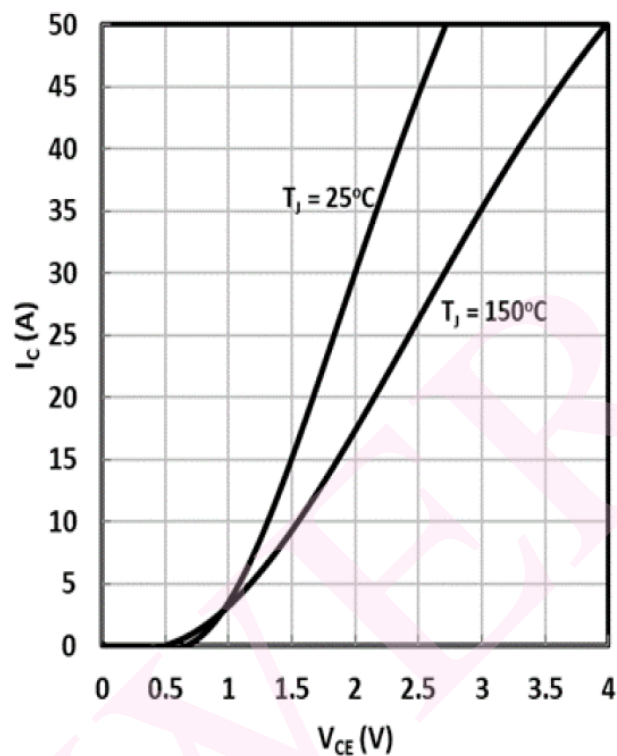


Fig. 10 IGBT (Break-Chopper) Output Characteristics

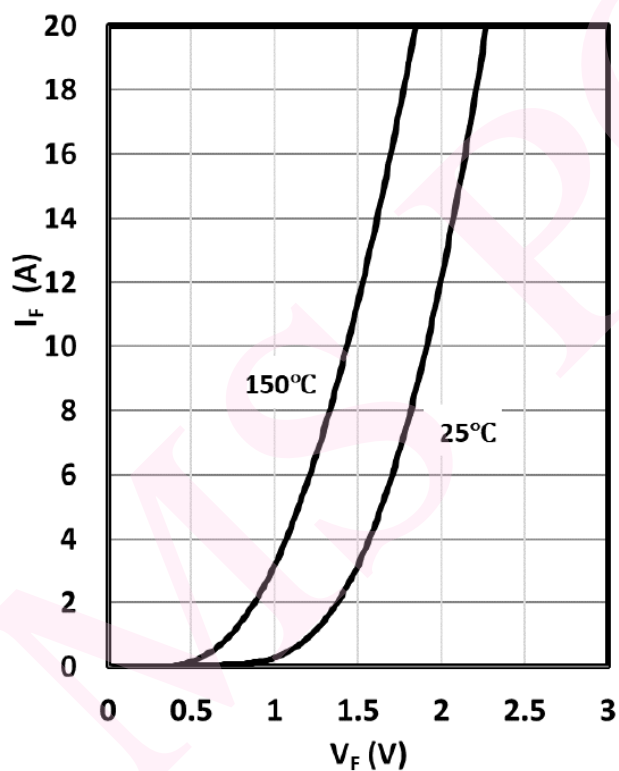


Fig. 11 Diode (Brake-Chopper) Output Characteristics

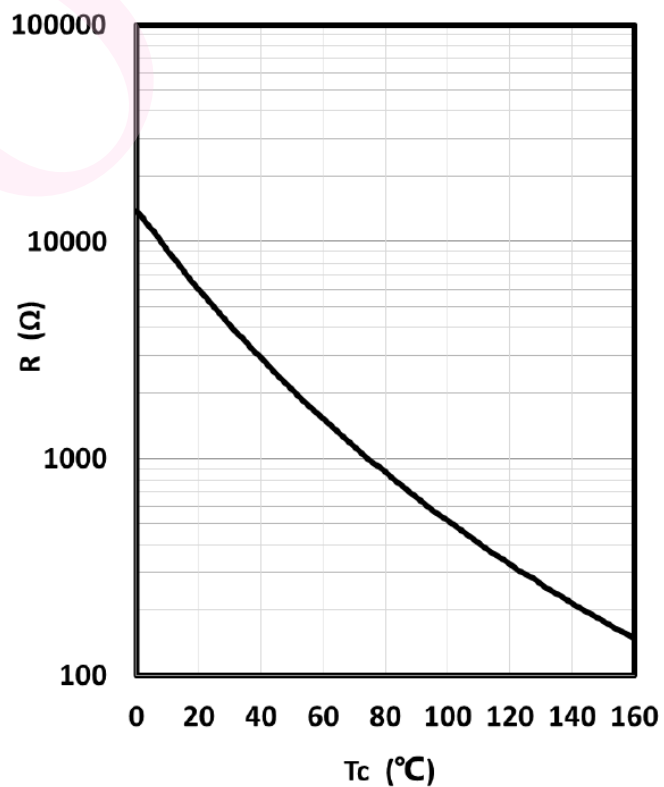
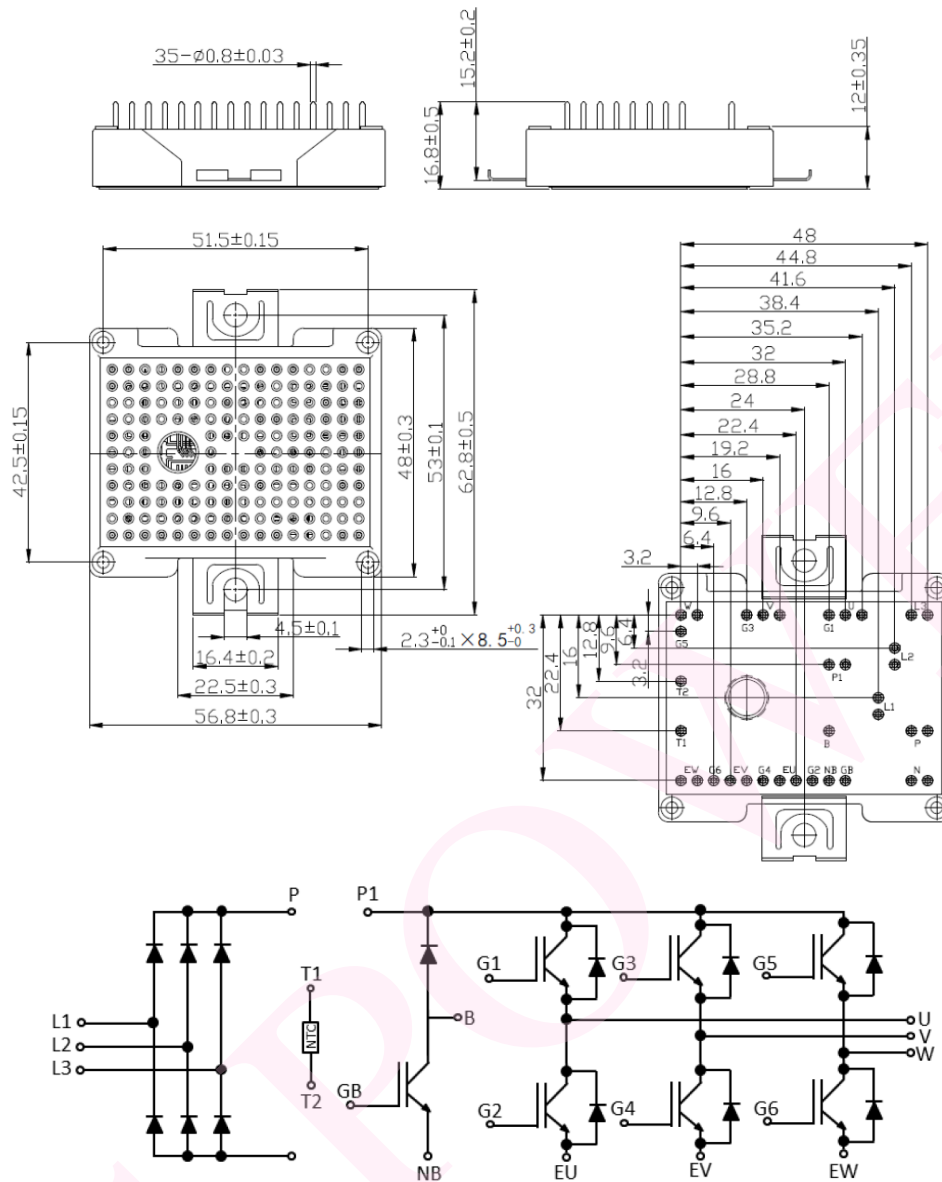


Fig. 12 NTC Temperature Characteristics

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