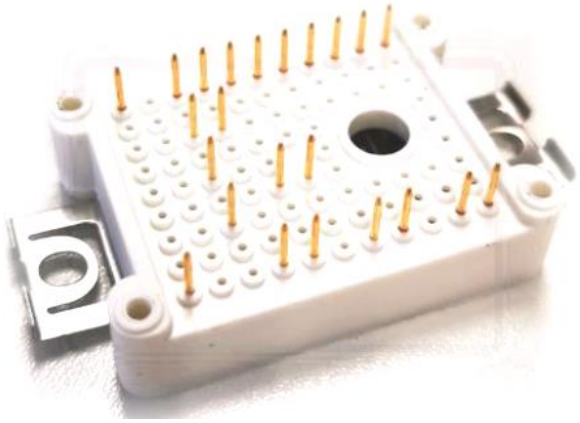


Key Parameters

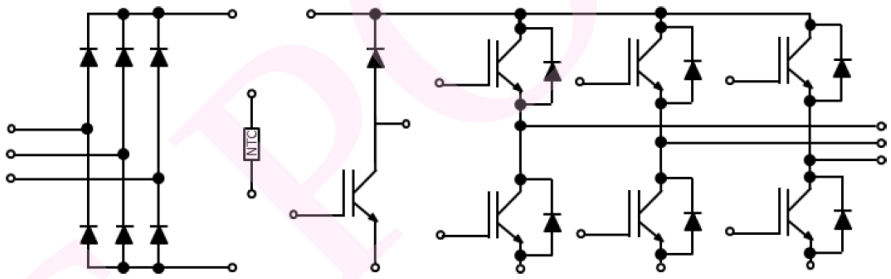
V_{CES}	= 1200V
I_C	= 25A

Features

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

Applications

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



Equivalent Circuit Schematic

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Approved by :	Revision : 0

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, Tj=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	Ic=25A,V_{GE}=15V, T_{vj}=25°C		1.85	2.2	V
		Ic=25A,V_{GE}=15V, T_{vj}=125°C		2.3		V
		Ic=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} =0/15V R_G = 15Ω T_{vj}=25°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} = 600 V V_{GE} =0/15V R_G = 15Ω T_{vj}=150°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		45		ηs
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
$I_{C(SC)}$	SC Data	t_{sc}≤10μs,V_{GE}=15V, Tv_j=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		2.4	2.9	V
		I_F=25A,T_{vj}=125°C		2.1		V
		I_F=25A,T_{vj}=150°C		2.0		V
Q_{rr}	Recovered Charge	I_F =25A V_R=600V -di_F/dt =455A/μs T_{vj}=25°C		1.5		μC
I_{rrm}	Peak Reverse Recovery Current			15.0		A
E_{rr}	Reverse Recovery Energy			0.55		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, Tj=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	Ic=25A,V_{GE}=15V, T_{vj}=25°C		1.85	2.2	V
		Ic=25A,V_{GE}=15V, T_{vj}=125°C		2.3		V
		Ic=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} =0/15V R_G = 15Ω T_{vj}=25°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} = 600 V V_{GE} =0/15V R_G = 15Ω T_{vj}=150°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		45		ηs
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
$I_{C(SC)}$	SC Data	t_{sc}≤10μs,V_{GE}=15V, Tv_j=25°C,V_{cc}≤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		2.2	2.65	V
		I_F=10A,T_{vj}=125°C		1.8		V
		I_F=10A,T_{vj}=150°C		1.7		V
Q_{rr}	Recovered Charge	I_F =10A V_R=600V -di_F/dt =600A/μs T_{vj}=25°C		0.8		μC
I_{rrm}	Peak Reverse Recovery Current			11.0		A
E_{rr}	Reverse Recovery Energy			0.22		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)	25	A
I_{RMSM}	Maximum RMS current at rectifier output (T_C=100°C)	50	A
I_{FSM}	Surge forward current (V_R=0V, t_p=10msec)	270	A
I^2t	I^2t value (V_R=0V, t_p=10msec)	360	A^2s

Diode Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	I_F=15A,T_{vj}=150°C		0.96		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
$R_{\theta jc}$	Junction-to Case	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		1.75		°C/W
		per Diode- Rectifier		1.03		°C/W
$R_{\theta cs}$	Case to Sink	per IGBT-inverter		0.95		°C/W
		per Diode-inverter		1.02		°C/W
		per IGBT-Break Chopper		0.95		°C/W
		per Diode- Break Chopper		1.30		°C/W
		per Diode- Rectifier		1.17		°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

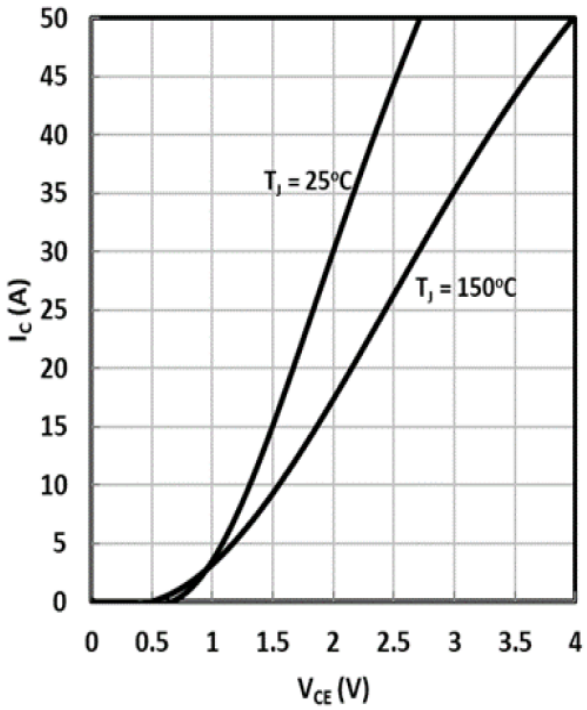

Fig. 1 IGBT (Inverter) Output Characteristics

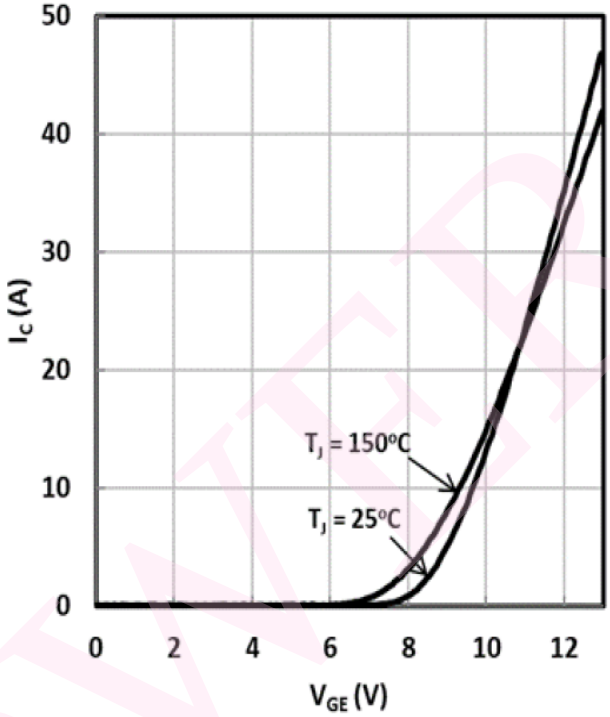

Fig. 2 IGBT (Inverter) Transfer Characteristics

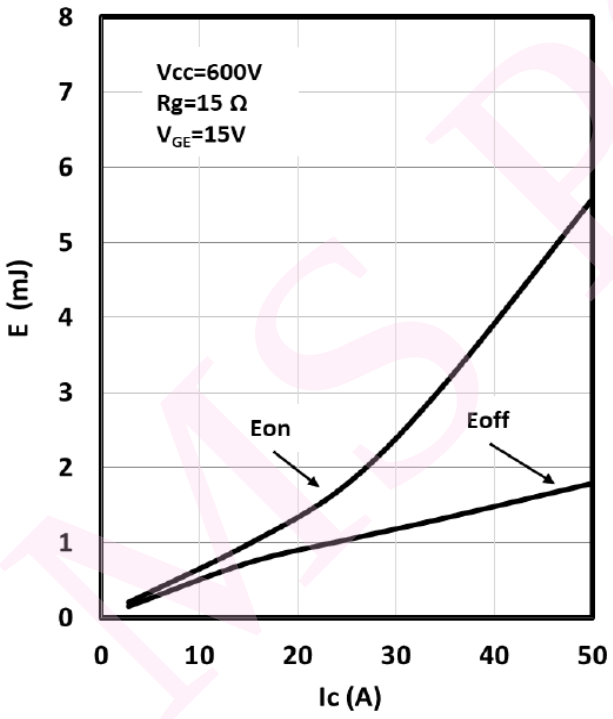

Fig. 3 IGBT (Inverter) Switching Loss vs. Ic

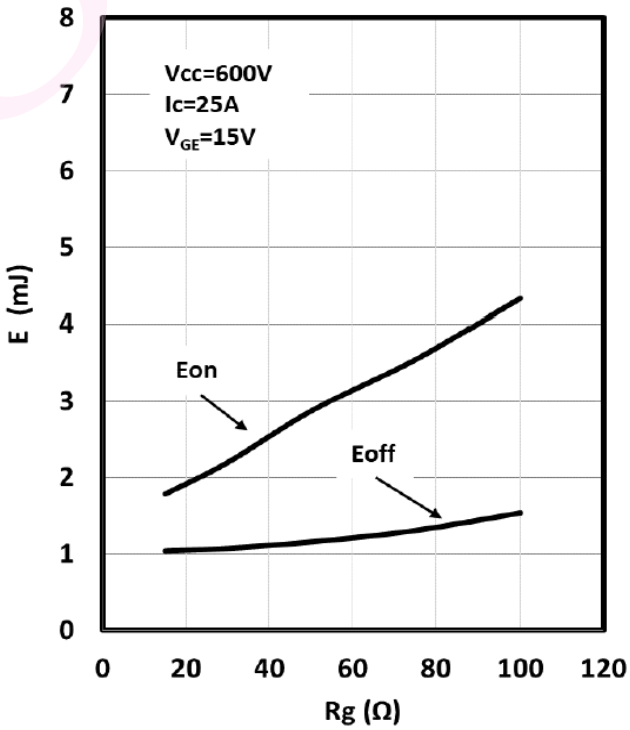

Fig. 4 IGBT (Inverter) Switching Loss vs. Rg

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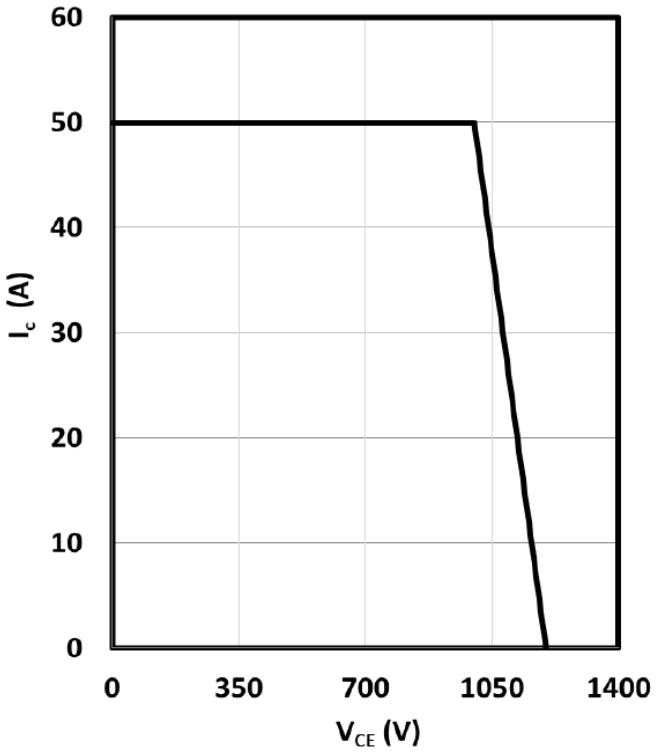

Fig. 5 RBSOA

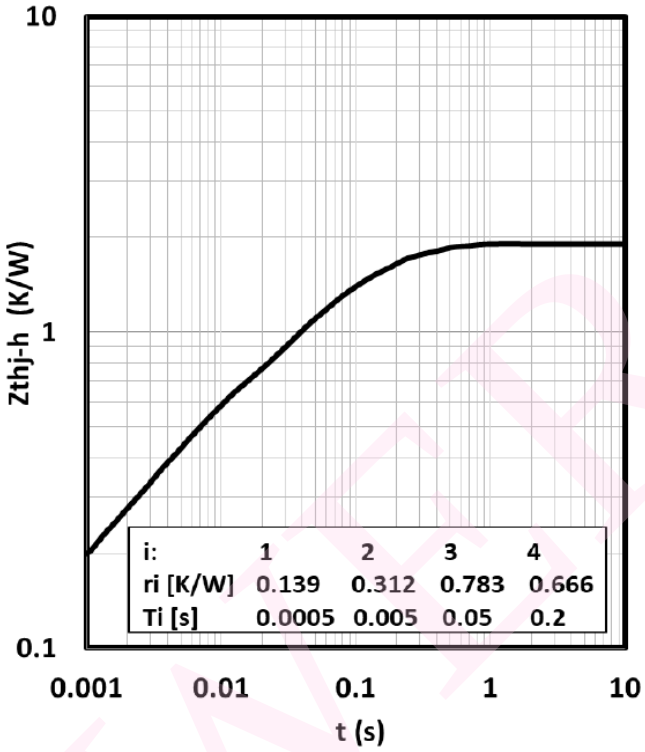

Fig. 6 IGBT (Inverter) Transient Thermal Impedance

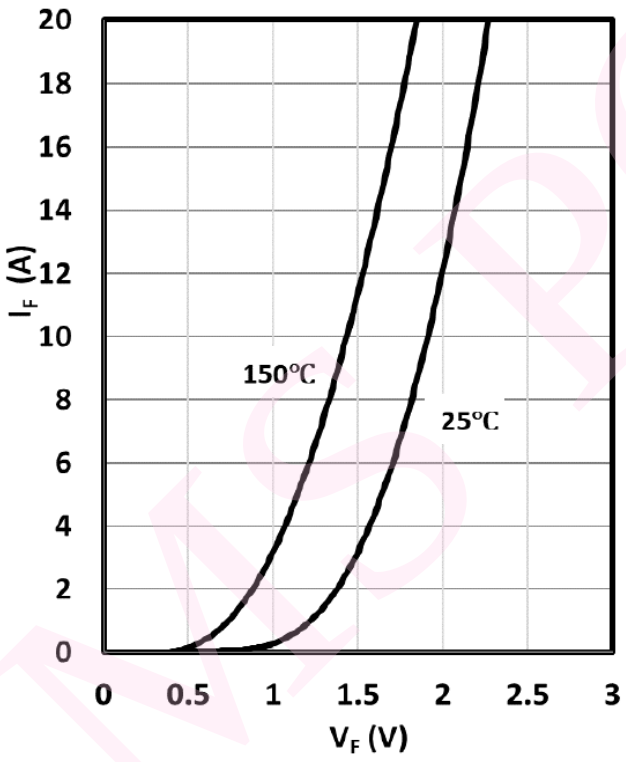

Fig. 7 Diode (Inverter) Forward Characteristics

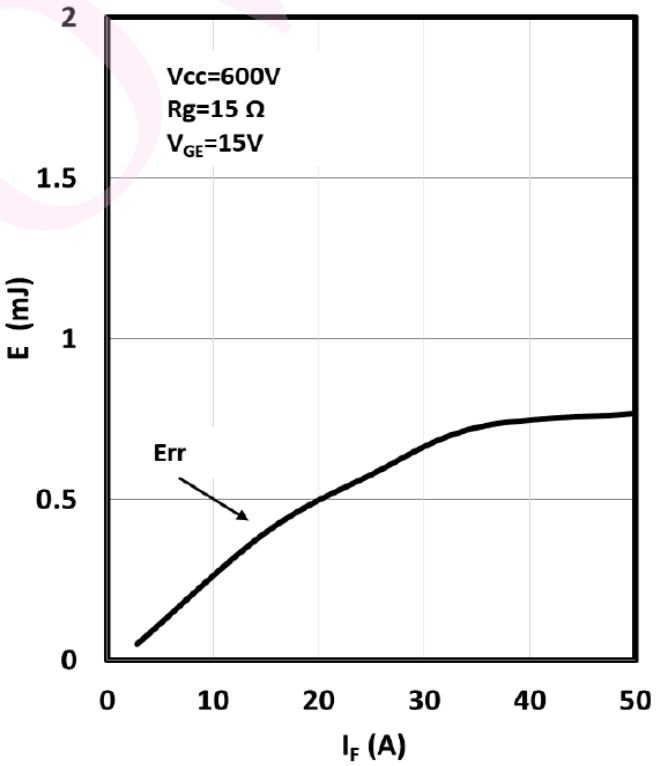

Fig. 8 Diode (Inverter) Reverse-Recovery Loss vs. I_F

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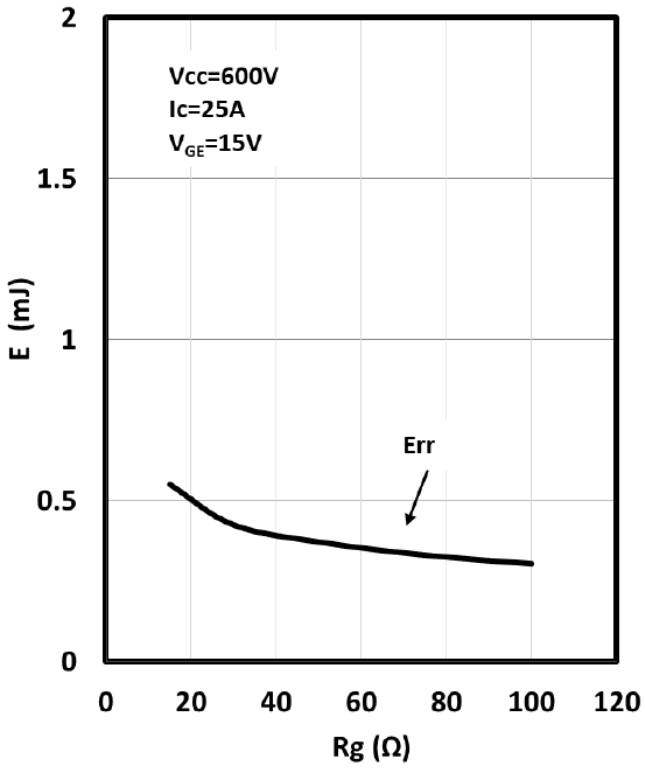

Fig. 9 Diode (Inverter) Reverse-Recovery Loss vs. Rg

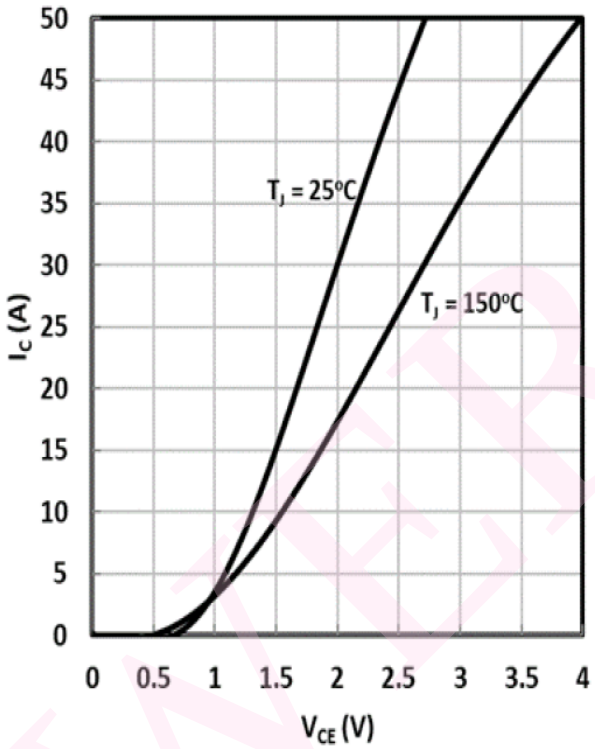

Fig. 10 IGBT (Brake-Chopper) Output Characteristics

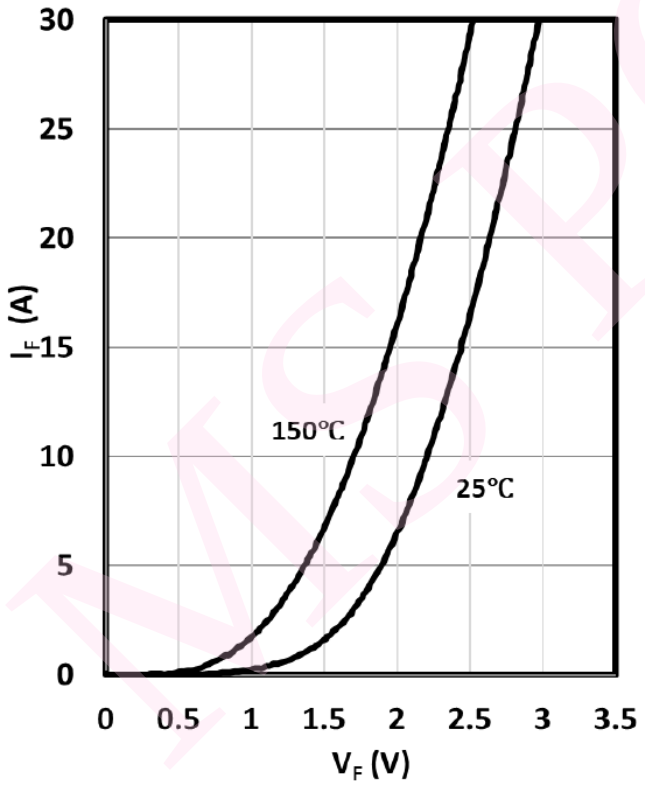

Fig. 11 Diode (Brake-Chopper) Output Characteristics

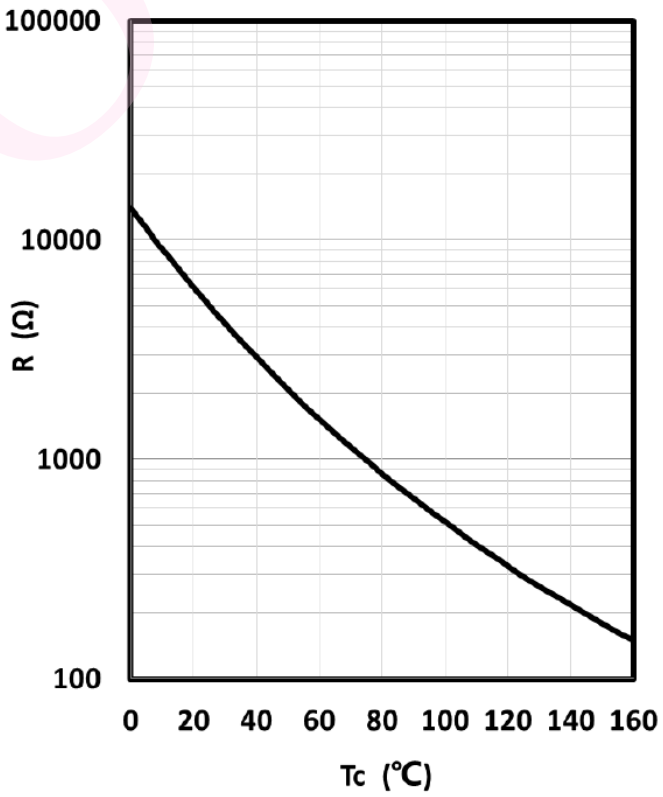

Fig. 12 NTC Temperature Characteristics

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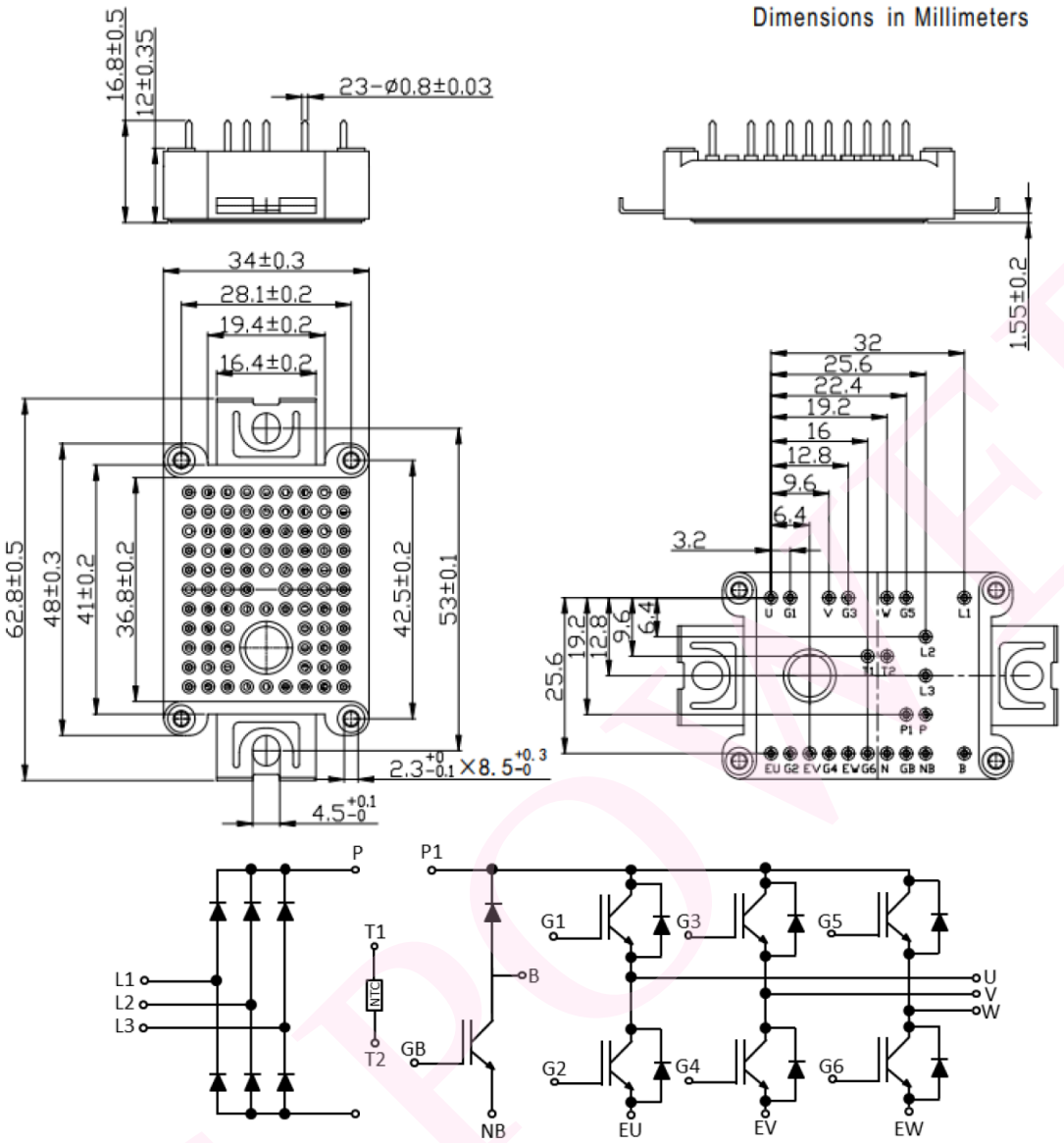
Outline :



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