

IGBT Modules



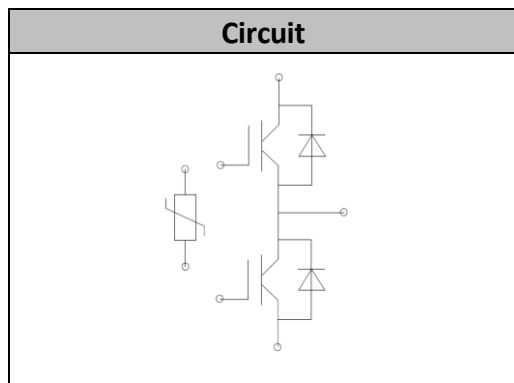
V_{CES} 1200V
 I_C 600A

Applications

- Motion/sevo control
- High frequency switching application
- UPS (Uninterruptible Power Supplies)
- Welding machine

Features

- Low $V_{ce(sat)}$ with Trench technology
- Low switching losses especially E_{off}
- $V_{ce(sat)}$ with positive temperature coefficient
- High short circuit capability(10us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance package
- Maximum junction temperature 175°C



● IGBT

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V$, $I_C=1mA$, $T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_c=100^{\circ}C$	600	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	1200	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_c=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	3800	W

**Characteristic values**

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=13mA$, $T_{vj}=25^{\circ}C$	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V$, $V_{GE}=0V$, $T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=600A$, $V_{GE}=15V$, $T_{vj}=25^{\circ}C$		1.8	2.5	V
		$I_C=600A$, $V_{GE}=15V$, $T_{vj}=125^{\circ}C$		2.25		
		$I_C=600A$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$		2.35		
Gate Charge	Q_G			4.4		uC
Internal Gate Resistance	R_{Gint}			1.67		Ω
Input Capacitance	C_{ies}	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$, $T_{vj}=25^{\circ}C$		52.44		nF
Reverse Transfer Capacitance	C_{res}			2.19		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V$, $V_{GE}=20V$, $T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_{GON}=2.5\Omega$ $R_{GOFF}=7.5\Omega$ $T_{vj}=25^{\circ}C$		248		ns
Rise Time	t_r			102		ns
Turn-off Delay Time	$t_{d(off)}$			1286		ns
Fall Time	t_f			111		ns
Energy Dissipation During Turn-on Time	E_{on}			42.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			102.3		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_{GON}=2.5\Omega$ $R_{GOFF}=7.5\Omega$ $T_{vj}=125^{\circ}C$		239		ns
Rise Time	t_r			125		ns
Turn-off Delay Time	$t_{d(off)}$			1395		ns
Fall Time	t_f			118		ns
Energy Dissipation During Turn-on Time	E_{on}			65.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			127.4		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_{GON}=2.5\Omega$ $R_{GOFF}=7.5\Omega$ $T_{vj}=150^{\circ}C$		245		ns
Rise Time	t_r			138		ns
Turn-off Delay Time	$t_{d(off)}$			1465		ns
Fall Time	t_f			124		ns
Energy Dissipation During Turn-on Time	E_{on}			75.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			136.5		mJ
SC Data	I_{sc}	$t_p \leq 10\mu s$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$, $V_{cc}=900V$, $V_{CEM} \leq 1200V$		2350		A



● Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F		600	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	1200	A
I^2t -value	I^2t	$V_R=0, t_p=10\text{ms}, T_{vj}=125^{\circ}\text{C}$	35000	A^2s
		$V_R=0, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	32000	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=600\text{A}, T_{vj}=25^{\circ}\text{C}$		2.15		V
		$I_F=600\text{A}, T_{vj}=125^{\circ}\text{C}$		1.94		
		$I_F=600\text{A}, T_{vj}=150^{\circ}\text{C}$		1.89		
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		32.6		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=4800\text{A}/\mu\text{s}$		298		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		14.2		mJ
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		85.6		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=4800\text{A}/\mu\text{s}$		437		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=125^{\circ}\text{C}$		40.5		mJ
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		95.5		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=4800\text{A}/\mu\text{s}$		455		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		52.7		mJ

● NTC-Thermistor

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		$\text{k}\Omega$
Deviation of R_{100}	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K



● Module Characteristics

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Thermal Resistance Junction to Case	$R_{\theta \text{ JC}}$	per IGBT			0.039	K/W
		per Diode			0.076	
Thermal Resistance Case to Sink	$R_{\theta \text{ CS}}$	Conductive grease applied		0.009		K/W
Comparative Tracking Index	CTI			>200		
Module Electrodes Torque	M_t	Recommended(M5)	3.0		5.0	N·m
Module to Sink Torque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			345		g

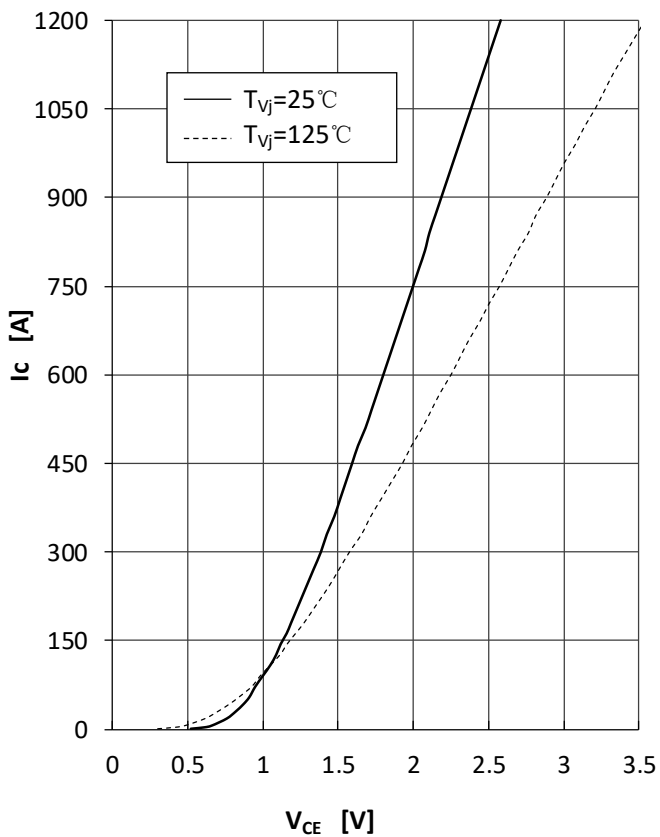


Fig1.IGBT Output Characteristics

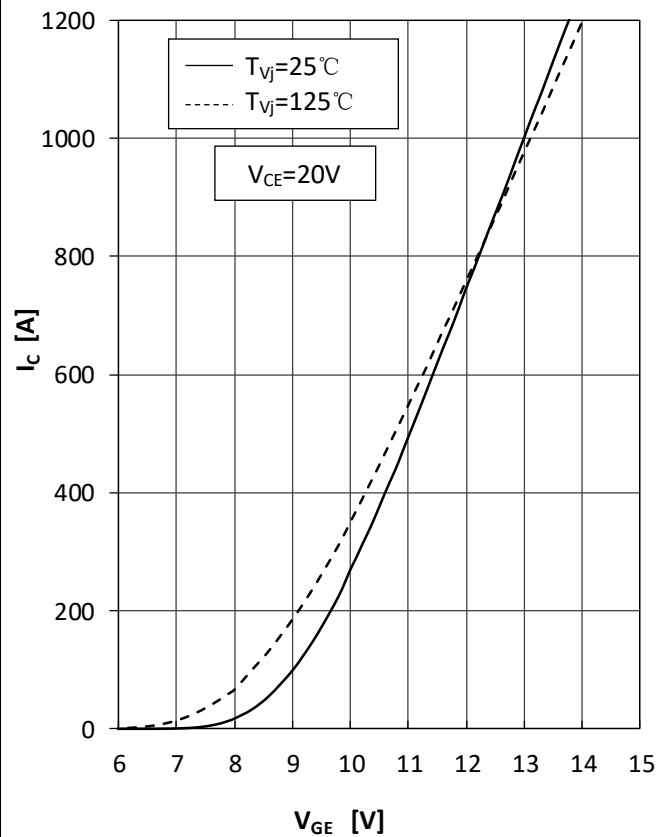


Fig2.IGBT Transfer Characteristics

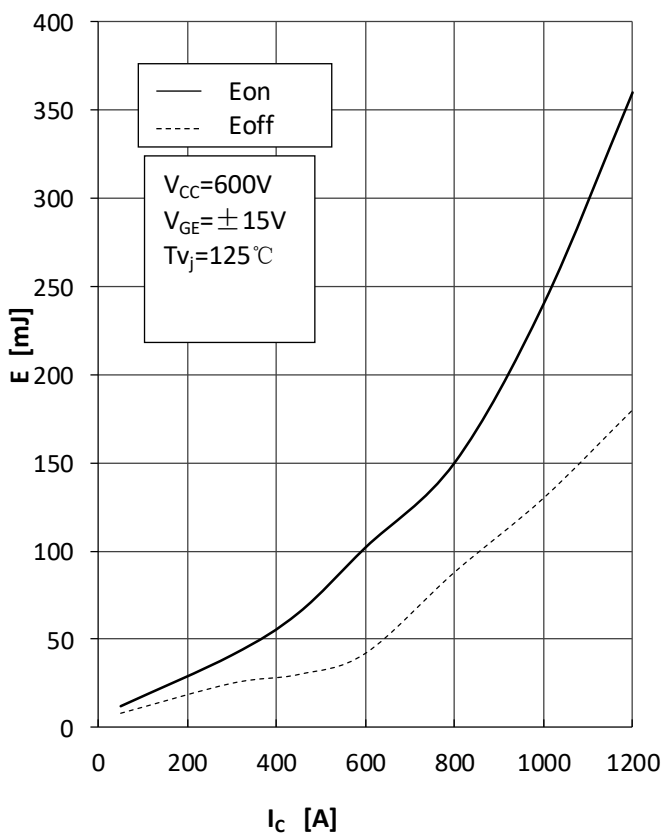


Fig3.IGBT Switching Loss vs.Ic

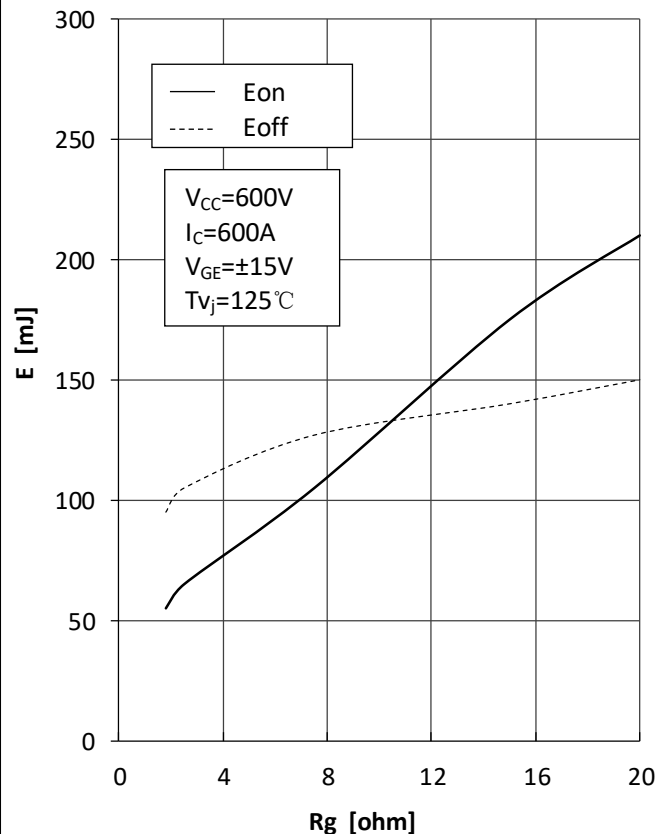
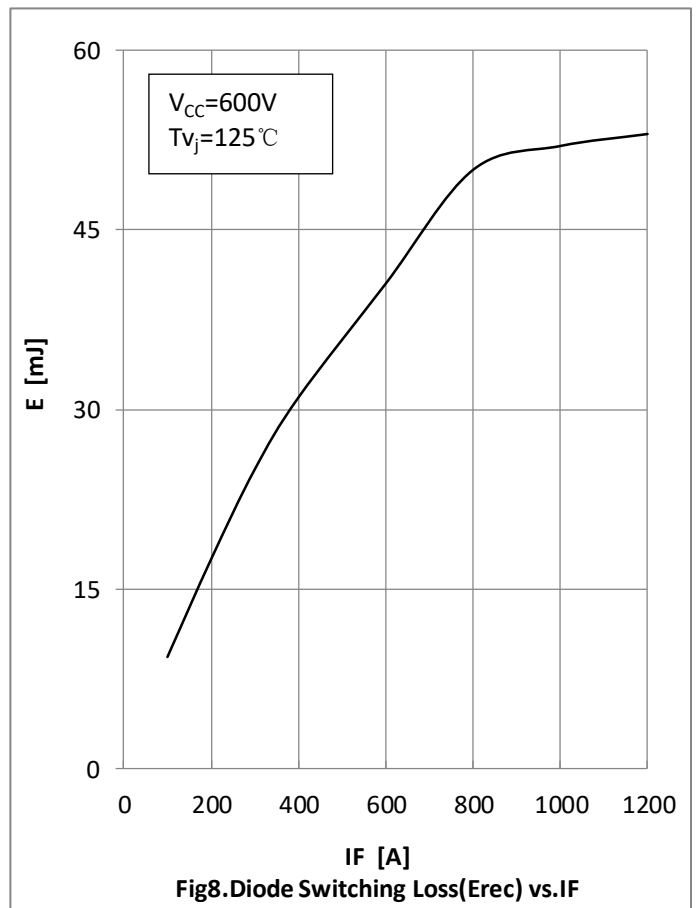
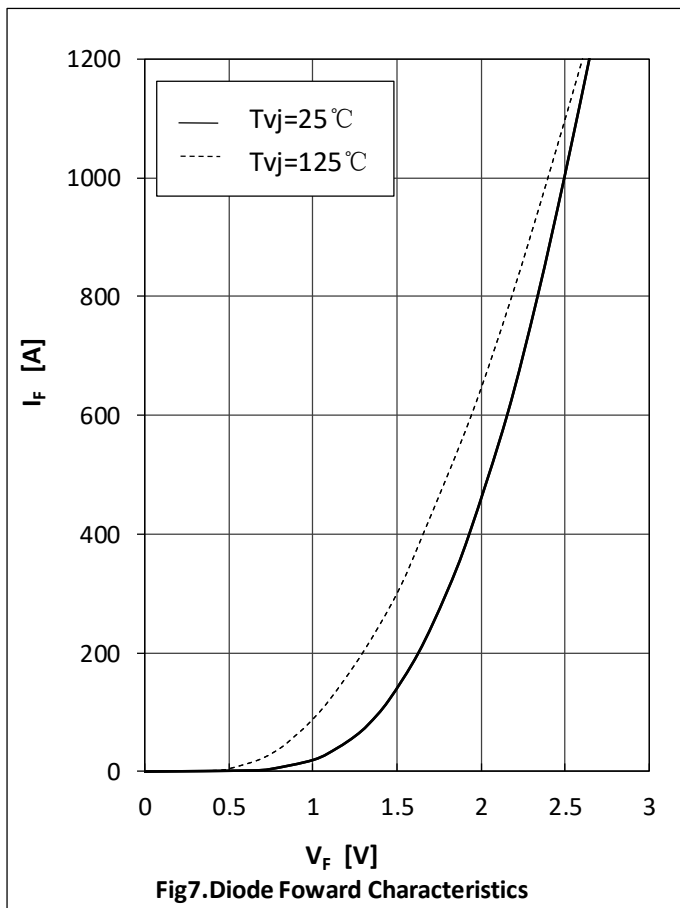
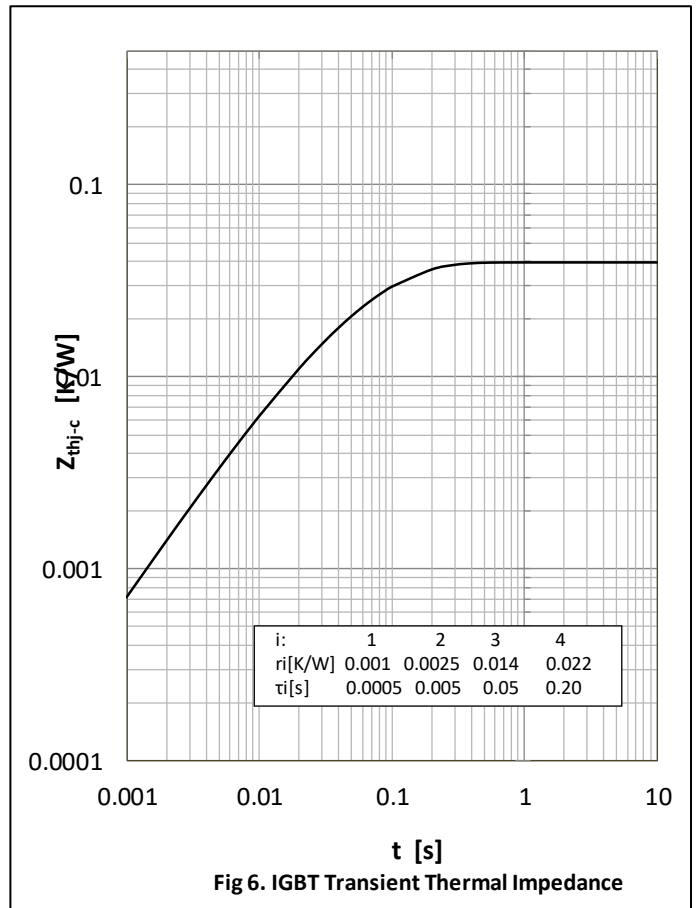
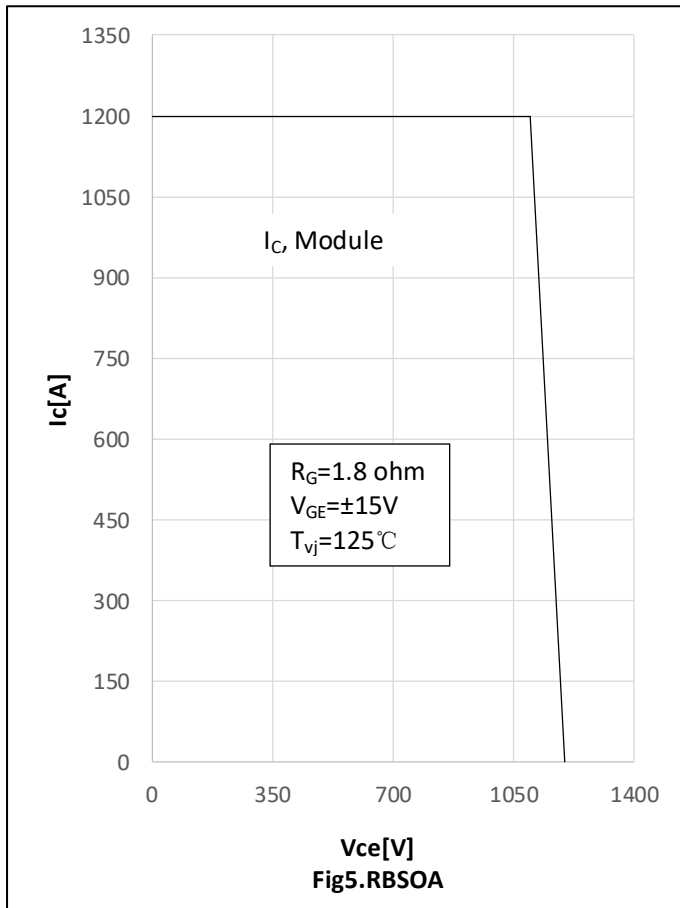
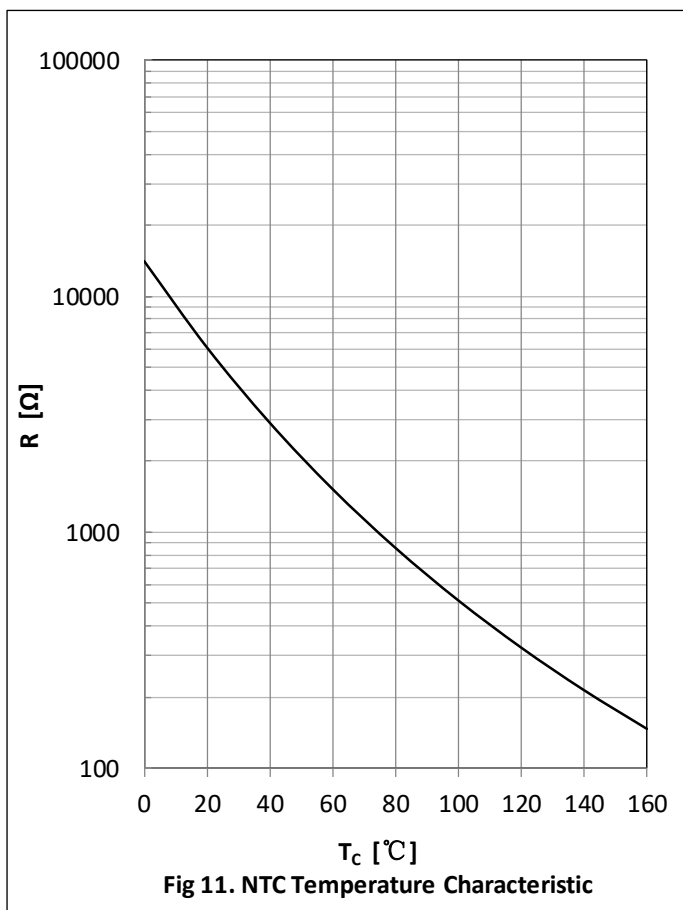
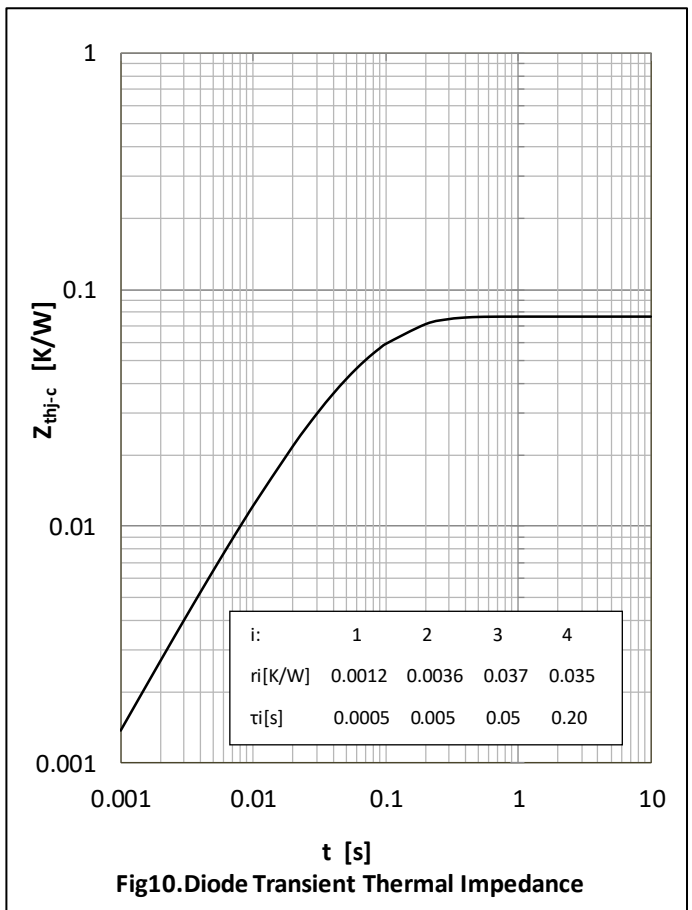
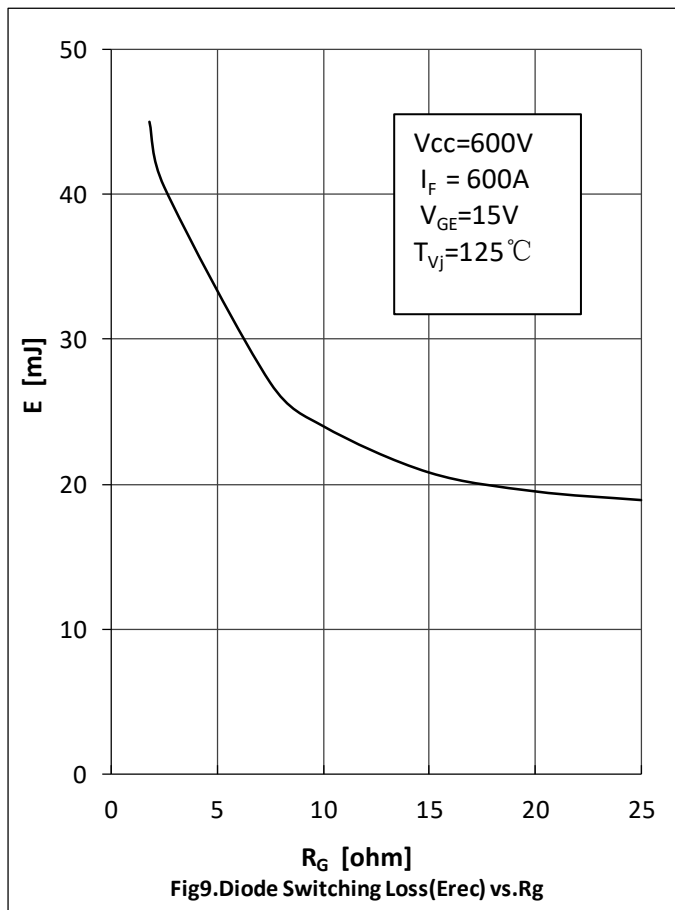
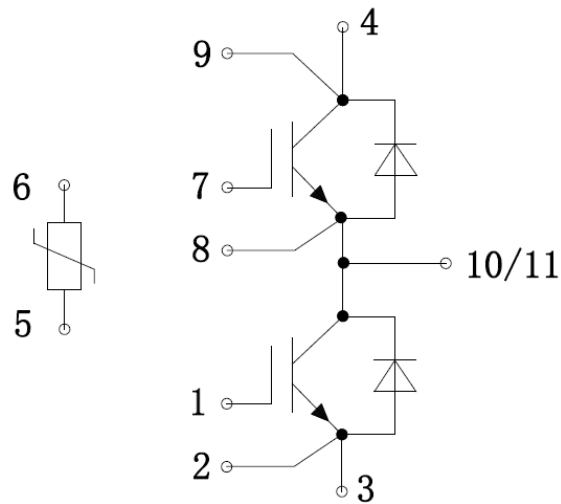


Fig4.IGBT Switching Loss vs.Rg

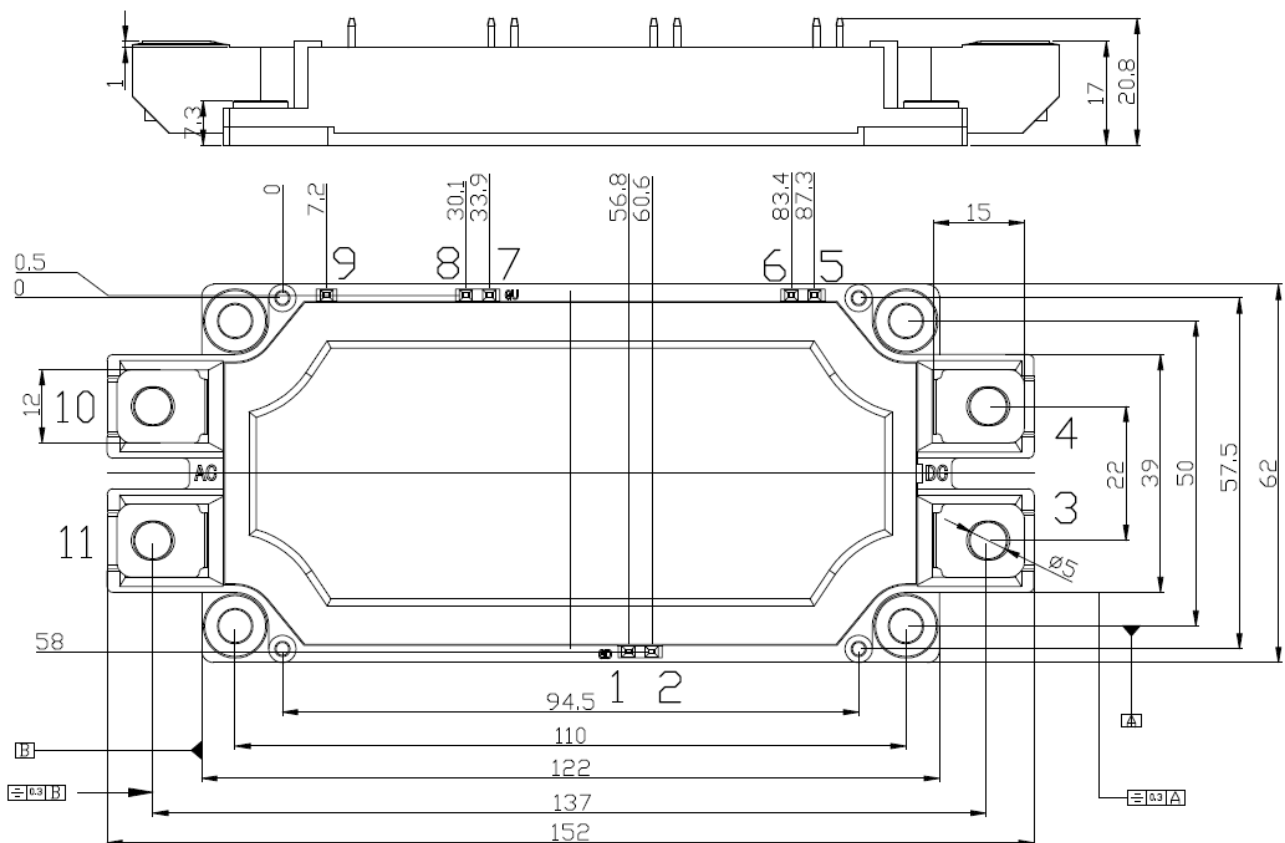




● Circuit Diagram



● Package Outline Information





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