

IGBT Modules



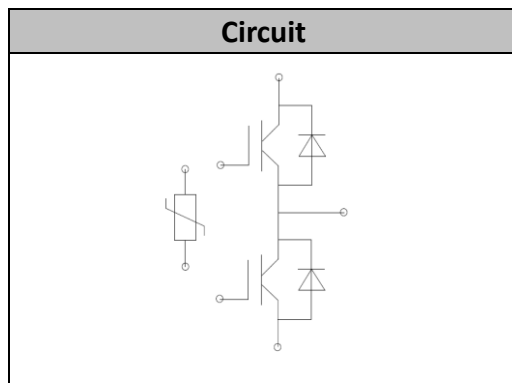
V_{CES}	1200V
I_C	600A

Applications

- Motion/servo 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}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	3333	W

**Characteristic Values**

Parameter	Symbol	Conditions	Value			Unit		
			Min.	Typ.	Max.			
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=13mA, T_{vj}=25^{\circ}C$	5.0	6.2	7.5	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	$V_{CE(sat)}$	$I_C=600A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.75		V		
		$I_C=600A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.0				
		$I_C=600A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.15				
Gate Charge	Q_G			5.3		μC		
Internal Gate Resistance	R_{Gint}			1.2		Ω		
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		44		nF		
Reverse Transfer Capacitance	C_{res}			2.1		nF		
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			500	nA		
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.5\Omega$ $T_{vj}=25^{\circ}C$		120		ns		
Rise Time	t_r			80		ns		
Turn-off Delay Time	$t_{d(off)}$				552		ns	
Fall Time	t_f				207		ns	
Energy Dissipation During Turn-on Time	E_{on}				84.2		mJ	
Energy Dissipation During Turn-off Time	E_{off}				59.3		mJ	
Turn-on Delay Time	$t_{d(on)}$		$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.5\Omega$ $T_{vj}=150^{\circ}C$		144		ns	
Rise Time	t_r				84		ns	
Turn-off Delay Time	$t_{d(off)}$					644		ns
Fall Time	t_f					323		ns
Energy Dissipation During Turn-on Time	E_{on}				110.4		mJ	
Energy Dissipation During Turn-off Time	E_{off}				79.1		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}	$T_{vj}=25^{\circ}C$	1200	V
Continuous DC Forward Current	I_F		600	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	1200	A
I^2t -value	I^2t	$V_R=0V, t_p=10ms, T_{vj}=150^{\circ}C$	37500	A ² s

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=600A, T_{vj}=25^{\circ}C$		2.0		V
		$I_F=600A, T_{vj}=125^{\circ}C$		2.15		
		$I_F=600A, T_{vj}=150^{\circ}C$		2.25		
Recovered Charge	Q_{rr}	$I_F=600A$		50.3		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt=6000A/us$		253		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}C$		15.2		mJ
Recovered Charge	Q_{rr}	$I_F=600A$		93.1		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=600V$ $-di_F/dt=6000A/us$		303		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}C$		29.4		mJ

● NTC-Thermistor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		kΩ
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15 K))]$		3375		K



● Module Characteristics

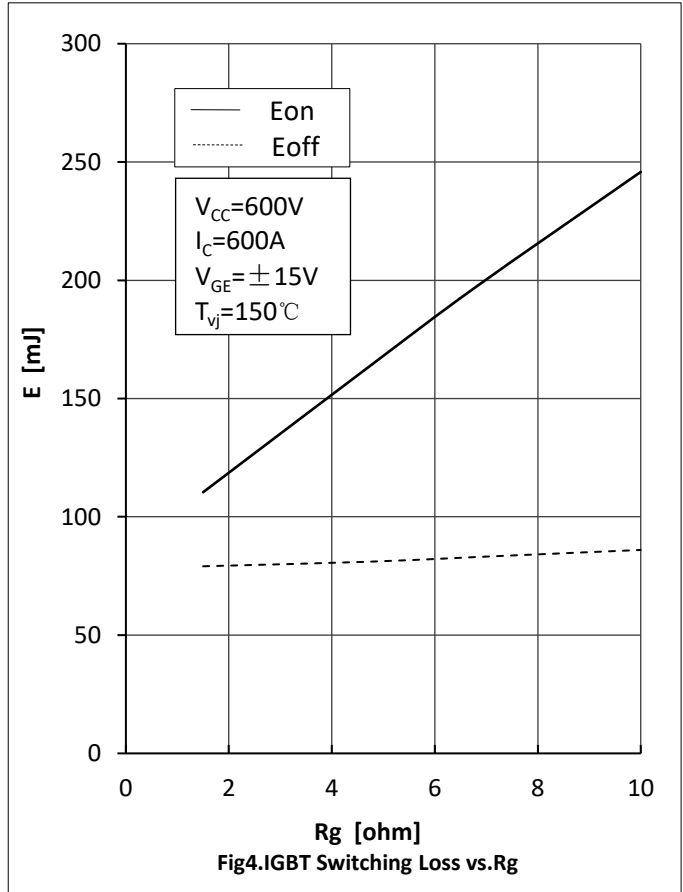
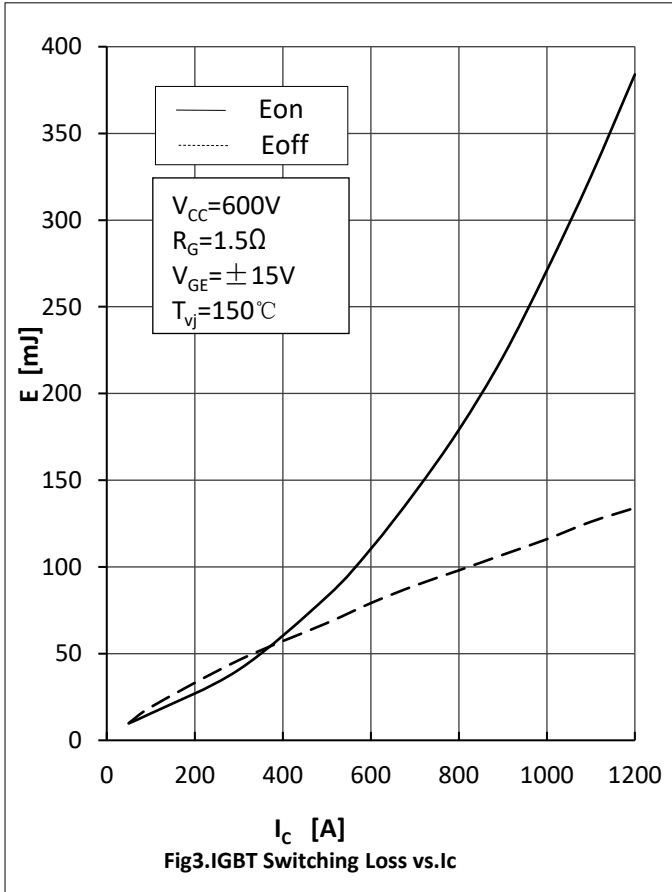
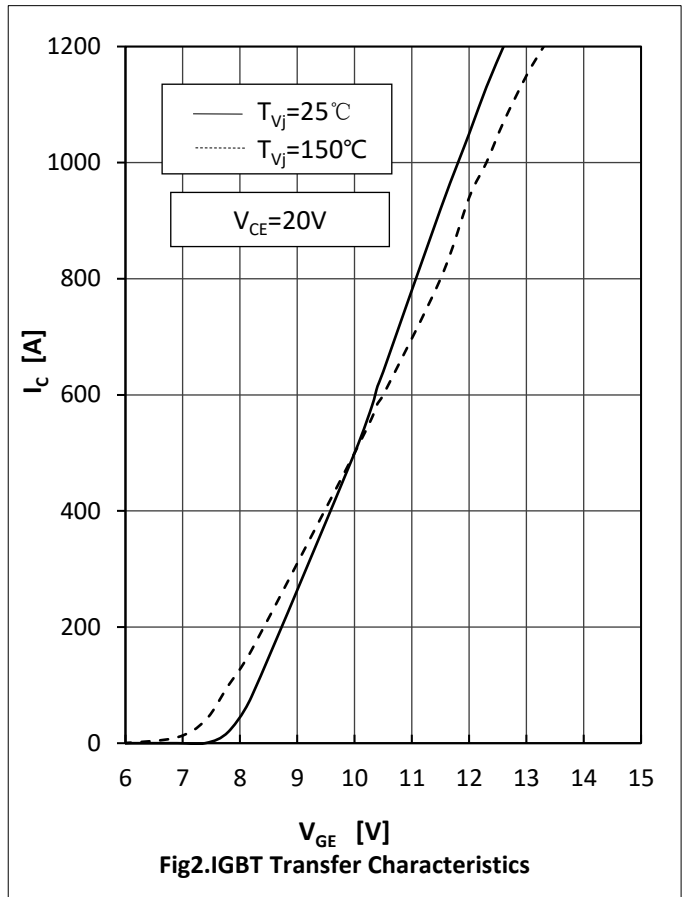
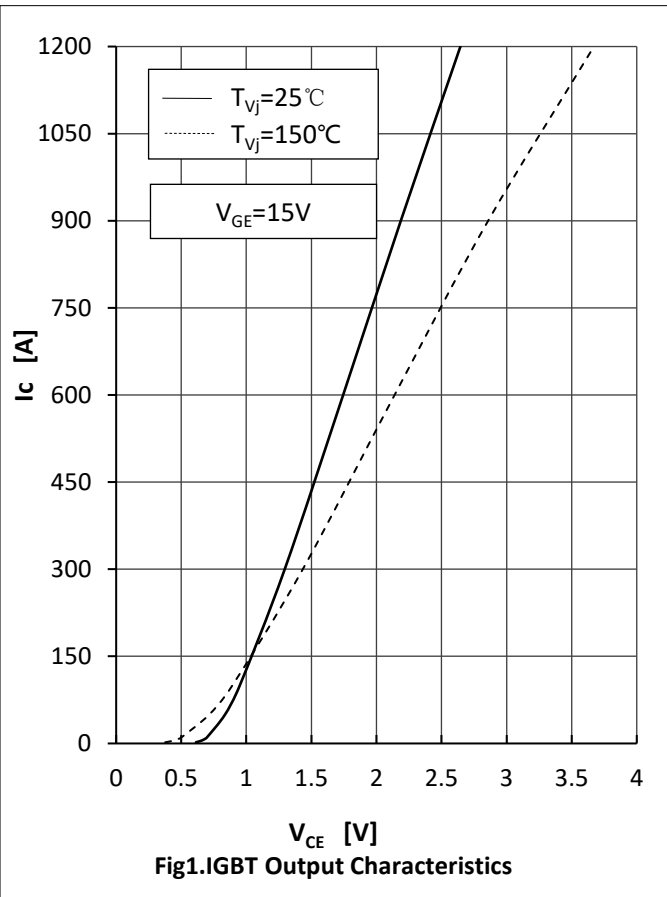
T_c=25°C unless otherwise specified

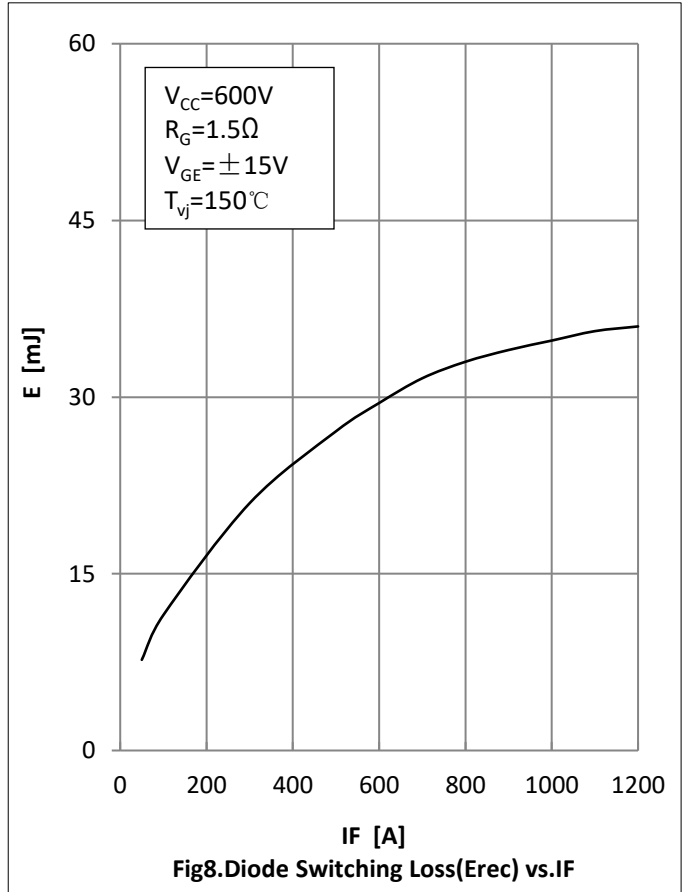
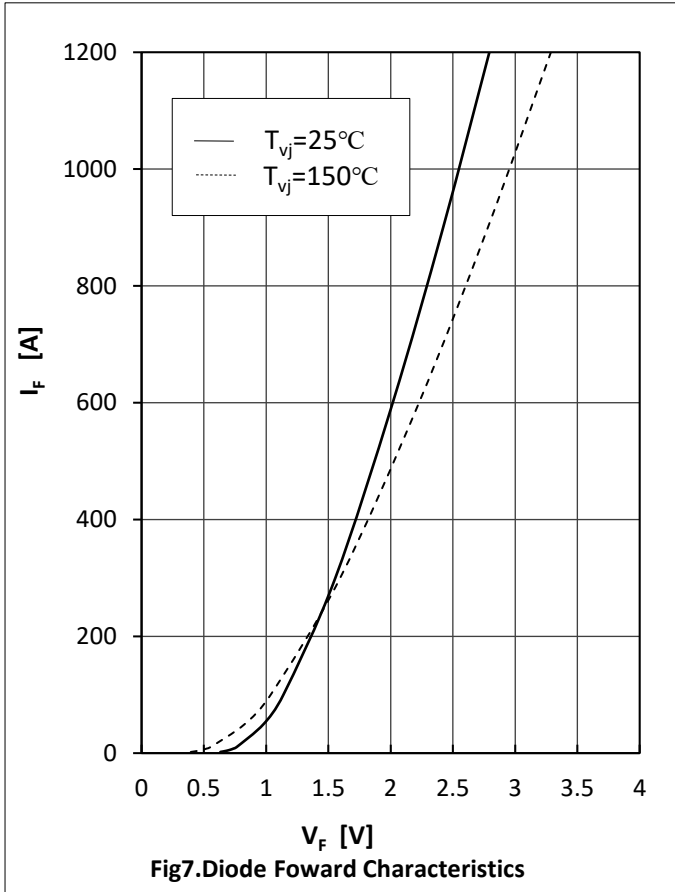
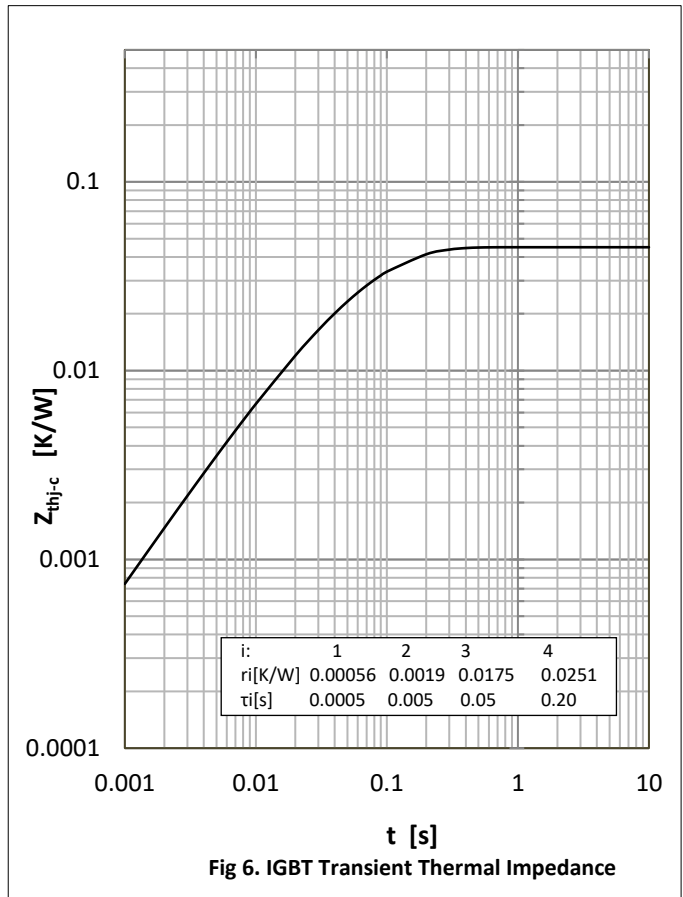
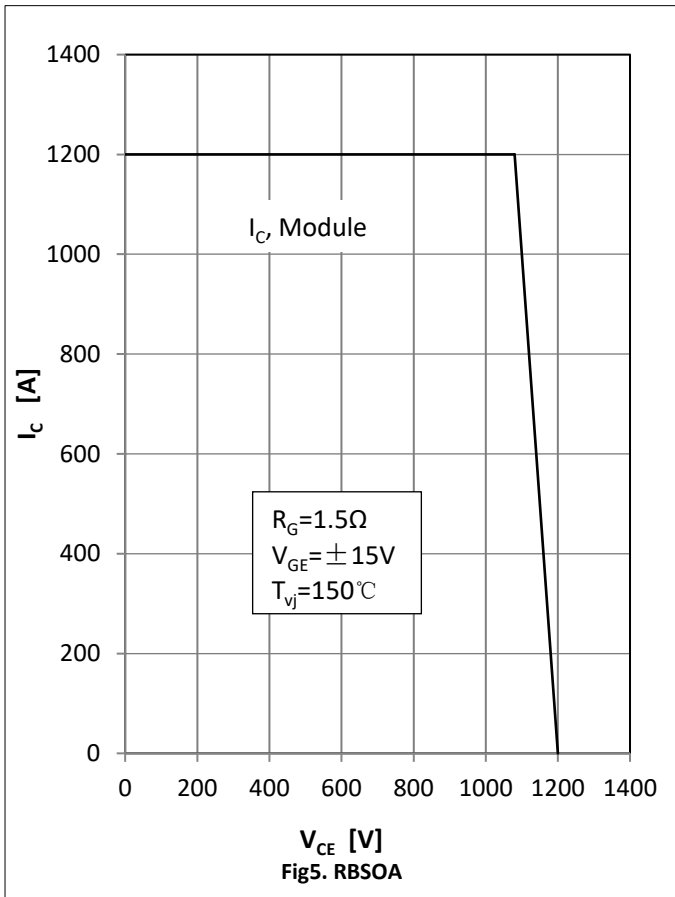
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V _{isol}	t=1min,f=50Hz	2500			V
Maximum Junction Temperature	T _{jmax}				175	°C
Operating Junction Temperature	T _{vj op}		-40		150	°C
Storage Temperature	T _{stg}		-40		125	°C
Thermal Resistance Junction to Case	R _{θJC}	per IGBT			0.045	K/W
		per Diode			0.076	
Thermal Resistance Case to Sink	R _{θCS}	Conductive grease applied		0.009		K/W
Comparative Tracking Index	CTI		200			
Module Electrodes Torque	M _t	Recommended(M6)	4.0		5.0	N·m
Module to Sink Torque	M _s	Recommended(M5)	3.0		6.0	N·m
Weight of Module	G			345		g

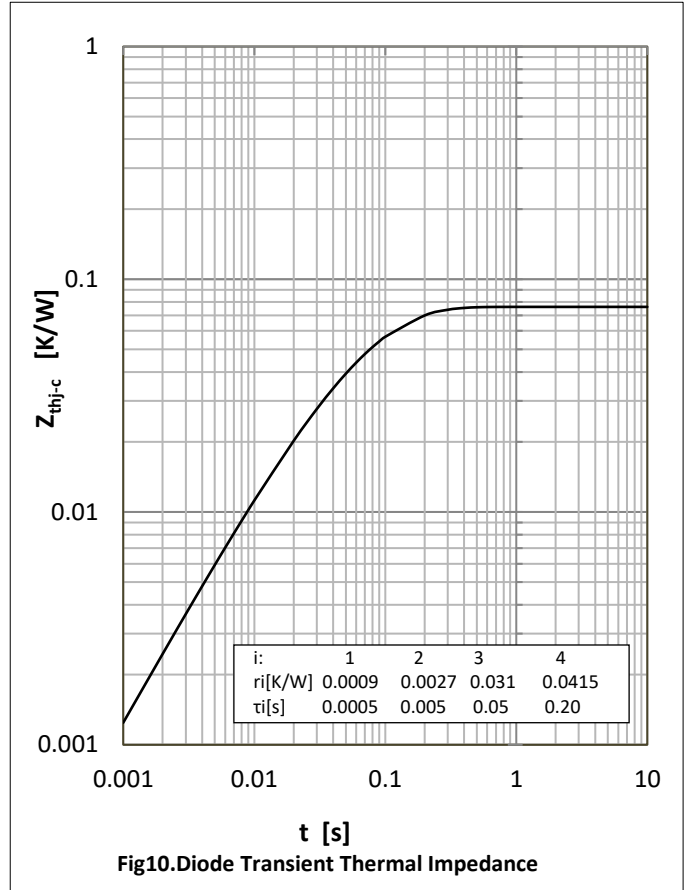
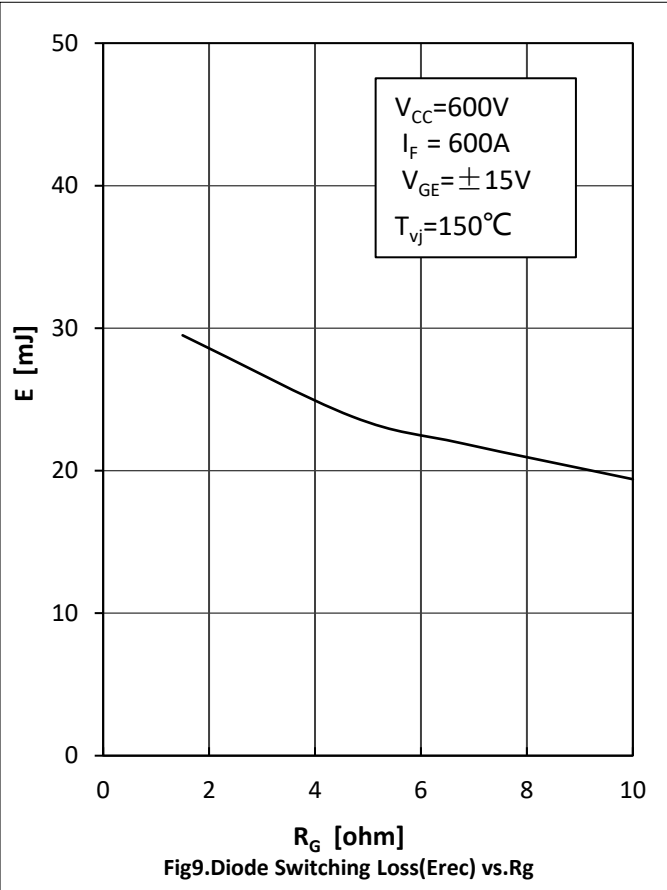


MG600HF12TLE3

RoHS
COMPLIANT

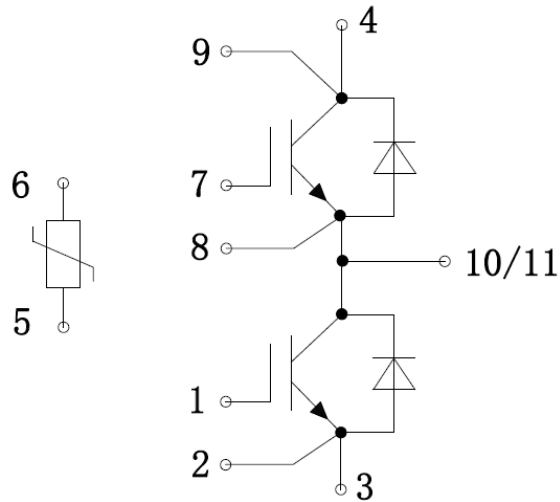




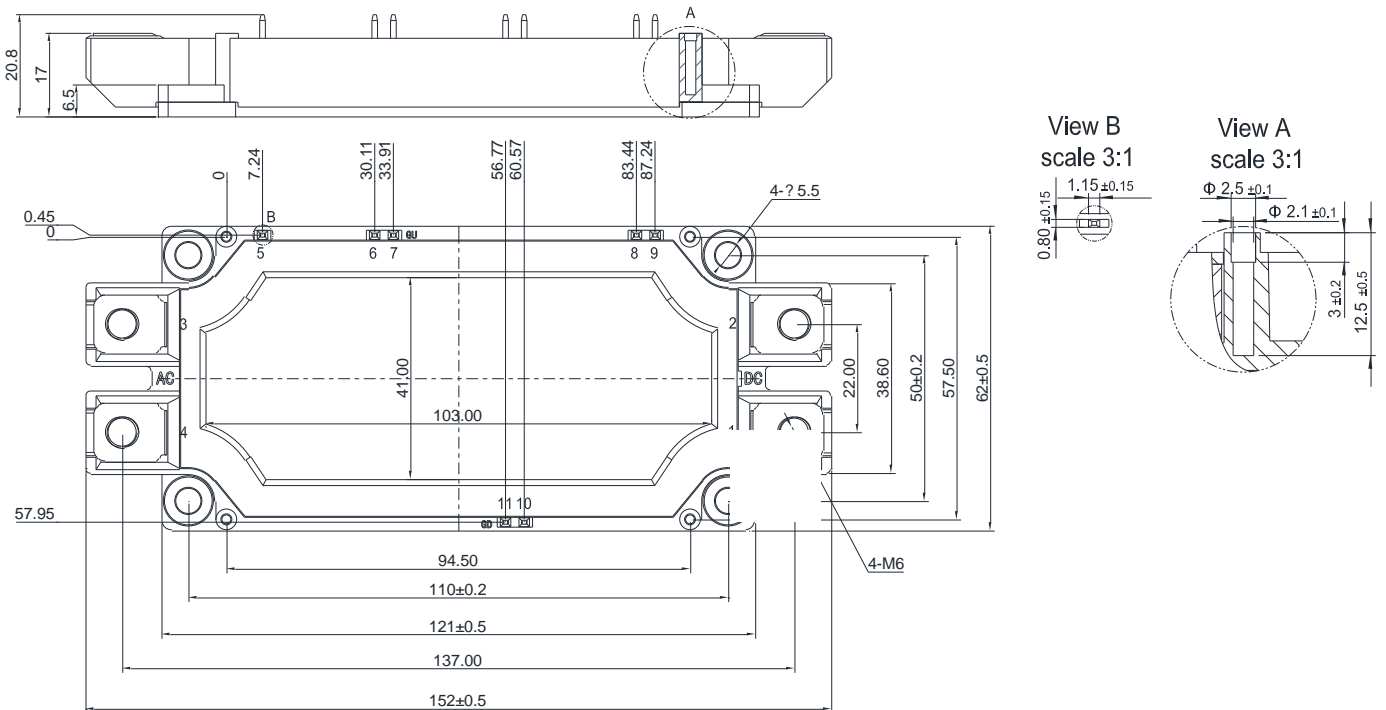




● Circuit Diagram



● Package Outline Information





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