

IGBT Modules

V_{CES}	1200V
I_C	450A

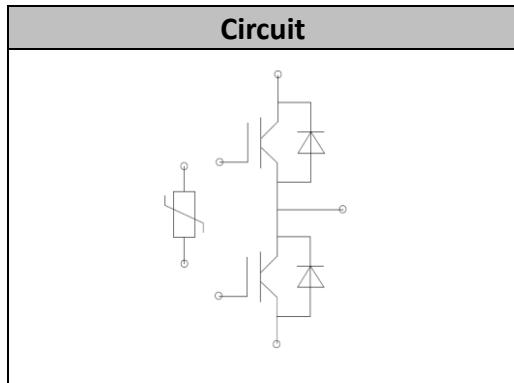


Applications

- 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(8us)
- 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	$T_C=100^{\circ}C$	450	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	900	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	1596	W



Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=9mA, T_{vj}=25^{\circ}C$	5	5.82	6.5	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	$V_{CE(sat)}$	$I_C=450A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.65		V
		$I_C=450A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.03		
		$I_C=450A, V_{GE}=15V, T_{vj}=175^{\circ}C$		2.09		
Gate Charge	Q_G			6.9		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		292.9		nF
Reverse Transfer Capacitance	C_{res}			0.92		nF
Internal Gate Resistance	R_{gint}			0.97		Ω
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=25^{\circ}C$		167.4		ns
Rise Time	t_r			81.6		ns
Turn-off Delay Time	$t_{d(off)}$			332.2		ns
Fall Time	t_f			137.0		ns
Energy Dissipation During Turn-on Time	E_{on}			53.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			30.5		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=150^{\circ}C$		177.3		ns
Rise Time	t_r			91.2		ns
Turn-off Delay Time	$t_{d(off)}$			391.0		ns
Fall Time	t_f			233.9		ns
Energy Dissipation During Turn-on Time	E_{on}			76.2		mJ
Energy Dissipation During Turn-off Time	E_{off}			43.8		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=175^{\circ}C$		184.0		ns
Rise Time	t_r			93.4		ns
Turn-off Delay Time	$t_{d(off)}$			406.4		ns
Fall Time	t_f			258.9		ns
Energy Dissipation During Turn-on Time	E_{on}			81.9		mJ
Energy Dissipation During Turn-off Time	E_{off}			47.1		mJ
SC Data	I_{sc}	$t_p \leq 8\mu s, V_{GE}=15V,$ $T_{vj}=175^{\circ}C, V_{CC}=600V,$ $V_{CEM} \leq 1200V$		1505		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		450	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	900	A

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=450\text{A}, T_{vj}=25^{\circ}\text{C}$		2.03		V
		$I_F=450\text{A}, T_{vj}=150^{\circ}\text{C}$		1.91		
		$I_F=450\text{A}, T_{vj}=175^{\circ}\text{C}$		1.86		
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		31.8		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$		120.1		A
Reverse Recovery Energy	E_{rec}	$-di_F/dt=4000\text{A}/\mu\text{s}$		11.0		mJ
		$T_{vj}=25^{\circ}\text{C}$				
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		75.3		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$		170.7		A
Reverse Recovery Energy	E_{rec}	$-di_F/dt=4000\text{A}/\mu\text{s}$		27.5		mJ
		$T_{vj}=150^{\circ}\text{C}$				
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		86.6		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$		181.2		A
Reverse Recovery Energy	E_{rec}	$-di_F/dt=4000\text{A}/\mu\text{s}$		31.9		mJ
		$T_{vj}=175^{\circ}\text{C}$				

● NTC-Thermistor

Characteristic values

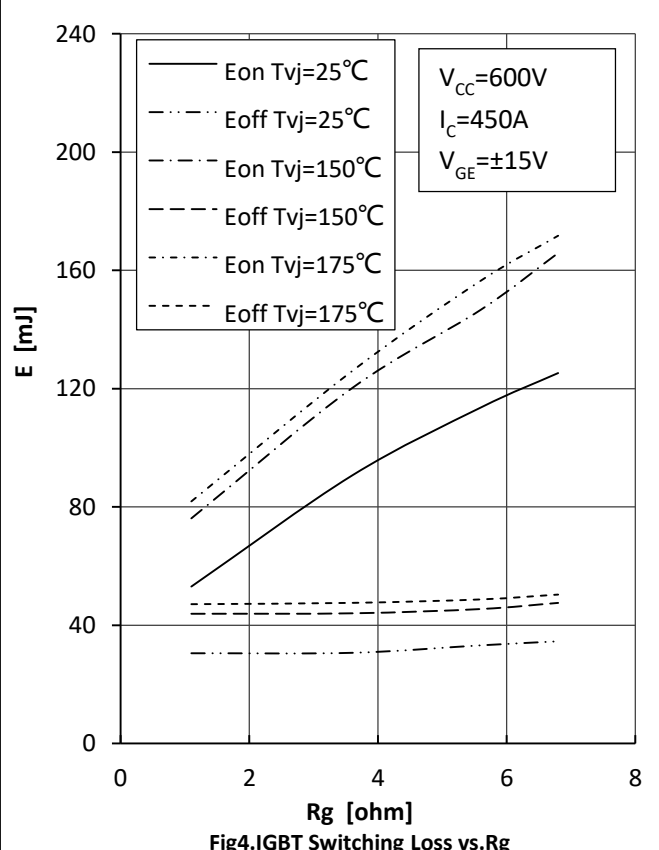
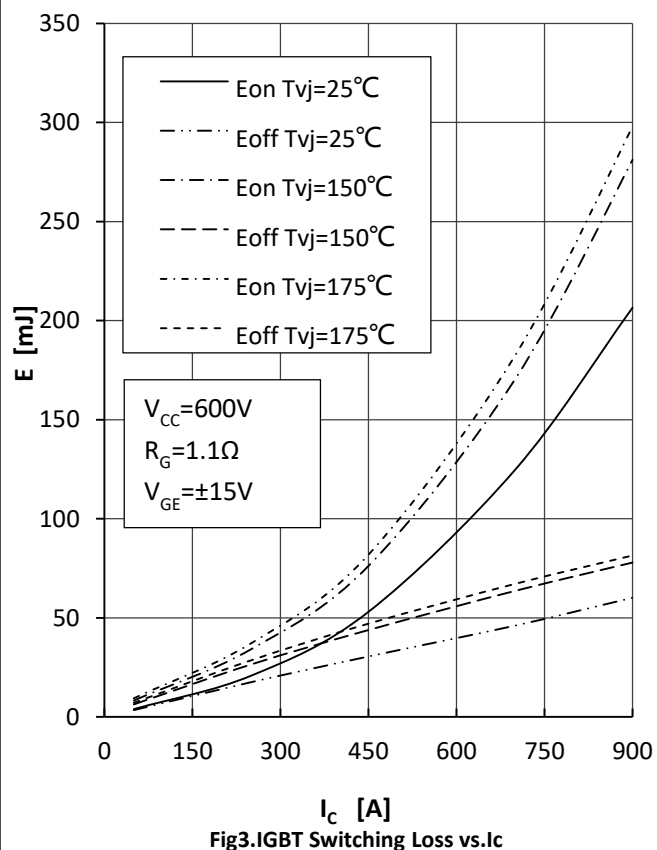
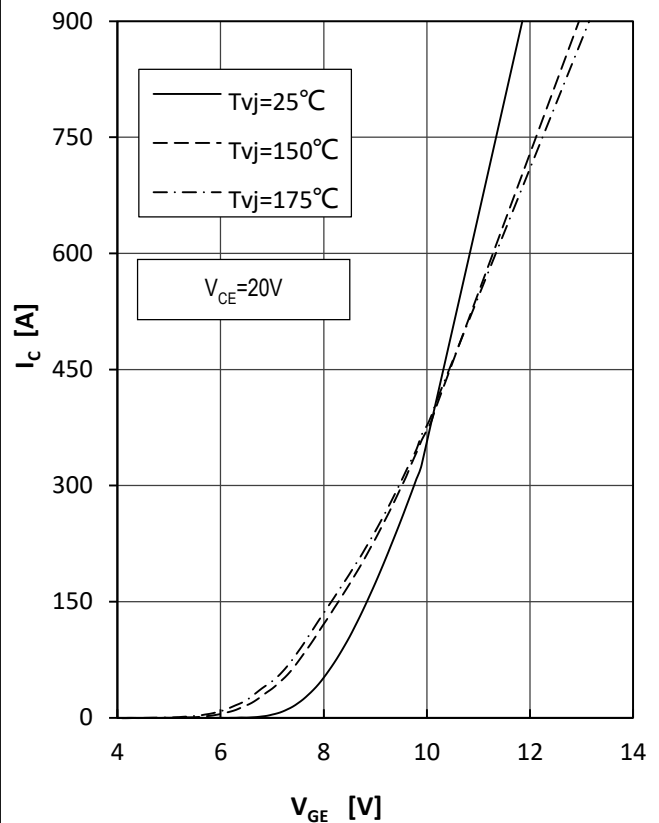
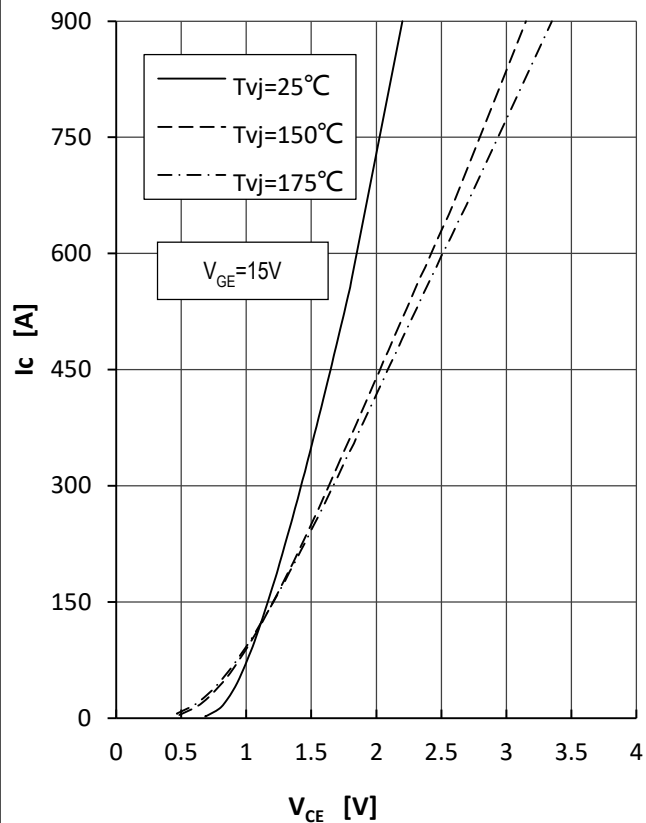
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		$\text{k}\Omega$
Deviation of R100	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

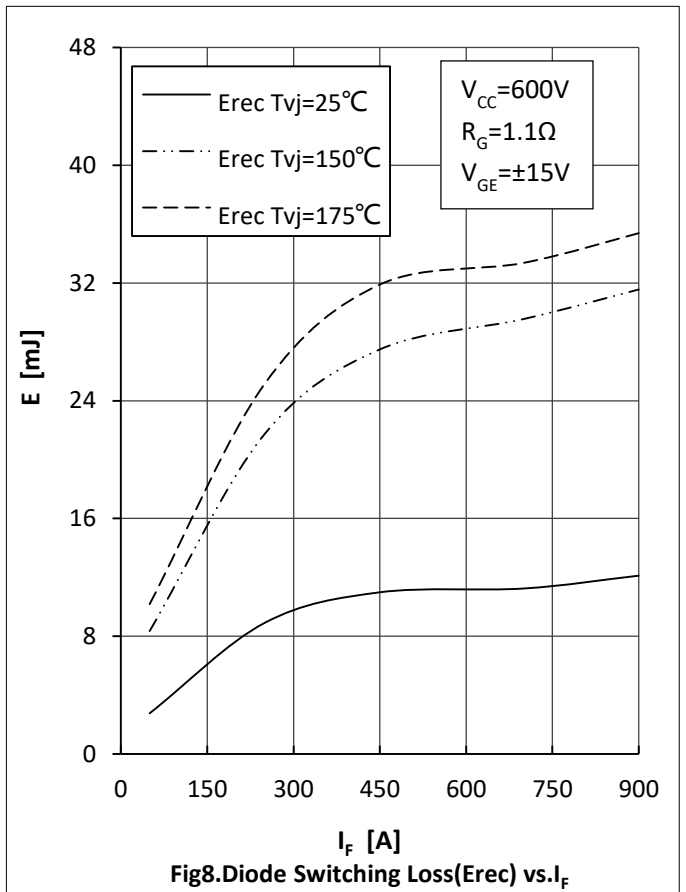
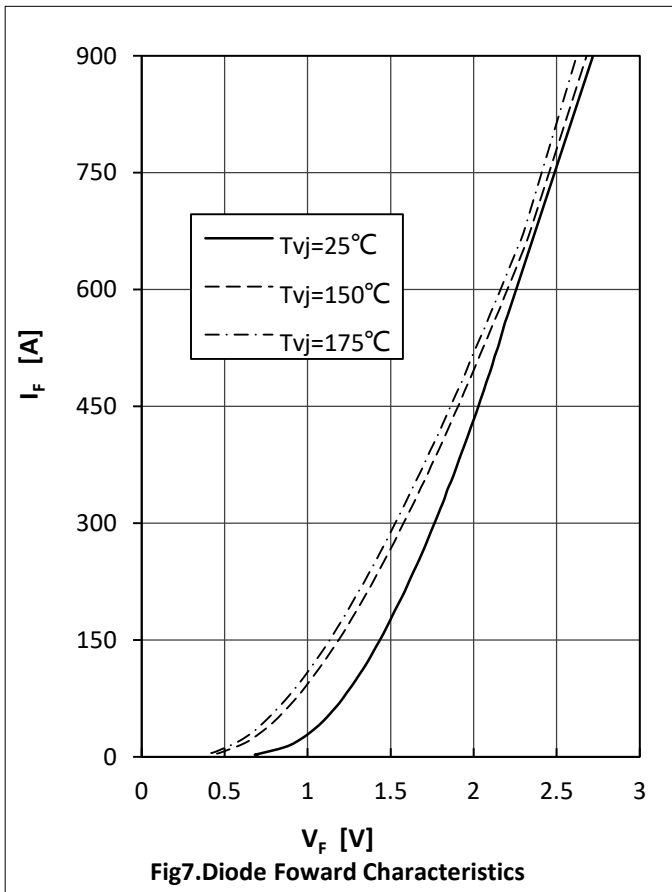
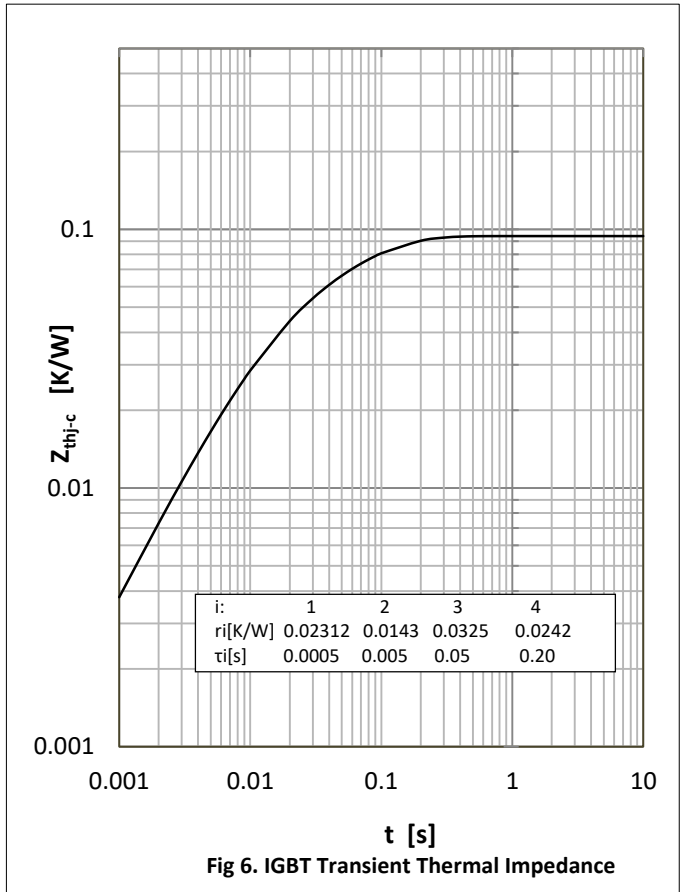
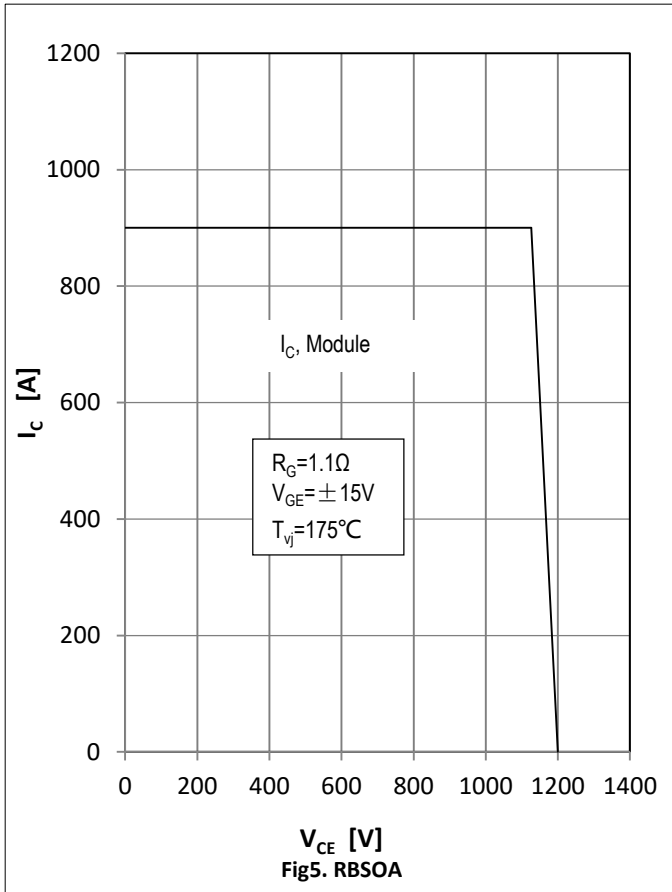


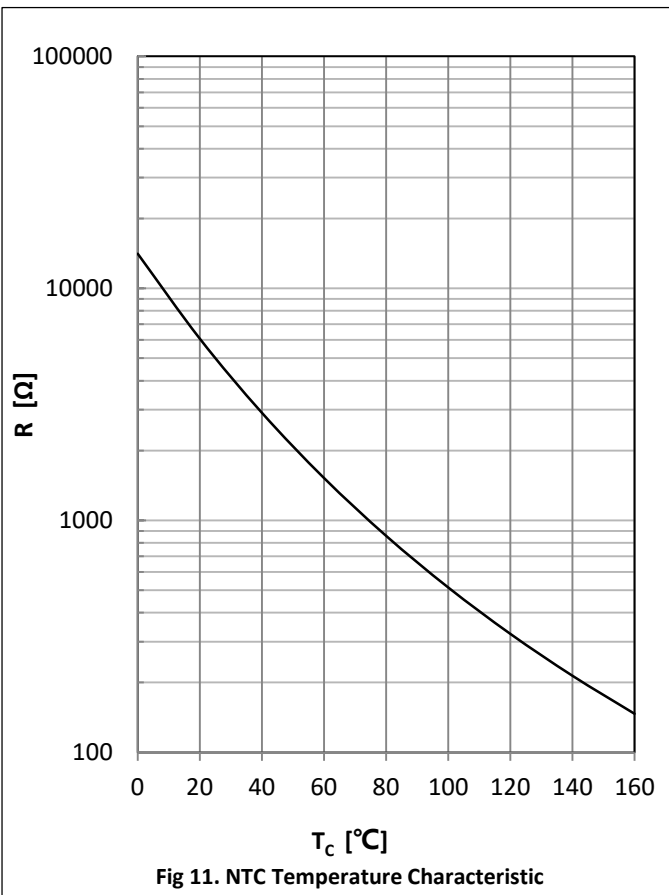
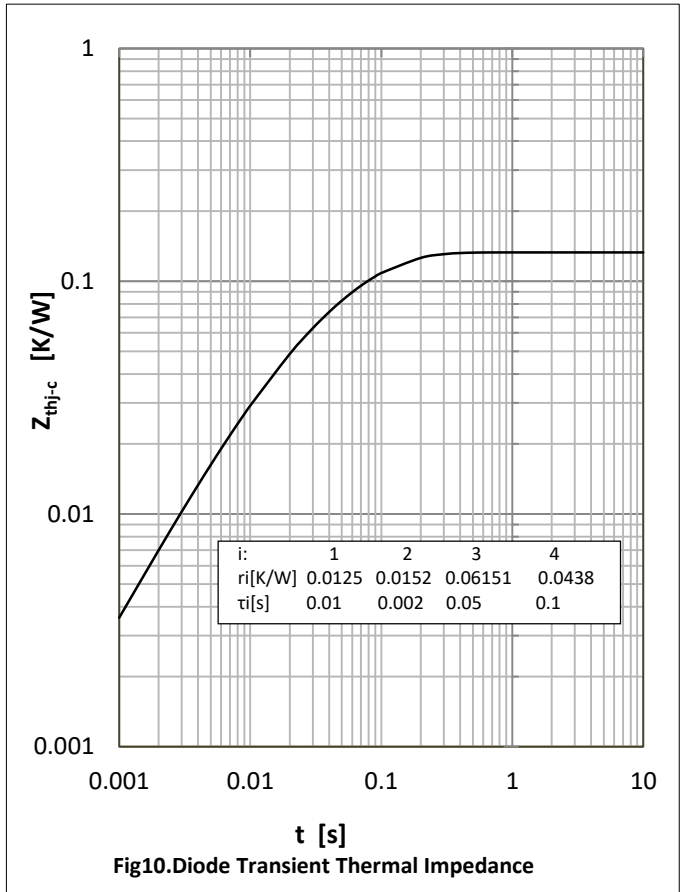
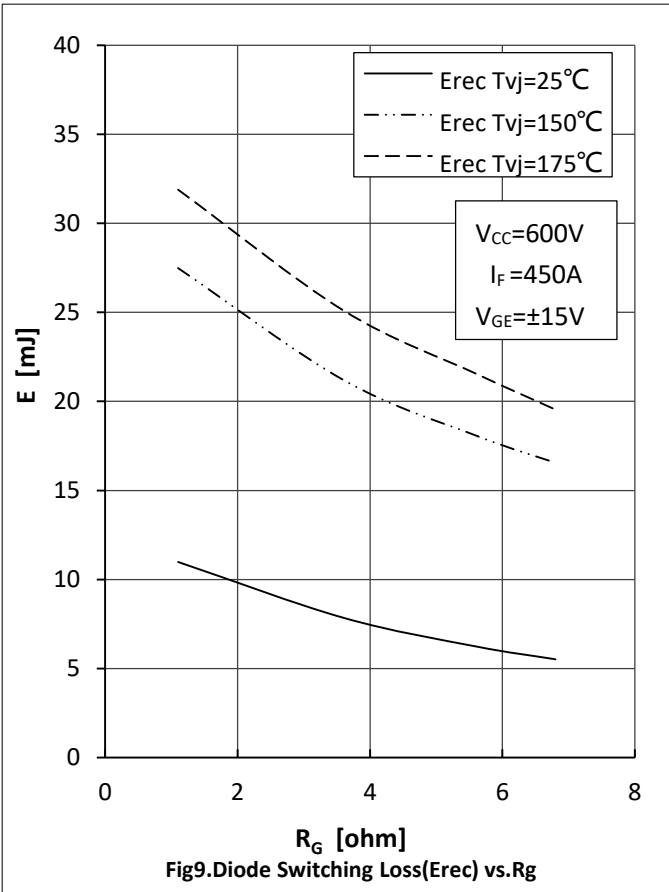
● Module Characteristics

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			0.09	K/W
		per Diode			0.13	
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

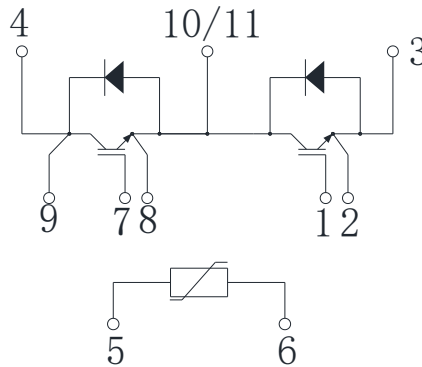




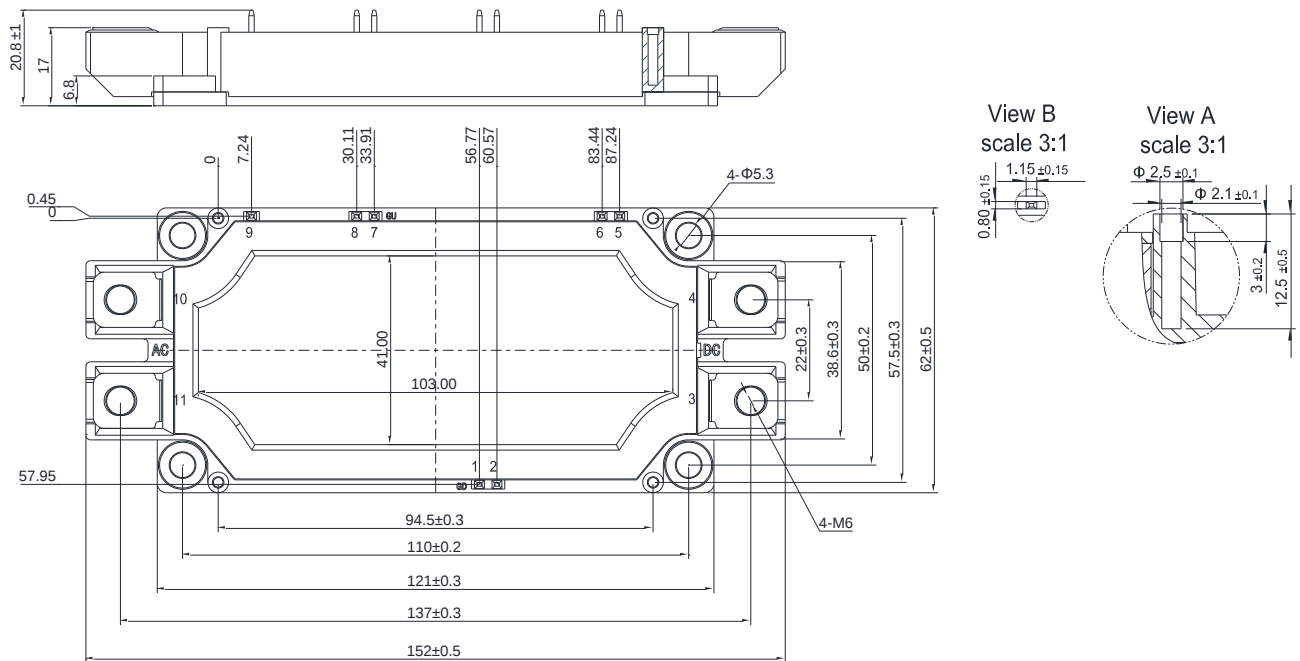




● Circuit Diagram



● Package Outline Information





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