

IGBT Modules



V_{CES} 1200V
 I_C 600A

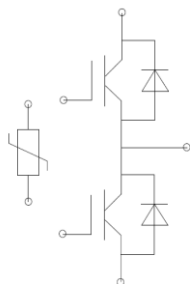
Applications

- 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

Circuit



● 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		uC
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}	$T_{vj}=25^{\circ}\text{C}$	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	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	37500	A^2s

Characteristic Values

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

● NTC-Thermistor

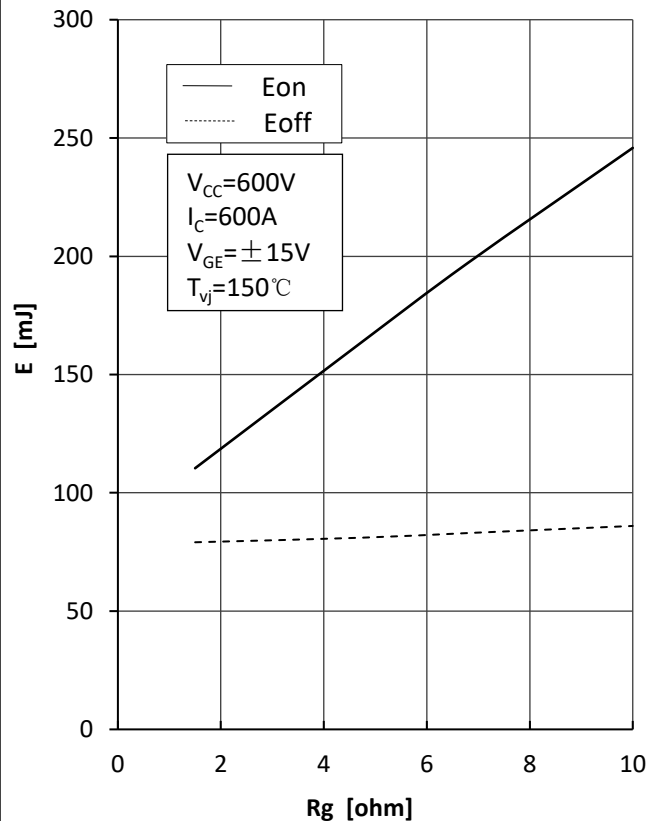
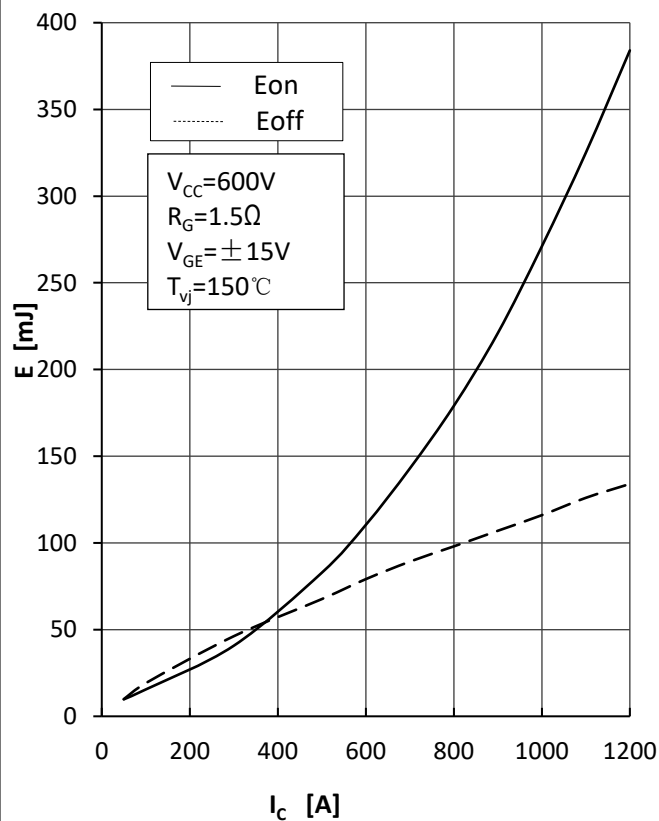
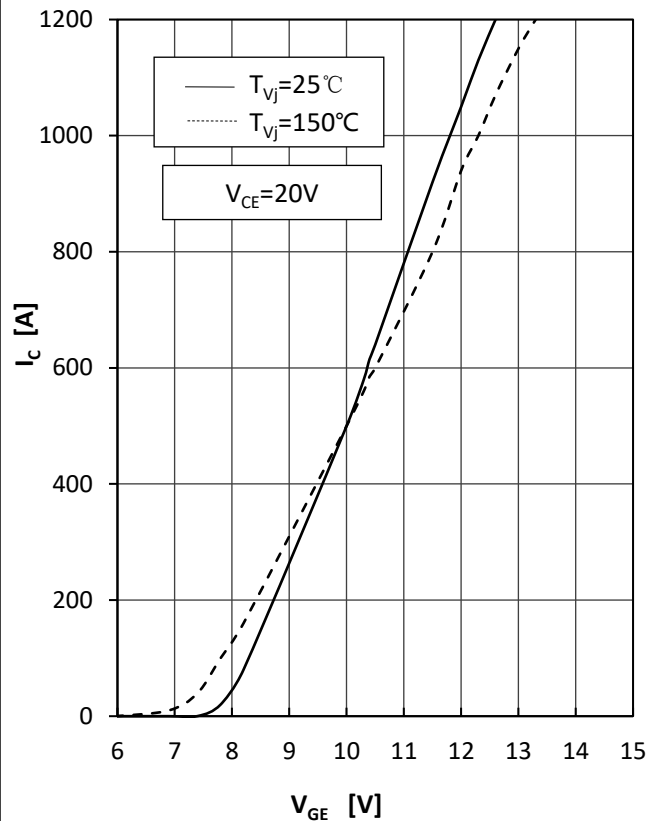
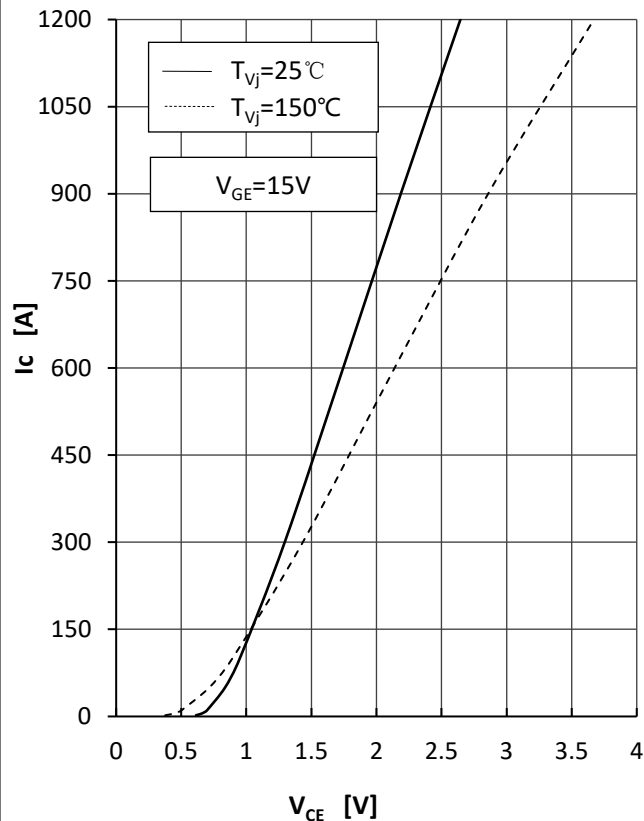
Characteristic Values

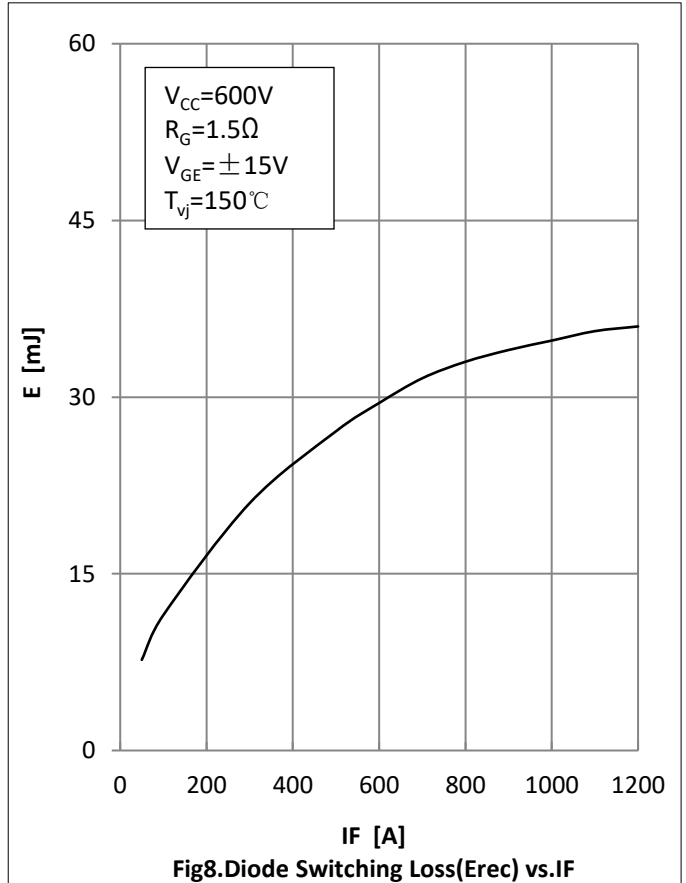
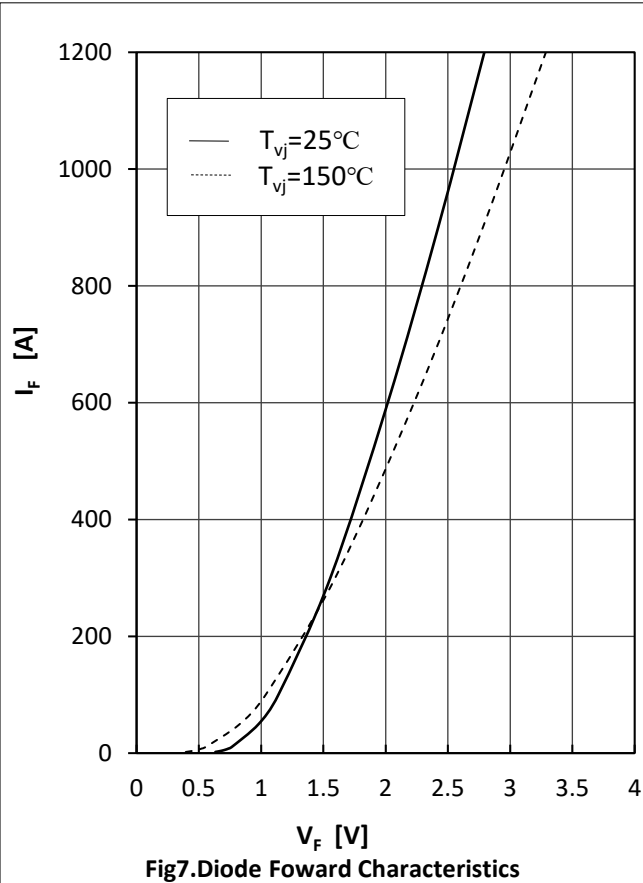
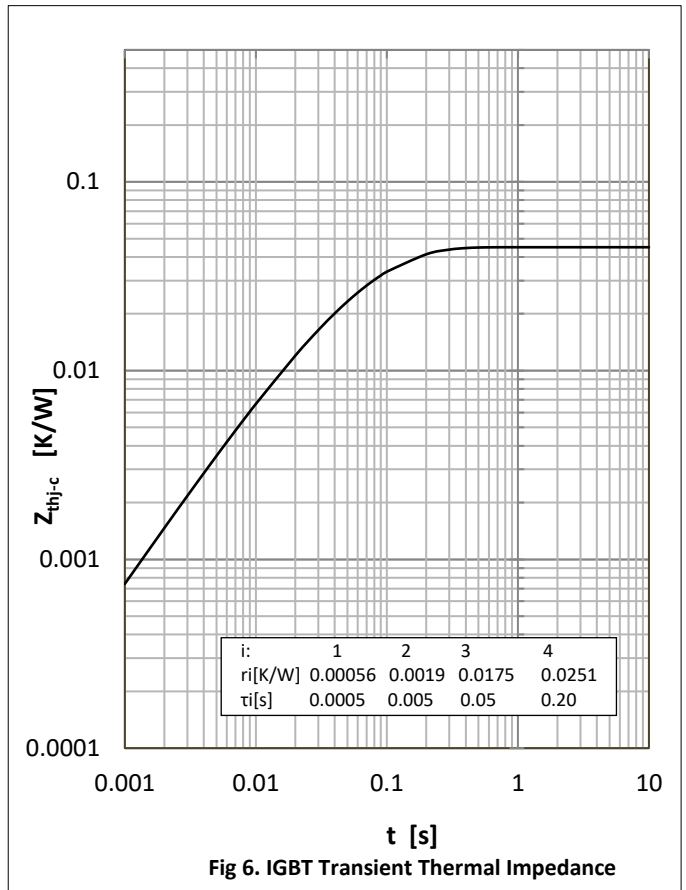
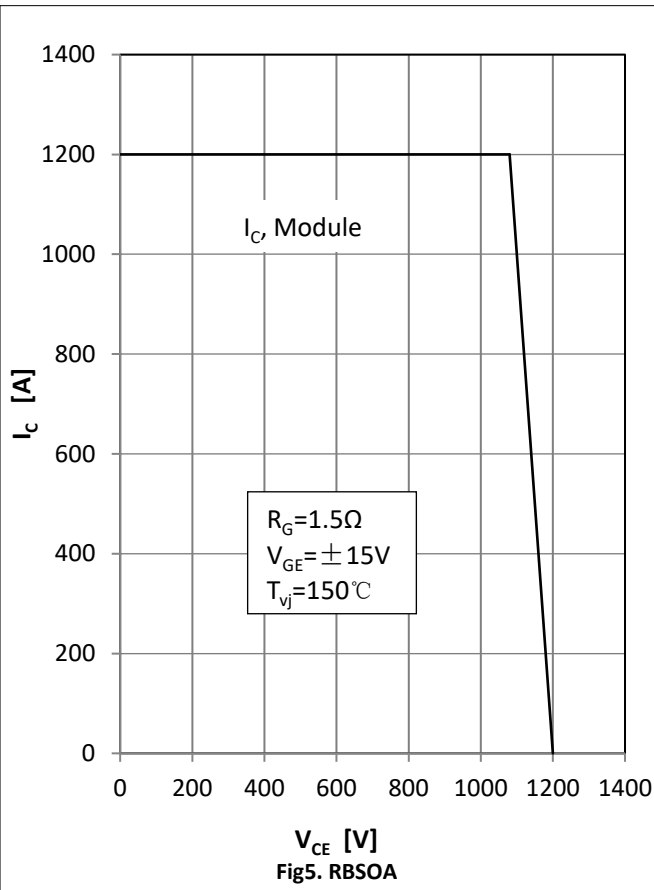
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		$\text{k}\Omega$
Deviation of R_{100}	$\Delta R/R$	$T_C=100, R_{100}=493.3\Omega$	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$		3375		K

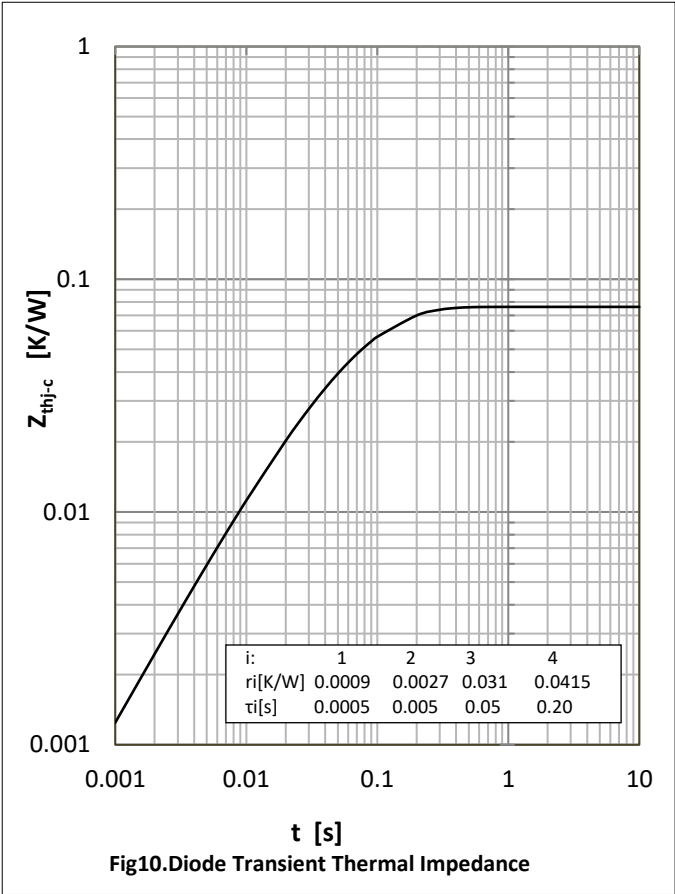
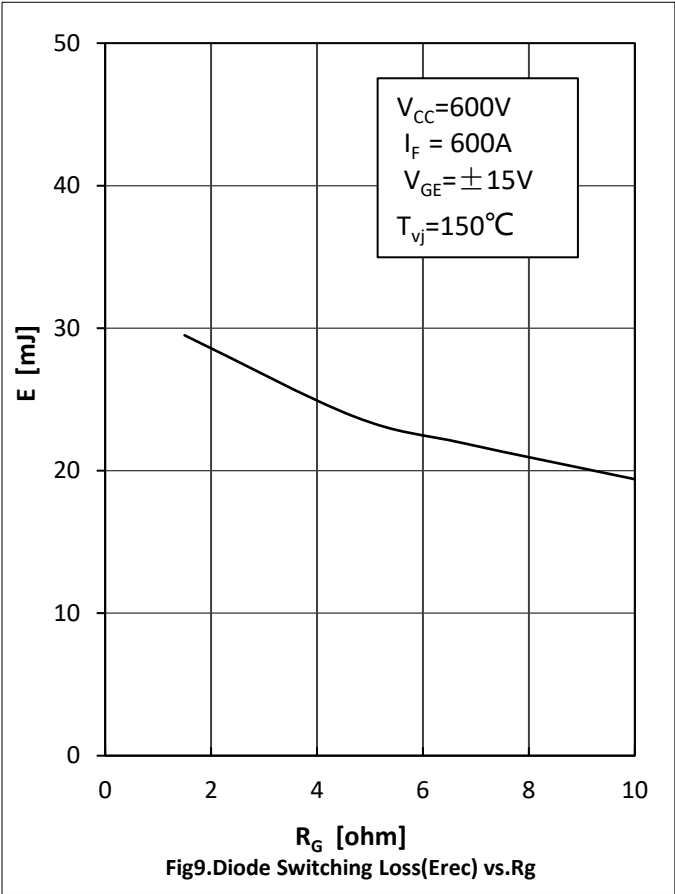
● Module Characteristics

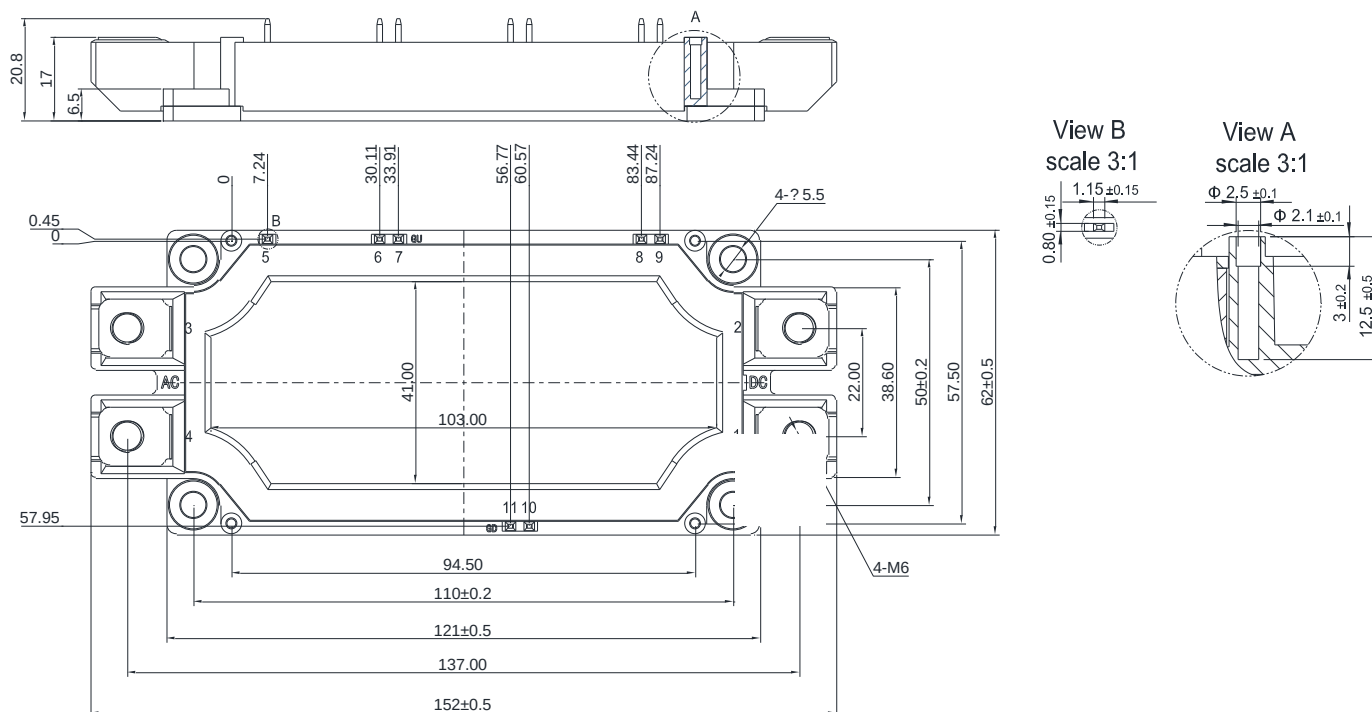
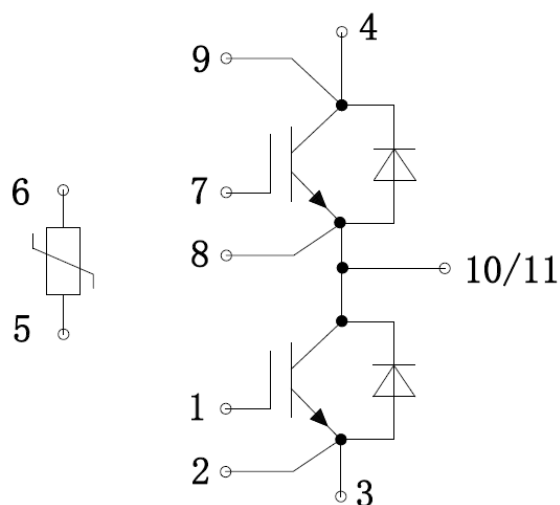
$T_c=25^{\circ}\text{C}$ unless otherwise specified

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			0.045	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(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









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