

IGBT Modules

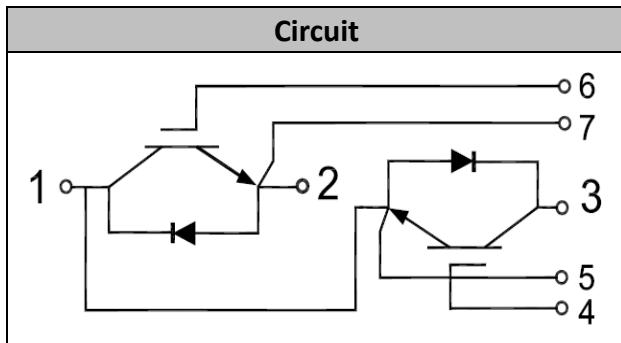
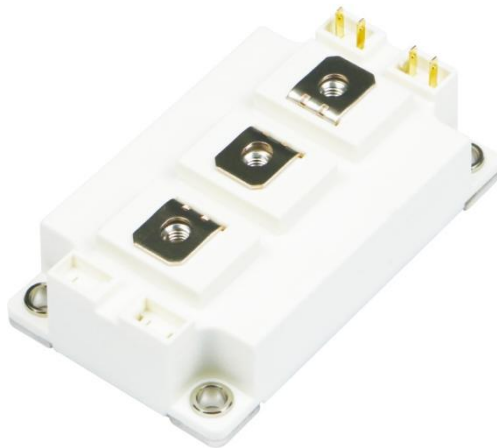
V_{CES} 1200V
 I_C 450A

Applications

- High frequency switching application
- UPS (Uninterruptible Power Supplies)
- Welding machine

Features

- Low switching losses especially E_{off}
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability(7us)
- 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}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	1500	W



Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=9mA, T_{vj}=25^{\circ}C$	5.0	5.87	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	$V_{CE(sat)}$	$I_C=450A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.70	2.00	V
		$I_C=450A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.06		
		$I_C=450A, V_{GE}=15V, T_{vj}=175^{\circ}C$		2.12		
Gate Charge	Q_G			6.8		uC
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		267.4		nF
Reverse Transfer Capacitance	C_{res}			0.9		nF
Internal Gate Resistance	R_{gint}			0.76		Ω
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=25^{\circ}C$		134.7		ns
Rise Time	t_r			62.7		ns
Turn-off Delay Time	$t_{d(off)}$			335.0		ns
Fall Time	t_f			139.2		ns
Energy Dissipation During Turn-on Time	E_{on}			40.0		mJ
Energy Dissipation During Turn-off Time	E_{off}			29.7		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=150^{\circ}C$		150.1		ns
Rise Time	t_r			70.7		ns
Turn-off Delay Time	$t_{d(off)}$			390.4		ns
Fall Time	t_f			229.8		ns
Energy Dissipation During Turn-on Time	E_{on}			68.7		mJ
Energy Dissipation During Turn-off Time	E_{off}			41.8		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=450A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=175^{\circ}C$		152.3		ns
Rise Time	t_r			72.6		ns
Turn-off Delay Time	$t_{d(off)}$			403.5		ns
Fall Time	t_f			259.5		ns
Energy Dissipation During Turn-on Time	E_{on}			77.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			45.5		mJ
SC Data	I_{sc}	$t_p \leq 7\mu s, V_{GE}=15V,$ $T_{vj}=175^{\circ}C, V_{CC}=600V,$ $V_{CEM} \leq 1200V$		1598		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

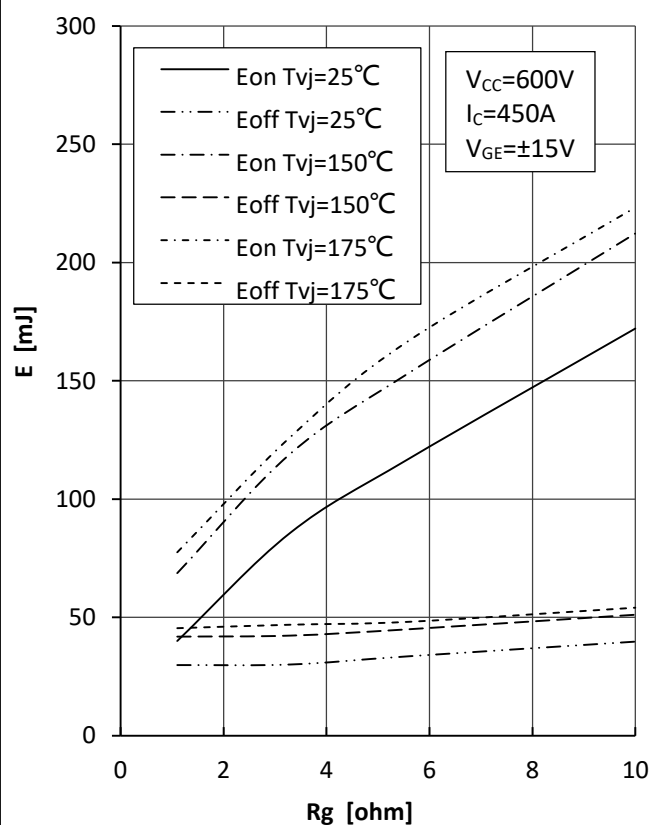
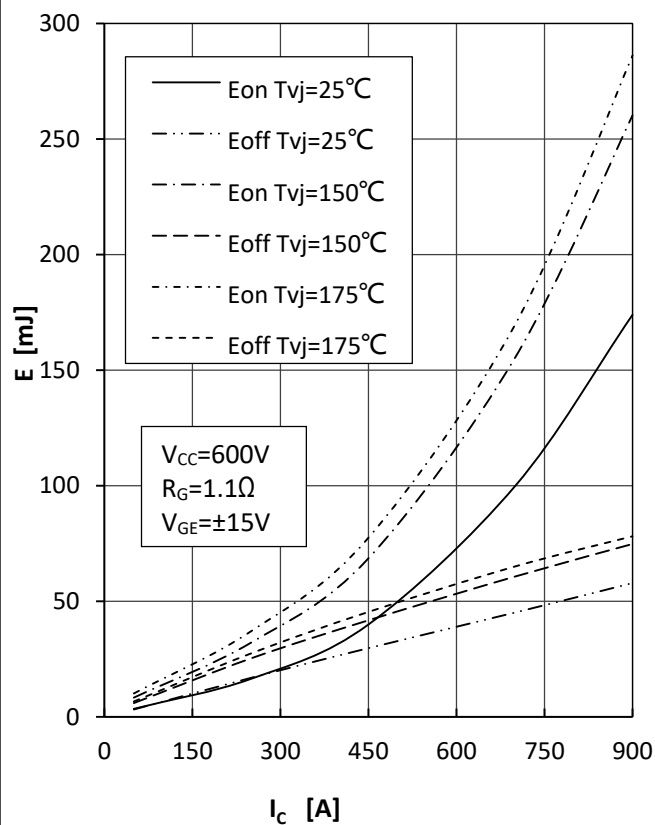
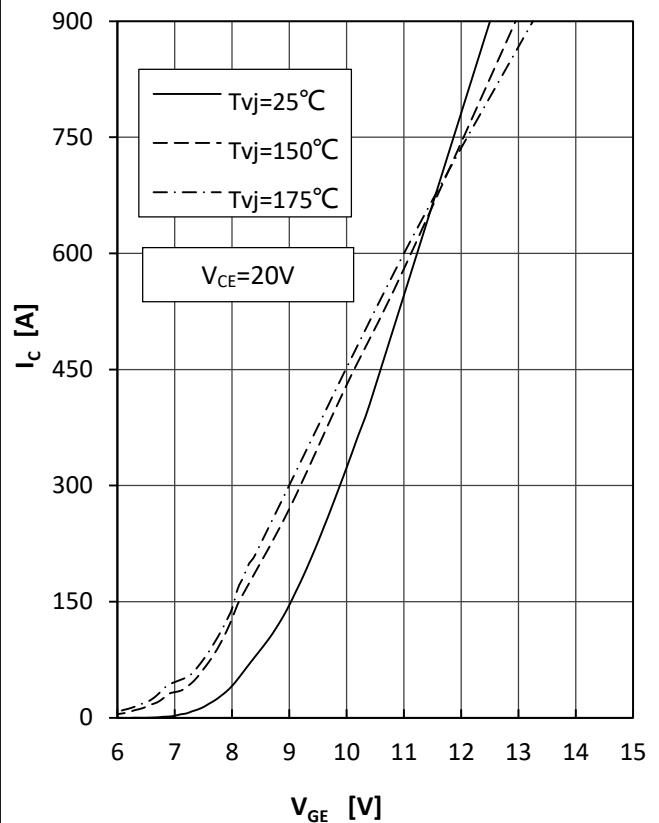
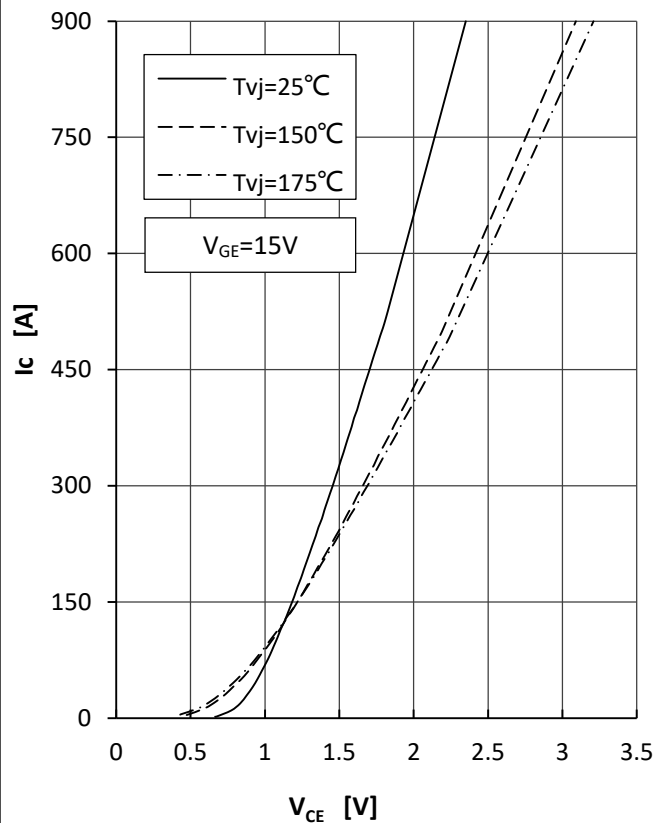
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=450\text{A}, T_{vj}=25^{\circ}\text{C}$		2.09	2.80	V
		$I_F=450\text{A}, T_{vj}=150^{\circ}\text{C}$		1.71		
		$I_F=450\text{A}, T_{vj}=175^{\circ}\text{C}$		1.64		
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		31.3		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=5200\text{A}/\mu\text{s}$		245.8		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		10.47		mJ
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		82.2		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=5200\text{A}/\mu\text{s}$		317.3		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		28.1		mJ
Recovered Charge	Q_{rr}	$I_F=450\text{A}$		98.7		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=5200\text{A}/\mu\text{s}$		327.9		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=175^{\circ}\text{C}$		34.0		mJ

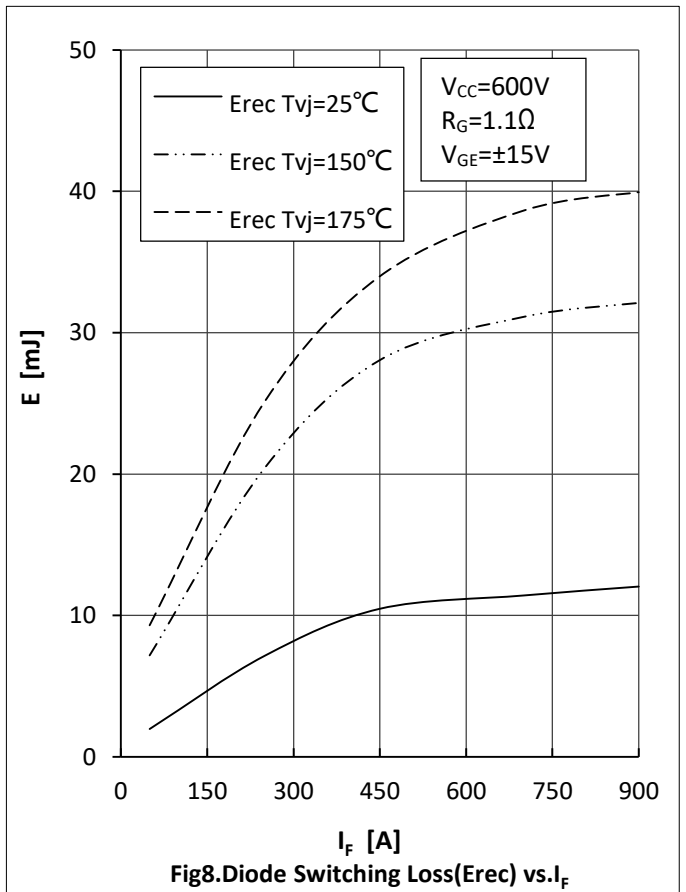
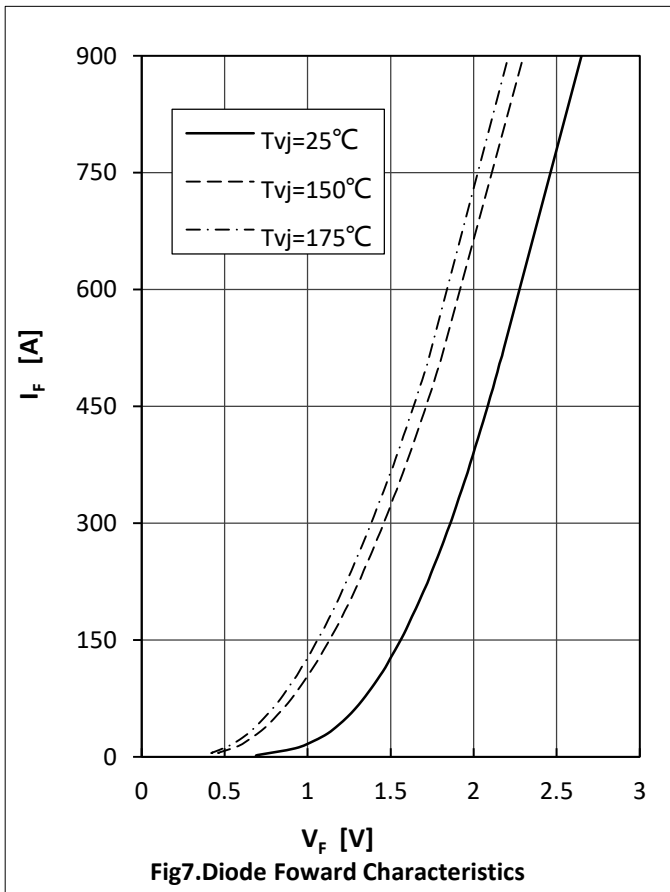
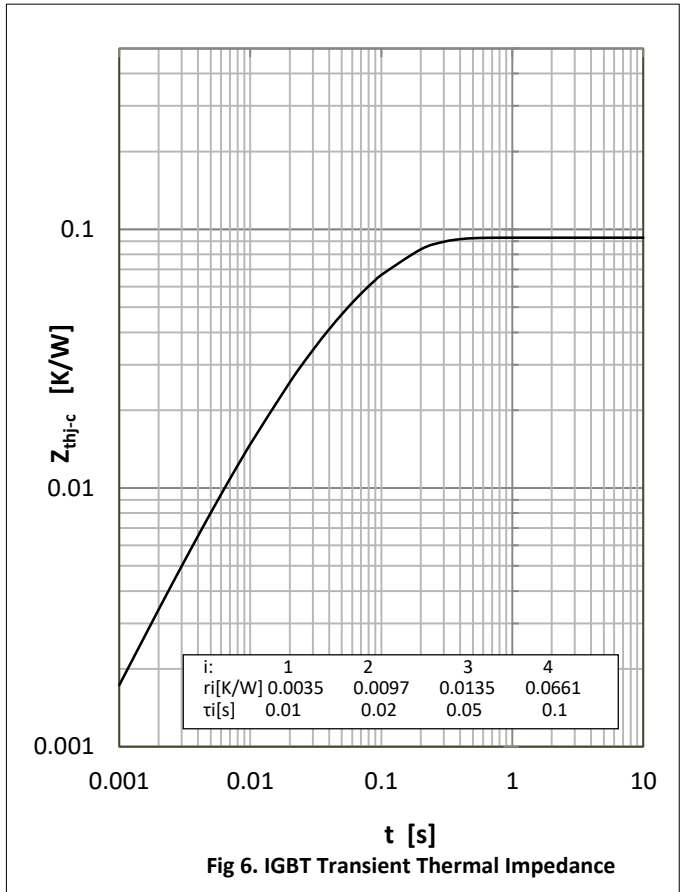
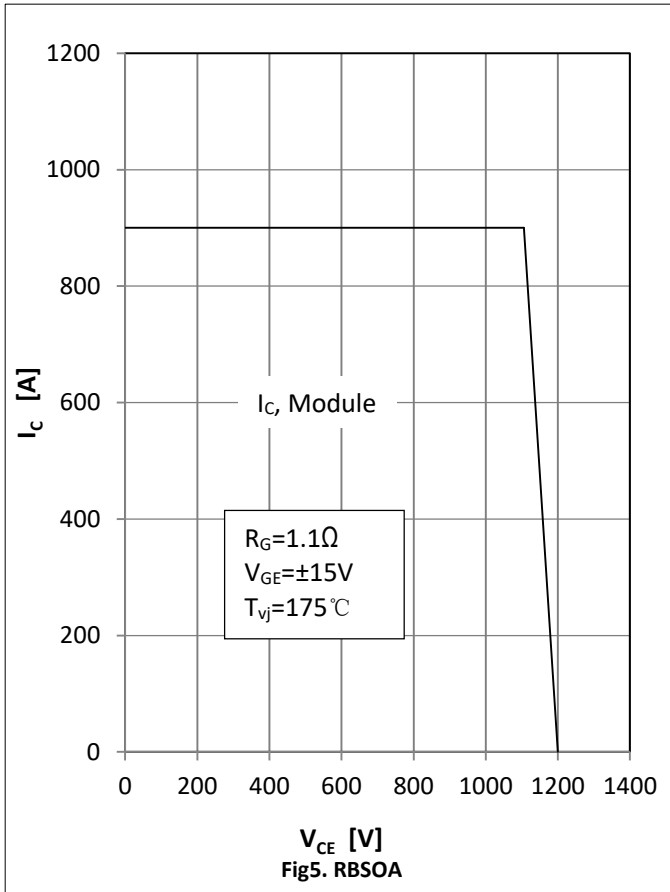


● Module Characteristics

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		0.012	0.035	K/W
Comparative Tracking Index	CTI		400			
Module Electrodes Torque	M _t	Recommended(M6)	3.0		5.0	N·m
Module to Sink Torque	M _s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			315		g





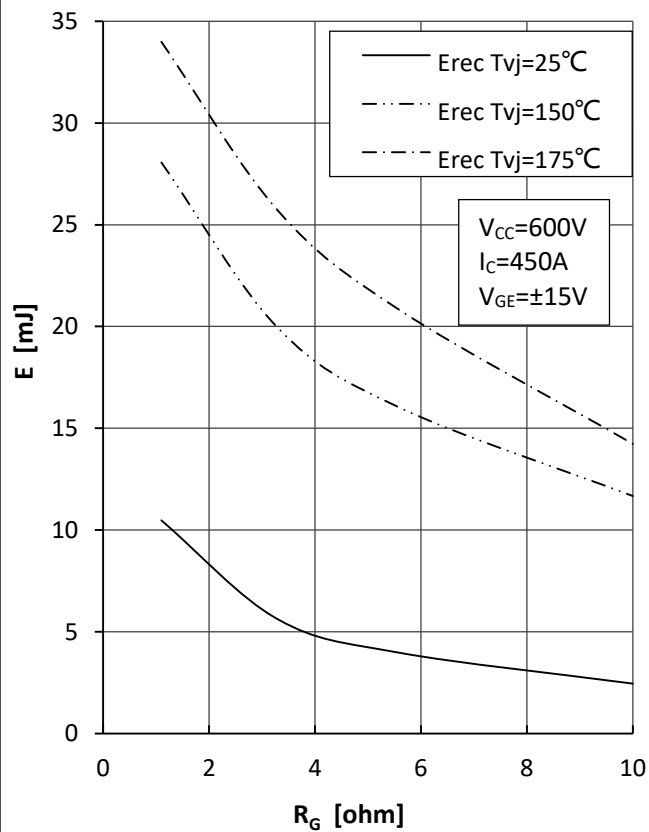


Fig9.Diode Switching Loss(E_{rec}) vs. R_g

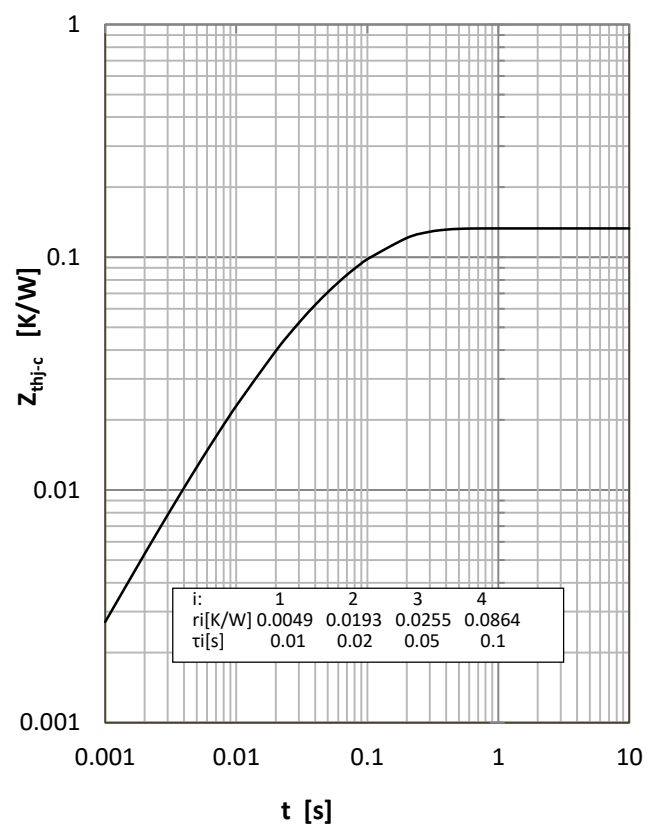
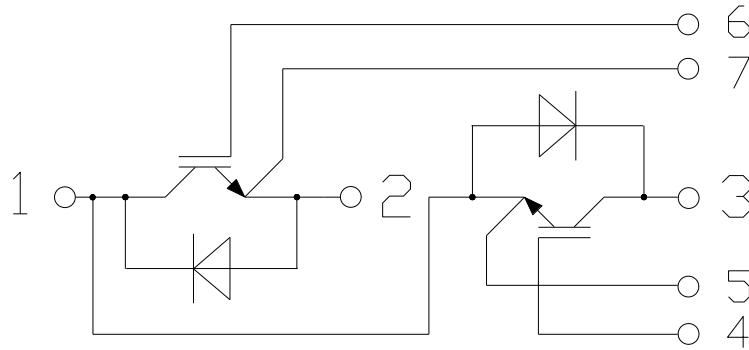


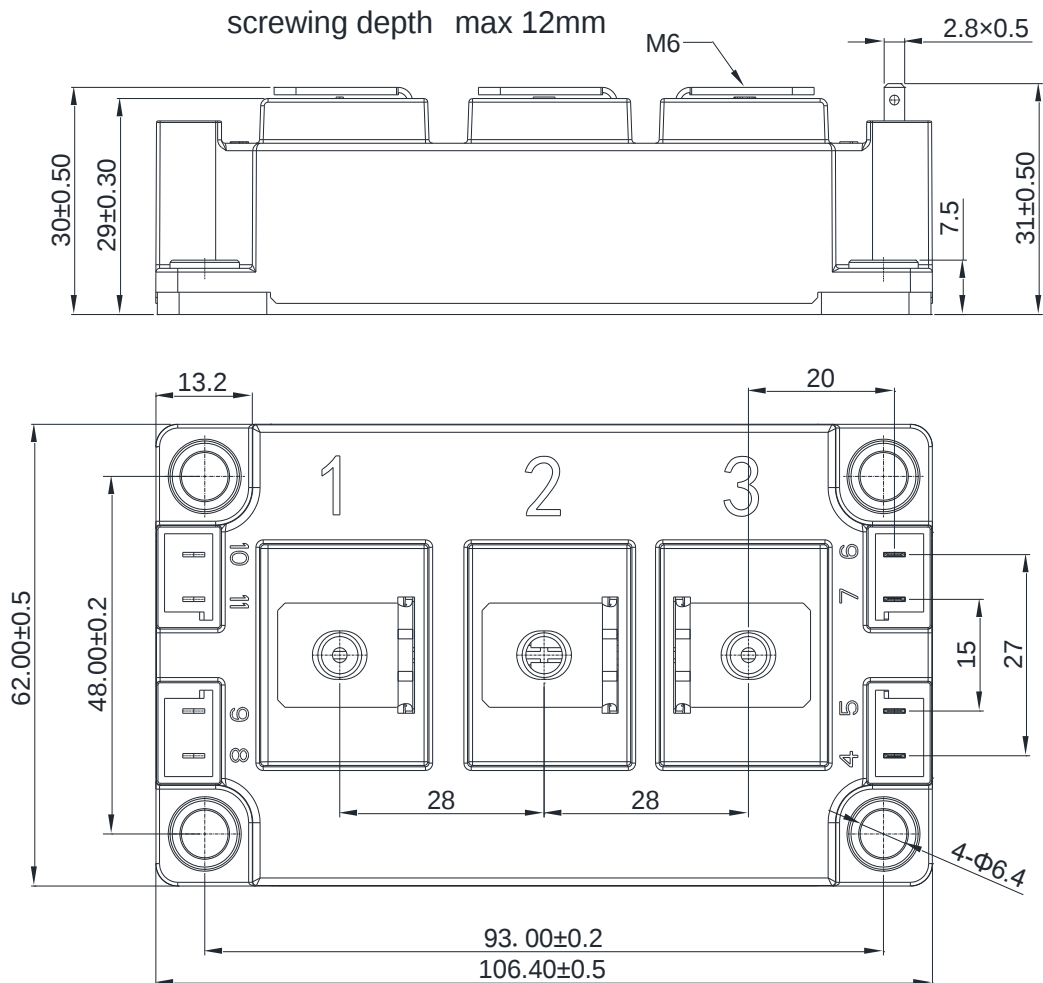
Fig10.Diode Transient Thermal Impedance

● Circuit Diagram



● Package Outline Information

Dimensions in Millimeters





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IGBTs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.

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