

IGBT Modules

V_{CES} 1200V
 I_C 600A

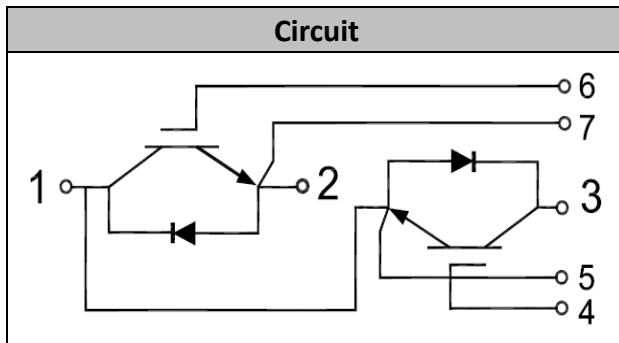


Applications

- 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 Eoff
- $V_{CE(sat)}$ 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}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	3480	W



Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=12mA, T_{vj}=25^{\circ}C$	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	$V_{CE(sat)}$	$I_C=600A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.95	2.50	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}			1.25		Ω
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		101.5		nF
Reverse Transfer Capacitance	C_{res}			0.8		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=25^{\circ}C$		135		ns
Rise Time	t_r			84		ns
Turn-off Delay Time	$t_{d(off)}$			350		ns
Fall Time	t_f			174		ns
Energy Dissipation During Turn-on Time	E_{on}			90		mJ
Energy Dissipation During Turn-off Time	E_{off}			46.6		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=150^{\circ}C$		153		ns
Rise Time	t_r			102		ns
Turn-off Delay Time	$t_{d(off)}$			407		ns
Fall Time	t_f			278		ns
Energy Dissipation During Turn-on Time	E_{on}			134.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			60.5		mJ
SC Data	I_{sc}	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_{vj}=150^{\circ}C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		2400		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	$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=125^{\circ}\text{C}$	35000	A^2s
		$V_R=0\text{V}, t_p=10\text{ms}, T_{vj}=150^{\circ}\text{C}$	32000	

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=600\text{A}, T_{vj}=25^{\circ}\text{C}$		1.55	2.10	V
		$I_F=600\text{A}, T_{vj}=125^{\circ}\text{C}$		1.46		
		$I_F=600\text{A}, T_{vj}=150^{\circ}\text{C}$		1.41		
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		68.9		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$		296		A
Reverse Recovery Energy	E_{rec}	$-di_F/dt=5700\text{A}/\mu\text{s}$		18.5		mJ
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		136.1		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$		343		A
Reverse Recovery Energy	E_{rec}	$-di_F/dt=5700\text{A}/\mu\text{s}$		39.8		mJ



● 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	$T_{j\text{max}}$				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{vj\text{op}}$		-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			0.043	K/W
		per Diode			0.075	
Thermal Resistance Case to Sink	$R_{\theta\text{CS}}$	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

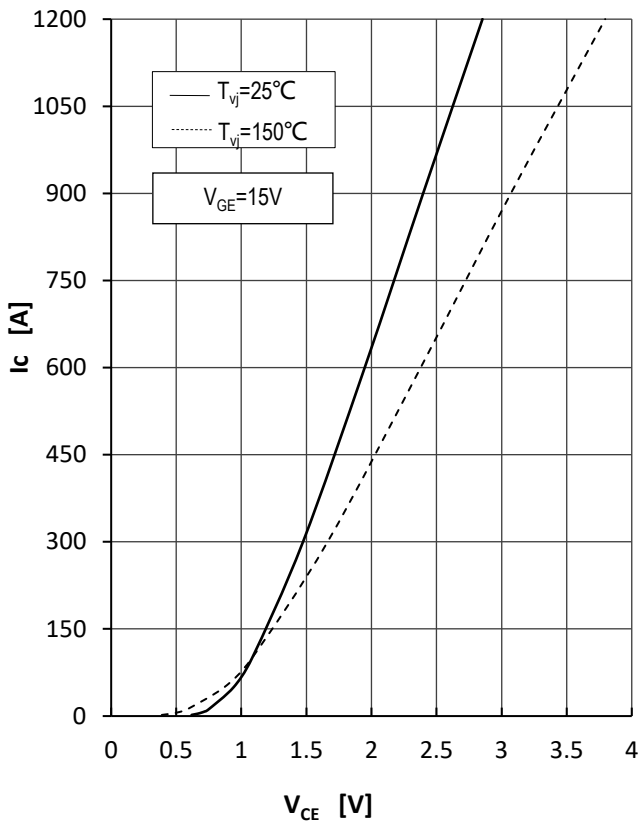


Fig1.IGBT Output Characteristics

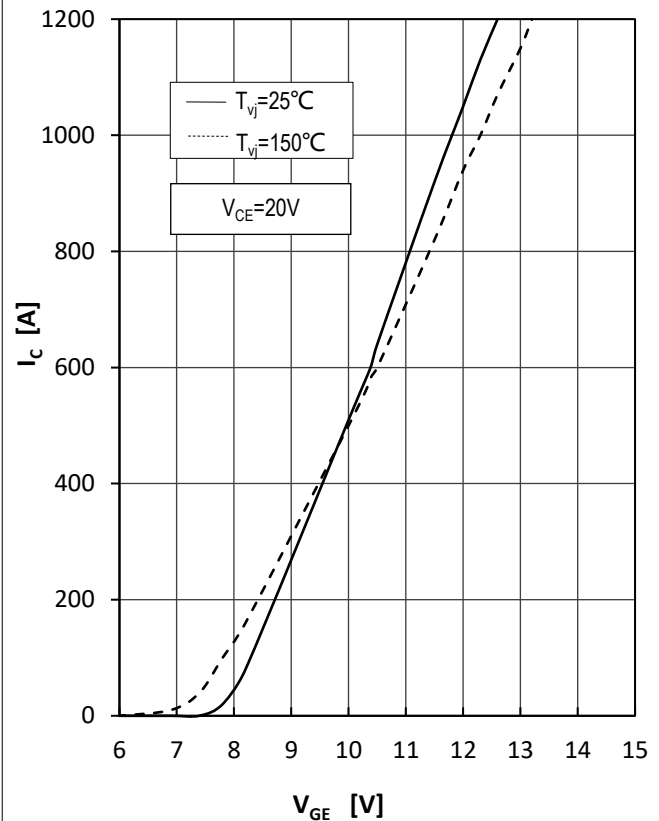


Fig2.IGBT Transfer Characteristics

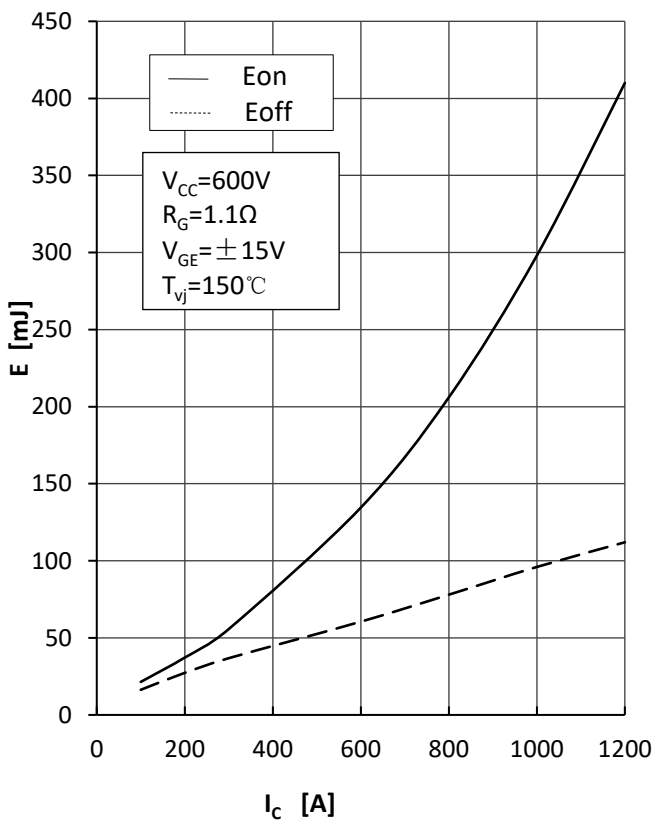


Fig3.IGBT Switching Loss vs.Ic

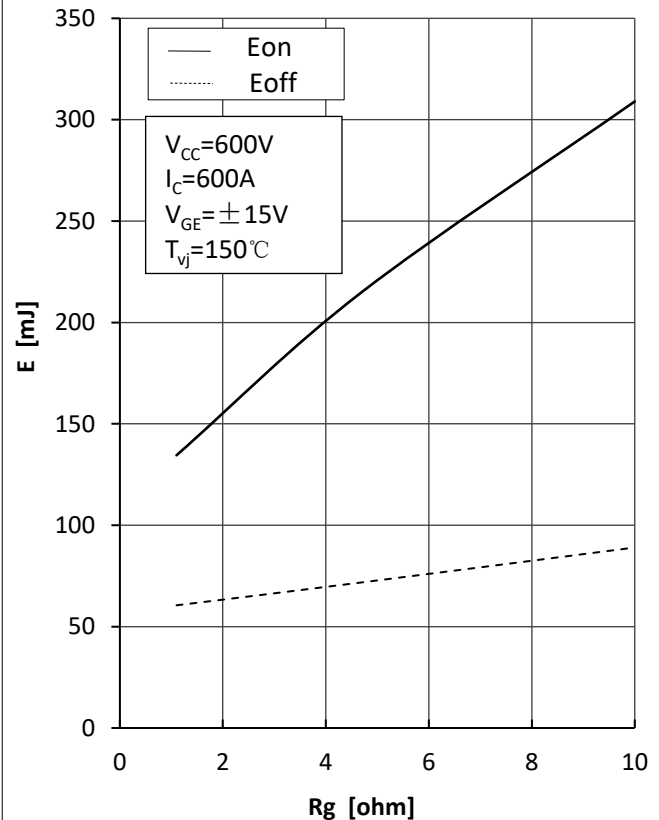
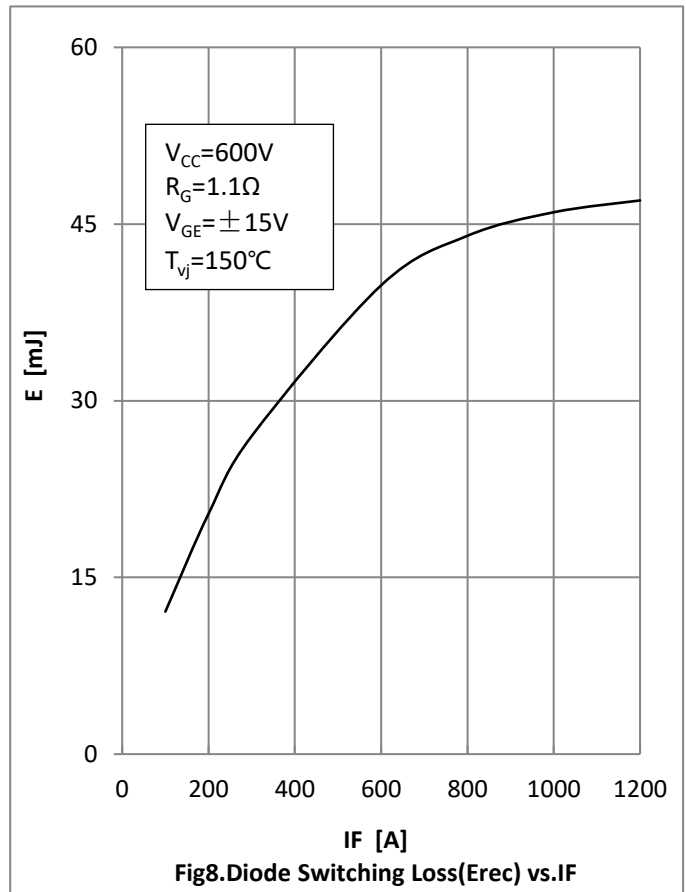
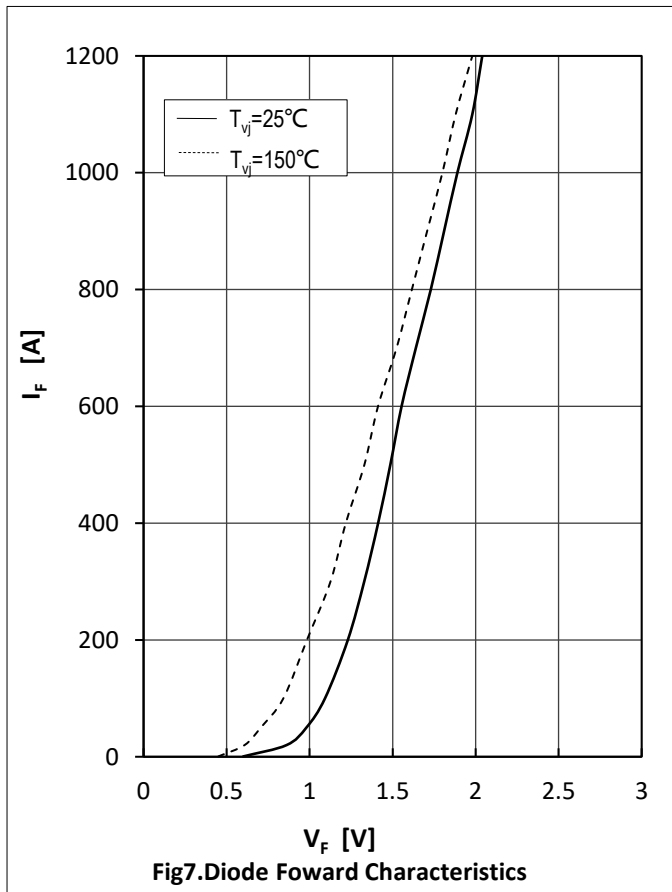
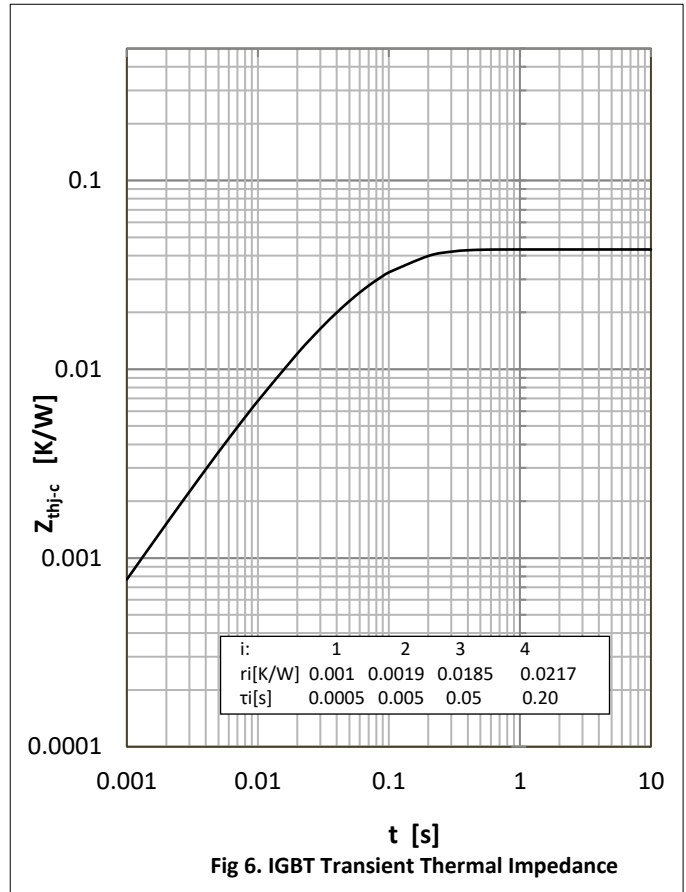
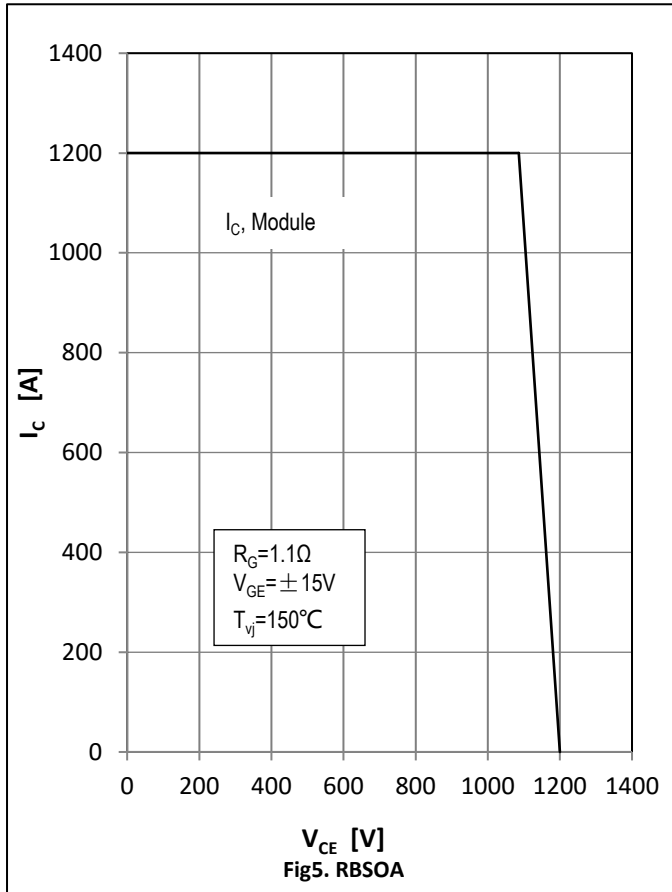
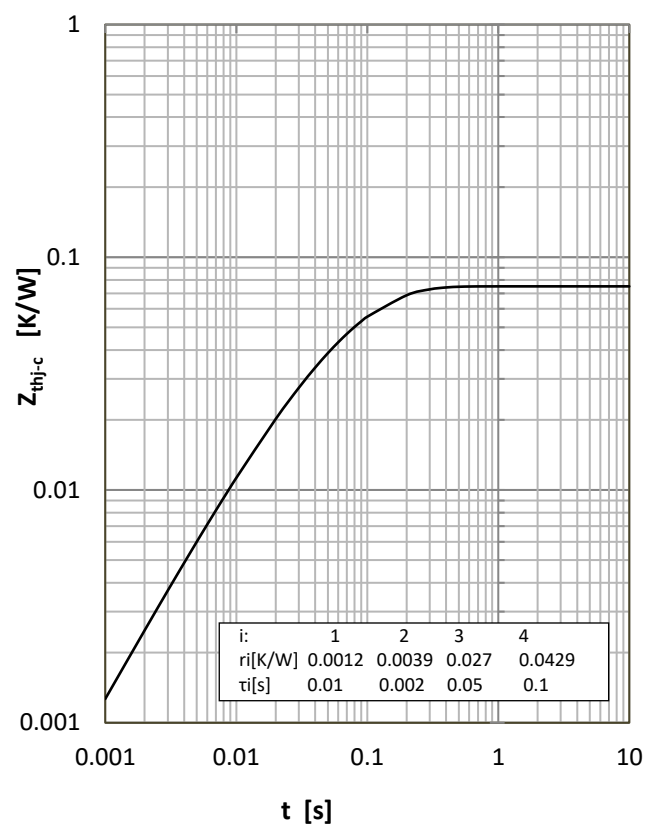
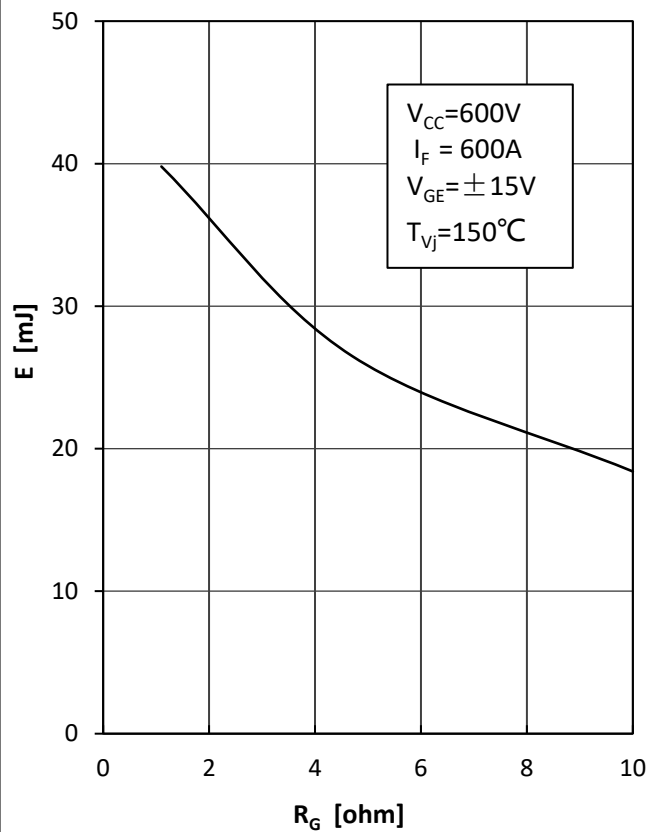
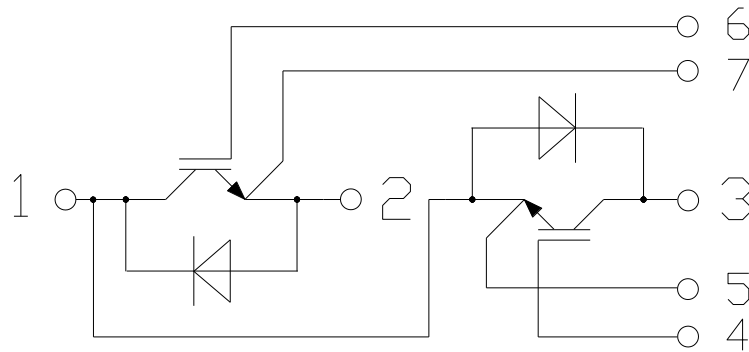


Fig4.IGBT Switching Loss vs.Rg



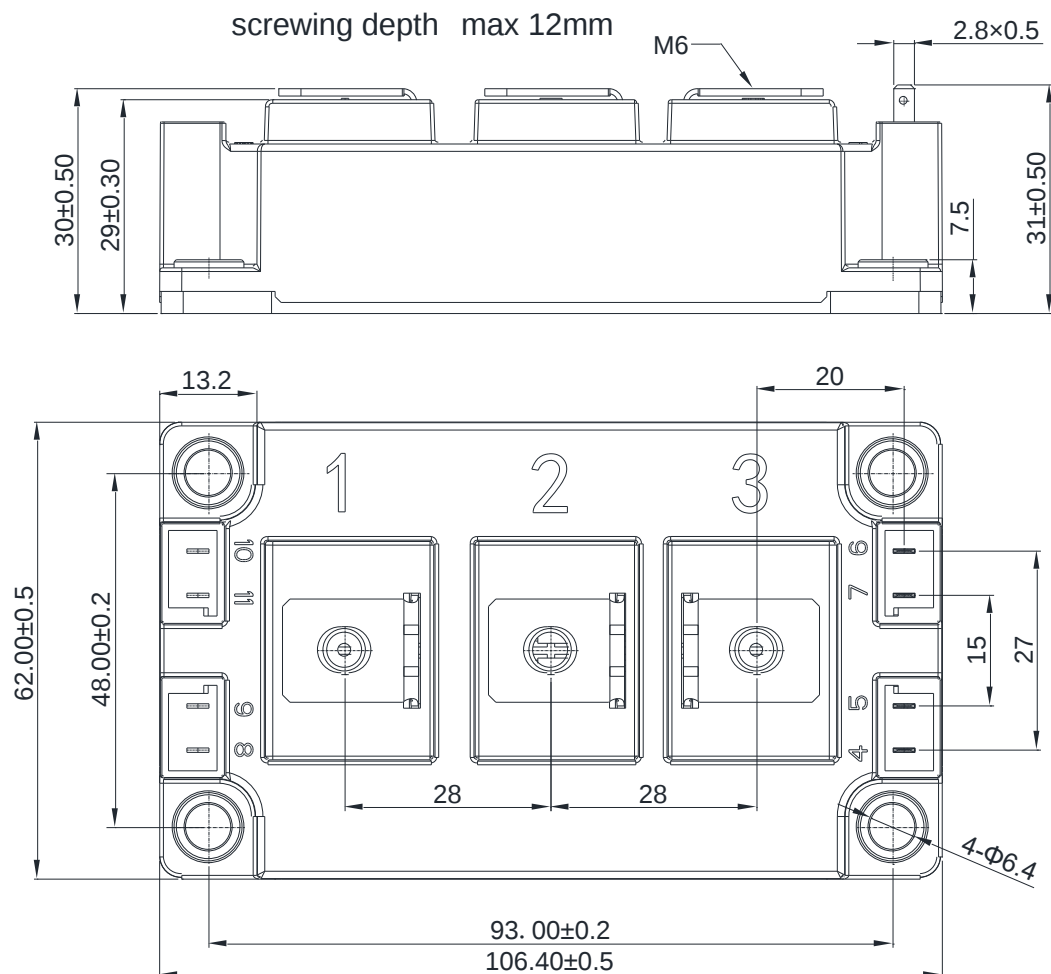


● Circuit Diagram



● Package Outline Information

Dimensions in Millimeters





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