



IGBT Modules

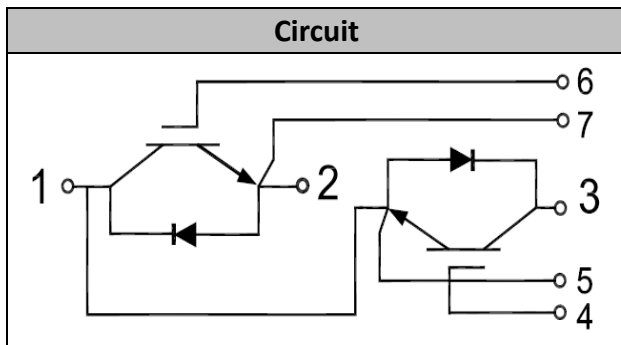
V_{CES} 650V
 I_C 400A

Applications

- High frequency drivers
- Solar inverters
- UPS (Uninterruptible Power Supplies)
- Electric welding machine

Features

- Low $V_{ce(sat)}$ with Trench technology
- Low switching losses
- High short circuit capability(6us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance
- Maximum junction temperature 175°C



● IGBT

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	650	V
Continuous Collector Current	I_C	$T_c=100^{\circ}C$	400	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	800	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_c=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	1250	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=10.0mA, T_{vj}=25^{\circ}C$	5.0	5.7	6.6	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=400A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.70	2.0	V
		$I_C=400A, V_{GE}=15V, T_{vj}=125^{\circ}C$		1.95		
Gate Charge	Q_G			4.60		uC
Internal Gate Resistance	R_{gint}			0.6		Ω
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz, T_{vj}=25^{\circ}C$		37.9		nF
Reverse Transfer Capacitance	C_{res}			0.76		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=400A$ $V_{CE}=300V$ $V_{GE}=\pm 15V$ $R_G=1.5\Omega$ $T_{vj}=25^{\circ}C$		66		ns
Rise Time	t_r			125		ns
Turn-off Delay Time	$t_{d(off)}$			290		ns
Fall Time	t_f			121		ns
Energy Dissipation During Turn-on Time	E_{on}			6.1		mJ
Energy Dissipation During Turn-off Time	E_{off}			8.5		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=400A$ $V_{CE}=300V$ $V_{GE}=\pm 15V$ $R_G=1.5\Omega$ $T_{vj}=125^{\circ}C$		80		ns
Rise Time	t_r			157		ns
Turn-off Delay Time	$t_{d(off)}$			341		ns
Fall Time	t_f			113		ns
Energy Dissipation During Turn-on Time	E_{on}			8.3		mJ
Energy Dissipation During Turn-off Time	E_{off}			13.2		mJ
SC Data	I_{sc}	$t_p \leq 6\mu s, V_{GE}=15V,$ $T_{vj}=125^{\circ}C, V_{cc}=300V,$ $V_{CEM} \leq 650V$		2000		A

● Diode

Absolute Maximum Ratings

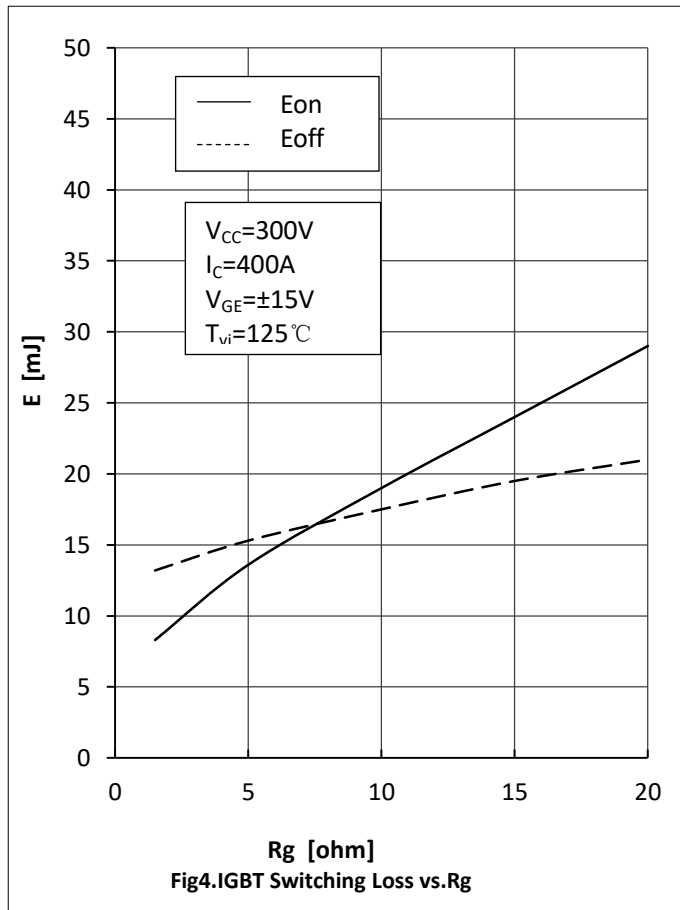
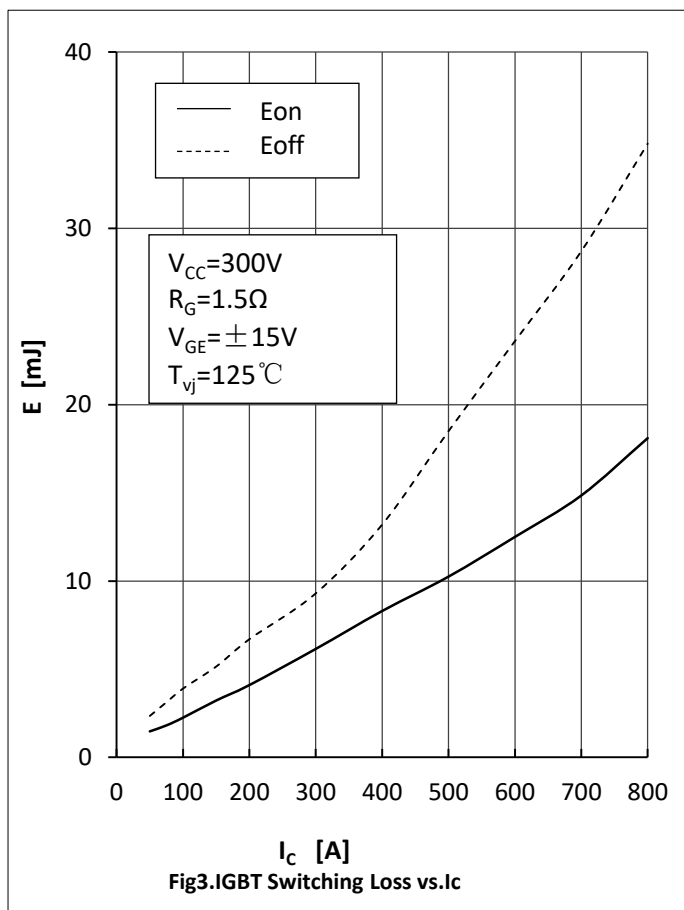
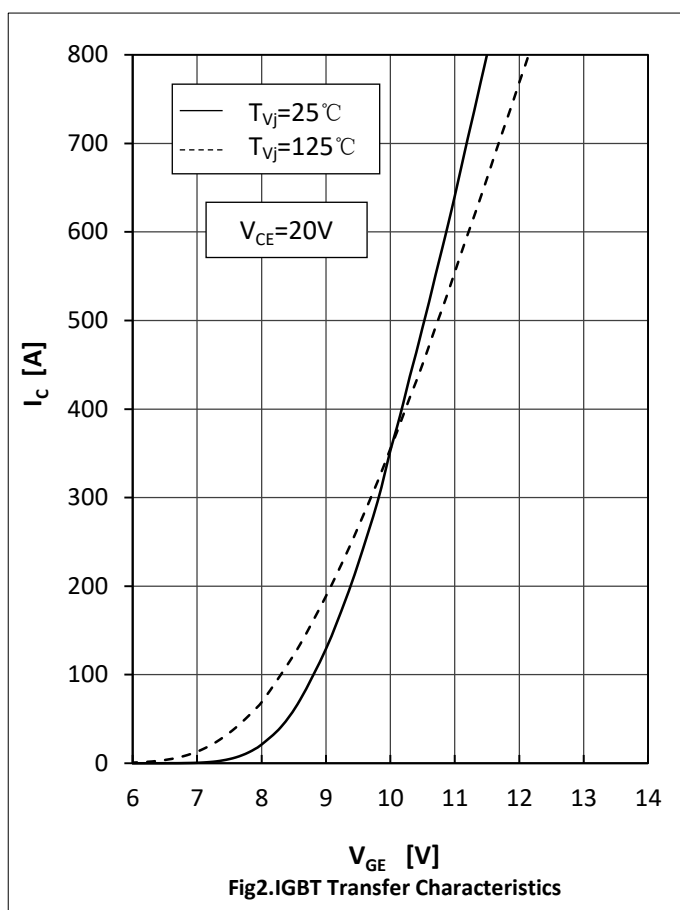
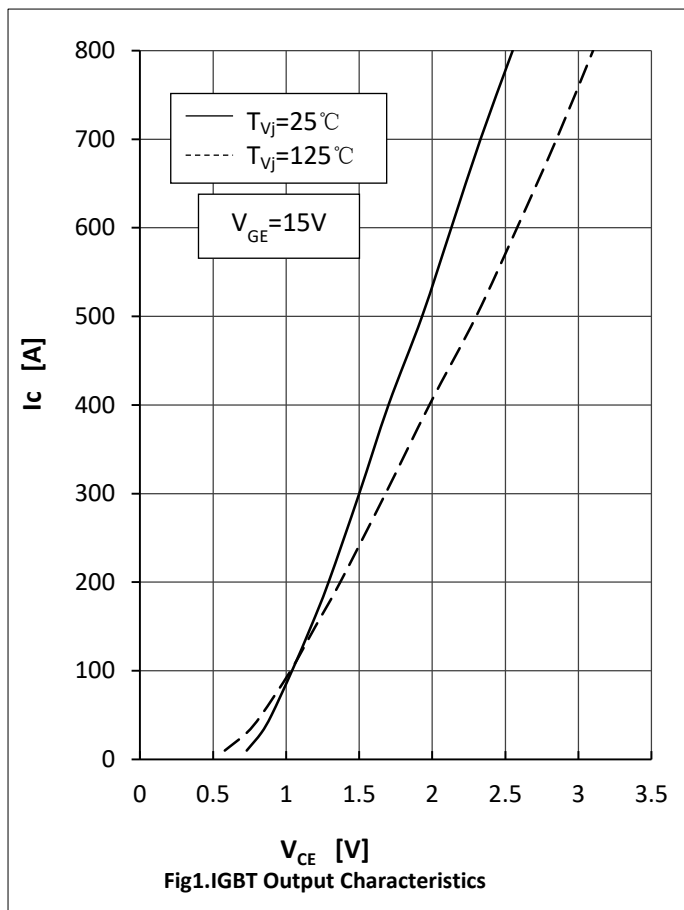
Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}C$	650	V
Continuous DC Forward Current	I_F		400	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1ms$	800	A

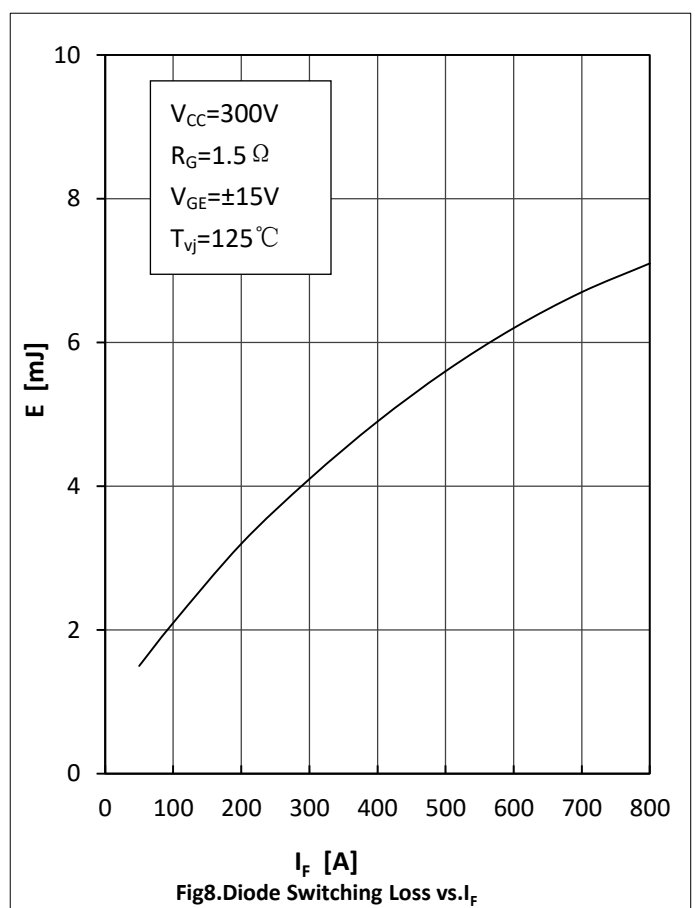
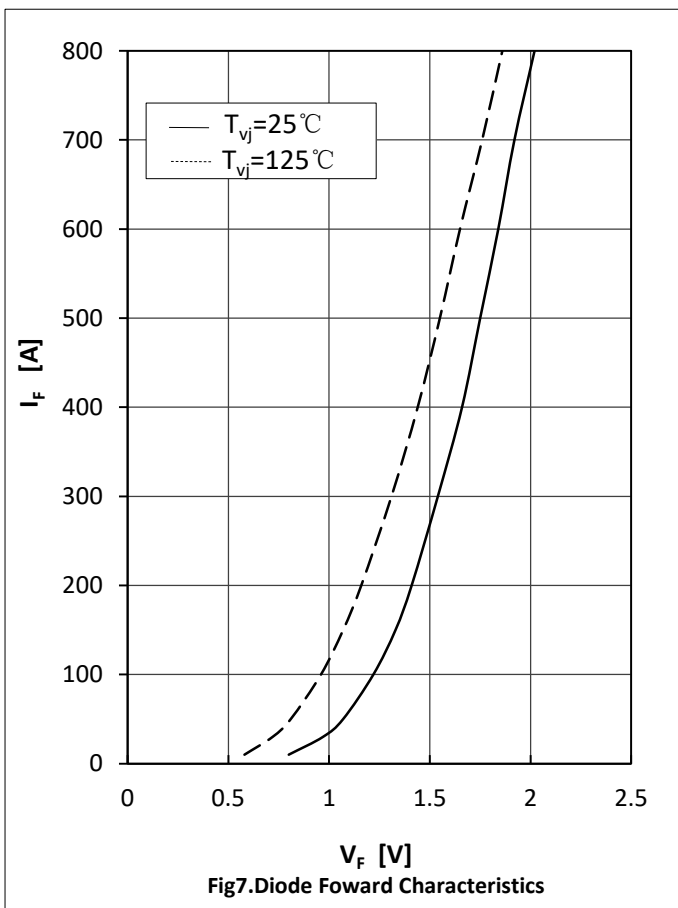
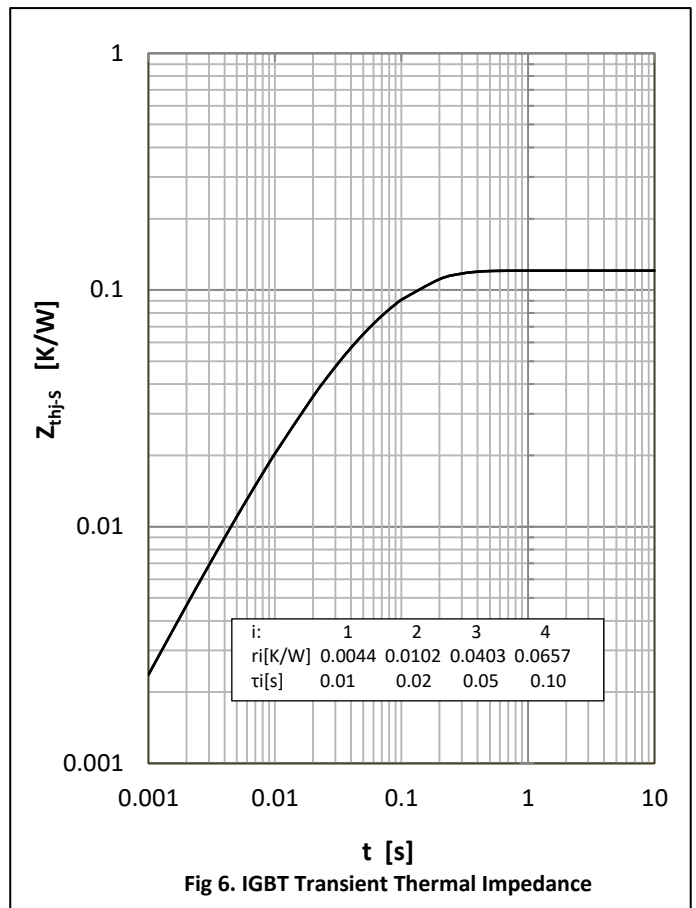
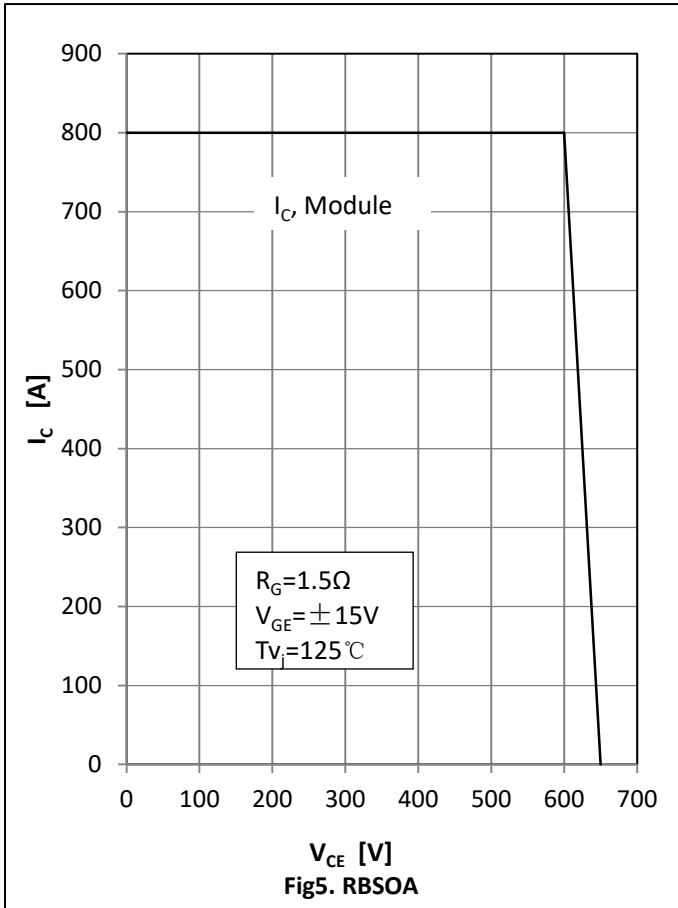
Characteristic values

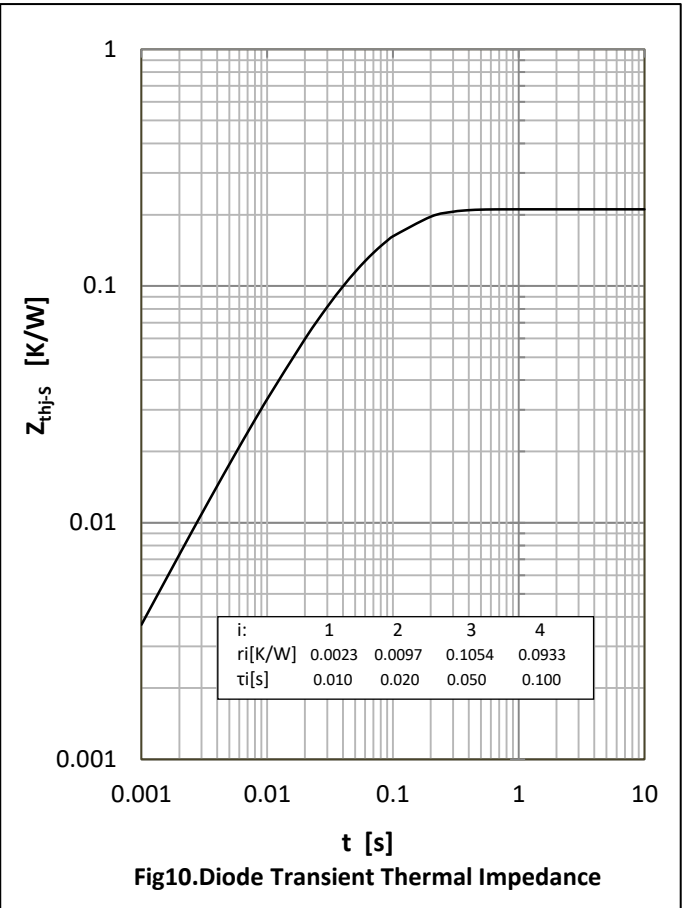
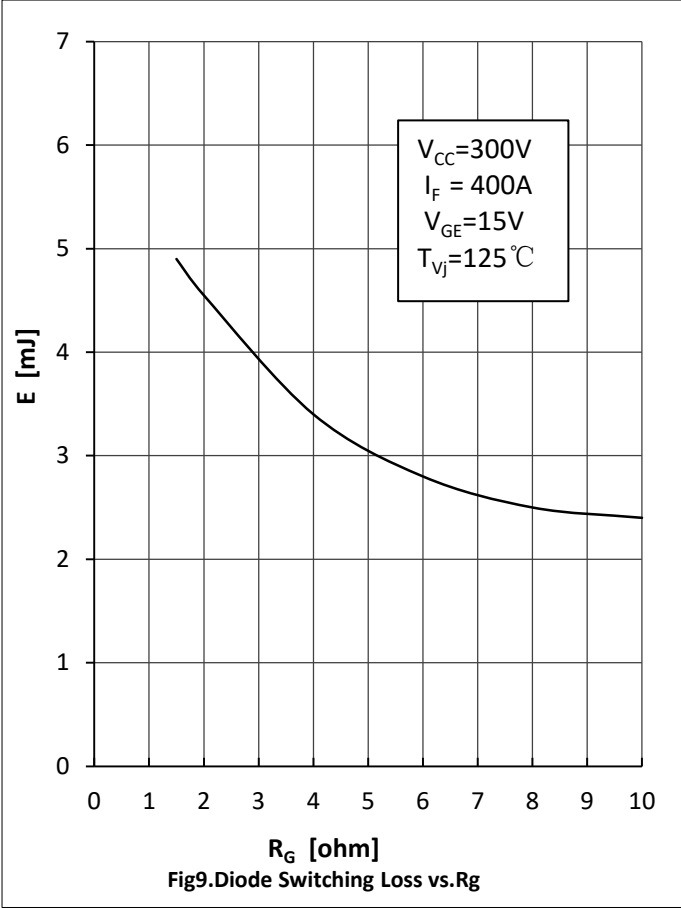
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=400A, T_{vj}=25^{\circ}C$		1.60		V
		$I_F=400A, T_{vj}=125^{\circ}C$		1.45		
Recovered Charge	Q_{rr}	$I_F=400A$ $V_R=300V$ $-di_F/dt = 4000A/us$ $T_{vj}=25^{\circ}C$		3.9		μC
Peak Reverse Recovery Current	I_{rr}			74		A
Reverse Recovery Energy	E_{rec}			2.6		mJ
Recovered Charge	Q_{rr}	$I_F=400A$ $V_R=300V$ $-di_F/dt = 4000A/us$ $T_{vj}=125^{\circ}C$		10.4		μC
Peak Reverse Recovery Current	I_{rr}			137		A
Reverse Recovery Energy	E_{rec}			4.9		mJ

● **Module Characteristics** $T_C=25^{\circ}\text{C}$ unless otherwise specified

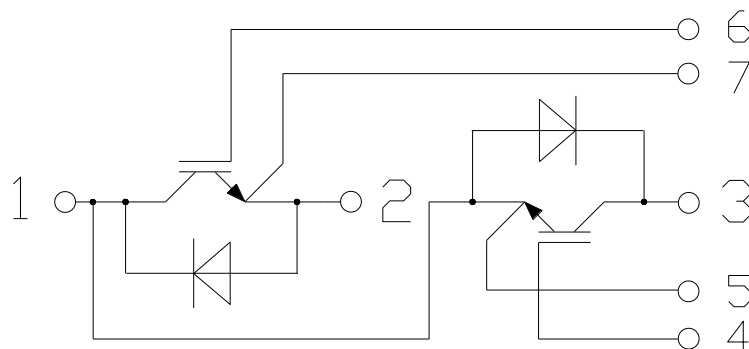
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	$T_{j\text{max}}$				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{vj\text{op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		150	$^{\circ}\text{C}$
Comparative Tracking Index	CTI		400			
Thermal Resistance Junction-to Case	$R_{\theta\text{JC}}$	per IGBT			0.12	K/W
		per Diode			0.22	
Thermal Resistance Case-to Sink	$R_{\theta\text{CS}}$	Conductive grease applied		0.012	0.035	K/W
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





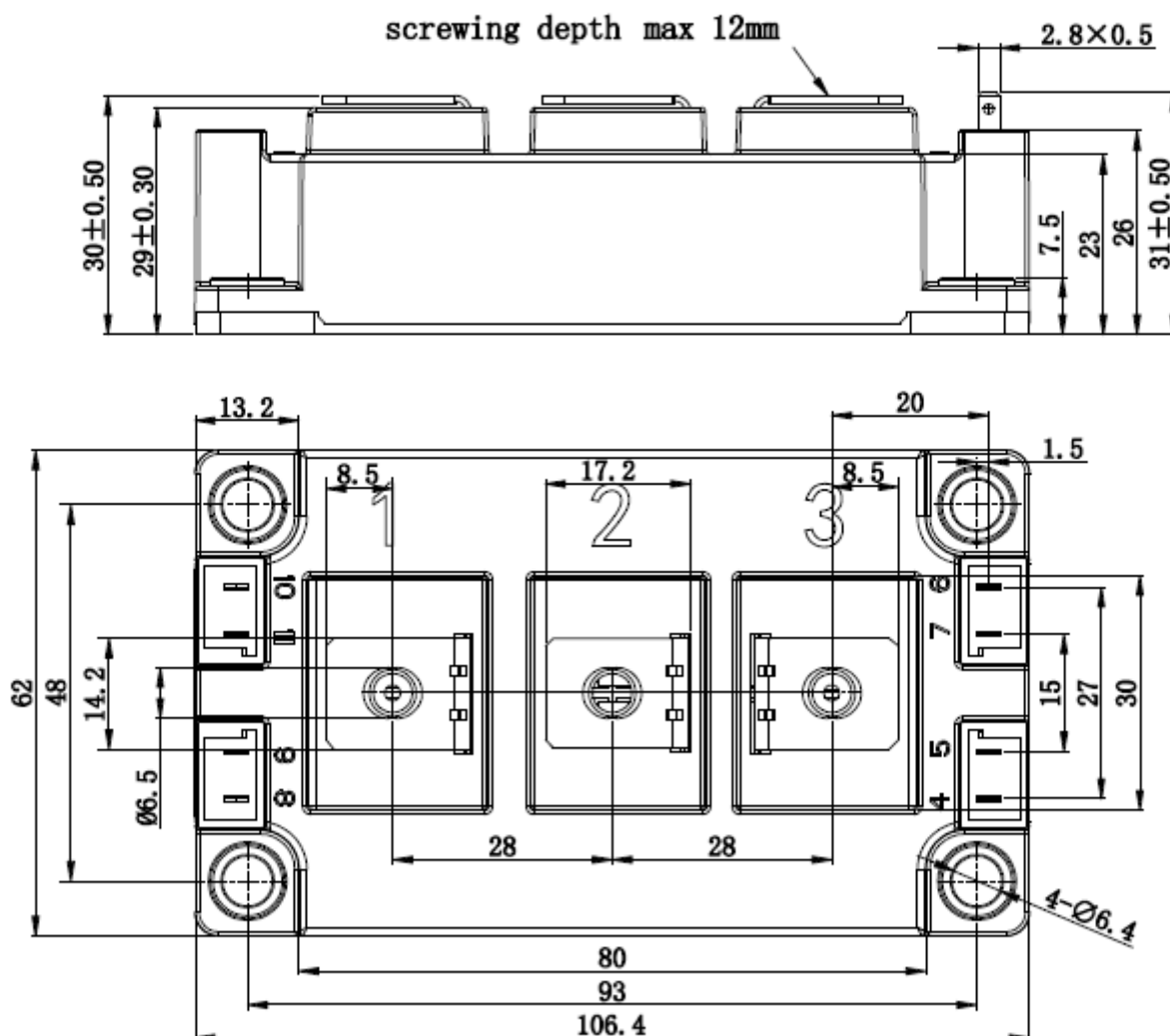


● Circuit Diagram



● Package Outline Information

Dimensions in Millimeters



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