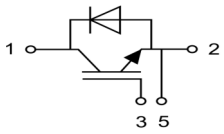
V_{CES} = 1200V
I_C = 400A at T_C = 80°C
t_{SC} ≥ 10µsec
$V_{CE\ (ON)}$ = 1.90V at I_C = 400A

Single Switch IGBT with Soft Recovery Diode
POWIR 62™ Package



Applications:

- Industrial Motor Drive
- Uninterruptible Power Supply
- Welding and Cutting Machine
- Switched Mode Power Supply
- Induction Heating

Features	Benefits
Low $V_{CE(ON)}$ and Switching Losses	High Efficiency in a Wide Range of Applications
RBSOA Tested	Rugged Transient Performance
10µsec Short Circuit Safe Operating Area	
POWIR 62™ Package	Industry Standard
Lead Free	RoHS Compliant, Environmental Friendly

Base Part Number	Package Type	Standard Pack	Quantity	Orderable Part Number
IRG7T400SD12B	***POWIR 62™***	Box	45	IRG7T400SD12B

Absolute Maximum Ratings of IGBT

V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Continuous Gate to Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80°C	400	A
		T_C = 25°C	780	A
I_{CM}	Pulse Collector Current	T_J = 175°C	800	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25°C, T_J = 175°C	2140	W
T_J	Maximum IGBT Junction Temperature		175	°C
T_{JOP}	Maximum Operating Junction Temperature Range		-40 to +150	°C
T_{stg}	Storage Temperature		-40 to +125	°C

Electrical Characteristics of IGBT at T_J = 25°C (Unless Otherwise Specified)

Parameter		Min.	Typ.	Max.	Unit	Test Conditions	
$V_{(BR)CES}$	Collector to Emitter Breakdown Voltage	1200			V	V_{GE} = 0V, I_C = 4mA	
$V_{GE(th)}$	Gate Threshold Voltage	5.0	5.8	6.5	V	I_C = 20mA, V_{CE} = V_{GE}	
$V_{CE(ON)}$	Collector to Emitter Saturation Voltage		1.90	2.20	V	T_J = 25°C	I_C = 400A, V_{GE} = 15V
			2.20		V	T_J = 125°C	
I_{CES}	Collector to Emitter Leakage Current			4	mA	V_{GE} = 0V, V_{CE} = V_{CES}	
I_{GES}	Gate to Emitter Leakage Current			400	nA	V_{GE} = ±20V, V_{CE} = 0	
R_{Gint}	Internal Gate Resistance		0.63		Ω		

Switching Characteristics of IGBT

Parameter		Min.	Typ.	Max.	Unit	Test Conditions	
$t_{d(on)}$	Turn-on Delay Time		330		ns	T_J = 25°C	V_{CC}=600V, I_C = 400A, R_G = 1.8Ω, V_{GE}=±15V, Inductive Load
			310			T_J = 125°C	
t_r	Rise Time		180		ns	T_J = 25°C	
			185			T_J = 125°C	
$t_{d(off)}$	Turn-off Delay Time		460		ns	T_J = 25°C	
			490			T_J = 125°C	
t_f	Fall Time		175		ns	T_J = 25°C	
			150			T_J = 125°C	
E_{on}	Turn-on Switching Loss		13.3		mJ	T_J = 25°C	
			17.0			T_J = 125°C	
E_{off}	Turn-off Switching Loss		32.4		mJ	T_J = 25°C	
			39.3			T_J = 125°C	
Q_g	Total Gate Charge		3440		nC	T_J = 25°C	
C_{ies}	Input Capacitance		58.5		nF	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz, T_J = 25°C	
C_{oes}	Output Capacitance		3.03				
C_{res}	Reverse Transfer Capacitance		1.82				
RBSOA	Reverse Bias Safe Operating Area	Trapezoid				I_C = 800A, V_{CC} = 960V, V_P =1200V, R_G = 4.7Ω, V_{GE} = +15V to 0V, T_J = 150°C	
SCSOA	Short Circuit Safe Operating Area	10			µs	V_{CC} = 600V, V_{GE} = 15V, T_J = 150°C	

Absolute Maximum Ratings of Freewheeling Diode

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current, T_C = 25°C	800	A
	Diode Continuous Forward Current, T_C = 80°C	400	
I_{FM}	Pulse Diode Current	800	A

Electrical and Switching Characteristics of Freewheeling Diode

Parameter		Typ.	Max.	Unit	Test Conditions	
V_F	Forward Voltage	2.20	2.70	V	T_J = 25°C	I_F = 400A , V_{GE} = 0V
		2.40			T_J = 125°C	
I_{rr}	Peak Reverse Recovery Current	185		A	T_J = 25°C	I_F=400A, di/dt=2900A/µs, V_{rr} = 600V, V_{GE} = -15V
		255			T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	23.7		µC	T_J = 25°C	
		37.0			T_J = 125°C	
E_{rec}	Reverse Recovery Energy	11.0		mJ	T_J = 25°C	
		18.8			T_J = 125°C	

Module Characteristics

Parameter		Min.	Typ.	Max.	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted), f = 50Hz, 1minute			2500	V
$R_{\theta JC}$	Junction-to-Case (IGBT)		0.070		°C/W
$R_{\theta JC}$	Junction-to-Case (Freewheeling Diode)		0.102		°C/W
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)		0.1		°C/W
M	Power Terminals Screw: M6	3.0		5.0	N·m
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		310		g

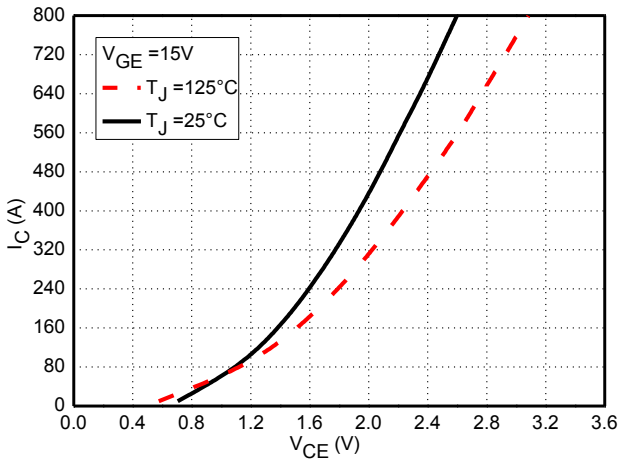


Fig.1 Typical IGBT Saturation Characteristics

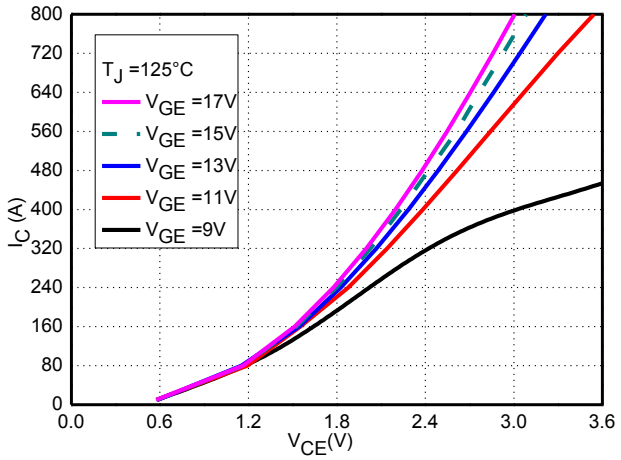


Fig.2 Typical IGBT Output Characteristics

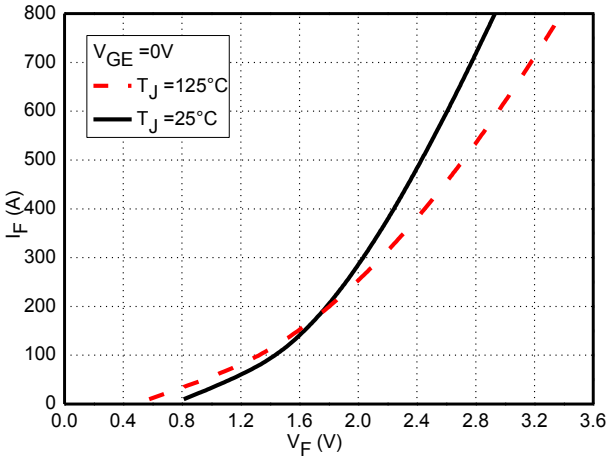


Fig.3 Typical Diode Forward Characteristics

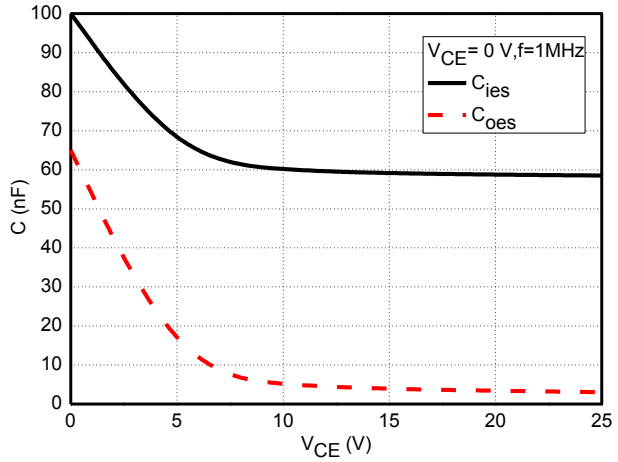


Fig. 4 Typical Capacitance Characteristics

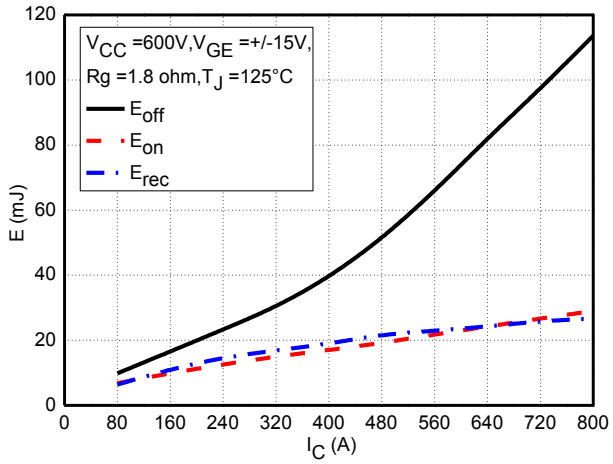


Fig.5 Typical Switching Loss vs. Collector Current

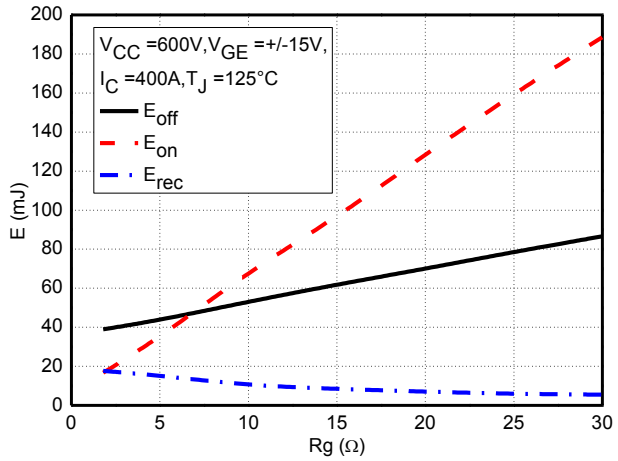


Fig.6 Typical Switching Loss vs. Gate Resistance

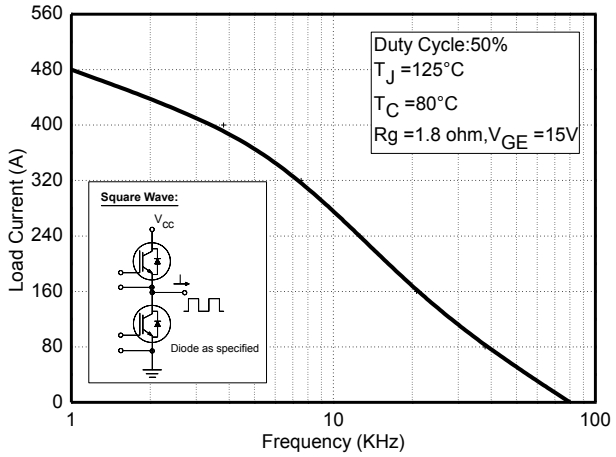


Fig.7 Typical Load Current vs. Frequency

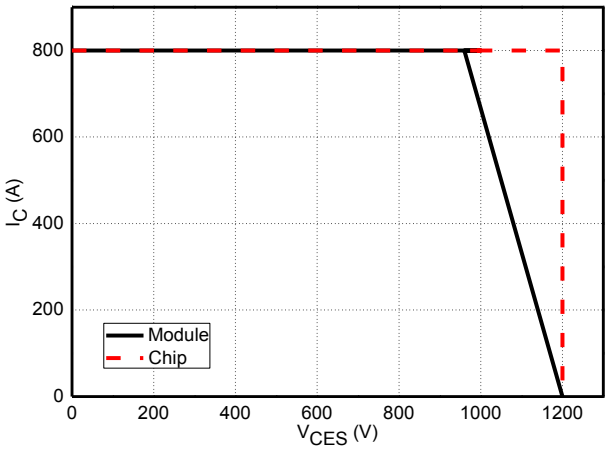


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

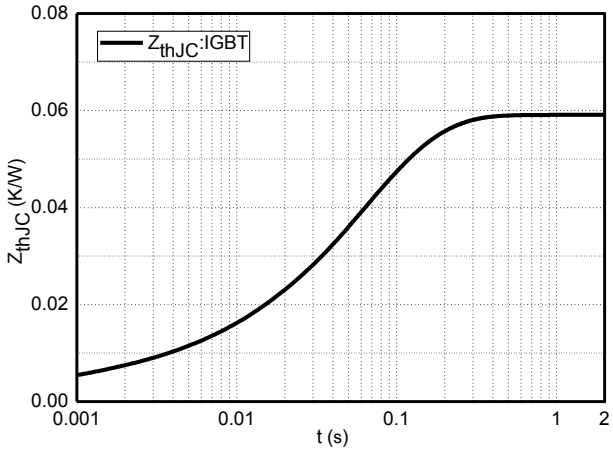


Fig.9 Typical Transient Thermal Impedance (IGBT)

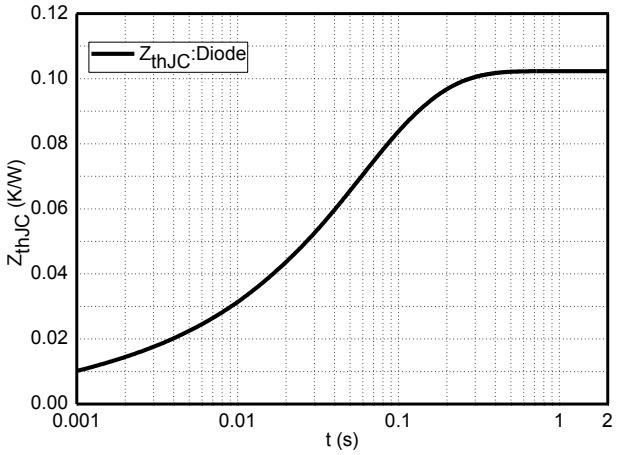
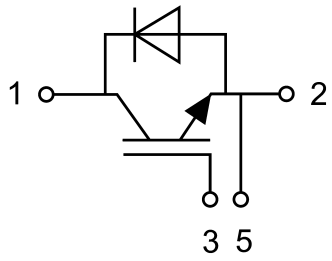
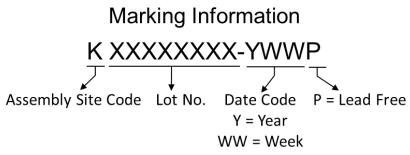


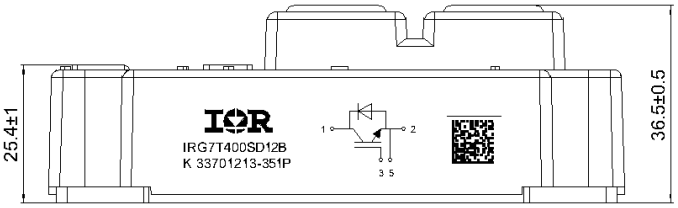
Fig.10 Typical Transient Thermal Impedance (Diode)

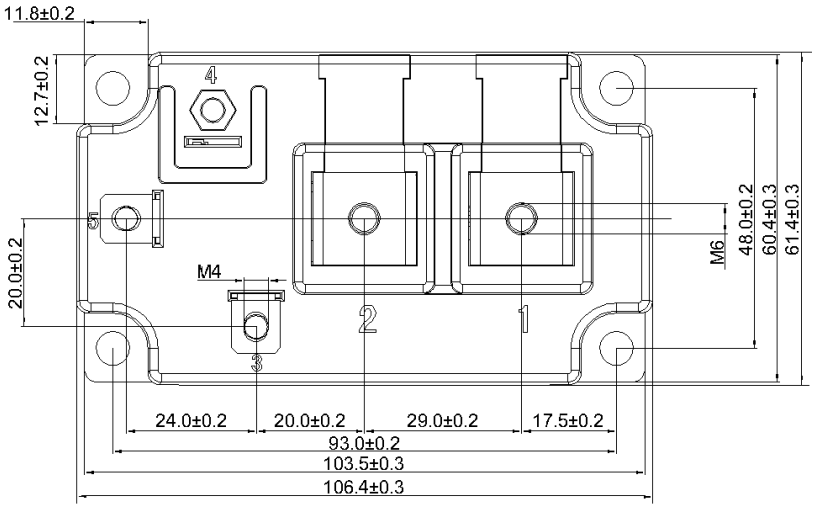
Internal Circuit:



Package Outline (Unit: mm):







Qualification Information†

Qualification Level	Industrial
Moisture Sensitivity Level	Not Applicable
RoHS Compliant	Yes

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com/product-info/reliability/

International
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