International Rectifier

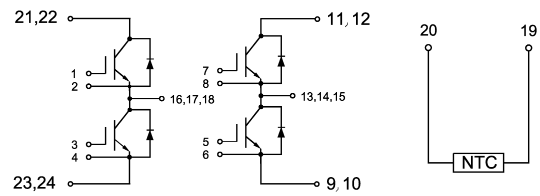
IRG5U75HH12E

V_{CES} = 1200V
I_C = 75A at T_C = 80°C
$t_{SC} \geq$ 10µsec
$V_{CE(ON)}$ = 3.20V at I_C = 75A

IGBT H-Bridge
POWIR ECO 2™ Package

Applications:

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



Features	**Benefits**
Low $V_{CE(ON)}$ and Switching Losses	High Efficiency in a Wide Range of Applications
100% RBSOA Tested	Rugged Transient Performance
10µsec Short Circuit Safe Operating Area	
POWIR ECO 2™ Package	Industry Standard
Lead Free	RoHS Compliant, Environmental Friendly

Base Part Number	Package Type	Standard Pack	Quantity	Orderable Part Number
IRG5U75HH12E	***POWIR ECO 2™***	Box	80	IRG5U75HH12E

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	75	A
		T_C = 25°C	130	A
I_{CM}	Pulse Collector Current	T_J = 150°C	150	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25°C, T_J = 150°C	540	W
T_J	Maximum IGBT Junction Temperature		150	°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 = 1mA	
$V_{GE(th)}$	Gate Threshold Voltage	4.5	5.3	6.0	V	I_C = 0.75mA, V_{CE} = V_{GE}	
$V_{CE(ON)}$	Collector to Emitter Saturation Voltage (Module Level)		3.20	3.50	V	T_J = 25°C	I_C = 75A, V_{GE} = 15V
			3.80		V	T_J = 125°C	
I_{CES}	Collector to Emitter Leakage Current			1	mA	V_{GE} = 0V, V_{CE} = V_{CES}	
I_{GES}	Gate to Emitter Leakage Current			400	nA	V_{GE} = ±20V, V_{CE} = 0	

Switching Characteristics of IGBT

Parameter		Min.	Typ.	Max.	Unit	Test Conditions	
$t_{d(on)}$	Turn-on Delay Time		160		ns	T_J = 25°C	V_{CC}=600V, I_C = 75A, R_G = 15Ω, V_{GE}=±15V, Inductive Load
			150			T_J = 125°C	
t_r	Rise Time		90		ns	T_J = 25°C	
			100			T_J = 125°C	
$t_{d(off)}$	Turn-off Delay Time		440		ns	T_J = 25°C	
			470			T_J = 125°C	
t_f	Fall Time		120		ns	T_J = 25°C	
			160			T_J = 125°C	
E_{on}	Turn-on Switching Loss		5.7		mJ	T_J = 25°C	
			6.8			T_J = 125°C	
E_{off}	Turn-off Switching Loss		1.9		mJ	T_J = 25°C	
			3.2			T_J = 125°C	
Q_g	Total Gate Charge		980		nC	T_J = 25°C	
C_{ies}	Input Capacitance		9.5		nF	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz, T_J = 25°C	
C_{oes}	Output Capacitance		0.70				
C_{res}	Reverse Transfer Capacitance		0.28				
RBSOA	Reverse Bias Safe Operating Area	Trapezoid				I_C = 150A, V_{CC} = 960V, V_P = 1200V, R_G = 15Ω, 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	150	A
	Diode Continuous Forward Current, T_C = 80°C	75	
I_{FM}	Pulse Diode Current	150	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 = 75A , V_{GE} = 0V
		2.40			T_J = 125°C	
I_{rr}	Peak Reverse Recovery Current	43		A	T_J = 25°C	I_F=75A, di/dt=880A/µs, V_{rr} = 600V, V_{GE} = -15V
		60			T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	4.1		µC	T_J = 25°C	
		8.2			T_J = 125°C	
E_{rec}	Reverse Recovery Energy	1.2		mJ	T_J = 25°C	
		2.5			T_J = 125°C	

NTC-Thermistor Characteristic Values

Parameter		Typ.	Max.	Unit
R_{25}	T_C =25°C	5		kΩ
ΔR/R	T_C =100°C，R_{100} =481Ω		±5	%
P_{25}	T_C =25°C	50		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	3440		K

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)		0.23		°C/W
$R_{\theta JC}$	Junction-to-Case (Diode)		0.56		°C/W
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)		0.1		°C/W
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		200		g

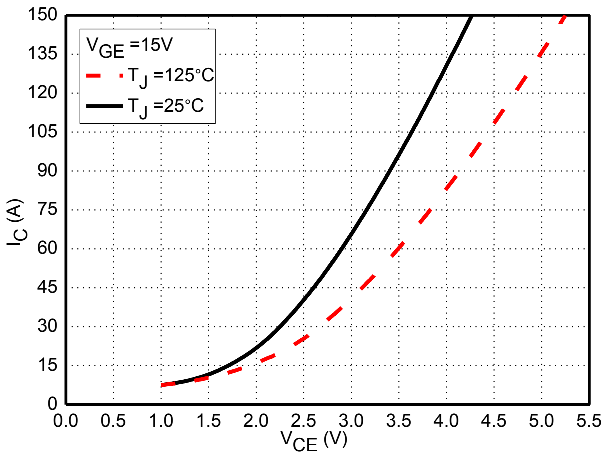


Fig.1 Typical IGBT Saturation Characteristics

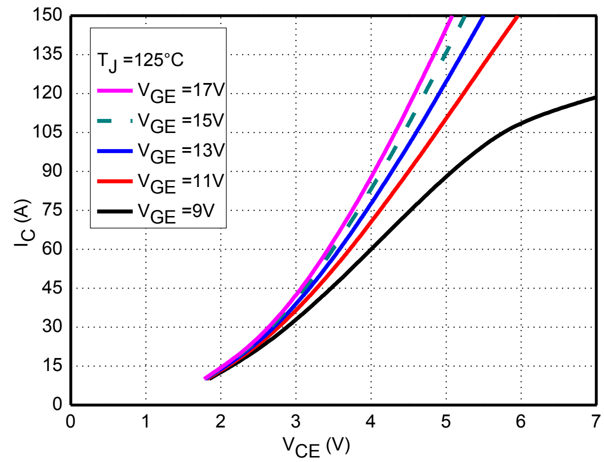


Fig.2 Typical IGBT Output Characteristics

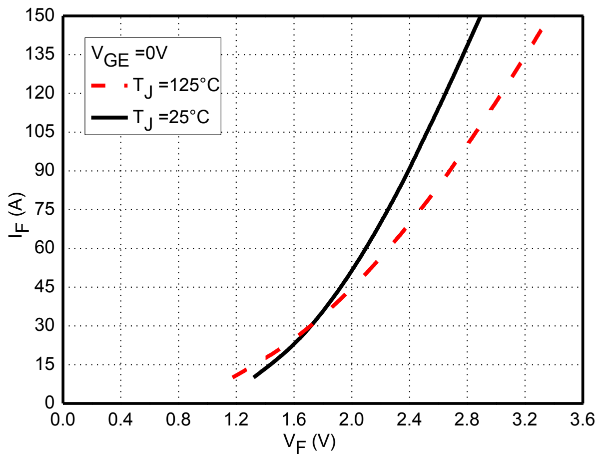


Fig.3 Typical Freewheeling Diode Characteristics

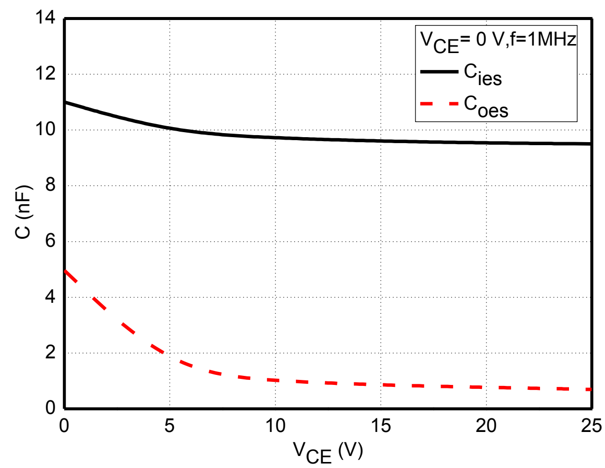


Fig. 4 Typical Capacitance Characteristics

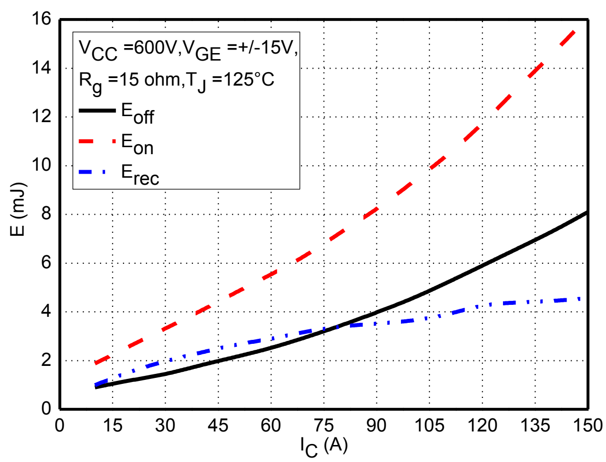


Fig.5 Typical Switching Loss vs. Collector Current

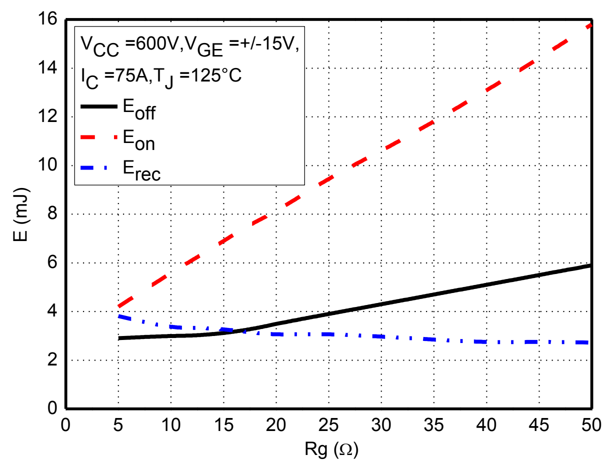


Fig.6 Typical Switching Loss vs. Gate Resistance

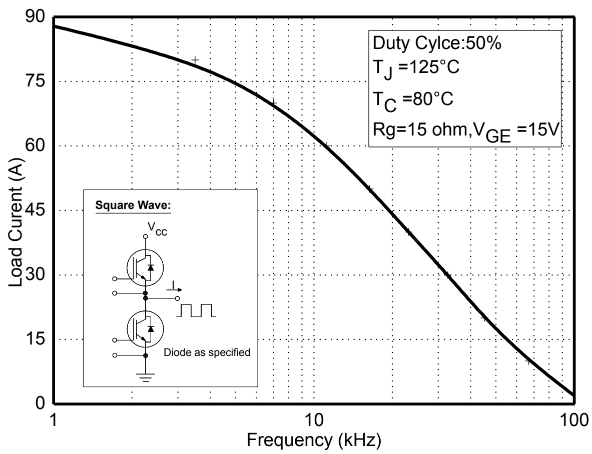


Fig.7 Typical Load Current vs. Frequency

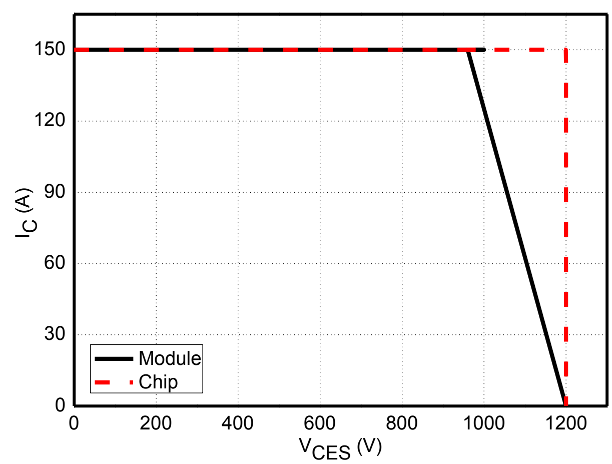


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

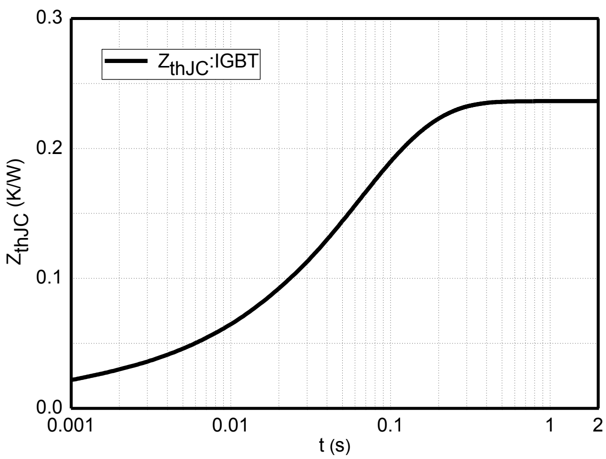


Fig.9 Typical Transient Thermal Impedance (IGBT)

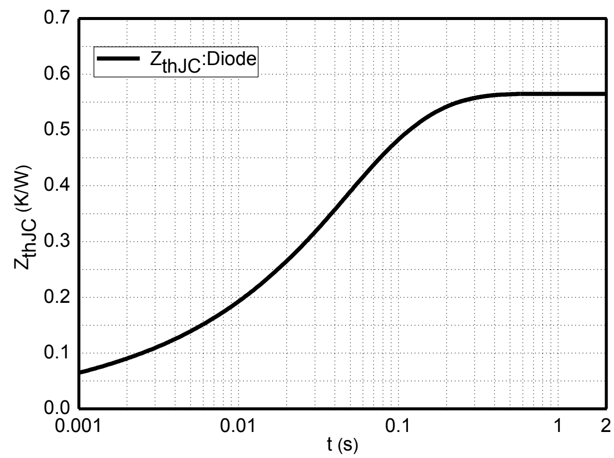


Fig.10 Typical Transient Thermal Impedance (Diode)

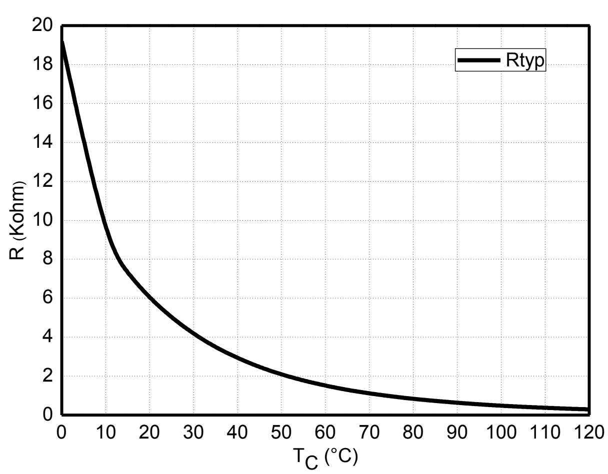
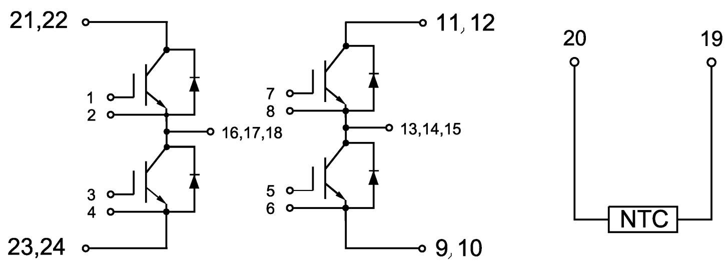
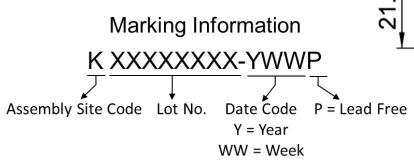


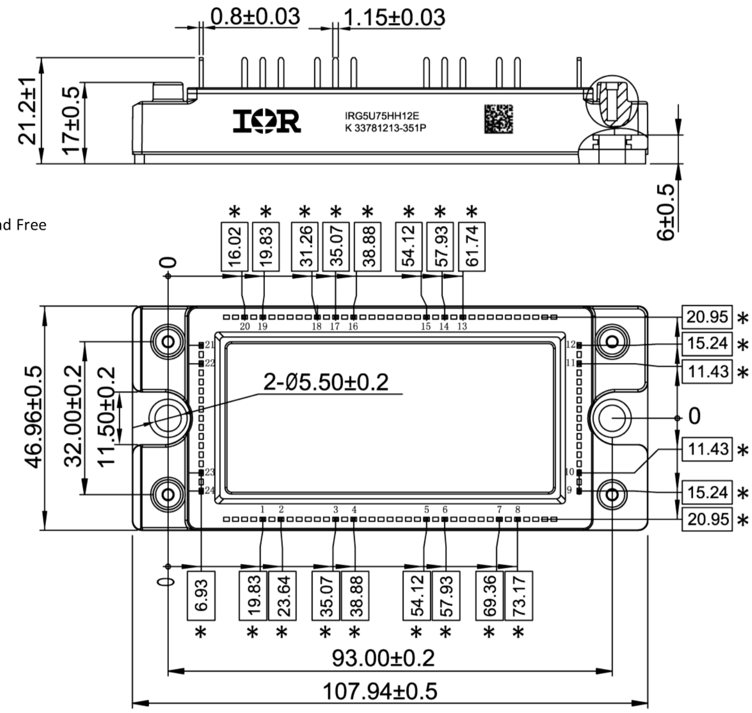
Fig.11 NTC Temperature Characteristics

Internal Circuit:



Package Outline (Unit: mm):





* =all dimensions with tolerance of ⌖ Ø0.4

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 Rectifier

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