



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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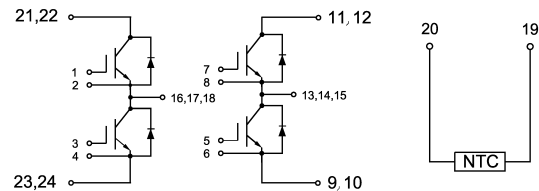
$V_{CES} = 1200V$ $I_C = 50A$ at $T_C = 80^\circ C$ $t_{SC} \geq 10\mu sec$ $V_{CE(ON)} = 3.20V$ at $I_C = 50A$
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**IGBT H-Bridge  
POWER ECO 2™ Package**



**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	
<b>POWER ECO 2™</b> Package	Industry Standard
Lead Free	RoHS Compliant, Environmental Friendly

Base Part Number	Package Type	Standard Pack	Quantity	Orderable Part Number
IRG5U50HH12E	<b>POWER ECO 2™</b>	Box	80	IRG5U50HH12E

**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	$T_C = 80^\circ C$	50 A
		$T_C = 25^\circ C$	85 A
$I_{CM}$	Pulse Collector Current	$T_J = 150^\circ C$	100 A
$P_D$	Maximum Power Dissipation (IGBT)	$T_C = 25^\circ C, T_J = 150^\circ C$	390 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  $T_J = 25^\circ\text{C}$  (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	$I_C = 0.50mA, V_{CE} = V_{GE}$	
$V_{CE(ON)}$	Collector to Emitter Saturation Voltage (Module Level)		3.20	3.50	V	$T_J = 25^\circ\text{C}$	$I_C = 50A, V_{GE} = 15V$
			3.80		V	$T_J = 125^\circ\text{C}$	
$I_{CES}$	Collector to Emitter Leakage Current			1	mA	$V_{GE} = 0V, V_{CE} = V_{CES}$	
$I_{GES}$	Gate to Emitter Leakage Current			400	nA	$V_{GE} = \pm 20V, V_{CE} = 0$	

**Switching Characteristics of IGBT**

Parameter		Min.	Typ.	Max.	Unit	Test Conditions	
$t_{d(on)}$	Turn-on Delay Time		115		ns	$T_J = 25^\circ\text{C}$	$V_{CC} = 600V, I_C = 50A, R_G = 15\Omega, V_{GE} = \pm 15V, \text{Inductive Load}$
			110			$T_J = 125^\circ\text{C}$	
$t_r$	Rise Time		70		ns	$T_J = 25^\circ\text{C}$	
			70			$T_J = 125^\circ\text{C}$	
$t_{d(off)}$	Turn-off Delay Time		305		ns	$T_J = 25^\circ\text{C}$	
			325			$T_J = 125^\circ\text{C}$	
$t_f$	Fall Time		125		ns	$T_J = 25^\circ\text{C}$	
			160			$T_J = 125^\circ\text{C}$	
$E_{on}$	Turn-on Switching Loss		3.6		mJ	$T_J = 25^\circ\text{C}$	
			4.6			$T_J = 125^\circ\text{C}$	
$E_{off}$	Turn-off Switching Loss		1.0		mJ	$T_J = 25^\circ\text{C}$	
			1.9			$T_J = 125^\circ\text{C}$	
$Q_g$	Total Gate Charge		630		nC	$T_J = 25^\circ\text{C}$	
$C_{ies}$	Input Capacitance		6.0		nF	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz, T_J = 25^\circ\text{C}$	
$C_{oes}$	Output Capacitance		0.50				
$C_{res}$	Reverse Transfer Capacitance		0.20				
RBSOA	Reverse Bias Safe Operating Area	Trapezoid				$I_C = 100A, V_{CC} = 960V, V_P = 1200V, R_G = 15\Omega, V_{GE} = +15V \text{ to } 0V, T_J = 150^\circ\text{C}$	
SCSOA	Short Circuit Safe Operating Area	10			$\mu s$	$V_{CC} = 600V, V_{GE} = 15V, T_J = 150^\circ\text{C}$	

**Absolute Maximum Ratings of Freewheeling Diode**

$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V
$I_F$	Diode Continuous Forward Current, $T_C = 25^\circ\text{C}$	100	A
	Diode Continuous Forward Current, $T_C = 80^\circ\text{C}$	50	
$I_{FM}$	Pulse Diode Current	100	A

**Electrical and Switching Characteristics of Freewheeling Diode**

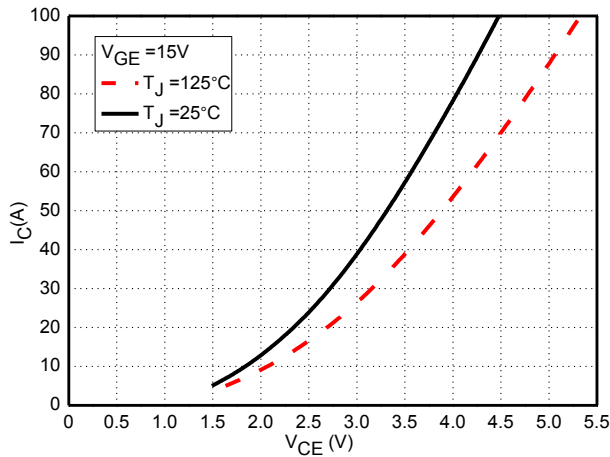
Parameter		Typ.	Max.	Unit	Test Conditions	
$V_F$	Forward Voltage	2.20	2.70	V	$T_J = 25^\circ\text{C}$	$I_F = 50\text{A}$ , $V_{GE} = 0\text{V}$
		2.40			$T_J = 125^\circ\text{C}$	
$I_{rr}$	Peak Reverse Recovery Current	40		A	$T_J = 25^\circ\text{C}$	$I_F = 50\text{A}$ , $di/dt = 850\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$
		50			$T_J = 125^\circ\text{C}$	
$Q_{rr}$	Reverse Recovery Charge	3.0		$\mu\text{C}$	$T_J = 25^\circ\text{C}$	
		5.6			$T_J = 125^\circ\text{C}$	
$E_{rec}$	Reverse Recovery Energy	1.02		mJ	$T_J = 25^\circ\text{C}$	
		2.01			$T_J = 125^\circ\text{C}$	

**NTC-Thermistor Characteristic Values**

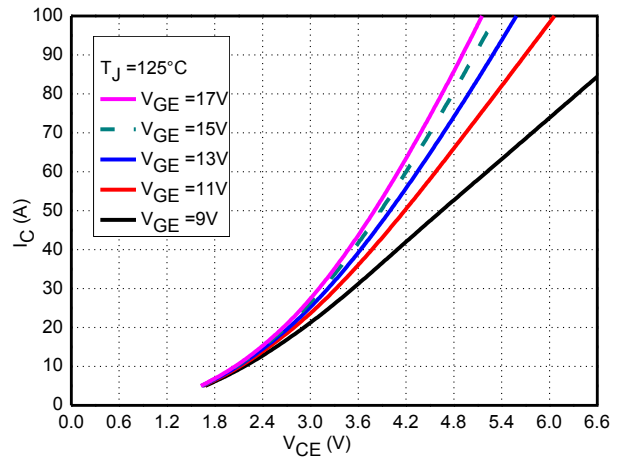
Parameter		Typ.	Max.	Unit
$R_{25}$	$T_C = 25^\circ\text{C}$	5		k $\Omega$
$\Delta R/R$	$T_C = 100^\circ\text{C}$ , $R_{100} = 481\Omega$		$\pm 5$	%
$P_{25}$	$T_C = 25^\circ\text{C}$	50		mW
$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$	3380		K
$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298.15\text{K}))]$	3440		K

**Module Characteristics**

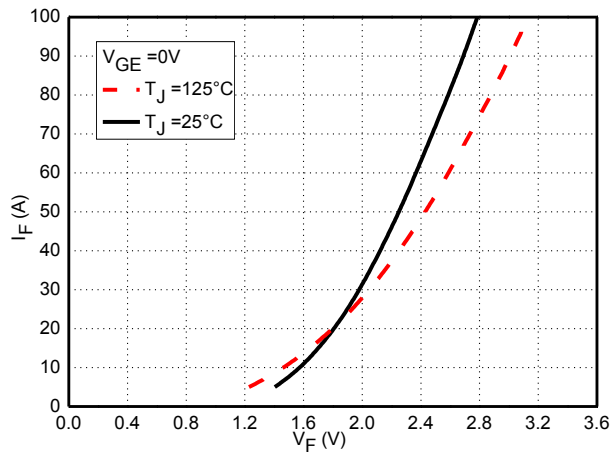
Parameter		Min.	Typ.	Max.	Unit
$V_{iso}$	Isolation Voltage (All Terminals Shorted), $f = 50\text{Hz}$ , 1minute			2500	V
$R_{\theta JC}$	Junction-to-Case (IGBT)		0.32		$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-to-Case (Diode)		0.87		$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)		0.1		$^\circ\text{C}/\text{W}$
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		200		g



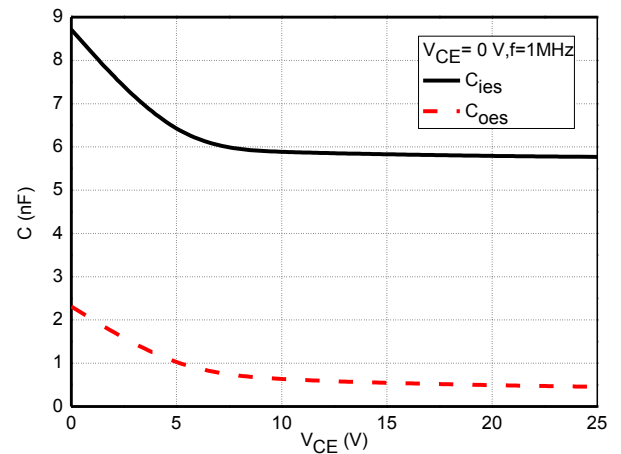
**Fig.1 Typical IGBT Saturation Characteristics**



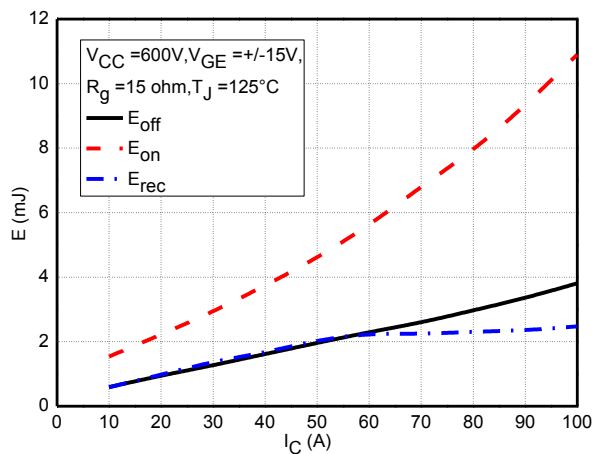
**Fig.2 Typical IGBT Output Characteristics**



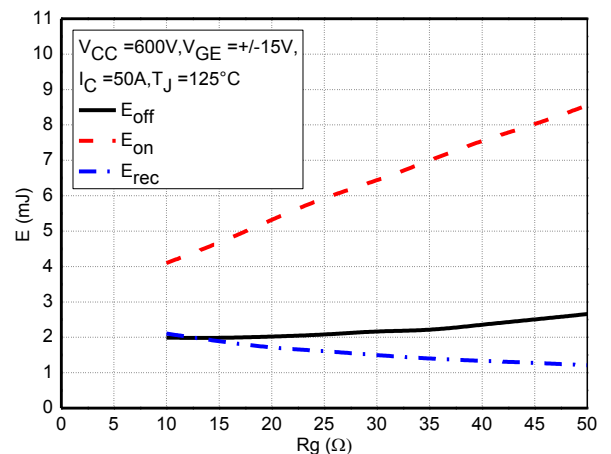
**Fig.3 Typical Freewheeling Diode Characteristics**



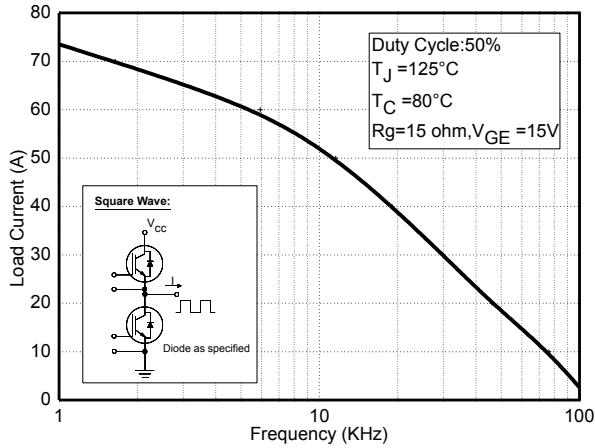
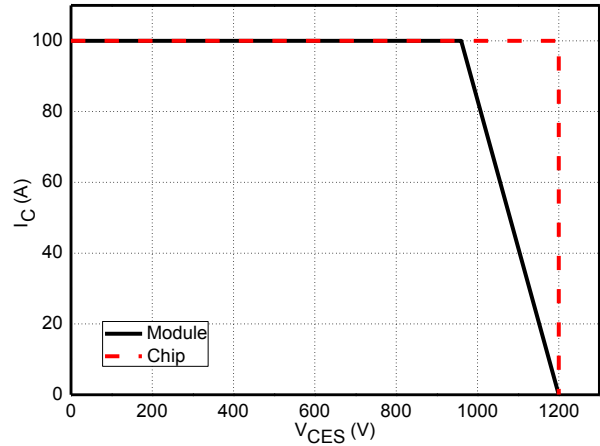
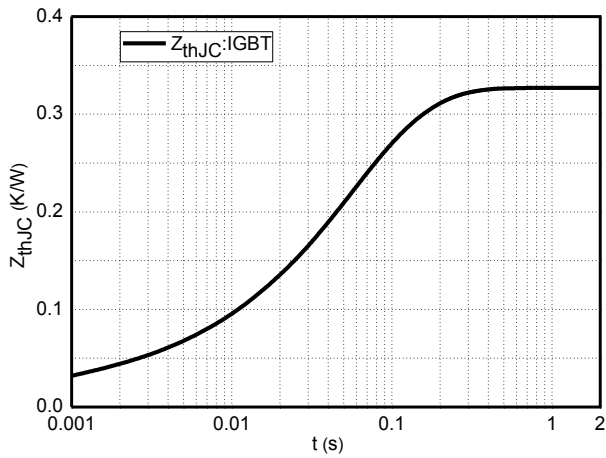
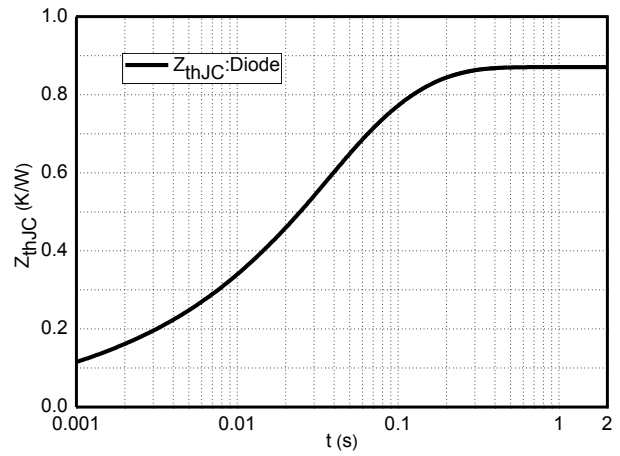
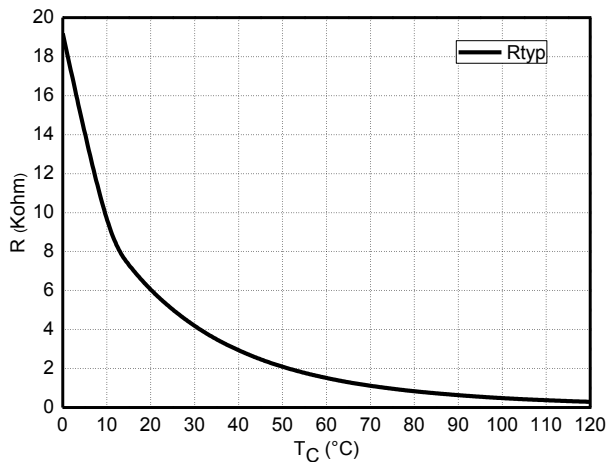
**Fig. 4 Typical Capacitance Characteristics**



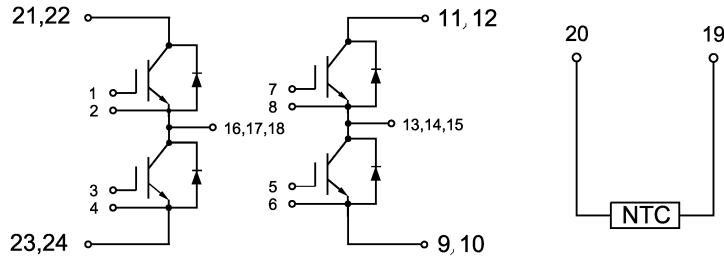
**Fig.5 Typical Switching Loss vs. Collector Current**



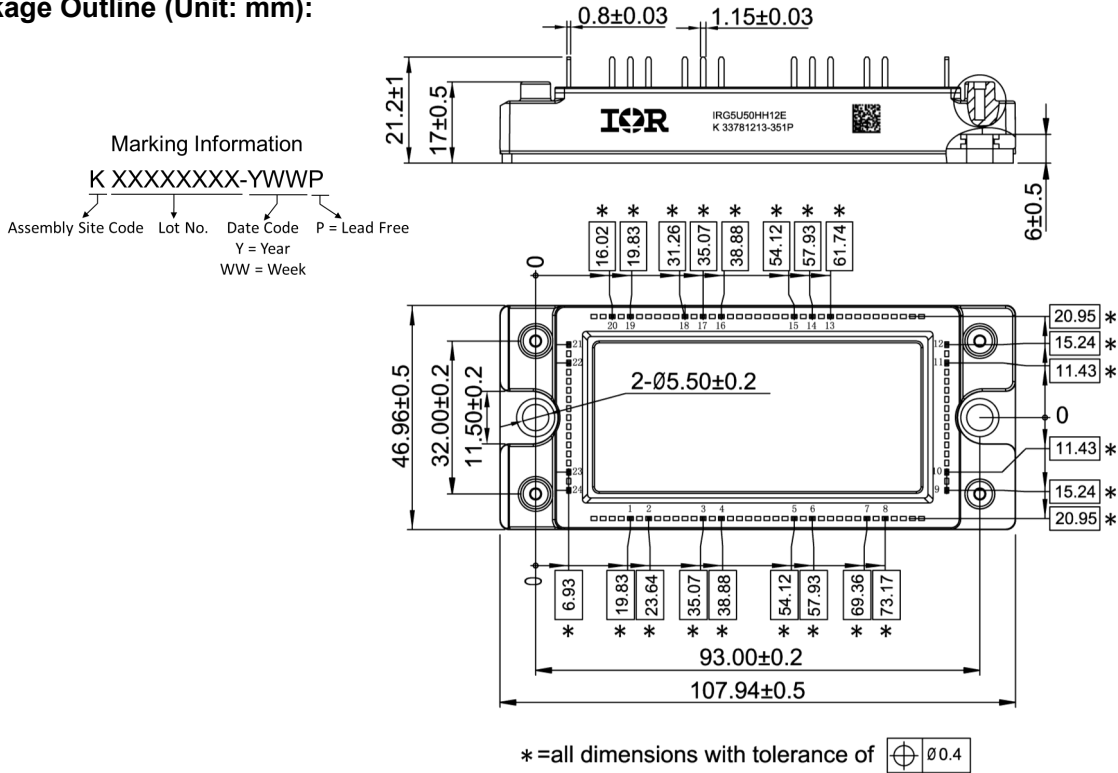
**Fig.6 Typical Switching Loss vs. Gate Resistance**


**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):**



**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/>