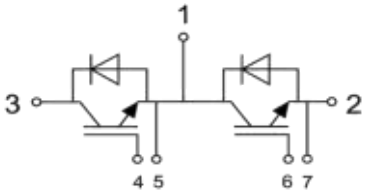
$V_{CES}$ = 600V
$I_C$ = 150A at $T_C$ = 80ºC
$t_{SC}$ ≥ 10µsec
$V_{CE(ON)}$ = 2.60V at $I_C$ = 150A

***IGBT Half-Bridge***
***POWIR 34™ Package***






**Applications:**

- Industrial Motor Drive
- Uninterruptible Power Supply
- Welding and Cutting Machine
- Switched Mode Power Supply
- Induction Heating
- AC 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 34™*** Package | Industry Standard |
| Lead Free | RoHS Compliant, Environmental Friendly |

| **Base Part Number** | **Package Type** | **Standard Pack** | **Quantity** | **Orderable Part Number** |
|---|---|---|---|---|
| IRG5U150HF06A | ***POWIR 34™*** | Box | 80 | IRG5U150HF06A |

**Absolute Maximum Ratings of IGBT**

| | | | | |
|---|---|---|---|---|
| $V_{CES}$ | Collector to Emitter Voltage | | 600 | V |
| $V_{GES}$ | Continuous Gate to Emitter Voltage | | ±20 | V |
| $I_C$ | Continuous Collector Current | $T_C$ = 80°C | 150 | A |
| | | $T_C$ = 25°C | 200 | A |
| $I_{CM}$ | Pulse Collector Current | $T_J$ = 150°C | 300 | A |
| $P_D$ | Maximum Power Dissipation (IGBT) | $T_C$ = 25°C, $T_J$ = 150°C | 660 | 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 |

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## 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 | 600 | | | V | $V_{GE}$ = 0V, $I_C$ = 1mA | |
| $V_{GE(th)}$ | Gate Threshold Voltage | 3.5 | 4.5 | 5.5 | V | $I_C$ = 0.50mA, $V_{CE}$ = $V_{GE}$ | |
| $V_{CE(ON)}$ | Collector to Emitter Saturation Voltage | | 2.60 | 2.90 | V | $T_J$ = 25°C | $I_C$ = 150A, $V_{GE}$ = 15V |
| | | | 3.00 | | 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 | |
| $R_{Gint}$ | Internal Gate Resistance | | 1.25 | | Ω | | |

## Switching Characteristics of IGBT

| Parameter | | Min. | Typ. | Max. | Unit | Test Conditions | |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | | 125 | | ns | $T_J$ = 25°C | $V_{CC}$=300V, $I_C$ = 150A, $R_G$ = 20Ω, $V_{GE}$=±15V, Inductive Load |
| | | | 120 | | | $T_J$ = 125°C | |
| $t_r$ | Rise Time | | 100 | | ns | $T_J$ = 25°C | |
| | | | 115 | | | $T_J$ = 125°C | |
| $t_{d(off)}$ | Turn-off Delay Time | | 285 | | ns | $T_J$ = 25°C | |
| | | | 690 | | | $T_J$ = 125°C | |
| $t_f$ | Fall Time | | 120 | | ns | $T_J$ = 25°C | |
| | | | 145 | | | $T_J$ = 125°C | |
| $E_{on}$ | Turn-on Switching Loss | | 1.78 | | mJ | $T_J$ = 25°C | |
| | | | 2.35 | | | $T_J$ = 125°C | |
| $E_{off}$ | Turn-off Switching Loss | | 1.23 | | mJ | $T_J$ = 25°C | |
| | | | 3.55 | | | $T_J$ = 125°C | |
| $Q_g$ | Total Gate Charge | | 800 | | nC | $T_J$ = 25°C | |
| $C_{ies}$ | Input Capacitance | | 8.5 | | nF | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz, $T_J$ = 25°C | |
| $C_{oes}$ | Output Capacitance | | 0.95 | | | | |
| $C_{res}$ | Reverse Transfer Capacitance | | 0.38 | | | | |
| RBSOA | Reverse Bias Safe Operating Area | Trapezoid | | | | $I_C$ = 300A, $V_{CC}$ = 480V, $V_P$ = 600V, $R_G$ = 15Ω, $V_{GE}$ = +15V to 0V, $T_J$ = 150°C | |
| SCSOA | Short Circuit Safe Operating Area | 10 | | | μs | $V_{CC}$ = 300V, $V_{GE}$ = 15V, $T_J$ = 150°C | |

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### Absolute Maximum Ratings of Freewheeling Diode

| | | | |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 600 | V |
| $I_F$ | Diode Continuous Forward Current, $T_C$ = 25°C | 300 | A |
| | Diode Continuous Forward Current, $T_C$ = 80°C | 150 | |
| $I_{FM}$ | Pulse Diode Current | 300 | A |

### Electrical and Switching Characteristics of Freewheeling Diode

| Parameter | | Typ. | Max. | Unit | Test Conditions | |
|---|---|---|---|---|---|---|
| $V_F$ | Forward Voltage | 1.40 | 1.70 | V | $T_J$ = 25°C | $I_F$ = 150A , $V_{GE}$ = 0V |
| | | 1.40 | | | $T_J$ = 125°C | |
| $I_{rr}$ | Peak Reverse Recovery Current | 65 | | A | $T_J$ = 25°C | $I_F$ = 150A, di/dt=1000A/µs, $V_{rr}$ = 300V, $V_{GE}$ = -15V |
| | | 80 | | | $T_J$ = 125°C | |
| $Q_{rr}$ | Reverse Recovery Charge | 4.6 | | µC | $T_J$ = 25°C | |
| | | 8.2 | | | $T_J$ = 125°C | |
| $E_{rec}$ | Reverse Recovery Energy | 0.95 | | mJ | $T_J$ = 25°C | |
| | | 2.00 | | | $T_J$ = 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) | | 0.19 | | °C/W |
| $R_{\theta JC}$ | Junction-to-Case (Diode) | | 0.69 | | °C/W |
| $R_{\theta CS}$ | Case-To-Sink (Conductive Grease Applied) | | 0.1 | | °C/W |
| M | Power Terminals Screw: M5 | 3.0 | | 5.0 | N·m |
| M | Mounting Screw: M6 | 4.0 | | 6.0 | N·m |
| G | Weight | | 165 | | g |

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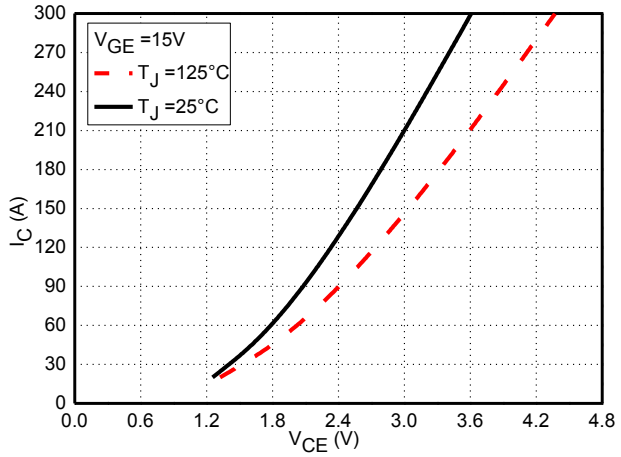



Fig.1 Typical IGBT Saturation Characteristics

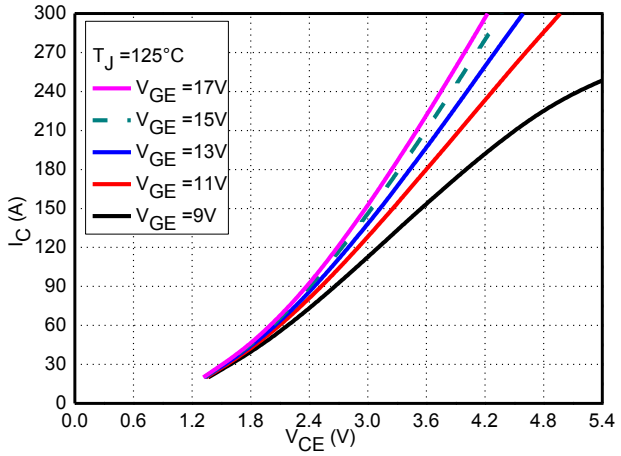



Fig.2 Typical IGBT Output Characteristics

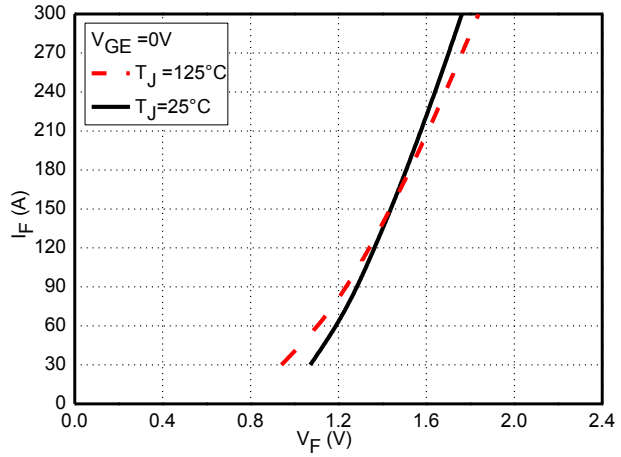



Fig.3 Typical Diode Forward Characteristics

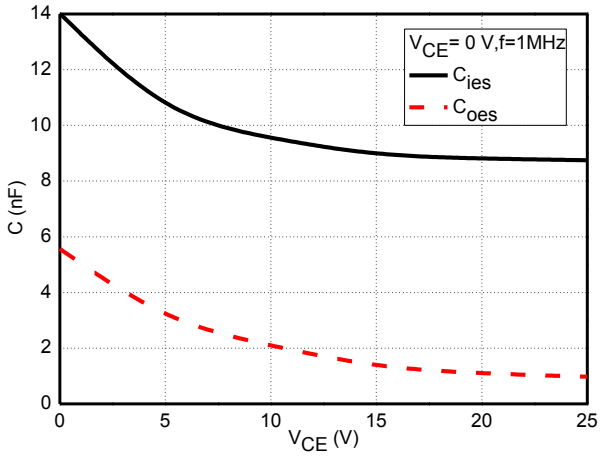



Fig. 4 Typical Capacitance Characteristics

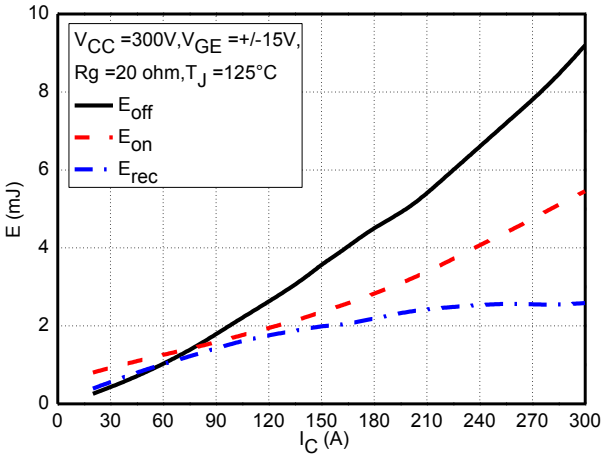



Fig.5 Typical Switching Loss vs. Collector Current

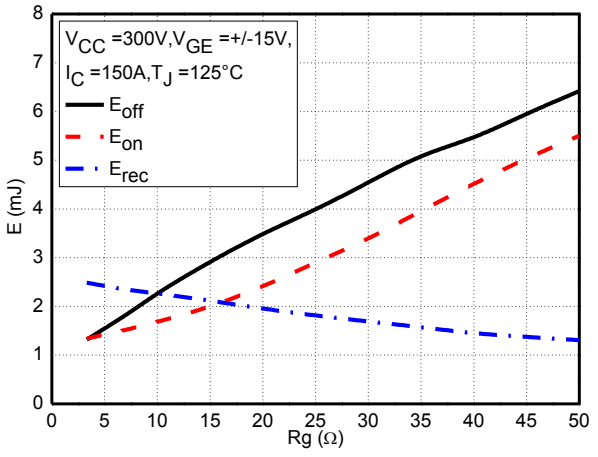



Fig.6 Typical Switching Loss vs. Gate Resistance

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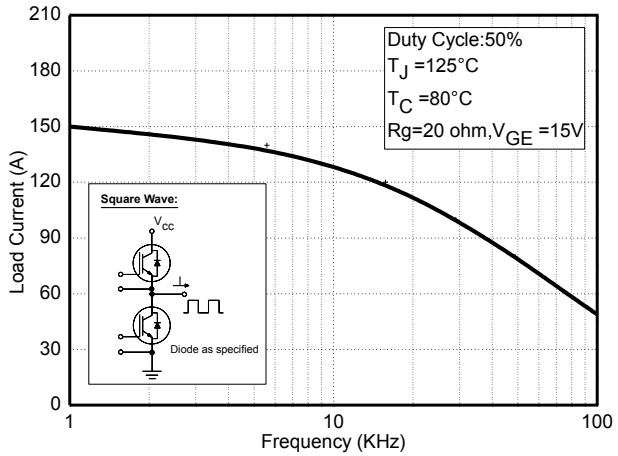



**Fig.7 Typical Load Current vs. Frequency**

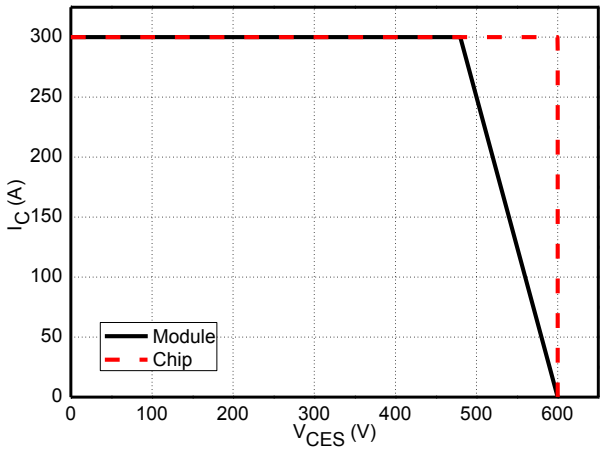



**Fig.8 Reverse Bias Safe Operation Area (RBSOA)**

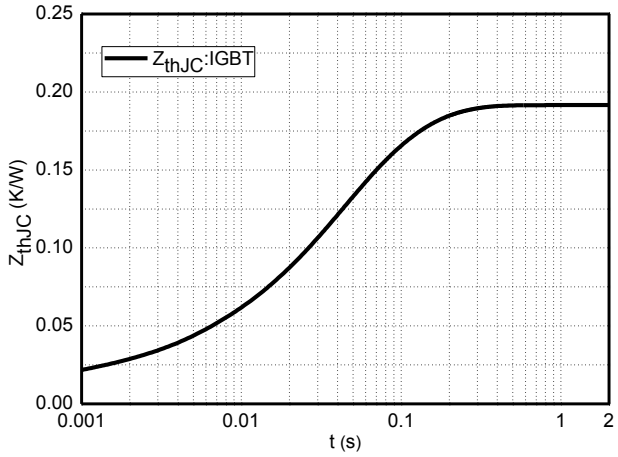



**Fig.9 Typical Transient Thermal Impedance (IGBT)**

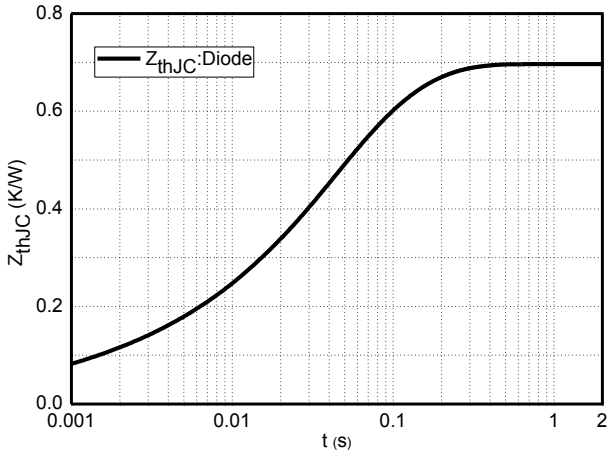
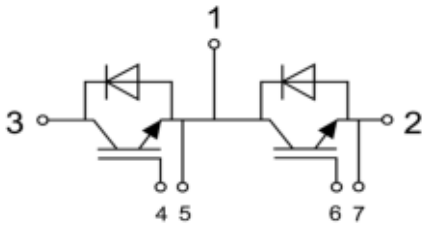


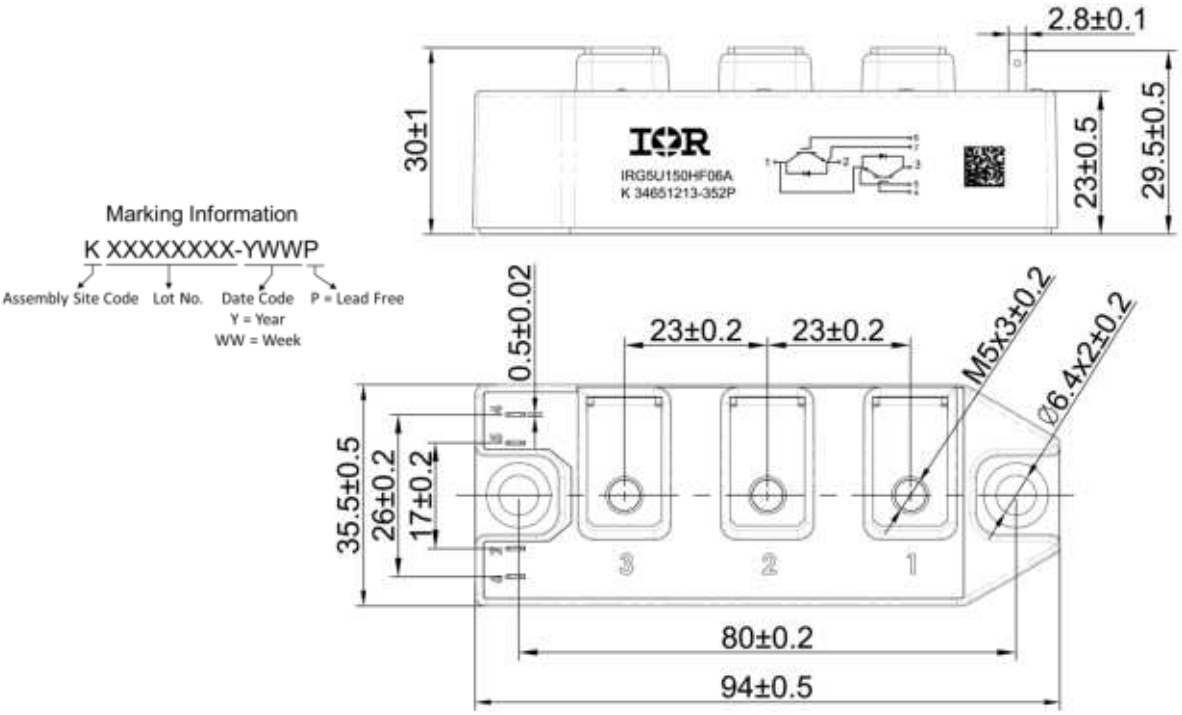

**Fig.10 Typical Transient Thermal Impedance (Diode)**

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**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/

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IOR Rectifier

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