

Molding Type Module IGBT, 2-in-1 Package, 1200 V and 300 A


Double INT-A-PAK

| PRODUCT SUMMARY | |
|--|------------------|
| V_{CES} | 1200 V |
| I_C at $T_C = 80\text{ }^\circ\text{C}$ | 300 A |
| $V_{CE(on)}$ (typical) at $I_C = 300\text{ A}$, $25\text{ }^\circ\text{C}$ | 3.10 V |
| Speed | 8 kHz to 30 kHz |
| Package | Double INT-A-PAK |
| Circuit | Half bridge |

FEATURES

- 10 μs short circuit capability
- $V_{CE(on)}$ with positive temperature coefficient
- Maximum junction temperature 150 $^\circ\text{C}$
- Low switching losses
- Rugged with ultrafast performance
- Low inductance case
- Fast and soft reverse recovery antiparallel FWD
- Isolated copper baseplate using DCB (Direct Copper Bonding) technology
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

TYPICAL APPLICATIONS

- Switching mode power supplies
- Inductive heating
- Electronic welder

DESCRIPTION

Vishay's IGBT power module provides ultra low conduction loss as well as short circuit ruggedness. It is designed for applications such as electronic welder and inductive heating.

| ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | |
|---|----------------|---|----------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
| Collector to emitter voltage | V_{CES} | | 1200 | V |
| Gate to emitter voltage | V_{GES} | | ± 20 | |
| Collector current | I_C | $T_C = 25\text{ }^\circ\text{C}$ | 530 | A |
| | | $T_C = 80\text{ }^\circ\text{C}$ | 300 | |
| Pulsed collector current | $I_{CM}^{(1)}$ | $t_p = 1\text{ ms}$ | 600 | |
| Diode continuous forward current | I_F | $T_C = 80\text{ }^\circ\text{C}$ | 300 | |
| Diode maximum forward current | I_{FM} | $t_p = 1\text{ ms}$ | 600 | |
| Maximum power dissipation | P_D | $T_J = 150\text{ }^\circ\text{C}$ | 2119 | W |
| Short circuit withstand time | t_{SC} | $T_J = 125\text{ }^\circ\text{C}$ | 10 | μs |
| RMS isolation voltage | V_{ISOL} | $f = 50\text{ Hz}$, $t = 1\text{ min}$ | 2500 | V |

Note

⁽¹⁾ Repetitive rating: pulse width limited by maximum junction temperature.



| IGBT ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|--|---------------|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Collector to emitter breakdown voltage | $V_{(BR)CES}$ | $T_J = 25\text{ }^\circ\text{C}$ | 1200 | - | - | V |
| Collector to emitter voltage | $V_{CE(on)}$ | $V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_J = 25\text{ }^\circ\text{C}$ | - | 3.10 | 3.60 | |
| | | $V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | - | 3.45 | - | |
| Gate to emitter threshold voltage | $V_{GE(th)}$ | $V_{CE} = V_{GE}, I_C = 3.0\text{ mA}, T_J = 25\text{ }^\circ\text{C}$ | 4.4 | 5.2 | 6.0 | |
| Collector cut-off current | I_{CES} | $V_{CE} = V_{CES}, V_{GE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | - | - | 5.0 | mA |
| Gate to emitter leakage current | I_{GES} | $V_{GE} = V_{GES}, V_{CE} = 0\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | - | - | 400 | nA |

| SWITCHING CHARACTERISTICS | | | | | | |
|--|---------------|--|------|------|------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Turn-on delay time | $t_{d(on)}$ | $V_{CC} = 600\text{ V}, I_C = 300\text{ A}, R_g = 3.3\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | - | 662 | - | ns |
| Rise time | t_r | | - | 142 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 633 | - | |
| Fall time | t_f | | - | 117 | - | |
| Turn-on switching loss | E_{on} | $V_{CC} = 600\text{ V}, I_C = 300\text{ A}, R_g = 3.3\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | 19.7 | - | mJ |
| Turn-off switching loss | E_{off} | | - | 22.4 | - | |
| Turn-on delay time | $t_{d(on)}$ | | - | 660 | - | |
| Rise time | t_r | | - | 143 | - | |
| Turn-off delay time | $t_{d(off)}$ | $V_{CC} = 600\text{ V}, I_C = 300\text{ A}, R_g = 3.3\text{ }\Omega,$ $V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | 665 | - | ns |
| Fall time | t_f | | - | 137 | - | |
| Turn-on switching loss | E_{on} | | - | 24.9 | - | |
| Turn-off switching loss | E_{off} | | - | 28.4 | - | |
| Input capacitance | C_{ies} | $V_{GE} = 0\text{ V}, V_{CE} = 30\text{ V}, f = 1.0\text{ MHz}$ | - | 25.3 | - | nF |
| Output capacitance | C_{oes} | | - | 2.25 | - | |
| Reverse transfer capacitance | C_{res} | | - | 0.91 | - | |
| SC data | I_{SC} | $t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C},$ $V_{CC} = 600\text{ V}, V_{CEM} \leq 1200\text{ V}$ | - | 2550 | - | A |
| Internal gate resistance | R_{gint} | | - | 1.2 | - | Ω |
| Stray inductance | L_{CE} | | - | - | 18 | nH |
| Module lead resistance, terminal to chip | $R_{CC'+EE'}$ | $T_C = 25\text{ }^\circ\text{C}$ | - | 0.32 | - | m Ω |

| DIODE ELECTRICAL SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | | |
|---|-----------|---|-----------------------------------|------|------|-------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS | |
| Diode forward voltage | V_F | $I_F = 300\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 1.82 | 2.25 | V |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 1.95 | - | |
| Diode reverse recovery charge | Q_{rr} | $I_F = 300\text{ A}, V_R = 600\text{ V},$ $di/dt = -2125\text{ A}/\mu\text{s},$ $V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 21.5 | - | μC |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 32.4 | - | |
| Diode peak reverse recovery current | I_{rr} | $I_F = 300\text{ A}, V_R = 600\text{ V},$ $di/dt = -2125\text{ A}/\mu\text{s},$ $V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 178 | - | A |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 225 | - | |
| Diode reverse recovery energy | E_{rec} | $I_F = 300\text{ A}, V_R = 600\text{ V},$ $di/dt = -2125\text{ A}/\mu\text{s},$ $V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 10.4 | - | mJ |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 16.6 | - | |



| THERMAL AND MECHANICAL SPECIFICATIONS | | | | | | |
|---------------------------------------|------------|---------------------------|------------|-------|-------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Operating junction temperature range | T_J | | - | - | 150 | °C |
| Storage temperature range | T_{STG} | | -40 | - | 125 | |
| Junction to case | IGBT | R_{thJC} | - | - | 0.059 | K/W |
| | Diode | | - | - | 0.107 | |
| Case to sink | R_{thCS} | Conductive grease applied | - | 0.035 | - | |
| Mounting torque | | Power terminal screw: M6 | 2.5 to 5.0 | | | Nm |
| | | Mounting screw: M6 | 3.0 to 6.0 | | | |
| Weight | | | 300 | | | g |

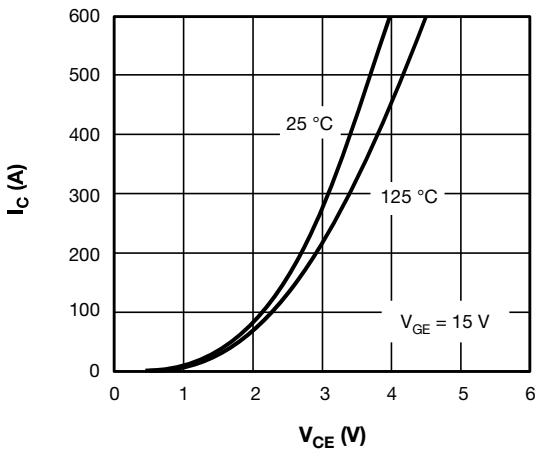


Fig. 1 - IGBT Typical Output Characteristics

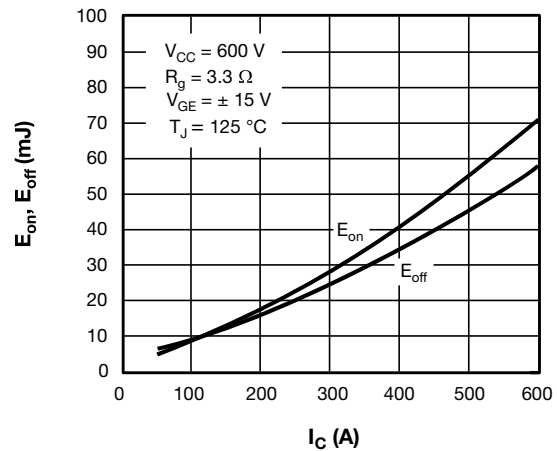


Fig. 3 - IGBT Switching Loss vs. I_C

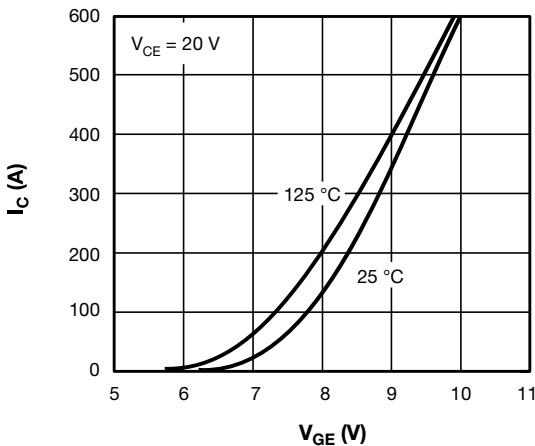


Fig. 2 - IGBT Typical Transfer Characteristics

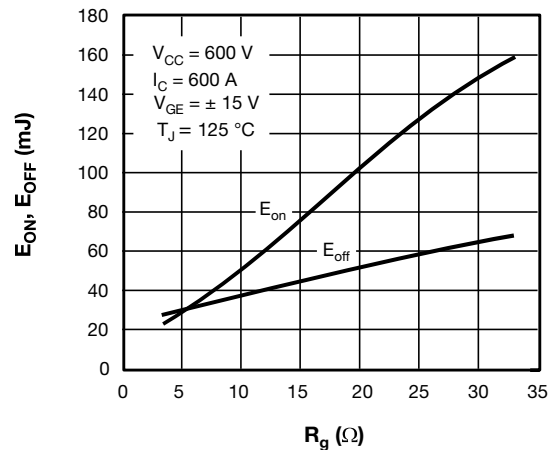
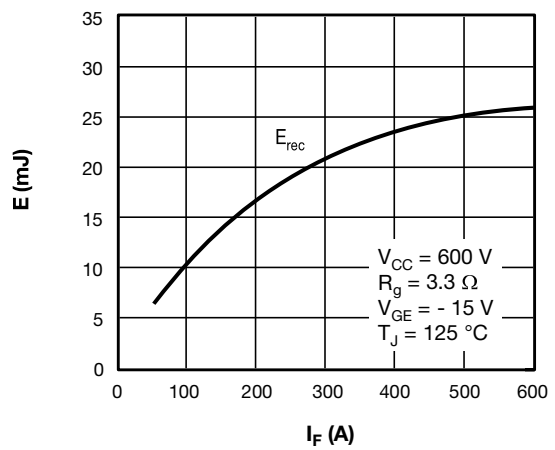
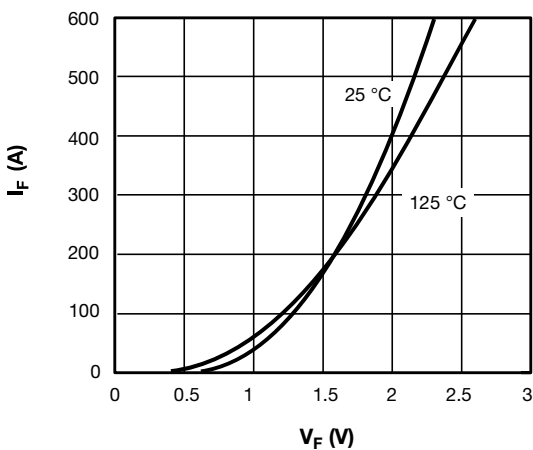
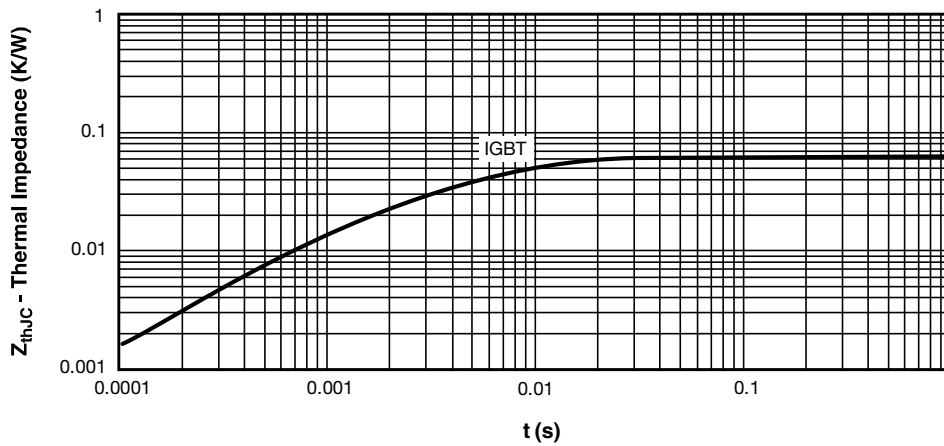
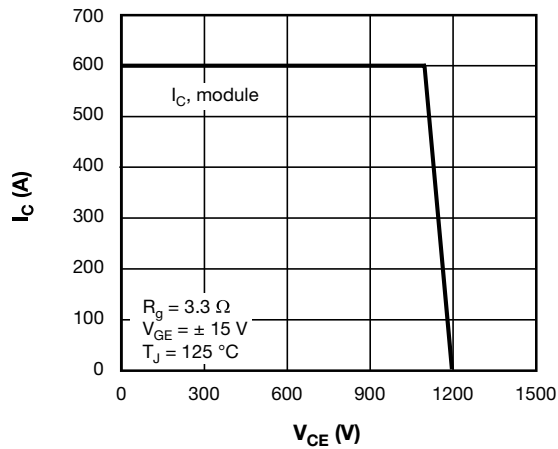


Fig. 4 - IGBT Switching Loss vs. R_g



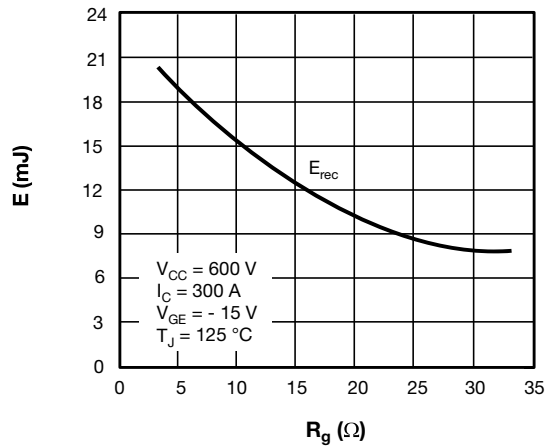


Fig. 9 - Diode Switching Loss vs. Gate Resistance

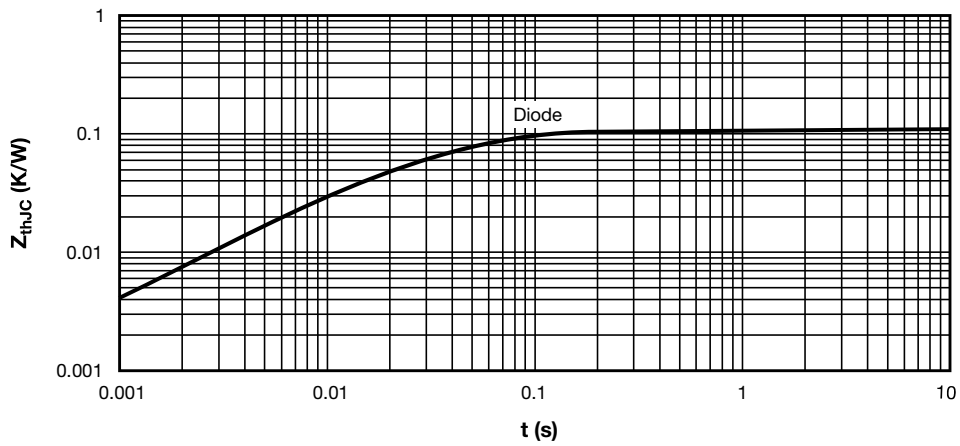
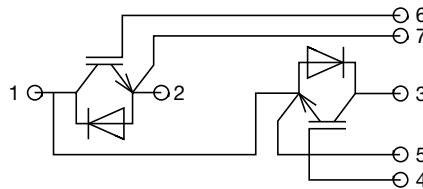


Fig. 10 - Diode Transient Thermal Impedance

CIRCUIT CONFIGURATION

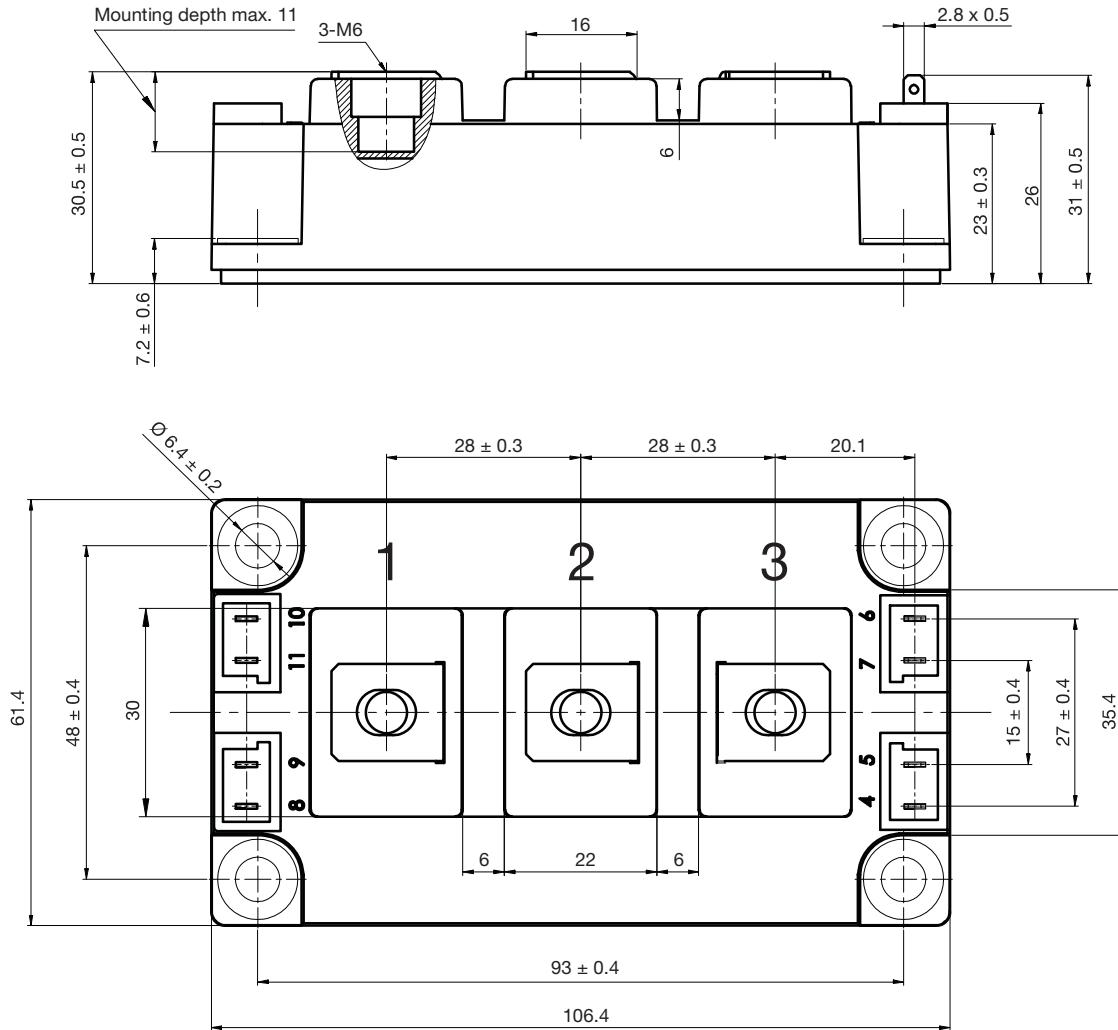


| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95525 |



Double INT-A-PAK

DIMENSIONS in millimeters (inches)





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