

Molding Type Module IGBT, 2-in-1 Package, 1200 V and 150 A



Double INT-A-PAK


RoHS
COMPLIANT

FEATURES

- Low $V_{CE(on)}$ SPT + IGBT technology
- 10 μ s short circuit capability
- $V_{CE(on)}$ with positive temperature coefficient
- Maximum junction temperature 150 °C
- 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

TYPICAL APPLICATIONS

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply (UPS)

DESCRIPTION

Vishay's IGBT power module provides ultra low conduction loss as well as short circuit ruggedness. It is designed for applications such as general inverters and UPS.

| PRODUCT SUMMARY | |
|--|------------------|
| V_{CES} | 1200 V |
| I_C at $T_C = 80\text{ }^\circ\text{C}$ | 150 A |
| $V_{CE(on)}$ (typical) at $I_C = 150\text{ A}$, $25\text{ }^\circ\text{C}$ | 1.9 V |
| Speed | 8 kHz to 30 kHz |
| Package | Double INT-A-PAK |
| Circuit | Half bridge |

| 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 | $T_C = 25\text{ }^\circ\text{C}$ | 300 | A |
| | | $T_C = 80\text{ }^\circ\text{C}$ | 150 | |
| Pulsed collector current | $I_{CM}^{(1)}$ | $t_p = 1\text{ ms}$ | 300 | |
| Diode continuous forward current | I_F | $T_C = 80\text{ }^\circ\text{C}$ | 150 | |
| Diode maximum forward current | I_{FM} | $t_p = 1\text{ ms}$ | 300 | |
| Maximum power dissipation | P_D | $T_J = 150\text{ }^\circ\text{C}$ | 1008 | W |
| Short circuit withstand time | t_{SC} | $T_J = 125\text{ }^\circ\text{C}$ | 10 | μ s |
| 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 | $V_{CE(on)}$ | $V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 25\text{ }^\circ\text{C}$ | - | 1.90 | 2.35 | |
| | | $V_{GE} = 15\text{ V}, I_C = 150\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | - | 2.10 | - | |
| Gate to emitter threshold voltage | $V_{GE(th)}$ | $V_{CE} = V_{GE}, I_C = 6\text{ mA}, T_J = 25\text{ }^\circ\text{C}$ | 5.0 | 6.2 | 7.0 | |
| 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 | $t_{d(on)}$ | $V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 4.7\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 25\text{ }^\circ\text{C}$ | - | 336 | - | ns |
| Rise time | t_r | | - | 75 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 346 | - | |
| Fall time | t_f | | - | 182 | - | |
| Turn-on switching loss | E_{on} | | $V_{CC} = 600\text{ V}, I_C = 150\text{ A}, R_g = 4.7\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | 7.25 | - |
| Turn-off switching loss | E_{off} | - | | 9.30 | - | |
| Turn-on delay time | $t_{d(on)}$ | - | | 346 | - | ns |
| Rise time | t_r | - | | 77 | - | |
| Turn-off delay time | $t_{d(off)}$ | - | | 389 | - | |
| Fall time | t_f | - | 322 | - | | |
| Turn-on switching loss | E_{on} | $V_{GE} = 0\text{ V}, V_{CE} = 25\text{ V}, f = 1.0\text{ MHz}$ | - | 9.95 | - | mJ |
| Turn-off switching loss | E_{off} | | - | 16.0 | - | |
| Input capacitance | C_{ies} | | - | 11.0 | - | nF |
| Output capacitance | C_{oes} | | - | 0.80 | - | |
| Reverse transfer capacitance | C_{res} | | - | 0.52 | - | |
| SC data | I_{SC} | $t_{sc} \leq 10\text{ }\mu\text{s}, V_{GE} = 15\text{ V}, T_J = 125\text{ }^\circ\text{C}, V_{CC} = 900\text{ V}, V_{CEM} \leq 1200\text{ V}$ | - | 890 | - | A |
| Internal gate resistance | R_{GINT} | | - | 1.5 | - | Ω |
| Stray inductance | L_{CE} | | - | - | 20 | nH |
| Module lead resistance, terminal to chip | $R_{CC'+EE'}$ | $T_C = 25\text{ }^\circ\text{C}$ | - | 0.35 | - | 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 | $I_F = 150\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 1.80 | 2.20 | V |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 1.85 | - | |
| Diode reverse recovery charge | Q_{rr} | $I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 16.2 | - | μC |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 26.6 | - | |
| Diode peak reverse recovery current | I_{rr} | $I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 138 | - | A |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 166 | - | |
| Diode reverse recovery energy | E_{rec} | $I_F = 150\text{ A}, V_R = 600\text{ V}, dI/dt = -2360\text{ A}/\mu\text{s}, V_{GE} = -15\text{ V}$ | $T_J = 25\text{ }^\circ\text{C}$ | - | 7.48 | - | mJ |
| | | | $T_J = 125\text{ }^\circ\text{C}$ | - | 13.4 | - | |



| 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 | | | | 0.124 | K/W |
| | Diode | | | | | |
| Case to sink | R_{thCS} | Conductive grease applied | - | 0.035 | - | |
| Mounting torque | | Power terminal screw: M6 | 2.5 to 5.0 | | | |
| | | Mounting screw: M6 | 3.0 to 5.0 | | | |
| Weight | | | 300 | | | g |

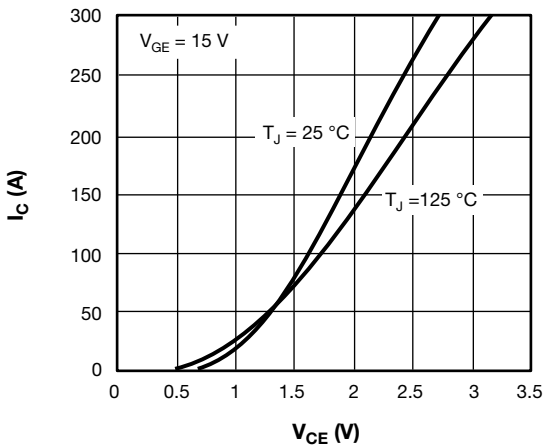


Fig. 1 - IGBT Typical Output Characteristics

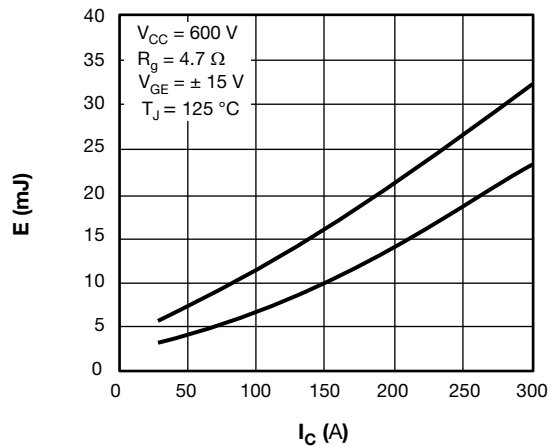


Fig. 3 - IGBT Switching Loss vs. I_C

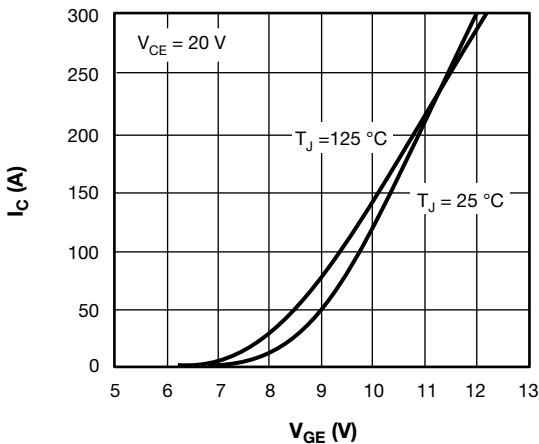


Fig. 2 - IGBT Typical Transfer Characteristics

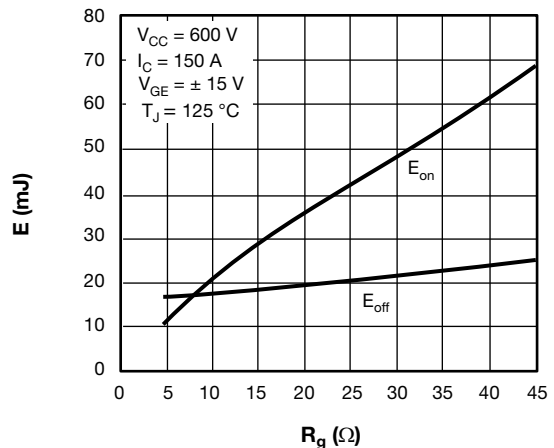


Fig. 4 - IGBT Switching Loss vs. R_g

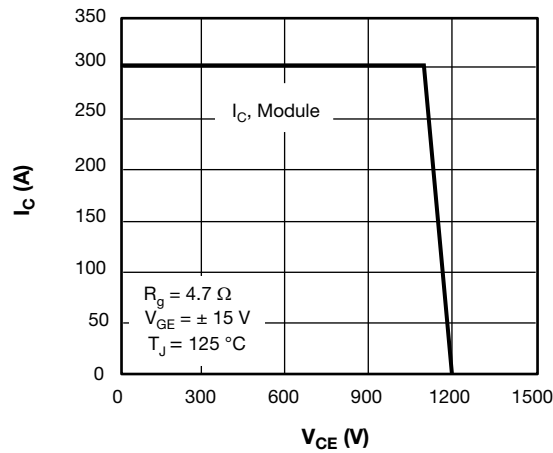


Fig. 5 - RBSOA

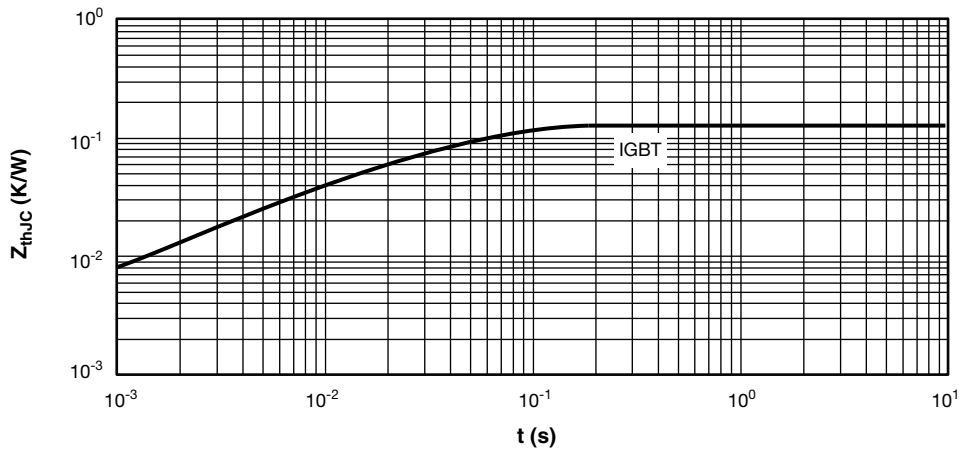


Fig. 6 - IGBT Transient Thermal Impedance

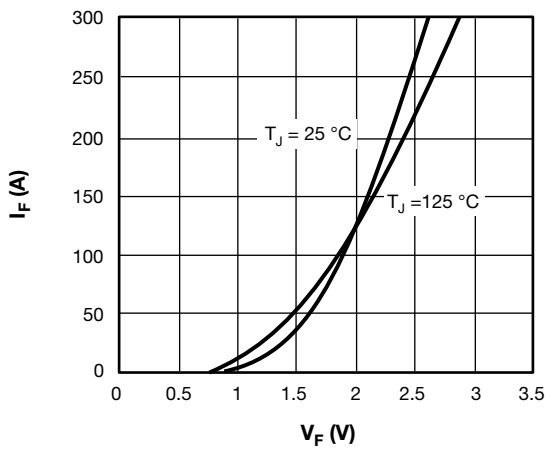


Fig. 7 - Diode Typical Forward Characteristics

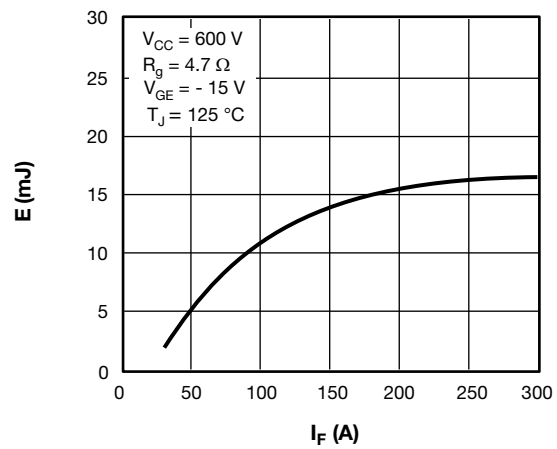


Fig. 8 - Diode Switching Loss vs. I_F

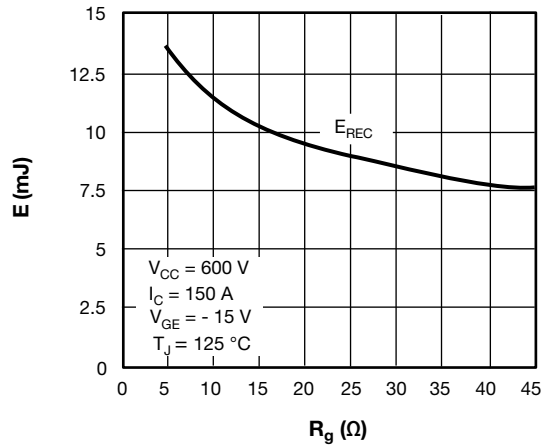


Fig. 9 - Diode Switching Loss vs. R_g

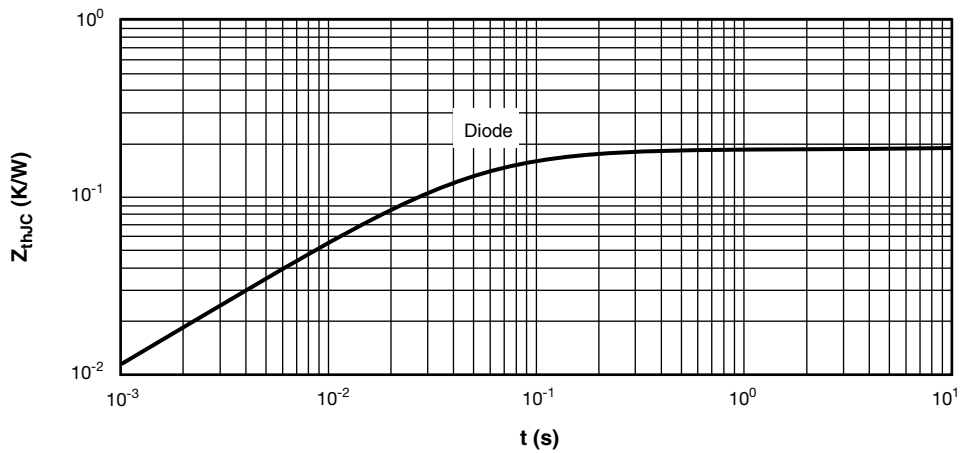
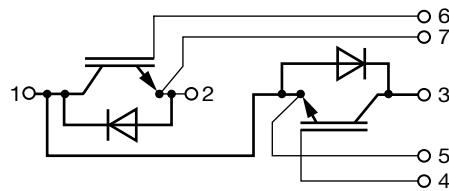


Fig. 10 - Diode Transient Thermal Impedance

CIRCUIT CONFIGURATION

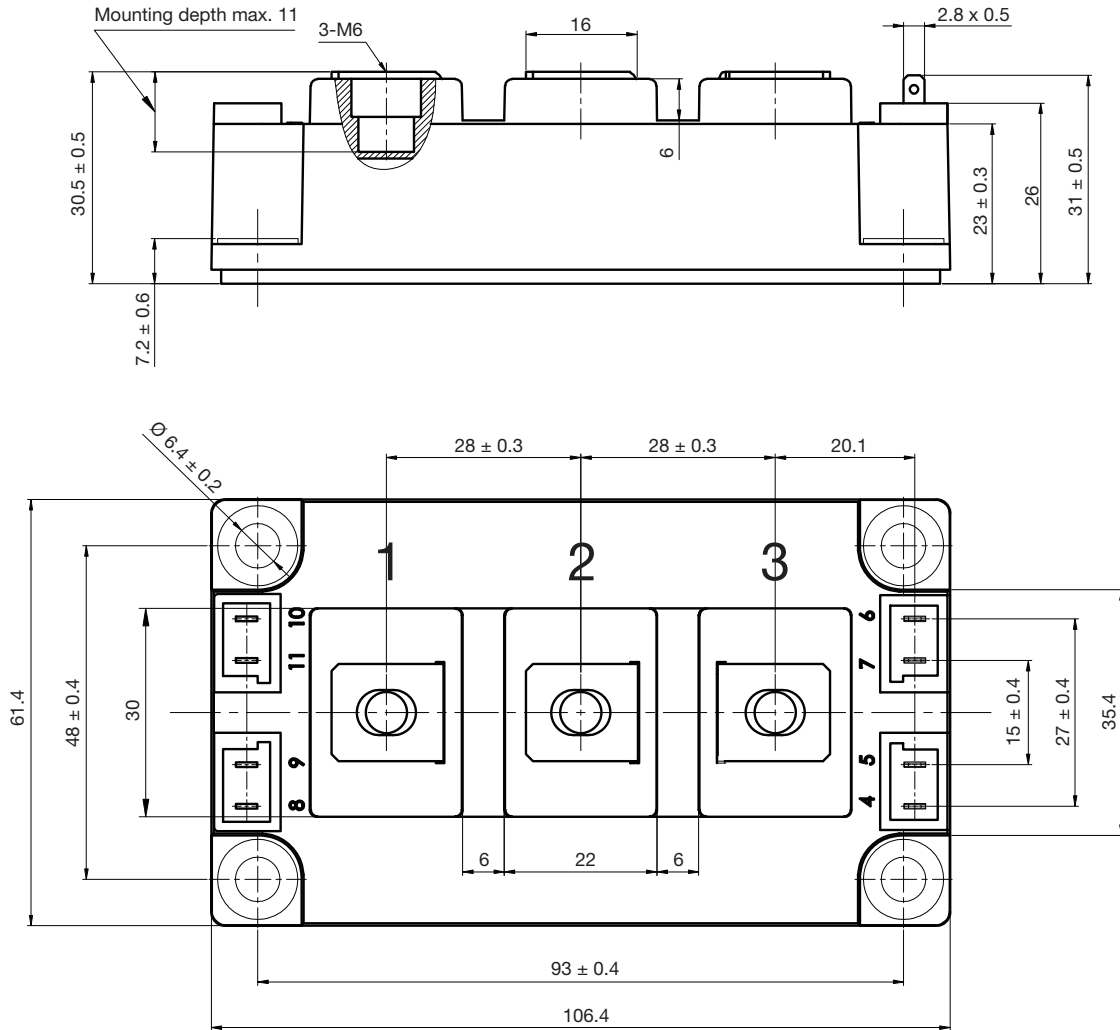


| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95525 |



Double INT-A-PAK

DIMENSIONS in millimeters (inches)





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