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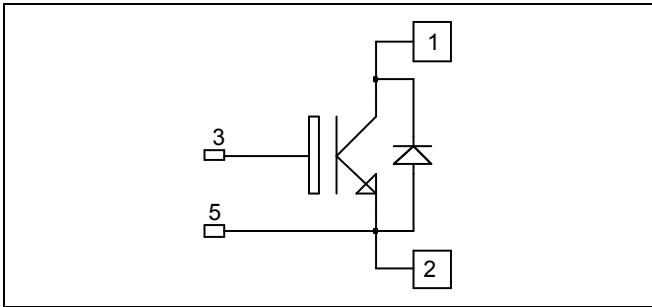
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**Single switch
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 1200V$
 $I_C = 400A @ T_c = 80^\circ C$**



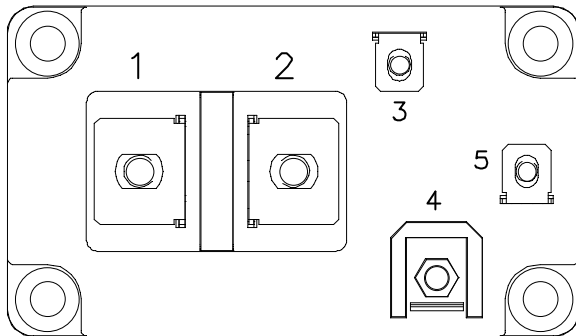
Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated

- Kelvin emitter for easy drive
- M6 connectors for power
- M4 connectors for signal
- High level of integration



Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 1200 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 650 |
| | | $T_C = 80^\circ C$ | 400 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 800 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 1785 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 800A@1050V |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|---------------|--------------------------------------|---|-----|-----|-----|---------------|
| I_{CES} | Zero Gate Voltage Collector Current | $V_{GE} = 0V, V_{CE} = 1200V$ | | | 750 | μA |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15V$ $I_C = 400A$ | 1.4 | 1.7 | 2.1 | V |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 2.0 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 12mA$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 600 | nA |

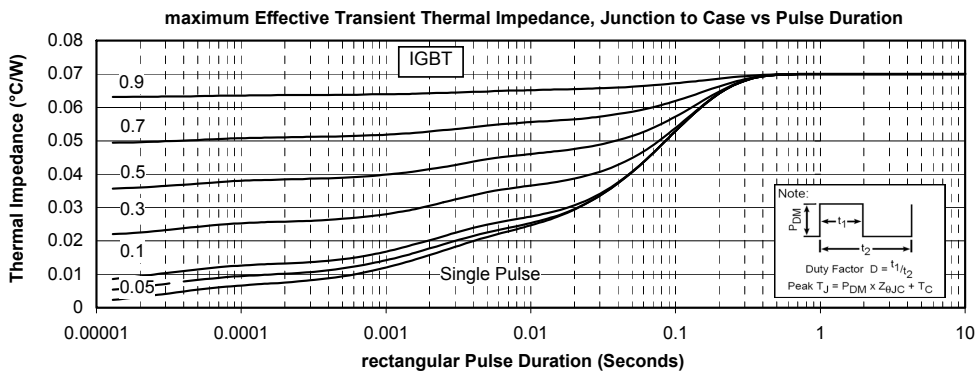
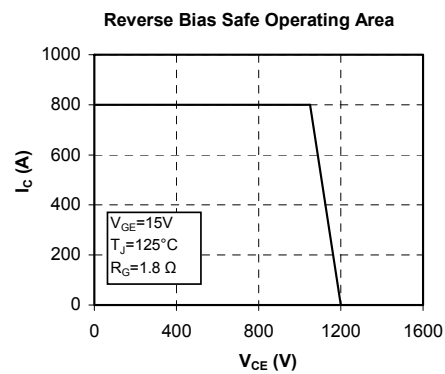
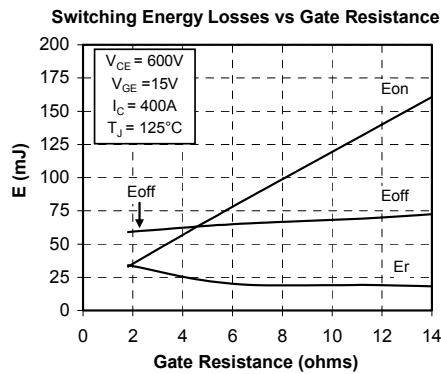
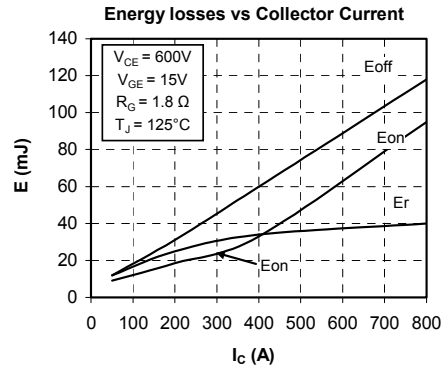
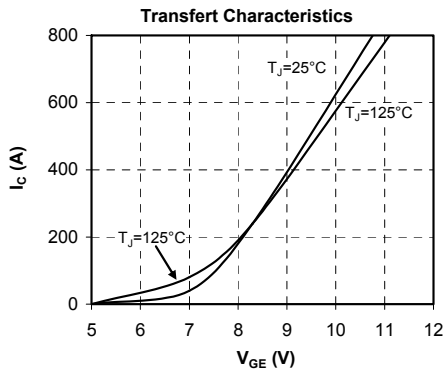
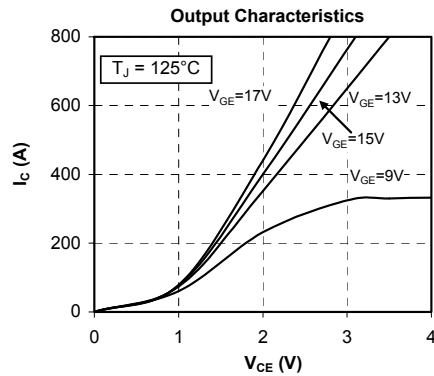
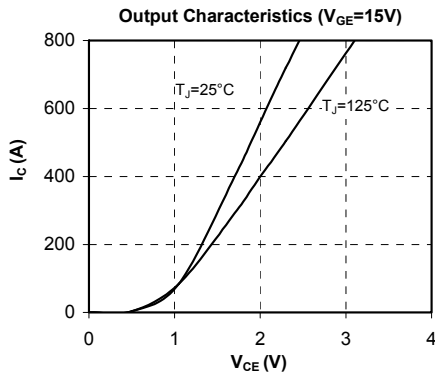
Dynamic Characteristics

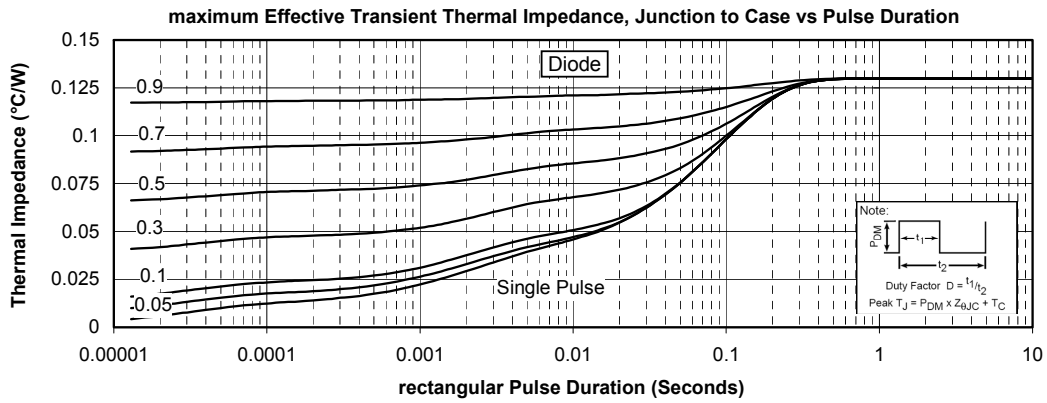
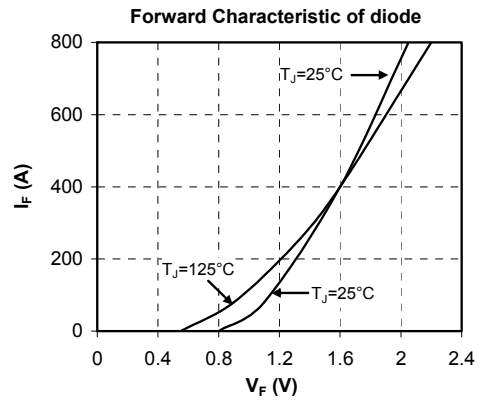
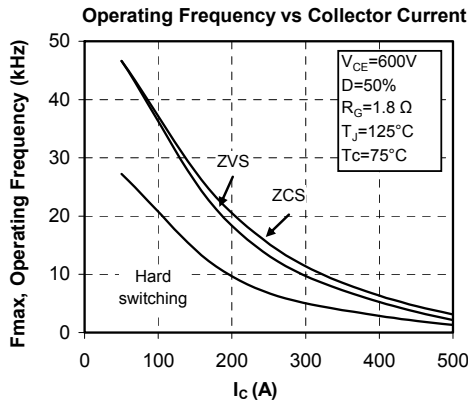
| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|---------------------------|------|-----|---------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 28 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 1.6 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 1.2 | | |
| Q_G | Gate charge | $V_{GE} = \pm 15V, I_C = 400A$ $V_{CE} = 600V$ | | 3.7 | | μC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 400A$ $R_G = 1.8\Omega$ | | 280 | | ns |
| T_r | Rise Time | | | 90 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 550 | | |
| T_f | Fall Time | | | 130 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 400A$ $R_G = 1.8\Omega$ | | 300 | | ns |
| T_r | Rise Time | | | 100 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 650 | | |
| T_f | Fall Time | | | 180 | | |
| E_{on} | Turn on Energy | $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ | $T_j = 125^\circ\text{C}$ | 33 | | mJ |
| E_{off} | Turn off Energy | $I_C = 400A$ $R_G = 1.8\Omega$ | $T_j = 125^\circ\text{C}$ | 59 | | |
| I_{sc} | Short Circuit data | $V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$ | | 1600 | | A |

Reverse diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|---|---|-----|------|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RRM} | Maximum Reverse Leakage Current | $V_R = 1200V$ | | | 750 | μA |
| | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | | 1000 | |
| I_F | DC Forward Current | | | 400 | | A |
| V_F | Diode Forward Voltage | $I_F = 400A$ $V_{GE} = 0V$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 1.6 | 2.1 | V |
| | | | | 1.6 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 400A$ $V_R = 600V$ $di/dt = 4000A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 250 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 350 | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | 40 | | μC |
| | | | $T_j = 125^\circ\text{C}$ | 75 | | |
| E_{rr} | Reverse Recovery Energy | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 18 | 34 | mJ |
| | | | | | | |

Typical Performance Curve





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