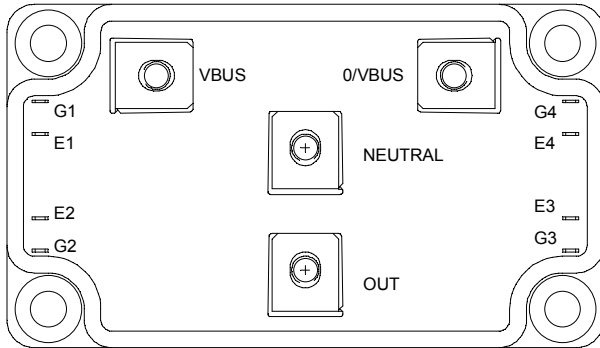
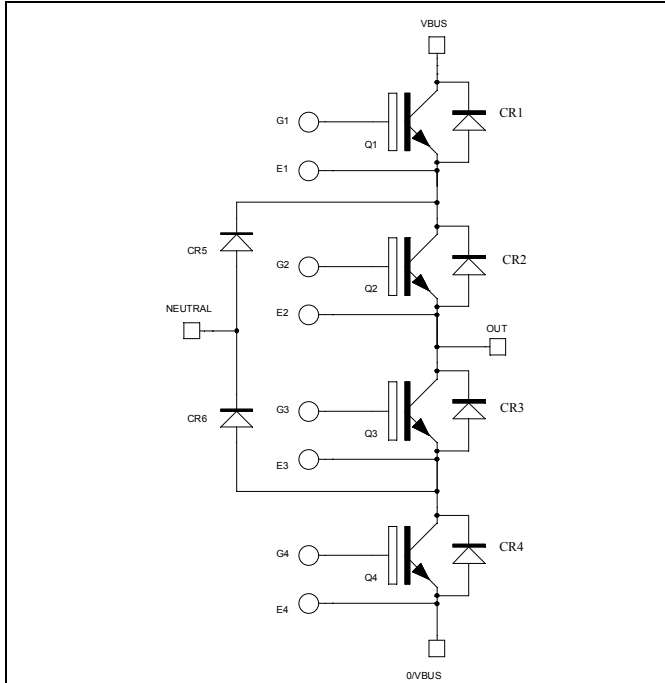


**Three level inverter
Trench + Field Stop IGBT
Power Module**

**$V_{CES} = 600V$
 $I_C = 150A @ T_c = 80^\circ C$**



Application

- Solar converter
- Uninterruptible Power Supplies

Features

- Trench + Field Stop IGBT 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
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- 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 TC of VCEsat
- Low profile
- RoHS Compliant

Q1 to Q4 Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|-------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 600 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 200 |
| | | $T_C = 80^\circ C$ | 150 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 300 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 480 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 150^\circ C$ | 300A @ 550V |

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

Q1 to Q4 Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|---------------|--------------------------------------|--|---------------------------|-----|-----|---------------|
| I_{CES} | Zero Gate Voltage Collector Current | $V_{GE} = 0V, V_{CE} = 600V$ | | | 250 | μA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15V$ $I_C = 150A$ | $T_j = 25^\circ\text{C}$ | 1.5 | 1.9 | V |
| | | | $T_j = 150^\circ\text{C}$ | 1.7 | | |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 2.5\text{ mA}$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 400 | nA |

Q1 to Q4 Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|-------------------------------------|--|---------------------------|------|------|--------------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 9200 | | pF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 580 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 270 | | |
| Q_G | Gate charge | $V_{GE} = \pm 15V, I_C = 150A$ $V_{CE} = 300V$ | | 1.6 | | μC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 150A$ $R_G = 3.3\Omega$ | | 115 | | ns |
| T_r | Rise Time | | | 45 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 225 | | |
| T_f | Fall Time | | | 55 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 150A$ $R_G = 3.3\Omega$ | | 130 | | ns |
| T_r | Rise Time | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 300 | | |
| T_f | Fall Time | | | 70 | | |
| E_{on} | Turn on Energy | $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ | $T_j = 25^\circ\text{C}$ | 0.85 | | mJ |
| | | | $T_j = 150^\circ\text{C}$ | 1.5 | | |
| E_{off} | Turn off Energy | $I_C = 150A$ $R_G = 3.3\Omega$ | $T_j = 25^\circ\text{C}$ | 4.1 | | mJ |
| | | | $T_j = 150^\circ\text{C}$ | 5.3 | | |
| I_{sc} | Short Circuit data | $V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 6\mu\text{s} ; T_j = 150^\circ\text{C}$ | | 750 | | A |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.31 | $^\circ\text{C/W}$ |

CR1 to CR4 diode ratings and characteristics

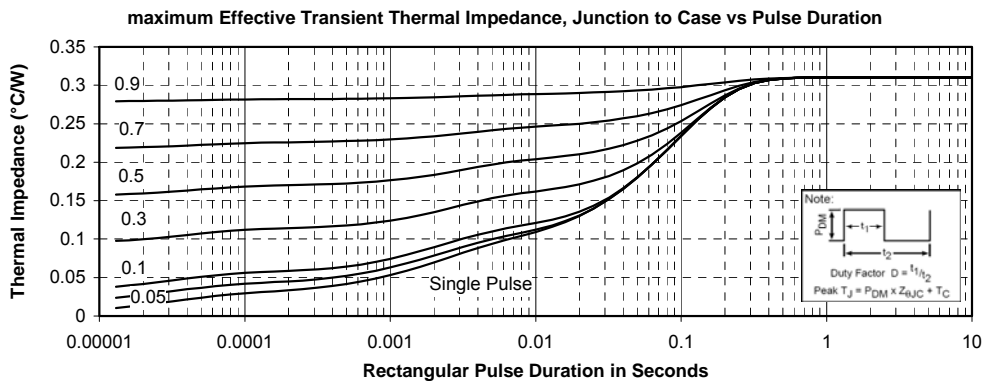
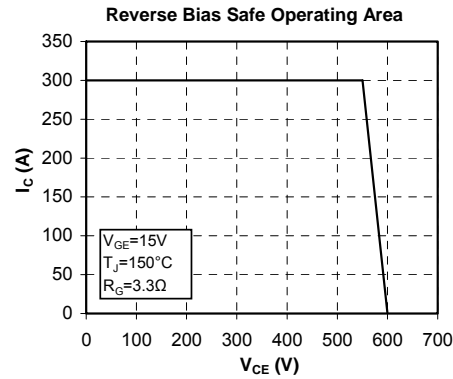
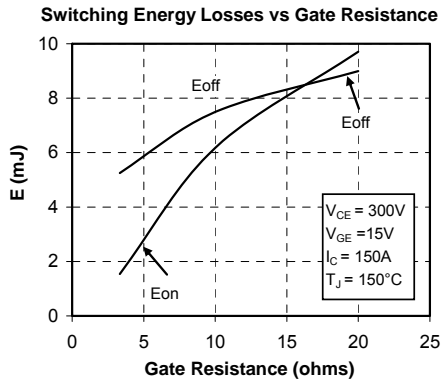
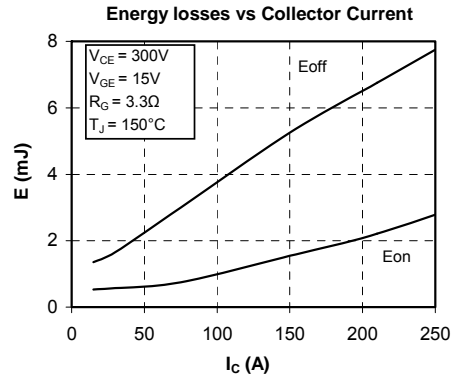
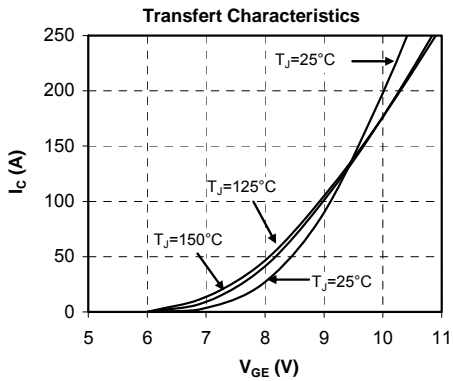
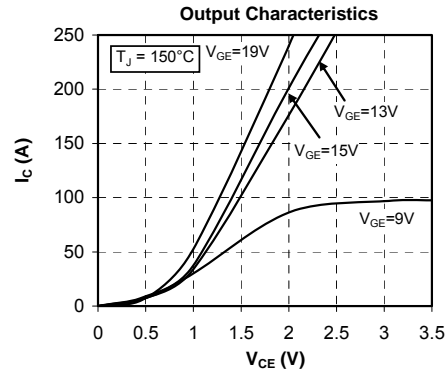
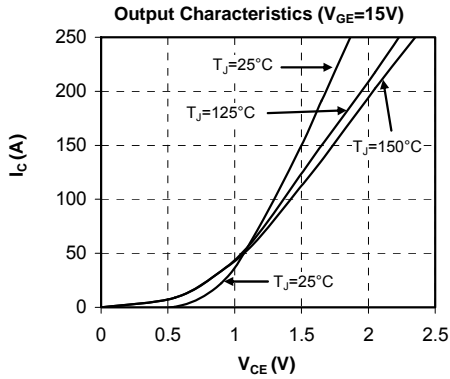
| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|-------------------|---|--|---|------------|------------|------------|-------------|
| V _{RRM} | Maximum Peak Repetitive Reverse Voltage | | | 600 | | | V |
| I _{RM} | Maximum Reverse Leakage Current | V _R =600V | T _j = 25°C T _j = 150°C | | | 150 350 | μA |
| I _F | DC Forward Current | | T _c = 80°C | | 100 | | A |
| V _F | Diode Forward Voltage | I _F = 100A V _{GE} = 0V | T _j = 25°C T _j = 150°C | | 1.6 1.5 | 2 | V |
| t _{rr} | Reverse Recovery Time | I _F = 100A V _R = 300V di/dt = 2000A/μs | T _j = 25°C T _j = 150°C | | 125 220 | | ns |
| Q _{rr} | Reverse Recovery Charge | | T _j = 25°C T _j = 150°C | | 4.7 9.9 | | μC |
| E _{rr} | Reverse Recovery Energy | | T _j = 25°C T _j = 150°C | | 1.1 2.4 | | mJ |
| R _{thJC} | Junction to Case Thermal Resistance | | | | | 0.77 | °C/W |

CR5 & CR6 diode ratings and characteristics

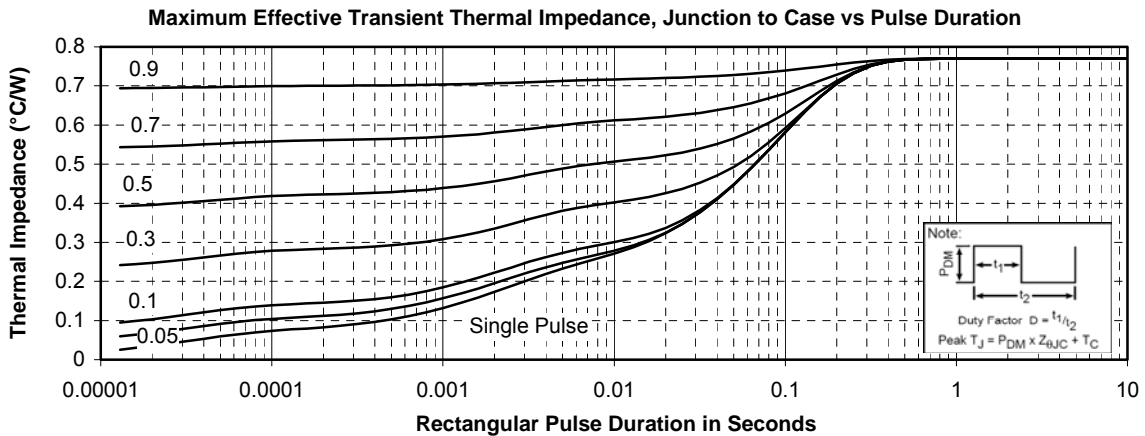
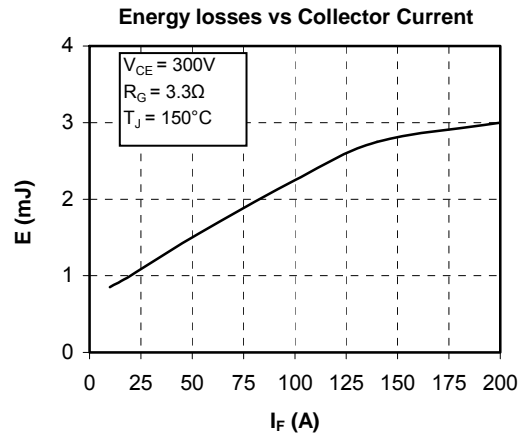
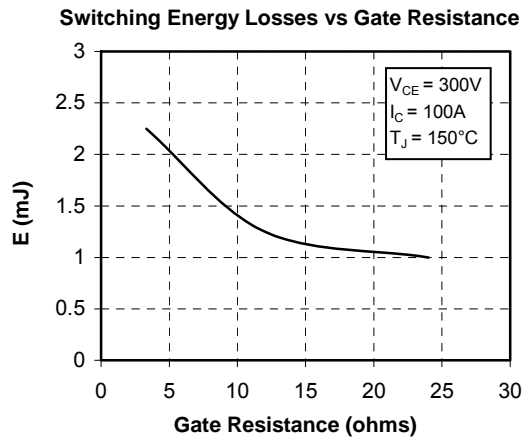
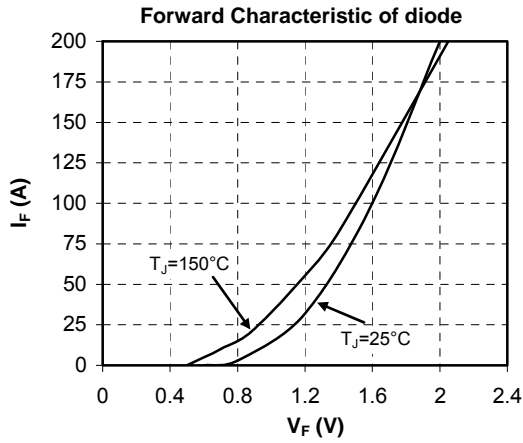
| <i>Symbol</i> | <i>Characteristic</i> | <i>Test Conditions</i> | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> |
|-------------------|---|--|---|------------|-------------|------------|-------------|
| V _{RRM} | Maximum Peak Repetitive Reverse Voltage | | | 600 | | | V |
| I _{RM} | Maximum Reverse Leakage Current | V _R =600V | T _j = 25°C T _j = 150°C | | | 150 350 | μA |
| I _F | DC Forward Current | | T _c = 80°C | | 150 | | A |
| V _F | Diode Forward Voltage | I _F = 150A V _{GE} = 0V | T _j = 25°C T _j = 150°C | | 1.6 1.5 | 2 | V |
| t _{rr} | Reverse Recovery Time | I _F = 150A V _R = 300V di/dt = 3000A/μs | T _j = 25°C T _j = 150°C | | 130 225 | | ns |
| Q _{rr} | Reverse Recovery Charge | | T _j = 25°C T _j = 150°C | | 6.9 14.5 | | μC |
| E _{rr} | Reverse Recovery Energy | | T _j = 25°C T _j = 150°C | | 1.6 3.5 | | mJ |
| R _{thJC} | Junction to Case Thermal Resistance | | | | | 0.52 | °C/W |

Thermal and package characteristics

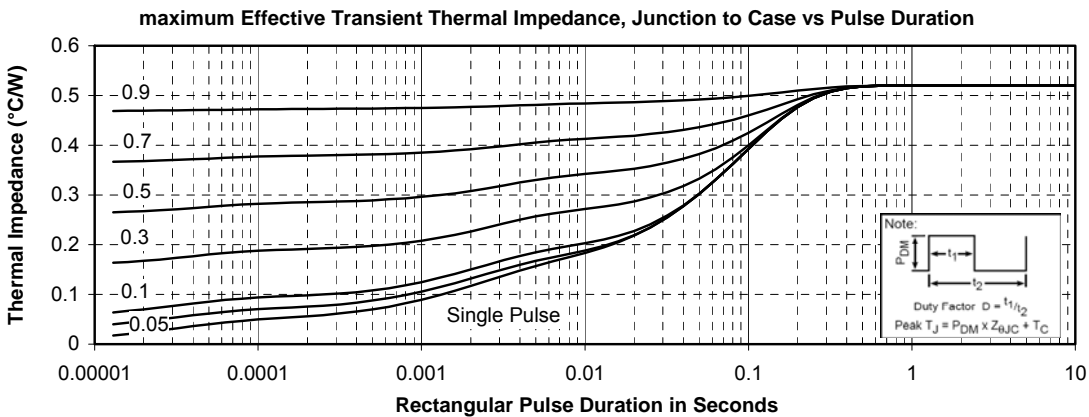
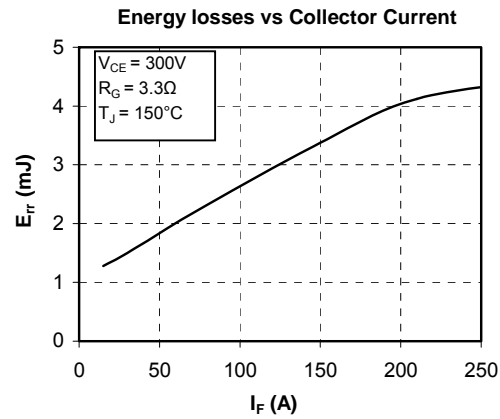
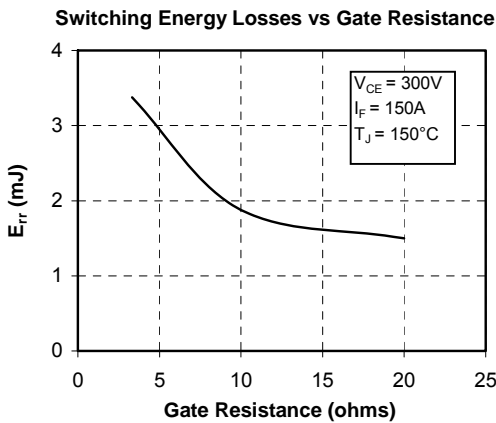
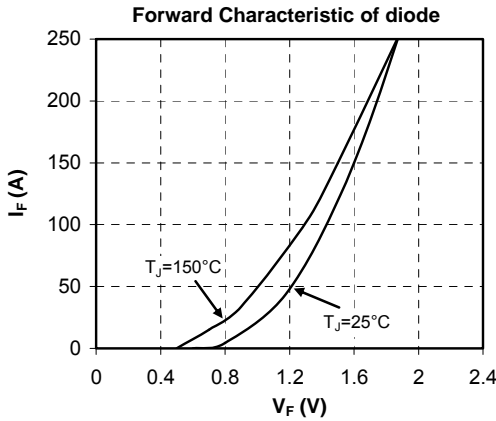
| <i>Symbol</i> | <i>Characteristic</i> | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> | |
|-------------------|---|---------------|------------|------------|-------------|-----|
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, I _{isol} < 1mA, 50/60Hz | 2500 | | | V | |
| T _J | Operating junction temperature range | -40 | | 175 | °C | |
| T _{STG} | Storage Temperature Range | -40 | | 125 | | |
| T _C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | To heatsink | M6 | 3 | 5 | N.m |
| | | For terminals | M5 | 2 | 3.5 | |
| Wt | Package Weight | | | | 280 | g |



CR1 to CR4 Typical performance curve



CR5 & CR6 Typical performance curve



Microsemi reserves the right to change, without notice, the specifications and information contained herein

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. U.S and Foreign patents pending. All Rights Reserved.