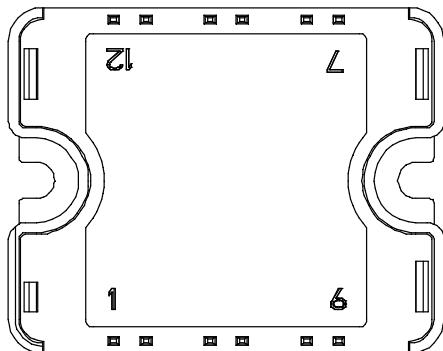
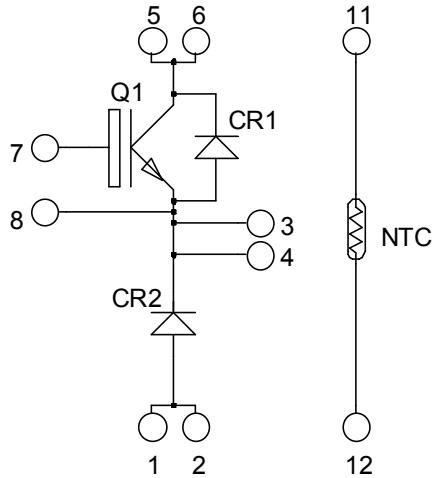


**Buck chopper
Trench + Field Stop IGBT3
Power Module**
 $V_{CES} = 600V$
 $I_C = 150A^* @ T_c = 80^\circ C$


Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|-------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 600 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 225 * |
| | | $T_c = 80^\circ C$ | 150 * |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 350 |
| 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 |

Specification of IGBT device but output current must be limited to 75A to not exceed a delta of temperature greater than 30°C for the connectors.

 **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 | $V_{GE} = 0\text{V}$, $V_{CE} = 600\text{V}$ | | | | 250 | μA |
| $V_{CE(\text{sat})}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15\text{V}$ | $T_j = 25^\circ\text{C}$ | | 1.5 | 1.9 | V |
| | | $I_C = 150\text{A}$ | $T_j = 150^\circ\text{C}$ | | 1.7 | | |
| $V_{GE(\text{th})}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}$, $I_C = 1.5\text{ mA}$ | | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20\text{V}$, $V_{CE} = 0\text{V}$ | | | | 400 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit |
|--------------|------------------------------|--|---------------------------|------|-----|-----|-------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$ | | 9200 | | | pF |
| C_{oes} | Output Capacitance | | | 580 | | | |
| C_{res} | Reverse Transfer Capacitance | | | 270 | | | |
| $T_{d(on)}$ | Turn-on Delay Time | $\text{Inductive Switching (25}^\circ\text{C)}$ $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 150\text{A}$ $R_G = 3.3\Omega$ | | 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 | $\text{Inductive Switching (150}^\circ\text{C)}$ $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 150\text{A}$ $R_G = 3.3\Omega$ | | 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 | $V_{GE} = \pm 15\text{V}$ | $T_j = 25^\circ\text{C}$ | 0.85 | | | mJ |
| | | $V_{Bus} = 300\text{V}$ | $T_j = 150^\circ\text{C}$ | 1.5 | | | |
| E_{off} | Turn off Energy | $I_C = 150\text{A}$ | $T_j = 25^\circ\text{C}$ | 4.1 | | | mJ |
| | | $R_G = 3.3\Omega$ | $T_j = 150^\circ\text{C}$ | 5.3 | | | |

Chopper diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | | Min | Typ | Max | Unit | |
|-----------|---|--|---------------------------|------|-----|-----|---------------|--|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | $V_R = 600\text{V}$ | | 600 | | | V | |
| I_{RM} | Maximum Reverse Leakage Current | | $T_j = 25^\circ\text{C}$ | | 250 | | μA | |
| | | | $T_j = 150^\circ\text{C}$ | | 500 | | | |
| I_F | DC Forward Current | | $T_c = 80^\circ\text{C}$ | 150 | | | A | |
| V_F | Diode Forward Voltage | $I_F = 150\text{A}$ $V_{GE} = 0\text{V}$ | $T_j = 25^\circ\text{C}$ | 1.6 | 2 | | V | |
| | | | $T_j = 150^\circ\text{C}$ | 1.5 | | | | |
| t_{rr} | Reverse Recovery Time | $I_F = 150\text{A}$ $V_R = 300\text{V}$ $di/dt = 3000\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 130 | | | ns | |
| | | | $T_j = 150^\circ\text{C}$ | 225 | | | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | 6.9 | | | μC | |
| | | | $T_j = 150^\circ\text{C}$ | 14.5 | | | | |
| E_r | Reverse Recovery Energy | | $T_j = 25^\circ\text{C}$ | 1.6 | | | mJ | |
| | | | $T_j = 150^\circ\text{C}$ | 3.5 | | | | |

Thermal and package characteristics
Symbol **Characteristic**

| | | | Min | Typ | Max | Unit |
|-------------------|--|-------------|------|-----|------|------|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | | 0.31 | °C/W |
| | | Diode | | | 0.52 | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz | | 4000 | | | 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 | M4 | 2 | 3 | N.m |
| Wt | Package Weight | | | | 80 | g |

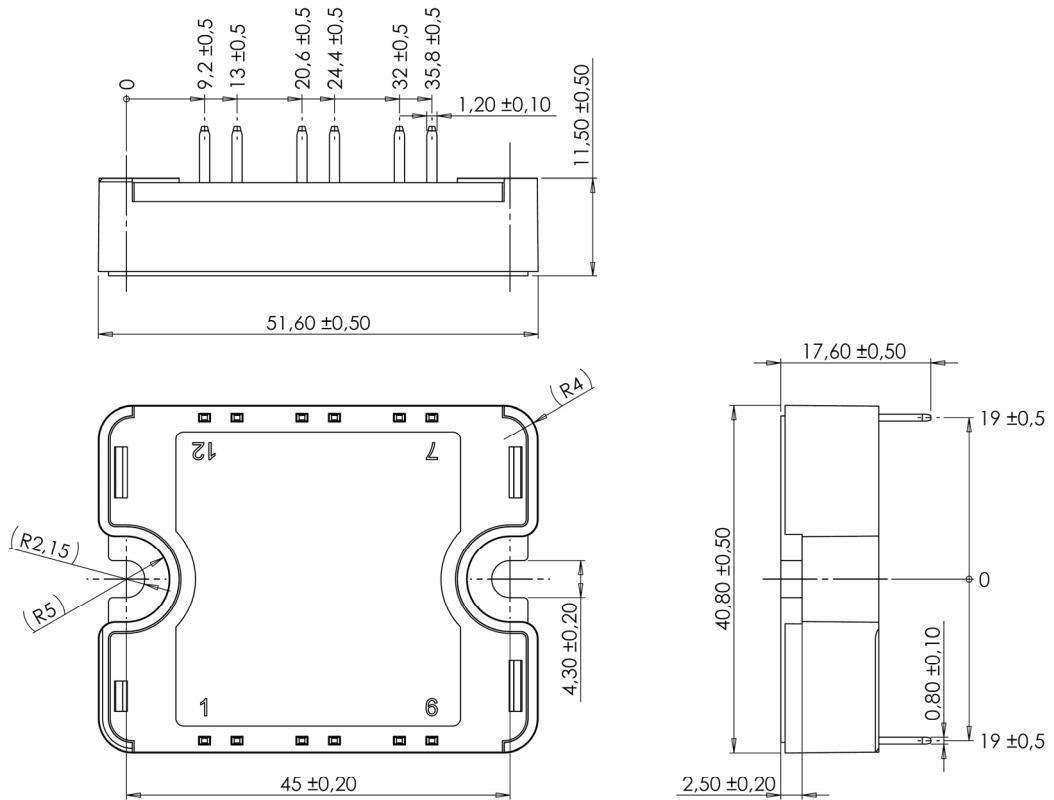
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

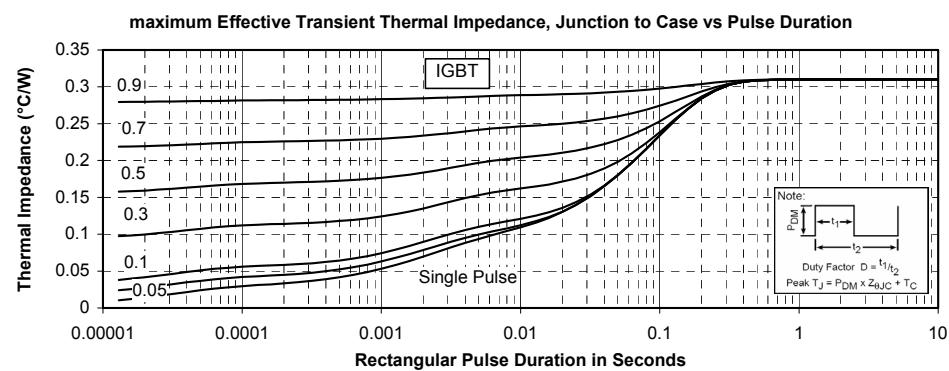
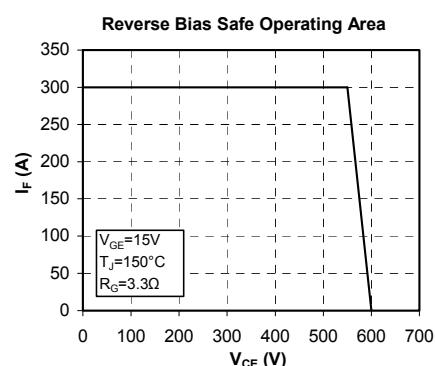
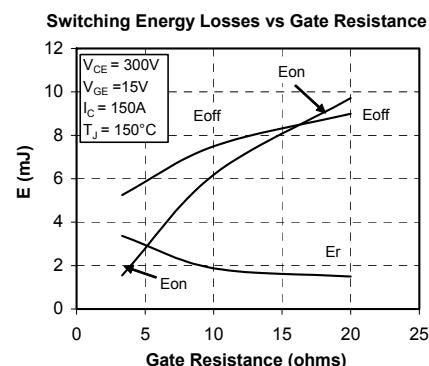
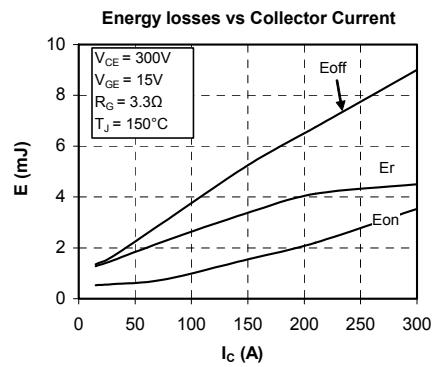
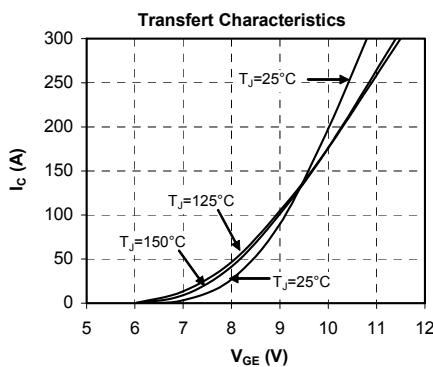
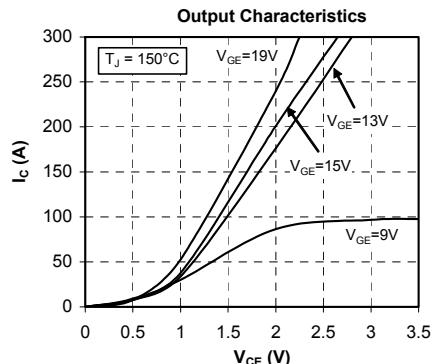
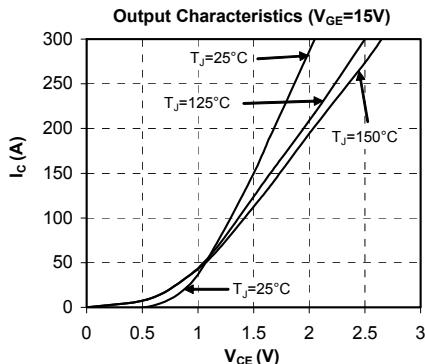
Symbol **Characteristic**

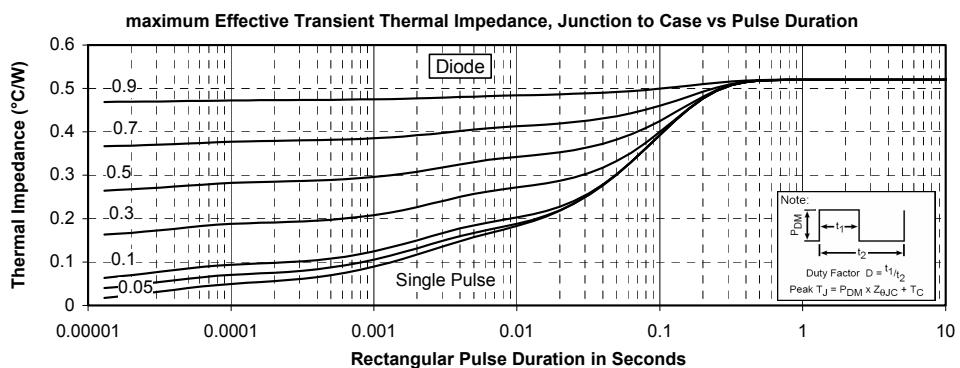
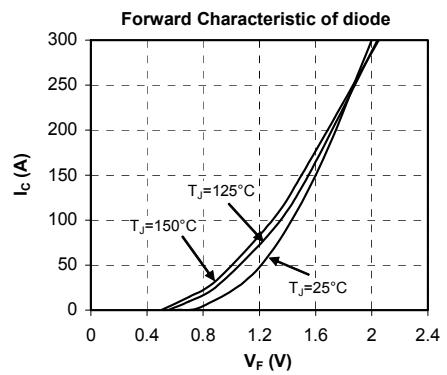
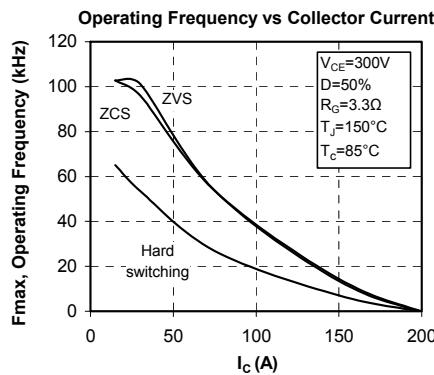
| | | Min | Typ | Max | Unit |
|--------------------|----------------------------|-----|------|-----|------|
| R ₂₅ | Resistance @ 25°C | | 50 | | kΩ |
| B _{25/85} | T ₂₅ = 298.15 K | | 3952 | | K |

$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

SP1 Package outline (dimensions in mm)

 See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical Performance Curve




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