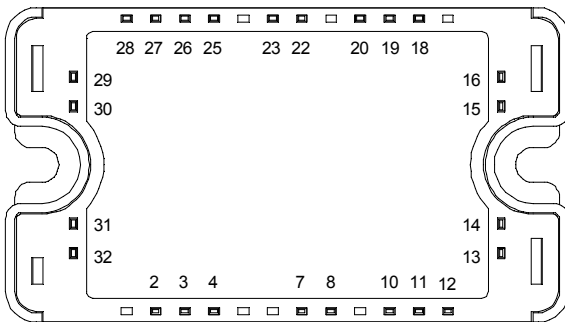
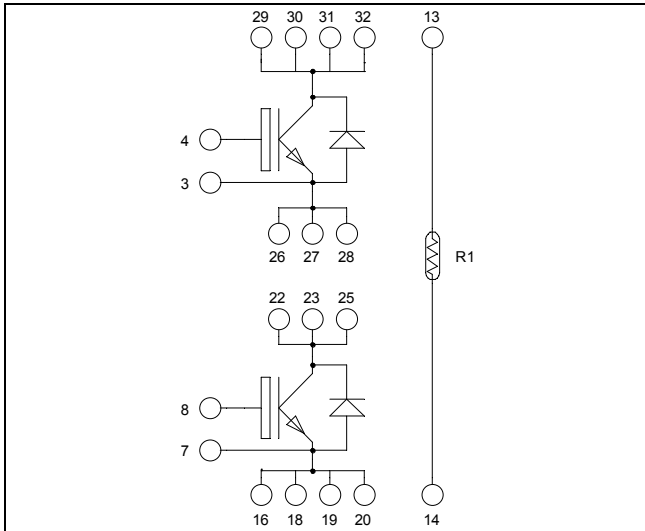


*Phase leg
Trench + Field Stop IGBT4
Power Module*

**$V_{CES} = 1200V$
 $I_C = 180A @ T_c = 100^\circ C$**



Pins 29/30/31/32 must be shorted together
 Pins 26/27/28/22/23/25 must be shorted together
 to achieve a phase leg
 Pins 16/18/19/20 must be shorted together

Application

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

Features

- Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Soft recovery parallel diodes
 - Low diode VF
 - RBSOA and SCSOA rated
- Very low stray inductance
- Kelvin emitter for easy drive
- Internal thermistor for temperature monitoring
- High level of integration
- AlN substrate for improved thermal performance

Benefits

- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- 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 | $T_C = 25^\circ C$ | 230 |
| | | $T_C = 100^\circ C$ | 180 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 300 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 940 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 125^\circ C$ | 300A @ 1100V |

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 | $V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}$ | | | 300 | μA |
| $V_{CE(sat)}$ | Collector Emitter saturation Voltage | $V_{GE} = 15\text{V}$ $I_C = 150\text{A}$ | | 1.8 2.2 | 2.2 | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 5.5\text{ mA}$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$ | | | 200 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|--|---------------------------|------|-----|---------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0\text{V}$ | | 9.3 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25\text{V}$ | | 0.58 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.5 | | |
| Q_G | Gate charge | $V_{GE} = -8\text{V} / 15\text{V}; V_{CE} = 600\text{V}$ $I_C = 150\text{A}$ | | 0.85 | | μC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 3\Omega$ | | 130 | | ns |
| T_r | Rise Time | | | 20 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 300 | | |
| T_f | Fall Time | | | 45 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 150\text{A}$ $R_G = 3\Omega$ | | 150 | | ns |
| T_r | Rise Time | | | 35 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 350 | | |
| T_f | Fall Time | | | 80 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 150\text{A}$ | $T_j = 150^\circ\text{C}$ | 13.5 | | mJ |
| E_{off} | Turn-off Switching Energy | $R_G = 3\Omega$ | $T_j = 150^\circ\text{C}$ | 14.5 | | mJ |
| I_{sc} | Short Circuit data | $V_{GE} \leq 15\text{V}; V_{Bus} = 900\text{V}$ $t_p \leq 10\mu\text{s}; T_j = 150^\circ\text{C}$ | | 600 | | A |

Reverse diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-----------|---|---|---------------------------|------|------------|---------------|
| V_{RRM} | Maximum Peak Repetitive Reverse Voltage | | 1200 | | | V |
| I_{RM} | Maximum Reverse Leakage Current | $V_R = 1200\text{V}$ | | | 150 600 | μA |
| I_F | DC Forward Current | $T_c = 100^\circ\text{C}$ | | 120 | | A |
| V_F | Diode Forward Voltage | $I_F = 120\text{A}$ | | 2.5 | 3 | V |
| | | $I_F = 240\text{A}$ | | 3 | | |
| | | $I_F = 120\text{A}$ | $T_j = 125^\circ\text{C}$ | | 1.8 | |
| t_{rr} | Reverse Recovery Time | $I_F = 120\text{A}$ $V_R = 800\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 265 | | ns |
| | | | $T_j = 125^\circ\text{C}$ | 350 | | |
| Q_{rr} | Reverse Recovery Charge | $I_F = 120\text{A}$ $V_R = 800\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | 1120 | | nC |
| | | | $T_j = 125^\circ\text{C}$ | 5780 | | |

Thermal and package characteristics

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | IGBT | | 0.16 | °C/W | |
| | | Diode | | 0.37 | | |
| 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 | | | | 110 | g |

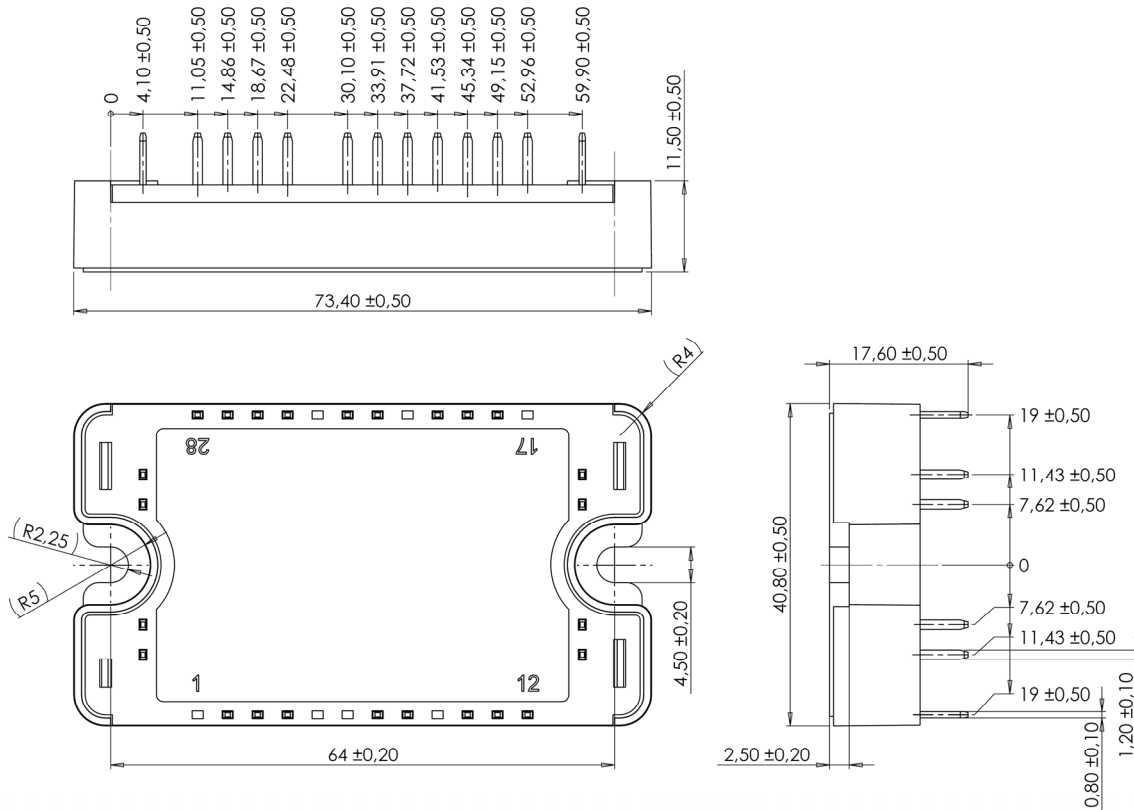
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

| Symbol | Characteristic | Min | Typ | Max | Unit |
|-----------------------------------|----------------------------|------------------------|------|-----|------|
| R ₂₅ | Resistance @ 25°C | | 50 | | kΩ |
| ΔR ₂₅ /R ₂₅ | | | 5 | | % |
| B _{25/85} | T ₂₅ = 298.15 K | | 3952 | | K |
| ΔB/B | | T _C = 100°C | 4 | | % |

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

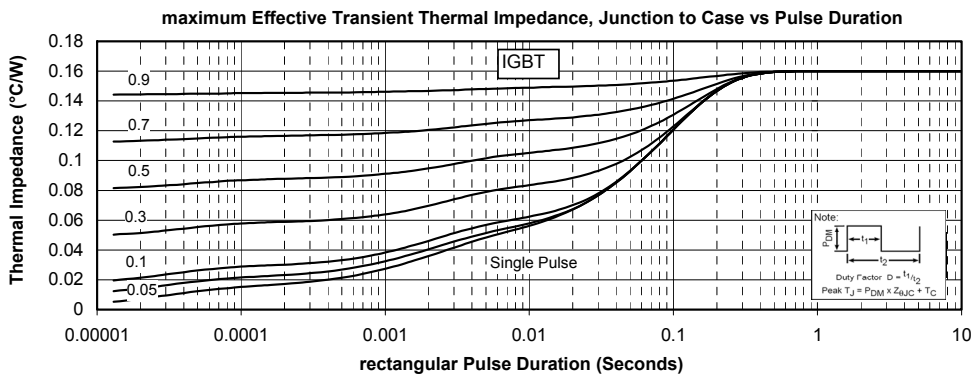
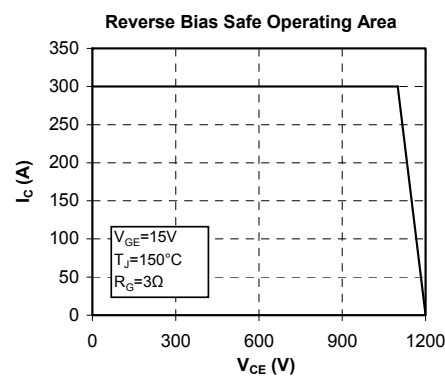
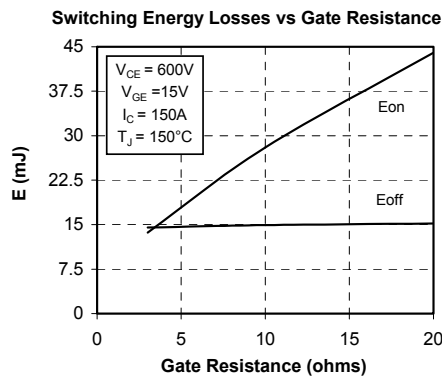
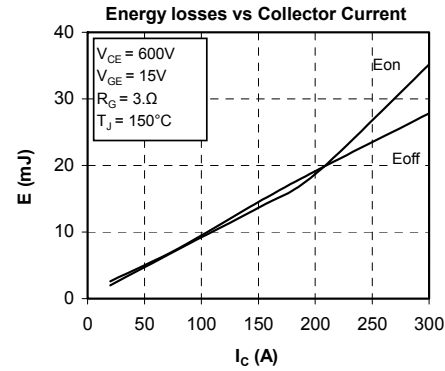
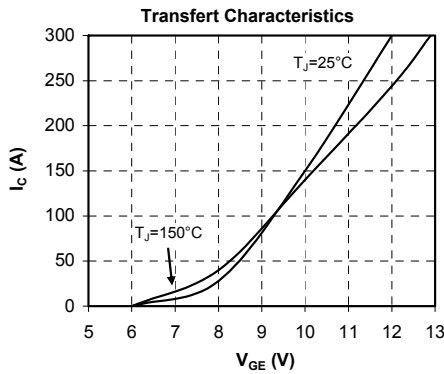
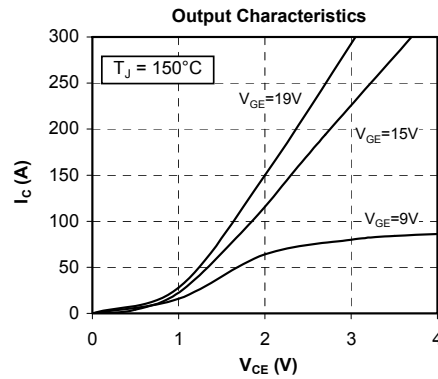
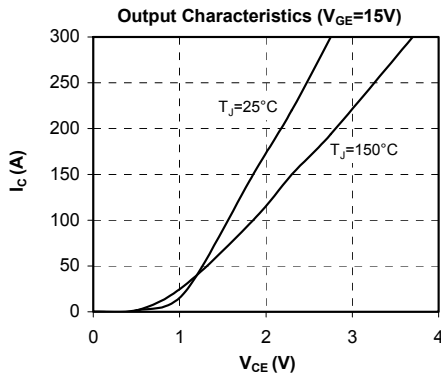
T: Thermistor temperature
 R_T: Thermistor value at T

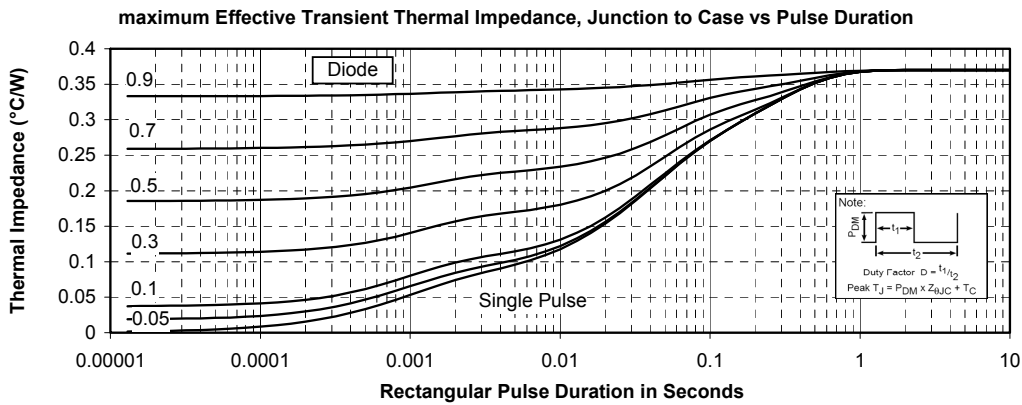
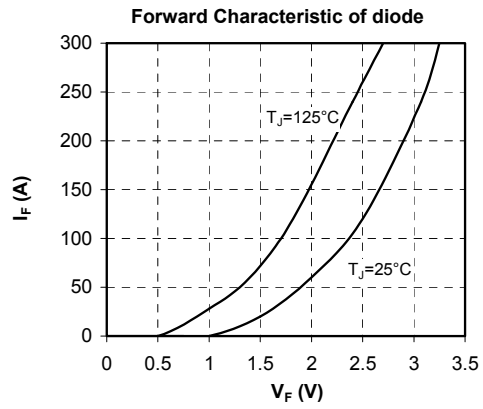
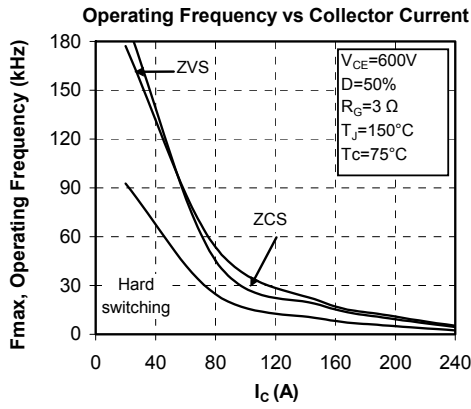
SP3 Package outline (dimensions in mm)



See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

Typical Performance Curve





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