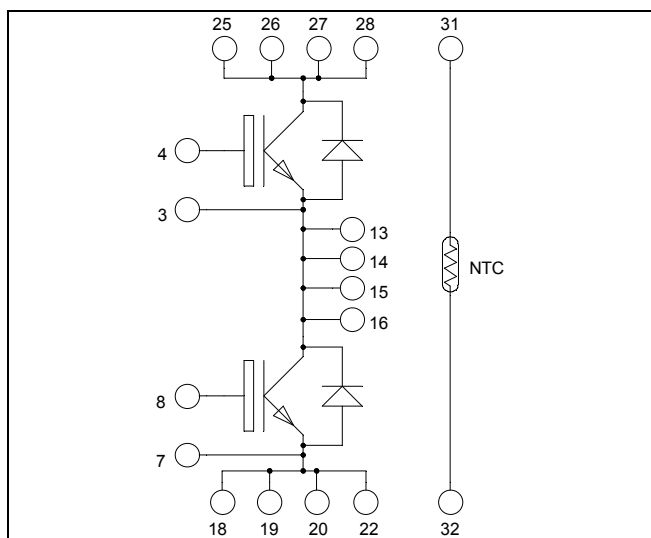


Phase leg NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 100A @ T_c = 80^\circ C$



Application

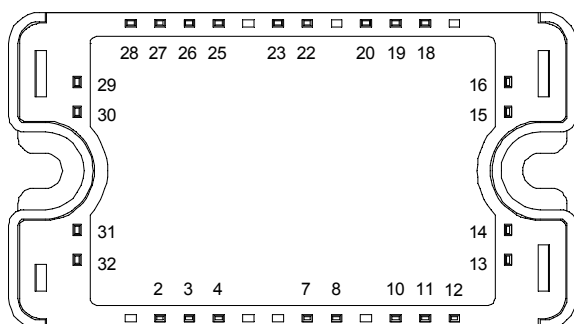
- Welding converters

Features

- Non Punch Through (NPT) Fast IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Outstanding performance at high frequency operation
- 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



Pins 25/26/27/28 must be shorted together
 Pins 13/14/15/16 must be shorted together
 Pins 18/19/20/22 must be shorted together

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|-----------|---------------------------------------|---------------------|--------------|
| V_{CES} | Collector - Emitter Breakdown Voltage | 1200 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 130 |
| | | $T_C = 80^\circ C$ | 100 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 200 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ | 657 |
| RBSOA | Reverse Bias Safe Operating Area | $T_J = 150^\circ C$ | 200A @ 1150V |

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 | $V_{GE} = 0V, V_{CE} = 1200V$ | | | 250 | μA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15V$ $I_C = 100A$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 3.2 3.9 | 3.7 | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 4mA$ | 4.5 | 5.5 | 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 | $V_{GE} = 0V$ | | 6.5 | | nF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 1 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 0.5 | | |
| Q_G | Gate charge | $V_{GE} = \pm 15V; V_{CE} = 600V$ $I_C = 100A$ | | 1.1 | | μC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5.6\Omega$ | | 120 | | ns |
| T_r | Rise Time | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 310 | | |
| T_f | Fall Time | | | 20 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5.6\Omega$ | | 130 | | ns |
| T_r | Rise Time | | | 60 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 360 | | |
| T_f | Fall Time | | | 30 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5.6\Omega$ | $T_j = 125^\circ\text{C}$ | 12 | | mJ |
| E_{off} | Turn-off Switching Energy | | $T_j = 125^\circ\text{C}$ | 5 | | |
| I_{sc} | Short Circuit data | $V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu s; T_j = 125^\circ\text{C}$ | | 650 | | 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 | $V_R = 1200V$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | | 100 500 | μA |
| I_F | DC Forward Current | $T_c = 80^\circ\text{C}$ | | 60 | | A |
| V_F | Diode Forward Voltage | $I_F = 60A$ $I_F = 120A$ $I_F = 60A; T_j = 125^\circ\text{C}$ | | 2.5 3 1.8 | 3 | V |
| t_{rr} | Reverse Recovery Time | $I_F = 60A$ $V_R = 800V$ $di/dt = 200A/\mu s$ | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 265 350 | | ns |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ | 560 2890 | | nC |

Thermal and package characteristics

| Symbol | Characteristic | | | Min | Typ | Max | Unit |
|-------------------|--|-------------|----|-------|-----|------|------|
| R _{thJC} | Junction to Case Thermal Resistance | | | IGBT | | 0.19 | °C/W |
| | | | | Diode | | 0.90 | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | | | 4000 | | | V |
| T _J | Operating junction temperature range | | | -40 | | 150 | °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 |

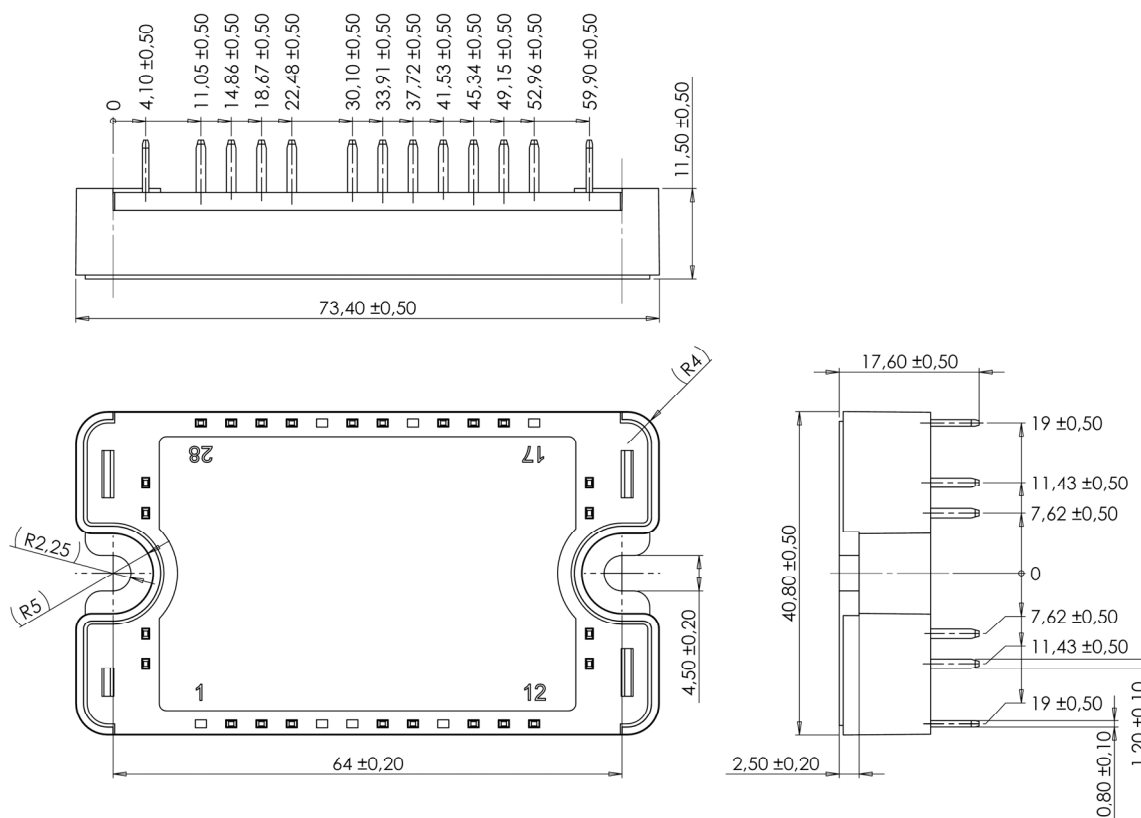
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

| 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 | | % |

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

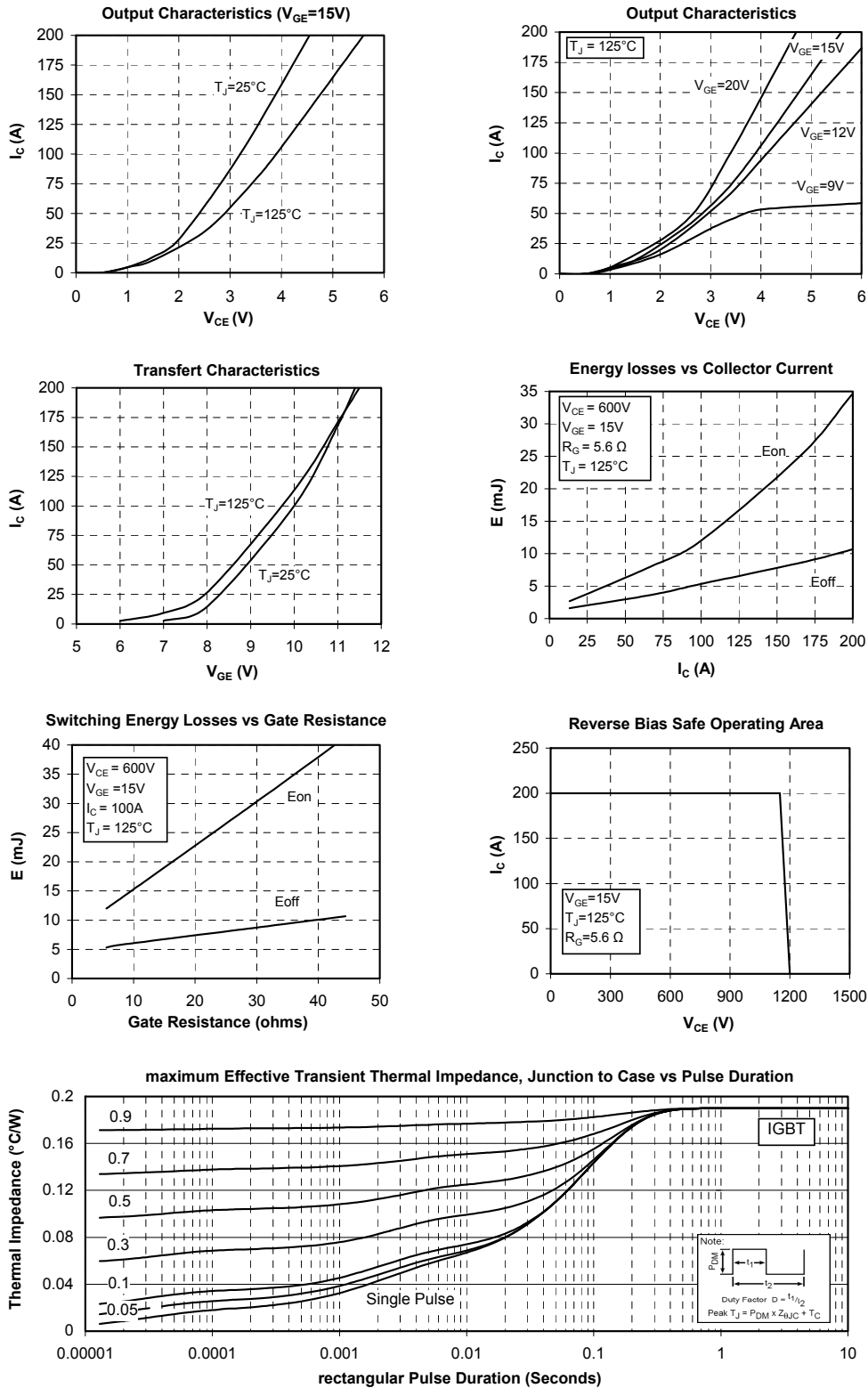
T: Thermistor temperature
R_T: Thermistor value at T

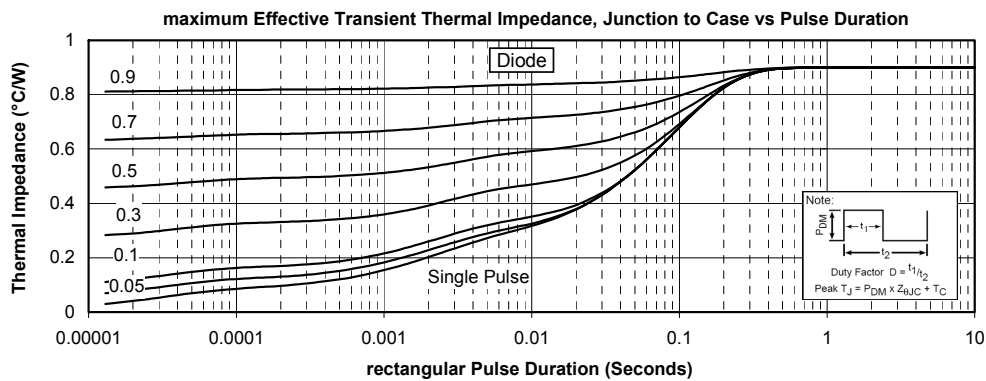
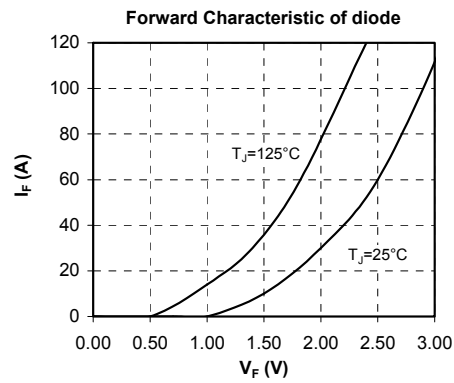
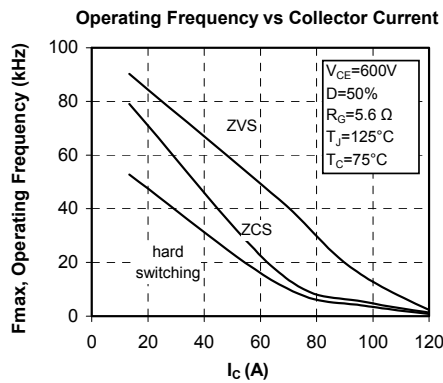
SP3 Package outline (dimensions in mm)



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

Typical Performance Curve





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