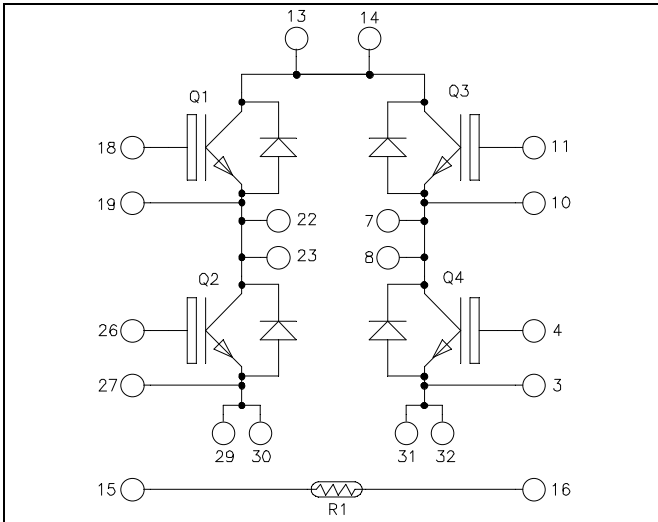


**Full - Bridge
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 600V$
 $I_C = 75A @ T_c = 80^\circ C$**

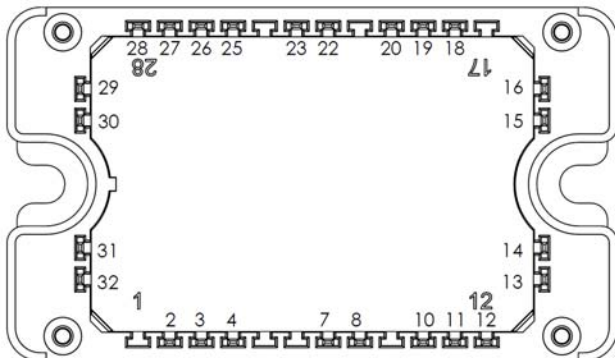


Application

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

Features

- **Trench + Field Stop IGBT3**
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - 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

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of V_{CESat}
- Low profile
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS compliant

All multiple inputs and outputs must be shorted together
 Example: 13/14 ; 29/30 ; 22/23 ...

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

Absolute maximum ratings (per IGBT)

| Symbol | Parameter | Max ratings | Unit |
|-----------|----------------------------------|---------------------|-------------|
| V_{CES} | Collector - Emitter Voltage | 600 | V |
| I_C | Continuous Collector Current | $T_C = 25^\circ C$ | 100 |
| | | $T_C = 80^\circ C$ | 75 |
| I_{CM} | Pulsed Collector Current | $T_C = 25^\circ C$ | 140 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Power Dissipation | $T_C = 25^\circ C$ | 250 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 150^\circ C$ | 150A @ 550V |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics (per IGBT)

| 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 | $V_{GE} = 15V$ $I_C = 75A$ | | 1.5 1.7 | 1.9 | V |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 600\mu A$ | 5.0 | 5.8 | 6.5 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 600 | nA |

Dynamic Characteristics (per IGBT)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|-------------------------------------|---|---------------------|------|-----|--------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 4620 | | pF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 300 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 140 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 75A$ $R_G = 4.7\Omega$ | | 110 | | ns |
| T_r | Rise Time | | | 45 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 200 | | |
| T_f | Fall Time | | | 40 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 75A$ $R_G = 4.7\Omega$ | | 120 | | ns |
| T_r | Rise Time | | | 50 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 250 | | |
| T_f | Fall Time | | | 60 | | |
| E_{on} | Turn-on Switching Energy | $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 75A$ | $T_j = 25^\circ C$ | 0.35 | | mJ |
| E_{off} | Turn-off Switching Energy | | $T_j = 150^\circ C$ | 0.6 | | |
| | | $R_G = 4.7\Omega$ | $T_j = 25^\circ C$ | 2.2 | | mJ |
| | | | $T_j = 150^\circ C$ | 2.6 | | |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.6 | $^\circ C/W$ |

Reverse diode ratings and characteristics (per diode)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|------------|-------------------------------------|--|---------------------|-----|------|--------------|
| V_{RRM} | Peak Repetitive Reverse Voltage | | | | 600 | V |
| I_{RM} | Reverse Leakage Current | $V_R = 600V$ | | | 250 | μA |
| I_F | DC Forward current | $T_c = 40^\circ C$ | | 75 | | A |
| V_F | Diode Forward Voltage | $I_F = 75A$ $V_{GE} = 0V$ | $T_j = 25^\circ C$ | 1.6 | 2 | V |
| | | | $T_j = 150^\circ C$ | 1.5 | | |
| t_{rr} | Reverse Recovery Time | $I_F = 75A$ $V_R = 300V$ $di/dt = 2000A/\mu s$ | $T_j = 25^\circ C$ | 100 | | ns |
| | | | $T_j = 150^\circ C$ | 150 | | |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ C$ | 3.6 | | μC |
| | | | $T_j = 150^\circ C$ | 7.6 | | |
| E_r | Reverse Recovery Energy | $T_j = 25^\circ C$ | 0.85 | | mJ | |
| | | $T_j = 150^\circ C$ | 1.8 | | | |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.98 | $^\circ C/W$ |

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 | | % |

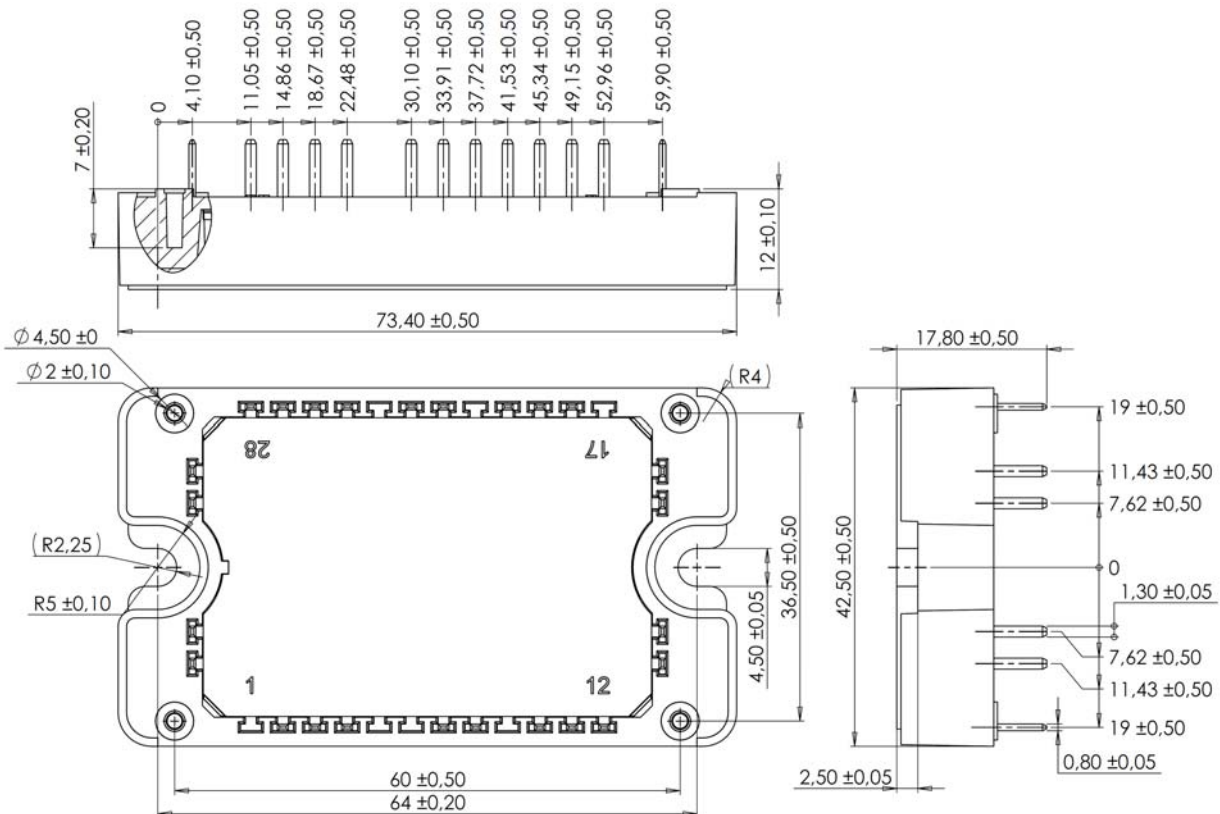
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

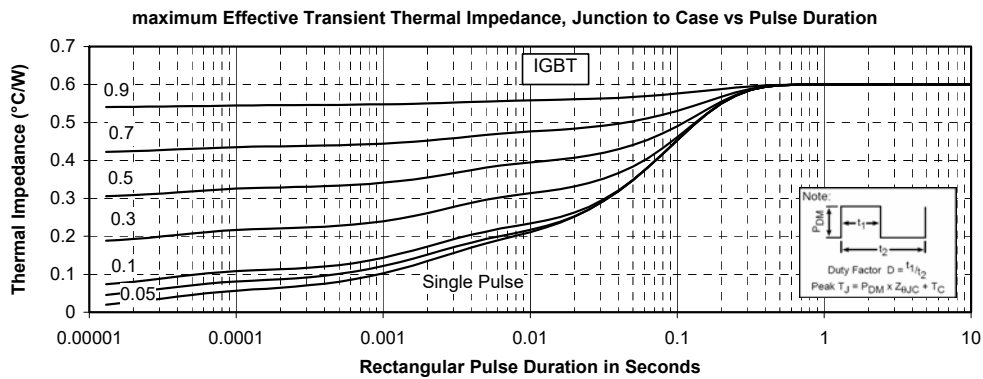
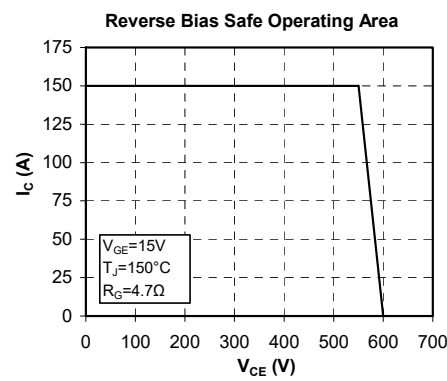
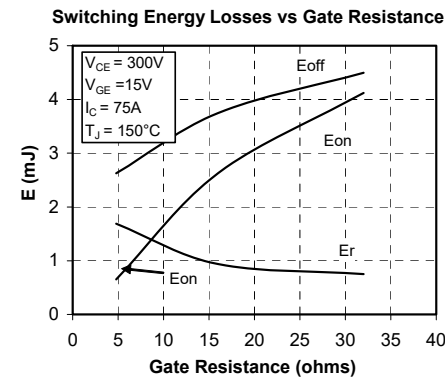
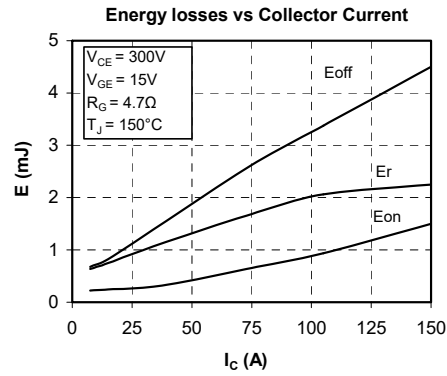
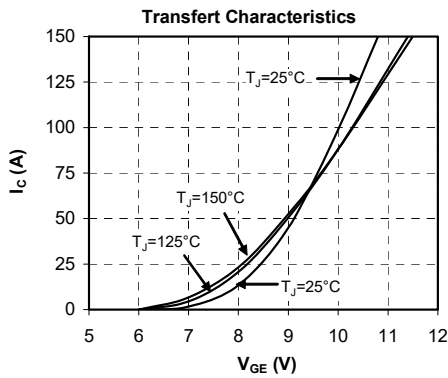
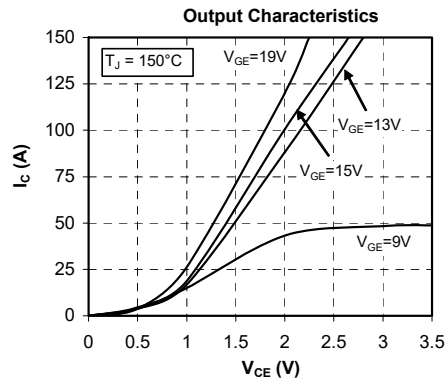
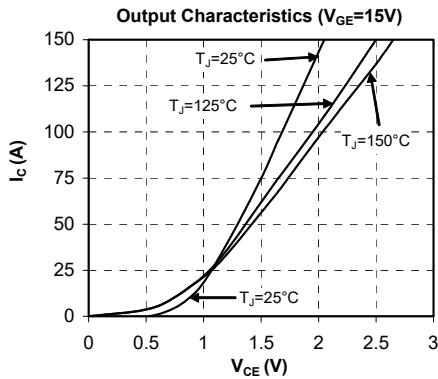
| Symbol | Characteristic | Min | Max | Unit | | |
|-------------------|--|-------------|-----------------------|------|-----|-----|
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 4000 | | V | | |
| T _J | Operating junction temperature range | -40 | 175 | °C | | |
| T _{JOP} | Recommended junction temperature under switching conditions | -40 | T _{Jmax} -25 | | | |
| T _{STG} | Storage Temperature Range | -40 | 125 | | | |
| T _C | Operating Case Temperature | -40 | 125 | | | |
| Torque | Mounting torque | To heatsink | M4 | 2 | 3 | N.m |
| Wt | Package Weight | | | | 110 | g |

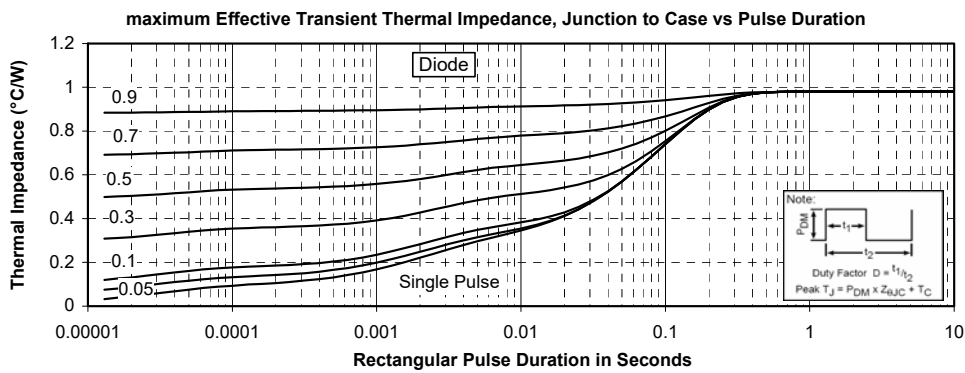
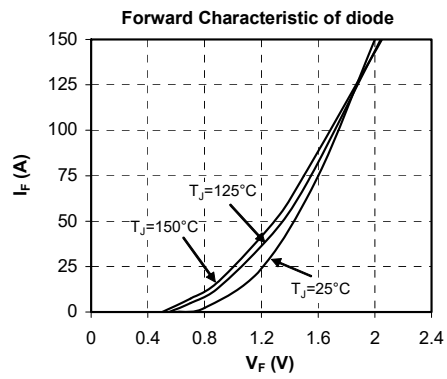
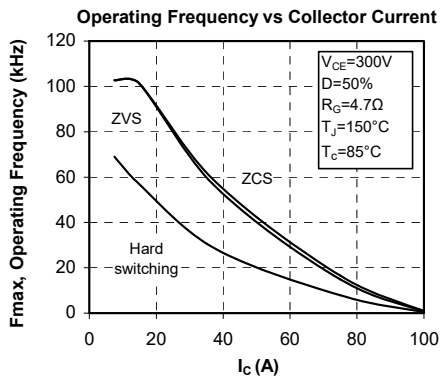
Package outline (dimensions in mm)



See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve





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