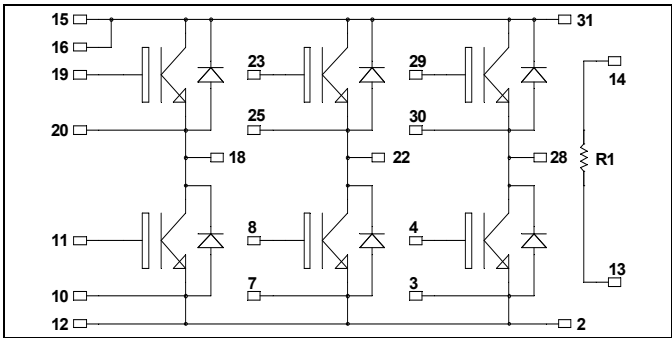
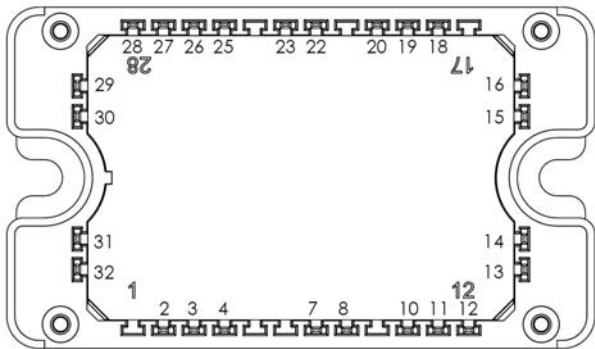


**3 Phase bridge
Trench + Field Stop IGBT4
Power Module**

**$V_{CES} = 1200V$
 $I_C = 40A @ T_c = 80^\circ C$**



It is recommended to connect a decoupling capacitor between pins 31 & 2 to reduce switching overvoltages, if DC Power is connected between pins 15, 16 & 12. Pins 15 & 16 must be shorted together.



Application

- Motor control

Features

- **Trench + Field Stop IGBT 4**
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Low tail current
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- 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
- RoHS compliant

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 | 1200 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 65 |
| | | $T_c = 80^\circ C$ | 40 |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 70 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Power Dissipation | $T_c = 25^\circ C$ | 220 |
| RBSOA | Reverse Bias Safe Operating Area | $T_j = 150^\circ C$ | 70A @ 1100V |

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} = 1200V | | | 250 | μA |
| V _{CE(sat)} | Collector Emitter saturation Voltage | V _{GE} = 15V I _C = 35A | | 1.85 2.25 | 2.25 | V |
| V _{GE(th)} | Gate Threshold Voltage | V _{GE} = V _{CE} , I _C = 1.2mA | 5.0 | 5.8 | 6.5 | V |
| I _{GES} | Gate – Emitter Leakage Current | V _{GE} = 20V, V _{CE} = 0V | | | 400 | nA |

Dynamic Characteristics (per IGBT)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|---------------------|-------------------------------------|---|-----|----------|------|------|
| C _{ies} | Input Capacitance | V _{GE} = 0V | | 1950 | | pF |
| C _{oes} | Output Capacitance | V _{CE} = 25V | | 155 | | |
| C _{res} | Reverse Transfer Capacitance | f = 1MHz | | 115 | | |
| Q _G | Gate charge | V _{GE} = ±15V ; V _{CE} = 600V I _C = 35A | | 0.27 | | μC |
| T _{d(on)} | Turn-on Delay Time | Inductive Switching (25°C) V _{GE} = ±15V V _{CE} = 600V I _C = 35A R _G = 12Ω | | 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} = ±15V V _{CE} = 600V I _C = 35A R _G = 12Ω | | 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} = ±15V V _{CE} = 600V | | 2.6 4 | | mJ |
| E _{off} | Turn-off Switching Energy | I _C = 35A R _G = 12Ω | | 2 3 | | |
| I _{sc} | Short Circuit data | V _{GE} ≤ 15V ; V _{Bus} = 900V t _p ≤ 10μs ; T _j = 150°C | | 140 | | A |
| R _{thJC} | Junction to Case Thermal Resistance | | | | 0.68 | °C/W |

Reverse diode ratings and characteristics (per diode)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|-------------------|-------------------------------------|--|-----|-------------------|------|------|
| V _{RRM} | Peak Repetitive Reverse Voltage | | | | 1200 | V |
| I _{RM} | Reverse Leakage Current | V _R = 1200V | | | 100 | μA |
| I _F | DC Forward Current | T _c = 80°C | | 30 | | A |
| V _F | Diode Forward Voltage | I _F = 30A I _F = 60A I _F = 30A | | 2.6 3.2 1.8 | 3.1 | V |
| t _{rr} | Reverse Recovery Time | I _F = 30A V _R = 800V | | 300 380 | | ns |
| Q _{rr} | Reverse Recovery Charge | di/dt = 200A/μs | | 360 1700 | | |
| R _{thJC} | Junction to Case Thermal Resistance | | | | 1.2 | °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 | | % |

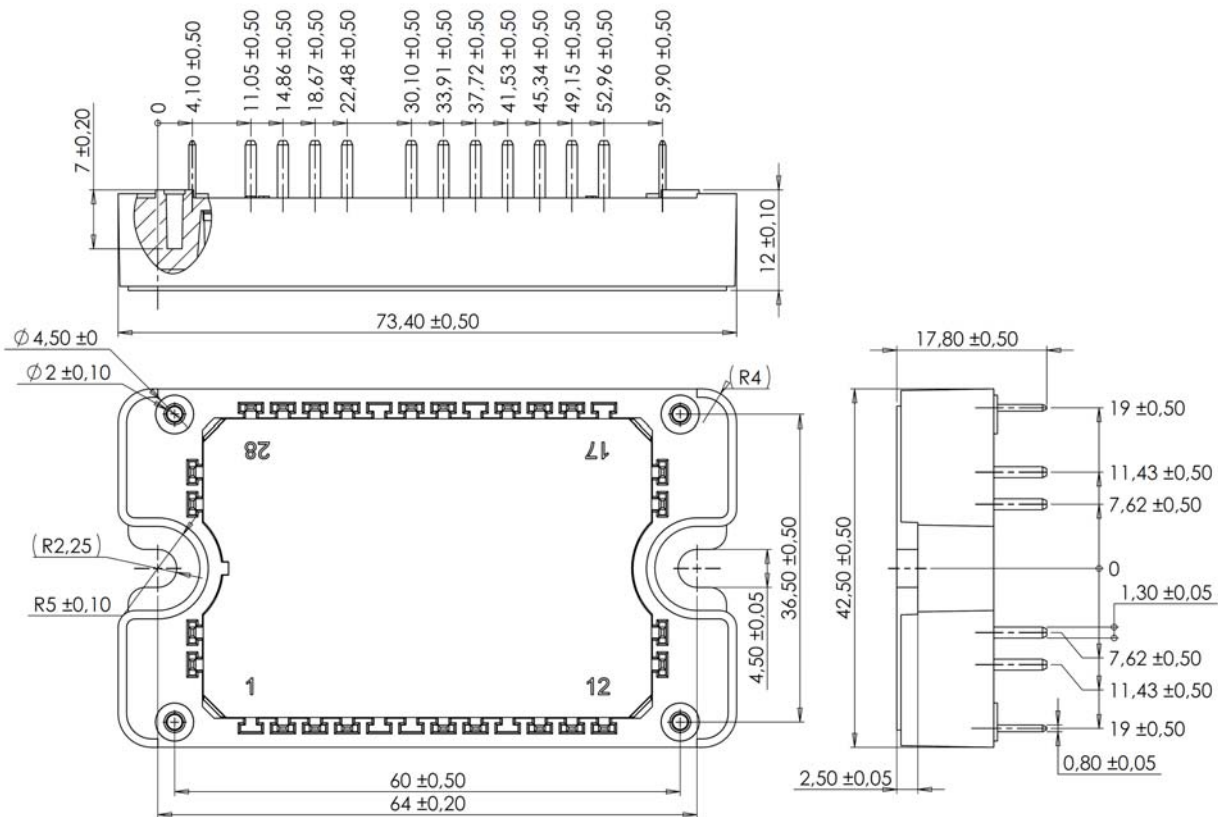
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

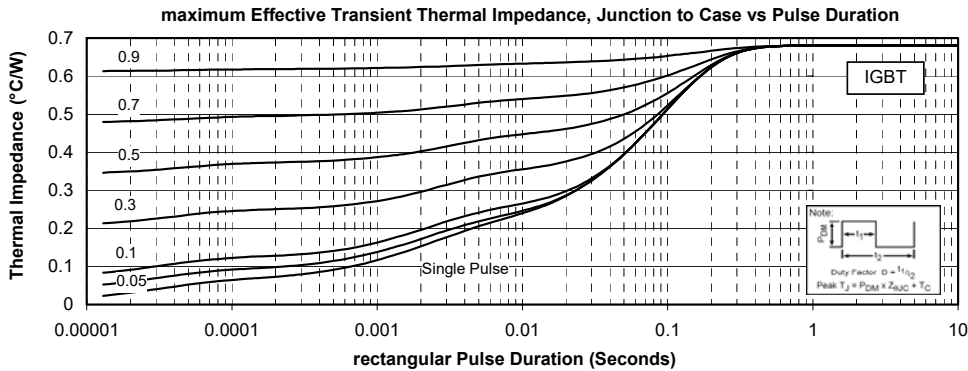
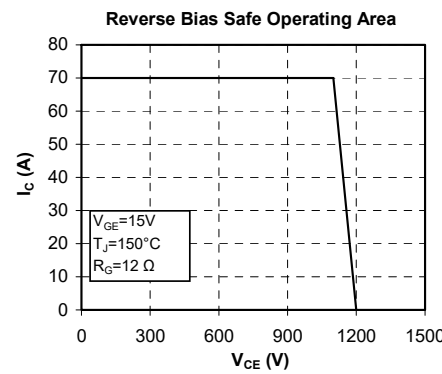
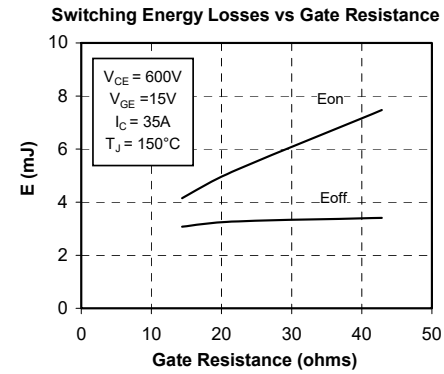
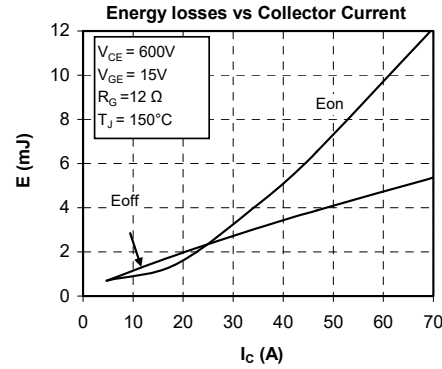
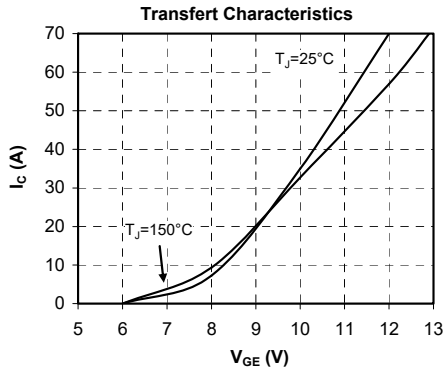
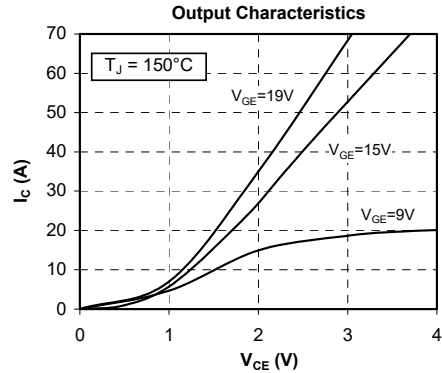
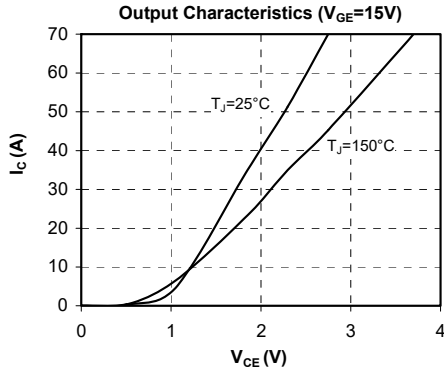
| Symbol | Characteristic | Min | Max | Unit | | |
|-------------------|--|-------------|-----------------------|------|-----|-----|
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz | 4000 | | V | | |
| T _J | Operating junction temperature range | -40 | 175 | °C | | |
| T _{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 |

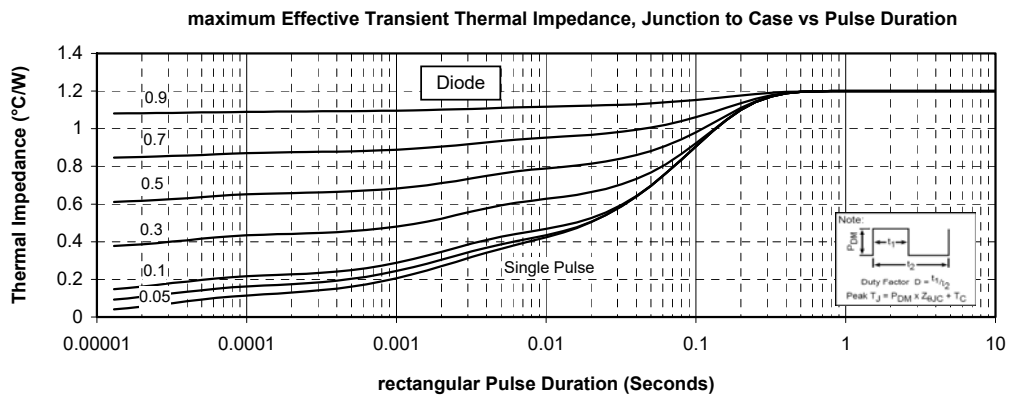
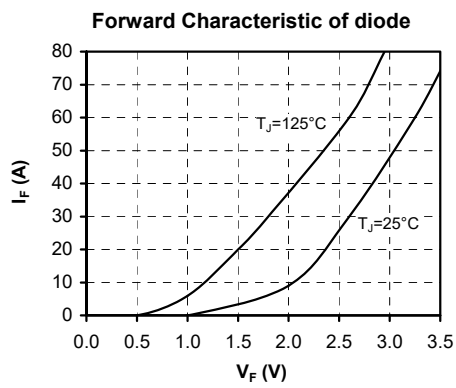
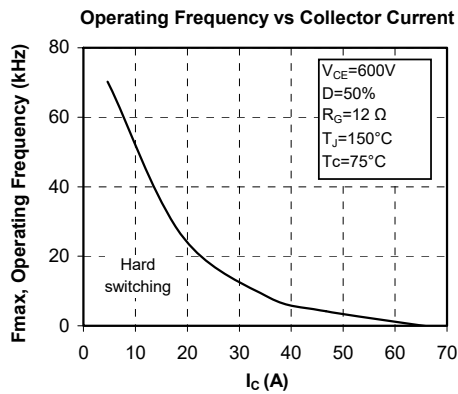
Package outline (dimensions in mm)



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

Typical Performance Curve





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