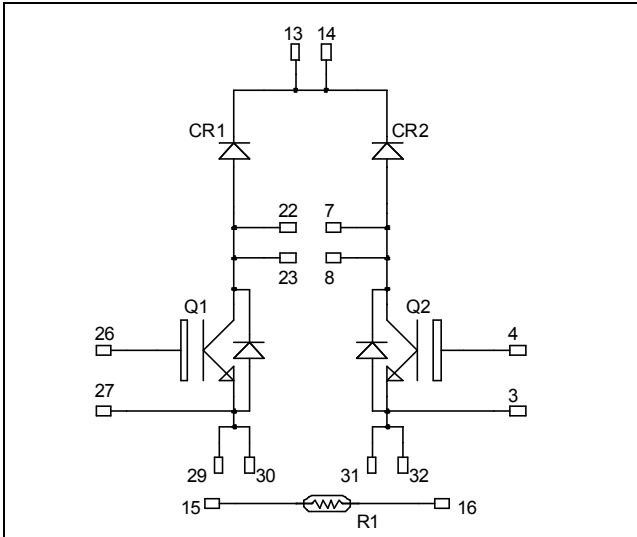


**Dual boost chopper
High speed IGBT 5 Power Module**

**$V_{CES} = 650V$
 $I_C = 100A @ T_c = 25^\circ C$**


Application

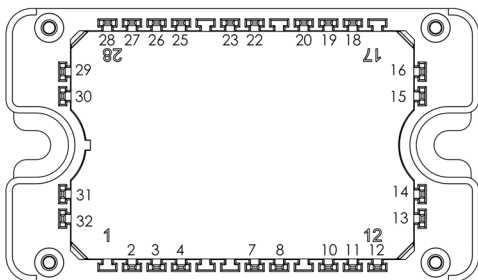
- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- High speed IGBT 5
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 100 kHz
 - Low leakage current
- 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
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a single boost 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 | 650 | V |
| I_C | Continuous Collector Current | $T_c = 25^\circ C$ | 100 |
| | | $T_c = 80^\circ C$ | 60 |
| I_{CM} | Pulsed Collector Current | $T_c = 25^\circ C$ | 200 |
| V_{GE} | Gate - Emitter Voltage | ± 20 | V |
| P_D | Power Dissipation | 250 | W |

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 | $V_{GE} = 0V, V_{CE} = 650V$ | | | 100 | μA |
| $V_{CE(sat)}$ | Collector Emitter Saturation Voltage | $V_{GE} = 15V$ $I_C = 100A$ | | 1.65 1.9 | 2.2 | V |
| | | | | | | $T_j = 25^\circ C$ $T_j = 150^\circ C$ |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE} = V_{CE}, I_C = 1mA$ | 3.3 | 4.0 | 4.7 | V |
| I_{GES} | Gate – Emitter Leakage Current | $V_{GE} = 20V, V_{CE} = 0V$ | | | 240 | nA |

Dynamic Characteristics (per IGBT)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|-------------------------------------|---|-----|------|-----|--------------|
| C_{ies} | Input Capacitance | $V_{GE} = 0V$ | | 6000 | | pF |
| C_{oes} | Output Capacitance | $V_{CE} = 25V$ | | 100 | | |
| C_{res} | Reverse Transfer Capacitance | $f = 1MHz$ | | 22 | | |
| Q_G | Gate charge | $V_{GE} = 15V, I_C = 100A$ $V_{CE} = 520V$ | | 240 | | nC |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 50A$ $R_G = 2\Omega$ | | 21 | | ns |
| T_r | Rise Time | | | 15 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 180 | | |
| T_f | Fall Time | | | 18 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive Switching (150°C) $V_{GE} = 15V$ $V_{Bus} = 400V$ $I_C = 50A$ $R_G = 2\Omega$ | | 20 | | ns |
| T_r | Rise Time | | | 15 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 205 | | |
| T_f | Fall Time | | | 26 | | |
| E_{on} | Turn on Energy | $V_{GE} = 15V$ $V_{Bus} = 400V$ | | 1.5 | | mJ |
| E_{off} | Turn off Energy | $I_C = 50A$ $R_G = 2\Omega$ | | 0.6 | | |
| R_{Gint} | Integrated gate resistor | | | 2.5 | | Ω |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.6 | $^\circ C/W$ |

Diode ratings and characteristics (per diode)

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|------------|-------------------------------------|--|-----|-------------|-----|---|
| V_{RRM} | Peak Repetitive Reverse Voltage | | | | 650 | V |
| I_{RM} | Reverse Leakage Current | $V_R = 650V$ | | | 100 | μA |
| I_F | DC Forward Current | | | 100 | | A |
| | | | | | | $T_c = 25^\circ C$ |
| V_F | Diode Forward Voltage | $I_F = 100A$ $V_{GE} = 0V$ | | 1.6 1.65 | 2.2 | V |
| | | | | | | $T_j = 25^\circ C$ $T_j = 150^\circ C$ |
| t_{rr} | Reverse Recovery Time | $I_F = 50A$ $V_R = 400V$ $di/dt = 3000A/\mu s$ | | 46 | | ns |
| | | | | 62 | | |
| Q_{rr} | Reverse Recovery Charge | | | 1 2 | | μC |
| | | | | | | $T_j = 25^\circ C$ $T_j = 150^\circ C$ |
| R_{thJC} | Junction to Case Thermal Resistance | | | | 0.7 | $^\circ C/W$ |

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

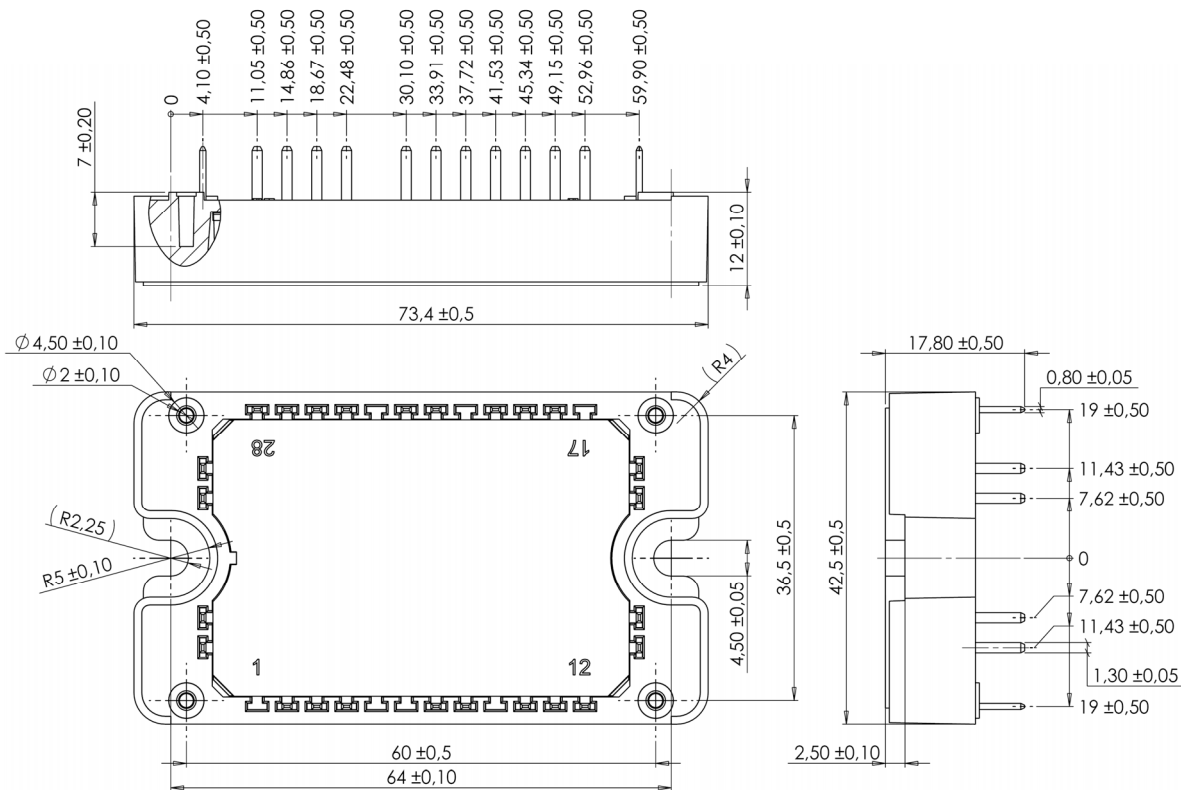
| Symbol | Characteristic | Min | Typ | Max | Unit |
|-----------------------------------|----------------------------|-----|------|-----|------|
| R ₂₅ | Resistance @ 25°C | | 50 | | kΩ |
| ΔR ₂₅ /R ₂₅ | | | 5 | | % |
| B _{25/85} | T ₂₅ = 298.15 K | | 3952 | | K |
| ΔB/B | T _C = 100°C | | 4 | | %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

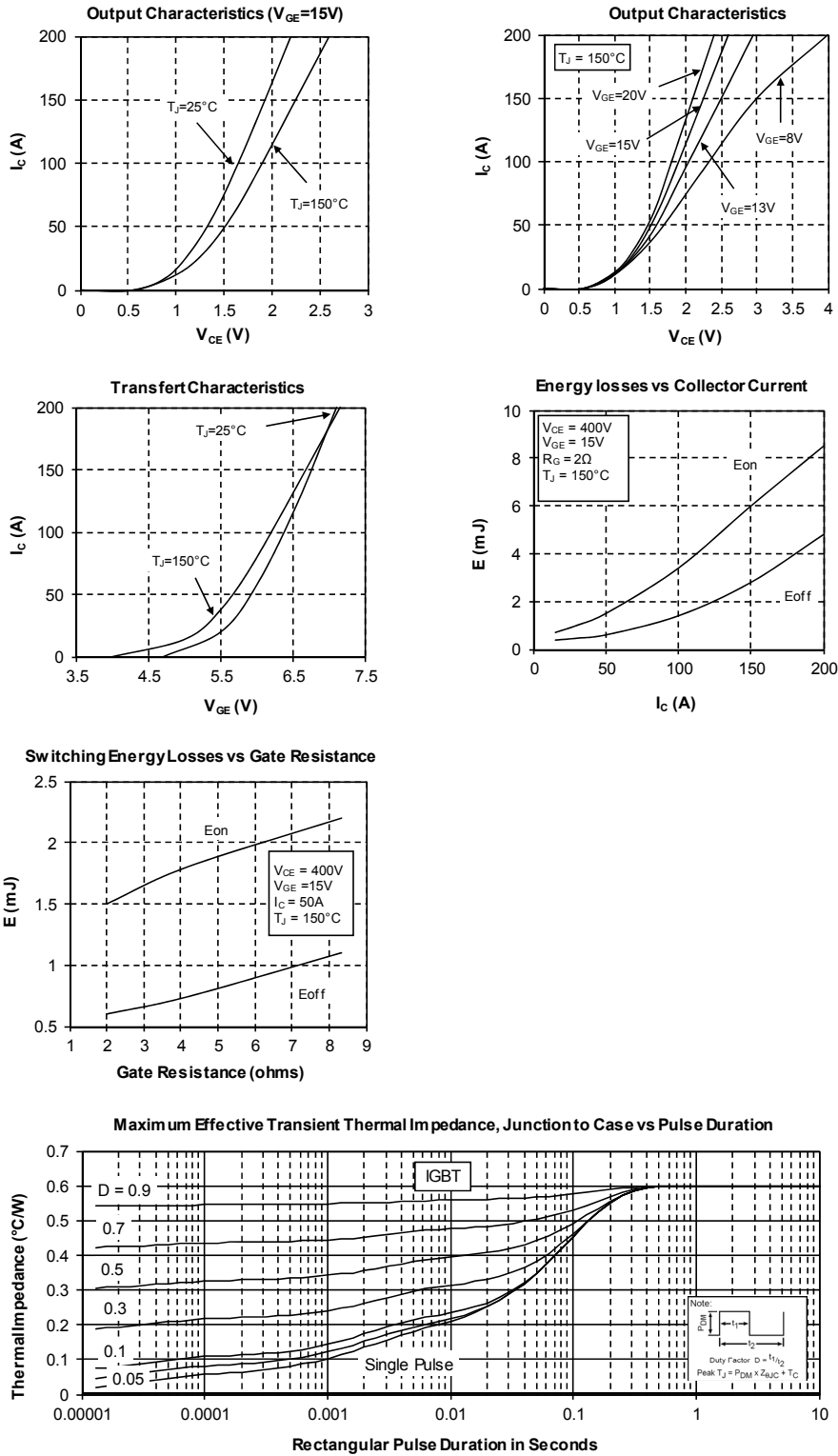
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

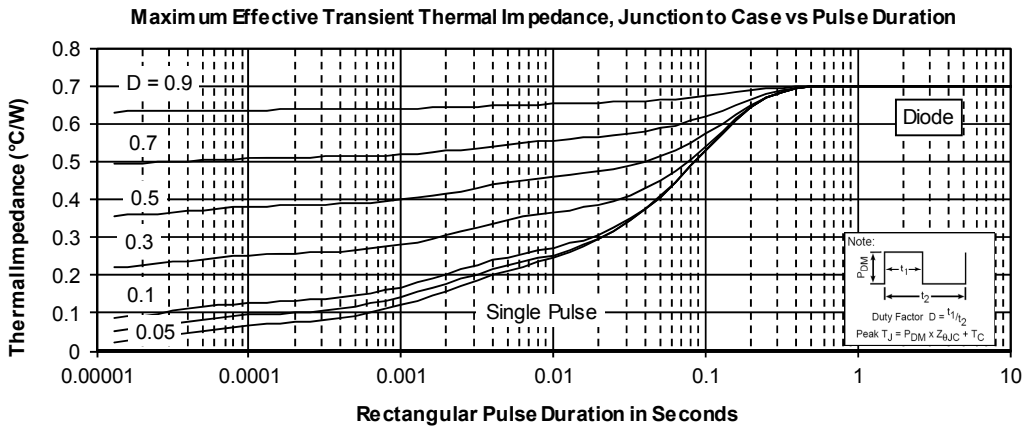
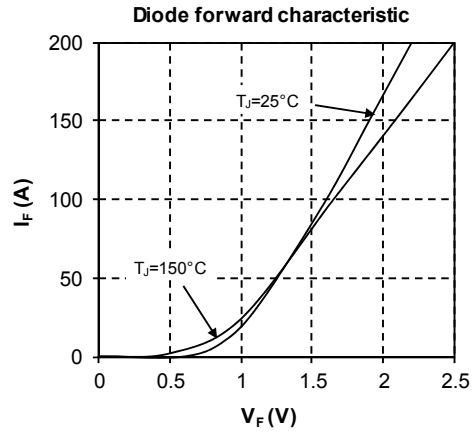
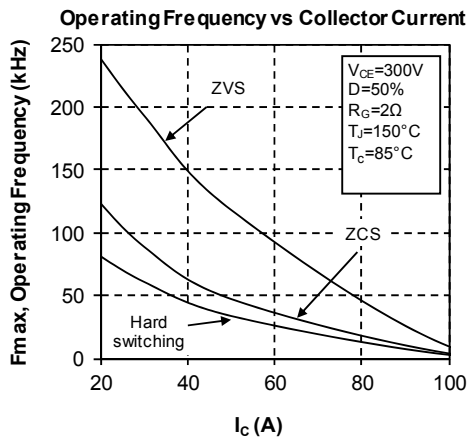
T: Thermistor temperature
 R_T: Thermistor value at T

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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