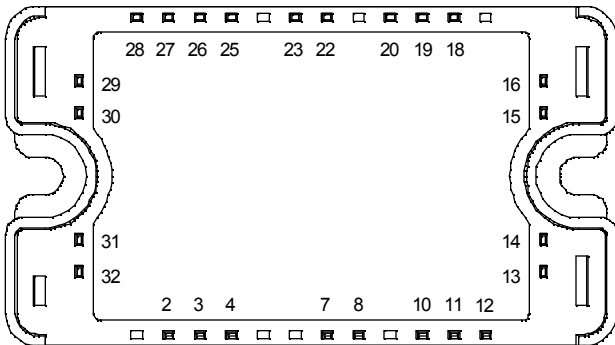
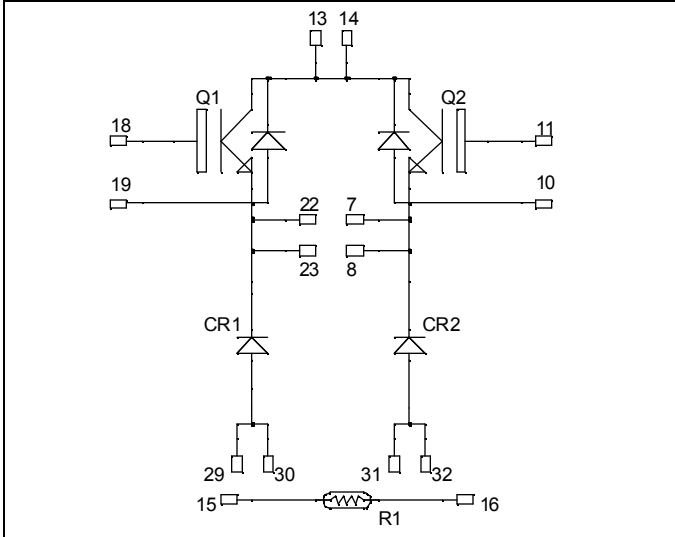


**Dual Buck chopper  
Trench + Field Stop IGBT®  
Power Module**

**V<sub>CES</sub> = 600V**  
**I<sub>C</sub> = 50A @ T<sub>c</sub> = 80°C**



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

### Application

- AC and DC motor control
- Switched Mode Power Supplies

### Features

- Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - Avalanche energy rated
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
- 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<sub>CES</sub>
- Low profile
- Each leg can be easily paralleled to achieve a single buck of twice the current capability.
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V <sub>CES</sub>	Collector - Emitter Breakdown Voltage	600	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 25°C	80
		T <sub>C</sub> = 80°C	50
I <sub>CM</sub>	Pulsed Collector Current	T <sub>C</sub> = 25°C	100
V <sub>GE</sub>	Gate - Emitter Voltage	±20	V
P <sub>D</sub>	Maximum Power Dissipation	T <sub>C</sub> = 25°C	176
RBSOA	Reverse Bias Safe Operating Area	T <sub>J</sub> = 150°C	100A @ 550V

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://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	$V_{GE} = 0\text{V}, V_{CE} = 600\text{V}$			250	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$		1.5 1.7	1.9	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 600\mu\text{A}$	5.0	5.8	6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			600	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$		3150		pF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}$		200		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		95		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ )		110		ns
$T_r$	Rise Time	$V_{GE} = \pm 15\text{V}$		45		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 300\text{V}$		200		
$T_f$	Fall Time	$I_C = 50\text{A}$ $R_G = 8.2\Omega$		40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ )		120		ns
$T_r$	Rise Time	$V_{GE} = \pm 15\text{V}$		50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 300\text{V}$		250		
$T_f$	Fall Time	$I_C = 50\text{A}$ $R_G = 8.2\Omega$		60		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	0.3 0.43		mJ
$E_{off}$	Turn-off Switching Energy	$I_C = 50\text{A}$ $R_G = 8.2\Omega$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1.35 1.75		mJ

## Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$			250 500	$\mu\text{A}$
$I_F$	DC Forward Current			50		A
$V_F$	Diode Forward Voltage	$I_F = 50\text{A}$ $V_{GE} = 0\text{V}$		1.6 1.5	2	V
$t_{rr}$	Reverse Recovery Time			100 150		ns
$Q_{rr}$	Reverse Recovery Charge	$I_F = 50\text{A}$ $V_R = 300\text{V}$ $di/dt = 1800\text{A}/\mu\text{s}$		2.6 5.4		$\mu\text{C}$
$E_r$	Reverse Recovery Energy			0.6 1.2		mJ

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K

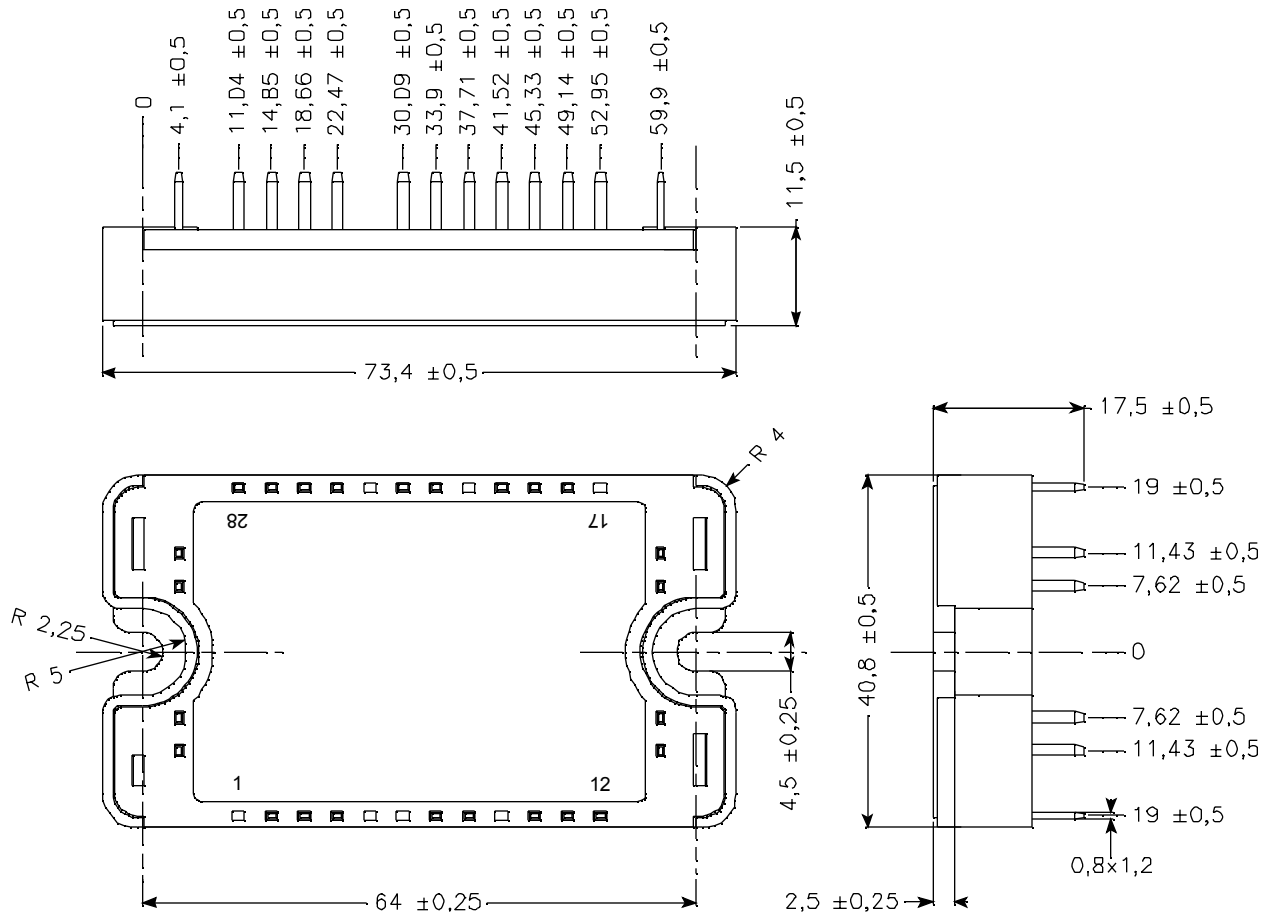
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

## Thermal and package characteristics

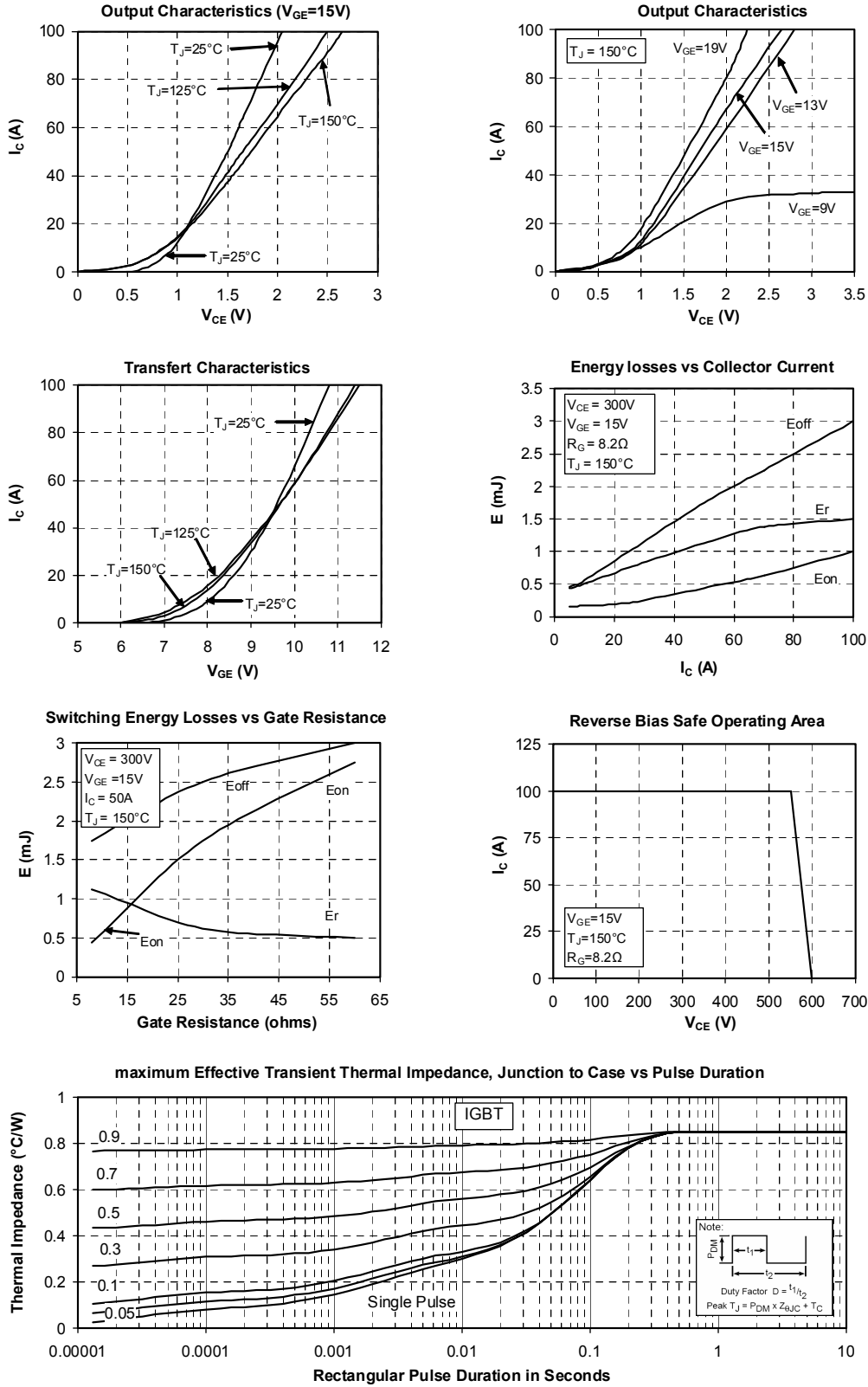
Symbol	Characteristic	Min	Typ	Max	Unit		
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT		0.85	°C/W		
		Diode		1.42			
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz	2500			V		
T <sub>J</sub>	Operating junction temperature range	-40		175	°C		
T <sub>STG</sub>	Storage Temperature Range	-40		125			
T <sub>C</sub>	Operating Case Temperature	-40		100			
Torque	Mounting torque		To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight					110	g

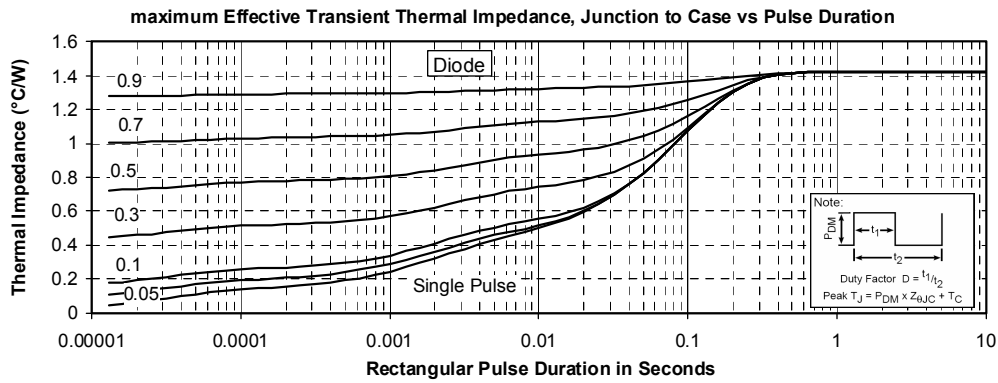
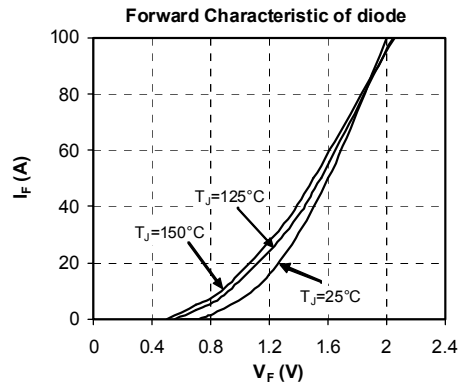
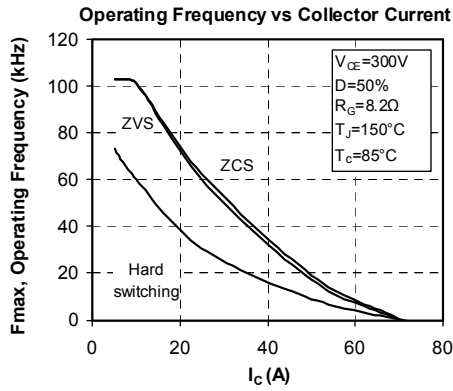
## SP3 Package outline (dimensions in mm)



See application note 1901 - Mounting Instructions for SP3 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve





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