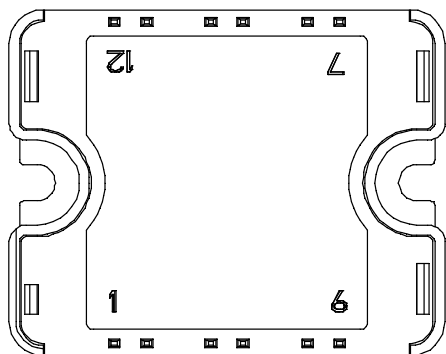
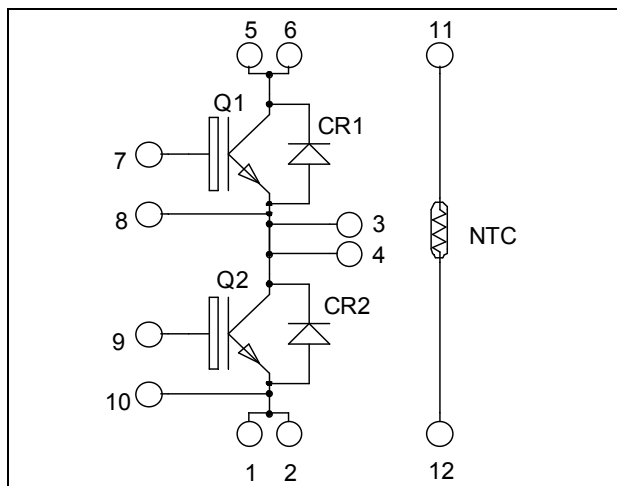


**Phase leg
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 1700V$
 $I_C = 50A @ T_c = 80^\circ C$**



Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Application

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

Features

- Trench + Field Stop IGBT3 Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - RBSOA and SCSOA rated
- Very low stray inductance
 - Symmetrical design
- Internal thermistor for temperature monitoring
- High level of integration

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

Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V _{CES}	Collector - Emitter Breakdown Voltage		1700	V
I _C	Continuous Collector Current	T _C = 25°C	75	A
		T _C = 80°C	50	
I _{CM}	Pulsed Collector Current	T _C = 25°C	100	
V _{GE}	Gate – Emitter Voltage		±20	V
P _D	Maximum Power Dissipation	T _C = 25°C	312	W
RBSOA	Reverse Bias Safe Operating Area	T _j = 125°C	100A @ 1600V	

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	$V_{GE} = 0V, V_{CE} = 1700V$			250	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 50A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	2.0 2.4	2.4	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1mA$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		4400		pF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		180		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		150		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)		370		ns
T_r	Rise Time	$V_{GE} = 15V$ $V_{Bus} = 900V$		40		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 50A$		650		
T_f	Fall Time	$R_G = 10\Omega$		180		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)		400		ns
T_r	Rise Time	$V_{GE} = 15V$ $V_{Bus} = 900V$		50		
$T_{d(off)}$	Turn-off Delay Time	$I_C = 50A$		800		
T_f	Fall Time	$R_G = 10\Omega$		300		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 900V$ $T_j = 125^\circ\text{C}$		16		mJ
E_{off}	Turn-off Switching Energy	$I_C = 50A$ $R_G = 10\Omega$ $T_j = 125^\circ\text{C}$		15		

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1700			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1700V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		250 500	μA
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	50		A
V_F	Diode Forward Voltage	$I_F = 50A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.8 1.9	2.2	V
t_{rr}	Reverse Recovery Time		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	385 490		ns
Q_{rr}	Reverse Recovery Charge	$I_F = 50A$ $V_R = 900V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	14 23		μC
E_r	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	6 12		mJ

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.40	°C/W
		Diode		0.70	
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	N.m
Wt	Package Weight			80	g

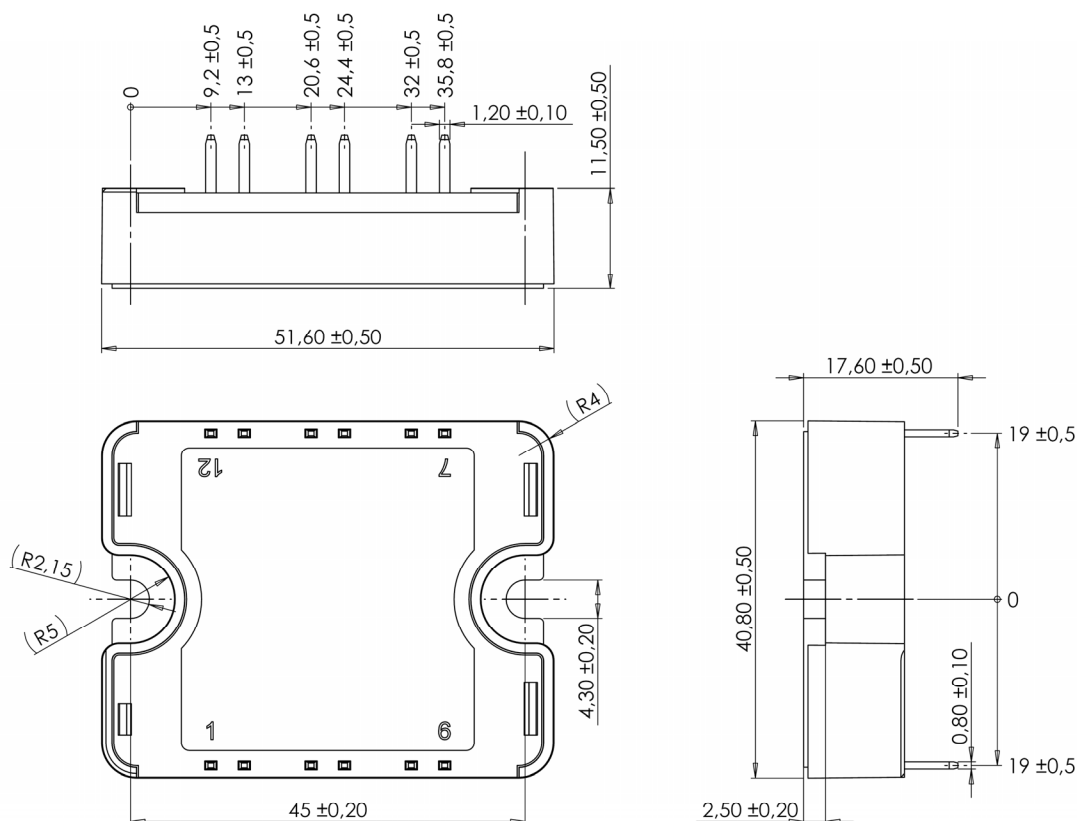
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
B _{25/85}	T ₂₅ = 298.15 K		3952		K

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

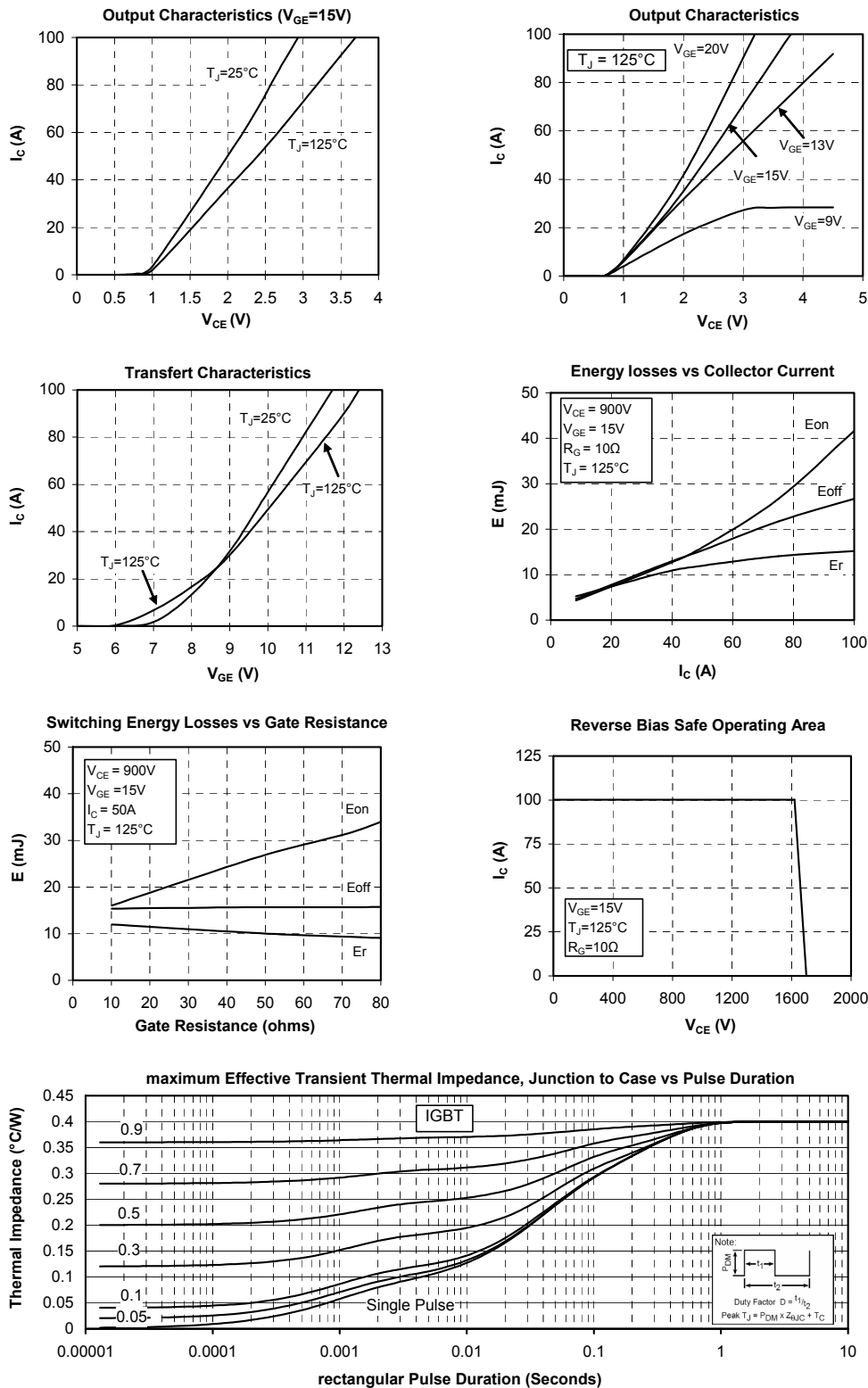
T: Thermistor temperature
 R_T: Thermistor value at T

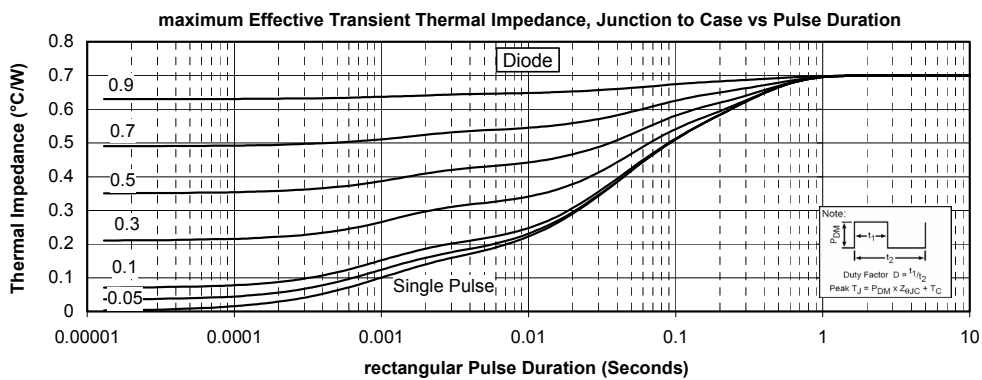
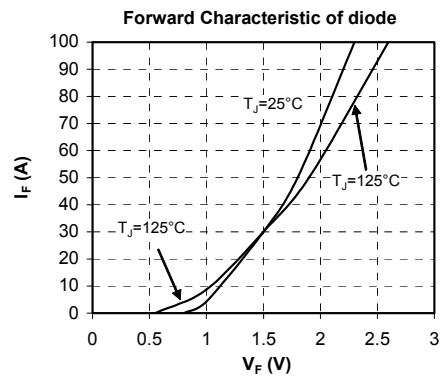
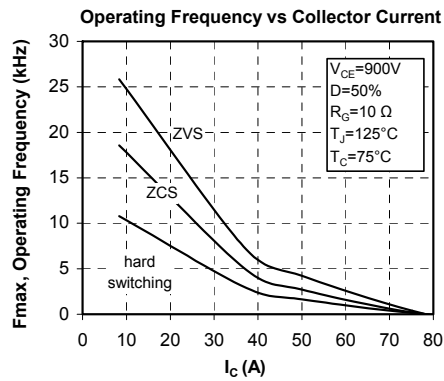
SP1 Package outline (dimensions in mm)



See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical Performance Curve





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