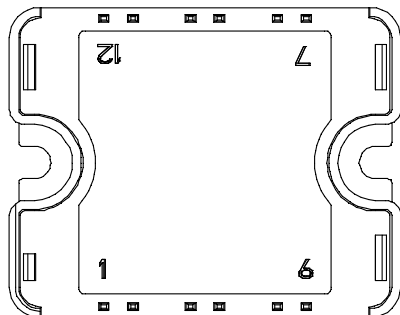
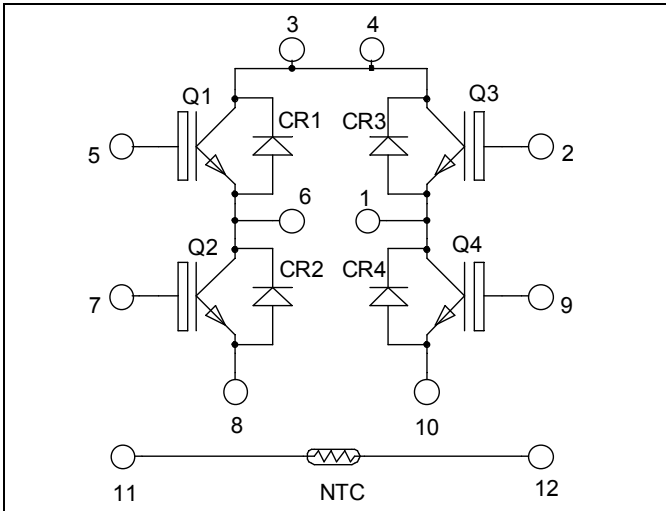


**Full bridge
Trench + Field Stop IGBT4
Power Module**

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



Pins 3/4 must be shorted together

Application

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

Features

- Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Low tail current
 - Soft recovery parallel diodes
 - Low diode VF
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- 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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown 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	Maximum 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. 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	$V_{GE} = 0V, V_{CE} = 1200V$			250	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 35A$		$T_j = 25^\circ\text{C}$ 1.85 $T_j = 150^\circ\text{C}$ 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

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	$V_{GE} = \pm 15V; V_{CE} = 600V$ $I_C = 35A$		0.27		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 35A$ $R_G = 12\Omega$		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) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 35A$ $R_G = 12\Omega$		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	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 35A$ $R_G = 12\Omega$	$T_j = 25^\circ\text{C}$	2.6		mJ
E_{off}	Turn-off Switching Energy		$T_j = 150^\circ\text{C}$	4		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_p \leq 10\mu\text{s}; T_j = 150^\circ\text{C}$		140		A

Reverse diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200V$			$T_j = 25^\circ\text{C}$ 100 $T_j = 150^\circ\text{C}$ 500	μA
I_F	DC Forward Current			30		A
V_F	Diode Forward Voltage	$I_F = 30A$		2.6	3.1	V
		$I_F = 60A$		3.2		
		$I_F = 30A$	$T_j = 125^\circ\text{C}$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 30A$ $V_R = 800V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	300		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 125^\circ\text{C}$	380		
			$T_j = 25^\circ\text{C}$	360		nC
			$T_j = 125^\circ\text{C}$	1700		

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		%

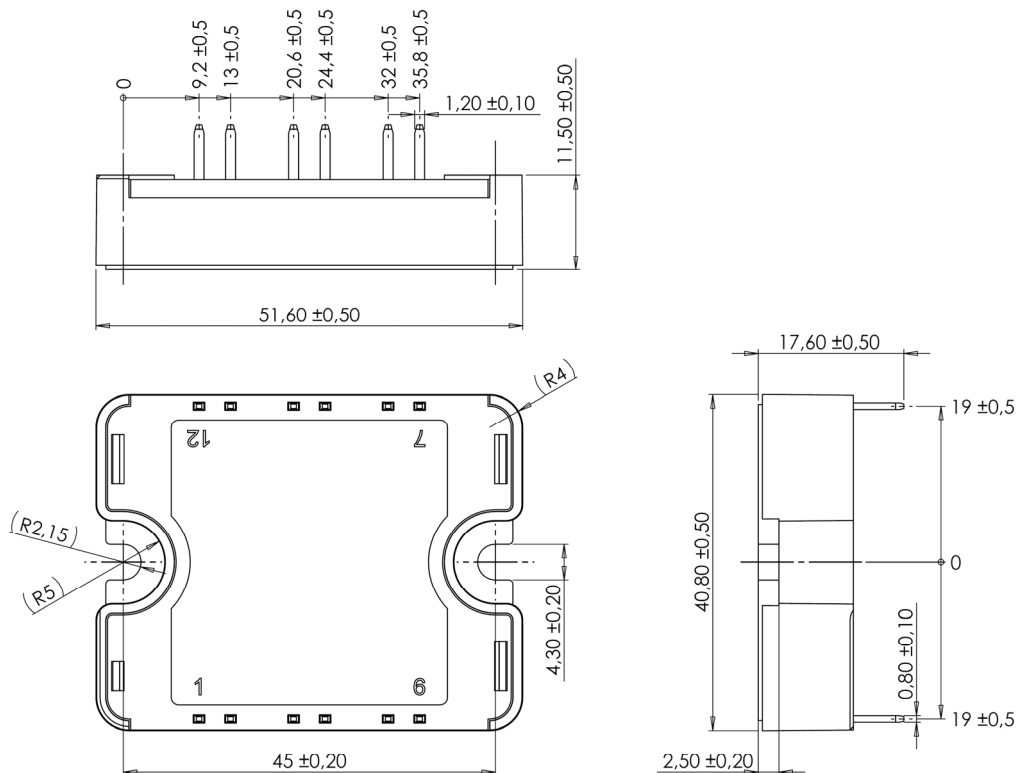
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

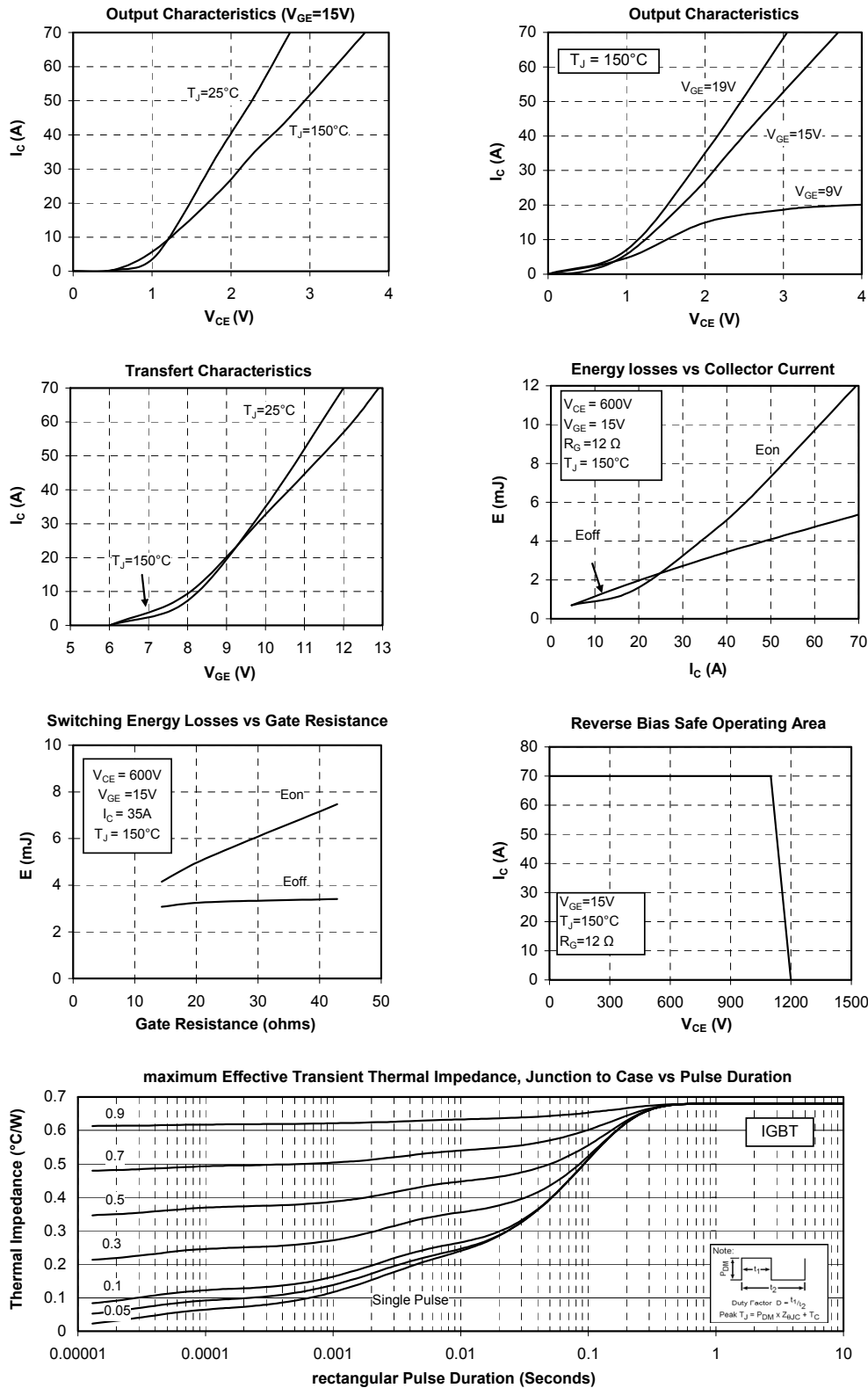
Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.68	°C/W	
		Diode		1.2		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000			V	
T _J	Operating junction temperature range	-40		175	°C	
T _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

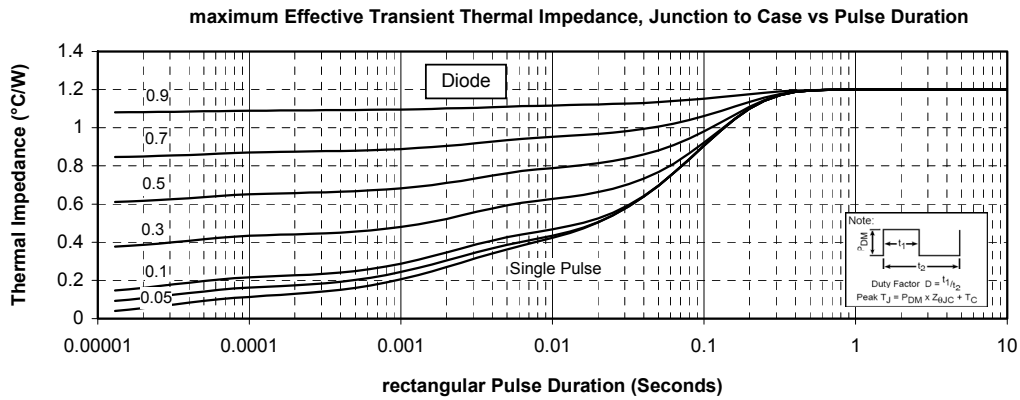
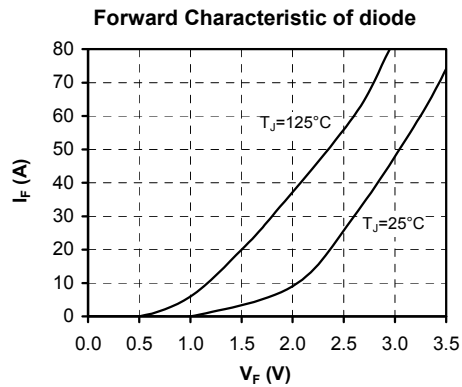
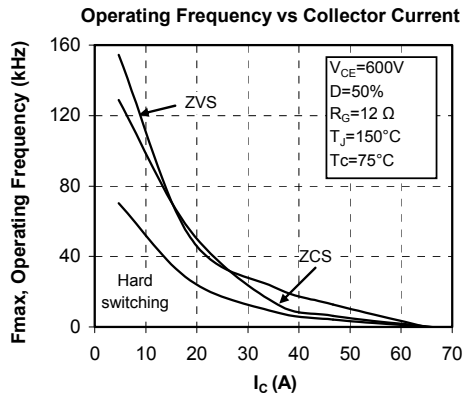
SP1 Package outline (dimensions in mm)



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

Typical Performance Curve





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