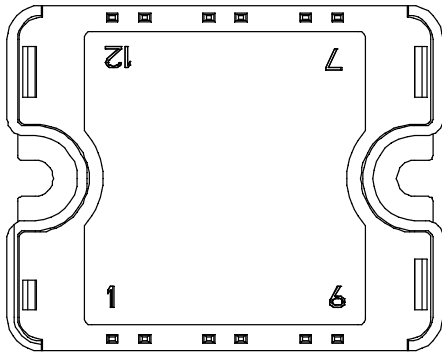
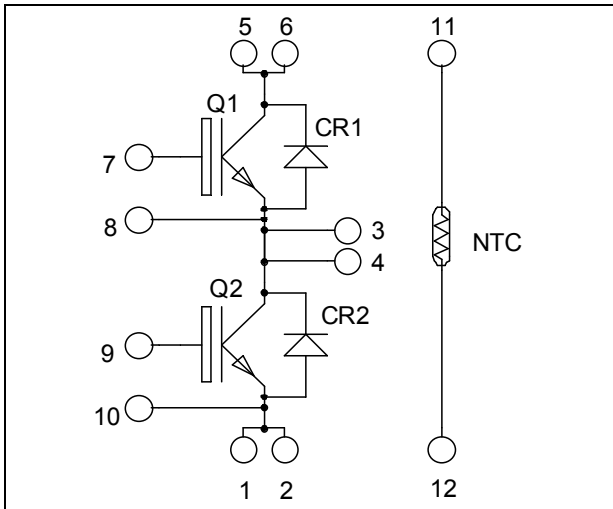


Phase leg NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 15A @ T_c = 80^\circ C$



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

Application

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

Features

- Non Punch Through (NPT) Fast IGBT
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 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	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	25
		$T_c = 80^\circ C$	15
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	60
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	140
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	30A@1150V

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	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$		250	μA	
			$T_j = 125^\circ\text{C}$		500		
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 15\text{A}$	$T_j = 25^\circ\text{C}$	2.5	3.2	3.7	V
			$T_j = 125^\circ\text{C}$		4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$	4		6	V	
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			400	nA	

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		1000		pF
C_{oes}	Output Capacitance			150		
C_{res}	Reverse Transfer Capacitance			70		
Q_g	Total gate Charge	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$		99		nC
Q_{ge}	Gate – Emitter Charge			10		
Q_{gc}	Gate – Collector Charge			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$		60		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			315		
T_f	Fall Time			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$		60		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			356		
T_f	Fall Time			40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 15\text{A}$ $R_G = 33\Omega$	$T_j = 125^\circ\text{C}$	2		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	1		

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	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		100	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current			15		A
V_F	Diode Forward Voltage	$I_F = 15\text{A}$		2.8	3.3	V
		$I_F = 30\text{A}$		3.4		
		$I_F = 15\text{A}$	$T_j = 125^\circ\text{C}$	2.4		
t_{rr}	Reverse Recovery Time	$I_F = 15\text{A}$ $V_R = 800\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	240		ns
			$T_j = 125^\circ\text{C}$	290		
Q_{rr}	Reverse Recovery Charge	$I_F = 15\text{A}$ $V_R = 800\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	260		nC
			$T_j = 125^\circ\text{C}$	960		

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.9	°C/W	
		Diode		2		
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 50/60Hz	2500			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	2.5	4.7	N.m
Wt	Package Weight			80		g

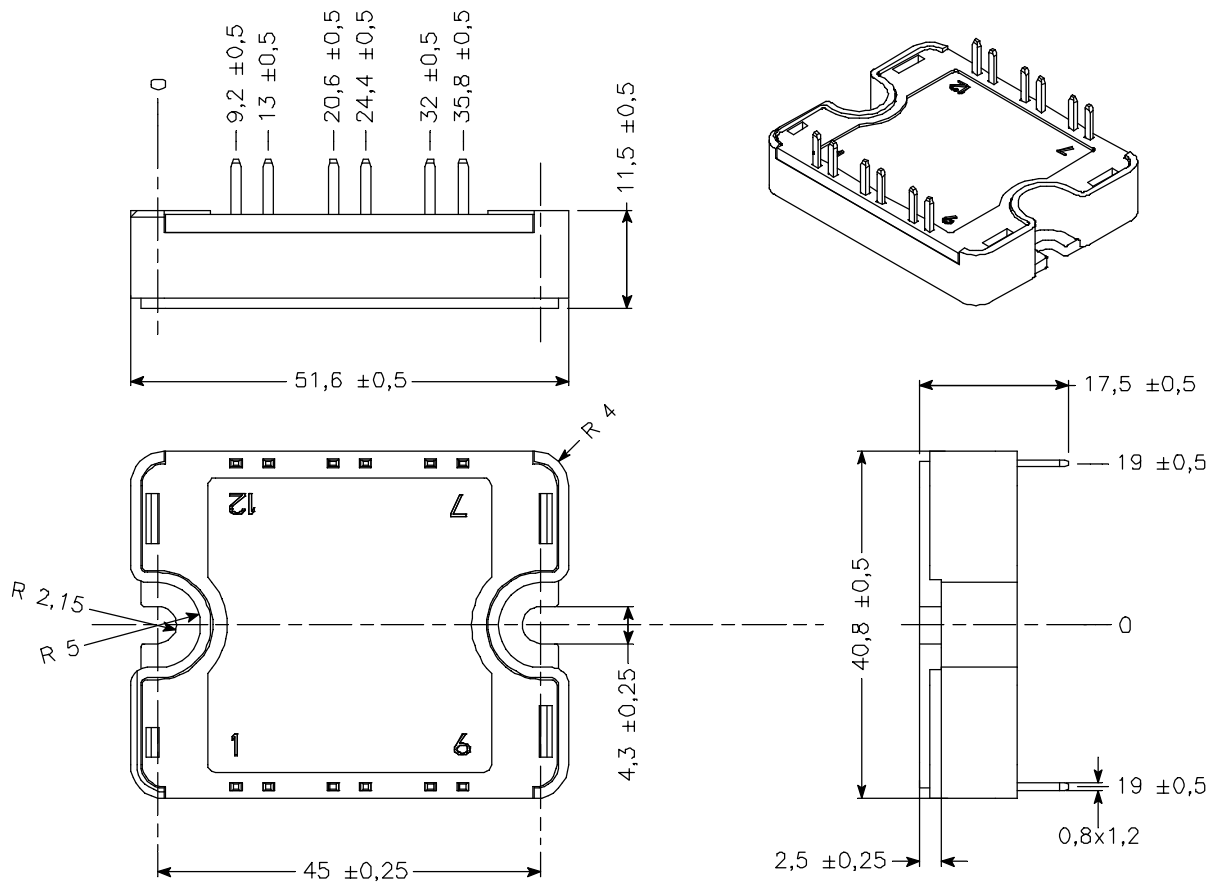
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

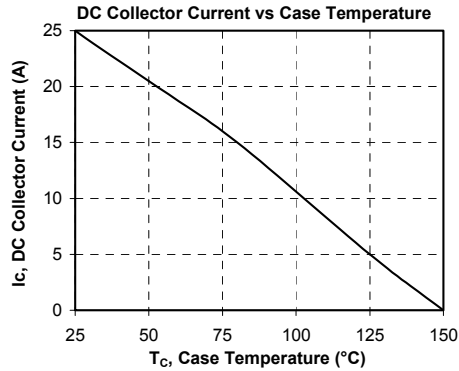
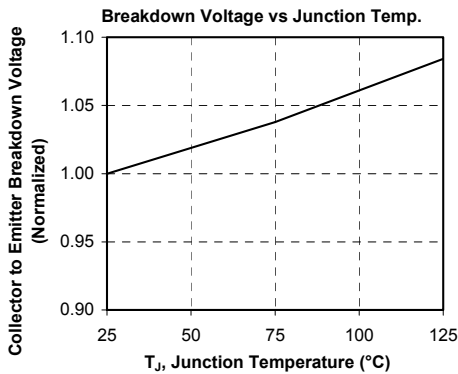
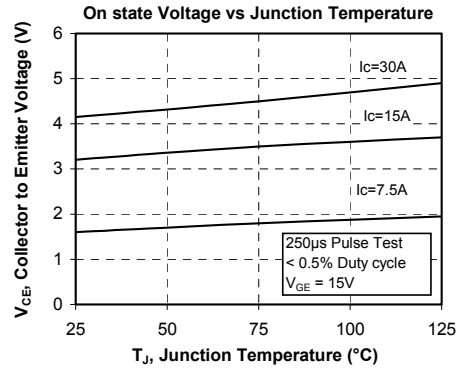
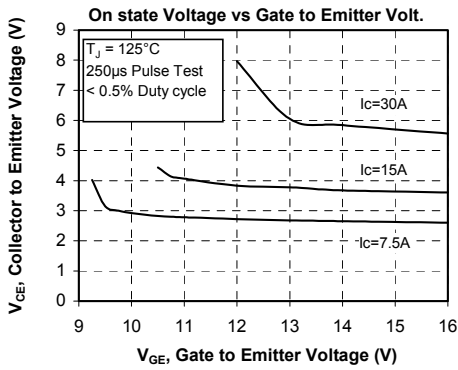
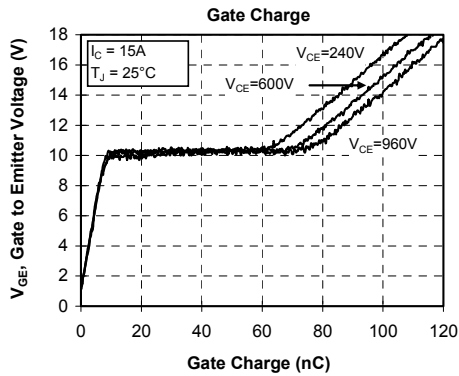
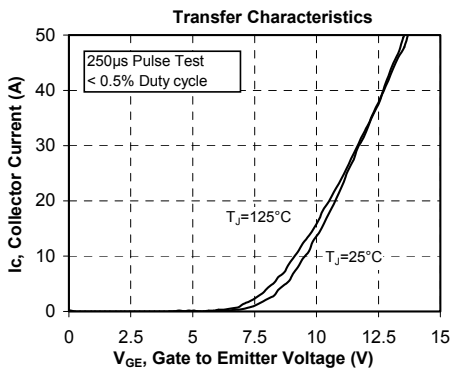
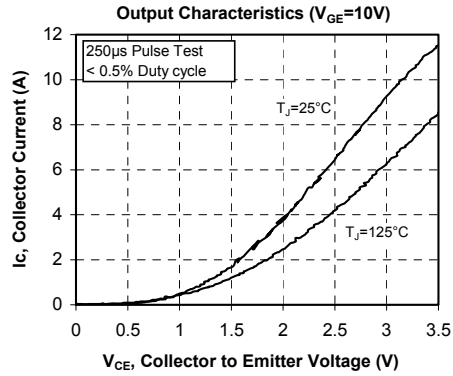
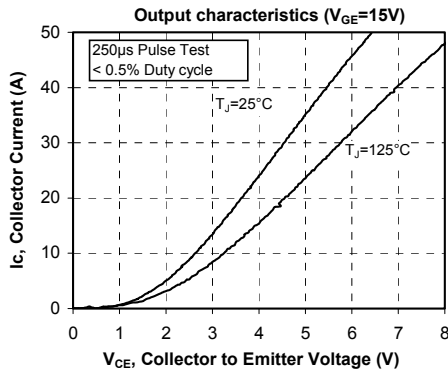
T: Thermistor temperature
 R_T: Thermistor value at T

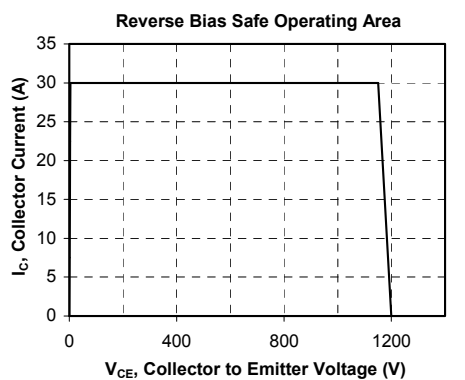
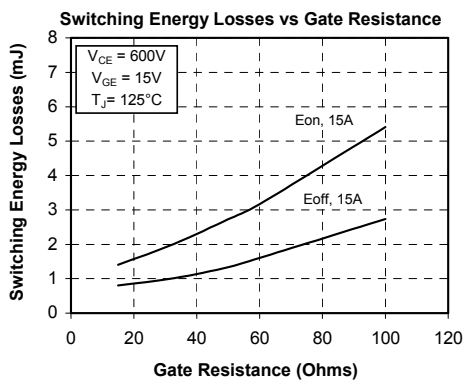
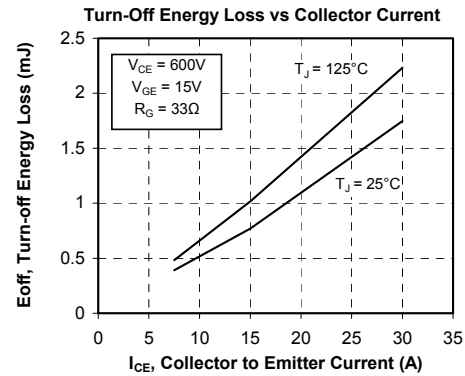
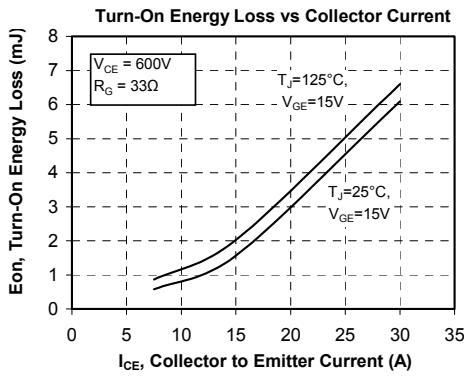
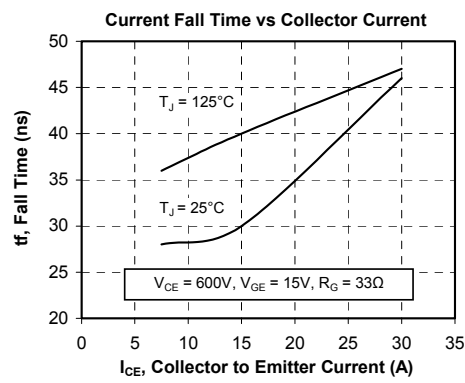
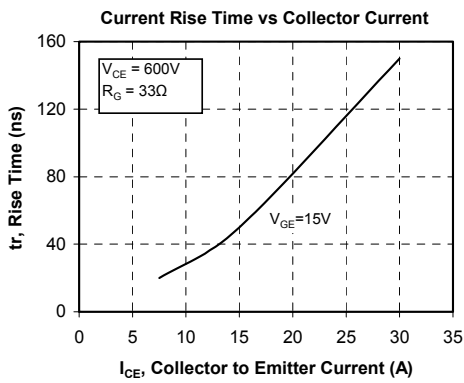
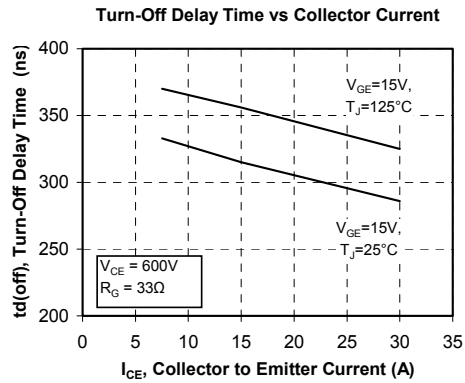
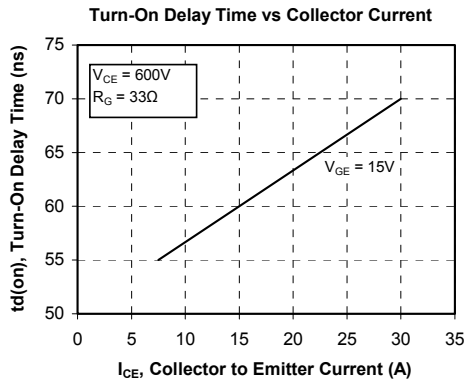
SP1 Package outline (dimensions in mm)

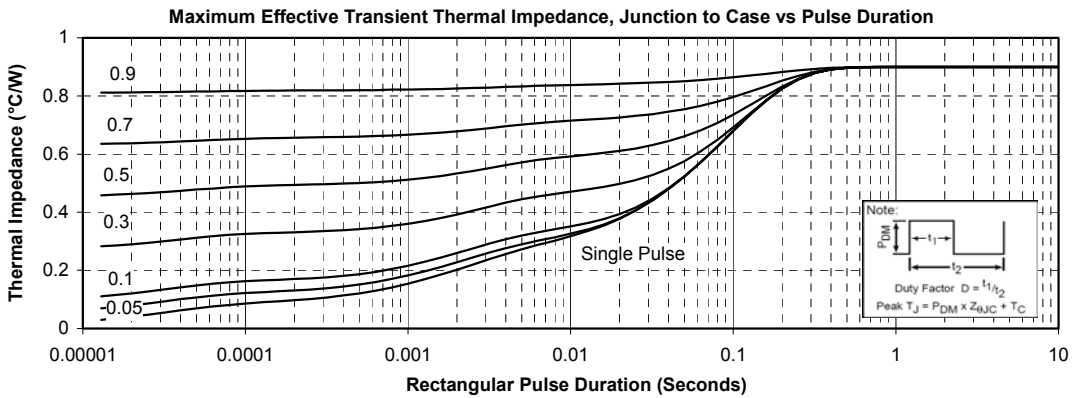
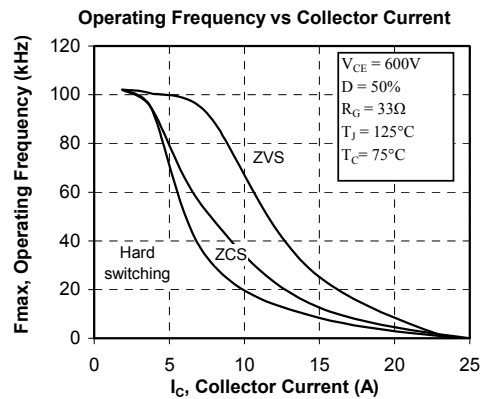
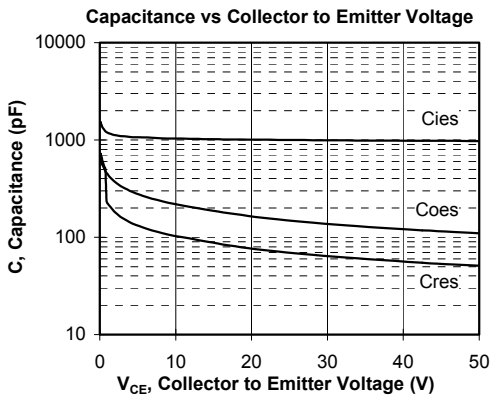


See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical Performance Curve







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