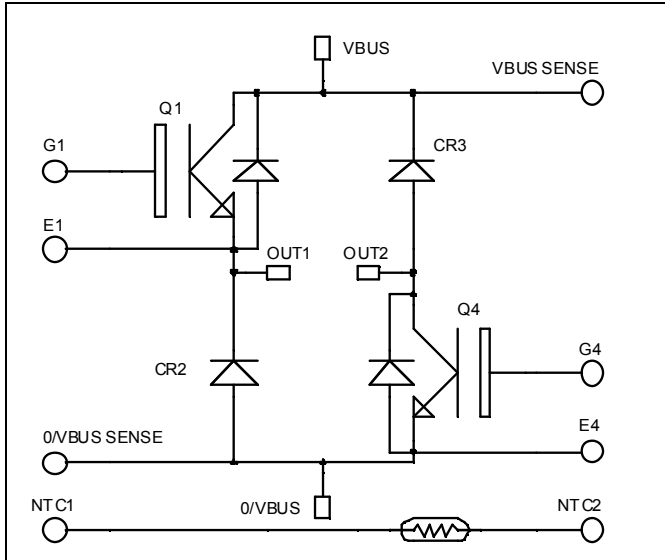


**Asymmetrical - Bridge
Fast Trench + Field Stop IGBT®
Power Module**

**$V_{CES} = 1200V$
 $I_C = 100A @ T_c = 80^\circ C$**

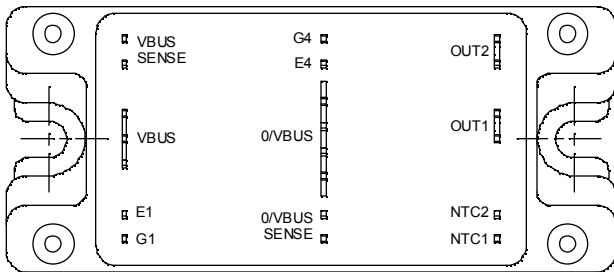


Application

- Welding converters
- Switched Mode Power Supplies
- Switched Reluctance Motor Drives

Features

- Fast 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
 - Lead frames for power connections
- 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 T_C of V_{CESat}
- 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	$T_C = 25^\circ C$	140
		$T_C = 80^\circ C$	100
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	200
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	480
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	200A @ 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	$V_{GE} = 0\text{V}$, $V_{CE} = 1200\text{V}$			250	μA	
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 100\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.4 2.0	2.1	V	
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 2\text{mA}$		5.0	5.8	6.5	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	$V_{GE} = 0\text{V}$		7200		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		400		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		300		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 3.9\Omega$		260		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			420		
T_f	Fall Time			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 3.9\Omega$		290		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			520		
T_f	Fall Time			90		
E_{on}	Turn on Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 600\text{V}$	$T_j = 125^\circ\text{C}$	10		mJ
E_{off}	Turn off Energy	$I_C = 100\text{A}$ $R_G = 3.9\Omega$	$T_j = 125^\circ\text{C}$	10		

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	$V_R = 1200\text{V}$			250 500	μA
I_F	DC Forward Current			100		A
V_F	Diode Forward Voltage	$I_F = 100\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.4 1.3	2.1	V
t_{rr}	Reverse Recovery Time	$I_F = 100\text{A}$ $V_R = 600\text{V}$ $di/dt = 2500\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	150		ns
			$T_j = 125^\circ\text{C}$	250		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	10		μC
			$T_j = 125^\circ\text{C}$	19		
E_r	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	4.5		
		$T_j = 125^\circ\text{C}$	8			

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

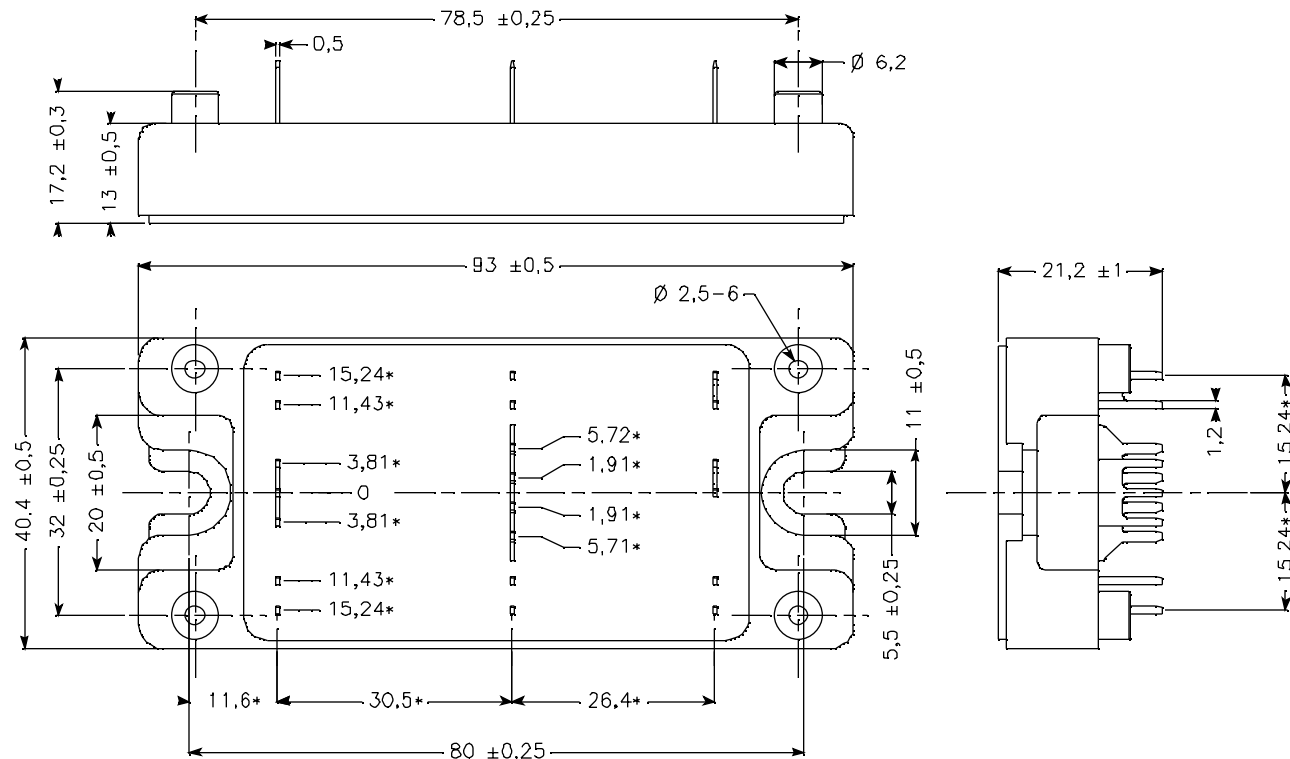
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T} - \frac{1}{T_{25}}\right)\right]}$$

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		0.26	°C/W	
		Diode		0.34		
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	M5	2.5	4.7	N.m
Wt	Package Weight			160		g

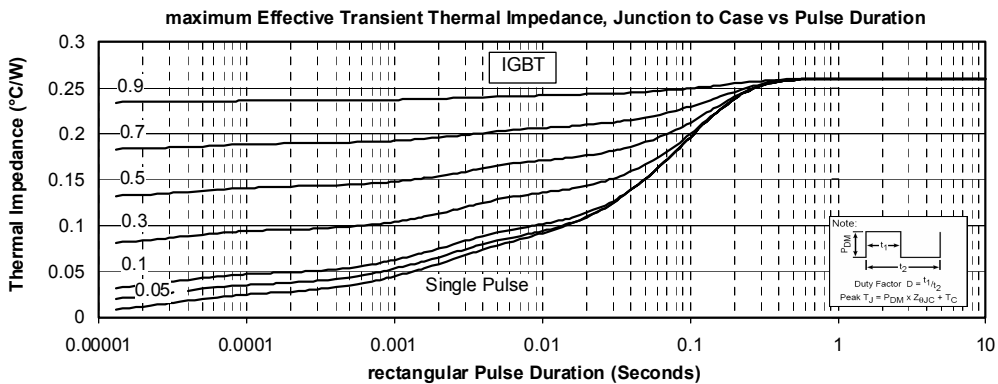
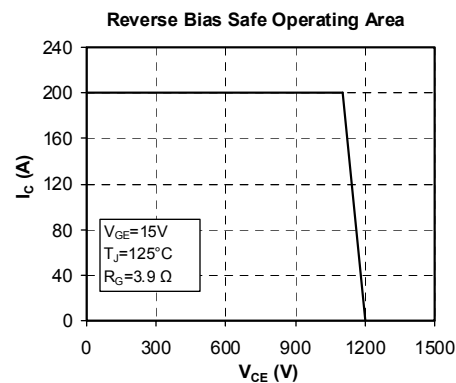
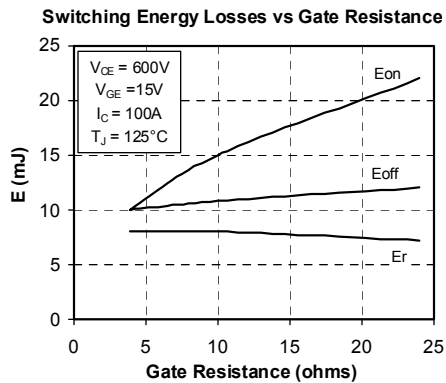
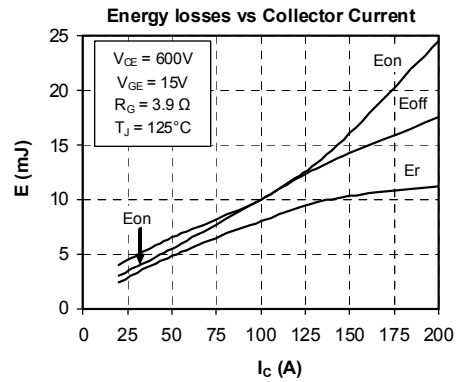
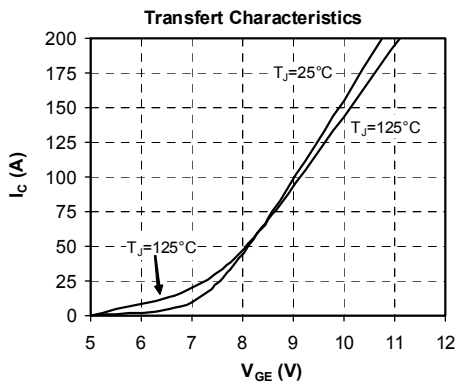
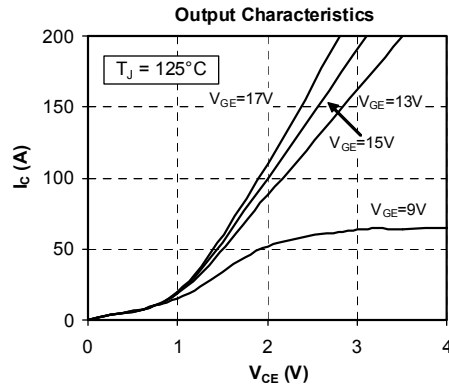
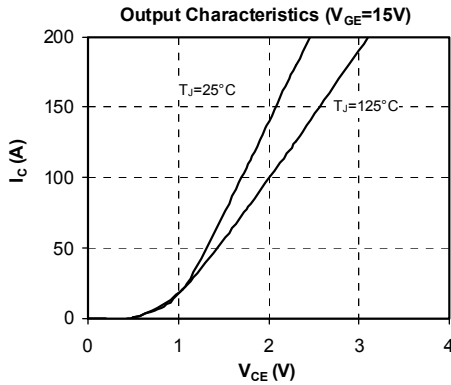
SP4 Package outline (dimensions in mm)

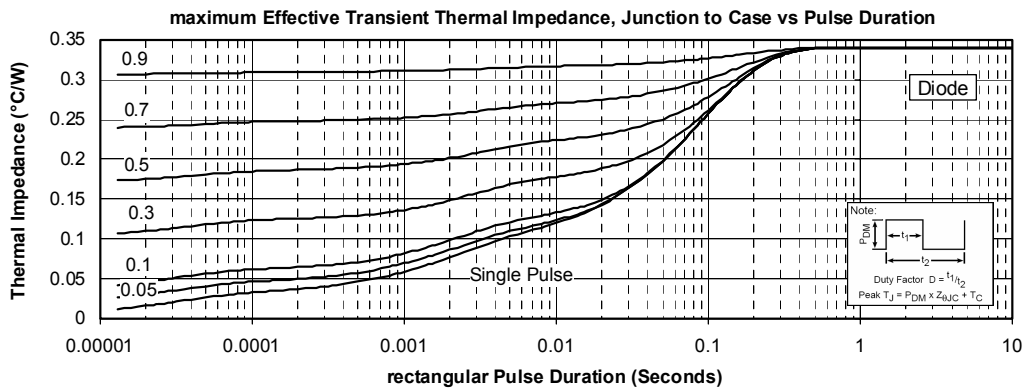
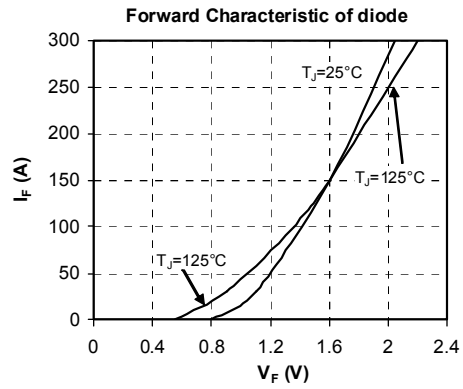
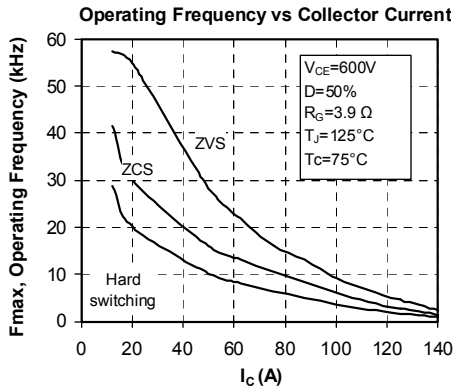


ALL DIMENSIONS MARKED "*" ARE TOLERENCED AS: $\text{⌀} \pm 0.1$

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve





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