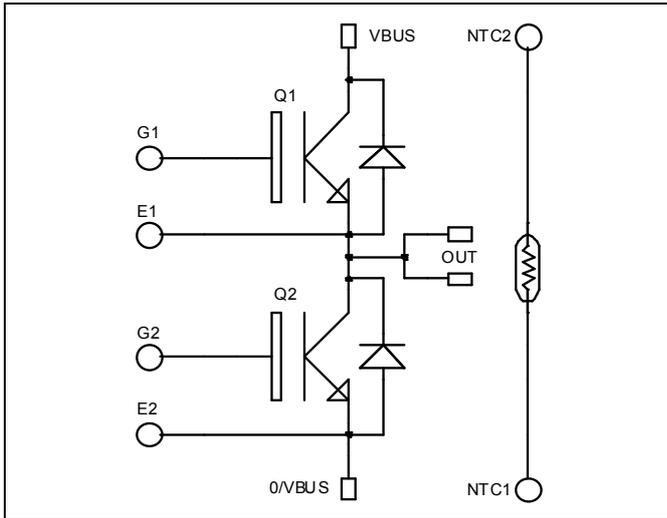


**Phase leg
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 1700V$
 $I_C = 100A @ T_c = 80^\circ C$**

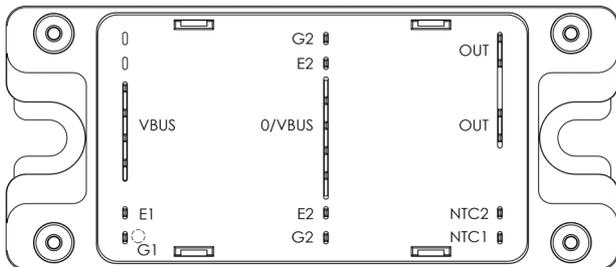


Application

- 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
- 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 TC of VCESat
- 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	$T_c = 25^\circ C$	150
		$T_c = 80^\circ C$	100
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	200
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	560
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	200A @ 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	$V_{GE} = 15V$ $I_C = 100A$		2.0	2.4	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		2.4		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2mA$	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	$V_{GE} = 0V$		9		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		0.36		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		0.3		
$T_{d(on)}$	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	$I_C = 100A$		650		
T_f	Fall Time	$R_G = 4.7 \Omega$		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	$I_C = 100A$		800		
T_f	Fall Time	$R_G = 4.7 \Omega$		300		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15V$ $V_{Bus} = 900V$		32		mJ
E_{off}	Turn-off Switching Energy	$I_C = 100A$ $R_G = 4.7 \Omega$		31		

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	$V_R = 1700V$			250	μA
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			500	
I_F	DC Forward Current			100		A
V_F	Diode Forward Voltage	$I_F = 100A$		1.8	2.2	V
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		1.9		
t_{rr}	Reverse Recovery Time			385		ns
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		490		
Q_{rr}	Reverse Recovery Charge	$I_F = 100A$ $V_R = 900V$ $di/dt = 1000A/\mu\text{s}$		25		μC
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		42		
E_r	Reverse Recovery Energy			11		mJ
		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		21		

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

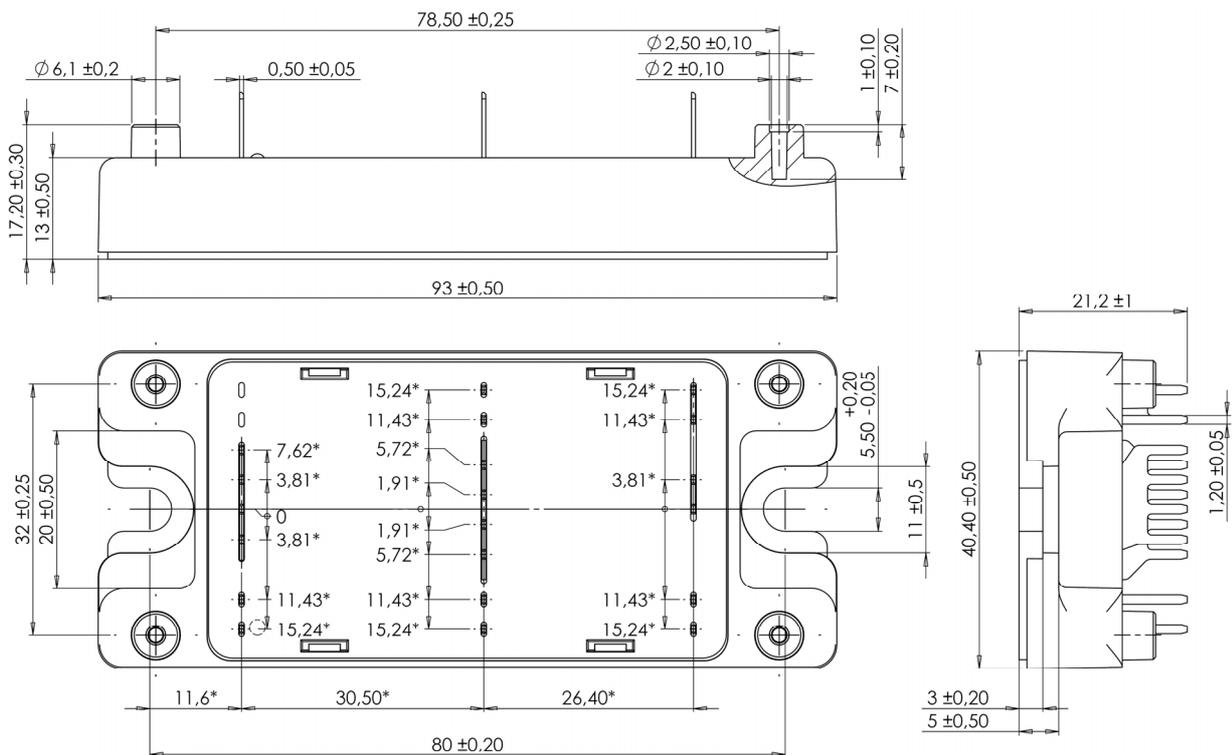
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	IGBT		0.22	°C/W	
		Diode		0.39		
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	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

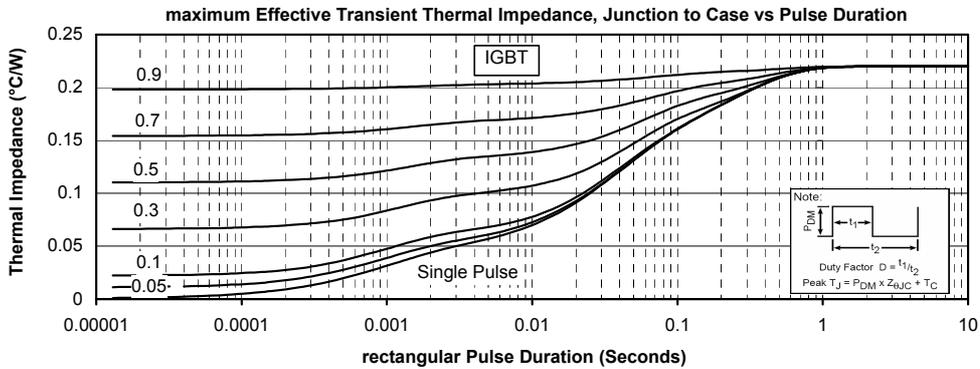
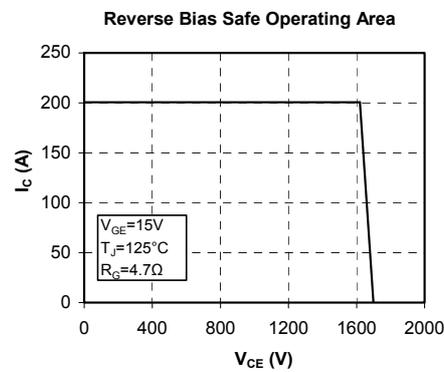
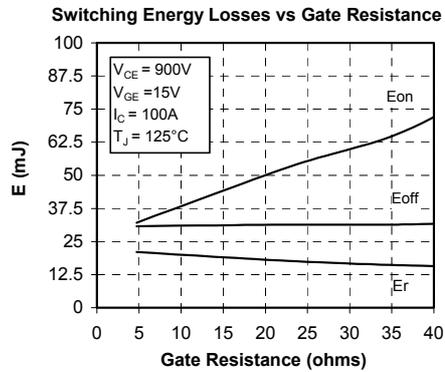
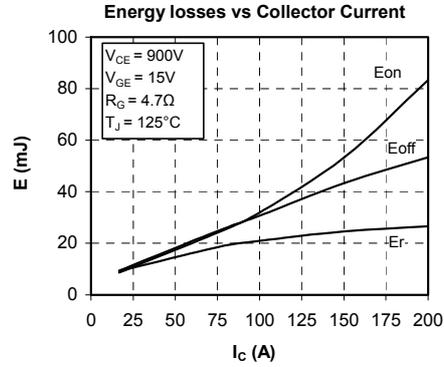
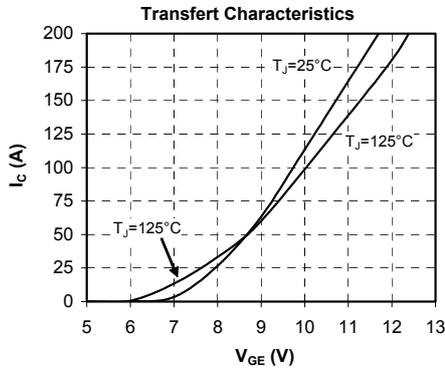
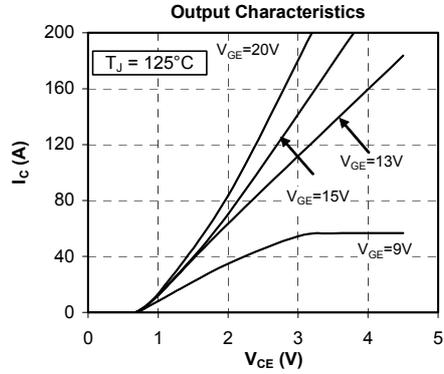
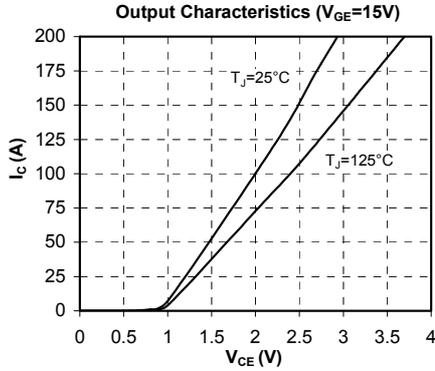
SP4 Package outline (dimensions in mm)

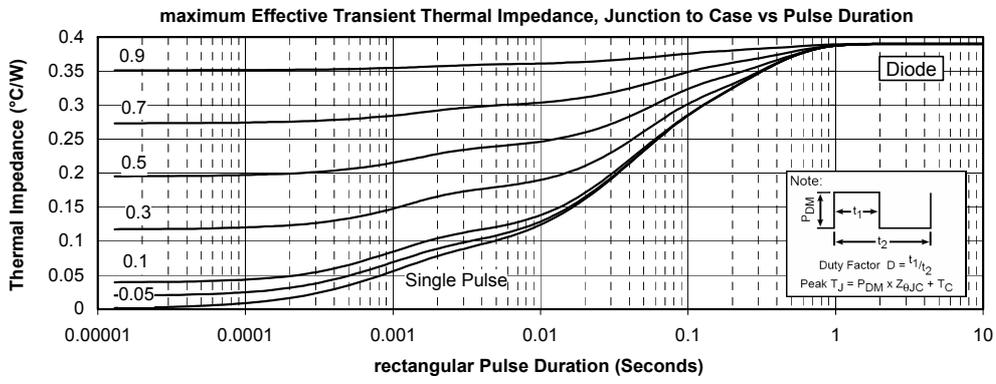
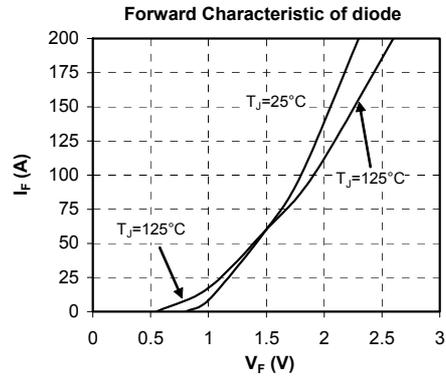
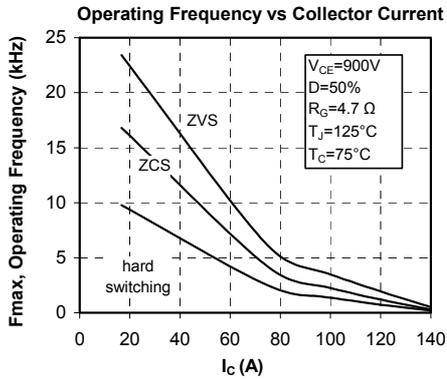


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: $\pm \phi 1$

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

Typical Performance Curve





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