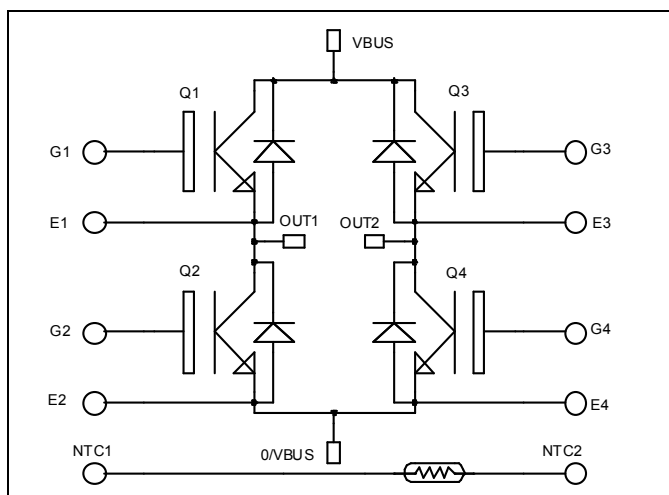


Full - Bridge NPT IGBT Power Module

$V_{CES} = 1200V$
 $I_C = 75A @ T_c = 80^\circ C$



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
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- 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	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	150
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	500
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	150A @ 1200V

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	$V_{GE} = 0V$ $V_{CE} = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		250 500	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 75A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	3.2 3.9	3.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2.5\text{ mA}$	4.5		6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$			± 500	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		5.1		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		0.7		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.4		
Q_G	Gate charge	$V_{GE} = \pm 15V, I_C = 75A$ $V_{CE} = 600V$		0.8		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7.5\Omega$		120		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			310		
T_f	Fall Time			20		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7.5\Omega$		130		ns
T_r	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			360		
T_f	Fall Time			30		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7.5\Omega$	$T_j = 125^\circ\text{C}$	9		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	4		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 900V$ $t_b \leq 10\mu\text{s}; T_j = 125^\circ\text{C}$		450		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	$V_R = 1200V$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		250 500	μA
I_F	DC Forward Current		$T_c = 80^\circ\text{C}$	50		A
V_F	Diode Forward Voltage	$I_F = 50A$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	2.1 1.9		V
t_{rr}	Reverse Recovery Time	$I_F = 50A$ $V_R = 600V$ $di/dt = 1500A/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	95 190		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	4.2 9		
E_r	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	1.5 3		mJ

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		%

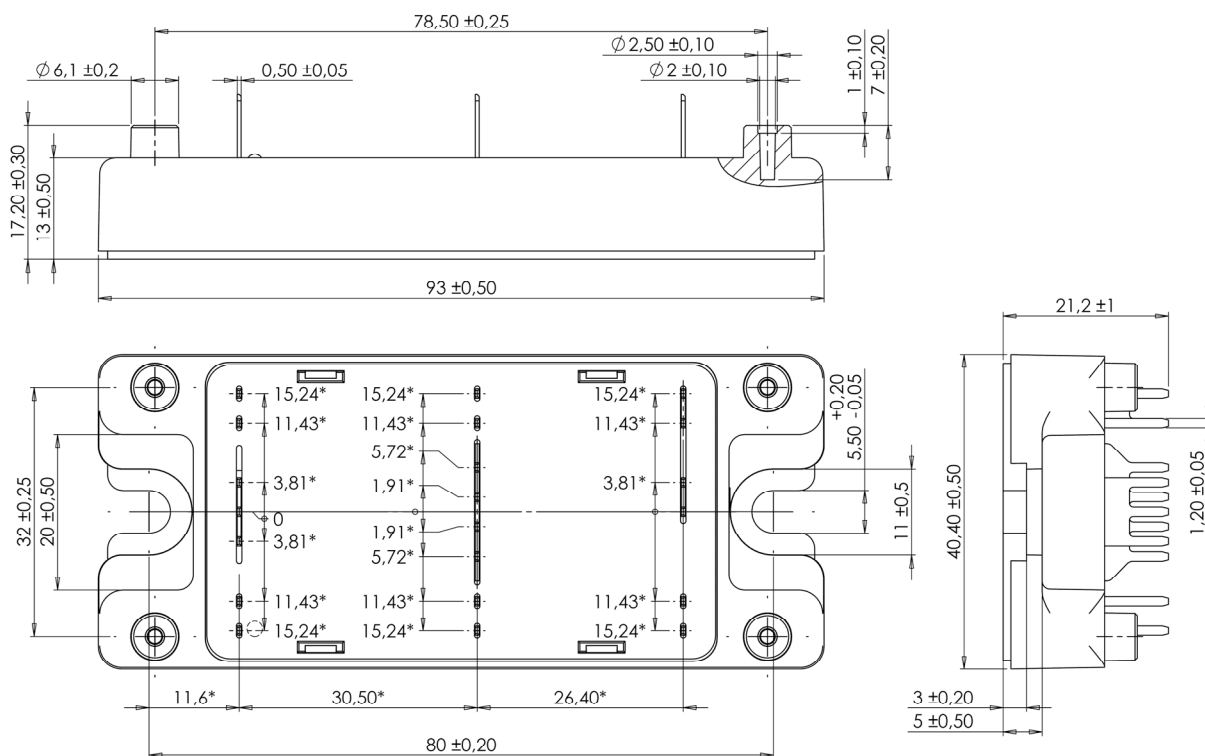
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

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			0.25	°C/W
				Diode			0.6	
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

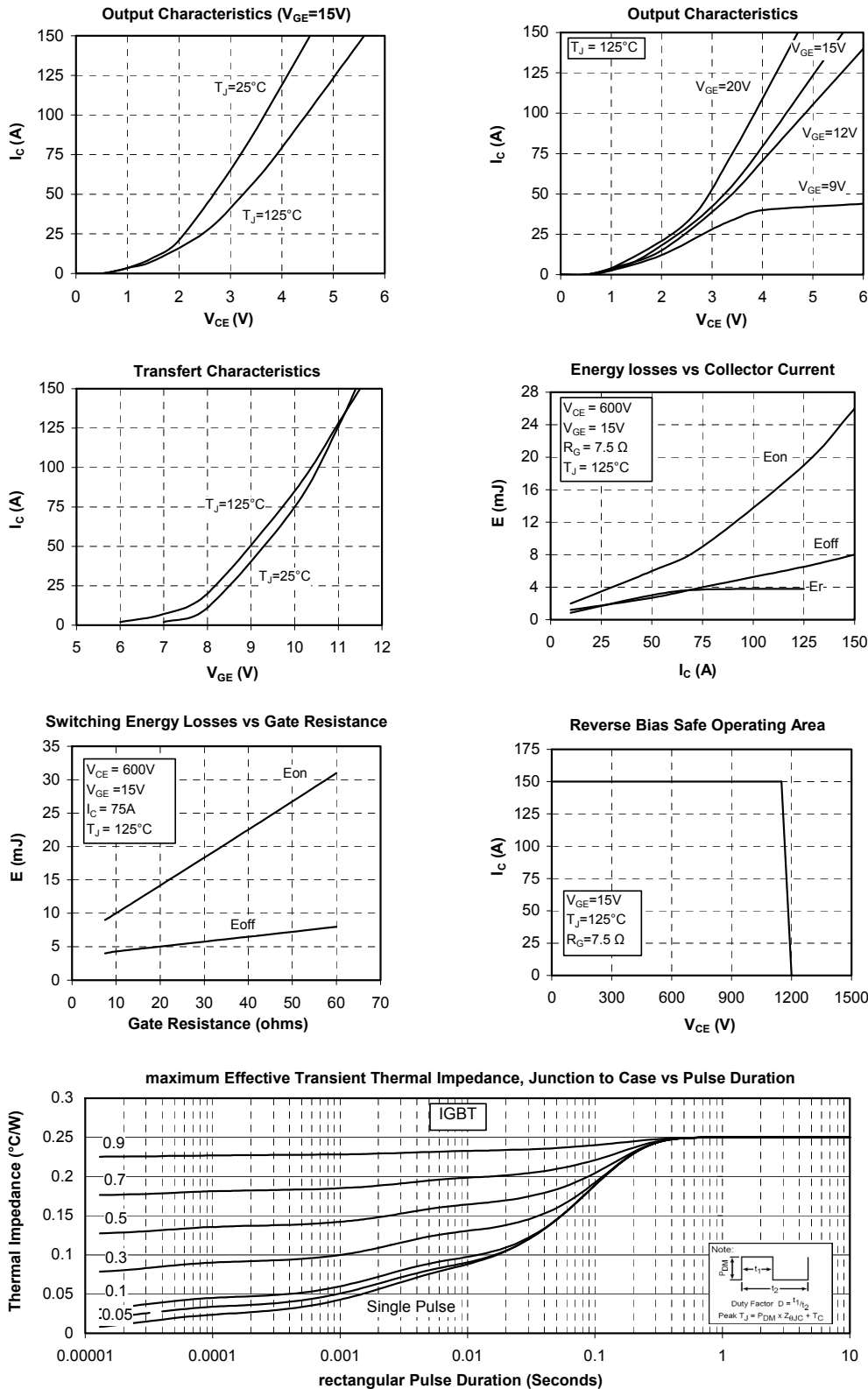
SP4 Package outline (dimensions in mm)

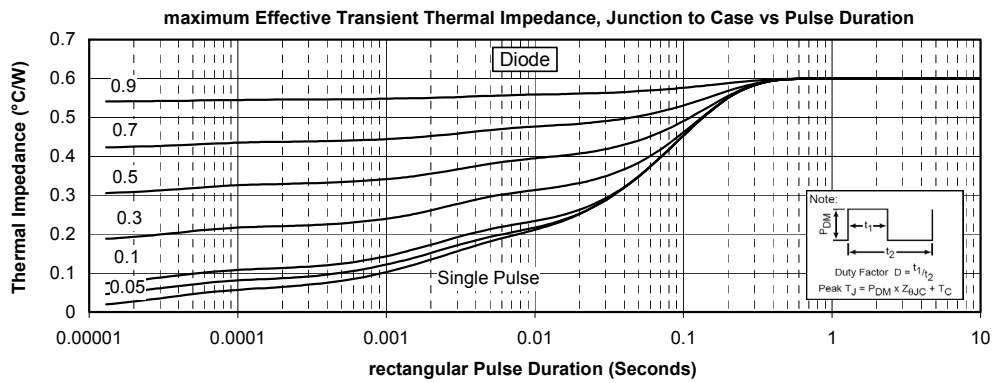
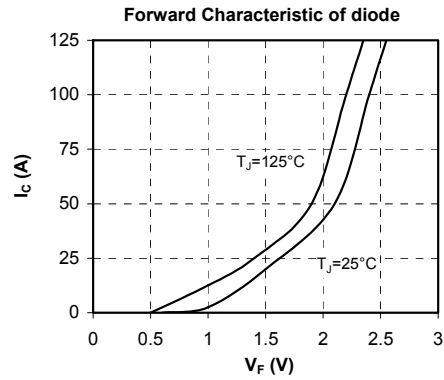
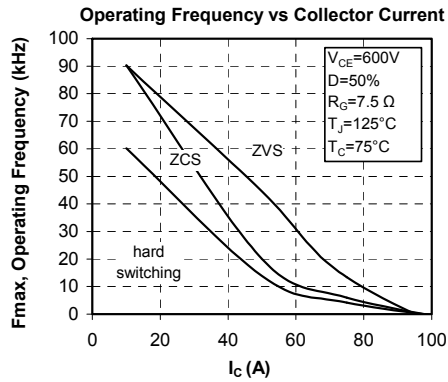


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: $\pm \phi 1$

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

Typical Performance Curve





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