

Dual Buck Chopper NPT IGBT Power Module

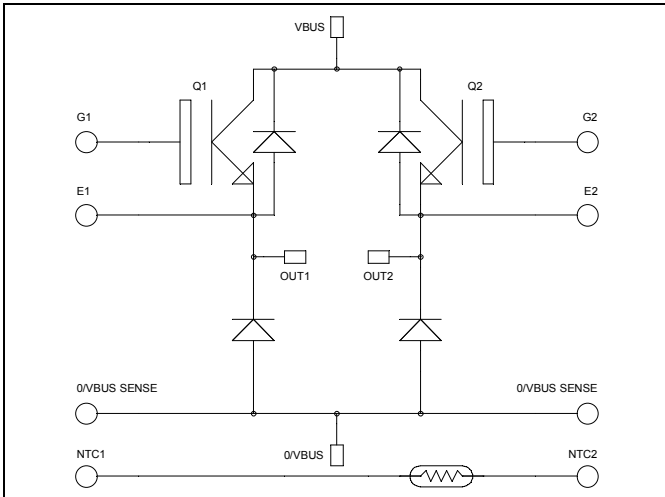
$V_{CES} = 1200V$
 $I_C = 75A @ T_c = 80^\circ C$

Application

- AC and DC motor control
- Switched Mode Power Supplies

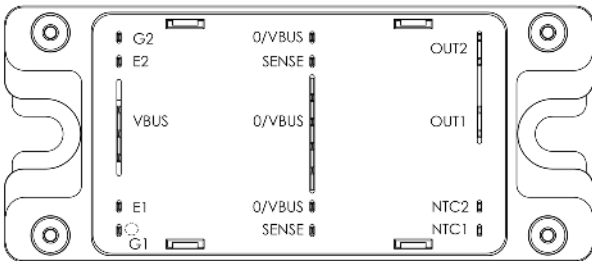
Features

- 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 TC of VCEsat
- 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	$T_c = 25^\circ C$	100
		$T_c = 80^\circ C$	75
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	$V_{GE} = 0V$ $V_{CE} = 1200V$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 75A$	$T_j = 25^\circ\text{C}$	3.2	3.7	V
			$T_j = 125^\circ\text{C}$	3.9		
$V_{GE(th)}$	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	$V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1\text{MHz}$		5.1		nF
C_{oes}	Output Capacitance			0.7		
C_{res}	Reverse Transfer Capacitance			0.4		
$T_{d(on)}$	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	$V_{GE} = 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 7.5\Omega$	$T_j = 125^\circ\text{C}$	9		mJ
E_{off}	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	4		

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	$V_R = 1200V$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		500	
I_F	DC Forward Current			100		A
V_F	Diode Forward Voltage	$I_F = 100A$		2.0	2.5	V
		$I_F = 200A$		2.3		
		$I_F = 100A$	$T_j = 125^\circ\text{C}$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 100A$ $V_R = 800V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	420		ns
			$T_j = 125^\circ\text{C}$	580		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	1.2		μC
			$T_j = 125^\circ\text{C}$	5.3		

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

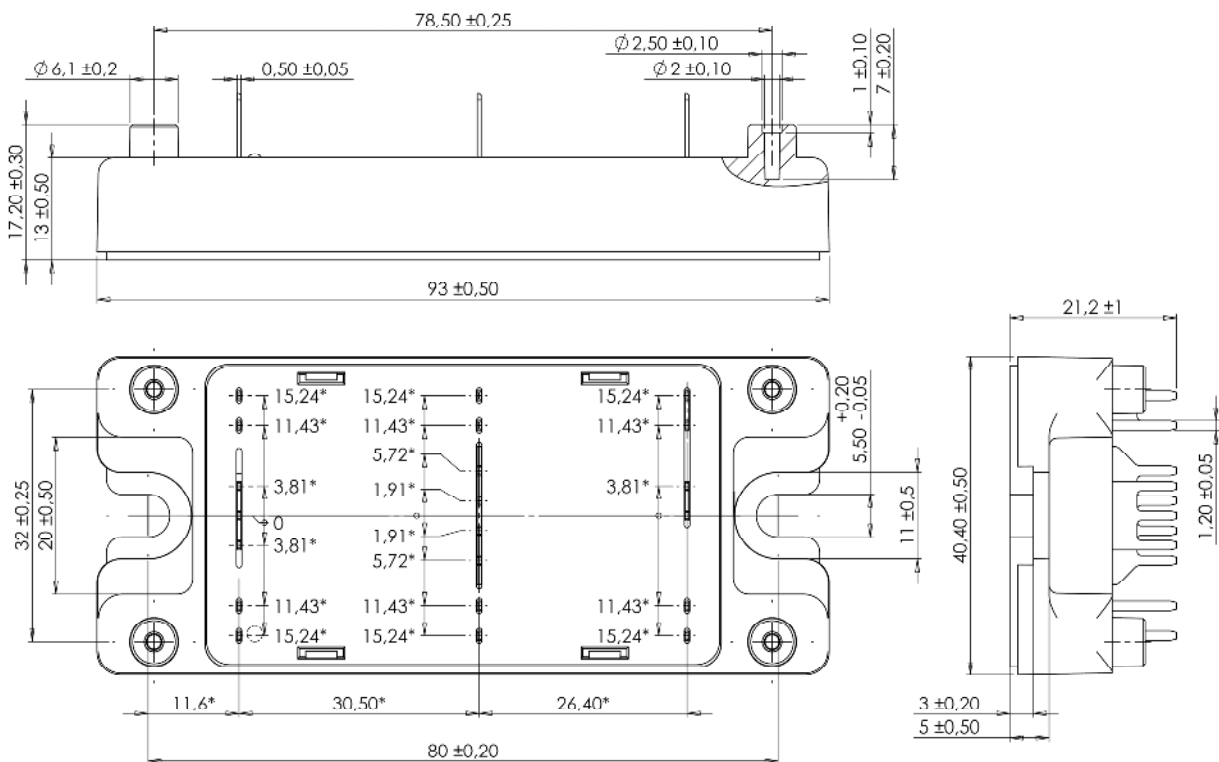
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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		0.25	°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

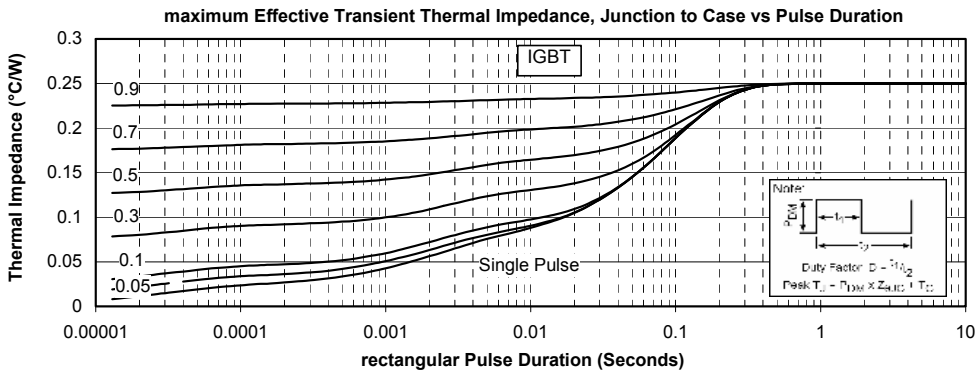
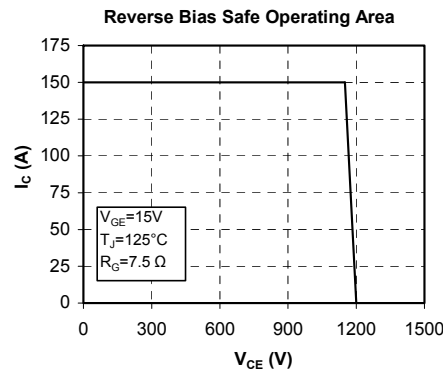
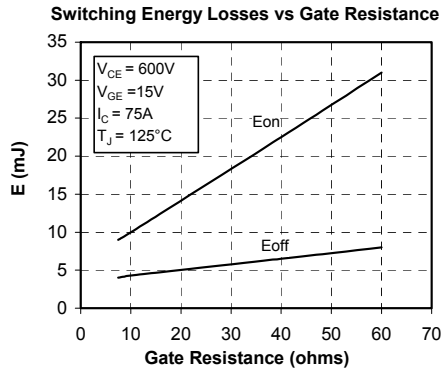
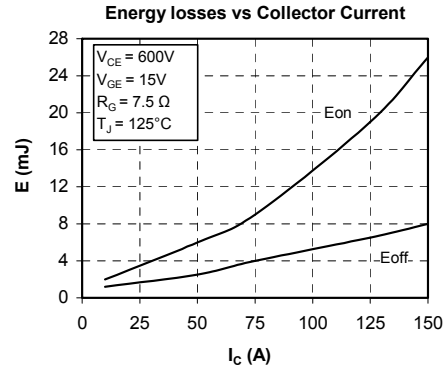
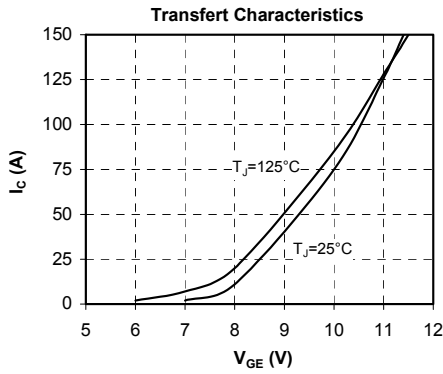
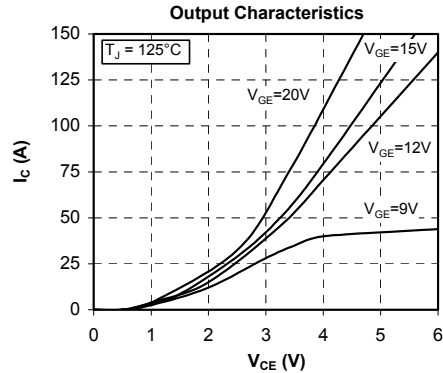
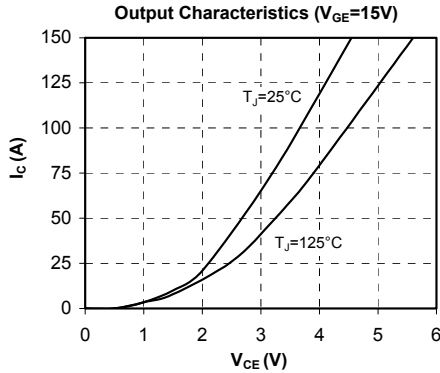
SP4 Package outline (dimensions in mm)

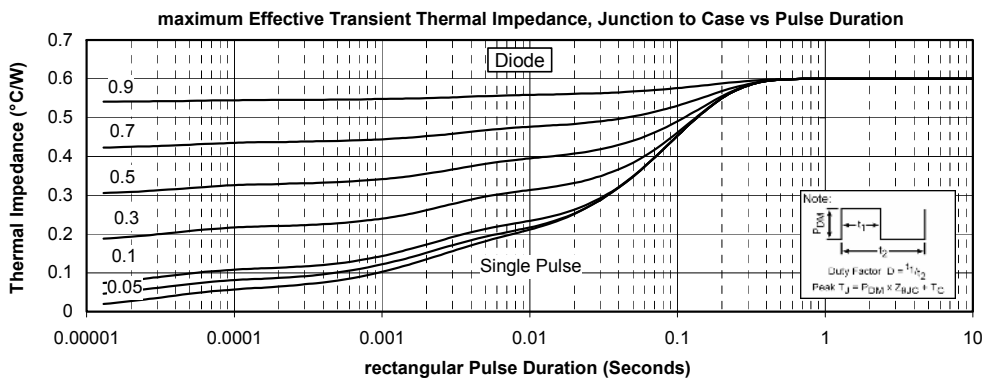
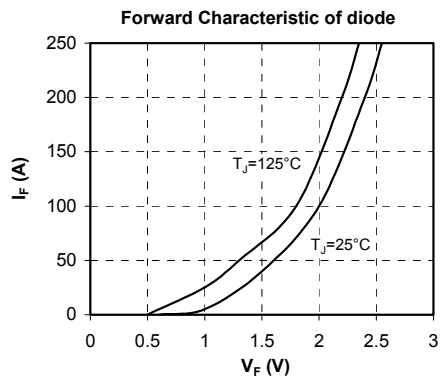
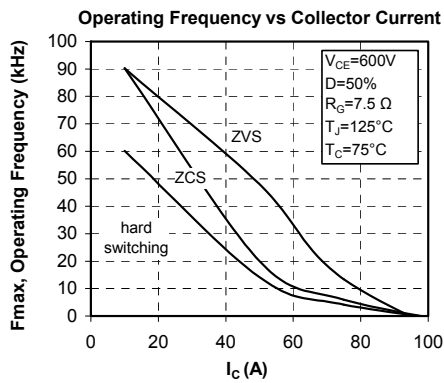


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS $\pm \phi 1$

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

Typical Performance Curve





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