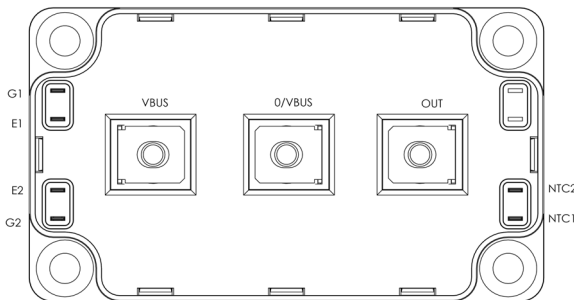
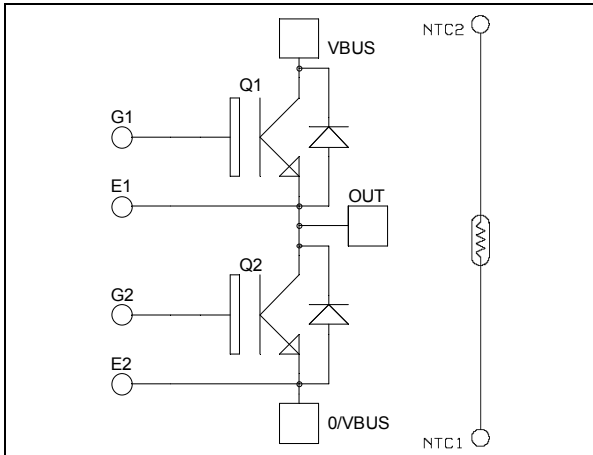


Phase leg
High speed Trench + Field Stop IGBT4
Power module

$V_{CES} = 650V$
 $I_C = 600A^* @ T_c = 60^\circ C$


Application

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

Features

- High speed Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Soft recovery parallel diodes
 - Low diode VF
 - RBSOA and SCSOA rated
- Kelvin source for easy drive
- Very low stray inductance
- M5 power connectors
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS Compliant

All ratings @ $T_j = 25^\circ C$ unless otherwise specified

Absolute maximum ratings (per IGBT)

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Voltage	650	V
I_C	Continuous Collector Current	$T_C = 25^\circ C$	770*
		$T_C = 60^\circ C$	600*
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	1500
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ C$	2000
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	1200A @ 600V

* Specification of device but current must be limited due to size of power connectors.

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

Electrical Characteristics (per IGBT)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 650V$			600	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15V$ $I_C = 600A$		1.85 2.2	2.3	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 3.2 mA$	4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			1	μA

Dynamic Characteristics (per IGBT)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C_{ies}	Input Capacitance	$V_{GE} = 0V$		36.6		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		1.3		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		1.08		
Q_G	Gate charge	$V_{GE} = 15V ; V_{CE} = 480V$ $I_C = 600A$		3500		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{CE} = 400V$ $I_C = 600A$ $R_G = 0.6\Omega$		19		ns
T_r	Rise Time			33		
$T_{d(off)}$	Turn-off Delay Time			197		
T_f	Fall Time			21		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{CE} = 400V$ $I_C = 600A$ $R_G = 0.6\Omega$		19		ns
T_r	Rise Time			29		
$T_{d(off)}$	Turn-off Delay Time			227		
T_f	Fall Time			22		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{CE} = 400V$ $I_C = 600A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	12 14.7		mJ
E_{off}	Turn-off Switching Energy	$R_G = 0.6\Omega$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	11.2 12		mJ
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 600V$ $t_p \leq 10\mu s ; T_j = 150^\circ C$		3900		A
R_{thJC}	Junction to Case Thermal Resistance				0.075	$^\circ C/W$

Diode ratings and characteristics (per diode)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V_{RRM}	Repetitive Reverse Voltage				650	V
I_{RM}	Reverse Leakage Current	$V_R = 650V$			300	μA
I_F	DC Forward Current			600		A
V_F	Diode Forward Voltage	$I_F = 600A$ $V_{GE} = 0V$	$T_j = 25^\circ C$	1.6	2	V
			$T_j = 150^\circ C$	1.5		
t_{rr}	Reverse Recovery Time	$I_F = 600A$ $V_R = 400V$ $di/dt = 7000A/\mu s$	$T_j = 25^\circ C$	125		ns
			$T_j = 150^\circ C$	220		
Q_{rr}	Reverse Recovery Charge	$I_F = 600A$ $V_R = 400V$ $di/dt = 7000A/\mu s$	$T_j = 25^\circ C$	28.1		μC
			$T_j = 150^\circ C$	59.3		
E_r	Reverse Recovery Energy	$I_F = 600A$ $V_R = 400V$ $di/dt = 7000A/\mu s$	$T_j = 25^\circ C$	6.6		mJ
			$T_j = 150^\circ C$	14.4		
R_{thJC}	Junction to Case Thermal Resistance				0.13	$^\circ C/W$

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

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		%

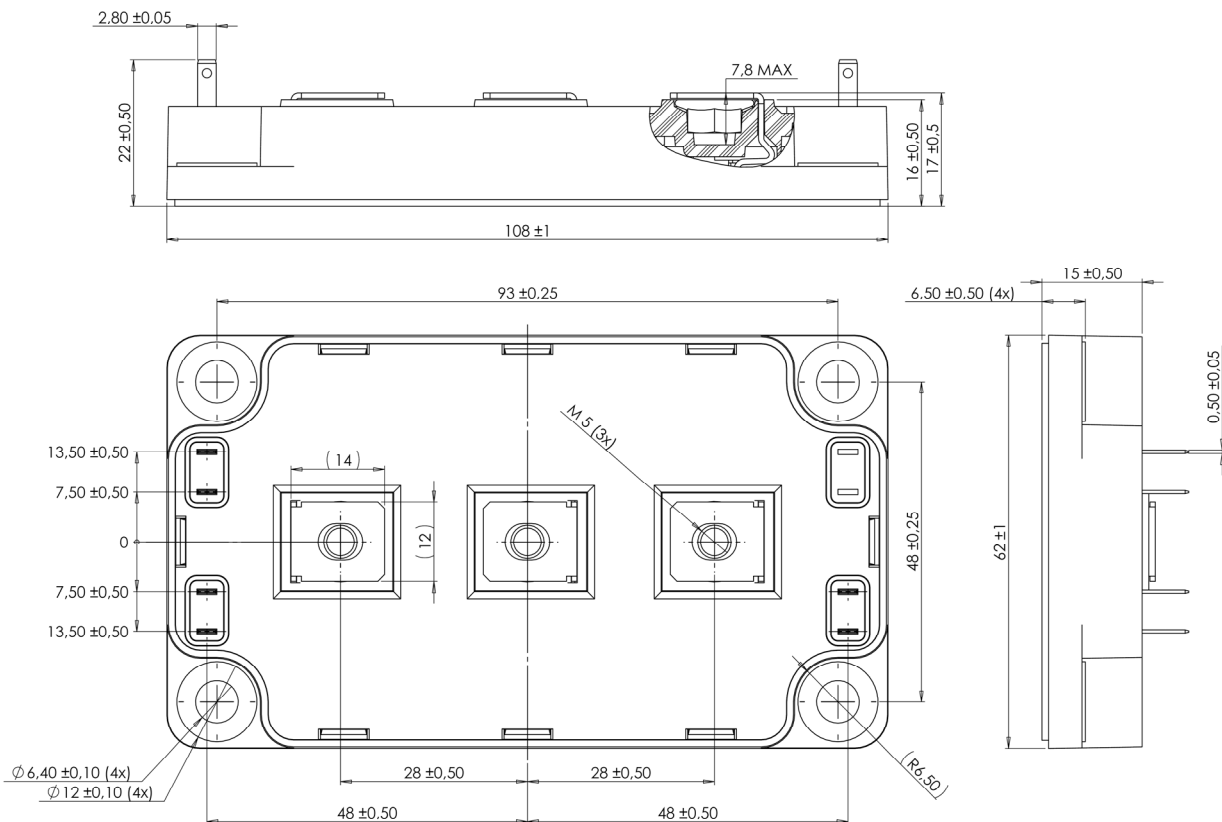
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T: Thermistor value at T

Thermal and package characteristics

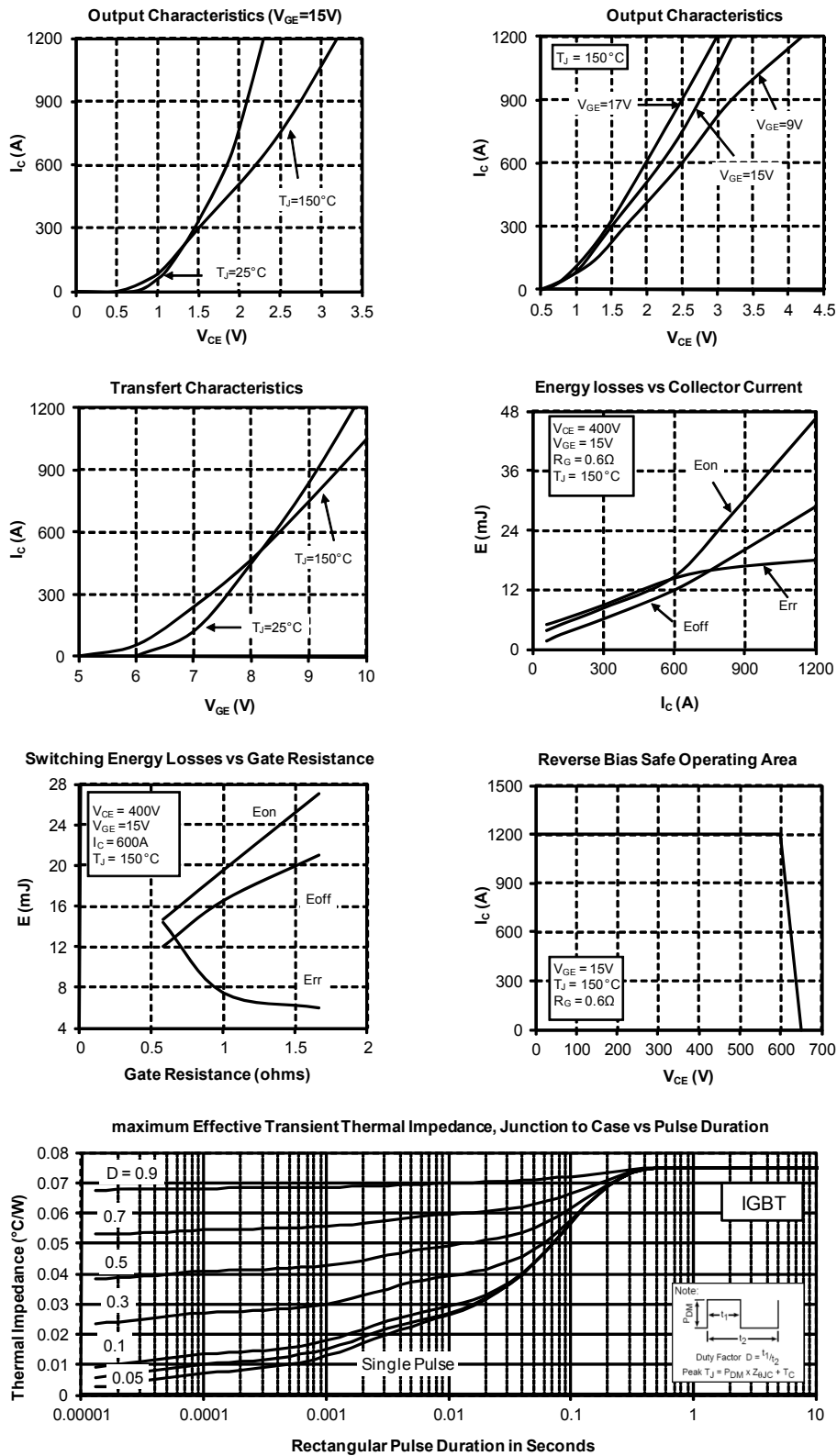
Symbol	Characteristic	Min	Max	Unit	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V	
T _J	Operating junction temperature range	-40	175	°C	
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} - 25		
T _{STG}	Storage Temperature Range	-40	125		
T _C	Operating Case Temperature	-40	100		
Torque	Mounting torque	To Heatsink	M6	3	N.m
		For terminals	M5	2	
Wt	Package Weight		300	g	

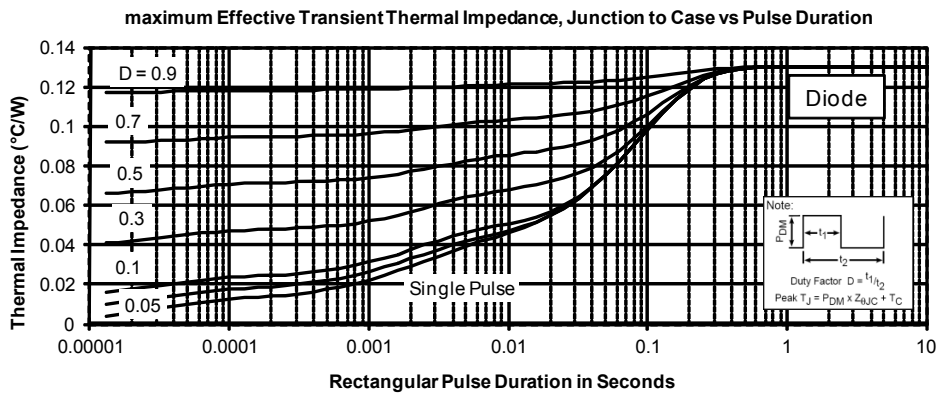
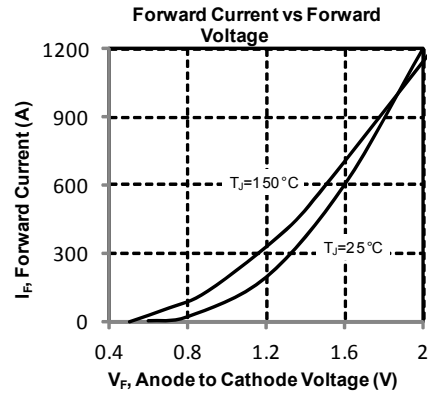
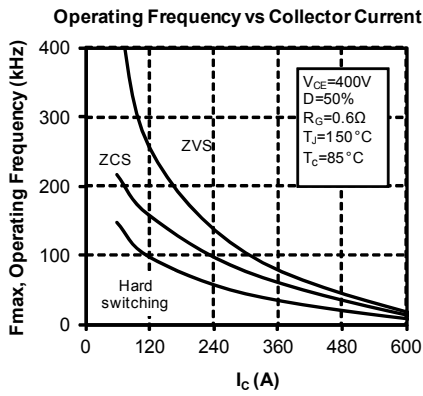
SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve





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