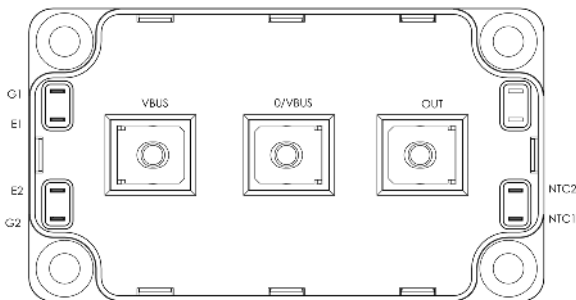
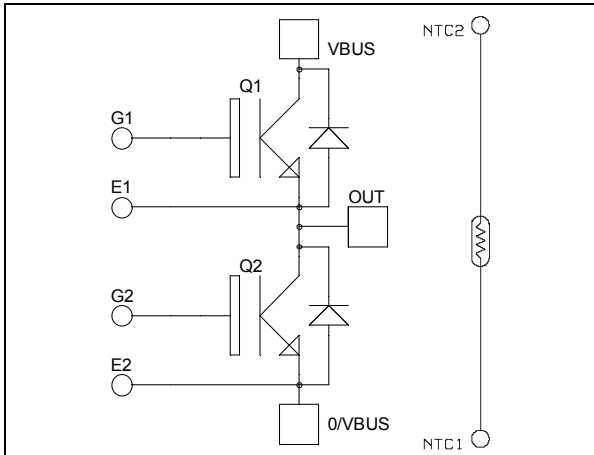


*Phase leg
High speed Trench + Field Stop IGBT4
Power module*

**$V_{CES} = 1200V$
 $I_C = 400A @ T_c = 80^\circ C$**


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)

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
V_{CES}	Collector - Emitter Voltage	1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	625
		$T_c = 80^\circ C$	400
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	1250
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1900
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ C$	800A @ 1100V

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _{CES}	Zero Gate Voltage Collector Current	V _{GE} = 0V, V _{CE} = 1200V			200	μA
V _{CE(sat)}	Collector Emitter saturation Voltage	V _{GE} = 15V I _C = 400A		2.05 2.6	2.4	V
V _{GE(th)}	Gate Threshold Voltage	V _{GE} = V _{CE} , I _C = 14 mA	5.2	5.8	6.4	V
I _{GES}	Gate – Emitter Leakage Current	V _{GE} = 20V, V _{CE} = 0V			680	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{ies}	Input Capacitance	V _{GE} = 0V		24.6		nF
C _{oes}	Output Capacitance	V _{CE} = 25V		1.4		
C _{res}	Reverse Transfer Capacitance	f = 1MHz		1.2		
Q _G	Gate charge	V _{GE} = 15V ; V _{CE} = 960V I _C = 400A		1800		nC
T _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C) V _{GE} = ±15V V _{CE} = 600V I _C = 400A R _G = 1.25Ω		30		ns
T _r	Rise Time			57		
T _{d(off)}	Turn-off Delay Time			290		
T _f	Fall Time			16		
T _{d(on)}	Turn-on Delay Time	Inductive Switching (150°C) V _{GE} = ±15V V _{CE} = 600V I _C = 400A R _G = 1.25Ω		30		ns
T _r	Rise Time			49		
T _{d(off)}	Turn-off Delay Time			366		
T _f	Fall Time			48		
E _{on}	Turn-on Switching Energy	V _{GE} = ±15V V _{CE} = 600V I _C = 400A		36		mJ
E _{off}	Turn-off Switching Energy	R _G = 1.25Ω		22		mJ
I _{sc}	Short Circuit data	V _{GE} ≤ 15V ; V _{Bus} = 600V t _p ≤ 10μs ; T _j = 150°C		1400		A
R _{thJC}	Junction to Case Thermal Resistance				0.08	°C/W

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Repetitive Reverse Voltage				1200	V
I _{RM}	Reverse Leakage Current	V _R = 1200V			250	μA
I _F	DC Forward Current			400		A
V _F	Diode Forward Voltage	I _F = 400A V _{GE} = 0V		1.9	2.2	V
			T _j = 25°C		1.85	
t _{rr}	Reverse Recovery Time	I _F = 400A V _R = 600V di/dt = 7000A/μs		155		ns
			T _j = 25°C		300	
Q _{rr}	Reverse Recovery Charge	I _F = 400A V _R = 600V di/dt = 7000A/μs		37.2		μC
			T _j = 25°C		78	
E _r	Reverse Recovery Energy	I _F = 400A V _R = 600V di/dt = 7000A/μs		16		mJ
			T _j = 25°C		32	
R _{thJC}	Junction to Case Thermal Resistance				0.14	°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		%

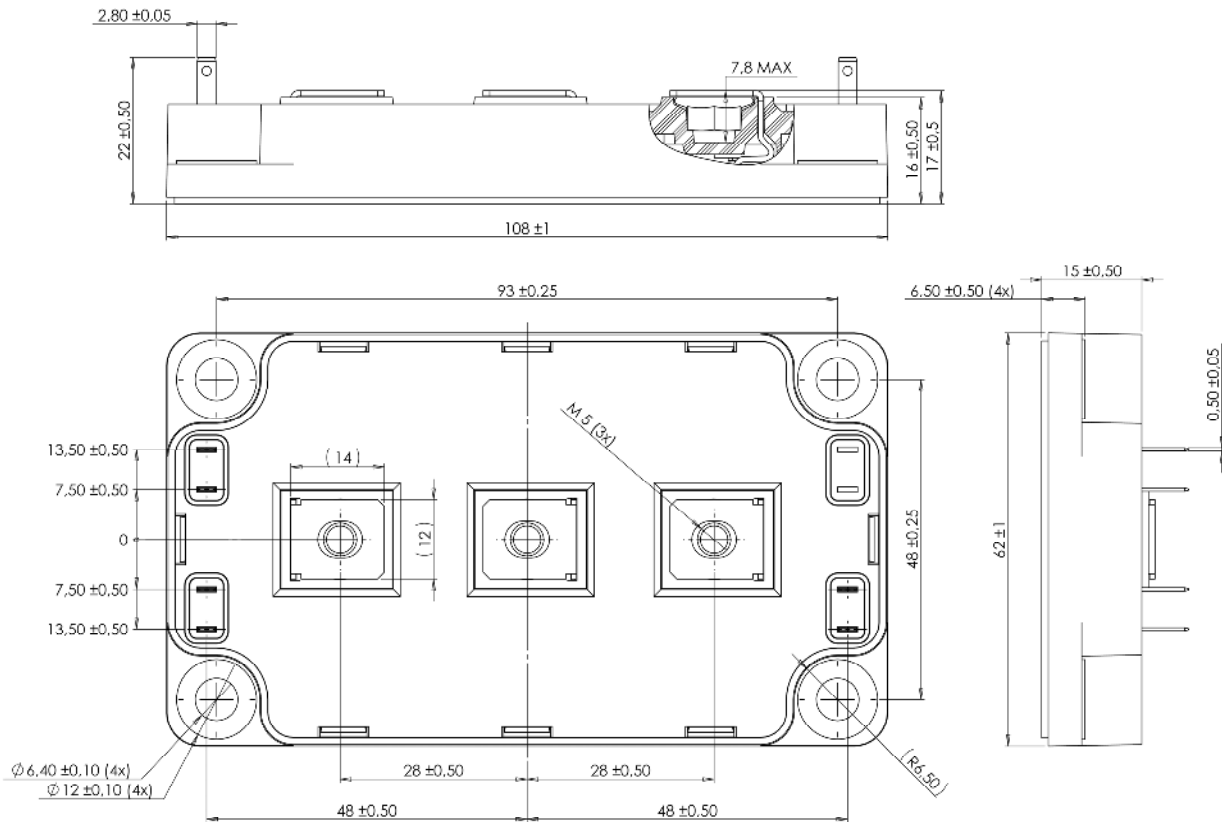
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

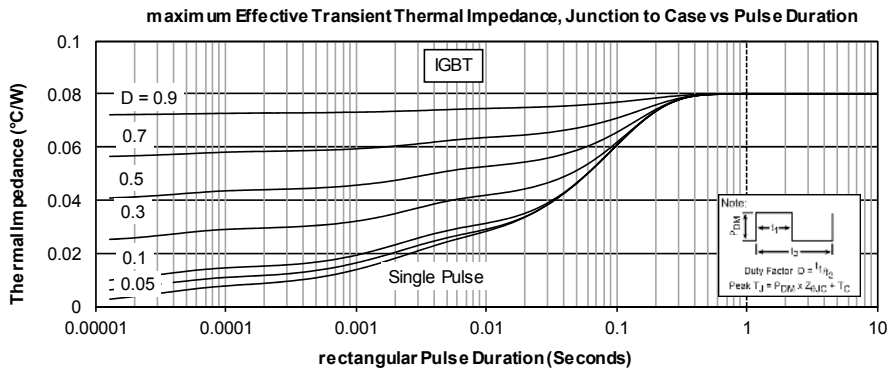
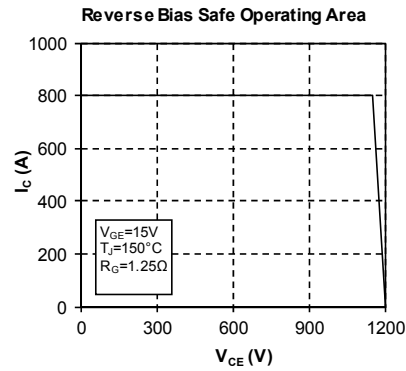
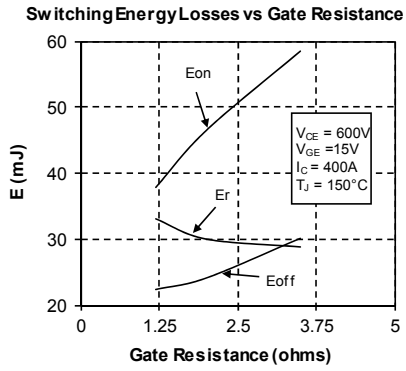
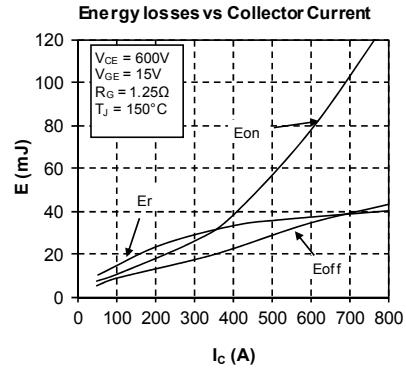
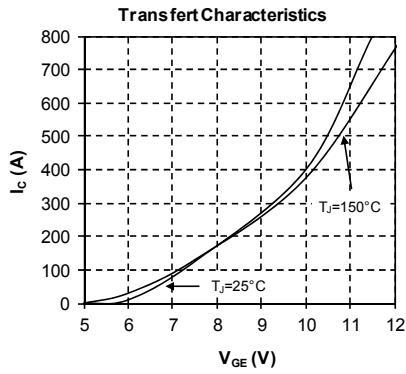
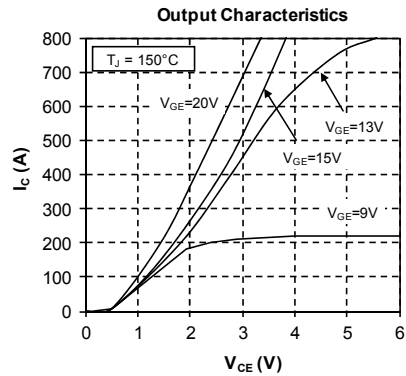
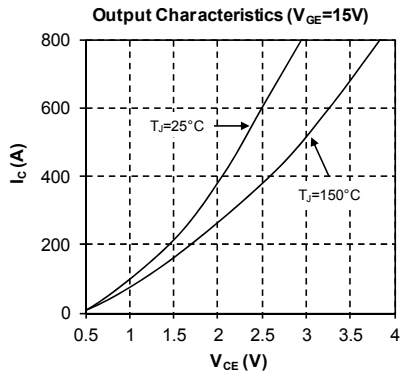
Symbol	Characteristic	Min	Max	Unit	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz	4000		V	
T _J	Operating junction temperature range	-40	175	°C	
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25		
T _{STG}	Storage Temperature Range	-40	125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

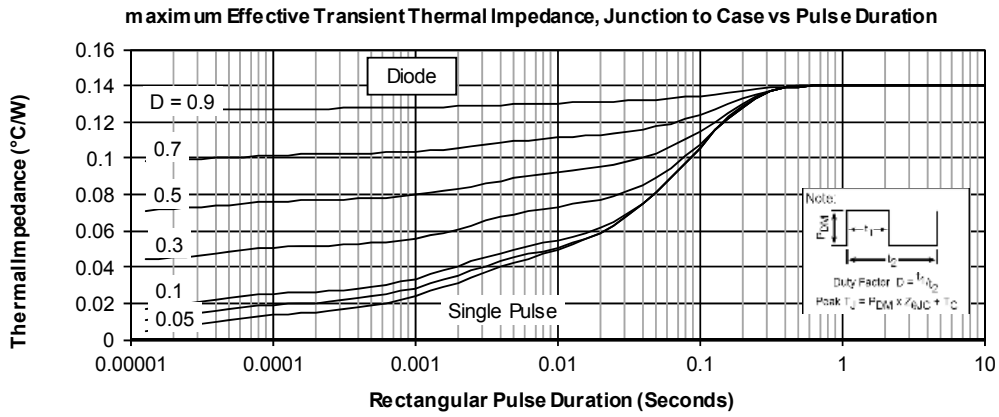
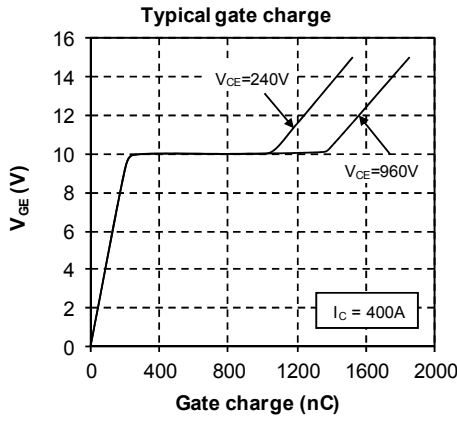
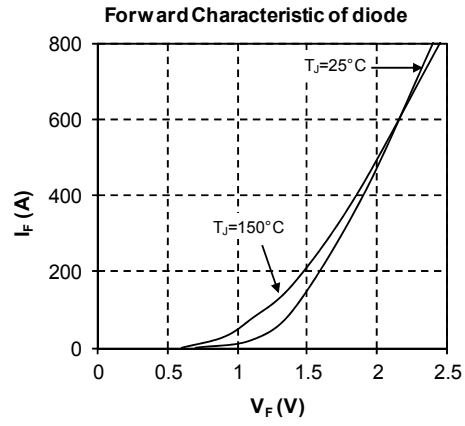
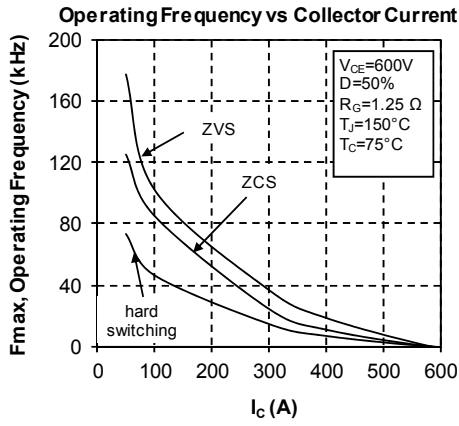
Package outline (dimensions in mm)



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

Typical Performance Curve





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