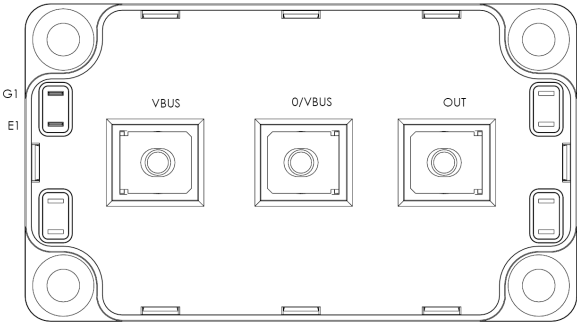
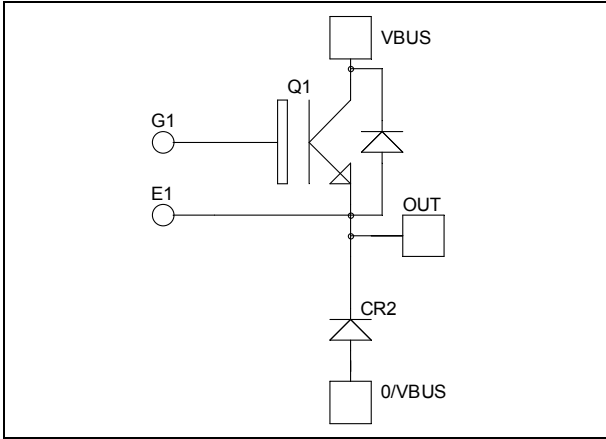


*Buck chopper
High speed Trench + Field Stop
IGBT4 Power module*

**$V_{CES} = 1200V$
 $I_C = 300A @ T_c = 80^\circ C$**



Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- **High speed Trench + Field Stop IGBT 4**
 - Low voltage drop
 - Low leakage current
 - Low switching losses
- Kelvin emitter for easy drive
- Very low stray inductance
- M5 power connectors

Benefits

- Outstanding performance at high frequency operation
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS compliant

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

Absolute maximum ratings

<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	$T_C = 25^\circ C$	500
		$T_C = 80^\circ C$	300
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ C$	960
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Power Dissipation	1500	W

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

Electrical Characteristics

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	$V_{GE} = 15V$ $I_C = 300A$	1.78	$T_j = 25^\circ C$ 2.05	2.42	V
		$T_j = 150^\circ C$		2.6		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 10.4 mA$	5.3	5.8	6.3	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			480	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1MHz$		17.6		nF
C_{oes}	Output Capacitance			1		
C_{res}	Reverse Transfer Capacitance			0.9		
Q_G	Gate charge	$V_{GE} = 15V, I_C = 300A$ $V_{CE} = 960V$		1290		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($25^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 300A$ $R_G = 1.6\Omega$		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 ($150^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 300A$ $R_G = 1.6\Omega$		30		ns
T_r	Rise Time			49		
$T_{d(off)}$	Turn-off Delay Time			366		
T_f	Fall Time			48		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 300A$ $R_G = 1.6\Omega$	$T_j = 150^\circ C$		26	mJ
E_{off}	Turn off Energy			$T_j = 150^\circ C$	16	
R_G	Integrated gate resistor			2.5		Ω
I_{sc}	Short Circuit data	$V_{GE} \leq 15V; V_{Bus} = 600V$ $t_p \leq 10\mu s; T_j = 150^\circ C$		1000		A
R_{thJC}	Junction to Case Thermal Resistance				0.1	$^\circ C/W$

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage				1200	V
I_{RM}	Reverse Leakage Current	$V_R = 1200V$			400	μA
I_F	DC Forward Current	$T_c = 80^\circ C$		400		A
V_F	Diode Forward Voltage	$I_F = 400A$		2.4	3.5	V
		$I_F = 600A$		2.7		
		$I_F = 400A$	$T_j = 125^\circ C$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 400A$ $V_R = 800V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ C$	385		ns
			$T_j = 125^\circ C$	480		
Q_{rr}	Reverse Recovery Charge	$I_F = 400A$ $V_R = 800V$ $di/dt = 800A/\mu s$	$T_j = 25^\circ C$	4.2		μC
			$T_j = 125^\circ C$	21		
R_{thJC}	Junction to Case Thermal Resistance				0.096	$^\circ C/W$

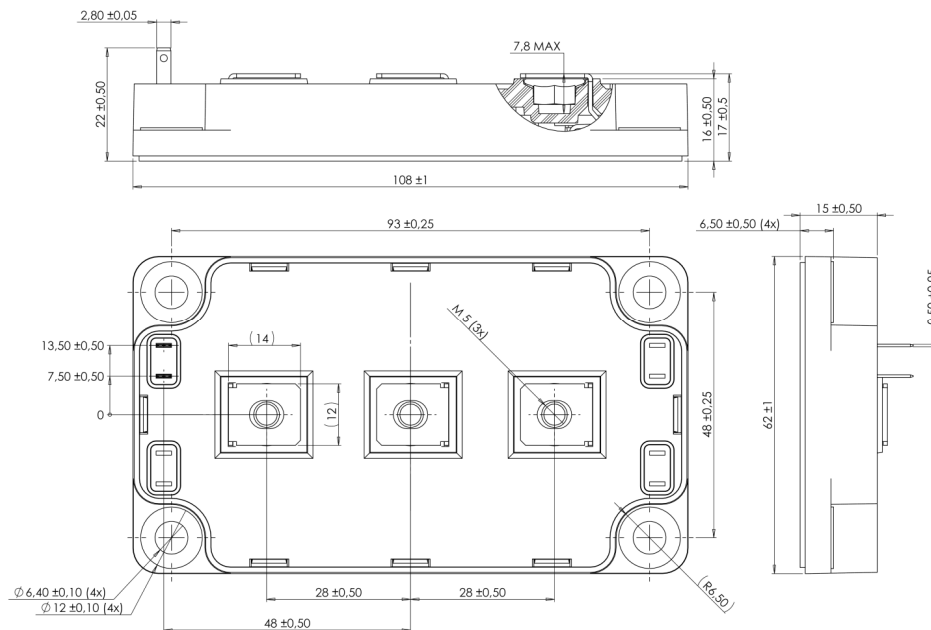
IGBT parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	$V_R=1200V$				100	μA
I_F	DC Forward Current		$T_c = 70^\circ C$		30		A
V_F	Diode Forward Voltage	$I_F = 30A$			2.6	3.5	V
		$I_F = 60A$			3.2		
		$I_F = 30A$	$T_j = 125^\circ C$		1.8		
t_{rr}	Reverse Recovery Time	$I_F = 30A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$		300		ns
	$T_j = 125^\circ C$			360			
Q_{rr}	Reverse Recovery Charge	$I_F = 30A$ $V_R = 800V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$		360		nC
	$T_j = 125^\circ C$			1700			
R_{thJC}	Junction to Case Thermal Resistance					1.2	$^\circ C/W$

Thermal and package characteristics

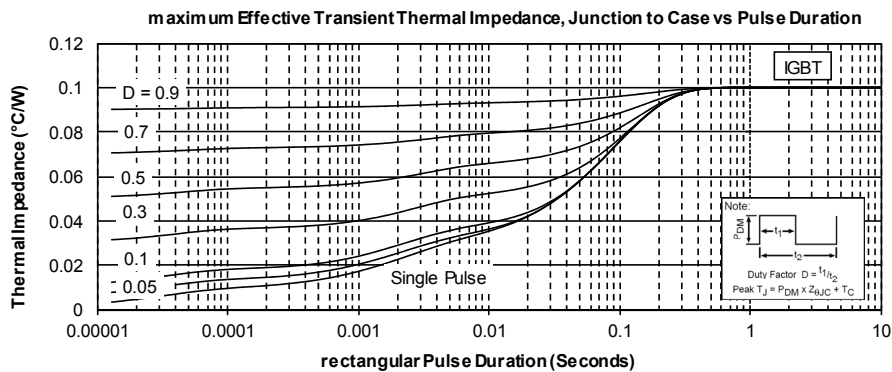
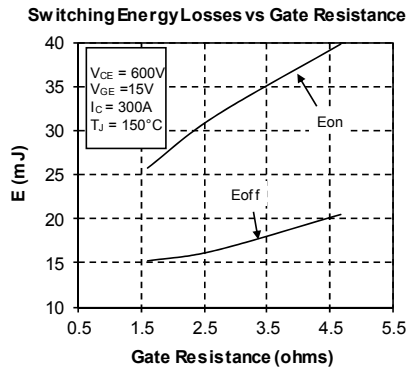
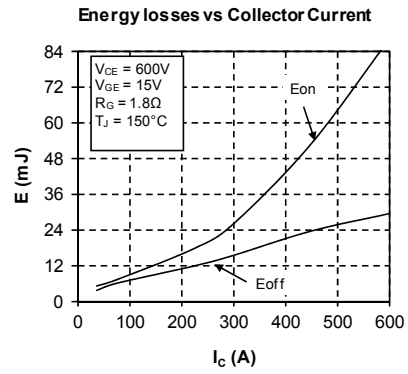
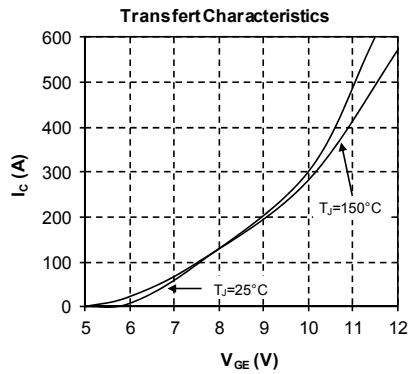
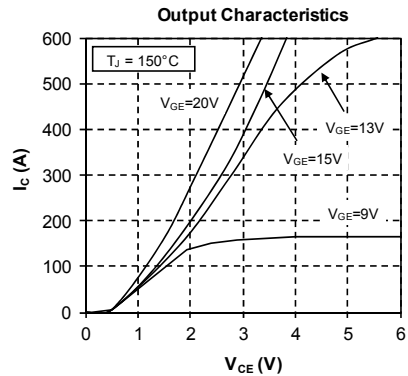
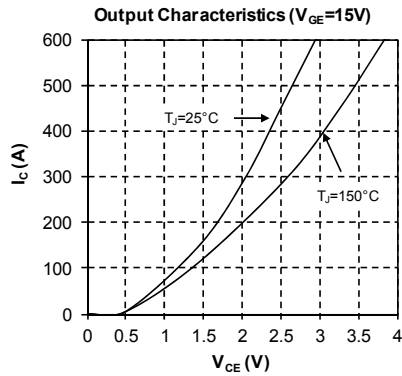
Symbol	Characteristic	Min	Max	Unit		
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, 50/60Hz	4000		V		
T_J	Operating junction temperature range	-40	175	$^\circ C$		
T_{JOP}	Recommended junction temperature under switching conditions	-40	$T_{jmax} - 25$			
T_{STG}	Storage Temperature Range	-40	125			
T_C	Operating Case Temperature	-40	125			
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			300	g	

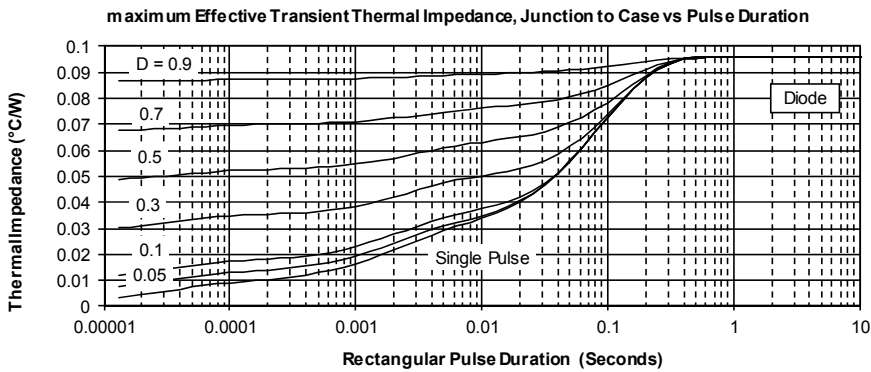
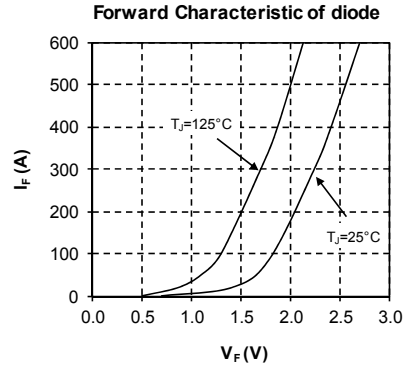
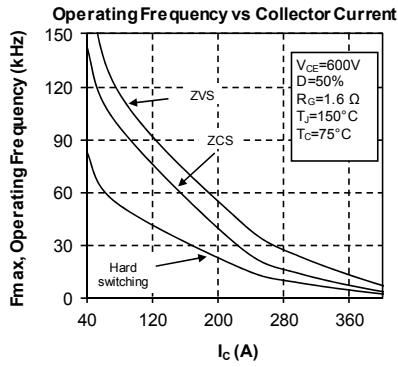
Package outline (dimensions in mm)



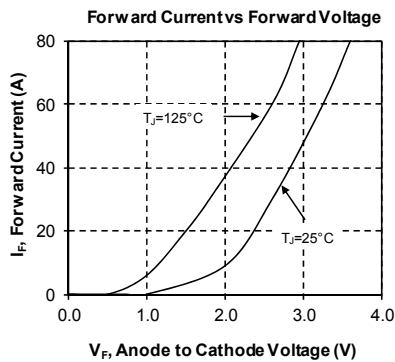
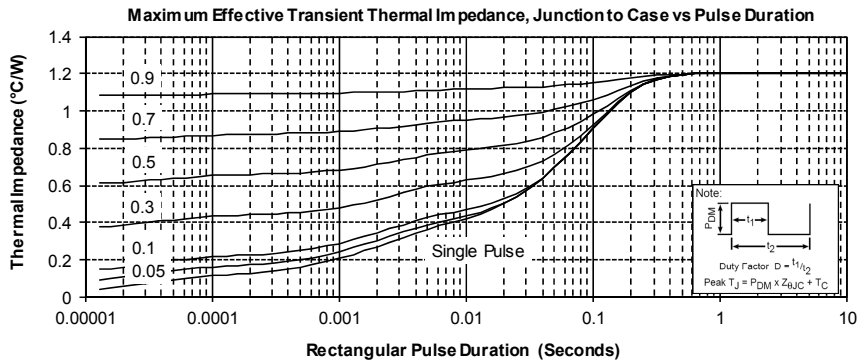
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical IGBT & chopper diode Performance Curve





IGBT parallel diode Typical Performance Curve



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