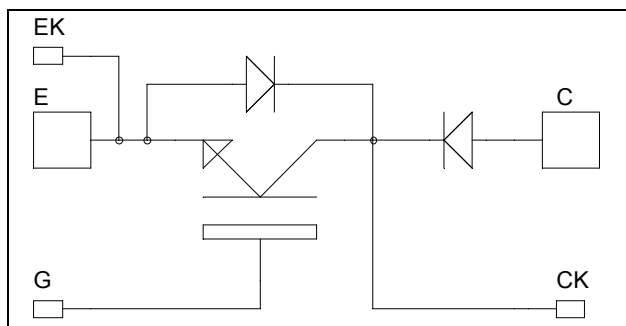


**Single switch
with Series diode
Trench + Field Stop IGBT4**

**$V_{CES} = 1200V$
 $I_C = 875A @ T_c = 80^\circ C$**



Application

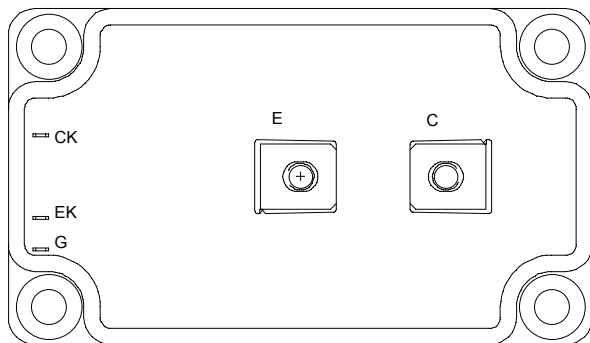
- Zero Current Switching resonant mode

Features

- Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration
- AlN substrate for improved thermal performance

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- 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	$T_c = 25^\circ C$	1500
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	4400
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	1500A @ 1150V

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	$V_{GE} = 0\text{V}$; $V_{CE} = 1200\text{V}$			4	mA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 750\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$	1.8 2.2	2.2	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 30\text{ mA}$	5	5.8	6.5	V

Dynamic Characteristics

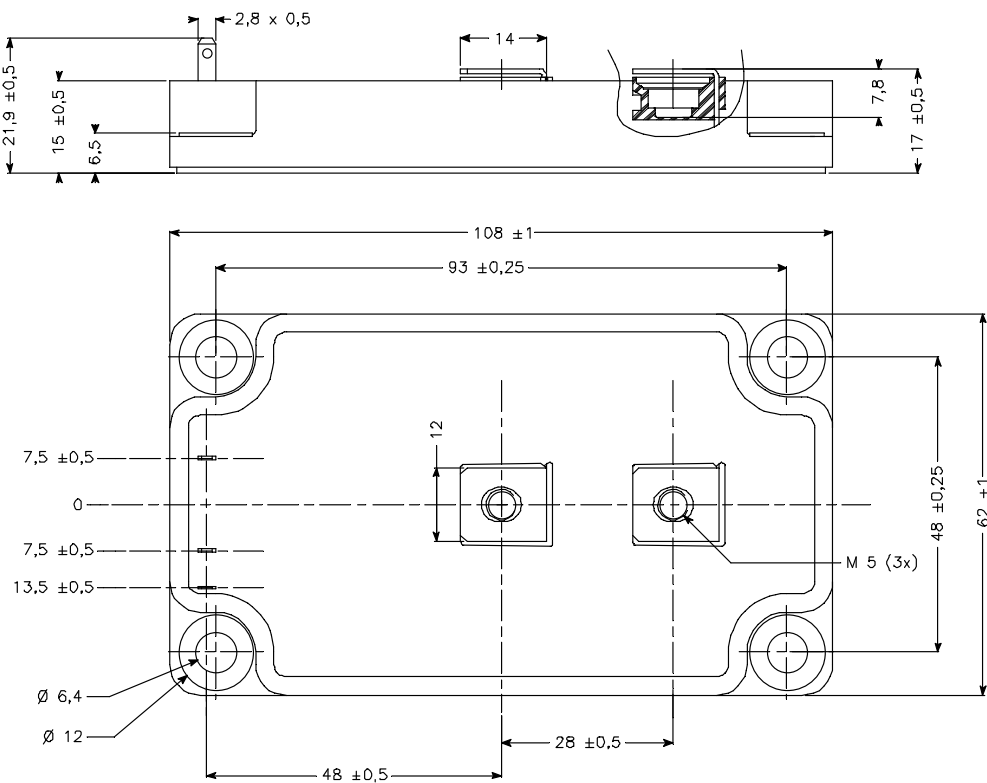
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		46.5		nF
C_{oes}	Output Capacitance			2.9		
C_{res}	Reverse Transfer Capacitance			2.55		
Q_G	Gate charge	$V_{GE} = -8\text{V} / 15\text{V}$; $V_{CE} = 600\text{V}$ $I_C = 750\text{A}$		4.25		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 750\text{A}$ $R_G = 0.6\Omega$		160		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			340		
T_f	Fall Time			80		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 750\text{A}$ $R_G = 0.6\Omega$		170		ns
T_r	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			450		
T_f	Fall Time			170		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 750\text{A}$ $R_G = 0.6\Omega$	$T_j = 150^\circ\text{C}$	68		mJ
E_{off}	Turn-off Switching Energy		$T_j = 150^\circ\text{C}$	72.5		mJ
I_{SC}	Short circuit current	$V_{GE} \leq 15\text{V}$; $V_{CC} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 150^\circ\text{C}$		3000		A

Series diode ratings and characteristics

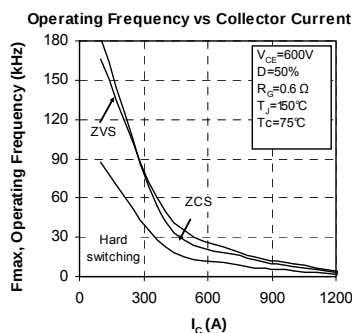
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		700 3500	μA
I_F	DC Forward Current		$T_j = 90^\circ\text{C}$	420		A
V_F	Diode Forward Voltage	$I_F = 420\text{A}$ $I_F = 840\text{A}$ $I_F = 420\text{A}$, $T_j = 125^\circ\text{C}$		2.5 3 1.8	3	V
t_{rr}	Reverse Recovery Time	$I_F = 420\text{A}$ $V_R = 800\text{V}$ $di/dt = 1400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	265 350		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	3.9 20.3		μC

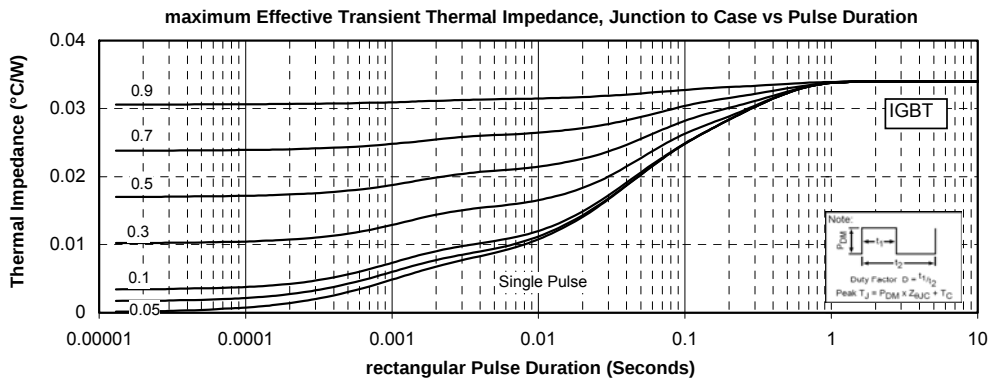
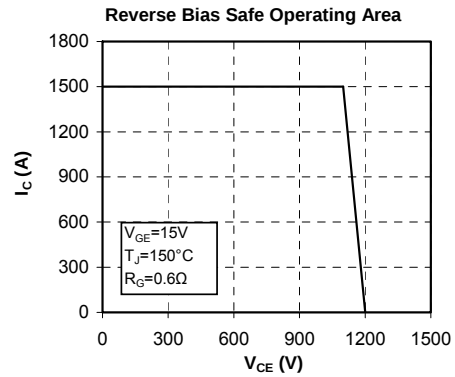
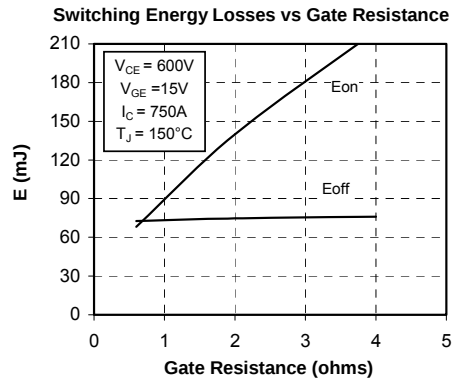
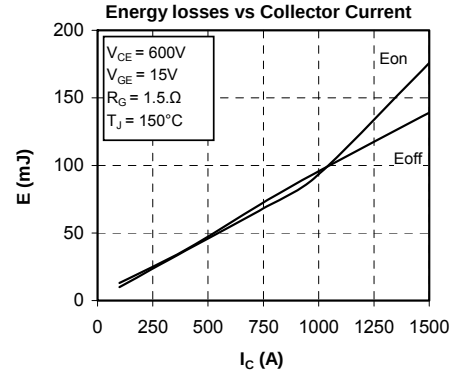
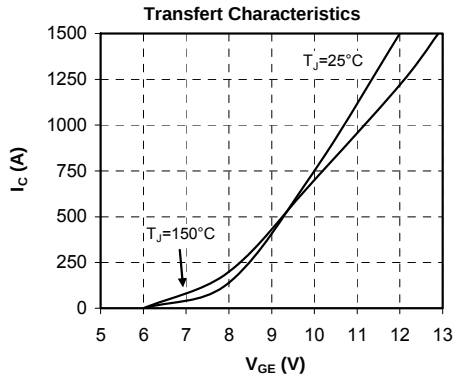
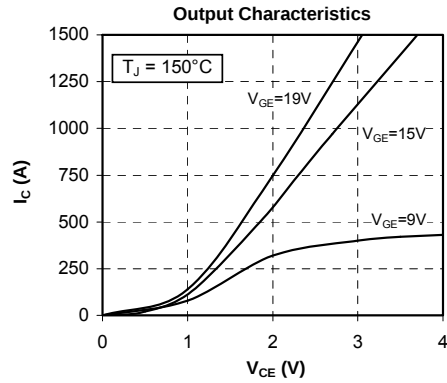
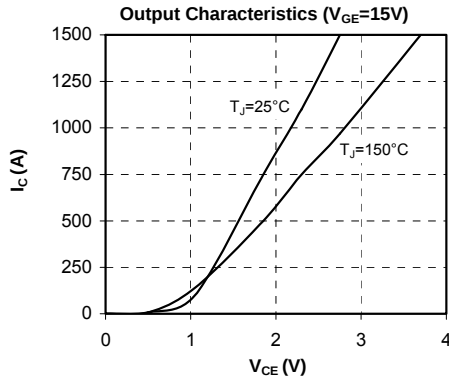
Thermal and package characteristics

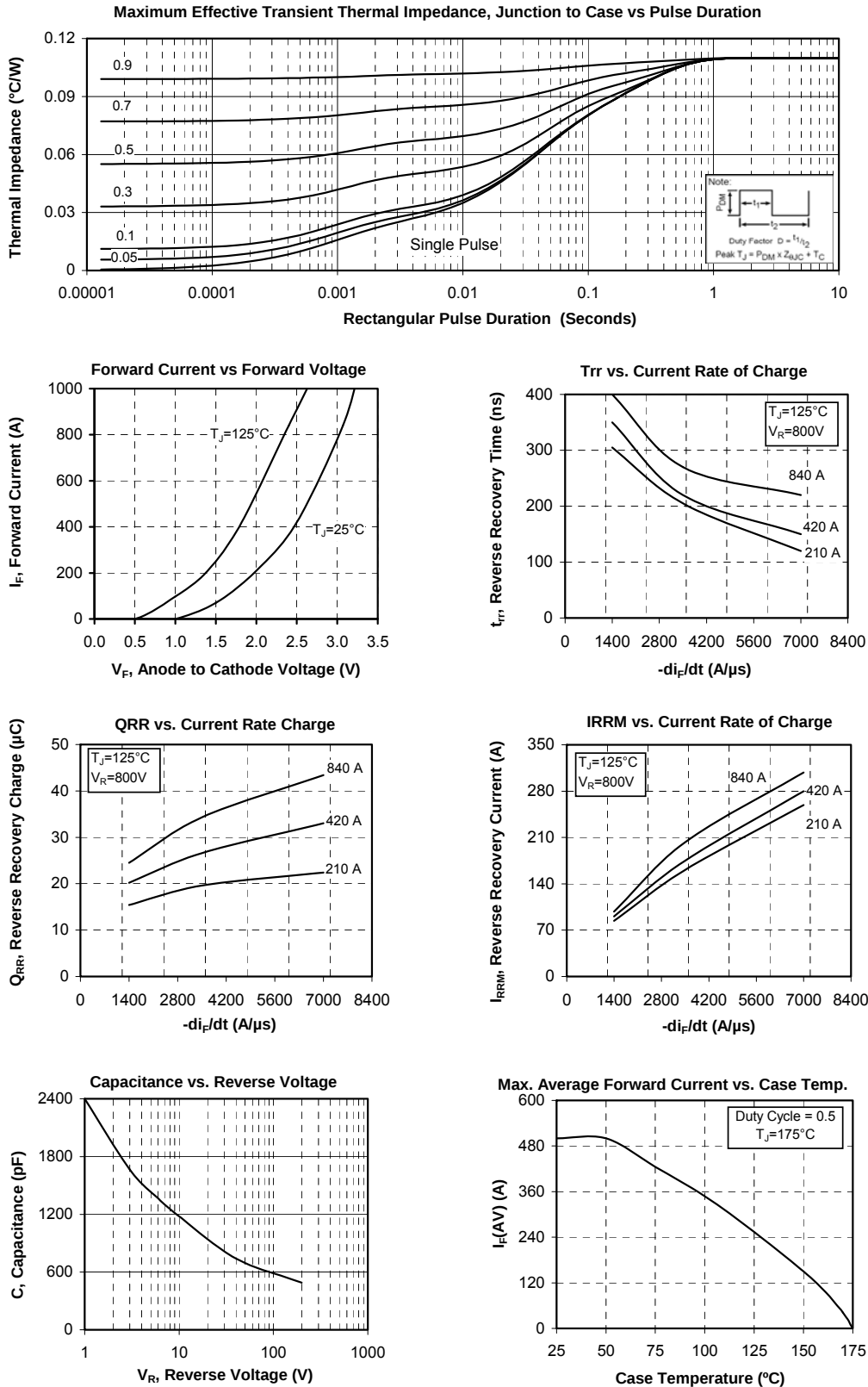
Symbol	Characteristic	Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT		0.034	°C/W
		Series diode		0.11	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1$ mA, 50/60Hz	2500			V
T_J	Operating junction temperature range	-40		175	°C
T_{STG}	Storage Temperature 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			280	g

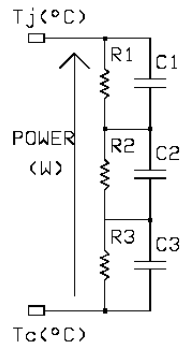
SP6 Package outline (dimensions in mm)


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

Typical IGBT Performance Curve




Typical Series diode Performance Curve


Thermal impedance model IGBT

RC Final Model

$$R1 = 0.0075 \, \Omega$$

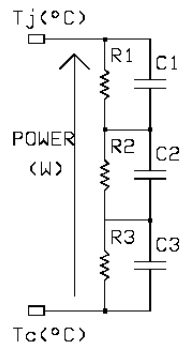
$$R2 = 0.0176 \, \Omega$$

$$R3 = 0.0089 \, \Omega$$

$$C1 = 0.129 \, \text{F}$$

$$C2 = 2.039 \, \text{F}$$

$$C3 = 25.34 \, \text{F}$$

Thermal impedance series diode

RC Final Model

$$R1 = 0.0241 \, \Omega$$

$$R2 = 0.057 \, \Omega$$

$$R3 = 0.029 \, \Omega$$

$$C1 = 0.0398 \, \text{F}$$

$$C2 = 0.6304 \, \text{F}$$

$$C3 = 7.832 \, \text{F}$$

Microsemi reserves the right to change, without notice, the specifications and information contained herein

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