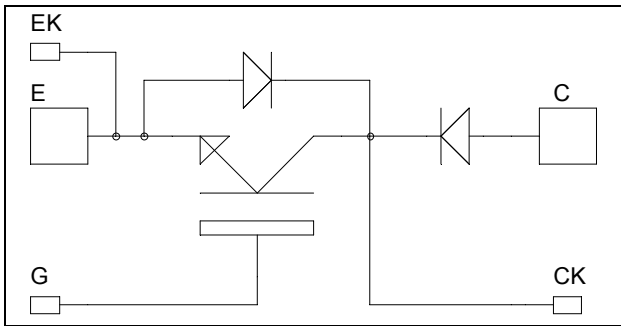


*Single switch
with Series diode
Trench + Field Stop IGBT4*

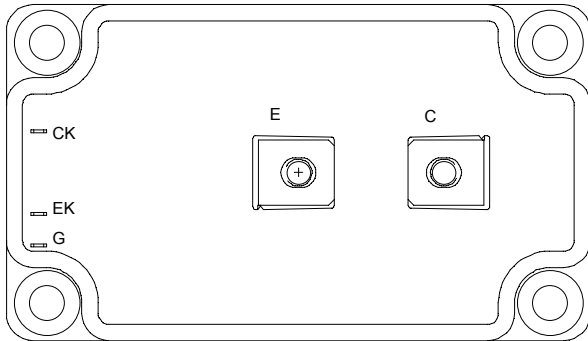
**$V_{CES} = 1200V$
 $I_C = 475A @ T_c = 100^\circ C$**


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	$T_c = 25^\circ C$	610	A
		$T_c = 100^\circ C$	475	
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	800	
V_{GE}	Gate - Emitter Voltage		± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	2307	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	800A @ 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	$V_{GE} = 15\text{V}$ $I_C = 400\text{A}$		$T_j = 25^\circ\text{C}$: 1.8 $T_j = 150^\circ\text{C}$: 2.2	2.2	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 10\text{mA}$	5	5.8	6.5	V

Dynamic Characteristics

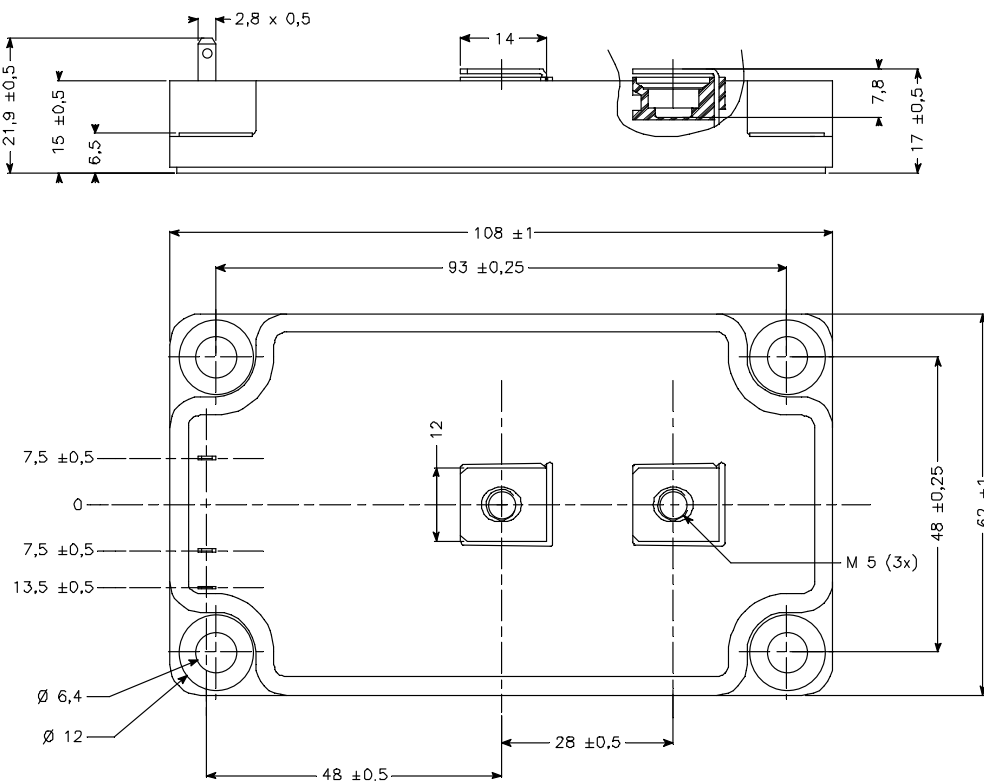
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$		24.6		nF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$		1.62		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.38		
Q_G	Gate charge	$V_{GE} = \pm 15\text{V}$		3.4		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.8\Omega$		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) $V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$ $R_G = 1.8\Omega$		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	$V_{GE} = \pm 15\text{V}$ $V_{CE} = 600\text{V}$ $I_C = 400\text{A}$	$T_j = 25^\circ\text{C}$	20.8		mJ
			$T_j = 150^\circ\text{C}$	42		
E_{off}	Turn-off Switching Energy	$R_G = 1.8\Omega$	$T_j = 25^\circ\text{C}$	22		mJ
			$T_j = 150^\circ\text{C}$	37.2		
I_{SC}	Short circuit current	$V_{GE} \leq 15\text{V}$; $V_{CC} = 900\text{V}$ $t_p \leq 10\mu\text{s}$; $T_j = 150^\circ\text{C}$		2000		A

Series diode ratings and characteristics

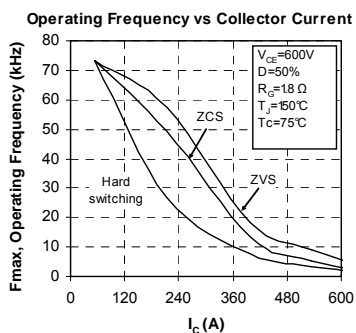
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$		$T_j = 25^\circ\text{C}$: $T_j = 125^\circ\text{C}$:	400 2000	μA
I_F	DC Forward Current			$T_j = 90^\circ\text{C}$: 360		A
V_F	Diode Forward Voltage	$I_F = 360\text{A}$		2.5	3	V
		$I_F = 720\text{A}$		3		
		$I_F = 360\text{A}$	$T_j = 125^\circ\text{C}$	1.8		
t_{rr}	Reverse Recovery Time	$I_F = 360\text{A}$ $V_R = 800\text{V}$ $di/dt = 1200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	265		ns
			$T_j = 125^\circ\text{C}$	350		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	3.3		μC
			$T_j = 125^\circ\text{C}$	17.3		

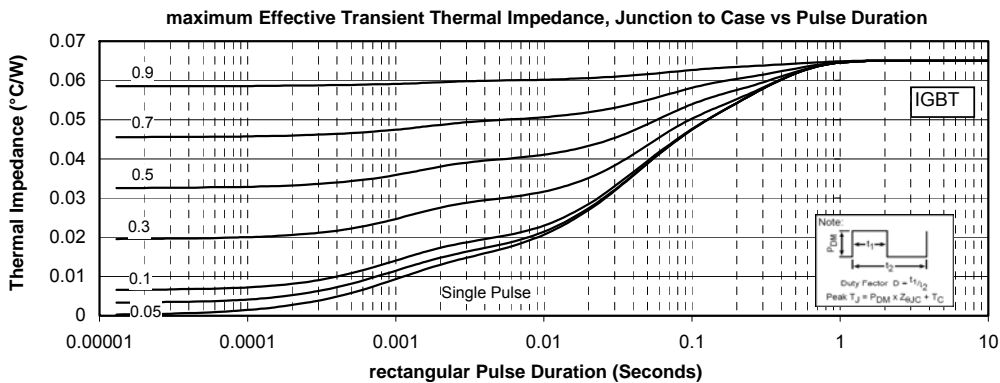
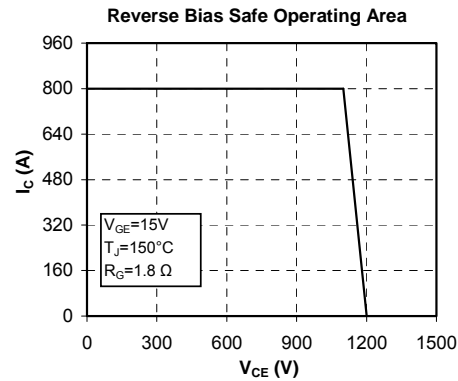
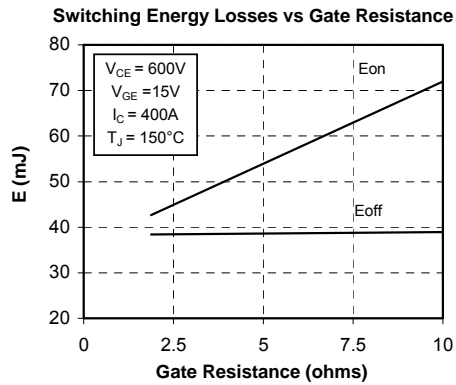
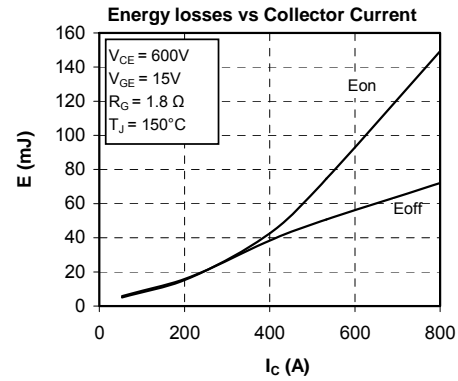
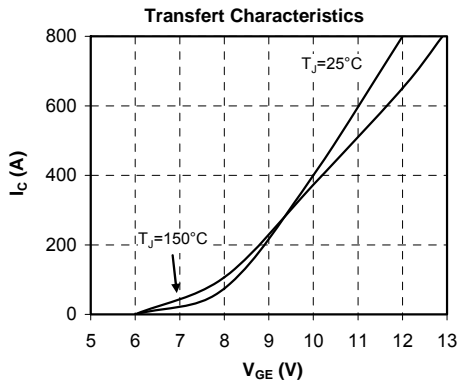
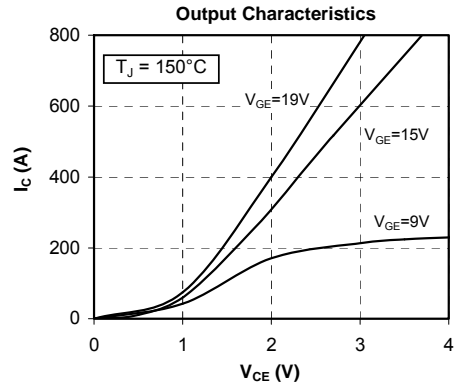
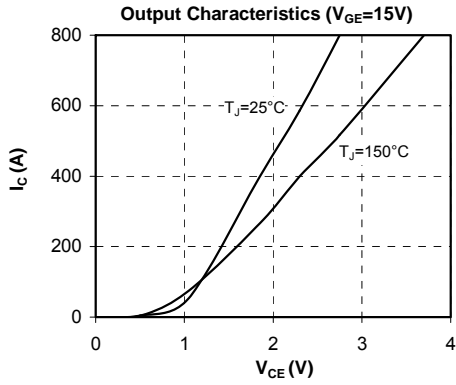
Thermal and package characteristics

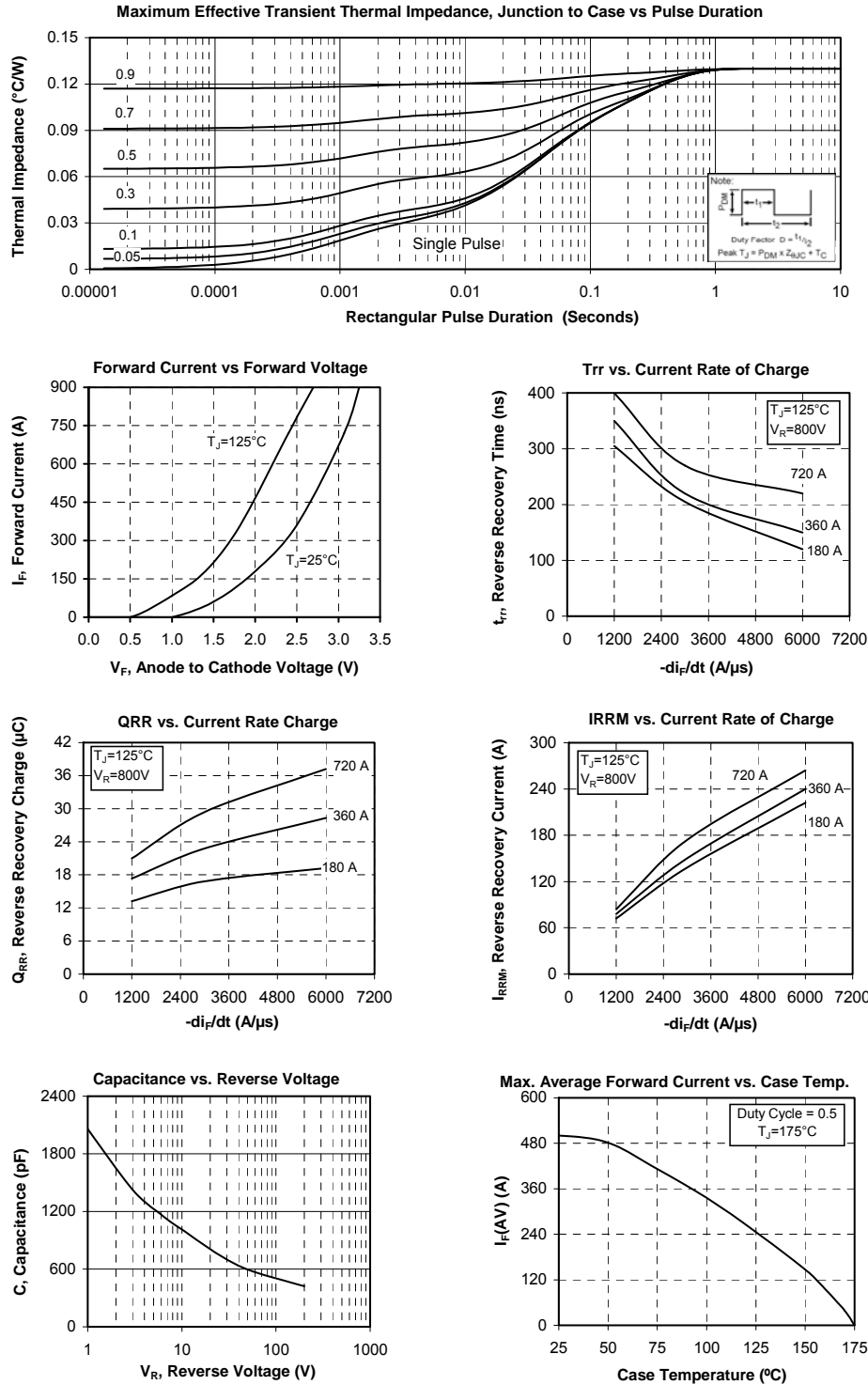
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case Thermal Resistance	IGBT		0.065	°C/W	
		Series diode		0.13		
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol}<1$ mA, 50/60Hz	2500			V	
T_J	Operating junction temperature range	-40		175	°C	
T_{STG}	Storage Temperature Range	-40		125		
T_C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To Heatsink	M6	3	5	N.m
		For teminals	M5	2	3.5	
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


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

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.