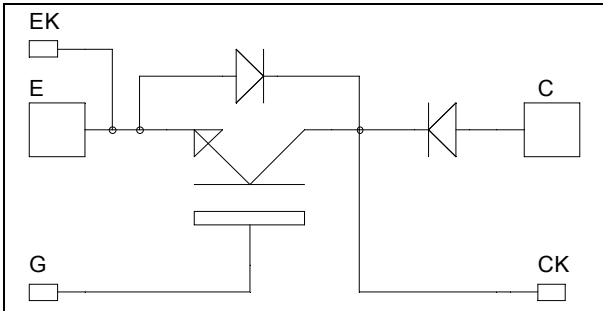


*Single switch  
with Series diode  
Trench + Field Stop IGBT4*

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


**Application**

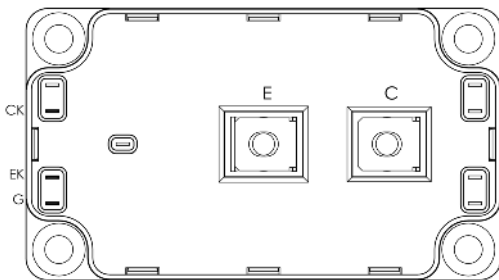
- Zero Current Switching resonant mode

**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
		$T_c = 100^\circ C$	475
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	800
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	2307
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](http://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	$V_{GE} = 0V$ ; $V_{CE} = 1200V$			4	mA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 400A$		1.8	2.2	V
		$T_j = 25^\circ\text{C}$ $T_j = 150^\circ\text{C}$		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$ , $I_C = 10\text{ mA}$	5	5.8	6.5	V

**Dynamic Characteristics**

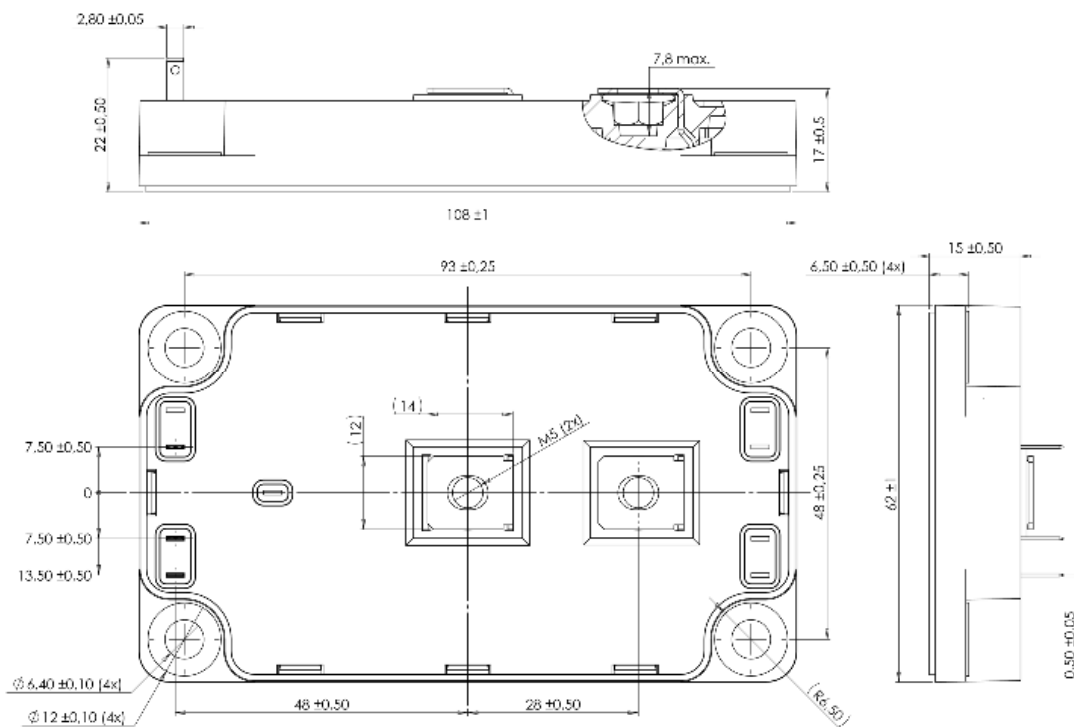
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0V$		24.6		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25V$		1.62		
$C_{res}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		1.38		
$Q_G$	Gate charge	$V_{GE} = \pm 15V$		3.4		$\mu\text{C}$
$T_{d(on)}$	Turn-on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

**Series diode ratings and characteristics**

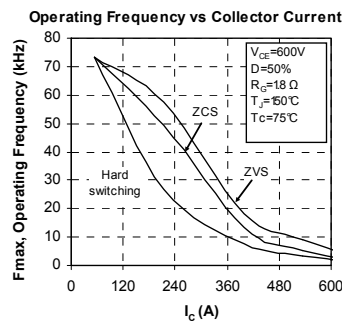
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200V$			400	$\mu\text{A}$
			$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			
$I_F$	DC Forward Current			360		A
$V_F$	Diode Forward Voltage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

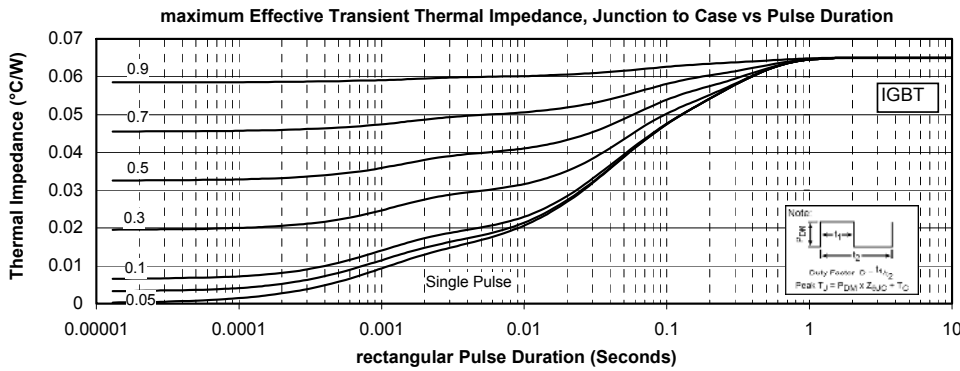
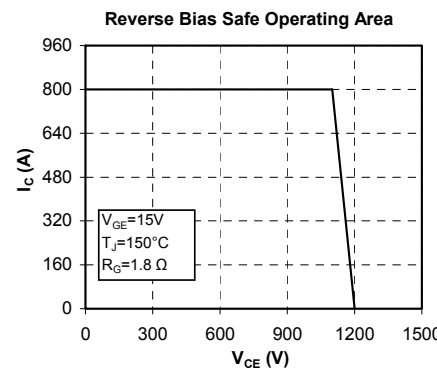
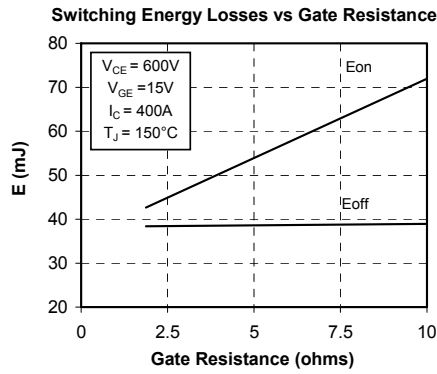
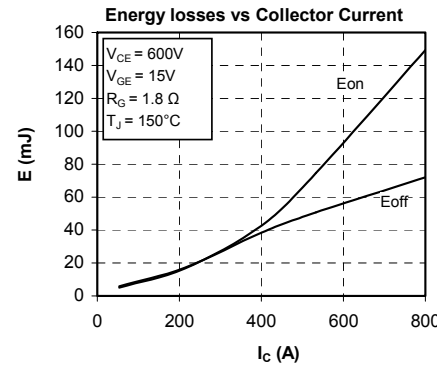
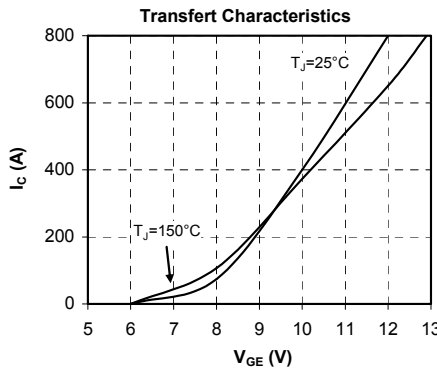
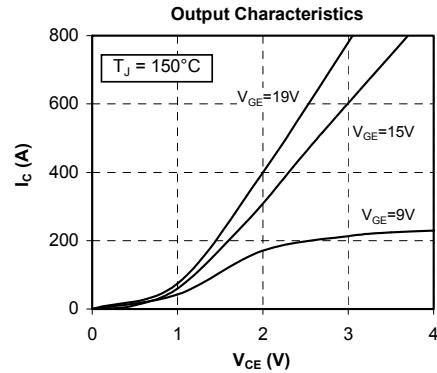
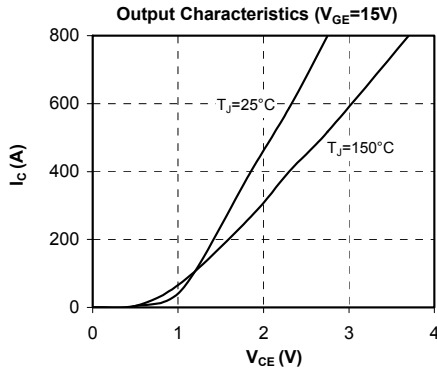
**Thermal and package characteristics**

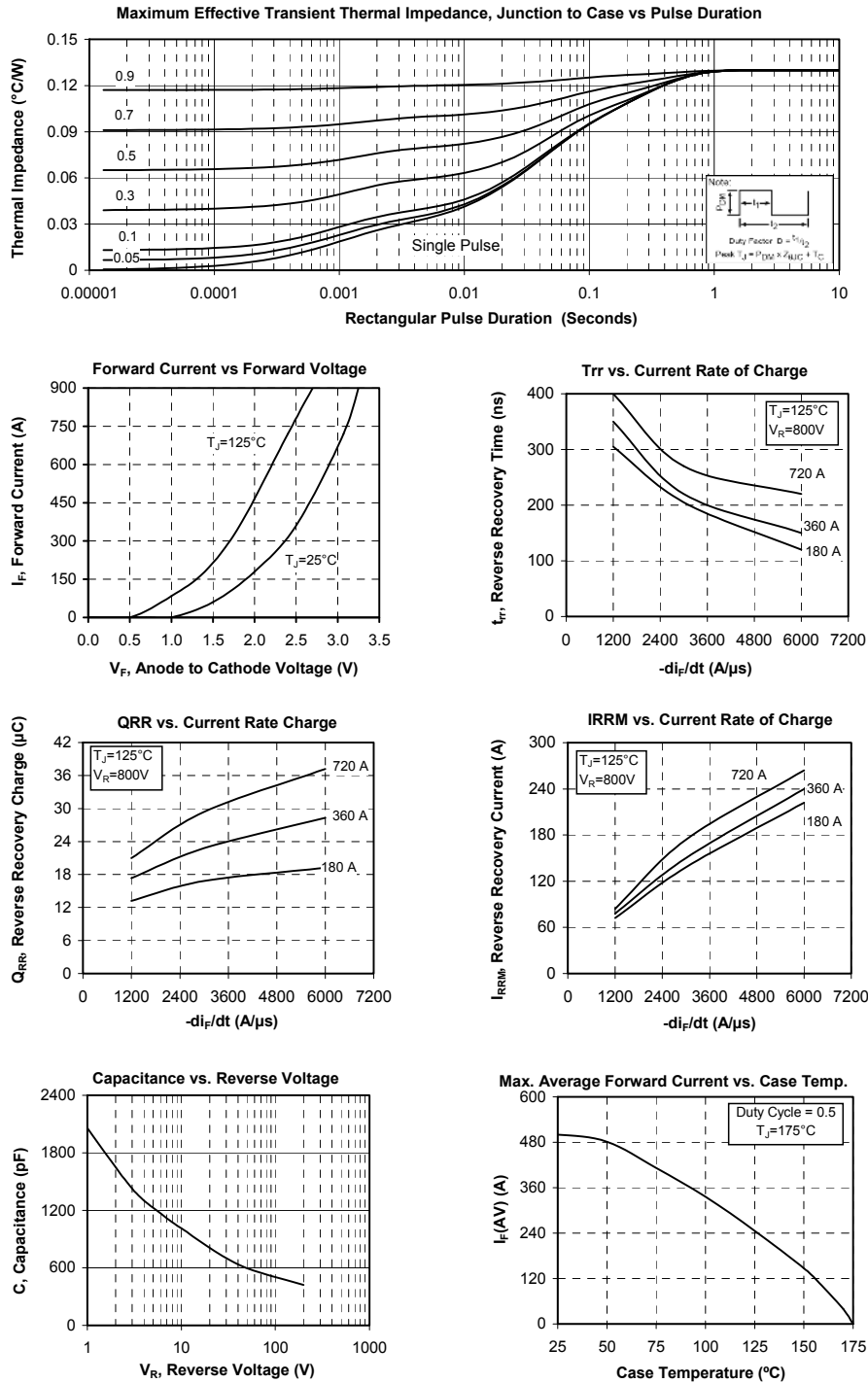
Symbol	Characteristic		Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	IGBT			0.065	°C/W
		Series diode			0.13	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz		4000			V
T <sub>J</sub>	Operating junction temperature range		-40		175	°C
T <sub>STG</sub>	Storage Temperature Range		-40		125	
T <sub>C</sub>	Operating Case Temperature		-40		100	
Torque	Mounting torque	To Heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
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](http://www.microsemi.com)

**Typical IGBT Performance Curve**




**Typical Series diode Performance Curve**


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