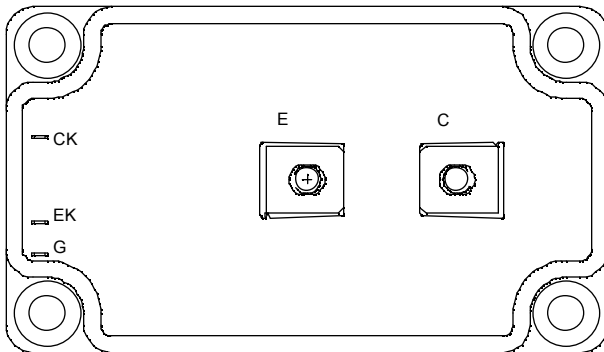
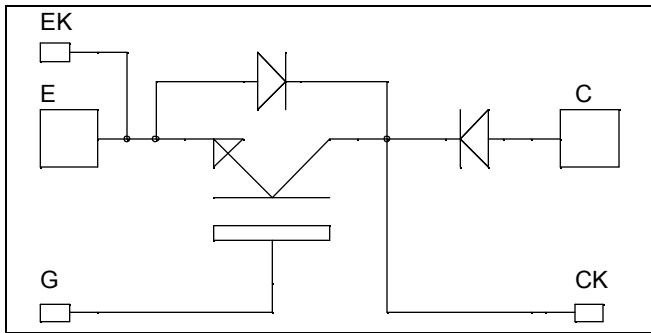


**Single Switch  
with Series diodes  
NPT IGBT Power Module**

**$V_{CES} = 1200V$   
 $I_C = 200A @ T_c = 80^\circ C$**



### Application

- Zero Current Switching resonant mode

### Features

- Non Punch Through (NPT) FAST IGBT
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 50 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - Avalanche energy rated
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- 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

### Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage		1200	V
$I_C$	Continuous Collector Current	$T_c = 25^\circ C$	275	A
		$T_c = 80^\circ C$	200	
$I_{CM}$	Pulsed Collector Current	$T_c = 25^\circ C$	600	
$V_{GE}$	Gate - Emitter Voltage		$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1136	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	400A @ 1200V	

**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	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$		500	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		750	
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 200\text{A}$	$T_j = 25^\circ\text{C}$	3.2	3.7	V
			$T_j = 125^\circ\text{C}$	4.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 4\text{mA}$	4.5		6.5	V
$I_{GES}$	Gate – Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$			$\pm 300$	nA

**Dynamic Characteristics**

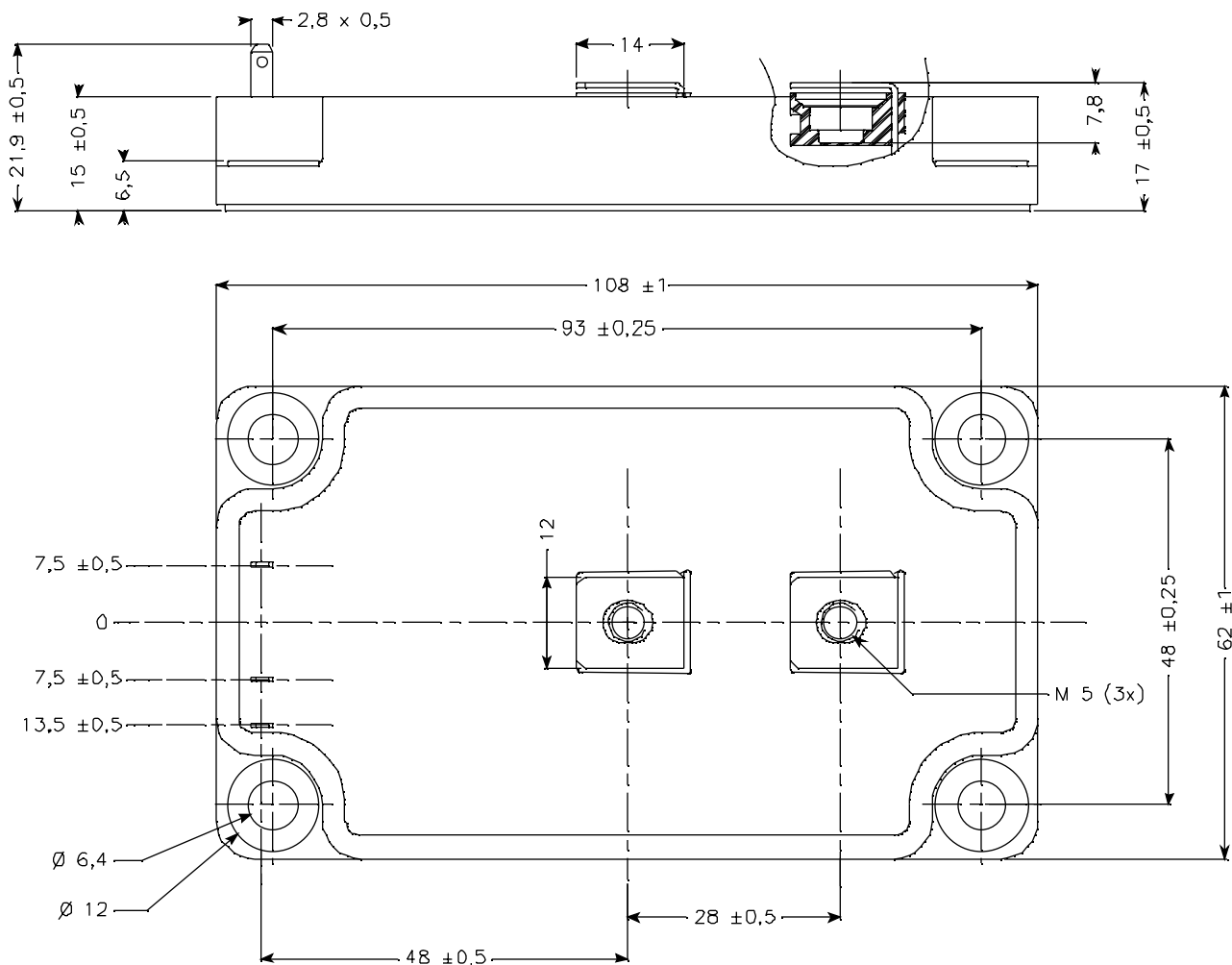
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		13.8		nF
$C_{oes}$	Output Capacitance			1.32		
$C_{res}$	Reverse Transfer Capacitance			0.88		
$Q_g$	Total gate Charge	$V_{GS} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$		1320		nC
$Q_{ge}$	Gate – Emitter Charge			140		
$Q_{gc}$	Gate – Collector Charge			800		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$		35		ns
$T_r$	Rise Time			65		
$T_{d(off)}$	Turn-off Delay Time			320		
$T_f$	Fall Time			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $125^\circ\text{C}$ ) $V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$		35		ns
$T_r$	Rise Time			65		
$T_{d(off)}$	Turn-off Delay Time			360		
$T_f$	Fall Time			40		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 600\text{V}$ $I_C = 200\text{A}$ $R_G = 1.2\Omega$	$T_j = 125^\circ\text{C}$	22		mJ
$E_{off}$	Turn-off Switching Energy		$T_j = 125^\circ\text{C}$	12.2		

**Series diode ratings and characteristics**

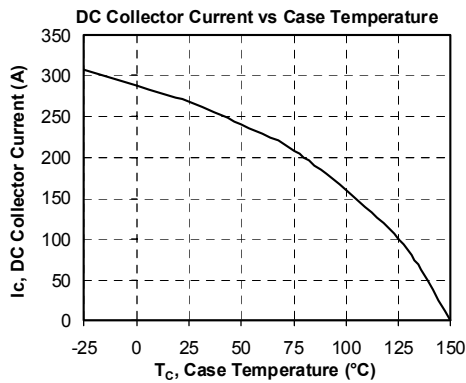
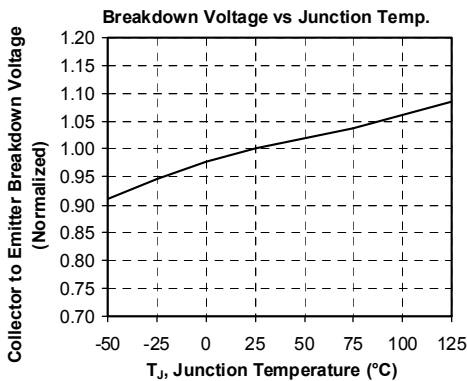
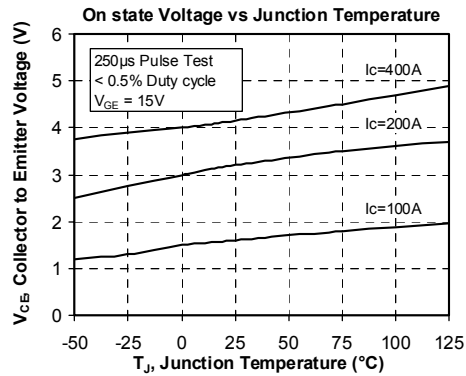
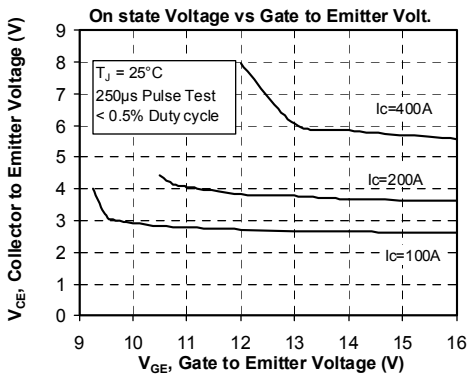
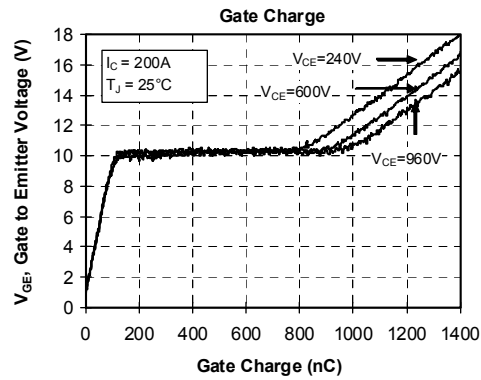
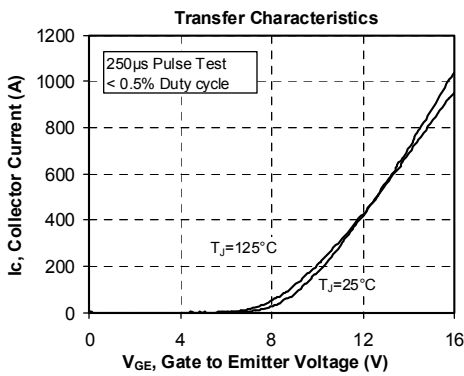
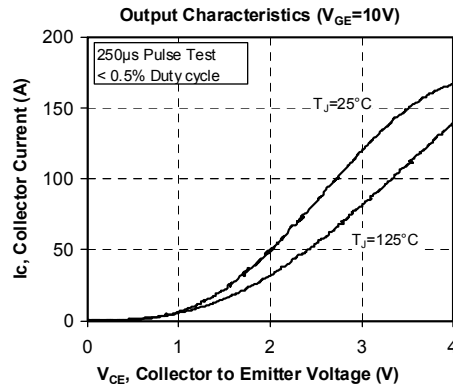
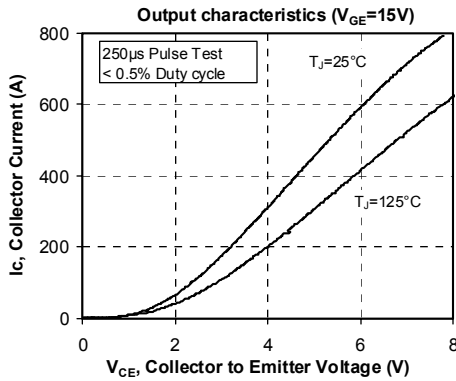
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		1200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$		750	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$I_F$	DC Forward Current	$T_c = 70^\circ\text{C}$		240		A
$V_F$	Diode Forward Voltage	$I_F = 240\text{A}$		2	2.5	V
		$I_F = 480\text{A}$		2.3		
		$I_F = 240\text{A}$	$T_j = 125^\circ\text{C}$		1.8	
$t_{rr}$	Reverse Recovery Time	$I_F = 240\text{A}$ $V_R = 800\text{V}$	$T_j = 25^\circ\text{C}$	400		ns
			$T_j = 125^\circ\text{C}$	470		
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 800\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	4.8		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	16		

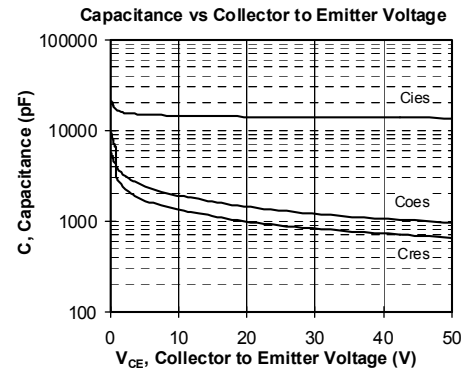
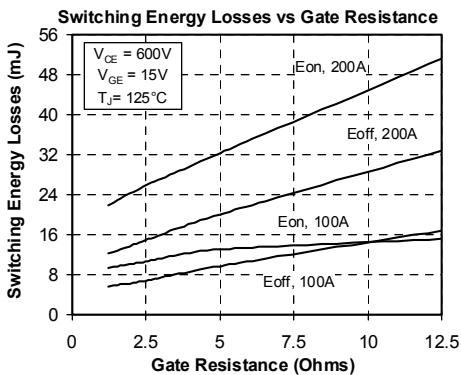
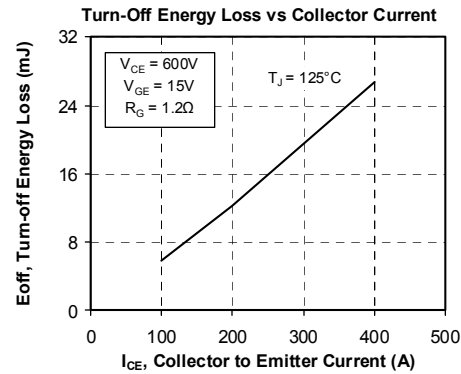
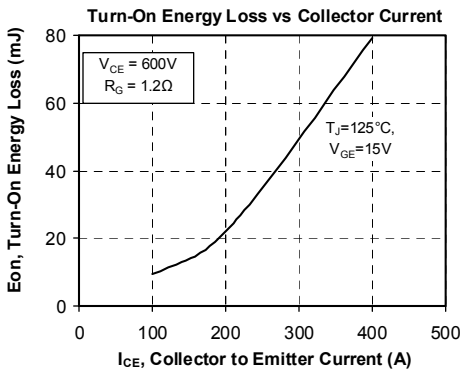
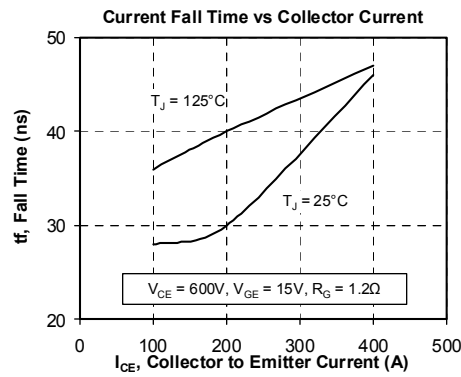
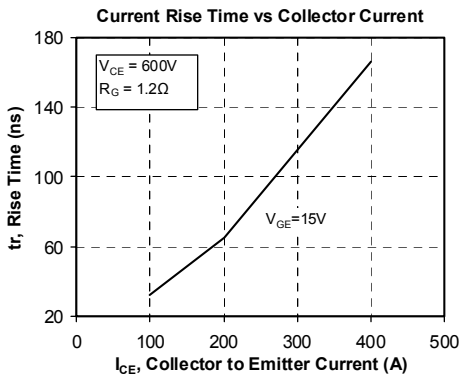
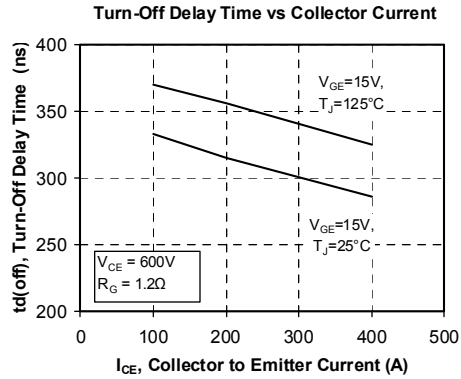
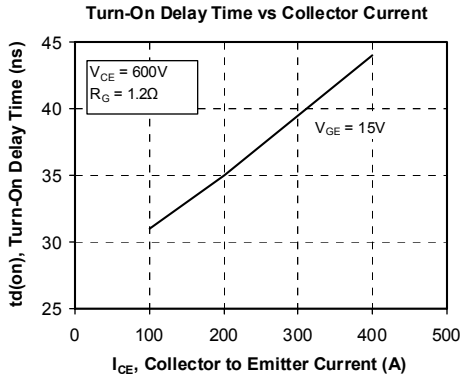
**Thermal and package characteristics**
*Symbol Characteristic*

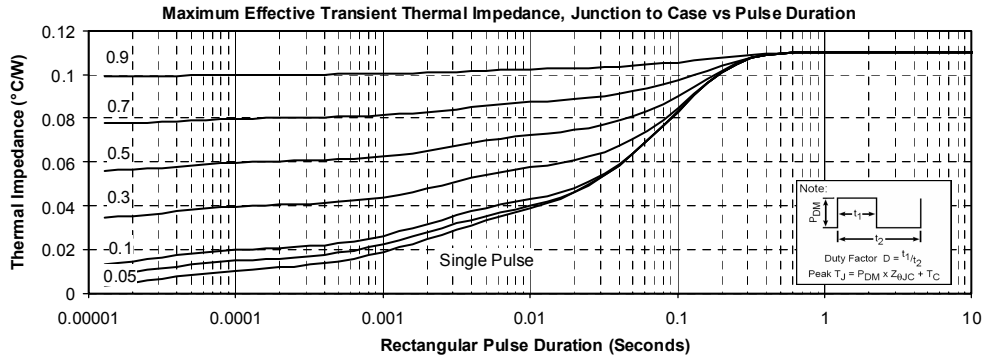
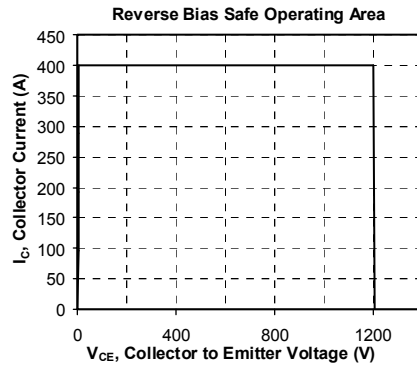
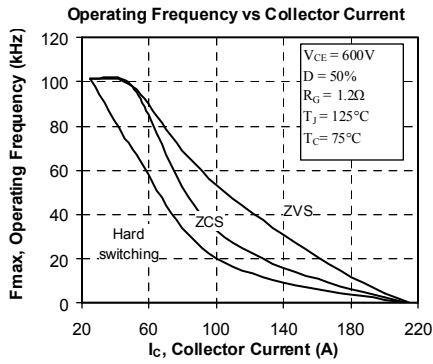
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
$R_{thJC}$	Junction to Case Thermal Resistance	IGBT		0.11	°C/W	
		Diode		0.23		
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1 mA, 50/60Hz	2500			V	
$T_J$	Operating junction temperature range	-40		150	°C	
$T_{STG}$	Storage Temperature Range	-40		125		
$T_C$	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	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](http://www.microsemi.com)

## Typical Performance Curve







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