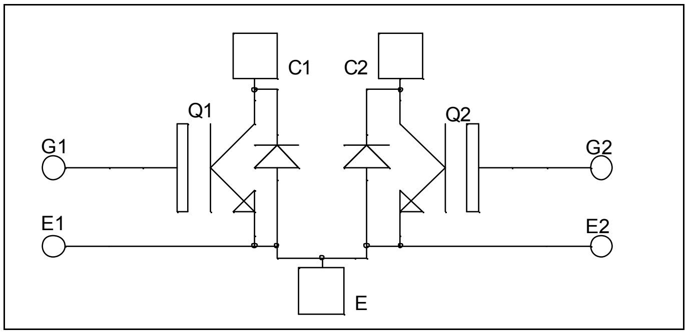
Microsemi POWER PRODUCTS GROUP

APTGT200DU120G

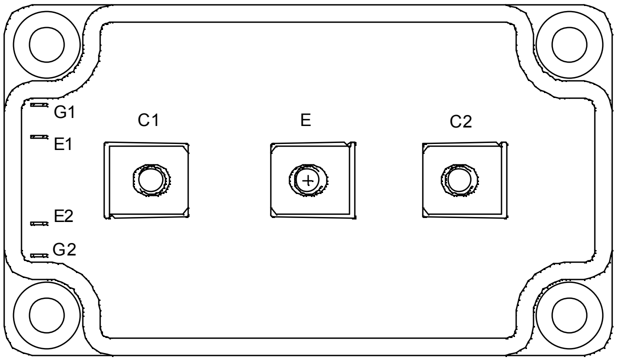
Dual common source Fast Trench + Field Stop IGBT® Power Module

V_{CES} = 1200V
I_C = 200A @ Tc = 80°C



Application
- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features
- Fast Trench + Field Stop IGBT® Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 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
- 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°C	280	A
		T_C = 80°C	200	
I_{CM}	Pulsed Collector Current	T_C = 25°C	400	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	890	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 125°C	400A @ 1100V	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25°C$ unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V$, $V_{CE} = 1200V$				350	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 200A$	$T_j = 25°C$	1.4	1.7	2.1	V
			$T_j = 125°C$		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 3$ mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V$, $V_{CE} = 0V$				500	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	$V_{GE} = 0V$ $V_{CE} = 25V$ f = 1MHz			14		nF
C_{oes}	Output Capacitance				0.8		
C_{res}	Reverse Transfer Capacitance				0.6		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 200A$ $R_G = 2.7\Omega$			260		ns
T_r	Rise Time				30		
$T_{d(off)}$	Turn-off Delay Time				420		
T_f	Fall Time				70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 200A$ $R_G = 2.7\Omega$			290		ns
T_r	Rise Time				50		
$T_{d(off)}$	Turn-off Delay Time				520		
T_f	Fall Time				90		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 200A$ $R_G = 2.7\Omega$	$T_j = 125°C$		20		mJ
E_{off}	Turn off Energy		$T_j = 125°C$		20		

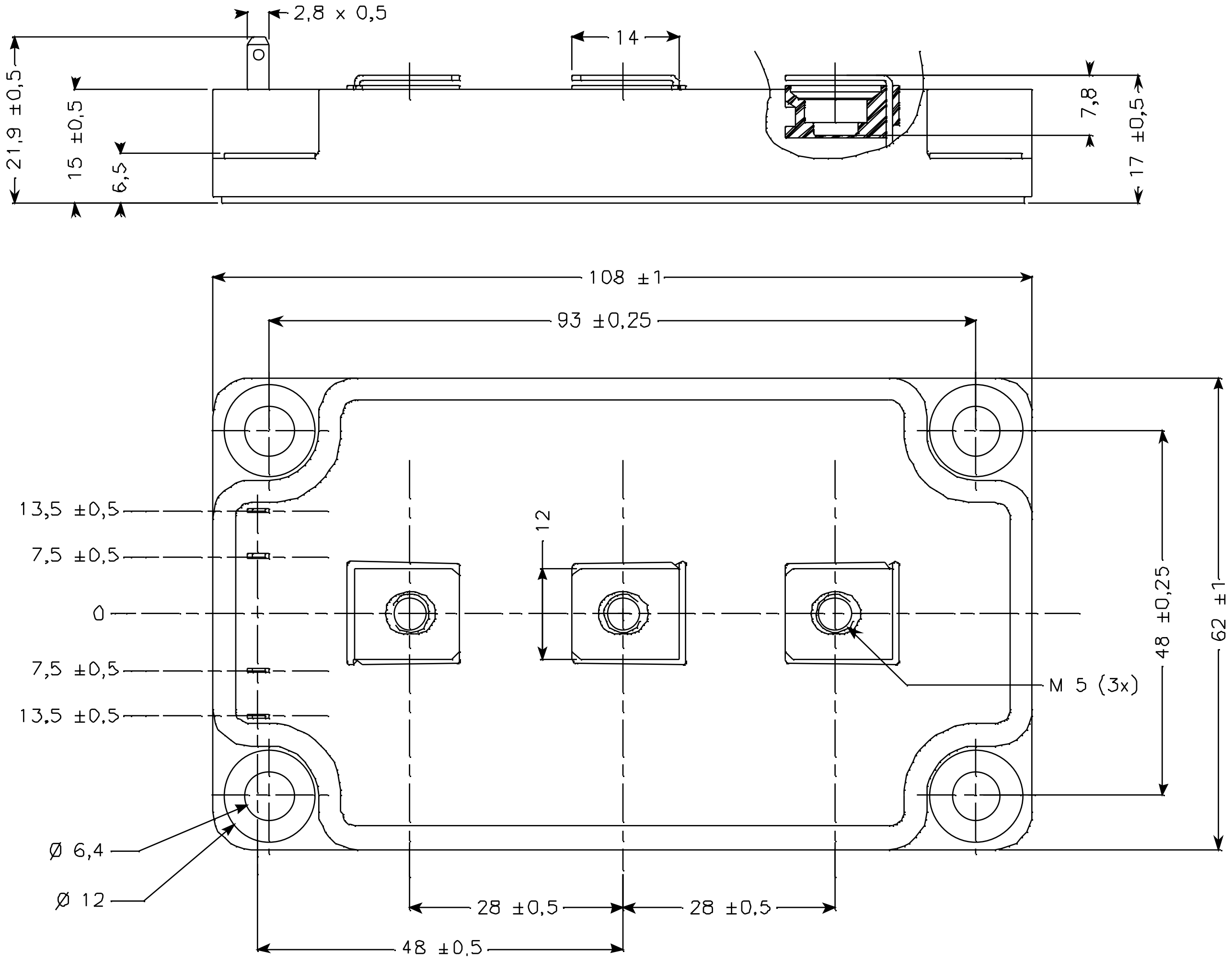
Reverse diode ratings and characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	V_R=1200V	$T_j = 25°C$			350	µA
			$T_j = 125°C$			600	
I_F	DC Forward Current		Tc = 80°C		200		A
V_F	Diode Forward Voltage	$I_F = 200A$ $V_{GE} = 0V$	$T_j = 25°C$		1.6	2.1	V
			$T_j = 125°C$		1.6		
t_{rr}	Reverse Recovery Time	$I_F = 200A$ $V_R = 600V$ di/dt =2500A/µs	$T_j = 25°C$		170		ns
			$T_j = 125°C$		280		
Q_{rr}	Reverse Recovery Charge		$T_j = 25°C$		18		µC
			$T_j = 125°C$		36		
E_r	Reverse Recovery Energy		$T_j = 25°C$		10		mJ
			$T_j = 125°C$		18		

Thermal and package characteristics

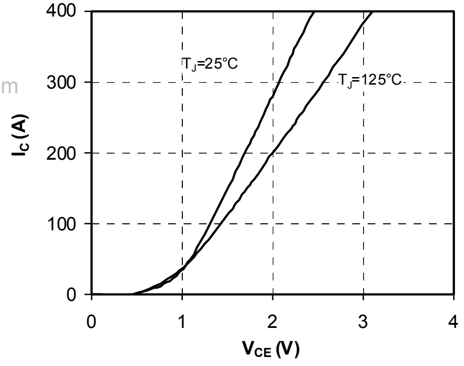
Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance		IGBT			0.14	°C/W
			Diode			0.25	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature 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

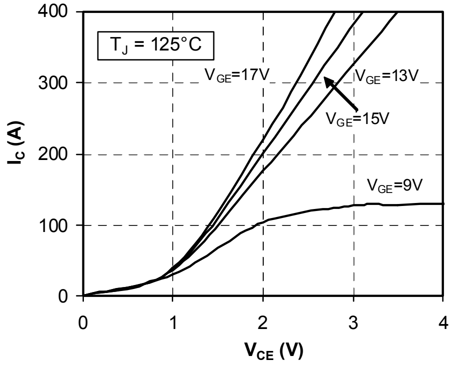
SP6 Package outline (dimensions in mm)

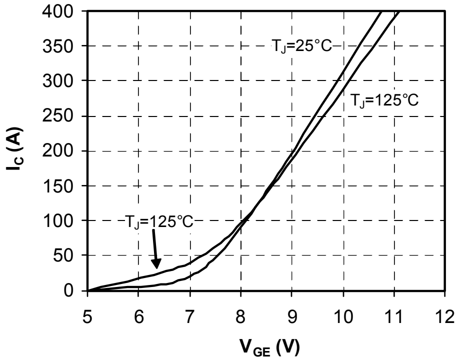


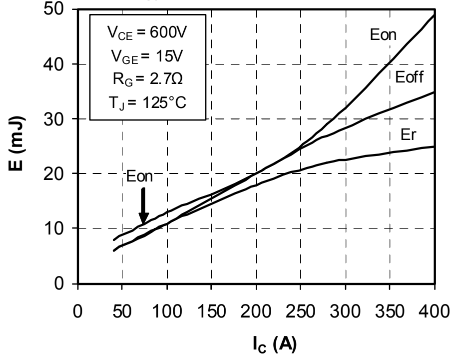
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

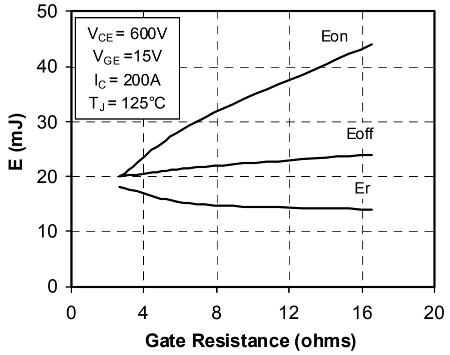
Typical Performance Curve

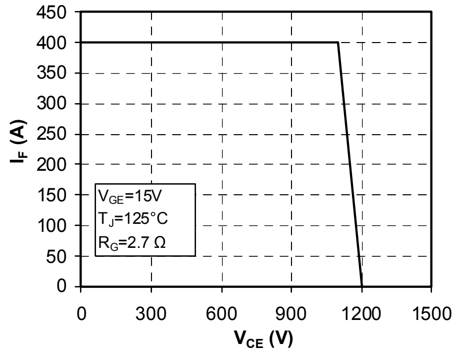

Output Characteristics (V_{GE}=15V)

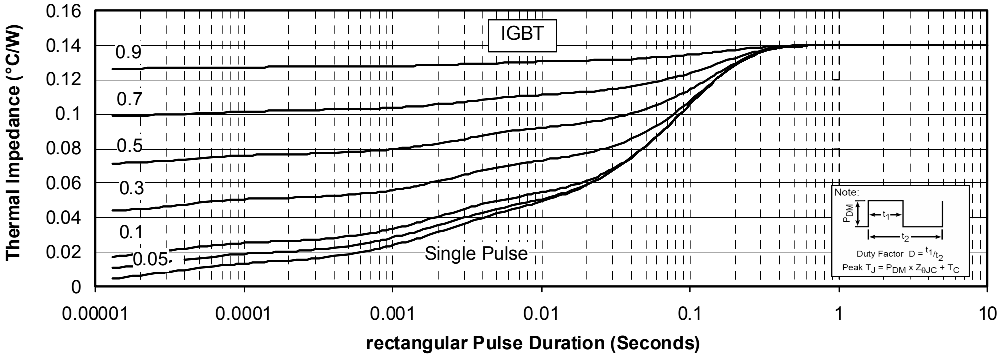

Output Characteristics

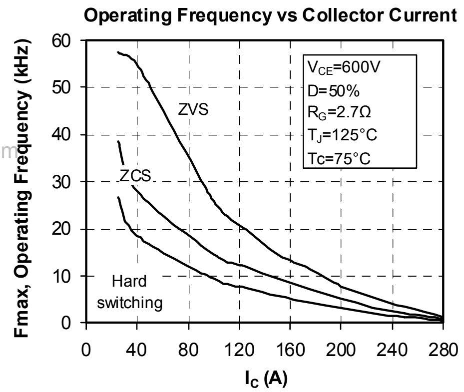

Transfert Characteristics

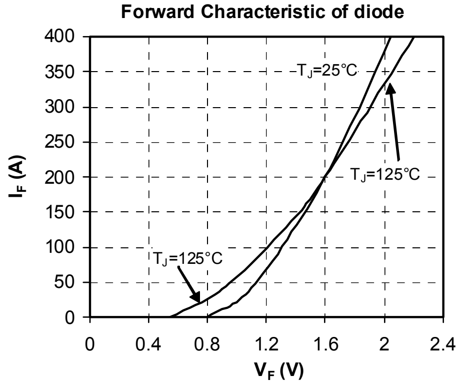

Energy losses vs Collector Current

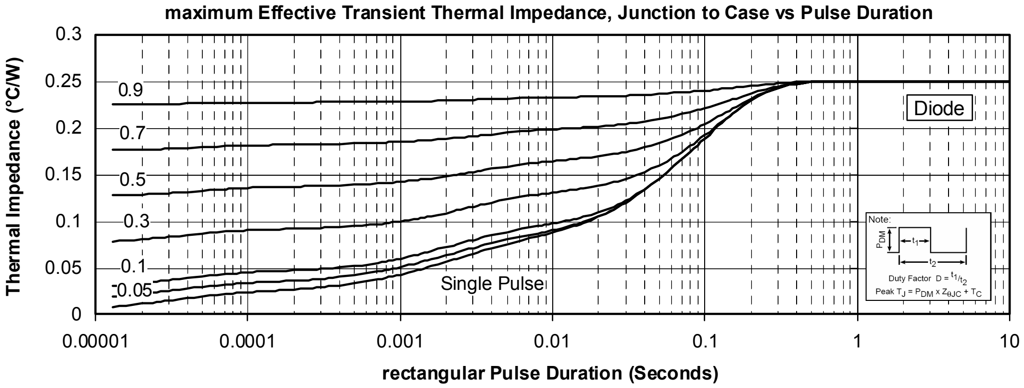

Switching Energy Losses vs Gate Resistance


Reverse Bias Safe Operating Area


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration







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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.