



**Absolute maximum ratings** (Per MOSFET)

<i>Symbol</i>	<i>Parameter</i>	<i>Max ratings</i>	<i>Unit</i>
V <sub>DSS</sub>	Drain - Source Breakdown Voltage	1000	V
I <sub>D</sub>	Continuous Drain Current	T <sub>c</sub> = 25°C	22
		T <sub>c</sub> = 80°C	17
I <sub>DM</sub>	Pulsed Drain current	88	A
V <sub>GS</sub>	Gate - Source Voltage	±30	V
R <sub>DS(on)</sub>	Drain - Source ON Resistance	420	mΩ
P <sub>D</sub>	Maximum Power Dissipation	T <sub>c</sub> = 25°C	390
I <sub>AR</sub>	Avalanche current (repetitive and non repetitive)	25	A
E <sub>AR</sub>	Repetitive Avalanche Energy	50	mJ
E <sub>AS</sub>	Single Pulse Avalanche Energy	3000	

**Electrical Characteristics** (Per MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1000V	T <sub>j</sub> = 25°C		100	μA
		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 800V	T <sub>j</sub> = 125°C		500	
R <sub>DS(on)</sub>	Drain – Source on Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 11A		350	420	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 2.5mA	3		5	V
I <sub>GSS</sub>	Gate – Source Leakage Current	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V			±100	nA

**Dynamic Characteristics** (Per MOSFET)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V f = 1MHz		5.2		nF
C <sub>oss</sub>	Output Capacitance			0.88		
C <sub>rss</sub>	Reverse Transfer Capacitance			0.16		
Q <sub>g</sub>	Total gate Charge	V <sub>GS</sub> = 10V V <sub>Bus</sub> = 500V I <sub>D</sub> = 22A		186		nC
Q <sub>gs</sub>	Gate – Source Charge			24		
Q <sub>gd</sub>	Gate – Drain Charge			122		
T <sub>d(on)</sub>	Turn-on Delay Time	<b>Inductive switching @ 125°C</b> V <sub>GS</sub> = 15V V <sub>Bus</sub> = 670V I <sub>D</sub> = 22A R <sub>G</sub> = 5Ω		18		ns
T <sub>r</sub>	Rise Time			12		
T <sub>d(off)</sub>	Turn-off Delay Time			155		
T <sub>f</sub>	Fall Time			40		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 25°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 670V I <sub>D</sub> = 22A, R <sub>G</sub> = 5Ω		540		μJ
E <sub>off</sub>	Turn-off Switching Energy			623		
E <sub>on</sub>	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> V <sub>GS</sub> = 15V, V <sub>Bus</sub> = 670V I <sub>D</sub> = 22A, R <sub>G</sub> = 5Ω		854		μJ
E <sub>off</sub>	Turn-off Switching Energy			779		
R <sub>thJC</sub>	Junction to Case Thermal Resistance				0.32	°C/W

**Series diode ratings and characteristics (per diode)**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V <sub>RRM</sub>	Maximum Repetitive Reverse Voltage			1000			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =1000V				250	μA
I <sub>F</sub>	DC Forward Current		T <sub>c</sub> = 80°C		30		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 30A			1.9	2.3	V
		I <sub>F</sub> = 60A			2.2		
		I <sub>F</sub> = 30A	T <sub>j</sub> = 125°C		1.7		
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 30A V <sub>R</sub> = 667V di/dt = 200A/μs	T <sub>j</sub> = 25°C		290		ns
	T <sub>j</sub> = 125°C			390			
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>j</sub> = 25°C			670	
		T <sub>j</sub> = 125°C			2350		
R <sub>thJC</sub>	Junction to Case Thermal Resistance					1.2	°C/W

**SiC Parallel diode ratings and characteristics (per SiC diode)**

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V <sub>RRM</sub>	Maximum Peak Repetitive Reverse Voltage			1200			V
I <sub>RM</sub>	Maximum Reverse Leakage Current	V <sub>R</sub> =1200V	T <sub>j</sub> = 25°C		64	400	μA
			T <sub>j</sub> = 175°C		112	2000	
I <sub>F</sub>	DC Forward Current		T <sub>c</sub> = 125°C		20		A
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 20A	T <sub>j</sub> = 25°C		1.6	1.8	V
			T <sub>j</sub> = 175°C		2.3	3	
Q <sub>C</sub>	Total Capacitive Charge	I <sub>F</sub> = 20A, V <sub>R</sub> = 600V di/dt = 1000A/μs			80		nC
C	Total Capacitance	f = 1MHz, V <sub>R</sub> = 200V			192		pF
		f = 1MHz, V <sub>R</sub> = 400V			138		
R <sub>thJC</sub>	Junction to Case Thermal Resistance					1	°C/W

**Thermal and package characteristics**

<i>Symbol</i>	<i>Characteristic</i>	<i>Min</i>	<i>Max</i>	<i>Unit</i>		
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	150	°C		
T <sub>JOP</sub>	Recommended junction temperature under switching conditions	-40	T <sub>Jmax</sub> -25			
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
Wt	Package Weight				250	g

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com)).

Pins NTC1 & NTC2 are only mounted on APTM100TA35SCTPG power module.

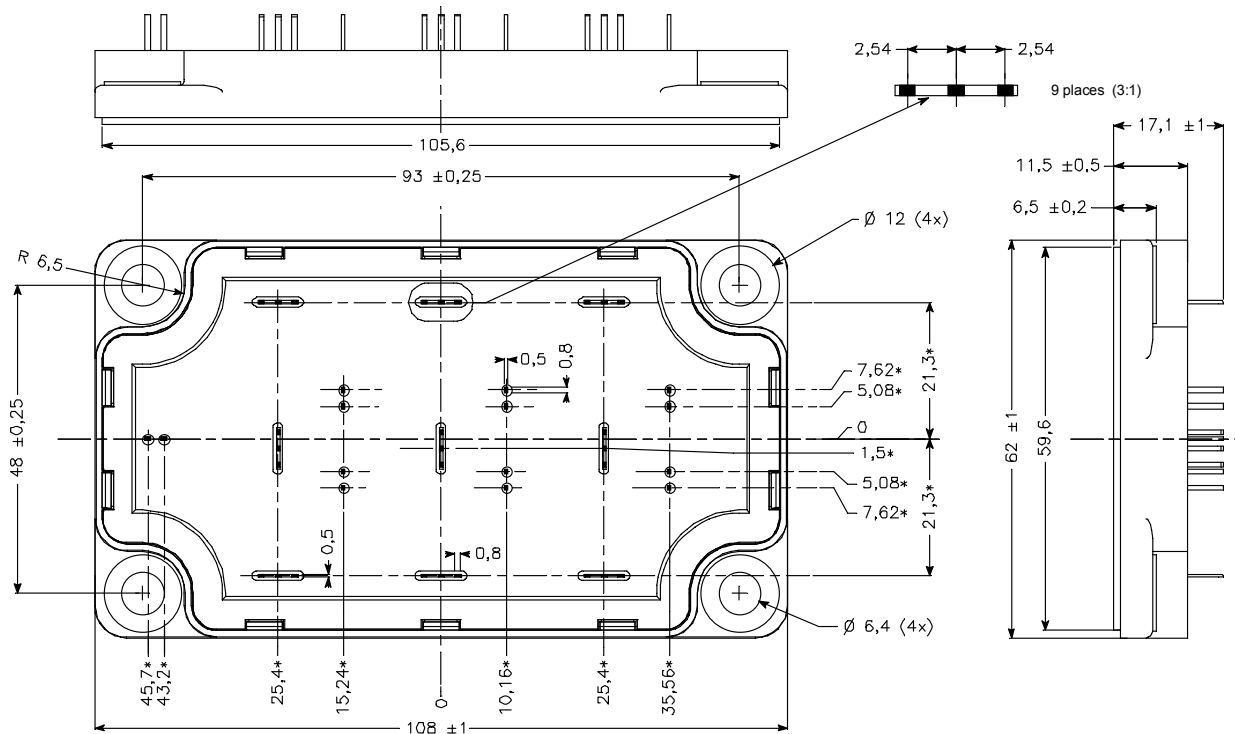
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B	T <sub>C</sub> = 100°C		4		%

$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

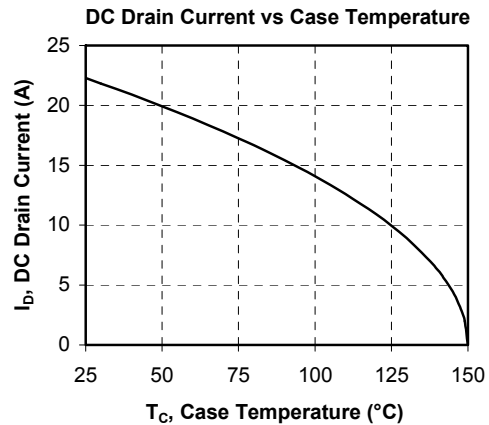
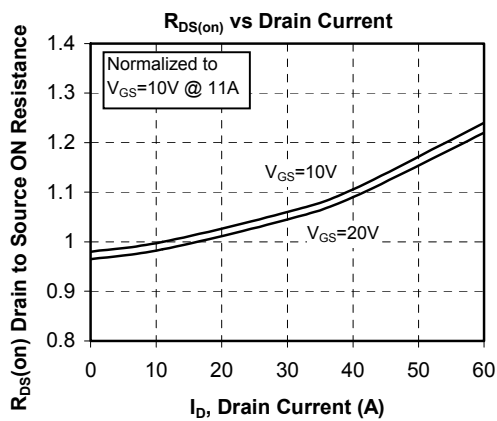
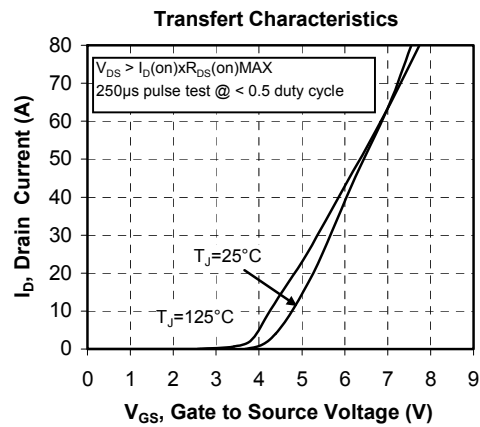
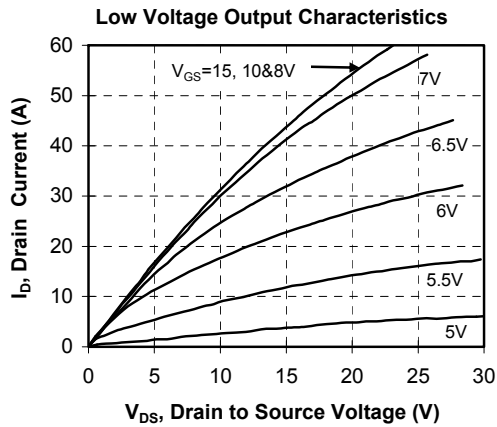
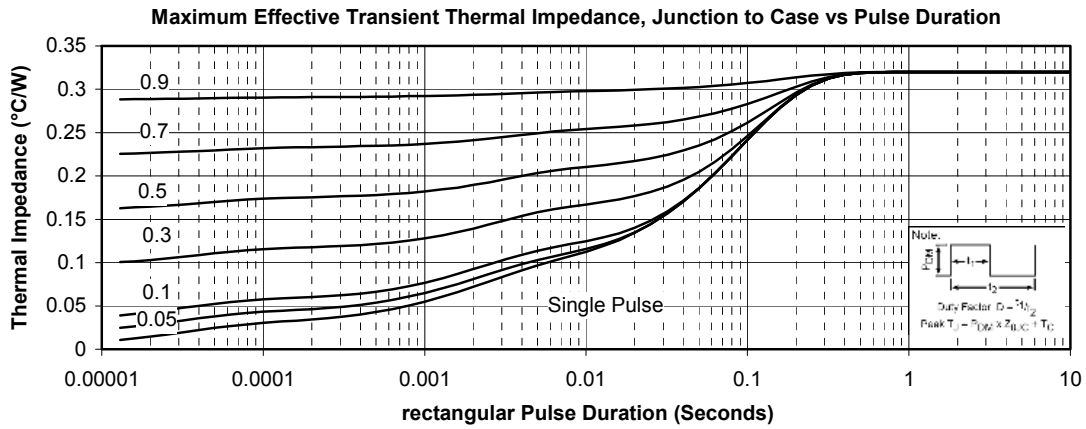
**SP6-P Package outline (dimensions in mm)**

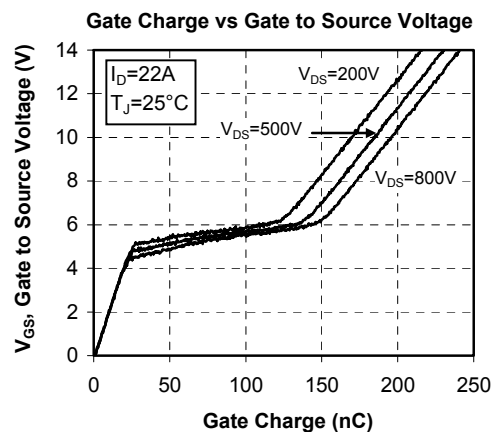
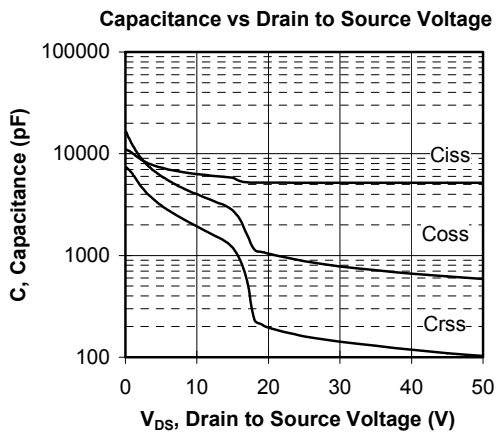
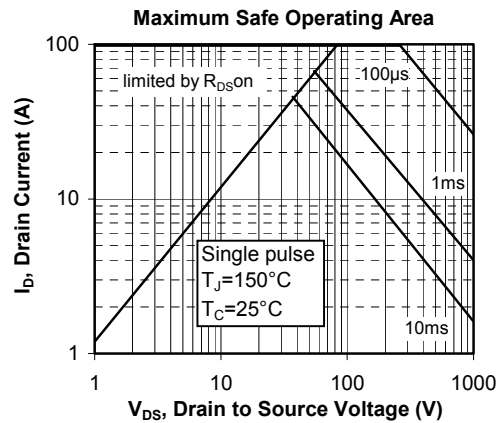
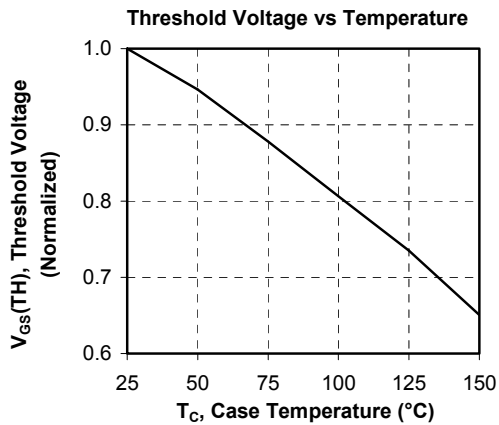
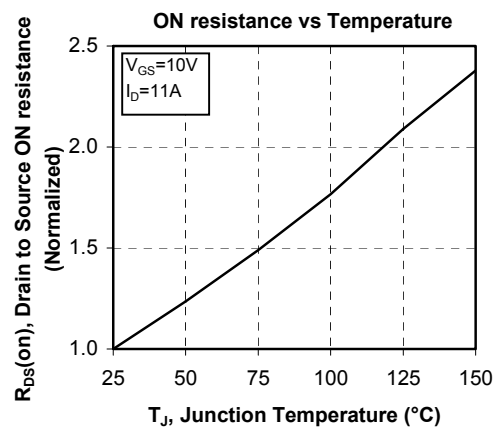
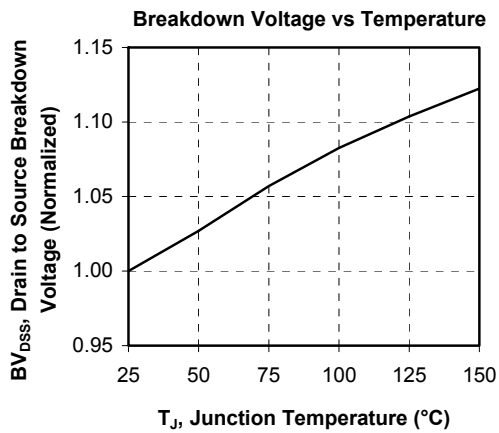
Pins NTC1 & NTC2 are only mounted on APTM100TA35SCTPG power module.

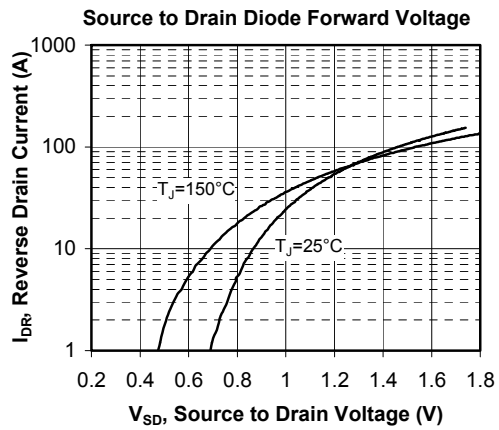
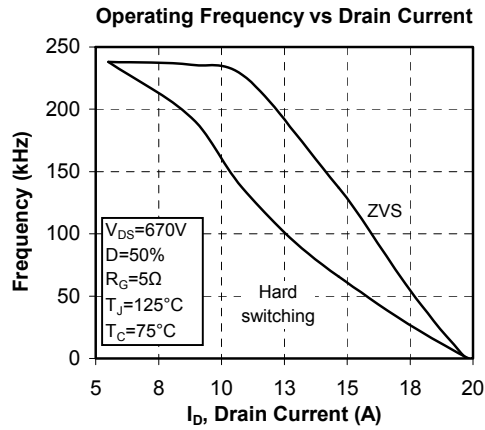
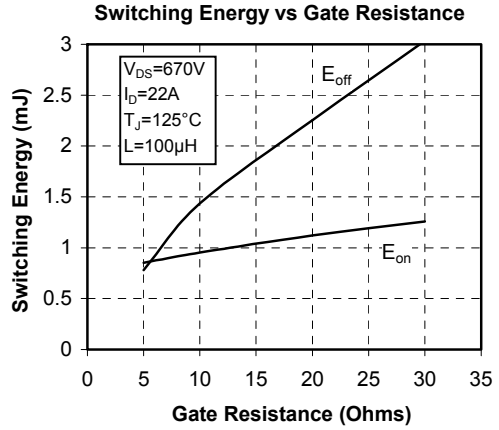
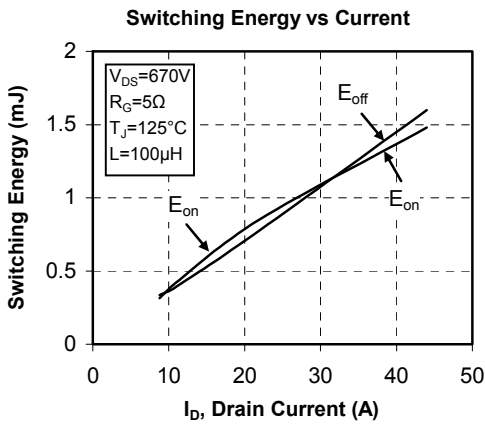
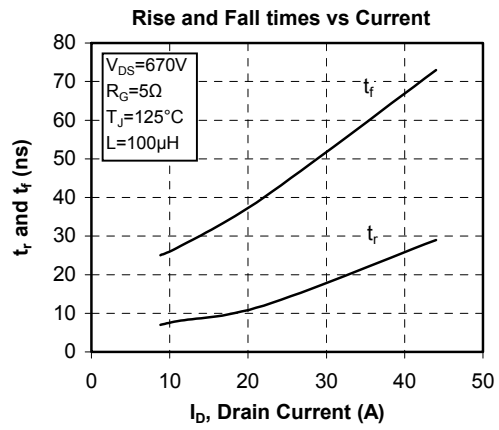
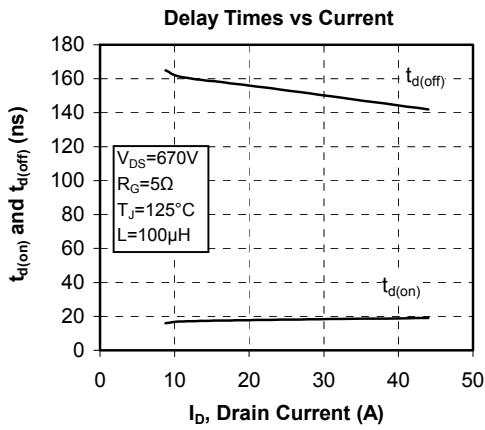


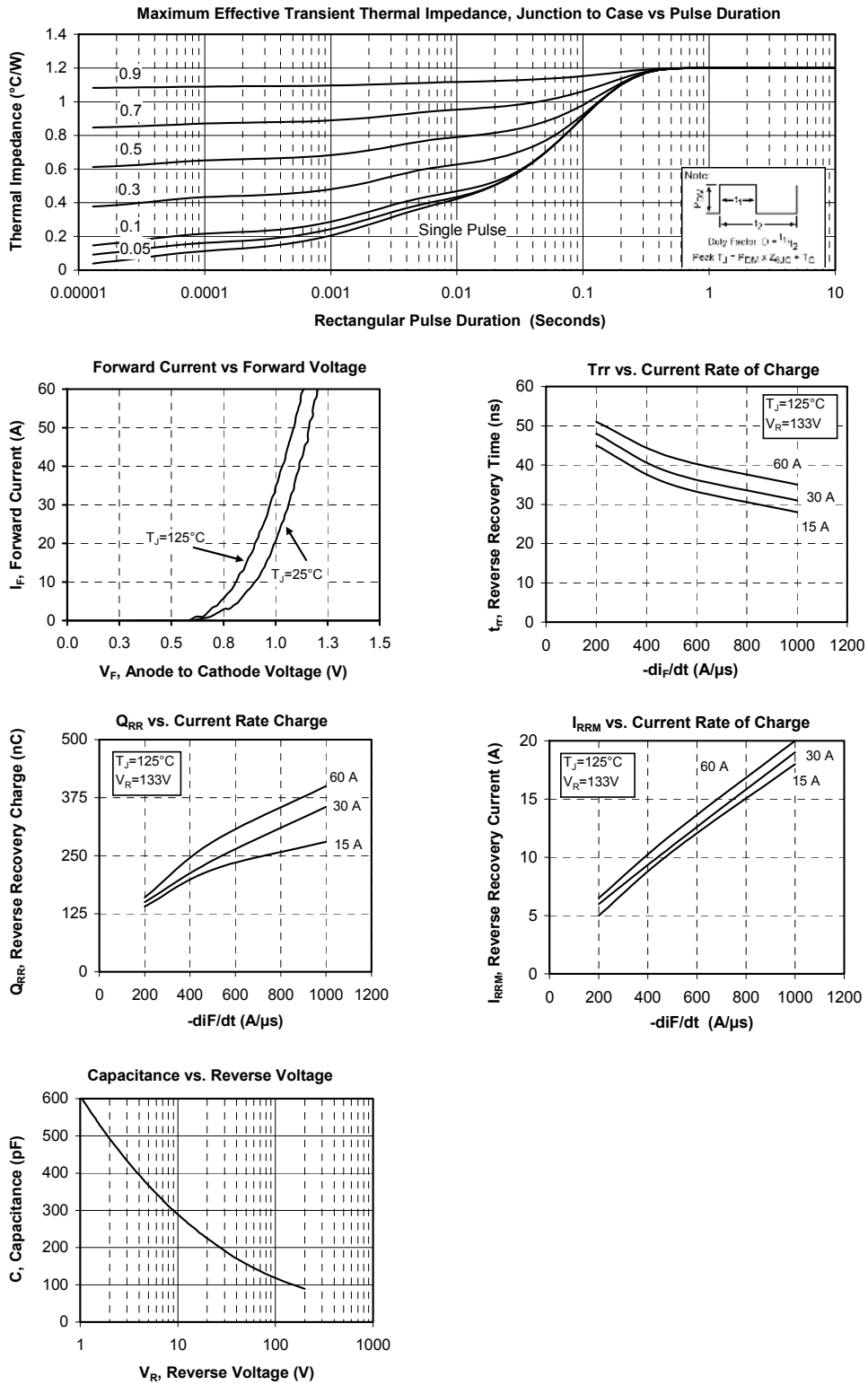
ALL DIMENSIONS MARKED "\*" ARE TOLERENCED AS:  $\pm 0.1$

See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on [www.microsemi.com](http://www.microsemi.com)

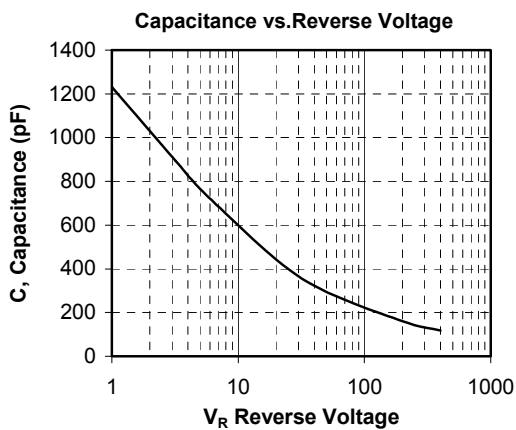
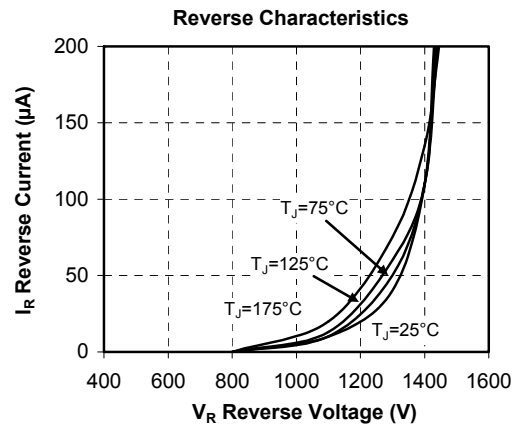
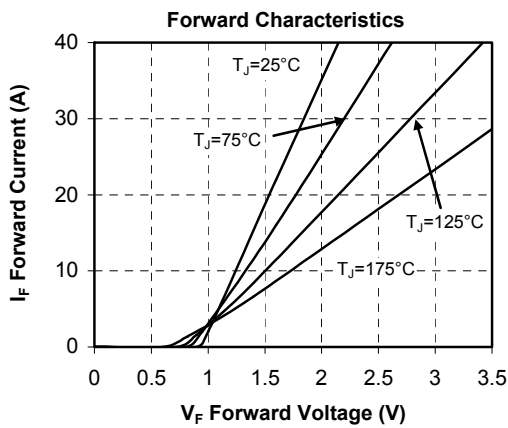
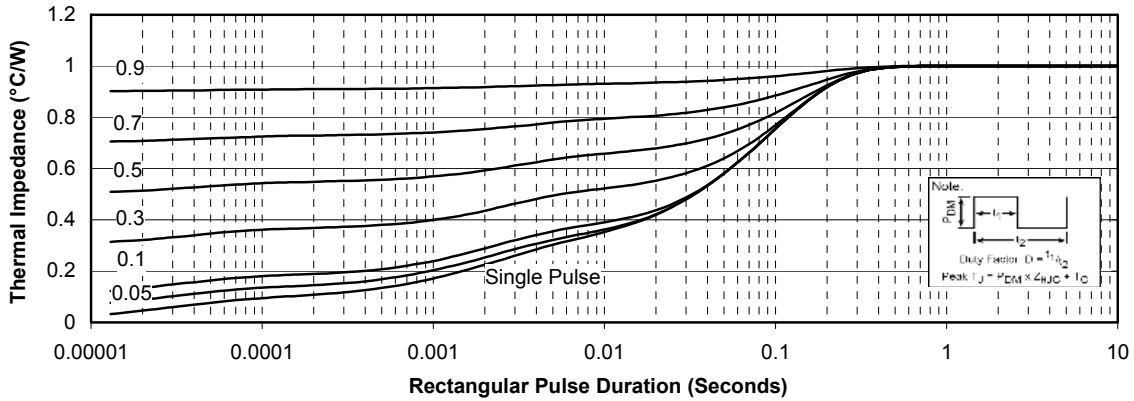
**Typical MOSFET Performance Curve**






**Typical series diode Performance Curve**




**Typical SiC parallel diode Performance Curve**
**Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration**


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