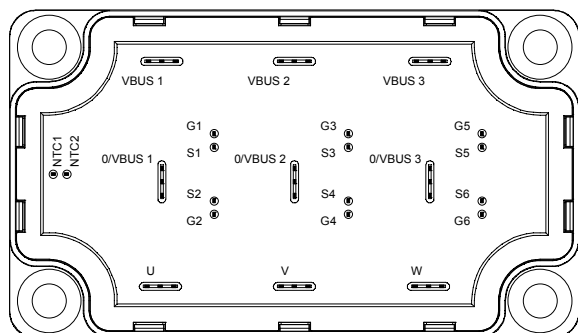
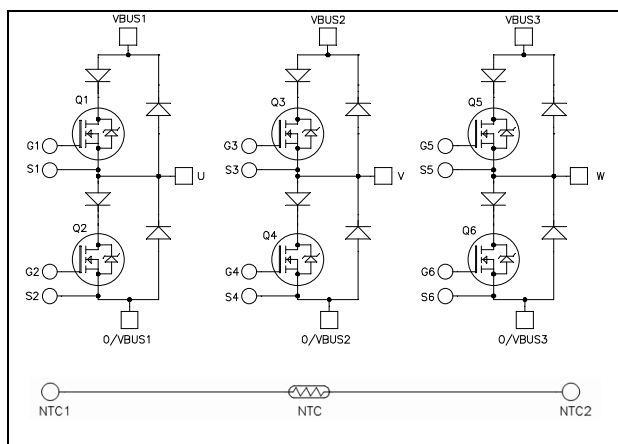


Triple phase leg MOSFET Power Module

$$V_{DSS} = 1000V$$

$$R_{DS(on)} = 350m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 22A \text{ @ } T_c = 25^\circ C$$



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

Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **Power MOS 7[®] MOSFETs**
 - Low $R_{DS(on)}$
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- **SiC Parallel Schottky Diode**
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Very low (12mm) profile
- Each leg can be easily paralleled to achieve a phase leg of three times the current capability
- Module can be configured as a three phase bridge
- RoHS Compliant

All ratings @ $T_j = 25^\circ C$ unless otherwise specified



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

Absolute maximum ratings (Per MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ\text{C}$	A
		$T_c = 80^\circ\text{C}$	
I_{DM}	Pulsed Drain current	88	
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	420	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ\text{C}$	W
I_{AR}	Avalanche current (repetitive and non repetitive)	25	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

Electrical Characteristics (Per MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1000V$ $T_j = 25^\circ\text{C}$			100	μA
		$V_{GS} = 0V, V_{DS} = 800V$ $T_j = 125^\circ\text{C}$			500	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 11A$		350	420	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 100	nA

Dynamic Characteristics (Per MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$		5.2		nF
C_{oss}	Output Capacitance			0.88		
C_{rss}	Reverse Transfer Capacitance			0.16		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 500V$ $I_D = 22A$		186		nC
Q_{gs}	Gate – Source Charge			24		
Q_{gd}	Gate – Drain Charge			122		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 22A$ $R_G = 5\Omega$		18		ns
T_r	Rise Time			12		
$T_{d(off)}$	Turn-off Delay Time			155		
T_f	Fall Time			40		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 22A, R_G = 5\Omega$		540		μJ
E_{off}	Turn-off Switching Energy			623		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 22A, R_G = 5\Omega$		854		μJ
E_{off}	Turn-off Switching Energy			779		
R_{thJC}	Junction to Case Thermal Resistance				0.32	$^\circ\text{C/W}$

Series diode ratings and characteristics (per diode)

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

SiC Parallel diode ratings and characteristics (per SiC diode)

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		64	400	μA
			T _j = 175°C		112	2000	
I _F	DC Forward Current		T _c = 125°C		20		A
V _F	Diode Forward Voltage	I _F = 20A	T _j = 25°C		1.6	1.8	V
			T _j = 175°C		2.3	3	
Q _C	Total Capacitive Charge	I _F = 20A, V _R = 600V di/dt = 1000A/μs			80		nC
C	Total Capacitance	f = 1MHz, V _R = 200V			192		pF
		f = 1MHz, V _R = 400V			138		
R _{thJC}	Junction to Case Thermal Resistance					1	°C/W

Thermal and package characteristics

Symbol	Characteristic			Min	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T _J	Operating junction temperature range			-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions			-40	T _J max -25	
T _{STG}	Storage Temperature Range			-40	125	
T _C	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).

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

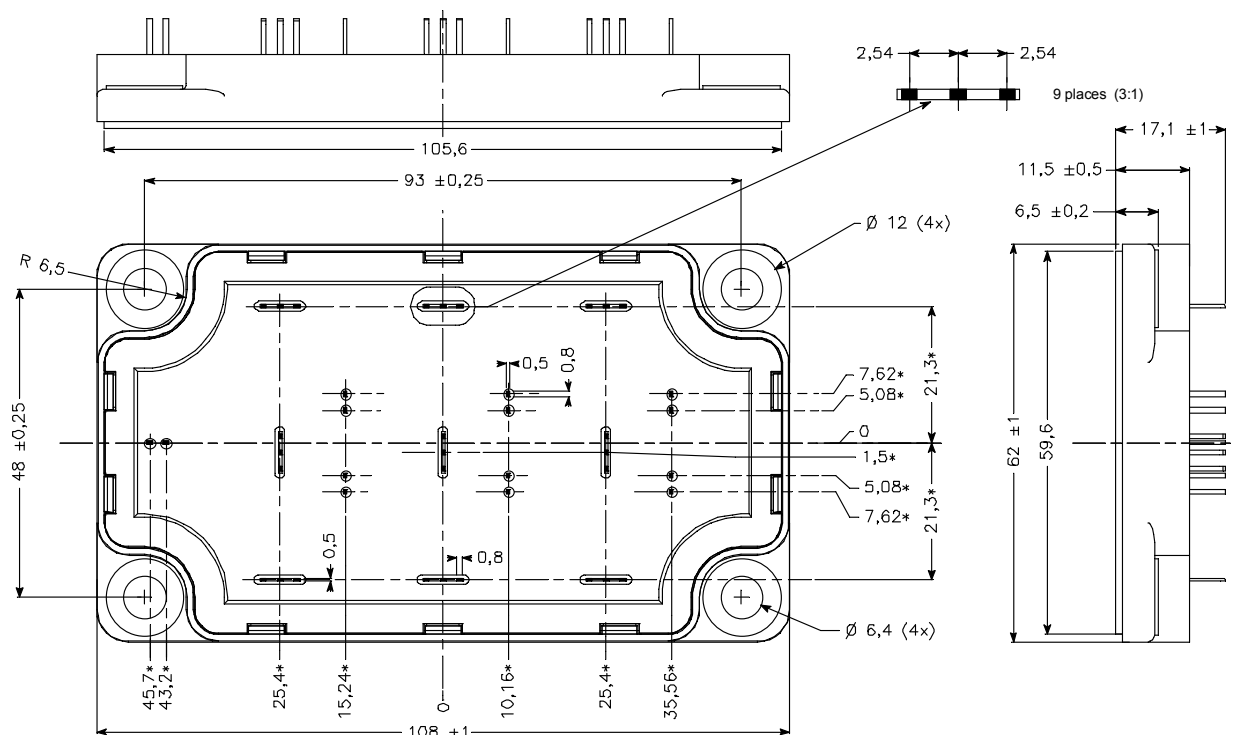
Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

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

T: Thermistor temperature
 R_T: Thermistor value at T

SP6-P Package outline (dimensions in mm)

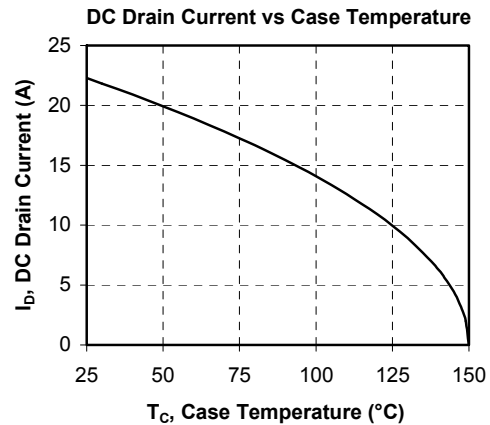
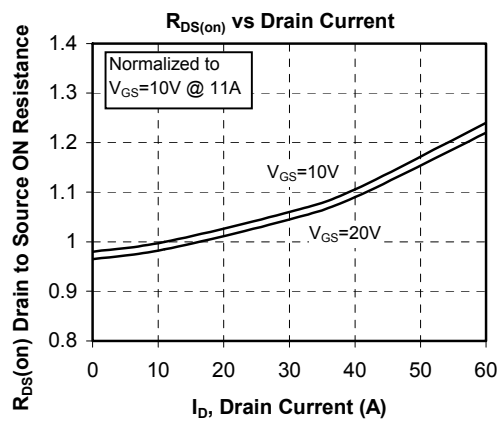
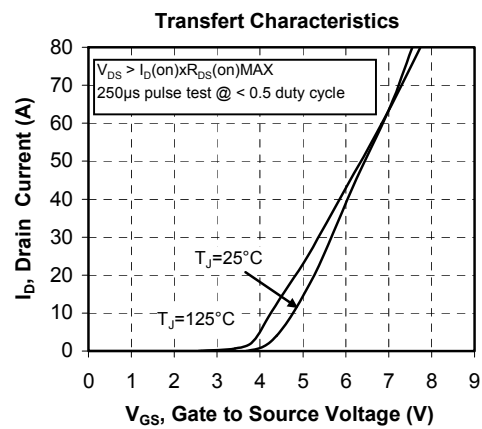
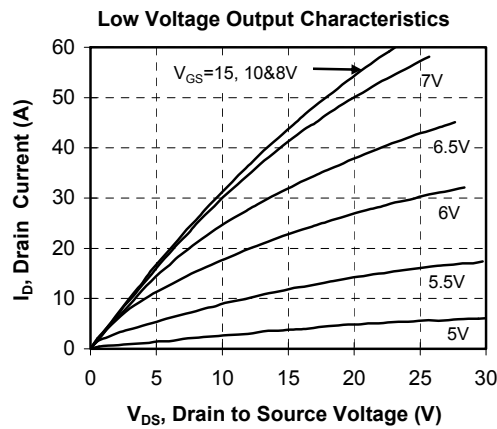
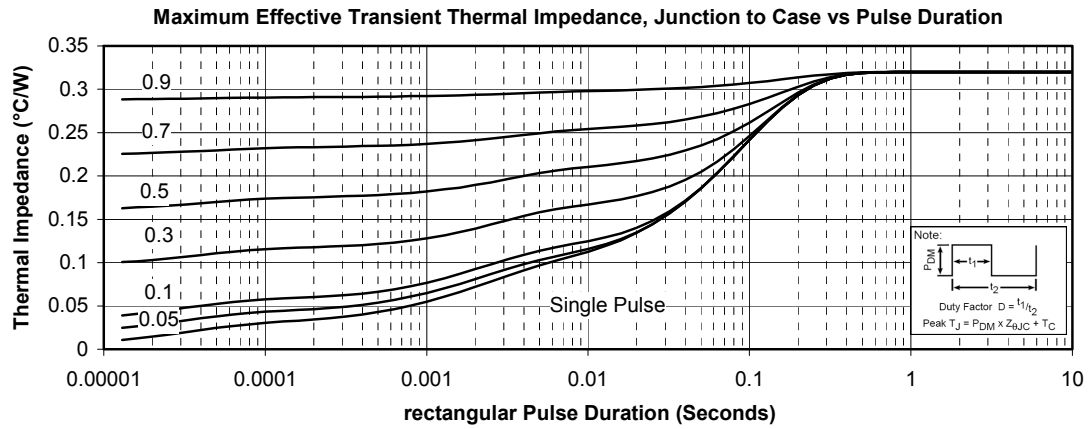
Pins NTC1 & NTC2 are only mounted on APTM100TA35SCTPG power module.

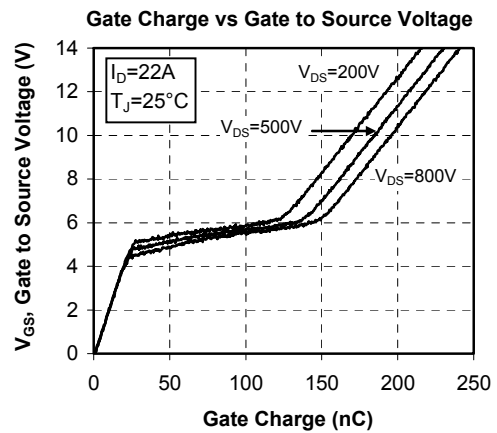
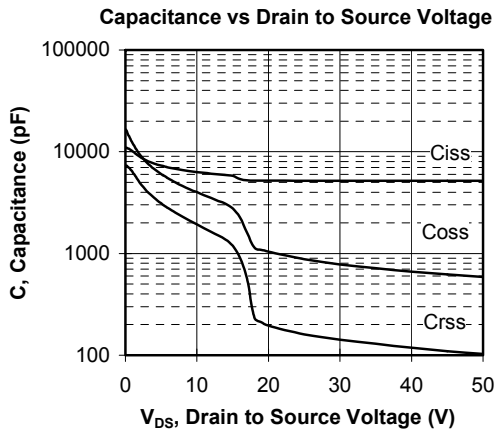
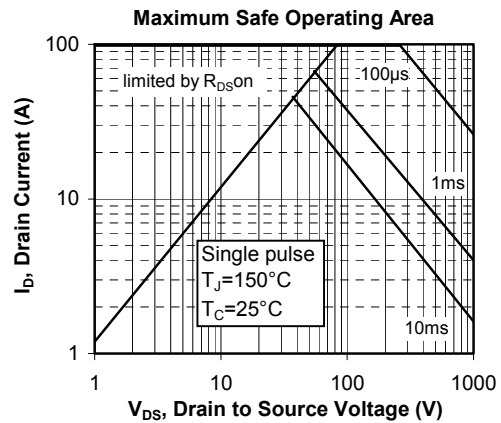
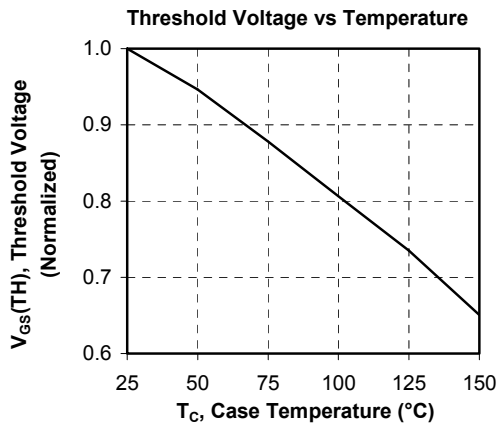
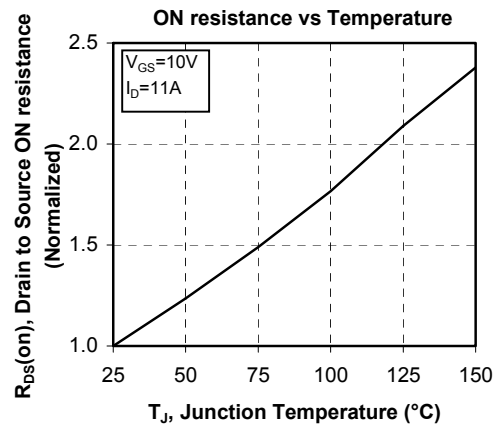
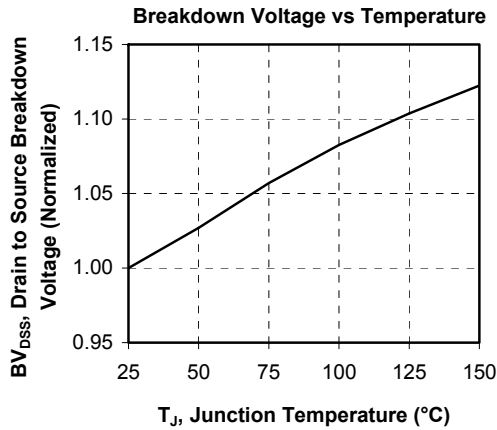


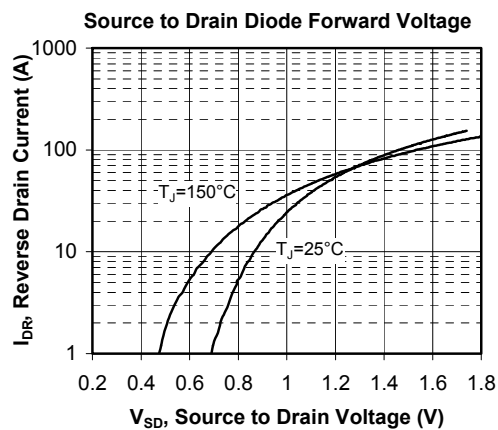
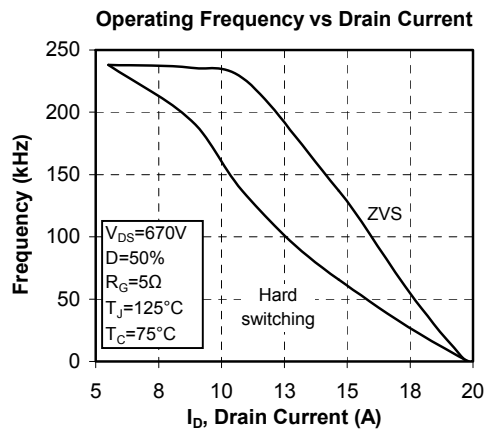
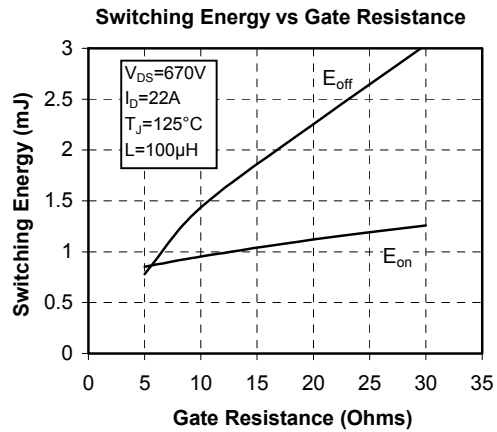
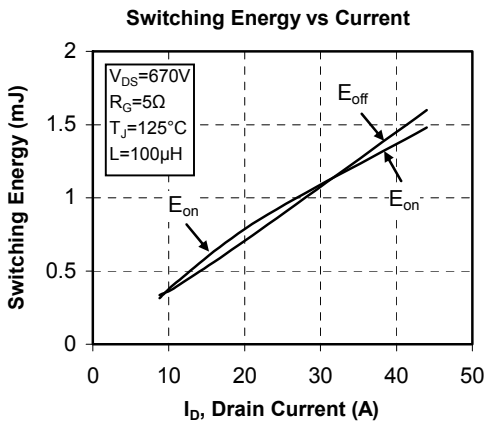
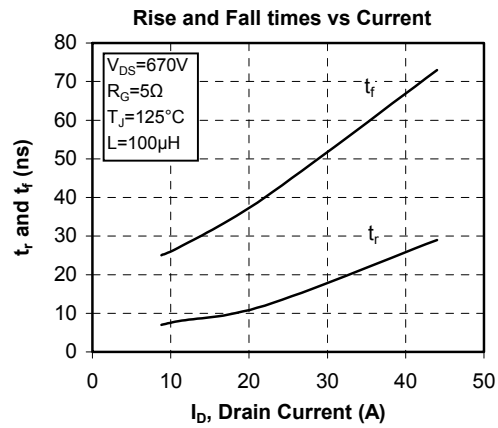
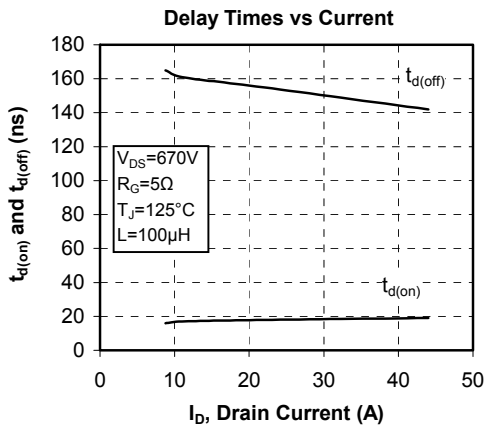
ALL DIMENSIONS MARKED "*" ARE TOLERENCED AS: $\pm 0,1$

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

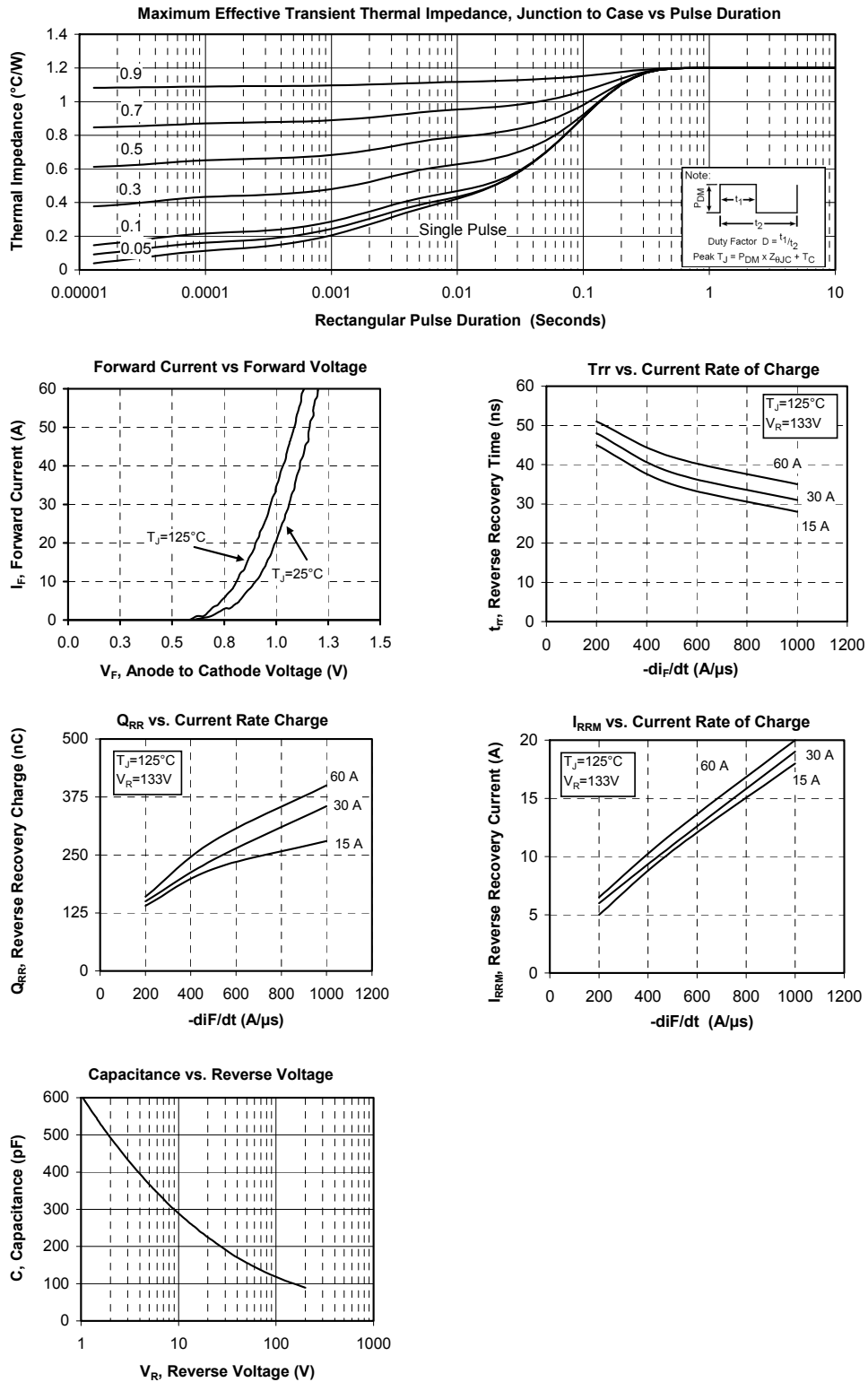
Typical MOSFET Performance Curve



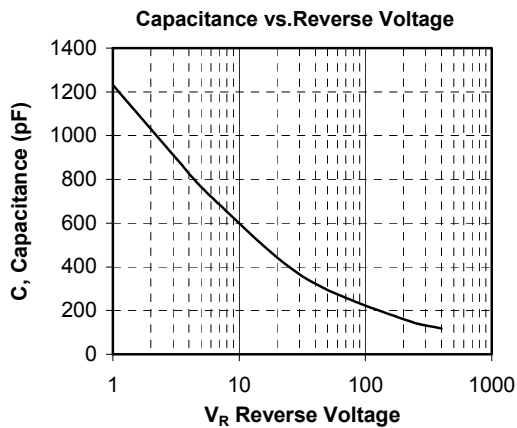
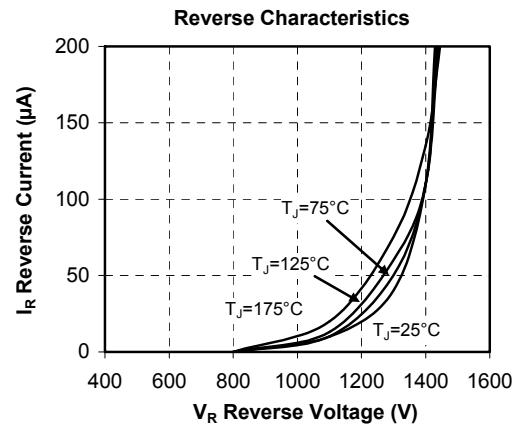
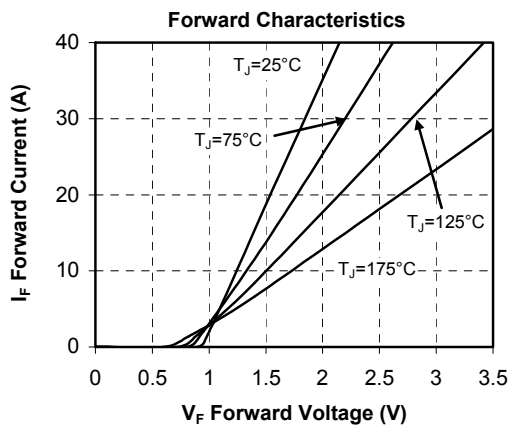
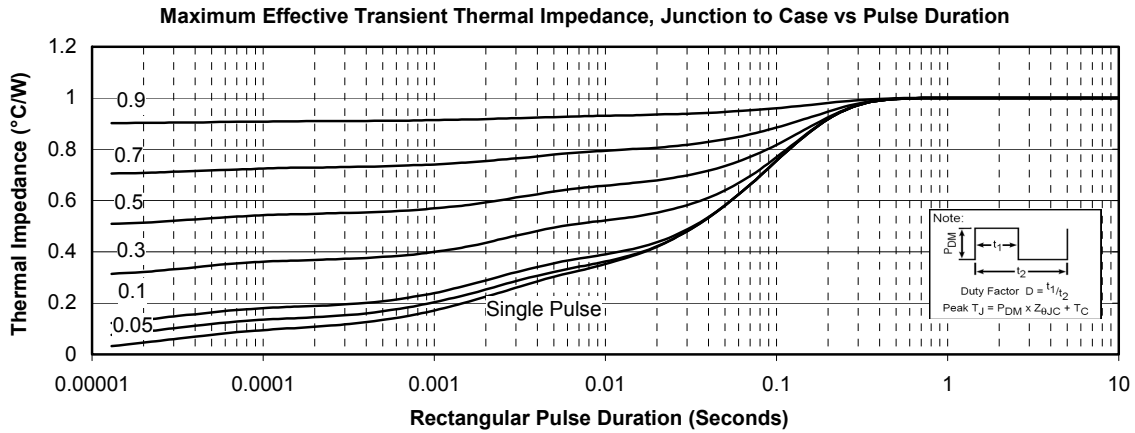




Typical series diode Performance Curve



Typical SiC parallel diode Performance Curve



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