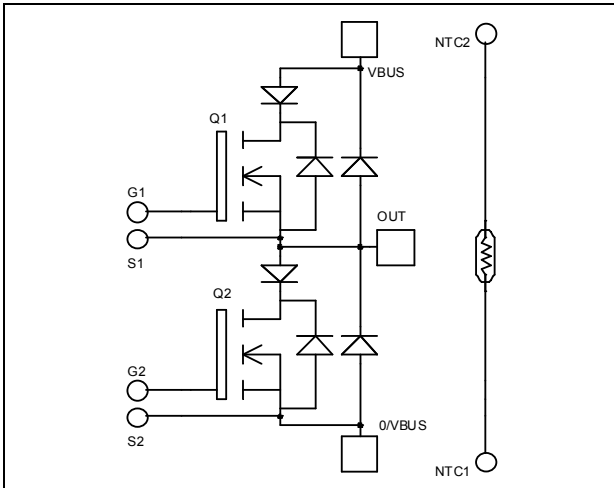


Phase leg

Series & parallel diodes

MOSFET Power Module

$V_{DSS} = 1000V$
 $R_{DSon} = 230m\Omega$ typ @ $T_j = 25^\circ C$
 $I_D = 36A$ @ $T_c = 25^\circ C$

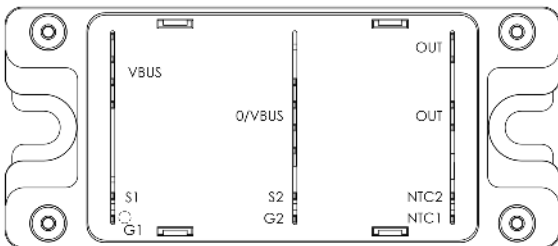


Application

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

Features

- Power MOS 7[®] MOSFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- Internal thermistor for temperature monitoring
- High level of integration



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
- Low profile
- RoHS Compliant

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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	36
		$T_c = 80^\circ C$	27
I_{DM}	Pulsed Drain current	144	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	270	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	694
I_{AR}	Avalanche current (repetitive and non repetitive)	18	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	2500	

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} = 0V, V _{DS} = 1000V			200	μA
		V _{GS} = 0V, V _{DS} = 800V	T _j = 25°C		1000	
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 18A		230	270	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 5mA	3		5	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V			±150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		8700		pF
C _{oss}	Output Capacitance			1430		
C _{rss}	Reverse Transfer Capacitance			240		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 500V I _D = 36A		308		nC
Q _{gs}	Gate – Source Charge			52		
Q _{gd}	Gate – Drain Charge			194		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 667V I _D = 36A R _G = 2.5Ω		10		ns
T _r	Rise Time			12		
T _{d(off)}	Turn-off Delay Time			121		
T _f	Fall Time			35		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 667V I _D = 36A, R _G = 2.5Ω		1278		μJ
E _{off}	Turn-off Switching Energy			760		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 667V I _D = 36A, R _G = 2.5Ω		2092		μJ
E _{off}	Turn-off Switching Energy			902		
R _{thJC}	Junction to Case Thermal Resistance				0.18	°C/W

Series diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		1000			V
I _{RM}	Maximum Reverse Leakage Current	V _R = 1000V			500	μA
I _F	DC Forward Current	T _c = 65°C		90		A
V _F	Diode Forward Voltage	I _F = 90A		1.9	2.3	V
		I _F = 180A		2.2		
		I _F = 90A	T _j = 125°C	1.7		
t _{rr}	Reverse Recovery Time	I _F = 90A V _R = 667V di/dt = 400A/μs	T _j = 25°C	290		ns
			T _j = 125°C	390		
Q _{rr}	Reverse Recovery Charge	I _F = 90A V _R = 667V di/dt = 400A/μs	T _j = 25°C	2010		nC
			T _j = 125°C	7050		
R _{thJC}	Junction to Case Thermal Resistance				0.45	°C/W

Parallel diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			1000			V
I _{RM}	Maximum Reverse Leakage Current	V _R =1000V				150	μA
I _F	DC Forward Current		T _c = 80°C		80		A
V _F	Diode Forward Voltage	I _F = 80A			2.5	3.5	V
		I _F = 140A			3.1		
		I _F = 80A	T _j = 125°C		2		
t _{rr}	Reverse Recovery Time	I _F = 80A V _R = 667V di/dt = 400A/μs	T _j = 25°C		250		ns
			T _j = 125°C		315		
Q _{rr}	Reverse Recovery Charge	I _F = 80A V _R = 667V di/dt = 400A/μs	T _j = 25°C		830		nC
			T _j = 125°C		3300		
R _{thJC}	Junction to Case Thermal Resistance					0.65	°C/W

Thermal and package characteristics

<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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 _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To Heatsink	M5	2.5		4.7	N.m
Wt	Package Weight					160	g

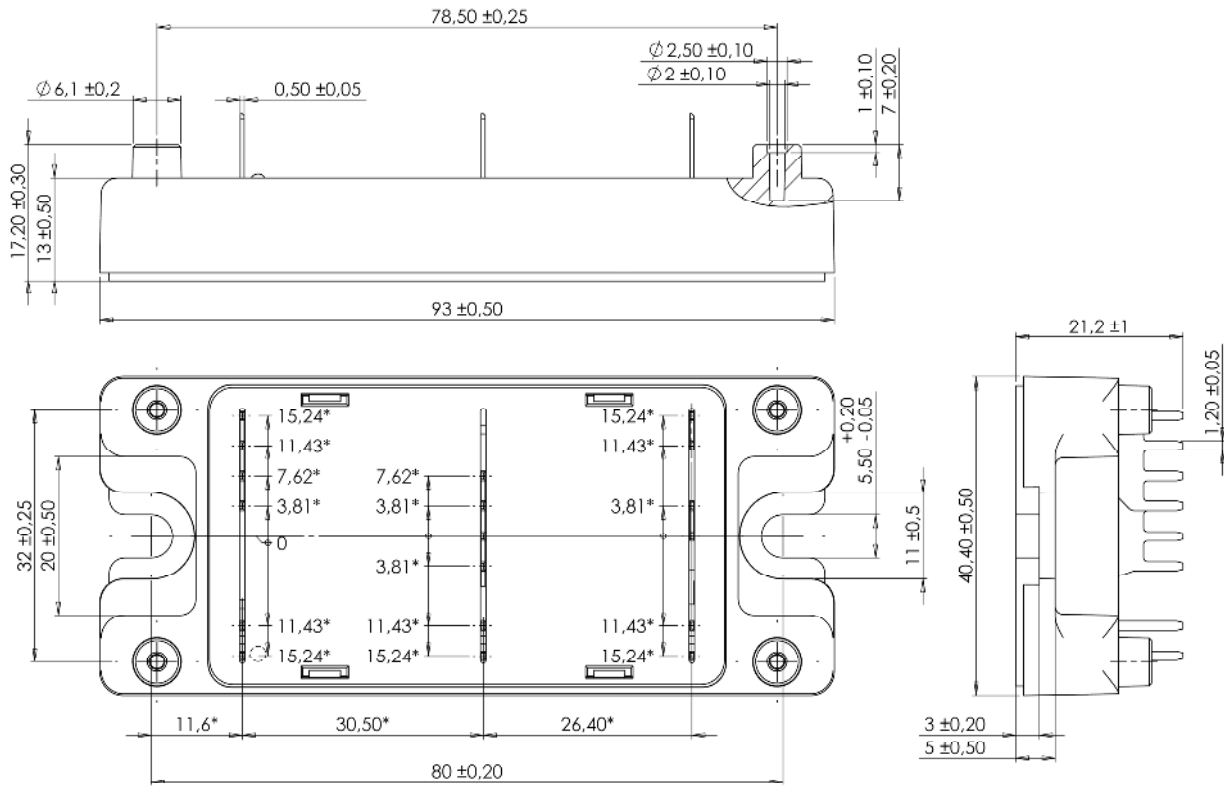
Temperature sensor NTC (see application note APT0406 on www.microsemi.com).

<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
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		%

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

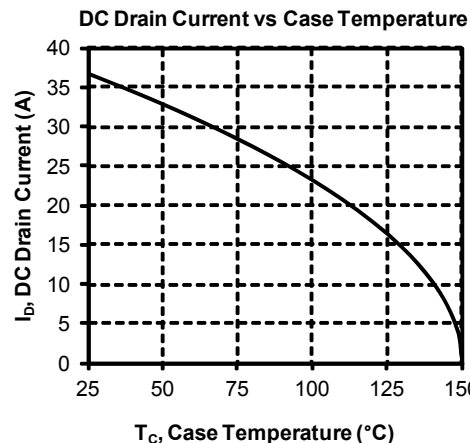
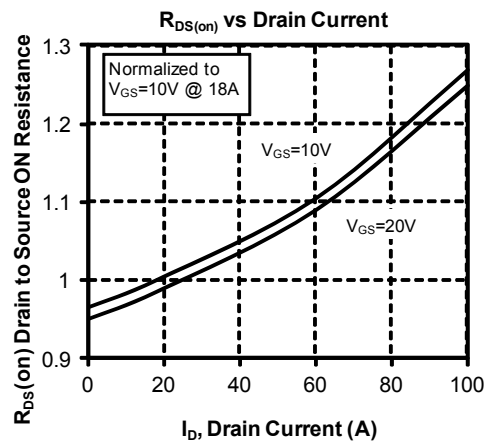
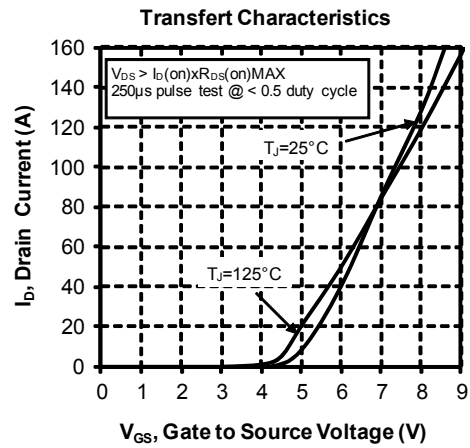
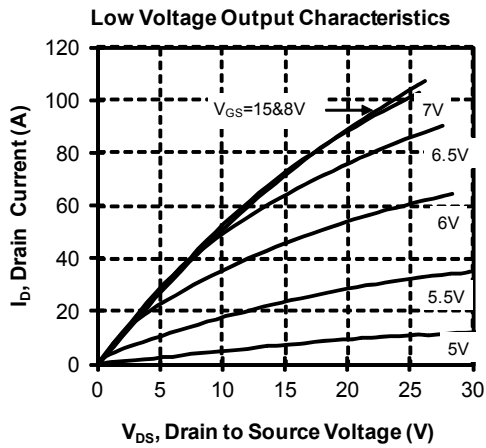
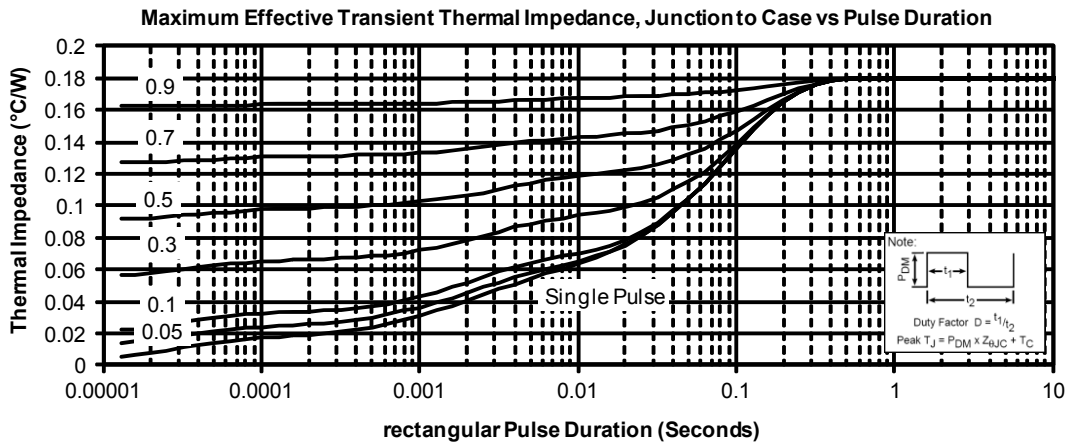
T: Thermistor temperature
 R_T: Thermistor value at T

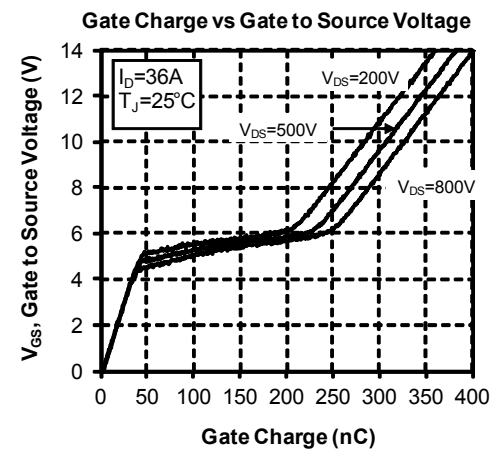
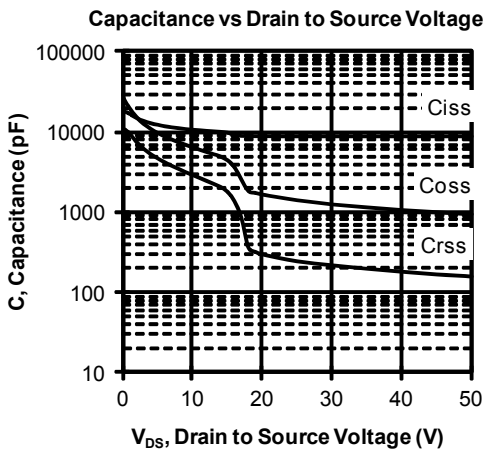
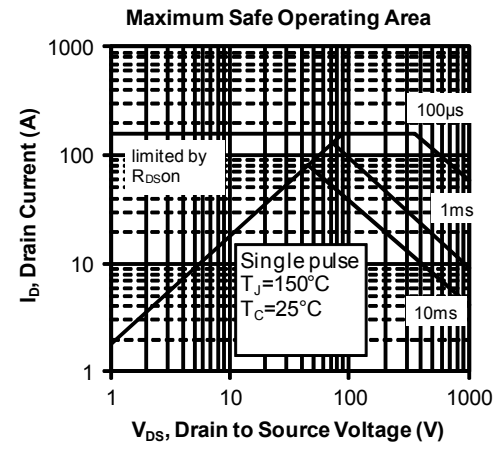
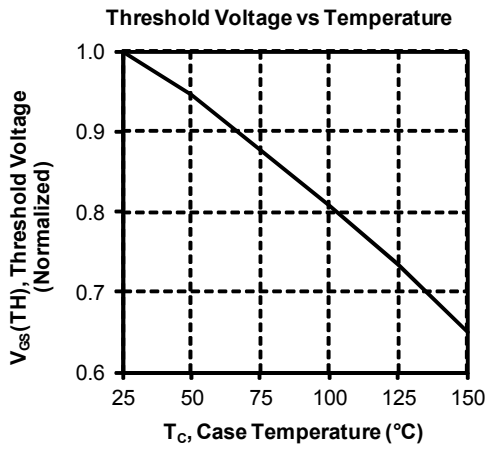
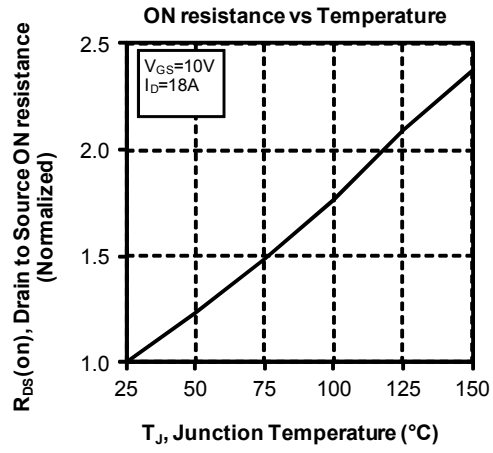
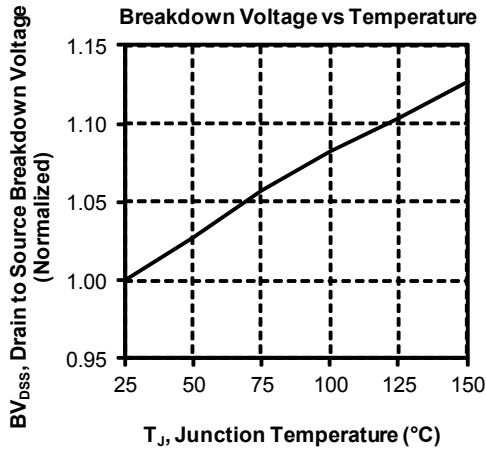
SP4 Package outline (dimensions in mm)

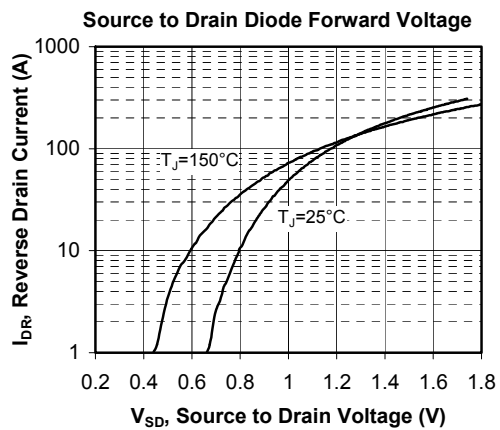
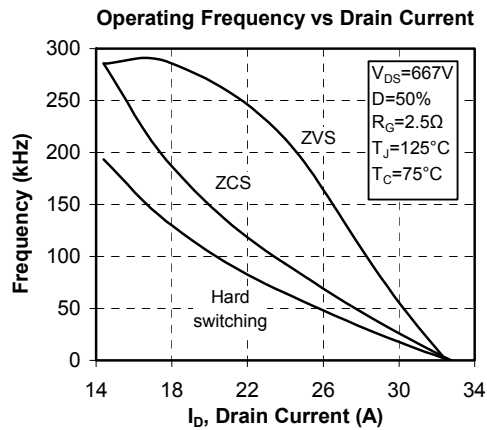
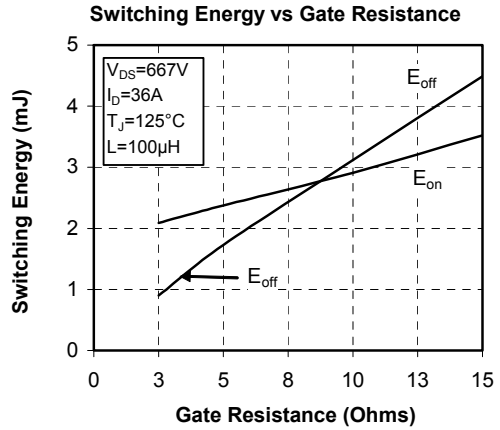
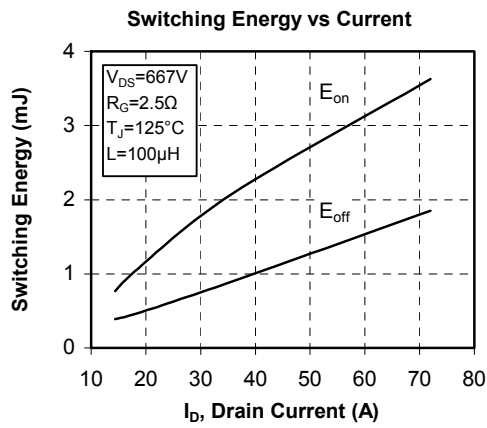
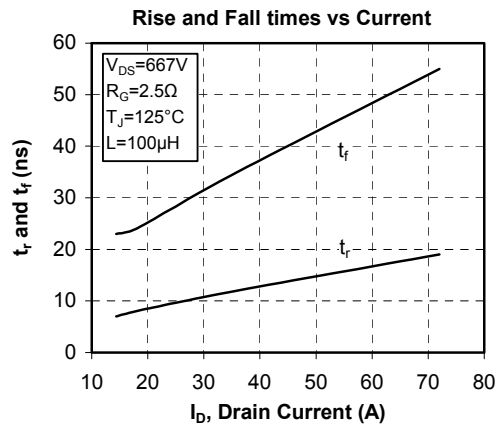
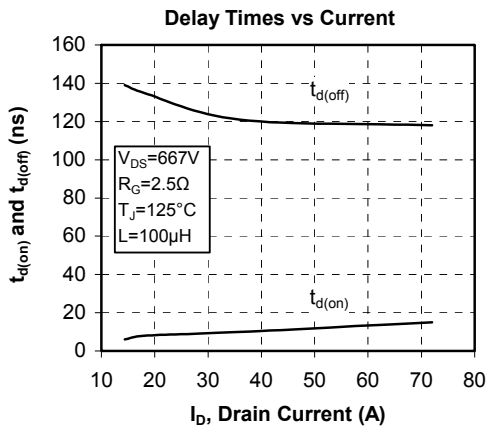


ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: ± 0.1

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical Performance Curve






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