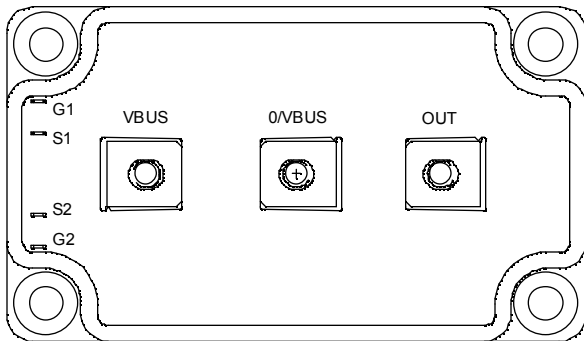
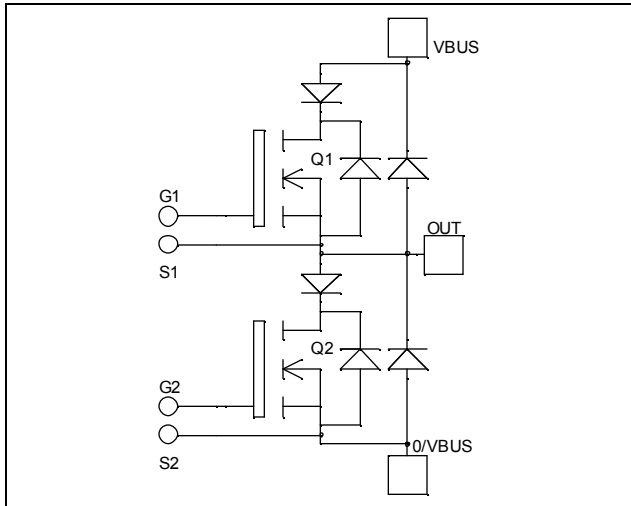


*Phase leg  
Series & parallel diodes  
MOSFET Power Module*

$V_{DSS} = 500V$   
 $R_{DSon} = 24m\Omega$  typ @  $T_j = 25^\circ C$   
 $I_D = 150A$  @  $T_c = 25^\circ C$



### Application

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

### Features


- Power MOS 7<sup>®</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - M5 power connectors
- High level of integration

### Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	150
		$T_c = 80^\circ C$	110
$I_{DM}$	Pulsed Drain current	600	A
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	28	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
$I_{AR}$	Avalanche current (repetitive and non repetitive)	24	A
$E_{AR}$	Repetitive Avalanche Energy	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1300	

 **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
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			500	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			3	$\text{mA}$
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 75\text{A}$		24	28	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 6\text{mA}$	3		5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			$\pm 500$	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		19.6		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		4.2		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.3		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 150\text{A}$		434		nC
$Q_{gs}$	Gate – Source Charge			120		
$Q_{gd}$	Gate – Drain Charge			216		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 150\text{A}$ $R_G = 0.8\Omega$		10		ns
$T_r$	Rise Time			17		
$T_{d(off)}$	Turn-off Delay Time			50		
$T_f$	Fall Time			41		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 150\text{A}, R_G = 0.8\Omega$		1.9		mJ
$E_{off}$	Turn-off Switching Energy			1.5		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 150\text{A}, R_G = 0.8\Omega$		3.3		mJ
$E_{off}$	Turn-off Switching Energy			1.7		

**Series diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		200			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 200\text{V}$	$T_j = 25^\circ\text{C}$		350	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		600	
$I_F$	DC Forward Current			120		A
$V_F$	Diode Forward Voltage	$I_F = 120\text{A}$		1.1	1.15	V
		$I_F = 240\text{A}$		1.4		
		$I_F = 120\text{A}$	$T_j = 125^\circ\text{C}$	0.9		
$t_{rr}$	Reverse Recovery Time	$I_F = 120\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	31		ns
			$T_j = 125^\circ\text{C}$	60		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 120\text{A}$ $V_R = 133\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	120		nC
			$T_j = 125^\circ\text{C}$	500		

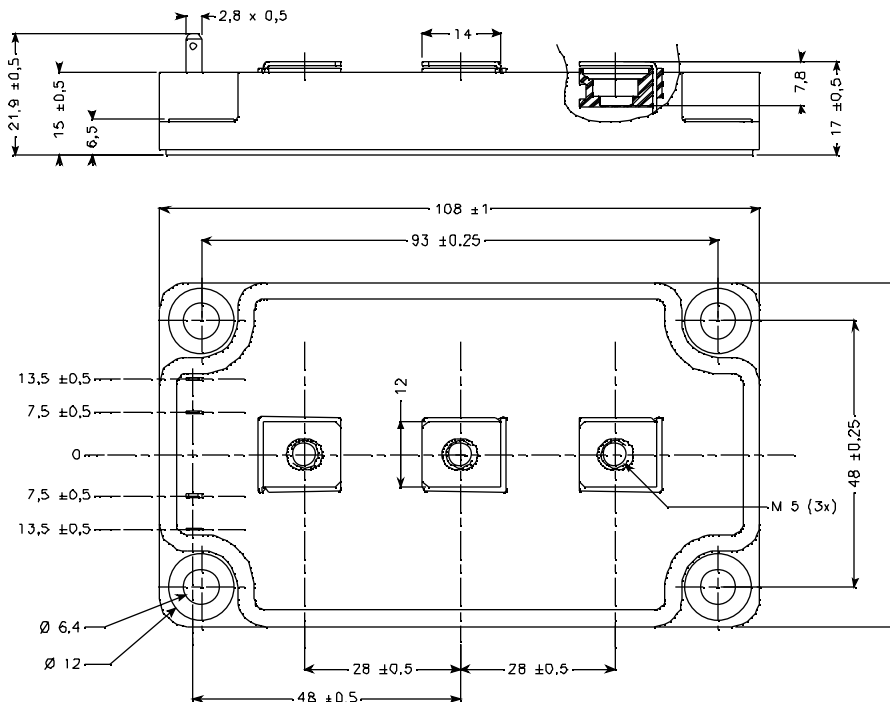
## Parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R=600V$	$T_j = 25^\circ C$		350	$\mu A$
			$T_j = 125^\circ C$		600	
$I_F$	DC Forward Current			120		A
$V_F$	Diode Forward Voltage	$I_F = 120A$		1.6	1.8	V
		$I_F = 240A$		1.9		
		$I_F = 120A$	$T_j = 125^\circ C$	1.4		
$t_{rr}$	Reverse Recovery Time	$I_F = 120A$	$T_j = 25^\circ C$	130		ns
		$V_R = 400V$	$T_j = 125^\circ C$	170		
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 400A/\mu s$	$T_j = 25^\circ C$	440		nC
			$T_j = 125^\circ C$	1840		

## Thermal and package characteristics

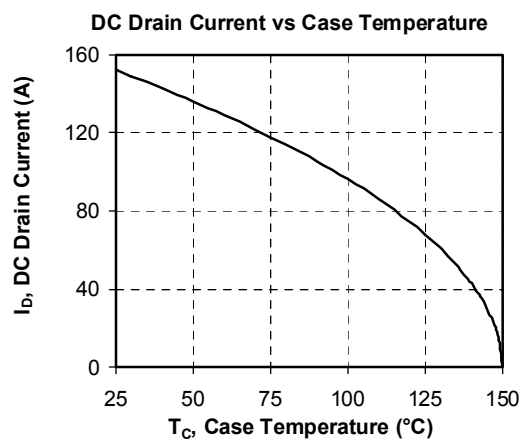
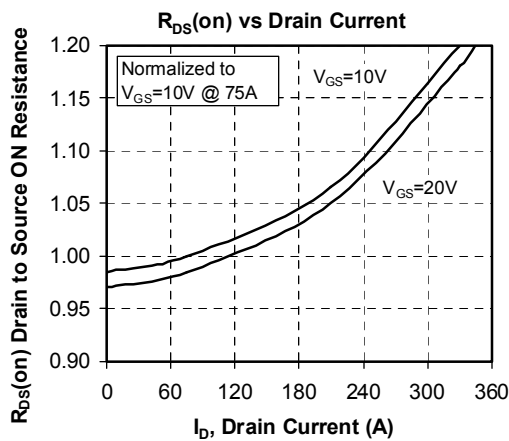
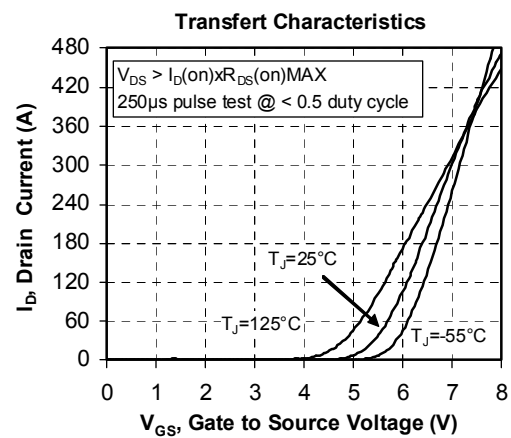
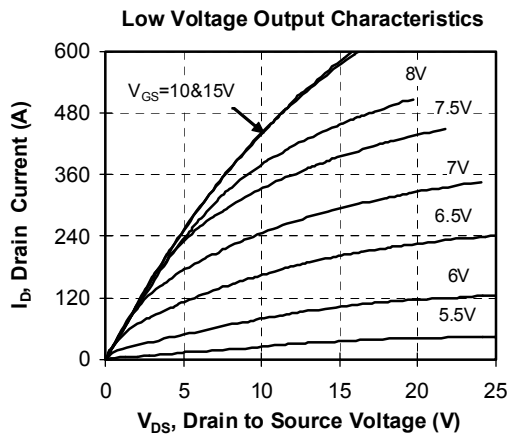
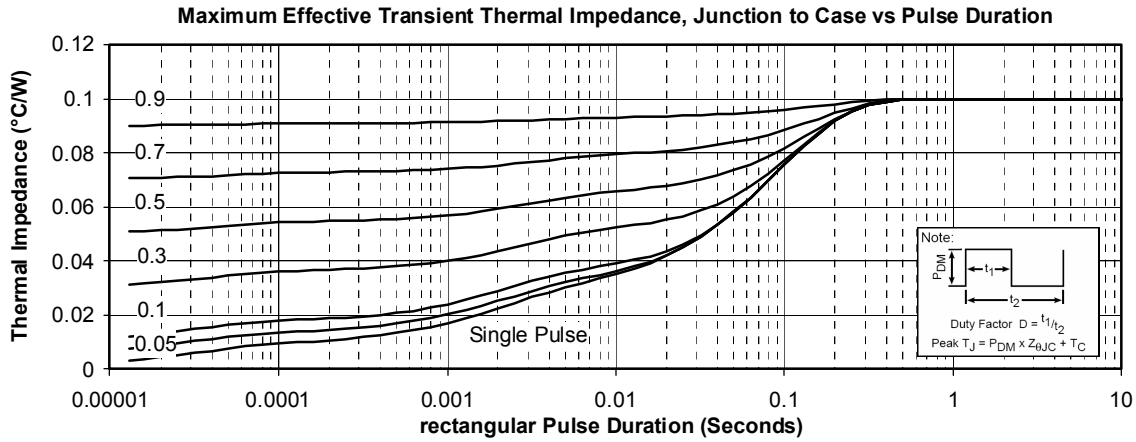
Symbol	Characteristic		Min	Typ	Max	Unit
$R_{thJC}$	Junction to Case Thermal Resistance	Transistor			0.10	$^\circ C/W$
		Diodes			0.46	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case $t=1$ min, $I_{isol} < 1mA$ , 50/60Hz		2500			V
$T_J$	Operating junction temperature range		-40		150	$^\circ C$
$T_{STG}$	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

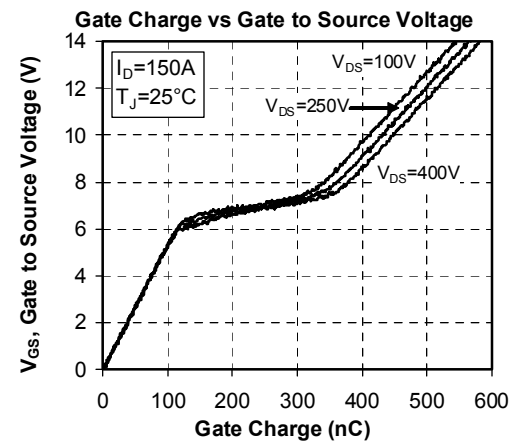
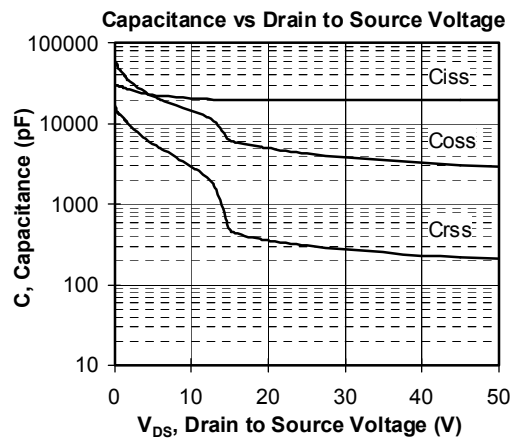
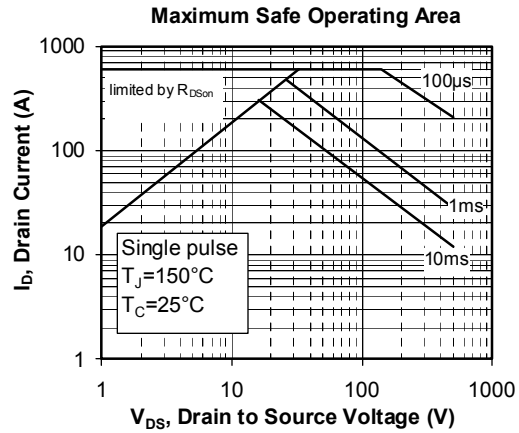
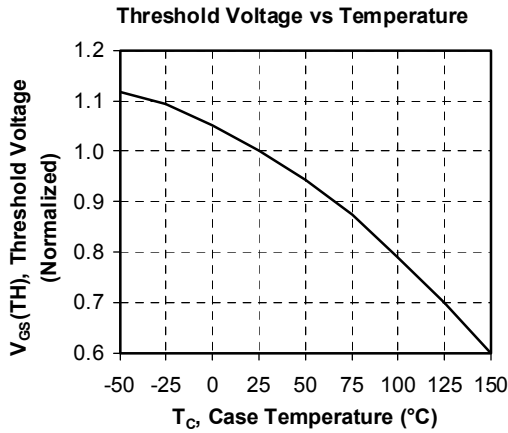
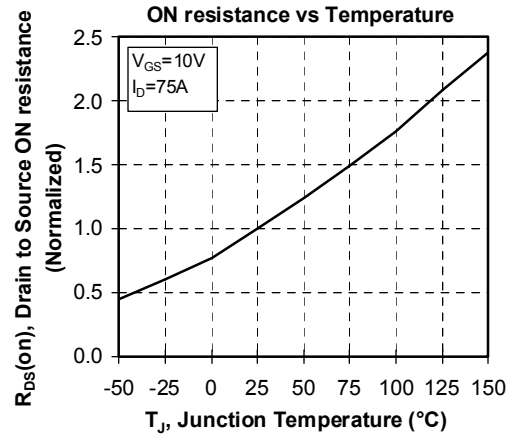
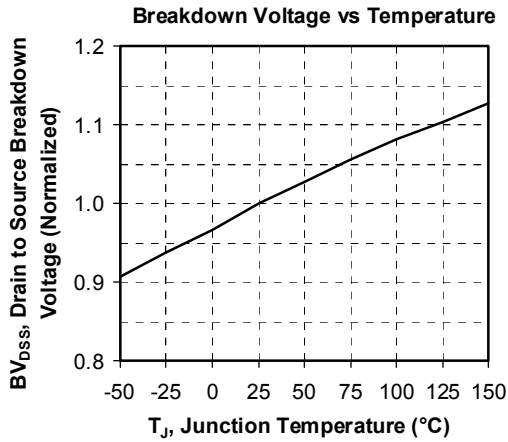
## SP6 Package outline (dimensions in mm)

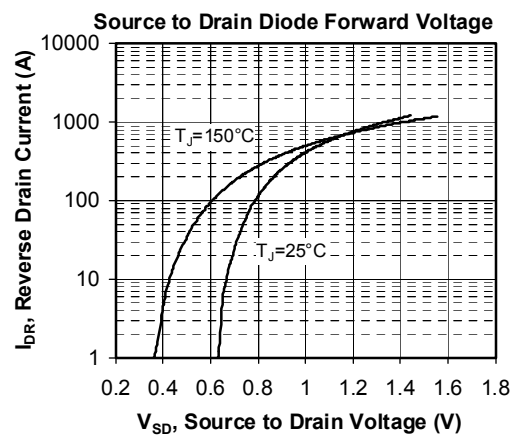
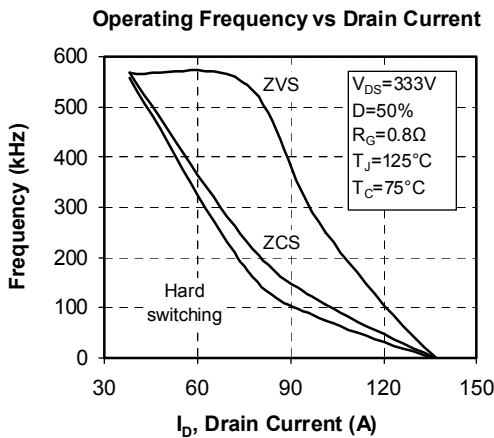
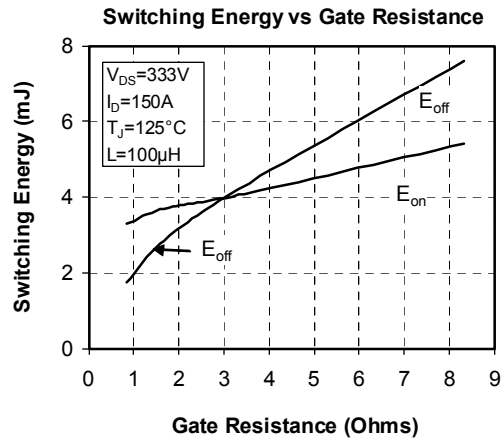
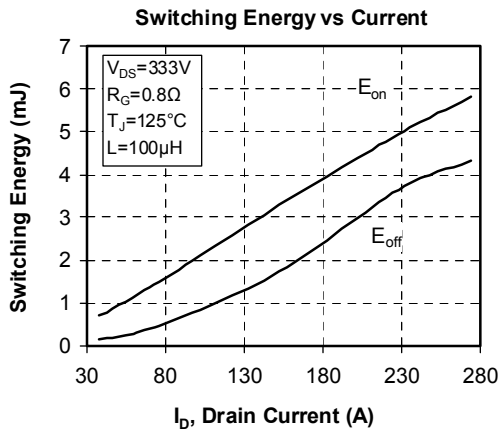
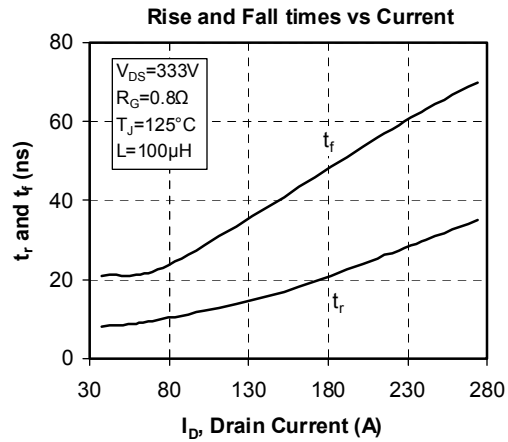
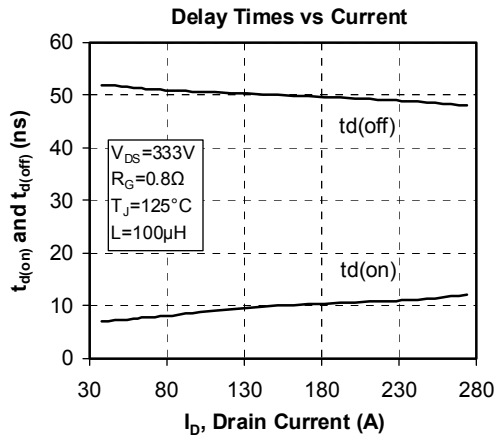


See application note APT0601 - Mounting Instructions for SP6 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical Performance Curve







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