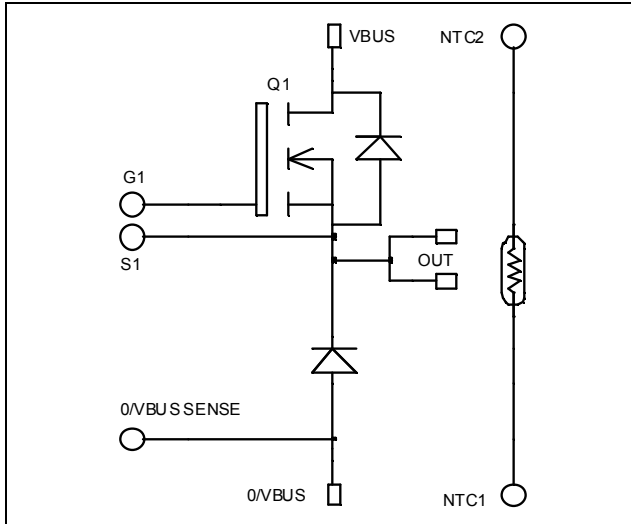


Buck Chopper MOSFET Power Module

$V_{DSS} = 500V$
 $R_{DSon} = 35m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 99A \text{ @ } T_c = 25^\circ C$

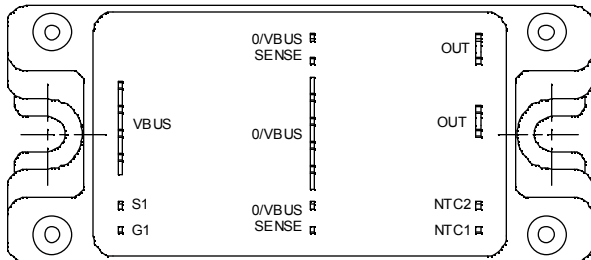


Application

- AC and DC motor control
- Switched Mode 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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	500	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	99
		$T_c = 80^\circ C$	74
I_{DM}	Pulsed Drain current	396	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	39	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	781
I_{AR}	Avalanche current (repetitive and non repetitive)	51	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on 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	$V_{GS} = 0\text{V}, V_{DS} = 500\text{V}$			200	μA
		$V_{GS} = 0\text{V}, V_{DS} = 400\text{V}$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 49.5\text{A}$		35	39	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5\text{mA}$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		14		nF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		2.8		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.2		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$		280		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 250\text{V}$		80		
Q_{gd}	Gate – Drain Charge	$I_D = 99\text{A}$		140		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 99\text{A}$ $R_G = 1\Omega$		21		ns
T_r	Rise Time			38		
$T_{d(off)}$	Turn-off Delay Time			75		
T_f	Fall Time			93		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 99\text{A}, R_G = 1\Omega$		2070		μJ
E_{off}	Turn-off Switching Energy			1690		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15\text{V}, V_{Bus} = 333\text{V}$ $I_D = 99\text{A}, R_G = 1\Omega$		3112		μJ
E_{off}	Turn-off Switching Energy			2026		

Chopper diode ratings and characteristics

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

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	Transistor		0.16	°C/W	
		Diode		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	°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

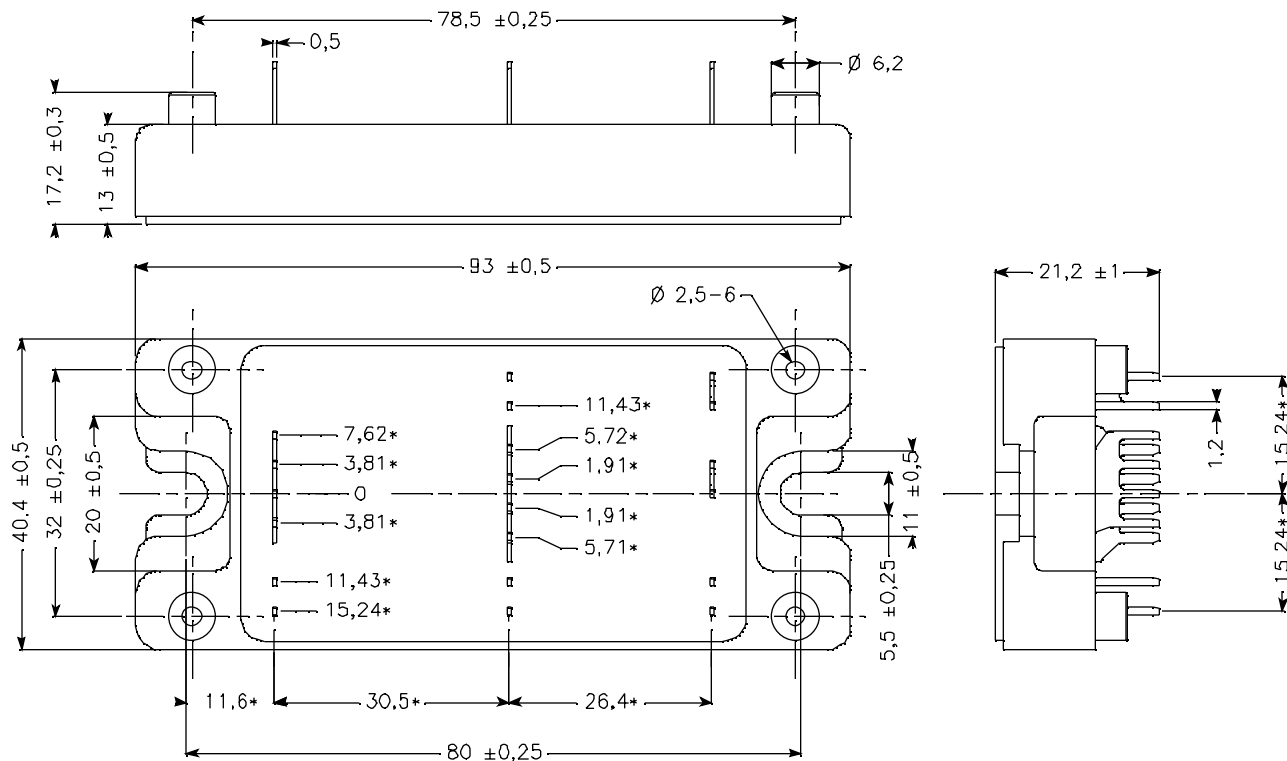
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
B _{25/85}	T ₂₅ = 298.15 K		3952		K

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

T: Thermistor temperature
 R_T: Thermistor value at T

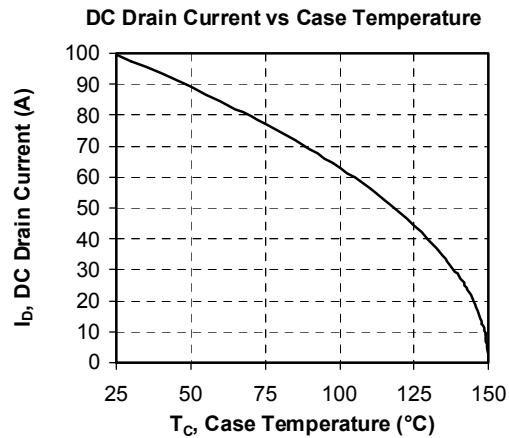
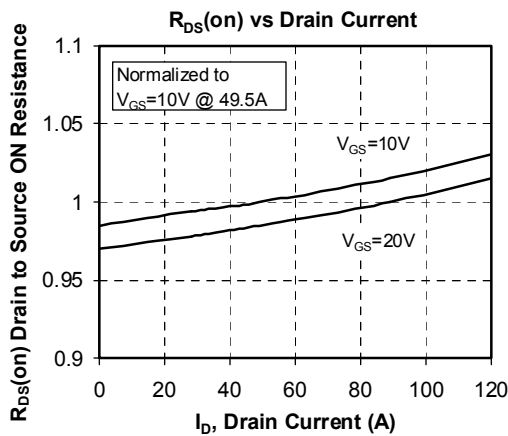
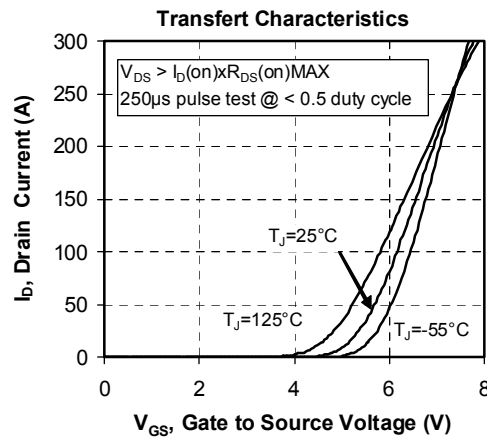
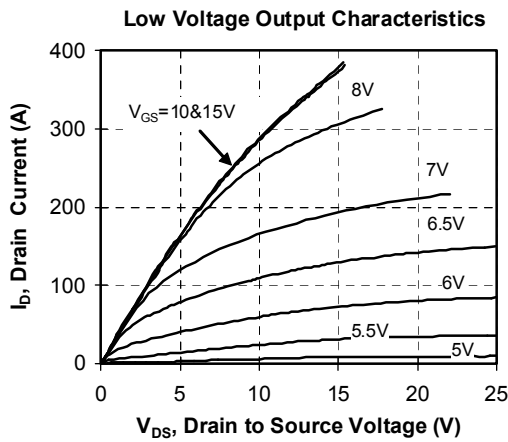
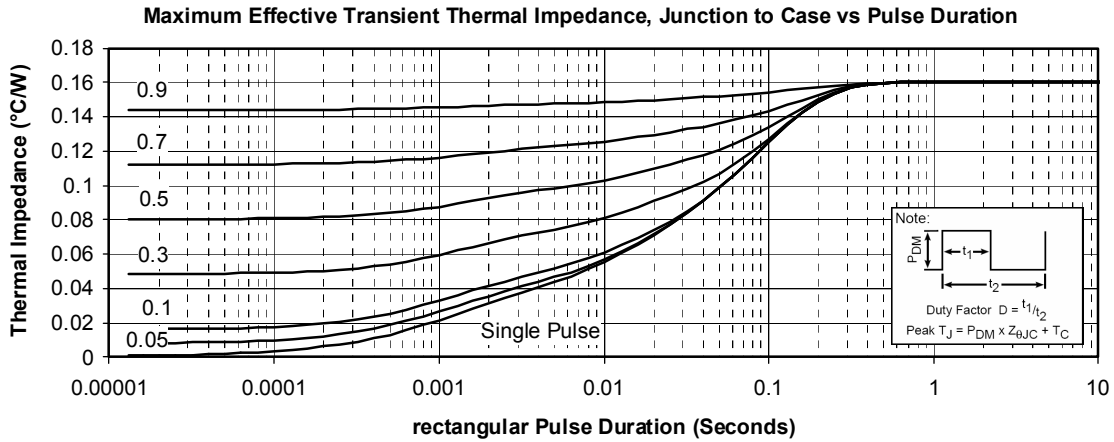
SP4 Package outline (dimensions in mm)



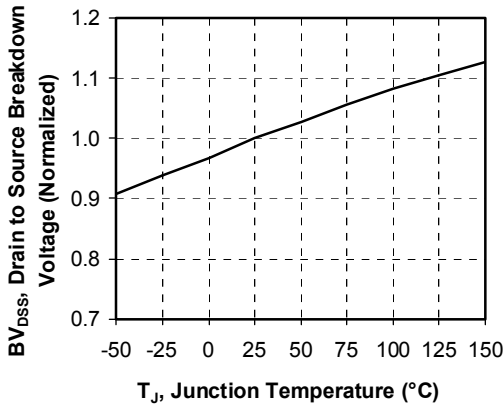
ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: $\boxed{\oplus \ominus 0.1}$

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

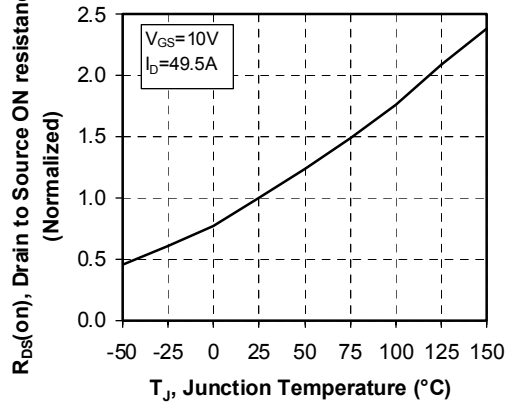
Typical Performance Curve



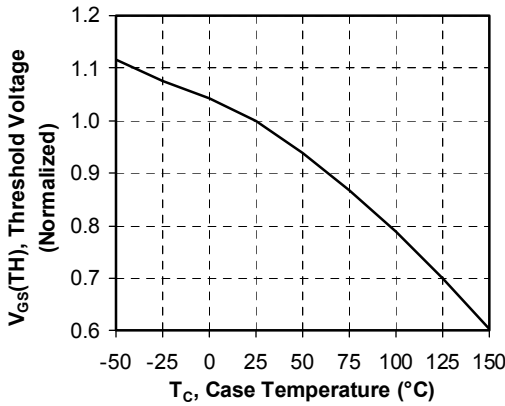
Breakdown Voltage vs Temperature



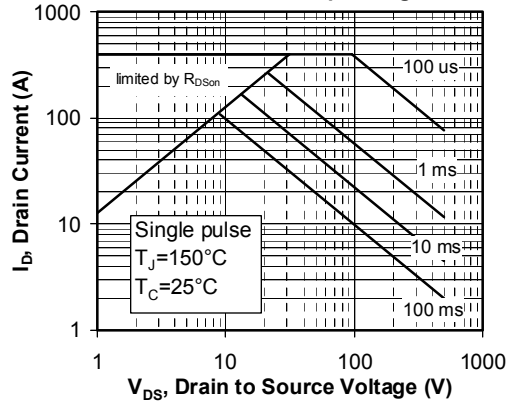
ON resistance vs Temperature



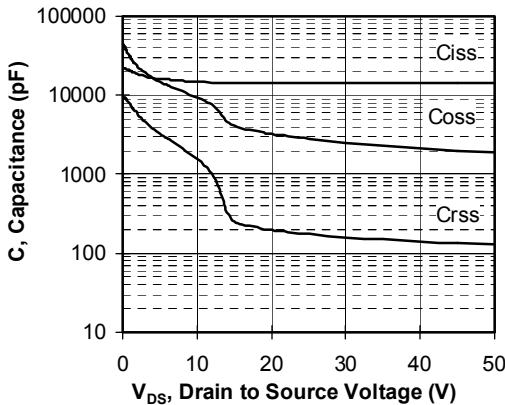
Threshold Voltage vs Temperature



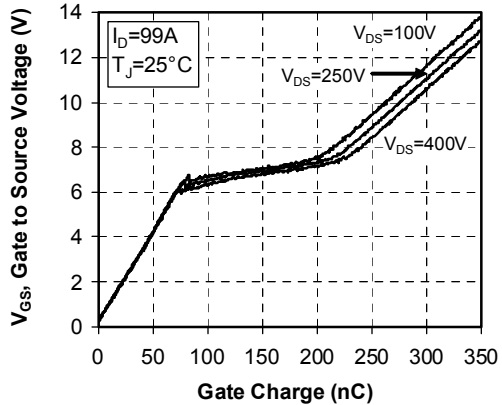
Maximum Safe Operating Area

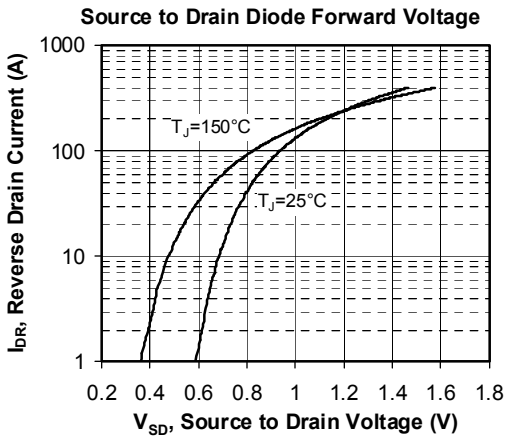
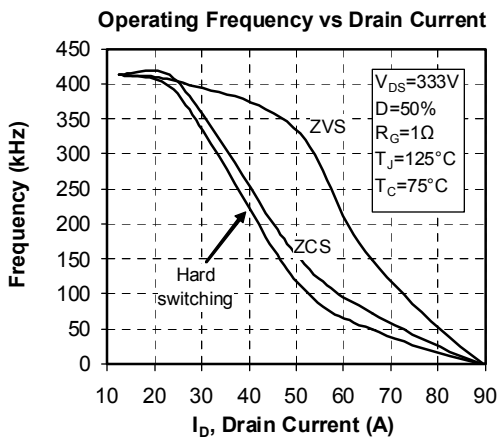
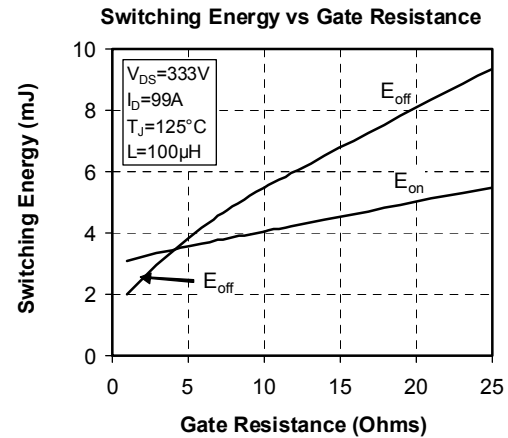
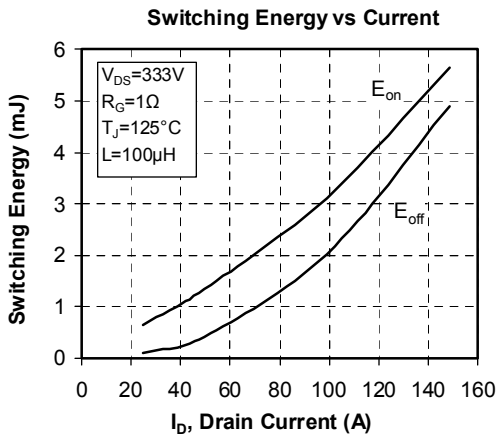
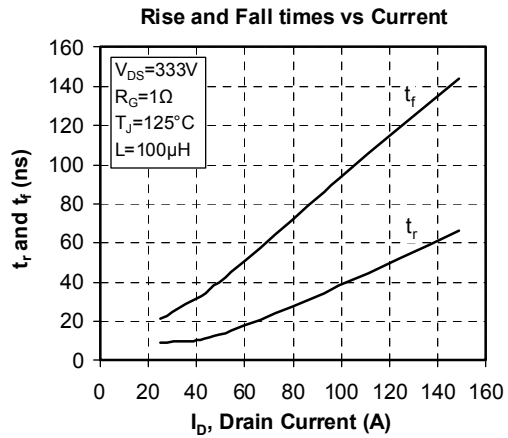
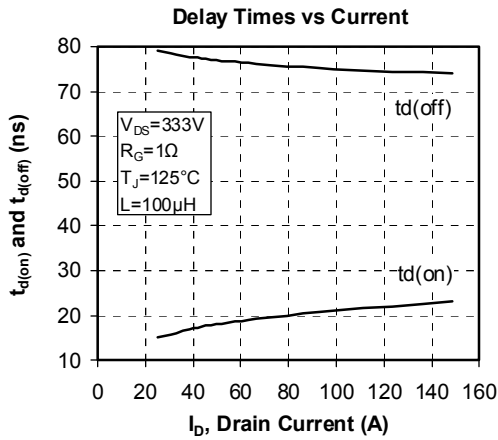


Capacitance vs Drain to Source Voltage



Gate Charge vs Gate to Source Voltage





Microsemi reserves the right to change, without notice, the specifications and information contained herein

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.