

Low Power EMI Reduction IC

Features

- FCC approved method of EMI attenuation.
- Provides up to 15dB EMI reduction.
- Generates a 1X, 2X and 4X low EMI spread spectrum clock of the input frequency.
 - 1X: ASM3P2811A/B
 - 2X: ASM3P2812A/B
 - 4X: ASM3P2814A/B
- Optimized for input frequency range from 10MHz to 40 MHz.
- Internal loop filter minimizes external components and board space.
- Selectable spread options: Down Spread and Center Spread.
- 8 spread frequency deviation selections:
 - $\pm 0.625\%$ to -3.5%
- Low inherent cycle-to-cycle jitter.
- 3.3V Operating Voltage.
- CMOS/TTL compatible inputs and outputs.
- Pin-out compatible with Cypress CY25811, CY25812 and CY25814.
- Products are available in Commercial and Industrial temperature range.
- Available in 8-pin SOIC and TSSOP Packages.

Product Description

The ASM3P28XX devices are versatile spread spectrum frequency modulators designed specifically for a wide range of input clock frequencies from 10MHz to 40MHz. (Refer *Input/Output Frequency Range Selection Table*). The ASM3P28XX can generate an EMI reduced clock from crystal, ceramic resonator, or system clock. The ASM3P28XX-A and the ASM3P28XX-B offer various combinations of spread options and percentage deviations (Refer *Output Frequency Deviation and Spread Option Selection Table*). These combinations include Down and Center Spread and percentage

deviation range from $\pm 0.625\%$ to -3.50% .

The ASM3P28XX reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The ASM3P28XX allows significant system cost savings by reducing the number of circuit board layers, ferrite beads, shielding, and other passive components that are traditionally required to pass EMI regulations.

The ASM3P28XX modulates the output of a single PLL in order to "spread" the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators. Lowering EMI by increasing a signal's bandwidth is called 'spread spectrum clock generation'.

The ASM3P28XX uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all-digital method.

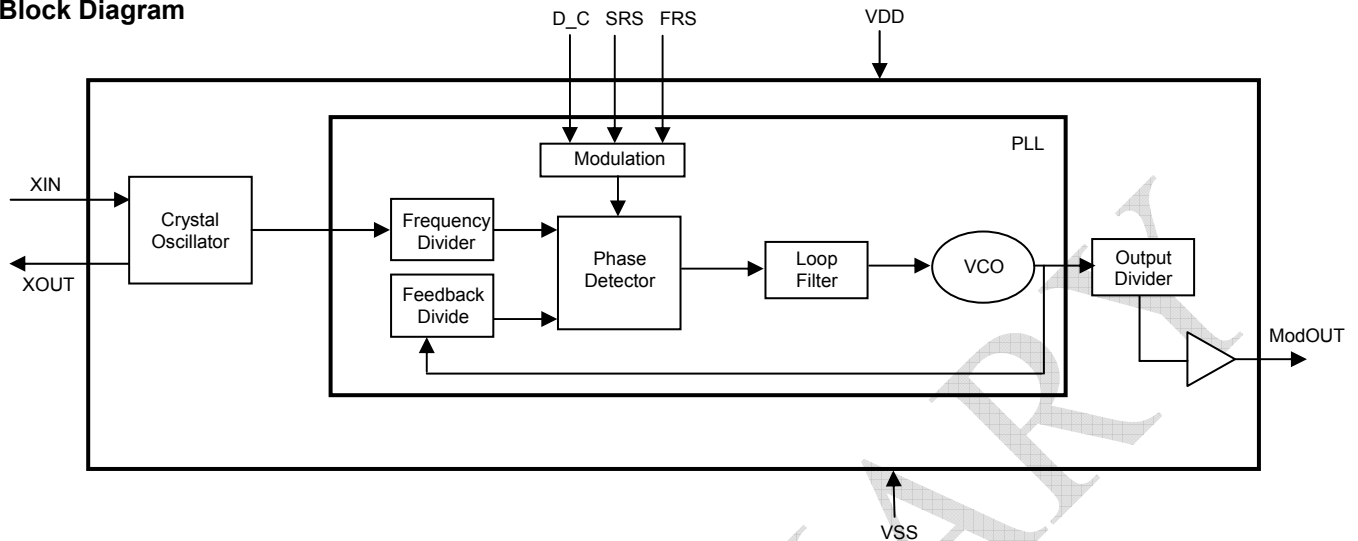
Applications

The ASM3P28XX is targeted towards EMI management for memory and LVDS interfaces in mobile graphic chipsets and high-speed digital applications such as PC peripheral devices, consumer electronics, and embedded controller systems.

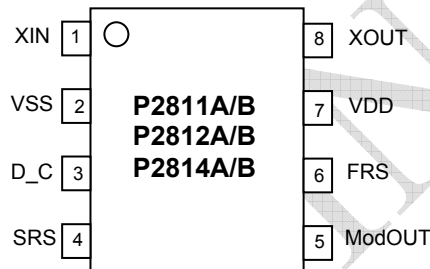
November 2006

rev 1.5

Block Diagram



Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	XIN	I	Crystal connection or external frequency input. This pin has dual functions. It can be connected to either an external crystal or an external reference clock.
2	VSS	P	Ground to entire chip.
3	D_C	I	Digital logic input used to select Down (LOW) or Center (HIGH) spread options. (Refer Output Frequency Deviation and Spread Option Selection Table). This pin has an internal pull-up resistor.
4	SRS	I	Spread range select. Digital logic input used to select frequency deviation (Refer Output Frequency Deviation and Spread Option Selection Table). This pin has an internal pull-up resistor.
5	ModOUT	O	Spread spectrum clock output
6	FRS	I	Frequency range select. Digital logic input used to select Input frequency range (Refer Input/Output Frequency Range Selection Table). This pin has an internal pull-up resistor.
7	VDD	P	Power supply for the entire chip.
8	XOUT	O	Crystal connection. Output connection for an external crystal. If using an external reference, this pin must be left unconnected.

November 2006

rev 1.5

Input/Output Frequency Range Selection Table

FRS (pin 6)	Part Number						Modulation Rate
	ASM3P2811 (1X)		ASM3P2812 (2X)		ASM3P2814 (4X)		
	Input (MHz)	Output (MHz)	Input (MHz)	Output (MHz)	Input (MHz)	Output (MHz)	
0	10-20	10-20	10-20	20-40	10-20	40-80	Input Frequency / 448
1	20-40	20-40	20-40	40-80	20-40	80-160	Input Frequency / 896

Output Frequency Deviation and Spread Option Selection Table

Part Number	D_C (pin 3)	SRS (pin 4)	Output frequency deviation and spread Option
ASM3P28XXA	0	0	-2.50% (Down)
	0	1	-3.50% (Down)
	1	0	± 1.25% (Center)
	1	1	±1.75% (Center)
ASM3P28XXB	0	0	-1.25% (Down)
	0	1	-1.75% (Down)
	1	0	± 0.625% (Center)
	1	1	± 0.875% (Center)

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DD}, V_{IN}	Voltage on any pin with respect to Ground	-0.5 to +4.6	V
T_{STG}	Storage temperature	-65 to +125	°C
T_A	Operating temperature	-40 to 85	°C
T_s	Max. Soldering Temperature (10 sec)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per JEDEC STD 22- A114-B)	2	KV

Note: These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

November 2006

rev 1.5

DC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V _{IL}	Input low voltage	V _{SS} – 0.3	-	0.8	V
V _{IH}	Input high voltage	-	-	V _{DD} + 0.3	V
I _{IL}	Input low current (Inputs D_C, SRS and FRS are pulled high internally)	-60.00	-	-20.00	μA
I _{IH}	Input high current	-	-	1.00	μA
I _{XOL}	XOUT Output low current (V _{XOL} @ 0.4V, V _{DD} = 3.3V)	-	-	12.00	mA
I _{XOH}	XOUT Output high current (V _{XOH} @ 2.5V, V _{DD} = 3.3V)	-	-	12.00	mA
V _{OL}	Output low voltage (V _{DD} = 3.3V, I _{OL} = 20mA)	-	-	0.4	V
V _{OH}	Output high voltage (V _{DD} = 3.3V, I _{OH} = 20mA)	2.5	-	-	V
I _{CC}	Dynamic supply current Normal mode (3.3V and 25pF loading)	7.1 @ f _{IN} - min	-	13.9 @ f _{IN} - max	mA
I _{DD}	Static supply current Standby mode	-	4.5	-	mA
V _{DD}	Operating voltage	3.0	3.3	3.6	V
t _{ON}	Power up time (first locked clock cycle after power up)	-	-	500	μS
Z _{OUT}	Clock out impedance	-	50	-	Ω

AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
f _{IN}	Input frequency for ASM3P2811/12/13/14 A/B	10	-	40	MHz
f _{OUT}	Output frequency for ASM3P2811A/B	10	-	40	MHz
	Output frequency for AS3P2812A/B	20	-	80	MHz
	Output frequency for AS3P2814A/B	40	-	160	MHz
t _{LH} *	Output rise time (measured at 0.8V to 2.0V)	0.5	-	0.96	nS
t _{HL} *	Output fall time (measured at 2.0V to 0.8V)	0.78	-	1.7	nS
t _{JC}	Jitter (Cycle to cycle)	-200	-	200	pS
T _D	Output duty cycle	45	50	55	%

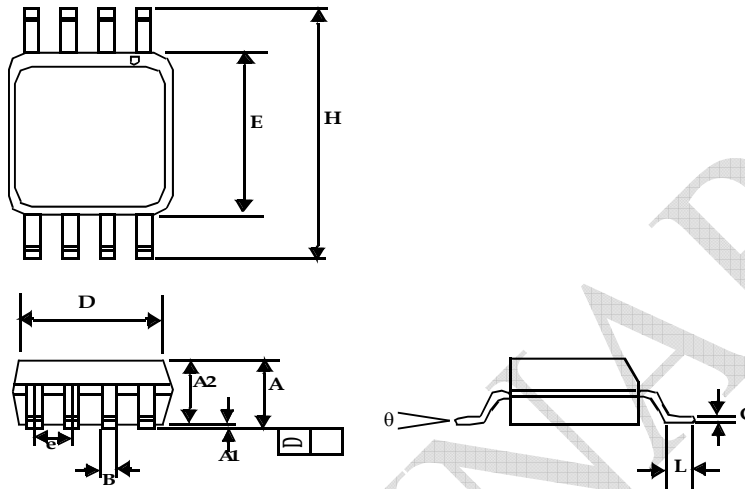
* t_{LH} and t_{HL} are measured into a capacitive load of 15pF

November 2006

rev 1.5

Package Information

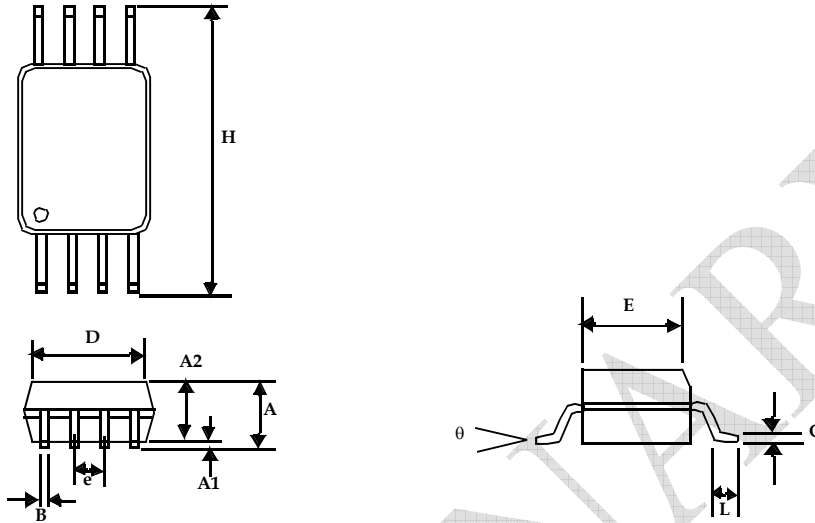
8-Pin SOIC Package



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

Note: Controlling dimensions are millimeters.
SOIC: 0.074 grams unit weight.

8-Pin TSSOP Package



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

Note: Controlling dimensions are millimeters.
TSSOP: 0.0325 grams unit weight.

November 2006

rev 1.5

Ordering Codes

Part Number	Marking	Package Type	Temperature
ASM3P2811AF-08SR	3P2811AFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2811AF-08ST	3P2811AFS	SOIC – Tube, Pb free	Commercial
ASM3P2811AF-08TR	3P2811AFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2811AF-08TT	3P2811AFT	TSSOP – Tube, Pb free	Commercial
ASM3P2811BF-08SR	3P2811BFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2811BF-08ST	3P2811BFS	SOIC – Tube, Pb free	Commercial
ASM3P2811BF-08TR	3P2811BFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2811BF-08TT	3P2811BFT	TSSOP – Tube, Pb free	Commercial
ASM3P2812AF-08SR	3P2812AFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2812AF-08ST	3P2812AFS	SOIC – Tube, Pb free	Commercial
ASM3P2812AF-08TR	3P2812AFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2812AF-08TT	3P2812AFT	TSSOP – Tube, Pb free	Commercial
ASM3P2812BF-08SR	3P2812BFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2812BF-08ST	3P2812BFS	SOIC – Tube, Pb free	Commercial
ASM3P2812BF-08TR	3P2812BFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2812BF-08TT	3P2812BFT	TSSOP – Tube, Pb free	Commercial
ASM3P2814AF-08SR	3P2814AFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2814AF-08ST	3P2814AFS	SOIC – Tube, Pb free	Commercial
ASM3P2814AF-08TR	3P2814AFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2814AF-08TT	3P2814AFT	TSSOP – Tube, Pb free	Commercial
ASM3P2814BF-08SR	3P2814BFS	SOIC – Tape & Reel, Pb free	Commercial
ASM3P2814BF-08ST	3P2814BFS	SOIC – Tube, Pb free	Commercial
ASM3P2814BF-08TR	3P2814BFT	TSSOP – Tape & Reel, Pb free	Commercial
ASM3P2814BF-08TT	3P2814BFT	TSSOP – Tube, Pb free	Commercial
ASM3I2811AF-08SR	3I2811AFS	SOIC – Tape & Reel, Pb free	Industrial
ASM3I2811AF-08ST	3I2811AFS	SOIC – Tube, Pb free	Industrial
ASM3I2811AF-08TR	3I2811AFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2811AF-08TT	3I2811AFT	TSSOP – Tube, Pb free	Industrial
ASM3I2811BF-08SR	3I2811BFS	SOIC – Tape & Reel, Pb free	Industrial
ASM3I2811BF-08ST	3I2811BFS	SOIC – Tube, Pb free	Industrial
ASM3I2811BF-08TR	3I2811BFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2811BF-08TT	3I2811BFT	TSSOP – Tube, Pb free	Industrial
ASM3I2812AF-08SR	3I2812AFS	SOIC – Tape & Reel, Pb free	Industrial
ASM3I2812AF-08ST	3I2812AFS	SOIC – Tube, Pb free	Industrial
ASM3I2812AF-08TR	3I2812AFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2812AF-08TT	3I2812AFT	TSSOP – Tube, Pb free	Industrial
ASM3I2812BF-08SR	3I2812BFS	SOIC – Tape & Reel, Pb free	Industrial

November 2006

rev 1.5

Ordering Codes (cont'd)

Part Number	Marking	Package Type	Temperature
ASM3I2812BF-08ST	3I2812BFS	SOIC - Tube, Pb free	Industrial
ASM3I2812BF-08TR	3I2812BFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2812BF-08TT	3I2812BFT	TSSOP – Tube, Pb free	Industrial
ASM3I2814AF-08SR	3I2814AFS	SOIC - Tape & Reel, Pb free	Industrial
ASM3I2814AF-08ST	3I2814AFS	SOIC - Tube, Pb free	Industrial
ASM3I2814AF-08TR	3I2814AFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2814AF-08TT	3I2814AFT	TSSOP – Tube, Pb free	Industrial
ASM3I2814BF-08SR	3I2814BFS	SOIC - Tape & Reel, Pb free	Industrial
ASM3I2814BF-08ST	3I2814BFS	SOIC - Tube, Pb free	Industrial
ASM3I2814BF-08TR	3I2814BFT	TSSOP – Tape & Reel, Pb free	Industrial
ASM3I2814BF-08TT	3I2814BFT	TSSOP – Tube, Pb free	Industrial
ASM3P2811AG-08SR	3P2811AGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2811AG-08ST	3P2811AGS	SOIC – Tube, Green	Commercial
ASM3P2811AG-08TR	3P2811AGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2811AG-08TT	3P2811AGT	TSSOP – Tube, Green	Commercial
ASM3P2811BG-08SR	3P2811BGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2811BG-08ST	3P2811BGS	SOIC – Tube, Green	Commercial
ASM3P2811BG-08TR	3P2811BGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2811BG-08TT	3P2811BGT	TSSOP – Tube, Green	Commercial
ASM3P2812AG-08SR	3P2812AGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2812AG-08ST	3P2812AGS	SOIC – Tube, Green	Commercial
ASM3P2812AG-08TR	3P2812AGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2812AG-08TT	3P2812AGT	TSSOP – Tube, Green	Commercial
ASM3P2812BG-08SR	3P2812BGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2812BG-08ST	3P2812BGS	SOIC – Tube, Green	Commercial
ASM3P2812BG-08TR	3P2812BGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2812BG-08TT	3P2812BGT	TSSOP – Tube, Green	Commercial
ASM3P2814AG-08SR	3P2814AGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2814AG-08ST	3P2814AGS	SOIC – Tube, Green	Commercial
ASM3P2814AG-08TR	3P2814AGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2814AG-08TT	3P2814AGT	TSSOP – Tube, Green	Commercial
ASM3P2814BG-08SR	3P2814BGS	SOIC – Tape & Reel, Green	Commercial
ASM3P2814BG-08ST	3P2814BGS	SOIC – Tube, Green	Commercial
ASM3P2814BG-08TR	3P2814BGT	TSSOP – Tape & Reel, Green	Commercial
ASM3P2814BG-08TT	3P2814BGT	TSSOP – Tube, Green	Commercial
ASM3I2811AG-08SR	3I2811AGS	SOIC – Tape & Reel, Green	Industrial
ASM3I2811AG-08ST	3I2811AGS	SOIC – Tube, Green	Industrial

November 2006

rev 1.5

Ordering Codes (cont'd)

Part Number	Marking	Package Type	Temperature
ASM3I2811AG-08TR	3I2811AGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2811AG-08TT	3I2811AGT	TSSOP – Tube, Green	Industrial
ASM3I2811BG-08SR	3I2811BGS	SOIC – Tape & Reel, Green	Industrial
ASM3I2811BG-08ST	3I2811BGS	SOIC – Tube, Green	Industrial
ASM3I2811BG-08TR	3I2811BGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2811BG-08TT	3I2811BGT	TSSOP – Tube, Green	Industrial
ASM3I2812AG-08SR	3I2812AGS	SOIC – Tape & Reel, Green	Industrial
ASM3I2812AG-08ST	3I2812AGS	SOIC – Tube, Green	Industrial
ASM3I2812AG-08TR	3I2812AGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2812AG-08TT	3I2812AGT	TSSOP – Tube, Green	Industrial
ASM3I2812BG-08SR	3I2812BGS	SOIC – Tape & Reel, Green	Industrial
ASM3I2812BG-08ST	3I2812BGS	SOIC - Tube, Green	Industrial
ASM3I2812BG-08TR	3I2812BGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2812BG-08TT	3I2812BGT	TSSOP – Tube, Green	Industrial
ASM3I2814AG-08SR	3I2814AGS	SOIC - Tape & Reel, Green	Industrial
ASM3I2814AG-08ST	3I2814AGS	SOIC - Tube, Green	Industrial
ASM3I2814AG-08TR	3I2814AGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2814AG-08TT	3I2814AGT	TSSOP – Tube, Green	Industrial
ASM3I2814BG-08SR	3I2814BGS	SOIC - Tape & Reel, Green	Industrial
ASM3I2814BG-08ST	3I2814BGS	SOIC - Tube, Green	Industrial
ASM3I2814BG-08TR	3I2814BGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2814BG-08TT	3I2814BGT	TSSOP – Tube, Green	Industrial

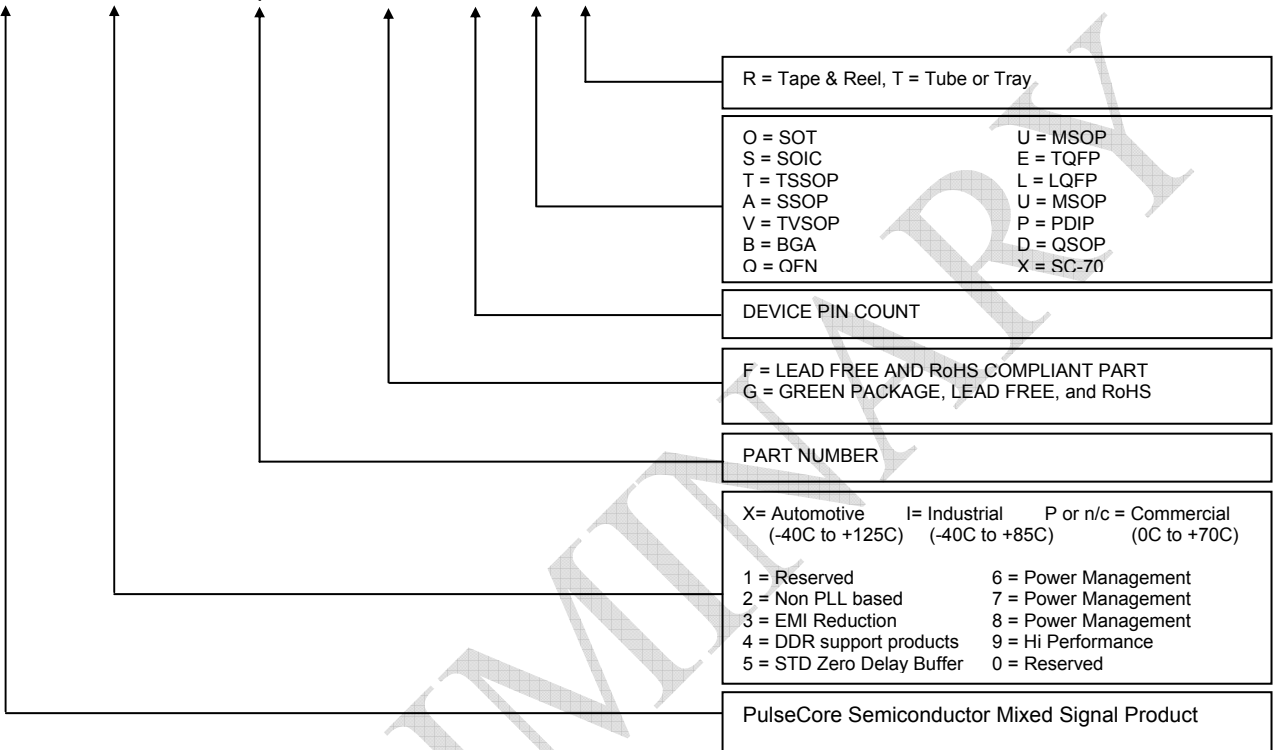
November 2006

Giving you the edge

rev 1.5

Device Ordering Information

A S M 3 P 2 8 1 1 A G - 0 8 S R



Licensed under US patent #5,488,627, #6,646,463 and #5,631,920



PulseCore Semiconductor Corporation
1715 S. Bascom Ave Suite 200
Campbell, CA 95008
Tel: 408-879-9077
Fax: 408-879-9018
www.pulsecoresemi.com

Copyright © PulseCore Semiconductor
All Rights Reserved
Part Numbers: ASM3P2811A/B
ASM3P2812A/B
ASM3P2814A/B
Document Version: v1.5

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003

© Copyright 2006 PulseCore Semiconductor Corporation. All rights reserved. Our logo and name are trademarks or registered trademarks of PulseCore Semiconductor. All other brand and product names may be the trademarks of their respective companies. PulseCore reserves the right to make changes to this document and its products at any time without notice. PulseCore assumes no responsibility for any errors that may appear in this document. The data contained herein represents PulseCore's best data and/or estimates at the time of issuance. PulseCore reserves the right to change or correct this data at any time, without notice. If the product described herein is under development, significant changes to these specifications are possible. The information in this product data sheet is intended to be general descriptive information for potential customers and users, and is not intended to operate as, or provide, any guarantee or warranty to any user or customer. PulseCore does not assume any responsibility or liability arising out of the application or use of any product described herein, and disclaims any express or implied warranties related to the sale and/or use of PulseCore products including liability or warranties related to fitness for a particular purpose, merchantability, or infringement of any intellectual property rights, except as express agreed to in PulseCore's Terms and Conditions of Sale (which are available from PulseCore). All sales of PulseCore products are made exclusively according to PulseCore's Terms and Conditions of Sale. The purchase of products from PulseCore does not convey a license under any patent rights, copyrights; mask works rights, trademarks, or any other intellectual property rights of PulseCore or third parties. PulseCore does not authorize its products for use as critical components in life-supporting systems where a malfunction or failure may reasonably be expected to result in significant injury to the user, and the inclusion of PulseCore products in such life-supporting systems implies that the manufacturer assumes all risk of such use and agrees to indemnify PulseCore against all claims arising from such use.