

April 2008

rev 1.6

## 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 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
- Commercial and Industrial temperature range
- Available in 8-pin SOIC and TSSOP Packages

and Center Spread, and percentage deviation range from  $\pm 0.625\%$  to  $-3.5\%$ .

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.

### 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 *Frequency Deviation and Spread Selection Table*. These combinations include Down

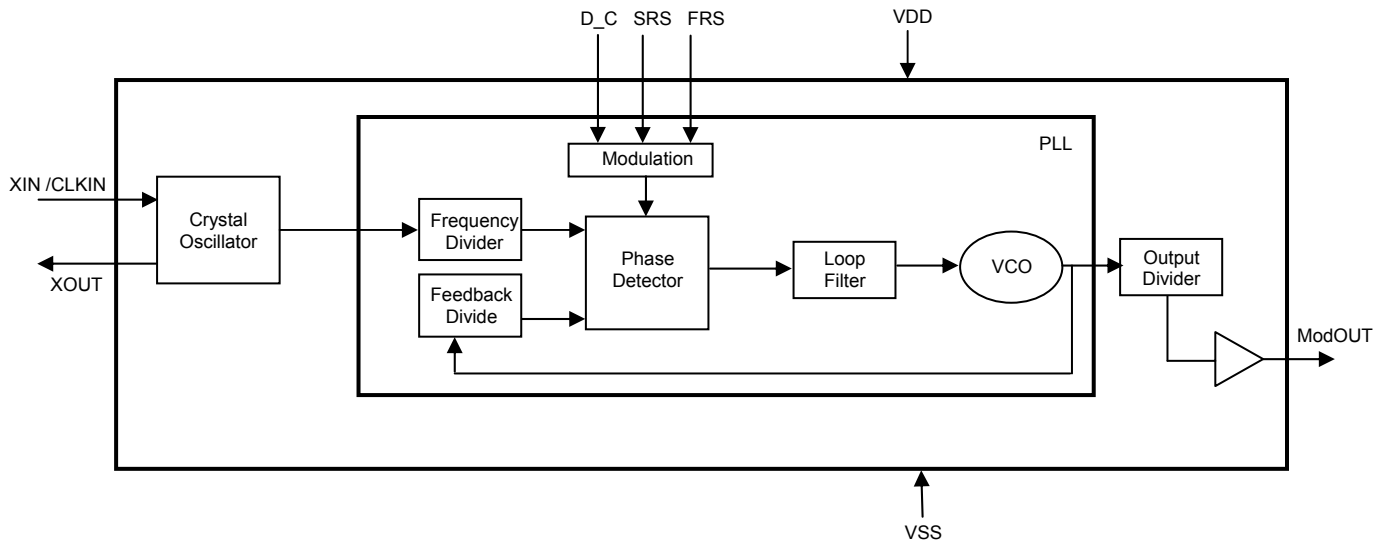
### Applications

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.

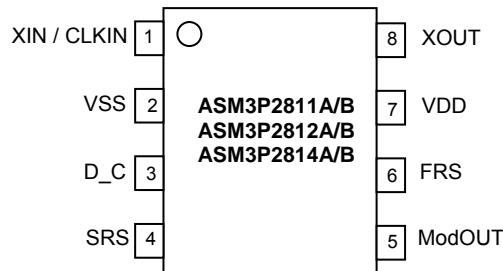
April 2008

rev 1.6

**Block Diagram**



**Pin Configuration**



**Pin Description**

Pin#	Pin Name	Type	Description
1	XIN / CLKIN	I	Crystal connection or external Clock input.
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 <i>Frequency Deviation and Spread Selection Table</i> ). This pin has an internal pull-up resistor.
4	SRS	I	Spread range select. Digital logic input used to select frequency deviation (Refer <i>Frequency Deviation and Spread Selection Table</i> ). 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 <i>Input/Output Frequency Range Selection Table</i> ). This pin has an internal pull-up resistor.
7	VDD	P	Power supply for the entire chip.
8	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.

April 2008

rev 1.6

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 Selection Table

Part Number	D_C (pin 3)	SRS (pin 4)	Frequency Deviation* (%)			
			FS=0		FS=1	
			10/20/40 (MHz)	20/40/80 (MHz)	20/40/80 (MHz)	40/80/160 (MHz)
ASM3P28XXA	0	0	-3	-2.5	-2.7	-2.6
	0	1	-3.7	-3.4	-3.8	-3.6
	1	0	±1.5	±1.2	±1.5	±1.3
	1	1	±1.8	±1.6	±1.9	±1.8
ASM3P28XXB	0	0	-1.7	-1.0	-1.5	-1.4
	0	1	-2.0	-1.5	-2.0	-1.9
	1	0	±0.75	±0.6	±0.8	±0.7
	1	1	±1.0	±0.75	±1.0	±0.9

Note: Frequency Deviation given in the table is for the Output Frequency Range covering ASM3P2811x / 12x / 14x

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V <sub>DD</sub> , V <sub>IN</sub>	Voltage on any pin with respect to Ground	-0.5 to +4.6	V
T <sub>STG</sub>	Storage temperature	-65 to +125	°C
T <sub>s</sub>	Max. Soldering Temperature (10 sec)	260	°C
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>DV</sub>	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.

April 2008

rev 1.6

Operating Conditions

Symbol	Parameter	Min	Max	Unit
V <sub>DD</sub>	Voltage on any pin with respect to GND	3.0	3.6	V
T <sub>A</sub>	Operating temperature	-40	+85	°C
C <sub>L</sub>	Load Capacitance		10	pF
C <sub>IN</sub>	Input Capacitance		7	pF

DC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
V <sub>IL</sub>	Input low voltage	V <sub>SS</sub> - 0.3		0.8	V
V <sub>IH</sub>	Input high voltage	2		V <sub>DD</sub> + 0.3	V
I <sub>IL</sub>	Input low current (Inputs D_C, SRS and FRS are pulled high internally)			-50	µA
I <sub>IH</sub>	Input high current			50	µA
I <sub>XOL</sub>	XOUT Output low current (V <sub>XOL</sub> @ 0.4V, V <sub>DD</sub> = 3.3V)			3	mA
I <sub>XOH</sub>	XOUT Output high current (V <sub>XOH</sub> @ 2.5V, V <sub>DD</sub> = 3.3V)			3	mA
V <sub>OL</sub>	Output low voltage (V <sub>DD</sub> = 3.3V, I <sub>OL</sub> = 5mA)			0.4	V
V <sub>OH</sub>	Output high voltage (V <sub>DD</sub> = 3.3V, I <sub>OH</sub> = -5mA)	2.5			V
I <sub>CC</sub>	Dynamic supply current (Unloaded Output)	8		18	mA
I <sub>DD</sub>	Static supply current, Standby mode (CLKIN pulled to GND)			4.5	mA
V <sub>DD</sub>	Operating voltage	3.0	3.3	3.6	V
t <sub>ON</sub>	Power up time (first locked clock cycle after power up)			500	µS
Z <sub>OUT</sub>	Clock out impedance		76		Ω

AC Electrical Characteristics

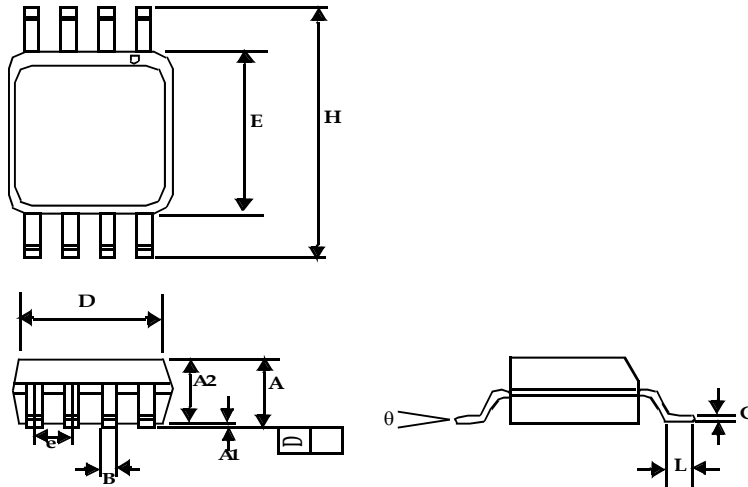
Symbol	Parameter	Min	Typ	Max	Unit
f <sub>IN</sub>	Input frequency for ASM3P2811/12/13/14 A/B	10		40	MHz
f <sub>OUT</sub>	Output frequency for ASM3P2811A/B	10		40	MHz
	Output frequency for ASM3P2812A/B	20		80	MHz
	Output frequency for ASM3P2814A/B	40		160	MHz
t <sub>LH</sub> *	Output rise time (measured at 0.8V to 2.0V)	0.5	0.9	1.2	nS
t <sub>HL</sub> *	Output fall time (measured at 2.0V to 0.8V)	0.8	1.0	1.3	nS
t <sub>JC</sub>	Cycle to Cycle Jitter (Unloaded Output)		±250		pS
t <sub>D</sub>	Output duty cycle	45	50	55	%

\* t<sub>LH</sub> and t<sub>HL</sub> are measured into a capacitive load of 10pF

April 2008

rev 1.6  
Package Information

8-Pin SOIC Package



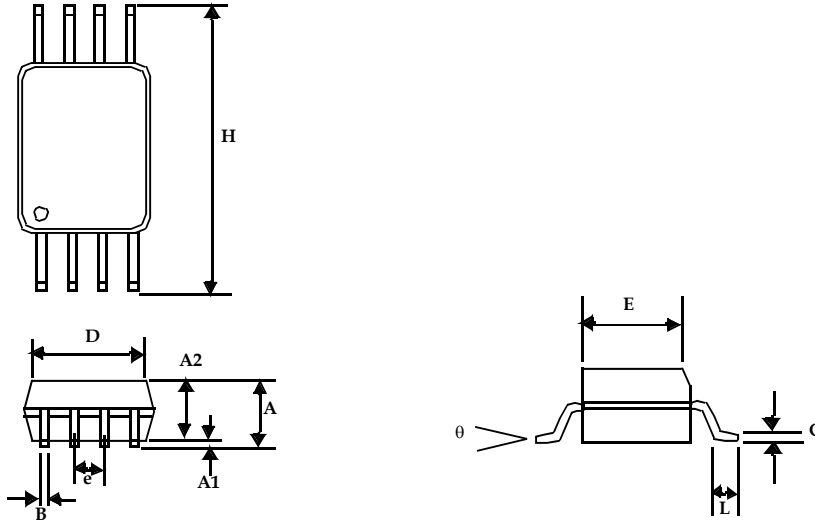
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
theta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

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

April 2008

rev 1.6

**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.

April 2008

rev 1.6

**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

April 2008

rev 1.6

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



April 2008

rev 1.6

Ordering Codes (cont'd)

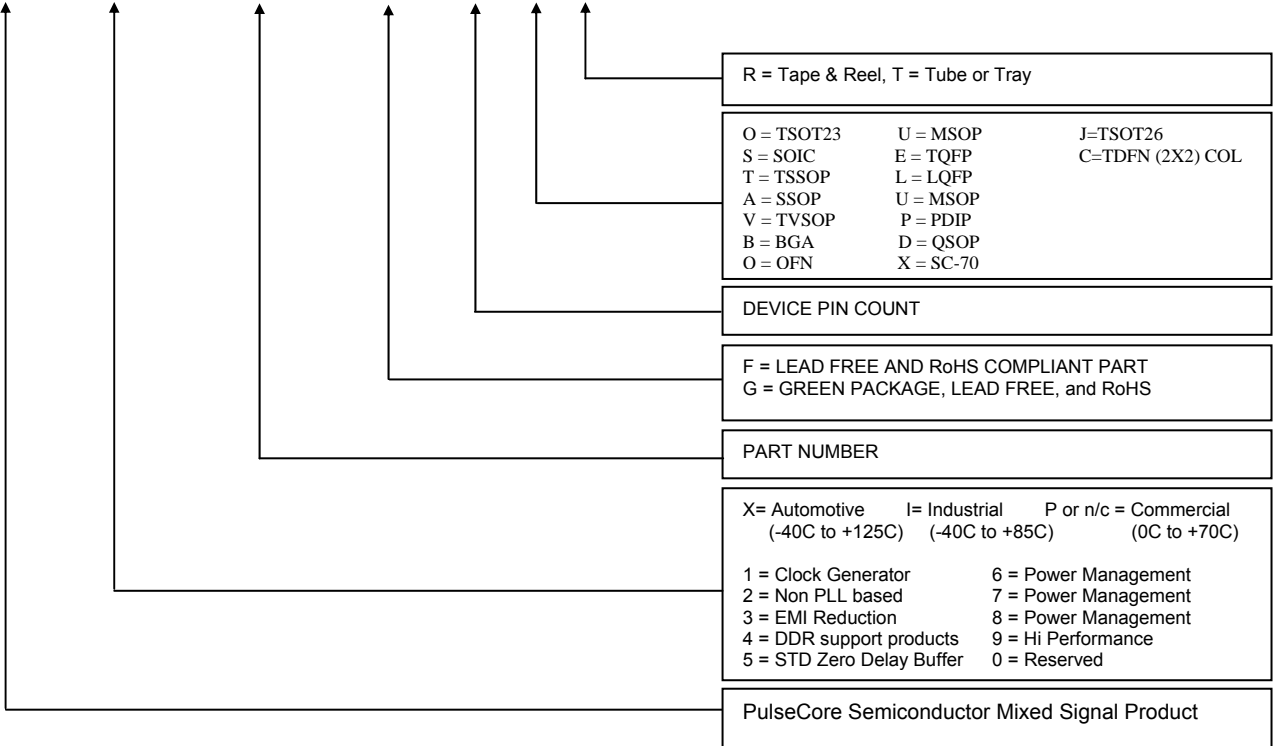
Part Number	Marking	Package Type	Temperature
ASM3I2811AG-08TR	3I2811AGT	TSSOP – Tape & Reel, Green	Industrial
ASM3I2811AG-08TT	3I2811AGT	TSSOP – Tube, Green	Industrial
ASM3I2811BG-08SR	3I2811BGS	SOIC – Tape & Reel, Green	Industrial
ASM3I2811BG-08ST	3I2811BGS	SOIC – Tube, Green	Industrial
ASM3I2811BG-08TR	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

April 2008

rev 1.6

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



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Part Numbers: ASM3P2811A/B  
ASM3P2812A/B  
ASM3P2814A/B  
Document Version: 1.6

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003  
**Many PulseCore Semiconductor products are protected by issued patents or by applications for patent**

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