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.
    - ASM3P2811A/B: 10 to 40MHz
    - ASM3P2812A/B: 10 to 40MHz
    - ASM3P2814A/B: 10 to 40MHz
- Internal loop filter minimizes external components and board space.
- Selectable spread options: Down Spread and Center Spread.
- 8 spread frequency deviation selections:
    - ±0.625% to –3.5%
- Low inherent cycle-to-cycle jitter.
- 3.3V operating voltage range.
- CMOS/TTL compatible inputs and outputs.
- Pinout compatible with Cypress CY25811, CY25812 and CY25814.
- Products are available for industrial temperature range.
- Available in 8-pin SOIC and TSSOP.

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 ±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.

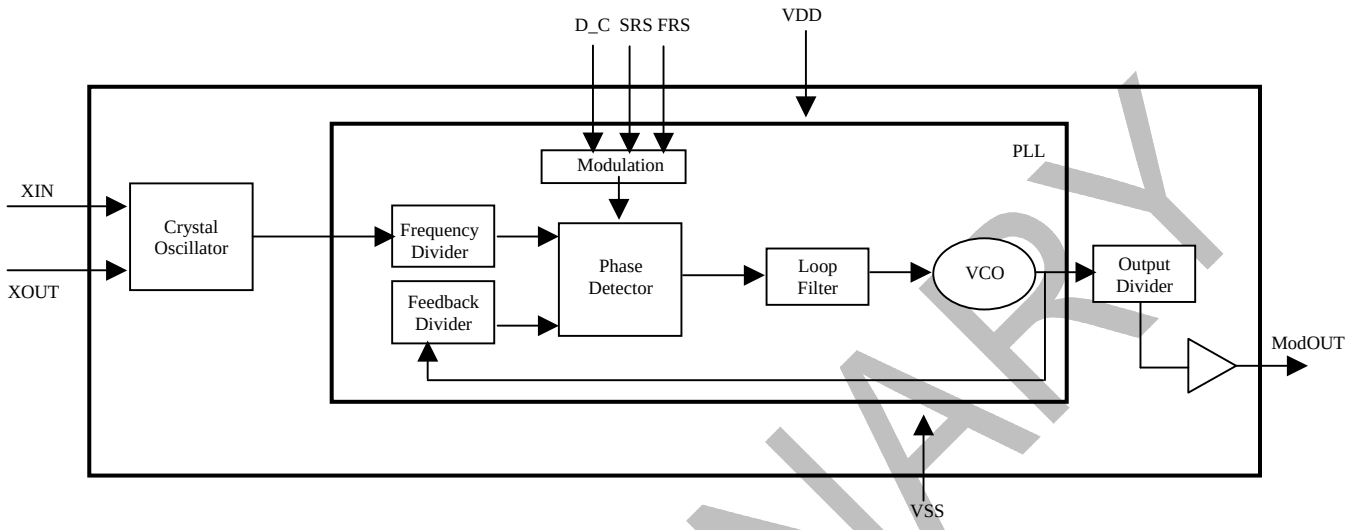
The ASM3P28XX modulates the output of a single PLL in order to “spread” the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most 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.

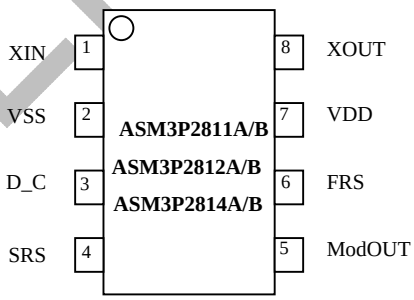
Applications

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.

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 (Refer *Input/Output Frequency Range Selection Table* and *Output Frequency Deviation and Spread Option Selection Table).*
6	FRS	I	Frequency range select. Digital logic input used to select input frequency range (*Refer Input/Output Frequency Deviation and Spread Option Selection Table*). This pin has an internal pull-up resistor.
7	VDD	P	Power supply for the entire chip (3.3V).
8	XOUT	I	Crystal connection. Input connection for an external crystal. If using an external reference, this pin must be left unconnected.

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 GND	-0.5 to + 7.0	V
T_{STG}	Storage temperature	-65 to +125	°C
T_A	Operating temperature	0 to 70	°C
Note: These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.			

DC Electrical Characteristics (3.3V, 25°C)

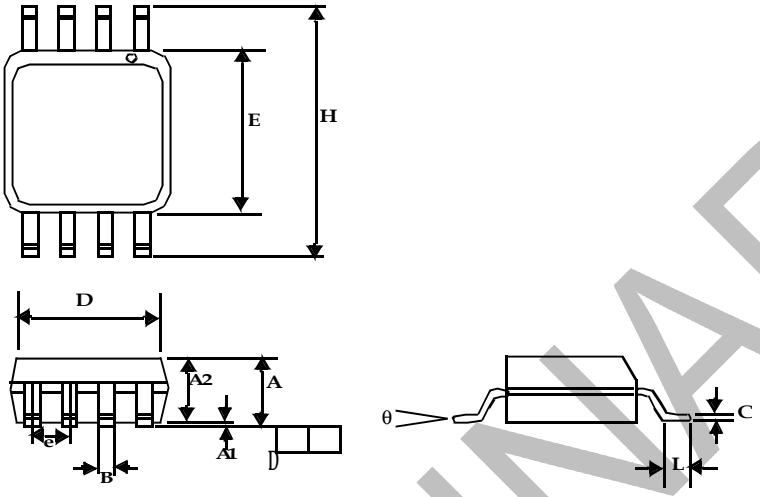
Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND – 0.3	-	0.8	V
V_{IH}	Input high voltage	-	-	V_{DD} + 0.3	V
I_{IL}	Input low current (inputs D_C, SRS and FRS)	-60.00	-	-20.00	µA
I_{IH}	Input high current	-	-	1.00	µA
I_{XOL}	XOUT Output low current (@ 0.4V, V_{DD} = 3.3V)	2.00	-	12.00	mA
I_{XOH}	XOUT Output high current (@ 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)	2.8	-	-	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	-	3.3	-	V
t_{ON}	Power up time (first locked clock cycle after power up)	-	0.18	-	mS
Z_{OUT}	Clock out impedance	-	50	-	Ω

AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input frequency ASM3P2811/12/13/14 A/B	10	-	40	MHz
f_{OUT}	Output frequency for ASM3P211A/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)	-	0.69	-	ns
t_{HL}*	Output fall time (measured at 2.0V to 0.8V)	-	0.66	-	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					

Package Information

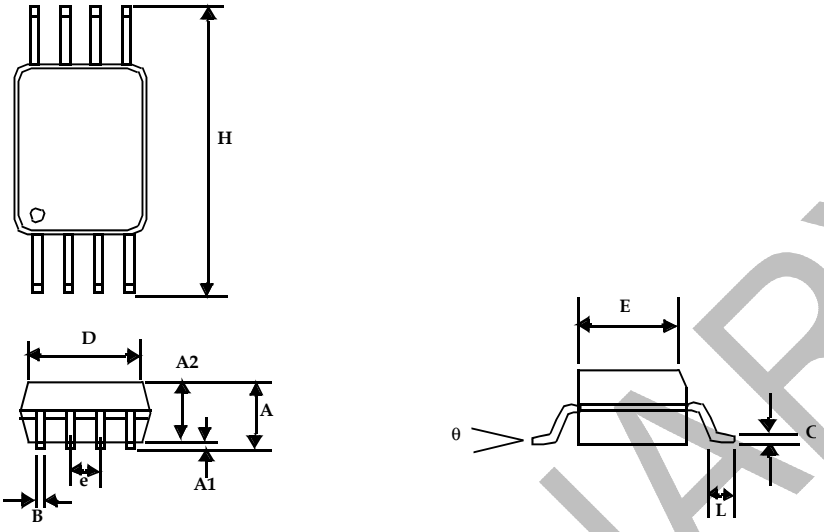
8-Pin SOIC



Symbol	Dimensions in inches		Dimensions in millimeters	
	Min	Max	Min	Max
A	0.057	0.071	1.45	1.80
A1	0.004	0.010	0.10	0.25
A2	0.053	0.069	1.35	1.75
B	0.012	0.020	0.31	0.51
C	0.004	0.01	0.10	0.25
D	0.186	0.202	4.72	5.12
E	0.148	0.164	3.75	4.15
E	0.050 BSC		1.27 BSC	
H	0.224	0.248	5.70	6.30
L	0.012	0.028	0.30	0.70
θ	0°	8°	0°	8°

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

8-Pin TSSOP



	Dimensions in inches		Dimensions in millimeters	
Symbol	**Min**	**Max**	**Min**	**Max**
A	0.047			1.10
A1	0.002	0.006	0.05	0.15
A2	0.031	0.041	0.80	1.05
B	0.007	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	0.244	0.260	6.20	6.60
L	0.018	0.030	0.45	0.75
θ	0°	8°	0°	8°

Note: Controlling dimensions are millimeters.
TSSOP: 0.034 grams unit weight.

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Preliminary Information
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ASM3P2814A/B
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