rev 1.0

Features

- FCC approved method of EMI attenuation.
- Generates a 1X or ½ X low EMI spread spectrum clock of the input frequency.
- Input frequency range: 6MHz to 10 MHz.
- Internal loop filter minimizes external components and board space.
- Frequency deviation: Maximum ± 1%.
- SSON# control pin for spread spectrum enable and disable options.
- Low cycle-to-cycle jitter.
- 5.0V ± 5% operating voltage range.
- TTL or CMOS compatible outputs.
- Ultra-low power CMOS design.
- Available in 8-pin SOIC and TSSOP.

Product Description

The ASM3X2105A is a versatile spread spectrum frequency modulator designed specifically for input clock frequencies from 6MHz to 12MHz. The ASM3X2105A can generate an EMI reduced clock from crystal, ceramic resonator, or system clock. The ASM3X2105A offers frequency deviation of ± 1%.

The ASM3X2105A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The ASM3X2105A 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.

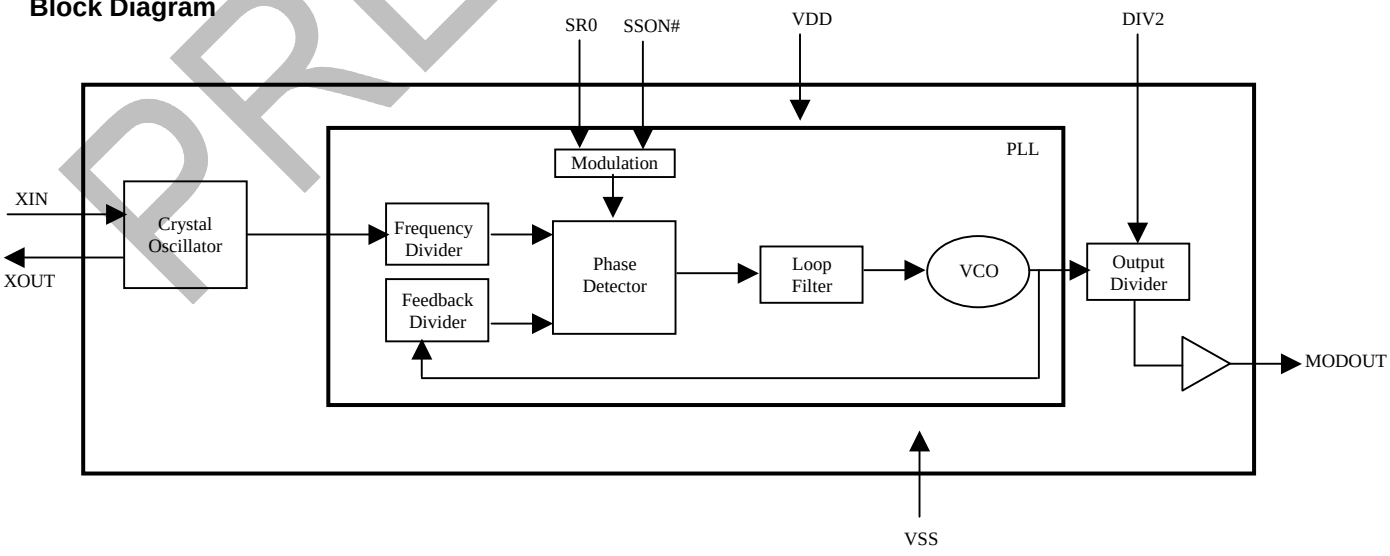
The ASM3X2105A uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

The ASM3X2105A 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'.

Applications

The ASM3X2105A is targeted towards EMI management for high speed digital applications such as PC peripheral devices, consumer electronics and embedded controller systems.

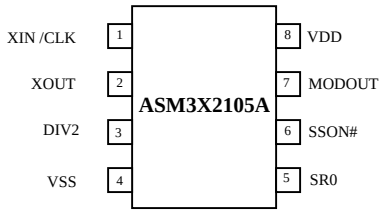
Block Diagram



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Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	XIN/CLK	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected to either an external crystal or an external reference clock.
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	DIV2	I	Digital logic input used to select normal output mode or divide-by-2 output mode. When this pin is HIGH, the frequency of the output clock is the same as the input clock frequency. When it is tied LOW, the output frequency is half the input clock frequency. This pin has an internal pull-up resistor.
4	VSS	P	Ground to entire chip.
5	SR0	I	Digital logic input used to select Spreading Range (Refer Spread Deviation Table). This pin has an internal pull-up resistor.
6	SSON#	I	Digital logic input used to enable Spread Spectrum function (Active LOW). Spread Spectrum function enabled when LOW, disabled when HIGH. This pin has an internal pull-low resistor.
7	MODOUT	O	Spread spectrum low EMI output.
8	VDD	P	Power supply for the entire chip (5V).

Spread Deviation Table

SR0	Spread Deviation (%)
1	±1
0	Reserved

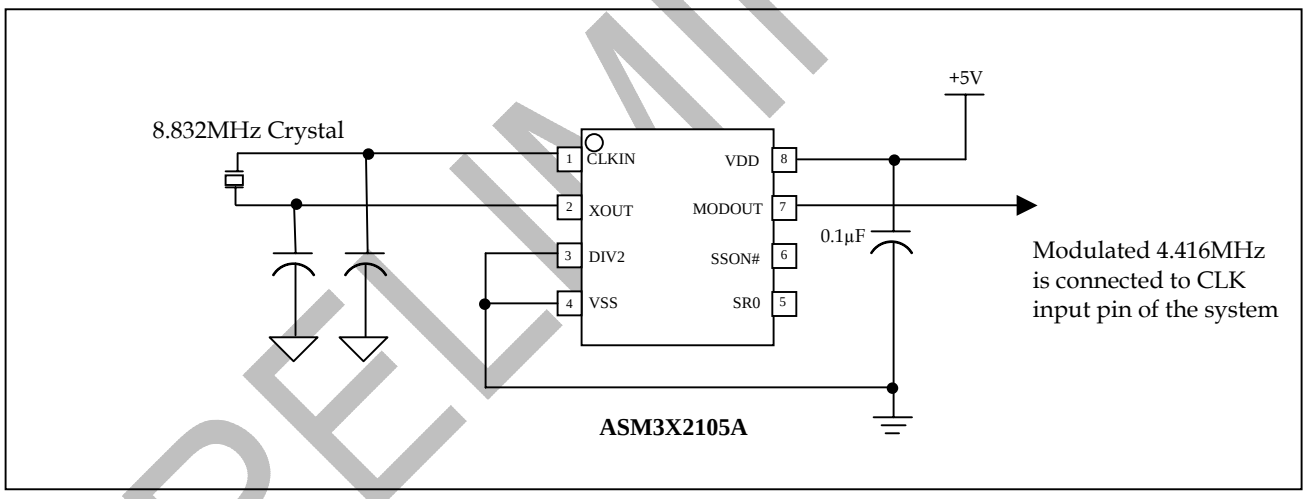
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Spread Spectrum

Spreading the spectrum of the signal reduces the system EMI. The optimal setting should minimize system EMI to the fullest without affecting system performance. The spreading is described as a percentage deviation of the center frequency (Note: The center frequency is the frequency of the external reference input on CLKIN, Pin1).

Example:
The ASM3X2105A is designed for communications, digital video and imaging applications. It is not only optimized for operation in the 6MHz – 12MHz range, but its output frequency can be extended down to one half of the input clock frequency using the divide-by-two feature. This feature extends low frequency operation to as low as 3MHz. Setting pin 3 low (DIV2=0; divide-by-two mode) sets the output frequency (MODOUT) to half the frequency of the input clock (CLKIN). This is a simple way to generate a spread spectrum modulated low frequency clock when only a higher frequency signal is available. If you want the output frequency to be the same as the input, you can either set DIV2=1 or leave it unconnected.



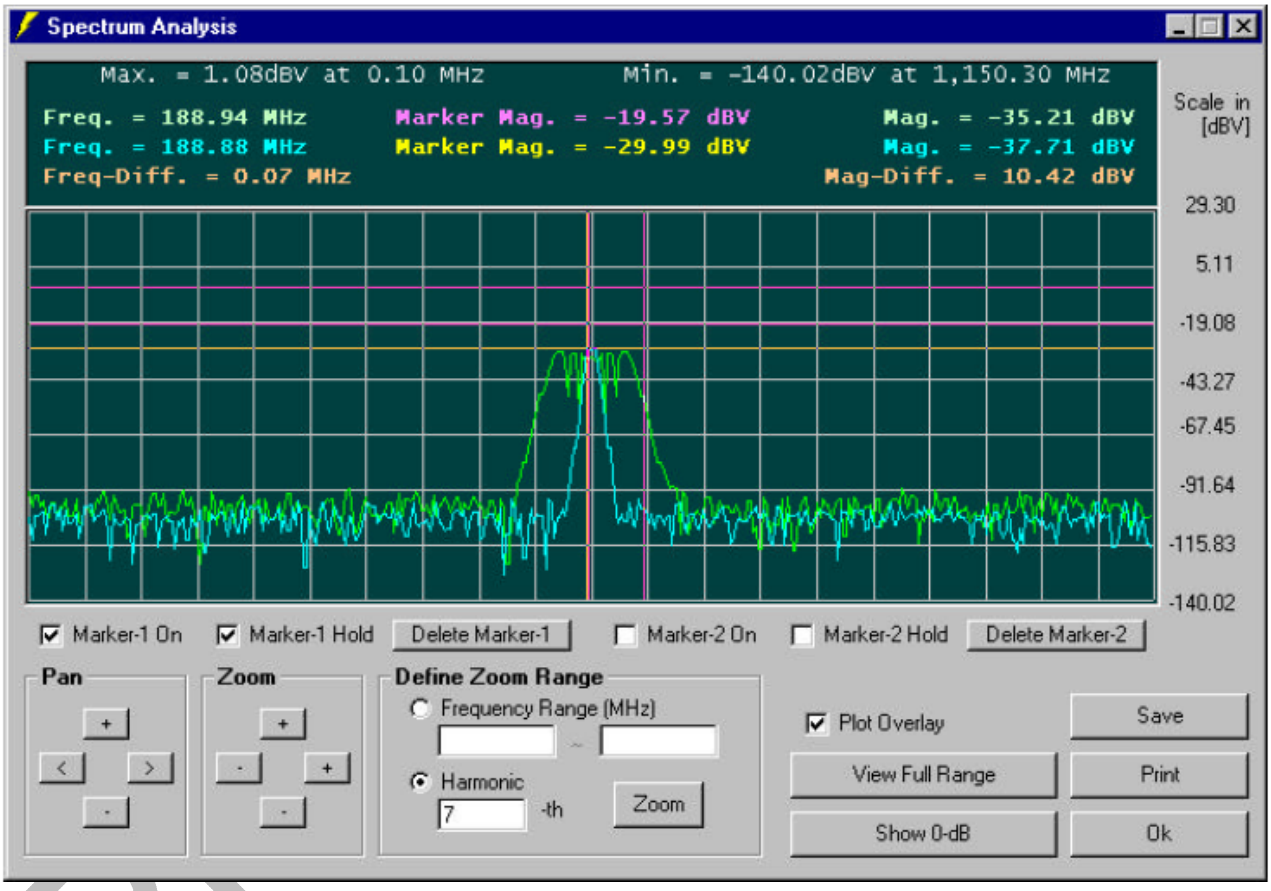
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EMC Software Simulation

By using Alliance's proprietary EMC simulation software – EMI-Lator®, radiated system level EMI analysis can be made easier, allowing quantitative measure on the benefits of Alliance's EMI reduction products. The simulation engine of this EMC software has already been characterized to correlate with the electrical characteristics of Alliance EMI reduction ICs. The figure below is an illustration of this simulation result.

Please visit our website at www.alsc.com for information on how to obtain a free copy and demonstration of EMI-Lator ®.



Simulation results From EMI-Lator®

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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

Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND – 0.3	-	0.8	V
V_{IH}	Input high voltage	2.0	-	V_{DD} + 0.3	V
I_{IL}	Input low current (pull-up resistors on inputs SR0 and DIV2)		44		µA
I_{IH}	Input high current (pull-down resistor on input SSON#)		66		µA
I_{XOL}	X_{OUT} output low current (@ 4.0V, V_{DD} = 5V)		3		mA
I_{XOH}	X_{OUT} output high current (@2.5V, V_{DD} = 5V)		3		mA
V_{OL}	Output low voltage (V_{DD} = 5V, I_{OL} = 20mA)			0.4	V
V_{OH}	Output high voltage (V_{DD} = 5V, I_{OH} = 20mA)	2.5			V
I_{CC}	Dynamic supply current normal mode (5V, 8MHz and 15pF loading)		40		mA
I_{DD}	Static supply current standby mode		40		µA
V_{DD}	Operating voltage	4.75	5.0	5.25	V
t_{ON}	Power up time (first locked clock cycle after power up)	-	0.18	-	mS
Z_{OUT}	Clock out impedance	-	50	-	Ω

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AC Electrical Characteristics

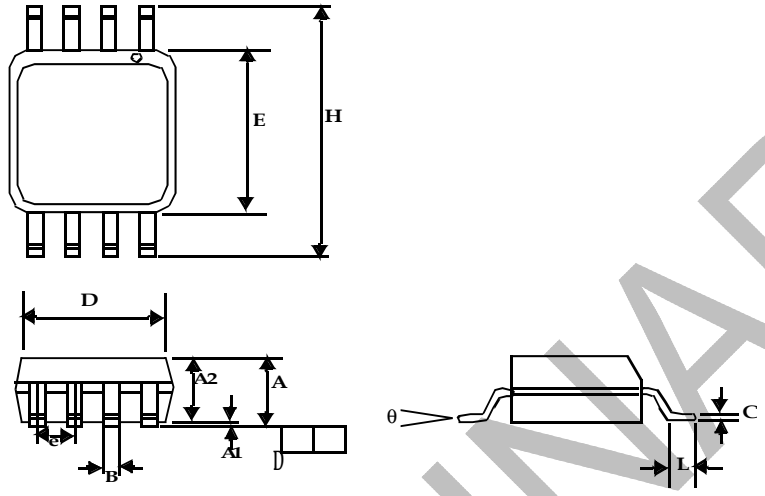
Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input frequency	6	-	10	MHz
MODOUT	Output frequency	6	-	10	MHz
t_{LH}*	Output rise time (measured at 0.8V to 2.0V)	-	440	-	ps
t_{HL}*	Output fall time (measured at 2.0V to 0.8V)	-	300	-	ps
t_{JC}	Jitter (cycle to cycle)	-	-	360	ps
t_D	Output duty cycle	45	50	55	%
* V_{DD} = +5V, Input Frequency = 8MHz, t_{LH} and t_{HL} are measured into a capacitive load of 15pF					

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Package Information

8-Pin SOIC (Pb Free Parts)

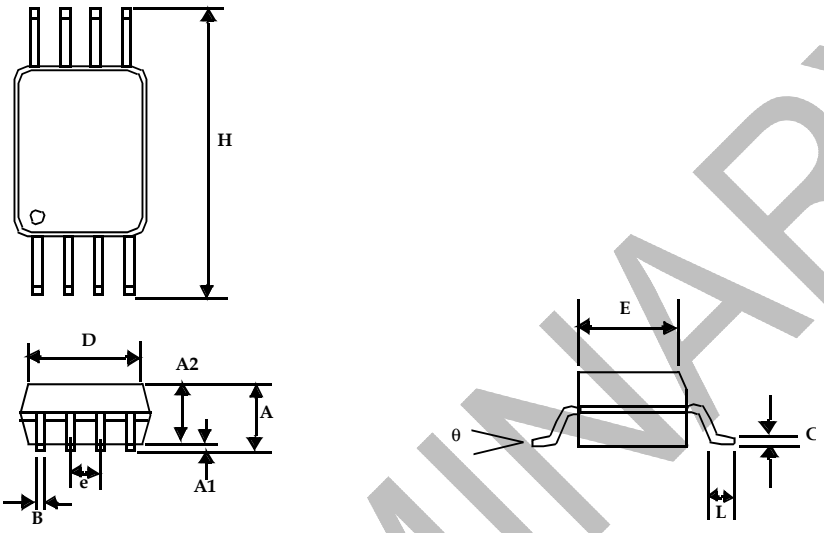


Symbol	Dimensions in inches		Dimensions in millimeters	
	Min	Max	Min	Max
A	0.057	0.071	1.45	1.80
A1	0.004	0.010	0.10	0.25
A2	0.053	0.069	1.35	1.75
B	0.012	0.020	0.31	0.51
C	0.004	0.01	0.10	0.25
D	0.186	0.202	4.72	5.12
E	0.148	0.164	3.75	4.15
e	0.050 BSC		1.27 BSC	
H	0.224	0.248	5.70	6.30
L	0.012	0.028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

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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°

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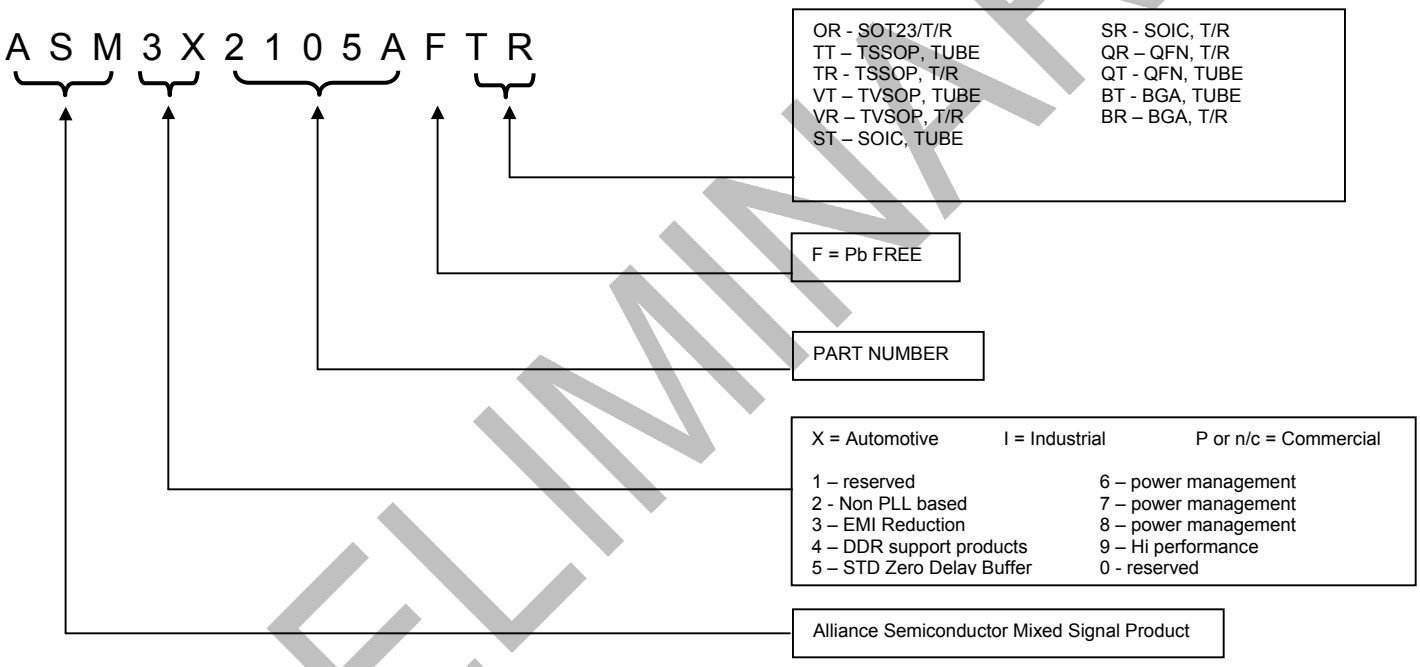
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rev 1.0

Ordering Codes

Part Number	Package	
ASM3X2105AFTR	8-PIN TSSOP	TAPE AND REEL
ASM3X2105AFT	8-PIN TSSOP	TUBE
ASM3X2105AFSR	8-PIN SOIC	TAPE AND REEL
ASM3X2105AFS	8-PIN SOIC	TUBE

Device Ordering Information



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