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EMI Reduction IC

Features

- FCC approved method of EMI attenuation.
- Provides up to 15dB EMI reduction.
- Generates a 1X low EMI spread spectrum clock of the input frequency.
- Input frequency range: 6MHz to 103MHz.
- Internal loop filter minimizes external components and board space.
- Selectable spread options: Down and Center Spread
- 2 spread frequency deviation selections:
  - -1.25% or ± 0.42%
- Low inherent cycle-to-cycle jitter.
- 3.3V operating voltage range.
- Low power CMOS design.
- Supports notebook VGA and other LCD timing controller applications.
- Products are available for industrial temperature range.
- Available in 8-pin SOIC and TSSOP.

Product Description

The ASM3P2183 is a versatile spread spectrum frequency modulators designed specifically for a wide range of input clock frequencies from 6MHz to 103MHz. *(Refer Input Frequency and Modulation Rate Table)*. The ASM3P2183A can generate an EMI reduced clock from an OSC or a system generated clock. The ASM3P2183A offers a Down Spread clock with a percentage deviation of -1.25% and a Center Spread clock with a percentage deviation of ± 0.42%.

The ASM3P2183A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of down stream clock and data dependent signals. The ASM3P2183A 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 ASM3P2183A uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

The ASM3P2183A 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 ASM3P2183A 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.

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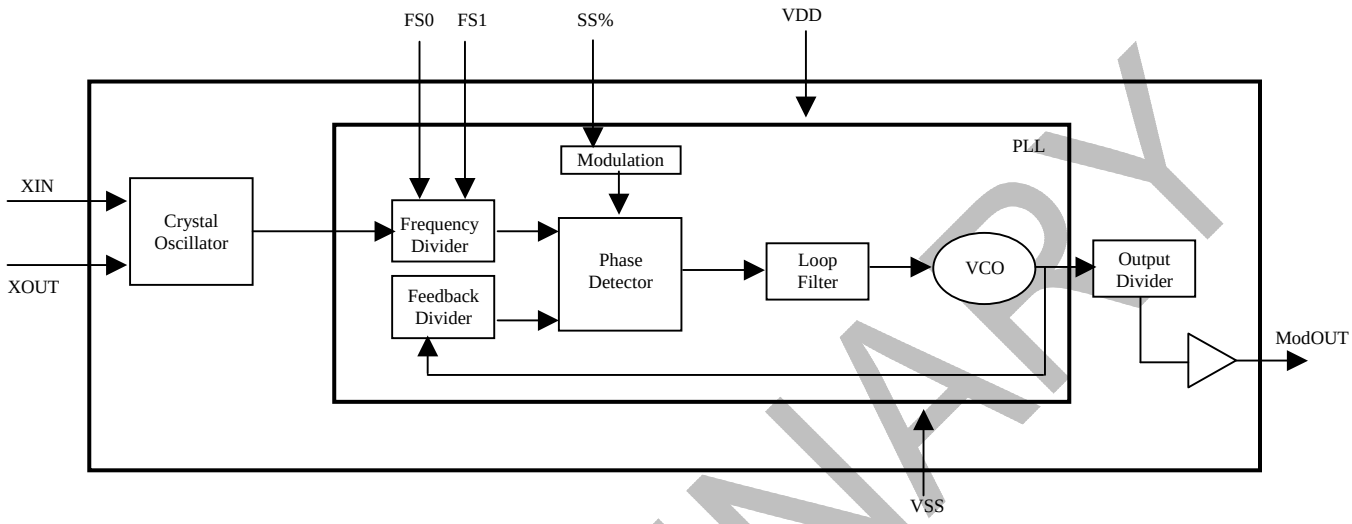
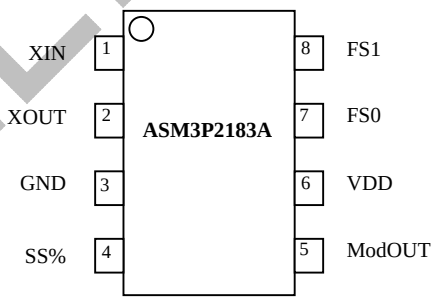
Block Diagram



Pin Configuration



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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	XOUT	I	Crystal connection. Input connection for an external crystal. If using an external reference, this pin must be left unconnected.
3	GND	P	Ground to entire chip.
4	SS%	I	Spread range select. Digital logic input used to select frequency deviation (Refer *Spread Deviation Selection Table*). This pin has an internal pull-up resistor.
5	ModOUT	O	Spread spectrum low EMI output.
6	VDD	P	Power supply for the entire chip (3.3V).
7	FS0	I	Frequency range select. Digital logic input used to select frequency range (*Refer Input Frequency and Modulation Rate Table*). This pin has an internal pull-up resistor.
8	FS1	I	Frequency range select. Digital logic input used to select frequency range (*Refer Input Frequency and Modulation Rate Table*). This pin has an internal pull-up resistor.

Input Frequency and Modulation Rate Table

FS1 (pin 8)	FS0 (pin 7)	Frequency Range
0	0	6 MHz to 13 MHz
0	1	12 MHz to 25 MHz
1	0	25 MHz to 50 MHz
1	1	50 MHz to 103 MHz

Spread Deviation Selection Table

SS% (pin 4)	Spread Deviation (%)
0	- 1.25
1	± 0.42

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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	-	-	-35	µA
I_{IH}	Input high current	-	-	35	µA
I_{XOL}	XOUT Output low current (@ 0.4V, V_{DD} = 3.3V)	-	TBD	-	mA
I_{XOH}	XOUT Output high current (@ 2.5V, V_{DD} = 3.3V)	-	TBD	-	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 10pF loading)	8.46	12	17.78	mA
I_{DD}	Static supply current Standby mode		0.6		mA
V_{DD}	Operating voltage	2.7	3.3	3.7	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	-	103	MHz
ModOUT	Output frequency	6	-	103	MHz
t_{LH}*	Output rise time (measured at 0.8V to 2.0V)	1.2	1.32	1.4	ns
t_{HL}*	Output fall time (measured at 2.0V to 0.8V)	0.8	0.9	1.0	ns
t_{JC}	Jitter (cycle to cycle)	-	-	200	ps
T_D	Output duty cycle	45	50	55	%
* t_{LH} and t_{HL} are measured into a capacitive load of 15pF					

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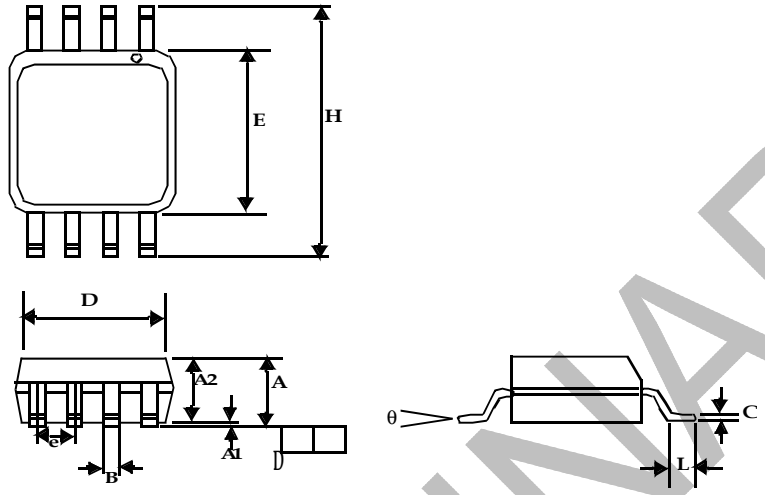
Package Information

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°

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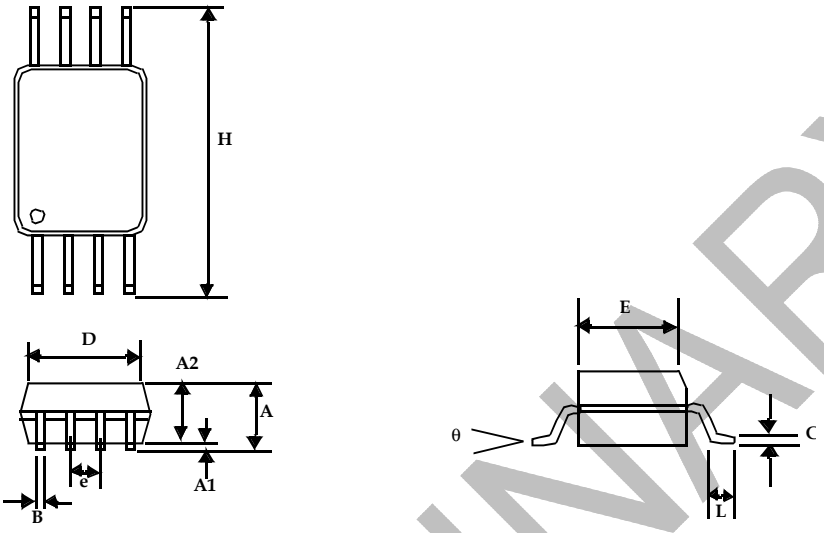
8-Pin TSSOP



	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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