ASM3P2183A

EMI Reduction IC

Description

The ASM3P2183A is a versatile spread spectrum frequency modulator designed specifically for a wide range of input clock frequencies from 6 MHz to 90 MHz. *(*Refer to *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

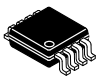
The ASM3P2183A is targeted towards EMI management for memory and LVDS interfaces in mobile graphic chipsets and high−speed digital applications such as PC peripheral devices, consumer electronics, and embedded controller systems.

Features

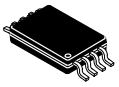
- FCC Approved Method of EMI Attenuation
- Provides up to 15 dB EMI Reduction
- Generates a 1X Low EMI Spread Spectrum Clock of the Input Frequency
- Input Frequency Range: 6 MHz to 90 MHz
- Internal Loop Filter Minimizes External Components and Board Space
- Selectable Spread Options: Down and Center Spread
- 2 Spread Frequency Deviation Selections: −1.25% or ± 0.42%
- Low Inherent Cycle−to−Cycle Jitter
- Supply Voltage: 3.3 V ± 0.3 V
- 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 Packages
- These are Pb−Free Devices

ON Semiconductor®

http://onsemi.com

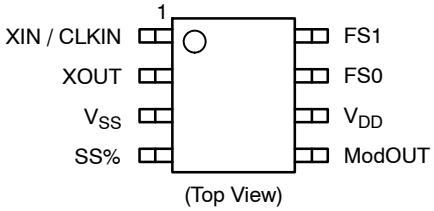


SOIC−8
S SUFFIX
CASE 751BD



TSSOP−8
T SUFFIX
CASE 948AL

PIN CONFIGURATION



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

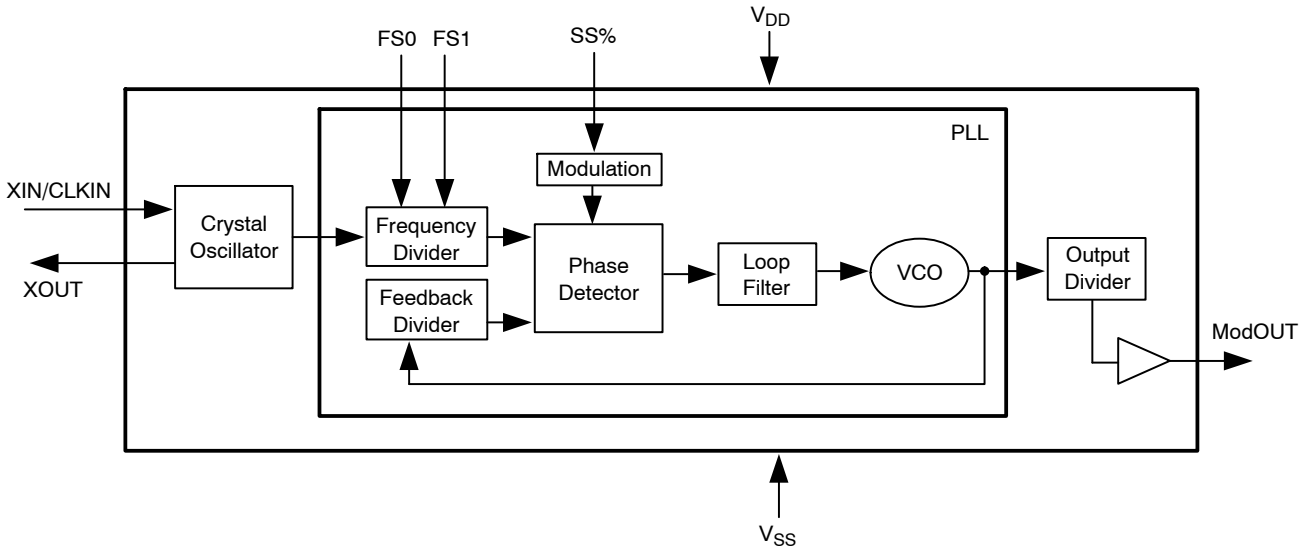


Figure 1. Block Diagram

Table 1. PIN DESCRIPTION

Pin#	Pin Name	Type	Description
1	XIN / CLKIN	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	V_{SS}	P	Ground to entire chip.
4	SS%	I	Spread range select. Digital logic input used to select frequency deviation (Refer to *Spread Deviation Selection Table*). This pin has an internal pull−up resistor.
5	ModOUT	O	Spread spectrum low EMI output.
6	V_{DD}	P	Power supply for the entire chip.
7	FS0	I	Frequency range select. Digital logic input used to select frequency range (Refer to *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 to *Input Frequency and Modulation Rate Table*). This pin has an internal pull−up resistor.

Table 2. 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 90 MHz

Table 3. SPREAD DEVIATION SELECTION TABLE

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

Table 4. 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_s	Max. Soldering Temperature (10 sec)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per JEDEC STD22− A114−B)	2	KV

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 5. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
T_A	Operating Temperature	0		+70	°C
VDD	Core Voltage	+3.0	+3.3	+3.6	V

Table 6. 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	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 (@ 0.4 V, V_{DD} = 3.3 V)	−	3	−	mA
I_{XOH}	XOUT Output high current (@ 2.5 V, V_{DD} = 3.3 V)	−	3	−	mA
V_{OL}	Output low voltage (V_{DD} = 3.3 V, I_{OL} = 20 mA)	−	−	0.4	V
V_{OH}	Output high voltage (V_{DD} = 3.3 V, I_{OH} = 20 mA)	2.5	−	−	V
I_{CC}	Dynamic supply current Normal mode (3.3 V, 90 MHz and 10 pF loading)	−	28	−	mA
I_{DD}	Static supply current (Note 1)	−	7.0	−	mA
V_{DD}	Operating voltage	3.0	3.3	3.6	V
t_{ON}	Power up time (first locked clock cycle after power up)	−	0.18	−	mS
Z_{OUT}	Clock out impedance	−	50	−	Ω

1. XIN /CLKIN pin is pulled low.

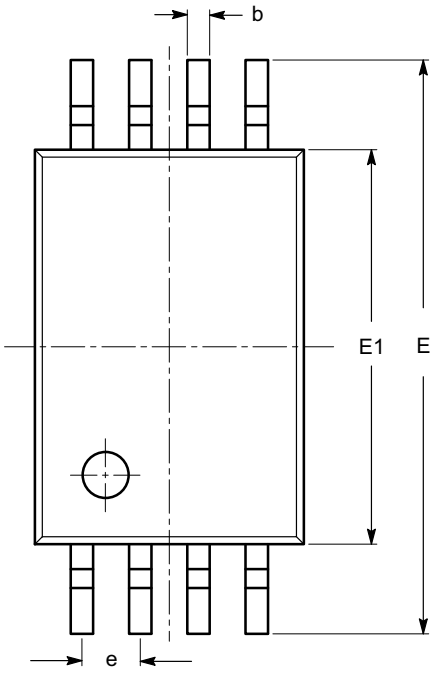
Table 7. AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input frequency	6	−	90	MHz
ModOUT	Output frequency	6	−	90	MHz
t_{LH} (Note 2)	Output rise time (measured at 0.8 V to 2.0 V)	0.3	0.9	1.1	nS
t_{HL} (Note 2)	Output fall time (measured at 2.0 V to 0.8 V)	0.5	1.0	1.2	nS
t_{JC}	Jitter (cycle to cycle)	−	−	200	pS
T_D	Output duty cycle	45	50	55	%

2. t_{LH} and t_{HL} are measured with a capacitive load of 15 pF at 27 MHz.

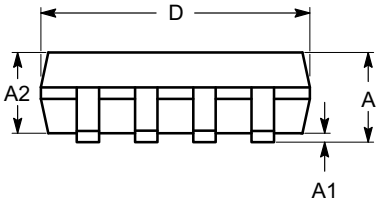
PACKAGE DIMENSIONS

TSSOP8, 4.4x3
CASE 948AL−01
ISSUE O

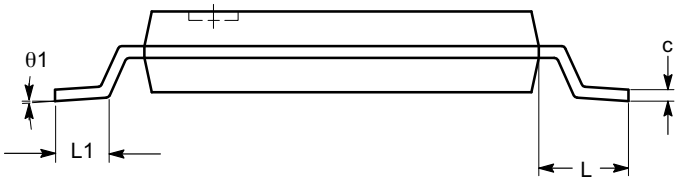


TOP VIEW

SYMBOL	MIN	NOM	MAX
A			1.20
A1	0.05		0.15
A2	0.80	0.90	1.05
b	0.19		0.30
c	0.09		0.20
D	2.90	3.00	3.10
E	6.30	6.40	6.50
E1	4.30	4.40	4.50
e	0.65 BSC		
L	1.00 REF		
L1	0.50	0.60	0.75
θ	0º		8º



SIDE VIEW



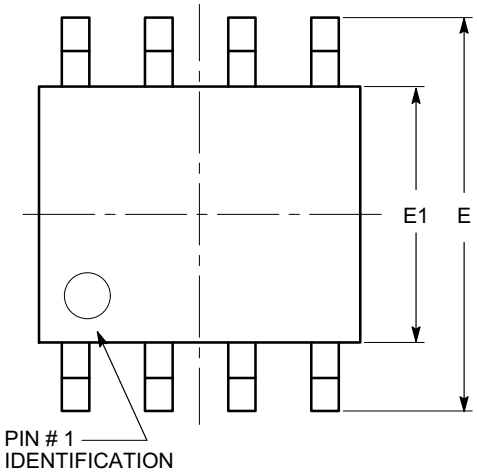
END VIEW

Notes:

(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MO-153.

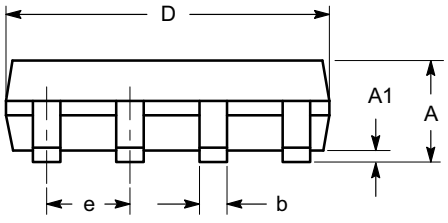
PACKAGE DIMENSIONS

SOIC 8, 150 mils
CASE 751BD−01
ISSUE O

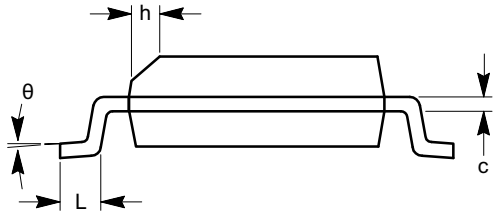


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	1.35		1.75
A1	0.10		0.25
b	0.33		0.51
c	0.19		0.25
D	4.80		5.00
E	5.80		6.20
E1	3.80		4.00
e	1.27 BSC		
h	0.25		0.50
L	0.40		1.27
θ	0º		8º



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MS-012.

Table 8. ORDERING INFORMATION

Part Number	Marking	Package Type	Temperature
ASM3P2183A−08ST	3P2183A	8−Pin SOIC, TUBE	Commercial
ASM3P2183A−08SR	3P2183A	8−Pin SOIC, TAPE & REEL	Commercial
ASM3P2183A−08TT	3P2183A	8−Pin TSSOP, TUBE	Commercial
ASM3P2183A−08TR	3P2183A	8−Pin TSSOP, TAPE & REEL	Commercial
ASM3P2183AF−08ST	3P2183AF	8−Pin SOIC, TUBE, Pb Free	Commercial
ASM3P2183AF−08SR	3P2183AF	8−Pin SOIC, TAPE & REEL, Pb Free	Commercial
ASM3P2183AF−08TT	3P2183AF	8−Pin TSSOP, TUBE, Pb Free	Commercial
ASM3P2183AF−08TR	3P2183AF	8−Pin TSSOP, TAPE & REEL, Pb Free	Commercial
ASM3P2183AG−08ST	3P2183AG	8−Pin SOIC, TUBE, Green	Commercial
ASM3P2183AG−08SR	3P2183AG	8−Pin SOIC, TAPE & REEL, Green	Commercial
ASM3P2183AG−08TT	3P2183AG	8−Pin TSSOP, TUBE, Green	Commercial
ASM3P2183AG−08TR	3P2183AG	8−Pin TSSOP, TAPE & REEL, Green	Commercial

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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