ASM3P2760A

Peak EMI Reducing Solution

Product Description

The ASM3P2760A is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2760A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2760A allows significant system cost savings by reducing the number of circuit board layers, ferrite beads and shielding that are traditionally required to pass EMI regulations.

The ASM3P2760A uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all digital method.

The ASM3P2760A 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.'

Features

- Generates an EMI Optimized Clock Signal at the Output
- Integrated Loop Filter Components
- Operates with a 2.5/3.3 V Supply
- Operating Current less than 4 mA
- CMOS Design
- Input Frequency Range:
  - 6 MHz to 12 MHz for 2.5 V
  - 6 MHz to 13 MHz for 3.3 V
- Generates a 1x Low EMI Spread Spectrum Clock of the Input Frequency
- Frequency Deviation: ±0.65% @ 8 MHz
- Available in TSOP−6 Package
- This Device is Pb-Free and is RoHS Compliant

Applications

The ASM3P2760A is targeted towards all portable devices like MP3 players and digital still cameras.

Table 1. KEY SPECIFICATIONS

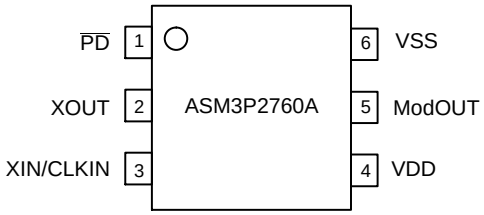
Description	Specification
Supply Voltages	V_{DD} = 2.5/3.3 V
Cycle-to-Cycle Jitter	±200 ps (Typ)
Output Duty Cycle	45/55%
Modulation Rate Equation	F_{IN}/256
Frequency Deviation	±0.65% @ 8 MHz

ON Semiconductor®

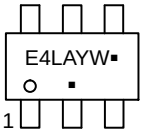
www.onsemi.com

TSOP−6
CASE 318G

PIN CONNECTION



MARKING DIAGRAM



E4L = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

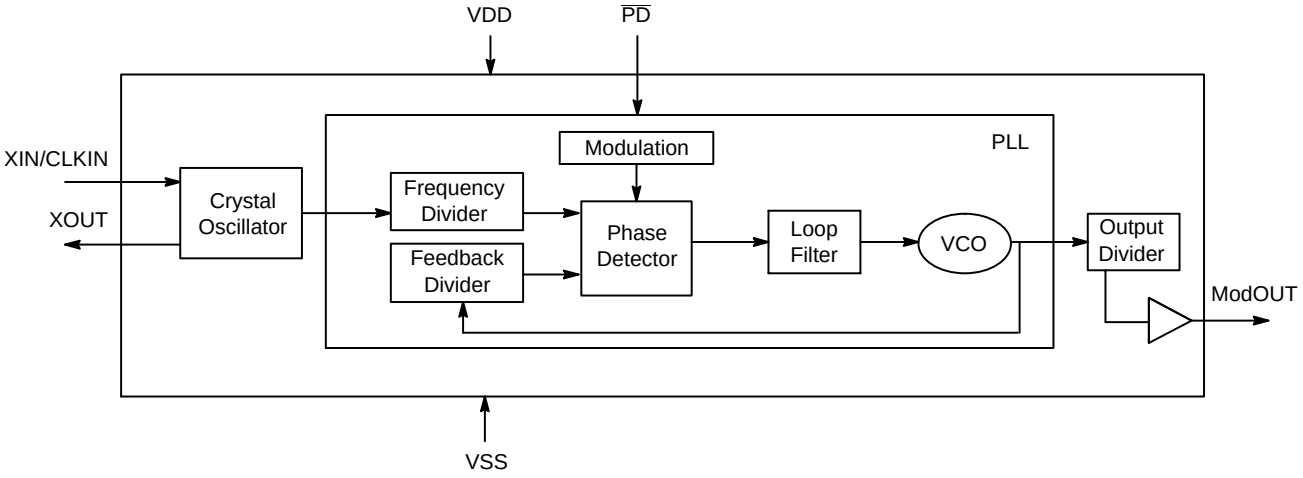


Figure 1. Block Diagram

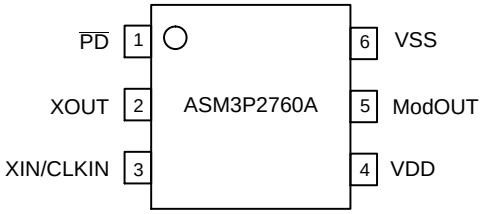


Figure 2. Pin Configuration

Table 2. PIN DESCRIPTION

Pin#	Pin Name	Type	Description
1	$\overline{PD}$	I	Power-Down Control Pin. Pull Low to Enable Power-Down Mode. Connect to VDD if Not Used
2	XOUT	O	Crystal Connection. If Using an External Reference, this Pin Must be Left Unconnected
3	XIN/CLKIN	I	Crystal Connection or External Reference Frequency Input. This Pin has Dual Functions. It can be Connected either to an External Crystal or an External Reference Clock
4	VDD	P	Power Supply for the Entire Chip
5	ModOUT	O	Spread Spectrum Clock Output
6	VSS	P	Ground Connection

Table 3. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VDD, 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	Maximum Soldering Temperature (10 s)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (as per JEDEC STD22−A114−B)	2	kV

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 4. RECOMMENDED OPERATING CONDITIONS

Parameter	Description	Min	Max	Unit
VDD	Supply Voltage	2.375	3.6	V
T_A	Operating Temperature (Ambient Temperature)	0	70	°C
C_L	Load Capacitance	−	15	pF
C_{IN}	Input Capacitance	−	7	pF

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Table 5. DC ELECTRICAL CHARACTERISTICS FOR 2.5 V SUPPLY

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}	X_{OUT} Output Low Current (@ 0.5 V, V_{DD} = 2.5 V)	−	3	−	mA
I_{XOH}	X_{OUT} Output High Current (@ 1.8 V, V_{DD} = 2.5 V)	−	3	−	mA
V_{OL}	Output Low Voltage (V_{DD} = 2.5 V, I_{OL} = 8 mA)	−	−	0.6	V
V_{OH}	Output High Voltage (V_{DD} = 2.5 V, I_{OH} = 8 mA)	1.8	−	−	V
I_{DD}	Static Supply Current (Note 1)	−	−	10	μA
I_{CC}	Dynamic Supply Current (2.5 V, 8 MHz and No Load)		2.5		mA
V_{DD}	Operating Voltage	2.375	2.5	2.625	V
t_{ON}	Power-Up Time (First Locked Cycle after Power-Up) (Note 2)	−	−	5	ms
Z_{OUT}	Output Impedance	−	50	−	Ω

1. XIN/CLKIN pin and $\overline{PD}$ pin are pulled low.
2. VDD and XIN/CLKIN input are stable, $\overline{PD}$ pin is made high from low.

Table 6. AC ELECTRICAL CHARACTERISTICS FOR 2.5 V SUPPLY

Symbol	Parameter	Min	Typ	Max	Unit
CLKIN	Input Frequency	6	−	12	MHz
ModOUT	Output Frequency	6	−	12	MHz
f_D	Frequency Deviation Input Frequency = 6 MHz Input Frequency = 12 MHz	 − −	 ±1.0 ±0.45	 − −	%
t_{LH}*	Output Rise Time (Measured at 0.7 V to 1.7 V)	0.4	1.2	1.4	ns
t_{HL}*	Output Fall Time (Measured at 1.7 V to 0.7 V)	0.4	0.9	1.1	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 15 pF.

Table 7. DC ELECTRICAL CHARACTERISTICS FOR 3.3 V SUPPLY

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}	X_{OUT} Output Low Current (@ 0.4 V, V_{DD} = 3.3 V)	−	3	−	mA
I_{XOH}	X_{OUT} 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} = 8 mA)	−	−	0.4	V
V_{OH}	Output High Voltage (V_{DD} = 3.3 V, I_{OH} = 8 mA)	2.5	−	−	V
I_{DD}	Static Supply Current (Note 1)	−	−	10	μA
I_{CC}	Dynamic Supply Current (3.3 V, 8 MHz and No Load)		3.0		mA
V_{DD}	Operating Voltage	2.7	3.3	3.6	V
t_{ON}	Power-Up Time (First Locked Cycle after Power-Up) (Note 2)	−	−	5	ms
Z_{OUT}	Output Impedance	−	45	−	Ω

1. XIN/CLKIN pin and $\overline{PD}$ pin are pulled low.
2. VDD and XIN/CLKIN input are stable, $\overline{PD}$ pin is made high from low.

Table 8. AC ELECTRICAL CHARACTERISTICS FOR 3.3 V SUPPLY

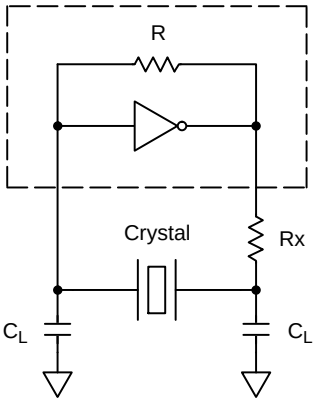
Symbol	Parameter	Min	Typ	Max	Unit
CLKIN	Input Frequency	6	−	13	MHz
ModOUT	Output Frequency	6	−	13	MHz
f_D	Frequency Deviation Input Frequency = 6 MHz Input Frequency = 13 MHz	 − −	 ±1.0 ±0.4	 − −	%
t_{LH}*	Output Rise Time (Measured at 0.8 V to 2.0 V)	0.5	1.3	1.5	ns
t_{HL}*	Output Fall Time (Measured at 2.0 V to 0.8 V)	0.4	1.0	1.2	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 15 pF.

Table 9. TYPICAL CRYSTAL SPECIFICATIONS

Fundamental AT Cut Parallel Resonant Crystal	Rating
Nominal Frequency	8 MHz
Frequency Tolerance	±50 ppm or Better at 25°C
Operating Temperature Range	−25 to +85°C
Storage Temperature	−40 to +85°C
Load Capacitance (C_P)	18 pF
Shunt Capacitance	7 pF Maximum
ESR	25 Ω

NOTE: C_L is Load Capacitance and Rx is used to prevent oscillations at overtone frequency of the Fundamental frequency.



$C_L = 2 \cdot (C_P - C_S)$
Where: C_L = Load Capacitance of Crystal
C_S = Stray Capacitance due to C_{IN}, PCB, Trace, etc.

Figure 3. Typical Crystal Interface Circuit

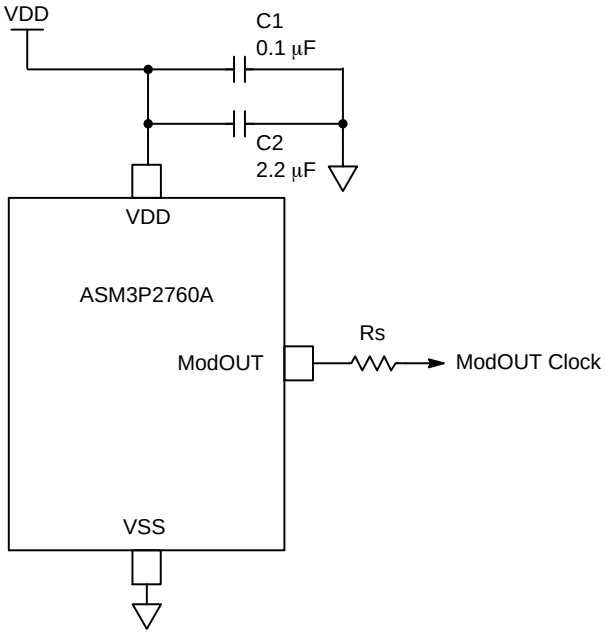


Figure 4. Typical Application Schematic

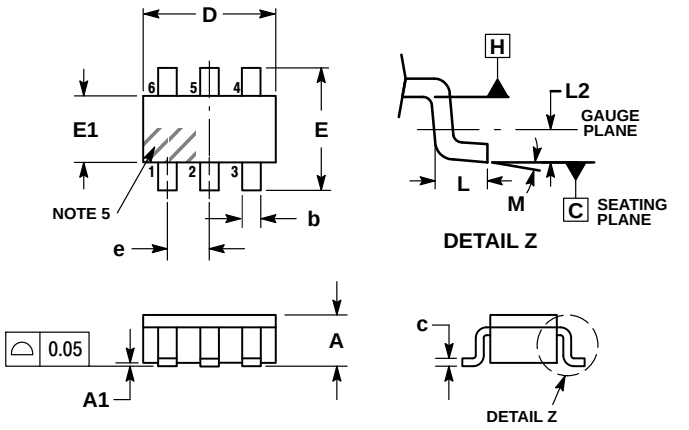
Table 10. ORDERING INFORMATION

Part Number	Marking	Package	Temperature	Shipping†
ASM3P2760AF-06OR	E4L	TSOP−6 (Pb-Free)	0 to 70°C	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

PACKAGE DIMENSIONS

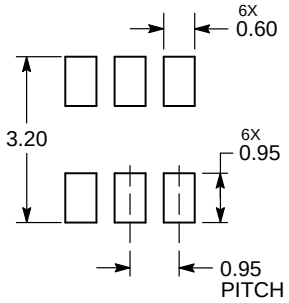
TSOP−6
CASE 318G−02
ISSUE V



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2		0.25 BSC	
M	0°	–	10°

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

ASM3P2760/D