

Low Power Peak EMI Reducing Solution

Features

- Generates an EMI optimized clock signal at the output.
- Integrated loop filter components.
- Operates with a 3.3V Supply.
- Operating current less than 6mA.
- Low power CMOS design.
- Input frequency range : 13MHz to 30MHz
- Generates a 1X and 2X low EMI spread spectrum clock of the input frequency.
- Output Frequency Selection through FSEL pin
- Frequency deviation : -1.5% (Typ) @25MHz
: -1.5% (Typ) @50MHz
- Available in 6-pin TSOT-23, 8-pin SOIC and 8-pin TSSOP packages.

Product Description

The ASM3P2474A is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2474A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2474A 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 ASM3P2474A uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all digital method.

The ASM3P2474A 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’.

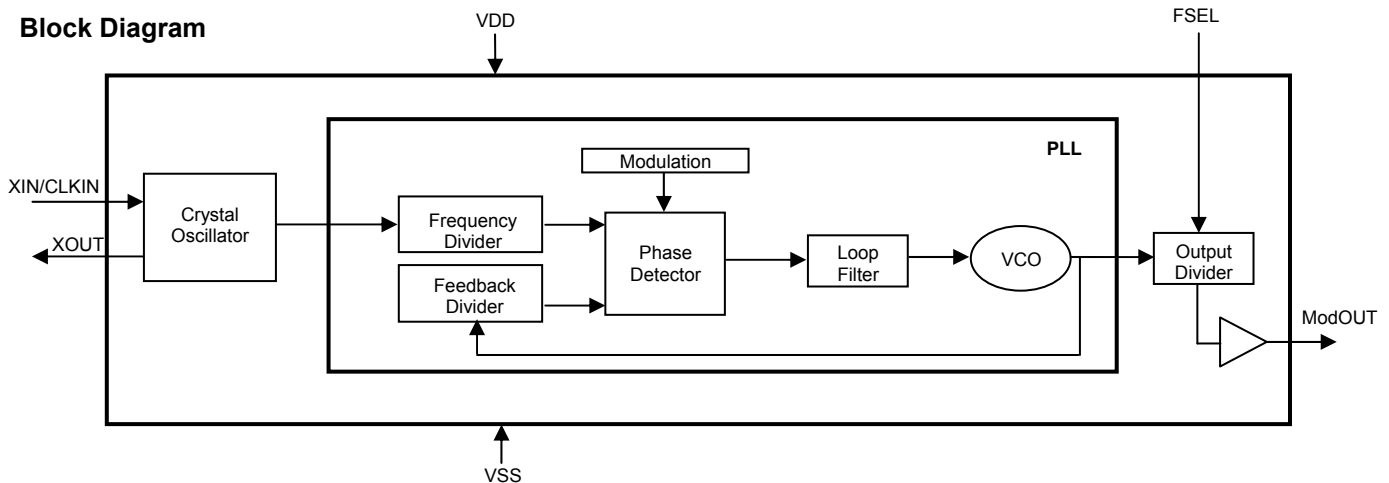
Applications

The ASM3P2474A is targeted towards all portable devices with very low power requirements like MP3 players and digital still cameras.

Key Specifications

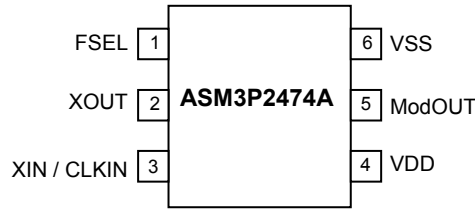
Description		Specification
Supply voltages		VDD = 3.3V ± 0.3V
Cycle-to-Cycle Jitter		200pS (Typ)
Output Duty Cycle		45/55% (worst case)
Modulation Rate Equation		$F_{IN}/640$
Frequency Deviation	FSEL=0	-1.5% (Typ) @ 50MHz
	FSEL=1	-1.5% (Typ) @ 25MHz

Block Diagram



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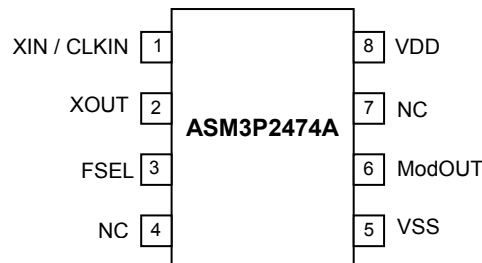
Pin Configuration (6-pin TSOT- 23 Package)



Pin Description

Pin#	Pin Name	Type	Description
1	FSEL	I	Selection Pin for 1X and 2X Output Frequency Options. Please refer the table "Frequency Selection Options" for further details
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.

Pin Configuration (8-pin SOIC and TSSOP Packages)

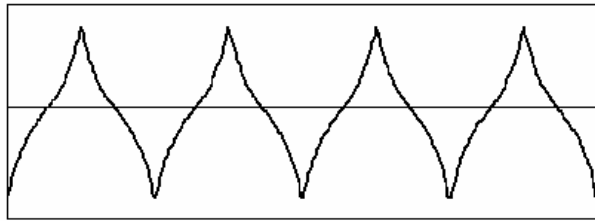


Pin Description

Pin#	Pin Name	Type	Description
1	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.
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	FSEL	I	Selection Pin for 1X and 2X Output Frequency Options. Please refer the table "Frequency Selection Options" for further details
4	NC	-	No connect.
5	VSS	P	Ground connection.
6	ModOUT	O	Spread spectrum clock output.
7	NC	-	No connect.
8	VDD	P	Power supply for the entire chip.

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Modulation Profile



Specifications

Description	Specification	
Frequency Range	13MHz < CLKIN < 30MHz	
Modulation Equation	$F_{IN}/640$	
Frequency Deviation	FSEL=0	-1.5% (Typ) @ 50MHz
	FSEL=1	-1.5% (Typ) @ 25MHz

Frequency Selection Options

FSEL Pin	Input Frequency (MHz)	Output Frequency (MHz)
0	13-30	26-60
1	13-30	13-30

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 _A	Operating temperature	0 to 70	°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

Note: These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

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DC Electrical Characteristics

(Test condition: All parameters are measured at room temperature (+25°C) unless otherwise stated)

Symbol	Parameter	Min	Typ	Max	Unit
V _{IL}	Input low voltage	VSS - 0.3	-	0.8	V
V _{IH}	Input high voltage	2.0	-	VDD + 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, VDD=3.3V)	-	3	-	mA
I _{XOH}	XOUT output high current (@2.5V, VDD=3.3V)	-	3	-	mA
V _{OL}	Output low voltage (VDD = 3.3V, I _{OL} = 8mA)	-	-	0.4	V
V _{OH}	Output high voltage (VDD = 3.3V, I _{OH} = 8mA)	2.5	-	-	V
I _{DD}	Static supply current*	-	1.6	-	mA
I _{CC}	Dynamic supply current (3.3V, 25MHz and no load and FSEL=1)	-	4.0	-	mA
VDD	Operating voltage	3.0	3.3	3.6	V
t _{ON}	Power-up time (first locked cycle after power-up)	-	-	5	mS
Z _{OUT}	Output impedance	-	45	-	Ω

* XIN /CLKIN pin is pulled low

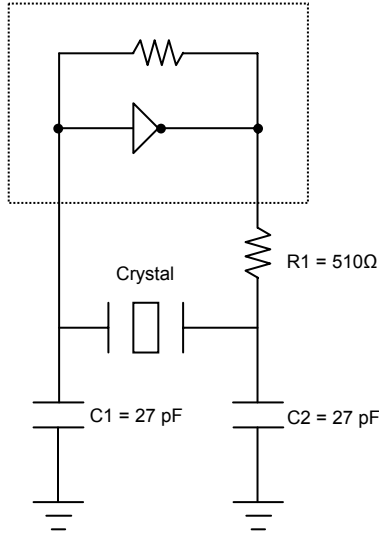
AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit	
CLKIN	Input frequency	13	-	30	MHz	
ModOUT	Output frequency	FSEL=0	26	-	60	MHz
		FSEL=1	13	-	30	
f _d	Frequency Deviation	Output Frequency = 13MHz	-	-1.8	-	%
		Output Frequency = 30MHz	-	-0.9	-	
f _d	Frequency Deviation	Output Frequency = 26MHz	-	-1.8	-	%
		Output Frequency = 60MHz	-	-0.9	-	
t _{LH} *	Output rise time (measured from 0.8 to 2.0V)	0.4	0.85	1.1	nS	
t _{HL} *	Output fall time (measured at 2.0V to 0.8V)	0.3	0.7	0.9	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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Typical Crystal Oscillator Circuit

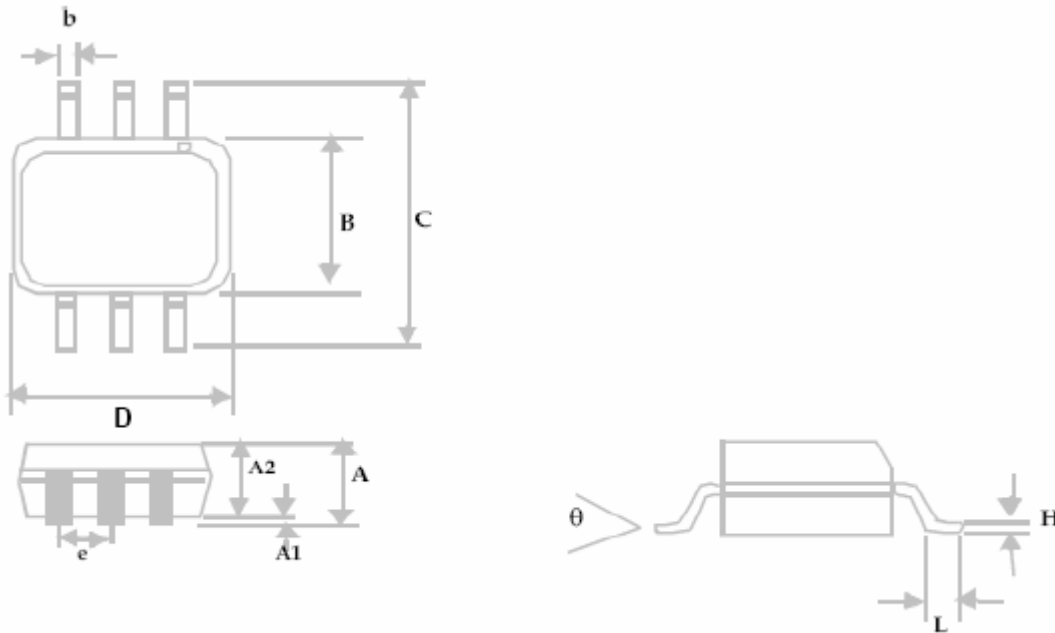


Typical Crystal Specifications

Fundamental AT cut parallel resonant crystal	
Nominal frequency	25MHz
Frequency tolerance	± 50 ppm or better at 25°C
Operating temperature range	-25°C to +85°C
Storage temperature	-40°C to +85°C
Load capacitance	18pF
Shunt capacitance	7pF maximum
ESR	25 Ω

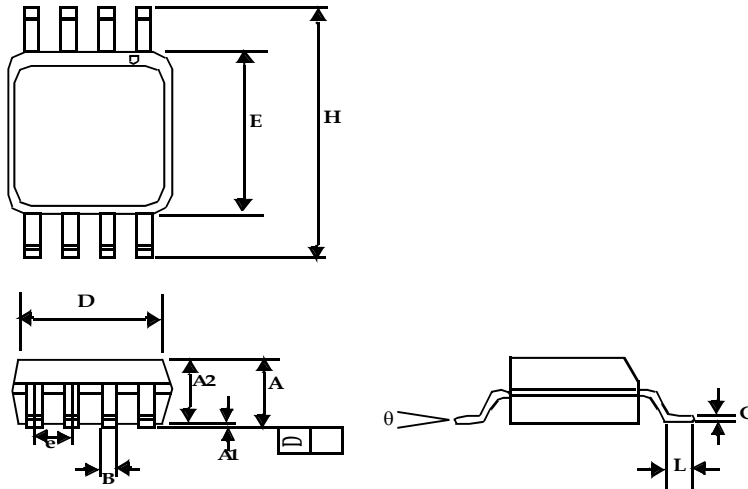
Package Information

6-pin TSOT-23 Package



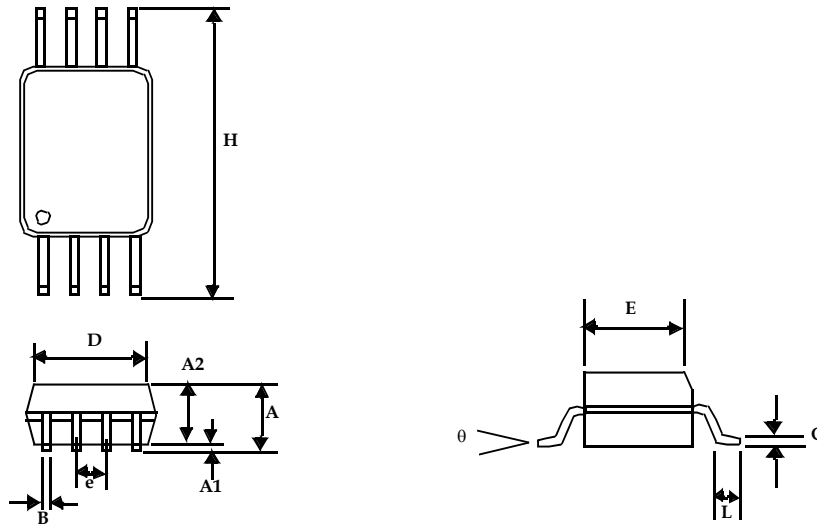
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.04		1.00
A1	0.00	0.004	0.00	0.10
A2	0.033	0.036	0.84	0.90
b	0.012	0.02	0.30	0.50
H	0.005 BSC		0.127 BSC	
D	0.114 BSC		2.90 BSC	
B	0.06 BSC		1.60 BSC	
e	0.0374 BSC		0.950 BSC	
C	0.11 BSC		2.80 BSC	
L	0.0118	0.02	0.30	0.50
θ	0°	4°	0°	4°

8-Pin SOIC Package



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

8-Pin TSSOP



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	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	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
theta	0°	8°	0°	8°

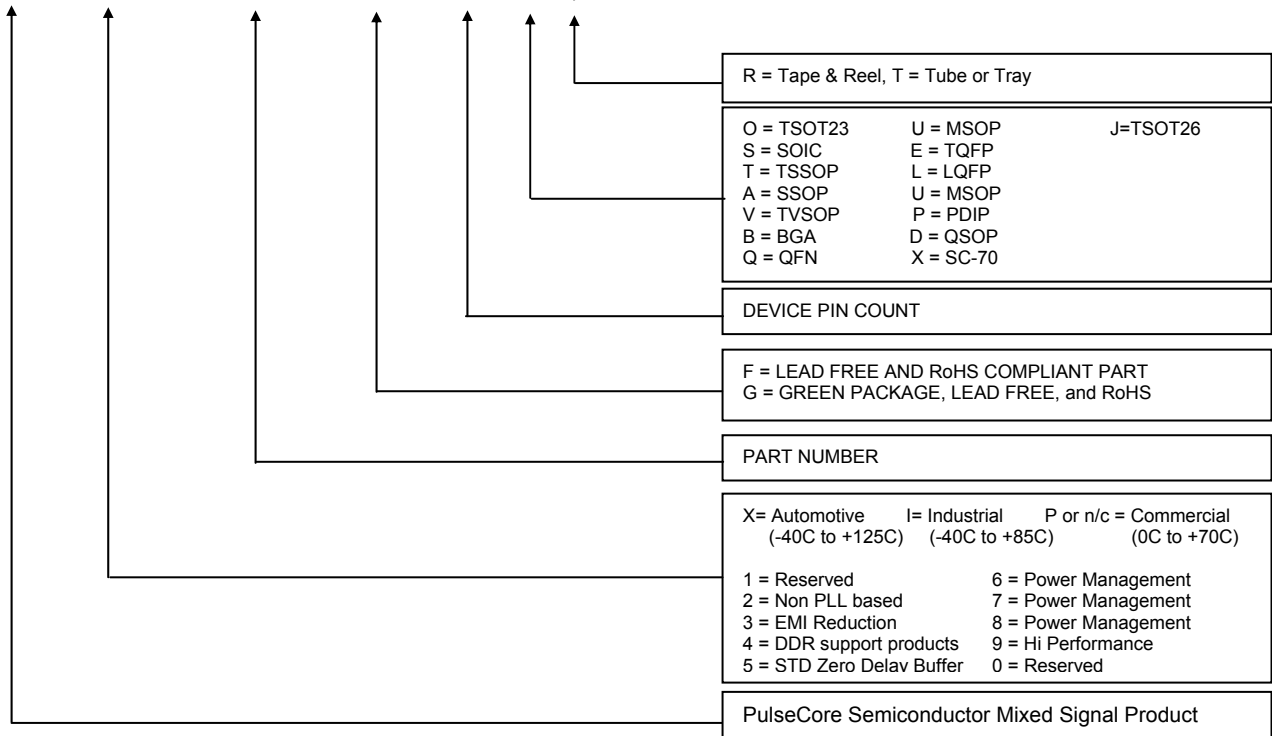
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Ordering Information

Part Number	Marking	Package Type	Temperature
ASM3P2474AF-06OR	W4LL	6-Pin TSOT-23, TAPE & REEL, Pb Free	Commercial
ASM3P2474AF-08TT	3P2474AF	8-Pin TSSOP, TUBE, Pb Free	Commercial
ASM3P2474AF-08TR	3P2474AF	8-Pin TSSOP, TAPE & REEL, Pb Free	Commercial
ASM3P2474AF-08ST	3P2474AF	8-Pin SOIC, TUBE, Pb Free	Commercial
ASM3P2474AF-08SR	3P2474AF	8-Pin SOIC, TAPE & REEL, Pb Free	Commercial
ASM3P2474AG-06OR	W3LL	6-Pin TSOT-23, TAPE & REEL, Green	Commercial
ASM3P2474AG-08TT	3P2474AG	8-Pin TSSOP, TUBE, Green	Commercial
ASM3P2474AG-08TR	3P2474AG	8-Pin TSSOP, TAPE & REEL, Green	Commercial
ASM3P2474AG-08ST	3P2474AG	8-Pin SOIC, TUBE, Green	Commercial
ASM3P2474AG-08SR	3P2474AG	8-Pin SOIC, TAPE & REEL, Green	Commercial

Device Ordering Information

A S M 3 P 2 4 7 4 A F - 0 8 T R





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Part Number: ASM3P2474A
Document Version: v1.1

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to PulseCore Semiconductor, dated 11-11-2003

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