ASM3P2474A

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.
- 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 6L-TSOP (6L-TSOT-23) package.

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.’

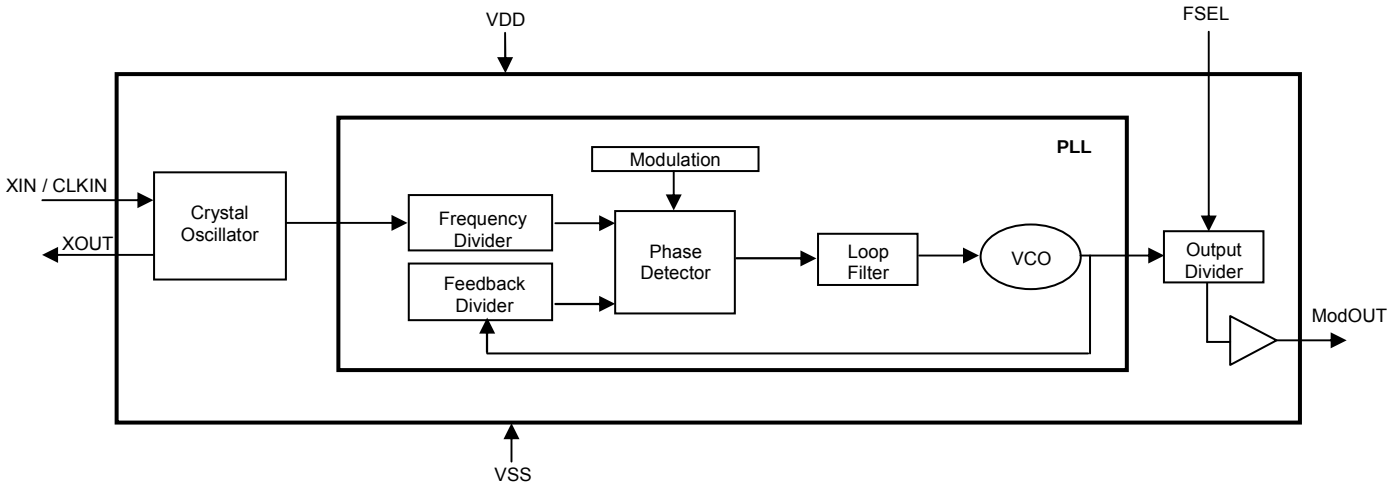
Applications

The ASM3P2474A is targeted towards all portable devices like MP3 players and digital still cameras.

Key Specifications

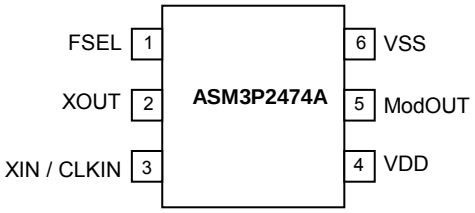
Description		Specification
Supply voltages		VDD = 3.3V ± 0.3V
Cycle-to-Cycle Jitter		±200pS (Typ)
Output Duty Cycle		45/55% (worst case)
Modulation Rate Equation		F_{IN}/640
Frequency Deviation	FSEL=0	-1.5% (Typ) @ 50MHz
	FSEL=1	-1.5% (Typ) @ 25MHz

Block Diagram



Publication Order Number:
ASM3P2474/D

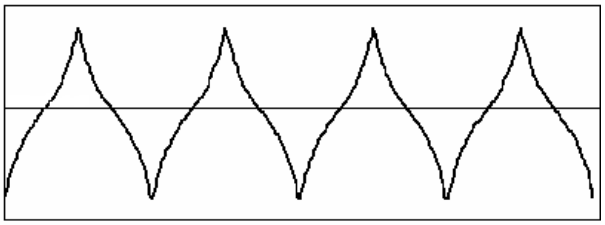
Pin Configuration (6L-TSOP Package)



Pin Description

Pin#	Pin Name	Type	Description
1	FSEL	I	Selection Pin for 1X and 2X Output Frequency Options. Please refer to 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.

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	℃
T_s	Max. Soldering Temperature (10 sec)	260	℃
T_J	Junction Temperature	150	℃
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.

Operating Conditions

Parameter	Description	Min	Max	Unit
VDD	Supply Voltage	3	3.6	V
T_A	Operating Temperature (Ambient Temperature)	0	70	℃
C_L	Load Capacitance		15	pF
C_{IN}	Input Capacitance		7	pF

DC Electrical Characteristics

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]		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

Note: 1. 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}[1]	Output rise time (measured from 0.8 to 2.0V)		0.4	0.85	1.1	nS
t_{HL}[1]	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	%

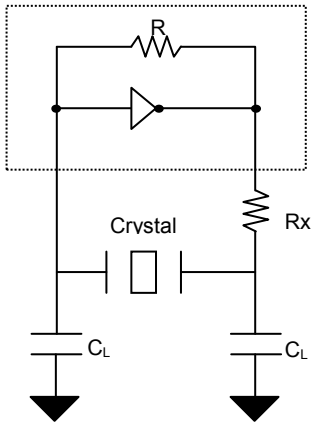
Note: 1. t_{LH} and t_{HL} are measured into a capacitive load of 15pF.

Typical Crystal Specifications

Fundamental AT cut parallel resonant crystal	
Nominal frequency	25MHz
Frequency tolerance	± 30 ppm or better at 25℃
Operating temperature range	-25℃ to +85℃
Storage temperature	-40℃ to +85℃
Load capacitance(C_P)	18pF
Shunt capacitance	7pF maximum
ESR	25 Ω

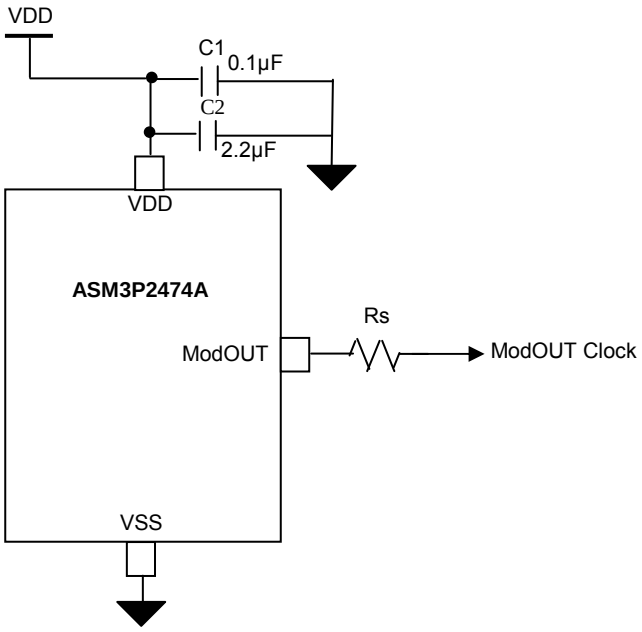
Note: Note: C_L is Load Capacitance and Rx is used to prevent oscillations at overtone frequency of the Fundamental frequency.

Typical Crystal Interface Circuit



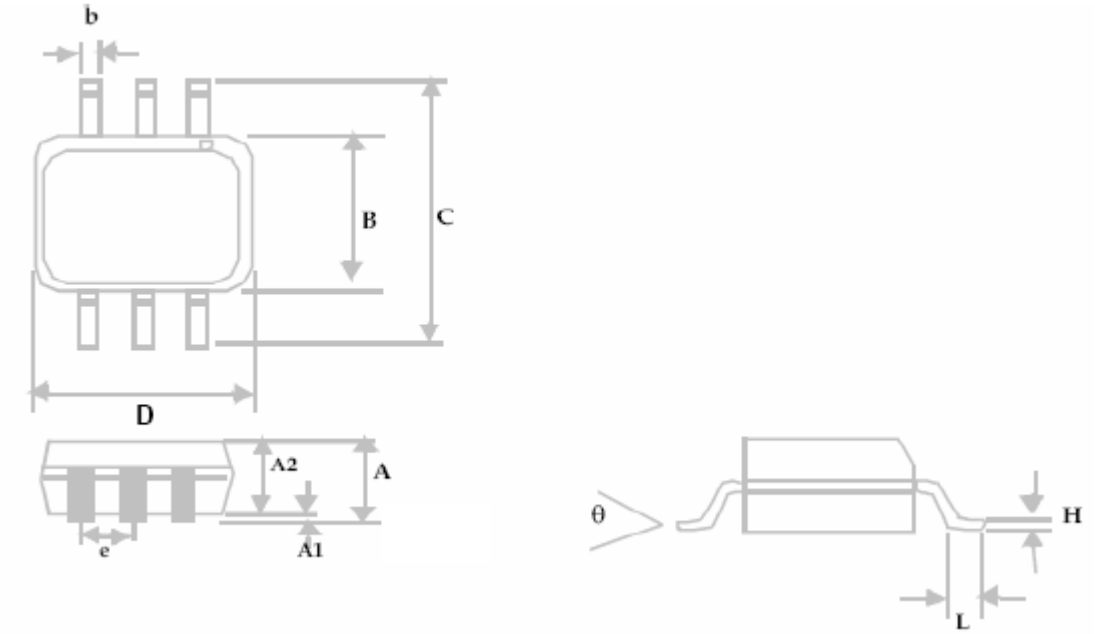
$C_L = 2*(C_P – C_S)$,
Where C_P = Load capacitance of crystal
C_S = Stray capacitance due to $C_{IN,}$ PCB, Trace etc.

Typical Application Schematic



Package Information

6L-TSOP 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°

Ordering Information

Part Number	Marking	Package Type	Temperature
ASM3P2474AF-06OR	W4L	6L-TSOP (6L-TSOT-23), TAPE & REEL, Pb Free	0℃ to +70℃

A “microdot” placed at the end of last row of marking or just below the last row toward the center of package indicates Pb-free.

PUBLICATION ORDERING INFORMATION

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