Low Power Peak EMI Reducing Solution

Features

- Generates an EMI optimized clocking signal at the output.
- Integrated loop filter components.
- Operates with a 3.3V ±10% supply.
- Operating current less than 6mA.
- Low power CMOS design.
- Input frequency range: 6MHz to 12MHz.
- Generates a 1X low EMI spread spectrum clock of the input frequency.
- Frequency deviation: ±1%.
- Available in 6-pin TSOT-23, 8-pin SOIC and 8-pin TSSOP packages.

Product Description

The ASM3P2869A is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2869A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2869A allows significant system cost savings by reducing the number of circuit board layers ferrite beads, shielding that are traditionally required to pass EMI regulations.

The ASM3P2869A uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all digital method.

The ASM3P2869A 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’.

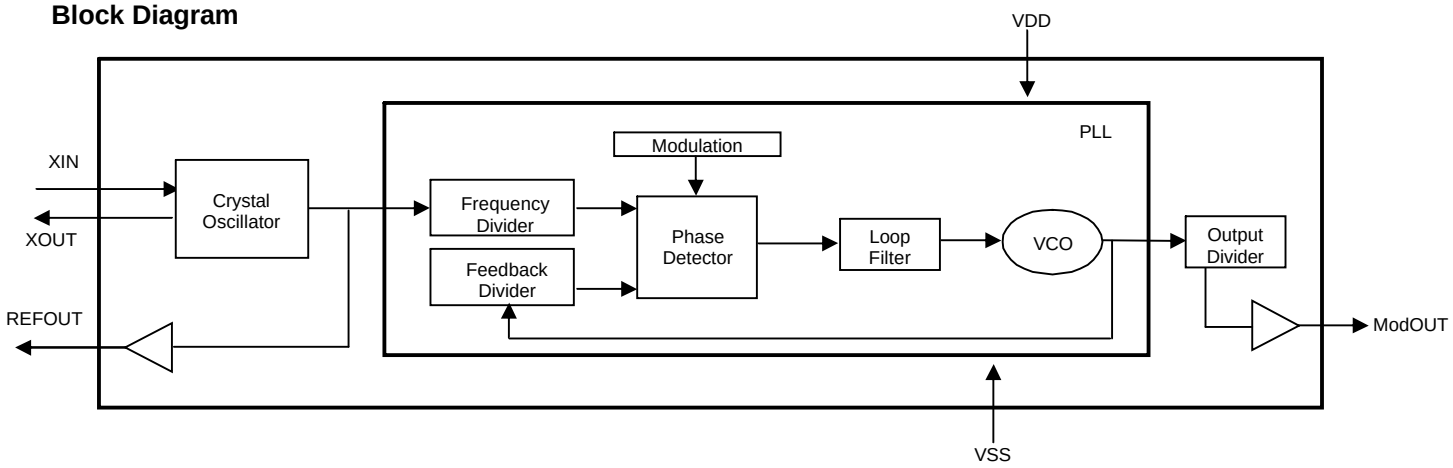
Applications

The ASM3P2869A is targeted towards all portable devices with very low power requirements like MP3 players, Notebooks and digital still cameras.

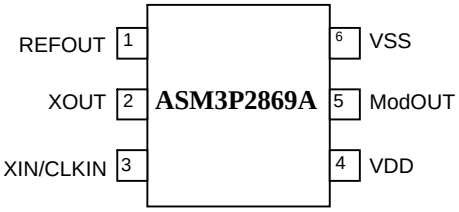
Key Specifications

Description	Specification
Supply voltages	V_{DD} = 3.3V ±10%
Frequency Range	6MHz < CLKIN < 12MHz
Cycle-to-Cycle Jitter	300 ps (maximum)
Output Duty Cycle	40/60% (worst case)
Output Rise and Fall Time	1.1 ns (maximum)
Modulation Rate Equation	F_{IN}/256
Frequency Deviation	±1%

Block Diagram

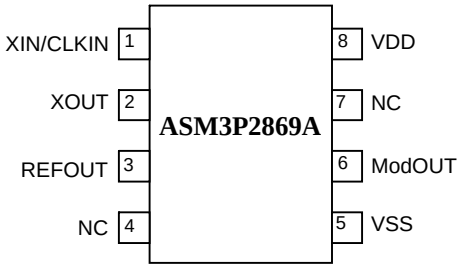


Pin Configuration (6-pin TSOT-23)



Pin#	Pin Name	Type	Description
1	REFOUT	O	Buffered output of the input frequency.
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 (3.3V)
5	ModOUT	O	Spread spectrum clock output.
6	VSS	P	Ground connection.

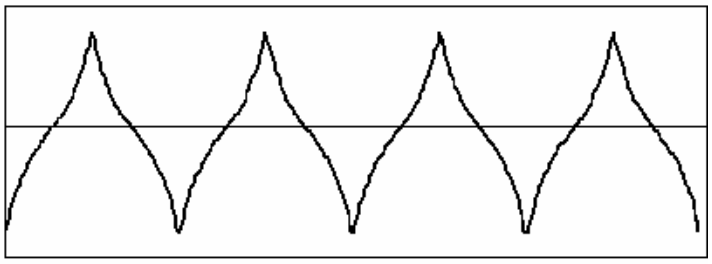
Pin Configuration (8-pin SOIC and TSSOP)



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	REFOUT	O	Buffered output of the input frequency.
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 (3.3V)

Modulation Profile



Specification

Description	Specification
Frequency Range	6MHz < CLKIN < 12MHz
Modulation Equation	$F_{IN}/256$
Frequency Deviation	±1%

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DD}, V_{IN}	Voltage on any pin with respect to Ground	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 are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.			

DC Electrical Characteristics

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

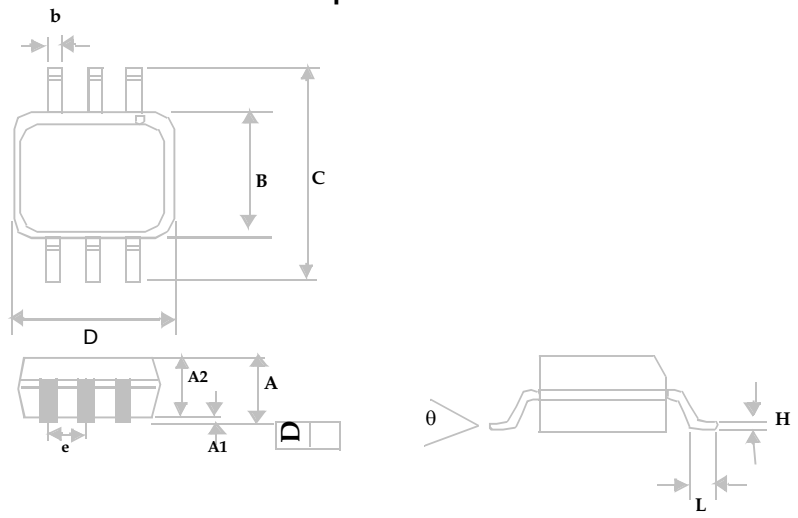
Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND - 0.3	–	0.8	V
V_{IH}	Input high voltage	2.0	–	V_{DD} + 0.3	V
I_{IL}	Input low current	–	–	-35	µA
I_{IH}	Input high current	–	–	35	µA
I_{XOL}	XOUT output low current (@4.0V, V_{DD}=3.3V)	-	3	-	mA
I_{XOH}	XOUT output high current (@2.5V, V_{DD}=3.3V)	-	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_{DD}	Static supply current*	–	–	1.5	mA
I_{CC}	Dynamic supply current (3.3V, 12MHz and 15pF loading)	–	–	6	mA
V_{DD}	Operating voltage	3.0	3.3	3.6	V
t_{ON}	Power-up time (first locked cycle after power-up)**	–	–	10	mS
Z_{OUT}	Clock output impedance	–	50	–	Ω
*XIN/CLKIN pin is pulled low **V_{DD} and XIN/CLKIN input are stable, $\overline{PD}$ pin is made high from low.					

AC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
CLKIN	Input frequency	6	-	12	MHz
ModOUT	Output frequency	6	-	12	MHz
t_{LH}*	Output rise time (measured at 0.8V to 2.0V)	0.5	0.7	1.1	ns
t_{HL}*	Output fall time (measured at 2.0V to 0.8V)	0.5	0.7	1.0	ns
t_{JC}	Jitter (cycle to cycle)	-	-	360	ps
t_D	Output duty cycle	45	50	55	%
*t_{LH} and t_{HL} are measured into a capacitive load of 15pF					

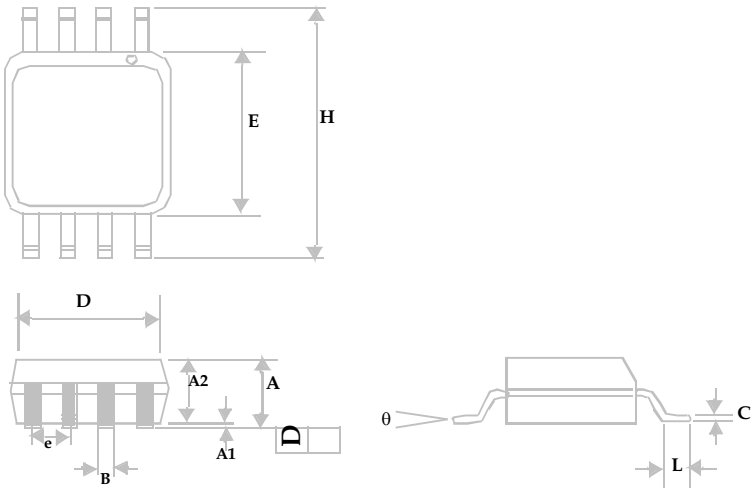
Package Information

6-pin TSOT-23



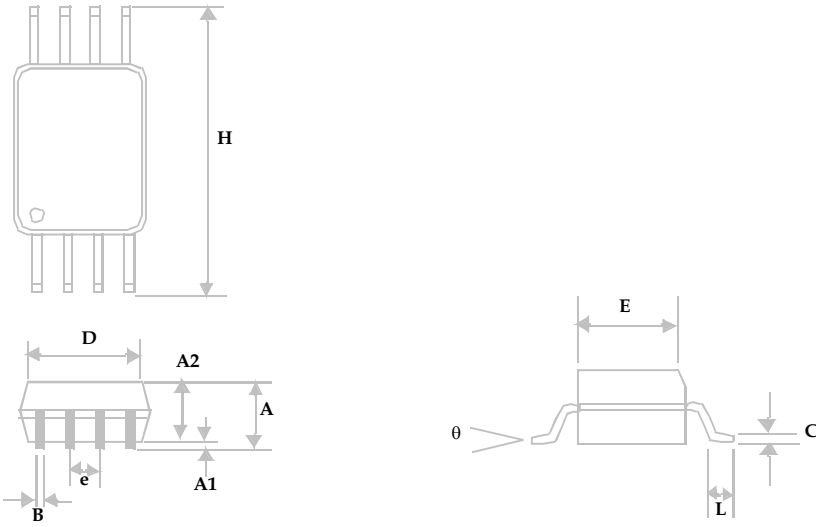
Symbol	Dimensions in millimeters		Dimensions in inches	
	Min	Max	Min	Max
A	-	1.00	-	0.040
A1	0	0.10	0	0.004
A2	0.87 REF		0.034 REF	
B	1.40	1.80	0.055	0.071
b	0.30	0.50	0.012	0.019
C	2.50	3.00	0.098	0.118
D	2.70	3.10	0.106	0.122
e	0.95 BSC		0.037 BSC	
H	0.10	0.35	0.004	0.014
L	MIN 0.20		MIN 0.008	
θ	0°	8°	0°	8°

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°

8-Pin TSSOP

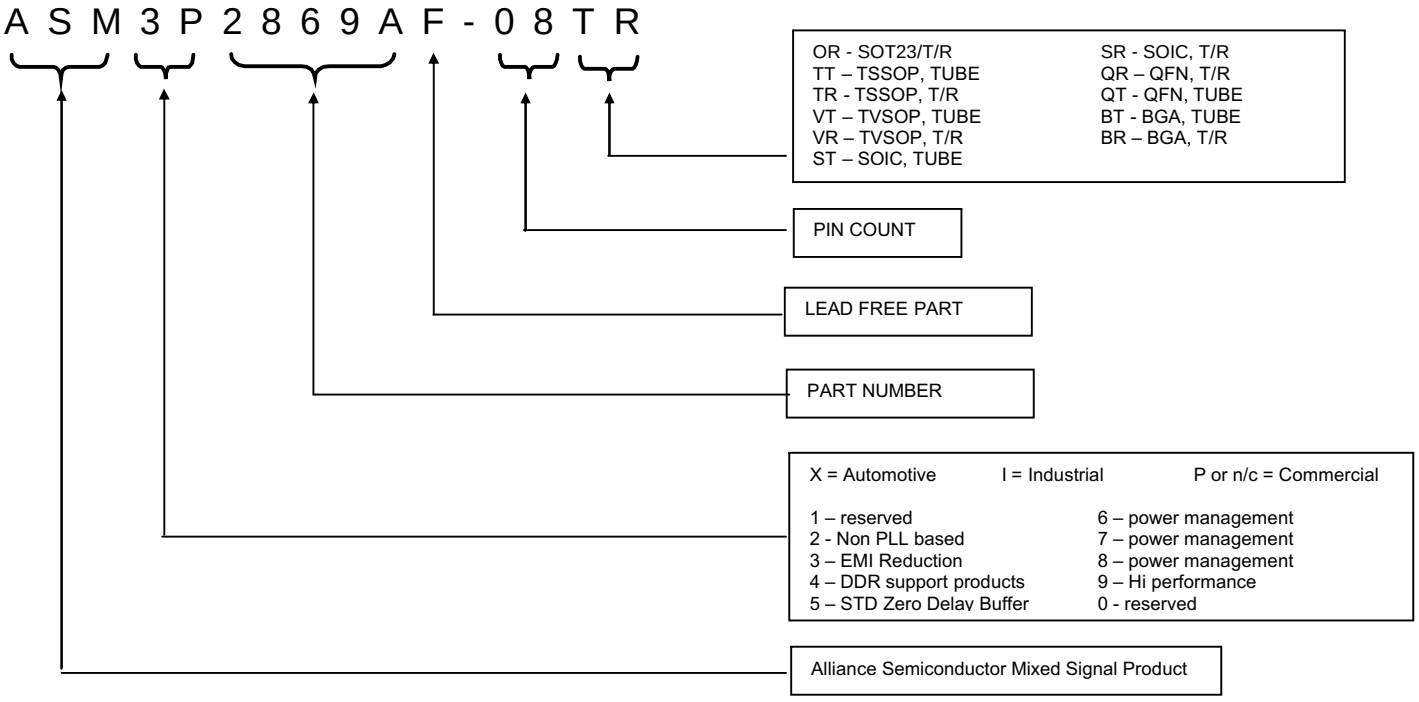


	Dimensions in inches		Dimensions in millimeters	
Symbol	**Min**	**Max**	**Min**	**Max**
A	0.047			1.10
A1	0.002	0.006	0.05	0.15
A2	0.031	0.041	0.80	1.05
B	0.007	0.012	0.19	0.30
C	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.244	0.260	6.20	6.60
L	0.018	0.030	0.45	0.75
θ	0°	8°	0°	8°

Ordering Information

Part Number	Marking	Package Type	Temperature
ASM3P2869AF-06OR	K4LL	6-Pin TSOT-23, TAPE & REEL	0°C – 70°C
ASM3P2869AF-08TT	ASM3P2869AFT	8-Pin TSSOP, TUBE	0°C – 70°C
ASM3P2869AF-08TR	ASM3P2869AFT	8-Pin TSSOP, TAPE & REEL	0°C – 70°C
ASM3P2869AF-08ST	ASM3P2869AFS	8-Pin SOIC, TUBE	0°C – 70°C
ASM3P2869AF-08SR	ASM3P2869AFS	8-Pin SOIC, TAPE & REEL	0°C – 70°C
ASM3P2869A-06OR	K1LL	6-Pin TSOT-23, TAPE & REEL	0°C – 70°C
ASM3P2869A-08TT	ASM3P2869AT	8-Pin TSSOP, TUBE	0°C – 70°C
ASM3P2869A-08TR	ASM3P2869AT	8-Pin TSSOP, TAPE & REEL	0°C – 70°C
ASM3P2869A-08ST	ASM3P2869AS	8-Pin SOIC, TUBE	0°C – 70°C
ASM3P2869A-08SR	ASM3P2869AS	8-Pin SOIC, TAPE & REEL	0°C – 70°C

Device Ordering Information



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