ASM3P2669A

Low Power Peak EMI Reducing Solution

Features

- Generates a 1X low EMI spread spectrum clock of the input frequency.
- Integrated loop filter components.
- Operates with a 3.3V / 2.5V supply.
- Operating current less than 4mA.
- Low power CMOS design.
- Input frequency range: 6MHz to 12MHz for 2.5V
  6MHz to 13MHz for 3.3V
- Frequency deviation: ±1% @ 10MHz
- 6-pin TSOT-23, 8-pin SOIC and 8-pin TSSOP packages.
- Commercial, Industrial and Extended Industrial temperature range

Product Description

The ASM3P2669A is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2669A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2669A 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.

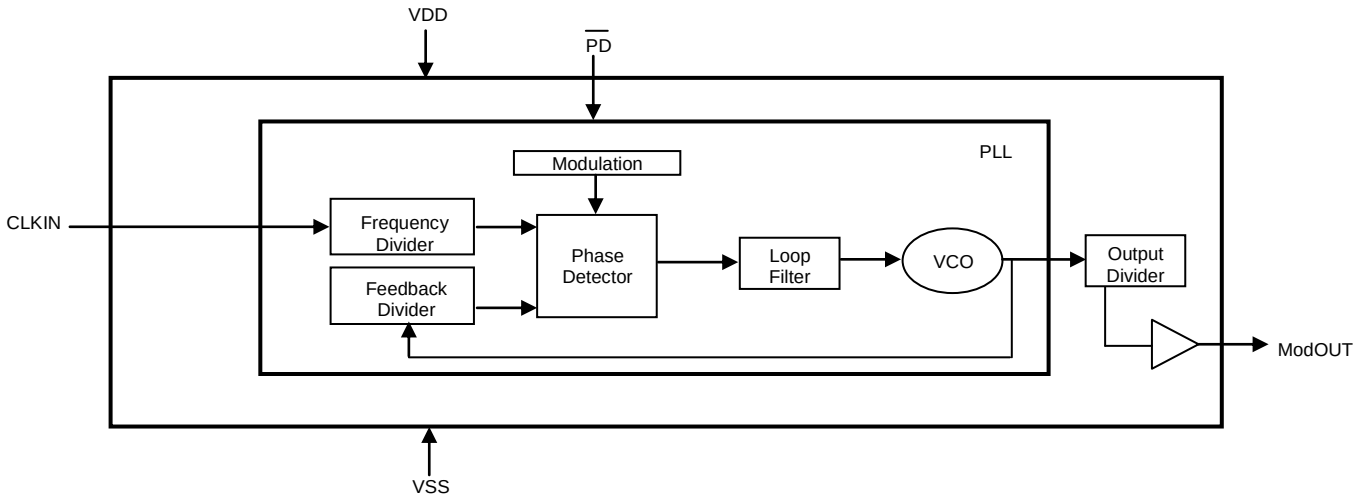
The ASM3P2669A uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all digital method.

The ASM3P2669A 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.’

Application

The ASM3P2669A is targeted towards all portable devices with very low power requirements like MP3 players and digital still cameras.

Block Diagram



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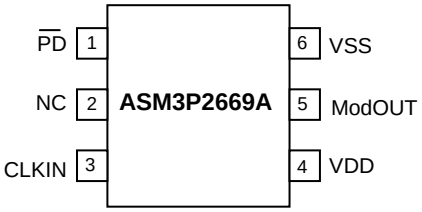
Publication Order Number:
ASM3P2669/D

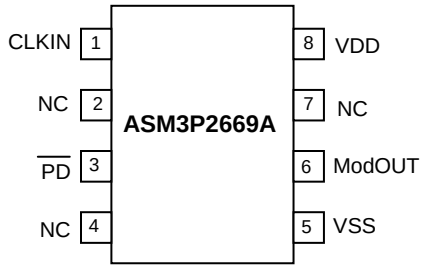
Pin Configuration (6-pin TSOT- 23 Package)



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	NC	-	No connect.
3	CLKIN	I	External reference clock input.
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 Package)



Pin Description

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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

Specifications

VDD (V)	Frequency Range (MHz)	Modulation Rate
2.5	6-12	$F_{IN}/256$
3.3	6-13	

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	-40 to +85	°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.

DC Electrical Characteristics for 2.5V Supply

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
V_{OL}	Output low voltage (VDD = 2.5 V, I_{OL} = 8mA)			0.6	V
V_{OH}	Output high voltage (VDD = 2.5 V, I_{OH} = 8mA)	1.8			V
I_{DD}	Static supply current[1]			10	uA
I_{CC}	Dynamic supply current (Unloaded Output)		2	2.5	mA
VDD	Operating voltage	2.375	2.5	2.625	V
t_{ON}	Power-up time (first locked cycle after power-up)[2]			5	mS
Z_{OUT}	Output impedance		40		Ω

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

AC Electrical Characteristics for 2.5V Supply

Symbol	Parameter		Min	Typ	Max	Unit
CLKIN	Input frequency		6		12	MHz
ModOUT	Output frequency		6		12	MHz
f_d	Frequency Deviation	CLKIN = 6MHz		±1.25		%
		CLKIN = 10MHz		±1		
		CLKIN = 12MHz		±0.9		
t_{LH}[1]	Output Rise time (measured from 0.7V to 1.7V)		0.9	1.7	2.5	nS
t_{HL}[1]	Output Fall time (measured from 1.7V to 0.7V)		0.6	1	1.5	nS
t_D	Output Duty Cycle		45	50	55	%
t_{JC}	Cycle-to-Cycle Jitter			±250	±400	pS

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

DC Electrical Characteristics for 3.3V Supply

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
V_{OL}	Output low voltage (VDD = 3.3 V, I_{OL} = 8mA)			0.4	V
V_{OH}	Output high voltage (VDD = 3.3 V, I_{OH} = 8mA)	2.5		-	V
I_{DD}	Static supply current[1]			10	uA
I_{CC}	Dynamic supply current (Unloaded Output)		2.5	3	mA
VDD	Operating voltage	2.7	3.3	3.6	V
t_{ON}	Power-up time (first locked cycle after power-up)[2]			5	mS
Z_{OUT}	Output impedance		35		Ω

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

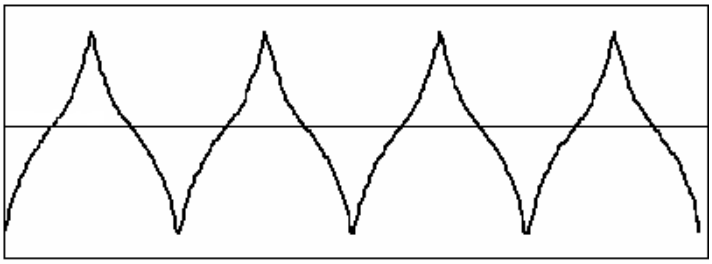
AC Electrical Characteristics for 3.3V Supply

Symbol	Parameter		Min	Typ	Max	Unit
CLKIN	Input frequency		6		13	MHz
ModOUT	Output frequency		6		13	MHz
f_d	Frequency Deviation	CLKIN = 6MHz		±1.25		%
		CLKIN = 10MHz		±1		
		CLKIN = 13MHz		±0.9		
t_{LH}[1]	Output Rise time (measured from 0.8V to 2.0V)		0.7	1.3	1.7	nS
t_{HL}[1]	Output Fall time (measured at 2.0V to 0.8V)		0.6	0.9	1.3	nS
t_D	Output Duty Cycle		45	50	55	%
t_{JC}	Cycle - Cycle Jitter			±300	±450	pS

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

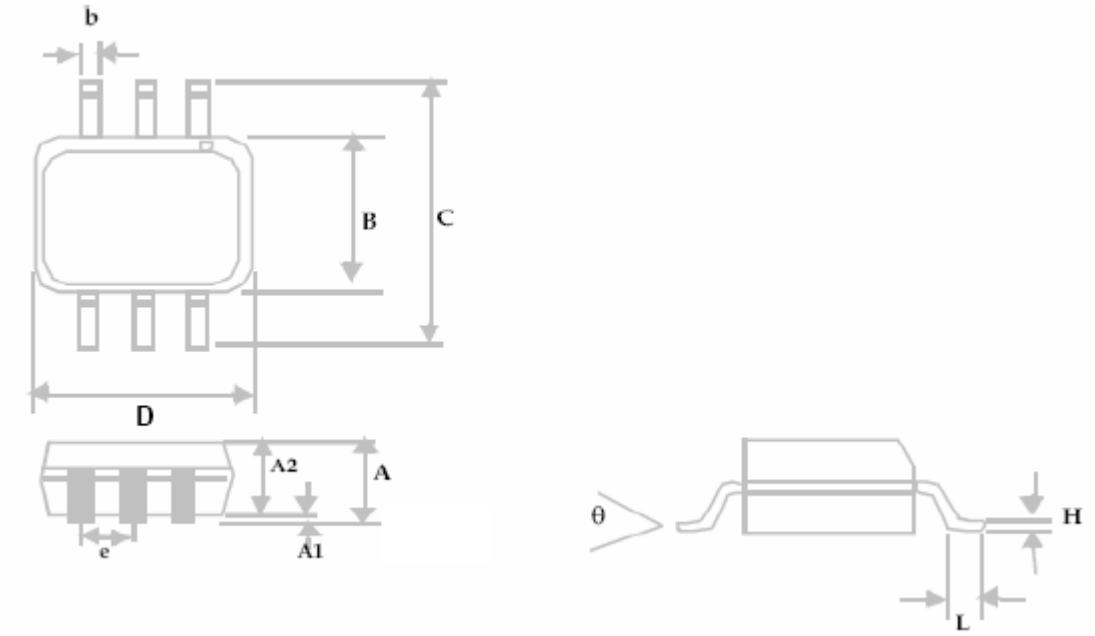
Note: All parameters are at an Extended Industrial temperature range unless otherwise stated.

Modulation Profile



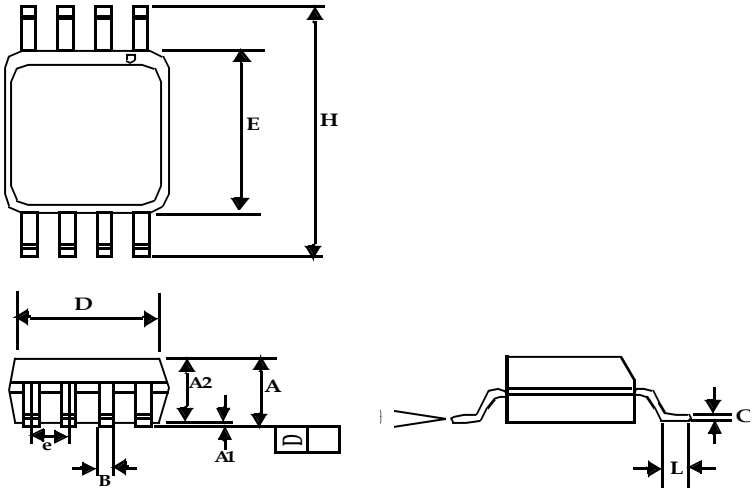
Package Information

6-pin TSOT-23 Package



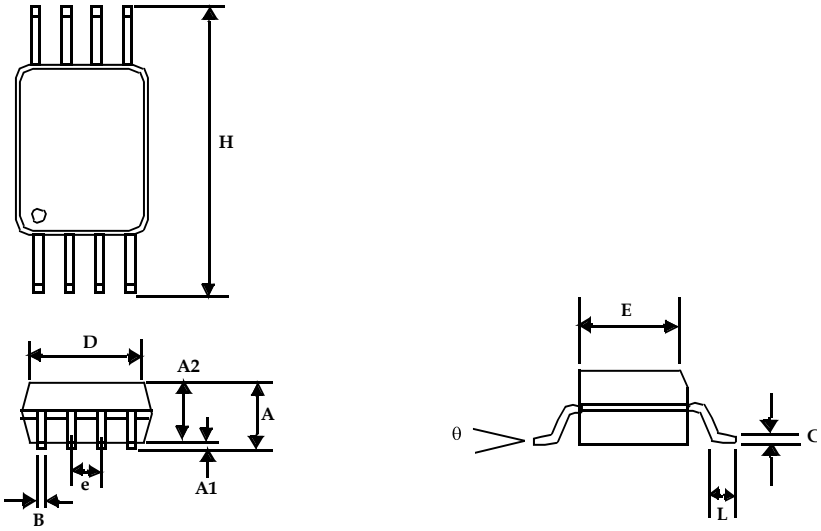
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.04		1.00
A1	0.00	0.004	0.00	0.10
A2	0.033	0.036	0.84	0.90
b	0.012	0.02	0.30	0.50
H	0.005 BSC		0.127 BSC	
D	0.114 BSC		2.90 BSC	
B	0.06 BSC		1.60 BSC	
e	0.0374 BSC		0.950 BSC	
C	0.11 BSC		2.80 BSC	
L	0.0118	0.02	0.30	0.50
θ	0°	4°	0°	4°

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 Package



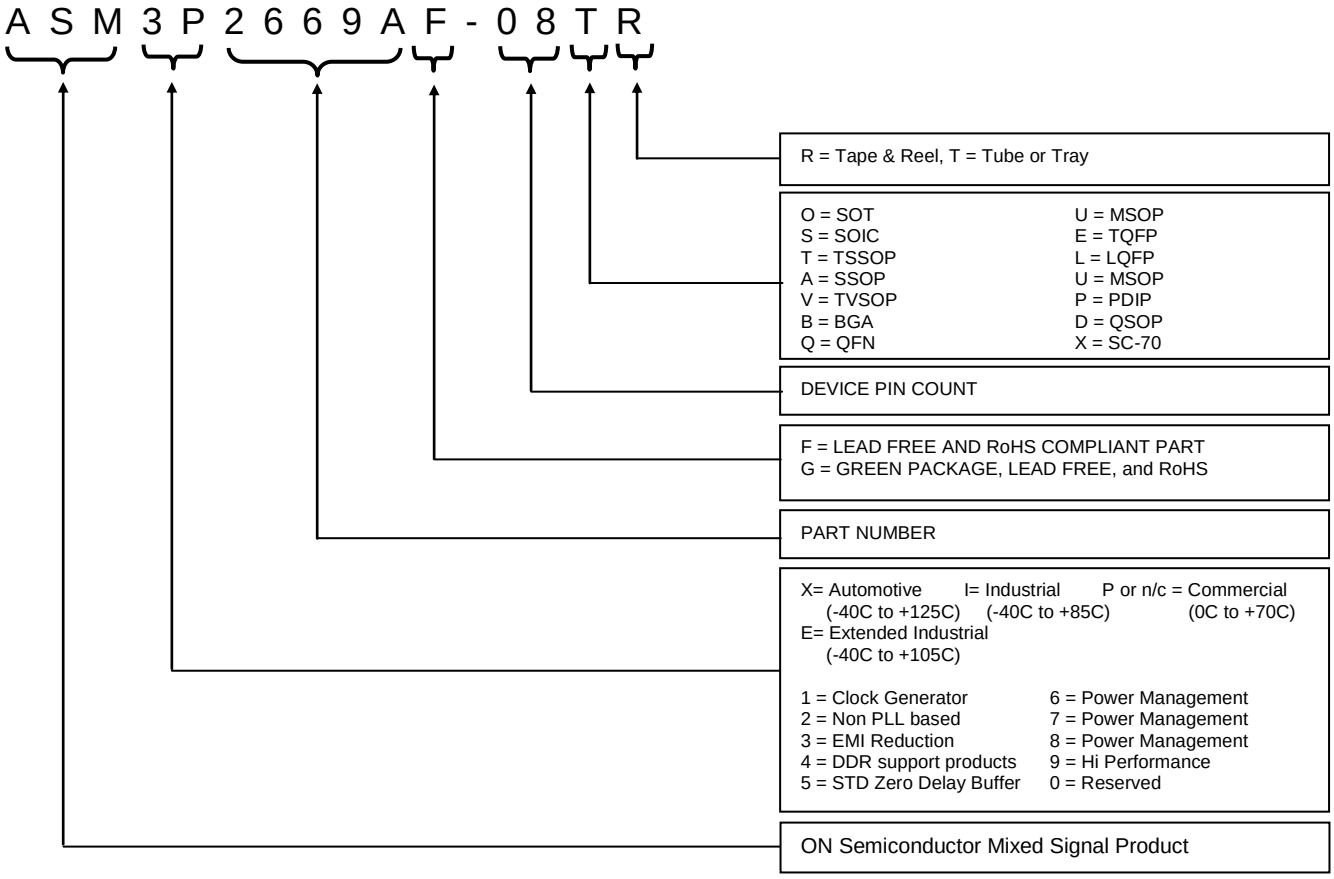
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
C	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

Ordering Information

Part Number	Marking	Package Type	Temperature
ASM3P2669AF-06OR	H4LL	6-Pin TSOT-23, TAPE & REEL, Pb Free	Commercial
ASM3P2669AF-08TT	3P2669AF	8-Pin TSSOP, TUBE, Pb Free	
ASM3P2669AF-08TR	3P2669AF	8-Pin TSSOP, TAPE & REEL, Pb Free	
ASM3P2669AF-08ST	3P2669AF	8-Pin SOIC, TUBE, Pb Free	
ASM3P2669AF-08SR	3P2669AF	8-Pin SOIC, TAPE & REEL, Pb Free	
ASM3P2669AG-06OR	H3LL	6-Pin TSOT-23, TAPE & REEL, Green	
ASM3P2669AG-08TT	3P2669AG	8-Pin TSSOP, TUBE, Green	
ASM3P2669AG-08TR	3P2669AG	8-Pin TSSOP, TAPE & REEL, Green	
ASM3P2669AG-08ST	3P2669AG	8-Pin SOIC, TUBE, Green	
ASM3P2669AG-08SR	3P2669AG	8-Pin SOIC, TAPE & REEL, Green	
ASM3I2669AF-06OR	H5LL	6-Pin TSOT-23, TAPE & REEL, Pb Free	Industrial
ASM3I2669AF-08TT	3I2669AF	8-Pin TSSOP, TUBE, Pb Free	
ASM3I2669AF-08TR	3I2669AF	8-Pin TSSOP, TAPE & REEL, Pb Free	
ASM3I2669AF-08ST	3I2669AF	8-Pin SOIC, TUBE, Pb Free	
ASM3I2669AF-08SR	3I2669AF	8-Pin SOIC, TAPE & REEL, Pb Free	
ASM3I2669AG-06OR	H6LL	6-Pin TSOT-23, TAPE & REEL, Green	
ASM3I2669AG-08TT	3I2669AG	8-Pin TSSOP, TUBE, Green	
ASM3I2669AG-08TR	3I2669AG	8-Pin TSSOP, TAPE & REEL, Green	
ASM3I2669AG-08ST	3I2669AG	8-Pin SOIC, TUBE, Green	
ASM3I2669AG-08SR	3I2669AG	8-Pin SOIC, TAPE & REEL, Green	
ASM3E2669AG-06OR	H7LL	6-Pin TSOT-23, TAPE & REEL, Green	Extended Industrial
ASM3E2669AG-08TT	3E2669AG	8-Pin TSSOP, TUBE, Green	
ASM3E2669AG-08TR	3E2669AG	8-Pin TSSOP, TAPE & REEL, Green	
ASM3E2669AG-08ST	3E2669AG	8-Pin SOIC, TUBE, Green	
ASM3E2669AG-08SR	3E2669AG	8-Pin SOIC, TAPE & REEL, Green	

LL = 2 Character LOT #

Device Ordering Information



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

PUBLICATION ORDERING INFORMATION

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