P2027A

General Purpose EMI Reduction IC

Features

- FCC approved method of EMI attenuation
- Provides up to 20 dB of EMI suppression
- Generates a low EMI spread spectrum clock of the input frequency
- Optimized for 27 MHz operation
- Internal loop filter minimizes external components and board space
- 3 selectable spread ranges and 2 modulation rate options
- SSON control pin for spread spectrum enable and disable options
- Low cycle-to-cycle jitter
- 3.3V operating voltage
- 16 mA output drives
- TTL or CMOS compatible outputs
- Low power CMOS design
- Supports digital camera and other digital video and imaging applications
- Available in 8 pin SOIC and TSSOP Packages

Product Description

The P2027 is a versatile spread spectrum frequency modulator designed specifically for digital camera and other digital video and imaging applications. The P2027 reduces electromagnetic interference (EMI) at the clock source, which provides system wide reduction of EMI of all clock dependent signals. The P2027 allows significant system cost savings by reducing the number of circuit board layers and shielding that are traditionally required to pass EMI regulations.

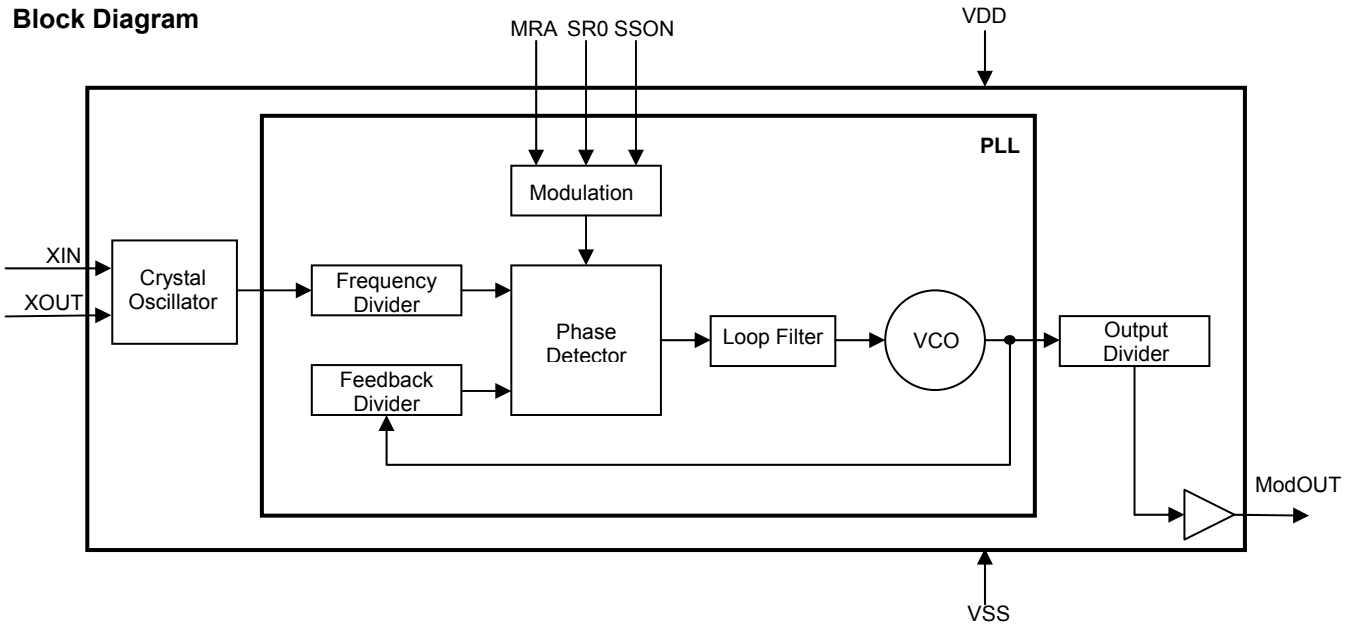
The P2027 uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all-digital method.

The P2027 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

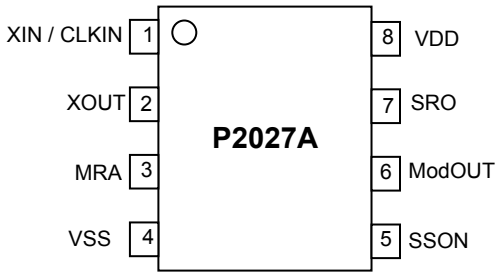
The P2027 is targeted towards DSC market as well as other imaging and digital video applications like DVD and VCD players.

Block Diagram



PulseCore Semiconductor Corporation
1715 S. Bascom Ave Suite 200, Campbell, CA 95008 • Tel: 408-879-9077 • Fax: 408-879-9018
www.pulsecoresemi.com

Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	XIN/CLK	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected to either an external crystal or an external reference clock.
2	XOUT	O	Crystal connection. Input connection for an external crystal. If using an external reference, this pin must be left unconnected.
3	MRA	I	Digital logic input used to select Modulation Rate (see Table 1). This pin has an internal pull-up resistor.
4	VSS	P	Ground Connection. Connect to system ground.
5	SSON	I	Digital logic input used to enable Spread Spectrum function (Active Low). Spread Spectrum function enable when low. This pin has an internal pull-low resistor.
6	ModOUT	O	Spread Spectrum Clock Output.
7	SR0	I	Digital logic input used to select Spreading Range (see Table 1). This pin has an internal pull-up resistor.
8	VDD	P	Connect to +3.3V Power Supply.

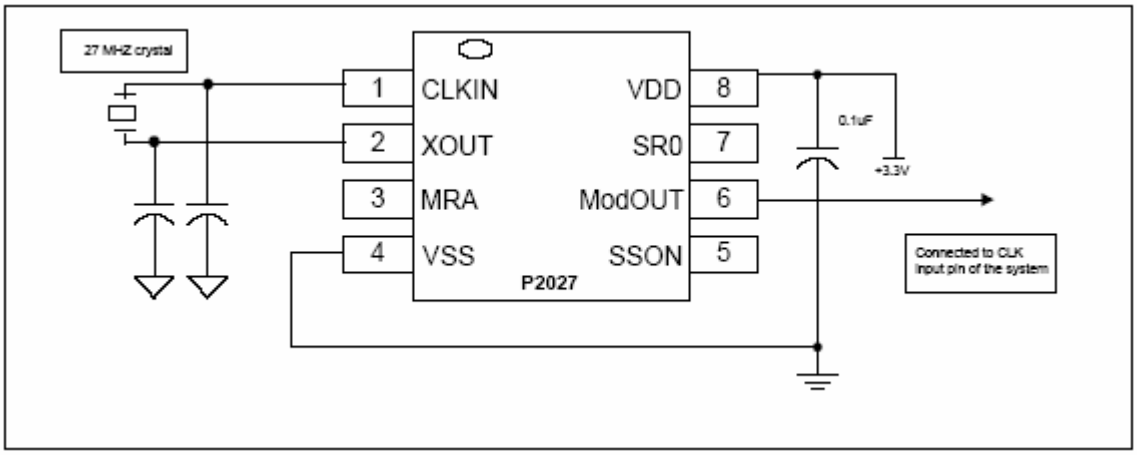
Table-1 Modulation and Spreading Selection

MRA	SR0	Spread Range	Modulation Rate
0	0	Reserve	Reserve
0	1	+/- 0.30%	(Fin/10)*34.72 KHz
1	0	+/- 0.20%	(Fin/10)*20.83 KHz
1	1	+/- 0.60%	(Fin/10)*20.83 KHz

Spread Spectrum Selection
Table 1 illustrates the possible spread spectrum options. The optimal setting should minimize system EMI to the fullest without affecting system performance. The spreading is described as a percentage deviation of the center frequency (Note: the center frequency is the frequency of the external reference input on CLKIN, Pin 1).

Example: P2027 is designed for DSC and digital video and imaging markets and is optimized for 27 MHz under minimum deviation settings. Selecting P2027's spread options to MRA=1 and SR0=1 for a 27 MHz input signal provides a percentage deviation of +/-0.60% (see Table 1) from the reference signal. This results in frequency on ModOUT being swept from 27.16 MHz to 26.84 MHz at a modulation rate of 56.24 KHz (see Table 1). This particular example (see the below figure) given here is a new EMI reduction method for DSC applications and is already gaining popularity among leading manufacturers.

Application Schematic for Digital Still Camera



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.

DC Electrical Characteristics

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 (pull-up resistor on inputs FS0, SR0 and MRA)	-	-	-35	µA
I_{IH}	Input High Current (pull-down resistor on input SSON)	-	-	35	µA
I_{XOL}	XOUT Output Low Current (@ 0.4V, 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} = 3.3V, I_{OL} = 20 mA)	-	-	0.4	V
V_{OH}	Output High Voltage (V_{DD} = 3.3V, I_{OH} = 20 mA)	2.5	-	-	V
I_{DD}	Static Supply Current	-	6.0	-	mA
I_{CC}	Dynamic Supply Current (3.3V and 15 pF loading)	6.0	7.0	8.3	mA
V_{DD}	Operating Voltage	2.7	3.3	3.8	V
t_{ON}	Power Up Time (First locked clock cycle after power up)		0.18		ms
Z_{OUT}	Clock Output Impedance		50		Ω

AC Electrical Characteristics

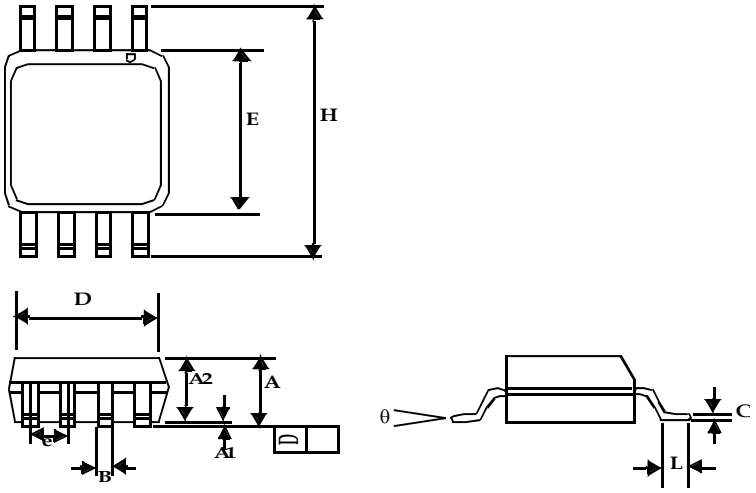
Symbol	Parameter	Min	Typ	Max	Unit
f_{IN}	Input Frequency	10	27	30	MHz
t_{LH}*	Output rise time (Measured at 0.8V to 2.0V)	0.7	0.9	1.1	ns
t_{HL}*	Output fall time (Measured at 0.8V to 2.0V)	0.6	0.8	1.0	ns
t_{JC}	Jitter (cycle to cycle)	-	-	360	ps
t_D	Output duty cycle	45	50	55	%

*t_{LH} and t_{HL} are measured into a capacitive load of 15pF

rev 0.2

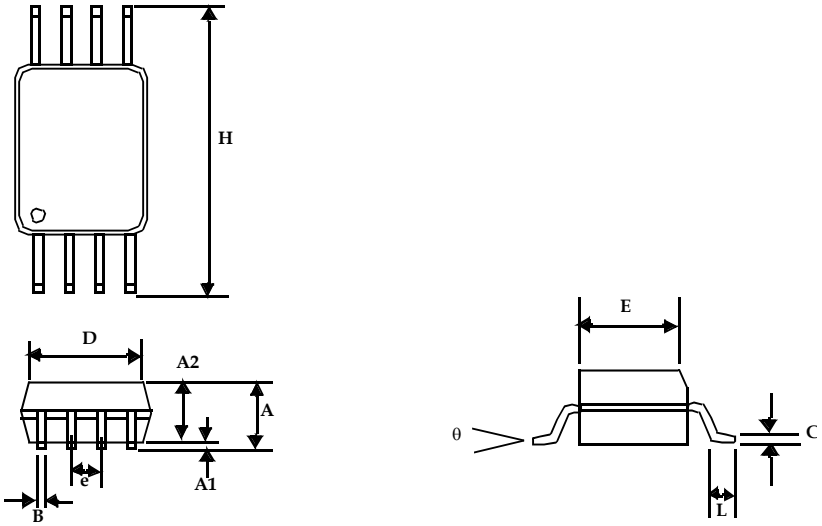
Package Information

8-lead (150-mil) 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-lead TSSOP (4.40-MM Body)

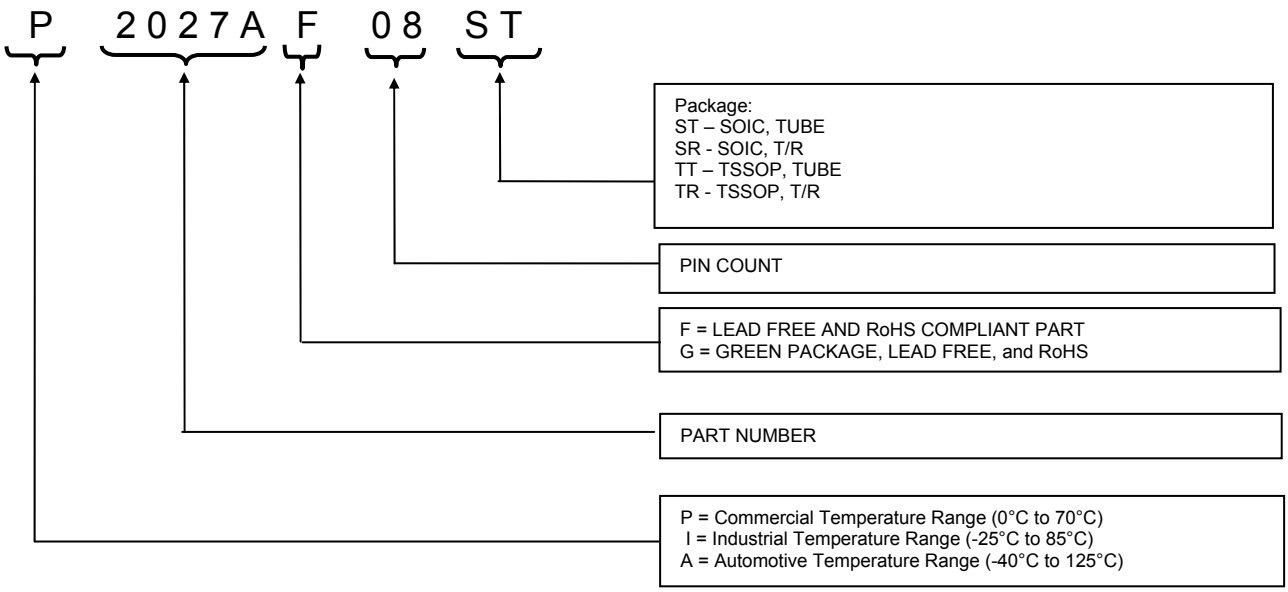


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°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

Ordering Codes

Part Number	Marking	Package Type	Temperature
P2027AF-08ST	P2027AF	8 PIN SOIC, TUBE, Pb Free	Commercial
P2027AF-08SR	P2027AF	8 PIN SOIC, TAPE AND REEL, Pb Free	Commercial
P2027AF-08TT	P2027AF	8 PIN TSSOP, TUBE, Pb Free	Commercial
P2027AF-08TR	P2027AF	8 PIN TSSOP, TAPE AND REEL, Pb Free	Commercial
P2027AG-08ST	P2027AG	8 PIN SOIC, TUBE, Green	Commercial
P2027AG-08SR	P2027AG	8 PIN SOIC, TAPE AND REEL, Green	Commercial
P2027AG-08TT	P2027AG	8 PIN TSSOP, TUBE, Green	Commercial
P2027AG-08TR	P2027AG	8 PIN TSSOP, TAPE AND REEL, Green	Commercial

Device Ordering Information



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Preliminary Information
Part Number: P2027A
Document Version: 0.2

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