



rev E

## 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

### 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.

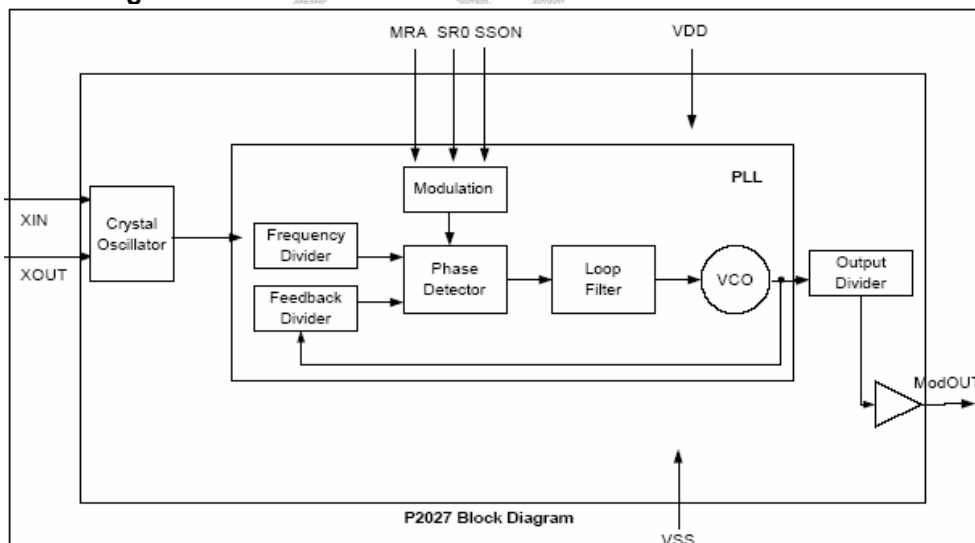
The P2027 uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all-digital method.

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

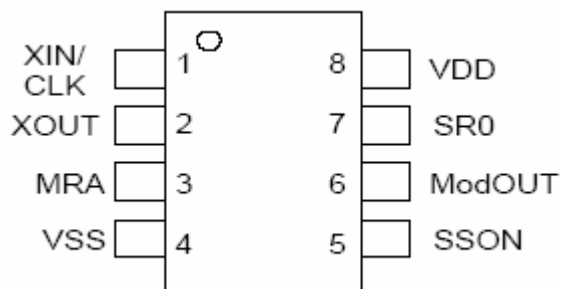
The P2027 is targeted towards DSC market as well as other imaging and digital video applications like DVD and VCD players.

### Block Diagram





rev E

**Pin Configuration****Pin Description**

Pin#	Pin Name	Type	Description
1	XIN/CLK	I	Connect to crystal or clock.
2	XOUT	I	Crystal output
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



rev E

Table-1 Modulation and Spreading Selection

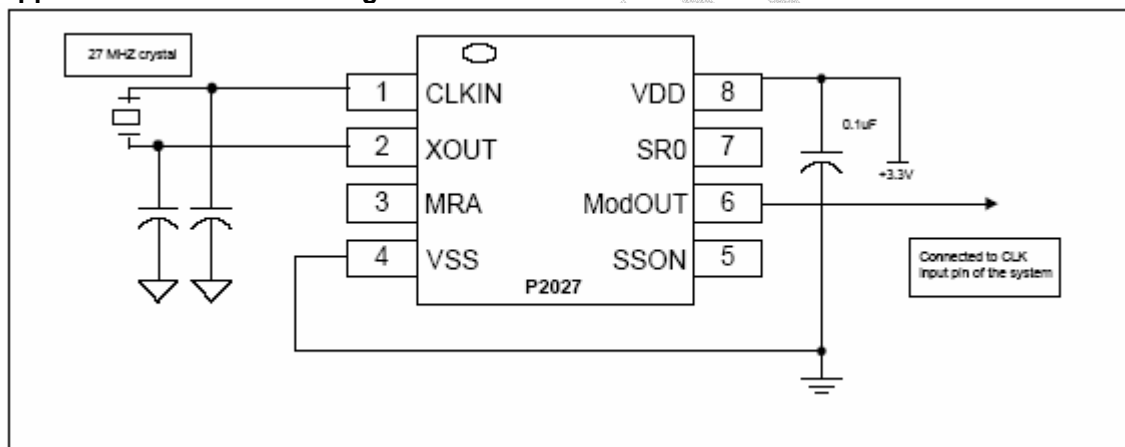
MRA	SR0	Spread Range	Modulation Rate
0	0	Reserve	Reserve
0	1	+/- 0.30%	$(F_{in}/10) \times 34.72 \text{ KHz}$
1	0	+/- 0.20%	$(F_{in}/10) \times 20.83 \text{ KHz}$
1	1	+/- 0.60%	$(F_{in}/10) \times 20.83 \text{ KHz}$

### 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

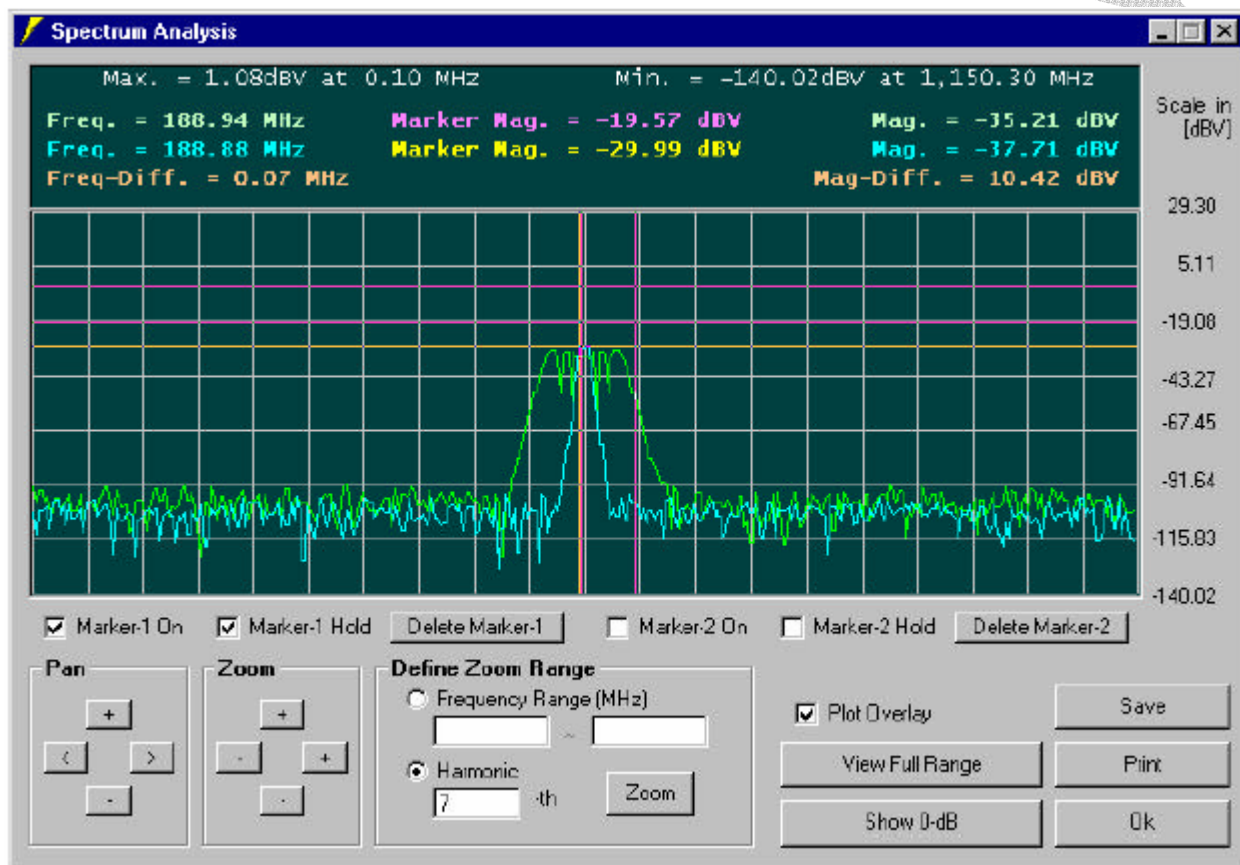




rev E

**EMC Software Simulation**

By using Alliance Semiconductor's proprietary EMC simulation software – EMI-lator®, radiated system level EMI analysis can be made easier to allow a quantitative assessment on Alliance's EMI reduction products. The simulation engine of this EMC software has already been characterized to correlate with the electrical characteristics of Alliance EMI reduction IC's. The figure below is an example of the simulation result. Please visit our web site at [www.alsc.com](http://www.alsc.com) for information on how to obtain a free copy and demonstration of EMI-lator®.

**Simulation Result from EMI-lator®**



## rev E

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
$V_{DD}, V_{IN}$	Voltage on any pin with respect to GND	-0.5 to + 7.0	V
$T_{STG}$	Storage temperature	-65 to +125	°C
$T_A$	Operating temperature	0 to +70	°C

## 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 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	%

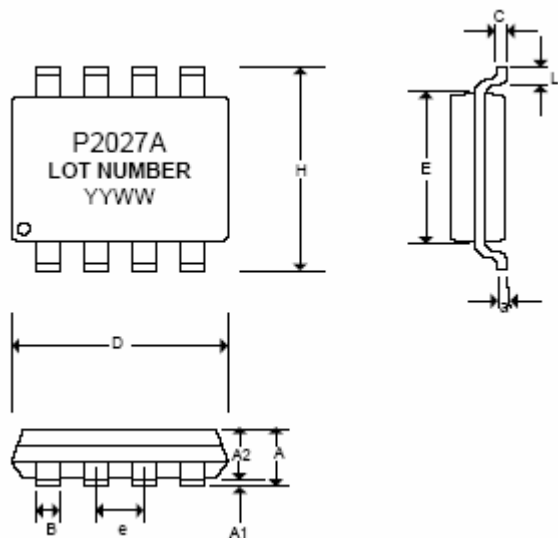
\* $t_{LH}$  and  $t_{HL}$  are measured into a capacitive load of 15pF



rev E

## Package Information

## Mechanical Package Outline 8-Pin SOIC



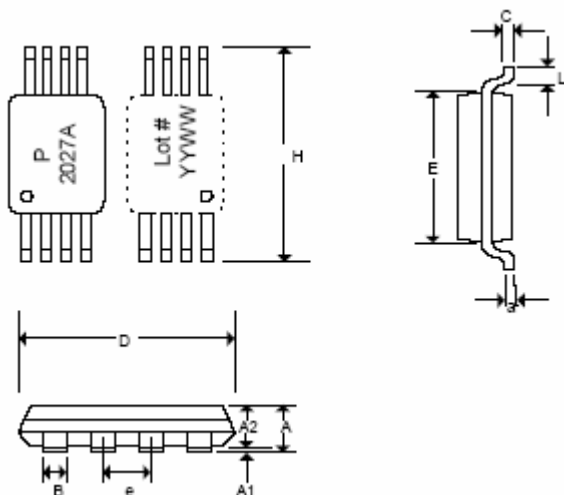
Symbol	Dimensions in inches			Dimensions in millimeters		
	Min	Nor	Max	Min	Nor	Max
A	0.057	0.064	0.071	1.45	1.63	1.80
A1	0.004	0.007	0.010	0.10	0.18	0.25
A2	0.053	0.061	0.069	1.35	1.55	1.75
B	0.012	0.016	0.020	0.31	0.41	0.51
C	0.004	0.006	0.01	0.10	0.15	0.25
D	0.186	0.194	0.202	4.72	4.92	5.12
E	0.148	0.156	0.164	3.75	3.95	4.15
e	0.050 BSC			1.27 BSC		
H	0.224	0.236	0.248	5.70	6.00	6.30
L	0.012	0.020	0.028	0.30	0.50	0.70
a	0°	5°	8°	0°	5°	8°

Note: Controlling dimensions are millimeters  
SOIC – 0.074 grams unit weight



rev E

## Mechanical Package Outline 8-Pin TSSOP



Symbol	Dimensions in inches			Dimensions in millimeters		
	Min	Nor	Max	Min	Nor	Max
A			0.047			1.10
A1	0.002		0.006	0.05		0.15
A2	0.031	0.039	0.041	0.80	1.00	1.05
B	0.007		0.012	0.19		0.30
C	0.004		0.008	0.09		0.20
D	0.114	0.118	0.122	2.90	3.00	3.10
E	0.169	0.173	0.177	4.30	4.40	4.50
e	0.026 BSC			0.65 BSC		
H	0.244	0.252	0.260	6.20	6.40	6.60
L	0.018	0.024	0.030	0.45	0.60	0.75
a	0°	5°	8°	0°	5°	8°

Note: Controlling dimensions are millimeters  
TSSOP – 0.034 grams unit weight





rev E

## Ordering Codes

Part Number	Marking	Package Type	Qty per reel	Temperature (°C)
P2027A-08ST	P2027A	8-pin SOIC, tube		0 to 70
P2027A-08SR	P2027A	8-pin SOIC, tape & reel	2500	0 to 70
P2027A-08TT	P2027A	8-pin TSSOP, tube		0 to 70
P2027A-08TR	P2027A	8-pin TSSOP, tape & reel	2500	0 to 70

Licensed under US patent Nos 5,488,627 and 5,631,920.  
Preliminary datasheet. Specification subject to change without notice.





rev E



Alliance Semiconductor Corporation  
2595, Augustine Drive,  
Santa Clara, CA 95054  
Tel# 408-855-4900  
Fax: 408-855-4999  
www.alsc.com

Copyright © Alliance Semiconductor  
All Rights Reserved  
Preliminary Information  
Part Number: P2027A  
Document Version: E

© Copyright 2003 Alliance Semiconductor Corporation. All rights reserved. Our three-point logo, our name and Intelliwatt are trademarks or registered trademarks of Alliance. All other brand and product names may be the trademarks of their respective companies. Alliance reserves the right to make changes to this document and its products at any time without notice. Alliance assumes no responsibility for any errors that may appear in this document. The data contained herein represents Alliance's best data and/or estimates at the time of issuance. Alliance reserves the right to change or correct this data at any time, without notice. If the product described herein is under development, significant changes to these specifications are possible. The information in this product data sheet is intended to be general descriptive information for potential customers and users, and is not intended to operate as, or provide, any guarantee or warranty to any user or customer. Alliance does not assume any responsibility or liability arising out of the application or use of any product described herein, and disclaims any express or implied warranties related to the sale and/or use of Alliance products including liability or warranties related to fitness for a particular purpose, merchantability, or infringement of any intellectual property rights, except as express agreed to in Alliance's Terms and Conditions of Sale (which are available from Alliance). All sales of Alliance products are made exclusively according to Alliance's Terms and Conditions of Sale. The purchase of products from Alliance does not convey a license under any patent rights, copyrights; mask works rights, trademarks, or any other intellectual property rights of Alliance or third parties. Alliance does not authorize its products for use as critical components in life-supporting systems where a malfunction or failure may reasonably be expected to result in significant injury to the user, and the inclusion of Alliance products in such life-supporting systems implies that the manufacturer assumes all risk of such use and agrees to indemnify Alliance against all claims arising from such use.