

## Spread Spectrum Clock Generator

### Features

- Generates a 4X low EMI spread spectrum clock of the input frequency.
- Input frequency: 10MHz - 25MHz
- Output frequency: 40MHz - 100MHz
- Internal loop filter minimizes external components and board space.
- Selectable Centre Spread frequency deviation:  $\pm 0.5\%$ ,  $\pm 1.0\%$ ,  $\pm 1.5\%$ ,  $\pm 2.0\%$
- Supply Voltage :3.3V  $\pm$  0.3V
- Commercial and Industrial temperature range
- 8-pin TSSOP Package
- Low power CMOS process

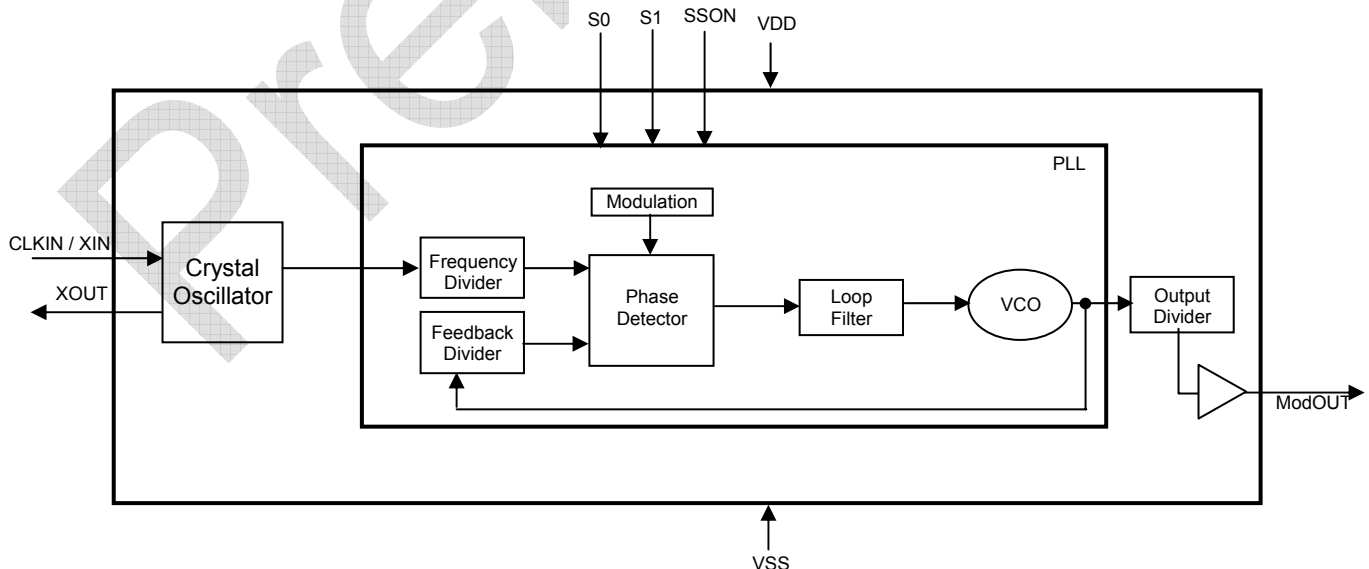
### Product Description

PCS3P2189A is a versatile spread spectrum frequency modulator that generates a low EMI 4x clock at the output. PCS3P2189A offers four selectable centre spread options of  $\pm 0.5\%$ ,  $\pm 1.0\%$ ,  $\pm 1.5\%$ ,  $\pm 2.0\%$ , (Refer *Spread Deviation Selection Tabnle*). PCS3P2189A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The PCS3P2189A 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. PCS3P2189A has spread spectrum ON/OFF option. The PCS3P2189A uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method.

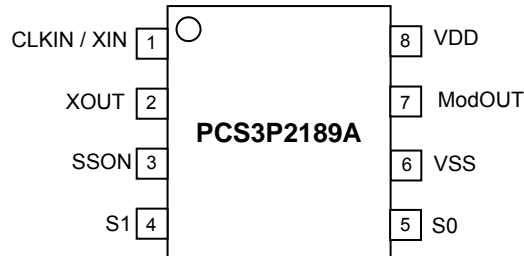
### Application

PCS3P2189A is targetted for LCD panel application

### Block Diagram



Pin Configuration



Pin Description

Pin#	Pin Name	Type	Description
1	CLKIN / XIN	I	Crystal connection or External reference Clock Input
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	SSON	I	Modulation enables pin. When HIGH enables spread spectrum modulation. Has an Internal pull up resistor
4	S1	I	Spread range select. Digital logic input used to select frequency deviation (Refer Spread Deviation Table). This pin has an internal pull-up resistor.
5	S0	O	Spread range select. Digital logic input used to select frequency deviation (Refer Spread Deviation Table). This pin has an internal pull-up resistor.
6	VSS	P	Ground Connection. Connect to system ground.
7	ModOUT	O	Low EMI 4x clock output.
8	VDD	P	Power Supply Voltage Pin. Connect to +3.3V.

Spread Deviation Selection Table

(For an Input CLK=15MHz)

S1	S0	Deviation (± %)
0	0	0.5
0	1	1.0
1	0	1.5
1	1	2.0

Modulation Enable Setting Table

SSON	Modulation
L	No Modulation
H	Modulation

**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
V <sub>DD</sub>	Supply Voltage pin with respect to Ground	-0.5 to +4.6	V
V <sub>IN</sub>	Input Voltage pin with respect to Ground	VSS-0.5 to VDD+0.5	V
V <sub>OUT</sub>	Output Voltage pin with respect to Ground	VSS-0.5 to VDD+0.5	V
T <sub>STG</sub>	Storage temperature	-55 to +125	°C
T <sub>s</sub>	Max. Soldering Temperature (10 sec)	260	°C
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>DV</sub>	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**

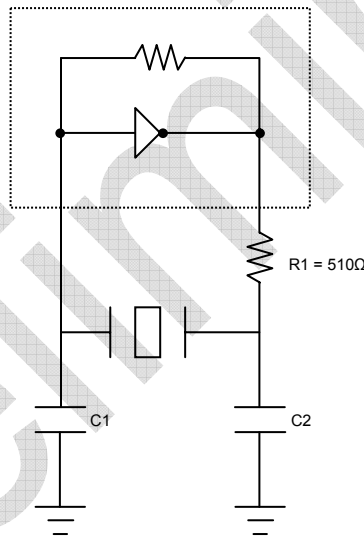
Symbol	Parameter		Min	Typ	Max	Unit
V <sub>IL</sub>	Input low voltage		VSS – 0.3		0.8	V
V <sub>IH</sub>	Input high voltage		2.0		VDD+ 0.3	V
I <sub>IL</sub>	Input low current				-50	µA
I <sub>IH</sub>	Input high current				+50	µA
V <sub>OL</sub>	Output low voltage	I <sub>OL</sub> = 4mA	VSS		0.4	V
V <sub>OH</sub>	Output high voltage	I <sub>OH</sub> = -4mA	2.4		VDD	V
I <sub>CC</sub>	Dynamic supply current (Unloaded Output)		7	14	20	mA
I <sub>DD</sub>	Static supply current standby, CLKIN/XIN pulled LOW				6	mA
VDD	Operating voltage		3.0	3.3	3.6	V
t <sub>ON</sub>	Power up time (first locked clock cycle after power up)			2	5	mS
Z <sub>OUT</sub>	Clock output impedance			50		Ω
C <sub>IN</sub>	Input Capacitance			5		pF
C <sub>L</sub>	Load Capacitance				15	pF

**AC Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Unit
XIN/CLKIN	Input Clock frequency	10	15	25	MHz
ModOUT	Output Modulated Clock frequency	40	60	100	MHz
M <sub>F</sub>	Modulation Frequency	26	39	65	KHz
t <sub>LH</sub> *	Output rise time ( Measured from 20% to 80% )		2	2.5	nS
t <sub>HL</sub> *	Output fall time ( Measured from 80% to 20% )		1.5	2	nS
t <sub>JC</sub>	Cycle to Cycle Jitter		±250	±325	pS
t <sub>JP</sub>	Period Jitter (With SSOFF)		±200	±250	
t <sub>D</sub>	Output duty cycle	45	50	55	%

\*t<sub>LH</sub> and t<sub>HL</sub> are measured with a capacitive load of 15pF

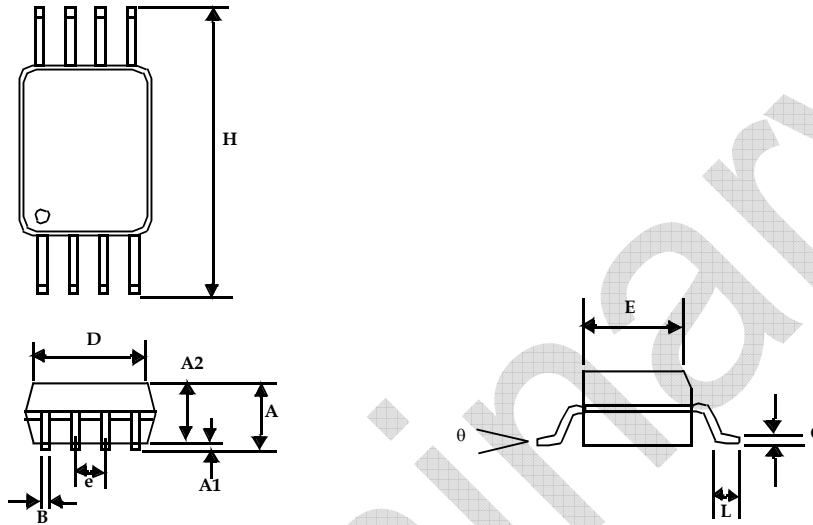
**Typical Crystal Oscillator Circuit**



**Typical Crystal Specifications**

Fundamental AT cut parallel resonant crystal	
Nominal frequency	15MHz
Frequency tolerance	± 50 ppm or better at 25°C
Operating temperature range	-25°C to +85°C
Storage temperature	-40°C to +85°C
Load capacitance	18pF
Shunt capacitance	7pF maximum
ESR	25Ω

Mechanical Package Outline 8-Pin TSSOP



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°

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



May 2008

PCS3P2189A

rev 0.2

Ordering Code

Part Number	Marking	Package Type	Temperature
PCS3P2189AG-08TT	3P2189AG	8-Pin TSSOP, TUBE, Green	Commercial
PCS3P2189AG-08TR	3P2189AG	8-Pin TSSOP, TAPE & REEL, Green	Commercial
PCS3I2189AG-08TT	3I2189AG	8-Pin TSSOP, TUBE, Green	Industrial
PCS3I2189AG-08TR	3I2189AG	8-Pin TSSOP, TAPE & REEL, Green	Industrial

Device Ordering Information

P C S 3 P 2 1 8 9 A G - 0 8 T T R

R = Tape & Reel, T = Tube or Tray																		
<table border="0"> <tr> <td>O = SOT</td> <td>U = MSOP</td> </tr> <tr> <td>S = SOIC</td> <td>E = TQFP</td> </tr> <tr> <td>T = TSSOP</td> <td>L = LQFP</td> </tr> <tr> <td>A = SSOP</td> <td>U = MSOP</td> </tr> <tr> <td>V = TVSOP</td> <td>P = PDIP</td> </tr> <tr> <td>B = BGA</td> <td>D = QSOP</td> </tr> <tr> <td>Q = QFN</td> <td>X = SC-70</td> </tr> </table>	O = SOT	U = MSOP	S = SOIC	E = TQFP	T = TSSOP	L = LQFP	A = SSOP	U = MSOP	V = TVSOP	P = PDIP	B = BGA	D = QSOP	Q = QFN	X = SC-70				
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DEVICE PIN COUNT																		
G = GREEN PACKAGE, LEAD FREE, and RoHS																		
PART NUMBER																		
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PulseCore Semiconductor Mixed Signal Product																		

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Giving you the edge

May 2008  
rev 0.2

PCS3P2189A

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Part Number: PCS3P2189A  
Document Version: 0.2

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