

Spread Spectrum Clock Generator

Features

- Generates a 4X low EMI spread spectrum clock of the input frequency.
- Input frequency : 15MHz
- Output frequency : 60MHz
- Internal loop filter minimizes external components and board space.
- Selectable Centre Spread frequency deviation: $\pm 0.5\%$, $\pm 1.0\%$, $\pm 1.5\%$, $\pm 2.0\%$
- Low power CMOS design
- $3.3V \pm 0.3V$ Operating Voltage
- Available in Commercial Temperature range
- Available in 8-pin TSSOP

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.

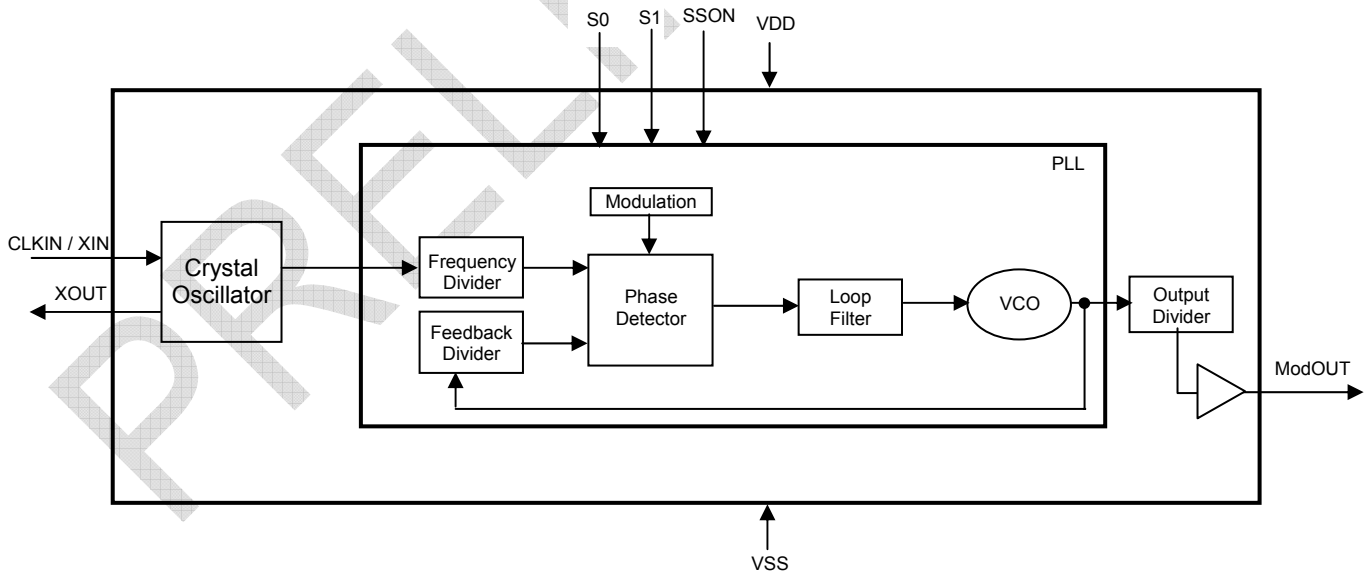
Product Description

PCS3P2189A is a versatile spread spectrum frequency modulator that generates a low EMI 4x clock at the

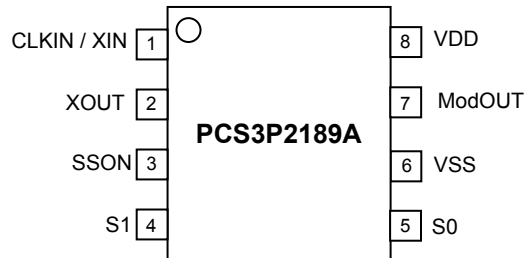
Application

PCS3P2189A is targetted for LCD panel application

Block Diagram



Pin Configurations



Pin Description

| Pin# | Pin Name | Type | Description |
|------|-------------|------|--|
| 1 | CLKIN / XIN | 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 | 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 <i>Spread Deviation Table</i>). This pin has an internal pull-up resistor. |
| 5 | S0 | O | Spread range select. Digital logic input used to select frequency deviation (Refer <i>Spread Deviation Table</i>). 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

| 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 |
|------------------|--|--------------------|------|
| VDD | Supply Voltage pin with respect to Ground | -0.5 to +4.6 | V |
| V _{IN} | Input Voltage pin with respect to Ground | VSS-0.5 to VDD+0.5 | V |
| V _{OUT} | Output Voltage pin with respect to Ground | VSS-0.5 to VDD+0.5 | V |
| T _{STG} | Storage temperature | -55 to +125 | °C |
| T _A | Operating temperature | 0 to +70 | °C |
| T _s | Max. Soldering Temperature (10 sec) | 260 | °C |
| T _J | Junction Temperature | -40 to +125 | °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

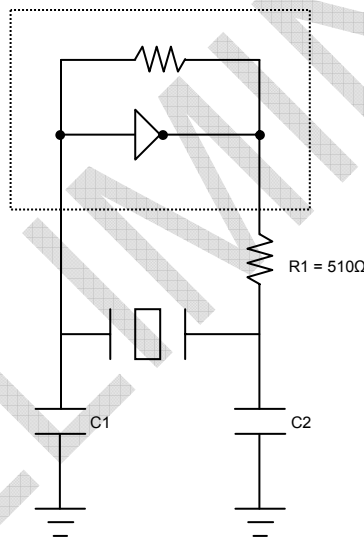
| Symbol | Parameter | Min | Typ | Max | Unit |
|------------------|---|-----------|-----|----------|------|
| V _{IL} | Input low voltage | VSS – 0.3 | - | 0.8 | V |
| V _{IH} | Input high voltage | 2.0 | - | VDD+ 0.3 | V |
| I _{IL} | Input low current | - | - | -35 | µA |
| I _{IH} | Input high current | - | - | +35 | µA |
| I _{XOL} | X _{OUT} output low current (V _{XOL} @ 0.4V, VDD = 3.3V) | - | 3 | - | mA |
| I _{XOH} | X _{OUT} output high current (V _{XOH} @ 2.5V, VDD = 3.3V) | - | 3 | - | mA |
| V _{OL} | Output low voltage I _{OL} = 4mA | VSS | - | 0.4 | V |
| V _{OH} | Output high voltage I _{OH} = -4mA | VDD-0.5 | - | VDD | V |
| I _{CC} | Dynamic supply current , TBD MHz Output, no load | | TBD | TBD | mA |
| I _{DD} | Static supply current standby mode | | TBD | | uA |
| VDD | Operating voltage | 3.0 | 3.3 | 3.6 | V |
| t _{ON} | Power up time (first locked clock cycle after power up) | - | 2 | 5 | mS |
| Z _{OUT} | Clock output impedance | - | TBD | - | Ω |
| C _{IN} | Input Capacitance | - | - | TBD | pF |
| C _L | Load Capacitance | - | - | 15 | pF |

AC Electrical Characteristics

| Symbol | Parameter | Min | Typ | Max | Unit |
|------------|---|-----|------|-----|------|
| f_{IN} | Input frequency | | 15 | | MHz |
| f_{OUT} | Output frequency | | 60 | | MHz |
| t_{LH}^* | Output rise time (Measured from 0.8V to 2.0V) | - | TBD | - | nS |
| t_{HL}^* | Output fall time (Measured from 2.0V to 0.8V) | - | TBD | - | nS |
| t_{JC} | Jitter (Cycle to cycle), $T_a=25^{\circ}C$ and $V_{DD}=3.3V$ No Load Capacitance | - | - | TBD | pS |
| t_D | Output duty cycle | 40 | 50 | 60 | % |
| M_F | Modulation Frequency , Input Frequency =15MHz | | 32.4 | | KHz |

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

Typical Crystal Oscillator Circuit

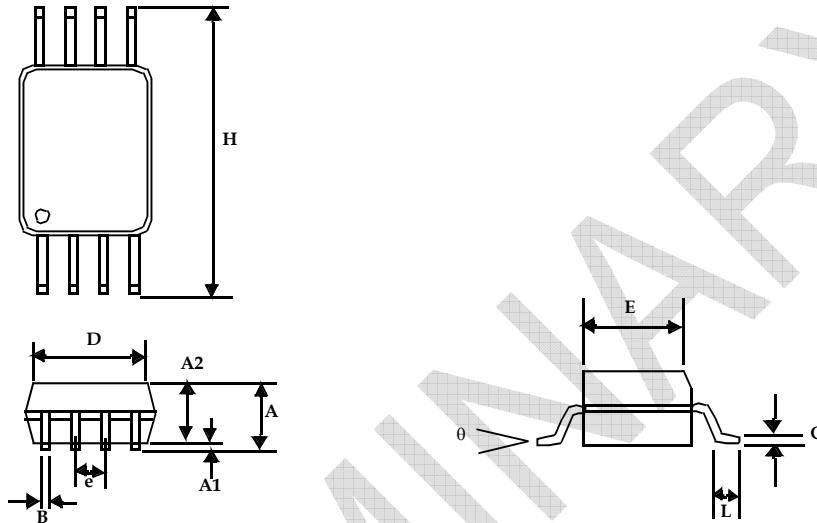


Typical Crystal Specifications

| 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 |

Package Information

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° |

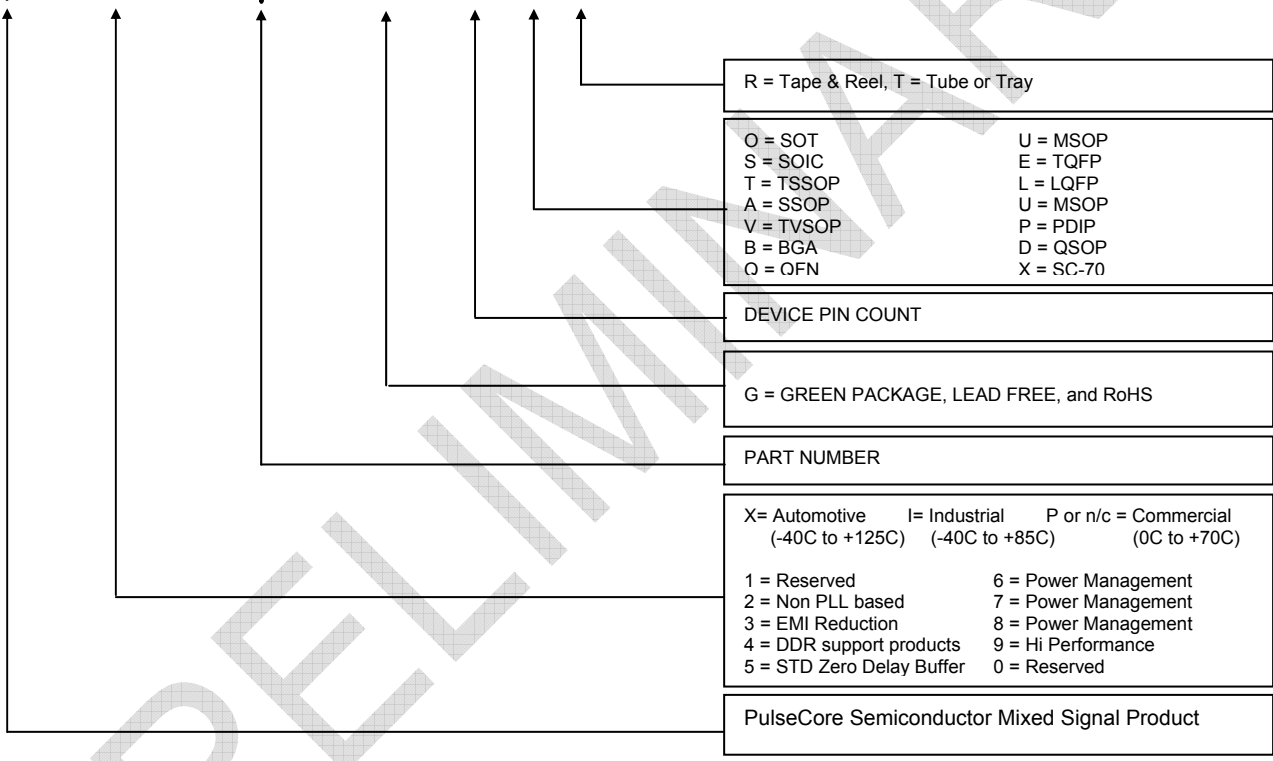
Note: Controlling dimensions are millimeters
TSSOP – 0.034 grams unit weight

Ordering Codes

| 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 |

Device Ordering Information

PCS3P2189AG-08TR





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

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