



General Purpose Peak EMI Reduction IC

General Features

- 1x, LVCMOS Peak EMI Reduction
- Input frequency:
 - 10MHz - 70MHz @ 2.5V
 - 10MHz - 80MHz @ 3.3V
- Output frequency:
 - 10MHz - 70MHz @ 2.5V
 - 10MHz - 80MHz @ 3.3V
- Analog Deviation Selection
- ModRate selection option
- Supply Voltage: 2.5V \pm 0.2V
3.3V \pm 0.3V
- 8-pin TSSOP, 8L 2mmX2mm WDFN(TDFN) Packages
- The First True Drop-in Solution

Functional Description

PCS3P7303A is a versatile, 3.3V/2.5V Peak EMI reduction IC based on Timing-Safe™ technology. PCS3P7303A accepts an input clock either from a Crystal or from an external reference (AC or DC coupled to XIN / CLKIN) and

locks on to it delivering a 1x modulated clock output. PCS3P7303A has a Frequency Selection (FS) control that facilitates selecting one of the two frequency ranges within the operating frequency range. Refer to the *Frequency Selection Table* for details.

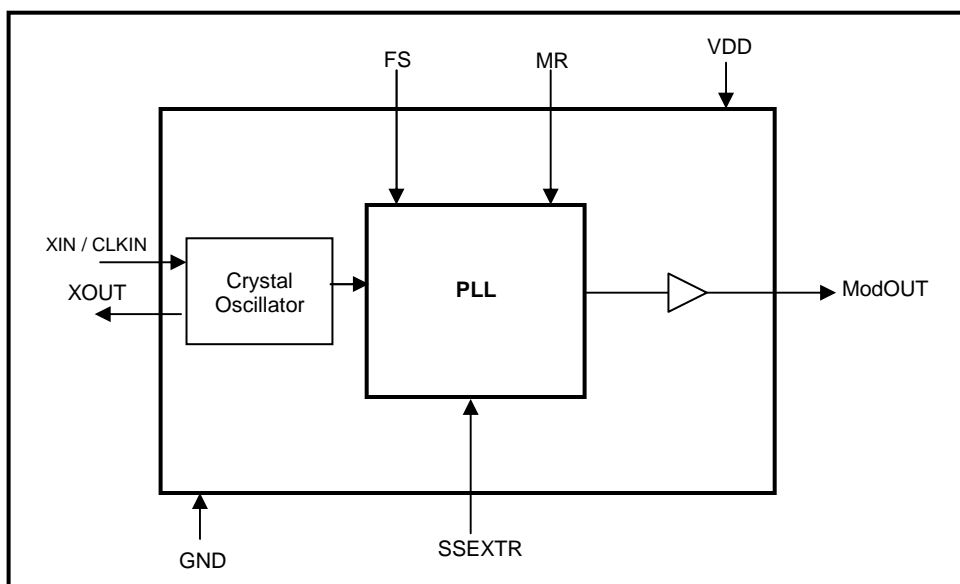
PCS3P7303A has an SSEXTR pin to select different deviations depending upon the value of an external resistor connected between SSEXTR and GND. Modulation Rate (MR) control selects two different Modulation Rates.

PCS3P7303A operates from a 3.3V/2.5V supply and is available in an 8-pin TSSOP and 8L 2mmX2mm WDFN packages.

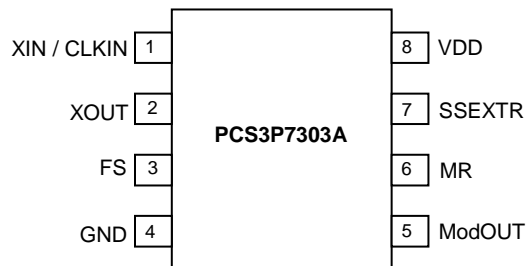
Application

PCS3P7303A is targeted for many applications including USB and SATA.

Block Diagram



Pin Configuration



Pin Description

| Pin # | Pin Name | Pin Type | Description |
|-------|-------------|----------|--|
| 1 | XIN / CLKIN | I | Crystal connection or External reference clock input. |
| 2 | XOUT | O | Crystal connection. If using an external reference, this pin should be left open. |
| 3 | FS | I | Frequency Select. Pull LOW to select Low Frequency range. Selects High Frequency range when pulled HIGH. Has an internal pull-up resistor. (See <i>Frequency Selection table</i> for details.) |
| 4 | GND | P | Ground. |
| 5 | ModOUT | O | Buffered Modulated clock output. |
| 6 | MR | I | Modulation Rate Select. When LOW selects Low Modulation Rate. Selects High Modulation Rate when pulled HIGH. Has an internal pull-down resistor. |
| 7 | SSEXTR | I | Analog Deviation Selection through external resistor to GND. |
| 8 | VDD | P | 2.5V / 3.3V supply Voltage. |

Frequency Selection Table

| VDD (V) | FS | Frequency (MHz) |
|---------|----|-----------------|
| 2.5 | 0 | 10-35 |
| | 1 | 30-70 |
| 3.3 | 0 | 10-40 |
| | 1 | 30-80 |

Absolute Maximum Rating

| Symbol | Parameter | Rating | Unit |
|----------------------|---|--------------|------|
| VDD, V _{IN} | Voltage on any input pin with respect to Ground | -0.5 to +4.6 | V |
| T _{STG} | Storage temperature | -65 to +125 | °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.

Operating Conditions

| Parameter | Description | Min | Max | Unit |
|-----------------|---|-----|-----|------|
| VDD | Supply Voltage | 2.3 | 3.6 | V |
| T _A | Operating Temperature (Ambient Temperature) | 0 | 70 | °C |
| C _L | Load Capacitance | | 10 | pF |
| C _{IN} | Input Capacitance | | 7 | pF |

DC Electrical Characteristics for 2.5V

| Parameter | Description | Test Conditions | Min | Typ | Max | Unit |
|-----------------|------------------------|-----------------------------------|---------------|-----|-----|------|
| VDD | Supply Voltage | | 2.3 | 2.5 | 2.7 | V |
| V _{IL} | Input LOW Voltage | | | | 0.7 | V |
| V _{IH} | Input HIGH Voltage | | 1.7 | | | V |
| I _{IL} | Input LOW Current | V _{IN} = 0V | | | -50 | µA |
| I _{IH} | Input HIGH Current | V _{IN} = V _{DD} | | | 50 | µA |
| V _{OL} | Output LOW Voltage | I _{OL} = 8mA | | | 0.6 | V |
| V _{OH} | Output HIGH Voltage | I _{OH} = -8mA | 1.8 | | | V |
| I _{CC} | Static Supply Current | XIN / CLKIN pulled low | | | 500 | µA |
| I _{DD} | Dynamic Supply Current | Unloaded Output | FS=0; @ 10MHz | | 5 | mA |
| | | | FS=1; @ 70MHz | | 12 | |
| Z _o | Output Impedance | | | 45 | | Ω |

Switching Characteristics for 2.5V

| Parameter | Test Conditions | | Min | Typ | Max | Unit | |
|--|--|------|-------|------|------|------|----|
| Input Frequency ¹ / ModoUT | FS=0 | | 10 | | 35 | MHz | |
| | FS=1 | | 30 | | 70 | | |
| Duty Cycle ^{2,3} | Measured at V _{DD} /2 | | 45 | 50 | 55 | % | |
| Output Rise Time ^{2,3} | Measured between 20% to 80% | | | 1.75 | 2.5 | nS | |
| Output Fall Time ^{2,3} | Measured between 80% to 20% | | | 1.0 | 1.6 | nS | |
| Cycle-to-Cycle Jitter ³ | Unloaded output | FS=0 | 10MHz | | ±450 | ±600 | pS |
| | | | 35MHz | | ±125 | ±250 | |
| | | FS=1 | 30MHz | | ±225 | ±350 | |
| | | | 70MHz | | ±150 | ±300 | |
| PLL Lock Time ³ | Stable power supply, valid clock presented on XIN / CLKIN | | | | 3 | mS | |

Notes: 1. Functionality with Crystal is guaranteed by design and characterization. Not 100% tested in production.
 2. All parameters are specified with 10pF loaded outputs.
 3. Parameter is guaranteed by design and characterization. Not 100% tested in production.

DC Electrical Characteristics for 3.3V

| Parameter | Description | Test Conditions | Min | Typ | Max | Unit |
|-----------------|------------------------|-----------------------------------|---------------|-----|-----|------|
| V _{DD} | Supply Voltage | | 3.0 | 3.3 | 3.6 | V |
| V _{IL} | Input LOW Voltage | | | | 0.8 | V |
| V _{IH} | Input HIGH Voltage | | 2.0 | | | V |
| I _{IL} | Input LOW Current | V _{IN} = 0V | | | -50 | μA |
| I _{IH} | Input HIGH Current | V _{IN} = V _{DD} | | | 50 | μA |
| V _{OL} | Output LOW Voltage | I _{OL} = 8mA | | | 0.4 | V |
| V _{OH} | Output HIGH Voltage | I _{OH} = -8mA | 2.4 | | | V |
| I _{CC} | Static Supply Current | XIN / CLKIN pulled low | | | 700 | μA |
| I _{DD} | Dynamic Supply Current | Unloaded Output | FS=0; @ 10MHz | | 7 | mA |
| | | | FS=1; @ 80MHz | | 20 | |
| Z _o | Output Impedance | | | 35 | | Ω |

Switching Characteristics for 3.3V

| Parameter | Test Conditions | Min | Typ | Max | Unit | |
|---------------------------------------|---|------|-------|------|------|----|
| Input Frequency ¹ / ModOUT | FS=0 | 10 | | 40 | MHz | |
| | FS=1 | 30 | | 80 | | |
| Duty Cycle ^{2,3} | Measured at V _{DD} /2 | 45 | 50 | 55 | % | |
| Output Rise Time ^{2,3} | Measured between 20% to 80% | | 1.3 | 2 | nS | |
| Output Fall Time ^{2,3} | Measured between 80% to 20% | | 0.9 | 1.3 | nS | |
| Cycle-to-Cycle Jitter ³ | Unloaded output | FS=0 | 10MHz | ±450 | ±600 | pS |
| | | | 40MHz | ±125 | ±250 | |
| | | FS=1 | 30MHz | ±225 | ±350 | |
| | | | 80MHz | ±125 | ±250 | |
| PLL Lock Time ³ | Stable power supply, valid clock presented on XIN / CLKIN | | | 3 | mS | |

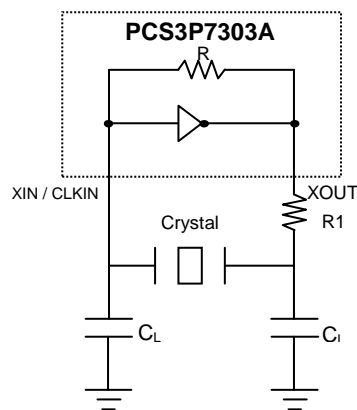
Notes: 1. Functionality with Crystal is guaranteed by design and characterization. Not 100% tested in production.
 2. All parameters are specified with 10pF loaded outputs.
 3. Parameter is guaranteed by design and characterization. Not 100% tested in production.

Typical Crystal Specifications

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

Note: C_L is the Load Capacitance and R1 is used to prevent oscillations at overtone frequency of the Fundamental frequency.

Typical Crystal Interface Circuit



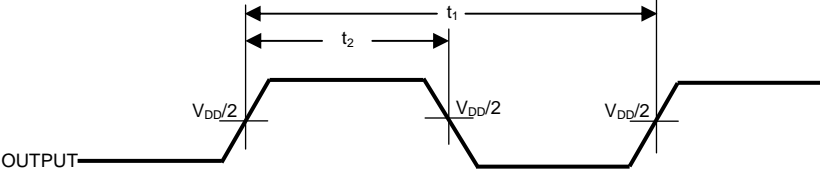
$$C_L = 2 * (C_P - C_S)$$

Where C_P = Load capacitance of crystal from crystal vendor datasheet.

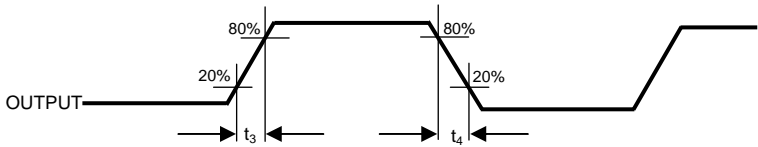
C_S = Stray capacitance due to C_{IN}, PCB, Trace, etc.

Switching Waveforms

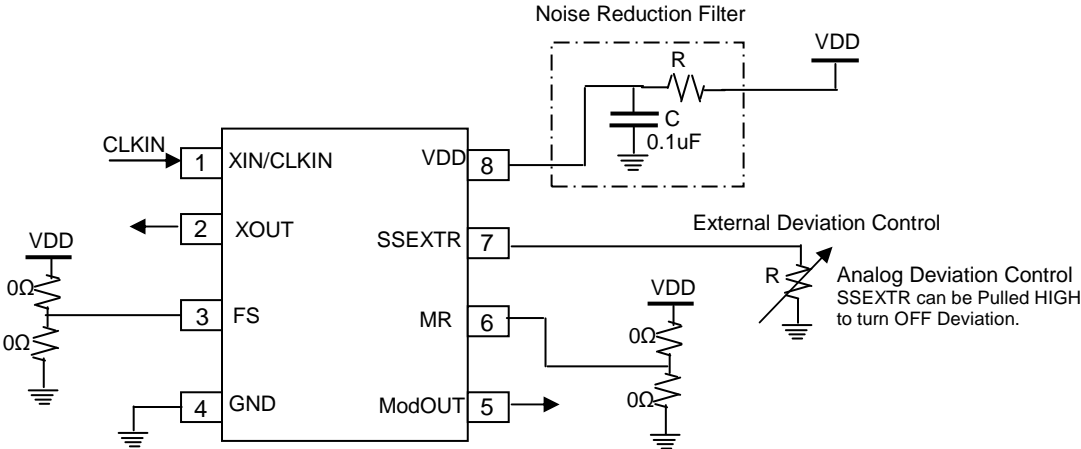
Duty Cycle Timing



Output Rise/Fall Time



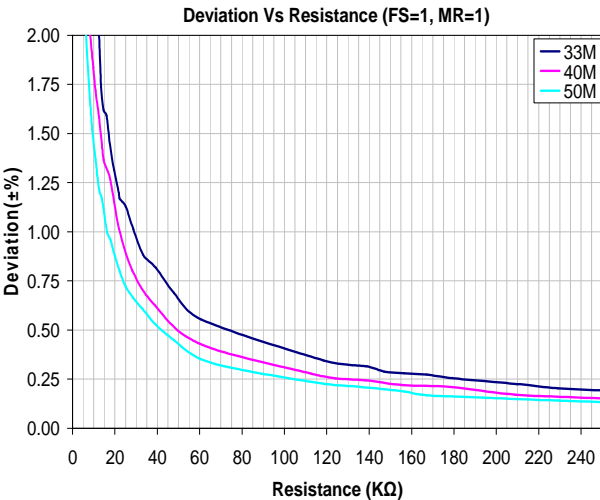
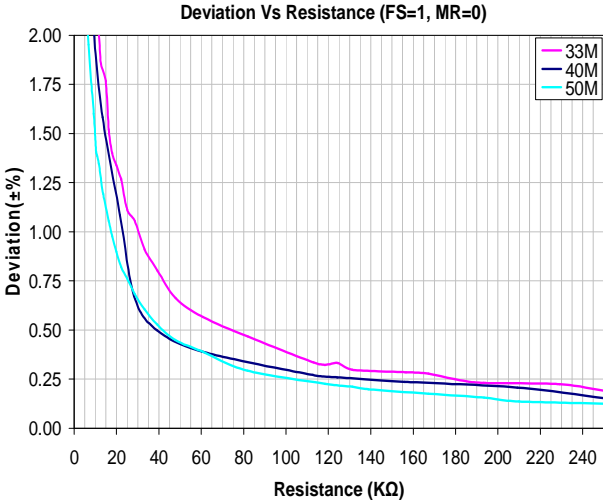
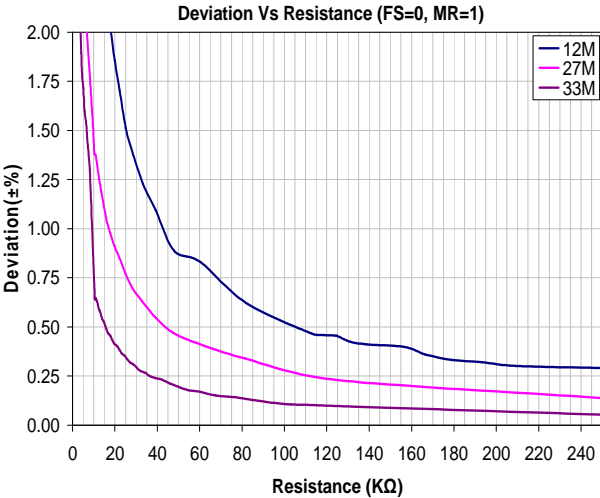
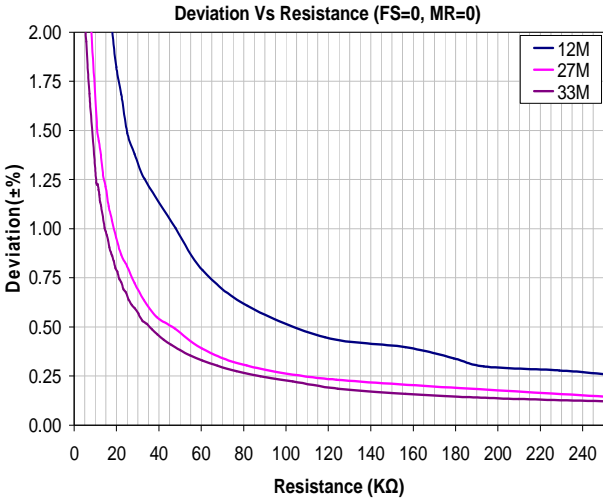
Application Schematic



Note: FS (Pin#3) MR (Pin#6): Connect to VDD or GND
Refer to Pin Description table for Functionality details.

Note: For AC Coupled Interface refer to Application Brief: CT100801.

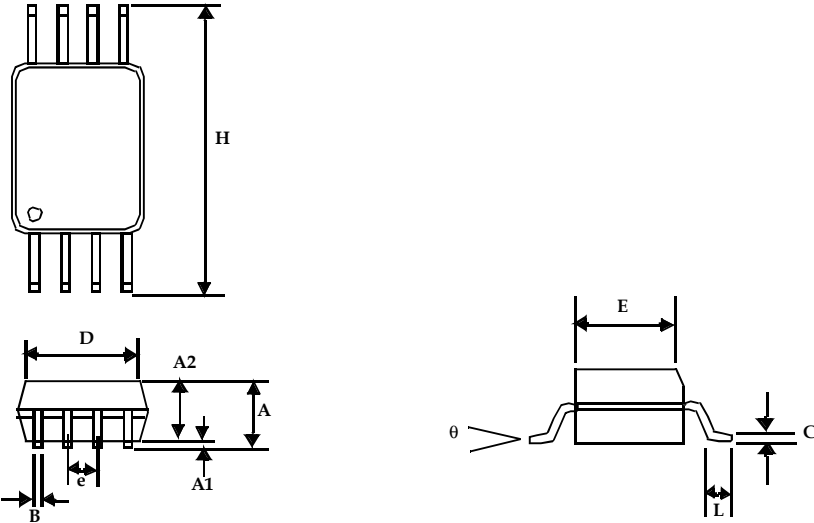
Charts



Note: Device to Device variation of Deviation is ±10%.

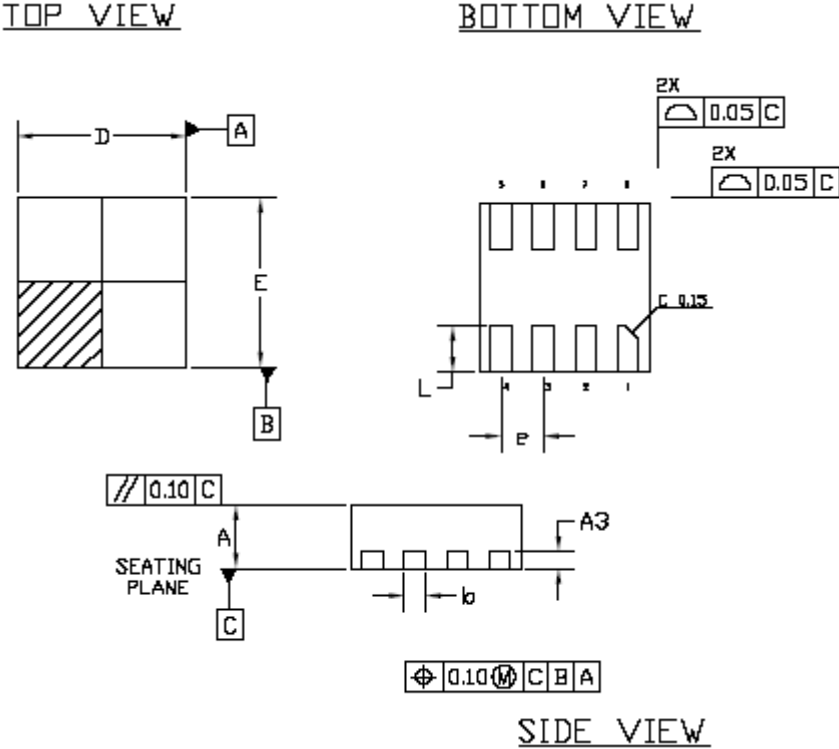
Package Information

8-lead TSSOP Package (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 |
| theta | 0° | 8° | 0° | 8° |

8L 2mmX2mm WDFN package Outline drawing




| Symbol | Dimensions | | | |
|--------|------------|--------|-------------|------|
| | Inches | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.027 | 0.0315 | 0.70 | 0.80 |
| A3 | 0.008 BSC | | 0.203 BSC | |
| b | 0.008 | 0.012 | 0.20 | 0.30 |
| D | 0.079 BSC | | 2.00 BSC | |
| E | 0.078 BSC | | 2.00 BSC | |
| e | 0.020 BSC | | 0.50 BSC | |
| L | 0.020 | 0.024 | 0.50 | 0.60 |

Ordering Code

| Part Number | Marking | Package | Temperature |
|------------------|---------|---------------------------------------|--------------|
| PCS3P7303AG-08TR | BKL | 8-pin TSSOP, TAPE AND REEL, Green | 0°C to +70°C |
| PCS3P7303AG-08TT | BKL | 8-pin TSSOP, TUBE, Green | 0°C to +70°C |
| PCS3P7303AG-08CR | BK | 8L WDFN (2mmX2mm), TAPE & REEL, Green | 0°C to +70°C |

A "microdot" placed at the end of last row of marking or just below the last row toward the center of package indicates Pb-free.

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