

PCS3P2191A

Product Preview

Spread Spectrum Clock Generator

Description

PCS3P2191A is a versatile spread spectrum frequency modulator that generates four low EMI 4x clocks at the output. PCS3P2191A offers seven selectable centre spread options of $\pm 0.5\%$ to $\pm 2.0\%$, and a no spread option. (Refer to *Spread Deviation Selection Table*). PCS3P2191A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The PCS3P2191A 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. The PCS3P2191A uses the most efficient and optimized modulation profile approved by the FCC and is implemented in a proprietary all digital method. The Device is available in 16-Pin TSSOP package, in Commercial and Industrial temperature range.

Application

PCS3P2191A is targeted for LCD panel application.

Features

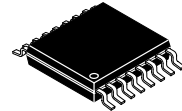
- Generates Four 4x Low EMI Spread Spectrum Clocks
- Input Frequency: 10 MHz – 25 MHz
- Output Frequency: 40 MHz – 100 MHz
- Internal Loop Filter Minimizes External Components and Board Space
- Selectable Centre Spread Frequency Deviation: $\pm 0.5\%$, $\pm 0.75\%$, $\pm 1.0\%$, $\pm 1.25\%$, $\pm 1.5\%$, $\pm 1.75\%$, $\pm 2.0\%$
- Supply Voltage: $3.3\text{ V} \pm 0.3\text{ V}$
- Commercial and Industrial Temperature Range
- 16-pin TSSOP Package
- Advanced Low Power CMOS Process
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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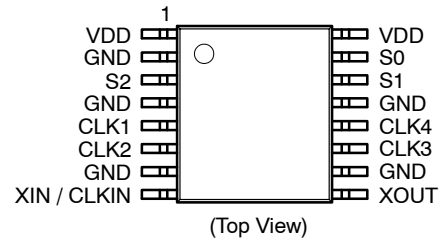
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TSSOP-16
T SUFFIX
CASE 948AN

PIN CONFIGURATION



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

PCS3P2191A

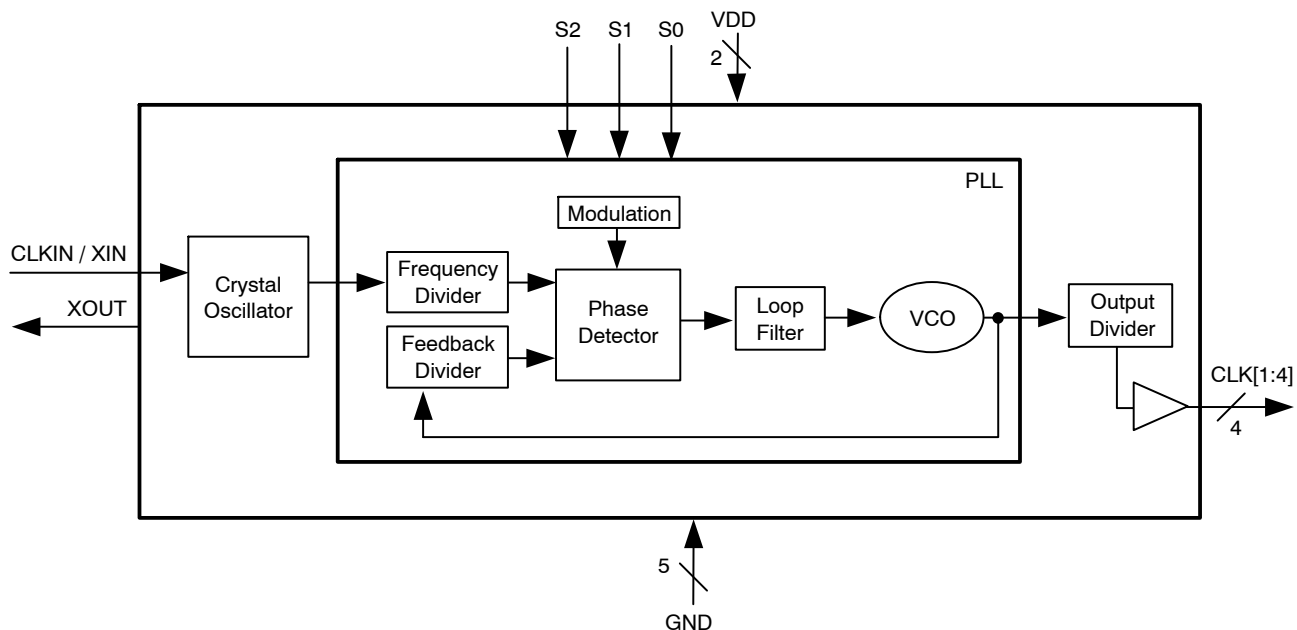


Figure 1. Block Diagram

Table 1. PIN DESCRIPTION

Pin#	Pin Name	Type	Description
1	V _{DD}	P	Power Supply Voltage Pin. Connect to +3.3 V.
2	GND	P	Ground Connection. Connect to system ground.
3	S2	I	Spread range select. Digital logic input used to select frequency deviation (Refer to <i>Spread Deviation Table</i>). This pin has an internal pull-up resistor.
4	GND	P	Ground Connection. Connect to system ground.
5	CLK1	O	Low EMI 4x clock output.
6	CLK2	O	Low EMI 4x clock output.
7	GND	P	Ground Connection. Connect to system ground.
8	XIN / CLKIN	I	Crystal connection or external reference clock input.
9	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
10	GND	P	Ground Connection. Connect to system ground.
11	CLK3	O	Low EMI 4x clock output.
12	CLK4	O	Low EMI 4x clock output.
13	GND	P	Ground Connection. Connect to system ground.
14	S1	I	Spread range select. Digital logic input used to select frequency deviation (Refer to <i>Spread Deviation Table</i>). This pin has an internal pull-up resistor.
15	S0	I	Spread range select. Digital logic input used to select frequency deviation (Refer to <i>Spread Deviation Table</i>). This pin has an internal pull-up resistor.
16	V _{DD}	P	Power Supply Voltage Pin. Connect to +3.3 V.

PCS3P2191A

Table 2. SPREAD DEVIATION SELECTION (For an Input CLK = 15 MHz.)

S2	S1	S0	Deviation (±%)
0	0	0	OFF
0	0	1	0.5
0	1	0	0.75
0	1	1	1.0
1	0	0	1.25
1	0	1	1.5
1	1	0	1.75
1	1	1	2.0

Table 3. ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
V _{DD}	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 _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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4. RECOMMENDED OPERATING CONDITIONS

Parameter	Description	Min	Typ	Max	Unit
V _{DD}	Operating Voltage	3.0	3.3	3.6	V
T _A	Operating Temperature	-40		+85	°C
C _L	Load Capacitance			15	pF
C _{IN}	Input Capacitance		5		pF

PCS3P2191A

Table 5. DC ELECTRICAL CHARACTERISTICS (TA = -40°C to +85°C, VDD = 3.3 V ± 0.3 V)

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	(XIN / CLKIN)			-35	μA
I _{IH}	Input high current				+35	
I _{IL}	Input low current	(S0:S1:S2)			-50	μA
I _{IH}	Input high current				+50	
V _{OL}	Output low voltage	I _{OL} = 12 mA	VSS		0.4	V
V _{OH}	Output high voltage	I _{OH} = -12 mA	2.4		V _{DD}	V
I _{CC}	Dynamic supply current (Unloaded Outputs)		8	15	26	mA
I _{DD}	Static supply current standby mode (Note 1)				8	mA
V _{DD}	Operating voltage		3.0	3.3	3.6	V
t _{ON}	Power up time (first locked clock cycle after power up) (Note 2)				5	mS
Z _{OUT}	Clock output impedance			27		Ω
C _{IN}	Input Capacitance			5		pF
C _L	Load Capacitance				15	pF

1. CLKIN pulled Low.
2. V_{DD} and CLKIN inputs are stable.

Table 6. AC ELECTRICAL CHARACTERISTICS (TA = -40°C to +85°C, VDD = 3.3 V ± 0.3 V)

Symbol	Parameter		Min	Typ	Max	Unit
XIN / CLKIN	Input Clock frequency		10	15	25	MHz
CLKOUT	Output Clock frequency	(Pin 5,6,11,12)	40	60	100	MHz
F _{MOD}	Spread Spectrum Modulation Rate		26	39	65	KHz
t _{LH} (Note 3)	Output rise time (Measured from 20% to 80%)			1.5	2	nS
t _{HL} (Note 3)	Output fall time (Measured from 80% to 20%)			1.0	1.5	nS
	Output frequency Synthesis error (With SSOFF)			0		ppm
t _{JC} (Note 3)	Cycle-to-Cycle Jitter			±250	±325	pS
t _{JP} (Note 3)	Period Jitter (With SSOFF)			±150	±200	pS
t _D (Note 3)	Output duty cycle		45	50	55	%

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

PCS3P2191A

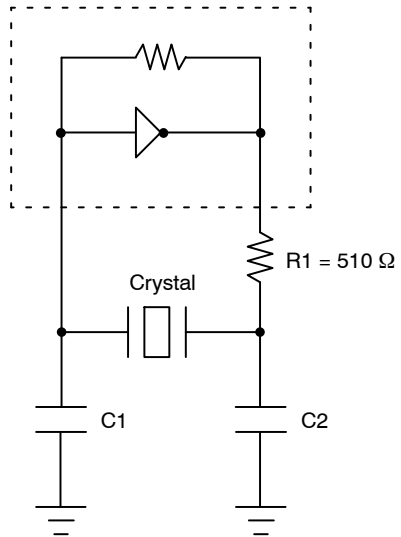


Figure 2. Typical Crystal Oscillator Circuit

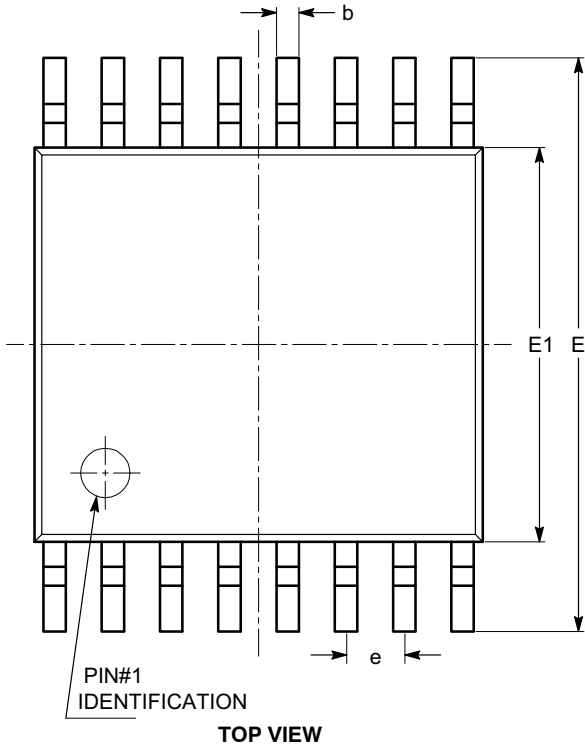
Table 7. TYPICAL CRYSTAL SPECIFICATIONS

Fundamental AT Cut Parallel Resonant Crystal	
Nominal frequency	15 MHz
Frequency tolerance	±50 ppm or better at 25°C
Operating temperature range	-45°C to +90°C
Load capacitance	18 pF
Shunt capacitance	7 pF maximum
ESR	25 Ω

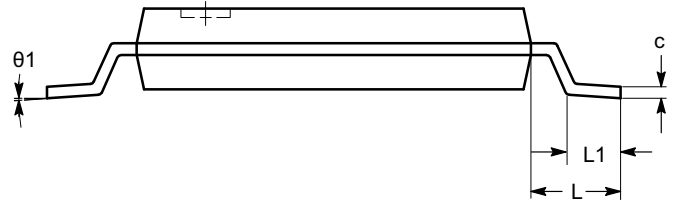
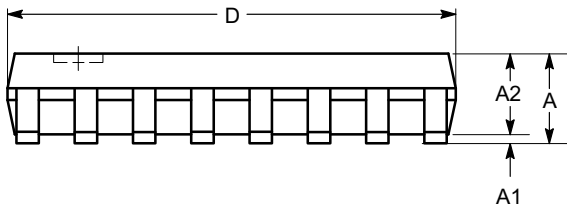
PCS3P2191A

PACKAGE DIMENSIONS

TSSOP16, 4.4x5
CASE 948AN-01
ISSUE O



SYMBOL	MIN	NOM	MAX
A			1.10
A1	0.05		0.15
A2	0.85		0.95
b	0.19		0.30
c	0.13		0.20
D	4.90		5.10
E	6.30		6.50
E1	4.30		4.50
e	0.65 BSC		
L	1.00 REF		
L1	0.45		0.75
θ	0°		8°




Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

PCS3P2191A

Table 8. ORDERING INFORMATION

Part Number	Marking	Package Type	Temperature
PCS3P2191AG-16TT	3P2191AG	16-Pin TSSOP, TUBE, Green	Commercial
PCS3P2191AG-16TR	3P2191AG	16-Pin TSSOP, TAPE & REEL, Green	Commercial
PCS3P2191AF-16TT	3P2191AF	16-Pin TSSOP, TUBE, Pb Free	Commercial
PCS3P2191AF-16TR	3P2191AF	16-Pin TSSOP, TAPE & REEL, Pb Free	Commercial
PCS3I2191AG-16TT	3I2191AG	16-Pin TSSOP, TUBE, Green	Industrial
PCS3I2191AG-16TR	3I2191AG	16-Pin TSSOP, TAPE & REEL, Green	Industrial
PCS3I2191AF-16TT	3I2191AF	16-Pin TSSOP, TUBE, Pb Free	Industrial
PCS3I2191AF-16TR	3I2191AF	16-Pin TSSOP, TAPE & REEL, Pb Free	Industrial

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