



5.0 x 3.2 x 1.2mm  
LCC Ceramic Package

## Features

- Field Programmable with the [PG-3200](#) oscillator programming instrument within seconds.
- Can be programmed twice (single Frequency) or one time as Dual frequency
- CMOS Output (will interface with TTL devices)
- 3.3V or 5.0V nominal Supply Voltage
- Size: 5 x 3.2mm
- Enable/Disable Function (optional Standby function) for single frequency program only

## Applications

Driving A/Ds, D/As, FPGAs  
Digital Video  
Ethernet, GbE  
Medical  
Storage Area Networking  
COTS  
Broad Band Access  
SONET/ SDH/ DWDM  
Test & Measurement

## Electrical Characteristics

Parameter	Min	Typ	Max	Unit	Condition
Programmable Frequency Range	1	-	133	MHz	(3.3V: 1 - 100MHz)
Frequency Stability <sup>2</sup>	±25	-	±100	ppm	For all supply voltages, load changes, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures.
Operating Temperature options <sup>2</sup>	-20 -40	-	+70 +85	°C	
Supply Voltage <sup>1,2</sup> V <sub>DD</sub>	2.97	-	5.5	V	
Supply Current I <sub>DD</sub> (No Load)	-	-	45 25	mA	V <sub>DD</sub> = 5.0V V <sub>DD</sub> = 3.3V
Output Type	CMOS				Cload = 50pF max, V <sub>DD</sub> = 4.5~5.5V, ≤ 66MHz Cload = 25pF max, V <sub>DD</sub> = 4.5~5.5V, > 66MHz Cload = 30pF max, V <sub>DD</sub> = 2.97~3.63V, ≤ 40MHz Cload = 15pF max, V <sub>DD</sub> = 2.97~3.63V, > 40MHz
	TTL				Cload = 50pF max; V <sub>DD</sub> = 4.5~5.5V, ≤ 40MHz
Duty Cycle	-	-	-	%	See Page 2
Output V <sub>OH</sub> (TTL Level) (CMOS Level)	2.4	-	-	V	V <sub>DD</sub> = 4.5~5.5V
	V <sub>DD</sub> - 0.4			V	All voltages
Output V <sub>OL</sub>	-	-	0.4	V	See Load Circuit and waveform page
Output T <sub>RISE</sub> and T <sub>FALL</sub>	-	-	-	ns	See page 2
Startup Time	-	-	2	ms	Time for output to reach specified frequency
V <sub>DISABLE</sub> (V <sub>IL</sub> )	-	-	0.8 0.2V <sub>DD</sub>	V	V <sub>DD</sub> = 4.5~5.5V V <sub>DD</sub> = 2.97~3.63V
V <sub>ENABLE</sub> (V <sub>IH</sub> )	2.0 0.7V <sub>DD</sub>	-			V <sub>DD</sub> = 4.5~5.5V V <sub>DD</sub> = 2.97~3.63V
Enable Time (PD Version)	-	-	2	ms	
Enable Time (TS Version)	-	-	1.5T + 25	ns	T = Frequency Period
Disable Time - Pin 1 low to Output Hi-Z	-	T/2	T+10	ns	T = Frequency Period
Disable Current	-	-	-	mA	Enable/Disable: Pad 1 low, output disabled; See above Supply Current
	-	0.4	-		Standby option: Pad 1 low, output disabled, oscillator shutdown
RMS Period Jitter	-	40	50	ps	≤ 33MHz > 33MHz
		30	40		
Period Jitter, Pk-Pk		100	250	ps	>1,000,000 samples ≤ 33MHz > 33MHz
		75	175		
Storage Temperature Range	-55	-	+125	°C	

Notes: Specifications with Pad 1 E/D open circuit

<sup>1</sup> Place an appropriate power supply bypass capacitor next to device for best performance

<sup>2</sup> Specified by part number

**Duty Cycle**

Parameter	Min	Typ	Max	Unit	
TTL @ 1.4V level; V <sub>DD</sub> = 4.5~5.5V	45 45 40 40		55 55 60 60	%	Fo ≤ 50 MHz, CL ≤ 50pF 50 MHz < Fo ≤ 66MHz; CL ≤ 15pF 66 MHz < Fo ≤ 125MHz, CL ≤ 25pF 125 MHz < Fo ≤ 133MHz, CL ≤ 15pF
CMOS @ 0.5V <sub>DD</sub> level; V <sub>DD</sub> = 4.5~5.5V	45 40 40		55 60 60	%	Fo ≤ 66 MHz, CL ≤ 25pF 66 MHz < Fo ≤ 125MHz; CL ≤ 25pF 125 MHz < Fo ≤ 133MHz, CL ≤ 15pF
CMOS @ 0.5V <sub>DD</sub> level; V <sub>DD</sub> = 2.97~3.63V	45 40		55 60	%	Fo ≤ 40 MHz, CL ≤ 30pF 40 MHz < Fo ≤ 100MHz; CL ≤ 15pF

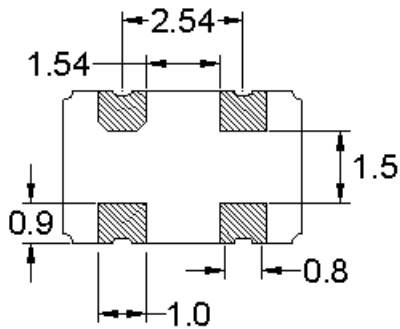
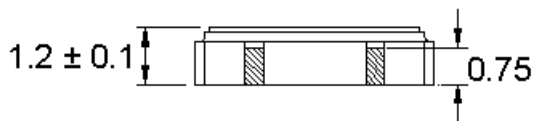
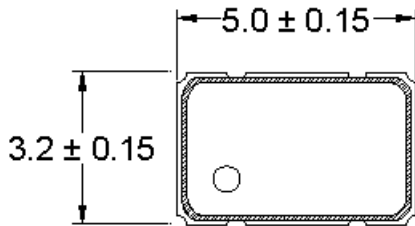
**Rise/Fall Time**

Parameter	Min	Typ	Max	Unit	
Rise/Fall Time			1.8 1.2 0.9 3.4 4.0 2.4	ns	0.8V~2.0V, V <sub>DD</sub> = 4.5~5.5V, CL=50pF 0.8V~2.0V, V <sub>DD</sub> = 4.5~5.5V, CL=25pF 0.8V~2.0V, V <sub>DD</sub> = 4.5~5.5V, CL=15pF 0.2V <sub>DD</sub> ~0.8V <sub>DD</sub> , V <sub>DD</sub> = 4.5~5.5V, CL=50pF 0.2V <sub>DD</sub> ~0.8V <sub>DD</sub> , V <sub>DD</sub> = 2.97~3.63V, CL=30pF 0.2V <sub>DD</sub> ~0.8V <sub>DD</sub> , V <sub>DD</sub> = 2.97~3.63V, CL=15pF

**Part Number Example: CPPX5-A7BP-XX.XXXNP**

Series Model	Package Size (mm)		Operating Temperature Range	Frequency Stability (ppm)			
CPPX	5	-	A7	BR	-	XX.XXX	NP or NC
	5 = 5 x 3.2		A5 = -20 to +70°C A7 = -40 to +85°C	BC = ±20 BR = ±25 BP = ±50 B6 = ±100			

### Mechanical Dimensions

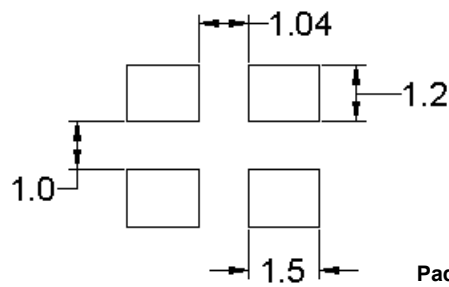


Dimensions in mm

### Pad Connections

Pad	Function
1	Enable/Disable
2	Ground
3	Output
4	Vcc

ENABLE/DISABLE	
Pad 1	Output
V <sub>IH</sub> /Open	Active
V <sub>IL</sub> /Gnd	Disabled/Tristate



#### Pad Layout

Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

**Contacts (pads): Gold (0.3 to 1.0 μm) over Nickel (1.27 to 8.89 μm)**

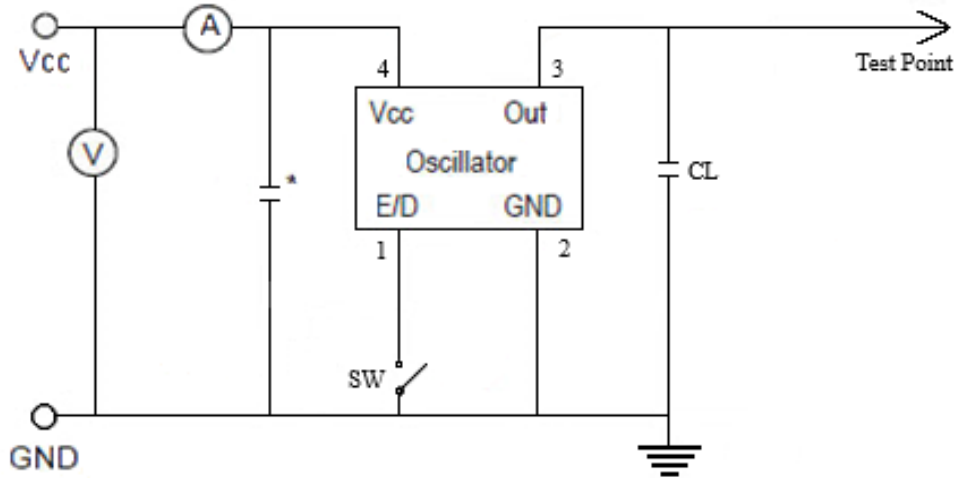
Cardinal Components Inc. certifies this device is in accordance with the RoHS and REACH directives.

Cardinal Components guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
 Weight of the Device: 0.09 grams  
 Moisture Sensitivity Level: 1 As defined in J-STD-020D  
 Second Level Interconnect code: e4

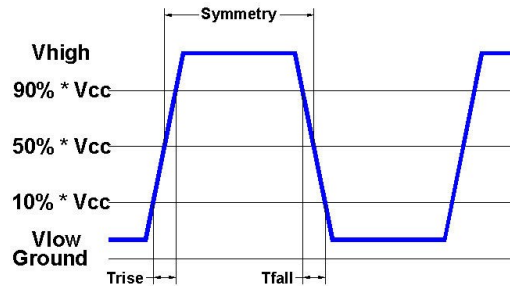
For Optimum Jitter Performance, Cardinal recommends:

- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

## Electrical Test / Load Circuit



Notes:  
 CL: 15pF Includes the input capacitance of oscilloscope  
 \* 0.01~0.1μF external by-pass filter is recommended



## Environmental / ESD Ratings

Reliability: Environmental

Parameter	Condition
Mechanical Shock	MIL-STD-883, Method 2002, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A
Solderability	IPC J-STD-002
Thermal Cycle	MIL-STD-883 Method 1010, Condition B

ESD Rating

Model	Min. Voltage	Condition
Human Body Model	2000V	MIL-STD-883 3015.7
Machine Model	200V	EIAJ ED-4701/304

Absolute Maximum Ratings

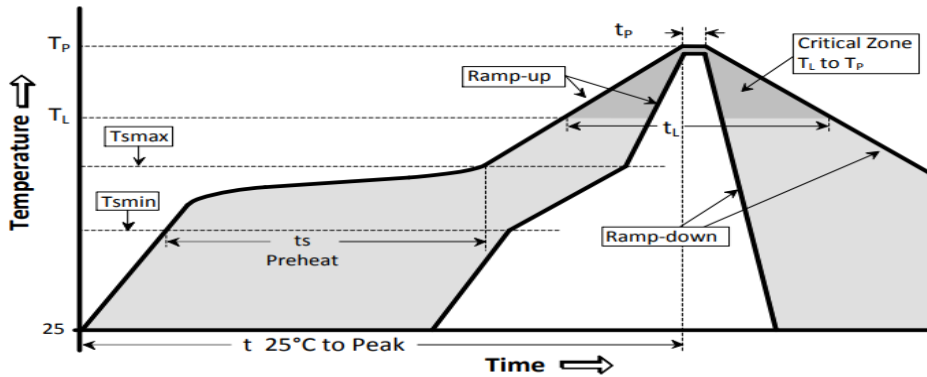
Parameter	Unit
V <sub>CC</sub> Supply Voltage	-0.5V to +7.0V
V <sub>i</sub> Input Voltage	-0.5V to V <sub>CC</sub> + 0.5V
V <sub>o</sub> Output Voltage	-0.5V to V <sub>CC</sub> + 0.5V

### Thermal Characteristics:

The maximum die or junction temperature is 100°C

## Reflow Cycle

Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"

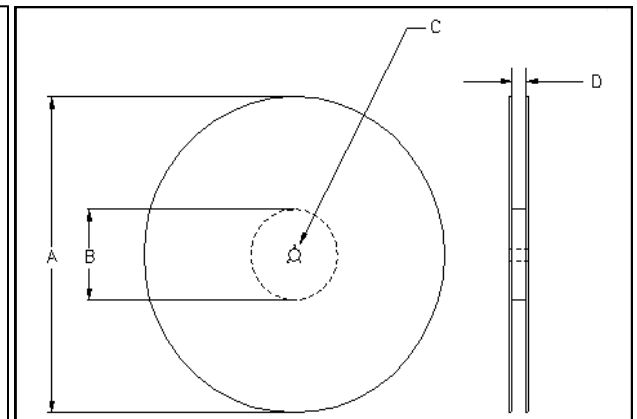
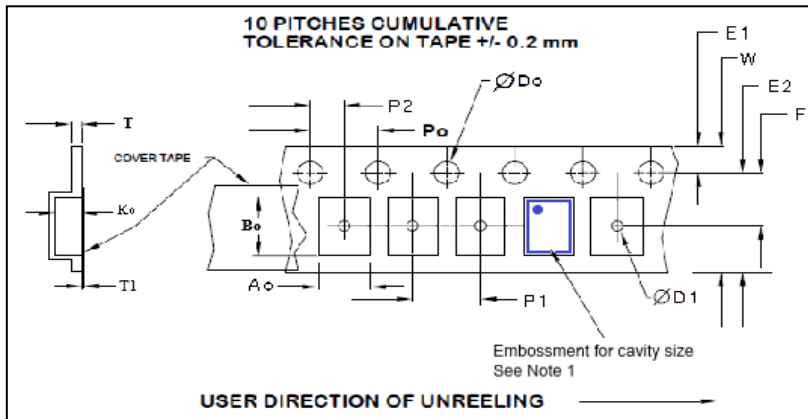


The part may be reflowed 2 times without degradation (typical for lead free processing).

Temperature Profile	Symbol	Condition	Unit
Average ramp-up rate	$(T_{S_{max}} \text{ to } T_P)$	3°C / second max	°C / s
Ramp down Rate	$T_{cool}$	6°C / second max	°C / s
Time 25°C to Peak Temperature	$T_{to-peak}$	8 minutes max	min
<b>Preheat</b>			
Temperature min	$T_{S_{min}}$	150	°C
Temperature max	$T_{S_{max}}$	200	°C
Time $T_{S_{min}}$ to $T_{S_{max}}$	$t_s$	60 – 180	sec
<b>Soldering above liquidus</b>			
Temperature liquidus	$T_L$	217	°C
Time above liquidus	$t_L$	60 – 150	sec
<b>Peak temperature</b>			
Peak Temperature	$T_P$	260	°C
Time within 5°C of peak temperature	$t_p$	20 – 40	sec

## Tape and Reel

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 12mm tape, 8mm pitch.



Tape Size	E2 typ	F	P1	W max	A <sub>o</sub>	B <sub>o</sub>	K <sub>o</sub>
12mm	10.25	5.5 ±0.05	8.0 ±0.1	12.2	3.6 ± 0.1	5.4 ± 0.1	1.4 ± 0.1

Reel Size	A		B		C	D
	Inches	mm	Inches	mm	mm	mm
7	7.0	180	2.50	60	13.0 +0.5 -0.2	Tape size +0.4 +2.0 -0.0

Dimensions in mm Drawing Not to scale  
Note 1: Embossed cavity to conform to EIA- 481-B

Tape Size	D <sub>o</sub>	D1 typ	E1	P <sub>o</sub>	P2	T typ	T1 max
12mm	1.5 +0.1 -0.0	1.5	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	0.3	0.1

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