GSXO1203

HCMOS Programmable Frequency Low Jitter XO

Features

EXTREMELY Low Jitter
Low Cost
EXPRESS Delivery
Frequency Resolution to six decimal places
Stabilities to ±20 PPM
-20 to +70°C or -40 to +85°C operating temperatures
Tri-State Enable / Disable Feature
Industry Standard Package, Footprint & Pin-Out
Fully RoHS compliant
Gold over Nickel Termination Finish
Serial ID with Comprehensive Traceability

Picture of Part

Description

The GSXO1203 Crystal Oscillator is a breakthrough in configurable Frequency Control Solutions. It utilizes a family of proprietary ASICs, designed and developed with a key focus on noise reduction technologies.

The 3rd order Delta Sigma Modulator reduces noise to the levels that are comparable to traditional Bulk Quartz and SAW oscillators. The ASICs family has ability to select the output type, input voltages, and temperature performance features.

With the express lead-time, low cost, low noise, wide frequency range, excellent ambient performance, it is an excellent choice over the conventional technologies.

Finished parts are 100% final tested.

Applications

ANY application requiring an oscillator
SONET
Ethernet
Storage Area Network
Broadband Access
Microprocessors / DSP / FPGA
Industrial Controllers
Test and Measurement Equipment
Fiber Channel

Model Selection Guide

GSXO1203 - H C 7 3 6 R – 1 0 6 . 2 5 Frequency (in MHz)
Resolutions to 6 places past the decimal point

H = HCMOS	**C = Ceramic**	5 = 5 x 3.2mm	**3 = 3.3 V**	0 = ± 100 PPM	*blank* = -20°C to +70°C
L = LVDS	Q = Quartz	7 = 7 x 5mm	2 = 2.5 V	5 = ± 50 PPM	R = -40°C to +85°C
P = LVPECL				6 = ± 25 PPM	
M = LVDS *(pin 2 E/D)*				8 = ± 20 PPM (-20 ~ +70°C)	
Q = LVPECL *(pin 2 E/D)*					
X = HCMOS *(comp 2nd Output)*					

Electrical Characteristics

Parameters	**Symbol**	**Condition**	**Maximum Value** (unless otherwise noted)
Frequency Range	F_O		0.750 to 250.000 MHz
Frequency Stability [1]			100, 50, 25, & 20 ppm
Temperature Range	T_O T_{STG}	Standard operating *Optional operating* Storage	-20°C to +70°C *-40°C to +85°C* -55°C to +125°C
Supply Voltage	V_{DD}	Standard	3.3 V ± 5%
Input Current (@ 15pF LOAD)	I_{DD}	0.75 ~ 20 MHz 20+ ~ 50 MHz 50+ ~ 130 MHz 130+ ~ 200 MHz 200+ ~ 250 MHz	32 mA 35 mA 47 mA 55 mA 60 mA
Output Load	HCMOS	Standard *Operational To 125MHz*	15 pF 30 pF
Start-Up Time	T_S		10 mS
Output Enable / Disable Time			100 nS
Moisture Sensitivity Level	MSL	*JEDEC J-STD-20*	1
Termination Finish			Au

Note 1 – Stability is inclusive of 25°C tolerance, operating temperature range, input voltage change, load change, aging, shock and vibration.

Absolute Maximum Ratings (Useful life may be impaired. For user guidelines only, not tested)

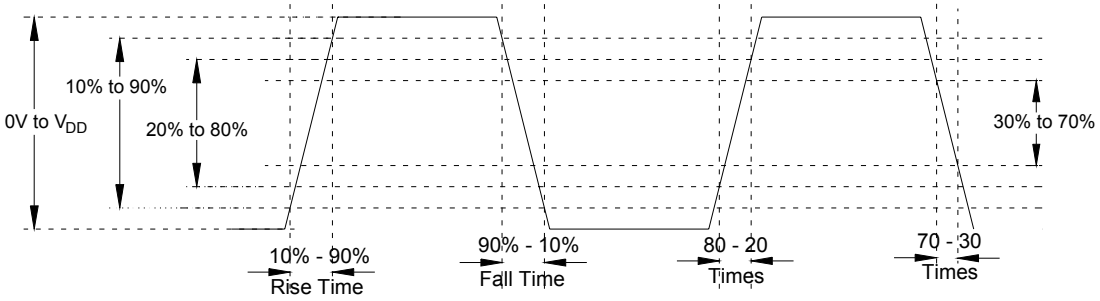
Parameters	Symbol	Condition	Maximum Value (unless otherwise noted)
Input Voltage	V_{DD}		–0.5V to +5.0V
Operating Temperature	T_{AMAX}		–55°C to +105°C
Storage Temperature	T_{STG}		–55°C to +125°C
Junction Temperature			150°C
ESD Sensitivity	HBM	Human Body Model	1 kV

Output Wave Characteristics

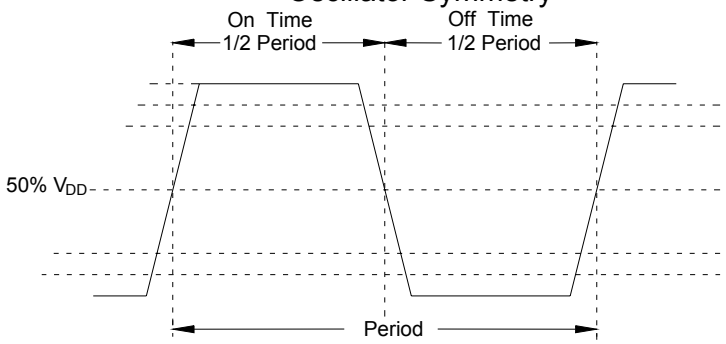
Parameters	Symbol	Condition	Maximum Value (unless otherwise noted)
Output LOW Voltage	V_{OL}	0.75 to 150 MHz 150+ to 250 MHz	10% V_{DD} 20% V_{DD}
Output HIGH Voltage	V_{OH}	0.75 to 150 MHz 150+ to 250 MHz	90% V_{DD} MIN 80% V_{DD} MIN
Output Symmetry (See Drawing Below)		@ 50% V_{DD} Level	45% ~ 55%
Output Enable (PIN # 1) Voltage	V_H		> 70% V_{DD}
Output Disable (PIN # 1) Voltage	V_{IL}		< 30% V_{DD}
Cycle Rise Time (See Drawing Below)	T_R	0.75 to 150 MHz 150+ to 250 MHz	3 nS (10%~90%) 3 nS (20%~80%)
Cycle Fall Time (See Drawing Below)	T_F	0.75 to 150 MHz 150+ to 250 MHz	3 nS (90%~10%) 3 nS (80%~20%)

If 30% to 70% times are used, Rise and Fall times change to 1.5 nS from 0.75 to 250MHz
If 20% to 80% times are used, Rise and Fall times change to 2 nS from 0.75 to 150MHz

Rise Time / Fall Time Measurements

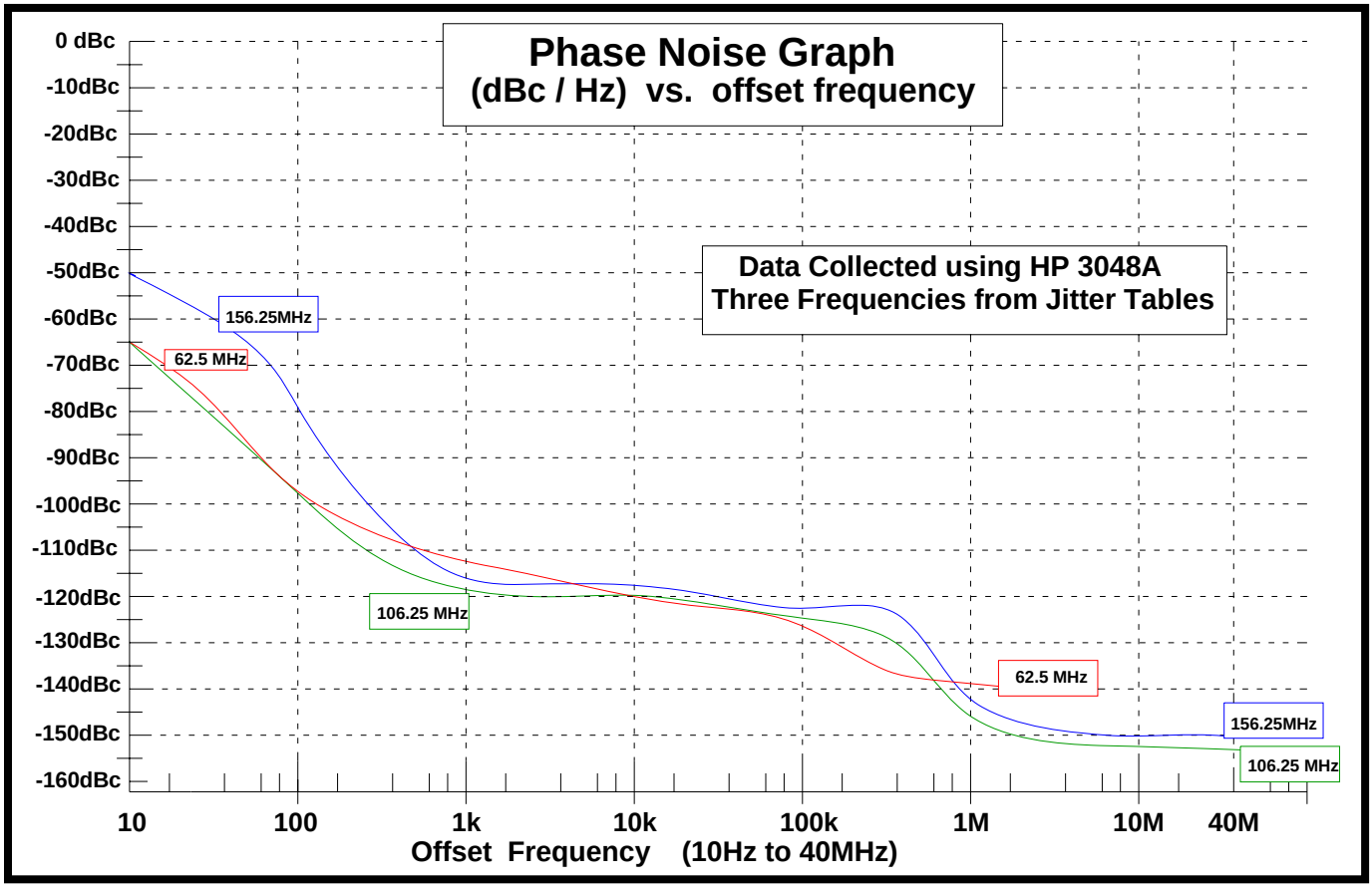


Oscillator Symmetry



Ideally, Symmetry should be 50/50 -- Other expressions are 45/55 or 55/45

Phase Noise



Jitter is frequency dependent. Below are typical values at select frequencies.

Phase Jitter & Time Interval Error (TIE)

Frequency	Phase Jitter (12kHz to 20MHz)	T I E (Sigma of Jitter Distribution)	Units
62.5 MHz	0.93	2.8	pS RMS
106.25 MHz	0.86	3.2	pS RMS
125 MHz	0.75	2.7	pS RMS
156.25 MHz	0.77	3.3	pS RMS

Phase Jitter is integrated from HP3048 Phase Noise Measurement System; measured directly into 50 ohm input; V_{DD} = 3.3V.
TIE was measured on LeCroy LC684 Digital Storage Scope, directly into 50 ohm input, with Amherst M1 software; V_{DD} = 3.3V.
*Per **MJSQ** spec (Methodologies for Jitter and Signal Quality specifications)*

Random & Deterministic Jitter Composition

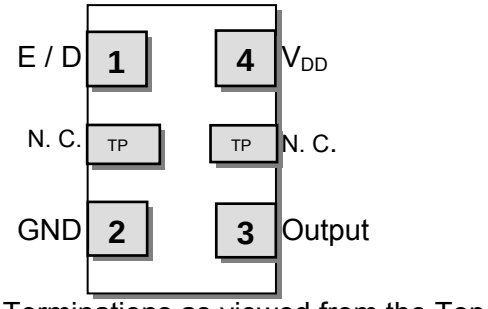
Frequency	Random (Rj) (pS RMS)	Deterministic (Dj) (pS P-P)	Total Jitter (Tj) (14 x Rj) + Dj
62.5 MHz	1.28	6.8	25.1 pS
106.25 MHz	1.28	8.4	26.6 pS
125 MHz	1.20	8.0	25.2 pS
156.25 MHz	1.27	8.6	26.6 pS

Rj and Dj, measured on LeCroy LC684 Digital Storage Scope, directly into 50 ohm input, with Amherst M1 software.
*Per **MJSQ** spec (Methodologies for Jitter and Signal Quality specifications)*

Pin Description and Recommended Circuit

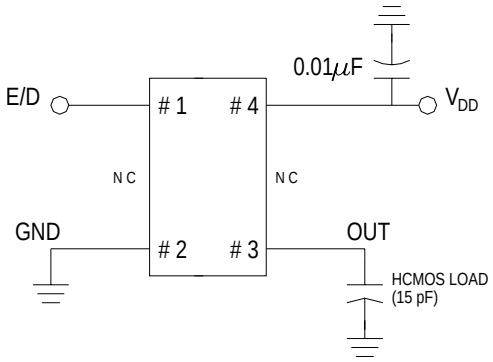
Pin #	Name	Type	Function
1	E / D [1]	Logic	Enable / Disable Control of Output (0 = Disabled)
2	GND	Ground	Electrical Ground for V_{DD}
3	Output	Output	HCMOS Oscillator Output
4	V_{DD} [2]	Power	Power Supply Source Voltage
Test Points	*N. C.*	Hi Z	*No Connection (Factory Use ONLY)*

NOTES:
[1] Includes pull-up resistor to V_{DD} to provide output when the pin (1) is No Connect.
[2] Installation should include a 0.01µF bypass capacitor placed between V_{DD} (Pin 4) and GND (Pin 2) to minimize power supply line noise.



Terminations as viewed from the Top

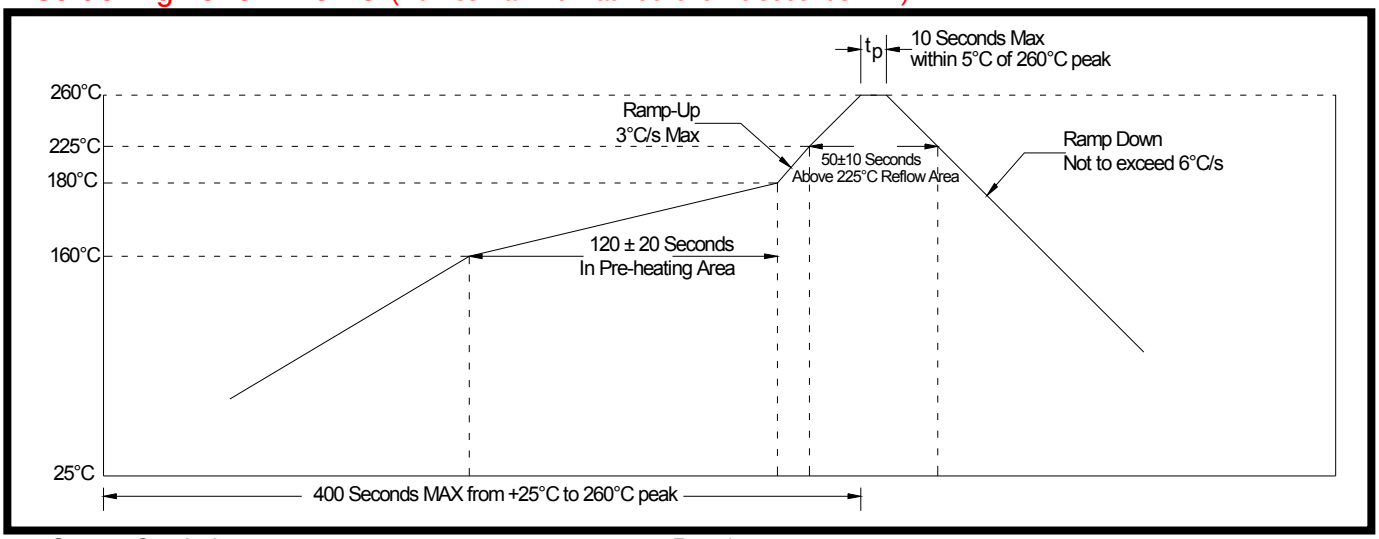
NOTE: HCMOS XOs are designed to fit on Industry Standard, 4 pad layouts



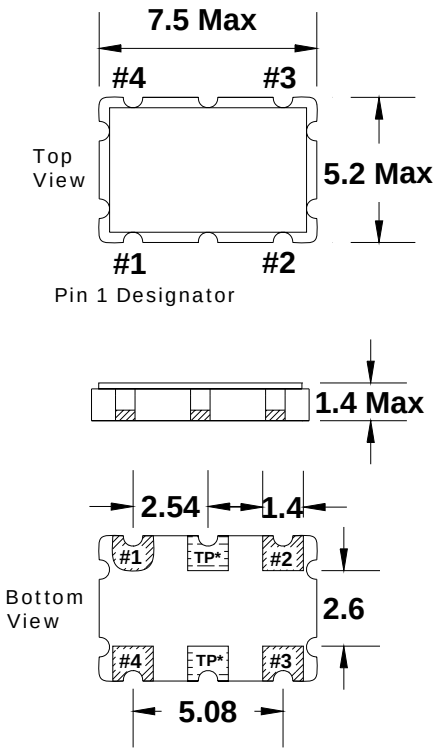
Enable / Disable Control

	Pin # 1 (state)	Output (Pin # 3)
	OPEN (No Connection)	ACTIVE Output
	"1" Level V_{IH} > 70% V_{DD}	ACTIVE Output
	"0" Level V_{IL} < 30% V_{DD}	High Impedance

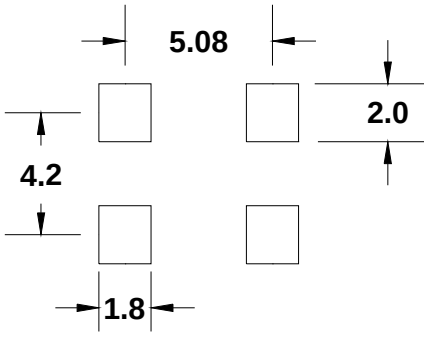
Soldering Reflow Profile (2 times Maximum at 260°C for 10 seconds MAX)



Mechanical Dimensional Drawing & Pad Layout



Recommended
Solder Pad Layout

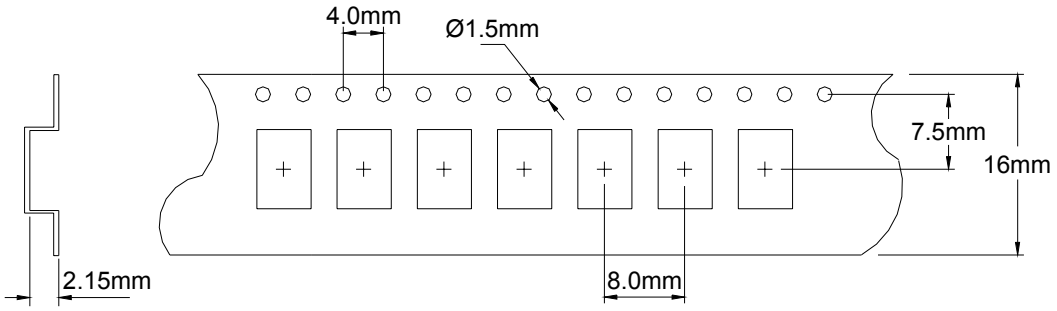


Note: HCMOS XOs are designed to fit on industry standard, 4 pad, layouts.

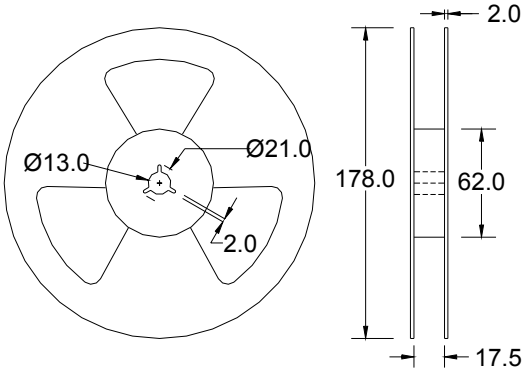
Pin Connections
#1) E/D #3 Output
#2 GND #4 VDD
***TP are test points and are NC**

Drawing is for reference to critical specifications defined by size measurements.
Certain non-critical visual attributes, such as side castellations, reference pin shape, etc. may vary

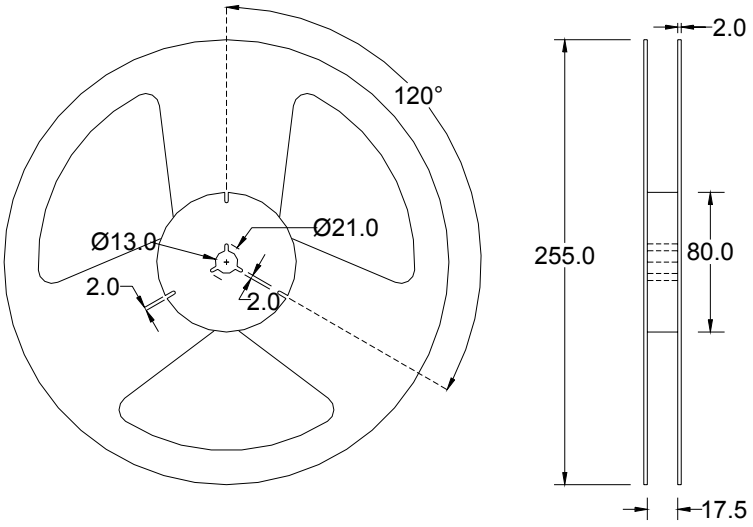
Tape and Reel Dimensions



1k Reel Dimensions in mm



2k Reel Dimensions in mm



Mechanical Testing

Parameter	Test Method
Mechanical Shock	Drop from 75cm to hardwood surface – 3 times
Mechanical Vibration	10~55Hz, 1.5mm amplitude, 1 Minute Sweep 2 Hours each in 3 Directions (X, Y, Z)
High Temperature Burn-in	Under Power @ 125°C for 2000 Hours (results below)
Hermetic Seal	He pressure: 4 ±1 kgf / cm^2 2 Hour soak

2,000 Hour Burn-In

Burn-In Testing – under power 2000 Hours, 125°C