

**T120** 

TIGHT STABILITY LOW NOISE TCXO

# **Product Description**

Greenray Industries' T120 TCXO offers low noise and tight stability in a rugged package

#### Features

- 22.9 x 17.8mm, ruggedized package
- 3.3 or 5VDC Supply
- Square wave, CMOS output
- Temperature Stability to ±0.5ppm (-40 to +85°C)
- -160 dBc/Hz Noise Floor
- Extended, long-term stability performance

# Applications

- Telecommunications
- Mobile radio
- Mobile instrumentation
- Airborne communications
- Wireless communications
- Microwave receivers

T120 BO MHZ SN 2000 OK 1740

Rev. E



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#### **Electrical Characteristics**

Frequency Characteristics								
Parameter	Conditions	Min	Турі	cal	Max	Units	Ordering Code	
Nominal Frequency	CMOS	10			100	MHz		
Frequency Stability (other stability available,	-40°C to +85°C		± 0	.5		ppm	Т57	
please contact factory)	-40°C to +85°C		±	1		ppm	T16	
Total Stability	From nominal over 10 years (including temp stability, load, aging, supply V)				± 5	ppm		
Aging	1 <sup>st</sup> year				± 1	ppm		
Acceleration Sensitivity	(note 1)				2.5	ppb/g		
Frequency vs Supply Voltage V <sub>DD</sub>	For a 5% change				± 0.1	ppm		
Frequency vs Load	For a 5% change				± 0.1	ppm		
Electronic Frequency	EFC = 0 to V <sub>DD</sub>		±	6		ppm		
Control	Positive slope,							
		Phase Noi	se Perfor	mance				
Parameter	Frequency Offset (Hz)	10 MHz Typical			100 MHz Typical	Units		
<b>Parameter</b> Phase Noise (static)	Frequency Offset (Hz) 10	<b>10 MHz</b> Typical -90			<b>100 MHz</b> Typical -70	Units dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal	Frequency Offset      (Hz)      10      100	<b>10 MHz</b> <b>Typical</b> -90 -125			<b>100 MHz</b> <b>Typical</b> -70 -100	Units dBc/Hz dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal Frequency	Frequency Offset      (Hz)      10      100      1k	<b>10 MHz</b> <b>Typical</b> -90 -125 -145			<b>100 MHz</b> <b>Typical</b> -70 -100 -125	Units dBc/Hz dBc/Hz dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal Frequency	Frequency Offset      (Hz)      10      100      1k      10 k	<b>10 MHz</b> <b>Typical</b> -90 -125 -145 -155			<b>100 MHz</b> <b>Typical</b> -70 -100 -125 -145	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal Frequency	Frequency Offset      (Hz)      10      100      1k      10 k      100 k	<b>10 MHz</b> <b>Typical</b> -90 -125 -145 -155 -160			<b>100 MHz</b> <b>Typical</b> -70 -100 -125 -145 -160	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal Frequency	Frequency Offset      (Hz)      10      100      1k      10 k      100 k	10 MHz Typical -90 -125 -145 -155 -160	C Supply		100 MHz Typical -70 -100 -125 -145 -160	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz		
Parameter Phase Noise (static) @ 100 MHz nominal Frequency Parameter	Frequency Offset      (Hz)      10      100      1k      10 k      100 k      Conditions	10 MHz Typical -90 -125 -145 -155 -160 DC Min	C Supply Typi	cal	100 MHz Typical -70 -100 -125 -145 -160 Max	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units	Ordering Code	
Parameter Phase Noise (static) @ 100 MHz nominal Frequency Parameter Supply Voltage (V <sub>DD</sub> )	Frequency Offset      (Hz)      10      100      1k      10 k      100 k      Conditions	10 MHz Typical -90 -125 -145 -155 -160 D0 Min 3.0	C Supply Typi 3.	cal	100 MHz Typical -70 -100 -125 -145 -160 Max 3.6	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC	Ordering Code 3.3	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)	Frequency Offset      10      100      1k      10 k      100 k	10 MHz Typical -90 -125 -145 -155 -160 <b>DO</b> Min 3.0 4.75	C Supply Typi 3. 5.	<b>cal</b> 3	100 MHz Typical -70 -100 -125 -145 -160 Max 3.6 5.25	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC	Ordering Code 3.3 5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current	Frequency Offset      (Hz)      10      100      1k      10 k      100 k      Conditions	10 MHz Typical -90 -125 -145 -155 -160 DC Min 3.0 4.75	C Supply Typi 3. 5.	<b>cal</b> 3 0	100 MHz Typical -70 -100 -125 -145 -145 -160 Max 3.6 5.25 30	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC mA	Ordering Code 3.3 5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current	Frequency Offset      (Hz)      10      100      1k      10 k      100 k      Conditions	10 MHz Typical -90 -125 -145 -155 -160 DC Min 3.0 4.75 RF Output: C	C Supply Typi 3. 5.	cal 3 0 are way	100 MHz Typical -70 -100 -125 -145 -145 -160 Max 3.6 5.25 30	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC wA	Ordering Code      3.3      5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current    Parameter	Conditions	10 MHz Typical -90 -125 -145 -155 -160 <b>DO</b> Min 3.0 4.75 <b>RF Output: C</b> Min	C Supply Typi 3. 5. MOS Squ Typi	ical 3 0 are way ical	100 MHz Typical -70 -100 -125 -145 -160 Max 3.6 5.25 30 ve Max	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC MA Units	Ordering Code 3.3 5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current    Parameter    Load	Conditions	10 MHz Typical -90 -125 -145 -155 -160 <b>DO</b> Min 3.0 4.75 <b>RF Output: C</b> Min 13.5	C Supply Typi 3 5. MOS Squ Typi 15	cal 3 0 are way cal	100 MHz Typical -70 -100 -125 -145 -160 Max 3.6 5.25 30 re Max 16.5	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC WDC mA Units pF	Ordering Code      3.3      5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current    Parameter    Load    Level	Conditions      15 pF load	10 MHz Typical -90 -125 -145 -155 -160 <b>DC</b> Min 3.0 4.75 <b>RF Output: C</b> Min 13.5 V <sub>DD</sub> -0.3 "1" level	C Supply Typi 3. 5. MOS Squ Typi 1:	cal 3 0 are way cal	100 MHz Typical -70 -100 -125 -145 -145 -160 Max 3.6 5.25 30 ve Max 16.5 0.3 "0" level	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC mA Units pF V	Ordering Code  3.3    5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current    Parameter    Load    Level    Rise/Fall Time	Frequency Offset (Hz)      10      100      1k      10 k      100 k      Conditions      Conditions      15 pF load      15 pF load	10 MHz Typical -90 -125 -145 -145 -155 -160 00 Min 3.0 4.75 RF Output: C Min 13.5 V <sub>DD</sub> -0.3 "1" level	C Supply Typi 3. 5. MOS Squ Typi 1	cal 3 0 are way cal	100 MHz Typical -70 -100 -125 -145 -145 -160 Max 3.6 5.25 30 ve Max 16.5 0.3 "0" level 10	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC VDC mA Units pF V N N	Ordering Code  3.3    5.0	
Parameter    Phase Noise (static)    @ 100 MHz nominal    Frequency    Parameter    Supply Voltage (VDD)    Supply Current    Parameter    Load    Level    Rise/Fall Time    Symmetry	Frequency Offset    10    100    1k    10 k    100 k	10 MHz Typical -90 -125 -145 -145 -155 -160 00 Min 3.0 4.75 RF Output: C Min 13.5 V <sub>DD</sub> -0.3 "1" level 40	C Supply Typi 3. 5. MOS Squ Typi 1:	cal 3 0 are way cal 5	100 MHz Typical -70 -100 -125 -145 -160 Max 3.6 5.25 30 ve Max 16.5 0.3 "0" level 10 60	Units dBc/Hz dBc/Hz dBc/Hz dBc/Hz Units VDC VDC VDC mA Units pF V V N N N N N N N N N N N N N	Ordering Code    3.3    5.0	

(1) Acceleration Sensitivity is worst axis tested at 90 Hz, 10 g



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### T120 SERIES 10 MHz to 100 MHz



## **Environmental and Mechanical Specifications**

Screenings						
Screening	Standard	Method, Condition	Description			
Vibration	MIL-STD-202	201A	0.6 PSD, 34.02 g RMS, 3min/axis			
Shock	MIL-STD-202	213, Cond K	90 g peak, half sine, 5 ms			

### **Recommendation and General Information**

Conditions				
Parameter	Notes			
Operating Temperature	-40°C to +85°C			
Storage Temperature	-55°C to +90°C			
Terminal Finish	Gold plating (RoHS) is standard (E). 63/37 SnPb (non-RoHS) also available			
Package Weight	< 3 grams			
Soldering Instruction	Hand and reflow soldering			
Shipping	Type of package (tray pack)			
Marking	Line 1: Greenray logo			
	Line 2: Model			
	Line 3: Frequency			
	Line 4: Serial Number			
	Line 5: Data Code (YYWW)			

# Ordering (Example)

T120	-	T16	-	3.3	-	70.0MHz	-	E
Model		Stability		Supply Voltage		Frequency in MHz		Termination finish
		<u>Refer to Electrical Specs</u> <u>Table*</u> T57 (-40 to +85°C) T16 (-40 to +85°C)		3.3: 3.3 VDC 5.0: 5.0 VDC		From 10 to 100 MHz		Code: Pads finish E: Gold plated (RoHS), Standard PB: SnPb 63/37 (non-RoHS)

\*other frequency stabilities available, please contact factory



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# Package dimensions and Pad Connections





#### PART DIMENSIONS

	Т	YP.	MAX.		
DIM	inches	mm	inches	mm	
А	0.900	22.86	0.910	23.11	
В	0.700	17.78	0.710	18.03	
С	NA	NA	0.155	3.94	
D	0.700	17.78	0.710	18.03	
Е	0.050	1.27	0.060	1.52	
F	0.350	8.89	0.360	9.14	
G	0.093	2.36	0.103	2.62	
Н	0.100	2.54	0.110	2.79	
Ι	0.100	2.54	0.110	2.79	
J	R0.045	R1.14	NA	NA	

RECOMMENDED LAND PATTERN



#### LAND PATTERN DIMENSIONS

	TY	MAX.		
DIM	inches	mm	inches	mm
K	0.150	3.81	NA	NA
L	0.700	17.78	NA	NA
М	0.050	1.27	NA	NA
Ν	0.190	4.83	NA	NA
0	0.150	3.81	NA	NA



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