



"X79T" Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

Features

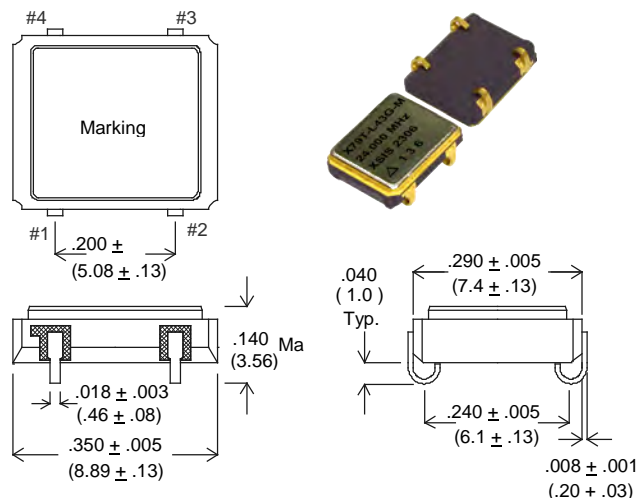
- 50K Rads(Si) Min. Total Dose Ionization
- Latch-up Immune up to 75 MeV cm²/mg LET
- 4 Point Crystal Mount
- High Shock & Vibration Design
- Tristate Output Option
- Low Profile Surface Mount, 0.140" Max. Height
- 100% Screening Options per MIL-PRF-55310, Level B plus PIND
- Low Phase Noise
- Hermetically Sealed, Ceramic Package
- Made in USA, ECCN: EAR99

Applications

- New Space, LEO
- Micro & Nano Satellites
- Commercial Satellites

Package Specifications & Outline:

- Package: Ceramic 90% AL₂O₃
 - Seal: Hermetic – Resistance Welded
 - Weight: 0.5 Gms Typical, 0.6 Gms Max.
 - Thermal Resistance, Junction to Case (θ_{JC}): 30 °C / Watt
 - Solder Reflow, Temp./Time: 260 °C Max for 10 Seconds Max.
 - Lead Material & Finish: Kovar, 50 to 80 μ inches gold over 100 to 250 μ inches Nickel,
- Hot Solder Tinning per MIL-PRF-55310 is optional at additional cost.



Dimensions: Inches (mm)

LEAD#	FUNCTION
1	Tristate or NC
2	GND/CASE
3	OUTPUT
4	VDD

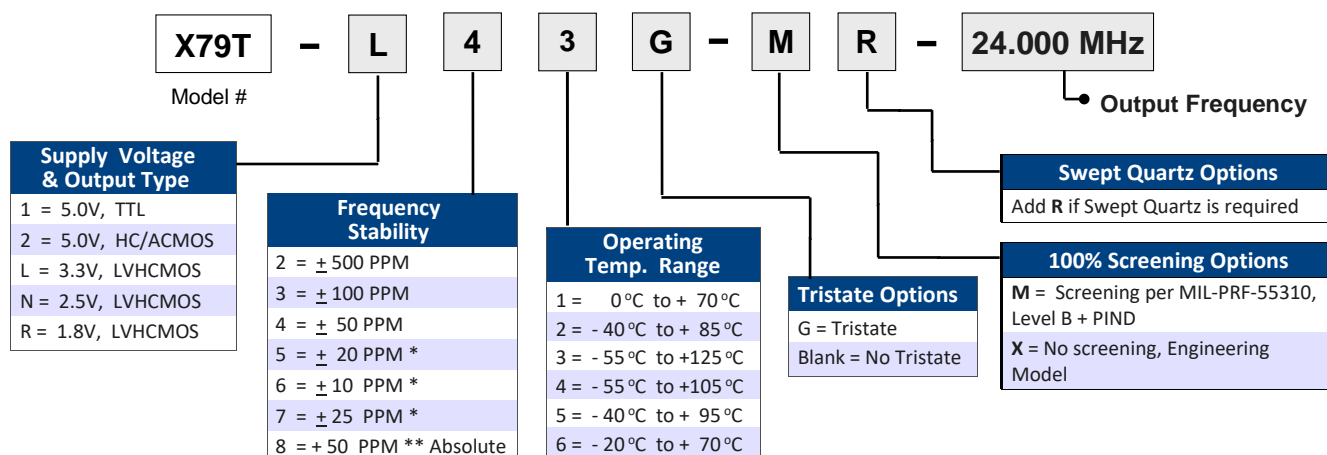
Tristate Input: A "Low" level at the input disables the Output into a high impedance state.

Tristate Input has internal pull-up. It can be left floating or connected to Vdd.

Contact Xsis Electronics at xisis@xisis.com for any special requirements.

ORDERING INFORMATION (Please build your part number from options below) :

P/N EXAMPLE: X79T - L43G - M - 24.000 MHz = 3.3V LVHCMOS, ± 50 PPM over -55 °C to +125 °C, Tristate Output, 100% Screening and 24.000 MHz



* Frequency Stability Options 5, 6 & 7 are not available for all operating temperature ranges.

** Option 8 provides ± 50 PPM Absolute accuracy with reference to the Nominal Frequency includes initial accuracy at 25 °C and ± 10% Supply Voltage and ± 10% load variation.



“X79T” Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

Electrical Specifications, 5V TTL & 5V HC/ACMOS Oscillators

Parameter	5 V TTL	5 V HC/ACMOS
Output Frequency Range	450 KHz - 100 MHz	450 KHz - 100 MHz
Frequency Accuracy at +25 °C	± 15 PPM	± 15 PPM
Frequency Stability Vs Temperature	See Ordering Information on Page 1	
Operating Temperature Range	See Ordering Information on Page 1	
Supply Voltage (Vdd)	+ 5 VDC ± 10%	+ 5 VDC ± 10%
Input Current (no Load)	450 KHz - < 5 MHz 10 mA Max. 5 MHz - < 20 MHz 20 mA Max. 20 MHz - < 40 MHz 30 mA Max. 40 MHz - < 60 MHz 40 mA Max. 60 MHz - 100 MHz 60 mA Max.	450 KHz - < 5 MHz 10 mA Max. 5 MHz - < 20 MHz 20 mA Max. 20 MHz - < 40 MHz 30 mA Max. 40 MHz - < 60 MHz 40 mA Max. 60 MHz - 100 MHz 60 mA Max.
Output Waveform	Square Wave	Square Wave
Output Duty Cycle	60/40% Max. (at 1.4V Output Level)	< 40 MHz 55/45% Max. ≥ 40 MHz 60/40% Max. (at 50% Output Level)
Output High Level	2.5 V Min.	0.9 Vdd Min.
Output Low Level	0.5 V Max.	0.1 Vdd Max.
Output Load	TTL, 10 Loads Max. 50 pF Max. for <50 MHz	10K // 15 pF 50 pF Max. for <50 MHz
Rise & Fall Times (Typical Load)	< 30 MHz 6 nS Max. ≥ 30 MHz 3 nS Max. (0.8 to 2.0V Output Levels)	< 30 MHz 6 nS Max. ≥ 30 MHz 3 nS Max. (10% to 90% Output Levels)
Tristate	Tristate Input ≥ 2.2V or Open : Normal Output Tristate Input ≤ 0.8V: High Impedance	
Start-Up Time	5 mS Max.	5 mS Max.
Phase Jitter (10 KHz - 20 MHz Integ.)	0.15 pS rms Typical	0.15 pS rms Typical
Freq. Stability Vs Supply Voltage	± 4 PPM Max. for ± 10% change in Supply Voltage	
Aging at 70 °C	± 3 PPM Max. first year, ± 2 PPM Max. per year thereafter	
Absolute Maximum Applied Voltage	+ 7VDC	+ 7VDC
Storage Temperature	-65 °C to +125 °C	-65 °C to +125 °C

For special requirements, such as, tighter output symmetry, faster start-up time, PIND screening, etc., please contact Xsis Electronics at xisis@xisis.com or call us at 913-631-0448.



“X79T” Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

Electrical Specifications, 3.3V, 2.5V & 1.8V LVHCMOS Oscillators

Parameter	3.3V	2.5V	1.8V
Output Frequency Range	250 KHz to 160 MHz	250 KHz to 135 MHz	250 KHz to 100 MHz
Frequency Accuracy at +25 °C	± 15 PPM		
Frequency Stability Vs Temperature	See Ordering Information on Page 1		
Operating Temperature Range	See Ordering Information on Page 1		
Supply Voltage (Vdd)	3.3V ± 10%	2.5V ± 10%	1.8V ± 10%
Input Current (no Load)	250 KHz - 8 MHz 3 mA Max. 8.1 MHz - 16 MHz 6 mA Max. 16.1 MHz - 32 MHz 10 mA Max. 32.1 MHz - 60 MHz 20 mA Max. 60.1 MHz - 100 MHz 30 mA Max. 100.1 MHz - 130 MHz 40 mA Max. 130.1 MHz - 160 MHz 50 mA Max	250 KHz - 8 MHz 3 mA Max. 8.1 MHz - 16 MHz 4 mA Max. 16.1 MHz - 32 MHz 8 mA Max. 32.1 MHz - 60 MHz 15 mA Max. 60.1 MHz - 100 MHz 20 mA Max. 100.1 MHz - 135 MHz 30 mA Max	250 KHz - 8 MHz 3 mA Max. 8.1 MHz - 16 MHz 4 mA Max. 16.1 MHz - 32 MHz 6 mA Max. 32.1 MHz - 60 MHz 10 mA Max. 60.1 MHz - 85 MHz 20 mA Max. 85.1 MHz - 100 MHz 25 mA Max.
Output Waveform	Square Wave, LVHCMOS Compatible		
Output Duty Cycle (at 50% Output Level)	< 40 MHz 55/45% ≥ 40 MHz 60/40%	< 40 MHz 55/45% ≥ 40 MHz 60/40%	< 40 MHz 55/45% ≥ 40 MHz 60/40%
Output High Level	0.9 Vdd Min.		
Output Low Level	0.1 Vdd Max.		
Output Load	10K // 15 pF		
Rise & Fall Times (Typical Load)	< 40 MHz 6 nS Max. ≥ 40 MHz 3 nS Max. (10% to 90% Output Levels)		
Tristate	Tristate Input ≥ 0.7 Vdd or Open : Normal Output Tristate Input ≤ 0.3 Vdd: High Impedance		
Start-Up Time	5 mS Max.		
Phase Jitter (10 KHz - 20 MHz Integ.)	0.15 pS rms Typical		
Freq. Stability Vs Supply Voltage	± 4 PPM Max. for ± 10% change in Supply Voltage		
Aging at 70 °C	± 3 PPM Max. first year, ± 2 PPM Max. per year thereafter		
Absolute Maximum Applied Voltage	+5.0 VDC		
Storage Temperature	-65 °C to +125 °C		

For special requirements, such as, tighter output symmetry, faster start-up time, PIND screening, etc., please contact Xsis Electronics at xisis@xisis.com or call us at 913-631-0448.



“X79T” Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

Table III - 100% Screening per MIL-PRF-55310 Including PIND

Test - Inspection	Test Method – Condition
Internal Visual	MIL-STD-883, Method 2017, Level B
Stabilization Bake (Prior to Seal) <u>1/</u>	MIL-STD-883, Method 1008, Condition C, (+150 °C), 24 hours minimum
Temperature Cycling	MIL-STD-883, Method 1010, Condition B
Constant Acceleration	MIL-STD-883, Method 2001, Condition A, Y ₁ axis only (5000 G)
Seal (Fine and Gross Leak)	MIL-PRF-55310, Para. 4.8.2.2.2 (1(10) ⁻⁸ atm-cc/s Max.)
Particle Impact Noise Detection (PIND)	MIL-STD-883, Method 2020, Condition A
Pre Burn-in Electrical Tests: Record as applicable	Refer to Table III-a below
Burn-in	+125 °C, Nominal Supply Voltage and Burn-in load, 160 Hours Minimum
Post Burn-in Electrical Tests: Record as applicable	Refer to Table III-a below
External Visual	MIL-STD-883, Method 2009

1/ Vacuum bake and maintain oscillators in dry nitrogen per MIL-PRF-55310

Table III-a – Pre & Post Burn-in Electrical Tests

Test Parameter	MIL-PRF-55310 Method	Pre BI 24 ± 1 °C	Post BI 24 ± 1 °C	Post BI Low Temp	Post BI High Temp
Input Current	4.8.5	✓	✓	✓	✓
Output Frequency	4.8.6	✓	✓	✓	✓
Frequency Vs. Temperature Stability	4.8.10.1		✓	✓	✓
Frequency Vs. Supply Voltage	4.8.14		✓	✓	✓
Output Voltage Levels	4.8.21.3	✓	✓	✓	✓
Output Rise & Fall Times	4.8.22	✓	✓	✓	✓
Output Duty Cycle	4.8.23	✓	✓	✓	✓
Start-up time	4.8.29		✓	✓	✓
Tristate, if applicable	4.8.28		✓	✓	✓

Quality Conformance Inspection: Group A per MIL-PRF-55310, Level B

Following QCI Options are available at additional cost:

Non-destruct Bond Pull per MIL-STD-883, Method 2023

Radiographic Inspection per MIL-STD-883, Method 2012, Class S

DPA (Destructive Physical Analysis)

Life Test per MIL-STD-883, Method 105, 1000 Hrs. at +125 °C



“X79T” Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

Packaging:

Standard packaging is in ESD protective enclosed tray. Tape & Reel (See Page 5) is available at additional cost.

Thermal Characteristics:

Junction to case Thermal Constant (θ_{JC}): 30 °C / Watt

Junction to Ambient (Device floating in free air) Thermal Constant (θ_{JA}): 128 °C / Watt

Typical Phase Noise (dbc/Hz):

	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz
10 MHz	-109	-140	-157	-162	-163	-164
25 MHz	-100	-127	-151	-158	-160	-162
50 MHz	-89	-117	-148	-157	-159	-160
96 MHz	-80	-107	-139	-151	-156	-158
110 MHz	-75	-102	-130	-142	-149	-153

Environmental Specifications:

XE40 series oscillators are designed to meet or exceed the Environmental tests specified below. Customized screening and environmental testing are also available to meet your special requirements.

Test	Test Conditions
Vibration	0.06" DA, 30 G peak, 10 - 2000 Hz, MIL-STD-202, Method 204, Cond. G
Shock	5000 G, 0.5 mS, half-Sine, MIL-STD-883, Method 2002, Cond. B modified
Temperature Cycling	MIL-STD-883, Method 1010, Cond. C
Thermal Shock	MIL-STD-202, Method 107, Cond. B
Seal (Fine and Gross)	MIL-STD-883, Method 1014 Cond. A & C
Burn-in	160 Hours, 125 °C, Nominal Supply Voltage & Load
Frequency Aging	± 1.5 PPM Max. first 30 days, ± 3 PPM Max. first year, ± 2 PPM Max. per year thereafter
Altitude	MIL-STD-202, Method 105, Cond. C
Constant Acceleration	MIL-STD-883, Method 2001, 5000 G
Moisture Resistance	MIL-STD-202, Method 106, Vibration Sub Cycle Omitted
Solderability	MIL-STD-202, Method 208
Resistance to Soldering Heat	MIL-STD-202, Method 210, Cond B. or C as applicable
Resistance to Solvents	MIL-STD-202, Method 215
Internal Water Vapor Content	MIL-STD-883, Method 1018
ESD Classification	MIL-STD-883, Method 3015, Class 1C, HBM 1000 to 1999
Moisture Sensitivity Level	J-STD-020, MSL=1



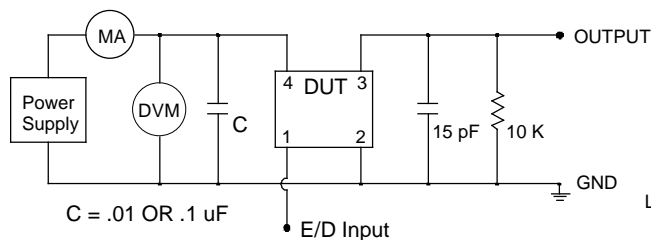
"X79T" Series – (New Space Applications)

7 x 9mm, Hi-Rel Hybrid Microcircuit Crystal Oscillators

5.0V TTL, 5.0V HC/ACMOS, 3.3V, 2.5V & 1.8V LVHCMOS

500KHz to 160 MHz

HCMOS Test Circuit

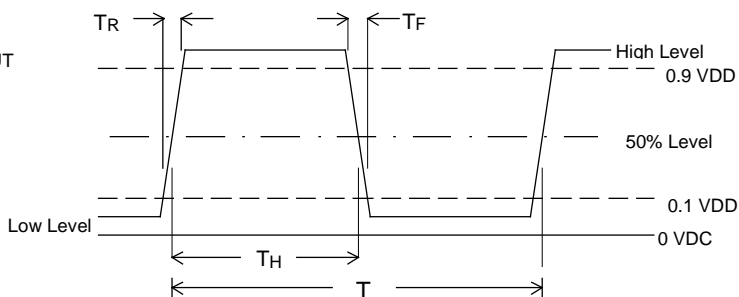


C = .01 OR .1 uF

E/D Input

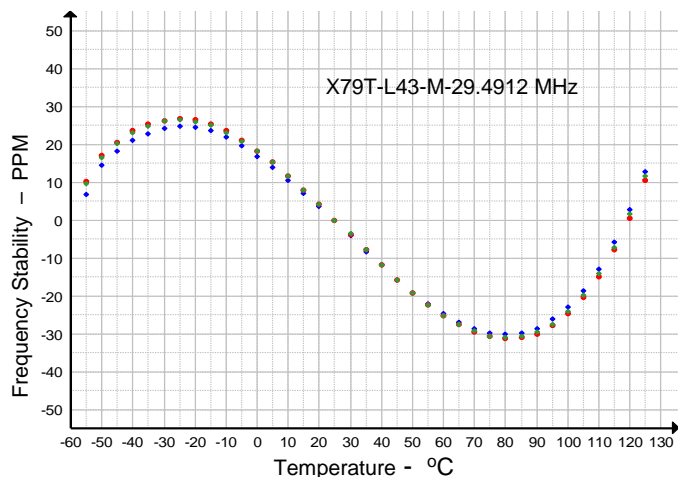
Tristate Input has an internal pull-up resistor. It can be left floating or connected to Vdd.

HCMOS Output Waveform

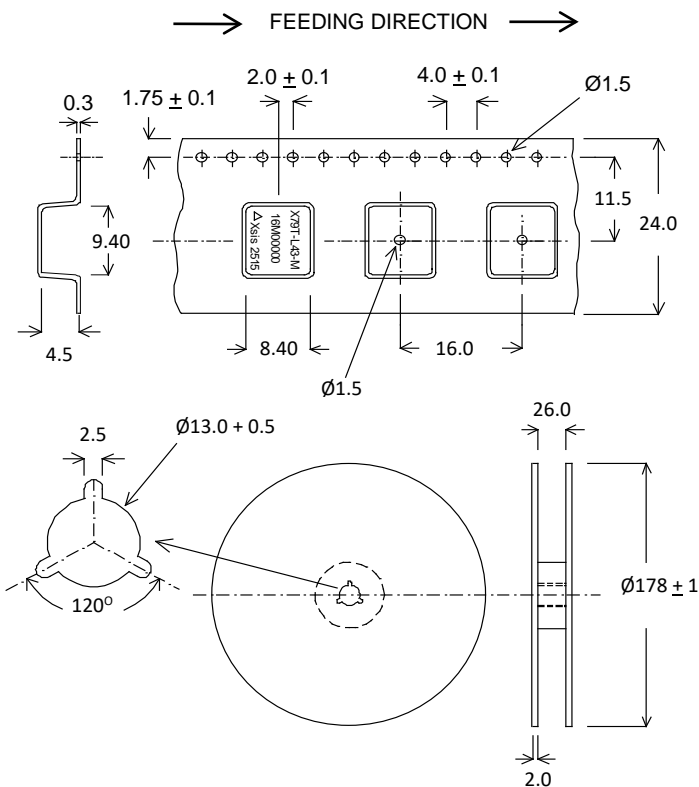


$$\text{Symmetry} = \frac{T_H}{T} \times 100\%$$

Typical Freq. Stability Vs. Temperature

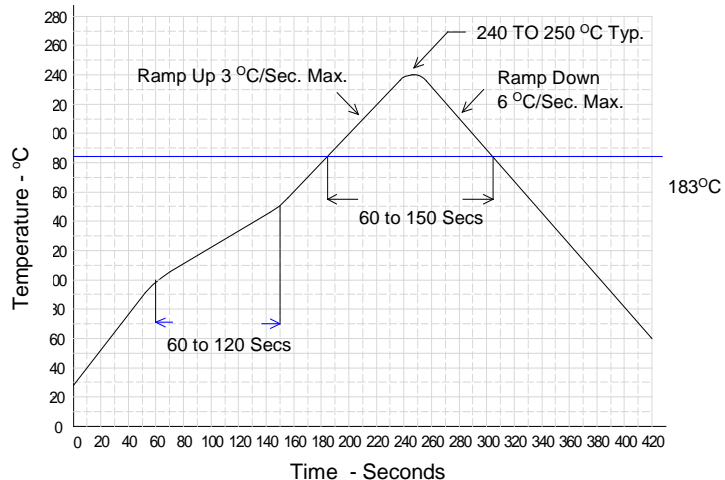


Tape & Reel Data for XE40 parts



Dimensions are in mm.

Typical Solder Reflow Profile



Tape is EIA-481-A Compliant.