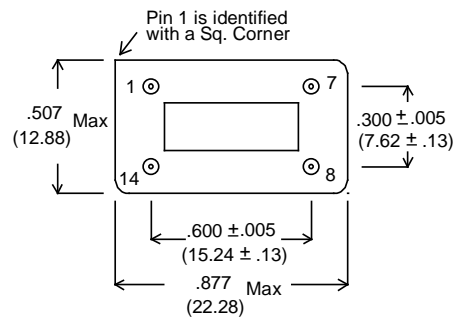
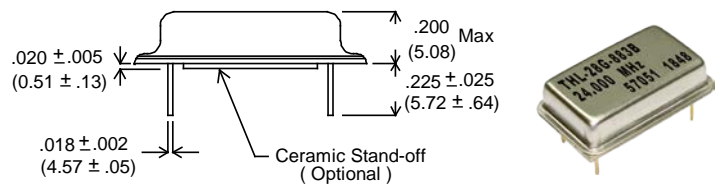


## Description

Xsis Electronics “TH” Series High Temperature crystal oscillators are designed and processed to operate over an extended temperature range of -55 °C to 230 °C. These oscillators are offered in a 4 Pin DIP, hermetically sealed resistance welded metal package.

High temperature materials and proven processes are utilized to provide high reliability and long life at extreme temperatures.

In addition, the quartz crystal is mounted at four points to provide excellent shock and vibration resistance.



| LEAD# | FUNCTION       |
|-------|----------------|
| 1     | E/D (Optional) |
| 2     | GND/CASE       |
| 3     | OUTPUT         |
| 4     | VDD            |

## Features

- Crystal Mounted at 4 Points
- > 10KG ( 0.3 mS) Shock Resistance
- 1.8V, 2.5V, 3.3V & 5.0V operation options
- 100% testing over operating temperature range
- Tristate Output Option
- Low Phase Noise
- Hermetically Sealed, Ceramic Package
- Made in USA, ECCN: EAR99

## Applications

- Downhole Drilling Operations
- High Shock & Vibration
- High Temperature Avionics
- Gun Launched Munitions
- Jet Engine Sensors

## Package Specifications & Outline:

- Header & Leads Material: Kovar
- Cover Material: Nickel
- Seal: Hermetic – Resistance Welded
- Weight: 4.0 Gms typical, 5.0 Gms Max.
- Thermal Resistance, Junction to Case (  $\theta_{JC}$  ): 22 °C / Watt
- Lead Soldering, Temp./Time: 260 °C, 10 Secs. Max.
- Header Finish: 100 to 250  $\mu$  inches nickel
- Lead Finish: 50 to 80  $\mu$  inches gold over 100 to 250  $\mu$  inches nickel

Contact Xsis Electronics at [xisis@xisis.com](mailto:xisis@xisis.com) for any special requirements.

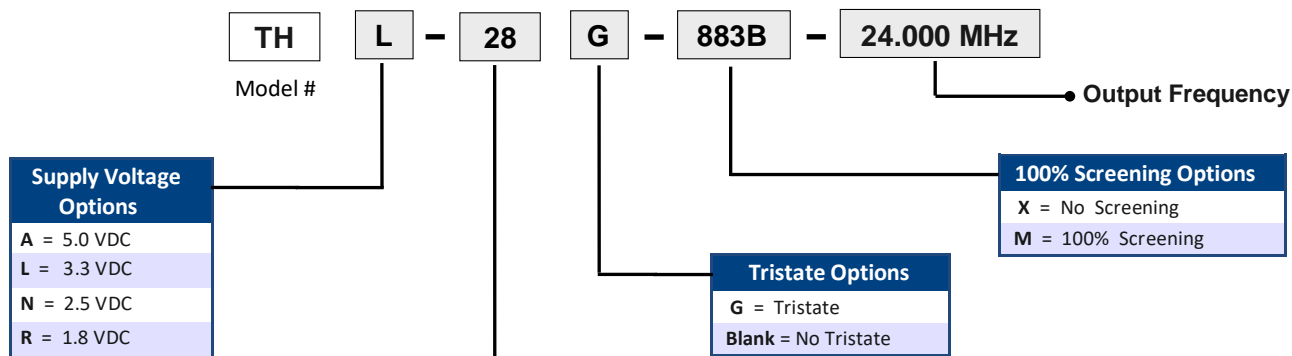
Dimensions: Inches (mm)

**E/D ( Enable/Disable ) Input:** A “Low” level at the input disables the Output into a high impedance state.

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

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

**P/N EXAMPLE: THL-28G-883B-24.000 MHz = 3.3 V LVHCMOS, ± 150 PPM Frequency Accuracy over -55 °C to +180 °C, Tristate Output, 100% Screening, 24.000 MHz**



| Frequency Accuracy Vs, Operating Temperature Range Options |                                    |     |
|--|------------------------------------|-----|
| 21   | = ± 40 PPM over -20 °C to +150 °C  | *** |
| 22   | = ± 100 PPM over -20 °C to +150 °C | *   |
| 23   | = ± 150 PPM over -20 °C to +150 °C | *   |
| 24   | = ± 40 PPM over -20 °C to +180 °C  | *** |
| 25   | = ± 100 PPM over -20 °C to +180 °C | *** |
| 26   | = ± 150 PPM over -20 °C to +180 °C | *   |
| 27   | = ± 100 PPM over -55 °C to +180 °C | *** |
| 28   | = ± 150 PPM over -55 °C to +180 °C | *   |
| 29   | = ± 250 PPM over -55 °C to +180 °C | *   |
| 30   | = ± 100 PPM over -20 °C to +200 °C | *** |
| 31   | = ± 150 PPM over -20 °C to +200 °C | **  |
| 32   | = ± 200 PPM over -20 °C to +200 °C | *   |
| 33   | = ± 250 PPM over -20 °C to +200 °C | *   |
| 34   | = ± 100 PPM over -55 °C to +200 °C | *** |
| 35   | = ± 150 PPM over -55 °C to +200 °C | *** |
| 36   | = ± 200 PPM over -55 °C to +200 °C | *   |
| 37   | = ± 250 PPM over -55 °C to +200 °C | *   |
| 38   | = ± 200 PPM over -55 °C to +220 °C | *** |
| 39   | = ± 300 PPM over -55 °C to +220 °C | *   |
| 40   | = ± 250 PPM over -20 °C to +230 °C | *** |
| 41   | = ± 350 PPM over -20 °C to +230 °C | *   |
| 42   | = ± 250 PPM over -55 °C to +230 °C | *** |
| 43   | = ± 350 PPM over -55 °C to +230 °C | *   |

\*\*\* Tight Stability      \* Standard Stability

**Contact Xsis Electronics at [xis@xis.com](mailto:xis@xis.com) (913-631-0448) for any special requirements.**



**Electrical Specifications, 5V & 3.3V HC/ACMOS Oscillators**

| Parameter                                 | 5 V HC/ACMOS   | 3.3 V HC/ACMOS  |
|---|--|---|
| Output Frequency Range                    | 500 KHz - 40 MHz   | 500 KHz - 40 MHz  |
| Frequency Stability Vs Temperature        | See Ordering Information on Page 1   |   |
| Operating Temperature Range               | See Ordering Information on Page 1   |   |
| Supply Voltage (Vdd)                      | + 5 VDC $\pm$ 10%  | + 3.3 VDC $\pm$ 10%   |
| Input Current (no Load )                  | 9 mA typical at 20 MHz<br>( For Lower current option, Contact factory )                | 5 mA typical at 20 MHz<br>( For Lower current option, Contact factory ) |
| Output Waveform                           | Square Wave  | Square Wave   |
| Output Duty Cycle ( at 50% Output Level ) | 40/60% Max.<br>( For tighter symmetry, Contact factory )                               | 40/60% Max.<br>( For tighter symmetry, Contact factory )                |
| Output High Level                         | 0.9 Vdd Min.   | 0.9 Vdd Min.  |
| Output Low Level                          | 0.1 Vdd Max.   | 0.1 Vdd Max.  |
| Output Load                               | 10K // 15 pF<br>50 pF Max.   | 10K // 15 pF<br>50 pF Max.  |
| Rise & Fall Times ( Typical Load )        | 3 nS Max.<br>( 10% to 90% Output Levels)   | 4 nS Max.<br>( 10% to 90% Output Levels)                                |
| Enable/Disable ( E/D)                     | E/D Input $\geq$ 2.2V or Open : Normal Output<br>E/D Input $\leq$ 0.8V: High Impedance |   |
| Start-Up Time                             | 10 mS Max.   | 10 mS Max.  |
| Phase Jitter ( 10 KHz - 20 MHz Integ.)    | 0.5 pS rms Typical   | 0.5 pS rms Typical  |
| Aging at 70 °C                            | $\pm$ 3 PPM Max. first year, $\pm$ 2 PPM Max. per year thereafter                      |   |
| Absolute Maximum Applied Voltage          | + 7VDC   | + 5VDC  |
| Storage Temperature                       | -65 °C to +125 °C  | -65 °C to +125 °C   |

**NOTE: Overall Frequency Accuracy Includes, Initial Accuracy at 25 °C, Frequency changes over Operating Temperature, Aging over 5 years, Frequency changes due to Supply Voltage & Load Variations.**

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



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

| Parameter                                 | 2.5 V HC/ACMOS  | 1.8 V HC/ACMOS   |
|---|---|--|
| Output Frequency Range                    | 500 KHz - 40 MHz  | 500 KHz - 40 MHz   |
| Frequency Stability Vs Temperature        | See Ordering Information on Page 1  |  |
| Operating Temperature Range               | See Ordering Information on Page 1  |  |
| Supply Voltage (Vdd)                      | + 2.5 VDC $\pm$ 10%   | + 1.8 VDC $\pm$ 5%   |
| Input Current (no Load )                  | 3.5 mA Typ. at 20 MHz<br>( For Lower current option, Contact factory )                      | 3 mA Typ. at 20 MHz<br>( For Lower current option, Contact factory )         |
| Output Waveform                           | Square Wave   | Square Wave  |
| Output Duty Cycle ( at 50% Output Level ) | 40/60% Max.<br>( For tighter symmetry, Contact factory )                                    | 40/60% Max.<br>( For tighter symmetry, Contact factory )                     |
| Output High Level                         | 0.9 Vdd Min.  | 0.9 Vdd Min.   |
| Output Low Level                          | 0.1 Vdd Max.  | 0.1 Vdd Max.   |
| Output Load                               | 10K // 15 pF<br>30 pF Max.  | 10K // 15 pF<br>30 pF Max.   |
| Rise & Fall Times ( Typical Load )        | < 30 MHz 6 nS Max.<br>$\geq$ 30 MHz 3 nS Max.<br>( 10% to 90% Output Levels)                | < 30 MHz 6 nS Max.<br>$\geq$ 30 MHz 3 nS Max.<br>( 10% to 90% Output Levels) |
| Enable/Disable ( E/D)                     | E/D Input $\geq$ 0.7 Vdd or Open : Normal Output<br>E/D Input $\leq$ 0.3Vdd: High Impedance |  |
| Start-Up Time                             | 10 mS Max.  | 10 mS Max.   |
| Phase Jitter ( 10 KHz - 20 MHz Integ.)    | 0.5 pS rms Typical  | 0.5 pS rms Typical   |
| Aging at 70 °C                            | $\pm$ 3 PPM Max. first year, $\pm$ 2 PPM Max. per year thereafter                           |  |
| Absolute Maximum Applied Voltage          | + 5VDC  | + 5VDC   |
| Storage Temperature                       | -65 °C to +125 °C   | -65 °C to +125 °C  |

**NOTE: Overall Frequency Accuracy Includes, Initial Accuracy at 25 °C, Frequency changes over Operating Temperature, Aging over 5 years, Frequency changes due to Supply Voltage & Load Variations.**

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



**Packaging:** ESD Foam Tray

**Thermal Characteristics:**

Junction to case Thermal Constant (  $\theta_{JC}$  ): 22 °C / Watt

**Typical Phase Noise (dbc/Hz):**

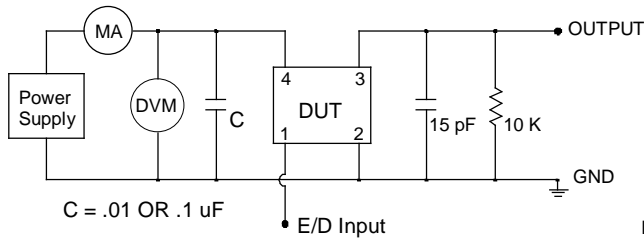
| Output Frequency | 10 Hz | 100 Hz | 1 KHz | 10 KHz | 100 KHz | 1 MHz |
|------------------|-------|--------|-------|--------|---------|-------|
| 10 MHz           | - 90  | -122   | -145  | -158   | -161    | -164  |
| 25 MHz           | -83   | -111   | -135  | -143   | -149    | -157  |
| 40 MHz           | -81   | -108   | -133  | -142   | -146    | -154  |

**Environmental Specifications:**

TH 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.

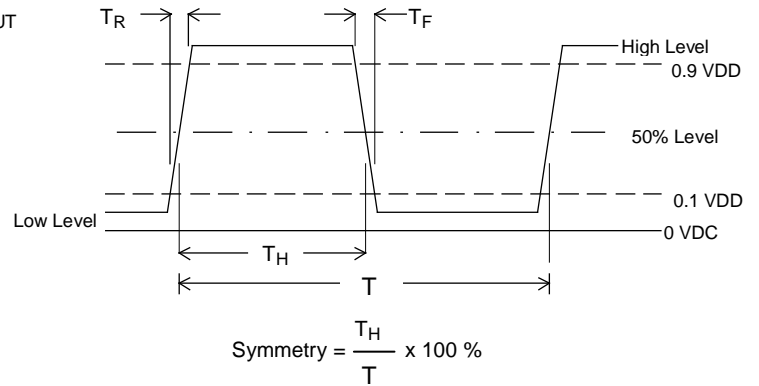
| Test                         | Test Conditions   |
|------------------------------|---|
| Vibration                    | 0.06” DA, 30 G peak, 10 - 2000 Hz, MIL-STD-202, Method 204, Cond. G |
| Shock                        | 5000 G, 0.3 mS, half-Sine, MIL-STD-883, Method 2002, Cond. D        |
| Temperature 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              | 30 days at 70 °C, ± 1.5 PPM Max.                                    |
| 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  |

### HC MOS Test Circuit



**E/D ( Enable/Disable ) Input** has an internal pull-up resistor. It can be left floating or connected to Vdd.

### HC MOS Output Waveform



### Typical Freq. Stability Vs. Temperature

