



# LVDS

## LVDS Output

10 MHz to 160 MHz  
Differential Output Crystal Oscillator

### DESCRIPTION

Statek's surface mount Differential Output Crystal Oscillator is designed for applications requiring low jitter and ultra high frequency differential outputs in a small footprint. Offered at frequencies from 10 MHz to 160 MHz with operation over a temperature range of -55°C to +125°C.

### FEATURES

- High Shock option
- Low phase noise - Low phase jitter
- V<sub>DD</sub> supply 2.5 V and 3.3 V
- Low Allan deviation; no PLL artifacts
- High Frequency Fundamental Mode Crystal
- Ultra-low period jitter

### APPLICATIONS

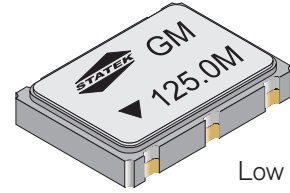
#### Military & Aerospace

- Avionics
- Communications
- Guidance and Navigation

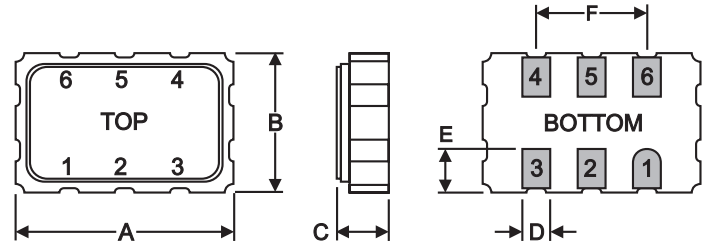
### ENABLE/DISABLE OPTION FUNCTION TABLE

|            | Enable (PIN 1 High*) | Disable (PIN 1 Low) |
|------------|----------------------|---------------------|
| Output     | Frequency Output     | High Z State        |
| Oscillator | Oscillates           | Oscillator stops    |
| Current    | Normal               | Very Low            |

\*When PIN 1 is allowed to float, it is held high by an internal pull-up resistor.



### DIMENSIONS



### PACKAGE DIMENSIONS

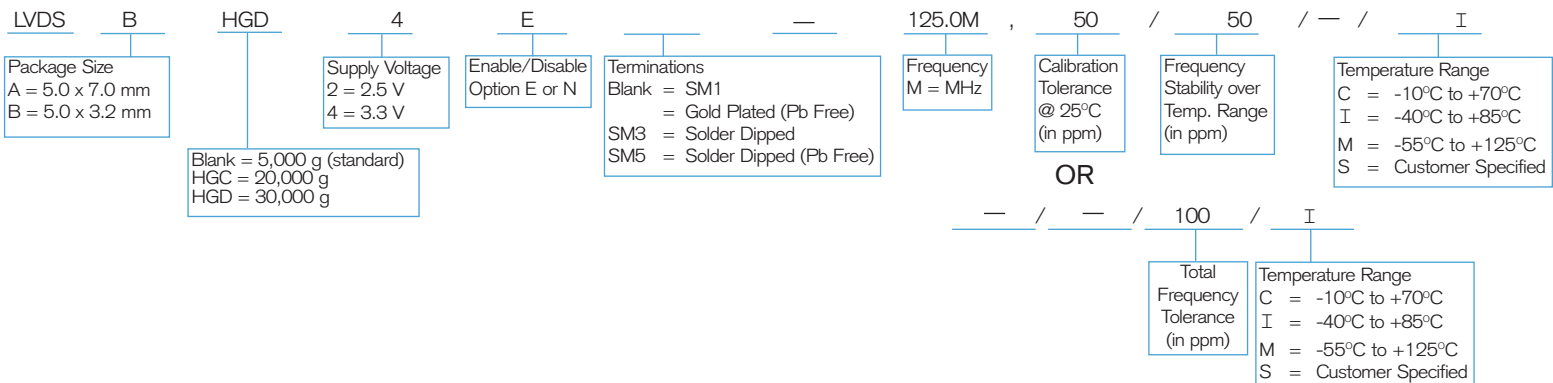
| Dimension   | 5mm x 3.2mm | 5mm x 7mm |
|-------------|-------------|-----------|
| A           | 5.00        | 7.00      |
| B           | 3.20        | 5.00      |
| C (SM1)     | 1.30        | 1.50      |
| C (SM3/SM5) | 1.40        | 1.60      |
| D           | 0.64        | 1.40      |
| E           | 1.20        | 1.10      |
| F           | 2.54        | 5.08      |

All dimensions are Typical (mm)

### PIN CONNECTIONS

1. (E) Enable/Disable or not connected (N)
2. (NC) Not Connected
3. Ground
4. LVDS
5. LVDS (complementary)
6. Supply Voltage (V<sub>DD</sub>)

### HOW TO ORDER LVDS SURFACE MOUNT CRYSTAL OSCILLATORS



10231 Rev A



## ABSOLUTE MAXIMUM RATINGS

|                                     |                      |
|-------------------------------------|----------------------|
| Supply Voltage $V_{DD}$             | -0.3 V to 4.0 V      |
| Storage Temperature                 | -55°C to +150°C      |
| Maximum Process Temperature         | 260°C for 10 seconds |
| ESD Protection Human Body Model 2kV |                      |

## PACKAGING OPTIONS

- LVDS - Tray Pack
- Tape and reel Per EIA 481

## SPECIFICATIONS

|                                |   |
|--------------------------------|---|
| Frequency                      | LVDSA;B :10 MHz to 160 MHz  |
| Operating Temperature          | -40°C to +85°C; -55°C to +125°C                                     |
| Supply Voltage                 | 3.3V ±10% (2.5V ±10% available)                                     |
| Shock, survival <sup>1,2</sup> | 5,000 g, 0.3 ms, ½ sine : LVDSA<br>20,000 g, 0.3 ms, ½ sine : LVDSB |
| Vibration, survival            | 20 g, 10-2,000 Hz swept sine  |

1. Per MIL-STD-202G, Method 204D, Random vibration testing also available.
2. Shock survival 10 MHz - 125 MHz.

## SPECIFICATIONS TABLE

Parameters listed are at 25°C unless otherwise noted.

| Parameter                              | Symbol           | Units  | Tightest | Standard | Maximum   | Conditions / Comments                          |  |
|--|------------------|--------|----------|----------|-----------|--|--|
| Frequency Stability <sup>2</sup>       |                  | ppm    | ±50      | ±75      | ±100      | -55°C to +125°C                                |  |
|  |                  | ppm    | ±30      | ±50      | ±100      | -40°C to +85°C                                 |  |
| Aging                                  |                  | ppm    |          | ±5       |           | First year depending on frequency              |  |
| Calibration Tolerance                  |                  | ppm    | ±25      | ±50      | ±100      | @25°C Other tolerances available               |  |
| Frequency Tolerance (Total)            |                  | ppm    | ±40      | ±50      | ±100      | -40°C to +85°C                                 |  |
| LVDS Output Parameter                  | Symbol           | Units  | Minimum  | Typical  | Maximum   | Conditions / Comments                          |  |
| Output Differential Voltage            | $V_{OD}$         | mV     | 247      | 330      | 454       | RL = 100 Ω (1%)<br>See figure 1                |  |
| Output Differential Voltage Error      | $\Delta V_{OD}$  | mV     |          |          | 50        |  |  |
| Output High Voltage                    | $V_{OH}$         | V      |          | 1.4      | 1.6       |  |  |
| Output Low Voltage                     | $V_{OL}$         | V      | 0.9      | 1.1      |           |  |  |
| Offset Voltage                         | $V_{OS}$         | V      | 1.125    | 1.250    | 1.375     |  |  |
| Offset Voltage Error                   | $\Delta V_{OS}$  | mV     | 0        |          | 50        |  |  |
| Output Leakage                         | $I_{OS}$         | uA     |          |          | 10        | $V_{OUT} = V_{DD}$ or GND (OE=0V)              |  |
| Stand by Current                       | $I_{OSD}$        | uA     |          |          | 15        | 30   | $T_a \leq +85^\circ\text{C}$ $T_a > +85^\circ\text{C}$ |
| Rise Time (Differential Clock)         | $t_R$            | ps     |          | 200      |           | RL = 100 Ω (20% to 80%)<br>See figures 2 and 3 |  |
| Fall Time (Differential Clock)         | $t_F$            | ps     |          | 200      |           |  |  |
| Supply Current (Outputs Loaded)        | $I_{DD}$         | mA     |          | 25*      | 30        | *Typical for 160 MHz, 3.3V                     |  |
| Duty Cycle (Output Clock) <sup>3</sup> |                  | %      | 40       |          | 60        | @ Differential 0V - See Figures 2 and 3        |  |
| Output Swing                           | $V_{DIFF}$       | V      | 0.4      |          |           | Figure 2                                       |  |
| Timing Jitter - 125 MHz                | Symbol           | Units  | Minimum  | Typical  | Maximum   | Conditions / Comments                          |  |
| Jitter (Integrated)                    |                  | pS     |          | 0.074    |           | 125 MHz (12 kHz to 20 MHz RMS)                 |  |
| Jitter (Period)                        |                  | pS     |          | 1.0      |           | 125 MHz (10,000 cycles RMS)                    |  |
| Phase Noise - 125 MHz                  | Offset Frequency |        | @ 1 kHz  | @ 10 kHz | @ 100 kHz | @ 1 MHz    @ 10 MHz                            |  |
| Typical (LVDS)                         | $L(f)$           | dBc/Hz | -127     | -144     | -155      | -158    -161                                   |  |

2. Does not include calibration tolerance.
3. Contact factory for 45-55% duty cycle.

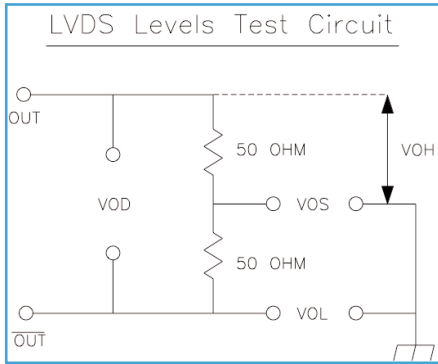


Figure 1

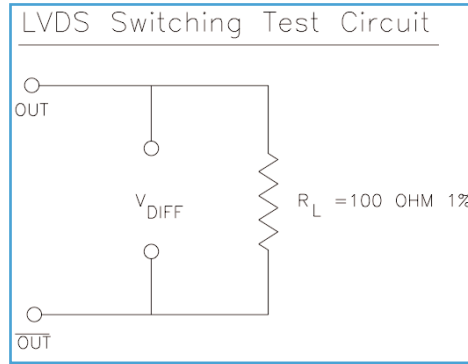


Figure 2

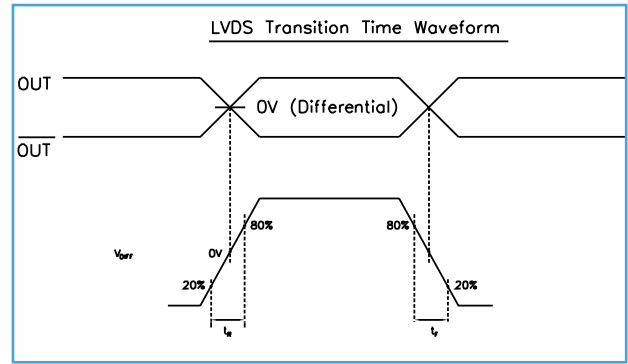


Figure 3

## PHASE NOISE PERFORMANCE AT 125 MHZ

