

**NEL**

# Crystal Clock Oscillators

## Low Power Real-Time

### HS-326/336 Series



#### Description

The HS-326/336 Series of quartz tuning fork clock oscillators offers a 32.768 kHz output frequency that is CMOS compatible. The HS-326 provides a  $\pm 10$  ppm calibration tolerance at 25° C with  $\pm 45$  ppm overall tolerance at 0° to 45° C; the HS-336 offers  $\pm 25$  ppm calibration tolerance with  $\pm 60$  ppm overall tolerance at 0° to 45° C. Supply current is typically 125  $\mu$ A at  $V_{DD} = 5.0$  V, decreasing rapidly to 25  $\mu$ A at  $V_{DD} = 3.0$  V.

All units are resistance welded in an all metal package, offering RFI shielding, and are designed to survive standard wave soldering operations without damage. Insulated standoffs to enhance board cleaning are standard.

#### Suggested Applications

HS-326/336 Series quartz tuning fork clock oscillators are designed to provide low power consumption for battery backup and precise frequency control that is unavailable with conventional 32.768 kHz tuning forks.

#### Features

- ☐ Real time clock output frequency
- ☐ User specified calibration and overall tolerances
- ☐ Low power consumption
- ☐ Case at electrical ground
- ☐ All metal, resistance weld, hermetically sealed package
- ☐ High shock resistance, to 3,000 G

#### Specifications

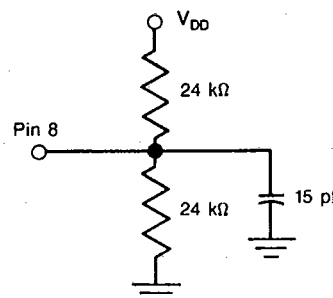
| PARAMETER                                    | CONDITIONS          | MINIMUM          | MAXIMUM          |
|----------------------------------------------|---------------------|------------------|------------------|
| <b>General Characteristics</b>               |                     |                  |                  |
| Supply voltage ( $V_{DD}$ )                  | Supply              | 3.0 V            | 5.7 V            |
|                                              | Breakdown           | —                | 120 V            |
| Supply current ( $I_{DD}$ )                  | $V_{DD}$ @ 3.0 V    | —                | 25 $\mu$ A Typ.  |
|                                              | 4.0 V               | —                | 75 $\mu$ A Typ.  |
|                                              | 4.5 V               | —                | 100 $\mu$ A Typ. |
|                                              | 5.25 V              | —                | 150 $\mu$ A Typ. |
|                                              | 5.7 V               | —                | 200 $\mu$ A Typ. |
| Operating temperature ( $T_A$ )              | —                   | 0° C             | 70° C            |
| Storage temperature ( $T_S$ )                | —                   | -35° C           | +85° C           |
| Lead temperature ( $T_L$ )                   | Soldering, 10 s     | —                | 300° C           |
| <b>Output Characteristics</b>                |                     |                  |                  |
| Frequency Tolerance                          | Calibration 25° C   |                  |                  |
|                                              | HS-326              | —                | $\pm 10$ ppm     |
|                                              | HS-336              | —                | $\pm 25$ ppm     |
|                                              | Overall 0° to 45° C |                  |                  |
|                                              | HS-326              | —                | $\pm 45$ ppm     |
|                                              | HS-336              | —                | $\pm 60$ ppm     |
| Symmetry                                     | 0.5 $V_{DD}$        | 40/60%           | 60/40%           |
| Logic 0 ( $V_{OL}$ )                         | Driving equiv. load | —                | 0.2 V            |
| Logic 1 ( $V_{OH}$ )                         | Driving equiv. load | $V_{DD} - 0.2$ V | —                |
| Logic 0 ( $I_{OL}$ sink)                     | Driving equiv. load | —                | 600 $\mu$ A      |
| Logic 1 ( $I_{OH}$ source)                   | Driving equiv. load | —                | 600 $\mu$ A      |
| Rise & fall time ( $t_r, t_f$ ) <sup>1</sup> | $V_{DD} = 3.0$ V    | —                | 750 ns           |
|                                              | $V_{DD} = 5.0$ V    | —                | 175 ns           |

1. Measured between  $V_{DD} = 10\%$  to 90%,  
 $C_L = 15$  pf.

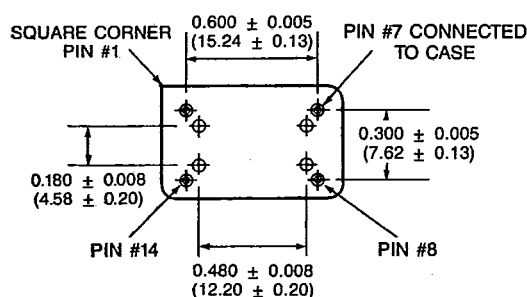
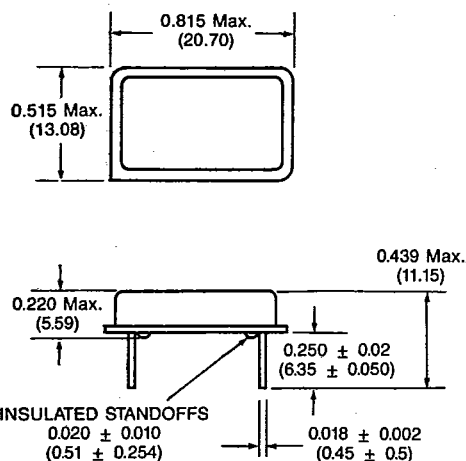
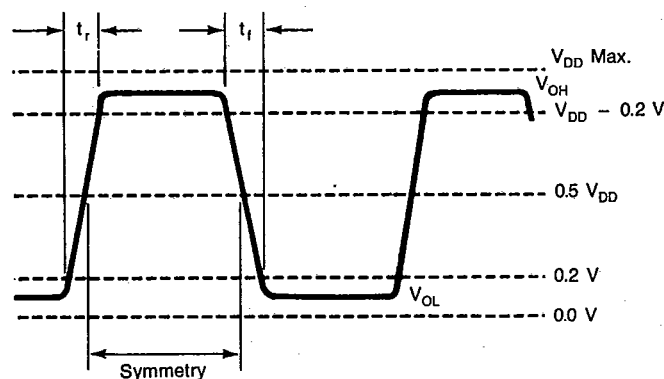


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# Equivalent Load



# Output Waveform



| Pin | Connection      |
|-----|-----------------|
| 1   | NC              |
| 7   | gnd and case    |
| 8   | Output          |
| 14  | V <sub>DD</sub> |

Dimensions are for reference only.

## HS-326/336 Series

This information is believed to be reliable at the time of printing; no responsibility is assumed for inaccuracies. NEL reserves the right to make changes at any time.

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