



### Differential Positive ECL (DPECL) HA-2870 Series

#### Description

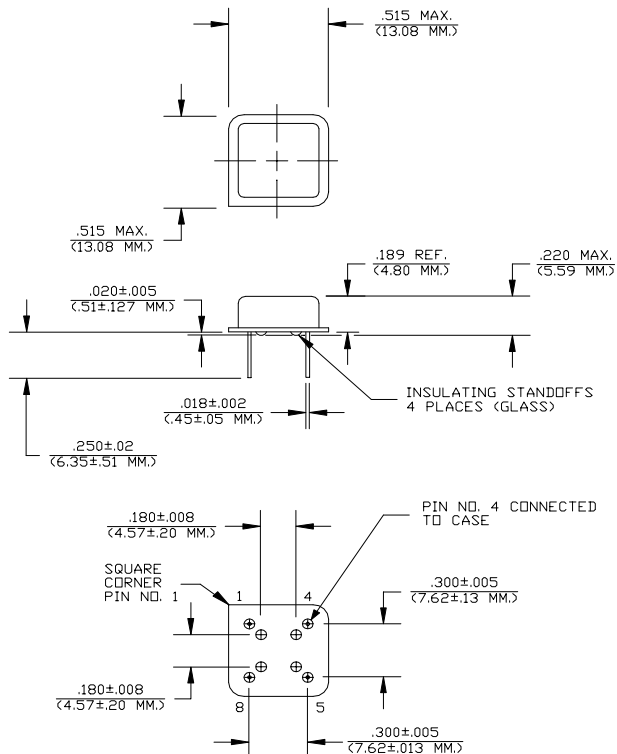
The **HA-2870 Series** of quartz crystal oscillators provide MECL 10K and 10KH series compatible signals in industry standard four pin DIP hermetic package. Systems designers may now specify space-saving, cost-effective packaged PECL oscillators to meet their timing requirements.

#### Features

- Wide frequency range—18.0MHz to 250.0MHz
- User specified tolerance available
- Will withstand vapor phase temperatures of 253°C for 4 minutes maximum
- Space-saving alternative to discrete component oscillators
- High shock resistance, to 3000g
- All metal, resistance weld, hermetically sealed package
- Low Jitter
- MECL 10K and 10KH series compatible output on Pin 5, complement on Pin 1
- High Q Crystal actively tuned oscillator circuit
- Power supply decoupling internal
- No internal PLL avoids cascading PLL problems
- High frequencies due to proprietary design
- Gold plated leads - Solder dipped leads available upon request

#### Electrical Connection

| Pin | Connection              |
|-----|-------------------------|
| 1   | Output Complement       |
| 4   | V <sub>EE</sub> /Ground |
| 5   | Output                  |
| 8   | V <sub>CC</sub>         |



Dimensions are in inches and (MM)

## HA-2870 Series Continued Differential Positive ECL (DPECL)

Rev. L

### Operating Conditions and Output Characteristics

#### Electrical Characteristics

| Parameter                          | Symbol   | Conditions   | Min            | Typical | Max            |
|------------------------------------|----------|--|----------------|---------|----------------|
| Frequency                          | ----     | ----   | 18.0MHz        | ----    | 250.0MHz       |
| Duty Cycle                         | ----     | @ $V_{CC}-1.29V$   | 45/55%         | ----    | 55/45%         |
| Logic 0 <sup>(2)</sup>             | $V_{OL}$ | ----   | $V_{CC}-1.95V$ | ----    | $V_{CC}-1.60V$ |
| Logic 1 <sup>(2)</sup>             | $V_{OH}$ | ----   | $V_{CC}-1.02V$ | ----    | $V_{CC}-0.74V$ |
| Rise & Fall Time                   | tr,tf    | 20-80% $V_O$ with 50 ohm load to $V_{CC}-2V$   | ----           | 1.0 ns  | 1.5 ns         |
| Tpd <sup>(4)</sup>                 | ----     | ----   | -0.5 ns        | ----    | +0.5 ns        |
| Jitter, RMS <sup>(3)</sup>         | ----     | ----   | ----           | ----    | 5 psec         |
| Frequency Stability <sup>(1)</sup> | dF/F     | Overall conditions including:<br>voltage, calibration, temp.,<br>10 yr aging, shock, vibration | -100ppm        | ----    | +100ppm        |

#### General Characteristics

| Parameter             | Symbol   | Conditions  | Min    | Typical | Max           |
|-----------------------|----------|---|--------|---------|---------------|
| Supply Voltage        | $V_{CC}$ | ----  | 4.75V  | 5.0V    | 5.25V         |
| Supply Current        | $I_{CC}$ | 50 ohm termination<br>To 2.00V below $V_{CC}$               | 0.0 mA | ----    | 80 mA         |
| Output current        | $I_O$    | Low level Output Current                                    | 0.0 mA | ----    | $\pm 50.0$ mA |
| Operating temperature | $T_A$    | ----  | ----   | ----    | 70°C          |
| Storage temperature   | $T_S$    | ----  | -55°C  | ----    | 125°C         |
| Power Dissipation     | $P_D$    | ----  | ----   | ----    | 420 mW        |
| Lead temperature      | $T_L$    | Soldering, 10 sec.  | ----   | ----    | 300°C         |
| Load                  |          | 50 Ohm to $V_{CC}-2V$ or Thevenin Equivalent, Bias Required |        |         |               |
| Start-up time         | $t_s$    | ----  | ----   | 2 ms    | 10 ms         |

#### Environmental and Mechanical Characteristics

|                     |  |
|---------------------|--|
| Mechanical Shock    | Per MIL-STD-202, Method 213, Condition E                         |
| Thermal Shock       | Per MIL-STD-883, Method 1011, Condition A                        |
| Vibration           | 0.060" double amplitude 10 Hz to 55 Hz, 35g's 55Hz to 2000 Hz    |
| Soldering Condition | 300°C for 10 seconds   |
| Hermetic Seal       | Leak rate less than $1 \times 10^{-8}$ atm.cc/sec of helium      |
| ESD Sensitivity     | Human Body Model per ON Semiconductor 10kH series ECL: 500V min. |

#### Footnotes:

- 1) Standard frequency stability ( $\pm 20, \pm 25, \pm 50$ ppm & others available)
- 2)  $V_{OL}, V_{OH}$ , referenced to ground ( $V_{EE}$ ) with  $V_{CC} = 5.0V$
- 3) Jitter performance is frequency dependent. Please contact factory for full characterization.
- 4) Tpd is phase shift between the falling edge of pin 5 at  $V_{CC}-1.29V$  and rising edge of pin 1 at  $V_{CC}-1.29V$ .

#### Creating a Part Number

**HA - A287X - FREQ**

#### Package Code

HA 4 Pin (8 Pin)  
SA 4 Pin (8 Pin) SMD Gull  
Wing

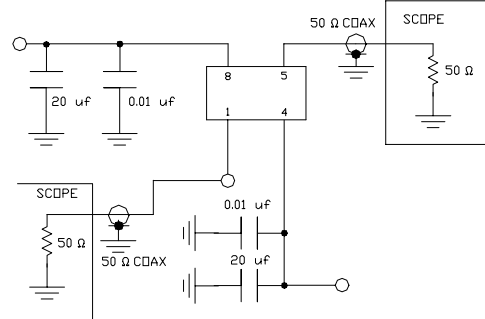
#### Input Voltage

Code Specification  
A 3.3V  
5V

#### Tolerance/Performance

0  $\pm 100$ ppm 0-70°C  
1  $\pm 50$ ppm 0-70°C  
7  $\pm 25$ ppm 0-70°C  
9 Customer Specific  
A  $\pm 20$ ppm 0-70°C  
B  $\pm 50$ ppm -40 to +85°C  
C  $\pm 100$ ppm -40 to +85°C

TEST CIRCUIT



TEST CIRCUIT USES A SPLIT SUPPLY OF +2V AND -3V FOR EASE OF TESTING.