Positive ECL (PECL)  
HA-A870 Series

Description
The HA-A870 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
- 3.3Volt operation
- 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
- RoHS Compliant, Lead Free Construction (unless solder dipped leads are supplied)
- COTS/Dual use

Electrical Connection

<table>
<thead>
<tr>
<th>Pin</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output Complement</td>
</tr>
<tr>
<td>4</td>
<td>VEE/Ground</td>
</tr>
<tr>
<td>5</td>
<td>Output</td>
</tr>
<tr>
<td>8</td>
<td>VCC</td>
</tr>
</tbody>
</table>

Dimensions are in inches and (MM)
**HA-A870 Series**  
Positive ECL (PECL)

## Operating Conditions and Output Characteristics

### Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>-----</td>
<td>-----</td>
<td>18.0MHz</td>
<td></td>
<td>250.0MHz</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>-----</td>
<td>@ VCC-1.29V</td>
<td>45/55%</td>
<td></td>
<td>55/45%</td>
</tr>
<tr>
<td>Logic 0 (2)</td>
<td>VDL</td>
<td>VCC-1.95V</td>
<td></td>
<td></td>
<td>VCC-1.60V</td>
</tr>
<tr>
<td>Logic 1 (2)</td>
<td>VOH</td>
<td>VCC-1.02V</td>
<td></td>
<td></td>
<td>VCC-0.74V</td>
</tr>
<tr>
<td>Rise &amp; Fall Time</td>
<td>tr,tf</td>
<td>20-80%VOC with 50 ohm load to VCC-2V</td>
<td>1.0ns</td>
<td>1.5ns</td>
<td></td>
</tr>
<tr>
<td>Jitter, RMS(3)</td>
<td>-----</td>
<td>-----</td>
<td></td>
<td>5 psec</td>
<td></td>
</tr>
</tbody>
</table>

### Frequency Stability (1)

- Overall conditions including: voltage, calibration, temp., 10 yr aging, shock, vibration

### General Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>VCC</td>
<td>-----</td>
<td>3.15V</td>
<td>3.3V</td>
<td>3.45V</td>
</tr>
<tr>
<td>Supply Current</td>
<td>ICC</td>
<td>50 ohm termination</td>
<td>0.0mA</td>
<td></td>
<td>80mA</td>
</tr>
<tr>
<td>Output current</td>
<td>IO</td>
<td>To 2.00V below VCC</td>
<td>0.0mA</td>
<td></td>
<td>±50.0mA</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>TA</td>
<td>Low level Output Current</td>
<td>0°C</td>
<td></td>
<td>70°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>TS</td>
<td>-----</td>
<td>-55°C</td>
<td></td>
<td>125°C</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>PD</td>
<td>-----</td>
<td></td>
<td></td>
<td>276mW</td>
</tr>
<tr>
<td>Lead temperature</td>
<td>TL</td>
<td>Soldering, 10 sec.</td>
<td></td>
<td></td>
<td>300°C</td>
</tr>
<tr>
<td>Load</td>
<td>-----</td>
<td>50 Ohm to VCC-2V or Thevenin Equivalent, Bias Required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-up time</td>
<td>ts</td>
<td>-----</td>
<td>2 ms</td>
<td>10 ms</td>
<td></td>
</tr>
</tbody>
</table>

### 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 x 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 (+20, ±25, ±50ppm & others available)
2) VDL, VOH referenced to ground (VEE) with VCC = 3.3V
3) Jitter performance is frequency dependent. Please contact factory for full characterization.

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### Creating a Part Number

**HA - A87X - 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: ±100ppm 0-70°C
  - 1: ±50ppm 0-70°C
  - 7: ±25ppm 0-70°C
  - 9: Customer Specific
  - A: ±20ppm 0-70°C
  - B: ±50ppm -40 to +85°C
  - C: ±100ppm -40 to +85°C