# CRYSTAL CLOCK OSCILLATORS

**Data Sheet 0350C**

**Rev. K**

**Differential Positive ECL (DPECL)**
**Fast Edge**
**PJ-B2980 Series**

## Description

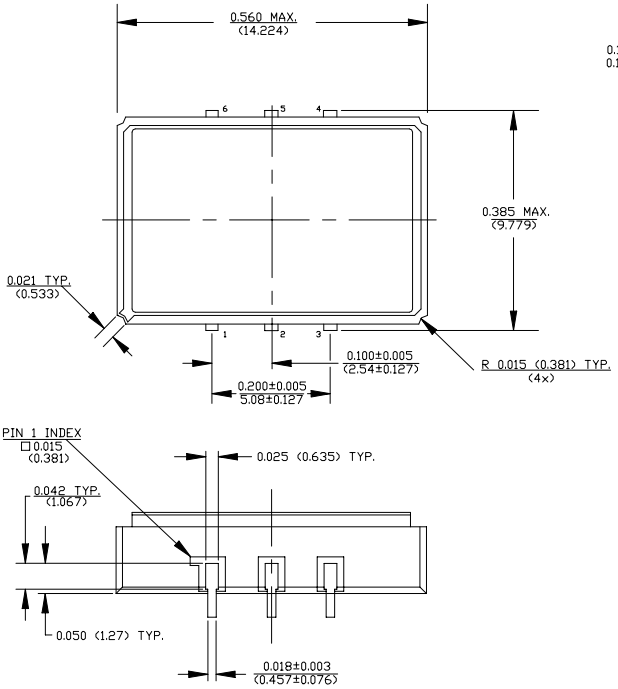
The **PJ-B2980 Series** of quartz crystal oscillators provide DPECL Fast Edge compatible signals. Systems designers may now specify space-saving, cost-effective packaged PECL oscillators to meet their timing requirements.

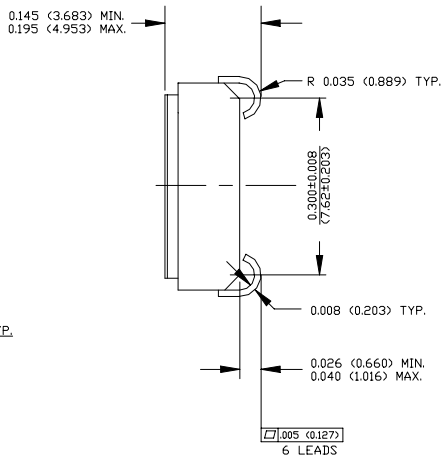
## Features

- Wide frequency range–60.0MHz to 312.5MHz
- User specified tolerance available
- Space-saving alternative to discrete component oscillators
- High shock resistance, to 1000g
- 2.5 volt operation
- Metal lid electrically connected to ground to reduce EMI
- COTS/Dual use
- High Reliability - NEL HALT/HASS qualified for crystal oscillator start-up conditions
- Low Jitter - Wavecrest jitter characterization available
- Overtone technology
- 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 pads
- RoHS Compliant, Lead Free Construction

### Electrical Connection

| Pin | Connection |
|---|---|
| 1 | Enable/Disable |
| 2 | N.C. |
| 3 | $V_{EE}$ /Ground |
| 4 | Output |
| 5 | /Output |
| 6 | $V_{CC}$ |




DIMENSIONS ARE IN INCHES & (MM)


NEL FREQUENCY CONTROLS, INC.

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Rev. K

**PJ-B2980 Series** Continued
Differential Positive ECL (DPECL) Fast Edge

## Operating Conditions and Output Characteristics

### Electrical Characteristics

| Parameter | Symbol | Conditions | Min | Typical | Max |
|---|---|---|---|---|---|
| Frequency | ----- | ----- | 60.0MHz | ----- | 312.5MHz |
| Duty Cycle | ----- | @ $V_{CC}$-1.29V | 45/55% | ----- | 55/45% |
| Logic 0 (2) | $V_{OL}$ | ----- | ----- | ----- | $V_{CC}$ -1.62V |
| Logic 1(2) | $V_{OH}$ | ----- | $V_{CC}$ -1.025V | ----- | ----- |
| Rise & Fall Time | tr,tf | 20-80%$V_O$ with 50 ohm load to $V_{CC}$-2V | ----- | ----- | 1 ns |
| $T_{pd}$ (4) | ----- | ----- | -200 psec | ----- | +200 psec |
| Jitter, Integrated | J | Integrated from phase noise, 12kHz to 20MHz, RMS | ----- | 0.1 ps | ----- |
| Jitter, Wavecrest Characterized (3) | ----- | Random Period | ----- | 2.3ps | ----- |
| | | Accum, pk-to-pk | ----- | 29ps | ----- |
| Phase Noise | £(Δf) | 125MHz | | | |
| | | @ 10Hz | ----- | -70 dBc/Hz | ----- |
| | | @100Hz | ----- | -102 dBc/Hz | ----- |
| | | @1kHz | ----- | -135 dBc/Hz | ----- |
| | | @10kHz | ----- | -145 dBc/Hz | ----- |
| | | @100kHz | ----- | -145 dBc/Hz | ----- |
| | | @ >1Mhz | ----- | -145 dBc/Hz | ----- |
| Enable Voltage(5) | ----- | with $V_{EE}$ = 0V | 1.6V | ----- | ----- |
| Disable Voltage | ----- | with $V_{EE}$ = 0V | ----- | ----- | 0.4V |
| Frequency Stability (1) | dF/F | Overall conditions including: voltage, calibration, temp., 10 yr aging, shock, vibration | -100ppm | ----- | +100ppm |

### General Characteristics

| Parameter | Symbol | Conditions | Min | Typical | Max |
|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | ----- | 2.375V | 2.5V | 2.625V |
| Supply Current | $I_{CC}$ | 50 ohm termination To 2.00V below $V_{CC}$ | 0.0 mA | ----- | 80 mA |
| Output current | $I_O$ | Low level Output Current | 0.0 mA | ----- | ±50.0 mA |
| Operating temperature | $T_A$ | ------ | 0°C | ----- | 70°C |
| Storage temperature | $T_S$ | ----- | -55°C | ----- | 125°C |
| Power Dissipation | $P_D$ | ----- | ----- | ----- | 210 mW |
| 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 |
| Hermetic Seal | Leak rate less than 1 x $10^{-8}$ atm.cc/sec of helium |

***Footnotes:***

1) Standard frequency stability (±20,±25,±50ppm & others available)
2) $V_{OL}$, $V_{OH}$, referenced to ground ($V_{EE}$) with $V_{CC}$ = 2.5V
3) Jitter performance is frequency dependent. Please contact factory for full Wavecrest characterization.
4) Tpd is phse shift between the falling edge of pin 4 at 2.0V and the rising edge of pin 5 at 2.01V.
5) Open to enable pin also enables the output.
6) Internal high frequency power source decoupling.

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**PJ-B2980 Series** Continued

**Creating a Part Number**

**PJ - B298X - FREQ**

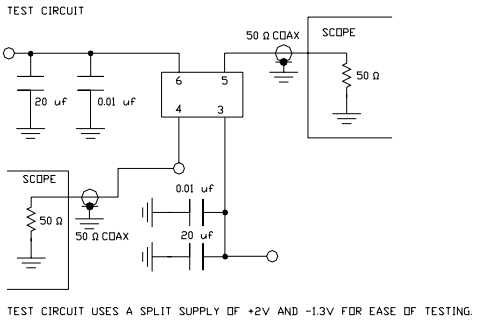
**Package Code**
PJ 6 J Lead SMD

**Input Voltage**

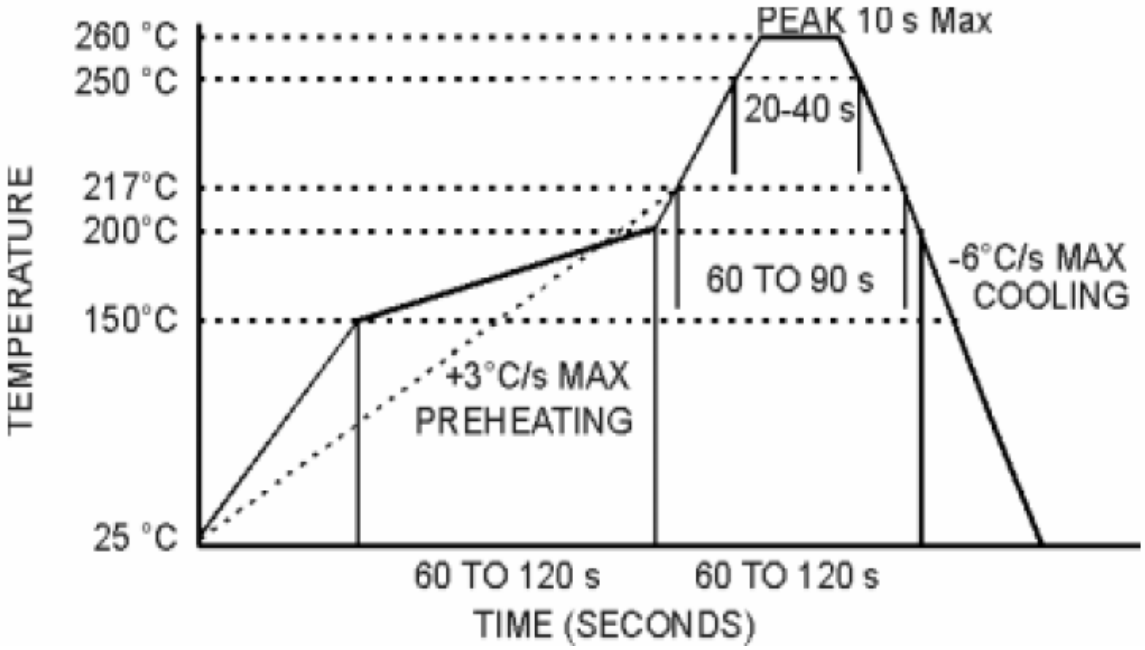
| Code | Specification |
|---|---|
| A | 3.3V |
| B | 2.5V |

**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 |




Max Reflow Profile

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