

STRATUM 3E High Stability Oven Stabilized Oscillator OH300 Series

OCXO

CONNOR WINFIELD



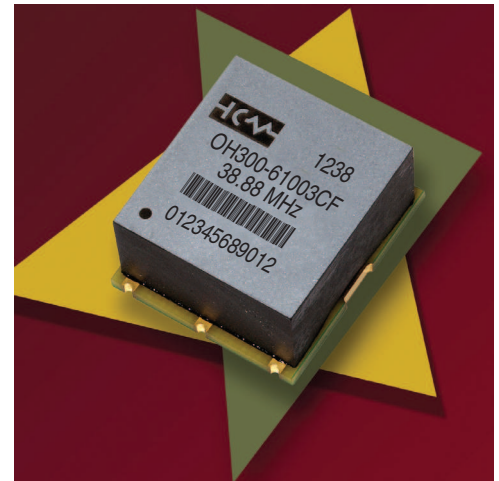
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Description

Connor-Winfield's high stability OH300 OCXO / OCVXCO series are exceptionally precise frequency standard, excellent for use in cellular base stations, test equipment, Synchronous Ethernet, VSAT and STRATUM 3E applications

These unique OCXOs and OCVXCOs provide frequency stabilities in the range of ± 5 ppb to ± 50 ppb, over the commercial, extended commercial or the industrial temperature range. Power requirements are 1.1W over the commercial temperature range and 1.5W over the industrial temperature range after warm-up. Additionally, excellent aging is achieved through the use of overtone SC cut crystals.

The OH300 series is available with CMOS logic or Sinewave output along with Electronic Frequency Tuning. These oscillators provide outstanding phase noise that varies depending on frequency requirements. Allan Variance specifications are rated for primary reference standards. Warm up times are on the order of 5 minutes to 0.10 ppm of final frequency.



Features

- Frequency Range: 5 to 40 MHz
- OCXO - Fixed Frequency
- OCVCXO - Voltage Controlled Frequency
- 3.3 Vdc or 5.0 Vdc Operation
- Available Frequency Stabilities:
 - ± 5.0 ppb, ± 10.0 ppb, ± 20 ppb or ± 50 ppb
- Available Temperature Ranges:
 - 0 to 70°C, -20 to 70°C, -20 to 75°C,
 - 40 to 70°C or -40 to 85°C
- Low Phase Noise / Phase Jitter
- Output: CMOS Logic or Sinewave
- SMT Package: 22 mm x 25 mm x 12.7 mm
- Tape and Reel Packaging
- RoHS Compliant / Lead Free

Ordering Information

| OH300- | 6 | 10 | 03 | C | F | - 038.88M |
|---|---|--|--|---|---|--|
| Package OH300- = 22x25mm Surface Mount Package | Temperature Range 5 = 0 to 70°C 6 = -40 to 85°C 7 = -20 to 70°C 8 = -40 to 70°C 9 = -20 to 75°C | Frequency Stability 05 = ± 5.0 ppb* 10 = ± 10.0 ppb 20 = ± 20.0 ppb 50 = ± 50.0 ppb | Supply Voltage 03 = 3.3 Vdc 05 = 5.0 Vdc | Output Type C = CMOS S = Sinewave | OCXO Type F = Fixed Freq. V = Voltage Controlled Freq. | Output Frequency Frequency Format -xxx.xM Min -xxx.xxxxxM Max *Amount of numbers after the decimal point. M = MHz |

* ± 5.0 ppb stability models are
only available from 0 to 70°C.

Example Part Number:

OH300-61003CF-038.88M = 22x25x12.7mm SMT package, -40 to 85°C temperature range, ± 10.0 ppb frequency stability, 3.3 Vdc supply voltage, CMOS square wave output, fixed output frequency OCXO, 38.88 MHz output frequency.

OH300-52005CV-010.0M = 22x25x12.7mm SMT package, 0 to 70°C temperature range, ± 20.0 ppb frequency stability, 5.0 Vdc supply voltage, CMOS square wave output, voltage controlled output frequency, OCVXCO, 10.0 MHz output frequency.

OH300-75005SV-020.0M = 22x25x12.7mm SMT package, -20 to 70°C temperature range, ± 50.0 ppb frequency stability, 5.0 Vdc supply voltage, Sinewave output, voltage controlled output frequency, OCVXCO, 20.0 MHz output frequency.



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Absolute Maximum Ratings

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|--|---------|---------|---------|-------|-------|
| Storage Temperature | -55 | - | 125 | °C | |
| Supply Voltage | -0.5 | - | 7.0 | Vdc | |
| Control Voltage (Vc) | -0.5 | - | 7.0 | Vdc | |
| Operating Supply Voltage 3.3 Vdc (Vcc) | 3.13 | 3.30 | 3.47 | Vdc | |
| Operating Supply Voltage 5.0 Vdc (Vcc) | 4.75 | 5.00 | 5.25 | Vdc | |

Absolute Ratings: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only. The functional operation of the device at those or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to conditions outside the "recommended operating conditions" for any extended period of time may adversely impact device reliability and result in failures not covered by warranty.

Operating Specifications

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|--|---------|---------|---------|---------|--------|
| Center Frequency: (Fo) | 5 | - | 40 | MHz | |
| Operating Temperature Range: | | | | | |
| Temperature Code 5 | 0 | - | 70 | °C | |
| Temperature Code 6 | -40 | - | 85 | °C | |
| Temperature Code 7 | -20 | - | 70 | °C | |
| Temperature Code 8 | -40 | - | 70 | °C | |
| Temperature Code 9 | -20 | - | 75 | °C | |
| Frequency Calibration: | -0.1 | - | 0.1 | ppm | @ 25°C |
| Frequency Stability vs. Change in Temperature: | | | | | |
| Stability Code 05 | -5.0 | - | 5.0 | ppb | 1, 2 |
| Stability Code 10 | -10.0 | - | 10.0 | ppb | 2 |
| Stability Code 20 | -20.0 | - | 20.0 | ppb | 2 |
| Stability Code 50 | -50.0 | - | 50.0 | ppb | 2 |
| Frequency Stability vs. Load | -2.0 | - | 2.0 | ppb | ±5% |
| Frequency Stability vs. Voltage | -2.0 | - | 2.0 | ppb | ±5% |
| Aging: Daily: | | | | | |
| 5 MHz to 20 MHz | -1.0 | - | 1.0 | ppb/day | 3 |
| >20 MHz to 40 MHz | -2.0 | - | 2.0 | ppb/day | 3 |
| Aging: First Year: | | | | | |
| 5 MHz to 20 MHz | -50 | - | 50 | ppb | |
| >20 MHz to 40 MHz | -100 | - | 100 | ppb | |
| Lifetime Tolerance: (20 Years) | | | | | |
| 5 MHz to 20 MHz | -300 | - | 300 | ppb | 4 |
| >20 MHz to 40 MHz | -500 | - | 500 | ppb | 4 |
| Supply Voltage: (Vcc) | | | | | |
| Voltage Code 03 | 3.13 | 3.30 | 3.47 | Vdc | 5 |
| Voltage Code 05 | 4.75 | 5.00 | 5.25 | Vd | 5 |
| Power Consumption: Turn-On | | | | | |
| 0 to 70°C Models | - | - | 3.00 | W | 6 |
| -20 to 70°C Models | - | - | 3.20 | W | 6 |
| -20 to 75°C Models | - | - | 3.30 | W | 6 |
| -40 to 85°C Models | - | - | 3.80 | W | 6 |
| Power Consumption: Steady State @ 25°C | | | | | |
| 0 to 70°C Models | - | - | 1.10 | W | 6 |
| -20 to 70°C Models | - | - | 1.15 | W | 6 |
| -20 to 75°C Models | - | - | 1.20 | W | 6 |
| -40 to 85°C Models | - | - | 1.50 | W | 6 |
| Phase Jitter: (BW: 10 Hz to Fo/2) | - | - | 1.0 | ps rms | |
| Short Term Allan Deviation (1s) | - | 1.0E-11 | - | rms | |
| Start-Up Time: | - | - | 500 | ms | |
| Warm Up Time @ 25°C: | - | - | 5 | minutes | 7 |



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Phase Noise Characteristics

Typical Phase Noise for 10 MHz OXCO's with CMOS Output

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|-----------------|---------|---------|---------|--------|-------|
| @1Hz offset | - | - | -85 | dBc/Hz | |
| @ 10Hz offset | - | - | -115 | dBc/Hz | |
| @ 100Hz offset | - | - | -140 | dBc/Hz | |
| @ 1KHz offset | - | - | -145 | dBc/Hz | |
| @ 10KHz offset | - | - | -150 | dBc/Hz | |
| @ 100KHz offset | - | - | -150 | dBc/Hz | |

OCVXCO Input Characteristics (OCXO Type Code V)

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|-----------------------------|---------|---------|---------|-------|-------|
| Control Voltage Range: (Vc) | | | | | |
| 3.3 Vdc Models | 0.30 | 1.65 | 3.00 | V | 8 |
| 5.0 Vdc Models | 0.50 | 2.50 | 4.50 | V | 8 |
| Frequency Pullability: | ±0.4 | - | - | ppm | |
| Input Impedance | 100K | - | - | Ohms | |

CMOS Output Characteristics (Output Code C)

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|------------------------------|---------|---------|---------|-------|-------|
| Load | - | 15 | - | pF | |
| 3.3 Vdc Models | | | | | |
| Output Voltage: High (Voh) | 3.0 | - | - | V | |
| Low (Vol) | - | - | 0.4 | V | |
| Output Current: High (Ioh) | - | - | -4 | mA | |
| Low (Iol) | - | - | 4 | mA | |
| 5.0 Vdc Models | | | | | |
| Output Voltage: High (Voh) | 4.7 | - | - | V | |
| Low (Vol) | - | - | 0.4 | V | |
| Output Current: High (Ioh) | - | - | -8 | mA | |
| Low (Iol) | - | - | 8 | mA | |
| Duty Cycle at 50% of Vcc | 45 | 50 | 55 | % | |
| Rise / Fall Time: 10% to 90% | - | - | 6 | ns | |
| Spurious Output | - | - | -80 | dBc | |

Sinewave Output Characteristics (Output Code S)

| Parameter | Minimum | Nominal | Maximum | Units | Notes |
|--------------|---------|---------|---------|-------|-------|
| Load | - | 50 | - | Ohms | |
| Output Power | 5.0 | - | - | dBm: | |
| Harmonics | - | - | -30 | dBc | |
| Spurious | - | - | -80 | dBc | |

Package Characteristics

OH300 Package

Package consisting of a FR-4 substrate and Ryton-R-4 cover. Water Resistant package, non-hermetic seal. (Engineering Properties of Ryton R-4 Application Note AN2100)

Re-Stabilization Time

| Off Time | Re stabilization Time |
|--------------|---------------------------|
| <1 Hour | <2 Hours * |
| <6 Hour | <12 Hours * |
| <24 Hour | <48 Hours * |
| 1 to 16 Days | 48 Hours + 1/4 Off Time * |
| >16 Days | <6 Days * |

* For a given off time, the time required to meet daily aging, short term stability requirements.

Notes:

- ±5.0 ppb stability models are only available from 0 to 70°C.
- Referenced to the frequency measured @ 25°C. OCVXCO control voltage (Vc) = nominal voltage.
- At time of shipment after 48 hours of operation.
- Inclusive of calibration, operating temperature, supply voltage change, load change and 20 years aging.
- Supply voltage must reach Vcc levels monotonically within a ramp-up time of <12 ms.
- Measured with Vcc = Nominal, in calm air.
- Measured @ 25°C, within ±100 ppb, referenced one hour after turn-on.
- To ensure proper operation of OCVXCO's the control voltage input must be biased the nominal control voltage. Failure to bias the Vc input will cause an unstable output condition.



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Environmental Characteristics

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| Shock | 500 G's 1ms, Halfsine, 3 shocks per direction, per MIL-STD 202G, Method 213B Test Condition D. |
| Sinusoidal Vibration | 0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD-202G, Method 204D, Test Condition A. |
| Random Vibration | 5.35 G's rms. 20 to 2000 Hz per MIL-STD-202G, Method 214, Test Condition 1A, 15 minutes each axis. |
| Moisture | 10 cycles, 95% RH, Per MIL-STD-202G, Method 112. |
| Marking Permanency | Per MIL-STD-202G, Method 215J. |

Solder Process Recommendations: RoHS compliant, lead free. See solder profile on page 6.

In-line reflow: Refer to recommended reflow pre-heat and reflow temperatures on page 6. Package material consist of Ryton R-4 high temperature cover with FR4 substrate. Component solder is Pb free high temperature eutectic alloy with a melting point of 221°C.

In-line oven profile: We recommend using KIC profiler or similar device placing one of the thermocouples on the device to insure that the internal package temperature does not exceed 221°C.

Removal of device: If for any reason the device needs to be removed from the board, use a temperature controlled repair station with profile monitoring capabilities. Following a monitored profile will insure the device is properly pre-heated prior to reflow. Refer to IPC 610E for inspection guidelines.

Recommended Cleaning Process: (If required)

Device is non-hermetic, water resistance with four weep holes, one in each corner to allow moisture to be removed during the drying cycle. We recommend in-line warm water wash with air knife and drying capabilities. If cleaner does not have drying capability, then use hot air circulated oven. Boards should be placed in the oven vertically for good water runoff

Device must be dried properly prior to use!

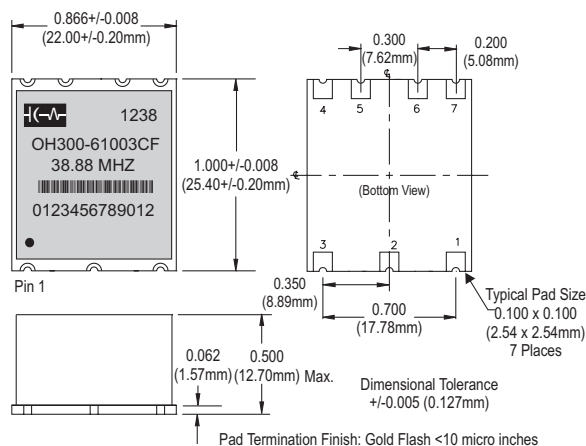
Note: If saponifier is used make sure the device is rinsed properly to insure all residues are removed. PH of saponifier should not exceed 10.

Drying Temperature: Between 85 to 100°C.

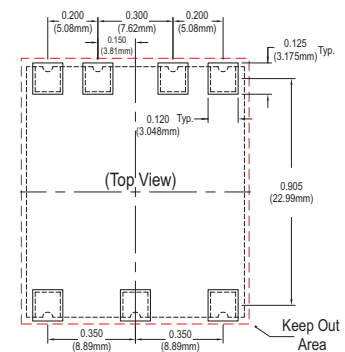
Drying Time: Time will vary depending on the board size.

Caution: Do not submerge the device!

Package Outline



Suggested Pad Layout



* Do not route any traces in the keep out area. It is recommended the next layer under the keep out area is to be ground plane.

Marking Information



Date Code (YYWW)

Model Number

Output Frequency

Serial # Barcode

Serial Number

Pad Connections

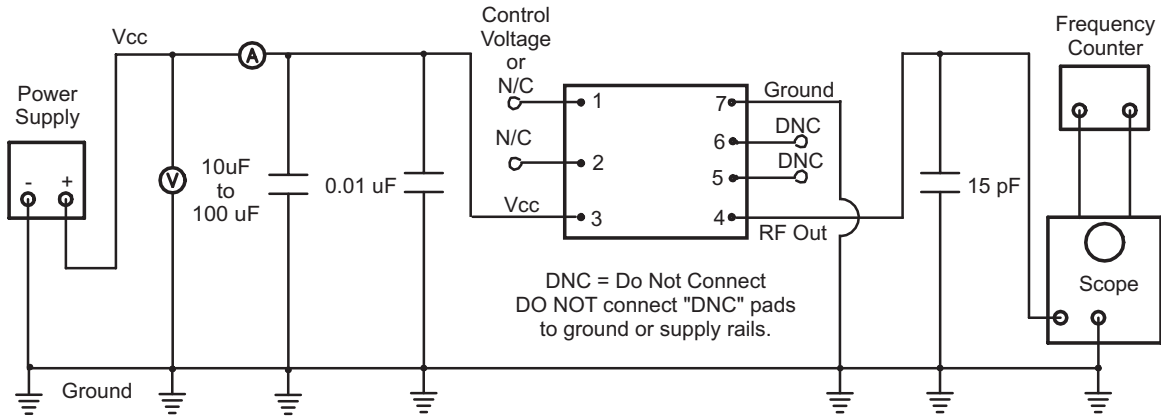
- 1: Control Voltage or N/C
- 2: N/C
- 3: Supply Voltage (Vcc)
- 4: RF Output
- 5: Do Not Connect
- 6: Do Not Connect
- 7: Ground (Case)

DO NOT connect "DNC" pads to ground or supply rails.

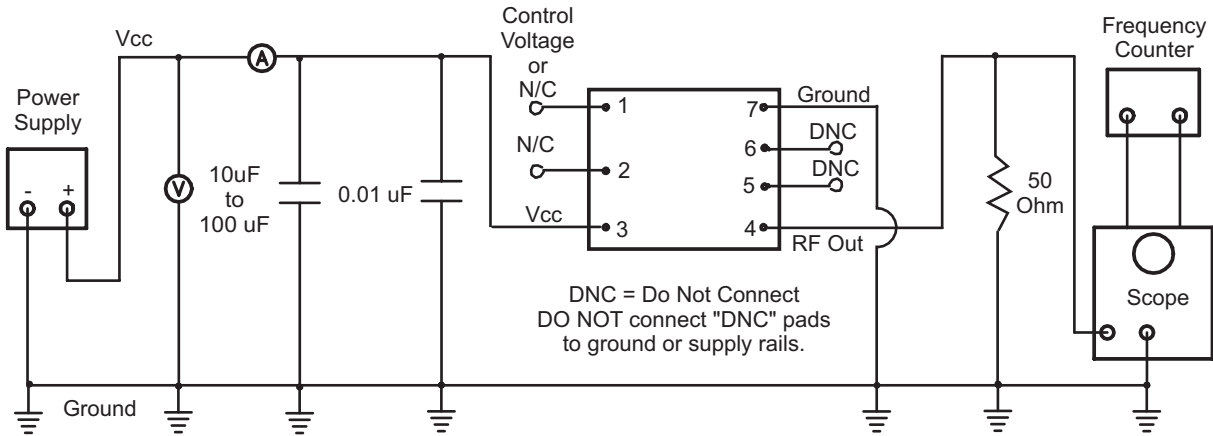
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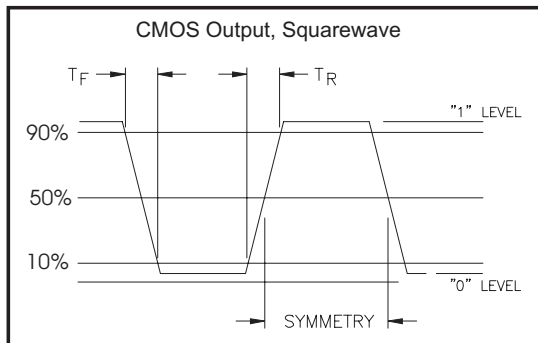
Test Circuit CMOS Output



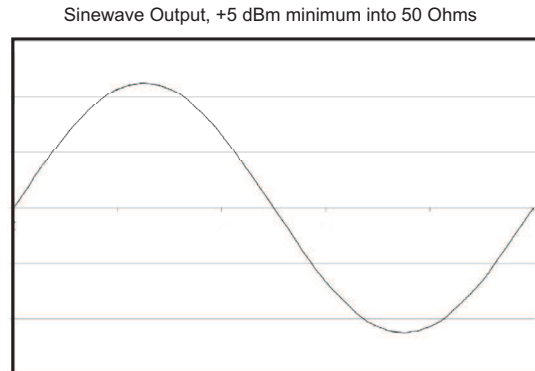
Test Circuit Sinewave Output



CMOS Output Waveform



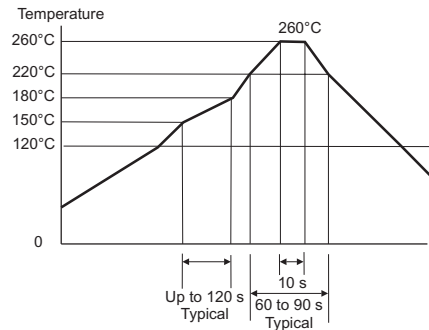
Sinewave Output Waveform



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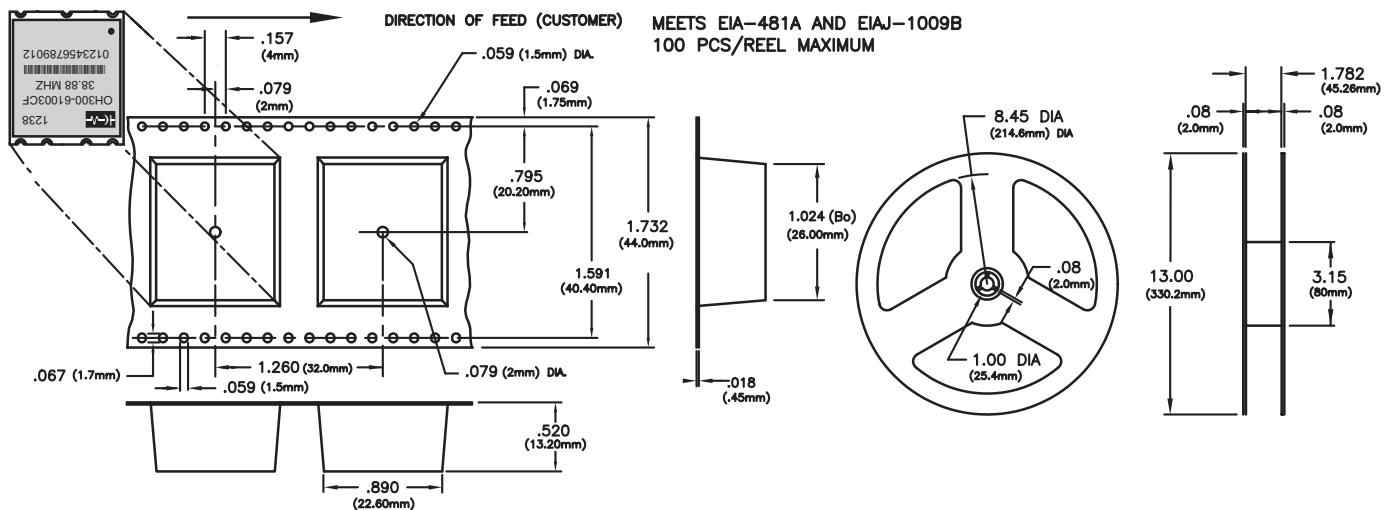
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Solder Profile



Meets IPC/JEDEC J-STD-020C

Tape and Reel Information



- Rev P00, New issue. 01/26/11.
- Rev P01, Added tape and reel information. 05/04/11.
- Rev P02, Added OH300 Photo. 05/06/11.
- Rev P03, updated Description. 05/25/11.
- Rev P04, Updated power consumption and changed package drawing. 07/27/11.
- Rev P05, Added sinewave models to the data sheet 09/08/11.
- Rev P06, added cleaning process and package characteristics. 08/09/12.
- Rev 07, added Barcode to package marking. 09/27/12
- Rev 08, Added link to Application Note: AN2093. 11/06/12
- Rev 09, Added additional notes. 11/14/12.
- Rev 10, Added additional notes. 12/07/12.
- Rev 11, Added ±5ppb models. 04/03/13
- Rev 12, Updated Environmental Characteristics, added output drive current. 04/24/13.
- Rev 13, Changed note 5 and removed note from power supply line, added absolute note. 05/13/13.



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