

## Low Phase Noise OCXO in 20.4x12.7 mm Package



ESD Sensitive

20.4 x 12.7 x 10.2 mm  
Datasheet #456826

### Features

- Compact 20.4 x 12.7mm DIL package
- SC-Cut crystal
- Tight Stability over Operating Temperature Range
- Fast Warm-up Time, Low Power Consumption
- Low Phase Noise
- Sine wave or CMOS/TTL output
- Voltage Control Function
- Reference Voltage Output

### Applications

- Instrumentation
- Cellular Infrastructure
- Radar Systems
- Battery Powered Equipment
- Tele/Data Communications
- GPS
- COTS/Dual use

### Absolute Maximum Ratings

| Parameters               | Symbol          | Condition  | Min  | Typ | Max  | Unit | Notes |
|--------------------------|-----------------|------------|------|-----|------|------|-------|
| Input Break Down Voltage | V <sub>cc</sub> | 5 V supply | -0.5 |     | 5.5  | V    |       |
| Storage temperature      | T <sub>s</sub>  |            | -55  |     | +125 | °C   |       |
| Control Voltage          | V <sub>c</sub>  |            | -0.5 |     | 5.5  | V    |       |

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### Electrical <sup>(1)</sup>

| Parameters                             | Symbol       | Condition                                             | Min             | Typ                                         | Max                                         | Unit      | Notes                                                                                                                |
|----------------------------------------|--------------|-------------------------------------------------------|-----------------|---------------------------------------------|---------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------|
| Frequency                              | F            |                                                       |                 | 10.00                                       |                                             | MHz       |                                                                                                                      |
| Frequency Tolerance                    | $\Delta F$   | Initial Tolerance                                     | -0.2            |                                             | +0.2                                        | ppm       | After 5 minutes of operation                                                                                         |
| Frequency Stability                    | $\Delta F/F$ | vs. Temp.                                             | -5              |                                             | +5                                          | ppb       | Referenced to frequency<br>$F_{ref} = (F_{max} + F_{min}) / 2$ , temperature variable speed less than 2°C per minute |
|                                        |              | vs. Supply                                            | -2              |                                             | +2                                          | ppb/5%Vcc | Vcc varied from 4.75V to 5.25V                                                                                       |
|                                        |              | G Sensitivity                                         | -1              |                                             | +1                                          | ppb/G     | Worst direction, 0-1kHz vibration bandwidth                                                                          |
| Aging                                  |              | per day<br>per year, first year                       | -5E-10<br>-5E-8 |                                             | +5E-10<br>+5E-8                             |           | Referenced to frequency observed at 25°C after 30 days of operation                                                  |
| Short Term Stability (Allan Deviation) |              | 1s                                                    |                 |                                             | 2E-11                                       |           |                                                                                                                      |
| SSB Phase Noise                        | S $\phi$     | 1 Hz<br>10 Hz<br>100 Hz<br>1 KHz<br>10 KHz<br>100 KHz |                 | -75<br>-110<br>-145<br>-155<br>-165<br>-165 | -70<br>-105<br>-140<br>-150<br>-160<br>-160 | dBc/Hz    |                                                                                                                      |
| Input Voltage                          | Vcc          |                                                       | 4.75            | 5.0                                         | 5.25                                        | V         |                                                                                                                      |
| Stead State Current                    | Idd          | steady state, 25°C                                    |                 |                                             | 65                                          | mA        |                                                                                                                      |
| Warm Up Current                        |              |                                                       |                 |                                             | 220                                         | mA        |                                                                                                                      |
| Warm Up Time                           |              |                                                       | 30              | 60                                          |                                             | s         | @25°C, within $\pm 100$ ppb of final frequency after powered on for 15 minutes                                       |
|                                        |              |                                                       |                 |                                             | 120                                         | s         | @25°C, within $\pm 10$ ppb of final frequency after powered on for 15 minutes                                        |
| Control Voltage                        | Vc           |                                                       | 0               |                                             | 4.2                                         | V         |                                                                                                                      |
| Reference Voltage                      | Vref         |                                                       | 4.0             |                                             | 4.3                                         | V         |                                                                                                                      |
| Linearity                              |              |                                                       |                 |                                             | 10                                          | %         |                                                                                                                      |
| Input impedance                        | Zin          | At Vc pin                                             | 100             |                                             |                                             | kOhm      |                                                                                                                      |
| Pull range                             |              | from nominal F                                        | $\pm 0.3$       |                                             | $\pm 1.0$                                   | ppm       | Referenced to frequency at Vc = 2.1V                                                                                 |

Notes:

1\* All measurements guaranteed at nominal VDD, nominal load, and at +25°C unless otherwise specified.

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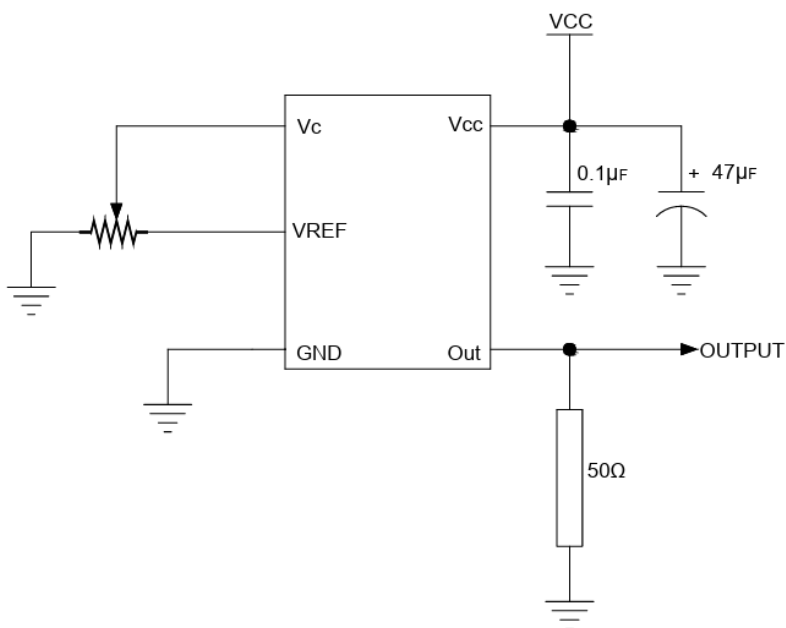
### Electrical (cont.)

| Parameters            | Symbol | Condition          | Min | Typ | Max | Unit | Notes                 |
|-----------------------|--------|--------------------|-----|-----|-----|------|-----------------------|
| Output Waveform       |        | Sine wave          |     |     |     |      | See options           |
| Load                  |        | 50 Ohm (Sine wave) |     |     |     |      |                       |
| Output Power          |        |                    | +7  |     |     | dBm  |                       |
| Harmonics Suppression |        |                    |     |     | -25 | dBc  |                       |
| Output Waveform       |        | CMOS               |     |     |     |      | See options           |
| Load                  |        | 15 pF              |     |     |     |      |                       |
| Output Low Voltage    | VOL    |                    |     |     | 0.4 | V    |                       |
| Output High Voltage   | VOH    |                    | 3.8 |     |     | V    |                       |
| Duty Cycle            |        |                    | 49  | 50  | 51  | %    |                       |
| Rise/Fall Time        |        |                    |     |     | 10  | ns   | 10% ~ 90% of waveform |

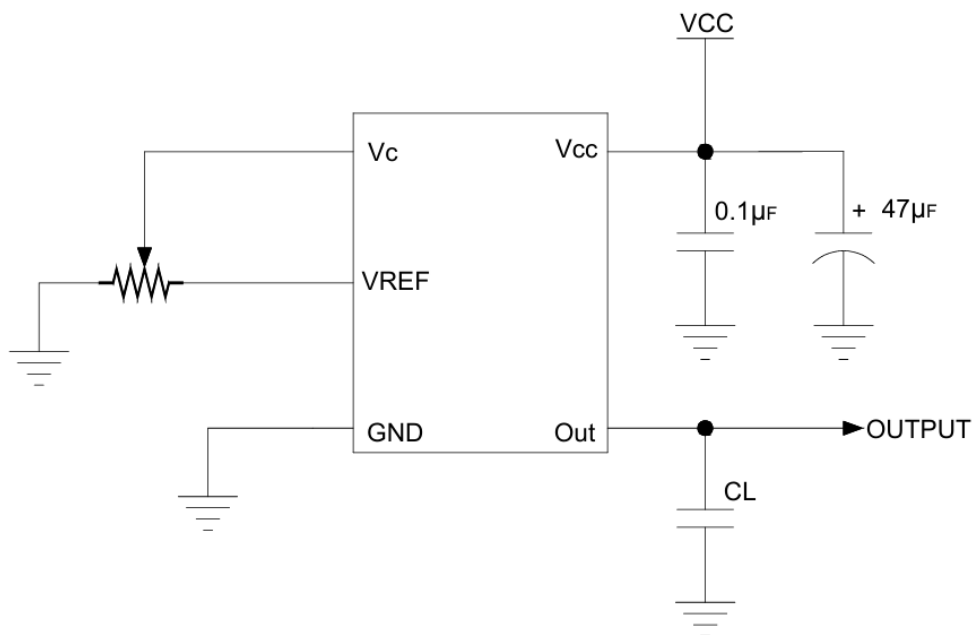
### Environmental and Mechanical

| Parameter             | Description                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temp. range | -40°C to +85°C standard                                                                                                                                |
| Vibration             | Test Condition: 0.75mm ;acceleration:10g;10Hz~500Hz, one cycle per 30 min, test 2 hour. (3 times for each 3 directions X ,Y , Z), IEC 68-2-06 Test Fc. |
| Soldering conditions  | 260°C for 10s Max leads only                                                                                                                           |
| MSL                   | N/A                                                                                                                                                    |
| ESD Level             | Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010.                                                                                 |
|                       | Machine Model, class B: 200V to 400V; JEDEC JESD22-A115C.                                                                                              |

## Test Circuit (Sine Wave)



## Test Circuit (CMOS)



CL = 15 pF (including probe capacitance)

## Creating a Part Number

**Q - C14AL - U - B S D K - 10.000 MHz - X**

**OCVCXO** (with Reference Voltage)

| Supply voltage |               |
|----------------|---------------|
| Code           | Specification |
| B              | 5V ± 5%       |

| Output |               |
|--------|---------------|
| Code   | Specification |
| S      | Sine wave     |
| T      | CMOS/TTL      |

| Temperature Stability |                     |
|-----------------------|---------------------|
| Code                  | Specification       |
| D                     | ±5x10 <sup>-9</sup> |
| G                     | ±3x10 <sup>-8</sup> |

| Packaging |           |
|-----------|-----------|
| Blank     | Bulk Tube |

| Output Frequency                                                                                              |  |
|---------------------------------------------------------------------------------------------------------------|--|
| Please specify the frequency in units of MHz out to 3-digit accuracy after the decimal.<br>Example: 10.000MHZ |  |

| Temperature Range |               |
|-------------------|---------------|
| Code              | Specification |
| K                 | -40°C to 85°C |

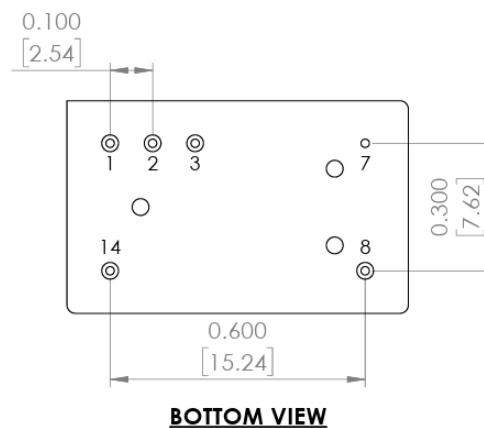
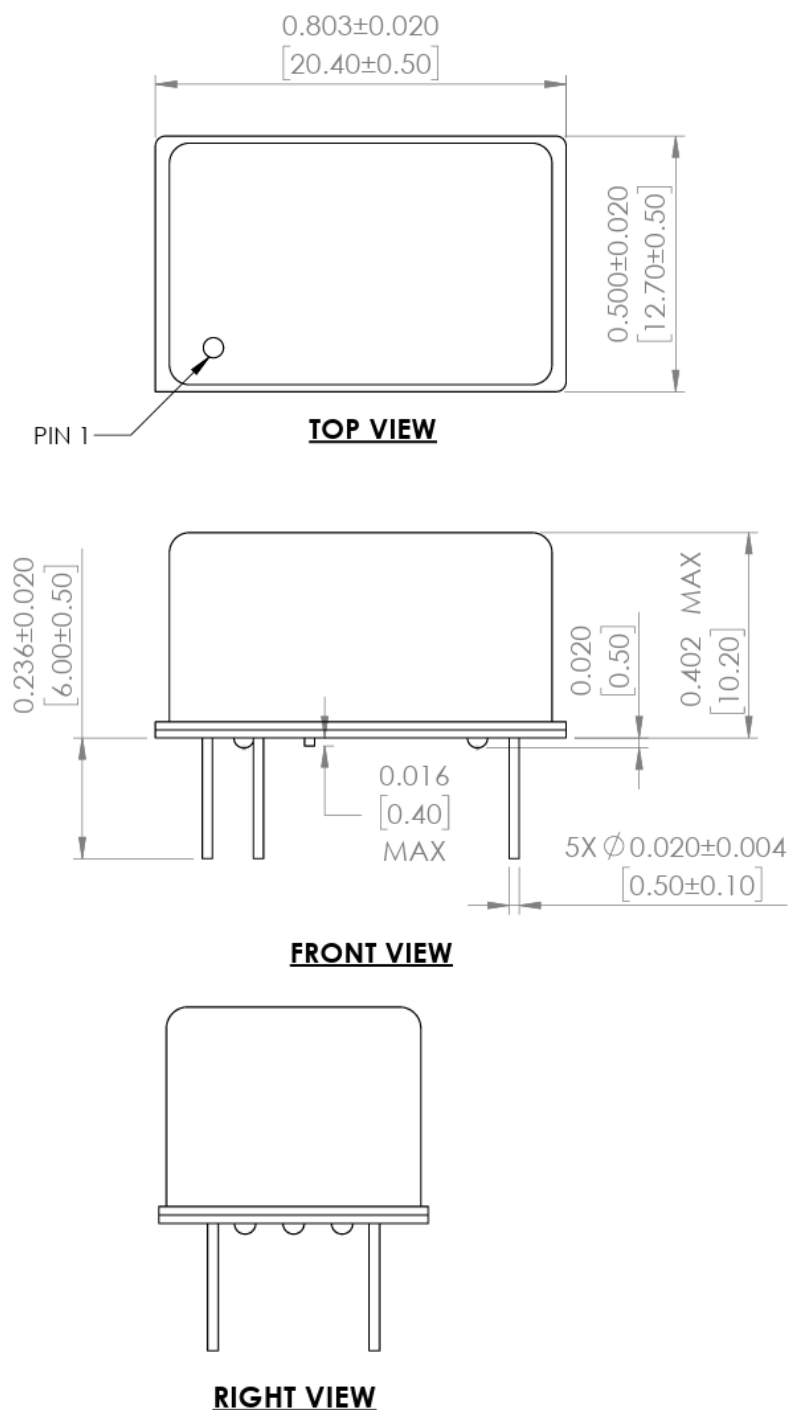
Not all combinations are available. Consult Factory.

Please see the table below for developed part numbers.

| Developed Part Numbers    |                           |                          |
|---------------------------|---------------------------|--------------------------|
| O-C14AL-U-BS DK-10.000MHz | O-C14AL-U-BS GK-10.000MHz | O-C14AL-U-BTGK-10.000MHz |
|                           |                           |                          |
|                           |                           |                          |



## Mechanical Dimensions



| Pin # | Function                      |
|-------|-------------------------------|
| 1     | Vc                            |
| 2     | Vref                          |
| 3     | Do not connect <sup>(2)</sup> |
| 7     | GND                           |
| 8     | Output                        |
| 14    | Vcc                           |

Notes:

2\* Pin #3 is cut during the manufacturing process and is not intended for customer use.

Dimensions: inches [mm]

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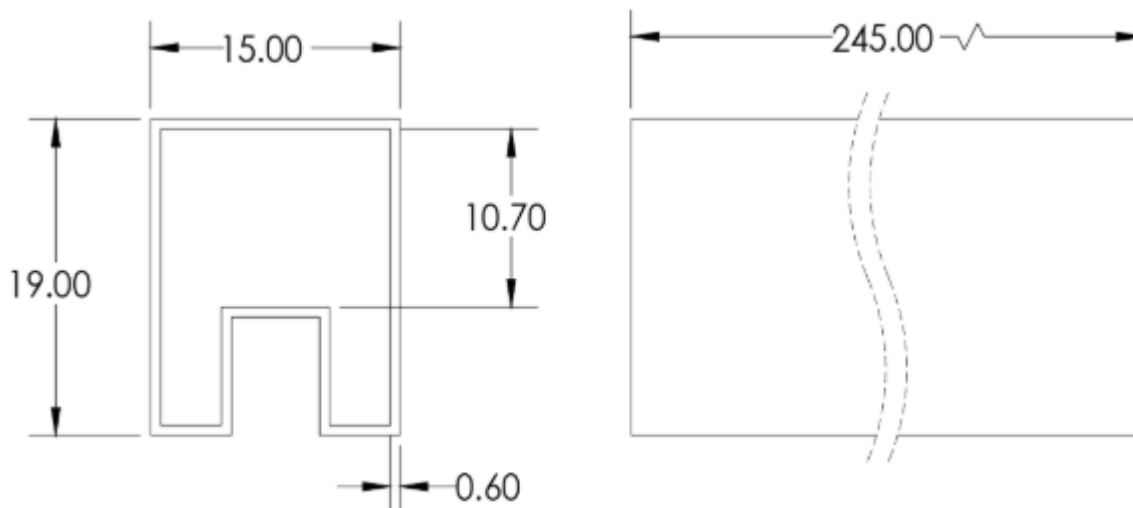


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## *Packaging*

Tube (10 pcs maximum/Tube)



Dimensions: mm