



## OeM4214-20.00M TCVCXO Oscillator

November 2010

- Pletronics' OeM4 is from the OeXO™ Series of temperature compensated voltage controlled crystal oscillator with a CMOS output.
- Tube packaging is available
- Hermetically sealed Metal Package to replace DIP/DIL OCXOs
- Supply Voltage range: 3.10 to 12.0V

**Pletronics Inc. certifies this device is in accordance with the  
RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:

Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 4.00 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020D.1

Second Level Interconnect code: e1



### Absolute Maximum Ratings:

| Parameter                      | Unit                              |
|--------------------------------|-----------------------------------|
| V <sub>CC</sub> Supply Voltage | -0.5V to +12.0V                   |
| V <sub>CONTROL</sub> Voltage   | -0.5V to +3.0V or limited to ±5mA |
| V <sub>O</sub> Output Voltage  | -0.5V to +6.0V                    |

### Thermal Characteristics

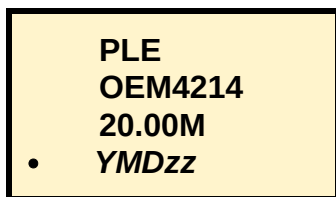
The maximum die or junction temperature is 155°C

The thermal resistance junction to board is 120°C/Watt depending on the solder pads, ground plane and construction of the PCB.

### ESD Rating

| Model                | Minimum Voltage | Conditions              |
|----------------------|-----------------|-------------------------|
| Human Body Model     | 1500            | MIL-STD-883 Method 3115 |
| Charged Device Model | 1000            | JESD 22-C101            |

### Part Marking:



PLE = Pletronics  
 OEM4 = Model number of the series  
 20.00 = frequency in MHZ  
 4214 = Model number  
 YMD = Year, Month and Date of manufacture  
 zz = internal factory code

### Codes for Date Code YMD

| Code | 0    | 1    | 2    | 3    | 4    | Code  | A   | B   | C   | D   | E   | F   | G   | H   | J   | K   | L   | M   |
|------|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year | 2010 | 2011 | 2012 | 2013 | 2014 | Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

| Code | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  | D  | E  | F  | G  |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H  | J  | K  | L  | M  | N  | P  | R  | T  | U  | V  | W  | X  | Y  | Z  |    |
| Day  | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |    |

### Reliability: Environmental Compliance

| Parameter        | Condition                            |
|------------------|--------------------------------------|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition B |
| Vibration        | MIL-STD-883 Method 2007, Condition A |
| Solderability    | MIL-STD-883 Method 2003              |
| Thermal Shock    | MIL-STD-883 Method 1011, Condition A |

### Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)

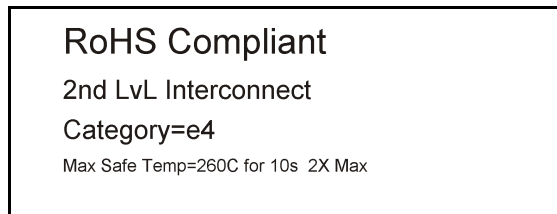
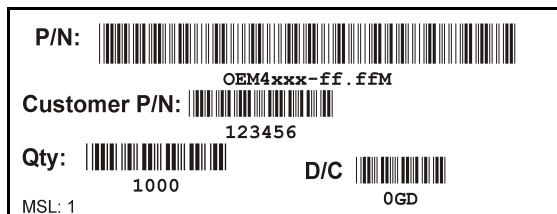
Font is Courier New

Bar code is 39-Full ASCII

The bar code will show the actual Part Number OEM4214-20.00M

Label is 1" x 2.6" (25.4mm x 66.7mm)

Font is Arial

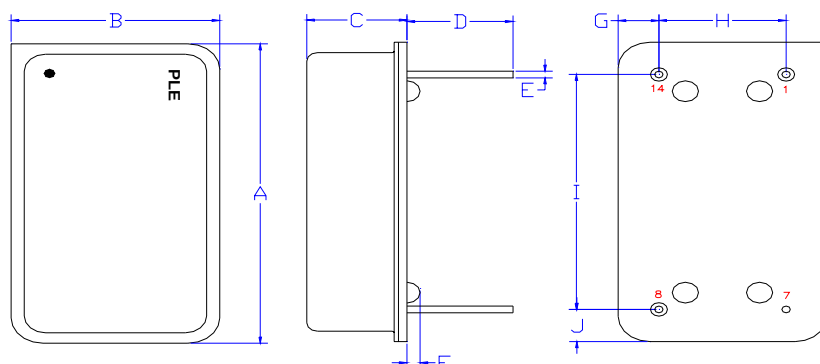


### Electrical Specification over the specified temperature range.

| Item                                                                 | Min                        | TYP                                        | Max                        | Unit            | Condition                                                                                                                   |
|----------------------------------------------------------------------|----------------------------|--------------------------------------------|----------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------|
| Frequency Stability over temperature                                 | -250                       | -                                          | 250                        | ppb             | Over -40°C to 85°C<br>at fixed supply voltage + load (reference to midpoint min/max frequency)                              |
| Holdover                                                             | -250<br>-125               | 0<br>0                                     | 250<br>125                 | ppb<br>ppb      | Over -40°C to 85°C for 24 hours<br>Over $\pm 5^\circ\text{C}$ change for 24 hours                                           |
| Frequency Calibration                                                | -2.0                       | -                                          | 2.0                        | ppm             | Frequency offset at 25°C, 60 minutes after reflow.                                                                          |
| Supply voltage stability                                             | -10                        | 0                                          | 10                         | ppb             | $\pm 2\%$ variation in supply voltage                                                                                       |
| Load sensitivity                                                     | -5                         | -                                          | 5                          | ppb             | 10K ohm $\pm 10\%$    15 pF $\pm 10\%$                                                                                      |
| Warm Up                                                              | -                          | 0.4                                        | 3.0                        | S               | Time to reach specified frequency                                                                                           |
| Aging rate following reflow                                          | -<br>-<br>-                | $\pm 10$<br>$\pm 3$<br>$\pm 1$             | -<br>-<br>-                | ppb/day         | 1 day after reflow<br>7 days after reflow<br>30 days after reflow                                                           |
| Long term stability (Aging)                                          | -1000<br>-1500<br>-4600    | -<br>-<br>-                                | 1000<br>1500<br>4600       | ppb             | after 1 year<br>after 5 years<br>after 15 years                                                                             |
| Output Waveform                                                      | CMOS                       |                                            |                            |                 |                                                                                                                             |
| Output $V_{\text{HIGH}}$                                             | 2.80                       | -                                          | -                          | V               | Load: 10K ohm $\pm 10\%$    15 pF $\pm 10\%$<br>Vth: $T_R$ and $T_F$ 10% and 90% of amplitude<br>Vth: D.C. 50% of amplitude |
| Output $V_{\text{LOW}}$                                              | -                          | -                                          | 0.20                       | V               |                                                                                                                             |
| $T_{\text{RISE}}$ and $T_{\text{FALL}}$                              | -                          | -                                          | 4.0                        | nS              |                                                                                                                             |
| Duty Cycle                                                           | 40                         | 50                                         | 60                         | %               |                                                                                                                             |
| Phase Noise<br>1 Hz<br>10 Hz<br>100 Hz<br>1 KHz<br>10 KHz<br>100 KHz | -<br>-<br>-<br>-<br>-<br>- | -71<br>-92<br>-115<br>-135<br>-148<br>-149 | -<br>-<br>-<br>-<br>-<br>- | dBc/Hz          | at 25°C                                                                                                                     |
| Jitter                                                               | -                          | -                                          | 0.6                        | pS              | Frequency offset from carrier 12kHz to 20MHz                                                                                |
| V Supply Range <sup>1</sup> $V_{\text{CC}}$                          | 3.10                       | -                                          | 12.0                       | Volts           |                                                                                                                             |
| Supply Current $I_{\text{CC}}$                                       | -                          | -                                          | 5.0                        | mA              |                                                                                                                             |
| $V_{\text{CONTROL}}$ Range                                           | 0.5                        | -                                          | 2.50                       | Volts           | 1.50 volts nominal                                                                                                          |
| $V_{\text{CONTROL}}$ Input Current                                   | -50                        | -                                          | 50                         | uA              |                                                                                                                             |
| Frequency Pullability                                                | 5                          | -                                          | 10                         | $\pm\text{ppm}$ | Slope positive                                                                                                              |
| Linearity                                                            | -                          | 0.05                                       | 2.0                        | %               | In accordance with MIL-PRF-55310                                                                                            |
| Operating Temperature                                                | -40                        | -                                          | +85                        | °C              |                                                                                                                             |
| Storage Temperature                                                  | -55                        | -                                          | +95                        | °C              |                                                                                                                             |

Note: <sup>1</sup> For correct operation a 10nF supply de-coupling capacitor should be placed next to the device.

## Mechanical:



### Cover:

Kovar  
Electroless Nickel Plated  
1  $\mu$ inch (25  $\mu$ m) typical  
Resistance welded to base

### Base:

Kovar  
Glass to metal sealed leads

### Label:

Laser marked

Pin 7 Connected to case

<sup>1</sup> Nominal dimension

|                | Inches            | mm               |
|----------------|-------------------|------------------|
| A              | 0.787 $\pm$ 0.005 | 20.00 $\pm$ 0.13 |
| B              | 0.487 $\pm$ 0.005 | 12.37 $\pm$ 0.13 |
| C              | 0.225 $\pm$ 0.011 | 5.72 $\pm$ 0.28  |
| D <sup>1</sup> | 0.250             | 6.35             |
| E <sup>1</sup> | 0.020             | 0.51             |
| F <sup>1</sup> | 0.031             | 0.79             |
| G <sup>1</sup> | 0.094             | 2.37             |
| H <sup>1</sup> | 0.300             | 7.62             |
| I <sup>1</sup> | 0.600             | 15.24            |
| J <sup>1</sup> | 0.094             | 2.37             |

Not to scale

| Pin | Name                 | Function                                                                    |
|-----|----------------------|-----------------------------------------------------------------------------|
| 1   | V <sub>CONTROL</sub> | EFC, electronics frequency control. 1.5V is nominal input                   |
| 7   | Ground (case)        |                                                                             |
| 8   | Output               | CMOS output                                                                 |
| 14  | V <sub>CC</sub>      | Power supply. Be sure to bypass near the pin with 10nF low noise capacitor. |

## Layout and application information

For Optimum Stability and Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.
- minimize air flow across the device

## PCB Mounting (typical for lead free processing)

Hand soldering is recommended.

Wave solder at 255°C to 280°C with maximum wave exposure of 15 seconds

Reflow solder maximum exposure of 245°C for 15 seconds

Soldering done in a nitrogen atmosphere enhances the solder joint quality.

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### **Pletronics Purchasing**

This requires a TEW 3.2x5 20.00MHz TCXO made with the 5032D crystal. No substitution is allowed!!!

This device will be programmed and tested at Pletronics.

Based on using the On Semi Voltage regulator similar to:

NCP551SN29T1G

NCP623MN-30R2G

Output buffer Fairchild NC7SZ04

FR4 PCB assembly inside

## PLETRONICS INC. DOCUMENT CONTROL

This is the document control page. **This is not printed or part of the PDF that can be downloaded on the web site.** This is to keep the history of the datasheet document and all revisions.

Part Number Family: OeXO  
Document File Name: oem4214-20.00m.wpd  
PDF File Name: oem4214-20.00m.pdf  
Written By: D. Kenny, D. Marston, B. Gubser

### Revision History:

|                   |                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------|
| August 31, 2010   | Initial Release                                                                                         |
| November 16, 2010 | Modified the hold over specification for both a wide and narrow range and defined loads to 10K 10pF Rag |

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