



## OeM4213-19.20M 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

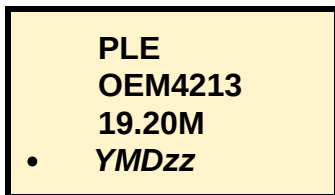
The maximum die or junction temperature is 155°C

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          |
| 19.20 | = | frequency in MHZ                    |
| 4213  | = | 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)

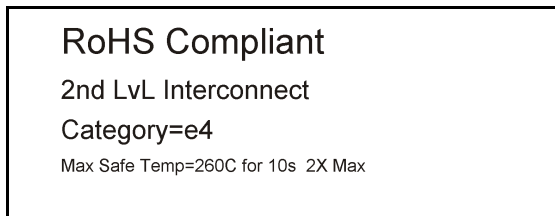
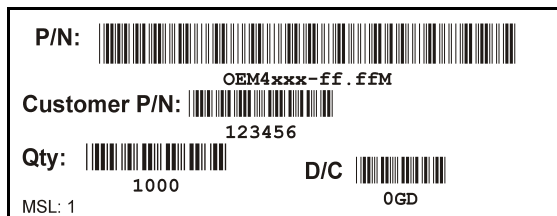
Font is Courier New

Bar code is 39-Full ASCII

The bar code will show the actual Part Number OEM4213-19.20M

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

Font is Arial

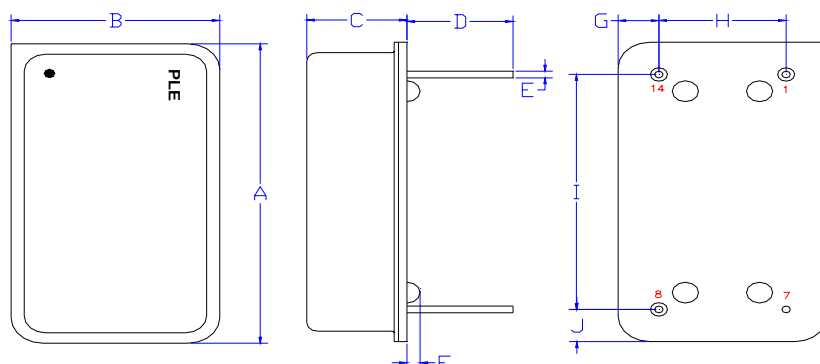


### Electrical Specification over the specified temperature range.

| 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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### **Contacting Pletronics Inc.**

Pletronics Inc.  
19013 36<sup>th</sup> Ave. West  
Lynnwood, WA 98036-5761 USA

Tel: 425-776-1880  
Fax: 425-776-2760  
E-mail: [ple-sales@pletronics.com](mailto:ple-sales@pletronics.com)  
URL: [www.pletronics.com](http://www.pletronics.com)

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