

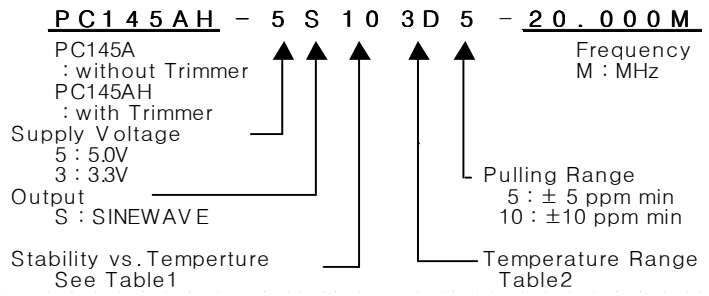
# VCTCXO

## PC145A Series

### Sinewave

### 4PAD SMD PACKAGE

#### \* PART NUMBERING GUIDE



| MECHANICAL DIMENSIONS   | ELECTRICAL SPECIFICATION  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
|---|---|-----------------|--|---|---|---|---|----------------|--|---------------------------|---|------------------------|---|---------------------------------------|--|----------------------|--|---------------------------------|--------------------|---|--|-----------------------|---|---|--------------------|----|---------------|---|---------------------|---|--------------------|----|---------------|---|---------------------|---|--------------------|----|---------------|---|---------------------|---|--------------------|----|---------------|--|--|---|--------------------|----|---------------|--|--|--|--|----|---------------|--|--|--|--|
| <p>OPTION</p> <p>PIN CONNECTION<br/>         #1 V.C<br/>         #2 GND<br/>         #3 OUTPUT<br/>         #4 Vcc</p> <p>Recommended Soldering Pattern</p> | <table border="1"> <tr> <td>Frequency range</td> <td>10.000MHz to 50.000MHz</td> </tr> <tr> <td>Frequency Stability<br/>vs. Temperature<br/>vs. Supply Voltage<br/>vs. Load<br/>vs. Aging</td> <td><math>\pm 0.5</math> ppm to <math>\pm 5.0</math>ppm<br/> <math>\pm 0.1 / \pm 0.2</math> ppm max / <math>V_{dd} \pm 5\%</math><br/> <math>\pm 0.2</math> ppm max / <math>15\text{pF} \pm 10\%</math><br/> <math>\pm 1.0</math> ppm max/ year</td> </tr> <tr> <td>Temperature Range<br/>Operating<br/>Storage</td> <td>See Table 2<br/> <math>-55^\circ\text{C}</math> to <math>125^\circ\text{C}</math></td> </tr> <tr> <td>Supply Voltage</td> <td><math>3.3\text{V} \pm 5\%</math><br/> <math>5.0\text{V} \pm 5\%</math></td> </tr> <tr> <td>Input Current<br/>Sinewave</td> <td>10.00MHz ~ 50.000MHz<br/>           12.0mA max ~ 30mA max</td> </tr> <tr> <td>Output characteristics</td> <td>Level 3.3V Sinewave<br/>           5.0V 0 dBm typ<br/>           Load 10 dBm typ<br/>           50<math>\Omega</math></td> </tr> <tr> <td>Phase Noise (typical)<br/>20MHz offset</td> <td>-80 dBc / Hz @ 10Hz<br/>           -120 dBc / Hz @ 100Hz<br/>           -135 dBc / Hz @ 1KHz<br/>           -140 dBc / Hz @ 10KHz<br/>           -145 dBc / Hz @100KHz</td> </tr> <tr> <td>Frequency Adjustment</td> <td><math>\pm 3</math>ppm min by internal trimmer (OPTION)</td> </tr> <tr> <td>Voltage Control Characteristics</td> <td></td> </tr> <tr> <td>Output Pulling Range<br/>(<math>\Delta F / \Delta V</math>)</td> <td><math>\pm 5.0</math>ppm or <math>\pm 10</math>ppm min<br/>           (<math>\Delta F / \Delta V &gt; \pm 20</math>ppm is available, please contact us)</td> </tr> <tr> <td>Control Voltage Range</td> <td><math>1.65\text{V} \pm 1.5\text{V}</math> (<math>V_{dd} : 3.3\text{V}</math>), <math>2.5\text{V} \pm 2.0\text{V}</math> (<math>V_{dd} : 5.0\text{V}</math>)</td> </tr> </table> | Frequency range | 10.000MHz to 50.000MHz                 | Frequency Stability<br>vs. Temperature<br>vs. Supply Voltage<br>vs. Load<br>vs. Aging | $\pm 0.5$ ppm to $\pm 5.0$ ppm<br>$\pm 0.1 / \pm 0.2$ ppm max / $V_{dd} \pm 5\%$<br>$\pm 0.2$ ppm max / $15\text{pF} \pm 10\%$<br>$\pm 1.0$ ppm max/ year | Temperature Range<br>Operating<br>Storage | See Table 2<br>$-55^\circ\text{C}$ to $125^\circ\text{C}$ | Supply Voltage | $3.3\text{V} \pm 5\%$<br>$5.0\text{V} \pm 5\%$ | Input Current<br>Sinewave | 10.00MHz ~ 50.000MHz<br>12.0mA max ~ 30mA max | Output characteristics | Level 3.3V Sinewave<br>5.0V 0 dBm typ<br>Load 10 dBm typ<br>50 $\Omega$ | Phase Noise (typical)<br>20MHz offset | -80 dBc / Hz @ 10Hz<br>-120 dBc / Hz @ 100Hz<br>-135 dBc / Hz @ 1KHz<br>-140 dBc / Hz @ 10KHz<br>-145 dBc / Hz @100KHz | Frequency Adjustment | $\pm 3$ ppm min by internal trimmer (OPTION) | Voltage Control Characteristics |                    | Output Pulling Range<br>( $\Delta F / \Delta V$ ) | $\pm 5.0$ ppm or $\pm 10$ ppm min<br>( $\Delta F / \Delta V > \pm 20$ ppm is available, please contact us) | Control Voltage Range | $1.65\text{V} \pm 1.5\text{V}$ ( $V_{dd} : 3.3\text{V}$ ), $2.5\text{V} \pm 2.0\text{V}$ ( $V_{dd} : 5.0\text{V}$ ) |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Frequency range   | 10.000MHz to 50.000MHz  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Frequency Stability<br>vs. Temperature<br>vs. Supply Voltage<br>vs. Load<br>vs. Aging   | $\pm 0.5$ ppm to $\pm 5.0$ ppm<br>$\pm 0.1 / \pm 0.2$ ppm max / $V_{dd} \pm 5\%$<br>$\pm 0.2$ ppm max / $15\text{pF} \pm 10\%$<br>$\pm 1.0$ ppm max/ year   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Temperature Range<br>Operating<br>Storage   | See Table 2<br>$-55^\circ\text{C}$ to $125^\circ\text{C}$   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Supply Voltage  | $3.3\text{V} \pm 5\%$<br>$5.0\text{V} \pm 5\%$  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Input Current<br>Sinewave   | 10.00MHz ~ 50.000MHz<br>12.0mA max ~ 30mA max   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Output characteristics  | Level 3.3V Sinewave<br>5.0V 0 dBm typ<br>Load 10 dBm typ<br>50 $\Omega$   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Phase Noise (typical)<br>20MHz offset   | -80 dBc / Hz @ 10Hz<br>-120 dBc / Hz @ 100Hz<br>-135 dBc / Hz @ 1KHz<br>-140 dBc / Hz @ 10KHz<br>-145 dBc / Hz @100KHz  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Frequency Adjustment  | $\pm 3$ ppm min by internal trimmer (OPTION)  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Voltage Control Characteristics   |   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Output Pulling Range<br>( $\Delta F / \Delta V$ )   | $\pm 5.0$ ppm or $\pm 10$ ppm min<br>( $\Delta F / \Delta V > \pm 20$ ppm is available, please contact us)  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Control Voltage Range   | $1.65\text{V} \pm 1.5\text{V}$ ( $V_{dd} : 3.3\text{V}$ ), $2.5\text{V} \pm 2.0\text{V}$ ( $V_{dd} : 5.0\text{V}$ )   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| <h4>OUTPUT WAVEFORM</h4>  | <h4>ENVIRONMENTAL &amp; MECHANICAL SPECIFICATION</h4> <table border="1"> <tr> <td>Shock</td> <td>MIL-STD-883C, Method 2002, Condition B</td> </tr> <tr> <td>Vibration</td> <td>MIL-STD-883C, Method 2007, Condition A</td> </tr> <tr> <td>Solderability</td> <td>MIL-STD-883C, Method 2003</td> </tr> <tr> <td>Seal integrity</td> <td>MIL-STD-883C, Method 1014, Condition C &amp; A2</td> </tr> <tr> <td>Marking</td> <td>MIL-STD-202F, Method 215</td> </tr> </table>  | Shock           | MIL-STD-883C, Method 2002, Condition B | Vibration   | MIL-STD-883C, Method 2007, Condition A  | Solderability                             | MIL-STD-883C, Method 2003                                 | Seal integrity | MIL-STD-883C, Method 1014, Condition C & A2    | Marking                   | MIL-STD-202F, Method 215                      |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Shock   | MIL-STD-883C, Method 2002, Condition B  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Vibration   | MIL-STD-883C, Method 2007, Condition A  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Solderability   | MIL-STD-883C, Method 2003   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Seal integrity  | MIL-STD-883C, Method 1014, Condition C & A2   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Marking   | MIL-STD-202F, Method 215  |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| <h4>TEST CIRCUIT</h4>   | <table border="1"> <thead> <tr> <th colspan="2">TABLE1</th> <th colspan="4">TABLE2</th> </tr> <tr> <th>Symbol</th> <th>Stability</th> <th>Symbol</th> <th>Temp.</th> <th>Symbol</th> <th>Temp.</th> </tr> </thead> <tbody> <tr> <td>05</td> <td><math>\pm 0.5</math>ppm</td> <td>0</td> <td><math>0^\circ\text{C}</math></td> <td>A</td> <td><math>50^\circ\text{C}</math></td> </tr> <tr> <td>10</td> <td><math>\pm 1.0</math>ppm</td> <td>1</td> <td><math>-10^\circ\text{C}</math></td> <td>B</td> <td><math>60^\circ\text{C}</math></td> </tr> <tr> <td>15</td> <td><math>\pm 1.5</math>ppm</td> <td>2</td> <td><math>-20^\circ\text{C}</math></td> <td>C</td> <td><math>70^\circ\text{C}</math></td> </tr> <tr> <td>20</td> <td><math>\pm 2.0</math>ppm</td> <td>3</td> <td><math>-30^\circ\text{C}</math></td> <td>D</td> <td><math>75^\circ\text{C}</math></td> </tr> <tr> <td>25</td> <td><math>\pm 2.5</math>ppm</td> <td>4</td> <td><math>-40^\circ\text{C}</math></td> <td>E</td> <td><math>80^\circ\text{C}</math></td> </tr> <tr> <td>30</td> <td><math>\pm 3.0</math>ppm</td> <td></td> <td></td> <td>F</td> <td><math>85^\circ\text{C}</math></td> </tr> <tr> <td>35</td> <td><math>\pm 3.5</math>ppm</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>50</td> <td><math>\pm 5.0</math>ppm</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>   | TABLE1          |  | TABLE2  |   |   |   | Symbol         | Stability                                      | Symbol                    | Temp.   | Symbol                 | Temp.   | 05                                    | $\pm 0.5$ ppm  | 0                    | $0^\circ\text{C}$                            | A                               | $50^\circ\text{C}$ | 10  | $\pm 1.0$ ppm  | 1                     | $-10^\circ\text{C}$   | B | $60^\circ\text{C}$ | 15 | $\pm 1.5$ ppm | 2 | $-20^\circ\text{C}$ | C | $70^\circ\text{C}$ | 20 | $\pm 2.0$ ppm | 3 | $-30^\circ\text{C}$ | D | $75^\circ\text{C}$ | 25 | $\pm 2.5$ ppm | 4 | $-40^\circ\text{C}$ | E | $80^\circ\text{C}$ | 30 | $\pm 3.0$ ppm |  |  | F | $85^\circ\text{C}$ | 35 | $\pm 3.5$ ppm |  |  |  |  | 50 | $\pm 5.0$ ppm |  |  |  |  |
| TABLE1  |   | TABLE2          |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| Symbol  | Stability   | Symbol          | Temp.                                  | Symbol  | Temp.   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 05  | $\pm 0.5$ ppm   | 0               | $0^\circ\text{C}$                      | A   | $50^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 10  | $\pm 1.0$ ppm   | 1               | $-10^\circ\text{C}$                    | B   | $60^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 15  | $\pm 1.5$ ppm   | 2               | $-20^\circ\text{C}$                    | C   | $70^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 20  | $\pm 2.0$ ppm   | 3               | $-30^\circ\text{C}$                    | D   | $75^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 25  | $\pm 2.5$ ppm   | 4               | $-40^\circ\text{C}$                    | E   | $80^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 30  | $\pm 3.0$ ppm   |                 |  | F   | $85^\circ\text{C}$  |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 35  | $\pm 3.5$ ppm   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |
| 50  | $\pm 5.0$ ppm   |                 |  |   |   |   |   |                |  |                           |   |                        |   |                                       |  |                      |  |                                 |                    |   |  |                       |   |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |   |                     |   |                    |    |               |  |  |   |                    |    |               |  |  |  |  |    |               |  |  |  |  |