

|                      |                  |         |                  |
|----------------------|------------------|---------|------------------|
| <b>Specification</b> | <b>AXLE145HF</b> | Rev.: 3 | Date: 2019-04-24 |
|----------------------|------------------|---------|------------------|

**Oscillator type: High Frequency SMD (VC)TCXO in 9x14 mm Package**  
**High Stability, Ultra-Low Jitter and Low-G Sensitivity**

| Parameter                              | min.                           | typ.                                | max.         | Unit   | Condition  |
|--|--------------------------------|-------------------------------------|--------------|--|--|
| <b>Frequency range</b> (Note 2)        | 60                             |                                     | 150          | MHz  |  |
| <b>Nominal frequencies</b>             | 100.000 / 125.000              |                                     |              | MHz  |  |
| <b>Frequency stability</b>             |                                |                                     |              |  |  |
| Initial tolerance @ +25°C              |                                |                                     | ±0.5         | ppm  | @ V <sub>C</sub> = V <sub>C</sub> typ.                   |
| vs. operating temperature range        | ±0.5 to ±5<br>See tables 2 & 3 |                                     |              | ppm  | Option 5 & 6   |
| vs. supply voltage variation           |                                |                                     | ±0.05        | ppm  | V <sub>S</sub> ±5 %                                      |
| vs. load change                        |                                |                                     | ±0.05        | ppm  | Load ±10 %   |
| Long term (aging) 1 <sup>st</sup> year |                                |                                     | ±1           | ppm  | @ +40°C  |
| Long term (aging) 10 years             |                                |                                     | ±4           | ppm  | @ +40°C  |
| <b>Frequency adjustment range</b>      |                                |                                     |              |  |  |
| Electronic Frequency Control (EFC)     | ±5                             |                                     |              | ppm  | Option 1 = "V"   |
| EFC voltage V <sub>C</sub>             | 0.5                            | 1.5                                 | 2.5          | V  | Option 2 = "33"  |
|  | 0.5                            | 2.5                                 | 4.5          | V  | Option 2 = "50"  |
| EFC slope (Δf / ΔV <sub>C</sub> )      | Positive                       |                                     |              |  |  |
| EFC input impedance                    | 100                            |                                     |              | kΩ   |  |
| <b>RF output</b>                       |                                |                                     |              |  |  |
| Signal waveform                        | Sine Wave<br>(LV)HCMOS         |                                     |              |  | Option 3 = "S"<br>Option 3 = "H"                         |
| Load                                   | 50 Ω<br>15 pF                  |                                     |              |  | Option 3 = "S"<br>Option 3 = "H"                         |
| Output level                           | +3                             | +6                                  |              | dBm  | Option 3 = "S"   |
| Harmonics                              |                                | -40                                 | -30          | dBc  |  |
| Duty cycle                             | 45                             |                                     | 55           | %  | Option 3 = "H"   |
| Rise/fall time                         |                                |                                     | 5            | ns   |  |
| Sub-Harmonics                          |                                | -70                                 | -60          | dBc  |  |
| Spurious                               |                                |                                     | -80          | dBc  |  |
| Phase noise @ 100 MHz (Note 3)         |                                | -78<br>-105<br>-130<br>-152<br>-178 |              | dBc/Hz<br>dBc/Hz<br>dBc/Hz<br>dBc/Hz<br>dBc/Hz | @ 10 Hz<br>@ 100 Hz<br>@ 1 kHz<br>@ 10 kHz<br>@ ≥100 kHz |
| RMS Phase Jitter @ 100 MHz             |                                | 10                                  |              | fs   | 12 kHz ~ 20 MHz  |
| <b>G-Sensitivity</b>                   | See table 1                    |                                     |              |  | Option 4   |
| <b>Supply voltage V<sub>S</sub></b>    | 3.15<br>4.75                   | 3.3<br>5.0                          | 3.45<br>5.25 | V<br>V   | Option 2 = "33"<br>Option 2 = "50"                       |
| <b>Current consumption</b>             |                                |                                     | 50           | mA   | Option 2 = "33" & "50"                                   |
| <b>Enclosure (see drawing) (LxWxH)</b> | 14.4x9.5x6.5 max.              |                                     |              | mm   | IEC 61837 CO 27  |
| <b>Weight</b>                          |                                |                                     | 5            | g  |  |
| <b>Packing</b>                         | Tape & Reel                    |                                     |              |  | IEC 60286-3  |

**Notes:**

1. Terminology and test conditions are according to IEC60679-1 and MIL-PRF-55310, unless otherwise stated
2. Frequencies up to 200 MHz with sine wave output on request
3. For phase noise of other frequencies please consult factory

### Absolute Maximum Ratings

| Parameter             | min. | max.         | Unit | Condition    |
|-----------------------|------|--------------|------|--------------|
| Supply Voltage $V_s$  | -0.5 | $V_s + 10\%$ | V    | $V_s$ to GND |
| Control Voltage $V_c$ | -0.5 | 6            | V    | $V_c$ to GND |
| Storage Temperature   | -55  | +105         | °C   |              |

### G-Sensitivity

| Option 4 | G-Sensitivity worst axis | Unit  |
|----------|--------------------------|-------|
| N        | Not required             | -     |
| A        | 0.8                      | ppb/g |
| B        | 0.5                      | ppb/g |
| C        | 0.4                      | ppb/g |
| D        | 0.3                      | ppb/g |
| E        | 0.2                      | ppb/g |

Table 1

### Frequency stability vs. temperature

| Option 5 | Stability [ppm] |
|----------|-----------------|
| 05       | ±0.5            |
| 10       | ±1.0            |
| 15       | ±1.5            |
| 20       | ±2.0            |
| 25       | ±2.5            |
| 30       | ±3.0            |
| 35       | ±3.5            |
| 50       | ±5.0            |

Table 2

| Lower Temperature |        | Upper Temperature |        |
|-------------------|--------|-------------------|--------|
| Option 6          | T [°C] | Option 6          | T [°C] |
| 0                 | 0      | A                 | +50    |
| 1                 | -10    | B                 | +60    |
| 2                 | -20    | C                 | +70    |
| 3                 | -30    | D                 | +75    |
| 4                 | -40    | E                 | +80    |
|                   |        | F                 | +85    |
|                   |        |                   |        |
|                   |        |                   |        |

Table 3

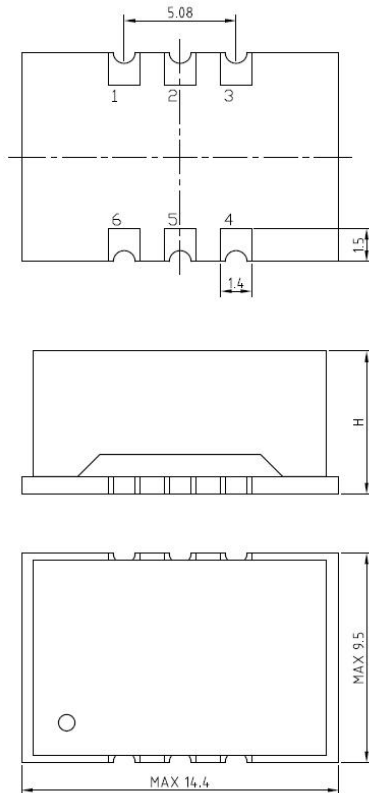
### Ordering Code

| Model     | Option 1 [EFC] | Option 2 [Supply voltage] | Option 3 [RF output] | Option 4 [G-Sensitivity] |
|-----------|----------------|---------------------------|----------------------|--------------------------|
| AXLE145HF | _ or "V"       | 33 or 50                  | "S" or "H"           | Table 1                  |

| Option 5 [Stability] | Option 6 [Temperature range] | Revision | Frequency [MHz] |
|----------------------|------------------------------|----------|-----------------|
| Table 2              | Table 3                      | Rev.3    | 100.000         |

Example: AXLE145HF-V-33-S-B-10-4F\_Rev.3 – 100.000 MHz

## Enclosure drawing



## Pin connections

| Pin # | Symbol         | Function              |
|-------|----------------|-----------------------|
| 1     | V <sub>c</sub> | Control Voltage (EFC) |
| 2     | D.N.C.         | Do Not Connect        |
| 3     | GND            | Ground                |
| 4     | RF OUT         | RF Output             |
| 5     | D.N.C.         | Do Not Connect        |
| 6     | V <sub>s</sub> | Supply Voltage        |

## Handling and Testing

| Parameter                     | Procedure   |     | Source        |
|-------------------------------|---|-----|---------------|
| Handling and Testing          | Application Note AXAN-011   |     | www.axtal.com |
| Processing                    | Application Note AXAN-012   |     | www.axtal.com |
| Parameter                     | Procedure   |     | Condition     |
| Electrostatic discharge (ESD) |   |     |               |
| THD devices                   | IEC60749-26   | HBM | 2000 V        |
| SMD devices                   | IEC60749-27   | MM  | 200 V         |
| Washable                      | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |     |               |
| RoHS compliant                | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |     |               |

## Environmental conditions

| Test  | IEC 60068 Part ... | IEC 60679-1 Clause | MIL-STD-202G Method | MIL-STD-810F Method | MIL-PRF-55310D Clause | Test conditions (IEC)  |
|---|--------------------|--------------------|---------------------|---------------------|-----------------------|--|
| Sealing tests (if applicable)                   | 2-17               | 5.6.2              | 112E                |                     | 3.6.1.2               | Gross leak: Test Qc,<br>Fine leak: Test Qk   |
| Solderability<br>Resistance to soldering heat   | 2-20<br>2-58       | 5.6.3              | 208H<br>210F        |                     | 3.6.52<br>3.6.48      | Test Ta Method 1<br>Test Td <sub>1</sub> Method 2<br>Test Td <sub>2</sub> Method 2 |
| Shock*  | 2-27               | 5.6.8              | 213B                | 516.4               | 3.6.40                | Test Ea, 3 x per axes 100g,<br>6 ms half-sine pulse                                |
| Vibration, sinusoidal*                          | 2-6                | 5.6.7.1            | 201A<br>204D        | 516.4-4             | 3.6.38.1<br>3.6.38.2  | Test Fc, 30 min per axes,<br>10 Hz - 55 Hz 0,75mm; 55 Hz - 2 kHz, 10g              |
| Vibration, random*                              | 2-64               | 5.6.7.3            | 214A                | 514.5               | 3.6.38.3<br>3.6.38.4  | Test Fdb   |
| Endurance tests<br>- ageing<br>- extended aging |                    | 5.7.1<br>5.7.2     | 108A                |                     | 4.8.35                | 30 days @ 85°C, OCXO @25°C<br>1000h, 2000h, 8000h @85°C                            |

Other environmental conditions on request

Data sheet is for information purposes only and may be subject to modifications or may be discontinued without notice.

## Revision History

| Rev. | Drawing | Date<br>[dd.mm.yyyy] | Remarks  | Author | Checked |
|------|---------|----------------------|--|--------|---------|
| 1    | D0      | 07.11.2018           | First issue  | HH     | HH      |
| 2    | D0      | 05.03.2019           | Options for supply voltage and stability over temperature range added          | BN     | BN      |
| 3    | D0      | 24.04.2019           | Current consumption corrected, typical values updated, package drawing updated | HH     | HH      |