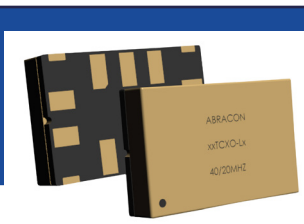
# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO




ABDFTCXO/ABDFVCTCXO SERIES

**9.0 x 14.0 x 3.0mm**

**RoHS/RoHS II Compliant**

**ESD SENSITIVE**

**MSL = 3**

## FEATURES

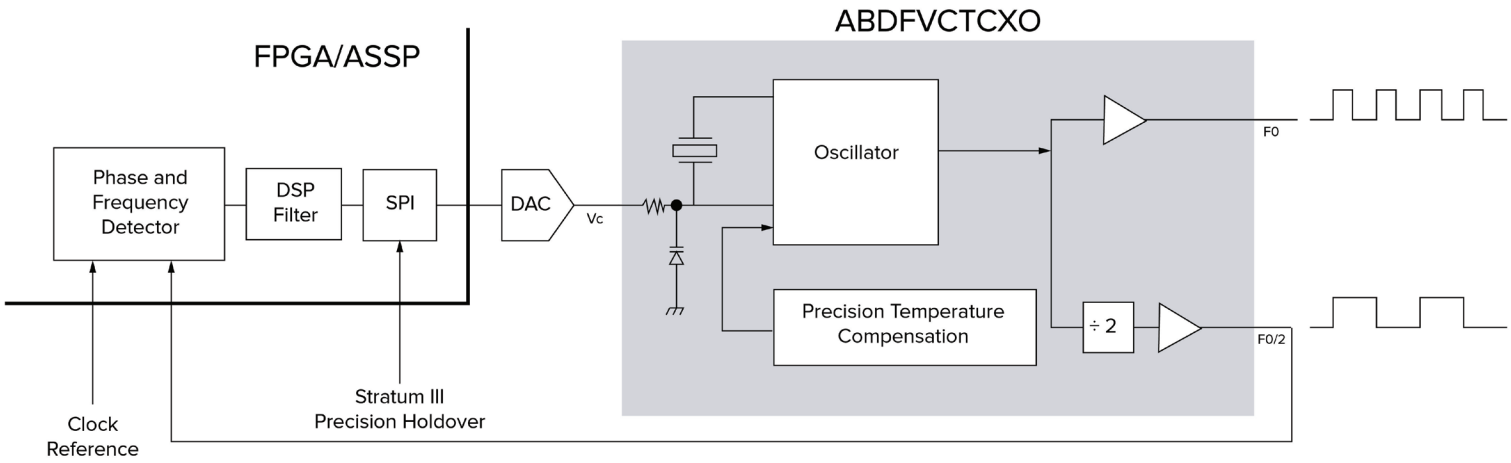
- Phase and frequency coherent dual output
- F0 and F0÷2 with integrated precision fanout buffers
- Meets ±280ppb Stratum-III stability requirements
- Excellent ±1ppm aging with ±4.6ppm guaranteed lifetime accuracy
- 5 to 52MHz standard and custom frequencies available
- TCXO or VCTCXO functionality available
- ±5ppm minimum pull with 0.5% typ linearity (VCTCXO only)
- LVCMOS outputs
- 10pin package
- -40°C to 85°C operation

## APPLICATIONS

- Communications and Networking
- Synchronization
- PLL with Holdover
- Geolocation, RTLS, GPS
- Synchronous Ethernet
- IEEE1588
- Instrumentation, test and measurement
- Femtocells, picocells (BTS)
- Oil and gas exploration

## TYPICAL OPERATING CIRCUIT

### DIGITAL FPGA BASED PLL WITH PRECISION STRATUM-III HOLDOVER




## OPTIONS AND PART IDENTIFICATION

**ABDFTCXO OR ABDFVCTCXO - ☐ MHz - ☐ - ☐ - ☐**

| OUTPUT 1 ($F_0$) IN MHZ |
|---|
| Please specify the frequency Output 1 (F0) in MHz e.g. 16.384MHz |

***F0 > 40MHz, available in Q4-2017**

| OPERATING TEMP. RANGE |
|---|
| E: -20°C to +70°C |
| L: -40°C to +85°C |

| FREQ. STABILITY |
|---|
| 1: ±100ppb* |
| 2: ±280ppb |

***Available Q4-2017**

| PACKAGING |
|---|
| Blank: Bulk** |
| T5: 500 pcs/reel |
| T2: 250 pcs/reel |
| CT: Cut Tape*** |

****Bulk devices are not in MSL-3 compliant packaging**

*****Cut Tape devices available in 25pc, 50pc, & 100pc quantities (MSL-3 compliant)**

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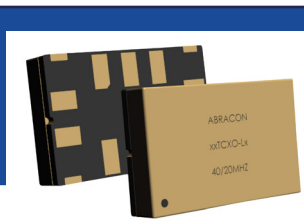

**9.0 x 14.0 x 3.0mm**

**RoHS/RoHS II Compliant**

**ESD SENSITIVE**

**MSL = 3**

## STANDARD SPECIFICATIONS

| PARAMETERS | RATING |
|---|---|
| Storage Temperature Range (Ts) | -55°C to +125°C |
| Supply Voltage (Vdd) | -0.5V to 6V |
| Control Voltage (Vc) | 0V to 3V |
| ESD, HBM/CDM/MM | 4kV/2kV/200V |

| PARAMETERS | MINIMUM | TYPICAL | MAXIMUM | UNITS | NOTES |
|---|---|---|---|---|---|
| Frequency Range | 5.000 | | 52.000 | MHz | |
| Standard Frequencies [Output 1($F_0$)/Output 2 ($F_0$/2)] | 10.000/5.000<br>16.384/8.192<br>20.000/10.000<br>26.000/13.000<br>38.400/19.200<br>50.000/25.000 | 12.800/6.400<br>19.200/9.600<br>24.576/12.288<br>30.000/15.000<br>38.880/19.440<br>52.000/26.000 | 16.000/8.000<br>19.440/9.720<br>25.000/12.500<br>30.720/15.360<br>40.000/20.000 | MHz | Custom frequencies available upon request. Please contact Abracon. *Note 1 |
| Supply Voltage (Vdd) | +3.135 | +3.3 | +3.465 | V | |
| Supply Current (Icc) (into 15pF load ) | | | 20 | mA | Carrier dependent |
| Initial Frequency Tolerance @ +25°C | -0.50 | | +0.50 | ppm | As received, Relative to carrier |
| Operating Temperature | -20 | | +70 | °C | Option “E” |
| | -40 | | +85 | | Option “L” |
| Frequency Stability vs. Operating Temperature ( ref. to +25°C ) | -100 | | +100 | ppb | Option “1” *Note 2 |
| | -280 | | +280 | ppb | Option “2” |
| Frequency Stability vs. Vdd Change | -100 | | +100 | ppb | Vdd ±5% |
| Frequency Stability vs. Load Change | -200 | | +200 | ppb | Load ±5% |
| Aging (1st year @ +25°C) | -1.0 | | +1.0 | ppm | |
| Aging (10 years @ +25°C) | -3.0 | | +3.0 | ppm | |
| All-inclusive frequency stability over 10 years product life (Stratum-III Compliant) | -4.60 | | +4.60 | ppm | |
| **LVCMOS Output (Square wave)** | | | | | |
| $V_{OH}$ | 2.4 | | | V | Load = 15pF |
| $V_{OL}$ | | | 0.4 | V | Load = 15pF |
| Load | | | 15 | pF | |
| Duty Cycle | 45 | | 55 | % | @ ($V_{OH}$ - $V_{OL}$)/2 |
| Rise/Fall Time | | | 6 | ns | Load = 15pF |
| **Control Port (Applicable for VCTCXO only)** | | | | | |
| Center Control Voltage (Vc) | | +1.50 | | V | |
| Control Voltage Range (Vc) | +0.50 | | +2.50 | V | |
| Frequency Pull | ±5.00 | | < ±13.00 | ppm | Vc = 1.5V±1.0V |
| Tuning Slope | | Positive | | | |
| Linearity Error | | < 0.5 | 10 | % | |

***Note 1: F0 > 40MHz, available in Q4-2017 | *Note 2: Available Q4-2017**

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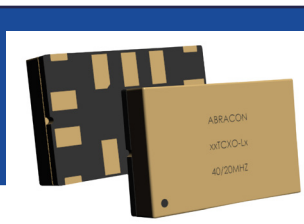


**9.0 x 14.0 x 3.0mm**

**RoHS/RoHS II Compliant**

**ESD SENSITIVE**

**MSL = 3**

## STANDARD SPECIFICATIONS (CONT.)

| PARAMETERS | MINIMUM | TYPICAL | MAXIMUM | UNITS | NOTES |
|---|---|---|---|---|---|
| **RMS Jitter (12kHz ~ 20MHz BW) @ 25°C** | | | | | |
| 16.384 MHz Carrier | | 650 | 1,300 | fs | |
| 20.000 MHz Carrier | | 525 | 1,300 | fs | |
| 10.000 MHz Carrier | | 650 | 1,300 | fs | |
| 26.000 MHz Carrier | | 450 | 1,300 | fs | |
| 13.000 MHz Carrier | | 775 | 1,300 | fs | |
| 40.000 MHz Carrier | | 325 | 1,300 | fs | |
| 20.000 MHz Carrier | | 450 | 1,300 | fs | |
| **Phase Noise** | | | | | |
| $F_0$ @ 20.000 MHz | | -85 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -135 | | | Offset @1kHz |
| | | -145 | | | Offset @10kHz |
| | | -150 | | | Offset @100kHz |
| | | -155 | | | Offset @ 5MHz |
| $F_0$/2 @ 10.000 MHz | | -90 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -135 | | | Offset @1kHz |
| | | -145 | | | Offset @10kHz |
| | | -150 | | | Offset @100kHz |
| | | -155 | | | Offset @ 5MHz |
| $F_0$ @ 26.000 MHz | | -85 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -135 | | | Offset @1kHz |
| | | -145 | | | Offset @10kHz |
| | | -150 | | | Offset @100kHz |
| | | -150 | | | Offset @ 5MHz |
| $F_0$/2 @ 13.000 MHz | | -75 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -135 | | | Offset @1kHz |
| | | -150 | | | Offset @10kHz |
| | | -150 | | | Offset @100kHz |
| | | -155 | | | Offset @ 5MHz |
| $F_0$ @ 40.000 MHz | | -80 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -125 | | | Offset @1kHz |
| | | -140 | | | Offset @10kHz |
| | | -150 | | | Offset @100kHz |
| | | -150 | | | Offset @ 5MHz |
| $F_0$/2 @ 20.000 MHz | | -80 | | dBc/Hz | Offset @10Hz |
| | | -100 | | | Offset @100Hz |
| | | -135 | | | Offset @1kHz |
| | | -140 | | | Offset @10kHz |
| | | -145 | | | Offset @100kHz |
| | | -155 | | | Offset @ 5MHz |

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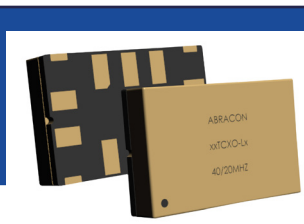



ABDFTCXO/ABDFVCTCXO SERIES

**9.0 x 14.0 x 3.0mm**

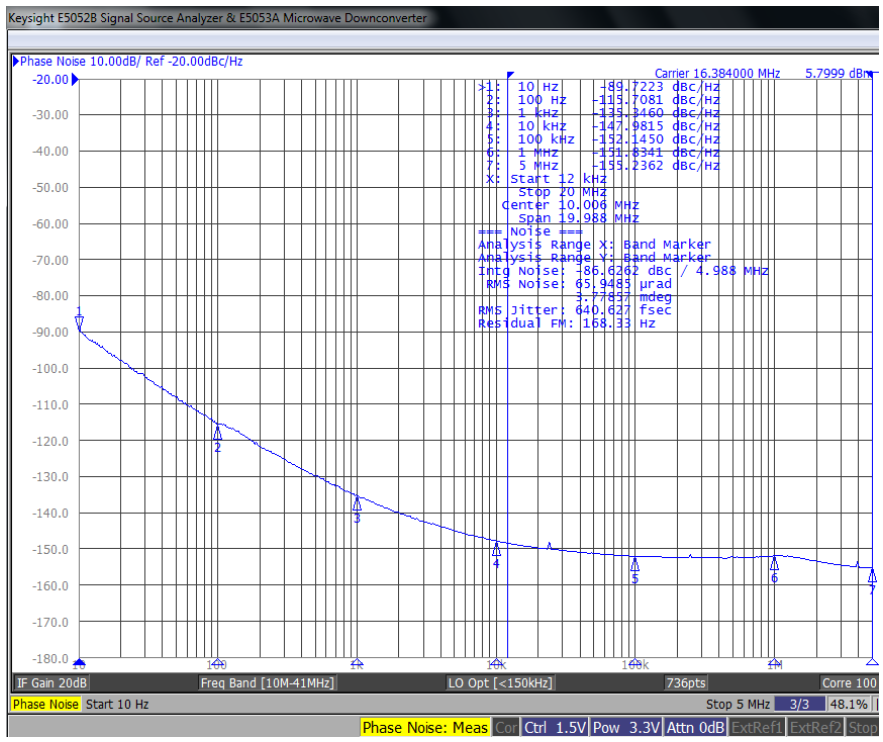
**RoHS/RoHS II Compliant**

**ESD SENSITIVE**

**MSL = 3**

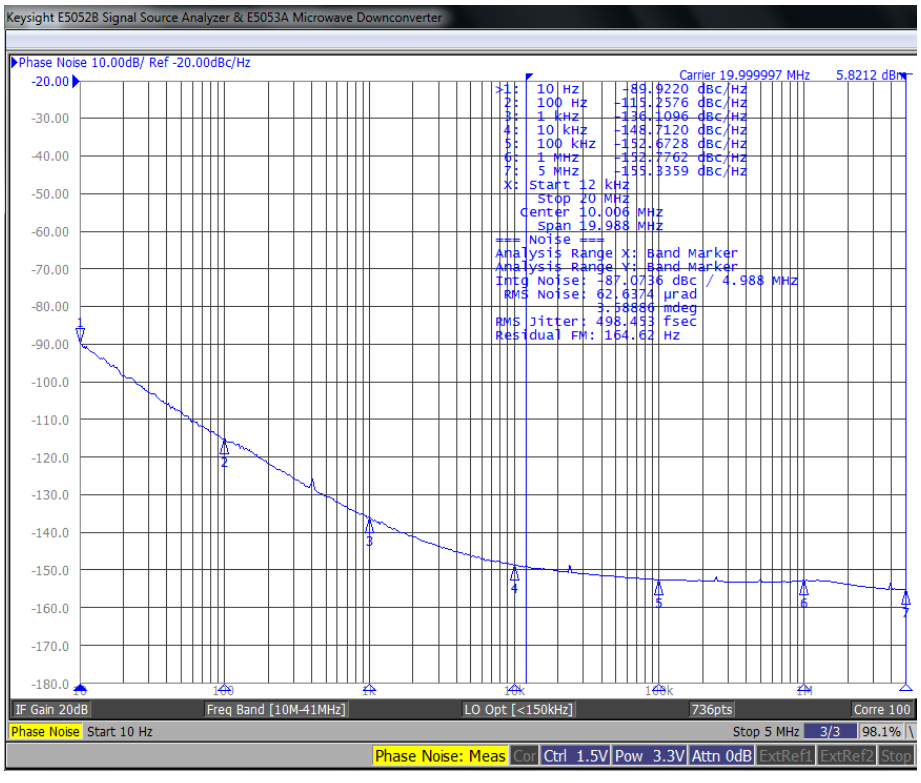
## TYPICAL PHASE NOISE & JITTER CHARACTERISTICS

### 16.384MHz
**[Output 1 (F0)]**

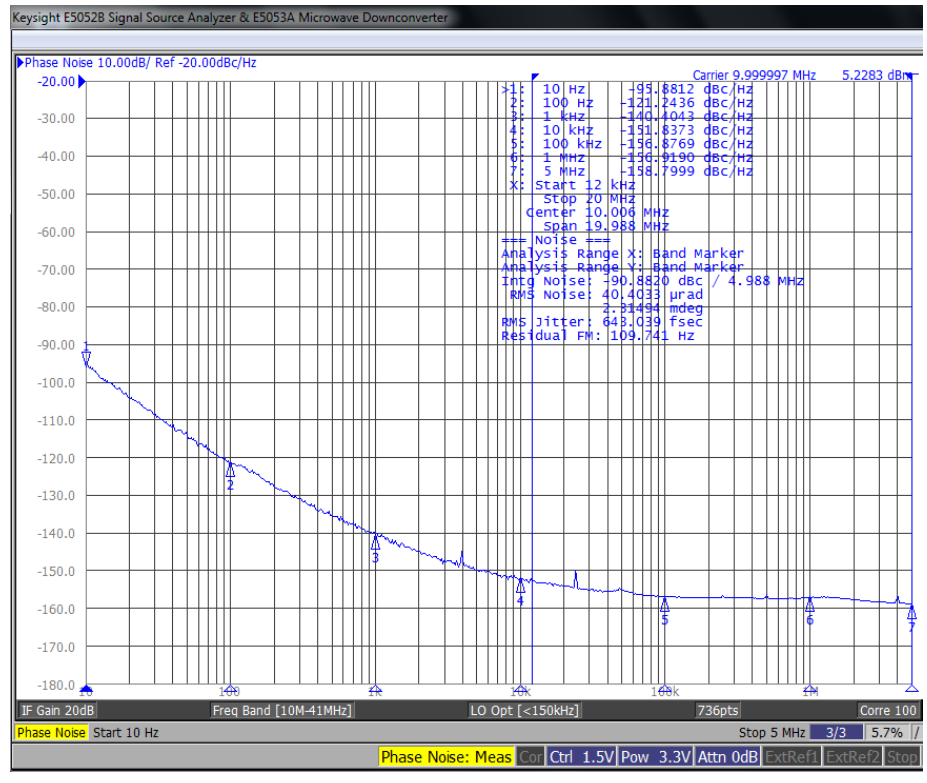



### 20.000MHz / 10.000MHz
**[Output 1 (F0) / Output 2 (F0/2)]**

### 20.000MHz




### 10.000MHz

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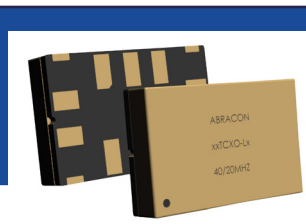


ABDFTCXO/ABDFVCTCXO SERIES

**9.0 x 14.0 x 3.0mm**

**RoHS/RoHS II Compliant**

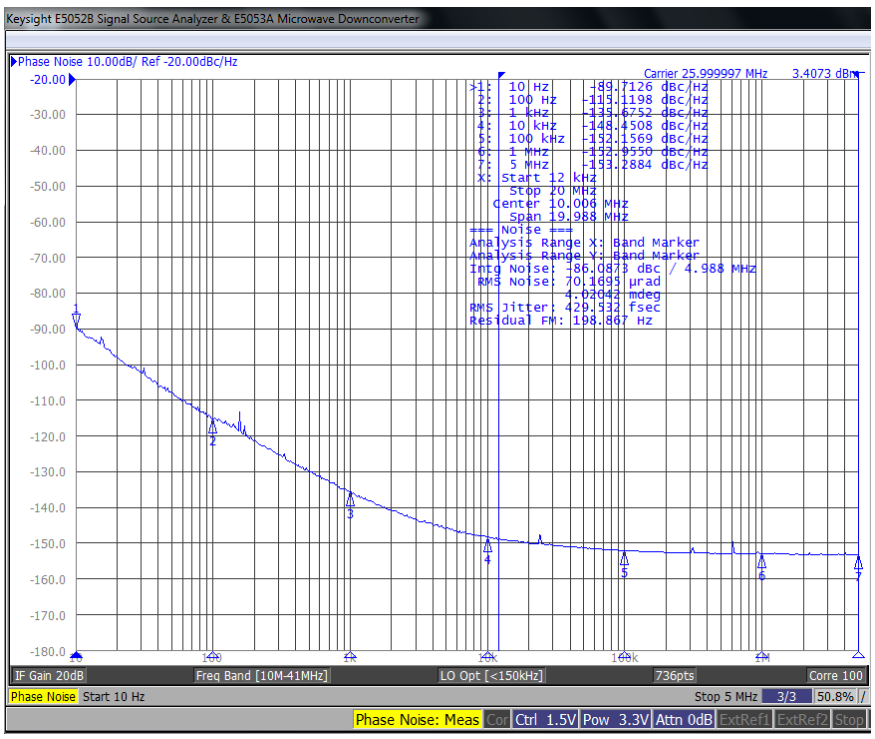
**ESD SENSITIVE**

**MSL = 3**

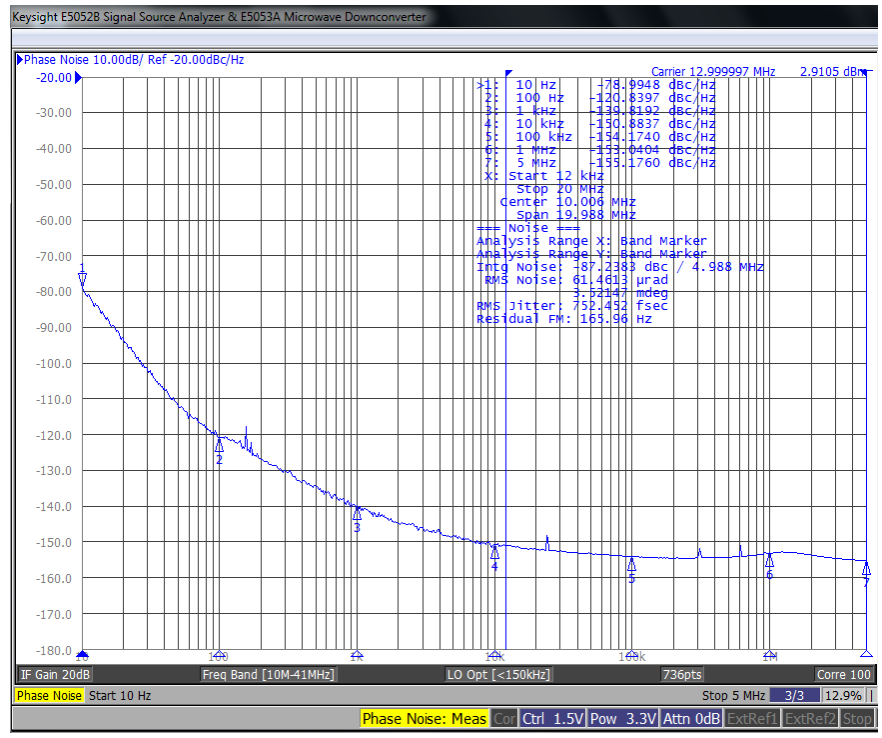
## TYPICAL PHASE NOISE & JITTER CHARACTERISTICS

**26.000MHz / 13.000MHz**
**[Output 1 (F0) / Output 2 (F0/2)]**

**26.000MHz**

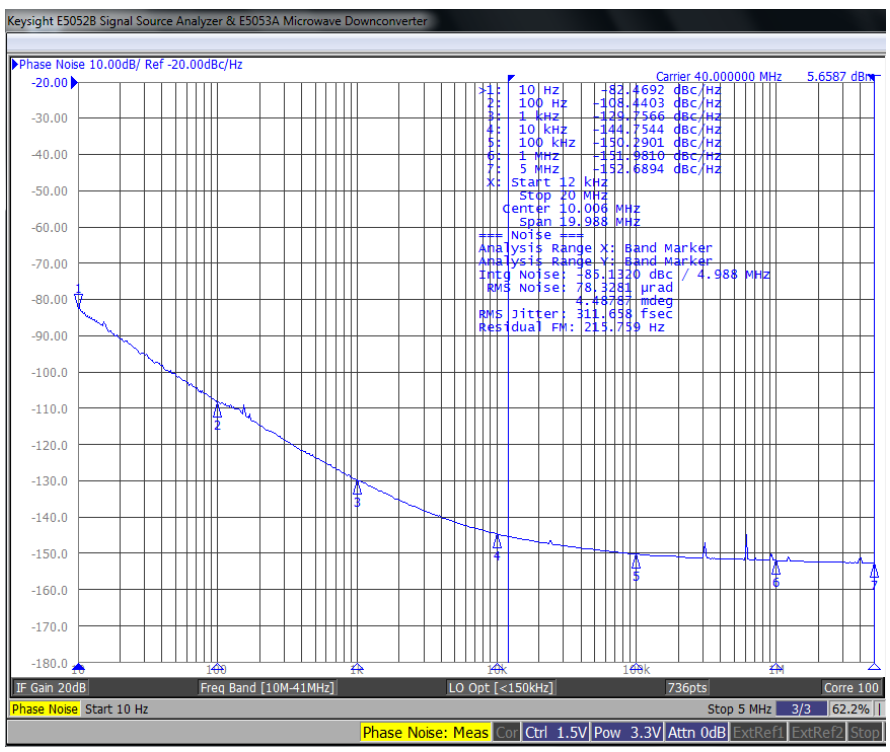



**13.000MHz**

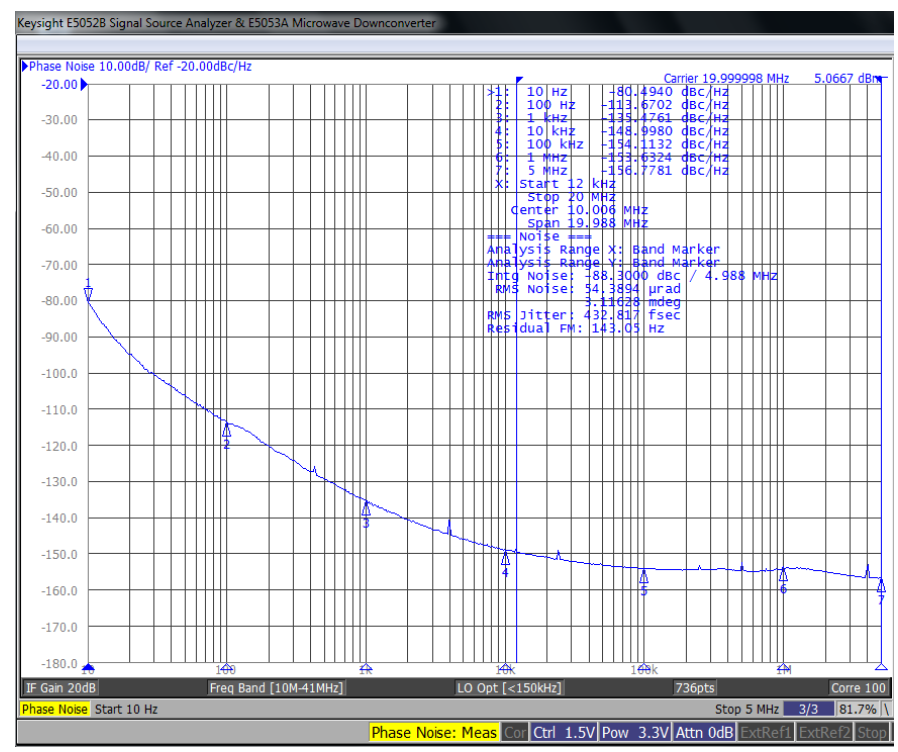



**40.000MHz / 20.000MHz**
**[Output 1 (F0) / Output 2 (F0/2)]**

**40.000MHz**




**20.000MHz**




| Frequency | 16.384MHz | 20MHz | 10MHz | 26MHz | 13MHz | 40MHz | 20MHz |
|---|---|---|---|---|---|---|---|
| Typical rms Phase Jitter (12kHz to 20MHz BW) | 640 fs | 498 fs | 643 fs | 429 fs | 752 fs | 311 fs | 432 fs |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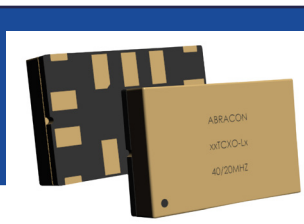


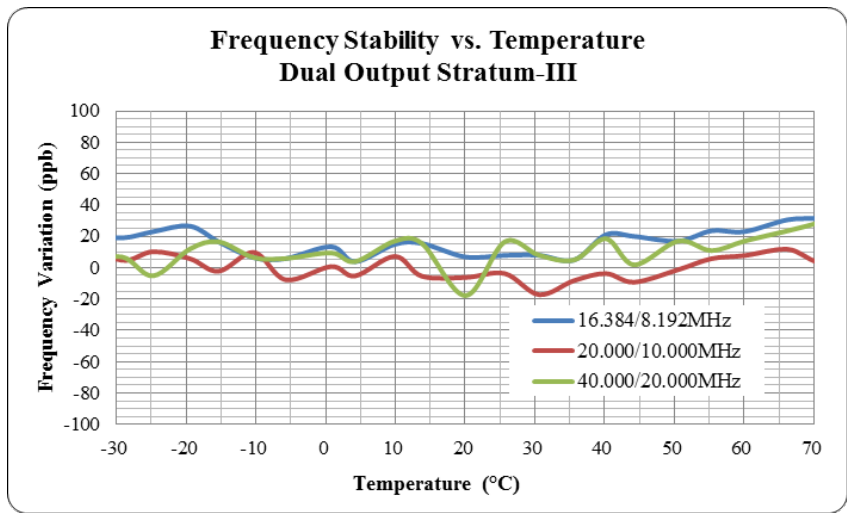

**9.0 x 14.0 x 3.0mm**

**RoHS/RoHS II Compliant**

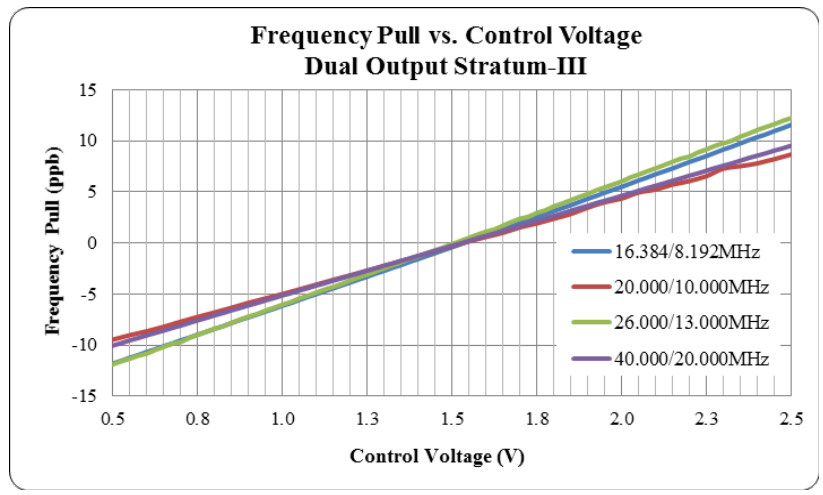
**ESD SENSITIVE**

**MSL = 3**

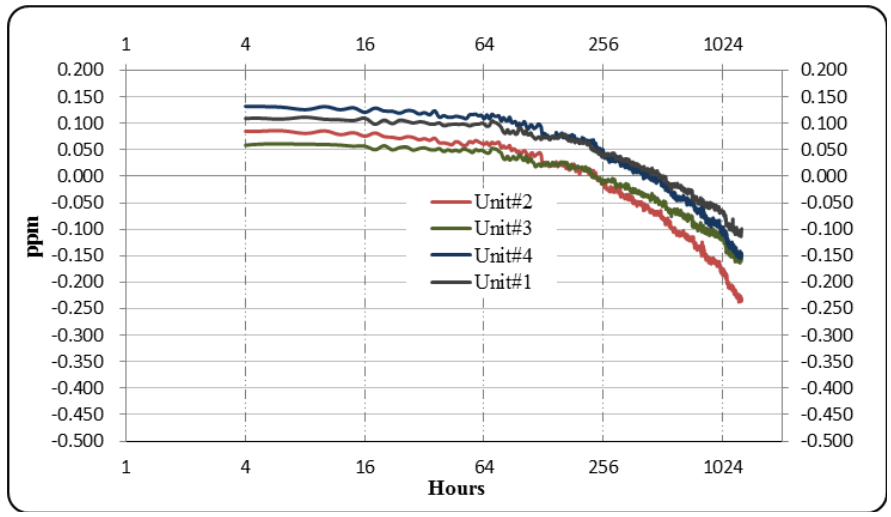
## FREQUENCY STABILITY VS. TEMPERATURE




## FREQUENCY PULL VS. CONTROL VOLTAGE (VCTCXO MODE)




## AGING PROFILE (ACCELERATED AGING @ +85°C)

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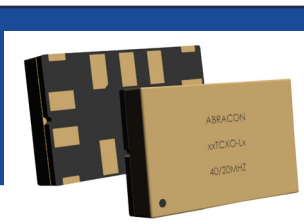

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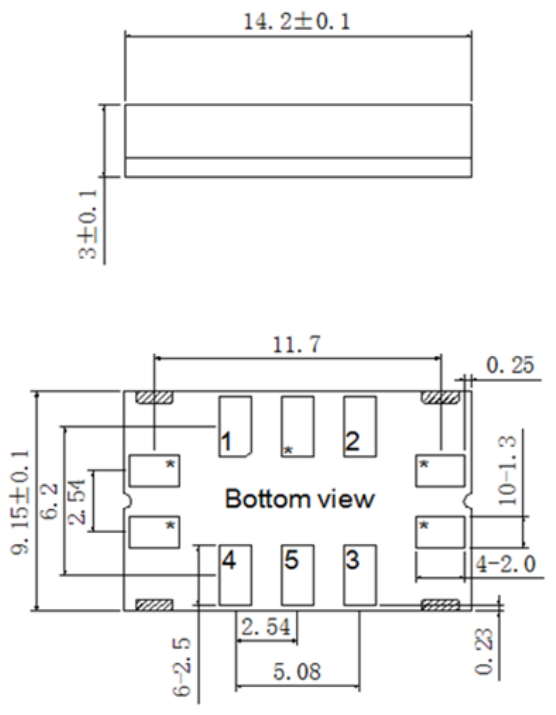
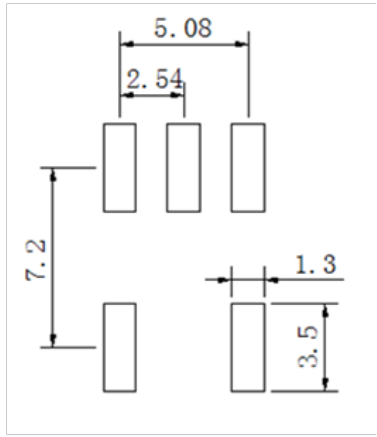


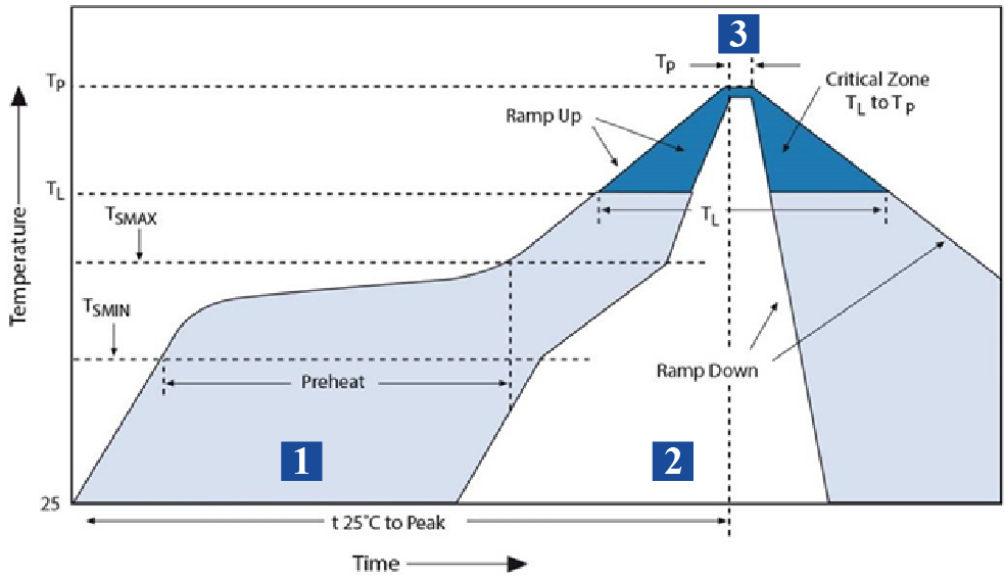

## RECOMMENDED LAND PATTERN




| Pin | Function |
|---|---|
| 1 | NC (for TCXO)<br>Vc (for VCTCXO) |
| 2 | GND |
| 3 | Output #1 (F0) |
| 4 | Vdd |
| 5 | Output #2 (F0/2) |
| * | For factory test only |

**Dimensions: mm**

## REFLOW PROFILE




| Zone | Description | Temperature | Time |
|---|---|---|---|
| 1 | Preheat | $T_{SMIN} \sim T_{SMAX}$<br>150°C ~ 200°C | 60 ~ 120 sec. |
| 2 | Reflow | $T_L$<br>220°C | 60 ~ 150 sec. |
| 3 | Peak Heat | $T_P$<br>260°C | 25 sec. MAX |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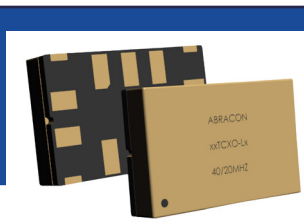


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**9.0 x 14.0 x 3.0mm**

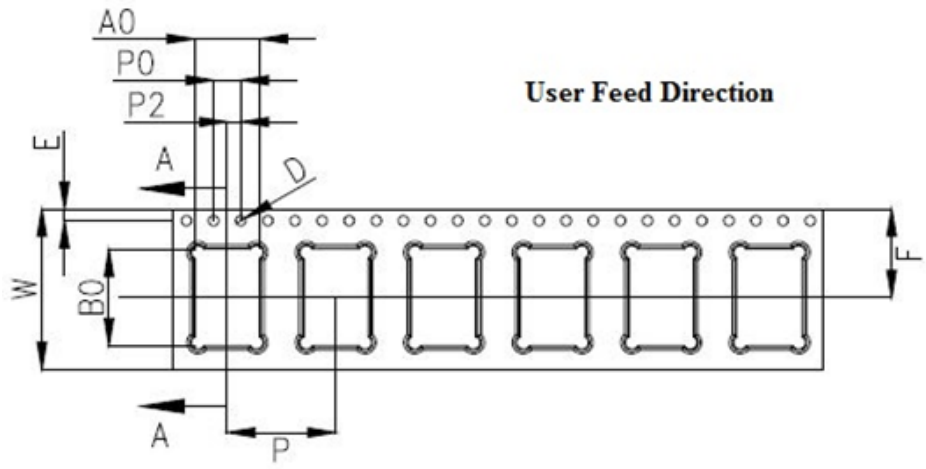
**RoHS/RoHS II Compliant**

**ESD SENSITIVE**

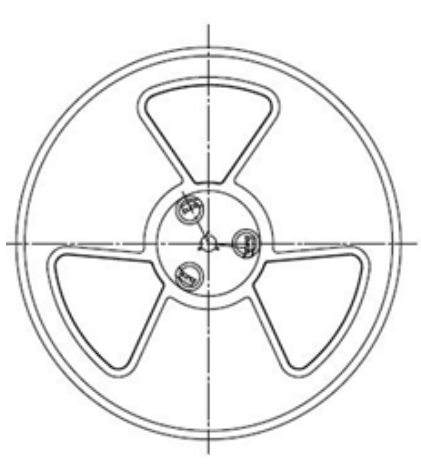
**MSL = 3**

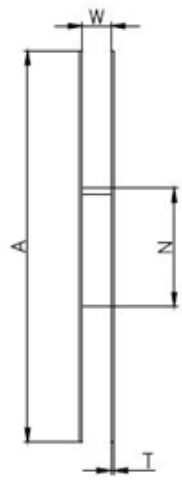
## PACKAGING

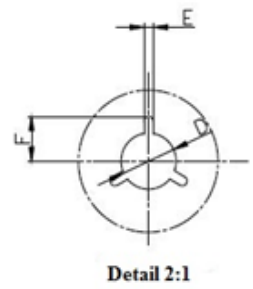
**T5: 500 pcs/reel**
**T2: 250 pcs/reel**
**MSL - 3 compliant packaging applies to MOQ=25 units (cut tape) & T5 and T2 options**
**MSL - 3 compliant packaging DOES NOT apply to bulk quantities**



| W | A0 | B0 | K0 | P | |
|---|---|---|---|---|---|
| 24.0±0.3 | 9.6±0.10 | 14.5±0.10 | 3.9±0.10 | 16.0±0.1 | |
| **F** | **E** | **D** | **P0** | **P2** | **T** |
| 13.25±0.1 | 1.75±0.1 | 1.5+0.1 | 4.0±0.1 | 2.0±0.1 | 0.3±0.05 |






Detail 2:1

| W | A | N | T | E | F | D |
|---|---|---|---|---|---|---|
| 24.5±0.4 | 330±0.5 | 100±0.3 | 1.8±0.2 | 2.1±0.3 | 10.75±0.3 | 13.5+0.5/-0.2 |

**Dimensions: mm**

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## ABRACON:

ABDFTCXO-26.000MHz-L-2-CT ABDFTCXO-16.384MHz-E-2-T5 ABDFTCXO-20.000MHz-E-2-T2 ABDFTCXO-25.000MHz-L-2-T5 ABDFTCXO-30.720MHz-E-2-T2 ABDFVCTCXO-50.000MHz-L-2-T2 ABDFVCTCXO-26.000MHz-L-2-T5 ABDFVCTCXO-52.000MHz-E-2-CT ABDFTCXO-19.200MHz-L-2-T5 ABDFVCTCXO-16.000MHz-L-2-T2 ABDFVCTCXO-26.000MHz-E-2-T2 ABDFTCXO-40.000MHz-L-2-CT ABDFTCXO-52.000MHz-E-2-T5 ABDFVCTCXO-24.576MHz-E-2-T2 ABDFTCXO-19.440MHz-L-2-CT ABDFVCTCXO-16.000MHz-L-2-T5 ABDFVCTCXO-38.400MHz-L-2-T2 ABDFTCXO-10.000MHz-E-2-T2 ABDFVCTCXO-52.000MHz-E-2-T2 ABDFVCTCXO-10.000MHz-L-2-CT ABDFVCTCXO-50.000MHz-E-2-T2 ABDFTCXO-19.200MHz-E-2-T2 ABDFTCXO-38.880MHz-E-2-T2 ABDFTCXO-10.000MHz-E-2-T5 ABDFTCXO-38.880MHz-L-2-CT ABDFTCXO-50.000MHz-L-2-T2 ABDFTCXO-19.200MHz-L-2-CT ABDFTCXO-50.000MHz-E-2-CT ABDFVCTCXO-16.000MHz-E-2-T5 ABDFVCTCXO-16.384MHz-E-2-T2 ABDFTCXO-30.000MHz-L-2-T2 ABDFTCXO-26.000MHz-L-2-T5 ABDFVCTCXO-38.400MHz-E-2-T5 ABDFTCXO-30.000MHz-L-2-T5 ABDFVCTCXO-40.000MHz-E-2-CT ABDFTCXO-19.200MHz-L-2-T2 ABDFVCTCXO-25.000MHz-L-2-T2 ABDFVCTCXO-16.000MHz-E-2-CT ABDFTCXO-12.800MHz-L-2-T5 ABDFVCTCXO-16.384MHz-E-2-CT ABDFVCTCXO-52.000MHz-L-2-T5 ABDFVCTCXO-20.000MHz-L-2-T5 ABDFTCXO-38.880MHz-E-2-CT ABDFTCXO-24.576MHz-E-2-T5 ABDFVCTCXO-25.000MHz-L-2-CT ABDFTCXO-20.000MHz-E-2-CT ABDFTCXO-25.000MHz-L-2-T2 ABDFTCXO-19.200MHz-E-2-T5 ABDFVCTCXO-40.000MHz-L-2-T5 ABDFTCXO-19.440MHz-L-2-T2 ABDFTCXO-30.720MHz-L-2-CT ABDFVCTCXO-10.000MHz-E-2-T2 ABDFTCXO-19.440MHz-E-2-T5 ABDFVCTCXO-24.576MHz-L-2-T5 ABDFTCXO-10.000MHz-L-2-T2 ABDFVCTCXO-30.720MHz-E-2-T2 ABDFTCXO-25.000MHz-E-2-T5 ABDFTCXO-40.000MHz-E-2-CT ABDFVCTCXO-12.800MHz-E-2-T5 ABDFVCTCXO-24.576MHz-L-2-T2 ABDFVCTCXO-50.000MHz-E-2-T5 ABDFTCXO-38.400MHz-E-2-CT ABDFVCTCXO-40.000MHz-E-2-T2 ABDFTCXO-26.000MHz-L-2-T2 ABDFVCTCXO-26.000MHz-E-2-T5 ABDFVCTCXO-50.000MHz-E-2-CT ABDFVCTCXO-38.880MHz-L-2-T5 ABDFVCTCXO-30.000MHz-L-2-T5 ABDFTCXO-40.000MHz-L-2-T5 ABDFVCTCXO-38.400MHz-E-2-T2 ABDFVCTCXO-30.000MHz-L-2-T2 ABDFVCTCXO-12.800MHz-L-2-T2 ABDFTCXO-19.440MHz-E-2-T2 ABDFTCXO-24.576MHz-E-2-T2 ABDFTCXO-52.000MHz-L-2-T5 ABDFTCXO-52.000MHz-E-2-CT ABDFTCXO-30.720MHz-E-2-T5 ABDFTCXO-12.800MHz-E-2-T2 ABDFTCXO-19.440MHz-L-2-T5 ABDFTCXO-38.400MHz-E-2-T5 ABDFVCTCXO-16.384MHz-L-2-T2 ABDFVCTCXO-16.000MHz-L-2-CT ABDFVCTCXO-40.000MHz-L-2-T2 ABDFVCTCXO-52.000MHz-L-2-T2 ABDFTCXO-12.800MHz-E-2-T5 ABDFTCXO-52.000MHz-E-2-T2 ABDFTCXO-24.576MHz-L-2-CT ABDFTCXO-38.880MHz-E-2-T5 ABDFVCTCXO-19.440MHz-E-2-CT ABDFVCTCXO-19.440MHz-L-2-T2 ABDFVCTCXO-10.000MHz-E-2-CT ABDFVCTCXO-38.400MHz-L-2-T5 ABDFVCTCXO-26.000MHz-E-2-CT ABDFVCTCXO-10.000MHz-L-2-T2 ABDFVCTCXO-19.200MHz-L-2-CT ABDFTCXO-30.720MHz-E-2-CT

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