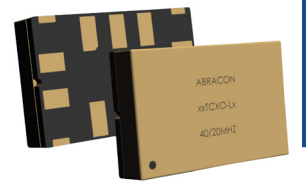


# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



9.0 x 14.0 x 3.0mm



RoHS/RoHS II Compliant



ESD SENSITIVE

MSL = 3

## ABDFTCXO/ABDFVCTCXO SERIES

### FEATURES

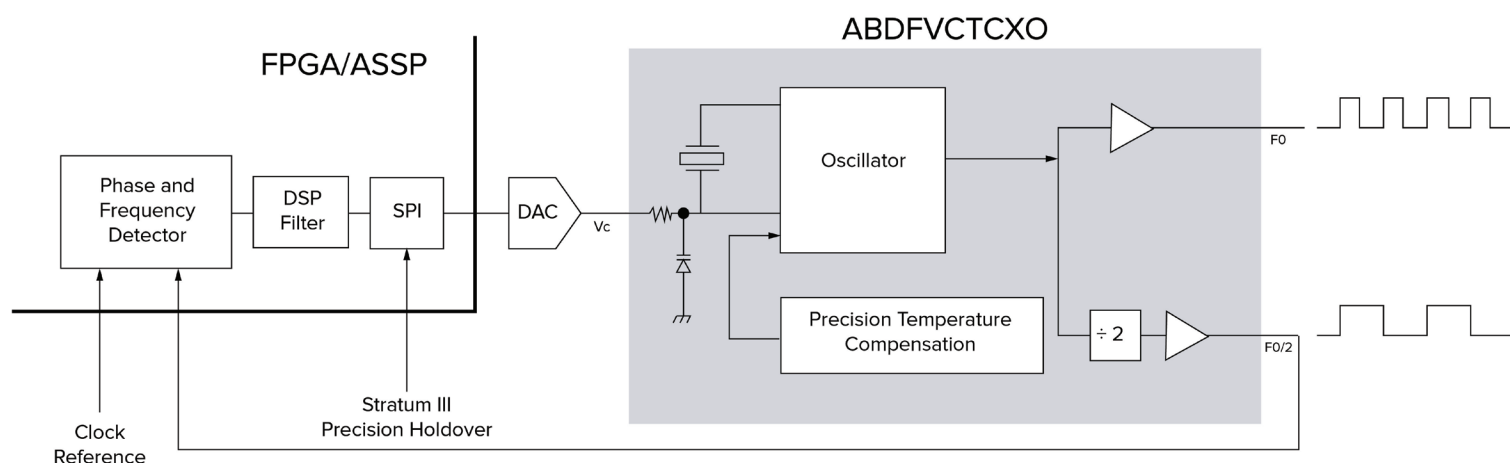
- Phase and frequency coherent dual output
- F0 and F0÷2 with integrated precision fanout buffers
- Meets ±280ppb Stratum-III stability requirements
- Excellent ±1ppm aging with ±4.6ppm guaranteed lifetime accuracy
- 5 to 52MHz standard and custom frequencies available
- TCXO or VCTCXO functionality available
- ±5ppm minimum pull with 0.5% typ linearity (VCTCXO only)
- LVC MOS 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<sub>0</sub>) 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

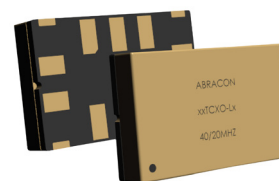
**PACKAGING**  
Blank: Bulk\*\*  
T5: 500 pcs/reel  
T2: 250 pcs/reel  
CT: Cut Tape\*\*\*

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

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

# 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

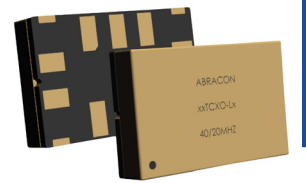
## STANDARD SPECIFICATIONS

| 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<br>[Output 1(F <sub>0</sub> )/Output 2 (F <sub>0</sub> /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.<br>*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<br>-40                                                                                       |                                                                                                  | +70<br>+85                                                                      | °C    | Option "E"<br>Option "L"                                                      |
| Frequency Stability vs. Operating Temperature ( ref. to +25°C )                      | -100<br>-280                                                                                     |                                                                                                  | +100<br>+280                                                                    | ppb   | Option "1" *Note 2<br>Option "2"                                              |
| Frequency Stability vs. Vdd Change                                                   | -100                                                                                             |                                                                                                  | +100                                                                            | ppb   | Vdd ±5%                                                                       |
| Frequency Stability vs. Load Change                                                  | -200                                                                                             |                                                                                                  | +200                                                                            | ppb   | Load ±5%                                                                      |
| Aging (1 <sup>st</sup> 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   |                                                                               |
| <b>LVCMOS Output (Square wave)</b>                                                   |                                                                                                  |                                                                                                  |                                                                                 |       |                                                                               |
| V <sub>OH</sub>                                                                      | 2.4                                                                                              |                                                                                                  |                                                                                 | V     | Load = 15pF                                                                   |
| V <sub>OL</sub>                                                                      |                                                                                                  |                                                                                                  | 0.4                                                                             | V     | Load = 15pF                                                                   |
| Load                                                                                 |                                                                                                  |                                                                                                  | 15                                                                              | pF    |                                                                               |
| Duty Cycle                                                                           | 45                                                                                               |                                                                                                  | 55                                                                              | %     | @ (V <sub>OH</sub> - V <sub>OL</sub> )/2                                      |
| Rise/Fall Time                                                                       |                                                                                                  |                                                                                                  | 6                                                                               | ns    | Load = 15pF                                                                   |
| <b>Control Port (Applicable for VCTCXO only)</b>                                     |                                                                                                  |                                                                                                  |                                                                                 |       |                                                                               |
| 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: F<sub>0</sub> > 40MHz, available in Q4-2017 | \*Note 2: Available Q4-2017

# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



ABDFTCXO/ABDFVCTCXO SERIES

9.0 x 14.0 x 3.0mm

RoHS/RoHS II Compliant

ESD SENSITIVE

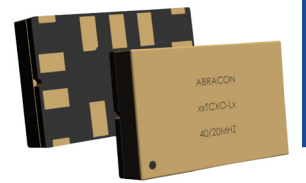
MSL = 3

## STANDARD SPECIFICATIONS (CONT.)

| PARAMETERS                                  | MINIMUM | TYPICAL | MAXIMUM | UNITS  | NOTES          |
|---------------------------------------------|---------|---------|---------|--------|----------------|
| <b>RMS Jitter (12kHz ~ 20MHz BW) @ 25°C</b> |         |         |         |        |                |
| 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     |                |
| <b>Phase Noise</b>                          |         |         |         |        |                |
| F <sub>0</sub> @ 20.000 MHz                 |         | -85     |         | dBc/Hz | Offset @10Hz   |
|                                             |         | -100    |         |        | Offset @100Hz  |
|                                             |         | -135    |         |        | Offset @1kHz   |
|                                             |         | -145    |         |        | Offset @10kHz  |
|                                             |         | -150    |         |        | Offset @100kHz |
|                                             |         | -155    |         |        | Offset @ 5MHz  |
|                                             |         |         |         |        |                |
| F <sub>0</sub> /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 <sub>0</sub> @ 26.000 MHz                 |         | -85     |         | dBc/Hz | Offset @10Hz   |
|                                             |         | -100    |         |        | Offset @100Hz  |
|                                             |         | -135    |         |        | Offset @1kHz   |
|                                             |         | -145    |         |        | Offset @10kHz  |
|                                             |         | -150    |         |        | Offset @100kHz |
|                                             |         | -150    |         |        | Offset @ 5MHz  |
|                                             |         |         |         |        |                |
| F <sub>0</sub> /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 <sub>0</sub> @ 40.000 MHz                 |         | -80     |         | dBc/Hz | Offset @10Hz   |
|                                             |         | -100    |         |        | Offset @100Hz  |
|                                             |         | -125    |         |        | Offset @1kHz   |
|                                             |         | -140    |         |        | Offset @10kHz  |
|                                             |         | -150    |         |        | Offset @100kHz |
|                                             |         | -150    |         |        | Offset @ 5MHz  |
|                                             |         |         |         |        |                |
| F <sub>0</sub> /2 @ 20.000 MHz              |         | -80     |         | dBc/Hz | Offset @10Hz   |
|                                             |         | -100    |         |        | Offset @100Hz  |
|                                             |         | -135    |         |        | Offset @1kHz   |
|                                             |         | -140    |         |        | Offset @10kHz  |
|                                             |         | -145    |         |        | Offset @100kHz |
|                                             |         | -155    |         |        | Offset @ 5MHz  |
|                                             |         |         |         |        |                |

# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO

ABDFTCXO/ABDFVCTCXO SERIES



9.0 x 14.0 x 3.0mm

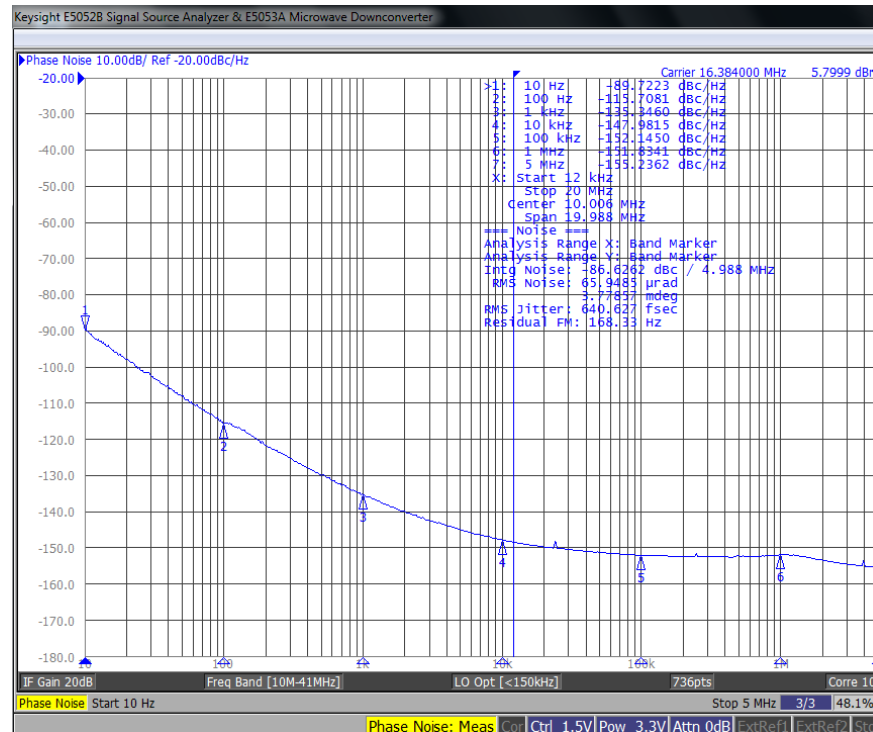
RoHS/RoHS II Compliant

ESD SENSITIVE

MSL = 3

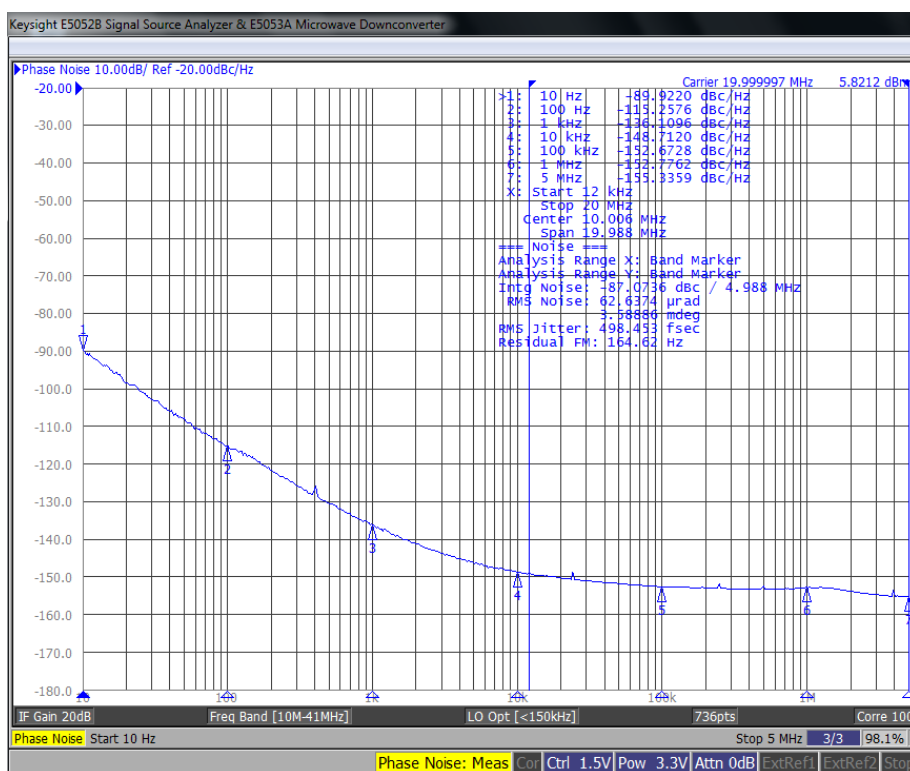
## TYPICAL PHASE NOISE & JITTER CHARACTERISTICS

16.384MHz  
[Output 1 (F0)]

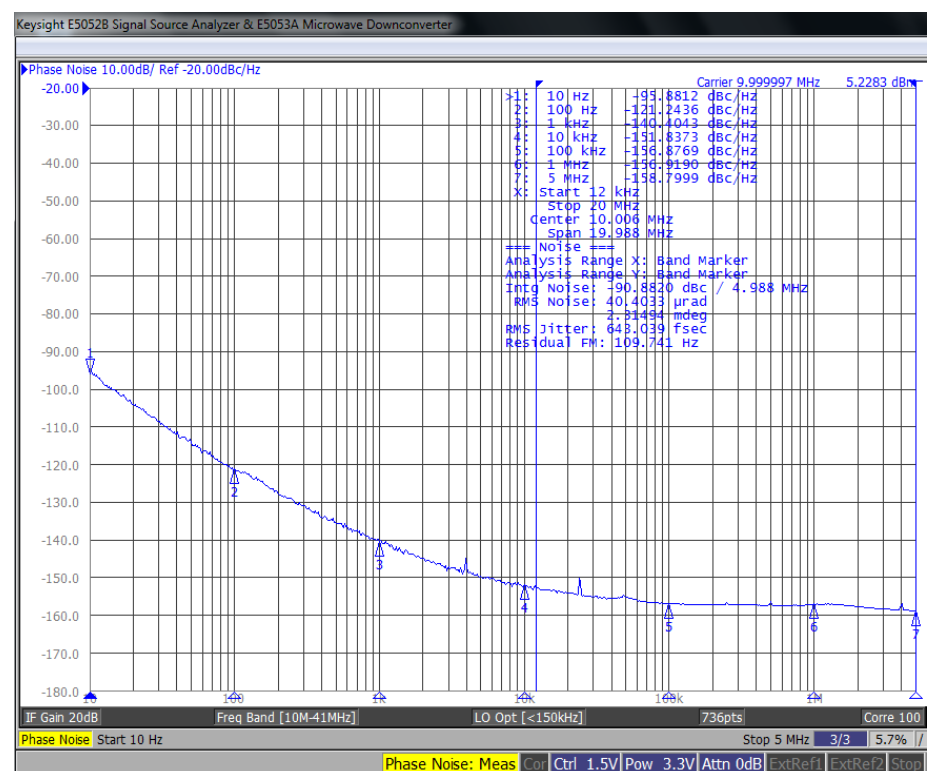


20.000MHz / 10.000MHz  
[Output 1 (F0) / Output 2 (F0/2)]

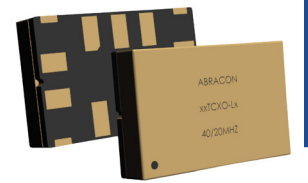
20.000MHz



10.000MHz



# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



ABDFTCXO/ABDFVCTCXO SERIES

9.0 x 14.0 x 3.0mm

**Pb** RoHS/RoHS II Compliant

**ESD SENSITIVE**

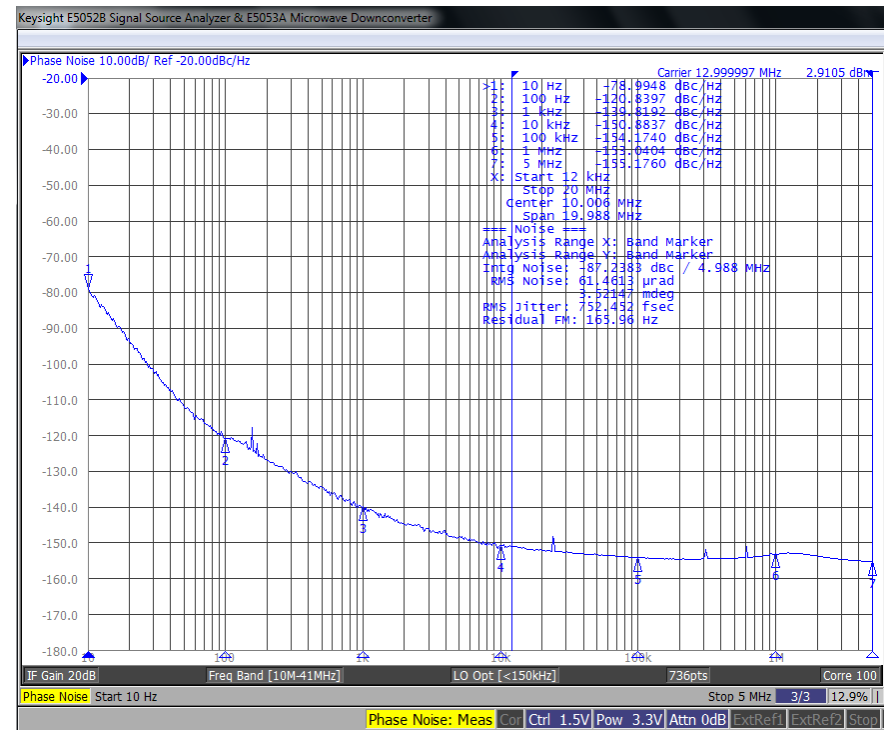
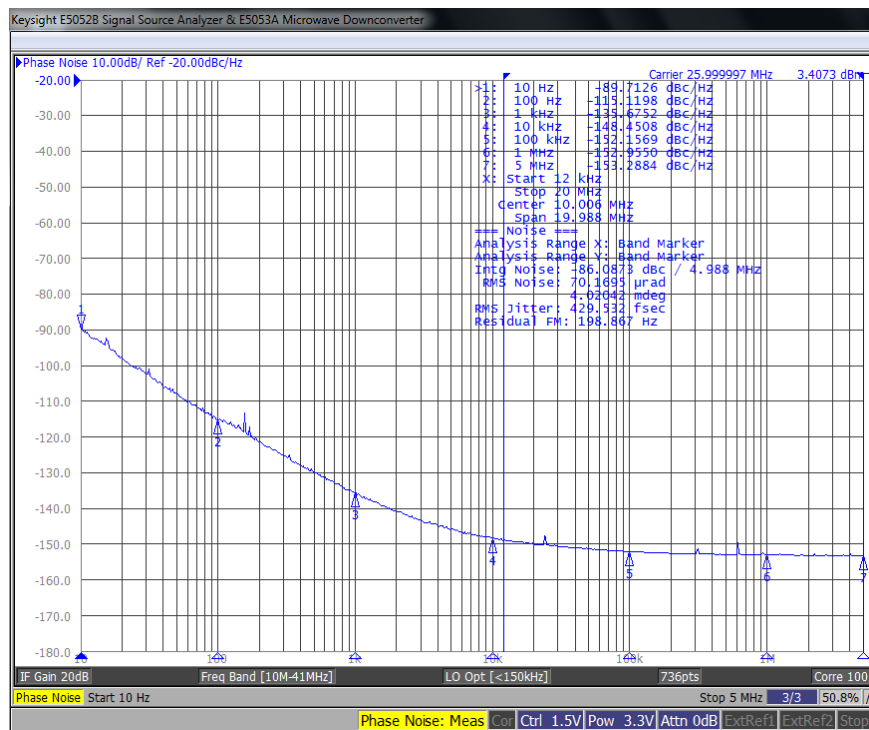
MSL = 3

## TYPICAL PHASE NOISE & JITTER CHARACTERISTICS

26.000MHz

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

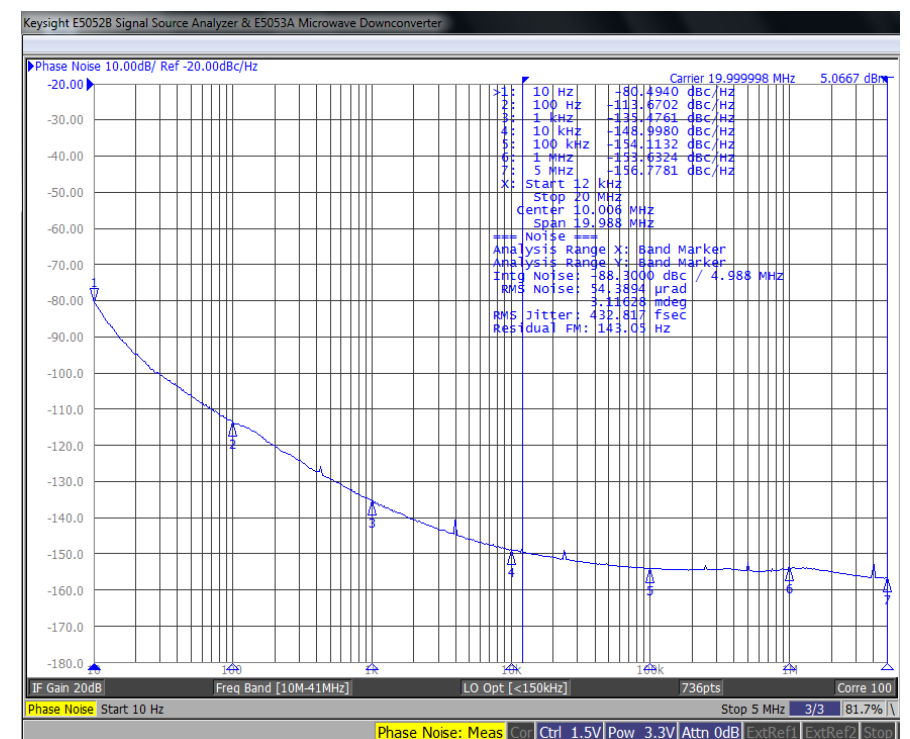
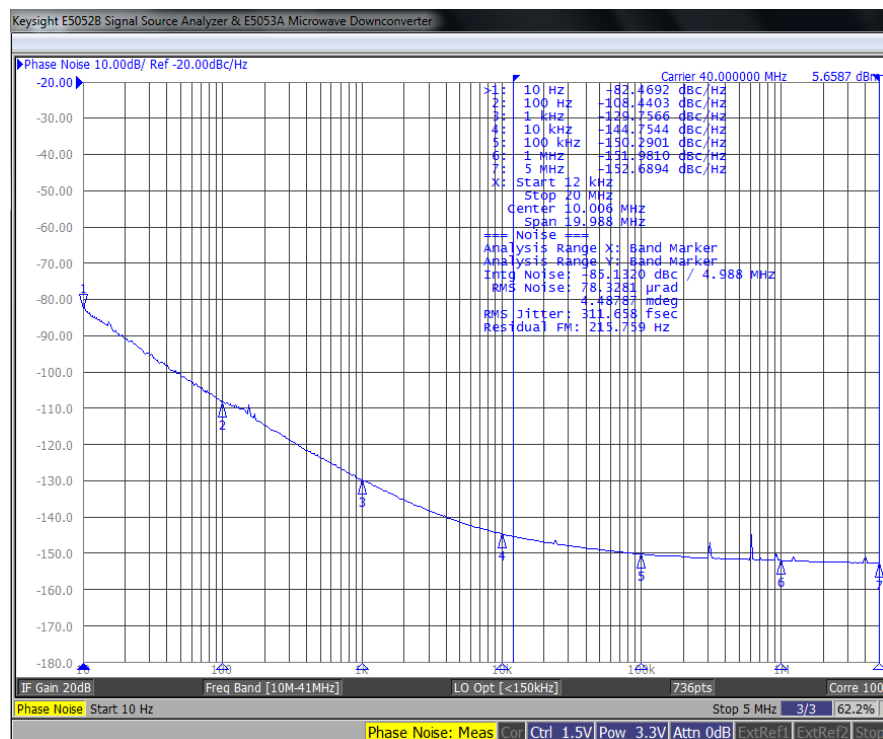
13.000MHz



40.000MHz

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

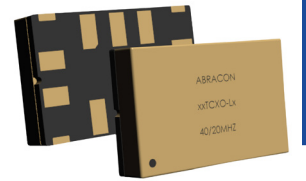
20.000MHz



| 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 |

REVISED: 05.19.2017

# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



ABDFTCXO/ABDFVCTCXO SERIES

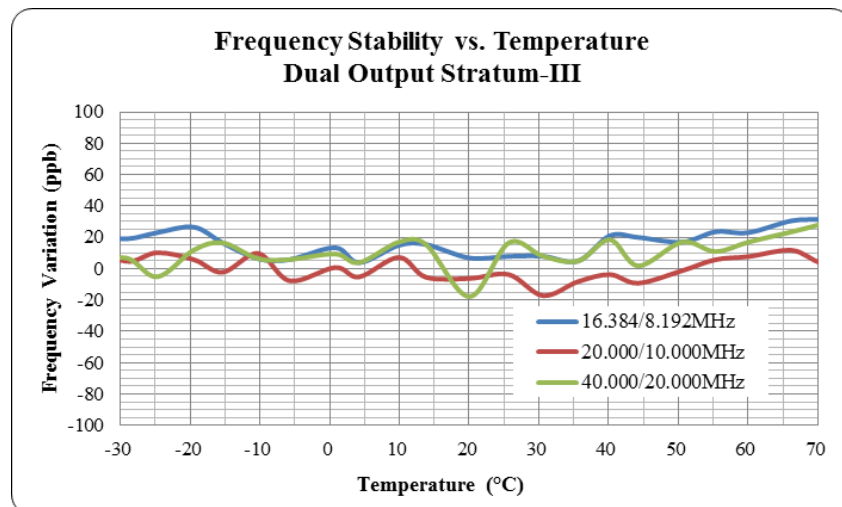
9.0 x 14.0 x 3.0mm

 RoHS/RoHS II Compliant

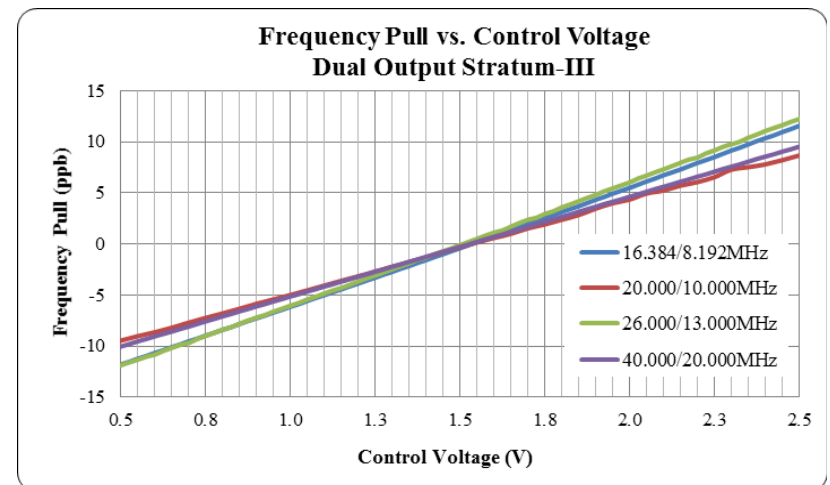
 ESD SENSITIVE

MSL = 3

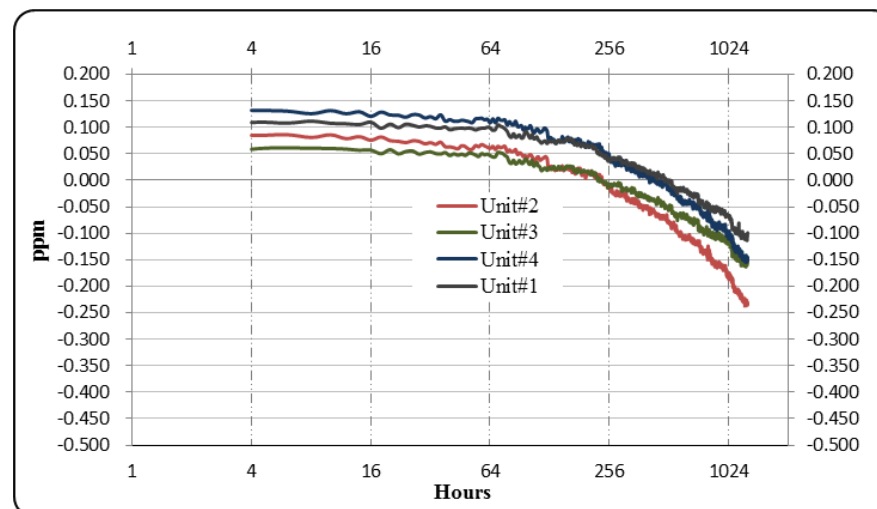
## FREQUENCY STABILITY VS. TEMPERATURE



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

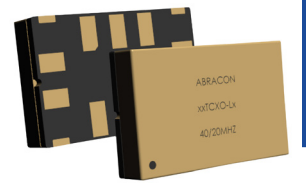


## AGING PROFILE (ACCELERATED AGING @ +85°C)



# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO

ABDFTCXO/ABDFVCTCXO SERIES



9.0 x 14.0 x 3.0mm

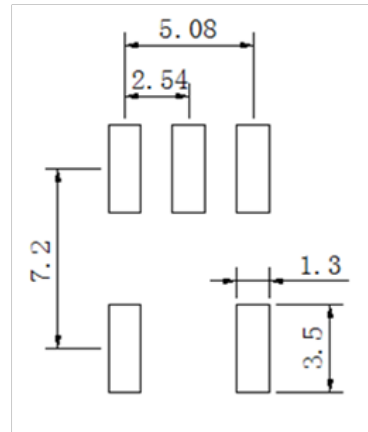
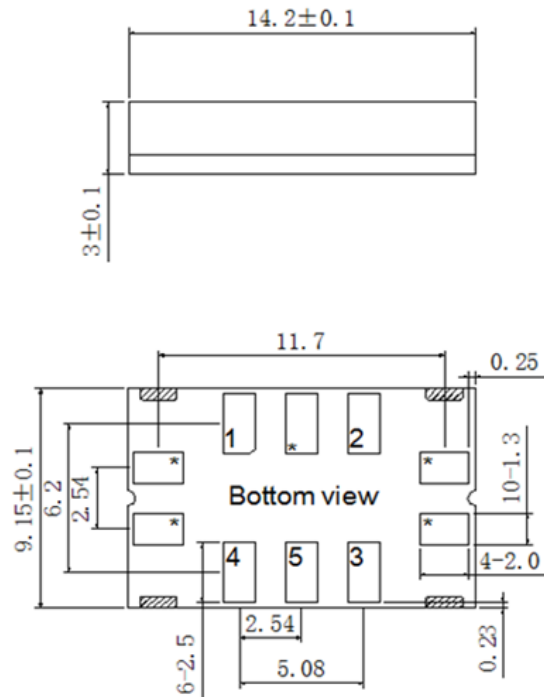
**Pb** RoHS/RoHS II Compliant

**ESD SENSITIVE**

MSL = 3

## TYPICAL PHASE NOISE & JITTER CHARACTERISTICS

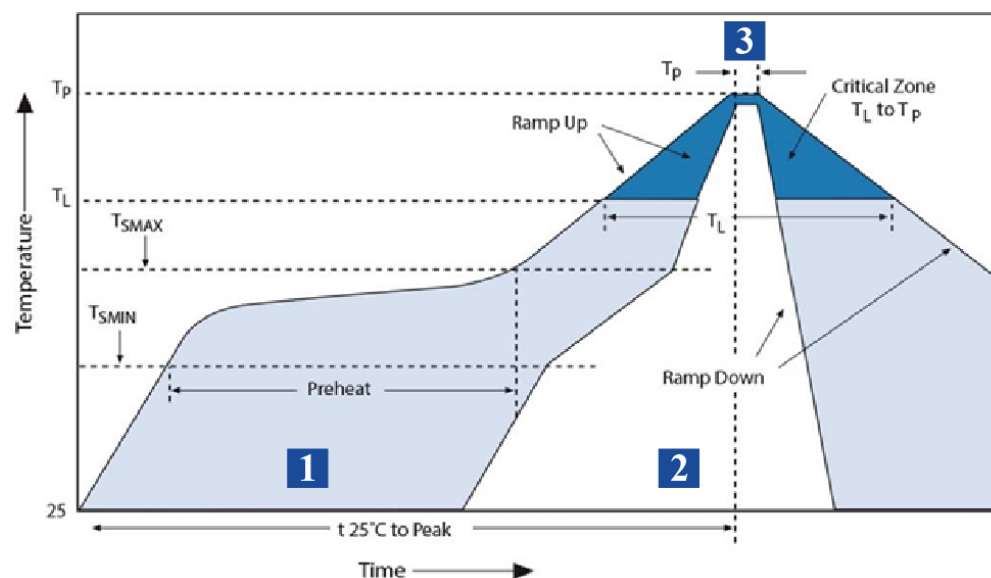
### RECOMMENDED LAND PATTERN



| 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            |

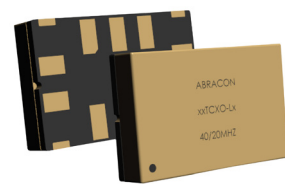
Dimensions: mm

### 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   |

# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



9.0 x 14.0 x 3.0mm



RoHS/RoHS II Compliant



ESD SENSITIVE

MSL = 3

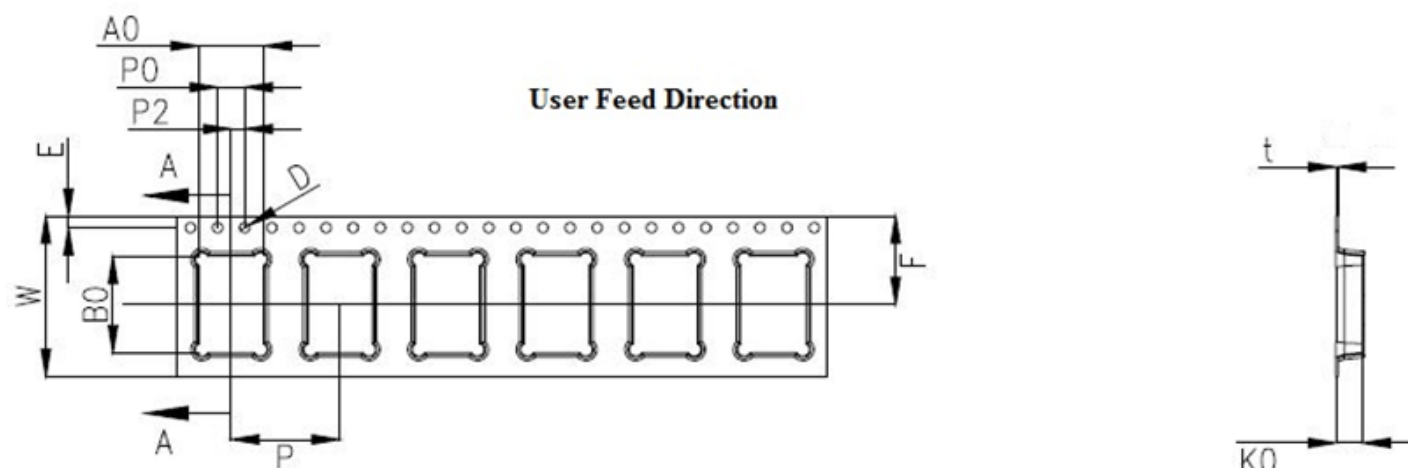
## PACKAGING

T5: 500 pcs/reel

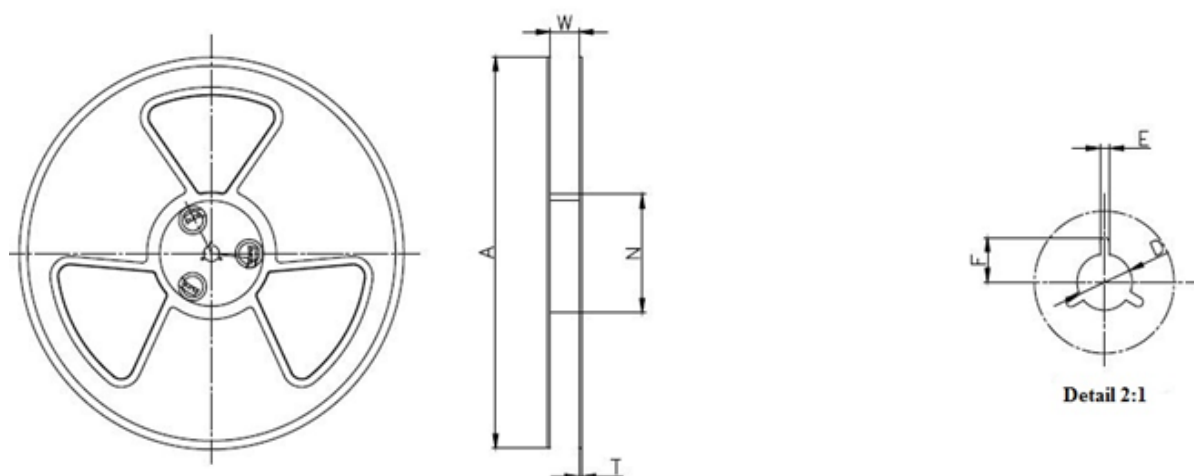
T2: 250 pcs/reel

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 |



| 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

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## 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](#)

## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9