

# DUAL OUTPUT STRATUM-III SMD TCXO & VCTCXO



9.0 x 14.0 x 3.0mm

**Pb** 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)



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## 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. *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 (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>LVC MOS 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

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## 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  |

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## 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**



REVISED: 05.19.2017



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9.0 x 14.0 x 3.0mm

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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 |

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## FREQUENCY STABILITY VS. TEMPERATURE

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



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



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## 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   |

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## 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

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## ABRACON:

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