

# Ultra Low Phase Noise XO / VCXO

**ABLNO**



**ESD Sensitive**



**RoHS Compliant**



9.2 x 14.8 x 5.5 mm SMT

## FEATURES:

- High "Q", 3rd Overtone Crystal Technology
- Ultra Low Phase Noise -162 dBc/Hz Typ. @ 10kHz offset, 100MHz carrier
- Standard LVCMOS RF Output
- Wide Operating Temperature (-40°C to +85°C) standard
- $\pm 28$  ppm Max. All inclusive Stability (including Aging) over 10-years
- Available Frequency range from 50MHz to 156.25MHz
- 9.2 x 14.8mm RoHS Compliant SMT package

## APPLICATIONS:

- Satellite Modem Communication Systems
- COTS - Military communications
- Avionics
- Low Phase Noise Signal Sources
- High Definition TV
- Test & Measurement
- Ultra Low Jitter RF Communication Circuitry

## STANDARD SPECIFICATIONS

| Parameters                     |                     | Minimum                                                                                                                                                       | Typical | Maximum | Units                | Notes                                     |
|--------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|----------------------|-------------------------------------------|
| RF Output Frequency Range      |                     | 50.00                                                                                                                                                         |         | 156.250 | MHz                  |                                           |
| Standard Available Frequencies |                     | 50.00MHz, 80.00MHz, 81.92MHz, 92.16MHz, 96.00MHz, 98.304MHz, 100MHz, 104.00MHz, 106.25MHz, 120.00MHz, 122.88MHz, 125.00MHz, 150.00MHz, 155.52MHz & 156.250MHz |         |         |                      | Custom frequencies available upon request |
| Supply Voltage (Vdd)           |                     | 3.135                                                                                                                                                         | 3.300   | 3.465   | Volts                |                                           |
| Current Drain                  | 50MHz ~ 99.999MHz   |                                                                                                                                                               |         | 25.00   | mA                   |                                           |
|                                | 100MHz ~ 149.999MHz |                                                                                                                                                               |         | 35.00   |                      |                                           |
|                                | ≥ 150.00MHz         |                                                                                                                                                               |         | 40.00   |                      |                                           |
| Waveform                       |                     | LVCMOS                                                                                                                                                        |         |         |                      |                                           |
| Output Load                    |                     |                                                                                                                                                               |         | 15      | pF                   |                                           |
| V <sub>OH</sub>                |                     | 0.9*Vdd                                                                                                                                                       |         |         | Volts                |                                           |
| V <sub>OL</sub>                |                     |                                                                                                                                                               |         | 0.1*Vdd | Ω                    |                                           |
| Symmetry                       |                     | 45                                                                                                                                                            | 50      | 55      | %                    |                                           |
| Rise & Fall Times              |                     |                                                                                                                                                               |         | 3.0     | ns                   |                                           |
| Operating Temperature Range    |                     | -40                                                                                                                                                           |         | +85     | °C                   |                                           |
| Frequency Stability            |                     |                                                                                                                                                               |         |         |                      |                                           |
| Over (-40° C to +85°C)         |                     |                                                                                                                                                               | ±12.00  | ±18.00  | ppm                  | Relative to measured frequency @ 25°C     |
| ALL effects, including Aging   |                     |                                                                                                                                                               |         | ±28.00  | ppm                  |                                           |
| Storage Temperature Range      |                     | -40                                                                                                                                                           |         | +90     | °C                   |                                           |
| Aging                          | First Year          |                                                                                                                                                               |         | ±2.00   | ppm                  |                                           |
|                                | 5-Years             |                                                                                                                                                               |         | ±5.00   | ppm                  |                                           |
|                                | 10-Years            |                                                                                                                                                               |         | ±7.00   | ppm                  |                                           |
| Phase Noise (50MHz Carrier)    |                     |                                                                                                                                                               |         |         |                      | Vdd=3.3V                                  |
| @ 10                           | Hz offset           |                                                                                                                                                               | -90     | -82     | dBc/Hz               | <i>Note #1 &amp; #2</i>                   |
| @ 100                          | Hz offset           |                                                                                                                                                               | -120    | -115    | dBc/Hz               |                                           |
| @ 1,000                        | Hz offset           |                                                                                                                                                               | -145    | -140    | dBc/Hz               |                                           |
| @ 10,000                       | Hz offset           |                                                                                                                                                               | -165    | -160    | dBc/Hz               |                                           |
| @ 100,000                      | Hz offset           |                                                                                                                                                               | -166    | -165    | dBc/Hz               |                                           |
| @ 1,000,000                    | Hz offset           |                                                                                                                                                               | -166    | -165    | dBc/Hz               |                                           |
| rms Jitter (12kHz ~ 20MHz BW)  |                     |                                                                                                                                                               | < 100   | 125     | <i>Femto Seconds</i> | 0.125 ps Max.                             |



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| Parameters                             | Minimum | Typical  | Maximum | Units                | Notes                     |
|----------------------------------------|---------|----------|---------|----------------------|---------------------------|
| <b>Phase Noise (100MHz Carrier)</b>    |         |          |         |                      | Vdd=3.3V                  |
| @ 10 Hz offset                         |         | -88      | -82     | dBc/Hz               | <i>Note #1 &amp; #2</i>   |
| @ 100 Hz offset                        |         | -118     | -115    | dBc/Hz               |                           |
| @ 1,000 Hz offset                      |         | -141     | -138    | dBc/Hz               |                           |
| @ 10,000 Hz offset                     |         | -160     | -155    | dBc/Hz               |                           |
| @ 100,000 Hz offset                    |         | -161     | -160    | dBc/Hz               |                           |
| @ 1,000,000 Hz offset                  |         | -165     | -160    | dBc/Hz               |                           |
| rms Jitter (12kHz ~ 20MHz BW)          |         | < 50     | 100     | <i>Femto Seconds</i> | 0.10 ps Max.              |
|                                        |         |          |         |                      |                           |
| <b>Phase Noise (156.25MHz Carrier)</b> |         |          |         |                      | Vdd=3.3V                  |
| @ 10 Hz offset                         |         | -75      | -70     | dBc/Hz               | <i>Note #1 &amp; #2</i>   |
| @ 100 Hz offset                        |         | -110     | -105    | dBc/Hz               |                           |
| @ 1,000 Hz offset                      |         | -140     | -135    | dBc/Hz               |                           |
| @ 10,000 Hz offset                     |         | -155     | -150    | dBc/Hz               |                           |
| @ 100,000 Hz offset                    |         | -161     | -160    | dBc/Hz               |                           |
| @ 1,000,000 Hz offset                  |         | -165     | -160    | dBc/Hz               |                           |
| rms Jitter (12kHz ~ 20MHz BW)          |         | < 50     | 100     | <i>Femto Seconds</i> | 0.10 ps Max.              |
|                                        |         |          |         |                      |                           |
| Electrical Frequency Adjustment        |         |          |         |                      |                           |
| Control Voltage Range (Vc)             | 0.0     | 1.65     | 3.30    | Volts                |                           |
| Frequency Pull Range                   | ±28.00  |          | ±55.00  | ppm                  | Referenced to the carrier |
| Frequency Pull Slope                   |         | Positive |         |                      |                           |
| Control Voltage Port Impedance         | 10      |          |         | kΩ                   |                           |
| Control Port Linearity                 |         |          | ±10     | %                    |                           |

**Note #1:** Maximum Phase Noise is verified on 100% of the parts at 25°C ± 3°C.

**Note #2:** The above specified Phase Noise & Jitter is with the oscillator device configured as a VCXO. In XO configuration, the Phase Noise will be slightly better at each offset between 10Hz and 10 kHz, by approximately -3dB to -5dB.



# Ultra Low Phase Noise XO / VCXO

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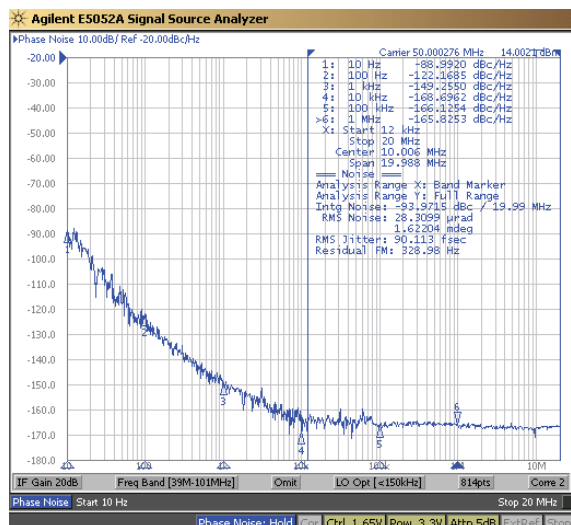


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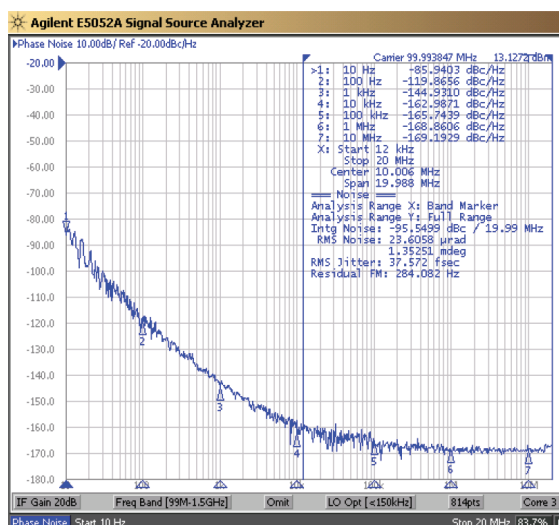


9.2 x 14.8 x 5.5 mm SMT

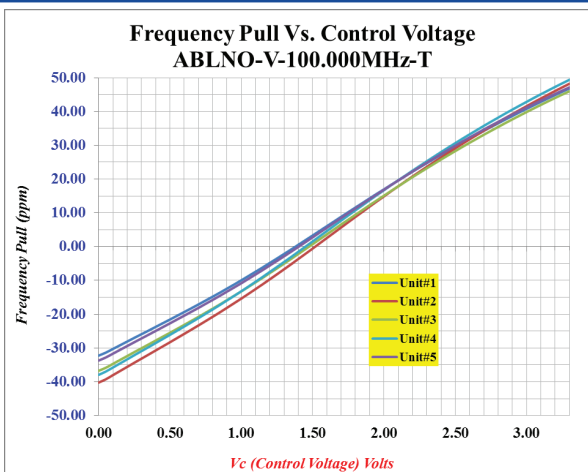
## TYPICAL PHASE NOISE PERFORMANCE @ 50.00 MHz CARRIER



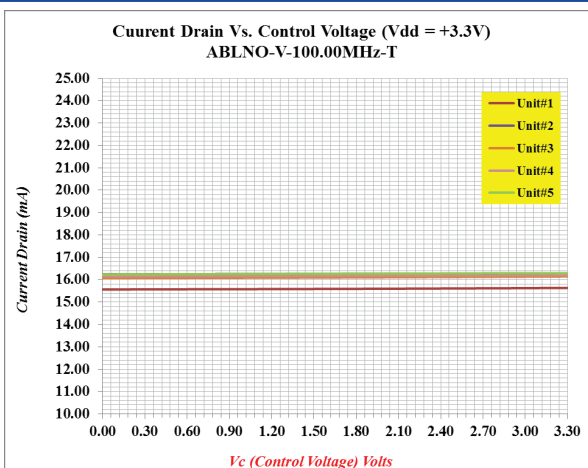
## TYPICAL PHASE NOISE PERFORMANCE @ 100.00 MHz CARRIER



## FREQUENCY PULL VERSUS CONTROL VOLTAGE (REFERENCED TO 100.000MHz)



## CURRENT DRAIN VERSUS CONTROL VOLTAGE @ VDD = +3.3V



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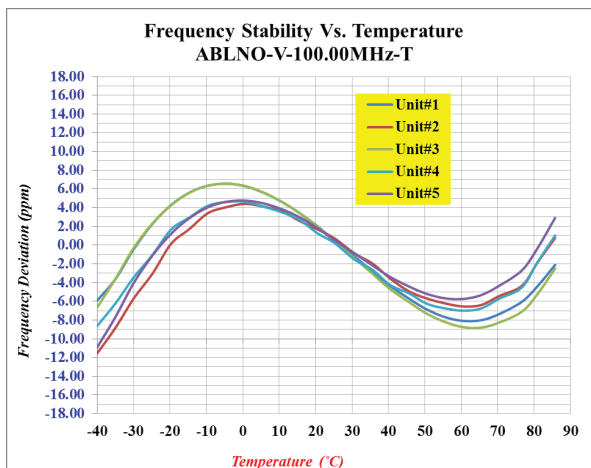


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## FREQUENCY STABILITY VS. TEMPERATURE @ VDD = +3.3V (REFERENCED TO MEASURED FREQUENCY @ 25°C)



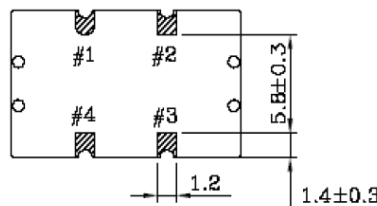
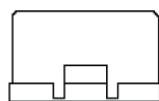
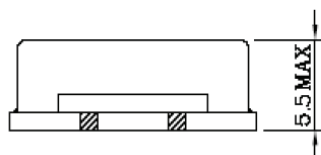
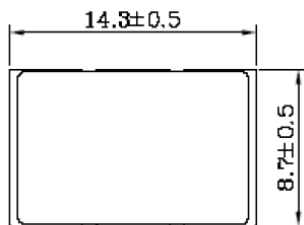
## PART IDENTIFICATION:

ABLNO -      Frequency (MHz) -          

| Fixed Clock Vs. VCXO Option |                          |
|-----------------------------|--------------------------|
| <b>Blank</b>                | Fixed Clock Oscillator   |
| <b>V</b>                    | VCXO (±28 ppm min. Pull) |

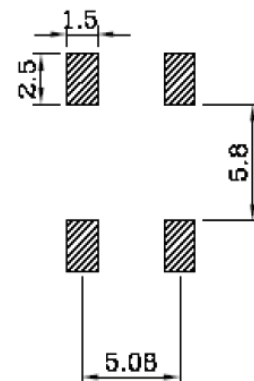
| Tape & Reel Options |                         |
|---------------------|-------------------------|
| Blank               | < 250 units on cut tape |
| T2                  | 250 units per reel      |
| T                   | 1,000 units per reel    |

## OUTLINE DIMENSIONS:



| Pin # | Functionality                                            |
|-------|----------------------------------------------------------|
| 1     | Voltage Control (Vc) for VCXO<br>No Connect (N/C) for XO |
| 2     | Ground                                                   |
| 3     | RF Output                                                |
| 4     | Vdd                                                      |

## Recommended Land Pattern



Dimensions: mm

# ABLNO



9.2 x 14.8 x 5.5 mm SMT

4°C/sec max

PRE-HEATING 183°C

4°C/sec max

Reflow 260°C max

10Sec

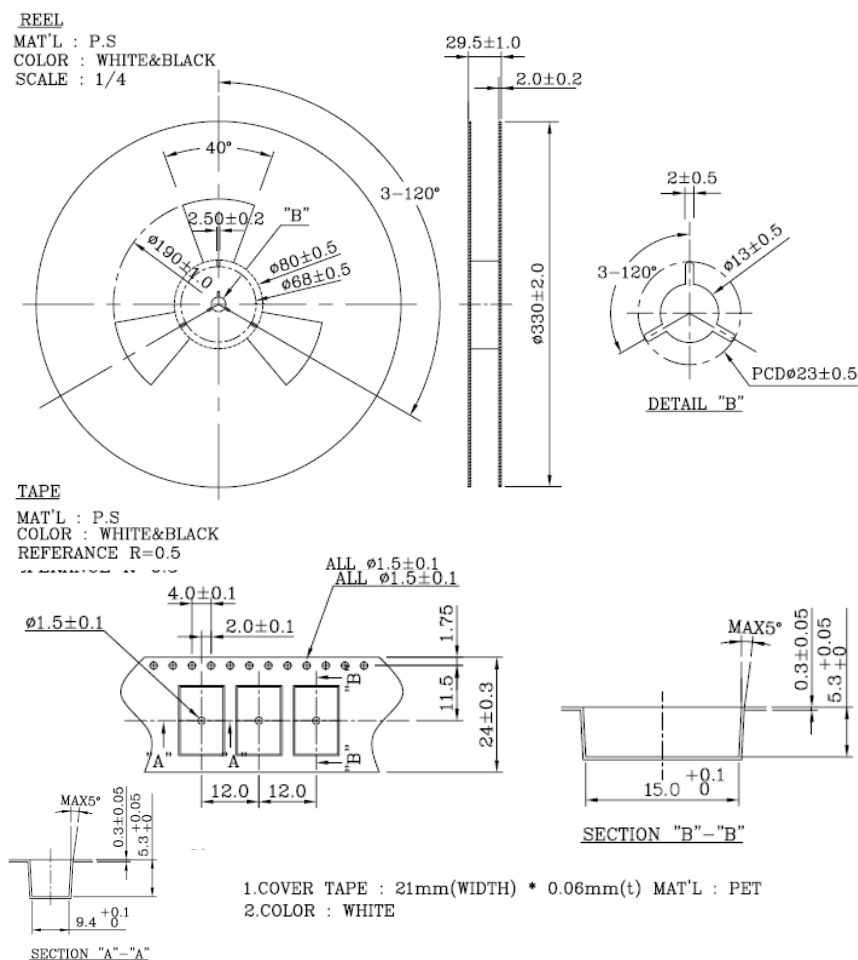
60~120Sec

Cooling

TOTAL TIME 210 Sec MAX

SOLDER MELTING FUSED 220°C

**(1,000) units per reel standard, (250) units per reel available (option # T2)**



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### 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:

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