# AE-x3A2 Series

NEL FREQUENCY CONTROLS
Powered By ABRACON

## SINEWAVE HF VCXO

ESD Sensitive

**17.4 x 14.38 x 6.38 mm**
**Datasheet #0707A**

### Features

- **Ultra Low Phase Noise and Jitter**
- **No Multiplication**
- **Absolute Pull Range (APR) to ± 1,000 ppm**
- **SONET ± 20 ppm overall free-run stability available**
- **High Shock Resistance, to 1000g**

### Applications

- **Fiber Channel**
- **10 GbE**
- **Infiniband**
- **Network Processors**
- **SONET/SDH**
- **COTS/Dual use**

## *Absolute Maximum Ratings*

| Parameters | Symbol | Condition | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|---|
| Operating Temperature Range | To | | -40 | | +85 | ºC | |
| Storage Temperature Range | Tst | | -50 | | +90 | ºC | |
| Supply Voltage | Vcc | | -0.5 | | 5.5 | V | |
| Control Voltage | Vc | | -0.5 | | 5.5 | V | |

## *Electrical (1*)*

| Parameters | | Symbol | Condition | | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Nominal Frequency | | Fo | | | 12 | | 250 | MHz | |
| Supply Voltage | | Vcc | Code 0<br>Code A | | 4.75<br>3.135 | 5.0<br>3.3 | 5.25<br>3.465 | V | |
| Supply current | | Icc | No load, Vcc=3.3V 100MHz | | | 60 | 160 | mA | |
| Output Logic Type | | | | | | Sine | | | |
| Load | | | Internally AC coupled | | 45 | 50 | 55 | Ohm | |
| Harmonic | | Ph | | | | | -25 | dBc | |
| Sub-Harmonics | | | None | | | | | | |
| Output Power | | Po | Into 50 ohm, 5V<br>3.3V | | 7<br>5 | 10<br>7 | | dBm | |
| Jitter | Integrated, RMS | J | Integrated from Phase Noise, 12KHz to 20MHz, RMS | | | 0.1 | 0.15 | ps | |
| | | | 100Hz to 80KHz, RMS | | | | 0.5 | ps | |
| | | | 50KHz to 80MHz | | | 0.2 | | ps | |
| | Wavecrest characterized | | Random period, | | | 2.5 | | ps | |
| | | | Accumul., pk-to-pk | | | 17 | | ps | |
| | | | Determin. | | | 0 | | ps | |

## *Electrical (cont.)*

| Parameters | Symbol | Condition | | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|---|---|
| Phase Noise | £(Δf) | 100 MHz, 3.3V APR 32 ppm or less | @10Hz<br>@100Hz<br>@1KHz<br>@10KHz<br>@100KHz<br>@>1MHz | | -85<br>-115<br>-145<br>-166<br>-171<br>-172 | | dBc/Hz | |
| Frequency Stability, usually not specified – unless necessary, APR is specified to incorporate stability | ΔF/F | Overall, including temperature, aging 10 years, shock and vibration @Vc=Vcc/2; APR 50 ppm, or less | | ±20 | ±30 | | ppm | |
| Control Voltage Range | Vc | | | 0V | | Vcc | V | |
| Setability | Vcs | Vc to set the F at Fo; T, Vcc, load – nominal, as shipped | | 0.4 Vcc | 0.5 Vcc | 0.6 Vcc | V | |
| Absolute Pull Range | APR | Over all conditions, see part # creation | | 10, 20, 32, 50, 100 | | | ppm | |
| Input impedance | Zin | @ Fmod < 100 KHz | | 50 | | | KOhm | |
| Modulation Bandwidth | | At Vc = Vcc/2, -3dB | | 20 | | | KHz | |

## *Environmental and Mechanical*

| Parameter | Description |
|---|---|
| Operating temp. range | See part # table |
| Mechanical Shock | Per MIL-STD-202, Method 213, Cond. A |
| Thermal Shock | Per MIL-STD-883, Method 1011, Cond. A |
| Vibration | Per MIL-STD-883, Method 2007, Cond. A |
| Hermetic Seal | Leak rate less than $5x10^{-8}$ atm.cc/s of helium, crystal only. |
| Soldering conditions | See MAX reflow profile below; The device may be reflowed once. Reflowing upside down is not allowed. NO CLEAN assembly is recommended. |

# AE-x3A2 Series

NEL FREQUENCY CONTROLS
Powered By ABRACON

**SINEWAVE HF VCXO**

ESD Sensitive

**17.4 x 14.38 x 6.38 mm**
**Datasheet #0707A**

## Creating a Part Number

**AE - X 3A2 X X - X – XXX.XXX MHZ - X**

**Package Code**
AE - 8Pad 17x14mm SMD

| Operating Voltage | |
|---|---|
| Code | Specification |
| 0 | 5.0 V ± 5% |
| A | 3.3 V ± 5% |

| Temperature Range, ºC | |
|---|---|
| Code | In 5ºC steps |
| A | 0 to 50 |
| B | 0 to 70 |
| C | -20 to 70 |
| D | -40 to 85 |
| 9 | customer specific |

| Absolute Pull Range, ppm | |
|---|---|
| Code | Specification |
| D | ± 10 |
| E | ± 20 |
| F | ± 32 |
| G | ± 50 |
| H | ± 100 |

| Environmental | |
|---|---|
| Code | Specification |
| L | Contains a level of lead that is in excess of RoHS directive |
| R | RoHS compliant |

**Output Frequency**
Please specify the frequency in units of MHz out to 3-digit accuracy after the decimal.
Example: 100.000MHZ

| Packaging | |
|---|---|
| Blank | Bulk |

**Not all combinations are available. Consult Factory.**

### *Temperature Code Table*

| Letter | Temp °C | Letter | Temp °C | Letter | Temp °C | Letter | Temp °C | Letter | Temp °C | Letter | Temp °C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | -40 | F | -15 | K | 10 | P | 35 | U | 60 | Z | 85 |
| B | -35 | G | -10 | L | 15 | Q | 40 | V | 65 | | |
| C | -30 | H | -5 | M | 20 | R | 45 | W | 70 | | |
| D | -25 | I | 0 | N | 25 | S | 50 | X | 75 | | |
| E | -20 | J | 5 | O | 30 | T | 55 | Y | 80 | | |

Notes:
1* All Parameters, unless otherwise specified, are at nominal conditions; ie: T=25ºC, Nominal Vcc & Nominal Load .

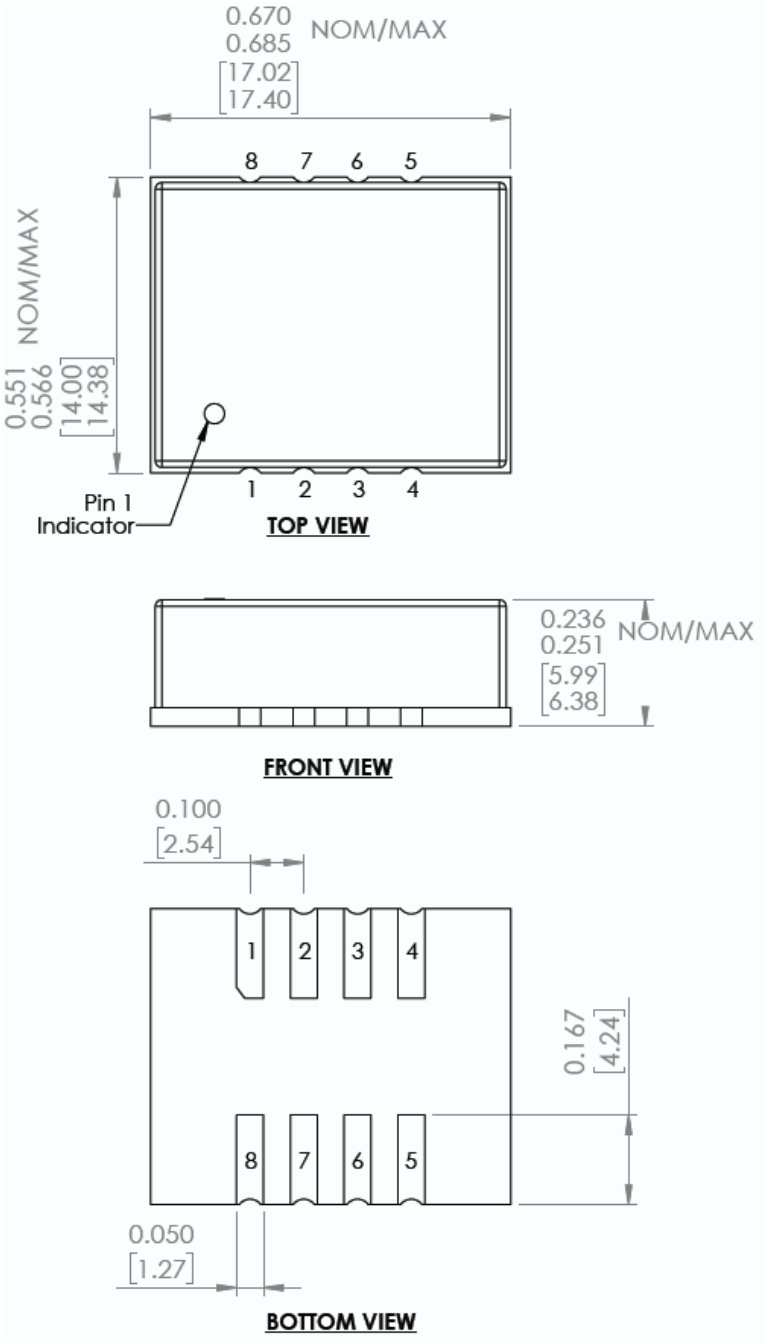
# AE-x3A2 Series

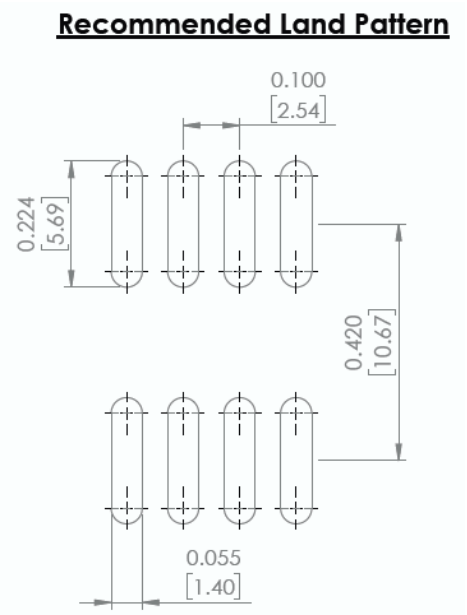
**SINEWAVE HF VCXO**

ESD Sensitive

**17.4 x 14.38 x 6.38 mm**
**Datasheet #0707A**

## *Mechanical Dimensions*



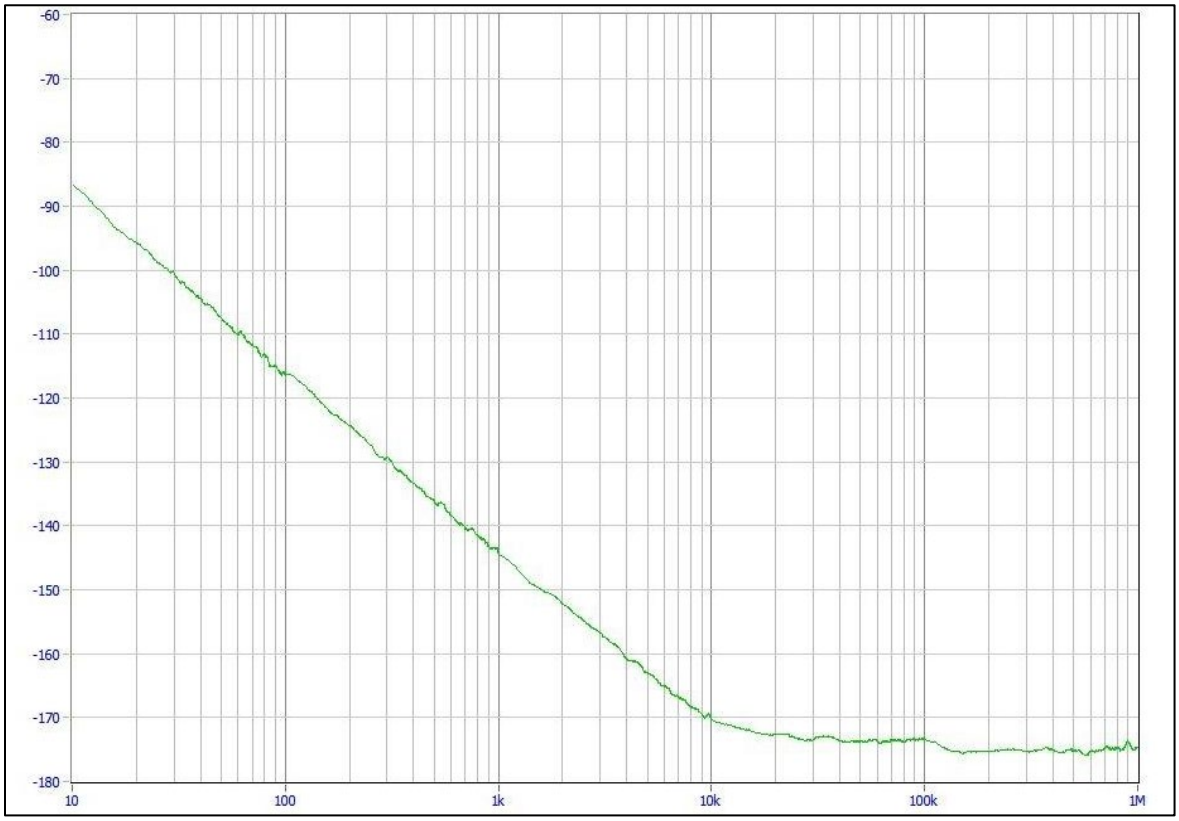

OUTLINE TOLERANCE:
±0.015 [0.40] (UNLESS OTHERWISE SPECIFIED)

| Pin # | Function |
|---|---|
| 1 | Vcc |
| 2 | GND |
| 3 | GND |
| 4 | GND |
| 5 | OUTPUT |
| 6 | N/C |
| 7 | GND |
| 8 | Vc |

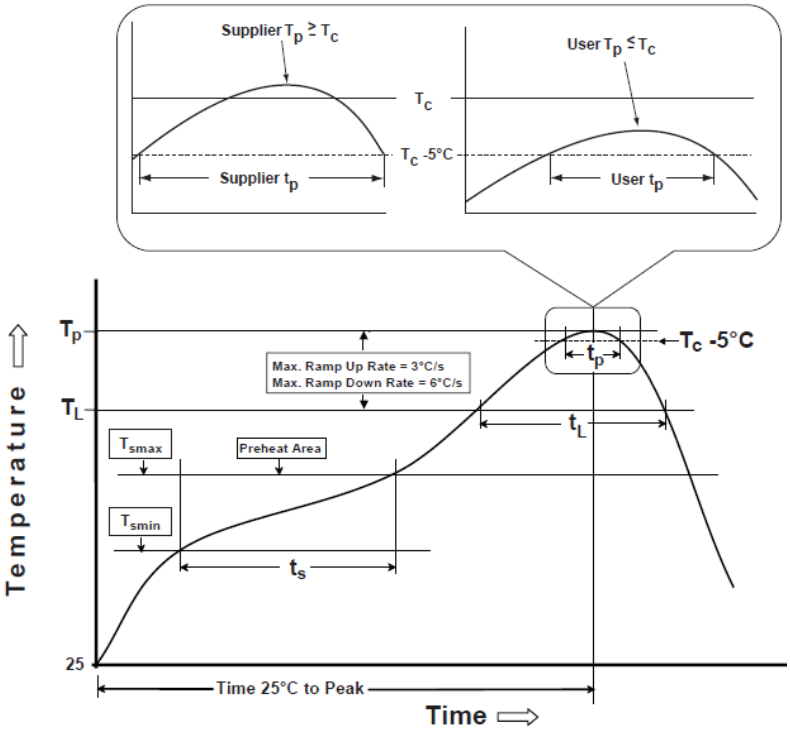
**Dimensions: inches [mm]**

## *Phase Noise Plot*

**Typical Phase Noise at 100 MHz**



## *Reflow Profile [JEDEC J-STD-020]*




### Table 1

| SnPb Eutectic Process Classification Temperatures ($T_c$) | | |
|---|---|---|
| **Package Thickness** | **Volume mm³ <350** | **Volume mm³ ≥350** |
| <2.5 mm | 235°C | 220°C |
| ≥2.5 mm | 220°C | 220°C |

### Table 2

| Pb-Free Process Classification Temperatures ($T_c$) | | | |
|---|---|---|---|
| **Package Thickness** | **Volume mm³ <350** | **Volume mm³ 350-2000** | **Volume mm³ >2000** |
| <1.6 mm | 260°C | 260°C | 260°C |
| 1.6 mm - 2.5 mm | 260°C | 250°C | 245°C |
| >2.5 mm | 250°C | 245°C | 245°C |

| Profile Feature | Sn-Pb Eutectic Assembly | Pb-Free Assembly |
|---|---|---|
| Preheat / soak | | |
| Temperature minimum ($T_{smin}$) | 100°C | 150°C |
| Temperature maximum ($T_{smax}$) | 150°C | 200°C |
| Time ($T_{smin}$ to $T_{smax}$) ($t_s$) | 60 - 120 sec. | 60 - 120 sec. |
| Average ramp-up rate ($T_{smax}$ to $T_P$) | 3°C/sec. max | 3°C/sec. max |
| Liquidous temperature ($T_L$) | 183°C | 217°C |
| Time at liquidous ($t_L$) | 60 - 150 sec. | 60 - 150 sec. |
| Peak package body temperature ($T_P$)* | **see Table 1** | **see Table 2** |
| Time ($t_p$)** within 5°C of the specified classification temperature ($T_C$) | 20 sec. | 30 sec. |
| Ramp-down rate ($T_p$ to $T_{smax}$) | 6°C/sec. max | 6°C/sec. max |
| Time 25°C to peak temperature | 6 min. max | 8 min. max |
| Reflow cycles | 1 max | 1 max |

*Tolerance for peak profile temperature ($T_P$) is defined as a supplier minimum and a user maximum.

**Tolerance for time at peak profile temperature ($t_p$) is defined as supplier minimum and a user maximum.