

# 32.768kHz CONTINUOUS VOLTAGE SMD CRYSTAL XO



**ASAKDV**

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ESD Sensitive



2.0 x 1.6 x 0.8 mm  
RoHS/RoHS II Compliant  
MSL Level = N/A

## Features

- Continuous Vdd operation from 1.62 V ~ 3.63 V
- Optimized for low current consumption
- Output Enable/Start & Disable/Stop function
- Output waveform CMOS/LVCMOS compatible
- Hermetically seam-sealed ceramic package

## Applications

- Portable & wearable electronics
- Internet of Things (IoT)
- Consumer electronics
- Industrial control & automation
- Mobile communication

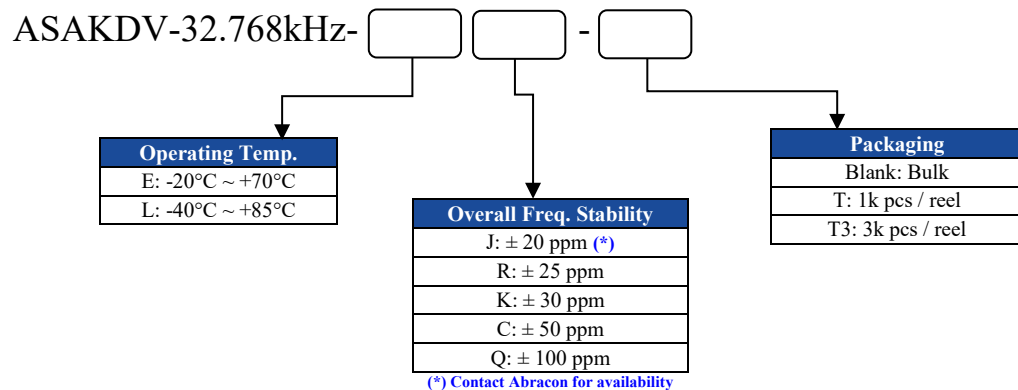
## Electrical Specifications

| Parameters  | Min.  | Typ.    | Max.    | Units | Notes       |
|---|---|---------|---------|-------|-------------|
| Frequency   |   | 32.768  |         | kHz   |             |
| Operating Temperature Range                             | -40.0   |         | +85     | °C    | See options |
| Storage Temperature Range                               | -55.0   |         | +125    | °C    |             |
| Overall Frequency Stability [Note 1]                    | -25.0   |         | +25     | ppm   | See options |
| Supply Voltage (Vdd)                                    | +1.62   |         | +3.63   | V     |             |
| Tri-state function [Note 2]                             | “1” (VIH≥0.7*Vdd) or Open: Oscillation;<br>“0” (VIL<0.3*Vdd): No Oscillation/Hi Z |         |         | V     |             |
| Output Load   |   |         | 15      | pF    | CMOS        |
| Output Voltage  | V <sub>OH</sub>   | 0.9*Vdd |         | V     |             |
|   | V <sub>OL</sub>   |         | 0.1*Vdd |       |             |
| Aging 1 year @25°C±3°C                                  | -3.0  |         | +3.0    | ppm   |             |
| Aging 5 years @25°C±3°C                                 | -5.0  |         | +5.0    | ppm   |             |
| Symmetry @ ½ Vdd  | 45  | 50      | 55      | %     |             |
| Start-up Time   |   |         | 10      | ms    |             |
| Rise and Fall Time (Tr/Tf)<br>@10%Vdd-90%Vdd, 15pF load |   |         | 50      | ns    |             |
| Disable Current   |   |         | 10      | µA    |             |
| Supply Current (Idd)<br>@25°C±3°C                       | Vdd = 3.3V  | 80      | 100     | µA    | No Load     |
|   | Vdd = 2.5V  | 70      | 90      | µA    | No Load     |
|   | Vdd = 1.8V  | 60      | 80      | µA    | No Load     |

**Note 1:** Overall frequency stability includes initial frequency tolerance @25°C±3°C and stability over the operating temperature range.

**Note 2:** Do not leave pin 1 (INH) floating. If pin 1 (INH) is not utilized for toggling, it must be tied to Vdd (logic 1).

## Part Identification



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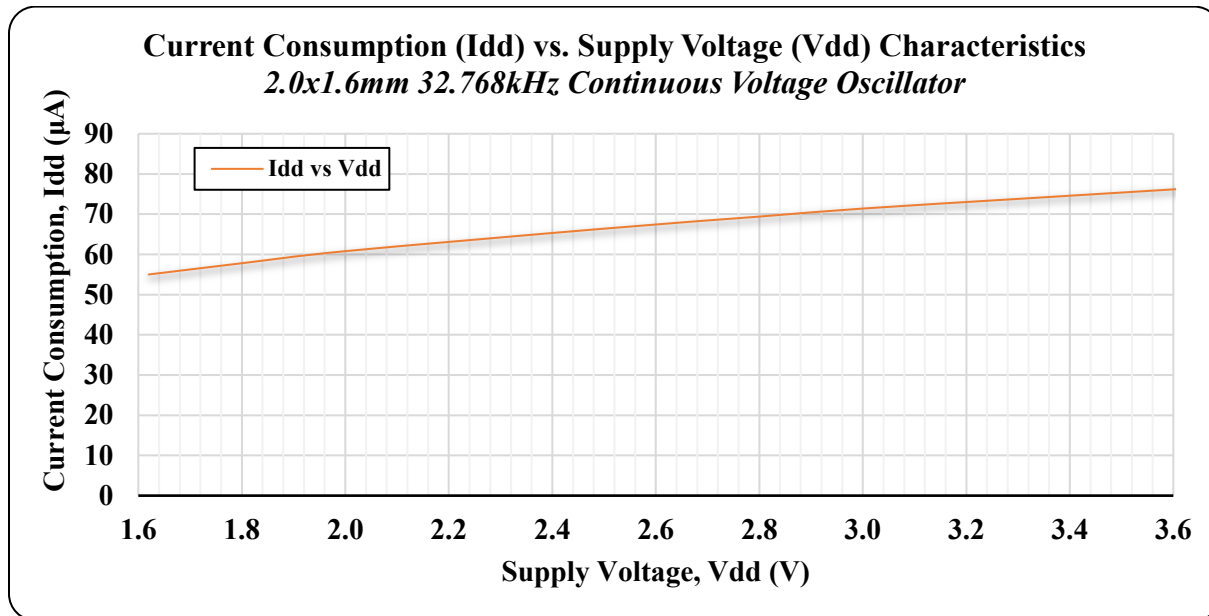


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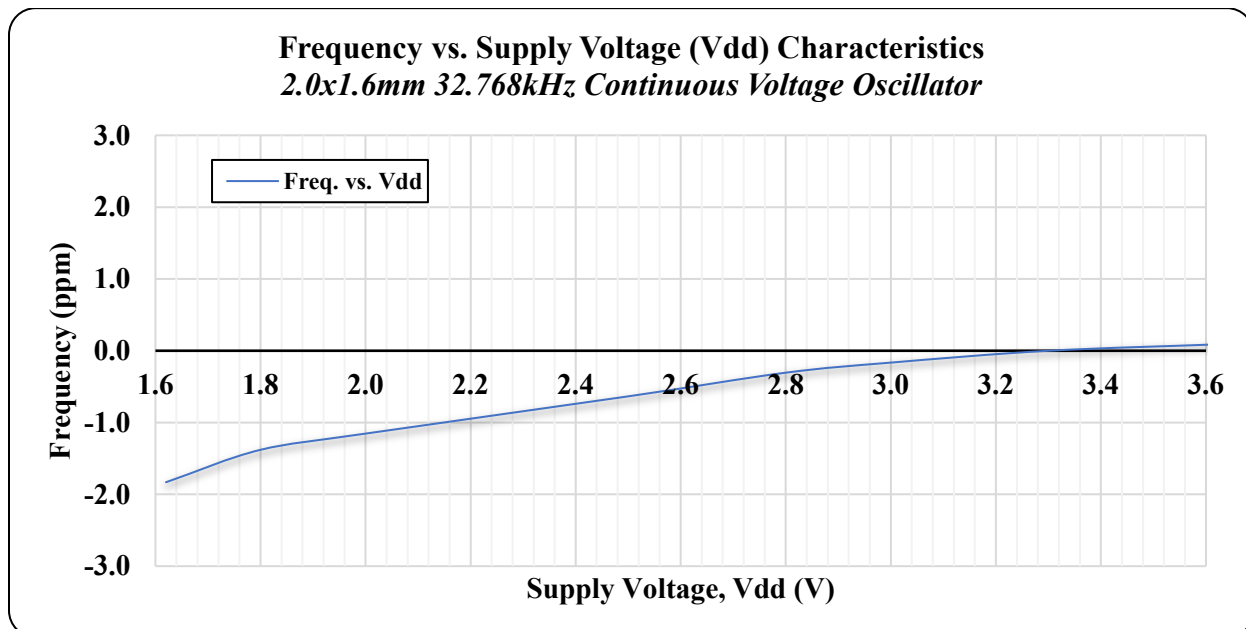


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## Typical Current Consumption (I<sub>dd</sub>) vs. Supply Voltage (V<sub>dd</sub>) Characteristics [ @ 25°C ± 3°C, No Load ]



## Typical Frequency vs. Supply Voltage (V<sub>dd</sub>) Characteristics [ @ 25°C ± 3°C, Normalized to V<sub>dd</sub>=3.3Vdc ]



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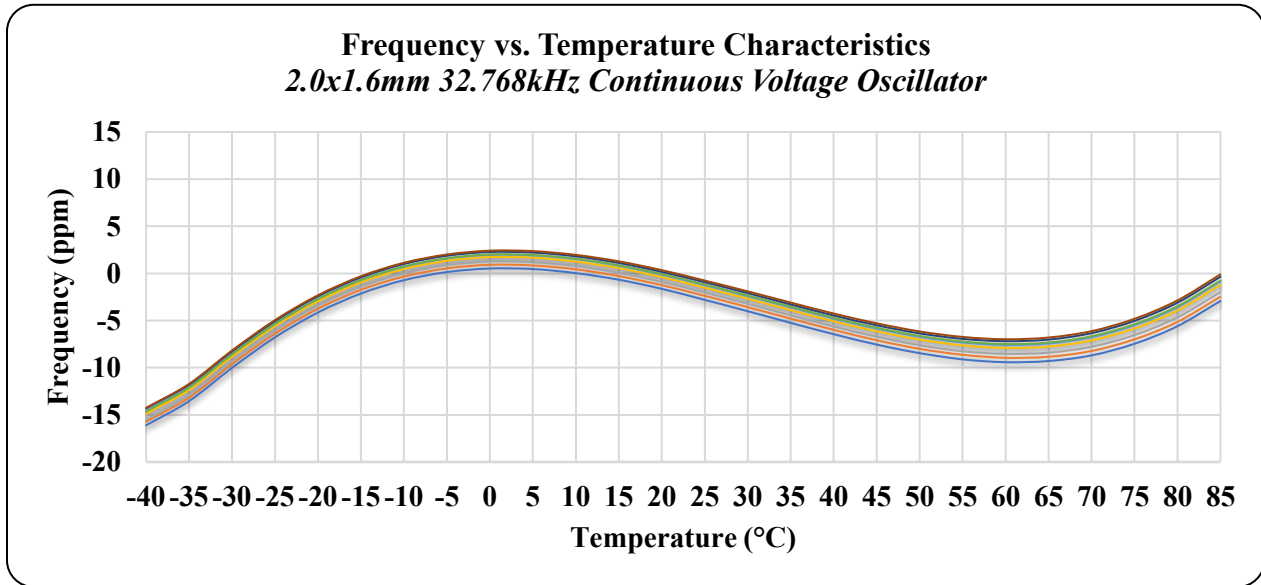


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## Typical Frequency vs. Temperature Characteristics



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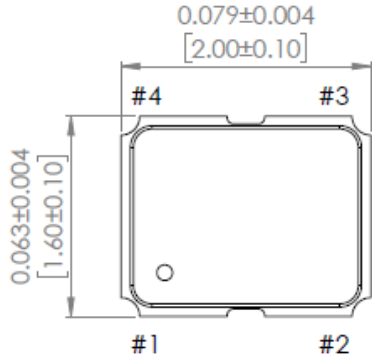


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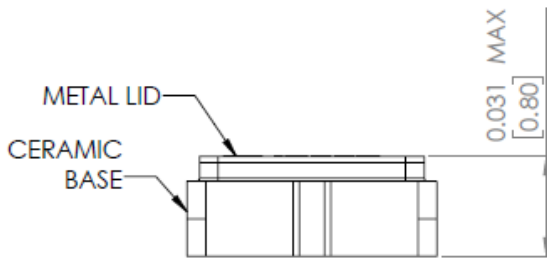


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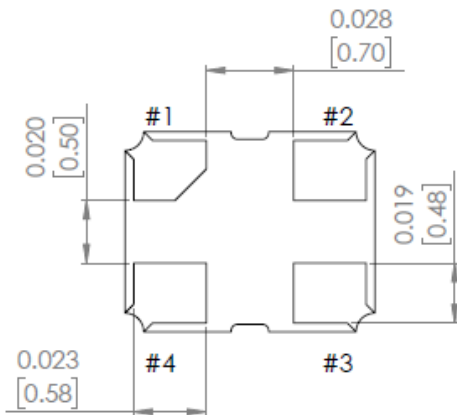
## Mechanical Dimensions



TOP VIEW

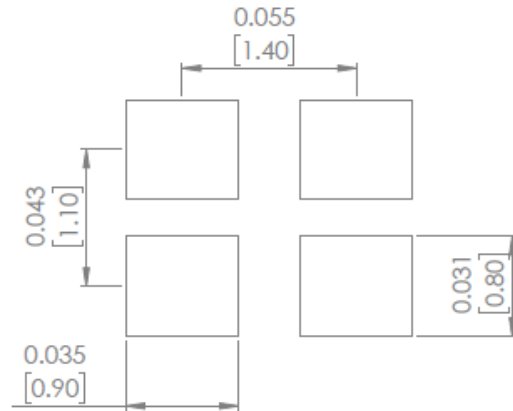


SIDE VIEW



BOTTOM VIEW

## Recommended Land Pattern



| Pin # | Function |
|-------|----------|
| 1     | INH      |
| 2     | GND      |
| 3     | Output   |
| 4     | Vdd      |

| INH Function |                         |
|--------------|-------------------------|
| #1           | #3 (Output)             |
| Open         | Active                  |
| "H" Level    | Active                  |
| "L" Level    | High Z (No Oscillation) |

**Note 3:**

- Do not leave Pin 1 (INH) floating
- If Pin 1 (INH) is not utilized for toggling, it must be tied to Vdd (logic 1)

**Note 4:**

Recommended to use approximately 0.01µF bypass capacitor between PIN 2 and PIN 4

Dimensions: inches (mm)



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## Reflow Profile [JDEC J-STD-020]

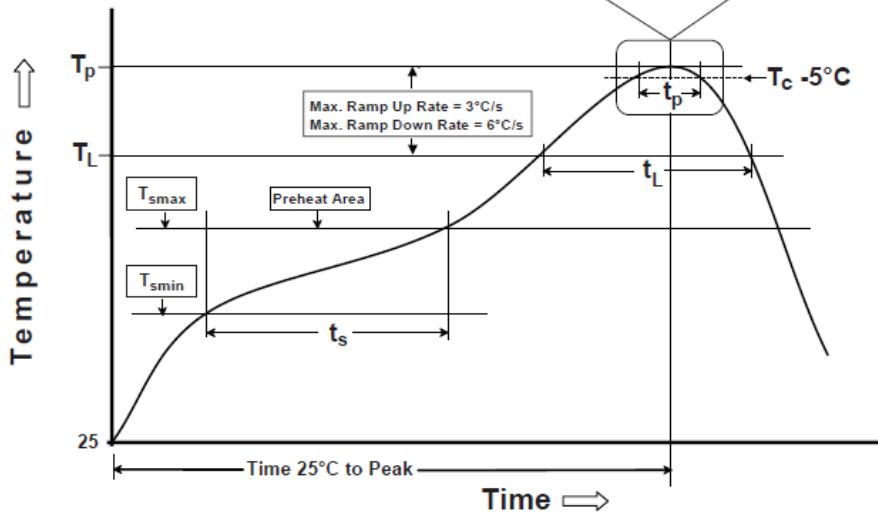
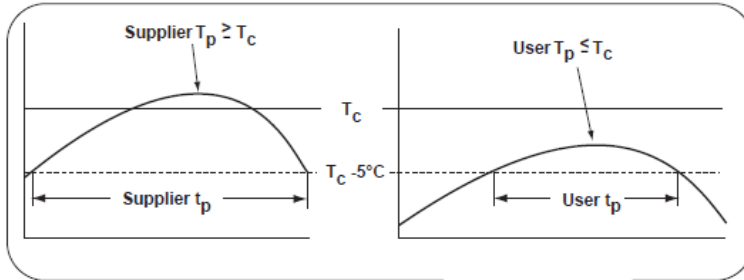


Table 1

### SnPb Eutectic Process Classification Temperatures ( $T_c$ )

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥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 mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350-2000 | Volume mm <sup>3</sup> >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       |

\*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 a supplier minimum and a user maximum.



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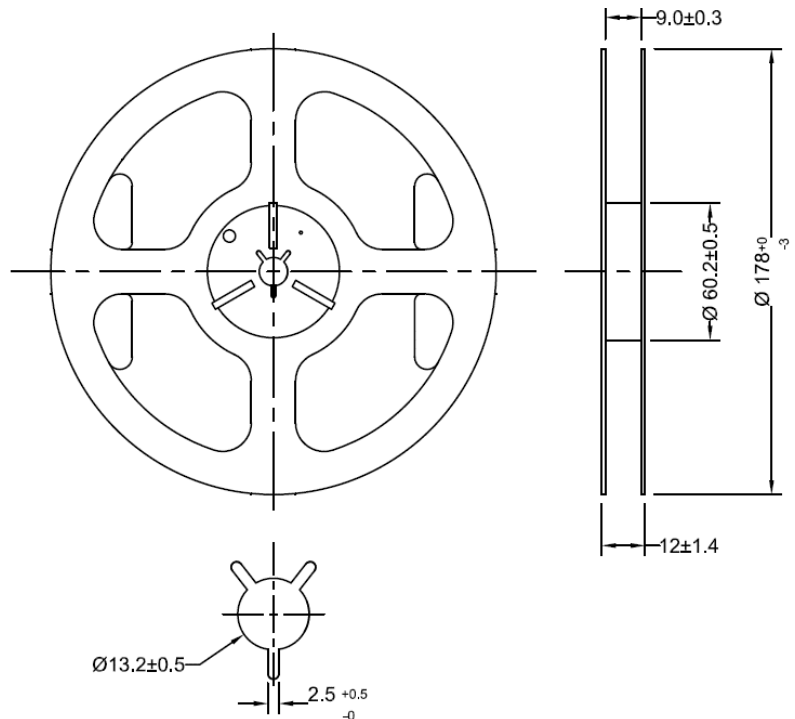
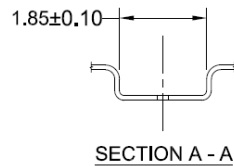
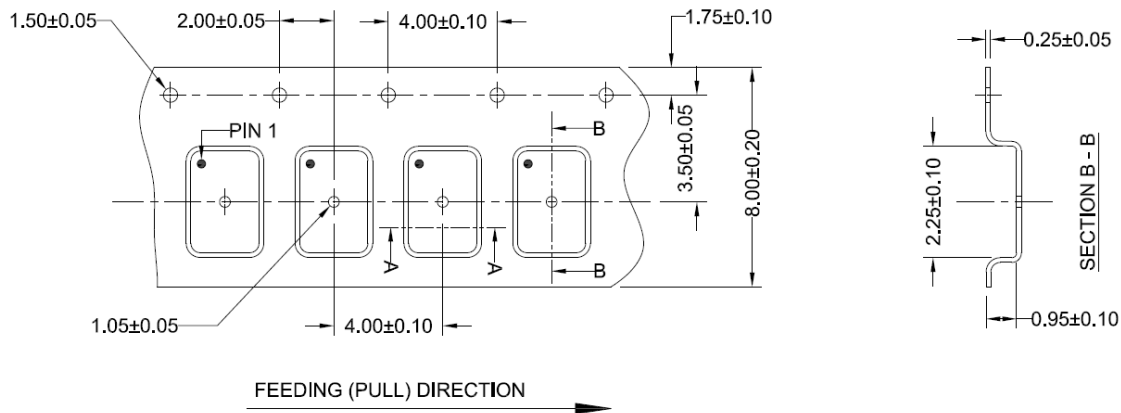


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## Packaging

T: 1,000pcs/reel

T3: 3,000pcs/reel



## Dimensions: mm

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