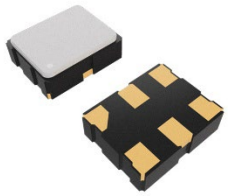
# ASEK Series

## 32.768kHz Ceramic SMD Crystal Oscillator

## Description

Abracon's ASEK series is a low power 32.768 kHz crystal oscillator within a 3.2 mm x 2.5 mm x 1.2 mm package. This series offers various supply voltage options at 1.8V, 2.5V and 3.3V. The ASEK delivers a CMOS output with a ±20 ppm frequency tolerance. This series has an output enable/disable feature, with a low 5 µA typical disable current.



## Features

- Optimized for low current consumption
- Output Enable/Start & Disable/Stop function
- Output waveform CMOS/LVCMOS compatible
- Hermetically seam-sealed ceramic package
- REACH/RoHS II Compliant | MSL Level 1
- Pb free

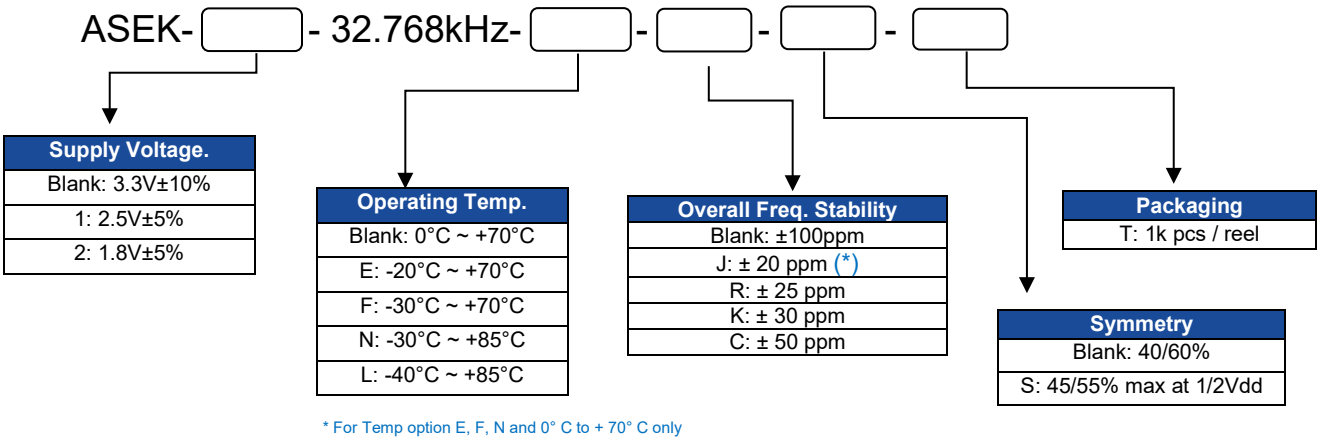
## Typical Applications

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

## Electrical Specifications

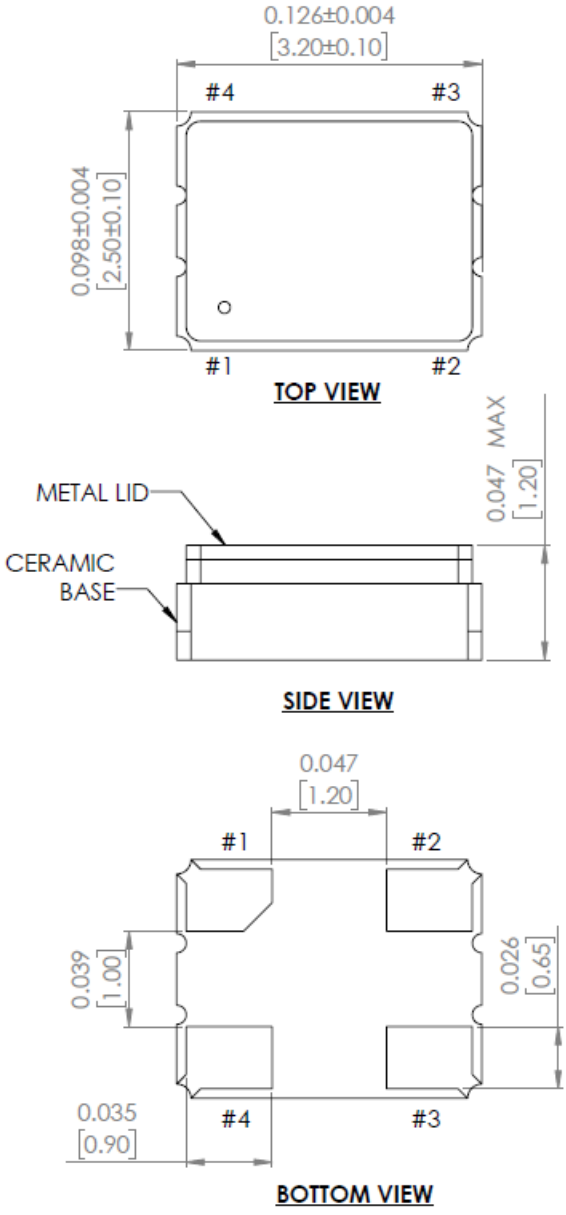
| Parameters | | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| Frequency | | | 32.768 | | kHz | |
| Operating Temperature Range | | 0 | | +70 | °C | See options |
| Storage Temperature Range | | -55.0 | | +125 | °C | |
| Overall Frequency Stability [Note 1] | | -100 | | +100 | ppm | See options |
| Supply Voltage (Vdd) | | 2.97 | 3.30 | 3.63 | V | See options |
| Tri-state function | | :Logic "1" or Open: Oscillation; Logic "0" (VIL<0.8 Vdd): Hi Z | | | V | |
| Output Load | | | | 15 | pF | CMOS |
| Output Voltage | $V_{OH}$ | 0.9*Vdd | | | V | |
| | $V_{OL}$ | | | 0.1*Vdd | | |
| Aging 1 year @25°C± 3°C | | -3.0 | | +3.0 | ppm | |
| Symmetry @ ½ Vdd | | 40 | | 60 | % | See options |
| Start-up Time | | | 24 | 28 | ms | |
| Rise and Fall Time (Tr/Tf) @10%Vdd-90%Vdd, 15pF load | | | 40 | 50 | ns | |
| Disable Current | | | | 10 | µA | |
| Supply Current (Idd) @25°C± 3°C | Vdd = 3.3V | | 1.7 | 3.5 | mA | |
| | Vdd = 2.5V | | 1.2 | 2.5 | | |
| | Vdd = 1.8V | | 0.8 | 1.5 | | |

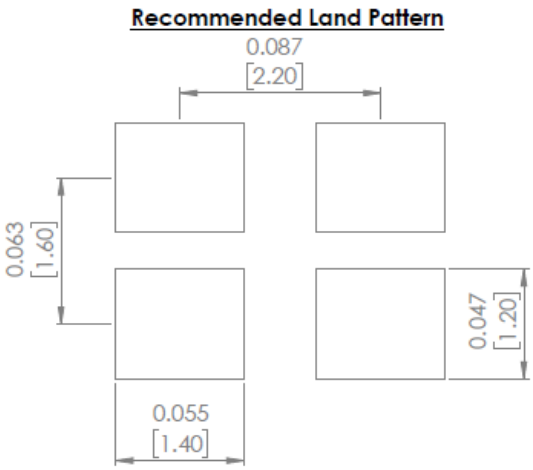
## Part Identification




* For Temp option E, F, N and 0° C to + 70° C only

## Mechanical Dimensions




| Pin # | Function |
|---|---|
| 1 | $\overline{\text{INH}}$ |
| 2 | GND |
| 3 | Output |
| 4 | Vdd |

| $\overline{\text{INH}}$ Function | |
|---|---|
| #1 | #3 (Output) |
| Open | Active |
| "H" Level | Active |
| "L" Level | High Z (No Oscillation) |

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

Dimensions: inches (mm)

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

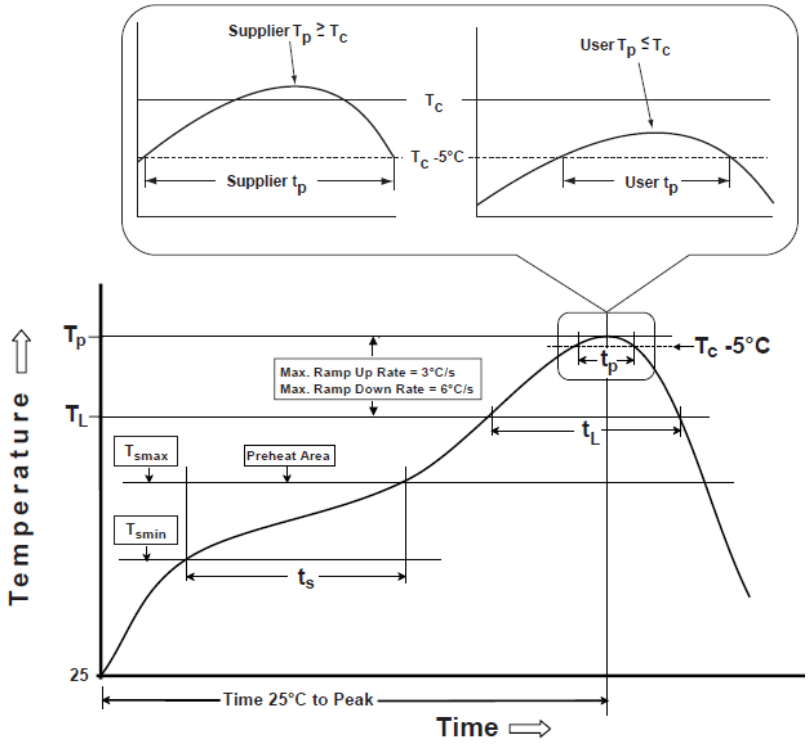



**Table 1**

| 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 | 2 max | 2 max |

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

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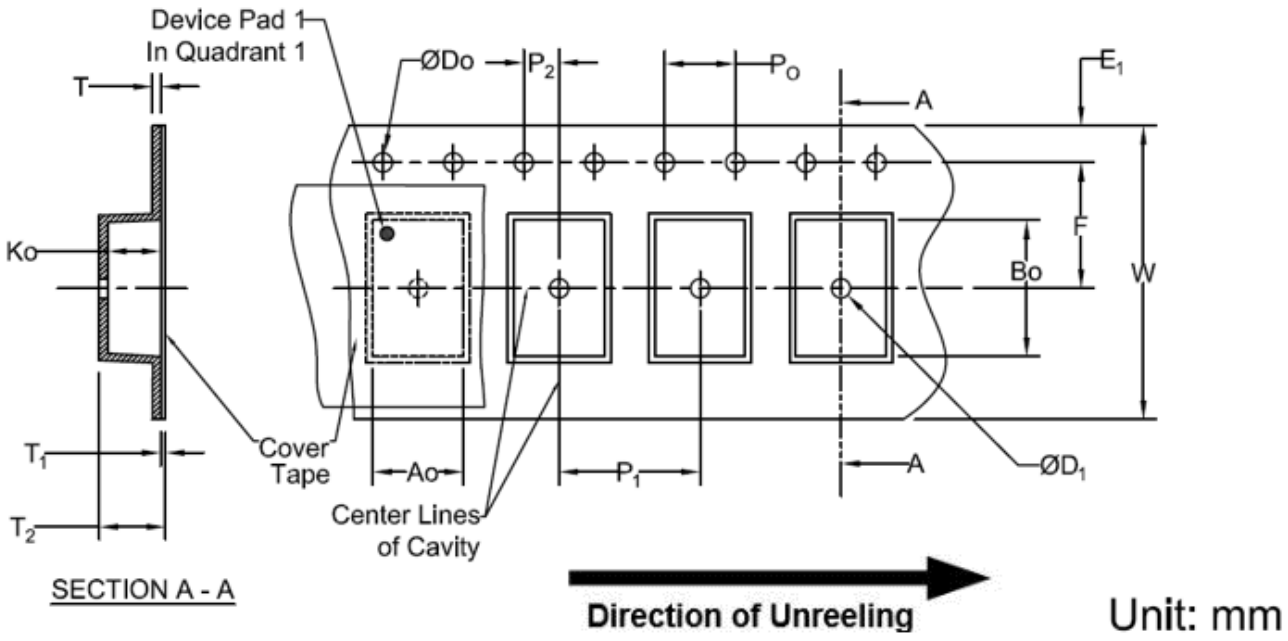
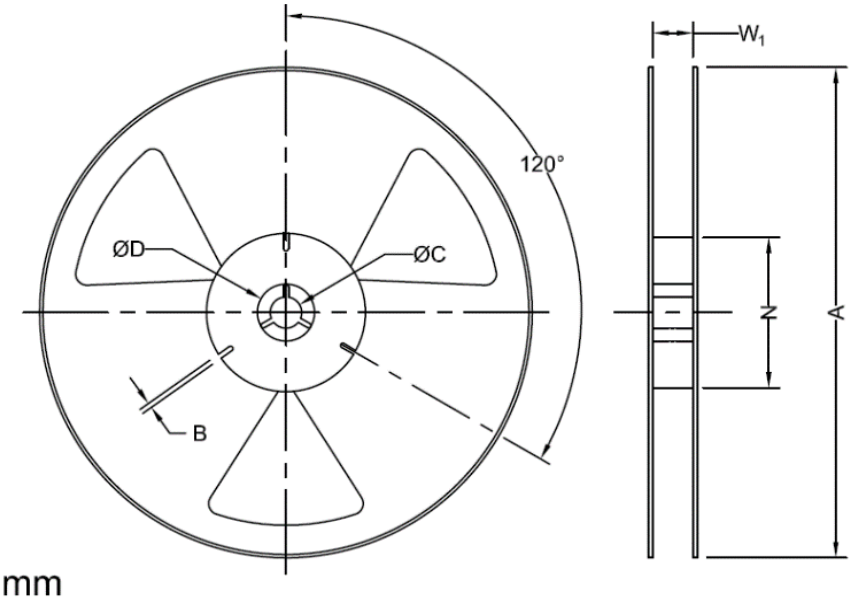
## Packaging

T: 1,000pcs/reel




| Tape Specifications (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Width** | Ao | Bo | Do | $D_1$ (Min) | $E_1$ | F | Ko |
| **8mm** | * | * | 1.5+0.1/-0.0 | 1.0 | 1.75±0.1 | 3.5±0.05 | * |
| **Width** | $P_1$ | $P_2$ | $P_0$ | T (Max) | $T_1$ (Max) | $T_2$ (Max) | W (Max) |
| **8mm** | 4.0±0.1 | 2.0±0.05 | 4.0±0.1 | 0.6 | 0.1 | 2.5 | 8.3 |

***Note: Compliant to EIA-481**




Unit: mm

| Reel Specifications (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Width** | Qty/Reel | A (Nom) | B (Min) | C (Min) | D (Min) | N (Min) | *$W_1$ |
| **8mm** | 1000 | 178 | 1.5 | 13.0+0.5/-0.2 | 20.2 | 50 | 8.4+1.5/-0.0 |

***Note: Measured at Hub**