

# Automotive & Industrial Grade 32.768kHz Continuous Voltage SMD Crystal X

ASEKDVAIG

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ESD Sensitive



3.2 x 2.5 x 1.2 mm  
RoHS/RoHS II Compliant  
MSL Level = N/A

## Features

- Continuous V<sub>DD</sub> 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
- AEC-Q200 Qualified
- Automotive Grade 1: -40°C to +125°C
- TS16949 Production Line Certified
- PPAP Available Upon Request

## Applications

- Infotainment Systems
- Keyless Entry & Startup
- GPS & Navigation
- Comfort control
- ADAS (Advanced Driver Assistance Systems)
- Vehicle to Vehicle Communication
- LiDAR (Light Detection and Ranging)
- In-vehicle Networking
- Powertrain & Drive Control
- Power Control & Conversion
- Industrial Control & Automation

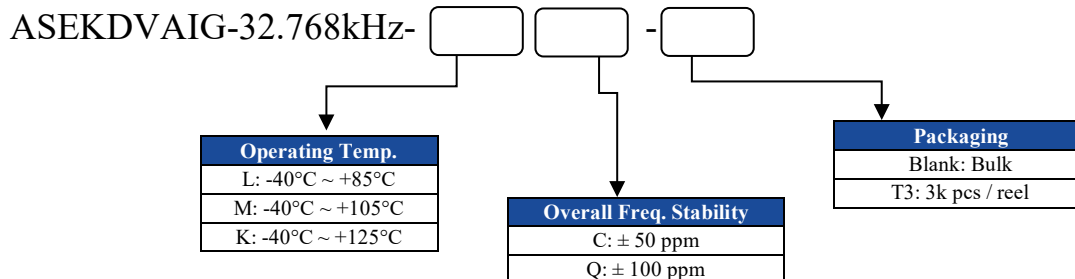
## Electrical Specifications

Parameters	Min.	Typ.	Max.	Units	Notes
Frequency		32.768		kHz	
Operating Temperature Range	-40.0		+125	°C	See options
Storage Temperature Range	-55.0		+125	°C	
Overall Frequency Stability <sup>[Note 1]</sup>	-100		+100	ppm	See options
Supply Voltage (V <sub>dd</sub> )	+1.62		+3.63	V	
Tri-state function <sup>[Note 2]</sup>	“1” (VIH≥0.7*V <sub>dd</sub> ) or Open: Oscillation; “0” (VIL<0.3*V <sub>dd</sub> ): No Oscillation/Hi Z			V	
Output Load			15	pF	CMOS
Output Voltage	V <sub>OH</sub>	0.9*V <sub>dd</sub>		V	
	V <sub>OL</sub>		0.1*V <sub>dd</sub>		
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 V <sub>dd</sub>	45	50	55	%	
Start-up Time			30	ms	
Rise and Fall Time (Tr/Tf) @10%V <sub>dd</sub> -90%V <sub>dd</sub> , 15pF load			30	ns	
Disable Current			5	µA	
Supply Current (I <sub>dd</sub> ) @25°C± 3°C	V <sub>dd</sub> = 3.3V	10	15	µA	No Load
	V <sub>dd</sub> = 2.5V	9	14	µA	No Load
	V <sub>dd</sub> = 1.8V	8	13	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 V<sub>dd</sub> (logic 1).

## Part Identification



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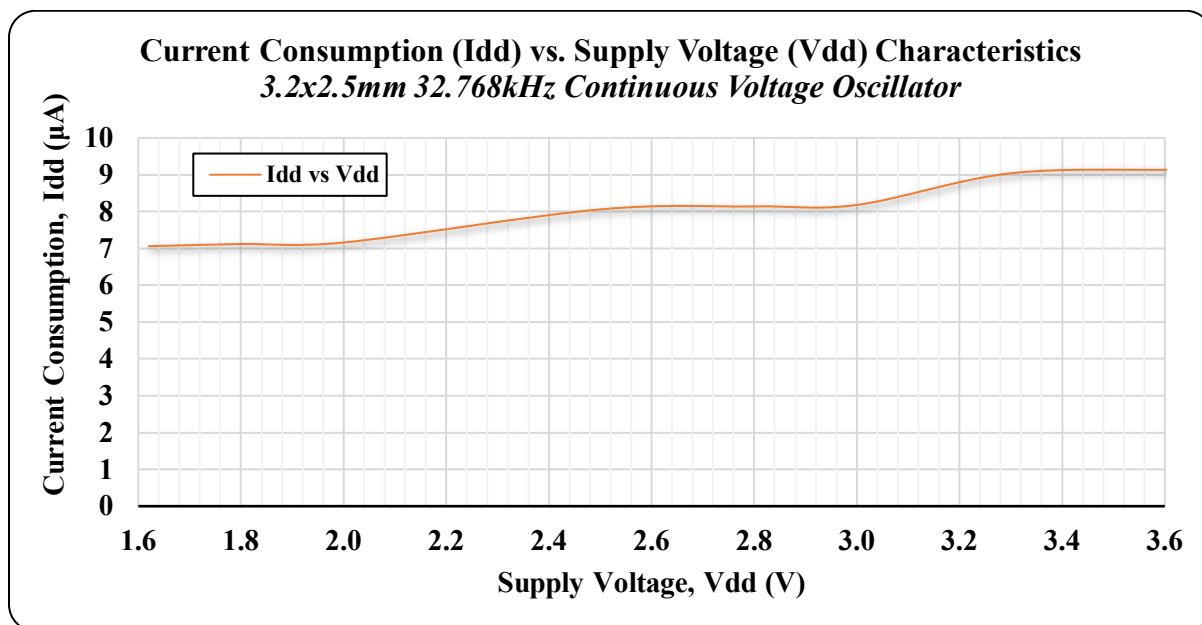


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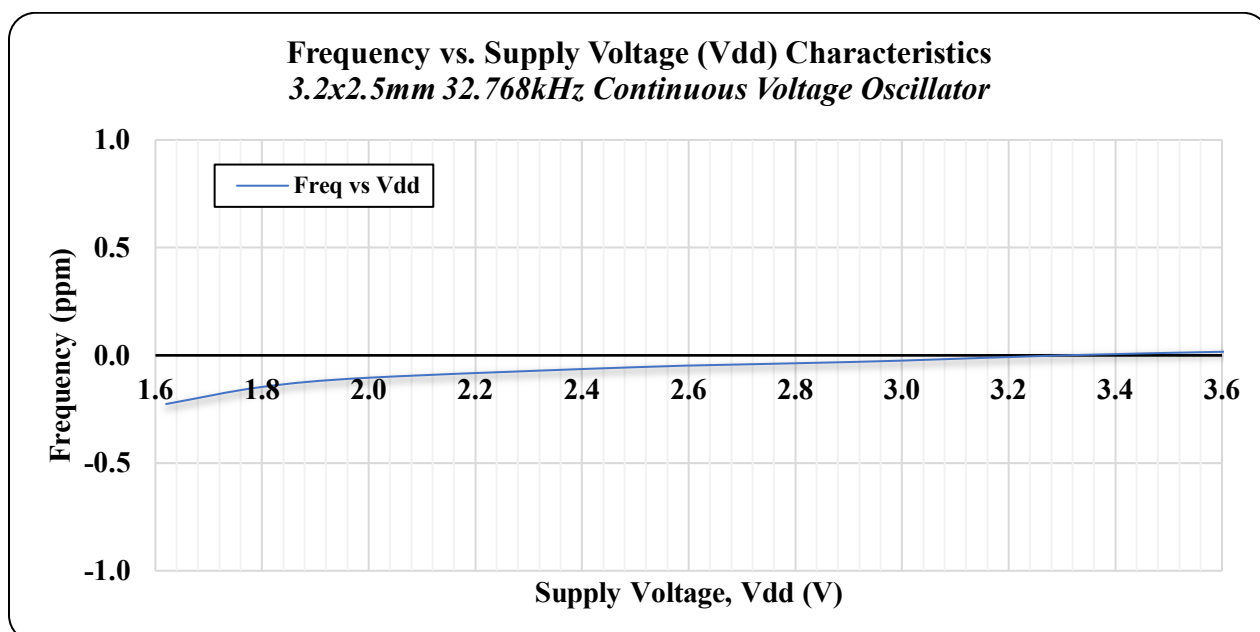


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## Typical Current Consumption (I<sub>dd</sub>) vs. Supply Voltage (V<sub>dd</sub>) Characteristics [ @ 25°C ± 3°C, No Load ]



## 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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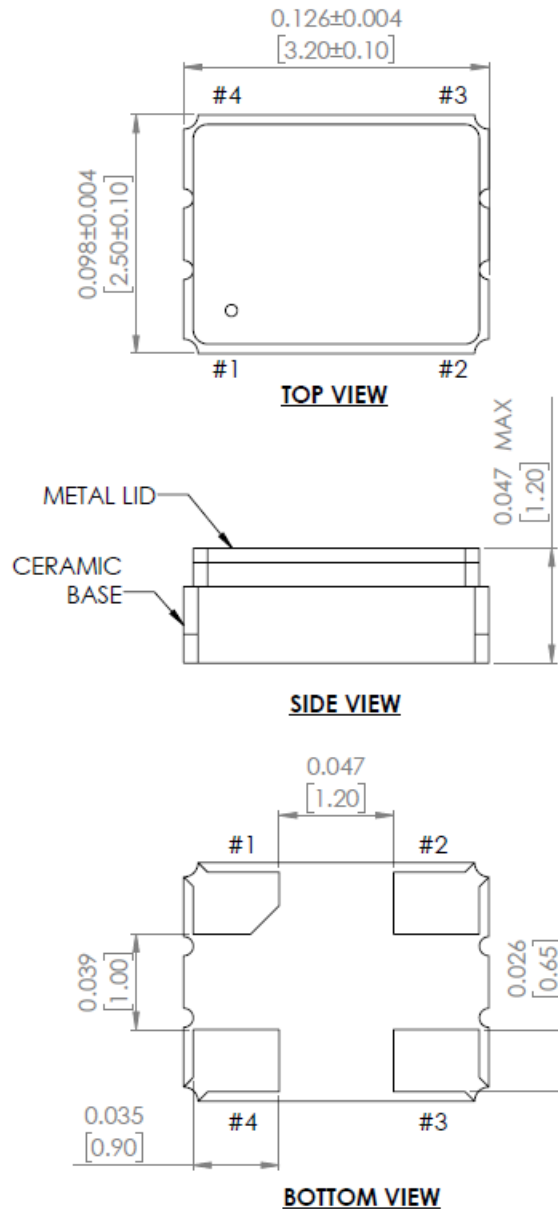


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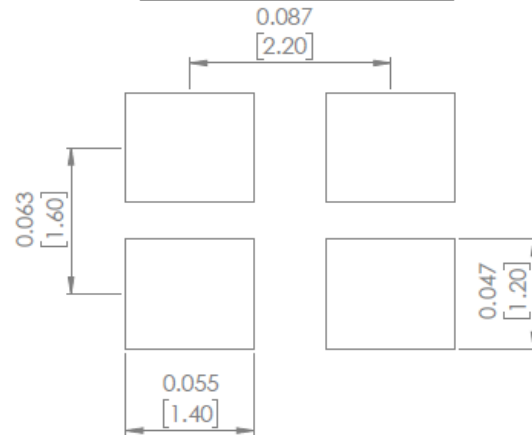


3.2 x 2.5 x 1.2 mm  
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## Mechanical Dimensions



### 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]

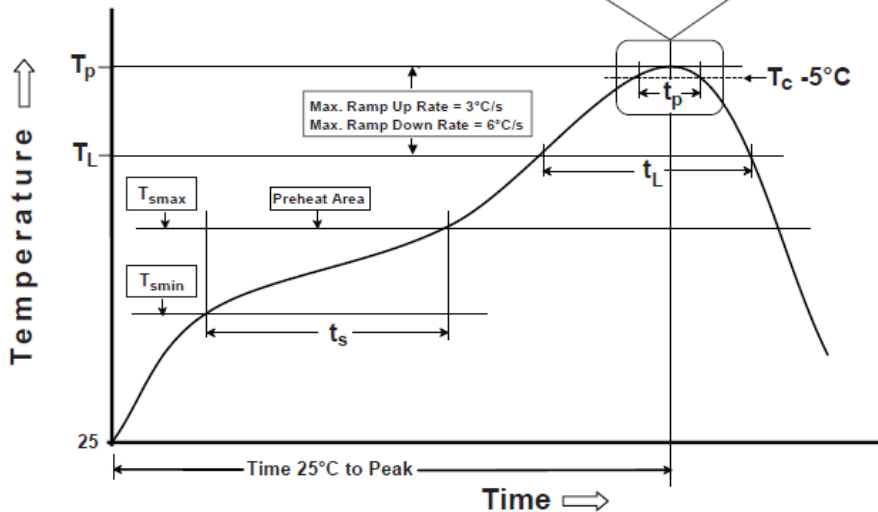
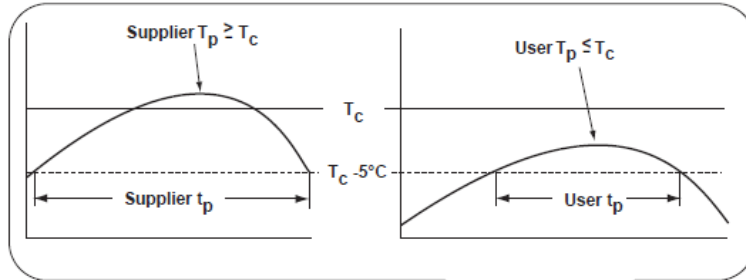


Table 1

### 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 supplier minimum and a user maximum.



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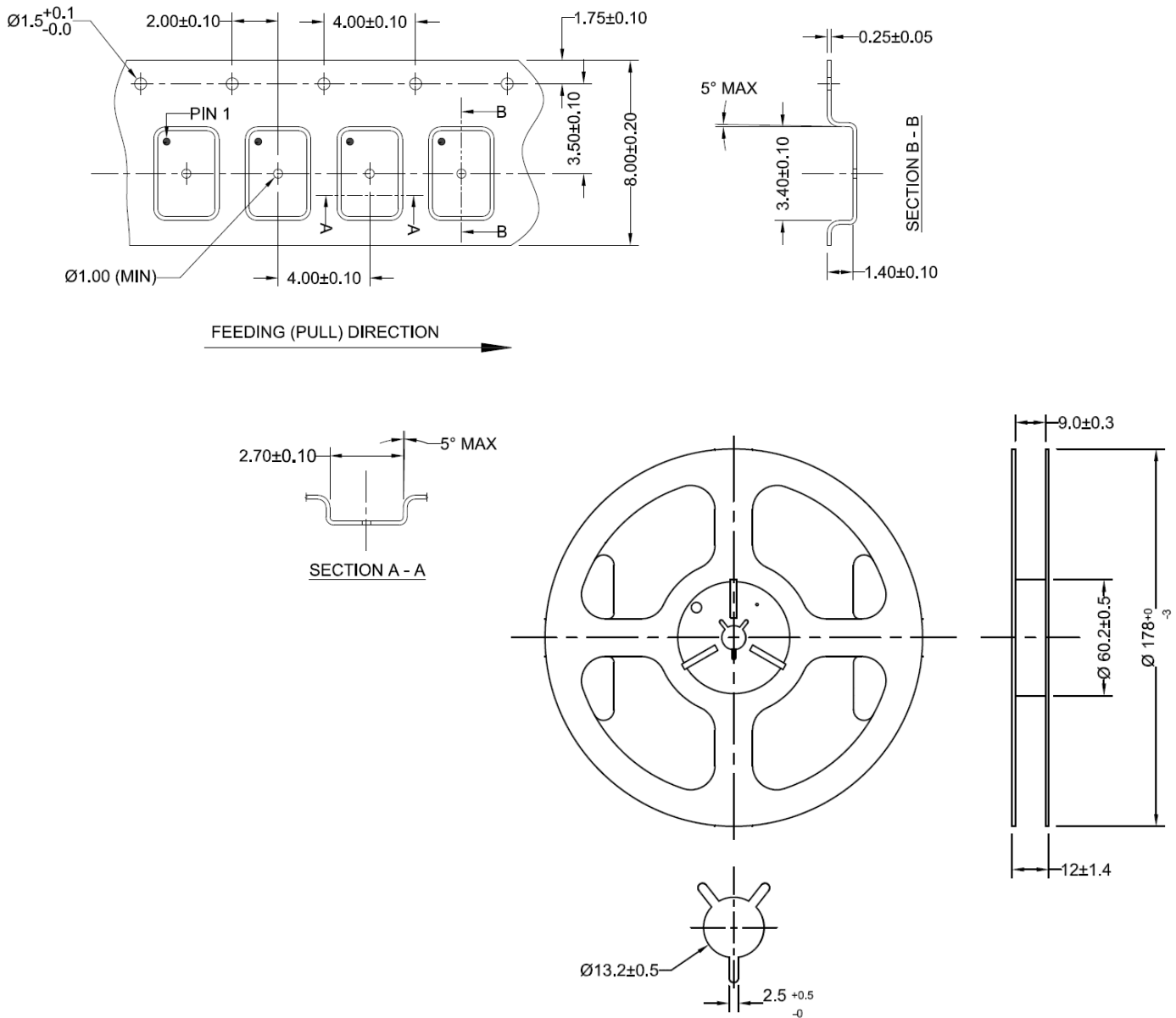
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## Packaging

T3: 3,000pcs/reel



Dimensions: mm

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