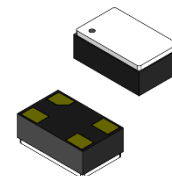


32.768 kHz Low Power SMD Crystal Oscillator

Description

Abrakon's ASZKDV series is a low power 32.768 kHz crystal oscillator with a miniature 2.0 mm x 1.2 mm x 0.7 mm package. This series offers a variable supply voltage, capable of operating with 1.6V to 5.5V. The ASZKDV delivers a CMOS output with a ± 20 ppm frequency tolerance. This series has an output enable/disable feature, with a low 0.45 μ A typical disable current.



Features

- Oscillator with internal at 32.768 kHz tuning fork resonator
- Ultra-miniature package 2.0x1.2x0.7mm [max.]
- CMOS output
- Continuous supply voltage operation from 1.6V to 5.5V
- Optimized for low current consumption
- Operating temperature range: -40 to +85 °C, -40 to +125 °C
- Output enable/disable function

Typical Applications

- Portable and wearable electronics
- Internet of Things (IoT)
- Consumer electronics
- Industrial control and automation
- General purpose clock generator for digital systems
- Clock reference for Real Time Clocks (RTCs)
- Timekeeping in network servers and computers
- Electricity, gas and water metering

Electrical Specifications [Note 1]

Parameters	Minimum	Typical	Maximum	Units	Notes
Output Frequency		32.768		kHz	
Operating Temperature Range (OTR)	-40		+85	°C	Option "L"
	-40		+125		Option "H"
Storage Temperature Range	-55		+125	°C	
Turnover Temperature	+20	+25	+30	°C	
Frequency Tolerance	-20		+20	ppm	
Temperature Coefficient		-0.035 $\pm$ 10%		ppm/C ²	
Supply Voltage Range (V _{dd})	+1.6		+5.5	V	@ OTR= -40°C ~ +85°C
	+2.25		+5.5		@ OTR= -40°C ~ +125°C
V _{dd} slew rate			$\pm$ 0.5	V/ms	
Current Consumption (I _{dd}) CLKOUT disabled [Note 2, 3]		0.45	0.65	μ A	V _{dd} = 3.0 V, @ +25°C
		0.68	0.90		V _{dd} = 5.0 V, @ +25°C
			1.30		V _{dd} = 3.0 V, over OTR -40 to 85°C
			1.80		V _{dd} = 5.0 V, over OTR -40 to 85°C
			1.95		V _{dd} = 3.0 V, over OTR -40 to 125°C
			2.70		V _{dd} = 5.0 V, over OTR -40 to 125°C
Output Load (CL)			15	pF	CMOS
Output Voltage	V _{OH}	V _{dd} -0.4		V	I _{OH} = -400 μ A, V _{dd} = 1.6 to 5.5 V
	V _{OL}		GND+0.4		I _{OL} = 400 μ A, V _{dd} = 1.6 to 5.5 V
Hi-Z leakage current			$\pm$ 100	nA	OE = GND; OUTPUT= V _{dd} or GND
OE Pin Function	"1" (VIH $\geq$ 0.7*V _{dd}) or Open: Oscillation "0" (VIL $<$ 0.3*V _{dd}): Output disabled				
Aging @ +25°C	-3.0		+3.0	ppm	First year
Duty Cycle	40		60	%	
Voltage Coefficient	-3.0		+3.0	ppm/V	
Start-up Time			0.5	s	
Output Rise Time		30.0	70.0	ns	CL = 10 pF, 10% to 90% V _{dd}
Output Fall Time		30.0	70.0	ns	CL = 10 pF, 10% to 90% V _{dd}
Output Enable Time	0.0		0.5	μ s	
Output Disable Time			0.1	μ s	

Note 1: V_{dd} = 3.0V; GND = 0V; @ +25 °C unless otherwise indicated

Note 2: See diagram "Typical Supply Current (I_{dd}) vs Supply Voltage (V_{dd})"

Note 3: When OUTPUT is enabled (OE is HIGH) the additional supply current can be calculated as follows: $\Delta I_{DD} = CL \times V_{DD} \times F_{out}$

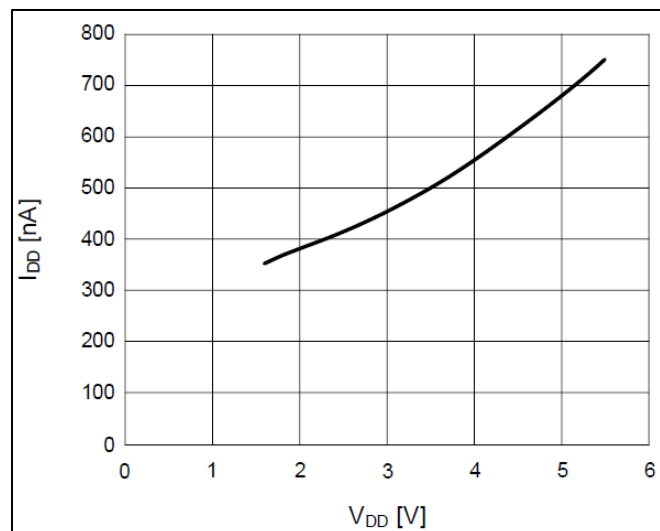
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Absolute Maximum Ratings

Parameters	Symbol	Conditions	Rating	Unit
Supply voltage range [Note 4]	V_{DD}	Between V_{DD} and V_{SS}	-0.5 to +6.0	V
Input voltage range [Note 4]	V_{IN}	Between V_{IN} and V_{SS}	-0.5 to +6.0 [Note 5]	V
Output voltage range [Note 4]	V_{OUT}	Output pad	-0.5 to +6.0 [Note 5]	V
Electrostatic discharge voltage	V_{ESD}	HBM	± 1000	V
Solder reflow profile		Per JEDEC J-STD-020C	+260 max	°C

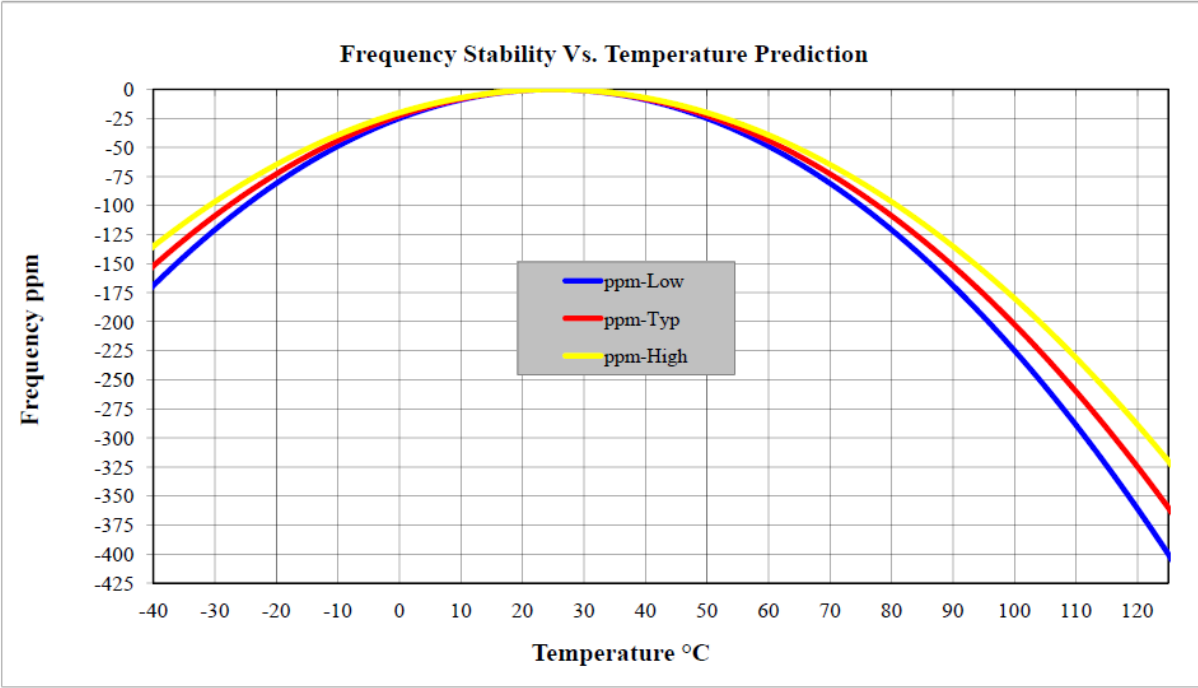
Note 4: Absolute maximum ratings are the values that must not be exceeded. This product may suffer damage if any one of these parameter ratings is exceeded. Operation and characteristics are guaranteed only when the product is operated per the specification datasheet.

Note 5: V_{DD} is a V_{DD} value of recommended operating conditions

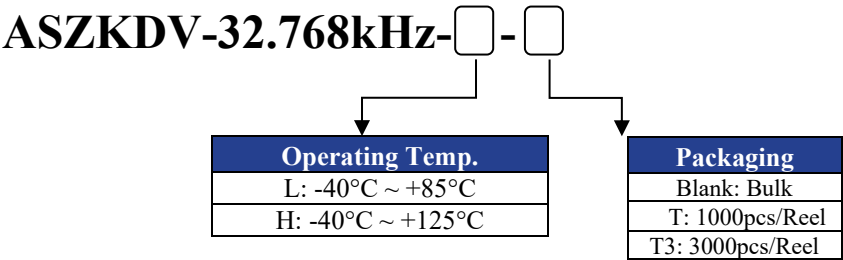
Typical Supply Current (I_{DD}) vs Supply Voltage (V_{DD}), Output Disabled, $T_{OPR} = 25^{\circ}\text{C}$ 

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Typical Frequency Temperature Characteristics

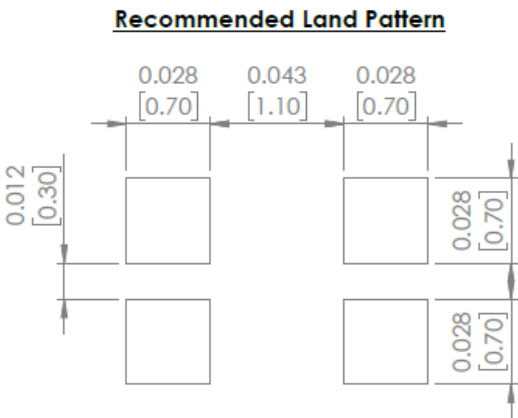
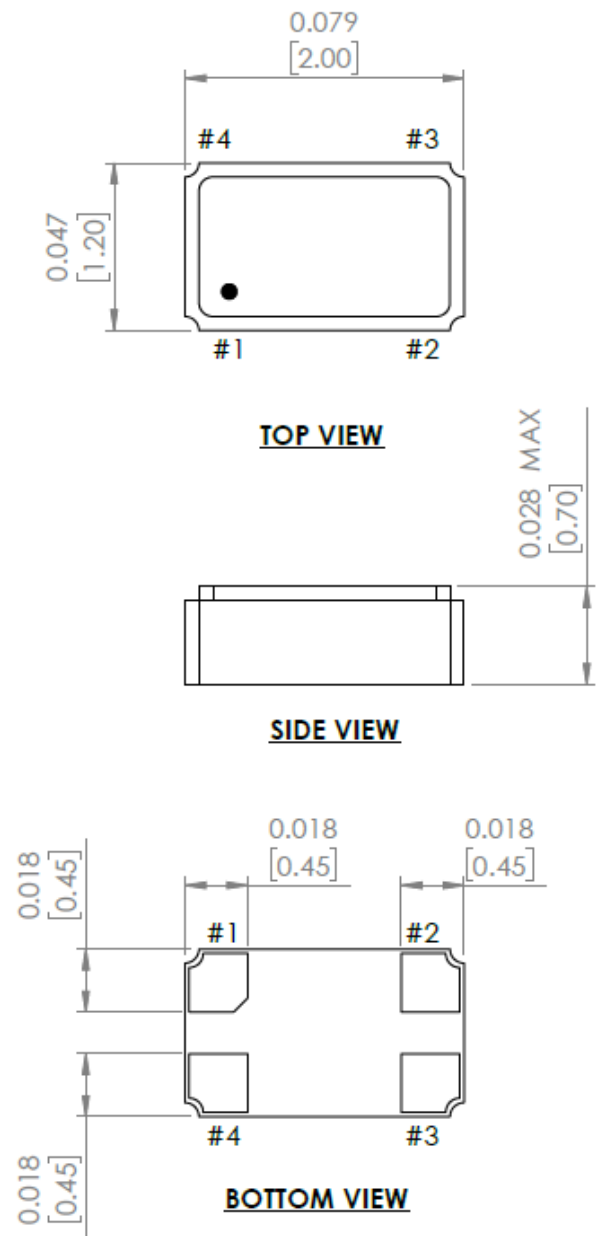


Part Identification



32.768 kHz Low Power SMD Crystal Oscillator

Mechanical Dimensions



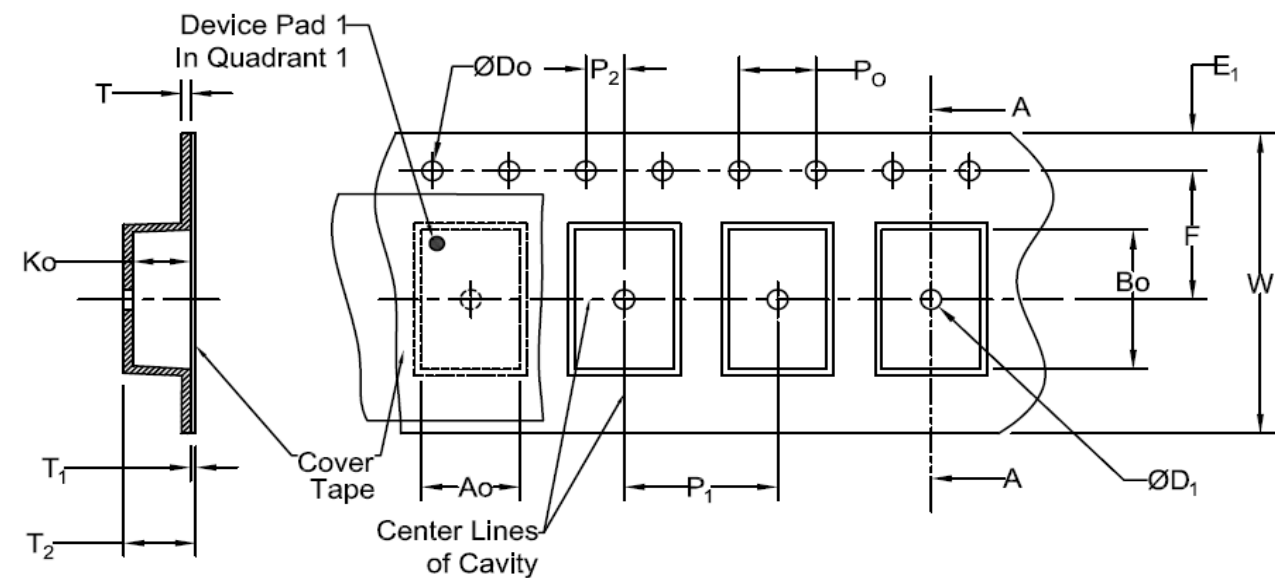
Pin #	Function
1	Output
2	Ground*
3	Enable/Disable
4	Supply Voltage

*Metal lid is connected to ground (pin 2)

Dimensions: Inches [mm]

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Tape



SECTION A - A

Unit: mm

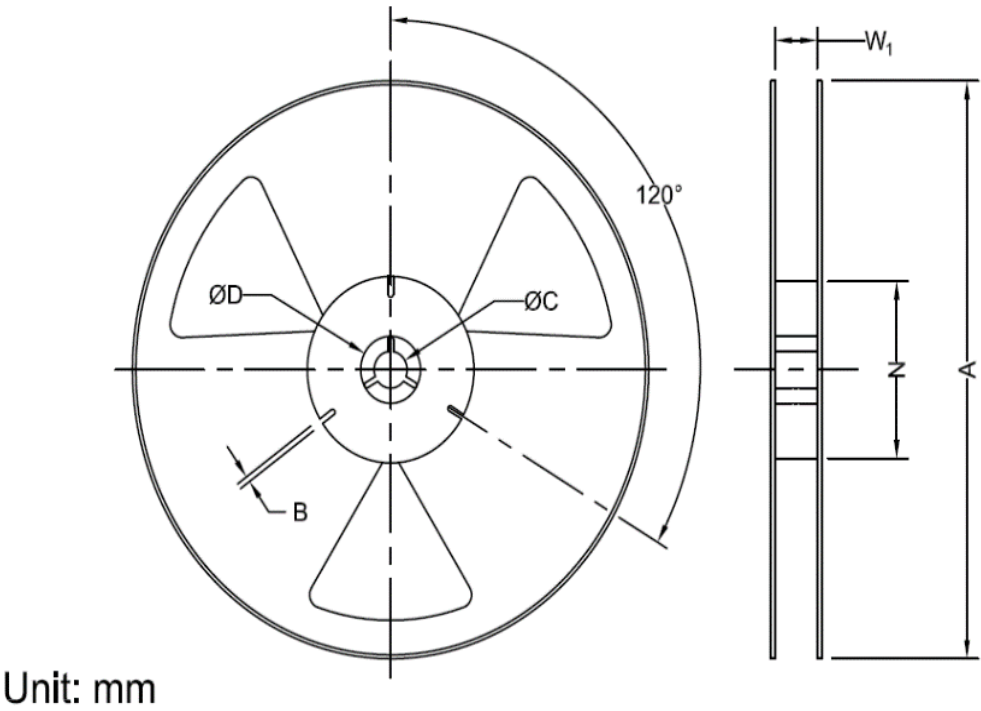
Tape Specifications (mm)							
Width	Ao	Bo	Do	D1 (Min)	E1	F	Ko
8mm	*	*	1.5+0.1/-0.0	1.0	1.75±0.1	3.5±0.05	*

Tape Specifications (mm)							
Width	P1	P2	P0	T (Max)	T1 (Max)	T2 (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

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Reel



Tape 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
	3000	178	1.5	13.0+0.5/-0.2	20.2	50	8.4+1.5/-0.0

*Measured at Hub

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Reflow

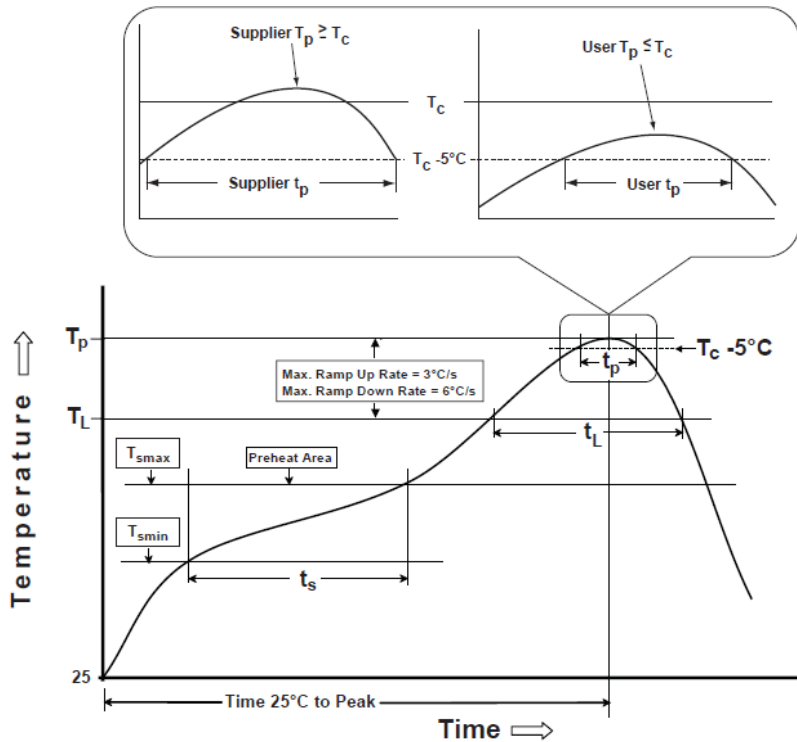


Table 1

SnPb Eutectic Process
Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥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 ³ <350	Volume mm ³ 350-2000	Volume mm ³ >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 ($T_{ Amin}$)	100°C	150°C
Temperature maximum ($T_{ smax}$)	150°C	200°C
Time ($T_{ Amin}$ 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.

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