

LOW VOLTAGE SMD CRYSTAL OSCILLATOR

Description

Abracon's ASA7 series is a crystal oscillator designed to operate with a supply voltage of 1.2V in a 2.0 mm x 1.6 mm ceramic package. This series provides a CMOS output with a best-case frequency stability of ± 20 ppm over an operating temperature range of -40°C to $+85^{\circ}\text{C}$.



Features

- Low Vdd 1.2 V operation
- Ultra Miniature 2.0 x 1.6 x 0.8mm package
- Tri-state function
- Suitable for high density SMT
- Suitable for RoHS compliant reflow process
- Seam sealed package assures high reliability

Typical Applications

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

Electrical Specifications [Note 1]

Parameters		Min.	Typ.	Max.	Units	Notes
Frequency range		20		54	MHz	
Operating Temperature range		-20		+70	$^{\circ}\text{C}$	See options
Storage Temperature range		-55		+125	$^{\circ}\text{C}$	
Overall Frequency stability [Note 2]		-20		+20	ppm	See options
Supply voltage (Vdd)		1.08	1.2	1.32	V	
Supply Current (Idd)				3.0	mA	F < 30 MHz
				3.5	mA	30 MHz $\leq$ F < 40 MHz
				4.0	mA	40 MHz $\leq$ F < 54 MHz
Tri-state function	VIH	$\geq 0.7 \cdot \text{Vdd}$ or Open: Oscillation;			V	
	VIL	< $0.3 \cdot \text{Vdd}$: No Oscillation/Hi Z			V	
Output Voltage	VOH	$0.9 \cdot \text{Vdd}$			V	
	VOL			$0.1 \cdot \text{Vdd}$		
Output Load				15	pF	CMOS
Aging		-3.0		+3.0	ppm	First year @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$
Symmetry @ $\frac{1}{2} \text{Vdd}$		45	50	55	%	@ $\frac{1}{2} \text{Vdd}$
Start-up Time				5	ms	
Rise/Fall Time (Tr/Tf)				6	ns	
RMS Phase Jitter ($\leq 39\text{MHz}$: 12kHz to 5MHz) ($> 39\text{MHz}$: 12kHz to 20MHz)				500	fs	
Enable Time				5	ms	
Disable Time				0.1	μs	
Disable Current				10.0	μA	No load, pad 1 = ground

Note 1: All measurements guaranteed at nominal Vdd, nominal load, and at 25°C unless otherwise specified.

Note 2: Overall frequency stability includes initial frequency tolerance @ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and stability over the operating temperature range.

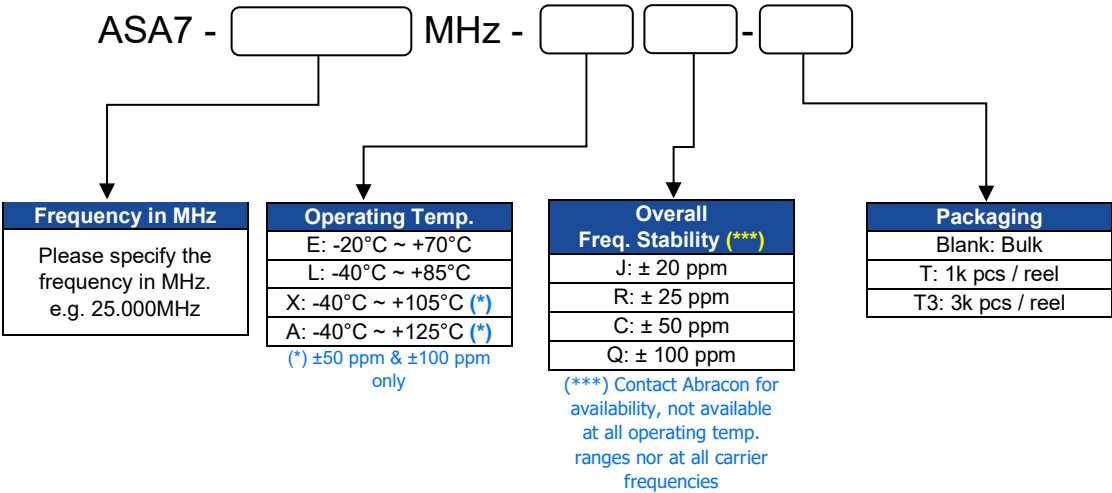
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Absolute Maximum Ratings [Note 3]

Parameters	Min.	Typ.	Max.	Units	Notes
Supply Voltage	V _{SS} -0.5		V _{DD} +0.3	V	
Input Voltage	V _{SS} -0.5		V _{DD} +0.3	V	
Output Voltage	V _{SS} -0.5		V _{DD} +0.3	V	
Maximum Junction Operating Temperature			125	°C	
Ambient Operating Temperature Range	-40		85	°C	
Reflow Temperature			260	°C	See Reflow Profile
ESD Protection	HBM Class 2 (2kV to <4kV)				
MSL Rating	1				

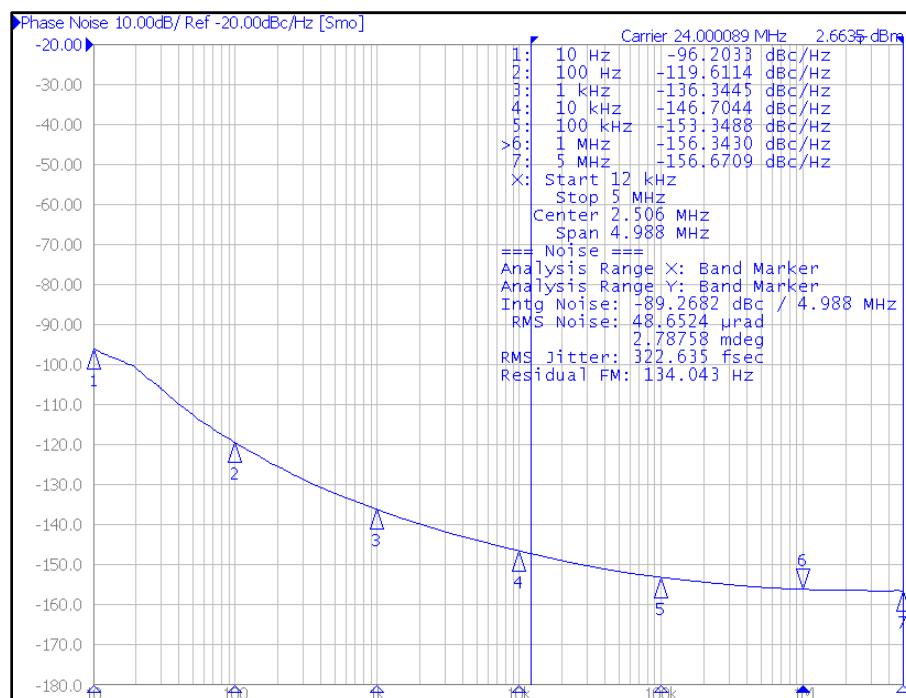
Note 3: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability. The data sheet limits are not guaranteed if the device is operated beyond the recommended operating conditions.

Options and Part Identification

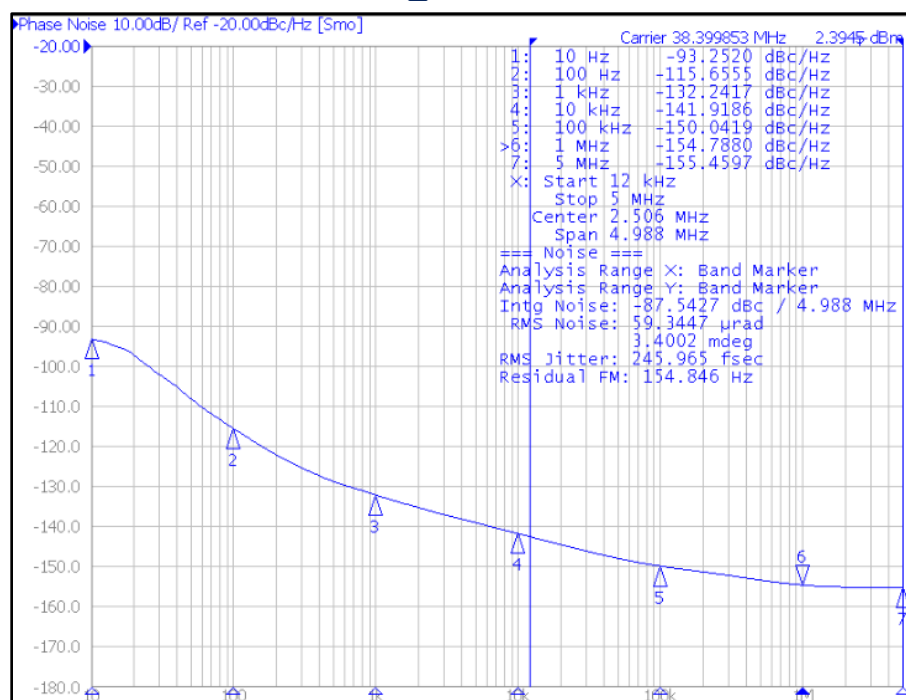


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Typical Phase Noise Performance – 24 MHz @ +25°C



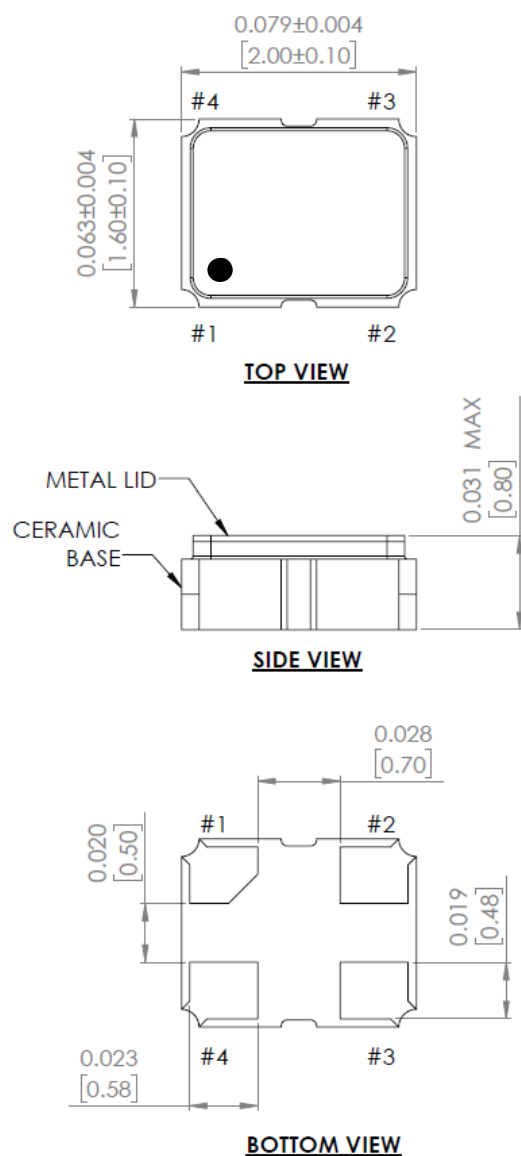
Typical Phase Noise Performance – 38.4 MHz @ +25°C



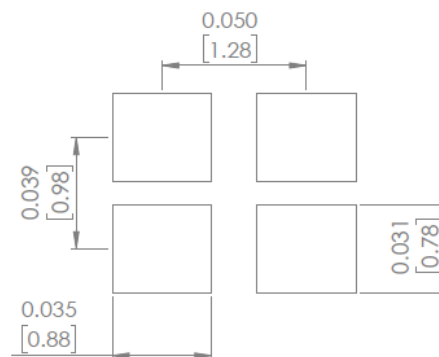
ASA7 Series

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Mechanical Dimensions



Recommended Land Pattern



Pin #	Function
1	Tri-state
2	GND
3	Output
4	Vdd

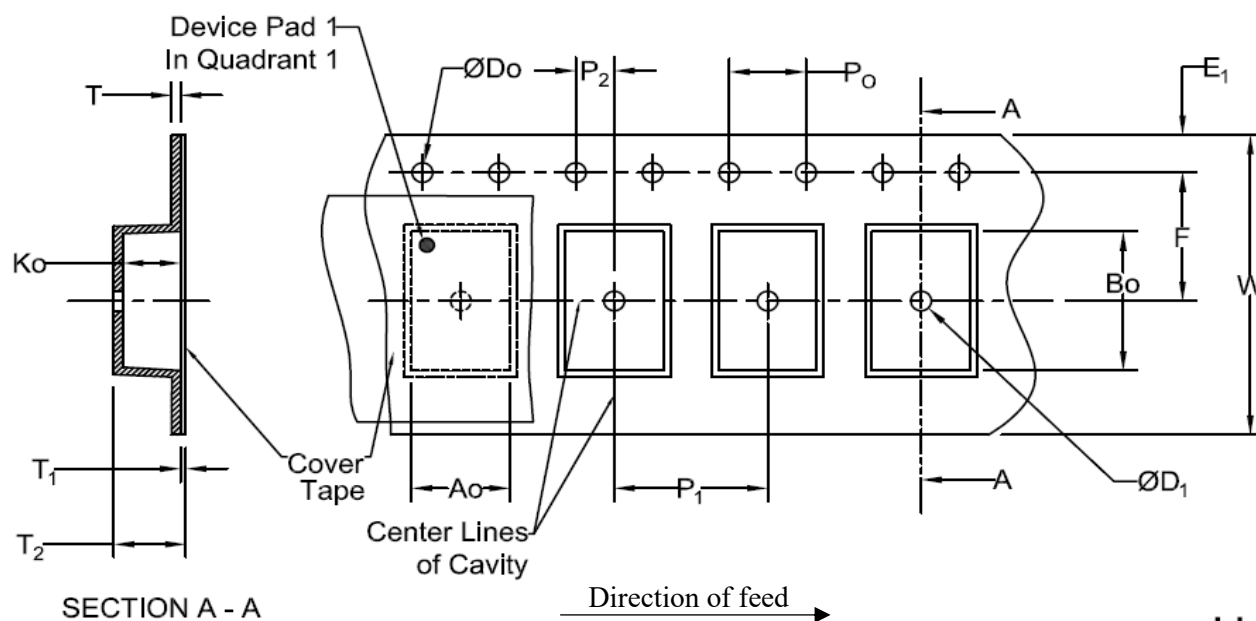
Dimensions: Inches [mm]

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Tape

T: 1,000pcs/reel

T3: 3,000pcs/reel



Unit: mm

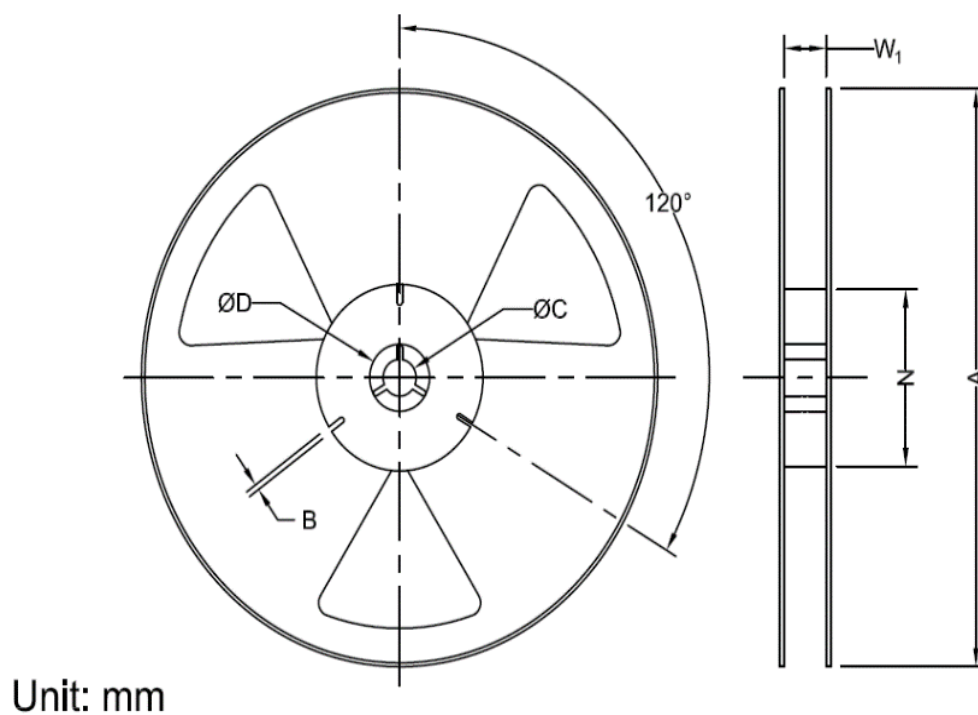
Tape Specifications (mm)							
Width	Ao	Bo	Do	D1	E1	F	Ko
8mm	*	*	1.5+0.1/-0.0	1.0	1.75±0.1	3.5±0.05	*

Tape Specifications (mm)							
Width	P1	P2	P0	T	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)							
Suffix	Qty/Reel	A (Nom)	B (Min)	C (Min)	D (Min)	N (Typ)	*W ₁
-T	1000	178	1.5	13.0+0.5/-0.2	20.2	50	8.4+1.5/-0.0
-T3	3000	178	1.5	13.0+0.5/-0.2	20.2	50	8.4+1.5/-0.0

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Reflow

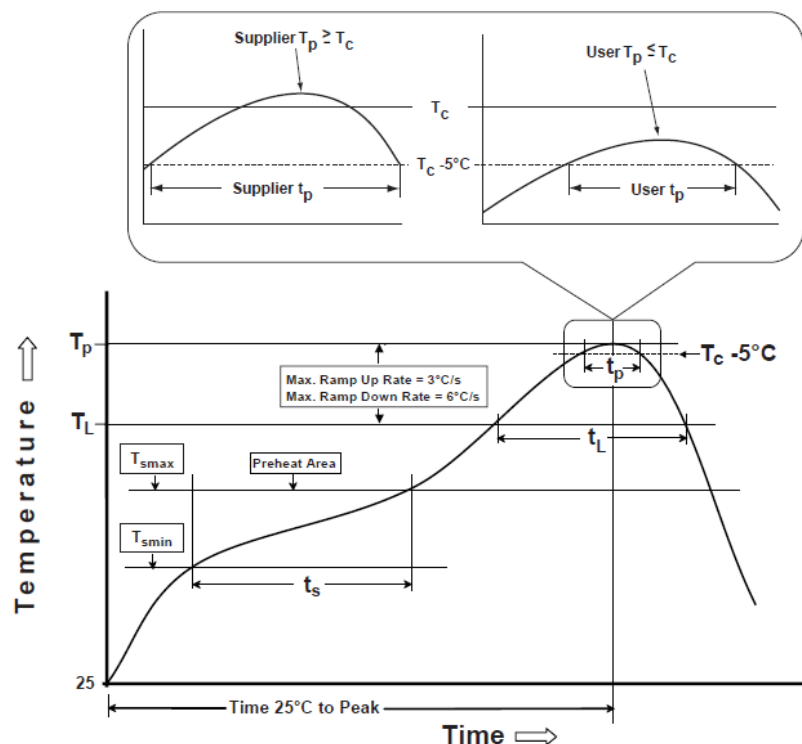


Table 1

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_{smin})	100°C	150°C
Temperature maximum (T_{smx})	150°C	200°C
Time (T_{smin} to T_{smx}) (t_s)	60 - 120 sec.	60 - 180 sec.
Average ramp-up rate (T_{smx} 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.	20 - 40 sec.
Ramp-down rate (T_p to T_{smx})	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.