

# CMOS Output Programmable SMD Crystal Clock Oscillator

**AP2S series**

Request Samples



Check Inventory



ESD Sensitive



2.5 x 2.0 x 1.0 mm

RoHS/RoHS II Compliant

MSL Level = N/A

## Features

- Performance comparable to fixed frequency oscillator
- Short lead time, Suitable for mass production
- CMOS output waveform, Tri-state output function
- 1.8V, 2.5V and 3.3V Supply Voltage Options
- Hermetically seam-sealed ceramic package

## Applications

- Industrial control and automation
- Portable and wearable electronics
- Internet of Things (IoT)
- Consumer electronics
- Networking

## Key Electrical Specifications

Parameters		Min.	Typ.	Max.	Units	Notes
Frequency Range	V <sub>dd</sub> = 3.3V	1		200	MHz	
	V <sub>dd</sub> = 2.5V	1		200		
	V <sub>dd</sub> = 1.8V	1		125		
Operating Temperature		-10		+60	°C	See options
Storage Temperature		-50		+125	°C	Storage Temperature
Overall Frequency Stability*		-100		+100	ppm	See options
Supply Voltage (V <sub>dd</sub> )	V <sub>dd</sub> = 3.3V	3.135	3.30	3.465	V	Standard
	V <sub>dd</sub> = 2.5V	2.375	2.50	2.625		V <sub>dd</sub> option 1
	V <sub>dd</sub> = 1.8V	1.71	1.80	1.89		V <sub>dd</sub> option 2
Input Current	V <sub>dd</sub> = 3.3V			40	mA	
	V <sub>dd</sub> = 2.5V			35		
	V <sub>dd</sub> = 1.8V			30		
Symmetry**		45	50	55	%	@ 1/2V <sub>dd</sub>
Rise and Fall Time (Tr/Tf)***	V <sub>dd</sub> = 3.3V			4	ns	
	V <sub>dd</sub> = 2.5V			5		
	V <sub>dd</sub> = 1.8V			6		
Output Load				15	pF	CMOS
Output Voltage	V <sub>OL</sub>			0.4	V	
	V <sub>OH</sub>	V <sub>dd</sub> - 0.4				
Start-up Time				8	ms	
Tri- state function		"1" (V <sub>IH</sub> > 0.7* V <sub>dd</sub> ) or Open: Oscillation "0" (V <sub>IH</sub> < 0.3* V <sub>dd</sub> ): No Oscillation (High Impedance)				
Standby current (Power Down option)			<400		uA	V <sub>dd</sub> = 1.8, 2.5, 3.3V



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Parameters	Min.	Typ.	Max.	Units	Notes
RMS Phase Jitter**** @25°C± 3°C (10 - 39MHz: 12kHz to 5MHz) (>39MHz: 12kHz to 20MHz)		1	2	ps	V <sub>dd</sub> =3.3V
		1.1	2	ps	V <sub>dd</sub> =2.5V
		1.5	2.2	ps	V <sub>dd</sub> =1.8V
Aging:	-3.0		+3.0	ppm	@+25°C First year

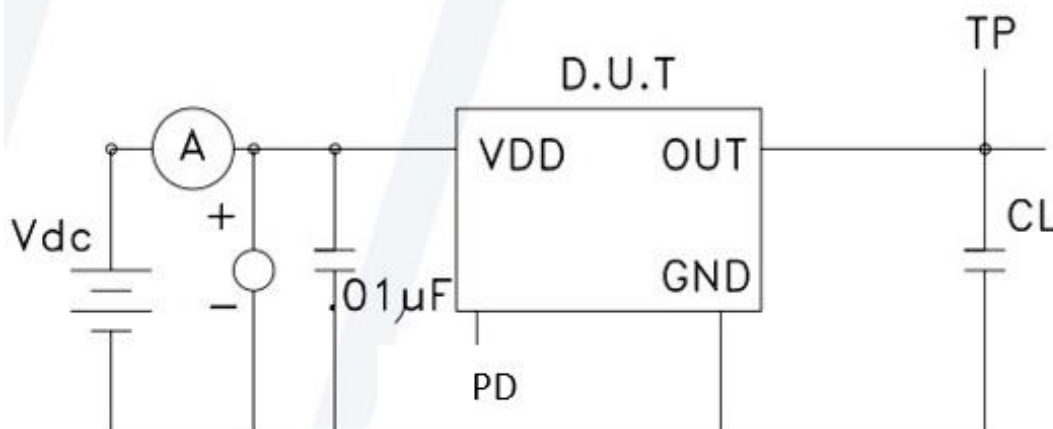
\* Inclusive of calibration tolerance @25°C, operating temperature range, input voltage variation, load variation, and first year aging. For ±20ppm Overall Frequency Stability: Inclusive of calibration tolerance @25°C, operating temperature range, and load variation.

\*\* Only 40/60% is available for certain frequencies. Please contact Abracon when ordering.

\*\*\* Transition times are measured between 10% and 90% of V<sub>dd</sub> with an output load of 15 pF.

\*\*\*\* Frequency dependent, contact factory.

## Test Circuit



CL = 15pF (including probe capacitance)

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Opting and part Identification (left blank if standard)

AP2S  -  MHz -    -

Supply Voltage
Blank: 3.3V(*)
1: 2.5V
2: 1.8V

Frequency in MHz
Please specify the frequency in MHz. e.g. 14.31818MHz

Operating Temp.
Blank: -10°C ~ +60°C
I: 0°C ~ +50°C
E: -20°C ~ +70°C
F: -30°C ~ +70°C
N: -30°C ~ +85°C
L: -40°C ~ +85°C

Overall Freq. Stability
J: ±20ppm (***)
R: ±25ppm
K: ±30ppm
C: ±50ppm

Tri- state pin
B: Power Down (**)

Packaging
Blank: Bulk
T: Tape & Reel (1k/reel)
T3: Tape & Reel (3k/reel)

\* 3.3V is standard

\*\* PDB: Tri- state the output buffer and shut off the oscillator.

\*\*\* Contact ABRACON for availability



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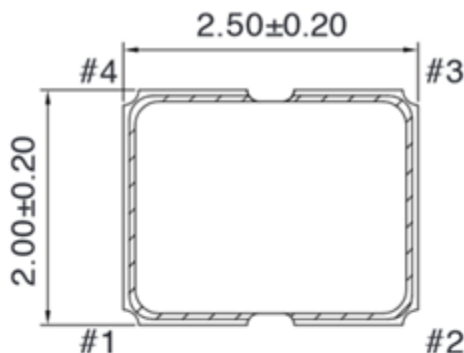


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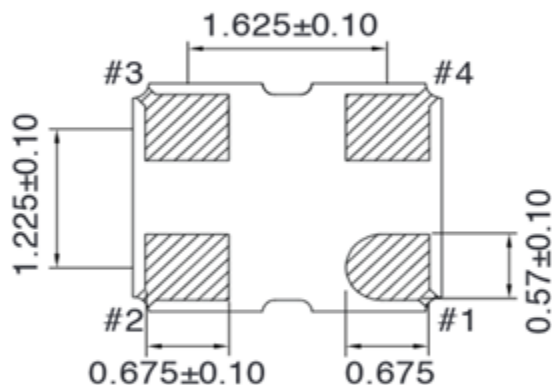
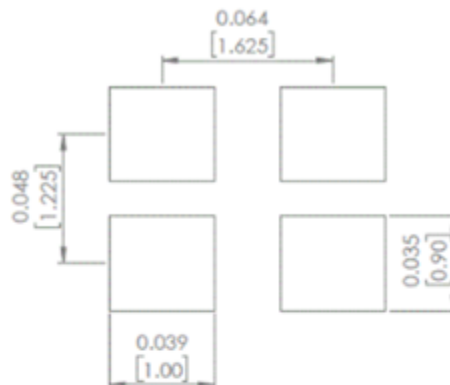


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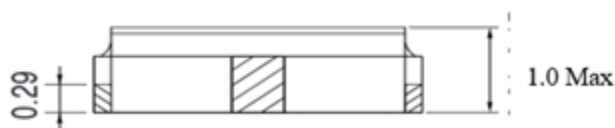
## Mechanical Dimensions



### Recommended Land Pattern



Pin	Function
1	Tri-State
2	GND/Case
3	Output
4	Vdd



### Note 1

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

### Note 2

Recommend using an approximately 0.01uF  
bypass capacitor between PIN 2 and 4.

Dimensions: inches (mm)

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## Reflow Profile

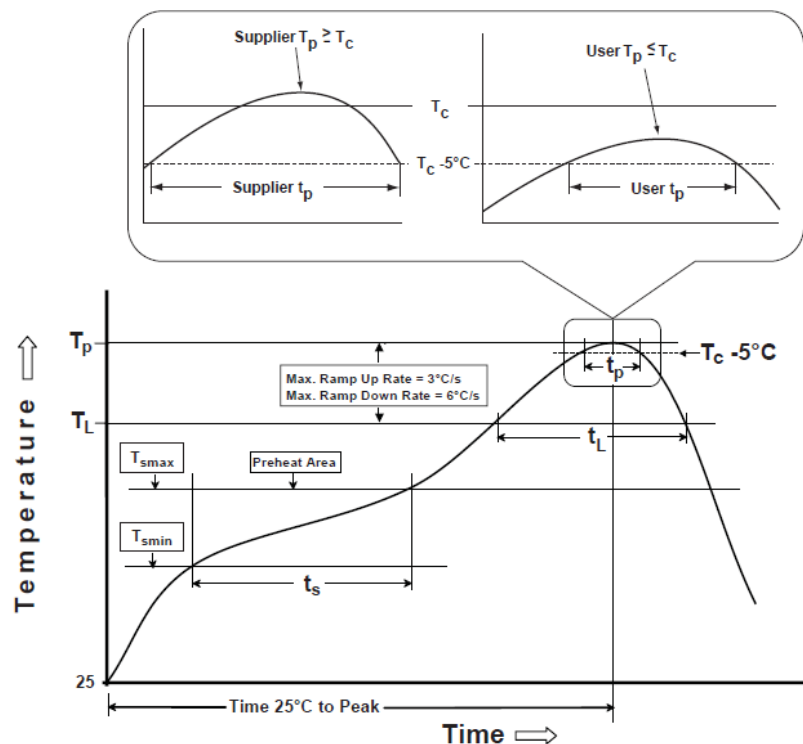


Table 1

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
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.

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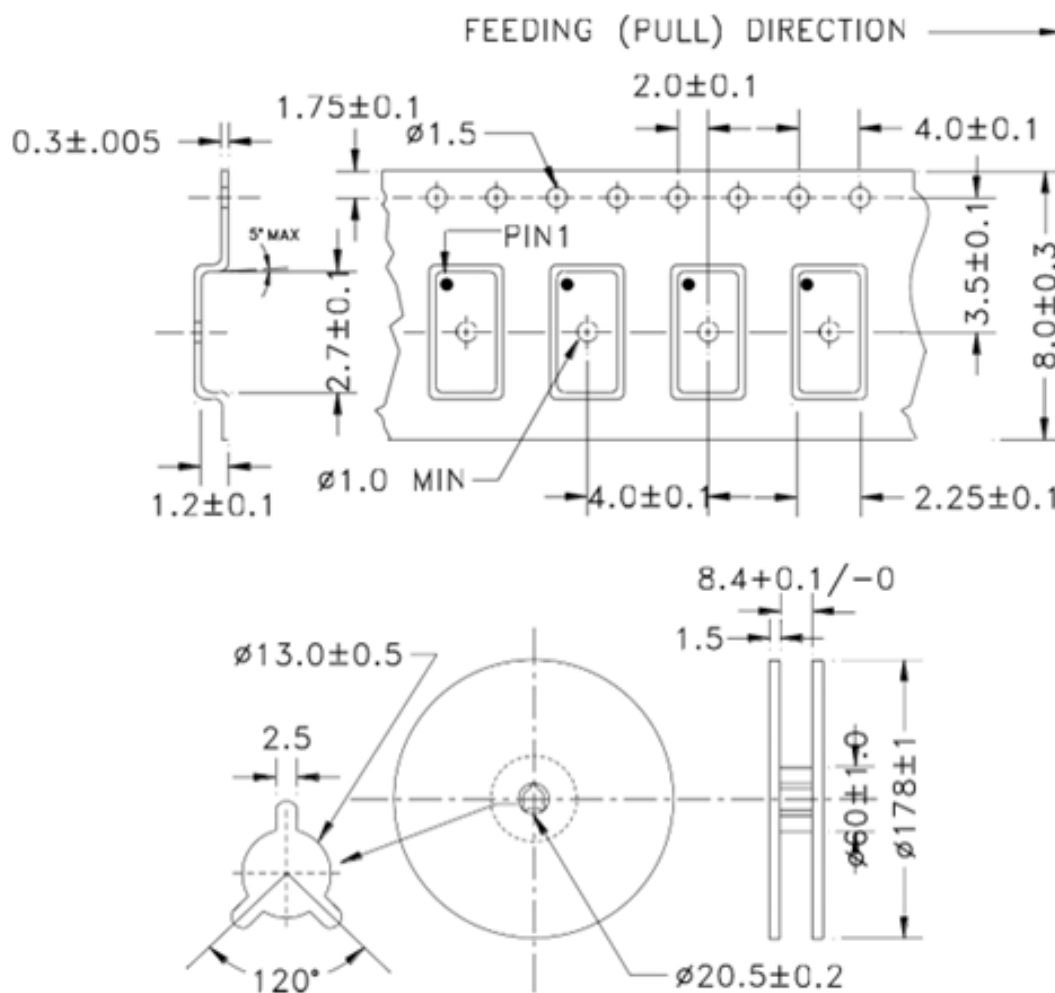


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MSL Level = N/A

## Packing

T= Tape and reel (1,000pcs/reel)

T3= Tape and reel (3,000pcs/reel)



Dimensions: mm

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