

# SMD CMOS PROGRAMMABLE CRYSTAL OSCILLATOR



3.2 x 2.5 x 1.2mm

AP3S

Moisture Sensitivity Level (MSL) –  
 This product is Hermetically Sealed and  
 not Moisture Sensitive -MSL = N/A: Not Applicable



RoHS  
 Compliant

## FEATURES:

- Performance comparable to fixed frequency oscillator
- Low RMS phase jitter
- Short lead time
- Suitable for mass production

## ELECTRICAL SPECIFICATIONS:

Parameters		Minimum	Typical	Maximum	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		-55		+125	°C	
Overall Frequency Stability*		-100		+100	ppm	See options
Supply Voltage (V <sub>dd</sub> )	V <sub>dd</sub> = 3.3V	3.125	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			35	mA	
	V <sub>dd</sub> = 2.5V			30		
	V <sub>dd</sub> = 1.8V			20		
Symmetry***		45	50	55	%	@ 1/2V <sub>dd</sub>
Rise and Fall Time (T <sub>r</sub> /T <sub>f</sub> )**	V <sub>dd</sub> = 3.3V			2	ns	
	V <sub>dd</sub> = 2.5V			3		
	V <sub>dd</sub> = 1.8V			4		
Output Load:				15	pF	CMOS



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## ELECTRICAL SPECIFICATIONS:

Parameters	Minimum	Typical	Maximum	Units	Notes
Output Voltage	V <sub>OL</sub>			0.33	V <sub>dd</sub> = 3.3V
	V <sub>OH</sub>	2.97			
	V <sub>OL</sub>			0.25	V <sub>dd</sub> = 2.5V
	V <sub>OH</sub>	2.25			
	V <sub>OL</sub>			0.18	V <sub>dd</sub> = 1.8V
	V <sub>OH</sub>	1.62			
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
RMS Phase Jitter		1	2	ps	V <sub>dd</sub> = 3.3V
		1.1	2	ps	V <sub>dd</sub> = 2.5
		1.5	2	ps	V <sub>dd</sub> = 1.8
Aging:	-3.0		+3.0	ppm	@+25°C First year

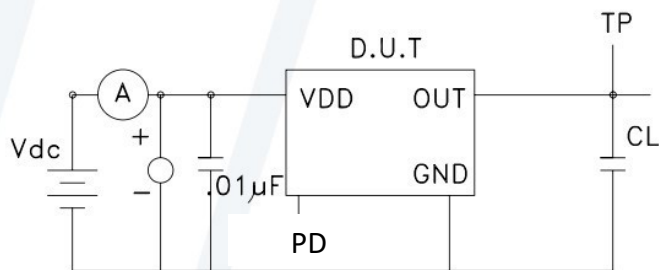
\* Inclusive of calibration @25°C, operating temperature range, input voltage variation, load variation, and first year aging.

For ±20ppm, inclusive of calibration @25°C, operating temperature range, and load variation.

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

\*\*\* 4.0, 13.0, 20.0, 26.0, and 40.0MHz

## TEST CIRCUIT:



CL = 15pF (including probe capacitance)

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## OPTIONS & PART IDENTIFICATION:

AP3S [ ] - [ ] MHz - [ ] [ ] [ ] - [ ]

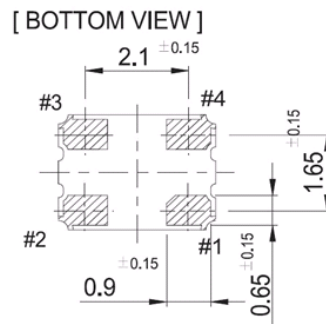
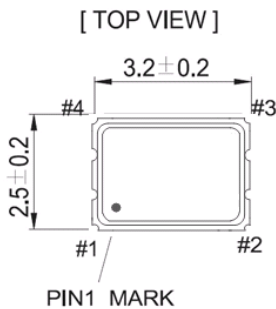
Supply Voltage	Frequency in MHz	Operating Temp.	Overall Freq. Stability	Tri-state pin	Packaging
Blank: 3.3V*	Please specify the frequency in MHz. e.g. 14.31818MHz	Blank: -10°C ~ +60°C	Blank: ±100ppm	B: Power Down**	Blank: Bulk T: Tape & Reel (1k/reel) T3: Tape & Reel (3k/reel)
1: 2.5V		I: 0°C ~ +50°C	J: ±20ppm (***)		
2: 1.8V		E: -20°C ~ +70°C	R: ±25ppm		
		F: -30°C ~ +70°C	K: ±30ppm		
		N: -30°C ~ +85°C	C: ±50ppm		
		L: -40°C ~ +85°C			

\* 3.3V is standard

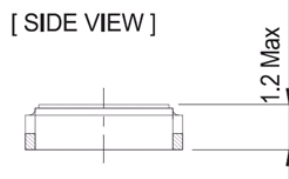
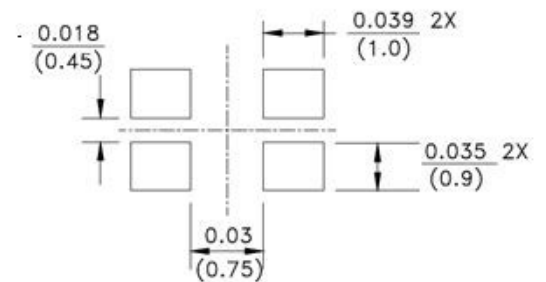
\*\* PDB: Tri-state the output buffer and shut off the oscillator, <400µA when PDB enabled.

\*\*\*Contact ABRACON for availability.

## OUTLINE DRAWING:



Recommended land pattern



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

### Note 2

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

UNIT : mm

### 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)

Dimensions: inches (mm)



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REVISED: 10.26.2021

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## REFLOW PROFILE

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

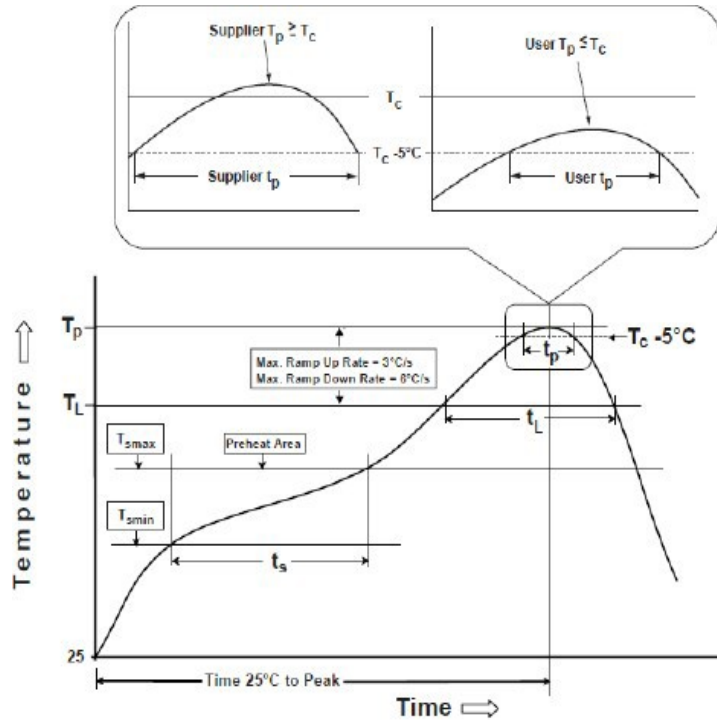


Table 1

SnPb Eutectic Process Classification Temperatures ( $T_c$ )		
Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> $\geq$ 350
<2.5 mm	235 °C	220 °C
$\geq$ 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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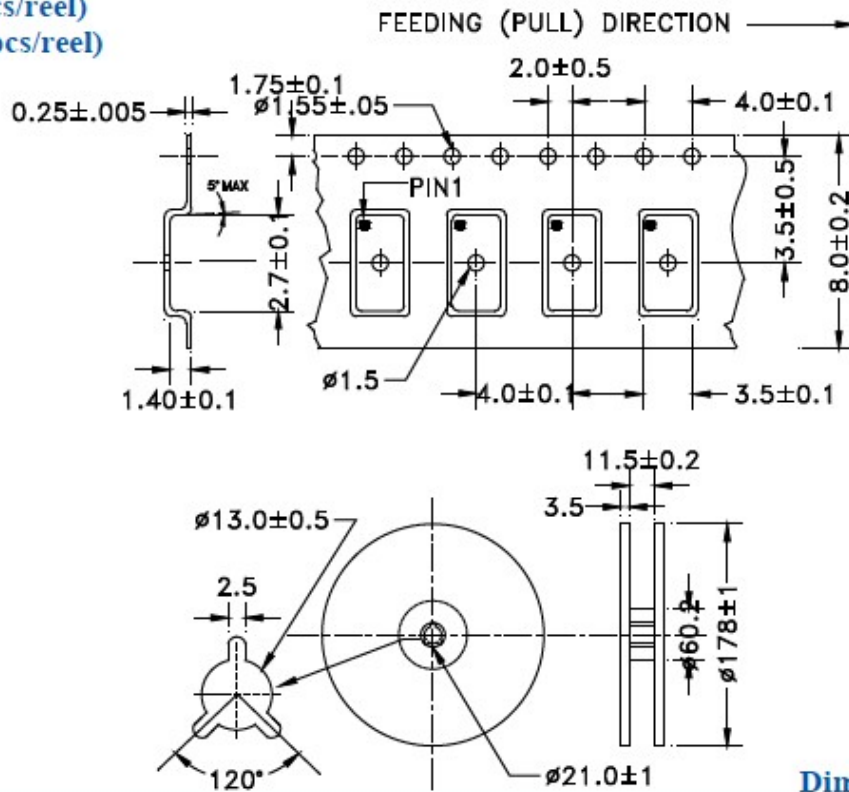
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## TAPE & REEL:

T= Tape and reel (1,000pcs/reel)  
T3= Tape and reel (3,000pcs/reel)



Dimensions: mm

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