

# 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

For Small  
Quantities,  
Delivery Time  
is 1-5 days

## FEATURES:

- Performance comparable to fixed frequency oscillator
- Lowest peak-to-peak jitter
- Low supply current
- Short lead time
- Suitable for mass production
- Alternative to long lead-time XO's

## ELECTRICAL SPECIFICATIONS:

| Parameters                        |                        | Minimum | Typical | Maximum | Units | Notes  |
|-----------------------------------|------------------------|---------|---------|---------|-------|--|
| Frequency Range                   | V <sub>dd</sub> = 3.3V | 2.048   | -----   | 200     | MHz   | In-house programming<br>small quantity only<br>(< 1,000pcs)<br>Contact Abracon for mass<br>production quantity |
|                                   | V <sub>dd</sub> = 2.5V | 2.048   | -----   | 166     |       |  |
|                                   | V <sub>dd</sub> = 1.8V | 11      | -----   | 110     |       |  |
|                                   | V <sub>dd</sub> = 1.8V | 2.048   | -----   | 10.999  |       |  |
| Operating Temperature             |                        | -10     | -----   | +60     | °C    | See options  |
| Storage Temperature               |                        | -55     | -----   | +150    | °C    |  |
| Overall Frequency Stability*      |                        | -100    | -----   | +100    | ppm   | See options  |
| Supply Voltage (V <sub>dd</sub> ) | V <sub>dd</sub> = 3.3V | 2.97    | 3.30    | 3.63    | V     | Standard   |
|                                   | V <sub>dd</sub> = 2.5V | 2.25    | 2.50    | 2.75    |       | V <sub>dd</sub> option 1   |
|                                   | V <sub>dd</sub> = 1.8V | 1.62    | 1.80    | 1.98    |       | V <sub>dd</sub> option 2   |
| Input Current                     | V <sub>dd</sub> = 3.3V | -----   | -----   | 10      | mA    | 2.048 MHz ≤ F < 30MHz  |
|                                   |                        | -----   | -----   | 15      |       | 30MHz ≤ F < 75MHz  |
|                                   |                        | -----   | -----   | 20      |       | 75MHz ≤ F < 133MHz   |
|                                   |                        | -----   | -----   | 22      |       | 133MHz ≤ F < 166MHz  |
|                                   |                        | -----   | -----   | 25      |       | 166MHz ≤ F < 200MHz  |
|                                   | V <sub>dd</sub> = 2.5V | -----   | -----   | 8       |       | 2.048 MHz ≤ F < 30MHz  |
|                                   |                        | -----   | -----   | 10      |       | 30MHz ≤ F < 75MHz  |
|                                   |                        | -----   | -----   | 15      |       | 75MHz ≤ F < 133MHz   |
|                                   |                        | -----   | -----   | 15      |       | 133MHz ≤ F < 166MHz  |
|                                   | V <sub>dd</sub> = 1.8V | -----   | -----   | 6       |       | 2.048 MHz ≤ F < 30MHz  |
|                                   |                        | -----   | -----   | 8       |       | 30MHz ≤ F < 75MHz  |
|                                   |                        | -----   | -----   | 2       |       | 75MHz ≤ F < 133MHz   |
| Symmetry****                      |                        | 45      | 50      | 55      | %     | @ 1/2 V <sub>dd</sub>  |
| Rise and Fall Time<br>(Tr/Tf)**   | V <sub>dd</sub> = 3.3V | -----   | -----   | 3       | ns    | 2.048 MHz ≤ F < 10 MHz   |
|                                   |                        | -----   | -----   | 2       |       | 10 MHz ≤ F   |
|                                   | V <sub>dd</sub> = 2.5V | -----   | -----   | 4       |       | 2.048 MHz ≤ F < 10MHz  |
|                                   |                        | -----   | -----   | 3       |       | 10 MHz ≤ F   |
|                                   | V <sub>dd</sub> = 1.8V | -----   | -----   | 5       |       | 2.048 MHz ≤ F < 10MHz  |
|                                   |                        | -----   | -----   | 4       |       | 10 MHz ≤ F   |
| Output Load:                      |                        | -----   | -----   | 15      | pF    | CMOS   |

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RoHS  
Compliant

## ELECTRICAL SPECIFICATIONS:

| Parameters  | Minimum  | Typical | Maximum | Units   | Notes   |                 |
|---|--|---------|---------|---------|---|-----------------|
| Output Voltage  | $V_{OL}$   | -----   | -----   | 0.33    | V   | $V_{dd} = 3.3V$ |
|   | $V_{OH}$   | 2.97    | -----   | -----   |   |                 |
|   | $V_{OL}$   | -----   | -----   | 0.25    | V   | $V_{dd} = 2.5V$ |
|   | $V_{OH}$   | 2.25    | -----   | -----   |   |                 |
|   | $V_{OL}$   | -----   | -----   | 0.18    | V   | $V_{dd} = 1.8V$ |
|   | $V_{OH}$   | 1.62    | -----   | -----   |   |                 |
| Start-up Time   | -----  | -----   | 8.0     | ms      |   |                 |
| Tri-state function (Stand-by)   | "1" ( $V_{IH} > 0.7 * V_{dd}$ ) or Open: Oscillation<br>"0" ( $V_{IH} < 0.3 * V_{dd}$ ): Disable |         |         | -----   |   |                 |
| Standby current   | -----  | -----   | 15      | $\mu A$ |   |                 |
| Period jitter Peak to Peak<br>(Reference only. Please contact Abracon for each frequencies.): | -----  | -----   | 40      | ps      | Standard frequencies***                                       |                 |
|   | -----  | -----   | 200     | ps      | Other frequencies<br>Reference only<br>Please contact Abracon |                 |
| Aging:  | -3.0   | -----   | +3.0    | ppm     | @+25°C First year   |                 |

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

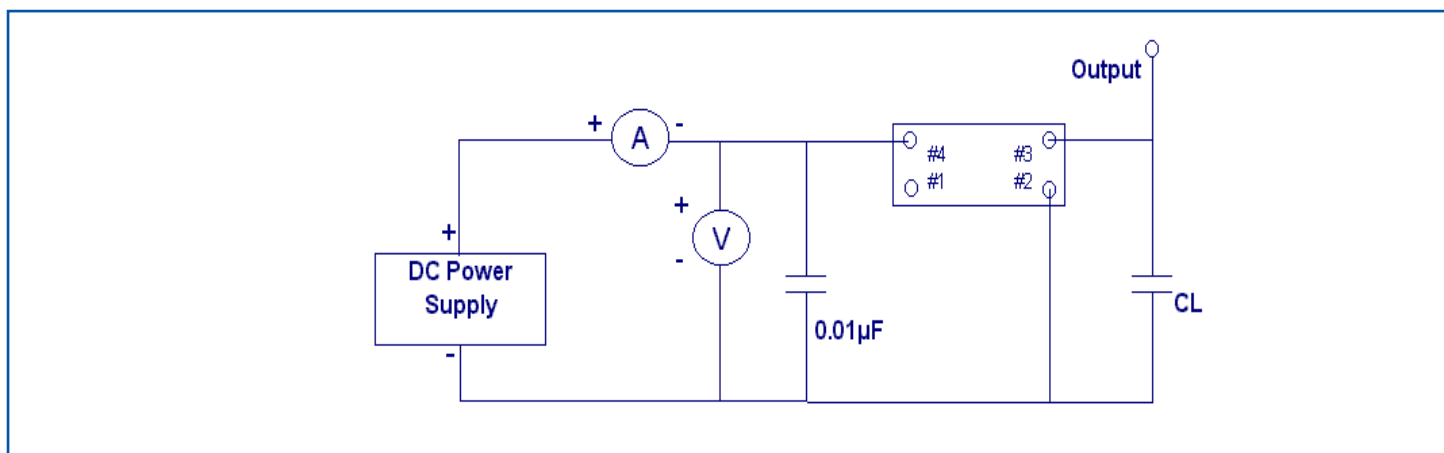
For  $\pm 20$ ppm, inclusive of calibration @25°C, operating temperature range, load variation, shock, and vibration.

\*\* Transition times are measured between 10% and 90% of  $V_{dd}$  with an output load of 15 pF.

\*\*\* 4.0, 6.0, 8.0, 12.0, 13.0, 16.0 19.2, 20.0, 24.0, 26.0, 32.0, 38.4, and 40.0MHz

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

## TEST CIRCUIT:



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3.2 x 2.5 x 1.2mm

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## OPTIONS & PART IDENTIFICATION:

AP3S  -  MHz -   -

| Supply Voltage |
|----------------|
| *Blank: 3.3V   |
| 1: 2.5V        |
| 2: 1.8V        |

| Frequency in MHz   |
|--|
| Please specify the frequency in MHz.<br>e.g. 14.31818MHz |

| Operating Temp.  |
|------------------|
| 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    |
|------------------|
| **Blank: OE      |
| ***B: Power Down |

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

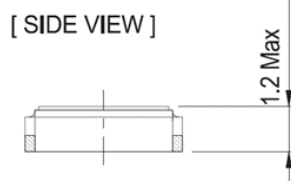
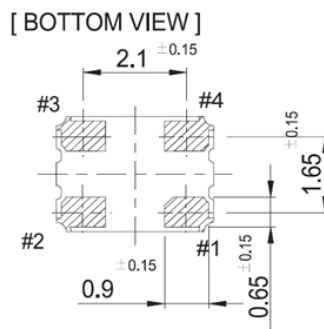
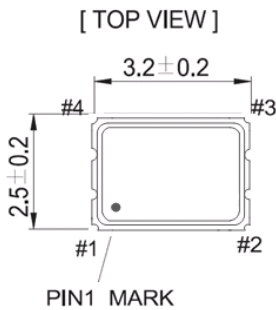
\* 3.3V is standard

\*\* OE: Tri-state the output buffer

\*\*\* PDB: Tri-state the output buffer and shut off the oscillator, <10µA when PDB enabled.

\*\*\*\* Available for -10 to +60°C, I, or E temp options only. Contact ABRACON for EJ or LR options. (Availability limited)

## OUTLINE DRAWING:



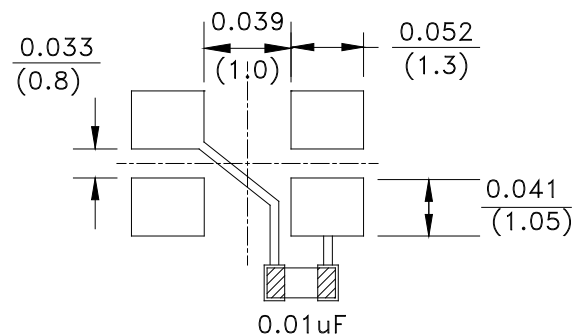
UNIT : mm

| 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)

Recommended land pattern



### \*Note 2

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

Dimensions: inches (mm)

# SMD CMOS PROGRAMMABLE CRYSTAL OSCILLATOR

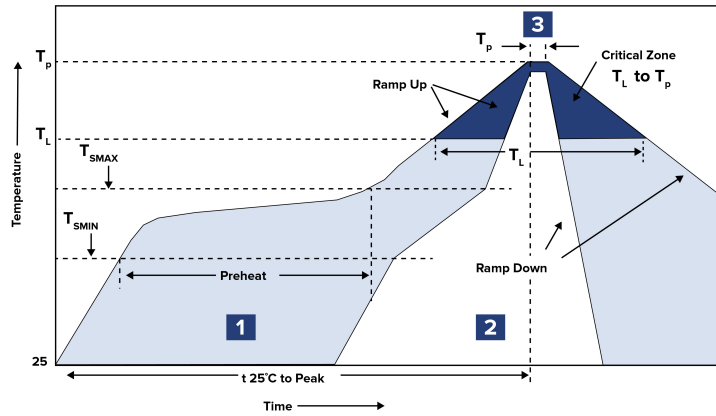


3.2 x 2.5 x 1.2mm

AP3S

**Pb** RoHS Compliant

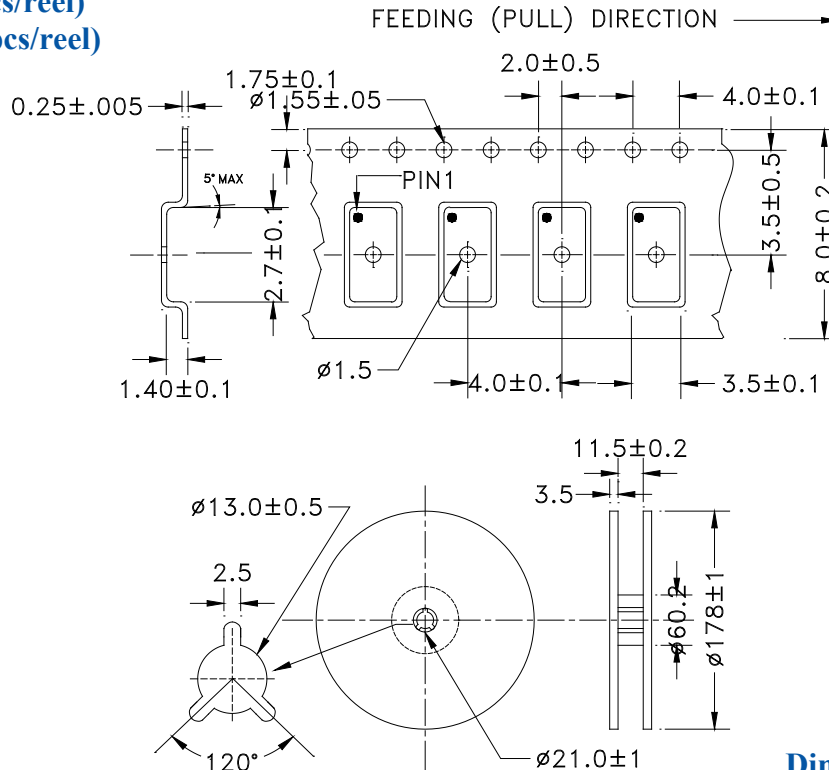
## REFLOW PROFILE



| Zone | Description | Temperature                               | Times         |
|------|-------------|---|---------------|
| 1    | Preheat     | $T_{SMIN} \sim T_{SMAX}$<br>150°C ~ 180°C | 60 ~ 120 sec. |
| 2    | Reflow      | $T_L$<br>230°C                            | 30 ~ 40 sec.  |
| 3    | Peak Heat   | $T_P$<br>260±5°C                          | 10 sec. MAX   |

## TAPE & REEL:

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



Dimensions: mm



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