

# SMD CMOS PROGRAMMABLE CRYSTAL OSCILLATOR

AP3S

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



RoHS  
Compliant



3.2 x 2.5 x 1.2mm

## 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

For Small  
Quantities,  
Delivery Time  
is 1-5 days

## 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       | -----   | 166     |       |                                                                                                                    |
|                                 | V <sub>dd</sub> = 1.8V | 11      | -----   | 110     |       |                                                                                                                    |
|                                 | V <sub>dd</sub> = 1.8V | 1       | -----   | 10.999  |       | In-house programming<br>small quantity only<br>( $< 1,000$ pcs)<br>Contact Abracon for mass<br>production quantity |
| Operating Temperature           |                        | -10     | -----   | +60     | °C    | See options                                                                                                        |
| Storage Temperature             |                        | -55     | -----   | +150    | °C    |                                                                                                                    |
| Overall Frequency Stability*    |                        | -100    | -----   | +100    | ppm   | See options                                                                                                        |
| Supply Voltage (Vdd)            | 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    |       | Vdd option 1                                                                                                       |
|                                 | V <sub>dd</sub> = 1.8V | 1.62    | 1.80    | 1.98    |       | Vdd option 2                                                                                                       |
| Input Current                   | V <sub>dd</sub> = 3.3V | -----   | -----   | 10      | mA    | $1\text{MHz} \leq F < 30\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 15      |       | $30\text{MHz} \leq F < 75\text{MHz}$                                                                               |
|                                 |                        | -----   | -----   | 20      |       | $75\text{MHz} \leq F < 133\text{MHz}$                                                                              |
|                                 |                        | -----   | -----   | 22      |       | $133\text{MHz} \leq F < 166\text{MHz}$                                                                             |
|                                 |                        | -----   | -----   | 25      |       | $166\text{MHz} \leq F < 200\text{MHz}$                                                                             |
|                                 | V <sub>dd</sub> = 2.5V | -----   | -----   | 8       |       | $1\text{MHz} \leq F < 30\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 10      |       | $30\text{MHz} \leq F < 75\text{MHz}$                                                                               |
|                                 |                        | -----   | -----   | 15      |       | $75\text{MHz} \leq F < 133\text{MHz}$                                                                              |
|                                 |                        | -----   | -----   | 15      |       | $133\text{MHz} \leq F < 166\text{MHz}$                                                                             |
|                                 |                        | -----   | -----   | 15      |       | $166\text{MHz} \leq F < 200\text{MHz}$                                                                             |
|                                 | V <sub>dd</sub> = 1.8V | -----   | -----   | 6       |       | $1\text{MHz} \leq F < 30\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 8       |       | $30\text{MHz} \leq F < 75\text{MHz}$                                                                               |
|                                 |                        | -----   | -----   | 2       |       | $75\text{MHz} \leq F < 133\text{MHz}$                                                                              |
|                                 |                        | -----   | -----   | 2       |       | $133\text{MHz} \leq F < 166\text{MHz}$                                                                             |
|                                 |                        | -----   | -----   | 2       |       | $166\text{MHz} \leq F < 200\text{MHz}$                                                                             |
|                                 | Symmetry****           |         | 45      | 50      |       | 55                                                                                                                 |
| Rise and Fall Time<br>(Tr/Tf)** | V <sub>dd</sub> = 3.3V | -----   | -----   | 3       | ns    | $1\text{MHz} \leq F < 10\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 2       |       | $10\text{MHz} \leq F$                                                                                              |
|                                 | V <sub>dd</sub> = 2.5V | -----   | -----   | 4       |       | $1\text{MHz} \leq F < 10\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 3       |       | $10\text{MHz} \leq F$                                                                                              |
|                                 | V <sub>dd</sub> = 1.8V | -----   | -----   | 5       |       | $1\text{MHz} \leq F < 10\text{MHz}$                                                                                |
|                                 |                        | -----   | -----   | 4       |       | $10\text{MHz} \leq F$                                                                                              |
| Output Load:                    |                        | -----   | -----   | 15      | pF    | CMOS                                                                                                               |



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## 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    |         | $V_{dd} = 2.5V$                                               |
|                                                                                               | $V_{OH}$ | 2.25                                                                                                     | -----   | -----   |         |                                                               |
|                                                                                               | $V_{OL}$ | -----                                                                                                    | -----   | 0.18    |         | $V_{dd} = 1.8V$                                               |
|                                                                                               | $V_{OH}$ | 1.62                                                                                                     | -----   | -----   |         |                                                               |
| Start-up Time                                                                                 |          | -----                                                                                                    | -----   | 2.0     | ms      |                                                               |
| Tri-state function (Stand-by)                                                                 |          | "1" ( $V_{IH} > 0.7 \cdot V_{dd}$ ) or Open: Oscillation<br>"0" ( $V_{IH} < 0.3 \cdot V_{dd}$ ): 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.

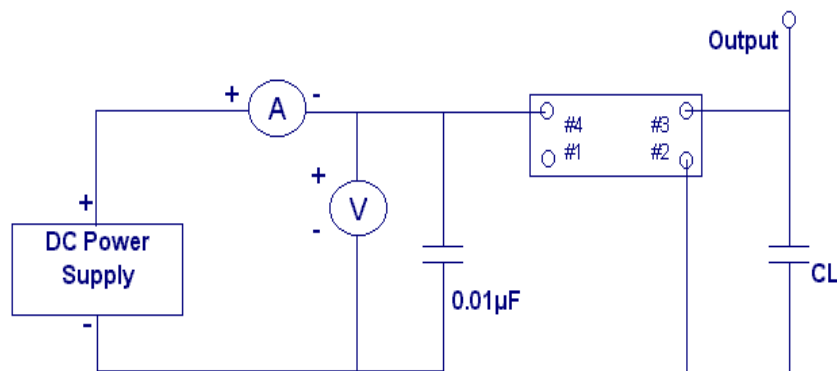
For  $\pm 20$ ppm, inclusive of calibration @25°C, operating temperature range, load variation, shock, and vibration.

\*\* 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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## 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.<br>e.g. 14.31818MHz | I: 0°C ~ +50°C   | J(****): ±20ppm         | **Blank: OE      | Blank: Bulk                  |
| 1: 2.5V        |                                                          | E: -20°C ~ +70°C | R: ±25ppm               | ***B: Power Down | T: Tape & Reel<br>(1k/reel)  |
| 2: 1.8V        |                                                          | F: -30°C ~ +70°C | K: ±30ppm               |                  | T3: Tape & Reel<br>(3k/reel) |
|                |                                                          | N: -30°C ~ +85°C | C: ±50ppm               |                  |                              |
|                |                                                          | L: -40°C ~ +85°C |                         |                  |                              |

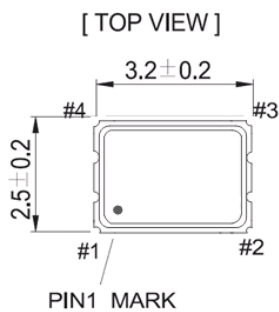
\* 3.3V is standard

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

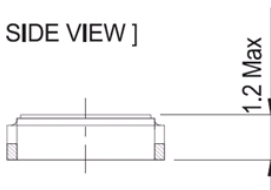
\*\*\* PDB: Tri-state the output buffer and shut off the oscillator, <10µA when PDB enabled.

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

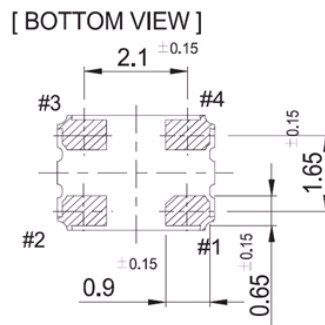
## OUTLINE DRAWING:



[ SIDE VIEW ]

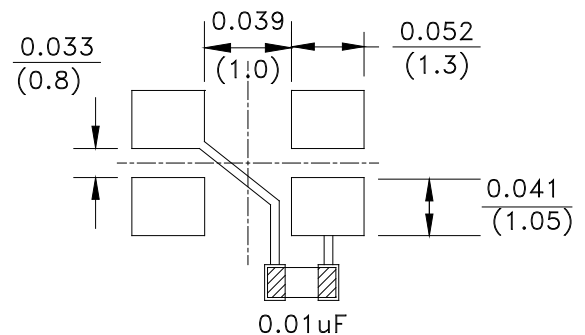


UNIT : mm



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

Recommended land pattern



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

Dimensions: inches (mm)

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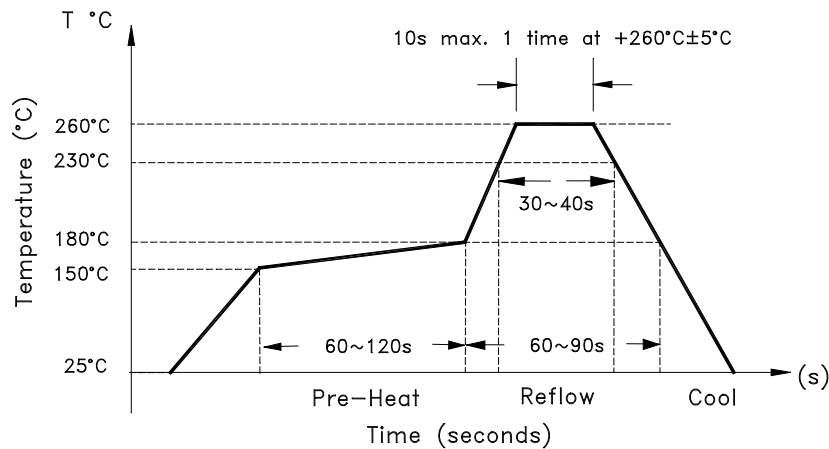


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3.2 x 2.5 x 1.2mm

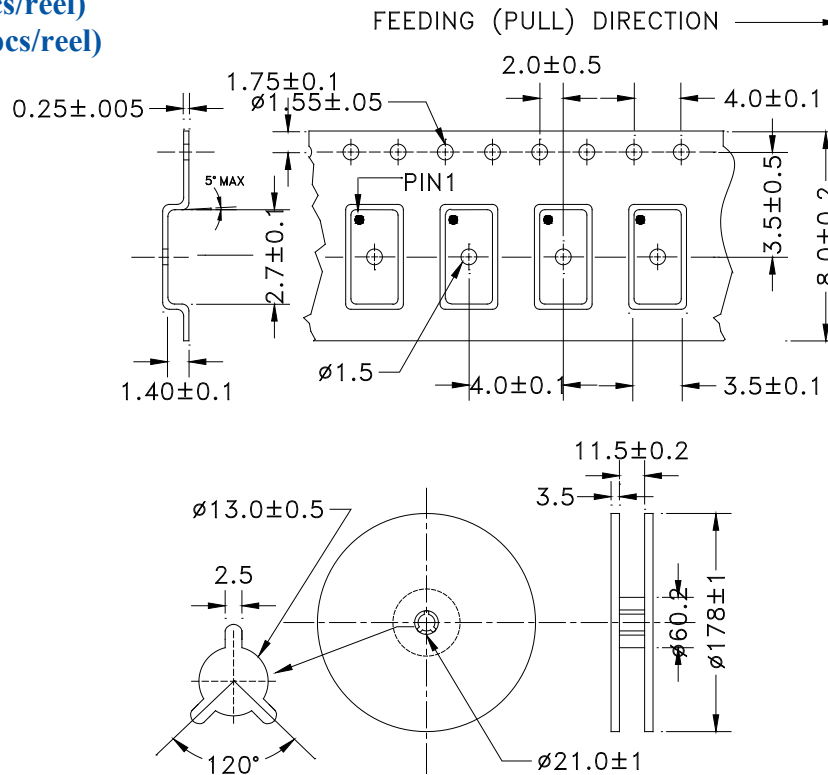
## REFLOW PROFILE



## TAPE & REEL:

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

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



Dimensions: mm

**ATTENTION:** Abracon Corporation's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life-dependant Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon Corporation is required. Please contact Abracon Corporation for more information.

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Revised: 09.16.11