

# Ultra-low ESR HC49/US (AT49)SMD MICROPROCESSOR CRYSTAL

**ABLS-LR**



**RoHS**  
Compliant



11.5 x 4.8 x 4.2 mm

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

## FEATURES:

- Ultra low ESR as low as 20 ohms for 4MHz, 85% lower than typical SMD Low Profile HC49S Crystals
- Low negative resistance(-R) IC design can ensure high oscillation margin
- Tight stability and automotive grade temperature available
- Hermetically resistance weld sealed

## APPLICATIONS:

- Low negative resistance u-controller design for low frequency
- Wide range of automotive applications
- Industrial applications

## STANDARD SPECIFICATIONS:

| Parameters                                                          | Minimum                                                                                                                                                                                                                                   | Typical | Maximum | Units | Notes                   |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------|-------------------------|
| Frequency Range                                                     | 3                                                                                                                                                                                                                                         |         | 36      | MHz   |                         |
| Operation Mode                                                      | Fundamental                                                                                                                                                                                                                               |         |         |       |                         |
| Operating Temperature                                               | 0                                                                                                                                                                                                                                         |         | +70     | °C    | See options             |
| Storage Temperature                                                 | -55                                                                                                                                                                                                                                       |         | +125    | °C    |                         |
| Frequency Tolerance @+25°C                                          | -50                                                                                                                                                                                                                                       |         | +50     | ppm   | See options             |
| Frequency Stability over the Operating Temperature ( ref. to +25°C) | 3.0~3.579545MHz                                                                                                                                                                                                                           | -100    | +100    | ppm   | Standard only           |
|                                                                     | 3.579545~36MHz                                                                                                                                                                                                                            | -50     | +50     |       | See options             |
| Equivalent series resistance (R1)                                   | See table 1 below                                                                                                                                                                                                                         |         |         | Ω     |                         |
| Shunt capacitance (C0)                                              |                                                                                                                                                                                                                                           |         | 7       | pF    |                         |
| Load capacitance (CL)                                               | 18                                                                                                                                                                                                                                        |         |         | pF    | See options             |
| Drive Level                                                         |                                                                                                                                                                                                                                           | 100     | 1000    | μW    |                         |
| Aging                                                               | -5                                                                                                                                                                                                                                        |         | +5      | ppm   | @25°C±3°C<br>First year |
| Insulation Resistance                                               | 500                                                                                                                                                                                                                                       |         |         | MΩ    | @ 100Vdc ± 15V          |
| Spurious Response                                                   |                                                                                                                                                                                                                                           |         | -3      | dB    |                         |
| Drive level dependency (DLD)                                        | Minimum 7 points tested: from 1μW to 500μW.<br>Change in frequency (Maximum - Minimum) over DLD range < ±10ppm<br>Change in ESR (Maximum - Minimum) over DLD range < 25% of Max ESR value.<br>Maximum ESR over DLD range < Max ESR value. |         |         |       |                         |

TABLE 1: ESR

| FREQUENCY (MHz)          | ESR (Ω) Max. |
|--------------------------|--------------|
| 3.000000                 | 100          |
| 3.072000                 | 100          |
| 3.276800                 | 75           |
| 3.500000 ~ 4.000000MHz   | 40           |
| 4.000001 ~ 4.500000MHz   | 30           |
| 4.500001 ~ 5.999999MHz   | 25           |
| 6.000000 ~ 7.499999MHz   | 20           |
| 7.500000 ~ 12.999999MHz  | 15           |
| 13.000000 ~ 36.000000MHz | 10           |

## OPTIONS & PART IDENTIFICATION: (Left blank if standard)

ABLS - LR-  MHz -  -  -  -

### Frequency in MHz

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

### Load Capacitance (pF)

Please specify CL in pF (10pF minimum) or S for series

### Operating Temp.

A: -10°C ~ +60°C  
B: -20°C ~ +70°C  
C: -30°C ~ +70°C  
N: -30°C ~ +85°C  
D: -40°C ~ +85°C  
J\*: -40°C ~ +105°C  
K\*: -40°C ~ +125°C  
L\*: -55°C ~ +125°C

### Freq. Tolerance

1: ± 10 ppm  
7: ± 15 ppm  
2: ± 20 ppm  
3: ± 25 ppm  
4: ± 30 ppm

### NOTE:

\* Frequency stability R option (±150ppm) only.  
Contact ABRACON for tighter frequency stability.  
\*\* For -10 to +60C only.

### Packaging

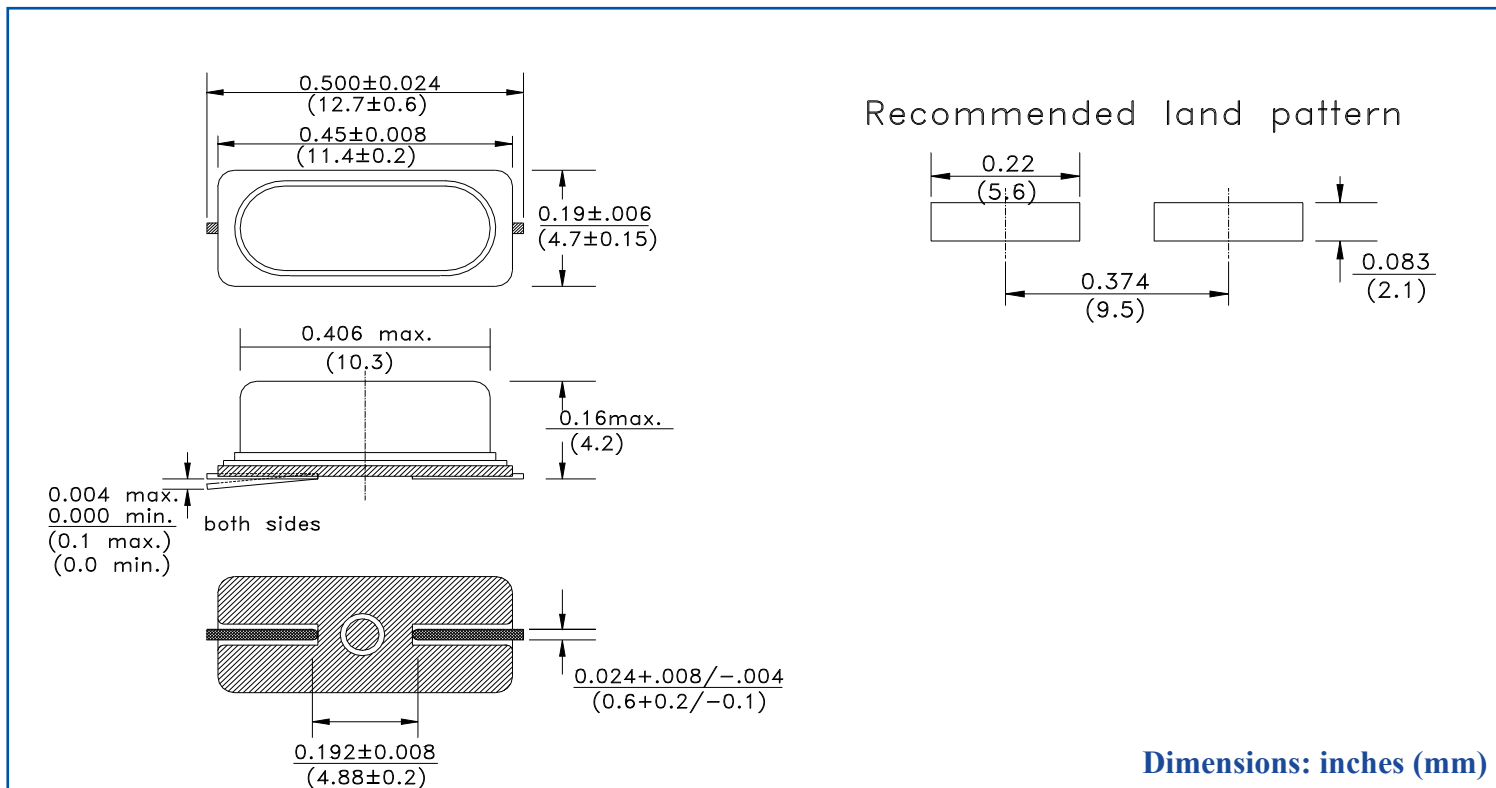
Blank: Bulk  
T: Tape & Reel

### Freq. Stability

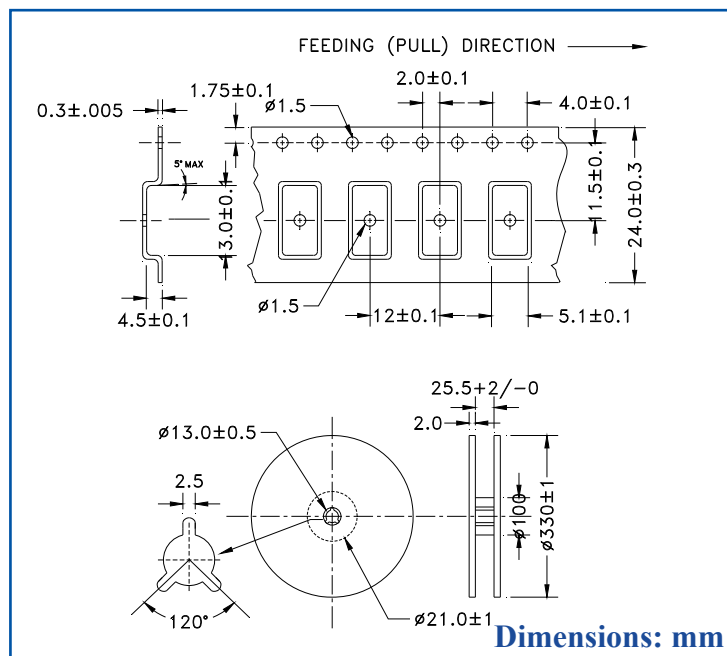
U\*\*: ± 10 ppm  
G: ± 15 ppm  
X: ± 20 ppm  
W: ± 25 ppm  
Y: ± 30 ppm  
H: ± 35 ppm  
Q: ± 100 ppm  
R: ± 150 ppm



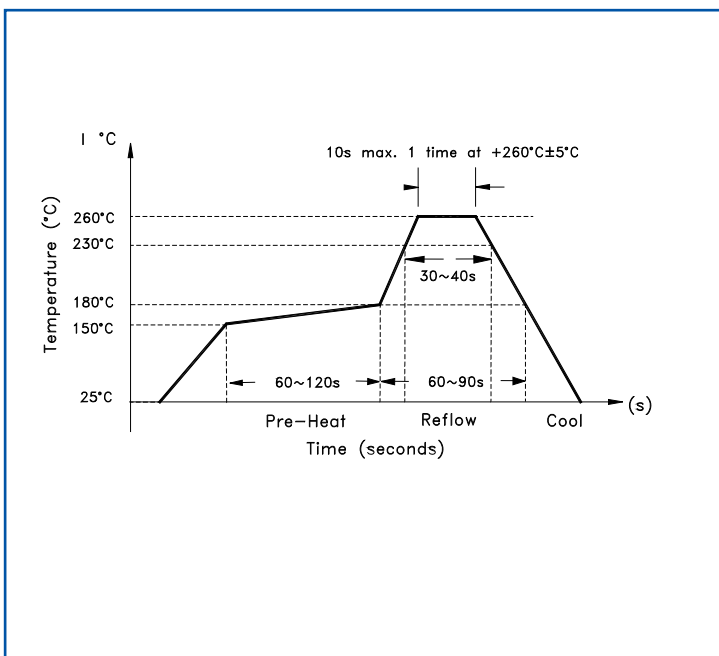
## ➤ OUTLINE DRAWING:



## ➤ TAPE & REEL: T = tape and reel (1000pcs/reel)



## ➤ REFLOW PROFILE:



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