ABRACON	ABLS Series HC49/US (AT49) SMD MICROPROCESSOR CRYSTAL	RoHS Compliant
Date of Issue: Sept. 7th, 2022	**11.4 x 4.7 x 4.2mm**	
Page (1) of (5)	**Abracon Drawing # 450669**	Revision #: AD

1.0 Key Electrical Specifications

Parameters	Minimum	Typical	Maximum	Units	Notes
Frequency Range	3.579545		24.00	MHz	Fundamental AT (Standard)
	24.01		75.00		3rd Overtone (Standard)
	24.01		50.00		Fundamental AT or BT (See options)
Operation Mode	Fundamental or 3rd Overtone				
Operating Temperature	0		+70	ºC	See options
Storage Temperature	-55		+125	ºC	
Frequency Tolerance @+25°C	-50		+50	ppm	See options
Frequency Stability over the Operating Temperature (ref. to +25°C)	-50		+50	ppm	See options (For BT cut, ±100ppm max.at -10° C to +60° C only)
Equivalent series resistance (R1)	See TABLE 1 below			Ω	
Shunt capacitance (C0)			7	pF	
Load capacitance (CL)	18			pF	Standard (See options if other than STD)
Drive Level		100	1000	µW	
Aging	-5		+5	ppm	@25°C±3°C First year
Insulation Resistance	500			MΩ	@ 100Vdc ± 15V
Drive level dependency (DLD)	Minimum 7 points tested: from 1µW to 500µW. Change in frequency (Maximum - Minimum) over DLD range < ±10ppm Change in ESR (Maximum - Minimum) over DLD range < 25% of Max ESR value. Maximum ESR over DLD range < Max ESR value.				

TABLE 1: ESR

FREQUENCY (MHz)	ESR (Ω)
3.579545 - 4.999 (Fund.)	180
5.000 - 5.999 (Fund.)	120
6.000 - 7.999 (Fund.)	100
8.000 - 8.999 (Fund.)	80
9.000 - 9.999 (Fund.)	60
10.000 - 15.999 (Fund.)	50
16.000 - 50.000 (Fund.)	40
24.01 - 31.999 (3rd O/T)	100
32.000 - 75.00 (3rd O/T)	80

NOTE: Please contact Abracon for the availability of non-standard ESR specifications

2.0 ABLS series is RoHS/RoHS II Compliant and Pb free

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

4.0 Options and Part Identification (left blank if standard)

ABLS - [ ] MHz - [ ] - [ ] - [ ][ ][ ] - [ ] - [ ]

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

Load Capacitance (pF)
Please specify CL (8 to 33pF) in pF or S for series
Please contact Abracon for other values

Custom ESR if other than standard
R□
□: Specify a value in Ω (e.g.: R40)

NOTE: Please contact Abracon for the availability of non-standard ESR specifications

Operating Temp.
Blank: 0°C ~ +70°C
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
Blank: ± 50 ppm
1: ± 10 ppm
7: ± 15 ppm
2: ± 20 ppm
3: ± 25 ppm
4: ± 30 ppm

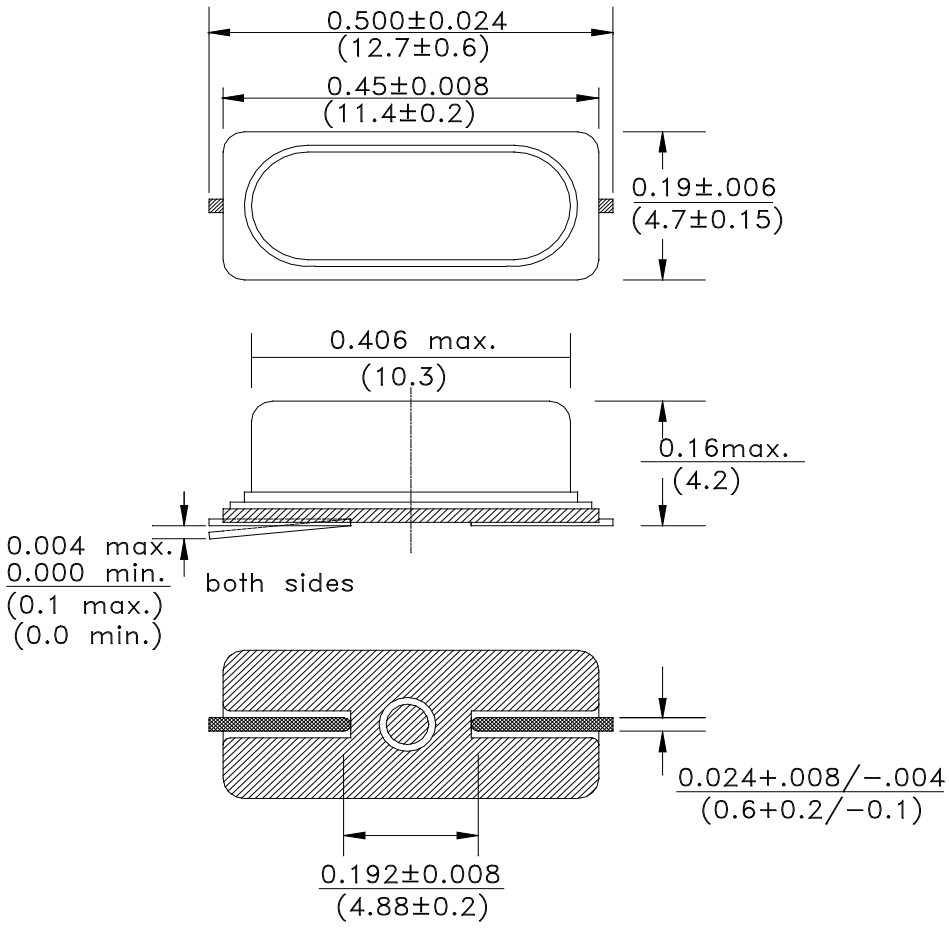
Freq. Stability
Blank: ± 50 ppm
U**: ± 10 ppm
G: ± 15 ppm
X: ± 20 ppm
W: ± 25 ppm
Y: ± 30 ppm
H: ± 35 ppm
Q: ± 100 ppm
R: ± 150 ppm

NOTE: Fundamental BT frequency stability ± 100ppm max. at -10° C to +60° C only.
* Frequency stability ±50ppm, ±100ppm, ±150ppm only. Contact ABRACON for tighter frequency stability.
** For -10 to +60C only.

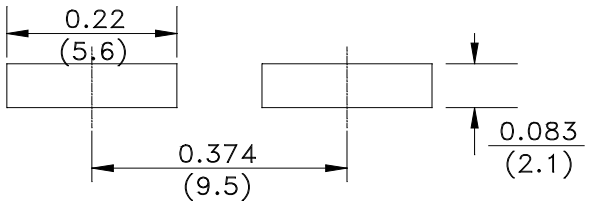
Packaging
Blank: Bulk
T: Tape&Reel

Oscillation Mode
Blank: Standard mode
F: Fund. AT>24MHz
FB: Fund. BT>24MHz

5.0 Mechanical Dimensions



Recommended land pattern



Dimensions: inches (mm)

6.1 Sealing Method = Resistance Weld Sealing

7.1 Reflow Profile [JEDEC J-STD-020]

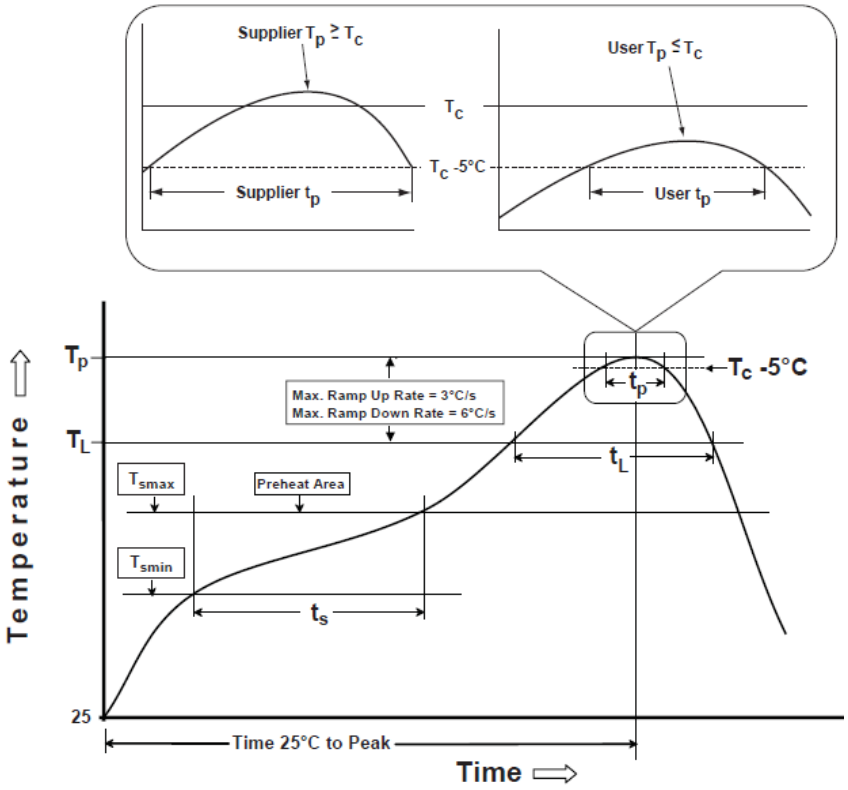


Table 1

SnPb Eutectic Process Classification Temperatures (T_c)		
Package Thickness	**Volume mm³ <350**	**Volume mm³ ≥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 mm³ <350**	**Volume mm³ 350-2000**	**Volume mm³ >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

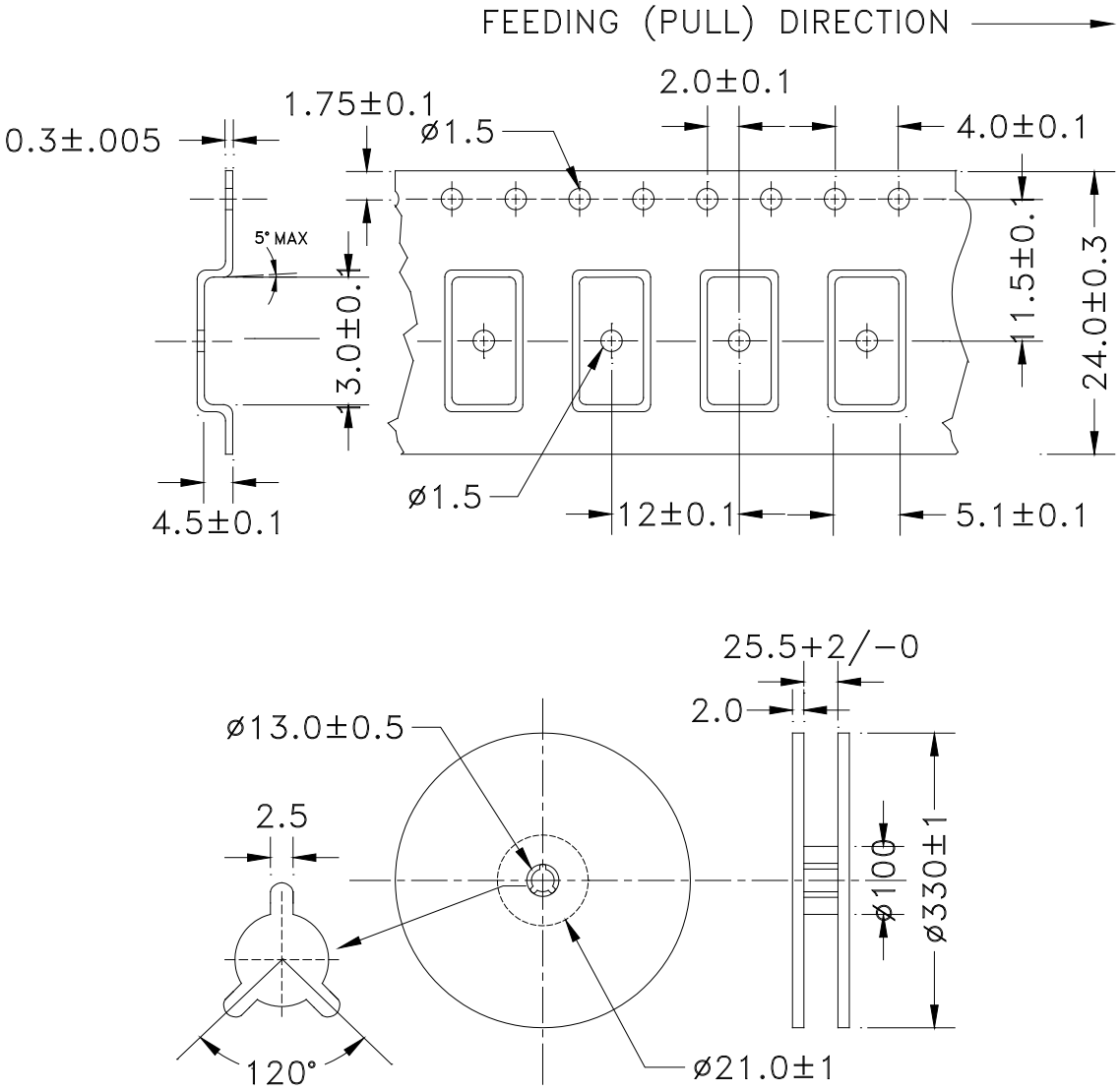
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100°C	150°C
Temperature maximum (T_{smax})	150°C	200°C
Time (T_{smin} to T_{smax}) (t_s)	60 - 120 sec.	60 - 120 sec.
Average ramp-up rate (T_{smax} to T_P)	3°C/sec. max	3°C/sec. max
Liquidous temperature (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.

8.0 Packing

T = Tape and Reel (1000pcs/reel)



Dimensions: mm