



APPROVAL SHEET

Customer Name	:	
Customer P/N	:	
Frequency	:	12.000000 MHz
AKER Approved P/N	:	49MN-012000-F-AL-01
AKER MPN	:	49MN-012000-F-AL-01
REVISION	:	A0
ISSUED DATE	:	2022/8/29

APPROVED	CHECKED	PREPARED
<i>Earnest</i>		<i>Kiku</i>
APPROVED BY CUSTOMER		

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RoHS compliant

[illegible]

*Please kindly be noted that **AKER DO NOT** guarantee parts quality which involves human security application.*



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HC-49US SMD CRYSTAL SPECIFICATION

1 . ELECTRICAL CHARACTERISTICS

(1) Standard atmospheric conditions

Unless otherwise specified , the standard range of atmospheric conditions for making measurement and tests are as follow :

Ambient temperature : $25 \pm 5^{\circ}\text{C}$

Relative humidity : 40%~70%

If there is any doubt about the results , measurement shall be made within the following limits :

Ambient temperature : $25 \pm 3^{\circ}\text{C}$

Relative humidity : 40%~70%

(2) Measurement Equipment : SAUNDERS 250B (Measured FL)

(3) Cutting Mode : AT CUT

(4) Oscillation Mode : Fundamental

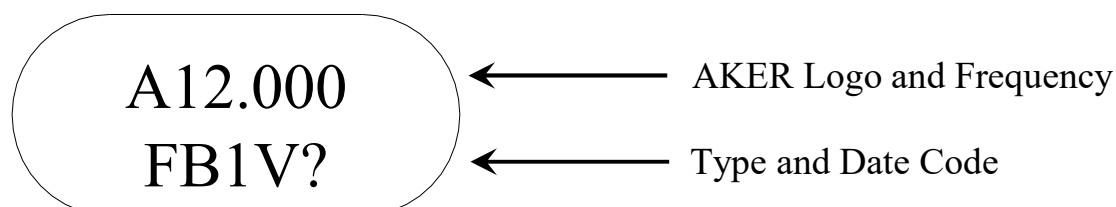
Parameters	Symbol	Electrical Specification				Notes
		Min.	Typ.	Max.	Unit	
Nominal Frequency	FL	12.000000				MHz
Load Capacitance	CL	20				pF
Frequency Tolerance		-20	~	20	ppm	At $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$
Frequency Stability		-20	~	20	ppm	Related to 25°C
Drive Level	DL		100	500	uW	
Operating Temperature Range		0	~	70	$^{\circ}\text{C}$	
Storage Temperature Range		-55	~	125	$^{\circ}\text{C}$	
Effective Series Resistance	RR			30	Ω	
Shunt Capacitance	C0			7	pF	
Motional Capacitance	C1		N/A		fF	
Ratio Of Capacitance	r		N/A			C0/C1
Aging Rate		-5	~	5	ppm	First Year
Insulation Resistance		500			MOhms	At DC 100V

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2 . MARKING



Type and Date Code

F	B	1	V	?
Oscillation Mode Code	Load Capacitance Code	Frequency Tolerance Code	Date Code	Internal identification code

Oscillation Mode Code

Code	Oscillation Mode
F	AT Cut / Fundamental
T	AT Cut / 3rd Overtone
B	BT Cut / Fundamental

Frequency Tolerance Code

Code	Tolerance	Code	Tolerance
1	±20 ppm	6	±50 ppm
2	±25 ppm	9	±10 ppm
3	±30 ppm	0	±100 ppm
5	±15 ppm		

Load Capacitance Code

Code	CL	Code	CL
S	Series	P	4
A	16	Q	39
B	20	R	12.5
C	30	T	8
D	18	U	33
E	32	V	7
F	12	W	6
G	22	X	17
H	27	Y	8.5
I	10	Z	19.5
J	14	a	21.5
K	15	b	24
L	25	c	35
M	9	d	37
N	13		

Date Code

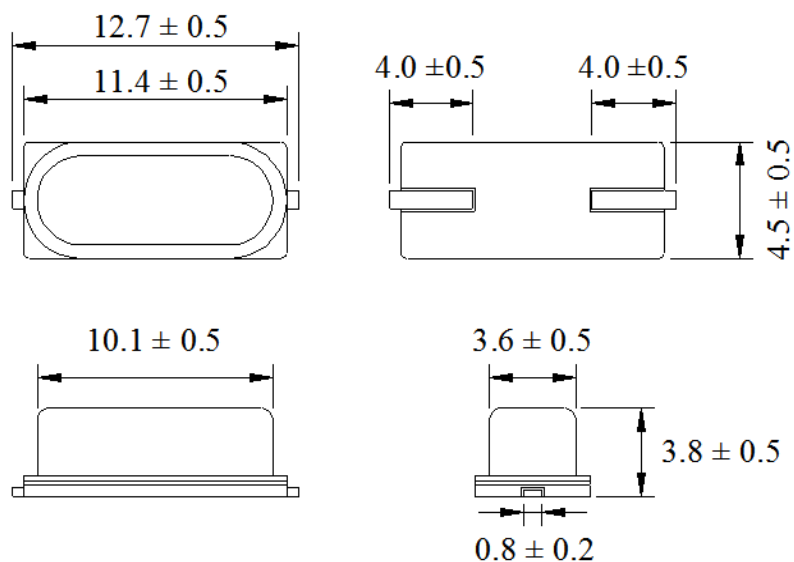
Year Month	2017	2018	2019	2020
	2021	2022	2023	2024
	2025	2026	2027	2028
	(4N+1)	(4N+2)	(4N+3)	(4N+0)
JAN	A	N	a	n
FEB	B	P	b	p
MAR	C	Q	c	q
APR	D	R	d	r
MAY	E	S	e	s
JUN	F	T	f	t
JUL	G	U	g	u
AUG	H	V	h	v
SEP	J	W	j	w
OCT	K	X	k	x
NOV	L	Y	l	y
DEC	M	Z	m	z

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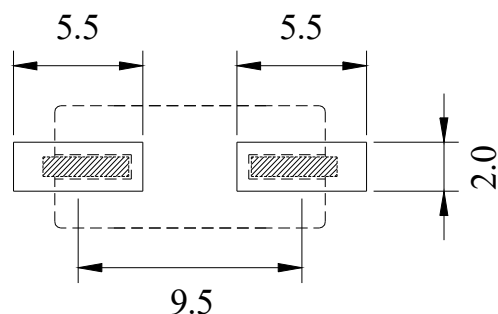


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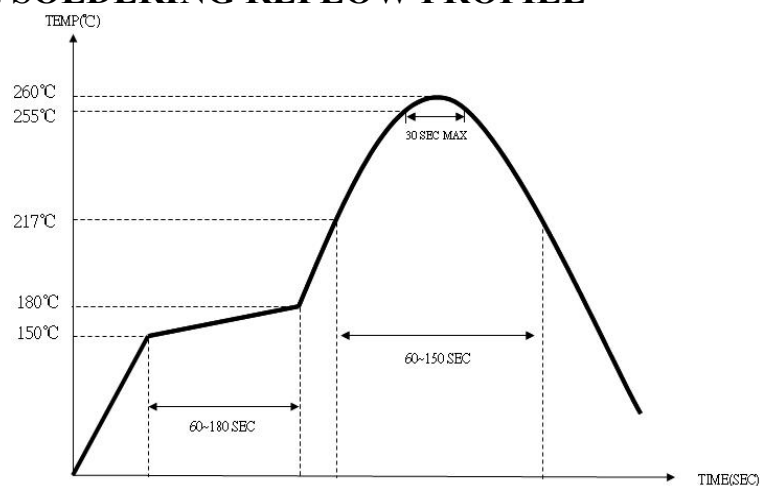
3 . DIMENSIONS : (Unit : mm)



4 . SUGGESTED LAND PATTERN : (Unit : mm)



5 . SOLDERING REFLOW PROFILE



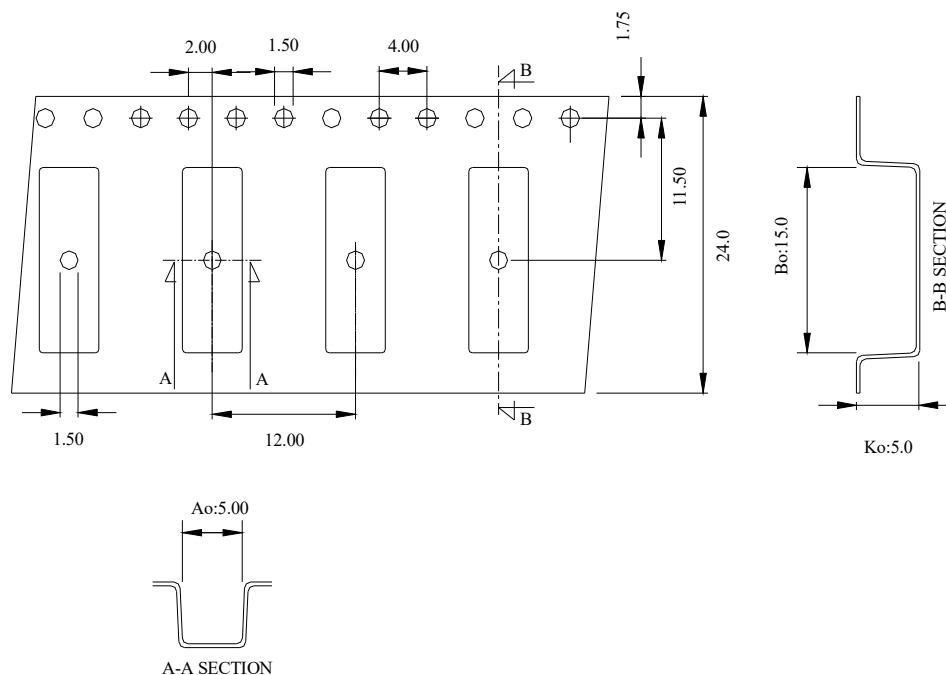
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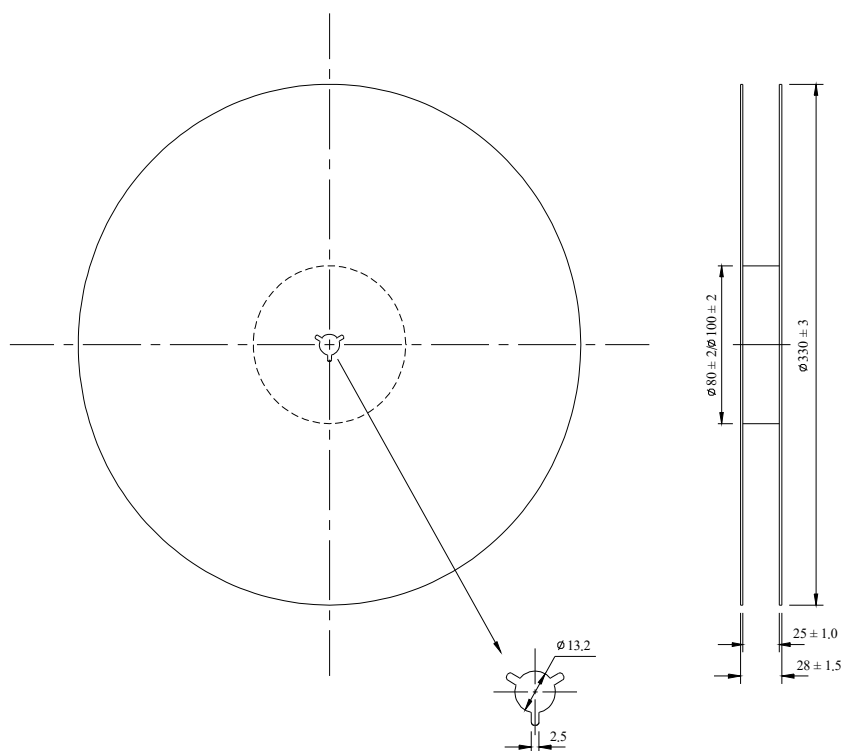
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6 . PACKING : (Unit : mm) 1000pcs/reel

6.1 TAPE SPECIFICATION



6.2 REEL SPECIFICATION

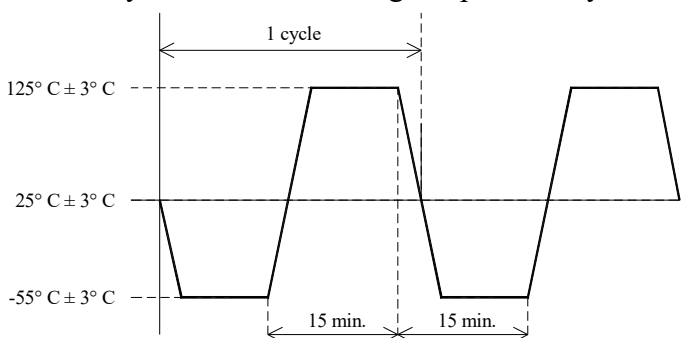


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7 . RELIABILITY SPECIFICATION

No	Test Item	Test Methods	Performance
1	Drop Test	Free drop from 50 cm height onto a hard wooden board for 3 times	To satisfy the electrical characteristics
2	Mechanical Shock	1000 G, 0.5 msec, 3 times for each direction (X, Y, Z)	
3	Vibration	Frequency range : 20 ~ 2000 Hz Amplitude : 1.52 mm / 20G Sweep time : 20 minutes Test time for each direction : 2 Hours (Total 6 Hours)	
4	Gross Leak	Alcohol, Test Pressure : > -40cm-Hg	No bubbles stream
5	Fine Leak	5 kgf /cm ² Helium bombing for 2 Hours	$\leq 10^{-8}$ atm.cc./sec
6	Solderability	Temperature : 260°C $\pm$ 5°C Immersion time : 5 $\pm$ 1 seconds	90% min. coverage of new solder
7	Resistance To Soldering Heat	Solder pot test Test temperature : 260°C $\pm$ 5°C Test time : 10 $\pm$ 1 seconds	To satisfy the electrical characteristics
8	High Temperature Storage	+ 125 °C $\pm$ 3 °C for 500 $\pm$ 12 Hours	
9	Low Temperature Storage	- 55 °C $\pm$ 3 °C for 500 $\pm$ 12 Hours	
10	Temperature Cycle	Total 100 cycles of the following temperature cycle 	
11	High Temperature And Humidity	85°C $\pm$ 5°C, RH 85% $\pm$ 5%, 500 $\pm$ 12 Hours	

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