



# APPROVAL SHEET

Customer Name	:	
Customer P/N	:	
Frequency	:	12.000000 MHz
AKER Approved P/N	:	49MN-012000-F-D4-01
AKER MPN	:	49MN-012000-F-D4-01
REVISION	:	A0
ISSUED DATE	:	2023/1/16

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

## AKER TECHNOLOGY CO., LTD.

ADDRESS : No.11-3, Jianguo Rd., Tanzi Dist., Taichung City 427, Taiwan

TEL : 886-4-25335978

FAX : 886-4-25336011

Web: [www.aker.com.tw](http://www.aker.com.tw)

**RoHS compliant**



Customer P/N			
AKER Approved P/N	49MN-012000-F-D4-01		
APPROVED	Earnest	SHEET	1 OF 6
PREPARED	Kiku	REV.	A0

Revision	Date	Reviser	Revised contents
A0	2023/1/16	Kiku	Initial Released

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



Customer P/N			
AKER Approved P/N	49MN-012000-F-D4-01		
APPROVED	Earnest	SHEET	2 OF 6
PREPARED	Kiku	REV.	A0

## 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

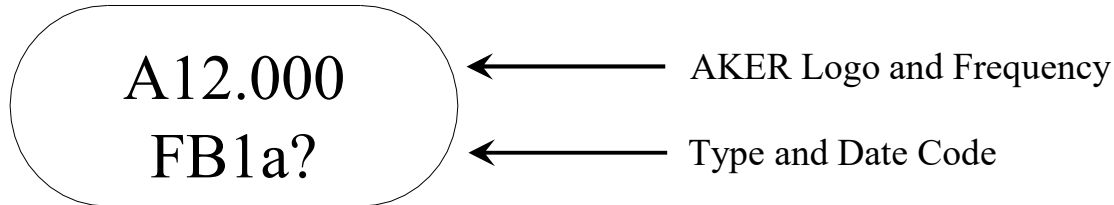
(4) Oscillation Mode : Fundamental

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 $25^{\circ}\text{C}$
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	$\Omega$	
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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	Customer P/N			
	AKER Approved P/N	49MN-012000-F-D4-01		
	APPROVED	Earnest	SHEET	3 OF 6
	PREPARED	Kiku	REV.	A0

## 2 . MARKING



### Type and Date Code

<b>F</b>	<b>B</b>	<b>1</b>	<b>a</b>	<b>?</b>
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

### Frquency 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

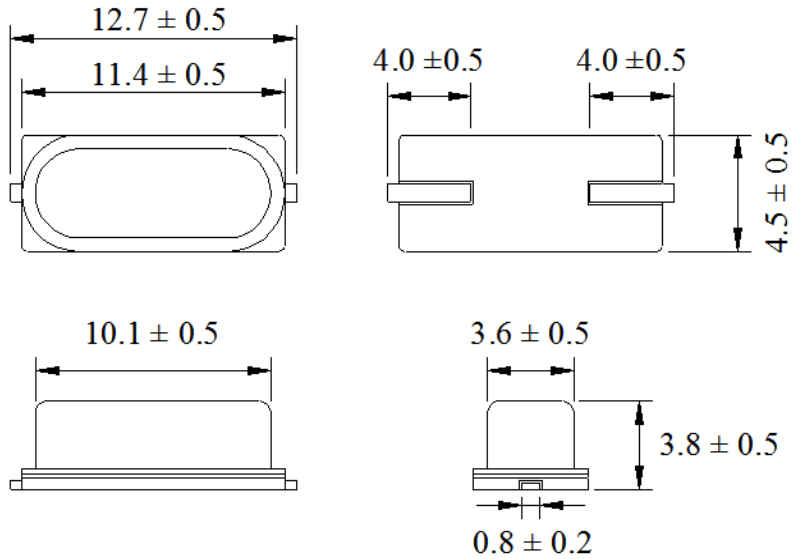
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	2021	2022	2023	2024
Month	2025	2026	2027	2028
	(4N+1)	(4N+2)	(4N+3)	(4N+0)
JAN	A	N	a	n
FEB	B	P	b	p
MAR	C	Q	c	q
APR	D	R	d	r
MAY	E	S	e	s
JUN	F	T	f	t
JUL	G	U	g	u
AUG	H	V	h	v
SEP	J	W	j	w
OCT	K	X	k	x
NOV	L	Y	l	y
DEC	M	Z	m	z

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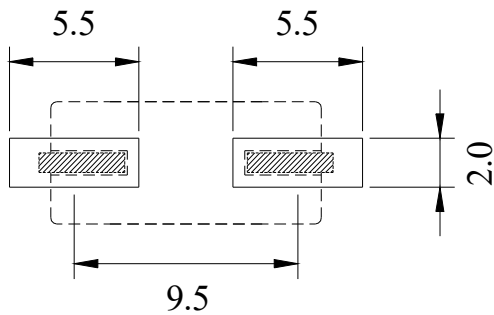


Customer P/N			
AKER Approved P/N	49MN-012000-F-D4-01		
APPROVED	Earnest	SHEET	4 OF 6
PREPARED	Kiku	REV.	A0

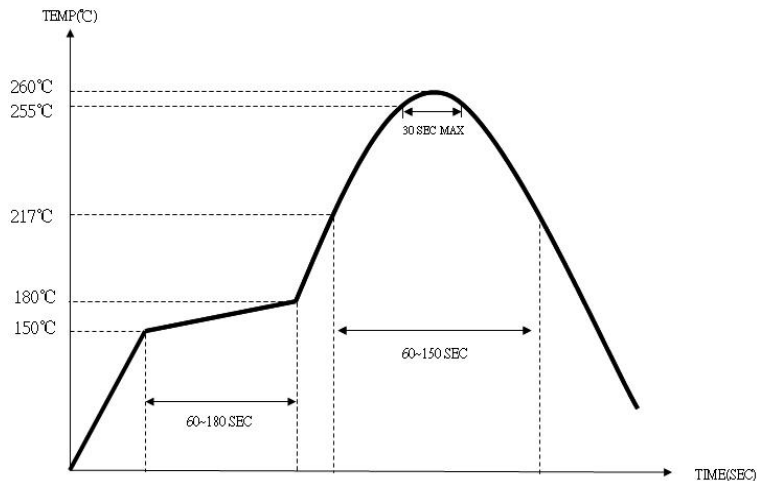
### 3 . DIMENSIONS : ( Unit : mm )



### 4 . SUGGESTED LAND PATTERN : ( Unit : mm )



### 5 . SOLDERING REFLOW PROFILE



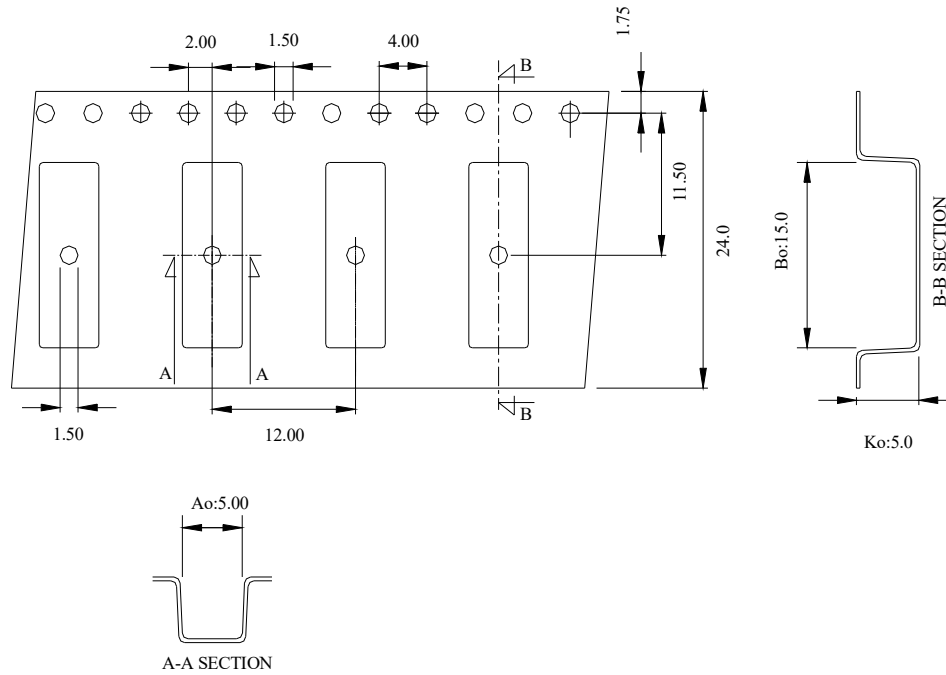
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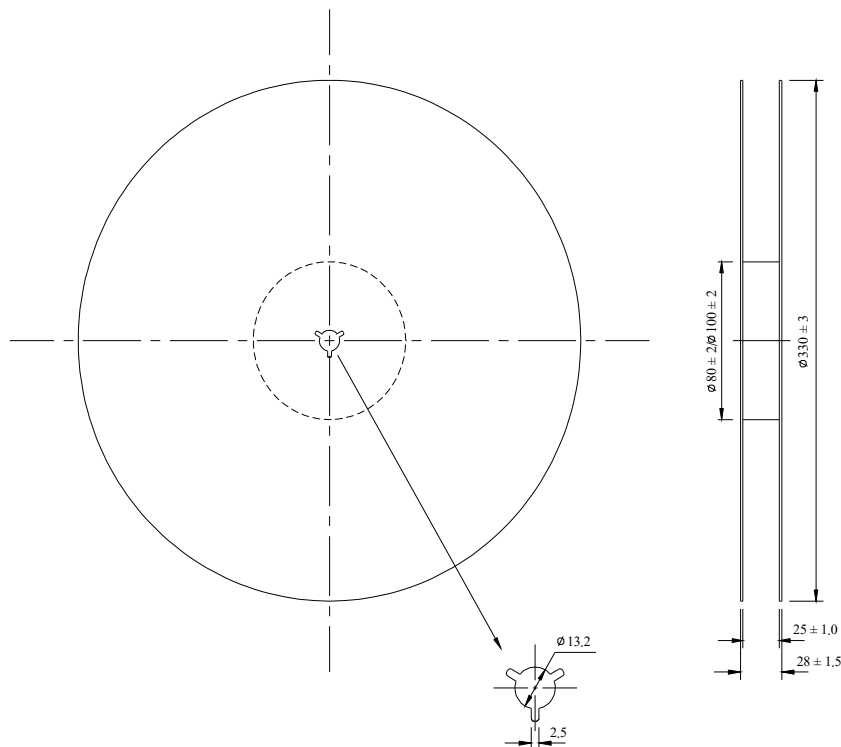
Customer P/N			
AKER Approved P/N	49MN-012000-F-D4-01		
APPROVED	Earnest	SHEET	5 OF 6
PREPARED	Kiku	REV.	A0

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

### 6.1 TAPE SPECIFICATION



### 6.2 REEL SPECIFICATION



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AKER Approved P/N	49MN-012000-F-D4-01		
APPROVED	Earnest	SHEET	6 OF 6
PREPARED	Kiku	REV.	A0

## 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 <sup>2</sup> Helium bombing for 2 Hours	≤10 <sup>-8</sup> atm.cc./sec
6	Solderability	Temperature : 260°C ± 5°C Immersion time : 5 ± 1 seconds	90% min. coverage of new solder
7	Resistance To Soldering Heat	Solder pot test Test temperature : 260°C ± 5°C Test time : 10 ± 1 seconds	To satisfy the electrical characteristics
8	High Temperature Storage	+ 125 °C ± 3 °C for 500 ± 12 Hours	
9	Low Temperature Storage	- 55 °C ± 3 °C for 500 ± 12 Hours	
10	Temperature Cycle	Total 100 cycles of the following temperature cycle 	
11	High Temperature And Humidity	85°C ± 5°C , RH 85% ± 5%, 500 ± 12 Hours	

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