



# APPROVAL SHEET

Customer Name : \_\_\_\_\_

Customer P/N : \_\_\_\_\_

Frequency : 16.000000 MHz

AKER Approved P/N : 49MN-016000-F-AL-00

AKER MPN : 49MN-016000-F-AL-00

REVISION : A0

ISSUED DATE : 2022/8/29

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

## AKER TECHNOLOGY CO., LTD.

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**RoHS compliant**



Customer P/N			
AKER Approved P/N	49MN-016000-F-AL-00		
APPROVED	Earnest	SHEET	1 OF 6
PREPARED	Kiku	REV.	A0

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



Customer P/N			
AKER Approved P/N	49MN-016000-F-AL-00		
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

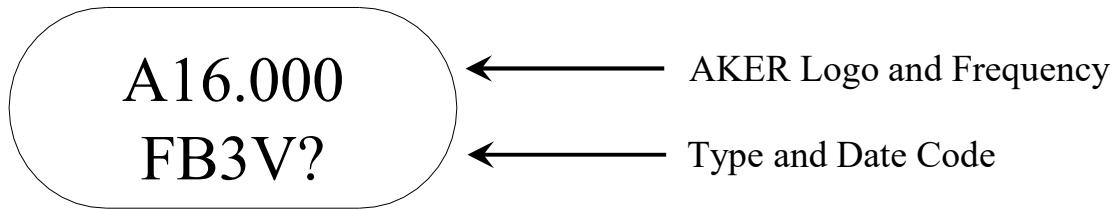
(4) Oscillation Mode : Fundamental

Parameters	Symbol	Electrical Specification				Notes
		Min.	Typ.	Max.	Unit	
Nominal Frequency	FL	16.000000			MHz	
Load Capacitance	CL	20			pF	
Frequency Tolerance		-30	~	30	ppm	At $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$
Frequency Stability		-30	~	30	ppm	Related to $25^{\circ}\text{C}$
Drive Level	DL	100	500	uW		
Operating Temperature Range		0	~	70	°C	
Storage Temperature Range		-55	~	125	°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



Customer P/N			
AKER Approved P/N	49MN-016000-F-AL-00		
APPROVED	Earnest	SHEET	3 OF 6
PREPARED	Kiku	REV.	A0

## 2 . MARKING



### Type and Date Code

F	B	3	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

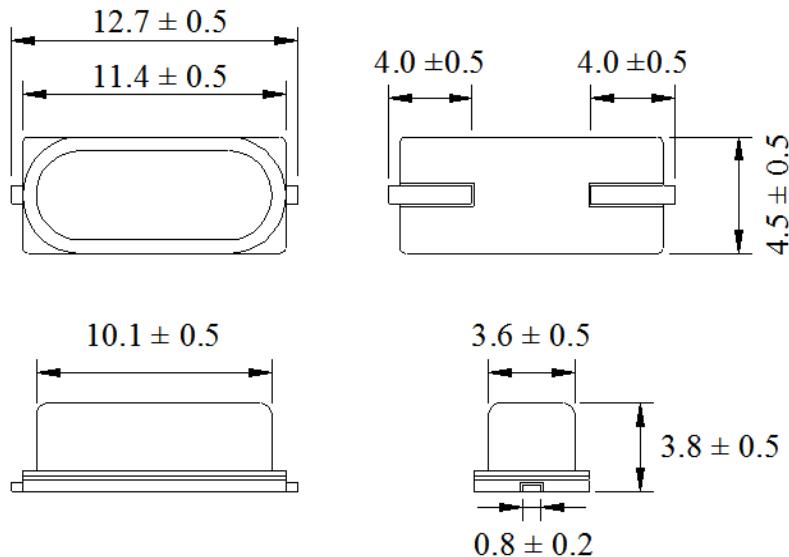
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	2021	2022	2023	2024
Month	2025	2026	2027	2028
(4N+1)	(4N+2)	(4N+3)	(4N+0)	
JAN	A	N	a	n
FEB	B	P	b	p
MAR	C	Q	c	q
APR	D	R	d	r
MAY	E	S	e	s
JUN	F	T	f	t
JUL	G	U	g	u
AUG	H	V	h	v
SEP	J	W	j	w
OCT	K	X	k	x
NOV	L	Y	l	y
DEC	M	Z	m	z

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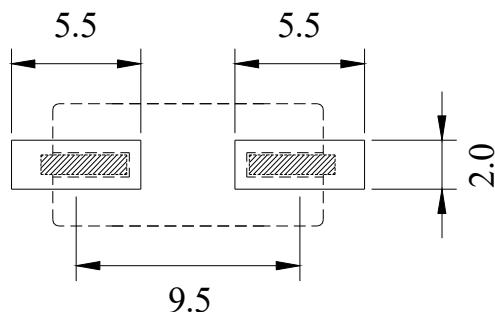


Customer P/N			
AKER Approved P/N	49MN-016000-F-AL-00		
APPROVED	Earnest	SHEET	4 OF 6
PREPARED	Kiku	REV.	A0

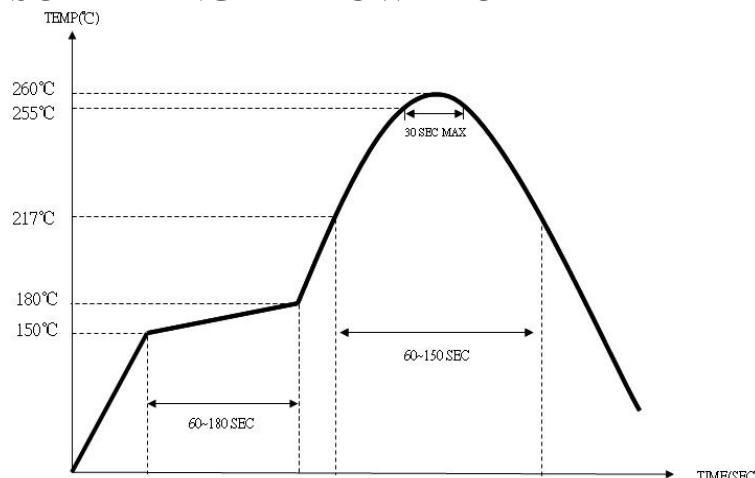
### 3 . DIMENSIONS : ( Unit : mm )



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



### 5 . SOLDERING REFLOW PROFILE



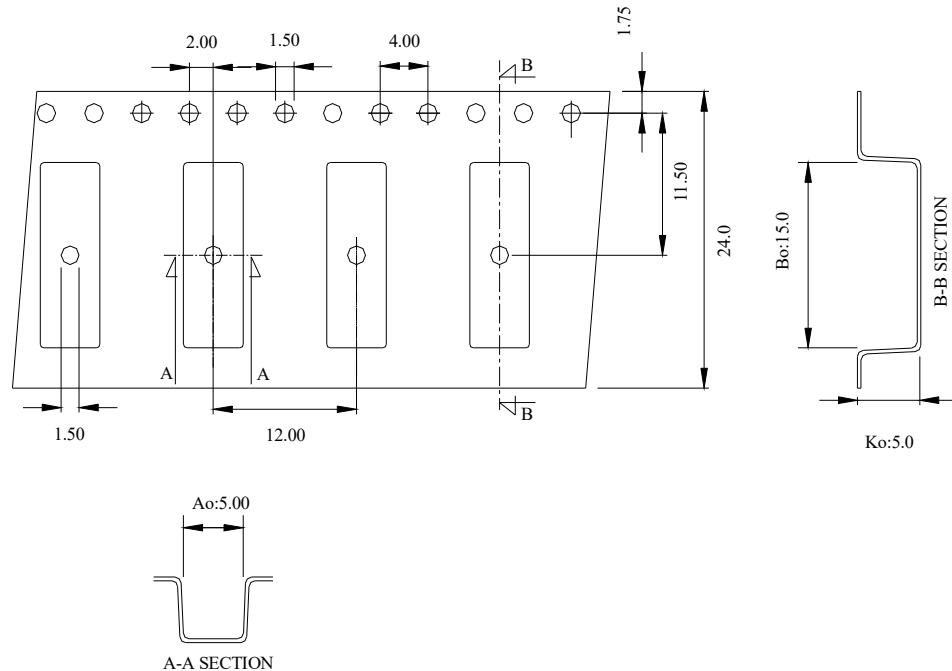
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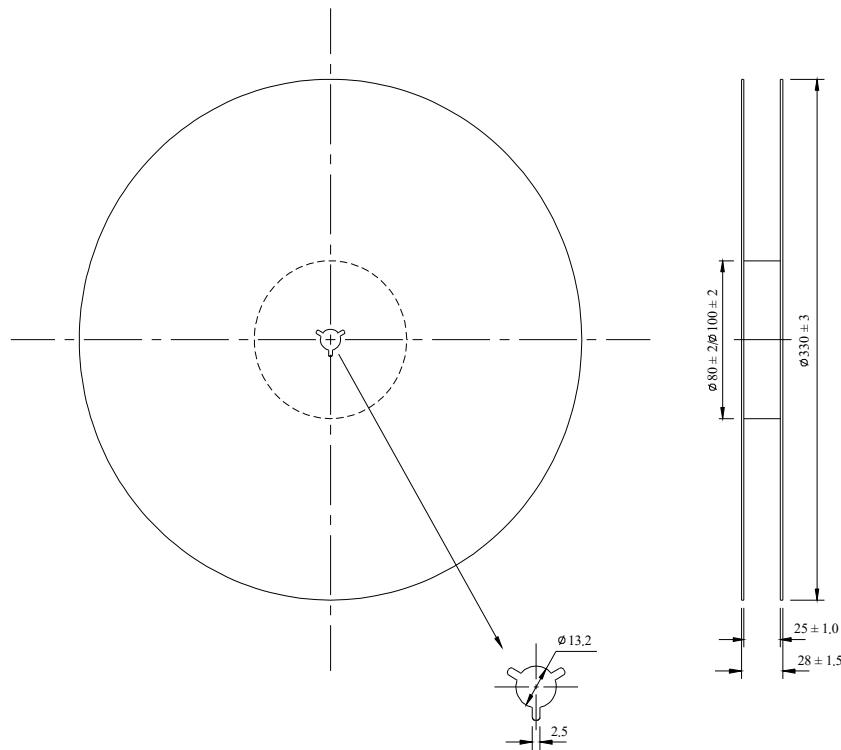
Customer P/N			
AKER Approved P/N	49MN-016000-F-AL-00		
APPROVED	Earnest	SHEET	5 OF 6
PREPARED	Kiku	REV.	A0

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

### 6.1 TAPE SPECIFICATION



### 6.2 REEL SPECIFICATION



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AKER Approved P/N	49MN-016000-F-AL-00		
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	$\leq 10^{-8}$ 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 The graph illustrates a temperature cycle with three distinct levels: a high level of 125°C ± 3°C, a low level of -55°C ± 3°C, and a intermediate level of 25°C ± 3°C. The cycle is defined by two trapezoidal transitions between the high and low levels, each taking 15 minutes to complete. The time interval between the end of one cycle and the start of the next is also 15 minutes.	To satisfy the electrical characteristics
11	High Temperature And Humidity	85°C ± 5°C, RH 85% ± 5%, 500 ± 12 Hours	