Jameco Part Number 325198

DATE: _____

SPECIFICATION FOR PRODUCT

PART NAME: **HC/49S 12.000M**

CUSTOMER NAME: _____

CUSTOMER PART NO.: _____

1. Model HC/49S

2. No. of specification

3. Genera

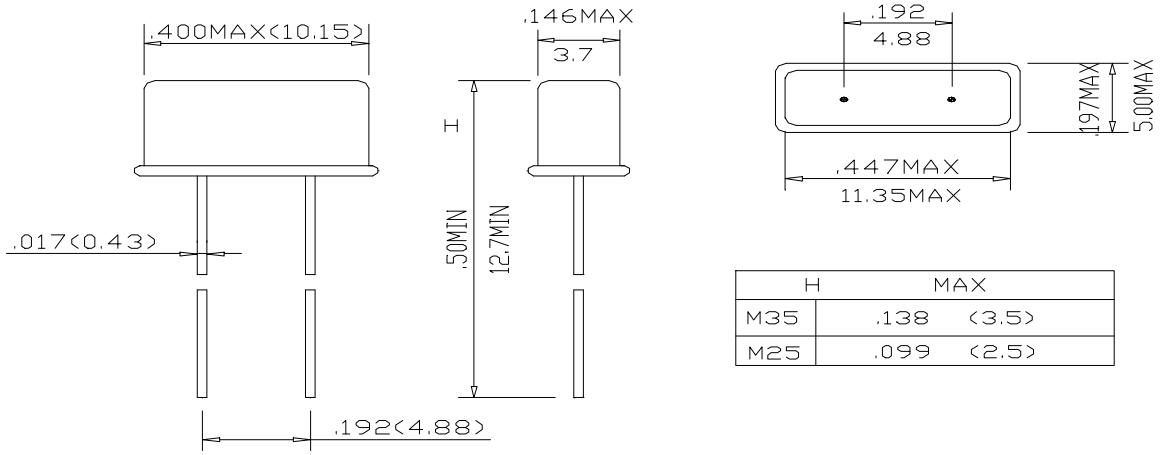
3.1. Nominal Frequency (F_0):	12.000
3.2. Mode of Oscillation (Mn):	Fund (AT Cut)
3.3. Operating Temperature Range (T_0):	-20°C~+70°C
3.4. Storage Temperature Range (Ts):	-55°C~+125°C
3.5. Test Set:	S&A 250B-1 S&A 350D
3.6. Drive Level (DL):	0.1mW Max.
3.7. Loading Capacitance (CL):	20pF

4. Electrical Characteristics

(This test shall be performed under the conditions of temp. at 25±3°C, humidity 60% max.)

4.1. Frequency Tolerance（△F):	±20PPM
4.2. Equivalent Resistance (Rr):	60Ω Max./Series
4.3. Temperature Drift (Tc):	±30PPM Max. / -20°C~+70°C
4.4. Shunt Capacitance (C_0):	7pF Max.
4.5. Drive Level Dependence (DLD):	△Rr=3Ω Max.
4.6. Insulation Resistance (Ri):	More than 500MΩ / 100V±15VDC.
4.7. Aging:	±3PPM Max.

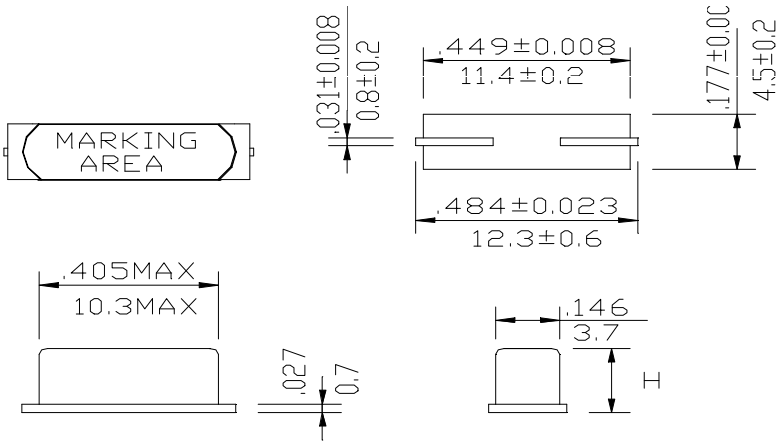
5. Outline Drawing (mm)



H	MAX
M35	.138 (3.5)
M25	.099 (2.5)

M35 ☐ M25 ☐

HC-49U/S SMD DIMENSIONS (MM)



H	MAX
M35	.177(4.50)
M25	.138(3.50)

M35 ☐ M25 ☐

MARKING:

按客户要求

6.1 Crystal Units Ordering Information

HC-49S — **C** **20** **Q** **Q** **A** — **12.000**

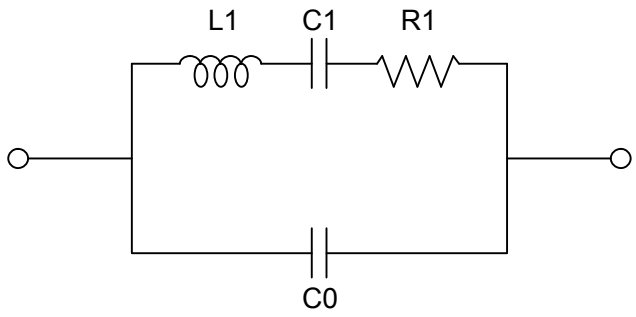
Package	Operating Temperature Range	Load Capacitance	Frequency Tolerance	Frequency Stability	Vibration Mode	Nominal Frequency (MHz)
HC-49U	A=0°C~+50°C	00=series	M=±3×10^{-6}	M=±3×10^{-6}	A=AT-Fund	Please enter the nominal frequency
HC-49UX	B=-10°C~+60°C	06=6.0pF	N=±5×10^{-6}	N=±5×10^{-6}	B=BT-Fund	
HC-33U	C=-20°C~+70°C	08=8.0pF	O=±10×10^{-6}	O=±10×10^{-6}	T=3RD	
HC-49S	G=-40°C~+85°C	10=10pF	P=±15×10^{-6}	P=±15×10^{-6}	F=5TH	
HC-49SA	J=-55°C~+125°C	12=12pF	Q=±20×10^{-6}	Q=±20×10^{-6}	TA=AT-3RD	
HC-49SB		16=16pF	S=±30×10^{-6}	S=±30×10^{-6}	FA=AT-5TH	
HC-49XA		20=20Pf	T=±50×10^{-6}	T=±50×10^{-6}		
HC-49XB		27=27Pf		U=±100×10^{-6}		
HC-49SMD		30=30pF				
X53F		50=50pF				
X63F		Please enter the value of load capacitance				
X75F						
X53T						
X63T						
UM-1						
UM-5						
AT-38						
AT-39						

6.2 Frequency Stability Over Temperature Range

Temperature Range	Frequency Stability						
	M:±3×10^{-6}	N:±5×10^{-6}	O:±10×10^{-6}	P:±15×10^{-6}	Q:±20×10^{-6}	S:±30×10^{-6}	T:±50×10^{-6}
A:0°C~+50°C	●	●	●	●	●	●	●
B:-10°C~+60°C		●	●	●	●	●	●
C:-20°C~+70°C		●	●	●	●	●	●
G:-40°C~+85°C				●	●	●	●
J:-55°C~+125°C							※

※: Specially designated products.

7. Equivalent Circuit of a Crystal Unit



8. Applied Circuit

8.1. Frequency Range: 3~25MHz

Overtone: Fundamental

Frequency Range (MHz)	C_1=C_2 (pF)	R_1 (Ω)	Load Capacitance (pF)
3~4	33	4.7K	20
4~5	33	3.3K	20
5~6	33	2.2K	20
6~9	22	1.0K	16
9~10	22	470	16
10~15	15	470	12
15~20	15	470	12
20~25	10	470	10

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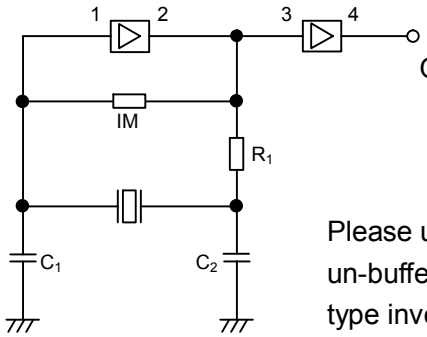


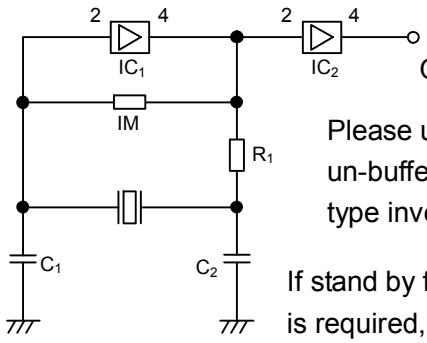
Please use un-buffered type invertors.

8.2. Frequency Range: 3~25MHz

Overtone: Fundamental

Frequency Range (MHz)	C_1=C_2 (pF)	R_1 (Ω)	Load Capacitance (pF)
3~4	33	6.8K	20
4~5	33	4.7K	20
5~6	33	3.3K	20
6~9	22	2.2K	16
9~10	22	1.0K	16
10~15	15	470	12
15~20	10	330	12
20~25	7	330	10

7SU04F 7SU04F



Please use un-buffered type invertors.

If stand by function is required, Please use IC/NJU6323P (New Japan Radio Co., Ltd.)

TEST OF RELIABILITY

9. MECHANICAL ENDURANCE

9.1 SHOCK

Frequency tolerance and CI value shall be complied with paragraph 3 without any mechanical damage by three times drop from height of 75cm onto hard wooden board of thickness more than 30mm.

9.2 VIBRATION

A fast supplying following vibration, frequency tolerance and CI value shall be complied with paragraph 3.

I)	VIBRATION FREQUENCY:	10-55Hz
II)	REPEATED PERIOD:	1-2 min.
III)	FULL CYCLE:	1.5mmP-P
IV)	DIRECTION:	X.Y.Z
V)	TIME:	2 Hours/EACH DIRECTION

9.3 STRENGTH OF TERMINALS/LEAD-WIRES

9.3.1 PULLING

A) Body of crystal unit shall be fixed, and 900g of tension weight shall be supplied gradually to axial direction of lead terminals for 30 seconds.

B) After above test A), there is no observation of any visual damages on the crystal unit. And frequency tolerance and CI value shall be complied with paragraph 3.

9.3.2 BENDING

A) Body of crystal unit shall be fixed, and 90 degree bending shall be given being supplied 450g Tension weight.
After that, lead terminals shall be straightened gradually.
Then the same bending and straightening shall be supplied to the opposite direction in the same Axial.

B) After above test A), there is no observation of any visual damages on the crystal unit. And frequency tolerance and CI value shall be complied with paragraph 3.

9.4 SEALING TIGHTNESS

9.4.1 There is no observation of gas bubble after specimen put hot water at +90℃-+95℃ for 5min.

9.4.2 Air tight sealing should satisfy requirements of the value
(3×10-8atm.cc.sec. max) tested by a leak detector (*He finding)

9.5 SOLDERING DIP

Each lead terminals shall be dipped into the solder melted tank at 230℃±5℃ for 3 second to 2mm from the bottom of lead terminals.
After this dipping, 90% min. Of dipped parts shall be covered with solder.
(Soldering should be performed after spreading ROSIN FLAX)

9.6 SOLDER HEATING

Each lead terminals shall be dipped into the solder melted tank at 350℃±10℃ for 3 second to 2mm from the bottom of lead terminals. And into the solder melted tank at 260℃±10℃ for 10 second by the same way. There is no observation of any visual damages on the unit. And frequency tolerance and CI value shall be complied with paragraph 3. In addition, there must be no problem when a through hole board is used.

10. ENVIRONMENTAL ENDURANCE

10.1 HUMIDITY

After letting it alone at 60℃±2℃ in humidity of 90-95% for 500 hours, frequency tolerance and CI value shall be complied with paragraph 3.

10.2 STORAGE IN LOW TEMPERATURE

After letting it alone at -40℃±2℃ for 500 hours, frequency tolerance and CI value shall be complied with paragraph 3.

10.3 TEMPERATURE CYCLE

After supplying the following temperature cycle (30 cycles).Frequency tolerance and CI value shall be complied with paragraph 3.Temperature shift from low to high, high to low shall be done in 1℃/min. (Refer to Fig-1)

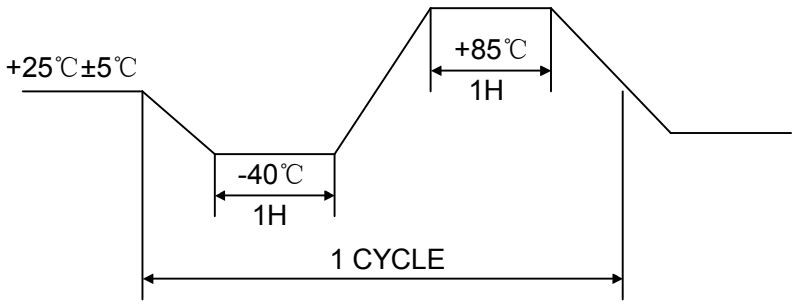


Fig-1

10.4 HEAT SCHOCK

After performing the following heat shock test according to 10 cycles, Frequency tolerance and CI value shall be complied with paragraph 3. (Refer to Fig-2)

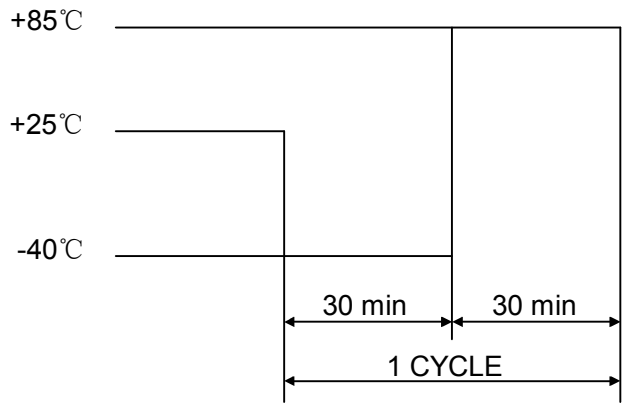


Fig - 2

10.5 SALT SPRAY TEST

After the storage of crystal unit for 48±4 hours at the temperature of 35℃ in the suit spray room (salt density: 5%), water cleaning and wiped up the moisture on its surface.
By visual inspection without noticeable corrosion unit, and frequency tolerance and CI value shall be complied with paragraph 3.

10.6 AGING

After letting it alone at +85℃±2℃ for 720 hours, Frequency tolerance shall be within ±10ppm and CI value shall be within ±25% or 25Ω.

10.7 ULTRASONIC CLEANSING

10.7.1 The specimen shall be cleaned at a normal temperature 500W (25W/L). 40KHz, 50sec using alcohol (density: 100%)

10.7.2 After about test I), there is no observation of any visual damages on the specimen, and frequency tolerance and CI value shall be complied with paragraph 3.Washine process shall be continuously done after dipping.

11. SPECIFICATION

DEVATION OF FREQUENCY TOLERANCE: ±5ppm Max.
DEVATION OF EQUIVALENT RESISTANCE: Either one bigger ±15% Max or 2ΩMax.
Provided that measurement shall be carried out after letting it alone in the room temperature for 1 hour.