

Part Number : [32.768K12.5PI/MC306](#)

### [1] Absolute Maximum Ratings

Item	Symbol	Rating value
Storage temperature	T <sub>STG</sub>	-40°C to +85°C
Maximum drive level	GL	1.0μW
Soldering condition	T <sub>SOL</sub>	Max. 260°C × Max. 10 sec

### [2] Operating Range

Item	Symbol	Value		
		Min.	Typ.	Max.
Operating temperature range	T <sub>OPR</sub>	-40°C		+85°C
Drive level	DL	0.01μW	0.1μW	1.0μW

### [3] Electrical Characteristics

Item	Symbol	Standard	Conditions
Frequency	f	32.768 KHz	
Frequency tolerance	$\Delta f/f$	± 20 PPM	CL=12.5 pF Ta=25°C (S&A 250B) not include aging
Turnover temperature	$\theta T$	25°C ± 5°C	Value calculated on temperature 10, 25, 40°C with C-MOS circuit
Temperature coefficient	a	-0.035 ± 0.01 PPM / °C <sup>2</sup> max.	
Q value	Q	50000 Typical	
Series resistance	R <sub>1</sub>	50.0 KΩ max.	
Motional capacitance	C <sub>1</sub>	0.003pF Typical	
Shunt capacitance	C <sub>0</sub>	0.85 pF typ.	
Insulation resistance	IR	Min. 500 MΩ	DC 100V, 60 sec. between terminals or terminal and case.
Aging	fa	Max. ± 5 PPM / year	Ta=25°C ± 3°C

## [4] Environmental and mechanical characteristics

Shall be tested after following pre-conditioning. Pre-conditioning (Item No.3 to No. 6 are a must)

1.  $85 \pm 2^\circ\text{C} \times 85 \pm 5\%\text{RH} \times 24 \pm 1\text{H}$
2. Dip a product into the Flux.
- 3 Dip a product into the solder bath ( $235 \pm 5^\circ\text{C}$ ) for  $20 \pm 1$  sec.

No.	Item	Standard	Condition
1	Shock resistance		Natural drop from 75 cm height on to the hard board 3 times (*2)
2	Vibration resistance		10~500 Hz, 1.5 mm p-p or 10→500→10Hz, 10G log. sweep 2 hours × 3 directions 15 min./cycle (*2)
3	High temperature storage		a) $125^\circ\text{C} \times 1000$ hours b) $85^\circ\text{C} \times 1000$ hours (*1)
4	Low temperature storage	$\Delta f/f : \pm 5$ PPM	$-55^\circ\text{C} \times 1000$ hours (*1)
5	Temperature cycle		$-55^\circ\text{C} \leftrightarrow +125^\circ\text{C}$ 15 minutes at each temp. 100 cycle (*1)
6	High temperature and Humidity bias		$85^\circ\text{C} \times 85\%\text{RH} \times 1000$ hours (*1)
7	Soldering heat resistance		$230 \pm 10^\circ\text{C}$ solder bath × $20 \pm 1$ sec. in solder bath or re-flow furnace with the condition shown in the blow profile 2 times. (*2)
8	Adhesion	No peeling-off at a soldered part	2.0kg press the side for $10 \pm 1$ sec. Ref. EIAJ RCX-0104 / 102 (Mechanical strength test for SMD)
9	Peeling strength	No peeling-off at a soldered part	1.0kg press the center of rear side for $10 \pm 1$ sec. Ref. EIAJ RCX-0104 / 103 (Mechanical strength test for SMD)
10	Solvent resistance	Abnormal outer appearance (dull of unreadable) in not allowed	Ref. EIAJ ED-4701 C-121 or MIL-STD-202F No.215
11	Solderability of terminals	Min. 90%	Terminals solder able at a bath temperature of $260 \pm 10^\circ\text{C}$ for 3 seconds (Using Rosin Flux)

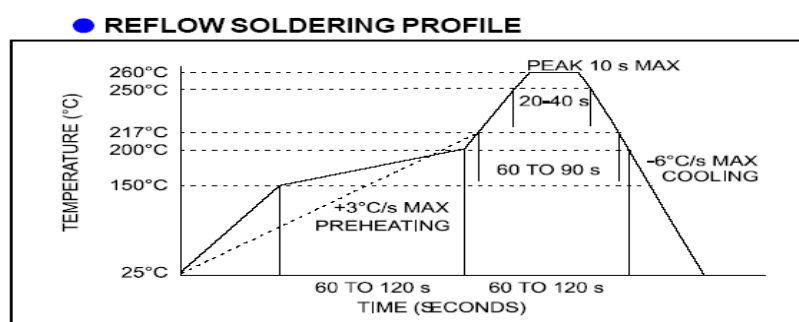
Note \* Above tests No. 1 to 7 should be made independently.

\* Shift of series resistance at before and after above test should be less than  $60\text{K}\Omega$

\*1 Measuring 24 hours later leaving in room temperature after each test.

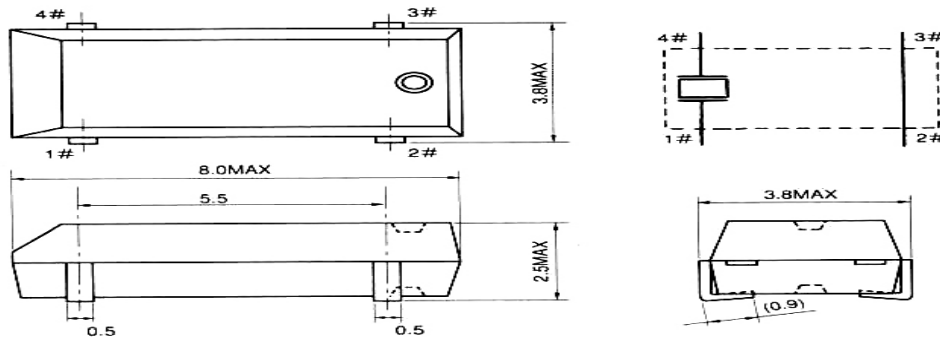
\*2 Measuring 2 hours later leaving in room temperature after each test.

**\*3 Please do not have on Round Cap on the direct tin. Like this, can cause its not good rate enhancement. If must fix it on the PCB. We intensely suggested the application point rubber way fixes.**

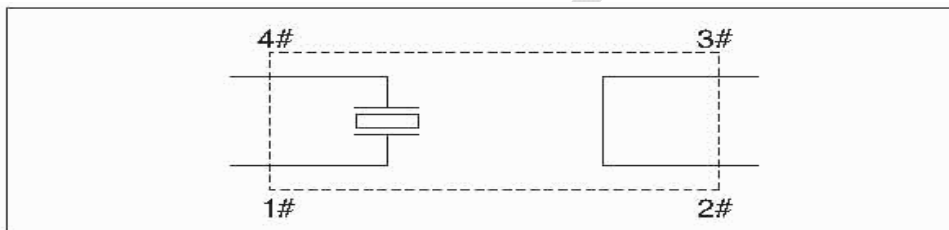


### [5] Dimensions and Package Specification

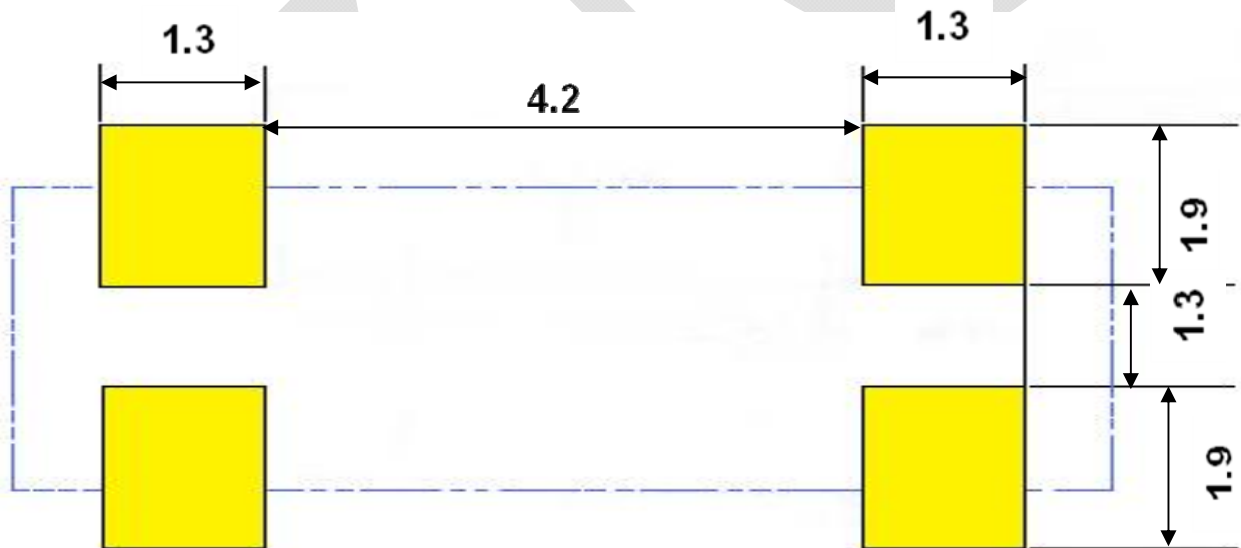
#### 1. OUTLINE DIMENSIONS(unit:mm)



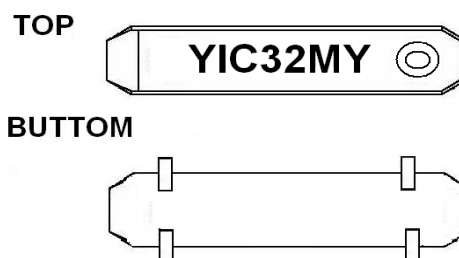
#### 2. INTERNAL LEAD CONNECTION



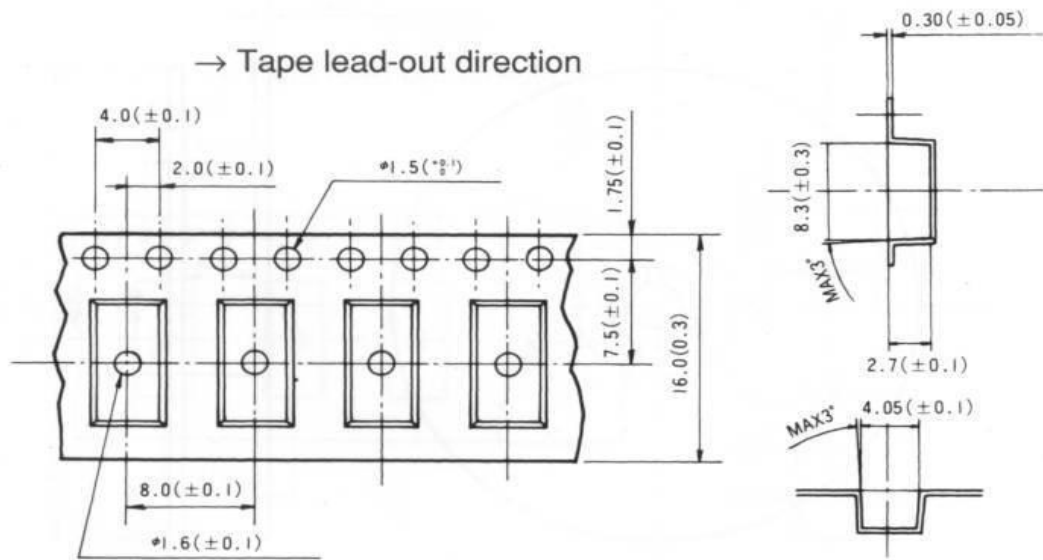
#### 3. RECOMMENDED SOLDERING PATTERN(unit:mm).



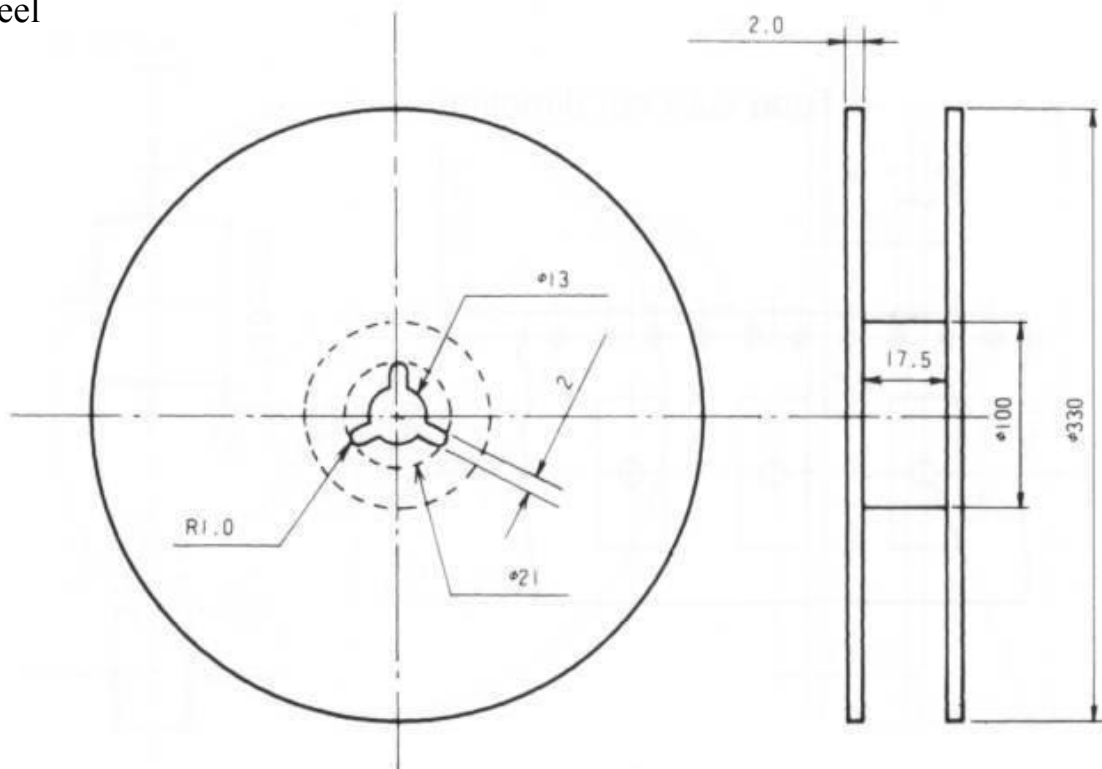
#### 4. MARKING



### 5. Tape



### 6. Reel

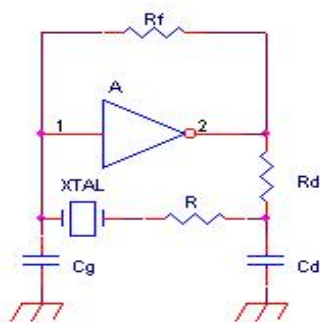


※ Packing Unit : 3000 / Reel

### [6] Notes

1. Max. two(s) times reflow is allowed. Once miss soldering is happen , hand work soldering by soldering iron is recommended.(350°C × within 5 sec.)
2. Patterning should be followed by our recommended one.
3. Applying excessive excitation force to the crystal resonator may cause deterioration damage.
4. Unless adequate negative resistance is allocated in the oscillation circuit, start up time of oscillation may be increased, or no oscillation may occur. In order to avoid this, please provide enough negative resistance in the circuit design.

How to check the negative resistance [-NR]



- (1) Connect the resistance (R) to the circuit in series with the crystal resonator.
- (2) Adjust R so that oscillation can start (or stop).
- (3) Measure R when oscillation just start (or stop) in above (2).
- (4) Get the negative resistance. [-R] = R + CI value
- (5) Recommended. [-R] > CI (Max.) × (5 to 10)

5. The shortest line patterning on board is recommendable. Too long line on board may cause of abnormal oscillation.
6. To avoid mull function, no pattern under or near to X'tal is allowed. Solder paste should be more than 150μm thickness.
7. This device must be stored at the normal temperature and humidity condition before mounting on a board.
8. Too much exciting shock or vibration may cause deterioration on damage. Depending on condition such as a shock in assembly machinery, the products may be damaged. Please check your condition in advance to maintain shock level to be smallest.
9. Depending on the conditions, ultrasonic cleaning cloud cause resonance damage of the internal crystal resonator, Since we are unable to determine the usage conditions (type of cleaning unit, power, time, conditions inside the bath, etc.) at our company, we cannot guarantee the safety of this unit when it is cleaned in an ultrasonic cleaner.
10. Ink marking is some kind of solvent may damage marking ink ; please take precautions when choosing solvent.
11. Please refer to packing specification regarding how to storage the products in the pack.