kHz Range Crystal unit MC-146

**SEIKO EPSON CORPORATION**

Product name MC-146 32.768000 kHz 7.0 +100.-100.

Product Number / Ordering code Q13MC14620005xx

Please refer to the 5.Packing information about xx (last 2 digits)

Complies with EU RoHS directive Reference weight Typ.

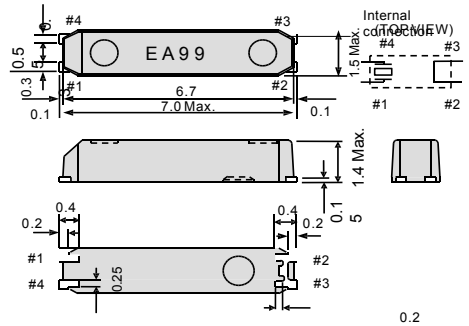
## 1.Absolute maximum ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions / Remarks |
|---|---|---|---|---|---|---|
| Storage temperature | T_stg | -55 | - | 125 | ºC | Storage as single product |
| Maximum drive level | GL | - | - | 1.0 | µW | |

## 2.Specificatoins(characteristics)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions / Remarks |
|---|---|---|---|---|---|---|
| Nominal frequency | f_nom | - | 32.768 | - | kHz | |
| Operating temperature | T_use | -40 | - | 85 | ºC | |
| Level of drive | DL | - | - | 1.0 | µW | |
| Frequency tolerance | f_tol | -100 | - | +100 | x $10^{-6}$ | +25ºC DL=0.1µW |
| Turnover temperature | Ti | 20 | 25 | 30 | ºC | |
| Parabolic coefficient | B | - | - | -0.04 | x $10^{-6}$/ºC$^2$ | |
| Load capacitance | CL | - | 7.0 | - | pF | |
| Motional resistance (ESR) | R1 | - | 45 | 65 | k Ω | |
| Motional capacitance | C1 | - | 1.9 | - | fF | |
| Shunt capacitance | C0 | - | 0.8 | - | pF | |
| Motional inductance | L1 | - | 11.7 | - | kH | |
| Frequency aging | f_age | -3 | - | 3 | x$10^{-6}$/yea | @+25ºC, First year |

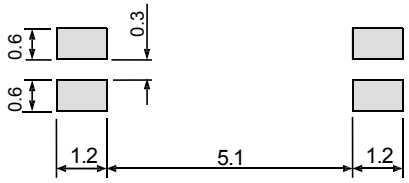
## 3.External dimensions (Unit: mm)




**Do not connect #2 and #3 to external device.**

**The metal case inside of the molding compound may be exposed on the top or bottom of this product. This purely cosmetic and does not have any effect on quality, reliability or electrical specs.**

## 4.Footprint(Recommended) (Unit: mm)




## 5.Packing information

[ 1 ]Product number last 2 digits code (xx) description The recommended code is "0X"

Q13MC14620005xx

| Code | Condition | Code | Condition |
|---|---|---|---|
| 01 | Any Q'ty vinyl bag(Tape cut) | 14 | 1000pcs / Reel |
| 11 | Any Q'ty / Reel | 15 | 2000pcs / Reel |
| 12 | 250pcs / Reel | 00 | 3000pcs / Reel |
| 13 | 500pcs / Reel | 0X | 9000pcs / Reel |

[ 2 ] Taping specification

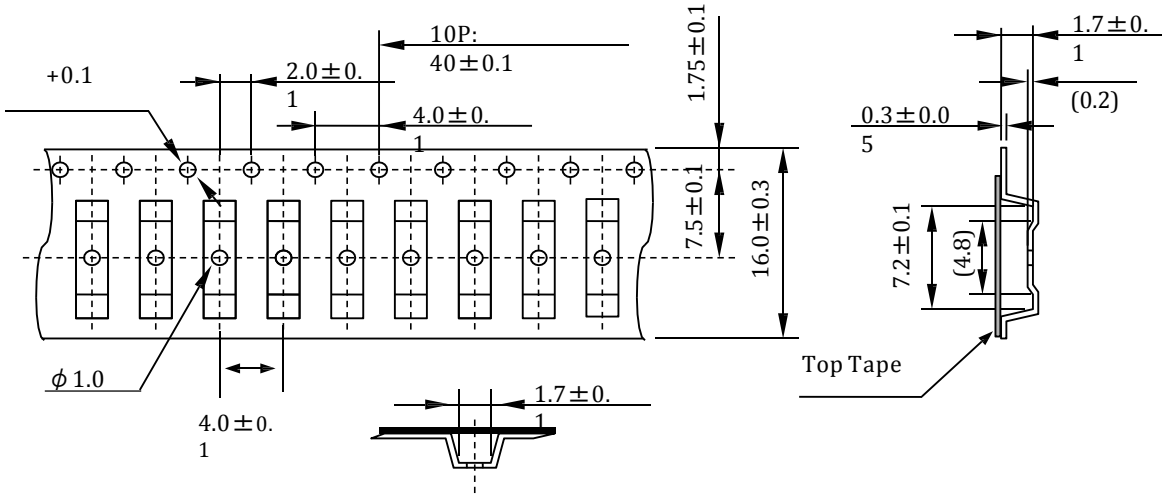
Subject to EIA-481 & IEC-60286

(1) Tape dimensions TE1604L

Material of the Carrier Tape :

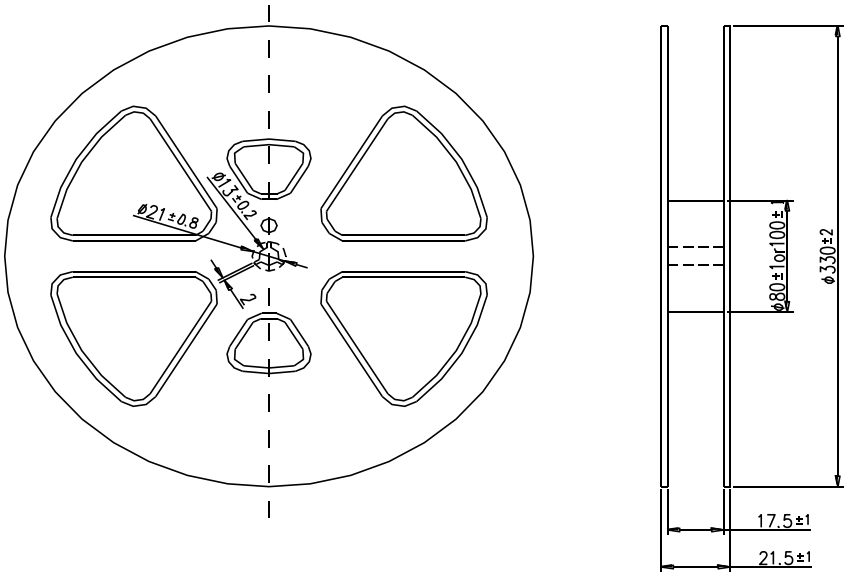
Material of the Top Tape : PET+PE

Unit: mm



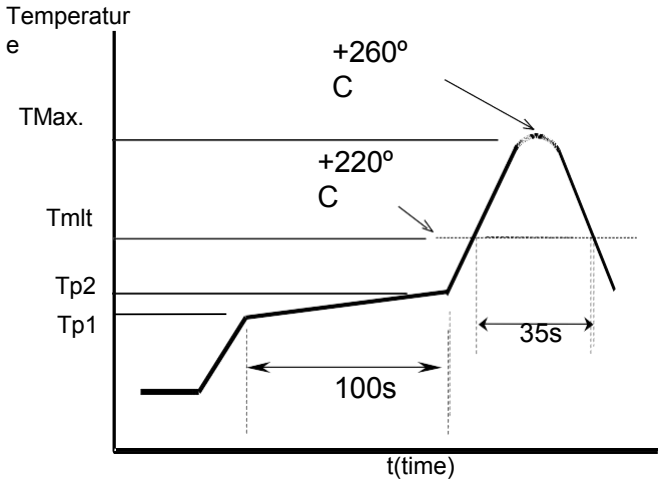

(2) Reel dimensions Material of the Reel : PS

Unit: mm



## Reflow profile

Pre Heating
Temperature Tp1 ~ Tp2 = + 170 °C
Heating Temperature
TMlt = + 220 °C
Peek Temperature
TMax. = + 260 °C
Point of measuring
In case of Solder ability Terminal.
In case of Resistance to soldering heat Surface.




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