kHz Range Crystal unit MC-146

SEIKO EPSON CORPORATION

Product name MC-146 32.768000 kHz 9.0 +20.0-20.0

Product Number / Ordering code Q13MC14610004xx

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

Complies with EU RoHS directive Reference weight Typ.

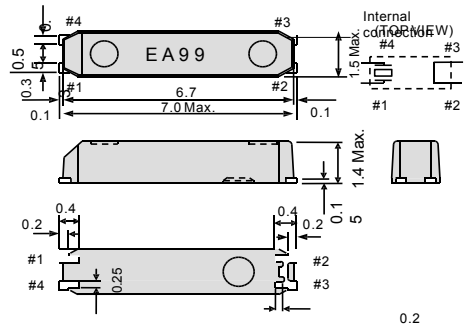
1.Absolute maximum ratings

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	-20.0	-	+20.0	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	-	9.0	-	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	x10^{-6}/yea	@+25ºC, First year

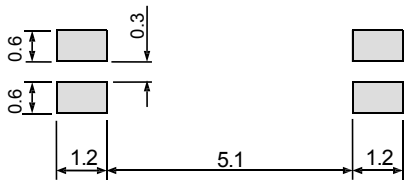
3.External dimensions (Unit: mm)



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"

Q13MC14610004xx

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

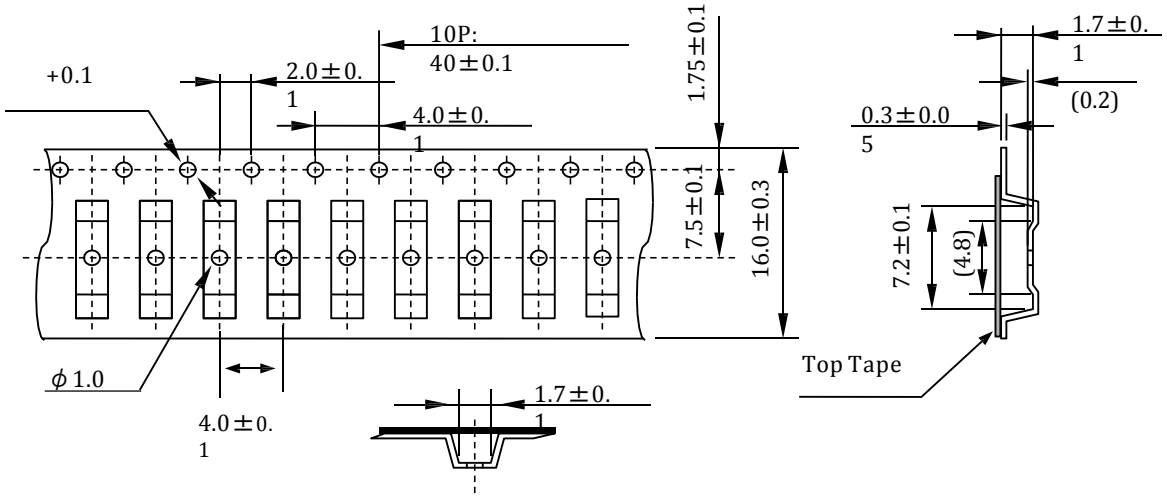
Subject to EIA-481 & IEC-60286

(1) Tape dimensions TE1604L

Material of the Carrier Tape :

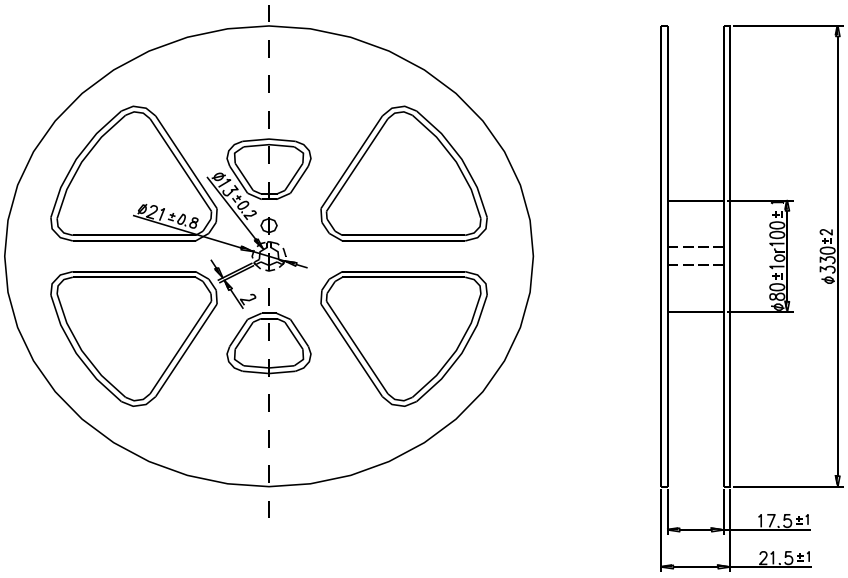
Material of the Top Tape : PET+PE

Unit: mm



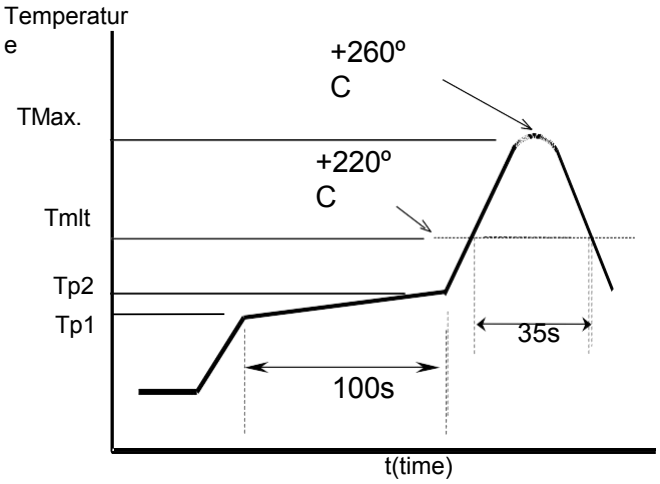
(2) Reel dimensions Material of the Reel : PS

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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