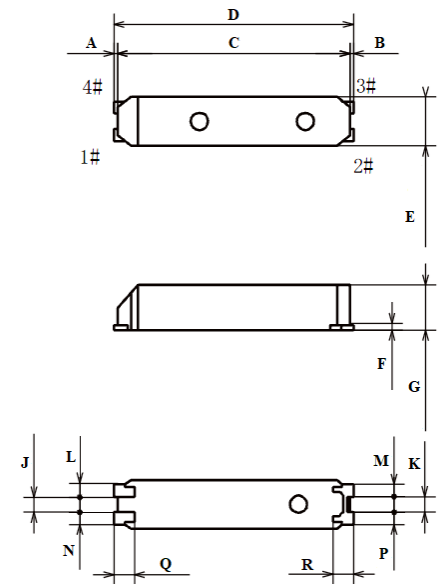


### Features

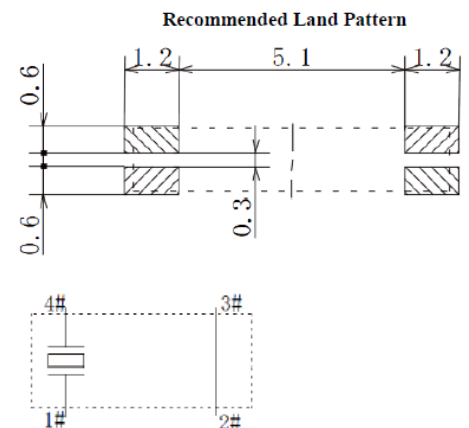
- SMD Tuning Fork Crystal Resonator
- Tolerance:  $\pm 20\text{ppm}$
- Operating Temperature  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

STANDARD SPECIFICATIONS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency	<b>32.768 kHz</b>
Operating Temperature	<b><math>-40^{\circ}\text{C}</math> to <math>+85^{\circ}\text{C}</math></b>
Turn Over Temperature	<b><math>+20^{\circ}\text{C}</math> to <math>+30^{\circ}\text{C}</math></b>
Storage Temperature	<b><math>-55^{\circ}\text{C}</math> to <math>+125^{\circ}\text{C}</math></b>
Frequency Tolerance @ $25^{\circ}\text{C}$	<b><math>\pm 20\text{PPM}</math>, see options</b>
Frequency Coefficient	<b><math>-0.035 \pm 0.01 \text{ PPM} / (\Delta^{\circ}\text{C})^2</math></b>
Equivalent Series Resistance (R1)	<b>65kOhms</b>
Load Capacitance (CL)	<b>12.5 pF, see options</b>
Drive Level	<b>1 <math>\mu\text{W}</math></b>
Aging@ $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ First year	<b><math>\pm 3\text{ppm}</math></b>
Insulation Resistance@ 100Vdc $\pm 15\text{V}$	<b>500 MOhms</b>
RoHS Compliant	<b>Yes</b>
Pb Free	<b>Yes</b>
Moisture Sensitivity Level	<b>1</b>

### DIMENSIONS / MECHANICAL SPECIFICATIONS



Dimension Table	
A	0.10
B	0.10
C	6.70
D	$6.9 \pm 0.1$
E	$1.4 \pm 0.1$
F	$0.15 \pm 0.03$
G	$1.4 \pm 0.1$
J	0.55
K	$0.65 \pm 0.1$
L	$0.3 \pm 0.1$
M	$0.3 \pm 0.1$
N	$0.3 \pm 0.1$
P	$0.3 \pm 0.1$
Q	$0.55 \pm 0.15$
R	$0.55 \pm 0.15$



Do not connect to external with #2 and #3.

Dimensions are in mm

### Notes

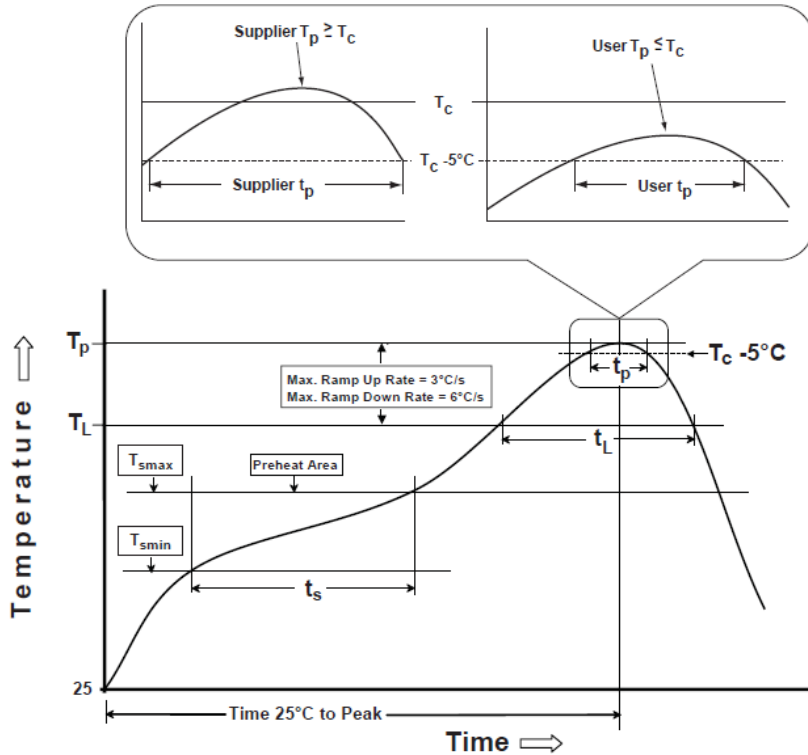
The part of the cylinder inside the resin mold may sometimes be exposed on the top or bottom of this crystal unit.

This aspect is purely cosmetic and does not have any effect on the quality, reliability, or electrical performance of the crystal unit.

## Part Numbering Guide

Available Options & Part Identification for SMD Crystal ELS13				
Sample PN: <u>ELS13-32.768kHz-7-4-T</u>				
ELS13	-32.768kHz	-7	-4	-T
<u>AEL Model</u>	<u>Frequency</u>	<u>Load Capacitance</u> Blank: 12.5 pF 7: 7pF	<u>Frequency Tolerance</u> Blank: ±20ppm 4: ±30ppm	<u>Values Added Options</u> Blank = Bulk T = 3,000 pcs

## Reflow Profile [JDEC J-STD-020]



**Table 1**

SnPb Eutectic Process Classification Temperatures ( $T_c$ )		
Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2**

Pb-Free Process Classification Temperatures ( $T_c$ )			
Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm - 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

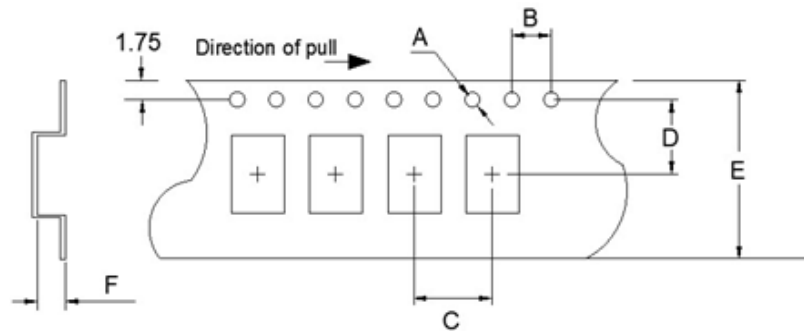
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum ( $T_{smin}$ )	100°C	150°C
Temperature maximum ( $T_{smax}$ )	150°C	200°C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60 - 120 sec.	60 - 120 sec.
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3°C/sec. max	3°C/sec. max
Liquidous temperature ( $T_L$ )	183°C	217°C
Time at liquidous ( $t_L$ )	60 - 150 sec.	60 - 150 sec.
Peak package body temperature ( $T_p$ )*	<b>see Table 1</b>	<b>see Table 2</b>
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20 sec.	30 sec.
Ramp-down rate ( $T_p$ to $T_{smax}$ )	6°C/sec. max	6°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max

\*Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

\*\*Tolerance for time at peak profile temperature ( $t_p$ ) is defined as supplier minimum and a user maximum.

### TAPE SPECIFICATIONS (mm)

A	B	C	D	E	F	REEL QTY
Ø1.5	4.0	4.0	7.5	16.0	1.6	3,000



### REEL SPECIFICATIONS (mm)

G	H	I	J	K	L	M
2.0	Ø13	Ø21	Ø60	Ø178	16.4	1.2

