

The ECS-31 Series features the same characteristics as only tuning fork crystals offer. Because of their miniature size they are ideal for portable and communication equipment applications.

FEATURES

- Miniature size
- Cost effective
- Long term stability
- Excellent shock and vibration characteristics

PART NUMBERING GUIDE *"EXAMPLE"*

| MANUFACTURER | FREQUENCY | LOAD CAPACITANCE | PACKAGE TYPE* |
|--------------|-----------|------------------|---------------|
| ECS | .400 | 12.5 | 8 |
| ECS | .400 | 12.5 | 13 |
| ECS | 2.0 | 12.5 | 14 |

* Package type examples (8=3x8, 13=2x6, 14=1x5)

OPERATING CONDITIONS/ELECTRICAL CHARACTERISTICS

| PARAMETERS | | 3X8 | 2X6 | 1X5 | CONDITIONS |
|------------------------------|----------------|---|----------------|------------------|---|
| FREQUENCY RANGE | f_0 | 20KHz ~ 40KHz | 30KHz ~ 150KHz | 200KHz | KHz |
| FREQUENCY TOLERANCE | $\Delta f/f_0$ | ± 30 PPM | ± 30 PPM | $\pm 10,000$ PPM | @ +25°C |
| FREQUENCY VS. TEMP. CHARAC. | $\Delta f/f_0$ | See Drawing | | | -10°C ~ +60°C |
| TURNOVER TEMPERATURE | T_m | +25°C typ. | | | |
| TEMPERATURE COEFFICIENT | β | -0.034 PPM/°C ² typ. | | | Varies depending on frequency |
| OPERATING TEMP. RANGE | T_{OPR} | -10 ~ +60 | | | °C |
| STORAGE TEMP. RANGE | T_{STG} | -40 ~ +85 | | | °C |
| EQUIVALENT SERIES RESISTANCE | R_1 | 30 ~ 50 (max.) | | 10 (max.) | K Ω |
| LOAD CAPACITANCE | C_L | 12.5pF typ. (Customer Specified) | | | pF |
| MOTIONAL CAPACITANCE | C_1 | 1 ~ 4fF typ. | | | fF |
| SHUNT CAPACITANCE | C_0 | 0.8 ~ 1.7pF typ. | | | pF |
| CAPACITANCE RATIO | τ | 425 ~ 800 typ. | | | |
| DRIVE LEVEL | DL | 1 μ W max. | | | μ W |
| INSULATION RESISTANCE | IR | 500 M Ω min. | | | DC 100V \pm 15 |
| AGING (FIRST YEAR) | $\Delta f/f_0$ | ± 5 PPM max. | | | +25°C \pm 3°C |
| SHOCK RESISTANCE | | ± 5 PPM max. Drop test of 3 times on a hard board from 75 cm height or shock test of 3000G x 0.3ms x 1/2 sin wave x 3 directions | | | Conditions will vary depending on frequency |

PACKAGE DIMENSIONS (mm)

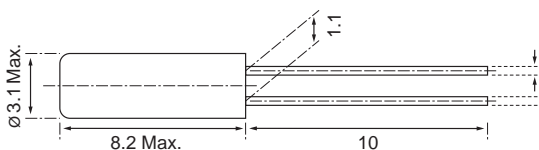


Figure 1) ECS-31-8

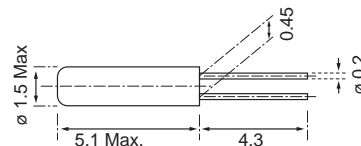


Figure 3) ECS-31-14

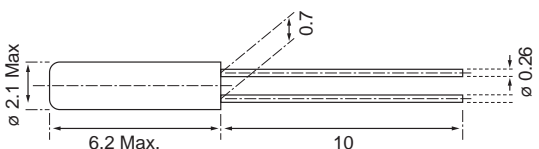
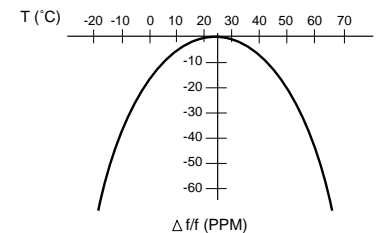


Figure 2) ECS-31-13

PARABOLIC TEMPERATURE CURVE



To determine frequency stability, use parabolic curvature. For example: What is the stability at 45°C?

- 1) Change in T (°C) = 45 - 25 = 20°C
- 2) Change in frequency = $-0.04 \text{ PPM} \times (\Delta T)^2$
 $= -0.04 \text{ PPM} \times (20)^2$
 $= -16.0 \text{ PPM}$