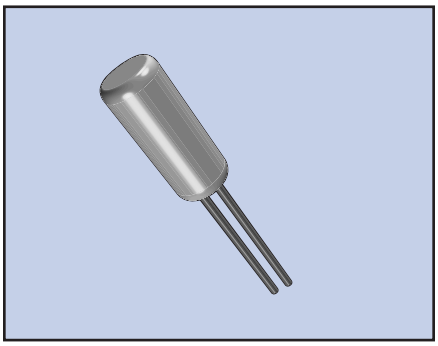
ECS-31 SERIES LOW FREQUENCY QUARTZ CRYSTALS



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	±10,000 PPM	@ +25˚C
FREQUENCY VS. TEMP. CHARAC.	$\Delta f/f_0$	See Drawing			-10˚C ~ +60˚C
TURNOVER TEMPERATURE	Tm	+25˚C typ.			
TEMPERATURE COEFFICIENT	ß	-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.)	KΩ
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	1µW max.			µW
INSULATION RESISTANCE	IR	500 MΩ min.			DC 100V±15
AGING (FIRST YEAR)	$\Delta f/f_0$	±5 PPM max.			+25˚C ± 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)

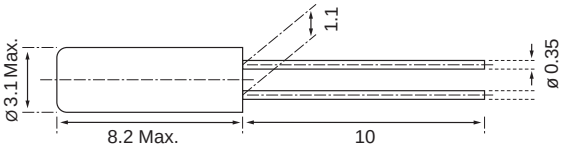


Figure 1) ECS-31-8

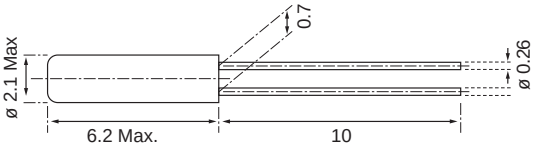


Figure 2) ECS-31-13

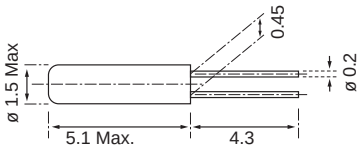
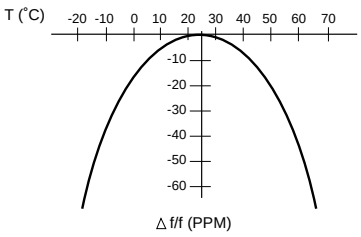


Figure 3) ECS-31-14

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 PPM x (ΔT)^2
= -0.04 PPM x (20)^2
= -16.0 PPM

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