ECS-3X8X, 2X6X, 1X5X

32.768 KHz Tuning Fork Crystal

RoHS COMPLIANT

ECS tuning fork type crystals are used as a clock source in communication equipment, measuring instruments, microprocessors and other time management applications. Their low power consumption makes these crystals ideal for portable equipment.

ECS-3X8X, 2X6X, 1X5X



- Cost Effective
- Tight Tolerance
- Long Term Stability
- Excellent Resistance and Environmental Characteristics
- Pb Free/RoHS Compliant

OPERATING CONDITIONS / ELECTRICAL CHARACTERISTICS

PARAMETERS		3X8X	2X6X	1X5X	UNITS
Frequency	F_O	32.768	32.768	32.768	KHz
Frequency Tolerance	Δf/fo	±20	±20	± 20	ppm
Load Capacitance	C_L	12.5	12.5	8.0	pF
Drive Level (max)	D_L	1	1	1	µW
Resistance At Series Resonance	R_1	35(max)	35(max)	40(max)	KΩ
Q-Factor	Q	90,000(typ.)	70,000(typ.)	80,000(typ.)	
Turnover Temperature	T_M	+25 ±5	+25 ±5	+25 ±5	°C
Temperature Coefficient	ß	-0.040ppm/°C^2 max.	-0.040ppm/°C^2 max.	-0.040ppm/°C^2 max.	PPM/ΔC°
Shunt Capacitance	C_O	1.60 (typ.)	1.35 (typ.)	1.00 (typ.)	pF
Capacitance Ratio		460 (typ.)	450 (typ.)	400 (typ.)	
Operating Temp	Topr	-10 ~ +60			°C
Storage Temperature	Tstg	-40 ~ +85			°C
Shock Resistance		Drop 3 times on hard wooden board from height of 75cm / ±5 ppm max.			PPM
Insulation Resistance	IR	500 MΩ min./DC100V			MΩ
Aging (First Year)	Δf/fo	±3 ppm max. @ +25°C ±3°C			ppm
Motional Capacitance	C_1	0.0035(typ.)	0.0030(typ.)	0.0025(typ.)	pF

DIMENSIONS (mm)

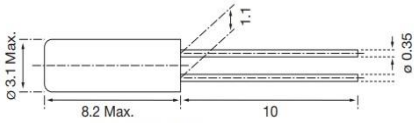


Figure 1) ECS-3X8X

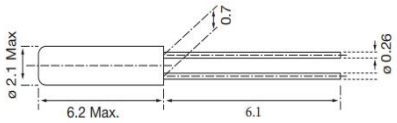


Figure 2) ECS-2X6X

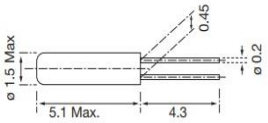
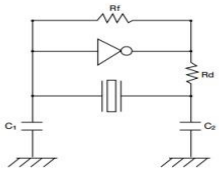


Figure 3) ECS-1X5X

RECOMMENDED OSCILLATION CIRCUIT

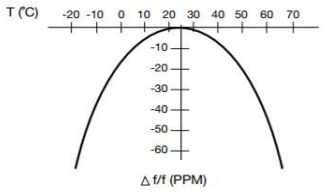


ELECTRICAL CHARACTERISTICS

IC: TC 4069P
Rf: 10MΩ
Rd: 330KΩ (As required)
C_1 = 22pF, C_2 = 22pF
V_{DD} = 3.0V

In this circuit, low drive level with a maximum of 1µW is recommended. If excessive drive is applied, irregular oscillation or quartz element fractures may occur.

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 $(\Delta T)^2$
= -0.04 PPM x $(20)^2$
= -16.0 PPM

PART NUMBERING GUIDE:

Manufacturer		Frequency		Load Capacitance		Package Type*
ECS	-	.327	-	12.5	-	8X
ECS	-	.327	-	12.5	-	13X
ECS	-	.327	-	12.5	-	14X

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

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SOLDER PROFILE
Peak solder Temp +260°C Max 10 sec Max.
2 Cycles Max.
MSL 1, Lead Finish Sn/Cu Matte

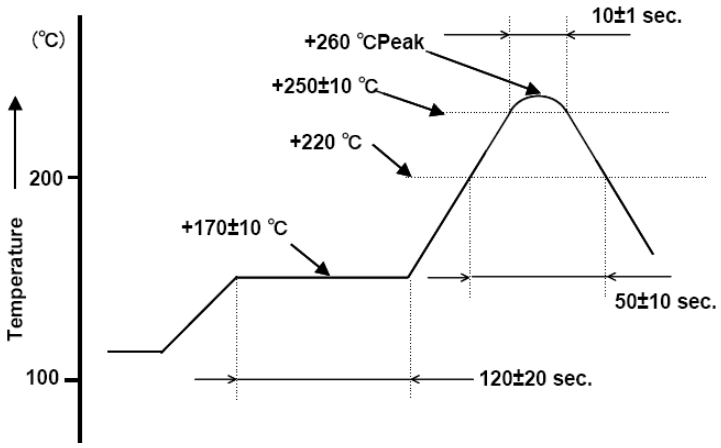


Figure 1) *Suggested Solder Profile*