ECS-3X8, 2X6, 1X5 32.768 KHz TUNING FORK CRYSTALS

ECS INC. INTERNATIONAL ®

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.

FEATURES

- Cost effective
- Tight tolerance
- Long term stability
- Excellent resistance and environmental characteristics

PART NUMBERING GUIDE *"EXAMPLE"*

		FREQUENCY		LOAD CAPACITANCE		PACKAGE TYPE*
ECS	–	.327	–	12.5	–	8
ECS	–	.327	–	12.5	–	13
ECS	–	.327	–	8	–	14

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

OPERATING CONDITIONS/ELECTRICAL CHARACTERISTICS

PARAMETERS		ECS-3X8	ECS-2X6	ECS-1X5	UNITS
NOMINAL FREQUENCY	F_O	32.768	32.768	32.768	KHz
FREQUENCY TOLERANCE	$\Delta f/fo$	±20	±20	±20	PPM
LOAD CAPACITANCE (typ.)	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. RANGE	T_{OPR}	-10~+60			˚C
STORAGE TEMP. RANGE	T_{STG}	-40~+85			˚C
SHOCK RESISTANCE		Drop test 3 times on hard wooden board from height of 75cm / ±5 PPM max.			PPM
INSULATION RESISTANCE	IR	500MΩ min./DC100V			MΩ
AGING (FIRST YEAR)	$\Delta f/fo$	±3 PPM max. @ +25˚C ±3˚C			PPM
MOTIONAL CAPACITANCE	C_1	0.0035 (typ.)	0.0030 (typ.)	0.0025 (typ.)	pF

Note: Contact factory for optional load capacitance.
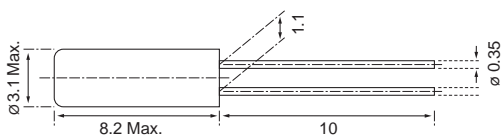
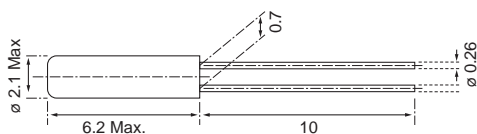## PACKAGE DIMENSIONS (mm)

Figure 1) ECS-3X8

Ø 3.1 Max. | 8.2 Max. | 10 | 1.1 | Ø 0.35

Figure 2) ECS-2X6

Ø 2.1 Max | 6.2 Max. | 10 | 0.7 | Ø 0.26
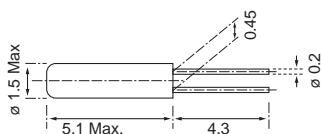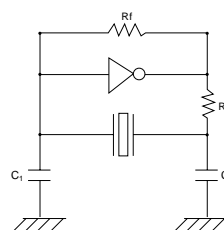

Figure 3) ECS-1X5

Ø 1.5 Max | 5.1 Max. | 4.3 | 0.45 | Ø 0.2
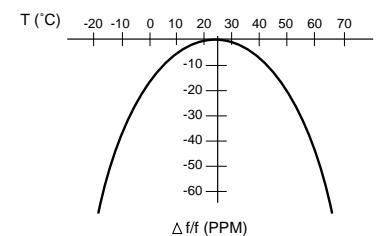
RECOMMENDED OSCILLATION CIRCUIT

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

T (˚C)   -20 -10 0 10 20 30 40 50 60 70

Δ f/f (PPM)

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

ECS, INC. INTERNATIONAL 1105 S. RIDGEVIEW, OLATHE, KS 66062 • 913-782-7787 • 800-237-1041 • FAX 913-782-6991 • WWW.ECSXTAL.COM

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