Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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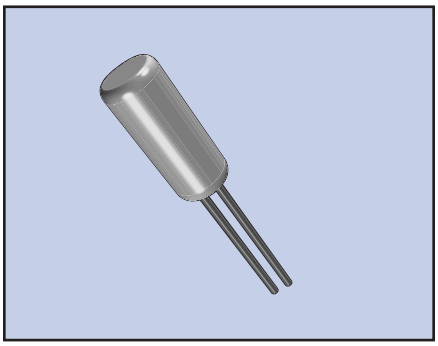
ECS-3X8, 2X6, 1X5 32.768 KHz TUNING FORK CRYSTALS



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	Fo	32.768	32.768	32.768	KHz
FREQUENCY TOLERANCE	Δf/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	β	-0.040ppm/˚C² max.	-0.040ppm/˚C² max.	-0.040ppm/˚C² max.	PPM/(Δ˚C)
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)	Δf/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)

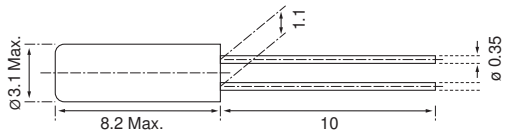


Figure 1) ECS-3X8

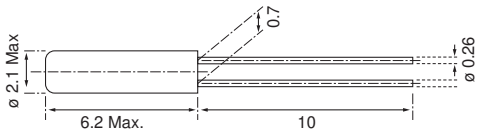


Figure 2) ECS-2X6

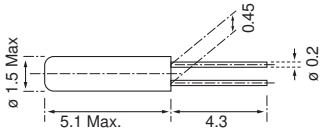
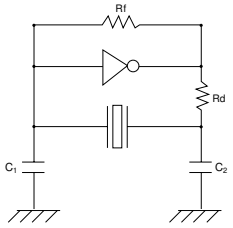


Figure 3) ECS-1X5

RECOMMENDED OSCILLATION CIRCUIT

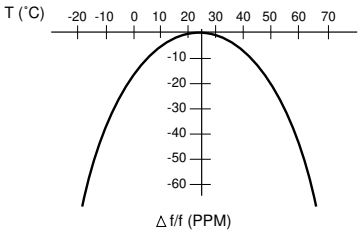


ELECTRICAL CHARACTERISTICS

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

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