



Model TC70

HCMOS Clock @ 32.768kHz

Features

- Low Power Consumption, 200µA Maximum
- Ceramic Surface Mount Package
- Fundamental Crystal Design
- Frequency 32.768kHz
- +1.8V, +2.5V or +3.3V Operating Voltage
- Operating Temperature Range to -40°C to +85°C
- Output Enable Standard
- Tape and Reel Packaging, EIA-481



Part Dimensions:
7.0 x 5.0 x 1.4mm • 160.7885mg

Applications

- Real Time Clock Reference
- IoT
- Portable Electronics
- Smart Metering
- Wireless Communications
- Telematics
- Data Loggers
- Timing Synchronization
- Battery Powered Applications

Description

CTS Model TC70 is a low cost, small size, HCMOS Clock Oscillator [XO] operating at 32.768kHz. Employing IC technology that provides low current consumption, TC70 provides a Real Time Clock reference with excellent stability and low phase jitter performance.

Ordering Information

Model	Supply Voltage	Frequency Stability	Temperature Range	Frequency Code																																
TC70	L	3	I	32K7680																																
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Notes:

1] Consult factory for availability of 6I Stability/Temperature combination.

**Not all performance combinations and frequencies may be available.
Contact your local CTS Representative or CTS Customer Service for availability.**

This product is specified for use only in standard commercial applications. Supplier disclaims all express and implied warranties and liability in connection with any use of this product in any non-commercial applications or in any application that may expose the product to conditions that are outside of the tolerances provided in its specification.



Electrical Specifications

Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Supply Voltage	V _{CC}	-	-0.5	-	5.0	V
			1.710	1.8	1.890	
Supply Voltage	V _{CC}	±5%	2.375	2.5	2.625	V
			3.135	3.3	3.465	
Supply Current	I _{CC}	No Load	-	-	200	μA
Operating Temperature	T _A	-	-20	-	+70	°C
			-30	+25	+85	
Storage Temperature	T _{STG}	-	-40	-	+85	°C
			-55	-	+125	

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f ₀	-		32.768		kHz
Frequency Stability [Note 1]	Δf/f ₀	-		20, 25, 30 or 50		±ppm
Aging	Δf/f ₂₅	First Year @ +25°C, nominal V _{CC}	-3	-	3	ppm

1.] Inclusive of initial tolerance at time of shipment, changes in supply voltage, load, temperature and 1st year aging.

Output Parameters

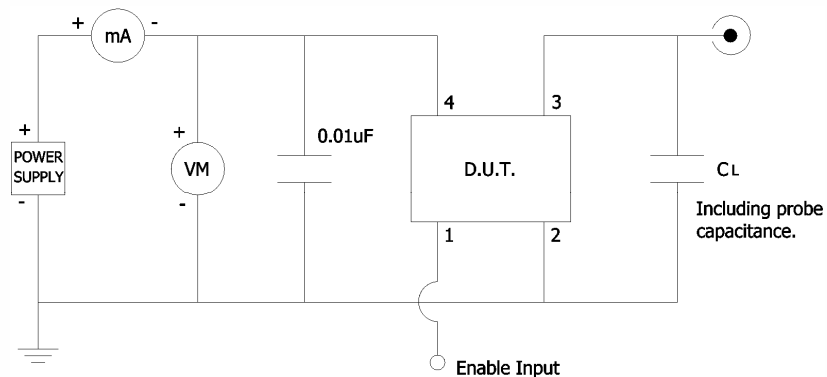
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Type	-	-		HCMOS		-
Output Load	C _L	-	-	-	15	pF
Output Voltage Levels	V _{OH}	CMOS Load	0.9V _{CC}	-	-	V
	V _{OL}		-	-	0.1V _{CC}	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Rise and Fall Time	T _R , T _F	@ 10%/90% Levels, C _L = 15pF	-	-	30	ns
Start Up Time	T _S	Application of V _{CC}	-	-	10	ms
Enable Function		Standby				
Enable Input Voltage	V _{IH}	Pin 1 Logic '1', Output Enabled	0.7V _{CC}	-	-	V
Disable Input Voltage	V _{IL}	Pin 1 Logic '0', Output Disabled	-	-	0.3V _{CC}	V
Disable Current	I _{IL}	Pin 1 Logic '0', Output Disabled	-	-	3	μA
Enable Time	T _{PLZ}	Pin 1 Logic '1', Output Enabled	-	-	10	ms

Enable Truth Table

Pin 1	Pin 3
Logic '1'	Output Enabled
Open	Output Enabled
Logic '0'	Output Disabled, High Impedance

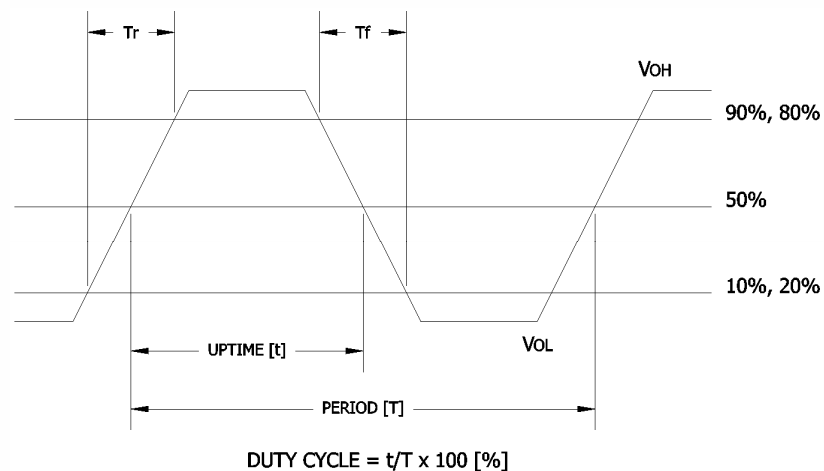
Electrical Specifications

Test Circuit
HCMOS



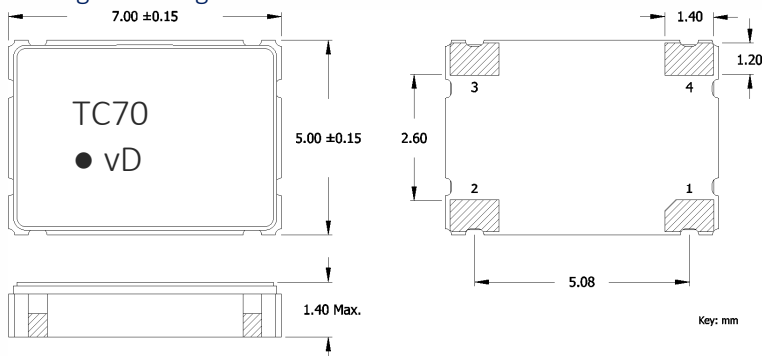
Output Waveform

HCMOS



Mechanical Specifications

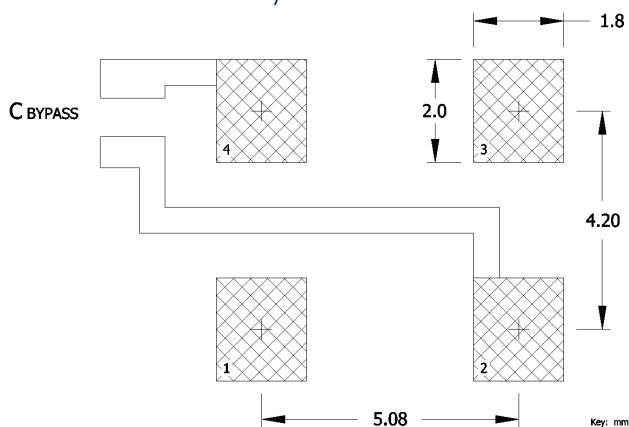
Package Drawing



Marking Information

1. TC70 – CTS Model.
2. v – Voltage Code
[L = 3.3V, N = 2.5V, M = 1.8V, V = 1.5V]
3. D – Date Code. See Table I for codes.

Recommended Pad Layout



Notes

1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

Pin Assignments

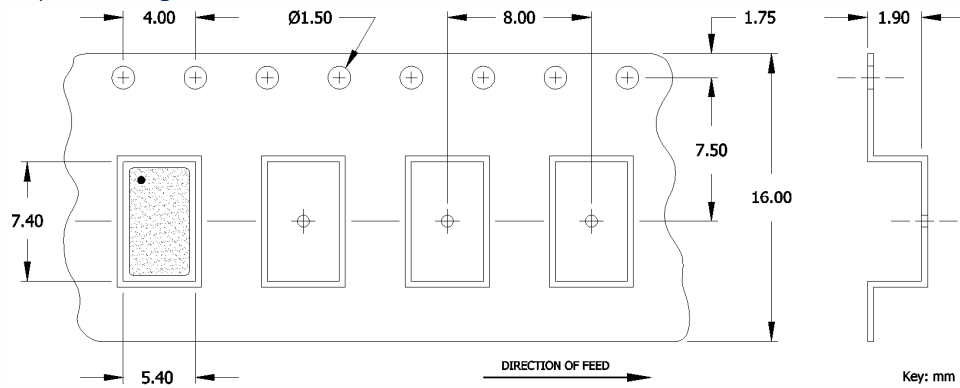
Pin	Symbol	Function
1	EOH	Enable
2	GND	Circuit & Package Ground
3	Output	RF Output
4	V _{CC}	Supply Voltage

Table I - Date Code, Beginning year 2021

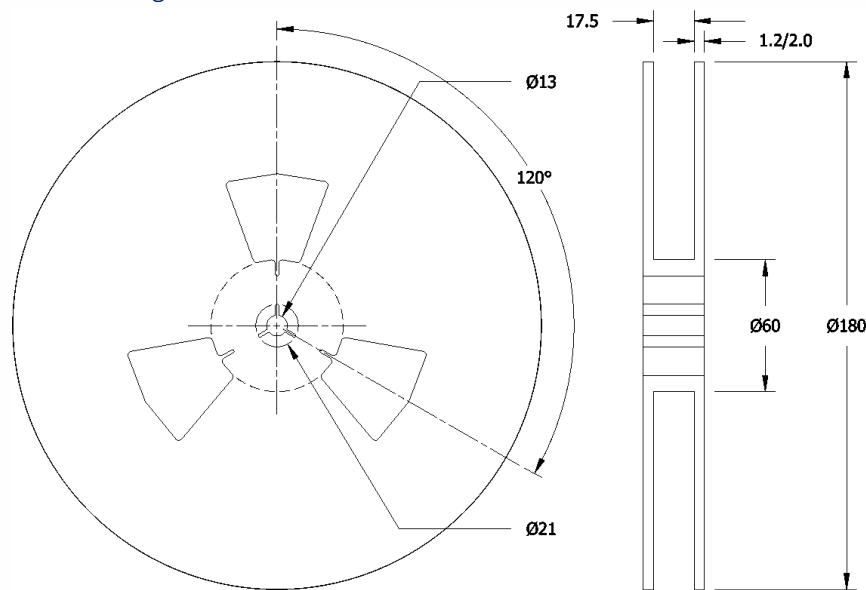
MONTH					YEAR											
					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2025	2029	2033	2037	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	2030	2034	2038	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	2031	2035	2039	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	2032	2036	2040	n	p	q	r	s	t	u	v	w	x	y	z

Packaging - Tape and Reel

Tape Drawing



Reel Drawing



Notes

1. Device quantity is 1k pieces minimum to 3k pieces maximum per 180mm reel.
2. Complete CTS part number, frequency value and date code information must appear on reel and carton labels.