

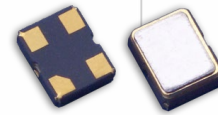


# Model 620

## HCMOS Clock Oscillator

### Features

- Ceramic Surface Mount Package
- Operating Temperature Range to -40°C to +105°C
- Fundamental and 3<sup>rd</sup> Overtone Crystal Designs
- Frequency Range 1.0 - 110MHz \*
- +1.8V, +2.5V and +3.3V Operation
- Output Enable Standard
- Tape and Reel Packaging, EIA-481



Part Dimensions:  
2.0 × 1.6 × 0.8mm • 8.29998mg

### Standard Frequencies

\* See Page 6 for common frequencies.  
Check with factory for availability of frequencies not listed.

### Applications

- Internet of Things [IoT, IIoT]
- Microcontrollers and FPGAs
- Wireless Communication
- Networking Equipment
- Data Communications
- Computers and Peripherals
- Ethernet/GbE/SyncE
- Portable Devices
- Test and Measurement

### Description

CTS Model 620 is a low cost, ultra-low voltage clock oscillator supporting HCMOS output. Employing the latest IC technology, M620 has excellent stability and low phase jitter performance.

### Ordering Information

Model	Supply Voltage	Frequency Stability	Temperature Range	Frequency Code [MHz]	Packaging
620	L	3	C	XXXMXXXXX	R
	<div><div>Code</div><div>Voltage</div></div>		<div><div>Code</div><div>Temp. Range</div></div>		<div><div>Code</div><div>Packing</div></div>
	M +1.8Vdc		C -20°C to +70°C		R 3k pcs./reel
	N +2.5Vdc		I -40°C to +85°C		
	L +3.3Vdc		G -40°C to +105°C <sup>2</sup>		
	<div><div>Code</div><div>Stability</div></div>	<div><div>Code</div><div>Stability</div></div>		<div><div>Code</div><div>Frequency</div></div>	
	6 ±20ppm <sup>1</sup>	4 ±30ppm			
	5 ±25ppm	3 ±50ppm		Product Frequency Code <sup>3</sup>	

#### Notes:

- 1] Consult factory for availability of 6I Stability/Temperature combination.
- 2] Available with stability codes 4 and 3.
- 3] Frequency is recorded with 3 leading digits before and 5 significant digits after the "M" [including zeroes].  
[Ex. 3.579545MHz = 003M57954; 14.31818MHz = 014M31818; 25MHz = 025M00000; 125MHz = 125M00000]

**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 <sub>CC</sub>	-	-0.5	-	4.0	V
Supply Voltage	V <sub>CC</sub>	±5%	1.710	1.80	1.890	V
			2.375	2.50	2.665	
			3.135	3.30	3.465	
Supply Current	I <sub>CC</sub>	Typical @ Nominal V <sub>CC</sub> , C <sub>L</sub> = 15 pF, T <sub>A</sub> = +25°C				
		@ +1.8V, 1.0MHz to <50MHz	-	-	7	mA
		@ +1.8V, 50MHz to 110MHz	-	-	15	
		@ +2.5V, 1.0MHz to <50MHz	-	-	10	
		@ +2.5V, 50MHz to 110MHz	-	-	15	
		@ +3.3V, 1.0MHz to <50MHz	-	-	15	
		@ +3.3V, 50MHz to 110MHz	-	-	20	
Output Load	C <sub>L</sub>	-	-	-	15	pF
Storage Temperature	T <sub>STG</sub>	-	-20	-	+70	°C
			-40	-	+85	
			-40	-	+105	
			-55	-	+125	

### Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	$f_o$	-		1.0 - 110		MHz
Frequency Stability [Note 1]	$\Delta f/f_o$	-		20, 25, 30, or 50		$\pm\text{ppm}$
Aging	$\Delta f/f_{25}$	First Year @ $+25^\circ\text{C}$ , 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 Voltage Levels	$V_{OH}$	Logic '1' Level, CMOS Load	$0.9V_{CC}$	-	-	V
	$V_{OL}$	Logic '0' Level, CMOS Load	-	-	$0.1V_{CC}$	
Output Current Levels	$I_{OH}$	$V_{OH} = 90\%V_{CC}$ [+1.8V, +2.5V, +3.3V]	-	-	-4, -4, -8	mA
	$I_{OL}$	$V_{OL} = 10\%V_{CC}$ [+1.8V, +2.5V, +3.3V]	-	-	+4, +4, +8	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Rise and Fall Time [Note 2]	$T_R, T_F$	@ 10%/90% Levels, Nominal $V_{CC}$ , $C_L = 15$ pF				ns
		@ +1.8V, 1.0MHz to <50MHz	-	-	6	
		@ +1.8V, 50MHz to 110MHz	-	-	3	
		@ +2.5V, 1.0MHz to <50MHz	-	-	6	
		@ +2.5V, 50MHz to 110MHz	-	-	3	
		@ +3.3V, 1.0MHz to <50MHz	-	-	5	
		@ +3.3V, 50MHz to 110MHz	-	-	3	
Start Up Time	$T_S$	Application of $V_{CC}$	-	2	5	ms

2.] Parameters are worst case and account for comprehensive range of product specification. Performance may vary by application and must be validated by end user.

## Electrical Specifications

### Output Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
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 Standby	-	-	$0.3V_{CC}$	V
Standby Current	$I_{STB}$	Pin 1 Logic '0', Output Standby	-	-	15	$\mu A$
Enable Time	$T_{PLZ}$	Pin 1 Logic '1'	-	-	5	ms
Phase Jitter, RMS [Note 3]	$t_{jrms}$	Bandwidth 12kHz - 20MHz	-	0.5	<1.0	ps

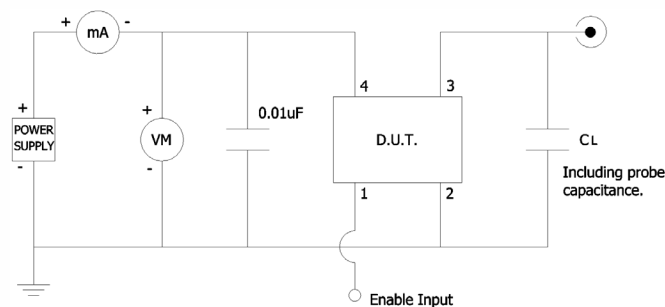
3.] For frequencies 40MHz or less, the measurement Bandwidth is 12kHz - 5MHz.

### Enable Truth Table

Pin 1	Pin 4
Logic '1'	Output Enabled
Open	Output Enabled
Logic '0'	Output Disabled, High Impedance

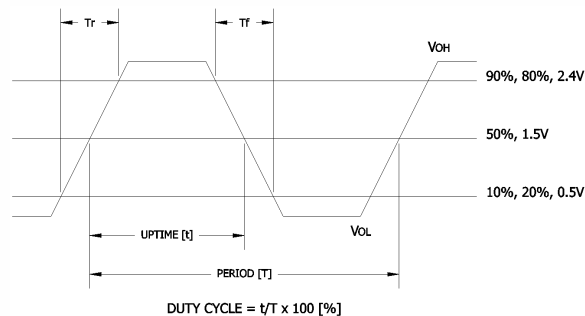
### Test Circuit

HCMOS



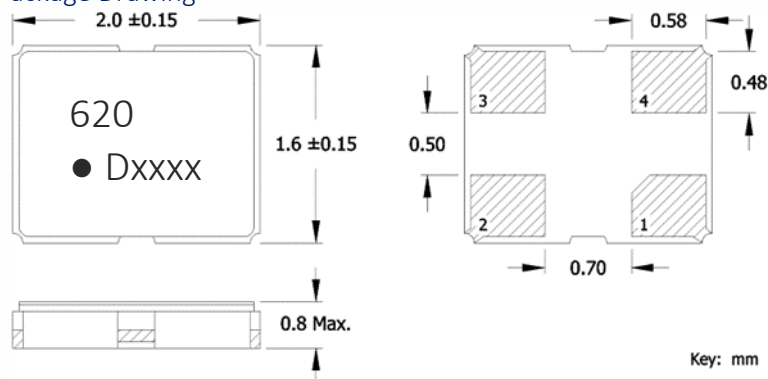
### Output Waveform

HCMOS



## Mechanical Specifications

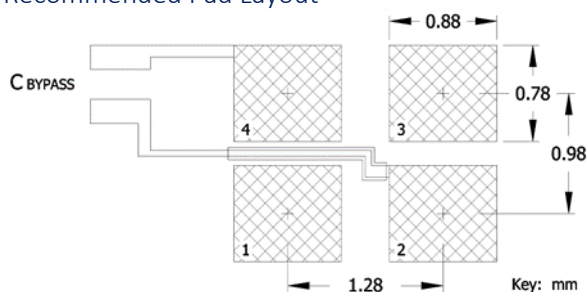
### Package Drawing



### Marking Information

1. 620 – CTS Model.
2. D - Date Code. See Table I for codes.
3. ● - Pin 1 indicator
4. xxxx – Frequency Code.  
3-digits, frequencies below 100MHz  
4-digits, frequencies 100MHz or greater  
[See document 016-1454-0, Frequency Code Tables.]

### 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

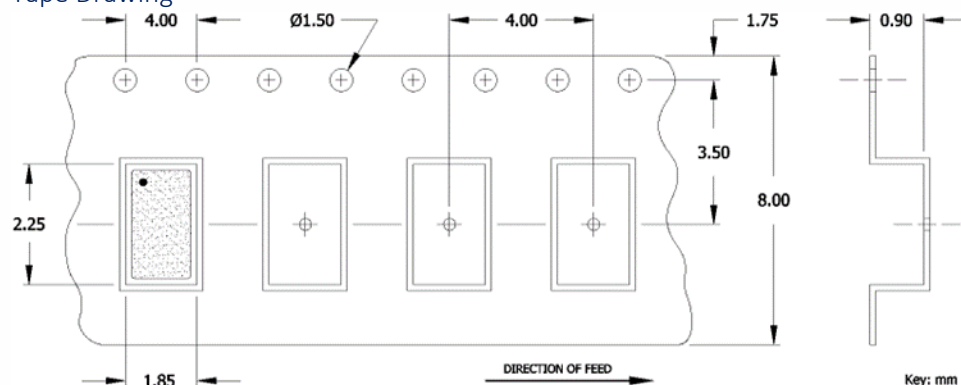
Pin	Symbol	Function
1	EOH	Enable
2	GND	Circuit & Package Ground
3	Output	RF Output
4	V <sub>CC</sub>	Supply Voltage

Table I - Date Code, Beginning year 2021

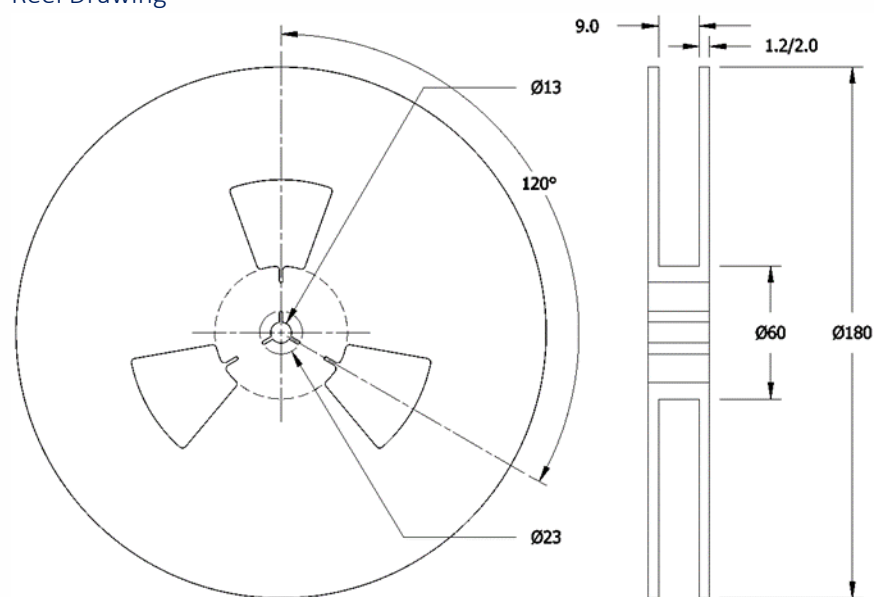
MONTH					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
YEAR																
2021	2025	2029	2033	2037	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	2030	2034	2038	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	2031	2035	2039	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	2032	2036	2040	n	p	q	r	s	t	u	v	w	x	y	z

## Packaging - Tape and Reel

Tape Drawing



Reel Drawing



### Notes

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



## Addendum

### Common Frequencies – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
4.000000	040	24.000000	240	40.000000	400		
8.000000	080	24.576000	24C	48.000000	480		
10.000000	100	25.000000	250	50.000000	500		
12.000000	120	26.000000	260	60.000000	600		
12.288000	122	27.000000	270	80.000000	800		
14.318180	143	30.000000	300	100.000000	1000		
14.745600	147	32.000000	320	110.000000	1100		
16.000000	160	33.333000	33E				
20.000000	200	37.400000	374				
22.118400	221	38.400000	384				