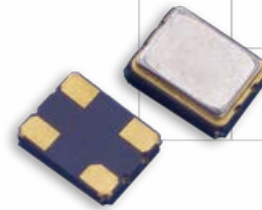


Model 632

HCMOS Clock Oscillator

Features

- Ceramic Surface Mount Package
- Operating Temperature Range to -40°C to +85°C
- Fundamental and 3rd Overtone Crystal Designs
- Frequency Range 1.0 – 125MHz
- +1.8V, +2.5V, +2.8V, +3.3V and +5.0V Operation
- Output Enable Standard
- Tape and Reel Packaging, EIA-418



Part Dimensions:
3.2 × 2.5 × 1.0mm • 30.803mg

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 632 is a low cost, ultra-low voltage clock oscillator supporting HCMOS output. Employing the latest IC technology, M632 has excellent stability and low phase jitter performance.

Ordering Information

Model	Supply Voltage	Frequency Stability	Temperature Range	Frequency Code [MHz]																				
632	L	3	C	XXXMXXXXX																				
	<table border="1"> <thead> <tr> <th>Code</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>+1.8Vdc</td> </tr> <tr> <td>N</td> <td>+2.5Vdc</td> </tr> <tr> <td>T</td> <td>+2.8Vdc</td> </tr> <tr> <td>L</td> <td>+3.3Vdc</td> </tr> <tr> <td>S</td> <td>+5.0Vdc</td> </tr> </tbody> </table>	Code	Voltage	M	+1.8Vdc	N	+2.5Vdc	T	+2.8Vdc	L	+3.3Vdc	S	+5.0Vdc		<table border="1"> <thead> <tr> <th>Code</th> <th>Temp. Range</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>-20°C to +70°C</td> </tr> <tr> <td>D</td> <td>-30°C to +85°C</td> </tr> <tr> <td>I</td> <td>-40°C to +85°C</td> </tr> </tbody> </table>	Code	Temp. Range	C	-20°C to +70°C	D	-30°C to +85°C	I	-40°C to +85°C	
Code	Voltage																							
M	+1.8Vdc																							
N	+2.5Vdc																							
T	+2.8Vdc																							
L	+3.3Vdc																							
S	+5.0Vdc																							
Code	Temp. Range																							
C	-20°C to +70°C																							
D	-30°C to +85°C																							
I	-40°C to +85°C																							
		<table border="1"> <thead> <tr> <th>Code</th> <th>Stability</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>±20ppm¹</td> </tr> <tr> <td>5</td> <td>±25ppm</td> </tr> <tr> <td>3</td> <td>±50ppm</td> </tr> </tbody> </table>	Code	Stability	6	±20ppm ¹	5	±25ppm	3	±50ppm	<table border="1"> <thead> <tr> <th>Code</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td colspan="2">Product Frequency Code²</td> </tr> </tbody> </table>	Code	Frequency	Product Frequency Code ²										
Code	Stability																							
6	±20ppm ¹																							
5	±25ppm																							
3	±50ppm																							
Code	Frequency																							
Product Frequency Code ²																								

Notes:

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

**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	-	7.0	V	
Supply Voltage	V_{CC}	$\pm 10\%$	1.62	1.8	1.98	V	
			2.25	2.5	2.75		
			2.52	2.8	3.08		
			2.97	3.3	3.63		
			4.50	5.0	5.50		
Supply Current	I_{CC}	Typical @ Nominal V_{CC} , $C_L = 15$ pF, $T_A = +25^\circ\text{C}$					mA
		@ +1.8V, 1.0MHz to <100MHz					
		@ +1.8V, 100MHz to 125MHz					
		@ +2.5V & +2.8V, 1.0MHz to <100MHz					
		@ +2.5V & +2.8V, 100MHz to 125MHz					
		@ +3.3V & +5.0V, 1.0MHz to <100MHz					
@ +3.3V & +5.0V, 100MHz to 125MHz							
Output Load	C_L	-	-	-	15	pF	
Operating Temperature	T_A	-	-20		+70	$^\circ\text{C}$	
			-30	+25	+85		
			-40		+85		
Storage Temperature	T_{STG}	-	-55	-	+125	$^\circ\text{C}$	

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f_O	-		1.0 - 125		MHz
Frequency Stability [Note 1]	$\Delta f/f_O$	-		20, 25, 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.

Electrical Specifications

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}	$V_{OH} = 90\%V_{CC} [+1.8V,+2.5V/+2.8V,+3.3V,+5.0V]$	-	-	-4, -4, -8, -16	mA
	I_{OL}	$V_{OL} = 10\%V_{CC} [+1.8V,+2.5V/+2.8V,+3.3V,+5.0V]$	-	-	+4, +4, +8, +16	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Rise and Fall Time [Note 2]	T_R, T_F	@ 10%/90% Levels, Nominal V_{CC} , $C_L = 15pF$				
		@ +1.8V, 1.0MHz to <20MHz	-	-	5	ns
		@ +1.8V, 20MHz to 125MHz	-	-	4	
		@ +2.5V & +2.8V, 1.0MHz to <20MHz	-	-	4	ns
		@ +2.5V & +2.8V, 20MHz to 125MHz	-	-	3	
		@ +3.3V & +5.0V, 1.0MHz to <20MHz	-	-	3	ns
@ +3.3V & +5.0V, 20MHz to 125MHz	-	-	2			
Start Up Time	T_S	Application of V_{CC}	-	2	5	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 Standby	-	-	$0.3V_{CC}$	V
Standby Current	I_{STB}	Pin 1 Logic '0', Output Standby	-	-	15	μA
Enable Time	T_{PLZ}	Pin 1 Logic '1'	-	-	5	ms
Phase Jitter, RMS [Note 3]	t_{jrms}	Bandwidth 12kHz - 20MHz	-	0.5	<1	ps

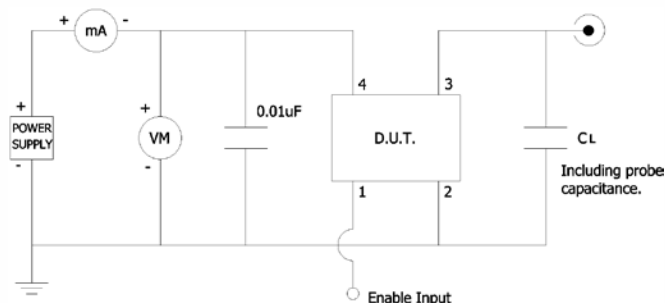
2.] Parameters are worst case and account for comprehensive range of product specification. Performance may vary by application and must be validated by end user.
3.] For frequencies 10MHz - 40MHz, the measurement Bandwidth is 12kHz - 5MHz.

Enable Truth Table

Pin 1	Pin 4
Logic '1'	Output
Open	Output
Logic '0'	High Imp.

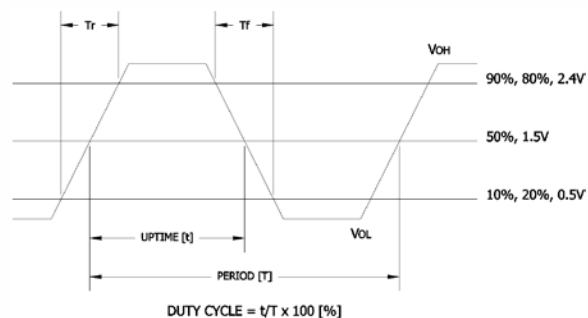
Test Circuit

HCMOS



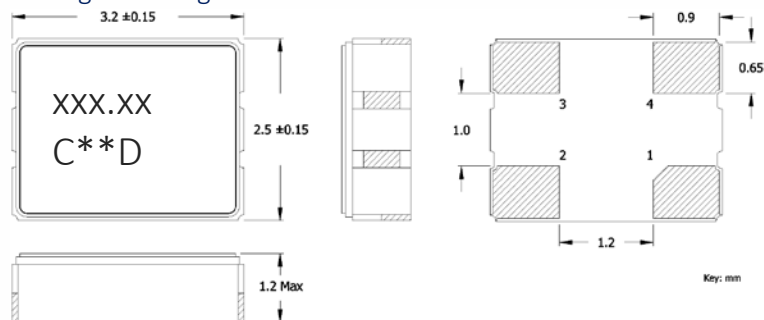
Output Waveform

HCMOS



Mechanical Specifications

Package Drawing



Marking Information

- xxx.xx – Frequency in MHz. Frequency is marked with 1 - 3 leading significant digits before and 2 significant digits [including zeroes] after the decimal.

Marking Examples:

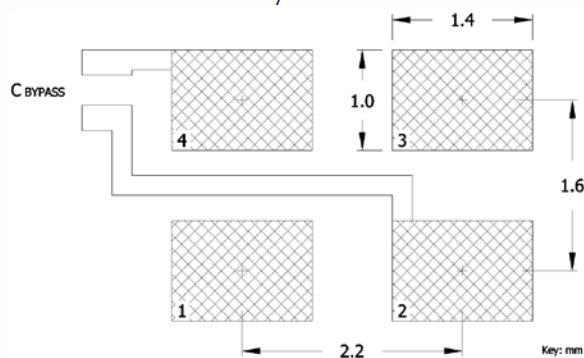
3.57954MHz = 3.57

14.31818 MHz = 14.31

125MHz = 125.00

- C – CTS and Pin 1 identifier.
- ** – Manufacturing Site Code.
- D – Date Code. See Table I for codes.

Recommended Pad Layout



Notes

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

Pin Assignments

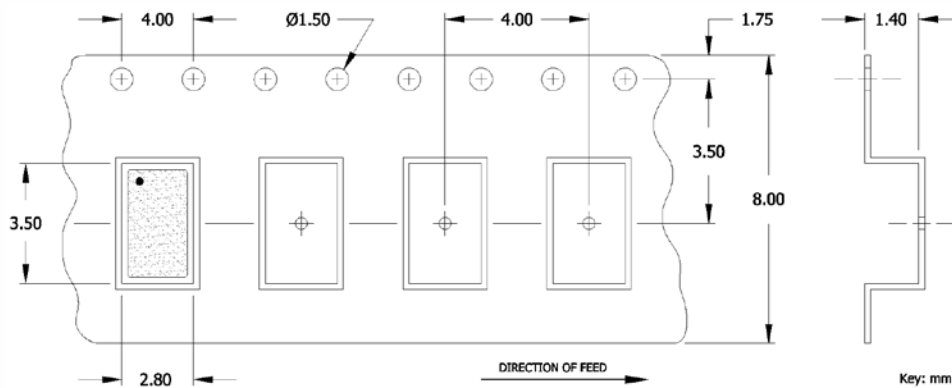
Pin	Symbol	Function
1	EOH	Enable
2	GND	Circuit & Package Ground
3	Output	RF Output
4	V _{CC}	Supply Voltage

Table I - Date Code

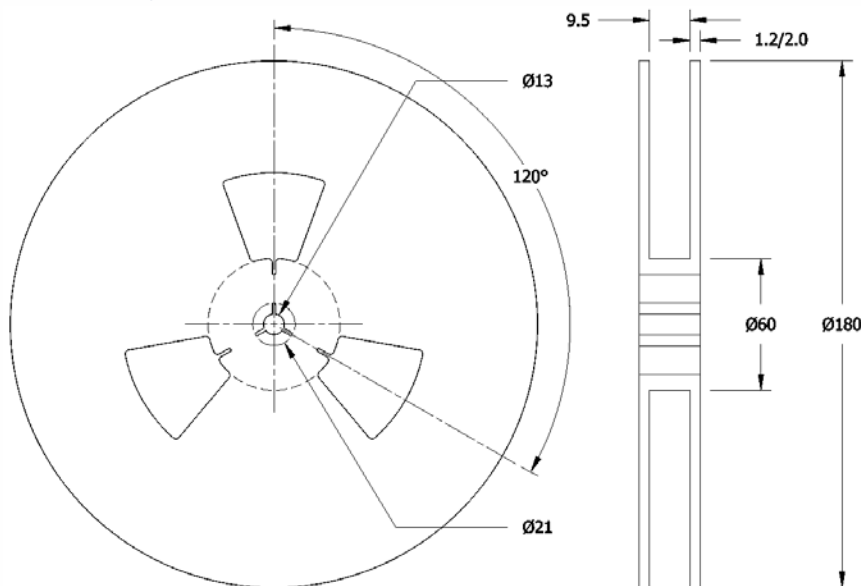
YEAR		MONTH					JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	2005	2009	2013	2017		A	B	C	D	E	F	G	H	J	K	L	M	
2002	2006	2010	2014	2018		N	P	Q	R	S	T	U	V	W	X	Y	Z	
2003	2007	2011	2015	2019		a	b	c	d	e	f	g	h	j	k	l	m	
2004	2008	2012	2016	2020		n	p	q	r	s	t	u	v	w	x	y	z	

Packaging - Tape and Reel

Tape Drawing



Reel Drawing



Notes

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