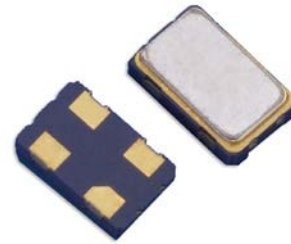


Model CHT50

HIGH TEMPERATURE HCMOS CLOCK



Part Dimensions:
5.0 × 3.2 × 1.3mm • 60.7734mg

Features

- Ceramic Surface Mount Package
- Extended-Industrial Temperature Ranges
- Fundamental and 3rd Overtone Crystal Designs
- Frequency Range 1.25 – 156.25MHz
- +1.8V, +2.5V, +3.3V Operation; +5.0V Limited Availability
- Output Enable Standard
- Tape and Reel Packaging, EIA-418

Standard Frequencies

* See Page 6 for common frequencies.
Check with factory for availability of frequencies not listed and for +5.0V operation.

Applications

- Industrial IoT [IIoT]
- Industrial Controls
- Commercial Military & Aerospace
- M2M Communication
- Energy Industry
- Test and Measurement

Description

CTS Model CHT50 is a low cost, small size, Clock Oscillator [XO] that operates over extended-industrial temperature ranges. CHT50 has an HCMOS/TTL compatible output, offers excellent stability and low jitter/phase noise performance.

Ordering Information

| Model | | Output Type | Frequency Code [MHz] | Frequency Stability | Temperature Range | Supply Voltage | Packaging |
|-------------------|-----------|-------------|-------------------------------------|---------------------|--------------------------------|----------------|----------------|
| CHT | 50 | C | XXX or XXXX | 2 | P | 3 | T |
| Code Package Size | | | Code Frequency | | Code Temp. Range | | Code Packing |
| 50 | 5.0x3.2mm | | Product Frequency Code ¹ | | P -55°C to +105°C ¹ | | T 1k pcs./reel |
| | | | | | M -55°C to +125°C ¹ | | |
| | | Code Output | | Code Stability | | Code Voltage | |
| | | C HCMOS | | 2 ±100ppm | | M +1.8Vdc | |
| | | | | 7 ±150ppm | | N +2.5Vdc | |
| | | | | | | L +3.3Vdc | |
| | | | | | | S +5.0Vdc | |

Notes:

1] Stability codes 2 and 7. Contact factory for availability.

**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} | $V_{CC} +1.8V$ to $+3.3V$ | -0.5 | - | 4.0 | V |
| Supply Voltage | V_{CC} | $\pm 5\%$ | 1.710 | 1.8 | 1.890 | V |
| | | | 2.375 | 2.5 | 2.665 | |
| | | | 3.135 | 3.3 | 3.465 | |
| | | | 4.750 | 5.0 | 5.250 | |
| Typical @ Nominal V_{CC} , $C_L = 15$ pF, $T_A = +25^\circ C$ | | | | | | |
| Supply Current | I_{CC} | @ +1.8V | - | 15 | 25 | mA |
| | | @ +2.5V | - | 20 | 30 | |
| | | @ +3.3V | - | 35 | 40 | |
| | | @ +5.0V | - | 35 | 55 | |
| Output Load | C_L | - | - | - | 15 | pF |
| Operating Temperature | T_A | - | -55 | +25 | +105 | $^\circ C$ |
| Storage Temperature | T_{STG} | - | -55 | - | +125 | $^\circ C$ |

Frequency Stability

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------------|-------------------|---------------------------------------------------|-----|------------------------|-----|-----------|
| Frequency Range | f_O | Temperature Range $-55^\circ C$ to $+105^\circ C$ | | 1.25 - 156.25 | | MHz |
| | | Temperature Range $-55^\circ C$ to $+125^\circ C$ | | 40 - 135 | | |
| Frequency Stability [Note 1] | $\Delta f/f_O$ | - | | 25, 30, 50, 100 or 150 | | $\pm ppm$ |
| Aging | $\Delta f/f_{25}$ | First Year @ $+25^\circ C$, nominal V_{CC} | -5 | - | 5 | 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, 5.0V] | - | - | -4, -4, -8, -16 | mA |
| | I_{OL} | $V_{OL} = 10\%V_{CC}$ [1.8V, 2.5V, 3.3V, 5.0V] | - | - | +4, +4, +8, +16 | |
| Output Duty Cycle | SYM | @ 50% Level | 45 | - | 55 | % |
| @ 10%/90% Levels, Nominal V_{CC} , $C_L = 15$ pF | | | | | | |
| Rise and Fall Time [Note 2] | T_R, T_F | @ +1.8V | - | 4 | 5 | ns |
| | | @ +2.5V | - | 4 | 5 | |
| | | @ +3.3V | - | 7 | 10 | |
| | | @ +5.0V | - | 7 | 10 | |
| 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

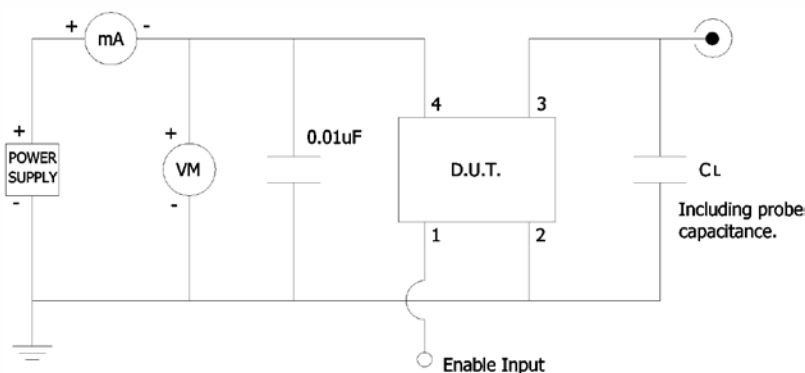
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------------------|------------|---------------------------------|-------------|-----|-------------|---------|
| Enable Function | | Standby | | | | |
| Enable Input Voltage | V_{IH} | Pin 1 Logic '1', Output Enabled | $0.7V_{CC}$ | - | - | V |
| Disable Input Voltage | V_{IL} | Pin 1 Logic '0', Output Standby | - | - | $0.3V_{CC}$ | V |
| Enable Current | I_{STB} | Pin 1 Logic '0', Output Standby | - | - | 10 | μA |
| Enable Time | T_{PLZ} | Pin 1 Logic '1' | - | - | 5 | ms |
| Phase Jitter, RMS | t_{jrms} | Bandwidth 12 kHz - 20 MHz | - | 0.5 | <1 | ps |

Enable Truth Table

| Pin 1 | Pin 3 |
|-----------|-----------|
| Logic '1' | Output |
| Open | Output |
| Logic '0' | High Imp. |

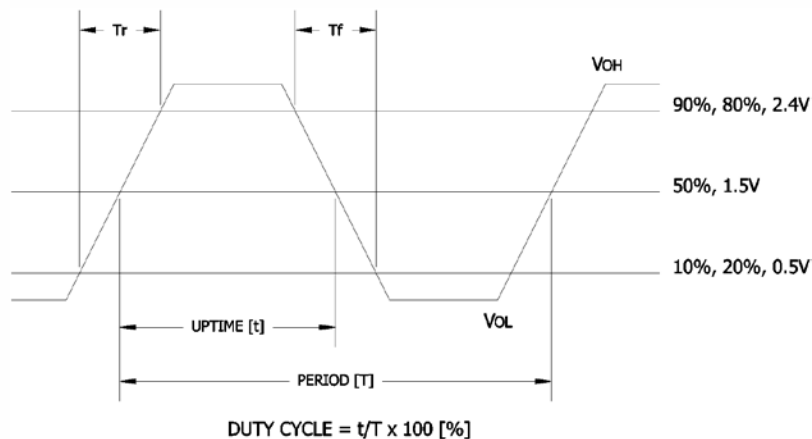
Test Circuit

HCMOS



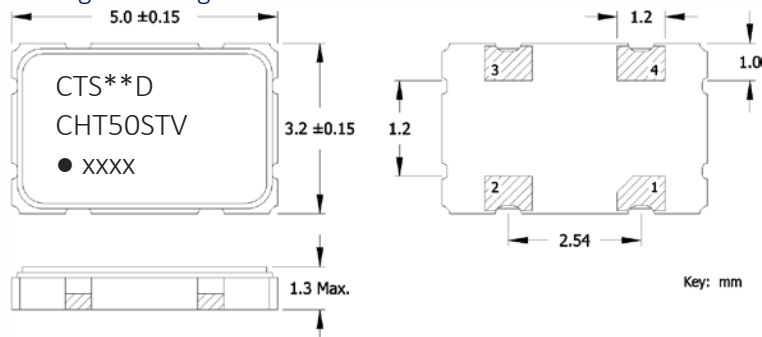
Output Waveform

HCMOS



Mechanical Specifications

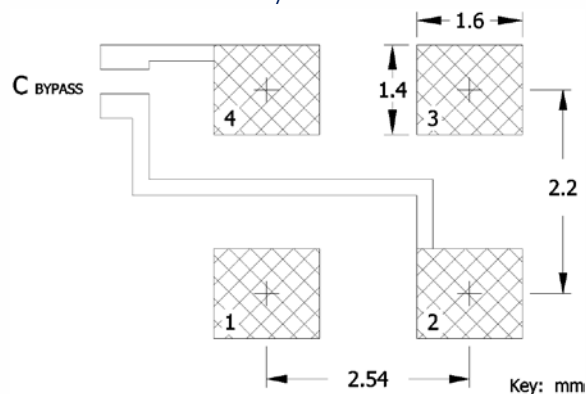
Package Drawing



Marking Information

- ** – Manufacturing Site Code.
- D – Date Code. See Table I for codes.
- CHT50 – CTS model.
- ST – Frequency stability/temperature code. [Refer to Ordering Information]
- V – Voltage code; M = 1.8V, N = 2.5V, L = 3.3V, S = 5.0V.
- – Pin 1 identifier.
- xxxx – Frequency Code.
3-digits for frequencies <100MHz
4-digits for frequencies 100MHz or greater
[See document 016-1454-0, Frequency Code Tables.]

Recommended Pad Layout



- Termination pads (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

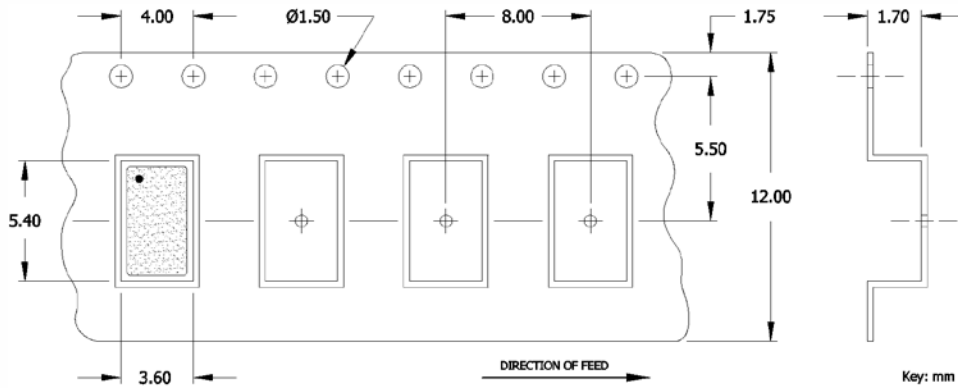
| Pin | Symbol | Function |
|-----|-----------------|-------------------|
| 1 | EOH | Enable |
| 2 | GND | Circuit & Package |
| 3 | Output | RF Output |
| 4 | V _{CC} | Supply Voltage |

Table I - Date Code

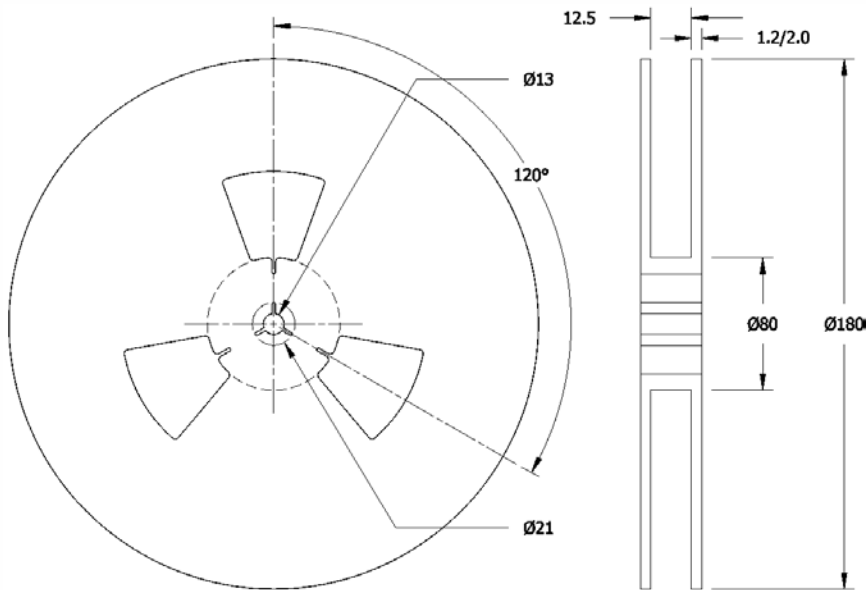
| | | MONTH | | | | | YEAR | | | | | | | | | |
|------|------|-------|------|------|-----|-----|------|-----|-----|-----|-----|-----|-----|---|---|---|
| | | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | | | |
| 2001 | 2005 | 2009 | 2013 | 2017 | A | B | C | D | E | F | G | 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 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 Available – 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 | 100.000000 | 1000 | | |
| 12.288000 | 122 | 27.000000 | 270 | 125.000000 | 1250 | | |
| 14.318180 | 143 | 30.000000 | 300 | 156.250000 | 1562 | | |
| 14.745600 | 147 | 32.000000 | 320 | | | | |
| 16.000000 | 160 | 33.333000 | 33E | | | | |
| 20.000000 | 200 | 37.400000 | 374 | | | | |
| 22.118400 | 221 | 38.400000 | 384 | | | | |