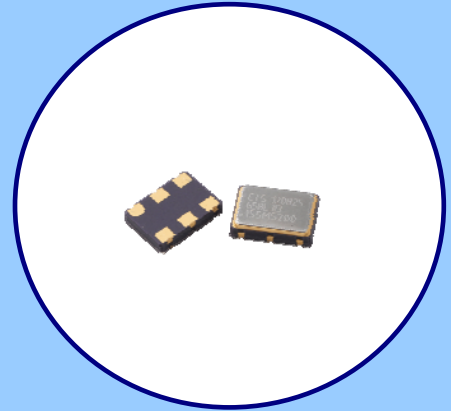


## FEATURES

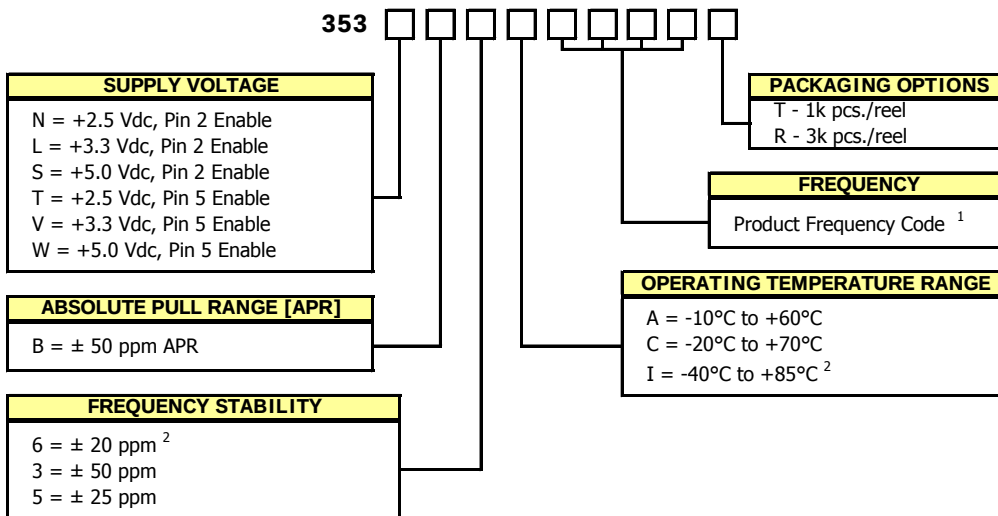
- **Standard 5.0mm x 3.2mm 6-Pad Surface Mount Package**
- **HCMOS Output**
- **Low Jitter Performance**
- **Fundamental Crystal Designs**
- Frequency Range 1 – 80 MHz
- Operating Voltages +2.5Vdc, +3.3Vdc or +5.0Vdc
- Operating Temperature to -40°C to +85°C
- Output Enable Standard
- Tape & Reel Packaging Standard, EIA-418
- **RoHS/Green Compliant [6/6]**



## APPLICATIONS

Model 353 is ideal for applications such as broadband access, Ethernet/Gigabit Ethernet, SONET/SDH, xDSL, PCMA, digital video, Picocells and base stations.

## ORDERING INFORMATION



1] Refer to document 016-1454-0, Frequency Code Tables.

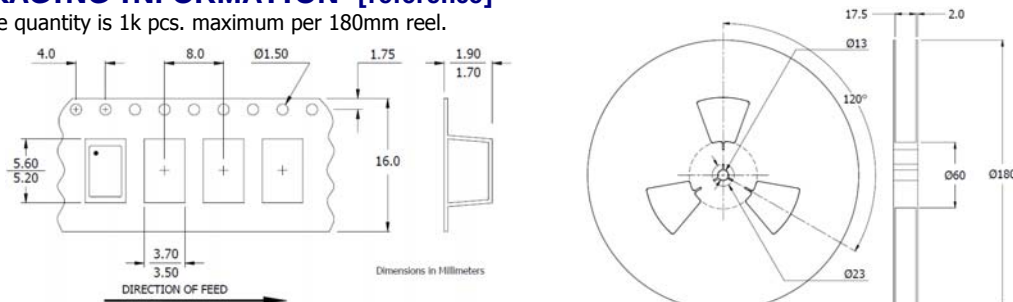
3-digits required for frequencies below 100MHz and 4-digits for frequencies 100MHz or greater.

2] 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.**

## PACKAGING INFORMATION [reference]

Device quantity is 1k pcs. maximum per 180mm reel.



**ELECTRICAL CHARACTERISTICS**

| ELECTRICAL PARAMETERS | PARAMETER                                                    | SYMBOL            | CONDITIONS                                                                                                     | MIN                  | TYP                  | MAX                  | UNIT  |
|-----------------------|--------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------|----------------------|----------------------|----------------------|-------|
|                       | Maximum Supply Voltage                                       | $V_{CC}$          | -                                                                                                              | -0.5                 | -                    | 5.0                  | V     |
|                       | Maximum Control Voltage                                      | $V_C$             | -                                                                                                              | -0.5                 | -                    | $V_{CC}$             | V     |
|                       | Storage Temperature                                          | $T_{STG}$         | -                                                                                                              | -40                  | -                    | +100                 | °C    |
|                       | Frequency Range                                              | $f_o$             | -                                                                                                              | 1 - 80               |                      |                      | MHz   |
|                       | Frequency Stability<br>(See Note 1 and Ordering Information) | $\Delta f/f_o$    | -                                                                                                              | -                    | -                    | 20, 25 or 50         | ± ppm |
|                       | Absolute Pull Range<br>(See Note 2 and Ordering Information) | APR               | -                                                                                                              | ±50                  | -                    | -                    | ppm   |
|                       | Aging                                                        | $\Delta f/f_{25}$ | First Year @ +25°C, nominal $V_{CC}$ and $V_C$                                                                 | -3                   | -                    | 3                    | ppm   |
|                       | Operating Temperature                                        | $T_A$             | -                                                                                                              | -10<br>-20<br>-40    | +25                  | +60<br>+70<br>+86    | °C    |
|                       | Supply Voltage                                               | $V_{CC}$          | Model 353N, 353T, ±5%<br>Model 353L, 353V, ±5%<br>Model 353S, 353W, ±5%                                        | 2.38<br>3.14<br>4.75 | 2.5<br>3.3<br>5.0    | 2.63<br>3.47<br>5.25 | V     |
|                       | Supply Current                                               | $I_{CC}$          | $C_L = 15$ pF<br>@ +2.5Vdc<br>@ +3.3Vdc<br>@ +5.0Vdc                                                           | -<br>-<br>-          | -<br>-<br>-          | 25<br>25<br>30       | mA    |
|                       | Output Load                                                  | $C_L$             | -                                                                                                              | -                    | -                    | 15                   | pF    |
|                       | Control Voltage                                              | $V_C$             | Model 353N, 353T, $V_{CC} = 2.5$ V<br>Model 353L, 353V, $V_{CC} = 3.3$ V<br>Model 353S, 353W, $V_{CC} = 5.0$ V | 0.20<br>0.15<br>0.50 | 1.25<br>1.65<br>2.50 | 2.30<br>3.15<br>4.50 | V     |
|                       | Frequency Deviation                                          | $\Delta f$        | +25°C @ Time of Shipment, over $V_C$ range                                                                     | ±100                 | -                    | -                    | ppm   |
|                       | Linearity                                                    | L                 | Best Straight Line Fit                                                                                         | -                    | -                    | 10                   | %     |
|                       | Input Impedance                                              | $Z_{Vc}$          | -                                                                                                              | 10                   | -                    | -                    | kOhms |
|                       | Transfer Function                                            | -                 | -                                                                                                              | Positive             |                      |                      | -     |
|                       | Output Duty Cycle                                            | SYM               | @ 50% Level                                                                                                    | 45                   | -                    | 55                   | %     |
|                       | Output Voltage Levels                                        | $V_{OH}$          | Logic '1' Level, CMOS Load                                                                                     | 0.9 $V_{CC}$         | -                    | -                    | V     |
|                       |                                                              | $V_{OL}$          | Logic '0' Level, CMOS Load                                                                                     | -                    | -                    | 0.1 $V_{CC}$         |       |
|                       | Rise and Fall Time                                           | $T_{Rf}$ $T_F$    | @ 20%/80% Levels                                                                                               | -                    | 3                    | 8.0                  | ns    |
|                       | Start Up Time                                                | $T_S$             | Application of $V_{CC}$                                                                                        | -                    | 5                    | 10                   | ms    |
|                       | Modulation Roll-off                                          | -                 | @ -3dB                                                                                                         | 12                   | -                    | -                    | kHz   |
|                       | Enable Function                                              |                   |                                                                                                                |                      |                      |                      |       |
|                       | Enable Input Voltage                                         | $V_{IH}$          | Pin 2 or Pin 5 Logic '1', Output Enabled                                                                       | 0.7 $V_{CC}$         | -                    | -                    | V     |
|                       | Disable Input Voltage                                        | $V_{IL}$          | Pin 2 or Pin 5 Logic '0', Output Disabled                                                                      | -                    | -                    | 0.3 $V_{CC}$         |       |
|                       | Enable Time                                                  | $T_{PLZ}$         | Pin 2 or Pin 5 Logic '1'                                                                                       | -                    | -                    | 100                  | ns    |
|                       | Phase Jitter, RMS                                            | $t_{jrms}$        | Bandwidth 12 kHz - 20 MHz                                                                                      | -                    | 0.5                  | 1                    | ps    |

1. Notes:

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

 Minimum guaranteed frequency shift from  $f_o$  over variations in temperature, aging, power supply and load.

**SINGLE SIDE BAND PHASE NOISE**  
 (typical maximum)

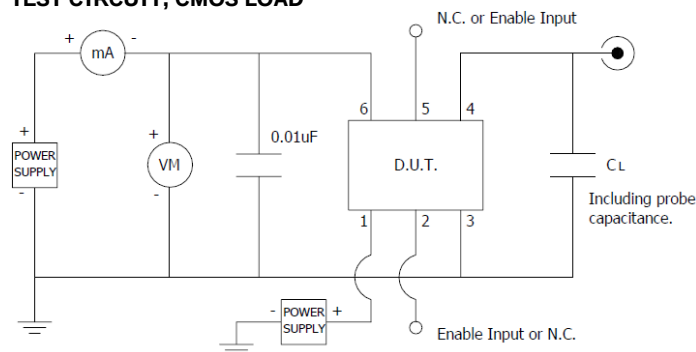
| Frequency Offset | Phase Noise (dBc/Hz) * | Frequency Offset | Phase Noise (dBc/Hz) * |
|------------------|------------------------|------------------|------------------------|
| 10 Hz            | -60                    | 10k Hz           | -135                   |
| 100 Hz           | -90                    | 100k Hz          | -150                   |
| 1k Hz            | -120                   | >100k Hz         | -150                   |

\* Results may vary depending on frequency.

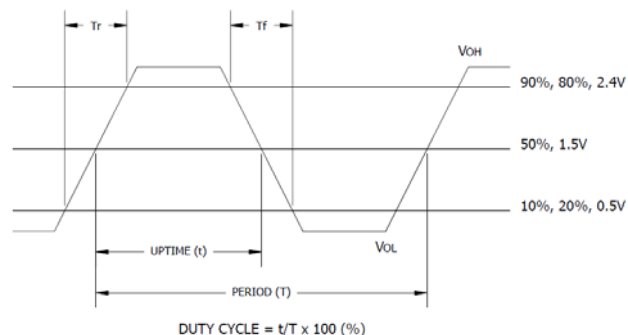
**ENABLE TRUTH TABLE**

| PIN 2 or Pin 5 | PIN 4     |
|----------------|-----------|
| Logic '1'      | Output    |
| Open           | Output    |
| Logic '0'      | High Imp. |

### TEST CIRCUIT, CMOS LOAD

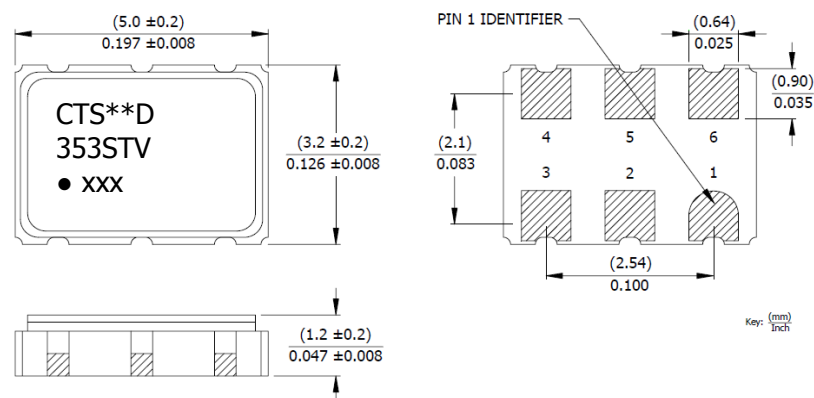


### OUTPUT WAVEFORM, CMOS



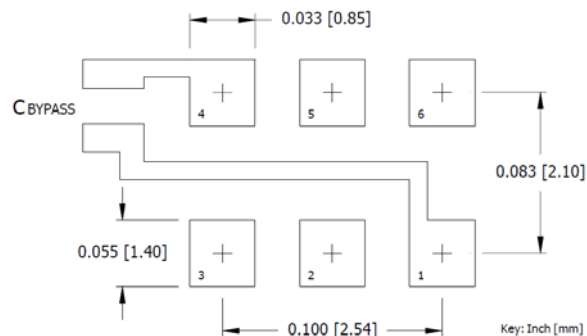
## MECHANICAL SPECIFICATIONS

### PACKAGE DRAWING



### SUGGESTED SOLDER PAD GEOMETRY

$C_{BYPASS}$  should be  $\geq 0.01 \mu F$ .



### MARKING INFORMATION

1. \*\* - Manufacturing Site Code.
2. D - Date Code. See Table I for codes.
3. ST - Frequency stability/temperature code. [Refer to Ordering Information.]
4. V - Voltage code. N or T = 2.5V, L or V = 3.3V, S or W = 5.0V
5. xxx - Frequency Code.  
3-digits, frequencies below 100MHz  
Refer to document 016-1454-0, Frequency Code Tables.

### NOTES

1. Complete CTS part number, frequency value and date code information must appear on reel and carton labels.
2. Termination pads [e4]. Barrier-plating is nickel [Ni] with gold [Au] flash plate.
3. Reflow conditions per JEDEC J-STD-020; 260°C maximum, 20 seconds.
4. MSL = 1.

### D.U.T. PIN ASSIGNMENTS

| PIN | SYMBOL      | DESCRIPTION                |
|-----|-------------|----------------------------|
| 1   | $V_C$       | Control Voltage            |
| 2   | EOH or N.C. | Enable [std] or No Connect |
| 3   | GND         | Circuit & Package Ground   |
| 4   | Output      | RF Output                  |
| 5   | N.C. or EOH | No Connect or Enable [opt] |
| 6   | $V_{CC}$    | Supply Voltage             |

TABLE I - DATE CODE

| YEAR |      |      |      |      | MONTH |     |     |     |     |     |     |     |     |     |     |     |
|------|------|------|------|------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2001 | 2002 | 2003 | 2004 | 2005 | JAN   | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| A    | N    | a    | n    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| B    | P    | b    | p    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| C    | Q    | c    | q    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| D    | R    | d    | r    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| E    | S    | e    | s    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| F    | T    | f    | t    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| G    | U    | g    | u    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| H    | V    | h    | v    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| J    | W    | j    | w    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| K    | X    | k    | x    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| L    | Y    | l    | y    |      |       |     |     |     |     |     |     |     |     |     |     |     |
| M    | Z    | m    | z    |      |       |     |     |     |     |     |     |     |     |     |     |     |