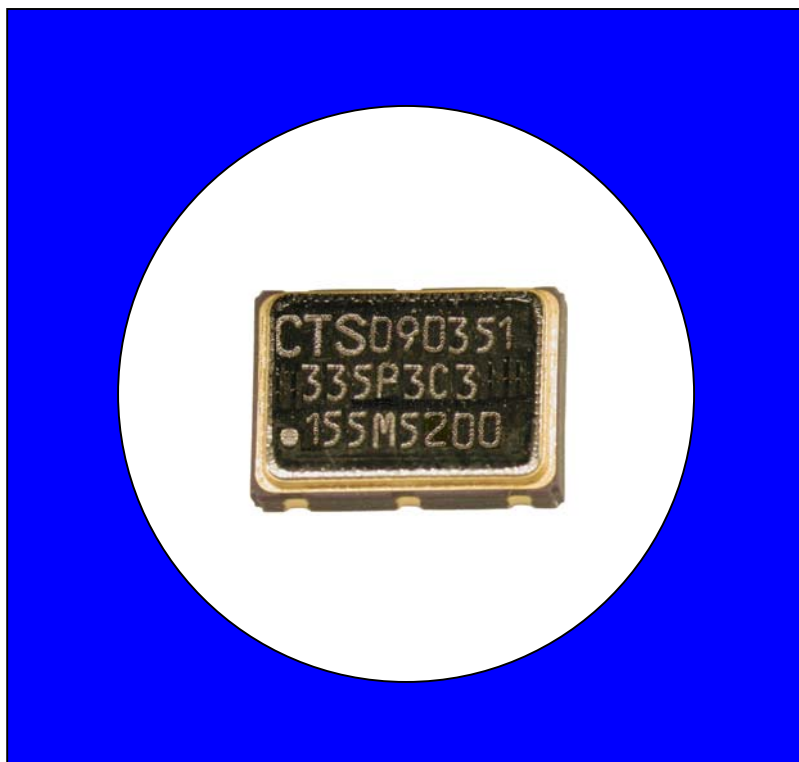


## FEATURES

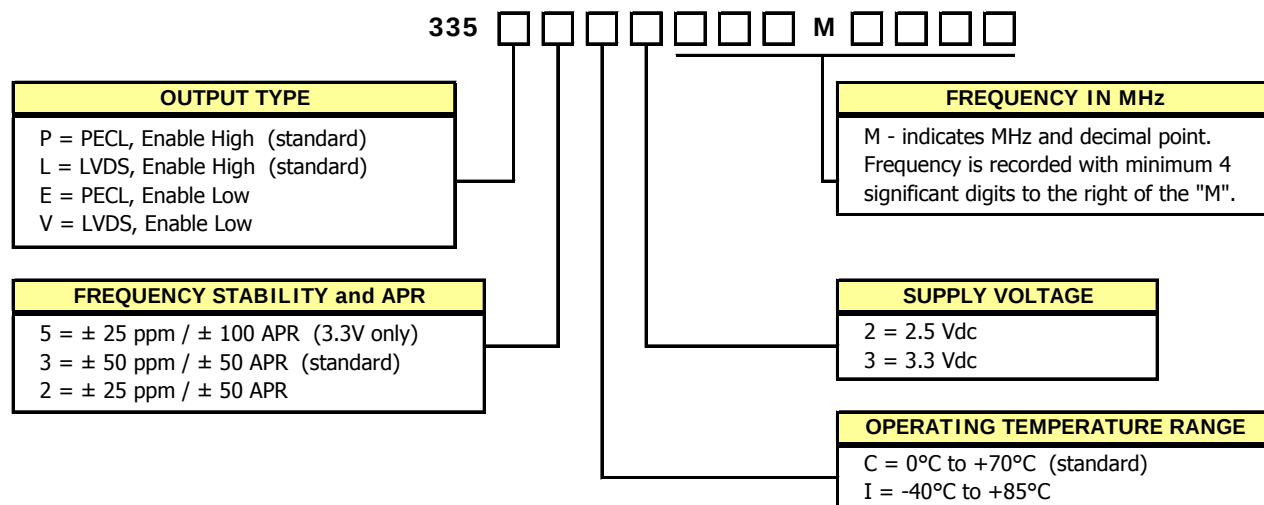
- Standard 7x5mm Surface Mount Footprint
- Differential LVPECL or LVDS Outputs
- Frequency Range 19.44 – 212.50 MHz
- Frequency Stability,  $\pm 50$  ppm Standard ( $\pm 25$  ppm available)
- +2.5Vdc or +3.3Vdc Operation
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Output Enable Standard
- Low Phase Jitter, **NON-Multiplied**
- Tape & Reel Packaging
- **RoHS/Green Compliant**

## DESCRIPTION

The Model 335 is a ceramic packaged Voltage Controlled oscillator offering reduced size and enhanced stability. The small size means it is perfect for any application. The enhanced stability means it is the perfect choice for today's communications applications that require tight frequency control.



## ORDERING INFORMATION



Example Part Number: 335P3C3155M5200

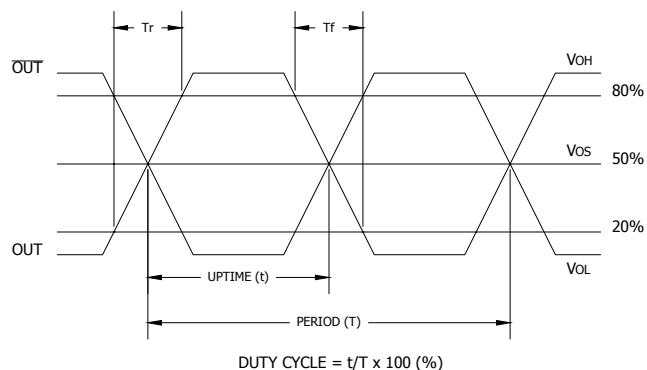
## ELECTRICAL CHARACTERISTICS

|                                    | PARAMETER                                                             | SYMBOL               | CONDITIONS                                                          | MIN                    | TYP        | MAX                   | UNIT   |
|------------------------------------|-----------------------------------------------------------------------|----------------------|---------------------------------------------------------------------|------------------------|------------|-----------------------|--------|
| Absolute Maximums                  | Maximum Supply Voltage                                                | $V_{CC}$             | -                                                                   | -0.5                   | -          | 5.0                   | V      |
|                                    | Storage Temperature                                                   | $T_{STG}$            | -                                                                   | -55                    | -          | 125                   | °C     |
|                                    | Frequency Range<br>LVPECL and LVDS                                    | $f_O$                | -                                                                   | 19.44                  | -          | 212.50                | MHz    |
|                                    | Frequency Stability<br>(See Note 1 and Ordering Information)          | $\Delta f/f_O$       | -                                                                   | -                      | -          | 25, 50                | ± ppm  |
|                                    | Absolute Pull Range<br>(See Note 2 and Ordering Information)          | APR                  | -                                                                   | 50, 100                | -          | -                     | ± ppm  |
|                                    | Operating Temperature<br>Commercial<br>Industrial                     | $T_A$                | -                                                                   | -20<br>-40             | 25         | 70<br>85              | °C     |
|                                    | Supply Voltage                                                        | $V_{CC}$             | ± 5 %                                                               | 2.38<br>3.14           | 2.5<br>3.3 | 2.63<br>3.47          | V      |
| Electrical and Waveform Parameters | Supply Current<br>LVPECL<br>LVDS                                      | $I_{CC}$             | Maximum Load                                                        | -<br>-                 | 50<br>25   | 75<br>40              | mA     |
|                                    | Control Voltage                                                       | $V_C$                | $V_{CC} = 3.3V$                                                     | 0.0                    | 1.65       | 3.3                   | V      |
|                                    | Frequency Deviation                                                   | $\Delta f$           | 25°C at Time of Shipment                                            | -                      | 130        | -                     | ± ppm  |
|                                    | Linearity                                                             | L                    | Best Straight Line Fit                                              | -15                    | 10         | 15                    | %      |
|                                    | Input Impedance                                                       | $Z_C$                | -                                                                   | 50                     | -          | -                     | kOhms  |
|                                    | Transfer Function                                                     | -                    | -                                                                   | -                      | Positive   | -                     | -      |
|                                    | Start Up Time                                                         | $T_S$                | Application of $V_{CC}$                                             | -                      | 5          | 10                    | ms     |
|                                    | Modulation Roll-off                                                   | -                    | @ -3dB                                                              | 25                     | -          | -                     | kHz    |
|                                    | Phase Jitter                                                          | $t_{jms}$            | Bandwidth 12 kHz - 20 MHz                                           | -                      | -          | 1                     | ps RMS |
|                                    | Enable Function High<br>Enable Input Voltage<br>Disable Input Voltage | $V_{IH}$<br>$V_{IL}$ | Pin 2 Logic '1', Output Enabled<br>Pin 2 Logic '0', Output Disabled | $0.7*V_{CC}$<br>-      | -<br>-     | -<br>$0.3*V_{CC}$     | V      |
|                                    | Enable Function Low<br>Enable Input Voltage<br>Disable Input Voltage  | $V_{IH}$<br>$V_{IL}$ | Pin 2 Logic '0', Output Enabled<br>Pin 2 Logic '1', Output Disabled | $0.3*V_{CC}$           | -          | $0.7*V_{CC}$          | V      |
|                                    | Disable Current                                                       | $I_{IL}$             | Pin 1 or Pin 2 Logic '1', Output Disabled                           | -                      | -          | 20                    | uA     |
|                                    | Enable Time                                                           | $T_{PLZ}$            | Pin 2 Logic '1' or Logic '0'                                        | -                      | -          | 10                    | ms     |
|                                    | <b>LVPECL WAVEFORM</b>                                                |                      |                                                                     |                        |            |                       |        |
|                                    | Output Load                                                           | $R_L$                | -                                                                   | -                      | 50         | -                     | Ohms   |
|                                    | Output Duty Cycle                                                     | SYM                  | @ $V_{CC} - 1.3V$                                                   | 45                     | -          | 55                    | %      |
|                                    | Output Voltage Levels<br>Logic '1' Level<br>Logic '0' Level           | $V_{OH}$<br>$V_{OL}$ | PECL Load<br>PECL Load                                              | $V_{CC} - 1.025V$<br>- | -<br>-     | -<br>$V_{CC} - 1.62V$ | V      |
|                                    | Rise and Fall Time                                                    | $T_R, T_F$           | @ 20% - 80% Levels                                                  | -                      | 0.4        | 1.0                   | ns     |
|                                    | <b>LVDS WAVEFORM</b>                                                  |                      |                                                                     |                        |            |                       |        |
|                                    | Output Load                                                           | $R_L$                | -                                                                   | -                      | 100        | -                     | Ohms   |
|                                    | Output Duty Cycle                                                     | SYM                  | @ 1.25V                                                             | 45                     | -          | 55                    | %      |
|                                    | Differential Voltage                                                  | $V_{OD}$             | RL = 100 Ohms                                                       | 250                    | 350        | 450                   | mV     |
|                                    | Output Voltage Levels<br>Logic '1' Level<br>Logic '0' Level           | $V_{OH}$<br>$V_{OL}$ | LVDS Load<br>LVDS Load                                              | -<br>0.9               | -<br>-     | 1.6<br>-              | V      |
|                                    | Rise and Fall Time                                                    | $T_R, T_F$           | @ 20% - 80% Levels                                                  | -                      | 0.4        | 1.0                   | ns     |

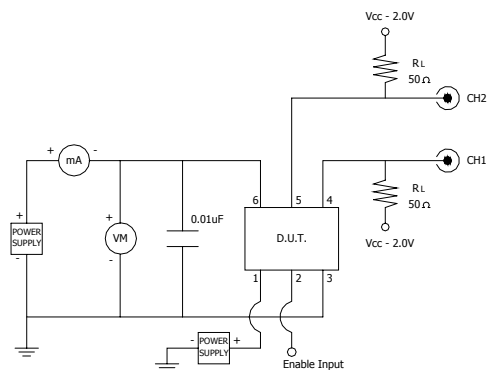
Notes:

- Inclusive of initial tolerance at time of shipment, changes in supply voltage, load, temperature and 10 year aging at an average operating temperature of +40 °C.
- Minimum guaranteed frequency shift from  $f_O$  over variations in temperature, aging, power supply and load at an average operating temperature of +40°C for 10 years.

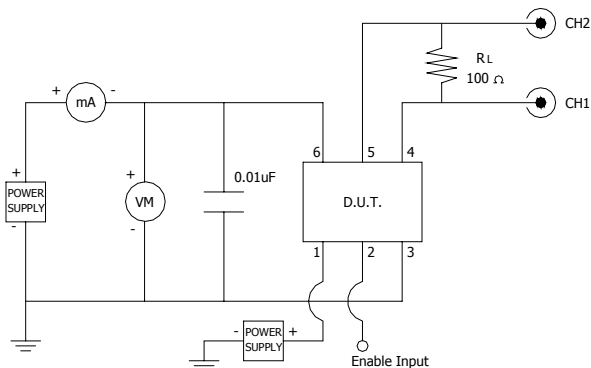
### PECL/LVDS OUTPUT WAVEFORM



### TEST CIRCUIT, PECL LOAD



### TEST CIRCUIT, LVDS LOAD



### D.U.T. PIN ASSIGNMENTS

| PIN | SYMBOL   | DESCRIPTION              |
|-----|----------|--------------------------|
| 1   | $V_C$    | Control Voltage          |
| 2   | EOH      | Enable                   |
| 3   | GND      | Circuit & Package Ground |
| 4   | Output   | RF Output                |
| 5   | Output   | Complimentary RF Output  |
| 6   | $V_{CC}$ | Supply Voltage           |

### ENABLE HIGH TRUTH TABLE

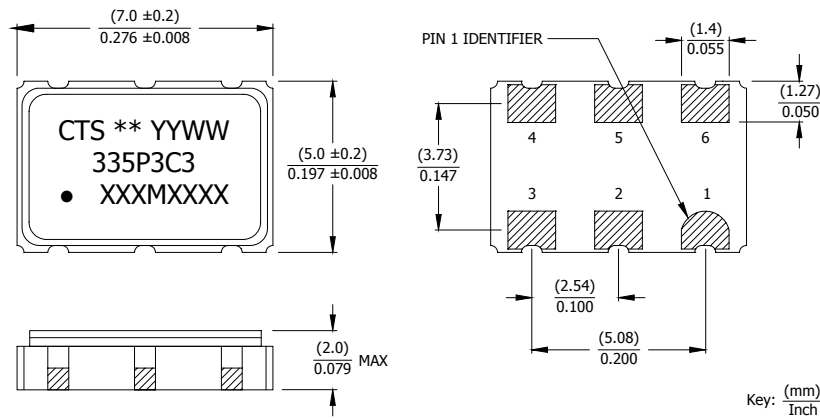
| PIN 2     | PIN 4 / PIN 5 |
|-----------|---------------|
| Logic '1' | Output        |
| Open      | Output        |
| Logic '0' | High Imp.     |

### ENABLE LOW TRUTH TABLE

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

## MECHANICAL SPECIFICATIONS

### PACKAGE DRAWING



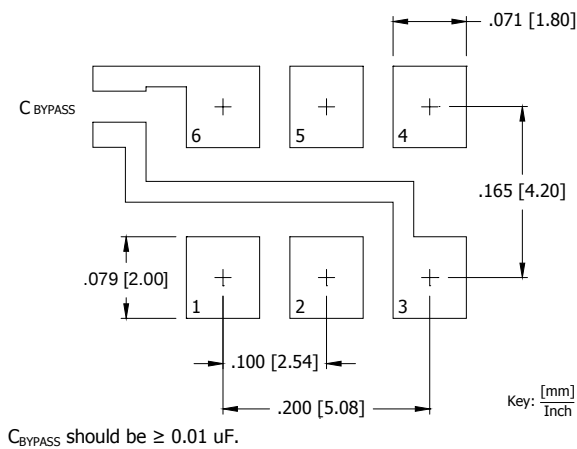
### MARKING INFORMATION

1. \*\* - Manufacturing Site Code.
2. YYWW – Date code, YY – year, WW – week.
3. Truncated CTS part number.
4. XXXMXXXX - Frequency marked with 4 significant digits after the 'M'.

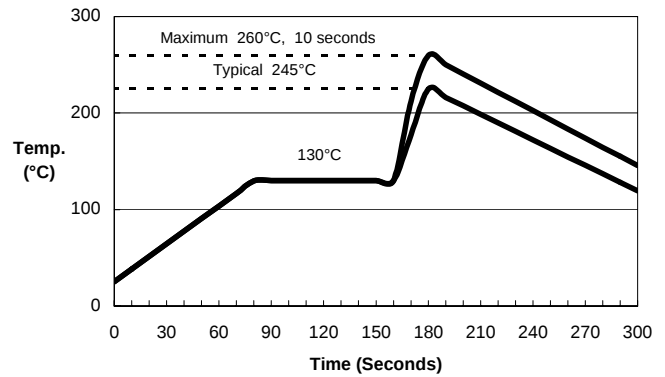
### Notes

1. Termination pads (e4), barrier-plating is nickel (Ni) with gold (Au) flash plate.
2. Reflow conditions per JEDEC J-STD-020.

### SUGGESTED SOLDER PAD GEOMETRY

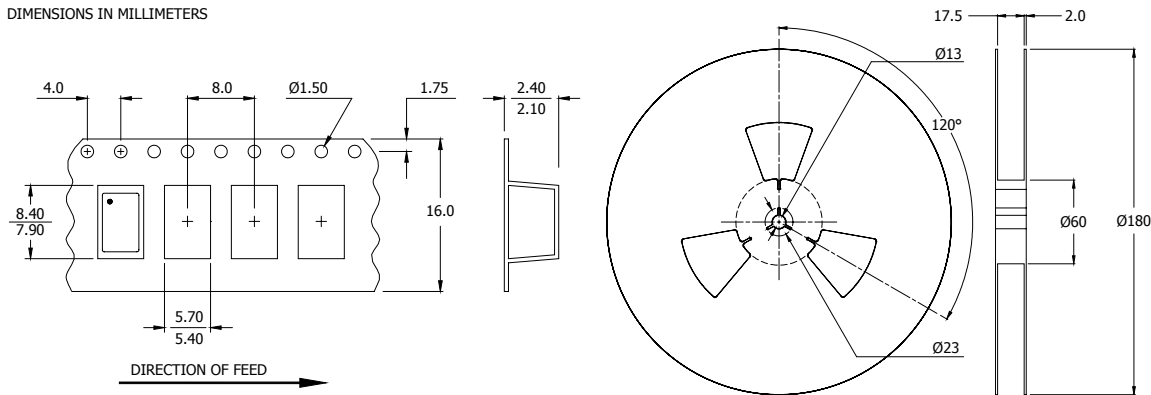


### SUGGESTED REFLOW PROFILE



## TAPE AND REEL INFORMATION

DIMENSIONS IN MILLIMETERS



Device quantity is 1,000 pieces per 180mm reel.

## ENVIRONMENTAL SPECIFICATIONS

|                                  |                                                                                                                                                     |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Cycle:               | 400 cycles from $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ , 10 minute dwell at each temperature, 1 minute transfer time between temperatures. |
| Mechanical Shock:                | 1,500g's, 0.5mS duration, $\frac{1}{2}$ sinewave, 3 shocks each direction along 3 mutually perpendicular planes (18 total shocks).                  |
| Sinusoidal Vibration:            | 0.06 inches double amplitude, 10 to 55 Hz and 20g's, 55 to 2,000 Hz, 3 cycles each in 3 mutually perpendicular planes (9 times total).              |
| Gross Leak:                      | No leak shall appear while immersed in an FC40 or equivalent liquid at $+125^{\circ}\text{C}$ for 20 seconds.                                       |
| Fine Leak:                       | Mass spectrometer leak rates less than $2 \times 10^{-8}$ ATM cc/sec air equivalent.                                                                |
| Resistance to Solder Heat:       | Product must survive 3 reflows of $+260^{\circ}\text{C}$ peak, 10 seconds maximum.                                                                  |
| High Temperature Operating Bias: | 2,000 hours at $+125^{\circ}\text{C}$ , maximum bias, disregarding frequency shift.                                                                 |
| Frequency Aging:                 | 1,000 hours at $+85^{\circ}\text{C}$ , full bias, less than $\pm 5$ ppm shift.                                                                      |
| Moisture Sensitivity Level:      | Level 1 per JEDEC J-STD-020.                                                                                                                        |

## QUALITY AND RELIABILITY

Quality systems meet or exceed the requirements of ISO 9000:2000 standards.