



### FEATURES

- Standard 7.0x5.0mm Surface Mount Footprint
- HCMOS/TTL Compatible
- **Fundamental and 3<sup>RD</sup> Overtone Crystals**
- Frequency Range 1.5 – 160 MHz
- Frequency Stability,  $\pm 50$  ppm Standard ( $\pm 25$  ppm and  $\pm 20$  ppm available)
- +3.3Vdc or +5.0Vdc Operation
- Operating Temperature to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Output Enable Standard
- Tape & Reel Packaging
- **RoHS/Green Compliant (6/6)**

### DESCRIPTION

The CB3/CB3LV is a ceramic packaged Clock 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



- 1] 6I Stability/Temperature combination is not available.
- 2] These stabilities are not recommended for new designs.
- 3] Frequency is recorded with only leading significant digits before the 'M' and 4 - 6 significant digits after the 'M' (including zeros).  
[Ex. XMXXXXX (3M579545), XXMXXXXX (14M31818), XXXMXXXX (125M0000)]
- 4] CTS Distributors may add a -T or -1 at the end of the part number to indicate Tape and Reel packaging.

**Not all performance combinations and frequencies may be available.  
Contact your local CTS Representative or CTS Customer Service for availability.**

Example Part Number: CB3LV-3C-32M7680 or CB3-3I-32M7680

## ELECTRICAL CHARACTERISTICS

|                                    | PARAMETER              | SYMBOL  | CONDITIONS   | MIN                  | TYP                  | MAX          | UNIT         |     |
|------------------------------------|------------------------|---|--|----------------------|----------------------|--------------|--------------|-----|
| Absolute Maximums                  | Maximum Supply Voltage | $V_{CC}$  | -  | -0.5                 | -                    | 7.0          | V            |     |
|                                    | Storage Temperature    | $T_{STG}$   | -  | -55                  | -                    | 125          | °C           |     |
|                                    | Frequency Range        | $f_0$   | -  | 1.5                  | -                    | 107          | MHz          |     |
|                                    | CB3LV                  |   | -  | 1.5                  | -                    | 160          |              |     |
|                                    | Frequency Stability    | $\Delta f/f_0$  | See Note 1 and Ordering Information                              | -                    | -                    | 20, 25 or 50 | ± ppm        |     |
|                                    | Aging                  | $\Delta f$  | First year   | -                    | 3                    | 5            | ± ppm        |     |
|                                    | Operating Temperature  | $T_A$   | -  | -20                  | 25                   | 70           | °C           |     |
| Commercial Industrial              | -                      |   | -40  | -                    | 85                   |              |              |     |
| Electrical and Waveform Parameters | Supply Voltage         | $V_{CC}$  | ± 10 %   | 4.5                  | 5.0                  | 5.5          | V            |     |
|                                    | CB3LV                  |   |  | 3.0                  | 3.3                  | 3.6          |              |     |
|                                    | Supply Current         | $I_{CC}$  | Frequency Range, tested load condition noted for typical values. |                      | -                    | 10           | 25           | mA  |
|                                    | CB3                    |   | 1.5 MHz to 20 MHz  | $C_L=50pF$           | -                    | 30           | 50           |     |
|                                    |                        |   | 20.1 MHz to 80 MHz   | $C_L=50pF$           | -                    | 40           | 80           |     |
|                                    |                        |   | 80.1 MHz to 107 MHz  | $C_L=15pF$           | -                    | 7            | 12           |     |
|                                    | CB3LV                  |   | 1.5 MHz to 20 MHz  | $C_L=15pF$           | -                    | 20           | 40           |     |
|                                    |                        |   | 20.1 MHz to 80 MHz   | $C_L=15pF$           | -                    | 30           | 60           |     |
|                                    |                        | 80.1 MHz to 160 MHz   | $C_L=15pF$   | -                    | -                    | -            |              |     |
|                                    | Output Load            | $C_L$   | 1.5 MHz to 50 MHz  | -                    | -                    | 50           | pF           |     |
|                                    | 50.1 MHz to 80 MHz     |   | -  | -                    | 30                   |              |              |     |
|                                    | 80.1 MHz to 160 MHz    |   | -  | -                    | 15                   |              |              |     |
|                                    | Output Voltage Levels  | $V_{OH}$  | CMOS Load  | 10                   | $0.9*V_{CC}$         | -            | -            | V   |
|                                    | Logic '1' Level        |   | TTL LOAD   |                      | $V_{CC}-0.6V$        | -            | -            |     |
|                                    | Logic '0' Level        | $V_{OL}$  | CMOS Load  | TTL                  | -                    | -            | $0.1*V_{CC}$ | 0.4 |
|                                    | Output Current         | $I_{OH}$  | $V_{OH} = 3.9V/2.2V$   | $V_{CC} = 4.5V/3.0V$ | -                    | -            | -16/-8       | mA  |
|                                    | Logic '0' Level        |   | $I_{OL}$   | $V_{OL} = 0.4V$      | $V_{CC} = 4.5V/3.0V$ | -            | -            |     |
| Output Duty Cycle                  | SYM                    | @ 50% Level   |  | 45                   | -                    | 55           | %            |     |
| Rise and Fall Time                 | $T_{R}, T_F$           | @ 10% - 90% Levels, Tested load condition noted for typical values. |  | -                    | 8                    | 10           | ns           |     |
| CB3                                |                        | 1.5 MHz to 20 MHz   | $C_L=50pF$   | -                    | 5                    | 8            |              |     |
|                                    |                        | 20.1 MHz to 80 MHz  | $C_L=50pF$   | -                    | 2.5                  | 5            |              |     |
|                                    |                        | 80.1 MHz to 160 MHz   | $C_L=15pF$   | -                    | 6                    | 8            |              |     |
| CB3LV                              |                        | 1.5 MHz to 20 MHz   | $C_L=15pF$   | -                    | 3                    | 5            |              |     |
|                                    |                        | 20.1 MHz to 80 MHz  | $C_L=15pF$   | -                    | 1.5                  | 3            |              |     |
|                                    | 80.1 MHz to 160 MHz    | $C_L=15pF$  | -  | -                    | -                    |              |              |     |
| Start Up Time                      | $T_S$                  | Application of $V_{CC}$   | -  | -                    | 10                   | ms           |              |     |
| Enable Function                    | $V_{IH}$               | Pin 1 Logic '1', Output Enabled                                     |  | 2.0                  | -                    | -            | V            |     |
| Enable Input Voltage               |                        | $V_{IL}$  | Pin 1 Logic '0', Output Disabled                                 |                      | -                    | -            |              | 0.8 |
| Disable Input Voltage              | $T_{PLZ}$              |   | Pin 1 Logic '1'  |                      | -                    | -            | 10           | ms  |
| Enable Time                        | $I_{ST}$               | Pin 1 Logic '0', Output Disabled                                    |  | -                    | -                    | 10           | µA           |     |
| Standby Current                    | -                      | -   |  | -                    | -                    | 50           | ps           |     |
| Period Jitter, Pk-Pk               | -                      | -   |  | -                    | -                    | 5            |              |     |
| Period Jitter, RMS                 | -                      | -   |  | -                    | -                    | 1            |              |     |
| Phase Jitter, RMS                  | -                      | Bandwidth 12 kHz - 20 MHz   |  | -                    | -                    | -            |              |     |

Notes:

1. Inclusive of calibration @ 25°C, operating temperature range, supply voltage variation, load variation, and first year aging.

### CMOS/TTL OUTPUT WAVEFORM



$$\text{DUTY CYCLE} = t/T \times 100 (\%)$$

### ENABLE TRUTH TABLE

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

### TEST CIRCUIT, CMOS LOAD



### D.U.T. PIN ASSIGNMENTS

| PIN | SYMBOL          | DESCRIPTION              |
|-----|-----------------|--------------------------|
| 1   | EOH             | Enable Input             |
| 2   | GND             | Circuit & Package Ground |
| 3   | Output          | RF Output                |
| 4   | V <sub>CC</sub> | Supply Voltage           |

## MECHANICAL SPECIFICATIONS

### PACKAGE DRAWING



### MARKING INFORMATION

- \*\* – Manufacturing Site Code.  
[Note a dash may follow the site code and is acceptable.]
- XXXXMXXXXXX – Frequency is marked with only leading significant digits before the 'M' and 4 - 6 digits after the 'M' (including zeros).  
Ex. XMXXXXXX (3M579545)  
XXMXXXXXX (14M31818)  
XXXMXXXX (125M0000)
- YYWW – Date code, YY – year, WW – week.
- ST – Frequency stability/temperature code.  
(Refer to Ordering Information.)
- V – Voltage code. 3 = 3.3V, 5 = 5.0V.

### NOTES

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

### SUGGESTED SOLDER PAD GEOMETRY



C<sub>BYPASS</sub> should be ≥ 0.01 uF.

## TAPE AND REEL INFORMATION

Standard packaging is tape and reel for this product family. 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.  |