

# Model CB3 & CB3LV

HCMOS/TTL CLOCK OSCILLATOR



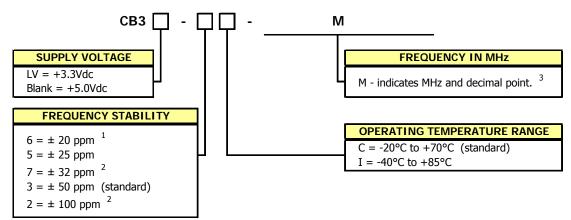
# FEATURES

- 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, ±50 ppm Standard (±25 ppm and ±20 ppm available)
- +3.3Vdc or +5.0Vdc Operation
- Operating Temperature to -40°C to +85°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. XMXXXXXX (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

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 Rev. F

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 • • • www.ctscorp.com • • •



# ELECTRICAL CHARACTERISTICS

Baseline         Waximum Supply Voltage         V <sub>CC</sub> -         -         -         7.0         V           Storage Temperature         T <sub>STG</sub> -         -         -         1.5         -         125         °C           Frequency Range         f <sub>0</sub> .         1.5         -         107         MHz           CB3         Afr         First year         -         3         5         # ppm           Operating Temperature         T <sub>A</sub> -         -         -         3         5         # ppm           Operating Temperature         T <sub>A</sub> -         -         -         3         5         # ppm           Operating Temperature         T <sub>A</sub> -         -         -         3         5         # ppm           Commercial         T <sub>A</sub> -         -         -         3         3.6         V           CB3         Voc         *10 %         4.5         5.0         5.5         V           CB3         1.5 MHz to 20 MHz         C_=50pF         -         10         25         -         20.1 MHz to 80 MHz         -         -         50         60         -         -		PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Frequency Range         0.0         .         1.5         .         107         MHz           GBJLV         6         -         1.5         -         107         160         MHz           GBJLV         Δff         Frequency Stability         Δff         First year         -         3         5         ± ppm           Operating Temperature         Commercial         TA         -         -         20         25         70         °C           CB3LV         Crammercial         TA         -         -         -         3         5         ± ppm           Operating Temperature         TA         -         -         -         -         0         25         70         °C           CB3         Vcc         ± 10 %         4.5         5.0         5.5         V         25         70         °C         6         3.3         3.6         V         25         70         °C         6         3.0         3.3         3.6         V         25         70         °C         6         3.0         3.3         3.6         V         10         25         20.1         Mtz to 20 MHz         C=         50         10         10		Maximum Supply Voltage	V <sub>CC</sub>	-	-0.5	-	7.0	V	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	S	Storage Temperature	T <sub>STG</sub>	-	-55	-	125	°C	
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	cim		f <sub>o</sub>	-				MHz	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	١a	CB3LV		-	1.5	-			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	tel	Frequency Stability	∆f/f <sub>o</sub>	See Note 1 and Ordering Information	-	-		± ppm	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	lut	Aging	٨f	First vear	-	3		± nnm	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	psq							_ ppm	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	A			-	-20	25	70	°C	
CB3         CB3         VCC         4.5         5.0         5.5         V           Supply Current         Frequency Range, rester road condition noted for typical values.         3.0         3.3         3.6         3.6           CB3         Log         Log         Supply Current         1.5 MHz to 20 MHz         C_=50pF         -         10         25           CB3         Log         NHz to 20 MHz         C_=50pF         -         40         80           CB3LV         Log         80.1 MHz to 107 MHz         C_=15pF         -         7         12         mA           CB3LV         Log         NHz to 20 MHz         C_=15pF         -         7         12         mA           CB3LV         Log         Thz to 80 MHz         C_=15pF         -         7         12         mA           Output Load         Logic '1' Level         Vort         S0.1 MHz to 80 MHz         -         -         15         MA           Output Voltage Levels         Vort         CMOS         TTL         -         -         0.1*Vcc         -         -         -         15           Output Voltage Levels         Logic '1' Level         Vort         GMOS         TTL         -					-40	ZJ	85		
CB3LV         requency karge, rester had condition noted for typical values.         3.0         3.3         3.6           Supply Current         I.S MHZ to 20 MHZ         C <sub>4</sub> =50pF         -         10         25           CB3         Lcc         Supply Current         -         10         25           CB3         Lcc         MHZ to 20 MHZ         C <sub>4</sub> =15pF         -         7         12           CB3         Logic MHZ to 80 MHZ         C <sub>4</sub> =15pF         -         7         12         mA           Output Load         C         1.5 MHZ to 160 MHZ         -         -         50         mA           Logic T' Level         VoH         CMOS Load         10         0.9*Vcc         -         -         -         -           Logic T' Level         Logi         VoH         S0.1 MHZ to 160 MHZ         -         -         -         -         -         -         -         -         -         -			N/	± 10 %					
Supply Current         Prequency karage, rescent out control on noced         -			V <sub>CC</sub>					V	
CB3         I.S. MHz to 20 MHz         C = 50pF         -         10         25           CB3         J.Cc         S0.1 MHz to 20 MHz         C = 50pF         -         30         50           CB3LV         I.S. MHz to 20 MHz         C = 15pF         -         40         80           CB3LV         I.S. MHz to 20 MHz         C = 15pF         -         7         12           Output Load         I.S. MHz to 30 MHz         C = 15pF         -         20         40           Output Load         I.S. MHz to 30 MHz         C = 15pF         -         20         40           Output Voltage Levels         I.S. MHz to 80 MHz         -         -         -         50           Logic '0' Level         VoH         CMOS Load         10         0.9*VcC         -         -         -         0.4           Output Current         Logic '0' Level         VoH         CMOS Load         10         0.9*VcC         -         -         +16/-8         mA           Logic '0' Level         Iot         VoL         Load         10         0.9*VcC         -         -         +16/-8         mA           Logic '0' Level         Iot         VoL         Load         10         NoL				Frequency Range, Tested load condition noted	5.0	5.5	3.0		
CB3LV         20.1 MHz to 80 MHz         C <sub>L</sub> =50pF         -         30         50         40         80           CB3LV         1.5 MHz to 20 MHz         C <sub>L</sub> =15pF         -         7         12         40         80           Output Load         1.5 MHz to 80 MHz         C <sub>L</sub> =15pF         -         7         12         40         80           Output Load         1.5 MHz to 80 MHz         C <sub>L</sub> =15pF         -         7         12         40           Output Load         1.5 MHz to 50 MHz         -         -         50         9           Output Voltage Levels         50.1 MHz to 160 MHz         -         -         15         9           Logic '1' Level         V <sub>OH</sub> CMOS Load         10         0.9*V <sub>CC</sub> -         -           Logic '0' Level         V <sub>OH</sub> CMOS Load         TTL         -         -         0.1*V <sub>CC</sub> -           Logic '0' Level         V <sub>OH</sub> CMOS Load         TUL         -		Supply Current		for typical values.					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		CB3		1.5 MHz to 20 MHz $C_L=50pF$	-	10	25		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				20.1 MHz to 80 MHz $C_L=50pF$	-				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			L <sub>CC</sub>	80.1 MHz to 107 MHz C <sub>L</sub> =15pF	-	40	80	m۸	
Bol 1 MHz to 160 MHz         C <sub>L</sub> =15pr         -         30         60           Output Load         1.5 MHz to 50 MHz         -         -         50         pF           Output Voltage Levels         50.1 MHz to 60 MHz         -         -         30         pF           Logic '1' Level         V <sub>OH</sub> CMOS Load         10         0.9*V <sub>CC</sub> -         -         -         V           Output Voltage Levels         Logic '1' Level         V <sub>OH</sub> CMOS Load         10         0.9*V <sub>CC</sub> -         -         -         -         0.1*V <sub>CC</sub> V           Output Current         Logic '1' Level         IOH         V <sub>OL</sub> = 0.4V         V <sub>CC</sub> = 4.5V/3.0V         -         -         -         -         -         0.4           Output Current         Logic '1' Level         IOH         V <sub>OL</sub> = 0.4V         V <sub>CC</sub> = 4.5V/3.0V         -         -         +16/-8         mA           Output Duty Cycle         SYM         0.50% Level         0.1         MHz to 20 MHz         C <sub>L</sub> =50pF         -         8         10           CB3         T <sub>Rv</sub> T <sub>F</sub> 20.1 MHz to 80 MHz         C <sub>L</sub> =50pF         -         5         8         1.5         Ms to 20 MHz         C <sub>L</sub> =15pF <td></td> <td>CB3LV</td> <td></td> <td>1.5 MHz to 20 MHz <math>C_L=15pF</math></td> <td>-</td> <td>7</td> <td>12</td> <td>ШA</td>		CB3LV		1.5 MHz to 20 MHz $C_L=15pF$	-	7	12	ШA	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				20.1 MHz to 80 MHz $C_L=15pF$	-				
Start Up Time         Ts         Application of Vcc         -         -         -         30         pF           Start Up Time         Ts         VoH         CMOS Load         10         0.9 <sup>4</sup> Vcc         -<				80.1 MHz to 160 MHz C <sub>L</sub> =15pF	-	30	60		
See         80.1 MHz to 160 MHz         -         -         15           Output Voltage Levels Logic '1' Level         VoH         CMOS Load         10         0.9*Vcc Vcc*0.6V         -         -         V           Logic '1' Level         VoL         CMOS         TTL         -         0.1*Vcc Vcc*0.6V         -         -         V           Logic '1' Level         Logic '1' Level         Logic '1' Level         Logic '1' Level         -         -         0.1*Vcc 0.4         -         -         0.4           Output Current Logic '0' Level         IoH         VoH = 3.9V/2.2V         Vcc = 4.5V/3.0V         -         -         -         -         16/-8         mA           Output Duty Cycle         SYM         @ 50% Level         45         -         55         %           Output Duty Cycle         SYM         @ 50% Level         45         -         55         %           Rise and Fall Time         Dot MHz C 0 MHz         C = 50 pF         -         8         10         -         -         -         1.5         MA           CB3         T <sub>R'</sub> T <sub>F</sub> So 1 MHz to 160 MHz         C = 150 F         -         2.5         5         ns         ns           Start Up Time		Output Load			-	-			
Output Voltage Levels Logic '1' Level $V_{OH}$ CMOS Load TTL LOAD         10 $0.9*V_{CC}$ $V_{CC}^{-0.6V}$ -         -         -         V           Logic '0' Level $V_{OL}$ CMOS         TTL         -         -         0.1*V <sub>CC</sub> V           Output Current Logic '0' Level $I_{OH}$ $V_{OL}$ $V_{OL}$ -         -         -         0.4           Output Current Logic '0' Level $I_{OH}$ $V_{OL}$ $V_{OL}$ -         -         -         -         -         0.4           Output Duty Cycle         SYM $0.5$ Level         45         - <td< td=""><td></td><td></td><td>CL</td><td></td><td>-</td><td>-</td><td></td><td>pF</td></td<>			CL		-	-		pF	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ŝrs			80.1 MHz to 160 MHz	-	-	15		
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Par				V <sub>CC</sub> 0.0V		0.1*\/	V	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	E	Logic '0' Level	V <sub>OL</sub>		-	-			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	for	Output Current		2000			0.1		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ave		I <sub>OH</sub>	$V_{OH} = 3.9V/2.2V$ $V_{CC} = 4.5V/3.0V$	-	-	-16/-8		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Ň	Logic '0' Level			-	-	+16/+8	MA	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	pu			@ 50% Level	45	-		%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	al a	Rise and Fall Time							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	rică					•	10		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	ect	CB3			-				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Ĕ		$T_{P}, T_{F}$		_				
$ \begin{array}{ c c c c c c c } \hline & 20.1 \text{ MHz to } 80 \text{ MHz} & C_L = 15 \text{pF} & - & 3 & 5 \\ \hline & 80.1 \text{ MHz to } 160 \text{ MHz} & C_L = 15 \text{pF} & - & 1.5 & 3 \\ \hline & 1.5 & 3 & \\ \hline & 1.5 & 1.5 & 1.5 & \\ \hline & 1.5 & 1.5 & 1.5 & \\ \hline & 1.5 & 1.5 & 1.5 & \\ \hline & 1.5 & 1.5 & 1.5 & \\ \hline & 1.5 & 1.5 & 1.5 & \\ \hline & 1.5$		CB3LV					-	ns	
$ \begin{array}{ c c c c c c c c } \hline & & & & & & & & & & & & & & & & & & $		CB3LV			-				
Start Up TimeTsApplication of V <sub>CC</sub> 10msEnable Function </td <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td>					_				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Chart Lin Time -	т	E 1			-		
$ \begin{array}{ c c c c c c } \hline Enable Input Voltage & V_{IH} & Pin 1 Logic '1', Output Enabled & 2.0 & - & - & V \\ \hline Disable Input Voltage & V_{IL} & Pin 1 Logic '0', Output Disabled & - & 0.8 \\ \hline Enable Time & T_{PLZ} & Pin 1 Logic '1' & - & 10 & ms \\ \hline Standby Current & I_{ST} & Pin 1 Logic '0', Output Disabled & - & - & 10 & \muA \\ \hline Period Jitter, Pk-Pk & - & - & - & 50 \\ \hline Period Jitter, RMS & - & - & - & 5 & ps \\ \hline \end{array} $			IS		-	-	10	ms	
Disable Input Voltage         V <sub>IL</sub> Pin 1 Logic '0', Output Disabled         -         -         0.8           Enable Time         T <sub>PLZ</sub> Pin 1 Logic '1'         -         -         10         ms           Standby Current         I <sub>ST</sub> Pin 1 Logic '0', Output Disabled         -         -         10         μA           Period Jitter, Pk-Pk         -         -         -         50         ps           Period Jitter, RMS         -         -         -         50         ps			V	Pin 1 Logic '1' Output Enabled	20	_	_	V	
Enable Time         T <sub>PLZ</sub> Pin 1 Logic '1'         -         -         10         ms           Standby Current         I <sub>ST</sub> Pin 1 Logic '0', Output Disabled         -         -         10         μA           Period Jitter, Pk-Pk         -         -         -         50         ps           Period Jitter, RMS         -         -         -         5         ps					2.0		0.8	v	
Standby Current         I         Pin 1 Logic '0', Output Disabled         -         10         μA           Period Jitter, Pk-Pk         -         -         50         -         50         ps           Period Jitter, RMS         -         -         -         50         ps		· · ·						me	
Period Jitter, Pk-Pk     -     -     50       Period Jitter, RMS     -     -     5     ps				-		_			
Period Jitter, RMS 5 ps			1	-	_	_		μΑ	
				<u>-</u>	-	-		ps	
		Phase Jitter, RMS	-	Bandwidth 12 kHz - 20 MHz	-	-	1		

Notes:

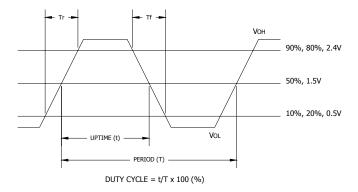
1. Inclusive of calibration @ 25°C, operating temperature range, supply voltage variation, load variation, and first year aging.

Document No. 008-0256-0



# Model CB3 & CB3LV 7.0x5.0mm Low Cost **HCMOS/TTL Clock Oscillator**

#### CMOS/TTL OUTPUT WAVEFORM

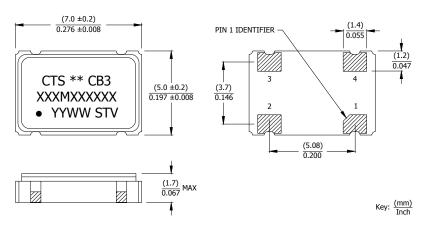


#### **ENABLE TRUTH TABLE**

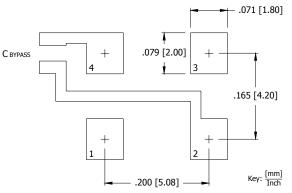
PIN 1	PIN 3		
Logic `1'	Output		
Open	Output		
Logic '0'	High Imp.		

# MECHANICAL SPECIFICATIONS

#### PACKAGE DRAWING



#### SUGGESTED SOLDER PAD GEOMETRY

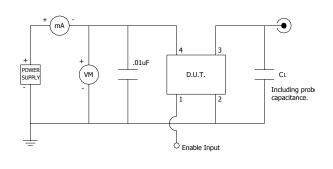


 $C_{BYPASS}$  should be  $\geq 0.01$  uF.

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 171 Covington Drive
 Bloomingdale, IL 60108
 \*

# 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	

# MARKING INFORMATION

- 1. \*\* Manufacturing Site Code.
- [Note a dash may follow the site code and is acceptable.] 2. XXXMXXXXX – Frequency is marked with
- only leading significant digits before the 'M' and 4 - 6 digits after the 'M' (including zeros). Ex. XMXXXXXX (3M579545) XXMXXXXX (14M31818) XXXMXXXX (125M0000)
- 3. YYWW Date code, YY year, WW week.
- 4. ST Frequency stability/temperature code. (Refer to Ordering Information.)
- 5. V - Voltage code. 3 = 3.3V, 5 = 5.0V.

#### NOTES

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

Rev. F

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# TAPE AND REEL INFORMATION

DIMENSIONS IN MILLIMETERS 17.5 - 2.0 Ø13 Ø1.50 1.75 4.0 8.0 2.40 2.10 120° 0 ÷ 0 0 Ć œ Φ C (Th 16.0 8.40 + . Ø60 Ø180 5.70 Ø23 DIRECTION OF FEED

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 $-55^{\circ}$ C to $+125^{\circ}$ 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°C for 20 seconds.		
Fine Leak:	Mass spectrometer leak rates less than $2x10^{-8}$ ATM cc/sec air equivalent.		
Resistance to Solder Heat:	Product must survive 3 reflows of +260°C peak, 10 seconds maximum.		
High Temperature Operating Bias:	2,000 hours at +125°C, maximum bias, disregarding frequency shift.		
Frequency Aging:	1,000 hours at +85°C, full bias, less than $\pm 5$ ppm shift.		
Moisture Sensitivity Level:	Level 1 per JEDEC J-STD-020.		

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