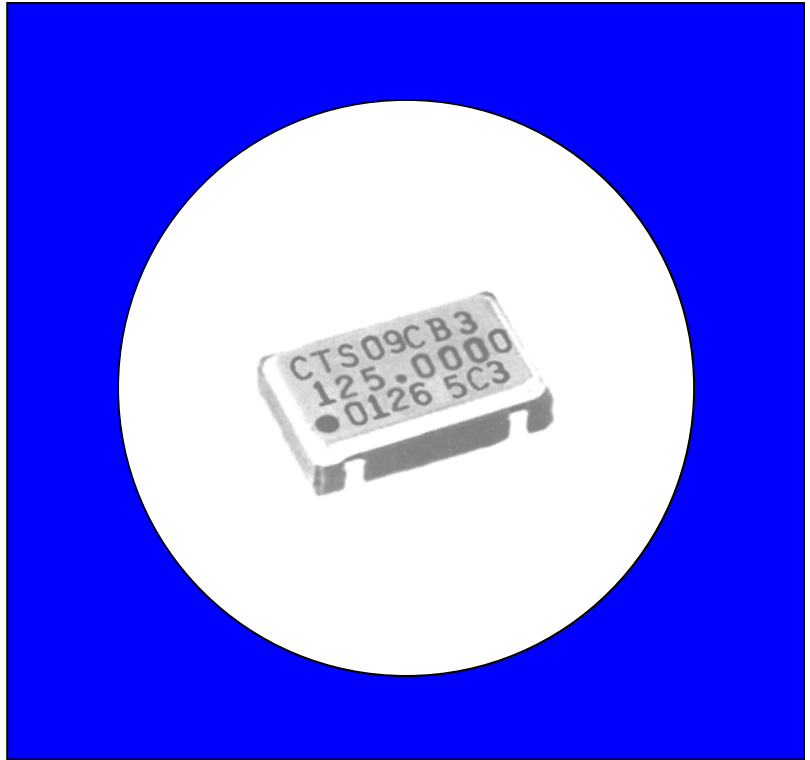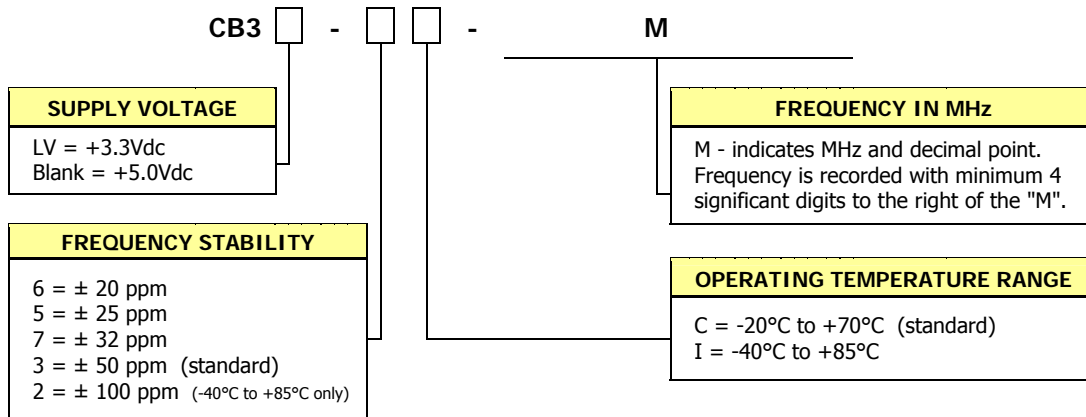# CTS®

CMOS/TTL CLOCK OSCILLATOR

FEATURES

- Standard 7.5x5mm Surface Mount Footprint
- CMOS/TTL Compatible
- 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 Compliant**

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

CB3 ☐ - ☐ ☐ - _____ M _____

SUPPLY VOLTAGE

LV = +3.3Vdc
Blank = +5.0Vdc

FREQUENCY STABILITY

6 = ± 20 ppm
5 = ± 25 ppm
7 = ± 32 ppm
3 = ± 50 ppm (standard)
2 = ± 100 ppm (-40°C to +85°C only)

FREQUENCY IN MHz

M - indicates MHz and decimal point. Frequency is recorded with minimum 4 significant digits to the right of the "M".

OPERATING TEMPERATURE RANGE

C = -20°C to +70°C (standard)
I = -40°C to +85°C

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_O	-	1.5	-	160	MHz
	Frequency Stability (See Note 1 and Ordering Information)	$\Delta f/f_O$	-	-	-	20,25,32, 50 or 100	± ppm

	Operating Temperature
	   Commercial
	   Industrial
		T_A	-	-20
				-40
					25	70
						85
							°C

Electrical and Waveform Parameters	Supply Voltage
	   CB3
	
	   CB3LV
		V_{CC}	± 10 %	
				4.5
				3.0
					
					5.0
					3.3
						
						5.5
						3.6
							V

	Supply Current
	   CB3
	
	   CB3LV
		I_{CC}	1.5 MHz to 20 MHz C_L=50pF
			20.1 MHz to 80 MHz C_L=50pF
			80.1 MHz to 160 MHz C_L=15pF
			1.5 MHz to 20 MHz C_L=15pF
			20.1 MHz to 80 MHz C_L=15pF
			80.1 MHz to 160 MHz C_L=15pF
				-
				-
				-
				-
				-
				-
					10
					30
					40
					7
					20
					30
						25
						50
						100
						12
						40
						60
							mA

	Output Load	C_L	1.5 MHz to 50 MHz 50.1 MHz to 80 MHz 80.1 MHz to 160 MHz	- - -	- - -	50 30 15	pF

	Output Voltage Levels
	   Logic '1' Level
	
	   Logic '0' Level
		V_{OH}
		
		V_{OL}
			CMOS Load
			10 TTL LOAD
			
			CMOS or TTL Load
				V_{CC} - 0.5V
				V_{CC} - 0.6V
				
				-
					-
					
					-
						-
						
						0.4
							V

	Output Current
	   Logic '1' Level
	   Logic '0' Level
		I_{OH}
		I_{OL}
			V_{OH} = 3.9V/2.2V V_{CC} = 4.5V/3.0V
			V_{OL} = 0.4V V_{CC} = 4.5V/3.0V
				-
				-
					-
					-
						-16/-8
						+16/+8
							mA

	Output Duty Cycle	SYM	@ 50% Level	45	-	55	%

	Rise and Fall Time
	   CB3
	
	   CB3LV
		T_R, T_F	@ 10% - 90% Levels
			1.5 MHz to 20 MHz C_L=50pF
			20.1 MHz to 80 MHz C_L=50pF
			80.1 MHz to 160 MHz C_L=15pF
			1.5 MHz to 20 MHz C_L=15pF
			20.1 MHz to 80 MHz C_L=15pF
			80.1 MHz to 160 MHz C_L=15pF
				
				-
				-
				-
				-
				-
				-
					
					8
					4
					2.5
					6
					3
					1.5
						
						10
						8
						5
						8
						4
						3
							ns

	Start Up Time	T_S	Application of V_{CC}	-	-	10	ms

	Enable Function
	(See Note 2)
	   Enable Input Voltage
	   Disable Input Voltage
		
		V_{IH}
		V_{IL}
			
			Pin 1 Logic '1', Output Enabled
			Pin 1 Logic '0', Output Disabled
				
				2
				-
					
					-
					-
						
						-
						0.8
							V

	Enable Time
	   CB3
	   CB3LV
		T_{PLZ}	Pin 1 Logic '1'	
				-
				-
					
					-
					-
						
						100
						10
							ns
							ms

	Phase Jitter	tjms	Bandwidth 12 KHz - 20 MHz	-	< 1	-	ps RMS

Notes:
1. Inclusive of initial tolerance at time of shipment, changes in supply voltage, load, temperature and first year aging at an average operating temperature of +40 °C.

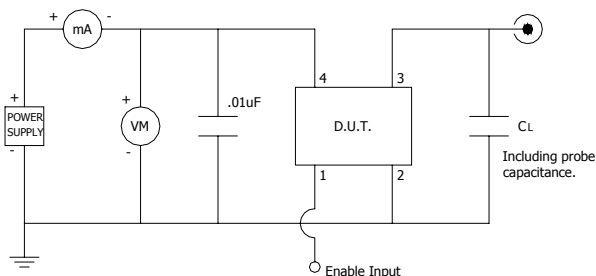2. Reference CTS Application Note 014-0002-0.

CMOS/TTL OUTPUT WAVEFORM

V_{OH}
90%, 80%, 2.4V
50%, 1.5V
10%, 20%, 0.5V
V_{OL}

UPTIME (t)
PERIOD (T)

DUTY CYCLE = t/T x 100 (%)
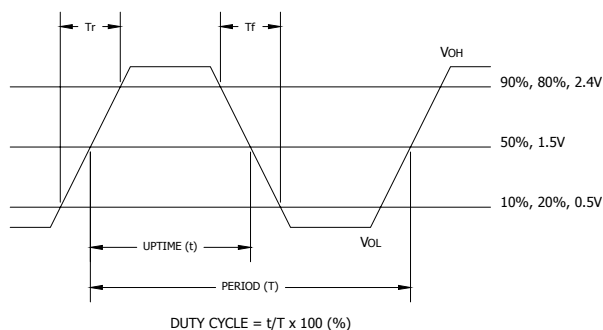
ENABLE TRUTH TABLE

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

TEST CIRCUIT, CMOS LOAD

Including probe capacitance.

Enable Input

D.U.T. PIN ASSIGNMENTS

PIN	SYMBOL	DESCRIPTION
1	EOH	Enable Input
2	GND	Circuit & Package Ground
3	Output	RF Output
4	V_{CC}	Supply Voltage

MECHANICAL SPECIFICATIONS

PACKAGE DRAWING

$\frac{(7.7)}{0.303}$ MAX

CTS ** - CB3
XXMXXXX
• YYWW STV

$\frac{(5.2)}{0.205}$ MAX

PIN 1 IDENTIFIER

$\frac{(1.4)}{0.055}$
$\frac{(1.2)}{0.047}$
$\frac{(3.7)}{0.146}$
$\frac{(5.08)}{0.200}$

$\frac{(1.8)}{0.071}$ MAX

Key: $\frac{(mm)}{Inch}$
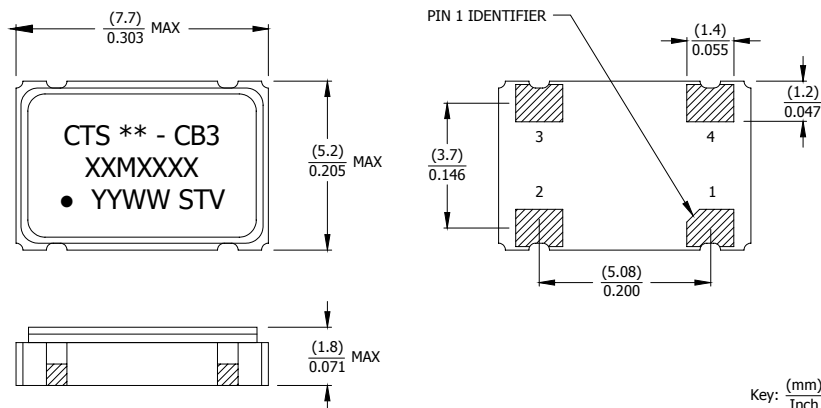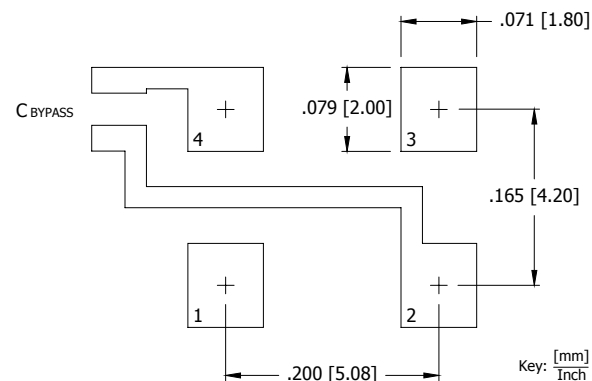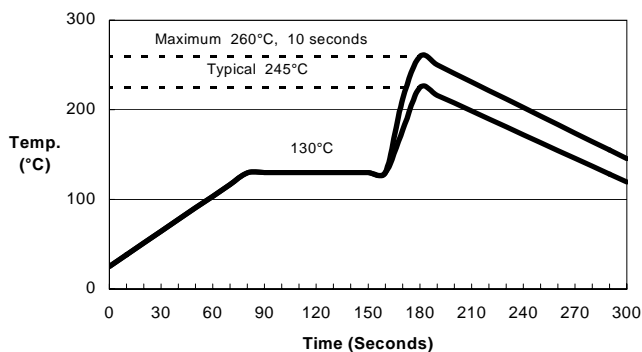
MARKING INFORMATION

1. ** - Manufacturing Site Code.
2. XXMXXXX - Frequency marked with 4 significant digits after the 'M'.
3. YYWW – Date code, YY – year, WW – week.
4. ST – Frequency stability/temperature code. (Reference Ordering Information.)
5. V – Voltage code. 3 = 3.3V, 5 = 5.0V.

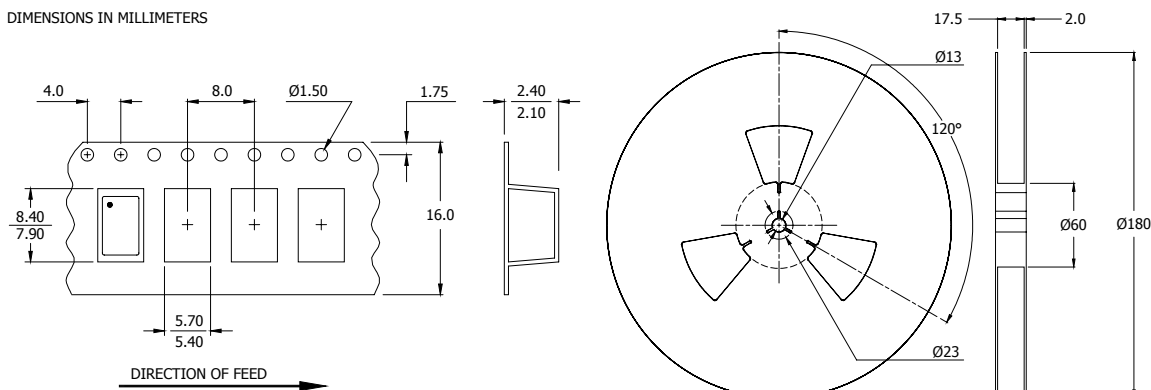## SUGGESTED SOLDER PAD GEOMETRY

C_{BYPASS}

.071 [1.80]
.079 [2.00]
.165 [4.20]
.200 [5.08]

Key: $\frac{[mm]}{Inch}$

C_{BYPASS} should be ≥ 0.01 uF.

SUGGESTED REFLOW PROFILE

Maximum 260°C, 10 seconds
Typical 245°C
130°C

Temp. (°C)

Time (Seconds)

* * * CTS Communications Components, Inc. * 171 Covington Drive * Bloomingdale, IL 60108 * 630-924-3500 * * *

TAPE AND REEL INFORMATION

DIMENSIONS IN MILLIMETERS

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

ENVIRONMENTAL SPECIFICATIONS

Temperature Cycle:	400 cycles from −55°C to +125°C, 10 minute dwell at each temperature, 1 minute transfer time between temperatures.
Mechanical Shock:	1,500g's, 0.5mS duration, ½ 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 2×10^{-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 ±5 ppm shift.

QUALITY AND RELIABILITY

Quality systems meet or exceed the requirements of ISO 9000:2000 standards. Reliability audits are performed on this or similar products with results available upon request.