

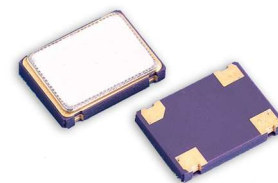


Model CB2V5

HCMOS/TTL Clock Oscillator

Features

- Ceramic Surface Mount Package
- Fundamental and 3rd Overtone Crystal Designs
- Frequency Range 1.0 – 160MHz *
- +2.5V Operation
- Operating Temperature Range to -40°C to +85°C
- Output Enable Standard
- Tape and Reel Packaging, EIA-481



Part Dimensions:
7.0 × 5.0 × 1.8mm • 171.497mg

Standard Frequencies

* See Page 6 for common frequencies.
Check with factory for availability of frequencies not listed.

Applications

- Internet of Things [IoT, IIoT]
- Microcontrollers and FPGAs
- Wireless Communication
- Networking Equipment
- Data Communications
- Computers and Peripherals
- Ethernet/GbE/SyncE
- Portable Devices
- Test and Measurement

Description

CTS Model CB2V5 is a low cost, low voltage clock oscillators supporting HCMOS output. Employing the latest IC technology, CB2V5 has excellent stability and low phase jitter performance.

Ordering Information

Model	Supply Voltage	Frequency Stability	Temperature Range	Frequency Code [MHz]																																		
CB	2V5	3	C	XXXMXXXX																																		
<table><tr><th>Code</th><th>Voltage</th></tr><tr><td>2V5</td><td>+2.5Vdc</td></tr></table> <table><tr><th>Code</th><th>Temp. Range</th></tr><tr><td>C</td><td>-20°C to +70°C</td></tr><tr><td>D</td><td>-30°C to +85°C</td></tr><tr><td>I</td><td>-40°C to +85°C</td></tr></table> <table><tr><th>Code</th><th>Stability</th><th>Code</th><th>Stability</th><th>Code</th><th>Stability</th></tr><tr><td>6</td><td>±20ppm¹</td><td>4</td><td>±30ppm</td><td>3</td><td>±50ppm</td></tr><tr><td>5</td><td>±25ppm</td><td>7</td><td>±32ppm²</td><td></td><td></td></tr></table> <table><tr><th>Code</th><th>Frequency</th></tr><tr><td colspan="2">Product Frequency Code³</td></tr></table>					Code	Voltage	2V5	+2.5Vdc	Code	Temp. Range	C	-20°C to +70°C	D	-30°C to +85°C	I	-40°C to +85°C	Code	Stability	Code	Stability	Code	Stability	6	±20ppm ¹	4	±30ppm	3	±50ppm	5	±25ppm	7	±32ppm ²			Code	Frequency	Product Frequency Code ³	
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Notes:

- 1] Consult factory for availability of 6I Stability/Temperature combination.
- 2] These stabilities are not recommended for new designs.
- 3] Frequency is recorded with 3 leading digits before and 4 significant digits after the "M" [including zeroes].
[Ex. 3.579545MHz = 003M5795; 14.31818MHz = 014M3181; 25MHz = 025M0000; 125MHz = 125M0000]

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

This product is specified for use only in standard commercial applications. Supplier disclaims all express and implied warranties and liability in connection with any use of this product in any non-commercial applications or in any application that may expose the product to conditions that are outside of the tolerances provided in its specification.



Electrical Specifications

Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Supply Voltage	V_{CC}	-	-0.5	-	4.0	V
Supply Voltage	V_{CC}	$\pm 10\%$	2.25	2.5	2.75	V
Typical @ Nominal V_{CC} , $C_L = 15$ pF, $T_A = +25^\circ\text{C}$						
Supply Current	I_{CC}	@ +2.5V, 1.0MHz to <60MHz	-	3	10	mA
		@ +2.5V, 60MHz to <100MHz	-	8	20	
		@ +2.5V, 100MHz to 160MHz	-	12	30	
Output Load	C_L	-	-	-	15	pF
Operating Temperature	T_A	-	-20	+25	+70	$^\circ\text{C}$
		-	-30		+85	
		-	-40		+85	
Storage Temperature	T_{STG}	-	-55	-	+125	$^\circ\text{C}$

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f_0	-		1.0 - 160		MHz
Frequency Stability [Note 1]	$\Delta f/f_0$	-		20, 25, 30, 50		$\pm\text{ppm}$
Aging	$\Delta f/f_{25}$	First Year @ +25 $^\circ\text{C}$, nominal V_{CC}	-3	-	3	ppm

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

Output Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Type	-	-		HCMOS		-
Output Voltage Levels	V_{OH}	Logic '1' Level, CMOS Load	$0.9V_{CC}$	-	-	V
	V_{OL}	Logic '0' Level, CMOS Load	-	-	$0.1V_{CC}$	
Output Current Levels	I_{OH}	$V_{OH} = 90\%V_{CC}$ [+2.5V]	-	-	-4	mA
	I_{OL}	$V_{OL} = 10\%V_{CC}$ [+2.5V]	-	-	+4	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
@ 10%/90% Levels, Nominal V_{CC} , $C_L = 15$ pF						
Rise and Fall Time [Note 2]	T_R, T_F	@ +2.5V or +3.3V, 1.0MHz to <20MHz	-	-	5	ns
		@ +2.5V or +3.3V, 20MHz to <125MHz	-	-	4	
		@ +2.5V or +3.3V, 125MHz to 160MHz	-	-	3	
Start Up Time	T_S	Application of V_{CC}	-	2	5	ms

2.] Parameters are worst case and account for comprehensive range of product specification. Performance may vary by application and must be validated by end user.



Electrical Specifications

Output Parameters

Enable Function		Standby				
Enable Input Voltage	V_{IH}	Pin 1 Logic '1', Output Enabled	$0.7V_{CC}$	-	-	V
Disable Input Voltage	V_{IL}	Pin 1 Logic '0', Output Standby	-	-	$0.3V_{CC}$	V
Standby Current	I_{STB}	Pin 1 Logic '0', Output Standby	-	-	15	μA
Enable Time	T_{PLZ}	Pin 1 Logic '1', Output Enabled	-	-	5	ms
Phase Jitter, RMS [Note 3]	t_{jrms}	Bandwidth 12kHz - 20MHz	-	0.5	<1	ps

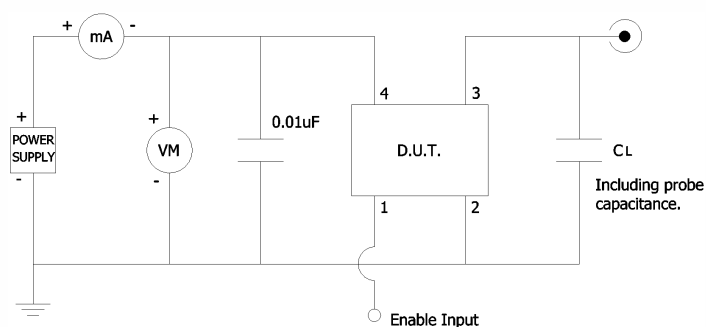
3.] For frequencies 10MHz - 40MHz, the measurement Bandwidth is 12kHz - 5MHz.

Enable Truth Table

Pin 1	Pin 3
Logic '1'	Output Enabled
Open	Output Enabled
Logic '0'	Output Disabled, High Impedance

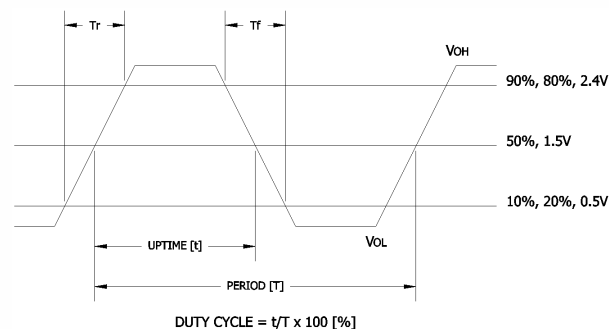
Test Circuit

HCMOS



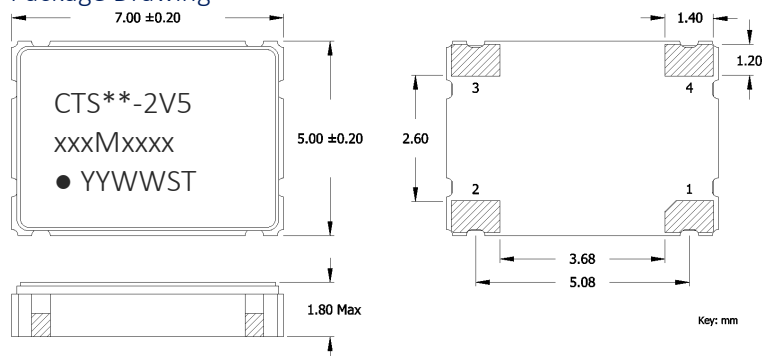
Output Waveform

HCMOS



Mechanical Specifications

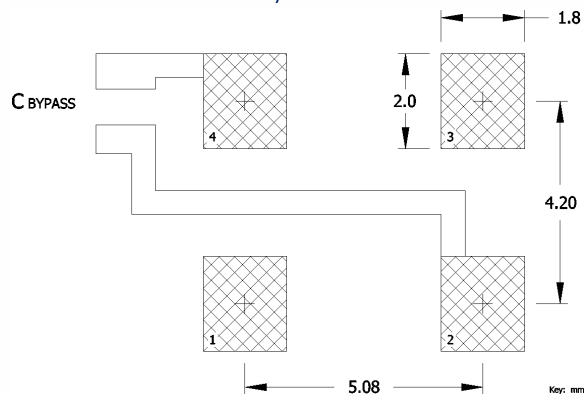
Package Drawing



Marking Information

1. ** – Manufacturing Site Code.
2. xxxMxxxx – Frequency is marked with 1,2 or 3 leading significant digits before the “M” and 4 digits after the “M” [including zeroes].
Ex. xMxxxx [3M5795]
xxMxxxx [14M3181]
xxMxxxx [25M0000]
xxxMxxxx[125M0000]
3. YYWW – Date Code; YY = year, WW = week.
4. ST – Frequency Stability/Temperature Code.
[Refer to ordering information for codes.]

Recommended Pad Layout



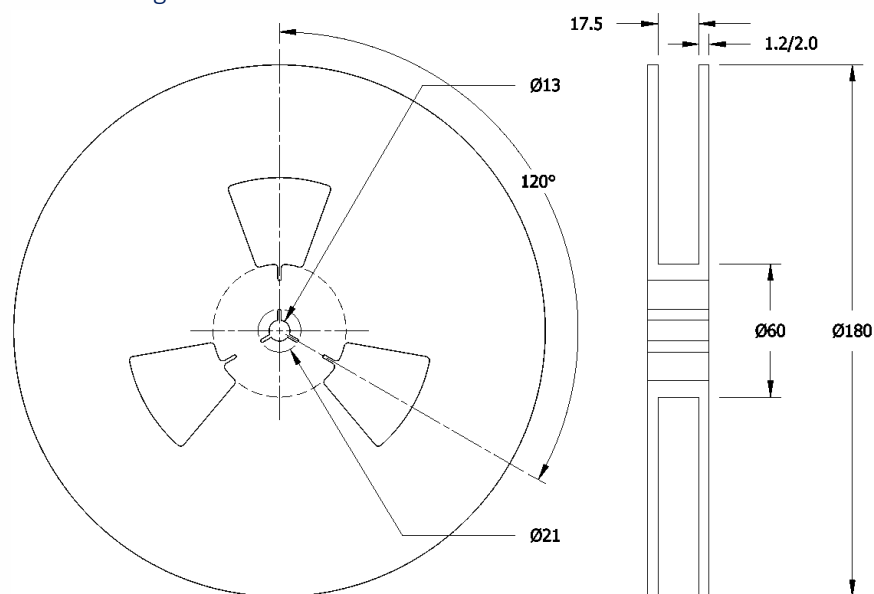
Notes

1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

Pin Assignments

Pin	Symbol	Function
1	EOH	Enable
2	GND	Circuit & Package Ground
3	Output	RF Output
4	V _{CC}	Supply Voltage

Tape Drawing



Notes

1. Device quantity is 1k pieces maximum per 180mm reel.
2. Complete CTS part number, frequency value and date code information must appear on reel and carton labels.



Addendum

Common Frequencies – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
1.000000	001M0000	10.240000	010M2400	27.120000	027M1200	66.660000	066M6600
1.024000	001M0240	11.059200	011M0592	30.000000	030M0000	66.666000	066M6660
1.042000	001M0420	12.000000	012M0000	30.720000	030M7200	66.666600	066M6666
1.440000	001M4400	12.288000	12M2880	32.000000	032M0000	66.666700	066M6667
1.544000	001M5440	13.000000	013M0000	32.768000	032M7680	66.667000	066M6670
1.843200	001M8432	13.560000	013M5600	33.000000	033M0000	66.670000	066M6700
2.000000	002M0000	14.318180	014M3181	33.330000	033M3300	74.175800	074M1758
2.048000	002M0480	14.745600	014M7456	33.333000	033M3330	74.250000	074M2500
2.176000	002M1760	15.360000	015M3600	33.333300	033M3333	74.752800	074M7528
2.400000	002M4000	16.000000	016M0000	34.368000	034M3680	77.760000	077M7600
2.457600	002M4576	16.384000	016M3840	34.560000	034M5600	80.000000	080M0000
2.500000	002M5000	16.666700	016M6667	35.000000	035M0000	98.304000	098M3040
3.072000	003M0720	16.667000	016M6670	36.000000	036M0000	100.000000	100M0000
3.088000	003M0880	16.670000	016M6700	37.400000	037M4000	106.250000	106M2500
3.579545	003M5795	18.192000	018M1920	38.400000	038M4000	125.000000	125M0000
3.686400	003M6864	18.432000	018M4320	40.000000	040M0000	125.009375	125M0093
4.000000	004M0000	19.200000	019M2000	40.960000	040M9600	127.000000	127M0000
4.096000	004M0960	19.440000	019M4400	42.500000	042M5000	133.000000	133M0000
4.500000	004M5000	19.660800	019M6608	44.000000	044M0000	148.500000	148M5000
4.915200	004M9152	20.000000	020M0000	45.000000	045M0000	150.000000	150M0000
5.000000	005M0000	20.480000	020M4800	48.000000	048M0000	153.600000	153M6000
6.144000	006M1440	22.118400	022M1184	49.152000	049M1520	155.520000	155M5200
6.176000	006M1760	24.000000	024M0000	50.000000	050M0000	156.250000	156M2500
7.372800	007M3728	24.545454	024M5454	52.000000	052M0000	160.000000	160M0000
7.680000	007M6800	24.574600	024M5746	54.000000	054M0000		
8.000000	008M0000	24.576000	024M5760	60.000000	060M0000		
8.192000	008M1920	25.000000	025M0000	61.140000	061M1400		
9.600000	009M6000	25.000625	025M0006	64.000000	064M0000		
9.830400	009M8304	26.000000	026M0000	65.536000	065M5360		
10.000000	010M0000	27.000000	027M0000	66.000000	066M0000		