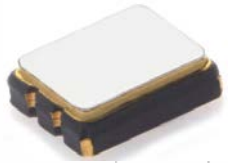
Model 334C

Advanced PLL HCMOS VCXO



Part Dimensions:
3.2 × 2.5 × 1.1mm • 24mg

Features

- Ceramic Surface Mount Package
- Low Phase Jitter Performance, 600fs Typical
- Advanced PLL Design w/ Low Fundamental Crystal
- Frequency Range 10 – 250MHz *
- +2.5V or +3.3V Operation
- Output Enable Standard
- Tape and Reel Packaging, EIA-418

Applications

- Broadcast Video Systems
- Storage Area Networking
- Broadband Access
- Phase-Locked Loop
- Networking Equipment
- Ethernet/GbE/SyncE
- Fiber Channel
- Test and Measurement

Standard Frequencies

- 50.00MHz	- 122.88MHz	- 156.25MHz
- 77.76MHz	- 125.00MHz	- 200.00MHz
- 100.00MHz	- 155.52MHz	

* See Page 7 for additional developed frequencies.
Check with factory for availability of frequencies not listed.

Description

CTS Model 334C is a low cost, high performance PLL voltage controlled oscillator supporting HCMOS output. Employing the latest IC technology, M334C has excellent stability and low phase jitter performance.

Ordering Information

Model	Output Type	Frequency Code [MHz]	Absolute Pull Range	Frequency Stability	Temperature Range	Supply Voltage	Packaging
334	C	XXX or XXXX	B	3	I	3	T

Code	Output
C	HCMOS

Code	APR
B	±50ppm

Code	Temp. Range
C	-20°C to +70°C
I	-40°C to +85°C

Code	Packing
T	1k pcs./reel

Code	Frequency
Product Frequency Code [1]	

Code	Stability
5	±25ppm [2]
4	±30ppm
3	±50ppm

Code	Voltage
2	+2.5Vdc
3	+3.3Vdc

Notes:

1] Refer to document 016-1454-0, Frequency Code Tables.
3-digits for frequencies <100MHz, 4-digits for frequencies 100MHz or greater.

2] Check factory availability when paired with "I" temperature code.

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

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Electrical Specifications

Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Supply Voltage	V_{CC}	-	-0.5	-	4.0	V
Maximum Control Voltage	V_C	V_{CC} = +2.5V	-0.5	-	3.0	V
		V_{CC} = +3.3V	-0.5	-	3.8	
Supply Voltage	V_{CC}	±5%	2.375	2.5	2.625	V
			3.135	3.3	3.465	
Supply Current	I_{CC}	Maximum Load	-	20	65	mA
Operating Temperature	T_A	-	-20	+25	+70	°C
			-40		+85	
Storage Temperature	T_{STG}	-	-55	-	+125	°C

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f_O	-		10 - 250		MHz
Frequency Stability [Note 1]	$\Delta f/f_O$	-		25, 30 or 50		±ppm
Absolute Pull Range [Note 2]	APR	-	50	-	-	±ppm
Aging	$\Delta f/f_{25}$	First Year @ +25°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.

2.] Minimum guaranteed frequency shift from f_O over variations in temperature, aging, power supply and load.

Output Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Output Type	-	-		HCMOS		-
Output Load	C_L	-	-	-	15	pF
Output Voltage Levels	V_{OH}	CMOS Load	$0.9V_{CC}$	-	-	V
	V_{OL}		-	-	$0.1V_{CC}$	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Rise and Fall Time	T_R, T_F	@ 20%/80% Levels, C_L = 15pF	-	5	10	ns
Start Up Time	T_S	Application of V_{CC}	-	3	5	ms
Enable Function [Tri-State]						
Enable Input Voltage	V_{IH}	Pin 2 Logic '1', Output Enabled	$0.7V_{CC}$	-	-	V
Disable Input Voltage	V_{IL}	Pin 2 Logic '0', Output Disabled	-	-	$0.3V_{CC}$	V
Disable Current	I_{IL}	Pin 2 Logic '0', Output Disabled	-	16	22	mA
Enable Time	T_{PLZ}	Pin 2 Logic '1', Output Enabled	-	-	200	ns
Phase Jitter, RMS	tjrms	Bandwidth 12 kHz - 20 MHz	-	600	<1000	fs
Period Jitter, RMS	pjrms	-	-	3.0	-	ps
Period Jitter, pk-pk	pjpk-pk	-	-	30	-	ps

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Electrical Specifications

Control Voltage

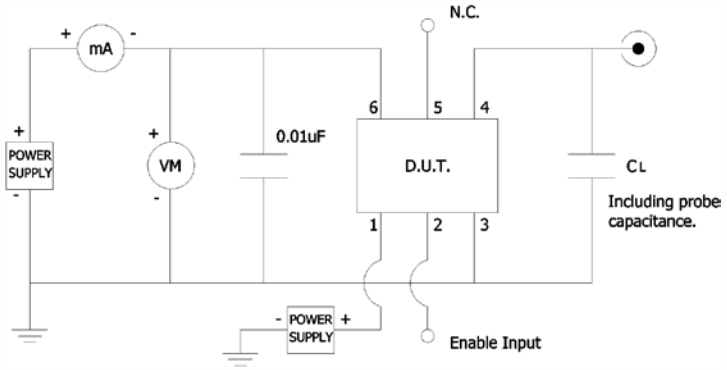
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Control Voltage	V_C	V_{CC} = 2.5V	0.2	1.25	2.3	V
		V_{CC} = 3.3V	0.3	1.65	3.0	
Frequency Deviation	$\Delta f/f_O$	V_C = 0.2V		-60 to -180		ppm
		V_C = 2.3V		60 to 180		
		V_C = 0.3V		-60 to -180		ppm
		V_C = 3.0V		60 to 180		
Linearity	L	Best Straight Line Fit	-	-	±15	%
Gain Transfer	K_V	Pull Sensitivity; @ +1.25V, +25°C	-	80	260	ppm/V
		Pull Sensitivity; @ +1.65V, +25°C				
Input Impedance	Z_{Vc}	-	1	-	-	MOhms
Modulation Roll-off	-	@ -3dB	10	-	-	kHz
Transfer Function	-	-		Positive		-

Enable Truth Table

Pin 2	Pin 4
Logic '1'	Output
Open	Output
Logic '0'	High Imp.

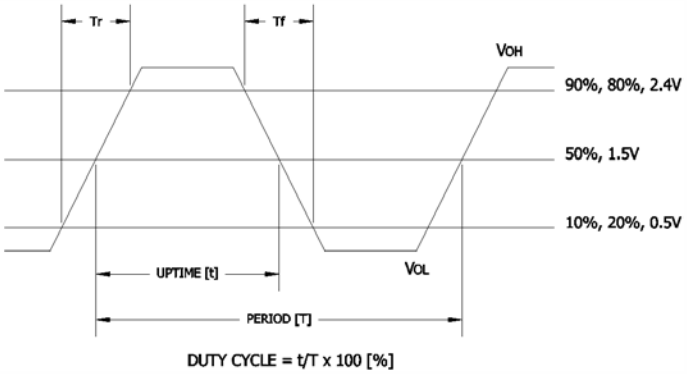
Test Circuit

HCMOS



Output Waveform

HCMOS



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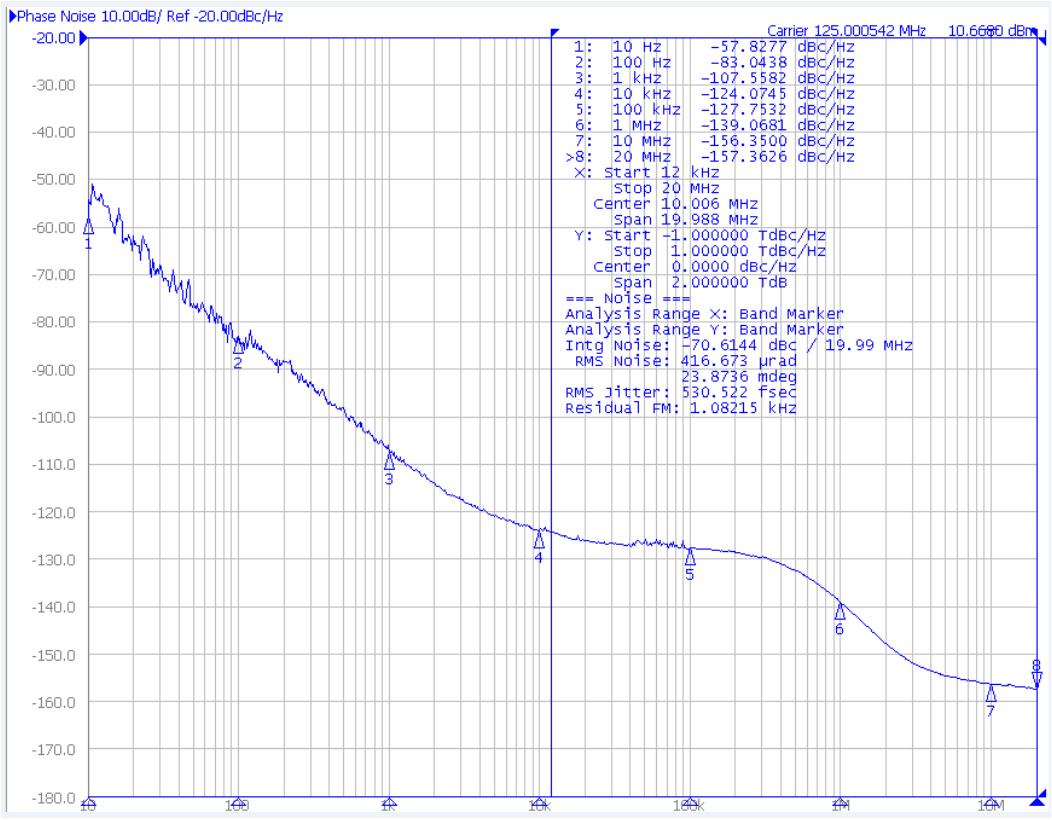
Electrical Specifications

Performance Data

Phase Noise [typical]

125MHz, HCMOS, V_{CC} = +3.3V, V_C = +1.65V, T_A = +25°C



Phase Noise Tabulated

125MHz, HCMOS, V_{CC} = +3.3V, V_C = +1.65V, T_A = +25°C

PARAMETER	SYMBOL	CONDITIONS	TYP	UNIT
HCMOS @ 125.00MHz				
Phase Noise		Single Side Band		
		@ 10Hz	-57.8277	
		@ 100Hz	-83.0438	
		@ 1kHz	-107.5582	
	-	@ 10kHz	-124.0745	dBc/Hz
		@ 100kHz	-127.7532	
		@ 1MHz	-139.0681	
		@ 10MHz	-156.3500	
		@ 20MHz	-157.3626	
Phase Jitter, RMS	tjrms	Integration Bandwidth 12kHz - 20MHz	530.5330	fs

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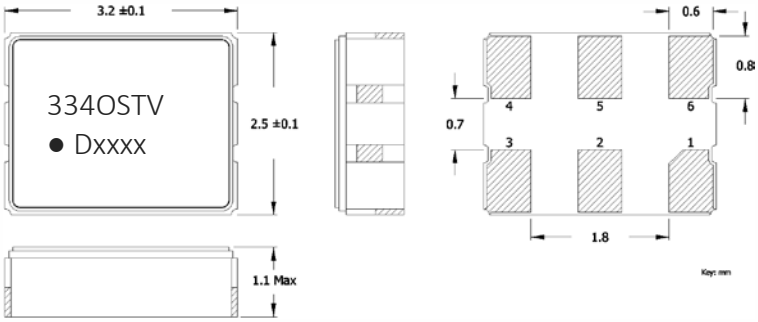
Mechanical Specifications

Package Drawing

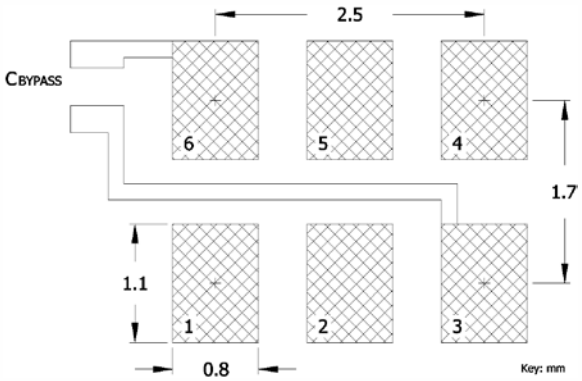


Marking Information

1. O – Output Type; C = HCMOS.
2. ST – Frequency Stability/Temperature Code. [Refer to Ordering Information]
3. V – Voltage Code; 3 = 3.3V, 2 = 2.5V.
4. D – Date Code. See Table I for codes.
5. xxxx – Frequency Code.
   3-digits, frequencies below 100MHz
   4-digits, frequencies 100MHz or greater

[See document 016-1454-0, Frequency Code Tables.]

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	V_C	Voltage Control
2	EOH	Enable [tri-state]
3	GND	Circuit & Package Ground
4	Output	RF Output
5	N.C.	No Connect
6	V_{CC}	Supply Voltage

Table I - Date Code

YEAR \ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001 2005 2009 2013 2017	A	B	C	D	E	F	G	H	J	K	L	M
2002 2006 2010 2014 2018	N	P	Q	R	S	T	U	V	W	X	Y	Z
2003 2007 2011 2015 2019	a	b	c	d	e	f	g	h	j	k	l	m
2004 2008 2012 2016 2020	n	p	q	r	s	t	u	v	w	x	y	z

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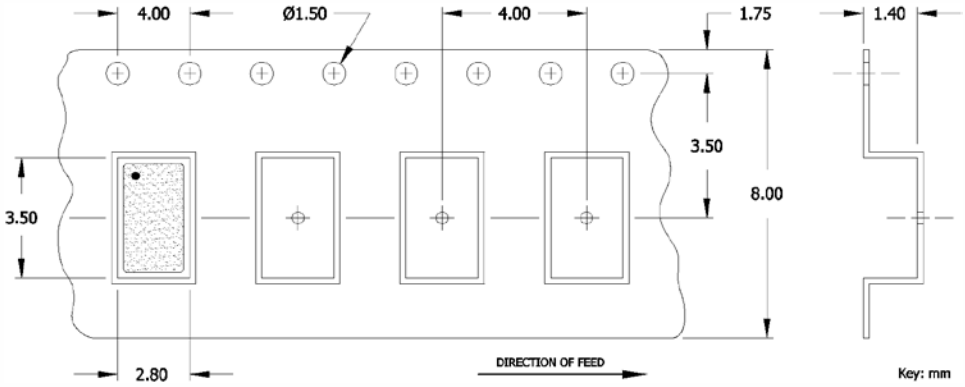
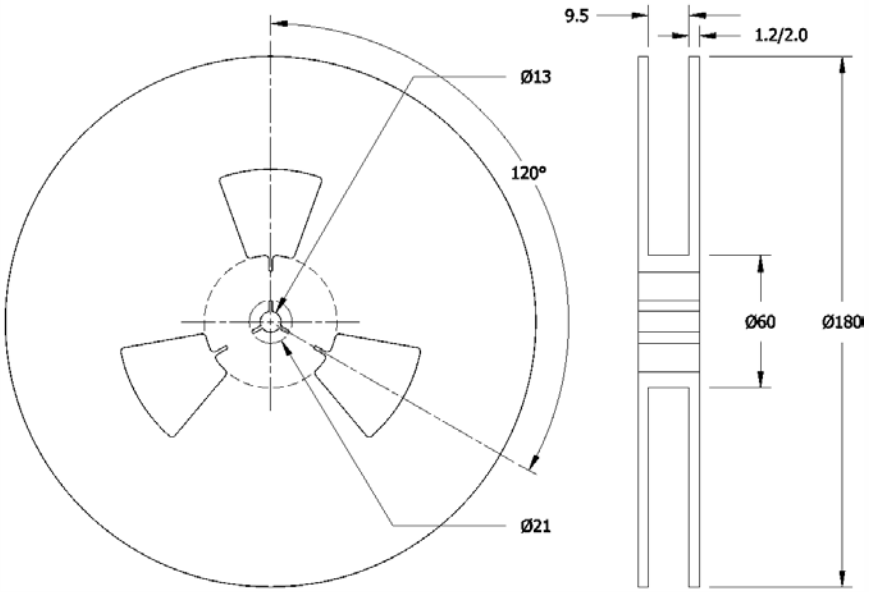
Packaging - Tape and Reel

Tape Drawing



Reel Drawing



Notes

1. Device quantity is 1k pieces minimum and 3k pieces maximum per 180mm reel.
2. Complete CTS part number, frequency value and date code information must appear on reel and carton labels.

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Addendum

Additional Developed Frequencies – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
25.000000	250	150.000000	1500				
62.500000	625	153.600000	1536				
106.250000	1062	250.000000	2500				
132.000000	1320						
148.500000	1485						

Frequency Codes for Cover Page Table – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
50.000000	500	155.520000	1555
77.760000	777	156.250000	1562
100.000000	1000	200.000000	2000
122.880000	1228		
125.000000	1250		

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