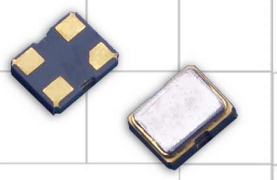
THE DATASHEET OF

CA20C2004GMT

Model CA20C

AUTOMOTIVE GRADE HCMOS CLOCK



Part Dimensions:
2.0 × 1.6 × 0.8mm • 8.29998mg

Features

- AEC-Q200 Compliant
- Ceramic Surface Mount Package
- Operating Temperature Range to -55°C to +105°C
- Fundamental and 3rd Overtone Crystal Designs
- Frequency Range 1.25 – 100MHz *
- +1.8V, +2.5V and +3.3V Operation
- Output Enable Standard
- Tape and Reel Packaging, EIA-481

Standard Frequencies

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

Applications

- Automotive Electronics
- Mobile Multimedia/Infotainment
- IoT and IIoT
- Wireless Communication
- Medical Electronics
- Commercial Military & Aerospace

Description

CTS Model CA20C is a low cost, small size, Clock Oscillator [XO] developed for use in automotive electronics operating over extended temperature ranges. CA20C has an HCMOS/TTL compatible output, offers excellent stability and low jitter/phase noise performance.

Ordering Information

Model		Output Type	Frequency Code [MHz]	Frequency Stability	Temperature Range	Supply Voltage	Packaging
CA	20	C	XXX or XXXX	3	G	L	R

Code	Package Size
20	2.0x1.6mm

Code	Output
C	HCMOS

Code	Frequency
	Product Frequency Code [1]

Code	Temp. Range
I	-40°C to +85°C
G	-40°C to +105°C [2]
H	-40°C to +125°C [3]
P	-55°C to +105°C [4]

Code	Voltage
M	+1.8Vdc
N	+2.5Vdc
L	+3.3Vdc

Code	Packing
R	3k pcs./reel

Code	Stability	Code	Stability	Code	Stability
5	±25ppm	3	±50ppm	7	±150ppm
4	±30ppm	2	±100ppm		

Notes:

1] Refer to document 016-1454-0, Frequency Code Tables. 3-digits for frequencies <100MHz, 4-digits for frequencies 100MHz or greater.
2] Available with stability codes 4, 3, 2 and 7.
3] Available with stability codes 3, 2 and 7.
4] Stability codes 2 and 7. Contact factory for availability.

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.

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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
Supply Voltage	V_{CC}	±5%	1.710 2.375 3.135	1.8 2.5 3.3	1.890 2.665 3.465	V
Supply Current	I_{CC}	Typical @ Nominal Vcc, C_L = 15 pF, T_A = +25°C				mA
		@ +1.8V	-	6	15	
		@ +2.5V	-	7	15	
		@ +3.3V	-	8	20	
Output Load	C_L	-	-	-	15	pF
Operating Temperature	T_A	-	-40 -40 -40 -55 -55	 +25 	+85 +105 +125 +105 +125	°C
Storage Temperature	T_{STG}	-	-55	-	+125	°C

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f_O	-		1.25 - 100		MHz
Frequency Stability [Note 1]	$\Delta f/f_O$	-		25, 30, 50, 100 or 150		±ppm
Aging	$\Delta f/f_{25}$	First Year @ +25°C, nominal V_{CC}	-5	-	5	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} [1.8V, 2.5V, 3.3V]	-	-	-4, -4, -8	mA
	I_{OL}	V_{OL} = 10%V_{CC} [1.8V, 2.5V, 3.3V]	-	-	+4, +4, +8	
Output Duty Cycle	SYM	@ 50% Level	45	-	55	%
Rise and Fall Time [Note 2]	T_R, T_F	@ 10%/90% Levels, Nominal V_{CC}, C_L = 15pF				ns
		@ +1.8V	-	6	7	
		@ +2.5V	-	5	7	
		@ +3.3V	-	5	7	
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.

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Electrical Specifications

Output Parameters

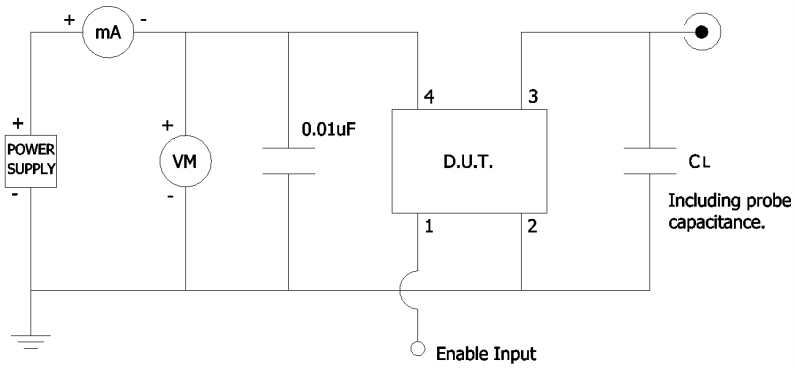
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Enable Function		Standby				
Enable Input Voltage	V_{IH}	Pin 1 Logic '1', Output Enabled	0.7V_{CC}	-	-	V
Disable Input Voltage	V_{IL}	Pin 1 Logic '0', Output Standby	-	-	0.3V_{CC}	V
Enable Current	I_{STB}	Pin 1 Logic '0', Output Standby	-	-	10	µA
Enable Time	T_{PLZ}	Pin 1 Logic '1'	-	-	5	ms
Phase Jitter, RMS	tjrms	Bandwidth 12 kHz - 20 MHz	-	0.5	<1	ps

Enable Truth Table

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

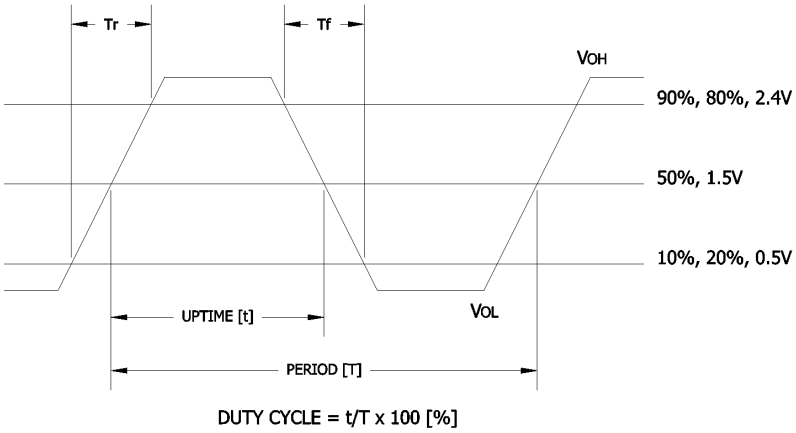
Test Circuit

HCMOS



Output Waveform

HCMOS



DUTY CYCLE = t/T x 100 [%]

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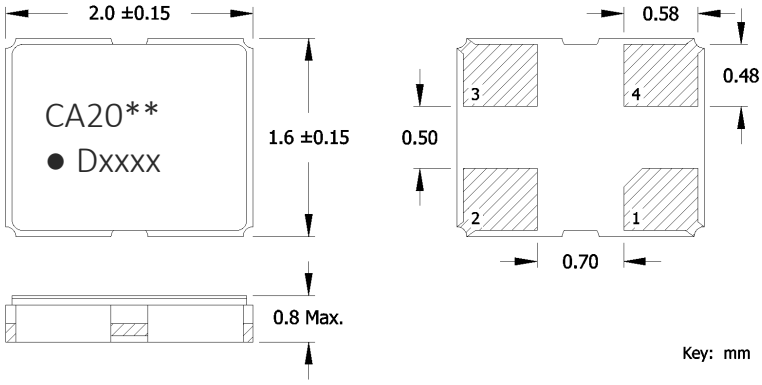
Mechanical Specifications

Package Drawing

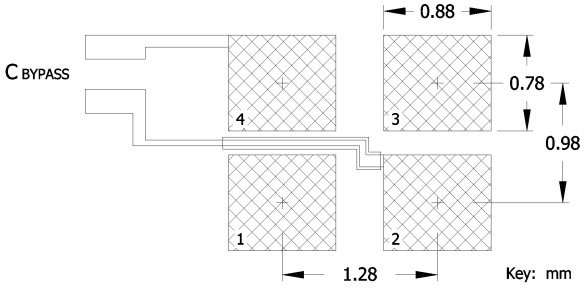


Marking Information

1. CA20 – CTS model.
2. ** – Manufacturing Site Code.
3. ● – Pin 1 identifier.
4. D – Date Code. See Table I for codes.
5. xxxx – Frequency Code.
   3-digits for frequencies <100MHz
   4-digits for frequencies 100MHz or greater

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

Recommended Pad Layout



Notes

1. Termination pads (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
3	Output	RF Output
4	V_{CC}	Supply Voltage

Table I - Date Code, Beginning year 2021

YEAR \ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021 2025 2029 2033 2037	A	B	C	D	E	F	G	H	J	K	L	M
2022 2026 2030 2034 2038	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023 2027 2031 2035 2039	a	b	c	d	e	f	g	h	j	k	l	m
2024 2028 2032 2036 2040	n	p	q	r	s	t	u	v	w	x	y	z

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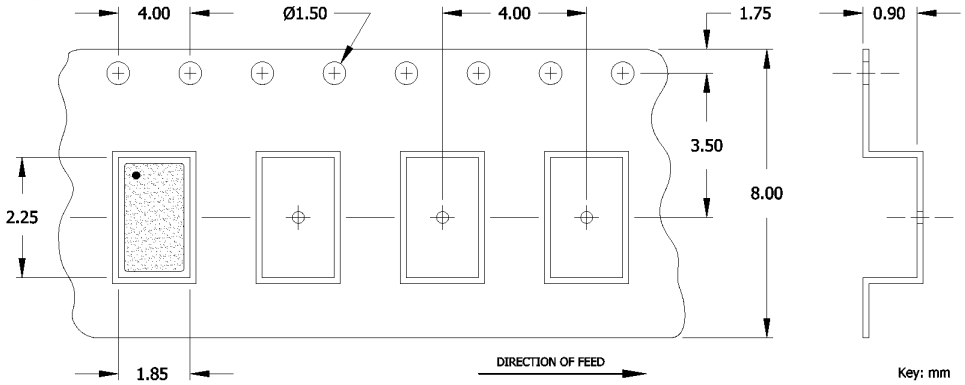
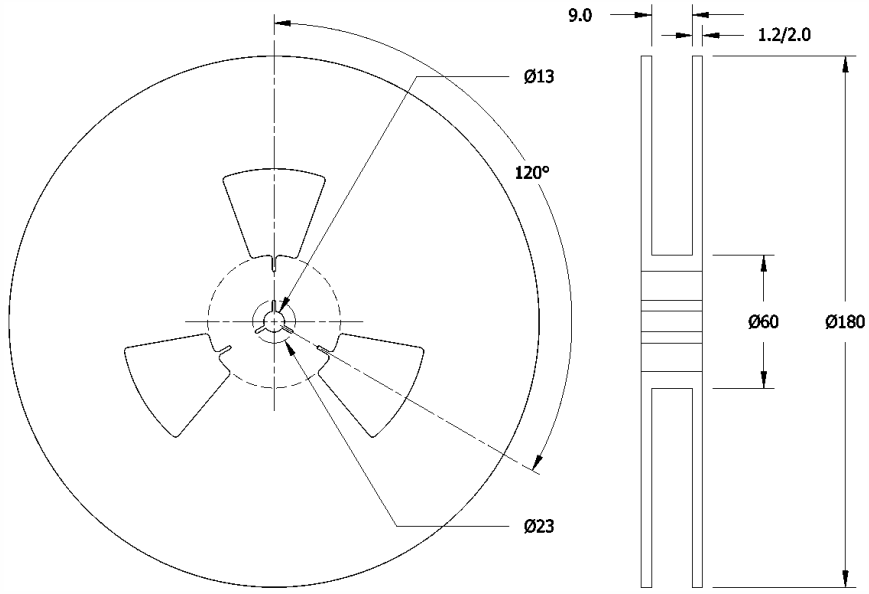
Packaging - Tape and Reel

Tape Drawing



Reel Drawing



Notes

1. Device quantity is 3k pieces 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

Common Frequencies Available – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
4.000000	040	24.000000	240	40.000000	400		
8.000000	080	24.576000	24C	48.000000	480		
10.000000	100	25.000000	250	50.000000	500		
12.000000	120	26.000000	260				
12.288000	122	27.000000	270				
14.318180	143	30.000000	300				
14.745600	147	32.000000	320				
16.000000	160	33.333000	33E				
20.000000	200	37.400000	374				
22.118400	221	38.400000	384				

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- Excess Inventory Management