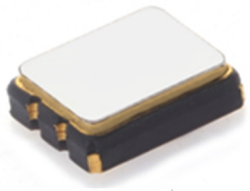
Model CA32P/L

Automotive Grade LVPECL or LVDS Clock



Part Dimensions:
3.2 × 2.5 × 1.2mm • 30.803mg

Features

- **AEC-Q200 Compliant**
- Very Low Phase Jitter Performance, 500fs Maximum
- Ceramic Surface Mount Package
- Operating Temperature Range to -40°C to +125°C
- Fundamental and 3rd Overtone Crystal Designs
- Frequency Range 13.5 – 160MHz *
- +2.5V or +3.3V Operation [+1.8V available, LVDS only]
- Output Enable Standard
- Tape and Reel Packaging, EIA-481

Standard Frequencies

* See Page 9 for common frequencies.
Check with factory for availability of frequencies not listed.

Applications

- Automotive Electronics
- Mobile Multimedia/Infotainment
- IoT and IIoT
- Ethernet/GbE/SyncE
- Audio/Video Systems
- Wireless Communication
- SerDes
- Medical Electronics
- Commercial Military & Aerospace

Description

CTS Model CA32P/L is a low cost, small size, Clock Oscillator [XO] developed for use in automotive electronics operating over extended temperature ranges. CA32P/L has optional LVPECL or LVDS compatible outputs, 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 32	P	XXX or XXXX	3	G	L	R

Code	Package Size
32	3.2x2.5mm

Code	Output
P	LVPECL
L	LVDS

Code	Frequency
Product Frequency Code [1]	

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

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

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

Code	Packing
R	3k pcs./reel

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.

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

Electrical Specifications

Operating Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Supply Voltage	V_{CC}	-	-0.5	-	5.0	V
Supply Voltage [Note 1]	V_{CC}	±5%	1.710 2.375 3.135	1.8 2.5 3.3	1.890 2.625 3.465	V
Supply Current						
LVPECL	I_{CC}	V_{CC} = +2.5V or +3.3V @ Maximum Load	-	55	80	mA
LVDS			-	45	60	
LVDS		V_{CC} = +1.8 @ Maximum Load	-	7	20	
Operating Temperature	T_A	-	-40 -40 -40	 +25 	+85 +105 +125	°C
Storage Temperature	T_{STG}	-	-55	-	+125	°C

1.] LVDS output only for +1.8V option.

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range						
LVPECL	f_O	V_{CC} = +2.5V or +3.3V		13.5 - 160		MHz
LVDS				13.5 - 160		
LVDS		V_{CC} = +1.8V		13.5 - 160		
Frequency Stability [Note 2]	$\Delta f/f_O$	-		25, 30, 50, 100 or 150		±ppm
Aging	$\Delta f/f_{25}$	First Year @ +25°C, nominal V_{CC}	-3	-	3	ppm

2.] 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	-	-		**LVPECL**		-
Output Load	R_L	Terminated to V_{CC} - 2.0V	-	50	-	Ohms
Output Voltage Levels	V_{OH} V_{OL}	PECL Load, Temperature Range	V_{CC} - 1.025 V_{CC} - 1.810	- -	V_{CC} - 0.880 V_{CC} - 1.620	V
Output Duty Cycle	SYM	@ V_{CC} - 1.3V	45	-	55	%
Rise and Fall Time	T_R, T_F	@ 20%/80% Levels, R_L = 50 Ohms	-	0.3	0.7	ns

Output Type	-	-		**LVDS**		-
Output Load	R_L	Between Outputs	-	100	-	Ohms
Output Voltage Levels	V_{OH} V_{OL}	LVDS Load	- 0.90	1.43 1.10	1.60 -	V
Output Duty Cycle	SYM	@ 1.25V	45	-	55	%
Differential Output Voltage	V_{OD}	R_L = 100 Ohms	247	330	454	mV
Offset Voltage	V_{OS}	LVDS Load	1.125	1.25	1.375	V
Rise and Fall Time	T_R, T_F	@ 20%/80% Levels, R_L = 100 Ohms	-	0.4	0.7	ns

Electrical Specifications

Output Parameters

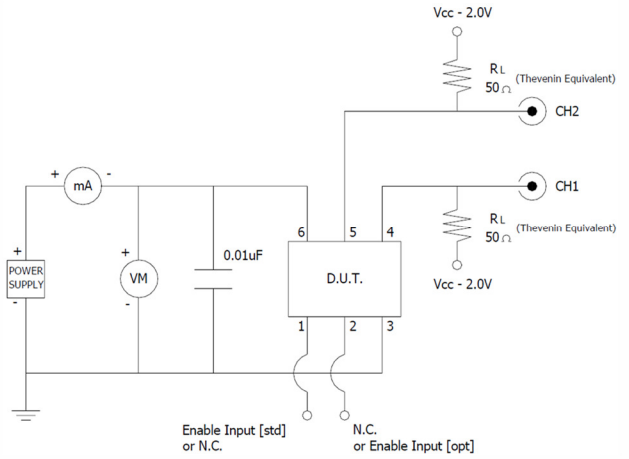
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Start Up Time	T_S	Application of V_{CC}	-	2	10	ms
Enable Function		Standby [oscillator stopped]				
Enable Input Voltage	V_{IH}	Pin 1 or 2 Logic '1', Output Enabled	$0.7V_{CC}$	-	-	V
Disable Input Voltage	V_{IL}	Pin 1 or 2 Logic '0', Output Disabled	-	-	$0.3V_{CC}$	V
Disable Time	T_{PLZ}	Pin 1 or 2 Logic '0', Output Disabled	-	-	200	ns
Standby Current	I_{ST}	Pin 1 Logic '0', Output Disabled	-	-	15	µA
Enable Time	T_{PLZ}	Pin 1 or 2 Logic '1', Output Enabled	-	-	10	ms
Phase Jitter, RMS	tjrms	40MHz - 160MHz, Bandwidth 12kHz to 20MHz	-	300	500	fs
		10MHz - 39.999MHz, Bandwidth 12kHz to 5MHz	-	500	<1	ps

Enable Truth Table

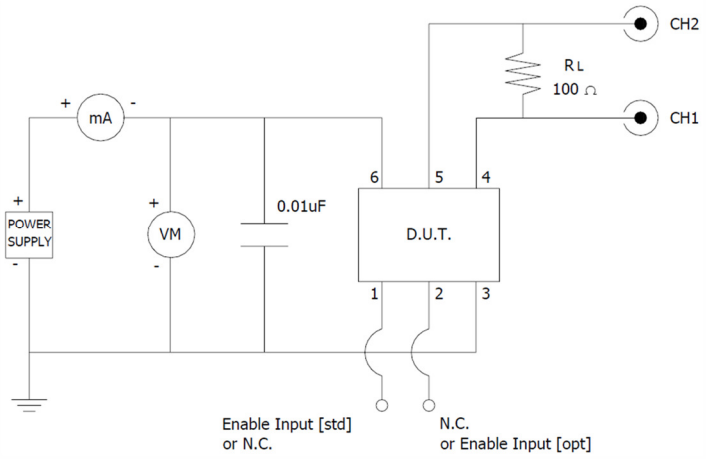
Pin 1	Pin 4 & Pin 5
Logic '1'	Output Enabled
Open	Output Enabled
Logic '0'	Output Disabled, High Impedance

Test Circuit

LVPECL

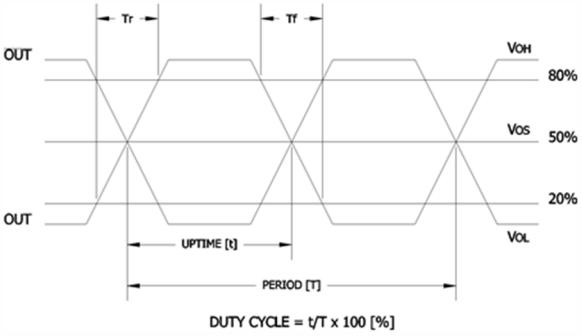


LVDS



Output Waveform

LVPECL or LVDS

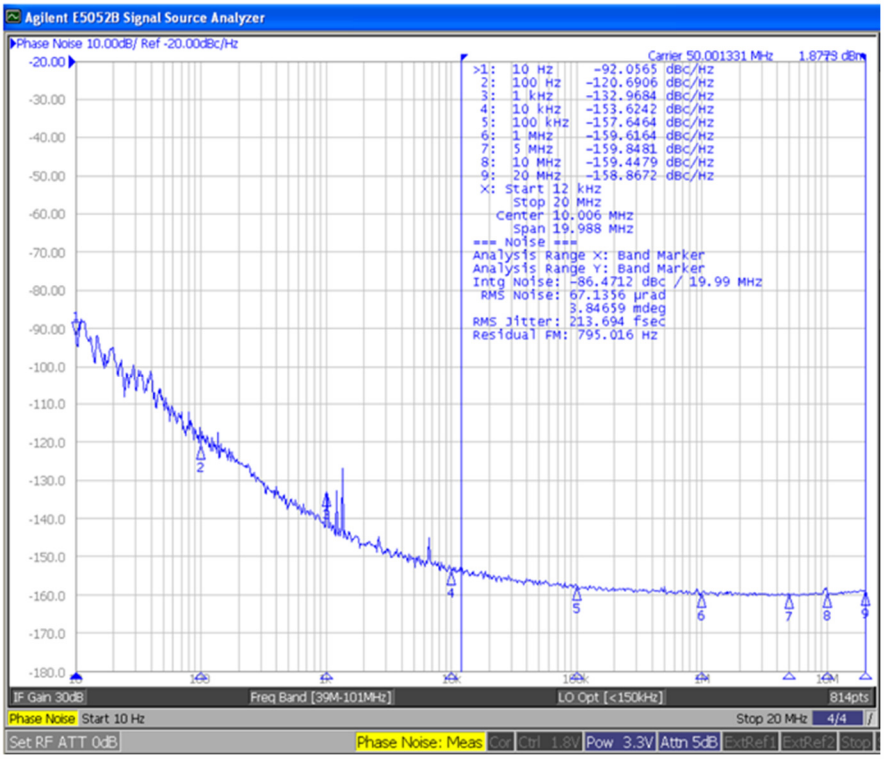


Electrical Specifications

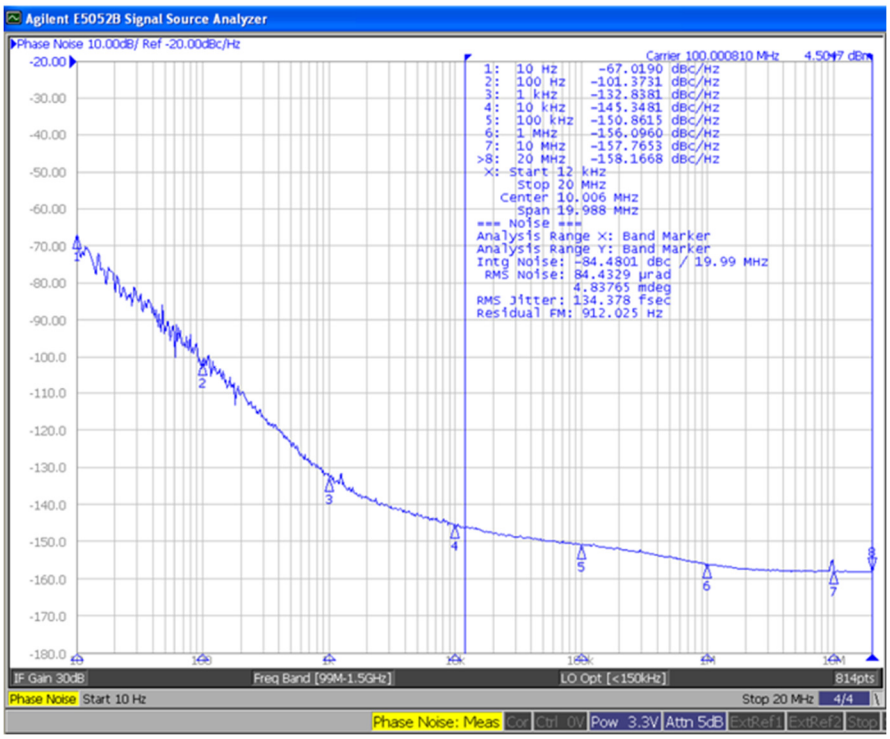
Performance Data

Phase Noise [typical]

50MHz, LVPECL, V_{CC} = +3.3V, T_A = +25°C



100MHz, LVPECL, V_{CC} = +3.3V, T_A = +25°C

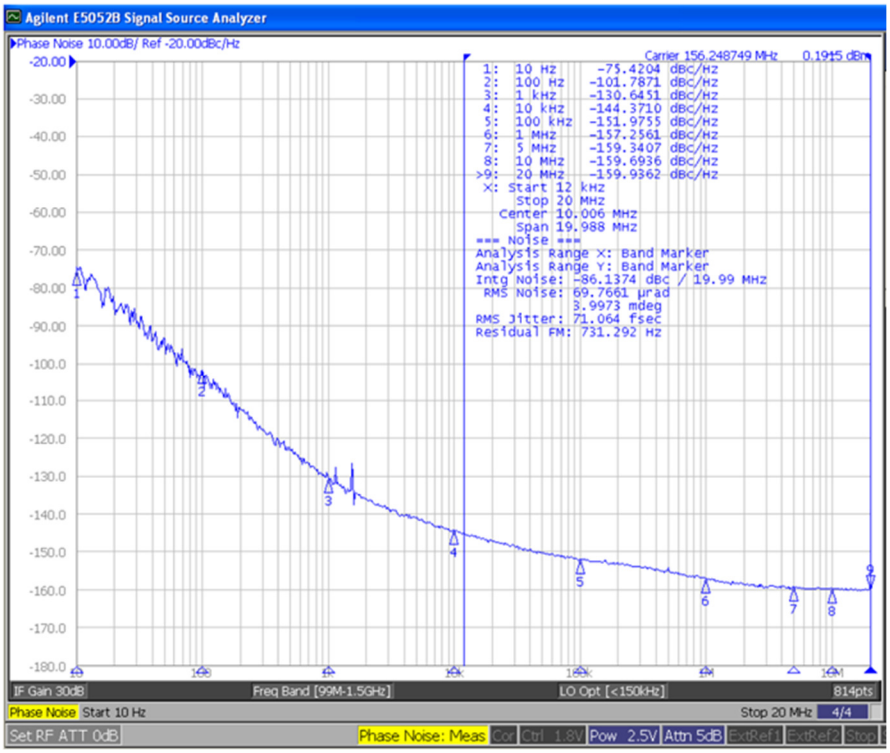


Electrical Specifications

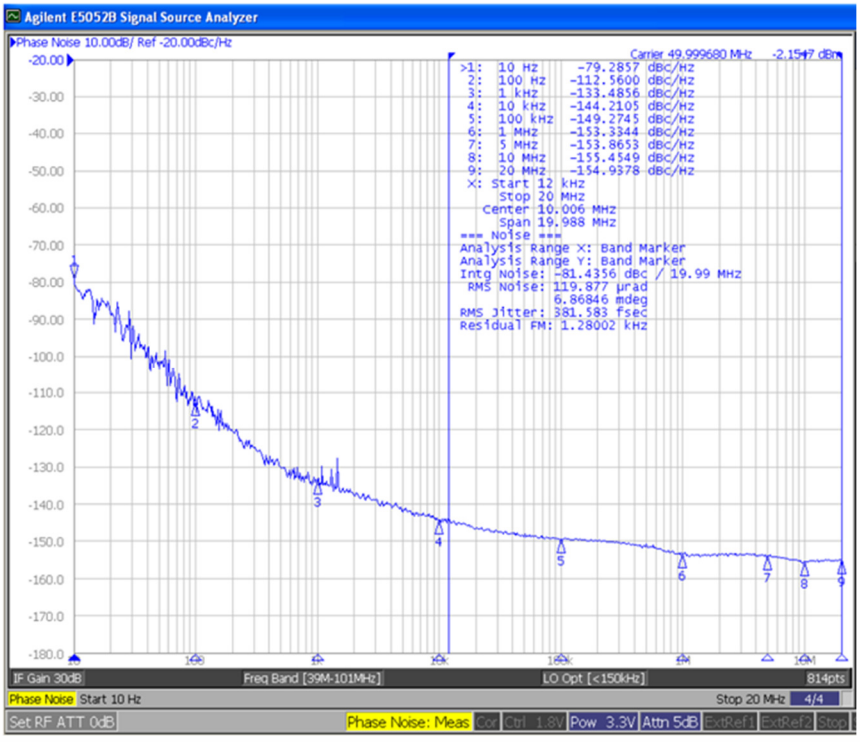
Performance Data

Phase Noise [typical]

156.25MHz, LVPECL, V_{CC} = +2.5V, T_A = +25°C



50MHz, LVDS, V_{CC} = +3.3V, T_A = +25°C

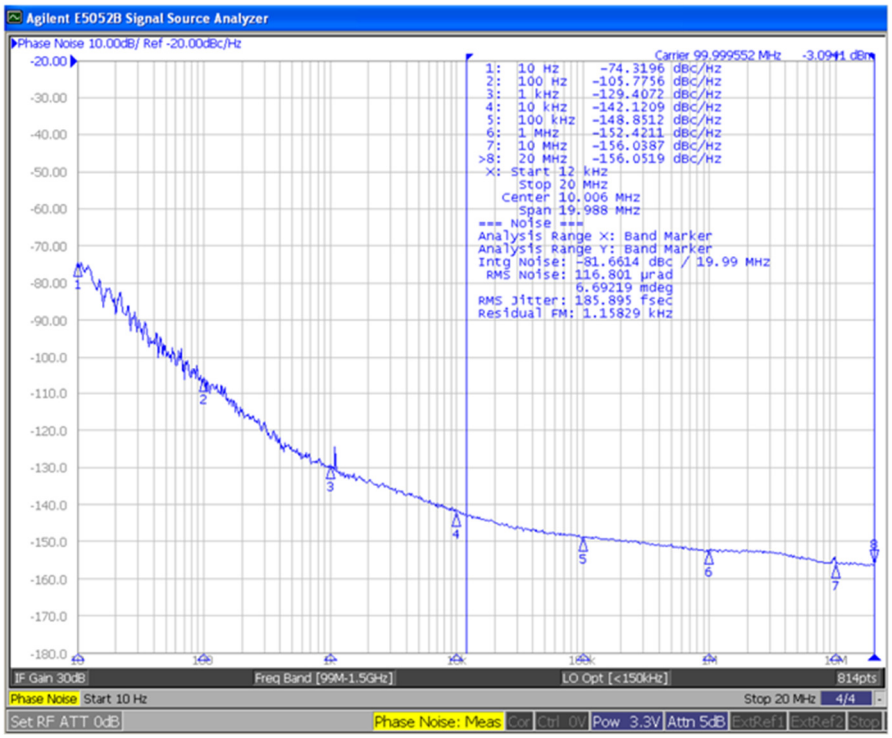


Electrical Specifications

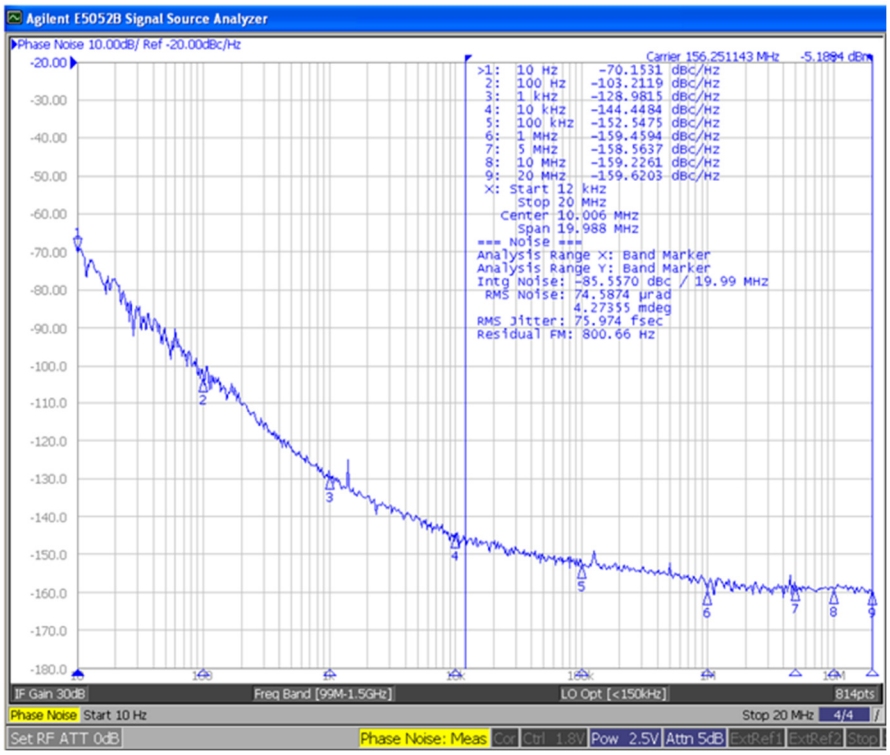
Performance Data

Phase Noise [typical]

100MHz, LVDS, V_{CC} = +3.3V, T_A = +25°C

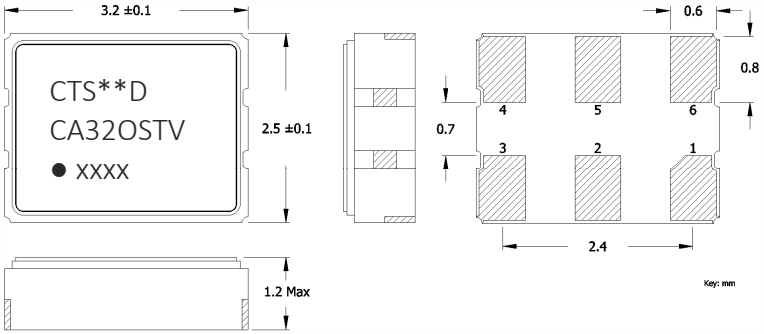


156.25MHz, LVDS, V_{CC} = +2.5V, T_A = +25°C

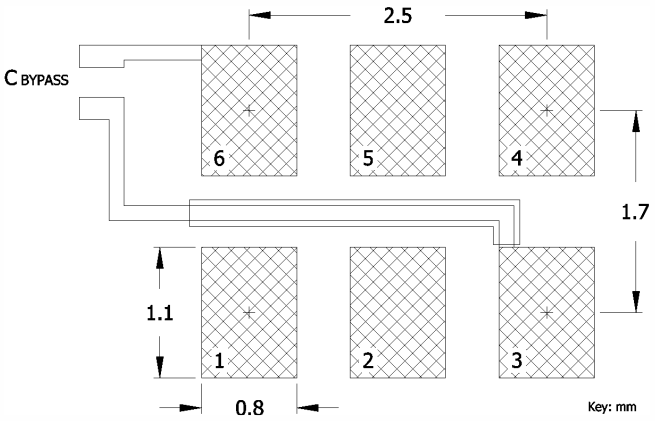


Mechanical Specifications

Package Drawing



Recommended Pad Layout



Marking Information

Option 1 [3 lines, 7 characters maximum per line]

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

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

CTS**D
CA32OSTV
● xxxx

Option 2 [2 lines, 7 characters maximum per line]

1. O – Output Type; P or E = LVPECL, L or V = LVDS.
2. ST – Frequency Stability/Temperature Code. [Refer to Ordering Information]
3. V – Voltage Code; 3 = 3.3V, 2 = 2.5V.
4. xxxx – Frequency Code.
   3-digits, frequencies below 100MHz
   4-digits, frequencies 100MHz or greater

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

5. D – Date Code. See Table I for codes.

[Note: Manufacturing site code must appear on reel and carton labels.]

CA32OSTV
● xxxxD

Pin Assignments

Pin	Symbol	Function
1	EOH or N.C.	Enable [std] or No Connect
2	N.C. or EOH	No Connect or Enable [opt]
3	GND	Circuit & Package Ground
4	Output	RF Output
5	$\overline{\text{Output}}$	Complimentary RF Output
6	V_{CC}	Supply Voltage

Notes

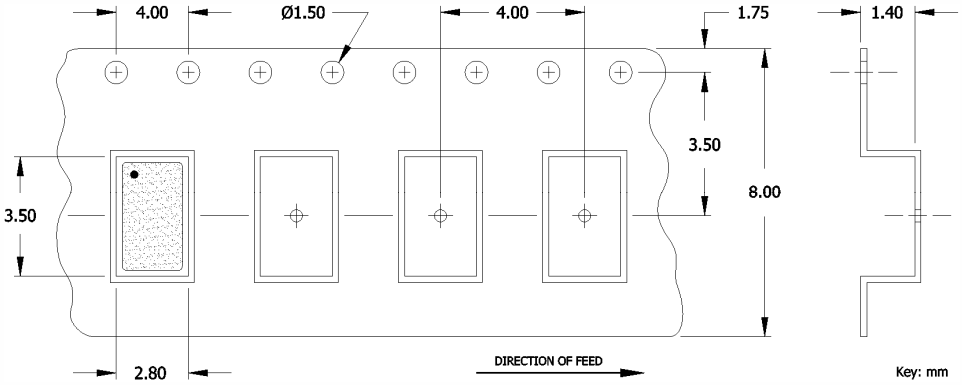
1. Termination pads (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
3. MSL = 1.

Table I - Date Code, Beginning year 2021

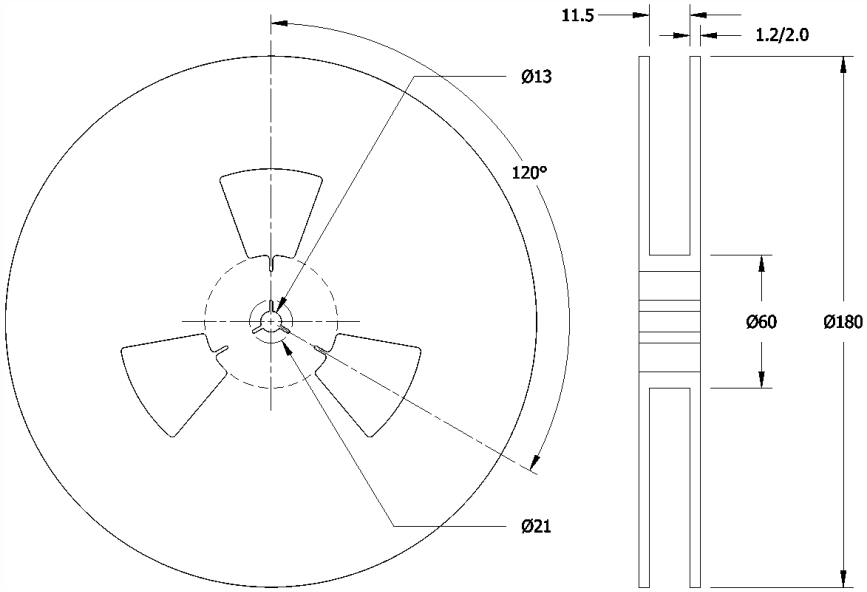
YEAR \ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021 2025 2029 2033 2037	A	B	C	D	E	F	G	H	J	K	L	M
2022 2026 2030 2034 2038	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023 2027 2031 2035 2039	a	b	c	d	e	f	g	h	j	k	l	m
2024 2028 2032 2036 2040	n	p	q	r	s	t	u	v	w	x	y	z

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.

Addendum

Common Frequencies Available – MHz

FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
25.000000	250						
50.000000	500						
74.175800	74A						
74.250000	742						
100.000000	1000						
125.000000	1250						
133.000000	1330						
150.000000	1500						
155.520000	1555						
156.250000	1562						
160.000000	1600						