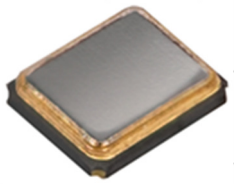
SA204 Series

Automotive Grade Quartz Crystal



Part Dimensions:
2.0 × 1.6 × 0.5mm • 5.70mg

Features

- **AEC-Q200 Compliant**
- Hermetic Ceramic Surface Mount Package
- Fundamental Crystal Design
- Frequency Range 16 – 96MHz
- Frequency Tolerance, ±30ppm Standard
- Frequency Stability, ±50ppm Standard
- Operating Temperature Range to -55°C to +125°C
- Tape and Reel Packaging, EIA-481

Standard Frequencies – see Page 5 for developed frequencies.
* Check with factory for availability of frequencies not listed.

Applications

- Automotive Electronics
- Mobile Multimedia/Infotainment
- Car Navigation Systems
- Internet of Things [IoT, IIot]
- Microcontrollers and FPGAs
- Wireless Communication
- Ethernet/GbE/SyncE
- Medical Electronics
- Commercial Military & Aerospace

Description

CTS Model SA204 incorporates a low cost, high Q, small size quartz resonator specifically developed to operate over extended temperature ranges for use in automotive electronics.

Ordering Information

Model	Frequency Code [MHz]	Mode of Oscillation	Tolerance @ +25°C	Temperature Stability	Temperature Range	Load Capacitance	Packaging
SA204	XXX	F	3	5	G	A	R

Frequency Code [MHz]

Code	Frequency
Product Frequency Code [1]	

Mode of Oscillation

Code	Mode
F	Fundamental

Tolerance @ +25°C

Code	Tolerance
1	±10ppm
X	±15ppm
2	±20ppm
3	±30ppm
5	±50ppm

Temperature Stability

Code	Stability	Code	Stability
X	±15ppm	5	±50ppm
2	±20ppm	6	±100ppm
3	±30ppm	7	±150ppm

Temperature Range

Code	Temp. Range
I	-40°C to +85°C [2]
G	-40°C to +105°C [3]
H	-40°C to +125°C [4]
N	-40°C to +150°C [5]
P	-55°C to +105°C [5]
M	-55°C to +125°C [5]

Load Capacitance

Code	Capacitance	Code	Capacitance
V	7pF	C	16pF
K	8pF	D	18pF
J	9pF	E	20pF
A	10pF	F	24pF
L	12pF	G	30pF
B	13pF	S	Series

Packaging

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 all stability codes.
3] Available with stability codes 3, 5, 6 and 7.
4] Available with stability codes 5, 6 and 7.
5] Stability codes 6 and 7. Contact factory for code 5 availability.

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
Operating Temperature	T_A	-	-40	+25	+85	°C
			-40		+105	
			-40		+125	
			-40		+150	
			-55		+105	
			-55		+125	
Storage Temperature	T_{STG}	-	-55	-	+125	°C

Frequency Stability

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Range	f_O	Fundamental mode		16 - 96		MHz
Frequency Tolerance	$\Delta f/f_O$	@ +25°C		10, 15, 20, 30 or 50		±ppm
Frequency Stability	$\Delta f/f_{25}$	Referenced to +25°C reading		15, 20, 30, 50, 100 or 150		±ppm
Aging	$\Delta f/f_0$	Typical per year @ +25°C	-3	-	3	ppm

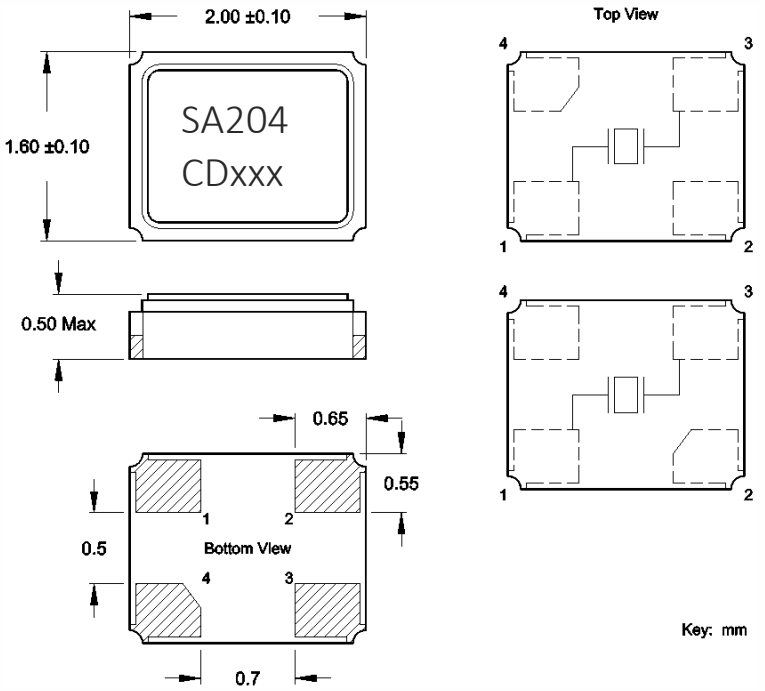
Crystal Parameters

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Mode	-	-		Fundamental		-
Crystal Cut	-	-		AT-Cut Strip		-
Load Capacitance	C_L	-		See Ordering Information		pF
Shunt Capacitance	C_0	-	-	-	3.0	pF
Series Resistance						
Fundamental	R_1	16MHz - <20MHz	-	-	200	Ω
		20MHz - <40MHz	-	-	100	
		40MHz - 96MHz	-	-	60	
Drive Level	DL	-	-	10	200	µW
Insulation Resistance	R_i	+100Vdc ±15Vdc	500	-	-	MΩ

$\Delta f/f_0$ - Frequency deviation referenced to nominal frequency.
$\Delta f/f_{25}$ - Frequency deviation over operating temperature range, referenced to +25°C frequency.

Mechanical Specifications

Package Drawing

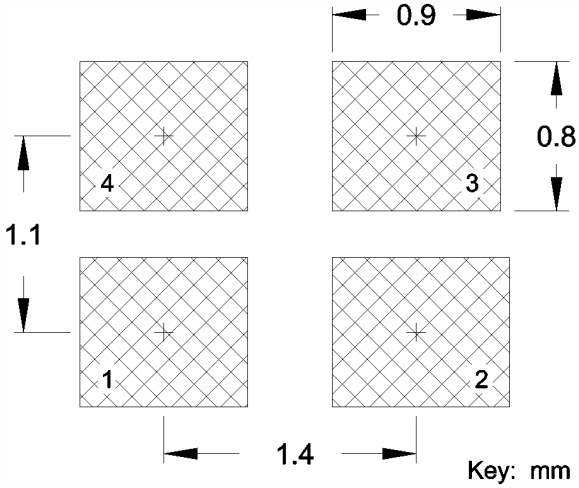


Marking Information

1. SA204 – CTS model.
2. C – CTS.
2. D – Date Code. See Table I for codes.
3. xxx – Frequency Code.
   3-digits, frequencies below 100MHz

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

Recommended Pad Layout



Notes

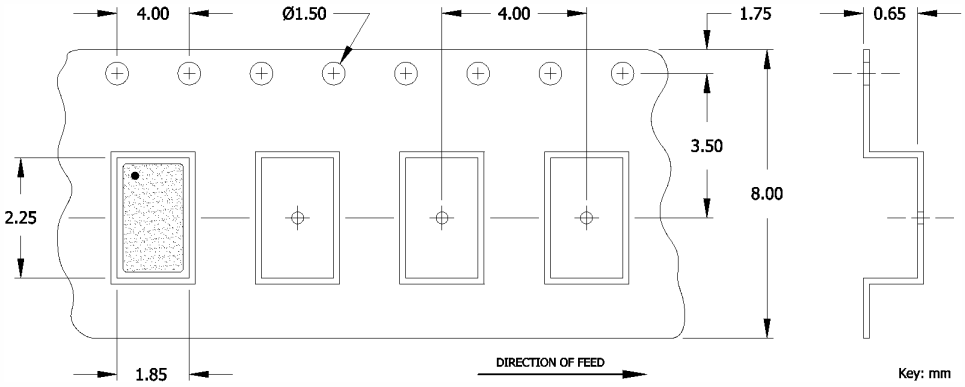
1. JEDEC termination code (e4). Barrier-plating is nickel [Ni] with gold [Au] flash plate.
2. Terminations #2, #4 and the metal lid are connected internally. End user may connect these pins to circuit ground for EMI suppression.
3. Due to package variability, the pad chamfer on the bottom could be located on Pin 1 in a given lot. Layout orientation should be based on the top view [marking side], as indicated in package drawing. The chamfer location does not affect the electrical performance of the device.
4. Reflow conditions per JEDEC J-STD-020; +260°C maximum, 20 seconds.
5. MSL = 1.

Table I – Date Code, Beginning year 2021

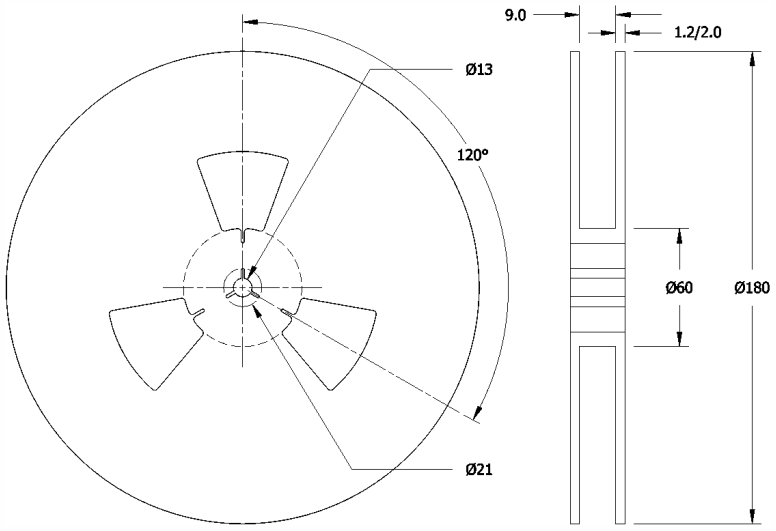
YEAR \ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021 2025 2029 2033 2037	A	B	C	D	E	F	G	H	J	K	L	M
2022 2026 2030 2034 2038	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023 2027 2031 2035 2039	a	b	c	d	e	f	g	h	j	k	l	m
2024 2028 2032 2036 2040	n	p	q	r	s	t	u	v	w	x	y	z

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, date code and manufacturing site code information must appear on reel and carton labels.

Addendum

Common Frequencies and Frequency Codes – MHz

Common Wireless Frequencies		Additional Frequencies					
FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE	FREQUENCY	FREQUENCY CODE
16.000000	160	16.367600	16E	26.041660	26F	39.062500	39A
19.200000	192	16.384000	163	27.000000	270	41.600000	41C
20.000000	200	16.666700	16N	28.224000	282	44.000000	440
24.000000	240	16.800000	168	28.322000	28C	45.000000	450
25.000000	250	16.934400	169	28.375000	283	49.152000	491
26.000000	260	18.000000	180	28.636360	286	50.000000	500
27.120000	271	18.432000	184	29.491200	29B	54.000000	540
30.000000	300	19.440000	194	30.400000	304		
32.000000	320	19.660800	19B	30.720000	307		
37.400000	374	19.680000	196	31.250000	312		
38.400000	384	20.480000	204	32.768000	327		
40.000000	400	20.736000	207	33.000000	330		
48.000000	480	22.118400	221	33.330000	333		
52.000000	520	22.579200	225	33.333000	33E		
		24.305000	243	33.333300	33A		
		24.545400	24F	33.868800	338		
		24.545454	24G	35.328000	353		
		24.553500	24B	36.000000	360		
		24.576000	24C	38.000000	380		
		25.000625	25A	38.880000	388		