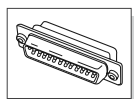


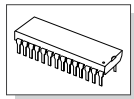
Section Reference Index



Connectors, Cable Assemblies, IC Sockets. 16-201



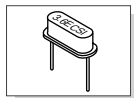
A



Semiconductors, ICs, Transistors, Diodes, Rectifiers ... 202-402



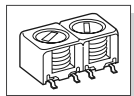
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Crystals, Oscillators 403-423



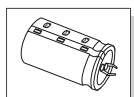
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Inductors, Coils, Filters 424-461



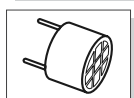
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Capacitors 462-534

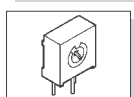


E



Audio, Buzzers, Microphones, Speakers 535-539

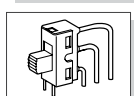
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Resistors, Potentiometers, Thermistors, ZNRs. 540-594



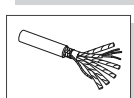
G



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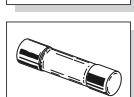
J



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K



Fuses 728-743

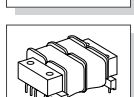


L



Fans 744-759

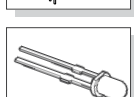
M



Transformers, Power Supplies 757-781



N



Optoelectronics, LEDs, LCDs, Lasers, Displays 782-832



O

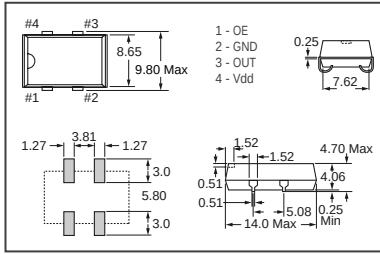
1-800-344-4539

218-681-6674 • FAX: 218-681-3380 • www.digikey.com

CMX309F Series Oscillators

SPECIFICATIONS:

• **Frequency Stability:** $\pm 100\text{ppm}$ (-10°C to $+70^{\circ}\text{C}$) • **Operating Temperature Range:** -10°C to $+70^{\circ}\text{C}$ • **Storage Temperature Range:** -55°C to $+125^{\circ}\text{C}$ • **Supply Voltage:** $V_{DD}: 5.0\text{V} \pm 0.5\text{V}$ • **Supply Current:** 23mA Max. • **Duty:** TTL Level (1.4V): 45% to 55% • **CMOS Level (V_{DD}/2):** 40% to 60% • **Output Voltage:** $V_{OH}: V_{DD} - 0.4\text{V}$ Min.; $V_{OL}: 0.4\text{V}$ Max. • **Output Load:** TTL: 10TTL Max.; CMOS: 50pF Max. • **Rise & Fall Time:** TTL: $t_{r/f}: 8\text{nsec}$ Max.; CMOS: $t_{r/f}: 7\text{nsec}$ Max. • **Start-up Time:** 4msec Max. • **Input (OE) Voltage:** $V_{IH}: 2.0\text{V}$ Min.; $V_{IL}: 0.8\text{V}$ Max. • **Disable Current:** 12mA Max. • **Aging (first year):** $\pm 5\text{ppm/year}$ Max.

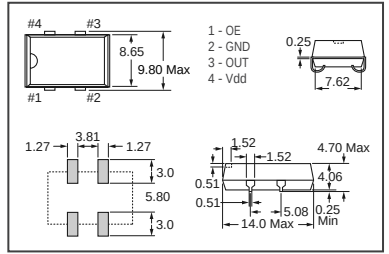


Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T & R Pricing 1,000	Citizen Part No.
		1	10	50			
1.544	300-7001-1-ND	3.00	2.80	1.80	300-7001-2-ND	1328.00	CMX309FLC1.544MT
1.8432	300-7002-1-ND	3.00	2.80	1.80	300-7002-2-ND	1328.00	CMX309FLC1.8432MT
2.000	300-7003-1-ND	3.00	2.80	1.80	300-7003-2-ND	1328.00	CMX309FLC2.000MT
2.048	300-7004-1-ND	3.00	2.80	1.80	300-7004-2-ND	1328.00	CMX309FLC2.048MT
2.4576	300-7005-1-ND	3.00	2.80	1.80	300-7005-2-ND	1328.00	CMX309FLC2.4576MT
3.072	300-7006-1-ND	3.00	2.80	1.80	300-7006-2-ND	1328.00	CMX309FLC3.072MT
3.579545	300-7007-1-ND	3.00	2.80	1.80	300-7007-2-ND	1328.00	CMX309FLC3.579545MT
3.6864	300-7008-1-ND	3.00	2.80	1.80	300-7008-2-ND	1328.00	CMX309FLC3.6864MT
4.000	300-7009-1-ND	3.00	2.80	1.80	300-7009-2-ND	1328.00	CMX309FLC4.000MT
4.096	300-7010-1-ND	3.00	2.80	1.80	300-7010-2-ND	1328.00	CMX309FLC4.096MT
4.9152	300-7011-1-ND	3.00	2.80	1.80	300-7011-2-ND	1328.00	CMX309FLC4.9152MT
5.000	300-7012-1-ND	3.00	2.80	1.80	300-7012-2-ND	1328.00	CMX309FLC5.000MT
6.000	300-7013-1-ND	3.00	2.80	1.80	300-7013-2-ND	1328.00	CMX309FLC6.000MT
6.144	300-7014-1-ND	3.00	2.80	1.80	300-7014-2-ND	1328.00	CMX309FLC6.144MT
7.3728	300-7015-1-ND	3.00	2.80	1.80	300-7015-2-ND	1328.00	CMX309FLC7.3728MT
8.000	300-7016-1-ND	3.00	2.80	1.80	300-7016-2-ND	1328.00	CMX309FLC8.000MT
8.192	300-7017-1-ND	3.00	2.80	1.80	300-7017-2-ND	1328.00	CMX309FLC8.192MT
9.8304	300-7018-1-ND	3.00	2.80	1.80	300-7018-2-ND	1328.00	CMX309FLC9.8304MT
10.000	300-7019-1-ND	3.00	2.80	1.80	300-7019-2-ND	1328.00	CMX309FLC10.000MT
11.000	300-7021-1-ND	3.00	2.80	1.80	300-7021-2-ND	1328.00	CMX309FLC11.000MT
11.0592	300-7022-1-ND	3.00	2.80	1.80	300-7022-2-ND	1328.00	CMX309FLC11.0592MT
11.2896	300-7023-1-ND	3.00	2.80	1.80	300-7023-2-ND	1328.00	CMX309FLC11.2896MT
12.000	300-7024-1-ND	3.00	2.80	1.80	300-7024-2-ND	1328.00	CMX309FLC12.000MT
12.288	300-7025-1-ND	3.00	2.80	1.80	300-7025-2-ND	1328.00	CMX309FLC12.288MT
12.352	300-7026-1-ND	3.00	2.80	1.80	300-7026-2-ND	1328.00	CMX309FLC12.352MT
13.500	300-7027-1-ND	3.00	2.80	1.80	300-7027-2-ND	1328.00	CMX309FLC13.500MT
14.31818	300-7028-1-ND	3.00	2.80	1.80	300-7028-2-ND	1328.00	CMX309FLC14.31818MT
14.7456	300-7029-1-ND	3.00	2.80	1.80	300-7029-2-ND	1328.00	CMX309FLC14.7456MT
15.360	300-7031-1-ND	3.00	2.80	1.80	300-7031-2-ND	1328.00	CMX309FLC15.360MT
16.000	300-7032-1-ND	3.00	2.80	1.80	300-7032-2-ND	1328.00	CMX309FLC16.000MT
16.384	300-7034-1-ND	3.00	2.80	1.80	300-7034-2-ND	1328.00	CMX309FLC16.384MT
16.6666	300-7035-1-ND	3.00	2.80	1.80	300-7035-2-ND	1328.00	CMX309FLC16.6666MT
17.734475	300-7036-1-ND	3.00	2.80	1.80	300-7036-2-ND	1328.00	CMX309FLC17.734475MT
18.000	300-7037-1-ND	3.00	2.80	1.80	300-7037-2-ND	1328.00	CMX309FLC18.000MT
18.432	300-7038-1-ND	3.00	2.80	1.80	300-7038-2-ND	1328.00	CMX309FLC18.432MT
19.6608	300-7039-1-ND	3.00	2.80	1.80	300-7039-2-ND	1328.00	CMX309FLC19.6608MT
20.000	300-7040-1-ND	3.00	2.80	1.80	300-7040-2-ND	1328.00	CMX309FLC20.000MT
22.1184	300-7041-1-ND	3.00	2.80	1.80	300-7041-2-ND	1328.00	CMX309FLC22.1184MT
24.000	300-7042-1-ND	3.00	2.80	1.80	300-7042-2-ND	1360.00	CMX309FLC24.000MT
24.576	300-7043-1-ND	3.00	2.80	1.80	300-7043-2-ND	1328.00	CMX309FLC24.576MT
25.000	300-7044-1-ND	3.00	2.80	1.80	300-7044-2-ND	1328.00	CMX309FLC25.000MT
25.175	300-7045-1-ND	3.00	2.80	1.80	300-7045-2-ND	1328.00	CMX309FLC25.175MT
27.000	300-7046-1-ND	3.00	2.80	1.80	300-7046-2-ND	1328.00	CMX309FLC27.000MT
28.322	300-7047-1-ND	3.00	2.80	1.80	300-7047-2-ND	1328.00	CMX309FLC28.322MT
28.63636	300-7048-1-ND	3.00	2.80	1.80	300-7048-2-ND	1328.00	CMX309FLC28.63636MT
29.498928	300-7049-1-ND	3.00	2.80	1.80	300-7049-2-ND	1328.00	CMX309FLC29.498928MT
30.000	300-7050-1-ND	3.00	2.80	1.80	300-7050-2-ND	1328.00	CMX309FLC30.000MT

CMX309H Series Oscillators

SPECIFICATIONS:

• **Frequency Stability:** $\pm 100\text{ppm}$ (-10°C to $+70^{\circ}\text{C}$) • **Operating Temperature Range:** -10°C to $+70^{\circ}\text{C}$ • **Storage Temperature Range:** -55°C to $+125^{\circ}\text{C}$ • **Supply Voltage:** $V_{DD}: 5.0\text{V} \pm 0.5\text{V}$ • **Supply Current:** 35mA Max. • **Duty:** TTL Level (1.4V): 45% to 55% • **CMOS Level (V_{DD}/2):** 40% to 60% • **Output Voltage:** $V_{OH}: V_{DD} - 0.5\text{V}$ Min.; $V_{OL}: 0.5\text{V}$ Max. • **Output Load:** TTL: 10TTL Max.; CMOS: 50pF Max. • **Rise & Fall Time:** TTL: $t_{r/f}: 5\text{nsec}$ Max.; CMOS: $t_{r/f}: 7\text{nsec}$ Max. • **Start-up Time:** 10msec Max. • **Input (OE) Voltage:** $V_{IH}: 2.0\text{V}$ Min.; $V_{IL}: 0.8\text{V}$ Max. • **Disable Current:** 28mA Max. • **Aging (first year):** $\pm 5\text{ppm/year}$ Max.

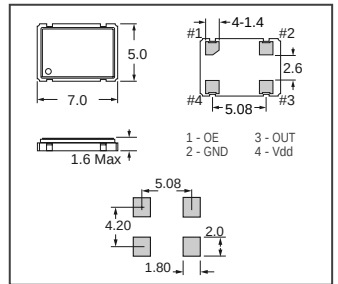


Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T & R Pricing 1,000	Citizen Part No.
		1	10	50			
32.000	300-7101-1-ND	3.00	2.80	1.80	300-7101-2-ND	1328.00	CMX309HWC32.000MT
32.768	300-7102-1-ND	3.00	2.80	1.80	300-7102-2-ND	1328.00	CMX309HWC32.768MT
33.000	300-7103-1-ND	3.00	2.80	1.80	300-7103-2-ND	1328.00	CMX309HWC33.000MT
33.3333	300-7104-1-ND	3.00	2.80	1.80	300-7104-2-ND	1328.00	CMX309HWC33.3333MT
33.8688	300-7105-1-ND	3.00	2.80	1.80	300-7105-2-ND	1328.00	CMX309HWC33.8688MT
40.000	300-7107-1-ND	3.00	2.80	1.80	300-7107-2-ND	1328.00	CMX309HWC40.000MT
44.2368	300-7108-1-ND	3.00	2.80	1.80	300-7108-2-ND	1328.00	CMX309HWC44.2368MT
48.000	300-7109-1-ND	3.00	2.80	1.80	300-7109-2-ND	1328.00	CMX309HWC48.000MT
49.152	300-7110-1-ND	3.00	2.80	1.80	300-7110-2-ND	1328.00	CMX309HWC49.152MT
50.000	300-7111-1-ND	3.19	2.98	1.92	300-7111-2-ND	1411.00	CMX309HWC50.000MT
53.125	300-7112-1-ND	3.00	2.80	1.80	300-7112-2-ND	1328.00	CMX309HWC53.125MT
60.000	300-7113-1-ND	3.00	2.80	1.80	300-7113-2-ND	1328.00	CMX309HWC60.000MT
64.000	300-7114-1-ND	3.00	2.80	1.80	300-7114-2-ND	1328.00	CMX309HWC64.000MT
66.000	300-7115-1-ND	3.00	2.80	1.80	300-7115-2-ND	1328.00	CMX309HWC66.000MT
66.6667	300-7116-1-ND	3.00	2.80	1.80	300-7116-2-ND	1328.00	CMX309HWC66.6667MT

CSX750PCC Series Oscillators

SPECIFICATIONS:

• **Frequency Stability:** $\pm 100\text{ppm}$ (-20°C to $+70^{\circ}\text{C}$) • **Operating Temperature Range:** -20°C to $+70^{\circ}\text{C}$ • **Storage Temperature Range:** -55°C to $+125^{\circ}\text{C}$ • **Supply Voltage:** $V_{DD}: 5.0\text{V} \pm 0.5\text{V}$ • **Supply Current:** 45mA Max. • **Duty:** CMOS Level (V_{DD}/2): 45% to 55% • **Output Voltage:** $V_{OH}: V_{DD} - 0.4\text{V}$ Min.; $V_{OL}: 0.4\text{V}$ Max. • **Output Load:** CMOS: 25pF Max. • **Rise & Fall Time:** CMOS: $t_{r/f}: 4\text{nsec}$ Max. • **Start-up Time:** 10msec Max. • **Input (OE) Voltage:** $V_{IH}: 2.0\text{V}$ Min.; $V_{IL}: 0.8\text{V}$ Max. • **Disable Current:** 30mA Max. • **Stand-by Current:** $50\mu\text{A}$ Max.



Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T & R Pricing 2,000	Citizen Part No.
		1	10	50			
1.5440	300-8001-1-ND	4.13	3.85	3.30	300-8001-2-ND	1540.00/M	CSX750PCC1.5440MT
1.8432	300-8002-1-ND	4.13	3.85	3.30	300-8002-2-ND	1540.00/M	CSX750PCC1.8432MT
3.6864	300-8003-1-ND	4.13	3.85	3.30	300-8003-2-ND	1540.00/M	CSX750PCC3.6864MT
4.0000	300-8004-1-ND	4.13	3.85	3.30	300-8004-2-ND	1540.00/M	CSX750PCC4.0000MT
6.1760	300-8005-1-ND	4.13	3.85	3.30	300-8005-2-ND	1540.00/M	CSX750PCC6.1760MT
7.3728	300-8006-1-ND	4.13	3.85	3.30	300-8006-2-ND	1540.00/M	CSX750PCC7.3728MT
8.0000	300-8007-1-ND	4.13	3.85	3.30	300-8007-2-ND	1540.00/M	CSX750PCC8.0000MT
10.0000	300-8008-1-ND	4.13	3.85	3.30	300-8008-2-ND	1540.00/M	CSX750PCC10.0000MT
12.0000	300-8009-1-ND	4.13	3.85	3.30	300-8009-2-ND	1540.00/M	CSX750PCC12.0000MT
12.2880	300-8010-1-ND	4.13	3.85	3.30	300-8010-2-ND	1540.00/M	CSX750PCC12.2880MT
12.3520	300-8011-1-ND	4.13	3.85	3.30	300-8011-2-ND	1540.00/M	CSX750PCC12.3520MT
14.31818	300-8012-1-ND	4.13	3.85	3.30	300-8012-2-ND	1540.00/M	CSX750PCC14.31818MT
15.3600	300-8013-1-ND	4.13	3.85	3.30	300-8013-2-ND	1540.00/M	CSX750PCC15.3600MT
16.0000	300-8014-1-ND	4.13	3.85	3.30	300-8014-2-ND	1540.00/M	CSX750PCC16.0000MT
16.3840	300-8015-1-ND	4.13	3.85	3.30	300-8015-2-ND	1540.00/M	CSX750PCC16.3840MT
18.4320	300-8016-1-ND	4.13	3.85	3.30	300-8016-2-ND	1540.00/M	CSX750PCC18.4320MT
19.4400	300-8017-1-ND	4.13	3.85	3.30	300-8017-2-ND	1540.00/M	CSX750PCC19.4400MT
20.0000	300-8018-1-ND	4.13	3.85	3.30	300-8018-2-ND	1540.00/M	CSX750PCC20.0000MT
24.0000	300-8019-1-ND	4.13	3.85	3.30	300-8019-2-ND	1540.00/M	CSX750PCC24.0000MT
24.7040	300-8020-1-ND	4.13	3.85	3.30	300-8020-2-ND	1540.00/M	CSX750PCC24.7040MT
25.0000	300-8021-1-ND	4.13	3.85	3.30	300-8021-2-ND	1540.00/M	CSX750PCC25.0000MT
29.4912	300-8022-1-ND	4.13	3.85	3.30	300-8022-2-ND	1540.00/M	CSX750PCC29.4912MT
30.0000	300-8023-1-ND	4.13	3.85	3.30	300-8023-2-ND	1540.00/M	CSX750PCC30.0000MT
32.0000	300-8024-1-ND	4.13	3.85	3.30	300-8024-2-ND	1540.00/M	CS

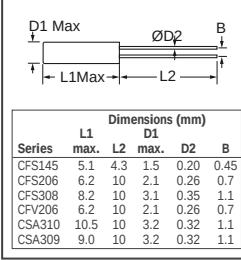
CFS, CFV, and CSA Series Cylinder Type Crystals

SPECIFICATIONS: • Frequency Tolerance: CFS Series: ±20ppm; CFV & CSA Series: ±30ppm • Operating Temperature Range: -10°C to +60°C • Storage Temperature Range: -40°C to +85°C • Drive Level: CFS & CFV Series: 1µW Max.; CSA Series: 50µW to 100µW • Insulation Resistance: 500MΩ Min. • Aging (first year): CFS Series: ±3ppm Max.; CFV & CSA Series: ±5ppm Max.

Equivalent Series Resistance (ESR, R1) (L1Max.) for CSA Series

Frequency	ESR	Mode
3.5MHz ≤ f < 4MHz	200	Fundamental
4MHz ≤ f < 6MHz	150	
6MHz ≤ f < 10MHz	100	
10MHz ≤ f < 30MHz	50	
30MHz ≤ f < 36MHz	100	
36MHz ≤ f < 66.666MHz	80	3rd OT

Cylinder Type



Dimensions (mm)

Series	L1 max.	L2	D1	D2	B
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CFS145	5.1	4.3	1.5	0.20	0.45
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CFS206	6.2	10	2.1	0.26	0.7
--------	-----	----	-----	------	-----

CFS308	8.2	10	3.1	0.35	1.1
--------	-----	----	-----	------	-----

CFV206	6.2	10	2.1	0.26	0.7
--------	-----	----	-----	------	-----

CSA310	10.5	10	3.2	0.32	1.1
--------	------	----	-----	------	-----

CSA309	9.0	10	3.2	0.32	1.1
--------	-----	----	-----	------	-----

CM100S, CM200S, CM201, and CM202 Series Crystals 32.768KHz

SPECIFICATIONS:

• Frequency Tolerance: ±20ppm • Operating Temperature Range: -40°C to +85°C • Storage Temperature Range: -55°C to +125°C • Equivalent Series Resistance: 50kΩ Max. • Load Capacitance: 12.5pF • Drive Level: 1µW Max. • Insulation Resistance: 500MΩ Min. • Aging (first year) ±3ppm Max.

Fig. 1 - CM100S Series

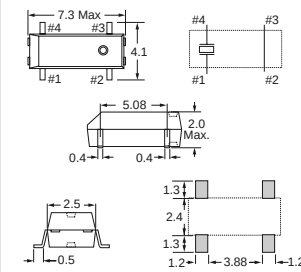


Fig. 2 - CM200S Series

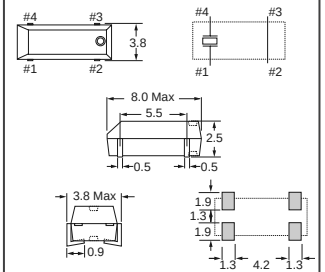


Fig. 3 - CM201 Series

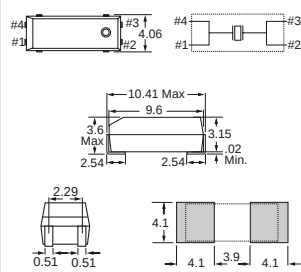


Fig. 4 - CM202 Series

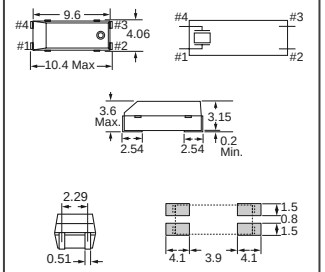
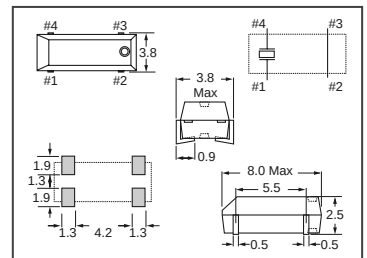


Fig.	Series	Digi-Key Part No.	Cut Tape Price Each	1	10	50	Digi-Key Part No.	Tape & Reel Pricing	2,000	3,000	Citizen Part No.
1	CM100S	300-1007-1-ND	1.58	1.35	1.02	—	300-1007-2-ND	—	819.23/M	—	CM100S32.768KZFT
2	CM200S	300-1004-1-ND	1.19	1.02	.77	—	300-1004-2-ND	—	618.98/M	—	CM200S32.768KZFT
3	CM201	300-1005-1-ND	1.19	1.02	.77	—	300-1005-2-ND	618.98/M	—	—	CM201-32.768KZFT
4	CM202	300-1006-1-ND	1.19	1.02	.77	—	300-1006-2-ND	618.98/M	—	—	CM202-32.768KZFT

CM250S Series Quartz Crystals

SPECIFICATIONS:

• Frequency Tolerance: ±50ppm
• Operating Temperature Range: -40°C to +85°C
• Storage Temperature Range: -55°C to +125°C
• Load Capacitance: 12.5pF
• Shunt Capacitance: 0.8 to 1.7pF
• Drive Level: 1µW Max.
• Insulation Resistance: ±500MΩ Min.
• Aging (first year): ±5ppm Max.



Frequency	Digi-Key Part No.	Cut Tape Price Each	1	10	50	Digi-Key Part No.	Tape & Reel Pricing	2,000	3,000	Citizen Part No.
32.000 KHz	300-2007-1-ND	1.65	1.35	1.20	—	300-2007-2-ND	864.00/M	—	—	CM250S32.000KAZFT
40.000 KHz	300-2015-1-ND	1.65	1.35	1.20	—	300-2015-2-ND	864.00/M	—	—	CM250S40.000KAZFT
60.000 KHz	300-2018-1-ND	1.65	1.35	1.20	—	300-2018-2-ND	864.00/M	—	—	CM250S60.000KAZFT
60.005 KHz	300-2019-1-ND	1.65	1.35	1.20	—	300-2019-2-ND	864.00/M	—	—	CM250S60.005KAZFT
65.536 KHz	300-2020-1-ND	1.65	1.35	1.20	—	300-2020-2-ND	864.00/M	—	—	CM250S65.536KAZFT
75.000 KHz	300-2021-1-ND	1.65	1.35	1.20	—	300-2021-2-ND	864.00/M	—	—	CM250S75.000KAZFT
76.790 KHz	300-2022-1-ND	1.65	1.35	1.20	—	300-2022-2-ND	864.00/M	—	—	CM250S76.790KAZFT
76.800 KHz	300-2023-1-ND	1.65	1.35	1.20	—	300-2023-2-ND	864.00/M	—	—	CM250S76.800KAZFT
76.810 KHz	300-2024-1-ND	1.65	1.35	1.20	—	300-2024-2-ND	864.00/M	—	—	CM250S76.810KAZFT
77.500 KHz	300-2025-1-ND	1.65	1.35	1.20	—	300-2025-2-ND	864.00/M	—	—	CM250S77.500KAZFT
77.503 KHz	300-2026-1-ND	1.65	1.35	1.20	—	300-2026-2-ND	864.00/M	—	—	CM250S77.503KAZFT
96.000 KHz	300-2029-1-ND	1.65	1.35	1.20	—	300-2029-2-ND	864.00/M	—	—	CM250S96.000KAZFT
100.000 KHz	300-2030-1-ND	1.65	1.35	1.20	—	300-2030-2-ND	864.00/M	—	—	CM250S100.000KAZFT
153.600 KHz	300-2031-1-ND	1.65	1.35	1.20	—	—	—	—	—	CM250S153.600KAZFT

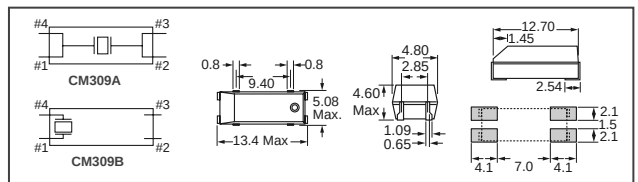
CITIZEN™ CM309 Series Crystals

SPECIFICATIONS:

- Frequency Tolerance: ± 50 ppm
- Operating Temperature Range: -40°C to $+85^{\circ}\text{C}$
- Storage Temperature Range: -55°C to $+125^{\circ}\text{C}$
- Load Capacitance: 18pF
- Shunt Capacitance: 7.0pF
- Drive Level: 50 μW to 100 μW
- Insulation Resistance: 500M Ω Min.
- Aging (first year): ± 5 ppm Max.

Equivalent Series Resistance (ESR, R₁)

Frequency	ESR	Mode
3.5MHz $\leq f_0 < 4$ MHz	200	Fundamental
4MHz $\leq f_0 < 6$ MHz	150	
6MHz $\leq f_0 < 10$ MHz	100	
10MHz $\leq f_0 \leq 32$ MHz	50	
30MHz $< f_0 \leq 36$ MHz	100	3rd OT
36MHz $\leq f_0 \leq 66.6666$ MHz	80	



Frequency (MHz)	309A Series		309B Series		Cut Tape Price Each			Tape & Reel Pricing†
	Digi-Key Part No.	Citizen Part No.	Digi-Key Part No.	Citizen Part No.	1	10	50	
3.579545	300-4001-1-ND	CM309A3.579545MABJT	300-4101-1-ND	CM309B3.579545MABJT	1.40	1.20	.90	700.00
3.6864	300-4002-1-ND	CM309A3.6864MABJT	300-4102-1-ND	CM309B3.6864MABJT	1.40	1.20	.90	700.00
4.000	300-4003-1-ND	CM309A4.000MABJT	300-4103-1-ND	CM309B4.000MABJT	1.40	1.20	.90	700.00
4.096	300-4004-1-ND	CM309A4.096MABJT	300-4104-1-ND	CM309B4.096MABJT	1.40	1.20	.90	700.00
4.800	300-4005-1-ND	CM309A4.800MABJT	300-4105-1-ND	CM309B4.800MABJT	1.40	1.20	.90	700.00
4.915	300-4006-1-ND	CM309A4.915MABJT	300-4106-1-ND	CM309B4.915MABJT	1.40	1.20	.90	700.00
5.120	300-4007-1-ND	CM309A5.120MABJT	300-4107-1-ND	CM309B5.120MABJT	1.40	1.20	.90	700.00
5.5296	300-4008-1-ND	CM309A5.5296MABJT	300-4108-1-ND	CM309B5.5296MABJT	1.40	1.20	.90	700.00
6.000	300-4009-1-ND	CM309A6.000MABJT	300-4109-1-ND	CM309B6.000MABJT	1.40	1.20	.90	700.00
6.144	300-4010-1-ND	CM309A6.144MABJT	300-4110-1-ND	CM309B6.144MABJT	1.40	1.20	.90	700.00
7.3728	300-4011-1-ND	CM309A7.3728MABJT	300-4111-1-ND	CM309B7.3728MABJT	1.40	1.20	.90	700.00
7.680	300-4012-1-ND	CM309A7.680MABJT	300-4112-1-ND	CM309B7.680MABJT	1.40	1.20	.90	700.00
8.000	300-4013-1-ND	CM309A8.000MABJT	300-4113-1-ND	CM309B8.000MABJT	1.40	1.20	.90	700.00
8.000156	300-4014-1-ND	CM309A8.000156MABJT	300-4114-1-ND	CM309B8.000156MABJT	1.40	1.20	.90	700.00
8.192	300-4015-1-ND	CM309A8.192MABJT	300-4115-1-ND	CM309B8.192MABJT	1.40	1.20	.90	700.00
9.216	300-4016-1-ND	CM309A9.216MABJT	300-4116-1-ND	CM309B9.216MABJT	1.40	1.20	.90	700.00
9.600	300-4017-1-ND	CM309A9.600MABJT	300-4117-1-ND	CM309B9.600MABJT	1.40	1.20	.90	700.00
9.8304	300-4018-1-ND	CM309A9.8304MABJT	300-4118-1-ND	CM309B9.8304MABJT	1.40	1.20	.90	700.00
10.000	300-4019-1-ND	CM309A10.000MABJT	300-4119-1-ND	CM309B10.000MABJT	1.40	1.20	.90	700.00
10.240	300-4020-1-ND	CM309A10.240MABJT	300-4120-1-ND	CM309B10.240MABJT	1.40	1.20	.90	700.00
11.000	300-4021-1-ND	CM309A11.000MABJT	300-4121-1-ND	CM309B11.000MABJT	1.40	1.20	.90	700.00
11.0592	300-4022-1-ND	CM309A11.0592MABJT	300-4122-1-ND	CM309B11.0592MABJT	1.40	1.20	.90	700.00
11.2896	300-4023-1-ND	CM309A11.2896MABJT	300-4123-1-ND	CM309B11.2896MABJT	1.40	1.20	.90	700.00
12.000	300-4024-1-ND	CM309A12.000MABJT	300-4124-1-ND	CM309B12.000MABJT	1.40	1.20	.90	700.00
12.288	300-4025-1-ND	CM309A12.288MABJT	300-4125-1-ND	CM309B12.288MABJT	1.40	1.20	.90	700.00
12.352	300-4026-1-ND	CM309A12.352MABJT	300-4126-1-ND	CM309B12.352MABJT	1.40	1.20	.90	700.00
12.500	300-4027-1-ND	CM309A12.500MABJT	300-4127-1-ND	CM309B12.500MABJT	1.40	1.20	.90	700.00
13.500	300-4028-1-ND	CM309A13.500MABJT	300-4128-1-ND	CM309B13.500MABJT	1.40	1.20	.90	700.00
14.31818	300-4029-1-ND	CM309A14.31818MABJT	300-4129-1-ND	CM309B14.31818MABJT	1.40	1.20	.90	700.00
14.7456	300-4030-1-ND	CM309A14.7456MABJT	300-4130-1-ND	CM309B14.7456MABJT	1.40	1.20	.90	700.00
15.000	300-4031-1-ND	CM309A15.000MABJT	300-4131-1-ND	CM309B15.000MABJT	1.40	1.20	.90	700.00
15.360	300-4032-1-ND	CM309A15.360MABJT	300-4132-1-ND	CM309B15.360MABJT	1.40	1.20	.90	700.00
16.000	300-4033-1-ND	CM309A16.000MABJT	300-4133-1-ND	CM309B16.000MABJT	1.40	1.20	.90	700.00
16.000312	300-4034-1-ND	CM309A16.000312MABJT	300-4134-1-ND	CM309B16.000312MABJT	1.40	1.20	.90	700.00
16.257	300-4035-1-ND	CM309A16.257MABJT	300-4135-1-ND	CM309B16.257MABJT	1.40	1.20	.90	700.00
16.384	300-4036-1-ND	CM309A16.384MABJT	300-4136-1-ND	CM309B16.384MABJT	1.40	1.20	.90	700.00
16.667	300-4037-1-ND	CM309A16.667MABJT	300-4137-1-ND	CM309B16.667MABJT	1.40	1.20	.90	700.00
16.9344	300-4038-1-ND	CM309A16.9344MABJT	300-4138-1-ND	CM309B16.9344MABJT	1.40	1.20	.90	700.00
17.734475	300-4039-1-ND	CM309A17.734475MABJT	300-4139-1-ND	CM309B17.734475MABJT	1.40	1.20	.90	700.00
18.000	300-4040-1-ND	CM309A18.000MABJT	300-4140-1-ND	CM309B18.000MABJT	1.40	1.20	.90	700.00
18.432	300-4041-1-ND	CM309A18.432MABJT	300-4141-1-ND	CM309B18.432MABJT	1.40	1.20	.90	700.00
18.869	300-4042-1-ND	CM309A18.869MABJT	300-4142-1-ND	CM309B18.869MABJT	1.40	1.20	.90	700.00
19.6608	300-4043-1-ND	CM309A19.6608MABJT	300-4143-1-ND	CM309B19.6608MABJT	1.40	1.20	.90	700.00
20.000	300-4044-1-ND	CM309A20.000MABJT	300-4144-1-ND	CM309B20.000MABJT	1.40	1.20	.90	700.00
20.480	300-4045-1-ND	CM309A20.480MABJT	300-4145-1-ND	CM309B20.480MABJT	1.40	1.20	.90	700.00
22.1184	300-4046-1-ND	CM309A22.1184MABJT	300-4146-1-ND	CM309B22.1184MABJT	1.40	1.20	.90	700.00
24.000	300-4047-1-ND	CM309A24.000MABJT	300-4147-1-ND	CM309B24.000MABJT	1.40	1.20	.90	700.00
24.576	300-4048-1-ND	CM309A24.576MABJT	300-4148-1-ND	CM309B24.576MABJT	1.40	1.20	.90	700.00
25.000	300-4049-1-ND	CM309A25.000MABJT	300-4149-1-ND	CM309B25.000MABJT	1.40	1.20	.90	700.00
25.175	300-4050-1-ND	CM309A25.175MABJT	300-4150-1-ND	CM309B25.175MABJT	1.40	1.20	.90	700.00
27.000	300-4051-1-ND	CM309A27.000MABJT	300-4151-1-ND	CM309B27.000MABJT	1.40	1.20	.90	700.00
28.000	300-4052-1-ND	CM309A28.000MABJT	300-4152-1-ND	CM309B28.000MABJT	1.40	1.20	.90	700.00
28.322	300-4053-1-ND	CM309A28.322MABJT	300-4153-1-ND	CM309B28.322MABJT	1.40	1.20	.90	700.00
28.63636	300-4054-1-ND	CM309A28.63636MABJT	300-4154-1-ND	CM309B28.63636MABJT	1.40	1.20	.90	700.00
29.4912	300-4055-1-ND	CM309A29.4912MABJT	300-4155-1-ND	CM309B29.4912MABJT	1.40	1.20	.90	700.00
30.000	300-4056-1-ND	CM309A30.000MABJT	300-4156-1-ND	CM309B30.000MABJT	1.40	1.20	.90	700.00
32.000	300-4057-1-ND	CM309A32.000MABJT	300-4157-1-ND	CM309B32.000MABJT	1.40	1.20	.90	700.00
32.768	300-4058-1-ND	CM309A32.768MABJT	300-4158-1-ND	CM309B32.768MABJT	1.40	1.20	.90	700.00
33.000	300-4059-1-ND	CM309A33.000MABJT	300-4159-1-ND	CM309B33.000MABJT	1.40	1.20	.90	700.00
33.3333	300-4060-1-ND	CM309A33.3333MABJT	300-4160-1-ND	CM309B33.3333MABJT	1.40	1.20	.90	700.00
33.8688	300-4061-1-ND	CM309A33.8688MABJT	300-4161-1-ND	CM309B33.8688MABJT	1.40	1.20	.90	700.00
40.000	300-4063-1-ND	CM309A40.000MABJT	300-4163-1-ND	CM309B40.000MABJT	1.40	1.20	.90	700.00
48.000	300-4064-1-ND	CM309A48.000MABJT	300-4164-1-ND	CM309B48.000MABJT	1.40	1.20	.90	700.00
49.152	300-4065-1-ND	CM309A49.152MABJT	300-4165-1-ND	CM309B49.152MABJT	1.40	1.20	.90	700.00
50.000	300-4066-1-ND	CM309A50.000MABJT	300-4166-1-ND	CM309B50.000MABJT	1.40	1.20	.90	700.00
53.125	300-4067-1-ND	CM309A53.125MABJT	300-4167-1-ND	CM309B53.125MABJT	1.40	1.20	.90	700.00
60.000	300-4068-1-ND	CM309A60.000MABJT	300-4168-1-ND	CM309B60.000MABJT	1.40	1.20	.90	700.00
64.000	300-4069-1-ND	CM309A64.000MABJT	300-4169-1-ND	CM309B64.000MABJT	1.40	1.20	.90	700.00
66.6666	300-4070-1-ND	CM309A66.6666MABJT	300-4170-1-ND	CM309B66.6666MABJT	1.40	1.20	.90	700.00

† For Tape & Reel part number, change -1-ND to -2-ND.

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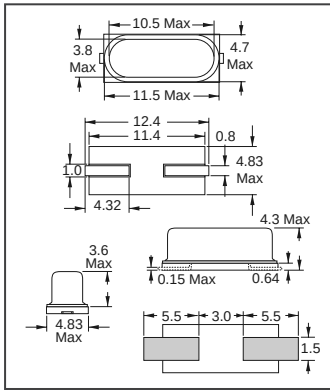
HCM49 Series Surface Mount Crystals

SPECIFICATIONS:

- Frequency Tolerance: ± 50 ppm
- Operating Temperature Range: -10°C to $+60^{\circ}\text{C}$
- Storage Temperature Range: -40°C to $+85^{\circ}\text{C}$
- Load Capacitance: 18pfd
- Shunt Capacitance: 7.0pF Max.
- Drive Level: 100 μ W
- Insulation Resistance: 500M Ω Min.
- Aging (first year): ± 5 ppm Max.

Equivalent Series Resistance (ESR, R1) (Ohm Max.)

Frequency	ESR
3.5MHz $\leq f < 4.0$ MHz	200
4.0MHz $\leq f < 6.0$ MHz	150
6.0MHz $\leq f < 10.0$ MHz	100
10.0MHz $\leq f < 14.0$ MHz	80
14.0MHz $\leq f \leq 25.0$ MHz	50



Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each	Tape & Reel Pricing 1,000	50	Citizen Part No.
3.579545	300-6101-1-ND	1.13 .98 .85	300-6101-2-ND	525.00	HCM49-3.579545MABJT
3.6864	300-6102-1-ND	1.13 .98 .85	300-6102-2-ND	525.00	HCM49-3.6864MABJT
4.000	300-6103-1-ND	1.13 .98 .85	300-6103-2-ND	525.00	HCM49-4.000MABJT
4.032	300-6104-1-ND	1.13 .98 .85	300-6104-2-ND	525.00	HCM49-4.032MABJT
4.096	300-6105-1-ND	1.13 .98 .85	300-6105-2-ND	525.00	HCM49-4.096MABJT
4.194304	300-6106-1-ND	1.13 .98 .85	300-6106-2-ND	525.00	HCM49-4.194304MABJT
4.433619	300-6107-1-ND	1.13 .98 .85	300-6107-2-ND	525.00	HCM49-4.433619MABJT
4.9152	300-6108-1-ND	1.13 .98 .85	300-6108-2-ND	525.00	HCM49-4.9152MABJT
5.000	300-6109-1-ND	1.13 .98 .85	300-6109-2-ND	525.00	HCM49-5.000MABJT
5.0688	300-6110-1-ND	1.13 .98 .85	300-6110-2-ND	525.00	HCM49-5.0688MABJT
5.9904	300-6111-1-ND	1.13 .98 .85	300-6111-2-ND	525.00	HCM49-5.9904MABJT
6.000	300-6112-1-ND	1.13 .98 .85	300-6112-2-ND	525.00	HCM49-6.000MABJT
6.144	300-6113-1-ND	1.13 .98 .85	300-6113-2-ND	525.00	HCM49-6.144MABJT
6.500	300-6114-1-ND	1.13 .98 .85	300-6114-2-ND	525.00	HCM49-6.500MABJT
7.3728	300-6115-1-ND	1.13 .98 .85	300-6115-2-ND	525.00	HCM49-7.3728MABJT
7.680	300-6116-1-ND	1.13 .98 .85	300-6116-2-ND	525.00	HCM49-7.680MABJT
8.000	300-6117-1-ND	1.13 .98 .85	300-6117-2-ND	525.00	HCM49-8.000MABJT
9.000	300-6118-1-ND	1.13 .98 .85	300-6118-2-ND	525.00	HCM49-9.000MABJT
9.8304	300-6120-1-ND	1.13 .98 .85	300-6120-2-ND	525.00	HCM49-9.8304MABJT
10.000	300-6121-1-ND	1.13 .98 .85	300-6121-2-ND	525.00	HCM49-10.000MABJT

Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each	Tape & Reel Pricing 1,000	Citizen Part No.
10.240	300-6122-1-ND	1.13 .98 .85	300-6122-2-ND	525.00
11.000	300-6123-1-ND	1.13 .98 .85	300-6123-2-ND	525.00
11.0592	300-6124-1-ND	1.13 .98 .85	300-6124-2-ND	525.00
11.520	300-6125-1-ND	1.13 .98 .85	300-6125-2-ND	525.00
12.000	300-6127-1-ND	1.13 .98 .85	300-6127-2-ND	525.00
12.000393	300-6128-1-ND	1.13 .98 .85	300-6128-2-ND	525.00
12.288	300-6129-1-ND	1.13 .98 .85	300-6129-2-ND	525.00
14.31818	300-6130-1-ND	1.13 .98 .85	300-6130-2-ND	525.00
14.7456	300-6131-1-ND	1.13 .98 .85	300-6131-2-ND	525.00
15.000	300-6132-1-ND	1.13 .98 .85	300-6132-2-ND	525.00
15.360	300-6133-1-ND	1.13 .98 .85	300-6133-2-ND	525.00
16.000	300-6134-1-ND	1.13 .98 .85	300-6134-2-ND	525.00
16.000312	300-6135-1-ND	1.13 .98 .85	300-6135-2-ND	525.00
16.257	300-6136-1-ND	1.13 .98 .85	300-6136-2-ND	525.00
16.384	300-6137-1-ND	1.13 .98 .85	300-6137-2-ND	525.00
17.734475	300-6138-1-ND	1.13 .98 .85	300-6138-2-ND	525.00
18.000	300-6139-1-ND	1.13 .98 .85	300-6139-2-ND	525.00
18.432	300-6140-1-ND	1.13 .98 .85	300-6140-2-ND	525.00
19.6608	300-6141-1-ND	1.13 .98 .85	300-6141-2-ND	525.00
20.000	300-6142-1-ND	1.13 .98 .85	300-6142-2-ND	525.00
21.47727	300-6143-1-ND	1.13 .98 .85	300-6143-2-ND	525.00
22.1184	300-6144-1-ND	1.13 .98 .85	300-6144-2-ND	525.00
24.000	300-6145-1-ND	1.13 .98 .85	300-6145-2-ND	525.00
24.00014	300-6146-1-ND	1.13 .98 .85	300-6146-2-ND	525.00
24.576	300-6147-1-ND	1.13 .98 .85	300-6147-2-ND	525.00
25.000	300-6148-1-ND	1.13 .98 .85	300-6148-2-ND	525.00
25.175	300-6149-1-ND	1.13 .98 .85	300-6149-2-ND	525.00
27.000	300-6150-1-ND	1.13 .98 .85	300-6150-2-ND	525.00
28.63636	300-6152-1-ND	1.13 .98 .85	300-6152-2-ND	525.00
32.000	300-6153-1-ND	1.13 .98 .85	300-6153-2-ND	525.00
33.8688	300-6156-1-ND	1.13 .98 .85	300-6156-2-ND	525.00
40.000	300-6157-1-ND	1.13 .98 .85	300-6157-2-ND	525.00
48.000	300-6158-1-ND	1.13 .98 .85	300-6158-2-ND	525.00
49.152	300-6159-1-ND	1.13 .98 .85	300-6159-2-ND	525.00
50.000	300-6160-1-ND	1.13 .98 .85	300-6160-2-ND	525.00

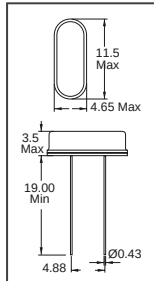
HC49US Series Through-Hole Crystals

SPECIFICATIONS:

- Frequency Tolerance: ± 50 ppm
- Operating Temperature Range: -10°C to $+60^{\circ}\text{C}$
- Storage Temperature Range: -40°C to $+85^{\circ}\text{C}$
- Load Capacitance: 18pfd
- Shunt Capacitance: 7.0pF Max.
- Drive Level: 100 μ W
- Insulation Resistance: 500M Ω Min.
- Aging (first year): ± 5 ppm Max.

Equivalent Series Resistance (ESR, R1) (Ohm Max.)

Frequency	ESR
3.5MHz $\leq f < 4.0$ MHz	200
4.0MHz $\leq f < 6.0$ MHz	150
6.0MHz $\leq f < 10.0$ MHz	100
10.0MHz $\leq f < 14.0$ MHz	80
14.0MHz $\leq f \leq 25.0$ MHz	50



Frequency (MHz)	Digi-Key Part No.	Price Each	Citizen Part No.
3.579545	300-6001-ND	.88 .75 .69	HC49US3.579545MABJ
3.6864	300-6002-ND	.88 .75 .69	HC49US3.6864MABJ
4.000	300-6003-ND	.88 .75 .69	HC49US4.000MABJ
4.032	300-6004-ND	.88 .75 .69	HC49US4.032MABJ
4.096	300-6005-ND	.88 .75 .69	HC49US4.096MABJ
4.194304	300-6006-ND	.88 .75 .69	HC49US4.194304MABJ
4.433619	300-6007-ND	.88 .75 .69	HC49US4.433619MABJ
4.9152	300-6008-ND	.88 .75 .69	HC49US4.9152MABJ
5.000	300-6009-ND	.88 .75 .69	HC49US5.000MABJ
5.0688	300-6010-ND	.88 .75 .69	HC49US5.0688MABJ
5.9904	300-6011-ND	.88 .75 .69	HC49US5.9904MABJ
6.000	300-6012-ND	.88 .75 .69	HC49US6.000MABJ
6.144	300-6013-ND	.88 .75 .69	HC49US6.144MABJ
6.500	300-6014-ND	.88 .75 .69	HC49US6.500MABJ
7.3728	300-6015-ND	.88 .75 .69	HC49US7.3728MABJ
7.680	300-6016-ND	.88 .75 .69	HC49US7.680MABJ
8.000	300-6017-ND	.88 .75 .69	HC49US8.000MABJ
9.000	300-6018-ND	.88 .75 .69	HC49US9.000MABJ
9.216	300-6019-ND	.88 .75 .69	HC49US9.216MABJ
9.8304	300-6020-ND	.88 .75 .69	HC49US9.8304MABJ

Frequency (MHz)	Digi-Key Part No.	Price Each	Citizen Part No.
10.000	300-6021-ND	.88 .75 .69	HC49US10.000MABJ
10.240	300-6022-ND	.88 .75 .69	HC49US10.240MABJ
11.000	300-6023-ND	.88 .75 .69	HC49US11.000MABJ
11.0592	300-6024-ND	.88 .75 .69	HC49US11.0592MABJ
11.520	300-6025-ND	.88 .75 .69	HC49US11.520MABJ
12.000	300-6027-ND	.88 .75 .69	HC49US12.000MABJ
12.000393	300-6028-ND	.88 .75 .69	HC49US12.000393MABJ
12.288	300-6029-ND	.88 .75 .69	HC49US12.288MABJ
14.31818	300-6030-ND	.88 .75 .69	HC49US14.31818MABJ
14.7456	300-6031-ND	.88 .75 .69	HC49US14.7456MABJ
15.000	300-6032-ND	.88 .75 .69	HC49US15.000MABJ
15.360	300-6033-ND	.88 .75 .69	HC49US15.360MABJ
16.000	300-6034-ND	.88 .75 .69	HC49US16.000MABJ
16.000312	300-6035-ND	.88 .75 .69	HC49US16.000312MABJ
16.257	300-6036-ND	.88 .75 .69	HC49US16.257MABJ
16.384	300-6037-ND	.88 .75 .69	HC49US16.384MABJ
17.734475	300-6038-ND	.88 .75 .69	HC49US17.734475MABJ
18.000	300-6039-ND	.88 .75 .69	HC49US18.000MABJ
18.432	300-6040-ND	.88 .75 .69	HC49US18.432MABJ
19.6608	300-6041-ND	.88 .75 .69	HC49US19.6608MABJ
20.000	300-6042-ND	.88 .75 .69	HC49US20.000MABJ
21.47727	300-6043-ND	.88 .75 .69	HC49US21.47727MABJ
22.1184	300-6044-ND	.88 .75 .69	HC49US22.1184MABJ
24.000	300-6045-ND	.88 .75 .69	HC49US24.000MABJ
24.00014	300-6046-ND	.88 .75 .69	HC49US24.00014MABJ
24.576	300-6047-ND	.88 .75 .69	HC49US24.576MABJ
25.000	300-6048-ND	.88 .75 .69	HC49US25.000MABJ
25.175	300-6049-ND	.88 .75 .69	HC49US25.175MABJ
27.000	300-6050-ND	.88 .75 .69	HC49US27.000MABJ
28.224	300-6051-ND	.88 .75 .69	HC49US28.224MABJ
28.63636	300-6052-ND	.88 .75 .69	HC49US28.63636MABJ
32.000	300-6053-ND	.88 .75 .69	HC49US32.000MABJ
33.8688	300-6056-ND	.88 .75 .69	HC49US33.8688MABJ
40.000	300-6057-ND	.88 .75 .69	HC49US40.000MABJ
48.000	300-6058-ND	.88 .75 .69	HC49US48.000MABJ
50.000	300-6060-ND	.88 .75 .69	HC49US50.000MABJ

More Product Available Online: www.digikey.com

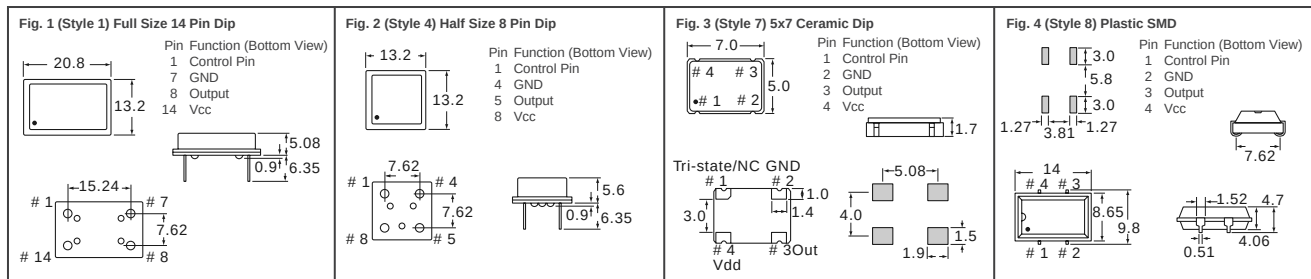
Toll-Free: 1-800-344-4539 • Phone: 218-681-6674 • Fax: 218-681-3380

NEW!

CARDINAL COMPONENTS, INC.

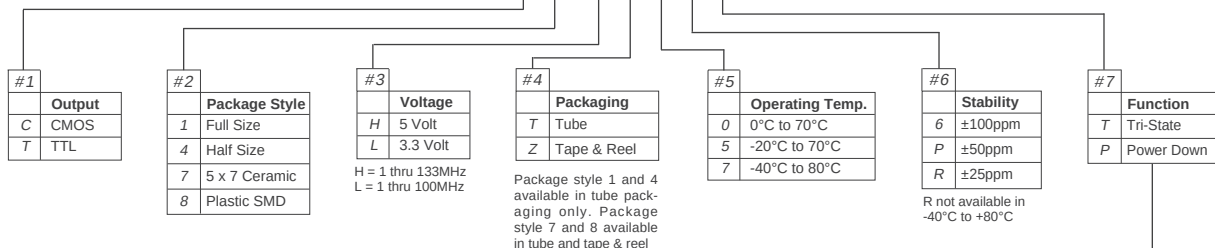
FIPO™ Field Instantly Programmable Oscillators

The FIPO system from Cardinal is indispensable for such things as prototypes, early stage design, unexpected design problems, modification, immediate service, a sudden ramp in production and volume production. Cardinal Oscillator Blanks are "Twice Programmable" to correct errors or to reuse the same part for two separate applications with different frequency and/or different output characteristics without having to dispose of the original part. Oscillator Blanks are available in four different package styles: Full Size 14 Pin Dip, Half Size 8 Pin Dip, 5x7 Ceramic SMD, and a Plastic SMD package. Frequency ranges are available from 1MHz to 133MHz in 5V, and 1MHz to 100MHz in 3.3V, and in ±100ppm, 50ppm and ±25ppm frequency stability options.



Example Part Number:

CPP □ □ - □ □ □ □ -ND



How to Select Base Number:

- # 1 = Select Output
- # 2 = Select Package Style
- # 3 = Select Voltage
- # 4 = Select Packaging
- # 5 = Select Operating Temperature
- # 6 = Select Stability
- # 7 = Select Function

Call Digi-Key with your Selected Base Part Number, and a Sales Representative will enter your desired frequency.

Tri-State Mode – The output of the part is weakly pulled low when the control pin goes low. The active circuitry continues to operate, allowing a rapid return to normal operation when the control pin goes high.

Power Down Mode – When the control pin goes low, all active circuitry on the chip within the oscillator is shut down. For reactivation, time in which the part regains its output is minimal.

Digi-Key, Base Part No.	Price Each			
	1	10	50	100
CPPC1-□T□R□-ND	6.20	5.74	5.12	4.66
CPPC1-□T□□□-ND	5.40	5.00	4.46	4.05
CPPT1-□T□R□-ND	6.20	5.74	5.12	4.66
CPPT1-□T□□□-ND	5.40	5.00	4.46	4.05
CPPC4-□T□R□-ND	6.20	5.74	5.12	4.66
CPPC4-□T□□□-ND	5.40	5.00	4.46	4.05
CPPT4-□T□R□-ND	6.20	5.74	5.12	4.66
CPPT4-□T□□□-ND	5.40	5.00	4.46	4.05

Digi-Key, Base Part No.	Price Each				Tape & Reel Pricing		
	1	10	50	100	100	500	1000
CPPC7-□□□□R□-ND	5.76	5.33	4.76	4.31	438.48	1627.78	2930.00
CPPC7-□□□□□-ND	5.00	4.63	4.13	3.75	382.50	1417.80	2550.00
CPPT7-□□□□R□-ND	5.76	5.33	4.76	4.31	438.48	1627.78	2930.00
CPPT7-□□□□□-ND	5.00	4.63	4.13	3.75	382.50	1417.80	2550.00
CPPC8-□□□□R□-ND	6.20	5.74	5.12	4.66	473.52	1752.83	3160.16
CPPC8-□□□□□-ND	5.40	5.00	4.46	4.05	412.50	1527.78	2750.00
CPPT8-□□□□R□-ND	6.20	5.74	5.12	4.66	473.52	1752.83	3160.16
CPPT8-□□□□□-ND	5.40	5.00	4.46	4.05	412.50	1527.78	2750.00

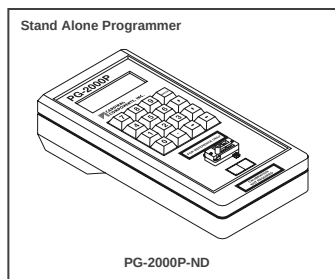
*Programmable parts are non-cancelable and non-returnable!

Stand-Alone Field Oscillator Programmer

Features:

- Create oscillators, at a user specified frequency, within seconds, IN THE FIELD
- No programming skills needed to create finished oscillators from sealed oscillator blanks
- Designed for low-volume program applications such as engineering, field sales, and sample quantity

- Internal frequency reference for single step programming
- Simple User Interface
- Cardinal 4-pin oscillators are easily inserted into a ZIF socket or SMD adapter for quick programming
- Oscillator characteristics are selected via keypad and 4-line LCD display



Description	Digi-Key Part No.	Price Each
Blank Oscillator, Full Size, ±50ppm or ±100ppm	CPPX1-A7BR-ND	4.73
Blank Oscillator, Full Size, ±25ppm	CPPX1-A5BC-ND	5.43
Blank Oscillator, Half Size, ±50ppm or ±100ppm	CPPX4-A7BR-ND	4.73
Blank Oscillator, Half Size, ±25ppm	CPPX4-A5BC-ND	5.43
Blank Oscillator, 5x7 Ceramic SMD, ±50ppm or 100ppm	CPPX7-A7BR-ND	4.38
Blank Oscillator, 5x7 Ceramic SMD, ±25ppm	CPPX7-A5BC-ND	5.04
Blank Oscillator, Plastic SMD, ±50ppm or ±100ppm	CPPX8-A7BR-ND	4.73
Blank Oscillator, Plastic SMD, ±25ppm	CPPX8-A5BC-ND	5.43
SMD Programming Socket for 5x7 Ceramic Oscillators	SC2000-ND	47.38
SMD Programming Socket for Plastic SMD Oscillators	SC2500-ND	88.00
Stand Alone Programmer	PG2000P-ND	1800.00

See Figures Above for Package Specifications

More Product Available Online: www.digikey.com

Toll-Free: 1-800-344-4539 • Phone: 218-681-6674 • Fax: 218-681-3380

SG-8002 Programmable Oscillators

The SG-8002 Series gives you the flexibility to solve many different application problems with a one time programmable device. Programmable Oscillators provide the ability to pick a custom frequency in one of five different packages available in SMD and Thru-Hole styles. These five packages are pin compatible with the

Epson SG-615, SG-636, SG-51, SG-531 and SG-710 Oscillators. Frequency ranges are available from 1Mhz to 125Mhz, in $\pm 100\text{ppm}$ and $\pm 50\text{ppm}$ frequency stability options and 3.3 or 5V power supply levels.

Dim. in mm

SG-615 Package (JA)

SG-636 Package (JC)

SG-51 Package (DB)

SG-531 Package (DC)

SG-710 Package (CA)

Package (JF) NEW!

Example Part Number:
SG-8002 - -ND

How to order: #1 = Select Package.
#2 = Select Function.
#3 = Select Power Supply Duty Level.
#4 = Select Frequency Stability and Operating Temperature.
Call Digi-Key with your Base Part Number and an Operator will enter your desired frequency.

#1	Package
JA	SG-615
JC	SG-636
DB	SG-51
DC	SG-531
CA	SG-710
JF	—

#2	Function
P	Output Enable
S	Standby

#3	Power Supply Duty Level	Frequency Stability	Operating Temperature	Available Frequency Range
H	5.0V, CMOS	B	-20°C to +70°C	1.00Mhz - 125.00Mhz
		C		
		M†		
T	5.0V, TTL	B	-20°C to +70°C	1.00Mhz - 125.00Mhz
		C		
		M†		
C	3.3V, CMOS	B	-20°C to +70°C	1.00Mhz - 106.25Mhz
		C		
		M†		

Digi-Key Base Part No.	Price Each			
	1	10	50	100
SG-8002JA- -ND	3.85	3.30	2.53	2.20
SG-8002JC- -ND	4.38	3.75	2.88	2.50
SG-8002DB- -ND	3.33	2.85	2.19	1.90
SG-8002DC- -ND	3.33	2.85	2.19	1.90
SG-8002CA- -ND	4.73	4.05	3.11	2.70
SG-8002JF- -ND NEW!	3.50	3.00	2.30	2.00

"Parts come marked with Manufacture Date Lot Code only. Marked parts are available as a non-catalog order only."

One Time Programmable parts are non-cancelable, non-returnable!

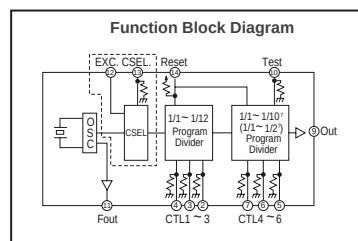
† Not available in JC Package

★ For complete Base Part Number, substitute the corresponding letter for .

Programmable Crystal Oscillators/Frequency Dividers

- Electrical Characteristics:**
- Supply Voltage: 4.5V-5.5V
 - Operating Temp.: -10°C to +70°C
 - L. Output Voltage: VOL = 0.4V.
 - H. Output Voltage: VOH = VDD -1.0V.
 - L. Output Current: IOL = 1.6mA.
 - H. Output Current: IOH = -40µA.
 - Rise Time: 30 nsec Typ.
 - Fall Time: 25 nsec Typ.
 - Start-up Time: 0.21 sec.

Features: • Provides 57 different frequencies from a single quartz crystal. • Packaged in standard 16-pin DIP containing both IC and quartz crystal. • SPG Series is high precision time-base frequency generators each comprised of a small quartz-crystal element and a CMOS monolithic chip integrated hybrid configuration.



Set Of Output Frequency

CTL1	CTL2	CTL3	Dividing Ratio	CTL4	CTL5	CTL6	Dividing Ratio
0	0	0	1/1	0	0	0	1/1
0	0	1	1/10	0	0	1	1/10
0	1	0	1/2	0	1	0	1/10²
0	1	1	1/3	0	1	1	1/10³
1	0	0	1/4	1	0	0	1/10⁴
1	0	1	1/5	1	0	1	1/10⁵
1	1	0	1/6	1	1	0	1/10⁶
1	1	1	1/12	1	1	1	1/10⁷

Base Frequency	Digi-Key Part No.	Price Each				Epson Part No.
		1	10	50	100	
60kHz±5ppm	SE3103-ND	19.20	16.00	11.38	10.24	SPG-8651A
100kHz±5ppm	SE3104-ND	19.20	16.00	11.38	10.24	SPG-8651B

HG-1000 Oscillators

Specifications:

• Max. Supply Voltage: -0.5V to +7.0V • Operating Voltage: 5.0V $\pm 25^\circ\text{C}$ • Storage Temperature: $\pm 55^\circ\text{C}$ to $\pm 125^\circ\text{C}$ • Operating Temperature: -40°C to +85°C • Frequency Tolerance: $\pm 25\text{ppm}$ @ -40°C to +85°C • Current Consumption: 10mA Max. • Duty: 40% to 60% @ 1/2 VDD Level • Output Load Capacitance: 15pF Max. • Output Rise Time: 8ns Max. • Output Fall Time: 8ns Max. • Oscillation Startup Time: 4ms max.

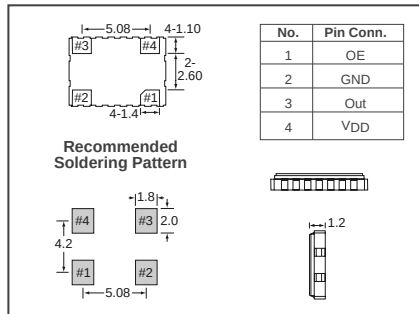
Frequency Mhz	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	Tape & Reel Pricing 1,000	Epson Part No.
		1	10	50			
1.544	SE2861CT-ND	8.73	7.28	5.09	SE2861TR-ND	3850.00	HG-1012JA 1.544M-BX2
16.384	SE2864CT-ND	8.73	7.28	5.09	SE2864TR-ND	3850.00	HG-1012JA 16.38M-BX2
19.440	SE2865CT-ND	8.73	7.28	5.09	SE2865TR-ND	3850.00	HG-1012JA 19.44M-BX2
20.000	SE2866CT-ND	8.73	7.28	5.09	SE2866TR-ND	3850.00	HG-1012JA 20.00M-BX2

More Product Available Online: www.digikey.com

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Surface-Mount Quartz Crystal Products

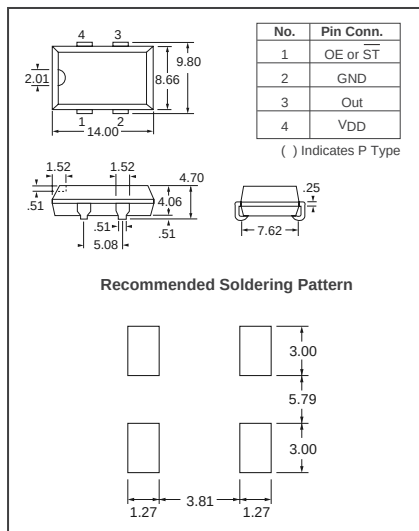
NEW! EG2001CA Series Oscillators



Specifications:
 • **Max. Supply Voltage:** -0.5 to +5.5 • **Operating Voltage:** 3.0 to 3.6
 • **Storage Temperature:** -55°C to +100°C • **Operating Temperature:** 0°C to +70°C • **Frequency Stability:** ±100ppm @ 0°C to +70°C
 • **Current Consumption:** 50mA Max. • **Duty:** 45% to 55% @ 50% VDD Level • **Output Load Condition:** 25pF Max. • **Output Rise/Fall Time:** 2ns Max. • **Oscillation Startup Time:** 10ms Max.

SG-615 Series Oscillators

- SG-615/615P (C-MOS, TTL compatible type)
- 615PT (TTL compatible type)
- SG-615H/PCV (C-MOS compatible type)
- Provided with an OE (Output Enable) function (SG-615P/615PT) (Contains internal pull-up resistor.)



Specifications:
 • **Supply Voltage:** Operating: 5.0±0.5V; Maximum: -0.3~+7.0V.
 • **Temperature Range:** Operating: -40°C to +85°C; Storage: -55°C to +125°C. • **Frequency Stability:** C: ±100ppm, -10°C to +70°C; C: ±200ppm, -40°C to +85°C. • **Current Consumption:** 25mA Max. (SG-615/615P); 35mA Max. (SG-615PT); 32mA Max. (SG-615H). Values are with no load. • **Duty Cycle:** 40~60%, 1.4V or 1/2VDD level. • **Output Voltage:** VDD -0.4V Min. (SG-615/615P), IOH = -400µA; VDD -0.4 Min. (SG-615PT), IOH = -400µA; VDD -0.37V Min. (SG-615H), IOH = 4mA; 0.4V Max. (SG-615/615P), IOL = 16mA; 0.4V Max. (SG-615PT), IOL = 16mA; 0.37V Max. (SG-615H), IOL = 4mA. • **OE Input Voltage** (SG-615P/615PT): 2.0V Min., IOH = IµA (VIH = VDD); 0.8V Max., IIL = 100mA (VIL = GND). • **Rise Time:** 8 nsec Max., 5 nsec Typ. (SG-615/615P); 10 nsec Max., 5 nsec Typ. (SG-615PT); 7 nsec Typ. (SG-615H). • **Fall Time:** 8 nsec Max., 5 nsec Typ. (SG-615/615P); 8 nsec Max., 3 nsec Typ. (SG-615PT); 7 nsec Max., 3.5 nsec Typ. (SG-615H). • **Oscillation Start Time:** 4 msec Max., (SG-615/615P); 10 msec Max., (SG-615PT); 10 msec Max., (SG-615H).

† Except when otherwise noted.

† **SE3-KIT-ND Digi-Key® SMT Crystal Kit** 2 each of values denoted (32 total pieces). Notebook style storage case and bin storage guide included\$109.00

Series	Frequency (MHz)†	Digi-Key Part No.	1	10	50	100	Digi-Key Part No.	Tape & Reel Pricing 1,000	Epson Part No.
EG2001CA	106.25	SE1008CT-ND NEW!	14.38	12.94	11.50	10.07	SE1008TR-ND NEW!	8050.00	EG2001CA 106.25MPCH3
	125.000	SE1009CT-ND NEW!	15.63	14.07	12.50	10.94	SE1009TR-ND NEW!	8750.00	EG2001CA 125.00MPCH3
SG-615	6.000	SE2107CT-ND	6.03	5.40	—	4.50	—	—	SG-615-6.0MCQ
SG-615P (OE) (CMOS) (TTL)	1.544	SE2217CT-ND	3.45	2.88	2.00	1.81	SE2217TR-ND	1520.00	SG-615P 1.544MCQ
	1.8432	SE2201CT-ND†	3.45	2.88	2.00	1.81	SE2201TR-ND	1520.00	SG-615P 1.843MCQ
	2.000	SE2202CT-ND†	3.45	2.88	2.00	1.81	SE2202TR-ND	1520.00	SG-615P 2.000MCQ
	2.048	SE2218CT-ND	3.45	2.88	2.00	1.81	SE2218TR-ND	1520.00	SG-615P 2.048MCQ
	2.4576	SE2203CT-ND†	3.45	2.88	2.00	1.81	SE2203TR-ND	1520.00	SG-615P 2.457MCQ
	3.072	SE2219CT-ND	3.45	2.88	2.00	1.81	SE2219TR-ND	1520.00	SG-615P 3.072MCQ
	3.579	SE2222CT-ND	3.45	2.88	2.00	1.81	SE2222TR-ND	1520.00	SG-615P 3.579MCQ
	3.6864	SE2204CT-ND†	3.45	2.88	2.00	1.81	SE2204TR-ND	1520.00	SG-615P 3.686MCQ
	4.000	SE2205CT-ND†	3.45	2.88	2.00	1.81	SE2205TR-ND	1520.00	SG-615P 4.000MCQ
	4.096	SE2223CT-ND	3.45	2.88	2.00	1.81	SE2223TR-ND	1520.00	SG-615P 4.096MCQ
	5.000	SE2224CT-ND	3.45	2.88	2.00	1.81	SE2224TR-ND	1520.00	SG-615P 5.000MCQ
	6.000	SE2207CT-ND†	3.45	2.88	2.00	1.81	SE2207TR-ND	1520.00	SG-615P 6.000MCQ
SG-615PT (OE)	6.144	SE2226CT-ND	3.45	2.88	2.00	1.81	SE2226TR-ND	1520.00	SG-615P 6.144MCQ
	7.372	SE2227CT-ND	3.45	2.88	2.00	1.81	SE2227TR-ND	1520.00	SG-615P 7.372MCQ
	8.192	SE2228CT-ND	3.45	2.88	2.00	1.81	SE2228TR-ND	1520.00	SG-615P 8.192MCQ
	9.830	SE2229CT-ND	3.45	2.88	2.00	1.81	SE2229TR-ND	1520.00	SG-615P 9.830MCQ
	10.000	SE2209CT-ND†	3.45	2.88	2.00	1.81	SE2209TR-ND	1520.00	SG-615P 10.000MCQ
	11.059	SE2232CT-ND	3.45	2.88	2.00	1.81	SE2232TR-ND	1520.00	SG-615P 11.059MCQ
	12.000	SE2210CT-ND†	3.45	2.88	2.00	1.81	SE2210TR-ND	1520.00	SG-615P 12.000MCQ
	12.288	SE2233CT-ND	3.45	2.88	2.00	1.81	SE2233TR-ND	1520.00	SG-615P 12.288MCQ
	14.31818	SE2211CT-ND†	3.45	2.88	2.00	1.81	SE2211TR-ND	1520.00	SG-615P 14.318MCQ
	16.000	SE2212CT-ND†	3.45	2.88	2.00	1.81	SE2212TR-ND	1520.00	SG-615P 16.000MCQ
	16.257	SE2236CT-ND	3.45	2.88	2.00	1.81	SE2236TR-ND	1520.00	SG-615P 16.257MCQ
	18.432	SE2213CT-ND†	3.45	2.88	2.00	1.81	SE2213TR-ND	1520.00	SG-615P 18.432MCQ
SG-615PTJ (TTL)	18.869	SE2238CT-ND	3.45	2.88	2.00	1.81	SE2238TR-ND	1520.00	SG-615P 18.869MCQ
	19.660	SE2239CT-ND	3.45	2.88	2.00	1.81	SE2239TR-ND	1520.00	SG-615P 19.660MCQ
	20.000	SE2214CT-ND†	3.45	2.88	2.00	1.81	SE2214TR-ND	1520.00	SG-615P 20.000MCQ
	20.480	SE2240CT-ND	3.45	2.88	2.00	1.81	SE2240TR-ND	1520.00	SG-615P 20.480MCQ
	22.118	SE2241CT-ND	3.45	2.88	2.00	1.81	SE2241TR-ND	1520.00	SG-615P 22.118MCQ
	24.000	SE2215CT-ND†	3.45	2.88	2.00	1.81	SE2215TR-ND	1520.00	SG-615P 24.000MCQ
	25.000	SE2242CT-ND	3.45	2.88	2.00	1.81	SE2242TR-ND	1520.00	SG-615P 25.000MCQ
	25.175	SE2216CT-ND†	3.45	2.88	2.00	1.81	SE2216TR-ND	1520.00	SG-615P 25.175MCQ
	36.000	SE2304CT-ND	6.20	5.55	—	4.63	—	—	SG-615PTJ36.0000MCQ
	27.000	SE2326CT-ND	3.45	2.88	2.00	1.81	SE2326TR-ND	1520.00	SG-615PTJ 27.000MCQ
	28.322	SE2327CT-ND	3.45	2.88	2.00	1.81	SE2327TR-ND	1520.00	SG-615PTJ 28.322MCQ
	28.636	SE2328CT-ND	3.45	2.88	2.00	1.81	SE2328TR-ND	1520.00	SG-615PTJ 28.636MCQ
SG-615PH (CMOS)	29.491	SE2329CT-ND	3.45	2.88	2.00	1.81	SE2329TR-ND	1520.00	SG-615PTJ 29.491MCQ
	30.000	SE2330CT-ND	3.45	2.88	2.00	1.81	SE2330TR-ND	1520.00	SG-615PTJ 30.000MCQ
	32.000	SE2337CT-ND	3.45	2.88	2.00	1.81	SE2337TR-ND	1520.00	SG-615PH 32.000MCQ
	32.768	SE2338CT-ND	3.45	2.88	2.00	1.81	SE2338TR-ND	1520.00	SG-615PH 32.768MCQ
	33.000	SE2339CT-ND	3.45	2.88	2.00	1.81	SE2339TR-ND	1520.00	SG-615PH 33.000MCQ
	33.333	SE2340CT-ND	3.45	2.88	2.00	1.81	SE2340TR-ND	1520.00	SG-615PH 33.333MCQ
	36.000	SE2341CT-ND	3.45	2.88	2.00	1.81	SE2341TR-ND	1520.00	SG-615PH 36.000MCQ
	40.000	SE2343CT-ND	3.45	2.88	2.00	1.81	SE2343TR-ND	1520.00	SG-615PH 40.000MCQ
	44.900	SE2344CT-ND	3.45	2.88	2.00	1.81	SE2344TR-ND	1520.00	SG-615PH 44.900MCQ
	48.000	SE2345CT-ND	3.45	2.88	2.00	1.81	SE2345TR-ND	1520.00	SG-615PH 48.000MCQ
	50.000	SE2346CT-ND	3.45	2.88	2.00	1.81	SE2346TR-ND	1520.00	SG-615PH 50.000MCQ
	55.000	SE2347CT-ND	3.45	2.88	2.00	1.81	SE2347TR-ND	1520.00	SG-615PH 55.000MCQ
SG-615PCV (OE) (CMOS)	60.000	SE2348CT-ND	3.63	3.03	2.13	1.92	SE2348TR-ND	1610.00	SG-615PH 60.000MCQ
	66.000	SE2351CT-ND	3.63	3.03	2.13	1.92	SE2351TR-ND	1610.00	SG-615PH 66.000MCQ
	66.666	SE2352CT-ND	3.63	3.03	2.13	1.92	SE2352TR-ND	1610.00	SG-615PH 66.666MCQ
	50.000	SE3503CT-ND	5.25	4.38	3.10	2.80	SE3503TR-ND	2300.00	SG-615PCV 50.000MCQ
	75.000	SE3511CT-ND	5.85	4.88	3.40	3.10	SE3511TR-ND	2550.00	SG-615PCV 75.000MCQ
	80.000	SE3512CT-ND	5.85	4.88	3.40	3.10	SE3512TR-ND	2550.00	SG-615PCV 80.000MCQ
	90.000	SE3513CT-ND	5.85	4.88	3.40	3.10	SE3513TR-ND	2550.00	SG-615PCV 90.000MCQ
	100.000	SE3514CT-ND	5.85	4.88	3.40	3.10	SE3514TR-ND	2550.00	SG-615PCV 100.000MCQ
	106.250	SE3515CT-ND	6.45	5.38	3.85	3.45	SE3515TR-ND	2900.00	SG-615PCV 106.250MCQ
	120.000	SE3516CT-ND	6.45	5.38	3.85	3.45	SE3516TR-ND	2900.00	SG-615PCV 120.000MCQ

EPSON ELECTRONICS AMERICA, INC. CMOS/TTL Oscillators

- High reliability by cylinder type AT Crystal
- Automatic mountable
- Lower current consumption by C-MOS IC
- TTL -10 output load by using C-MOS IC
- DIP 14-PIN plastic package compatible with metal package oscillator
- DIP 8-PIN plastic package compatible with half size metal package oscillator

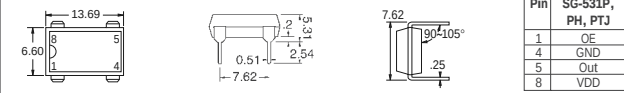
SG-51P, SG-51PTJ, SG-51PH Specifications: Operating Voltage: 5.0±0.5V. Operating Temperature Range: -10°C to +70°C. Frequency Stability: C:±100ppm. Current Consumption: 25mA Max. Typ. Output Voltage: VDD -0.4V Min., IOH = -400mA, 0.4V Max., IOL = 16mA. Input Voltage: VIH 2.0V Min., IOH = 1mA (VIH = VDD); VIL 0.8V Max., IIL = -100uA (VIL = GND). Output Rise Time: 8 nsec Max., 4 nsec Typ. Output Fall Time: 8 nsec Max., 5 nsec Typ. Oscillation Time: 4 msec Max., 0.3 msec.

SG-51PCV Specifications: Operating Voltage: 2.7V to 5.5V. Operating Temperature Range: -10°C to +70°C. Frequency Stability: C:±100ppm. Current Consumption: 50mA Max. Output Rise Time: 4 nsec. Output Fall Time: 4 nsec. Oscillation Start-Up Time: 10 msec Max.

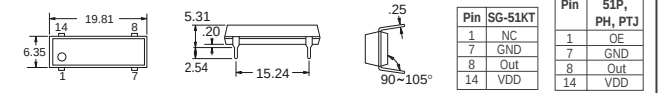
SG-51KT, SG-51PTJ, SG-51PTJ Specifications: Operating Voltage: 5.0±0.5V. Operating Temperature Range: -10°C to +70°C. Frequency Stability: C:±100ppm. Current Consumption: 25mA (32MHz) without load Typ. Output Voltage: VDD -0.4V Min., IOH = -400 mA, 0.4V Max., IOL = 16mA. Input Voltage: VIH 2.0V Min., IOH = 1mA (VIH = VDD); VIL 0.8V Max., IIL = -100uA (VIL = GND). Output Rise Time: 10 nsec Max., 5 nsec Typ. Output Fall Time: 8 nsec Max., 3 nsec Typ. Oscillation Time: 10 msec Max., 5 msec.

SG-51PH Specifications: Operating Voltage: 5.0±0.5V. Operating Temperature Range: -10°C to +70°C. Frequency Stability: C:±100ppm. Current Consumption: 32mA Max. Typ. Output Voltage: VDD -0.37V Min., IOH = -4mA; 0.37V Max., IOL = 4mA. Output Rise Time: 7 nsec Max., 3.5 nsec Typ. Output Fall Time: 7 nsec Max., 3.5 nsec Typ. Oscillation Time: 10 msec Max., 3 msec Typ.

SG-51P, SG-51PTJ, SG-51PH, SG-51PCV (Half Size)



SG-51P, SG-51KT, SG-51PTJ, SG-51PH (Full Size)

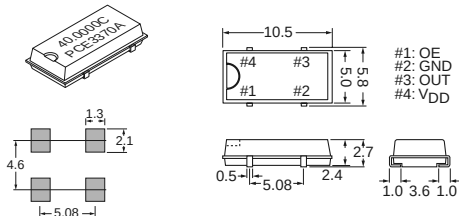


Case	Frequency (MHz)	Digi-Key Part No.	1	10	50	100	Epson Part No.
SG-51PH (OE) (CMOS)	32.000	SE1111-ND	3.00	25.00	87.00	158.00	SG-51PH 32.000MC
	32.514	SE1112-ND	3.00	25.00	87.00	158.00	SG-51PH 32.514MC
	32.768	SE1113-ND	3.00	25.00	87.00	158.00	SG-51PH 32.768MC
	33.000	SE1114-ND	3.00	25.00	87.00	158.00	SG-51PH 33.000MC
	33.333	SE1115-ND	3.00	25.00	87.00	158.00	SG-51PH 33.333MC
	36.000	SE1116-ND	3.00	25.00	87.00	158.00	SG-51PH 36.000MC
	38.000	SE1117-ND	3.00	25.00	87.00	158.00	SG-51PH 38.000MC
	42.000	SE1119-ND	3.00	25.00	87.00	158.00	SG-51PH 42.000MC
	44.900	SE1120-ND	3.00	25.00	87.00	158.00	SG-51PH 44.900MC
	46.000	SE1121-ND	3.00	25.00	87.00	158.00	SG-51PH 46.000MC
	48.000	SE1122-ND	3.00	25.00	87.00	158.00	SG-51PH 48.000MC
	55.000	SE1124-ND	3.00	25.00	87.00	158.00	SG-51PH 55.000MC
	64.000	SE1126-ND	3.18	26.50	92.50	167.00	SG-51PH 64.000MC
	65.000	SE1127-ND	3.18	26.50	92.50	167.00	SG-51PH 65.000MC
	66.000	SE1128-ND	3.18	26.50	92.50	167.00	SG-51PH 66.000MC
	66.666	SE1129-ND	3.18	26.50	92.50	167.00	SG-51PH 66.666MC
	1.544	SE1216-ND	3.00	25.00	87.00	158.00	SG-51P 1.544MC
	1.8432	SE1201-ND	3.00	25.00	87.00	158.00	SG-51P 1.843MC
SG-51P (OE) (CMOS/ TTL)	2.000	SE1217-ND	3.00	25.00	87.00	158.00	SG-51P 2.000MC
	2.048	SE1218-ND	3.00	25.00	87.00	158.00	SG-51P 2.048MC
	2.4576	SE1202-ND	3.00	25.00	87.00	158.00	SG-51P 2.4576MC
	3.072	SE1219-ND	3.00	25.00	87.00	158.00	SG-51P 3.072MC
	3.088	SE1220-ND	3.00	25.00	87.00	158.00	SG-51P 3.088MC
	3.276	SE1221-ND	3.00	25.00	87.00	158.00	SG-51P 3.276MC
	3.579	SE1222-ND	3.00	25.00	87.00	158.00	SG-51P 3.579MC
	3.686	SE1223-ND	3.00	25.00	87.00	158.00	SG-51P 3.686MC
	4.000	SE1203-ND	3.00	25.00	87.00	158.00	SG-51P 4.000MC
	4.096	SE1224-ND	3.00	25.00	87.00	158.00	SG-51P 4.096MC
	4.9152	SE1204-ND	3.00	25.00	87.00	158.00	SG-51P 4.915MC
	5.000	SE1205-ND	3.00	25.00	87.00	158.00	SG-51P 5.000MC
	5.068	SE1225-ND	3.00	25.00	87.00	158.00	SG-51P 5.068MC
	6.000	SE1206-ND	3.00	25.00	87.00	158.00	SG-51P 6.000MC
	6.144	SE1226-ND	3.00	25.00	87.00	158.00	SG-51P 6.144MC
	7.3728	SE1227-ND	3.00	25.00	87.00	158.00	SG-51P 7.3728MC
	8.000	SE1207-ND	3.00	25.00	87.00	158.00	SG-51P 8.000MC
	8.192	SE1228-ND	3.00	25.00	87.00	158.00	SG-51P 8.192MC
SG-51PTJ (OE) (TTL)	9.830	SE1229-ND	3.00	25.00	87.00	158.00	SG-51PTJ 9.830MC
	10.000	SE1208-ND	3.00	25.00	87.00	158.00	SG-51PTJ 10.000MC
	10.240	SE1230-ND	3.00	25.00	87.00	158.00	SG-51PTJ 10.240MC
	11.000	SE1231-ND	3.00	25.00	87.00	158.00	SG-51PTJ 11.000MC
	11.059	SE1232-ND	3.00	25.00	87.00	158.00	SG-51PTJ 11.059MC
	12.000	SE1209-ND	3.00	25.00	87.00	158.00	SG-51PTJ 12.000MC
	12.288	SE1233-ND	3.00	25.00	87.00	158.00	SG-51PTJ 12.288MC
	14.31818	SE1210-ND	3.00	25.00	87.00	158.00	SG-51PTJ 14.318MC
	14.745	SE1234-ND	3.00	25.00	87.00	158.00	SG-51PTJ 14.745MC
	15.000	SE1235-ND	3.00	25.00	87.00	158.00	SG-51PTJ 15.000MC
	16.257	SE1236-ND	3.00	25.00	87.00	158.00	SG-51PTJ 16.257MC
	18.000	SE1237-ND	3.00	25.00	87.00	158.00	SG-51PTJ 18.000MC
	18.432	SE1238-ND	3.00	25.00	87.00	158.00	SG-51PTJ 18.432MC
	18.869	SE1239-ND	3.00	25.00	87.00	158.00	SG-51PTJ 18.869MC
	19.660	SE1240-ND	3.00	25.00	87.00	158.00	SG-51PTJ 19.660MC
	20.480	SE1241-ND	3.00	25.00	87.00	158.00	SG-51PTJ 20.480MC
	22.118	SE1242-ND	3.00	25.00	87.00	158.00	SG-51PTJ 22.118MC
	24.000	SE1213-ND	3.00	25.00	87.00	158.00	SG-51PTJ 24.000MC
SG-51PCV (OE) (CMOS)	25.175	SE1215-ND	3.00	25.00	87.00	158.00	SG-51PCV 25.175MC
	25.576	SE1243-ND	3.00	25.00	87.00	158.00	SG-51PCV 25.576MC
	27.000	SE1817-ND	3.00	25.00	87.00	158.00	SG-51PTJ 27.000MC
	28.000	SE1818-ND	3.00	25.00	87.00	158.00	SG-51PTJ 28.000MC
	28.322	SE1819-ND	3.00	25.00	87.00	158.00	SG-51PTJ 28.322MC
	28.636	SE1820-ND	3.00	25.00	87.00	158.00	SG-51PTJ 28.636MC
	29.491	SE1821-ND	3.00	25.00	87.00	158.00	SG-51PTJ 29.491MC
	30.000	SE1822-ND	3.00	25.00	87.00	158.00	SG-51PTJ 30.000MC
	32.514	SE1824-ND	3.00	25.00	87.00	158.00	SG-51PTJ 32.514MC
	32.768	SE1825-ND	3.00	25.00	87.00	158.00	SG-51PTJ 32.768MC
	33.000	SE1826-ND	3.00	25.00	87.00	158.00	SG-51PTJ 33.000MC
	33.333	SE1827-ND	3.00	25.00	87.00	158.00	SG-51PTJ 33.333MC
	36.000	SE1828-ND	3.00	25.00	87.00	158.00	SG-51PTJ 36.000MC
	44.900	SE2901-ND	4.80	40.00	142.50	255.00	SG-51PCV 44.900MC
	48.000	SE2902-ND	4.80	40.00	142.50	255.00	SG-51PCV 48.000MC
	50.000	SE2903-ND	4.80	40.00	142.50	255.00	SG-51PCV 50.000MC
	55.000	SE2904-ND	4.80	40.00	142.50	255.00	SG-51PCV 55.000MC
	60.000	SE2905-ND	4.80	40.00	142.50	255.00	SG-51PCV 60.000MC

Case	Frequency (MHz)	Digi-Key Part No.	1	10	50	100	Epson Part No.
SG-51KT (TTL)	64.000	SE2906-ND	4.80	40.00	142.50	255.00	SG-51KT 64.000MC
	65.000	SE2907-ND	4.80	40.00	142.50	255.00	SG-51KT 65.000MC
	66.000	SE2908-ND	4.80	40.00	142.50	255.00	SG-51KT 66.000MC
	66.666	SE2909-ND	4.80	40.00	142.50	255.00	SG-51KT 66.666MC
	70.000	SE2910-ND	5.85	48.75	172.50	310.00	SG-51KT 70.000MC
	75.000	SE2911-ND	5.85	48.75	172.50	310.00	SG-51KT 75.000MC
	80.000	SE2912-ND	5.85	48.75	172.50	310.00	SG-51KT 80.000MC
	90.000	SE2913-ND	5.85	48.75	172.50	310.00	SG-51KT 90.000MC
	100.000	SE2914-ND	5.85	48.75	172.50	310.00	SG-51KT 100.000MC
	106.250	SE2915-ND	7.95	66.25	232.50	420.00	SG-51KT 106.250MC
	120.000	SE2916-ND	7.95	66.25	232.50	420.00	SG-51KT 120.000MC
	28.322	SE1602-ND	3.45	28.75	—	230.00	SG-51KT-28.3220MC
	1.544	SE1716-ND	3.00	25.00	87.00	158.00	SG-51P 1.544MC
	1.8432	SE1701-ND	3.00	25.00	87.00	158.00	SG-51P 1.843MC
	2.000	SE1717-ND	3.00	25.00	87.00	158.00	SG-51P 2.000MC
	2.048	SE1718-ND	3.00	25.00	87.00	158.00	SG-51P 2.048MC
	3.072	SE1719-ND	3.00	25.00	87.00	158.00	SG-51P 3.072MC
	3.088	SE1720-ND	3.00	25.00	87.00	158.00	SG-51P 3.088MC
SG-51P (OE) (CMOS/ TTL)	3.276	SE1721-ND	3.00	25.00	87.00	158.00	SG-51P 3.276MC
	3.579	SE1722-ND	3.00	25.00	87.00	158.00	SG-51P 3.579MC
	3.686	SE1723-ND	3.00	25.00	87.00	158.00	SG-51P 3.686MC
	4.000	SE1703-ND	3.00	25.00	87.00	158.00	SG-51P 4.000MC
	4.096	SE1724-ND	3.00	25.00	87.00	158.00	SG-51P 4.096MC
	4.9152	SE1704-ND	3.00	25.00	87.00	158.00	SG-51P 4.915MC
	5.000	SE1705-ND	3.00	25.00	87.00	158.00	SG-51P 5.000MC
	5.068	SE1725-ND	3.00	25.00	87.00	158.00	SG-51P 5.068MC
	6.000	SE1706-ND	3.00	25.00	87.00	158.00	SG-51P 6.000MC
	6.144	SE1726-ND	3.00	25.00	87.00	158.00	SG-51P 6.144MC
	7.372	SE1727-ND	3.00	25.00	87.00	158.00	SG-51P 7.372MC
	8.000	SE1707-ND	3.00	25.00	87.00	158.00	SG-51P 8.000MC
	8.192	SE1728-ND	3.00	25.00	87.00	158.00	SG-51P 8.192MC
	9.830	SE1729-ND	3.00	25.00	87.00	158.00	SG-51P 9.830MC
	10.000	SE1708-ND	3.00	25.00	87.00	158.00	SG-51P 10.000MC
	10.240	SE1730-ND	3.00	25.00	87.00	158.00	SG-51P 10.240MC
	11.000	SE1731-ND	3.00	25.00	87.00	158.00	SG-51P 11.000MC
	11.059	SE1732-ND	3.00	25.00	87.00	158.00	SG-51P 11.059MC
SG-51PTJ (OE) (TTL)	12.000	SE1709-ND	3.00	25.00	87.00	158.00	SG-51PTJ 12.000MC
	12.288	SE1733-ND	3.00	25.00	87.00	158.00	SG-51PTJ 12.288MC
	14.31818	SE1710-ND	3.00	25.00	87.00	158.00	SG

Surface-Mount Quartz Crystal Products

SG636PCE/636PCV Oscillator



FEATURES:

- 3.3 volt operation, low current consumption. • 45/55% duty cycle. • Small type SMD, thus allowing high density mounting. • Suitable for small handy equipments, especially "Energy Star Computers Program" products.

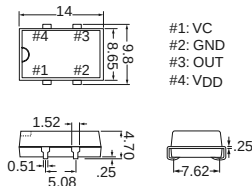
SPECIFICATIONS:

Max. Supply Voltage: -0.5V to +7.0V. **Operating Voltage:** 3.3V±0.3V. It is possible to work on 2.7 to 5.5 VDD. **Storage Temperature:** -55°C to +100°C, Stored without Tape and Reel. **Operating Temperature:** -10°C to +70°C. **Soldering Condition:** Under 260°C within 10 sec. x 2 times or under 230°C within 3 min. **Frequency Stability:** C: ±100ppm, -10°C to +70°C. **Current Consumption:** 9mA Max., No Load Condition. **Output Disable Current:** 5.0mA Max. **Duty:** 45% to 55%. **High Output Voltage:** VDD -0.4V Max., IOH=-4mA. **Low Output Voltage:** 0.4V Max., IOL=-4mA. **High Input Voltage:** 80% VDD Min., OE Terminal. **Low Input Voltage:** 20% VDD Max., OE Terminal. **Output Rise Time:** 5ns Max., 20% to 80% VDD Level. **Output Fall Time:** 5ns Max., 80% to 20% VDD Level. **Oscillation Start Up Time:** 4ms Max. **Aging:** ±5ppm/year Max. **Shock Resistance:** ±20ppm Max.

Voltage Controlled Crystal Oscillator (VCXO) VG-1011JA Series

FEATURES:

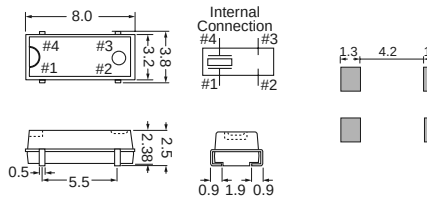
- Reflowable and high density mounting type SMD. • Using the heat-resisting type AT cut quartz crystal allows almost the same temperature soldering as universal SMD IC. • Using C-MOS IC allows low current consumption and assures high reliability. • Operating Supply Voltage: 5V. Control Voltage: 5V.



SPECIFICATIONS:

Supply Voltage (VDD): -0.5V Min, 7.0V Max. **Control Voltage (VC):** -0.5V Min, 7.0V Max. **Soldering Condition (Tsol):** Under 260°C within 10 sec. x 2 times. **Supply Voltage (VDD):** 4.5V Min, 5.5V Max. **Control Voltage (VC):** 0.5V Min, 4.5V Max. **Operable Temperature (Topr):** -40°C Min, 85°C Max. **Frequency Stability:** AV: Ta=-20 to 70°C, AV: ±20 Max. **Frequency Adjustment Range:** K=±75ppm. **Frequency Control Sensitivity:** VC=2.5±2.0V, ±10%. **Supply Current:** VDD=5.0V, No Load, 13mA Max. **Start-Up Time:** VDD=4.5V to be 0 sec., 10 msec Max. **Duty:** 1/2 VDD Level, 40% Min, 60% Max. **High Output Voltage:** IOH=-0.8mA, VDD-0.4V. **Low Output Voltage:** IOL=0.8mA, 0.4V Max. **Output Rise Time:** 20% to 80% VDD Level, 3 Typical, 8ns. **Output Fall Time:** 80% to 20% VDD Level 3 Typical, 8ns.

MA-306



SPECIFICATIONS:

Storage Temperature: -55°C to +100°C, Stored as naked product after unpacking. **Operating Temperature:** -20°C to +70°C. **Maximum Drive Level:** 2mW Max., Only crystal oscillation is guaranteed. **Recommended Drive Level:** 10µW to 100µW. **Soldering Condition:** Twice at under 260°C within 10 seconds or under 230°C within 3 minutes. **Frequency Tolerance (standard):** ±100ppm. **Frequency Temperature Characteristics (standard):** ±30ppm, -20°C to +70°C, DL=100µW. **Load Capacitance:** 18pF. **Series Resistance:** 60Ω Max., -20°C to +70°C, DL=100µW. **Shunt Capacitance:** 5pF Max. **Aging:** ±5ppm/Y Max.

Series	Frequency (MHz)	Digi-Key Part No.	Cut Tape Pricing				Digi-Key Part No.	T/R Pricing 1,000	Epson Part No.
SG636PCE/SG636PCV	2.4576	SE2801CT-ND	3.90	32.50	114.00	206.00	SE2801TR-ND	1730.00	SG-636PCE 2.457MCQ
	3.6864	SE2806CT-ND	3.90	32.50	114.00	206.00	SE2806TR-ND	1730.00	SG-636PCE 3.6864MCQ
	4.0000	SE2807CT-ND	3.90	32.50	114.00	206.00	SE2807TR-ND	1730.00	SG-636PCE 4.0000MCQ
	4.096	SE2808CT-ND	3.90	32.50	114.00	206.00	SE2808TR-ND	1730.00	SG-636PCE 4.096MCQ
	5.000	SE2810CT-ND	3.90	32.50	114.00	206.00	SE2810TR-ND	1730.00	SG-636PCE 5.0000MCQ
	6.000	SE2812CT-ND	3.90	32.50	114.00	206.00	SE2812TR-ND	1730.00	SG-636PCE 6.000MCQ
	7.372	SE2814CT-ND	3.90	32.50	114.00	206.00	SE2814TR-ND	1730.00	SG-636PCE 7.372MCQ
	8.0000	SE2815CT-ND	3.90	32.50	114.00	206.00	SE2815TR-ND	1730.00	SG-636PCE 8.0000MCQ
	8.192	SE2816CT-ND	3.90	32.50	114.00	206.00	SE2816TR-ND	1730.00	SG-636PCE 8.192MCQ
	10.000	SE2818CT-ND	3.90	32.50	114.00	206.00	SE2818TR-ND	1730.00	SG-636PCE 10.000MCQ
	10.240	SE2819CT-ND	3.90	32.50	114.00	206.00	SE2819TR-ND	1730.00	SG-636PCE 10.240MCQ
	12.000	SE2822CT-ND	3.90	32.50	114.00	206.00	SE2822TR-ND	1730.00	SG-636PCE 12.000MCQ
	14.3181	SE2824CT-ND	3.90	32.50	114.00	206.00	SE2824TR-ND	1730.00	SG-636PCE 14.318MCQ
	14.7456	SE2825CT-ND	3.90	32.50	114.00	206.00	SE2825TR-ND	1730.00	SG-636PCE 14.745MCQ
	15.000	SE2826CT-ND	3.90	32.50	114.00	206.00	SE2826TR-ND	1730.00	SG-636PCE 15.000MCQ
	16.000	SE2827CT-ND	3.90	32.50	114.00	206.00	SE2827TR-ND	1730.00	SG-636PCE 16.000MCQ
	18.000	SE2829CT-ND	3.90	32.50	114.00	206.00	SE2829TR-ND	1730.00	SG-636PCE 18.000MCQ
	18.432	SE2830CT-ND	3.90	32.50	114.00	206.00	SE2830TR-ND	1730.00	SG-636PCE 18.432MCQ
	20.000	SE2833CT-ND	3.90	32.50	114.00	206.00	SE2833TR-ND	1730.00	SG-636PCE 20.000MCQ
	24.000	SE2836CT-ND	3.90	32.50	114.00	206.00	SE2836TR-ND	1730.00	SG-636PCE 24.000MCQ
	25.000	SE2837CT-ND	3.90	32.50	114.00	206.00	SE2837TR-ND	1730.00	SG-636PCE 25.000MCQ
	25.175	SE2838CT-ND	3.90	32.50	114.00	206.00	SE2838TR-ND	1730.00	SG-636PCE 25.175MCQ
	27.000	SE2839CT-ND	3.90	32.50	114.00	206.00	SE2839TR-ND	1730.00	SG-636PCE 27.000MCQ
	28.636	SE2841CT-ND	3.90	32.50	114.00	206.00	SE2841TR-ND	1730.00	SG-636PCE 28.636MCQ
	29.491	SE2842CT-ND	3.90	32.50	114.00	206.00	SE2842TR-ND	1730.00	SG-636PCE 29.4912MCQ
VG1011JA	30.000	SE2843CT-ND	3.90	32.50	114.00	206.00	SE2843TR-ND	1730.00	SG-636PCE 30.000MCQ
	32.000	SE2844CT-ND	3.90	32.50	114.00	206.00	SE2844TR-ND	1730.00	SG-636PCE 32.000MCQ
	33.000	SE2847CT-ND	3.90	32.50	114.00	206.00	SE2847TR-ND	1730.00	SG-636PCE 33.000MCQ
	33.333	SE2848CT-ND	3.90	32.50	114.00	206.00	SE2848TR-ND	1730.00	SG-636PCE 33.333MCQ
	36.000	SE2849CT-ND	3.90	32.50	114.00	206.00	SE2849TR-ND	1730.00	SG-636PCE 36.000MCQ
	38.000	SE2850CT-ND	3.90	32.50	114.00	206.00	SE2850TR-ND	1730.00	SG-636PCE 38.000MCQ
	40.000	SE2851CT-ND	3.90	32.50	114.00	206.00	SE2851TR-ND	1730.00	SG-636PCE 40.000MCQ
	44.900	SE2852CT-ND	6.15	51.25	180.00	325.00	SE2852TR-ND	2700.00	SG-636PCV 44.900MCQ
	48.000	SE2853CT-ND	6.15	51.25	180.00	325.00	SE2853TR-ND	2700.00	SG-636PCV 48.000MCQ
	50.000	SE2854CT-ND	6.15	51.25	180.00	325.00	SE2854TR-ND	2700.00	SG-636PCV 50.000MCQ
	55.000	SE2855CT-ND	6.15	51.25	180.00	325.00	SE2855TR-ND	2700.00	SG-636PCV 55.000MCQ
	60.000	SE2856CT-ND	6.15	51.25	180.00	325.00	SE2856TR-ND	2700.00	SG-636PCV 60.000MCQ
	66.000	SE2859CT-ND	6.15	51.25	180.00	325.00	SE2859TR-ND	2700.00	SG-636PCV 66.000MCQ
	66.666	SE2860CT-ND	6.15	51.25	180.00	325.00	SE2860TR-ND	2700.00	SG-636PCV 66.6667MCQ
	12.288	SE3601CT-ND	13.68	114.00	405.50	730.00	SE3601TR-ND	6080.00	VG-1011JA 12.28MAVK2
	16.384	SE3603CT-ND	13.68	114.00	405.50	730.00	SE3603TR-ND	6080.00	VG-1011JA 16.38MAVK2
	19.200	SE3605CT-ND	13.68	114.00	405.50	730.00	SE3605TR-ND	6080.00	VG-1011JA 19.20MAVK2
	19.440	SE3606CT-ND	13.68	114.00	405.50	730.00	SE3606TR-ND	6080.00	VG-1011JA 19.44MAVK2
	27.000	SE3607CT-ND	13.68	114.00	405.50	730.00	SE3607TR-ND	6080.00	VG-1011JA 27.00MAVK2
MA-306	18.000	SE2701CT-ND	1.89	15.75	55.50	100.00	SE2701TR-ND	830.00	MA-306 18.000M-CQ
	18.432	SE2702CT-ND	1.89	15.75	55.50	100.00	SE2702TR-ND	830.00	MA-306 18.432M-CQ
	19.660	SE2704CT-ND	1.89	15.75	55.50	100.00	SE2704TR-ND	830.00	MA-306 19.660M-CQ
	20.000	SE2705CT-ND	1.89	15.75	55.50	100.00	SE2705TR-ND	830.00	MA-306 20.000M-CQ
	22.118	SE2707CT-ND	1.89	15.75	55.50	100.00	SE2707TR-ND	830.00	MA-306 22.1180M-CQ
	24.000	SE2708CT-ND	1.89	15.75	55.50	100.00	SE2708TR-ND	830.00	MA-306 24.000M-CQ
	24.576	SE2709CT-ND	1.89	15.75	55.50	100.00	SE2709TR-ND	830.00	MA-306 24.576M-CQ
	25.000	SE2710CT-ND	1.89	15.75	55.50	100.00	SE2710TR-ND	830.00	MA-306 25.000M-CQ
	25.175	SE2711CT-ND	1.89	15.75	55.50	100.00	SE2711TR-ND	830.00	MA-306 25.175M-CQ
	27.000	SE2712CT-ND	1.89	15.75	55.50	100.00	SE2712TR-ND	830.00	MA-306 27.000M-CQ
	28.000	SE2713CT-ND	1.89	15.75	55.50	100.00	SE2713TR-ND	830.00	MA-306 28.000M-CQ
	28.636	SE2715CT-ND	1.89	15.75	55.50	100.00	SE2715TR-ND	830.00	MA-306 28.636M-CQ
	29.491	SE2716CT-ND	1.89	15.75	55.50	100.00	SE2716TR-ND	830.00	MA-306 29.491M-CQ
	32.000	SE2718CT-ND	1.89	15.75	55.50	100.00	SE2718TR-ND	830.00	MA-306 32.000M-CQ
	40.000	SE2725CT-ND	2.04	17.00	60.00	108.00	SE2725TR-ND	900.00	MA-306 40.000M-CQ

Cylinder-Type Quartz Crystals

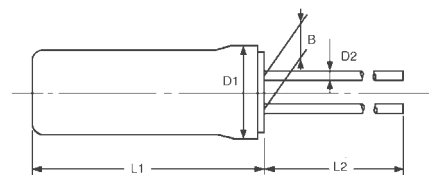
C-Type/C-2-Type

SPECIFICATIONS FOR C-TYPE (Characteristics):

• **Nominal Frequency:** 32.768KHz • **Operating Temperature:** -10°C ~ +60°C • **Maximum Drive Level:** 1.0µW Max. • **Frequency Tolerance (Standard):** ±20ppm • **Load Capacitance:** (SE3201, SE3202, SE3203) 12.5pf; (SE3204) 9pf • **Series Resistance:** C-001R ~ 35KΩ Max. (18KΩ Typ.); C-002RX and C-004R ~ 50KΩ Max. (30KΩ Typ.); and C-005R ~ 50KΩ Max. (37KΩ Typ.)

SPECIFICATIONS FOR C-2-TYPE (Characteristics):

• **Operating Temperature:** -10°C ~ +60°C • **Max. Drive Level:** 1.0µW Max. • **Crystal Load Capacitance/Tolerance:** All parts have 11 pfd. load capacitance, ±100 ppm except: **(SE3307)** C-2 31.200KI-AG, 7 pfd., ±200 ppm; **(SE3311)** C-2 32.560KH-AG, 7pfd., ±190 ppm; **(SE3314)** C-2 38.000KA-P 12.5 pfd., ±20 ppm • **Series Resistance Over 20KHz and Under 99KHz:** 35KΩ ~ 15KΩ • **Series Resistance Over 100KHz and Under 200KHz:** 12KΩ ~ 8KΩ.

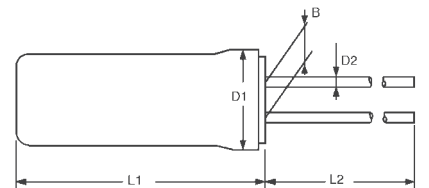


Model	L ₁	L ₂	D ₁	D ₂	B
C-2-Type	6.2 MAX	4.0 MIN	ø2.0 MAX	ø0.2	0.6
C-001R	8.0 MAX	9.0 MIN	ø3.1 MAX	ø0.3	1.1
C-002RX	6.0 MAX	4.0 MIN	ø2.0 MAX	ø0.2	0.6
C-004R	5.0 MAX	4.0 MIN	ø1.5 MAX	ø0.18	0.5
C-005R	4.6 MAX	4.0 MIN	ø1.2 MAX	ø0.15	0.3

CA-301 Type

SPECIFICATIONS (Characteristics):

• **Operating Temperature:** -20°C ~ +70°C • **Maximum Drive Level:** 2mW Max. • **Recommended Level:** 10µW ~ 100µW Typ. • **Frequency Tolerance (Standard):** ±30ppm • **Load Capacitance:** 18 pfd • **Series Resistance:** As per table below.



Model	L ₁	L ₂	D ₁	D ₂	B
Under 5.3MHz	10.3 MAX	9.0 MIN	ø3.1 MAX	ø0.3	1.1
Over 5.5 MHz	8.9 MAX	9.0 MIN	ø3.1 MAX	ø0.3	1.1

Frequency (MHz)	Series Resistance (Ω)	Mode
Over 4.0MHz Under 5.3MHz	150 Ω MAX.	Fundamental
Over 5.5MHz Under 6.0MHz	100 Ω MAX.	
Over 6.0MHz Under 10.0MHz	80 Ω MAX.	
Over 10.0MHz Under 12.0MHz	60 Ω MAX.	
Over 12.0MHz Under 16.0MHz	50 Ω MAX.	
Over 16.0MHz Under 26.0MHz	40 Ω MAX.	
Over 26.0MHz Under 36.0MHz	100 Ω MAX.	
Exceeding 36.0MHz Below 60.0MHz	80 Ω MAX.	
		3rd Overtone

Series	Frequency	Digi-Key Part No.	1	10	Pricing 50	100	1,000	Epson Part No.
C-Type	32.768KHz	SE3201-ND	.42	3.50	12.00	22.00	180.00	C-001R 32.768K-A
	32.768KHz	SE3202-ND	.42	3.50	12.00	22.00	180.00	C-002RX 32.768K-A
	32.768KHz	SE3203-ND	1.38	11.50	41.00	74.00	620.00	C-004R 32.768K-A
	32.768KHz	SE3204-ND	5.64	47.00	166.50	300.00	2500.01	C-005R 32.768K-AC
C-2 Type	20.000KHz	SE3301-ND	1.23	10.25	36.50	66.00	550.00	C-2 20.000K-P
	25.600KHz	SE3302-ND	1.23	10.25	36.50	66.00	550.00	C-2 25.600K-P
	26.667KHz	SE3303-ND	1.23	10.25	36.50	66.00	550.00	C-2 26.667K-P
	28.000KHz	SE3304-ND	1.23	10.25	36.50	66.00	550.00	C-2 28.000K-P
	30.000KHz	SE3305-ND	1.23	10.25	36.50	66.00	550.00	C-2 30.000K-P
	30.760KHz	SE3306-ND	1.23	10.25	36.50	66.00	550.00	C-2 30.760K-P
	31.200KHz	SE3307-ND	1.23	10.25	36.50	66.00	550.00	C-2 31.200KI-AG
	31.250KHz	SE3308-ND	1.23	10.25	36.50	66.00	550.00	C-2 31.250K-P
	31.500KHz	SE3309-ND	1.23	10.25	36.50	66.00	550.00	C-2 31.500K-P
	32.000KHz	SE3310-ND	1.23	10.25	36.50	66.00	550.00	C-2 32.000K-P
	32.560KHz	SE3311-ND	1.23	10.25	36.50	66.00	550.00	C-2 32.560KH-AG
	32.919KHz	SE3312-ND	1.23	10.25	36.50	66.00	550.00	C-2 32.919K-P
	36.000KHz	SE3313-ND	1.23	10.25	36.50	66.00	550.00	C-2 36.000K-P
	38.000KHz	SE3314-ND	1.35	11.25	36.50	66.00	550.00	C-2 38.000KA-P
	38.400KHz	SE3315-ND	1.23	10.25	36.50	66.00	550.00	C-2 38.400K-P
	40.000KHz	SE3316-ND	1.23	10.25	36.50	66.00	550.00	C-2 40.000K-P
	46.6084KHz	SE3317-ND	1.23	10.25	36.50	66.00	550.00	C-2 46.6084K-P
	50.000KHz	SE3318-ND	1.23	10.25	36.50	66.00	550.00	C-2 50.000K-P
	59.787KHz	SE3319-ND	1.23	10.25	36.50	66.00	550.00	C-2 59.787K-P
	60.000KHz	SE3320-ND	1.23	10.25	36.50	66.00	550.00	C-2 60.000K-P
	60.002KHz	SE3321-ND	1.23	10.25	36.50	66.00	550.00	C-2 60.002K-P
	65.535KHz	SE3322-ND	1.23	10.25	36.50	66.00	550.00	C-2 65.535K-P
	75.000KHz	SE3323-ND	1.23	10.25	36.50	66.00	550.00	C-2 75.000K-P
	76.800KHz	SE3324-ND	1.23	10.25	36.50	66.00	550.00	C-2 76.800K-P
	83.000KHz	SE3330-ND	1.47	12.25	43.50	78.00	650.00	C-2 83.000K-P
	96.000KHz	SE3331-ND	1.47	12.25	43.50	78.00	650.00	C-2 96.000K-P
	100.000KHz	SE3333-ND	1.47	12.25	43.50	78.00	650.00	C-2 100.000K-P
	111.000KHz	SE3334-ND	1.47	12.25	43.50	78.00	650.00	C-2 111.000K-P
	120.000KHz	SE3335-ND	1.47	12.25	43.50	78.00	650.00	C-2 120.000K-P
	120.8475KHz	SE3336-ND	1.47	12.25	43.50	78.00	650.00	C-2 120.847K-P
	131.072KHz	SE3337-ND	1.77	14.75	52.00	94.00	780.00	C-2 131.072K-P
	149.475KHz	SE3338-ND	1.77	14.75	52.00	94.00	780.00	C-2 149.475K-P
	4.0000MHz	SE3404-ND	1.89	15.75	55.50	100.00	830.00	CA-301 4.000M-C
	4.194304MHz	SE3405-ND	1.89	15.75	55.50	100.00	830.00	CA-301 4.194M-C
	4.433619MHz	SE3406-ND	1.89	15.75	55.50	100.00	830.00	CA-301 4.433M-C
	4.9152MHz	SE3407-ND	1.89	15.75	55.50	100.00	830.00	CA-301 4.915M-C
	5.500MHz	SE3408-ND	1.17	9.75	34.00	62.00	520.00	CA-301 5.500M-C
	6.000MHz	SE3409-ND	1.17	9.75	34.00	62.00	520.00	CA-301 6.000M-C
	6.144MHz	SE3410-ND	1.17	9.75	34.00	62.00	520.00	CA-301 6.144M-C
	6.757MHz	SE3411-ND	1.17	9.75	34.00	62.00	520.00	CA-301 6.757M-C
	7.200MHz	SE3412-ND	1.17	9.75	34.00	62.00	520.00	CA-301 7.200M-C
	7.3728MHz	SE3413-ND	1.17	9.75	34.00	62.00	520.00	CA-301 7.372M-C
	8.000MHz	SE3414-ND	1.17	9.75	34.00	62.00	520.00	CA-301 8.000M-C
	8.388608MHz	SE3415-ND	1.17	9.75	34.00	62.00	520.00	CA-301 8.388M-C
	8.432MHz	SE3416-ND	1.17	9.75	34.00	62.00	520.00	CA-301 8.432M-C
	9.600MHz	SE3418-ND	1.17	9.75	34.00	62.00	520.00	CA-301 9.600M-C
	9.8304MHz	SE3419-ND	1.17	9.75	34.00	62.00	520.00	CA-301 9.830M-C
	10.000MHz	SE3420-ND	1.17	9.75	34.00	62.00	520.00	CA-301 10.000M-C
	10.240MHz	SE3421-ND	1.17	9.75	34.00	62.00	520.00	CA-301 10.240M-C
	10.6244MHz	SE3422-ND	1.17	9.75	34.00	62.00	520.00	CA-301 10.624M-C
	11.0592MHz	SE3423-ND	1.17	9.75	34.00	62.00	520.00	CA-301 11.059M-C
	12.000MHz	SE3424-ND	1.17	9.75	34.00	62.00	520.00	CA-301 12.000M-C
	12.096MHz	SE3425-ND	1.17	9.75	34.00	62.00	520.00	CA-301 12.096M-C
	12.288MHz	SE3426-ND	1.17	9.75	34.00	62.00	520.00	CA-301 12.288M-C
	13.500MHz	SE3427-ND	1.17	9.75	34.00	62.00	520.00	CA-301 13.500M-C
	14.000MHz	SE3428-ND	1.17	9.75	34.00	62.00	520.00	CA-301 14.000M-C
	14.31818MHz	SE3429-ND	1.17	9.75	34.00	62.00	520.00	CA-301 14.318M-C
	14.500MHz	SE3430-ND	1.17	9.75	34.00	62.00	520.00	CA-301 14.500M-C
	14.7456MHz	SE3431-ND	1.17	9.75	34.00	62.00	520.00	CA-301 14.745M-C
	15.000MHz	SE3432-ND	1.17	9.75	34.00	62.00	520.00	CA-301 15.000M-C
	16.000MHz	SE3433-ND	1.17	9.75	34.00	62.00	520.00	CA-301 16.000M-C
	16.257MHz	SE3434-ND	1.17	9.75	34.00	62.00	520.00	CA-301 16.257M-C
	18.000MHz	SE3435-ND	1.17	9.75	34.00	62.00	520.00	CA-301 18.000M-C
	18.432MHz	SE3436-ND	1.17	9.75	34.00	62.00	520.00	CA-301 18.432M-C
	19.6608MHz	SE3437-ND	1.17	9.75	34.00	62.00	520.00	CA-301 19.660M-C
	20.000MHz	SE3438-ND	1.17	9.75	34.00	62.00	520.00	CA-301 20.000M-C
	22.1184MHz	SE3439-ND	1.17	9.75	34.00	62.00	520.00	CA-301 22.118M-C
	24.000MHz	SE3440-ND	1.17	9.75	34.00	62.00	520.00	CA-301 24.000M-C
	25.000MHz	SE3441-ND	1.17	9.75	34.00	62.00	520.00	CA-301 25.000M-C
	25.175MHz	SE3442-ND	1.17	9.75	34.00	62.00	520.00	CA-301 25.175M-C
	27.000MHz	SE3443-ND	1.20	10.00	35.00	63.00	530.00	CA-301 27.000M-C
	28.000MHz	SE3444-ND	1.20	10.00	35.00	63.00	530.00	CA-301 28.000M-C
	28.322MHz	SE3445-ND	1.20	10.00	35.00	63.00	530.00	CA-301 28.322M-C
	32.000MHz	SE3446-ND	1.20	10.00	35.00	63.00	530.00	CA-301 32.000M-C
	32.768MHz	SE3447-ND	1.20	10.00	35.00	63.00	530.00	CA-301 32.768M-C
	33.000MHz	SE3448-ND	1.20	10.00	35.00	63.00	530.00	CA-301 33.000M-C
	33.333MHz	SE3449-ND	1.20	10.00	35.00	63.00	530.00	CA-301 33.333M-C
	36.000MHz	SE3450-ND	1.20	10.00	35.00	63.00	530.00	CA-301 36.000M-C
	40.000MHz	SE3451-ND	1.20	10.00	35.00	63.00	530.00	CA-301 40.000M-C
	46.000MHz	SE3453-ND	1.20	10.00	35.00	63.00	530.00	CA-301 46.000M-C
	49.860MHz	SE3454-ND	1.20	10.00	35.00	63.00	530.00	CA-301 49.860M-C
	50.000MHz	SE3455-ND	1.20	10.00	35.00	63.00	530.00	CA-301 50.000M-C
	55.000MHz	SE3456-ND	1.20	10.00	35.00	63.00	530.00	CA-301 55.000M-C
	60.000MHz	SE3457-ND	1.29	10.75	37.00	67.00	560.00	CA-301 60.000M-C

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Surface-Mount Quartz Crystal Products

Storage Temperature: -55°C to +125°C.

MC-405

MA-505/MA-506

MC-156

MC-206

MC-306

Recommended Soldering Pattern

- Capable of withstanding reflow temperatures of 260°C for 20 seconds
- Suitable for use in today's high density surface mount boards

Type	A	B	C	D
MC-405	4.09	3.91	4.09	—
MA-505	4.09	7.01	5.61	—
MA-506	4.09	6.86	2.06	1.52
MC-156	1.2	3.88	1.5	1.0
MC-206	1.2	3.88	1.3	2.4
MC-306	1.3	4.2	1.9	1.3

Series	Frequency (MHz) [†]	Digi-Key Part No.	Cut Tape Price Each				Digi-Key Part No.	T/R Pricing 1,000	Epson Part No.
			1	10	50	100			
MC-405	32.768kHz	SE2405CT-ND	2.04	1.70	1.20	1.08	SE2405TR-ND	900.00	MC-405 32.768K-A2
	4.000	SE2518CT-ND	2.37	1.98	1.38	1.25	SE2518TR-ND	1050.00	MA-505 4.000M-C0
	4.096	SE2519CT-ND	2.37	1.98	1.38	1.25	SE2519TR-ND	1050.00	MA-505 4.096M-C0
	4.915	SE2520CT-ND	2.37	1.98	1.38	1.25	SE2520TR-ND	1050.00	MA-505 4.915M-C0
	6.000	SE2501CT-ND†	1.56	1.30	.91	.83	SE2501TR-ND	690.00	MA-505 6.000M-C0
	6.144	SE2502CT-ND†	1.56	1.30	.91	.83	SE2502TR-ND	690.00	MA-505 6.144M-C0
	7.3728	SE2503CT-ND†	1.56	1.30	.91	.83	SE2503TR-ND	690.00	MA-505 7.372M-C0
	8.000	SE2504CT-ND†	1.56	1.30	.91	.83	SE2504TR-ND	690.00	MA-505 8.000M-C0
	9.830	SE2524CT-ND	1.56	1.30	.91	.83	SE2524TR-ND	690.00	MA-505 9.830M-C0
	10.000	SE2505CT-ND†	1.56	1.30	.91	.83	SE2505TR-ND	690.00	MA-505 10.000M-C0
MA-505	10.240	SE2525CT-ND	1.56	1.30	.91	.83	SE2525TR-ND	690.00	MA-505 10.240M-C0
	11.0592	SE2506CT-ND†	1.56	1.30	.91	.83	SE2506TR-ND	690.00	MA-505 11.059M-C0
	12.000	SE2507CT-ND†	1.56	1.30	.91	.83	SE2507TR-ND	690.00	MA-505 12.000M-C0
	14.318	SE2528CT-ND	1.56	1.30	.91	.83	SE2528TR-ND	690.00	MA-505 14.318M-C0
	14.745	SE2529CT-ND	1.56	1.30	.91	.83	SE2529TR-ND	690.00	MA-505 14.745M-C0
	16.000	SE2508CT-ND†	1.56	1.30	.91	.83	SE2508TR-ND	690.00	MA-505 16.000M-C0
	18.432	SE2533CT-ND	1.56	1.30	.91	.83	SE2533TR-ND	690.00	MA-505 18.432M-C0
	19.660	SE2535CT-ND	1.56	1.30	.91	.83	SE2535TR-ND	690.00	MA-505 19.660M-C0
	20.000	SE2509CT-ND†	1.56	1.30	.91	.83	SE2509TR-ND	690.00	MA-505 20.000M-C0
	24.000	SE2510CT-ND†	1.56	1.30	.91	.83	SE2510TR-ND	690.00	MA-505 24.000M-C0
MA-506	24.576	SE2538CT-ND	1.56	1.30	.91	.83	SE2538TR-ND	690.00	MA-505 24.576M-C0
	25.000	SE2539CT-ND	1.56	1.30	.91	.83	SE2539TR-ND	690.00	MA-505 25.000M-C0
	27.000	SE2541CT-ND	1.56	1.30	.91	.83	SE2541TR-ND	690.00	MA-505 27.000M-C0
	28.636	SE2542CT-ND	1.56	1.30	.91	.83	SE2542TR-ND	690.00	MA-505 28.636M-C0
	29.491	SE2543CT-ND	1.56	1.30	.91	.83	SE2543TR-ND	690.00	MA-505 29.491M-C0
	30.000	SE2544CT-ND	1.56	1.30	.91	.83	SE2544TR-ND	690.00	MA-505 30.000M-C0
	32.768	SE2546CT-ND	1.62	1.35	.94	.85	SE2546TR-ND	710.00	MA-505 32.768M-C0
	33.3333	SE2514CT-ND†	1.62	1.35	.94	.85	SE2514TR-ND	710.00	MA-505 33.3330M-C0
	36.000	SE2548CT-ND	1.62	1.35	.94	.85	SE2548TR-ND	710.00	MA-505 36.000M-C0
	40.000	SE2515CT-ND†	1.62	1.35	.94	.85	SE2515TR-ND	710.00	MA-505 40.000M-C0
MA-506	60.000	SE2517CT-ND†	1.77	1.48	1.02	.92	SE2517TR-ND	770.00	MA-505 60.000M-C0
	64.000	SE2553CT-ND	1.77	1.48	1.02	.92	SE2553TR-ND	770.00	MA-505 64.000M-C0
	4.000	SE2618CT-ND	2.37	1.98	1.38	1.25	SE2618TR-ND	1050.00	MA-506 4.000M-C0
	4.096	SE2619CT-ND	2.37	1.98	1.38	1.25	SE2619TR-ND	1050.00	MA-506 4.096M-C0
	4.915	SE2620CT-ND	2.37	1.98	1.38	1.25	SE2620TR-ND	1050.00	MA-506 4.915M-C0
	6.000	SE2601CT-ND*	1.56	1.30	.91	.83	SE2601TR-ND	690.00	MA-506 6.000M-C0
	6.144	SE2602CT-ND*	1.56	1.30	.91	.83	SE2602TR-ND	690.00	MA-506 6.144M-C0
	7.3728	SE2603CT-ND*	1.56	1.30	.91	.83	SE2603TR-ND	690.00	MA-506 7.372M-C0
	8.000	SE2604CT-ND*	1.56	1.30	.91	.83	SE2604TR-ND	690.00	MA-506 8.000M-C0
	9.830	SE2624CT-ND	1.56	1.30	.91	.83	SE2624TR-ND	690.00	MA-506 9.8300M-C0
MA-506	10.000	SE2605CT-ND*	1.56	1.30	.91	.83	SE2605TR-ND	690.00	MA-506 10.000M-C0
	10.240	SE2625CT-ND	1.56	1.30	.91	.83	SE2625TR-ND	690.00	MA-506 10.240M-C0
	11.000	SE2626CT-ND	1.56	1.30	.91	.83	SE2626TR-ND	690.00	MA-506 11.000M-C0
	11.0592	SE2606CT-ND*	1.56	1.30	.91	.83	SE2606TR-ND	690.00	MA-506 11.059M-C0
	12.000	SE2607CT-ND*	1.56	1.30	.91	.83	SE2607TR-ND	690.00	MA-506 12.000M-C0
	12.288	SE2627CT-ND	1.56	1.30	.91	.83	SE2627TR-ND	690.00	MA-506 12.288M-C0
	14.318	SE2628CT-ND	1.56	1.30	.91	.83	SE2628TR-ND	690.00	MA-506 14.318M-C0
	14.745	SE2629CT-ND	1.56	1.30	.91	.83	SE2629TR-ND	690.00	MA-506 14.745M-C0
	15.000	SE2630CT-ND	1.56	1.30	.91	.83	SE2630TR-ND	690.00	MA-506 15.000M-C0
	16.000	SE2608CT-ND*	1.56	1.30	.91	.83	SE2608TR-ND	750.00	MA-506 16.000M-C0
MA-506	16.257	SE2631CT-ND	1.56	1.30	.91	.83	SE2631TR-ND	690.00	MA-506 16.257M-C0
	18.000	SE2632CT-ND	1.56	1.30	.91	.83	SE2632TR-ND	690.00	MA-506 18.000M-C0
	18.432	SE2633CT-ND	1.56	1.30	.91	.83	SE2633TR-ND	690.00	MA-506 18.432M-C0
	19.660	SE2635CT-ND	1.56	1.30	.91	.83	SE2635TR-ND	690.00	MA-506 19.660M-C0
	20.000	SE2609CT-ND*	1.56	1.30	.91	.83	SE2609TR-ND	690.00	MA-506 20.000M-C0
	20.480	SE2636CT-ND	1.56	1.30	.91	.83	SE2636TR-ND	690.00	MA-506 20.480M-C0
	22.118	SE2637CT-ND	1.56	1.30	.91	.83	SE2637TR-ND	690.00	MA-506 22.118M-C0
	24.000	SE2610CT-ND*	1.56	1.30	.91	.83	SE2610TR-ND	690.00	MA-506 24.000M-C0
	24.576	SE2638CT-ND	1.56	1.30	.91	.83	SE2638TR-ND	690.00	MA-506 24.576M-C0
	25.000	SE2639CT-ND	1.56	1.30	.91	.83	SE2639TR-ND	690.00	MA-506 25.000M-C0
MA-506	27.000	SE2641CT-ND	1.56	1.30	.91	.83	SE2641TR-ND	690.00	MA-506 27.000M-C0
	28.636	SE2642CT-ND	1.56	1.30	.91	.83	SE2642TR-ND	690.00	MA-506 28.636M-C0
	32.000	SE2613CT-ND*	1.62	1.35	.94	.85	SE2613TR-ND	710.00	MA-506 32.000M-C0
	33.000	SE2647CT-ND	1.62	1.35	.94	.85	SE2647TR-ND	710.00	MA-506 33.000M-C0
	40.000	SE2615CT-ND*	1.62	1.35	.94	.85	SE2615TR-ND	710.00	MA-506 40.000M-C0
	48.000	SE2651CT-ND	1.62	1.35	.94	.85	SE2651TR-ND	710.00	MA-506 48.000M-C0
	50.000	SE2616CT-ND*	1.62	1.35	.94	.85	SE2616TR-ND	710.00	MA-506 50.000M-C0
	64.000	SE2653CT-ND	1.77	1.48	1.02	.92	SE2653TR-ND	770.00	MA-506 64.000M-C0
MC-156	32.768kHz	SE2412CT-ND	2.64	2.20	1.56	1.40	SE2412TR-ND	1170.00	MC-156 32.768KA-A2
MC-206	32.768kHz	SE2406CT-ND	1.77	1.48	1.04	.94	SE2406TR-ND	780.00	MC-206 32.768KA-A2
MC-306	32.768kHz	SE2407CT-ND	1.17	.98	.71	.64	SE2407TR-ND	530.00	MC-306 32.768K-A2

† Except when otherwise noted.

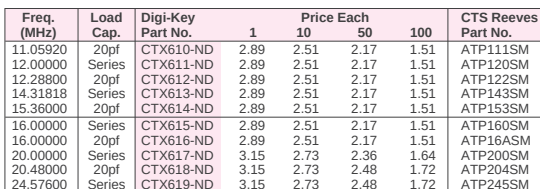
† SE1-KIT-ND **Digi-Key® SMT Crystal Kit** 3 each of values denoted (51 total pieces). Notebook style storage case and bin storage guide included. **\$89.00**

• SE2-KIT-ND **Digi-Key® SMT Crystal Kit** 3 each of values denoted (51 total pieces). Notebook style storage case and bin storage guide included. **\$89.00**

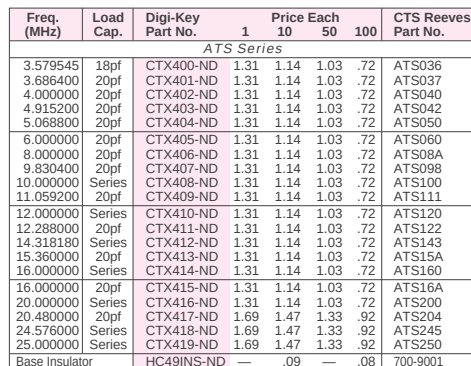
Package	MC-405	MA-505	MA-506	MC-156	MC-206	MC-306
Operating Temperature	-40°C to +85°C	-20°C to +70°C	-20°C to +70°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Maximum Drive Level	1.0μW	2mW	2mW	1.0μW	1.0μW	1.0μW
Frequency Tolerance	±20ppm @ 25°C	±50ppm @ 25°C	±50ppm @ 25°C	±20ppm @ 25°C	±20ppm @ 25°C	±20ppm @ 25°C
Load Capacitance	12.5pf	18pf	18pf	12.5pf	12.5pf	12.5pf
Series Resistance	50K Ohm Max.	50 Ohm Max.	50 Ohm Max.	65K Ohm Max.	50K Ohm Max.	50K Ohm Max.
Shunt Capacitance	0.85pf Typ.	5pf Max.	5pf Max.	—	0.9pf max.	0.9pf Max.

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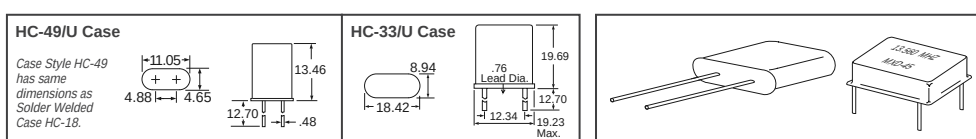


- **Operating Temperature Range:** 0°C to 70°C
- **Operating Mode:** Fundamental



Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each				Digi-Key Part No.	Tape & Reel Pricing 1,000	CTS Reeves Part No.
			1	10	50	100			
ATS-SM Series — Surface Mount									
3.579545	18pf	CTX500-ND	1.50	1.30	1.13	.79	CTX500TR-ND	540.00	ATS036SM-1
3.686400	20pf	CTX501-ND	1.50	1.30	1.13	.79	CTX501TR-ND	540.00	ATS037SM-1
4.000000	20pf	CTX502-ND	1.50	1.30	1.13	.79	CTX502TR-ND	540.00	ATS040SM-1
4.915200	20pf	CTX503-ND	1.50	1.30	1.13	.79	CTX503TR-ND	540.00	ATS042SM-1
5.068800	20pf	CTX504-ND	1.50	1.30	1.13	.79	CTX504TR-ND	540.00	ATS050SM-1
6.000000	20pf	CTX505-ND	1.50	1.30	1.13	.79	CTX505TR-ND	540.00	ATS060SM-1
8.000000	20pf	CTX506-ND	1.50	1.30	1.13	.79	CTX506TR-ND	540.00	ATS084SM-1
9.830400	20pf	CTX507-ND	1.50	1.30	1.13	.79	CTX507TR-ND	540.00	ATS098SM-1
10.000000	Series	CTX508-ND	1.50	1.30	1.13	.79	CTX508TR-ND	540.00	ATS100SM-1
11.059200	20pf	CTX509-ND	1.50	1.30	1.13	.79	CTX509TR-ND	540.00	ATS111SM-1
12.000000	Series	CTX510-ND	1.50	1.30	1.13	.79	CTX510TR-ND	540.00	ATS120SM-1
12.288000	20pf	CTX511-ND	1.50	1.30	1.13	.79	CTX511TR-ND	540.00	ATS122SM-1
14.318180	Series	CTX512-ND	1.50	1.30	1.13	.79	CTX512TR-ND	540.00	ATS143SM-1
15.360000	20pf	CTX513-ND	1.50	1.30	1.13	.79	CTX513TR-ND	540.00	ATS154SM-1
16.000000	Series	CTX514-ND	1.50	1.30	1.13	.79	CTX514TR-ND	540.00	ATS160SM-1
20.000000	Series	CTX515-ND	1.50	1.30	1.13	.79	CTX515TR-ND	540.00	ATS200SM-1
20.480000	20pf	CTX516-ND	1.88	1.63	1.43	1.00	CTX516TR-ND	680.00	ATS204SM-1
24.576000	Series	CTX517-ND	1.88	1.63	1.43	1.00	CTX517TR-ND	680.00	ATS245SM-1

- Frequency Tolerance $\pm .005\%$ (50PPM) @ 25°C
- $\pm .005\%$ (50PPM) 0°C to +70°C
- Fully Hermetic Package
- Low Start-Up Resistance



Freq. (MHz)	Case	Load Capacit.	Max. Series Resist.	Digi-Key Part No.	Price Each				Microprocessor	CTS Reeves Part No.
					1	10	100			
1.843200	HC49	13pF	540	CTX067-ND	3.22	2.69	1.97	—	MP0185 MP0205	
2.000000	HC49	20pF	300	CTX068-ND	3.22	2.69	1.97	—		
2.457600	HC49	32pF	300	CTX069-ND	2.08	1.74	1.27	IM6100C, 1CM7205; CDP1802, 1802C, 1804, 1804C; MC6802	MP0245 MP0335	
3.276800	HC33/51	15pF	100	CTX094-ND	3.92	3.28	2.40		—	
3.579545	HC49	18pF	150	CTX049-ND	.94	.79	.57	MM5369 (Color burst); IM6102; PPS-8; MC6801, 6803, MC6802, 6809; CDP1802, 1802C, 1804, 1804C	MP0365 MP037	
3.686400	HC49	20pF	150	CTX071-ND	.94	.79	.57		—	
4.000000	HC49	20pF	75	CTX006-ND	.94	.79	.57	MCS-40, 4004, 4040, 4201; MC-6802, 6808, 6809; MK-3870, 3872, 3883, 3876; IM 6102; CDP1802, 1802C, 1804, 1804C	MP040	
4.000000	HC49	Series	75	CTX080-ND	.94	.79	.57		Pace; MC6875; Z80, Z80A; TMS9940	MP04A
4.194304	HC49	12pF	75	CTX007-ND	.94	.79	.57	ICM7038, 7213, 7049; CDP1802, 1802C, 1804, 1804C	MP041	
4.915200	HC49	20pF	75	CTX050-ND	.94	.79	.57	CDP1802, 1802C, 1804, 1804C	MP042	
5.000000	HC49	20pF	50	CTX051-ND	.94	.79	.57	General Purpose; CDP1802, 1802C, 1804, 1804C	MP05A	
5.000000	HC49	Series	50	CTX081-ND	.94	.79	.57	CDP1802, 1803, 1802C, 1804, 1804C; TMS 9985, 9940; IM6100A	MP05B	
5.068800	HC49	Series	50	CTX052-ND	.94	.79	.57	CMC5016, 5016T Dual Brg.	MP050	
6.000000	HC49	20pF	50	CTX026-ND	.94	.79	.57	MCS-48, 8035, 8041, 8048, 8741, 8748; IM8048, IM8748; CDP1802, 1802C, 1804, 1804C, MC68A09	MP060	
6.144000	HC49	20pF	50	CTX054-ND	.94	.79	.57	MCS-85, 8086; CDP1802, 1802C, 1804, 1804C	MP061	
7.372800	HC49	Series	45	CTX074-ND	.94	.79	.57	—	MP073	
8.000000	HC49	Series	45	CTX056-ND	.94	.79	.57	8 x 300; MC6875, 68000; Z8000; AMZ8000	MP080	
8.000000	HC49	20pF	45	CTX082-ND	.94	.79	.57	IM6100A; CDP1807; Z8, 9940-B; MC68B09	MP080A	
9.830400	HC49	20pF	45	CTX084-ND	.94	.79	.57	General Purpose	MP098	
10.000000	HC49	Series	35	CTX057-ND	.94	.79	.57	General Purpose	MP100	
10.000000	HC49	30pF	35	CTX083-ND	.94	.79	.57	MCS-85, 8085A-2; 9940-10	MP101	
10.738635	HC49	32pF	35	CTX085-ND	.94	.79	.57	TI9918A	MP107	
11.000000	HC49	18pF	35	CTX086-ND	.94	.79	.57	MCS-48, 8039, 8049	MP110	
11.059200	HC49	Series	35	CTX078-ND	.94	.79	.57	—	MP111	
12.000000	HC49	Series	35	CTX058-ND	.94	.79	.57	MCS-86, 8086/8284; 8202 Ram Controller; 9940-12	MP120	
12.288000	HC49	32pF	35	CTX087-ND	.94	.79	.57	General Purpose	MP122	
14.318180	HC49	Series	35	CTX088-ND	.94	.79	.57	General Purpose	MP143	
14.745600	HC49	Series	35	CTX089-ND	.94	.79	.57	General Purpose	MP147	
15.000000	HC49	Series	35	CTX059-ND	.94	.79	.57	MCS-86, 8086/8284; 8202 Ram Controller	MP150	
16.000000	HC49	Series	35	CTX077-ND	.94	.79	.57	General Purpose	MP160	
18.432000	HC49	Series	35	CTX061-ND	.94	.79	.57	MCS-80, 8080A/8224	MP184	
19.660800	HC49	Series	35	CTX090-ND	.94	.79	.57	General Purpose	MP196	
20.000000	HC49	Series	35	CTX062-ND	.94	.79	.57	MCS-80, 8080A/8224	MP200	
22.118400	HC49	Series	35	CTX063-ND	1.51	1.26	.92	MCS-80, 8080A/8224	MP221	
24.000000	HC49	Series	35	CTX091-ND	1.51	1.26	.92	MCS-86, 8086, 8284	MP240	
24.576000	HC49	Series	35	CTX092-ND	1.51	1.26	.92	General Purpose	MP245	
25.000000	HC49	Series	35	CTX093-ND	1.51	1.26	.92	8202 Ram Controller	MP250	
Base Insulators				HC49INS-ND	—	.09	.08		700-90	

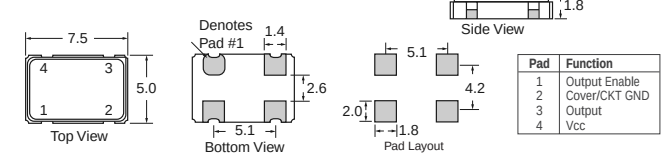
FEATURES:

• Standard miniature surface mount footprint • PCMCIA Type II and III compatible • CMOS/TTL compatible • 16mm Tape and Reel • Ceramic construction for long-term reliability • Seam welded and shielded with Kovar cover

SPECIFICATIONS:

• **Frequency Stability:** ±50ppm • **Supply Voltage:** CB3: 4.5V Min., 5.5V Max.; CB3LV: 3.0V Min., 3.6V Max. • **Supply Current:** 1.5440MHz to 20.000MHz: CB3 (25mA), CB3LV (12mA); >20.000MHz: CB3 (50mA), CB3LV (40mA) • **Operating Temperature:** 0°C to +70°C • **Rise and Fall Time:** 1.5440MHz to 20.000MHz: 10ns; >20.000MHz to <50MHz: 8ns; >50.000MHz to 80.000MHz: 5ns • **Output Load:** 1.5440MHz to 50.000MHz: 50pF; 50.10MHz to 80.000MHz: 30pF • **Enable Input Voltage:** 2V Min. • **Disable Input Voltage:** 0.8V Max.

CB3 and CB3LV Series



Frequency (MHz)	Digi-Key Part No.	1	10	50	100	Digi-Key Part No.	Tape & Reel Pricing 1,000	CTS Reeves Part No.
CB3 SMD Clock Oscillator — 5V								
1.54400	CTX290CT-ND	8.08	7.44	4.27	2.97	CTX290TR-ND	2260.00	CB3-3C-1.5440-T
1.84320	CTX291CT-ND	8.08	7.44	4.27	2.97	CTX291TR-ND	2260.00	CB3-3C-1.8432-T
3.68640	CTX260CT-ND	8.08	7.44	4.27	2.97	CTX260TR-ND	2260.00	CB3-3C-3.6864-T
4.00000	CTX261CT-ND	8.08	7.44	4.27	2.97	CTX261TR-ND	2260.00	CB3-3C-4.0000-T
6.17600	CTX262CT-ND	8.08	7.44	4.27	2.97	CTX262TR-ND	2260.00	CB3-3C-6.1760-T
7.37280	CTX263CT-ND	8.08	7.44	4.27	2.97	CTX263TR-ND	2260.00	CB3-3C-7.3728-T
8.00000	CTX264CT-ND	8.08	7.44	4.27	2.97	CTX264TR-ND	2260.00	CB3-3C-8.0000-T
10.00000	CTX265CT-ND	8.08	7.44	4.27	2.97	CTX265TR-ND	2260.00	CB3-3C-10.0000-T
12.00000	CTX292CT-ND	8.08	7.44	4.27	2.97	CTX292TR-ND	2260.00	CB3-3C-12.0000-T
12.28800	CTX266CT-ND	8.08	7.44	4.27	2.97	CTX266TR-ND	2260.00	CB3-3C-12.2880-T
12.35200	CTX267CT-ND	8.08	7.44	4.27	2.97	CTX267TR-ND	2260.00	CB3-3C-12.3520-T
14.31818	CTX268CT-ND	8.08	7.44	4.27	2.97	CTX268TR-ND	2260.00	CB3-3C-14.3181-T
15.36000	CTX269CT-ND	8.08	7.44	4.27	2.97	CTX269TR-ND	2260.00	CB3-3C-15.3600-T
16.00000	CTX270CT-ND	8.08	7.44	4.27	2.97	CTX270TR-ND	2260.00	CB3-3C-16.0000-T
16.38400	CTX271CT-ND	8.08	7.44	4.27	2.97	CTX271TR-ND	2260.00	CB3-3C-16.3840-T
18.43200	CTX293CT-ND	8.08	7.44	4.27	2.97	CTX293TR-ND	2260.00	CB3-3C-18.4320-T
19.44000	CTX272CT-ND	8.08	7.44	4.27	2.97	CTX272TR-ND	2260.00	CB3-3C-19.4400-T
20.00000	CTX273CT-ND	8.08	7.44	4.27	2.97	CTX273TR-ND	2260.00	CB3-3C-20.0000-T
20.48000	CTX274CT-ND	8.08	7.44	4.27	2.97	CTX274TR-ND	2260.00	CB3-3C-20.4800-T
24.00000	CTX294CT-ND	8.08	7.44	4.27	2.97	CTX294TR-ND	2260.00	CB3-3C-24.0000-T
24.70400	CTX275CT-ND	8.08	7.44	4.27	2.97	CTX275TR-ND	2260.00	CB3-3C-24.7040-T
25.00000	CTX276CT-ND	8.08	7.44	4.27	2.97	CTX276TR-ND	2260.00	CB3-3C-25.0000-T
29.49120	CTX295CT-ND	8.08	7.44	4.27	2.97	CTX295TR-ND	2260.00	CB3-3C-29.4912-T
30.00000	CTX296CT-ND	8.08	7.44	4.27	2.97	CTX296TR-ND	2260.00	CB3-3C-30.0000-T
32.00000	CTX277CT-ND	8.08	7.44	4.27	2.97	CTX277TR-ND	2260.00	CB3-3C-32.0000-T
32.76800	CTX278CT-ND	8.08	7.44	4.27	2.97	CTX278TR-ND	2260.00	CB3-3C-32.7680-T
33.33300	CTX279CT-ND	8.08	7.44	4.27	2.97	CTX279TR-ND	2260.00	CB3-3C-33.3330-T
40.00000	CTX280CT-ND	8.08	7.44	4.27	2.97	CTX280TR-ND	2260.00	CB3-3C-40.0000-T
44.73600	CTX281CT-ND	8.08	7.44	4.27	2.97	CTX281TR-ND	2260.00	CB3-3C-44.7360-T
45.00000	CTX297CT-ND	8.08	7.44	4.27	2.97	CTX297TR-ND	2260.00	CB3-3C-45.0000-T
49.15200	CTX282CT-ND	8.08	7.44	4.27	2.97	CTX282TR-ND	2260.00	CB3-3C-49.1520-T
50.00000	CTX283CT-ND	8.08	7.44	4.27	2.97	CTX283TR-ND	2260.00	CB3-3C-50.0000-T
51.84000	CTX284CT-ND	8.08	7.44	4.27	2.97	CTX284TR-ND	2260.00	CB3-3C-51.8400-T
60.00000	CTX285CT-ND	8.88	8.19	4.59	3.19	CTX285TR-ND	2486.00	CB3-3C-60.0000-T
64.00000	CTX286CT-ND	8.88	8.19	4.59	3.19	CTX286TR-ND	2486.00	CB3-3C-64.0000-T
66.66660	CTX287CT-ND	8.88	8.19	4.59	3.19	CTX287TR-ND	2486.00	CB3-3C-66.6666-T
72.00000	CTX288CT-ND	11.26	10.37	6.03	4.19	CTX288TR-ND	3150.70	CB3-3C-72.0000-T
80.00000	CTX289CT-ND	11.26	10.37	6.03	4.19	CTX289TR-ND	3150.70	CB3-3C-80.0000-T
CB3LV SMD Clock Oscillator — 3.3V								
1.54400	CTX290LVCT-ND	8.08	7.44	4.27	2.97	CTX290LVTR-ND	2260.00	CB3LV-3C-1.5440-T
1.84320	CTX291LVCT-ND	8.08	7.44	4.27	2.97	CTX291LVTR-ND	2260.00	CB3LV-3C-1.8432-T
3.68640	CTX260LVCT-ND	8.08	7.44	4.27	2.97	CTX260LVTR-ND	2260.00	CB3LV-3C-3.6864-T
4.00000	CTX261LVCT-ND	8.08	7.44	4.27	2.97	CTX261LVTR-ND	2260.00	CB3LV-3C-4.0000-T
6.17600	CTX262LVCT-ND	8.08	7.44	4.27	2.97	CTX262LVTR-ND	2260.00	CB3LV-3C-6.1760-T
7.37280	CTX263LVCT-ND	8.08	7.44	4.27	2.97	CTX263LVTR-ND	2260.00	CB3LV-3C-7.3728-T
8.00000	CTX264LVCT-ND	8.08	7.44	4.27	2.97	CTX264LVTR-ND	2260.00	CB3LV-3C-8.0000-T
10.00000	CTX265LVCT-ND	8.08	7.44	4.27	2.97	CTX265LVTR-ND	2260.00	CB3LV-3C-10.0000-T
12.00000	CTX292LVCT-ND	8.08	7.44	4.27	2.97	CTX292LVTR-ND	2260.00	CB3LV-3C-12.0000-T
12.28800	CTX266LVCT-ND	8.08	7.44	4.27	2.97	CTX266LVTR-ND	2260.00	CB3LV-3C-12.2880-T
12.35200	CTX267LVCT-ND	8.08	7.44	4.27	2.97	CTX267LVTR-ND	2260.00	CB3LV-3C-12.3520-T
14.31818	CTX268LVCT-ND	8.08	7.44	4.27	2.97	CTX268LVTR-ND	2260.00	CB3LV-3C-14.3181-T
15.36000	CTX269LVCT-ND	8.08	7.44	4.27	2.97	CTX269LVTR-ND	2260.00	CB3LV-3C-15.3600-T
16.00000	CTX270LVCT-ND	8.08	7.44	4.27	2.97	CTX270LVTR-ND	2260.00	CB3LV-3C-16.0000-T
16.38400	CTX271LVCT-ND	8.08	7.44	4.27	2.97	CTX271LVTR-ND	2260.00	CB3LV-3C-16.3840-T
18.43200	CTX293LVCT-ND	8.08	7.44	4.27	2.97	CTX293LVTR-ND	2260.00	CB3LV-3C-18.4320-T
19.44000	CTX272LVCT-ND	8.08	7.44	4.27	2.97	CTX272LVTR-ND	2260.00	CB3LV-3C-19.4400-T
20.00000	CTX273LVCT-ND	8.08	7.44	4.27	2.97	CTX273LVTR-ND	2260.00	CB3LV-3C-20.0000-T
20.48000	CTX274LVCT-ND	8.08	7.44	4.27	2.97	CTX274LVTR-ND	2260.00	CB3LV-3C-20.4800-T
24.00000	CTX294LVCT-ND	8.08	7.44	4.27	2.97	CTX294LVTR-ND	2260.00	CB3LV-3C-24.0000-T
24.70400	CTX275LVCT-ND	8.08	7.44	4.27	2.97	CTX275LVTR-ND	2260.00	CB3LV-3C-24.7040-T
25.00000	CTX276LVCT-ND	8.08	7.44	4.27	2.97	CTX276LVTR-ND	2260.00	CB3LV-3C-25.0000-T
29.49120	CTX295LVCT-ND	8.08	7.44	4.27	2.97	CTX295LVTR-ND	2260.00	CB3LV-3C-29.4912-T
30.00000	CTX296LVCT-ND	8.08	7.44	4.27	2.97	CTX296LVTR-ND	2260.00	CB3LV-3C-30.0000-T
32.00000	CTX277LVCT-ND	8.08	7.44	4.27	2.97	CTX277LVTR-ND	2260.00	CB3LV-3C-32.0000-T
32.76800	CTX278LVCT-ND	8.08	7.44	4.27	2.97	CTX278LVTR-ND	2260.00	CB3LV-3C-32.7680-T
33.33300	CTX279LVCT-ND	8.08	7.44	4.27	2.97	CTX279LVTR-ND	2260.00	CB3LV-3C-33.3330-T
40.00000	CTX280LVCT-ND	8.08	7.44	4.27	2.97	CTX280LVTR-ND	2260.00	CB3LV-3C-40.0000-T
44.73600	CTX281LVCT-ND	8.08	7.44	4.27	2.97	CTX281LVTR-ND	2260.00	CB3LV-3C-44.7360-T
45.00000	CTX297LVCT-ND	8.08	7.44	4.27	2.97	CTX297LVTR-ND	2260.00	CB3LV-3C-45.0000-T
49.15200	CTX282LVCT-ND	8.08	7.44	4.27	2.97	CTX282LVTR-ND	2260.00	CB3LV-3C-49.1520-T
50.00000	CTX283LVCT-ND	8.08	7.44	4.27	2.97	CTX283LVTR-ND	2260.00	CB3LV-3C-50.0000-T
51.84000	CTX284LVCT-ND	8.08	7.44	4.27	2.97	CTX284LVTR-ND	2260.00	CB3LV-3C-51.8400-T
60.00000	CTX285LVCT-ND	8.88	8.19	4.70	3.27	CTX285LVTR-ND	2486.00	CB3LV-3C-60.0000-T
64.00000	CTX286LVCT-ND	8.88	8.19	4.70	3.27	CTX286LVTR-ND	2486.00	CB3LV-3C-64.0000-T
66.66660	CTX287LVCT-ND	8.88	8.19	4.70	3.27	CTX287LVTR-ND	2486.00	CB3LV-3C-66.6666-T
72.00000	CTX288LVCT-ND	11.26	10.37	5.95	4.14	CTX288LVTR-ND	3150.70	CB3LV-3C-72.0000-T
80.00000	CTX289LVCT-ND	11.26	10.37	5.95	4.14	CTX289LVTR-ND	3150.70	CB3LV-3C-80.0000-T

Tri-State Output

Tri-State Logic uses the two standard logic levels of high (logic 1) and low (logic 0) but has added a third state that is not a logic level but an open circuit condition that effectively disconnects the output from your circuit with a high impedance (floating) state. Thereby enabling the use of numerous oscillators on

Thereby enabling the use of numerous oscillators on the same bus line. Also, by using the enable pin control the output, the crystal is still running even when the output is disabled (stand-by mode), thus eliminating any start-up time for the oscillator.

CTS HCMOS/TTL products utilize an Application Specific Integrated Circuit (ASIC) design strategy. Employing a single design family supporting both HCMOS/TTL applications helps in reducing costs and lead times. Utilizing ASIC technology reduces the number of components inside the XO (crystal oscillator), thus increasing reliability and further reducing cost.

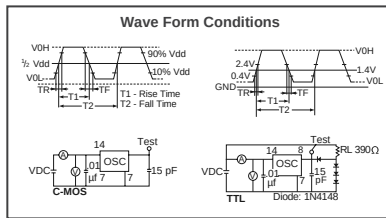
Figure 1: Comparison of C-MOS and TTL oscillator circuitry.

Features:

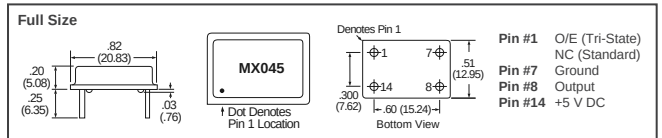
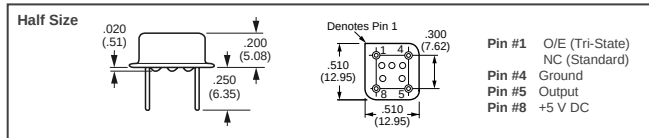
- C-MOS/TTL compatible
- Drives up to 10 standard TTL loads
- 100 PPM tolerance
- Tri-State output
- Fully hermetic resistance weld package

Standard Output

- Frequency Tolerance: ± 100 PPM 0°C to 70°C • C-MOS compatible • Fully hermetic resistance weld package • 8/14-pin compatible • Drives up to 10 standard TTL Loads • Input Voltage: +5 V DC $\pm .5$ V



Parameter	Symbol	Condition	Minimum	Typical	Maximum	Units
Supply Voltage	VCC	—	4.5	5.0	5.5	V
Supply Current	ICC	1.0->7.0MHz	—	5	12	mA
	—	>7.0->25MHz	—	15	25	mA
	—	>25->50MHz	—	30	40	mA
Output Load	—	—	—	—	10	TTL
Output Current	IOH	VOH = 3.9V	—	—	-16	mA
	IOH	VOH = 0.4V	—	—	16	mA
Symmetry	Duty	1.0->50MHz	45	—	55	%
		>50->70MHz	40	—	60	%
Rise & Fall Time	Tr/Tf	1.0->25MHz	—	5	8	ns
	Tr/Tf	>25->70MHz	—	3	5	ns
Enable Input V	VIH VIL	—	2.0	—	—	V V
Enable Input Load	Cin	—	—	—	10	pF
Tri-state Leakage	Iz	VIL = 0.8V	—	—	0.05	mA
Jitter	—	Peak-Peak	—	30	50	ps
Temperature	0-70°C					



Frequency (MHz)	Digi-Key Part No.	1	10	Price Each 100	250	500	CTS Reeves Part No.
Half Size Clock Oscillator with Tri-State Output							
1.00000	CTX180-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-1.000
1.84320	CTX181-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-1.8432
2.00000	CTX182-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-2.000
2.45760	CTX183-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-2.4576
3.68640	CTX184-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-3.6864
4.00000	CTX185-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-4.000
4.91520	CTX186-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-4.9152
5.00000	CTX187-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-5.000
5.06880	CTX188-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-5.0688
6.00000	CTX189-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-6.000
6.14400	CTX190-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-6.144
7.37280	CTX191-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-7.3728
8.00000	CTX192-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-8.000
10.00000	CTX193-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-10.000
12.00000	CTX194-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-12.000
14.31818	CTX195-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-14.31818
16.00000	CTX196-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-16.000
18.43200	CTX197-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-18.432
19.66080	CTX198-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-19.6608
20.00000	CTX199-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-20.000
24.00000	CTX250-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-24.000
25.00000	CTX251-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-25.000
25.17500	CTX252-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-25.175
28.32200	CTX253-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-28.322
32.00000	CTX254-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-32.000
40.00000	CTX255-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-40.000
50.00000	CTX256-ND	2.78	2.47	1.87	1.66	1.42	MXO45HST-50.000
64.00000	CTX257-ND	3.64	3.22	2.45	2.17	1.86	MXO45HST-64.000
66.66660	CTX258-ND	3.64	3.22	2.45	2.17	1.86	MXO45HST-66.6666
80.00000	CTX259-ND	5.85	5.18	3.94	3.49	2.99	MXO45HST-80.000

Half Size Clock Oscillator with Standard Output							
1.00000	CTX150-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-1.0000
1.84320	CTX151-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-1.8432
2.00000	CTX152-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-2.0000
2.45760	CTX153-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-2.4576
3.68640	CTX154-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-3.6864
4.00000	CTX155-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-4.0000
4.91520	CTX156-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-4.9152
5.00000	CTX157-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-5.0000
5.06880	CTX158-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-5.0688
6.00000	CTX159-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-6.0000
6.14400	CTX160-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-6.1440
7.37280	CTX161-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-7.3728
8.00000	CTX162-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-8.0000
10.00000	CTX163-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-10.0000
12.00000	CTX164-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-12.0000
14.31818	CTX165-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-14.31818
16.00000	CTX166-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-16.0000
18.43200	CTX167-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-18.4320
19.66080	CTX168-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-19.6608
20.00000	CTX169-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-20.0000
24.00000	CTX170-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-24.0000
25.00000	CTX171-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-25.0000
25.17500	CTX172-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-25.1750
28.32200	CTX173-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-28.3220
32.00000	CTX174-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-32.0000
40.00000	CTX175-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-40.0000
50.00000	CTX176-ND	2.78	2.47	1.87	1.66	1.42	MXO45HS-50.0000
64.00000	CTX177-ND	3.64	3.22	2.45	2.17	1.86	MXO45HS-64.0000
66.66660	CTX178-ND	3.64	3.22	2.45	2.17	1.86	MXO45HS-66.6666
80.00000	CTX179-ND	5.85	5.18	3.94	3.49	2.99	MXO45HS-80.0000

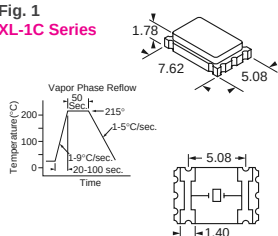
Frequency (MHz)	Digi-Key Part No.	Price Each				CTS Reeves Part No.	
		1	10	100	250	500	
Full Size Clock Oscillator with Tri-State Output							
1.00000	CTX139-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-1.000
1.84320	CTX140-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-1.8432
2.00000	CTX141-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-2.000
2.45760	CTX142-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-2.4576
3.68640	CTX143-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-3.6864
4.00000	CTX144-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-4.000
4.91520	CTX145-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-4.9152
5.00000	CTX146-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-5.000
5.06880	CTX147-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-5.0688
6.00000	CTX148-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-6.000
6.14400	CTX200-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-6.144
7.37280	CTX201-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-7.3728
8.00000	CTX202-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-8.000
10.00000	CTX203-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-10.000
12.00000	CTX204-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-12.000
14.31818	CTX205-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-14.31818
16.00000	CTX206-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-16.000
18.43200	CTX207-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-18.432
19.66080	CTX208-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-19.6608
20.00000	CTX209-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-20.000
24.00000	CTX210-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-24.000
25.00000	CTX211-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-25.000
25.17500	CTX212-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-25.175
28.32200	CTX213-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-28.322
32.00000	CTX214-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-32.000
40.00000	CTX215-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-40.000
50.00000	CTX216-ND	2.78	2.47	2.19	1.87	1.66	MXO45T-50.000
64.00000	CTX217-ND	3.64	3.22	2.87	2.45	2.17	MXO45T-64.000
66.66660	CTX218-ND	3.64	3.22	2.87	2.45	2.17	MXO45T-66.6666
80.00000	CTX219-ND	5.85	5.18	4.61	3.94	3.49	MXO45T-80.000

Full Size Clock Oscillator with Standard Output							
1.00000	CTX101-ND	2.78	2.47	2.19	1.87	1.66	MXO45-1.0000
1.84320	CTX103-ND	2.78	2.47	2.19	1.87	1.66	MXO45-1.8432
2.00000	CTX104-ND	2.78	2.47	2.19	1.87	1.66	MXO45-2.0000
2.45760	CTX105-ND	2.78	2.47	2.19	1.87	1.66	MXO45-2.4576
3.68640	CTX106-ND	2.78	2.47	2.19	1.87	1.66	MXO45-3.6864
4.00000	CTX107-ND	2.78	2.47	2.19	1.87	1.66	MXO45-4.0000
4.91520	CTX108-ND	2.78	2.47	2.19	1.87	1.66	MXO45-4.9152
5.00000	CTX109-ND	2.78	2.47	2.19	1.87	1.66	MXO45-5.0000
5.06880	CTX110-ND	2.78	2.47	2.19	1.87	1.66	MXO45-5.0688
6.00000	CTX111-ND	2.78	2.47	2.19	1.87	1.66	MXO45-6.0000
6.14400	CTX122-ND	2.78	2.47	2.19	1.87	1.66	MXO45-6.1440
7.37280	CTX123-ND	2.78	2.47	2.19	1.87	1.66	MXO45-7.3728
8.00000	CTX112-ND	2.78	2.47	2.19	1.87	1.66	MXO45-8.0000
10.00000	CTX114-ND	2.78	2.47	2.19	1.87	1.66	MXO45-10.0000
12.00000	CTX131-ND	2.78	2.47	2.19	1.87	1.66	MXO45-12.0000
14.31818	CTX115-ND	2.78	2.47	2.19	1.87	1.66	MXO45-14.31818
16.00000	CTX116-ND	2.78	2.47	2.19	1.87	1.66	MXO45-16.0000
18.43200	CTX118-ND	2.78	2.47	2.19	1.87	1.66	MXO45-18.4320
19.66080	CTX124-ND	2.78	2.47	2.19	1.87	1.66	MXO45-19.6608
20.00000	CTX119-ND	2.78	2.47	2.19	1.87	1.66	MXO45-20.0000
24.00000	CTX125-ND	2.78	2.47	2.19	1.87	1.66	MXO45-24.0000
25.00000	CTX126-ND	2.78	2.47	2.19	1.87	1.66	MXO45-25.0000
25.17500	CTX127-ND	2.78	2.47	2.19	1.87	1.66	MXO45-25.1750
28.32200	CTX128-ND	2.78	2.47	2.19	1.87	1.66	MXO45-28.3220
32.00000	CTX129-ND	2.78	2.47	2.19	1.87	1.66	MXO45-32.0000
40.00000	CTX120-ND	2.78	2.47	2.19	1.87	1.66	MXO45-40.0000
50.00000	CTX121-ND	2.78	2.47	2.19	1.87	1.66	MXO45-50.0000
64.00000	CTX130-ND	3.64	3.22	2.87	2.45	2.18	MXO45-64.0000
66.66660	CTX137-ND	3.64	3.22	2.87	2.45	2.18	MXO45-66.6666
80.00000	CTX138-ND	5.85	5.18	4.61	3.94	3.49	MXO45-80.0000

A462-ND	Aries Full-Size Socket for a 4-Pin Oscillator	\$60/1;	\$12.50/25;	\$40.48/100
A463-ND	Aries Half-Size Socket for a 4-Pin Oscillator.....	\$60/1;	\$12.50/25;	\$40.48/100

Surface Mount Crystals and Oscillators

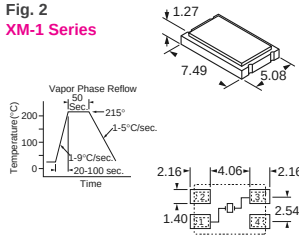
Fig. 1
XL-1C Series



Specifications:

Frequency Tolerance: $\pm 50\text{ppm}$ (@ 25°C)
 Temperature Stability: $\pm 50\text{ ppm}$
 Operating Temp.: -10°C to $+65^{\circ}\text{C}$
 Drive Level: .1MW Typical

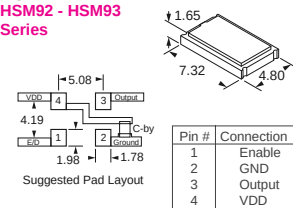
Fig. 2
XM-1 Series



Specifications:

Frequency Tolerance: ± 50 ppm (@ 25°C)
Temperature Stability: ± 50 ppm
Operating Temperature: -10°C to +65°C
Drive Level: .1 MW Typical

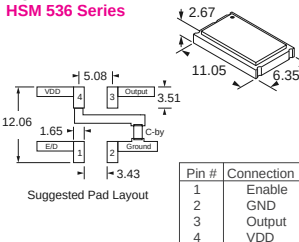
Fig. 3
HSM92 - HSM93
Series



Specifications:

- **Frequency Stability:** HSM92: $\pm 50\text{ppm}$; HSM93: $\pm 100\text{ppm}$.
- **Temperature Range:** 0°C to $+70^{\circ}\text{C}$.
- **Waveform:** HCMOS Squarewave, Tri-State
- **Output:** Voh: 4.5V Min., Vol: 0.5V Max.
- **Current:** Ioh: 16mA; Iol: 16mA.
- **Rise/Fall Time:** 7ns Max.
- **Duty Cycle:** 45/55 max.
- **Start Up Time:** 10ms Max.
- **Supply Voltage:** $\pm 5\text{VDC} \pm 10\%$.
- **Enable/Disable Time:** 100ns Max.
- **Output Load:** 50pF

Fig. 4
HSM 536 Series



Specifications:

- **Frequency Stability:** $\pm 100\text{ppm}$.
- **Temperature Range:** 0°C to $+70^{\circ}\text{C}$.
- **Waveform:** HCMOS Squarewave.
- **Output:** Voh: 4.5V Min. , Vol: 0.5V Max.
- **Rise/Fall Time:** 7ns Max.
- **Duty Cycle:** $50/50\% \pm 10\%$.
- **Start Up Time:** 10ms Max.
- **Supply Voltage:** $+5\text{VDC} \pm 10\%$.
- **Output Load:** 50pF

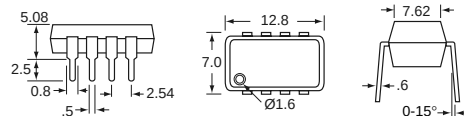
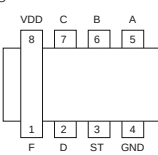
Fig.	Frequency (MHz)	Load Cap.	Digi-Key Part No.	1	Price Each 10	100	500	Connor-Winfield Part No.
SMT Quartz Crystals								
1	10.000	16pf	CW401-ND	4.73	3.94	3.15	2.54	XL-1C-10.0000
	12.000	16pf	CW402-ND	4.73	3.94	3.15	2.54	XL-1C-12.0000
	16.000	16pf	CW403-ND	4.73	3.94	3.15	2.54	XL-1C-16.0000
	18.432	16pf	CW404-ND	4.73	3.94	3.15	2.54	XL-1C-18.4320
	20.000	16pf	CW405-ND	4.73	3.94	3.15	2.54	XL-1C-20.0000
	29.4912	16pf	CW407-ND	5.54	4.62	3.69	2.98	XL-1C-29.4912
	40.000	Series	CW408-ND	5.13	4.28	3.42	2.76	XL-1C-40.0000
	44.2368	Series	CW409-ND	5.13	4.28	3.42	2.76	XL-1C-44.2368
	50.000	Series	CW410-ND	5.13	4.28	3.42	2.76	XL-1C-50.0000
2	10.000	16pf	CW421-ND	7.83	6.53	5.22	4.21	XM-1-10.0000
	12.000	16pf	CW422-ND	7.83	6.53	5.22	4.21	XM-1-12.0000
	16.000	16pf	CW423-ND	7.83	6.53	5.22	4.21	XM-1-16.0000
	18.432	16pf	CW424-ND	7.83	6.53	5.22	4.21	XM-1-18.4320
	20.000	16pf	CW425-ND	7.83	6.53	5.22	4.21	XM-1-20.0000
	29.4912	Series	CW427-ND	9.32	7.77	6.21	5.01	XM-1-29.4912
	40.000	Series	CW428-ND	8.51	7.09	5.67	4.57	XM-1-40.0000
	44.2368	Series	CW429-ND	8.51	7.09	5.67	4.57	XM-1-44.2368
	50.000	Series	CW430-ND	8.51	7.09	5.67	4.57	XM-1-50.0000
SMT Oscillator								
3	4.9152	—	CW301-ND	11.61	9.68	7.74	6.24	HSM93-4.9152
	8.000	—	CW302-ND	11.61	9.68	7.74	6.24	HSM93-8.0000
	10.000	—	CW303-ND	11.61	9.68	7.74	6.24	HSM93-10.0000
	16.000	—	CW304-ND	11.61	9.68	7.74	6.24	HSM93-16.0000
	20.000	—	CW305-ND	11.61	9.68	7.74	6.24	HSM93-20.0000
	25.000	—	CW306-ND	11.61	9.68	7.74	6.24	HSM93-25.0000
	29.4912	—	CW341-ND	12.15	10.13	8.10	6.53	HSM92-29.4912
	32.000	—	CW307-ND	11.61	9.68	7.74	6.24	HSM93-32.0000
	40.000	—	CW308-ND	11.61	9.68	7.74	6.24	HSM93-40.0000
4	44.2368	—	CW342-ND	12.15	10.13	8.10	6.53	HSM92-44.2368
	50.000	—	CW309-ND	11.61	9.68	7.74	6.24	HSM93-50.0000
	60.000	—	CW310-ND	13.23	11.03	8.82	7.11	HSM93-60.0000
	8.000	—	CW320-ND	10.80	9.00	7.20	5.80	HSM536-8.0000
	10.000	—	CW321-ND	10.80	9.00	7.20	5.80	HSM536-10.0000
	18.432	—	CW322-ND	10.80	9.00	7.20	5.80	HSM536-18.4320
	20.000	—	CW323-ND	10.80	9.00	7.20	5.80	HSM536-20.0000
	25.000	—	CW324-ND	10.80	9.00	7.20	5.80	HSM536-25.0000
	32.000	—	CW325-ND	10.80	9.00	7.20	5.80	HSM536-32.0000
4	40.000	—	CW326-ND	10.80	9.00	7.20	5.80	HSM536-40.0000
	50.000	—	CW327-ND	10.80	9.00	7.20	5.80	HSM536-50.0000
	60.000	—	CW328-ND	11.07	9.23	7.38	5.95	HSM536-60.0000
	64.000	—	CW329-ND	11.07	9.23	7.38	5.95	HSM536-64.0000
	66.6666	—	CW330-ND	11.07	9.23	7.38	5.95	HSM536-66.6666

Dual Output Oscillator - ECS-300C Series

Electrical Characteristics:

- **Frequency Stability:** 0.01%
- **Operating Temperature Range:** Ta = -10°C to +70°C
- **Storage Temperature Range:** Ta = -55°C to +125°C
- **Supply Voltage:** 5V $\pm$ 0.5V; 3-5V $\pm$ 5V
- **Current Consumption:** 20mA max.
- **Input Current:** 35mA max.
- **Output Load:** 15pF
- **Output Level:** Voh: 4.5V min. Vol: 0.5V max.

- **Output Symmetry:** 40% to 60%
- **Rise Time/Fall Time:** 15nS
- **Start-up Time:** 2mS



SETTING OF DIVIDING OUTPUT					
Input				Output	
Select				F (Original Frequency)	D (Divided Waveform)
C	B	A	ST	L	L
X	X	X	L		
L	L	L	H	fo clock	fo 1/2 clock
L	L	H	H	fo clock	fo 1/2' clock
L	H	L	H	fo clock	fo 1/2' clock
L	H	H	H	fo clock	fo 1/2' clock
H	L	L	H	fo clock	fo 1/2' clock
H	L	H	H	fo clock	fo 1/2' clock
H	H	L	H	fo clock	fo 1/2' clock
H	H	H	H	fo clock	fo 1/2' clock

Pin	Connection
1	Output
2	Dividing Ratio
3	Standby
4	GND
5	A (Programming)
6	B (Programming)
7	C (Programming)
8	V _{DD} (5V)

Frequency (MHz)	Digi-Key Part No.	1	Price Each 10	100	500	ECS Part No.
12.000	XC301-ND	5.54	4.62	3.69	2.98	OECS-120-3-C3X1A
12.288	XC302-ND	5.54	4.62	3.69	2.98	OECS-122.8-3-C3X1A
12.800	XC303-ND	5.54	4.62	3.69	2.98	OECS-128-3-C3X1A
14.31818	XC304-ND	5.54	4.62	3.69	2.98	OECS-143-3-C3X1A
14.7456	XC305-ND	5.54	4.62	3.69	2.98	OECS-147.4-3-C3X1A
15.9744	XC306-ND	5.54	4.62	3.69	2.98	OECS-159.7-3-C3X1A
16.000	XC307-ND	5.54	4.62	3.69	2.98	OECS-160-3-C3X1A
16.3840	XC308-ND	5.54	4.62	3.69	2.98	OECS-163.8-3-C3X1A
17.734476	XC309-ND	5.54	4.62	3.69	2.98	OECS-177.3-3-C3X1A
18.432	XC310-ND	5.54	4.62	3.69	2.98	OECS-184-3-C3X1A
19.6608	XC311-ND	5.54	4.62	3.69	2.98	OECS-196.6-3-C3X1A
20.000	XC312-ND	5.54	4.62	3.69	2.98	OECS-200-3-C3X1A
24.000	XC313-ND	5.54	4.62	3.69	2.98	OECS-240-3-C3X1A

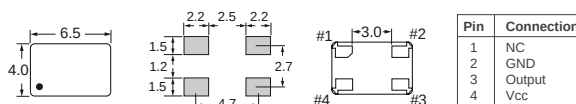
SMD Clock Oscillator - 32.768 KHz ECS-327SMO Series

Electrical Characteristics:

- **Frequency Stability:**
 - 10°C ~ +60°C: -60ppm min., +30ppm max.;
 - 40°C ~ +85°C: -140ppm min., +30ppm max.
- **Operating Temperature Range:** -40°C ~ +85°C
- **Storage Temperature Range:** -40°C ~ +85°C
- **Input Voltage (Vcc):** +3.3V DC typ.

- **Input Current:** 15µA max. (with 15pF load)
- **Symmetry:** 40% to 60% (at 1/2 V_{CC} Level and +25°C)
- **Rise and Fall Time:** 200ns
- **"0" Level:** V_{CC} x 0.1V max.
- **"1" Level:** V_{CC} x 0.9V min.
- **Load:** 15pF CMOS

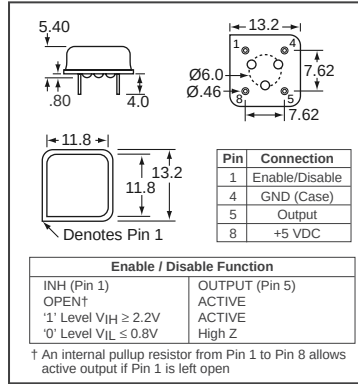
Frequency (KHz)	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	Tape & Reel Pricing 1,000	ECS Part No.
		1	10	100			
32.768	XC777CT-ND	6.74	5.52	4.90	XC777TR-ND	3430.00	FCS-3275M0



Package Thickness: 2.0mm

Electrical Characteristics:

- **Frequency Stability:** ±50ppm max.
- **Supply Voltage:** 4.5V min., 5.5V max.
- **Input Current:**
 - 4.000 ~ 25.000MHz: 25mA
 - 25.000+ ~ 50.000MHz: 46mA
 - 50.000+ ~ 80.000MHz: 77mA
- **Output Symmetry @2.5V:**
 - 4.000 ~ 80.000MHz: 45% min., 55% max.
- **Operating Temp.:** -10°C to +70°C
- **Storage Temp.:** -55°C to +125°C
- **Rise Time (0.5V to 4.5V):** 5nS
- **Fall Time (4.5V to 0.5V):** 5nS
- **Output Voltage (4.000 ~ 80.000MHz):**
 - IOL = 16mA: 0.5V max.
 - IOH = 16mA: 4.5V min.
- **Output Current (4.000 ~ 80.000MHz):**
 - VOL = 0.5V: 16mA max.
 - VOH = 4.5V: -16mA max.
- **Output Load:**
 - TTL: 10 TTL max.
 - HCMOS: 50pF
- **Start up Time:** 4.000-80.000MHz: 10mS
- **Output Enable/Disable Time:** 100nS

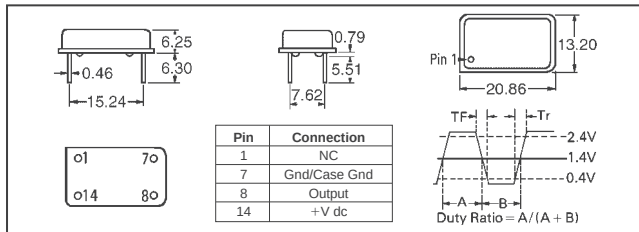


Frequency (MHz)	Digi-Key Part No.	1	Price Each 10	100	500	ECS Part No.
4.000	XC259-ND	2.63	2.37	1.89	1.68	OECs-2200B-040
4.9152	XC260-ND	2.63	2.37	1.89	1.68	OECs-2200B-049
6.000	XC261-ND	2.63	2.37	1.89	1.68	OECs-2200B-060
6.144	XC262-ND	2.63	2.37	1.89	1.68	OECs-2200B-061
7.3728	XC263-ND	2.63	2.37	1.89	1.68	OECs-2200B-073
8.000	XC264-ND	2.63	2.37	1.89	1.68	OECs-2200B-080
9.216	XC265-ND	2.63	2.37	1.89	1.68	OECs-2200B-092.1
9.8304	XC266-ND	2.63	2.37	1.89	1.68	OECs-2200B-098
10.000	XC267-ND	2.63	2.37	1.89	1.68	OECs-2200B-100
11.0592	XC268-ND	2.63	2.37	1.89	1.68	OECs-2200B-110
12.000	XC269-ND	2.63	2.37	1.89	1.68	OECs-2200B-120
14.31818	XC270-ND	2.63	2.37	1.89	1.68	OECs-2200B-143
16.000	XC271-ND	2.63	2.37	1.89	1.68	OECs-2200B-160
18.432	XC272-ND	2.63	2.37	1.89	1.68	OECs-2200B-184
19.6608	XC273-ND	2.63	2.37	1.89	1.68	OECs-2200B-196
20.000	XC274-ND	2.63	2.37	1.89	1.68	OECs-2200B-200
24.000	XC275-ND	2.63	2.37	1.89	1.68	OECs-2200B-240
25.000	XC276-ND	2.63	2.37	1.89	1.68	OECs-2200B-250
28.322	XC277-ND	2.63	2.37	1.89	1.68	OECs-2200B-283
32.000	XC278-ND	2.63	2.37	1.89	1.68	OECs-2200B-320
40.000	XC279-ND	2.63	2.37	1.89	1.68	OECs-2200B-400
48.000	XC280-ND	2.63	2.37	1.89	1.68	OECs-2200B-480
50.000	XC281-ND	2.63	2.37	1.89	1.68	OECs-2200B-500
66.666	XC282-ND	2.63	2.37	1.89	1.68	OECs-2200B-666
80.000	XC283-ND	2.63	2.37	1.89	1.68	OECs-2200B-800

Full Size TTL Clock Oscillators

Electrical Characteristics:

- **Frequency Stability:** ±100ppm max.
- **Supply Voltage:** 4.5V min., 5.5V max.
- **Input Current:**
 - 1.000 ~ 8.000MHz: 15mA
 - 8.000+ ~ 24.000MHz: 30mA
 - 24.000+ ~ 66.666MHz: 70 mA
- **Output Symmetry @1.4V:**
 - 45% min., 55% max.
- **Operating Temp.:** 0°C to +70°C
- **Storage Temp.:** -55°C to +125°C
- **Rise Time:**
 - 1.000 ~ 25.000MHz @ 0.4V to 2.4V: 10nS
 - 25.000+ ~ 66.666MHz @ 0.5V to 2.4V: 5nS
- **Fall Time:**
 - 1.000 ~ 25.000MHz @ 0.4V to 2.4V: 10nS
 - 25.000+ ~ 66.666MHz @ 0.5V to 2.4V: 5nS
- **Output Voltage (IOL = 20mA):**
 - 1.000 ~ 25.000MHz: 0.4V max.
 - 25.000+ ~ 66.666MHz: 0.5V max.
- **Output Voltage**
 - (IOH = 1mA): 2.4V min.
- **Output Current:**
 - VOL = 0.5V: 16mA max.
 - VOH = 2.4V: -4mA max.
- **Output Load:**
 - TTL: 10 TTL max.
- **Start up Time:**
 - 1.000-3.500MHz: 20mS
 - 3.500+4.000MHz: 35mS
 - 4.000+6.000MHz: 30mS
 - 6.000+20.000MHz: 20mS
 - 20.000+66.666MHz: 15mS



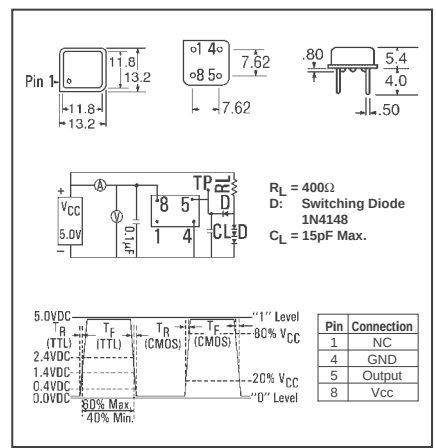
Frequency (MHz)	Digi-Key Part No.	1	Price Each 10	100	500	ECS Part No.
1.000	X101-ND	2.88	2.59	2.07	1.84	OECs-10-1-A101A
1.2288	X102-ND	2.88	2.59	2.07	1.84	OECs-12-2-1-A101A
1.8432	X103-ND	2.88	2.59	2.07	1.84	OECs-18-2-1-A101A
2.000	X104-ND	2.88	2.59	2.07	1.84	OECs-20-1-A101A
2.4576	X105-ND	2.88	2.59	2.07	1.84	OECs-24-1-A101A
3.579545	XC227-ND	2.88	2.59	2.07	1.84	OECs-35-1-A101A
3.6864	X106-ND	2.88	2.59	2.07	1.84	OECs-36-1-A101A
4.000	X107-ND	2.88	2.59	2.07	1.84	OECs-40-1-A101A
4.9152	X108-ND	2.88	2.59	2.07	1.84	OECs-49-1-A101A
5.000	X109-ND	2.88	2.59	2.07	1.84	OECs-50-1-A101A
5.0688	X110-ND	2.88	2.59	2.07	1.84	OECs-51-1-A101A
6.000	X111-ND	2.88	2.59	2.07	1.84	OECs-60-1-A101A
6.144	X112-ND	2.88	2.59	2.07	1.84	OECs-61-1-A101A
7.3728	X113-ND	2.88	2.59	2.07	1.84	OECs-73-1-A101A
8.000	X114-ND	2.88	2.59	2.07	1.84	OECs-80-1-A101A
9.216	X115-ND	2.88	2.59	2.07	1.84	OECs-92-1-1-A101A
9.8304	X116-ND	2.88	2.59	2.07	1.84	OECs-98-3-1-A101A
10.000	X117-ND	2.88	2.59	2.07	1.84	OECs-100-1-A101A
11.0592	X125-ND	2.88	2.59	2.07	1.84	OECs-110-5-1-A101A
12.000	X126-ND	2.88	2.59	2.07	1.84	OECs-120-1-A101A
14.31818	X115-ND	2.88	2.59	2.07	1.84	OECs-143-1-A101A
14.7456	X127-ND	2.88	2.59	2.07	1.84	OECs-147-4-1-A101A
16.000	X116-ND	2.88	2.59	2.07	1.84	OECs-160-1-A101A
16.257	X128-ND	2.88	2.59	2.07	1.84	OECs-162-5-1-A101A
18.000	X117-ND	2.88	2.59	2.07	1.84	OECs-180-1-A101A
18.432	X118-ND	2.88	2.59	2.07	1.84	OECs-184-1-A101A
19.6608	XC314-ND	2.88	2.59	2.07	1.84	OECs-196-6-1-A101A
20.000	X119-ND	2.88	2.59	2.07	1.84	OECs-200-1-A101A
24.000	X129-ND	2.88	2.59	2.07	1.84	OECs-240-1-A101A
25.000	XC315-ND	2.88	2.59	2.07	1.84	OECs-250-1-A101A
25.175	X130-ND	2.88	2.59	2.07	1.84	OECs-251-7-1-A101A
28.322	X131-ND	2.88	2.59	2.07	1.84	OECs-283-2-1-A101A
30.000	XC316-ND	2.88	2.59	2.07	1.84	OECs-300-1-A101A
32.000	X132-ND	2.88	2.59	2.07	1.84	OECs-320-1-A101A
32.514	X133-ND	2.88	2.59	2.07	1.84	OECs-325-1-1-A101A
35.000	X134-ND	2.88	2.59	2.07	1.84	OECs-350-1-A101A
40.000	X120-ND	2.88	2.59	2.07	1.84	OECs-400-1-A101A
48.000	X135-ND	2.88	2.59	2.07	1.84	OECs-480-1-A101A
50.000	X121-ND	2.88	2.59	2.07	1.84	OECs-500-1-A101A
64.000	X136-ND	2.88	2.59	2.07	1.84	OECs-640-1-A101A
66.666	XC228-ND	2.88	2.59	2.07	1.84	OECs-666-1-A101A

A462-ND Aries Full-Size Socket for a 4-Pin Oscillator \$60/1; \$12.50/25; \$40.48/100
A463-ND Aries Half-Size Socket for a 4-Pin Oscillator \$60/1; \$12.50/25; \$40.48/100

Half Size TTL Clock Oscillators

Electrical Characteristics:

- **Frequency Stability:** ±100ppm max.
- **Supply Voltage:** 4.5V min., 5.5V max.
- **Input Current:**
 - 1.000 ~ 25.000MHz: 25mA
 - 25.000+ ~ 50.000MHz: 46mA
 - 50.000+ ~ 66.666MHz: 77mA
- **Output Symmetry @2.5V:**
 - 1.000 ~ 66.666MHz: 45% min., 55% max.
- **Operating Temp.:** 0°C to +70°C
- **Storage Temp.:** -55°C to +125°C
- **Rise Time (0.5V to 4.5V):** 5nS
- **Fall Time (4.5V to 0.5V):** 5nS
- **Output Voltage**
 - IOL = 16mA: 0.5V max.
 - IOH = -16mA: 4.5V min.
- **Output Current:**
 - VOL = 0.5V: 16mA max.
 - VOH = 4.5V: -16mA max.
- **Output Load:**
 - TTL: 10 TTL max.
 - HCMOS: 50pF
- **Start up Time:** 10mS



Frequency (MHz)	Digi-Key Part No.	1	Price Each 10	100	500	ECS Part No.
1.000	XC229-ND	2.63	2.37	1.89	1.68	OECs-10-2-A401A
1.2288	XC230-ND	2.63	2.37	1.89	1.68	OECs-12-2-2-A401A
1.8432	XC231-ND	2.63	2.37	1.89	1.68	OECs-18-2-A401A
2.000	XC232-ND	2.63	2.37	1.89	1.68	OECs-20-2-A401A
2.4576	XC233-ND	2.63	2.37	1.89	1.68	OECs-24-2-A401A
3.6864	XC234-ND	2.63	2.37	1.89	1.68	OECs-36-2-A401A
3.579545	XC235-ND	2.63	2.37	1.89	1.68	OECs-35-2-A401A
4.000	X202-ND	2.63	2.37	1.89	1.68	OECs-40-2-A401A
4.9152	XC236-ND	2.63	2.37	1.89	1.68	OECs-49-2-A401A
5.000	XC237-ND	2.63	2.37	1.89	1.68	OECs-50-2-A401A
5.0688	XC238-ND	2.63	2.37	1.89	1.68	OECs-51-2-A401A
6.000	XC239-ND	2.63	2.37	1.89	1.68	OECs-60-2-A401A
6.144	XC240-ND	2.63	2.37	1.89	1.68	OECs-61-2-A401A
7.3728	X208-ND	2.63	2.37	1.89	1.68	OECs-73-2-A401A
8.000	X209-ND	2.63	2.37	1.89	1.68	OECs-80-2-A401A
9.216	XC241-ND	2.63	2.37	1.89	1.68	OECs-92-1-2-A401A
9.8304	XC242-ND	2.63	2.37	1.89	1.68	OECs-98-3-2-A401A
10.000	XC243-ND	2.63	2.37	1.89	1.68	OECs-100-2-A401A
11.0592	XC244-ND	2.63	2.37	1.89	1.68	OECs-110-5-2-A401A
12.000	XC245-ND	2.63	2.37	1.89	1.68	OECs-120-2-A401A
14.31818	XC246-ND	2.63	2.37	1.89	1.68	OECs-143-2-A401A
14.7456	XC247-ND	2.63	2.37	1.89	1.68	OECs-147-4-2-A401A
16.000	X216-ND	2.63	2.37	1.89	1.68	OECs-160-2-A401A
16.257	XC248-ND	2.63	2.37	1.89	1.68	OECs-162-5-2-A401A
18.000	XC249-ND	2.63	2.37	1.89	1.68	OECs-180-2-A401A
18.432	XC250-ND	2.63	2.37	1.89	1.68	OECs-184-2-A401A
19.6608	XC251-ND	2.63	2.37	1.89	1.68	OECs-196-6-2-A401A
20.000	X220-ND	2.63	2.37	1.89	1.68	OECs-200-2-A401A
24.000	X221-ND	2.63	2.37	1.89	1.68	OECs-240-2-A401A
25.000	XC252-ND	2.63	2.37	1.89	1.68	OECs-250-2-A401A
25.175	X222-ND	2.63	2.37	1.89	1.68	OECs-251-7-2-A401A
28.322	X223-ND	2.63	2.37	1.89	1.68	OECs-283-2-2-A401A
30.000	XC253-ND	2.63	2.37	1.89	1.68	OECs-300-2-A401A
32.000	XC254-ND	2.63	2.37	1.89	1.68	OECs-320-2-A401A
32.514	X224-ND	2.63	2.37	1.89	1.68	OECs-325-1-2-A401A
35.000	XC255-ND	2.63	2.37	1.89	1.68	OECs-350-2-A401A
40.000	X225-ND	2.63	2.37	1.89	1.68	OECs-400-2-A401A
48.000	XC256-ND	2.63	2.37	1.89	1.68	OECs-480-2-A401A
50.000	X226-ND	2.63	2.37	1.89	1.68	OECs-500-2-A401A
64.000	XC257-ND	2.63	2.37	1.89	1.68	OECs-640-2-A401A
66.666	XC258-ND	2.63	2.37	1.89	1.68	OECs-666-2-A401A

Electrical Specifications:

	ECS-3953C	ECS-3951C	ECS-3953M	ECS-3951M
Frequency Stability @ 25°C and over Operating Temp.	±100ppm	±100ppm	±50ppm	±50ppm
Supply Voltage - Min. to Max.	3.0V to 3.6V	4.5V to 5.5V	3.0V to 3.6V	4.5V to 5.5V
Input Current	20.00-32.00MHz - 8mA max. 32.00-50.00MHz - 12mA max. 66.666-80.00MHz - 30mA max.	1.8432 - 20.00MHz - 10mA max. 33.00MHz - 15mA max. 40.00-65.00MHz - 30mA max. 66.666MHz - 50mA max.	1.8432-32.00MHz - 15mA max. 40.00-66.666MHz - 25mA max. 80.00MHz - 30mA max.	1.8432-33.00MHz - 20mA max. 40.00-66.666MHz - 55mA max.
Output Symmetry @ 1/2 Vcc Level	40% min., 60% max.	40% min., 60% max.	40% min., 60% max.	40% min., 60% max.
Operating Temperature	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C
Storage Temperature	-55°C to +125°C	-55°C to +125°C	-55°C to +125°C	-55°C to +125°C
Rise and Fall Time	15nS	10nS	5nS	Up to 66.666MHz - 15nS 80.000MHz - 5nS
Output Current (IOL) VOL=0.5V/0.33V	4mA	4mA	4mA	4mA
Output Current (IOH) VOL=4.5V/2.97V	-4mA	-4mA	-4mA	-4mA
Output Load HCMOS	15pF	30pF	15pF	30pF
Enable/Disable Time	100nS	100nS	100nS	100nS

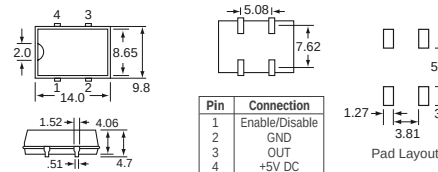
NOTE:

Frequency Stability for ECS-8FM, ECS-3953C, ECS-3953M, ECS-3951C, and ECS-3951M Series inclusive of 25°C tolerance, operating temperature range, input voltage change, load change, aging, shock, and vibration.

NOTE:

For the Enable/Disable Function in the ECS-8FM, ECS-3953C, ECS-3953M, ECS-3951C, and ECS-3951M Series, an internal pullup resistor from Pin 1 to Pin 4 allows active output if Pin 1 is left open. A 0.01μF bypass capacitor should be placed between VDD (Pin 4) and GND (Pin 2) to minimize power supply line noise.

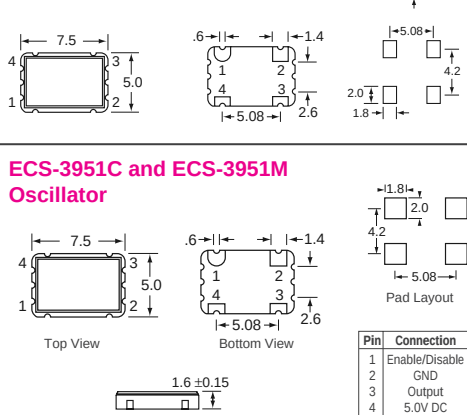
ECS-8FM Oscillator



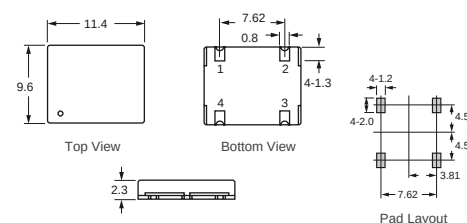
ELECTRICAL CHARACTERISTICS:

- **Frequency Stability:** ±100ppm @ 25°C and over operating temperature range
- **Supply Voltage:** 4.5V min., 5.5V max.
- **Input Current:** 1.00 ~ 32.00MHz: 27mA; 32.00+ ~ 50.00MHz: 45mA; 50.00+ ~ 66.666MHz: 60mA
- **Output Symmetry @ 2.5V:** 1.00 ~ 50.00MHz: 45% min., 55% max.; 50.00+ ~ 66.666MHz: 40% min., 60% max.
- **Operating Temperature:** -10°C to +70°C
- **Storage Temp.:** -55°C to +125°C
- **Rise Time (0.5V to 4.5V):** 7nS
- **Fall Time (4.5V to 0.5V):** 7nS
- **Output Voltage:** IOL = 16mA; 0.5V max.; IOH = -16mA; 4.5V min.
- **Output Current:** VOL = 0.5V; 16mA max.; VOH = 4.5V; -16mA max.
- **Output Load:** TTL: 10 TTL max.; HCMOS: 50pF max.
- **Start-up Time:** 10mS max.
- **Enable/Disable Time:** 100nS max.

ECS3953C and ECS3953M 3.3 Volt Oscillator



VC-TXCO Oscillator



ELECTRICAL CHARACTERISTICS:

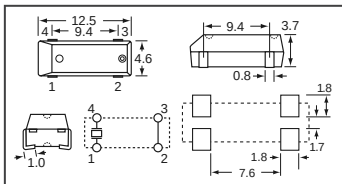
- **Frequency Range:** 10,000-19.440MHz
- **Frequency Stability** (@ -30°C to +75°C): 2.5ppm max.
- **Supply Voltage:** ±2.85 V min., 3.15 V max.
- **Storage Temperature:** -40°C to +85°C
- **Output Voltage:** 0.8 Vp-p min.
- **Output Load:** 10kΩ ±10%/10pF ±10%
- **Control Voltage:** +1.5V typ.

Frequency (MHz)	Digi-Key Part No.	Cut Tape Price Each	100	500	Digi-Key Part No.	Tape & Reel Pricing	1,000	ECS Part No.
ECS-8FM Series Oscillators								
1.000	XC7038CT-ND	2.97	2.48	1.98	XC7038TR-ND	—	1503.00	ECS-8FM-1.000-TR
1.8432	XC7040CT-ND	2.97	2.48	1.98	XC7040TR-ND	—	1503.00	ECS-8FM-1.8432-TR
2.000	XC7052CT-ND	2.97	2.48	1.98	XC7052TR-ND	—	1503.00	ECS-8FM-2.000-TR
2.4576	XC7062CT-ND	2.97	2.48	1.98	XC7062TR-ND	—	1503.00	ECS-8FM-2.4576-TR
3.579545	XC7072CT-ND	2.97	2.48	1.98	XC7072TR-ND	—	1503.00	ECS-8FM-3.579545-TR
3.6864	XC7082CT-ND	2.97	2.48	1.98	XC7082TR-ND	—	1503.00	ECS-8FM-3.6864-TR
4.000	XC635CT-ND	3.30	2.97	2.48	XC635TR-ND	—	1503.00	ECS-8FM-4.000-TR
4.9152	XC636CT-ND	3.30	2.97	2.48	XC636TR-ND	—	1503.00	ECS-8FM-4.9152-TR
6.000	XC637CT-ND	3.30	2.97	2.48	XC637TR-ND	—	1503.00	ECS-8FM-6.000-TR
7.3728	XC709CT-ND	2.97	2.48	1.98	XC709TR-ND	—	1503.00	ECS-8FM-7.3728-TR
8.000	XC638CT-ND	3.30	2.97	2.48	XC638TR-ND	—	1503.00	ECS-8FM-8.000-TR
9.8304	XC710CT-ND	2.97	2.48	1.98	XC710TR-ND	—	1503.00	ECS-8FM-9.8304-TR
10.000	XC639CT-ND	3.30	2.97	2.48	XC639TR-ND	—	1503.00	ECS-8FM-10.000-TR
11.0592	XC711CT-ND	2.97	2.48	1.98	XC711TR-ND	—	1503.00	ECS-8FM-11.0592-TR
12.000	XC640CT-ND	3.30	2.97	2.48	XC640TR-ND	—	1503.00	ECS-8FM-12.000-TR
12.288	XC712CT-ND	2.97	2.48	1.98	XC712TR-ND	—	1503.00	ECS-8FM-12.288-TR
14.31818	XC641CT-ND	3.30	2.97	2.48	XC641TR-ND	—	1503.00	ECS-8FM-14.31818-TR
16.000	XC642CT-ND	3.30	2.97	2.48	XC642TR-ND	—	1503.00	ECS-8FM-16.000-TR
18.432	XC643CT-ND	3.30	2.97	2.48	XC643TR-ND	—	1503.00	ECS-8FM-18.432-TR
19.6608	XC713CT-ND	2.97	2.48	1.98	XC713TR-ND	—	1503.00	ECS-8FM-19.6608-TR
20.000	XC644CT-ND	3.30	2.97	2.48	XC644TR-ND	—	1503.00	ECS-8FM-20.000-TR
24.000	XC645CT-ND	3.30	2.97	2.48	XC645TR-ND	—	1503.00	ECS-8FM-24.000-TR
25.000	XC714CT-ND	2.97	2.48	1.98	XC714TR-ND	—	1503.00	ECS-8FM-25.000-TR
25.175	XC646CT-ND	3.30	2.97	2.48	XC646TR-ND	—	1503.00	ECS-8FM-25.175-TR
28.322	XC647CT-ND	3.30	2.97	2.48	XC647TR-ND	—	1503.00	ECS-8FM-28.322-TR
32.000	XC648CT-ND	3.30	2.97	2.48	XC648TR-ND	—	1503.00	ECS-8FM-32.000-TR
32.514	XC649CT-ND	3.30	2.97	2.48	XC649TR-ND	—	1503.00	ECS-8FM-32.514-TR
40.000	XC650CT-ND	3.30	2.97	2.48	XC650TR-ND	—	1503.00	ECS-8FM-40.000-TR
48.000	XC651CT-ND	3.30	2.97	2.48	XC651TR-ND	—	1503.00	ECS-8FM-48.000-TR
50.000	XC652CT-ND	3.30	2.97	2.48	XC652TR-ND	—	1503.00	ECS-8FM-50.000-TR
66.666	XC715CT-ND	2.97	2.48	1.98	XC715TR-ND	—	1503.00	ECS-8FM-66.666-TR
ECS-3953C Series Oscillators								
20.000	XC721CT-ND	5.25	4.73	3.94	XC721TR-ND	—	2625.00	OECES-3953C-200-TR
24.000	XC722CT-ND	5.25	4.73	3.94	XC722TR-ND	—	2625.00	OECES-3953C-240-TR
25.000	XC723CT-ND	5.25	4.73	3.94	XC723TR-ND	—	2625.00	OECES-3953C-250-TR
32.000	XC724CT-ND	5.25	4.73	3.94	XC724TR-ND	—	2625.00	OECES-3953C-320-TR
40.000	XC725CT-ND	5.25	4.73	3.94	XC725TR-ND	—	2625.00	OECES-3953C-400-TR
50.000	XC726CT-ND	5.25	4.73	3.94	XC726TR-ND	—	2625.00	OECES-3953C-500-TR
66.666	XC727CT-ND	5.25	4.73	3.94	XC727TR-ND	—	2625.00	OECES-3953C-666-TR
80.000	XC728CT-ND	5.25	4.73	3.94	XC728TR-ND	—	2625.00	OECES-3953C-800-TR
ECS-3953M Series Oscillators								
1.8432	XC284CT-ND	5.25	4.73	3.94	XC284TR-ND	—	2625.00	ECS-3953M-018-B-TR
3.6864	XC285CT-ND	5.25	4.73	3.94	XC285TR-ND	—	2625.00	ECS-3953M-036-B-TR
4.000	XC286CT-ND	5.25	4.73	3.94	XC286TR-ND	—	2625.00	ECS-3953M-040-B-TR
8.000	XC287CT-ND	5.25	4.73	3.94	XC287TR-ND	—	2625.00	ECS-3953M-080-B-TR
10.000	XC288CT-ND	5.25	4.73	3.94	XC288TR-ND	—	2625.00	ECS-3953M-100-B-TR
12.000	XC289CT-ND	5.25	4.73	3.94	XC289TR-ND	—	2625.00	ECS-3953M-120-B-TR
16.000	XC290CT-ND	5.25	4.73	3.94	XC290TR-ND	—	2625.00	ECS-3953M-160-B-TR
20.000	XC790CT-ND	5.25	4.73	3.94	XC790TR-ND	—	2625.00	ECS-3953M-200-B-TR
24.000	XC791CT-ND	5.25	4.73	3.94	XC791TR-ND	—	2625.00	ECS-3953M-240-B-TR
25.000	XC792CT-ND	5.25	4.73	3.94	XC792TR-ND	—	2625.00	ECS-3953M-250-B-TR
32.000	XC793CT-ND	5.25	4.73	3.94	XC793TR-ND	—	2625.00	ECS-3953M-320-B-TR
40.000	XC794CT-ND	5.25	4.73	3.94	XC794TR-ND	—	2625.00	ECS-3953M-400-B-TR
50.000	XC795CT-ND	5.25	4.73	3.94	XC795TR-ND	—	2625.00	ECS-3953M-500-B-TR
66.666	XC796CT-ND	5.25	4.73	3.94	XC796TR-ND	—	2625.00	ECS-3953M-666-B-TR
80.000	XC797CT-ND	5.25	4.73	3.94	XC797TR-ND	—	2625.00	ECS-3953M-800-B-TR
ECS-3951M Series Oscillators								
1.8432	XC780CT-ND	5.25	4.73	3.94	XC780TR-ND	—	2625.00	ECS-3951M-018-B-TR
3.6864	XC781CT-ND	5.25	4.73	3.94	XC781TR-ND	—	2625.00	ECS-3951M-036-B-TR
12.000	XC782CT-ND	5.25	4.73	3.94	XC782TR-ND	—	2625.00	ECS-3951M-120-B-TR
16.000	XC783CT-ND	5.25	4.73	3.94	XC783TR-ND	—	2625.00	ECS-3951M-160-B-TR
20.000	XC784CT-ND	5.25	4.73	3.94	XC784TR-ND	—	2625.00	ECS-3951M-200-B-TR
33.000	XC785CT-ND	5.25	4.73	3.94	XC785TR-ND	—	2625.00	ECS-3951M-330-B-TR
40.000	XC786CT-ND	5.25	4.73	3.94	XC786TR-ND	—	2625.00	ECS-3951M-400-B-TR
50.000	XC787CT-ND	5.25	4.73	3.94	XC787TR-ND	—	2625.00	ECS-3951M-500-B-TR
65.000	XC788CT-ND	5.25	4.73	3.94	XC788TR-ND	—	2625.00	ECS-3951M-650-B-TR
66.666	XC789CT-ND	5.25	4.73	3.94	XC789TR-ND	—	2625.00	ECS-3951M-666-B-TR
ECS-3951C Series Oscillators								
1.8432	XC653CT-ND	5.25	4.73	3.94	XC653TR-ND	—	2625.00	ECS-3951C-018-TR
3.6864	XC654CT-ND	5.25	4.73	3.94	XC654TR-ND	—	2625.00	ECS-3951C-036-TR
12.000	XC655CT-ND	5.25	4.73	3.94	XC655TR-ND	—	2625.00	ECS-3951C-120-TR
16.000	XC656CT-ND	5.25	4.73	3.94	XC656TR-ND	—	2625.00	ECS-3951C-160-TR
20.000	XC657CT-ND	5.25	4.73	3.94	XC657TR-ND	—	2625.00	ECS-3951C-200-TR
33.000	XC658CT-ND	5.25	4.73	3.94	XC658TR-ND	—	2625.00	ECS-3951C-330-TR
40.000	XC659CT-ND	5.25	4.73	3.94	XC659TR-ND	—	2625.00	ECS-3951C-400-TR
50.000	XC660CT-ND	5.25	4.73	3.94	XC660TR-ND	—	2625.00	ECS-3951C-500-TR
65.000	XC661CT-ND	5.25	4.73	3.94	XC661TR-ND	—	2625.00	ECS-3951C-650-TR
66.666	XC662CT-ND	5.25	4.73	3.94	XC662TR-ND	—	2625.00	ECS-3951C-666-TR1
VC-TXO Series Oscillators								
10.000	X493CT-ND	15.13	12.38	11.00	X493TR-ND	4950.00	7700.00	VC-TXO-39SM-100
12.800	X489CT-ND	15.13	12.38	11.00	X489TR-ND	4950.00	7700.00	VC-TXO-39SM-128
13.000	X490CT-ND	15.13	12.38	11.00	X490TR-ND	4950.00	7700.00	VC-TXO-39SM-130
16.800	X491CT-ND	15.13	12.38	11.00	X491TR-ND	4950.00	7700.00	VC-TXO-39SM-168
19.440	X492CT-ND	15.13	12.38	11.00	X492TR-ND	4950.00	7700.00	VC-TXO-39SM-194.4

ECX-3S

The ECX-3S Series has a special high temperature seal which is able to withstand SMD soldering techniques. Housing for this crystal is made from the same rugged thermoplastic that is standard for integrated circuits.

ELECTRICAL CHARACTERISTICS: • Frequency Tolerance: ± 50 ppm @ $+25^{\circ}\text{C}$ and over operating temp. range • Shunt Capacitance: 7.0pF • Drive Level: 0.1mW • Operating Temperature: -10°C to $+70^{\circ}\text{C}$ • Storage Temp.: -40°C to $+85^{\circ}\text{C}$ • Mode of Operation: Fundamental

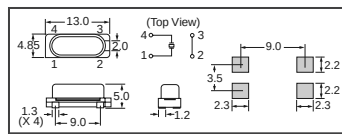


Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
			1	100	1000			
3.579545	17pF	XC501CT-ND	2.03	1.69	1.35	XC501TR-ND	1012.50	ECS-35-17-7S
3.579545	Series	XC529CT-ND	2.03	1.69	1.35	XC529TR-ND	1012.50	ECS-35-S-7S
3.6864	20pF	XC502CT-ND	2.03	1.69	1.35	XC502TR-ND	1012.50	ECS-36-S-7S
3.6864	20pF	XC503CT-ND	2.03	1.69	1.35	XC503TR-ND	1012.50	ECS-36-20-7S
4.000	Series	XC504CT-ND	2.03	1.69	1.35	XC504TR-ND	1012.50	ECS-40-S-7S
4.000	20pF	XC505CT-ND	2.03	1.69	1.35	XC505TR-ND	1012.50	ECS-40-20-7S
4.096	16pF	XC500CT-ND	2.03	1.69	1.35	XC500TR-ND	1125.00	ECS-41-16-7S
4.194304	12pF	XC503CT-ND	2.03	1.69	1.35	XC503TR-ND	1012.50	ECS-42-12-7S
4.433618	Series	XC506CT-ND	2.03	1.69	1.35	XC506TR-ND	1012.50	ECS-44-20-7S
4.9152	20pF	XC507CT-ND	2.03	1.69	1.35	XC507TR-ND	1012.50	ECS-49-S-7S
4.9152	20pF	XC508CT-ND	2.03	1.69	1.35	XC508TR-ND	1012.50	ECS-49-20-7S
5.000	20pF	XC499CT-ND	2.03	1.69	1.35	XC499TR-ND	1125.00	ECS-50-20-7S
6.000	32pF	XC498CT-ND	2.03	1.69	1.35	XC498TR-ND	1125.00	ECS-60-32-7S
6.000	Series	XC497CT-ND	2.03	1.69	1.35	XC497TR-ND	1125.00	ECS-60-S-7S
6.144	32pF	XC509CT-ND	2.03	1.69	1.35	XC509TR-ND	1012.50	ECS-61-32-7S

• XC-KIT-ND Digi-Key® SMT Low Profile Quartz Crystal Kit 3 each of values denoted (81 total pieces). Notebook style storage case and bin storage guide included.....\$169.00

CSM-4A

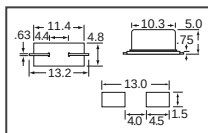
ELECTRICAL CHARACTERISTICS: • Freq. Tolerance: ± 50 ppm @ $+25^{\circ}\text{C}$ and over operating temperature range • Shunt Capacitance: 7.0pF • Drive Level: 0.1mW • Operating Temp.: -10°C to $+70^{\circ}\text{C}$ • Storage Temp.: -40°C to $+85^{\circ}\text{C}$ • Mode of Operation: Fundamental. The CSM-4A is also pin-out compatible with the Epson SM-506.



Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
			1	100	1000			
3.579545	17pF	XC747CT-ND	1.35	1.24	1.02	XC747TR-ND	675.00	ECS-35-17-28A
3.6864	20pF	XC748CT-ND	1.35	1.24	1.02	XC748TR-ND	675.00	ECS-36-20-28A
4.000	20pF	XC749CT-ND	1.35	1.24	1.02	XC749TR-ND	675.00	ECS-40-20-28A
4.9152	20pF	XC751CT-ND	1.35	1.24	1.02	XC751TR-ND	675.00	ECS-49-20-28A
5.000	20pF	XC750CT-ND	1.35	1.24	1.02	XC750TR-ND	675.00	ECS-50-20-28A
6.000	32pF	XC752CT-ND	1.35	1.24	1.02	XC752TR-ND	675.00	ECS-60-32-28A
7.3728	20pF	XC753CT-ND	1.35	1.24	1.02	XC753TR-ND	675.00	ECS-73-20-28A
8.000	16pF	XC754CT-ND	1.35	1.24	1.02	XC754TR-ND	675.00	ECS-80-16-28A
9.8304	20pF	XC778CT-ND	1.35	1.24	1.02	XC778TR-ND	675.00	ECS-98-32-20-28A
10.000	Series	XC755CT-ND	1.35	1.24	1.02	XC755TR-ND	675.00	ECS-100-S-28A
10.000	20pF	XC756CT-ND	1.35	1.24	1.02	XC756TR-ND	675.00	ECS-100-20-28A

CSM-7 Case — HC-49USMD

ELECTRICAL CHARACTERISTICS: • Frequency Tolerance: ± 50 ppm @ $+25^{\circ}\text{C}$ and over operating temperature range • Frequency Stability (Extended Temp. Version): ± 100 ppm, -40°C to $+85^{\circ}\text{C}$ • Shunt Capacitance: 7.0pF • Drive Level: 0.5mW • Operating Temperature: -10°C to $+70^{\circ}\text{C}$ (Extended Temperature Version: -40°C to $+85^{\circ}\text{C}$) • Storage Temperature: -30°C to $+85^{\circ}\text{C}$ (Extended Temp. Version: -55°C to $+125^{\circ}\text{C}$) • Aging Characteristics (first year): ± 5 ppm @ 25°C • Mode of Operation: Fundamental

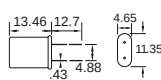


Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
			1	100	1000			
CSM-7 Case								
3.579545	17pF	XC560CT-ND	1.00	.84	.67	XC560TR-ND	499.50	ECS-35-17-5P
3.579545	Series	XC663CT-ND	1.00	.84	.67	XC663TR-ND	555.00	ECS-35-S-5P
3.6864	Series	XC561CT-ND	1.00	.84	.67	XC561TR-ND	499.50	ECS-36-S-5P
3.6864	20pF	XC562CT-ND	1.00	.84	.67	XC562TR-ND	499.50	ECS-36-20-5P
4.000	Series	XC563CT-ND	1.00	.84	.67	XC563TR-ND	499.50	ECS-40-S-5P
4.000	20pF	XC564CT-ND	1.00	.84	.67	XC564TR-ND	499.50	ECS-40-20-5P
4.032	20pF	XC664CT-ND	1.00	.84	.67	XC664TR-ND	555.00	ECS-40-3-20-5P
4.032	Series	XC665CT-ND	1.00	.84	.67	XC665TR-ND	555.00	ECS-40-3-S-5P
4.096	20pF	XC666CT-ND	1.00	.84	.67	XC666TR-ND	555.00	ECS-41-20-5P
4.194304	12pF	XC667CT-ND	1.00	.84	.67	XC667TR-ND	555.00	ECS-42-12-5P
4.194304	16pF	XC668CT-ND	1.00	.84	.67	XC668TR-ND	555.00	ECS-42-16-5P
4.433618	20pF	XC669CT-ND	1.00	.84	.67	XC669TR-ND	555.00	ECS-44-20-5P
4.9152	Series	XC665CT-ND	1.00	.84	.67	XC665TR-ND	499.50	ECS-49-S-5P
4.9152	20pF	XC666CT-ND	1.00	.84	.67	XC666TR-ND	499.50	ECS-49-20-5P
5.000	Series	XC670CT-ND	1.00	.84	.67	XC670TR-ND	555.00	ECS-50-S-5P
5.000	20pF	XC671CT-ND	1.00	.84	.67	XC671TR-ND	555.00	ECS-50-20-5P
5.0688	Series	XC672CT-ND	1.00	.84	.67	XC672TR-ND	555.00	ECS-51-S-5P
5.0688	20pF	XC673CT-ND	1.00	.84	.67	XC673TR-ND	555.00	ECS-51-20-5P
5.185	Series	XC674CT-ND	1.00	.84	.67	XC674TR-ND	555.00	ECS-52-S-5P
5.185	32pF	XC675CT-ND	1.00	.84	.67	XC675TR-ND	555.00	ECS-52-32-5P
5.9904	Series	XC676CT-ND	1.00	.84	.67	XC676TR-ND	555.00	ECS-59-S-5P
5.9904	20pF	XC677CT-ND	1.00	.84	.67	XC677TR-ND	555.00	ECS-59-20-5P
6.000	Series	XC678CT-ND	1.00	.84	.67	XC678TR-ND	555.00	ECS-60-S-5P
6.000	32pF	XC679CT-ND	1.00	.84	.67	XC679TR-ND	555.00	ECS-60-32-5P
6.144	32pF	XC567CT-ND	1.00	.84	.67	XC567TR-ND	499.50	ECS-61-32-5P
7.3728	Series	XC568CT-ND	1.00	.84	.67	XC568TR-ND	499.50	ECS-73-S-5P
7.3728	20pF	XC680CT-ND	1.00	.84	.67	XC680TR-ND	555.00	ECS-73-20-5P
8.000	Series	XC569CT-ND	1.00	.84	.67	XC569TR-ND	499.50	ECS-80-S-5P
8.000	16pF	XC681CT-ND	1.00	.84	.67	XC681TR-ND	555.00	ECS-80-16-5P
8.000	32pF	XC682CT-ND	1.00	.84	.67	XC682TR-ND	555.00	ECS-80-32-5P
9.216	Series	XC683CT-ND	1.00	.84	.67	XC683TR-ND	555.00	ECS-92-1-S-5P
9.216	20pF	XC684CT-ND	1.00	.84	.67	XC684TR-ND	555.00	ECS-92-1-20-5P
9.8304	Series	XC570CT-ND	1.00	.84	.67	XC570TR-ND	499.50	ECS-98-3-S-5P
9.8304	20pF	XC571CT-ND	1.00	.84	.67	XC571TR-ND	499.50	ECS-98-3-20-5P
10.000	Series	XC572CT-ND	1.00	.84	.67	XC572TR-ND	499.50	ECS-100-S-5P
10.000	16pF	XC716CT-ND	1.00	.84	.67	XC716TR-ND	499.50	ECS-100-16-5P
11.000	Series	XC685CT-ND	1.00	.84	.67	XC685TR-ND	555.00	ECS-110-S-5P

Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
			1	100	1000			
6.5536	12pF	XC496CT-ND	2.03	1.69	1.35	XC496TR-ND	1125.00	ECS-65-12-7S
7.3728	20pF	XC536CT-ND	2.03	1.69	1.35	XC536TR-ND	1012.50	ECS-73-20-7S
7.3728	Series	XC510CT-ND	2.03	1.69	1.35	XC510TR-ND	1012.50	ECS-73-S-7S
8.000	Series	XC511CT-ND	2.03	1.69	1.35	XC511TR-ND	1012.50	ECS-80-S-7S
8.000	16pF	XC495CT-ND	2.03	1.69	1.35	XC495TR-ND	1125.00	ECS-80-16-7S
9.8304	Series	XC512CT-ND	2.03	1.69	1.35	XC512TR-ND	1012.50	ECS-98-3-S-7S
9.8304	20pF	XC513CT-ND	2.03	1.69	1.35	XC513TR-ND	1012.50	ECS-98-3-20-7S
10.000	Series	XC514CT-ND	2.03	1.69	1.35	XC514TR-ND	1012.50	ECS-100-S-7S
10.000	Series	XC515CT-ND	2.03	1.69	1.35	XC515TR-ND	1012.50	ECS-100-S-7S
11.0592	20pF	XC516CT-ND	2.03	1.69	1.35	XC516TR-ND	1012.50	ECS-110-S-20-7S
12.000	18pF	XC548CT-ND	2.03	1.69	1.35	XC548TR-ND	1012.50	ECS-120-18-7S
12.000	Series	XC517CT-ND	2.03	1.69	1.35	XC517TR-ND	1012.50	ECS-120-S-7S
12.000	32pF	XC494CT-ND	2.03	1.69	1.35	XC494TR-ND	1125.00	ECS-120-32-7S
12.288	Series	XC518CT-ND	2.03	1.69	1.35	XC518TR-ND	1012.50	ECS-122-8-S-7S
12.288	20pF	XC493CT-ND	2.03	1.69	1.35	XC493TR-ND	1125.00	ECS-122-8-20-7S
14.31818	Series	XC519CT-ND	2.03	1.69	1.35	XC519TR-ND	1012.50	ECS-143-S-7S
14.31818	20pF	XC492CT-ND	2.03	1.69	1.35	XC492TR-ND	1125.00	ECS-143-20-7S
14.7456	Series	XC520CT-ND	2.03	1.69	1.35	XC520TR-ND	1012.50	ECS-147-4-S-7S
14.7456	20pF	XC491CT-ND	2.03	1.69	1.35	XC491TR-ND	1125.00	ECS-147-4-20-7S
16.000	20pF	XC550CT-ND	2.03	1.69	1.35	XC550TR-ND	1012.50	ECS-160-20-7S
16.000	Series	XC521CT-ND	2.03	1.69	1.35	XC521TR-ND	1012.50	ECS-160-S-7S
18.432	Series	XC522CT-ND	2.03	1.69	1.35	XC522TR-ND	1012.50	ECS-184-S-7S
19.6608	Series	XC523CT-ND	2.03	1.69	1.35	XC523TR-ND	1012.50	ECS-196-6-S-7S
19.6608	20pF	XC490CT-ND	2.03	1.69	1.35	XC490TR-ND	1125.00	ECS-196-6-20-7S
20.000	Series	XC524CT-ND	2.03	1.69	1.35	XC524TR-ND	1012.50	ECS-200-S-7S
20.000	16pF	XC489CT-ND	2.03	1.69	1.35	XC489TR-ND	1125.00	ECS-200-16-7S
20.000	20pF	XC525CT-ND	2.03	1.69	1.35	XC525TR-ND	1012.50	ECS-200-20-7S
23.592	Series	XC559CT-ND	2.03	1.69	1.35	XC559TR-ND	1012.50	ECS-235-92-S-7S
24.000	Series	XC526CT-ND	2.03	1.69	1.35	XC526TR-ND	1012.50	ECS-240-S-7S
24.000	20pF	XC527CT-ND	2.03	1.69	1.35	XC527TR-ND	1012.50	ECS-240-20-7S
24.000	16pF	XC528CT-ND	2.03	1.69	1.35	XC528TR-ND	1012.50	ECS-240-16-7S

Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each			Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
			1	10	100			
11.0592	Series	XC757CT-ND	1.35	1.24	1.02	XC757TR-ND	675.00	ECS-110-5-S-28A
11.0592	20pF	XC758CT-ND	1.35	1.24	1.02	XC758TR-ND	675.00	ECS-110-5-0-28A
12.000	Series	XC760CT-ND	1.35	1.24	1.02	XC760TR-ND	675.00	ECS-120-5-S-28A
12.000	18pF	XC759CT-ND	1.35	1.24	1.02	XC759TR-ND	675.00	ECS-120-5-0-28A
12.000	20pF	XC761CT-ND	1.35	1.24	1.02	XC761TR-ND	675.00	ECS-120-5-S-28A
12.288	20pF	XC762CT-ND	1.35	1.24	1.02	XC762TR-ND	675.00	ECS-122-8-0-28A
14.31818	Series	XC764CT-ND	1.35	1.24	1.02	XC764TR-ND	675.00	ECS-143-5-S-28A
14.31818	20pF	XC763CT-ND	1.35	1.24	1.02	XC763TR-ND	675.00	ECS-143-2-0-28A
14.7456	Series	XC765CT-ND	1.35	1.24	1.02	XC765TR-ND	675.00	ECS-147-4-S-28A
14.7456	20pF	XC766CT-ND	1.35	1.24	1.02	XC766TR-ND	675.00	ECS-147-4-0-28A
16.000	Series	XC768CT-ND	1.35	1.24	1.02	XC768TR-ND	675.00	ECS-160-5-S-28A
16.000	20pF	XC767CT-ND	1.35	1.24	1.02	XC767TR-ND	675.00	ECS-160-5-0-28A
18.432	Series	XC769CT-ND	1.35	1.24	1.02	XC769TR-ND	675.00	ECS-184-5-S-28A
18.432	20pF	XC770CT-ND	1.35	1.24	1.02	XC770TR-ND	675.00	ECS-184-2-0-28A
20.000	Series	XC771CT-ND	1.35	1.24	1.02	XC771TR-ND	675.00	ECS-200-5-S-28A
20.000	20pF	XC772CT-ND	1.35	1.24	1.02	XC772TR-ND	675.00	ECS-200-20-28A
24.000	Series	XC773CT-ND	1.35	1.24	1.02	XC773TR-ND	675.00	ECS-240-5-S-28A
24.000	20pF	XC774CT-ND	1.35	1.24	1.02	XC774TR-ND	675.00	ECS-240-20-28A
25.000	Series	XC775CT-ND	1.35	1.24	1.02	XC775TR-ND	675.00	ECS-245-5-S-28A
25.000	20pF	XC776CT-ND	1.35	1.24	1.02	XC776TR-ND	675.00	ECS-250-20-28A-F

Electrical Characteristics: • **Frequency Tolerance:** $\pm 50\text{ppm}$ @ $+25^{\circ}\text{C}$ and over operating temperature range • **Shunt Capacitance:** 7.0pF • **Drive Level:** 1.0mW • **Operating Temp.:** -10°C to $+70^{\circ}\text{C}$ • **Storage Temperature:** -40°C to $+85^{\circ}\text{C}$ • **Aging Characteristics (first year):** $\pm 5.0\text{ppm}$ @ $+25^{\circ}\text{C}$

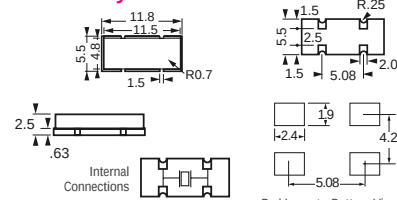


Series resonance appears resistive in the circuit and impedance at f_s is at its minimum value. Unless load capacitance is specified, all crystals are manufactured at series resonance. When a crystal is operating at parallel resonance (f_L) it will look inductive in a circuit. Crystal frequency varies depending on the value of load capacitance. The load capacitance is the dynamic capacitance of the total circuit as measured or computed across the crystal terminals. Always specify the load capacitance if the crystal will be operated in the parallel mode.

Frequency (MHz)	Load Cap.	Digi-Key Part No.	1	Price Each	100	500	ECS Part No.
HC-49/U/A							
1.000	13pF	X066B-ND*	17.88	14.85	8.09	7.54	ECS-10-13-1H
1.8432	13pF	X067-ND	2.83	2.35	1.88	1.45	ECS-18-13-1
1.8432	Series	X002-ND	3.02	2.52	2.00	1.55	ECS-18-13-1
2.000	20pF	X068-ND	2.57	2.14	1.70	1.32	ECS-20-20-1
2.000	Series	X004-ND	2.73	2.27	1.81	1.40	ECS-20-20-1
2.048	12pF	X098-ND	2.73	2.27	1.81	1.40	ECS-20-48-12-1
2.4576	32pF	X069-ND	2.57	2.14	1.70	1.32	ECS-24-32-1
2.500	Series	X070-ND	2.57	2.14	1.70	1.32	ECS-25-5-1
3.000	Series	X009-ND	3.02	2.52	2.00	1.55	ECS-30-3-1
3.2768	17pF	X022-ND	1.37	1.14	.91	.70	ECS-32-17-1
3.579545	17pF	X049-ND	.64	.58	.52	.46	ECS-35-17-1
3.579545	Series	X011-ND	.64	.58	.52	.46	ECS-35-5-1
3.6864	17-18pF	X071-ND	.64	.58	.52	.46	ECS-36-18-1
3.6864	Series	X080-ND	.64	.58	.52	.46	ECS-36-5-1
3.932160	17pF	X013-ND	.64	.58	.52	.46	ECS-37-17-1
4.000	20pF	X006-ND	.64	.58	.52	.46	ECS-40-20-1
4.000	Series	X081-ND	.64	.58	.52	.46	ECS-40-5-1
4.032	20pF	X072-ND	.64	.58	.52	.46	ECS-40-3-20-1
4.032	Series	X015-ND	.64	.58	.52	.46	ECS-40-3-5-1
4.096	20pF	X082-ND	.64	.58	.52	.46	ECS-41-20-1
4.194304	12pF	X007-ND	.64	.58	.52	.46	ECS-42-12-1
4.433618	20pF	X083-ND	.64	.58	.52	.46	ECS-44-20-1
4.9152	Series	X050-ND	.64	.58	.52	.46	ECS-49-5-1
4.9152	20pF	X084-ND	.64	.58	.52	.46	ECS-49-20-1
5.000	Series	X099-ND	.64	.58	.52	.46	ECS-50-5-1
5.000	20pF	X051-ND	.64	.58	.52	.46	ECS-50-20-1
5.0688	Series	X052-ND	.64	.58	.52	.46	ECS-51-5-1
5.0688	20pF	X085-ND	.64	.58	.52	.46	ECS-51-20-1
5.185	32pF	X053-ND	.64	.58	.52	.46	ECS-52-32-1
5.185	32pF	X016-ND	.64	.58	.52	.46	ECS-52-32-1
5.9904	Series	X073-ND	.64	.58	.52	.46	ECS-59-5-1
5.9904	20pF	X017-ND	.64	.58	.52	.46	ECS-59-9-20-1
6.000	Series	X026-ND	.64	.58	.52	.46	ECS-60-5-1
6.000	32pF	X086-ND	.64	.58	.52	.46	ECS-60-32-1
6.144	32pF	X054-ND	.64	.58	.52	.46	ECS-61-32-1
6.5536	12pF	X018-ND	.64	.58	.52	.46	ECS-65-12-1
7.3728	Series	X074-ND	.64	.58	.52	.46	ECS-73-5-1
7.3728	20pF	X019-ND	.64	.58	.52	.46	ECS-73-20-1
7.680	20pF	X020-ND	.64	.58	.52	.46	ECS-76-8-20-1
8.000	Series	X056-ND	.64	.58	.52	.46	ECS-80-5-1
8.000	18pF	X100-ND	.64	.58	.52	.46	ECS-80-18-1
8.000	20pF	X021-ND	.64	.58	.52	.46	ECS-80-20-1
8.000	32pF	X137-ND	.64	.58	.52	.46	ECS-82-32-1
9.216	Series	X075-ND	.64	.58	.52	.46	ECS-92-1-5-1
9.216	20pF	X138-ND	.64	.58	.52	.46	ECS-92-1-20-1
9.8304	20pF	X087-ND	.64	.58	.52	.46	ECS-98-3-20-1
9.8304	Series	X023-ND	.64	.58	.52	.46	ECS-98-3-5-1
10.000	Series	X057-ND	.64	.58	.52	.46	ECS-100-5-1
10.738635	Series	X024-ND	.64	.58	.52	.46	ECS-107-3-5-1
11.000	Series	X088-ND	.64	.58	.52	.46	ECS-110-5-1
11.046	Series	X025-ND	.64	.58	.52	.46	ECS-110-4-5-1
11.0592	Series	X078-ND	.64	.58	.52	.46	ECS-110-5-5-1
11.0592	20pF	X089-ND	.64	.58	.52	.46	ECS-110-5-20-1
11.0592	32pF	X139-ND	.64	.58	.52	.46	ECS-110-5-32-1
11.228	Series	X028-ND	.64	.58	.52	.46	ECS-112-2-5-1
11.52	Series	X140-ND	.64	.58	.52	.46	ECS-115-2-5-1
11.5135	Series	X029-ND	.64	.58	.52	.46	ECS-118-3-5-1
12.000	Series	X058-ND	.64	.58	.52	.46	ECS-121-5-1
12.000	32pF	X030-ND	.64	.58	.52	.46	ECS-120-32-1
12.000393	18pF	X147-ND	.64	.58	.52	.46	ECS-120.003-18-1
12.096	Series	X031-ND	.64	.58	.52	.46	ECS-121-5-1
12.288	Series	X090-ND	.64	.58	.52	.46	ECS-122-8-5-1
12.288	20pF	X141-ND	.64	.58	.52	.46	ECS-122-8-20-1
13.5168	Series	X032-ND	.64	.58	.52	.46	ECS-135-5-1
13.6181	Series	X091-ND	.64	.58	.52	.46	ECS-143-5-1
14.690	Series	X033-ND	.64	.58	.52	.46	ECS-146-5-1
14.7456	Series	X092-ND	.64	.58	.52	.46	ECS-147-4-5-1
14.7456	20pF	X142-ND	.64	.58	.52	.46	ECS-147-4-20-1
15.000	Series	X059-ND	.64	.58	.52	.46	ECS-150-5-1
16.000	Series	X077-ND	.64	.58	.52	.46	ECS-160-5-1
16.000	20pF	X143-ND	.64	.58	.52	.46	ECS-160-20-1
16.000312	18pF	X048-ND	.64	.58	.52	.46	ECS-160.003-18-1
18.000	Series	X060-ND	.64	.58	.52	.46	ECS-180-5-1
18.000	20pF	X144-ND	.64	.58	.52	.46	ECS-180-20-1
18.432	Series	X061-ND	.64	.58	.52	.46	ECS-184-5-1
18.432	18pF	X145-ND	.64	.58	.52	.46	ECS-184-18-1
18.432	20pF	X146-ND	.64	.58	.52	.46	ECS-184-20-1
19.6608	Series	X094-ND	.64	.58	.52	.46	ECS-196-6-5-1
19.6608	20pF	X035-ND	.64	.58	.52	.46	ECS-196-6-20-1
20.000	Series	X062-ND	.64	.58	.52	.46	ECS-200-5-1
20.000	20pF	X036-ND	.64	.58	.52	.46	ECS-200-20-1
22.1184	Series	X063-ND	.64	.58	.52	.46	ECS-221-5-1
24.000	Series	X037-ND	.64	.58	.52	.46	ECS-240-20-1
24.000	Series	X095-ND	.64	.58	.52	.46	ECS-240-5-1
25.0014	18pF	X049-ND	.64	.58	.52	.46	ECS-240.001-18-1
35.2512	18pF	X151-ND	.80	.72	.58	.52	ECS-352-5-18-1
38.000530	18pF	X150-ND	.80	.72	.58	.52	ECS-380.005-18-1
40.32	18pF	X152-ND	.80	.72	.58	.52	ECS-403-2-18-1
40.32	Series	X065-ND	.64	.58	.52	.46	ECS-480-5-1
49.860	20pF	X038-ND	.64	.58	.52	.46	ECS-498-8-20-1
Base Insulator			HC4913N-ND	—	.09	.08	700-9001

* 1.0 Frequency (#X066B-ND): 100ppm @ +25°C: +100ppm from 0°C to +60°C

CSM-12 Crystals

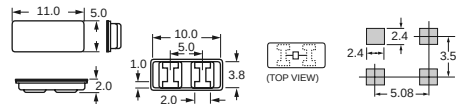


ELECTRICAL CHARACTERISTICS:

- **Frequency Tolerance:** ± 50 ppm @ 25°C and over operating temperature range
- **Shunt Capacitance:** 7.0pF • **Drive Level:** 0.5mW • **Operating Temp.:** -10°C to +70°C • **Storage Temp.:** -40°C to +85°C • **Aging Characteristics (first year):** ± 5.0 ppm @ 25°C • **Mode of Operation:** Fundamental

ECX-19A Crystals

ELECTRICAL CHARACTERISTICS: • Frequency Tolerance: ± 50 ppm @ 25°C and over operating temp. range • Shunt Capacitance: 7.0pF • Drive Level: 0.5mW • Operating Temp.: -10°C to +70°C • Storage Temp.: -30°C to +85°C • Aging Characteristics (first year): ± 5.0 ppm @ 25°C



Frequency (MHz)	Load Cap.	Max. ESR (Ω)	Digi-Key Part No.	Cut Price Each			Digi-Key Part No.	Tape & Reel Pricing 1,000	ECS Part No.		
				1	10	500					
CSM-12 Series Crystals											
3.579545	17pf	Series	—	XC5894CT-ND	1.95	1.76	1.47	1.17	XC5894TR-ND	975.00	ECS-35-17-18-TR
3.6864	20pf	200	—	XC585CT-ND	1.95	1.76	1.47	1.17	XC585TR-ND	975.00	ECS-36-S-18-TR
3.6864	20pf	—	—	XC586CT-ND	1.95	1.76	1.47	1.17	XC586TR-ND	975.00	ECS-36-20-18-TR
4.000	20pf	Series	—	XC587CT-ND	1.95	1.76	1.47	1.17	XC587TR-ND	975.00	ECS-40-20-18-TR
4.000	Series	200	—	XC588CT-ND	1.95	1.76	1.47	1.17	XC588TR-ND	975.00	ECS-40-S-18-TR
4.9152	20pf	—	—	XC589CT-ND	1.95	1.76	1.47	1.17	XC589TR-ND	975.00	ECS-49-20-18-TR
4.9152	Series	150	—	XC590CT-ND	1.95	1.76	1.47	1.17	XC590TR-ND	975.00	ECS-49-S-18-TR
6.144	32pf	—	—	XC591CT-ND	1.95	1.76	1.47	1.17	XC591TR-ND	975.00	ECS-61-32-18-TR
7.3728	Series	100	—	XC592CT-ND	1.95	1.76	1.47	1.17	XC592TR-ND	975.00	ECS-73-S-18-TR
8.000	Series	100	—	XC593CT-ND	1.95	1.76	1.47	1.17	XC593TR-ND	975.00	ECS-80-S-18-TR
9.8304	Series	100	—	XC594CT-ND	1.95	1.76	1.47	1.17	XC594TR-ND	975.00	ECS-98.3-S-18-TR
9.8304	20pf	—	—	XC595CT-ND	1.95	1.76	1.47	1.17	XC595TR-ND	975.00	ECS-98.3-20-18-TR
10.000	Series	80	—	XC596CT-ND	1.95	1.76	1.47	1.17	XC596TR-ND	975.00	ECS-100-S-18-TR
11.0592	Series	80	—	XC597CT-ND	1.95	1.76	1.47	1.17	XC597TR-ND	975.00	ECS-110.5-S-18-TR
11.0592	20pf	—	—	XC598CT-ND	1.95	1.76	1.47	1.17	XC598TR-ND	975.00	ECS-110.5-20-18-TR
12.000	Series	80	—	XC599CT-ND	1.95	1.76	1.47	1.17	XC599TR-ND	975.00	ECS-120-S-18-TR
14.31818	Series	50	—	XC600CT-ND	1.95	1.76	1.47	1.17	XC600TR-ND	975.00	ECS-143-S-18-TR
16.000	Series	50	—	XC601CT-ND	1.95	1.76	1.47	1.17	XC601TR-ND	975.00	ECS-160-S-18-TR
18.432	Series	50	—	XC602CT-ND	1.95	1.76	1.47	1.17	XC602TR-ND	975.00	ECS-184-S-18-TR
19.6608	Series	50	—	XC603CT-ND	1.95	1.76	1.47	1.17	XC603TR-ND	975.00	ECS-196.6-S-18-TR
20.000	Series	50	—	XC604CT-ND	1.95	1.76	1.47	1.17	XC604TR-ND	975.00	ECS-200-S-18-TR
20.000	20pf	—	—	XC605CT-ND	1.95	1.76	1.47	1.17	XC605TR-ND	975.00	ECS-200-20-18-TR
24.000	20pf	—	—	XC606CT-ND	1.95	1.76	1.47	1.17	XC606TR-ND	975.00	ECS-240-20-18-TR
24.000	16pf	—	—	XC607CT-ND	1.95	1.76	1.47	1.17	XC607TR-ND	975.00	ECS-240-16-18-TR
CSM-8 Series Crystals											
9.8304	Series	60	—	XC608CT-ND	3.30	2.97	2.48	1.98	XC608TR-ND	1650.00	ECS-98.3-S-20A-TR
9.8304	20pf	—	—	XC609CT-ND	3.30	2.97	2.48	1.98	XC609TR-ND	1650.00	ECS-98.3-20-20A-TR
10.000	Series	60	—	XC610CT-ND	3.30	2.97	2.48	1.98	XC610TR-ND	1650.00	ECS-100-S-20A-TR
11.0592	Series	60	—	XC611CT-ND	3.30	2.97	2.48	1.98	XC611TR-ND	1650.00	ECS-110.5-S-20A-TR
11.0592	20pf	—	—	XC612CT-ND	3.30	2.97	2.48	1.98	XC612TR-ND	1650.00	ECS-110.5-20-20A-TR
12.000	Series	60	—	XC613CT-ND	3.30	2.97	2.48	1.98	XC613TR-ND	1650.00	ECS-120-S-20A-TR
14.31818	Series	60	—	XC614CT-ND	3.30	2.97	2.48	1.98	XC614TR-ND	1650.00	ECS-143-S-20A-TR
14.7456	Series	40	—	XC615CT-ND	3.30	2.97	2.48	1.98	XC615TR-ND	1650.00	ECS-147.4-S-20A-TR
16.000	Series	40	—	XC616CT-ND	3.30	2.97	2.48	1.98	XC616TR-ND	1650.00	ECS-160-S-20A-TR
18.432	Series	40	—	XC617CT-ND	3.30	2.97	2.48	1.98	XC617TR-ND	1650.00	ECS-184-S-20A-TR
19.6608	Series	40	—	XC618CT-ND	3.30	2.97	2.48	1.98	XC618TR-ND	1650.00	ECS-196.6-S-20A-TR
20.000	Series	40	—	XC619CT-ND	3.30	2.97	2.48	1.98	XC619TR-ND	1650.00	ECS-200-S-20A-TR
20.000	20pf	—	—	XC620CT-ND	3.30	2.97	2.48	1.98	XC620TR-ND	1650.00	ECS-200-20-20A-TR
24.000	Series	40	—	XC621CT-ND	3.30	2.97	2.48	1.98	XC621TR-ND	1650.00	ECS-240-S-20A-TR
24.000	20pf	—	—	XC622CT-ND	3.30	2.97	2.48	1.98	XC622TR-ND	1650.00	ECS-240-20-20A-TR
24.00014	Series	40	—	XC623CT-ND	3.30	2.97	2.48	1.98	XC623TR-ND	1650.00	ECS-240.0014-S-20A-TR
30.000	Series	40	—	XC624CT-ND*	3.30	2.97	2.48	1.98	XC624TR-ND*	1650.00	ECS-300-S-20A-TR
32.000	Series	40	—	XC625CT-ND*	3.30	2.97	2.48	1.98	XC625TR-ND*	1650.00	ECS-320-S-20A-TR
33.000	Series	40	—	XC626CT-ND*	3.30	2.97	2.48	1.98	XC626TR-ND*	1650.00	ECS-330-S-20A-TR
36.000	Series	40	—	XC627CT-ND*	3.30	2.97	2.48	1.98	XC627TR-ND*	1650.00	ECS-360-S-20A-TR
40.000	Series	40	—	XC628CT-ND*	3.30	2.97	2.48	1.98	XC628TR-ND*	1650.00	ECS-400-S-20A-TR
40.320	Series	40	—	XC629CT-ND*	3.30	2.97	2.48	1.98	XC629TR-ND*	1650.00	ECS-403.2-S-20A-TR
30.000	Series	40	—	XC630CT-ND	3.30	2.97	2.48	1.98	XC630TR-ND	1650.00	ECS-300-S-20A-F-TR
32.000	Series	40	—	XC631CT-ND	3.30	2.97	2.48	1.98	XC631TR-ND	1650.00	ECS-320-S-20A-F-TR
35.2512	Series	40	—	XC632CT-ND	3.30	2.97	2.48	1.98	XC632TR-ND	1650.00	ECS-352.512-S-20A-F-TR
36.000	Series	40	—	XC633CT-ND	3.30	2.97	2.48	1.98	XC633TR-ND	1650.00	ECS-360-S-20A-F-TR
40.000	Series	40	—	XC634CT-ND	3.30	2.97	2.48	1.98	XC634TR-ND	1650.00	ECS-400-S-20A-F-TR
ECX-19A Series Crystals											
3.579545	17Pf	—	—	XC850CT-ND	3.30	2.97	2.48	1.98	XC850TR-ND	1650.00	ECS-35-17-19A
3.6864	20Pf	—	—	XC851CT-ND	3.30	2.97	2.48	1.98	XC851TR-ND	1650.00	ECS-36-20-19A
4.000	20Pf	—	—	XC852CT-ND	3.30	2.97	2.48	1.98	XC852TR-ND	1650.00	ECS-40-20-19A
4.9152	20Pf	—	—	XC853CT-ND	3.30	2.97	2.48	1.98	XC853TR-ND	1650.00	ECS-49-20-19A
6.144	32Pf	—	—	XC854CT-ND	3.30	2.97	2.48	1.98	XC854TR-ND	1650.00	ECS-61-32-19A
7.3728	20Pf	—	—	XC855CT-ND	3.30	2.97	2.48	1.98	XC855TR-ND	1650.00	ECS-73-20-19A
8.000	20Pf	—	—	XC856CT-ND	3.30	2.97	2.48	1.98	XC856TR-ND	1650.00	ECS-80-20-19A
9.8304	20Pf	—	—	XC857CT-ND	3.30	2.97	2.48	1.98	XC857TR-ND	1650.00	ECS-98.3-20-19A
10.000	Series	—	—	XC858CT-ND	3.30	2.97	2.48	1.98	XC858TR-ND	1650.00	ECS-100-S-19A
11.0592	20Pf	—	—	XC859CT-ND	3.30	2.97	2.48	1.98	XC859TR-ND	1650.00	ECS-110.5-20-19A
12.000	Series	—	—	XC860CT-ND	3.30	2.97	2.48	1.98	XC860TR-ND	1650.00	ECS-120-S-19A
12.000	20Pf	—	—	XC861CT-ND	3.30	2.97	2.48	1.98	XC861TR-ND	1650.00	ECS-120-20-19A
14.31818	Series	—	—	XC862CT-ND	3.30	2.97	2.48	1.98	XC862TR-ND	1650.00	ECS-143-S-19A
14.31818	20Pf	—	—	XC863CT-ND	3.30	2.97	2.48	1.98	XC863TR-ND	1650.00	ECS-143-20-19A
16.000	Series	—	—	XC864CT-ND	3.30	2.97	2.48	1.98	XC864TR-ND	1650.00	ECS-160-S-19A
18.432	Series	—	—	XC865CT-ND	3.30	2.97	2.48	1.98	XC865TR-ND	1650.00	ECS-184-S-19A
19.6608	Series	—	—	XC866CT-ND	3.30	2.97	2.48	1.98	XC866TR-ND	1650.00	ECS-196.6-S-19A
20.000	Series	—	—	XC867CT-ND	3.30	2.97	2.48	1.98	XC867TR-ND	1650.00	ECS-200-S-19A
20.000	20Pf	—	—	XC868CT-ND	3.30	2.97	2.48	1.98	XC868TR-ND	1650.00	ECS-200-20-19A
24.000	20Pf	—	—	XC869CT-ND	3.30	2.97	2.48	1.98	XC869TR-ND	1650.00	ECS-240-20-19A
24.000	Series	—	—	XC870CT-ND	3.30	2.97	2.48	1.98	XC870TR-ND	1650.00	ECS-240-S-19A

* 3rd Overtone

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Quartz Crystals

ELECTRICAL CHARACTERISTICS: • Frequency Tolerance: $\pm 50\text{ppm}$ @ $+25^\circ\text{C}$ and over operating temp. range • Frequency Stability (Extended Temp. Version): $\pm 100\text{ppm}$ from -40°C to $+85^\circ\text{C}$ • Shunt Capacitance: 7.0pF • Drive Level: 0.5mW • Operating Temp.: -10°C to $+70^\circ\text{C}$ (Extended Temperature Version: -40°C to $+85^\circ\text{C}$) • Storage Temp.: -40°C to $+85^\circ\text{C}$ (Extended Temp. Version: -55°C to $+125^\circ\text{C}$) • Aging Characteristics (first year): $\pm 5.0\text{ppm}$ @ $+25^\circ\text{C}$ • Mode of Operation: Fundamental

HC-49/US	HC-33	HC-6/U

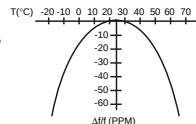
Frequency (MHz)	Load Cap.	Digi-Key Part No.	1	Price Each	100	500	ECS Part No.
HC-49/US							
3.579545	17pF	X079-ND	.80	.72	.58	.52	ECS-35-17-4
3.579545	Series	X153-ND	.80	.72	.58	.52	ECS-35-S-4
3.6864	18pF	X402-ND	.80	.72	.58	.52	ECS-36-18-4
3.6864	Series	X403-ND	.80	.72	.58	.52	ECS-36-S-4
4.000	Series	X404-ND	.80	.72	.58	.52	ECS-40-S-4
4.000	20pF	X405-ND	.80	.72	.58	.52	ECS-40-20-4
4.032	20pF	X154-ND	.80	.72	.58	.52	ECS-40-3-20-4
4.032	Series	X155-ND	.80	.72	.58	.52	ECS-40-3-S-4
4.096	20pF	X156-ND	.80	.72	.58	.52	ECS-41-20-4
4.194304	12pF	X406-ND	.80	.72	.58	.52	ECS-42-12-4
4.194304	16pF	X157-ND	.80	.72	.58	.52	ECS-42-16-4
4.433618	20pF	X407-ND	.80	.72	.58	.52	ECS-44-20-4
4.9152	Series	X408-ND	.80	.72	.58	.52	ECS-49-S-4
4.9152	20pF	X409-ND	.80	.72	.58	.52	ECS-49-20-4
5.000	20pF	X410-ND	.80	.72	.58	.52	ECS-50-20-4
5.000	Series	X158-ND	.80	.72	.58	.52	ECS-50-S-4
5.0688	20pF	X411-ND	.80	.72	.58	.52	ECS-51-20-4
5.0688	Series	X159-ND	.80	.72	.58	.52	ECS-51-S-4
5.185	32pF	X064-ND	1.04	.87	.69	.54	ECS-52-32-4
5.185	Series	X160-ND	.80	.72	.58	.52	ECS-52-S-4
5.9904	Series	X161-ND	.80	.72	.58	.52	ECS-59-S-4
5.9904	20pF	X162-ND	.80	.72	.58	.52	ECS-59-9-20-4
6.000	Series	X412-ND	.80	.72	.58	.52	ECS-60-S-4
6.000	32pF	X413-ND	.80	.72	.58	.52	ECS-60-32-4
6.144	32pF	X414-ND	.80	.72	.58	.52	ECS-61-32-4
6.500	20pF	X415-ND	.80	.72	.58	.52	ECS-65-20-4
7.3728	20pF	X076-ND	1.04	.87	.69	.54	ECS-73-20-4
7.3728	Series	X416-ND	.80	.72	.58	.52	ECS-73-S-4
7.68	20pF	X163-ND	.80	.72	.58	.52	ECS-76-8-20-4
8.000	18pF	X164-ND	.80	.72	.58	.52	ECS-80-18-4
8.000	20pF	X165-ND	.80	.72	.58	.52	ECS-80-20-4
8.000	32pF	X166-ND	.80	.72	.58	.52	ECS-80-32-4
8.000	Series	X417-ND	.80	.72	.58	.52	ECS-80-S-4
8.500	Series	X418-ND	.80	.72	.58	.52	ECS-85-S-4
9.000	Series	X419-ND	.80	.72	.58	.52	ECS-90-S-4
9.216	Series	X167-ND	.80	.72	.58	.52	ECS-92-1-S-4
9.216	20pF	X168-ND	.80	.72	.58	.52	ECS-92-1-20-4
9.545	20pF	X420-ND	.80	.72	.58	.52	ECS-95-4-S-4
9.8304	20pF	X169-ND	.80	.72	.58	.52	ECS-98-3-20-4
9.8304	Series	X421-ND	.80	.72	.58	.52	ECS-98-3-S-4
10.000	Series	X422-ND	.80	.72	.58	.52	ECS-100-S-4
10.000	18pF	X443-ND	.80	.72	.58	.52	ECS-100-18-4
10.738635	Series	X423-ND	.80	.72	.58	.52	ECS-107-3-S-4
11.000	Series	X424-ND	.80	.72	.58	.52	ECS-110-S-4
11.0592	Series	X425-ND	.80	.72	.58	.52	ECS-110.5-S-4
11.0592	20pF	X426-ND	.80	.72	.58	.52	ECS-110.5-20-4

Frequency (MHz)	Load Cap.	Digi-Key Part No.	1	Price Each	100	500	ECS Part No.
11.0592	32pF	X170-ND	.80	.72	.58	.52	ECS-110.5-32-4
11.520	Series	X171-ND	.80	.72	.58	.52	ECS-115.2-S-4
11.98135	Series	X427-ND	.80	.72	.58	.52	ECS-119.8-S-4
12.000	20pF	X227-ND	.80	.72	.58	.52	ECS-120-20-4
12.000	32pF	X172-ND	.80	.72	.58	.52	ECS-120-32-4
12.000	Series	X428-ND	.80	.72	.58	.52	ECS-120-S-4
12.000393	18pF	X173-ND	.80	.72	.58	.52	ECS-120.003-18-4
12.096	Series	X429-ND	.80	.72	.58	.52	ECS-121-S-4
12.288	20pF	X228-ND	.80	.72	.58	.52	ECS-122.8-20-4
12.288	Series	X174-ND	.80	.72	.58	.52	ECS-122.8-S-4
12.960	18pF	X097-ND	1.04	.87	.69	.54	ECS-129.6-18-4
14.31818	Series	X430-ND	.80	.72	.58	.52	ECS-143-S-4
14.31818	20pF	X444-ND	.80	.72	.58	.52	ECS-143-20-4
14.7456	Series	X431-ND	.80	.72	.58	.52	ECS-147.4-S-4
14.7456	20pF	X175-ND	.80	.72	.58	.52	ECS-147.4-20-4
15.000	Series	X432-ND	.80	.72	.58	.52	ECS-150-S-4
15.360	20pF	X098-ND	1.04	.87	.69	.54	ECS-153-20-4
16.000	Series	X433-ND	.80	.72	.58	.52	ECS-160-S-4
16.000	20pF	X176-ND	.80	.72	.58	.52	ECS-160-20-4
16.000312	18pF	X177-ND	.80	.72	.58	.52	ECS-160.003-18-4
16.257	20pF	X039-ND	1.04	.87	.69	.54	ECS-162.5-20-4
16.257	Series	X434-ND	.80	.72	.58	.52	ECS-162.5-S-4
18.000	Series	X435-ND	.80	.72	.58	.52	ECS-180-S-4
18.000	20pF	X178-ND	.80	.72	.58	.52	ECS-180-20-4
18.432	Series	X436-ND	.80	.72	.58	.52	ECS-184-S-4
18.432	18pF	X179-ND	.80	.72	.58	.52	ECS-184-18-4
18.432	20pF	X180-ND	.80	.72	.58	.52	ECS-184-20-4
19.6608	Series	X437-ND	.80	.72	.58	.52	ECS-196.6-S-4
19.6608	20pF	X181-ND	.80	.72	.58	.52	ECS-196.6-20-4
20.000	Series	X438-ND	.80	.72	.58	.52	ECS-200-S-4
20.000	20pF	X439-ND	.80	.72	.58	.52	ECS-200-20-4
21.47727	Series	X044-ND	1.04	.87	.69	.54	ECS-214.7-S-4
22.1184	Series	X182-ND	.80	.72	.58	.52	ECS-221-S-4
24.000	Series	X440-ND	.80	.72	.58	.52	ECS-240-S-4
24.000	16pF	X441-ND	.80	.72	.58	.52	ECS-240-16-4
24.000	20pF	X442-ND	.80	.72	.58	.52	ECS-240-20-4
24.00014	18pF	X183-ND	.80	.72	.58	.52	ECS-240.001-18-4
20.480	20pF	X229-ND	.80	.72	.58	.52	ECS-204.8-20-4
24.576	20pF	X230-ND	.80	.72	.58	.52	ECS-245.7-20-4
25.000	18pF	X231-ND	.80	.72	.58	.52	ECS-250-18-4F
HC-49/US Industrial Temperature Range							
3.579545	17pF	X184-ND	.98	.88	.71	.63	ECS-35-17-4DN
3.6864	20pF	X185-ND	.98	.88	.71	.63	ECS-36-20-4DN
4.000	20pF	X186-ND	.98	.88	.71	.63	ECS-40-20-4DN
6.000	32pF	X187-ND	.98	.88	.71	.63	ECS-60-32-4DN
7.3728	20pF	X188-ND	.98	.88	.71	.63	ECS-73-20-4DN
8.000	18pF	X189-ND	.98	.88	.71	.63	ECS-80-18-4DN
12.000	20pF	X190-ND	.98	.88	.71	.63	ECS-120-20-4DN
14.31818	20pF	X191-ND	.98	.88	.71	.63	ECS-143-20-4DN
16.000	20pF	X192-ND	.98	.88	.71	.63	ECS-160-20-4DN
18.432	20pF	X193-ND	.98	.88	.71	.63	ECS-184-20-4DN
19.6608	20pF	X194-ND	.98	.88	.71	.63	ECS-196-20-4DN
20.000	20pF	X195-ND	.98	.88	.71	.63	ECS-200-20-4DN
24.000	20pF	X196-ND	.98	.88	.71	.63	ECS-240-20-4DN
HC-33							
2.4576	Series	X043-ND	6.34	5.27	4.20	3.24	ECS-24-S-2
2.94912	32pF	X014-ND	1.37	1.14	.91	.70	ECS-29.4-32-2P
3.000	32pF	X048-ND	4.39	3.65	2.91	2.25	ECS-30-32-2
HC-6/U							
2.560	32pF	X003-ND	1.24	1.03	.82	.64	ECS-25.6-32-2P
3.640	32pF	X008-ND	1.24	1.03	.82	.64	ECS-36.4-32-2P
3.700	32pF	X012-ND	1.24	1.03	.82	.64	ECS-37-32-2P
4.433	32pF	X034-ND	1.24	1.03	.82	.64	ECS-44.32-2P
Base Insulator		HC49INS-ND	—	.09	.08	.06	700-9001

Quartz Crystals — 32.768KHz and 1.000MHz

Parabolic Temperature Curve

To determine frequency stability, use parabolic curve. For example: What is the stability at 45°C ?
(1) Change in $T (^\circ\text{C}) = 45 - 25 = 20^\circ\text{C}$
(2) Change in frequency
= $0.04 \text{ PPM} \times (\Delta T)^2$
= $0.04 \text{ PPM} \times (20)^2$
= -16.0 PPM



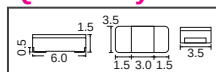
Cylinder Type

	X801-ND	X802-ND	X803-ND	X804-ND
Frequency	32.768KHz	32.768KHz	32.768KHz	1.000MHz
Frequency Tolerance @ 25°C	$\pm 20\text{ppm}$	$\pm 20\text{ppm}$	$\pm 20\text{ppm}$	$\pm 3000\text{ppm}$
Load Capacitance	12.5pF	12.5pF	8.0pF	8.0pF
Equivalent Series Resistance	35K Ohm	35K Ohm	40K Ohm	3K Ohm
Shunt Capacitance	1.6pF Typ.	1.35pF Typ.	1.00pF Typ.	0.4pF Typ.
Operating Temperature Range	-10°C to $+60^\circ\text{C}$	-10°C to $+60^\circ\text{C}$	-10°C to $+60^\circ\text{C}$	-10°C to $+60^\circ\text{C}$
Storage Temperature Range	-40°C to $+85^\circ\text{C}$	-40°C to $+85^\circ\text{C}$	-40°C to $+85^\circ\text{C}$	-30°C to $+70^\circ\text{C}$

Drive Level	Digi-Key Part No.	1	Price Each	100	500	ECS Part No.
1μW	X801-ND	.30	.27	.22	.20	ECS-3X8
1μW	X802-ND	.30	.27	.22	.20	ECS-327-12-13
1μW	X803-ND	2.63	2.37	1.89	1.68	ECS-327-8-14
1.0μW	X804-ND	7.18	6.46	5.17	4.60	ECS-10-8-14

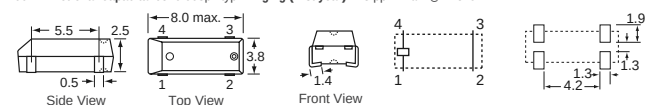
SMT Ultra-Low Profile Quartz Crystals

ELECTRICAL CHARACTERISTICS: • Mode: Fundamental • Drive Level: $10 \mu\text{W}$ • Frequency Tolerance: $\pm 50 \text{ ppm}$ @ 25°C and over operating temp. range • Frequency Stability: $\pm 50 \text{ ppm}$ • Operating Temp. Range: -10°C to $+70^\circ\text{C}$



ECX-306 Series — SMT

Specifications: • Frequency: 32.768KHz • Frequency Tolerance @ 25°C : $\pm 20\text{ppm}$ • Equivalent Series Resistance: $50\text{K}\Omega$ max. • Shunt Capacitance: 1.3pF typ. • Drive Level: $1\mu\text{W}$ max. • Calibration Tolerance: $\pm 20 \text{ ppm}$ @ 25°C • Temperature Coefficient: $-0.040 \text{ ppm}/^\circ\text{C}$ max. • Operating Temperature Range: -40°C to $+85^\circ\text{C}$ Max. • Storage Temperature Range: -55°C to $+125^\circ\text{C}$ • Q Factor: 50,000 min. • Turnover Temperature: $+25^\circ\text{C}$ ($\pm 5^\circ\text{C}$) • Insulation Resistance: $500\text{M}\Omega$ min./DC 100V • Motional Capacitance: 0.003pF typ. • Aging (first year): $\pm 3 \text{ ppm}$ max. @ $+25^\circ\text{C}$



Load Cap.	Digi-Key Part No.	1	Price Each	100	500	Digi-Key Part No.	Tape & Reel
6pF	XC746CT-ND	1.08	.90	.72		XC746TR-ND	3,000 560.00/M
12.5pF	XC488CT-ND	1.08	.90	.72		XC488TR-ND	3,000 560.00/M

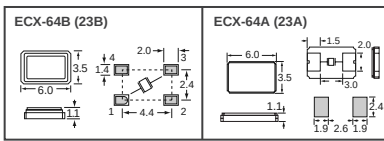


SMT Low Profile Quartz Crystals

ECX-64 1.1mm

ELECTRICAL CHARACTERISTICS:

- Freq. Tolerance: $\pm 50\text{ppm}$ @ $+25^\circ\text{C}$ and over operating temp. range
- Shunt Capacitance: 7.0pF
- Drive Level: 0.1mW
- Operating Temp.: -40°C to $+70^\circ\text{C}$
- Storage Temp.: -40°C to $+85^\circ\text{C}$
- Aging Characteristics (first year): $\pm 2.0\text{ppm}$ @ 25°C
- Max. ESR: 40Ω
- Mode of Operation: Fundamental

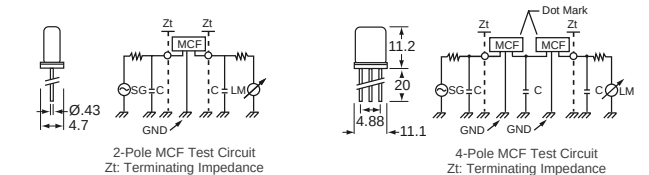


Freq. (MHz)	Load Cap.	Digi-Key Part No.	Cut Tape Price Each	Digi-Key Part No.	T&R Pricing 1,000	ECS Part No.
ECX-64B						
14.31818	20pF	XC809CT-ND	3.75	XC809TR-ND	1875.00	ECS-143-20-23B-TR
14.31818	Series	XC810CT-ND	3.75	XC810TR-ND	1875.00	ECS-143-S-23B-TR
14.7456	20pF	XC811CT-ND	3.75	XC811TR-ND	1875.00	ECS-147-20-23B-TR
16.000	20pF	XC812CT-ND	3.75	XC812TR-ND	1875.00	ECS-160-20-23B-TR
16.000	Series	XC813CT-ND	3.75	XC813TR-ND	1875.00	ECS-160-S-23B-TR



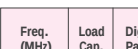
Monolithic Crystal Filters - "10.7MHz"

- 12.5KHz Channel Spacing:** • Operating Temp. Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 3.75\text{KHz}$ min. • Stop Bandwidth: $20\text{dB} \pm 18\text{KHz}$ for Model 10.7-7.5A; $40\text{dB} \pm 14\text{KHz}$ for Model 10.7-7.5B
- 25KHz Channel Spacing:** • Operating Temp. Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 7.5\text{KHz}$ min. • Stop Bandwidth: $18\text{dB} \pm 25\text{KHz}$ for Model 10.7-15A; $40\text{dB} \pm 25\text{KHz}$ for Model 10.7-15B
- 50KHz Channel Spacing:** • Operating Temperature Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 15\text{KHz}$ min. • Stop Bandwidth: $15\text{dB} \pm 50\text{KHz}$ for Model 10.7-30A; $30\text{dB} \pm 40\text{KHz}$ for Model 10.7-30B



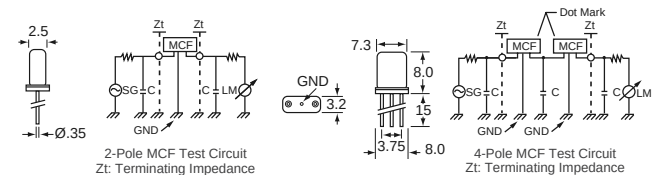
No. of Pole	Ripple (Max.)	Insert. Loss	Term. Impedance OHMS/pF	Digi-Key Part No.	Price Each	100	500	ECS Part No.
12.5KHz Channel Spacing								
2	0.5dB	1.5dB	1.8K/5	X701-ND	5.53	4.59	3.66	ECS-10.7-7.5A
4	1dB	2.5dB	1.8K/4	X702-ND†	12.51	10.40	8.28	ECS-10.7-7.5B
25KHz Channel Spacing								
2	0.5dB	2.0dB	3K/2	X703-ND	3.41	2.84	2.26	ECS-10.7-15A
4	1dB	2.5dB	3K/2	X704-ND†	6.66	5.54	4.41	ECS-10.7-15B
50KHz Channel Spacing								
2	0.5dB	1.5dB	5K/0	X705-ND	4.23	3.51	2.80	ECS-10.7-30A
4	1dB	2.5dB	5.5K/1	X706-ND†	8.78	7.29	5.81	ECS-10.7-30B

† Package is HC-49/U x 2



Monolithic Crystal Filters - "21.4MHz"

- 12.5KHz Channel Spacing:** • Operating Temp. Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 3.75\text{KHz}$ min. • Stop Bandwidth: $18\text{dB} \pm 12.5\text{KHz}$ for Model 21K-7.5A; $35\text{dB} \pm 12.5\text{KHz}$ for Model 21K-7.5B
- 25KHz Channel Spacing:** • Operating Temperature Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 7.5\text{KHz}$ min. • Stop Bandwidth: $18\text{dB} \pm 25\text{KHz}$ for Model 21K15A; $40\text{dB} \pm 25\text{KHz}$ for Model 21K15B
- 50KHz Channel Spacing:** • Operating Temperature Range: -20°C to $+70^\circ\text{C}$ • Pass Bandwidth: $3\text{dB} \pm 15\text{KHz}$ min. • Stop Bandwidth: $15\text{dB} \pm 45\text{KHz}$ for Model 21K30A; $40\text{dB} \pm 50\text{KHz}$ for Model 21K30B



No. of Pole	Ripple (Max.)	Insert. Loss	Term. Impedance OHMS/pF	Digi-Key Part No.	Price Each	100	500	ECS Part No.
12.5KHz Channel Spacing								
2	0.5dB	2.0dB	1.5K/6	X707-ND	4.39	3.65	2.91	ECS-21K7.5A
4	1dB	2.5dB	850/5	X708-ND†	10.24	8.51	6.78	ECS-21K7.5B
25KHz Channel Spacing								
2	0.5dB	1.5dB	1.5K/3	X709-ND	4.39	3.65	2.91	ECS-21K15A
4	1dB	2.5dB	1.5K/2	X710-ND†	10.24	8.51	6.78	ECS-21K15B
50KHz Channel Spacing								
2	0.5dB	1.5dB	1.5K/1	X711-ND	4.39	3.65	2.91	ECS-21K30A
4	1dB	2.5dB	1.8K/0.5	X712-ND†	10.24	8.51	6.78	ECS-21K30B

† Package is UM-1 x 2



SMD Monolithic Crystal Filters

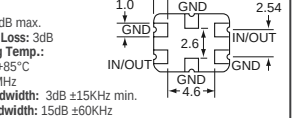
No. of Pole	Term. Impedance OHMS/pF	Digi-Key Part No.	Cut Tape Price Each	Digi-Key Part No.	T & R Pricing 1,000	ECS Part No.
2	1500/2.5	X713CT-ND	21.94	X713TR-ND	5950.00	96SMF21A15-TR
2	1100/0	X714CT-ND	27.30	X714TR-ND	7350.00	96SMF45A30-TR

21.4MHz



- Ripple: 1dB max.
- Insertion Loss: 2.5dB
- Operating Temperature: -30°C to $+85^\circ\text{C}$
- Fo: 21.4MHz
- Pass Bandwidth: $3\text{dB} \pm 7.5\text{KHz}$ min.
- Stop Bandwidth: $10\text{dB} \pm 25\text{KHz}$

45MHz



- Ripple: 1dB max.
- Insertion Loss: 3dB
- Operating Temp.: -30°C to $+85^\circ\text{C}$
- Fo: 45.0MHz
- Pass Bandwidth: $3\text{dB} \pm 15\text{KHz}$ min.
- Stop Bandwidth: $15\text{dB} \pm 60\text{KHz}$



Ceramic Resonators

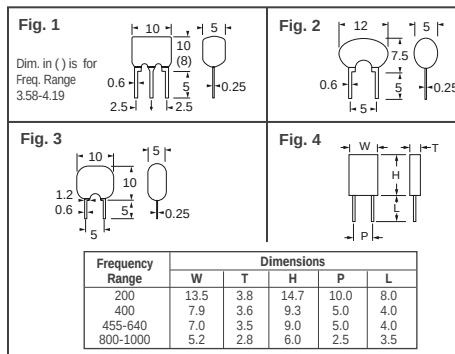
ZTT and SR1-B Series:

- Frequency Accuracy: $\pm 0.5\%$
- Stability in Temperature: -20°C to $+80^\circ\text{C}$, $\pm 0.3\%$
- Aging for Ten Years: $\pm 0.3\%$
- Built-in Capacitance: $30\text{pF} \pm 20\%$

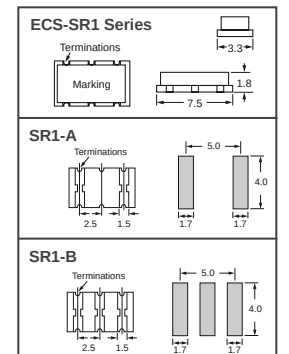
ZTA, ZTB and SR1-A Series:

- Frequency Accuracy: $\pm 0.5\%$
- Stability in Temperature: -20°C to $+80^\circ\text{C}$, $\pm 0.3\%$
- Aging for Ten Years: $\pm 0.5\%$
- Operating Temperature: -20°C to $+80^\circ\text{C}$

Series	Fig.	Frequency	Digi-Key Part No.	Price Each	ECS Part No.
110					
ZTT Series with Caps	1	3.58MHz	X901-ND	.68	ZTT-3.58MG
		4.00MHz	X902-ND	.68	ZTT-4.00MG
		4.19MHz	X903-ND	.81	ZTT-4.19MG
		6.00MHz	X904-ND	.68	ZTT-6.00MT
		8.00MHz	X905-ND	.70	ZTT-8.00MT
		10.00MHz	X906-ND	.70	ZTT-10.00MT
		12.00MHz	X907-ND	.81	ZTT-12.00MT
		16.00MHz	X908-ND	.81	ZTT-16.00MX
20.00MHz	X909-ND	.81	ZTT-20.00MX		
ZTA Series without Caps	2	3.58MHz	X910-ND	.54	ZTA-3.58MG
		4.00MHz	X911-ND	.54	ZTA-4.00MG
		4.19MHz	X912-ND	.68	ZTA-4.19MG
		6.00MHz	X913-ND	.54	ZTA-6.00MT
	3	8.00MHz	X914-ND	.59	ZTA-8.00MT
		10.00MHz	X915-ND	.59	ZTA-10.00MT
		12.00MHz	X916-ND	.68	ZTA-12.00MT
		16.00MHz	X917-ND	.68	ZTA-16.00MX011
20.00MHz	X918-ND	.68	ZTA-20.00MX011		
ZTB Series without Caps	4	200KHz	X919-ND	.84	ZTB200D
		400KHz	X920-ND	.68	ZTB400D
		455KHz	X921-ND	.68	ZTB455E
		500KHz	X922-ND	.68	ZTB500E
		540KHz	X923-ND	.68	ZTB540P
		640KHz	X924-ND	.68	ZTB640P
		800KHz	X925-ND	.68	ZTB800J
		1000KHz	X926-ND	.68	ZTB1000J



Series	Fig.	Freq.	Internal Cap. C1 & C2	Digi-Key Part No.	Cut Tape Price Each		
					1	10	100
ECS-SR1-A Series	1	3.58	—	X932CT-ND	.70	.60	.47
		4.000	—	X933CT-ND	.70	.60	.47
		4.19	—	X934CT-ND	.70	.60	.47
		6.000	—	X935CT-ND	.70	.60	.47
		8.000	—	X936CT-ND	.70	.60	.47
ECS-SR1-B Series	2	3.58	30 pF	X927CT-ND	.77	.66	.52
		4.000	30 pF	X928CT-ND	.77	.66	.52
		4.19	30 pF	X929CT-ND	.77	.66	.52
		6.000	30 pF	X930CT-ND	.77	.66	.52
		8.000	30 pF	X931CT-ND	.77	.66	.52



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