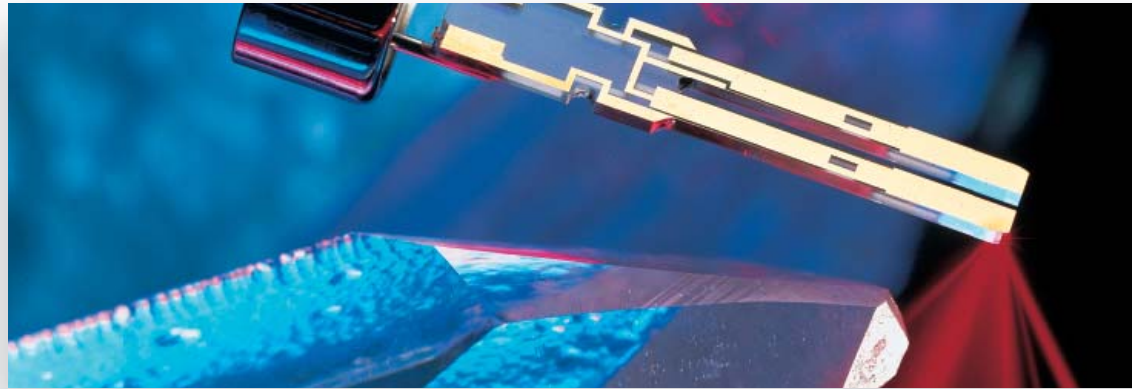


Micro Crystal



Tuning Fork Crystals

Real Time Clocks

AT & HFF Crystals

Oscillators & OCXO





Timing for Your Next Generation of Products

Micro Crystal AG, Switzerland, a Company of the Swatch Group, is a technological leader in the development of micro-size crystals and oscillator modules. Formed in 1978, Micro Crystal began by manufacturing SMD and thru-hole quartz crystals and oscillators. Today, we are recognized worldwide for high quality, low-power components and for manufacturing the world's smallest and lightest precision quartz crystals and oscillators. Manufacturing facilities in Grenchen (Switzerland), Bangkok (Thailand) and Zhuhai (China) use state-of-the-art technology to produce large volu-

mes of quartz resonators of different shapes and functions. Our company and production facilities are ISO 9001:2000, ISO 14001:2004 and ISO/TS 16949 certified by SGS systems. Component products include tuning forks, length extensional, thickness-shear AT and inverted-mesa crystals. All crystals are etched out of accurately machined wafers using a well-proven photolithographic batch process. Our products are fully compliant with RoHS regulations. Some typical applications for our products are shown below:

Crystals

Tuning Fork Crystals

10 kHz - 2.1 MHz

- | | |
|-------------------------|-----------------------|
| Battery Powered Devices | Wireless Devices |
| Cell Phones | Pacemakers |
| Devices w/ Sleep Mode | Medical Devices |
| Handheld Devices | Smart Cards |
| Pagers | Radio & Accessories |
| PDAs | Tire Pressure Systems |
| Security Systems | Computers |
| Watches | Timing Devices |

AT Crystals

8 MHz - 30 MHz

- Avionics
- Automotive
- Telecom
- RF-Systems
- Test Instruments
- Medical

Inverted Mesa AT Crystals

30 MHz - 250 MHz

- SONET VCXOs
- Frame Relay
- Gigabit Ethernet
- 10 base T
- Filters

Oscillators

Low Power Oscillators

32.768 kHz

- | | |
|---------------|-------------|
| GPS Receivers | Cell Phones |
| Metering | PDAs |
| Dashboards | |
| Tachographs | |

Clocks

up to 160 MHz

- Avionics
- Telecom
- Wireless
- Computers

OCXOs

up to 60 MHz

- GPS Base Stations
- Telecom Timing
- Satellite Links
- Internet Infrastructure
- Stratum 3
- Cospas Sarsat

Real Time Clock Modules

RTC Modules

32.768 kHz Crystal embedded

- | | | | |
|-----------------|------------------|----------------|------------------------|
| Cell Phones | POS Systems | Automotive | White Goods |
| PDAs | Scales | Data Loggers | Car Radios |
| Digital Cameras | Security Systems | Metering | Factory Automatization |
| Computers | Health Care | Glucose Meters | Dashboards |



Tuning Fork Crystals in Metal Packages RoHS Compliant

Package Type		Pin Thru Hole	SMD			Units
Product Type		DS26-T1N	MS1V-T1K	MS3V-T1R	MS5V-T1R	
Frequency Range	F _L	32.768 kHz	30-200 kHz	30-200 kHz	32.768 kHz	
Dimensions	typ.	∅ 2.0 x 6.0	2.0 x 8.1 x 2.0	1.4 x 6.7 x 1.4	1.15 x 4.7 x 1.15	mm
Package Form		Round	Square	Square	Square	
Leads		Pin thru hole	Formed SMD	Formed SMD	Formed SMD	
Leads Pitch		N/A	2.54	1.00	1.00	mm
Operating Temperature Range		-10 to +60	-40 to +85	-40 to +85	-40 to +85	°C
Delivery Form		1000 pcs bag	Tape & Reel	Tape & Reel	Tape & Reel	

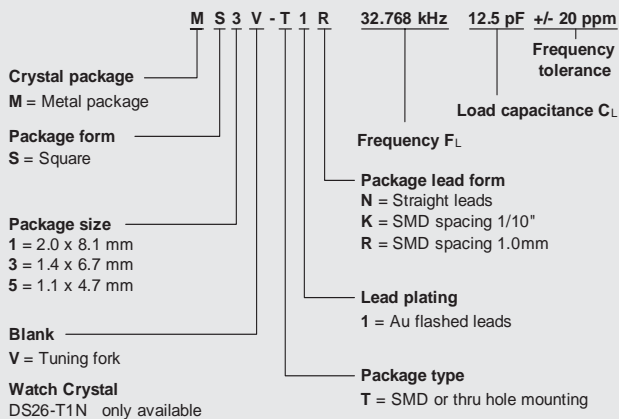
Frequency Example	¹⁾ F _L	32.768	32.768	32.768	32.768	kHz
Standard Load Capacitance	²⁾ C _L	8.2	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	pF
Frequency Tolerance @ 25 °C	³⁾ ΔF/F	+/- 20	+/- 20	+/- 20	+/- 20	ppm
Series Resistance typ/max	R _s	30/42	45/60	50/65	60/80	kΩ
Motional Capacitance typ.	C ₁	2.1	2.1	2.1	3.7	fF
Static Capacitance typ.	C ₀	0.9	0.9	0.9	1.0	pF
Drive Level max.	P	1.0	1.0	1.0	0.5	μW
Aging max. 1st Year @ 25 °C	ΔF/F	+/-3	+/-3	+/-3	+/-3	ppm
Turnover Temperature	T ₀	25 +/-5	25 +/-5	25 +/-5	25 +/-5	°C
Frequency vs. Temperature	ΔF/F	-0.035 ppm /°C ² (T-To) ² +/- 10%				ppm

1) Values for non-example frequencies consult factory

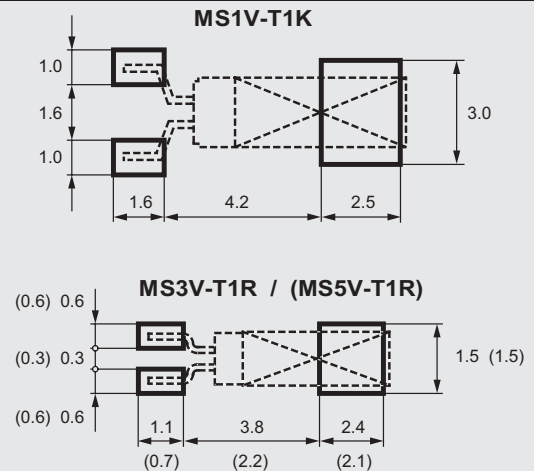
2) Other load capacitance on request

3) Tighter and wider frequency tolerances on request

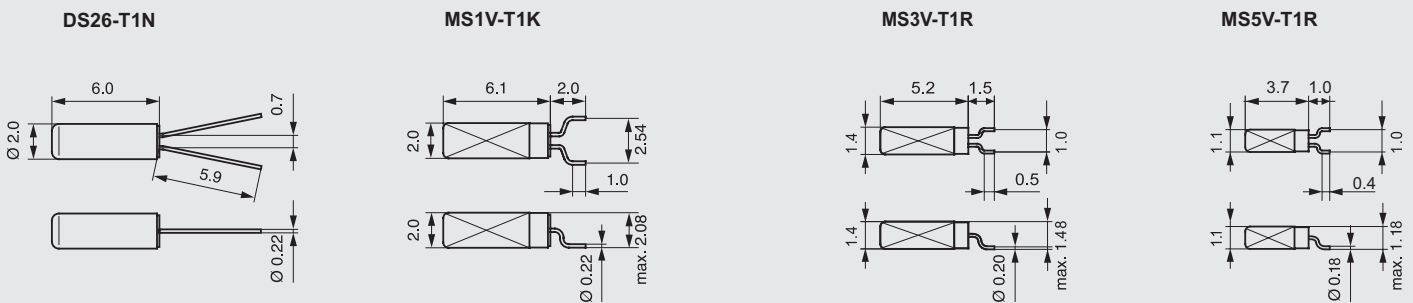
Part Number / Ordering Information









Recommended Solder Pad Layout



Dimensions in mm: (typical)



Tuning Fork Crystals in SMD Ceramic Packages 100% Lead free

Crystal Type	Tuning Fork Crystals							Units
Product Type		CC1V-T1A	CC4V-T1A	CC5V-T1A	CC7V-T1A	CM7V-T1A 0.4	CM8V-T1A	
Frequency Range	F _L	10-2100 kHz	30-1000 kHz	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	
								
Dimensions	typ.	8.0 x 3.7 x 1.75	5.0 x 1.9 x 0.9	4.1 x 1.5 x 0.9	3.2 x 1.5 x 0.9	3.2 x 1.5 x 0.38	2.0 x 1.2 x 0.6	mm
Lid Material		Ceramic	Ceramic	Ceramic	Ceramic	Metal	Metal	
Operating Temperature Range ¹⁾		-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85	°C
Delivery Form		Tape & Reel	Tape & Reel	Tape & Reel	Tape & Reel	Tape & Reel	Tape & Reel	

Frequency Example ²⁾	F _L	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	32.768 kHz	
Standard Load Capacitance ³⁾	C _L	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	7.0 / 9.0 / 12.5	pF
Frequency Tolerance @ 25 °C ⁴⁾	ΔF/F	+/-20 +/-100	+/-20 +/-100	+/-20 +/-100	+/-20 +/-100	+/-20 +/-100	+/-20 +/-100	ppm
Series Resistance typ/max	R _s	37/60	50/65	50/70	50/70	55/80	80/90	kΩ
Motional Capacitance typ.	C ₁	2.1	2.1	2.8	3.7	3.5	3.5	fF
Static Capacitance typ.	C ₀	1.6	1.2	1.2	1.0	1.4	1.0	pF
Drive Level max.	P	1.0	1.0	1.0	1.0	0.5	0.5	μW
Aging max. 1st Year @ 25 °C	ΔF/F	+/-3	+/-3	+/-3	+/-3	+/-3	+/-3	ppm
Turnover Temperature	T ₀	25 +/-5	25 +/-5	25 +/-5	25 +/-5	25 +/-5	25 +/-5	°C
Frequency vs. Temperature	ΔF/F	-0.035 ppm / °C ² (T-T ₀) ² +/- 10%						ppm

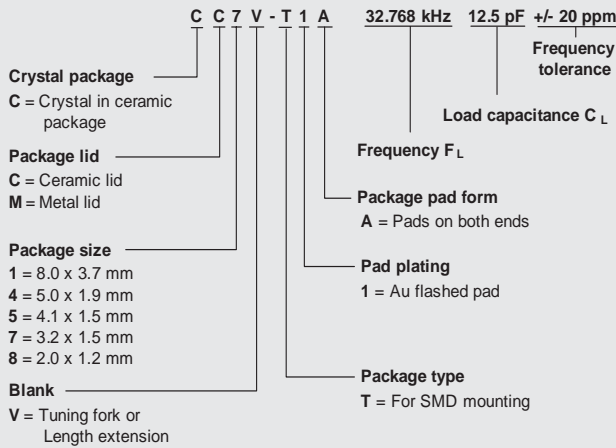
1) Also available in -55 to +125 °C temp. range

3) Other load capacitance on request

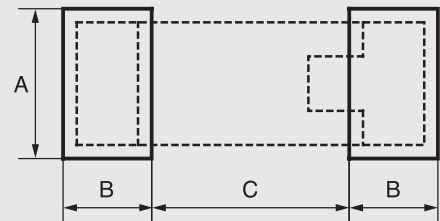
2) Values for non-example frequencies consult factory

4) Tighter and wider frequency tolerances on request

Part Number / Ordering Information

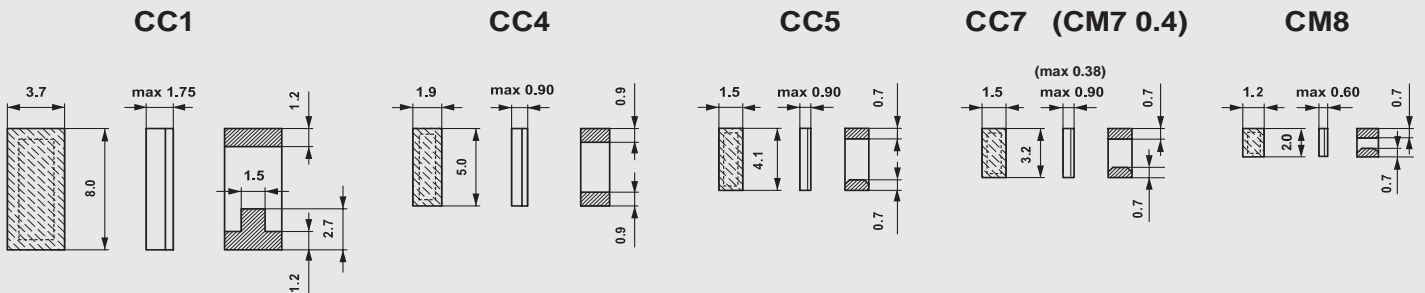


Recommended Solder Pad Layout







CC1	mm	CC4	mm	CC5	mm
A	4.2	A	2.2	A	1.9
B	2.3	B	1.3	B	1.1
C	4.0	C	2.9	C	2.3
CC7	mm	CM8	mm		
A	1.8	A	1.5		
B	1.0	B	0.8		
C	1.5	C	0.7		

Dimensions in mm: (typical)



Quartz Crystals in SMD Ceramic Packages 100% Lead free

Crystal Type		AT Crystals		Inverted Mesa AT Crystals		Units
Product Type		CC1A-T1A	CC7A-T1A	CC1F-T1A	CC6F-T1A	
Frequency Range	F_L	8-30 MHz	24-30 MHz	30-250 MHz	30-250 MHz	
						
Dimensions	typ.	8.0 x 3.7 x 1.75	3.2 x 1.5 x 0.90	8.0 x 3.7 x 1.75	3.5 x 2.2 x 0.70	mm
Lid Material		Ceramic	Ceramic	Ceramic	Ceramic	
Operating Temperature Range ¹⁾		-40 to +85	-40 to +85	-40 to +85	-40 to +85	°C
Delivery Form		Tape & Reel	Tape & Reel	Tape & Reel	Tape & Reel	

Frequency Example ²⁾	F_L	10.000 MHz	26.000 MHz	155.520 MHz	155.520 MHz	
Standard Load Capacitance ³⁾	C_L	20.0	20.0	10.0 or ∞	10.0 or ∞	pF
Frequency Tolerance @ 25 °C ⁴⁾	$\Delta F/F$	+/-50	+/-50	+/-50	+/-50	ppm
Series Resistance typ/max	R_s	35/75	60/100	15/35	15/35	Ω
Motional Capacitance typ.	C_1	5.2	1.0	5.6	5.6	fF
Static Capacitance typ.	C_0	2.2	0.7	2.9	2.9	pF
Drive Level max.	P	500	250	100	100	μW
Aging max. 1st Year @ 25 °C	$\Delta F/F$	+/-3	+/-3	+/-3	+/-3	ppm
Frequency vs. Temperature	$\Delta F/F$	+/-50	+/-50	+/-30	+/-30	ppm

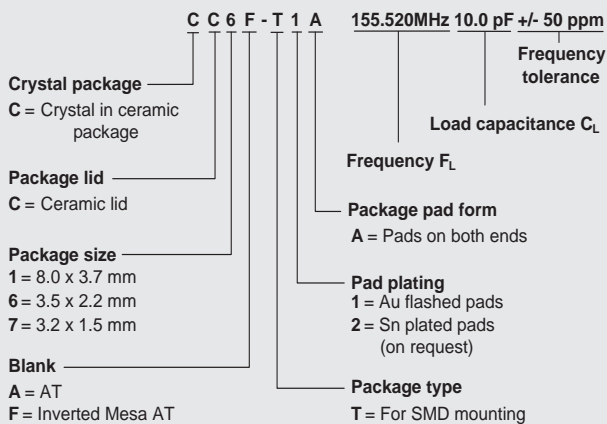
1) Also available in -55 to +125 °C temp. range

3) Other load capacitance on request

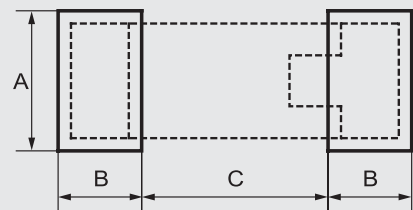
2) Values for non-example frequencies consult factory

4) Tighter and wider frequency tolerances on request

Part Number / Ordering Information

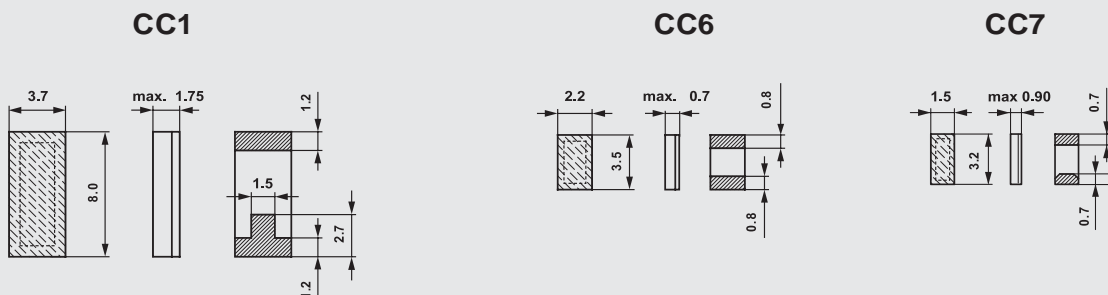


Recommended Solder Pad Layout



CC1	mm	CC6	mm	CC7	mm
A	4.2	A	2.5	A	1.8
B	2.3	B	1.2	B	1.0
C	4.0	C	1.5	C	1.5

Dimensions in mm: (typical)



Real Time Clock 100% Lead free

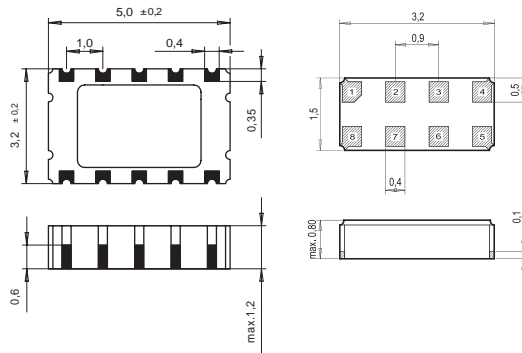
Real Time Clock Module in Miniature SMD Ceramic Package Serial Interfaces

RV-xxxx-C2

Dimensions in mm



RV-4162-C7



Real Time Clock Modules:

- Combine 32.768 kHz "tuning-fork" crystal with CMOS RTC-circuitry all in one package.
- Miniature SMD ceramic packages, RoHS-compliant and 100% leadfree.
- Standard Calendar function tracks year, month, date, day-of-the-week, built-in century and leap-year flags
- Standard Clock function tracks hour, minute and second in 24-hour format
- RV-4162-C7 Smallest RTC-Module worldwide
- RV-2123-C2 Lowest current consumption 130nA
- RV-8523-C2 Lowest current consumption 130nA
- RV-3029-C2 Smallest Temp compensated / 125°C
- RV-3049-C2 Smallest Temp compensated / 125°C

Type	Main Feature	Time accuracy over Temperature [ppm]	Supply Voltage [V]	Current consumption [nA] @ V _{DD} 3V	Operating Temp Range [°C]	Freq. Compensation	Temp Sensor	Backup Battery	Trickle Charger	User RAM [Bytes]	User E ² PROM [Bytes]
2-wire I²C compatible											
RV-8564-C2	Popular Standard		1.2 to 5.5	250	-40 to +85						
RV-8523-C2	Ultra Low Power		1.2 to 5.5	130	-40 to +85	✓		✓			
RV-4162-C7	Miniature 3.2 x 1.5 mm		1.0 to 4.4	350	-40 to +85	✓					
RV-3029-C2	High accuracy High Stability Temperature Compensated	A	±4 ppm 0°C to +50°C ±6 ppm -40°C to +85°C	1.3 to 5.5	800	-40 to 125	✓	✓	✓	8	2
		B	±5 ppm 0°C to +50°C ±25 ppm -40°C to +85°C								
4-wire / 3-wire SPI compatible											
RV-2123-C2	Ultra Low Power		1.2 to 5.5	130	-40 to +85	✓					
RV-3049-C2	High accuracy High Stability Temperature Compensated	A	±4 ppm 0°C to +50°C ±6 ppm -40°C to +85°C	1.3 to 5.5	800	-40 to 125	✓	✓	✓	8	2
		B	±5 ppm 0°C to +50°C ±25 ppm -40°C to +85°C								

Temperature Compensation: RV-3029-C2 / RV3049-C2

Option: A

Calibrated

Time accuracy

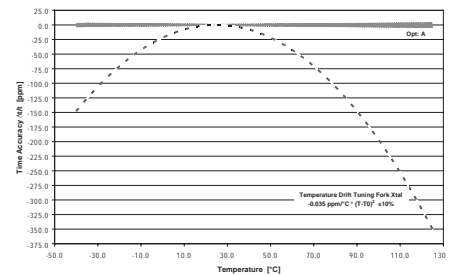
±3 ppm	±0.26 s/day	@ +25°C
±4 ppm	±0.35 s/day	from 0°C to +50°C
±5 ppm	±0.44 s/day	from -10°C to +60°C
±6 ppm	±0.52 s/day	from -40°C to +85°C
±8 ppm	±0.70 s/day	from -40°C to +125°C

Option: B

Default

Time accuracy

± 3 ppm	±0.26 s/day	@ +25°C
± 5 ppm	±0.44 s/day	from 0°C to +50°C
±10 ppm	±0.87 s/day	from -10°C to +60°C
±25 ppm	±2.17 s/day	from -40°C to +85°C
±30 ppm	±2.60 s/day	from -40°C to +125°C

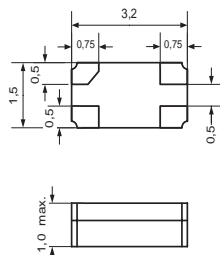


32.768 kHz Low Power Clock Oscillators 100% Lead free

Ultra Low Power Clock Oscillator in Miniature SMD Ceramic Package Frequency: 32.768 kHz

OV-7604-C7

Dimensions in mm and Pinout



PINOUT

1	CLKOUT
2	GND
3	CLKOE
4	VDD

Features:

- All-in-one-package solution
- Miniature leadfree ceramic package
- Ultra low power consumption
- Low Jitter

Specifications:

- Supply Voltage: 1.2 to 5.5 V
- Current Consumption: typ. 350 nA (no load)
- Output: HC-MOS Compatible
- Operating Temperature range: -40 to +125 °C



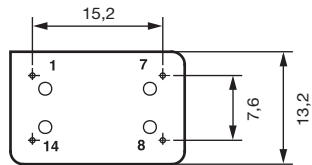
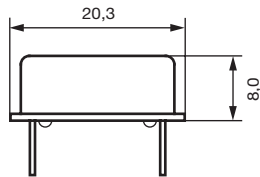
Oven Controlled XTAL Oscillators RoHS Compliant

Oven Controlled Oscillator in 14 Pin DIL Package

Frequency Range: Up to 60 MHz

OCXO Series

Dimensions in mm and Pinout



PINOUT	
1	Frequency adjustment
7	GND
8	Output
14	VCC

Features:

- Extremely small dimensions
- Very fast warm up
- Low power consumption
- Electronic frequency set

Specifications:

- Frequency Stability: ± 0.025 ppm (Over Temperature Range)
- Supply Voltage: 12.0 Vdc ± 0.50 V
5.0 Vdc ± 0.20 V
3.3 Vdc ± 0.15 V
- Output: HC-MOS Compatible Sinewave
- Operating Temp. Range: A 0 to +60 °C
B -20 to +70 °C
C -40 to +85 °C
- Specification available: Stratum 3
Cospas Sarsat
Low G-sensitivity
- Shock Resistance: 2000 g, 0.3 ms, 1/2 sine
- Vibration Resistance: 10 g / 10 – 2000 Hz
- Standard Frequencies: 10.000 MHz 20.000 MHz
12.800 MHz 26.000 MHz
16.000 MHz 40.000 MHz
16.384 MHz 50.000 MHz
19.440 MHz 60.000 MHz

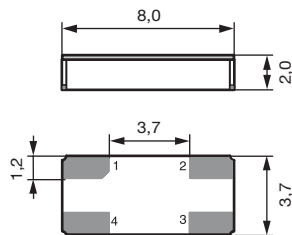
Clock Oscillators 100% Lead free

Clock Oscillator in SMD Ceramic Package (MCSO & MCSO1)

Frequency Range: Up to 160 MHz

MCSO1 Series

Dimensions in mm and Pinout



PINOUT	
1	N.C./Option Enable/Disable
2	GND
3	Output
4	VCC

Features:

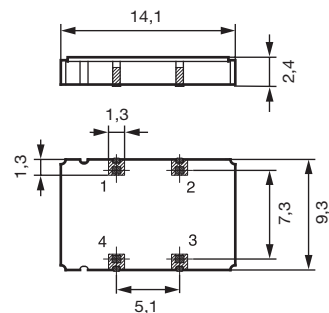
- Custom specification
- HC-MOS technology
- Excellent temperature and shock stability
- 3.3 Vdc version available
- Surface mountable ceramic package MCSO & MCSO1
- Extremely wide temp. range

Specifications:

- Frequency Stability: ± 20 ppm to ± 100 ppm (Overall, tighter tolerance available on request)
- Supply Voltage: 3.3 Vdc to 5.0 Vdc
- Output: HC-MOS Compatible Load 10 TTL
- Operating Temperature Ranges: Industrial: -40 to +85 °C
Military: -55 to +125 °C
- Shock Resistance: 5000 g, 0.3 ms, 1/2 sine
- Vibration Resistance: 10 g / 10 – 2000 Hz
- Standard Frequencies: see full list on: www.microcrystal.com

MCSO Series

Dimensions in mm and Pinout



PINOUT	
1	N.C./Option Enable/Disable
2	GND
3	Output
4	VCC



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MICRO CRYSTAL SWITZERLAND

A COMPANY OF THE  SWATCH GROUP

 SWATCH GROUP ELECTRONIC SYSTEMS