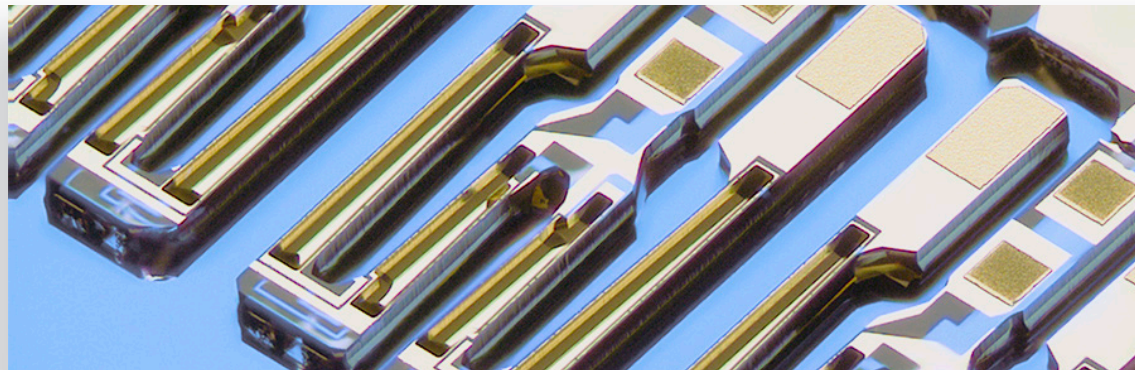


Micro Crystal



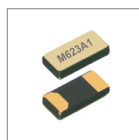
kHz Tuning Fork Crystals

MHz AT-Cut Crystals

Real-Time Clock Modules

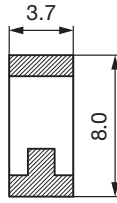
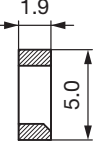
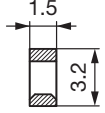
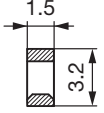
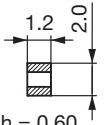
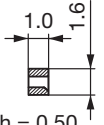
Low Frequency Oscillators

Medical Implantable Products



Short Form Catalog Q1 2023

kHz Tuning Fork Crystals in Ceramic Packages

Crystal Type		30.0 kHz to 2'000 kHz Tuning Fork Crystals						Units
Product Type		CC1V-T1A	CC4V-T1A	CM7V-T1A	CM7V-T1A low ESR	CM8V-T1A	CM9V-T1A	
Dimensions (l × w × h)		8.0 x 3.7 x 1.75	5.0 x 1.9 x 0.90	3.2 x 1.5 x 0.65	3.2 x 1.5 x 0.65	2.0 x 1.2 x 0.60	1.6 x 1.0 x 0.50	mm
  				 h = 0.35 on request	 h = 0.35 on request	 h = 0.35 on request	 h = 0.35 on request	mm
 PCB Symbol, Footprint & 3D Model available on product pages on website		 h = 1.75	 h = 0.90	 h = 0.65	 h = 0.65	 h = 0.60	 h = 0.50	mm
Lid Material		Ceramic	Ceramic	Metal	Metal	Metal	Metal	
Operating Temp. Range TA		-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85	-40 to +85	°C
Operating Temp. Range TB ¹⁾		-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125	°C

Frequency	F _L	32.768	32.768	32.768	32.768	32.768	32.768	kHz
Standard Load Capacitance ²⁾	C _L	9 / 12.5	6 / 7 / 9 / 12.5	6 / 7 / 9 / 12.5	6 / 7 / 9 / 12.5	4 / 7 / 9 / 12.5	4 / 7 / 9 / 12.5	pF
Frequency Tolerance @ 25°C ³⁾	ΔF/F	±20	±20	±20	±20	±20	±20	ppm
Series Resistance typ./max.	R _s	40 / 60	50 / 65	50 / 70	40 / 50	55 / 70	60 / 75	kΩ
Motional Capacitance typ.	C ₁	2.0	2.1	3.7	4.7	4.7	6.3	fF
Static Capacitance typ.	C ₀	1.6	1.2	1.2	1.3	1.2	1.4	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 (TC).

2) Other load capacitance on request.

3) Tighter and wider frequency tolerances on request.

Applications

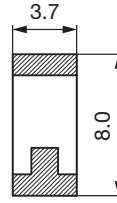
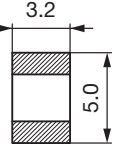
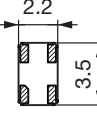
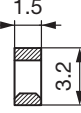
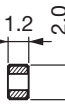
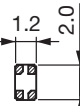
- IoT
- Computing
- Automotive
- Wireless Units
- Smart Metering
- Industrial Control
- Embedded Modules
- GPS and Navigation
- Tablets, Smart Phones
- Security and Access Control
- Wearables, Portable Devices
- Remote Keyless Entry Systems
- High Temperature Range Designs
- Ultra Small Size Devices, Smart Cards
- Healthcare, Medical and Medical Implantable

Ordering Information

C M 7 V - T 1 A 0.3 32.768 kHz 12.5 pF ±20 ppm TA QC	
Ceramic package	Frequency F _L
Package lid C = Ceramic lid M = Metal lid	Load capacitance C _L
Package size 1 = 8.0 x 3.7 x 1.75 mm 4 = 5.0 x 1.9 x 0.90 mm 5 = 4.1 x 1.5 x 0.90 mm 7 = 3.2 x 1.5 x 0.65 mm 8 = 2.0 x 1.2 x 0.60 mm 9 = 1.6 x 1.0 x 0.50 mm	Frequency tolerance
Tuning fork	Temperature range TA = -40 to +85°C (Standard) TB = -40 to +125°C
SMD Package	Qualification QC = Commercial Grade (Standard) QA = Automotive Grade AEC-Q200 QM = Medical Grade (see page 6)
Au flashed pads	Special feature 0.3 = Lowest profile, 0.35 mm Low ESR = 50 kΩ max.
2 pads	



MHz AT-Cut Crystals in Ceramic Packages

Crystal Type	MHz AT-Cut Crystals					
Product Type	CC1A/F	CC2A	CC6A/F	CC7A	CC8A	CM8A
Dimensions (l x w x h) mm	8.0 x 3.7 x 1.75	5.0 x 3.2 x 1.20	3.5 x 2.2 x 1.0/0.8	3.2 x 1.5 x 0.75	2.0 x 1.2 x 0.60	2.0 x 1.2 x 0.60
  			 4 or 2 pads			
 PCB Symbol, Footprint & 3D Model available on product pages on website	 h = 1.75	 h = 1.20	 h = 1.0/0.80	 h = 0.75	 h = 0.60	 h = 0.60

Standard (Fundamental Mode)

Product Type	Number of pads	Frequency MHz	Operating Temp. °C	R _s typ. in Ω @ F _{min} - F _{max}	C ₁ typ. in fF @ F _{min} - F _{max}	C ₀ typ. in pF @ F _{min} - F _{max}	Key Features / Applications
CC1A-T1A	2	8 - 30	-55 to +125	60 - 30	4 - 11	2.0 - 4.0	
CC1F-T1A	2	30 - 250	-55 to +125	35 - 15	4 - 7	2.0 - 4.0	Inverted mesa crystal
CC2A-T1A	2	12 - 70	-55 to +125	60 - 10	3 - 12	2.0 - 5.0	
CC6A-T1D	4	16 - 70	-55 to +125	60 - 20	2 - 5	1.5 - 3.0	
CC6F-T1A	2	70 - 250	-55 to +125	30 - 15	5 - 6	2.4 - 3.2	Inverted mesa crystal
CC6F-T1A F	2	70 - 200	-55 to +125	35 - 15	3 - 3	2.4 - 3.2	Inverted mesa crystal Filter applications - low spurious
CC7A-T1A	2	20 - 50	-55 to +125	40 - 25	2 - 2	0.7 - 0.7	
CC8A-T1A	2	24 - 50	-55 to +125	40 - 20	1 - 1	0.7 - 0.7	Smallest package
CM8A-T1D	4	24 - 50	-55 to +125	40 - 20	1 - 1	0.7 - 0.7	Smallest package

High Temperature / Harsh Environment (Fundamental Mode)

CC1A-T1A H	2	8 - 24	-55 to +200	100 - 50	4 - 9	2.0 - 3.2	
CC2A-T1A H	2	14 - 40	-55 to +200	70 - 40	5 - 10	2.5 - 4.0	
CC6A-T1D H	4	16 - 40	-55 to +200	80 - 50	2 - 4	1.5 - 2.5	

Applications

Customer-specific applications such as:

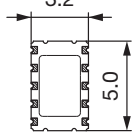
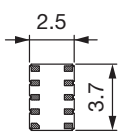
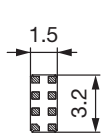
- Filters
- Industrial
- Telemetry
- Animal Tracking
- Optical Network
- Airborne Equipment
- Avionics / Aerospace
- Radio Communication
- Geothermal Equipment
- TCXO, VCTCXO, VCXO
- Downhole and Well Drilling
- Healthcare, Medical and Medical Implantable

Ordering Information

C C 6 A - T 1 D H	24.000 MHz	20.0 pF	±50 ppm	TC	QI
Ceramic package	Frequency F_L	Load capacitance C_L	Frequency tolerance	Temperature range	Qualification
Package lid C = Ceramic lid M = Metal lid				TA = -40 to +85°C (Standard) TB = -40 to +125°C TC = -55 to +125°C TD = -55 to +175°C TG = -55 to +200°C TX = Custom	QI = Industrial Grade (Standard) QM = Medical Grade (see page 6) QS = Custom Specification
Package size 1 = 8.0 x 3.7 x 1.75 mm 2 = 5.0 x 3.2 x 1.20 mm 6 = 3.5 x 2.2 x 1.00 mm 7 = 3.2 x 1.5 x 0.75 mm 8 = 2.0 x 1.2 x 0.60 mm					Special feature H = Harsh environment F = Filter applications
Quartz blank A = AT-Cut F = AT-Cut inverted mesa					
SMD Package					
Au flashed pads					
Number of pads A = 2 pads D = 4 pads					



RTC Modules in Ceramic Packages

Product Type	RV-xxxx-C2	RV-xxxx-C3	RV-xxxx-C7
Dimensions (l x w x h) mm	5.0 x 3.2 x 1.2	3.7 x 2.5 x 0.9	3.2 x 1.5 x 0.8
  			
 PCB Symbol, Footprint & 3D Model available on product pages on website	 h = 1.2	 h = 0.9	 h = 0.8
Lid Material	Glass	Metal	Metal

I²C-Bus Interface

Product Type	Main Feature	Time Acc. @ 25°C	Temp. Comp. -40°C to 85°C	Supply V _{DD} V	Current I _{DD} nA	T _{OP} °C	Offset Comp.	Backup Switch	Trickle Charge	Event Input	RAM Bytes	EEPROM Bytes
RV-3028-C7	Lowest Power	±1 ppm		1.1 to 5.5	45	-40 to +85	✓	✓	✓	✓	2	43
RV-4162-C7	Smallest Package	±20 ppm		1.0 to 4.4	350	-40 to +85	✓					
RV-8263-C7	Low Power	±20 ppm		0.9 to 5.5	190	-40 to +85	✓				1	
RV-8564-C2		±20 ppm		1.2 to 5.5	250	-40 to +85						
RV-8564-C3	Small Package	±20 ppm		1.2 to 5.5	250	-40 to +85						
RV-8523-C3	Low Power	±20 ppm		1.2 to 5.5	130	-40 to +85	✓	✓				
RV-3129-C3	Highest Accuracy Readable 8-bit T-Sensor		Opt. A: ±6 ppm Opt. B: ±25 ppm	1.3 to 5.5	800	-40 to +125		✓	✓		8	2
RV-8803-C7	Highest Accuracy		±3.0 ppm	1.5 to 5.5	240	-40 to +105	✓			✓	1	
RV-3032-C7	Highest Accuracy Readable 12-bit T-Sensor		±2.5 ppm	1.3 to 5.5	160	-40 to +85	✓	✓	✓	✓	16	32

SPI-Bus Interface

RV-8063-C7	Low Power	±20 ppm		0.9 to 5.5	190	-40 to +85	✓				1	
RV-2123-C2	Low Power	±20 ppm		1.1 to 5.5	130	-40 to +85	✓					
RV-3149-C3	Highest Accuracy Readable 8-bit T-Sensor		Opt. A: ±6 ppm Opt. B: ±25 ppm	1.3 to 5.5	800	-40 to +125		✓	✓		8	2

Applications

System power consumption can be greatly reduced by using Micro Crystal's small, high-accuracy and low-power RTC Modules for:

- IoT
- Telemetry
- Smart Metering
- POS, SPS Control
- Energy Harvesting Solutions
- Battery Management Systems
- Automotive, GPS and Drive Recorders
- IP Cameras, Alarm and Building Control
- Door Lock and Access Control Systems
- Industrial, Computing, Embedded Systems
- Wearables, Activity Bands, Fitness Trackers
- Healthcare, Medical and Medical Implantable

Ordering Information

RV - 3129 - C3	Option A	TA	QC
RTC Module			Qualification
Product type			QC = Commercial Grade (Standard)
Package size			QA = Automotive Grade AEC-Q200
C2 = 5.0 x 3.2 x 1.2 mm			QM = Medical Grade (see page 6)
C3 = 3.7 x 2.5 x 0.9 mm			Temperature range
C7 = 3.2 x 1.5 x 0.8 mm			TA = -40 to +85°C (Standard)
Time accuracy			TB = -40 to +125°C
Option A = ±6 ppm @ -40°C to +85°C			
Option B = ±25 ppm @ -40°C to +85°C			



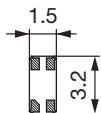
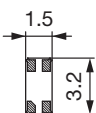
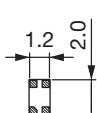
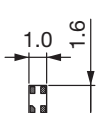
Linux Drivers available



Demo Boards available



Low Frequency Oscillators in Ceramic Packages

Product Type	OM-xxxx-C7	OV-xxxx-C7	OM-xxxx-C8	OM-xxxx-C9
Dimensions (l x w x h) mm	3.2 x 1.5 x 0.70	3.2 x 1.5 x 1.0	2.0 x 1.2 x 0.70	1.6 x 1.0 x 0.60
  				
 PCB Symbol, Footprint & 3D Model available on product pages on website	 h = 0.70	 h = 1.0	 h = 0.70	 h = 0.60
Lid Material	Metal	Ceramic	Metal	Metal

32.768 kHz Oscillators

Product Type	Dimensions (l x w x h) mm	Frequency kHz	$\Delta F/F$ @ 25°C ppm	Supply V _{DD} V	Current I _{DD} nA	T _{OP} °C	Duty Cycle %	CLKOE Input	$\Delta f/V$ ppm/V	Aging 1Y @ 25°C ppm
OM-7604-C7	3.2 x 1.5 x 0.70	32.768	±20 ¹⁾	1.2 to 5.5	300	-40 to +125	40 to 60	✓	±1.5	±3.0
OV-7604-C7	3.2 x 1.5 x 1.0	32.768	±20 ¹⁾	1.2 to 5.5	300	-40 to +125	40 to 60	✓	±1.5	±3.0
OM-7605-C8	2.0 x 1.2 x 0.70	32.768	±20 ¹⁾	1.6 to 5.5	450	-40 to +125	40 to 60	✓	±3.0	±3.0
OM-7605-C9	1.6 x 1.0 x 0.60	32.768	±20 ¹⁾	1.6 to 5.5	450	-40 to +125	40 to 60	✓	±3.0	±3.0

100.000 kHz Oscillators

OM-0100-C7	3.2 x 1.5 x 0.70	100.000	±20 ¹⁾	1.2 to 5.5	650	-40 to +85	40 to 60	✓	±1.5	±3.0
OM-0100-C8	2.0 x 1.2 x 0.70	100.000	±100 ¹⁾	1.6 to 5.5	550	-40 to +85	40 to 60	✓	±3.0	±3.0

¹⁾ Tighter and wider frequency tolerances on request.

Applications

Lowest current, smallest package and high accuracy make Micro Crystal's oscillators ideal for:

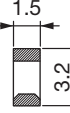
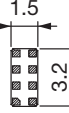
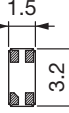
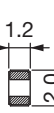
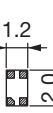
- IoT
- Smart Pens
- Industrial Computing
- Wearables and Activity Bands
- Automotive, Driver Assistance
- Driving Recorders, Camera Systems
- Navigation and Emergency Call Systems
- Bluetooth Low Energy (BLE) Applications
- Tire Pressure Monitoring Systems (TPMS)
- Healthcare, Medical and Medical Implantable

Ordering Information

Product O = Oscillator	Package lid M = Metal lid V = Ceramic lid	Frequency 0100 = 100.000 kHz 7604 = 32.768 kHz 7605 = 32.768 kHz	Package size C7 = 3.2 x 1.5 mm C8 = 2.0 x 1.2 mm C9 = 1.6 x 1.0 mm	Qualification QC = Commercial Grade (Standard) QA = Automotive Grade AEC-Q200 QM = Medical Grade (see page 6)	Temperature range TA = -40 to +85°C (Standard) TB = -40 to +125°C	Frequency tolerance¹⁾
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Medical Implantable Products

Product Type	CC7	RV-xxxx-C7	OV-xxxx-C7	CC8	OV-xxxx-C8	CC9	OV-xxxx-C9
Dimensions (l x w) mm	3.2 x 1.5			2.0 x 1.2		1.6 x 1.0	
  							
Full Ceramic Packages  PCB Symbol, Footprint & 3D Model available on product pages on website	 Crystal	 RTC	 Oscillator	 Crystal	 Oscillator	 Crystal	 Oscillator

kHz Tuning Fork Crystals			
Product Type	Height mm	Frequency kHz	Frequency Tol. @ 25°C
CC7V-T1A Medical	0.90	32 - 100	±20 ppm
CC8V-T1A Medical	0.67	32 - 102.4	±20 ppm
CC8V-T1A Thin Medical	0.48	32.768	±20 ppm
CC9V-T1A Medical ¹⁾	0.55	32.768	±20 ppm

MHz AT-Cut Crystals			
Product Type	Height mm	Frequency MHz	Frequency Tol. @ 25°C
CC7A-T1A Medical	0.75	14 - 50	±30 ppm
CC8A-T1A Medical	0.60	24 - 50	±30 ppm
CC9A-T1A Medical ¹⁾	0.50	32 - 50	±30 ppm

Low Frequency Clock Oscillators				
Product Type	Height mm	Frequency kHz	Supply V _{DD} V	Current I _{DD} nA
OV-7604-C7 Medical	1.0	32.768	1.2 to 5.5	300
OV-7605-C8 Medical	0.85	32.768	1.6 to 5.5	450
OV-7605-C9 Medical	0.65	32.768	1.6 to 5.5	450
OV-0100-C7 Medical	1.0	100.000	1.2 to 5.5	650
OV-0100-C8 Medical	0.85	100.000	1.6 to 5.5	550

Real-Time Clock Module				
Product Type	Height mm	Time Acc. @ 25°C	Supply V _{DD} V	Current I _{DD} nA
RV-5028-C7 Medical	1.0	±1 ppm	1.1 to 5.5	45

1) In qualification.

Key Features

- Hermetic full ceramic package
- Safe for Helium environment
- Proprietary manufacturing and testing processes
- Full traceability records retained

Applications

- Pacemakers
- Defibrillators
- Infusion Pumps
- Neurostimulators
- Cochlear Implants
- Smart Orthopedic Implants
- Cardiac Monitoring Devices
- Implantable Drug Delivery Pumps



Micro Crystal – The Art of Timing

Company

Micro Crystal AG is a company of the Swatch Group Inc. Switzerland, the world's leading watchmaker. Micro Crystal applies high-tech Swiss MEMS technology for the manufacture of ultra-high precision Quartz Crystal Resonators, Oscillators and Real-Time Clock Modules. Focused on mass production of high-quality components, Micro Crystal supports not only large volume consumer applications, but also high-reliability automotive and medical implantable components. Using its manufacturing facilities in Switzerland and Thailand, the company produces the smallest available Quartz Crystal Resonators, Oscillators

and Real-Time Clock Modules. Micro Crystal timing devices, offering the world's lowest power consumption, are perfectly suited for today's IoT and wearables applications. Most of its products are AEC-Q200 qualified. Micro Crystal's production facilities are ISO 9001, ISO 14001 and IATF 16949 certified; and comply with all social and environmental regulations.

Micro Crystal, a leading player in this market, offers cost competitive products through its worldwide distribution and customer support networks.

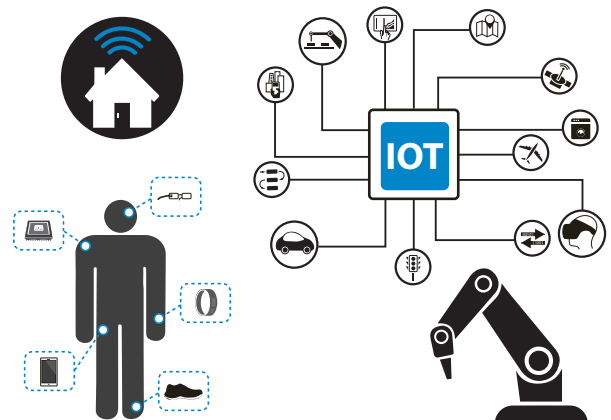


Applications and Markets

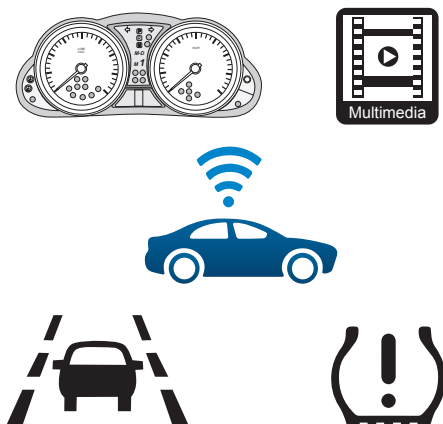
Telecommunications and Industrial



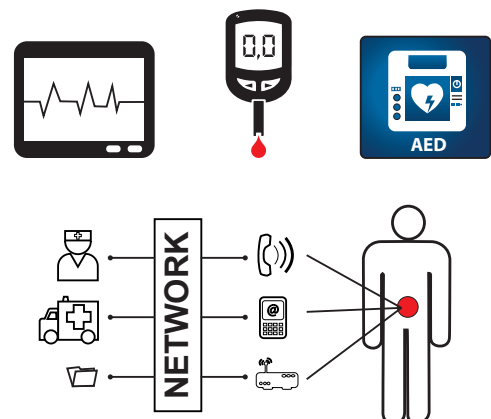
Wearables and IoT



Automotive



Healthcare and Medical Implantable



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● Sales Offices ● Production Locations

