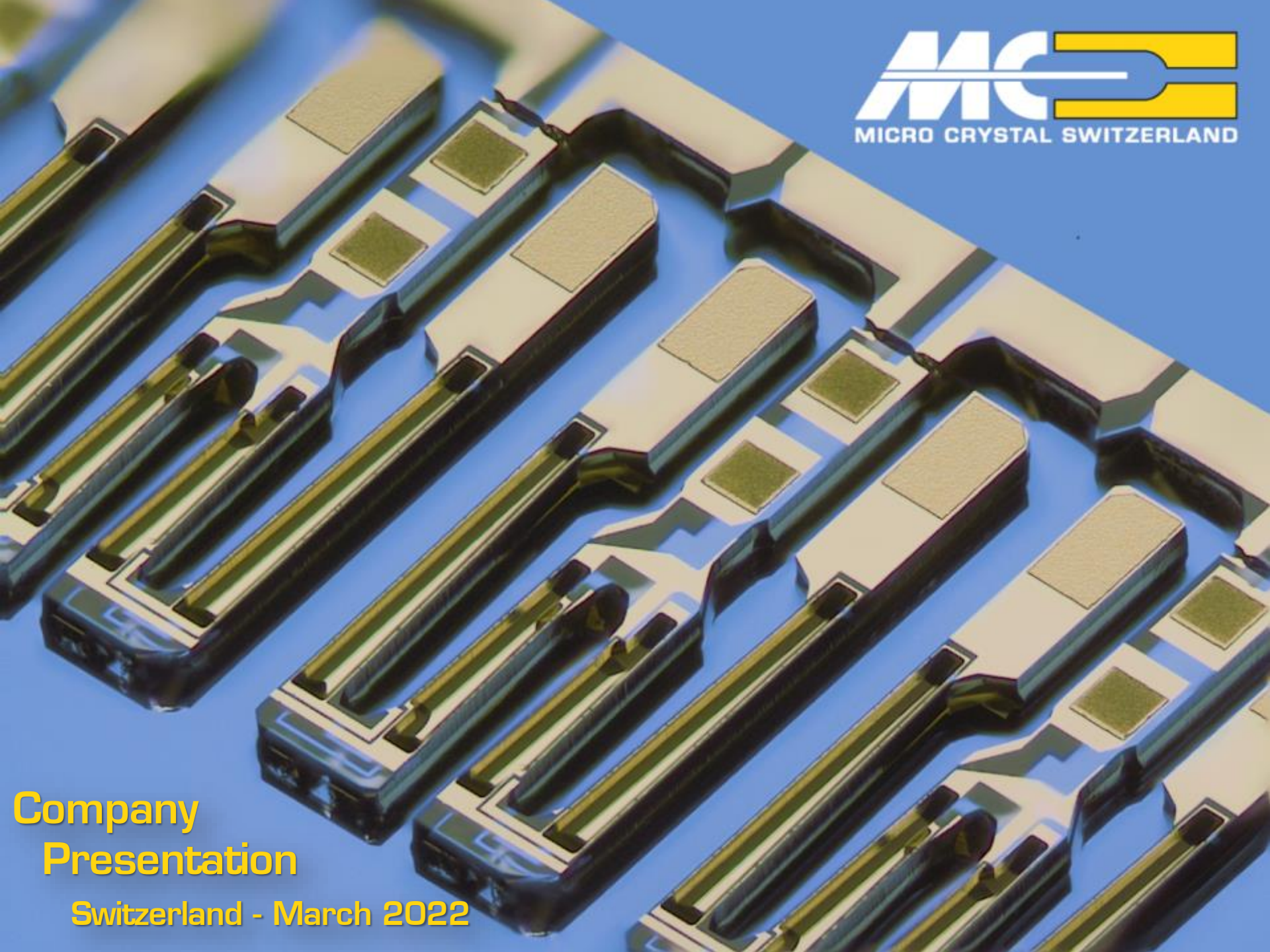




Company Presentation

Switzerland - March 2022



World
Largest
Watchmaker



...with 17 of the most
famous brands
in the world

Prestige and Luxury Range



High Range



Middle Range



Basic Range



Watches & Jewelry

Prestige and Luxury Range

Breguet
Harry Winston
Blancpain
Glashütte Original
Jaquet Droz
Léon Hatot
Omega

High Range

Longines
Rado
Union Glashütte

Middle Range

Tissot
Balmain
Certina
Mido
Hamilton

Basic Range

Swatch
Flik Flak

Electronic Systems

EM Microelectronic
Renata

Micro Crystal

Swiss Timing &
ST-Sportservice

Production

Watches

ETA, Mecro, Novi
CHH Microtechnique
Nivarox-FAR, Comadur,
Lascor, Universo
Rubattel et Weyermann
MOM Le Prélet
Manufacture Ruedin
Simon Et Membrez
Swatch Group Assembly

Jewelry

Dress Your Body (DYB)



Watches Retailing

Tourbillon
Hour Passion

Corporate

Swatch Group Research and Development
(Asulab, Moebius, CDNP)
Belenos Clean Power
ICB Ingénieurs Conseils en Brevets
Swatch Group Quality Management
Swatch Group Immobilien

Swatch Group Services

European Distribution Center
Swatch Group Logistics
Swatch Group Information Technologies
Swatch Group Corporate Customer Service
Swatch Group Gems
Real Estate Development





Electronic Systems Companies



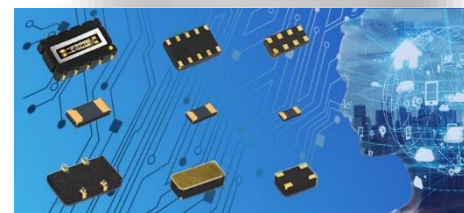
Sports Timing Systems
Data Processing
Olympic Games



Full-Custom
Chips and Modules
Manufacturer



High-Tech Micro Batteries
Primary Coin Cells, Thin Film
Secondary Cells



Oscillators
RTC-Modules
Miniature Quartz Crystals





Technology leader for low frequency miniature SMD Crystals, Oscillators and Real-Time Clock modules



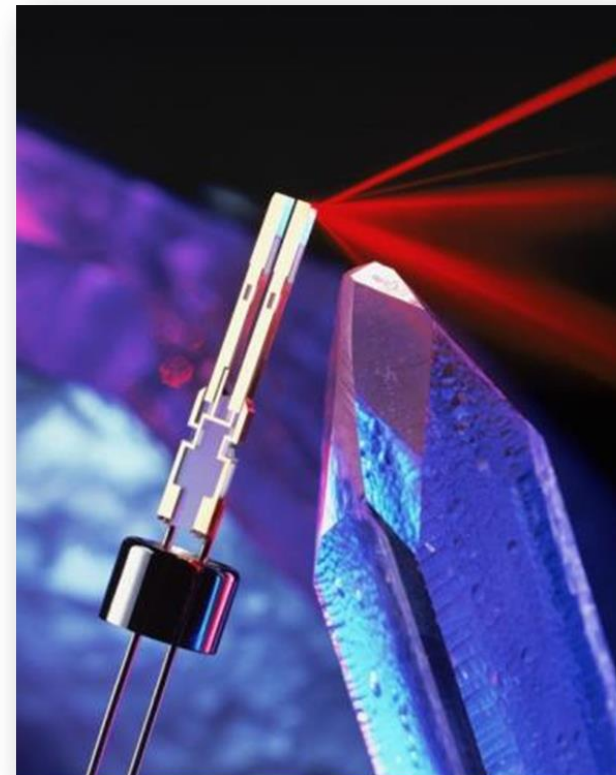
High quality, high volume production at competitive prices



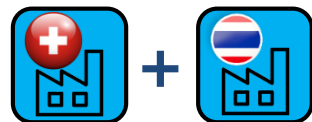
Top supplier serving various applications like IoT, wearables, automotive control, metering or pacemaker



Production capacity of multiple hundred million pieces per year



> 500 Employees worldwide



Facilities located in Switzerland and Thailand



Headquarters
R&D
Production
Switzerland



Production

Bangkok
Thailand



- Sales Offices
- Production Locations



Valid for Switzerland and Thailand



9001

Since 1998

Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. 01 100 2115881/01

Certificate Holder: **MICRO CRYSTAL AG**
MUEHLESTRASSE 14 CH-2540
GRENCHEM
Switzerland

Scope: Design and manufacture of miniature quartz crystals, oscillators and real-time clock modules

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-04-22 until 2024-04-21.
First certification 2018

2021-07-12

TUV
TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com



14001

Since 2005

CERTIFICATE

International Certification Management GmbH

Micro Crystal AG

(HQ)
Muehlestrasse 14
2540 Grenchen
SCHWEIZ

Standard: **ISO 14001:2015**

Scope: Development and Manufacture of miniature Quartz Crystals, Oscillators and Real-Time Clock Modules

With this certificate it is confirmed, that the Micro Crystal AG (HQ) with the locations specified in the appendix applies an environmental management system which meets the requirements of ISO 14001:2015.

HL
Certification Body, January 12, 2021



International Certification
Management GmbH
Ohmstrasse 2-4
94542 Strauskirchen
Germany

Tel.: +49 9424 9181 400
Fax: +49 9424 9181 420

info@ic-management.com
www.ic-management.com

ZERTIFIKAT
CERTIFICATE
CERTIFICAT
CERTIFICATO
CERTIFICADO

International
Certification
Management



Certificate No.
A2012289

Issue date
December 28, 2020

Valid until
December 27, 2023

Page 1 of 2



16949

Since 2017

Certificate

Standard **IATF 16949:2016**
(1st edition, 2016-10-01)

Certificate Registr. No. 01 111 1715901/02
IATF Certificate No. 0400888

Certificate Holder: **Micro Crystal A Division Of Eta**
(Thailand) Co. Ltd.
439 Moo 17 Bangplee Industrial Estate
A. Bangsaothong Samutprakarn 10570
Thailand

With remote location(s) according to annex

Scope: Design and Manufacture of miniature Quartz Crystals, Oscillators and Real-Time Clock Modules

Proof has been furnished by means of an audit that the requirements of IATF 16949:2016 are met.

Validity: The certificate is valid from 2021-05-24 until 2024-05-23.

Release date: 2021-05-25



2-IAD-QMC 01003

TUV
TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln
Germany · NRW

www.tuv.com



Total Sales by Region in 2021

Americas

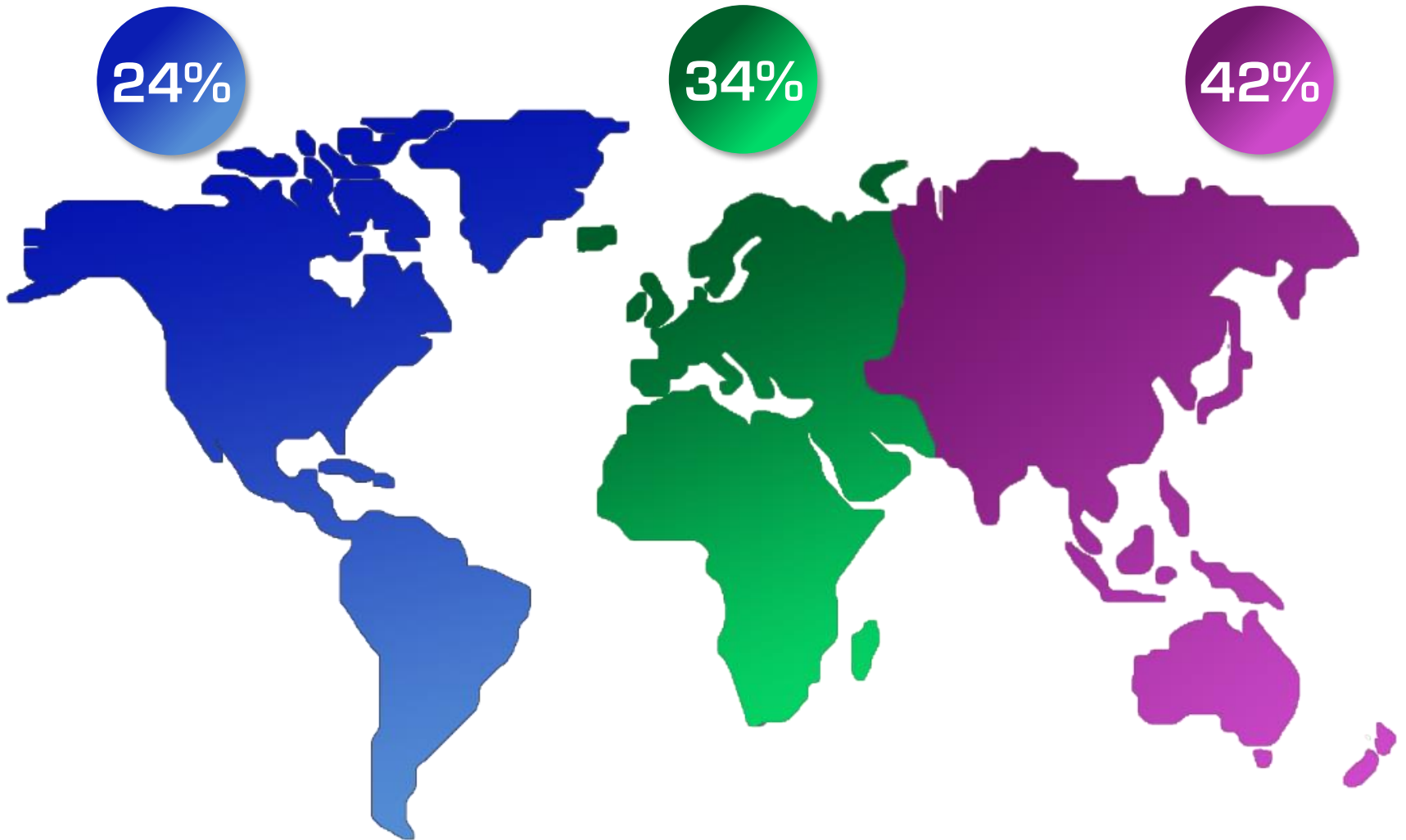
24%

EMEA

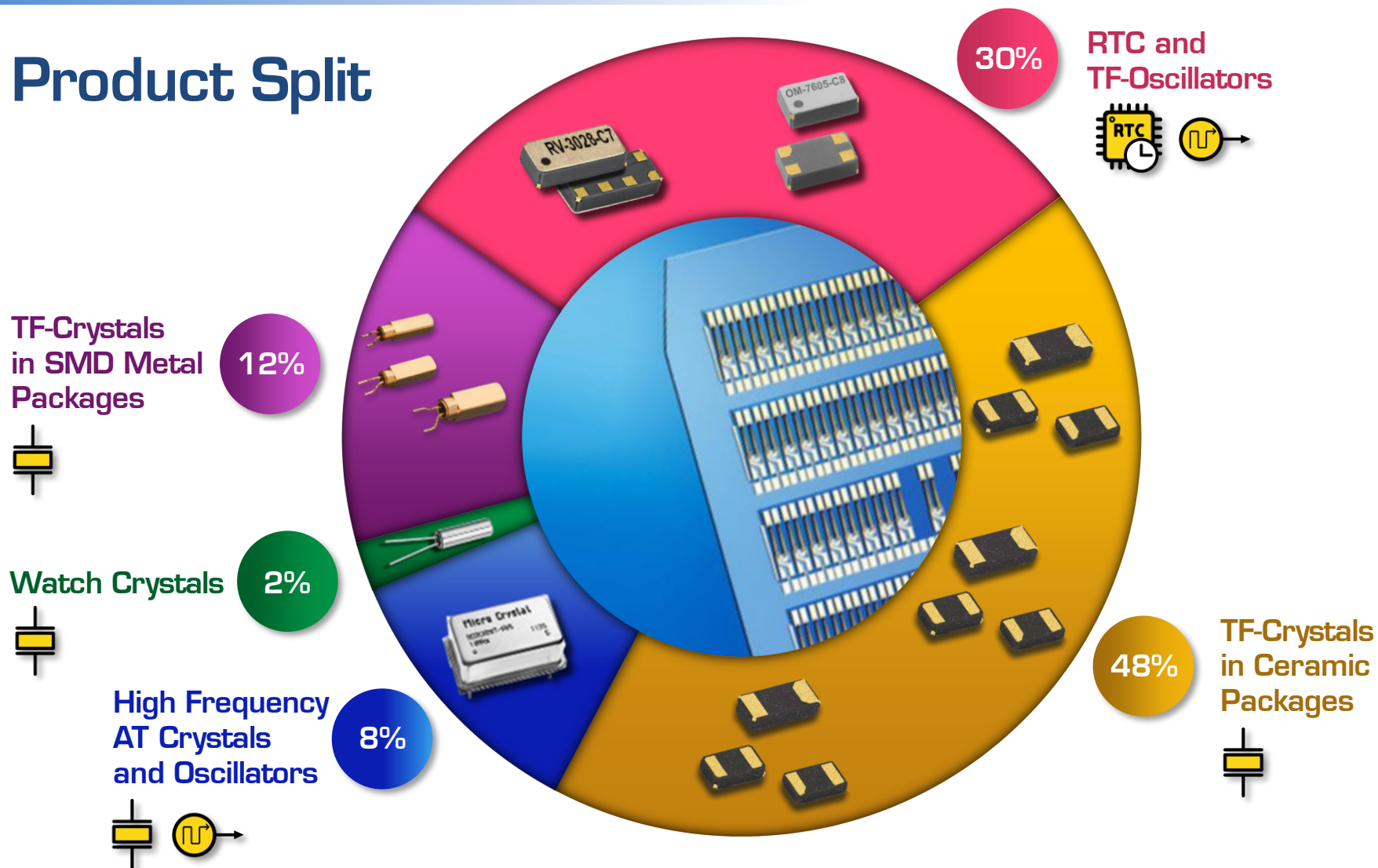
34%

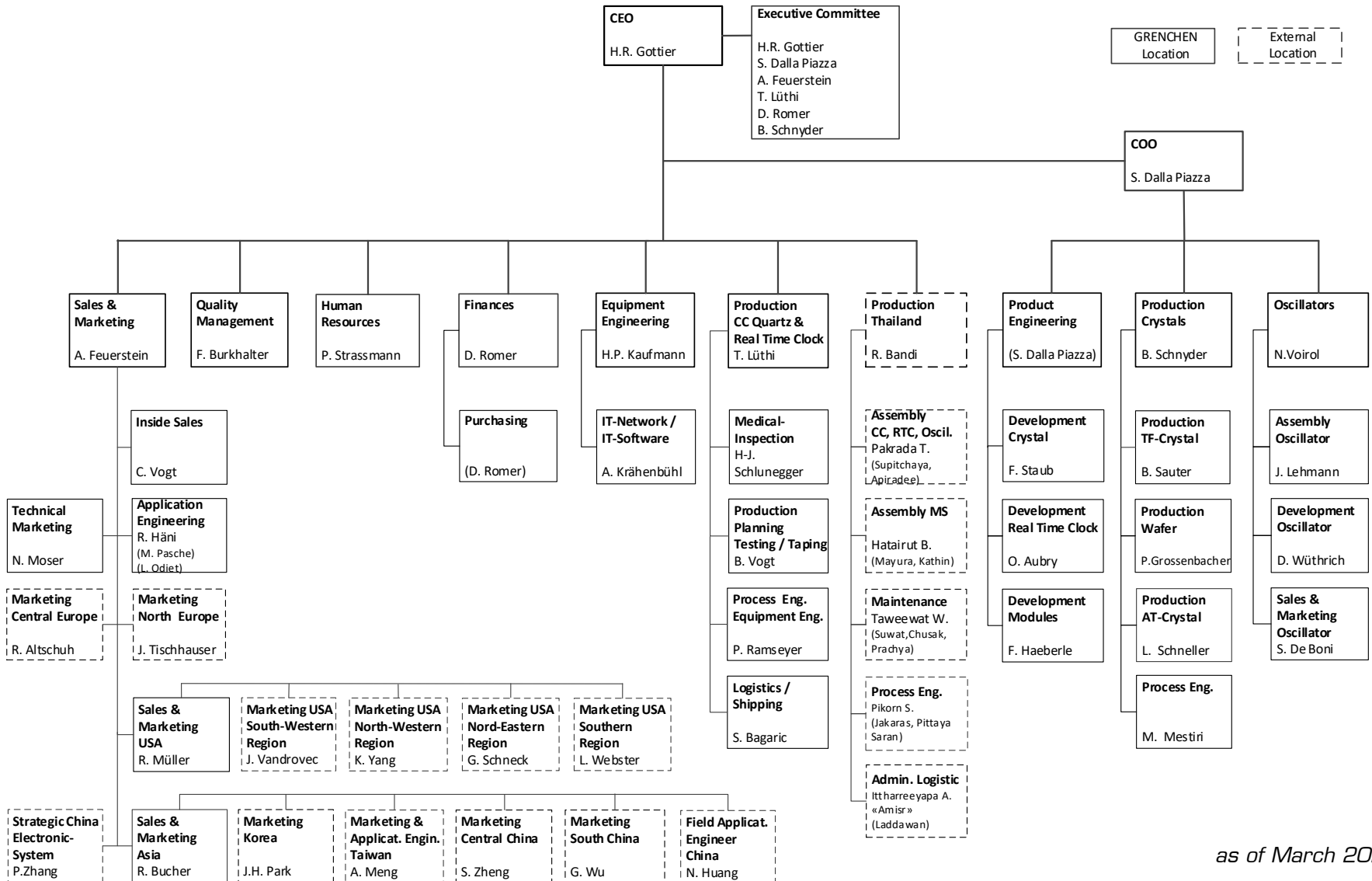
APAC

42%

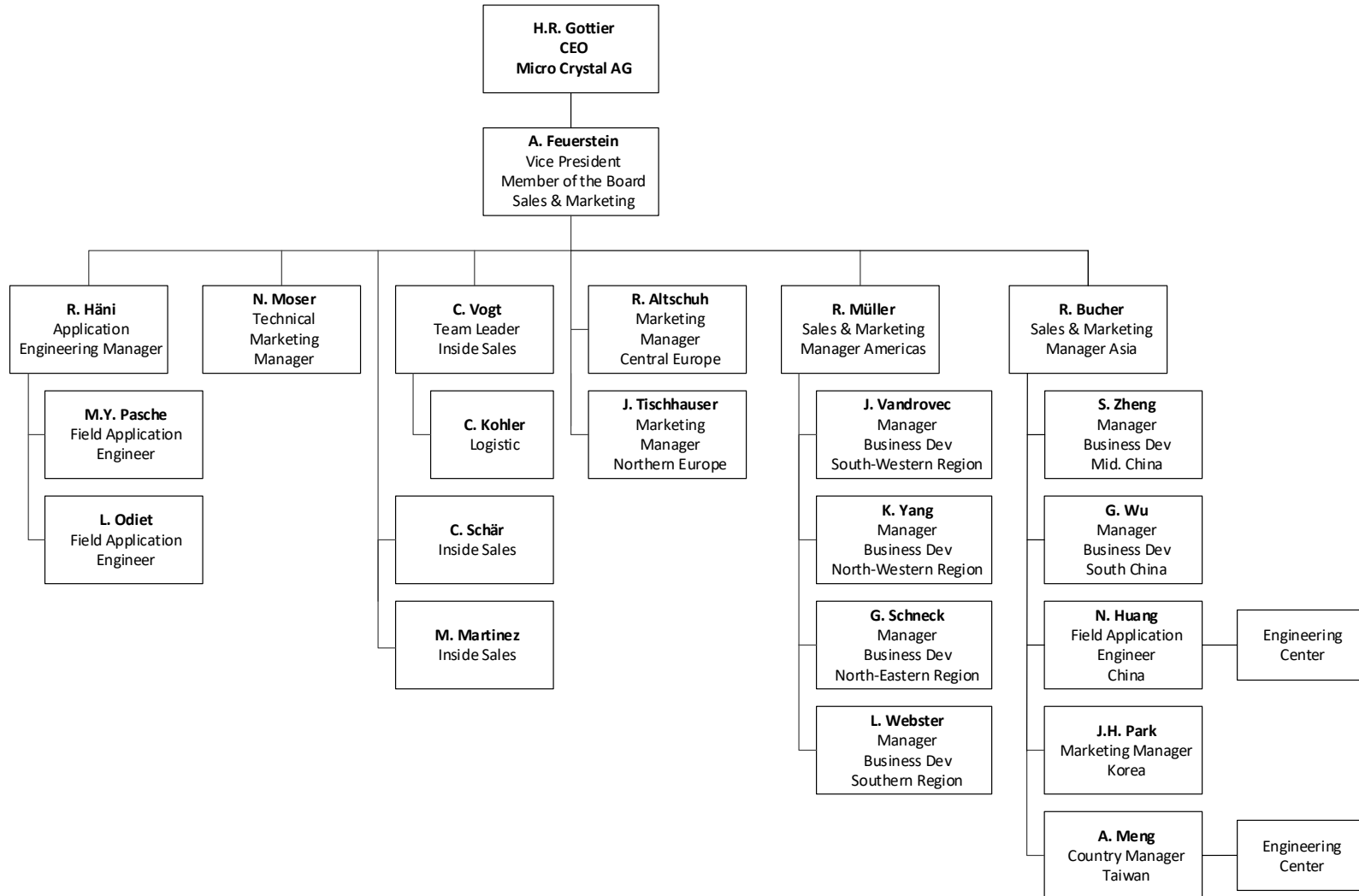


Product Split





as of March 2022



as of March 2022

Market Segments

Automotive and Industrial

Smart Grid, Factory Automation,
Telemetry, Metering, White Goods



Medical

Glucose Meters, Defibrillators, Pacemakers
Neurostimulators, Insulin Pumps, Smart Implants



Consumer

Smart Phones, POS Terminals,
Notebooks, Wearables, IoT



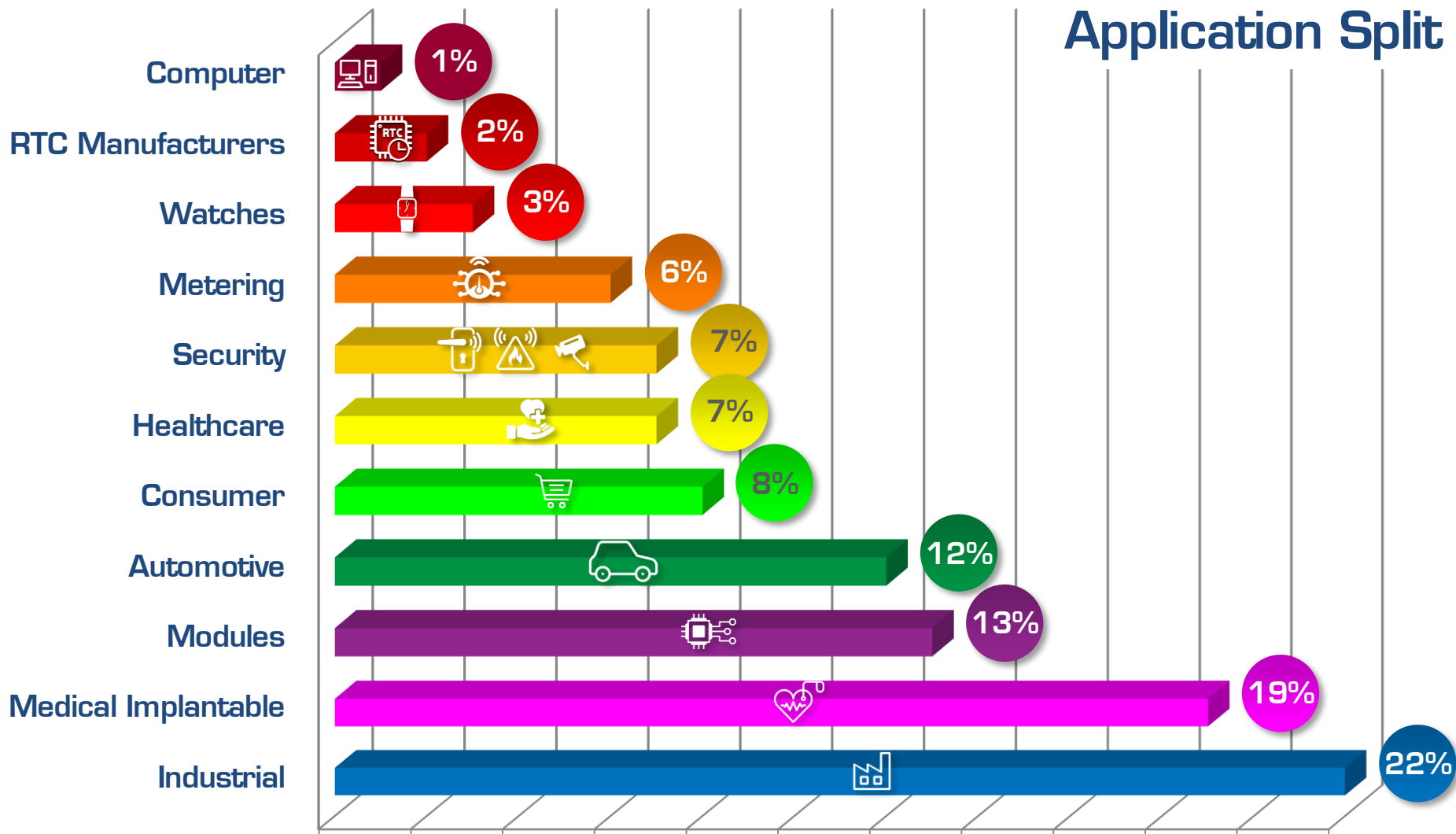
High Reliability Applications

Down Hole Drilling, Avionics,
Base Stations, Aerospace

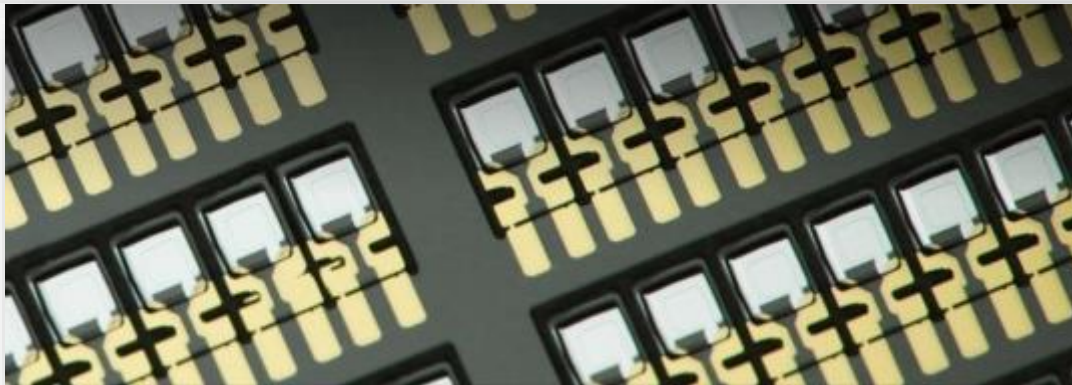
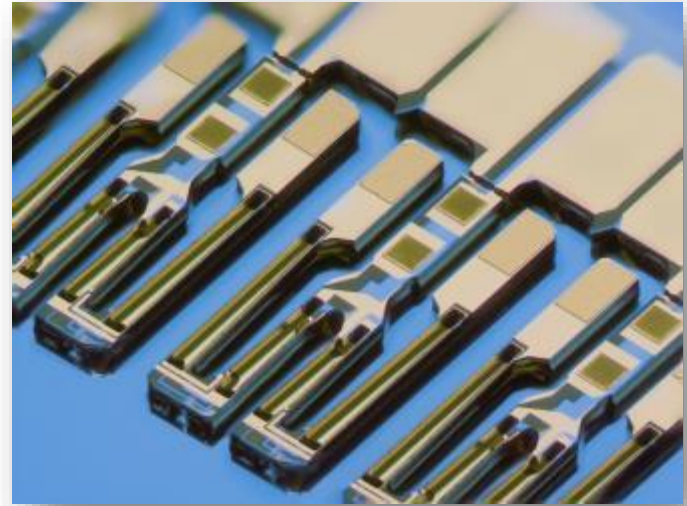
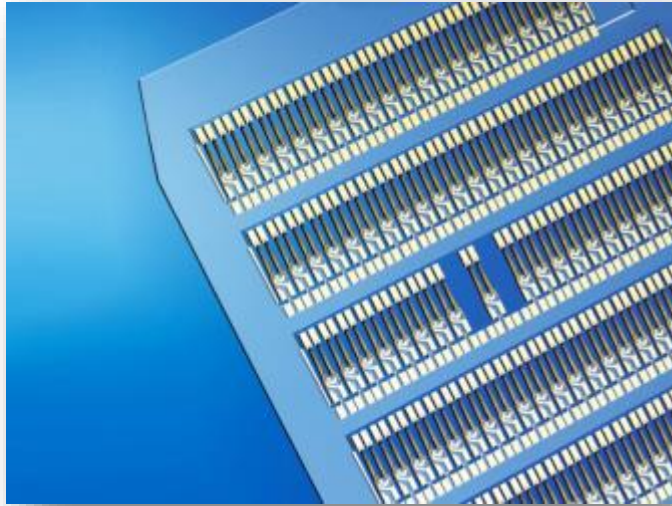


Turnover by Applications 2021

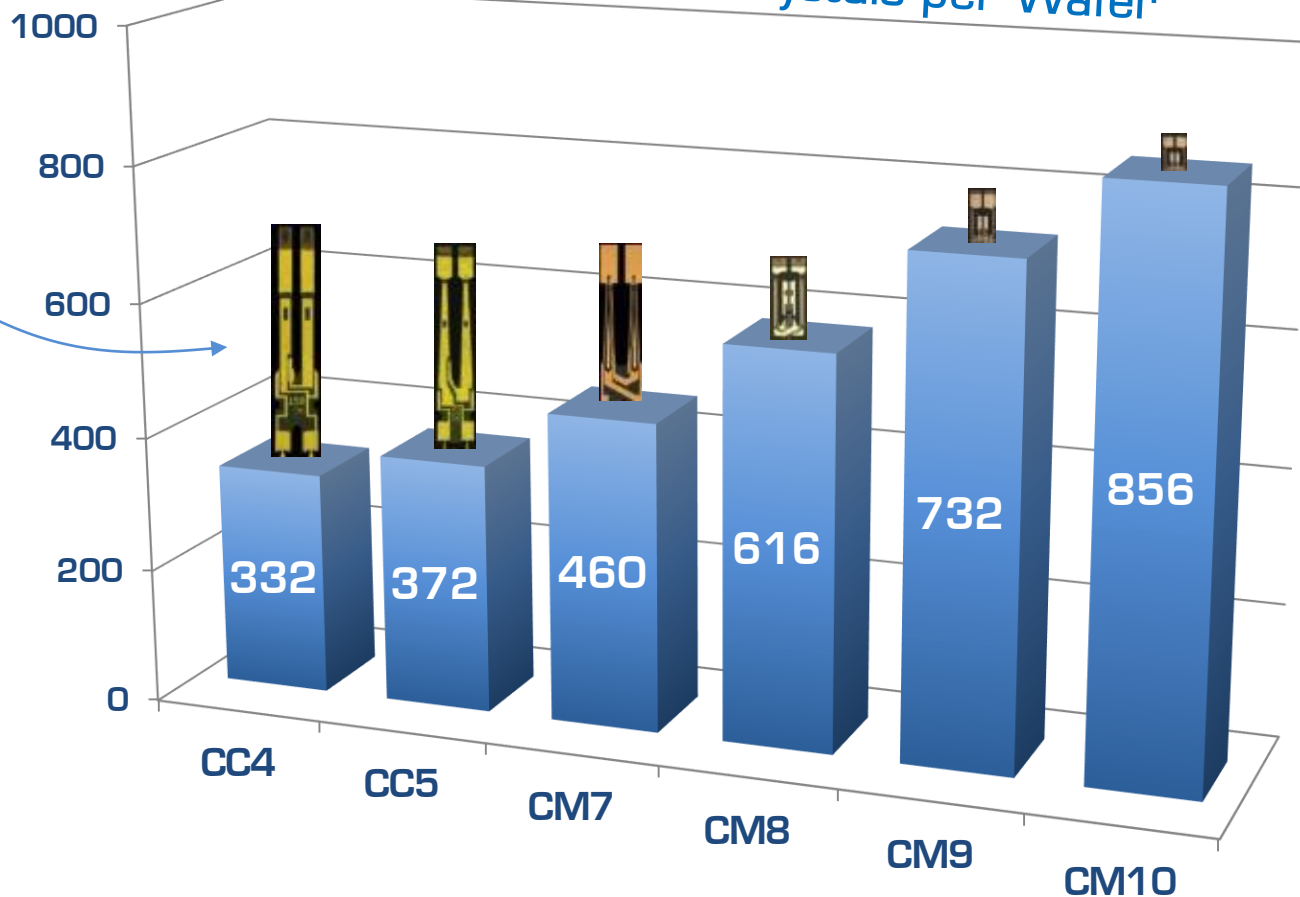
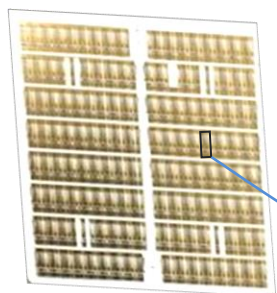
Application Split

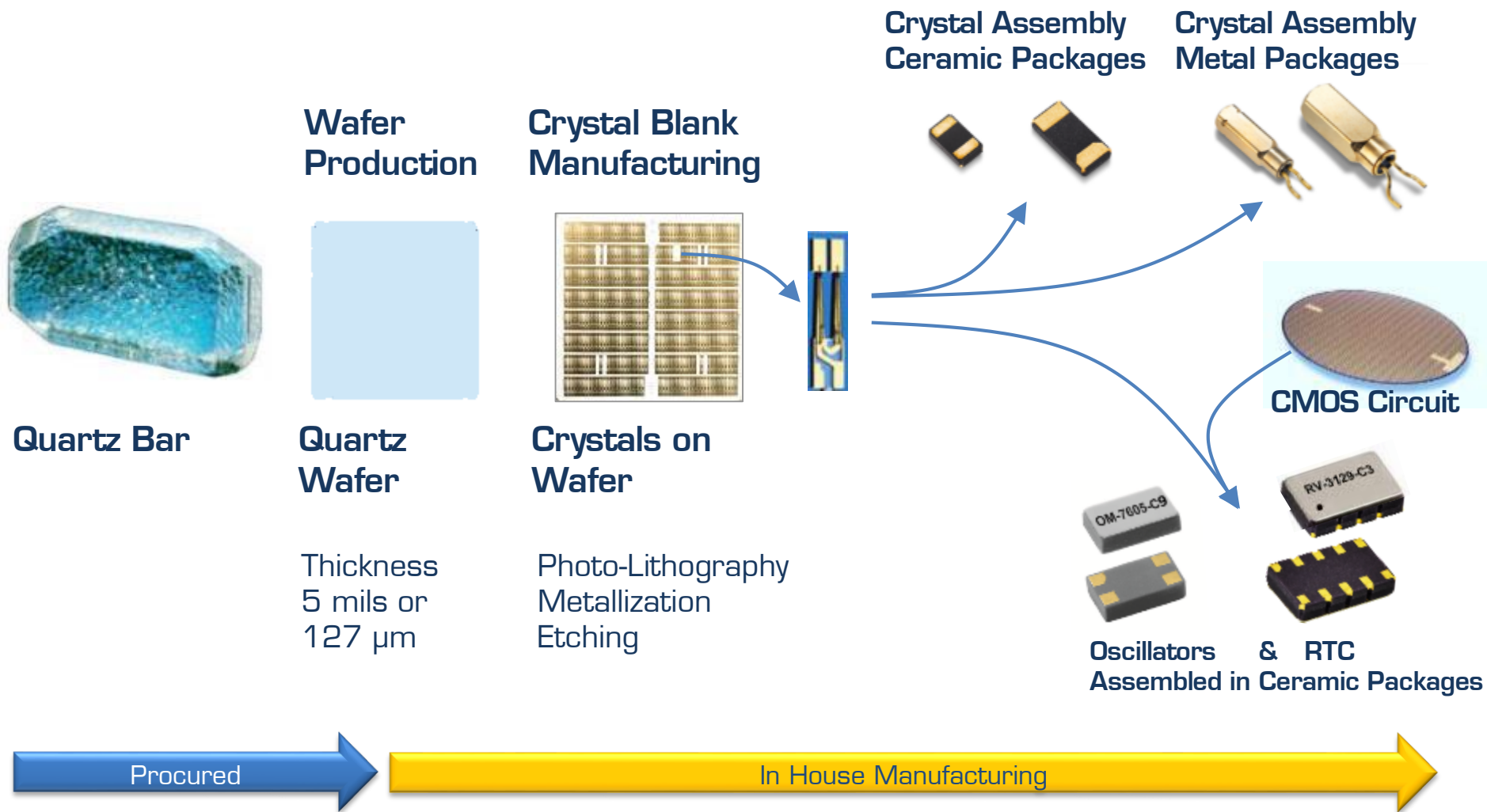


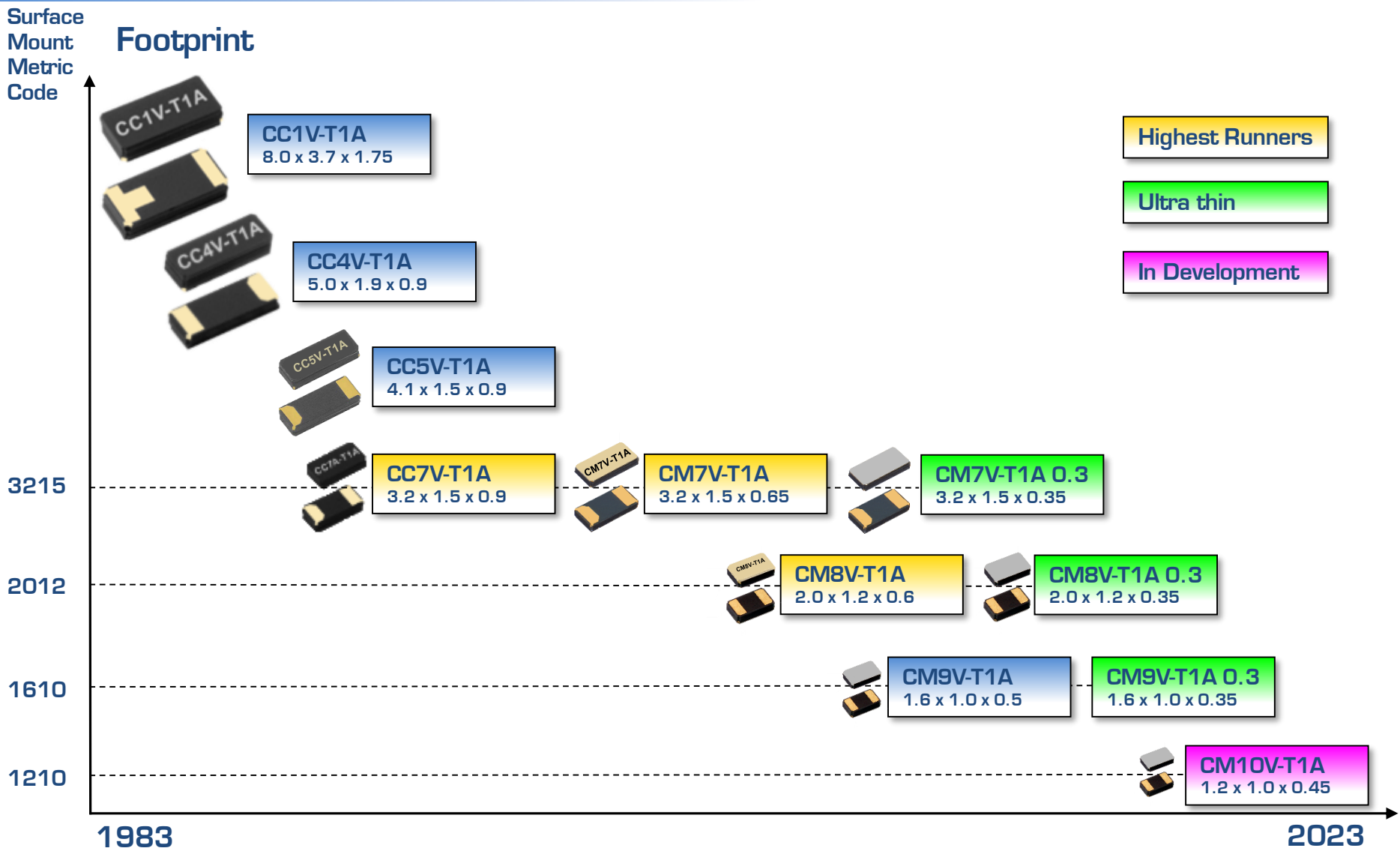
Wafers with Quartz Crystals



Number of Crystals per Wafer









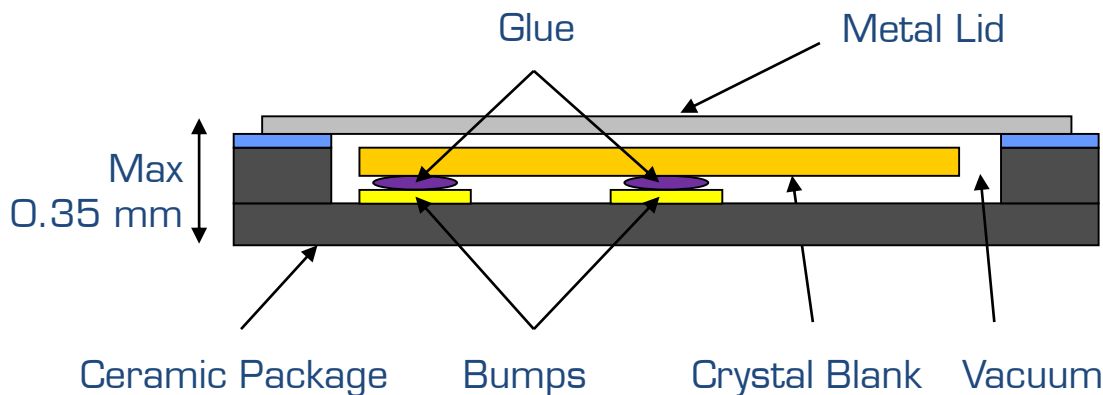
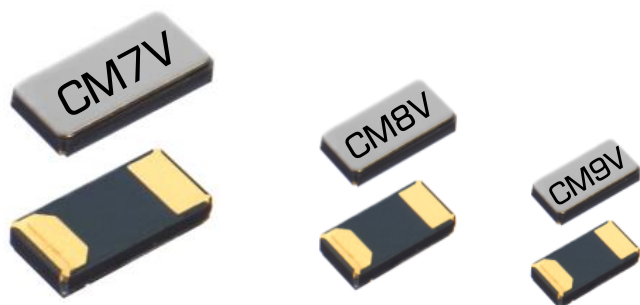
Thin and Small

Ultra Low Profile: 0.35 mm max height
to achieve 0.8 mm ISO cards requirements

CM8V-T1A 0.3 2.0 x 1.2 x 0.35 mm

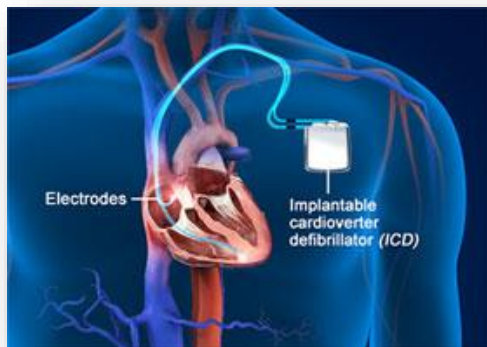
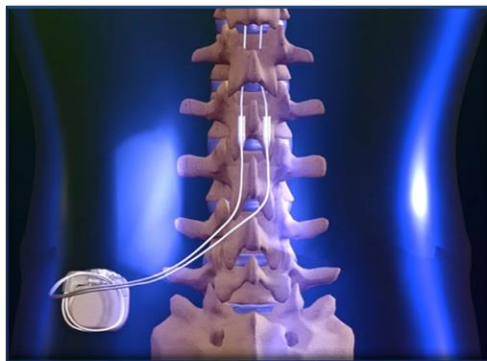
CM9V-T1A 0.3 1.6 x 1.0 x 0.35 mm

NEW



Leading Supplier for Electromedical and Active Implantable Devices

Where Performance, Reliability, Quality and Size are at a Premium.



Low Frequency Crystals

- CC7V, CC8V

MHz Crystals

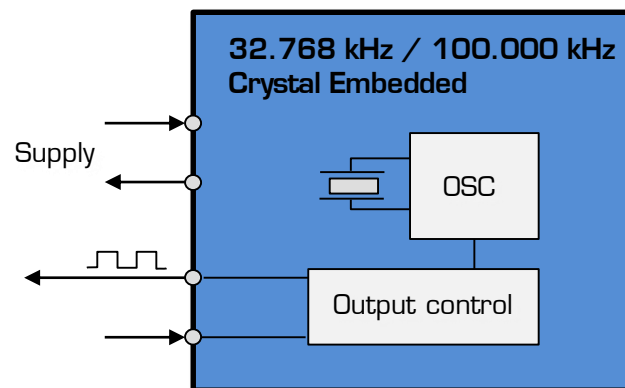
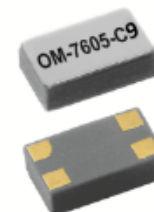
- CC7A, CC8A

Oscillators

- OV-C7, OV-C8, OV-C9

Real-Time Clock Module

- RV-5028-C7



**Ultra Low Power Consumption
Miniature Ceramic Package**

OM-7604-C7 32.768 kHz
OM-0100-C7 100.000 kHz
3.2 x 1.5 x 0.7 mm
3215

OM-7605-C8 32.768 kHz
OM-0100-C8 100.000 kHz
2.0 x 1.2 x 0.7 mm
2012

OM-7605-C9 32.768 kHz
1.6 x 1.0 x 0.5 mm
1610

Comparison

RV-C2



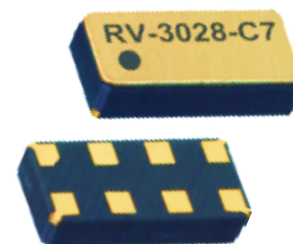
C2 Package
5.0 x 3.2 x 1.2 mm

RV-C3



C3 Package
3.7 x 2.5 x 0.9 mm

RV-C7



C7 Package
3.2 x 1.5 x 0.8 mm

SIZE

POWER CONSUMPTION

FREQUENCY TOLERANCE

Product Type	Interface	Features	IDD @ 3 V	Time Accuracy @ 25°C	Temp Comp -40 / 85°C	VDD min	VDD max	TMAX [°C]	Temp. Readback	Clock Out	Battery Switch	Battery Charge	Charge Pump	Time Stamp	Alarm	Timer	Event Input	Unix Time	Offset Comp	RAM [Bytes]	EEPROM [Bytes]
New RV-3032 -C7	I ² C	  	160 nA		±2.5 ppm	1.3 V	5.5 V	+85	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	16	32
New RV-5028 -C7	I ² C	   	45 nA	±1 ppm		1.1 V	5.5 V	+85		✓	✓	✓		✓	✓	✓	✓	✓	✓	2	43
RV-3028 -C7	I ² C	  	45 nA	±1 ppm		1.1 V	5.5 V	+85		✓	✓	✓		✓	✓	✓	✓	✓	✓	2	43
RV-8803 -C7	I ² C	  	240 nA		±3 ppm	1.5 V	5.5 V	+105		✓				✓	✓	✓	✓		✓	1	
RV-8263 -C7	I ² C		190 nA	±20 ppm		0.9 V	5.5 V	+85		✓					✓	✓			✓	1	
RV-4162 -C7	I ² C		350 nA	±20 ppm		1.0 V	4.4 V	+85		✓					✓				✓		
RV-8523 -C3	I ² C		130 nA	±20 ppm		1.2 V	5.5 V	+85		✓	✓				✓	✓			✓		
RV-8564 -C3	I ² C		250 nA	±20 ppm		1.2 V	5.5 V	+85		✓					✓	✓					
RV-8564 -C2	I ² C		250 nA	±20 ppm		1.2 V	5.5 V	+85		✓					✓	✓					
RV-3129 -C3	I ² C		800 nA		±6 ppm	1.3 V	5.5 V	+125	✓	✓	✓	✓			✓	✓				8	2
RV-8063 -C7	SPI		190 nA	±20 ppm		0.9 V	5.5 V	+85		✓					✓	✓			✓	1	
RV-2123 -C2	SPI		130 nA	±20 ppm		1.1 V	5.5 V	+85		✓					✓	✓			✓		
RV-3149 -C3	SPI		800 nA		±6 ppm	1.3 V	5.5 V	+125	✓	✓	✓	✓			✓	✓				8	2

Package [mm]

C2



5.0 x 3.2 x 1.2

C3



3.7 x 2.5 x 0.9

C7



3.2 x 1.5 x 0.8



Standard Features



Small Package



Medical

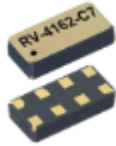


High Accuracy



Low Power

C7 Package
3.2 x 1.5 x 0.8 mm



RV-3032-C7 I²C
High Stability

RV-3028-C7 I²C
RV-5028-C7 
XTreme Low Power

RV-8803-C7 I²C
High Stability

RV-4162-C7 I²C
Standard Features

RV-8263-C7 I²C
RV-8063-C7 SPI
Standard Features

C3 Package
3.7 x 2.5 x 0.9 mm



RV-3129-C3 I²C
RV-3149-C3 SPI
High Stability (+125 °C)

RV-8523-C3 I²C
Ultra Low Power

RV-8564-C3 I²C
Standard Features

C2 Package
5.0 x 3.2 x 1.2 mm



RV-8564-C2 I²C
Standard Features

RV-3029-C2 I²C
RV-3049-C2 SPI
High Stability (+125 °C)

RV-2123-C2 SPI
Ultra Low Power

Available also with AEC-Q200 automotive qualification

RTC Modules



World's lowest power consumption!



World's smallest size!

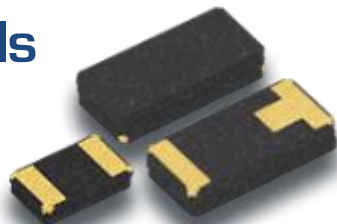


World's highest accuracy!



World's smallest temperature compensated!

AT / HFF Crystals



AT Frequency Range: 8 – 30 MHz
 HFF Frequency Range: 30 – 250 MHz
 High Temperature Version up to 200°C

OCXOs



Frequency Range: up to 120 MHz
 High Stability 0 to +60°C: ± 0.025 ppm
 High Stability -40 to +85°C: ± 0.1 ppm

Clock Oscillators



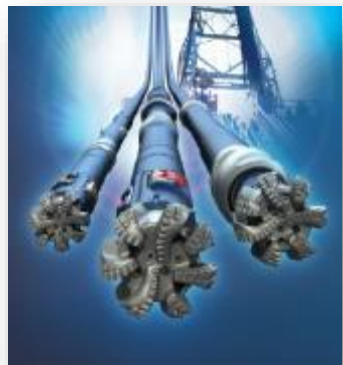
Frequency Range: 10 kHz – 225 MHz
 High Temperature Version up to 250°C

VCXOs



Frequency Range: 5 MHz – 170 MHz
 High Temperature Version up to 210°C

Proven track record with high performance
and high reliability applications



Telemetry
Cospas-Sarsat
Radio Receivers
Animal Tracking
Medical Implantable
Avionics / Aerospace
Oil & Gas / Downhole Drilling
Land & Mobile Telecommunications
GPS Position & Navigation / Time & Synchronization

New MCOCXO

Oven Controlled Crystal Oscillator in a small SMD ceramic package, with the following characteristics:

- Full ceramic package hermetically sealed
- Only 14.1 x 9.3 x 6.2 mm
- RoHs compliant – 100% lead-free
- Output Frequency up to 120 MHz
- Stability $\leq \pm 75$ ppb from 0 to +60°C



Operating Temperature Range	Vdd = 3.3 V $\pm$ 0.15 V
A = 0 to +60°C	$\leq \pm 75$ ppb
B = -20 to +70°C	$\leq \pm 150$ ppb
C = -40 to +85°C	$\leq \pm 250$ ppb

Coming soon

Thank You