  
**SWATCH GROUP**  
ELECTRONIC SYSTEMS

[www.sg-electronicssystem.com](http://www.sg-electronicssystem.com)

# SEMICONDUCTORS



EM Microelectronic is a semiconductor manufacturer specialized in ultra low power, low voltage integrated circuits for consumer, healthcare, automotive and industrial applications.

# CRYSTALS, RTCs, OSCILLATORS



The leader in precise and accurate timing products, Low Frequency Tuning Fork Quartz Crystals, Real-Time Clocks (RTC) and Oscillators.

# BATTERIES AND RECHARGEABLES



Renata the world-class leader in coin cells from Switzerland, also offers a comprehensive range of rechargeable microbatteries.

designs and manufactures ultra low power integrated circuits for connectivity, identification, sensing and energy harvesting. Its highly energy efficient technologies enable devices to run longer and smarter across consumer, medical, logistics, automotive and industrial automation markets, offering both standard ICs and tailor made silicon solutions.



## BLUETOOTH® LE ICs, MODULES & LABELS

Small-package Bluetooth® LE SoC ICs with industry-leading sleep currents, delivering maximum battery life for our Bluetooth® LE modules, beacons, and labels.

Applications: Medical devices, healthcare RTLS, asset tracking, consumer electronics, smart home devices, cold-chain monitoring.



## RFID ICs

Delivering ultra low power RFID innovation with advanced RAIN performance, dual frequency intelligence, and reliable ICs that connect products, systems, and people worldwide.

Applications: Access control, brand protection, anti-counterfeiting, animal ID, logistics, road tolling.



## POWER MANAGEMENT ICs

Ultra efficient power management ICs delivering smart energy harvesting, reliable multi source conversion, and long life performance for compact, self sustaining IoT devices.

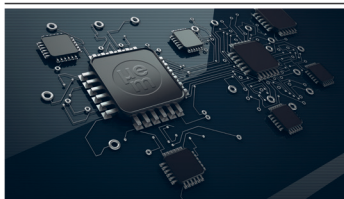
Applications: Battery management, solar-powered IoT, field-powered sensors.



## SENSING ICs

Empowering innovative devices with ultra low power sensing ICs that deliver precise motion, pressure, optical, and hall effect performance.

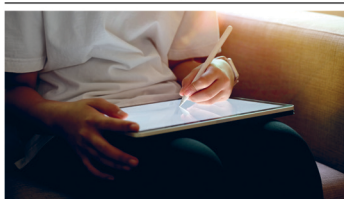
Applications: Wearables, environmental monitoring, smart home devices.



## AUTOMOTIVE ICs

Automotive-grade custom ICs delivering secure access, reliable immobilization, and efficient connectivity through advanced RFID, NFC, and Bluetooth® LE technologies for modern vehicles.

Applications: Keyless entry, immobilizers.



## CUSTOM DISPLAYS

Tailor made display solutions combining advanced materials, curved form factors, and precision optics.

Applications: Wearables, smart metering, intelligent building controls, urban / micro-mobility, user Interfaces for industrial machines and handhelds, medical devices.

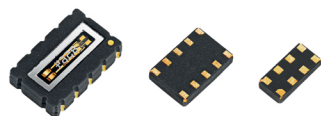
**Let us power your next breakthrough**  
Connect with an EM Microelectronic expert today.

HEADQUARTERS / EUROPE  
EM MICROELECTRONIC SA  
Rue des Sors 3  
2074 Marin  
Switzerland  
Phone: +41 32 755 5111  
www.emmicroelectronic.com  
info@emmicroelectronic.com

USA  
EM MICROELECTRONIC US INC.  
5475 mark Dabling Blvd.  
Suite 200 CO 80918  
Colorado Springs United States  
www.emmicroelectronic.com  
info@emmicroelectronic.com

ASIA, PACIFIC  
EM MICROELECTRONIC  
HONG KONG OFFICE  
SHANGHAI OFFICE  
SHENZHEN OFFICE  
SINGAPORE OFFICE  
TAIWAN OFFICE  
www.emmicroelectronic.com  
info@emmicroelectronic.com

is a leading manufacturer of Miniature Tuning Fork Quartz Crystals (32kHz to 250MHz), Real-Time Clock and Temperature Modules, Oscillators and OCXOs for the world's leading manufacturers of mobile phones, consumer products, computers, automobile electronics, watches, industrial controls, as well as medical implantable devices and other high-reliability product applications.



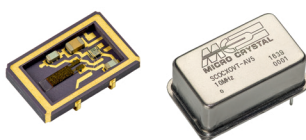
## REAL-TIME CLOCKS MODULES

- Lowest power 45 nA
- Highest accuracy  $\pm 0.22$  s/day,  $\pm 2.5$  ppm
- Temperature compensation -40 to +125°C
- Smallest package  $2.0 \times 1.2 \times 0.7$  mm



## LOW POWER OSCILLATORS

- 32.768 kHz
- 100.000 kHz
- Lowest power, tuning fork



## MHZ OSCILLATORS

- XO up to 210°C
- VCXO up to 210°C
- OCXO up to 120 MHz
- Low power and high stability  $\pm 30$  ppb, < 120 mW



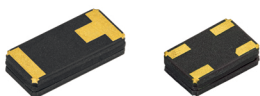
## TEMPERATURE SENSOR MODULE

- Lowest power 160 nA
- High precision and accuracy  $\pm 1^\circ\text{C}$ , 12-bit resolution
- Temperature range -40 to +105°C
- Alarm and timestamp functions



## KHZ TF CRYSTALS

- 32.768 kHz
- Tuning fork crystal
- Miniature ceramic SMD



## MHZ AT-CUT CRYSTALS

- Frequency up to 250 MHz
- High temperature up to 200°C
- High-end applications

HEADQUARTERS  
MICRO CRYSTAL AG  
Muehlestrasse 14  
CH-2540 Grenchen  
Switzerland  
Phone: +41 32 655 82 82  
sales@microcrystal.com

EUROPE  
NORTHERN EUROPE  
Phone: +44 7483 449 531  
sales.nordic@microcrystal.com

EUROPE  
CENTRAL AND SOUTHERN  
EUROPE Phone: +49 6021 58 20 79 1  
sales.germany@microcrystal.com

AMERICAS  
WESTERN US  
WESTERN CANADA  
Phone: +1 650 495 6649  
sales.us@microcrystal.com

AMERICAS  
SOUTHERN US  
MEXICO AND SOUTH AMERICA  
Phone: +1 949 231 0972  
sales.us@microcrystal.com

AMERICAS  
NORTHEASTERN US  
EASTERN CANADA  
Phone: +1 978 302 3135  
sales.us@microcrystal.com

ASIA  
CHINA SHANGHAI  
Phone: +86 21 2412 5280  
sales.shanghai@microcrystal.com

ASIA  
CHINA SHENZHEN  
Phone: +86 755 8832 0687  
sales.shenzhen@microcrystal.com

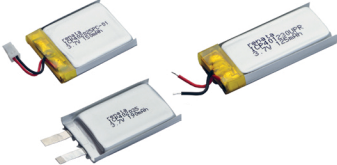
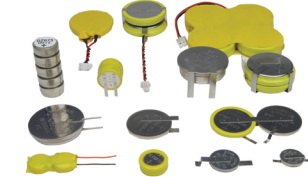
ASIA  
KOREA  
Phone: +82 2 3149 8290  
sales.korea@microcrystal.com

ASIA  
TAIWAN  
Phone: +886 2 2652 3689  
sales.taiwan@microcrystal.com

Within only a few years, the company became a leading manufacturer and supplier of coin cells for watches and many electronic product areas (medical technology, RFID, radio control, metering, and many more).

Renata lithium batteries meet the highest quality standards and offer excellent reliability.

Sufficient inventory as well as a network of dedicated importers and distributors make Renata products readily available world-wide.

|                                                                                    |                         |                                                                                                                                                 |                 |
|------------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
|    | PRIMARY CELLS           | <ul style="list-style-type: none"><li>— Silver-Oxide</li><li>— Lithium</li></ul>                                                                | 1.55 V<br>3.0 V |
|    | SECONDARY CELLS         | <ul style="list-style-type: none"><li>— Lithium-Cobalt-Oxide</li><li>— Lithium-Cobalt-Oxide</li></ul>                                           | 3.7 V<br>3.85 V |
|   | RECHARGEABLE COIN CELLS | <ul style="list-style-type: none"><li>— Lithium</li></ul>                                                                                       | 3.7 V<br>3.85 V |
|  | BATTERY HOLDERS         | <ul style="list-style-type: none"><li>— Metal low profile</li><li>— Thru hole mounted</li><li>— Surface mounted</li><li>— Gold plated</li></ul> |                 |
|  | CUSTOMIZED SOLUTIONS    |                                                                                                                                                 |                 |



|                                                                                                                                                                                 |                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HEADQUARTERS<br>SWITZERLAND -<br>ITINGEN RENATA SA<br>Kreuzenstrasse 30 4452<br>Itingen<br>Phone: +41 61 975 75 75<br>sales@renata.com<br>www.renata.com<br>www.swatchgroup.com | USA<br>MIAMI<br>THE SWATCH GROUP (U.S.)<br>LNC. RENATA BATTERIES<br>DIVISION 703 Waterford Way,<br>Suite #450 Miami - FL 33126<br>Phone: +1 786 725 5444<br>renata_sales@swatchgroup.com<br>www.renata.com | ASIA<br>SINGAPORE AND CHINA<br>THE SWATCH GROUP S.E.A. (S) PTE<br>LTD No. 2 Boon Leat Terrace #06-01/04<br>Harbourside Building 2<br>Singapore 119844<br>WeChat ID / WhatsApp / LINE / DID:<br>+65 9671 5101<br>sales@renata.com<br>keanwah.yeap@swatchgroup.com.sg | ASIA<br>SHANGHAI QIHENG TRADING CO.,<br>LTD ZHUHAI BRANCH<br>Room 401, 4/F, Building B,<br>XH Technology Park, No.78 Fulin Road<br>Zhuhai FTZ, Guangdong,<br>China 519000<br>WeChat ID / WhatsApp LINE:<br>+65 9671 5101<br>sales@renata.com<br>keanwah.yeap@swatchgroup.com.sg |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|