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# hf-praxis

**HF and microwave technology**

**Oscillating  
quartz or  
oscillator:**

**The heart of many electronic  
applications**

**PETERMANN-TECHNIK, P. 6**



# Resonant crystal or oscillator - the heart of many electronic applications

*Without a frequency-generating component that functions optimally over a long period of time, even the most expensive and highest-performance IC that requires a clock or a frequency cannot deliver full performance.*



PETERMANN-TECHNIK, founded in 1996, specializes in offers an optimum product solution for every requirement thanks to many years of expert knowledge, high product quality, the best possible delivery reliability and innovative technology.

## The LRT technology

The LRT technology, which is only available from PETERMANN, was and is a pioneer for outstanding quality and product performance. LRT stands for low-ESR resonator technology and is based on 31 patents. The low-resistance quartz resonators not only oscillate extremely safely and very quickly the customer circuit, but also offer the user many advantages at the respective MHz or kHz frequency.

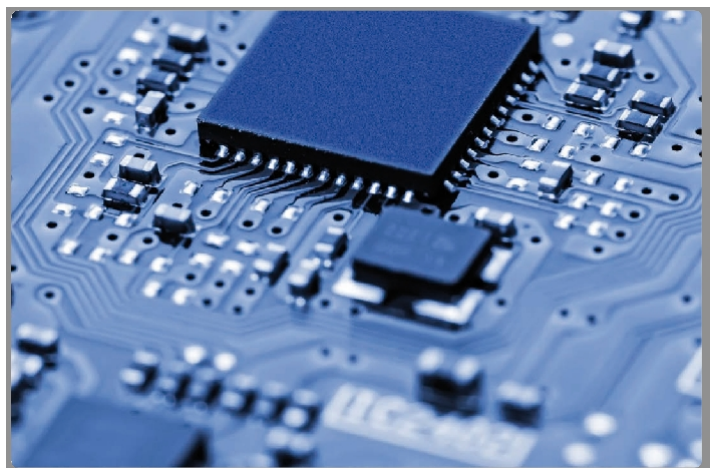
What is the secret behind it? In the PETERMANN TECHNIK

The quartz crystals and oscillators supplied are exclusively LRT's exclusive quartz resonators and offer a wide range of

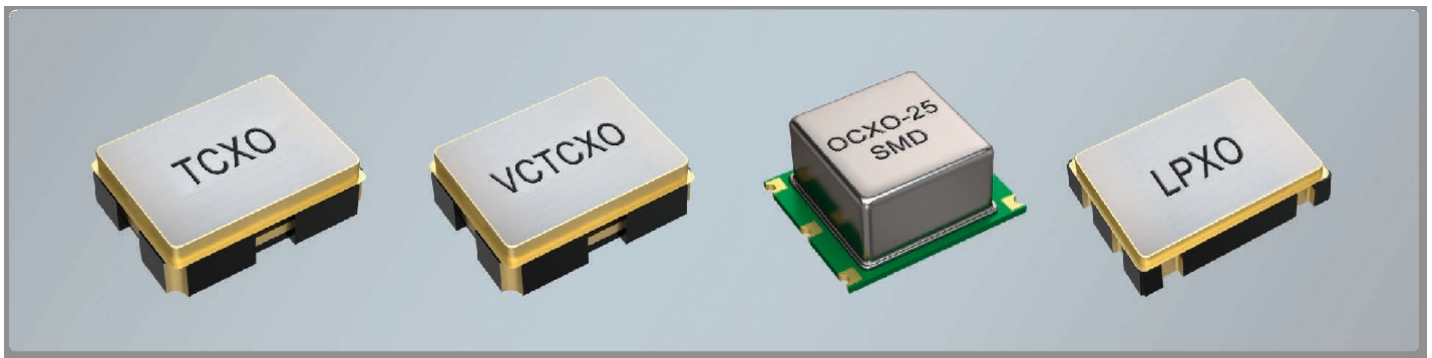
Combination with the 100% Tests absolute top security. So components based on LRT technology offer the user the following advantages:

1. Due to the very low resistance, a significantly faster and safer transient response of the LRT quartz in the circuit is made possible, which reduces the current consumption of the circuit and results in a lower power requirement.
2. Maximum product safety from delivery batch to delivery batch, because

Only quartz resonators developed and manufactured in-house are used in the SMD LRT crystals and oscillators. This means that the same LRT resonator design can always be supplied for the correspondingly specified customer product for many years to come.







### Powerful quartz oscillators

3. Excellent quality and product performance is guaranteed by the 100% testing of the SMD LRT oscillating crystals supplied by PETERMANN-TECHNIK and the -oscillators are guaranteed. From the raw quartz material to the end product, everything is under the control of our own quality assurance department. Pure quality promise, for very durable LRT-based frequency-generating components.

4. Also in quartz oscillators from PETERMANN-TECHNIK, the LRT technology-based crystal resonators are installed. In addition, the oscillator ICs (die's) are also assembled and bonded in the housings, so that everything is under our own QA control for the crystal oscillators too. This means that the users of the quartz oscillators can also benefit from the LRT resonator technology. Another advantage is the low power consumption, even for high frequencies.

### Ultrasonically weldable SMD quartz crystal

Based on LRT technology, PETERMANN is the only supplier in the world that can supply an ultrasonic welding resistant SMD crystal in a 3.2 x 2.5 mm/4 pad housing. Or be the only supplier worldwide to the frequency range from 8 to 285 MHz in the AT base tone with the 3.2 x 2.5 mm/4 pad ceramic housing. Or



in the 2 x 1.6 mm/4 pad ceramic housing the frequency range from 16 to 285 MHz in the AT fundamental or even in the 1.6 x 1.2 mm/4 pad ceramic housing the frequency range from 24 to 285 MHz. This means, for example, that a user of different MHz oscillating crystals can always obtain them in the same housing. This increases delivery reliability and reduces qualification costs.

### The TOTAL QUALITY MANAGEMENT System

PETERMANN-TECHNIK is based on its TOTAL QUALITY MANAGEMENT (TQM) system. Thereby

the customer takes center stage. Their safety, flexibility and performance have top priority. Background:

The demands placed on frequency-generating components such as oscillating quartz crystals or oscillators are as unique as the corresponding customer applications in which the clock generators are used. It is no coincidence that PETERMANN was recently named an employer of the future by the Innovation Institute for Sustainability and Digitalization.

In addition, employee commitment and development, continuous learning, improvement

The company prioritizes innovation, the establishment and further development of cooperations (also worldwide) as well as the development, production and delivery of top-quality components (crystals and oscillators) with delivery reliability, sustainability and longevity.

At [www.petermann-technik.de](http://www.petermann-technik.de), visitors can find various easy-to-use product configurators for quartz crystals and oscillators. Interested parties can choose from the currently largest product portfolio and define their desired product using the product configurator. Samples are available. And small quantities can be ordered or larger quantities requested in the webshop at [www.quarze24.de](http://www.quarze24.de).

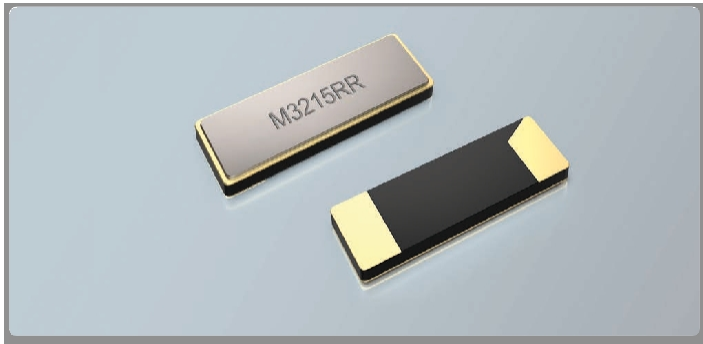
Product advice comes first. From PETERMANN-TECHNIK

customers only receive product proposals that enable absolutely reliable production of their applications for over ten years.

### Securing the supply chain

Securing their supply chains is a top priority for customers. In order to become even more independent of Japanese fine ceramic manufacturers, the company has developed its own housings.





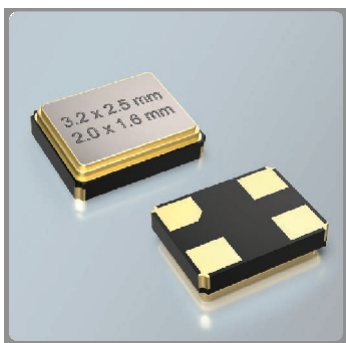
**50 kOhm 32.768 kHz Quartz  
3.2x1.5mm**

developed. For example, for the most commonly used 32.768 kHz quartz in the 3.2x1.5mm/2pad ceramic housing. Or MHz crystals in the 3.2x2.5mm/4pad and 2.0x1.6mm/4pad ceramic housings, as well as oscillating crystals in 7.0x5.0mm/2pads, 6.0x3.5mm/2pads or 5.0x3.2mm/2pad ceramic housings.

When working with PETERMANN TECHNIK customers, the aim is always to enable them to achieve a very fast time-to-market and save costs. The development support services, which can be reliably integrated into the customer's design process without any frictional losses, are correspondingly precise and efficient.

## The CRYSTAL CIRCUIT ANALYSER SERVICE

PETERMANN TECHNIK offers a very comprehensive circuit analysis service under the abbreviation CCAS (Crystal Circuit Analyzer Service).



**Low-ESR quartz crystals in LRT  
technology impress with their  
extremely safe**

service. This the following services, among others:

- Circuit analysis/ -validation/simulation
- 3D models for quick and easy integration of products into layouts
- In-circuit test of the used or the quartz/oscillator to be used based on the IEC60444 quartz standard
- Measuring the current and drive level of quartz crystals
- Determination of the working frequency and the effective load capacity
- Determination of the safety factor and swing safety
- Suggestions for adapting the circuit to the respective quartz or oscillator
- Measured samples with detailed measurement logs (25 °C values and the corresponding temperature)
- Large-scale production support in coordination with the engineering, purchasing, production and QA department of the customer

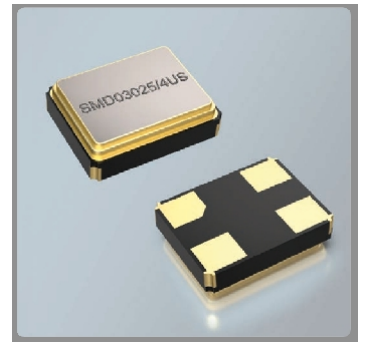
By outsourcing the tests, customers save development time and money and can release the product based on the technically tested and well-founded analysis. LRT oscillator crystals with their very low resistances oscillate very quickly and very reliably in all customer circuits. This also applies to circuits with ICs whose oscillator stages do not have a good negative input voltage.

when the negative input resistance of the oscillator stages of the ICs in the series scatters. This means that the transient response factor (SF) for the SMD LRT crystals is always very high, so that the application designer can develop a reliably functioning circuit by using the LRT crystals. Quick and easy: Connect the crystal to the IC with a short lead, install external circuit capacitances or program the corresponding capacitances internally - done.

## High swing-back safety factors save energy and offer range advantages

A very high SF is particularly important for product safety. Especially in battery-operated applications, the use of resistance-optimized LRT quartz oscillators can reduce the system energy and thus significantly increase the battery life. As the LRT crystals oscillate extremely quickly and reliably due to their very low resistance, much less energy is required to operate the IC. In radio applications in particular, the very high frequency accuracy and the resulting range advantages also have a hugely beneficial effect, meaning that

Telegram transmissions can be completed very quickly and without having to be repeated.



**Low-cost quartz  
for ultrasonic applications**

## Conclusion

Clock generators with excellent performance can provide a competitive advantage, especially in combination with expert know-how. These crystals and oscillators can be used in the following applications, among others: Automotive products/smart meters/medical end products such as hearing aids/telemedicine/M2M/IoT/we arables/wireless (WLAN WiFi, DECT, ISM, LoRa, Mioty, KNX, Bluetooth, BLE, USB, ZigBee, Z-Wave, NFC, BidCos) /Embedded/Industrial- and Robotic-Solutions/GPS, GNSS/UWB-Tracking/Networks/5G ◀

