



## SAW filters for medical applications



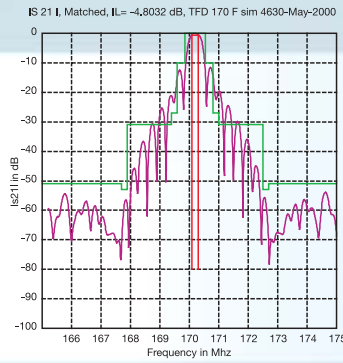
**VECTRON**  
INTERNATIONAL

A **DOVER** COMPANY

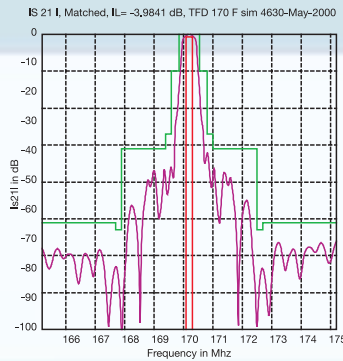
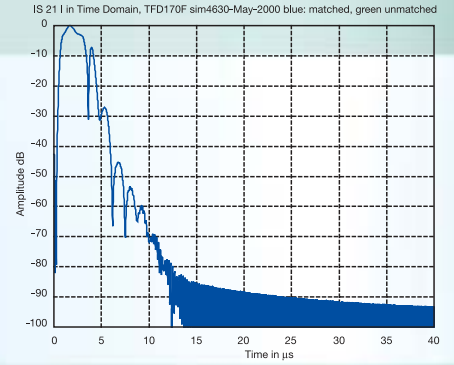


## Requirements for SAW filters for medical applications:

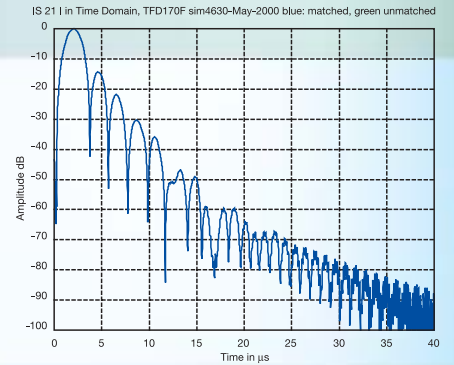
- Low insertion loss
- Sharp filter characteristics and good close-in rejection for small-sized packages
- High reliability
- Single-ended to balanced operations



**Not optimised:**  
Structure is too short to meet rejection requirements of specification. Signal in time domain is attenuated by 70 dB after 10  $\mu$ s.



**Optimised:**  
Length of structure is not changed. Filter meets rejection requirements of specification. Shape of filter characteristic follows limit lines. Signal in time domain is attenuated by 70 dB after 25  $\mu$ s.



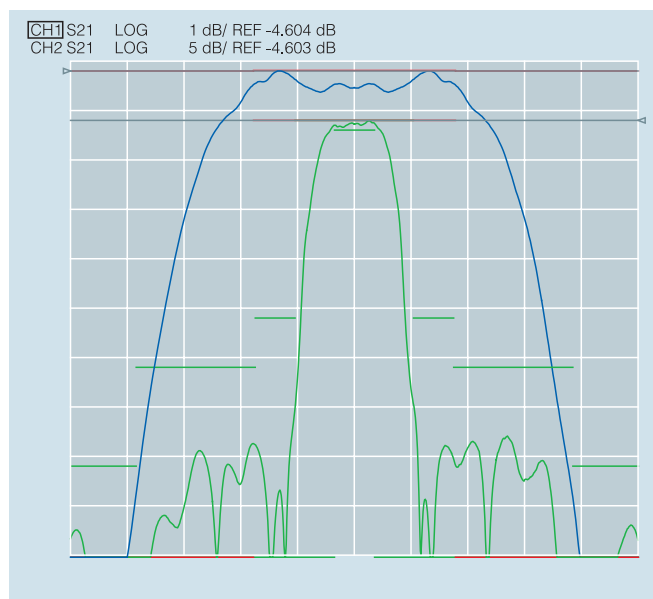
### SAW filters for medical applications:

Optimised SPUDT (Single Phase Unidirectional Transducers) combine transversal and resonant filter design principles to take advantage of either of them. This design principle can support single-ended to balanced operations.

An extremely high reliability is the most important prerequisite for this application. VI-Telefilter has been certified according to the TS16949 standard.

### Design capabilities:

Optimising the transduction and reflection of interdigital transducers improves filter performances while keeping the chip size (filter size) the same. Caused by internal reflections, the signal length in time domain is increased. A better filter performance may be achieved when having a longer signal in the time domain. One of the optimisation parameters may be the insertion loss.





### VI-Telefilter products for medical applications

Most of our SAW filters for medical applications are based on the optimised SPUDT design principle. This provides the best compromise between close-in rejection and low insertion loss for small sized packages. The advantage is given by the design principle and the substrate materials applicable for it. If the insertion loss is more important than close-in rejection, Telefilter uses design techniques based on resonant structures. Considering the bandwidth for medical applications, Telefilter uses substrate materials with higher temperature coefficients. This reduces the close-in rejection, which may be guaranteed in the operating temperature range.

### Medical applications and VI-Telefilter

All VI-Telefilter plants are TS16949 and ISO14000 certified.

VI-Telefilter is using its experience in the development and production of GSM base station filters, where it leads the market to support the upcoming need for medical applications.

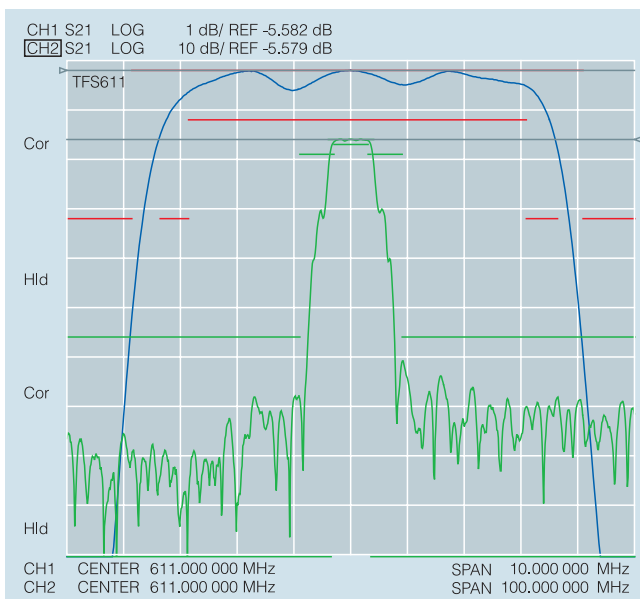
All design principles that are needed to address this market with its special requirements are available. Several cuts of LiTaO<sub>3</sub> and quartz are used to find the best solution for the customer. The market of filters for medical applications is one of customized products. VI-Telefilter is well known for its tight contacts to customers in the design phase to develop optimum solutions.



## Solutions for medical applications

- Products for medical bands at 403 MHz and 611 MHz
- Good compromise for insertion loss and close in rejection within operating temperature range
- Small sized packages
- Customized solutions

Type	Frequency MHz	Bandwidth MHz	Insertion Loss dB	Package mm
TFS141	141.70	2.20	12.5	13.6x6.5
TFS144	144.15	2.20	12.5	13.6x6.5
TFS403	403.50	3.00	4.6	5.0x5.0
TFS403A	403.50	3.00	4.8	3.8x3.8
TFS611	611.00	6.00	5.6	5.0x5.0
TFS611A	611.00	6.00	1.8	3.8x3.8





**Vectron International-  
Telefilter – Germany**

Employees: 170

Turnover: \$28 Mio (2004)

**Products:**

SAW Filters, SAW Resonators and  
Monolithic Crystal Filters (MCF)

Experienced SAW design team,  
supported by a worldwide sales  
organization

75% of product portfolio less  
than 2 years old

Technological expertise on  
materials, front-end and back-end

Fully automated assembly process

**Vectron Frequency Devices –  
Switzerland**

High-end Nikon stepper  
for high resolution (0.35µm)  
and high throughput

**Products:**

High-performance RF-filters,  
High volume low cost RF-filters  
up to 3 GHz



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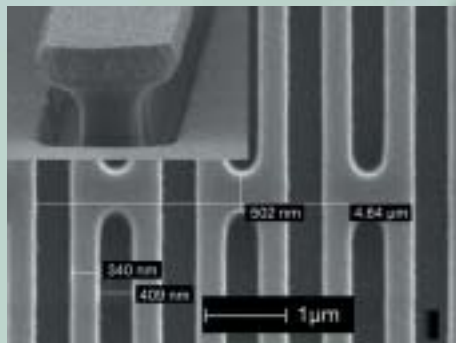
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www.vectron.com



**Vectron International-Telefilter  
is always a good address**

Vectron International-Telefilter (VI-Telefilter) is particularly successful in the development of passive electronic components like SAW filters, SAW resonators, and monolithic crystal filters (MCF). Our corporate policy is strictly customer-oriented, and our customers opt for us because we reliably deliver high-quality components always according to the individual customer requirements in terms of performance, costs, and technology modification.

Due to its flexible design capacities and thoroughly cost-optimized production facilities VI-Telefilter has gained a leading role among the suppliers of electronic components for the mass market as well as in the high-performance segment.



**A true partner – with the reliability of an international group**

VI-Telefilter is 100%-owned by Vectron International and is thus a member of the international Dover Corporation. Dover Corporation is NYSE-traded (DOV) and listed at Fortune 500. Dover Corporation has a broad customer base throughout the world, in over 100 countries and sales close to \$5 Billion.

According to the Dover corporate policy each individual group member company operates independently on the very sound financial background of a strong international group. VI is one of the largest suppliers of Frequency Control Products with worldwide annual sales of over \$200 Million and a growth rate that is clearly above average.

As a group member within the VI group VI-Telefilter is located in Teltow/Berlin and operates on a global level.