



Filtronic

Microwave and mmWave Filters



DESIGNED AND BUILT IN THE UK

www.filtronic.com

About Us

Filtronic Broadband Limited is a long-established, world-leading designer and manufacturer of microwave and millimetre-wave products for telecoms and defence systems.

The Filtronic Broadband research and design team has over 200 man-years combined experience in RF, microwave and millimetre wave product design, with an unrivalled background as a high volume manufacturer of microwave products.

Filtronic Broadband are able to offer bespoke microwave design services for a broad range of applications up to 110GHz, across a range of market sectors including; telecoms; aerospace/defence; security imaging and medical.



Areas of expertise include;

- Filters and duplexers
- Multi-chip packaging
- GaN power amplifiers
- High data rate point to point transceivers
- MMIC design
- Millimetre-wave test



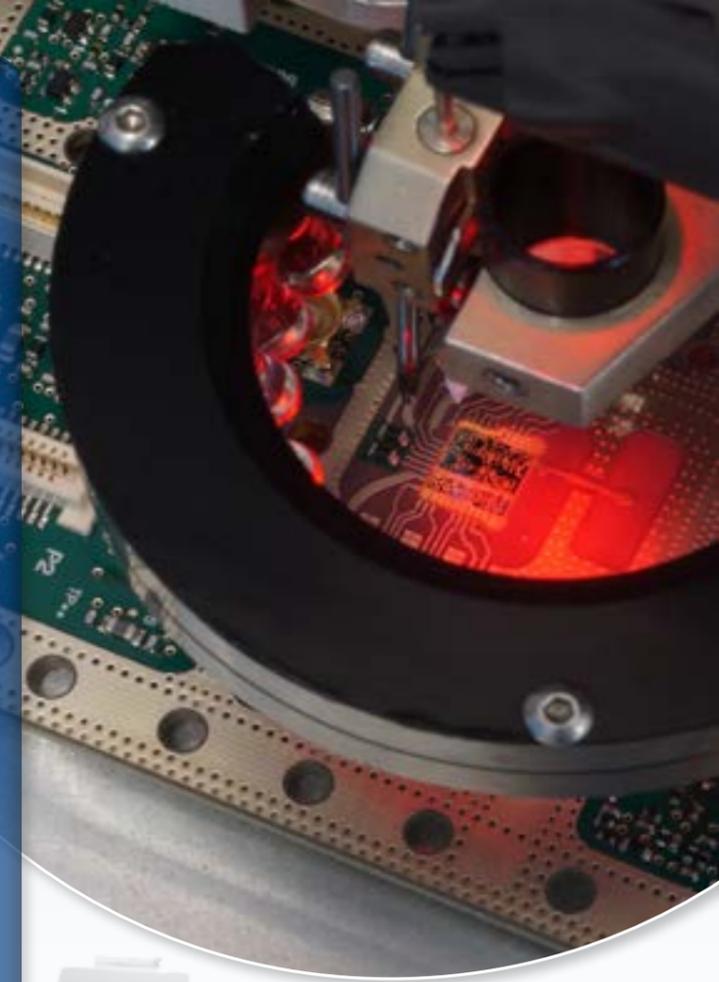
IMAGES
Above: Our facility at NETPark, Sedgfield, UK.
Right: Visual inspection at NETPark

Contract Manufacturing

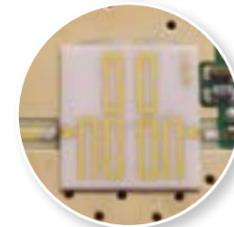
Filtronic Broadband is also proud to offer its unrivalled Contract Manufacturing Services.

Utilising precision hybrid manufacturing facilities in the UK; we offer cost effective manufacturing for both volume and high mix products.

Filtronic has a proven capability in hybrid assembly, advanced microwave test and military standard processes (including MMIC die attach, precision component placement, wire bonding, ribbon bonding, ball bonding, hermetic sealing, automated test to over 90GHz) in alignment with MIL-STD-883.



IMAGES
Above: Transceiver module
Filter Capability (top to bottom):
Screw-in resonators for temperature compensation
 TE_{016} resonators
Thin film circuit



Filter Capability

Filtronic has extensive knowledge and expertise in the design, development and production of microwave filters that dates back to 1977.

Our team of highly experienced engineers work with customers to ascertain optimum technologies dependent upon specific filter requirements, e.g. size, response, power handling, insertion loss and rejection.

Core competencies available include metal cavity filters, ceramic, combine, interdigital, lumped element, suspended substrate, waveguide and thin-film.

All Metal Filters

Filtronic Broadband has extensive expertise of machined and cast metal cavity filters. Traditionally supporting the wireless infrastructure business, where typical demands include low loss, tight rejection specifications, high power and low passive intermodulation.

Typical products include, band pass and band stop filters, cross-band and in-band combiners for antenna sharing, multiplexers and tunable filters, either factory tuned or field reconfigurable.

All designs are fully modelled prior to release using the latest electrical, mechanical and thermal modelling tools ensuring designs remain compliant over severe temperature ranges.

All filters are 100% tested using Filtronic's in-house fully automated test suite; recording all RF parameters.

IMAGES
Top: Cavity filter with cast in resonators
Below: TE balanced filter
Examples of ceramic resonators



Ceramic

Filtronic's unique in-house ceramic facility offers a rapid turn around, ideal for prototyping and proof-of-concept for new designs.

Filter capability includes TE, TEM, TM, Quasi-TM, ceramic combine etc. dependent upon the required filter performance and size.

Metallisation of ceramic parts allow different modes of operation to be achieved, e.g. TEM and TM.

New material development, pressing, machining, firing, grinding and metallisation are processes available to meet the demanding requirements of new ceramic filters.

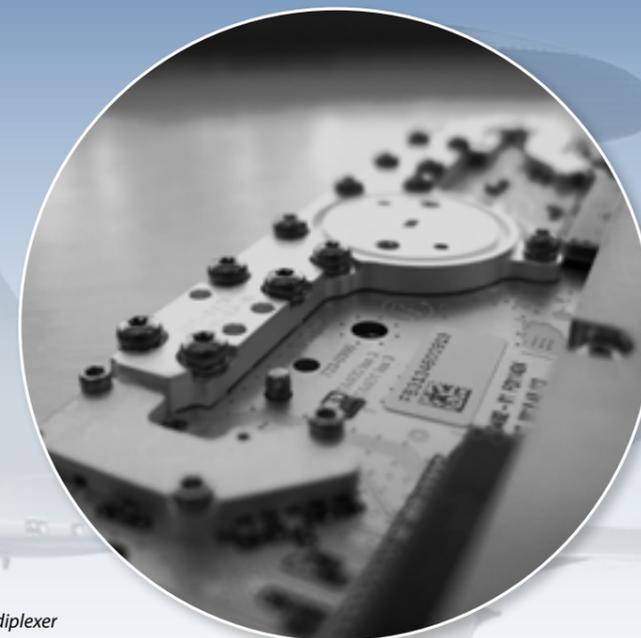
Waveguide

Filtronic offer waveguide products such as filters, diplexers and OMTs; typical frequency ranges are from 6GHz to 110GHz.

Waveguide products offer high "Q" and low insertion loss, making them suitable for high power applications.

Filtronic manufacture waveguide products in conventional flanged designs or bespoke form factors, including surface mountable.

IMAGE
Surface mounted E-band diplexer

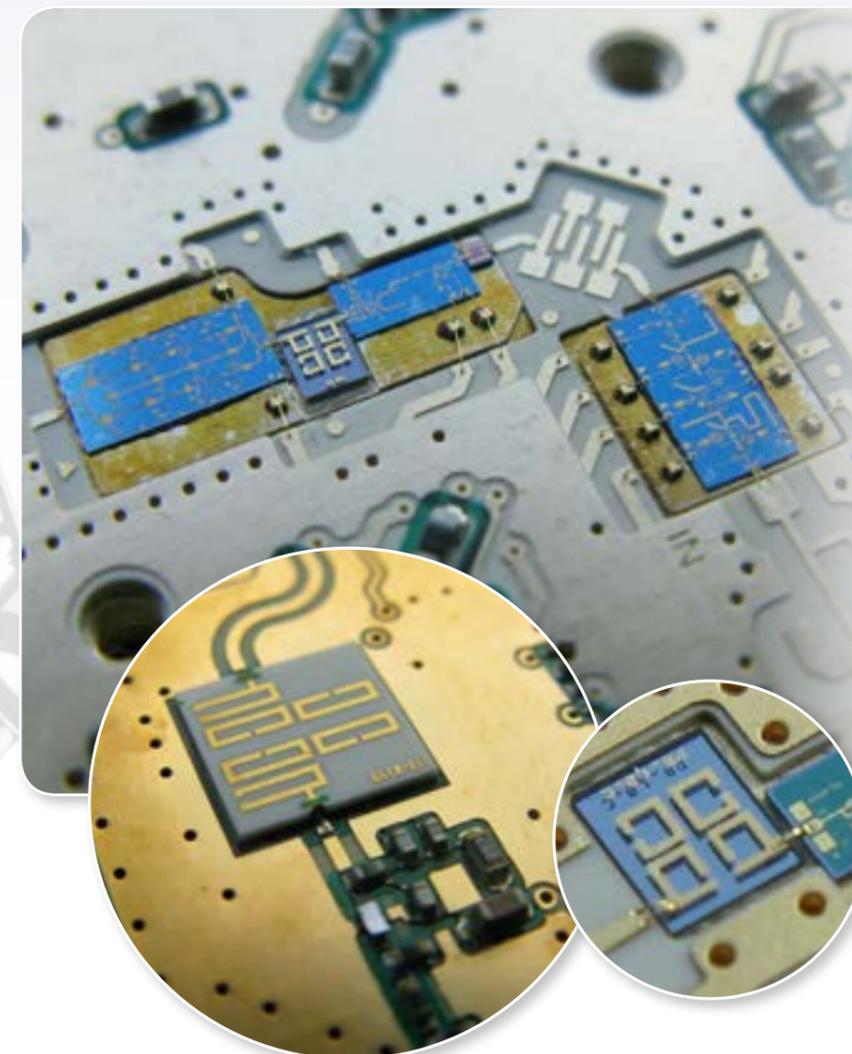


Thin Film

Surface mountable thin film filters are available in band pass, band stop, high pass and low pass configurations.

High dielectric constant, low loss substrate enables significant size reduction for space critical applications.

Frequency range suitable from 3GHz to 110GHz.



IMAGES
Main: 84GHz band pass on quartz, 11GHz band pass on LCP and 6GHz low pass on LCP
Large Circle: 10GHz band pass on alumina
Small Circle: 71 - 76GHz band pass on quartz

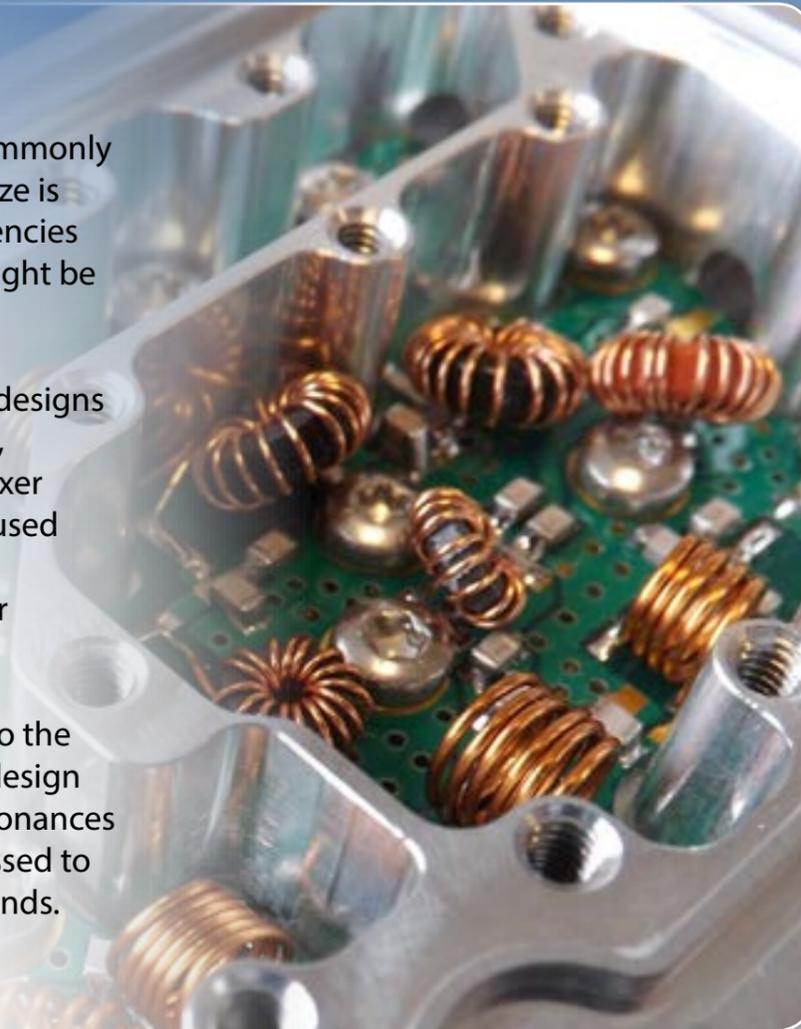
Lumped Element

Lumped element technology is commonly used in applications where small size is required, especially at lower frequencies where transmission line devices might be excessively large.

Both narrowband and broadband designs are available in high pass, low pass, band pass, band stop and multiplexer form. Various filter prototypes are used combining capacitive or inductive coupling to produce asymmetric or symmetric responses.

Filtronic pays particular attention to the selection of components and the design of the housing so that parasitic resonances and waveguide modes are suppressed to ensure broad, spurious free stopbands.

IMAGE
800MHz section of multiplexer



Suspended Substrate Stripline

Suspended Substrate Stripline (SSS) is traditionally a printed circuit technology that can be used for both broadband and narrowband filters; typical frequency range 500MHz to 26GHz.

The wide range of realizable impedance values makes this medium particularly suitable for high pass and low pass filters that can be cascaded together to form broadband band pass filters and multiplexers.

Generalised Chebychev filter prototype designs result in highly selective band edges with low passband loss and high stopband attenuation.

As suspended substrate is a printed technology it exhibits very repeatable performance, and devices can be made with very tight amplitude and phase tracking.

For some higher power applications, rather than use a substrate, solid metal bars are suspended in air forming low PIM filter structures.

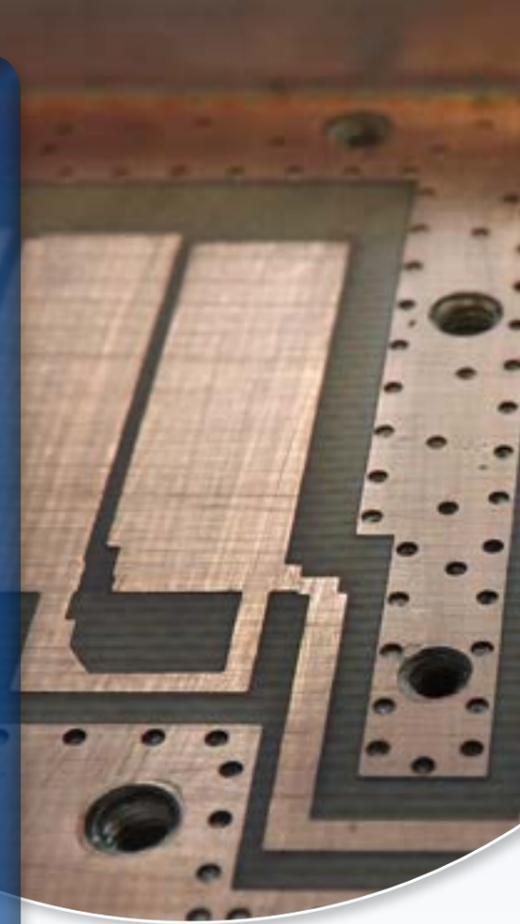


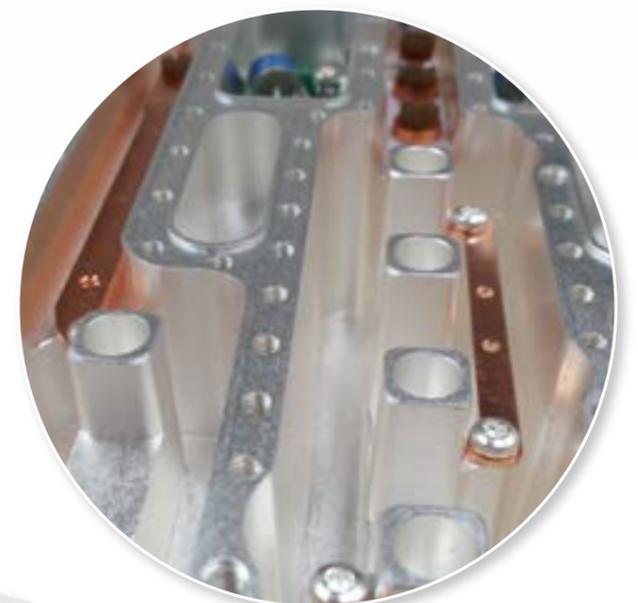
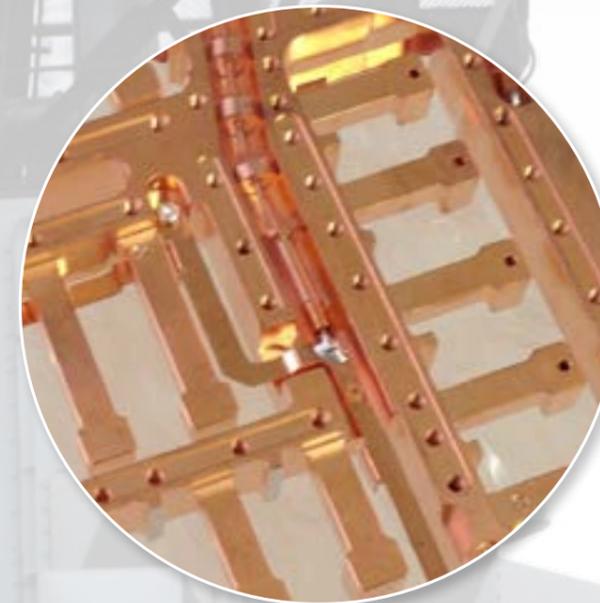
IMAGE
Middle section of SSS multiplexer

Comblines / Interdigital

Although very similar to cavity filters, combline filters can be designed to have bandwidths of 1% to 50% of the centre frequency. Centre frequencies in the range of 100MHz to 20GHz are possible with stopbands extending to 5 times f_0 . Wider stopbands are achievable with appropriate resonator loading.

Multiplexers can be formed by coupling band pass filters together at a common transformer junction. Both contiguous and non-contiguous types are available. Diplexers, for example, are often used in applications such as Tx/Rx communications systems, where a common antenna is shared.

In some applications requiring wider bandwidths and where flatter group delay is important, we can use interdigital structures. The electrical and mechanical characteristics are similar to combline but the resonators are longer and are alternately inverted. The longer resonators result in a lower upper stopband frequency.



IMAGES
Left: Planar combline filter Right: Comblines band pass filter with cross couplings



Filtronic Broadband is a state-of-the-art, designer and manufacturer of RF, microwave and millimetre-wave products for telecoms, medical and aerospace/defence applications.

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