



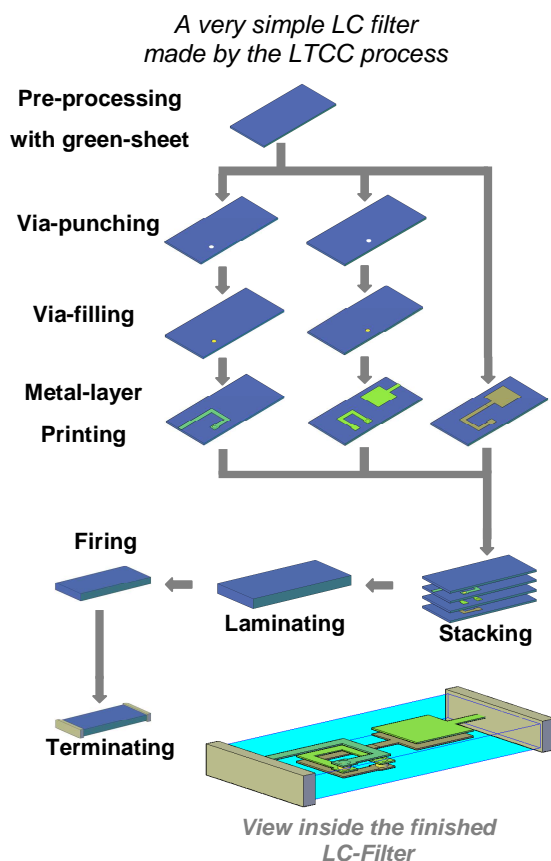
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Design and Manufacture of Microwave Filters using the LTCC Technique

Syfer now offers a range of SMD filters for frequencies up to 6 GHz using LTCC technology. These include both standard and custom-built devices for low pass, band pass, high pass or band-stop filter applications.

We have both the microwave and the manufacturing expertise to cost-effectively design filters for specific applications. We use advanced 3D electromagnetic field modelling software to benefit from the speed and accuracy of the finite difference time domain method of simulation. Close liaison between design, development and volume LTCC fabrication enables us to offer an efficient turnkey service from design through prototyping to volume manufacture.



What is LTCC?

LTCC is an acronym for Low Temperature Co-Fired Ceramic. The product is based on a glass-ceramic composite; components are made up from several layers (green sheets) with the required circuits printed on them; a minimum layer thickness of 50 μm (1.8 mils) is possible.

After printing all the different layers are stacked then fired in a single process. Contact can be made between layers using conducting vias which allows the creation of inductors. It is thus possible to produce both capacitive and inductive elements with ground planes and stripline interconnects.

What are the performance benefits of LTCC?

A firing temperature below 900°C allows silver conductor material to be used, which offers the best possible electrical conductivity and thus the highest Q.

As the dimensions of an LTCC filter are much smaller than those of the equivalent discrete component its departure from ideal discrete component performance occurs at a much higher frequency.

How does LTCC reduce costs?

Implementing many circuit elements within a single package obviously much reduces assembly time, component cost and circuit dimensions. Less obvious are two further cost benefits, one in product manufacture, due to the more constant reproducibility of the performance characteristics of

an LTCC component, and the other in product development, due to the elimination of the cost of the in-house design and development of a discrete element filter. LTCC is therefore a technique which offers both lower cost and higher performance than its discrete component equivalent.

Advantages of LTCC

- Well established mass production process
- Hermetically sealed component
- Many inductors and capacitors in one component using 3-D design
- High thermal conductivity, good temperature performance
- Silver, gold and other material combinations possible
- Established technique for communication, automotive, aerospace...

A few of the many Applications:

Frequency	Bandwidth	Application
433.92 MHz	± 870 kHz	ISM; RFID; Car-Keys; Wireless Switches
446.05 MHz	± 50 kHz	PMR; DMR446
458.52 MHz	± 7.22 MHz	C-Net Mobile Phone
859 MHz	± 35 MHz	GSM 850; Digital AMPS
866.5 MHz	± 1.5 MHz	RFID
869 MHz	± 1.0 MHz	Wireless Audio; SRD
898 MHz	± 30 MHz	RFID
915 MHz	± 13 MHz	ISM; RFID; Wireless LAN
922 MHz	± 4 MHz	RFID
920 MHz	± 40 MHz	GSM 900
1.17645 GHz		GPS
1.2 GHz		Wireless Video Security Links
1.2276 GHz		GPS
1.472 GHz	± 20 MHz	Digital Audio Broadcasting
1.57542 GHz		GPS
1.6205 GHz	± 450 Hz	Iridium
1.785 GHz	± 75 MHz	DCS
1.795 GHz	± 85 MHz	GSM 1800
1.92 GHz	± 70 MHz	GSM 1900; PCS
1.955 GHz	± 70 MHz	UMTS
2.155 GHz	± 45 MHz	UMTS
2.45 GHz	± 50 MHz	ISM; 802.11b; 802.11g; 802.11n; WiFi; Bluetooth; HyperLAN; HomeRF; Hotspot; ZigBee; RFID; etc...
2.6 GHz		802.16; 802.20; MMDS; WiMAX; NLOS
3.4-3.6 GHz		WiMAX
4.4-5.0 GHz		Mil comms

also: CAN bus and USB: (all frequencies, without differential filters/converter), MLS, RLAN...

Availability

Sample kits are available which contain the following filters:

- 1206 900 MHz low-pass filters
- 0805 2400 MHz low-pass filters
- 0805 5500 MHz band-pass filters
- 1206 1900 MHz band-pass filters
- 1008 2400 MHz band-pass filters

For any other applications please consult us.