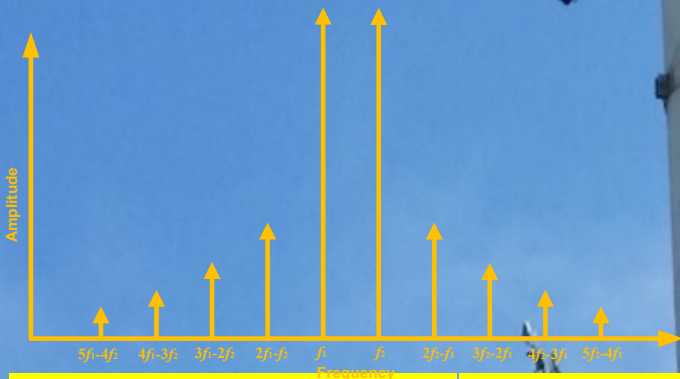
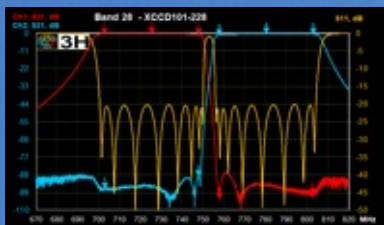




3H Communication Systems

ISO9001:2015 & AS9100D
Registered

RF Filters, Multiplexers, Switched Filter Banks and RF Front-End Systems



RF Filters & Front-End Systems Experts



Vision



Through our current efforts to innovate and elevate industry quality standards, we look to position ourselves ahead of our competitors and secure competitive advantage for the future. 3H's solutions for today and tomorrow's industry needs will contain smaller, lighter, and higher performing technologies than industry competition can provide. We acknowledge that customer's current and future time-to-market demands help make them successful. 3H is fully capable to meet the dynamic needs of our customers.

Value



We are guided by our core values of Honesty, Humility and Harmony (3H). Customers are our best assets, and we believe that we will succeed when we provide them with cutting-edge solutions that provide immeasurable value and produce superior results.

Mission

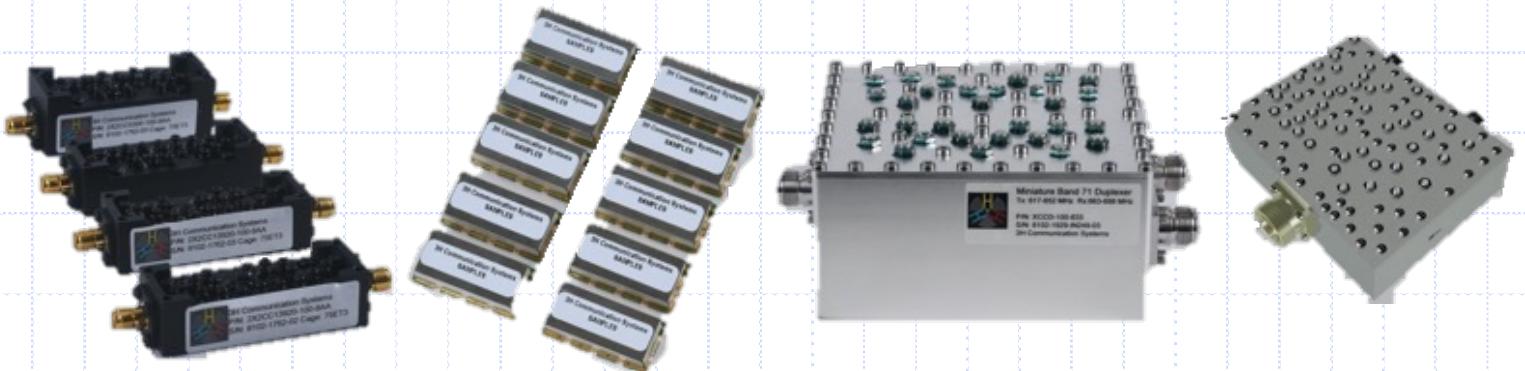


Guided by decades of industry experience and expertise, our mission is to offer innovative, high quality, and cost-effective solutions for the RF and microwave filtering and other front-end solutions for multiple markets including defense, commercial, public safety and aerospace. Our strengths lie in both engineering and manufacturing which guides our innovation.



About 3H Communication Systems is an industry leading RF and microwave company that provides high value, cost effective solutions to military and commercial markets. Our team specializes in the design and manufacturing of filter products including Lumped Component, Ceramic, Cavity, High Power, Multiplexers, Multi-function assemblies, SMT, Connectorized, Pins, and Leadless filter products from DC to 50 GHz. The high degree of engineering and technical capability focused on innovation with decades of expertise for high value and high-quality RF products allows 3H to provide its customers with custom, high performing filters solutions. We believe that customer service should be nothing short of exceptional, so we support our customer through every step of the design process to ensure that all their technical needs are met.

All our employees here at 3H Communication Systems are our most highly valued resource and take great pride in delivering superior customer satisfaction. We understand that we win only when you win. Our engineering staff offers extensive modeling in custom housings to accommodate any configuration required by our customers. We use the most advanced software techniques to model electrical performance under extreme conditions including power and environmental conditions. Our software techniques allow 3H to accurately simulate performance, thus reducing the proto-type time allowing for a short delivery of custom products.



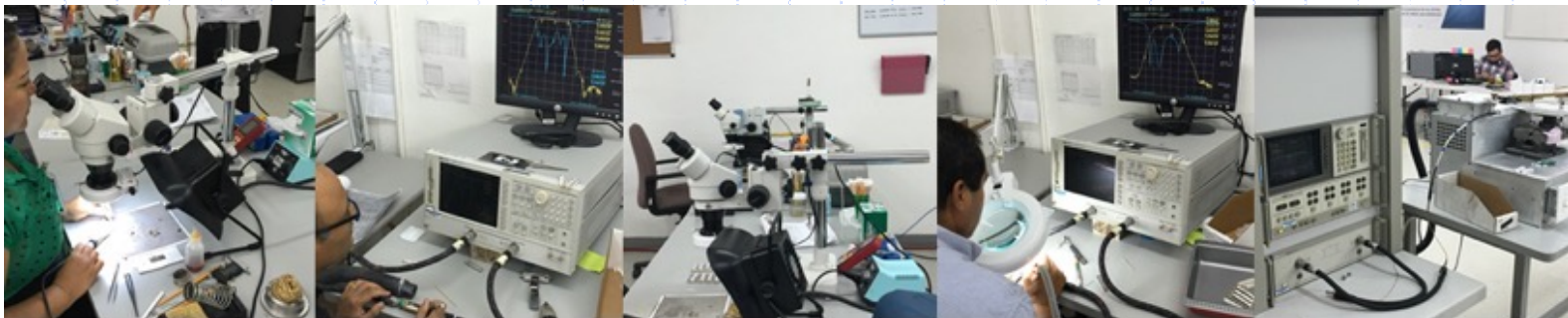


Quality

Guided by our experience and expertise, our mission is to offer innovative, high quality and yet cost-effective solutions for RF and microwave filter products and other front-end solutions for multiple markets including military defense, commercial, public safety and aerospace and medical industries.

3H Communication Systems maintains a full Quality Management System and maintains ISO Certification. Our management team continually strives for improvement and consistently audits our processes to maintain the highest quality standards for our customers. 3H Communication Systems complies with and is certified to **AS9100D & ISO9001:2015**.

3H Communication Systems stands behind every products we manufacture and includes a **5 Year warranty for our passive filter products.**





3H Communications offers a complete line of RF and microwave filter products and frequency conditioning solutions from DC to 50 GHz. Our product listings include Cavity, Lumped Component, Ceramic and printed topologies & Switched Filter Banks. All our products are available in connectorized and or SMT formats. Our expertise is second to none for low PIM and high-power filter products. 3H design filters that yield the most optimum performance with the smallest size possible. 3H offers complete engineering assistance with developing the most optimum filter solutions for your system’s unique needs. Working together with you will lead to the most cost-effective solutions over the life of the product and program.

Most of our filter products are utilized in for the following applications,

➤ Commercial

- 4G LTE
- 4G WiMAX
- AWS
- SMR
- UMTS
- DCS
- GPS
- WiFi
- PCS
- WLL
- TRS
- GSM
- AMPS
- IMT-2000
- GPS
- DCS
- TMA’s
- CATV
- Broadcast
- Small Cells
- RADAR
- Jammers
- Remote Radio-Heads
- Cellular Base Stations
- Distributed Antenna Systems (DAS)
- Repeaters and Coverage Systems
- Wi-Fi (Both 2.4 or 5 GHz Wireless LAN)
- Digital Dividend
- Cross-Band Combiners/Splitters
- Point to Point Radio
- Electronic Warfare
- Public Safety
- Test Equipment



➤ Military

- Radar transmitters and receivers
- Electronic Warfare (EW)
- Electronic Countermeasures (ECM)
- Electronic Counter-Counter Measures (ECCM)
- Signal Electronic Intelligence (SIGNET)
- Unmanned Aerial Vehicles (UAV)
- IED Jammers
- Radar Warning Receiver (RWR)
- Weapons Targeting Systems
- Missiles/Missile Guidance Systems
- ATC Air Traffic Control
- Military Communications



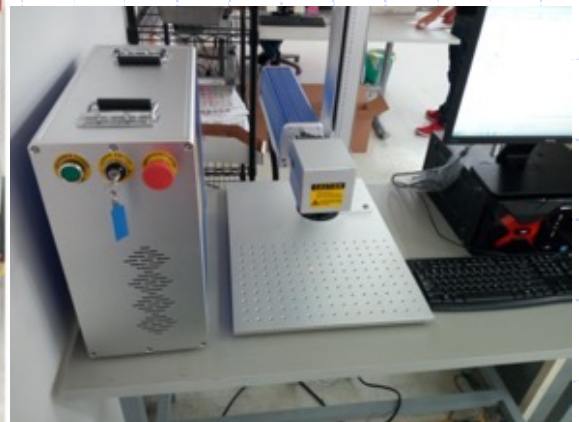
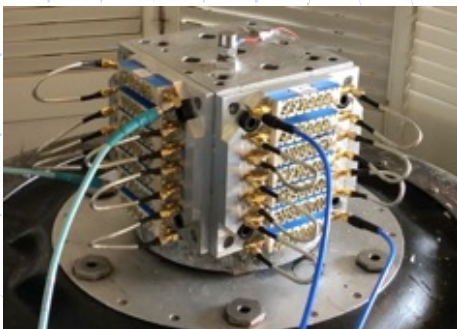


3H Products

Since 2014, 3H has become a major supplier of filter products supporting the military and commercial markets. Our filters are field proven in Space, Ground, Sea and Air.

The 3H advantage:

- 3H offers multiple **AS9100D & ISO9001:2015** certified facilities in the US and Mexico
- 3H offers a wide selection of filter options
 - Bandpass, Lowpass, Highpass, Band Reject, Multiplexer, Duplexer
 - Switched Filters Banks
 - Multi-Function Assemblies
- In-House Laser Equipment for
 - Welding and Marking
- Automated Pre-Tuning Ceramics
- In-House Environmental capability
- Reflow Ovens
- Technically qualified to meet today's stringent environmental requirements including Hi Rel Space
- 3H offers filter solutions in the smallest possible package, starting at 0.065"
- Power Options up to 30 KW peak
- Low PIM
- Frequency Range: DC to 50 GHz
- 3H stands behind our product with a 5-year warranty



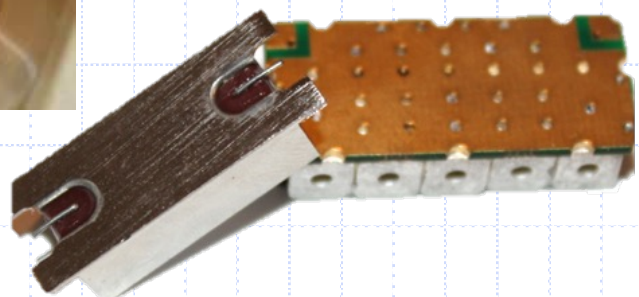
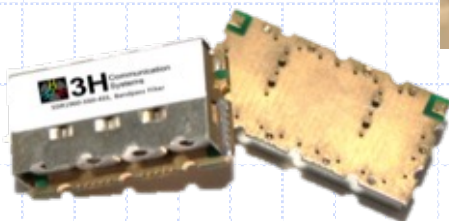
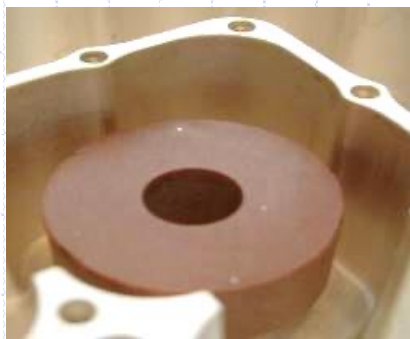


Ceramic Filters

3H Ceramic Filter Products offer high Q, low insertion loss while minimizing size. 3H can design for combline or Multi-Mode ceramic loaded cavity filters. 3H ceramic filters can also be designed for high power applications. Our ceramic filters can be connectorized or SMT with tape and reel packaging. Sizes as low as <math><0.08\text{''}</math> ht available with tape and reel packaging or trays for automated assembly. Available in RoHS and NON-RoHS packages.

3H Ceramic Filter Products are Specified as Follows:

- Frequency Range: 200 MHz to 6000 MHz
- Type: BPF, BRF
- Bandwidths: 1.0 to 10% (available in 0.5, 1.0, 3.0 dB Bandwidths)
- Chebyshev Response (other responses are available)
- Power up to 50 Watts CW
- Available with Connectors and SMT
- Low profile packages start at <math><0.08\text{''}</math> ht.
- Available with High Power options
- Mil-Std-202 Conditions



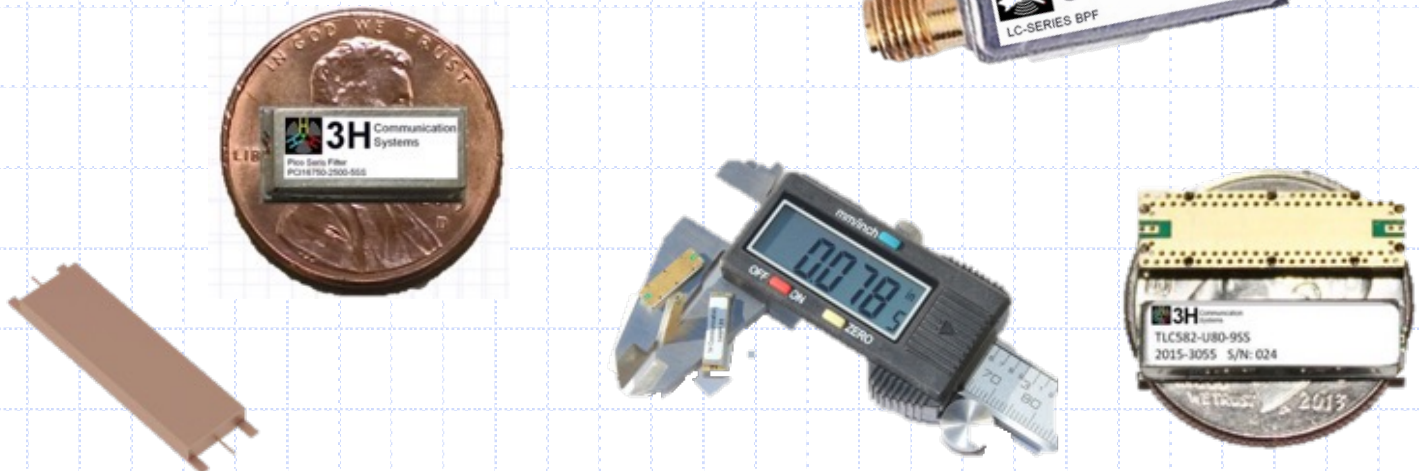


Lumped Component Filters

3H Lumped Component Filter Products are designed to meet the smallest possible size while maintaining electrical specifications of larger filters on the market today. 3H Communications Systems offers filters with a height starting at <math><0.08\text{''}</math> available with tape and reel packaging or trays for automated assembly. Available in RoHS and NON-RoHS packages.

Lumped Component Filter Products are Specified as Follows:

- Frequency Range: From 5 MHz to 10 GHz
- Type: BPF, LPF, HPF, and BRF
- Bandwidths: 3.0 to 150% (available in 0.5, 1.0, 3.0 dB bandwidths)
- Chebyshev Response (other responses are available).
- Available with Connectors and SMT.
- Low profile packages start at <math><0.08\text{''}</math> ht.
- Available with High Power options.
- Mil-Std-202 Conditions.



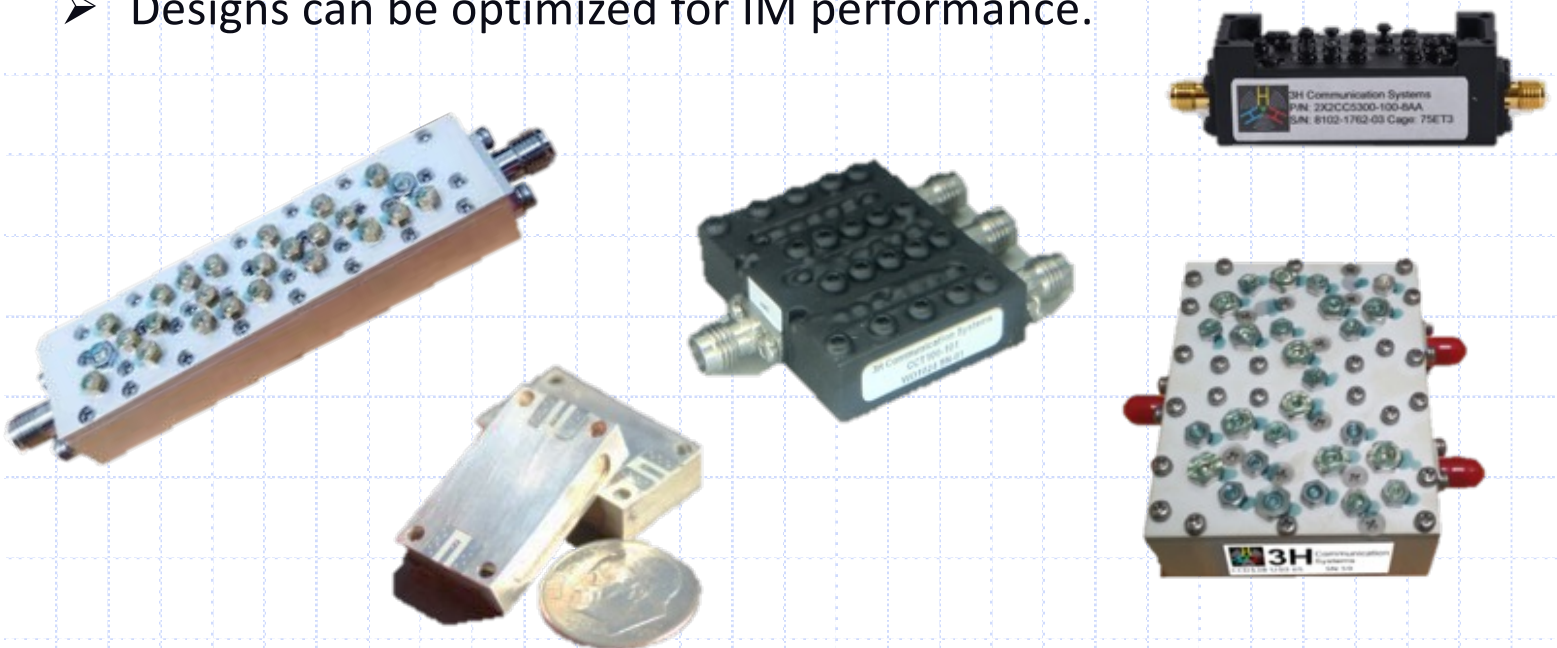


Cavity Filters

3H Cavity Filters are designed for ease of assembly and long-term use under the most difficult environments. Our cavity filters are designed with high Q and low insertion loss with high out of band rejection in the smallest possible size. 3H Cavity Filters are available with High Power and Low PIM options. Available in connectorized or SMT packages.

3H Cavity Filter Products are Specified as Follows:

- Frequency Range: 10 MHz to 50 GHz.
- Bandwidths: 0.2 to 100% (available in 0.5, 1.0, 3.0 dB or equal-ripple bandwidths).
- Generalized Chebyshev Response with cross couplings. Other responses available, i.e. group delay equalization.
- Available with Connectors and SMT.
- Available with High Power Options, up to **30 kW PEP**.
- Mil-Std-202 Conditions.
- Designs can be optimized for IM performance.



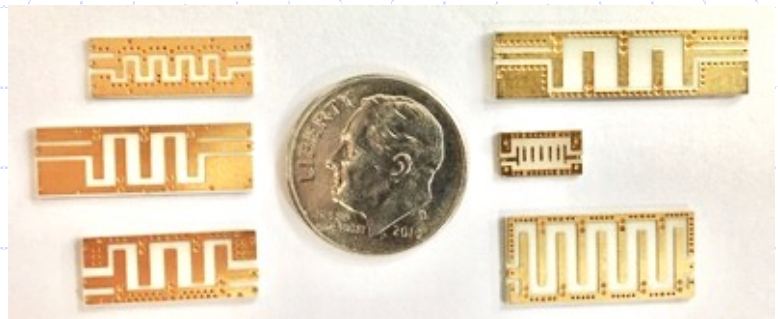
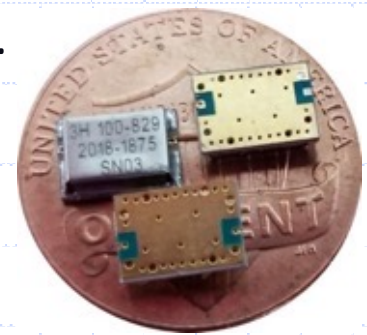


Printed Filters

Printed Filter Products: 3H Printed filter products are designed for high performance, low loss, high frequency up to 30 GHz. 3H printed filters are optimal for high frequency switched filter banks when size, insertion loss and power are critical.

3H Printed Filter Products are Specified as Follows:

- Frequency Range: 5.0 GHz to 30.0 GHz
- Type: BPF, LPF, HPF, BRF, & Multiplexer options
- Bandwidths: 1.0 to 60% (available in 0.5, 1.0, 3.0 dB & Custom Bandwidths)
- Chebyshev Response
- Available with Connectors and SMT
- Low profile packages start at <math><0.065\text{''}</math> ht.
- Mil-Std-202 Conditions





Switched Filter Banks

Switched Filter Products & Multi-Function Assemblies are designed using priority assembly and switching methods for optimal performance. 3H SFB's & Multi-function Assemblies can be specified up to 25 watts without the use of mechanical switches. 3H designs *the most economical* Switch Filter Banks in connectorized or surface mount applications. Our SFB's are designed and manufactured in accordance to the customers electrical and environmental requirements whether for military or commercial application. At 3H, we utilize our *Micro*, *Nano* & *Printed* filter technology to offer the smallest possible size for our SFB's and Multi-Function-Assemblies.

3H Switched Filter Banks & MFA's Products are Specified as Follows:

- Frequency Range: 40 MHz to 18.0 GHz
- Number of Channels: 2 to 8
- Insertion Loss: 1.5 to 5.0 dB
- VSWR: 1.3:1 to 2.0:1 Typical
- Switching Speed: 50 ns to 8 micro Sec
- Input Power: Up to 25 watts
- Power Supply: + 5, - 5, -12 or -15 volts
- Available with Connectors and SMT
- Low profile packages start at <0.065" ht.
- Mil-Std-202 Conditions

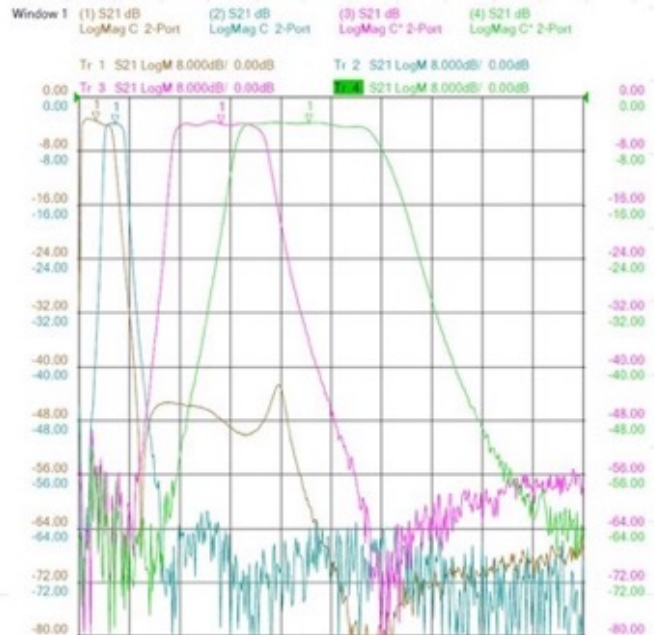
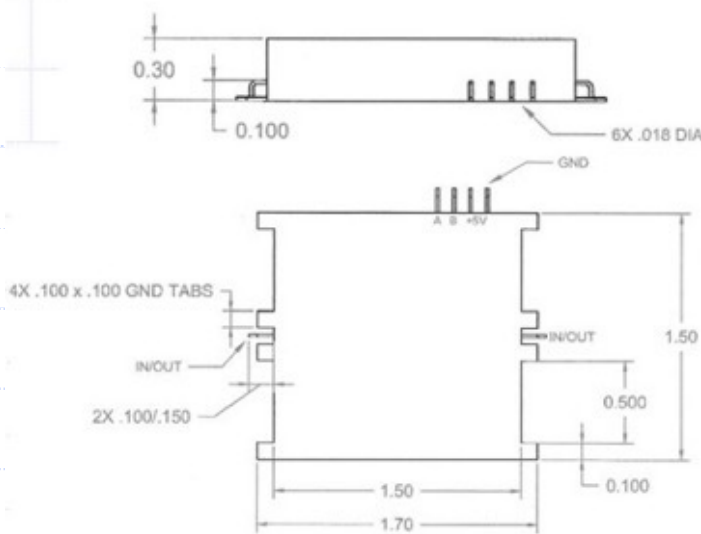




Switched Filter Banks

Using 3H priority switch and assembly process, 3H can offer lower insertion loss and reduce size for SFB's up to 25 watts input power. The chart below compares the 3H switch to a solid-state switch.

SP4T Switch		
	3H	Competition
CW Input Power	25 W	2 W
Switching Time	8 μ s	3 μ s
Settling Time	10 μ s	3 μ s
Operating Frequency	DC to 12.0 GHz	10 MHz to 18.0 GHz
Insertion Loss @ 6.0 GHz	0.35 dB	2.05 dB
Insertion Loss @ 12.0 GHz	0.75 dB	2.80 dB
Return Loss @ 6.0 GHz	17 dB	14 dB
Return Loss @ 12.0 GHz	11 dB	14 dB
Isolation @ 6.0 GHz	30 dB	46 dB
Isolation @ 12.0 GHz	28 dB	36 dB
Second-Order Output Intercept (IP2)	>125 dBm	>113 dBm
Third Order Output Intercept (IP3)	>85 dBm	59 dBm
Size	4 x 4 2.137 mm	4 x 4 x 0.91 mm



Specifications

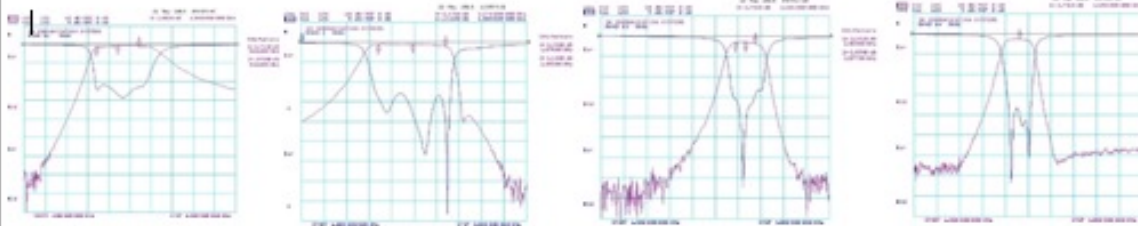


DATA SHEET

4 Channel Switched Filter Bank High Power (RoHS Compliant)



3H Part Number	Rev	Change Description	Date	ENG	MFG/QA	MKT
SFB101-141-4CH	0	Initial Release	May 31, 2019	PS	LW	MG



ELECTRICAL SPECIFICATIONS

Ch1:

Parameter	Specifications
Center Frequency	940 MHz
Insertion Loss From 740-1040 MHz	2.7 dB Max
Amp. Flatness From 740-1040 MHz	1.0 dBc Max
Return Loss From 740-1040 MHz	10 dB Min
Rejection From 10 – 540 MHz	60 dBc Min

Ch2:

Parameter	Specifications
Center Frequency	1985 MHz
Insertion Loss From 1676-2274 MHz	3.95 dB Max
Amp. Flatness From 1676-2274 MHz	1.85 dBc Max
Return Loss From 1676-2274 MHz	10 dB Min
Rejection From 10 – 1000 MHz	35 dBc Min
Rejection @ 2400 MHz	25 dBc Min

Ch3:

Parameter	Specifications
Center Frequency	3077 MHz
Insertion Loss From 2970-3185 MHz	5.20 dB Max
Amp. Flatness From 2970-3185 MHz	1.5 dBc Max
Return Loss From 2970-3185 MHz	10 dB Min
Rejection From 10 – 2450 MHz	60 dBc Min
Rejection From 3600 – 5000 MHz	60 dBc Min

Ch4:

Parameter	Specifications
Center Frequency	2650 MHz
Insertion Loss At 2650 MHz	5.20 dB Max
Return Loss At 2650 MHz	14 dB Min
Rejection From 10 – 2145 MHz	60 dBc Min
Rejection From 3090 – 5000 MHz	60 dBc Min

MECHANICAL SPECIFICATIONS

Connectors	SMT or Connectorized Options
RF Connectors Configuration	In Line
Weight	< 6.5 Oz [180 gram] max
Size	63.5mm x 63.5mm x 12.7mm [2.5" x 2.5" x 0.81"] max Excluding connectors and mounting brackets.

ENVIRONMENTAL/QUALITY SPECIFICATIONS

Operating Temperature Range	-40 to +85°C
Non-Operating Temperature Range	-55 to +125°C
Vibration 10 to 500 Hz	10 G Mx
Shock Duration	11 ms
Humidity, Relative non-condensing	95% max



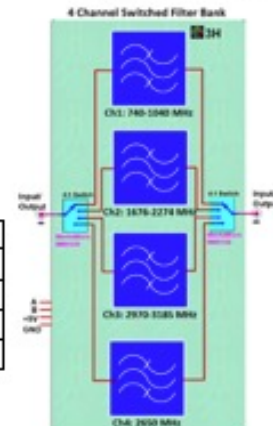
SWITCH SPECIFICATIONS (Menlo Micro Ideal Switch)

Parameter	Specifications
Typical Switch Insertion Loss @6 GHz	0.35 dB
Typical Switch Insertion Loss @12 GHz	0.75 dB
Switch Third Order Intercept Point	+85 dBm
Power Handling Per Channel	25 Watts Max*
Control Voltages	TTL/CMOS
Low	0 to +1 VDC
High	+1.55 to +5 VDC

*Filter Power options from 0 to 25 Watts.

TRUTH TABLE

A	B	RF Out
Low	Low	Ch1
High	Low	Ch2
Low	High	Ch3
High	High	Ch4



Drawn By:	Material:	Tolerances	Proprietary Notice: The information contained in this document is proprietary and shall not be used or disclosed without the prior written permission of 3H.			
QA Approval:	AL, CU, Ag, Ni, FR4	XX ±0.020[0.508] XXX ±0.010[0.254]	Date	DWG #	Unite	Pages
Eng. Approval:	Finish: Natural Aluminium, Ni		May 31, 2019	101-141	mm	1 of 1



Low PIM, High Power Filter Products

3H Low PIM, High Power Filter Products: 3H is a leader in the development of high power, low Passive Inter-modulation (PIM) products including filters, duplexers, multiplexers, combiners for in-building wireless and outdoor use. Our low PIM products can be found on communication satellites, stadiums, transportation systems, and many other communication systems. 3H utilizes custom software allowing 3H to design high power products in the smallest packages. The reduced package size allow our customer a cost-effective solution.

Distributed Antenna System (DAS) allows additional wireless coverage without the cost of expensive infrastructure, 3H Communication Systems offers a complete line of catalog and custom filter products for today's growing DAS infrastructure.

3H Communication Systems offers a complete line of low Passive Inter-modulation filters for the DAS market including the following bands:



- 5G
- Bluetooth
- LTE Bands
- First Responders
- Transportation
- Point to Point Radio
- Public Safety
- Satellite Communication
- AWS
- GSM
- PCS
- WCS
- SMR
- UMTS
- WiFi



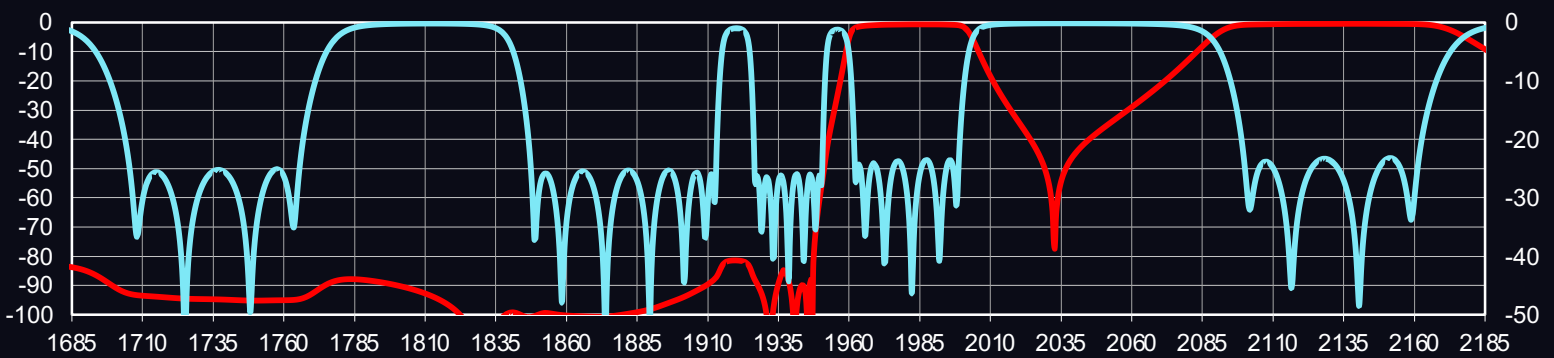
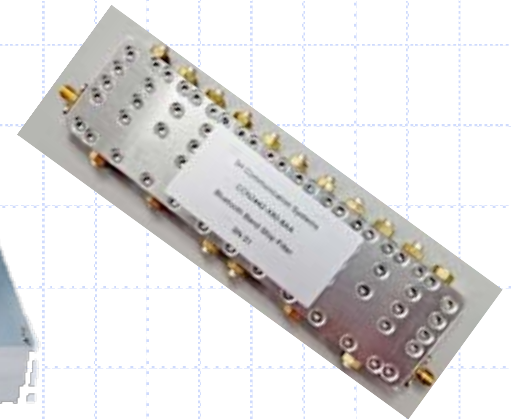
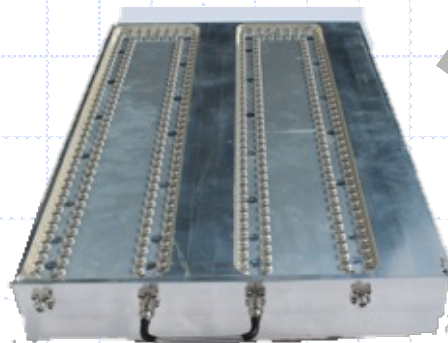


Low PIM, High Power Filter Products

3H Low PIM Filter Products are Specified as Follows:

- Frequency Bands: DC to 6.0 GHz
- Low PIM: As low as 175 dBc (two, 40 watt tones)
- Power Handling: 1500 CW, as high as 30 Kw Peak, Avg
- Multiplexed: Up to 5 channel
- Application: In or Out-Door Wireless infrastructure
- Custom packages available
- Connectors: Customer Specified including 4.3-10 availability

3H Low PIM filter products are currently the standard for PIM measurements equipment.





Bandpass Filters

	Topology	Configuration	Frequency Range	Passband % BW	VSWR	Avg. Power	Mounting
	Micro (TLC-Series) Available in Lowpass, Bandpass, Highpass and Band Reject	LC/Ceramic	50 MHz to 9.0 GHz	Up to 100%	2.0:1 Typ	1 Watt	Leadless SMT
	Nano (NLC-Series) Available in Lowpass, Bandpass, Highpass and Band Reject	LC/Ceramic	50 MHz to 6.0 GHz	Up to 100%	2.0:1 Typ	1 Watt	Leadless SMT
	Mini Lumped Element (LC-Series) Available in Lowpass, Bandpass, Highpass and Band Reject	LC/Ceramic	1 MHz to 10.0 GHz	Up to 150%	1.5:1 Typ	Up to 50 Watts	SMT, SMA, Pins,
	Lumped Element (LC-Series) Available in Lowpass, Bandpass, Highpass and Band Reject	LC/Ceramic	1 MHz to 10.0 GHz	Up to 150%	1.5:1 Typ	Up to 50 Watts	Pins, SMA, Type N
	Ceramic (DR-Series) Available in Bandpass and Band Reject	Ceramic	200 MHz to 6500 MHz	3% to 10%	1.5:1	Up to 5 Watts	SMT, SMA, Type N
	Miniature Cavity (MCC) Available in Bandpass and Band Reject	Miniature Cavity	5000 MHz to 20.0 GHz	Up to 60%	1.5:1	Up to 5 Watts	SMT, Pins
	Cavity (CC-Series) Available in Bandpass and Band Reject	Combine, Interdigital	40 MHz to 50 GHz	0.2% to 70%	1.5:1	Up to 30 KW Peak	7/16th, N, SMA, SMT, Pins

LTE Bands Bandpass Filters

	Configuration	Pass Band (MHz)	Passband IL	Rejected Frequency (MHz)	Attenuation	Power
	Band 29	Ceramic	717 to 728	<1.5 dB	697 & 748	50 dB 5 Watts
	Band 42	Ceramic	3400 to 3600	<1.25 dB	3200 & 3800	50 dB 5 Watts

LTE Bands Duplexers

	Configuration	Rx Passband (MHz)	Tx Passband (MHz)	Passband IL	Co-Channel Isolation	Power
	Band 7	Cavity	2500 to 2570	2620 to 2690	1.0 dB	>85 dB 200 Watts
	Band 8	Ceramic	880 to 915	925 to 960	<1.8 dB	>55 dB 5 Watts
	Band 11	Ceramic	1427.9 to 1452.9	1475.9 to 1500.9	<1.5 dB	>55 dB 5 Watts
	Band 12	Ceramic	698 to 716	728 to 746	<1.5 dB	>55 dB 5 Watts
	Band 13	Ceramic	777 to 787	746 to 756	<1.0 dB	>55 dB 5 Watts
	Band 13	Cavity	777 to 787	746 to 756	<1.0 dB	>85 dB 50 Watts
	Band 20	Ceramic	832 to 847	791 to 821	<1.5 dB	>55 dB 5 Watts
	Band 21	Ceramic	1447.9 to 1462.9	1495.9 to 1510.9	<1.0 dB	>55 dB 5 Watts
	Band 21	Cavity	1447.9 to 1462.9	1495.9 to 1510.9	<0.80 dB	>70 dB 50 Watts
	Band 26	Ceramic	814 to 849	859 to 894	<1.8 dB	>55 dB 5 Watts
	Band 27	Ceramic	807 to 824	852 to 869	<1.0 dB	>55 dB 5 Watts
	Band 28	Ceramic	703 to 748	758 to 803	<1.6 dB	>55 dB 5 Watts
	Band 30	Cavity	2305 to 2315	2350 to 2360	<0.75 dB	>80 dB 200 Watts



Shock	Vibration	Humidity	Operational Temp. Range	Size	Notes
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	0.65" x 0.20" x 0.08"	Ruggedized products available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	0.65" x 0.20" x 0.09"	Ruggedized products available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	1.0" x 0.38" x 0.38"	Ruggedized products available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	Starting 0.74" x 0.44" x 0.27"	Ruggedized & High power products available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	TBD	High Power Options available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	Starting at 1.0" x 0.60" x 0.20	Ruggedized products available
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-55° to 85° C	TBD	Ruggedized products available

Shock	Vibration	Humidity	Operational Temp. Range	Size
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 0.75" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 0.75" x 0.6"

Shock	Vibration	Humidity	Operational Temp. Range	Size
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.0" x 3.0" x 1.5"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	7.50" x 6.0" x 2.0"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	7.50" x 6.0" x 2.0"
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11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	4.75" x 1.5" x 0.6"
11 ms , 20 G's	10 G's, 10 Hz to 2000 Hz	95%	-40° to 70° C	7.50" x 6.0" x 2.0"



RUGGEDIZED Custom Nano & Micro Series Filters for some of the Harshes Military and Commercial Environments Today

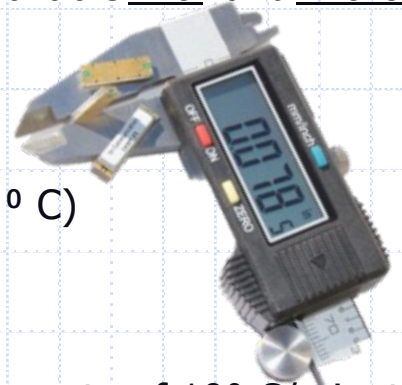


3H Communication Systems now offers *Ruggedized* miniature Nano and Micro series filter products that meet military and commercial harshes environments today.

Our ruggedized NLC & TLC filter products offer low passband insertion loss and steep rejection parameters designed and manufactured to YOUR electrical and environmental specification requirements. The filters are available with and without RoHS. Sizes start at ***0.65" x 0.20" x 0.08"***

Environmental Specifications

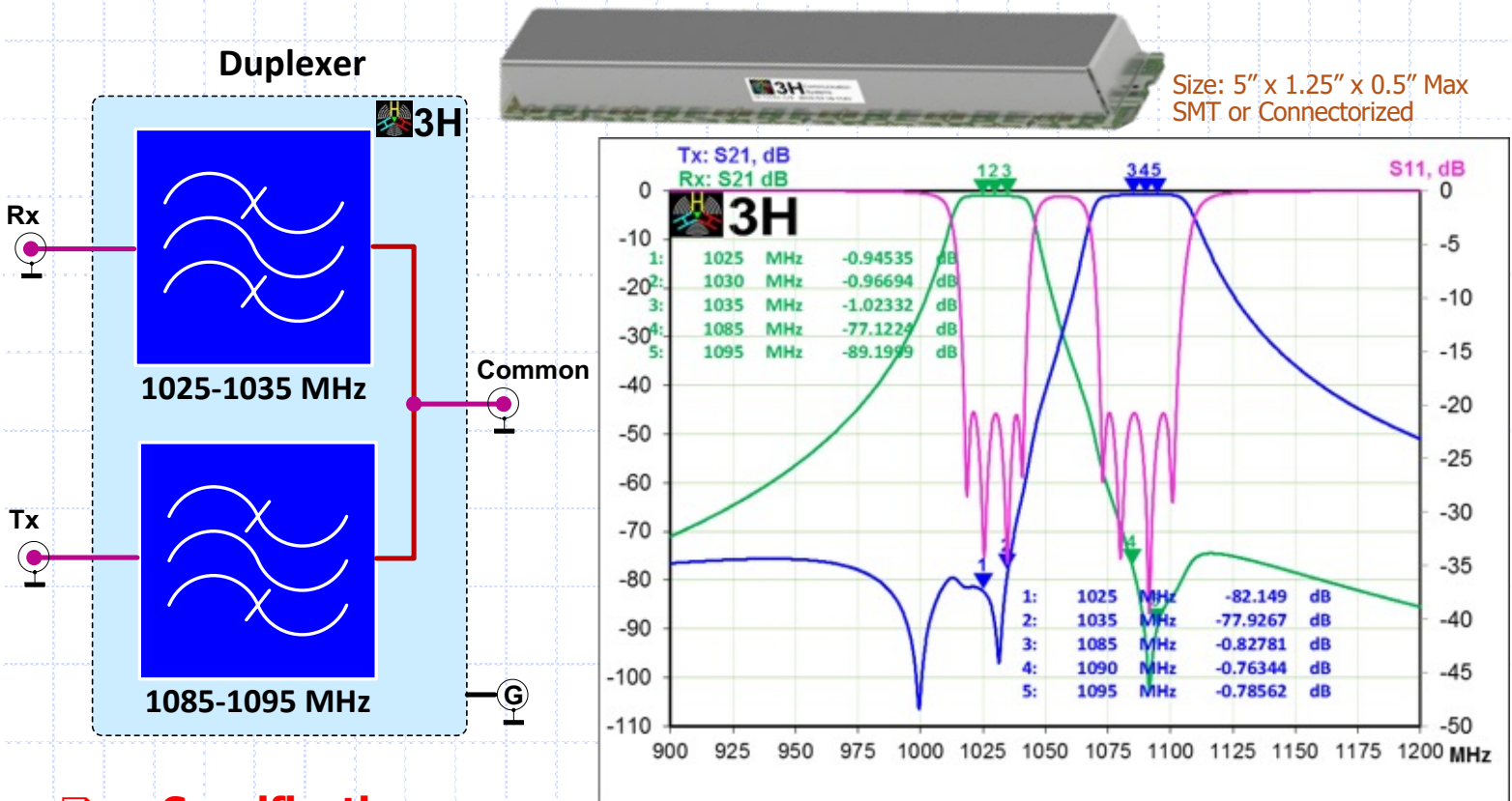
- Operating Temp: -55° to +85° C (Optional up to +125 ° C)
- Storage Temp: -55° to +125° C
- Pressure: 870 mbar to 1084 mbar
- Humidity: 0% to 95% relative humidity
- Thermal Shock: -55° to +125° C with temp changes at a rate of 10° C/minute min.
- Shock: 500 G's, 1 millisecond half-sine pulse
- Vibration: 3 axes, (X: 2.31 gRMS, 20 to 2000 Hz) (Y & Z: 17.31 gRMS, 20 to 2000 Hz)





High Performance 1030/1090 MHz Duplexer for Air Traffic Control and Traffic Collision Avoidance System

Tx Filter has less than **1 dB** of loss while rejecting **70 dB** in the **Rx** band. **Rx** filter is designed to maintain less than **1.25 dB** of loss while providing **70 dB** of rejections in the **Tx** band.

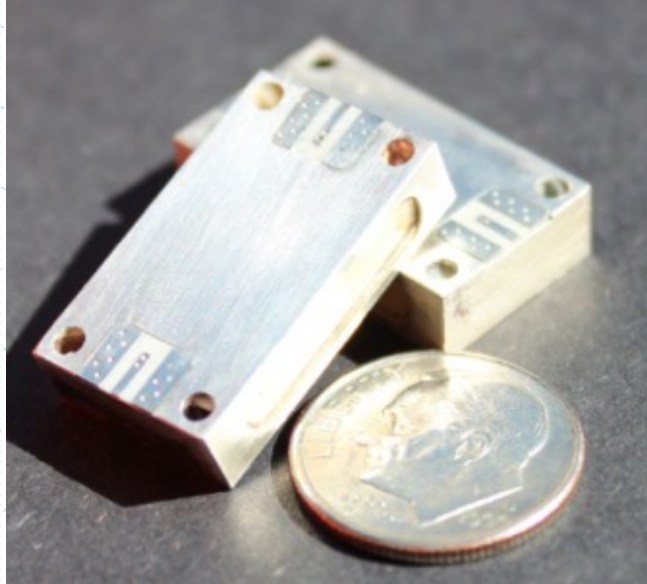


Specifications:

Rx Band		Tx Band	
Pass Band	1025-1035 MHz	Pass Band	1085-1095 MHz
Insertion Loss:	<1.25 dB	Insertion Loss:	<1.00 dB
Return Loss:	>15 dB	Return Loss:	>15 dB
Rejections: 1085-1095 MHz:	>70 dB	Rejections: DC-1025 MHz	>70 dB
		Average Power:	20 Watts
		Peak Power	250 Watts



Miniature Cavity filters from 5.0 to 20 GHz
Package Height of 0.20"



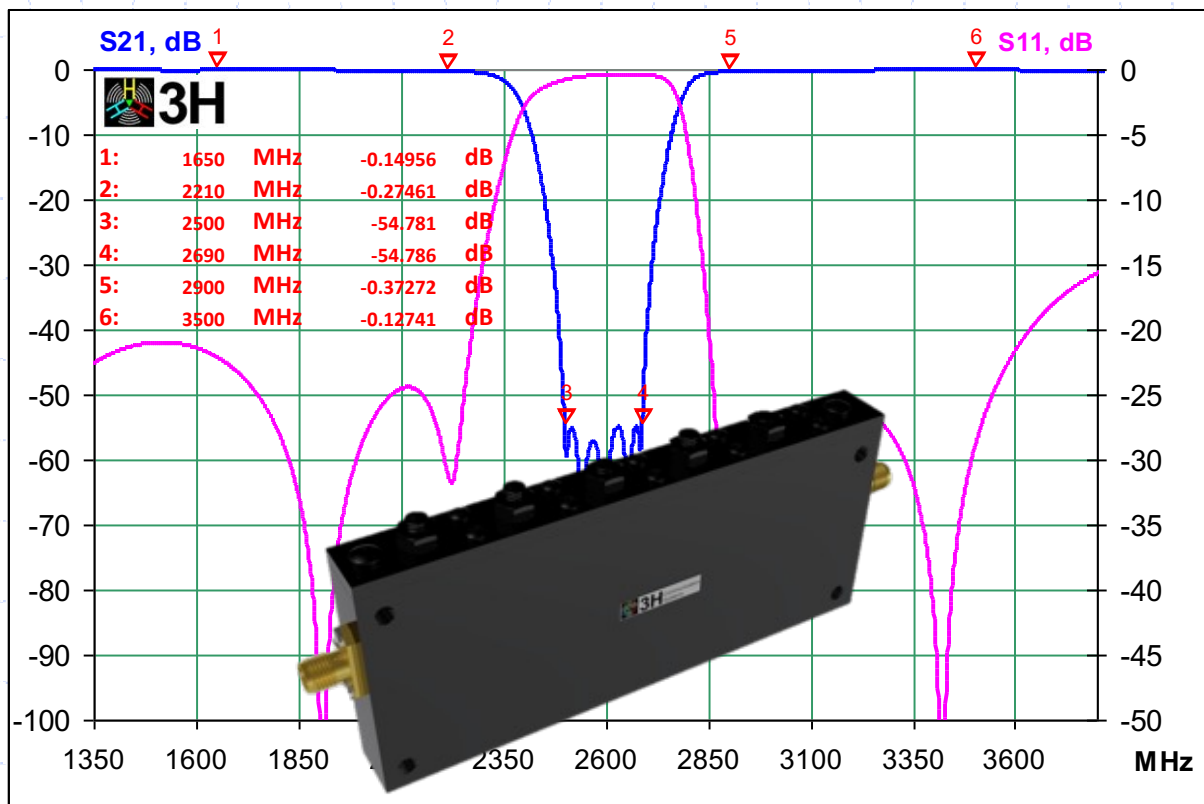
3H Communication Systems design and manufactures Miniature Cavity Filters that yield the most optimum performance with the smallest size possible.

- **Topology: Compline and Interdigital**
- **Frequency Range: 5.0 GHz to 20.0 GHz**
- **Bandwidth: Up to 60%**
- **Low Insertion Loss**
- **SMT**
- **Meets Mil-Std-202 Conditions**
- **Military**
- **Commercial**
- **Custom design to your specification requirements**



Ultra Wide Band Cavity Notch Filter

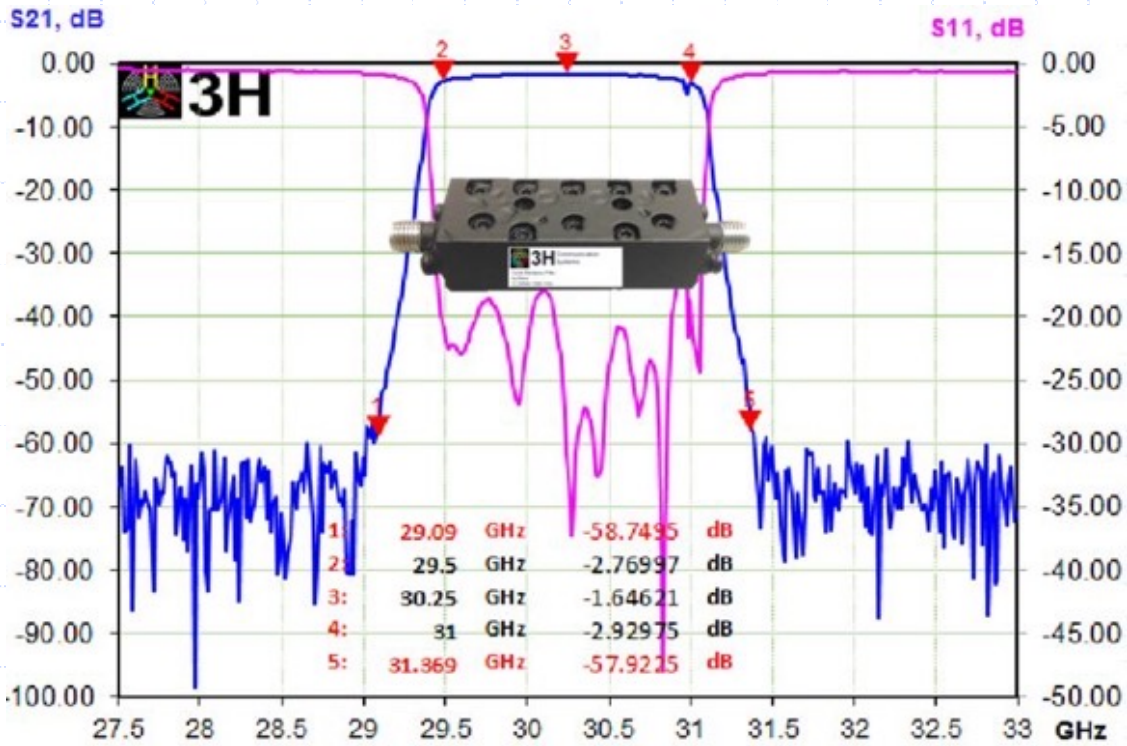
If the 2600 MHz LTE/WiMAX band is causing interference, 3H has the perfect solution. 3H is pleased to announced this 190-MHz wide notch filter solution providing over 50 dB of attenuation while passing other frequency with a very low insertion loss.



- Pass Band Frequency Bands: DC-2210 MHz & 2900-3500 MHz
- Pass band Insertion Loss < 0.5 dB
- Notch Frequency Band: 2500-2690 MHz
- Notch level: > 50 dB
- Power Handling: 300W Average and 30 kW PEP



30.25 GHz Bandpass Filter Offering Low Passband Insertion Loss and >50 dB dBc Rejection



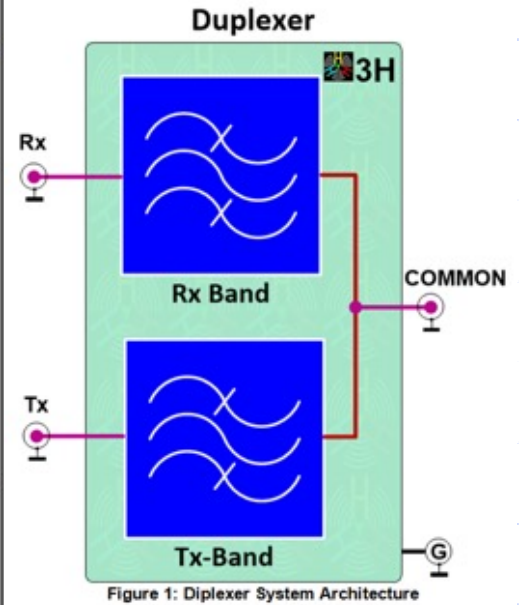
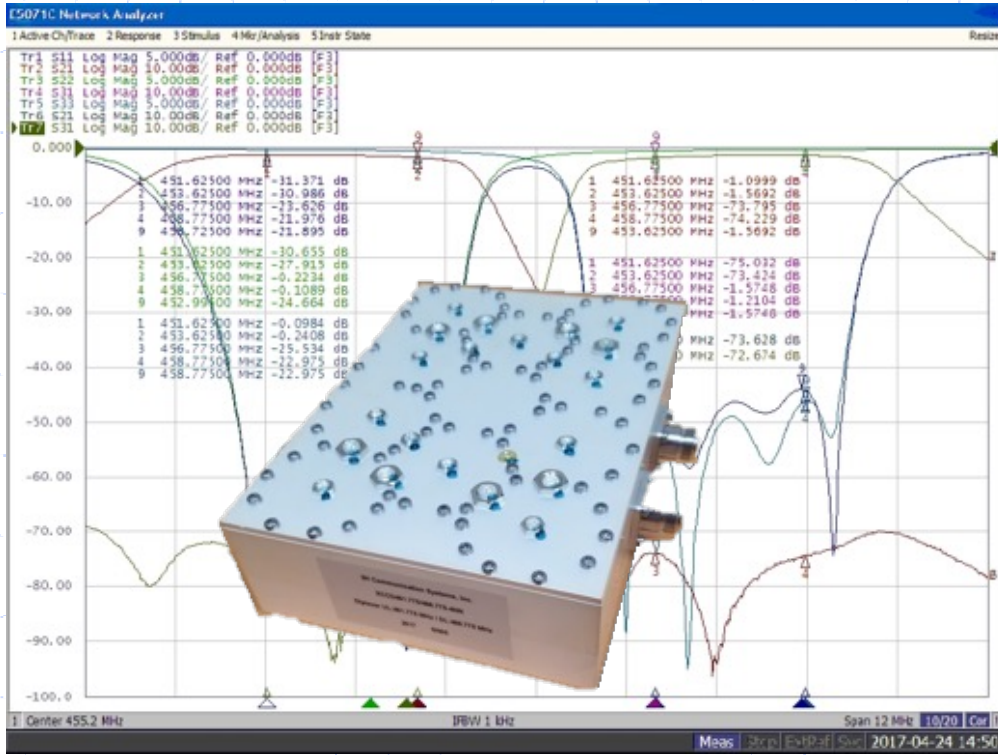
This 30.25 GHz Cavity, Combline Bandpass filter, offers low in-band insertion loss over the 5% bandwidth and >50 dB attenuation while maintaining a VSWR of 1.5:1. The filter size is 1.65" L x 0.63" W x 0.50" H.

Specifications:

- Fo: 30.25 GHz
- 3 dB Bandwidth: 1.5 GHz
- Passband Insertion Loss @ Fo: < 1.5 dB
- VSWR: 1.5:1
- Rejection: >50dBc @ and 30.586 GHz
- Ultimate Rejection: 70 dBc
- Transmit Power: 50 W CW
- Size: 1.65" x 0.63" x 0.50"



450 MHz Factory TUNABLE Combiner/Diplexer
Tx and Rx Bands provide >70 dB Co-channel Isolation



This factory tunable combiner/diplexer can be tuned between the frequencies of 440 MHz to 470 MHz while maintaining <1.75 dB passband insertion loss across any 2.0 MHz bandwidth with 5.15 MHz Tx to Rx separation.

Specifications

- Tx: 451.625 – 453.625MHz
- Rx: 456.775 – 458.775MHz
- Passband Insertion Loss: <2.25 dB (1.75 dB nominal)
- Passband Return Loss: 18.0 dB
- Co-Channel Isolation: 70 dB
- Average Power Handling: Up to 100 Watts
- Size: 8.0" x 5.85" x 2.35"

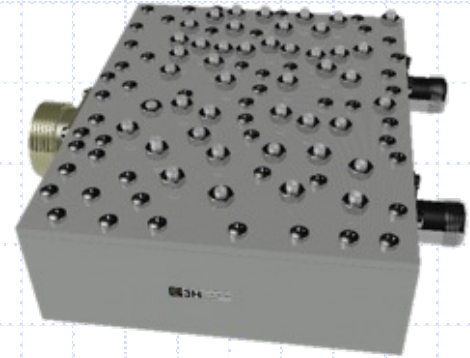


High Power and Low Passive Inter-Modulation (PIM) Filter Products

Our DAS products offer high power and low Passive Inter-modulation (PIM) performance. 3H Communication Systems offers a complete line of low Passive Inter-modulation filter products for the DAS market including the following bands, 700 MHz, Band 5, AWS, PCS and SMR



700 MHz Duplexer/Triplexer



Band 5, PCS, AWS, SMR

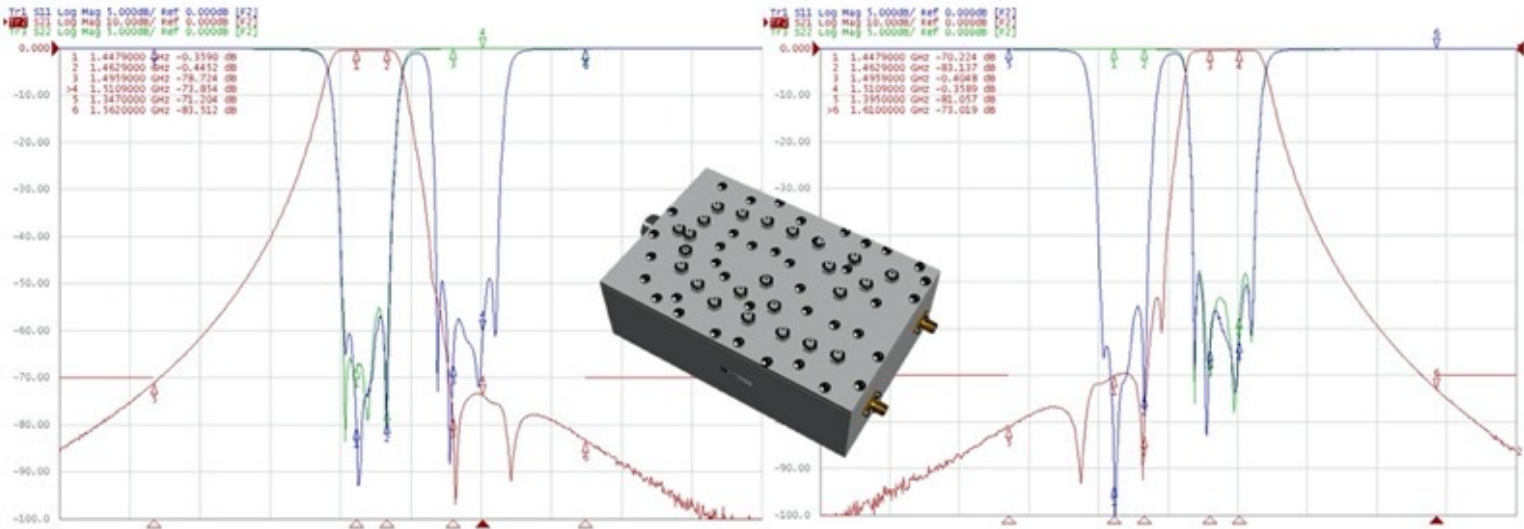
700 MHz Bands	Insertion Loss	Isolation RX to TX	Return Loss	Input Power	Peak Power	* PIM Comm Port	Size
RX 1: 698 to 776 MHz	1.0 dB						
TX: 728 to 757 MHz	1.0 dB	80 dB	- 18 dB	100 W	1000 W	150 to 170 dBc	396 x 91 x 35
RX 2: 776 to 787 MHz	1.0 dB						

Band	RX	TX	Insertion Loss	Isolation	Return Loss	Input Power	Peak Power	* PIM Common Port	Size
Band 5	824 to 849 MHz	869 to 894 MHz	0.85 dB	70 dB	- 18 dB	110 W	1100 W	150 to 170 dBc	144 x 116 x 1.97
AWS	1710 to 1755 MHz	2110 to 2170 MHz	1.0 dB	70 dB	- 18 dB	100 W	1000 W	150 to 170 dBc	144 x 116 x 1.97
PCS	1850 to 1915 MHz	1930 to 1995 MHz	1.0 dB	70 dB	- 18 dB	100 W	1000 W	150 to 170 dBc	144 x 116 x 1.97
SMR	806 to 824 MHz	851 to 869 MHz	1.0 dB	70 dB	- 18 dB	100 W	1000 W	150 to 170 dBc	144 x 116 x 1.97

- **Note: PIM specification is 2 x 20W tones @ Antenna port and measured at Rx port.**
- **Also available in 2 x 40 w. PIM performance varies from type N vs. 7/16th connector**



LTE Band 21 Duplexer, 1500 MHz, 3GPP



Product Features

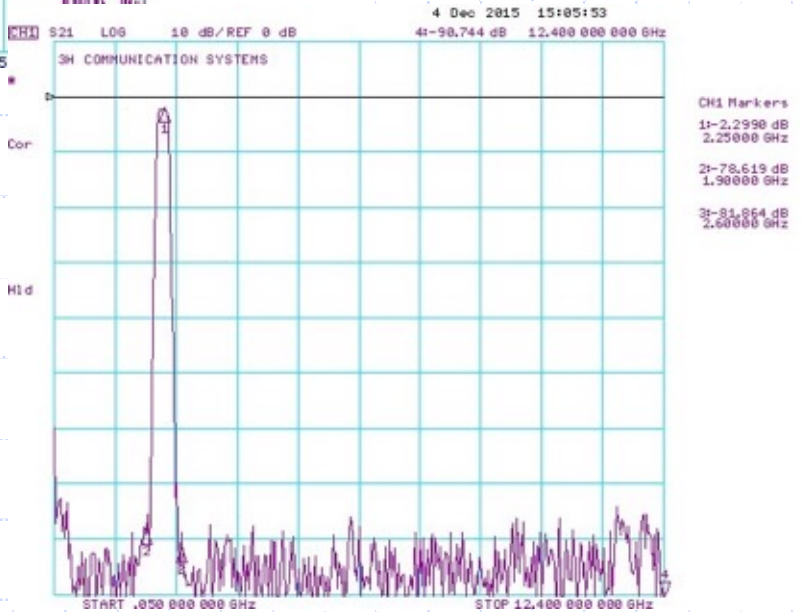
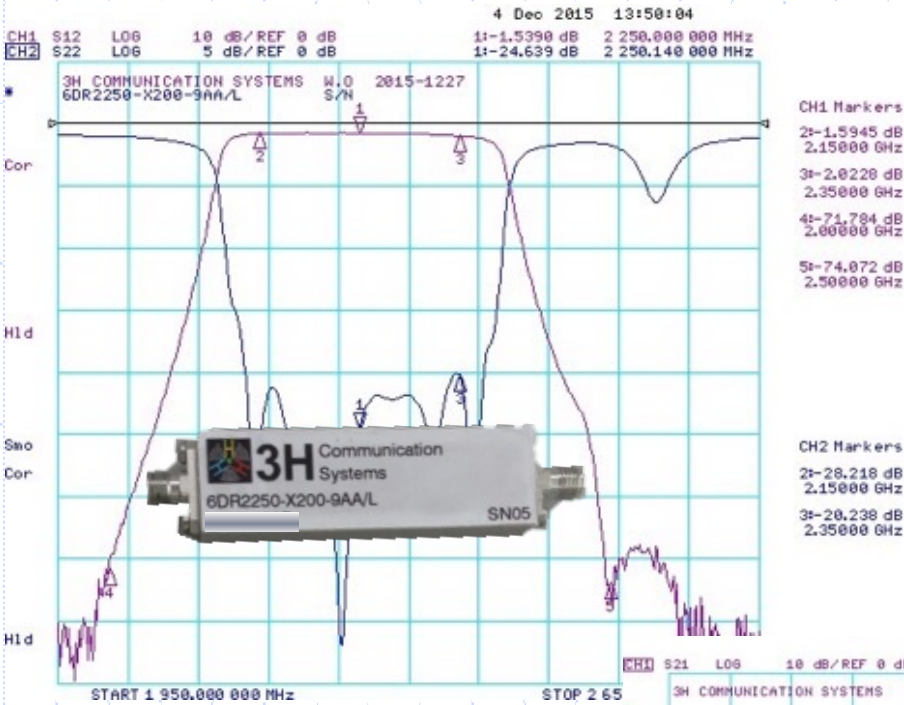
- Channel 1 Passband: 1447.9 to 1462.9 MHz
- Channel 2 Passband: 1495.9 to 1510.9 MHz
- Passband Insertion Loss: <0.8 dB
- Return Loss: -18 dB
- Rejection: >70 dB
- Isolation: >60 dB
- Avg. Power: 50 Watts
- Connectors: SMA, Type N or 7/16th
- Temperature Range: -40° to +85°C

Other frequency bands available in Bandpass and Duplexer configurations.



S-Band ,High Selectivity Bandpass Filter with Extend Attenuation out to 12.0 GHz

3H's NEW Ceramic S-Band, bandpass filter offers low insertion and >60 dB attenuation to the 5th Harmonic.

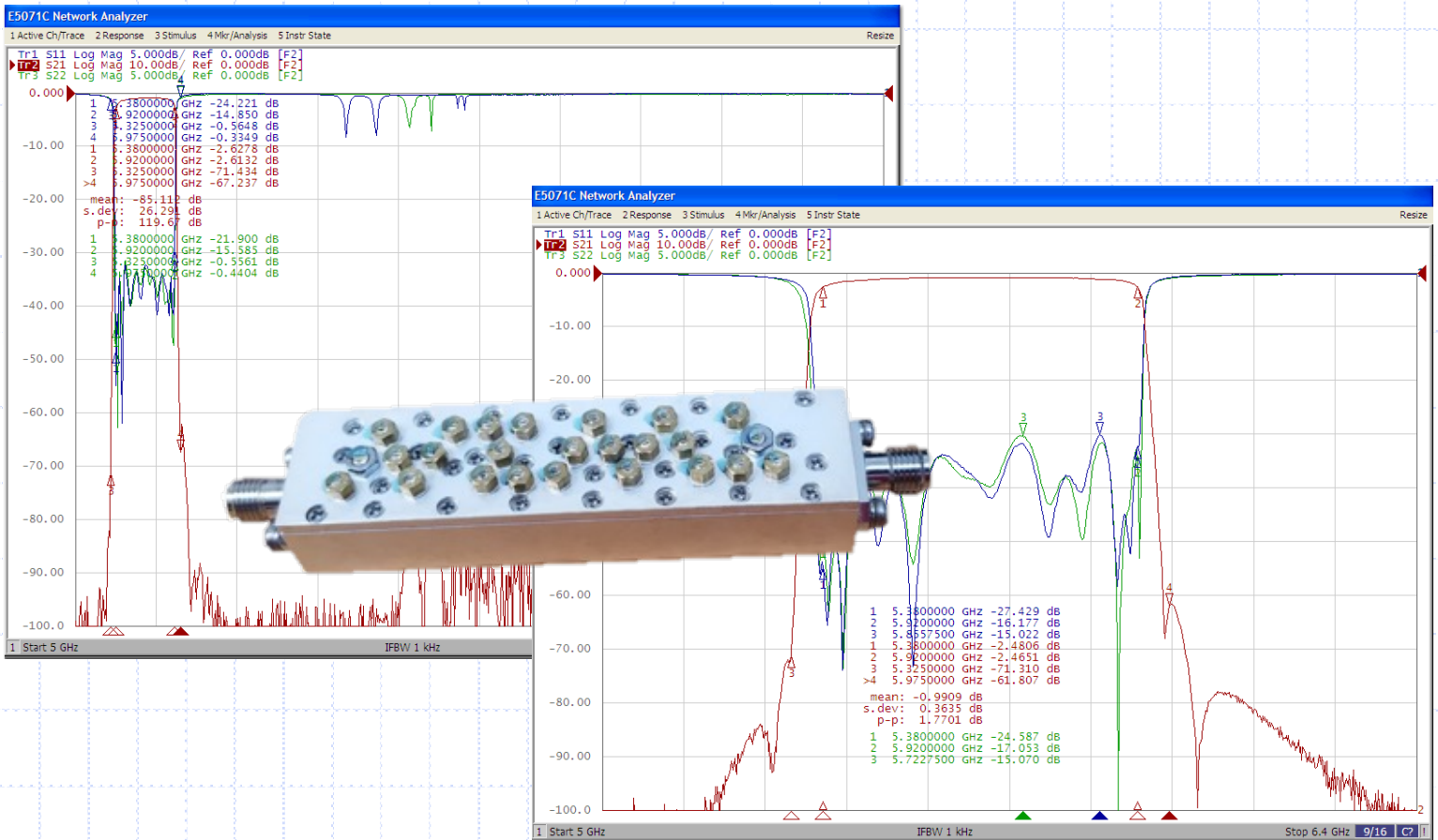


Specification

- Fc: 2250 MHz
- Passband: 2150 to 2350 MHz
- Passband Insertion Loss: <3.0 dB
- Return Loss: 14 dB
- Rejection:
 - 70 dB @ 1900 to 2000 MHz
 - 70 dB @ 2500 to 2600 MHz
 - 65 dB @ 2600 to 12000 MHz
- Connectors: SMA,
- Size: 2.35" L x 0.70" W x 0.40" W
- Temperature: -55° to +85°C
- Meets Mil-Std-202 Conditions



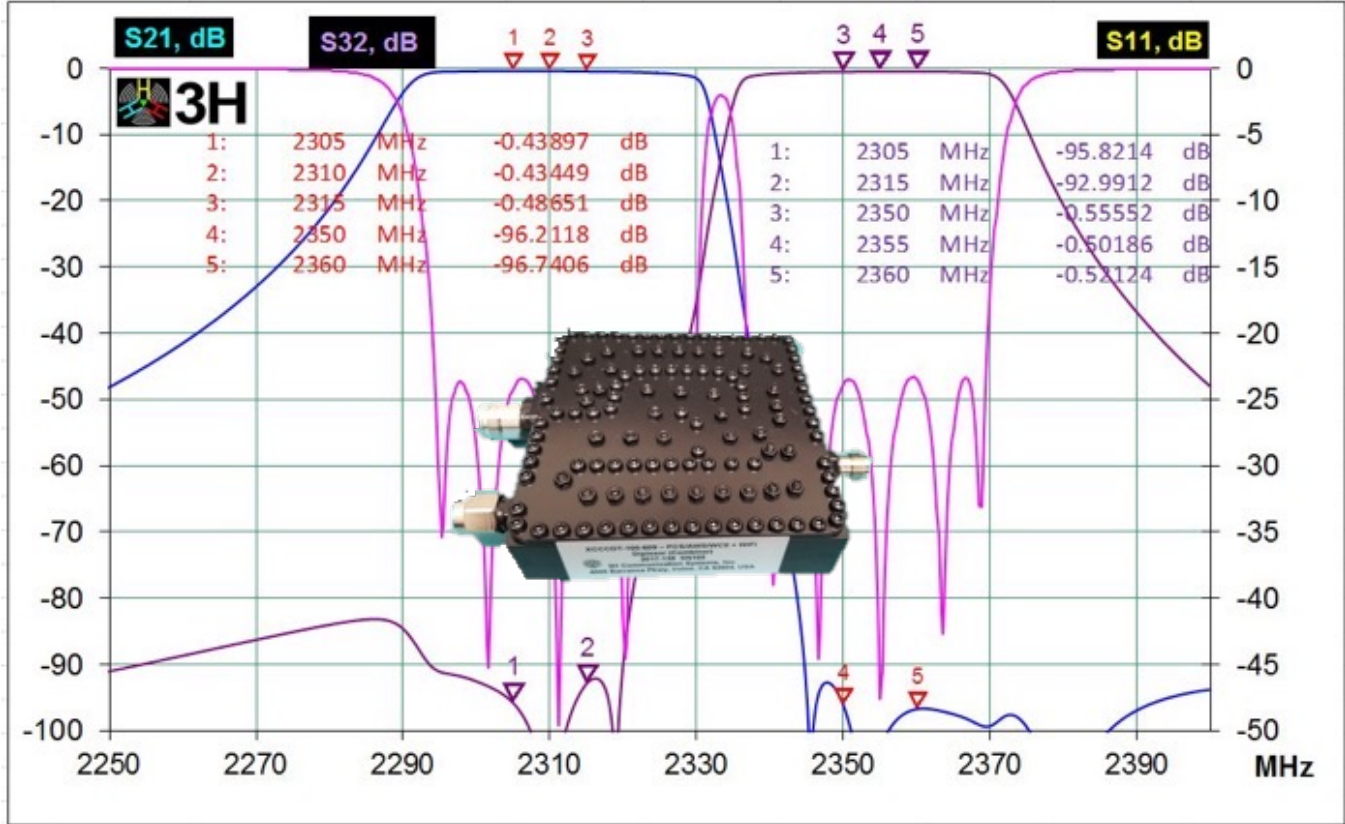
C-Band Cavity Offers Low Insertion Loss and with >60 dB Attenuation to 12.0 GHz



This C-Band, cavity filters is a 13 section Comblin filter with 6 zeros to offer extremely sharp roll offs on both sides of the pass band while maintaining low passband insertion loss as well as achieving > 60 dB attenuation all the way up to 12.0 GHz. The filter size is 2.80"L x 0.70"W x 0.50"H excluding connectors. Other connector options available. The filter is designed and manufactured to meet Mil-Std-202 conditions.



LTE Band 30 Duplexer



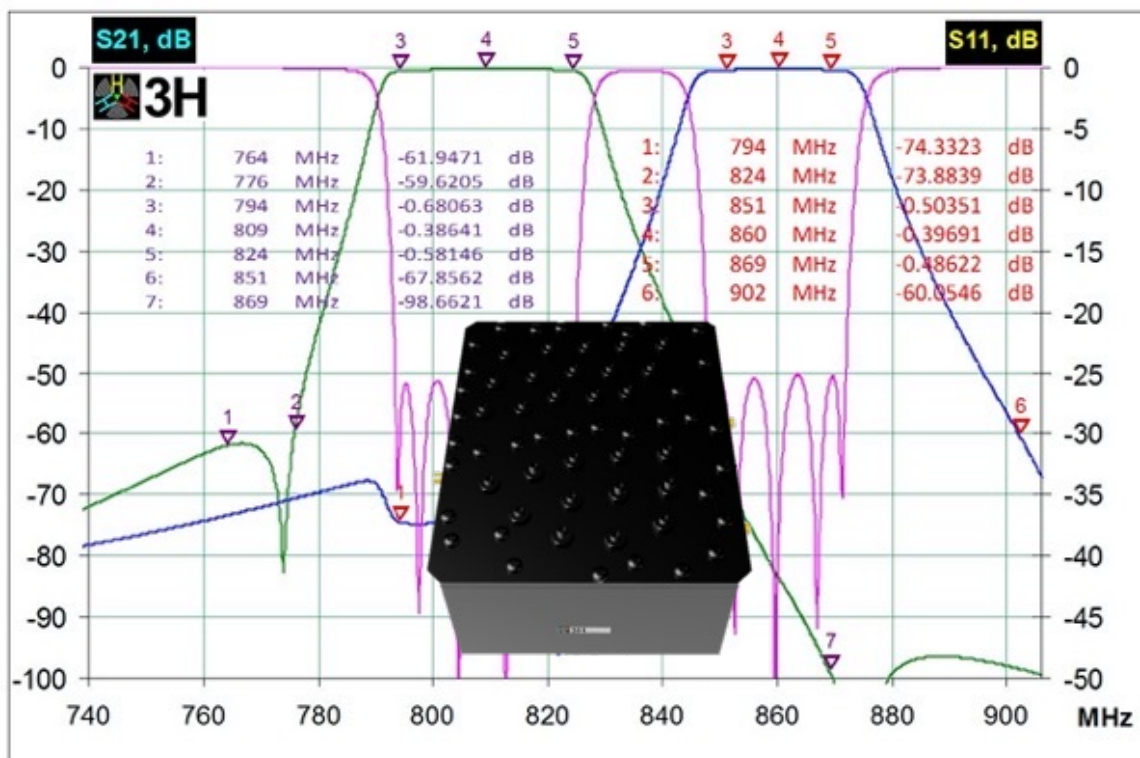
- Low Channel: 2305 to 2315 MHz
- High Channel: 2350 to 2360 MHz
- Passband Insertion Loss: <0.75 dB
- Rejection (Ant. to High Channel, 2350 to 2360 MHz): 80 dB
- Rejection (Ant. to Low Channel, 2305 to 2315 MHz): 80 dB
- Isolation (RX-TX): 80 dB at 2305-2315 & 2350-2360 MHz
- Power Handling: 200 Watt CW (100 watts per channel)
- Power Handling: 2 kw Peak
- Other Power Options, Frequency Bands and sizes available

3H Communication Systems, Inc. is a premier high value microwave and RF company supporting the military and commercial markets with RF Filters, Duplexers/Diplexers, Multiplexers, Multi-Function Assemblies, RF Front-End Solutions. The high degree of engineering and technical capability focused on innovation with decades of expertise for high value and high quality RF products allows 3H to offer premium microwave and RF filter products and solutions at discounted prices. 3H understands that highest quality is achieved when quality is designed in and potential problems are designed out. 3H works with customers to achieve optimal solutions for both performance and price. Highest achievable quality does not have to be expensive.



Public Safety Filter Products

3H Communication Systems designs and manufactures a full line of Public Safety filter products for first responders. Our products include Land, Mobile, Marine and Aeronautical.

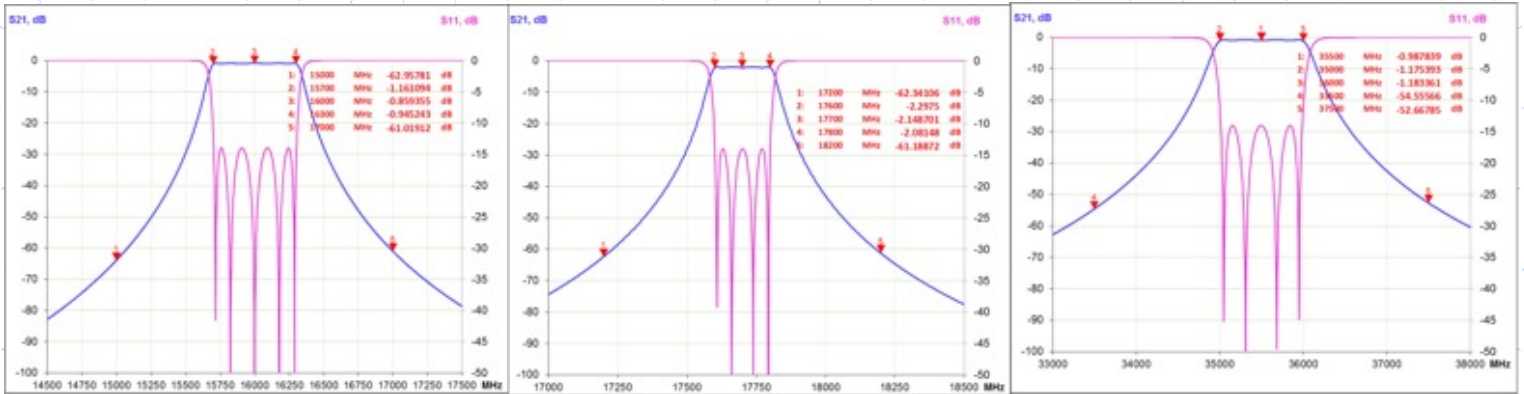


- Frequency Bands: VHF, UHF, 700, 800, 900 MHz and Tetra
- Excellent Co-Channel Isolation
- Low Passband Insertion Loss
- High Passband Power options available
- Available for Indoor and Outdoor use
- Custom Frequency Bands available



3H Communication Systems

3H custom design triplexer offers low insertion loss across K and Ku bands with port to port isolation >45 dB. 3H designs and manufactures custom Filters and Multiplexers from DC to 50 GHz.



This 3H Communication Systems high frequency triplexer offers channel bandwidths from 1.0% to 2.7% with a channel insertion loss at Fc measured at <0.75 dB to <2.0 dB with port to port Isolation of >45 dB. The unit has <0.5 dB passband ripple and can handle 10 watts average power.

Package size: 1.5 W x 1.5 L x 0.5 H inches



Warranty

3H offers a 5 Year Warranty

see below for more details

3H Communication Systems is committed to providing our customers with the highest quality products that meet and exceeds our customer's expectations. Products manufactured by 3H are warranted against defective material and workmanship for a period of 5 years (passive products) and 1 year (active products). 3H Warranty starts at time of shipment. 3H is not responsible for improper/mishandling use, including operation beyond the specified requirements as agreed to by 3H and the customer. 3H reserves the right to repair or replace defective hardware. Additional warranty terms can be designated at time of quote. No returned hardware will be accepted without an RMA number (Returned Material Authorize). Please contact 3H for RMA number.

Relentless Innovations
RF Filters and Front-End Systems Experts



3H Communication
Systems

