

Switched Filter Bank, 8.0 to 22.0 GHz

TSFB-900A Data Sheet



TSFB-900A—Shown with Interface Board and Cover

General Description

The TSFB-900A is an instrument-grade, 9-channel Switched Filter Bank (SFB) module that operates from 8 to 22 GHz. Each band has a minimum of 1.5 GHz bandwidth and 150 MHz band overlap.

The TSFB-900A is intended for applications that require a band of signals to be selectively passed over a wide frequency range while rejecting other signals. These applications include super-heterodyne systems where the mixer input band must be a subset of the input frequency band, and wide-tuning transmitters where output filtering is desired to remove harmonics and other out-of-band spurs.

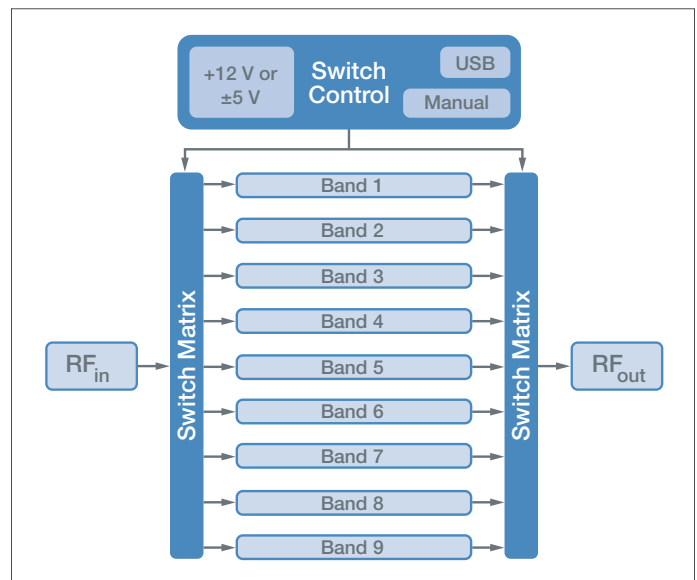
Tektronix Component Solutions can customize this module, or develop other integrated microwave assemblies, to meet your specific requirements.

Features & Benefits

- Tunable Frequency Range: 8 – 22 GHz
 - Ideal for wide-tuning transmitters and receivers
- 9 Bands with 1.5-2.0 GHz bandwidth
 - Ideal for block up-/down-converter systems
- ≥ 80 dBc Rejection to 50 GHz
 - Suppresses out-of-band signals
- Manual and USB Control of Band Switching
 - Allows for easy user control and automation
- Supply Voltage: $+12 V_{dc}$ or $\pm 5 V_{dc}$
 - Provides two separate configurations for powering the SFB

Applications

- High Performance Transmitter/Receiver Systems
- Synthesizer Systems
- General Purpose Lab Equipment



Functional Diagram (Excludes External Low-Pass Filter)

Electrical Characteristics ($T_A = +25^\circ\text{C}$, 26.5 GHz LPF attached)

Typical Performance

Parameter	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7	Band 8	Band 9	Units
Center Frequency (fc)	8.78	10.45	12.22	13.74	15.14	16.47	17.84	19.37	21.08	GHz
Pass-band 3 dB Bandwidth	1.6	2.1	1.9	1.7	1.8	1.9	2.0	2.2	2.5	GHz
Insertion Loss in Pass-band @ fc	9.5	10	11.2	12.6	12	12.4	13.8	14.7	16.2	dB
Maximum Input Return Loss in Pass-band	13	12	14.5	12.5	13	12.5	12.5	13	13	dB
Maximum Output Return Loss in Pass-band	12	8.5	8.5	9.5	7	7.5	6.5	6	6	dB
Lower Side Stop-band ≥ 60 dB	7.6	8.9	10.7	12.4	13.6	14.9	16.2	17.3	18.5	GHz
Upper Side Stop-band ≥ 60 dB	10.2	12.2	13.9	15.6	16.8	19.3	19.8	21.4	23.5	GHz

Parameter	Min	Typical	Max	Units
Frequency Range	7.94		22.06	GHz
Out-of-Band Rejection		> 80		dBc
Switching Speed		1		μsec
Power Supply Current † Option 1 ($\pm 5 V_{dc}$): +5 Vdc Current -5 Vdc Current Option 2 (+12 V _{dc}): +12 Vdc Current		800 67 500		mA mA mA
System Impedance		50		Ω

† For improved versatility, the Switched Filter Bank can be supplied with either +12 V_{dc} or $\pm 5 V_{dc}$.

Absolute Maximum Ratings

Parameter	Min	Typical	Max	Units
Storage Temperature Range	-20		80	$^\circ\text{C}$
Maximum RF Input Power			30	dBm

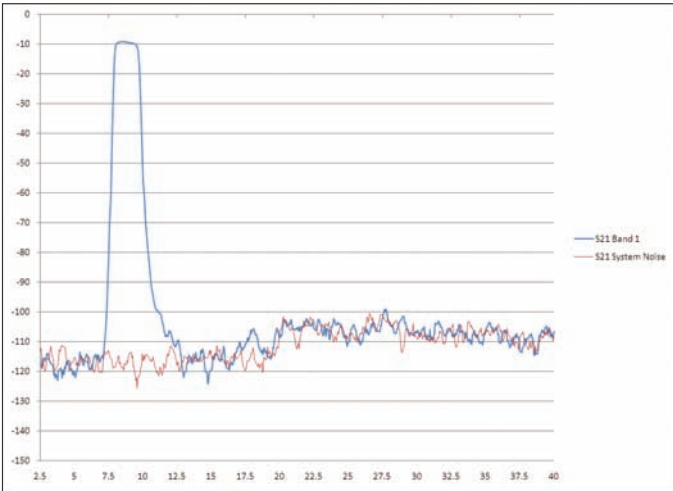
Mechanicals

Parameter	Typical	Units
Size Switched Filter Bank External Low Pass Filter	4.5 x 7.5 x 1.25 1.6 x 0.6 x 0.4	in ³ in ³
Weight	2.0	lbs
RF Connector Configuration Switched Filter Bank External Low Pass Filter	2.92 mm – Female Input – Male SMA; Output – Female SMA	

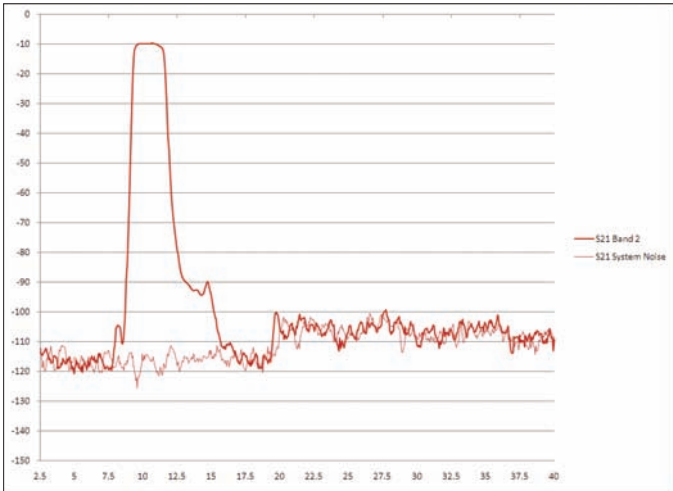
Environmental

Parameter	Method
Humidity	Per MIL-STD-883, Method 1004
Altitude	Per MIL-STD-883, Method 1001, Cond. C
Vibration	Per MIL-STD-883, Method 2026, Cond. A
Mechanical Shock	MIL-STD-883, Method 2002, 60 g's/11 mS

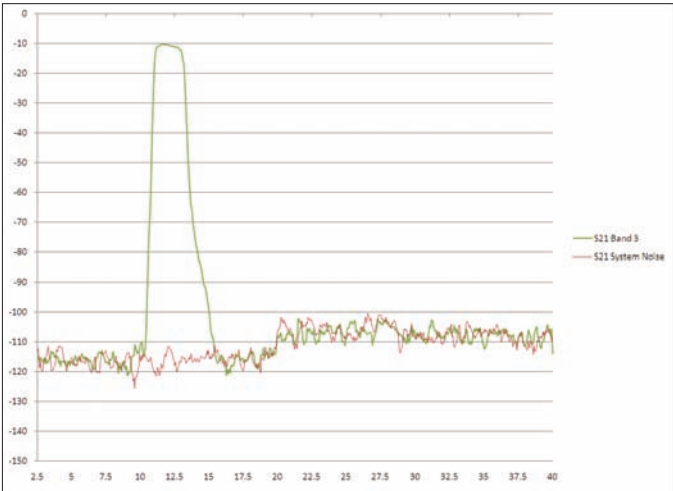
Typical S_{21} Performance ($T_A = +25^\circ\text{C}$, 26.5 GHz LPF attached)



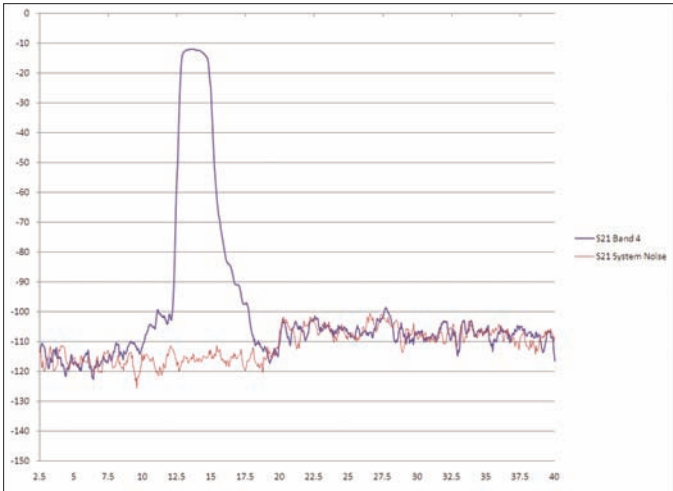
Band 1



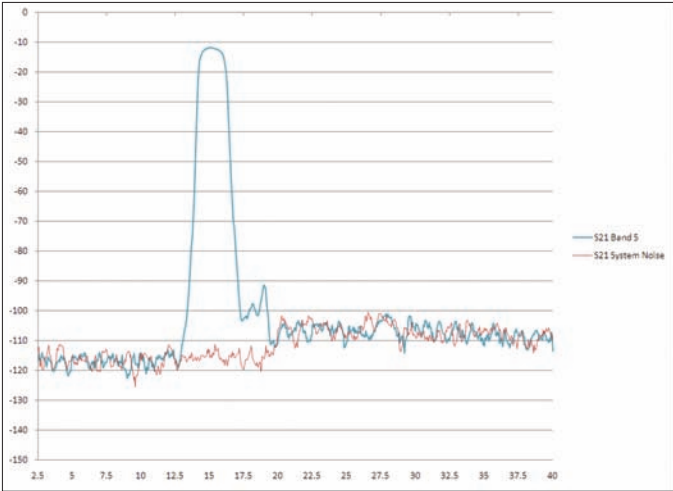
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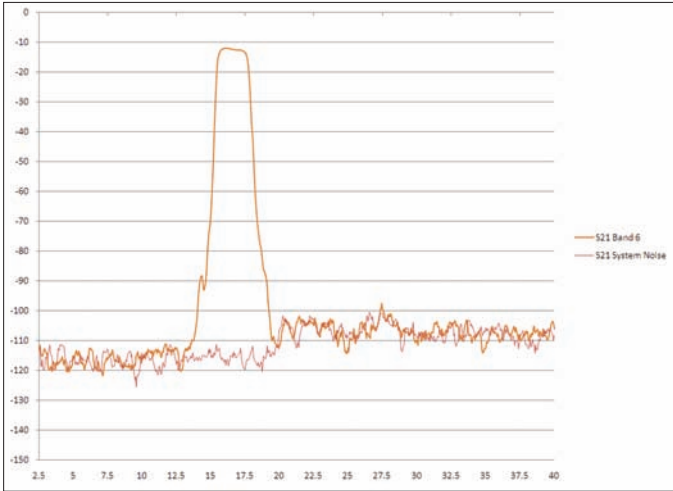
Band 3



Band 4

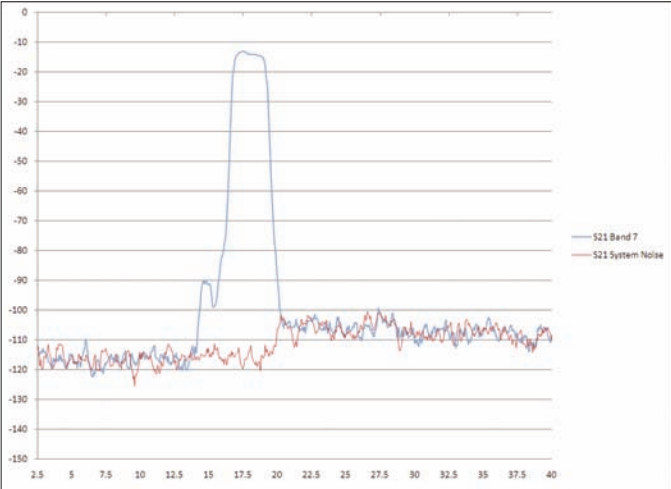


Band 5

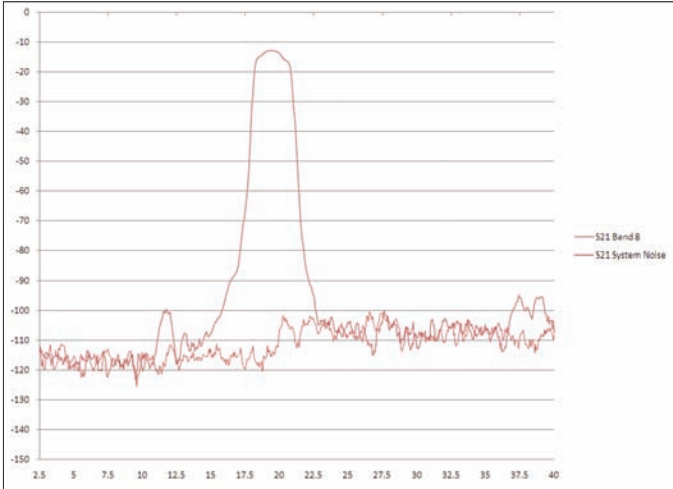


Band 6

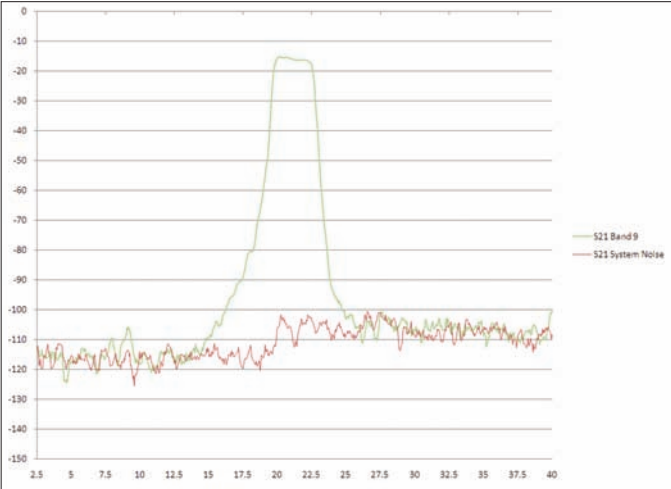
Typical S_{21} Performance ($T_A = +25^\circ\text{C}$, 26.5 GHz LPF attached)



Band 7

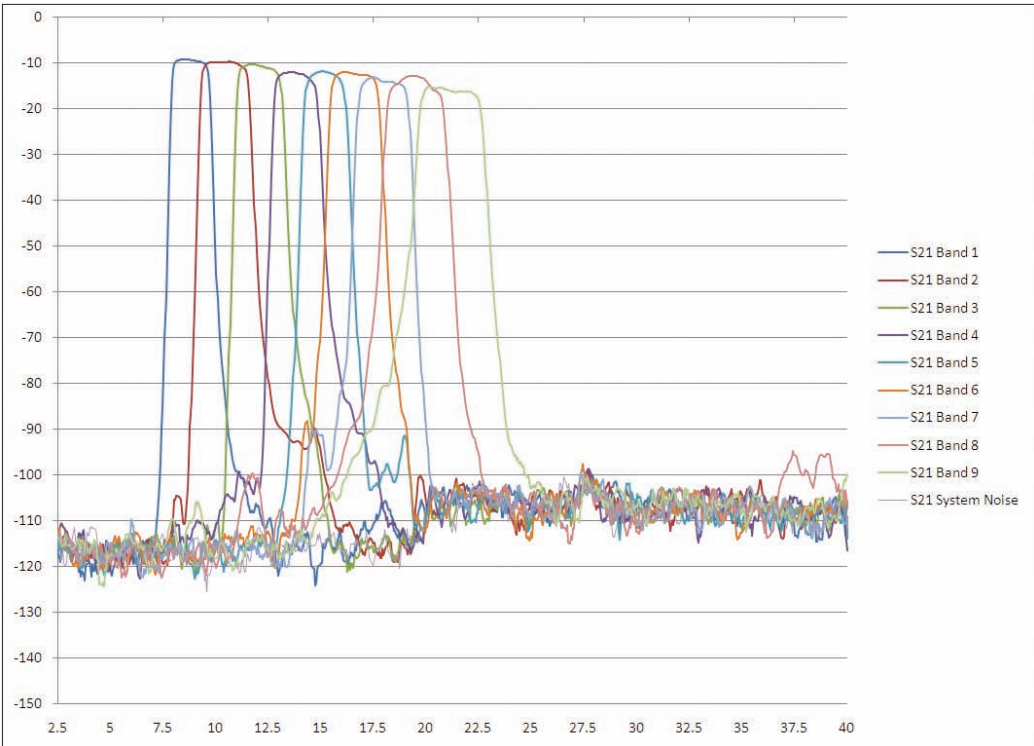


Band 8



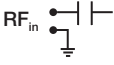
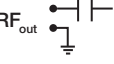

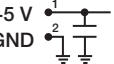
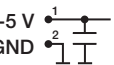
Band 9

Typical S_{21} Performance ($T_A = +25^\circ\text{C}$, 26.5 GHz LPF attached)

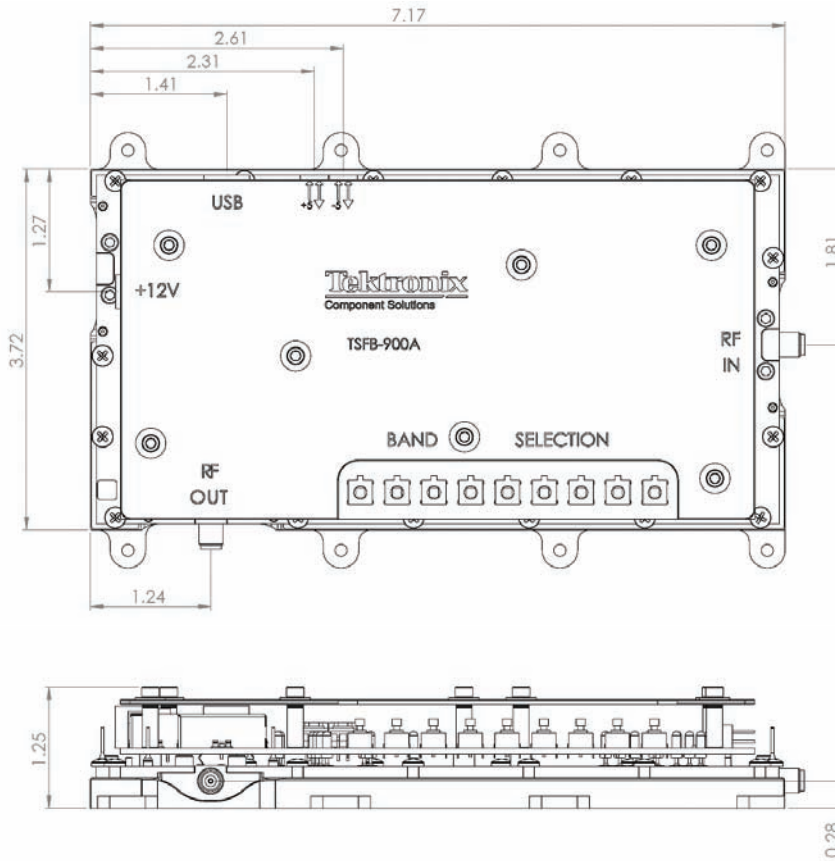


Composite Frequency Response

Connector & Control Descriptions

Connector/Control	Description	Schematic Representation
RF in	2.92 mm f	
RF out	2.92 mm f	
+12 V	2.1 mm DC Barrel Socket	
+5 V	0.001" (2.54 mm) Connector 2 X 1	
-5 V	0.001" (2.54 mm) Connector 2 X 1	
USB	USB-B	
Manual Switches	9 push-button switches to individually select bands 1 – 9	

Outline Drawing



Application Notes

The filter bands can be selected manually via push-button switches or through software via the USB interface. The module is configured to enable only one band at a time. The active band is indicated on the module with a green LED. For improved performance, an external 26.5 GHz LPF has been included (attached to RF_{out}).

Manual Operation

- To select a band, push the button with the corresponding band-number label.
- To change bands, simply push the button with the corresponding band-number label of the desired band.
- To deselect all bands, push the button for the band that is currently active.

You can now communicate to the unit with either a serial communication tool such as HyperTerminal or with the supplied executable “comport.exe.” To use HyperTerminal, configure the connection as follows:

Connect using:	COMx (where x is the address assigned to your virtual COM port)
BAUD Rate:	9600
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None

Once connected, the following single-character commands are used to control the unit:

Command	Result
1	Select Band 1
2	Select Band 2
3	Select Band 3
4	Select Band 4
5	Select Band 5
6	Select Band 6
7	Select Band 7
8	Select Band 8
9	Select Band 9
0	Deselect all bands
r	Read back active band. Returns 1 – 9 for Bands 1 – 9 respectively, returns 0 if all bands are off.

The provided executable “comport.exe” can be used in a command terminal using the following syntax:

Inside quotation marks, type the path to the executable comport.exe, followed by a space, then the COM port number, followed by a space, then the command character. Example: C:\>“C:\Temp\comport.exe” 3 1

This sends the command “Select Band 1” to the device on COM port 3.

USB Operation

Connect the unit to your PC using the supplied USB-B to USB-A cable. Install the Virtual COM Port (VCP) driver from the CD or by running the driver installation executable CDM20802_setup.exe, or download the VCP drivers from the FTDI website here: www.ftdichip.com/Drivers/VCP.htm. Upon connection, the hardware device manager will assign a COM port address to the virtual COM port. You will need the COM port address to communicate with the unit. The address can be found in the Device Manager under the “Ports” directory with the heading “USB Serial Port (COMx)” where “x” is the COM port address.

About Tektronix Component Solutions

With four decades of expertise, a talented in-house engineering team, a lean US-based manufacturing facility, advanced test capabilities and DSCC-suitable labs, Tektronix Component Solutions brings performance, reliability and quality to component design, assembly and test.

Originally created in 1970 as the Hybrid Components Organization within Tektronix, the group was formed to supply high-performance components for Tektronix high-speed measurement equipment, a charter we continue to fulfill today.

In 1994, our organization was spun out as a joint venture between Maxim and Tektronix. As Maxtek, we began to apply our expertise in the design, assembly and test of demanding microelectronics for customers in a variety of industries.

Reacquired by Tektronix in 2000 and renamed Tektronix Component Solutions in 2010, our organization continues to provide a full range of design, assembly and test services to those requiring components for demanding applications.

We are headquartered in Beaverton, Oregon, with additional sites in Orlando, Florida and Phoenix, Arizona.

For price, delivery and ordering information contact Tektronix Component Solutions directly at 1 (800)-462-9835 or email us at components@tektronix.com. For more information visit us at component-solutions.tektronix.com.



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