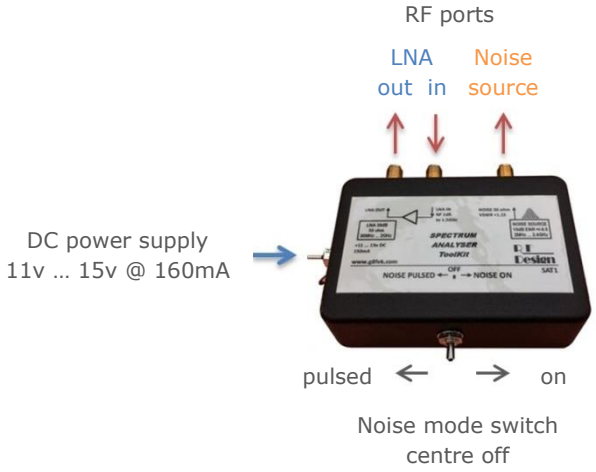
Products: Spectrum Analyser ToolKit SAT1



SAT1 at a glance …

Calibrated noise source

- 2 MHz … 2400 MHz
- 10dB ENR +/-0.5dB (-104dBm/MHz)
- PRO option gives 0.1dB resolution calibration
- 50 ohm sma output
- VSWR <1.15:1 noise on or off (RL >23dB)
- Pulse mode frequency 5Hz

Very Low Noise Amplifier

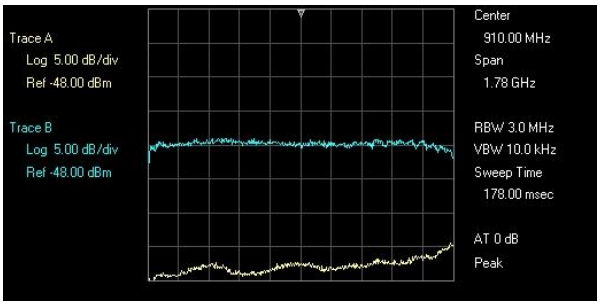
- 30 MHz … 2 GHz (to 2.5 Ghz with reduced gain)
- 32dB gain; <+/-2dB flatness to 2 GHz
- <1dB noise figure to 1500 MHz (<2dB @ 2.5 GHz)

Measuring frequency response without a tracking generator

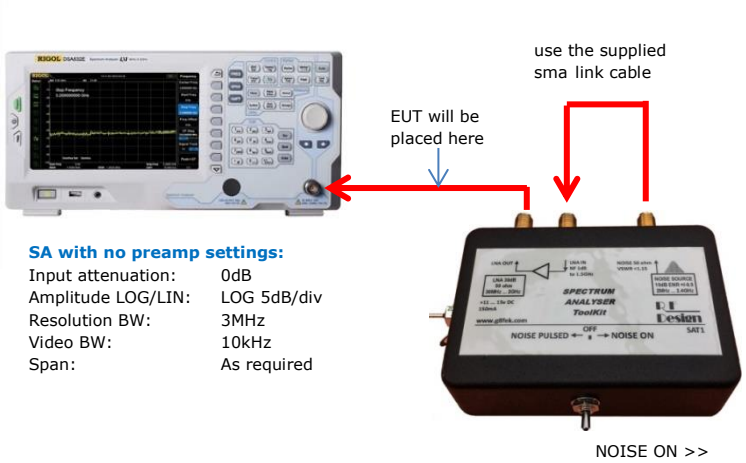
If you spectrum analyser (SA) doesn't feature a tracking generator, SAT1 provides a flat power source against frequency from 30 MHz to 2 GHz. By routing the noise source through the SAT1 VLNA, your spectrum analyser can be used to display the passband characteristics of amplifiers, filters, cables and other 2 port devices.

SA with an internal preamp will display approximately 30 to 40dB of noise from SAT1, compared to the SA noise floor. With no internal SA preamp, expect 15 to 20dB of noise above the SA noise floor.

20 … 1800MHz no internal SA preamp, 5dB / division.



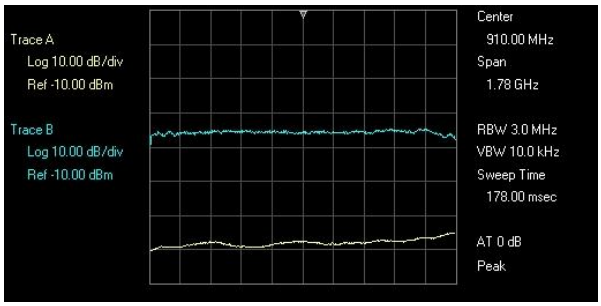
The lower trace is with SAT1 power removed

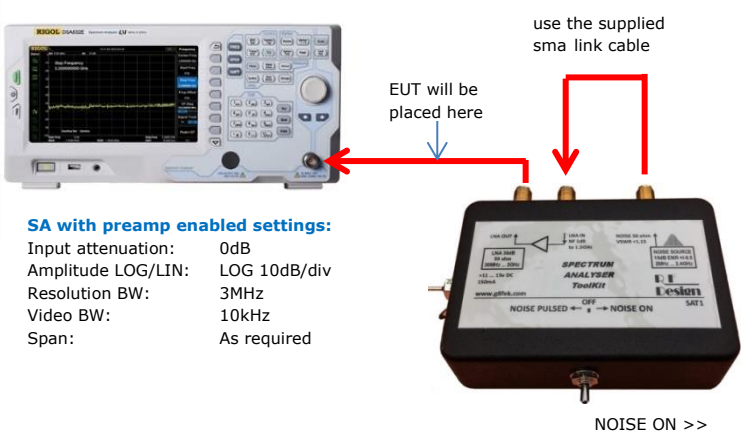


SA with no preamp settings:

Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 5dB/div
Resolution BW:	3MHz
Video BW:	10kHz
Span:	As required

20 … 1800 MHz SA preamplifier on, 10dB / division.



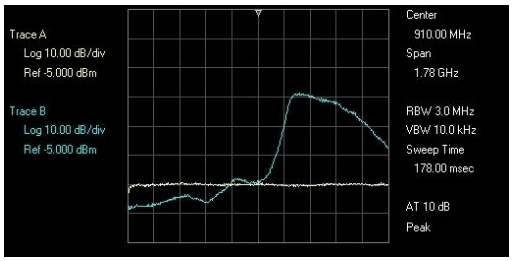


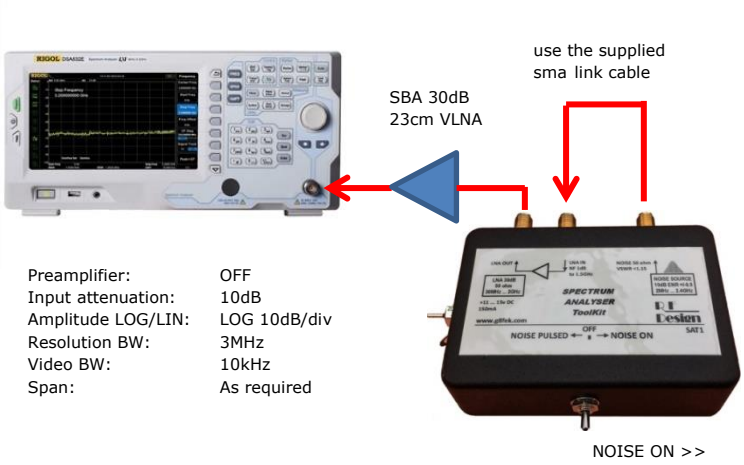
SA with preamp enabled settings:

Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 10dB/div
Resolution BW:	3MHz
Video BW:	10kHz
Span:	As required

Amplifier testing

If the equipment under test has gain, the amplitude display range is extended further, approximately by the gain of the equipment under test (EUT). The plot below shows results from one of our SBA 23cm amplifiers with integrated filters. The plot is from 20 MHz to 1800 MHz.



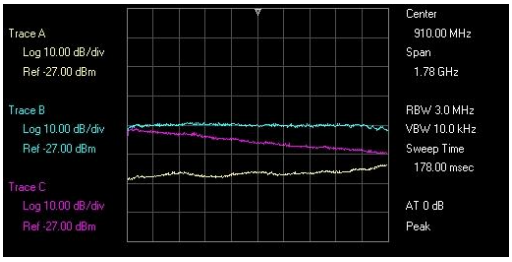


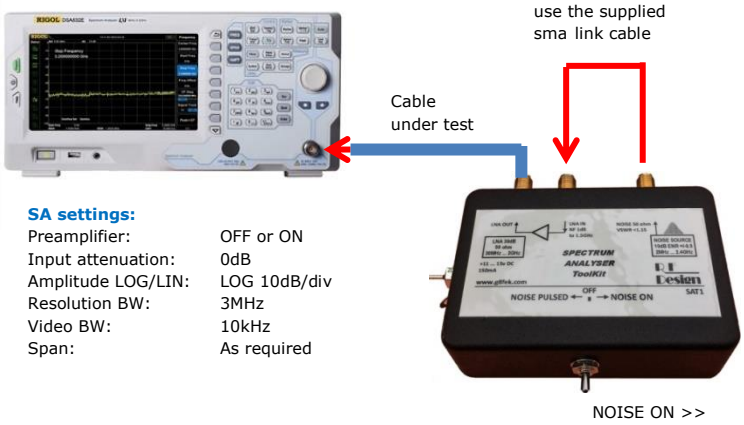
Preamplifier:	OFF
Input attenuation:	10dB
Amplitude LOG/LIN:	LOG 10dB/div
Resolution BW:	3MHz
Video BW:	10kHz
Span:	As required

The bottom flat trace is with the VLNA under test out of circuit and provides a 0dB gain reference.
Note the 30dB gain 23cm SBA has excellent rejection below 1000 MHz and a through loss in the digital TV band.

50 ohm cable testing

Cable loss sweep using SA without preamp.





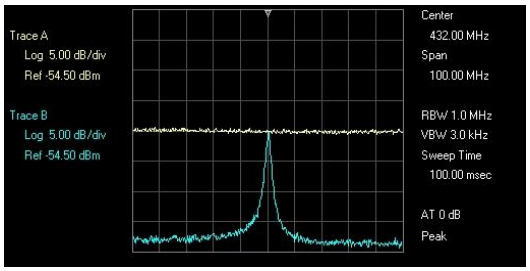
SA settings:

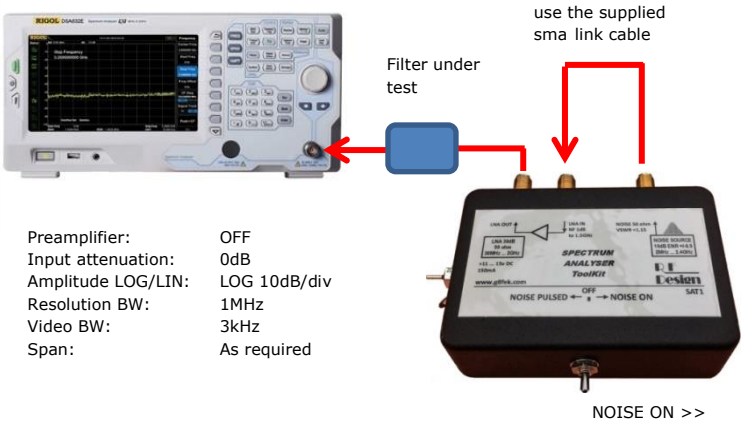
Preamplifier:	OFF or ON
Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 10dB/div
Resolution BW:	3MHz
Video BW:	10kHz
Span:	As required

The bottom trace is with SAT1 power OFF. The top trace (0dB gain ref) is with the SAT VLNA fed directly into the SA input.
The middle trace is with 10m coax (similar to URM76) connected in the 'Cable under test' position above.
10dB loss is observed at 1.8GHz.

Filter testing

UHF bandpass filter with 2 MHz BW and 1dB loss.

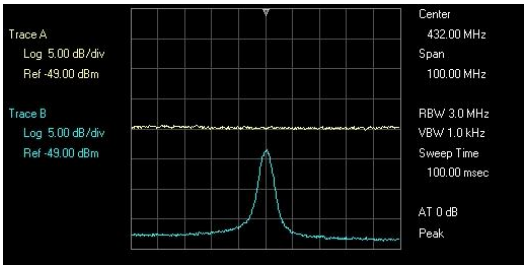




Preamplifier:	OFF
Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 10dB/div
Resolution BW:	1MHz
Video BW:	3kHz
Span:	As required

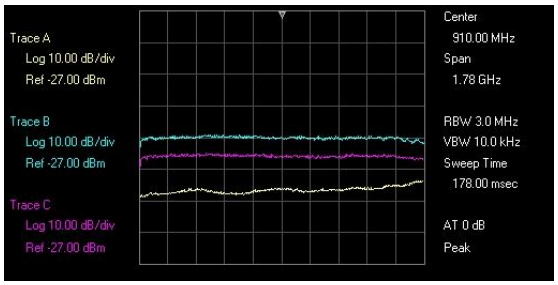
The plot shows a 432 MHz bandpass filter characteristic displayed on a SA with no preamp.
If your SA has a preamp, expect approximately 15dB more range. Remember to use 0dB input attenuation.

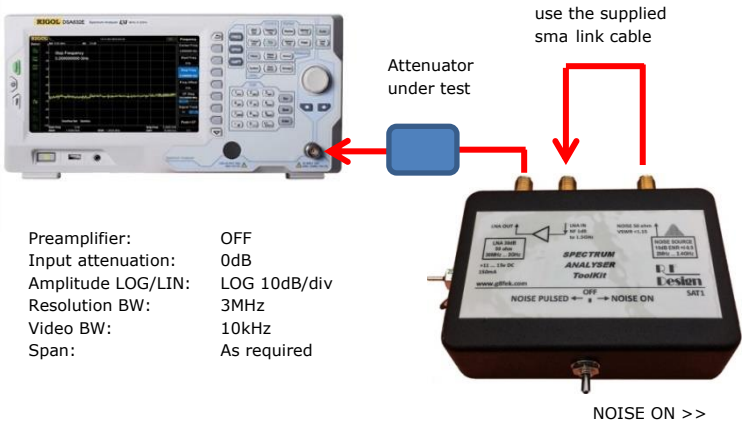
Testing narrow band filters requires attention to be paid to the SA resolution bandwidth setting (RBW). It's important to select an RBW setting that is narrower than the filter under test. The plot on the following page demonstrates the faulty result of setting an RBW wider than the filter.



Here is the same filter but with a 3MHz RBW setting. The SA fails to resolve the true amplitude value at the peak of the filter response.

Attenuator testing





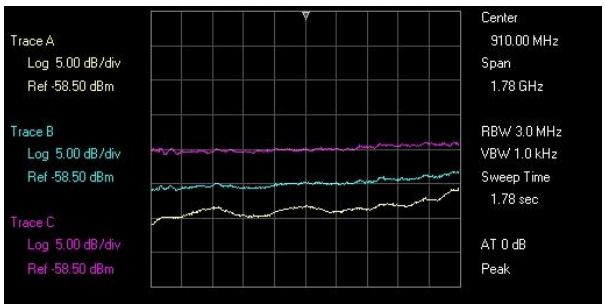
Preamplifier:	OFF
Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 10dB/div
Resolution BW:	3MHz
Video BW:	10kHz
Span:	As required

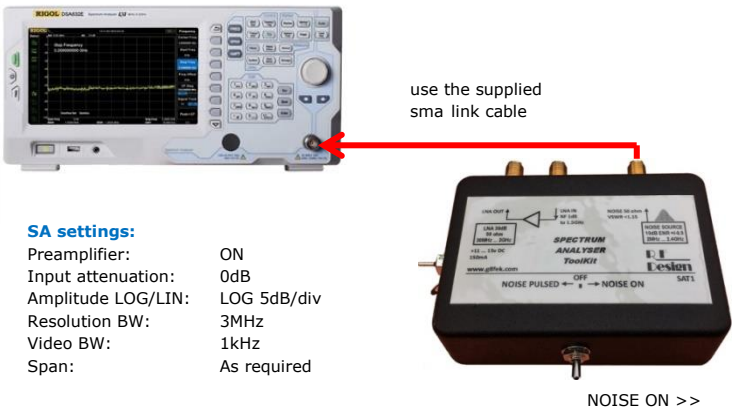
NOISE ON >>

The plot shown is with a SA with no integral preamp.
The bottom trace is with SAT1 power OFF. The top trace (0dB gain ref) is with the SAT VLNA fed directly into the SA input.
The middle trace is with a 6dB precision attenuator connected in the 'Attenuator under test' position above.
The plot shows the attenuator characteristics from 20 MHz to 1.8 GHz.
If you have an integral preamp feature on your SA, a further 15dB of range will be available.

Checking your SA integral preamplifier flatness

If your SA has an integral preamplifier feature, use the SAT1 noise source directly to check the flatness of your instrument.
The SAT1 noise source is flat within a few tenths of dB from 30 MHz to 2.4GHz.





SA settings:

Preamplifier:	ON
Input attenuation:	0dB
Amplitude LOG/LIN:	LOG 5dB/div
Resolution BW:	3MHz
Video BW:	1kHz
Span:	As required

NOISE ON >>

The bottom trace is with SAT1 power OFF and SA preamplifier off. Notice 5dB/div.
The middle trace is with the SA preamplifier enabled. (The amplitude axis hasn't been corrected for the preamp gain)
Finally the top trace is preamp on and SAT1 noise source on. Notice the overall flatness of around 1dB. This particular preamp is known to have a gain peak around 1.5 to 2 Ghz.

We hope you have found this note useful.