



COMBGEN.5-70MPPS-ADJ_DIFF - Comb Generator PRODUCT SPECIFICATION Rev B – 2/14/17

Differential output – can also provide single ended outputs, one with positive going pulse, the second with negative going pulse.

Pulse height adjustable +1 to +5V peak into 50 ohms, on positive output, with concurrent -1 to -5V peak on negative output

Produces differential pulse on positive edge of input clock

Input clock may be 20-100MHz sinewave or 0.5-100MHz square wave, producing comb to 4GHz. Usable energy to >10GHz.

Differential outputs are designed to drive matched 50 ohm loads, but can drive any load, including short, without damage. Has integral fan.

Power Requirements: -12V @ 120mA and +18V @ 90mA.

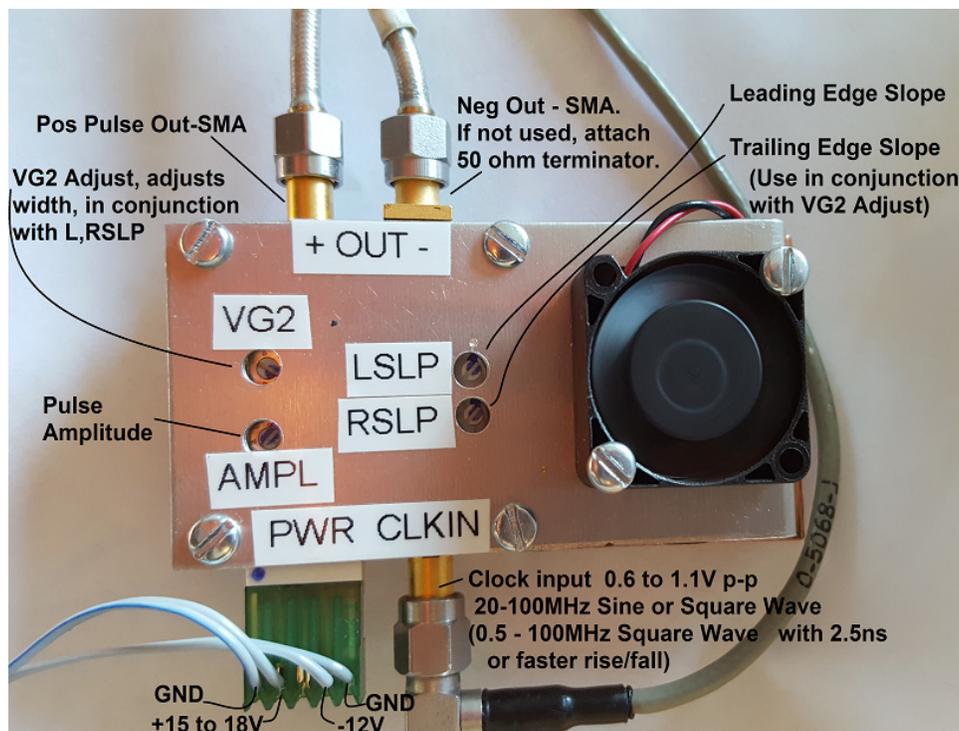


Figure 1. Connections and Adjustments on COMBGEN.5-70MPPS-ADJ_DIFF.

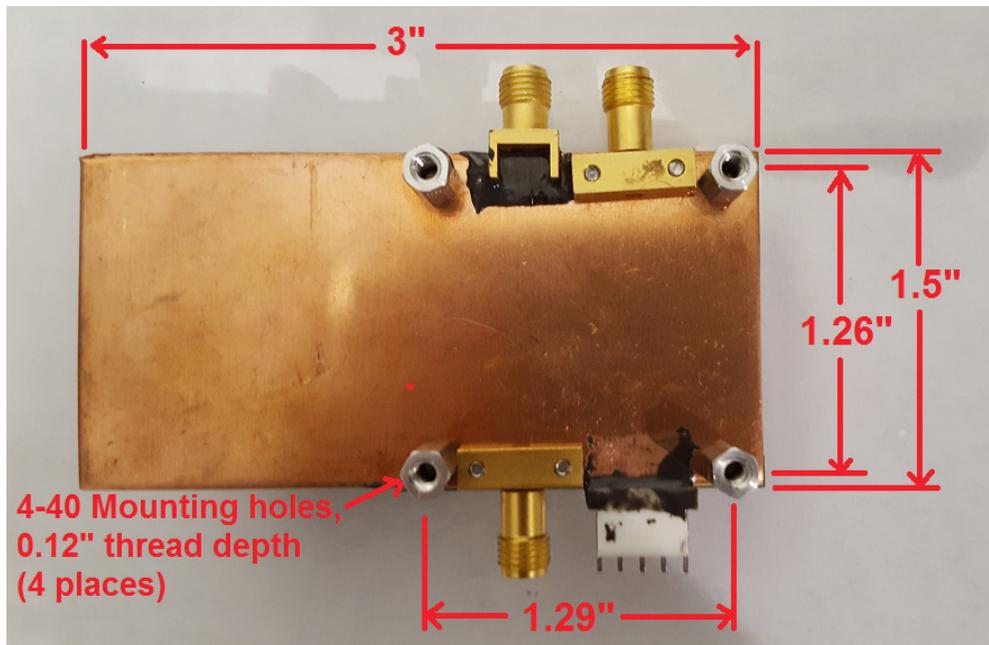


Figure 2. The module may be mounted using four 4-40 screws. Mounting hole pattern is shown. Do not remove spacers or drill through the copper plate.

Mounting the module

The module may be mounted, using four 4-40 screws. If the internal fan is removed, then continuous airflow of at least 20LFPM must be supplied across the module during operation. Damage due to overheating caused by insufficient airflow is not covered by the warranty. The module should be slightly warm, but comfortable to the touch, during operation.

Controls

There are four potentiometer adjustments on the module, which together and with some interaction, determine the pulse amplitude and shape. They take some practice to obtain the desired pulse. **In some cases the pulse may disappear during some combinations of settings – if that happens, just back off on the control being adjusted, or reduce the amplitude, until the pulses reappear.**

The amplitude pot controls the pulse height. The negative and positive outputs track and have equal amplitudes but opposite polarity. Amplitude may be set between 1V and 4V peak (2–8V p-p differential) with minor changes in pulse shape. **At some high amplitude settings, the pulse may be present during adjustment, but may not appear when the unit is turned off and then powered up again. In this case, the amplitude may need to be reduced.**

The VG2, left edge (LEDG) and right edge (REDG) controls adjust the rise and fall times. The best way to see their effect is through some trial and error while watching the pulse outputs on an oscilloscope, after which the operation will become simple. Figures 4-7 show some examples of pulses generated, and the respective potentiometer settings. These settings were made when using a 50MHz pulser clock. The settings will need to be varied somewhat for other pulser clock frequencies.

Power and Clock Input Connections

Figure 1 shows all connections to the module. A low-noise dual output power supply should be used to power the module, and both supply voltages should come up within 1 second of each other. The supplied power input cable should be used to bring power into the module. The -12V voltage should be connected to the purple wire on the cable. The return (ground) voltage on the negative supply should be connected to the blue wire on the cable. The +12V voltage should be connected to the white wire on the cable, and the return (ground) voltage on the positive supply should be connected to the black wire on the cable. Check cable connections, and power supply settings before powering up the module, as damage due to excessive or incorrectly connected power is not covered by the warranty. Also, check airflow before powering up module. The module should be comfortable to the touch during operation.

The Clock SMA connector should be fed, using as short a cable as possible, with a 1V p-p square wave clock, with risetime of $<2.5\text{ns}$ and frequency between 500 KHz and 100 MHz. Alternatively, a 0dBm to +6dBm sinewave between 20 MHz and 100 MHz may be used. Check power level before connecting to module. Damage due to excessive input voltage is not covered by the warranty.

Output Connections

The outputs have rise times that can be as short as 50ps, so good quality RF cables must be used for their connection to the load. Figure 1 shows connections for differential pulse output (left) and a single-ended positive pulse output (right). For single-ended output, a 50 ohm SMA terminator must be installed on the unused output – Do not use a shorting plug. The outputs on these two SMA jacks may be monitored during adjustments, through 20dB DC-18GHz attenuators to the two inputs of a sampling scope. **Be sure to use attenuators, otherwise the pulses will destroy the sampling heads in your scope.**

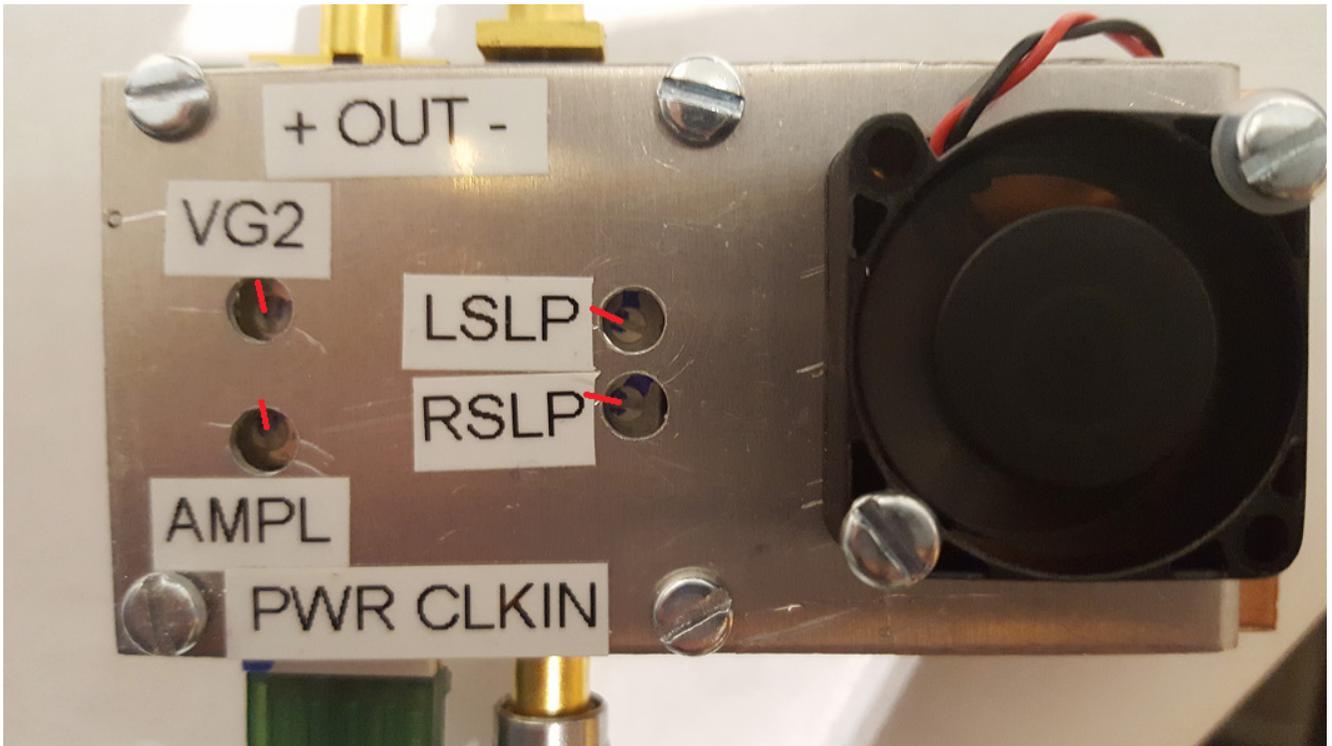
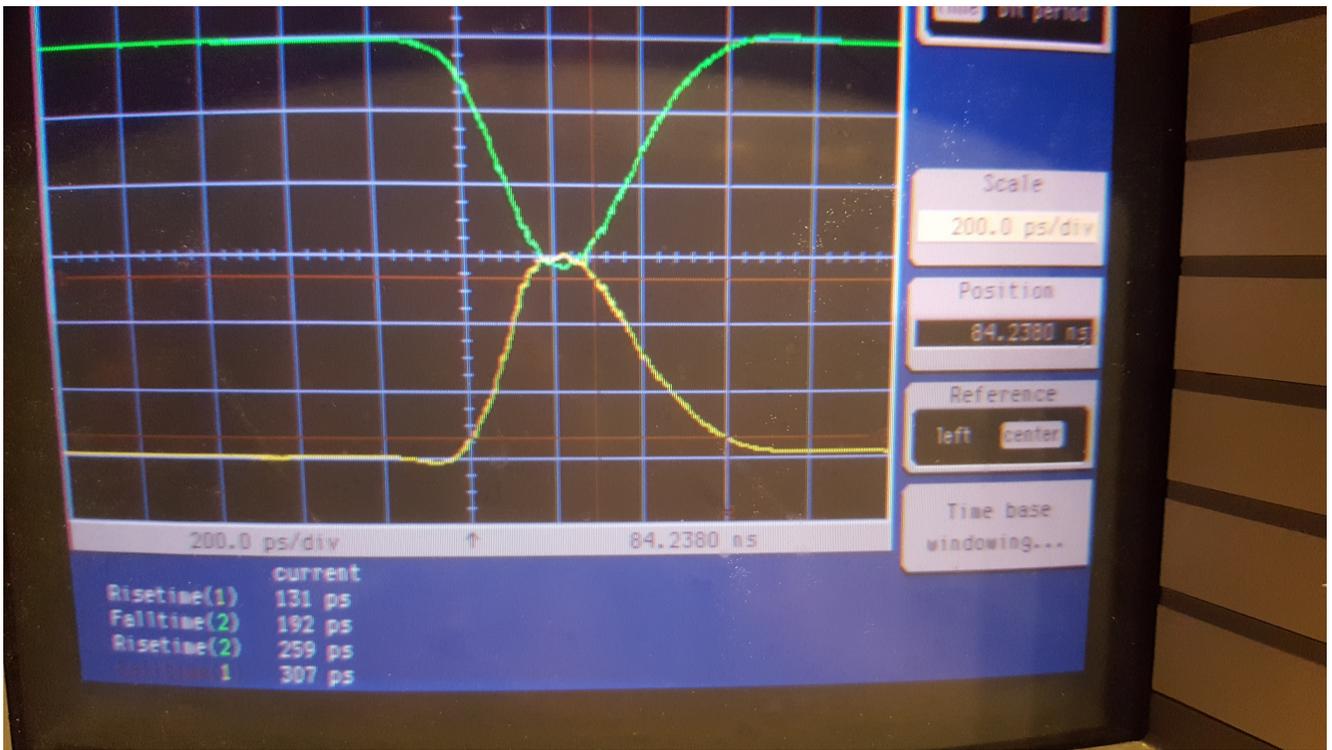


Figure 3. Example settings for medium-width Gaussian pulse

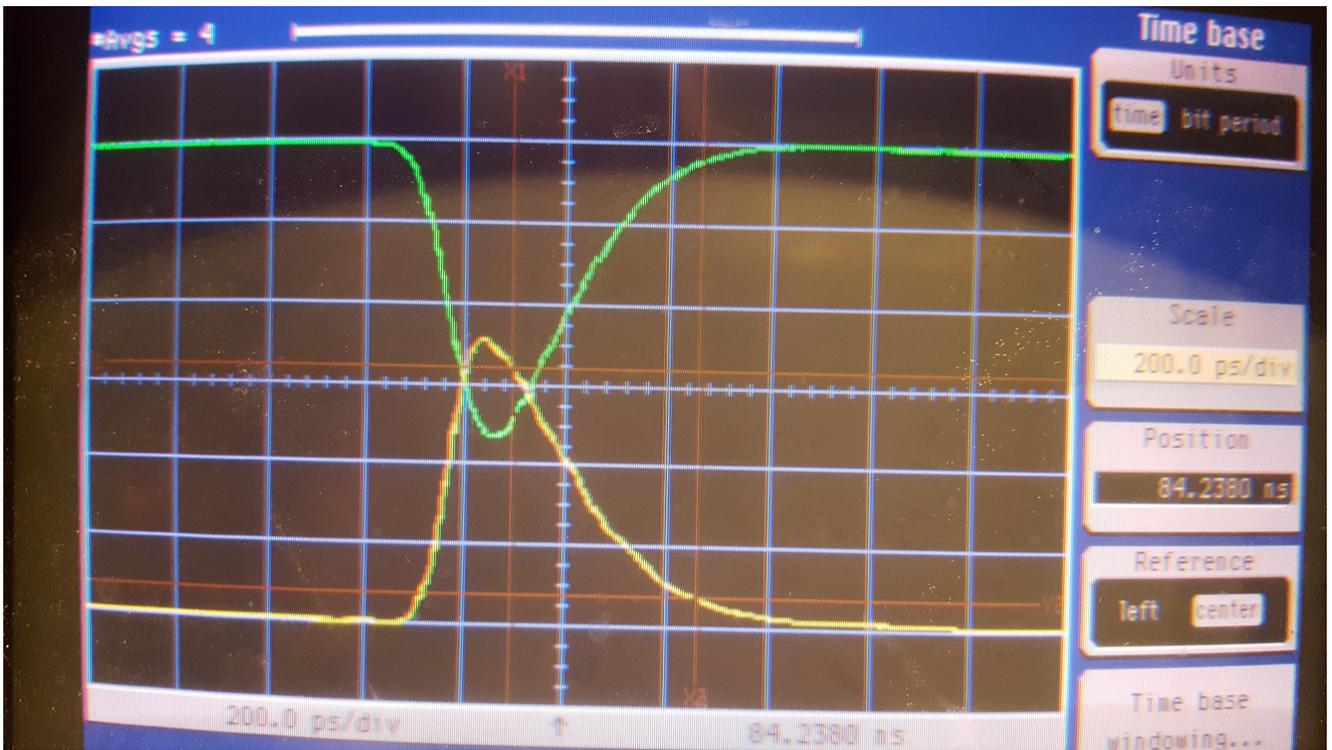


Figure 4. Example settings for narrow Gaussian pulse.

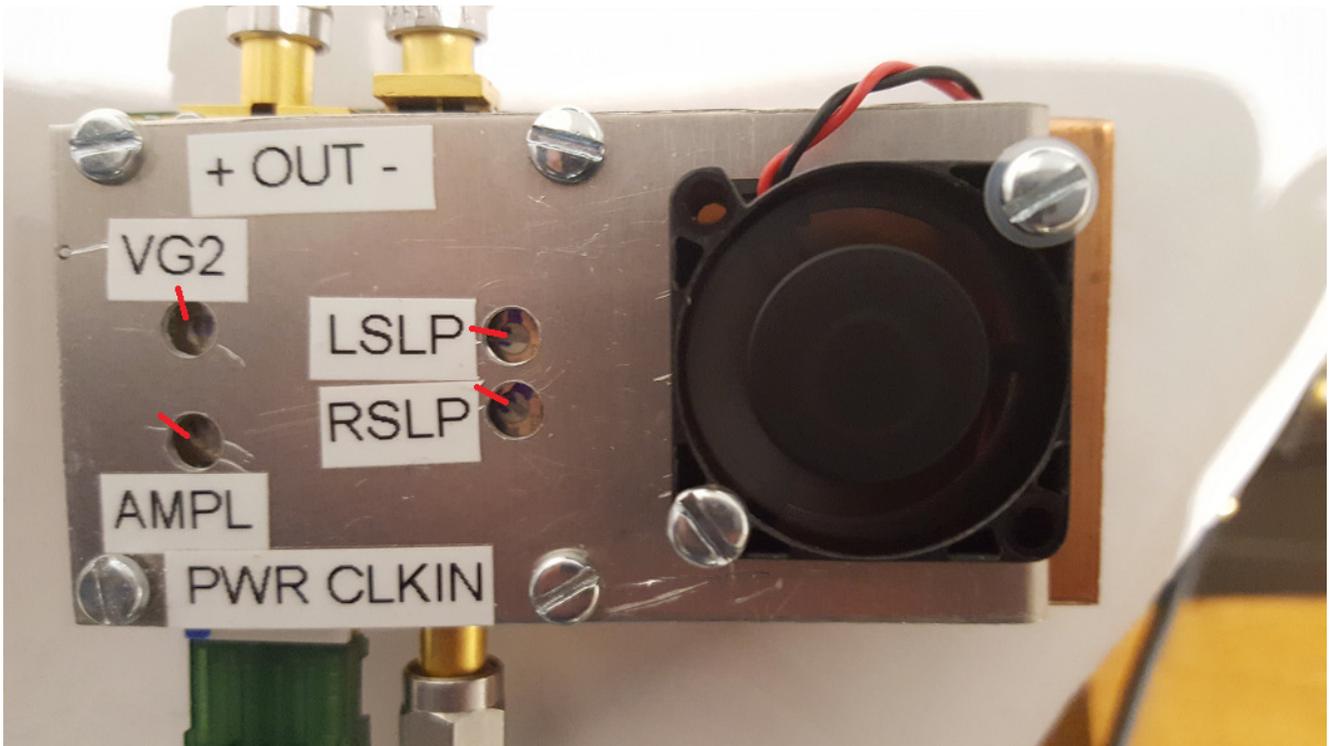
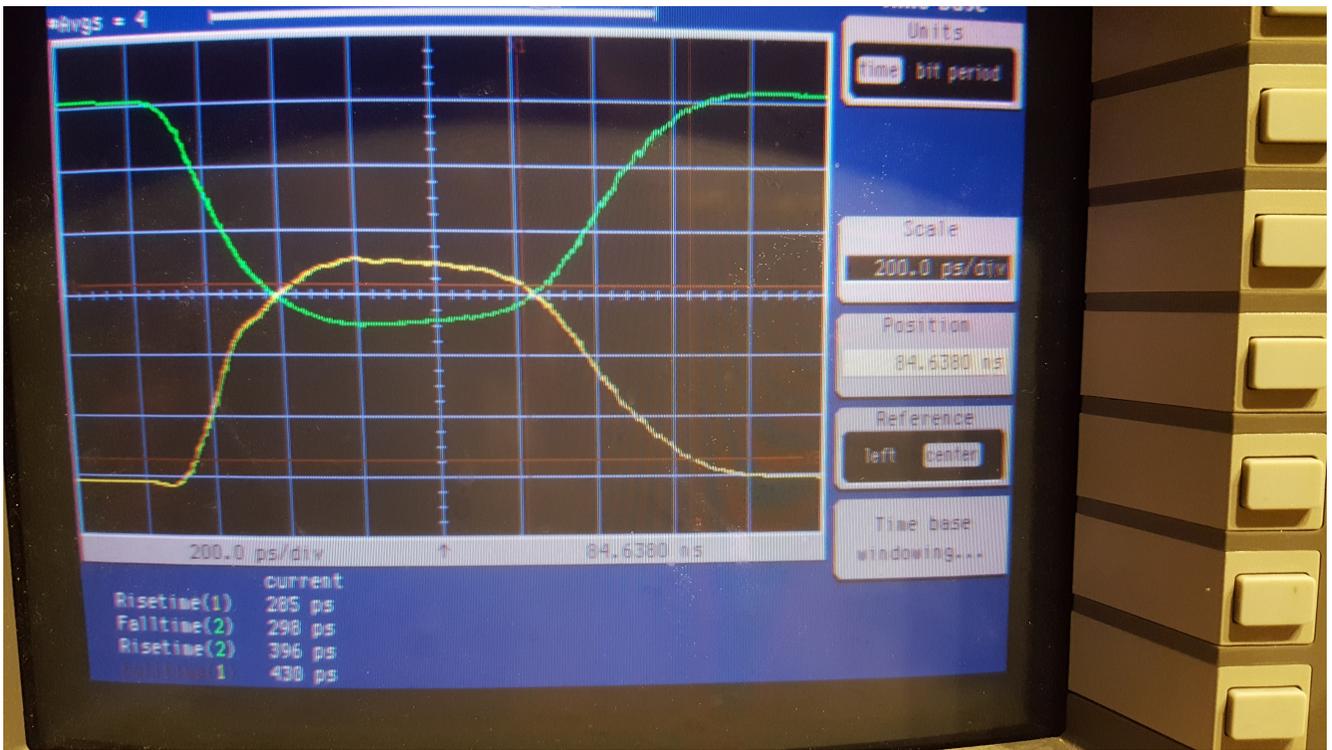
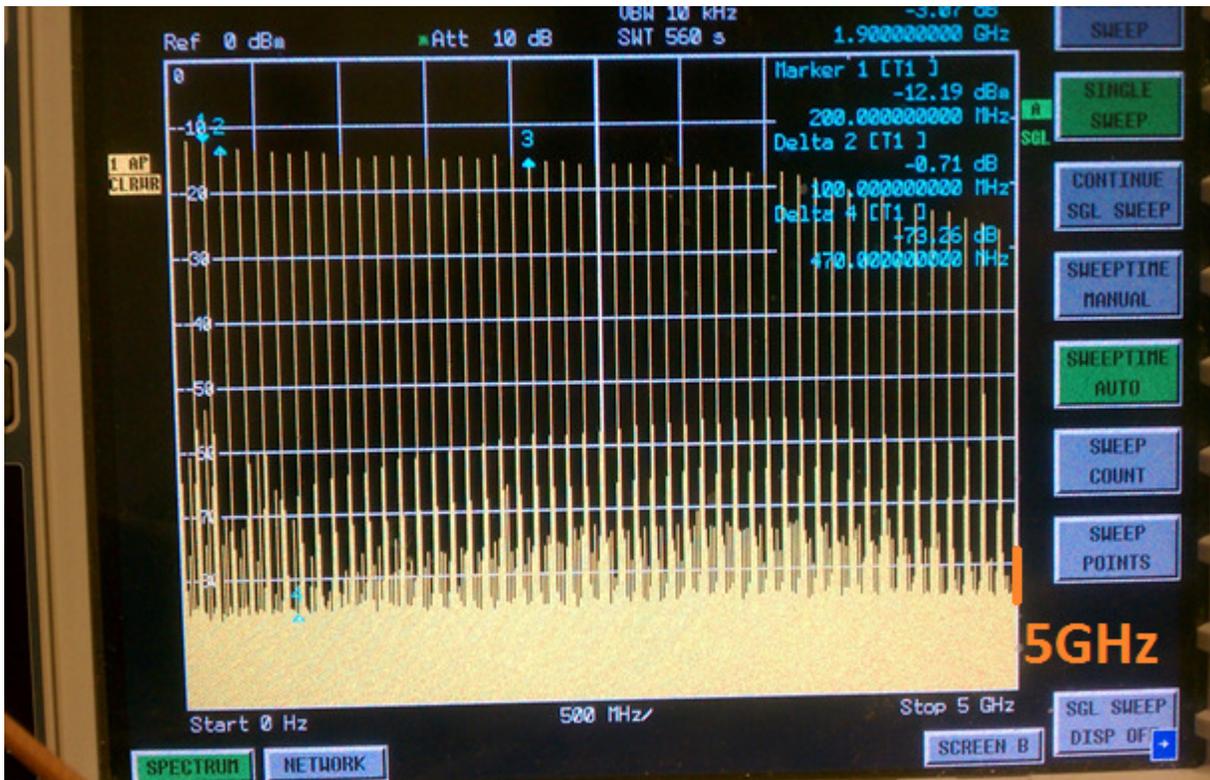


Fig 5. Example settings for ultra-wide pulse with some top flattening



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Figure 6. Frequency spectrum, from DC to 5GHz of the Phase Splitter Pulser, when set for its narrowest possible full-amplitude (10V peak) differential pulse. Pulse repetition frequency is 100 MPPS in this example, resulting in comb teeth spaced 100 MHz apart.