KW LDMOS PA with low pass filter

Measurement results

The filters are calculated not to be “too good”, so that the passband attenuation remains minimal. Nevertheless, even on the WARC bands it was possible to fall below the required -40dB. Even on 60m it worked, although there is no chance that we will be allowed to transmit with more power there anyway.

The biggest challenge is the 30m band, here the 20m filter is used so that the first harmonic at 20MHz is only slightly attenuated. Nevertheless it worked also here.

Power test

- connect a 1000 W dummy load
- transmit on each band min. 1 minute with 750 Watt continuous wave
- Measure temperature of filter components

All band filters were below 40 degrees, with one exception, on the 15m band I measured 48 degrees. So I don't need a fan for the filter. If someone wants to do much longer continuous transmissions, a light airflow would certainly be useful.

Measurement setup for the following tests

- Control transmitter: IC-7300 (approx. 4 Watt output power)
- PA: the LDMOS KW-PA described here
- Transmitting power 750 Watt
- 1kW dummy load with 50 Ohm (cooled with fan)
- decoupling element directly at the dummy load and additional switchable attenuator
- spectrum analyzer Siglent

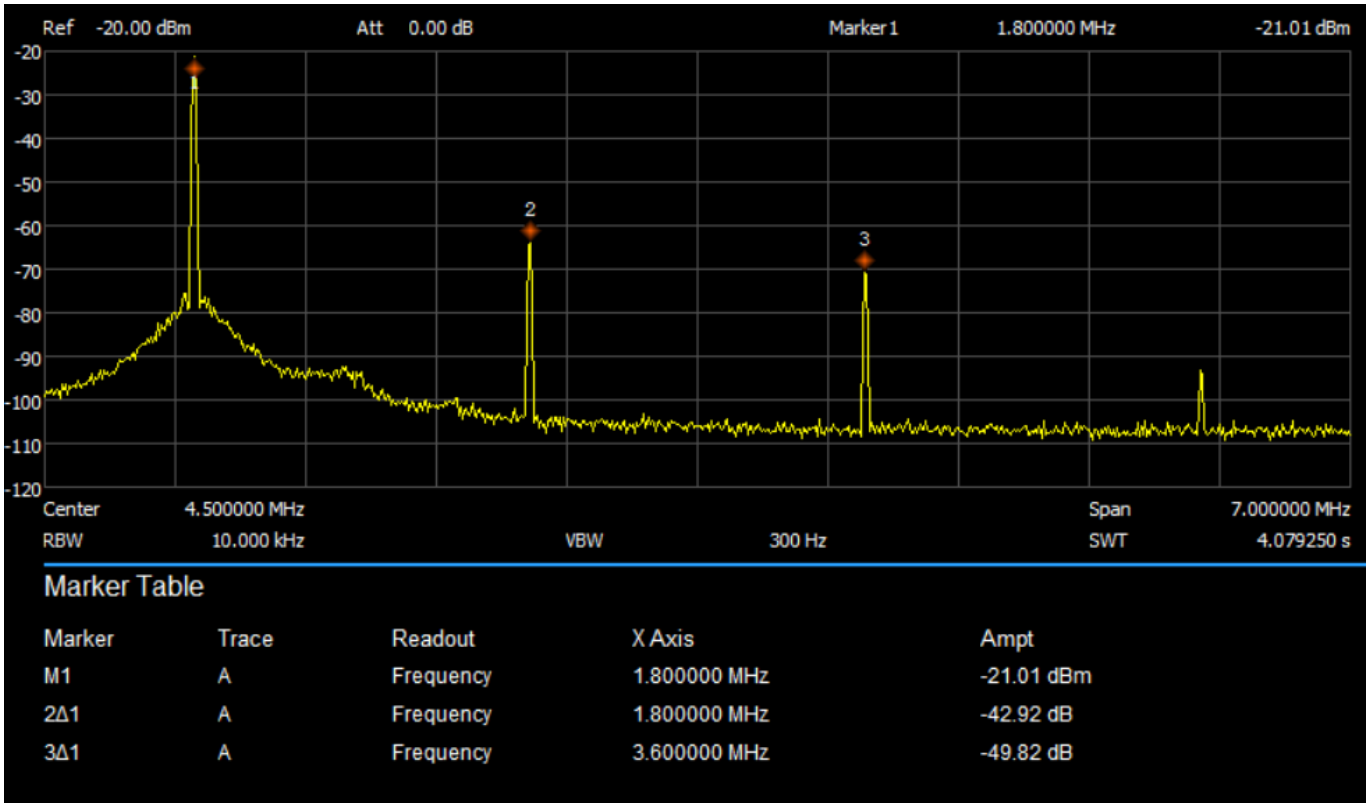
The carrier was adjusted to about -20dBm with the switchable attenuator, the first and second harmonics are given in the table as difference to the carrier (difference frequency and dBc).

You have to be careful not to overdrive the analyzer, otherwise you can see peaks which are not there in reality.

M1 ... Carrier frequency, this was attenuated to -20dBm before the analyzer.

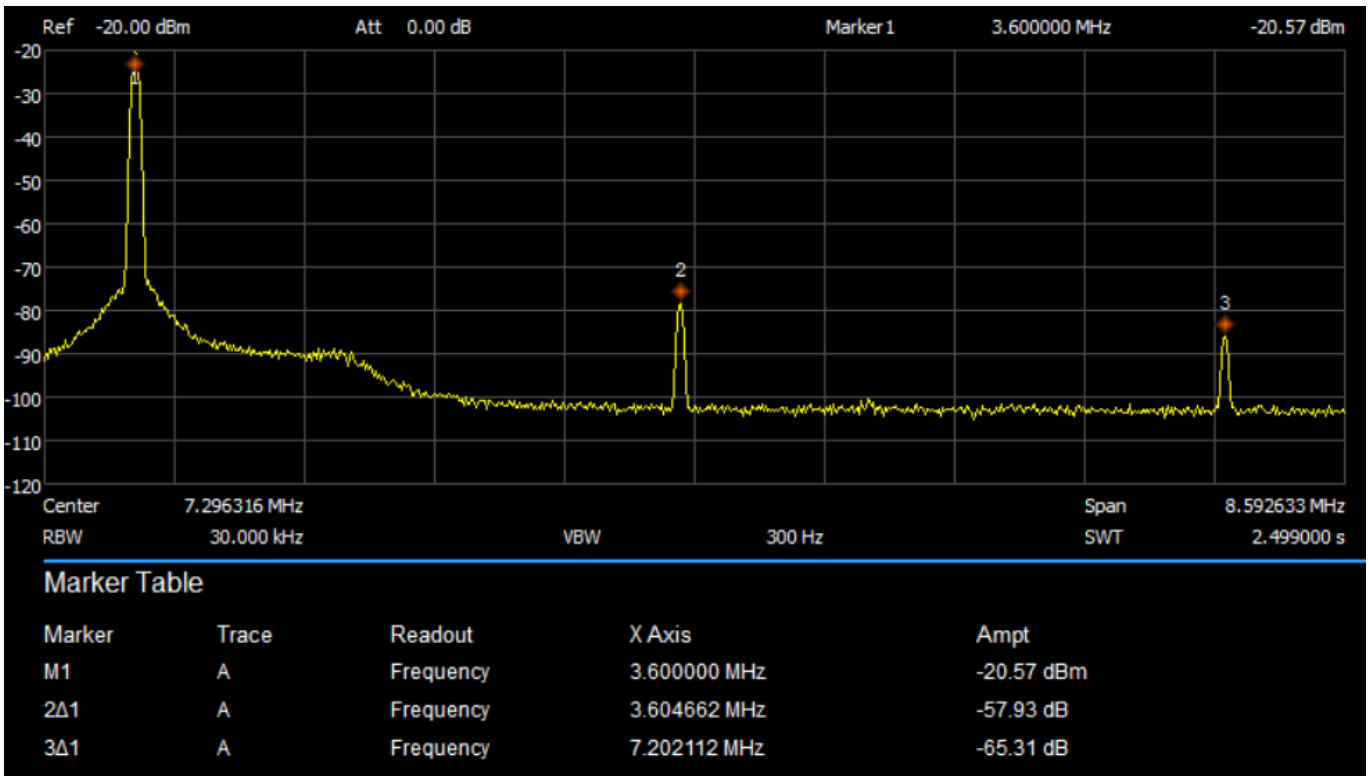
2Delta1 ... this is how much the first harmonic is lowered compared to the carrier (at least it must be 40dB)

3Delta1 ... the second harmonic is attenuated by this amount compared to the carrier (at least it must be 40dB)



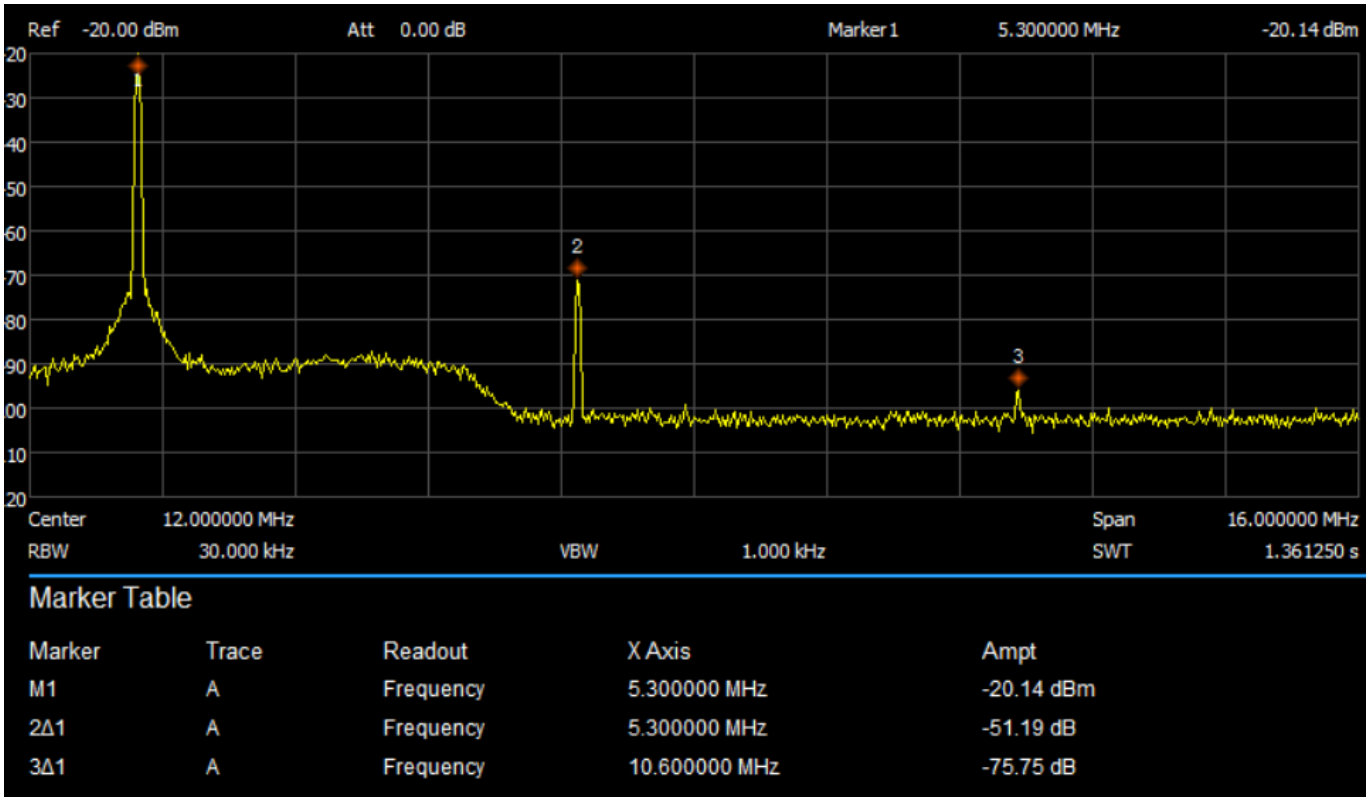
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	1.800000 MHz	-21.01 dBm
2Δ1	A	Frequency	1.800000 MHz	-42.92 dB
3Δ1	A	Frequency	3.600000 MHz	-49.82 dB



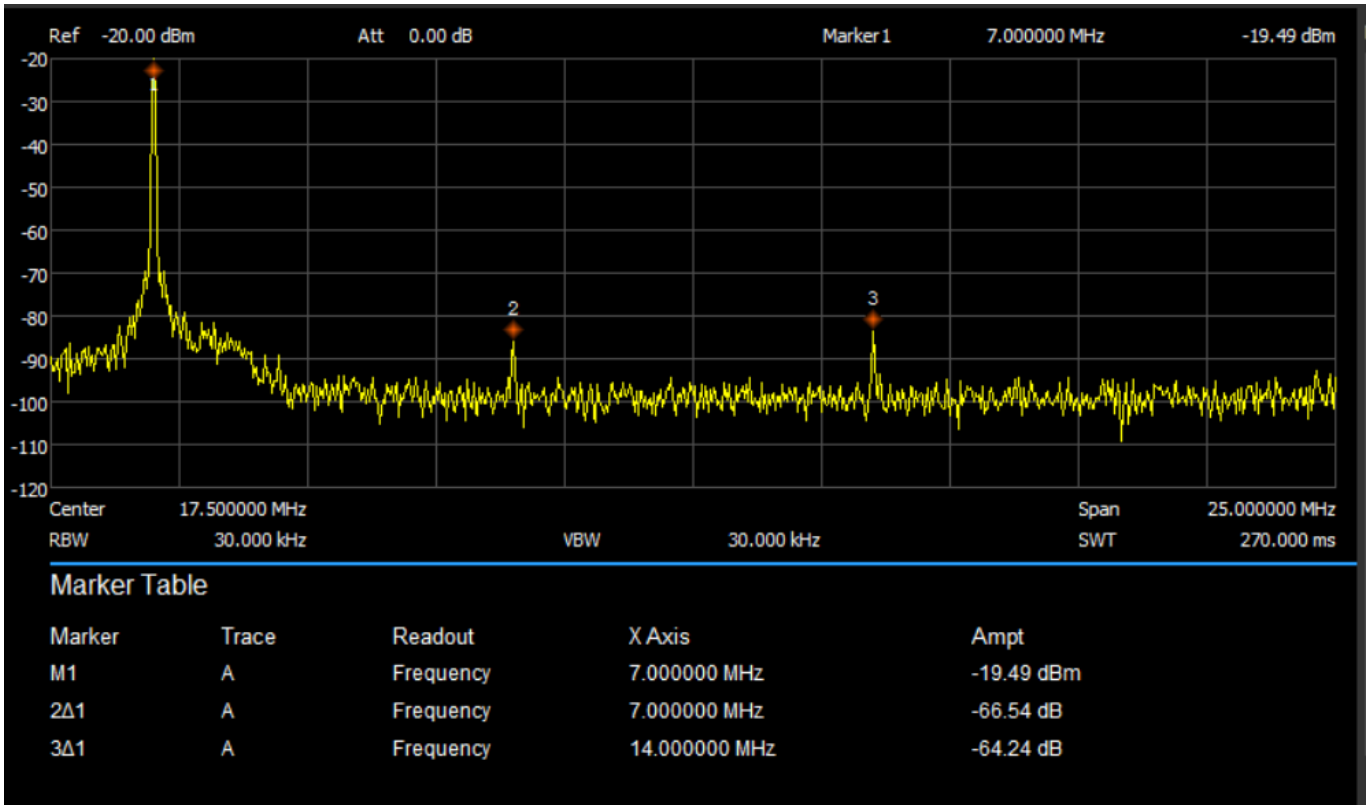
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	3.600000 MHz	-20.57 dBm
2Δ1	A	Frequency	3.604662 MHz	-57.93 dB
3Δ1	A	Frequency	7.202112 MHz	-65.31 dB



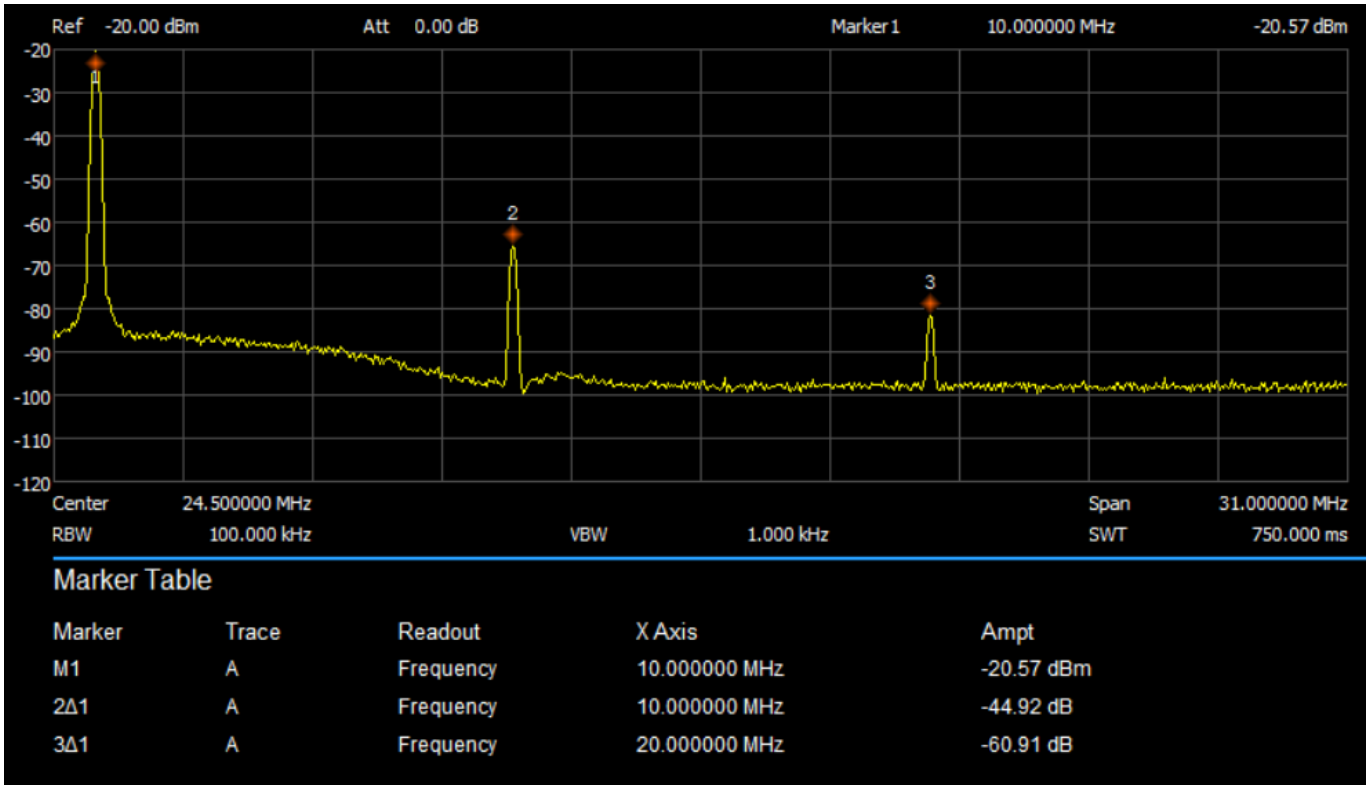
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	5.300000 MHz	-20.14 dBm
2Δ1	A	Frequency	5.300000 MHz	-51.19 dB
3Δ1	A	Frequency	10.600000 MHz	-75.75 dB



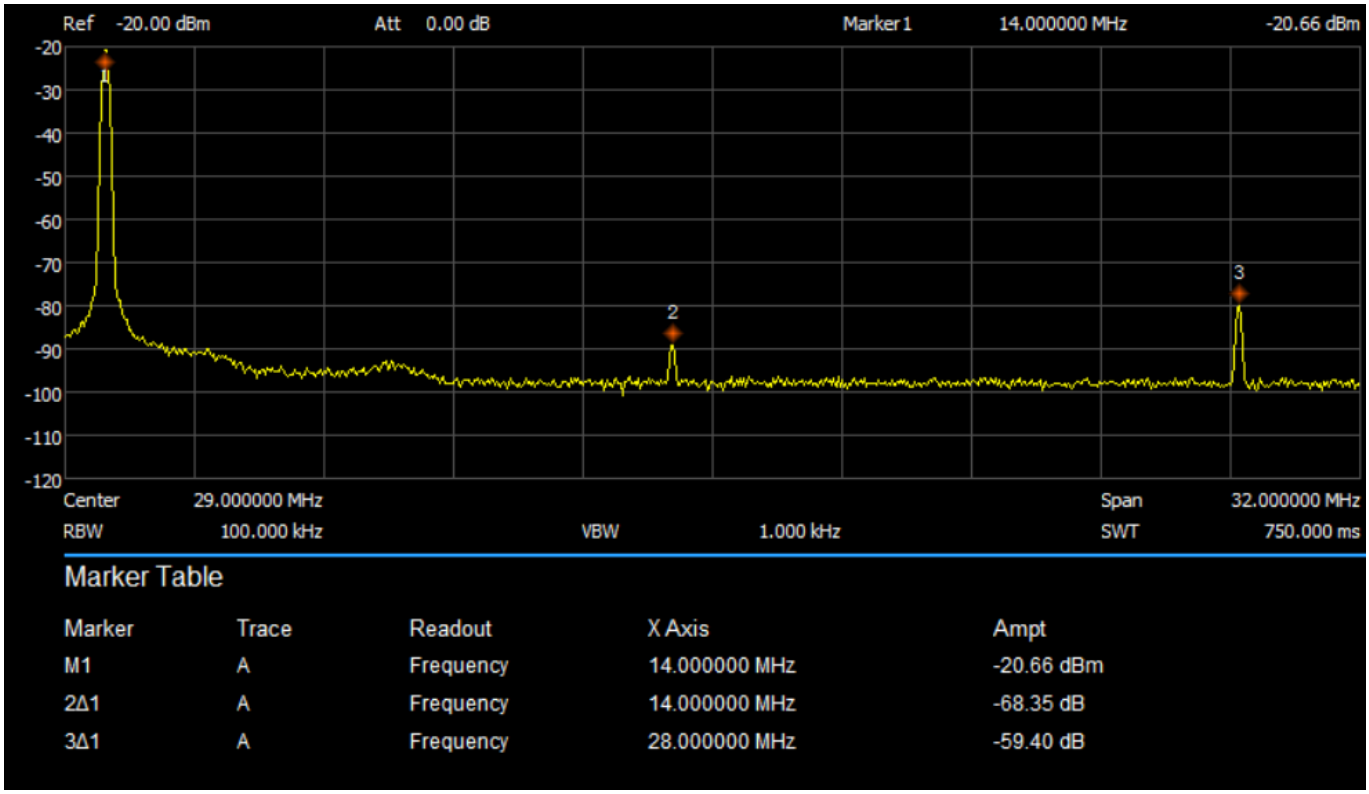
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	7.000000 MHz	-19.49 dBm
2Δ1	A	Frequency	7.000000 MHz	-66.54 dB
3Δ1	A	Frequency	14.000000 MHz	-64.24 dB



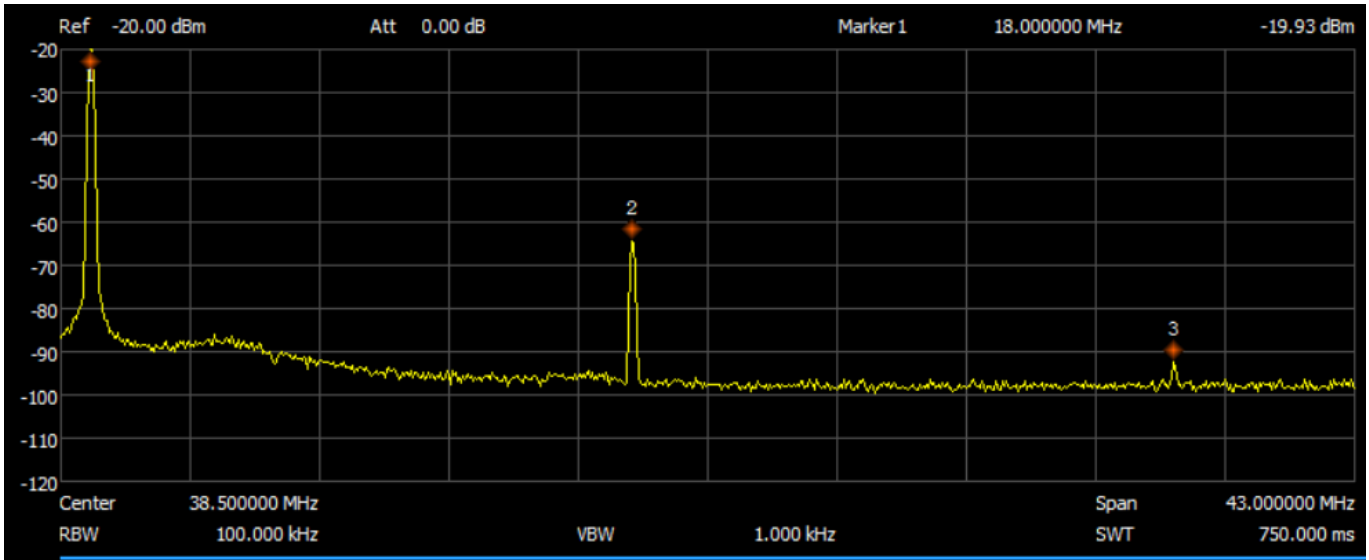
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	10.000000 MHz	-20.57 dBm
2Δ1	A	Frequency	10.000000 MHz	-44.92 dB
3Δ1	A	Frequency	20.000000 MHz	-60.91 dB



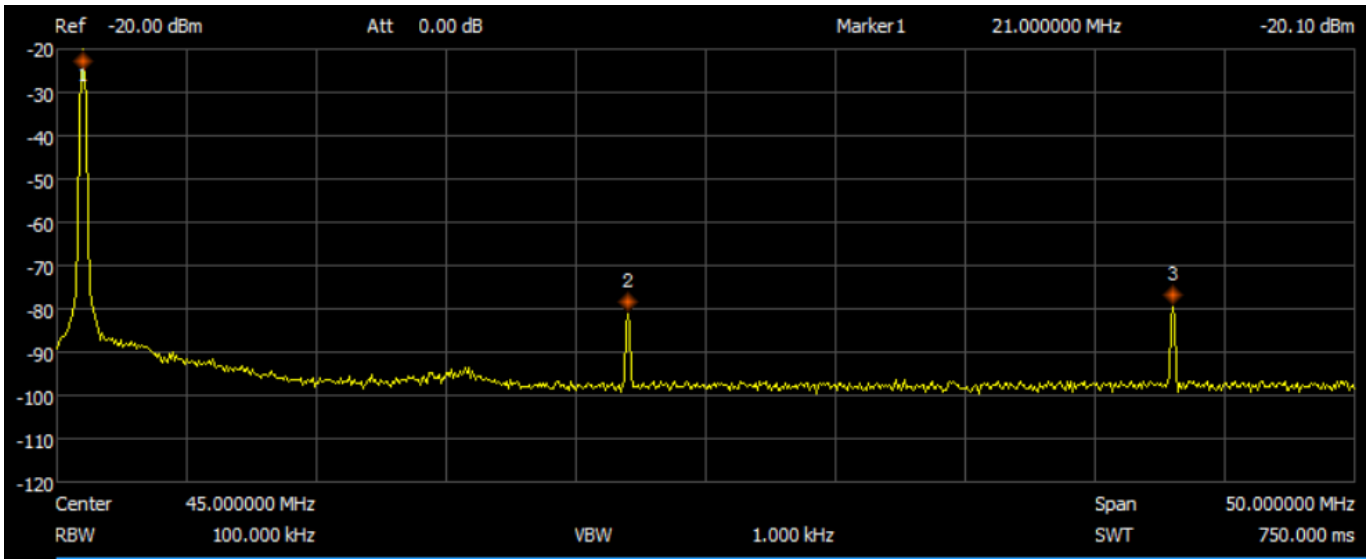
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	14.000000 MHz	-20.66 dBm
2Δ1	A	Frequency	14.000000 MHz	-68.35 dB
3Δ1	A	Frequency	28.000000 MHz	-59.40 dB



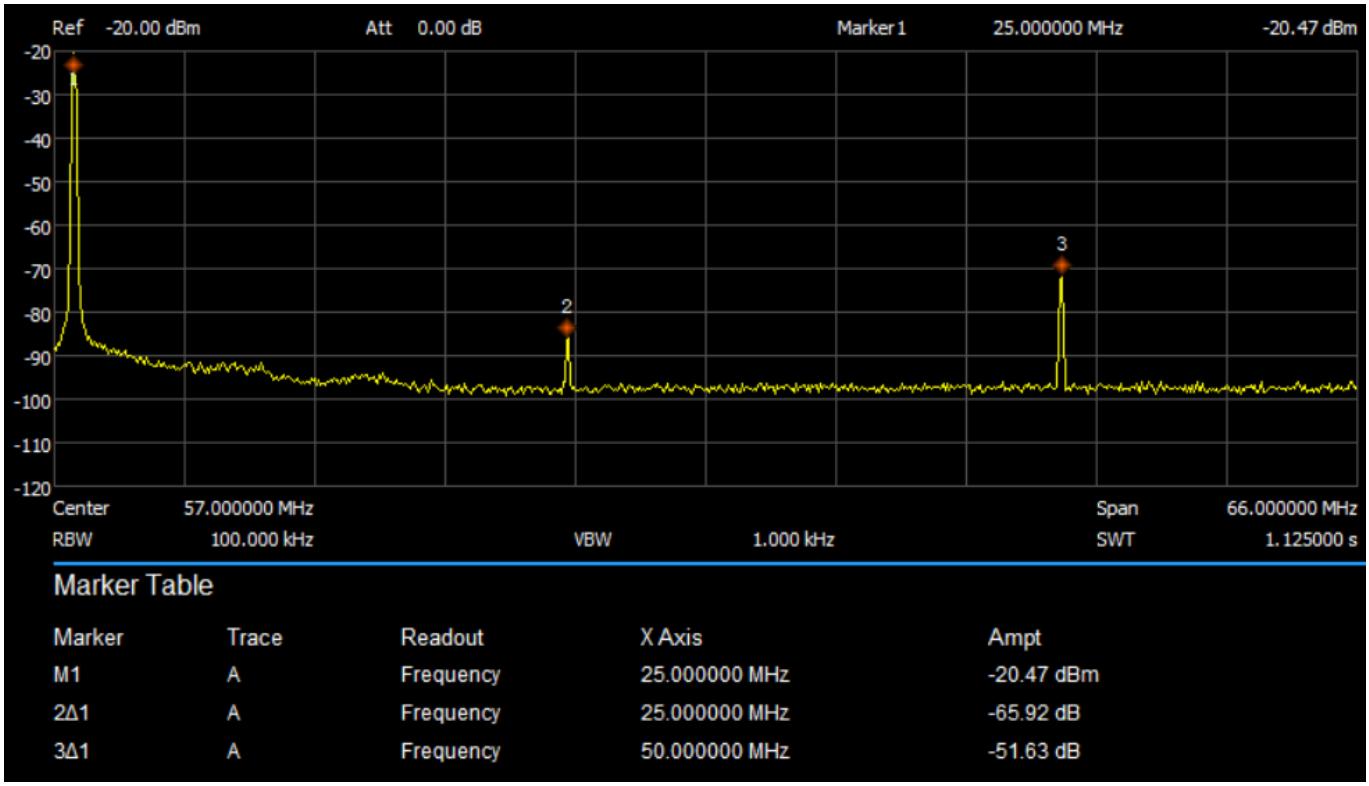
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	18.000000 MHz	-19.93 dBm
2Δ1	A	Frequency	18.000000 MHz	-44.45 dB
3Δ1	A	Frequency	36.000000 MHz	-72.64 dB



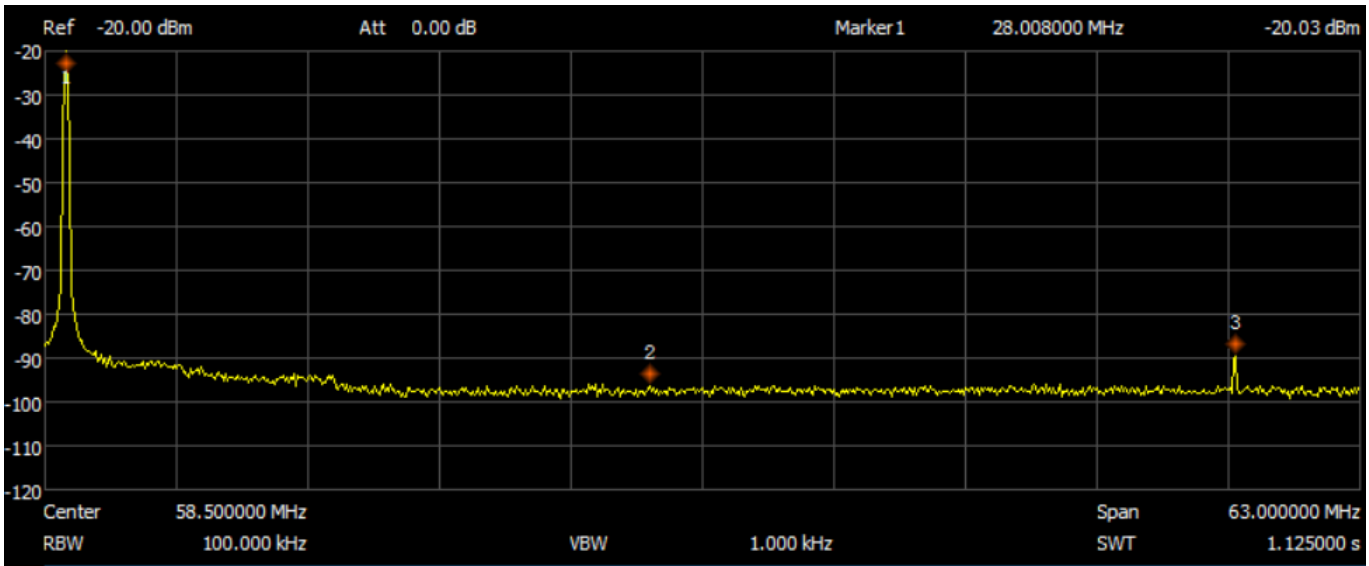
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	21.000000 MHz	-20.10 dBm
2Δ1	A	Frequency	21.000000 MHz	-60.99 dB
3Δ1	A	Frequency	42.000000 MHz	-59.67 dB



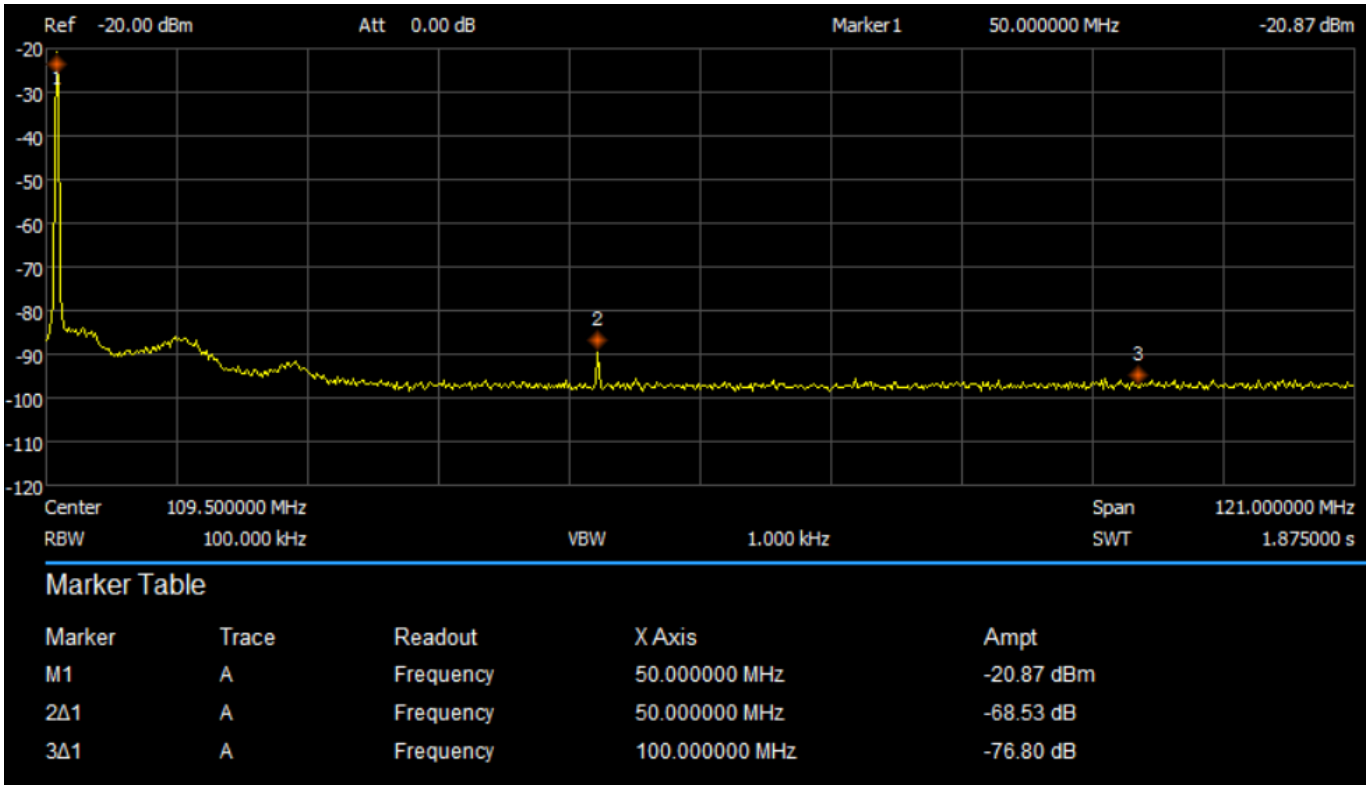
Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	25.000000 MHz	-20.47 dBm
2Δ1	A	Frequency	25.000000 MHz	-65.92 dB
3Δ1	A	Frequency	50.000000 MHz	-51.63 dB



Marker Table

Marker	Trace	Readout	X Axis	Ampt
M1	A	Frequency	28.008000 MHz	-20.03 dBm
2Δ1	A	Frequency	27.992000 MHz	-76.22 dB
3Δ1	A	Frequency	55.992000 MHz	-69.69 dB



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