

9 Appendix

9.1 Appendix FCC data.

1.Occupied Bandwidth

Test Frequency (MHz)	Modulation Type	Power Level	99% Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Limit (kHz)
156.025	FM/G3E	Max	10.848	15.98	20
		Low	10.852	15.97	20
156.3		Max	10.864	15.98	20
		Low	10.866	15.98	20
156.8		Max	10.825	15.97	20
		Low	10.828	15.97	20
156.65		Max	10.829	13.59	20
		Low	10.833	15.96	20
157.425		Max	10.929	16.17	20
		Low	10.934	16.17	20
162.025	GMSK/GXW	/	9.600	5.615	20
156.525	FSK/G2B (dsc-1300Hz)	Max	8.068	10.66	20
		Low	8.034	10.59	20
	FSK/G2B dsc-2100Hz	Max	12.835	17.04	20
		Low	12.821	17.03	20

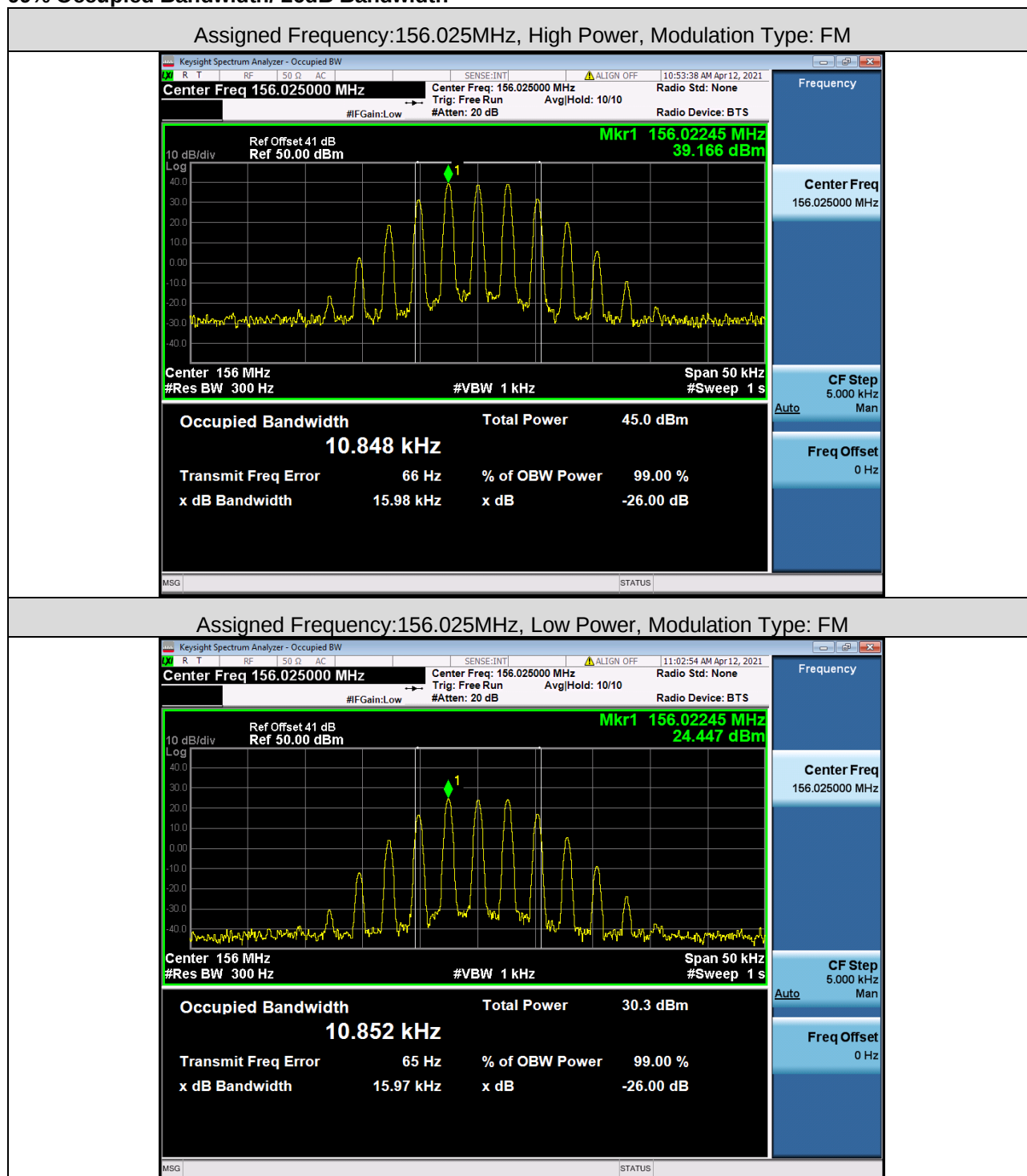


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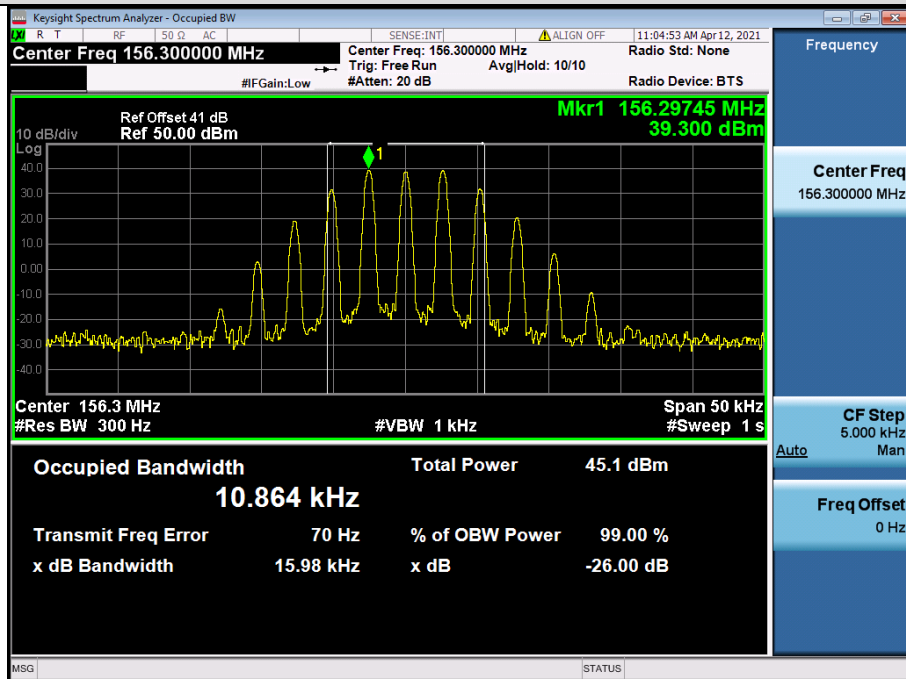
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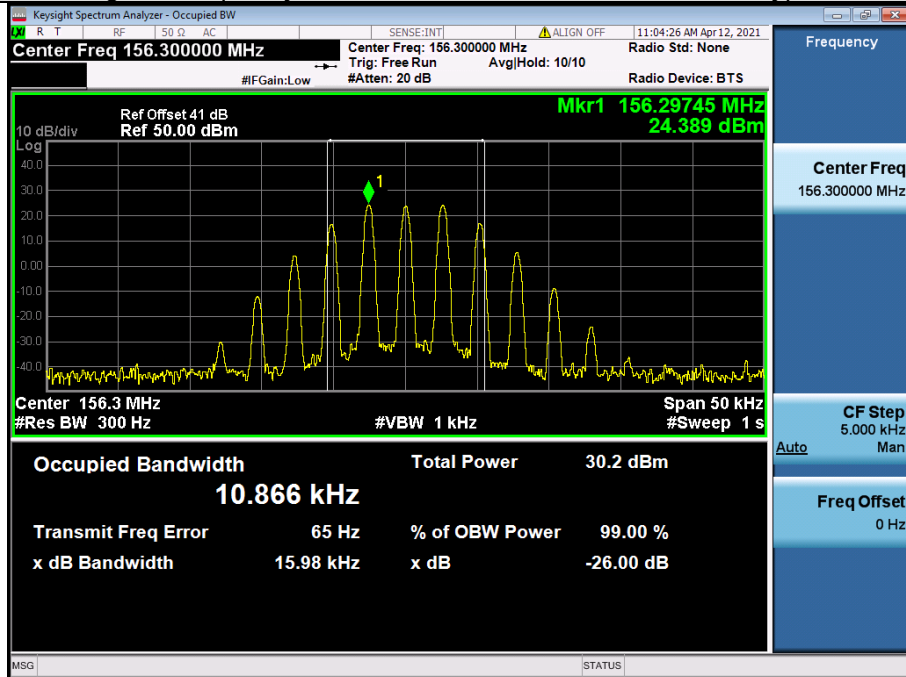
99% Occupied Bandwidth/ 26dB Bandwidth



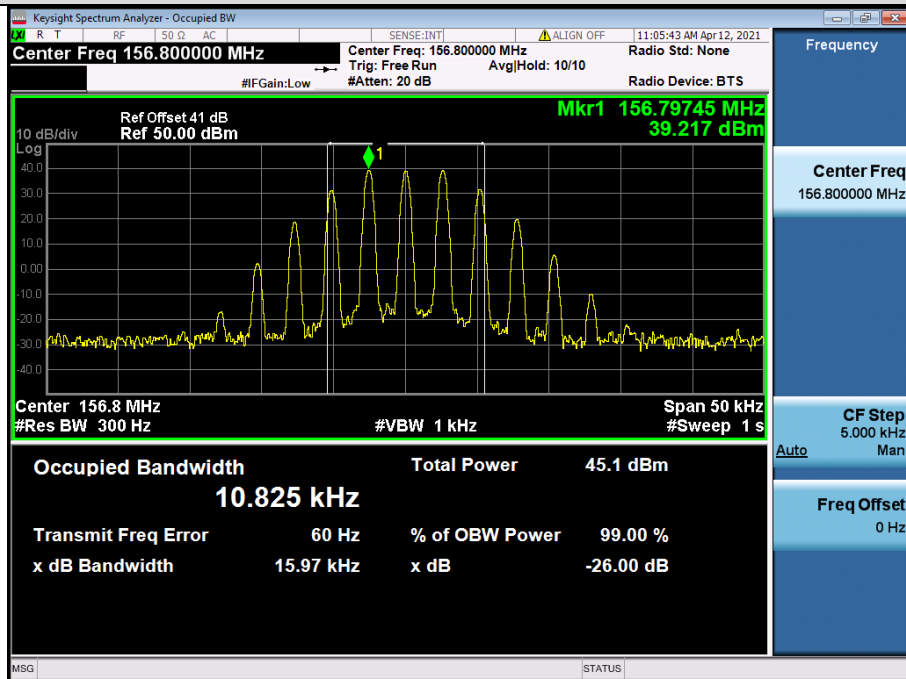
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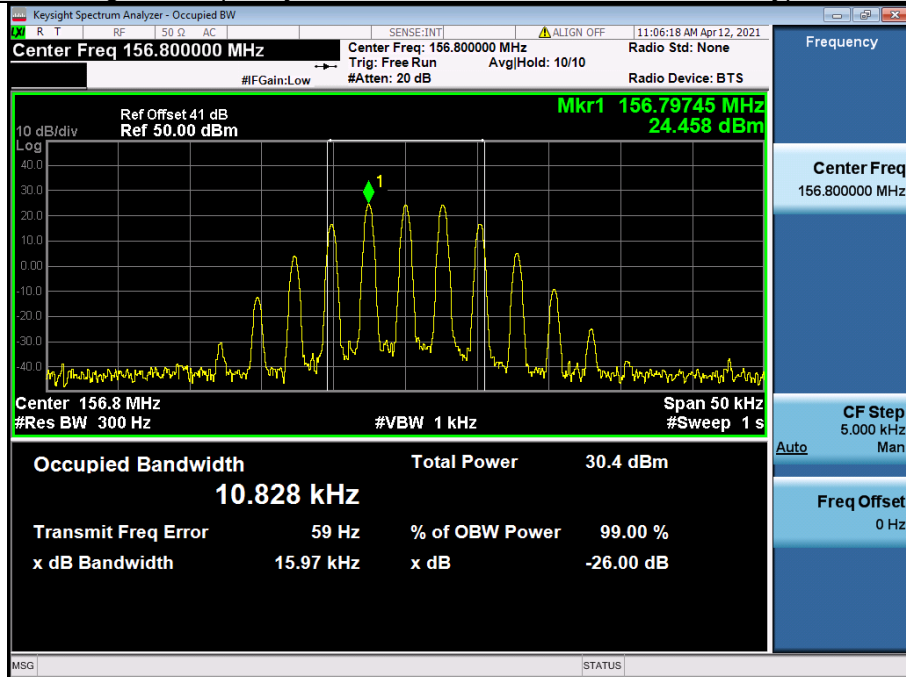
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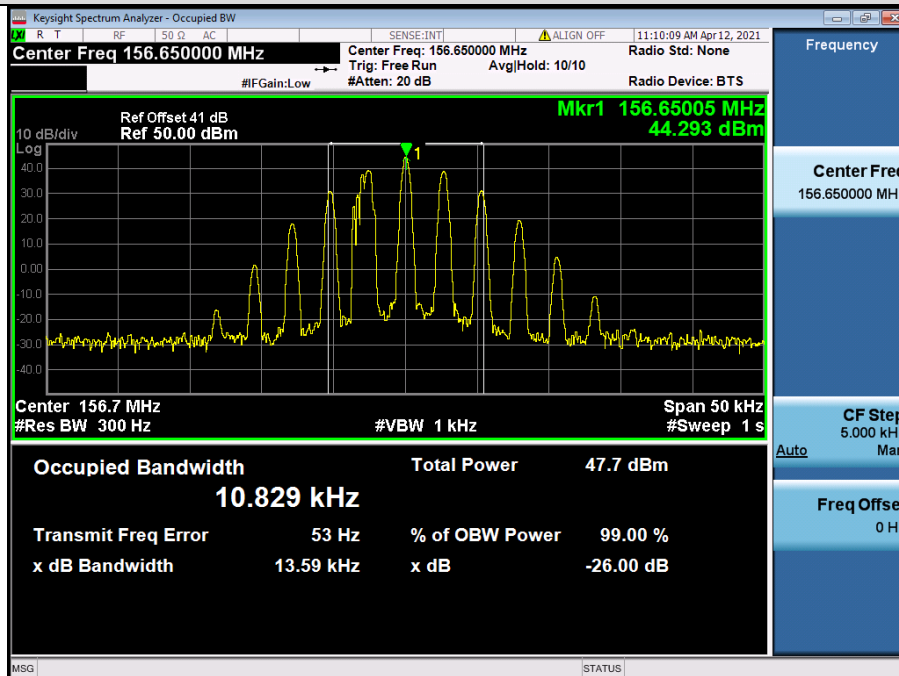
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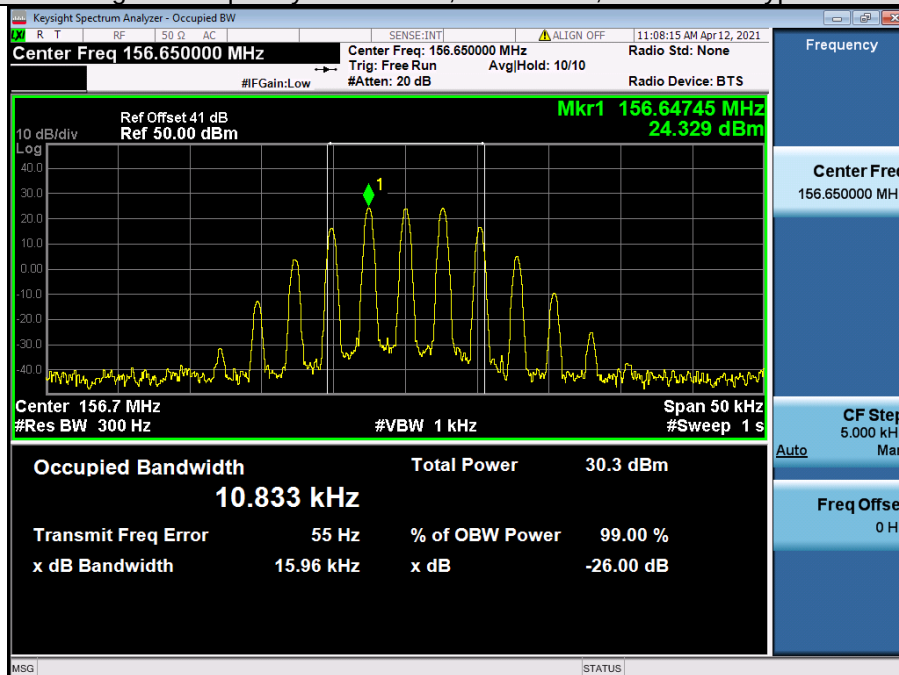
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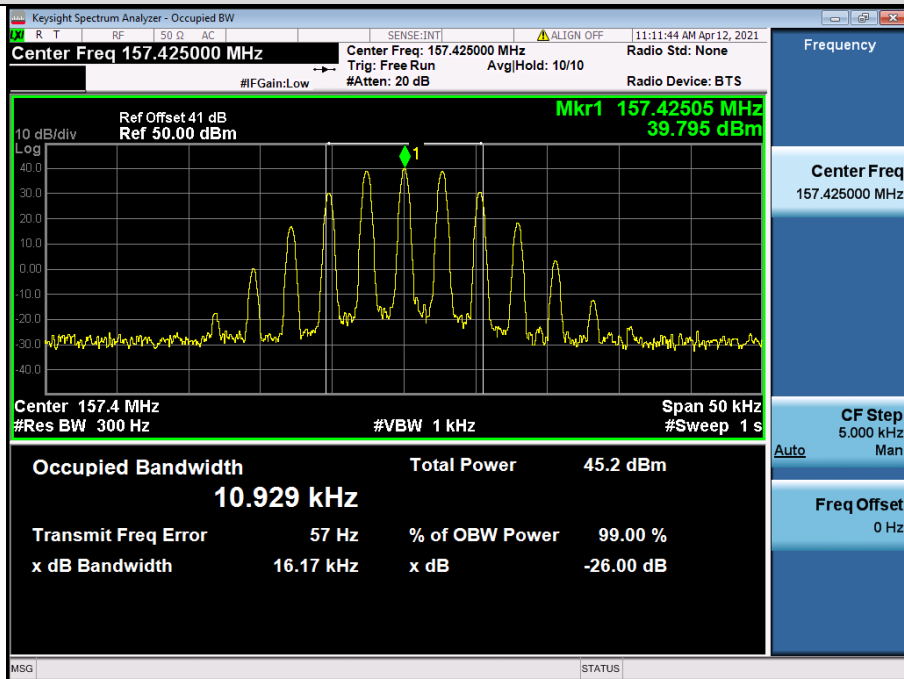
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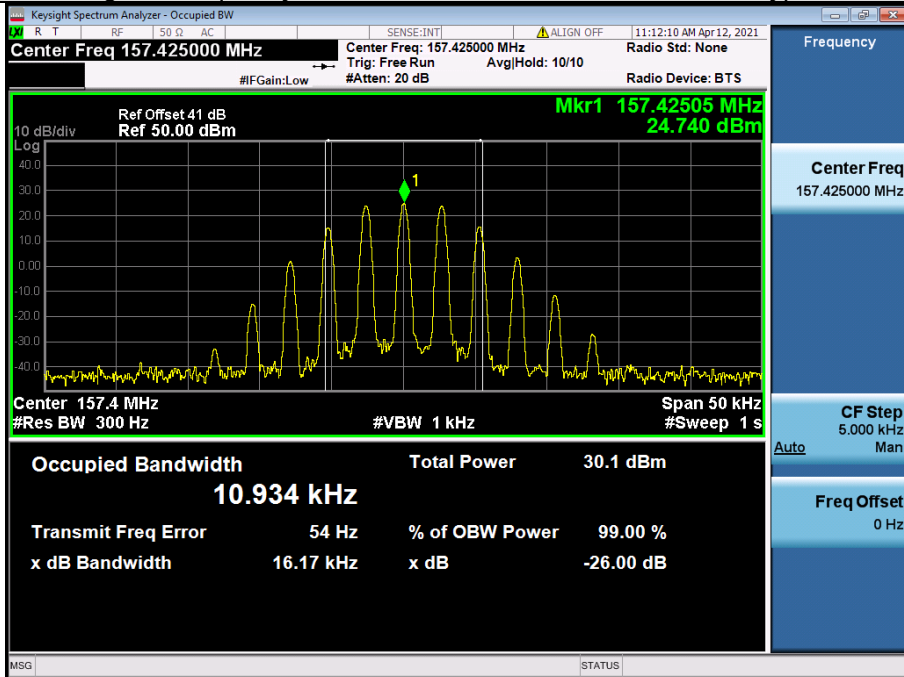
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Assigned Frequency:157.425MHz, High Power, Modulation Type: FM



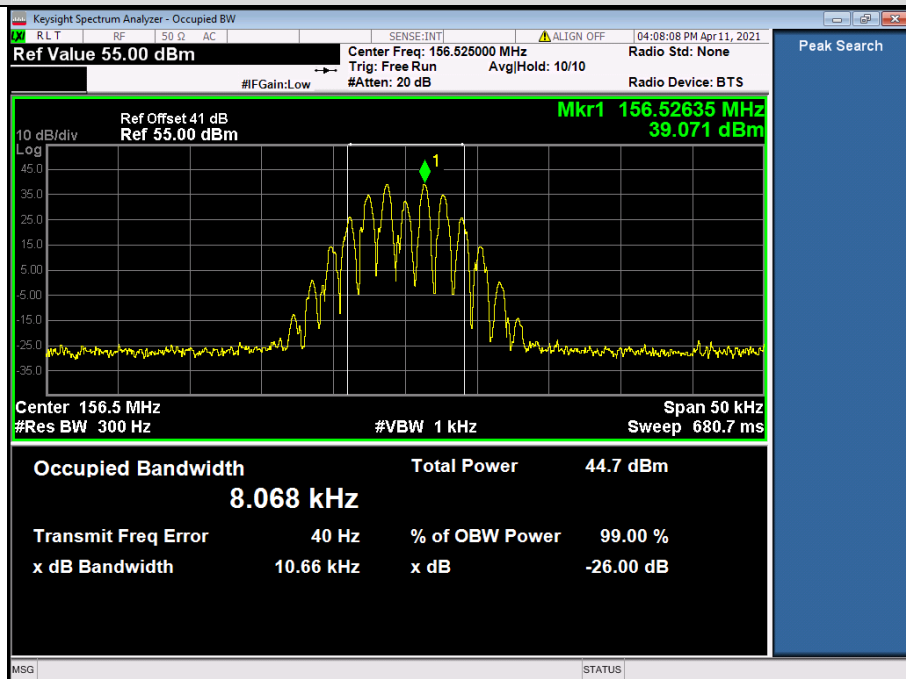
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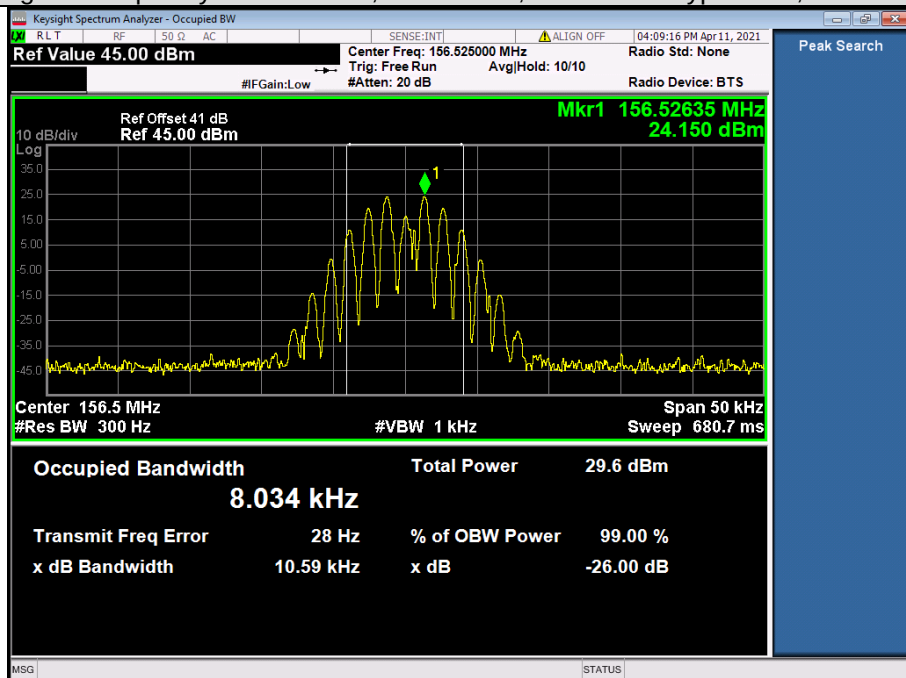
Report No.: SZEM210300219707
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Test data for DSC mode: 99% Occupied Bandwidth and 26dB Bandwidth

Assigned Frequency: 156.525 MHz, High Power, Modulation Type: FSK, dsc-1300 Hz



Assigned Frequency: 156.525 MHz, Low Power, Modulation Type: FSK, dsc-1300 Hz



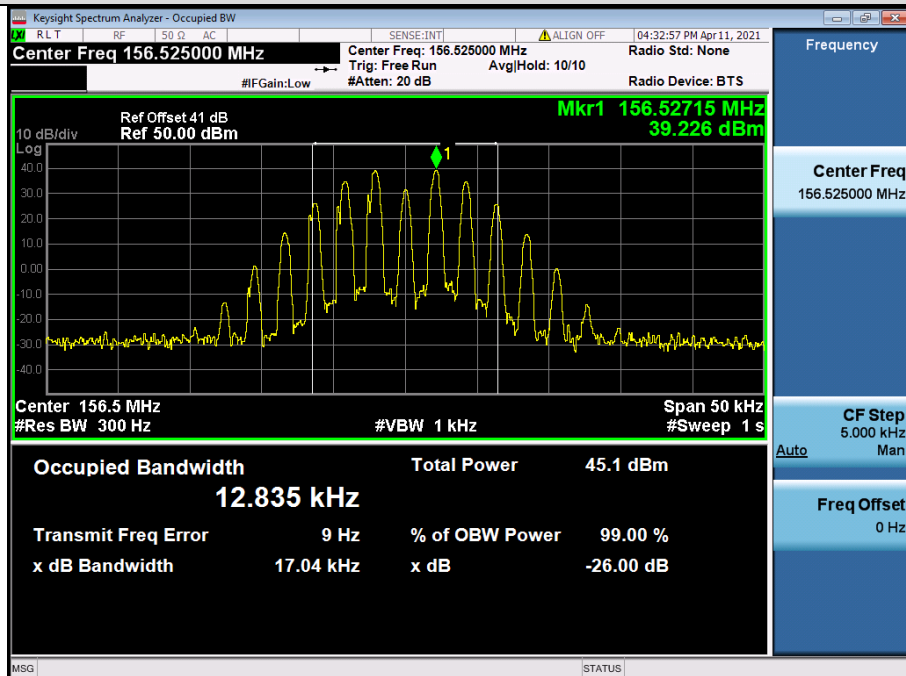
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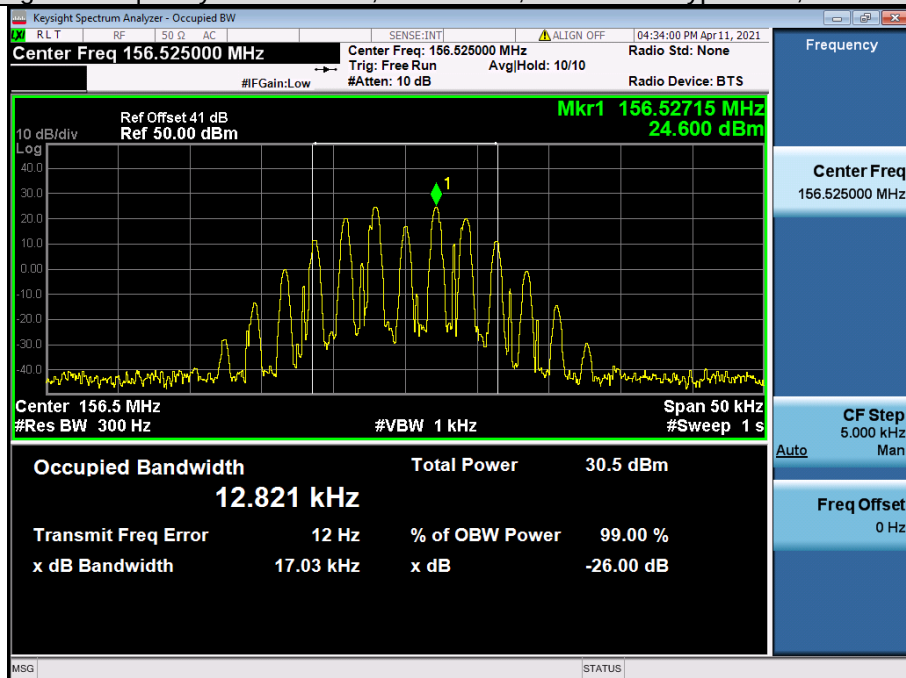
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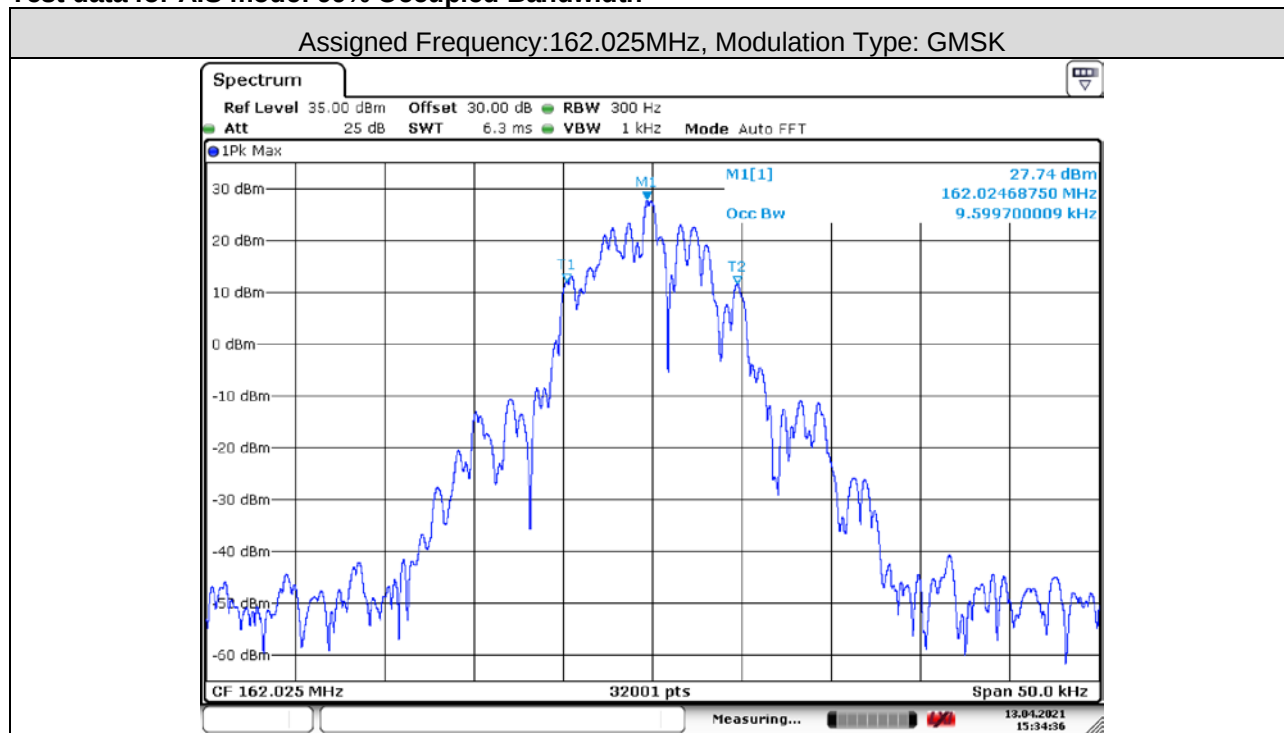
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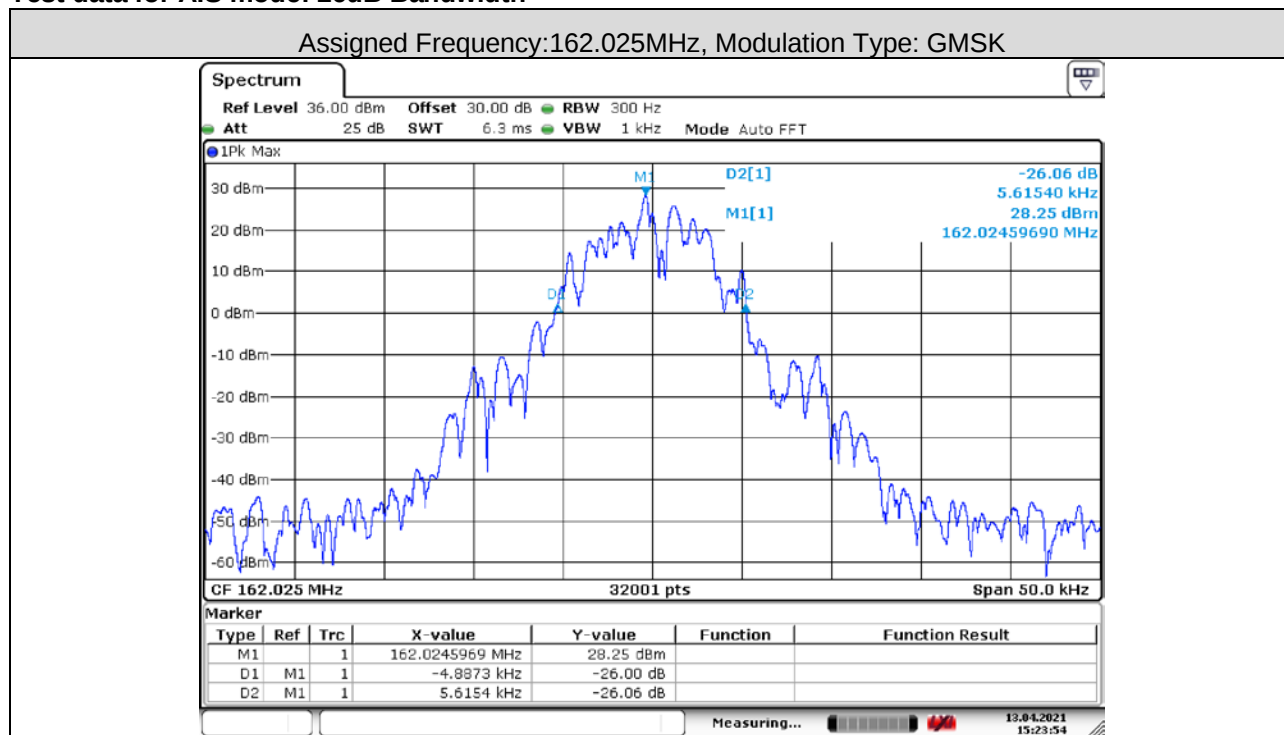
Assigned Frequency:156.525MHz, Low Power, Modulation Type: FSK, dsc-2100Hz



Test data for AIS mode: 99% Occupied Bandwidth



Test data for AIS mode: 26dB Bandwidth



2. Transmitter Frequency Tolerances.

Unmodulated, Assigned Frequency:156.025MHz					
Voltage(V)	Temperature (°C)	Measured Frequency(MHz)	Frequency Error(ppm)	FCC Limit (ppm)	Result
12	-20	156.02505	-0.3205	±10	Pass
	-15	156.025054	-0.3461		
	-10	156.025044	-0.2820		
	0	156.025068	-0.4358		
	10	156.025038	-0.2436		
	20	156.025062	-0.3974		
	30	156.025069	-0.4422		
	40	156.025039	-0.2500		
	50	156.025048	-0.3076		
	55	156.025051	-0.3269		
10.2	25	156.025044	-0.2820		
13.8	25	156.025051	-0.3269		

Unmodulated, Assigned Frequency:156.525MHz					
Voltage(V)	Temperature (°C)	Measured Frequency(MHz)	Frequency Error(ppm)	FCC Limit (ppm)	Result
12	-20	156.525038	-0.2428	±10	Pass
	-15	156.525052	-0.3322		
	-10	156.525058	-0.3705		
	0	156.525048	-0.3067		
	10	156.525034	-0.2172		
	20	156.525066	-0.4217		
	30	156.525068	-0.4344		
	40	156.525053	-0.3386		
	50	156.525046	-0.2939		
	55	156.525055	-0.3514		
10.2	25	156.525066	-0.4217		
13.8	25	156.525055	-0.3514		

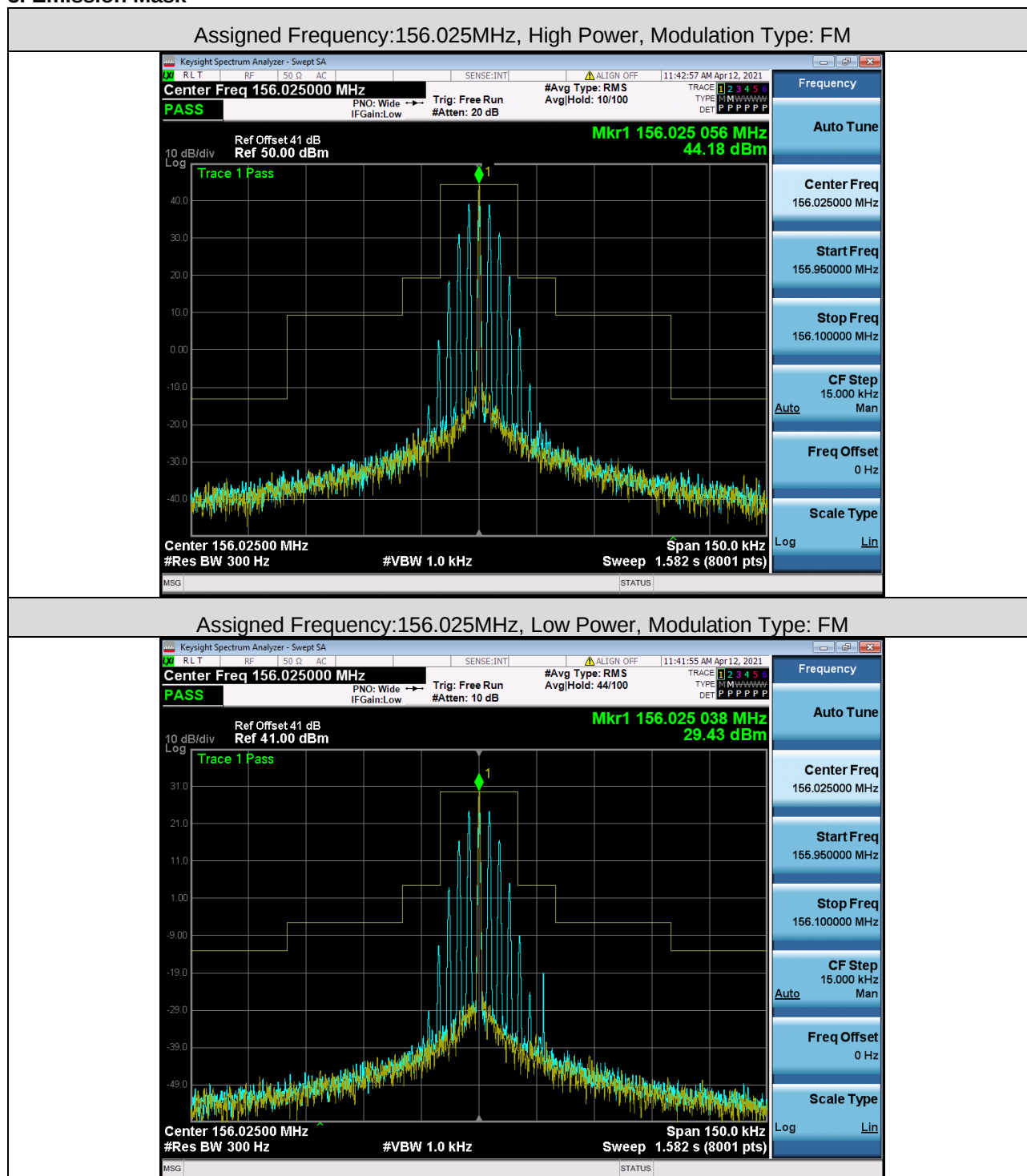


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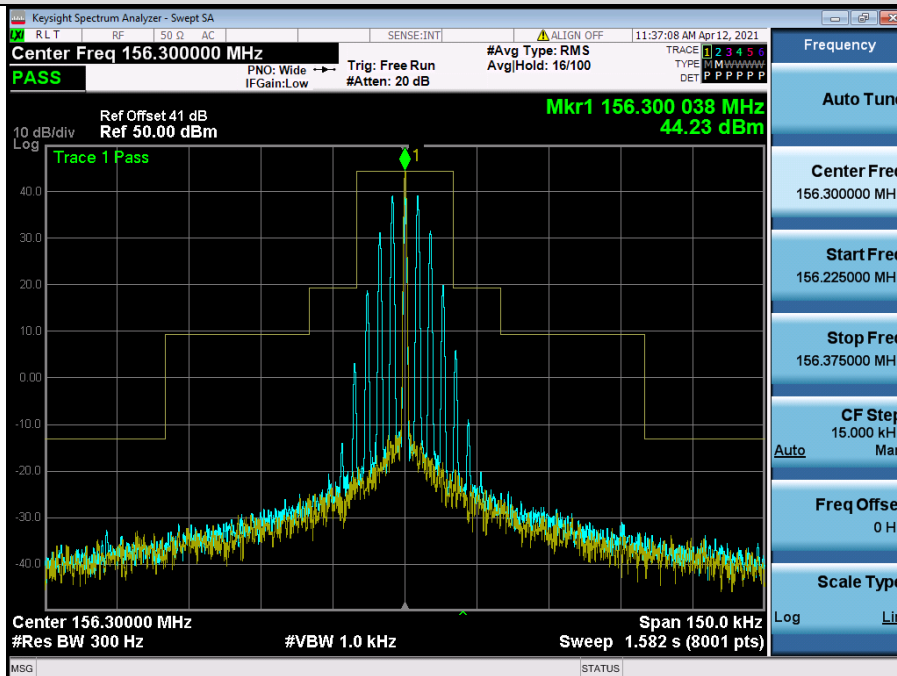
Unmodulated, Assigned Frequency:162.025MHz					
Voltage(V)	Temperature (°C)	Measured Frequency(MHz)	Frequency Error(ppm)	FCC Limit (ppm)	Result
12	-20	162.025045	-0.2777	±10	Pass
	-15	162.025053	-0.3271		
	-10	162.025071	-0.4382		
	0	162.025046	-0.2839		
	10	162.025072	-0.4444		
	20	162.025037	-0.2284		
	30	162.025044	-0.2716		
	40	162.02503	-0.1852		
	50	162.025036	-0.2222		
	55	162.025043	-0.2654		
10.2	25	162.025062	-0.3827		
13.8	25	162.025045	-0.2777		



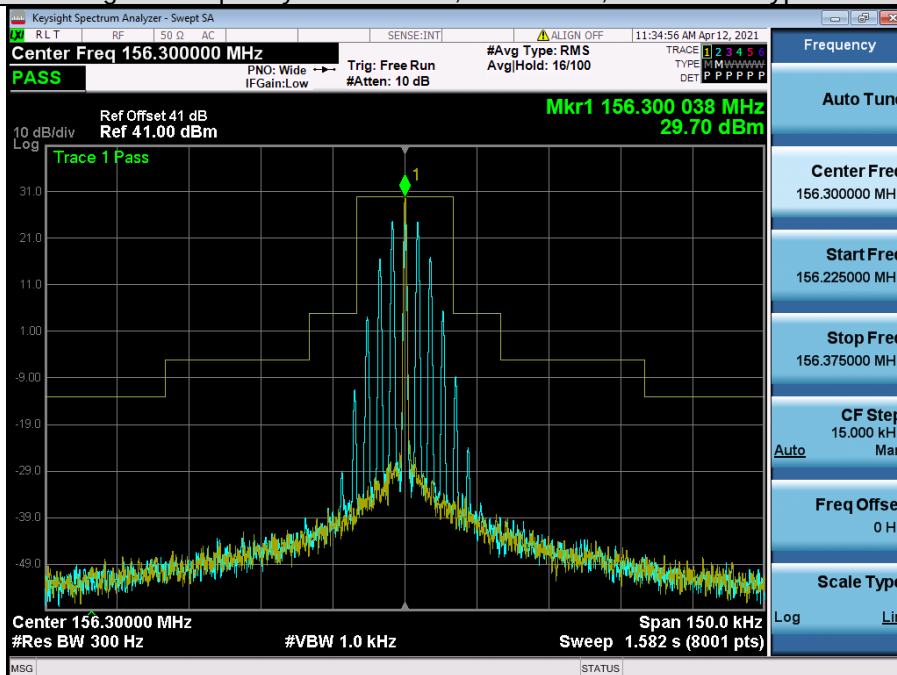
3. Emission Mask



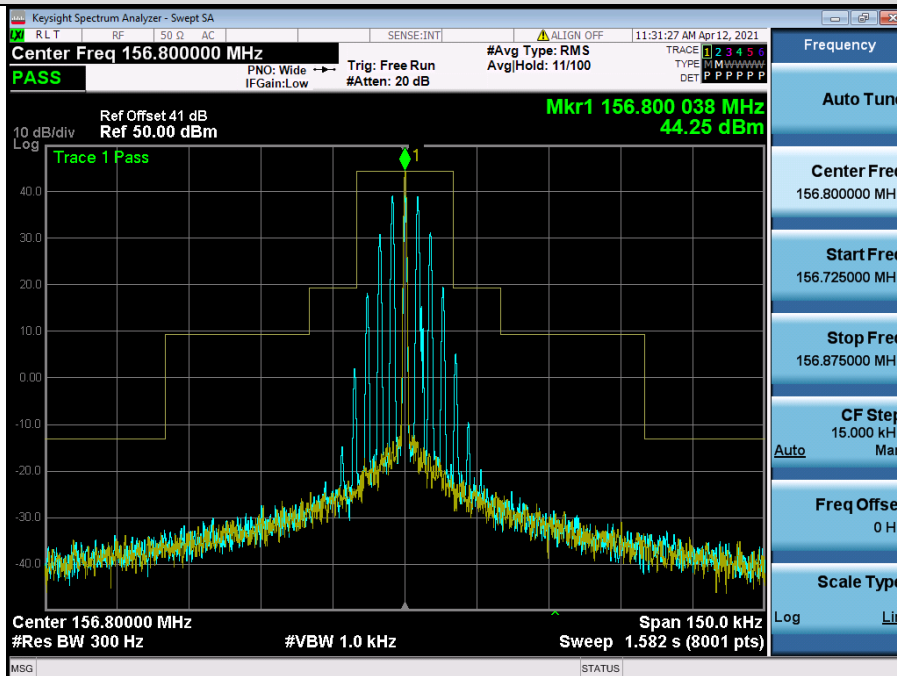
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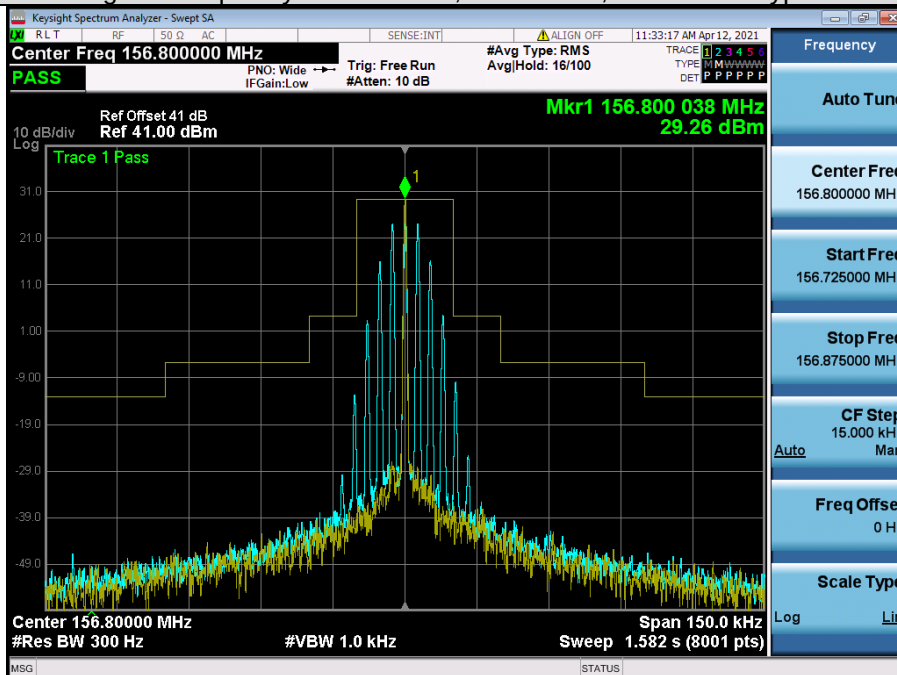
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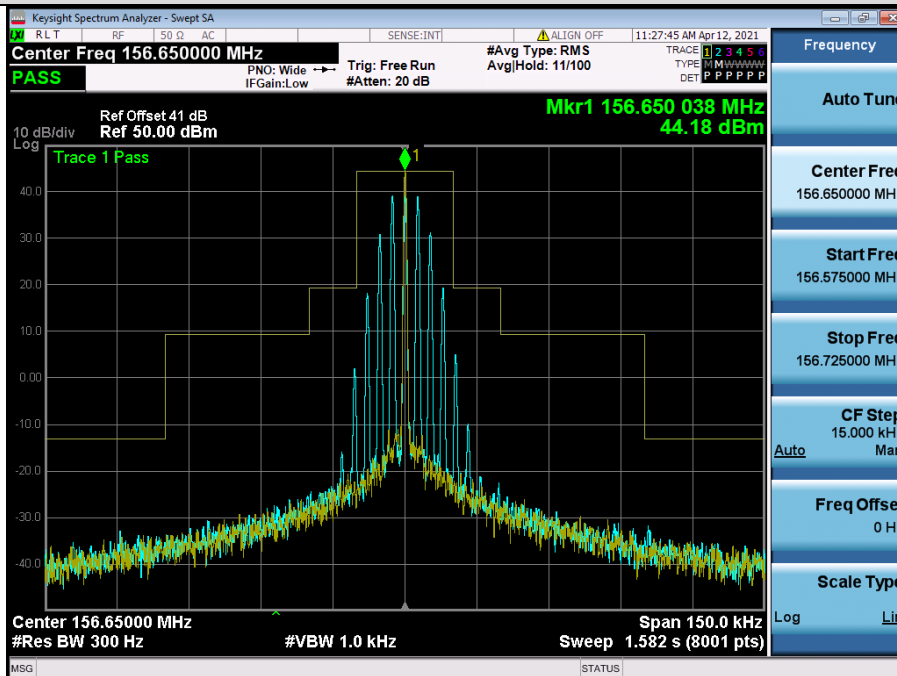
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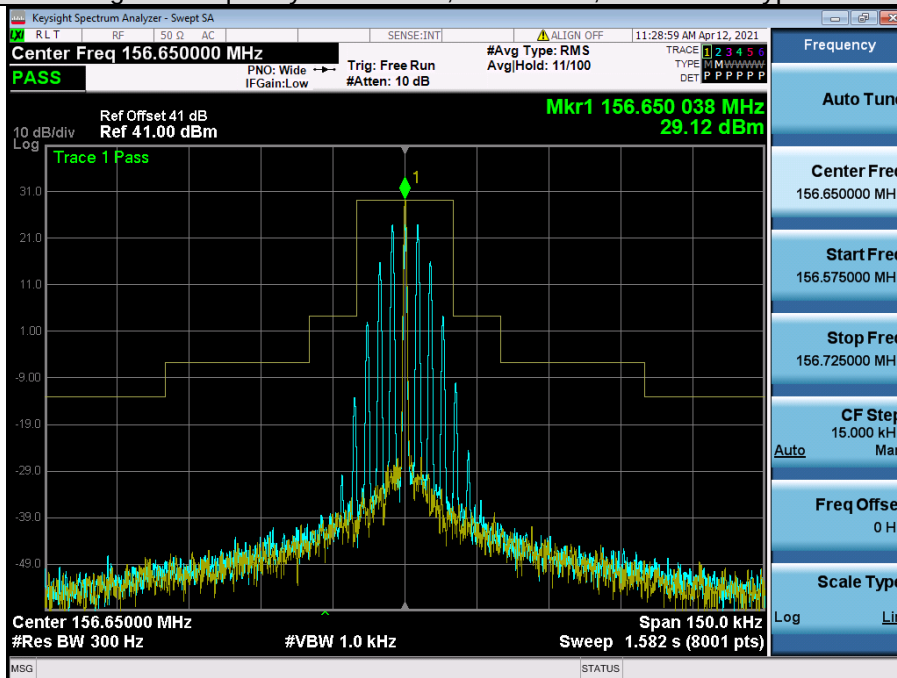
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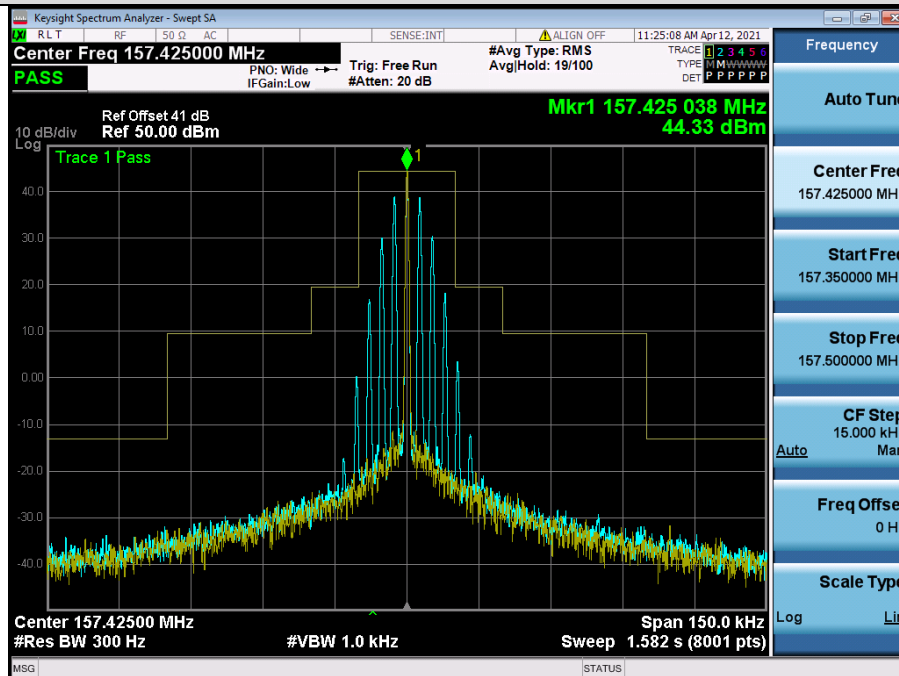
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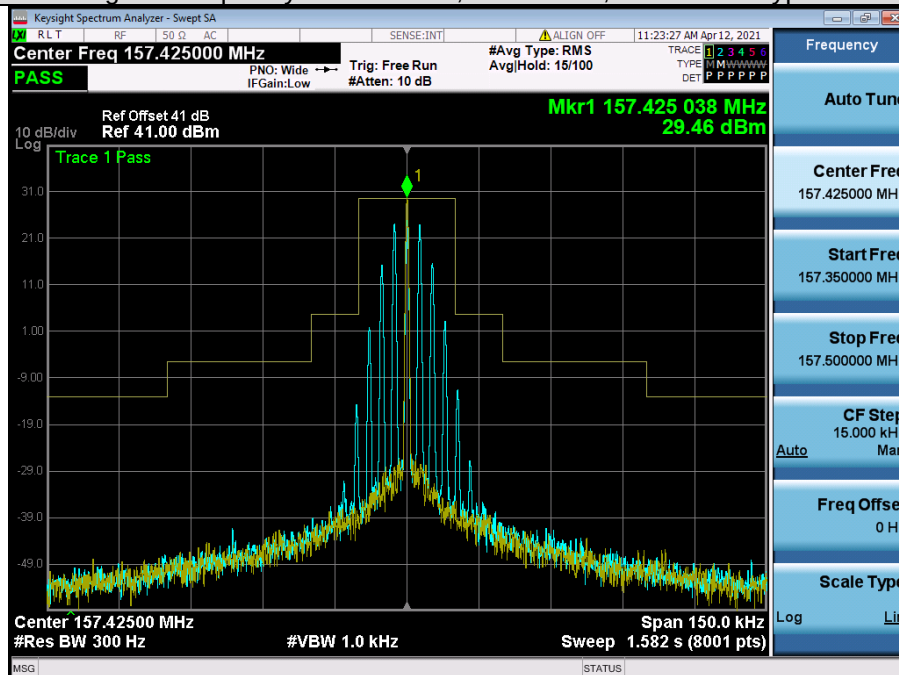
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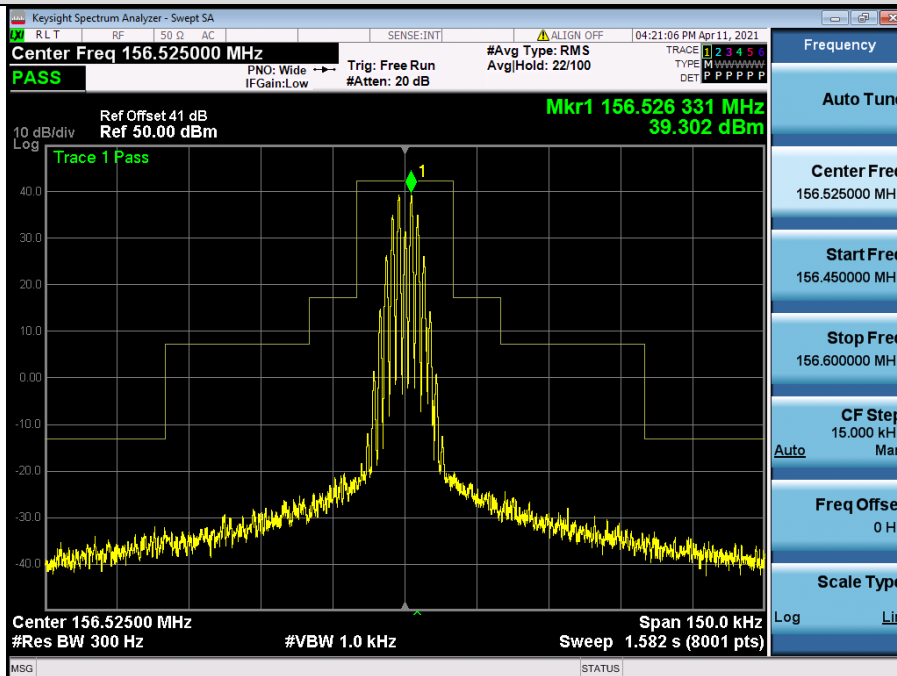
Assigned Frequency:157.425MHz, High Power, Modulation Type: FM



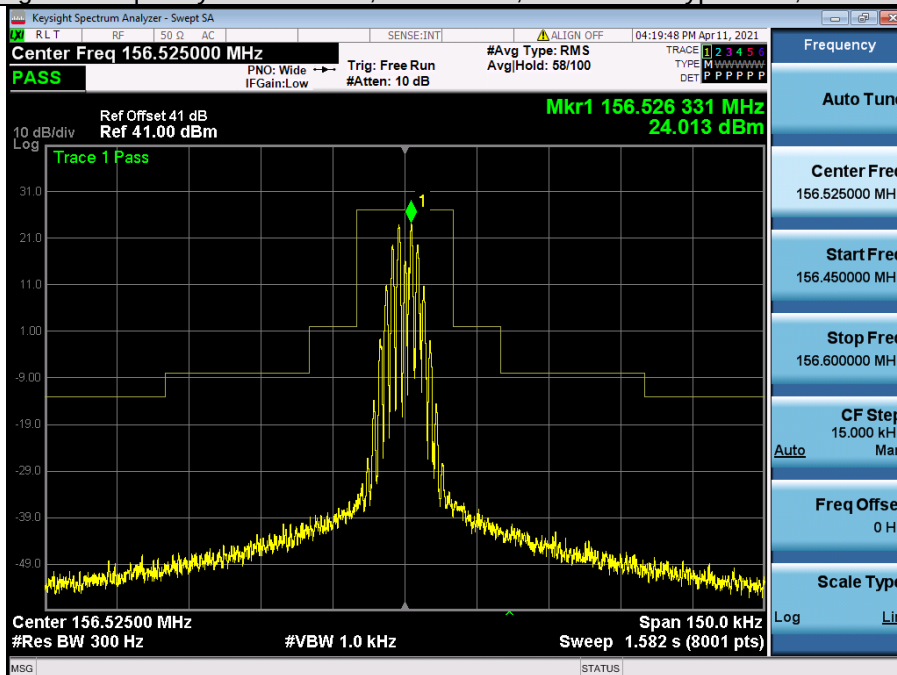
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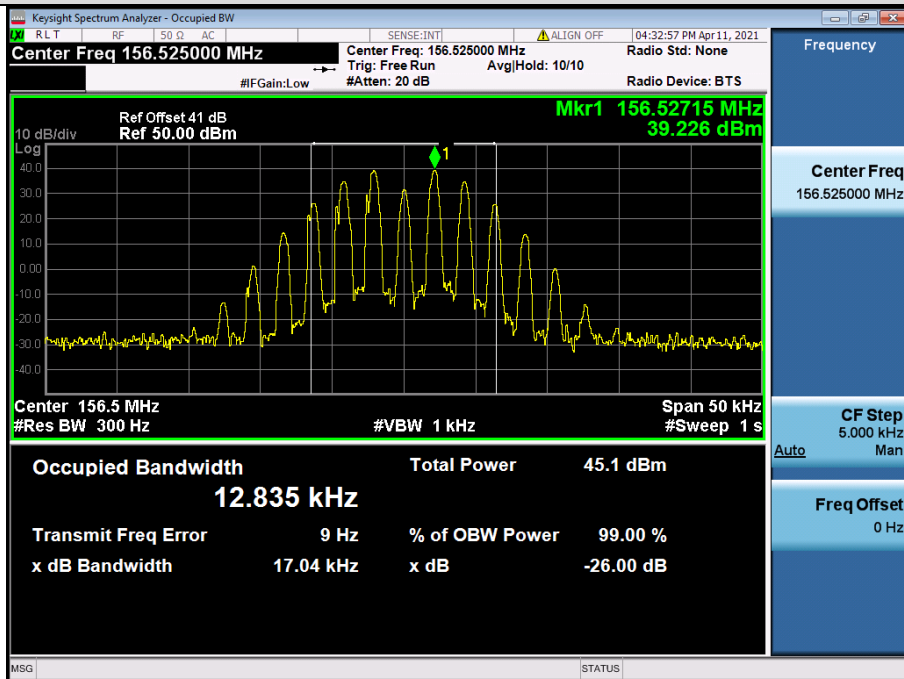
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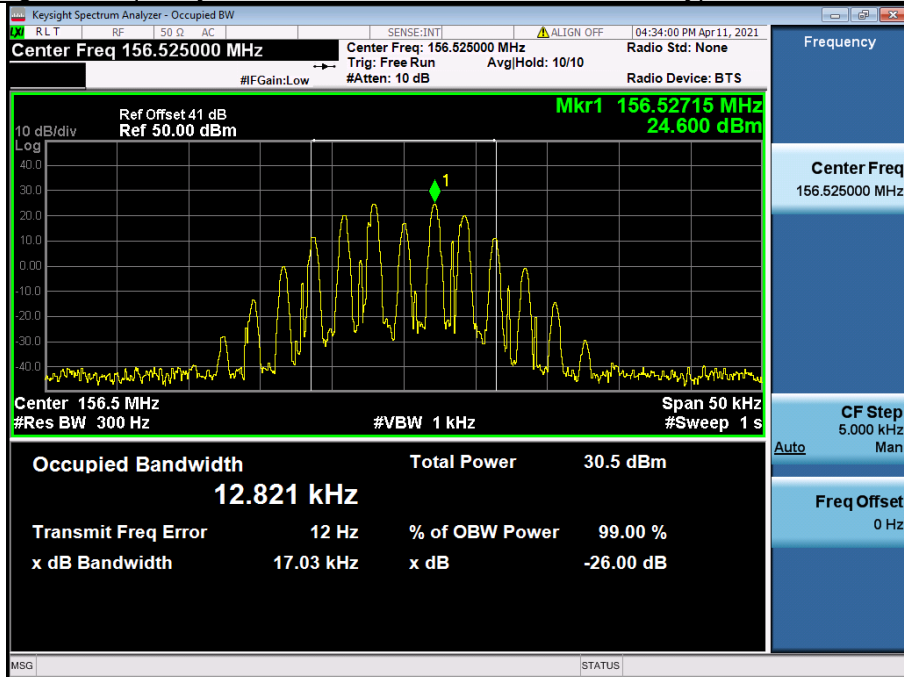
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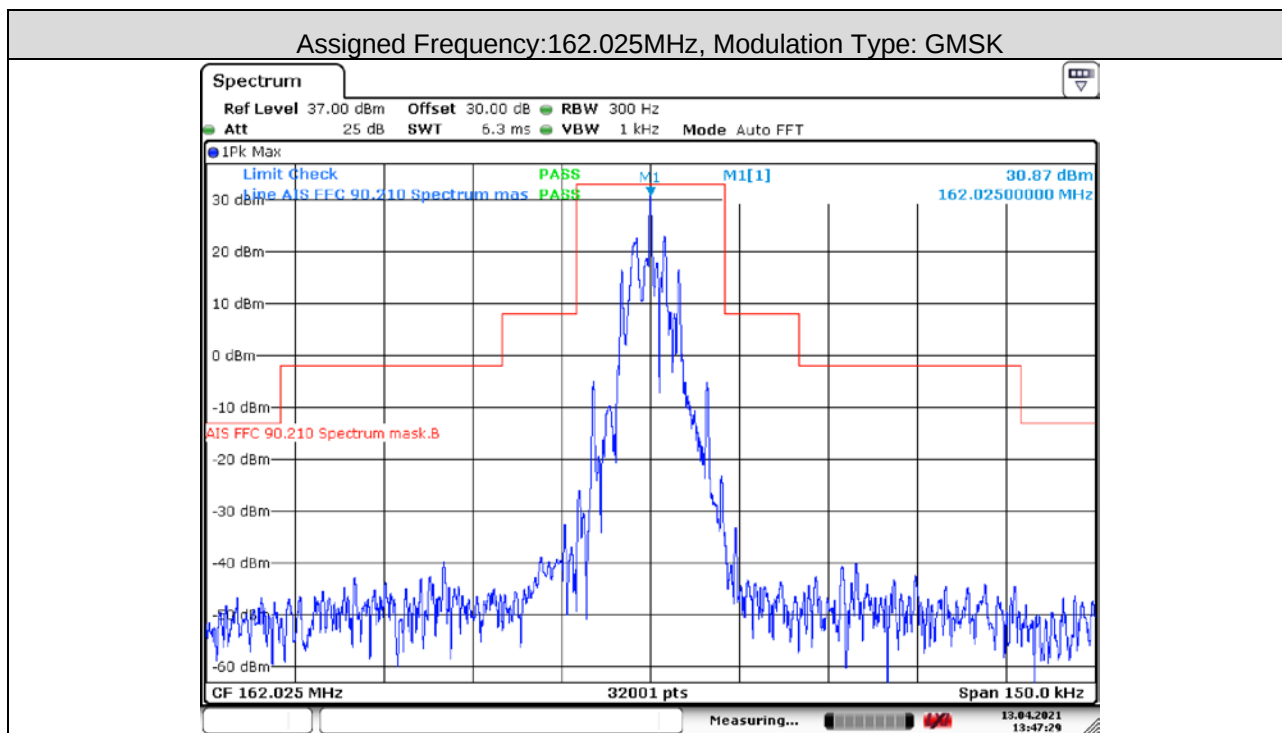


Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, dsc-2100Hz



Assigned Frequency:156.525MHz, Low Power, Modulation Type: FSK, dsc-2100Hz





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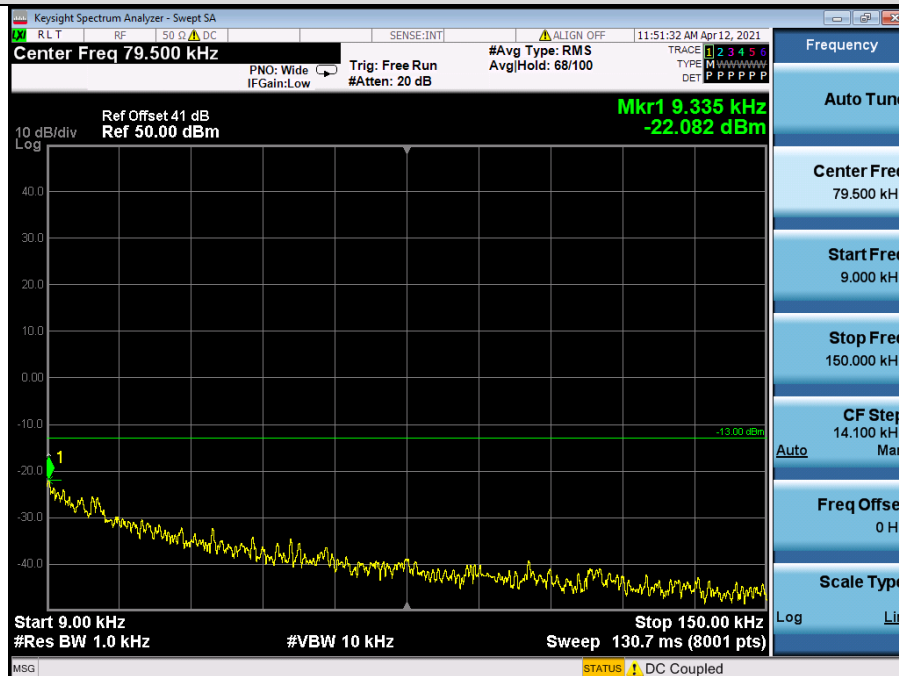
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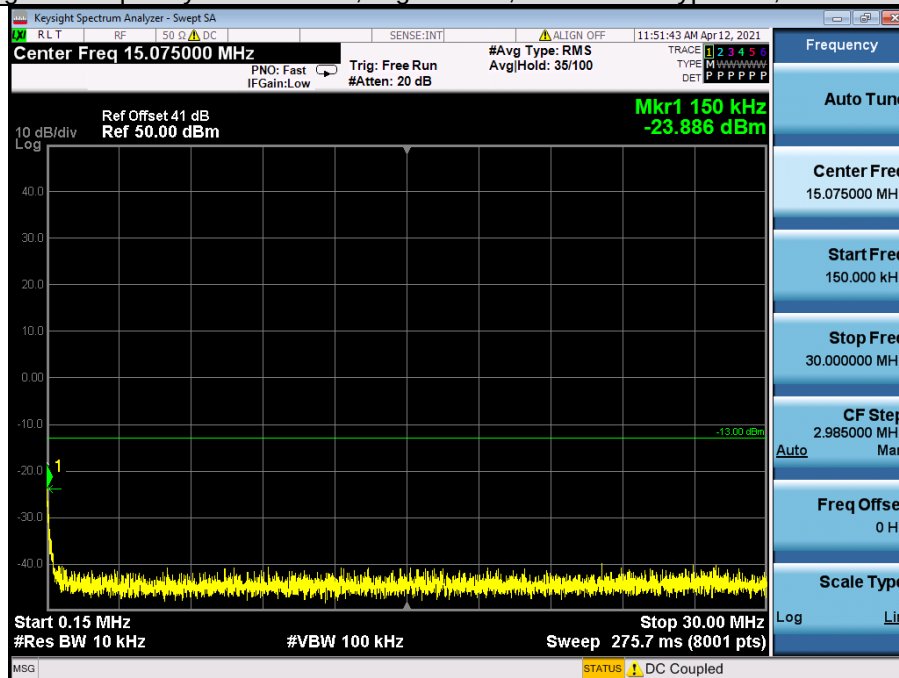
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4. Conducted Spurious Emission

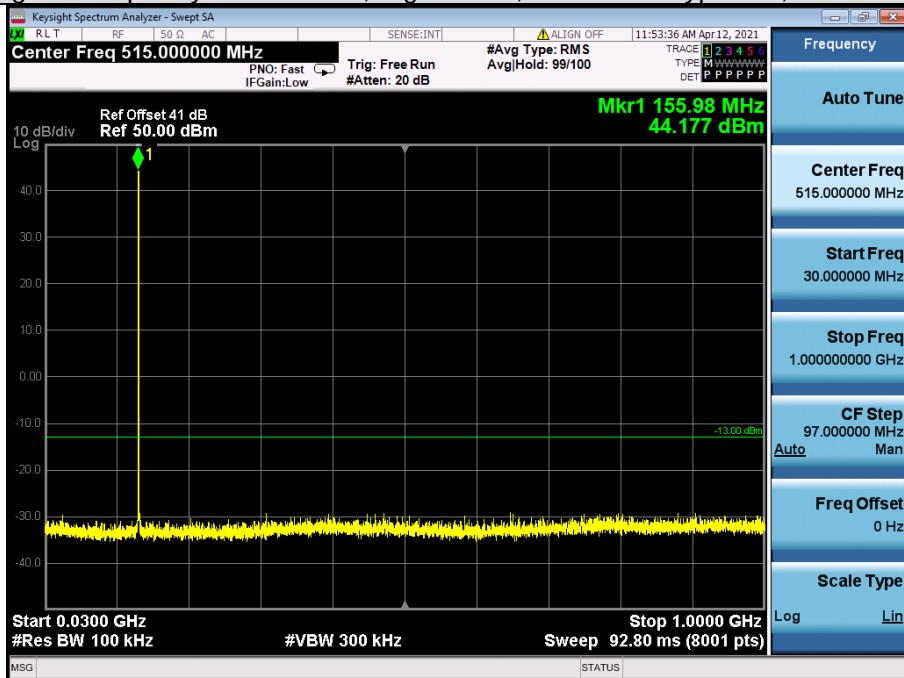
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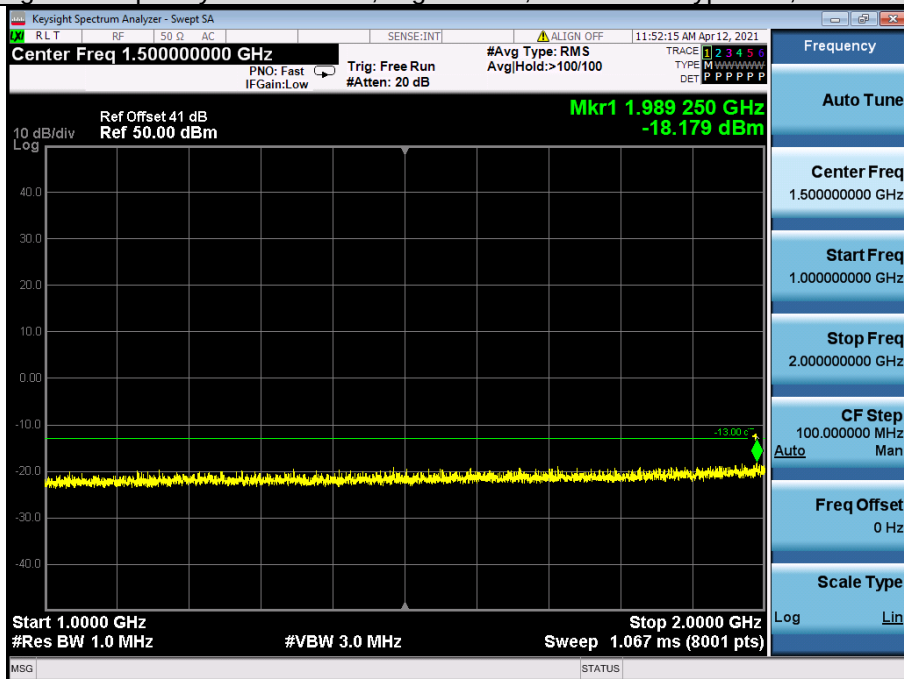
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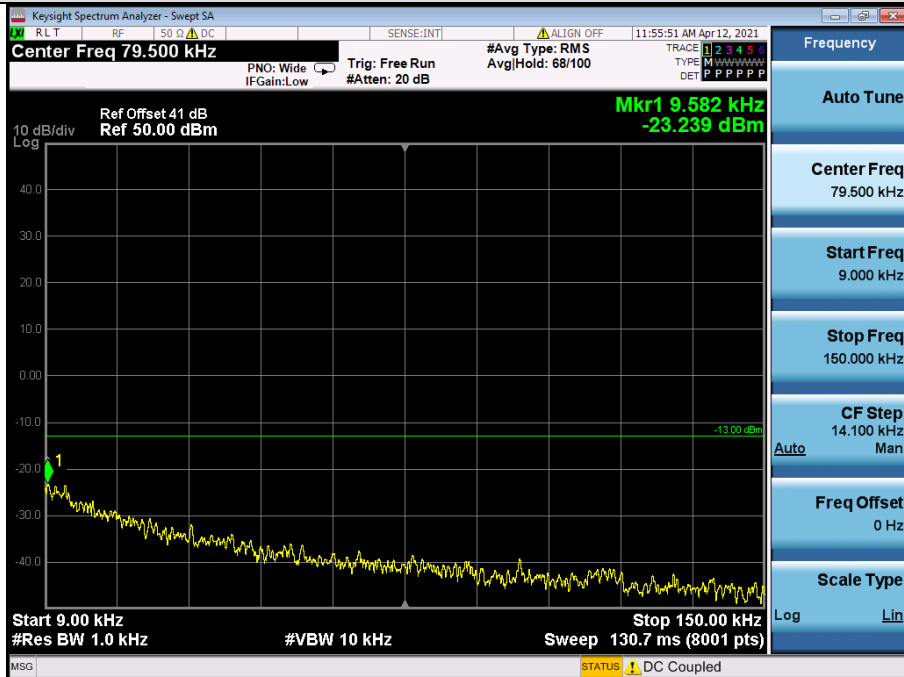
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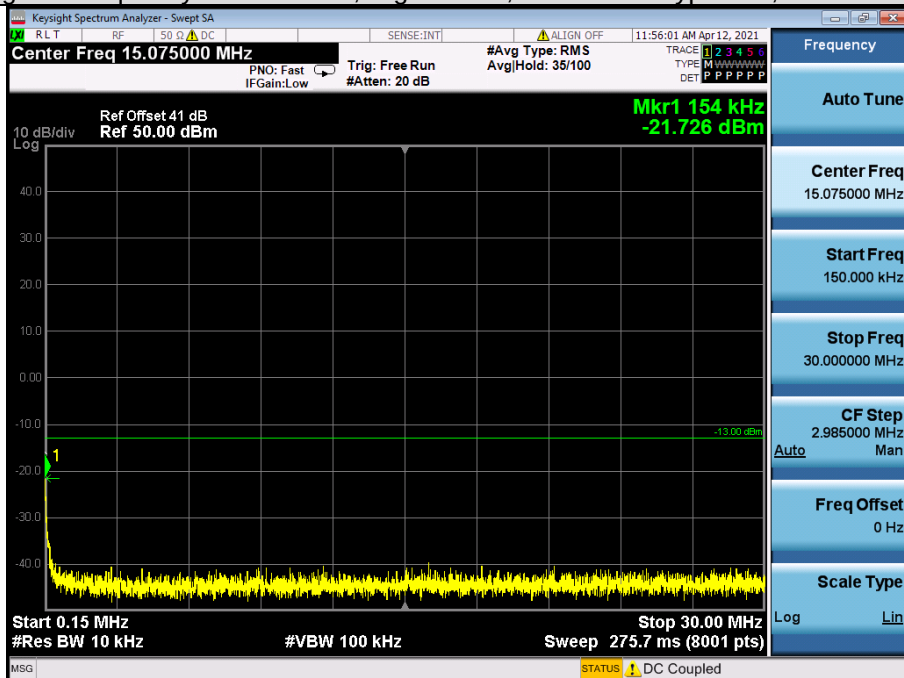
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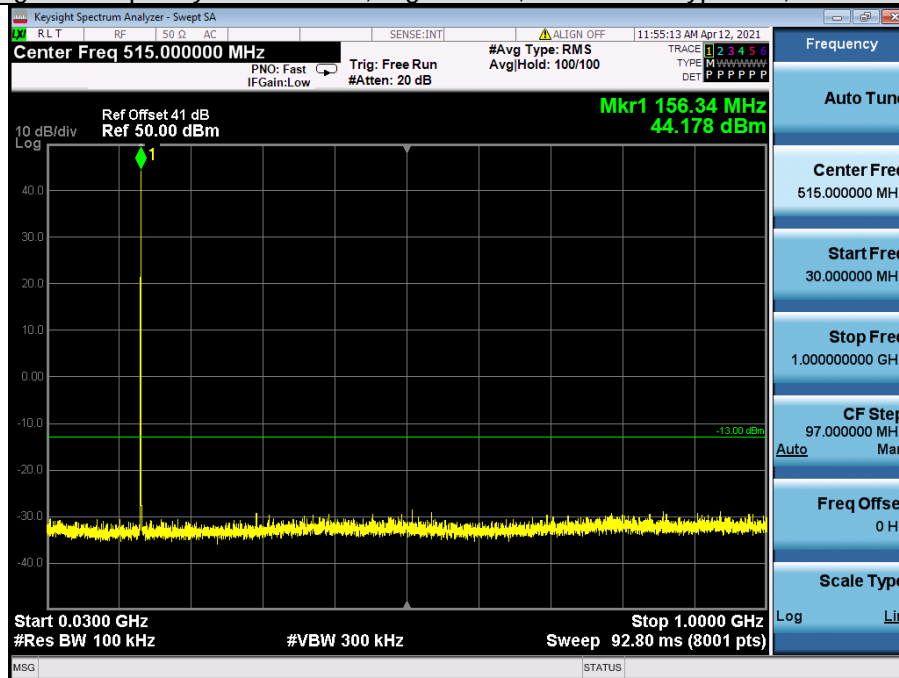
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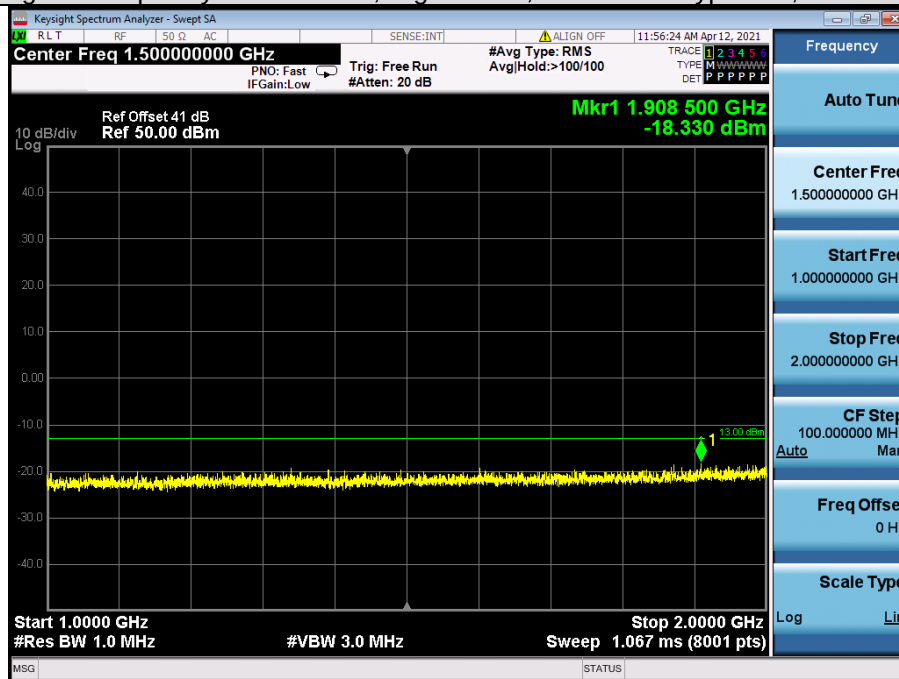
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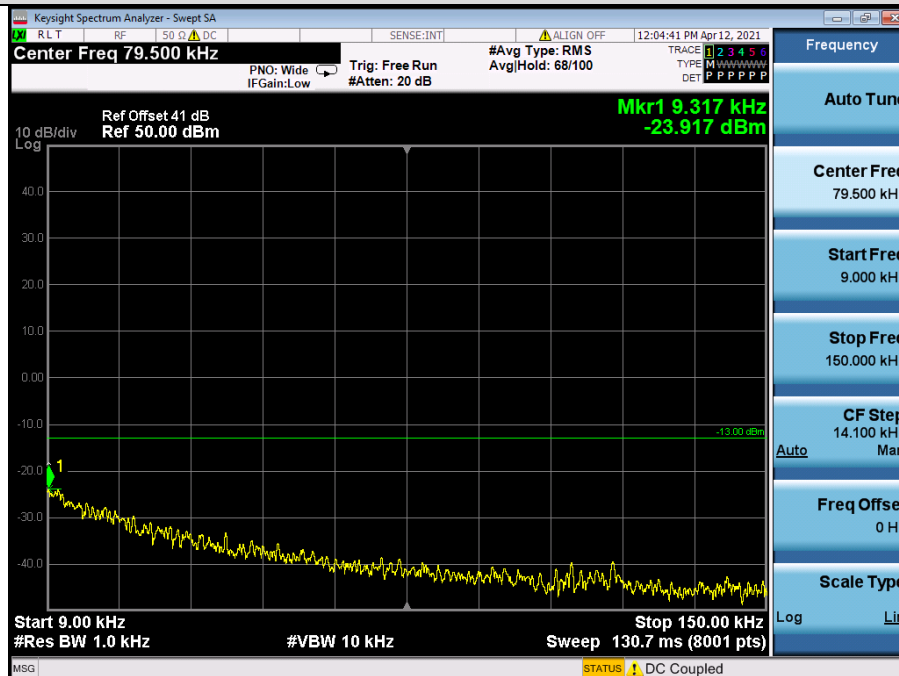
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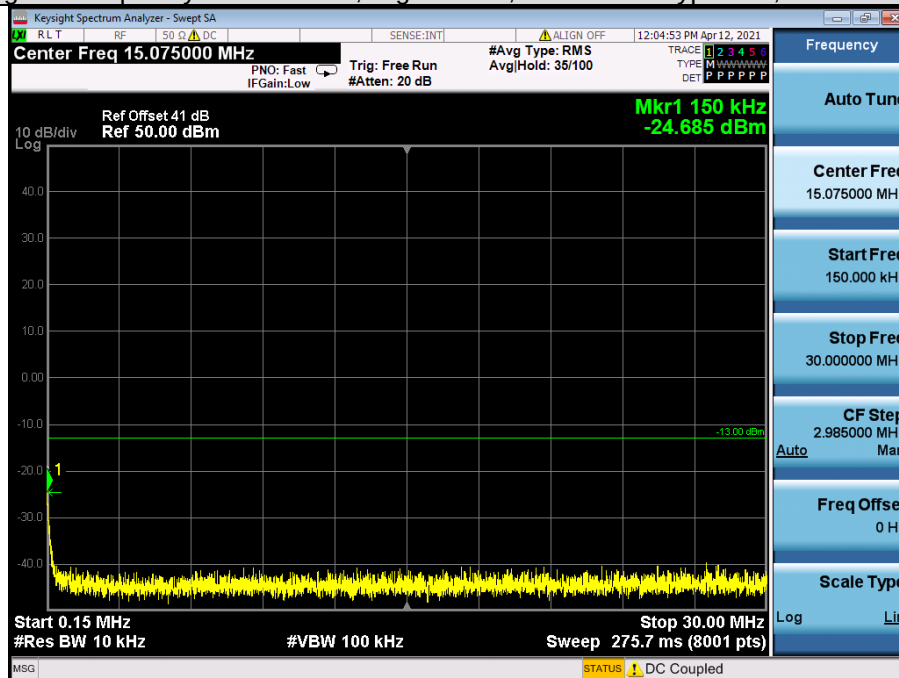
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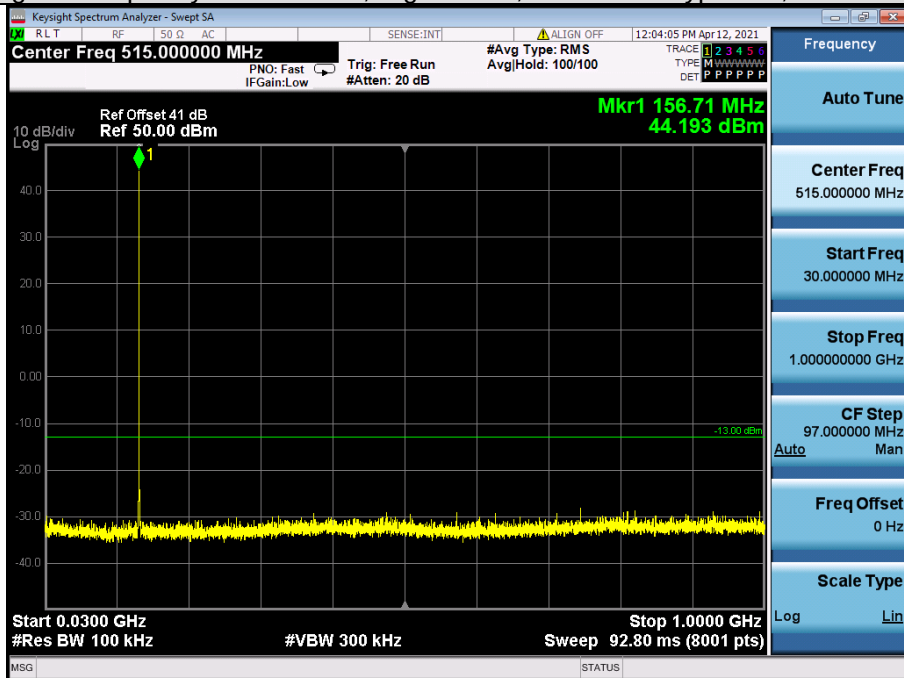
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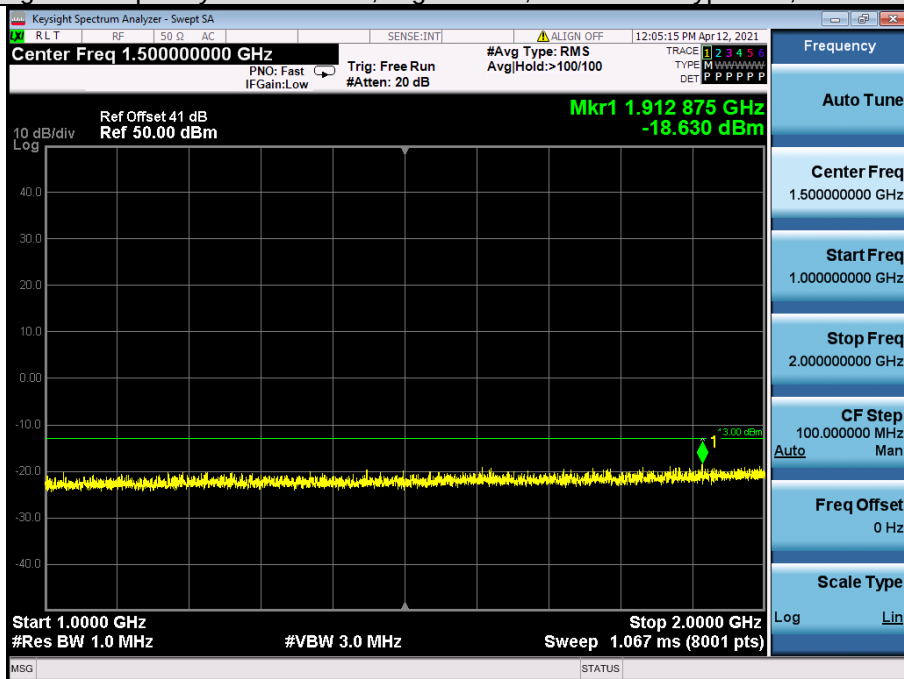
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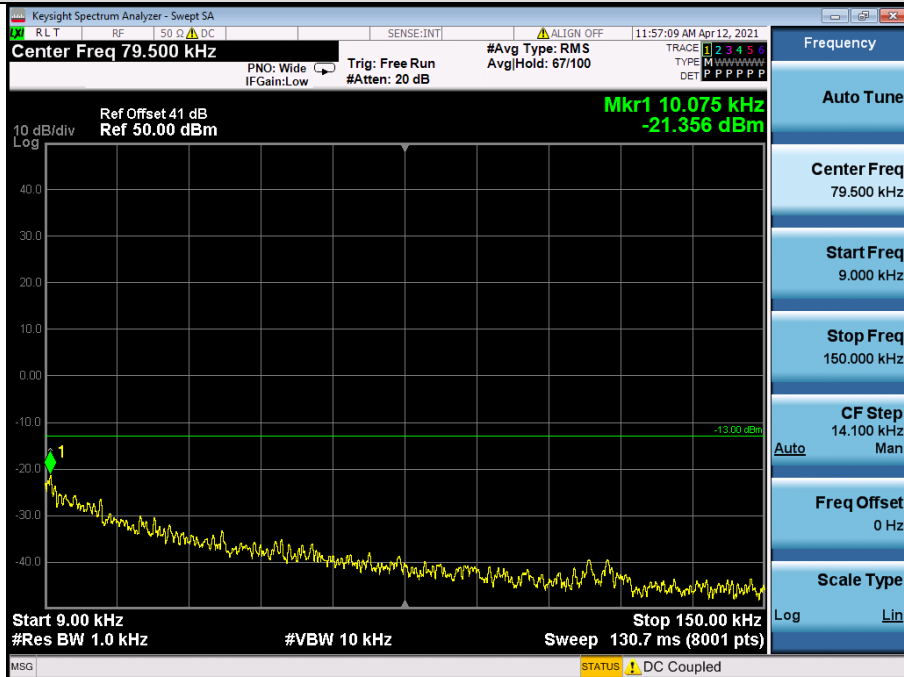
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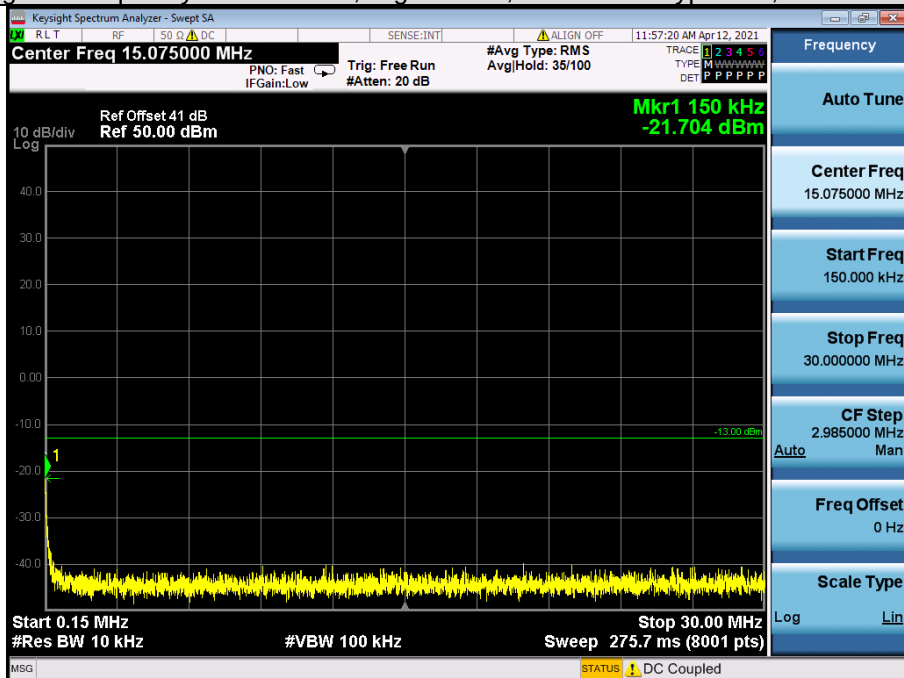
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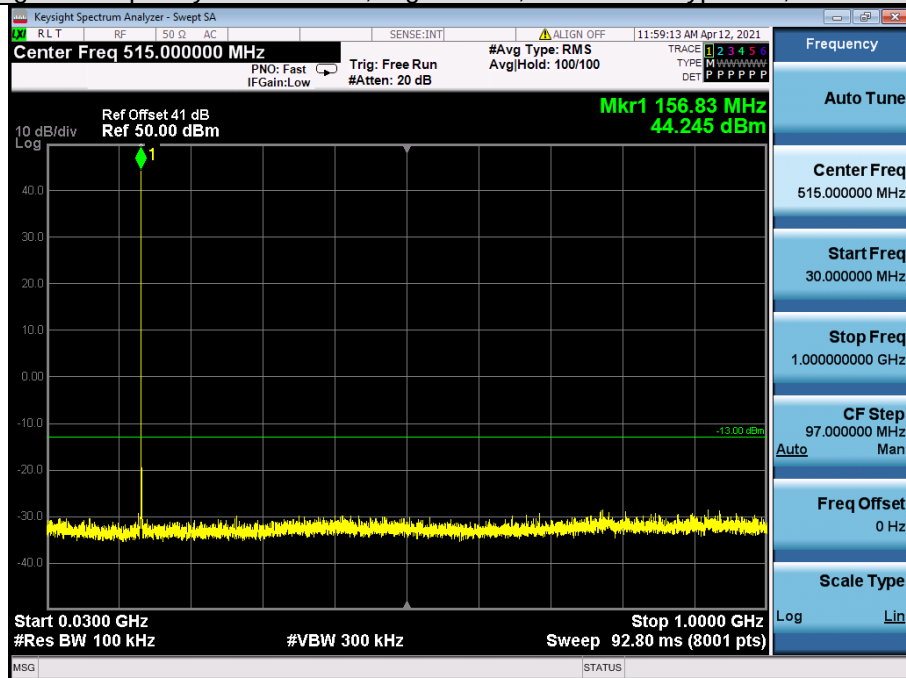
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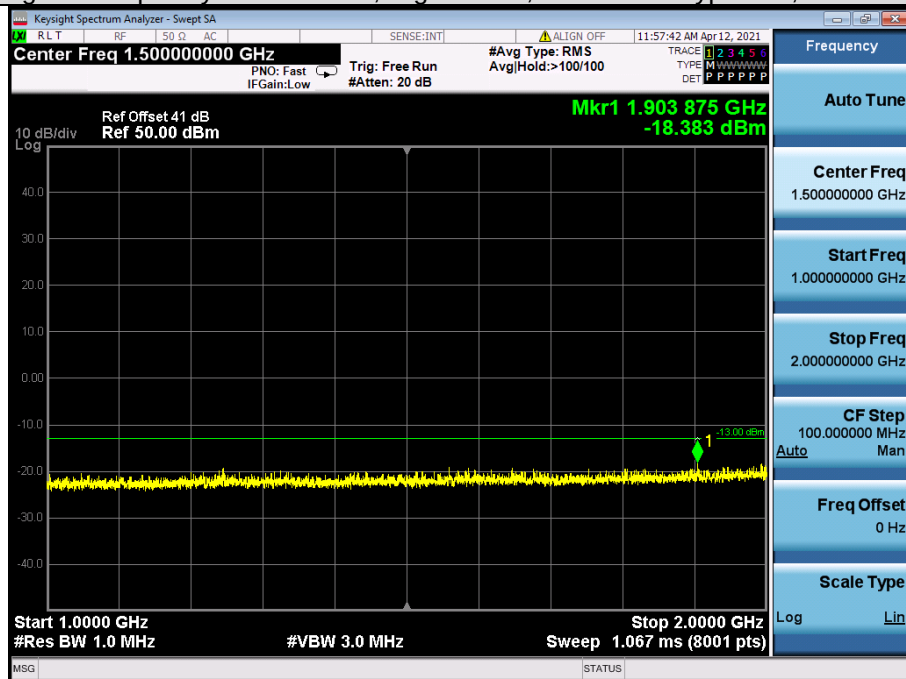
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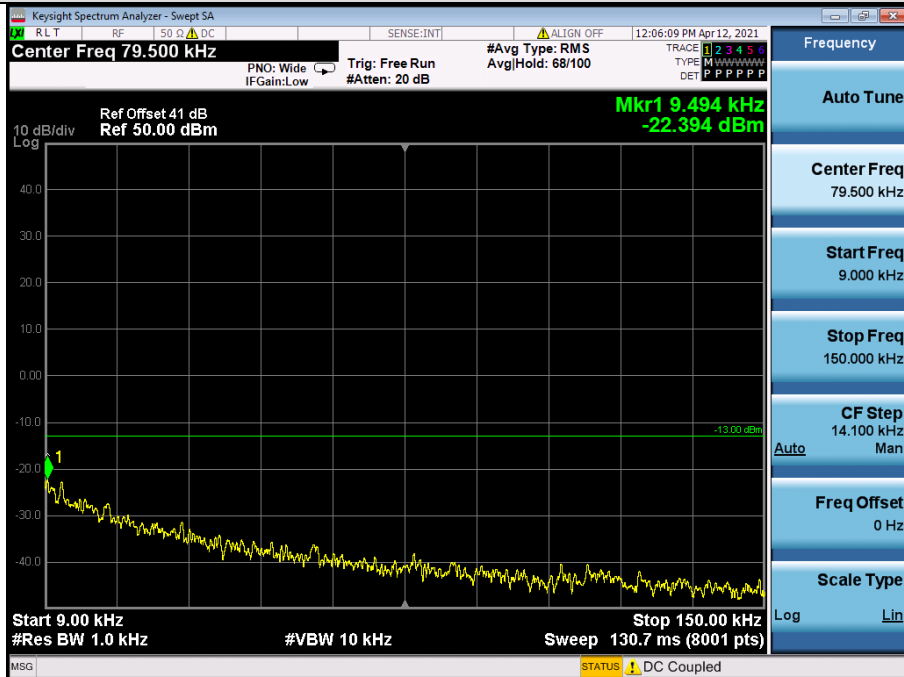
Assigned Frequency:156.800MHz, High Power, Modulation Type: FM, 1GHz-2GHz



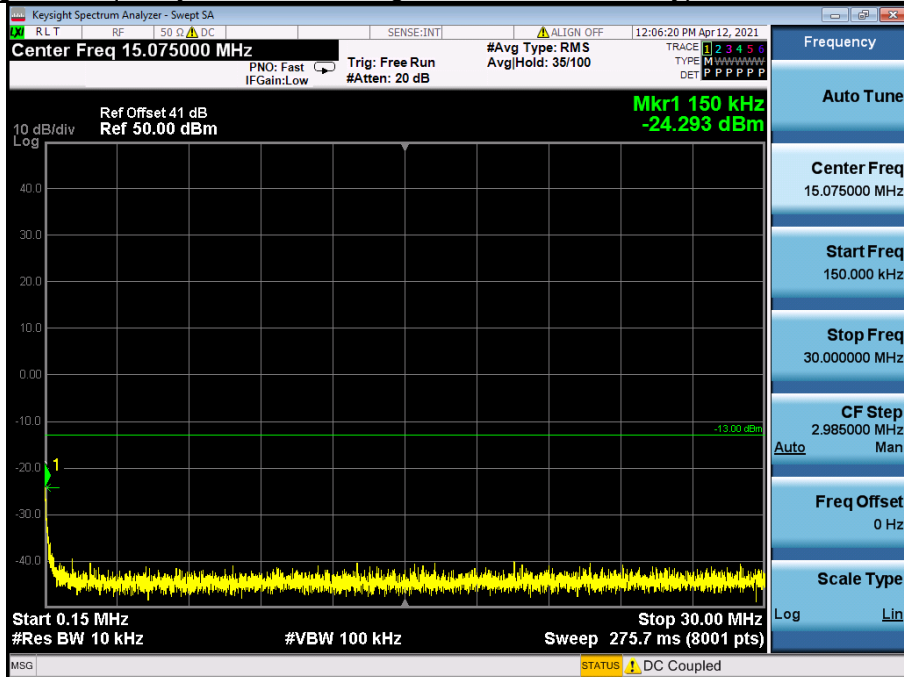
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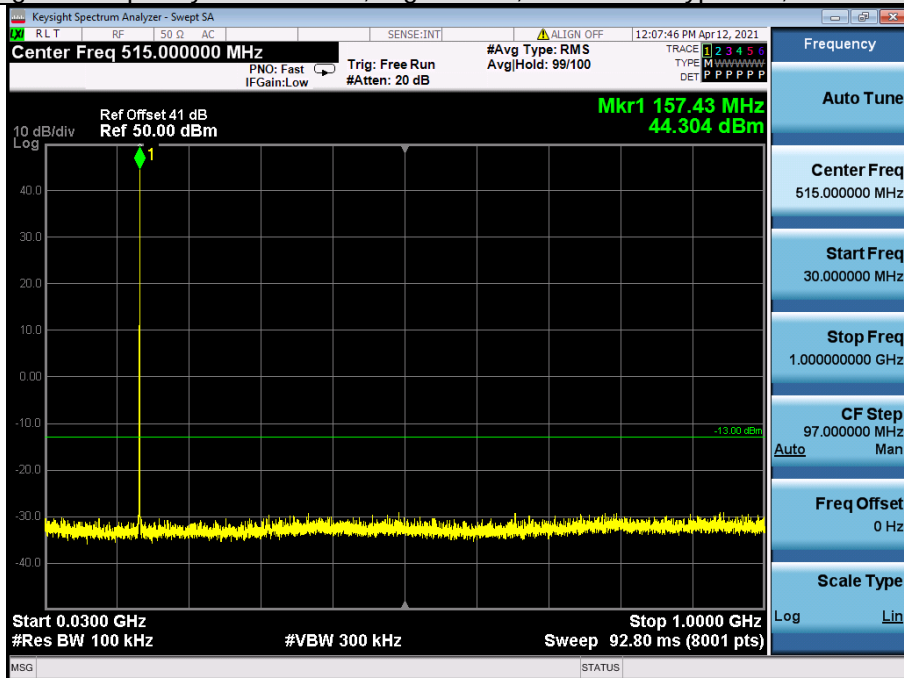
Assigned Frequency:157.425MHz, High Power, Modulation Type: FM, 9KHz-150KHz



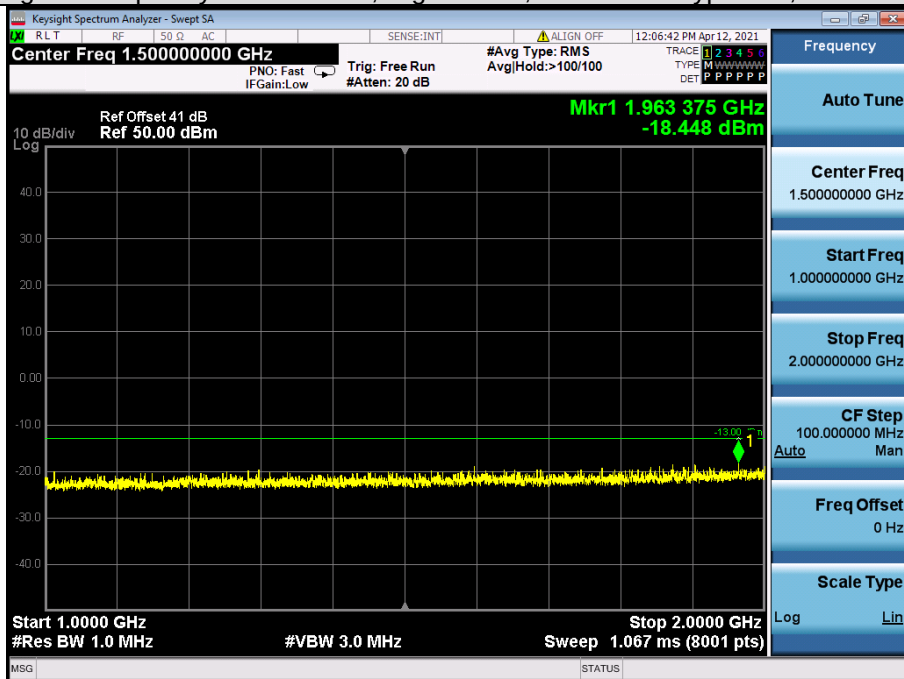
Assigned Frequency:157.425MHz, High Power, Modulation Type: FM, 150KHz-30MHz



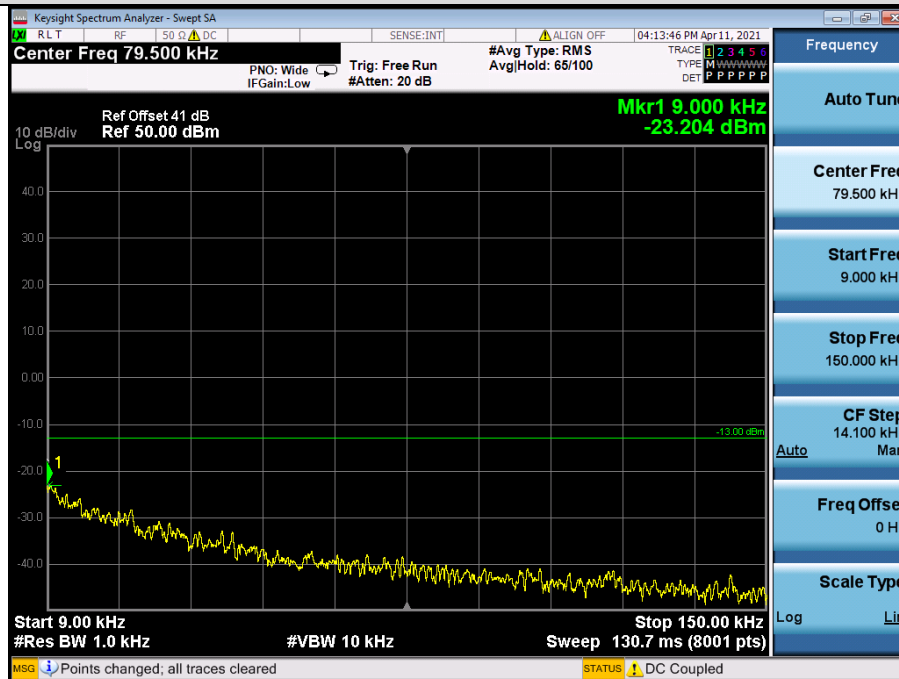
Assigned Frequency:157.425MHz, High Power, Modulation Type: FM, 30MHz-1GHz



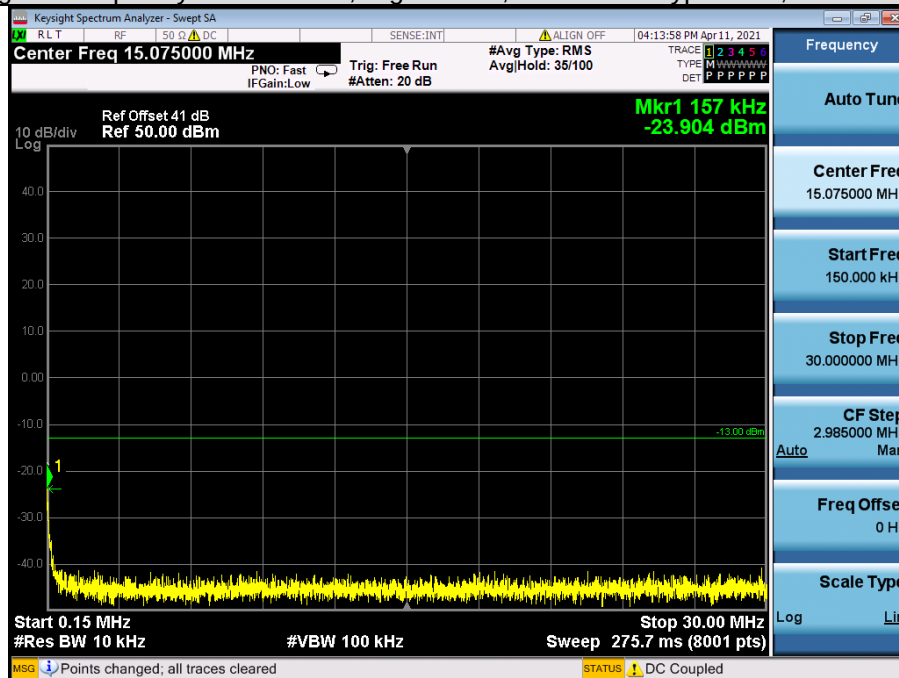
Assigned Frequency:157.425MHz, High Power, Modulation Type: FM, 1GHz-2GHz



Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, 9KHz-150KHz



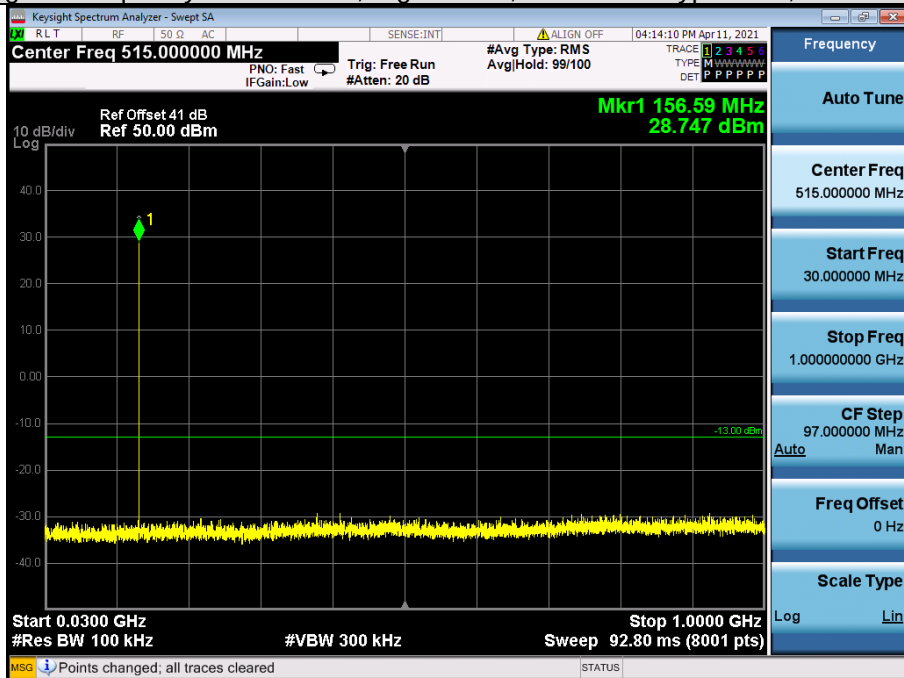
Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK,150KHz-30MHz



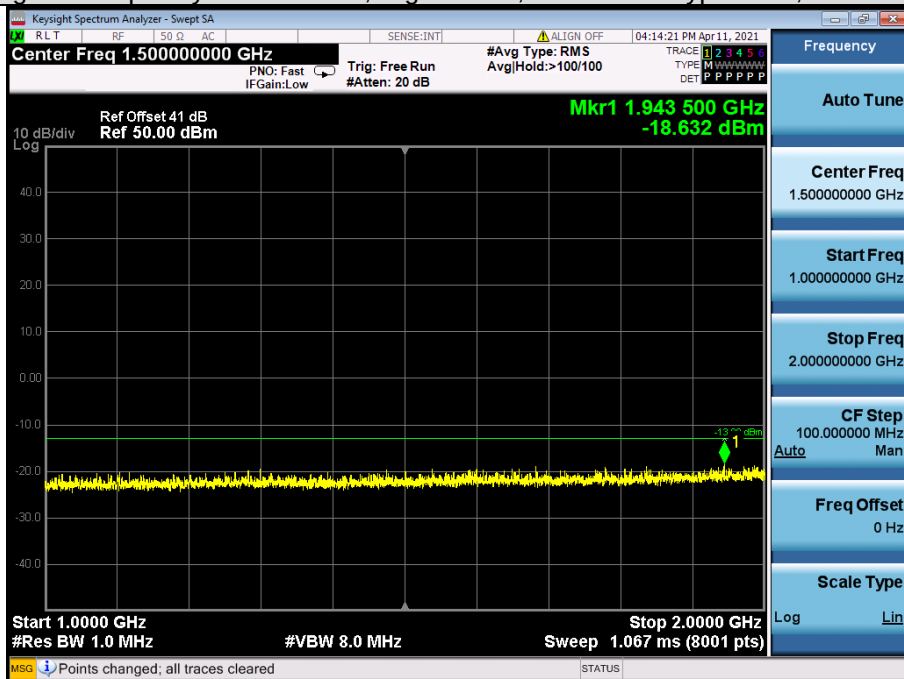
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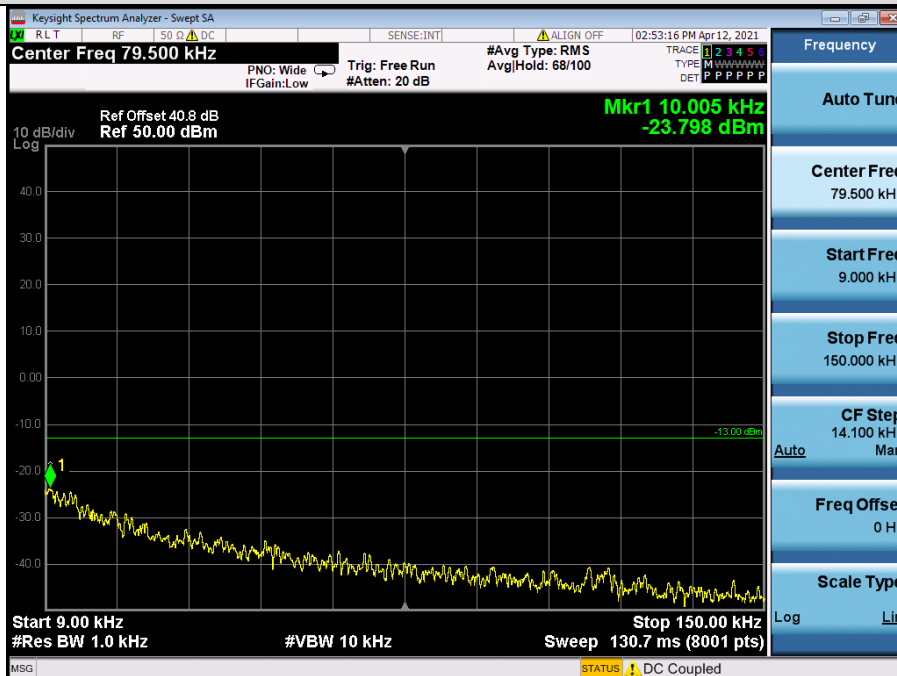
Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, 30MHz-1GHz



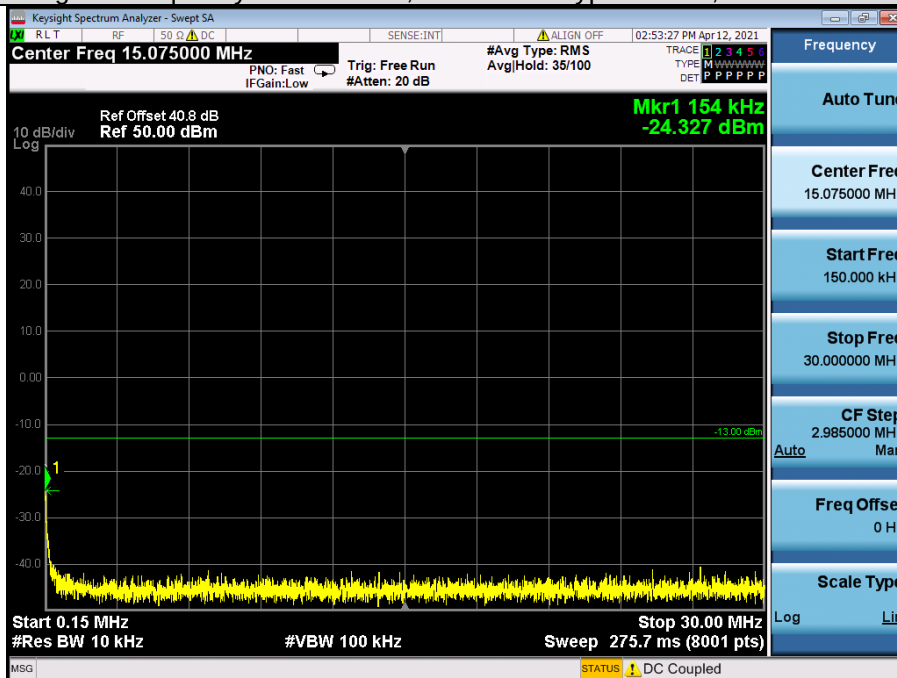
Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, 1GHz-2GHz



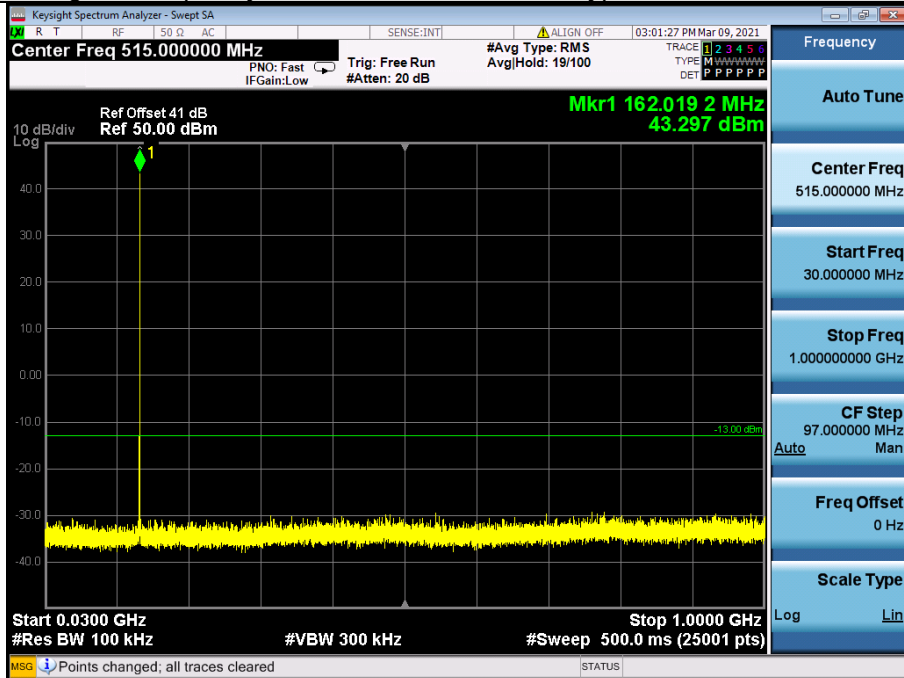
Assigned Frequency:162.025MHz, Modulation Type: GMSK, 9KHz-150KHz



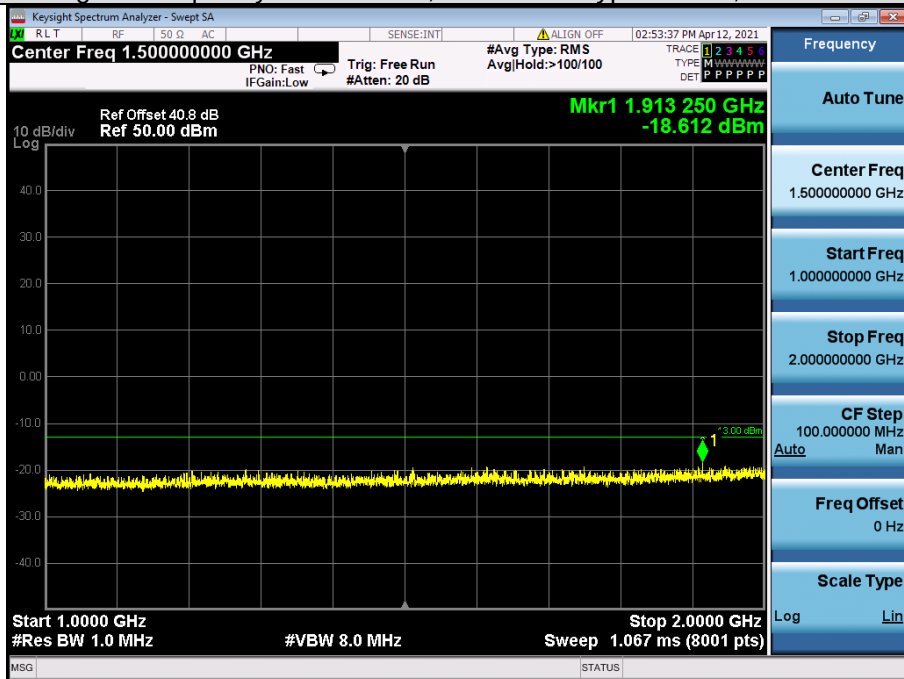
Assigned Frequency:162.025MHz, Modulation Type: GMSK, 150KHz-30MHz



Assigned Frequency:162.025MHz, Modulation Type: GMSK, 30MHz-1GHz



Assigned Frequency:162.025MHz, Modulation Type: GMSK, 1GHz-2GHz



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5. Transmitter Unwanted Emission(Radiated)

Assigned Frequency:156.025MHz, Modulation Type: FM								
Frequency (MHz)	S.G. Power (dBm)	Cable loss (dB)	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Over Limit(dB)	Polarization (H/V)	Result
1249.39	-51.37	0.43	1.9	-49.9	-13	-36.9	Horizontal	Pass
1426.24	-49.65	0.43	1.9	-48.18	-13	-35.18	Horizontal	Pass
1557.44	-54.79	0.52	6	-49.31	-13	-36.31	Horizontal	Pass
1245.29	-49.56	0.43	1.9	-48.09	-13	-35.09	Vertical	Pass
1429.89	-45.99	0.43	1.9	-44.52	-13	-31.52	Vertical	Pass
1551.43	-54.27	0.52	6	-48.79	-13	-35.79	Vertical	Pass

Assigned Frequency:162.025MHz, Modulation Type: GMSK								
Frequency (MHz)	S.G. Power (dBm)	Cable loss (dB)	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Over Limit(dB)	Polarization (H/V)	Result
1294.54	-50.28	0.43	1.9	-48.81	-13	-35.81	Horizontal	Pass
1460.27	-49.6	0.43	1.9	-48.13	-13	-35.13	Horizontal	Pass
1611.47	-53.44	0.52	6	-47.96	-13	-34.96	Horizontal	Pass
1296.5	-49.88	0.43	1.9	-48.41	-13	-35.41	Vertical	Pass
1466.75	-44.11	0.43	1.9	-42.64	-13	-29.64	Vertical	Pass
1607.36	-49.01	0.52	6	-43.53	-13	-30.53	Vertical	Pass

Assigned Frequency:156.525MHz, Modulation Type: FSK								
Frequency (MHz)	S.G. Power (dBm)	Cable loss (dB)	Antenna Gain(dBi)	EIRP (dBm)	Limit (dBm)	Over Limit(dB)	Polarization (H/V)	Result
1238.58	-49.38	0.43	1.9	-47.91	-13	-34.91	Horizontal	Pass
1442.54	-50.1	0.43	1.9	-48.63	-13	-35.63	Horizontal	Pass
1565.35	-52.89	0.52	6	-47.41	-13	-34.41	Horizontal	Pass
1259.77	-47.75	0.43	1.9	-46.28	-13	-33.28	Vertical	Pass
1451.23	-45.1	0.43	1.9	-43.63	-13	-30.63	Vertical	Pass
1567.44	-48.02	0.52	6	-42.54	-13	-29.54	Vertical	Pass

Note: All modes and modulation have been tested and we found the three frequencies shown above has the worst test result. Only record the worst test result.



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6. Modulation Characteristics

Test Frequency (MHz)	Modulation Frequency (Hz)	Upper Limit	Lower Limit	Modulation Index(dB) Relative. To 1KHz	Verdict
156.025	300	-9.5	-13.5	-12.5	Pass
	500	-5	-9	-7.7	Pass
	800	-0.9	-4.9	-3.2	Pass
	1000	1	-3	0	Pass
	1500	4.5	0.5	+2.3	Pass
	1800	6.1	2.1	+4.3	Pass
	2000	7	3	+5.5	Pass
	2500	9	5	+8.7	Pass
	3000	10.5	6.5	+8.6	Pass
156.525	300	-9.5	-13.5	-12.5	Pass
	500	-5	-9	-8.5	Pass
	800	-0.9	-4.9	-3.7	Pass
	1000	1	-3	0	Pass
	1500	4.5	0.5	+2.6	Pass
	1800	6.1	2.1	+4.8	Pass
	2000	7	3	+6.2	Pass
	2500	9	5	+8.7	Pass
	3000	10.5	6.5	+9.6	Pass

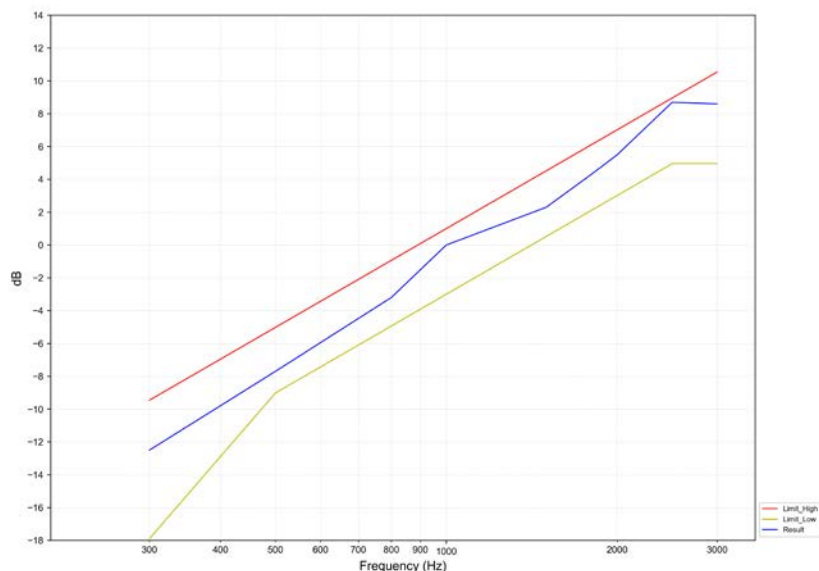


Test Frequency (MHz)	Modulation Frequency (Hz)	Input level	Maximum Deviation(KHz)		Limit (KHz)	Verdict
			High Power	Low Power		
156.025	100	20dB 3KHz	1.0	1.1	≤5.0	Pass
	200	20dB 3KHz	2.9	2.9	≤5.0	Pass
	300	20dB 3KHz	3.5	3.6	≤5.0	Pass
	400	20dB 3KHz	3.6	3.6	≤5.0	Pass
	500	20dB 3KHz	4.1	4.1	≤5.0	Pass
	1000	20dB 3KHz	3.5	3.7	≤5.0	Pass
	1500	20dB 3KHz	3.2	3.4	≤5.0	Pass
	2000	20dB 3KHz	4.1	4.1	≤5.0	Pass
	2500	20dB 3KHz	4.1	4.1	≤5.0	Pass
	3000	20dB 3KHz	4.2	4.2	≤5.0	Pass
156.525	100	20dB 3KHz	1.5	1.6	≤5.0	Pass
	200	20dB 3KHz	2.5	2.7	≤5.0	Pass
	300	20dB 3KHz	4.1	4.2	≤5.0	Pass
	400	20dB 3KHz	4.3	4.4	≤5.0	Pass
	500	20dB 3KHz	4.3	4.4	≤5.0	Pass
	1000	20dB 3KHz	4.2	4.3	≤5.0	Pass
	1500	20dB 3KHz	4.1	4.2	≤5.0	Pass
	2000	20dB 3KHz	4.1	4.2	≤5.0	Pass
	2500	20dB 3KHz	4.3	4.5	≤5.0	Pass
	3000	20dB 3KHz	4.5	4.6	≤5.0	Pass

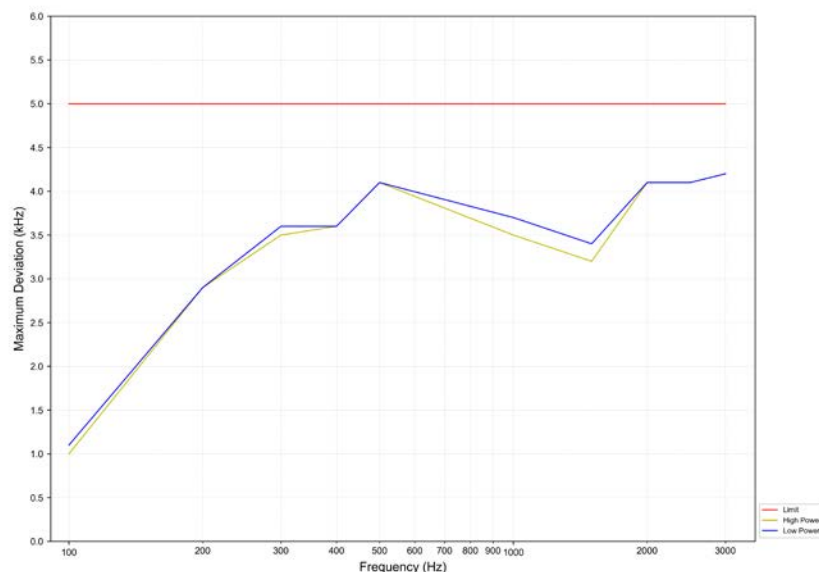


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Assigned Frequency:156.025MHz, High Power, Modulation Type: FM

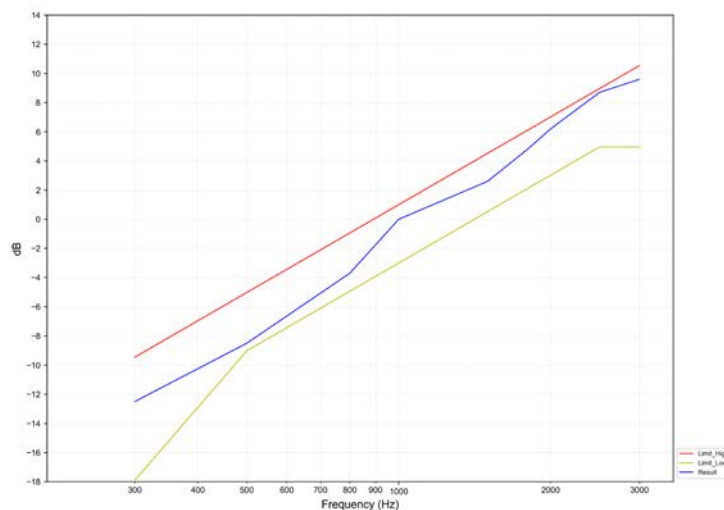


Assigned Frequency:156.025MHz, High Power, Modulation Type: FM

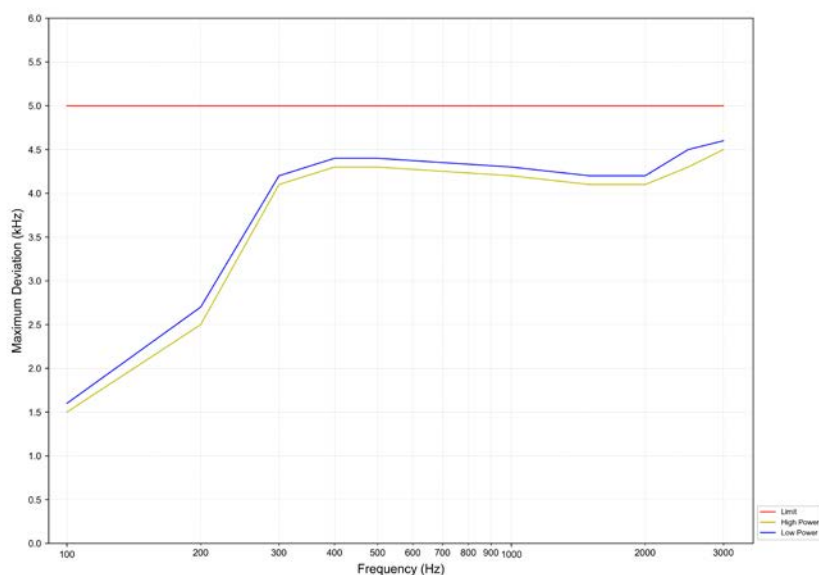


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Assigned Frequency:156.525MHz, Modulation Type: FSK

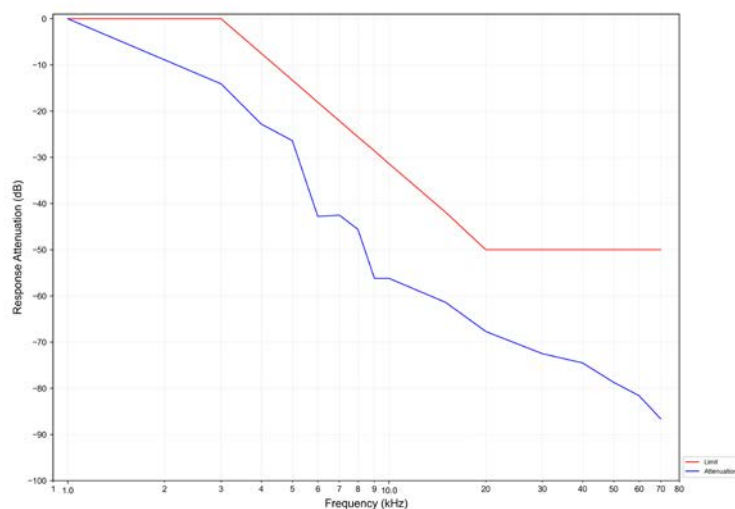


Assigned Frequency:156.525MHz, Modulation Type: FSK



Low Pass Filter Response

Assigned Frequency:156.025MHz, High Power, Modulation Type: FM		
Audio Frequency(KHz)	ResponseAttenuation(dB)	Limit (dB)
1	0	/
3	-14.1	0
4	-22.8	-7.5
5	-26.4	-13.3
6	-42.8	-18.1
7	-42.5	-22.1
8	-45.6	-25.6
9	-56.2	-28.6
10	-56.2	-31.4
15	-61.4	-41.9
20	-67.7	-50.0
30	-72.5	-50.0
40	-74.5	-50.0
50	-78.7	-50.0
60	-81.6	-50.0
70	-86.6	-50.0



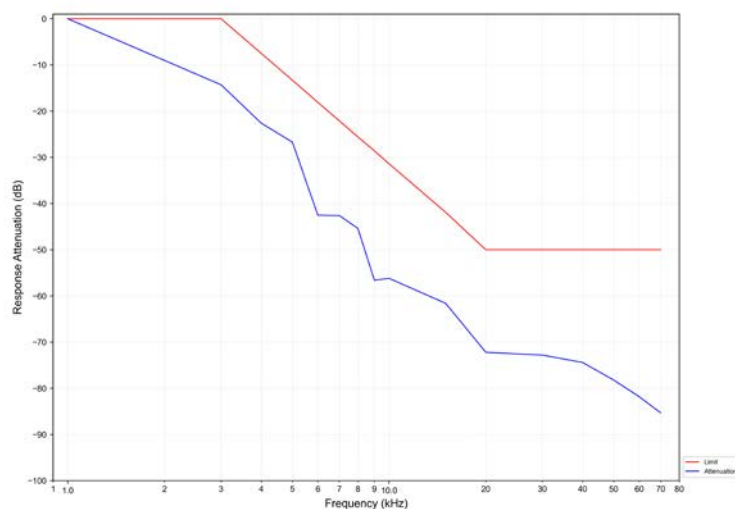
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Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK		
Audio Frequency(KHz)	ResponseAttenuation(dB)	Limit (dB)
1	0	/
3	-14.3	0
4	-22.6	-7.5
5	-26.7	-13.3
6	-42.5	-18.1
7	-42.6	-22.1
8	-45.4	-25.6
9	-56.6	-28.6
10	-56.2	-31.4
15	-61.6	-41.9
20	-72.2	-50.0
30	-72.8	-50.0
40	-74.4	-50.0
50	-78.2	-50.0
60	-81.8	-50.0
70	-85.3	-50.0



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7. Transmitter Power

Test Voltage (V Dc)	Test Frequency (MHz)	Power Level	Output Power(dBm)	Output Power(W)	Limit
12	156.025	Max	43.65	23.17	25W
		Low	29.23	0.84	1W
	156.300	Max	43.79	23.93	25W
		Low	29.31	0.85	1W
	156.650	Max	43.75	23.71	25W
		Low	29.79	0.95	1W
	156.800	Max	43.86	24.32	25W
		Low	29.18	0.83	1W
	157.425	Max	43.91	24.60	25W
		Low	29.07	0.81	1W
	156.525	Max	43.84	24.21	25W
		Low	28.87	0.77	1W
	162.025	/	32.82	1.91	See Note
			ERP:36.67	ERP:4.65	See Note

Note:

- 1). The high power is 25W, the low power is 1W for VHF/DSC, that declared by manufacturer.



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8. Transmitter Carrier Power Reduction

Test Voltage (V Dc)	Test Frequency (MHz)	Power Level	Default Power (W)	Limit	Result
12	156.375	Low	0.81	one watt or less	Pass
	156.525	Low	0.79	one watt or less	Pass
	156.650	Low	0.80	one watt or less	Pass

Note:

- 1).All transmitters units must be capable of reducing the carrier power to one watt or less;
- 2).All transmitters must automatically reduce the carrier power to one watt or less when transmitting on 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650 MHz;



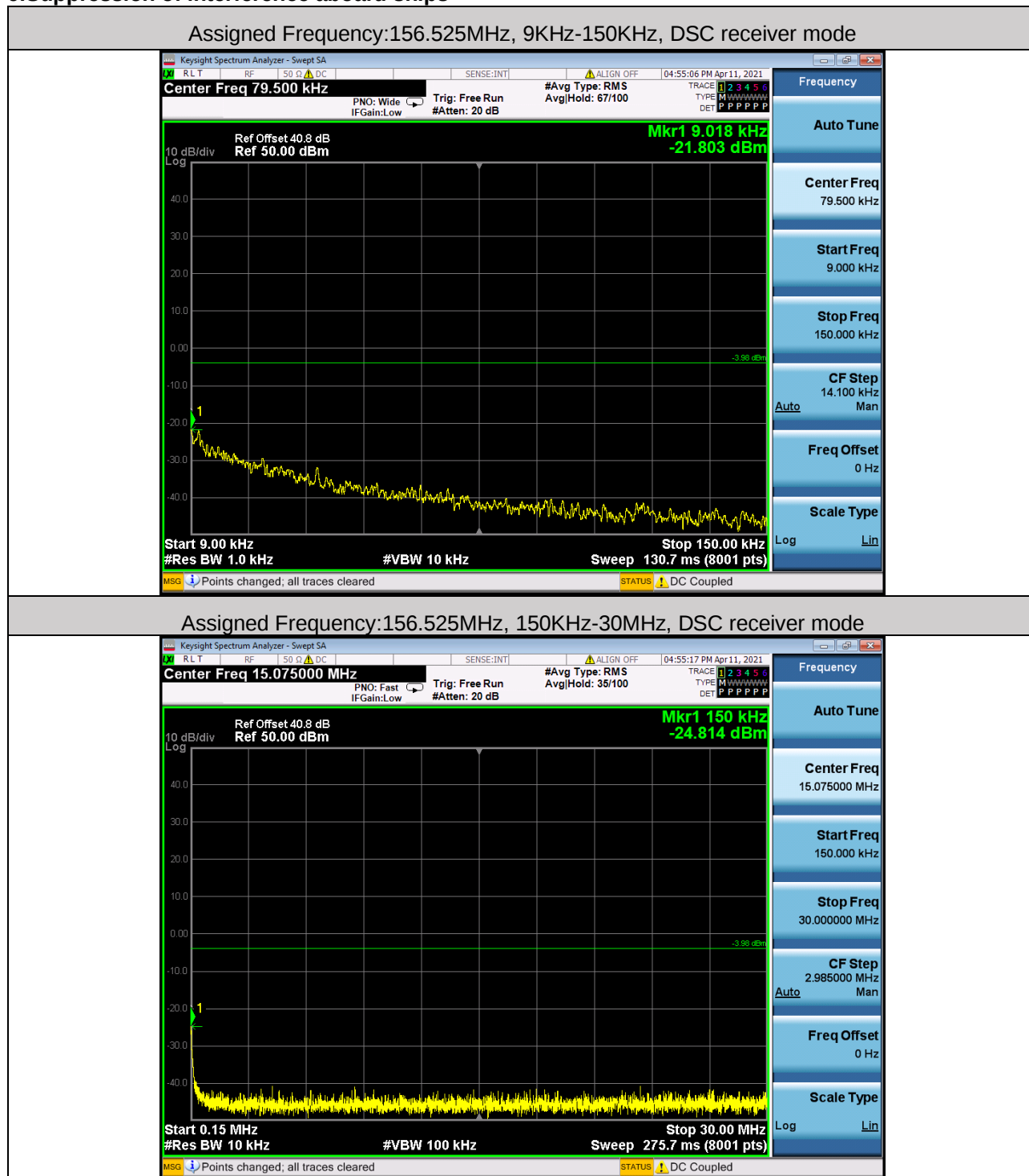
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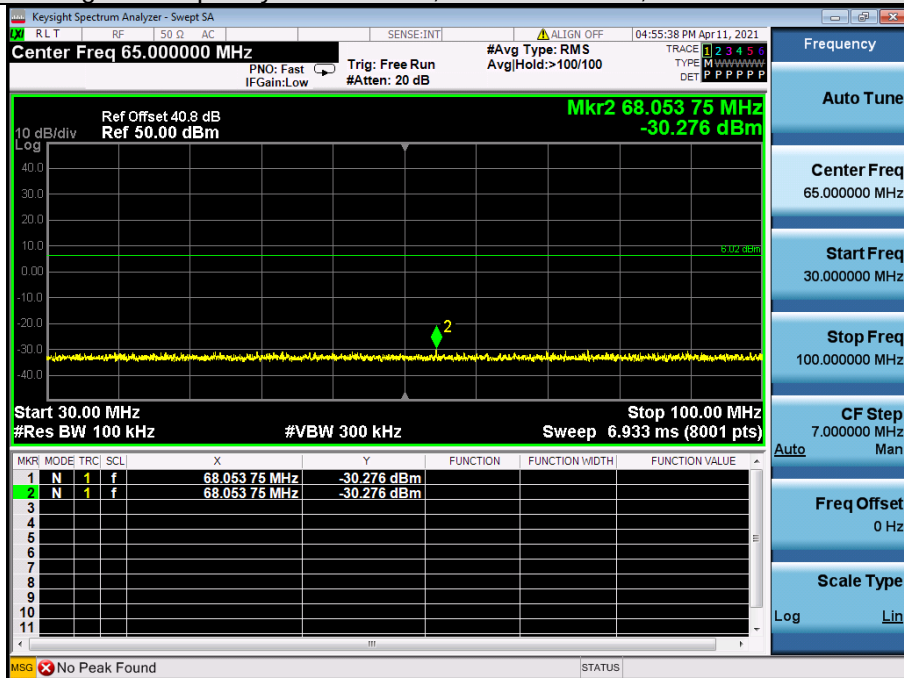
9. Suppression of interference aboard ships



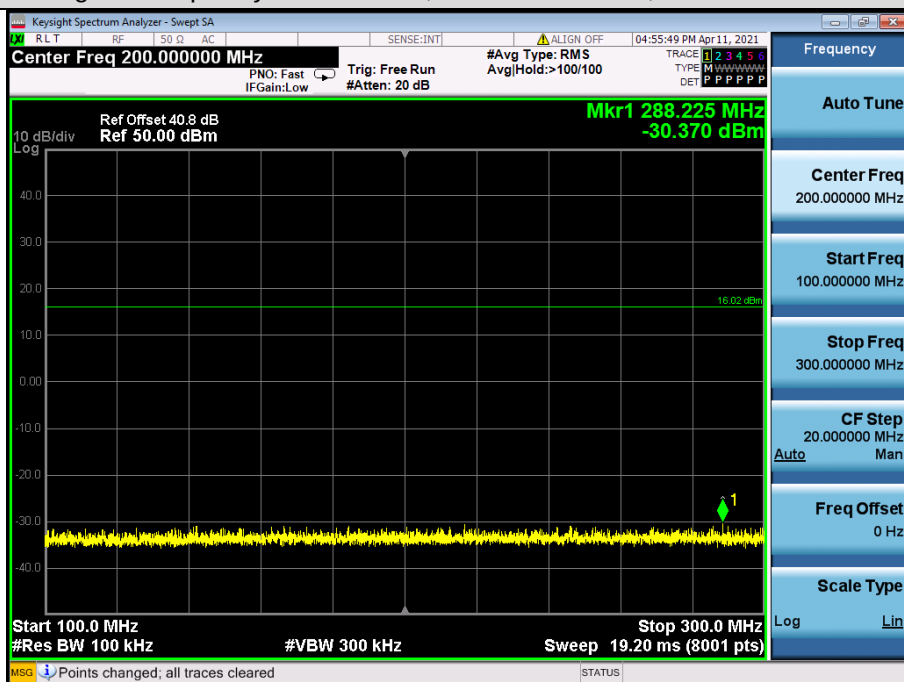
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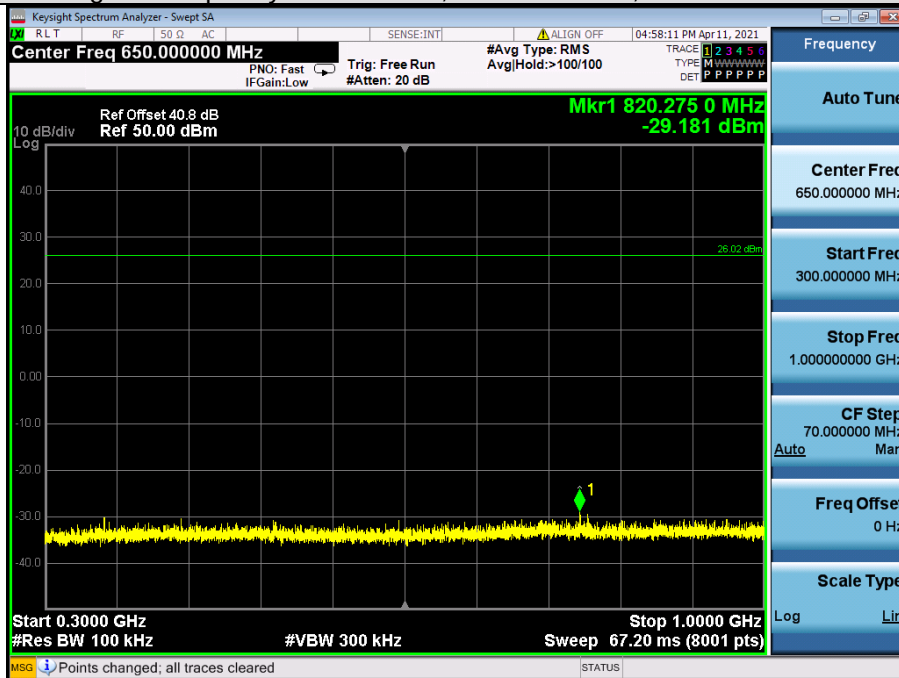
Assigned Frequency:156.525MHz, 30MHz-100MHz, DSC receiver mode



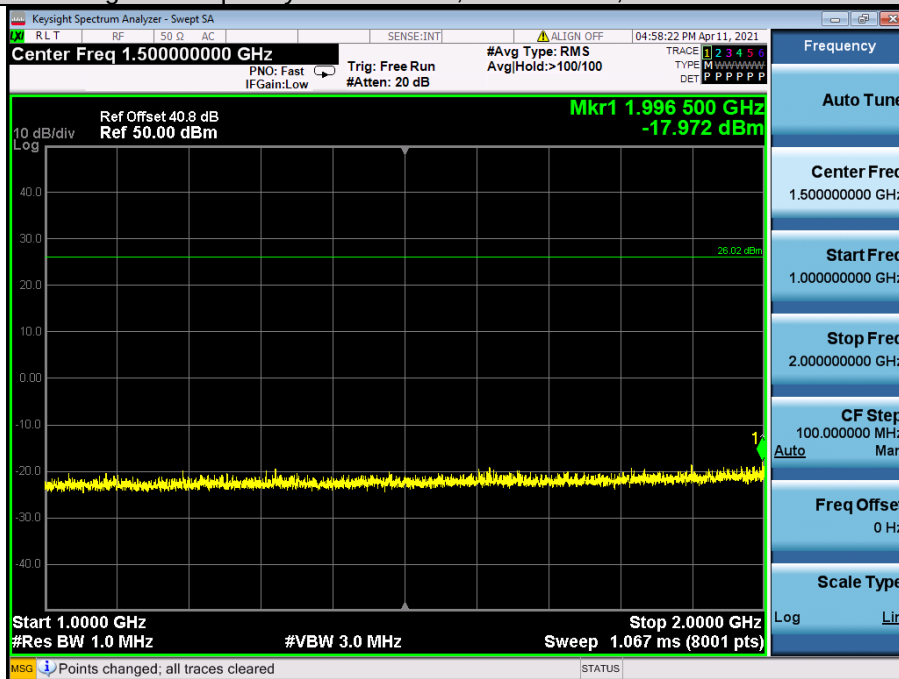
Assigned Frequency:156.525MHz, 100MHz-300MHz, DSC receiver mode



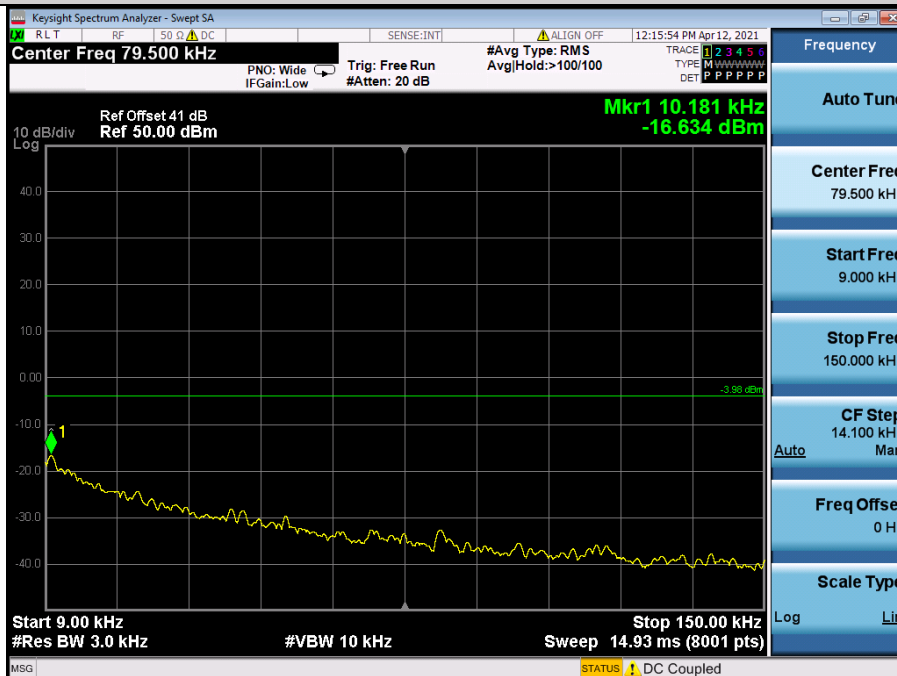
Assigned Frequency:156.525MHz, 300MHz-1GHz, DSC receiver mode



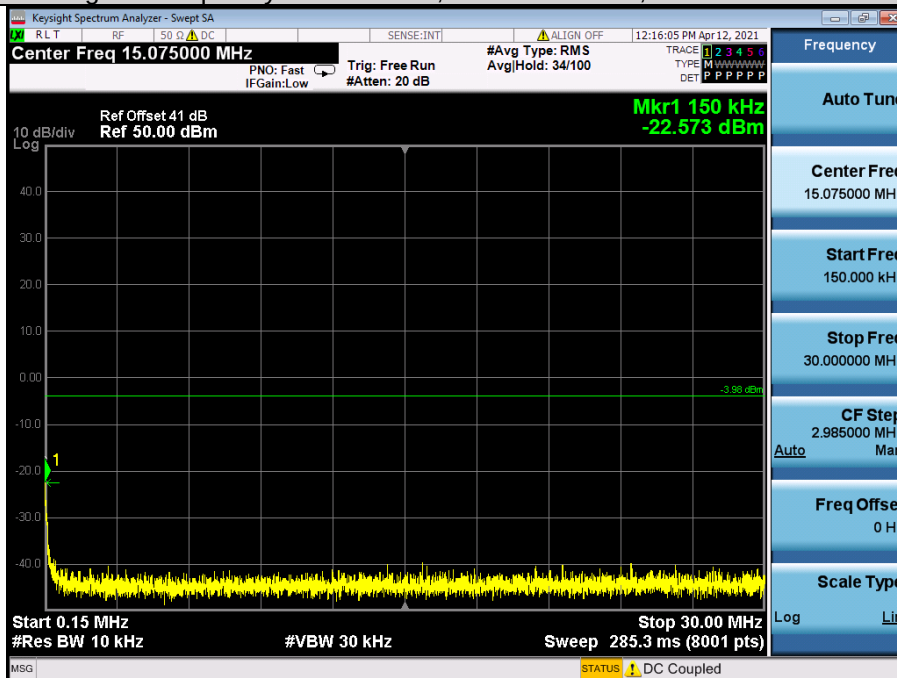
Assigned Frequency:156.525MHz, 1GHz-2GHz, DSC receiver mode



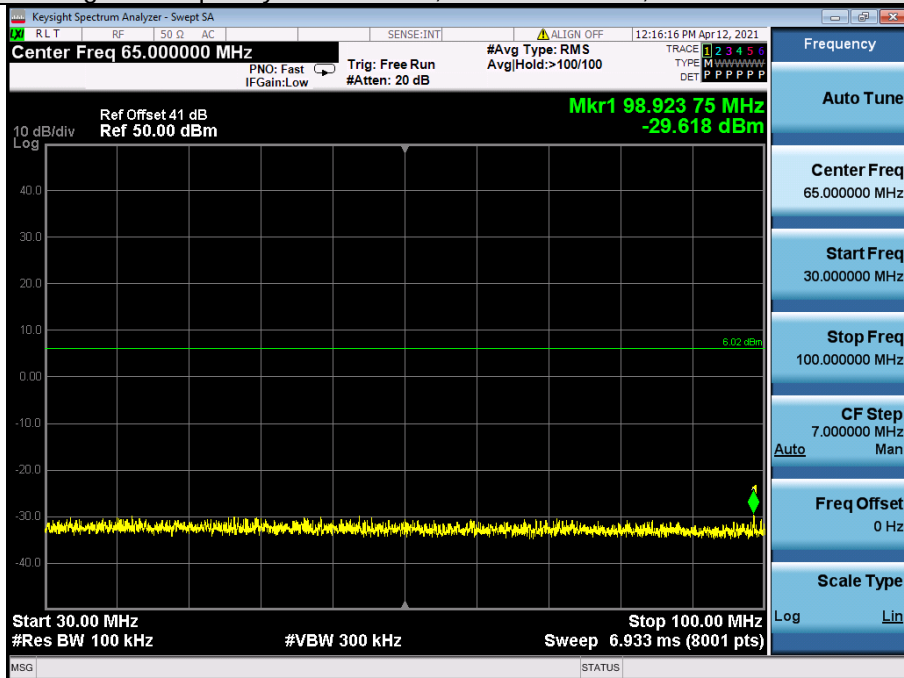
Assigned Frequency:156.025MHz, 9KHz-150KHz, VHF receiver mode



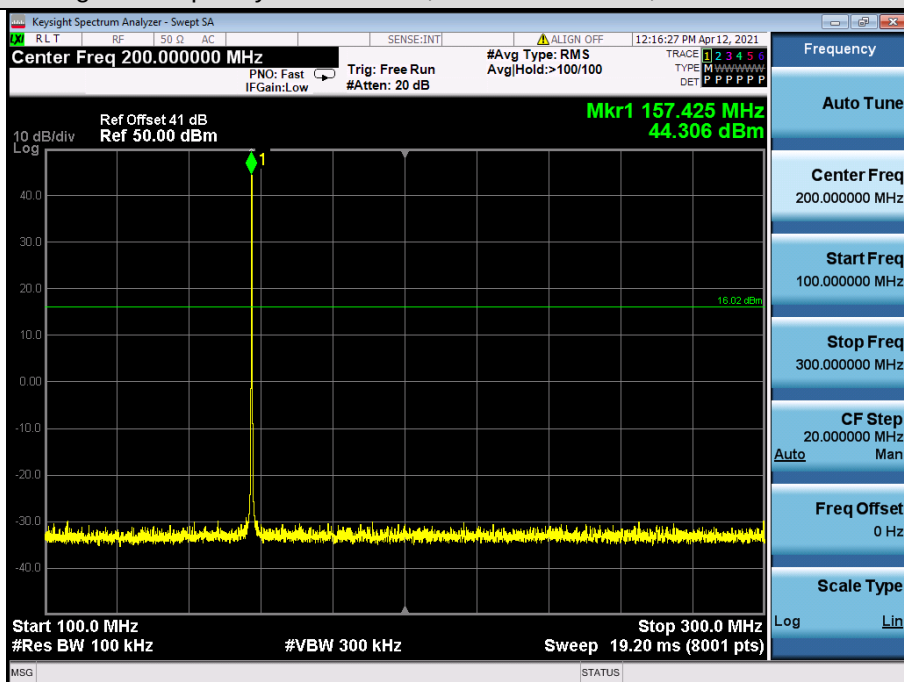
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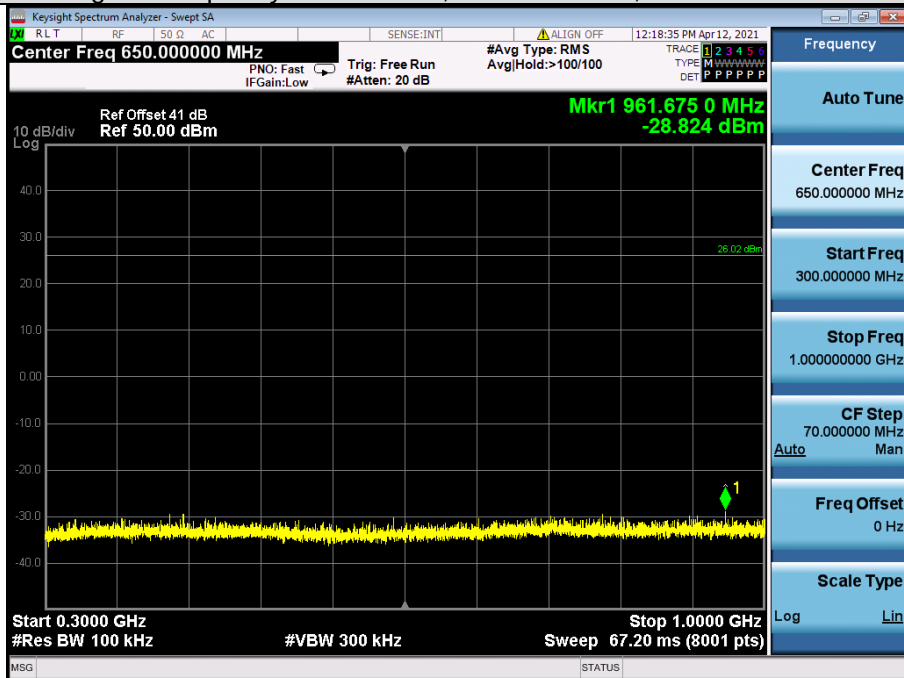
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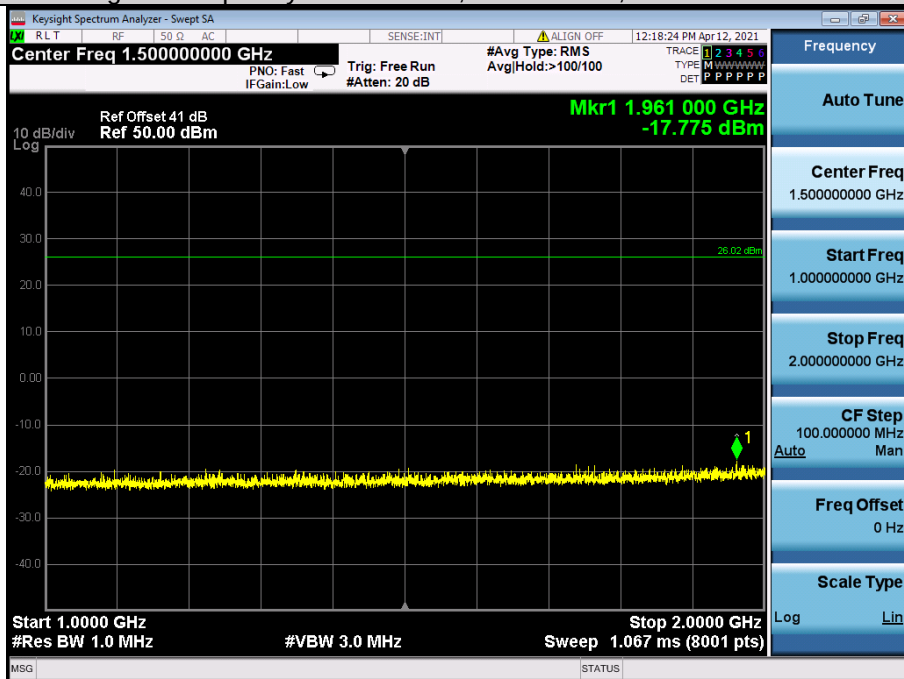
Assigned Frequency:156.025MHz, 100MHz-300MHz, VHF receiver mode



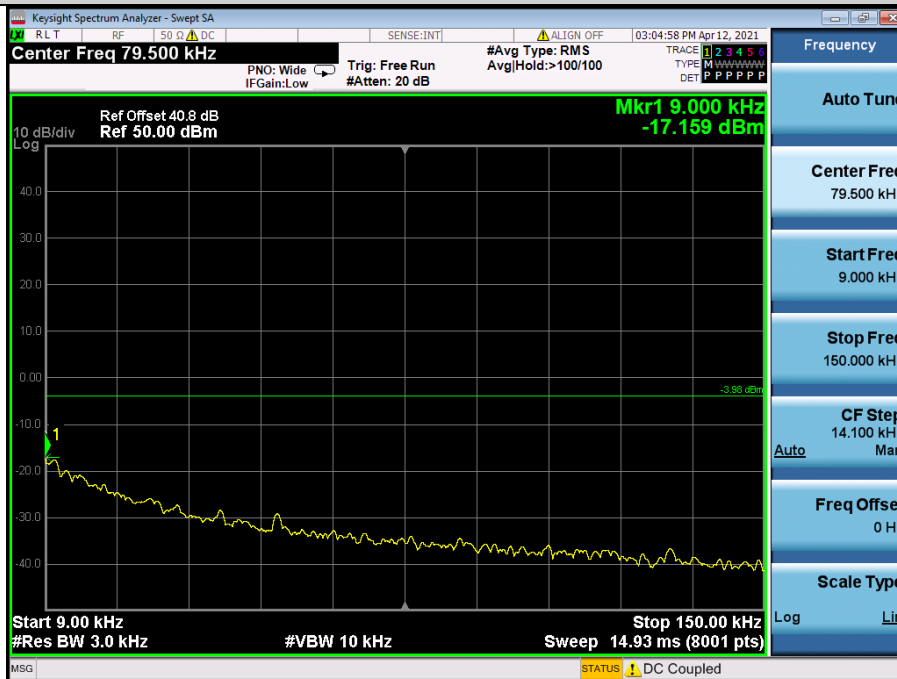
Assigned Frequency:156.025MHz, 300MHz-1GHz, VHF receiver mode



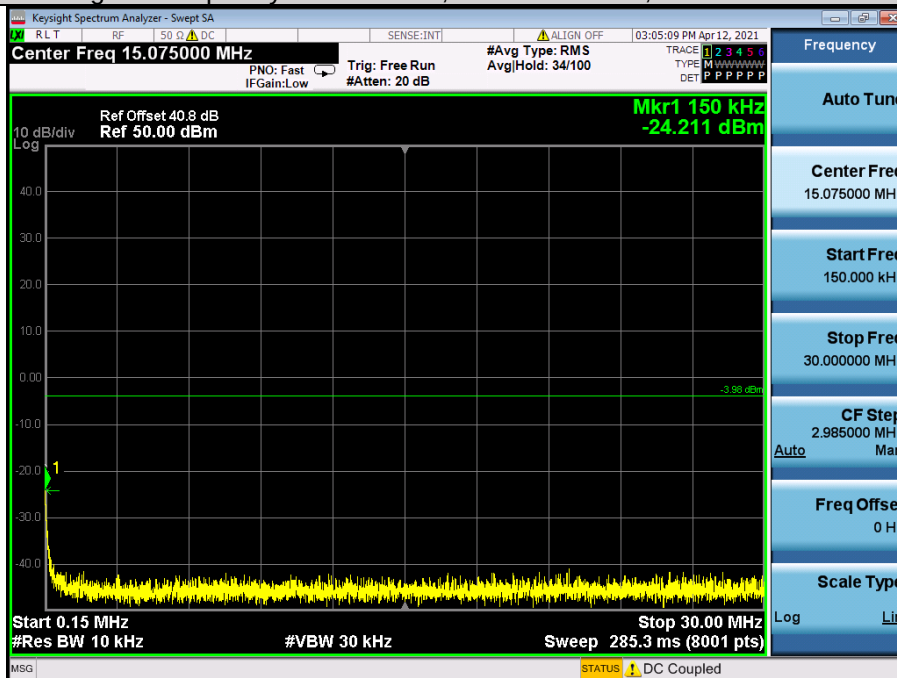
Assigned Frequency:156.025MHz, 1GHz-2GHz, VHF receiver mode



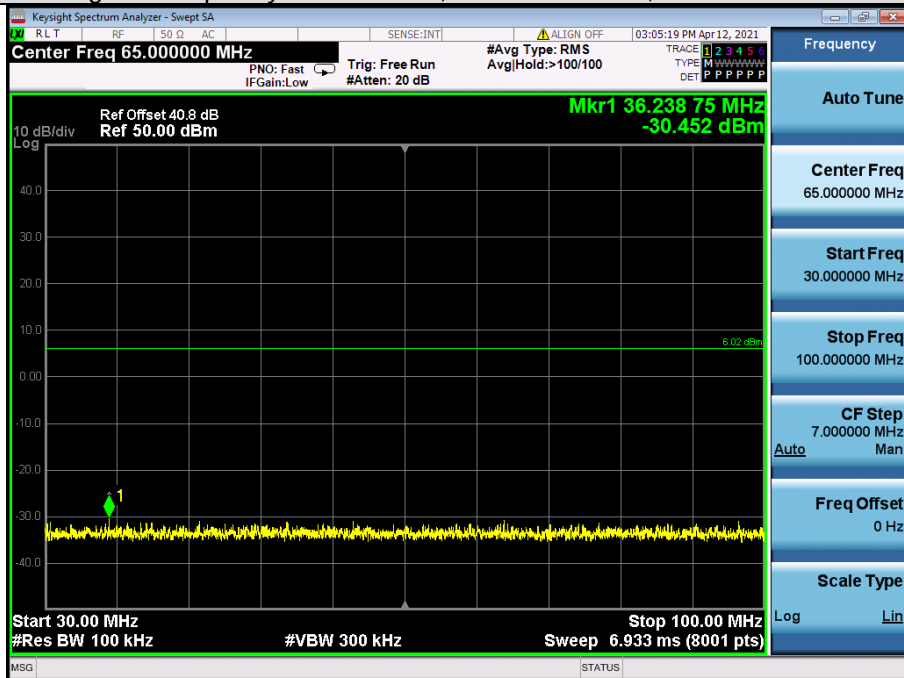
Assigned Frequency:162.025MHz, 9KHz-150KHz, AIS receiver mode



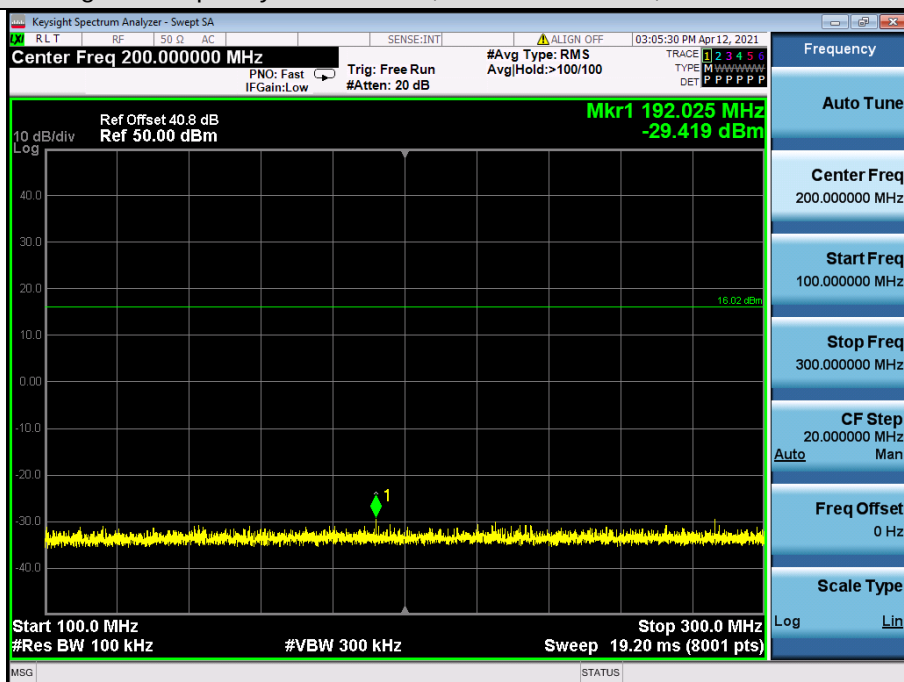
Assigned Frequency:162.025MHz, 150KHz-30MHz, AIS receiver mode



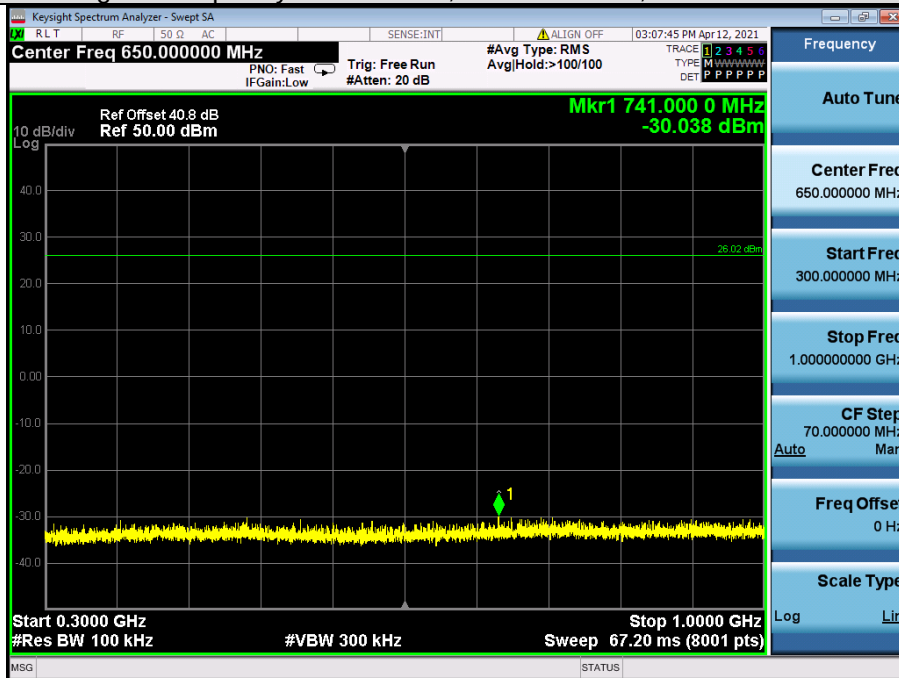
Assigned Frequency:162.025MHz, 30MHz-100MHz, AIS receiver mode



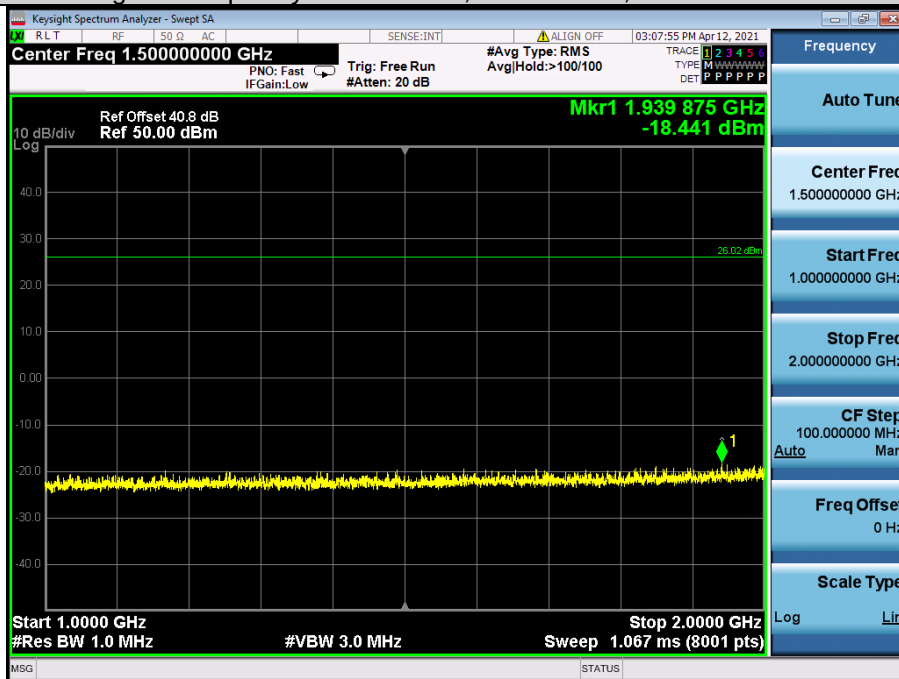
Assigned Frequency:162.025MHz, 100MHz-300MHz, AIS receiver mode



Assigned Frequency:162.025MHz, 300MHz-1GHz, AIS receiver mode



Assigned Frequency:162.025MHz, 1GHz-2GHz, AIS receiver mode





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-End of Report-



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