Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-1W

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
400.025	H	0		pass
800.050	H	-25.22	-20	pass
1200.075	H	-29.19	-20	pass
1600.100	H	-26.69	-20	pass
2000.125	H	-26.89	-20	pass
2400.150	H	-30.72	-20	pass
2800.175	H	-33.01	-20	pass
3200.200	H	-28.57	-20	pass
3600.225	H	-30.10	-20	pass
4000.250	H	-31.73	-20	pass

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
400.025	V	0		pass
800.050	V	-25.58	-20	pass
1200.075	V	-26.10	-20	pass
1600.100	V	-23.47	-20	pass
2000.125	V	-23.89	-20	pass
2400.150	V	-29.39	-20	pass
2800.175	V	-27.42	-20	pass
3200.200	V	-31.21	-20	pass
3600.225	V	-32.48	-20	pass
4000.250	V	-34.79	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 435.025MHz-1W

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
435.025	H	0		pass
870.050	H	-26.45	-20	pass
1305.075	H	-25.68	-20	pass
1740.100	H	-29.44	-20	pass
2175.125	H	-29.03	-20	pass
2610.150	H	-32.86	-20	pass
3045.175	H	-35.01	-20	pass
3480.200	H	-29.22	-20	pass
3915.225	H	-29.53	-20	pass
4350.250	H	-34.81	-20	pass

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
435.025	V	0		pass
870.050	V	-28.29	-20	pass
1305.075	V	-28.33	-20	pass
1740.100	V	-29.41	-20	pass
2175.125	V	-29.86	-20	pass
2610.150	V	-30.56	-20	pass
3045.175	V	-32.30	-20	pass
3480.200	V	-28.76	-20	pass
3915.225	V	-33.05	-20	pass
4350.250	V	-32.18	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-1W

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
454.025	H	0		pass
908.050	H	-26.04	-20	pass
1362.075	H	-27.11	-20	pass
1816.100	H	-28.00	-20	pass
2270.125	H	-28.61	-20	pass
2724.150	H	-28.44	-20	pass
3178.175	H	-31.29	-20	pass
3632.200	H	-27.93	-20	pass
4086.225	H	-30.72	-20	pass
4540.250	H	-32.49	-20	pass

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
454.025	V	0		pass
908.050	V	-27.52	-20	pass
1362.075	V	-24.56	-20	pass
1816.100	V	-29.80	-20	pass
2270.125	V	-28.58	-20	pass
2724.150	V	-32.97	-20	pass
3178.175	V	-34.00	-20	pass
3632.200	V	-27.77	-20	pass
4086.225	V	-28.77	-20	pass
4540.250	V	-34.00	-20	pass

Measurement Result for 12.5 KHz Channel Separation @ 469.975MHz-5W

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
469.975	H	0		pass
939.950	H	-26.41	-20	pass
1409.925	H	-25.23	-20	pass
1879.900	H	-27.68	-20	pass
2349.875	H	-28.02	-20	pass
2819.850	H	-31.64	-20	pass
3289.825	H	-34.35	-20	pass
3759.800	H	-28.51	-20	pass
4229.775	H	-28.02	-20	pass
4699.750	H	-34.18	-20	pass

Emission Frequency (MHz)	Ant.Polarity (H/V)	Measurement Result (dBm)	Limit (dBm)	Result (P/F)
469.975	V	0		pass
939.950	V	-27.06	-20	pass
1409.925	V	-26.43	-20	pass
1879.900	V	-27.95	-20	pass
2349.875	V	-29.10	-20	pass
2819.850	V	-29.38	-20	pass
3289.825	V	-32.47	-20	pass
3759.800	V	-27.86	-20	pass
4229.775	V	-30.95	-20	pass
4699.750	V	-32.79	-20	pass

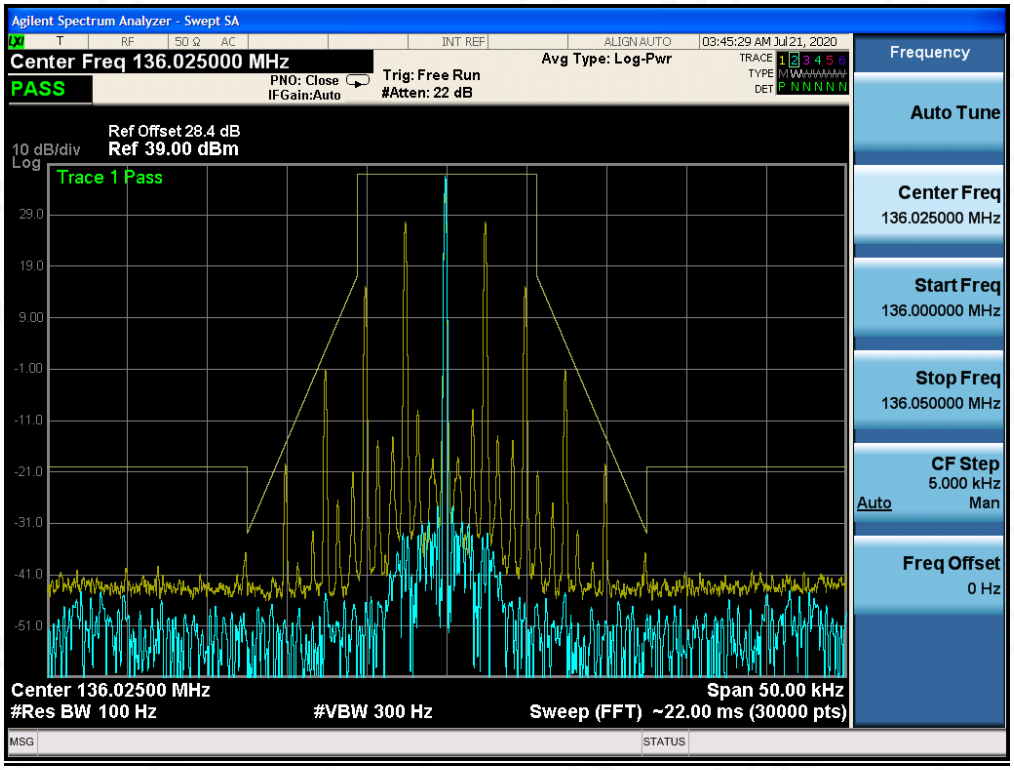
8.5 EMISSION MASK PLOT

The detailed procedure employed for Emission Mask measurements are specified as following:

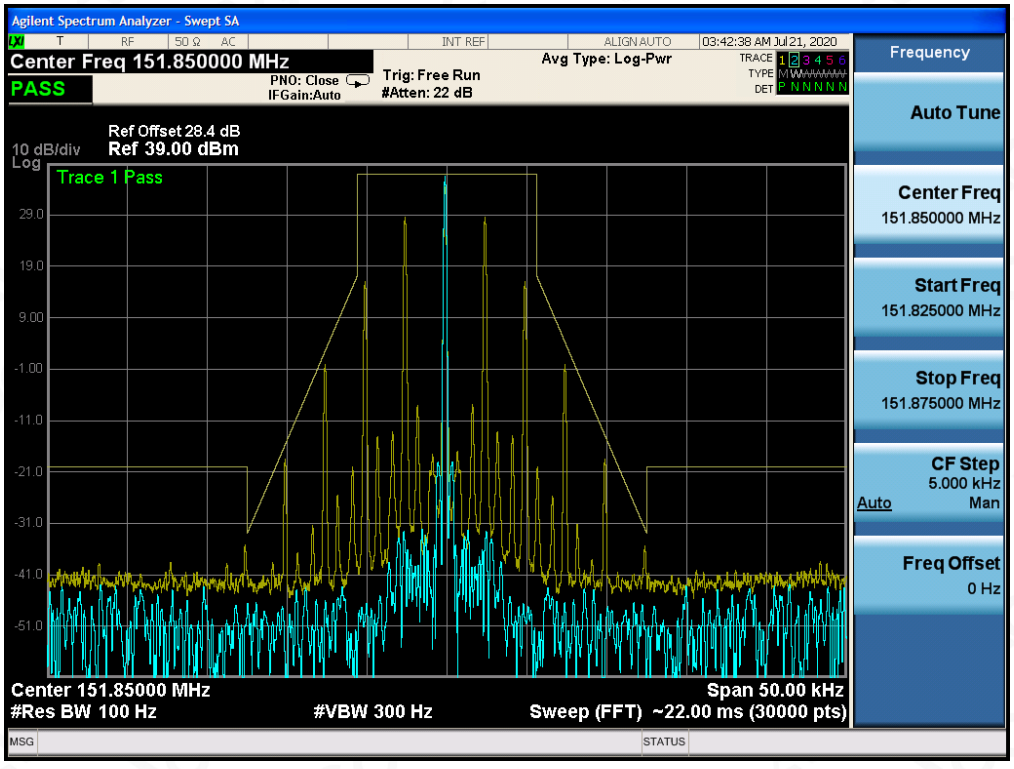
- The transmitter shall be modulated by a 2.5 kHz audio signal,
- The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz.

VHF:

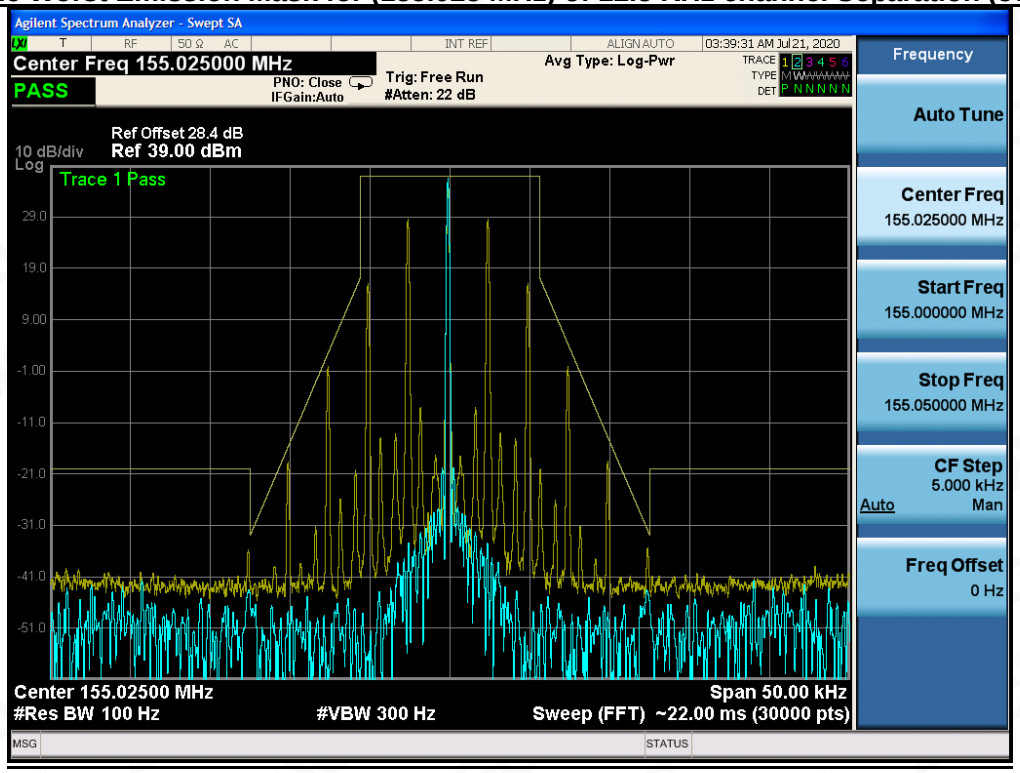
The Worst Emission Mask for (136.025 MHz) of 12.5 KHz channel Separation (5W)



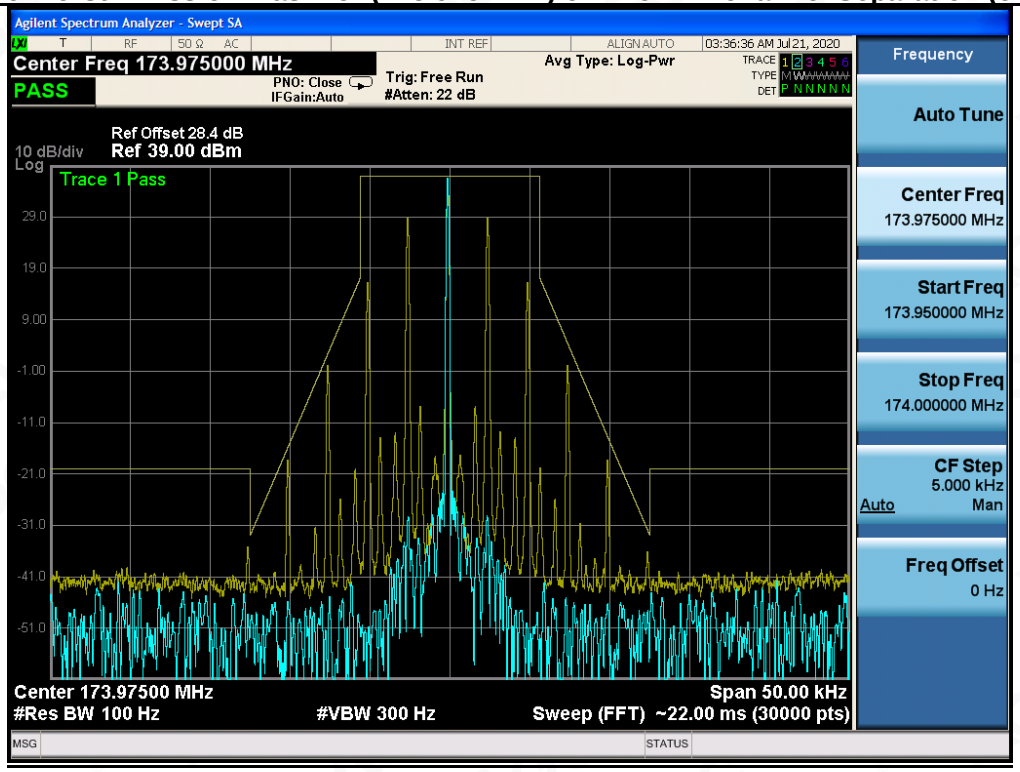
The Worst Emission Mask for (151.850 MHz) of 12.5 KHz channel Separation (5W)



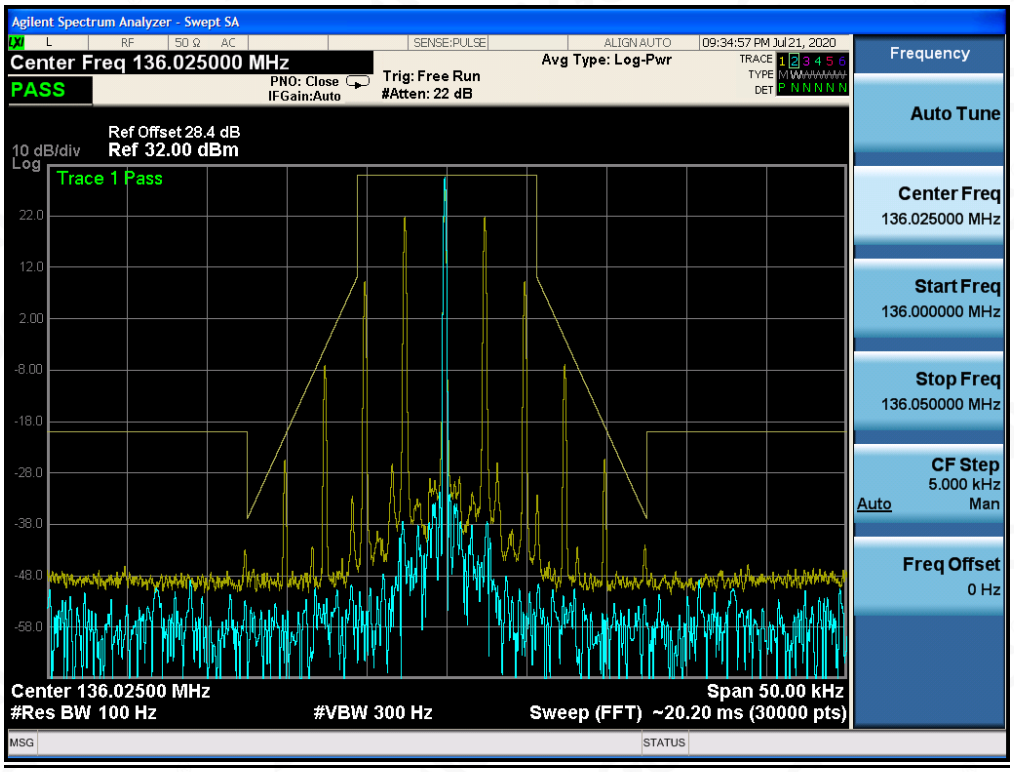
The Worst Emission Mask for (155.025 MHz) of 12.5 KHz channel Separation (5W)



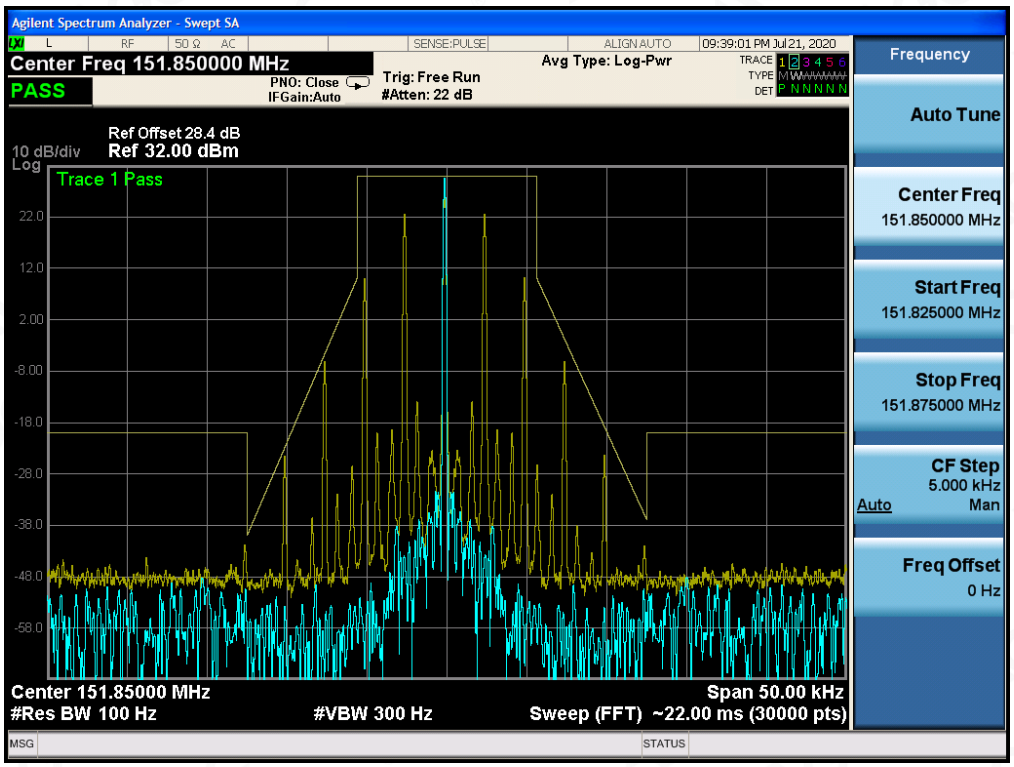
The Worst Emission Mask for (173.975 MHz) of 12.5 KHz channel Separation (5W)



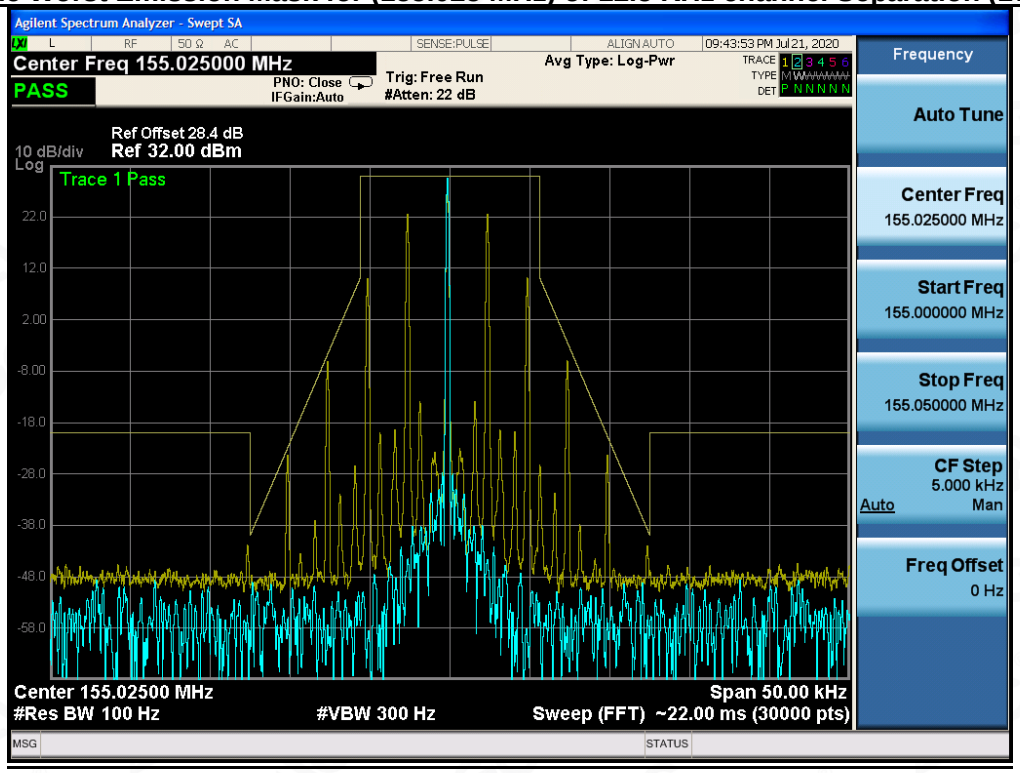
The Worst Emission Mask for (136.025 MHz) of 12.5 KHz channel Separation (1W)



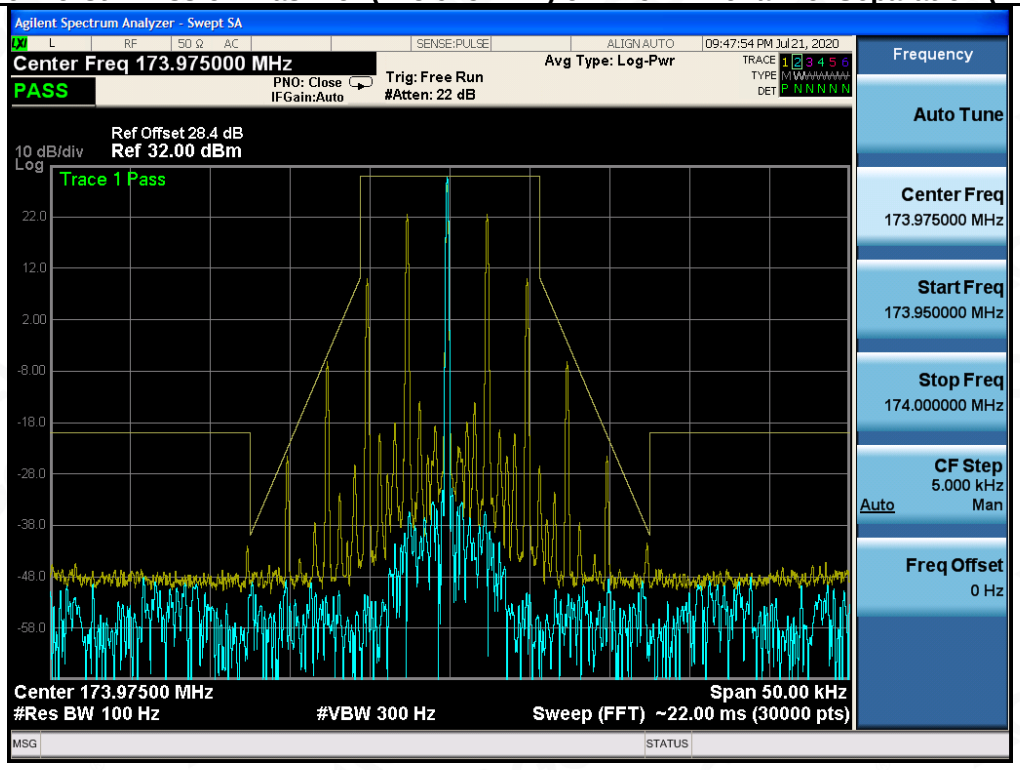
The Worst Emission Mask for (151.850 MHz) of 12.5 KHz channel Separation (1W)



The Worst Emission Mask for (155.025 MHz) of 12.5 KHz channel Separation (1W)

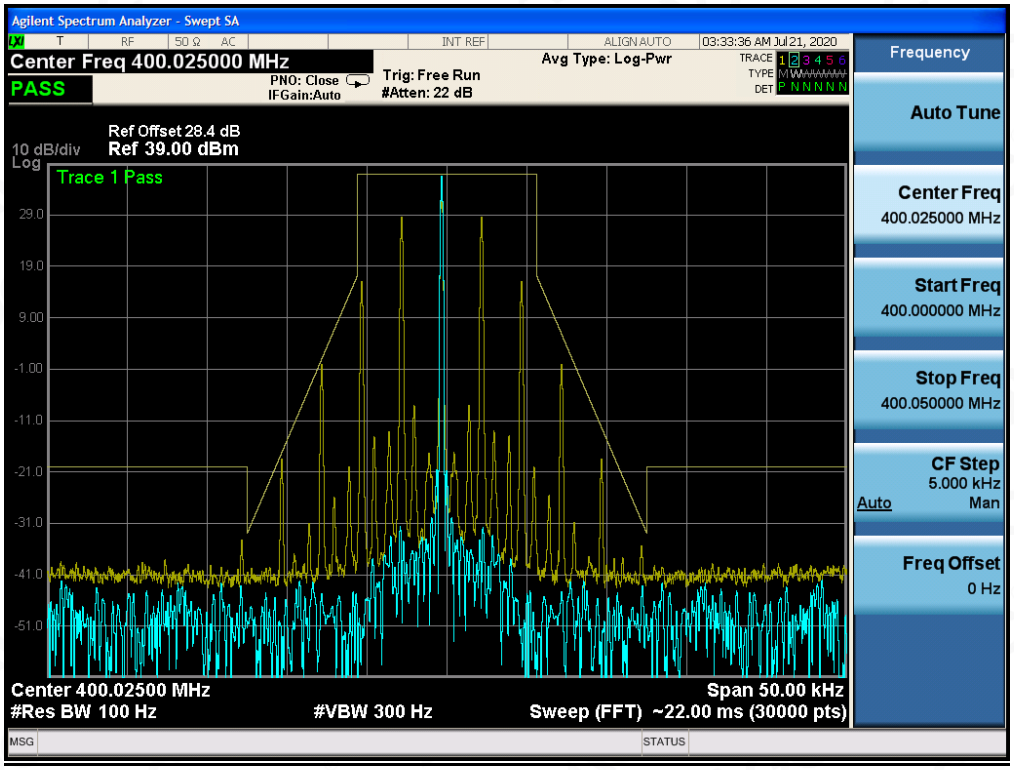


The Worst Emission Mask for (173.975 MHz) of 12.5 KHz channel Separation (1W)

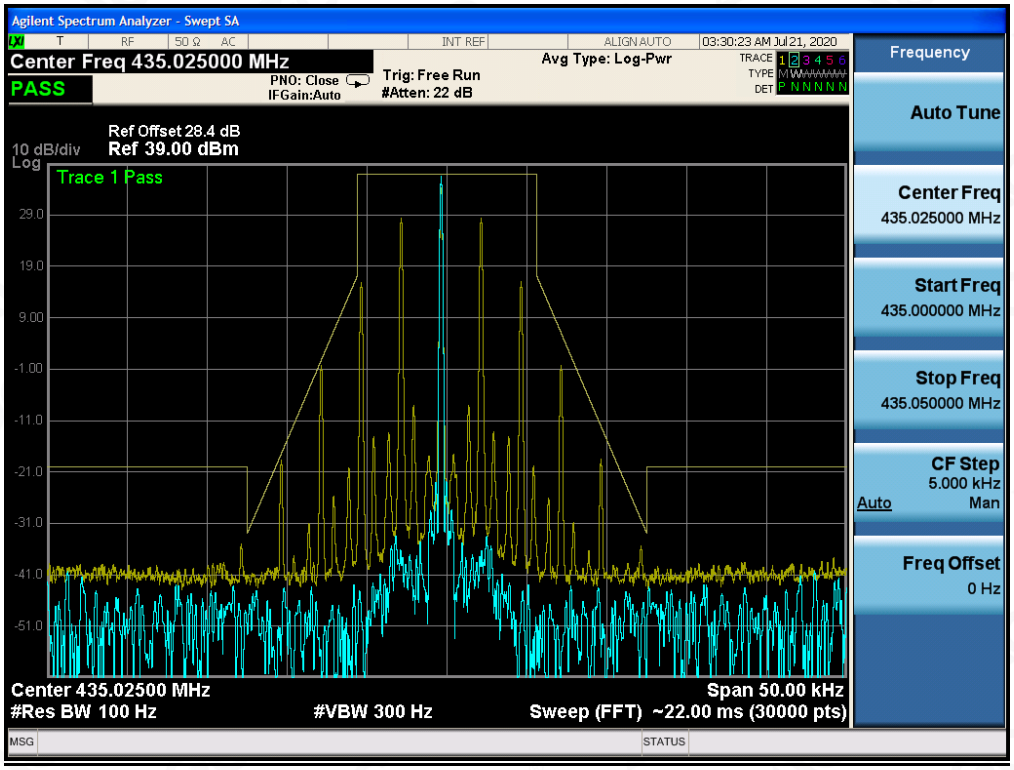


UHF:

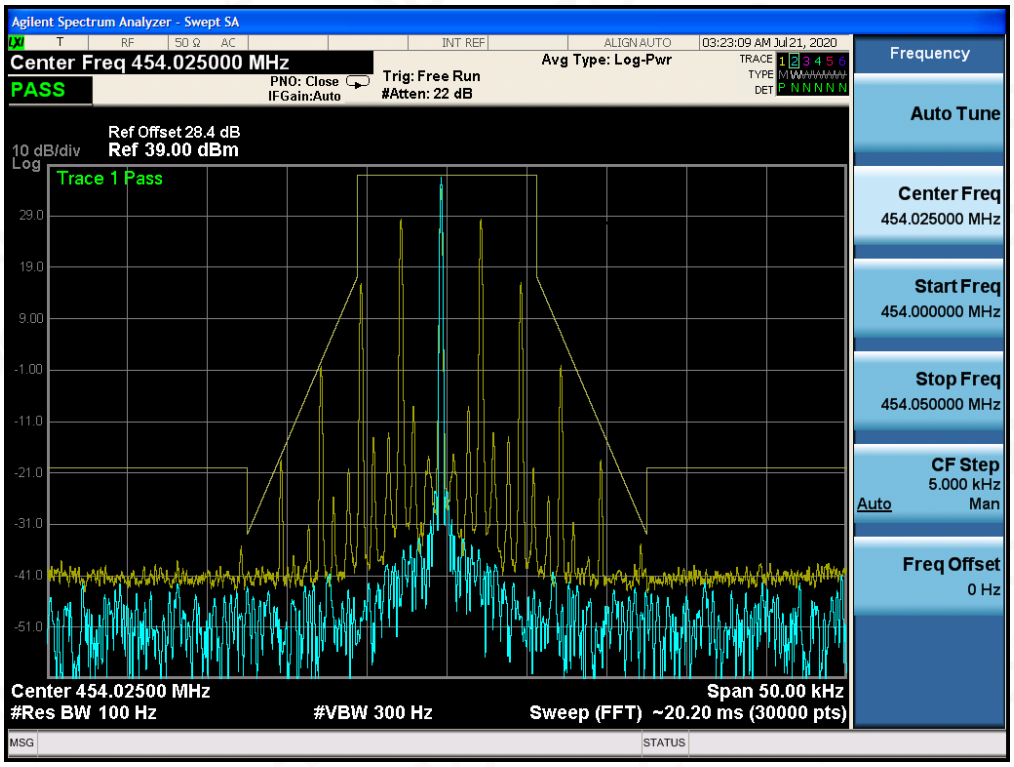
The Worst Emission Mask for (400.025 MHz) of 12.5 KHz channel Separation (5W)



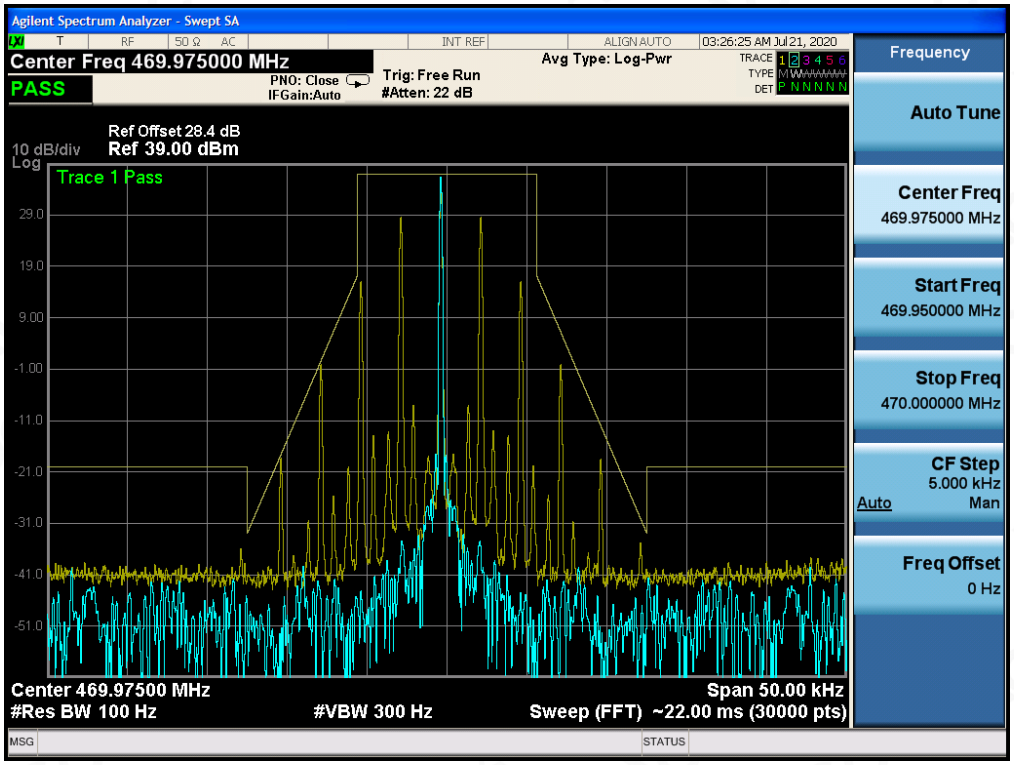
The Worst Emission Mask for (435.025 MHz) of 12.5 KHz channel Separation (5W)



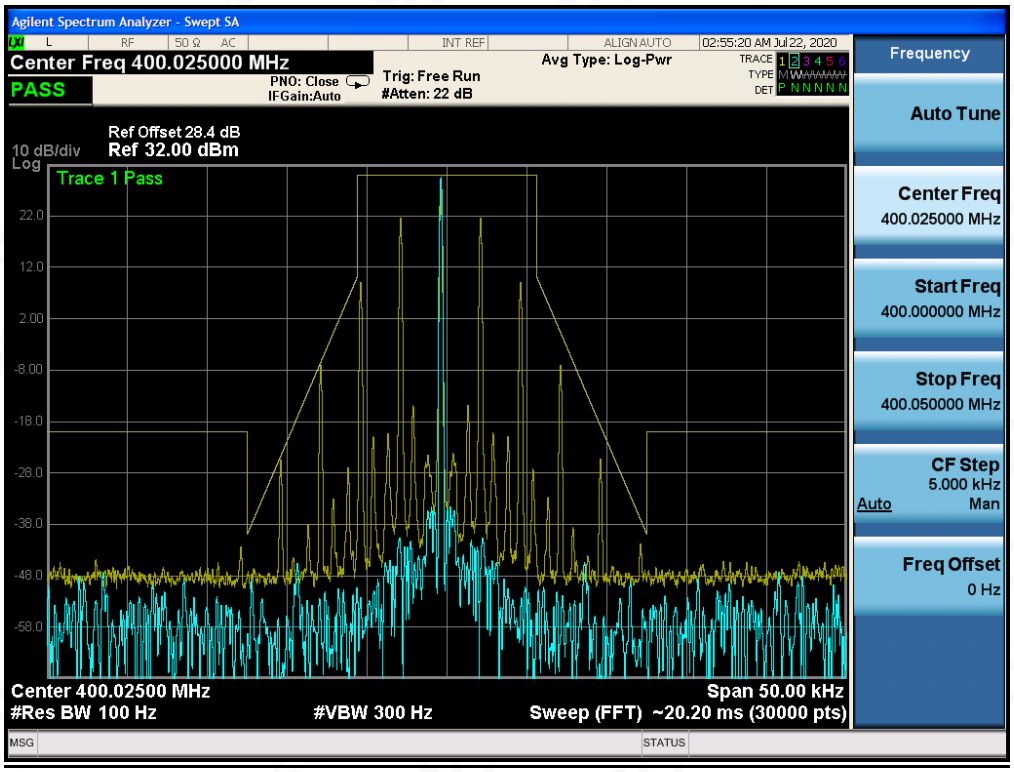
The Worst Emission Mask for (454.025 MHz) of 12.5 KHz channel Separation (5W)



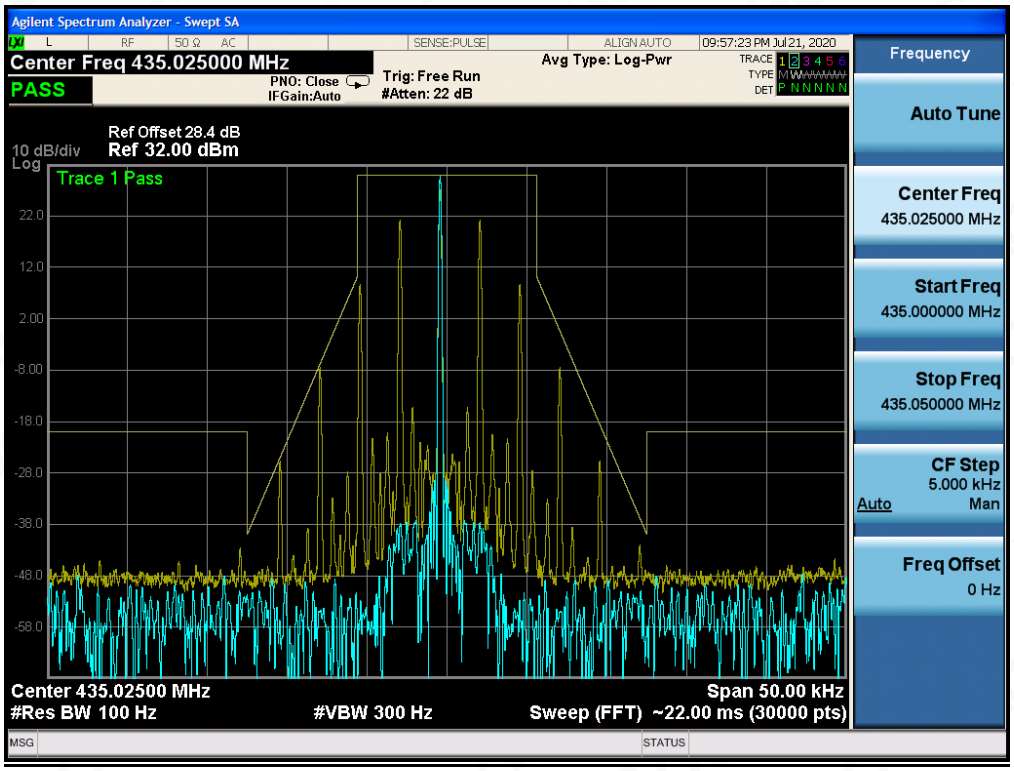
The Worst Emission Mask for (469.975 MHz) of 12.5 KHz channel Separation (5W)



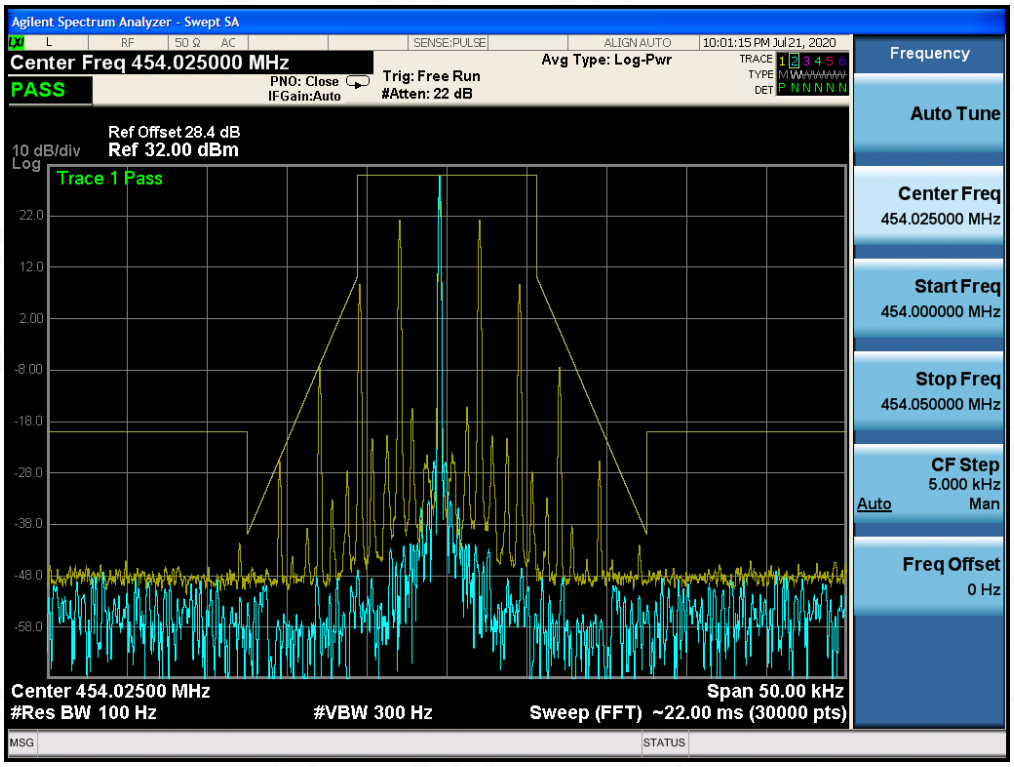
The Worst Emission Mask for (400.025 MHz) of 12.5 KHz channel Separation (1W)



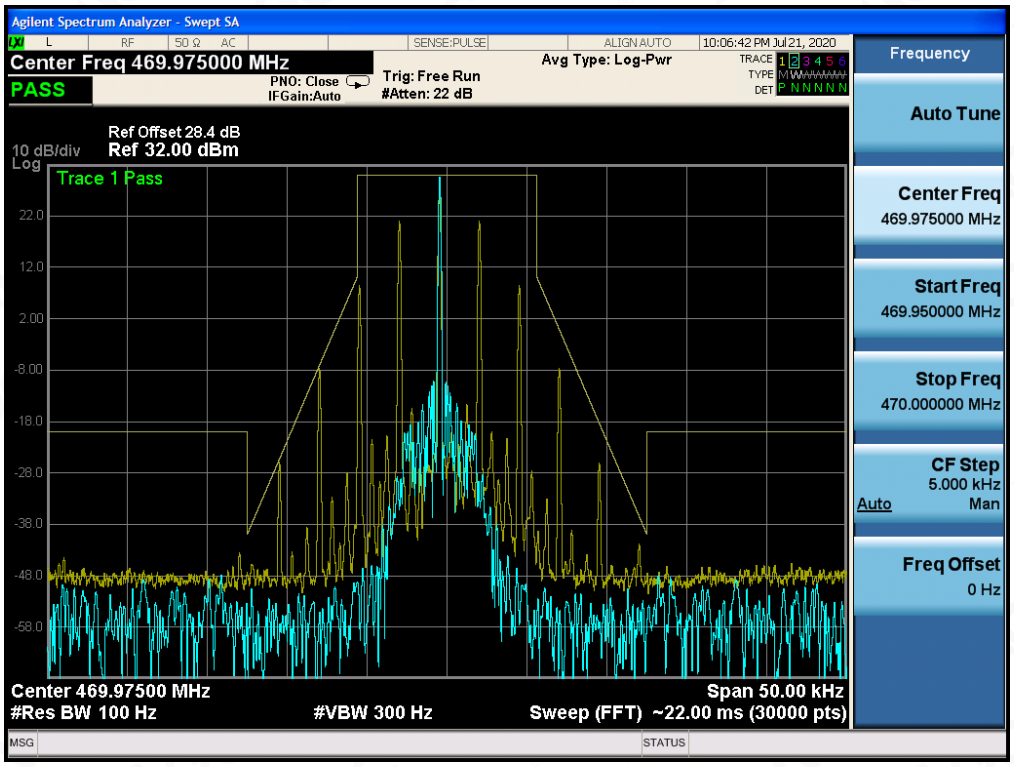
The Worst Emission Mask for (435.025 MHz) of 12.5 KHz channel Separation (1W)



The Worst Emission Mask for (454.025 MHz) of 12.5 KHz channel Separation (1W)



The Worst Emission Mask for (469.975 MHz) of 12.5 KHz channel Separation (1W)



9.MODULATION CHARACTERISTICS

9.1 PROVISIONS APPLICABLE

According to FCC§2.1047 and §90.207, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

9.2 MEASUREMENT METHOD

9.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

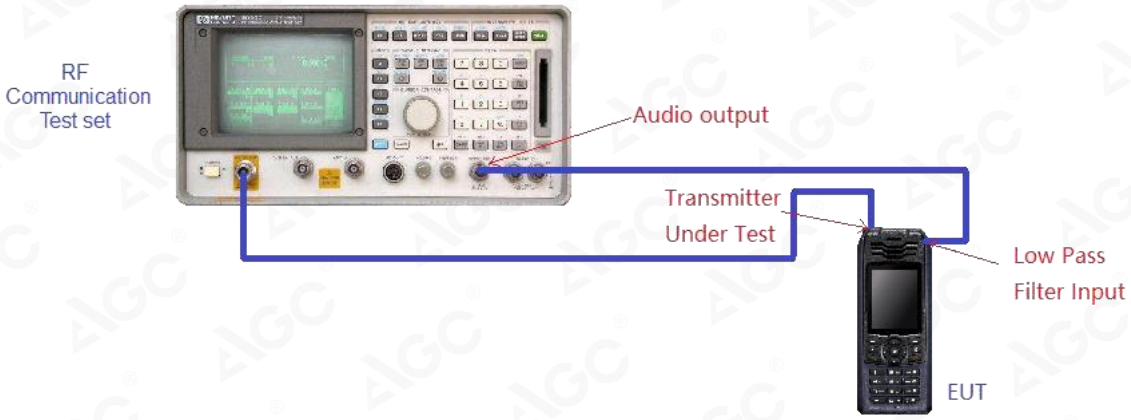
9.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0 dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).



9.3 MEASUREMENT RESULT

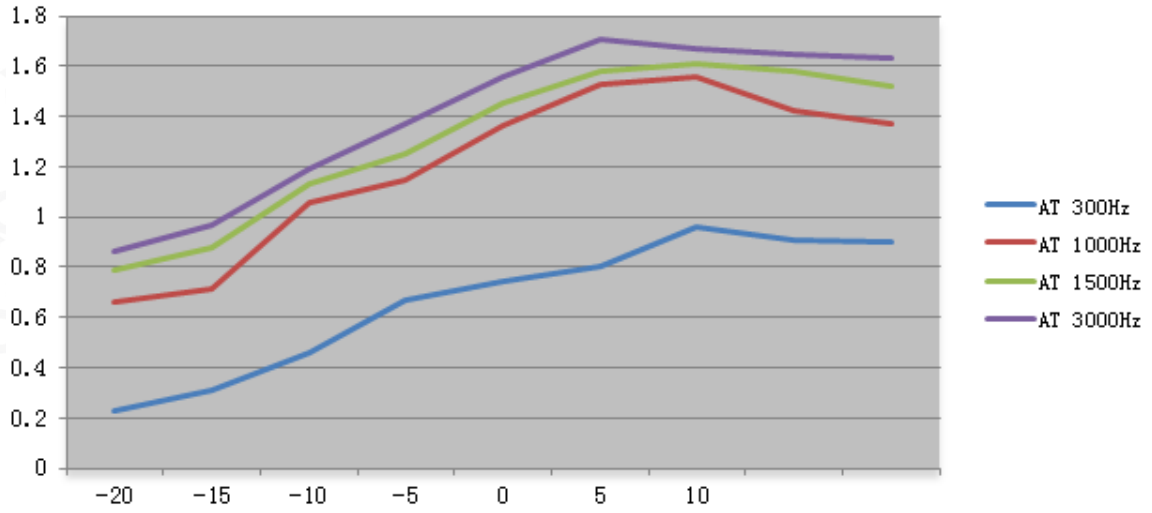
VHF:

TEST RESULT TS FOR 5W

(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.23	0.66	0.79	0.86
-15	0.31	0.71	0.88	0.97
-10	0.46	1.06	1.13	1.19
-5	0.67	1.15	1.25	1.37
0	0.74	1.36	1.45	1.56
+5	0.8	1.53	1.58	1.71
+10	0.96	1.56	1.61	1.67
+15	0.91	1.42	1.58	1.65
+20	0.9	1.37	1.52	1.63



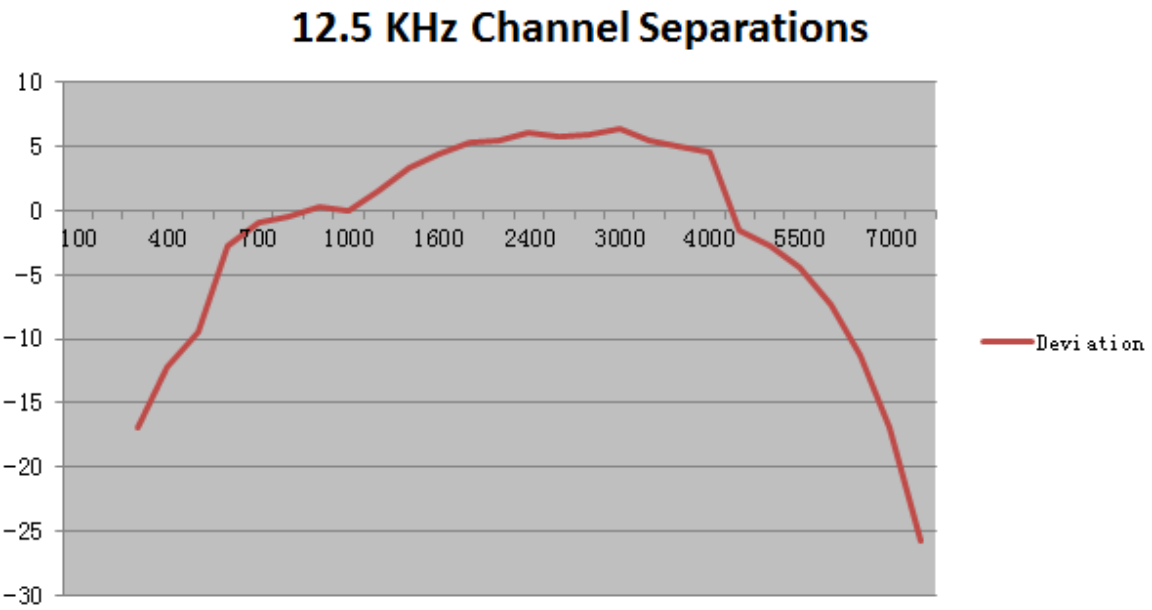
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Bottom Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.11	-16.90
400	0.19	-12.15
500	0.26	-9.43
600	0.56	-2.77
700	0.69	-0.95
800	0.73	-0.46
900	0.79	0.22
1000	0.77	0.00
1200	0.92	1.55
1400	1.13	3.33
1600	1.27	4.35
1800	1.42	5.32
2000	1.45	5.50
2400	1.55	6.08
2500	1.49	5.73
2800	1.53	5.96
3000	1.61	6.41
3200	1.44	5.44
3600	1.38	5.07
4000	1.29	4.48
4500	0.64	-1.61
5000	0.56	-2.77
5500	0.46	-4.47
6000	0.33	-7.36
6500	0.21	-11.29
7000	0.11	-16.90
7500	0.04	-25.69
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel

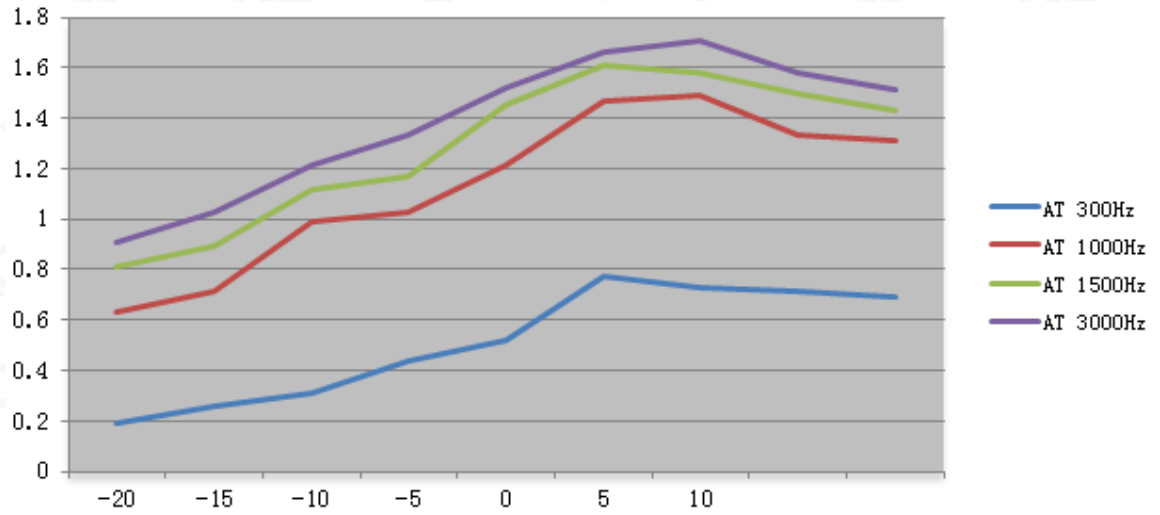


Note: All the modes had been tested, but only the worst data recorded in the report.

UHF:
TEST RESULT TS FOR 5W
(A). MODULATION LIMIT:

Bottom Channel @ 12.5 KHz Channel Separations

Modulation Level (dB)	Peak Freq. Deviation At 300 Hz	Peak Freq. Deviation At 1000 Hz	Peak Freq. Deviation At 1500 Hz	Peak Freq. Deviation At 3000 Hz
-20	0.19	0.63	0.81	0.91
-15	0.26	0.71	0.89	1.03
-10	0.31	0.99	1.12	1.21
-5	0.44	1.03	1.17	1.33
0	0.52	1.21	1.45	1.52
+5	0.77	1.47	1.61	1.66
+10	0.73	1.49	1.58	1.71
+15	0.71	1.33	1.50	1.58
+20	0.69	1.31	1.43	1.51



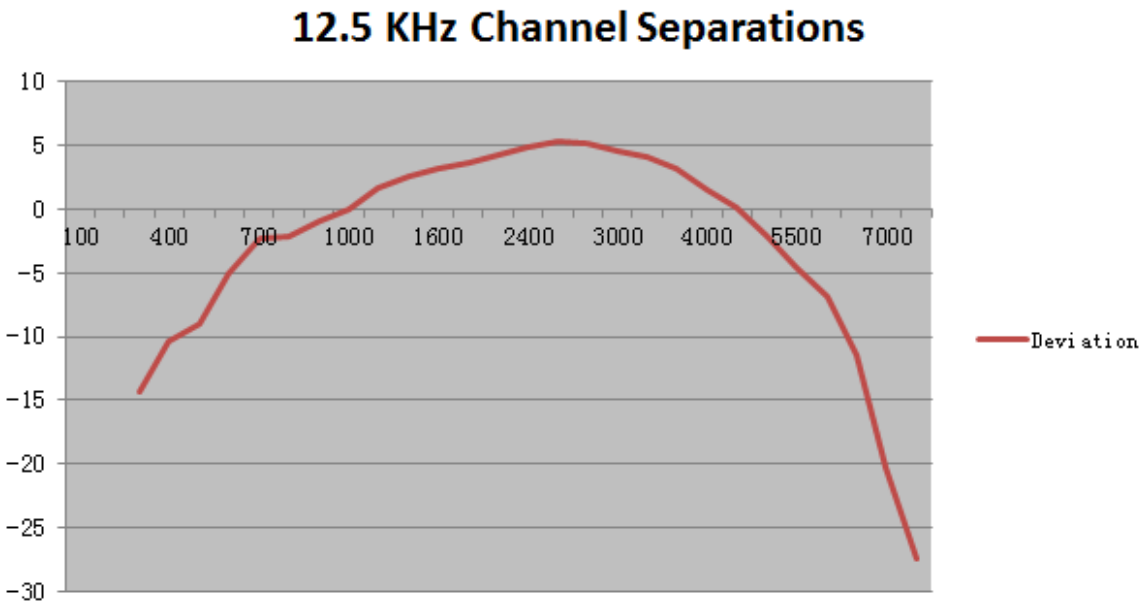
Note: All the modes had been tested, but only the worst data recorded in the report.

(B). AUDIO FREQUENCY RESPONSE:

Bottom Channel @ 12.5 KHz Channel Separations

Frequency (Hz)	Deviation (KHz)	Audio Frequency Response(dB)
100	--	--
200	--	--
300	0.18	-14.26
400	0.28	-10.43
500	0.33	-9.00
600	0.52	-5.05
700	0.71	-2.34
800	0.73	-2.10
900	0.83	-0.99
1000	0.93	0.00
1200	1.12	1.61
1400	1.25	2.57
1600	1.33	3.11
1800	1.4	3.55
2000	1.52	4.27
2400	1.61	4.77
2500	1.71	5.29
2800	1.69	5.19
3000	1.58	4.60
3200	1.49	4.09
3600	1.35	3.24
4000	1.11	1.54
4500	0.94	0.09
5000	0.73	-2.10
5500	0.55	-4.56
6000	0.42	-6.90
6500	0.25	-11.41
7000	0.09	-20.28
7500	0.04	-27.33
9000	--	--
10000	--	--
14000	--	--
18000	--	--
20000	--	--
30000	--	--

Frequency Response of High Channel



Note: All the modes had been tested, but only the worst data recorded in the report.

10.MAXIMUMN TRANSMITTER POWER (CONDUCTED OUTPUT POWER) PEAK POWER

10.1 PROVISIONS APPLICABLE

Per FCC §2.1046 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

10.2 TEST PROCEDURE

The RF output of Two-way Radio was conducted to a spectrum analyzer through an appropriate attenuator.

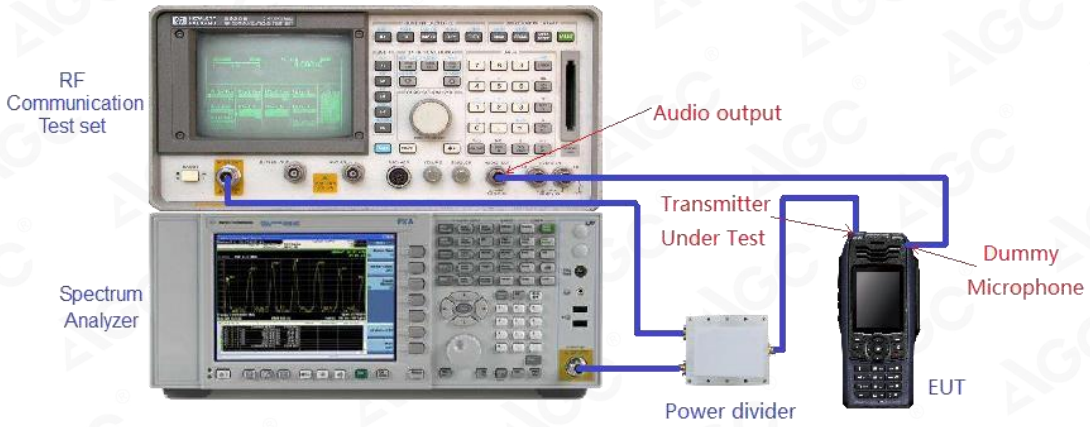
In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The "Read Value" is the spectrum reading of maximum power value.

The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.

EIRP = "Read Value" + Measured substitution value + 2.15.

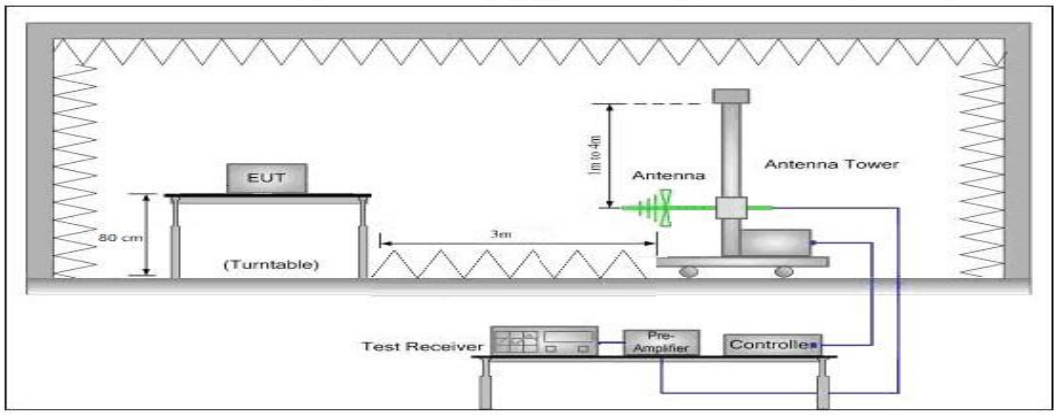
10.3 TEST CONFIGURATION

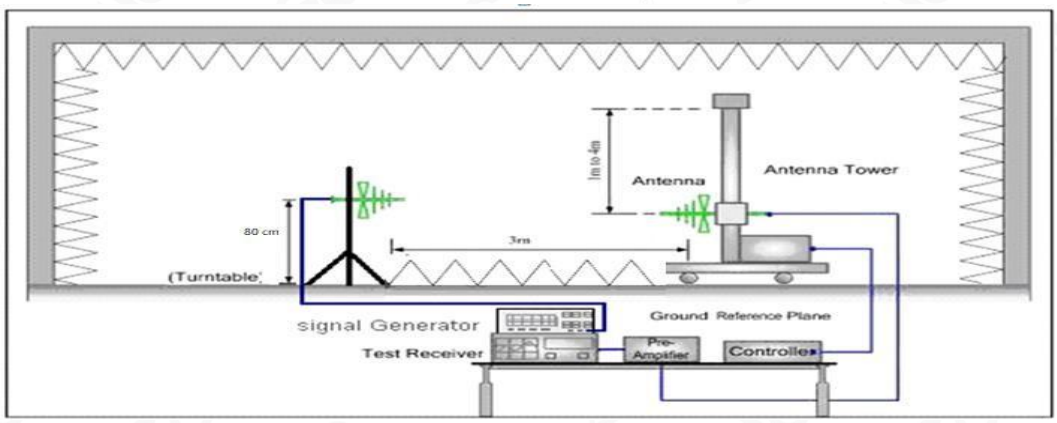
Conducted Output Power:



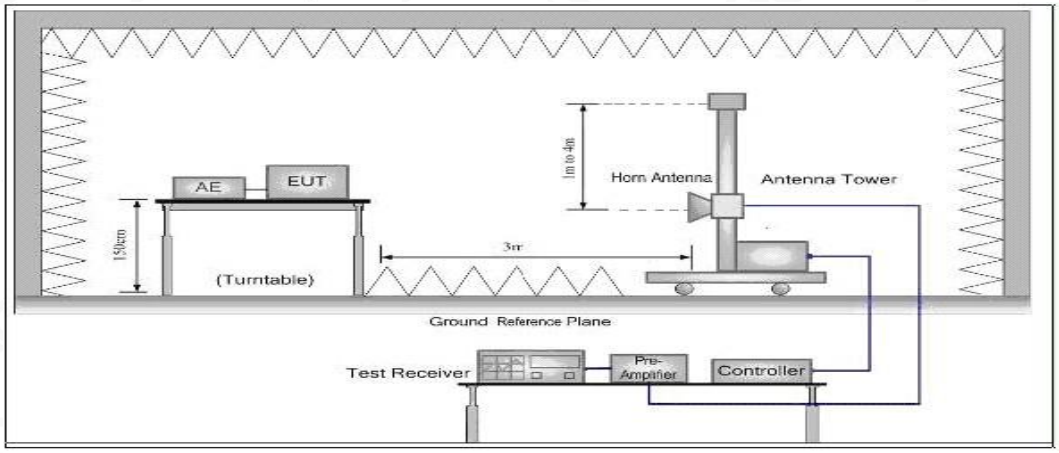
Effective Radiated Power

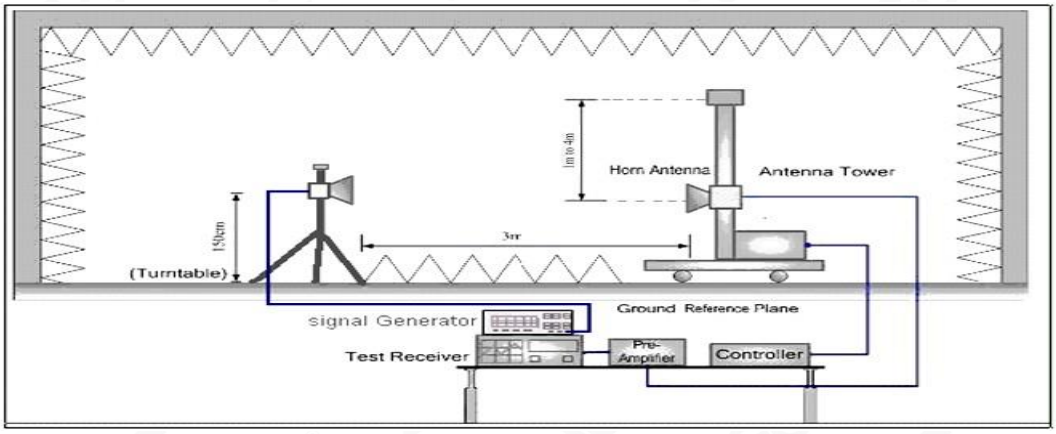
Radiated Below1GHz





Radiated Above 1 GHz





10.4 TEST RESULT

The maximum Conducted Power (CP) for UHF is

Analog: 5W/1W for 12.5 KHz Channel Separation VHF

Analog: 5W/1W for 12.5 KHz Channel Separation UHF

Calculation Formula: CP = R + A + L

Note:

CP: The final Conducted Power

R : The reading value from spectrum analyzer

A : The attenuation value of the used attenuator

L : The loss of all connection cables

VHF:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(136.025MHz)	36.22
	Middle(151.850MHz)	36.42
	Middle (155.025MHz)	**36.43**
	Top(173.975MHz)	36.22

Radiated Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(136.025MHz)	36.19
	Middle(151.850MHz)	36.22
	Middle (155.025MHz)	36.31
	Top(173.975MHz)	36.20

Conducted Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30.00dBm(1W)
12.5 KHz	Bottom(136.025MHz)	29.94
	Middle(151.850MHz)	29.87
	Middle (155.025MHz)	29.89
	Top(173.975MHz)	29.90

Radiated Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30.0dBm(1W)
12.5 KHz	Bottom(136.025MHz)	29.63
	Middle(151.850MHz)	29.52
	Middle (155.025MHz)	29.47
	Top(173.975MHz)	29.58

UHF:

Conducted Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	35.63
	Middle(435.025MHz)	35.61
	Middle (454.025MHz)	35.70
	Top(469.975Hz)	**35.71**

Radiated Power Measurement Results-5W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 36.99dBm(5W)
12.5 KHz	Bottom(400.025MHz)	35.40
	Middle(435.025MHz)	35.44
	Middle (454.025MHz)	35.59
	Top(469.975Hz)	35.52

Conducted Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30.00dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.91
	Middle(435.025MHz)	29.88
	Middle (454.025MHz)	29.85
	Top(469.975Hz)	29.89

Radiated Power Measurement Results-1W		
Channel Separation	**Channel**	**Measurement Result (dBm)**
		For 30.00dBm(1W)
12.5 KHz	Bottom(400.025MHz)	29.68
	Middle(435.025MHz)	29.53
	Middle (454.025MHz)	29.64
	Top(469.975Hz)	26.65

11.SPURIOUS EMISSION ON ANTENNA PORT

11.1 PROVISIONS APPLICABLE

Please refer to FCC 47 CFR 2.1051, 2.1057 & 90.210 for specification details.
Emissions shall be attenuated below the mean output power of the transmitter as follows:

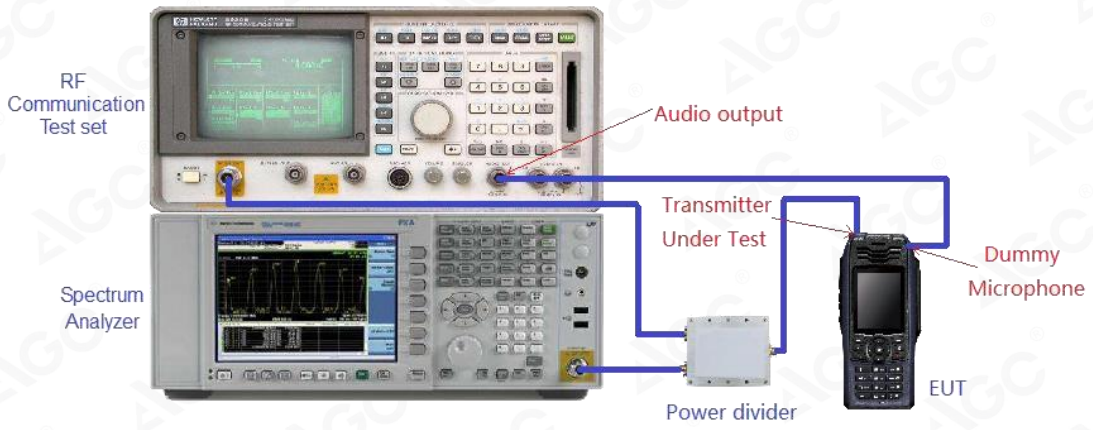
FCC Rules	Attenuation Limit (dBc)
§ 90.210	At least 50 + 10 log (P) dB

50 +10 log (Pwatts)
Note: In general, the worse case attenuation requirement shown above was applied.
Calculation: Limit (dBm) =EL-50-10log10 (TP)
EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm)
Limit (dBm) = P(dBm)-50-10 log (Pwatts) = -20dBm

11.2 TEST PROCEDURE

1. The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were taken to show any out of band emission up to 10th . Harmonic for the lower and the highest frequency range.
3. Set RBW 100 kHz, VBW 300 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz.VBW=3MHz from the 1GHz to 10th Harmonic.
4. The audio input was set the unmodulated carrier, the resulting picture is print out for each channel separation.

11.3 TEST CONFIGURATION

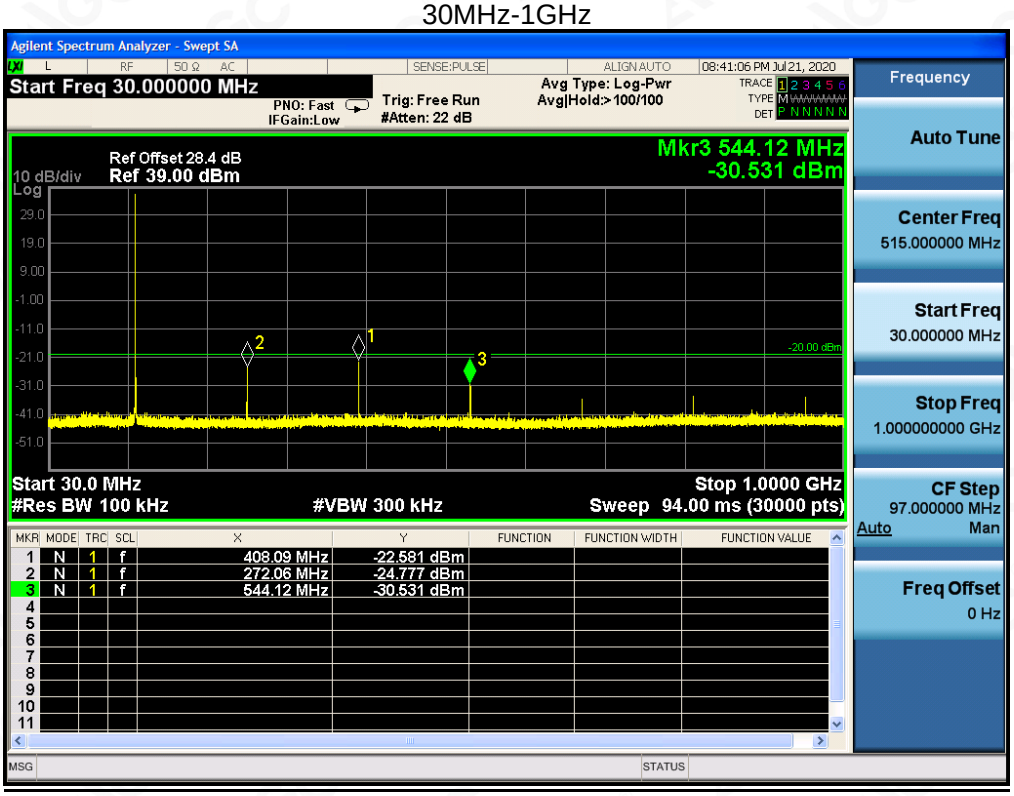


11.4 TEST RESULT

VHF:

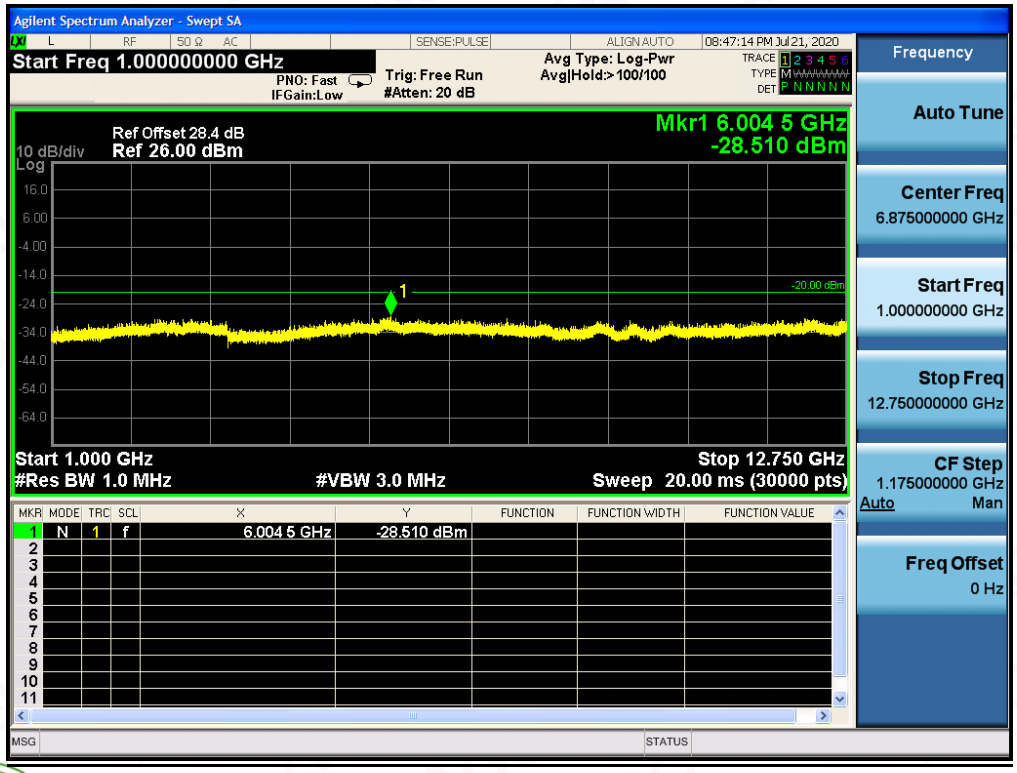
Conducted Spurious Emission (worst) @136.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



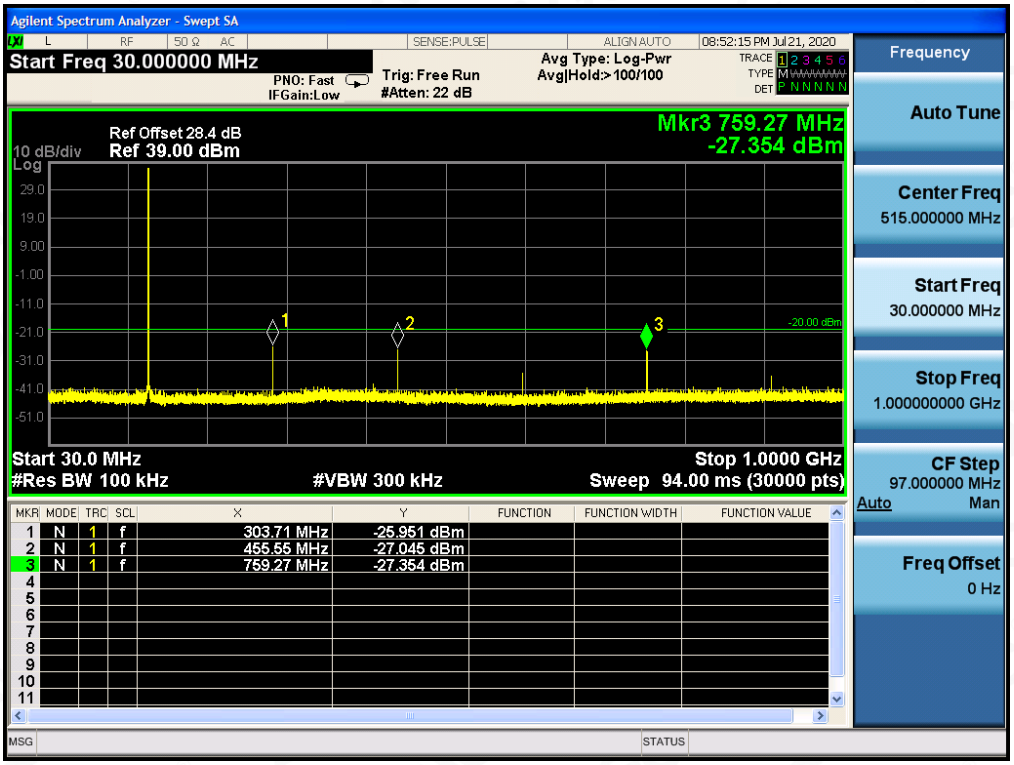
Conduct Spurious Emission (worst) @ 136.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



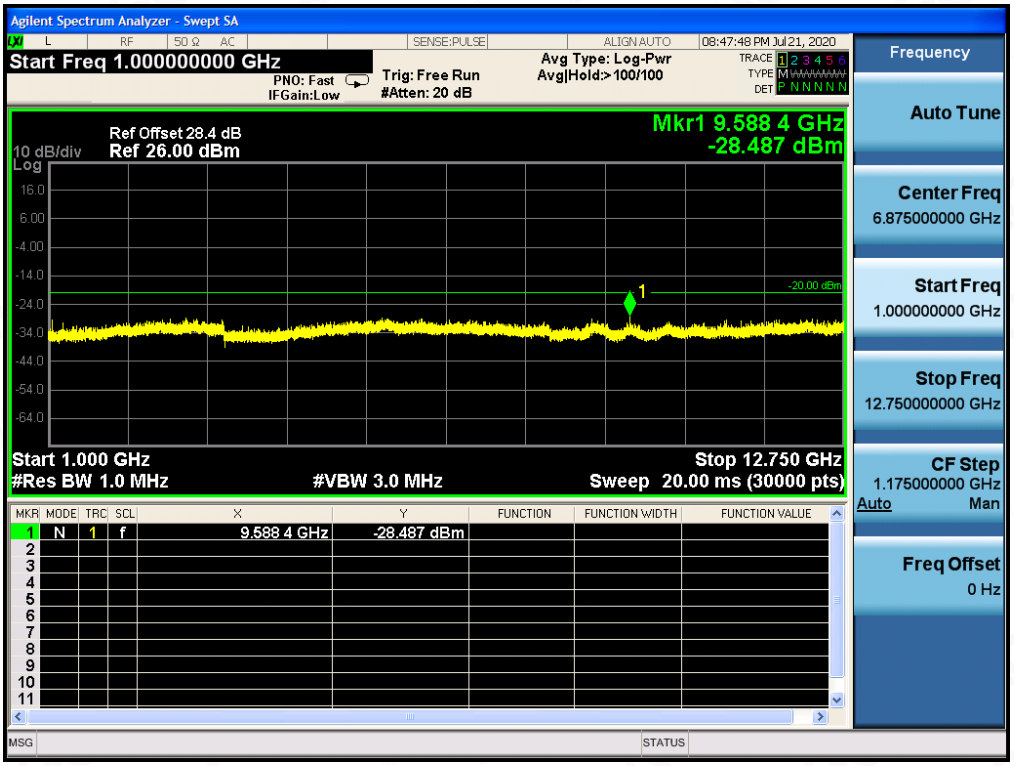
Conducted Spurious Emission (worst) @151.850 MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



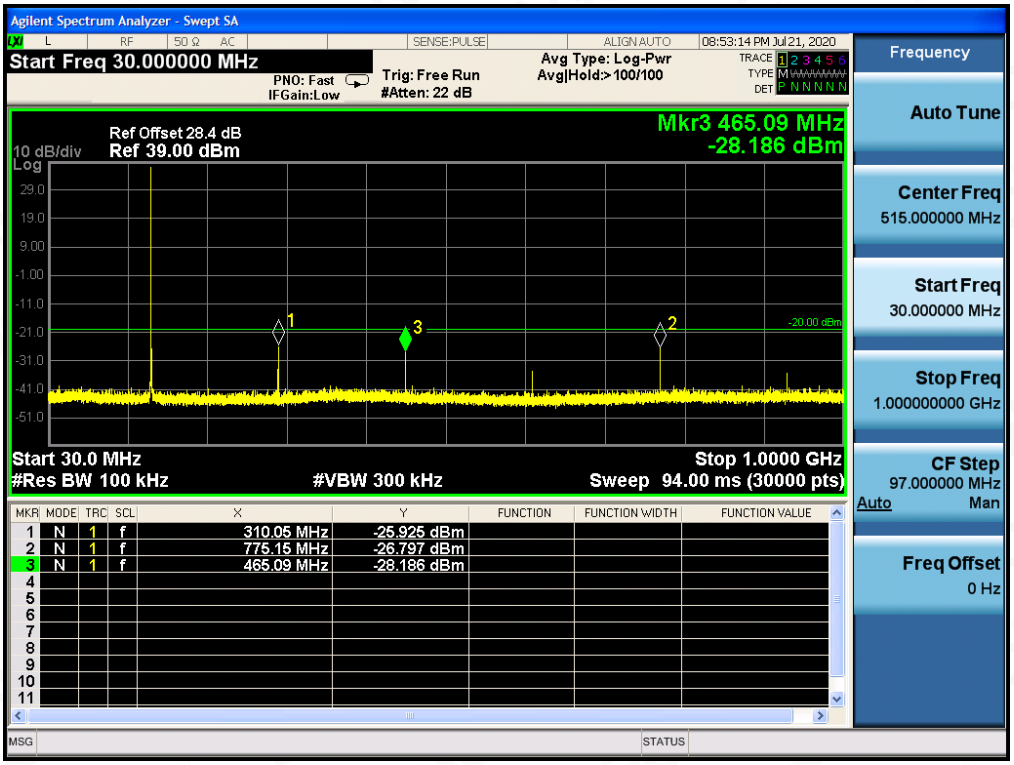
Conduct Spurious Emission (worst) @ 151.850MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



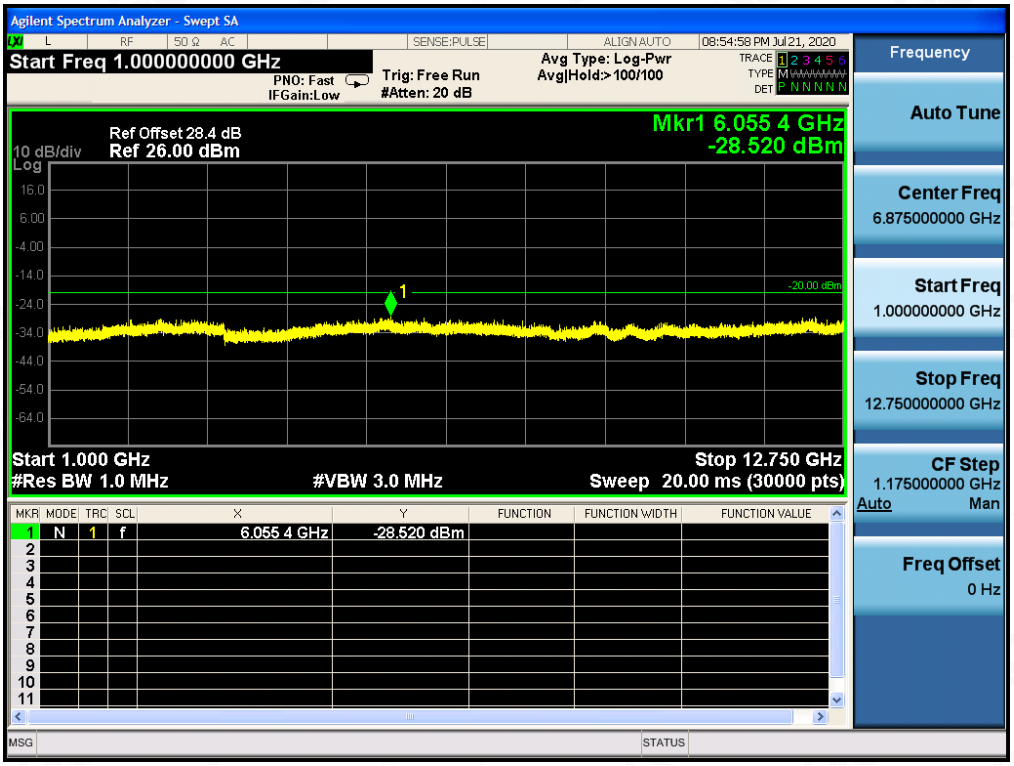
Conducted Spurious Emission (worst) @155.025 MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



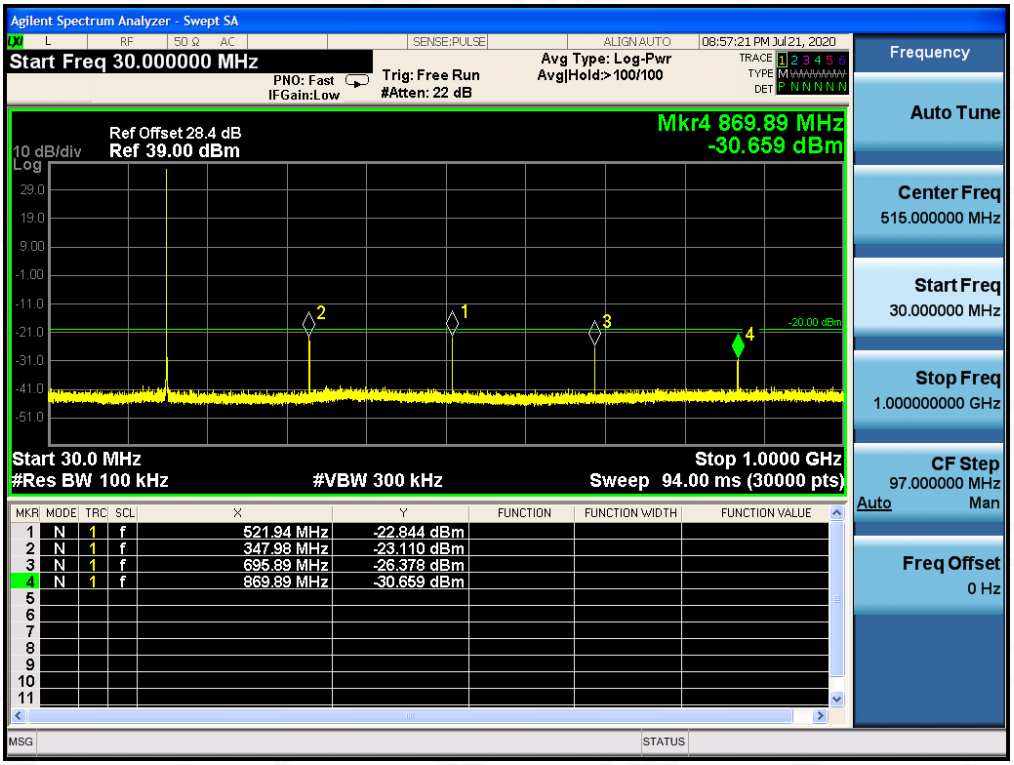
Conduct Spurious Emission (worst) @ 155.025 MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



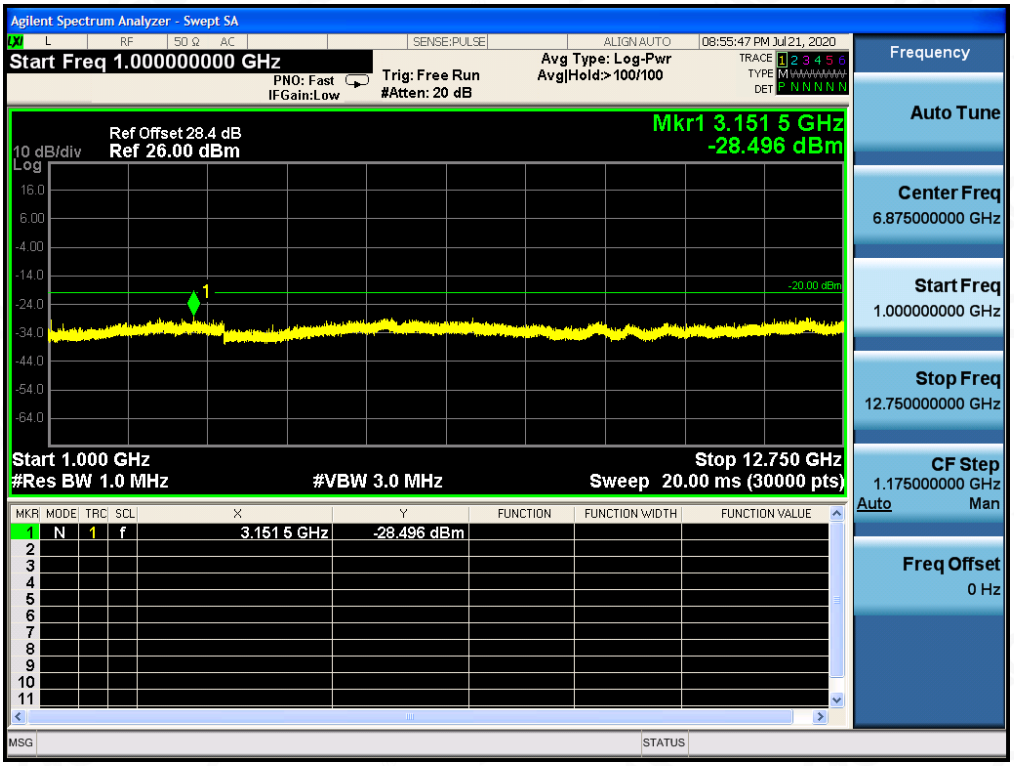
Conducted Spurious Emission (worst) @173.975 MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



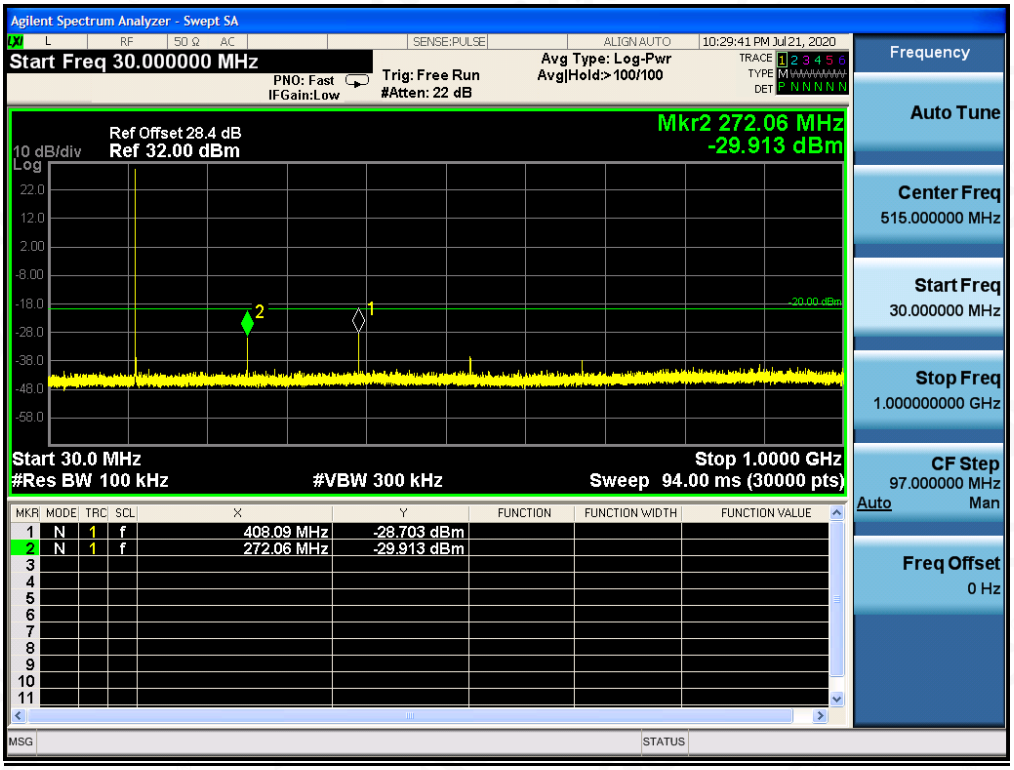
Conduct Spurious Emission (worst) @ 173.975 MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



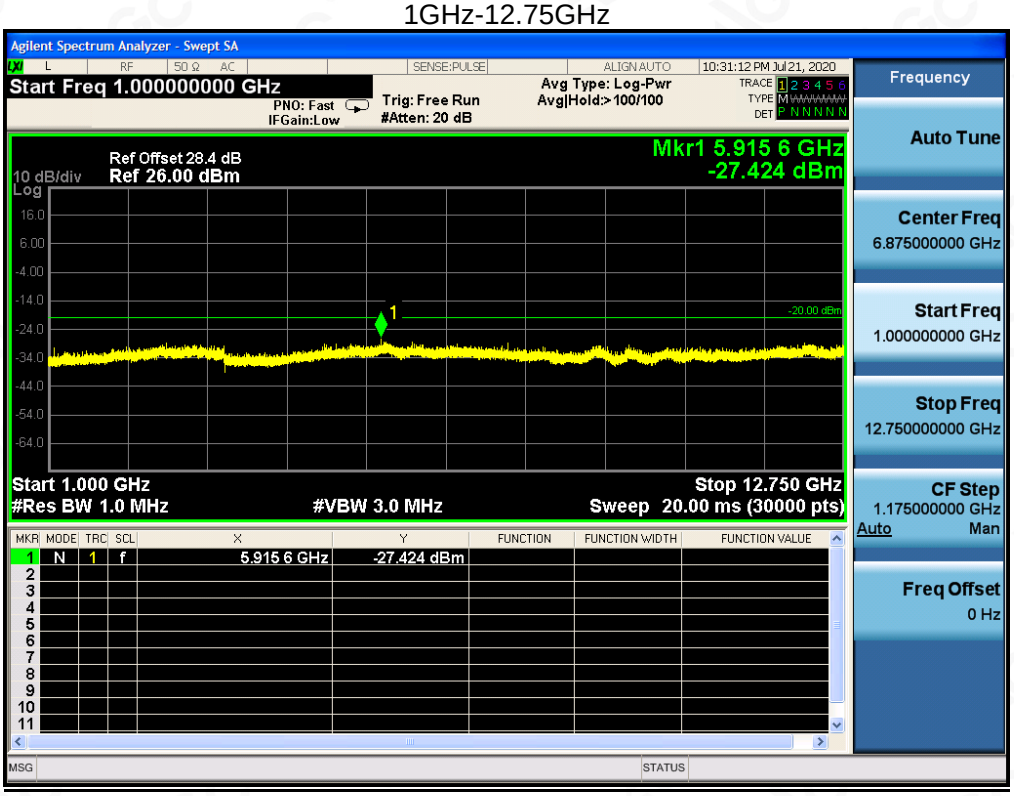
Conducted Spurious Emission (worst) @136.025MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



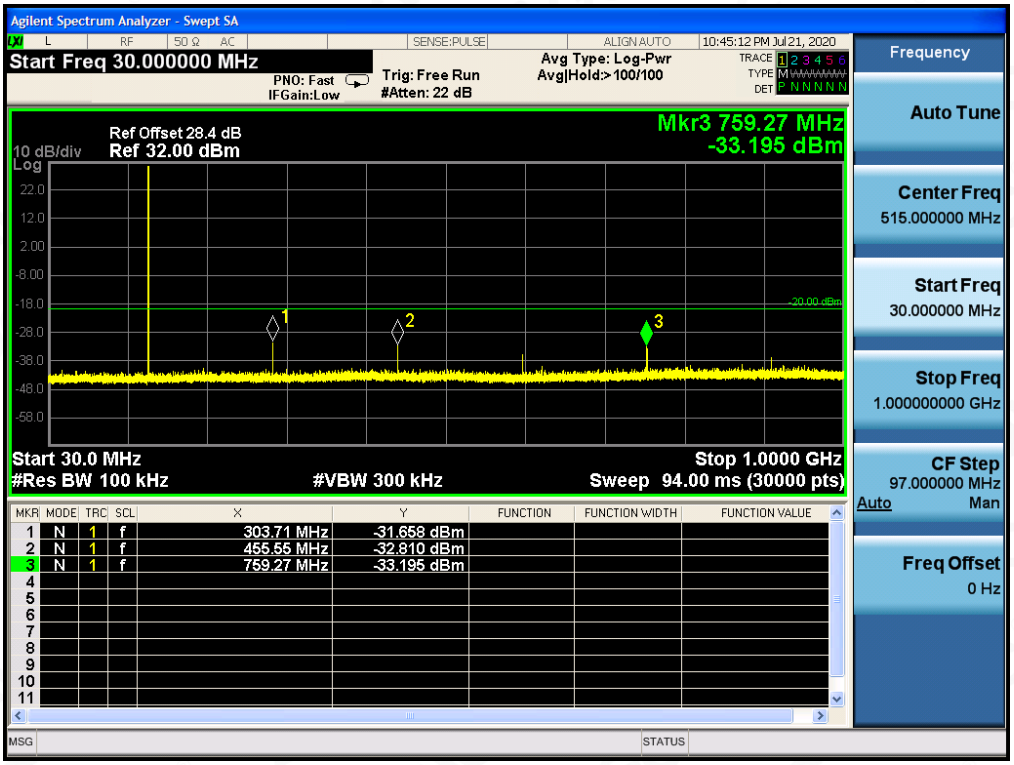
Conduct Spurious Emission (worst) @ 136.025MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



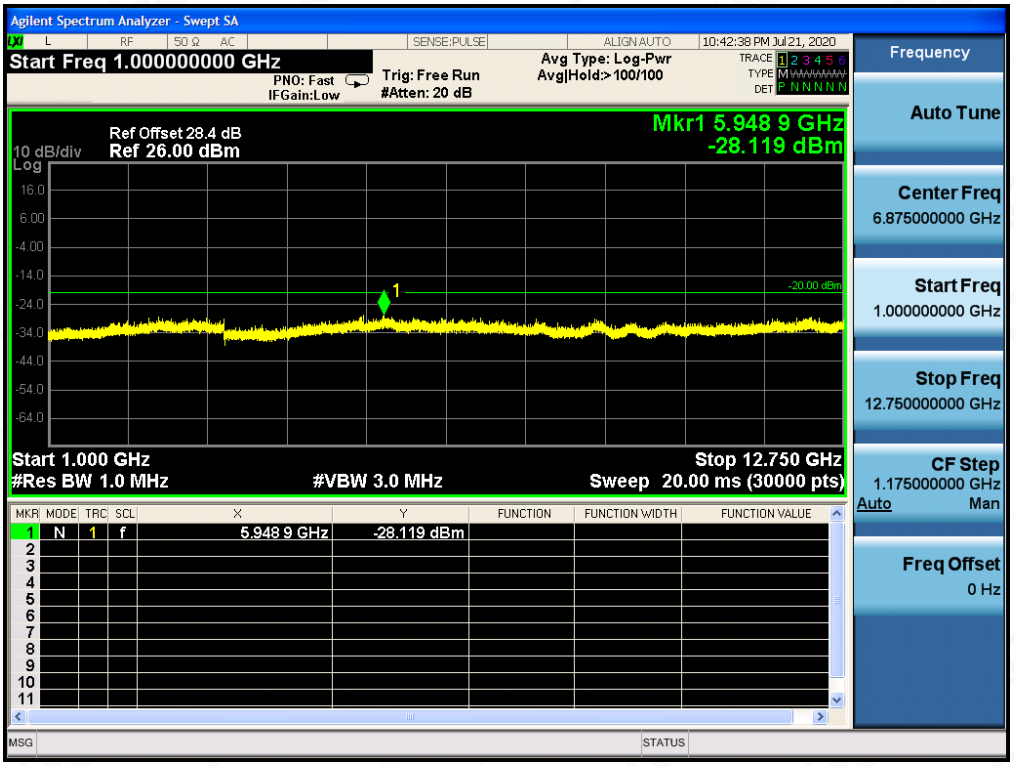
Conducted Spurious Emission (worst) @151.850 MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



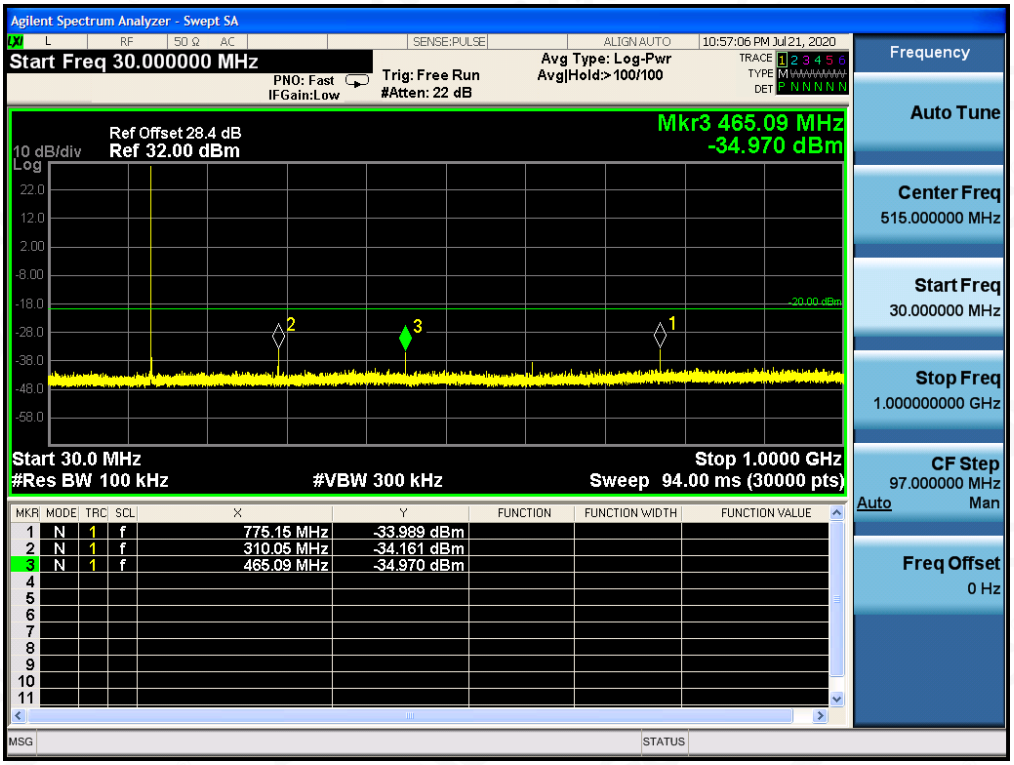
Conduct Spurious Emission (worst) @ 151.850MHz With 12.5 KHz Channel Separation-1W

1GHz-12.75GHz



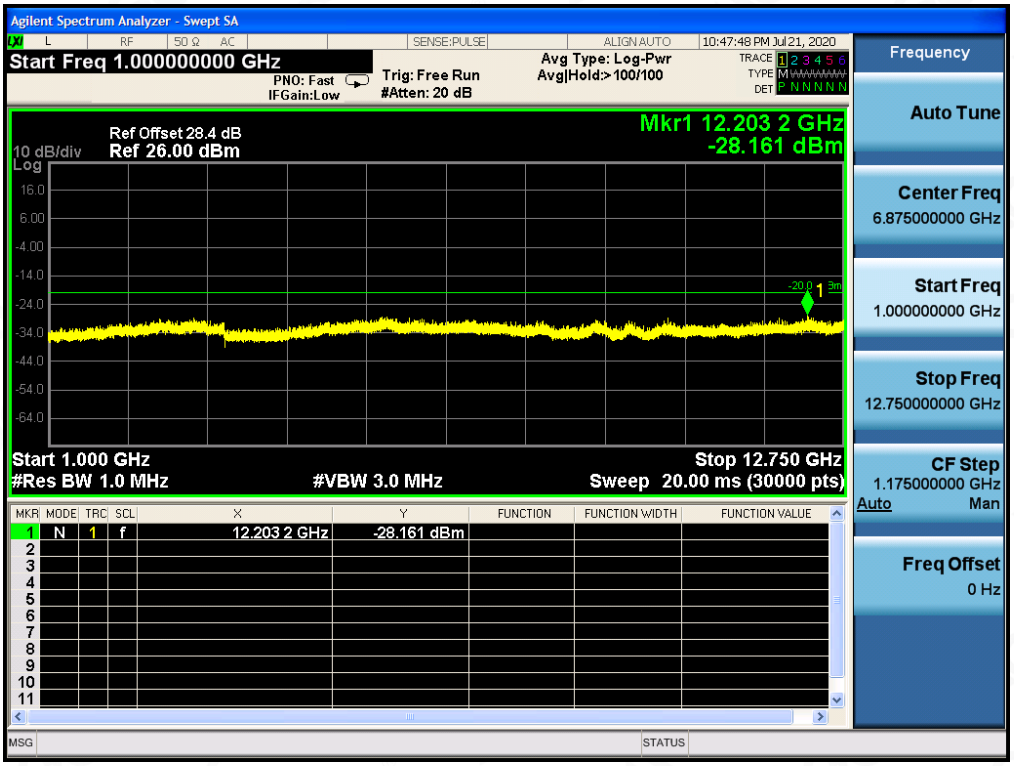
Conducted Spurious Emission (worst) @155.025 MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



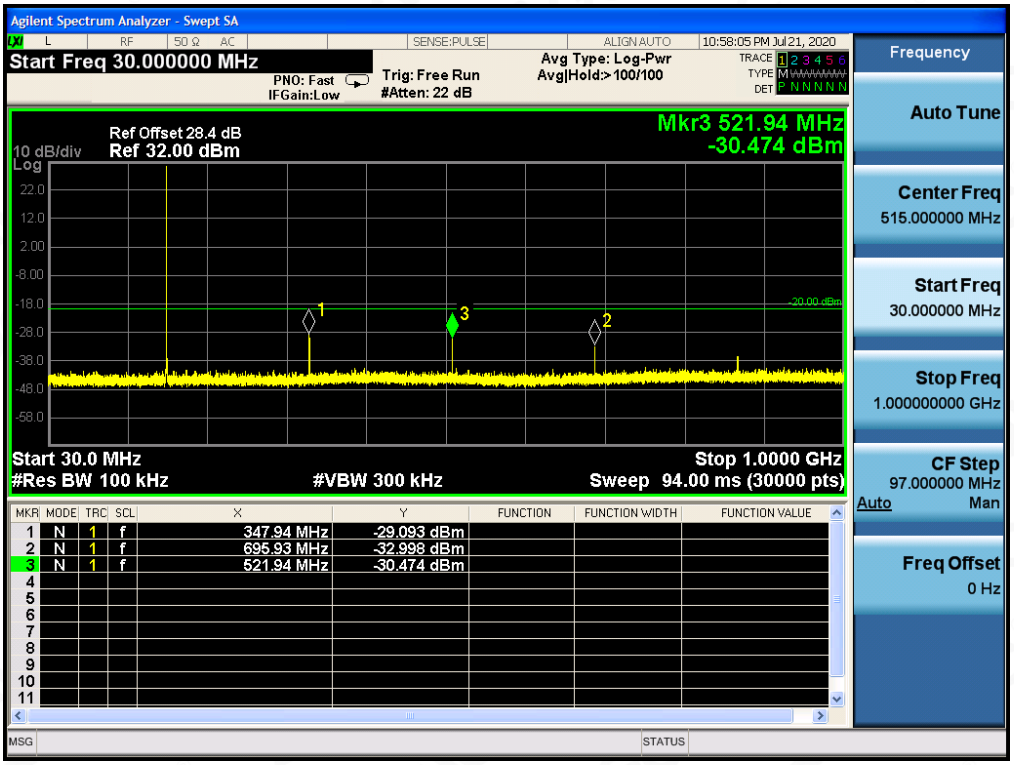
Conduct Spurious Emission (worst) @ 155.025 MHz With 12.5 KHz Channel Separation1W

1GHz-12.75GHz



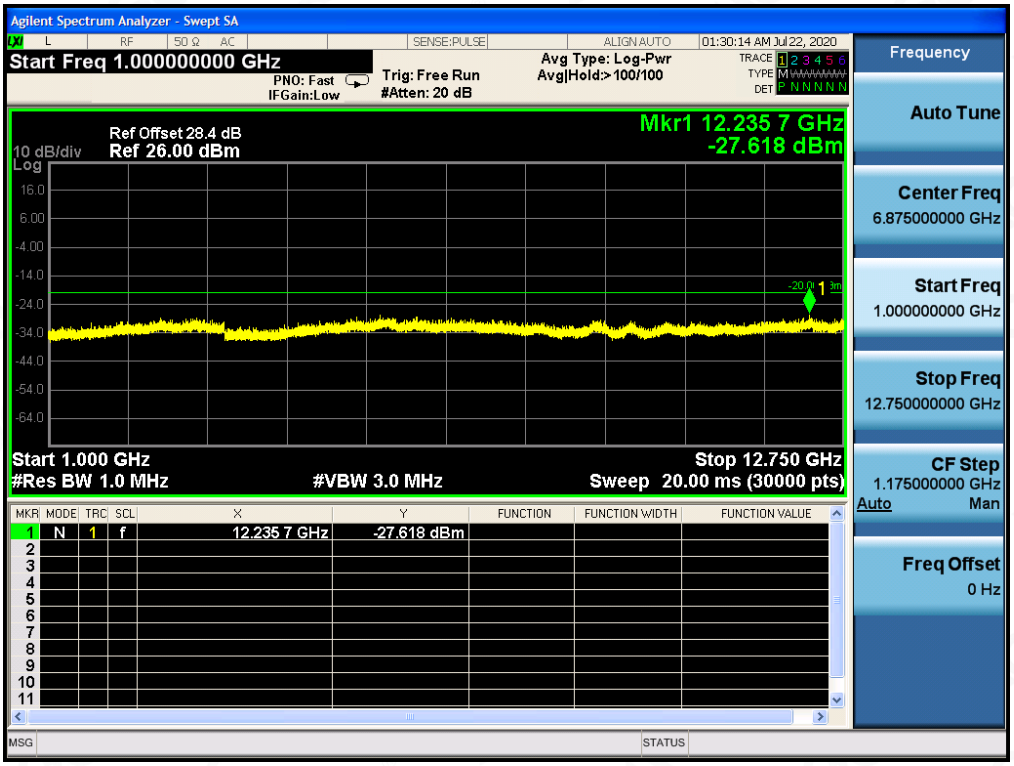
Conducted Spurious Emission (worst) @173.975 MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 173.975 MHz With 12.5 KHz Channel Separation-1W

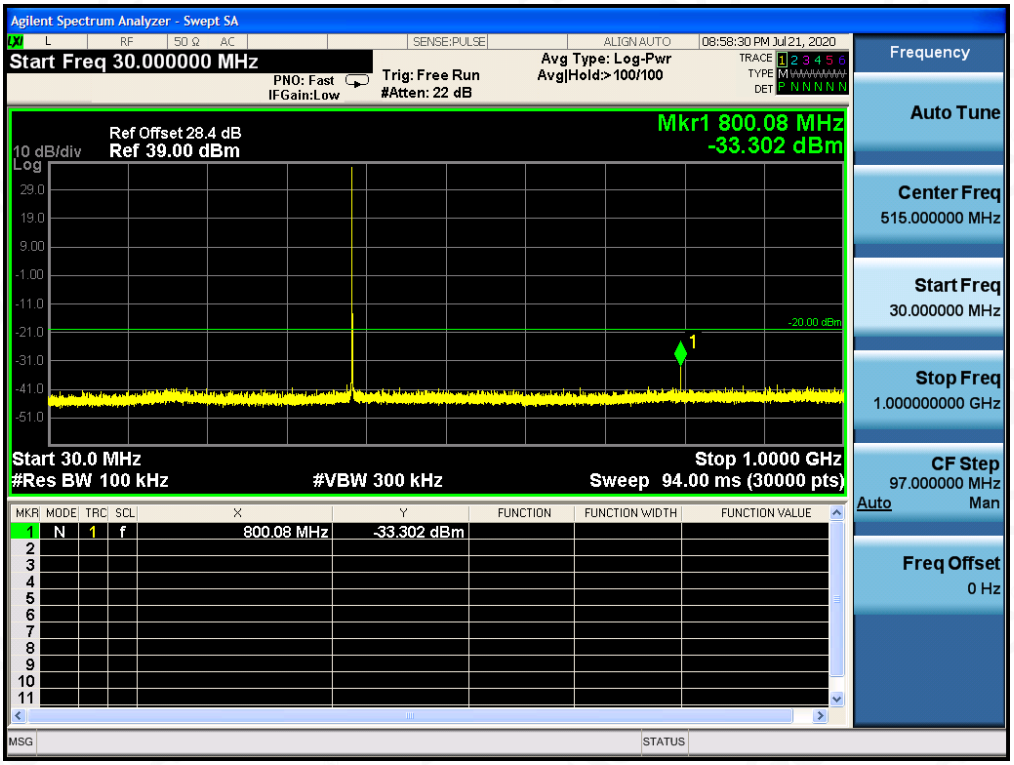
1GHz-12.75GHz



UHF:

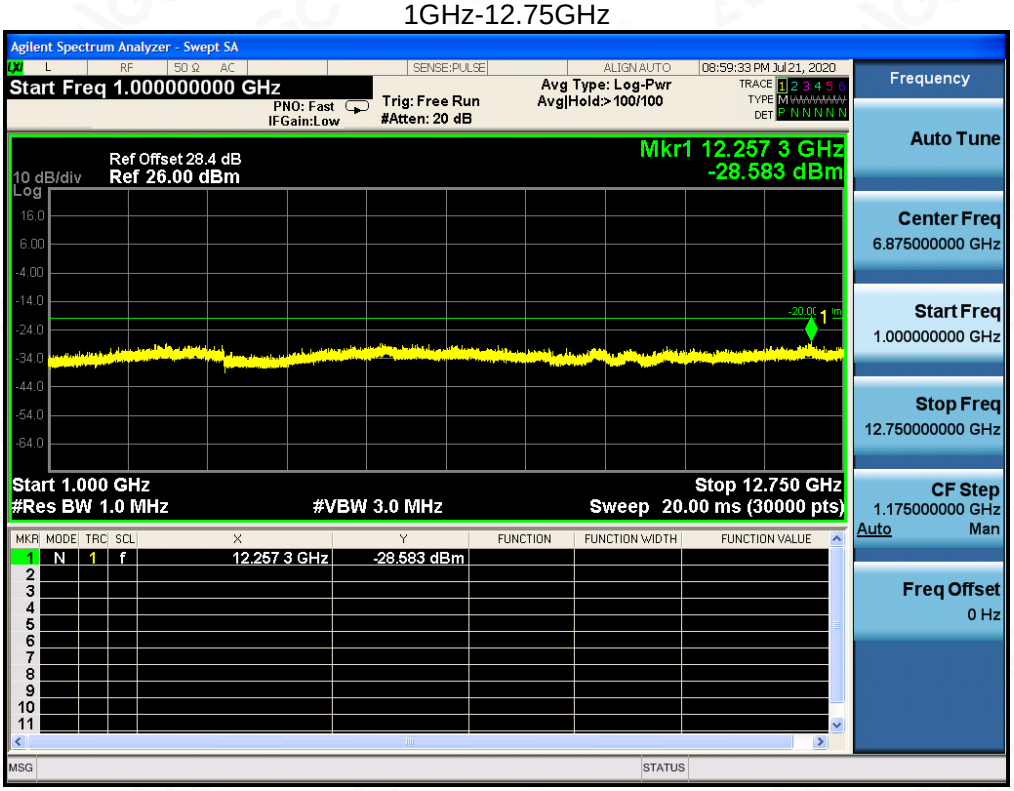
Conducted Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



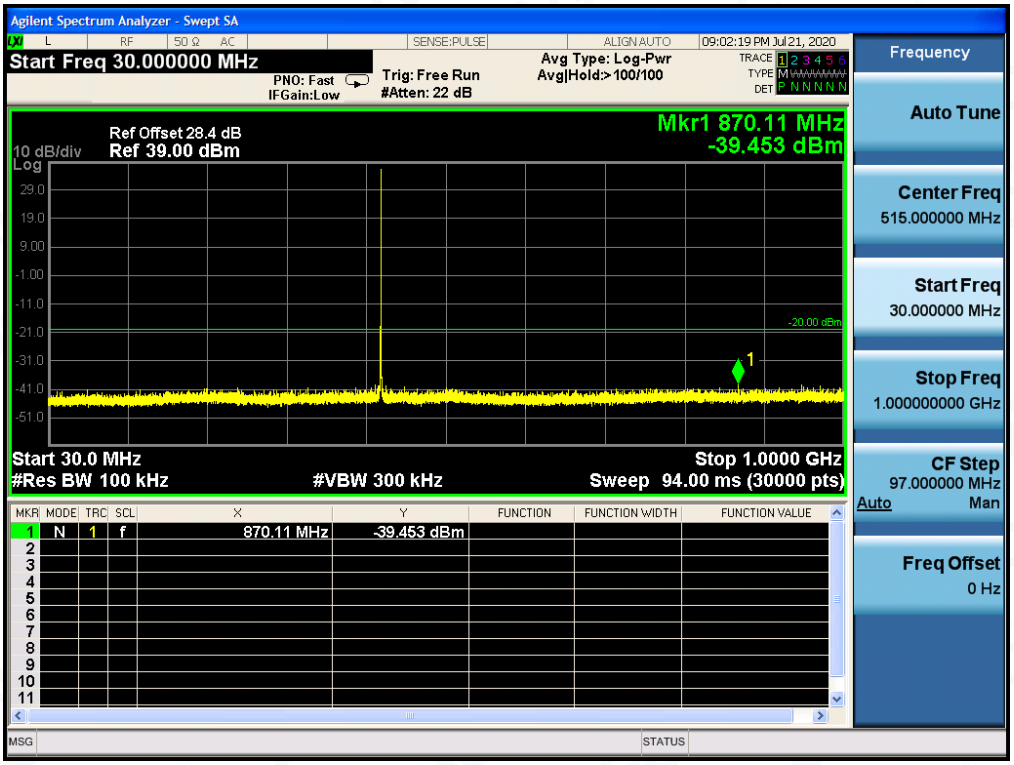
Conduct Spurious Emission (worst) @ 400.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



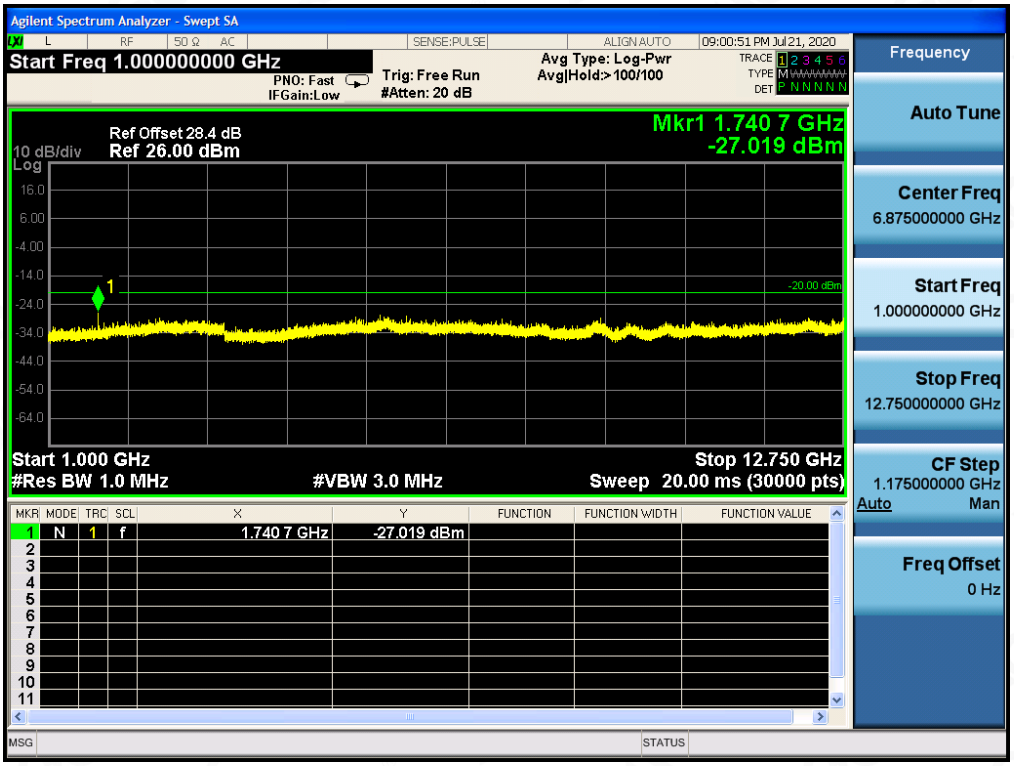
Conducted Spurious Emission (worst) @ 435.025 MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



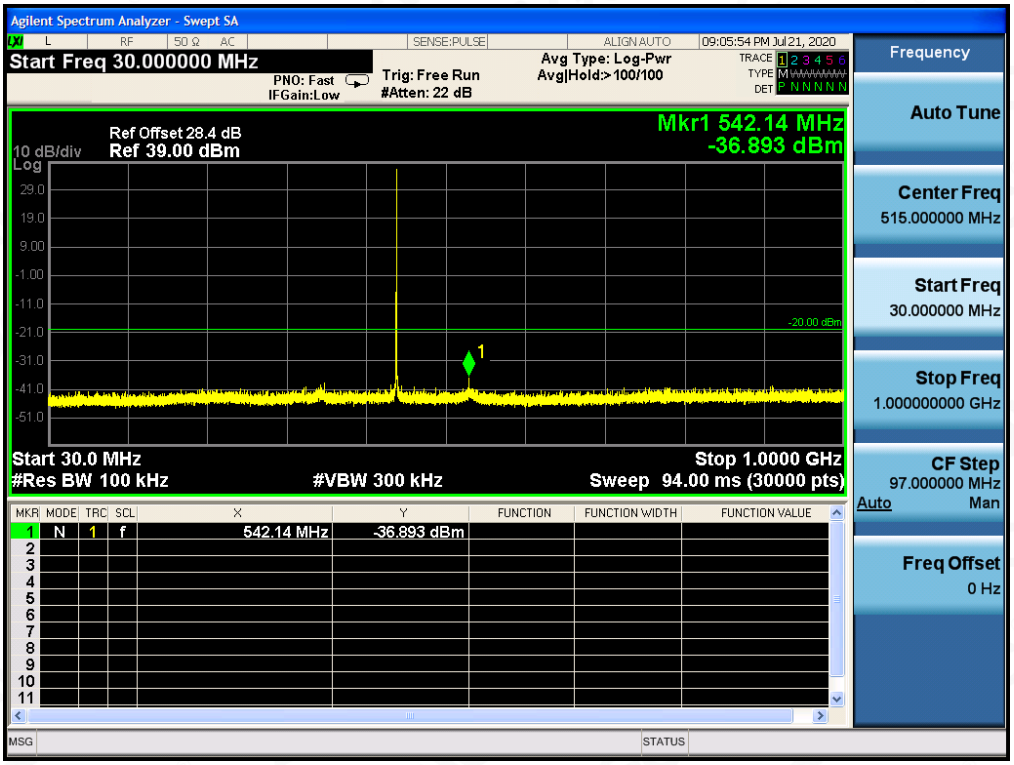
Conduct Spurious Emission (worst) @ 435.025 MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz



Conducted Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

30MHz-1GHz



Conduct Spurious Emission (worst) @ 454.025MHz With 12.5 KHz Channel Separation-5W

1GHz-12.75GHz