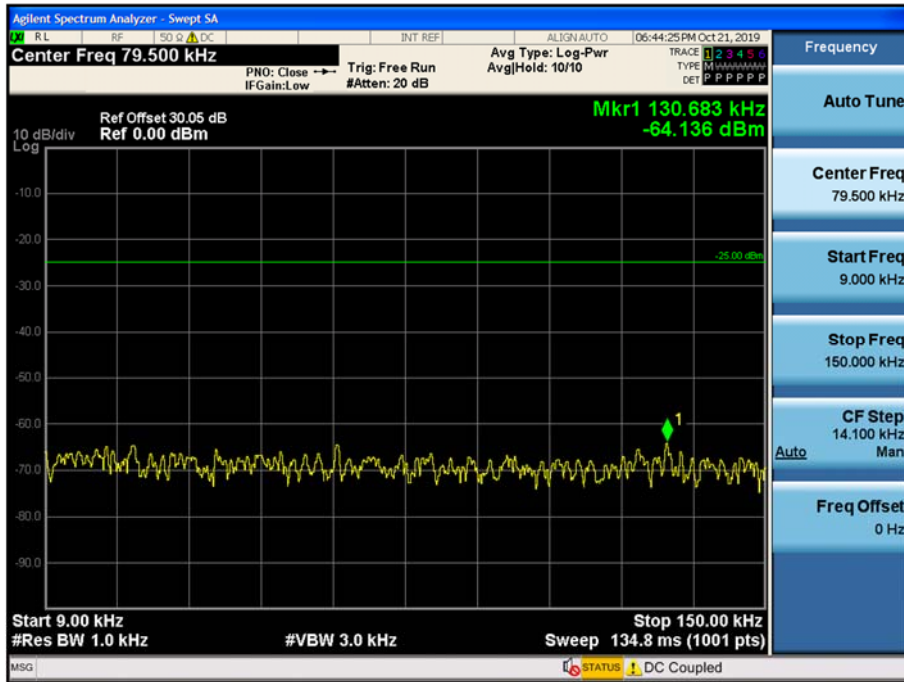
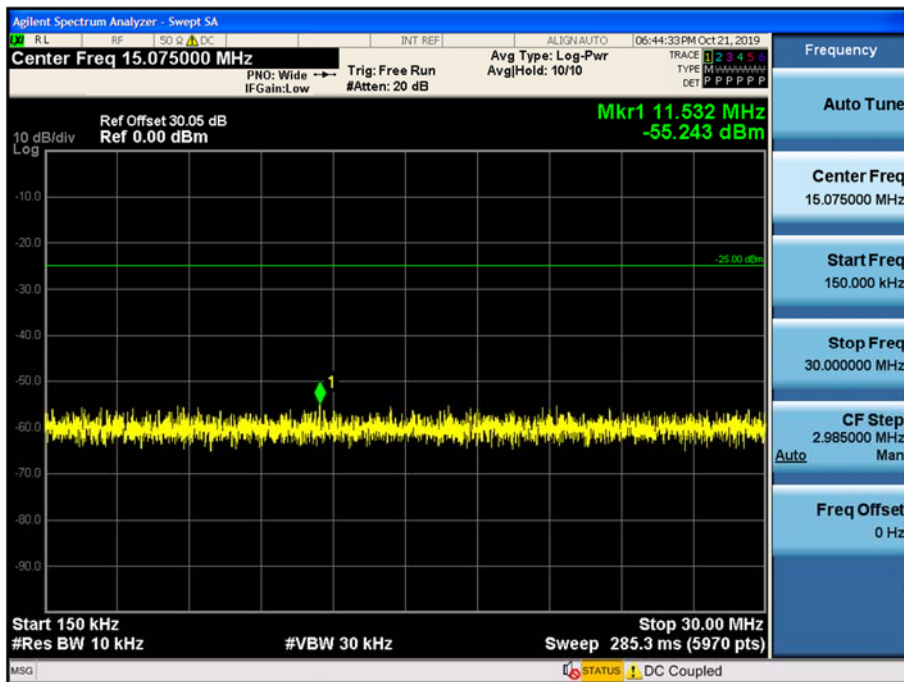


4K00F2D_FCC

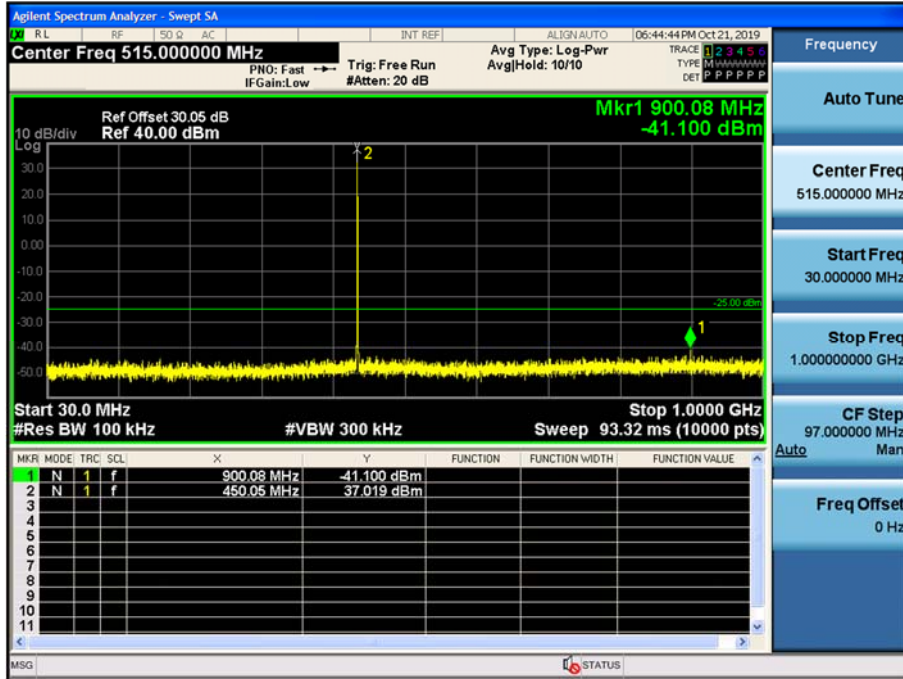
(450.05 MHz)_High
9 kHz~150 kHz



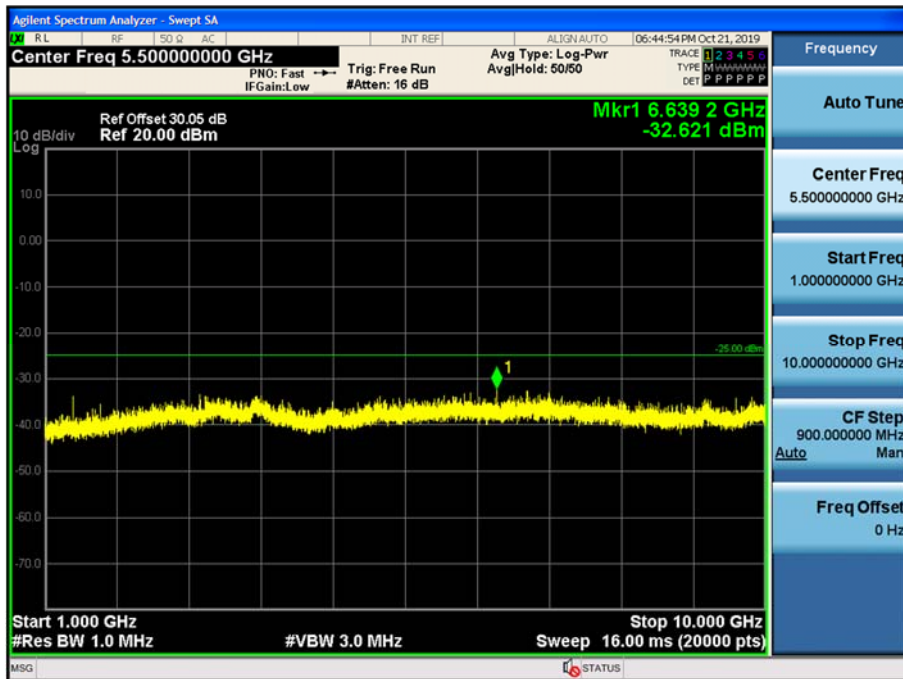
150 kHz~30 MHz



30 MHz~1 GHz

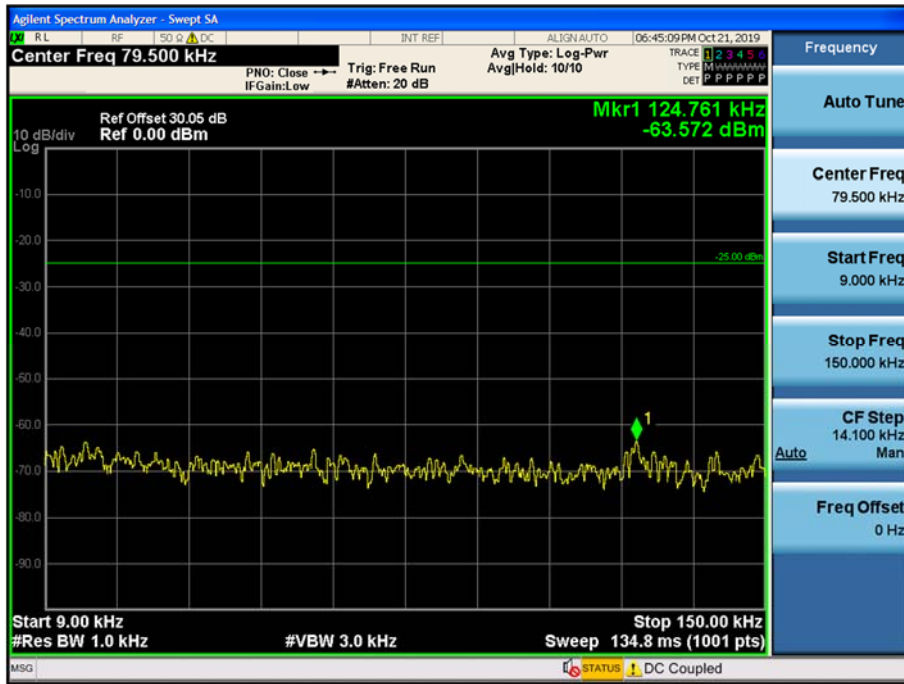


1 GHz~10 GHz

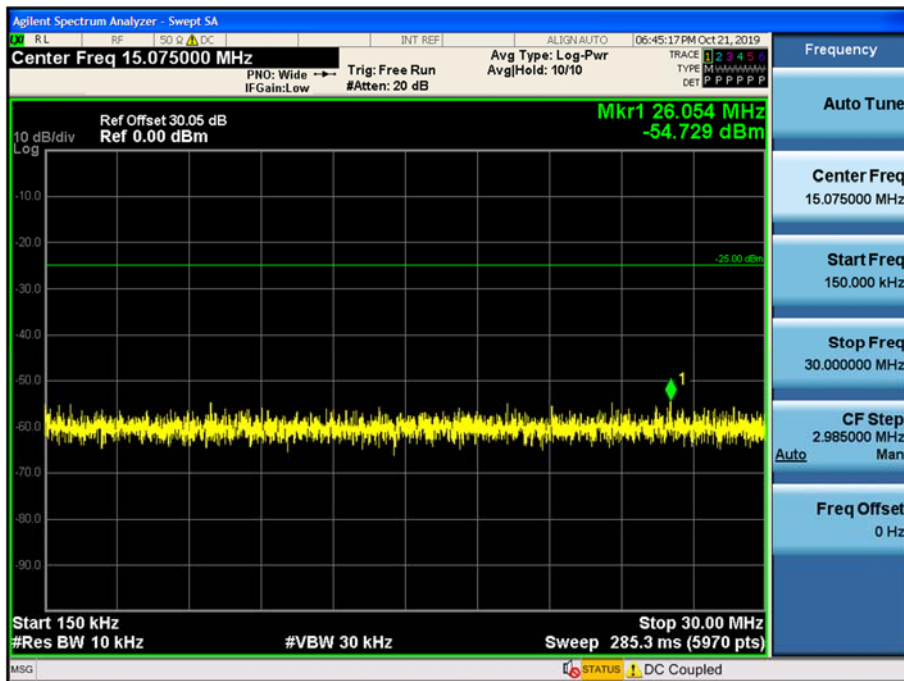


(481.05 MHz)_High

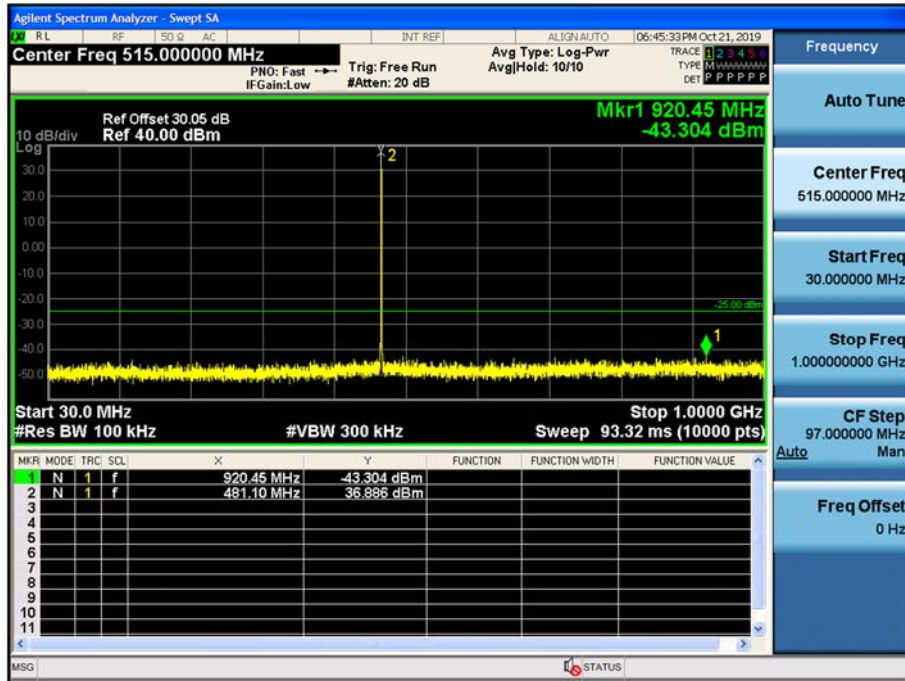
9 kHz~150 kHz



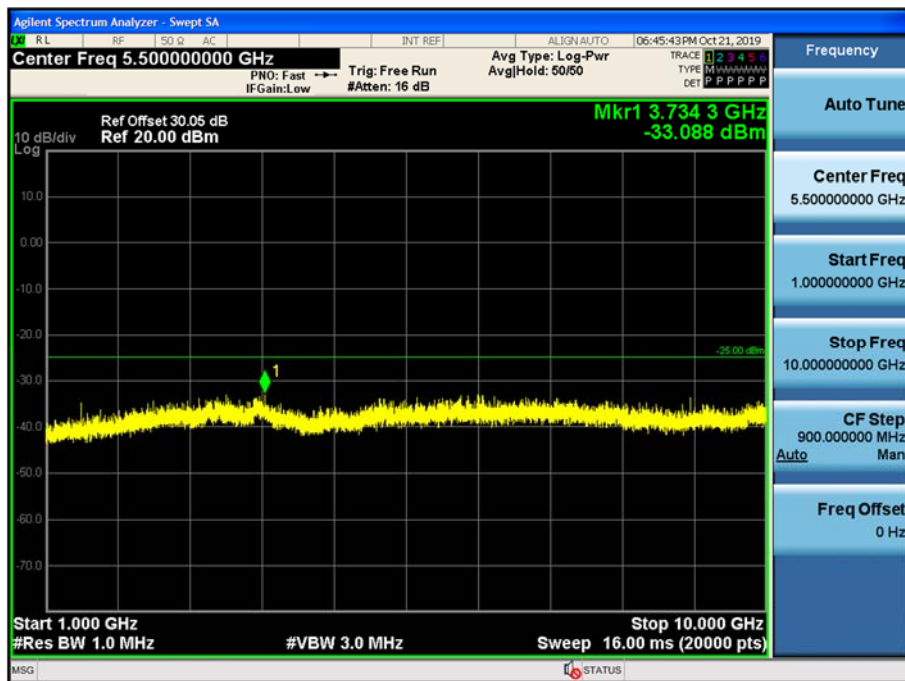
150 kHz~30 MHz



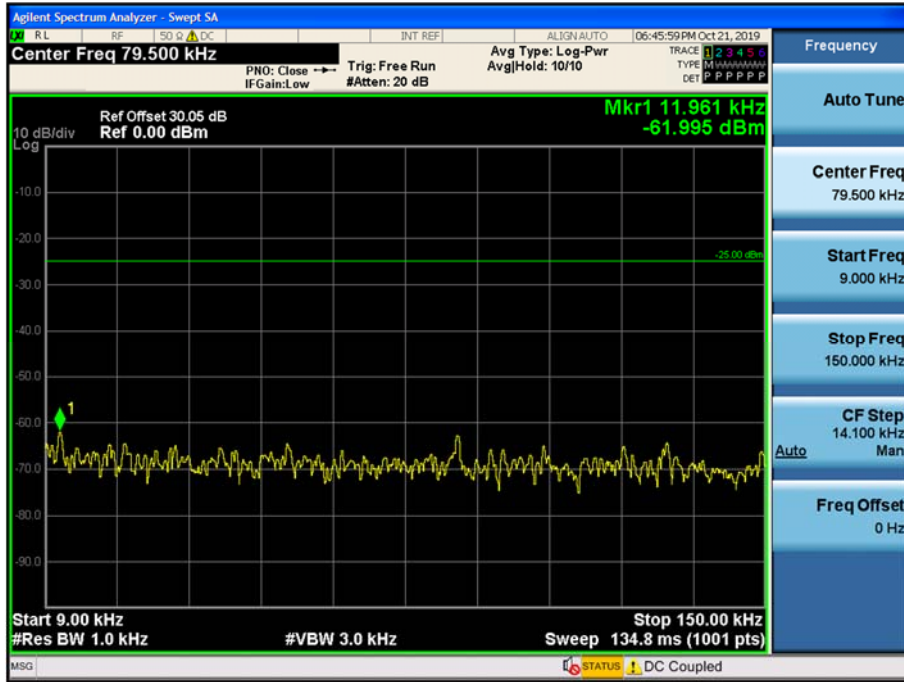
30 MHz~1 GHz



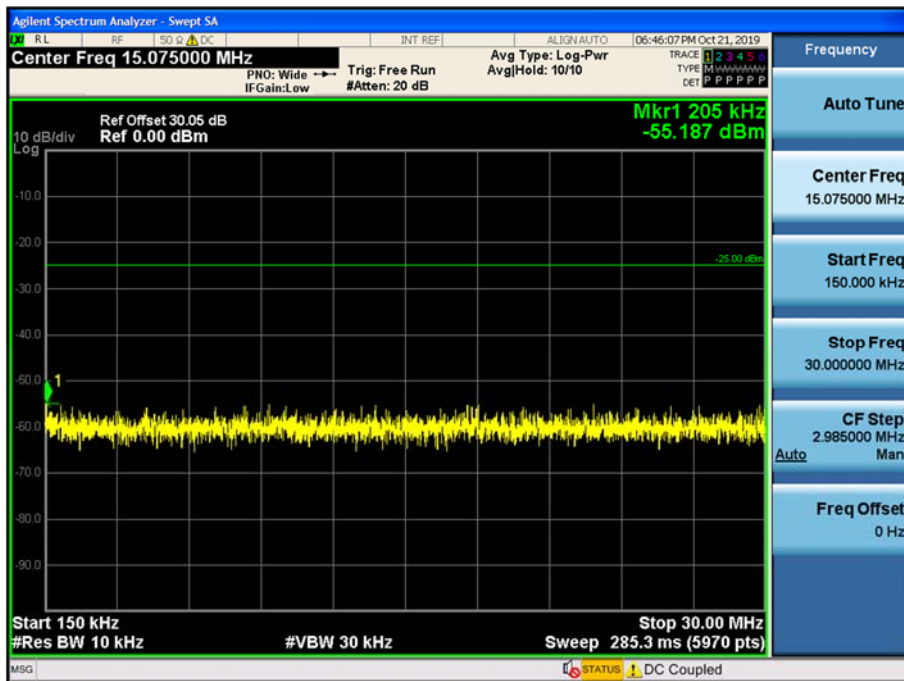
1 GHz~10 GHz



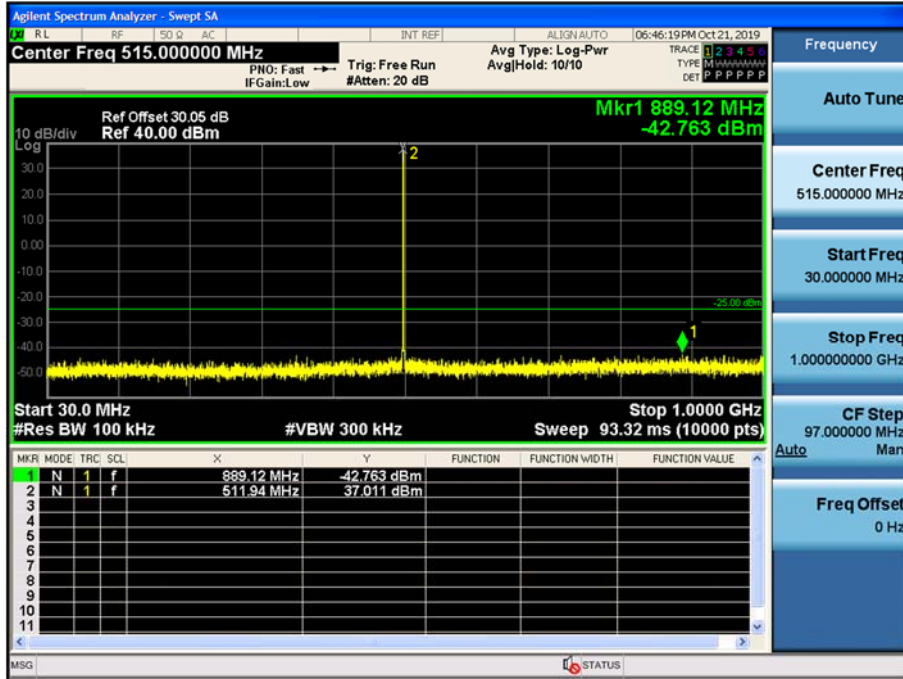
(511.95 MHz)_High
9 kHz~150 kHz



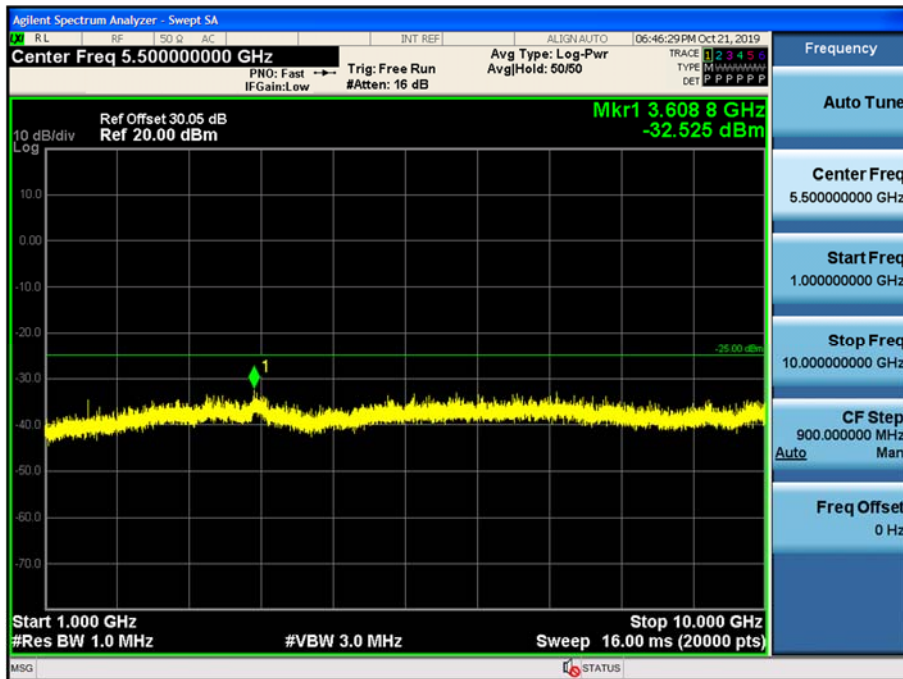
150 kHz~30 MHz



30 MHz~1 GHz



1 GHz~10 GHz

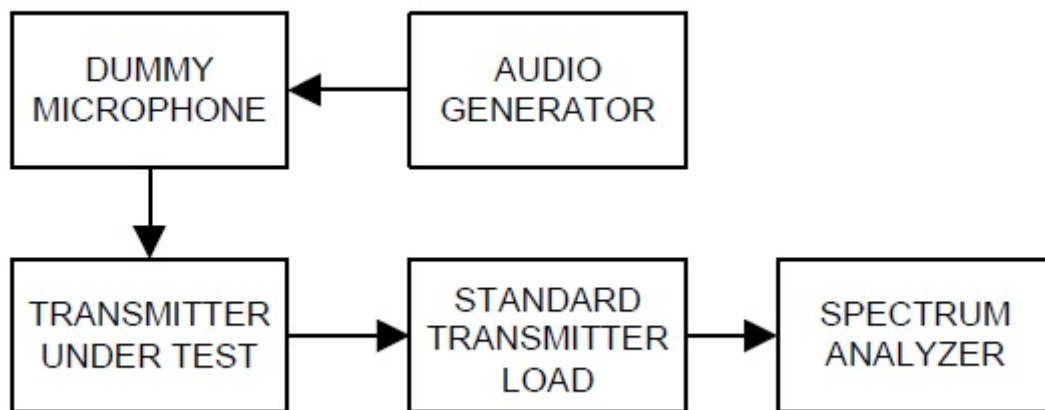


8.9 Adjacent Channel Power

▣ Definition

For 450 MHz – 470 MHz, operating using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the adjacent channel power(ACP) limits. A measurement bandwidth is 18 kHz.

▣ TEST CONFIGURATION

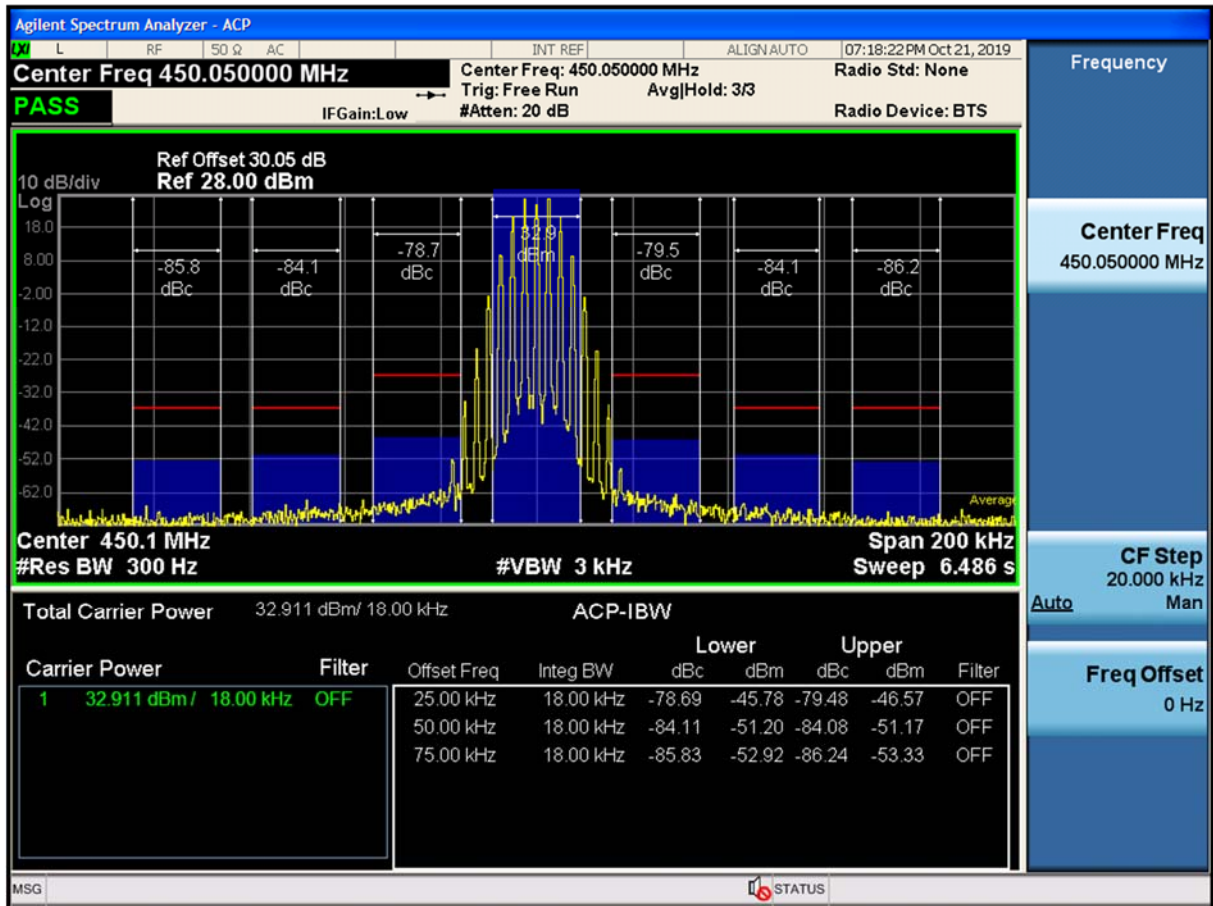


▣ TEST RESULTS

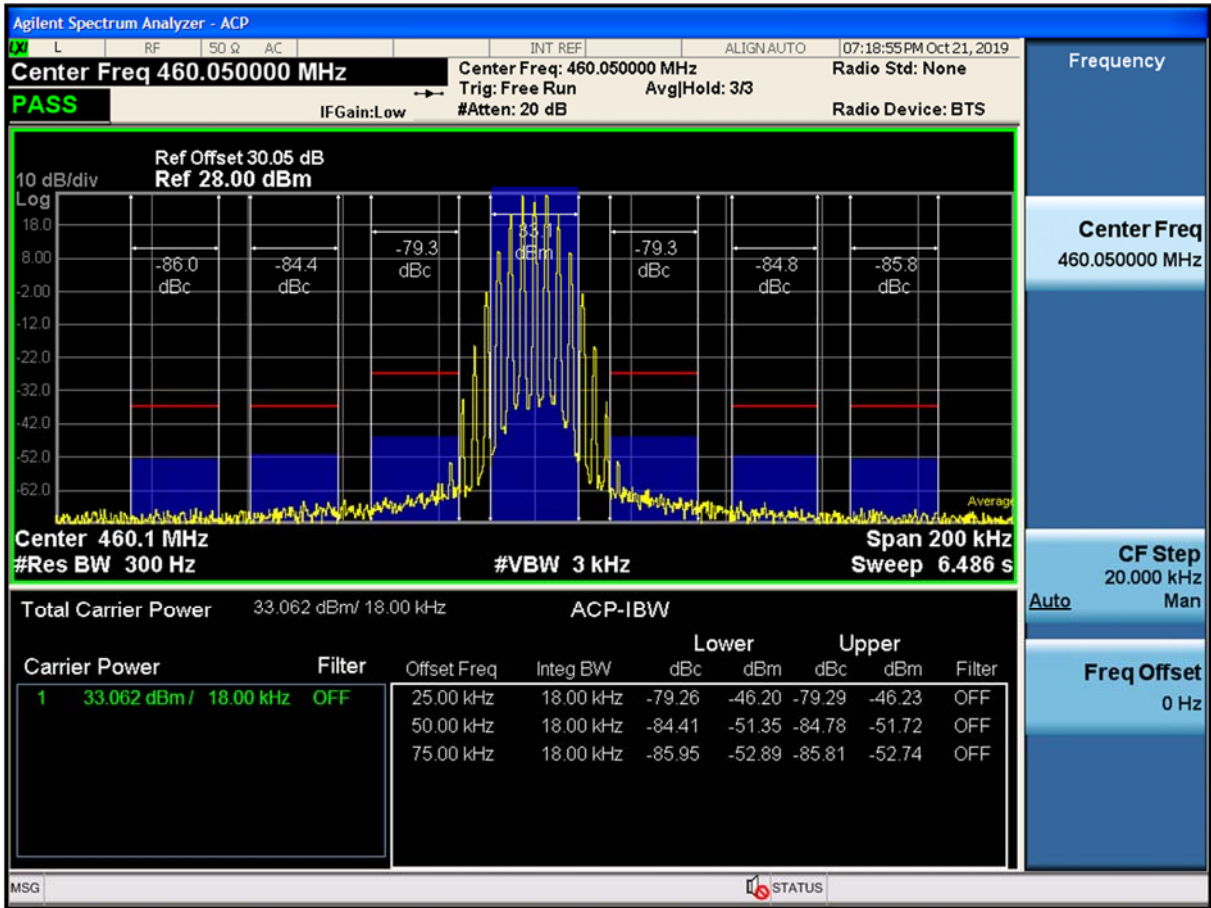
Frequency(MHz)	Frequency offset(kHz)	Lower(dBc)	Upper(dBc)	Limit(dBc)
450.05 (High Power)	25	-78.69	-79.48	-60.00
	50	-84.11	-84.08	-70.00
	75	-85.83	-86.24	-70.00
460.05 (High Power)	25	-79.26	-79.29	-60.00
	50	-84.41	-84.78	-70.00
	75	-85.95	-85.81	-70.00
469.95 (High Power)	25	-79.38	-79.44	-60.00
	50	-84.59	-84.46	-70.00
	75	-86.10	-85.68	-70.00
450.05 (Low Power)	25	-77.88	-77.59	-55.00
	50	-81.85	-82.05	-70.00
	75	-83.73	-83.61	-70.00
460.05 (Low Power)	25	-78.34	-77.97	-55.00
	50	-82.16	-82.18	-70.00
	75	-83.76	-83.91	-70.00
469.95 (Low Power)	25	-78.28	-78.34	-55.00
	50	-82.68	-82.28	-70.00
	75	-83.96	-84.44	-70.00

Plots of Adjacent Channel Power

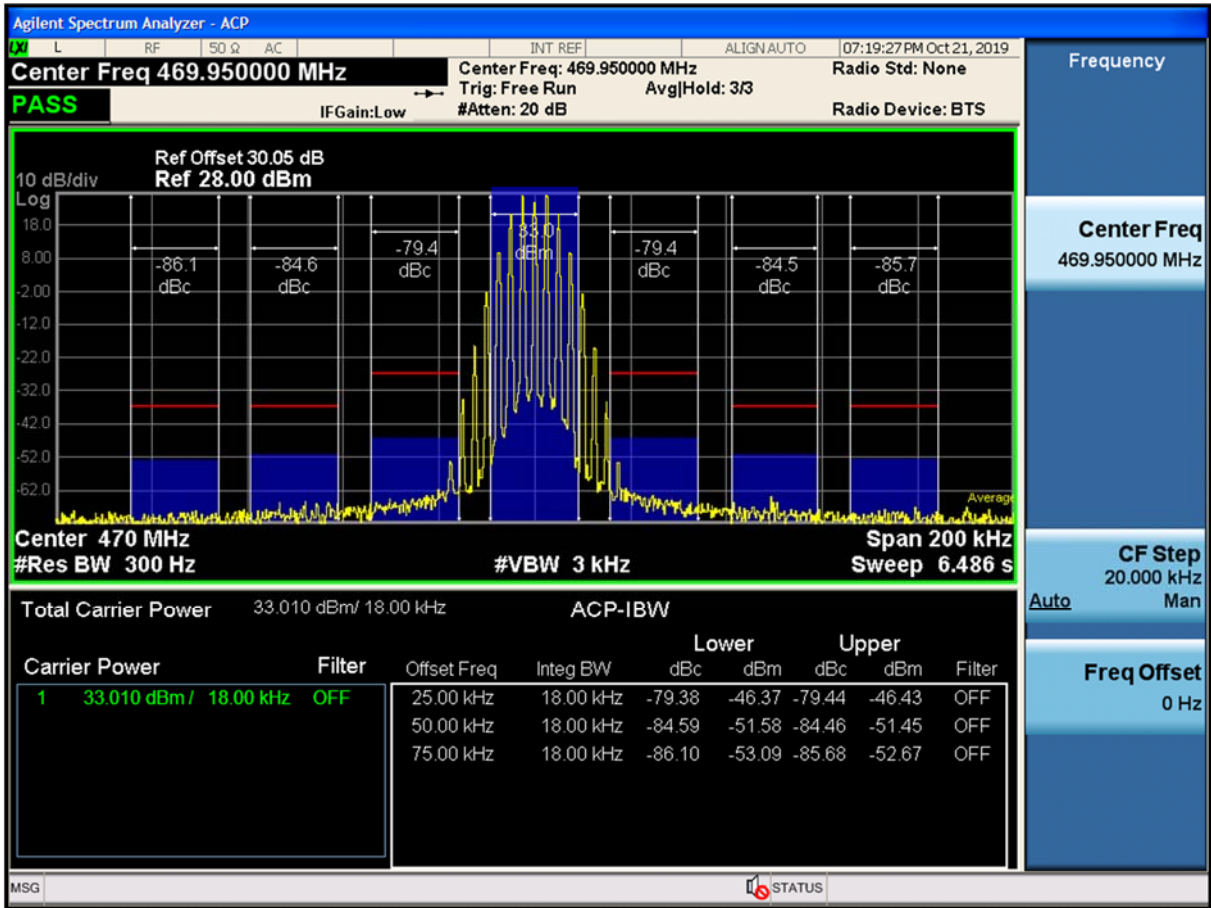
16K0F3E_450.05 MHz_High Power



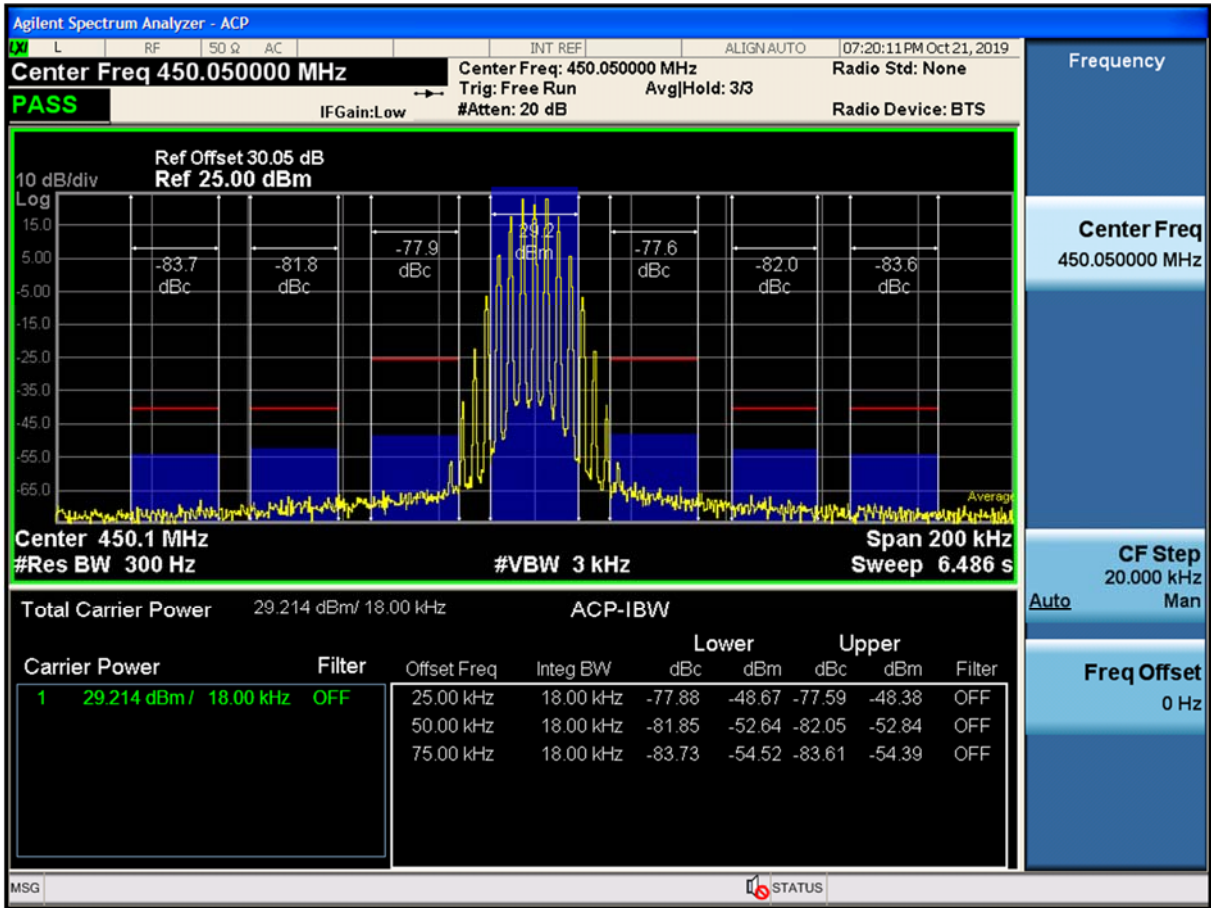
16K0F3E_460.05 MHz_High Power



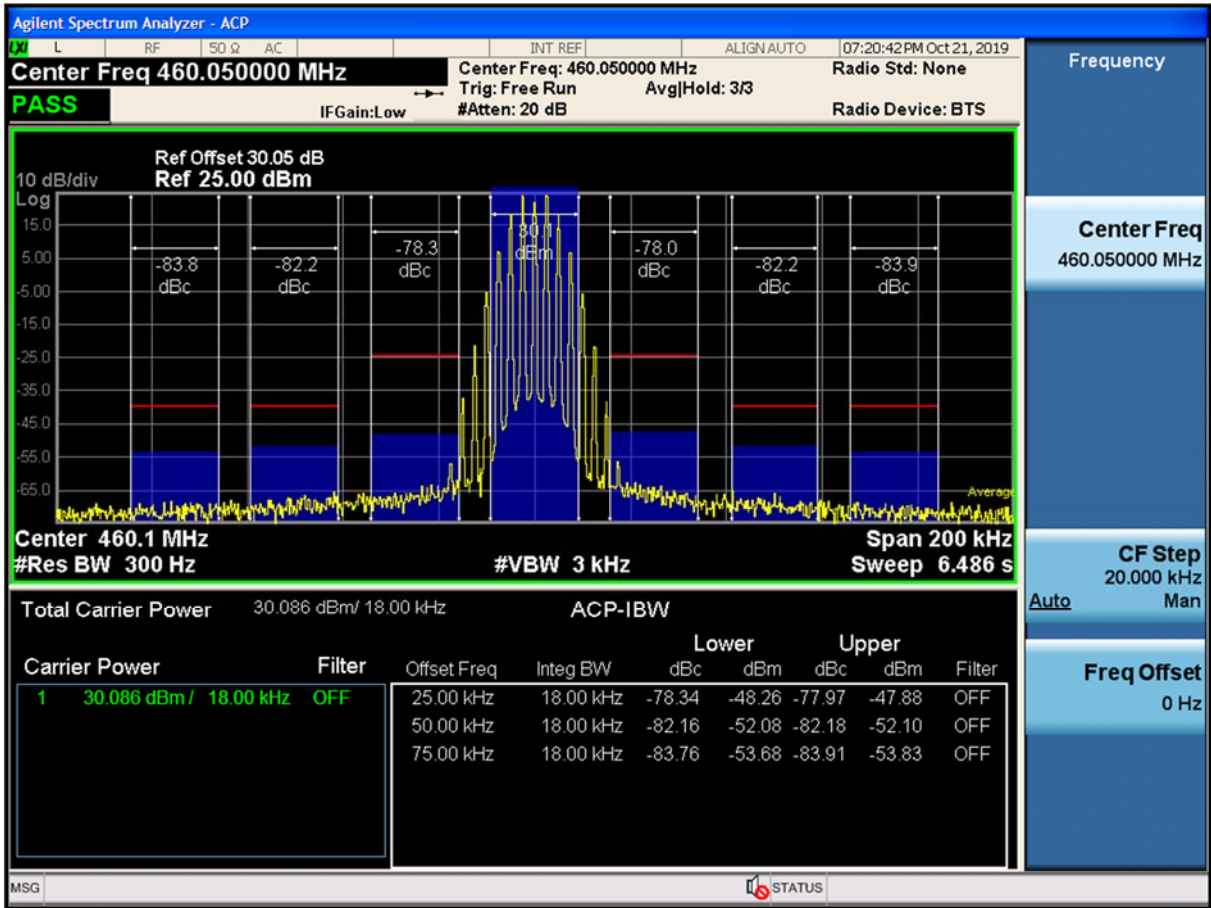
16K0F3E_ 469.95 MHz_High Power



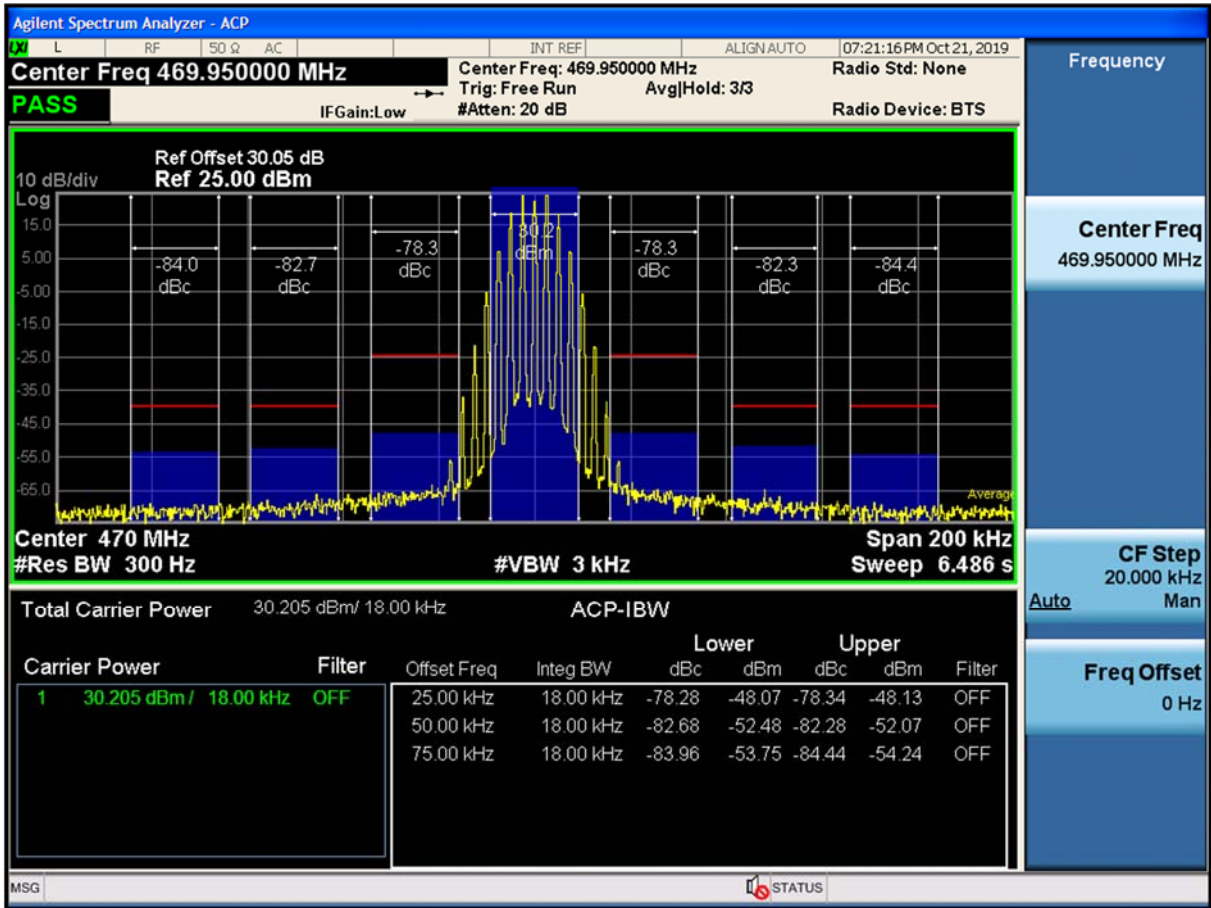
16K0F3E_ 450.05 MHz_Low Power



16K0F3E_ 460.05 MHz_Low Power



16K0F3E_ 469.95 MHz_Low Power



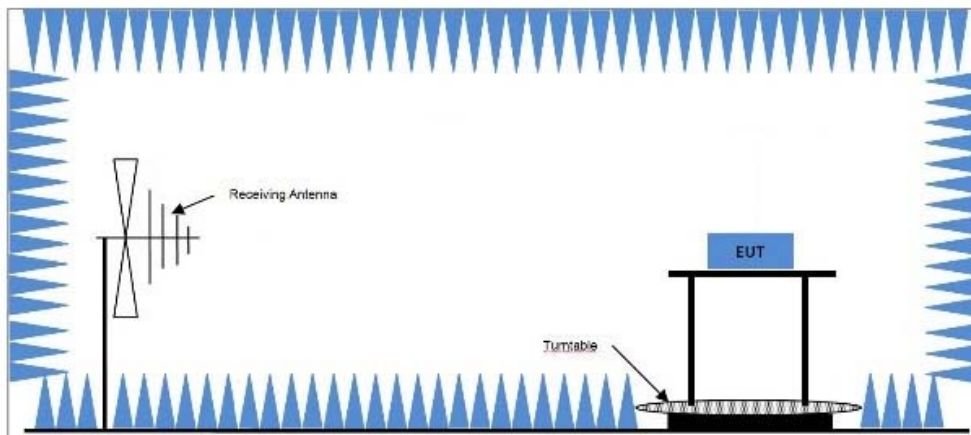
8.10 Unwanted Emissions : Radiated Spurious Emission

▣ Definition

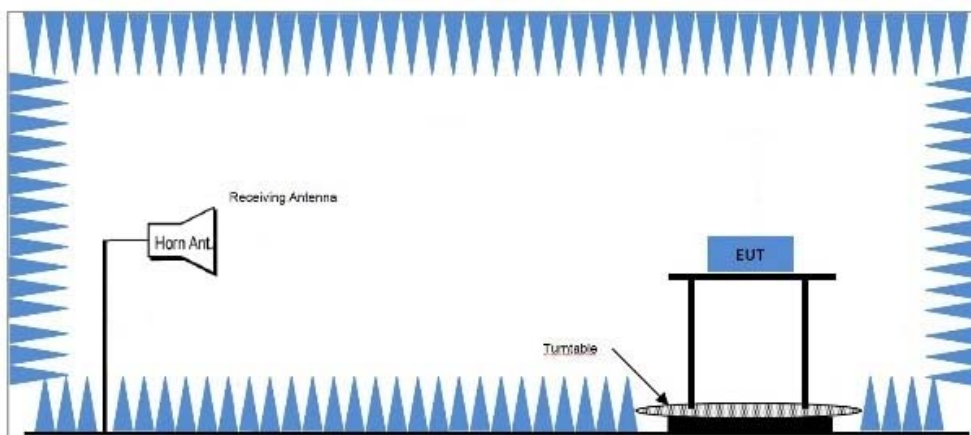
Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

▣ TEST CONFIGURATION

Below 30 MHz



Above 1 GHz



TEST PROCEDURE USED

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603E-2016.

- a) The Resolution Bandwidth for scanning Radiated Emission below 1 GHz is 100 kHz with Video Bandwidth = 300 kHz and Resolution Bandwidth for above 1 GHz is 1 MHz with Video Bandwidth = 3 MHz.
 - b) Detector mode is peak.
 - c) In the fully-anechoic chamber, setup as illustrated above the DUT placed on the 2.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization.
The “Read Value” is the spectrum reading the maximum power value.
 - d) 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 to find the maximum radiation power.
Record the power level of maximum radiation power from spectrum.
So, the measured Factor value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4) Result(dBm) = “Reading” + Factor

▣ TEST RESULTS

16K0F3E

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
470.05	940.10	V	-84.74	39.939	-44.80	-13.00	31.80
	1410.15	V	-35.95	-6.300	-42.25	-13.00	29.25
	1880.20	H	-40.65	-6.939	-47.59	-13.00	34.59
	2350.25	V	-44.02	-3.200	-47.22	-13.00	34.22
	2820.30	V	-44.83	-1.694	-46.52	-13.00	33.52
	4230.45	H	-51.53	3.338	-48.19	-13.00	35.19
	4700.50	H	-49.95	5.065	-44.89	-13.00	31.89
	5170.55	H	-47.14	6.513	-40.63	-13.00	27.63

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
491.05	982.10	H	-79.84	40.284	-39.56	-13.00	26.56
	1473.15	H	-33.99	-7.543	-41.53	-13.00	28.53
	1964.20	H	-44.98	-5.864	-50.84	-13.00	37.84
	2455.25	V	-40.79	-3.074	-43.86	-13.00	30.86
	2946.30	H	-49.13	-0.503	-49.63	-13.00	36.63
	3437.35	V	-49.95	0.250	-49.70	-13.00	36.70
	3928.40	V	-47.62	2.552	-45.07	-13.00	32.07
	4419.45	H	-46.70	4.235	-42.47	-13.00	29.47
	4910.50	V	-39.95	5.617	-34.33	-13.00	21.33
	5401.55	V	-42.75	7.014	-35.74	-13.00	22.74

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-35.51	-8.977	-44.49	-13.00	31.49
	1535.85	V	-37.36	-7.372	-44.73	-13.00	31.73
	2047.80	V	-31.74	-4.931	-36.67	-13.00	23.67
	2559.75	H	-44.60	-3.009	-47.61	-13.00	34.61
	3071.70	H	-44.73	-0.424	-45.15	-13.00	32.15
	3583.65	V	-45.65	1.276	-44.37	-13.00	31.37
	4095.60	H	-40.35	3.050	-37.30	-13.00	24.30
	4607.55	V	-41.89	4.746	-37.14	-13.00	24.14
	5119.50	V	-34.16	6.305	-27.85	-13.00	14.85
	5631.45	V	-38.54	7.270	-31.27	-13.00	18.27

11K0F3E

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
450.05	900.10	H	-79.58	39.262	-40.32	-20.00	20.32
	1350.15	V	-35.65	-6.467	-42.12	-20.00	22.12
	1800.20	V	-46.65	-6.939	-53.59	-20.00	33.59
	2250.25	H	-44.35	-2.913	-47.26	-20.00	27.26
	2700.30	H	-49.87	-2.277	-52.15	-20.00	32.15
	3600.40	H	-50.21	1.132	-49.08	-20.00	29.08
	4950.55	V	-50.06	5.779	-44.28	-20.00	24.28

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
481.05	962.10	H	-81.25	40.092	-41.16	-20.00	21.16
	1443.15	V	-35.19	-6.849	-42.04	-20.00	22.04
	1924.20	V	-37.49	-6.405	-43.90	-20.00	23.90
	2405.25	H	-43.85	-3.593	-47.44	-20.00	27.44
	2886.30	H	-46.88	-1.283	-48.16	-20.00	28.16
	5291.55	V	-48.72	6.434	-42.29	-20.00	22.29

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-35.55	-8.977	-44.53	-20.00	24.53
	1535.85	V	-37.18	-7.372	-44.55	-20.00	24.55
	2047.80	V	-31.63	-4.931	-36.56	-20.00	16.56
	2559.75	H	-44.36	-3.009	-47.37	-20.00	27.37
	3071.70	H	-45.02	-0.424	-45.44	-20.00	25.44
	3583.65	V	-46.04	1.276	-44.76	-20.00	24.76
	4095.60	H	-40.36	3.050	-37.31	-20.00	17.31
	4607.55	V	-42.08	4.746	-37.33	-20.00	17.33
	5119.50	V	-34.02	6.305	-27.71	-20.00	7.71
	5631.45	V	-38.83	7.270	-31.56	-20.00	11.56

8K30F1E, 8K30F1D, 8K30F7W

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
450.05	900.10	H	-79.58	39.262	-40.32	-20.00	20.32
	1350.15	V	-36.01	-6.467	-42.48	-20.00	22.48
	1800.20	V	-47.01	-6.939	-53.95	-20.00	33.95
	2250.25	H	-44.79	-2.913	-47.70	-20.00	27.70
	2700.30	H	-50.24	-2.277	-52.52	-20.00	32.52
	3600.40	H	-50.73	1.132	-49.60	-20.00	29.60
	4950.55	V	-50.67	5.779	-44.89	-20.00	24.89

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
481.05	962.10	H	-81.25	40.092	-41.16	-20.00	21.16
	1443.15	V	-35.69	-6.849	-42.54	-20.00	22.54
	1924.20	V	-37.76	-6.405	-44.16	-20.00	24.16
	2405.25	H	-44.48	-3.593	-48.08	-20.00	28.08
	2886.30	H	-47.15	-1.283	-48.44	-20.00	28.44
	5291.55	V	-48.95	6.434	-42.52	-20.00	22.52

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-35.77	-8.977	-44.74	-20.00	24.74
	1535.85	V	-37.51	-7.372	-44.88	-20.00	24.88
	2047.80	V	-31.91	-4.931	-36.84	-20.00	16.84
	2559.75	H	-44.88	-3.009	-47.89	-20.00	27.89
	3071.70	H	-45.28	-0.424	-45.70	-20.00	25.70
	3583.65	V	-46.60	1.276	-45.33	-20.00	25.33
	4095.60	H	-40.77	3.050	-37.72	-20.00	17.72
	4607.55	V	-42.34	4.746	-37.60	-20.00	17.60
	5119.50	V	-34.55	6.305	-28.24	-20.00	8.24
	5631.45	V	-39.16	7.270	-31.89	-20.00	11.89

7K60FXD, 7K60FXE

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
450.05	900.10	H	-79.58	39.262	-40.32	-20.00	20.32
	1350.15	V	-36.01	-6.467	-42.48	-20.00	22.48
	1800.20	V	-47.35	-6.939	-54.28	-20.00	34.28
	2250.25	H	-44.86	-2.913	-47.77	-20.00	27.77
	2700.30	H	-50.45	-2.277	-52.72	-20.00	32.72
	3600.40	H	-50.66	1.132	-49.53	-20.00	29.53
	4950.55	V	-50.33	5.779	-44.55	-20.00	24.55

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
481.05	962.10	H	-81.25	40.092	-41.16	-20.00	21.16
	1443.15	V	-35.66	-6.849	-42.50	-20.00	22.50
	1924.20	V	-38.08	-6.405	-44.48	-20.00	24.48
	2405.25	H	-44.08	-3.593	-47.68	-20.00	27.68
	2886.30	H	-47.17	-1.283	-48.45	-20.00	28.45
	5291.55	V	-49.17	6.434	-42.74	-20.00	22.74

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-36.12	-8.977	-45.10	-20.00	25.10
	1535.85	V	-37.75	-7.372	-45.12	-20.00	25.12
	2047.80	V	-32.29	-4.931	-37.22	-20.00	17.22
	2559.75	H	-44.63	-3.009	-47.64	-20.00	27.64
	3071.70	H	-45.56	-0.424	-45.98	-20.00	25.98
	3583.65	V	-46.40	1.276	-45.13	-20.00	25.13
	4095.60	H	-41.01	3.050	-37.96	-20.00	17.96
	4607.55	V	-42.75	4.746	-38.01	-20.00	18.01
	5119.50	V	-34.72	6.305	-28.41	-20.00	8.41
	5631.45	V	-39.31	7.270	-32.04	-20.00	12.04

4K00F1E, 4K00F1D, 4K00F7W

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
450.05	900.10	H	-79.58	39.262	-40.32	-25.00	15.32
	1350.15	V	-36.69	-6.467	-43.16	-25.00	18.16
	1800.20	V	-47.97	-6.939	-54.91	-25.00	29.91
	2250.25	H	-45.21	-2.913	-48.13	-25.00	23.13
	2700.30	H	-50.58	-2.277	-52.86	-25.00	27.86
	3600.40	H	-50.85	1.132	-49.71	-25.00	24.71
	4950.55	V	-50.84	5.779	-45.07	-25.00	20.07

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
481.05	962.10	H	-81.25	40.092	-41.16	-25.00	16.16
	1443.15	V	-35.42	-6.849	-42.27	-25.00	17.27
	1924.20	V	-37.96	-6.405	-44.36	-25.00	19.36
	2405.25	H	-44.52	-3.593	-48.11	-25.00	23.11
	2886.30	H	-47.44	-1.283	-48.73	-25.00	23.73
	5291.55	V	-48.94	6.434	-42.51	-25.00	17.51

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-35.81	-8.977	-44.78	-25.00	19.78
	1535.85	V	-37.63	-7.372	-45.00	-25.00	20.00
	2047.80	V	-32.23	-4.931	-37.16	-25.00	12.16
	2559.75	H	-44.99	-3.009	-48.00	-25.00	23.00
	3071.70	H	-45.47	-0.424	-45.90	-25.00	20.90
	3583.65	V	-46.59	1.276	-45.32	-25.00	20.32
	4095.60	H	-40.77	3.050	-37.72	-25.00	12.72
	4607.55	V	-42.61	4.746	-37.86	-25.00	12.86
	5119.50	V	-34.66	6.305	-28.35	-25.00	3.35
	5631.45	V	-39.19	7.270	-31.92	-25.00	6.92

4K00F2D

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
450.05	900.10	H	-79.58	39.262	-40.32	-25.00	15.32
	1350.15	V	-36.20	-6.467	-42.67	-25.00	17.67
	1800.20	V	-47.08	-6.939	-54.02	-25.00	29.02
	2250.25	H	-45.02	-2.913	-47.93	-25.00	22.93
	2700.30	H	-50.54	-2.277	-52.82	-25.00	27.82
	3600.40	H	-50.66	1.132	-49.52	-25.00	24.52
	4950.55	V	-50.64	5.779	-44.86	-25.00	19.86

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
481.05	962.10	H	-81.25	40.092	-41.16	-25.00	16.16
	1443.15	V	-35.50	-6.849	-42.35	-25.00	17.35
	1924.20	V	-37.98	-6.405	-44.39	-25.00	19.39
	2405.25	H	-44.26	-3.593	-47.85	-25.00	22.85
	2886.30	H	-47.54	-1.283	-48.82	-25.00	23.82
	5291.55	V	-48.99	6.434	-42.55	-25.00	17.55

Test Frequency (MHz)	Measured Frequency (MHz)	Pol	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
511.95	1023.90	H	-35.75	-8.977	-44.73	-25.00	19.73
	1535.85	V	-37.44	-7.372	-44.81	-25.00	19.81
	2047.80	V	-32.04	-4.931	-36.97	-25.00	11.97
	2559.75	H	-44.69	-3.009	-47.69	-25.00	22.69
	3071.70	H	-45.60	-0.424	-46.02	-25.00	21.02
	3583.65	V	-46.25	1.276	-44.97	-25.00	19.97
	4095.60	H	-40.68	3.050	-37.63	-25.00	12.63
	4607.55	V	-42.53	4.746	-37.78	-25.00	12.78
	5119.50	V	-34.45	6.305	-28.14	-25.00	3.14
	5631.45	V	-39.15	7.270	-31.88	-25.00	6.88

8.11 Necessary Bandwidth Calculations

Modulation : 16K0F3E (Authorized Bandwidth 20 kHz)	
Maximum Modulation (M), kHz	3
Maximum Deviation (D), kHz	5
Constant Factor (K)	1
Necessary Bandwidth (BN), kHz	$(2 \times M) + (2 \times D \times K) = 16.0$

Modulation : 11K0F3E (Authorized Bandwidth 11.25 kHz)	
Maximum Modulation (M), kHz	3
Maximum Deviation (D), kHz	2.5
Constant Factor (K)	1
Necessary Bandwidth (BN), kHz	$(2 \times M) + (2 \times D \times K) = 11.0$

Modulation : 8K30F1E, 8K30F1D, 8K30F7W (4Level FSK / 9600bps, Authorized Bandwidth 11.25 kHz)	
Digital information rate (R), bps	9600
Maximum Deviation (D), kHz	3.391
Signaling States (S)	4
Numerical factor (K)	0.516
Necessary Bandwidth (BN), kHz	$(R / \log_2 S) + 2DK = 8.3$

Modulation : 4K00F1E, 4K00F1D, 4K00F7W (4Level FSK / 4800bps, Authorized Bandwidth 6 kHz)	
Digital information rate (R), bps	4800
Maximum Deviation (D), kHz	1.55
Signaling States (S)	4
Numerical factor (K)	0.516
Necessary Bandwidth (BN), kHz	$(R / \log_2 S) + 2DK = 4.0$

Modulation : 7K60FXD, 7K60FXE	
Digital information rate (R), bps	9600
Maximum Deviation (D), kHz	3.024
Signaling States (S)	4
Numerical factor (K)	0.463
Necessary Bandwidth (BN), kHz	$(R / \log_2 S) + 2DK = 7.6$

Modulation : 4K00F2D (CWID, Authorized Bandwidth 6 kHz)	
Maximum Modulation (M), kHz	0.8
Maximum Deviation (D), kHz	1.2
Numerical factor (K)	1
Necessary Bandwidth (BN), kHz	$(2 \times M) + (2 \times D \times K) = 4.0$

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Agilent	N9020A/ Signal Analyzer	Annual	2020-05-23	MY51110085
Agilent	N9030A / Signal Analyzer	Annual	2020-01-10	MY49431210
Hewlett Packard	E3632A / DC Power Supply	Annual	2020-06-18	KR75303960
Agilent	N1911A/Power Meter	Annual	2020-04-10	MY45100523
Agilent	N1921A /POWER SENSOR	Annual	2020-04-10	MY52260025
TEKTRONIX	RSA3408A/SPECTRUM ANALYZER	Annual	2020-08-20	B010198
Hewlett Packard	8903B/Audio Analyzer	Annual	2020-09-25	3413A13913
Hewlett Packard	8901B/Modulation Analyzer	Annual	2020-09-27	3438A05231
Agilent	8498A/30 dB Attenuator	Annual	2020-02-18	51161
Hewlett Packard	8493C/ATTENUATOR(20dB)	Annual	2020-06-04	17280
EAGLE	230NFM/Tuneable Notch Filter	Annual	2020-10-14	H00564-9
EAGLE	230NFM/Tuneable Notch Filter	Annual	2020-10-15	H00564-10
ESPEC	SU-642 / Chamber	Annual	2020-03-12	0093008124
CERNEX	CBLU1183540B-01/AMP	Annual	2020-06-03	26822
Wainwright	WHKX10-900-1000-15000/H.P.F	Annual	2020-07-15	5
Rohde & Schwarz	Loop Antenna	Biennial	2021-01-18	1513-175
Schwarzbeck	VULB9160/ Bilog Antenna	Biennial	2021-03-12	3150
Schwarzbeck	VULB9160/ Bilog Antenna	Biennial	2020-08-09	9160-3368
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	Biennial	2020-08-29	147
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	Biennial	2021-09-25	9120D-1298
REOHDE&SCHWARZ	FSV30/Spectrum Analyzer	Annual	2020-05-09	100854
Inn-co GmbH	DE 3260/Turn table	N/A	N/A	N/A
EMERSON&CUMING	10m×5m×5m/ Full anechoic chamber	N/A	N/A	N/A

Note:

1. Model / Equipment : 230NFM/Tuneable Notch Filter

- Use date of Equipment : November 01, 2019 ~ November 04, 2019

10. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-1911-FC005-P