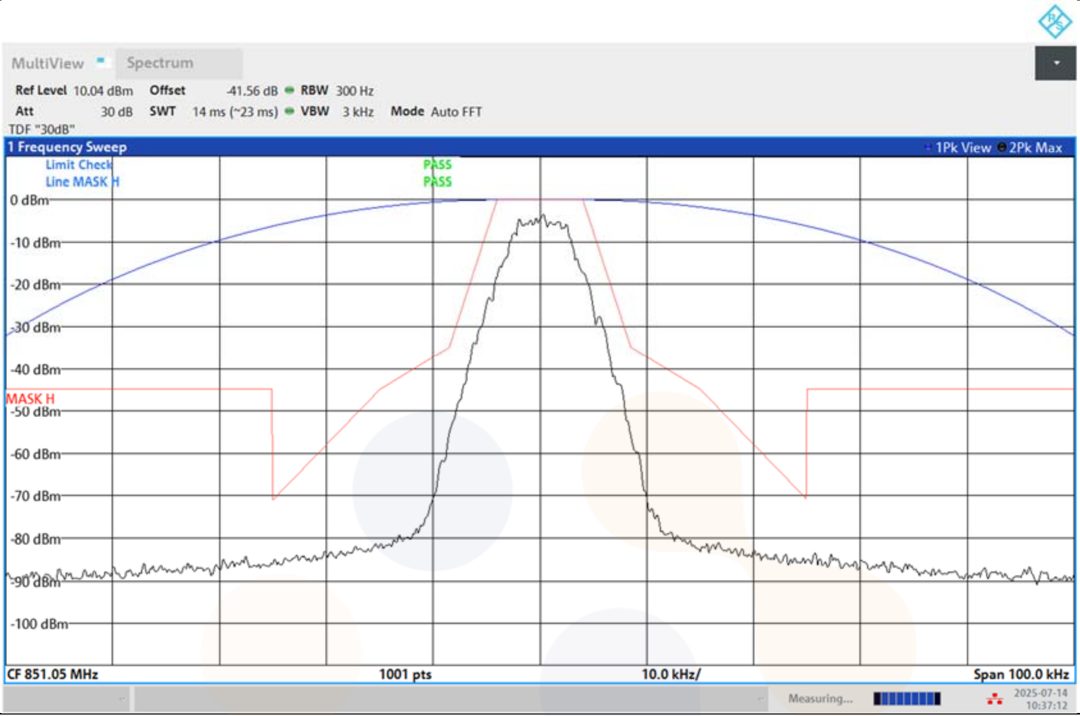
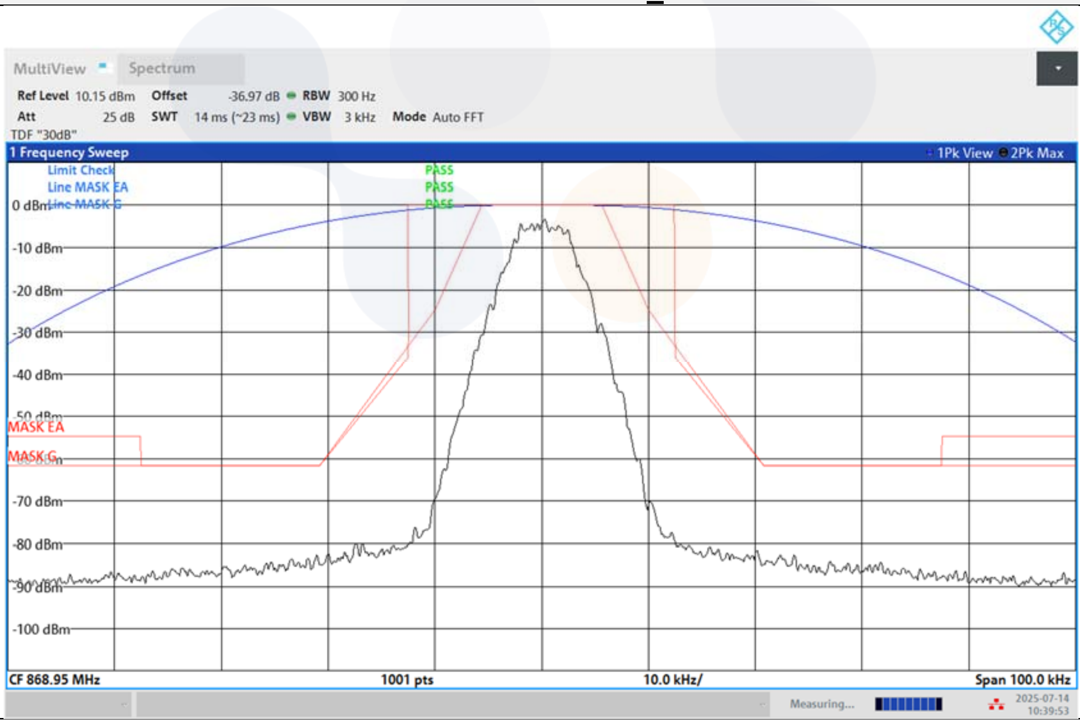
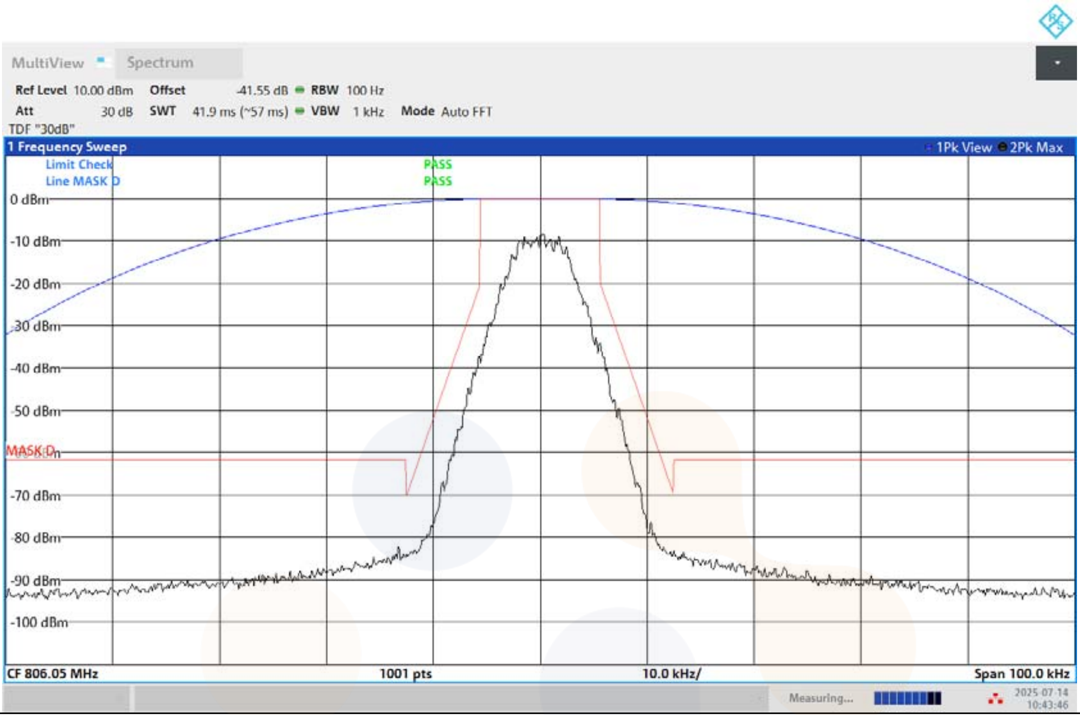
High Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 851.05 ㎒
Emission Mask : FCC_H



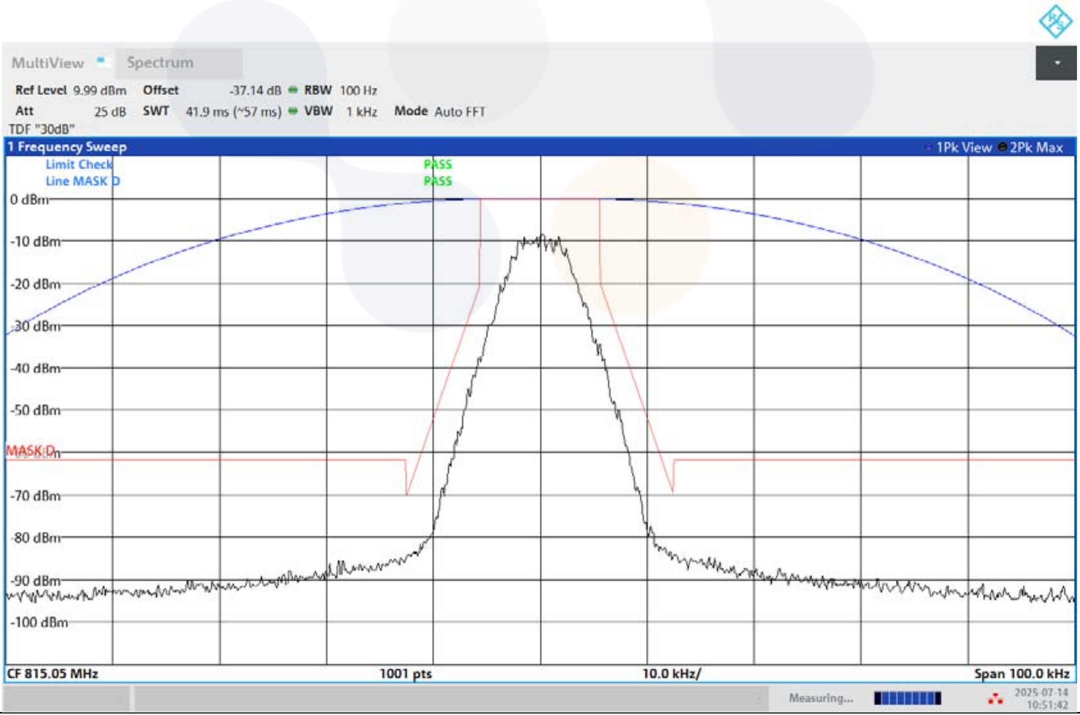
Low Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 868.95 ㎒
Emission Mask : FCC_G/EA



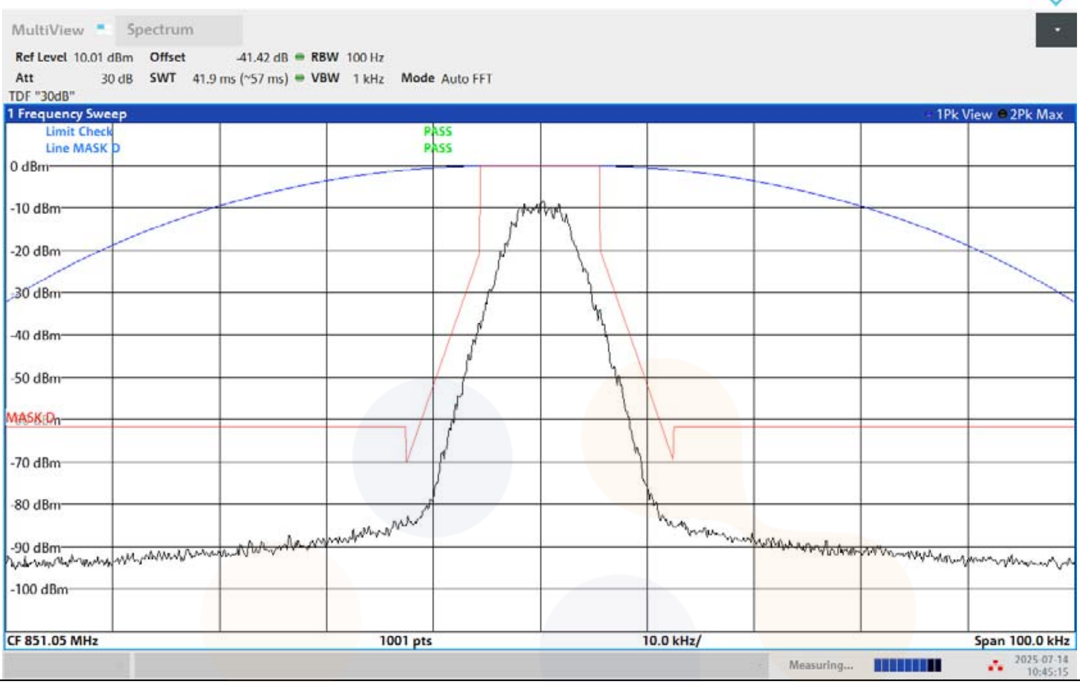
High Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 806.05 ㎒
Emission Mask : IC_D



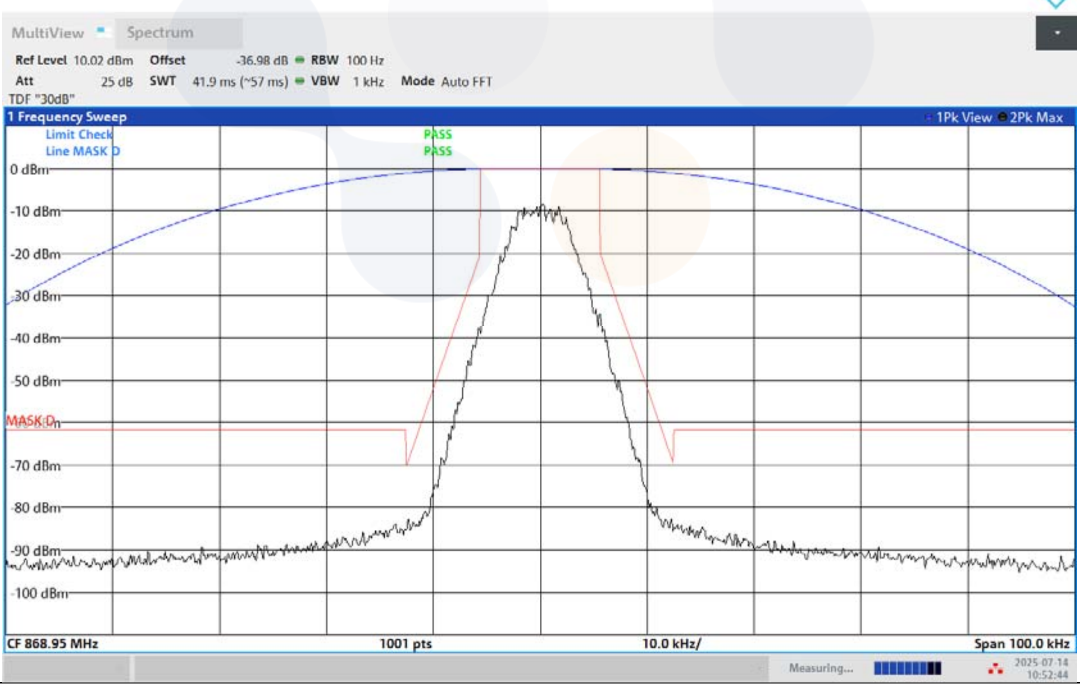
Low Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 815.05 ㎒
Emission Mask : IC_D



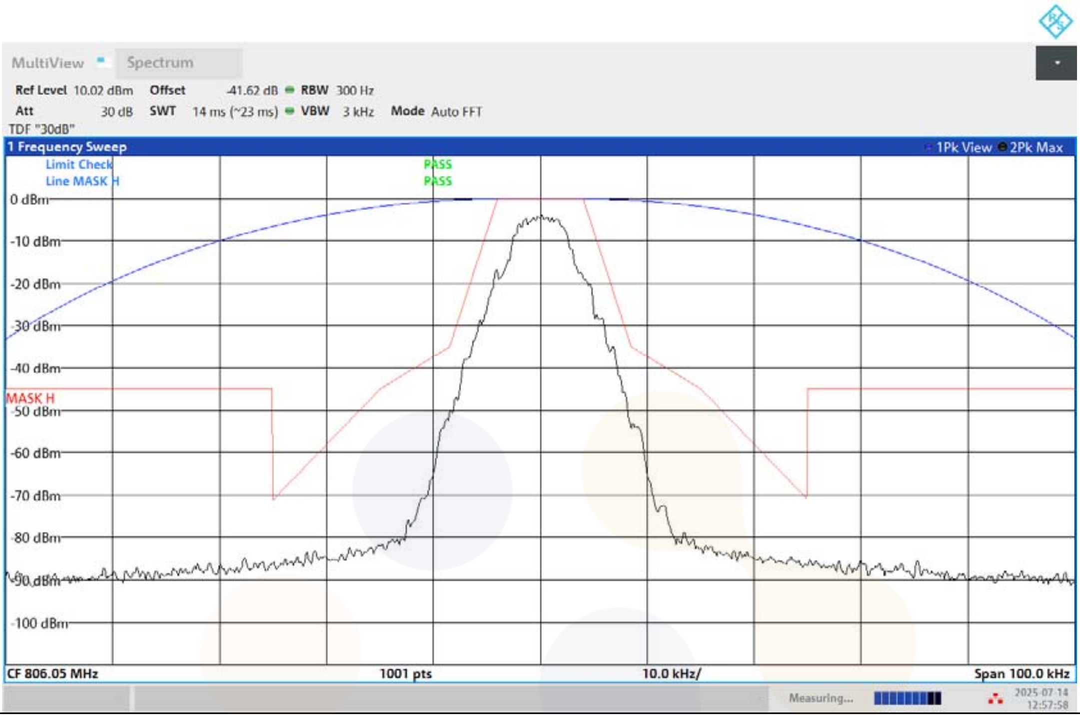
High Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 851.05 ㎒
Emission Mask : IC_D



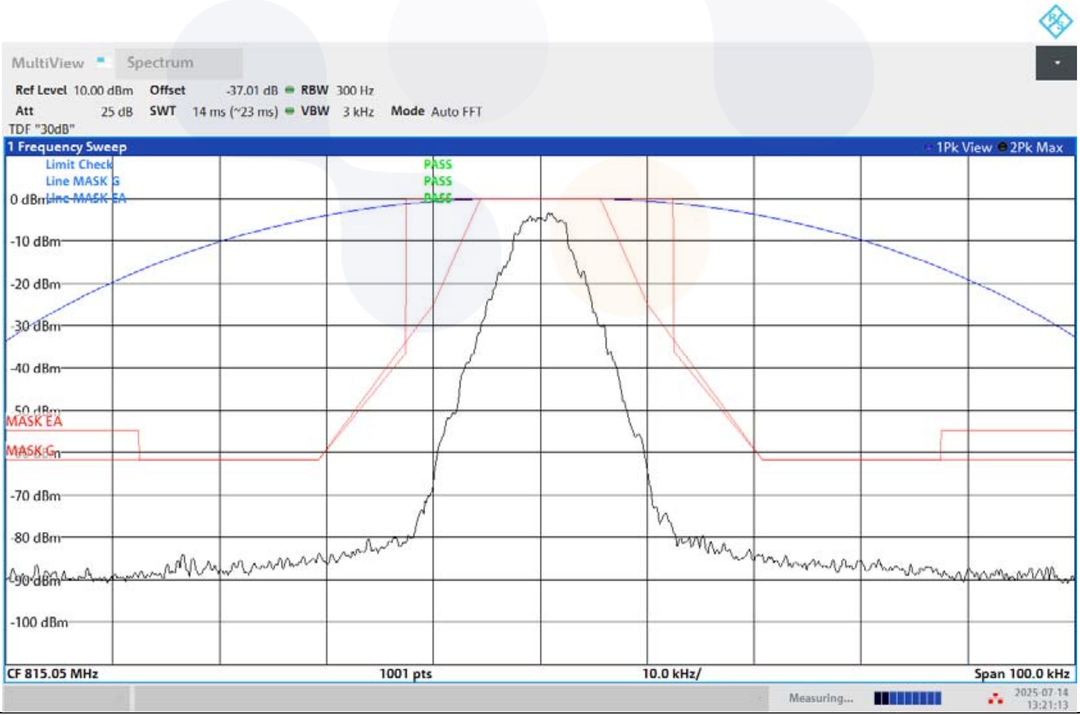
Low Power / 8K30F1E, 8K30F1D, 8K30F7W / Without Audio Filter / 868.95 ㎒
Emission Mask : IC_D



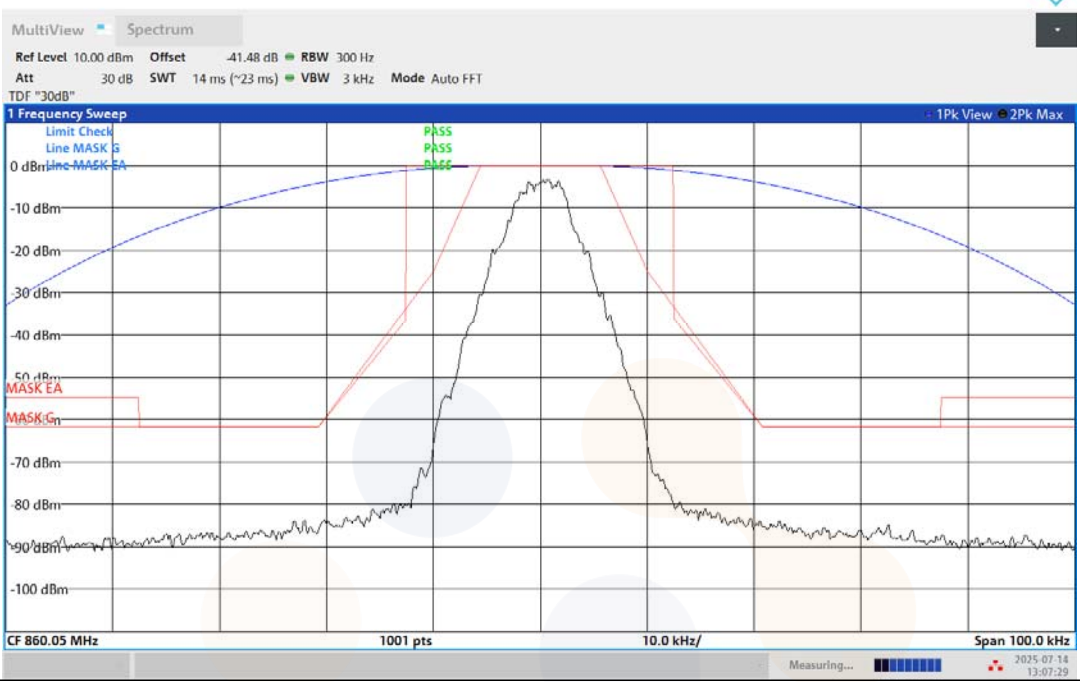
High Power / 7K60FXD, 7K60FXE / Without Audio Filter / 806.05 ㎒
Emission Mask : FCC_H



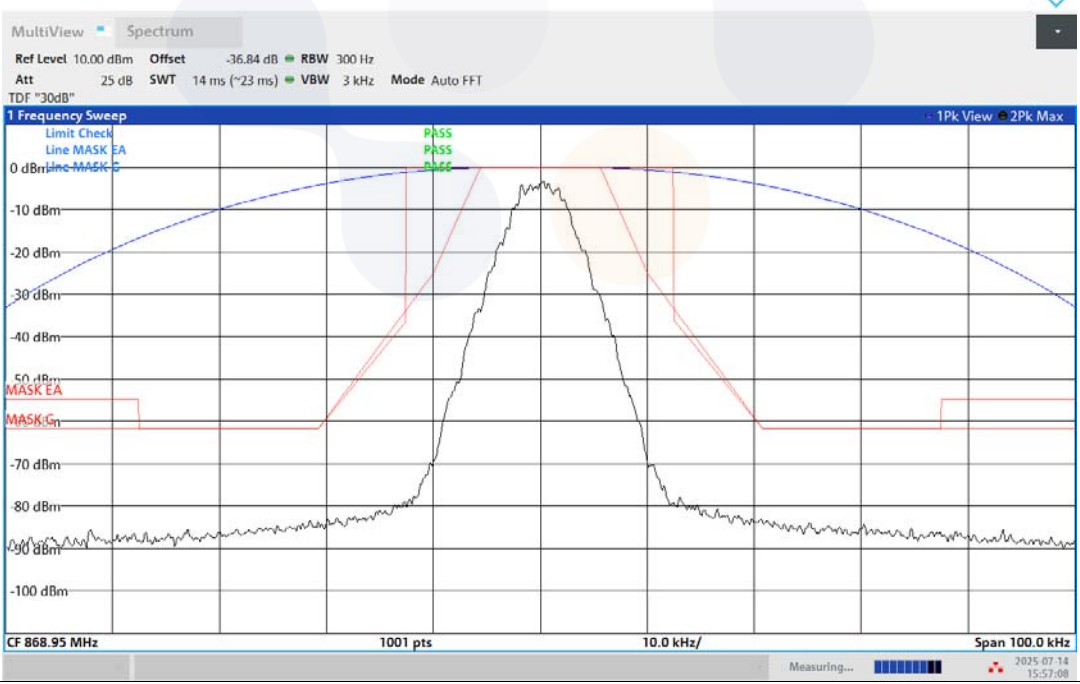
Low Power / 7K60FXD, 7K60FXE / Without Audio Filter / 815.05 ㎒
Emission Mask : FCC_G/EA



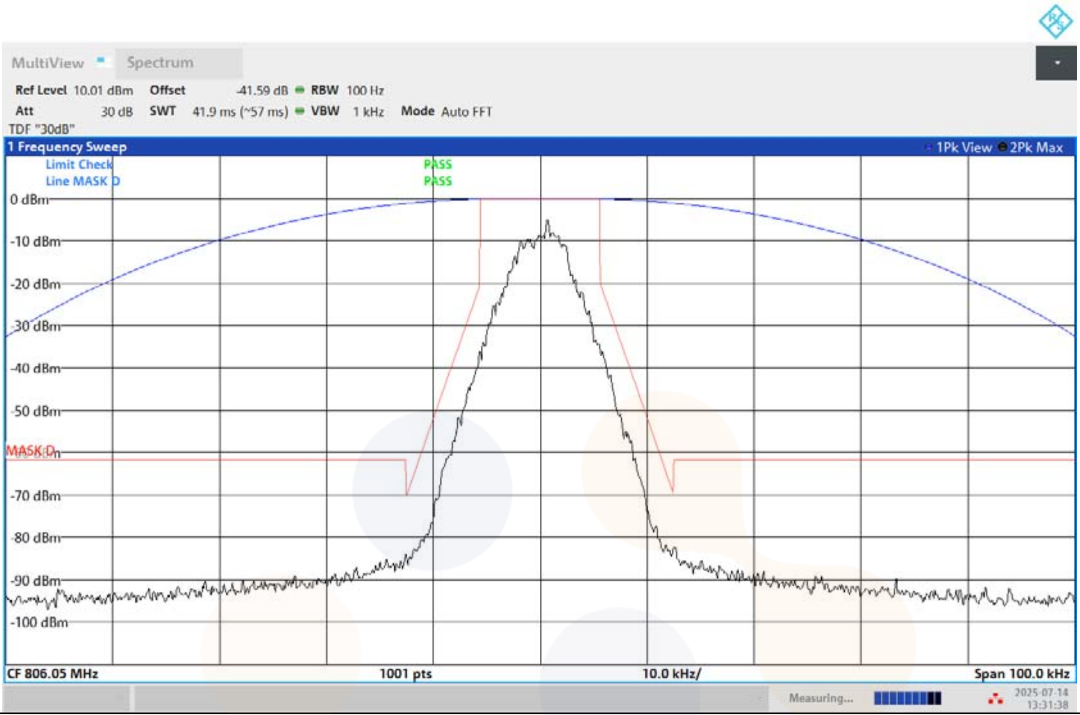
High Power / 7K60FXD, 7K60FXE / Without Audio Filter / 860.05 ㎒
Emission Mask : FCC_G/EA



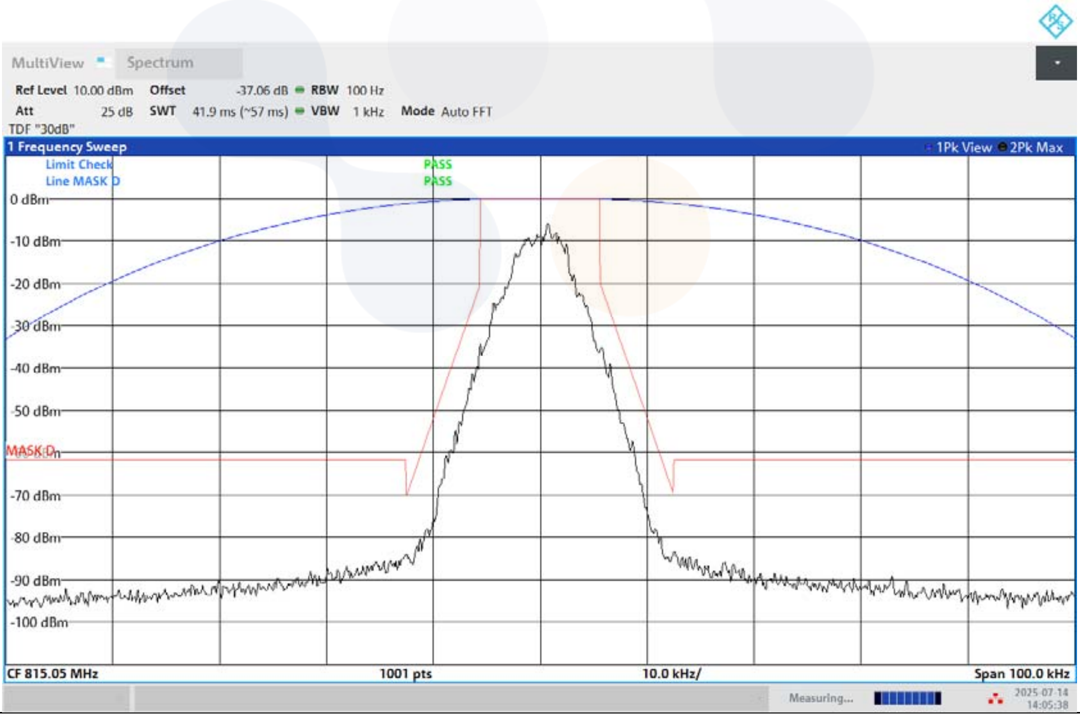
Low Power / 7K60FXD, 7K60FXE / Without Audio Filter / 868.95 ㎒
Emission Mask : FCC_ G/EA

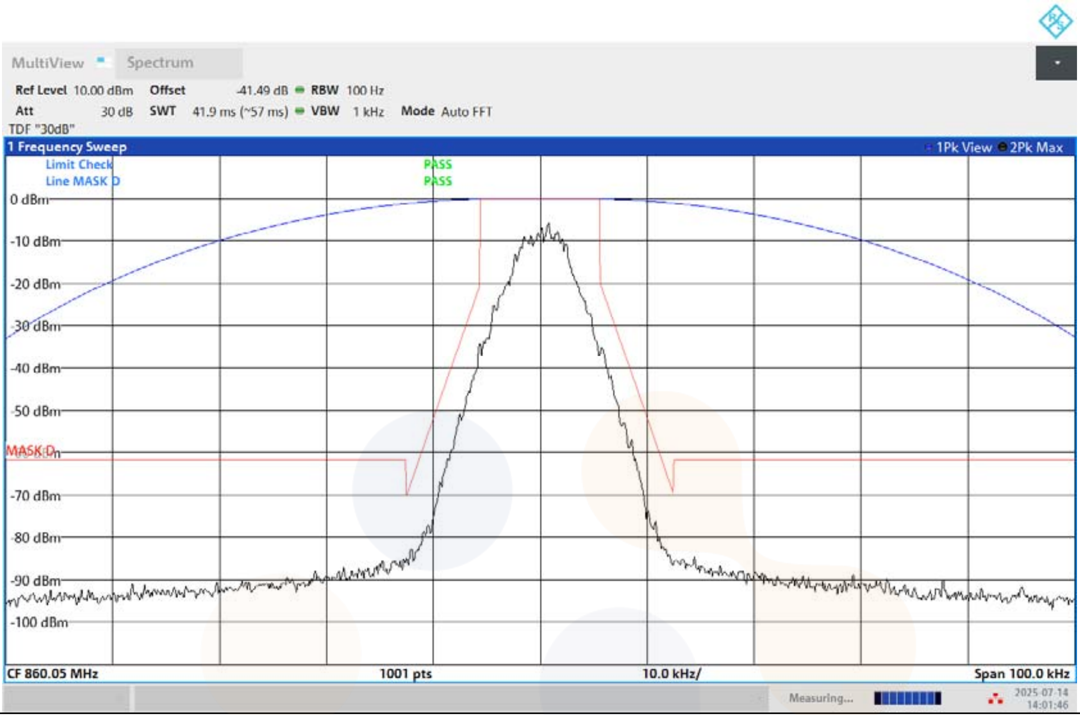
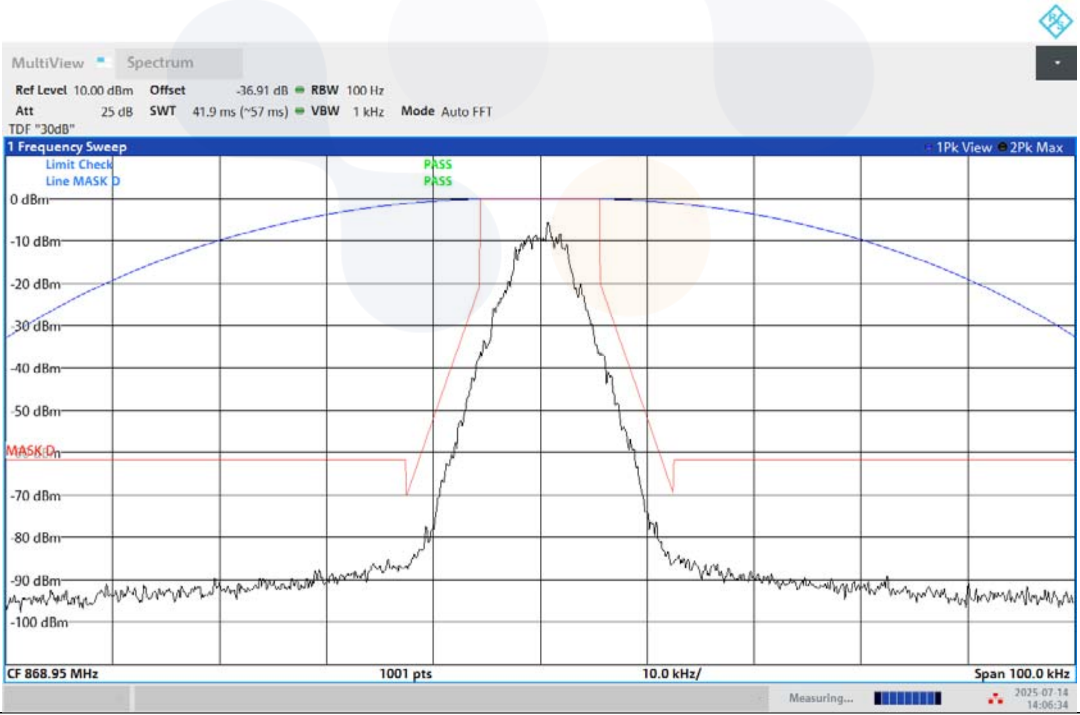


High Power / 7K60FXD, 7K60FXE / Without Audio Filter / 806.05 ㎒
Emission Mask : IC_D

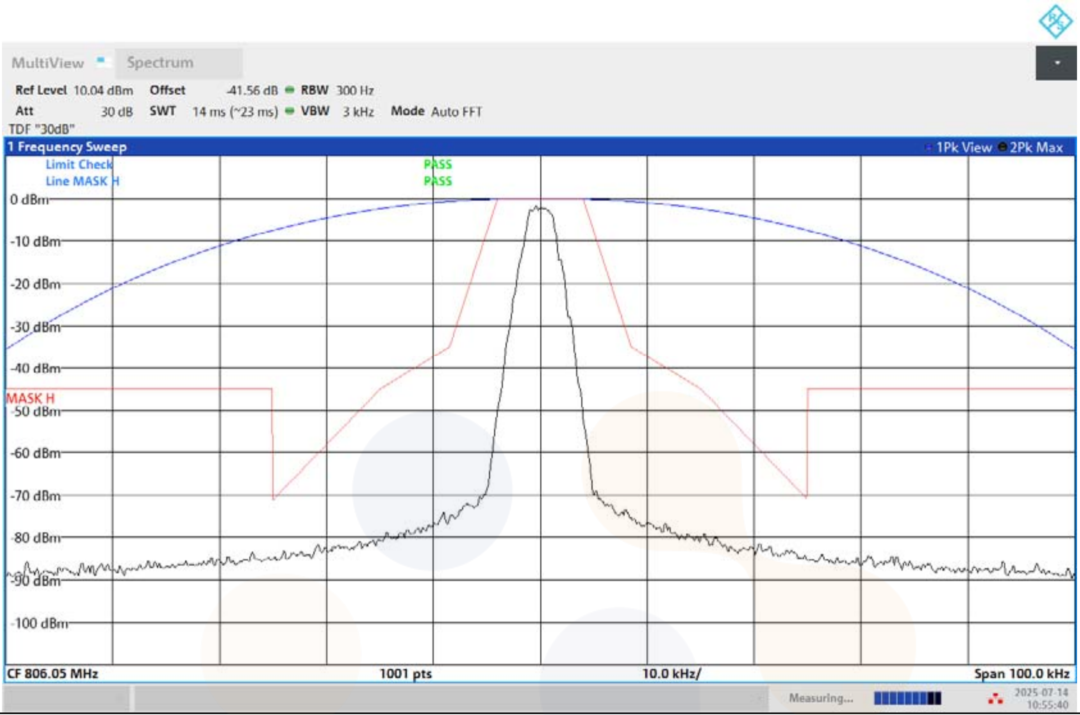


Low Power / 7K60FXD, 7K60FXE / Without Audio Filter / 815.05 ㎒
Emission Mask : IC_D

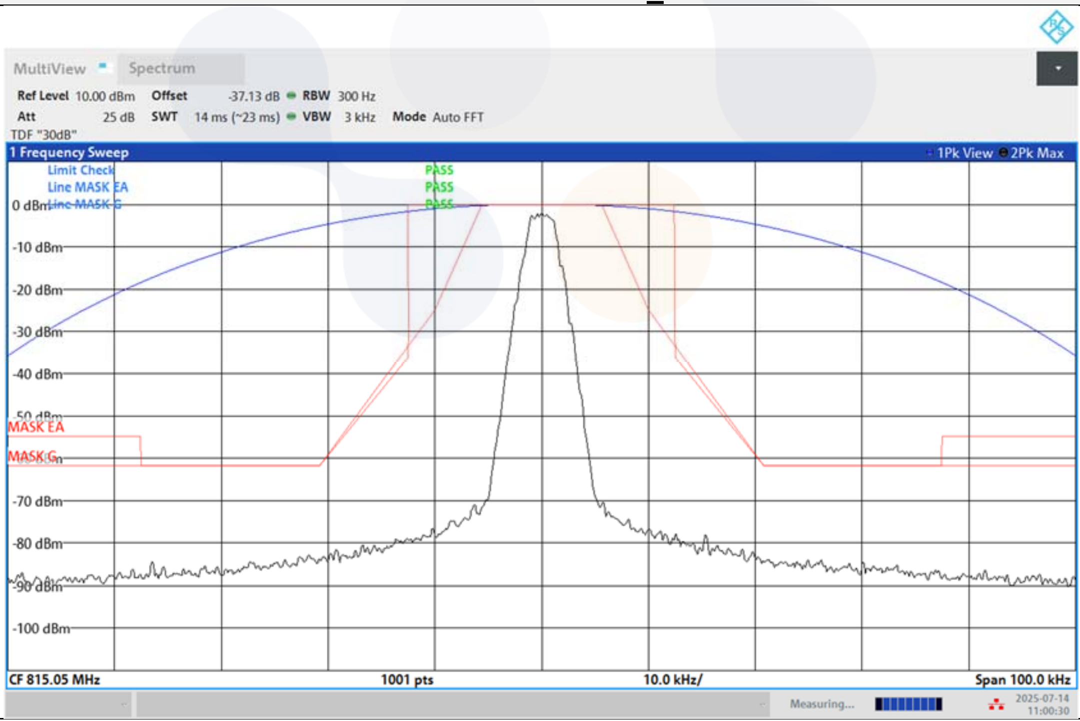


High Power / 7K60FXD, 7K60FXE / Without Audio Filter / 860.05 ㎒ Emission Mask : IC_D

Low Power / 7K60FXD, 7K60FXE / Without Audio Filter / 868.95 ㎒ Emission Mask : IC_D


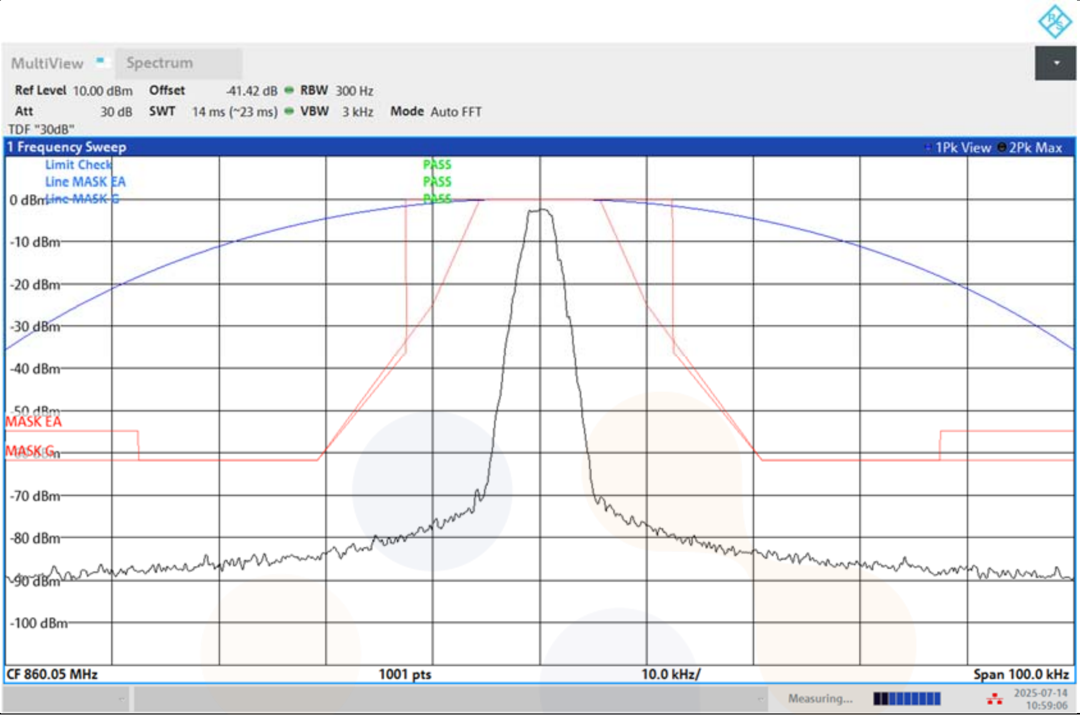
High Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 806.05 ㎒
Emission Mask : FCC_H



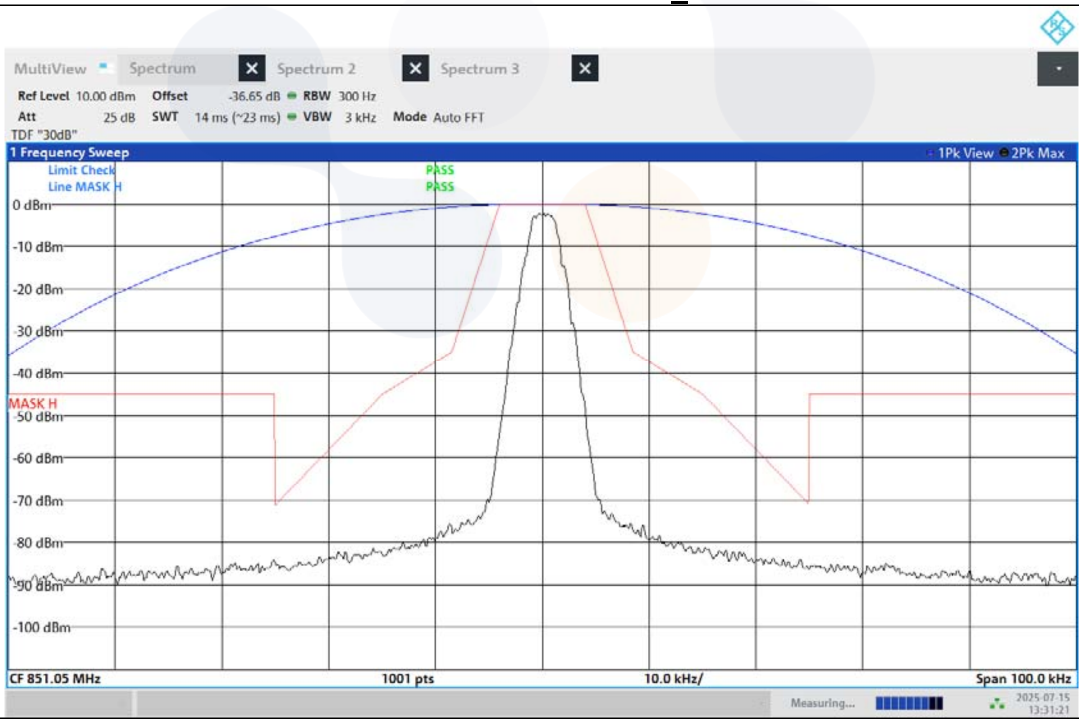
Low Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 815.05 ㎒
Emission Mask : FCC_G/EA



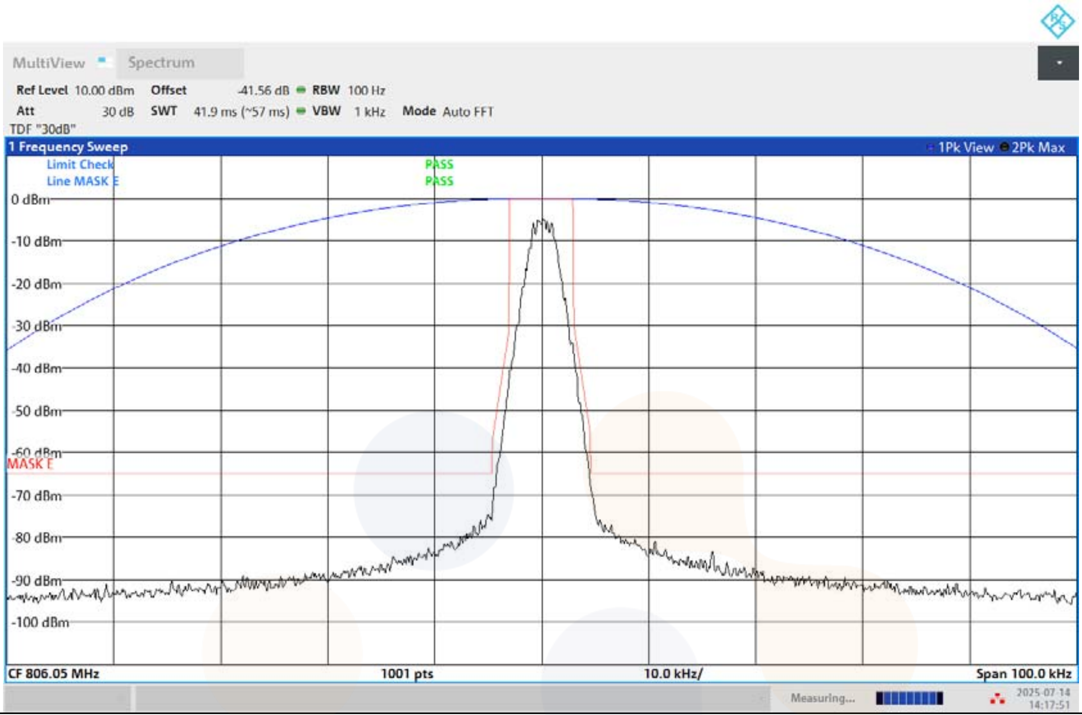
High Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 860.05 ㎒
Emission Mask : FCC_G/EA



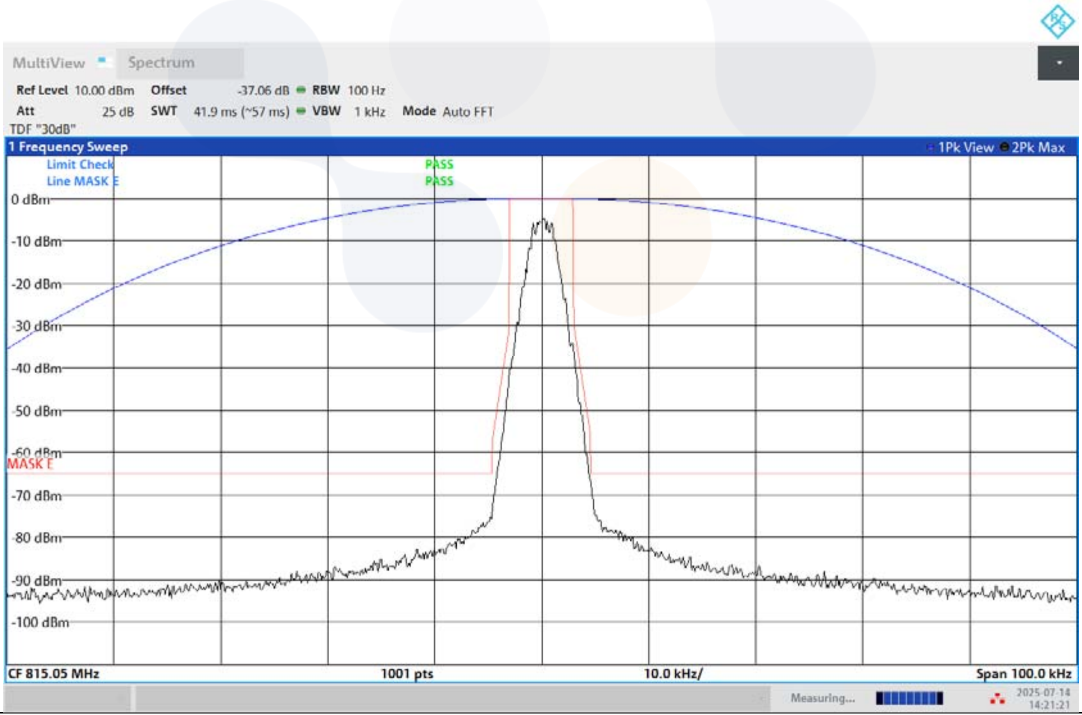
Low Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 851.05 ㎒
Emission Mask : FCC_H



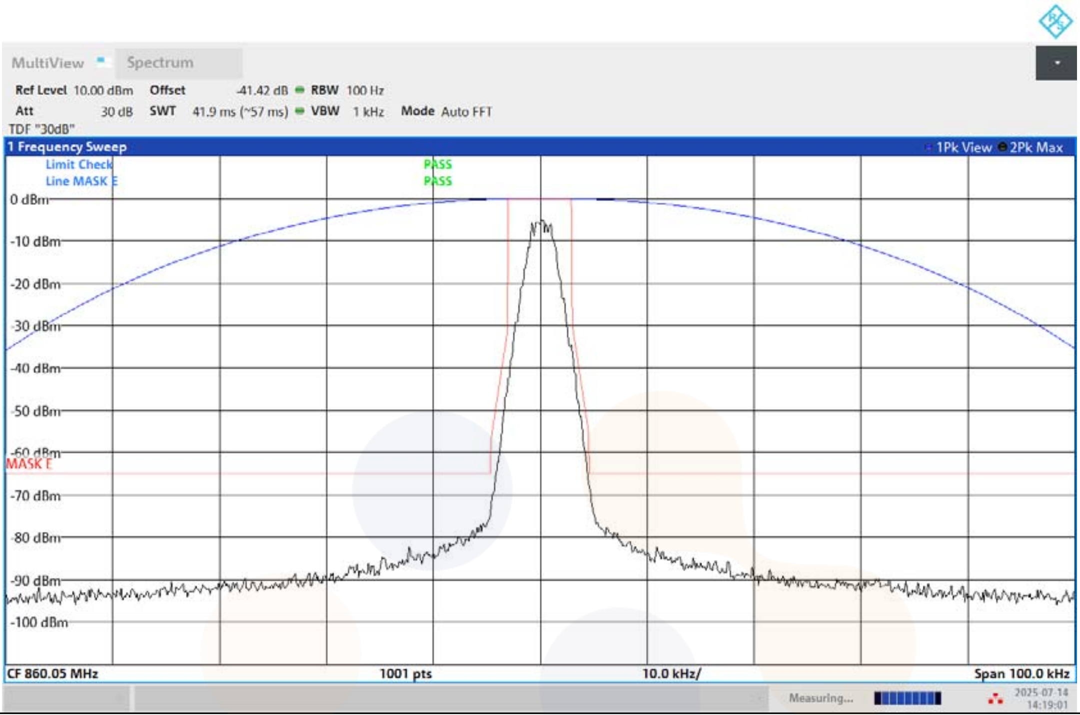
High Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 806.05 ㎒
Emission Mask : IC_E



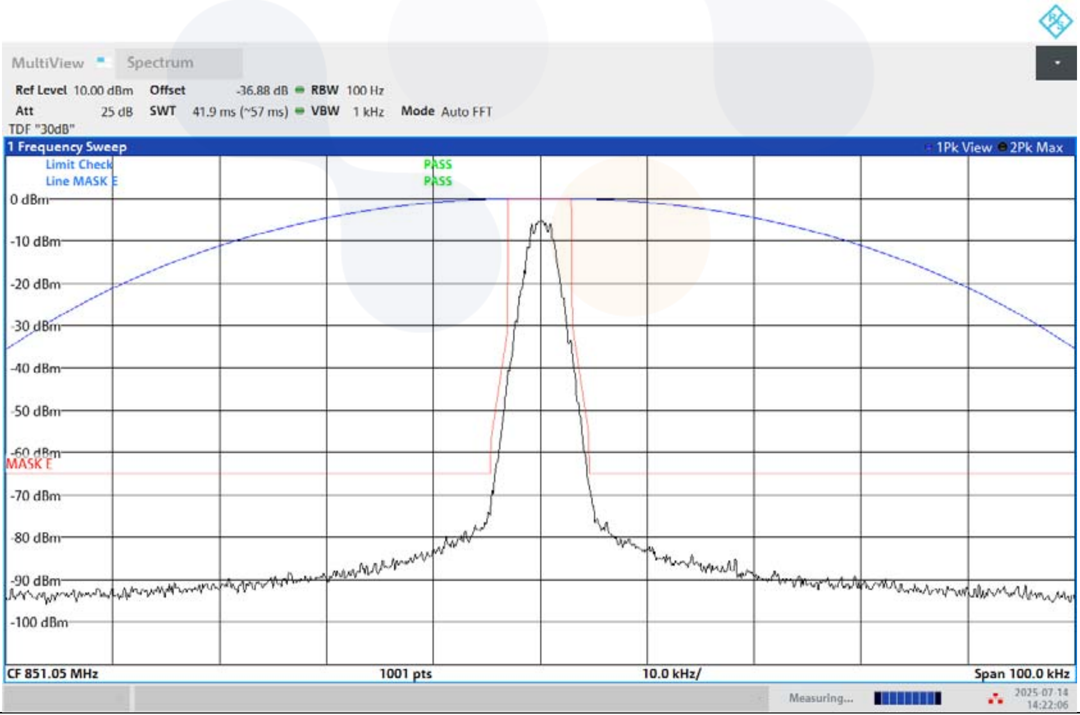
Low Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 815.05 ㎒
Emission Mask : IC_E

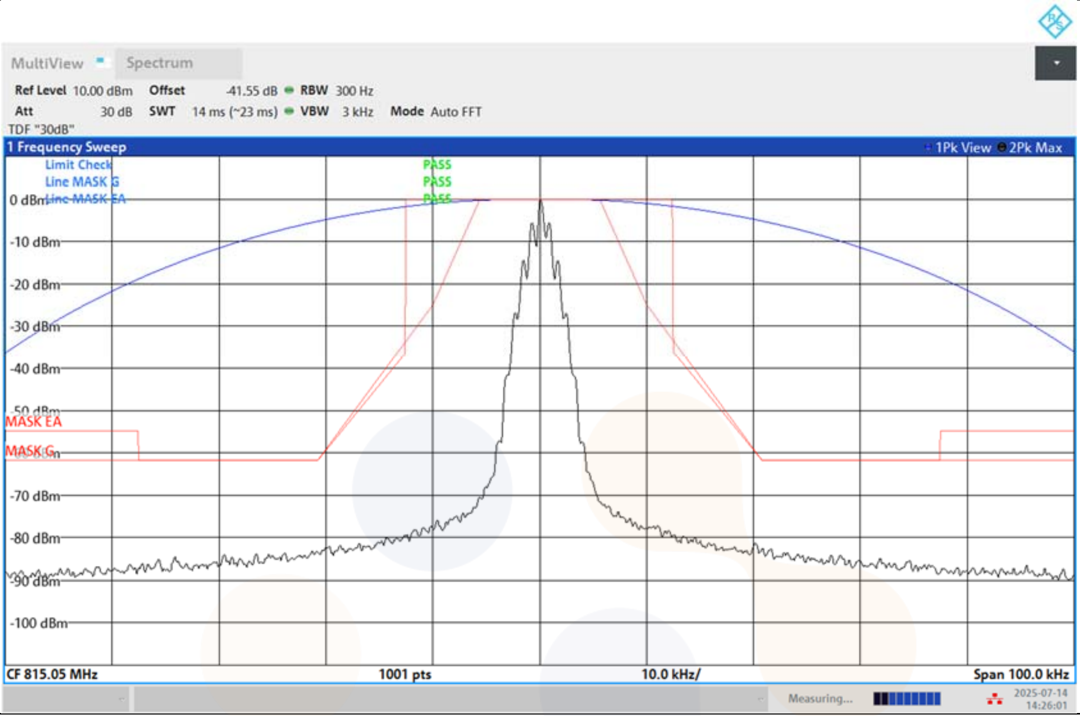
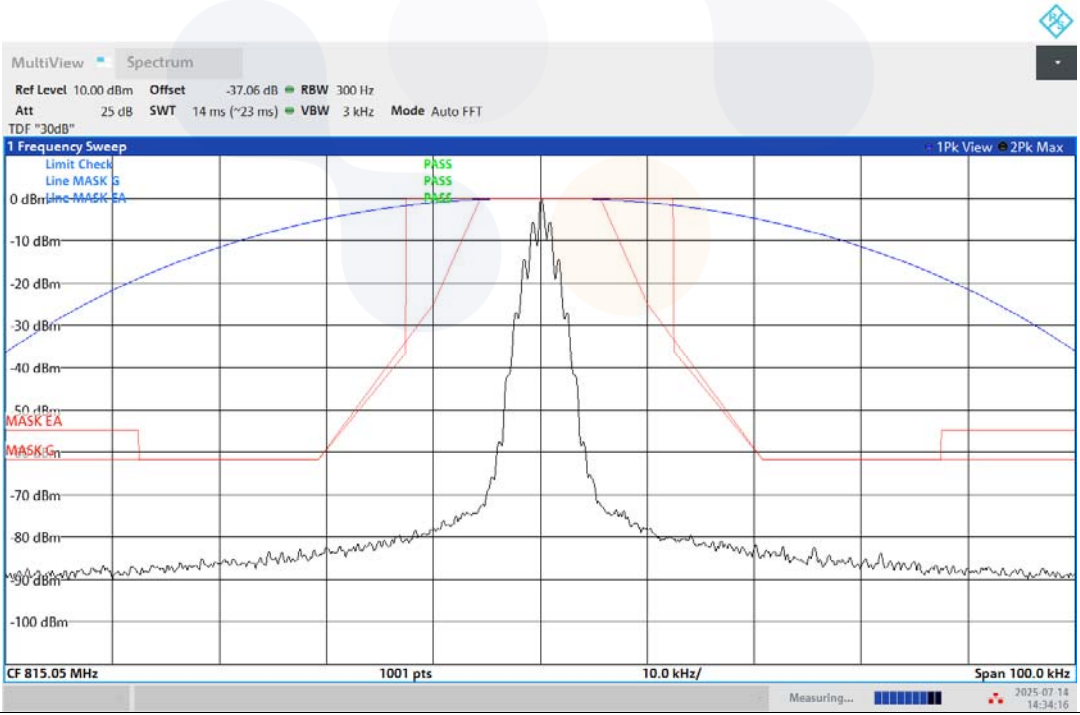


High Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 860.05 ㎒
Emission Mask : IC_E

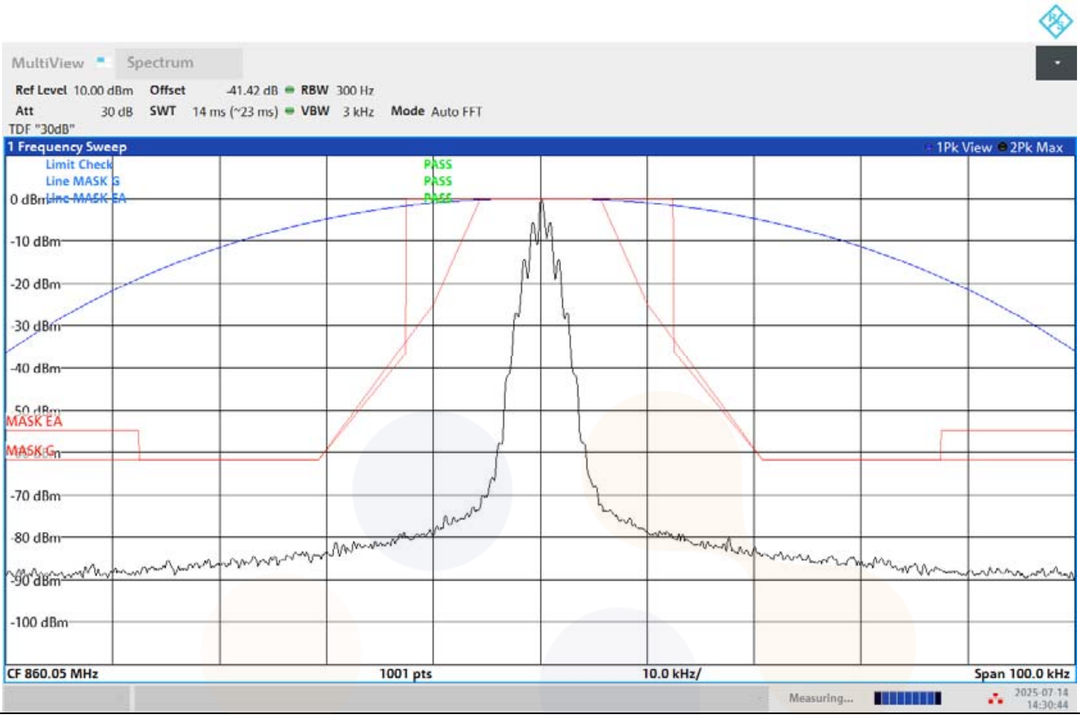


Low Power / 4K00F1E, 4K00F1D, 4K00F7W / Without Audio Filter / 851.05 ㎒
Emission Mask : IC_E

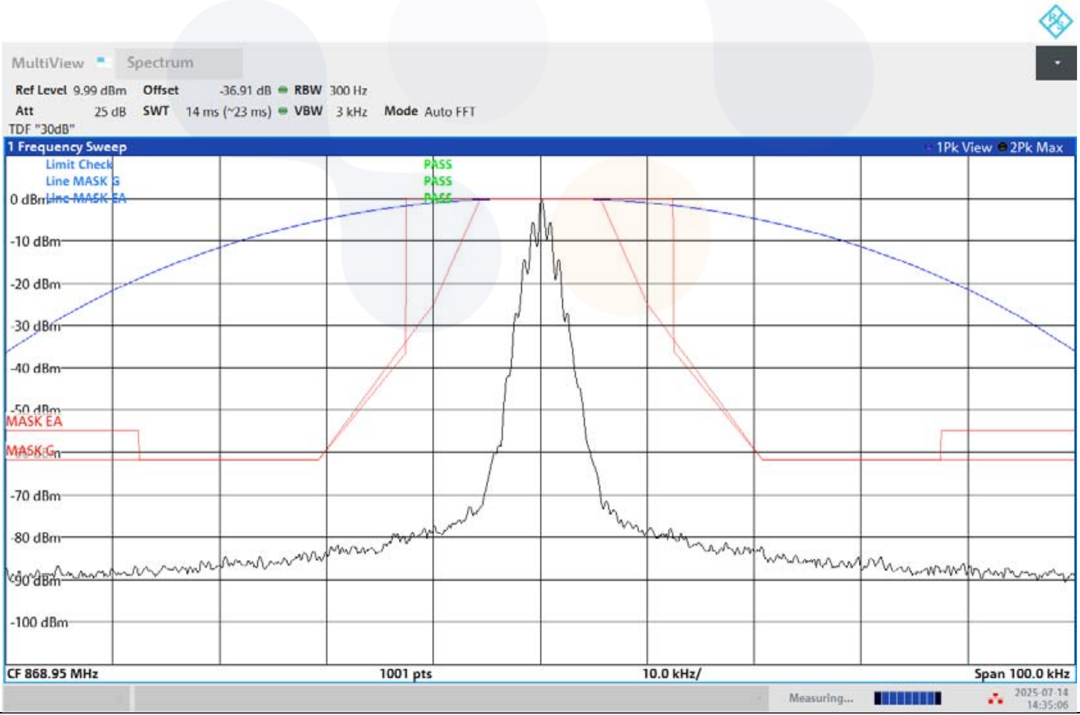


High Power / 4K00F2D / Without Audio Filter / 815.05 ㎒ Emission Mask : FCC_G/EA

Low Power / 4K00F2D / Without Audio Filter / 815.05 ㎒ Emission Mask : FCC_G/EA


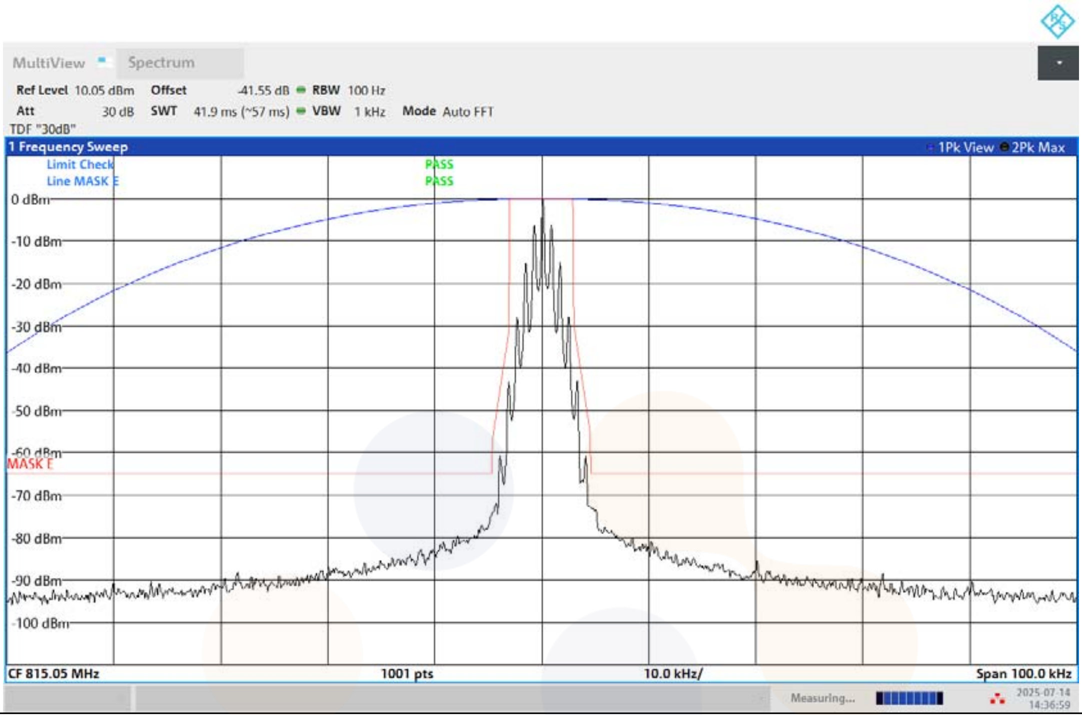
High Power / 4K00F2D / Without Audio Filter / 860.05 ㎒
Emission Mask : FCC_G/EA



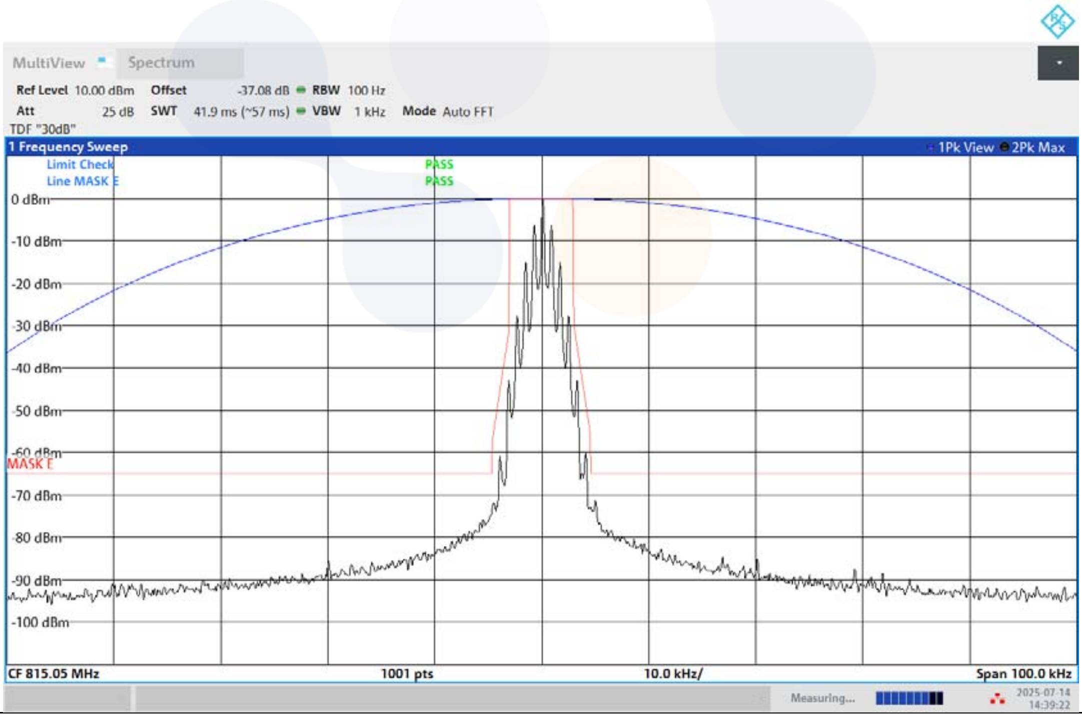
Low Power / 4K00F2D / Without Audio Filter / 868.95 ㎒
Emission Mask : FCC_G/EA



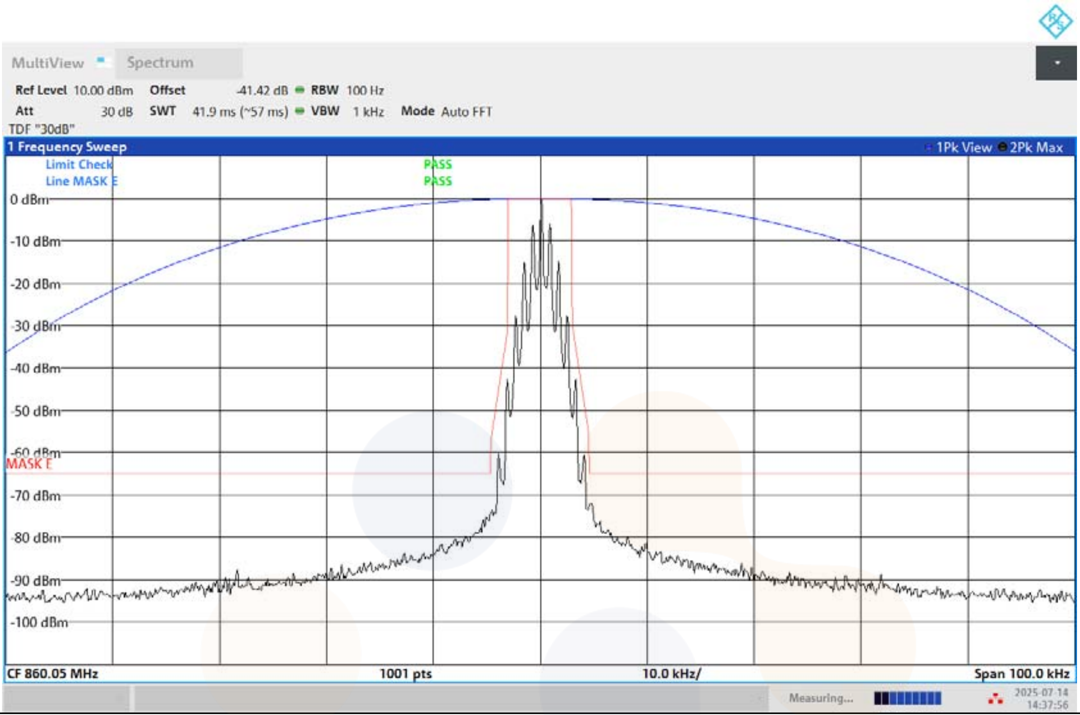
High Power / 4K00F2D / Without Audio Filter / 815.05 ㎒
Emission Mask : IC_E



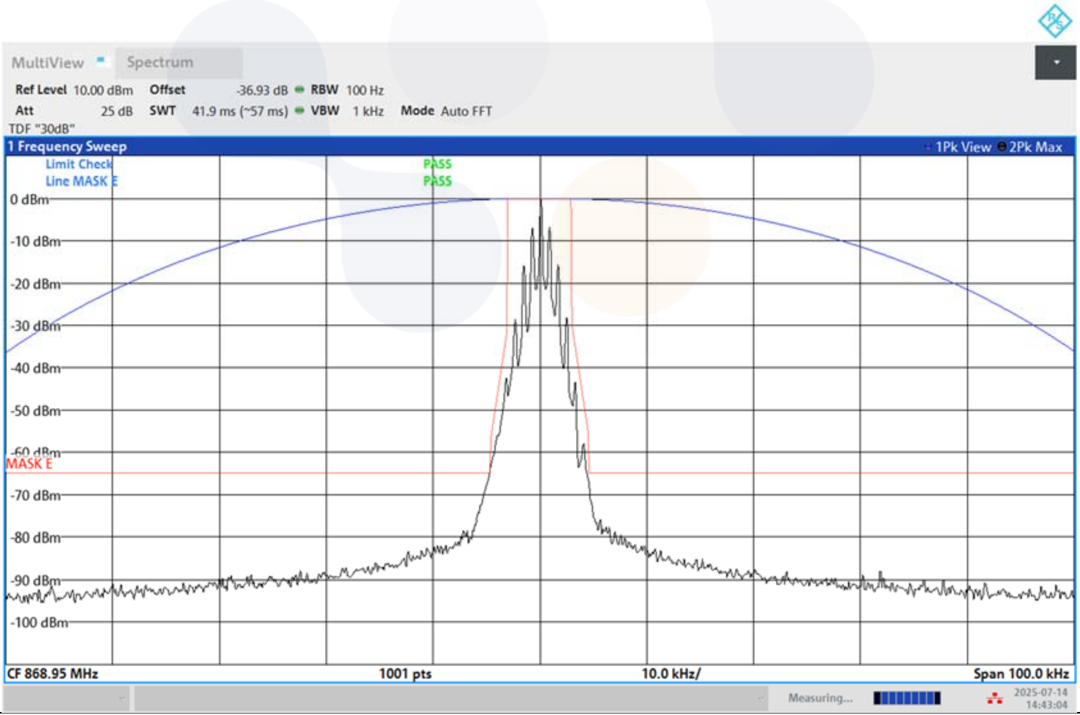
Low Power / 4K00F2D / Without Audio Filter / 815.05 ㎒
Emission Mask : IC_E



High Power / 4K00F2D / Without Audio Filter / 860.05 ㎒
Emission Mask : IC_E

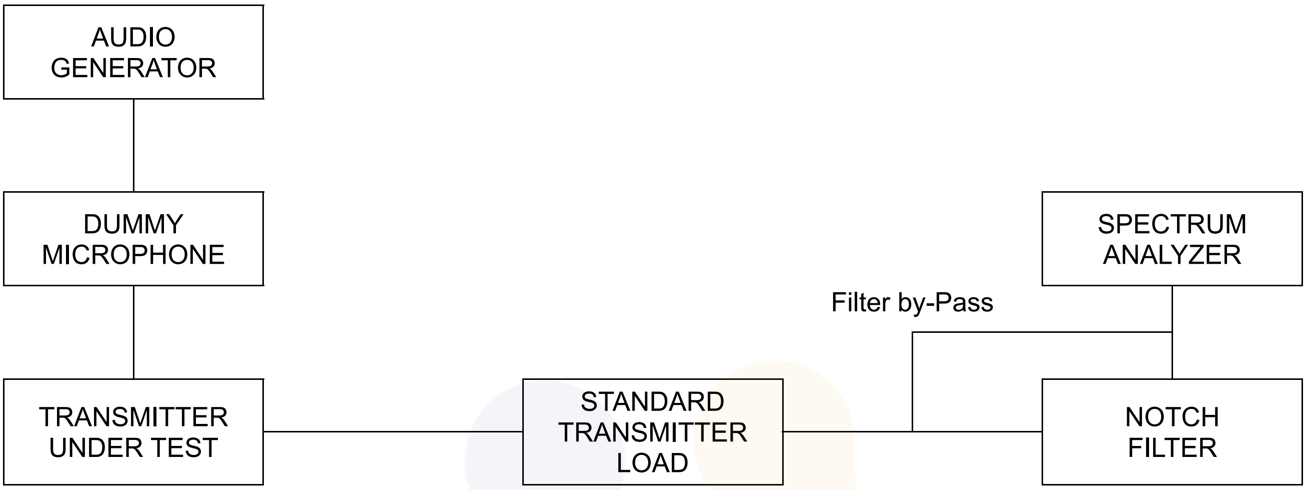


Low Power / 4K00F2D / Without Audio Filter / 868.95 ㎒
Emission Mask : IC_E



6.4. Unwanted Emissions : Conducted Spurious Emission

Test setup



Limit

FCC

According to §2.1051,

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

According to §90.210,

The unwanted emissions shall not exceed the following limits.

- 43 + 10log(P) dB

IC

According to §RSS-119(5.8),

The unwanted emissions shall not exceed the following limits.

- 25 kHz: 43 + 10log(P) dB
- 12.5 kHz: 50 + 10log(P) dB
- 6.25 kHz: 55 + 10log(P) dB

Test procedure

ANSI C63.26 Clause 5.7.4
ANSI/TIA-603-E Section 2.2.13.2
RSS-119 Section 4.2

Test settings

a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 ㎑, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep ≥ 2 × (span / RBW). This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation.

g) The test report shall include the data plots of the measuring instrument display and the measured data.

Test results

Test mode: High Power / 7K60FXD, 7K61FXE

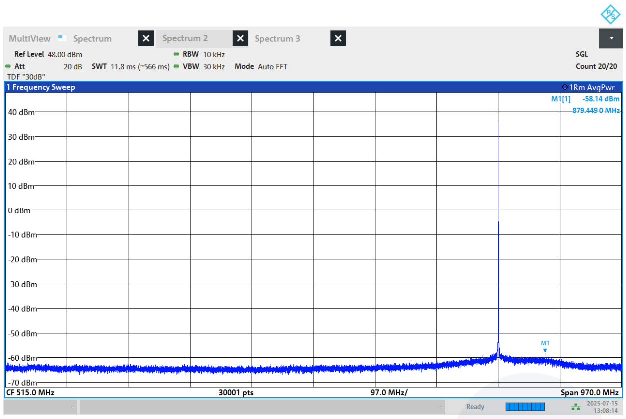
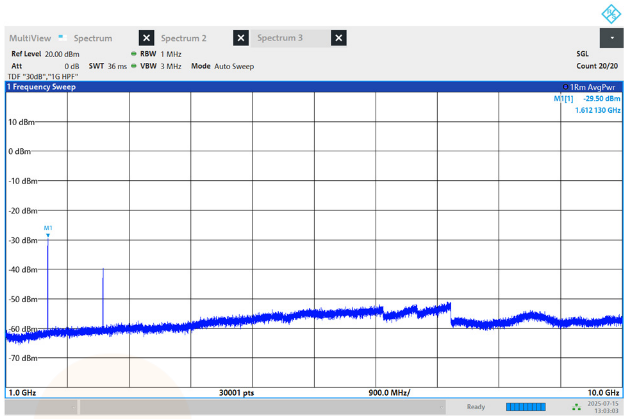
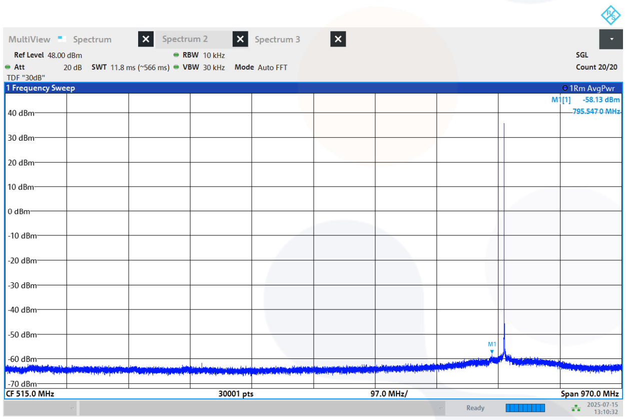
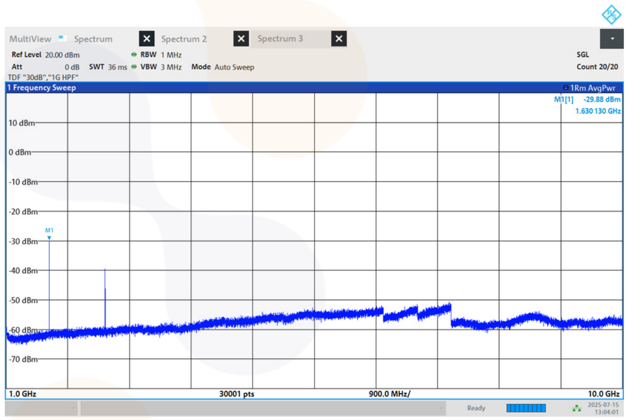
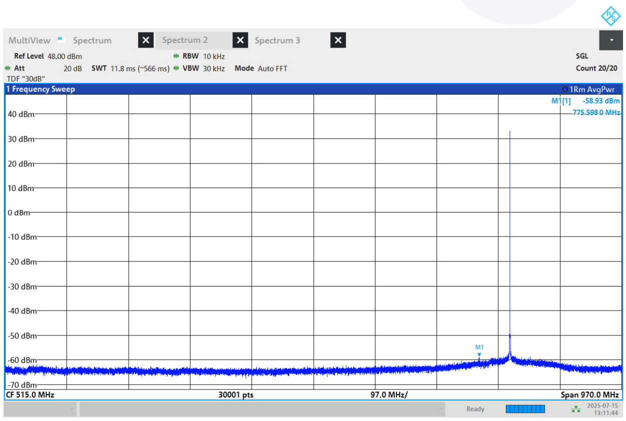
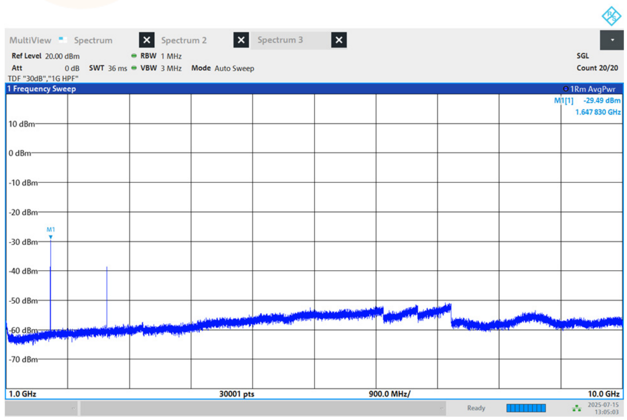
Tx frequency (㎒)	Measured Frequency (㎒)	Result (dBm)	Limit (dBm)	Margin (dB)
806.05	879.45	-48.14	-20.00	28.14
	1 612.13	-29.50	-20.00	9.50
815.05	795.55	-48.13	-20.00	28.13
	1 630.13	-29.88	-20.00	9.88
823.95	775.60	-48.93	-20.00	28.93
	1 647.83	-29.49	-20.00	9.49
851.05	779.03	-50.16	-20.00	30.16
	1 702.13	-29.09	-20.00	9.09
860.05	889.31	-49.18	-20.00	29.18
	1 720.13	-28.10	-20.00	8.10
868.95	880.48	-48.85	-20.00	28.85
	1 737.83	-28.07	-20.00	8.07

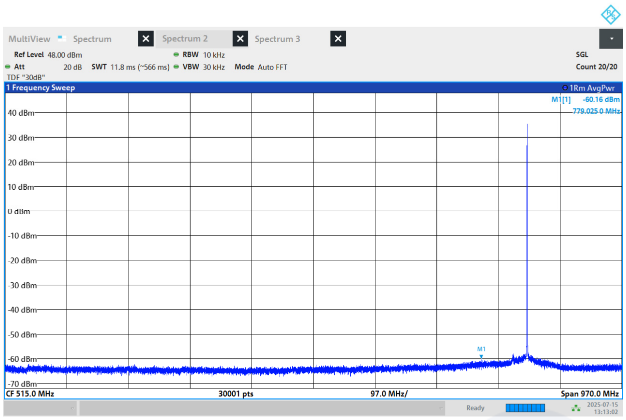
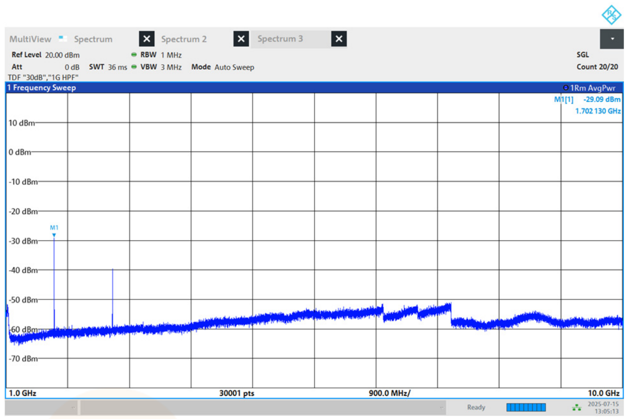
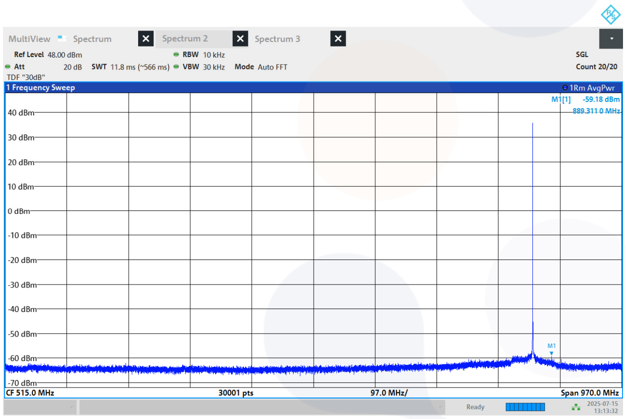
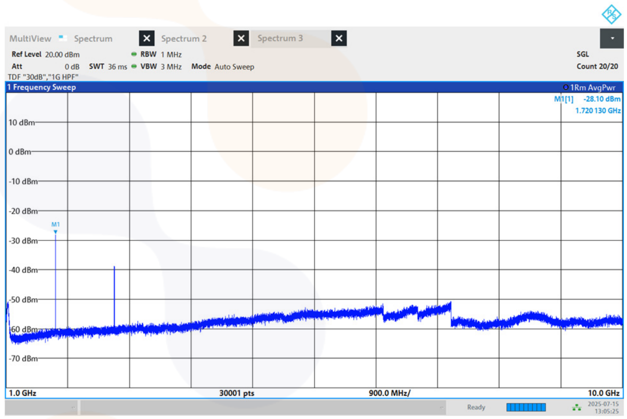
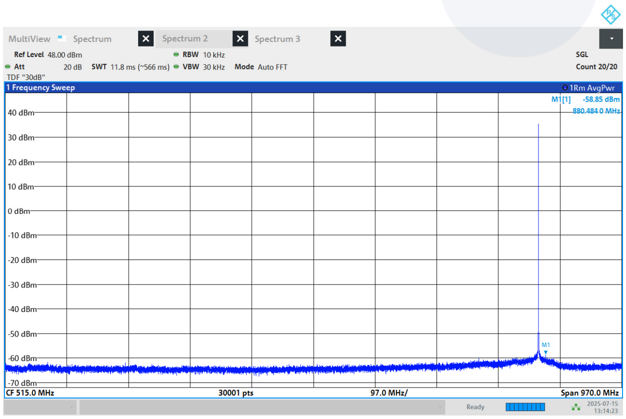
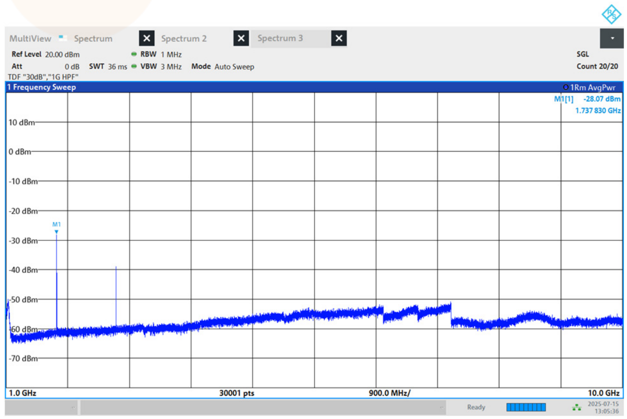
Test mode: Low Power / 7K60FXD, 7K61FXE

Tx frequency (㎒)	Measured Frequency (㎒)	Result (dBm)	Limit (dBm)	Margin (dB)
806.05	800.95	-49.49	-20.00	29.49
	1 612.13	-39.09	-20.00	19.09
815.05	799.33	-50.12	-20.00	30.12
	1 630.13	-39.12	-20.00	19.12
823.95	876.60	-50.60	-20.00	30.60
	1 647.83	-38.98	-20.00	18.98
851.05	874.54	-50.74	-20.00	30.74
	1 702.13	-38.54	-20.00	18.54
860.05	877.35	-49.60	-20.00	29.60
	1 720.13	-37.47	-20.00	17.47
868.95	870.88	-48.45	-20.00	28.45
	1 737.83	-37.42	-20.00	17.42

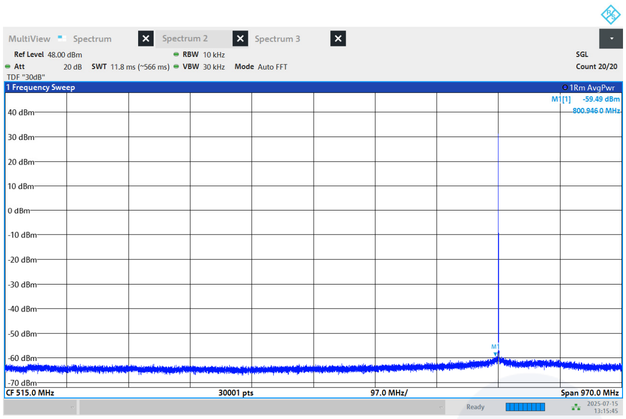
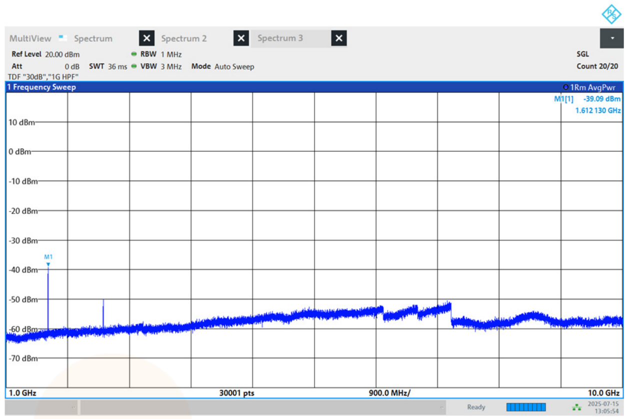
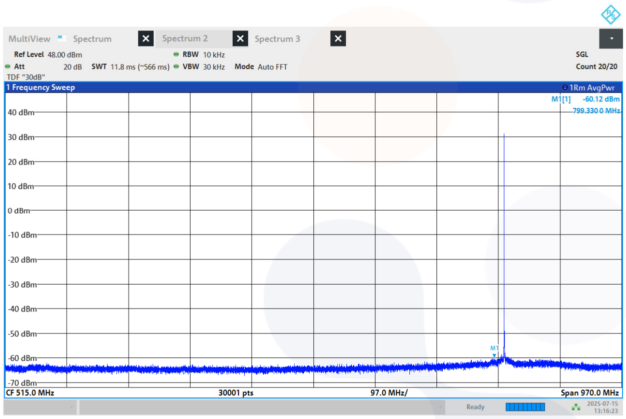
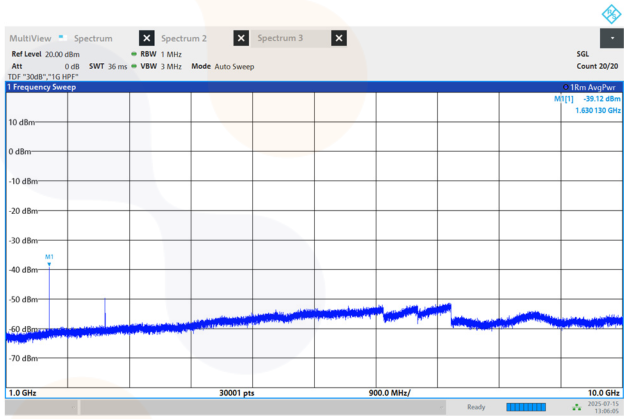
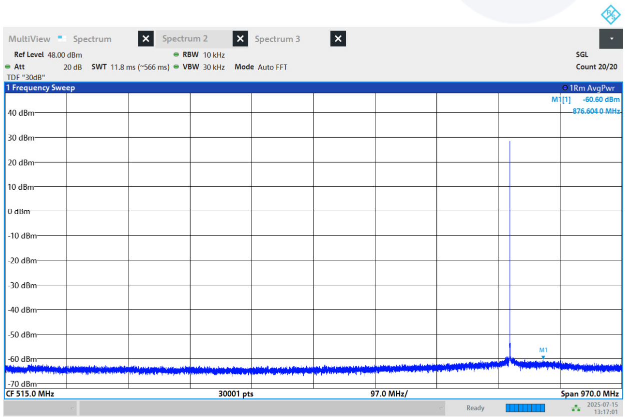
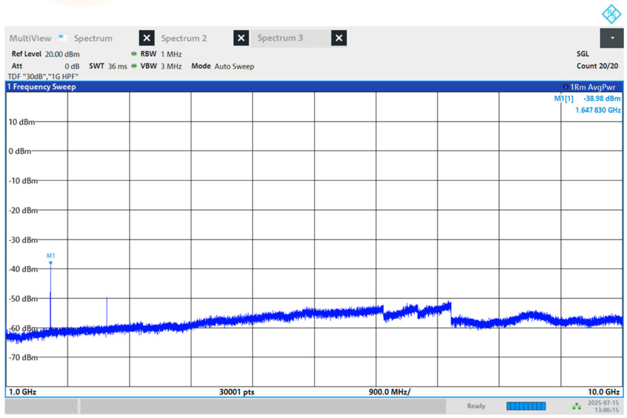
Note.
1. Limit Calculation(dBm) = 50 + 10log($P_{[Watts]}$)
2. Below 1 ㎓, no emissions were detected; the noise level was observed with the RBW factor compensated.

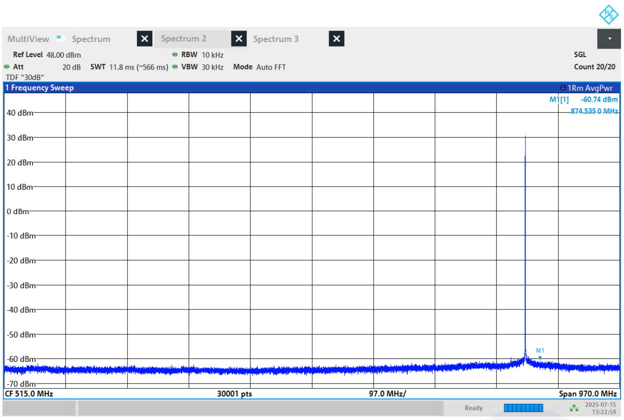
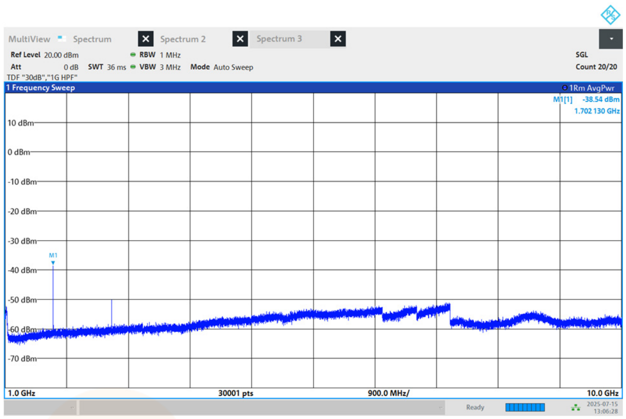
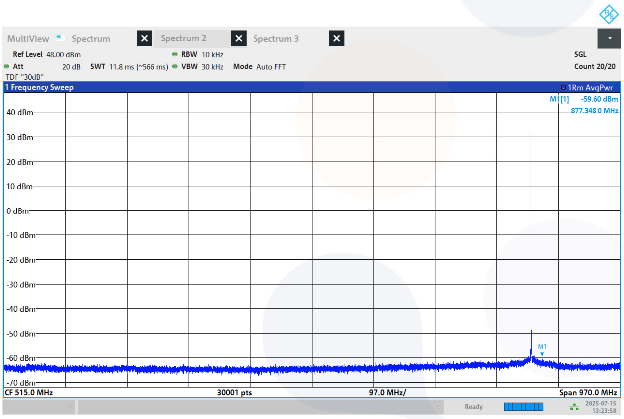
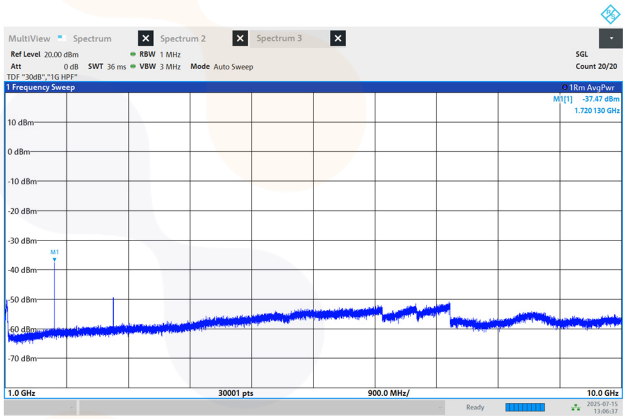
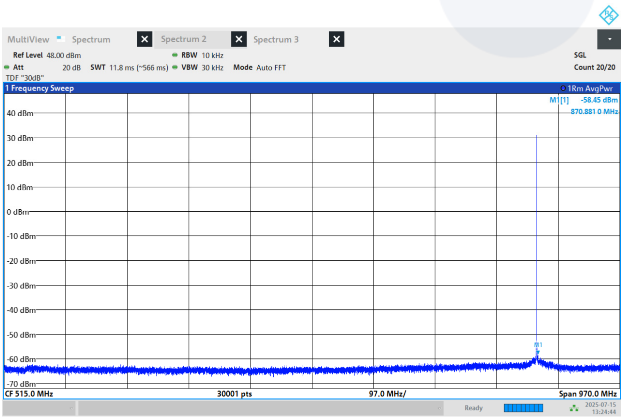
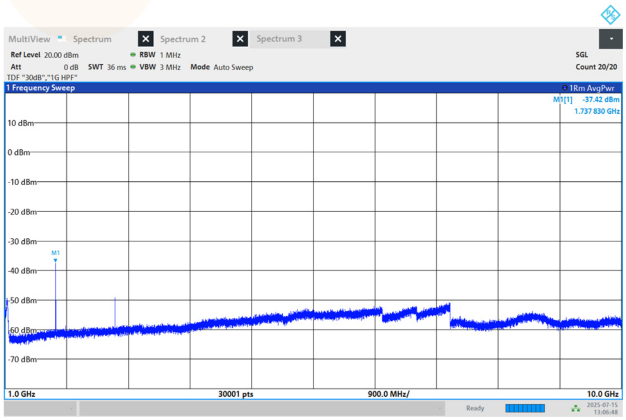
Test mode: High Power / 7K60FXD, 7K61FXE

806.05 ㎒_Below 1 ㎓	806.05 ㎒_Above 1 ㎓
	
815.05 ㎒_Below 1 ㎓	**815.05 ㎒_Above 1 ㎓**
	
823.95 ㎒_Below 1 ㎓	**823.95 ㎒_Above 1 ㎓**
	

851.05 ㎒_Below 1 ㎓	851.05 ㎒_Above 1 ㎓
	
860.05 ㎒_Below 1 ㎓	**860.05 ㎒_Above 1 ㎓**
	
868.95 ㎒_Below 1 ㎓	**868.95 ㎒_Above 1 ㎓**
	

Test mode: Low Power / 7K60FXD, 7K61FXE

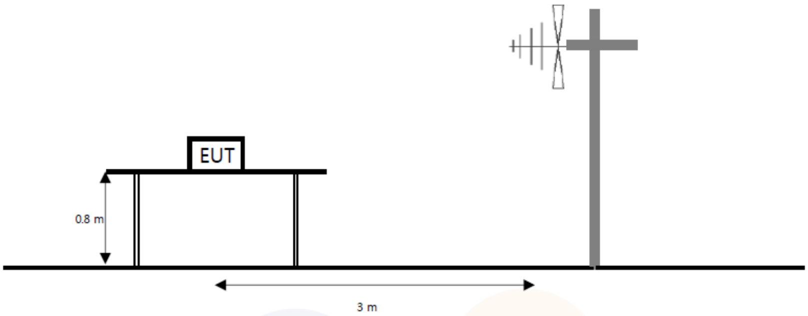
806.05 ㎒_Below 1 ㎓	806.05 ㎒_Above 1 ㎓
	
815.05 ㎒_Below 1 ㎓	**815.05 ㎒_Above 1 ㎓**
	
823.95 ㎒_Below 1 ㎓	**823.95 ㎒_Above 1 ㎓**
	

851.05 ㎒_Below 1 ㎓	851.05 ㎒_Above 1 ㎓
	
860.05 ㎒_Below 1 ㎓	**860.05 ㎒_Above 1 ㎓**
	
868.95 ㎒_Below 1 ㎓	**868.95 ㎒_Above 1 ㎓**
	

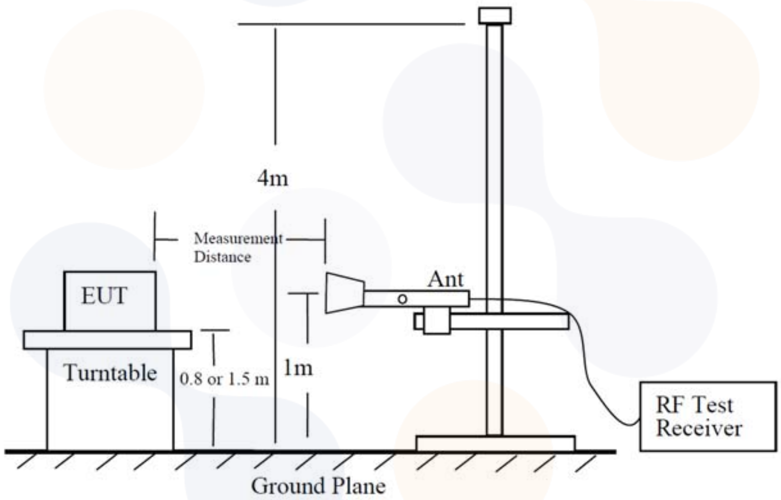
6.5. Unwanted Emissions : Radiated Spurious Emission

Test setup

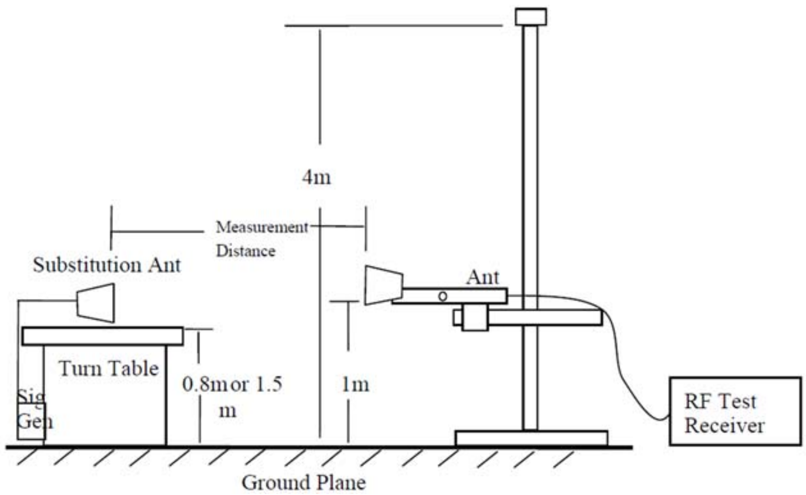
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

FCC

According to §2.1053 (a),

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 ㎒, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

According to §90.210,

The unwanted emissions shall not exceed the following limits.

- 43 + 10log(P) ㏈

IC

According to §RSS-119(5.8),

The unwanted emissions shall not exceed the following limits.

- 25 ㎑: 43 + 10log(P) ㏈
- 12.5 ㎑: 50 + 10log(P) ㏈
- 6.25 ㎑: 55 + 10log(P) ㏈

Test procedure

ANSI C63.26 Clause 5.5.3.2
ANSI/TIA-603-E Section 2.2.12.2
RSS-119 Section 4.2

Test settings

Final compliance data (i.e., data to be reported to the regulatory agency in support of an application for an equipment authorization) shall be collected in accordance with procedures provided in 5.5.2 with the EUT transmitting on each intended frequency of operation. The emission characteristics of the EUT may be identified from the pre-scan measurement information obtained as specified in 5.5.2.5. Final measurements shall be performed for the worst case combination(s) of OBW, modulation type, and data rate, which produce the maximum emission, using the guidelines provided in 5.1.2. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable), and/or the frequencies and amplitudes of the six highest unwanted emissions. A step-by-step procedure is as follows.

a) Place the EUT in the center of the turntable. The EUT shall be configured to transmit into the standard non-radiating load (for measuring radiated spurious emissions), connected with cables of minimal length unless specified otherwise. If the EUT uses an adjustable antenna, the antenna shall be positioned to the length that produces the worst case emission at the fundamental operating frequency.

b) Each emission under consideration shall be evaluated:
   1) Raise and lower the measurement antenna in accordance 5.5.2, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
   2) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
   3) Return the turntable to the azimuth where the highest emission amplitude level was observed.
   4) Vary the measurement antenna height again through 1 m to 4 m again to find the height
   5) associated with the maximum emission amplitude.
   6) Record the measured emission amplitude level and frequency using the appropriate RBW.

c) Repeat step b) for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.

d) Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.

e) Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.

f) Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.

g) For each emission that was detected and measured in the initial test [i.e., in step b) and step c)]:
   1) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
   2) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step b) and step c).
   3) Record the output power level of the signal generator when equivalence is achieved in step 2).

h) Repeat step e) through step g) with the measurement antenna oriented in the opposite polarization.

i) Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:

   Pe = Ps(dBm) − cable loss (dB) + antenna gain (dBd)

   where

   Pe = equivalent emission power in dBm

   Ps = source (signal generator) power in dBm

   NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.

j) Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from: gain (dBd) = gain (dBi) − 2.15 dB. If necessary, the antenna gain can be calculated from calibrated antenna factor information

k) Provide the complete measurement results as a part of the test report.

Test results

7K60FXD, 7K61FXE

Test Frequency [MHz]	Frequency [MHz]	Pol. [V/H]	Antenna Gain [dBi]	Cable loss [dB]	Substitute Level [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]
806.05	1 612.03	V	5.45	8.53	-33.52	-36.60	-20.00	16.60
	2 441.21	H	5.69	10.50	-42.39	-47.20	-20.00	27.20
	3 224.05	V	7.64	12.26	-45.28	-49.90	-20.00	29.90
	4 030.26	V	8.94	13.76	-46.28	-51.10	-20.00	31.10
	4 836.08	V	10.18	15.42	-46.05	-51.30	-20.00	31.30
	5 643.43	H	10.56	16.52	-45.03	-51.00	-20.00	31.00
	6 448.10	V	11.06	17.84	-40.92	-47.70	-20.00	27.70
	7 254.69	V	11.85	18.93	-40.83	-47.90	-20.00	27.90
	8 060.51	V	12.66	19.85	-40.91	-48.10	-20.00	28.10
815.05	1 630.03	V	5.41	8.57	-31.44	-34.60	-20.00	14.60
	2 444.66	V	5.76	10.55	-47.01	-51.80	-20.00	31.80
	3 260.05	V	7.72	12.34	-45.28	-49.90	-20.00	29.90
	4 075.07	V	8.99	13.88	-47.91	-52.80	-20.00	32.80
	4 888.93	V	10.28	15.48	-48.40	-53.60	-20.00	33.60
	5 704.71	V	10.58	16.64	-45.85	-51.90	-20.00	31.90
	6 518.58	V	11.12	17.96	-44.05	-50.90	-20.00	30.90
	7 332.44	V	11.93	19.06	-40.57	-47.70	-20.00	27.70
	8 152.82	V	12.75	19.99	-41.16	-48.40	-20.00	28.40
823.95	1 648.03	H	5.37	8.61	-26.77	-30.00	-20.00	10.00
	2 471.85	V	5.83	10.60	-47.03	-51.80	-20.00	31.80
	3 296.06	V	7.81	12.42	-45.69	-50.30	-20.00	30.30
	4 119.88	V	9.04	14.04	-48.01	-53.00	-20.00	33.00
	4 944.08	V	10.39	15.67	-45.92	-51.20	-20.00	31.20
	5 768.67	H	10.61	16.73	-46.28	-52.40	-20.00	32.40
	6 590.20	V	11.19	18.06	-43.23	-50.10	-20.00	30.10
	7 416.32	H	12.02	19.49	-42.23	-49.70	-20.00	29.70
	8 237.46	H	12.84	20.52	-41.12	-48.80	-20.00	28.80

Note.
1. Limit Calculation(dBm)= 55 + 10log($P_{[Watts]}$)
2. E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

Test Frequency [MHz]	Frequency [MHz]	Pol. [V/H]	Antenna Gain [dBi]	Cable loss [dB]	Substitute Level [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]
851.05	1 702.03	H	5.26	8.77	-29.68	-33.20	-20.00	13.20
	2 553.05	H	6.03	10.76	-44.26	-49.00	-20.00	29.00
	3 404.06	V	8.07	12.65	-43.92	-48.50	-20.00	28.50
	4 254.69	H	9.21	14.34	-48.17	-53.30	-20.00	33.30
	5 106.47	V	10.50	16.64	-47.06	-53.20	-20.00	33.20
	5 958.64	V	10.68	17.08	-44.21	-50.60	-20.00	30.60
	6 808.89	H	11.41	18.42	-42.79	-49.80	-20.00	29.80
	7 661.82	V	12.26	19.54	-41.92	-49.20	-20.00	29.20
	8 510.53	V	13.11	20.57	-40.53	-48.00	-20.00	28.00
860.05	1 720.03	H	5.22	8.77	-32.45	-36.00	-20.00	16.00
	2 580.24	H	6.09	10.79	-43.71	-48.40	-20.00	28.40
	3 440.06	V	8.16	12.73	-42.62	-47.20	-20.00	27.20
	4 298.74	H	9.26	14.38	-47.78	-52.90	-20.00	32.90
	5 161.24	H	10.50	16.68	-46.42	-52.60	-20.00	32.60
	6 023.75	H	10.72	17.01	-43.11	-49.40	-20.00	29.40
	6 882.80	H	11.48	18.52	-42.46	-49.50	-20.00	29.50
	7 739.56	V	12.34	19.53	-42.21	-49.40	-20.00	29.40
	8 600.15	V	13.16	20.43	-40.53	-47.80	-20.00	27.80
868.95	1 738.03	H	5.18	8.80	-30.87	-34.50	-20.00	14.50
	2 607.05	H	6.16	10.97	-47.99	-52.80	-20.00	32.80
	3 475.68	V	8.24	12.81	-44.13	-48.70	-20.00	28.70
	4 344.31	V	9.31	14.50	-46.92	-52.10	-20.00	32.10
	5 215.63	V	10.50	15.91	-46.39	-51.80	-20.00	31.80
	6 081.96	H	10.77	17.11	-44.36	-50.70	-20.00	30.70
	6 948.30	V	11.55	18.55	-42.60	-49.60	-20.00	29.60
	7 823.82	H	12.42	19.74	-41.08	-48.40	-20.00	28.40
	8 689.01	V	13.21	20.58	-40.74	-48.10	-20.00	28.10

Note.

1. Limit Calculation(dBm)= 55 + 10log($P_{[Watts]}$)
2. E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40-N	101462	25.10.10
Spectrum Analyzer	R&S	FSV3044	101427	26.03.12
DC Power Supply	AGILENT	E3632A	KR73001026	26.01.16
Signal Generator	R&S	SMB100A	176206	26.01.23
Attenuator	Weinschel Associates	WA88-30-1414	SN1	25.10.14
Power Sensor	R&S	NRP-Z81	1137.9009.02-106224-tg	26.07.01
Audio Analyzer	HP	8903B	3729A18248	26.06.30
Modulation Analyzer	HP	8901B	3226A04314	26.05.10
Tunable Notch Filter	Wainwright Instruments GmbH	WTRCTW8-670-980-20-40-40SSK	SN1	25.10.10
Spectrum Analyzer	Agilent	N9040B	US55230151	26.07.01
Bilog Antenna	Teseq GmbH	CBL 6112D	62027	26.10.17
Bilog Antenna	ETS-LINDGREN	3143B	228420	27.07.03
Horn Antenna	ETS-LINDGREN	3117	251528	26.01.21
Horn Antenna	ETS-LINDGREN	3117	246058	26.01.21
Amplifier	SONOMA INSTRUMENT	310N	421822	25.10.10
Amplifier	B&Z Technologies	BZR-0050400-551028-252525	5927736	26.04.30
High pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	26.06.30
Signal Generator	R&S	SMB100A	176206	26.01.17
Dummy Load	BIRD	8201	19052	26.07.11

End of test report