

In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded ( $P_r$ ). The power of signal source ( $P_{Mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss ( $P_{pl}$ ) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain ( $G_a$ ) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss ( $P_{pl}$ ) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} - P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dB}$ .

### A.2.2 Measurement Limit

NR n2/25: Part 24.238 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power ( $P$ ) by a factor of at least  $43 + 10 \log(P)$  dB.

NR n7/41: Part 27.53(m) specifies for mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating



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on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

NR n4/66: Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

NR n12/13/71: Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log(P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

### **A.2.3 Measurement Results**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of each LTE Band. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of each LTE Band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

**DC\_66A\_n25A\_BPSK\_CH370500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3491.01	-56.15	5.50	8.18	-53.47	-13.00	40.47	H
5248.01	-55.04	7.00	10.25	-51.79	-13.00	38.79	H
6989.01	-53.03	8.21	11.59	-49.65	-13.00	36.65	V
3706.01	-36.94	6.41	8.49	-34.86	-13.00	21.86	V
5561.01	-21.34	7.19	10.59	-17.94	-13.00	4.94	H
9278.01	-36.68	9.10	13.27	-32.51	-13.00	19.51	V

**DC\_66A\_n25A\_BPSK\_CH376500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3478.01	-55.82	5.48	8.15	-53.15	-13.00	40.15	V
5258.01	-55.03	7.00	10.26	-51.77	-13.00	38.77	H
6965.01	-53.63	8.03	11.56	-50.10	-13.00	37.10	V
3765.01	-36.55	6.25	8.57	-34.23	-13.00	21.23	V
5651.01	-21.01	7.27	10.57	-17.71	-13.00	4.71	V
9430.01	-29.08	9.19	13.36	-24.91	-13.00	11.91	V

**DC\_66A\_n25A\_BPSK\_CH 382500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3469.01	-56.33	5.46	8.13	-53.66	-13.00	40.66	H
5221.01	-55.35	6.99	10.21	-52.13	-13.00	39.13	H
6950.01	-53.73	7.91	11.54	-50.10	-13.00	37.10	H
3826.01	-37.59	6.06	8.66	-34.99	-13.00	21.99	H
5741.01	-23.78	7.28	10.55	-20.51	-13.00	7.51	H
9575.01	-30.43	9.27	13.32	-26.38	-13.00	13.38	H

**DC\_2A\_n25A\_BPSK\_CH 370500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3747.01	-55.09	6.30	8.55	-52.84	-13.00	39.84	H
5645.01	-53.90	7.27	10.57	-50.60	-13.00	37.60	V
7496.01	-53.91	8.38	12.20	-50.09	-13.00	37.09	V
3706.01	-37.39	6.41	8.49	-35.31	-13.00	22.31	V
5562.01	-21.27	7.19	10.59	-17.87	-13.00	4.87	V
9276.01	-37.00	9.10	13.27	-32.83	-13.00	19.83	H

**DC\_2A\_n25A\_BPSK\_CH 376500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3765.01	-40.97	6.25	8.57	-38.65	-13.00	25.65	H
5652.01	-21.38	7.27	10.57	-18.08	-13.00	5.08	V
7542.01	-51.92	8.22	12.23	-47.91	-13.00	34.91	V
9425.01	-31.24	9.16	13.36	-27.04	-13.00	14.04	H
11303.00	-43.45	10.00	13.14	-40.31	-13.00	27.31	V
13152.00	-47.49	10.71	13.71	-44.49	-13.00	31.49	V

**DC\_2A\_n25A\_BPSK\_CH 382500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3740.01	-55.62	6.32	8.54	-53.40	-13.00	40.40	H
5646.01	-52.50	7.27	10.57	-49.20	-13.00	36.20	V
7493.01	-54.12	8.37	12.19	-50.30	-13.00	37.30	H
3825.01	-38.69	6.06	8.66	-36.09	-13.00	23.09	H
5742.01	-23.19	7.28	10.55	-19.92	-13.00	6.92	V
9578.01	-28.52	9.26	13.32	-24.46	-13.00	11.46	V

**DC\_12A\_n25A\_BPSK\_CH370500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1415.01	-45.20	3.25	5.06	2.15	-45.54	-13.00	32.54	H
2123.00	-47.32	4.21	4.97	2.15	-48.71	-13.00	35.71	H
2849.00	-49.19	4.96	6.73	2.15	-49.57	-13.00	36.57	V
3706.01	-38.97	6.41	8.49	0	-36.89	-13.00	23.89	V
5561.01	-23.34	7.19	10.59	0	-19.94	-13.00	6.94	V
9276.01	-33.64	9.10	13.27	0	-29.47	-13.00	16.47	V

**DC\_12A\_n25A\_BPSK\_CH376500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1415.01	-44.82	3.25	5.06	2.15	-45.16	-13.00	32.16	H
2123.00	-46.25	4.21	4.97	2.15	-47.64	-13.00	34.64	H
2831.00	-50.42	4.95	6.70	2.15	-50.82	-13.00	37.82	V
3766.01	-38.03	6.24	8.57	0	-35.70	-13.00	22.70	V
5652.01	-22.45	7.27	10.57	0	-19.15	-13.00	6.15	H
9426.01	-32.51	9.17	13.36	0	-28.32	-13.00	15.32	H

**DC\_12A\_n25A\_BPSK\_CH382500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1400.01	-58.45	3.24	4.98	2.15	-58.86	-13.00	45.86	V
2124.00	-54.57	4.21	4.97	2.15	-55.96	-13.00	42.96	V
2849.00	-50.09	4.96	6.73	2.15	-50.47	-13.00	37.47	V
3826.01	-40.30	6.06	8.66	0	-37.70	-13.00	24.70	H
5742.01	-23.48	7.28	10.55	0	-20.21	-13.00	7.21	H
9576.01	-30.26	9.27	13.32	0	-26.21	-13.00	13.21	H

**DC\_2A\_n41A\_BPSK\_CH 500202**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3733.01	-55.49	6.35	8.53	-53.31	-25.00	28.31	V
5643.01	-48.65	7.27	10.57	-45.35	-25.00	20.35	V
7518.01	-48.74	8.32	12.21	-44.85	-25.00	19.85	H
5005.01	-46.73	6.59	9.91	-43.41	-25.00	18.41	V
7518.01	-48.74	8.32	12.21	-44.85	-25.00	19.85	H
10012.01	-46.48	9.21	12.90	-42.79	-25.00	17.79	V

**DC\_2A\_n41A\_BPSK\_CH 518598**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3758.01	-55.37	6.27	8.56	-53.08	-25.00	28.08	V
5646.01	-48.16	7.27	10.57	-44.86	-25.00	19.86	H
7491.01	-53.33	8.37	12.19	-49.51	-25.00	24.51	H
5190.01	-40.31	6.94	10.17	-37.08	-25.00	12.08	H
7790.01	-37.72	8.30	12.43	-33.59	-25.00	8.59	H
10386.01	-50.34	9.78	13.05	-47.07	-25.00	22.07	V

**DC\_2A\_n41A\_BPSK\_CH 537000**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3743.01	-55.55	6.31	8.54	-53.32	-25.00	28.32	V
5644.01	-49.47	7.27	10.57	-46.17	-25.00	21.17	V
7528.01	-54.15	8.28	12.22	-50.21	-25.00	25.21	V
5372.01	-31.00	6.89	10.42	-27.47	-25.00	2.47	V
8072.01	-29.50	8.32	12.66	-25.16	-25.00	0.16	H
10757.00	-49.78	9.44	13.15	-46.07	-25.00	21.07	H

**DC\_66A\_n41A\_BPSK\_CH 500202**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3482.00	-57.08	5.49	8.16	-54.41	-25.00	29.41	V
5266.00	-53.99	6.99	10.27	-50.71	-25.00	25.71	V
7031.00	-54.06	8.25	11.64	-50.67	-25.00	25.67	H
5003.00	-51.63	6.60	9.90	-48.33	-25.00	23.33	H
7504.00	-52.69	8.38	12.20	-48.87	-25.00	23.87	V
10013.00	-52.35	9.22	12.91	-48.66	-25.00	23.66	V

**DC\_66A\_n41A\_BPSK\_CH 518598**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3512.00	-56.97	5.54	8.22	-54.29	-25.00	29.29	V
5266.00	-54.55	6.99	10.27	-51.27	-25.00	26.27	V
7049.00	-54.32	8.23	11.66	-50.89	-25.00	25.89	H
5160.00	-55.41	6.90	10.12	-52.19	-25.00	27.19	V
7780.00	-45.04	8.32	12.42	-40.94	-25.00	15.94	H
10377.00	-51.06	9.76	13.05	-47.77	-25.00	22.77	V

**DC\_66A\_n41A\_BPSK\_CH 537000**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3499.00	-56.33	5.52	8.20	-53.65	-25.00	28.65	H
5255.00	-55.44	7.00	10.26	-52.18	-25.00	27.18	H
6994.00	-54.09	8.25	11.59	-50.75	-25.00	25.75	H
5370.00	-38.69	6.89	10.42	-35.16	-25.00	10.16	H
8056.00	-40.56	8.32	12.64	-36.24	-25.00	11.24	H
10739.00	-50.95	9.40	13.15	-47.20	-25.00	22.20	V

**DC\_2A\_n66A\_BPSK\_CH 342500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3759.01	-55.10	6.26	8.56	-52.80	-13.00	39.80	V
5648.01	-55.11	7.27	10.57	-51.81	-13.00	38.81	V
7508.01	-53.56	8.36	12.21	-49.71	-13.00	36.71	V
3425.01	-51.11	5.38	8.02	-48.47	-13.00	35.47	V
5141.01	-30.19	6.87	10.10	-26.96	-13.00	13.96	V
8580.01	-36.23	8.53	13.02	-31.74	-13.00	18.74	V

**DC\_2A\_n66A\_BPSK\_CH 347500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3732.01	-54.41	6.35	8.52	-52.24	-13.00	39.24	V
5643.01	-55.44	7.27	10.57	-52.14	-13.00	39.14	V
7549.01	-53.83	8.19	12.24	-49.78	-13.00	36.78	H
3476.01	-53.79	5.48	8.14	-51.13	-13.00	38.13	H
5217.01	-25.81	6.99	10.20	-22.60	-13.00	9.60	H
8700.01	-35.88	8.36	13.04	-31.20	-13.00	18.20	V

**DC\_2A\_n66A\_BPSK\_CH 352500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3757.01	-55.39	6.27	8.56	-53.10	-13.00	40.10	V
5637.01	-55.62	7.27	10.57	-52.32	-13.00	39.32	H
7510.01	-53.83	8.35	12.21	-49.97	-13.00	36.97	H
3525.01	-53.98	5.57	8.24	-51.31	-13.00	38.31	V
5291.01	-23.76	6.99	10.31	-20.44	-13.00	7.44	V
8826.01	-35.27	8.71	13.07	-30.91	-13.00	17.91	V



**DC\_12A\_n66A\_BPSK\_CH 342500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1415.01	-57.96	3.25	5.06	2.15	-58.30	-13.00	45.30	V
2857.00	-50.79	4.96	6.74	2.15	-51.16	-13.00	38.16	V
3557.01	-54.08	5.90	8.28	2.15	-53.85	-13.00	40.85	V
3425.01	-50.95	5.38	8.02	0	-48.31	-13.00	35.31	H
5142.01	-30.90	6.87	10.10	0	-27.67	-13.00	14.67	H
8578.01	-34.70	8.53	13.02	0	-30.21	-13.00	17.21	H

**DC\_12A\_n66A\_BPSK\_CH 347500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1395.01	-45.88	3.23	4.95	2.15	-46.31	-13.00	33.31	H
2831.00	-51.08	4.95	6.70	2.15	-51.48	-13.00	38.48	V
6342.01	-52.14	7.56	10.84	2.15	-51.01	-13.00	38.01	V
3475.01	-54.25	5.47	8.14	0	-51.58	-13.00	38.58	H
5217.01	-26.77	6.99	10.20	0	-23.56	-13.00	10.56	V
8701.01	-34.76	8.36	13.04	0	-30.08	-13.00	17.08	V

**DC\_12A\_n66A\_BPSK\_CH 352500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
2152.00	-43.58	4.25	5.06	2.15	-44.92	-13.00	31.92	H
2818.00	-45.35	4.94	6.67	2.15	-45.77	-13.00	32.77	V
4233.01	-51.59	6.26	9.13	2.15	-50.87	-13.00	37.87	V
3525.01	-54.08	5.57	8.24	0	-51.41	-13.00	38.41	V
5292.01	-23.68	6.99	10.31	0	-20.36	-13.00	7.36	H
8826.01	-34.14	8.71	13.07	0	-29.78	-13.00	16.78	H

**DC\_2A\_n71A\_BPSK\_CH 133100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3752.52	-52.09	6.28	8.55	0.00	-51.97	-13.00	38.97	V
5628.01	-53.09	7.26	10.57	0.00	-51.93	-13.00	38.93	V
7506.01	-52.16	8.37	12.20	0.00	-50.48	-13.00	37.48	V
1331.51	-52.51	3.15	4.62	2.15	-53.19	-13.00	40.19	H
1997.01	-52.09	4.04	4.61	2.15	-53.67	-13.00	40.67	V
2676.00	-53.24	4.76	6.42	2.15	-53.73	-13.00	40.73	V

**DC\_2A\_n71A\_BPSK\_CH 136100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3747.02	-56.25	6.30	8.55	0.00	-54.00	-13.00	41.00	V
5632.01	-55.39	7.26	10.57	0.00	-52.08	-13.00	39.08	H
7516.01	-54.33	8.33	12.21	0.00	-50.45	-13.00	37.45	H
1364.51	-43.84	3.19	4.80	2.15	-44.38	-13.00	31.38	V
2042.00	-49.95	4.14	4.73	2.15	-51.51	-13.00	38.51	V
2727.00	-53.19	4.81	6.51	2.15	-53.64	-13.00	40.64	V

**DC\_2A\_n71A\_BPSK\_CH 139100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3773.02	-56.25	6.22	8.58	0.00	-53.89	-13.00	40.89	V
5641.01	-46.22	7.27	10.57	0.00	-42.92	-13.00	29.92	H
7530.51	-53.95	8.27	12.22	0.00	-50.00	-13.00	37.00	V
1391.51	-39.16	3.23	4.94	2.15	-39.60	-13.00	26.60	V
2087.00	-45.08	4.18	4.86	2.15	-46.55	-13.00	33.55	H
2783.00	-52.85	4.89	6.61	2.15	-53.28	-13.00	40.28	V

**DC\_66A\_n71A\_BPSK\_CH 133100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3523.02	-56.52	5.56	8.23	0.00	-53.85	-13.00	40.85	H
5266.01	-54.20	6.99	10.27	0.00	-50.92	-13.00	37.92	H
7013.01	-54.23	8.28	11.62	0.00	-50.89	-13.00	37.89	V
1331.01	-43.43	3.15	4.62	2.15	-44.11	-13.00	31.11	H
1997.01	-43.66	4.04	4.61	2.15	-45.24	-13.00	32.24	V
2671.00	-53.46	4.76	6.41	2.15	-53.96	-13.00	40.96	H

**DC\_66A\_n71A\_BPSK\_CH 136100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3512.02	-57.29	5.54	8.22	0.00	-54.61	-13.00	41.61	V
5266.01	-56.24	6.99	10.27	0.00	-52.96	-13.00	39.96	H
7026.51	-53.21	8.26	11.63	0.00	-49.84	-13.00	36.84	V
1361.01	-40.50	3.19	4.78	2.15	-41.06	-13.00	28.06	H
2042.00	-45.18	4.14	4.73	2.15	-46.74	-13.00	33.74	V
2726.00	-53.39	4.81	6.51	2.15	-53.84	-13.00	40.84	V

**DC\_66A\_n71A\_BPSK\_CH 139100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3519.02	-56.87	5.55	8.23	0.00	-54.19	-13.00	41.19	H
5262.51	-55.51	6.99	10.27	0.00	-52.23	-13.00	39.23	H
7033.51	-54.47	8.25	11.64	0.00	-51.08	-13.00	38.08	V
1391.01	-44.07	3.22	4.93	2.15	-44.51	-13.00	31.51	V
2087.00	-48.72	4.18	4.86	2.15	-50.19	-13.00	37.19	H
2791.00	-53.88	4.90	6.62	2.15	-54.31	-13.00	41.31	V

**SA\_n25\_BPSK\_CH370500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3705.01	-37.32	6.42	8.49	-35.25	-13.00	22.25	V
5561.01	-21.48	7.19	10.59	-18.08	-13.00	5.08	H
7423.01	-49.91	8.18	12.11	-45.98	-13.00	32.98	H
9281.01	-36.60	9.11	13.27	-32.44	-13.00	19.44	V
11131.00	-41.29	9.70	13.17	-37.82	-13.00	24.82	V
12973.00	-47.83	10.48	13.48	-44.83	-13.00	31.83	H

**SA\_n25\_BPSK\_CH376500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3766.01	-37.80	6.24	8.57	-35.47	-13.00	22.47	H
5653.01	-22.15	7.27	10.57	-18.85	-13.00	5.85	H
7546.01	-46.92	8.20	12.24	-42.88	-13.00	29.88	H
9423.01	-33.03	9.15	13.35	-28.83	-13.00	15.83	V
11311.00	-44.93	10.00	13.14	-41.79	-13.00	28.79	H
13191.00	-47.98	10.54	13.77	-44.75	-13.00	31.75	H

**SA\_n25\_BPSK\_CH382500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3825.01	-35.98	6.06	8.66	-33.38	-13.00	20.38	H
5743.01	-24.36	7.27	10.55	-21.08	-13.00	8.08	H
7657.01	-46.18	8.23	12.33	-42.08	-13.00	29.08	V
9579.01	-24.51	9.25	13.32	-20.44	-13.00	7.44	V
11491.00	-46.30	9.83	13.10	-43.03	-13.00	30.03	H
13393.00	-48.23	10.57	14.05	-44.75	-13.00	31.75	H

**SA\_n41\_BPSK\_CH 500202**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5006.01	-43.97	6.59	9.91	-40.65	-25.00	15.65	H
7507.01	-46.27	8.36	12.21	-42.42	-25.00	17.42	V
10008.01	-51.77	9.20	12.90	-48.07	-25.00	23.07	V
12499.00	-48.34	10.18	13.20	-45.32	-25.00	20.32	V
15029.00	-45.03	11.25	13.98	-42.30	-25.00	17.30	H
17529.00	-44.07	12.84	14.94	-41.97	-25.00	16.97	H

**SA\_n41\_BPSK\_CH 518598**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5187.01	-39.82	6.94	10.16	-36.60	-25.00	11.60	V
7783.01	-40.14	8.31	12.43	-36.02	-25.00	11.02	H
10338.01	-50.90	9.70	13.04	-47.56	-25.00	22.56	V
12978.00	-47.50	10.48	13.49	-44.49	-25.00	19.49	V
15522.00	-43.25	11.52	13.70	-41.07	-25.00	16.07	H
16827.00	-41.53	12.08	13.73	-39.88	-25.00	14.88	H

**SA\_n41\_BPSK\_CH 537000**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
5373.01	-34.09	6.89	10.42	-30.56	-25.00	5.56	V
8068.01	-34.60	8.32	12.65	-30.27	-25.00	5.27	V
10722.00	-50.00	9.36	13.14	-46.22	-25.00	21.22	V
13431.00	-43.93	10.59	14.10	-40.42	-25.00	15.42	V
16121.00	-42.41	11.83	13.68	-40.56	-25.00	15.56	H
17461.00	-44.03	12.64	14.81	-41.86	-25.00	16.86	V

**SA\_n66\_BPSK\_CH 342500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3425.01	-56.80	5.38	8.02	-54.16	-13.00	41.16	V
5141.01	-47.13	6.87	10.10	-43.90	-13.00	30.90	H
6857.01	-63.13	7.81	11.43	-59.51	-13.00	46.51	V
8575.01	-62.42	8.54	13.02	-57.94	-13.00	44.94	H
10281.01	-61.76	9.58	13.01	-58.33	-13.00	45.33	V
12003.00	-59.85	10.06	13.00	-56.91	-13.00	43.91	V

**SA\_n66\_BPSK\_CH 349000**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3490.01	-59.81	5.50	8.18	-57.13	-13.00	44.13	H
5240.01	-43.80	7.00	10.24	-40.56	-13.00	27.56	H
6987.01	-63.23	8.20	11.58	-59.85	-13.00	46.85	V
8742.01	-61.21	8.49	13.05	-56.65	-13.00	43.65	H
10486.01	-61.39	9.67	13.09	-57.97	-13.00	44.97	V
12199.00	-59.40	10.06	13.08	-56.38	-13.00	43.38	V

**SA\_n66\_BPSK\_CH 355500**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polorization
3555.01	-58.41	5.87	8.28	-56.00	-13.00	43.00	H
5335.01	-41.73	6.97	10.37	-38.33	-13.00	25.33	V
7120.01	-64.60	8.16	11.74	-61.02	-13.00	48.02	V
8905.01	-63.29	8.86	13.08	-59.07	-13.00	46.07	H
10681.00	-61.19	9.30	13.14	-57.35	-13.00	44.35	V
12456.00	-59.30	10.29	13.18	-56.41	-13.00	43.41	V

**SA\_n71\_BPSK\_CH 133100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1331.51	-33.45	3.15	4.62	2.15	-34.13	-13.00	21.13	H
1997.01	-35.40	4.04	4.61	2.15	-36.98	-13.00	23.98	H
2662.50	-49.93	4.75	6.39	2.15	-50.44	-13.00	37.44	V
3328.52	-41.55	5.30	7.79	2.15	-41.21	-13.00	28.21	V
3994.02	-42.53	6.07	8.89	2.15	-41.86	-13.00	28.86	H
4660.02	-46.85	6.47	9.56	2.15	-45.91	-13.00	32.91	V

**SA\_n71\_BPSK\_CH 136100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1361.51	-31.53	3.19	4.78	2.15	-32.09	-13.00	19.09	H
2042.00	-37.02	4.14	4.73	2.15	-38.58	-13.00	25.58	V
2722.50	-51.49	4.81	6.50	2.15	-51.95	-13.00	38.95	V
3403.02	-44.09	5.36	7.97	2.15	-43.63	-13.00	30.63	V
4084.02	-42.77	6.04	8.98	2.15	-41.98	-13.00	28.98	V
4765.01	-47.98	6.60	9.67	2.15	-47.06	-13.00	34.06	V

**SA\_n71\_BPSK\_CH 139100**

Frequency (MHz)	SG (dBm)	CableLoss (dB)	AntennaGain (dBi)	Correction	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polorization
1391.51	-31.94	3.23	4.94	2.15	-32.38	-13.00	19.38	H
2087.00	-41.30	4.18	4.86	2.15	-42.77	-13.00	29.77	H
2782.50	-51.34	4.89	6.61	2.15	-51.77	-13.00	38.77	V
3478.52	-50.11	5.48	8.15	2.15	-49.59	-13.00	36.59	H
4174.52	-50.35	6.15	9.07	2.15	-49.58	-13.00	36.58	H
4881.51	-54.08	6.72	9.78	2.15	-53.17	-13.00	40.17	V

Note: The maximum value of expanded measurement uncertainty for this test item is  $U = 5.16$  dB,  $k = 2$ .

## **A.3 Frequency Stability**

### **A.3.1 Method of Measurement**

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as  $F_L$  and  $F_H$  respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of UXM.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the UXM, and in a simulated call on middle channel for each NR band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the UXM and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of the lower, higher and nominal voltage. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.



### A.3.2 Measurement results

#### LTE Band 12+NR n25

##### Frequency Error vs Voltage

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1850.280	1913.640		
50				-5.70	0.0030
40				-5.50	0.0029
30				-10.70	0.0057
10				-8.00	0.0042
0				-7.60	0.0040
-10				-7.00	0.0037
-20				-7.00	0.0037
-30				-4.30	0.0023

##### Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1850.280	1913.640	-12.60	0.0067
4.4				-11.50	0.0061

#### n41

##### Frequency Error vs Voltage

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	2496.720	2688.160		
50				-10.30	0.0040
40				-6.60	0.0025
30				-4.50	0.0017
10				-6.30	0.0024
0				-10.50	0.0040
-10				-2.70	0.0010
-20				-8.50	0.0033
-30				-1.50	0.0006

##### Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	2496.720	2688.160	-1.30	0.0005
4.4				-0.90	0.0003

**LTE Band 12+NR n66**
**Frequency Error vs Voltage**

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	1710.120	1779.880		
50				-8.60	0.0049
40				-8.10	0.0046
30				-6.50	0.0037
10				-8.50	0.0049
0				-7.80	0.0045
-10				-4.90	0.0028
-20				-8.20	0.0047
-30				-8.80	0.0050

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	1710.120	1779.880	-7.20	0.0041
4.4				-8.10	0.0046

**LTE Band 66+NR n71**
**Frequency Error vs Voltage**

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	663.280	696.640		
50				-6.80	0.0100
40				-4.10	0.0060
30				-4.50	0.0066
10				-6.40	0.0094
0				-4.50	0.0066
-10				-4.50	0.0066
-20				-5.80	0.0085
-30				-5.20	0.0076

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	663.280	696.640	-5.90	0.0087
4.4				-5.00	0.0073

**n77L**
**Frequency Error vs Voltage**

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	3450.400	3547.800		
50				-9.20	0.0026
40				-12.00	0.0034
30				-8.90	0.0025
10				-7.90	0.0023
0				-13.60	0.0039
-10				-10.00	0.0029
-20				-7.10	0.0020
-30				-6.90	0.0020

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	3450.400	3547.800	-12.90	0.0037
4.4				-7.40	0.0021

**n77H**
**Frequency Error vs Voltage**

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	3700.360	3978.520		
50				1.90	0.0005
40				-2.80	0.0007
30				-2.90	0.0008
10				0.70	0.0002
0				-3.40	0.0009
-10				-5.50	0.0014
-20				-2.50	0.0007
-30				-5.00	0.0013

**Frequency Error vs Voltage**

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.5	20	3700.360	3978.520	-5.70	0.0015
4.4				-6.90	0.0018

#### **A.4 Occupied Bandwidth**

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies frequency. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

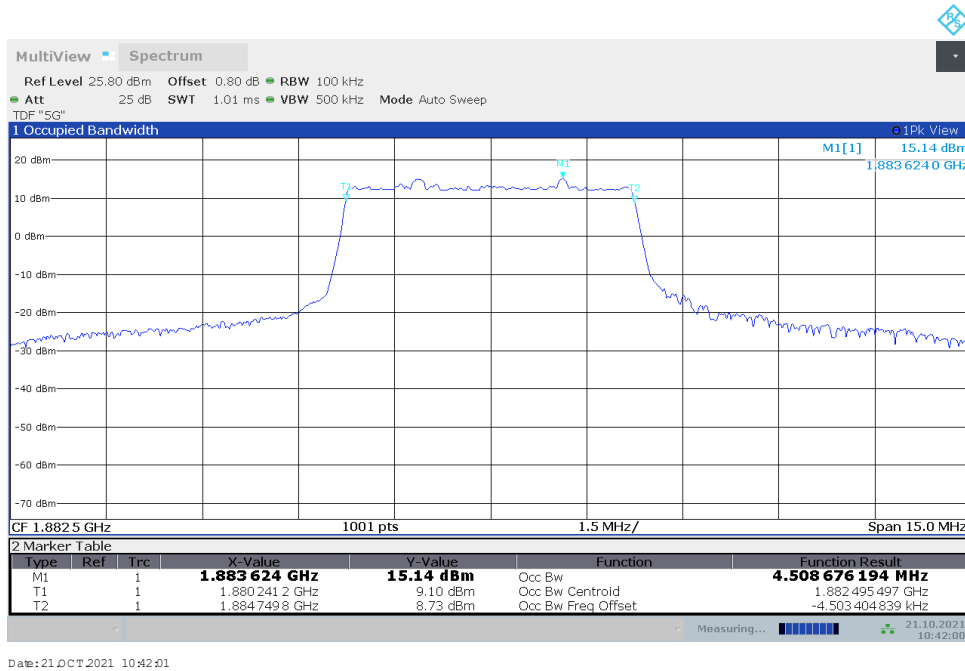
The measurement method is from ANSI C63.26:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
- d) Set the detection mode to peak, and the trace mode to max-hold.

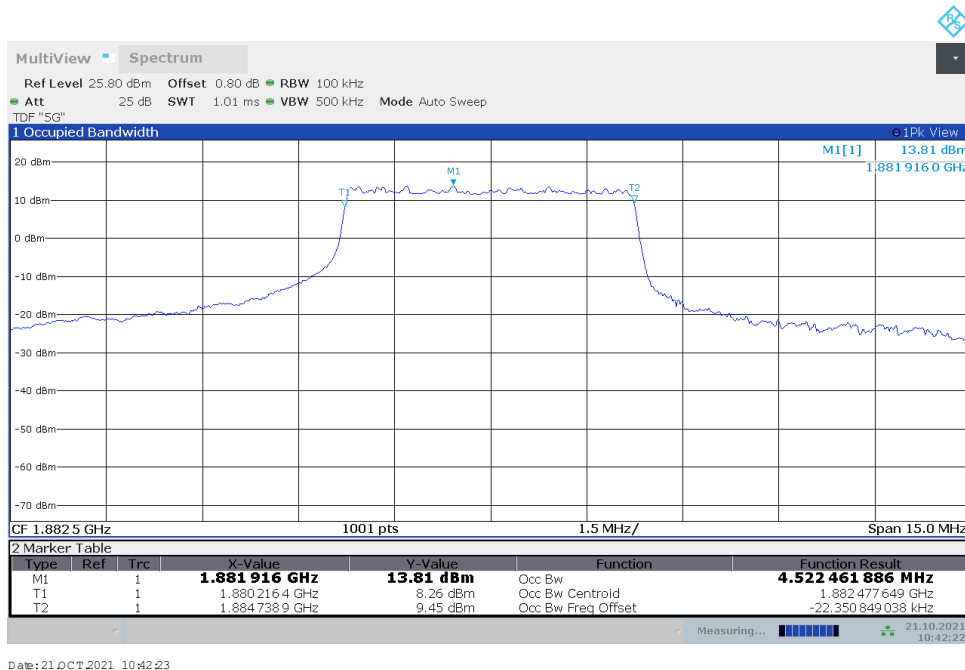
**LTE Band 12+NR n25**  
**n25,5MHz(99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	4.509	4.522

**n25,5MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)**



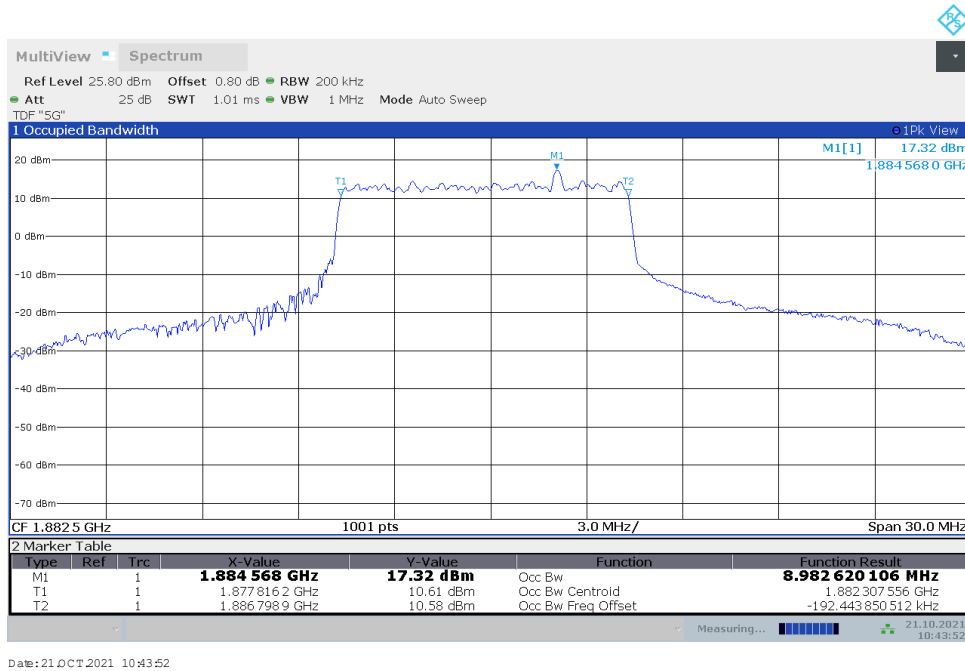
**n25,5MHz Bandwidth,DFT-s-QPSK (99% BW)**



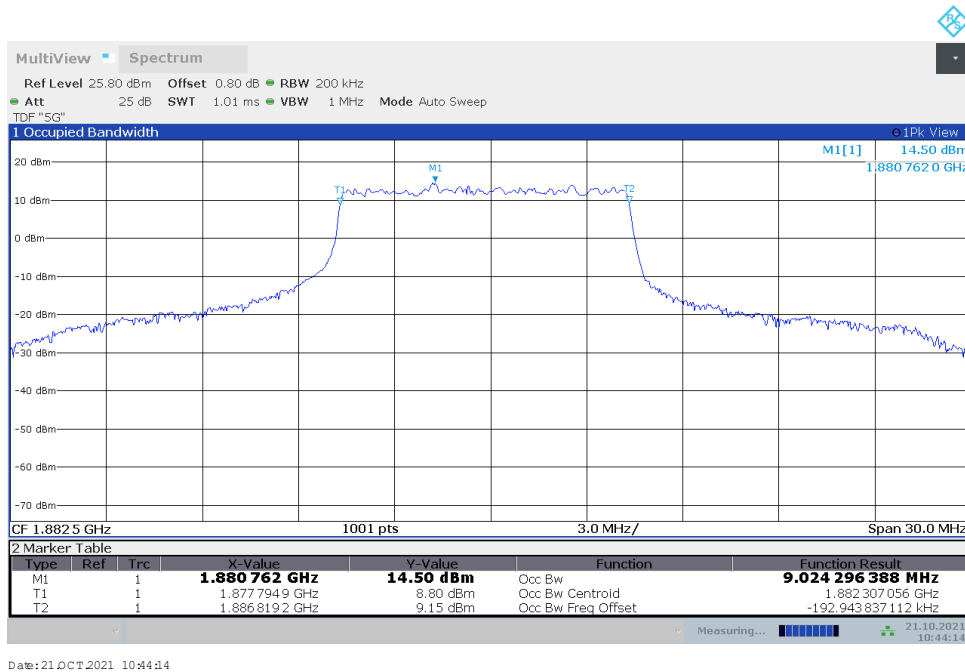
### LTE Band 12+NR n25 n25,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	8.983	9.024

### n25,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



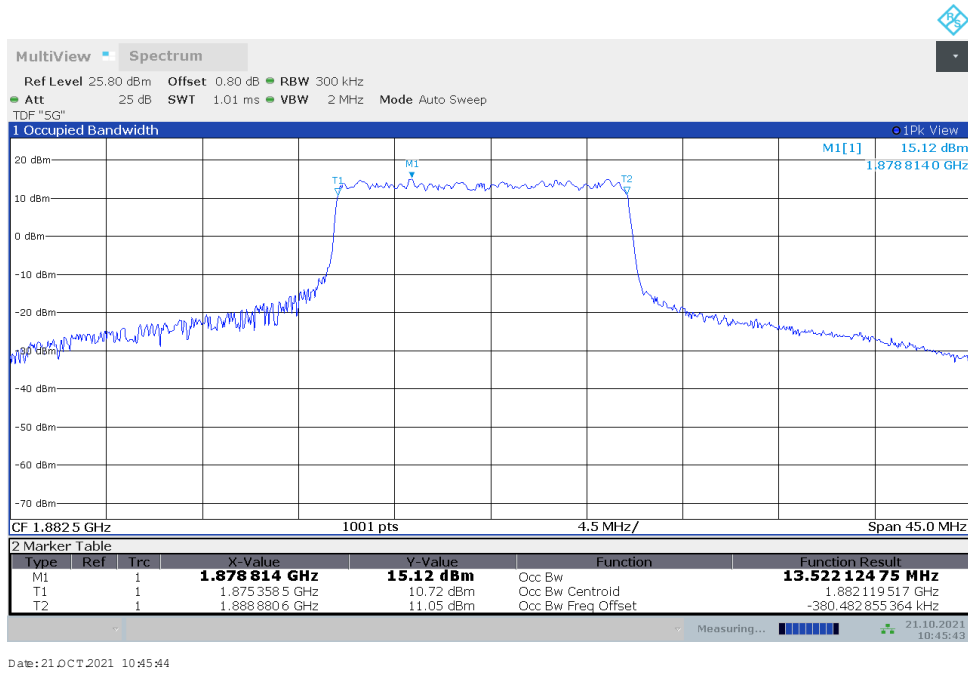
### n25,10MHz Bandwidth,DFT-s-QPSK (99% BW)



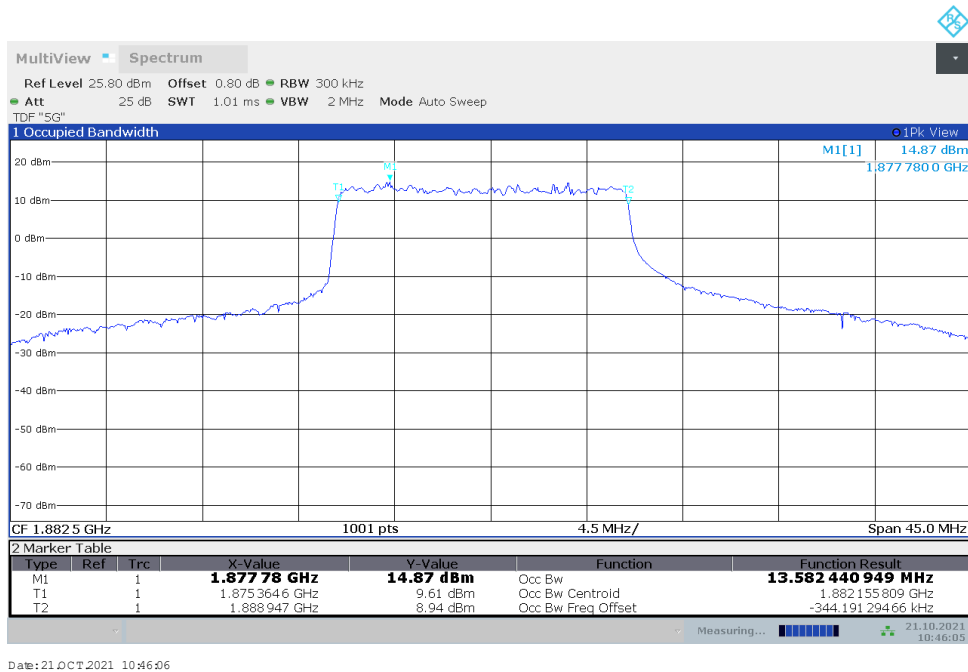
### LTE Band 12+NR n25 n25,15MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	13.522	13.582

### n25,15MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



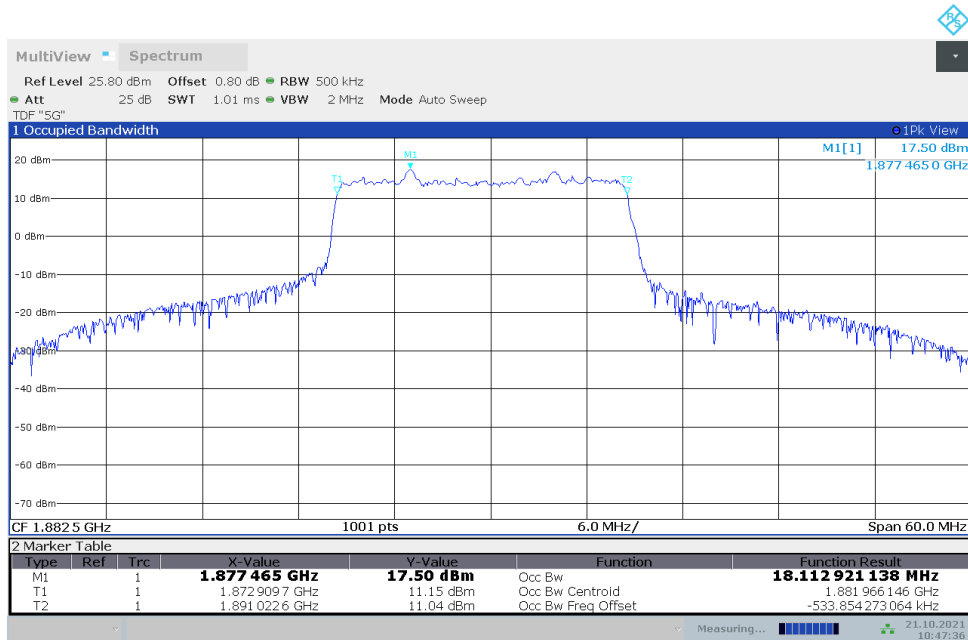
### n25,15MHz Bandwidth,DFT-s-QPSK (99% BW)



**LTE Band 12+NR n25**  
**n25,20MHz(99%)**

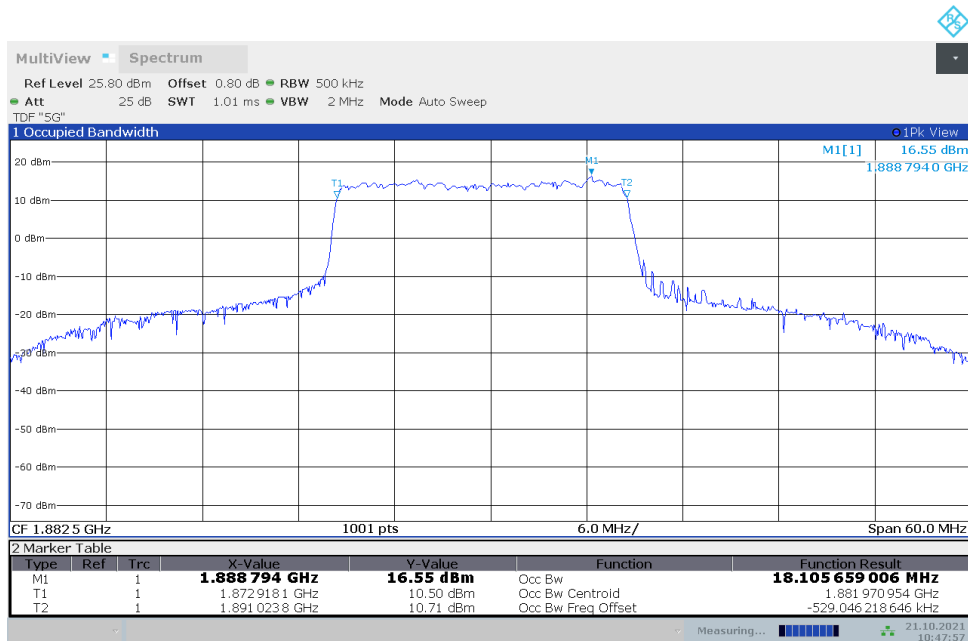
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	18.113	18.106

**n25,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)**



Date: 21.OCT.2021 10:47:36

**n25,20MHz Bandwidth,DFT-s-QPSK (99% BW)**



Date: 21.OCT.2021 10:47:58

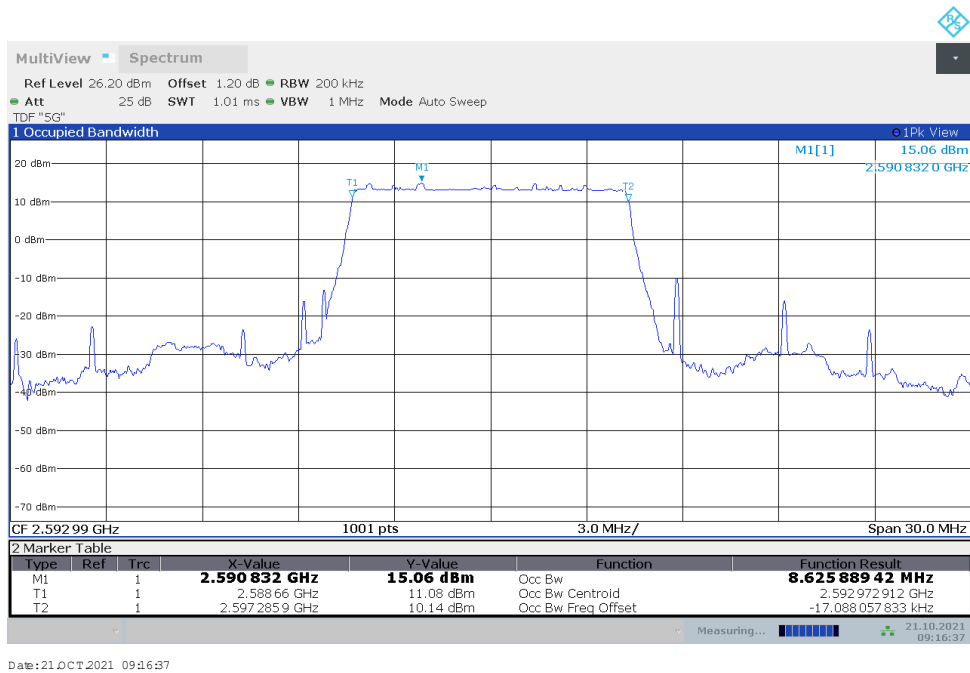


n41

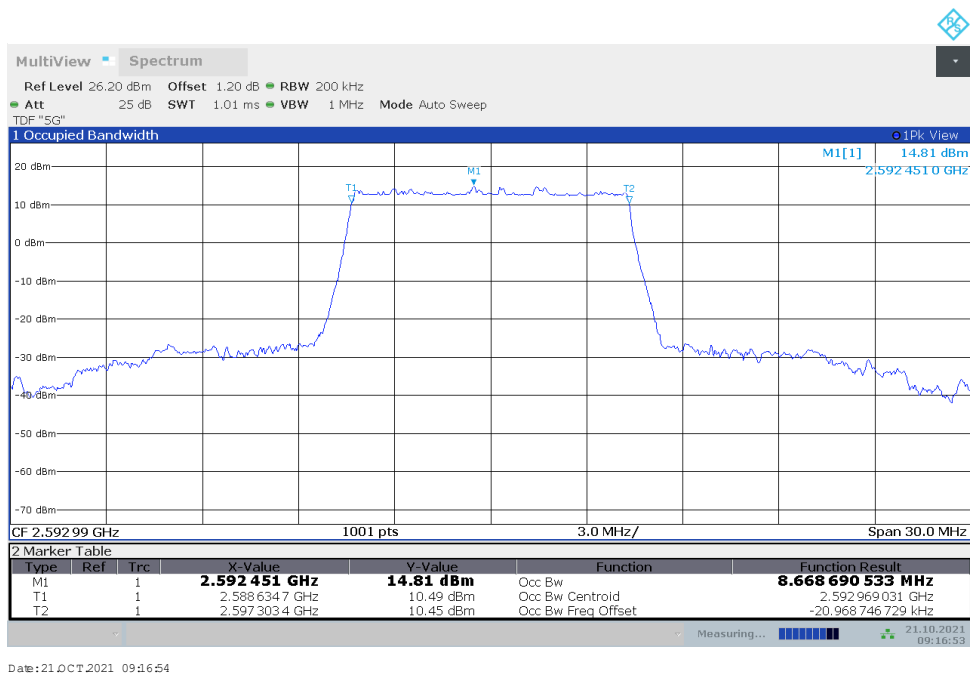
n41,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	8.626	8.669

n41,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)

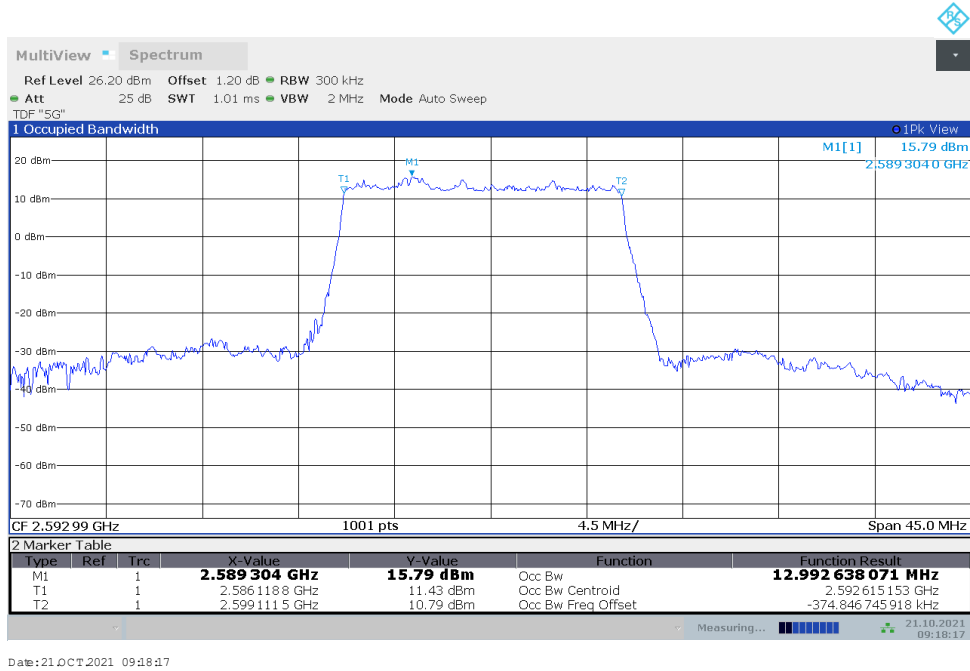
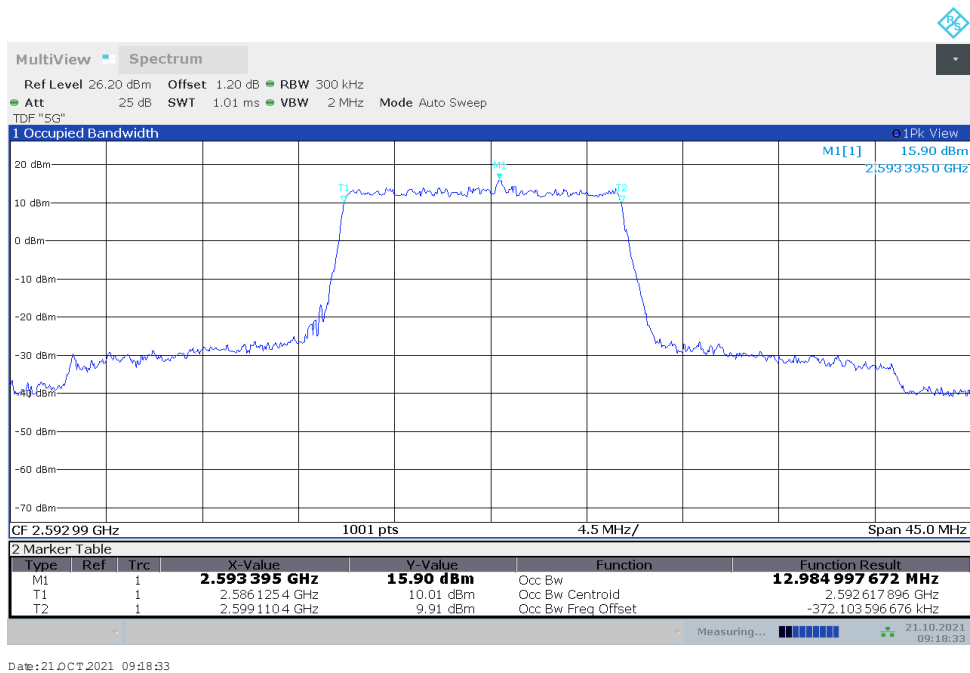


n41,10MHz Bandwidth,DFT-s-QPSK (99% BW)



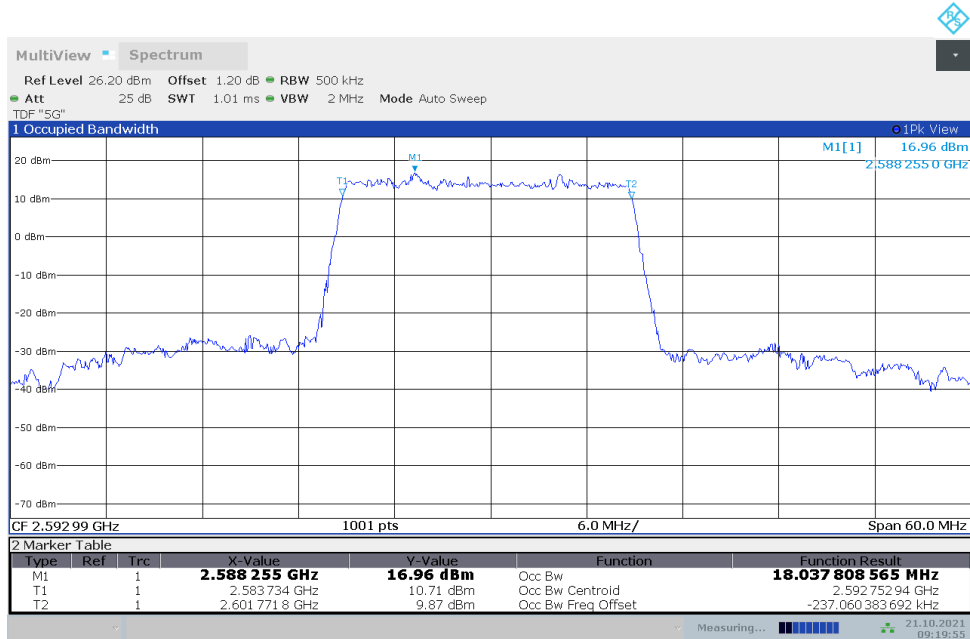
**n41,15MHz(99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	12.993	12.985

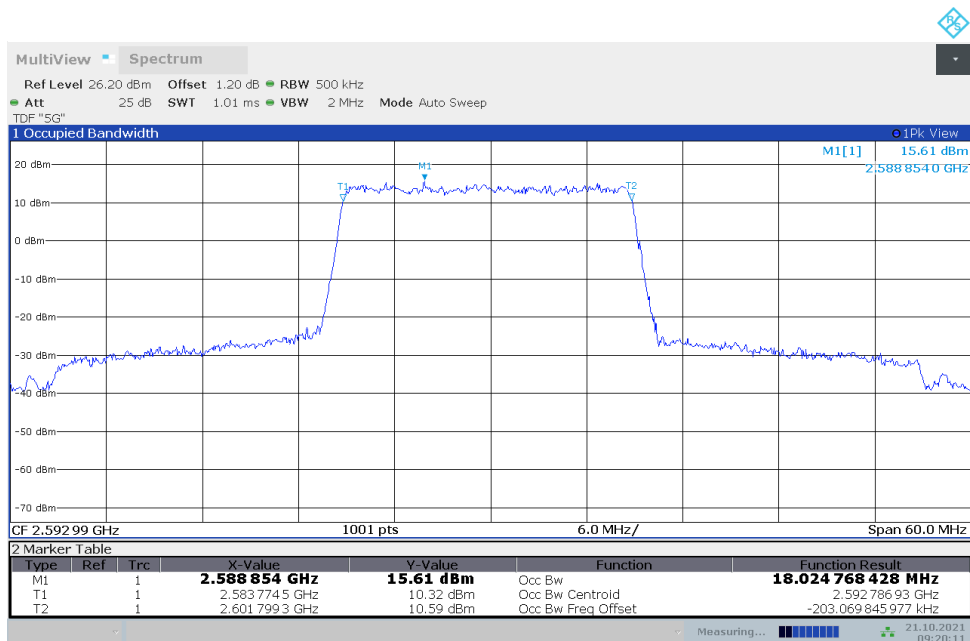
**n41,15MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)**

**n41,15MHz Bandwidth,DFT-s-QPSK (99% BW)**


**n41,20MHz(99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	18.038	18.025

**n41,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)**


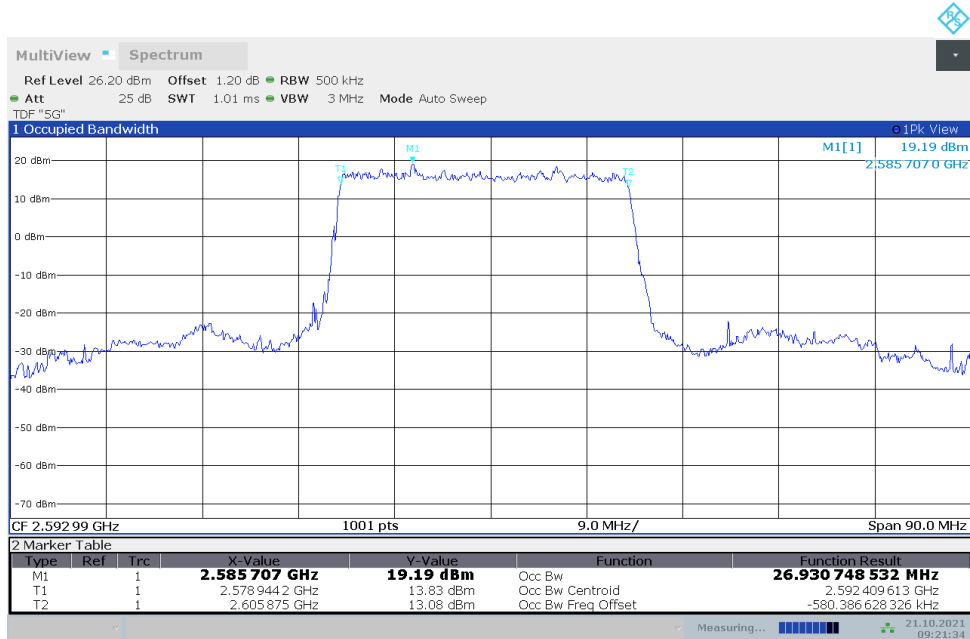
Date: 21.OCT.2021 09:19:55

**n41,20MHz Bandwidth,DFT-s-QPSK (99% BW)**


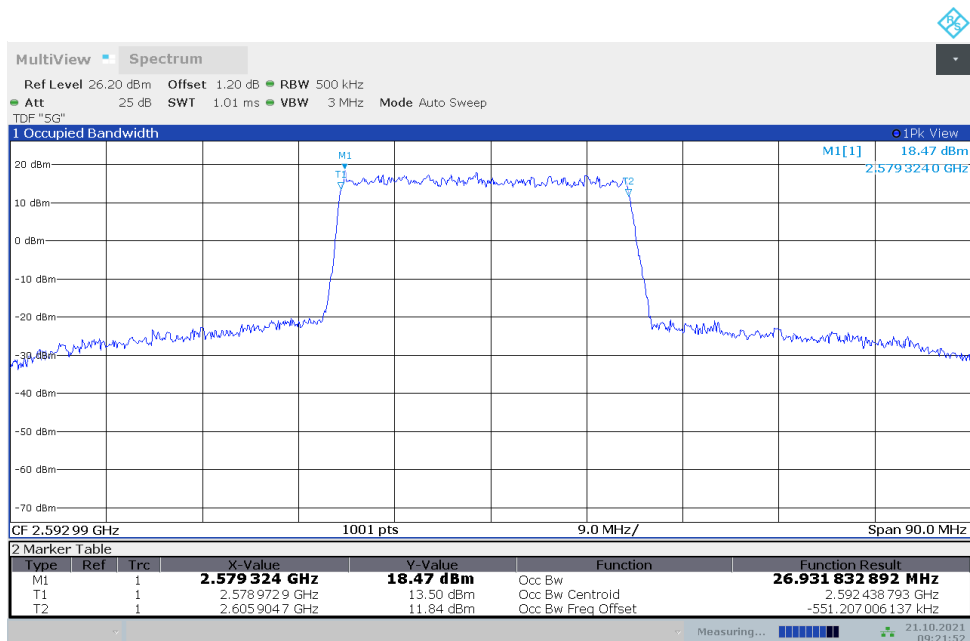
Date: 21.OCT.2021 09:20:12

**n41,30MHz(99%)**

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	26.931	26.932

**n41,30MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)**


Date: 21.OCT.2021 09:21:35

**n41,30MHz Bandwidth,DFT-s-QPSK (99% BW)**


Date: 21.OCT.2021 09:21:52