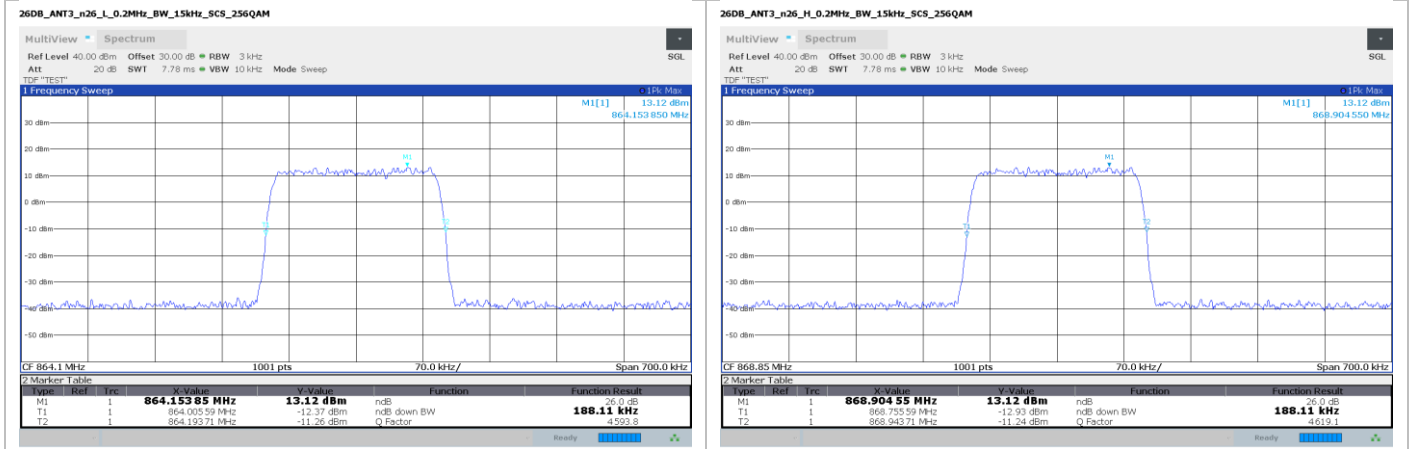


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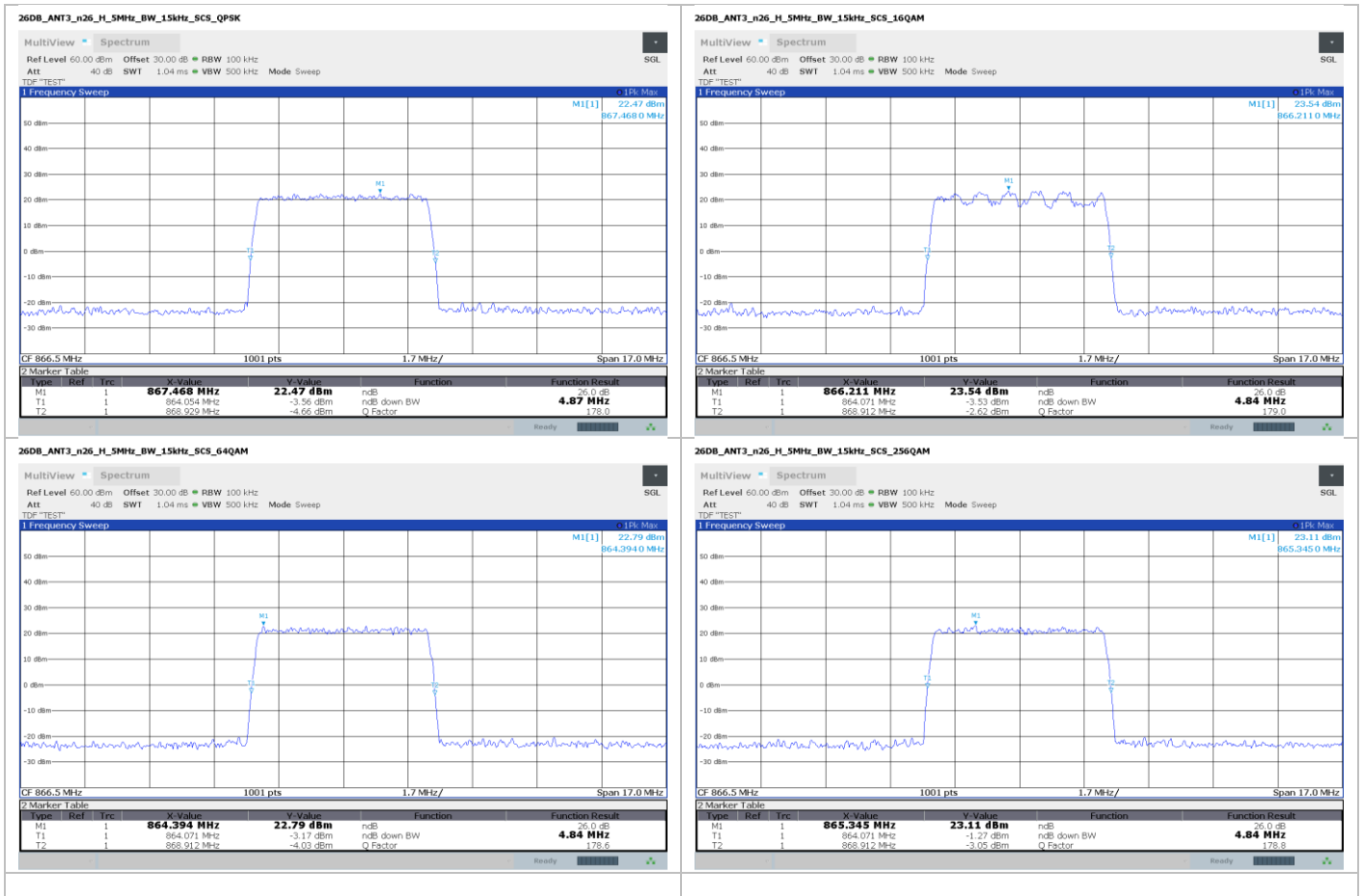
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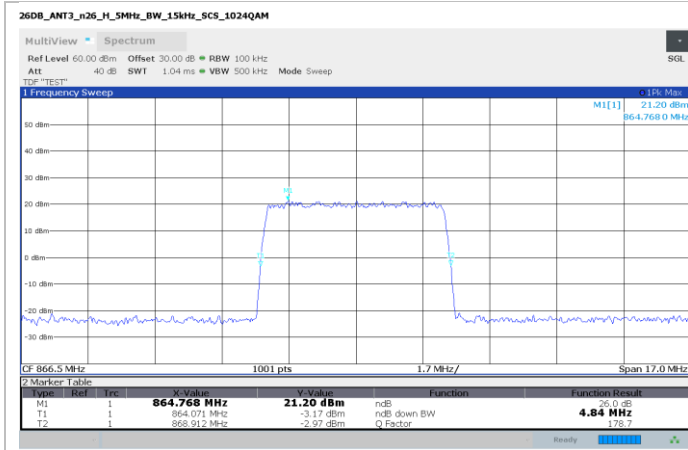


Band n26 (NB-IoT) – 0.2 MHz



Band n26 – 5 MHz





Band n29:

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n29	5 MHz	C	720.5	4.84
n29	5 MHz	C	723	4.857
n29	5 MHz	C	725.5	4.84

Table 8.3-8: 26 dB Occupied bandwidth, QPSK Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	5 MHz	C	720.5	4.84
n29	5 MHz	C	723	4.874
n29	5 MHz	C	725.5	4.823

Table 8.3-9: 26 dB Occupied bandwidth, 16QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	5 MHz	C	720.5	4.84
n29	5 MHz	C	723	4.857
n29	5 MHz	C	725.5	4.806

Table 8.3-10: 26 dB Occupied bandwidth, 64QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	5 MHz	C	720.5	4.823
n29	5 MHz	C	723	4.857
n29	5 MHz	C	725.5	4.84

Table 8.3-11: 26 dB Occupied bandwidth, 256QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	5 MHz	C	720.5	4.84
n29	5 MHz	C	723	4.857
n29	5 MHz	C	725.5	4.84

Table 8.3-12: 26 dB Occupied bandwidth, 1024QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n29	10 MHz	C	723	9.956

Table 8.3-13: 26 dB Occupied bandwidth, QPSK Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	10 MHz	C	723	9.89

Table 8.3-14: 26 dB Occupied bandwidth, 16QAM Modulation, 10 MHz

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Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	10 MHz	C	723	9.89

Table 8.3-15: 26 dB Occupied bandwidth, 64QAM Modulation, 10 MHz

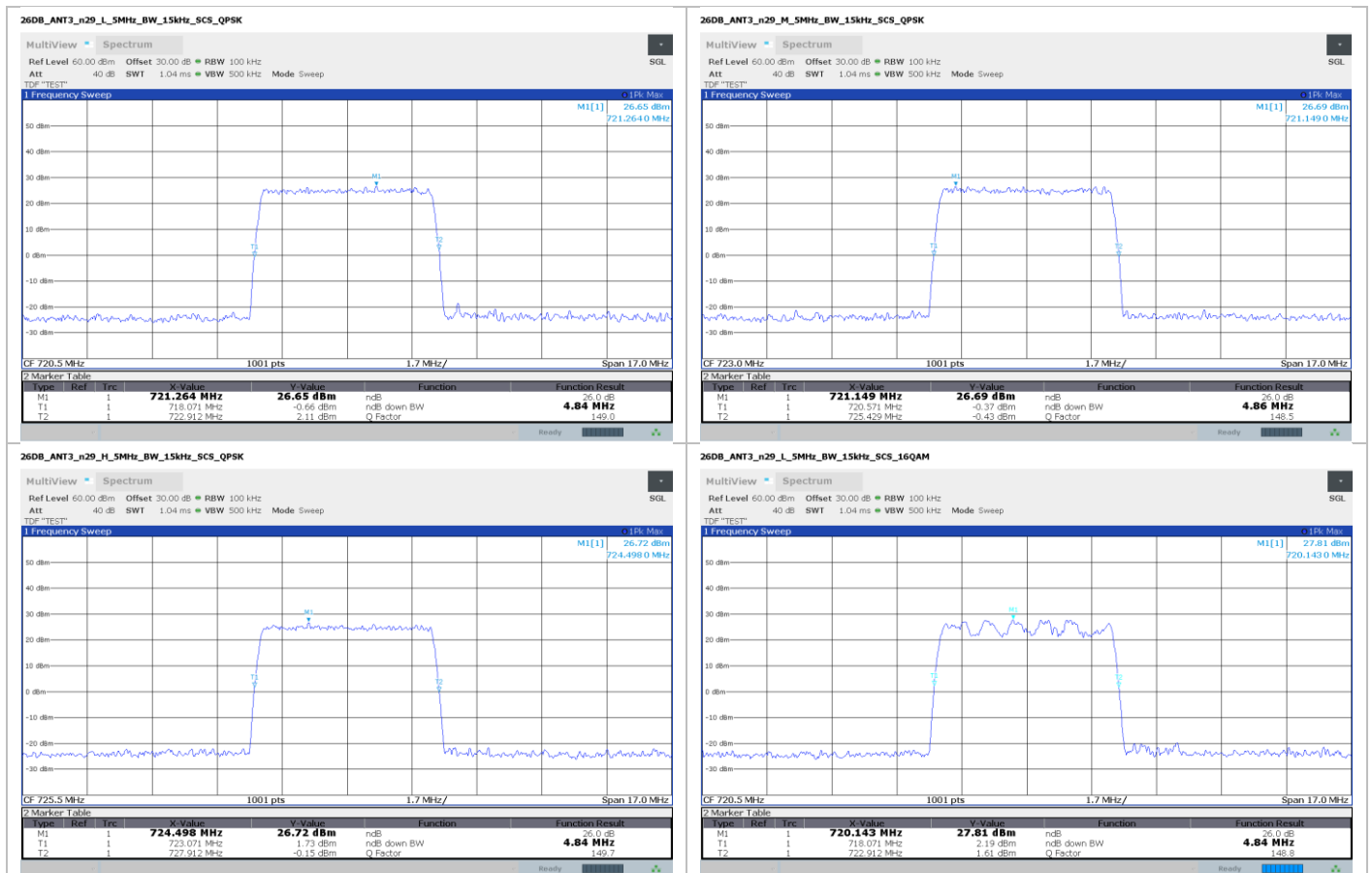
Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	10 MHz	C	723	9.857

Table 8.3-16: 26 dB Occupied bandwidth, 256QAM Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n29	10 MHz	C	723	9.923

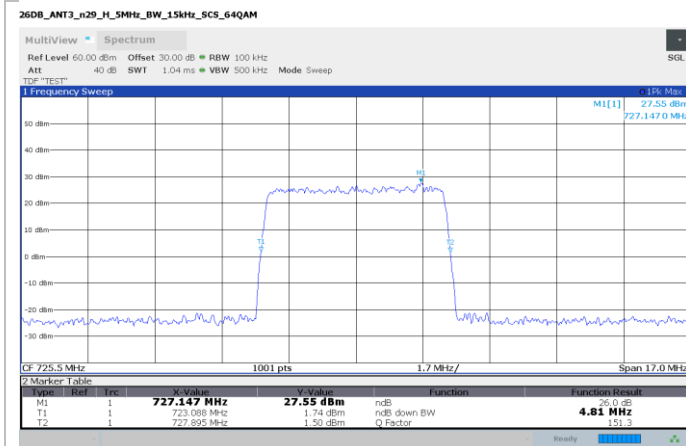
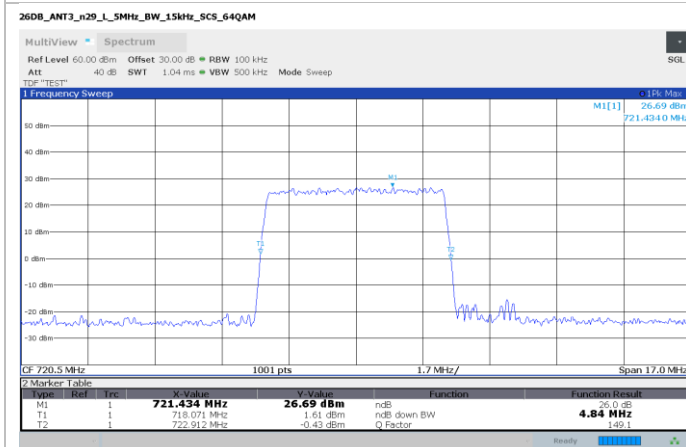
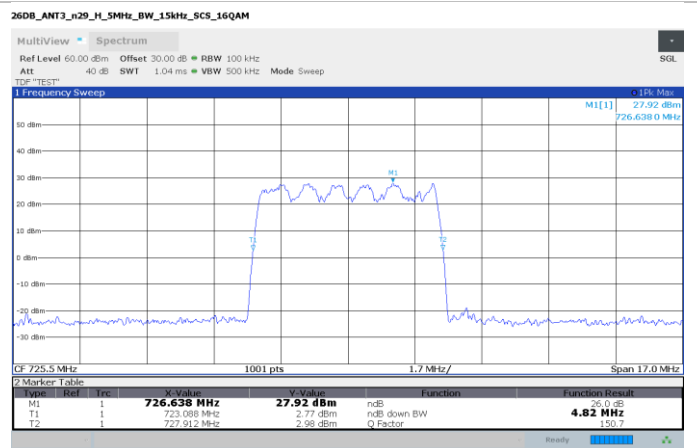
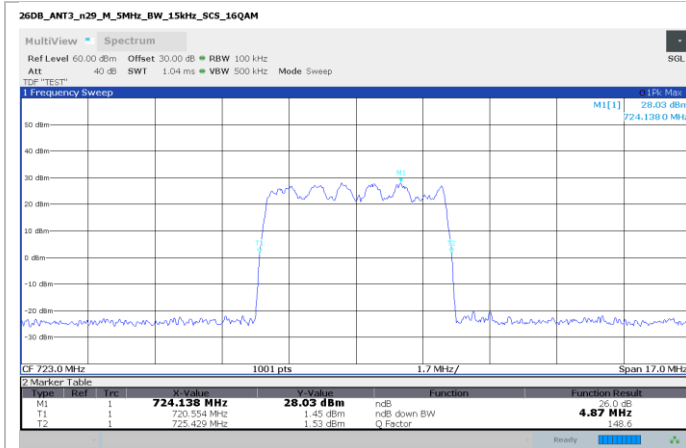
Table 8.3-17: 26 dB Occupied bandwidth, 1024QAM Modulation, 10 MHz

Band n29 – 5 MHz



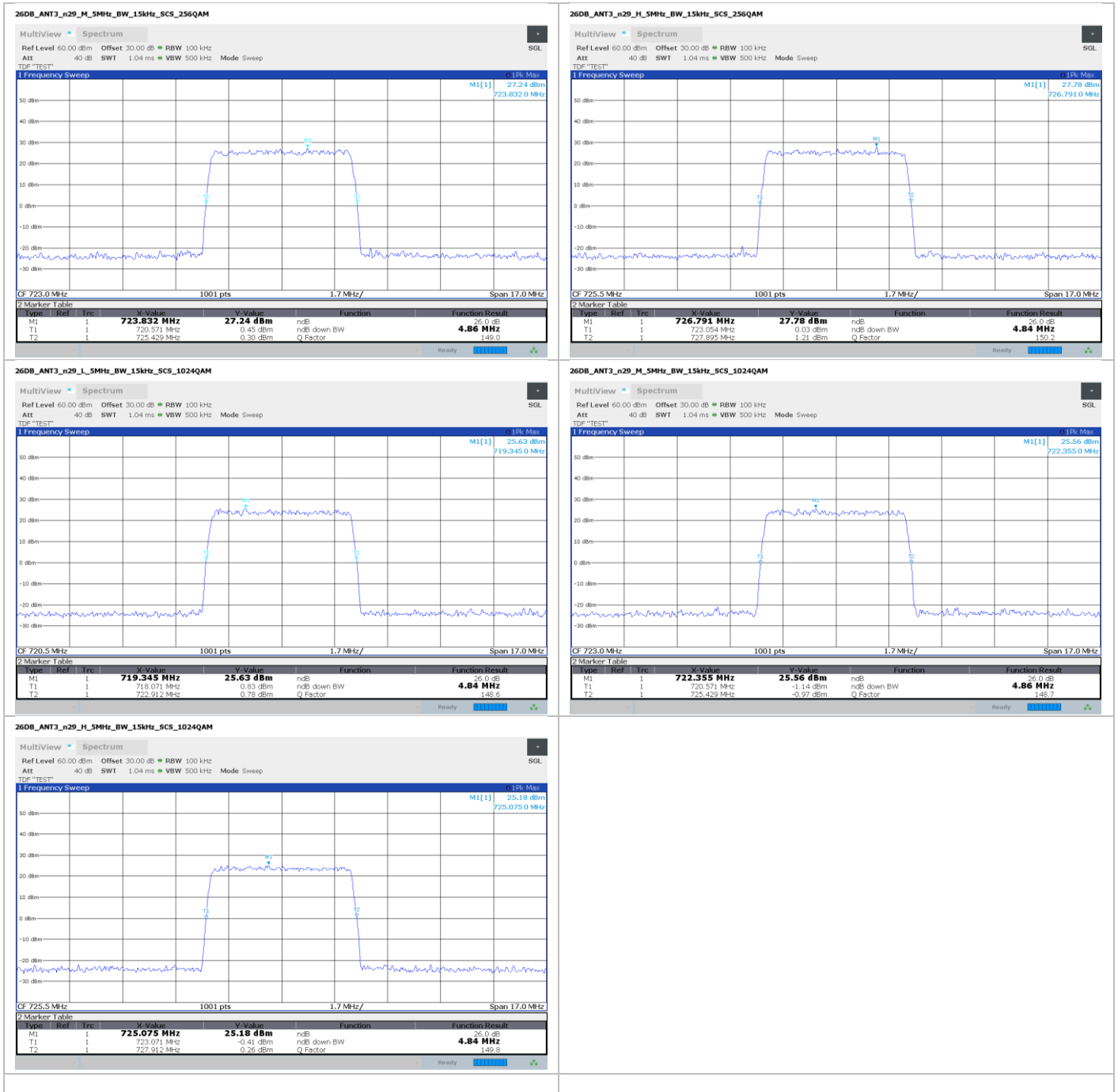
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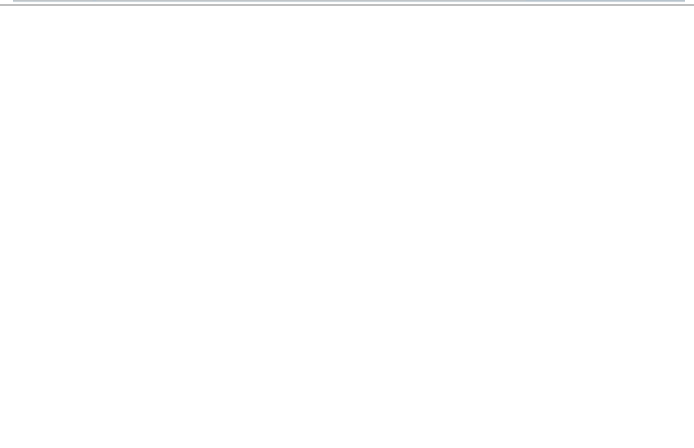
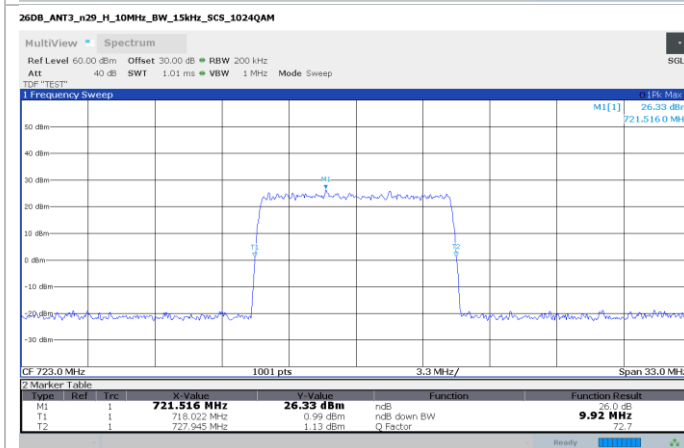
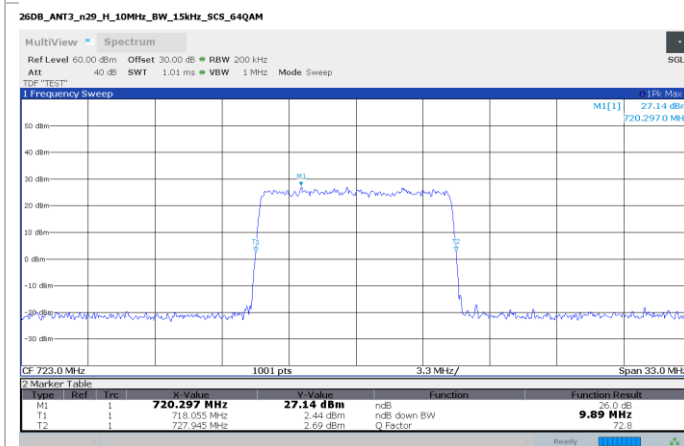
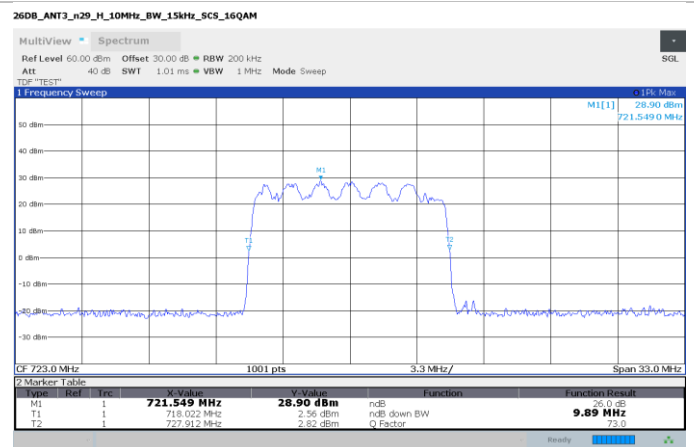
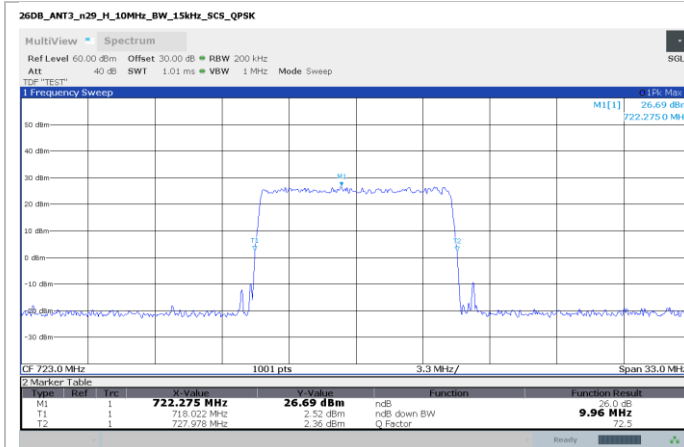


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Band n29 – 10 MHz



Band n71:

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n71 (NB-IoT)	0.2 MHz	C	617.307	0.188
n71 (NB-IoT)	0.2 MHz	C	636.4925	0.189
n71 (NB-IoT)	0.2 MHz	C	651.692	0.189

Table 8.3-18: 26 dB Occupied bandwidth, QPSK Modulation, NB-IoT mode

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n71	5 MHz	C	619.5	4.84
n71	5 MHz	C	634.5	4.84
n71	5 MHz	C	649.5	4.857

Table 8.3-19: 26 dB Occupied bandwidth, QPSK Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	5 MHz	C	619.5	4.857
n71	5 MHz	C	634.5	4.823
n71	5 MHz	C	649.5	4.84

Table 8.3-20: 26 dB Occupied bandwidth, 16QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	5 MHz	C	619.5	4.84
n71	5 MHz	C	634.5	4.857
n71	5 MHz	C	649.5	4.823

Table 8.3-21: 26 dB Occupied bandwidth, 64QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	5 MHz	C	619.5	4.823
n71	5 MHz	C	634.5	4.823
n71	5 MHz	C	649.5	4.84

Table 8.3-22: 26 dB Occupied bandwidth, 256QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	5 MHz	C	619.5	4.84
n71	5 MHz	C	634.5	4.857
n71	5 MHz	C	649.5	4.857

Table 8.3-23: 26 dB Occupied bandwidth, 1024QAM Modulation, 5 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n71	10 MHz	C	622	9.923
n71	10 MHz	C	634.5	9.956
n71	10 MHz	C	647	9.956

Table 8.3-24: 26 dB Occupied bandwidth, QPSK Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	10 MHz	C	622	9.824
n71	10 MHz	C	634.5	9.89
n71	10 MHz	C	647	9.857

Table 8.3-25: 26 dB Occupied bandwidth, 16QAM Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	10 MHz	C	622	9.956
n71	10 MHz	C	634.5	9.923
n71	10 MHz	C	647	9.956

Table 8.3-26: 26 dB Occupied bandwidth, 64QAM Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	10 MHz	C	622	9.956
n71	10 MHz	C	634.5	9.956
n71	10 MHz	C	647	9.956

Table 8.3-27: 26 dB Occupied bandwidth, 256QAM Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	10 MHz	C	622	9.956
n71	10 MHz	C	634.5	9.989
n71	10 MHz	C	647	9.923

Table 8.3-28: 26 dB Occupied bandwidth, 1024QAM Modulation, 10 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n71	15 MHz	C	624.5	14.783
n71	15 MHz	C	634.5	14.881
n71	15 MHz	C	644.5	14.832

Table 8.3-29: 26 dB Occupied bandwidth, QPSK Modulation, 15 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	15 MHz	C	624.5	14.832
n71	15 MHz	C	634.5	14.881
n71	15 MHz	C	644.5	14.881

Table 8.3-30: 26 dB Occupied bandwidth, 16QAM Modulation, 15 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	15 MHz	C	624.5	14.881
n71	15 MHz	C	634.5	14.832
n71	15 MHz	C	644.5	14.881

Table 8.3-31: 26 dB Occupied bandwidth, 64QAM Modulation, 15 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	15 MHz	C	624.5	14.832
n71	15 MHz	C	634.5	14.881
n71	15 MHz	C	644.5	14.881

Table 8.3-32: 26 dB Occupied bandwidth, 256QAM Modulation, 15 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	15 MHz	C	624.5	14.832
n71	15 MHz	C	634.5	14.93
n71	15 MHz	C	644.5	14.881

Table 8.3-33: 26 dB Occupied bandwidth, 1024QAM Modulation, 15 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW (MHz)
n71	20 MHz	C	627	19.87
n71	20 MHz	C	634.5	19.935
n71	20 MHz	C	642	19.935

Table 8.3-34: 26 dB Occupied bandwidth, QPSK Modulation, 20 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	20 MHz	C	627	19.935
n71	20 MHz	C	634.5	19.935
n71	20 MHz	C	642	19.935

Table 8.3-35: 26 dB Occupied bandwidth, 16QAM Modulation, 20 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	20 MHz	C	627	19.935
n71	20 MHz	C	634.5	19.935
n71	20 MHz	C	642	19.87

Table 8.3-36: 26 dB Occupied bandwidth, 64QAM Modulation, 20 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	20 MHz	C	627	19.87
n71	20 MHz	C	634.5	19.935
n71	20 MHz	C	642	19.935

Table 8.3-37: 26 dB Occupied bandwidth, 256QAM Modulation, 20 MHz

Band	OBW Declared	Port	Channel (MHz)	26 dB OBW
n71	20 MHz	C	627	19.87
n71	20 MHz	C	634.5	19.87
n71	20 MHz	C	642	19.935

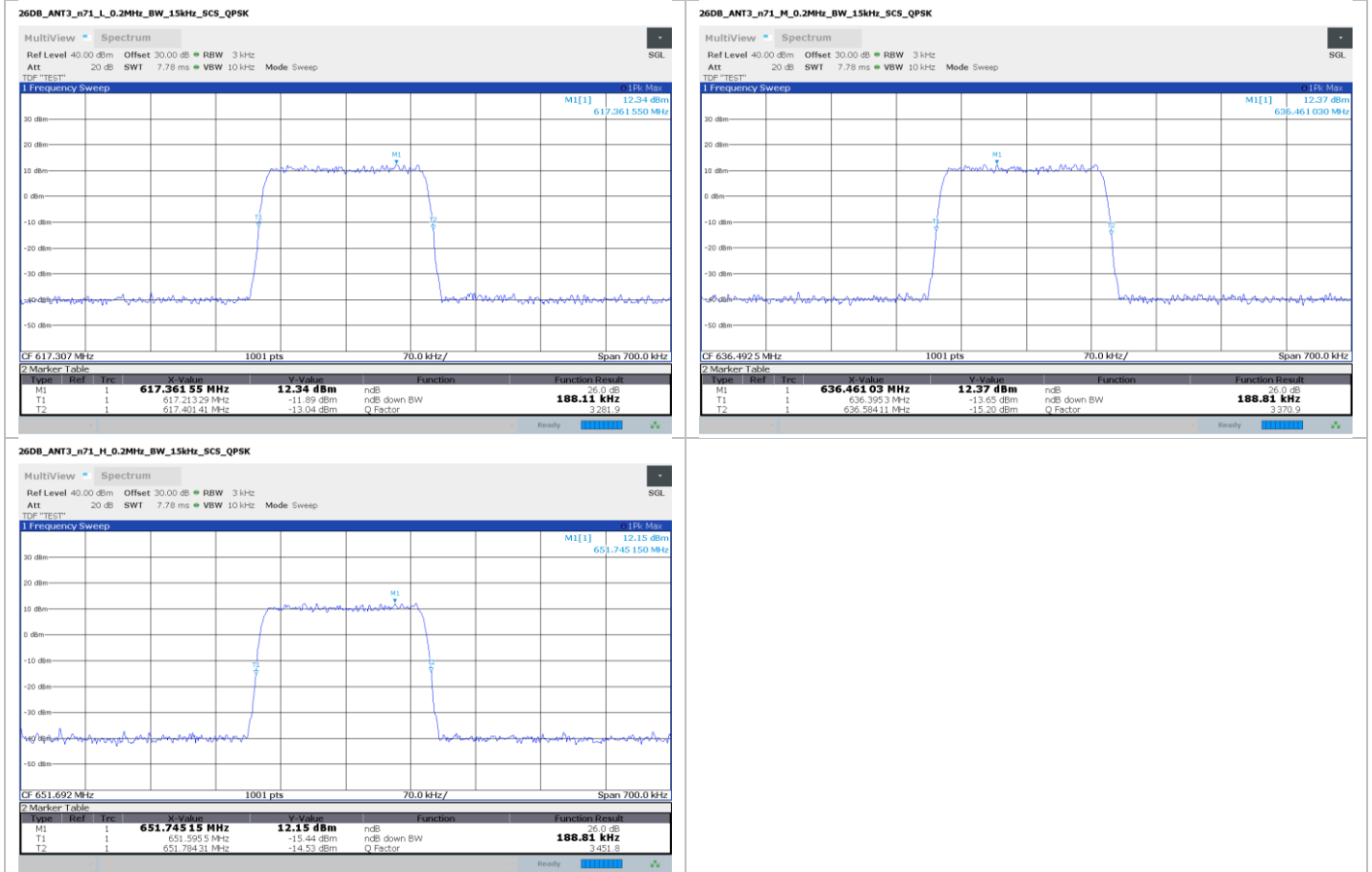
Table 8.3-38: 26 dB Occupied bandwidth, 1024QAM Modulation, 20 MHz

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Band n71 (NB-IoT) – 0.2 MHz

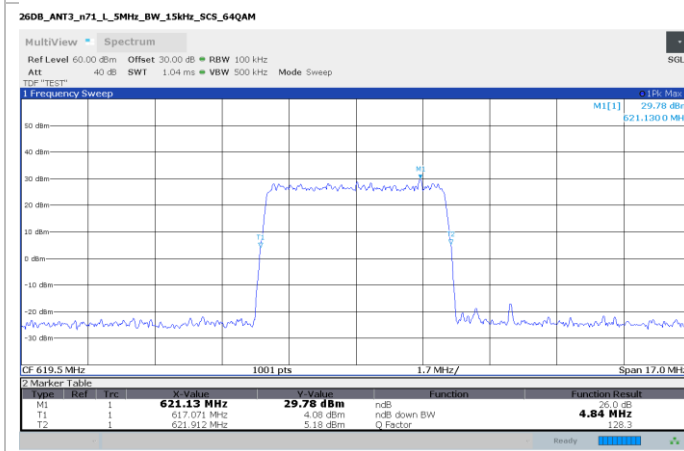
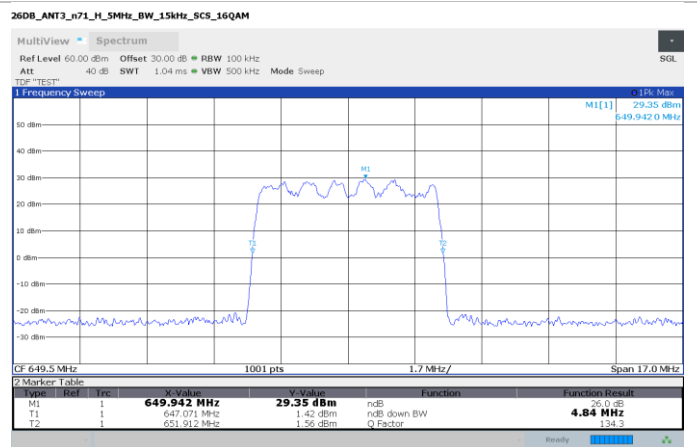
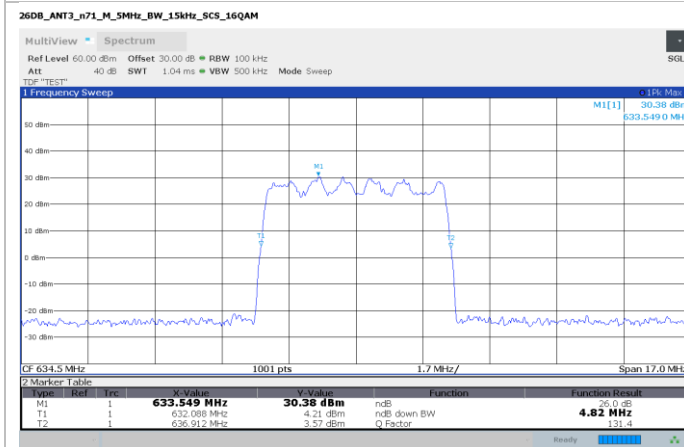
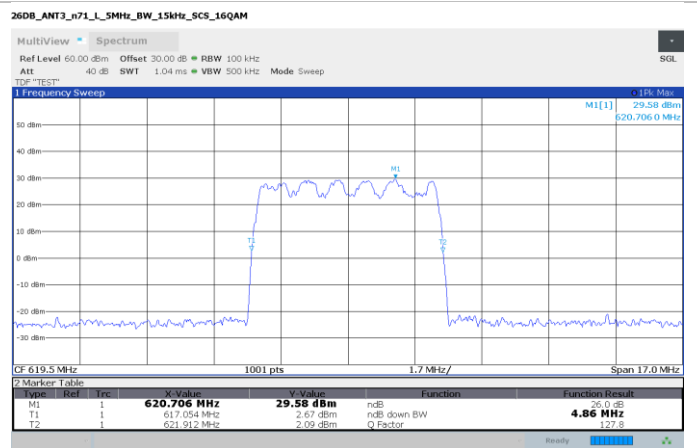
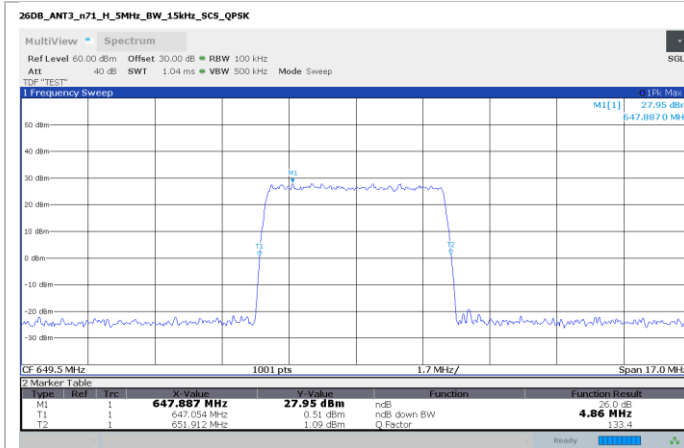


Band n71 – 5 MHz



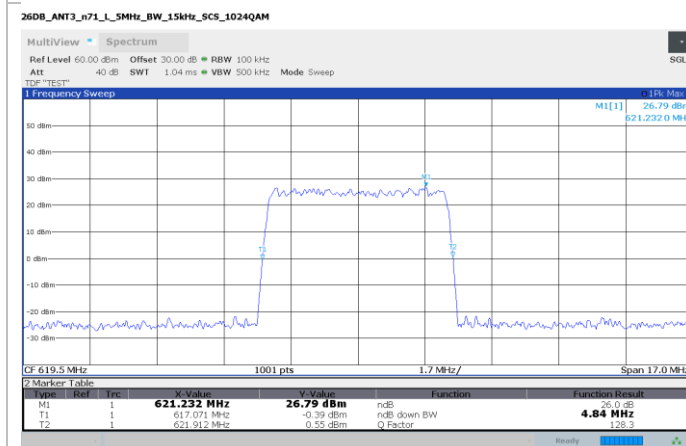
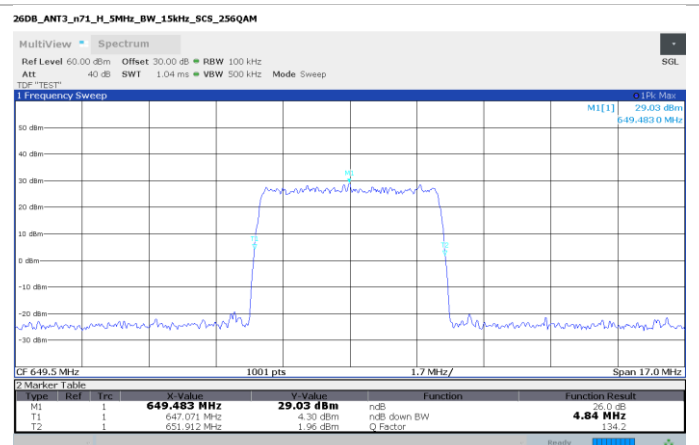
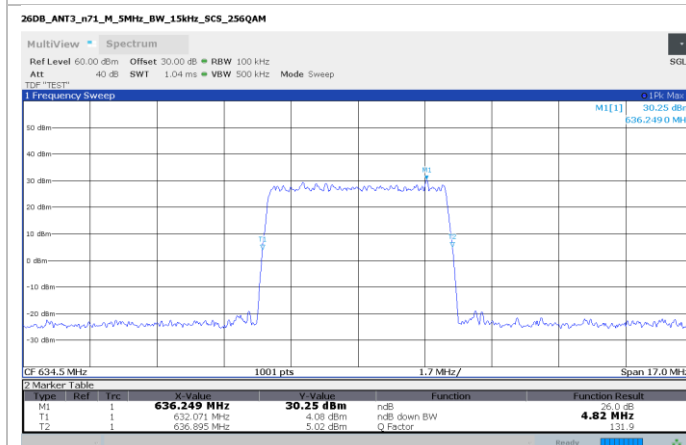
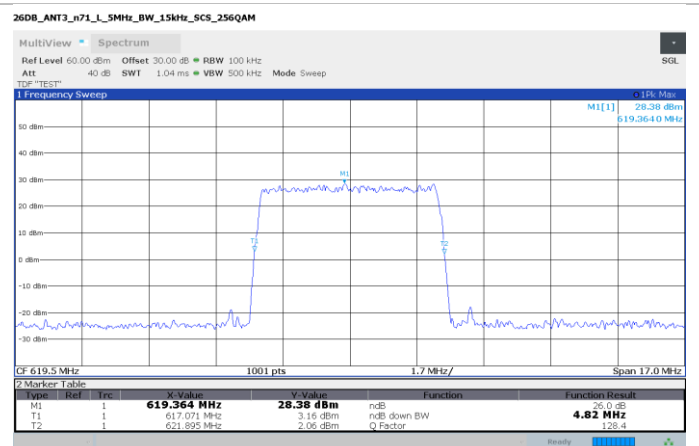
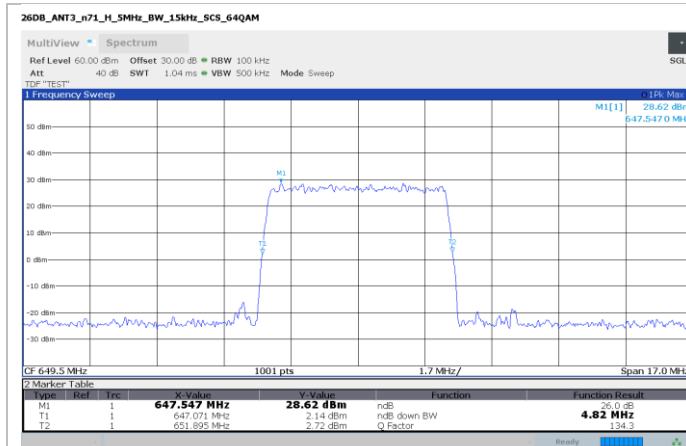
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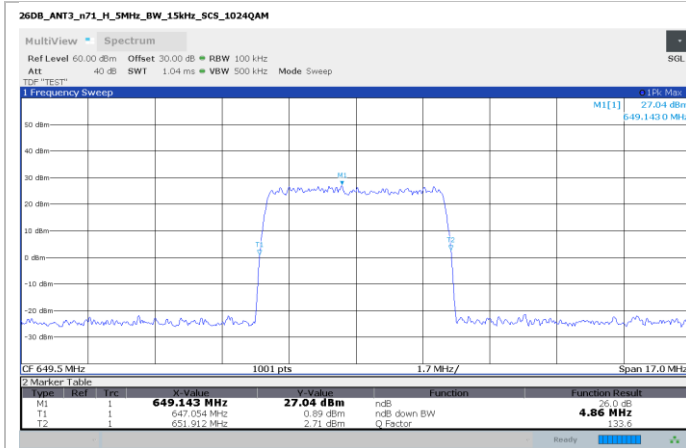
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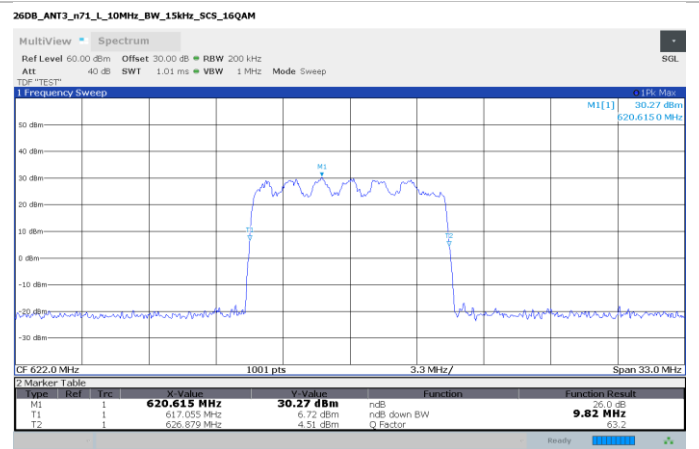
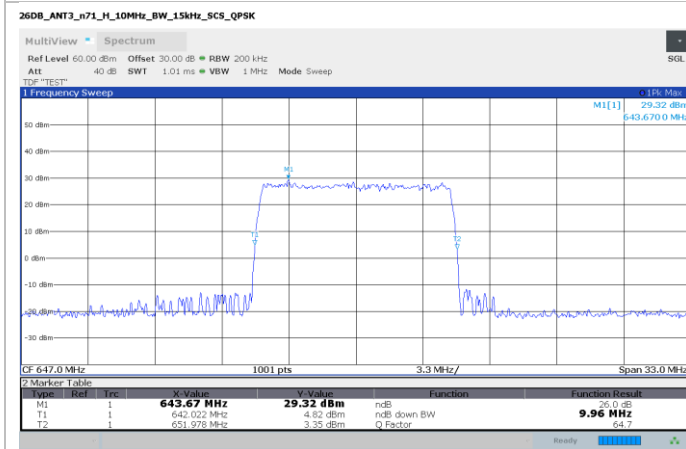
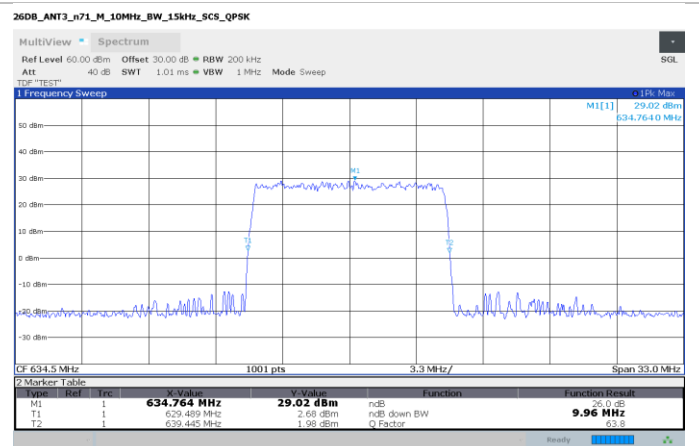
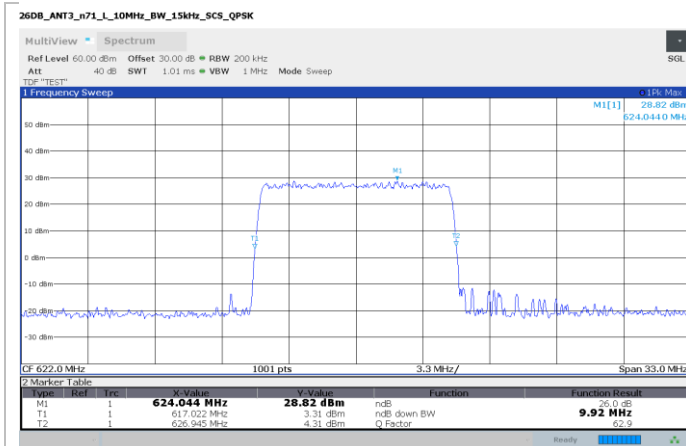


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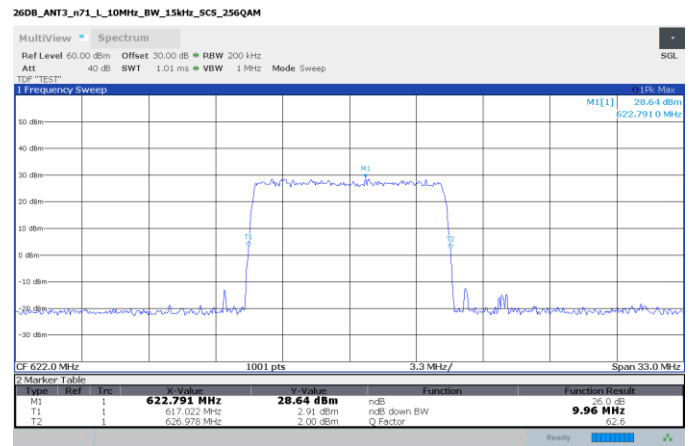
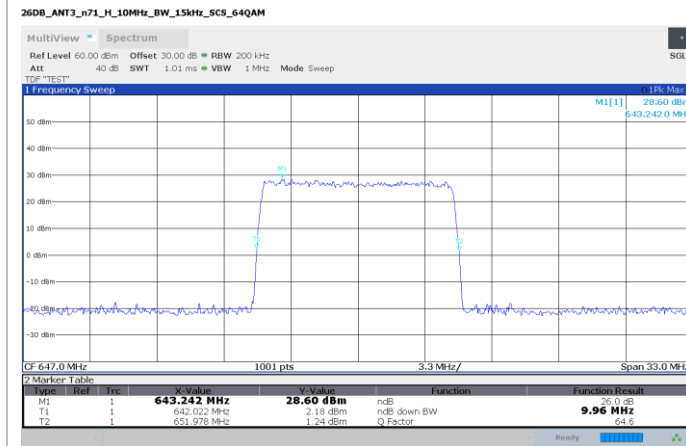
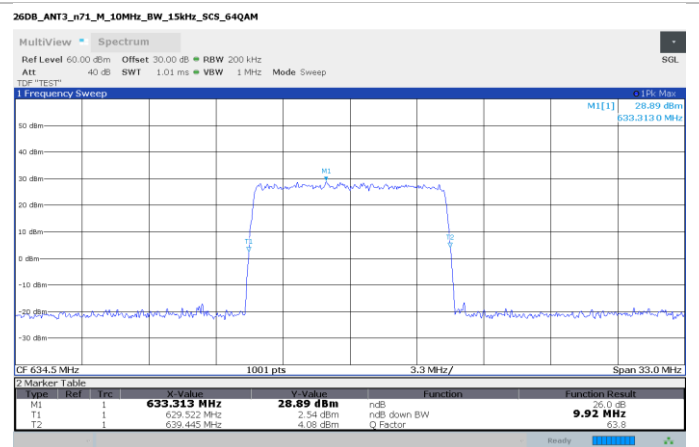
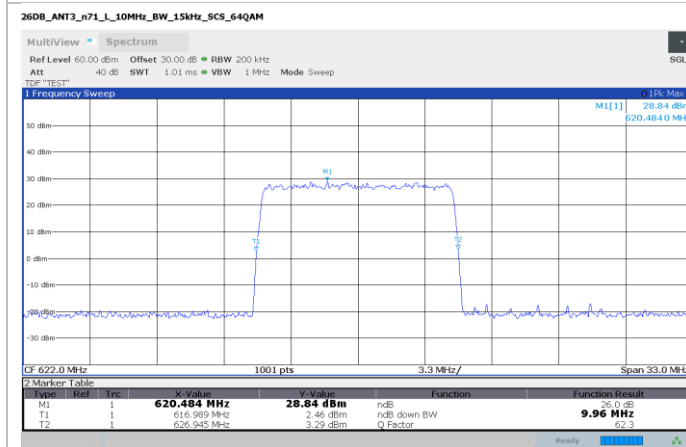
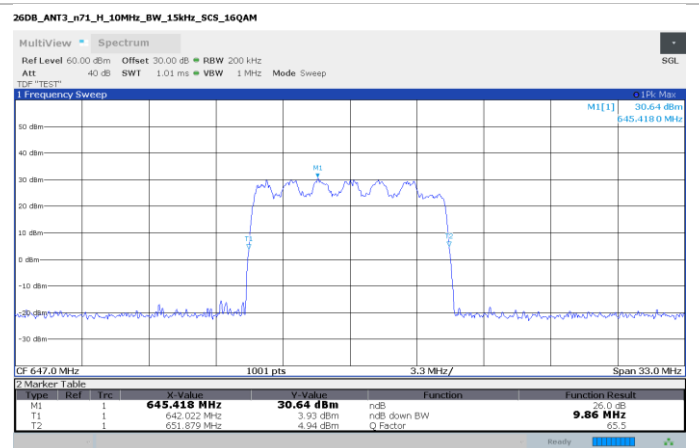
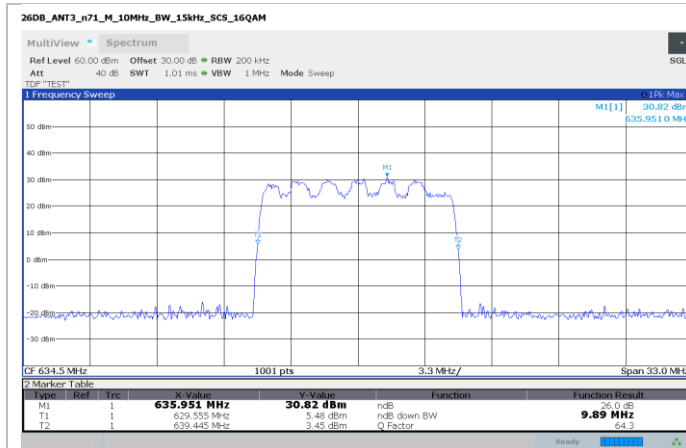


Band n71 – 10 MHz



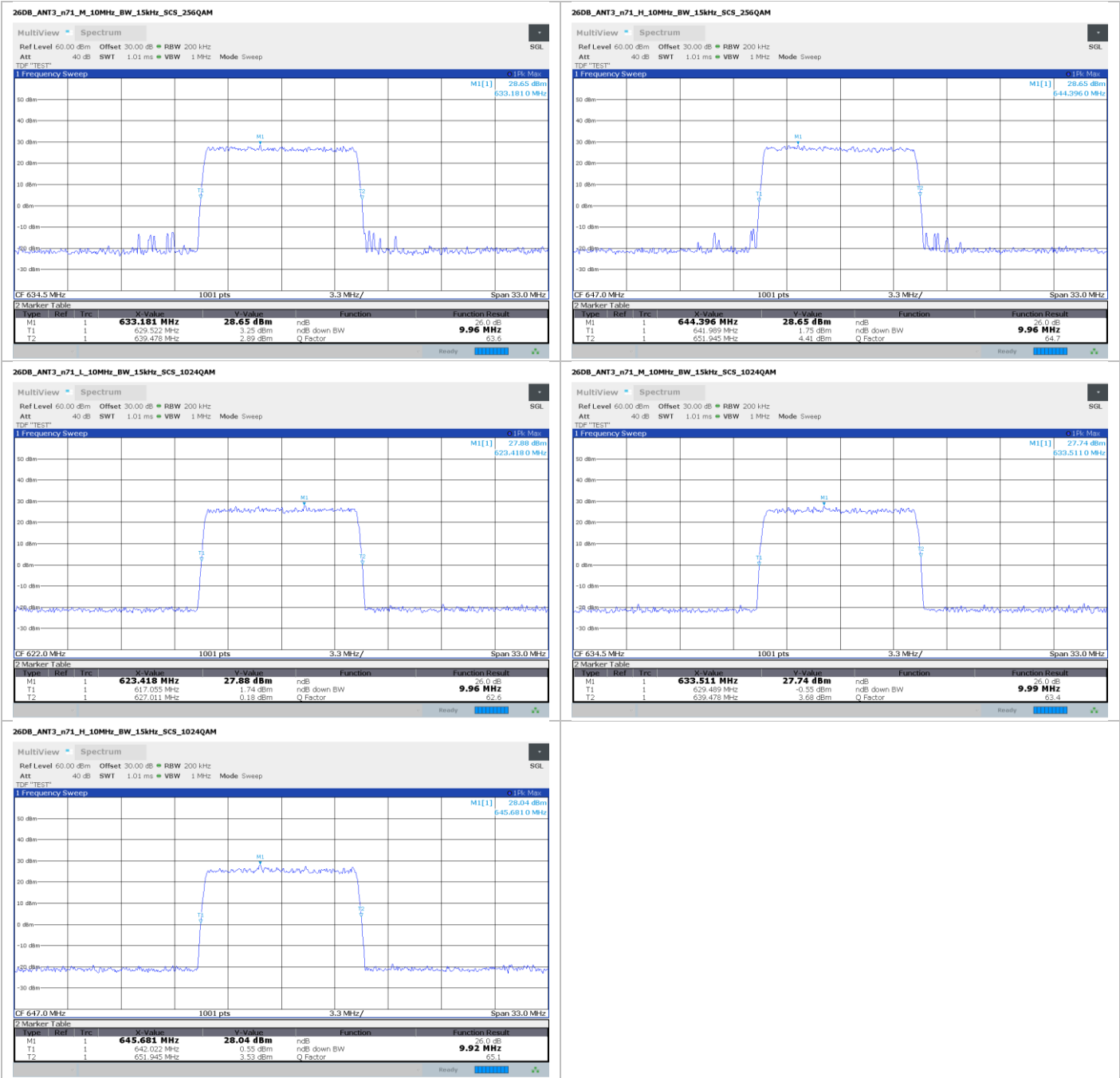
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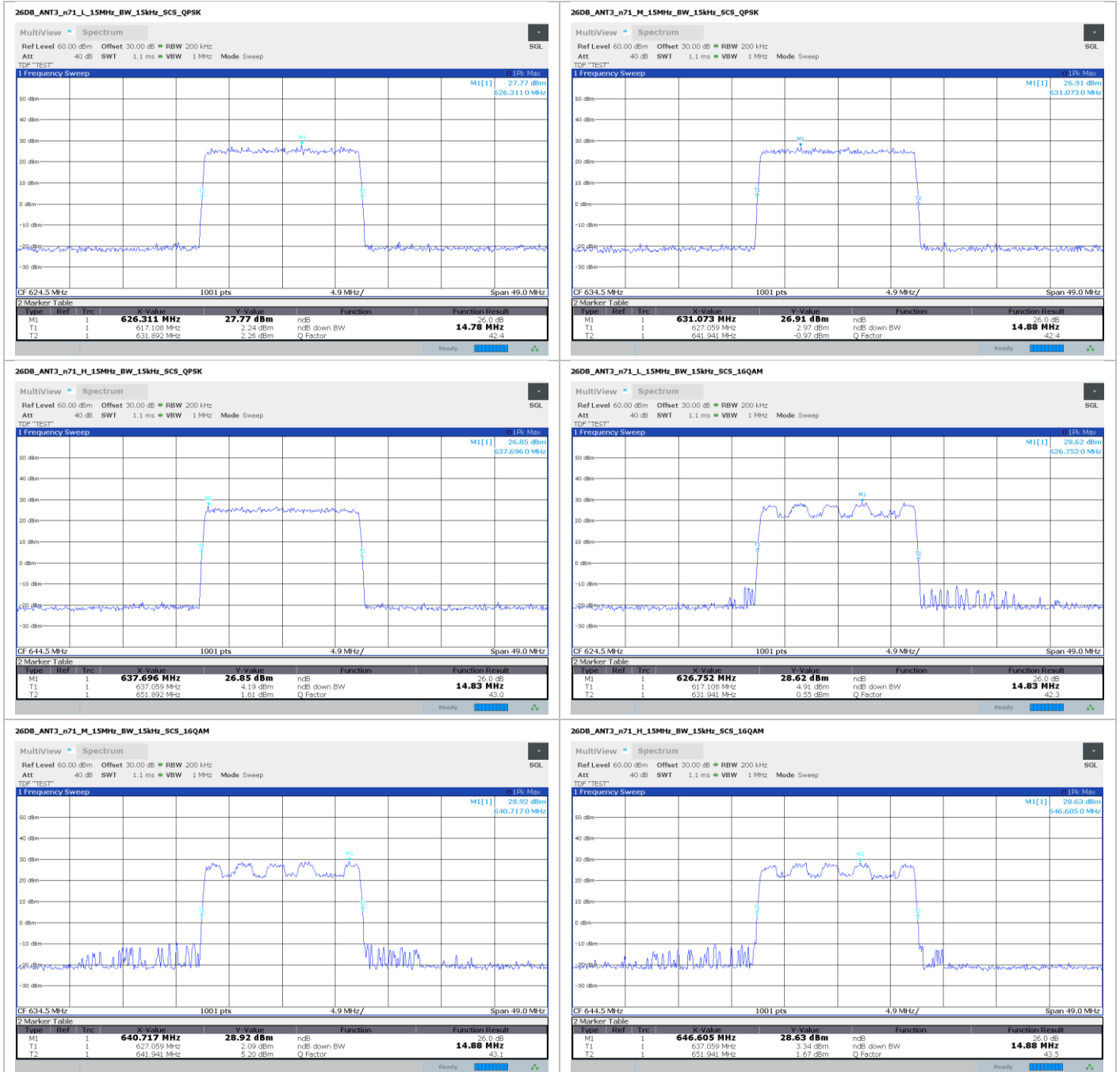


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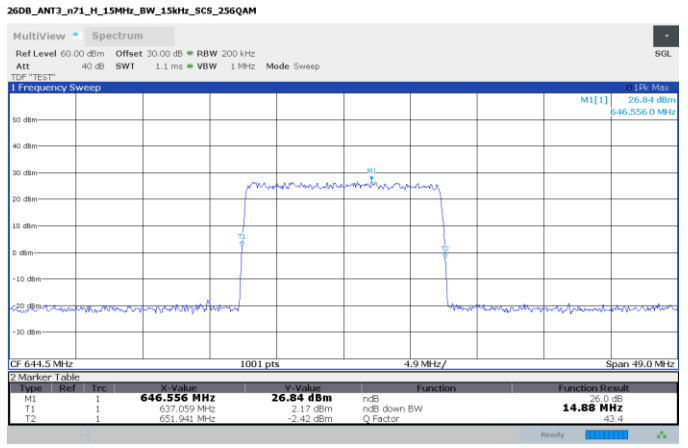
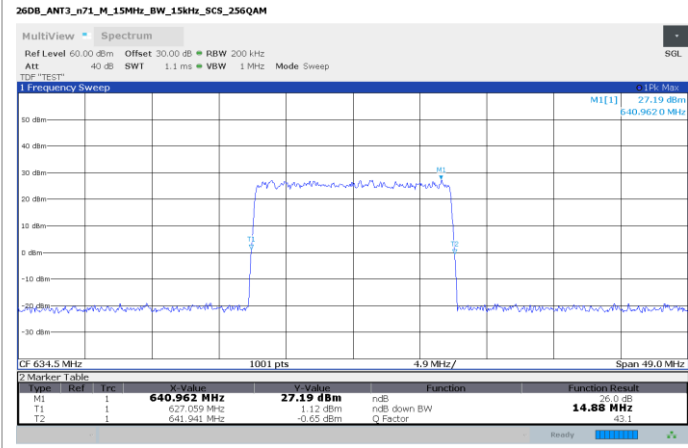
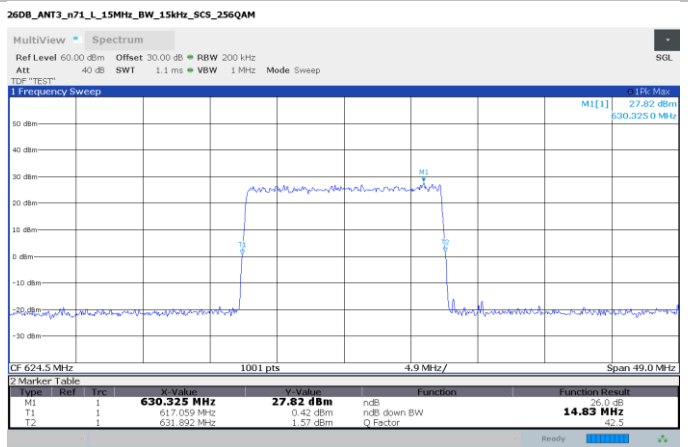
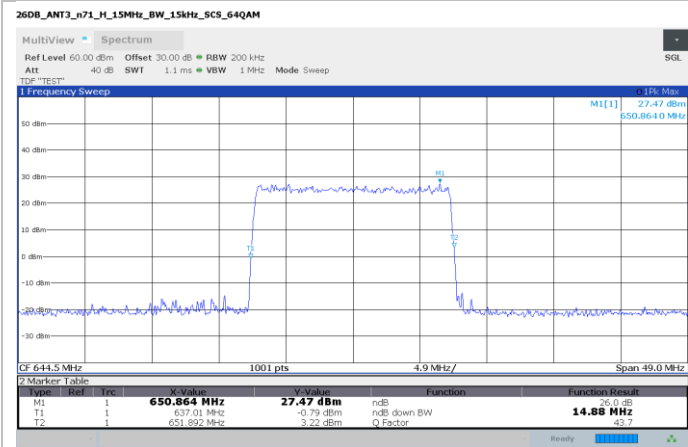
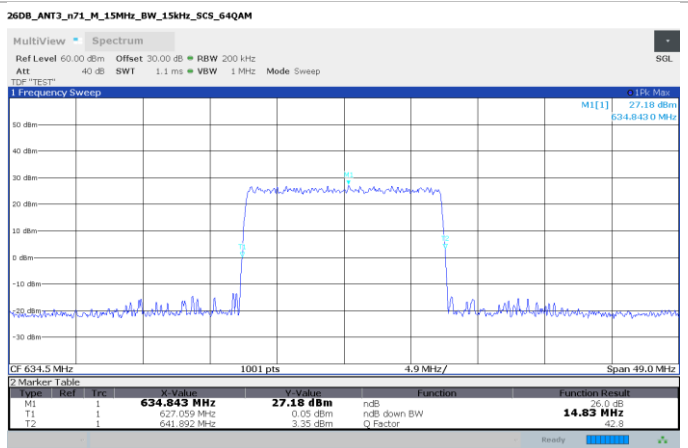
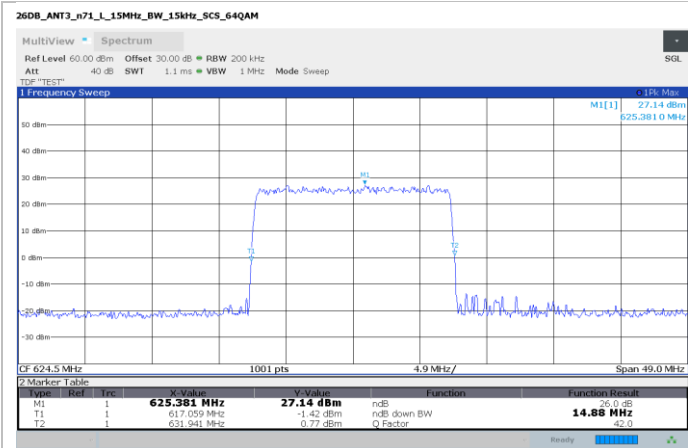


Band n71 – 15 MHz



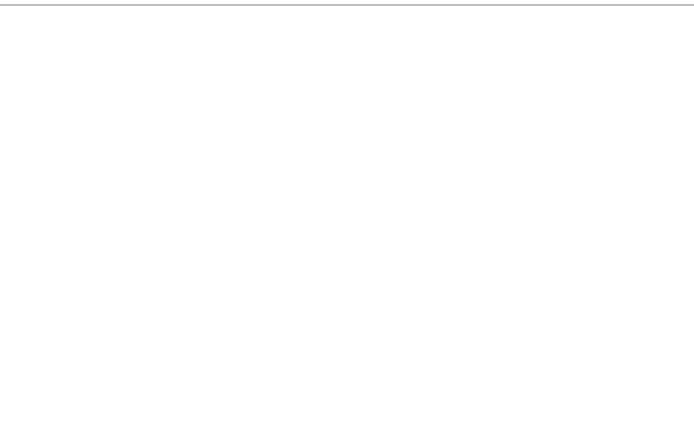
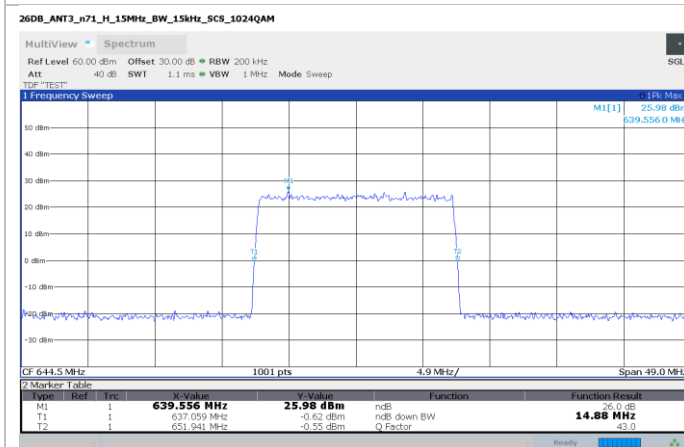
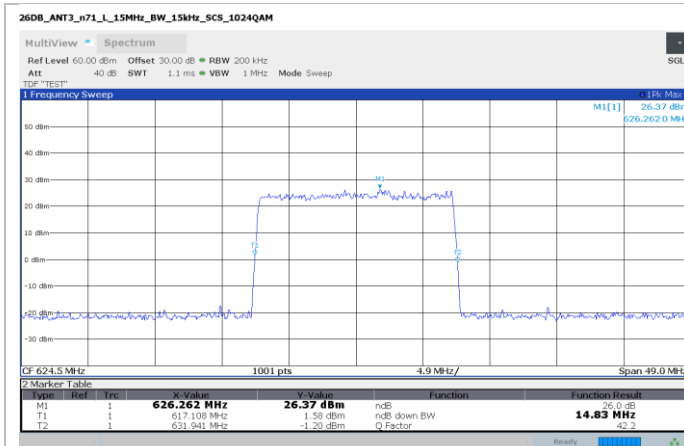
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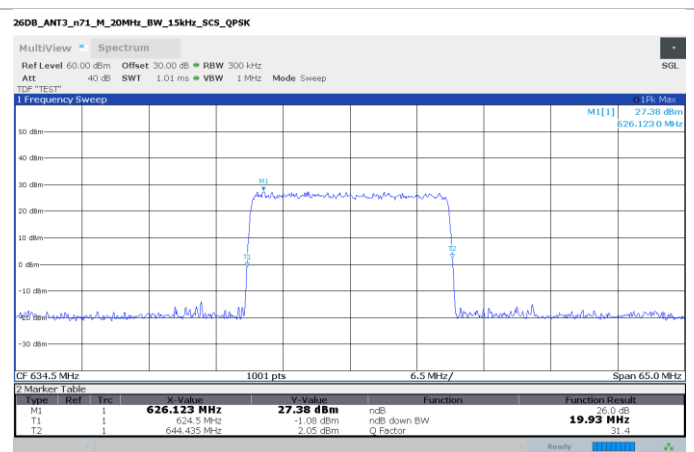
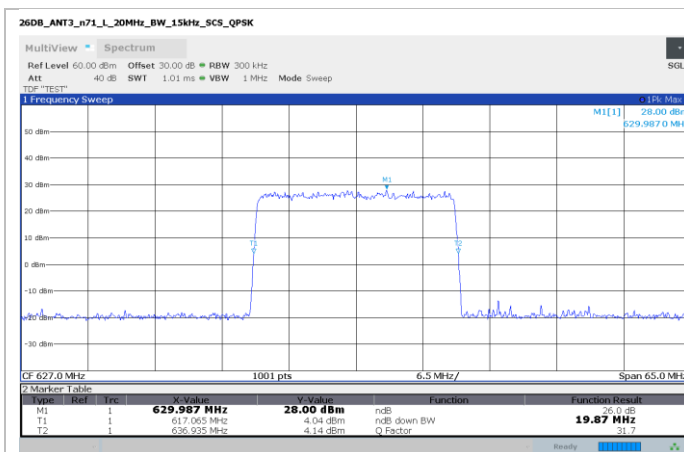


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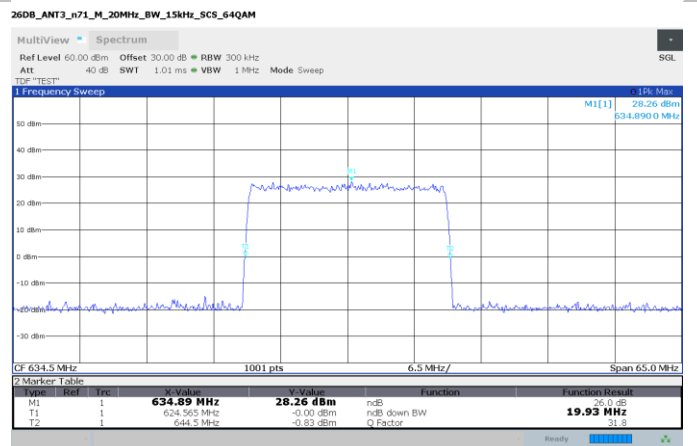
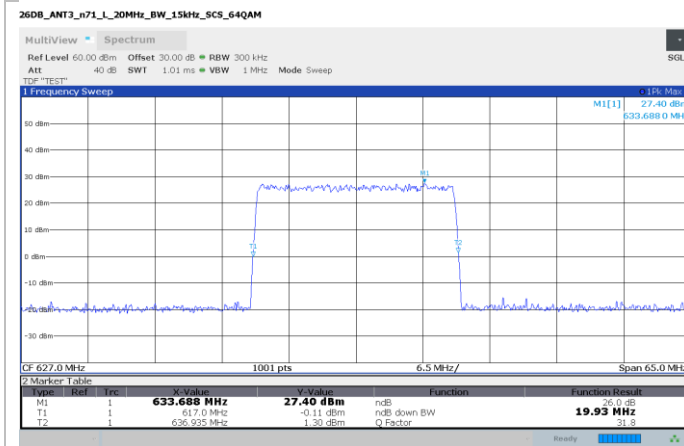
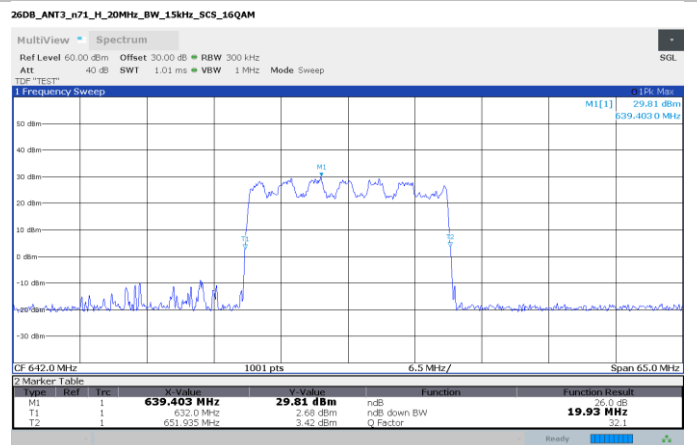
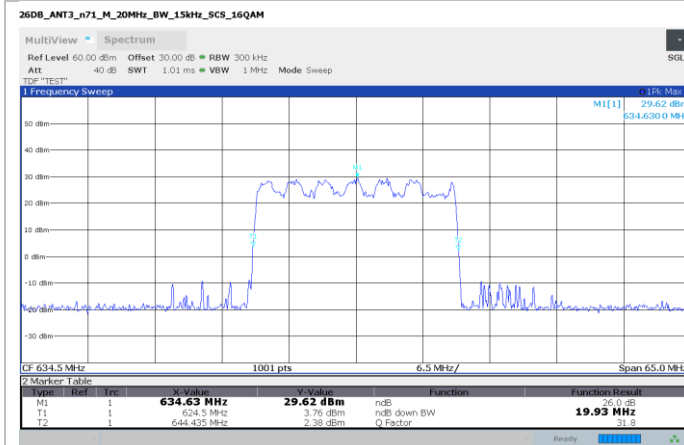
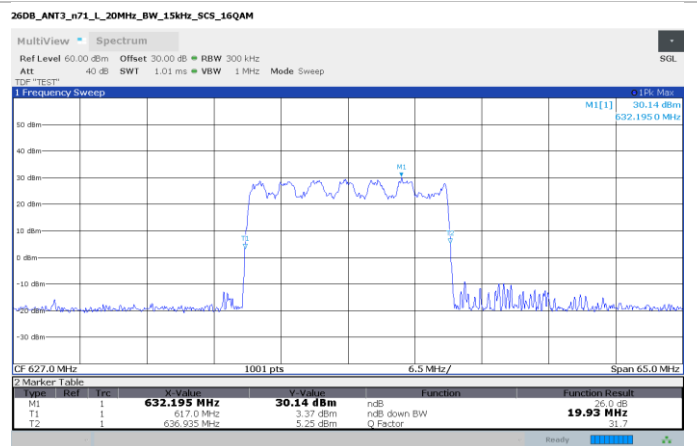
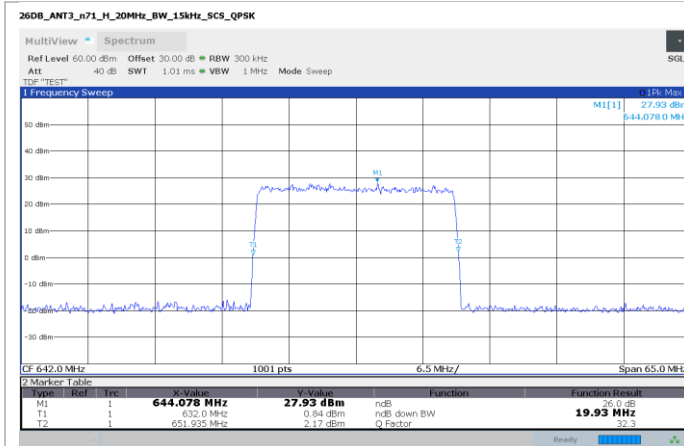


Band n71 – 20 MHz



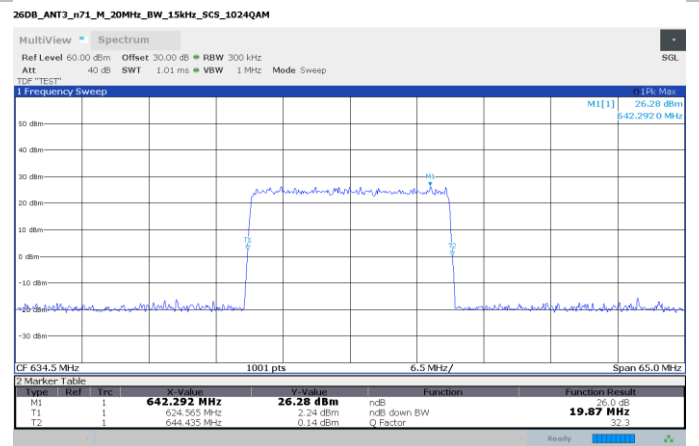
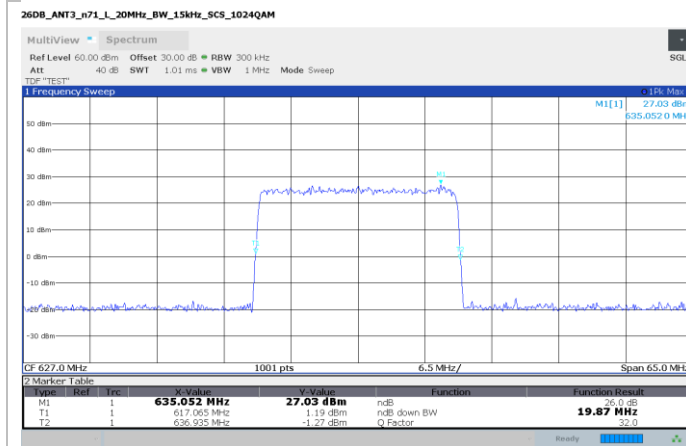
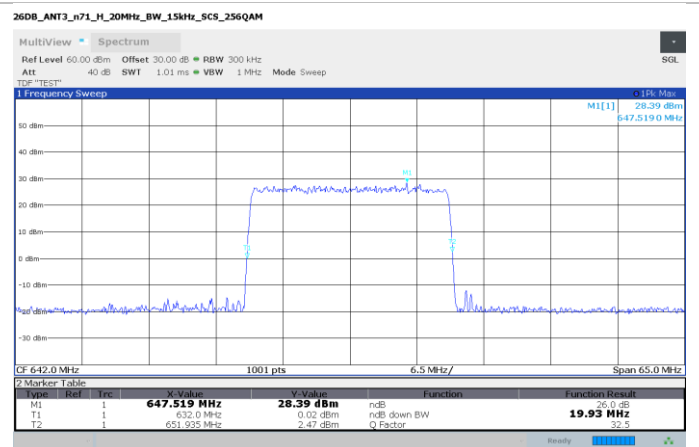
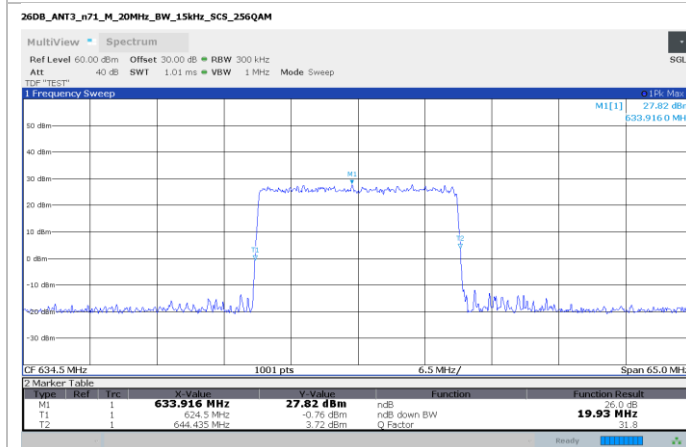
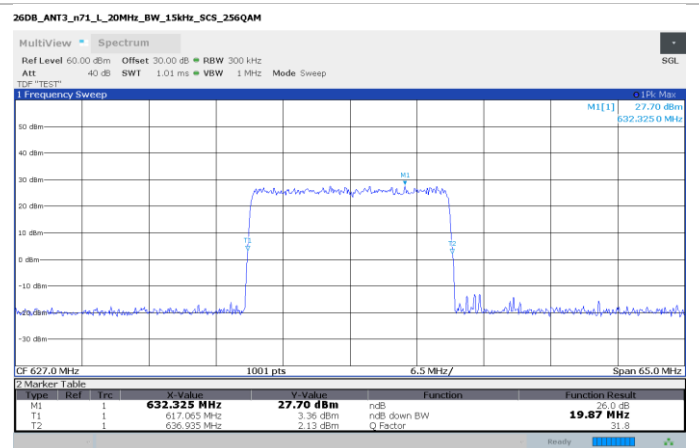
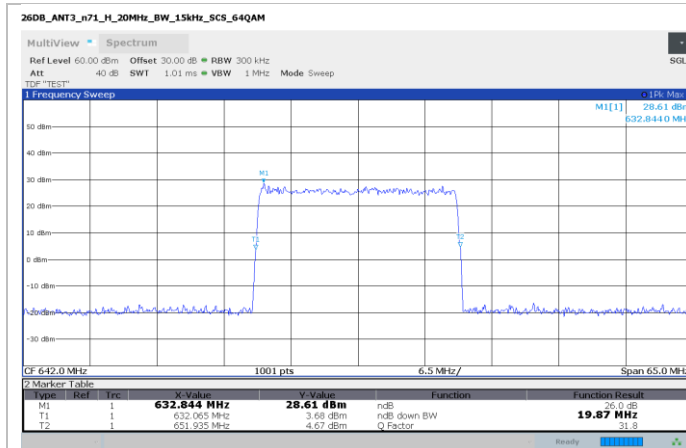
Section 8
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Specification

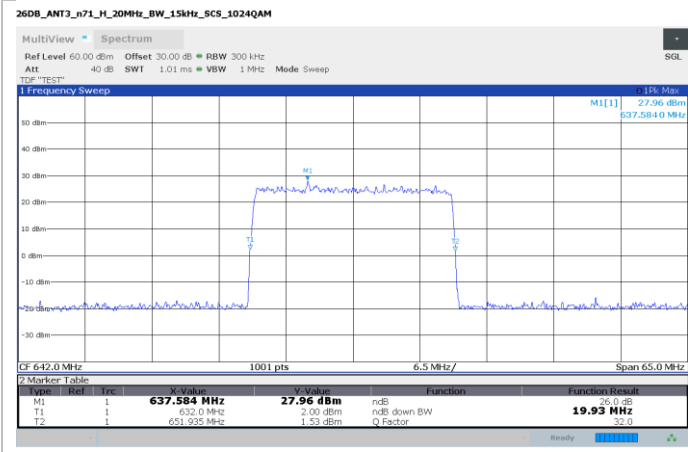
Testing data
FCC §27.53 (h)(3) / §90.209 26 dB Occupied Bandwidth
FCC Part 27 / FCC Part 90



Section 8
Test name
Specification

Testing data
 FCC §27.53 (h)(3) / §90.209 26 dB Occupied Bandwidth
 FCC Part 27 / FCC Part 90





8.4 FCC §27.50(c)(3)(ii) and §90.205 / §90.635 Output power

8.4.1 Definitions and limits

FCC §27.50(c)(3)(ii) (Band n29, Band n71)

(c) The following power and antenna height requirements apply to stations transmitting in the 600 MHz band and the 698-746 MHz band:

(3) Fixed and base stations transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section;

FCC §90.205(j) (Band n26)

806-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz. Power and height limitations for frequencies in the 806-824 MHz and 851-869 MHz bands and for narrowband operations in the 896-901/935-940 MHz band are specified in § 90.635.

FCC §90.635

The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBW) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

8.4.2 Test summary

Test date	July 12, 2022	Temperature	21 °C
Test engineer	Lan Sayasane, EMC Test Engineer	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	65%

8.4.3 Observations, settings and special notes

Spectrum analyzer settings:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Frequency span	>= 1.5 * OBW
Detector mode	Peak
Trace mode	Max Hold

This test was made across the conducted port and using a sensor power. An offset of 30 dB was added to the measurement to compensate the loss of the external 30 dB attenuator. Interconnecting cable losses were included as a transducer factor in the spectrum analyzer.

The EUT has four ports which can transmit at the same time in a correlated way. This correlation permit to make the measurement in one port getting as a result the total power from the four ports adding a factor calculated from the next equation:

$$\text{Correlation factor} = 10\log(N)$$

Where N is the number of ports. In this specific case, N = 4,

$$\text{Correlation factor} = 10\log(4) = 6.02 \text{ dB}$$

To select the measurement port, a quick power test was done. The four ports are similar, however, the port with maximum power was chosen to make all the remaining tests.

Band	Modulation	OBW	Channel	Power Port A	Power Port B	Power Port C	Power Port D
n26	QPSK	5 MHz	866.5 MHz	33.37	33.32	33.37	33.32

Note: Port C was selected in the band, and it will be used to evaluate all the tests of this document.

Band	Modulation	OBW	Channel	Power Port A	Power Port B	Power Port C	Power Port D
n29	QPSK	5 MHz	725.5 MHz	37.41	37.41	37.53	37.41

Note: Port C was selected in the band, and it will be used to evaluate all the tests of this document.

Band	Modulation	OBW	Channel	Power Port A	Power Port B	Power Port C	Power Port D
n71	QPSK	5 MHz	634.5 MHz	39.2	39.25	39.79	39.02

Note: Port C was selected in the band, and it will be used to evaluate all the tests of this document.

EUT can transmit three bands: band n26, n29, and band n71, unit transmitted the selected signal at full power.

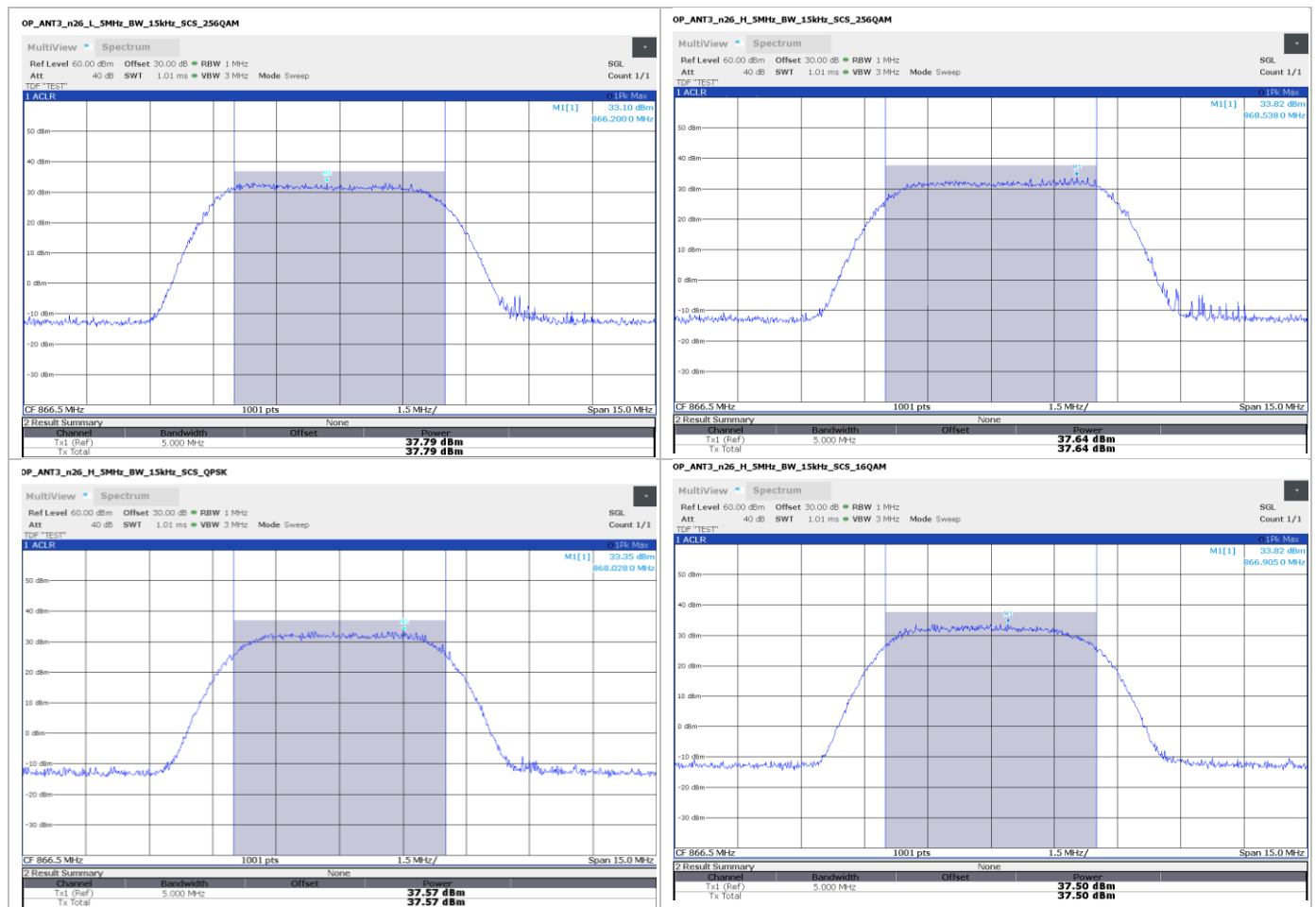
8.4.4 Test data

Band n26:

Band	Modulation	OBW (MHz)	Port	Frequency (MHz)	Power (dBm)	Correlation factor (dB)	Total power across all ports (dBm)
n26 (NB-IoT)	256QAM	0.2 + 5	C	866.5	37.79	6.02	43.81
n26 (NB-IoT)	256QAM	0.2 + 5	C	866.5	37.64	6.02	43.66
n26	QPSK	5	C	866.5	37.57	6.02	43.59
n26	16QAM	5	C	866.5	37.50	6.02	43.52
n26	64QAM	5	C	866.5	38.70	6.02	44.72
n26	256QAM	5	C	866.5	37.73	6.02	43.75
n26	1024QAM	5	C	866.5	37.11	6.02	43.13

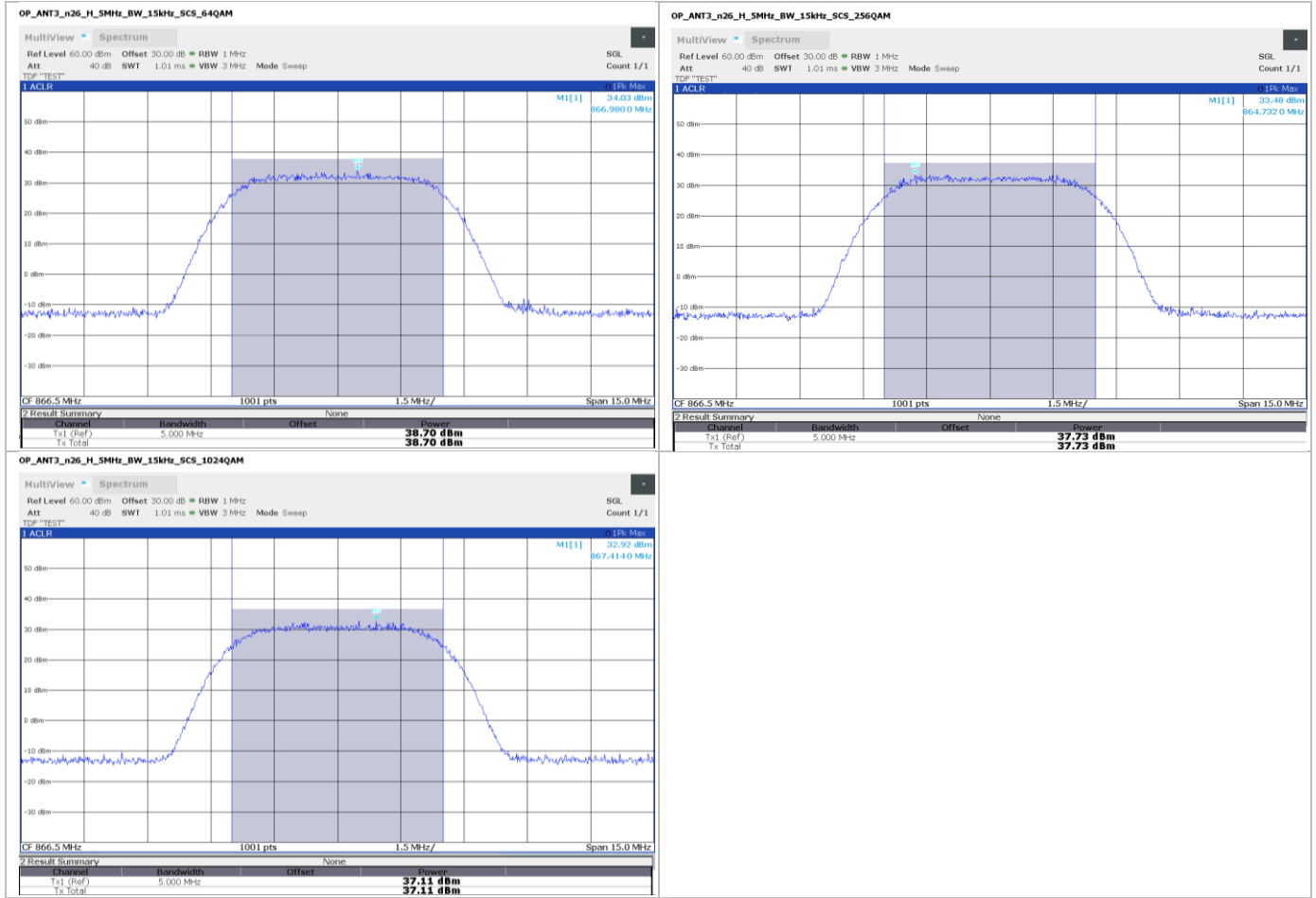
Table 8.4-1: Conducted output power, band n26, 0,2 and 5 MHz OBW

Band n26



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FCC Part 27 / FCC Part 90



Band n29:

Band	Modulation	OBW (MHz)	Port	Frequency (MHz)	Power Density (dBm/1 MHz)	Correlation factor (dB)	Total power density across all ports (dBm / 1 MHz)
n29	QPSK	5	C	720.5	37.27	6.02	43.29
n29	QPSK	5	C	723	37.48	6.02	43.5
n29	QPSK	5	C	725.5	37.53	6.02	43.55
n29	16QAM	5	C	720.5	37.57	6.02	43.59
n29	16QAM	5	C	723	37.62	6.02	43.64
n29	16QAM	5	C	725.5	37.97	6.02	43.99
n29	64QAM	5	C	720.5	38.13	6.02	44.15
n29	64QAM	5	C	723	38.14	6.02	44.16
n29	64QAM	5	C	725.5	38.02	6.02	44.04
n29	256QAM	5	C	720.5	37.33	6.02	43.35
n29	256QAM	5	C	723	37.79	6.02	43.81
n29	256QAM	5	C	725.5	37.9	6.02	43.92
n29	1024QAM	5	C	720.5	36.85	6.02	42.87
n29	1024QAM	5	C	723	37.0	6.02	43.02
n29	1024QAM	5	C	725.5	36.97	6.02	42.99

Table 8.4-2: Conducted output power density, band n29, 5 MHz OBW

Band	Modulation	OBW (MHz)	Port	Frequency (MHz)	Power Density (dBm/1 MHz)	Correlation factor (dB)	Total power density across all ports (dBm / 1 MHz)
n29	QPSK	10	C	723	34.58	6.02	40.6
n29	16QAM	10	C	723	35.46	6.02	41.48
n29	64QAM	10	C	723	34.51	6.02	40.53
n29	256QAM	10	C	723	35.72	6.02	41.74
n29	1024QAM	10	C	723	33.39	6.02	38.41

Table 8.4-3: Conducted output power density, band n29, 10 MHz OBW

For informational purposes, the table below documents the peak total channel power. Measured data obtained from the PAPR measurements documented in section 8.5 of this report.

Band	Modulation	OBW (MHz)	Port	Frequency (MHz)	Total channel power (dBm)	Correlation factor (dB)	Total channel power across all ports (dBm)
n29	QPSK	5	C	720.5	42.17	6.02	48.19
n29	QPSK	5	C	723	41.41	6.02	47.43
n29	QPSK	5	C	725.5	41.34	6.02	47.36
n29	16QAM	5	C	720.5	41.78	6.02	47.80
n29	16QAM	5	C	723	41.35	6.02	47.37
n29	16QAM	5	C	725.5	41.34	6.02	47.36
n29	64QAM	5	C	720.5	41.80	6.02	47.82
n29	64QAM	5	C	723	41.38	6.02	47.40
n29	64QAM	5	C	725.5	41.37	6.02	47.39
n29	256QAM	5	C	720.5	41.89	6.02	47.91
n29	256QAM	5	C	723	41.42	6.02	47.44
n29	256QAM	5	C	725.5	41.33	6.02	47.35
n29	1024QAM	5	C	720.5	41.85	6.02	47.87
n29	1024QAM	5	C	723	41.30	6.02	47.32
n29	1024QAM	5	C	725.5	41.31	6.02	47.33
n29	QPSK	10	C	723	42.87	6.02	48.89
n29	16QAM	10	C	723	42.46	6.02	48.48
n29	64QAM	10	C	723	42.69	6.02	48.71
n29	256QAM	10	C	723	42.66	6.02	48.68
n29	1024QAM	10	C	723	42.17	6.02	48.19

Table 8.4-3: Conducted total channel power, band n29

Band n29

