

n25
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1850.272	1913.640		
50				2.60	0.0014
40				0.30	0.0002
30				1.00	0.0005
10				4.50	0.0024
0				-6.00	0.0032
-10				-3.50	0.0019
-20				9.70	0.0052
-30				-1.90	0.0010

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	1850.272	1913.640	1.20	0.0006
4.4				0.10	0.0001

n38
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	2570.528	2617.328		
50				-10.90	0.0042
40				15.00	0.0058
30				-2.70	0.0010
10				6.20	0.0024
0				18.30	0.0071
-10				15.60	0.0060
-20				18.20	0.0070
-30				0.10	0.0000

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	2570.528	2617.328	19.70	0.0076
4.4				22.70	0.0087

n41
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	2496.704	2688.160		
50				39.10	0.0151
40				27.30	0.0105
30				19.50	0.0075
10				23.10	0.0089
0				21.80	0.0084
-10				25.10	0.0097
-20				30.40	0.0117
-30				39.80	0.0153

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	2496.704	2688.160	22.40	0.0086
4.4				20.90	0.0081

n48
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	3550.784	3697.024		
50				-8.90	0.0025
40				0.10	0.0000
30				4.60	0.0013
10				14.90	0.0041
0				8.50	0.0023
-10				11.80	0.0033
-20				-2.80	0.0008
-30				8.60	0.0024

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	3550.784	3697.024	12.30	0.0034
4.4				16.50	0.0046

n71
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	663.432	696.464		
50				0.00	0.0000
40				3.00	0.0044
30				0.10	0.0001
10				3.10	0.0046
0				-0.10	0.0001
-10				-1.50	0.0022
-20				-3.10	0.0046
-30				-0.50	0.0007

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	663.432	696.464	-3.60	0.0053
4.4				2.00	0.0029

n77L
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	3450.752	3548.464		
50				-10.50	0.0030
40				1.30	0.0004
30				27.10	0.0077
10				11.10	0.0032
0				7.80	0.0022
-10				21.90	0.0063
-20				4.40	0.0013
-30				10.60	0.0030

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	3450.752	3548.464	11.40	0.0033
4.4				0.80	0.0002

n77H
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	3700.416	3978.464		
50				-1.20	0.0003
40				-1.90	0.0005
30				8.40	0.0022
10				17.10	0.0045
0				6.10	0.0016
-10				13.60	0.0035
-20				23.60	0.0061
-30				15.90	0.0041

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	3700.416	3978.464	4.10	0.0011
4.4				25.50	0.0066

n78L
Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	3450.720	3548.496		
50				7.40	0.0021
40				20.80	0.0059
30				24.30	0.0069
10				38.20	0.0109
0				23.00	0.0066
-10				18.60	0.0053
-20				33.10	0.0095
-30				18.60	0.0053

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	3450.720	3548.496	40.20	0.0115
4.4				35.30	0.0101

LTE Band 12+NR n66
Frequency Error vs Voltage

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.85	1710.096	1779.856		
50				1.60	0.0009
40				-2.30	0.0013
30				4.20	0.0024
10				5.30	0.0030
0				4.80	0.0028
-10				2.60	0.0015
-20				12.80	0.0073
-30				3.50	0.0020

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.7	20	1710.096	1779.856	3.70	0.0021
4.4				4.40	0.0025

Note: The maximum value of expanded measurement uncertainty for this test item is $U = 0.047k \text{ Hz}$, $k = 2$.

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.

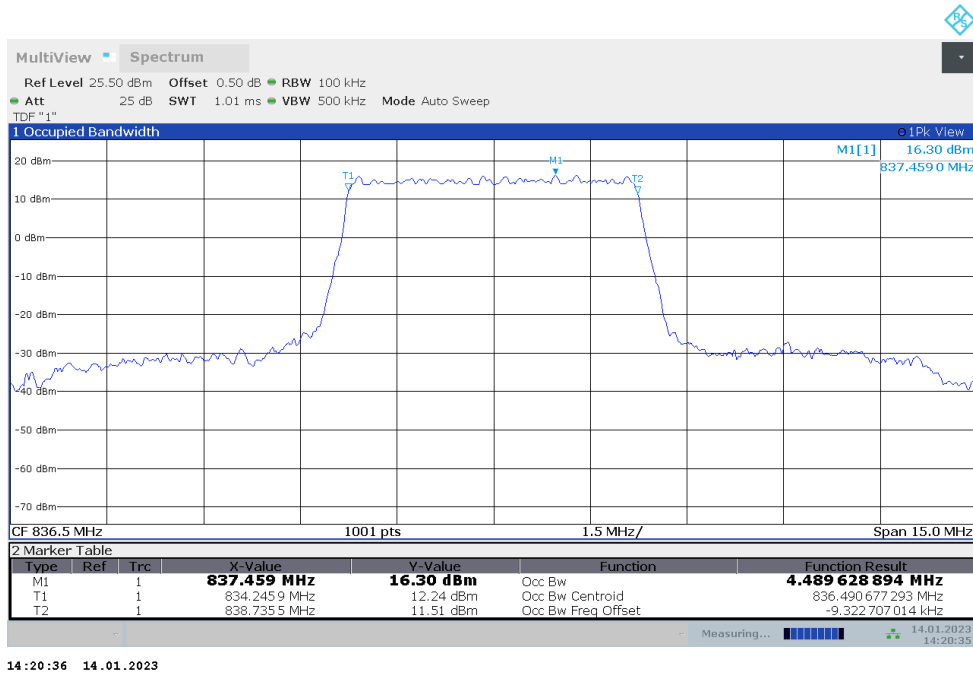
The measurement method is from ANSI C63.26:

- 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.

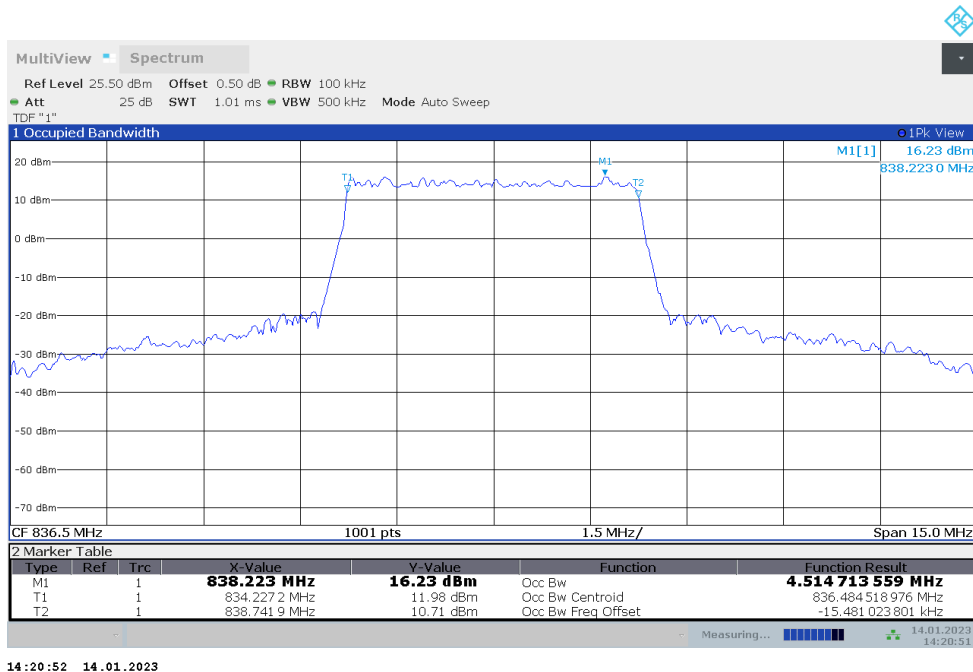
n5
n5,5MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
836.5	4.490	4.515

n5,5MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



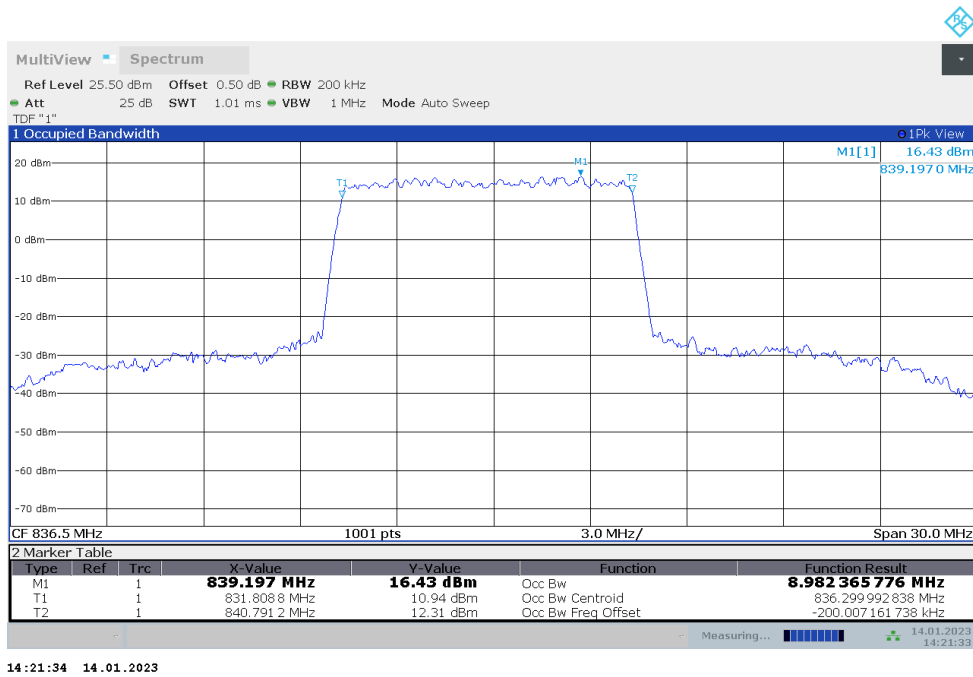
n5,5MHz Bandwidth,DFT-s-QPSK (99% BW)



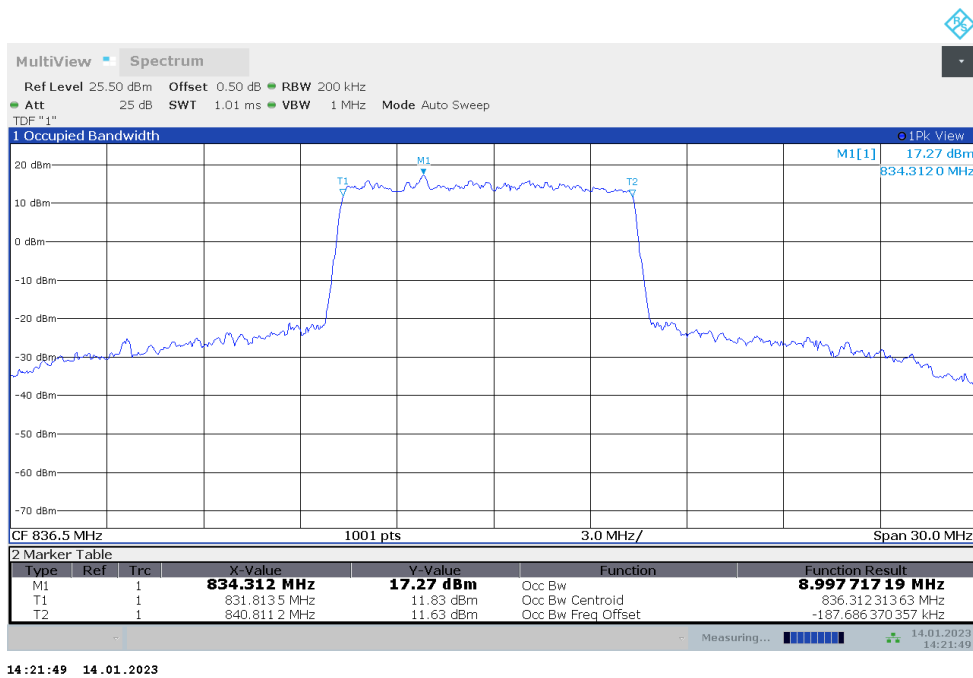
n5
n5,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
836.5	8.982	8.998

n5,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



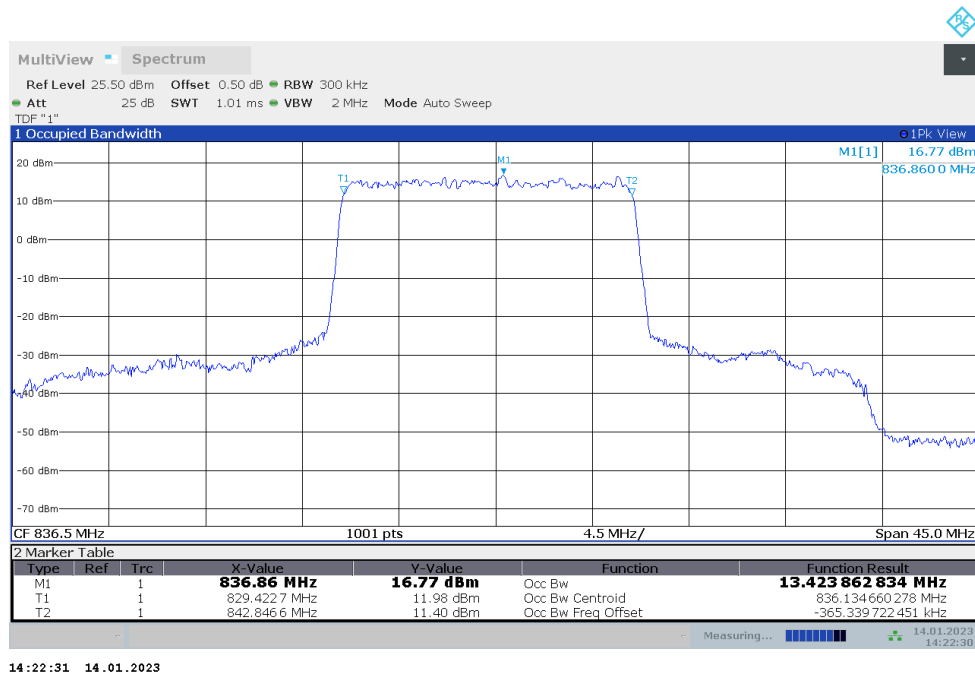
n5,10MHz Bandwidth,DFT-s-QPSK (99% BW)



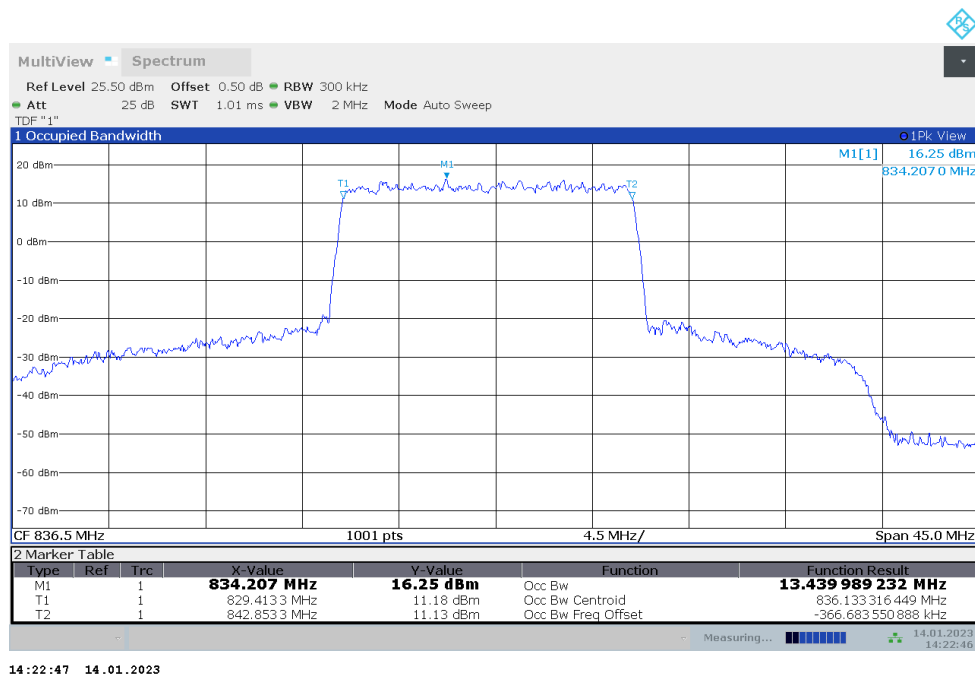
n5
n5,15MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
836.5	13.424	13.440

n5,15MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



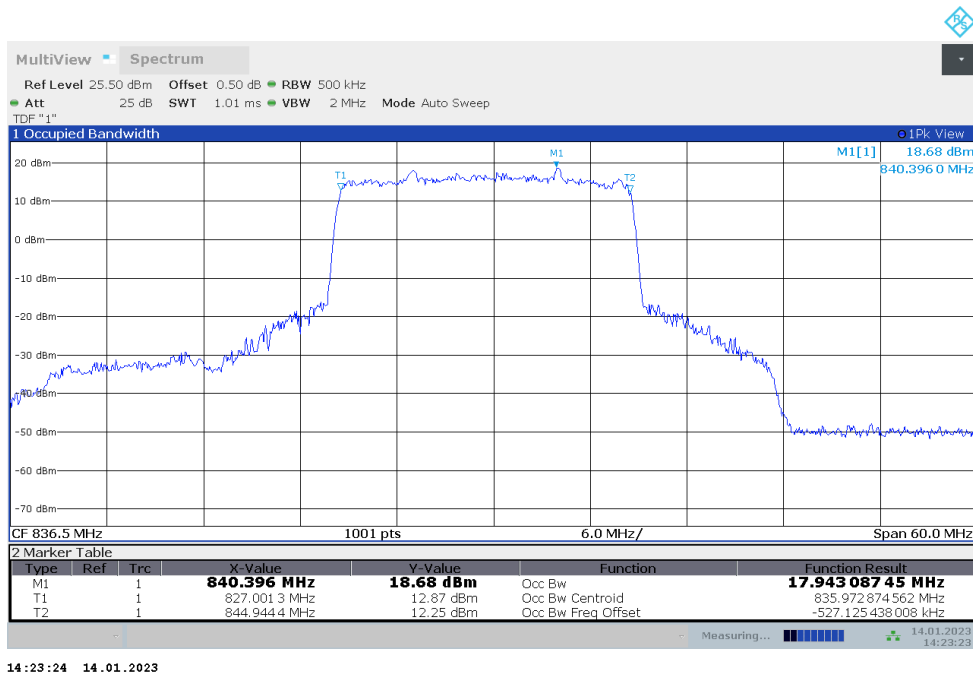
n5,15MHz Bandwidth,DFT-s-QPSK (99% BW)



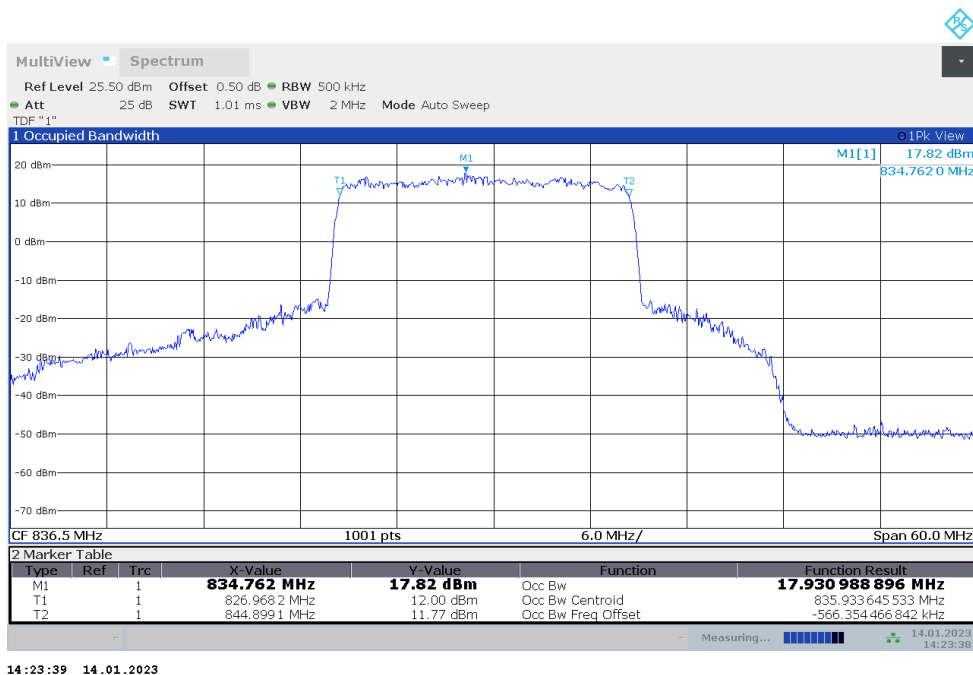
n5
n5,20MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
836.5	17.943	17.931

n5,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



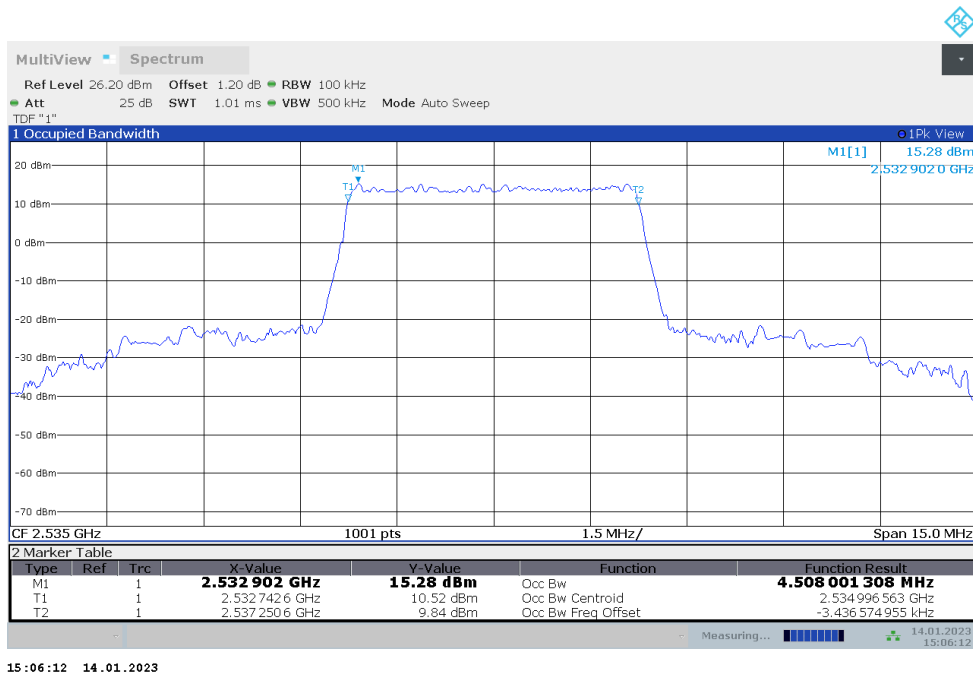
n5,20MHz Bandwidth,DFT-s-QPSK (99% BW)



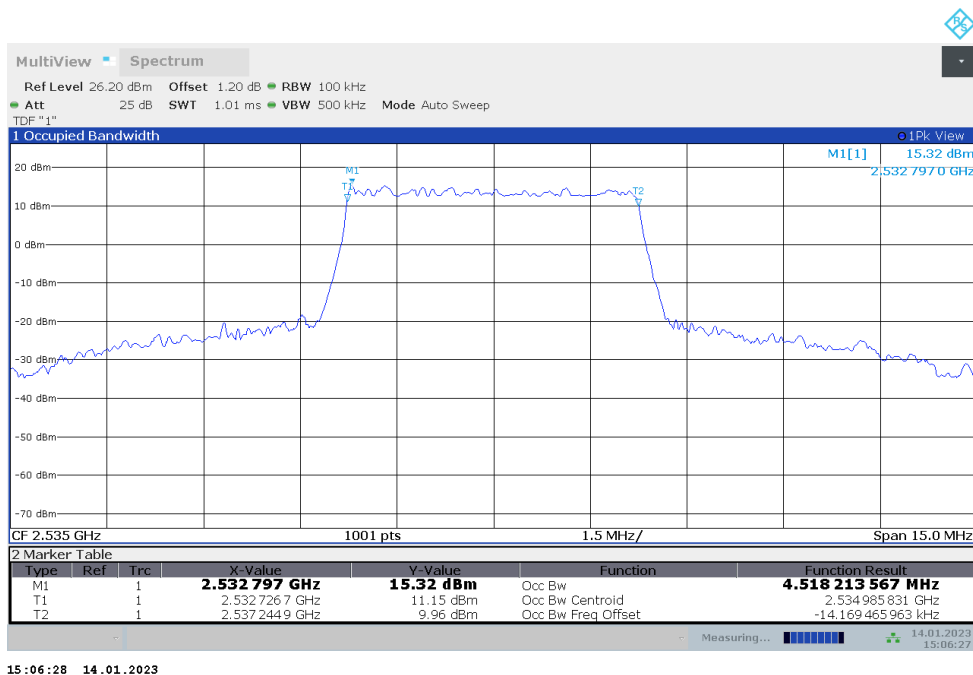
n7
n7,5MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2535	4.508	4.518

n7,5MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



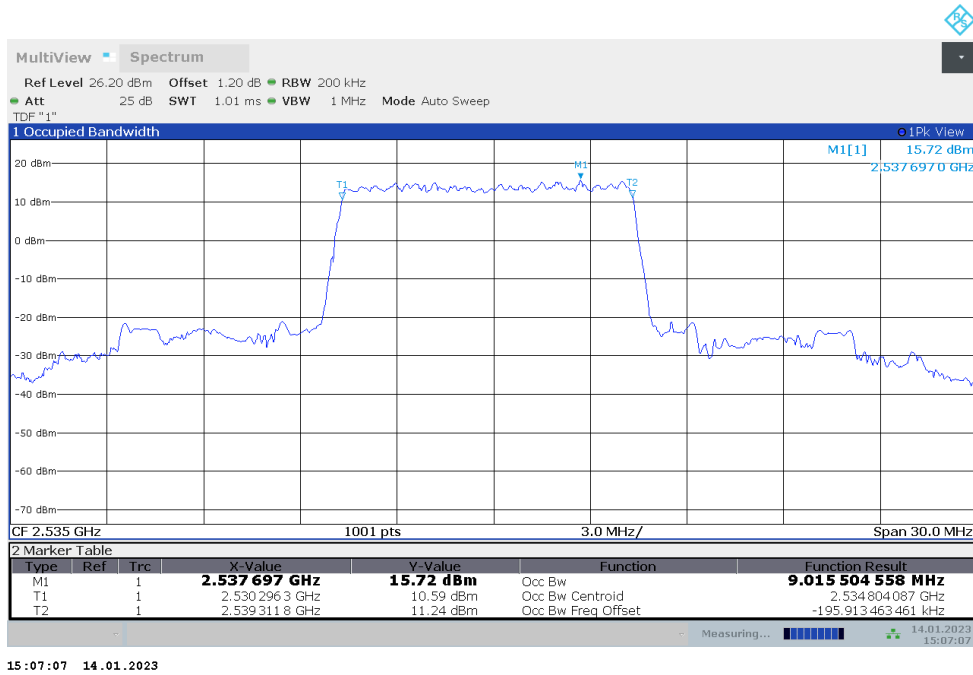
n7,5MHz Bandwidth,DFT-s-QPSK (99% BW)



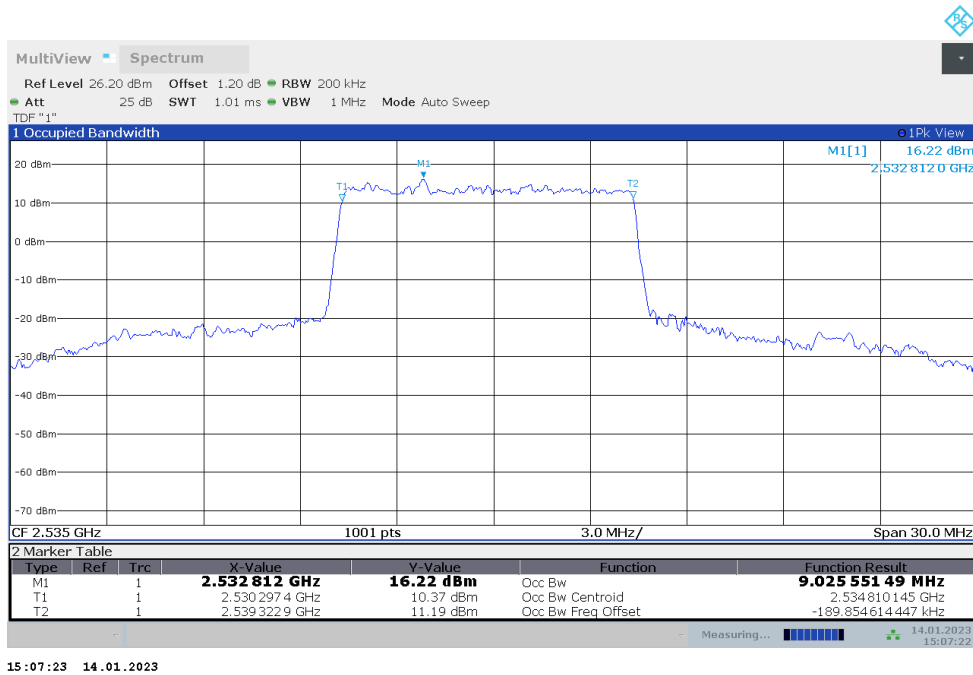
n7
n7,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2535	9.016	9.026

n7,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n7,10MHz Bandwidth,DFT-s-QPSK (99% BW)

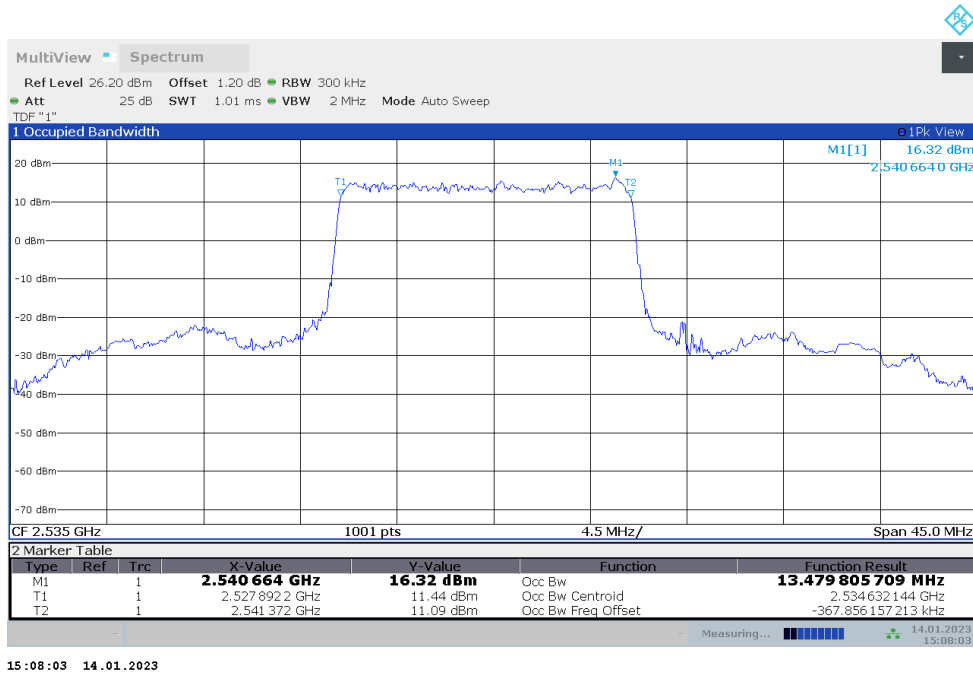


n7

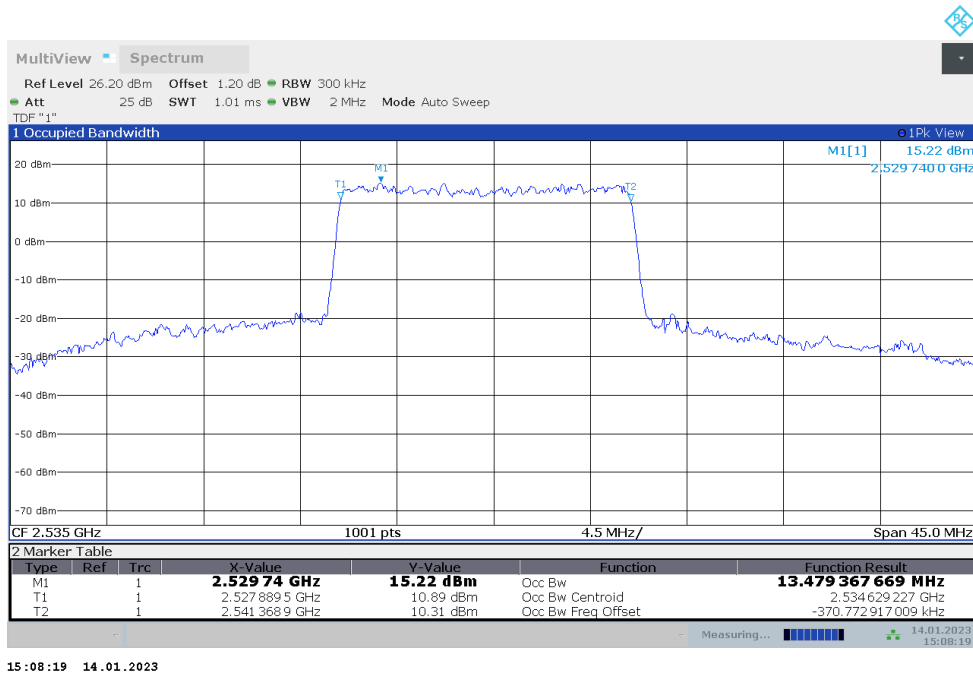
n7,15MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2535	13.480	13.479

n7,15MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n7,15MHz Bandwidth,DFT-s-QPSK (99% BW)

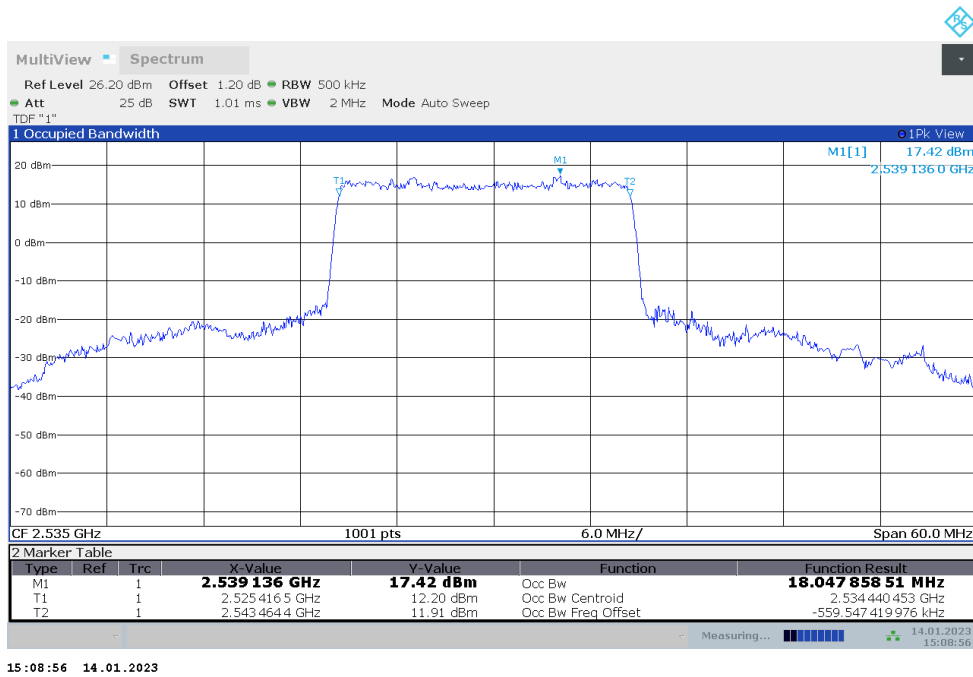


n7

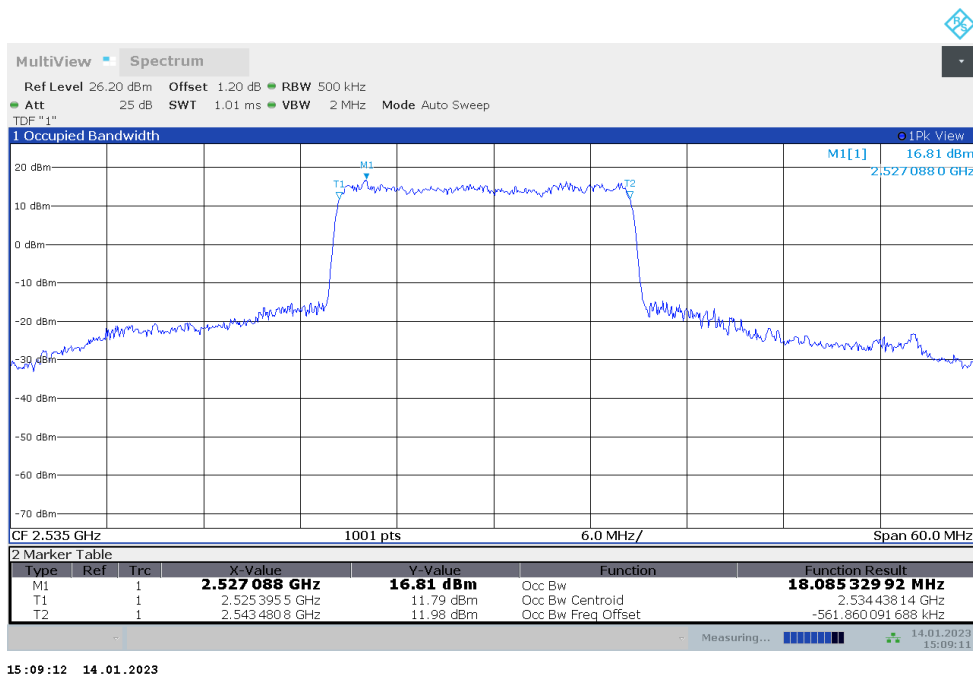
n7,20MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2535	18.048	18.085

n7,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



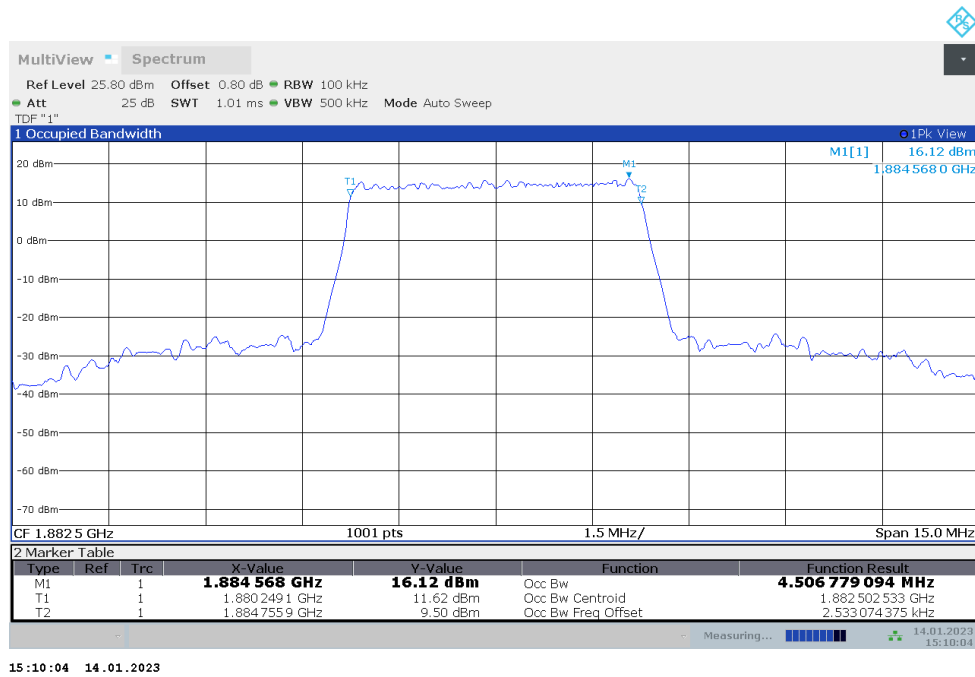
n7,20MHz Bandwidth,DFT-s-QPSK (99% BW)



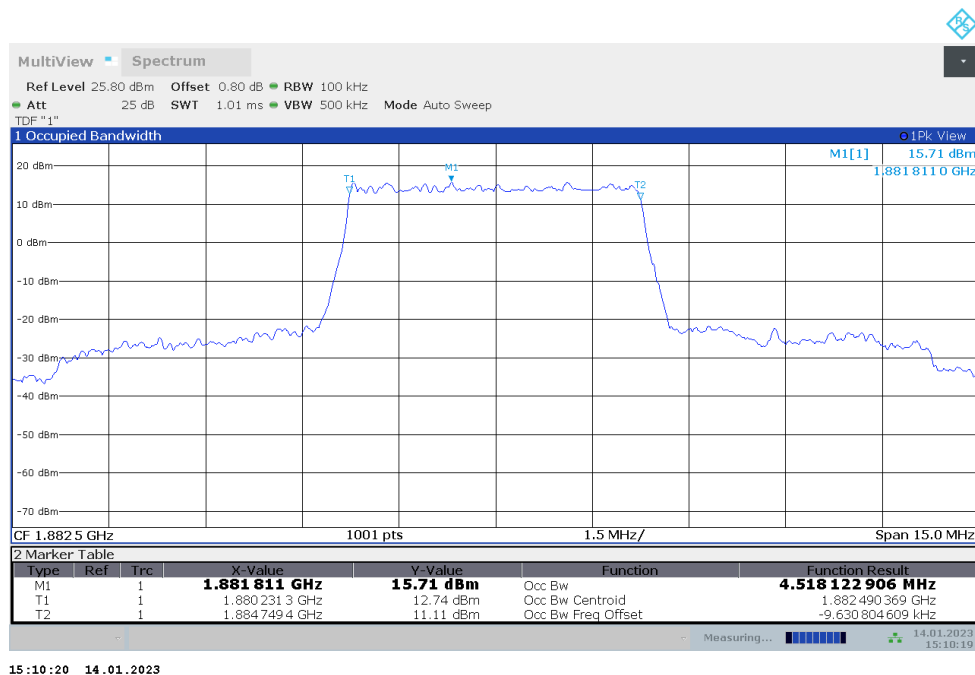
n25
n25,5MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	4.507	4.518

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



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

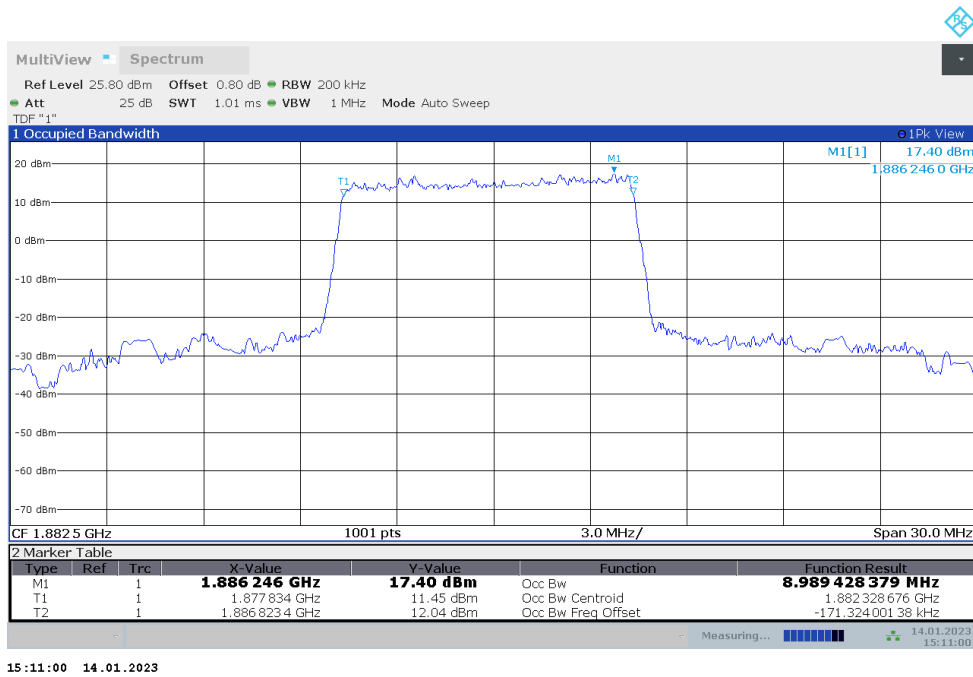


n25

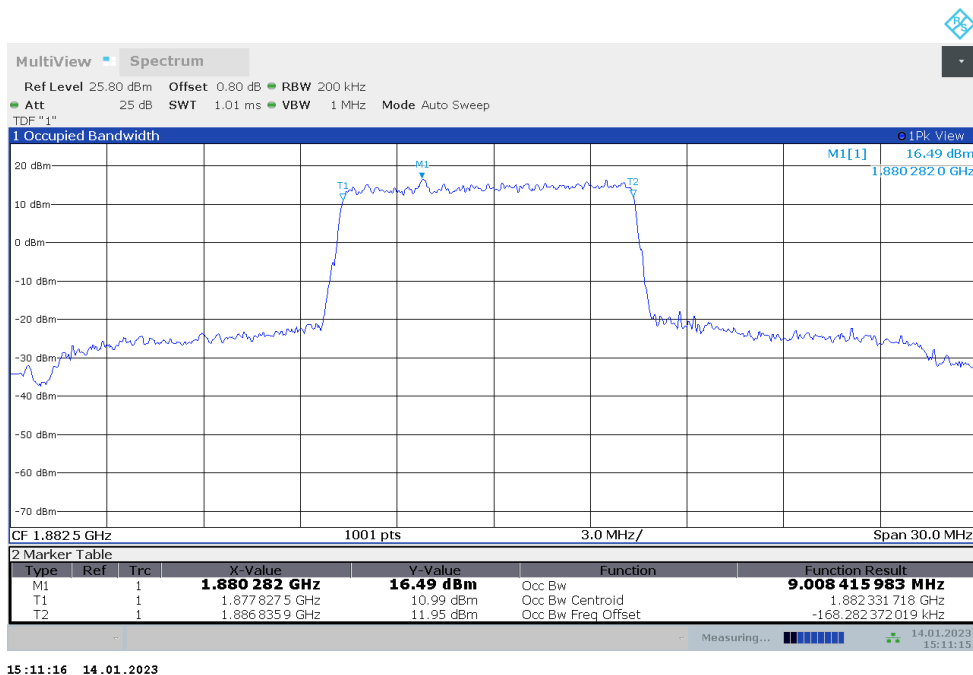
n25,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	8.989	9.008

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



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

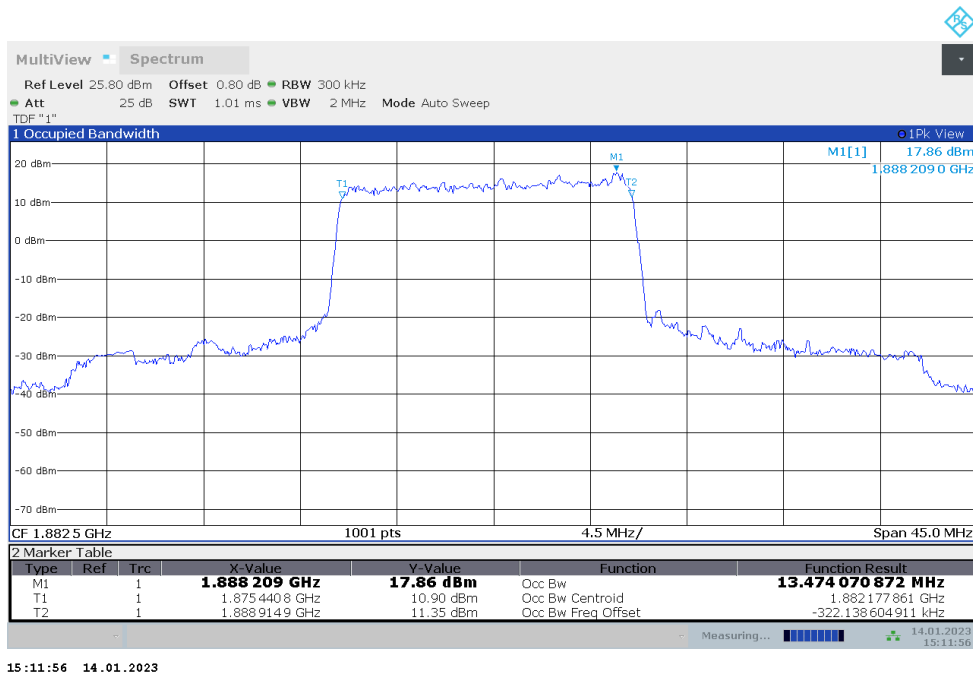


n25

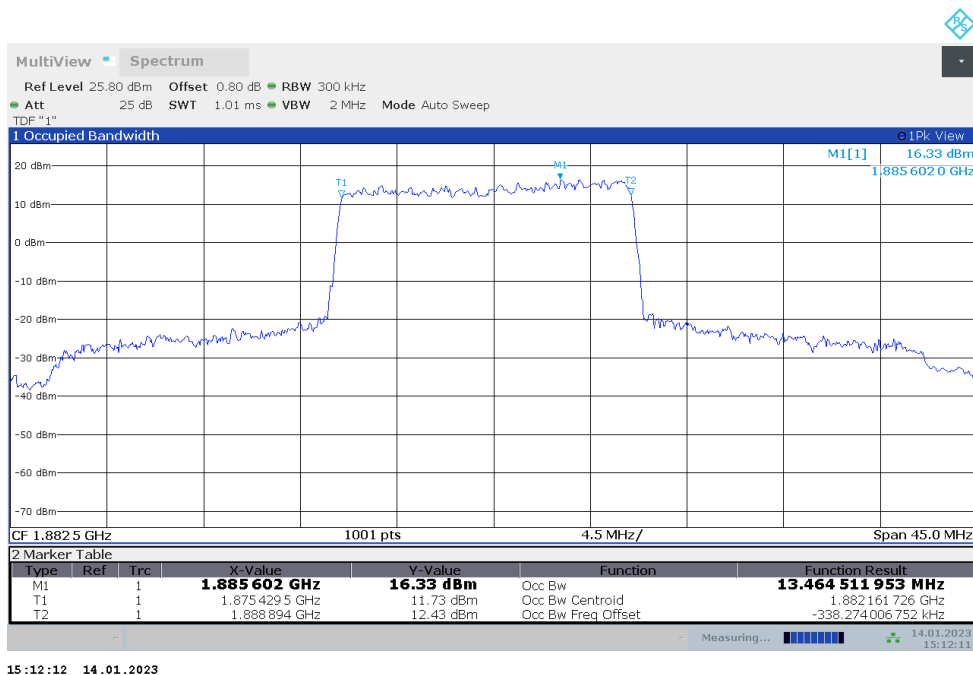
n25,15MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	13.474	13.465

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



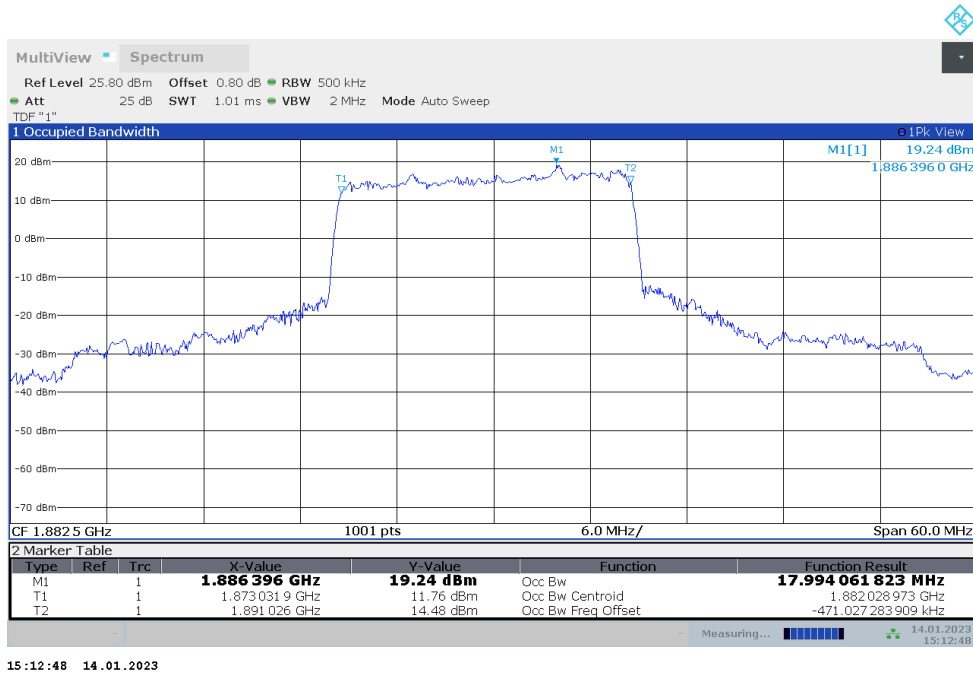
n25,15MHz Bandwidth,DFT-s-QPSK (99% BW)



n25
n25,20MHz(99%)

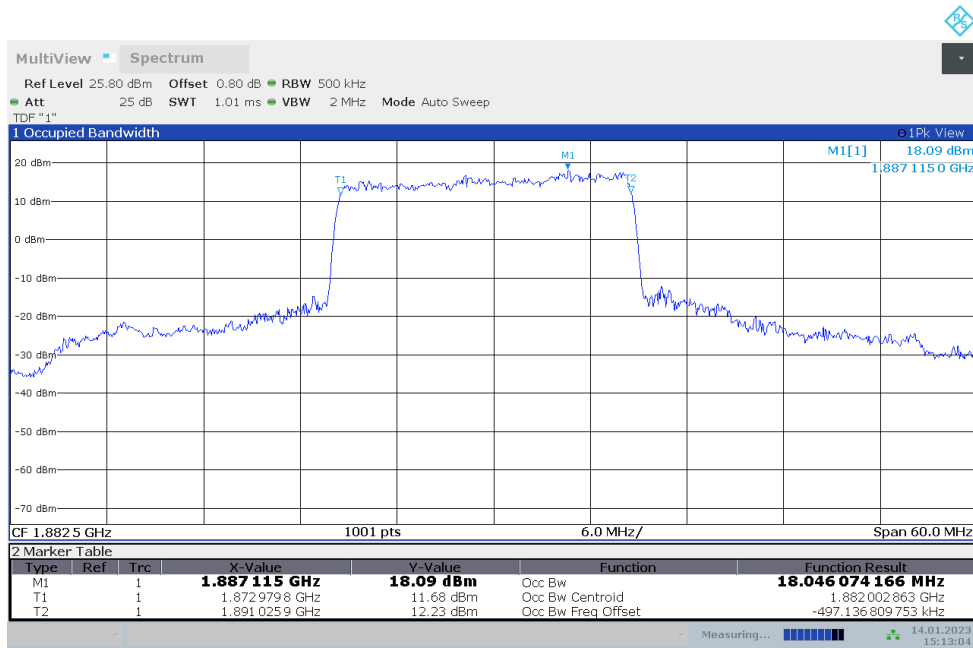
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
1882.5	17.994	18.046

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



15:12:48 14.01.2023

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



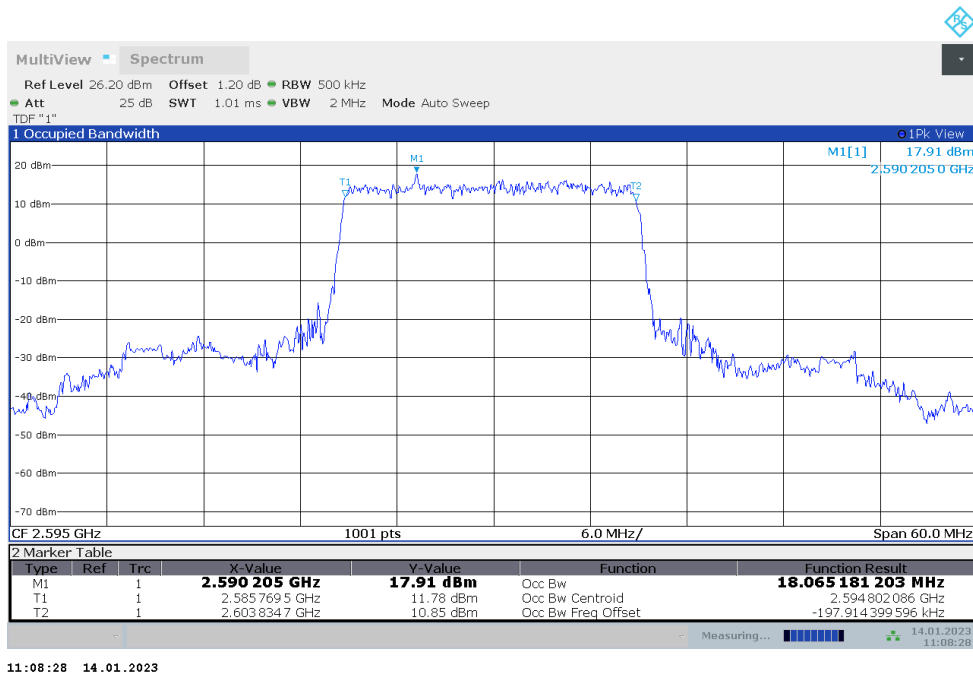
15:13:04 14.01.2023

n38

n38,20MHz(99%)

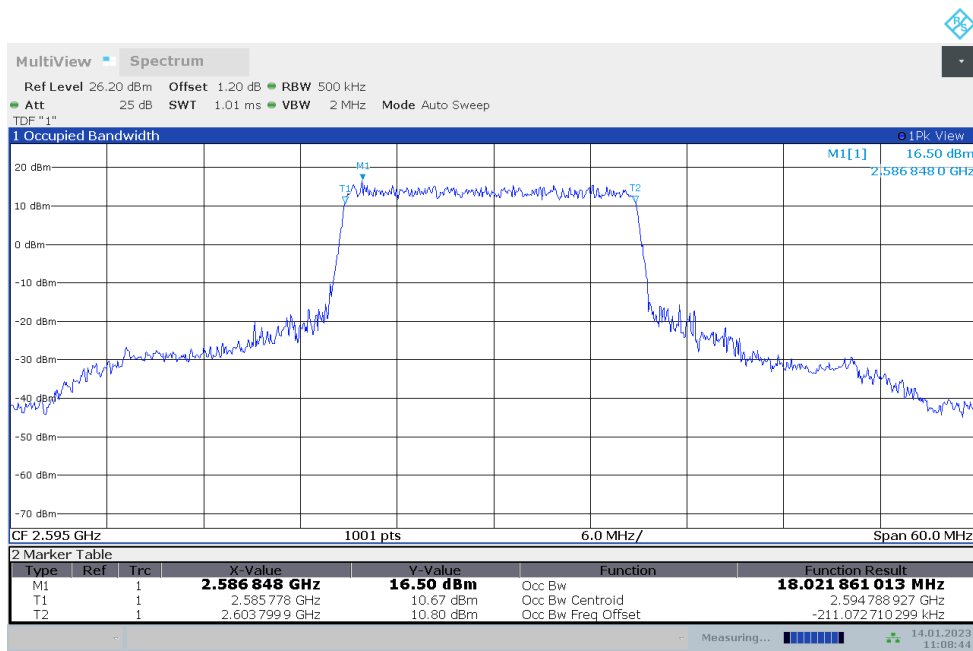
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2595	18.065	18.022

n38,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



11:08:28 14.01.2023

n38,20MHz Bandwidth,DFT-s-QPSK (99% BW)



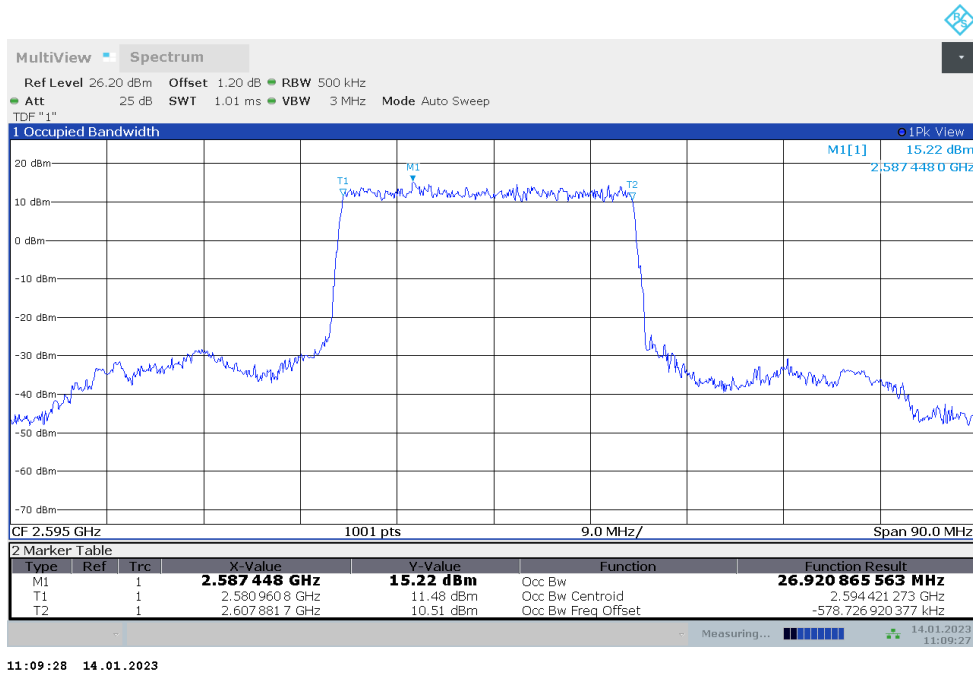
11:08:44 14.01.2023

n38

n38,30MHz(99%)

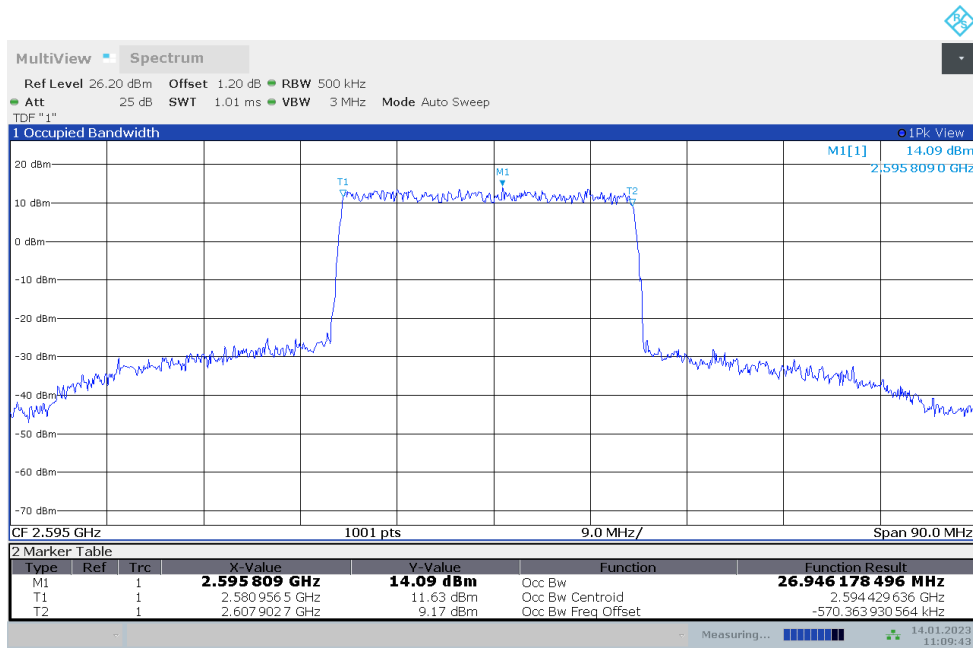
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2595	26.921	26.946

n38,30MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



11:09:28 14.01.2023

n38,30MHz Bandwidth,DFT-s-QPSK (99% BW)



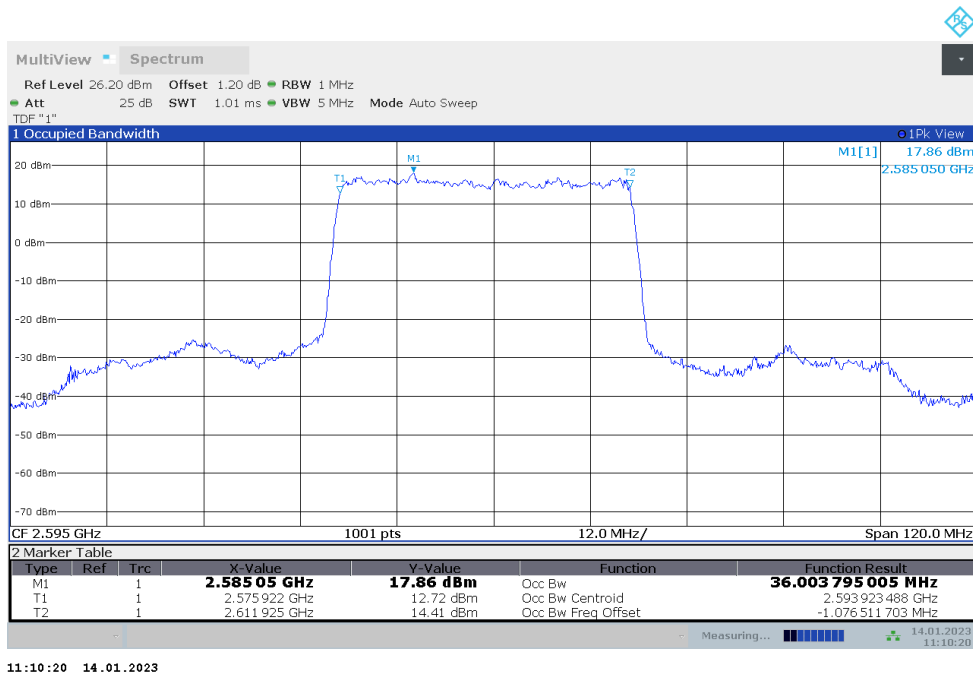
11:09:43 14.01.2023

n38

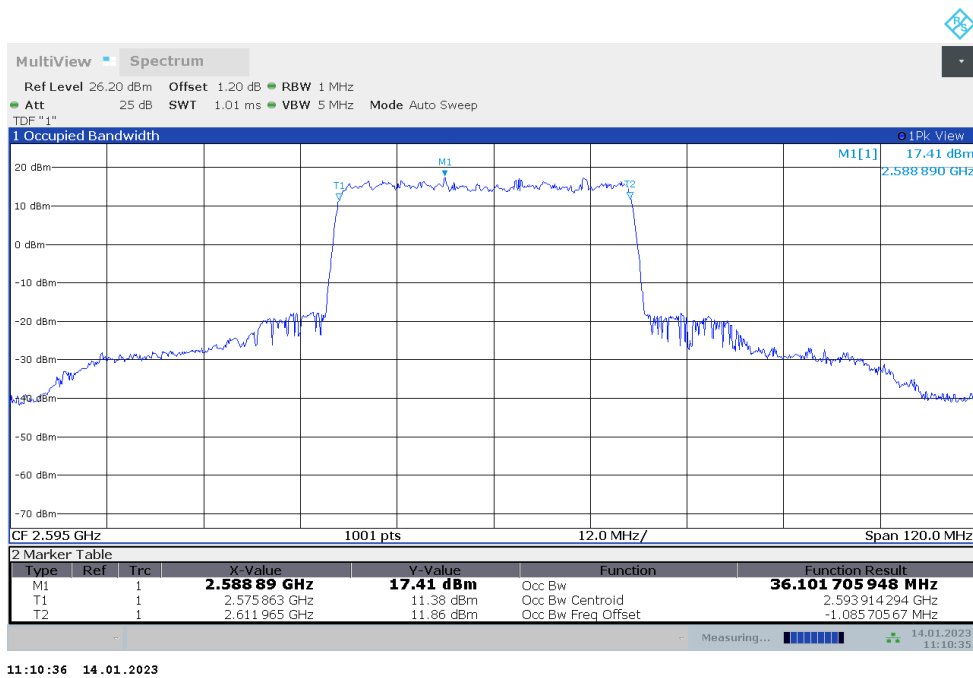
n38,40MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2595	36.004	36.102

n38,40MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n38,40MHz Bandwidth,DFT-s-QPSK (99% BW)

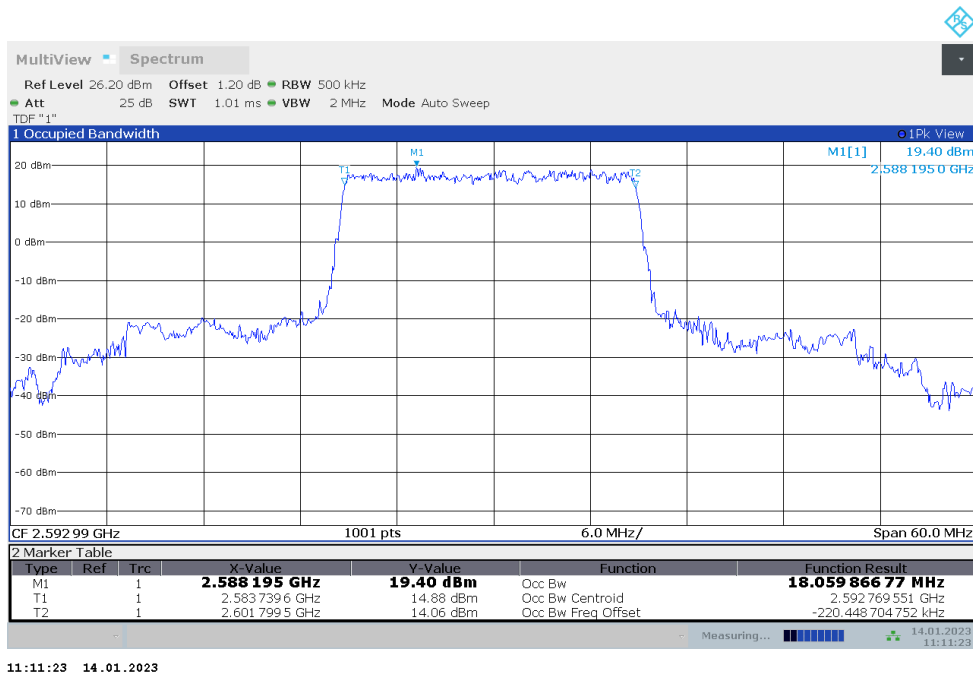


n41

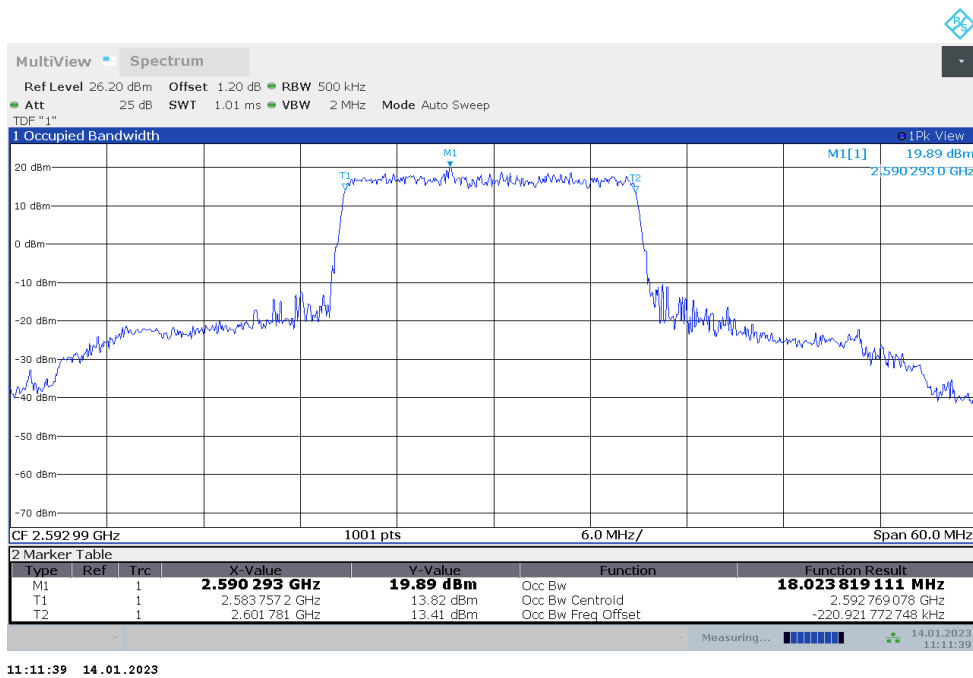
n41,20MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	18.060	18.024

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



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

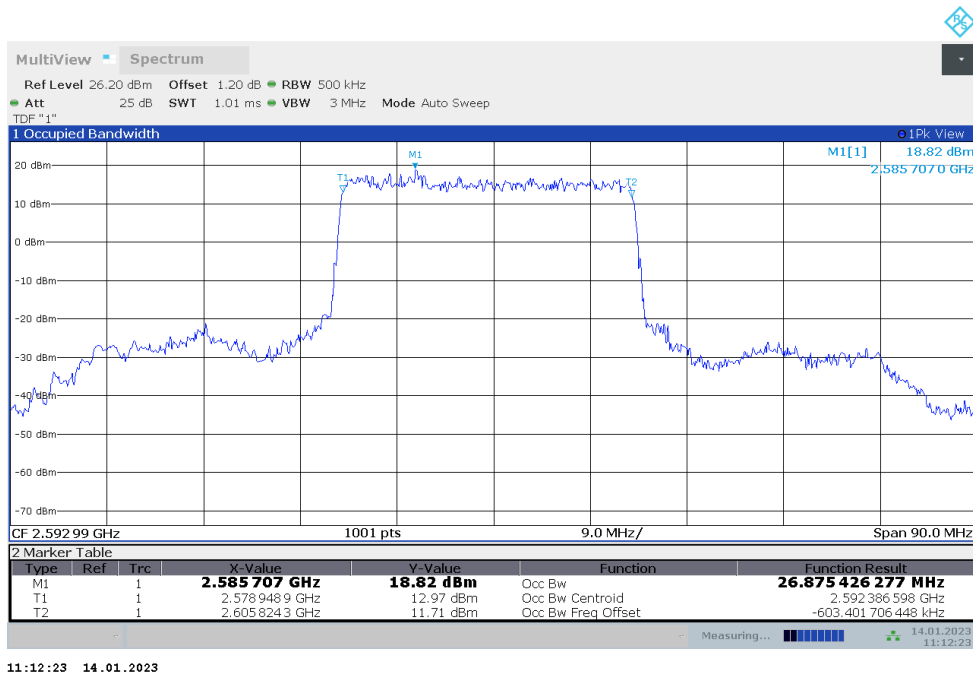


n41

n41,30MHz(99%)

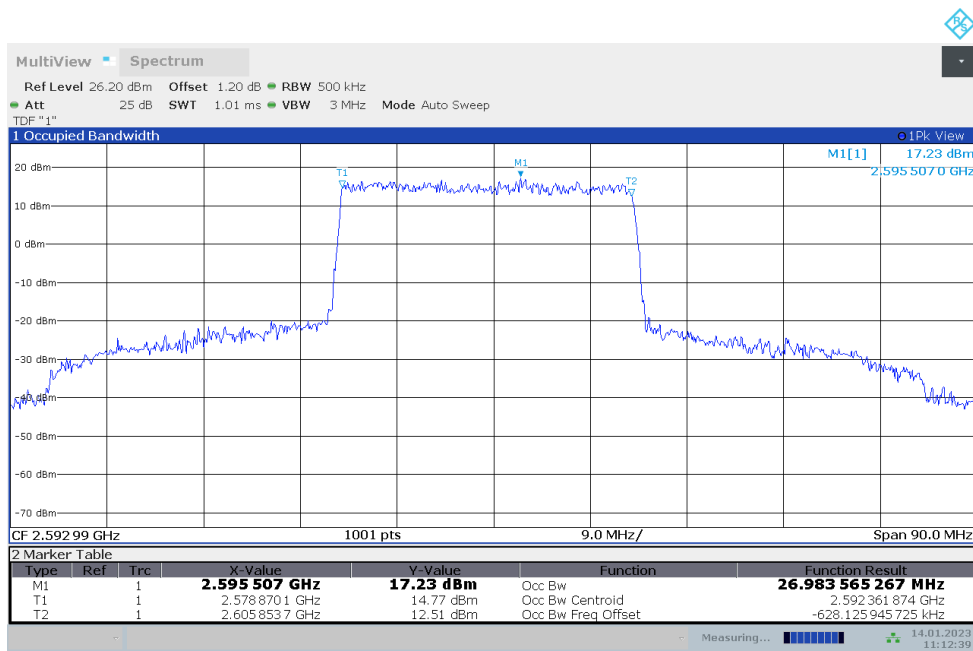
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	26.875	26.984

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



11:12:23 14.01.2023

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



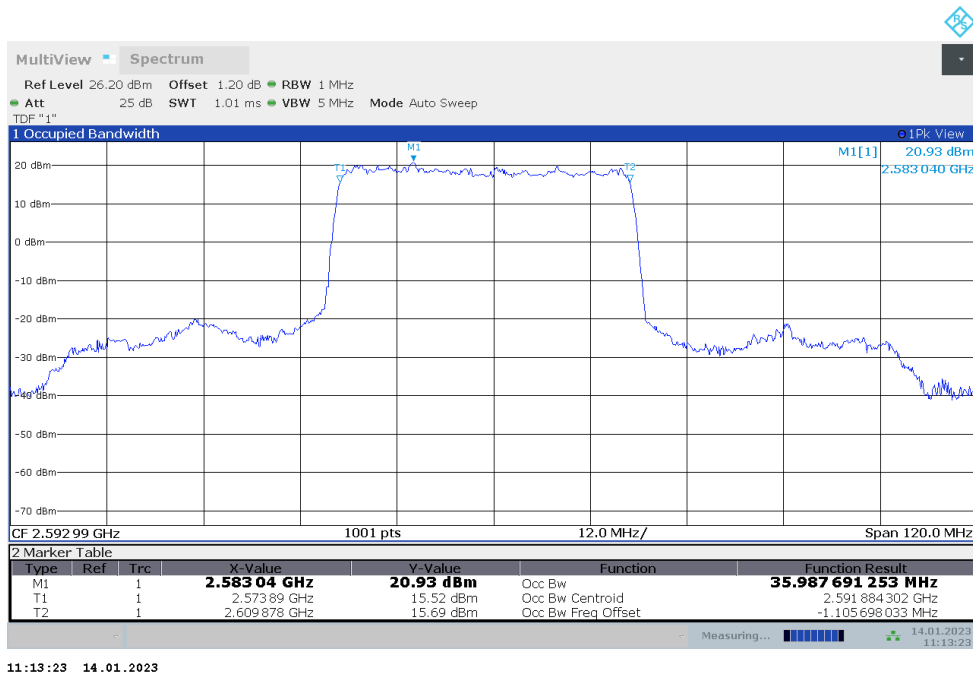
11:12:39 14.01.2023

n41

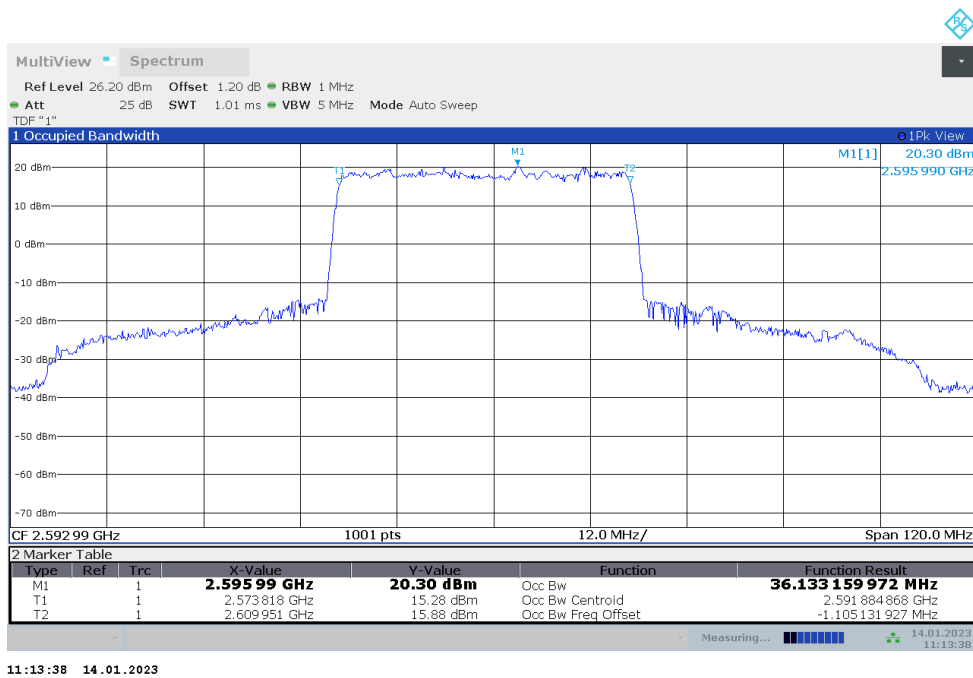
n41,40MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	35.988	36.133

n41,40MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n41,40MHz Bandwidth,DFT-s-QPSK (99% BW)

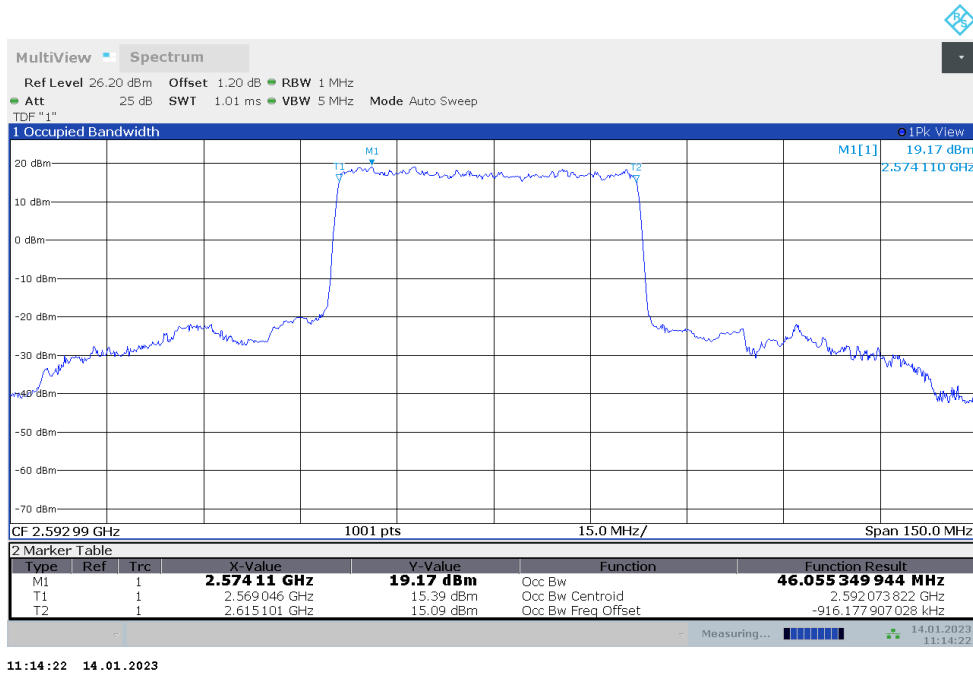


n41

n41,50MHz(99%)

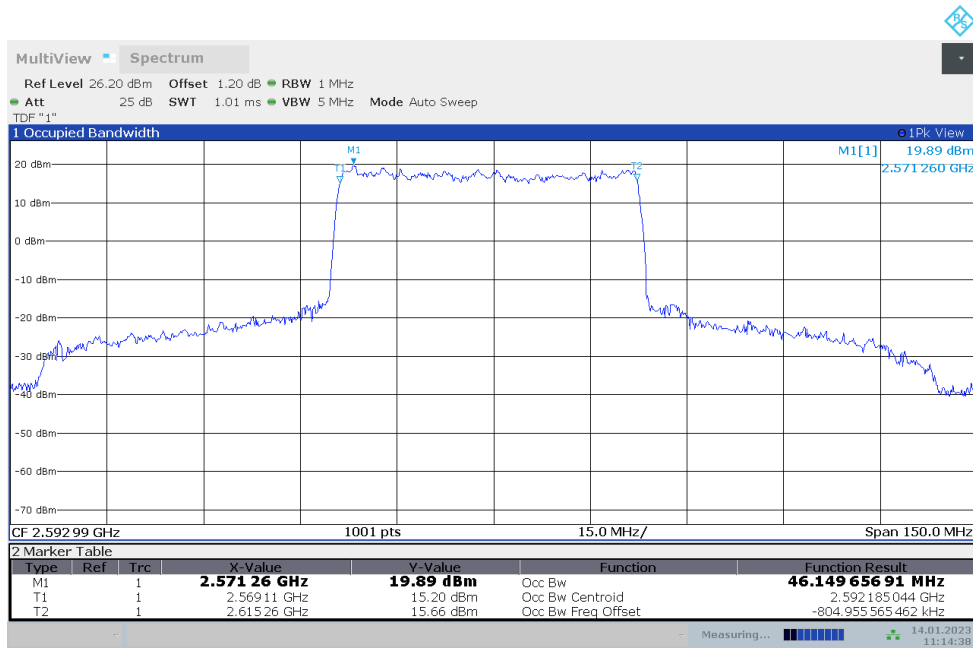
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	46.055	46.150

n41,50MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



11:14:22 14.01.2023

n41,50MHz Bandwidth,DFT-s-QPSK (99% BW)



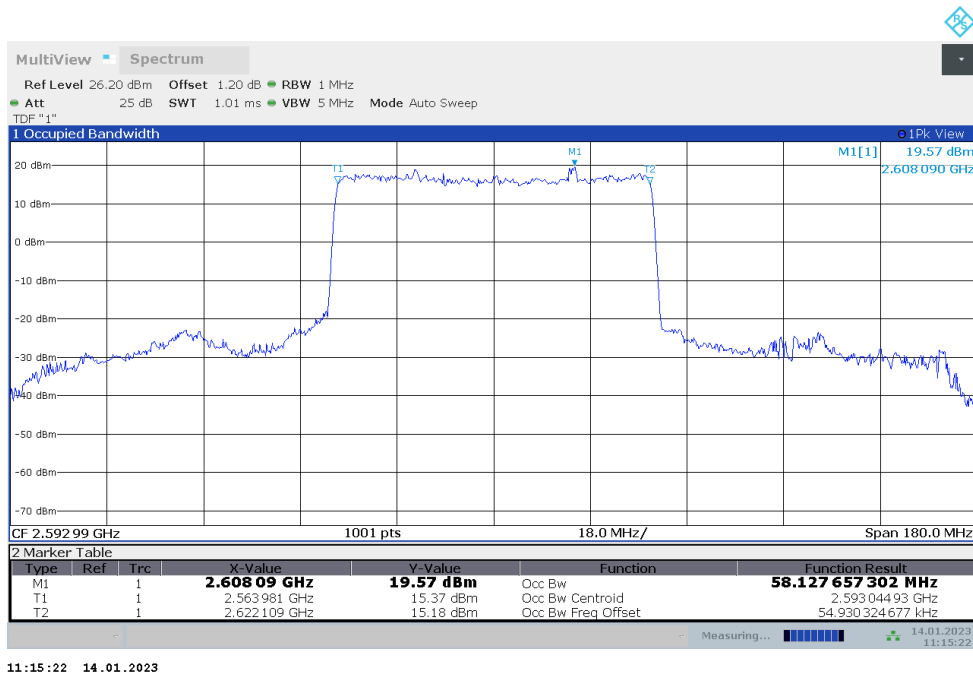
11:14:38 14.01.2023

n41

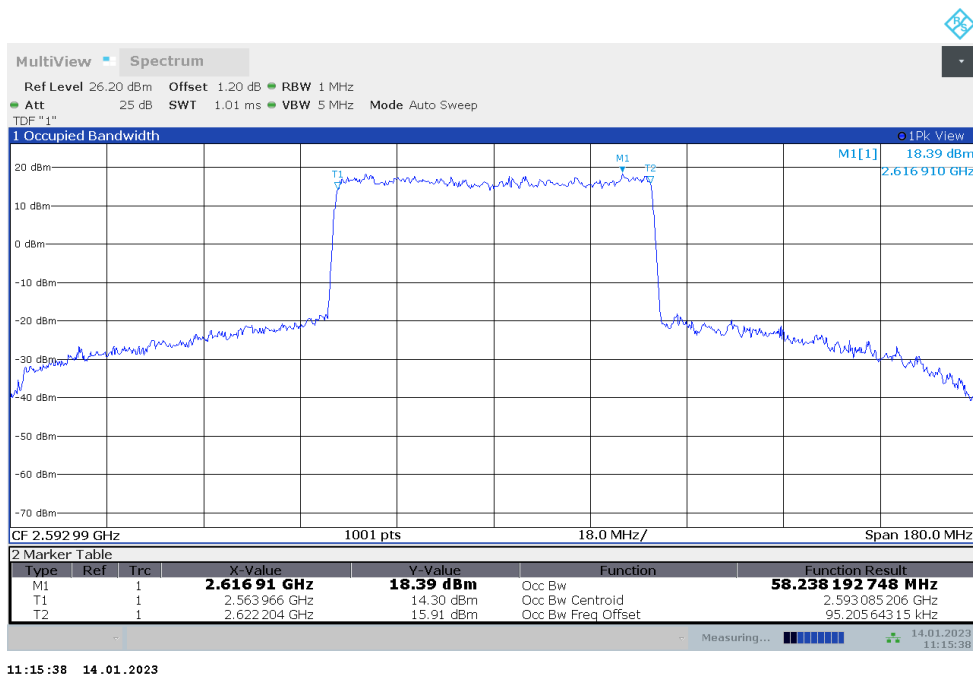
n41,60MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	58.128	58.238

n41,60MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n41,60MHz Bandwidth,DFT-s-QPSK (99% BW)

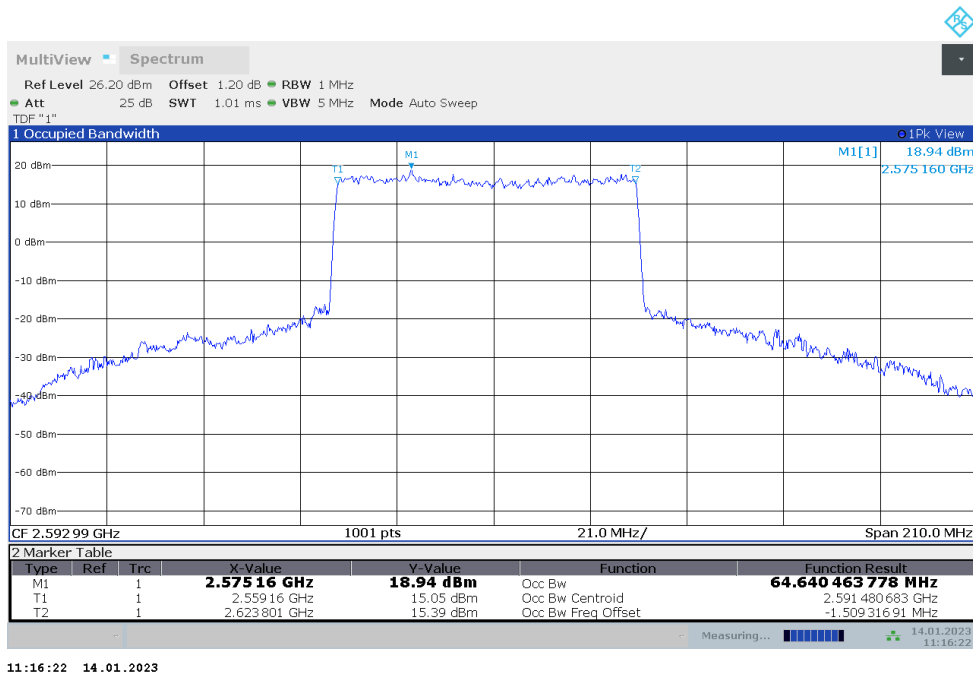


n41

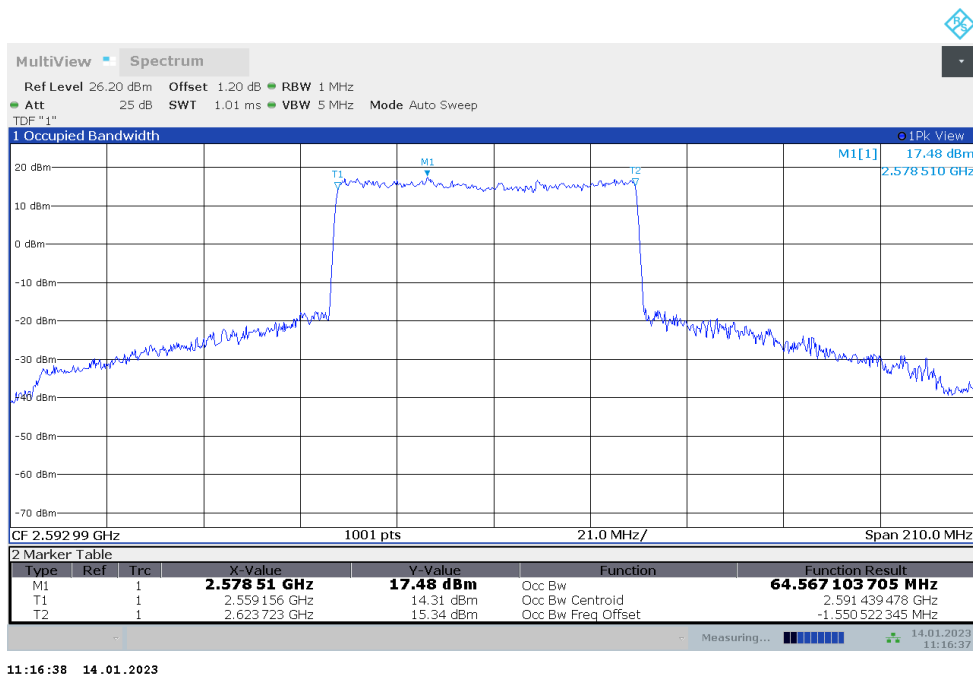
n41,70MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	64.640	64.567

n41,70MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n41,70MHz Bandwidth,DFT-s-QPSK (99% BW)

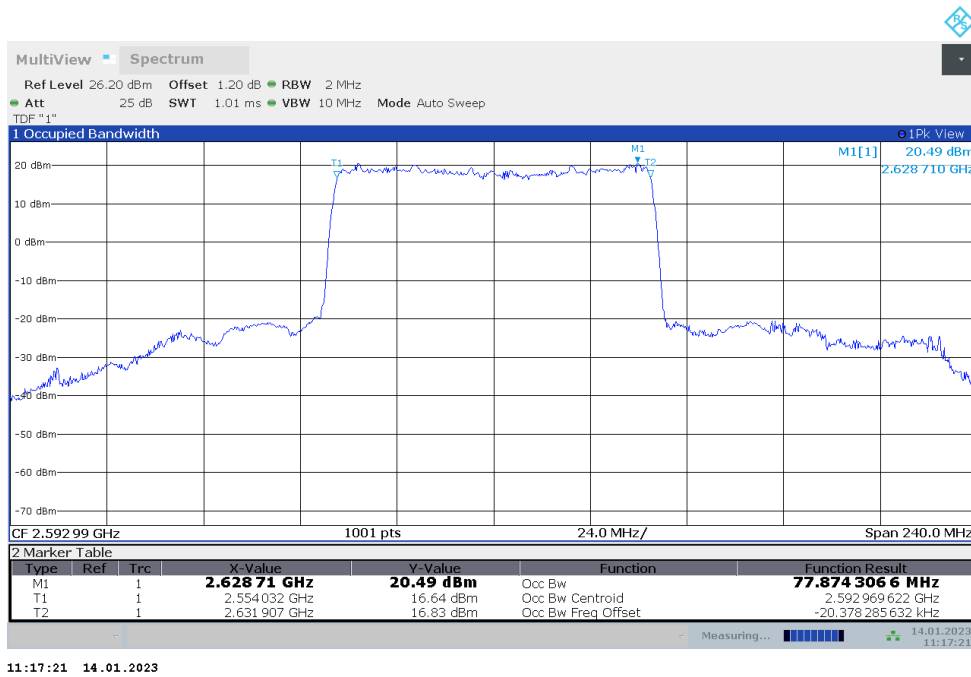


n41

n41,80MHz(99%)

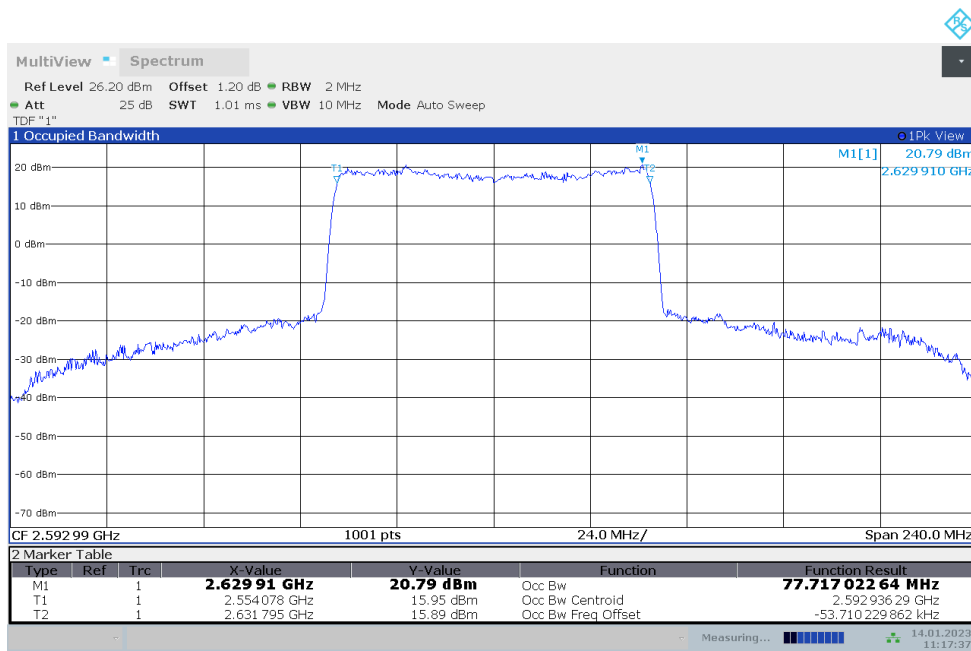
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	77.874	77.717

n41,80MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



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n41,80MHz Bandwidth,DFT-s-QPSK (99% BW)



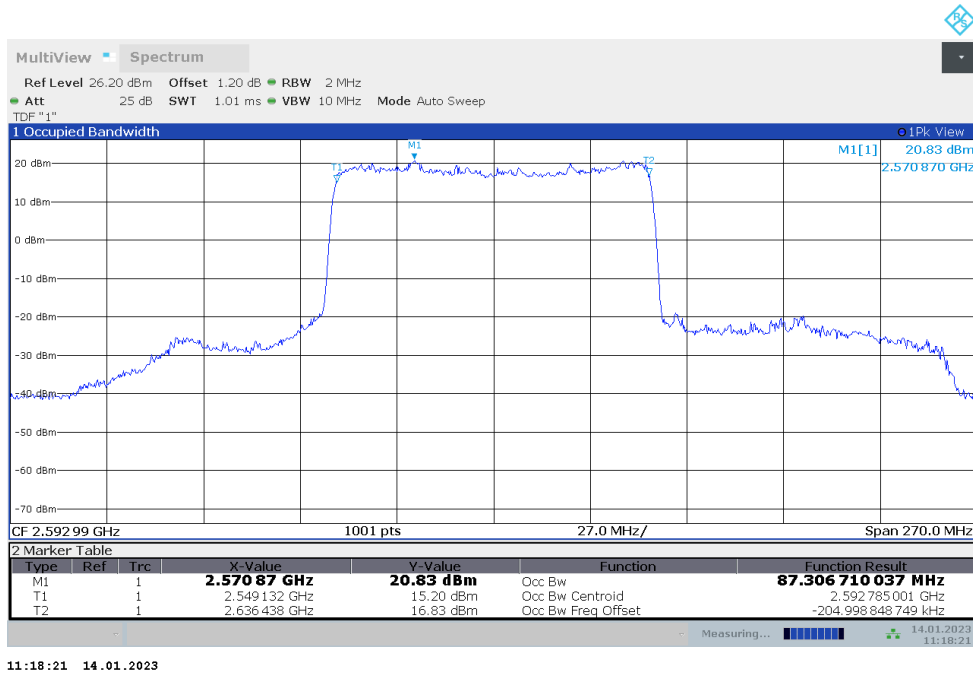
11:17:37 14.01.2023

n41

n41,90MHz(99%)

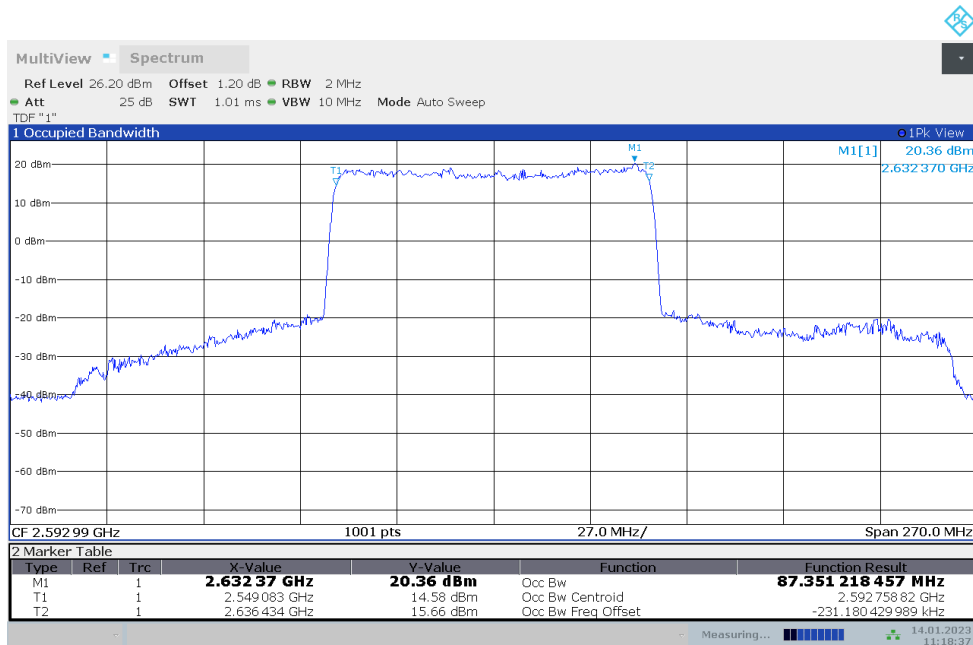
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	87.307	87.351

n41,90MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



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n41,90MHz Bandwidth,DFT-s-QPSK (99% BW)



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n41

n41,100MHz(99%)

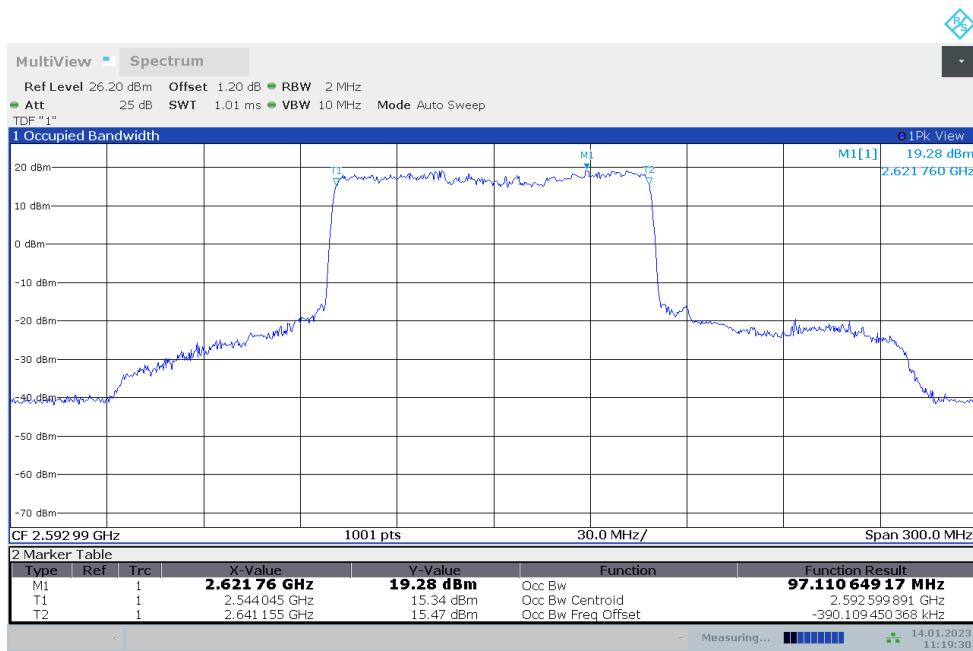
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
2592.99	96.903	97.111

n41,100MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



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n41,100MHz Bandwidth,DFT-s-QPSK (99% BW)

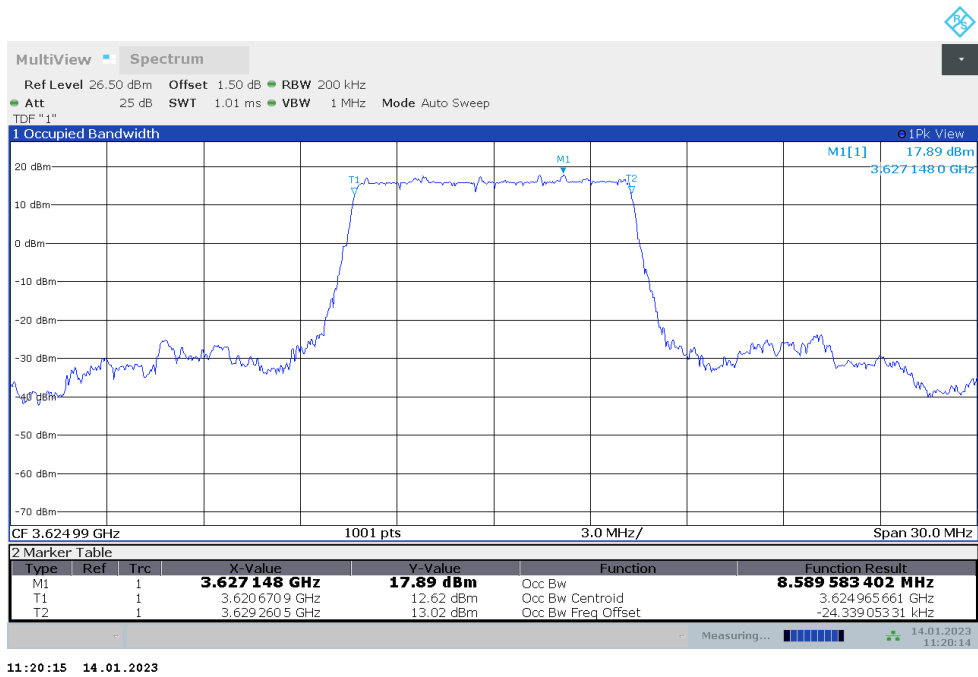


11:19:30 14.01.2023

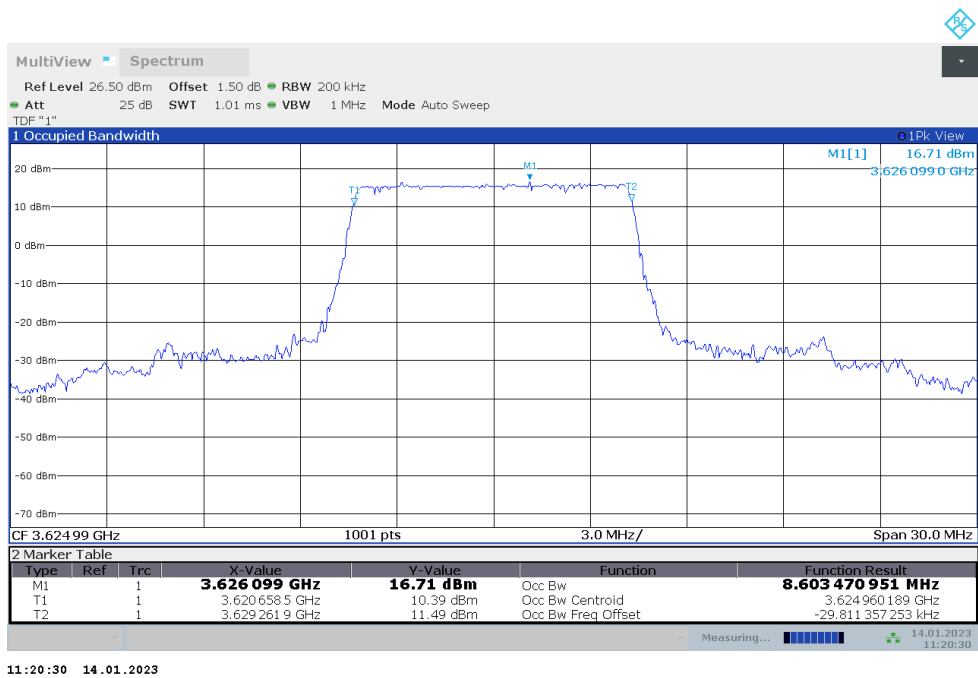
n48
n48,10MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3624.99	8.590	8.603

n48,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



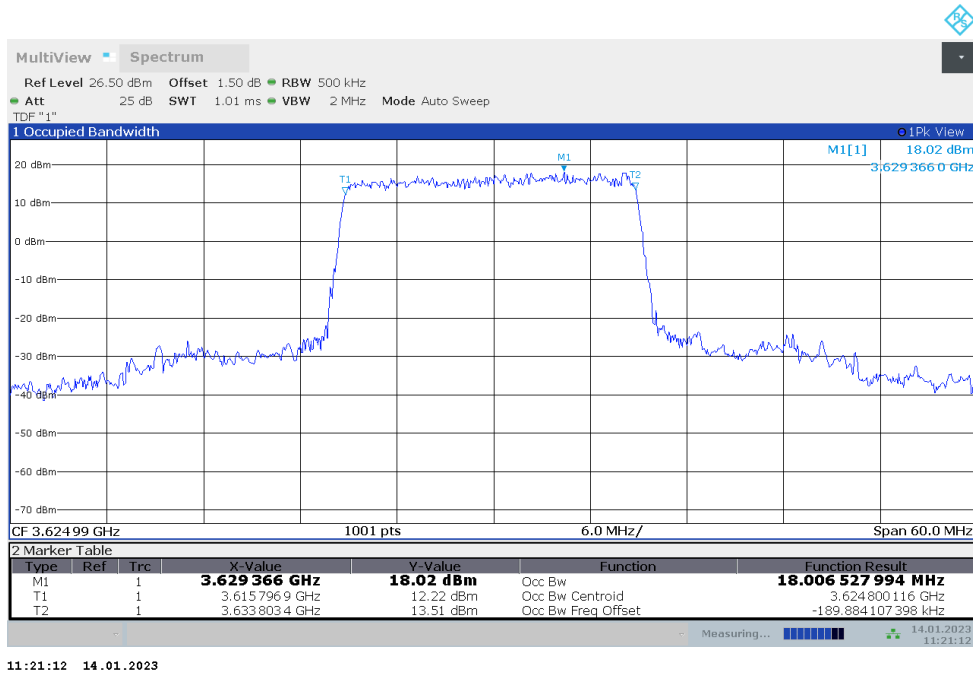
n48,10MHz Bandwidth,DFT-s-QPSK (99% BW)



n48
n48,20MHz(99%)

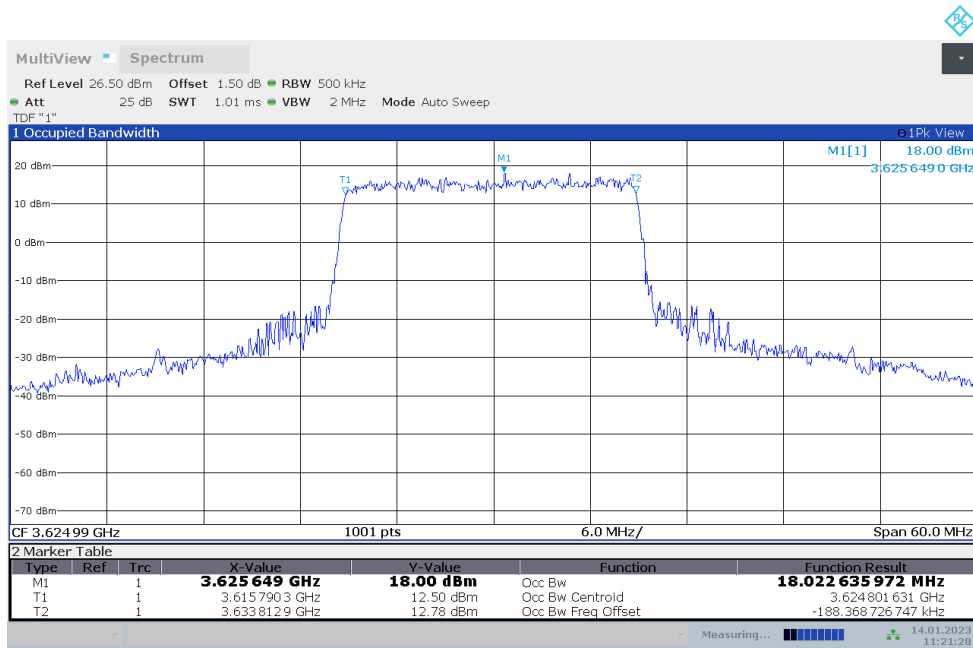
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3624.99	18.007	18.023

n48,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



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n48,20MHz Bandwidth,DFT-s-QPSK (99% BW)



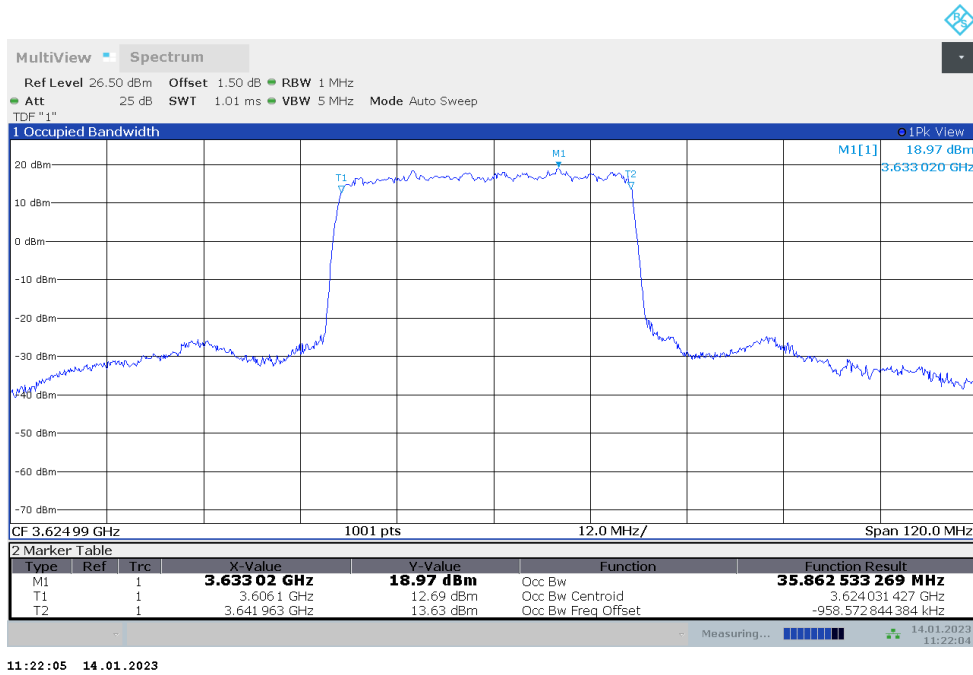
11:21:28 14.01.2023

n48

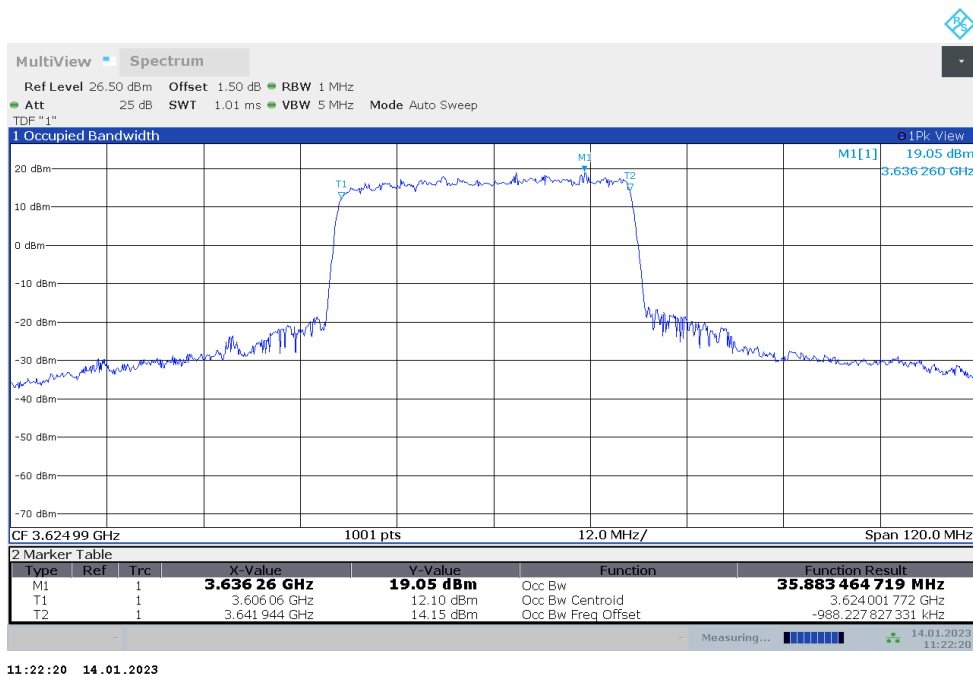
n48,40MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3624.99	35.863	35.883

n48,40MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



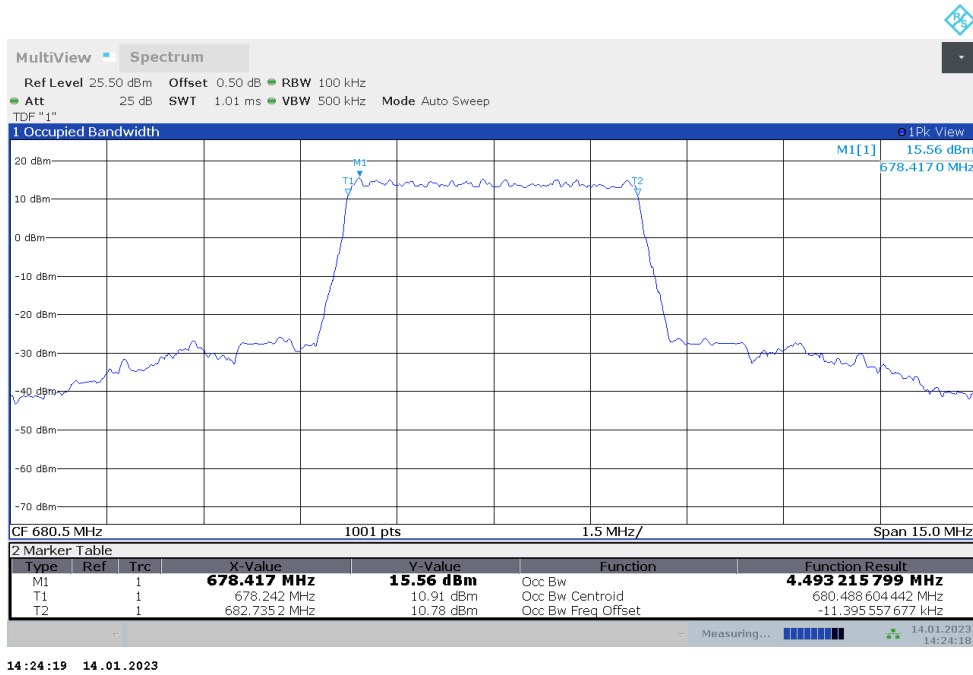
n48,40MHz Bandwidth,DFT-s-QPSK (99% BW)



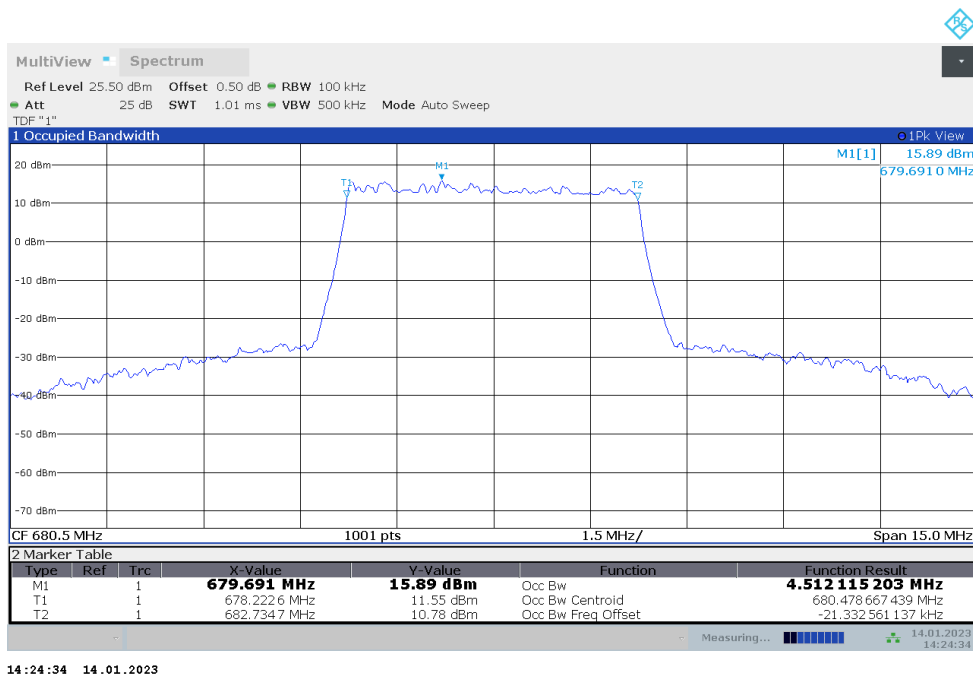
n71
n71,5MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
680.5	4.493	4.512

n71,5MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n71,5MHz Bandwidth,DFT-s-QPSK (99% BW)



n71

n71,10MHz(99%)

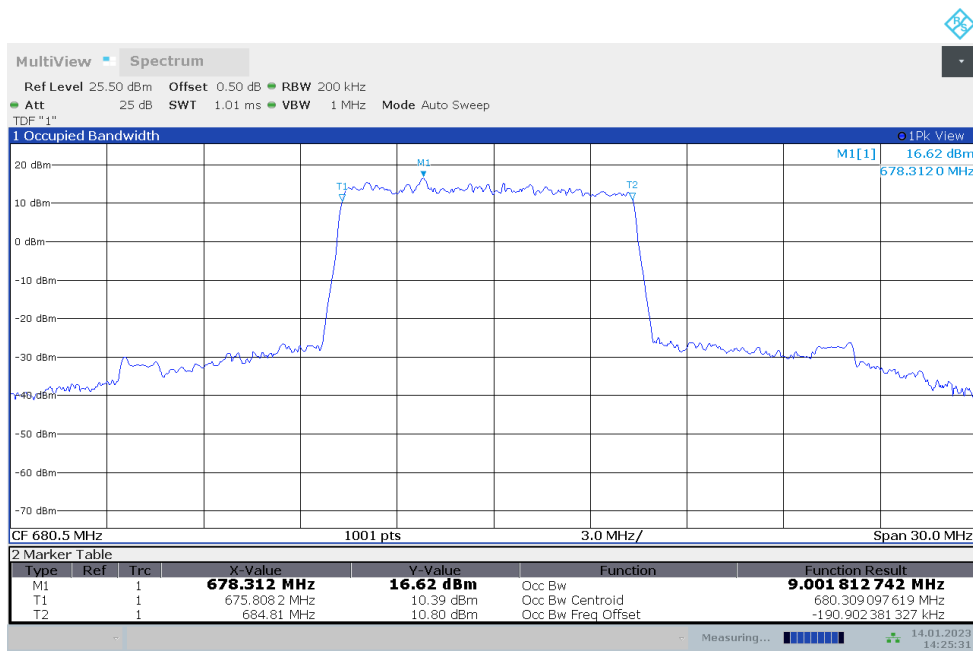
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
680.5	8.979	9.002

n71,10MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



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n71,10MHz Bandwidth,DFT-s-QPSK (99% BW)



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n71

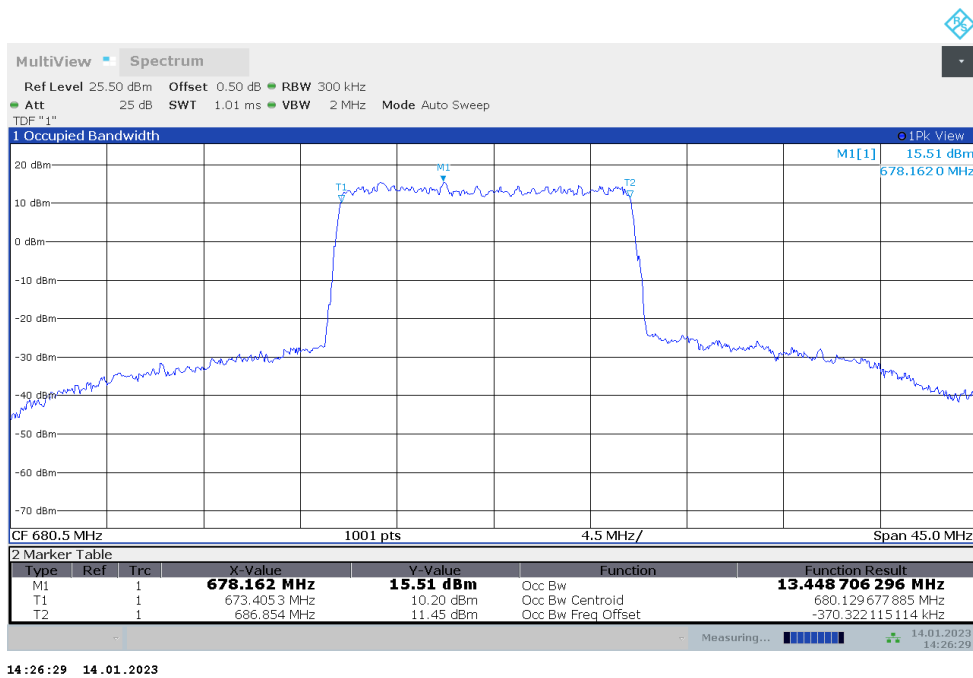
n71,15MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
680.5	13.452	13.449

n71,15MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n71,15MHz Bandwidth,DFT-s-QPSK (99% BW)



n71

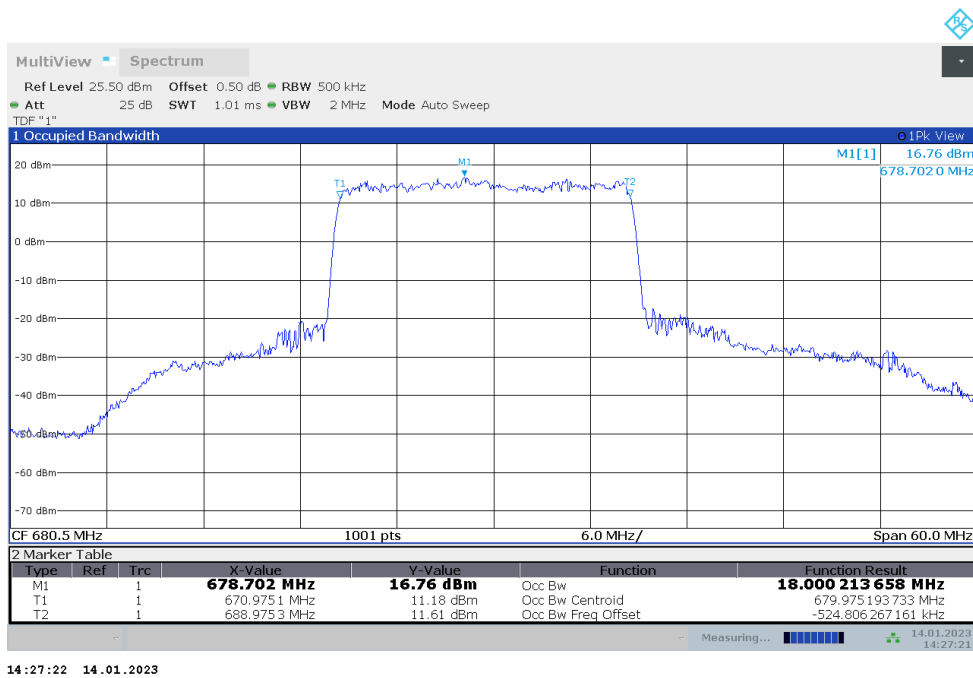
n71,20MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
680.5	17.976	18.000

n71,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



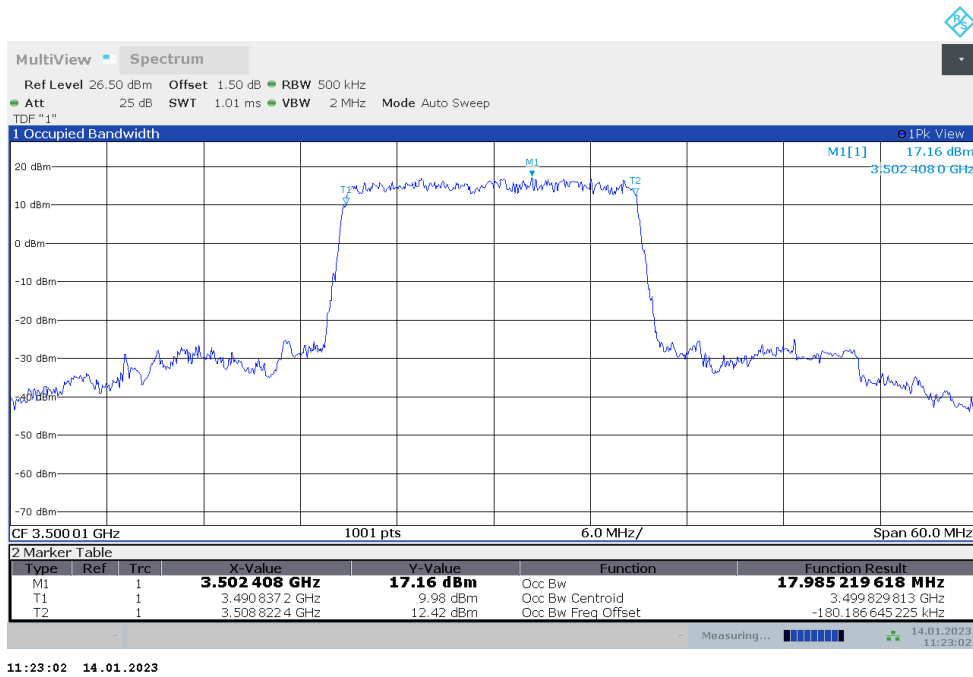
n71,20MHz Bandwidth,DFT-s-QPSK (99% BW)



n77L
n77L,20MHz(99%)

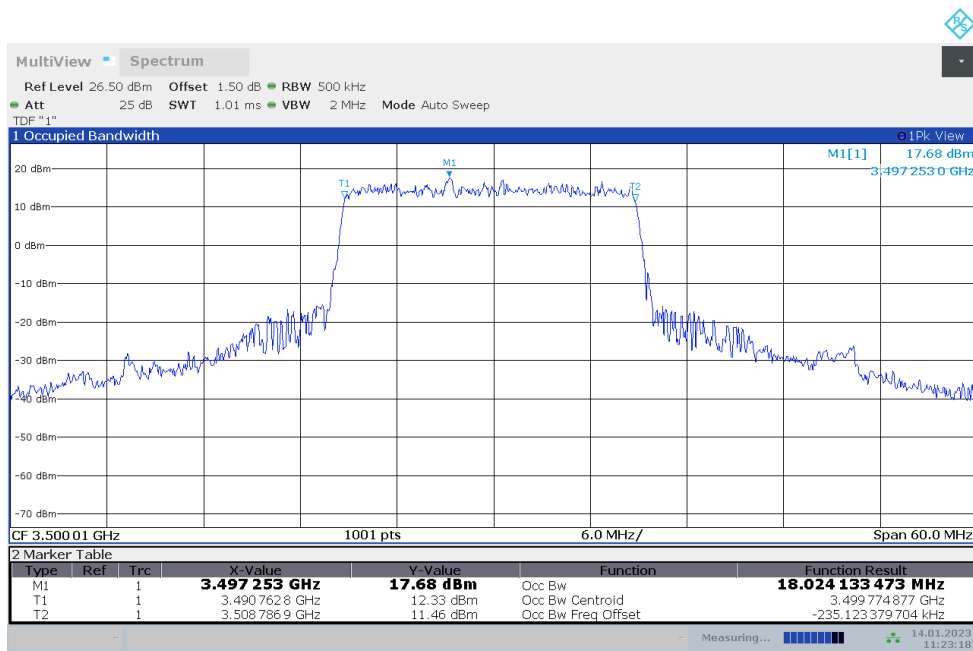
Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3500.01	17.985	18.024

n77L,20MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



11:23:02 14.01.2023

n77L,20MHz Bandwidth,DFT-s-QPSK (99% BW)

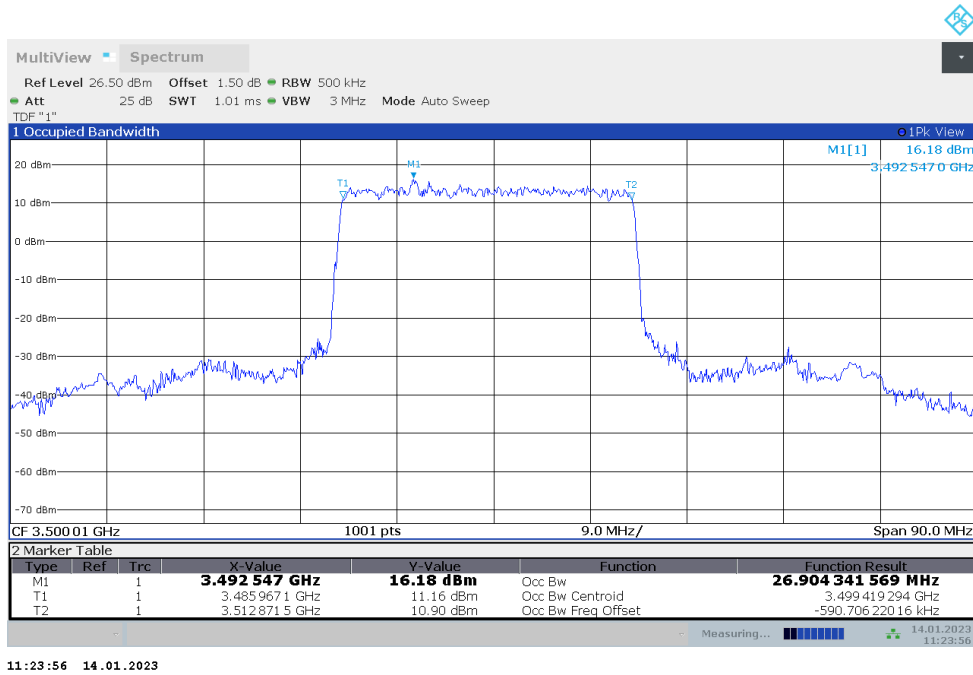


11:23:18 14.01.2023

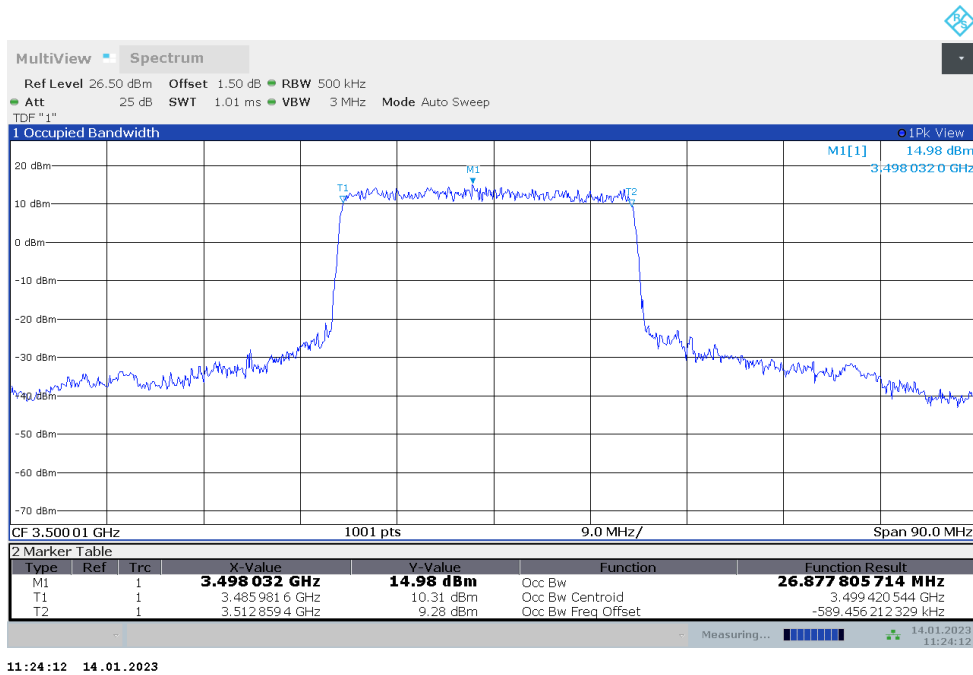
n77L
n77L,30MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3500.01	26.904	26.878

n77L,30MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



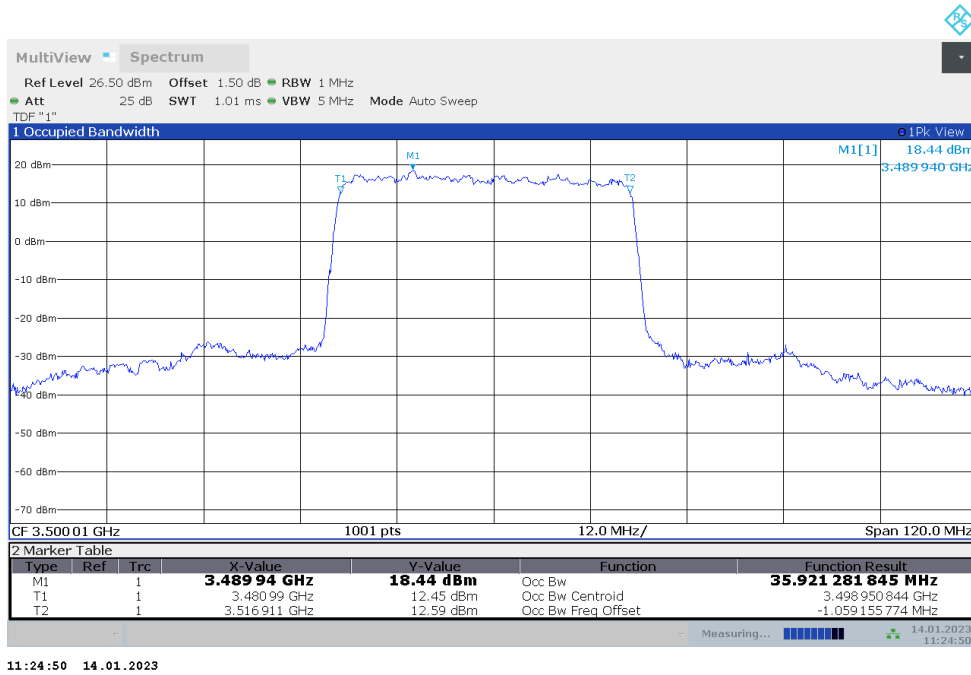
n77L,30MHz Bandwidth,DFT-s-QPSK (99% BW)



n77L
n77L,40MHz(99%)

Frequency (MHz)	Occupied Bandwidth (99%) (MHz)	
	DFT-s-pi/2 BPSK	DFT-s-QPSK
3500.01	35.921	35.957

n77L,40MHz Bandwidth,DFT-s-pi/2 BPSK (99% BW)



n77L,40MHz Bandwidth,DFT-s-QPSK (99% BW)

