TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR25-SRF0019 Page(1) of (78)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2024-11-11

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-X356B

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

5. FCC ID : A3LSMX356B

6. Date of Test : 2024-11-29 to 2025-03-06

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 2
FCC Part 90 subpart S

9. Test Result : Refer to the test result in the test report

	Tested by	Technical Manager
Affirmation	Name : Kwonse Kim (Signature)	Name : Harim Lee (Signature)

2025-03-06

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2025-03-06	Originally issued	-

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

CONTENTS

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	Samsung Electronics Vietnam Thai Nguyen Co., Ltd
Address	:	Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, Vietnam
Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Tablet PC		
Model	:	SM-X356B		
Modulation technique	:	LTE	:	QPSK, 16QAM, 64QAM, 256QAM
		5G NR DFT-s OFDM	:	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
		5G NR CP OFDM	:	QPSK, 16QAM, 64QAM, 256QAM
Power source	:	DC 3.85 V		
Antenna specification	:	Main Antenna 1	:	LDS Antenna (LTE B26, NR n26)
Antenna gain	:	Main Antenna 1	:	0.1 dBi
5G NR Antenna operation	:	SA/NSA		
5G NR SCS	:	15 ㎑		
Frequency range	:	LTE B26	:	814.7 ㎒ ~ 848.3 ㎒
		5G NR n26	:	816.5 ㎒ ~ 846.5 ㎒
Bandwidth	:	LTE B26	:	1.4/3/5/10/15 ㎒
		5G NR n26	:	5/10/15/20 ㎒
Software version	:	X356B.001		
Hardware version	:	REV1.0		
Test device serial No.	:	Conducted	:	R32XB0066LV, R32XB006PFD
		Radiated	:	R32Y100QWZF
Operation temperature	:	0 ℃ ~ 35 ℃		

2.1. Frequency/channel operations

This device contains the following capabilities:
LTE B26, NR n26

LTE B26

Ch.	Frequency (㎒)
26697	814.7
26740	819.0
26783	823.3
26790	824.0

Table 2.1-1. 1.4M BW

Ch.	Frequency (㎒)
26705	815.5
26740	819.0
26775	822.5
26790	824.0

Table 2.1-2. 3M BW

Ch.	Frequency (㎒)
26715	816.5
26740	819.0
26765	821.5
26790	824.0

Table 2.1-3. 5M BW

Ch.	Frequency (㎒)
26740	819.0
26790	824.0

Table 2.1-4. 10M BW

Ch.	Frequency (㎒)
26765	821.5
26790	824.0

Table 2.1-5. 15M BW

5G NR n26

Ch.	Frequency (㎒)
163300	816.5
163800	819.0
164300	821.5
164800	824.0

Table 2.1-6. 5M BW

Ch.	Frequency (㎒)
163800	819.0
164800	824.0

Table 2.1-7. 10M BW

Ch.	Frequency (㎒)
164300	821.5
164800	824.0

Table 2.1-8. 15M BW

Ch.	Frequency (㎒)
164800	824.0

Table 2.1-9. 20M BW

3. Maximum output power

LTE B26

Mode	Tx frequency (㎒)	Emission designator	Conducted	
			Max. power (㏈m)	Max. power (W)
LTE B26	814.7 ~ 823.3	1M11G7D	22.88	0.194
		1M10W7D	22.26	0.168
	815.5 ~ 822.5	2M71G7D	22.80	0.191
		2M71W7D	22.18	0.165
	816.5 ~ 821.5	4M53G7D	22.77	0.189
		4M53W7D	22.16	0.164
	819.0	8M99G7D	22.83	0.192
		8M97W7D	22.16	0.164
	821.5	13M5G7D	22.52	0.179
		13M5W7D	21.91	0.155
Straddle channel	824.0	1M10G7D	22.82	0.191
		1M11W7D	22.17	0.165
		2M71G7D	22.72	0.187
		2M71W7D	22.16	0.164
		4M52G7D	22.75	0.188
		4M52W7D	22.16	0.164
		8M97G7D	22.77	0.189
		8M97W7D	22.04	0.160
		13M5G7D	22.46	0.176
		13M5W7D	21.73	0.149

5G NR n26

Mode	Tx frequency (㎒)	Emission designator	Conducted	
			Max. power (dBm)	Max. power (W)
5G NR n26	816.5 ~ 821.5	4M51G7D	22.91	0.195
		4M53W7D	21.84	0.153
	819	8M99G7D	22.95	0.197
		9M02W7D	21.89	0.155
	821.5	13M5G7D	23.01	0.200
		13M5W7D	22.04	0.160
Straddle channel	824.0	4M50G7D	22.81	0.191
		4M51W7D	21.76	0.150
		8M97G7D	22.77	0.189
		9M02W7D	21.62	0.145
		13M5G7D	22.91	0.195
		13M5W7D	21.83	0.152
		17M9G7D	22.93	0.196
		17M9W7D	21.87	0.154

4. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046 90.635	Conducted Output Power	<100 Watts	Conducted	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/A		Pass
2.1051 90.691(a)	Band Edge Emissions at Antenna Terminal	<43 + 10Log$_{10}$(P) dB, <50 + 10Log$_{10}$(P) dB at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge		Pass
	Spurious Emissions at Antenna Terminal			Pass
-	Peak to Average Power Ratio	<13 dB		Pass
2.1055 90.213	Frequency stability	<2.5 ppm		Pass
22.913(a)(5)	Effective Radiated Power	<7 Watts max. ERP	Radiated	Pass
2.1053 90.691(a)	Radiated Spurious Emissions	<43 + 10Log$_{10}$(P) dB		Pass

Notes:

1. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.26-2015
   - ANSI/TIA-603-E-2016
   - KDB 971168 D01 v03r01
   - KDB 971168 D02 v02r02

4.1. Worst case orientation

1. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations in the test data.
2. In the case of radiated spurious emissions, only the worst case bandwidth results were reported.
3. Output power measurements were measured on all of modulation. All tests except output power was performed with below modulation with highest power.
   1) LTE: QPSK, 16QAM
   2) NR: QPSK, 16QAM
      - Waveform: DFT-s OFDM
      - Mode: NSA/SA [Worst case: SA]
4. However, the PAPR was evaluated for all wave forms and modulations during pre-test, then all bandwidth was performed for the modulations with the highest result.
   1) LTE: QPSK, 16QAM
   2) NR: QPSK, 256QAM
      - Waveform: DFT-s OFDM/CP OFDM [Worst case: CP OFDM]
5. All configurations have been performed (Stand-alone, Stand-alone with TA, With accessories).
      - Accessory type: S-pen, TA, DLC, Protective cover
6. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z and all of the radiated tests have been performed with the accessories as below. It was determined that below orientation was worst case orientation for each band.

Band	Stand-alone			Stand-alone with TA			With accessories		
	X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis
LTE B26 (Part 90)	-	-	-	-	-	-	O	-	-
NR n26 (Part 90)	-	-	-	-	-	-	O	-	-

7. Test Condition

- The measurement was performed with various configurations then worst results are reported.

1) Radiated measurement

Test Description	Mode	Condition		Test Channel
Radiated power	LTE	QPSK, 16QAM	RB Size: 1	Low, Middle, High
	NR	DFT-s OFDM: QPSK, 16QAM	RB Size: 1	
Radiated Spurious Emissions	LTE	QPSK	RB Size: 1	Low, Middle, High
	NR	DFT-s OFDM: QPSK	RB Size: 1	

Band	Bandwidth (㎒)	RB size	RB offset
LTE B26 (Part 90)	1.4, 3, 5, 10, 15	1	Low, Middle, High
NR n26 (Part 90)	5, 10, 15, 20	1	Low, Middle, High

2) Conducted measurement

Test Description	Mode	Condition		Test Channel
OBW & 26 ㏈ BW	LTE	QPSK, 16QAM	RB Size: Full	Low, Middle, High
	NR	DFT-s OFDM: QPSK, 16QAM	RB Size: Full	
PAPR	LTE	QPSK, 16QAM	RB Size: Full	Middle
	NR	CP OFDM: QPSK, 256QAM	RB Size: Full	
Stability	LTE	QPSK	RB Size: Full	Middle
	NR	DFT-s OFDM: QPSK	RB Size: Full	
Band Edge	LTE	QPSK	RB Size: 1, Full	Low, High
	NR	DFT-s OFDM: QPSK	RB Size: 1, Full	
Spurious Emissions	LTE	QPSK	RB Size: 1	Low, Middle, High
	NR	DFT-s OFDM: QPSK	RB Size: 1	

Band	Bandwidth (㎒)	RB size	RB offset
LTE B26 (Part 90)	1.4, 3, 5, 10, 15	1	0, 5, 14, 24, 49, 74
		Full	0
NR n26 (Part 90)	5, 10, 15, 20	1	0, 23, 50, 77, 104
		Full	0

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±)	
Conducted RF power	0.9 dB	
Conducted spurious emissions	2.0 dB	
Radiated spurious emissions	Below 1 000 ㎒	2.5 dB
	1 000 ㎒ to 18 000 ㎒	2.5 dB
	Above 18 000 ㎒	2.6 dB

6. Measurement results explanation example

[GSM, WCDMA, LTE]

Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	6.15	11 000	9.26
50	6.19	12 000	8.88
100	6.27	13 000	6.58
200	6.40	14 000	9.49
300	6.50	15 000	10.19
400	6.59	16 000	10.31
500	6.67	17 000	10.19
600	6.71	18 000	10.51
700	6.78	19 000	10.77
800	6.84	20 000	10.96
900	6.91	21 000	10.91
1 000	6.95	22 000	11.03
2 000	7.40	23 000	11.14
3 000	7.67	24 000	10.80
4 000	8.01	25 000	10.72
5 000	8.08	26 000	10.71
6 000	8.27	26 500	11.14
7 000	8.19	27 000	11.30
8 000	8.83	28 000	12.27
9 000	8.90	29 000	13.16
10 000	9.17	30 000	12.10

Note.

1. Offset(㏈) = RF cable loss(㏈) + Divider (㏈)

[NR]

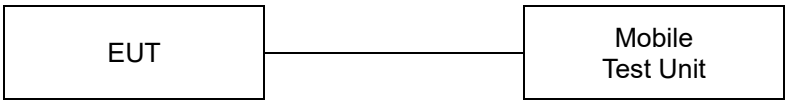
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	6.19	11 000	9.72
50	6.23	12 000	9.53
100	6.31	13 000	9.91
200	6.44	14 000	9.38
300	6.57	15 000	9.98
400	6.63	16 000	9.81
500	6.73	17 000	10.35
600	6.77	18 000	11.09
700	6.86	19 000	10.16
800	6.92	20 000	10.01
900	6.97	21 000	10.52
1 000	7.05	22 000	11.09
2 000	7.50	23 000	11.04
3 000	7.81	24 000	10.97
4 000	8.19	25 000	10.96
5 000	8.66	26 000	11.07
6 000	9.34	26 500	11.46
7 000	8.42	27 000	12.05
8 000	8.97	28 000	12.21
9 000	9.18	29 000	12.13
10 000	9.38	30 000	12.03

Note.
1. Offset(㏈) = RF cable loss(㏈) + Divider (㏈)

7. Test results

7.1. Conducted output power

Test setup



Limit

According to §90.635(b),

The maximum output power of the transmitter for mobile stations is 100 watts (20 ㏈w).

Test procedure

971168 D01 v03r01 – Section 5.2
ANSI C63.26-2015 – Section 5.2.4.2
CFR 47 - Section §2.1046

Test settings

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ± 2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

Notes:

1. Offset(㏈) = RF cable loss(㏈)

Test results

Main Antenna

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average power (dBm)		
					Channel		
					Low	Middle	High
LTE B26	1.4	QPSK	1	0	22.60	22.58	22.75
			1	3	22.74	22.69	22.81
			1	5	22.77	22.76	22.71
			3	0	22.79	22.74	22.86
			3	1	22.78	22.75	22.78
			3	3	22.72	22.65	22.88
			6	0	21.18	21.20	21.15
		16QAM	1	0	22.12	22.12	22.01
			1	3	21.99	21.99	21.97
			1	5	22.02	21.97	22.26
			3	0	21.84	21.80	21.73
			3	1	21.87	21.81	21.94
			3	3	21.78	21.79	21.93
			6	0	20.82	20.84	20.93
		64QAM	1	0	20.82	20.84	20.80
			1	3	20.73	20.74	20.88
			1	5	20.89	20.79	20.83
			3	0	20.75	20.71	20.71
			3	1	20.78	20.72	20.85
			3	3	20.83	20.76	20.92
			6	0	19.68	19.69	19.74
		256QAM	1	0	17.92	17.93	17.61
			1	3	17.93	17.88	17.99
			1	5	17.77	17.68	17.93
			3	0	17.83	17.78	17.66
			3	1	17.84	17.85	17.96
			3	3	17.68	17.61	17.84
			6	0	17.75	17.74	17.83
	3	QPSK	1	0	22.73	22.75	22.75
			1	8	22.76	22.70	22.80
			1	14	22.68	22.69	22.70
			8	0	21.79	21.81	21.74
			8	4	21.76	21.69	21.83
			8	7	21.81	21.79	21.84
			15	0	21.75	21.73	21.84
		16QAM	1	0	21.99	21.97	21.88
			1	8	22.14	22.15	22.18
			1	14	22.06	21.99	22.16
			8	0	20.90	20.85	20.79
			8	4	20.84	20.85	20.81
			8	7	20.78	20.73	20.81
			15	0	20.75	20.73	20.73
		64QAM	1	0	20.74	20.78	20.93
			1	8	21.15	20.94	21.10
			1	14	20.87	20.87	20.90
			8	0	19.80	19.76	19.72
			8	4	19.77	19.77	19.82
			8	7	19.80	19.74	19.88
			15	0	19.80	19.76	19.88
		256QAM	1	0	17.80	17.75	17.94
			1	8	17.84	17.80	17.95
			1	14	17.77	17.71	17.96
			8	0	17.80	17.82	17.89
			8	4	17.76	17.73	17.81
			8	7	17.79	17.75	17.85
			15	0	17.74	17.66	17.81

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average power (㏈m)		
					Channel		
					Low	Middle	High
LTE B26	5	QPSK	1	0	22.77	22.73	22.76
			1	12	22.68	22.67	22.53
			1	24	22.65	22.69	22.52
			12	0	21.76	21.76	21.74
			12	7	21.78	21.76	21.65
			12	13	21.73	21.68	21.71
			25	0	21.75	21.71	21.67
		16QAM	1	0	22.16	22.14	22.09
			1	12	21.98	21.95	22.10
			1	24	21.91	21.83	21.89
			12	0	20.82	20.77	20.69
			12	7	20.83	20.83	20.66
			12	13	20.87	20.84	20.74
			25	0	20.74	20.75	20.79
		64QAM	1	0	21.05	21.04	21.09
			1	12	20.95	20.93	21.05
			1	24	21.05	21.06	21.01
			12	0	19.70	19.67	19.70
			12	7	19.81	19.76	19.86
			12	13	19.82	19.76	19.76
			25	0	19.78	19.79	19.74
		256QAM	1	0	17.72	17.71	17.69
			1	12	17.89	17.88	17.81
			1	24	17.77	17.77	17.79
			12	0	17.74	17.72	17.65
			12	7	17.82	17.72	17.82
			12	13	17.80	17.78	17.76
			25	0	17.75	17.72	17.70
	10	QPSK	1	0	-	22.83	-
			1	25	-	22.80	-
			1	49	-	22.70	-
			25	0	-	21.77	-
			25	12	-	21.85	-
			25	25	-	21.83	-
			50	0	-	21.81	-
		16QAM	1	0	-	22.16	-
			1	25	-	22.00	-
			1	49	-	21.96	-
			25	0	-	20.72	-
			25	12	-	20.87	-
			25	25	-	20.78	-
			50	0	-	20.84	-
		64QAM	1	0	-	20.88	-
			1	25	-	21.00	-
			1	49	-	20.99	-
			25	0	-	19.66	-
			25	12	-	19.80	-
			25	25	-	19.79	-
			50	0	-	19.78	-
		256QAM	1	0	-	17.73	-
			1	25	-	17.93	-
			1	49	-	17.79	-
			25	0	-	17.73	-
			25	12	-	17.82	-
			25	25	-	17.81	-
			50	0	-	17.75	-

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average power (dBm)		
					Channel		
					Low	Middle	High
LTE B26	15	QPSK	1	0	-	22.52	-
			1	36	-	22.51	-
			1	74	-	22.47	-
			36	0	-	21.61	-
			36	18	-	21.67	-
			36	37	-	21.72	-
			75	0	-	21.67	-
		16QAM	1	0	-	21.70	-
			1	36	-	21.91	-
			1	74	-	21.77	-
			36	0	-	20.64	-
			36	18	-	20.72	-
			36	37	-	20.68	-
			75	0	-	20.72	-
		64QAM	1	0	-	20.99	-
			1	36	-	20.84	-
			1	74	-	20.51	-
			36	0	-	19.63	-
			36	18	-	19.66	-
			36	37	-	19.70	-
			75	0	-	19.65	-
		256QAM	1	0	-	17.78	-
			1	36	-	17.72	-
			1	74	-	17.83	-
			36	0	-	17.59	-
			36	18	-	17.73	-
			36	37	-	17.67	-
			75	0	-	17.71	-

Straddle channel

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average Power (dBm)
LTE B26	1.4	QPSK	1	0	22.75
			1	3	22.73
			1	5	22.67
			3	0	22.82
			3	1	22.80
			3	3	22.80
			6	0	21.19
		16QAM	1	0	22.04
			1	3	22.00
			1	5	22.17
			3	0	21.76
			3	1	21.91
			3	3	21.91
			6	0	20.92
		64QAM	1	0	20.81
			1	3	20.91
			1	5	20.90
			3	0	20.73
			3	1	20.81
			3	3	20.86
			6	0	19.73
		256QAM	1	0	17.69
			1	3	17.95
			1	5	17.92
			3	0	17.69
			3	1	17.98
			3	3	17.72
			6	0	17.83
	3	QPSK	1	0	22.69
			1	8	22.72
			1	14	22.60
			8	0	21.65
			8	4	21.68
			8	7	21.71
			15	0	21.73
		16QAM	1	0	21.85
			1	8	22.16
			1	14	22.07
			8	0	20.69
			8	4	20.70
			8	7	20.69
			15	0	20.60
		64QAM	1	0	20.85
			1	8	20.84
			1	14	20.83
			8	0	19.67
			8	4	19.67
			8	7	19.82
			15	0	19.74
		256QAM	1	0	17.85
			1	8	17.89
			1	14	17.85
			8	0	17.79
			8	4	17.74
			8	7	17.78
			15	0	17.71

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average Power (dBm)
LTE B26	5	QPSK	1	0	22.75
			1	12	22.54
			1	24	22.56
			12	0	21.67
			12	7	21.74
			12	13	21.66
			25	0	21.69
		16QAM	1	0	22.15
			1	12	22.16
			1	24	21.89
			12	0	20.64
			12	7	20.71
			12	13	20.74
			25	0	20.70
		64QAM	1	0	21.17
			1	12	21.06
			1	24	21.10
			12	0	19.66
			12	7	19.80
			12	13	19.81
			25	0	19.77
		256QAM	1	0	17.67
			1	12	17.82
			1	24	17.88
			12	0	17.69
			12	7	17.76
			12	13	17.65
			25	0	17.75
	10	QPSK	1	0	22.77
			1	25	22.70
			1	49	22.56
			25	0	21.62
			25	12	21.75
			25	25	21.80
			50	0	21.70
		16QAM	1	0	22.04
			1	25	21.89
			1	49	21.89
			25	0	20.59
			25	12	20.72
			25	25	20.65
			50	0	20.72
		64QAM	1	0	20.79
			1	25	20.92
			1	49	20.89
			25	0	19.60
			25	12	19.71
			25	25	19.67
			50	0	19.70
		256QAM	1	0	17.62
			1	25	17.82
			1	49	17.63
			25	0	17.58
			25	12	17.71
			25	25	17.72
			50	0	17.65

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average Power (dBm)
LTE B26	15	QPSK	1	0	22.46
			1	36	22.44
			1	74	22.39
			36	0	21.64
			36	18	21.51
			36	37	21.64
			75	0	21.56
		16QAM	1	0	21.41
			1	36	21.67
			1	74	21.73
			36	0	20.54
			36	18	20.48
			36	37	20.57
			75	0	20.62
		64QAM	1	0	20.97
			1	36	20.80
			1	74	20.06
			36	0	19.40
			36	18	19.39
			36	37	19.77
			75	0	19.51
		256QAM	1	0	17.72
			1	36	17.53
			1	74	17.52
			36	0	17.52
			36	18	17.39
			36	37	17.56
			75	0	17.62

Test Band	Bandwidth (㎒)	Waveform	SCS (㎑)	Modulation	RB size	RB offset	Maximum Average Power (dBm)		
							Channel		
							Low	Middle	High
5G NR n26	5	DFT-s OFDM	15	PI/2 BPSK	1	1	22.82	22.68	22.66
					1	13	22.79	22.72	22.76
					1	23	22.87	22.75	22.76
					12	0	22.24	22.21	22.26
					12	7	22.80	22.70	22.75
					12	13	22.33	22.29	22.23
					25	0	22.40	22.21	22.28
				QPSK	1	1	22.90	22.74	22.69
					1	13	22.78	22.68	22.73
					1	23	22.91	22.78	22.71
					12	0	21.82	21.74	21.81
					12	7	22.79	22.78	22.73
					12	13	21.93	21.83	21.74
					25	0	21.84	21.69	21.71
				16QAM	1	1	21.84	21.69	21.68
				64QAM	1	1	20.46	20.29	20.30
				256QAM	1	1	17.91	17.69	17.68
		CP OFDM		QPSK	1	1	21.43	21.25	21.19
	10	DFT-s OFDM		PI/2 BPSK	1	1	-	22.79	-
					1	26	-	22.75	-
					1	50	-	22.72	-
					25	0	-	22.25	-
					25	14	-	22.75	-
					25	27	-	22.22	-
					50	0	-	22.03	-
				QPSK	1	1	-	22.89	-
					1	26	-	22.95	-
					1	50	-	22.69	-
					25	0	-	21.74	-
					25	14	-	22.78	-
					25	27	-	21.57	-
					50	0	-	22.03	-
				16QAM	1	1	-	21.89	-
				64QAM	1	1	-	20.54	-
				256QAM	1	1	-	17.96	-
		CP OFDM		QPSK	1	1	-	21.34	-

Test Band	Bandwidth (㎒)	Waveform	SCS (㎑)	Modulation	RB size	RB offset	Maximum Average Power (dBm)		
							Channel		
							Low	Middle	High
5G NR n26	15	DFT-s OFDM	15	PI/2 BPSK	1	1	-	22.92	-
					1	40	-	22.81	-
					1	77	-	22.82	-
					36	0	-	22.32	-
					36	22	-	22.90	-
					36	43	-	22.33	-
					75	0	-	22.21	-
				QPSK	1	1	-	23.00	-
					1	40	-	23.01	-
					1	77	-	22.97	-
					36	0	-	21.86	-
					36	22	-	22.91	-
					36	43	-	21.81	-
					75	0	-	22.20	-
				16QAM	1	1	-	22.04	-
				64QAM	1	1	-	20.69	-
				256QAM	1	1	-	18.35	-
		CP OFDM		QPSK	1	1	-	21.47	-

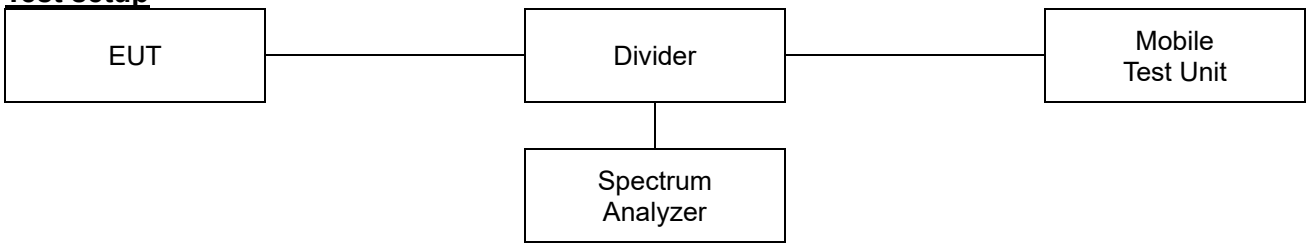
Straddle channel

Test Band	Bandwidth (㎒)	Waveform	SCS (㎑)	Modulation	RB size	RB offset	Maximum Average Power (dBm)
5G NR n26	5	DFT-s OFDM	15	PI/2 BPSK	1	1	22.69
					1	13	22.75
					1	23	22.73
					12	0	22.23
					12	7	22.70
					12	13	22.17
					25	0	22.19
				QPSK	1	1	22.76
					1	13	22.81
					1	23	22.70
					12	0	21.73
					12	7	22.72
					12	13	21.72
					25	0	21.69
				16QAM	1	1	21.76
				64QAM	1	1	20.26
				256QAM	1	1	17.74
		CP OFDM		QPSK	1	1	21.26
	10	DFT-s OFDM		PI/2 BPSK	1	1	22.55
					1	26	22.62
					1	50	22.66
					25	0	22.21
					25	14	22.71
					25	27	22.18
					50	0	22.17
				QPSK	1	1	22.68
					1	26	22.68
					1	50	22.64
					25	0	21.76
					25	14	22.77
					25	27	21.74
					50	0	21.70
				16QAM	1	1	21.62
				64QAM	1	1	20.28
				256QAM	1	1	17.63
		CP OFDM		QPSK	1	1	21.22

Test Band	Bandwidth (㎒)	Waveform	SCS (㎑)	Modulation	RB size	RB offset	Maximum Average Power (dBm)
5G NR n26	15	DFT-s OFDM	15	PI/2 BPSK	1	1	22.90
					1	40	22.86
					1	77	22.81
					36	0	22.25
					36	22	22.91
					36	43	22.34
					75	0	22.41
				QPSK	1	1	22.90
					1	40	22.91
					1	77	22.83
					36	0	21.86
					36	22	22.89
					36	43	21.87
					75	0	21.91
				16QAM	1	1	21.83
				64QAM	1	1	20.48
				256QAM	1	1	17.91
		CP OFDM		QPSK	1	1	21.42
	20	DFT-s OFDM		PI/2 BPSK	1	1	22.91
					1	40	22.89
					1	77	22.78
					36	0	22.39
					36	22	22.93
					36	43	22.35
					75	0	22.44
				QPSK	1	1	22.91
					1	40	22.92
					1	77	22.82
					36	0	21.84
					36	22	22.93
					36	43	21.81
					75	0	21.93
				16QAM	1	1	21.87
				64QAM	1	1	20.52
				256QAM	1	1	17.89
		CP OFDM		QPSK	1	1	21.50

7.2. 99% Occupied Bandwidth & 26 dB Bandwidth

Test setup



Limit

According to §2.1049,

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Test procedure

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

Test settings

◆ 26dB Bandwidth

c) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

d) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

e) 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.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used

for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

◆ 99% Occupied Bandwidth

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 (typically a span of 1.5 × OBW is sufficient).

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 ≥ 3 × 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. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Notes:

1. The EUT was setup to maximum output power with all bandwidth and modulation.

Test results

Test Band	Bandwidth (㎒)	Channel	Test mode	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
LTE B26	1.4	Low	QPSK	1.36	1.10
			16QAM	1.38	1.10
		Middle	QPSK	1.36	1.10
			16QAM	1.38	1.10
		High	QPSK	1.38	1.10
			16QAM	1.37	1.10
	3	Low	QPSK	3.06	2.71
			16QAM	3.05	2.70
		Middle	QPSK	3.07	2.71
			16QAM	3.06	2.70
		High	QPSK	3.05	2.70
			16QAM	3.09	2.70
	5	Low	QPSK	5.18	4.53
			16QAM	5.12	4.53
		Middle	QPSK	5.17	4.51
			16QAM	5.21	4.53
		High	QPSK	5.20	4.52
			16QAM	5.16	4.52
	10	Middle	QPSK	9.89	8.99
			16QAM	9.89	8.97
	15	Middle	QPSK	14.80	13.45
			16QAM	14.87	13.49

Straddle channel

Test Band	Bandwidth (㎒)	Channel	Test mode	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
LTE B26	1.4	Middle	QPSK	1.37	1.10
			16QAM	1.39	1.10
	3	Middle	QPSK	3.09	2.70
			16QAM	3.06	2.70
	5	Middle	QPSK	5.18	4.52
			16QAM	5.17	4.52
	10	Middle	QPSK	10.07	8.97
			16QAM	9.94	8.97
	15	Middle	QPSK	14.80	13.49
			16QAM	14.99	13.49

Test Band	Bandwidth (㎒)	Channel	Waveform	SCS (㎑)	Modulation	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
5G NR n26	5	Low	DFT-s OFDM	15	QPSK	5.17	4.50
					16QAM	5.18	4.51
		Middle			QPSK	5.14	4.51
					16QAM	5.26	4.53
		High			QPSK	5.17	4.50
					16QAM	5.21	4.52
	10	Middle	DFT-s OFDM		QPSK	9.84	8.99
					16QAM	9.79	9.02
	15	Middle	DFT-s OFDM		QPSK	14.65	13.49
					16QAM	14.61	13.52

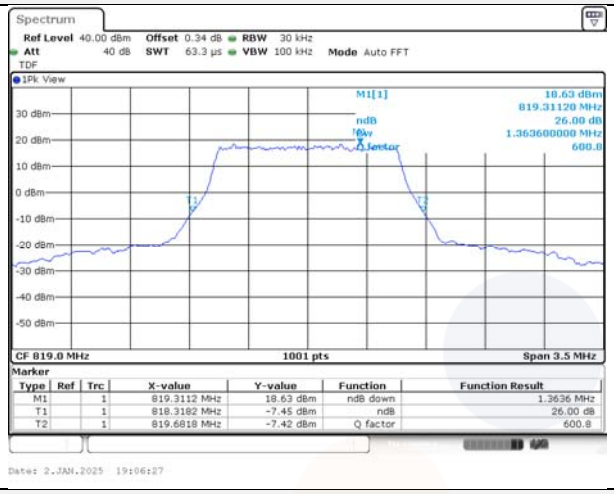
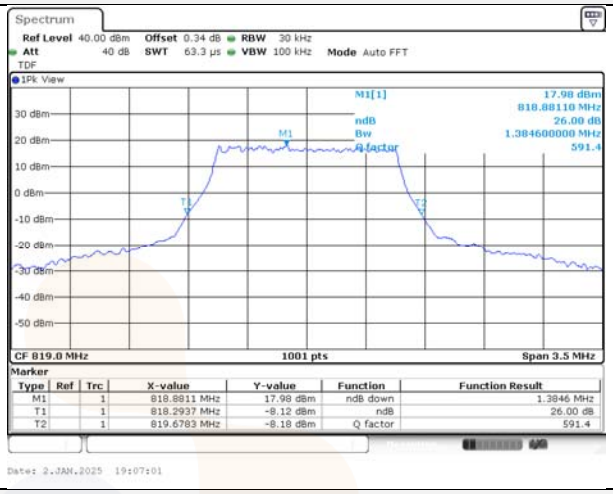
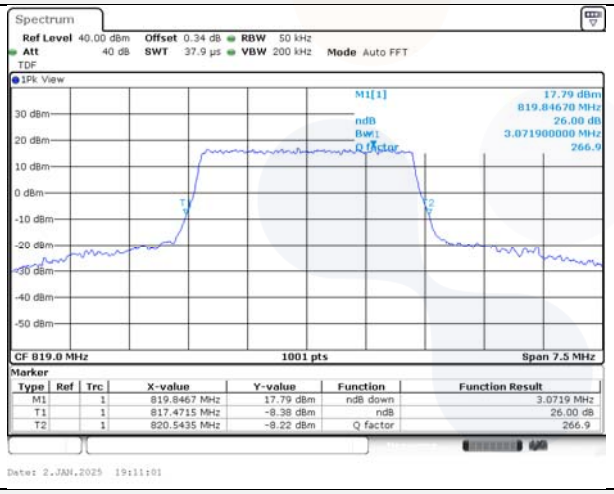
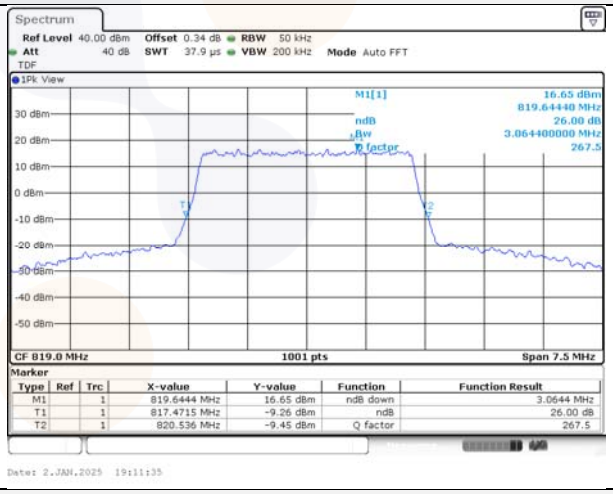
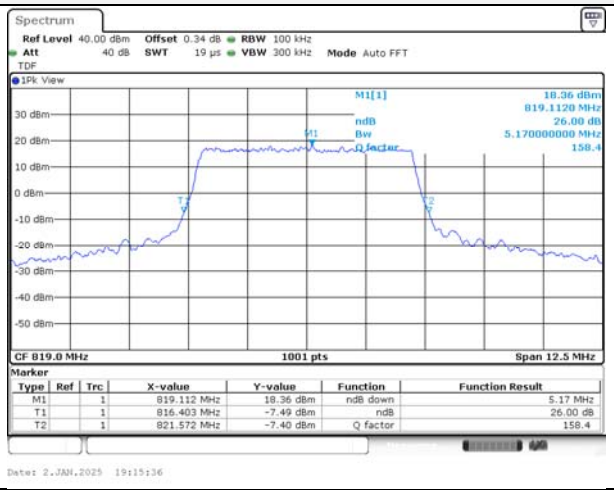
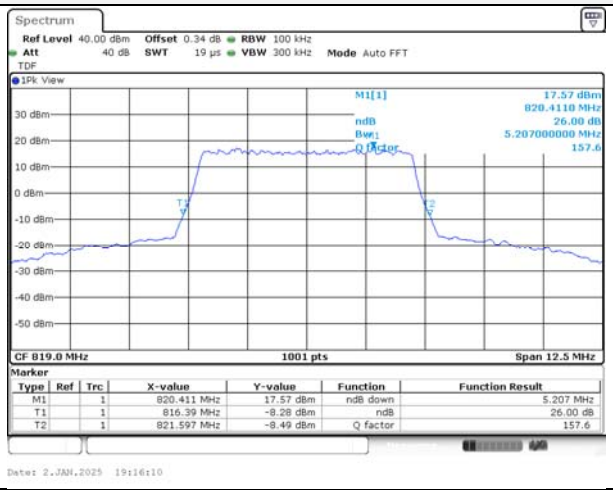
Straddle channel

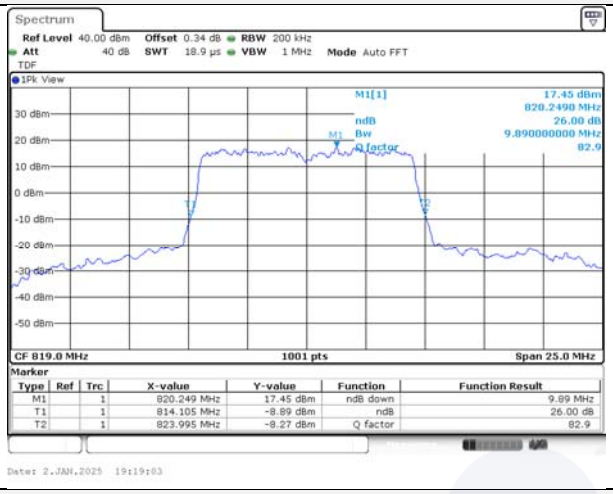
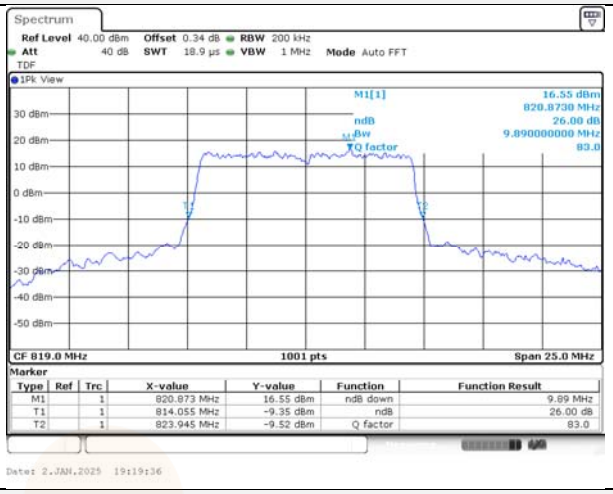
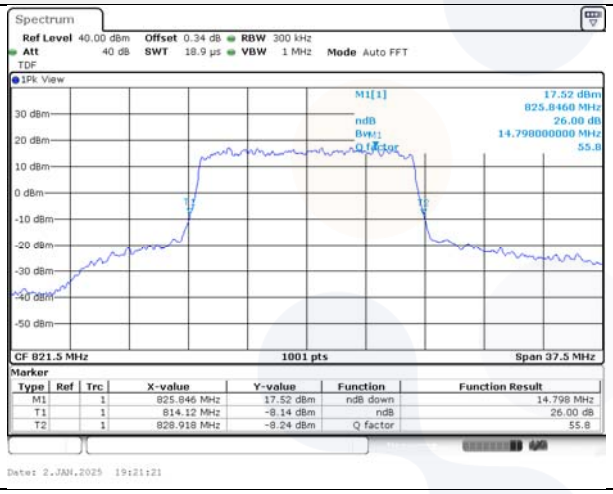
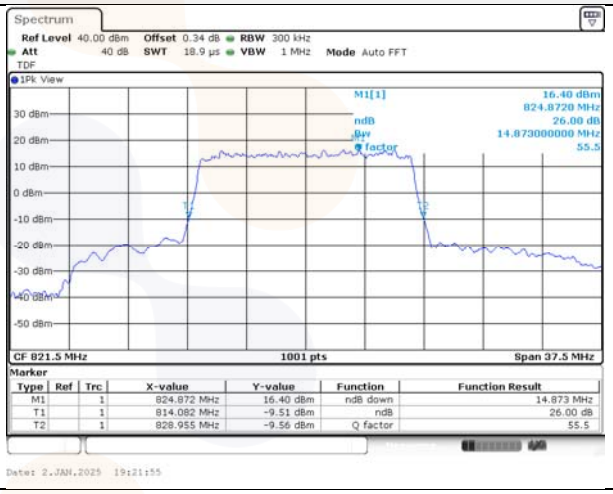
Test Band	Bandwidth (㎒)	Channel	Waveform	SCS (㎑)	Modulation	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
5G NR n26	5	Middle	DFT-s OFDM	15	QPSK	5.09	4.50
					16QAM	5.12	4.51
	10	Middle	DFT-s OFDM		QPSK	9.94	8.97
					16QAM	9.82	9.02
	15	Middle	DFT-s OFDM		QPSK	14.61	13.45
					16QAM	14.27	13.52
	20	Middle	DFT-s OFDM		QPSK	19.43	17.93
					16QAM	19.38	17.88

In order to simplify the report, only Middle channel test plots are attached

26dB Bandwidth

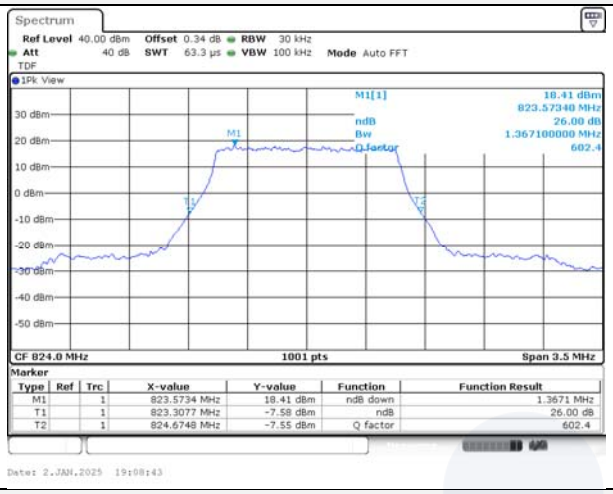
Test mode: LTE B26

1.4M BW QPSK Middle channel	1.4M BW 16QAM Middle channel
	
3M BW QPSK Middle channel	**3M BW 16QAM Middle channel**
	
5M BW QPSK Middle channel	**5M BW 16QAM Middle channel**
	

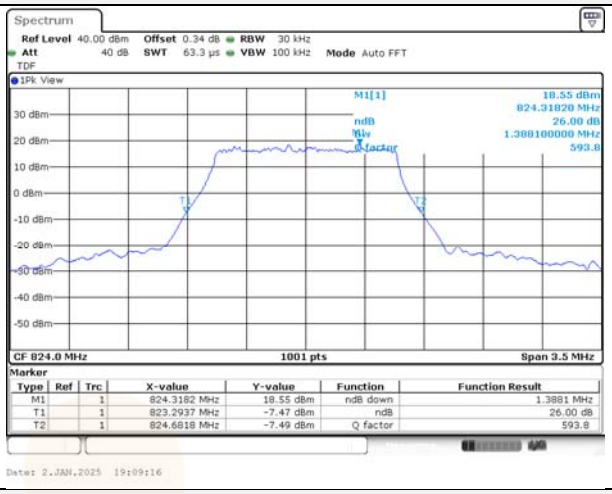
10M BW QPSK Middle channel	10M BW 16QAM Middle channel
	
15M BW QPSK Middle channel	**15M BW 16QAM Middle channel**
	

LTE B26 (Straddle channel)

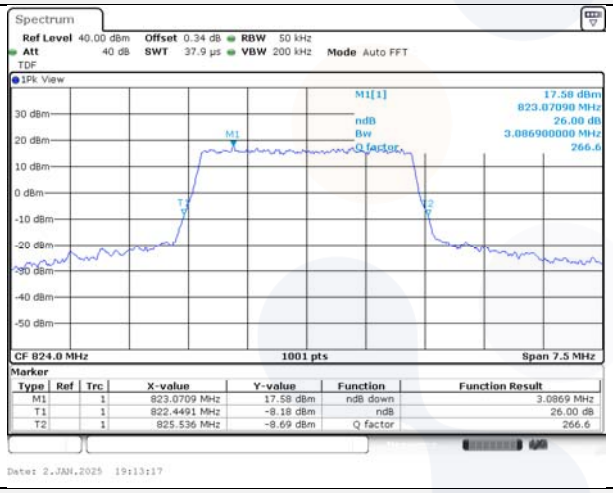
1.4M BW QPSK



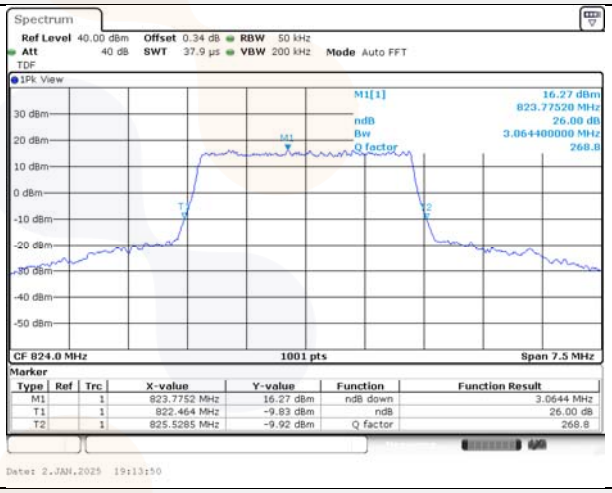
1.4M BW 16QAM



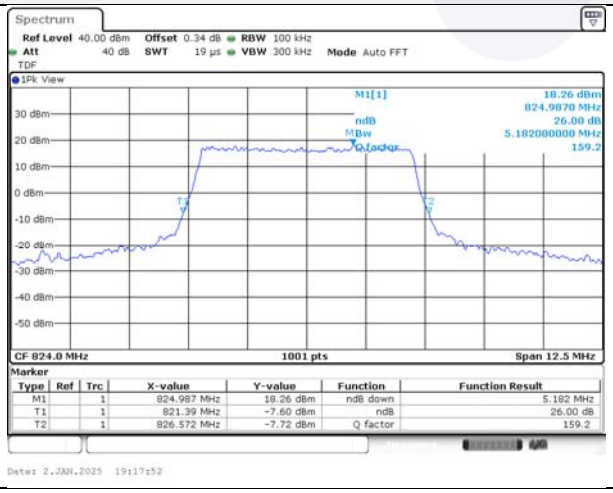
3M BW QPSK



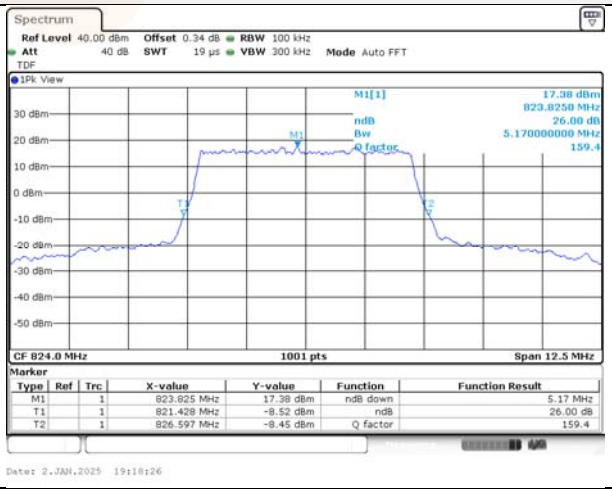
3M BW 16QAM



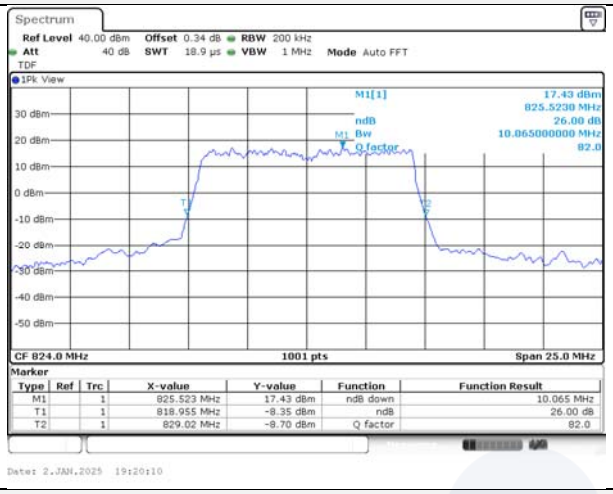
5M BW QPSK



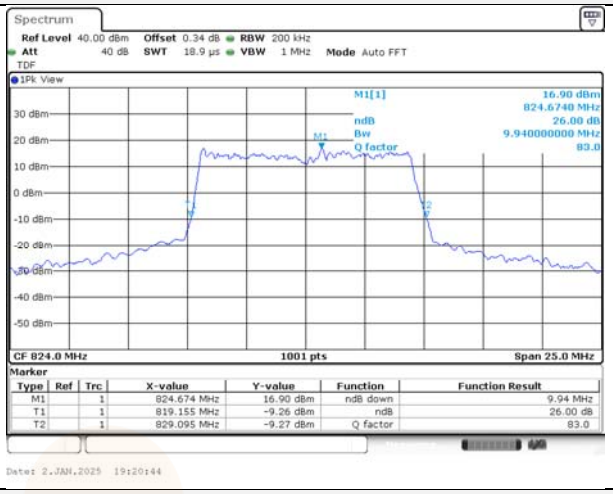
5M BW 16QAM



10M BW QPSK

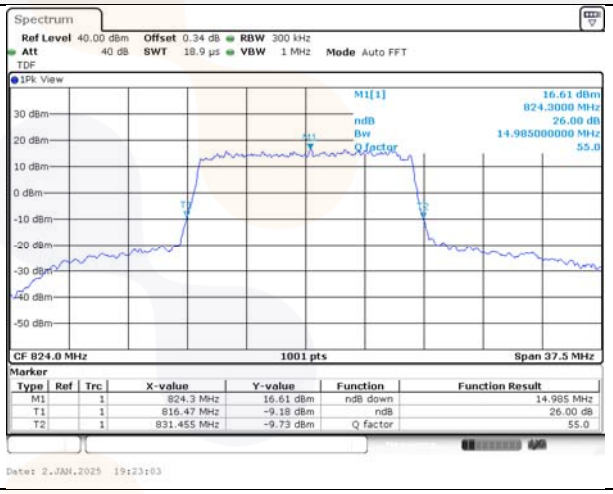


10M BW 16QAM

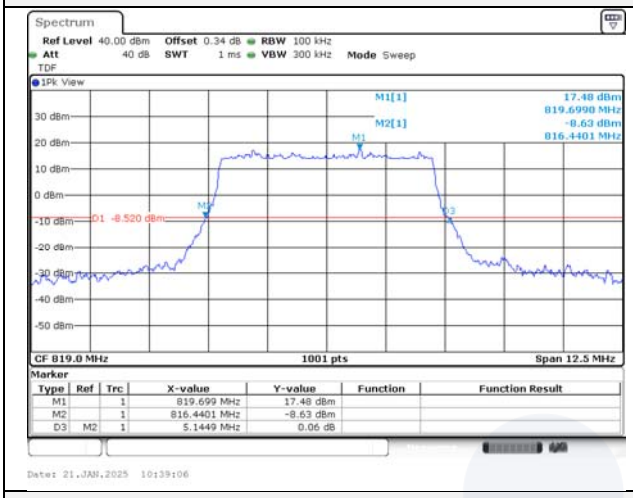
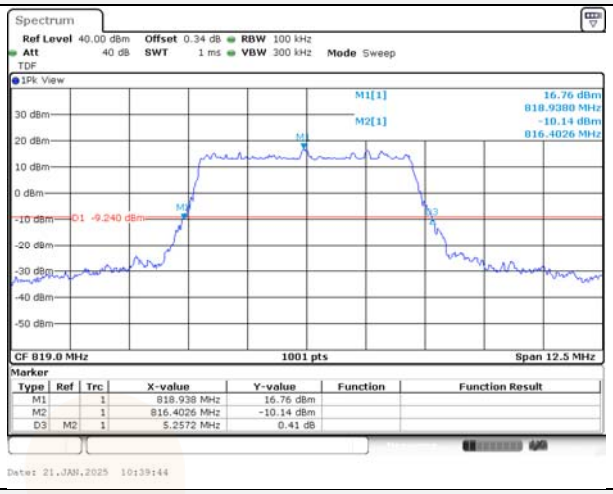
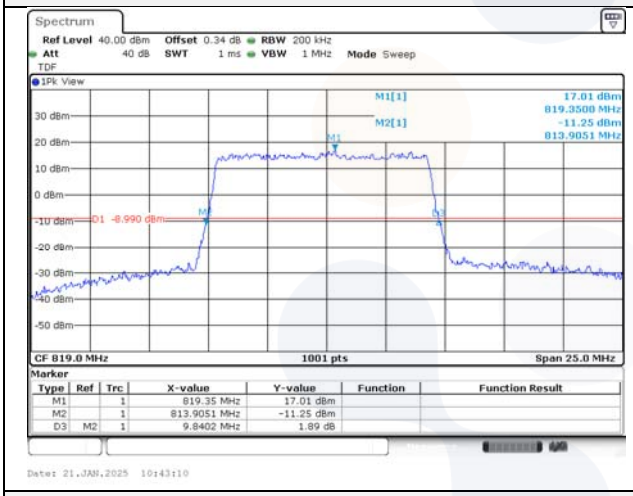
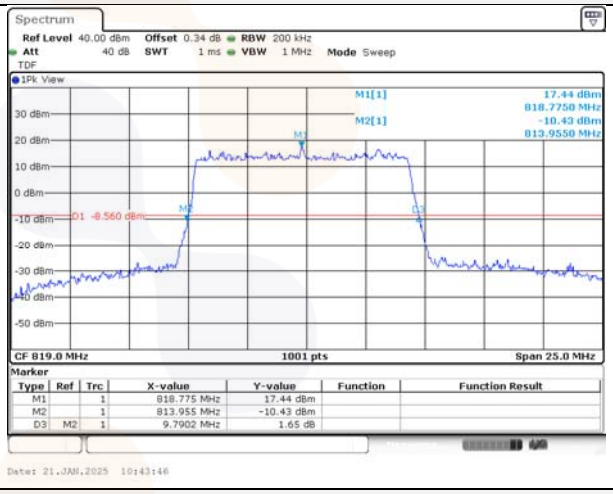
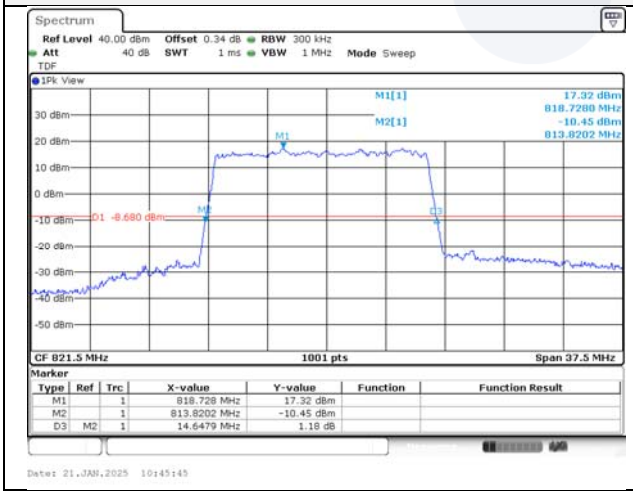
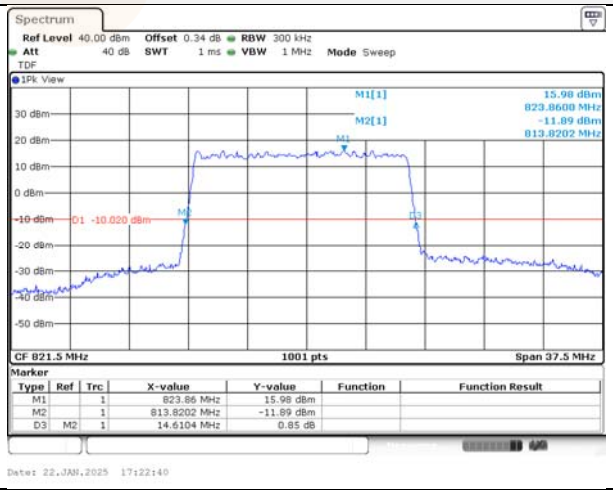


15M BW QPSK

15M BW 16QAM

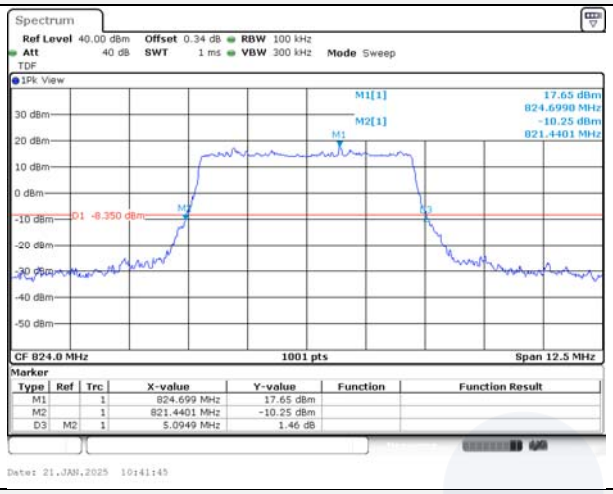


Test mode: 5G NR n26 DFT-s OFDM

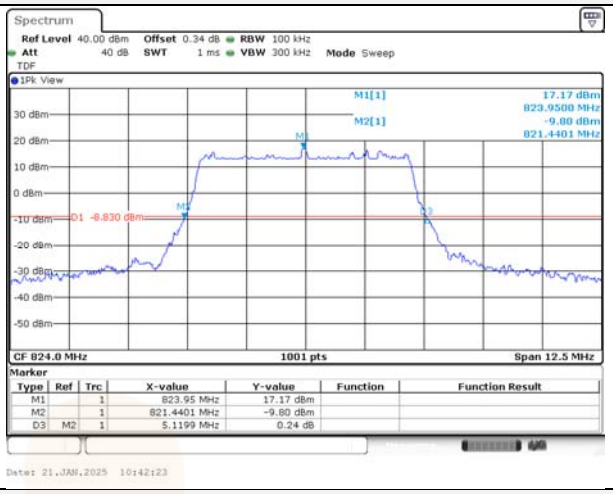
5M BW QPSK Middle channel	5M BW 16QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 16QAM Middle channel**
	
15M BW QPSK Middle channel	**15M BW 16QAM Middle channel**
	

5G NR n26 DFT-s OFDM (Straddle channel)

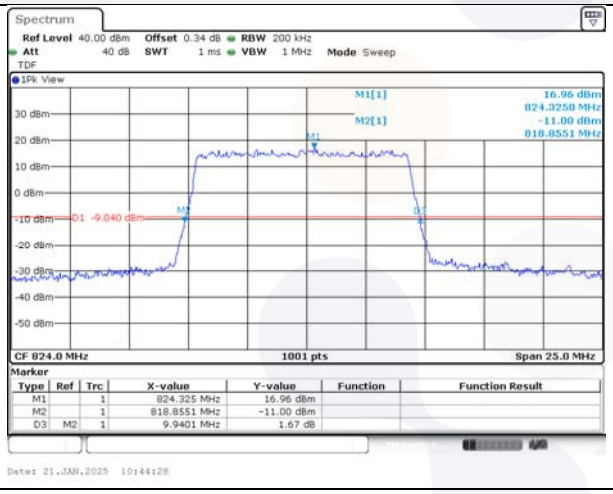
5M BW QPSK



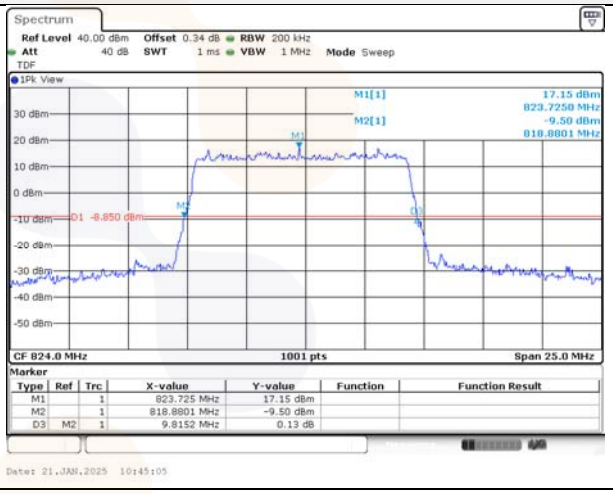
5M BW 16QAM

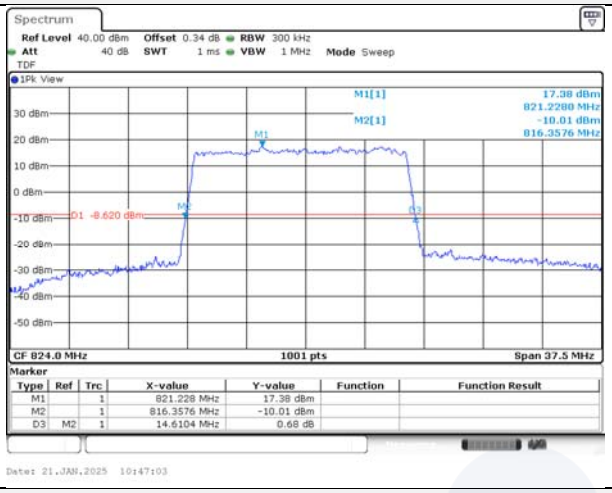
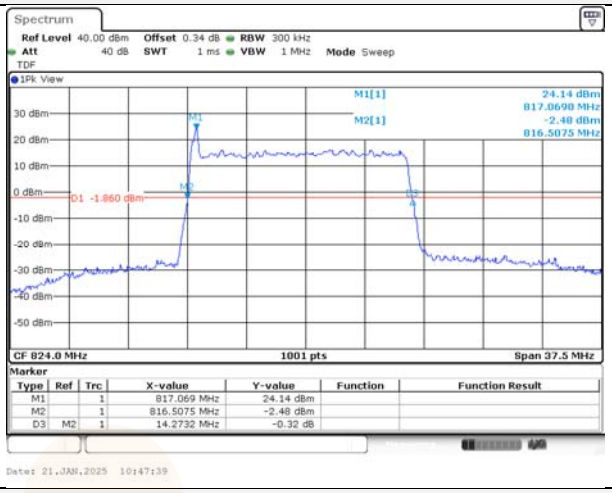
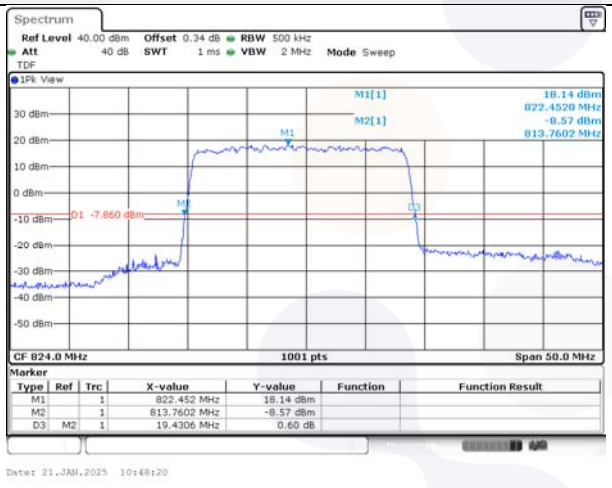
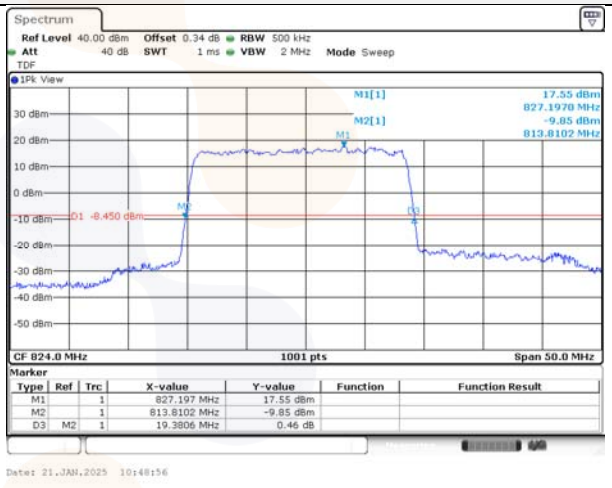


10M BW QPSK



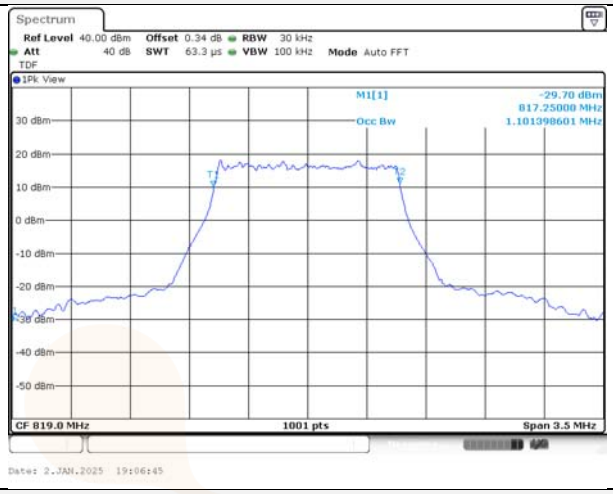
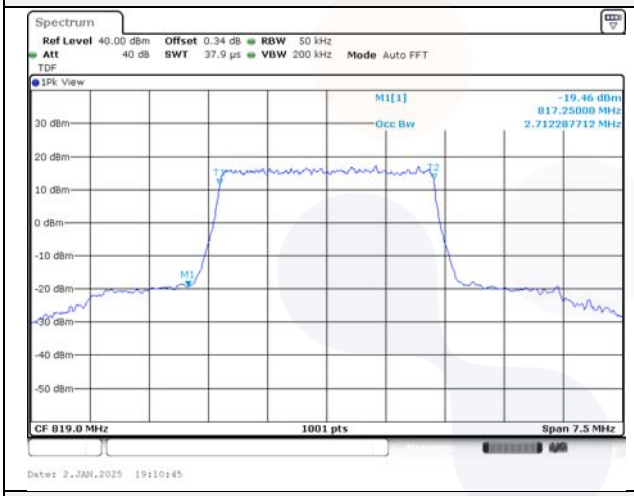
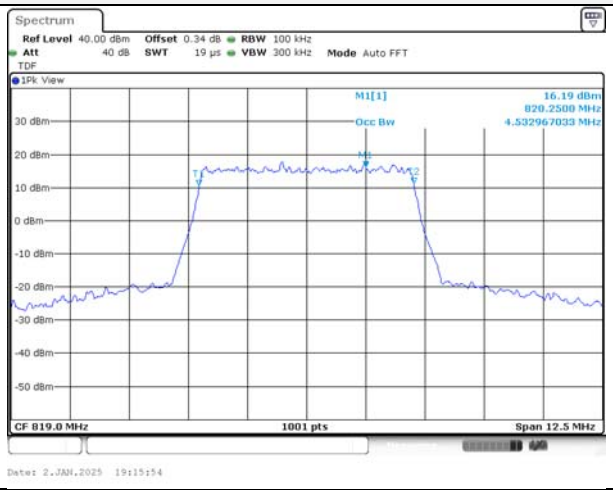
10M BW 16QAM

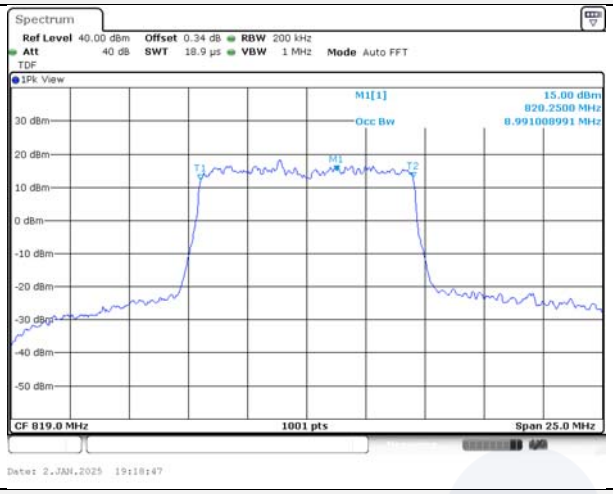
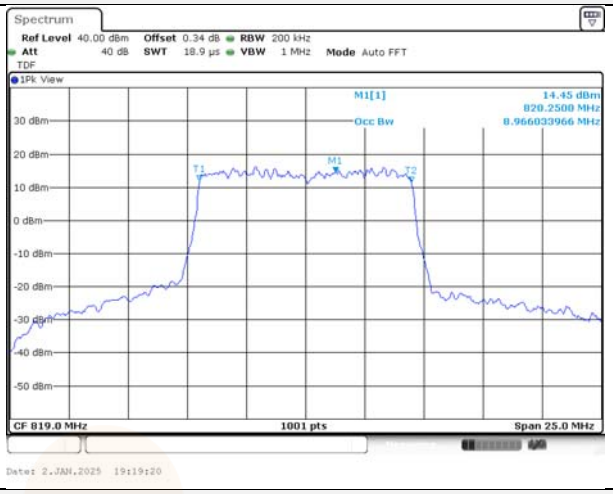
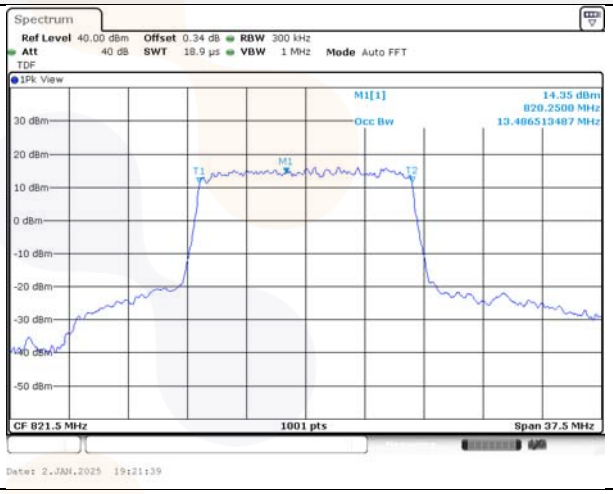


15M BW QPSK	15M BW 16QAM
	
20M BW QPSK	**20M BW 16QAM**
	

99% Occupied Bandwidth

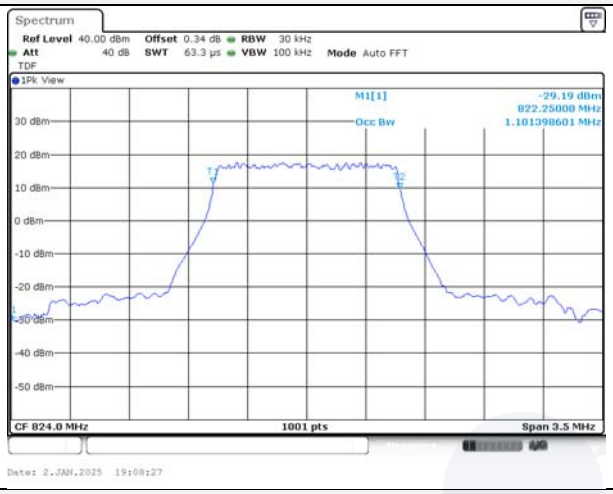
Test mode: LTE B26

1.4M BW QPSK Middle channel	1.4M BW 16QAM Middle channel
	
3M BW QPSK Middle channel	**3M BW 16QAM Middle channel**
	
5M BW QPSK Middle channel	**5M BW 16QAM Middle channel**
	

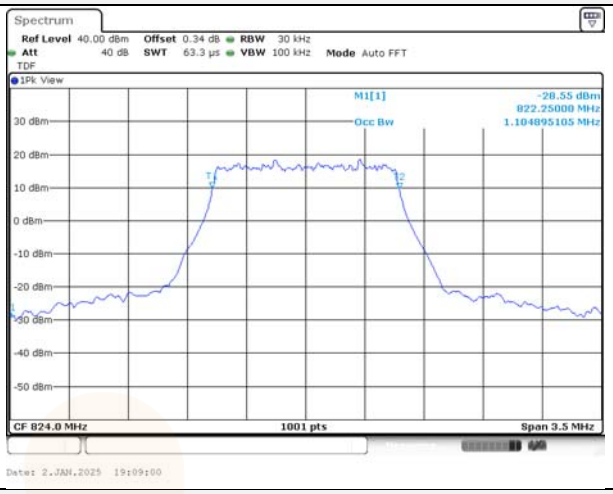
10M BW QPSK Middle channel	10M BW 16QAM Middle channel
	
15M BW QPSK Middle channel	**15M BW 16QAM Middle channel**
	

LTE B26 (Straddle channel)

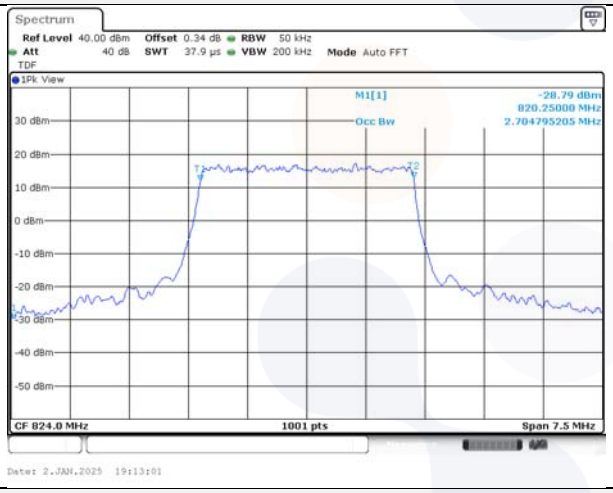
1.4M BW QPSK



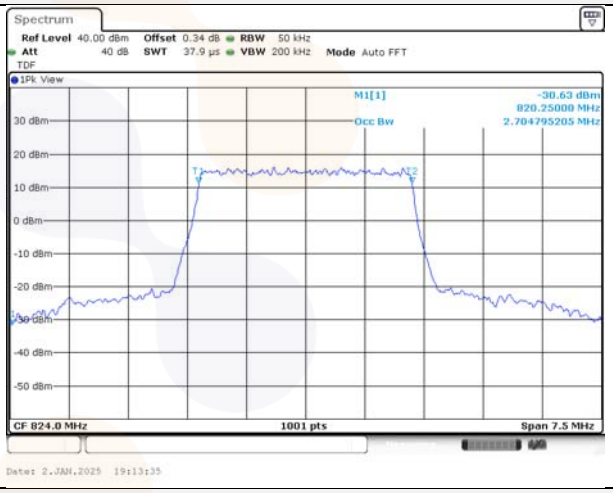
1.4M BW 16QAM



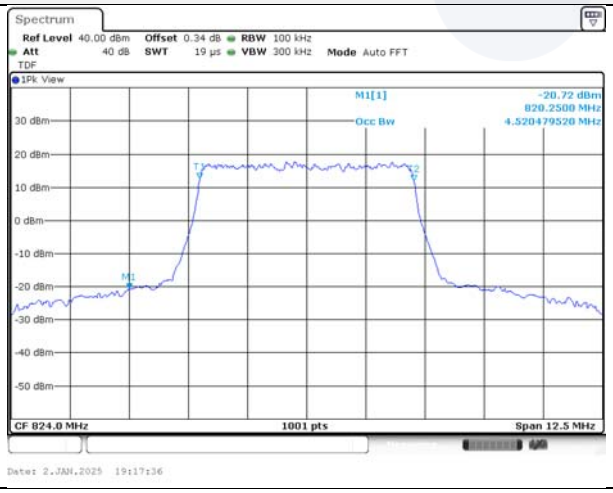
3M BW QPSK



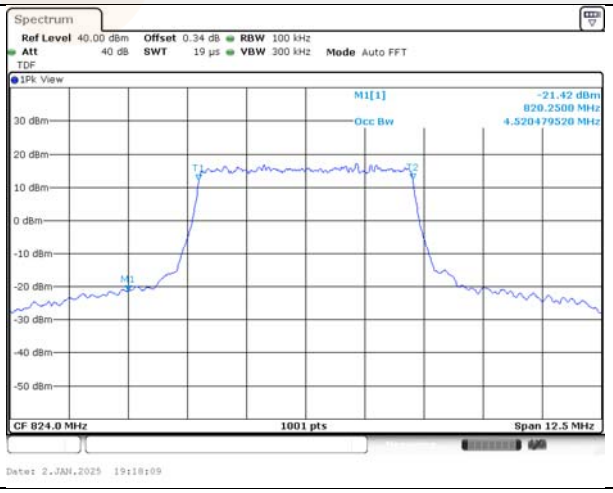
3M BW 16QAM

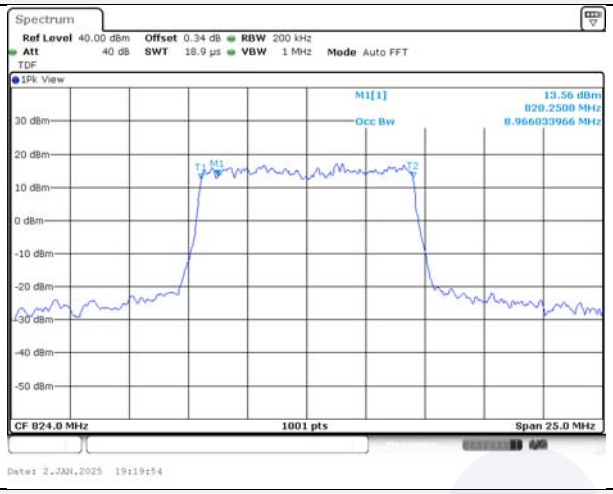
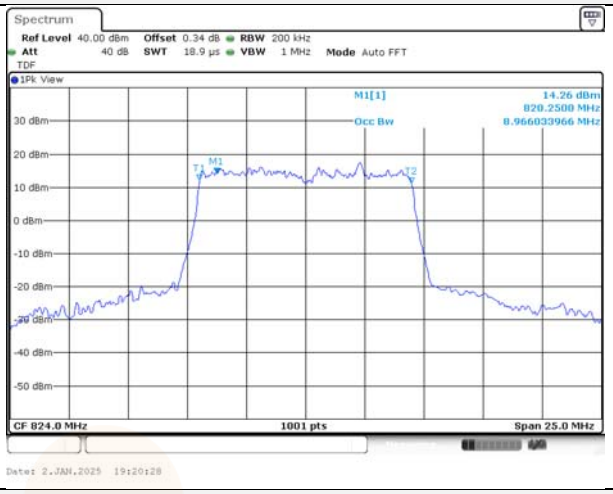
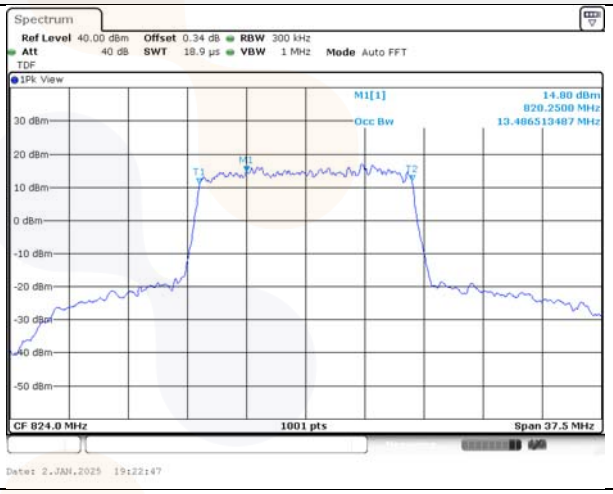


5M BW QPSK

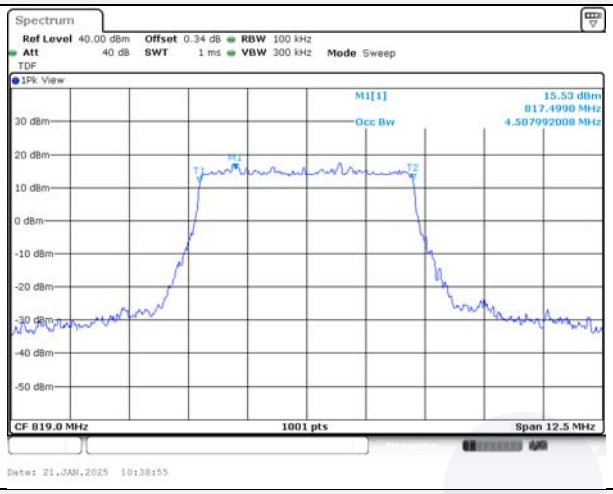
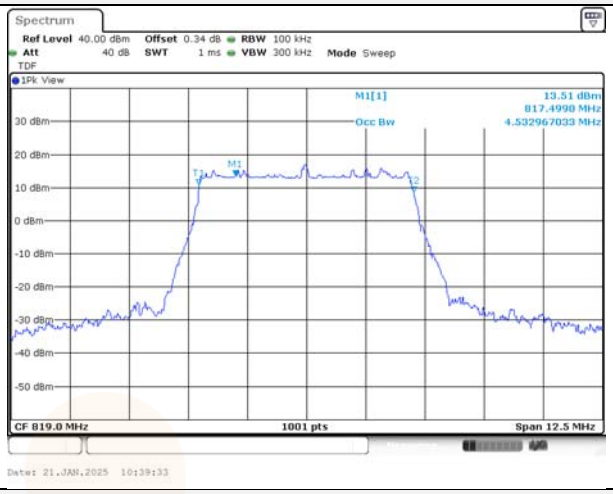
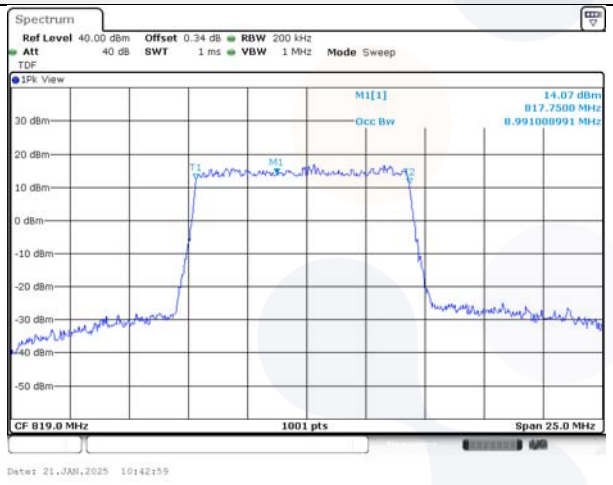
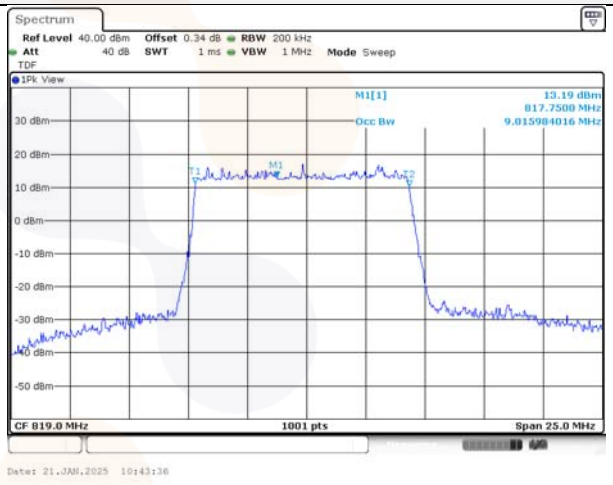
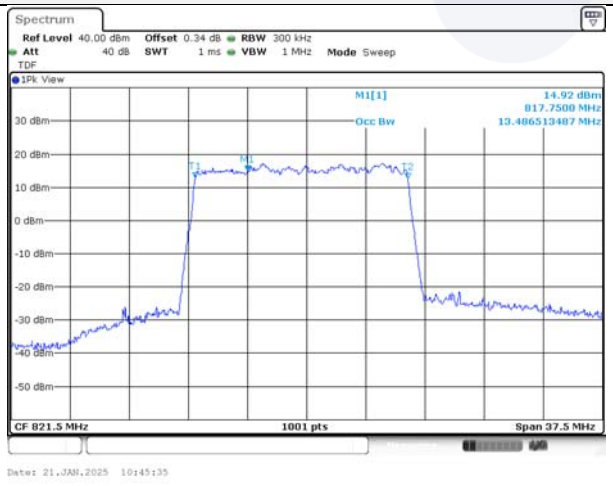
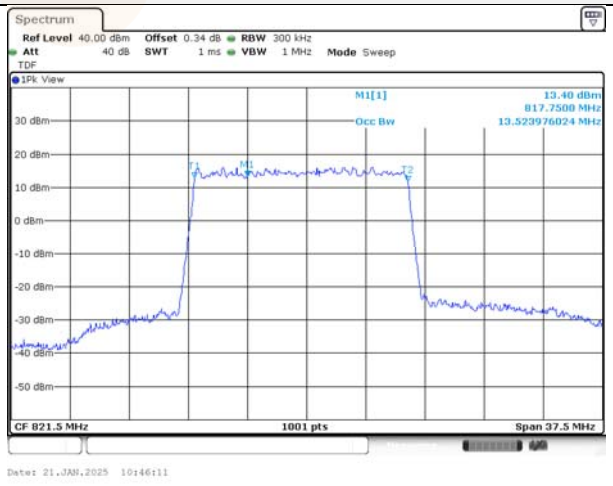


5M BW 16QAM

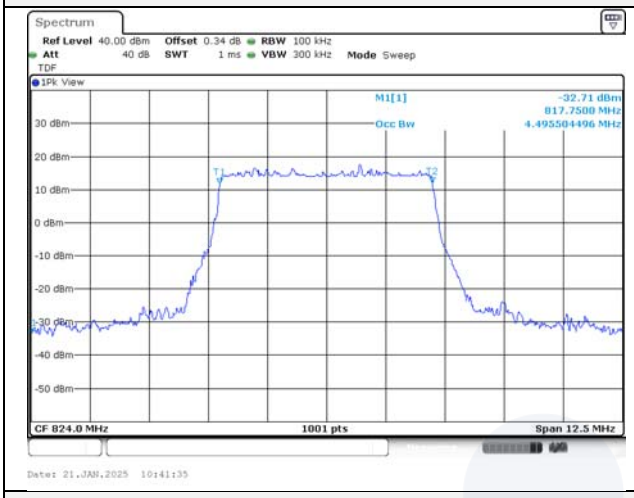
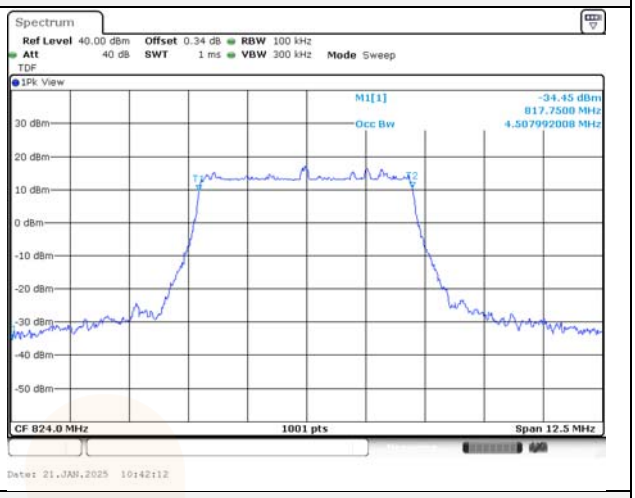
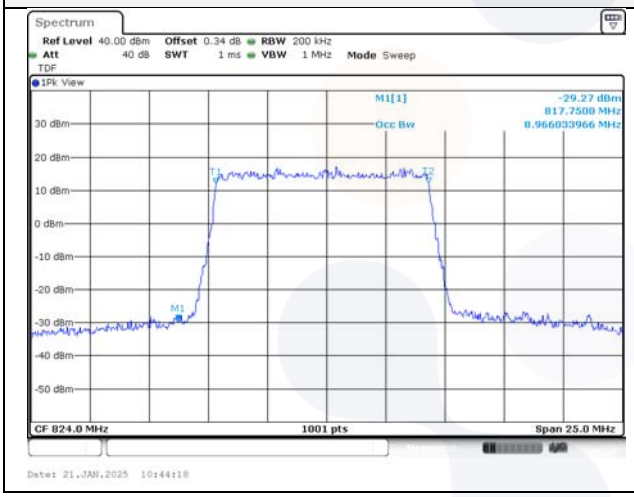
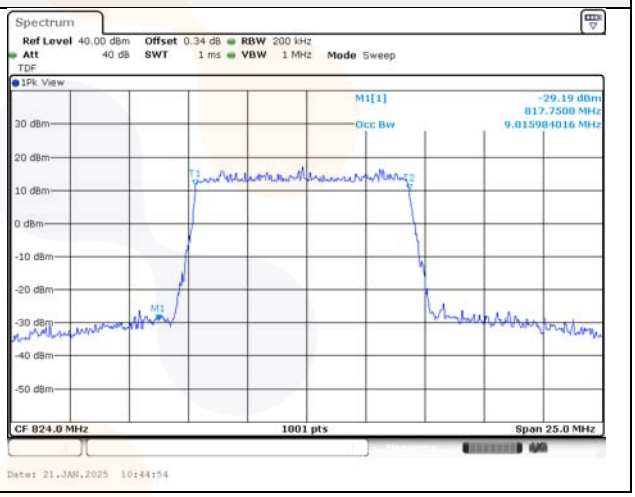


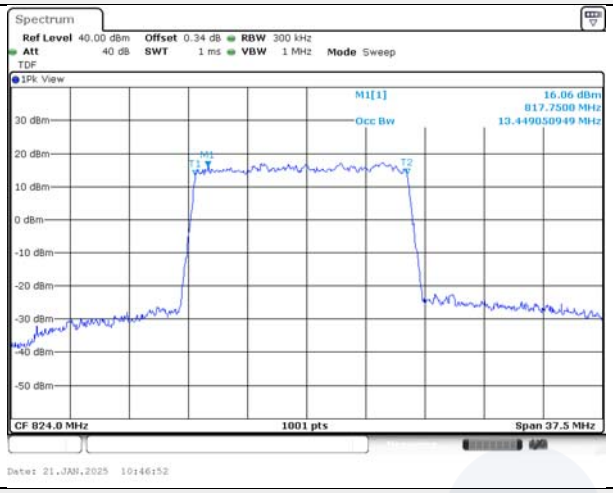
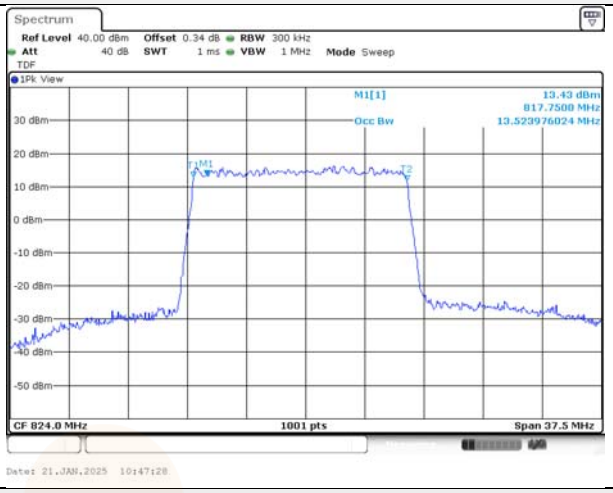
10M BW QPSK	10M BW 16QAM
	
15M BW QPSK	**15M BW 16QAM**
	

Test mode: 5G NR n26 DFT-s OFDM

5M BW QPSK Middle channel	5M BW 16QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 16QAM Middle channel**
	
15M BW QPSK Middle channel	**15M BW 16QAM Middle channel**
	

5G NR n26 DFT-s OFDM (Straddle channel)

5M BW QPSK	5M BW 16QAM
	
10M BW QPSK	**10M BW 16QAM**
	

15M BW QPSK	15M BW 16QAM
	
20M BW QPSK	**20M BW 16QAM**