



TEST REPORT

<p>KCTL KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p>	<p>Report No.: KR20-SRF0155-A Page (1) of (61)</p>	
<p>1. Client</p> <ul style="list-style-type: none"> ◦ Name : Samsung Electronics Co., Ltd. ◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea ◦ Date of Receipt : 2020-04-24 <p>2. Use of Report : Certification</p> <p>3. Name of Product / Model : Tablet PC / SM-T976B</p> <p>4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam</p> <p>5. FCC ID : A3LSMT976B</p> <p>6. Date of Test : 2020-05-09 to 2020-06-22</p> <p>7. Location of Test : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address: Address of testing location)</p> <p>8. Test method used : FCC Part 2 FCC Part 90 subpart S</p> <p>9. Test Results : Refer to the test result in the test report</p>		
<p>Affirmation</p>	<p>Tested by</p> <p>Name : Taeyoung Kim </p>	<p>Technical Manager</p> <p>Name : Seungyong Kim </p>
<p style="text-align: right;">2020-07-02</p>		
<p style="text-align: center;">KCTL Inc.</p> <p>As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.</p>		

REPORT REVISION HISTORY

Date	Revision	Page No
2020-06-24	Originally issued	-
2020-07-02	Updated	4,5

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Note. The report No. KR20-SRF0155 is superseded by the report No. KR20-SRF0155-A.

General remarks for test reports

Nothing significant to report.



CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Accessory information	6
2.2.	Frequency/channel operations.....	6
3.	Maximum ERP/EIRP power.....	7
4.	Summary of tests.....	8
4.1.	Worst case orientation	8
5.	Measurement uncertainty	9
6.	Measurement results explanation example	10
7.	Test results	11
7.1.	Conducted output power.....	11
7.2.	99% Occupied Bandwidth & 26 dB Bandwidth.....	18
7.3.	Spurious Emissions at Antenna Terminal.....	33
7.4.	Band Edge Emissions at Antenna Terminal	38
7.5.	Frequency stability.....	50
7.6.	Radiated Power (ERP/EIRP)	53
7.7.	Radiated Spurious Emissions.....	57
8.	Measurement equipment.....	61

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 Zone Pho Ten Dist., Thai Nguyen Province, Vietnam
Laboratory : KCTL Inc.
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
Industry Canada Registration No. : 8035A
KOLAS No.: KT231

2. Device information

Equipment under test : Tablet PC
Model : SM-T976B
Modulation technique : Bluetooth(BDR/EDR)_GFSK, $\pi/4$ DQPSK, 8DPSK
Bluetooth(BLE)_GFSK
WIFI(802.11a/b/g/n/ac/ax)_DSSS, OFDM, OFDMA
WPT_AM
LTE_QPSK, 16QAM, 64QAM, 256QAM
WCDMA_QPSK
GSM_GMSK, 8-PSK
Number of channels : Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch
802.11b/g/n/ac/ax_HT20/VHT20/HE20 : 13 ch
UNII-1: 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
UNII-2A: 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
UNII-2C: 12 ch (20 MHz), 6 ch (40 MHz), 3 ch (80 MHz)
UNII-3: 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
WPT_1 ch
Power source : DC 3.86 V
Antenna specification : LTE/WCDMA_Metal Antenna
WIFI/Bluetooth(BDR/EDR/BLE)_ Metal Antenna
Loop Coil Antenna_Flat type (WPT)
Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE)_ ANT 1 : -5.71 dBi, ANT 2 : -6.52 dBi
UNII-1 ANT 1 : -8.45 dBi, ANT 2 : -8.84 dBi
UNII-2A ANT 1 : -6.15 dBi, ANT 2 : -8.46 dBi

Frequency range	: UNII-2C ANT 1 : -6.05 dBi, ANT 2 : -8.57 dBi UNII-3 ANT 1 : -8.65 dBi, ANT 2 : -7.70 dBi Bluetooth(BDR/EDR/BLE)_2 402 MHz ~ 2 480 MHz 2 412 MHz ~ 2 472 MHz (802.11b/g/n/ac/ax_HT20/VHT20/HE20) UNII-1: 5 180 MHz ~ 5 240 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-1: 5 190 MHz ~ 5 230 MHz (802.11n/ac/ax_HT40/VHT40/HE40) UNII-1: 5 210 MHz (802.11ac/ax_VHT80/HE80) UNII-2A: 5 260 MHz ~ 5 320 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-2A: 5 270 MHz ~ 5 310 MHz (802.11n/ac/ax_HT40/VHT40/HE40) UNII-2A: 5 290 MHz (802.11ac/ax_VHT80/HE80) UNII-2C: 5 500 MHz ~ 5 720 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-2C: 5 510 MHz ~ 5 710 MHz (802.11n/ac/ax_HT40/VHT40/HE40) UNII-2C: 5 530 MHz ~ 5 690 MHz (802.11ac/ax_VHT80/HE80) UNII-3: 5 745 MHz ~ 5 825 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-3: 5 755 MHz ~ 5 795 MHz (802.11n/ac/ax_HT40/VHT40/HE40) UNII-3: 5 775 MHz (802.11ac/ax_VHT80/HE80) LTE Band 2_1 850.7 MHz ~ 1909.3 MHz LTE Band 4_1 710.7 MHz ~ 1754.3 MHz LTE Band 5_824.7 MHz ~ 848.3 MHz LTE Band 12_699.7 MHz ~ 715.3 MHz LTE Band 13_779.5 MHz ~ 784.5 MHz LTE Band 25_1850.7 MHz ~ 1914.3 MHz LTE Band 26_824.7 MHz ~ 848.3 MHz, 814.7 MHz ~ 824.0 MHz LTE Band 41_2 498.5 MHz ~ 2 687.5 MHz LTE Band 66_1 710.7 MHz ~ 1779.3 MHz GSM 850_824.2 MHz ~ 848.8 MHz GSM 1900_1 850.2 MHz ~ 1 909.8 MHz WCDMA 850_826.4 MHz ~ 846.6 MHz WCDMA 1700_1 712.4 MHz ~ 1752.6 MHz WCDMA 1900_1 852.4 MHz ~ 1907.6 MHz WPT_530 kHz ~ 600 kHz
Software version	: T976B.001
Hardware version	: REV0.4
Test device serial No.	: Conducted(4264ec94771d7ece), Radiated(R32N500LKZT)
Operation temperature	: -30 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID
Travel Adapter	Samsung Electronics Co., Ltd	EP-TA800	-	Input : 100-240V, 50-60Hz Output : (PDO) 5.0V, 3A or 9.0V, 2.77A (PPS) 3.3-5.9V, 3A or 3.3-11.0V, 2.25A	-
Data Cable	Samsung Electronics Co., Ltd	EP-DT725BBE	-	-	-
Stylus Pen	Samsung Electronics Co., Ltd	EJ-PT870	-	DC 2.75 V	A3LEJPT870
Earphone	Samsung Electronics Co., Ltd	EHS64	-	-	-
External Keyboard	Samsung Electronics Co., Ltd	EF-DT970	-	DC 3.30 V	-

2.2. Frequency/channel operations

This device contains the following capabilities:

WIFI(802.11a/b/g/n/ac/ax), Bluetooth(BDR/EDR/BLE), WPT,
 LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 25, LTE Band 26,
 LTE Band 41, LTE Band 66, GSM 850, GSM 1900, WCDMA 850, WCDMA 1700, WCDMA 1900

LTE Band 26

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

Table 2.2.1. 1.4M BW

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

Table 2.2.2. 3M BW

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

Table 2.2.3. 5M BW

Ch.	Frequency (MHz)
26740	819.0
26790	824.0

Table 2.2.4. 10M BW

Ch.	Frequency (MHz)
26765	821.5
26790	824.0

Table 2.2.5. 15M BW

3. Maximum ERP/EIRP power**LTE Band 26 (Part 90)**

Mode	Tx frequency (MHz)	Emission designator	Conducted	
			Max. power (dBm)	Max. power (W)
LTE Band 26	814.7 ~ 823.3	1M10G7D	23.48	0.223
		1M09W7D	22.78	0.190
	815.5 ~ 822.5	2M70G7D	23.53	0.225
		2M70W7D	22.80	0.191
	816.5 ~ 821.5	4M52G7D	23.54	0.226
		4M52W7D	22.74	0.188
	819.0	8M97G7D	23.59	0.229
		8M99W7D	22.96	0.198
	821.5	13M5G7D	23.53	0.225
		13M5W7D	22.68	0.185
Straddle channel	824.0	1M09G7D	23.55	0.226
		1M09W7D	22.81	0.191
		2M70G7D	23.61	0.230
		2M69W7D	22.89	0.195
		4M50G7D	23.62	0.230
		4M51W7D	22.84	0.192
		8M97G7D	23.76	0.238
		8M97W7D	23.11	0.205
		13M5G7D	23.62	0.230
		13M5W7D	22.76	0.189

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
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:

- 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

4.1. Worst case orientation

- 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.
- Output power measurements were measured on QPSK, 16QAM, 64QAM and 256QAM modulation. All tests except output power was performed with QPSK and 16QAM modulation.
- All final radiated testing was performed with the EUT in worst case orientation.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Y** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Y** orientation.
- All the radiated tests have been performed several case.

(Stand-alone, with accessories (keyboard, earphone, etc.))

Worst case : Stand-alone

Test condition	LTE Band	Modulation	Bandwidth (MHz)	RB size	RB offset
Radiated	B26 (Part90)	QPSK	3	1	0, 24, 49
Conducted		QPSK, 16QAM	1.4, 3, 5, 10, 15	1	0, 5, 14, 24, 49, 74
				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 indicate a 95 % level of confidence. The measurement data shown herein meets or 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 (\pm)	
Conducted RF power	1.3 dB	
Conducted spurious emissions	1.3 dB	
Radiated spurious emissions	30 MHz ~ 1 GHz	3.7 dB
	Above 1 GHz	5.7 dB

6. Measurement results explanation example

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	5.77	11 000	7.10
50	5.78	12 000	7.22
100	5.76	13 000	7.52
200	5.76	14 000	7.57
300	5.82	15 000	8.17
400	5.84	16 000	8.48
500	5.88	17 000	8.50
600	5.87	18 000	8.52
700	5.74	19 000	8.57
800	5.77	20 000	8.57
900	6.03	21 000	8.80
1 000	6.15	22 000	8.82
2 000	6.37	23 000	8.79
3 000	6.47	24 000	8.95
4 000	6.49	25 000	9.10
5 000	6.50	26 000	9.13
6 000	6.38	26 500	9.12
7 000	6.49	27 000	9.23
8 000	6.60	28 000	9.25
9 000	6.70	29 000	9.30
10 000	7.31	30 000	9.31

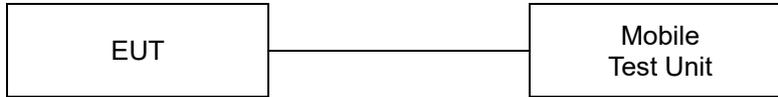
Note.

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

7. Test results

7.1. Conducted output power

Test setup



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 $\pm 2\%$) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to $[10\log(1/\text{duty cycle})]$. 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:

Offset(dB) = RF cable loss(dB)

Test results

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			Limit (W)	
						Frequency (MHz)				
						Low	Middle	High		
LTE Band 26	1.4	QPSK	1	0	0	23.20	-	23.26	100	
			1	3	0	23.39	-	23.48		
			1	5	0	23.33	-	23.41		
			3	0	0	23.28	-	23.38		
			3	1	0	23.34	-	23.41		
			3	3	0	23.31	-	23.40		
		6	0	1	22.37	-	22.45			
		16QAM	1	0	1	22.51	-	22.57		
			1	3	1	22.68	-	22.76		
			1	5	1	22.68	-	22.78		
			3	0	1	22.42	-	22.45		
			3	1	1	22.53	-	22.62		
			3	3	1	22.39	-	22.42		
		64QAM	6	0	2	21.45	-	21.50		
			1	0	2	21.34	-	21.43		
			1	3	2	21.35	-	21.41		
			1	5	2	21.33	-	21.37		
			3	0	2	21.29	-	21.34		
			3	1	2	21.35	-	21.38		
		256QAM	3	3	2	21.20	-	21.26		
			6	0	3	20.24	-	20.34		
			1	0	5	18.86	-	19.02		
			1	3	5	18.93	-	19.11		
			1	5	5	18.84	-	18.98		
	3		0	5	18.90	-	19.02			
	3	QPSK	3	1	5	18.93	-	19.07		
			3	3	5	18.93	-	19.05		
			6	0	5	18.80	-	18.95		
			1	0	0	23.26	-	23.33		
			1	8	0	23.48	-	23.53		
			1	14	0	23.35	-	23.44		
			8	0	1	22.45	-	22.48		
			8	4	1	22.55	-	22.61		
			8	7	1	22.46	-	22.49		
			15	0	1	22.45	-	22.54		
			16QAM	1	0	1	22.59	-		22.62
				1	8	1	22.68	-		22.76
		1		14	1	22.70	-	22.80		
		8		0	2	21.47	-	21.55		
		8		4	2	21.61	-	21.69		
		8		7	2	21.53	-	21.63		
		64QAM	15	0	2	21.54	-	21.63		
			1	0	2	21.04	-	21.10		
			1	8	2	21.17	-	21.21		
			1	14	2	21.04	-	21.14		
			8	0	3	20.21	-	20.23		
			8	4	3	20.13	-	20.19		
		256QAM	8	7	3	20.01	-	20.09		
15			0	3	20.14	-	20.24			
1	0		5	18.88	-	19.00				
1	8		5	19.16	-	19.36				
1	14		5	19.02	-	19.15				
8	0		5	18.96	-	19.06				
15	8	4	5	18.98	-	19.16				
	8	7	5	18.90	-	19.02				
	15	0	5	18.93	-	19.13				

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			Limit (W)
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 26	5	QPSK	1	0	0	23.30	-	23.35	100
			1	12	0	23.46	-	23.54	
			1	24	0	23.25	-	23.29	
			12	0	1	22.41	-	22.51	
			12	7	1	22.48	-	22.52	
			12	13	1	22.32	-	22.40	
		25	0	1	22.41	-	22.44		
		16QAM	1	0	1	22.52	-	22.60	
			1	12	1	22.68	-	22.74	
			1	24	1	22.44	-	22.53	
			12	0	2	21.43	-	21.46	
			12	7	2	21.61	-	21.68	
			12	13	2	21.50	-	21.54	
		25	0	2	21.49	-	21.58		
		64QAM	1	0	2	21.32	-	21.35	
			1	12	2	21.16	-	21.22	
			1	24	2	21.01	-	21.08	
			12	0	3	20.15	-	20.24	
			12	7	3	20.13	-	20.21	
			12	13	3	20.09	-	20.11	
		25	0	3	20.04	-	20.10		
		256QAM	1	0	5	18.84	-	19.02	
			1	12	5	18.93	-	19.09	
			1	24	5	19.05	-	19.25	
	12		0	5	18.81	-	18.98		
	12		7	5	18.88	-	19.00		
	12		13	5	18.89	-	19.00		
	25	0	5	18.77	-	18.89			
	10	QPSK	1	0	0	-	23.40	-	
			1	25	0	-	23.41	-	
			1	49	0	-	23.59	-	
			25	0	1	-	22.40	-	
			25	12	1	-	22.47	-	
			25	25	1	-	22.45	-	
		50	0	1	-	22.54	-		
		16QAM	1	0	1	-	22.69	-	
			1	25	1	-	22.73	-	
			1	49	1	-	22.96	-	
			25	0	2	-	21.37	-	
			25	12	2	-	21.49	-	
			25	25	2	-	21.49	-	
		50	0	2	-	21.49	-		
		64QAM	1	0	2	-	21.56	-	
			1	25	2	-	21.37	-	
			1	49	2	-	21.13	-	
			25	0	3	-	20.46	-	
			25	12	3	-	20.38	-	
			25	25	3	-	20.21	-	
50		0	3	-	20.08	-			
256QAM		1	0	5	-	18.53	-		
		1	25	5	-	18.94	-		
		1	49	5	-	18.81	-		
	25	0	5	-	18.83	-			
	25	12	5	-	18.81	-			
	25	25	5	-	18.92	-			
50	0	5	-	18.74	-				

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			Limit (W)
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 26	15	QPSK	1	0	0	-	23.30	-	100
			1	36	0	-	23.33	-	
			1	74	0	-	23.53	-	
			36	0	1	-	22.31	-	
			36	18	1	-	22.49	-	
			36	37	1	-	22.54	-	
		75	0	1	-	22.36	-		
		16QAM	1	0	1	-	22.62	-	
			1	36	1	-	22.68	-	
			1	74	1	-	22.60	-	
			36	0	2	-	21.30	-	
			36	18	2	-	21.49	-	
			36	37	2	-	21.54	-	
		64QAM	75	0	2	-	21.38	-	
			1	0	0	-	21.44	-	
			1	36	0	-	21.30	-	
			1	74	0	-	21.46	-	
			36	0	1	-	20.15	-	
			36	18	1	-	20.09	-	
			36	37	1	-	20.51	-	
			75	0	1	-	20.27	-	
		256QAM	1	0	5	-	18.60	-	
			1	36	5	-	18.83	-	
			1	74	5	-	18.66	-	
			36	0	5	-	18.62	-	
			36	18	5	-	18.82	-	
			36	37	5	-	18.75	-	
		75	0	5	-	18.81	-		

Straddle channel

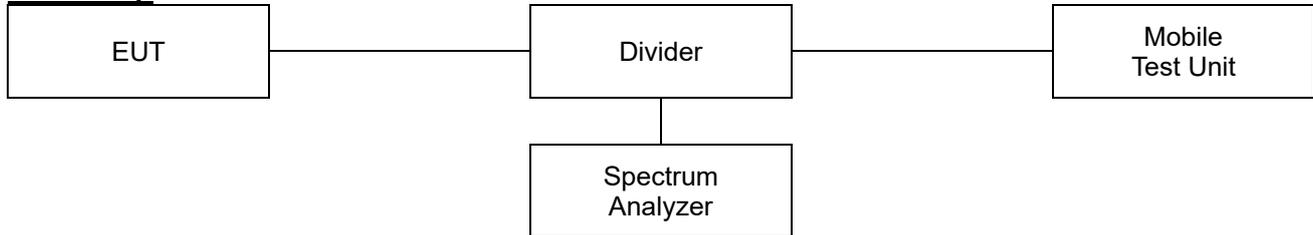
Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power	Limit (W)	
						Frequency (MHz)		
LTE Band 26	1.4	QPSK	1	0	0	23.35	100	
			1	3	0	23.55		
			1	5	0	23.44		
			3	0	0	23.42		
			3	1	0	23.43		
			3	3	0	23.42		
		16QAM	6	0	1	22.49		
			1	0	1	22.60		
			1	3	1	22.81		
			1	5	1	22.80		
			3	0	1	22.52		
			3	1	1	22.67		
		64QAM	3	3	1	22.48		
			6	0	2	21.53		
			1	0	2	21.52		
			1	3	2	21.48		
			1	5	2	21.42		
			3	0	2	21.37		
		256QAM	3	1	2	21.42		
			3	3	2	21.33		
			6	0	3	20.42		
			1	0	5	18.99		
			1	3	5	19.09		
			1	5	5	18.99		
		3	QPSK	3	0	5		19.07
				3	1	5		19.05
				3	3	5		19.13
				6	0	5		19.00
				1	0	0		23.39
				1	8	0		23.61
	1			14	0	23.51		
	8			0	1	22.52		
	8			4	1	22.71		
	8			7	1	22.56		
	15			0	1	22.64		
	16QAM			1	0	1		22.64
				1	8	1		22.81
				1	14	1		22.89
				8	0	2		21.64
			8	4	2	21.79		
			8	7	2	21.70		
	64QAM		15	0	2	21.73		
			1	0	2	21.18		
			1	8	2	21.29		
			1	14	2	21.18		
			8	0	3	20.28		
			8	4	3	20.23		
	256QAM		8	7	3	20.11		
			15	0	3	20.26		
			1	0	5	19.03		
			1	8	5	19.31		
			1	14	5	19.19		
			8	0	5	19.09		
				8	4	5		19.08
			8	7	5	19.03		
			15	0	5	19.12		

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power	Limit (W)
						Frequency (MHz)	
LTE Band 26	5	QPSK	1	0	0	23.45	100
			1	12	0	23.62	
			1	24	0	23.36	
			12	0	0	22.53	
			12	7	0	22.55	
			12	13	0	22.48	
		25	0	1	22.52		
		16QAM	1	0	1	22.67	
			1	12	1	22.84	
			1	24	1	22.60	
			12	0	1	21.55	
			12	7	1	21.75	
			12	13	1	21.58	
		64QAM	25	0	2	21.65	
			1	0	2	21.43	
			1	12	2	21.25	
			1	24	2	21.18	
			12	0	2	20.26	
			12	7	2	20.30	
		256QAM	12	13	2	20.17	
			25	0	3	20.12	
			1	0	5	19.07	
			1	12	5	19.20	
			1	24	5	19.30	
	12		0	5	19.03		
	10	QPSK	12	7	5	19.11	
			12	13	5	19.14	
			25	0	5	19.07	
			1	0	0	23.50	
			1	25	0	23.51	
			1	49	0	23.69	
		25	0	1	22.48		
		25	12	1	22.50		
		25	25	1	22.47		
		50	0	1	22.58		
		16QAM	1	0	1	22.78	
			1	25	1	22.80	
			1	49	1	23.01	
			25	0	2	21.47	
			25	12	2	21.57	
			25	25	2	21.59	
		64QAM	50	0	2	21.56	
			1	0	2	21.65	
			1	25	2	21.47	
			1	49	2	21.20	
			25	0	3	20.48	
			25	12	3	20.44	
		256QAM	25	25	3	20.25	
			50	0	3	20.12	
	1		0	5	18.65		
	1		25	5	19.11		
	1		49	5	18.96		
25	0		5	18.95			
25	12	5	18.91				
25	25	5	19.07				
50	0	5	18.91				

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power	Limit (W)
						Frequency (MHz)	
LTE Band 26	15	QPSK	1	0	0	23.33	100
			1	36	0	23.36	
			1	74	0	23.62	
			36	0	0	22.36	
			36	18	0	22.55	
			36	37	0	22.58	
			75	0	1	22.42	
		16QAM	1	0	1	22.69	
			1	36	1	22.76	
			1	74	1	22.62	
			36	0	1	21.35	
			36	18	1	21.55	
			36	37	1	21.61	
			75	0	2	21.44	
		64QAM	1	0	2	21.52	
			1	36	2	21.35	
			1	74	2	21.48	
			36	0	2	20.17	
			36	18	2	20.15	
			36	37	2	20.55	
			75	0	3	20.36	
		256QAM	1	0	5	18.54	
			1	36	5	18.87	
			1	74	5	18.62	
			36	0	5	18.61	
			36	18	5	18.82	
			36	37	5	18.78	
			75	0	5	18.80	

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 $\geq 3 \times$ 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 $1.5 \times \text{OBW}$ 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 $\geq 3 \times \text{RBW}$.
- 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 as its lowest and highest channel with all bandwidth, Modulation.

Test results

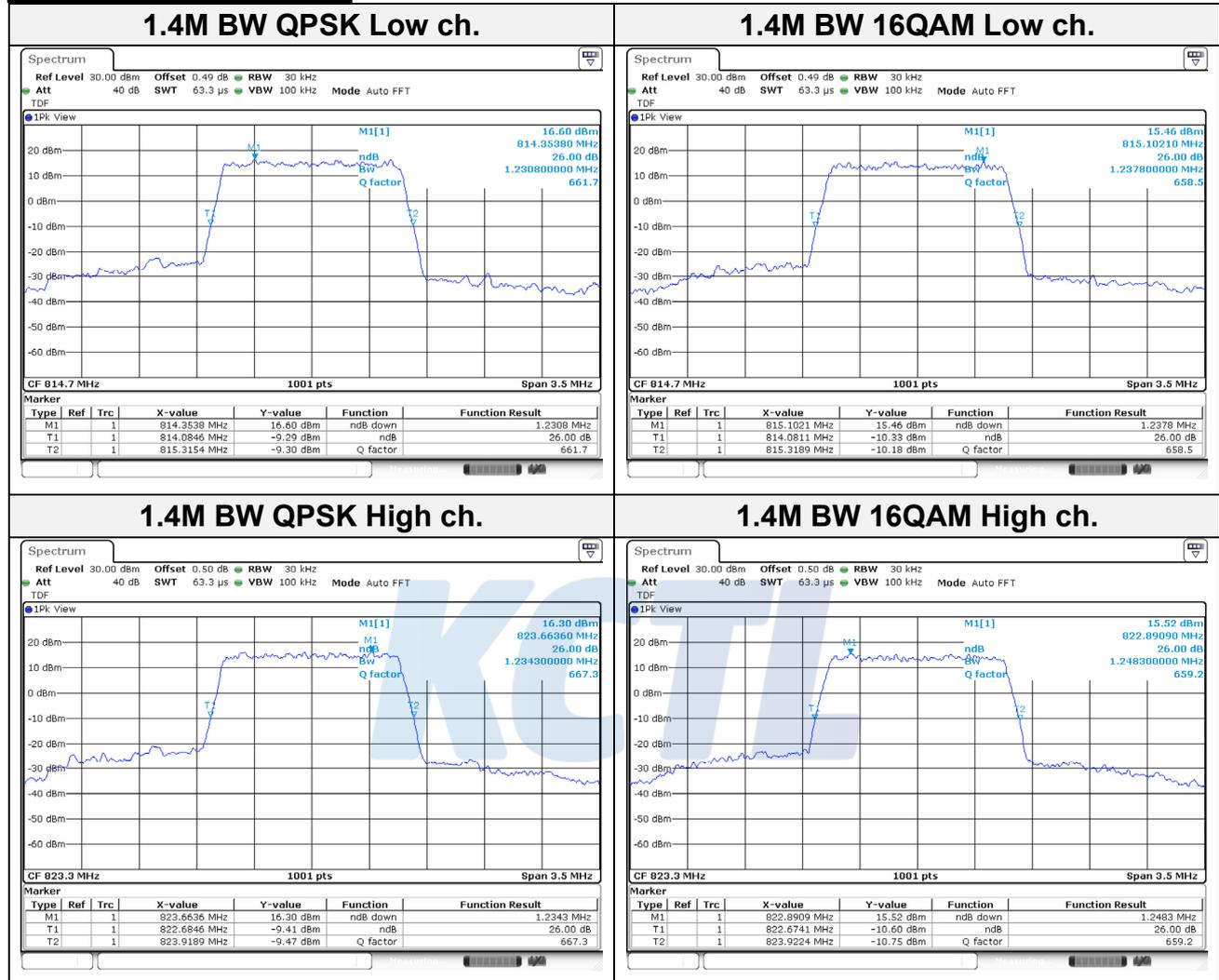
Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 26	1.4	814.7	QPSK	1.23	1.10
			16QAM	1.24	1.09
		823.3	QPSK	1.23	1.09
			16QAM	1.25	1.09
	3	815.5	QPSK	2.98	2.70
			16QAM	3.01	2.70
		822.5	QPSK	2.98	2.70
			16QAM	3.00	2.69
	5	816.5	QPSK	4.98	4.52
			16QAM	4.96	4.48
		821.5	QPSK	5.00	4.50
			16QAM	5.00	4.52
	10	819.0	QPSK	9.84	8.97
			16QAM	9.79	8.99
	15	821.5	QPSK	14.65	13.49
			16QAM	14.65	13.49

Straddle channel

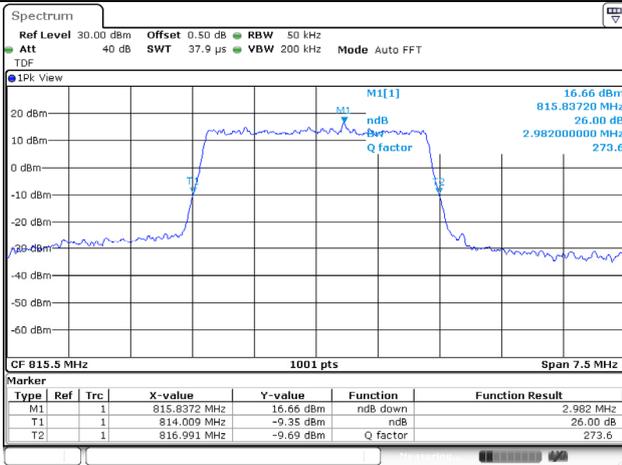
Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 26	1.4	824	QPSK	1.24	1.09
			16QAM	1.23	1.09
	3	824	QPSK	3.00	2.70
			16QAM	3.00	2.69
	5	824	QPSK	4.95	4.50
			16QAM	5.00	4.51
	10	824	QPSK	9.79	8.97
			16QAM	9.77	8.97
	15	824	QPSK	14.69	13.45
			16QAM	14.69	13.45

26dB Bandwidth

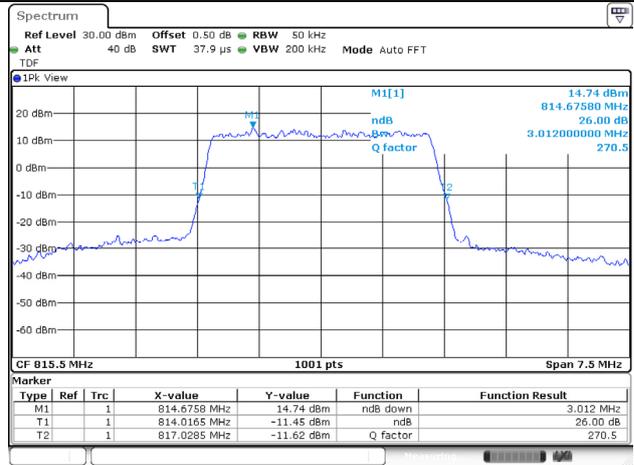
Test mode: LTE Band 26



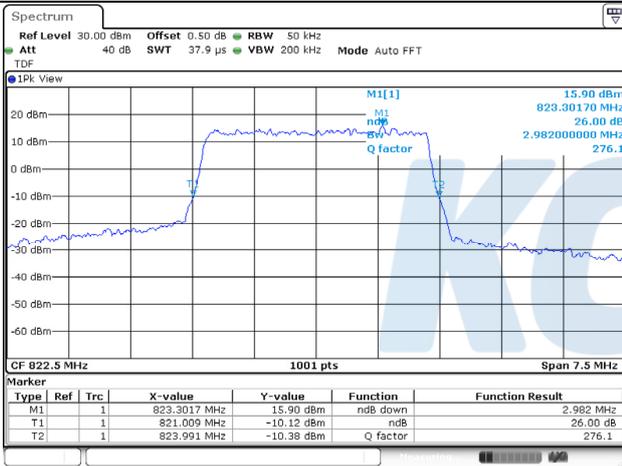
3M BW QPSK Low ch.



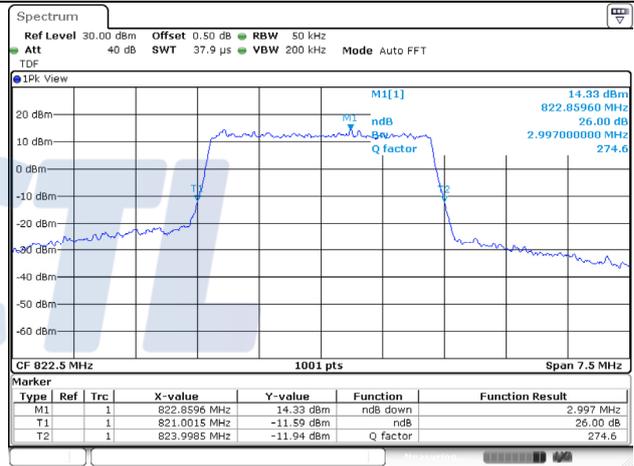
3M BW 16QAM Low ch.



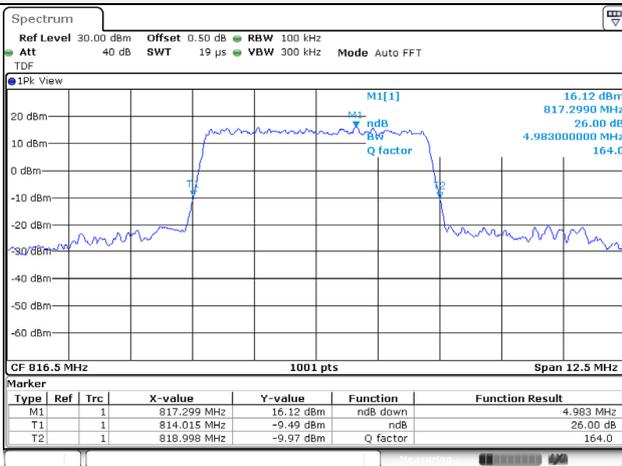
3M BW QPSK High ch.



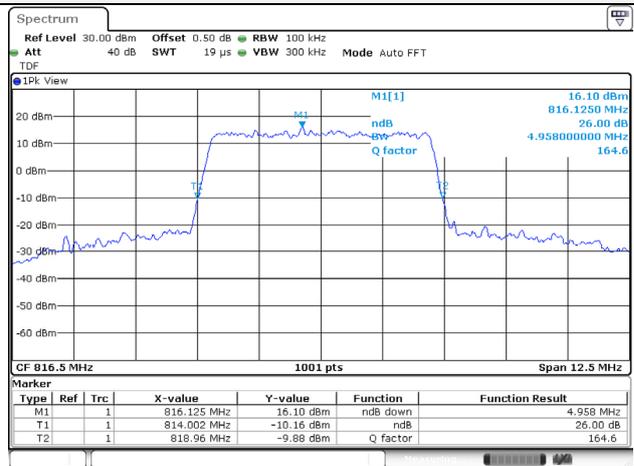
3M BW 16QAM High ch.



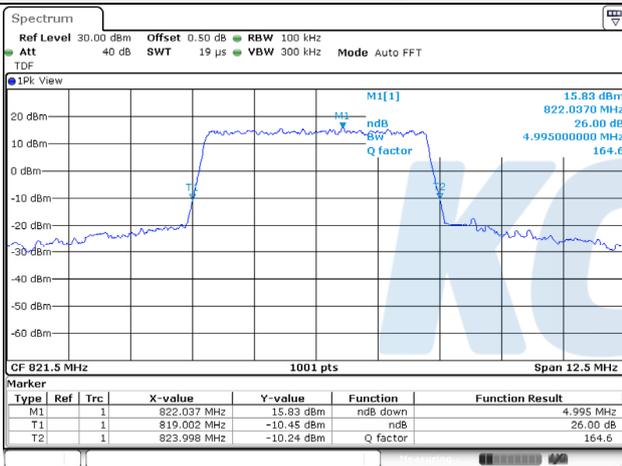
5M BW QPSK Low ch.



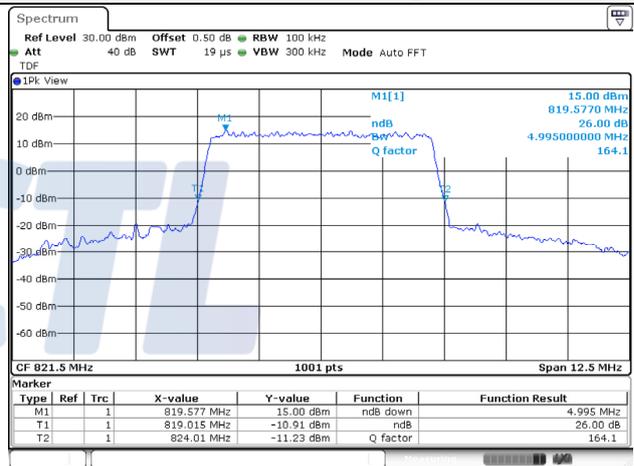
5M BW 16QAM Low ch.



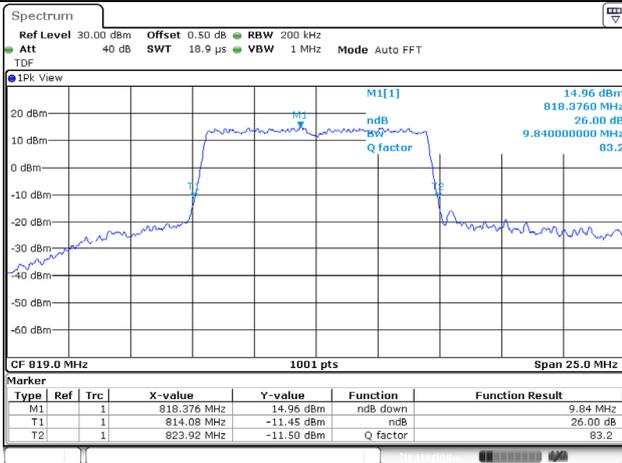
5M BW QPSK High ch.



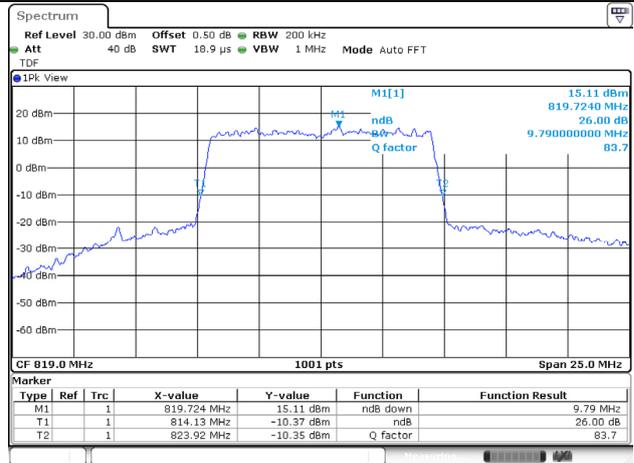
5M BW 16QAM High ch.



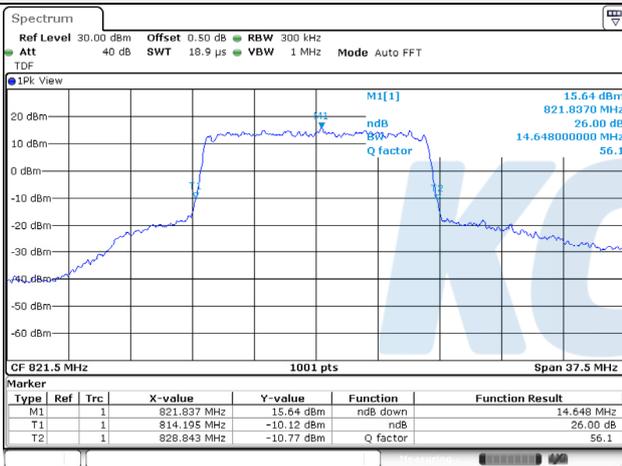
10M BW QPSK Mid ch.



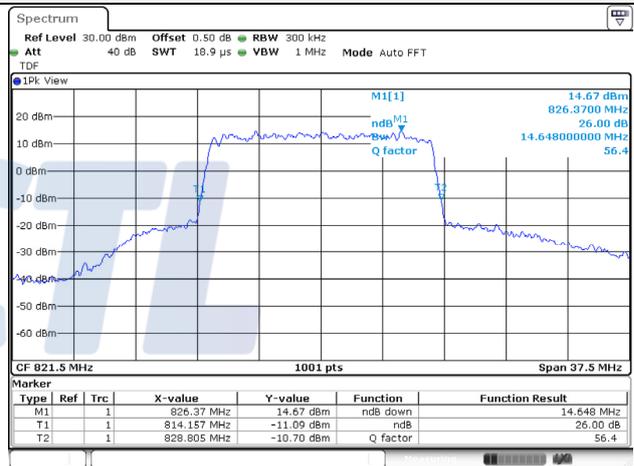
10M BW 16QAM Mid ch.



15M BW QPSK Mid ch.

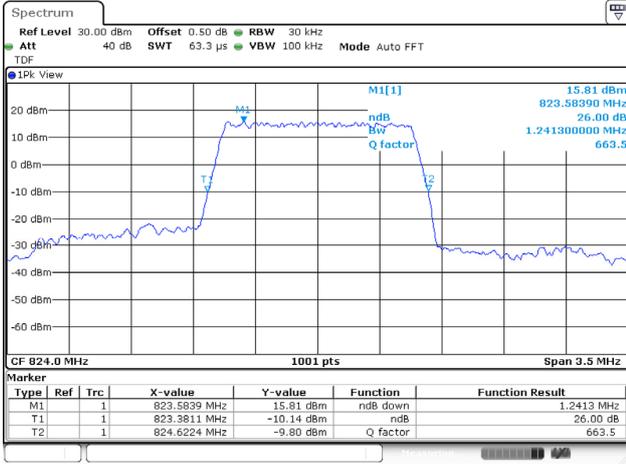


15M BW 16QAM Mid ch.

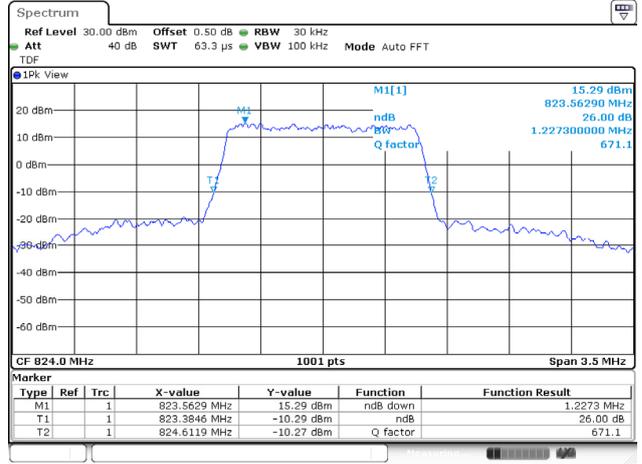


Straddle channel

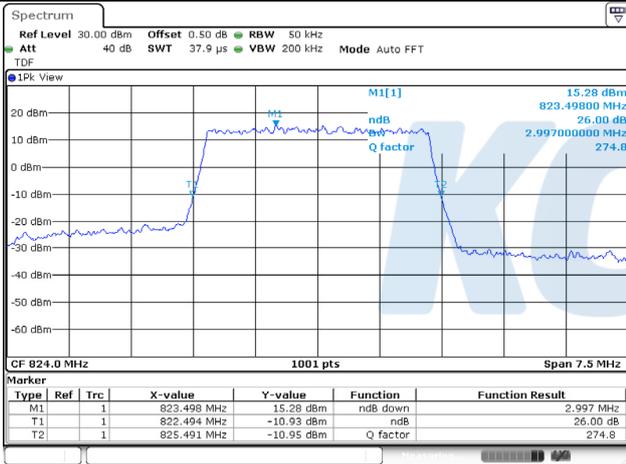
1.4M BW QPSK



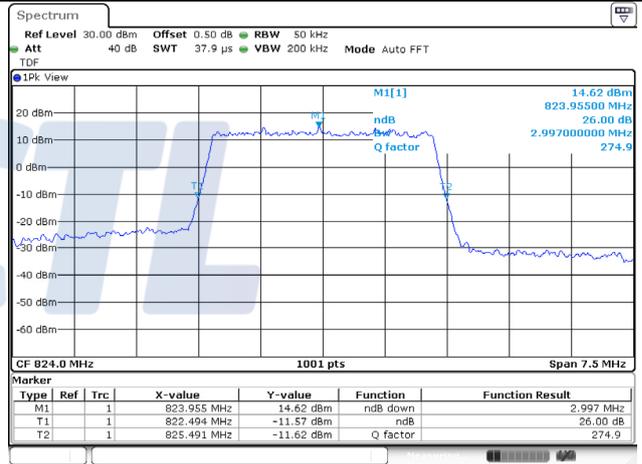
1.4M BW 16QAM



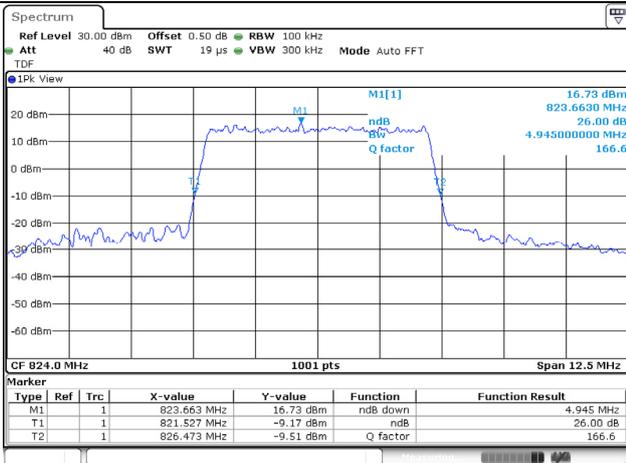
3M BW QPSK



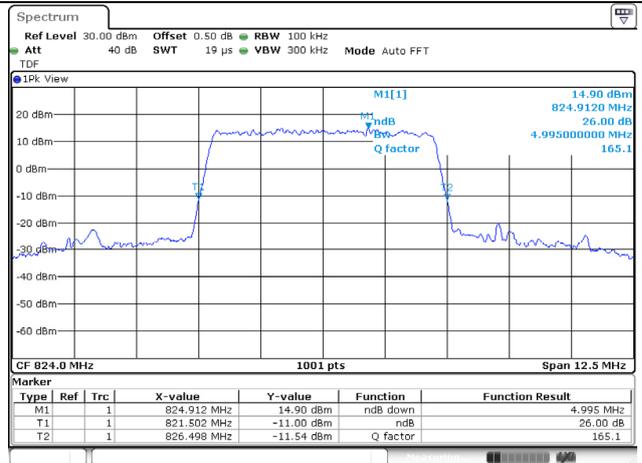
3M BW 16QAM



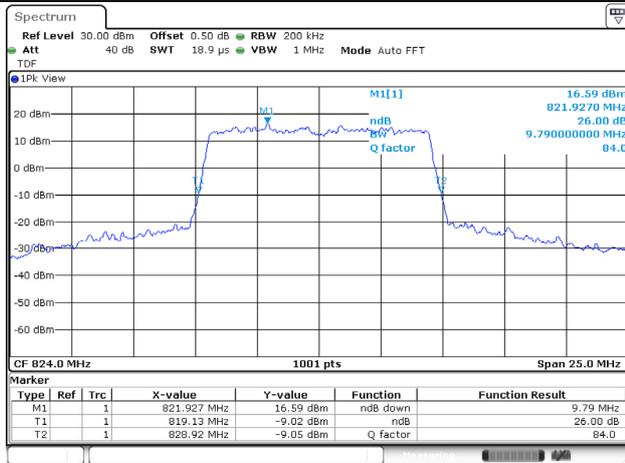
5M BW QPSK



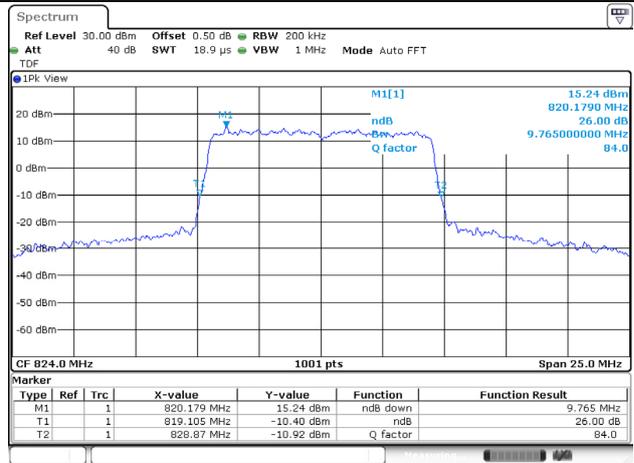
5M BW 16QAM



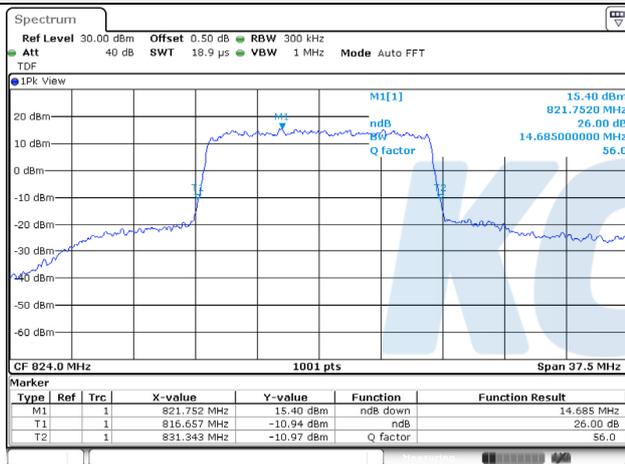
10M BW QPSK



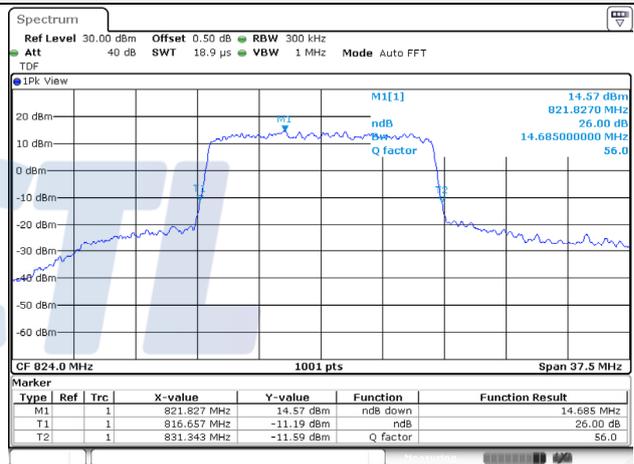
10M BW 16QAM



15M BW QPSK



15M BW 16QAM



99% Occupied Bandwidth

Test mode: LTE Band 26

