TEST REPORT

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	Report No.: KR22-SRF0031-A Page (1) of (109)	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 : 2022-02-03

2. Use of Report : Certification

3. Name of Product / Model : Mobile phone / SC-53C, SCG15

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

5. FCC ID : A3LSMA536JPN

6. Date of Test : 2022-02-17 to 2022-03-23

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 22 subpart H
FCC Part 27 subpart C

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

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

2022-03-24

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-03-21	Originally issued	-
2022-03-24	Added PAR test for LTE B5	85~88

Note. The report No. KR22-SRF0031 is superseded by the report No. KR22-SRF0031-A.

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	:	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 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Mobile phone
Model	:	SC-53C, SCG15
Modulation technique	:	Bluetooth(BDR/EDR)_GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11a/b/g/n/ac)_DSSS, OFDM LTE_QPSK, 16QAM, 64QAM WCDMA_QPSK GSM_GMSK, 8-PSK NFC_ASK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch 802.11b/g/n_HT20 : 13 ch UNII-1: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2A: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2C: 12 ch (20 ㎒), 6 ch (40 ㎒), 3 ch (80 ㎒) UNII-3: 5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) NFC: 1 ch
Power source	:	DC 3.88 Ⅴ
Antenna specification	:	LTE/WCDMA/GSM_Metal Antenna WIFI(2.4G)/Bluetooth(BDR/EDR/BLE)_Metal Antenna WIFI(5G)/NFC_LDS Antenna

Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE)_-7.11 dBi UNII-1 : -9.23 dBi UNII-2A : -9.29 dBi UNII-2C : -9.01 dBi UNII-3 : -9.12 dBi
Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒ 2 412 ㎒ ~ 2 472 ㎒ (802.11b/g/n_HT20) UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n/ac _HT20/VHT20) UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (802.11n/ac_HT40/VHT40) UNII-1: 5 210 ㎒ (802.11ac_VHT80) UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-2A: 5 270 ㎒ ~ 5 310 ㎒ (802.11n/ac_HT40/VHT40) UNII-2A: 5 290 ㎒ (802.11ac_VHT80) UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-2C: 5 510 ㎒ ~ 5 710 ㎒ (802.11n/ac_HT40/VHT40) UNII-2C: 5 530 ㎒ ~ 5 690 ㎒ (802.11ac_VHT80) UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n/ac_HT20/VHT20) UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (802.11n/ac_HT40/VHT40) UNII-3: 5 775 ㎒ (802.11ac_VHT80) LTE Band 5_824.7 ㎒ ~ 848.3 ㎒ LTE Band 12_699.7 ㎒ ~ 715.3 ㎒ LTE Band 41_2 498.5 ㎒ ~ 2 687.5 ㎒ GSM 850_824.2 ㎒ ~ 848.8 ㎒ GSM 1900_1 850.2 ㎒ ~ 1 909.8 ㎒ WCDMA 850_826.4 ㎒ ~ 846.6 ㎒ NFC_13.56 ㎒
Software version	:	SC-53C(A536D.001) / SCG15(A536J.001)
Hardware version	:	REV1.0
Test device serial No.	:	Conducted(R3CRC0HR75N) Radiated(R3CRC0HRG5Z)
Operation temperature	:	-30 ℃ ~ 50 ℃

2.1. Frequency/channel operations

This device contains the following capabilities:
WiFi (802.11a/b/g/n/ac), Bluetooth (BDR/EDR/BLE), NFC, LTE Band 5, LTE Band 12, LTE Band 41
GSM 850, GSM 1900, WCDMA 850

LTE Band 5

Ch.	Frequency (㎒)
20407	824.7
20525	836.5
20643	848.3

Table 2.1.1. 1.4M BW

Ch.	Frequency (㎒)
20415	825.5
20525	836.5
20635	847.5

Table 2.1.2. 3M BW

Ch.	Frequency (㎒)
20425	826.5
20525	836.5
20625	846.5

Table 2.1.3. 5M BW

Ch.	Frequency (㎒)
20450	829.0
20525	836.5
20600	844.0

Table 2.1.4. 10M BW

LTE Band 12

Ch.	Frequency (㎒)
23017	699.7
23095	707.5
23173	715.3

Table 2.1.5. 1.4M BW

Ch.	Frequency (㎒)
23025	700.5
23095	707.5
23165	714.5

Table 2.1.6. 3M BW

Ch.	Frequency (㎒)
23035	701.5
23095	707.5
23155	713.5

Table 2.1.7. 5M BW

Ch.	Frequency (㎒)
23060	704.0
23095	707.5
23130	711.0

Table 2.1.8. 10M BW

LTE Band 41

Ch.	Frequency (㎒)
39675	2 498.5
40620	2 593.0
41565	2 687.5

Table 2.1.9. 5M BW

Ch.	Frequency (㎒)
39700	2 501.0
40620	2 593.0
41540	2 685.0

Table 2.1.10. 10M BW

Ch.	Frequency (㎒)
39725	2 503.5
40620	2 593.0
41515	2 682.5

Table 2.1.11. 15M BW

Ch.	Frequency (㎒)
39750	2 506.0
40620	2 593.0
41490	2 680.0

Table 2.1.12. 20M BW

3. Maximum ERP/EIRP power

LTE Band 5

Mode	Tx frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 5	824.7 ~ 848.3	1M10G7D	19.36	0.086
		1M10W7D	16.25	0.042
	825.5 ~ 847.5	2M71G7D	19.65	0.092
		2M71W7D	16.61	0.046
	826.5 ~ 846.5	4M55G7D	19.49	0.089
		4M56W7D	16.57	0.045
	829.0 ~ 844.0	9M04G7D	19.89	0.097
		9M02W7D	16.98	0.050

LTE Band 12

Mode	Tx frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 12	699.7 ~ 715.3	1M10G7D	18.60	0.072
		1M10W7D	15.40	0.035
	700.5 ~ 714.5	2M71G7D	18.53	0.071
		2M70W7D	15.77	0.038
	701.5 ~ 713.5	4M53G7D	18.62	0.073
		4M53W7D	15.73	0.037
	704.0 ~ 711.0	9M04G7D	18.61	0.073
		9M04W7D	15.66	0.037

LTE Band 41

Mode	Tx frequency (㎒)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 41	2 498.5 ~ 2 687.5	4M57G7D	19.28	0.085
		4M56W7D	16.78	0.048
	2 501.0 ~ 2 685.0	9M04G7D	19.16	0.082
		9M02W7D	17.30	0.054
	2 503.5 ~ 2 682.5	13M5G7D	20.02	0.100
		13M5W7D	18.32	0.068
	2 506.0 ~ 2 680.0	18M0G7D	20.16	0.104
		18M1W7D	18.41	0.069

4. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046	Conducted Output Power	N/A	Conducted	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/A		Pass
2.1051 22.917(a) 27.53(g),(m)(4)	Band Edge Emissions at Antenna Terminal	<43 + 10Log$_{10}$(P) dB for all out of band emissions, Undesirable emissions must meet the limits detailed in 27.53(m).		Pass
	Spurious Emissions at Antenna Terminal			Pass
27.50(d)(5)	Peak to Average Power Ratio	< 13 dB		Pass
2.1055 22.355	Frequency stability	< 2.5 ppm		Pass
27.54		Emission must remain in band		
22.913(a)(5)	Effective Radiated Power	< 7 Watts max. ERP	Radiated	Pass
27.50(c)(10)		< 3 Watts max. ERP		Pass
27.50(h)(2)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		Pass
2.1053 22.917(a) 27.53(g),(m)(4)	Radiated Spurious Emissions	<43 + 10Log$_{10}$(P) dB for all out of band emissions, Undesirable emissions must meet the limits detailed in 27.53(m).		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

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. Output power measurements were measured on QPSK, 16QAM and 64QAM modulation. All tests except output power was performed with QPSK and 16QAM modulation.
3. All final radiated testing was performed with the EUT in worst case orientation.
4. **For LTE Band 5 and 12,** the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.
5. **For LTE Band 41,** the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Z** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Z** orientation.

Test condition	LTE Band	Modulation	Bandwidth (㎒)	RB size	RB offset
Radiated	B5	QPSK	10	1	0, 25, 49
	B12		5	1	0, 13, 24
	B41		20	1	0, 49, 99
Conducted	B5	QPSK 16QAM	1.4, 3, 5, 10	1	0, 5, 14, 24, 49
				Full	0
	B12		1.4, 3, 5, 10	1	0, 5, 14, 24, 49
				Full	0
	B41		5, 10, 15, 20	1	0, 24, 49, 74, 99
				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	1.1 dB	
Radiated spurious emissions	Below 1 000 ㎒	4.3 dB
	1 000 ㎒ ~ 18 000 ㎒	3.8 dB
	Above 1 8000 ㎒	5.9 dB

6. Measurement results explanation example

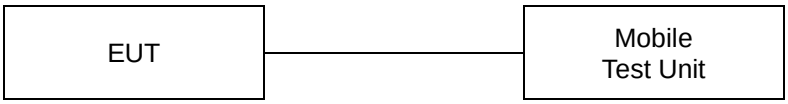
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	5.68	11 000	9.30
50	5.94	12 000	9.52
100	6.20	13 000	9.64
200	6.28	14 000	9.32
300	6.38	15 000	9.16
400	6.46	16 000	10.36
500	6.64	17 000	10.34
600	6.69	18 000	10.67
700	6.74	19 000	10.06
800	6.78	20 000	10.31
900	6.80	21 000	10.85
1 000	6.84	22 000	10.70
2 000	7.45	23 000	11.42
3 000	7.74	24 000	11.15
4 000	8.04	25 000	11.05
5 000	8.76	26 000	11.48
6 000	8.27	26 500	11.36
7 000	8.04	27 000	12.09
8 000	8.33	28 000	12.38
9 000	8.79	29 000	12.62
10 000	8.87	30 000	12.82

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

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 ± 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.

Test results

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power Frequency (㎒)		
						Low	Middle	High
LTE Band 5	1.4	QPSK	1	0	0	24.31	24.35	23.92
			1	3	0	24.32	24.18	24.00
			1	5	0	24.34	24.35	24.01
			3	0	0	24.44	24.38	24.13
			3	1	0	24.44	24.37	24.01
			3	3	0	24.49	24.42	24.13
			6	0	2.5	21.46	21.39	21.37
		16QAM	1	0	2.5	21.72	21.44	21.03
			1	3	2.5	21.70	21.44	21.07
			1	5	2.5	21.72	21.46	21.07
			3	0	2.5	21.57	21.26	21.15
			3	1	2.5	21.45	21.34	21.18
			3	3	2.5	21.38	21.29	21.06
			6	0	3.5	20.51	20.35	20.02
		64QAM	1	0	3.5	20.52	20.30	20.17
			1	3	3.5	20.38	20.11	20.01
			1	5	3.5	20.37	20.22	20.10
			3	0	3.5	20.41	20.26	20.03
			3	1	3.5	20.45	20.31	20.03
			3	3	3.5	20.46	20.24	20.07
			6	0	4.5	19.37	19.16	19.05
	3	QPSK	1	0	0	24.43	24.31	24.11
			1	8	0	24.28	24.26	24.01
			1	14	0	24.42	24.32	24.06
			8	0	2.5	21.44	21.37	21.10
			8	4	2.5	21.45	21.36	21.02
			8	7	2.5	21.48	21.32	21.04
			15	0	2.5	21.49	21.38	21.09
		16QAM	1	0	2.5	21.92	21.34	21.23
			1	8	2.5	21.60	21.21	21.18
			1	14	2.5	21.79	21.25	21.06
			8	0	3.5	20.52	20.38	20.07
			8	4	3.5	20.48	20.32	20.06
			8	7	3.5	20.49	20.39	20.05
			15	0	3.5	20.46	20.34	20.08
		64QAM	1	0	3.5	20.47	20.42	20.07
			1	8	3.5	20.52	20.17	20.05
			1	14	3.5	20.42	20.28	20.05
			8	0	4.5	19.46	19.25	19.03
			8	4	4.5	19.25	19.24	19.02
			8	7	4.5	19.29	19.17	19.10
			15	0	4.5	19.44	19.30	19.08

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (㎒)		
						Low	Middle	High
LTE Band 5	5	QPSK	1	0	0	24.42	24.30	24.01
			1	12	0	24.40	24.09	23.95
			1	24	0	24.46	24.30	23.97
			12	0	2.5	21.45	21.44	21.10
			12	7	2.5	21.51	21.41	21.06
			12	13	2.5	21.47	21.41	21.08
			25	0	2.5	21.47	21.43	21.10
		16QAM	1	0	2.5	21.70	21.35	21.10
			1	12	2.5	21.46	21.17	21.00
			1	24	2.5	21.62	21.52	21.33
			12	0	3.5	20.46	20.39	20.10
			12	7	3.5	20.42	20.41	20.04
			12	13	3.5	20.38	20.35	20.10
			25	0	3.5	20.49	20.35	20.06
		64QAM	1	0	3.5	20.56	20.46	20.11
			1	12	3.5	20.59	20.37	20.13
			1	24	3.5	20.49	20.37	20.11
			12	0	4.5	19.46	19.25	19.04
			12	7	4.5	19.37	19.20	19.02
			12	13	4.5	19.35	19.24	19.00
			25	0	4.5	19.46	19.22	19.08
	10	QPSK	1	0	0	24.52	24.34	24.12
			1	25	0	24.43	24.32	24.12
			1	49	0	24.38	24.33	24.10
			25	0	2.5	21.45	21.42	21.21
			25	12	2.5	21.47	21.41	21.16
			25	25	2.5	21.44	21.40	21.14
			50	0	2.5	21.46	21.38	21.15
		16QAM	1	0	2.5	21.61	21.42	21.34
			1	25	2.5	21.73	21.41	21.36
			1	49	2.5	21.65	21.38	21.32
			25	0	3.5	20.42	20.38	20.16
			25	12	3.5	20.40	20.35	20.20
			25	25	3.5	20.36	20.36	20.15
			50	0	3.5	20.41	20.43	20.17
		64QAM	1	0	3.5	20.58	20.30	20.26
			1	25	3.5	20.37	20.32	20.11
			1	49	3.5	20.40	20.29	20.18
			25	0	4.5	19.43	19.28	19.14
			25	12	4.5	19.42	19.30	19.09
			25	25	4.5	19.36	19.23	19.06
			50	0	4.5	19.44	19.27	19.12

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (㎒)		
						Low	Middle	High
LTE Band 12	1.4	QPSK	1	0	0	24.34	24.43	24.35
			1	3	0	24.28	24.31	24.38
			1	5	0	24.31	24.37	24.36
			3	0	0	24.31	24.41	24.42
			3	1	0	24.32	24.40	24.28
			3	3	0	24.36	24.44	24.39
			6	0	2.5	21.32	21.43	21.38
		16QAM	1	0	2.5	21.37	21.67	21.40
			1	3	2.5	21.35	21.47	21.47
			1	5	2.5	21.47	21.65	21.42
			3	0	2.5	21.42	21.49	21.37
			3	1	2.5	21.36	21.50	21.35
			3	3	2.5	21.28	21.46	21.30
			6	0	3.5	20.32	20.37	20.39
		64QAM	1	0	3.5	20.58	20.67	20.50
			1	3	3.5	20.42	20.64	20.47
			1	5	3.5	20.48	20.61	20.55
			3	0	3.5	20.46	20.48	20.48
			3	1	3.5	20.45	20.57	20.44
			3	3	3.5	20.38	20.55	20.43
			6	0	4.5	19.42	19.53	19.47
	3	QPSK	1	0	0	24.36	24.54	24.51
			1	8	0	24.24	24.40	24.36
			1	14	0	24.30	24.50	24.48
			8	0	2.5	21.36	21.46	21.43
			8	4	2.5	21.37	21.44	21.39
			8	7	2.5	21.36	21.39	21.39
			15	0	2.5	21.37	21.44	21.39
		16QAM	1	0	2.5	21.49	21.17	21.25
			1	8	2.5	21.38	21.62	21.51
			1	14	2.5	21.65	21.67	21.54
			8	0	3.5	20.49	20.46	20.43
			8	4	3.5	20.45	20.38	20.36
			8	7	3.5	20.42	20.38	20.40
			15	0	3.5	20.36	20.39	20.38
		64QAM	1	0	3.5	20.50	20.55	20.60
			1	8	3.5	20.55	20.62	20.58
			1	14	3.5	20.61	20.53	20.61
			8	0	4.5	19.45	19.54	19.51
			8	4	4.5	19.45	19.58	19.59
			8	7	4.5	19.46	19.55	19.48
			15	0	4.5	19.47	19.58	19.59

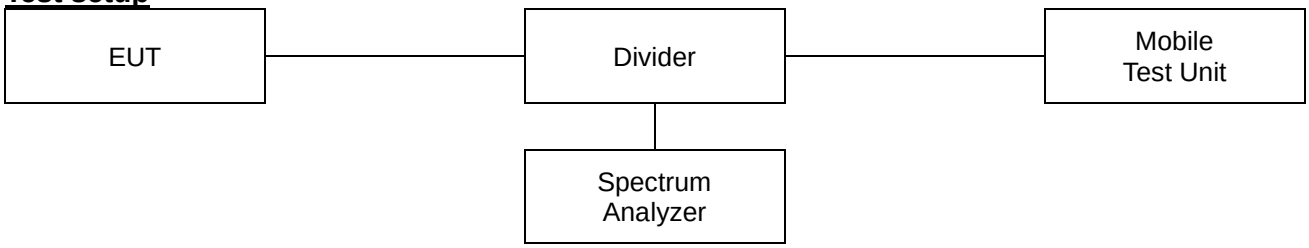
Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (㎒)		
						Low	Middle	High
LTE Band 12	5	QPSK	1	0	0	24.40	24.41	24.35
			1	12	0	24.36	24.27	24.35
			1	24	0	24.37	24.41	24.25
			12	0	2.5	21.39	21.45	21.39
			12	7	2.5	21.38	21.46	21.36
			12	13	2.5	21.38	21.44	21.38
			25	0	2.5	21.42	21.44	21.41
		16QAM	1	0	2.5	21.45	21.56	21.55
			1	12	2.5	21.27	21.34	21.36
			1	24	2.5	21.43	21.34	21.51
			12	0	3.5	20.37	20.48	20.38
			12	7	3.5	20.31	20.46	20.37
			12	13	3.5	20.33	20.45	20.36
			25	0	3.5	20.40	20.39	20.40
		64QAM	1	0	3.5	20.62	20.77	20.62
			1	12	3.5	20.59	20.66	20.65
			1	24	3.5	20.61	20.71	20.60
			12	0	4.5	19.56	19.56	19.57
			12	7	4.5	19.49	19.62	19.56
			12	13	4.5	19.51	19.53	19.55
			25	0	4.5	19.52	19.57	19.54
	10	QPSK	1	0	0	24.46	24.52	24.48
			1	25	0	24.38	24.45	24.40
			1	49	0	24.35	24.41	24.41
			25	0	2.5	21.40	21.45	21.41
			25	12	2.5	21.37	21.42	21.40
			25	25	2.5	21.37	21.39	21.36
			50	0	2.5	21.38	21.41	21.36
		16QAM	1	0	2.5	21.67	21.33	21.52
			1	25	2.5	21.65	21.29	21.50
			1	49	2.5	21.59	21.22	21.41
			25	0	3.5	20.40	20.47	20.42
			25	12	3.5	20.40	20.45	20.42
			25	25	3.5	20.42	20.42	20.33
			50	0	3.5	20.41	20.44	20.39
		64QAM	1	0	3.5	20.76	20.75	20.58
			1	25	3.5	20.57	20.56	20.57
			1	49	3.5	20.53	20.37	20.52
			25	0	4.5	19.61	19.61	19.60
			25	12	4.5	19.58	19.57	19.59
			25	25	4.5	19.56	19.61	19.53
			50	0	4.5	19.59	19.62	19.64

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (㎒)		
						Low	Middle	High
LTE Band 41	5	QPSK	1	0	0	23.48	23.64	23.41
			1	12	0	23.43	23.51	23.17
			1	24	0	23.51	23.58	22.93
			12	0	2	21.59	21.70	21.45
			12	7	2	21.55	21.74	21.44
			12	13	2	21.57	21.70	21.49
			25	0	2	21.57	21.71	21.46
		16QAM	1	0	2	21.53	21.63	21.33
			1	12	2	21.29	21.52	21.23
			1	24	2	21.49	21.62	21.36
			12	0	3	20.68	20.79	20.52
			12	7	3	20.71	20.78	20.55
			12	13	3	20.74	20.79	20.44
			25	0	3	20.72	20.80	20.57
		64QAM	1	0	3	20.67	20.91	20.79
			1	12	3	20.64	20.95	20.62
			1	24	3	20.49	20.98	20.58
			12	0	4	19.62	19.92	19.78
			12	7	4	19.65	19.99	19.76
			12	13	4	19.63	19.96	19.77
			25	0	4	19.62	19.98	19.82
	10	QPSK	1	0	0	23.41	23.61	23.65
			1	25	0	23.42	23.51	23.51
			1	49	0	23.47	23.56	22.93
			25	0	2	21.52	21.69	21.64
			25	12	2	21.58	21.65	21.71
			25	25	2	21.63	21.69	21.71
			50	0	2	21.65	21.70	21.58
		16QAM	1	0	2	21.65	21.58	21.61
			1	25	2	21.63	21.48	21.46
			1	49	2	21.67	21.57	21.70
			25	0	3	20.62	20.73	20.67
			25	12	3	20.57	20.72	20.69
			25	25	3	20.57	20.78	20.69
			50	0	3	20.70	20.76	20.71
		64QAM	1	0	3	20.69	20.94	20.97
			1	25	3	20.38	20.83	20.81
			1	49	3	20.54	20.70	20.83
			25	0	4	19.67	19.93	19.91
			25	12	4	19.56	19.92	19.97
			25	25	4	19.55	19.89	19.96
			50	0	4	19.52	19.90	19.97

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (㎒)		
						Low	Middle	High
LTE Band 41	15	QPSK	1	0	0	22.34	23.60	23.54
			1	36	0	23.45	23.54	23.25
			1	74	0	23.48	23.52	22.78
			36	0	2	21.44	21.64	21.58
			36	18	2	21.44	21.65	21.62
			36	37	2	21.43	21.65	21.67
			75	0	2	21.49	21.67	21.67
		16QAM	1	0	2	21.18	21.64	21.53
			1	36	2	21.50	21.60	21.49
			1	74	2	21.52	21.64	20.88
			36	0	3	20.51	20.61	20.65
			36	18	3	20.51	20.68	20.72
			36	37	3	20.53	20.70	20.62
			75	0	3	20.54	20.71	20.60
		64QAM	1	0	3	20.21	20.99	20.87
			1	36	3	20.22	20.87	20.88
			1	74	3	20.21	20.93	20.84
			36	0	4	19.50	19.98	19.92
			36	18	4	19.43	19.94	19.89
			36	37	4	19.52	19.95	19.92
			75	0	4	19.46	19.92	19.81
	20	QPSK	1	0	0	22.47	23.61	23.30
			1	49	0	23.38	23.63	23.35
			1	99	0	23.49	23.57	22.24
			50	0	2	21.53	21.71	21.66
			50	24	2	21.55	21.72	21.66
			50	50	2	21.52	21.69	21.47
			100	0	2	21.55	21.69	21.63
		16QAM	1	0	2	20.43	21.68	21.62
			1	49	2	21.56	21.74	21.54
			1	99	2	21.50	21.67	20.38
			50	0	3	20.62	20.82	20.65
			50	24	3	20.64	20.76	20.66
			50	50	3	20.64	20.82	20.65
			100	0	3	20.63	20.78	20.72
		64QAM	1	0	3	20.44	20.99	20.90
			1	49	3	20.28	20.89	20.75
			1	99	3	20.31	20.87	20.73
			50	0	4	19.59	19.98	19.95
			50	24	4	19.60	19.96	19.91
			50	50	4	19.57	19.92	19.93
			100	0	4	19.58	19.93	19.97

7.2. 99% Occupied Bandwidth & 26 dB Bandwidth

Test setup



Limit

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**

a) 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.

b) The nominal 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) 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."

k) 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 u pper 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

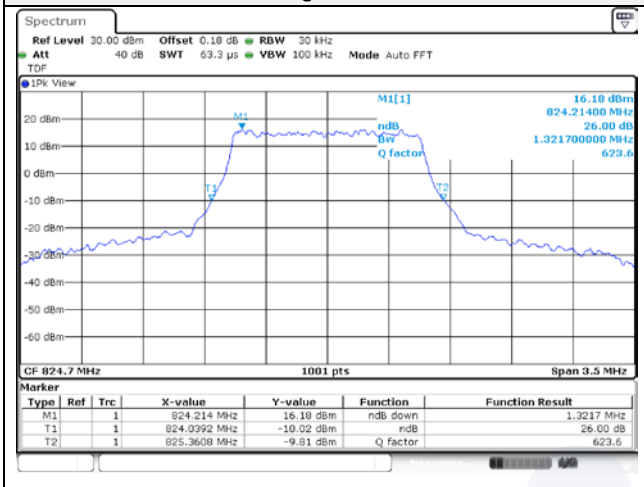
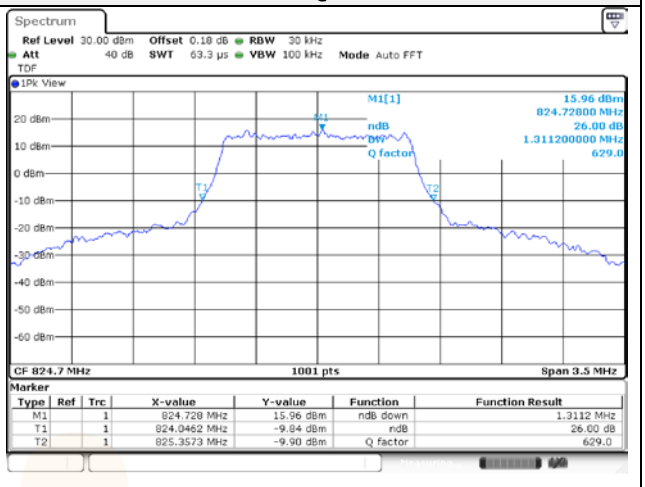
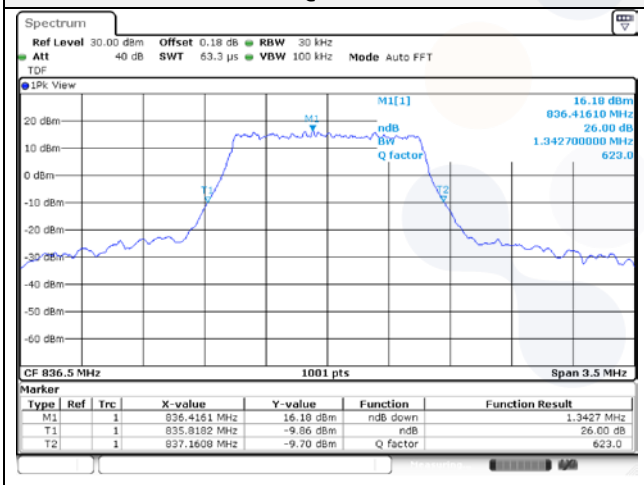
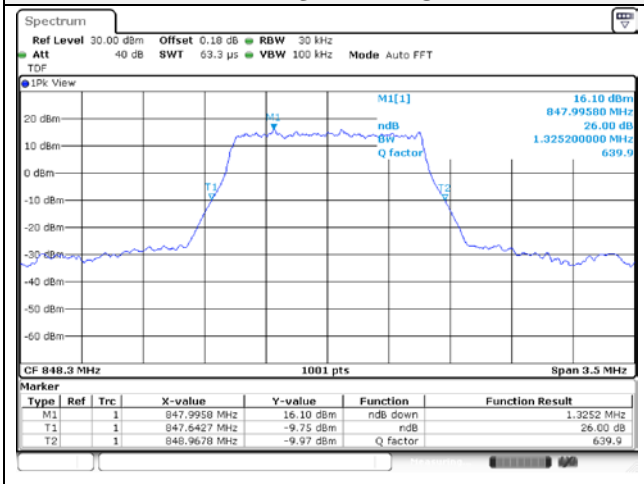
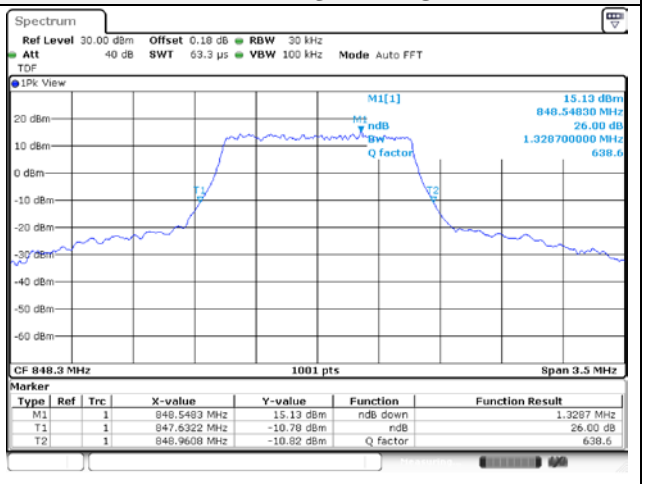
Test Band	Bandwidth (㎒)	Frequency (㎒)	Test mode	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
LTE Band 5	1.4	824.7	QPSK	1.32	1.09
			16QAM	1.31	1.09
		836.5	QPSK	1.34	1.10
			16QAM	1.36	1.10
		848.3	QPSK	1.33	1.10
			16QAM	1.33	1.09
	3	825.5	QPSK	3.10	2.71
			16QAM	3.10	2.70
		836.5	QPSK	3.11	2.70
			16QAM	3.08	2.70
		847.5	QPSK	3.08	2.70
			16QAM	3.14	2.71
	5	826.5	QPSK	5.32	4.55
			16QAM	5.40	4.53
		836.5	QPSK	5.32	4.53
			16QAM	5.37	4.56
		846.5	QPSK	5.35	4.51
			16QAM	5.38	4.52
	10	829.0	QPSK	10.29	9.04
			16QAM	10.44	9.02
		836.5	QPSK	10.19	9.04
			16QAM	10.19	8.99
		844.0	QPSK	10.47	9.02
			16QAM	10.39	8.99

Test Band	Bandwidth (㎒)	Frequency (㎒)	Test mode	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
LTE Band 12	1.4	699.7	QPSK	1.34	1.10
			16QAM	1.35	1.10
		707.5	QPSK	1.34	1.09
			16QAM	1.32	1.10
		715.3	QPSK	1.34	1.10
			16QAM	1.35	1.10
	3	700.5	QPSK	3.10	2.70
			16QAM	3.12	2.70
		707.5	QPSK	3.08	2.70
			16QAM	3.13	2.70
		714.5	QPSK	3.13	2.71
			16QAM	3.09	2.70
	5	701.5	QPSK	5.40	4.53
			16QAM	5.41	4.53
		707.5	QPSK	5.33	4.53
			16QAM	5.46	4.53
		713.5	QPSK	5.21	4.50
			16QAM	5.32	4.53
	10	704.0	QPSK	10.22	9.04
			16QAM	10.37	9.04
		707.5	QPSK	10.42	9.02
			16QAM	10.39	8.97
		711.0	QPSK	10.19	8.97
			16QAM	10.17	8.97

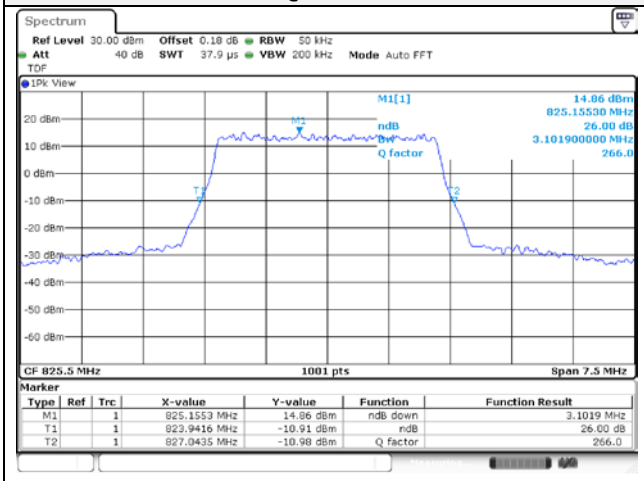
Test Band	Bandwidth (㎒)	Frequency (㎒)	Test mode	26㏈ bandwidth (㎒)	99 % bandwidth (㎒)
LTE Band 41	5	2 498.5	QPSK	5.43	4.52
			16QAM	5.43	4.56
		2 593.0	QPSK	5.38	4.55
			16QAM	5.36	4.53
		2 687.5	QPSK	5.36	4.57
			16QAM	5.30	4.52
	10	2 501.0	QPSK	10.27	8.99
			16QAM	10.42	8.99
		2 593.0	QPSK	10.14	9.04
			16QAM	10.19	9.02
		2 685.0	QPSK	10.22	9.02
			16QAM	9.99	8.97
	15	2 503.5	QPSK	14.72	13.52
			16QAM	14.95	13.52
		2 593.0	QPSK	15.10	13.45
			16QAM	15.06	13.37
		2 682.5	QPSK	15.44	13.49
			16QAM	14.91	13.45
	20	2 506.0	QPSK	19.68	17.98
			16QAM	19.73	18.08
		2 593.0	QPSK	19.73	17.98
			16QAM	19.73	17.93
		2 680.0	QPSK	19.83	17.98
			16QAM	19.63	18.03

26dB Bandwidth

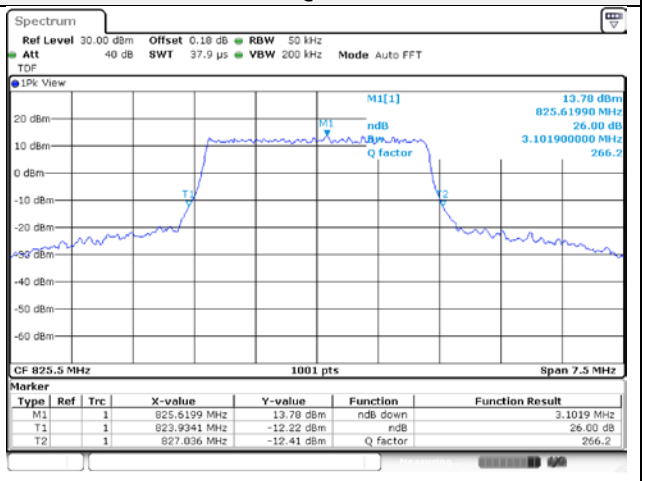
Test mode: LTE Band 5

1.4M BW QPSK Low ch.	1.4M BW 16QAM Low ch.
	
1.4M BW QPSK Mid ch.	**1.4M BW 16QAM Mid ch.**
	
1.4M BW QPSK High ch.	**1.4M BW 16QAM High ch.**
	

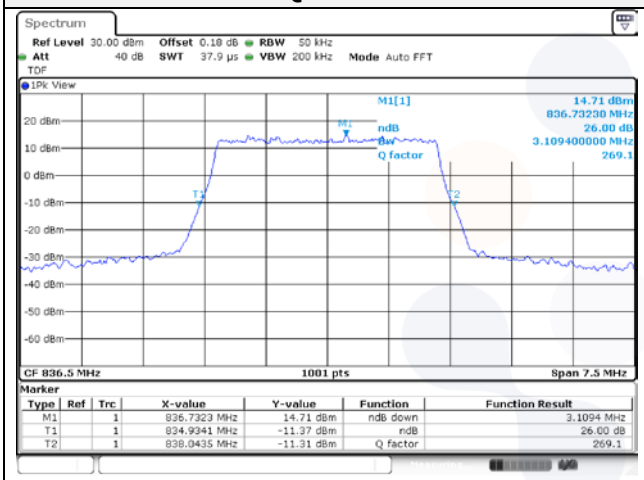
3M BW QPSK Low ch.



3M BW 16QAM Low ch.



3M BW QPSK Mid ch.



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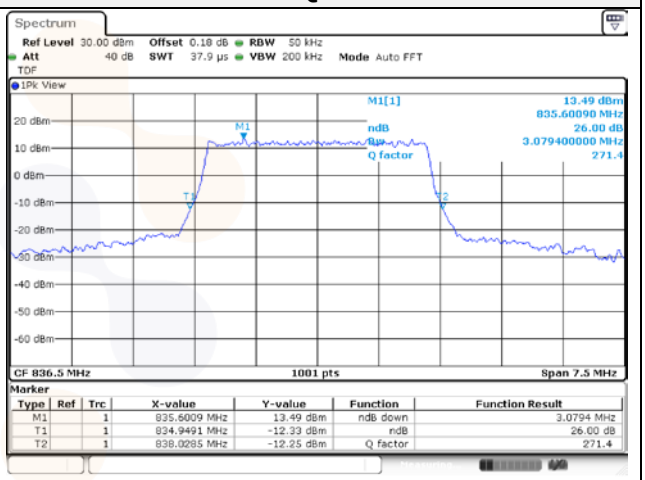
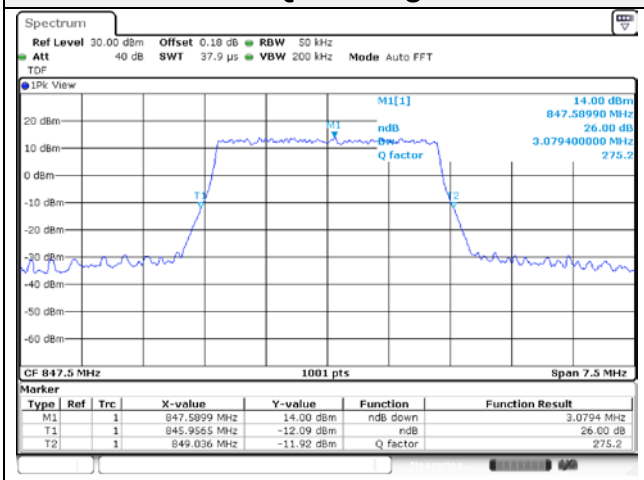
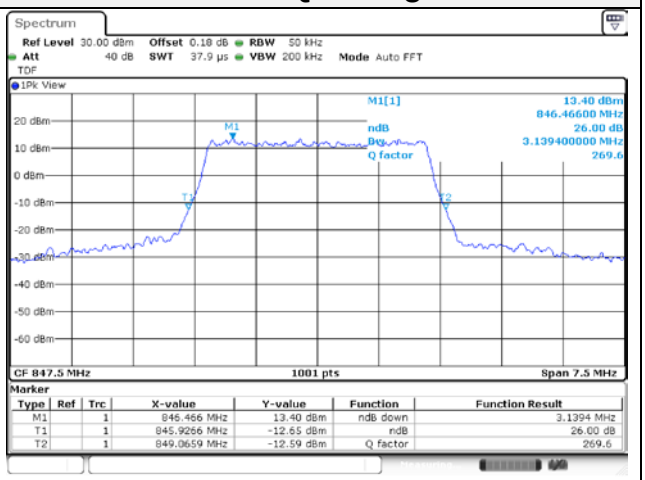


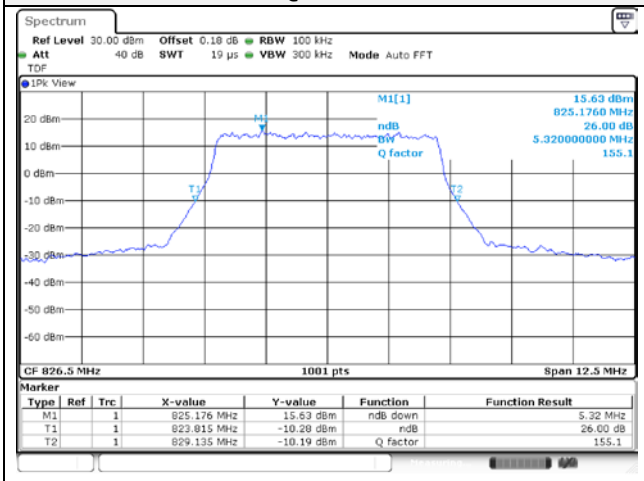
3M BW QPSK High ch.



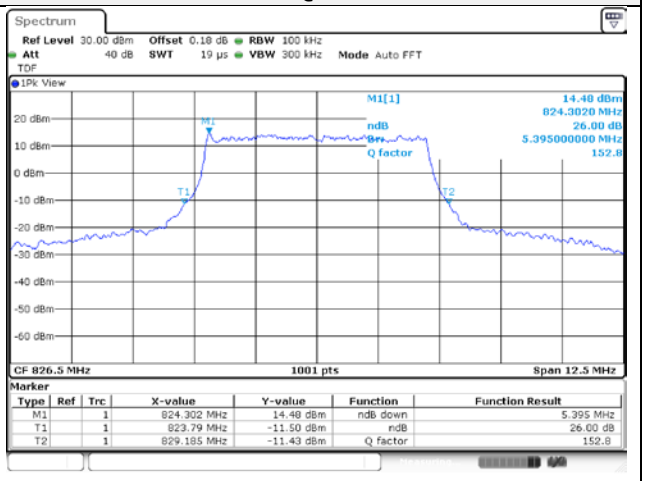
3M BW 16QAM High ch.



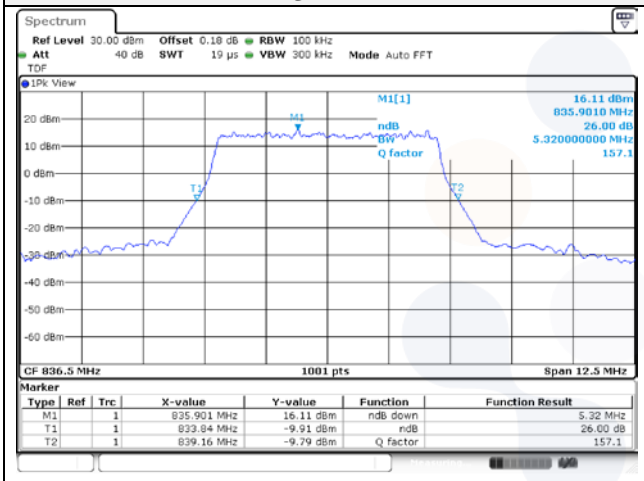
5M BW QPSK Low ch.



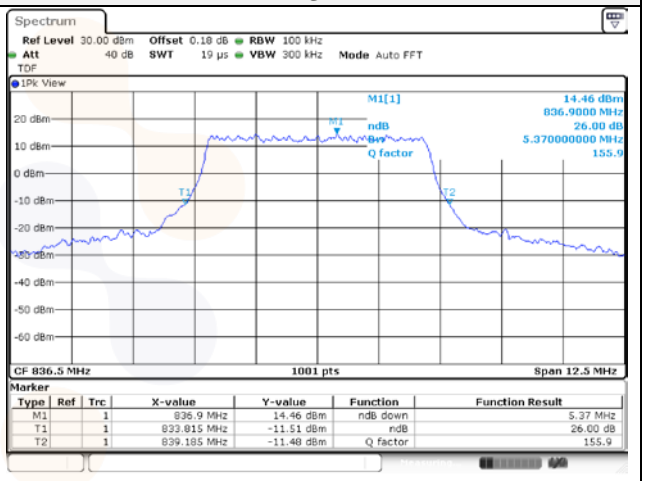
5M BW 16QAM Low ch.



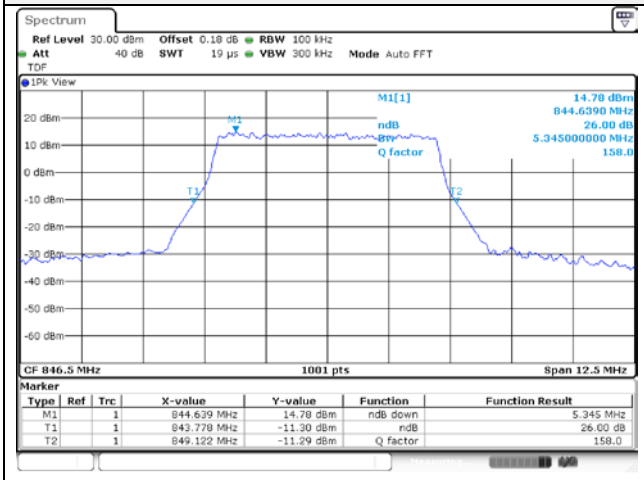
5M BW QPSK Mid ch.



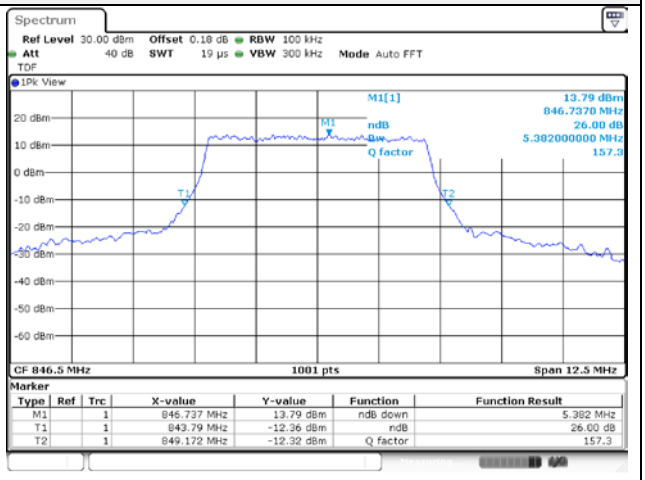
5M BW 16QAM Mid ch.



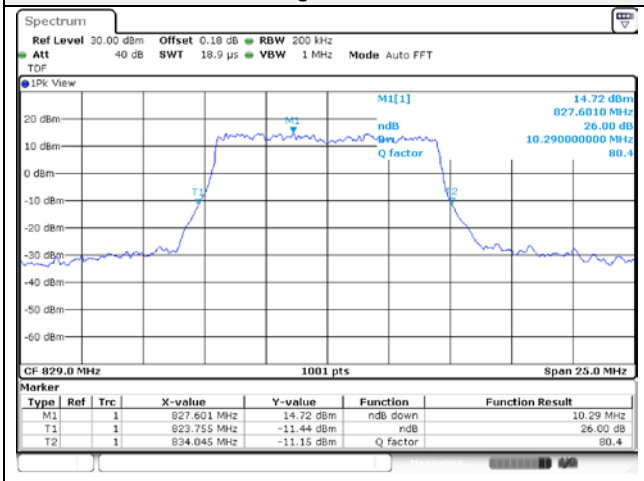
5M BW QPSK High ch.



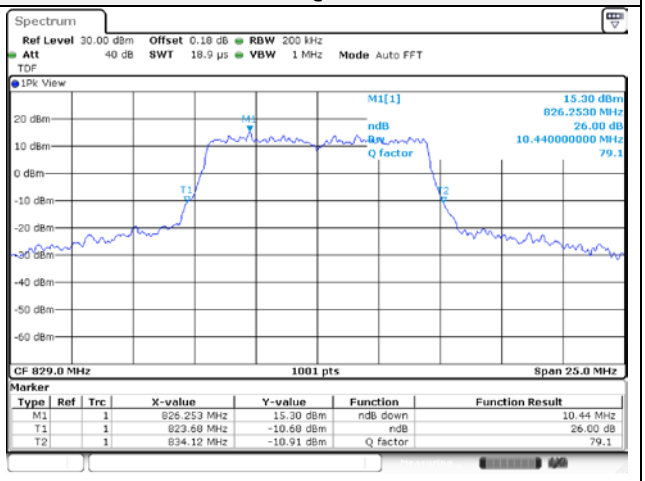
5M BW 16QAM High ch.



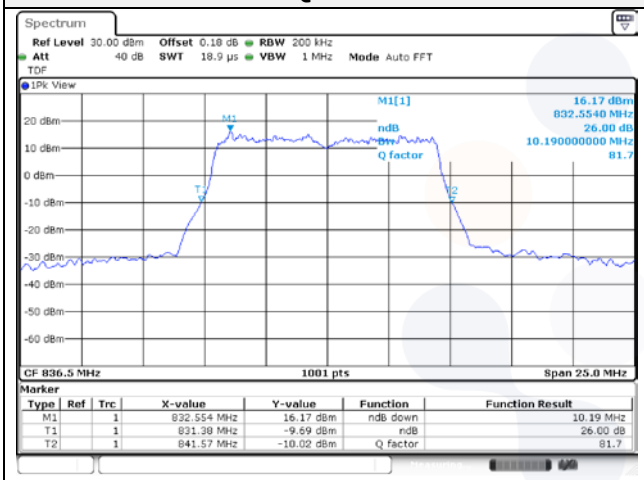
10M BW QPSK Low ch.



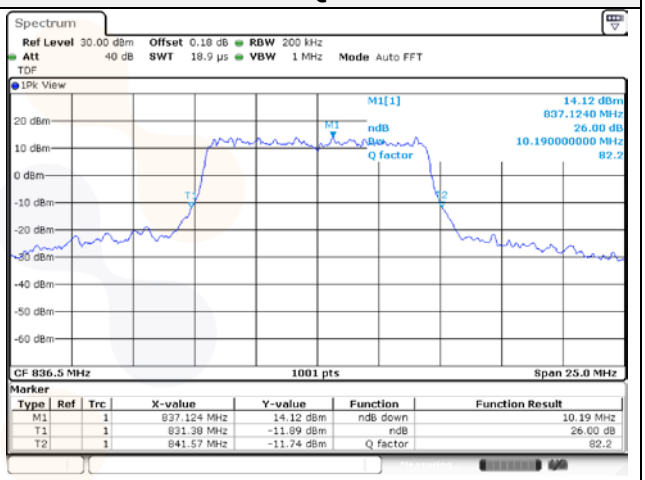
10M BW 16QAM Low ch.



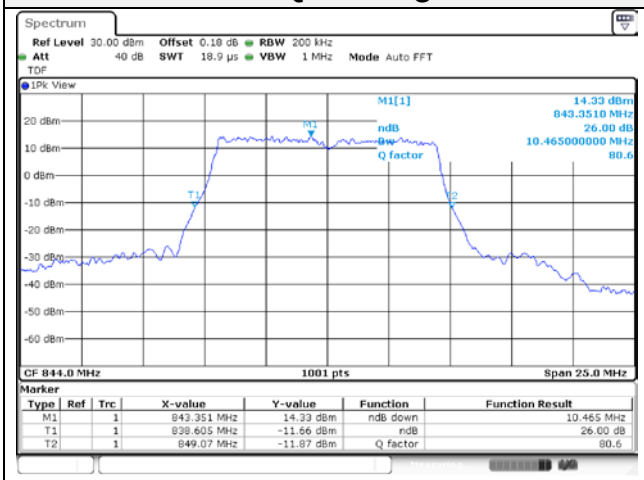
10M BW QPSK Mid ch.



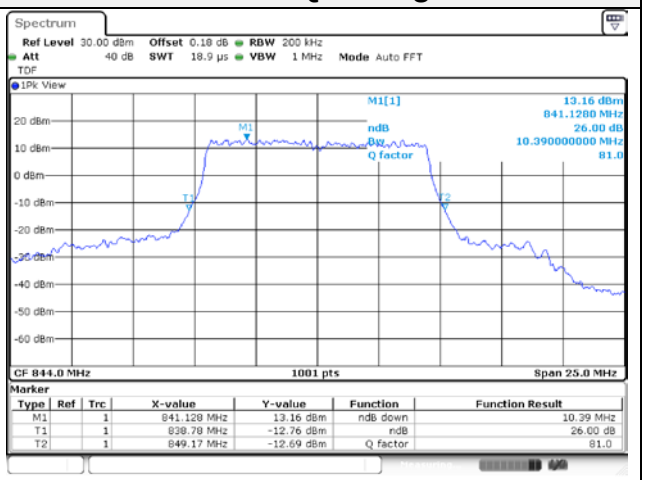
10M BW 16QAM Mid ch.



10M BW QPSK High ch.

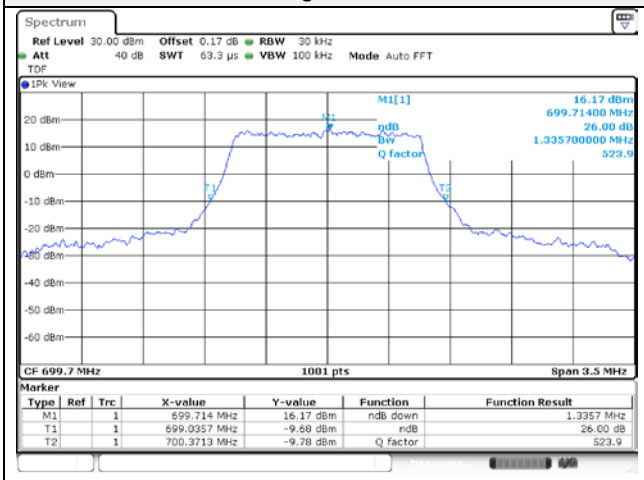


10M BW 16QAM High ch.

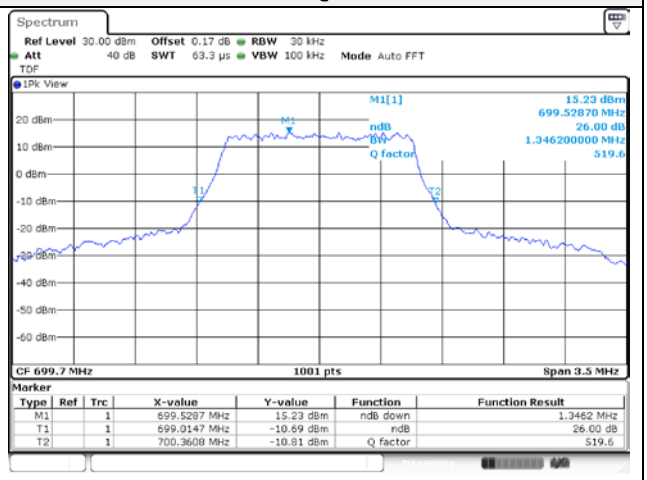


Test mode: LTE Band 12

1.4M BW QPSK Low ch.

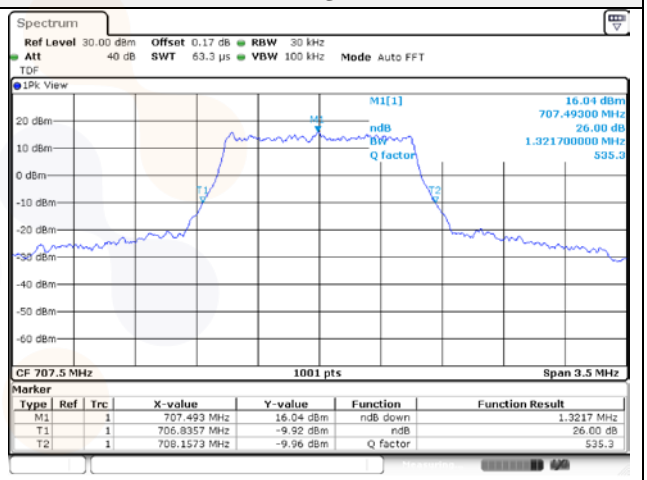


1.4M BW 16QAM Low ch.

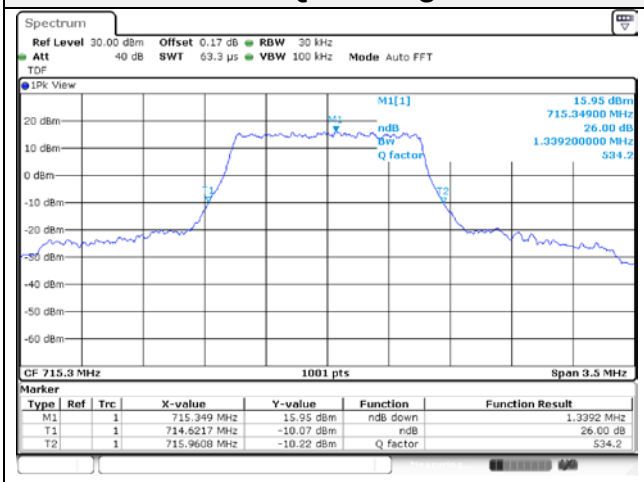


1.4M BW QPSK Mid ch.

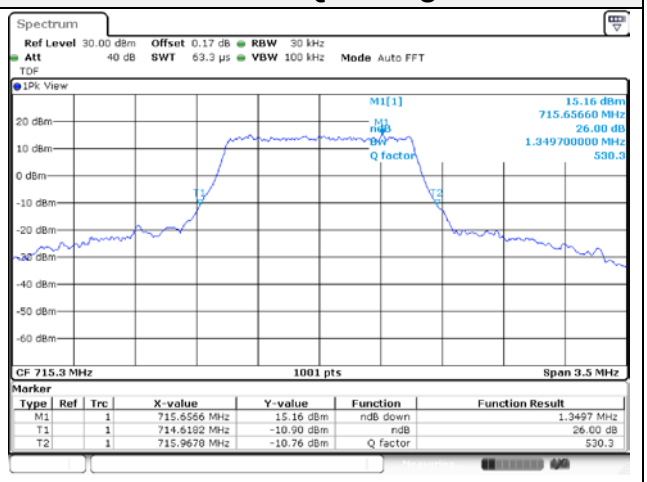
1.4M BW 16QAM Mid ch.



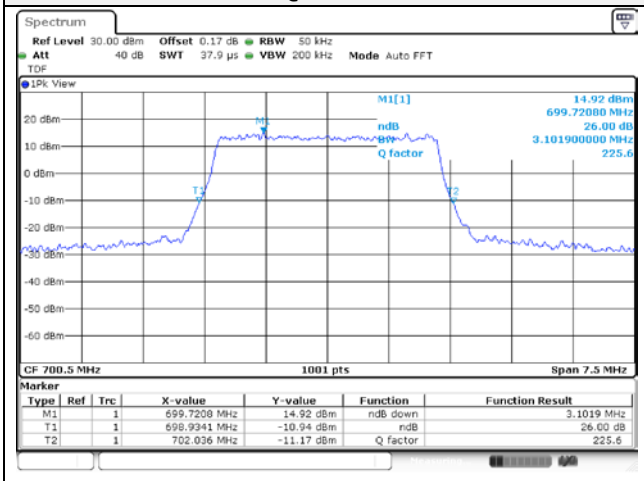
1.4M BW QPSK High ch.



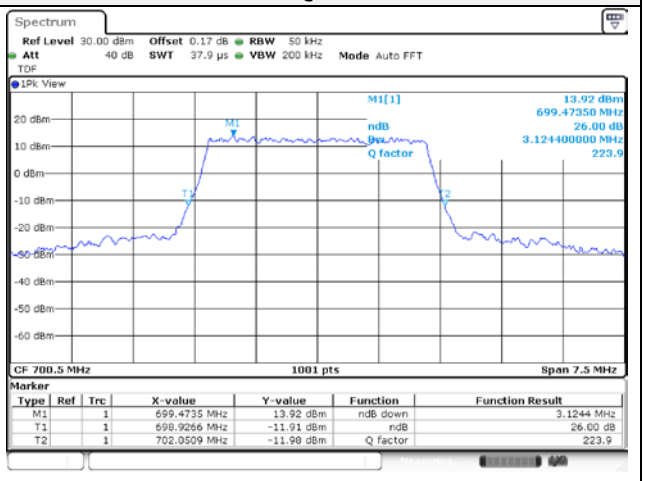
1.4M BW 16QAM High ch.



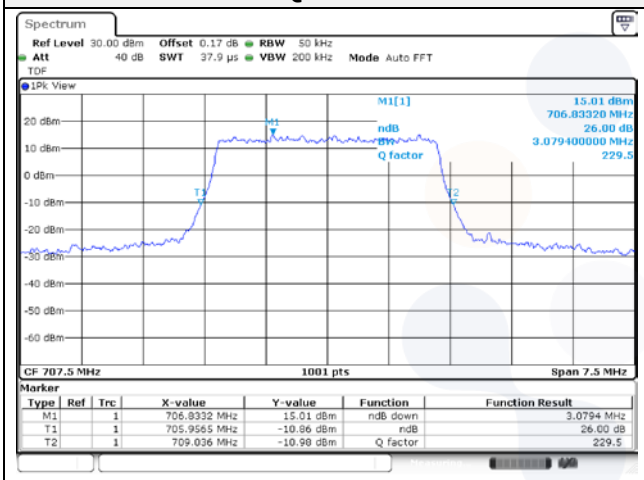
3M BW QPSK Low ch.



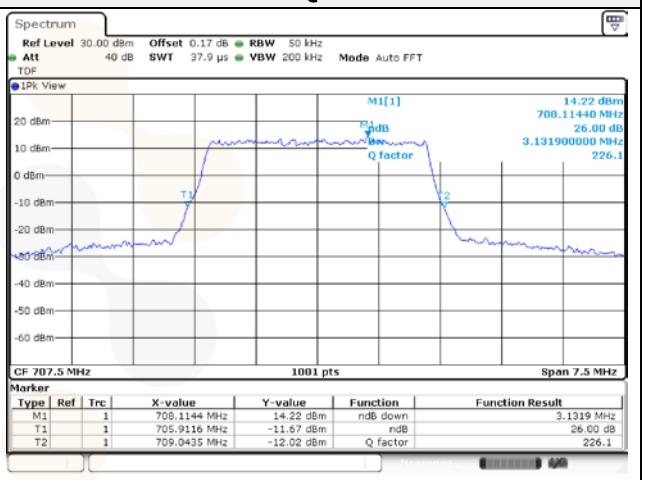
3M BW 16QAM Low ch.



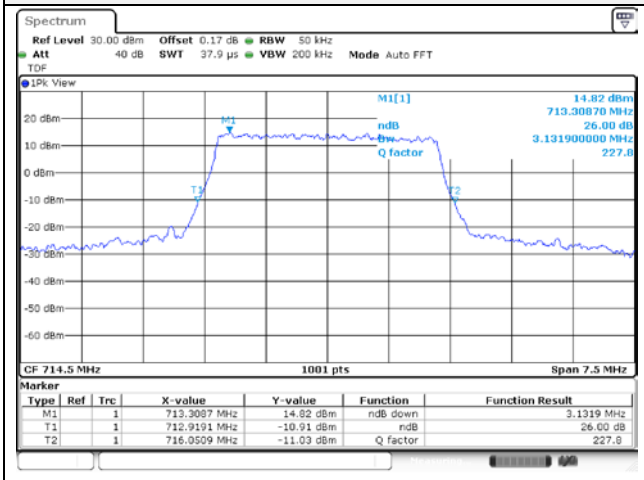
3M BW QPSK Mid ch.



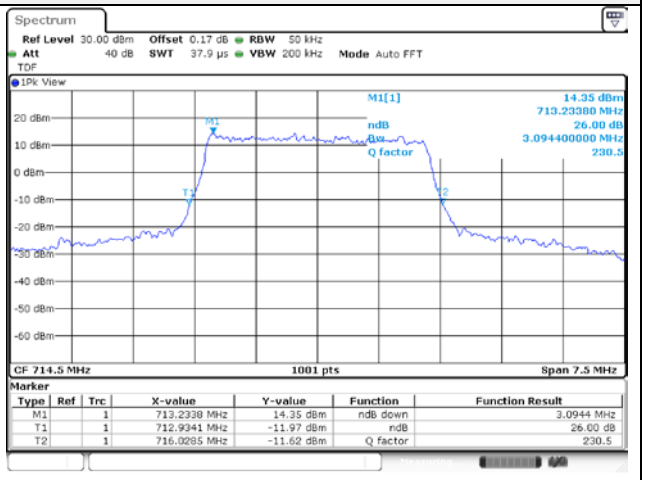
3M BW 16QAM Mid ch.

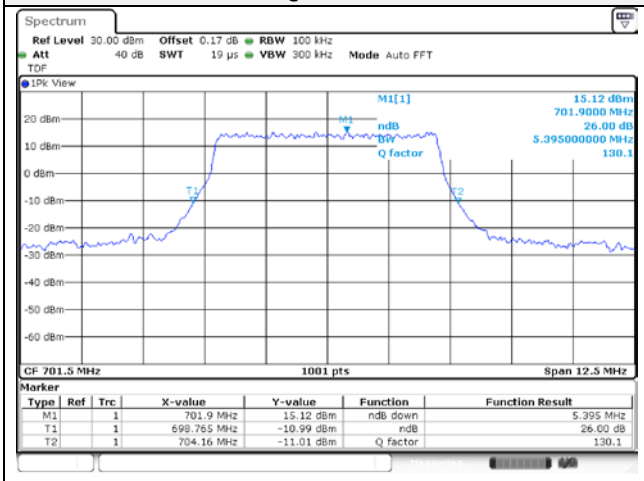
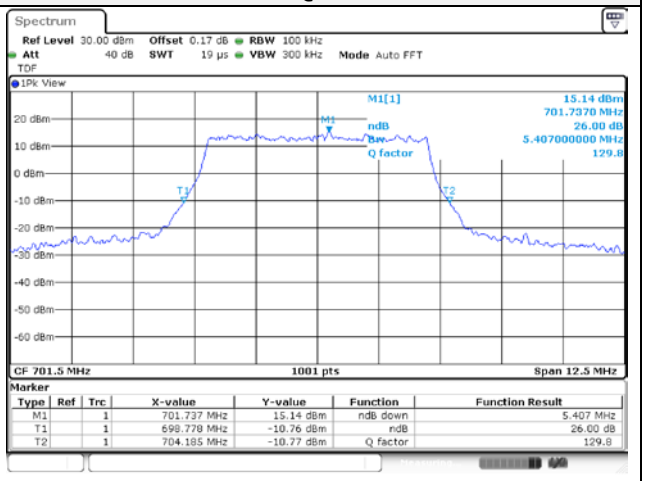
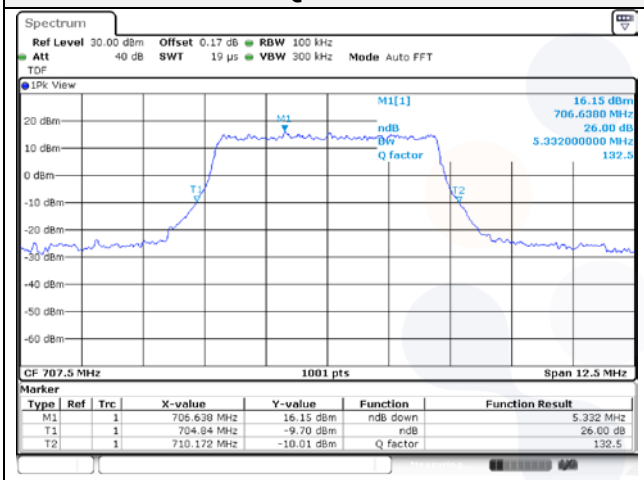
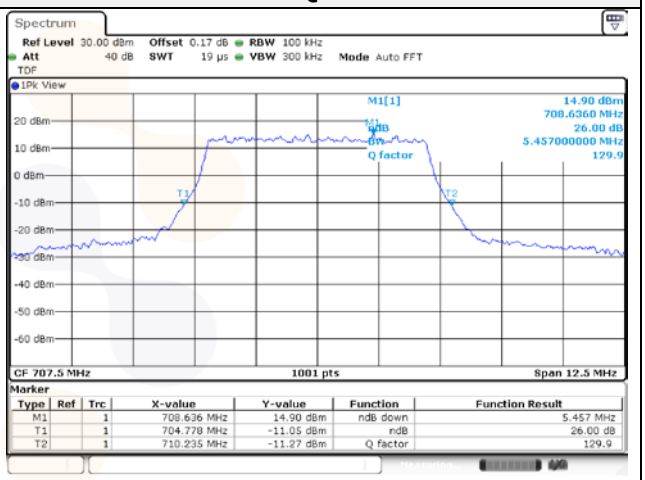
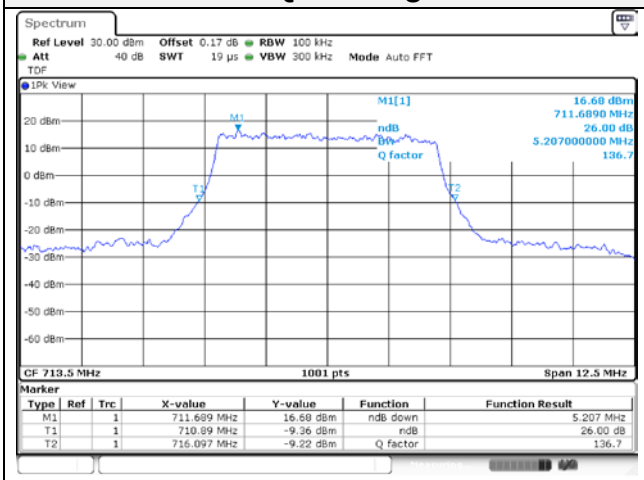
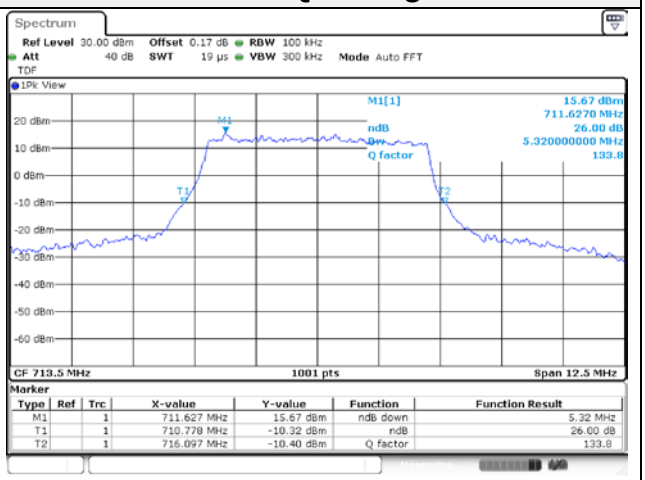


3M BW QPSK High ch.

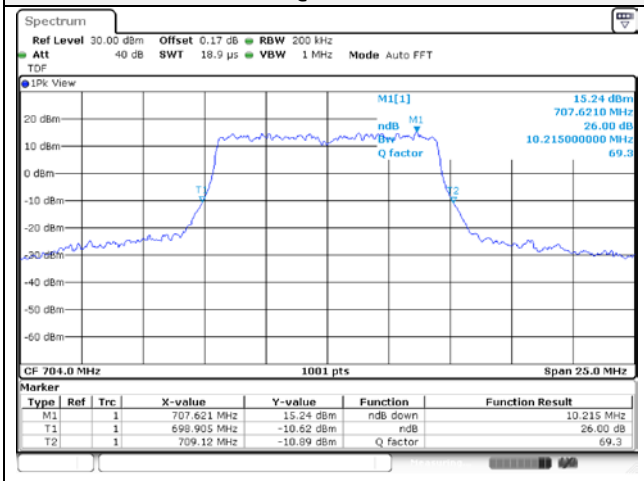


3M BW 16QAM High ch.

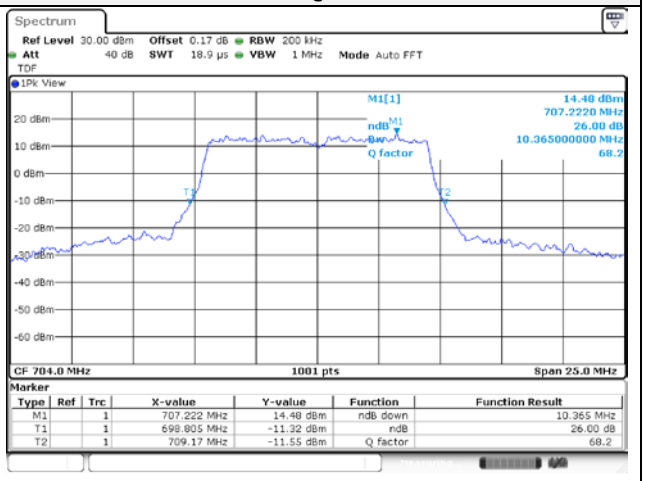


5M BW QPSK Low ch.	5M BW 16QAM Low ch.
	
5M BW QPSK Mid ch.	**5M BW 16QAM Mid ch.**
	
5M BW QPSK High ch.	**5M BW 16QAM High ch.**
	

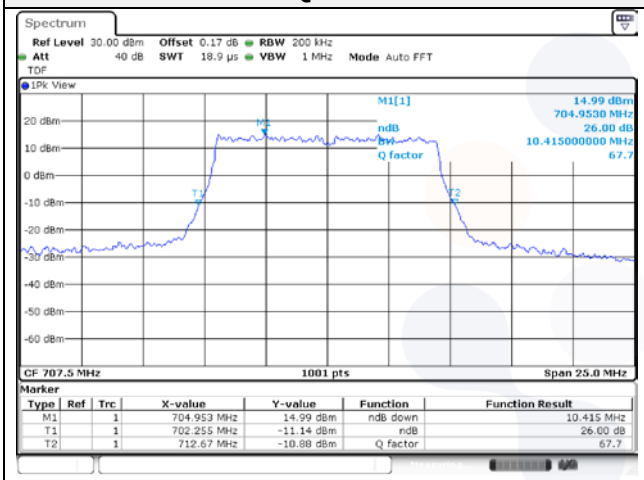
10M BW QPSK Low ch.



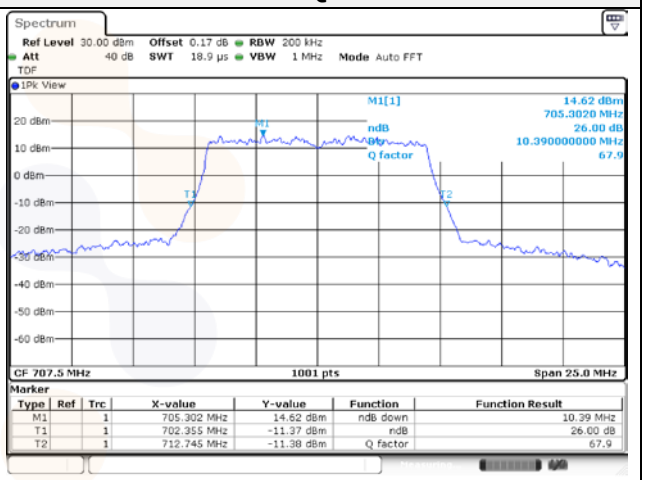
10M BW 16QAM Low ch.



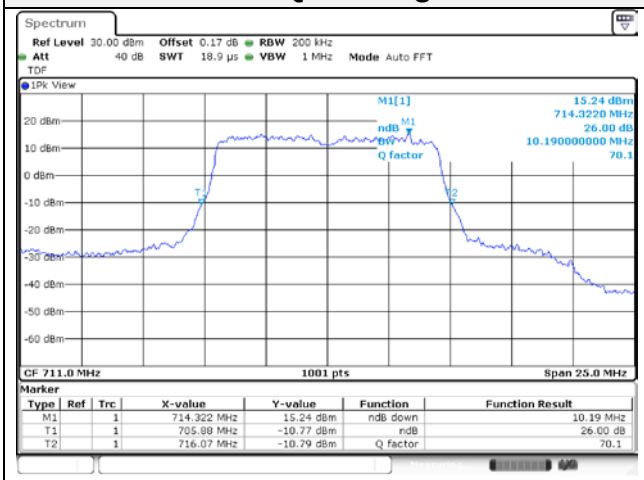
10M BW QPSK Mid ch.



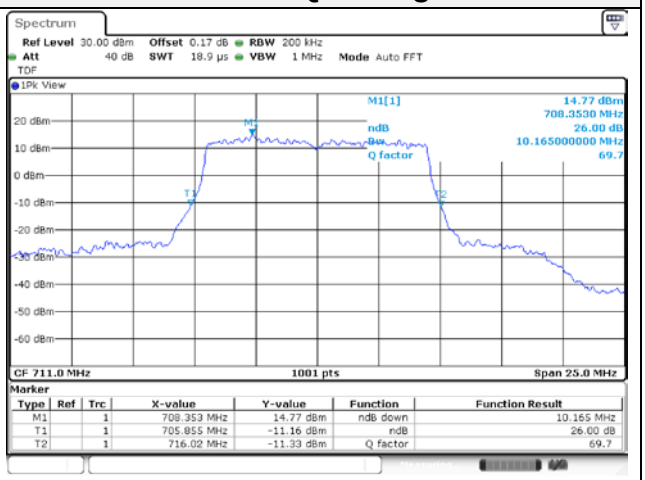
10M BW 16QAM Mid ch.



10M BW QPSK High ch.

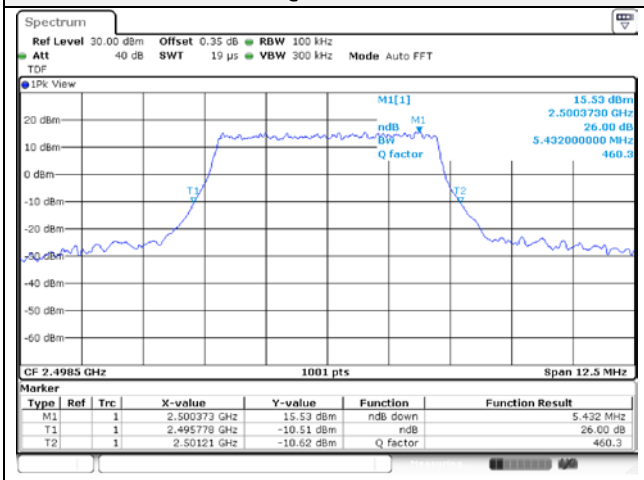


10M BW 16QAM High ch.

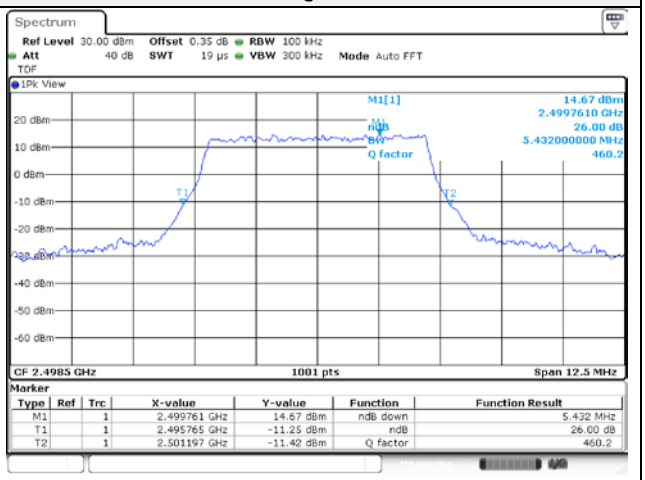


Test mode: LTE Band 41

5M BW QPSK Low ch.

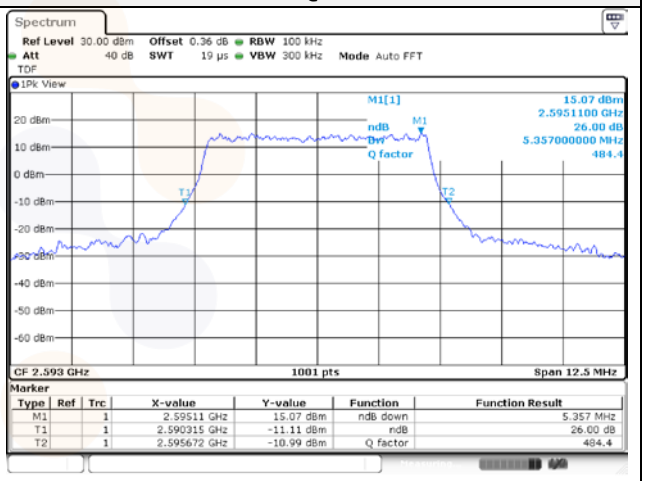


5M BW 16QAM Low ch.

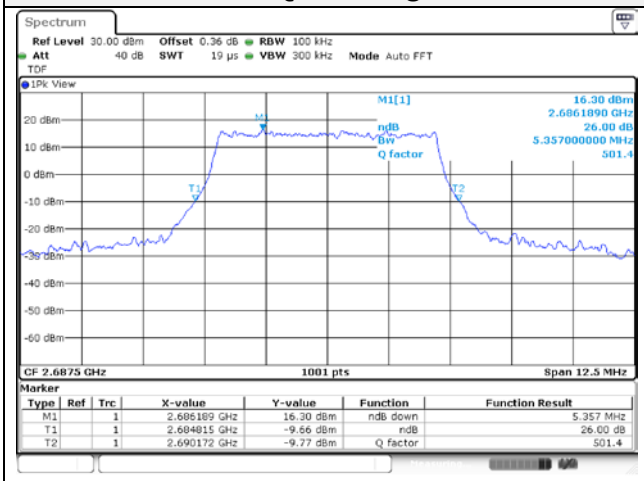


5M BW QPSK Mid ch.

5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.