



TEST REPORT

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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2024-03-26

2. Use of Report : Certification

3. Name of Product / Model : Smart Wearable / SM-L305U

4. Derivative Model : SM-L305F

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

6. FCC ID : A3LSML305

7. Date of Test : 2024-04-01 to 2024-04-22

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

9. Test method used : FCC Part 2
 FCC Part 27 Subpart C

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

Affirmation	Tested by Name : Kwonse Kim (Signature)	Technical Manager Name : Harim Lee (Signature)
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2024-04-23

Eurofins KCTL Co.,Ltd.

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REPORT REVISION HISTORY

Date	Revision	Page No
2024-04-23	Originally issued	-

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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

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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
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 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 : Smart Wearable
 Model : SM-L305U
 Derivative model : SM-L305F
 Modulation technique : WCDMA : QPSK
 : LTE : QPSK, 16QAM
 Power source : DC 3.88 V
 Antenna specification : WCDMA 1700, LTE B4/66 : PIFA + Metal Antenna
 : LTE B12/13/71 : PIFA + FPCB Antenna
 Antenna gain : WCDMA 1700, LTE B4/66 : -11.1 dBi
 : LTE B12/13 : -14.2 dBi
 : LTE B71 : -15.1 dBi
 Frequency range : WCDMA 1700 : 1 712.4 MHz ~ 1 752.6 MHz
 : LTE B4 : 1 710.7 MHz ~ 1 754.3 MHz
 : LTE B12 : 699.7 MHz ~ 715.3 MHz
 : LTE B13 : 779.5 MHz ~ 784.5 MHz
 : LTE B66 : 1 710.7 MHz ~ 1 779.3 MHz
 : LTE B71 : 665.5 MHz ~ 695.5 MHz
 Bandwidth : LTE B4 : 1.4/3/5/10/15/20 MHz
 : LTE B12 : 1.4/3/5/10 MHz
 : LTE B13 : 5/10 MHz
 : LTE B66 : 1.4/3/5/10/15/20 MHz
 : LTE B71 : 5/10/15/20 MHz
 Software version : L305U.001
 Hardware version : REV1.0
 Test device serial No. : Conducted : 4100a2704ea12b0f
 : Radiated : R3AX300MBVF, R3AX300MBGY
 Operation Temperature : 0 °C ~ 35 °C

Note.

1. The product equality letter includes detailed information about the differences between SM-L305U and SM-L305F model.

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
Wireless charger	RF TECH	EP-OL300	-	5.0 V, 3.0 A	FCC ID : A3LEPOL300 IC : 649E-EPOL300

2.2. Frequency/channel operations

This device contains the following capabilities:

WCDMA 1700, LTE B4/12/13/66/71

WCDMA 1700

Ch.	Frequency (MHz)
1312	1 712.4
1412	1 732.4
1513	1 752.6

Table 2.2-1.
RMC/HSDPA/HSUPA/
DC-HSDPA

LTE B4

Ch.	Frequency (MHz)
19957	1 710.7
20175	1 732.5
20393	1 754.3

Table 2.2-2. 1.4M BW

Ch.	Frequency (MHz)
19965	1 711.5
20175	1 732.5
20385	1 753.5

Table 2.2-3. 3M BW

Ch.	Frequency (MHz)
19975	1 712.5
20175	1 732.5
20375	1 752.5

Table 2.2-4. 5M BW

Ch.	Frequency (MHz)
20000	1 715.0
20175	1 732.5
20350	1 750.0

Table 2.2-5. 10M BW

Ch.	Frequency (MHz)
20025	1 717.5
20175	1 732.5
20325	1 747.5

Table 2.2-6. 15M BW

Ch.	Frequency (MHz)
20050	1 720.0
20175	1 732.5
20300	1 745.0

Table 2.2-7. 20M BW

LTE B12

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

Table 2.2-8. 1.4M BW

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

Table 2.2-9. 3M BW

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

Table 2.2-10. 5M BW

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

Table 2.2-11. 10M BW

LTE B13

Ch.	Frequency (MHz)
23205	779.5
23230	782.0
23255	784.5

Table 2.2-12. 5M BW

Ch.	Frequency (MHz)
-	-
23230	782.0
-	-

Table 2.2-13. 10M BW

LTE B66

Ch.	Frequency (MHz)
131979	1 710.7
132322	1 745.0
132665	1 779.3

Table 2.2-14. 1.4M BW

Ch.	Frequency (MHz)
131987	1 711.5
132322	1 745.0
132657	1 778.5

Table 2.2-15. 3M BW

Ch.	Frequency (MHz)
131997	1 712.5
132322	1 745.0
132647	1 777.5

Table 2.2-16. 5M BW

Ch.	Frequency (MHz)
132022	1 715.0
132322	1 745.0
132622	1 775.0

Table 2.2-17. 10M BW

Ch.	Frequency (MHz)
132047	1 717.5
132322	1 745.0
132597	1 772.5

Table 2.2-18. 15M BW

Ch.	Frequency (MHz)
132072	1 720.0
132322	1 745.0
132572	1 770.0

Table 2.2-19. 20M BW

LTE B71

Ch.	Frequency (MHz)
133147	665.5
133297	680.5
133447	695.5

Table 2.2-22. 5M BW

Ch.	Frequency (MHz)
133172	668.0
133297	680.5
133422	693.0

Table 2.2-23. 10M BW

Ch.	Frequency (MHz)
133197	670.5
133297	680.5
133397	690.5

Table 2.2-24. 15M BW

Ch.	Frequency (MHz)
133222	673.0
133297	680.5
133372	688.0

Table 2.2-25. 20M BW

Notes:

1. LTE B4(1 710 – 1 755 MHz) overlaps the entire frequency range of LTE B66(1 710 – 1 780 MHz) and they have same maximum tune-up power. Therefore, B66 was tested as a representative and the test data provided in this report covers B66 as well as B4 subpart to Part 27.

3. Maximum ERP/EIRP power

WCDMA 1700

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
WCDMA 1700	1 712.4 ~ 1 752.6	4M18F9W	19.61	0.091

LTE B12

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE B12	699.7 ~ 715.3	1M10G7D	8.87	0.008
		1M11W7D	7.83	0.006
	700.5 ~ 714.5	2M72G7D	8.37	0.007
		2M72W7D	7.26	0.005
	701.5 ~ 713.5	4M53G7D	8.09	0.006
		4M53W7D	7.01	0.005
	704.0 ~ 711.0	9M07G7D	7.89	0.006
		9M04W7D	7.06	0.005

LTE B13

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE B13	779.5 ~ 784.5	4M55G7D	11.70	0.015
		4M56W7D	10.67	0.012
	782	9M02G7D	11.50	0.014
		9M07W7D	10.53	0.011

LTE B66/4

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE B66/4	1 710.7 ~ 1 779.3	1M11G7D	17.96	0.063
		1M11W7D	16.92	0.049
	1 711.5 ~ 1 778.5	2M72G7D	18.08	0.064
		2M71W7D	17.22	0.053
	1 712.5 ~ 1 777.5	4M53G7D	18.20	0.066
		4M55W7D	17.28	0.053
	1 715.0 ~ 1 775.0	9M02G7D	18.47	0.070
		9M04W7D	17.61	0.058
	1 717.5 ~ 1 772.5	13M5G7D	18.53	0.071
		13M5W7D	17.63	0.058
	1 720.0 ~ 1 770.0	18M1G7D	18.42	0.069
		18M0W7D	17.59	0.057

LTE B71

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE B71	665.5 ~ 695.5	4M57G7D	12.89	0.019
		4M55W7D	11.85	0.015
	668.0 ~ 693.0	9M04G7D	12.45	0.018
		9M07W7D	11.31	0.014
	670.5 ~ 690.5	13M5G7D	12.59	0.018
		13M5W7D	11.50	0.014
	673.0 ~ 688.0	18M1G7D	12.15	0.016
		18M0W7D	11.27	0.013

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 27.53(c)(2) 27.53(g) 27.53(h)	Band Edge Emissions at Antenna Terminal	<43 + 10Log ₁₀ (P) dB at Band Edge and for all out of band emissions, <65 + 10Log ₁₀ (P) dB for all frequencies between 763 ~ 775 MHz and 793 ~ 805 MHz		Pass
	Spurious Emissions at Antenna Terminal			Pass
27.50(d)	Peak to Average Power Ratio	<13 dB		Pass
2.1055 27.54	Frequency stability	Emission must remain in band		Pass
27.50(d)	Equivalent Isotropic Radiated Power	<1 Watts max. EIRP	Radiated	Pass
27.50(b)(10) 27.50(c)(10)	Equivalent Radiated Power	<3 Watts max. ERP		Pass
2.1053 27.53(c)(2)(f) 27.53(g) 27.53(h)	Radiated Spurious Emissions	<43 + 10Log ₁₀ (P) dB for all out of band emissions, <-70 dBW/MHz EIRP - Wideband <-80 dBW/MHz EIRP- Narrowband		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

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) WCDMA: RMC
 - 2) LTE: QPSK, 16QAM
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
5. All configurations have been performed (Stand-alone, Stand-alone with TA and Strap).
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	Strap	With charger	Without charger		
		X-axis	X-axis	Y-axis	Z-axis
WCDMA 1700	With strap	-	-	O	-
	Without strap	-	-	-	-
LTE B12	With strap	O	-	-	-
	Without strap	-	-	-	-
LTE B13	With strap	O	-	-	-
	Without strap	-	-	-	-
LTE B66/4	With strap	-	-	O	-
	Without strap	-	-	-	-
LTE B71	With strap	O	-	-	-
	Without strap	-	-	-	-

7. Test Condition

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

1) Radiated measurement

Test Description	Mode	Condition		Test Channel
Effective Radiated power	WCDMA	RMC (12.2 kbps)		Low, Middle, High
	LTE	QPSK, 16QAM	RB Size: 1	
Radiated Spurious Emissions	WCDMA	RMC (12.2 kbps)		Low, Middle, High
	LTE	QPSK	RB Size: 1	

Band	Bandwidth (MHz)	RB size	RB offset
LTE B12	1.4, 3, 5, 10	1	Low, Middle, High
LTE B13	5, 10		
LTE B66/4	1.4, 3, 5, 10, 15, 20		
LTE B71	5, 10, 15, 20		

2) Conducted measurement

Test Description	Mode	Condition		Test Channel
OBW & 26 dB BW	WCDMA	RMC (12.2 kbps)		Low, Middle, High
	LTE	QPSK, 16QAM	RB Size: Full	
PAPR	WCDMA	RMC (12.2 kbps)		Middle
	LTE	QPSK, 16QAM	RB Size: Full	
Band Edge	WCDMA	RMC (12.2 kbps)		Low, High
	LTE	QPSK	RB Size: 1, Full	
Spurious Emissions	WCDMA	RMC (12.2 kbps)		Low, Middle, High
	LTE	QPSK	RB Size: 1	

Band	Bandwidth (MHz)	RB size	RB offset
LTE B12	1.4, 3, 5, 10	1	0, 5, 14, 24, 49
		Full	0
LTE B13	5, 10	1	0, 24, 49
		Full	0
LTE B66/4	1.4, 3, 5, 10, 15, 20	1	0, 5, 14, 24, 49, 74, 99
		Full	0
LTE B71	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 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	0.9 dB	
Conducted spurious emissions	1.9 dB	
Radiated spurious emissions	Below 1 000 MHz	2.5 dB
	1 000 MHz ~ 18 000 MHz	2.5 dB
	Above 1 8000 MHz	2.6 dB

6. Measurement results explanation example

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	5.82	16000	9.29
50	6.09	17000	9.50
100	6.15	18000	9.55
200	6.09	19000	9.31
300	6.28	20000	8.51
400	6.51	21000	9.00
500	6.57	22000	9.52
600	6.62	23000	9.53
700	6.67	24000	9.95
800	6.70	25000	10.82
900	6.74	26000	10.60
1000	6.76	26500	10.73
2000	7.06	27000	10.59
3000	7.25	28000	11.48
4000	7.39	29000	10.38
5000	7.54	30000	10.69
6000	7.94	31000	11.57
7000	8.10	32000	11.70
8000	8.21	33000	12.00
9000	8.26	34000	11.88
10000	7.36	35000	11.65
11000	8.35	36000	11.80
12000	8.40	37000	11.51
13000	8.62	38000	10.82
14000	8.71	39000	11.00
15000	9.02	40000	11.30

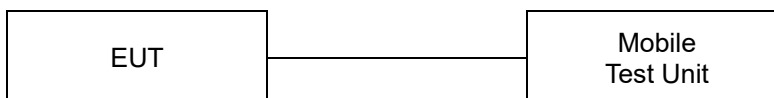
Note.

- 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.

Note:

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

Test results

Test Band	Test mode	Maximum Average Power (dBm)		
		Channel		
		Low	Middle	High
WCDMA 1700	RMC	22.50	22.50	22.62
	HSDPA-Subtest 1	22.34	22.46	22.60
	HSDPA-Subtest 2	22.43	22.40	22.56
	HSDPA-Subtest 3	22.43	22.31	22.46
	HSDPA-Subtest 4	22.39	22.40	22.48
	HSUPA-Subtest 1	21.40	21.40	21.46
	HSUPA-Subtest 2	19.48	19.45	19.58
	HSUPA-Subtest 3	20.54	20.51	20.59
	HSUPA-Subtest 4	19.48	19.42	19.63
	HSUPA-Subtest 5	22.07	22.02	22.57
	DC-HSDPA-Subtest 1	20.92	20.64	20.78
	DC-HSDPA-Subtest 2	20.72	20.77	20.80
	DC-HSDPA-Subtest 3	20.81	20.76	20.74
	DC-HSDPA-Subtest 4	20.75	20.75	20.89

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B4	1.4	QPSK	1	0	21.98	21.98	22.28
			1	3	22.15	21.95	22.51
			1	5	22.17	22.25	22.46
			3	0	22.37	22.56	22.60
			3	1	22.37	22.55	22.60
			3	3	22.40	22.54	22.57
			6	0	21.35	21.51	21.60
		16QAM	1	0	21.32	21.56	21.40
			1	3	21.24	21.53	21.46
			1	5	21.29	21.39	21.41
			3	0	21.41	21.39	21.70
			3	1	21.32	21.39	21.66
			3	3	21.34	21.41	21.63
			6	0	20.46	20.47	20.61
	3	QPSK	1	0	21.95	22.09	22.20
			1	8	21.80	22.01	22.13
			1	14	22.13	21.99	22.06
			8	0	21.41	21.59	21.62
			8	4	21.37	21.56	21.57
			8	7	21.37	21.55	21.58
			15	0	21.39	21.57	21.59
		16QAM	1	0	21.76	21.58	21.56
			1	8	21.75	21.37	21.64
			1	14	21.18	21.46	21.46
			8	0	20.51	20.53	20.56
			8	4	20.45	20.56	20.59
			8	7	20.47	20.45	20.54
			15	0	20.34	20.55	20.57
	5	QPSK	1	0	22.07	22.25	22.23
			1	12	22.15	22.22	22.11
			1	24	22.16	21.82	21.93
			12	0	21.41	21.56	21.58
			12	7	21.37	21.52	21.52
			12	13	21.30	21.47	21.48
			25	0	21.37	21.50	21.50
		16QAM	1	0	21.31	21.62	21.56
			1	12	21.17	21.39	21.45
			1	24	21.31	21.45	21.56
			12	0	20.41	20.49	20.46
			12	7	20.38	20.45	20.41
			12	13	20.33	20.41	20.38
			25	0	20.35	20.49	20.49
	10	QPSK	1	0	22.31	22.20	22.37
			1	25	21.93	22.05	22.26
			1	49	21.92	21.86	22.16
			25	0	21.57	21.59	21.75
			25	12	21.46	21.49	21.66
			25	25	21.40	21.45	21.57
			50	0	21.49	21.47	21.67
		16QAM	1	0	21.63	21.77	21.69
			1	25	21.68	21.54	21.48
			1	49	21.54	21.29	21.48
			25	0	20.54	20.63	20.77
			25	12	20.47	20.53	20.65
			25	25	20.39	20.46	20.59
			50	0	20.50	20.50	20.66

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B4	15	QPSK	1	0	22.30	22.40	22.40
			1	36	21.99	22.09	22.21
			1	74	21.77	21.87	21.87
			36	0	21.62	21.72	21.80
			36	18	21.50	21.55	21.68
			36	37	21.38	21.46	21.55
		16QAM	75	0	21.50	21.59	21.69
			1	0	21.89	21.77	21.98
			1	36	21.62	21.39	21.50
			1	74	21.42	21.23	21.49
			36	0	20.60	20.73	20.78
			36	18	20.47	20.56	20.62
			36	37	20.37	20.46	20.53
			75	0	20.52	20.53	20.67
	20	QPSK	1	0	22.47	22.58	22.69
			1	49	21.91	22.19	22.22
			1	99	21.77	21.98	22.02
			50	0	21.67	21.72	21.88
			50	24	21.49	21.55	21.68
			50	50	21.36	21.38	21.55
		16QAM	100	0	21.51	21.56	21.73
			1	0	21.82	21.93	22.10
			1	49	21.39	21.52	21.73
			1	99	21.31	21.32	21.33
			50	0	20.67	20.71	20.85
			50	24	20.49	20.50	20.67
			50	50	20.34	20.36	20.50
			100	0	20.52	20.53	20.72

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B12	1.4	QPSK	1	0	22.79	22.51	22.08
			1	3	22.82	22.80	22.05
			1	5	22.81	22.58	22.05
			3	0	22.98	22.81	22.62
			3	1	22.99	22.80	22.61
			3	3	22.97	22.78	22.58
			6	0	22.28	22.09	21.93
		16QAM	1	0	22.23	22.21	21.80
			1	3	22.29	22.23	21.78
			1	5	22.31	22.27	21.79
			3	0	22.18	22.04	21.93
			3	1	22.22	22.03	21.94
			3	3	22.26	22.03	21.93
			6	0	21.23	21.09	20.93
	3	QPSK	1	0	22.57	22.36	22.47
			1	8	22.61	22.35	22.41
			1	14	22.52	22.38	22.49
			8	0	22.27	22.06	21.92
			8	4	22.24	22.08	21.91
			8	7	22.24	22.05	21.90
			15	0	22.24	22.09	21.94
		16QAM	1	0	22.37	22.14	21.83
			1	8	22.34	22.14	21.81
			1	14	22.37	22.10	21.79
			8	0	21.32	21.09	20.95
			8	4	21.32	21.08	20.97
			8	7	21.31	21.06	20.95
			15	0	21.23	21.09	20.93
	5	QPSK	1	0	22.34	22.41	22.13
			1	12	22.36	22.35	22.16
			1	24	22.29	22.47	22.01
			12	0	22.21	22.12	21.97
			12	7	22.20	22.08	21.96
			12	13	22.20	22.06	21.92
			25	0	22.20	22.06	21.95
		16QAM	1	0	22.18	22.12	21.84
			1	12	22.08	22.05	21.80
			1	24	22.08	22.04	21.76
			12	0	21.19	21.02	20.97
			12	7	21.15	21.03	20.95
			12	13	21.17	21.00	20.89
			25	0	21.17	21.06	20.99
	10	QPSK	1	0	22.52	22.53	22.23
			1	25	22.43	22.37	22.27
			1	49	22.24	22.28	22.19
			25	0	22.21	22.23	22.05
			25	12	22.15	22.10	22.00
			25	25	22.15	22.03	21.94
		16QAM	50	0	22.17	22.20	22.00
			1	0	22.33	22.06	22.17
			1	25	22.22	21.95	22.02
			1	49	22.21	21.98	21.93
			25	0	21.22	21.16	21.09
			25	12	21.18	21.09	21.01
			25	25	21.12	21.04	20.95
			50	0	21.17	21.10	21.04

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B13	5	QPSK	1	0	23.21	23.17	23.25
			1	12	23.10	23.06	23.16
			1	24	22.99	23.00	23.11
			12	0	22.15	22.14	22.22
			12	7	22.08	22.09	22.20
			12	13	22.02	22.03	22.14
			25	0	22.09	22.10	22.16
		16QAM	1	0	21.95	22.05	22.04
			1	12	21.81	21.95	21.95
			1	24	21.73	21.87	21.90
			12	0	21.11	21.10	21.23
			12	7	21.05	21.05	21.19
			12	13	21.03	21.02	21.16
			25	0	21.06	21.10	21.17
	10	QPSK	1	0	-	23.35	-
			1	25	-	23.11	-
			1	49	-	22.98	-
			25	0	-	22.17	-
			25	12	-	22.09	-
			25	25	-	22.01	-
			50	0	-	22.09	-
		16QAM	1	0	-	22.42	-
			1	25	-	22.15	-
			1	49	-	22.01	-
			25	0	-	21.23	-
			25	12	-	21.12	-
			25	25	-	20.98	-
			50	0	-	21.14	-

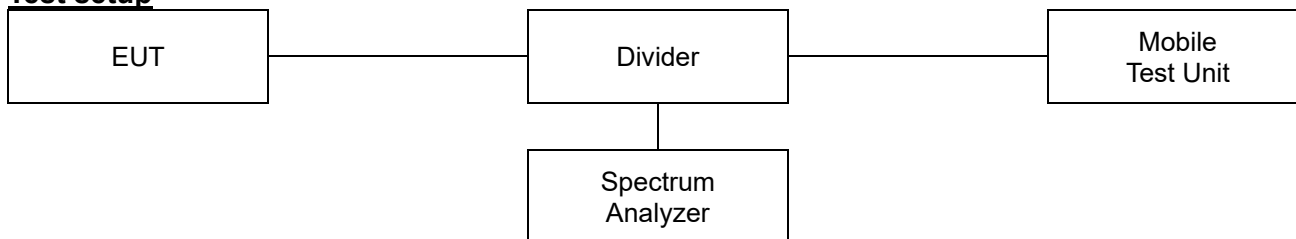
Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B66	1.4	QPSK	1	0	22.19	22.17	22.40
			1	3	22.08	22.12	22.40
			1	5	22.23	22.38	22.46
			3	0	22.48	22.77	22.87
			3	1	22.48	22.77	22.88
			3	3	22.51	22.78	22.85
			6	0	21.56	21.77	21.90
		16QAM	1	0	21.78	21.73	21.86
			1	3	21.65	21.57	21.84
			1	5	21.65	21.72	21.79
			3	0	21.55	21.64	21.99
			3	1	21.59	21.62	21.90
			3	3	21.58	21.70	21.90
			6	0	20.57	20.77	20.92
	3	QPSK	1	0	22.08	22.49	22.66
			1	8	22.07	22.40	22.57
			1	14	22.04	22.21	22.39
			8	0	21.63	21.79	21.95
			8	4	21.60	21.74	21.94
			8	7	21.57	21.74	21.90
			15	0	21.61	21.79	21.91
		16QAM	1	0	21.56	21.72	21.90
			1	8	21.52	21.63	21.94
			1	14	21.49	21.72	21.78
			8	0	20.72	20.71	20.95
			8	4	20.72	20.70	20.92
			8	7	20.58	20.67	20.84
			15	0	20.60	20.80	20.93
	5	QPSK	1	0	22.11	22.37	22.60
			1	12	21.99	22.22	22.49
			1	24	21.99	22.21	22.34
			12	0	21.65	21.81	22.02
			12	7	21.60	21.77	21.96
			12	13	21.56	21.74	21.93
			25	0	21.60	21.79	21.93
		16QAM	1	0	21.69	21.80	22.00
			1	12	21.55	21.67	21.93
			1	24	21.54	21.57	21.96
			12	0	20.63	20.80	20.95
			12	7	20.61	20.37	20.83
			12	13	20.61	20.29	20.85
			25	0	20.58	20.75	20.91
	10	QPSK	1	0	22.37	22.56	22.68
			1	25	22.10	22.33	22.47
			1	49	21.95	22.25	22.41
			25	0	21.76	21.86	22.06
			25	12	21.65	21.78	21.98
			25	25	21.56	21.74	21.91
			50	0	21.68	21.78	21.98
		16QAM	1	0	21.83	21.92	21.98
			1	25	21.75	21.91	21.67
			1	49	21.68	21.75	21.61
			25	0	20.74	20.86	21.11
			25	12	20.64	20.77	21.01
			25	25	20.56	20.70	20.90
			50	0	20.65	20.74	21.01

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B66	15	QPSK	1	0	22.62	22.71	22.88
			1	36	22.20	22.38	22.49
			1	74	22.25	22.31	22.29
			36	0	21.98	21.97	22.08
			36	18	21.82	21.83	21.97
			36	37	21.69	21.74	21.85
		16QAM	75	0	21.81	21.84	21.97
			1	0	22.12	22.08	22.23
			1	36	21.78	21.76	21.87
			1	74	21.74	21.63	21.71
			36	0	20.92	20.99	21.10
			36	18	20.77	20.83	20.89
			36	37	20.67	20.74	20.81
			75	0	20.80	20.85	20.94
	20	QPSK	1	0	22.65	22.71	23.00
			1	49	22.27	22.28	22.59
			1	99	21.90	22.04	22.32
			50	0	21.93	21.97	22.10
			50	24	21.75	21.78	21.94
			50	50	21.61	21.65	21.75
		16QAM	100	0	21.76	21.83	21.93
			1	0	22.09	22.30	22.21
			1	49	21.69	21.89	21.82
			1	99	21.71	21.68	21.50
			50	0	20.90	20.96	21.09
			50	24	20.70	20.80	20.88
			50	50	20.57	20.66	20.73
			100	0	20.74	20.85	20.93

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B71	5	QPSK	1	0	22.32	22.32	22.27
			1	12	22.50	22.42	22.19
			1	24	22.33	22.22	22.14
			12	0	22.09	22.03	21.97
			12	7	22.06	22.00	21.96
			12	13	22.02	21.97	21.94
			25	0	22.05	21.98	21.94
		16QAM	1	0	22.08	22.14	22.02
			1	12	21.98	22.08	21.90
			1	24	21.90	22.00	21.83
			12	0	21.08	20.95	20.97
			12	7	21.04	20.94	20.92
			12	13	21.01	20.90	20.88
			25	0	21.02	20.95	20.95
	10	QPSK	1	0	22.53	22.41	22.59
			1	25	22.28	22.22	22.39
			1	49	22.17	22.06	22.03
			25	0	22.05	22.02	22.05
			25	12	21.98	21.96	22.01
			25	25	21.89	21.93	21.97
			50	0	22.01	21.99	22.00
		16QAM	1	0	22.23	22.05	21.94
			1	25	22.06	21.92	21.78
			1	49	21.95	21.84	21.68
			25	0	21.07	21.07	21.07
			25	12	20.98	21.01	21.04
			25	25	20.91	20.98	21.00
			50	0	20.98	20.99	21.04
	15	QPSK	1	0	22.58	22.47	22.33
			1	36	22.21	22.46	22.21
			1	74	22.26	22.38	22.15
			36	0	22.08	22.06	22.09
			36	18	21.96	22.02	22.00
			36	37	21.86	21.98	21.92
			75	0	21.96	22.01	21.99
		16QAM	1	0	22.20	22.22	22.04
			1	36	21.96	22.02	21.81
			1	74	21.81	21.87	21.75
			36	0	21.06	21.09	21.07
			36	18	20.95	21.05	20.98
			36	37	20.88	20.98	20.88
			75	0	20.96	21.02	20.98
	20	QPSK	1	0	22.35	22.60	22.54
			1	49	22.21	22.37	22.02
			1	99	21.83	22.27	21.85
			50	0	22.06	22.08	22.02
			50	24	21.93	21.97	21.89
			50	50	21.83	21.88	21.81
			100	0	21.95	21.99	21.91
		16QAM	1	0	22.38	22.31	22.41
			1	49	22.02	22.09	22.20
			1	99	21.87	21.87	21.97
			50	0	21.05	21.07	21.00
			50	24	20.90	20.97	20.91
			50	50	20.79	20.88	20.79
			100	0	20.93	20.98	20.95

7.2. 99% Occupied Bandwidth & 26dB 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

- 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.
- The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- 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.
- 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.
- Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- Determine the reference value by either of the following:
 - 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).
 - Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- 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.
- 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 $1.5 \times \text{OBW}$ 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 with all bandwidth and modulation.

Test results

Test mode		Channel	26 dB Bandwidth (MHz)	99 % Bandwidth (MHz)
WCDMA1700	RMC	Low	4.74	4.17
		Middle	4.75	4.18
		High	4.77	4.17

Test Band	Bandwidth (MHz)	Channel	Test mode	26dB Bandwidth (MHz)	99 % Bandwidth (MHz)
LTE B12	1.4	Low	QPSK	1.33	1.10
			16QAM	1.35	1.10
		Middle	QPSK	1.34	1.10
			16QAM	1.35	1.10
		High	QPSK	1.33	1.10
			16QAM	1.34	1.10
	3	Low	QPSK	3.12	2.72
			16QAM	3.12	2.72
		Middle	QPSK	3.12	2.71
			16QAM	3.11	2.70
		High	QPSK	3.12	2.70
			16QAM	3.12	2.70
	5	Low	QPSK	5.48	4.53
			16QAM	5.38	4.53
		Middle	QPSK	5.33	4.51
			16QAM	5.32	4.53
		High	QPSK	5.38	4.52
			16QAM	5.35	4.51
	10	Low	QPSK	10.27	9.07
			16QAM	10.44	9.04
		Middle	QPSK	10.39	9.02
			16QAM	10.44	9.04
		High	QPSK	10.32	8.97
			16QAM	10.37	8.99

Test Band	Bandwidth (MHz)	Channel	Test mode	26dB Bandwidth (MHz)	99 % Bandwidth (MHz)
LTE B13	5	Low	QPSK	5.32	4.53
			16QAM	5.42	4.51
		Middle	QPSK	5.42	4.52
			16QAM	5.38	4.56
		High	QPSK	5.42	4.55
			16QAM	5.40	4.52
	10	Middle	QPSK	10.19	9.02
			16QAM	10.32	9.07



Test Band	Bandwidth (MHz)	Channel	Test mode	26dB Bandwidth (MHz)	99 % Bandwidth (MHz)
LTE B66/4	1.4	Low	QPSK	1.34	1.10
			16QAM	1.32	1.10
		Middle	QPSK	1.34	1.10
			16QAM	1.37	1.10
		High	QPSK	1.34	1.09
			16QAM	1.36	1.10
	3	Low	QPSK	3.09	2.72
			16QAM	3.08	2.70
		Middle	QPSK	3.10	2.70
			16QAM	3.12	2.71
		High	QPSK	3.12	2.70
			16QAM	3.13	2.70
	5	Low	QPSK	5.37	4.53
			16QAM	5.42	4.55
		Middle	QPSK	5.41	4.52
			16QAM	5.42	4.52
		High	QPSK	5.31	4.52
			16QAM	5.35	4.53
	10	Low	QPSK	10.22	8.99
			16QAM	10.42	9.02
		Middle	QPSK	10.47	9.02
			16QAM	10.19	9.04
		High	QPSK	10.47	8.97
			16QAM	10.34	9.02
	15	Low	QPSK	15.21	13.49
			16QAM	15.10	13.45
		Middle	QPSK	15.25	13.52
			16QAM	15.06	13.49
		High	QPSK	15.36	13.49
			16QAM	14.95	13.49
	20	Low	QPSK	19.78	17.98
			16QAM	19.83	17.93
		Middle	QPSK	20.18	17.98
			16QAM	19.83	18.03
		High	QPSK	20.33	18.08
			16QAM	19.68	17.98

Test Band	Bandwidth (MHz)	Channel	Test mode	26dB Bandwidth (MHz)	99 % Bandwidth (MHz)
LTE B71	5	Low	QPSK	5.35	4.57
			16QAM	5.27	4.52
		Middle	QPSK	5.33	4.51
			16QAM	5.38	4.55
		High	QPSK	5.38	4.53
			16QAM	5.37	4.55
	10	Low	QPSK	10.12	9.04
			16QAM	10.47	9.02
		Middle	QPSK	10.29	9.02
			16QAM	10.39	9.02
		High	QPSK	10.29	9.02
			16QAM	10.19	9.07
	15	Low	QPSK	15.10	13.49
			16QAM	15.10	13.52
		Middle	QPSK	15.29	13.45
			16QAM	14.87	13.49
		High	QPSK	15.02	13.52
			16QAM	15.14	13.49
	20	Low	QPSK	19.68	17.98
			16QAM	19.73	18.03
		Middle	QPSK	19.88	18.03
			16QAM	19.83	17.93
		High	QPSK	20.03	18.08
			16QAM	20.03	18.03

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

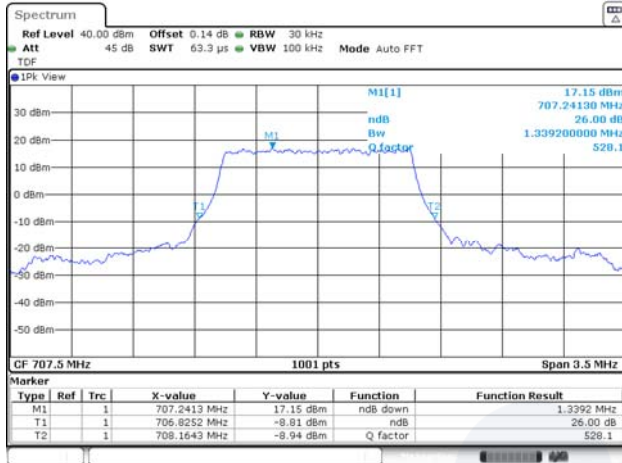
26dB Bandwidth

Test mode: WCDMA 1700

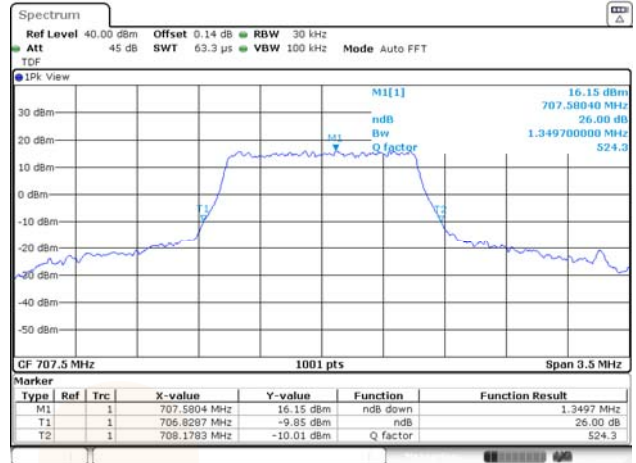


Test mode: LTE B12

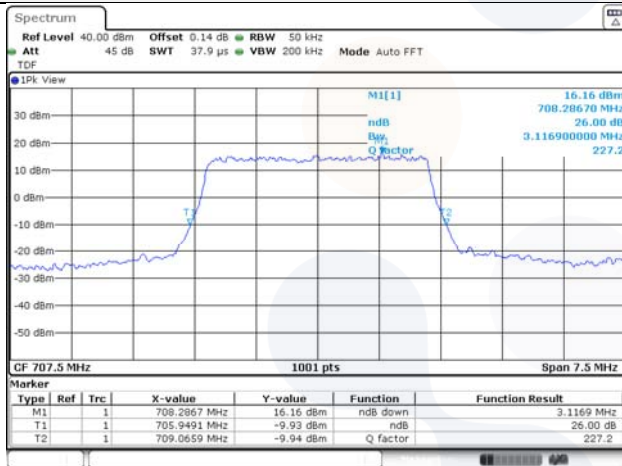
1.4M BW QPSK Middle channel



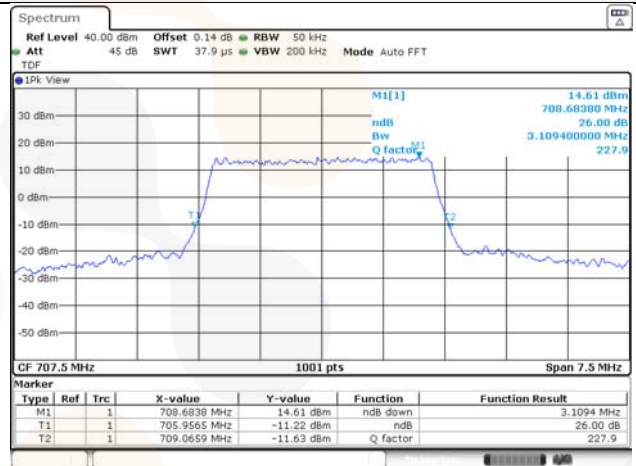
1.4M BW 16QAM Middle channel



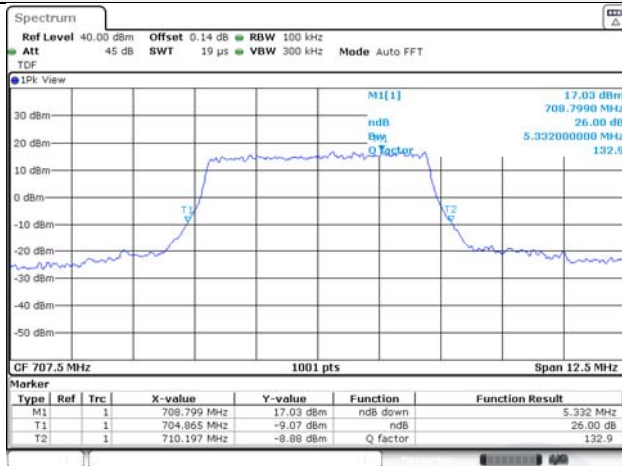
3M BW QPSK Middle channel



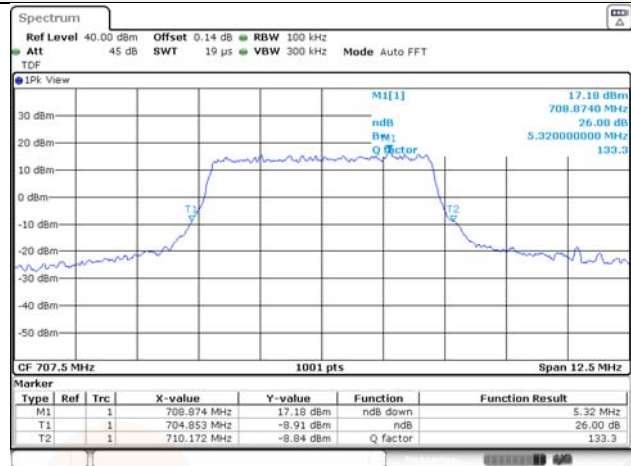
3M BW 16QAM Middle channel



5M BW QPSK Middle channel



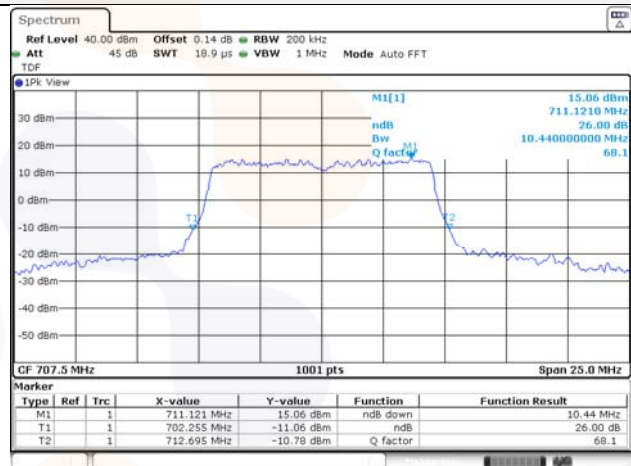
5M BW 16QAM Middle channel



10M BW QPSK Middle channel

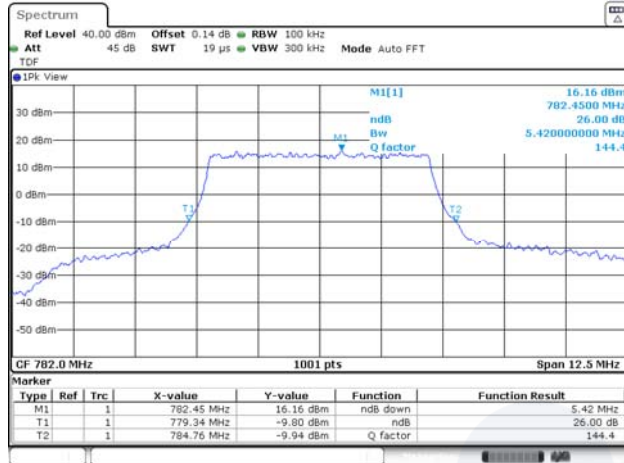


10M BW 16QAM Middle channel

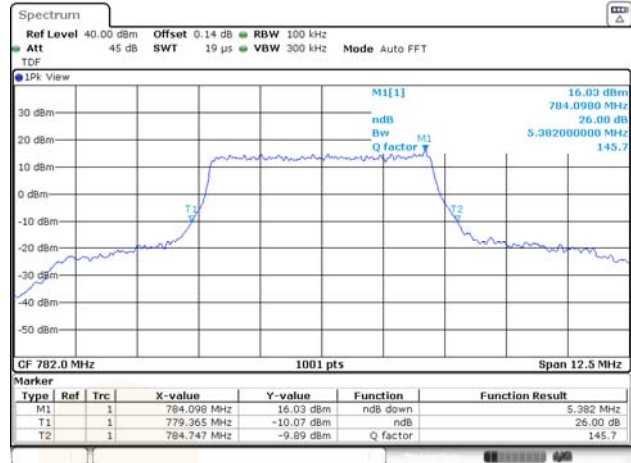


Test mode: LTE B13

5M BW QPSK Middle channel



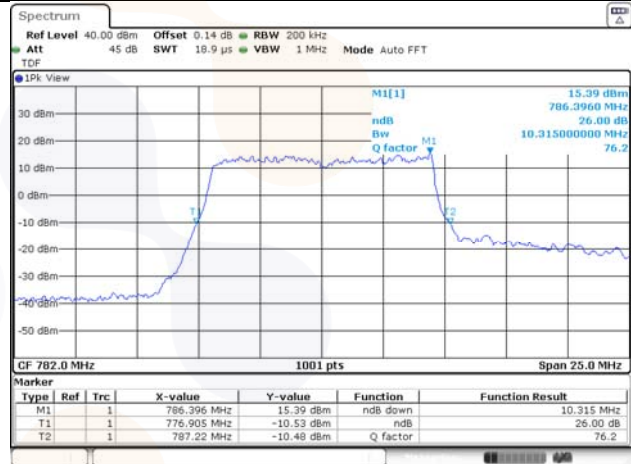
5M BW 16QAM Middle channel



10M BW QPSK Middle channel

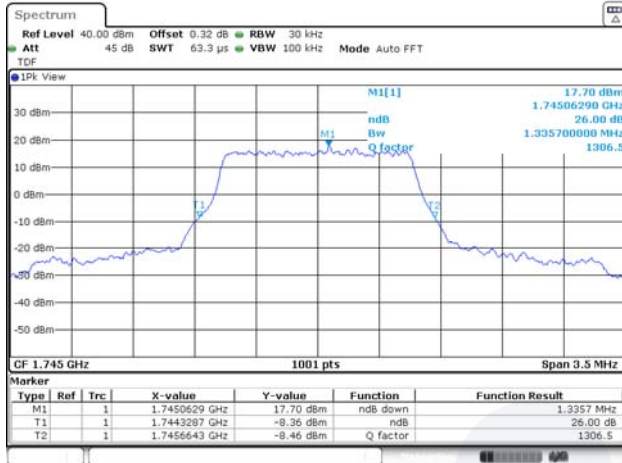


10M BW 16QAM Middle channel

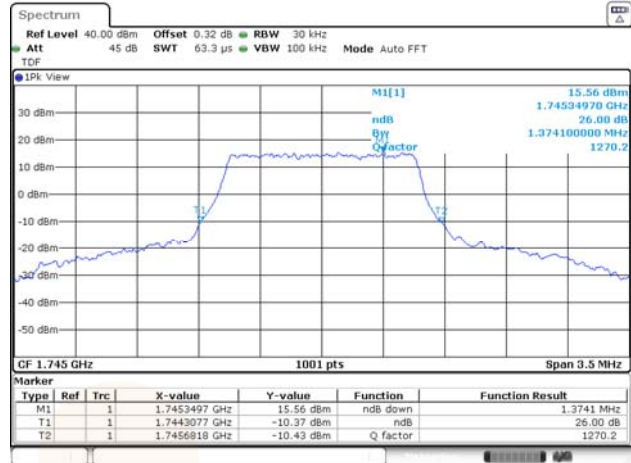


Test mode: LTE B66/4

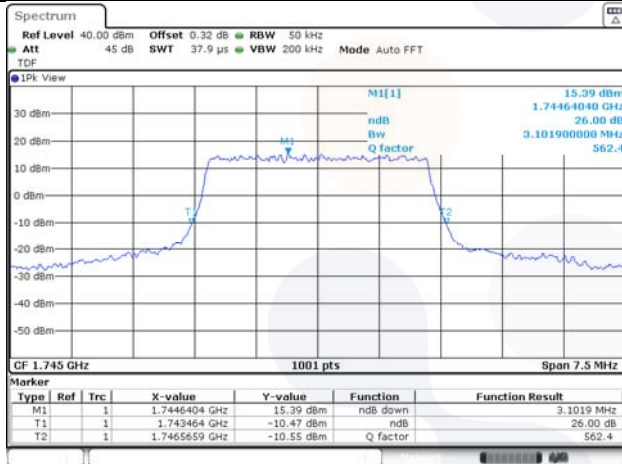
1.4M BW QPSK Middle channel



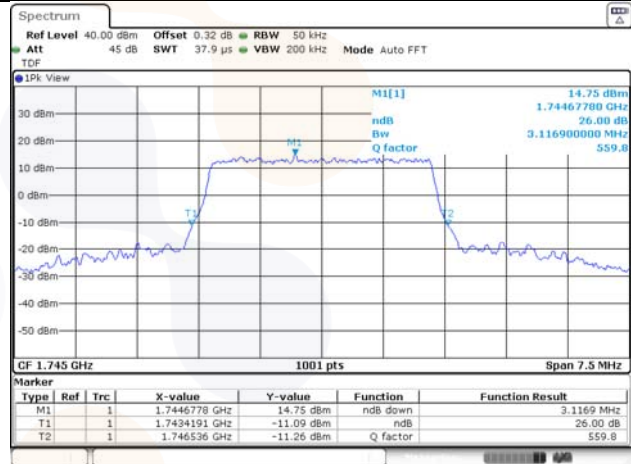
1.4M BW 16QAM Middle channel



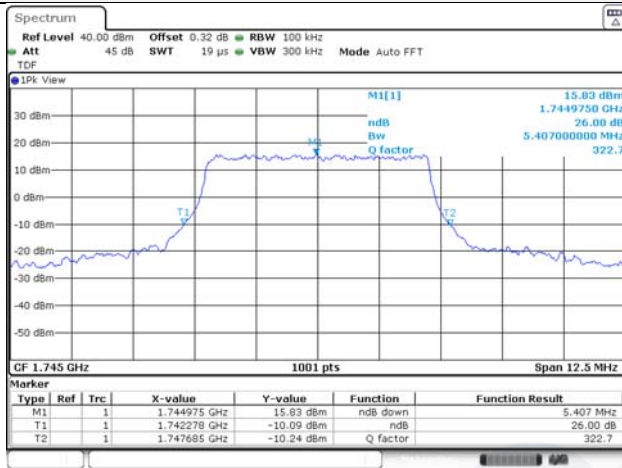
3M BW QPSK Middle channel



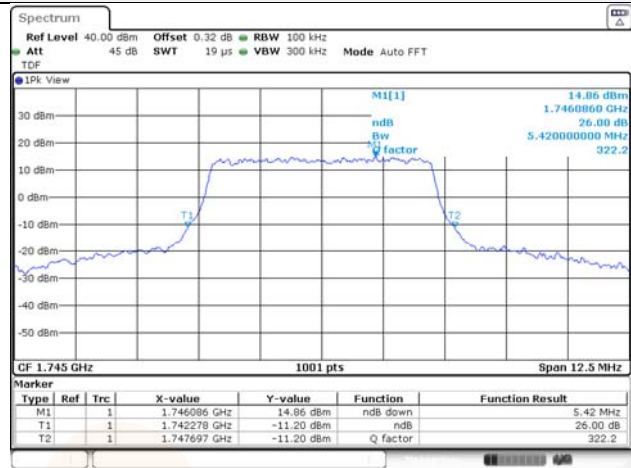
3M BW 16QAM Middle channel



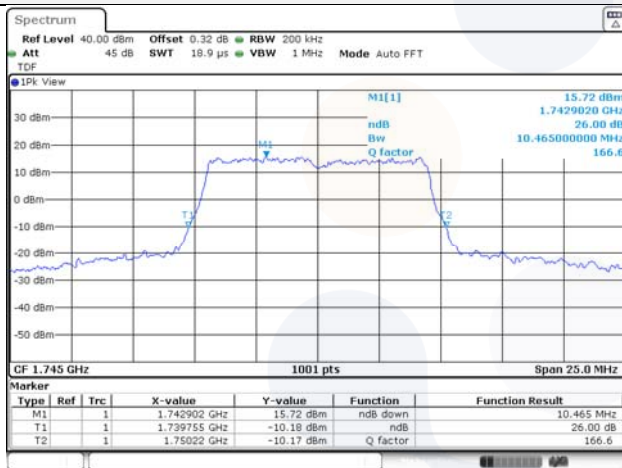
5M BW QPSK Middle channel



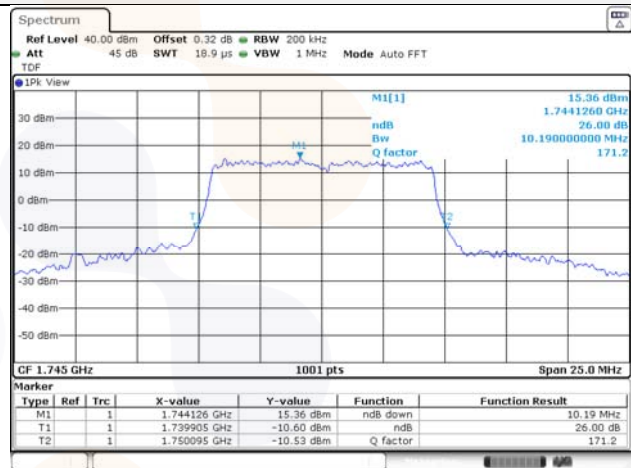
5M BW 16QAM Middle channel



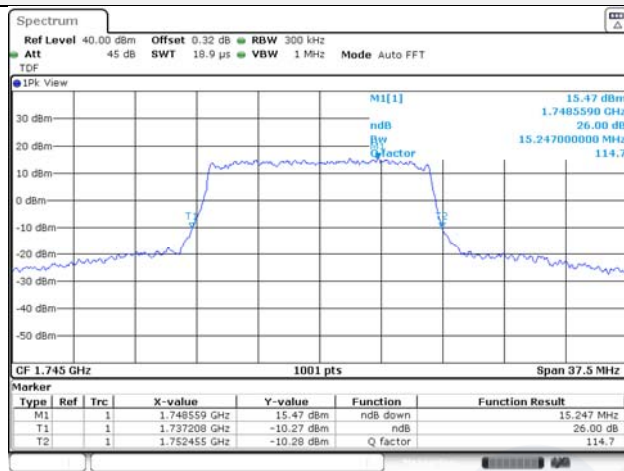
10M BW QPSK Middle channel



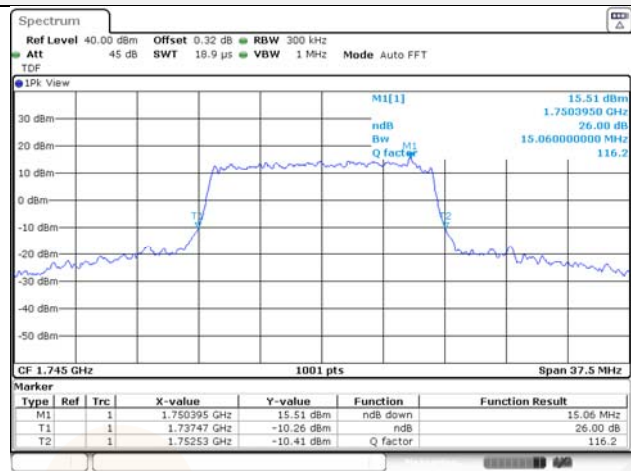
10M BW 16QAM Middle channel



15M BW QPSK Middle channel



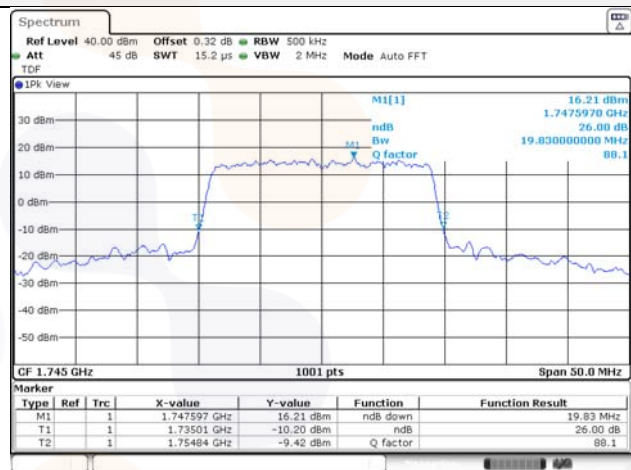
15M BW 16QAM Middle channel



20M BW QPSK Middle channel

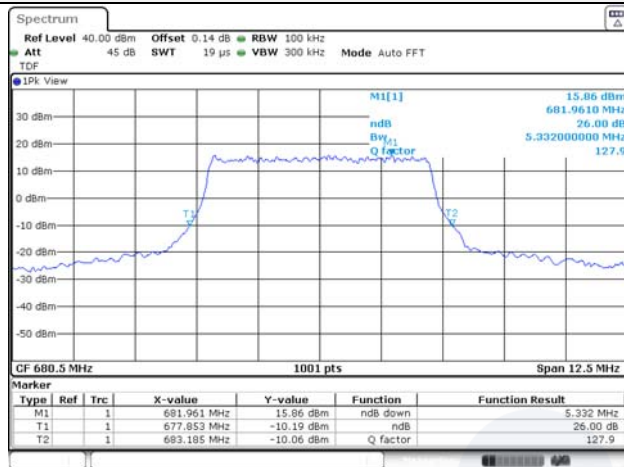


20M BW 16QAM Middle channel

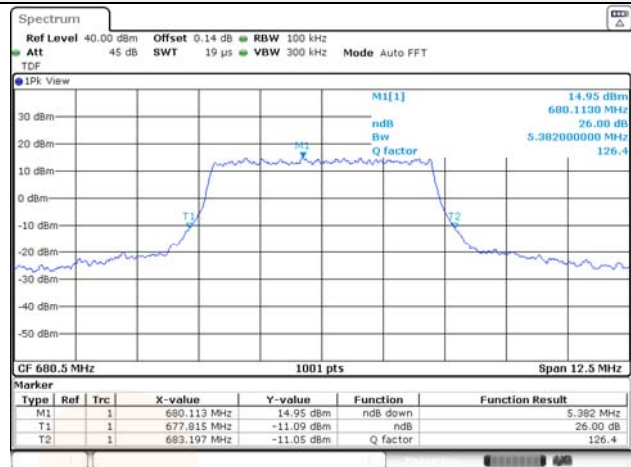


Test mode: LTE B71

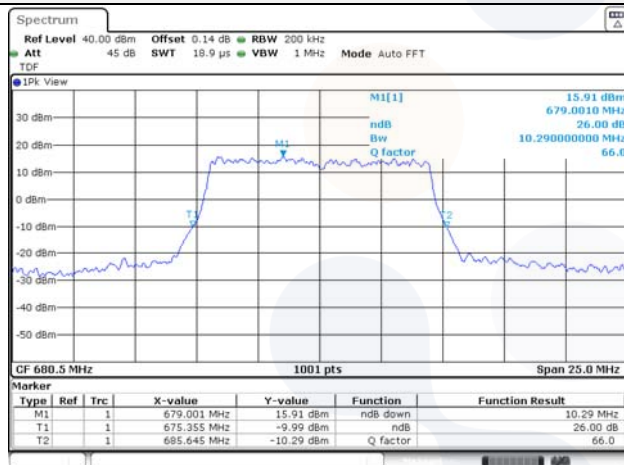
5M BW QPSK Middle channel



5M BW 16QAM Middle channel



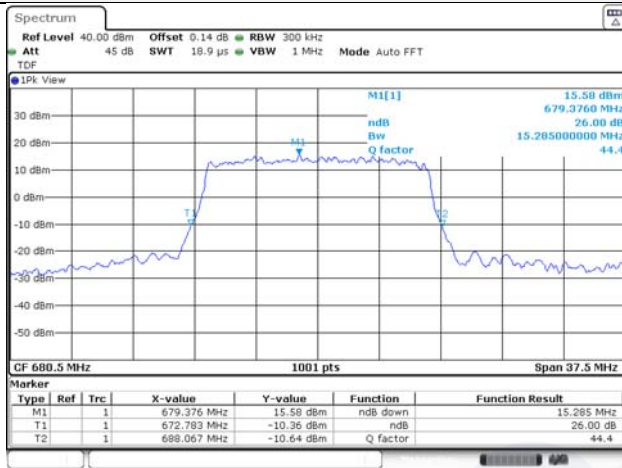
10M BW QPSK Middle channel



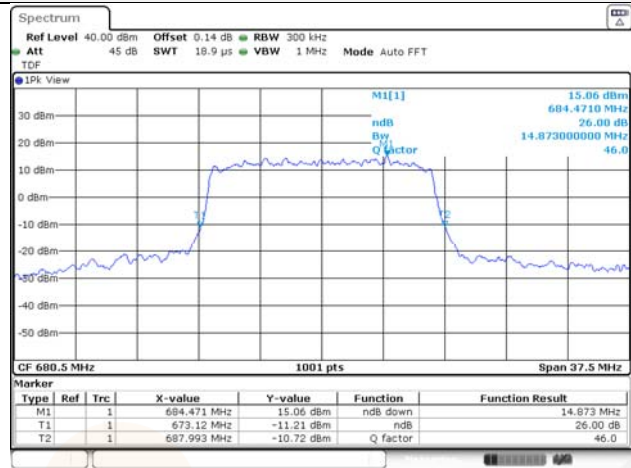
10M BW 16QAM Middle channel



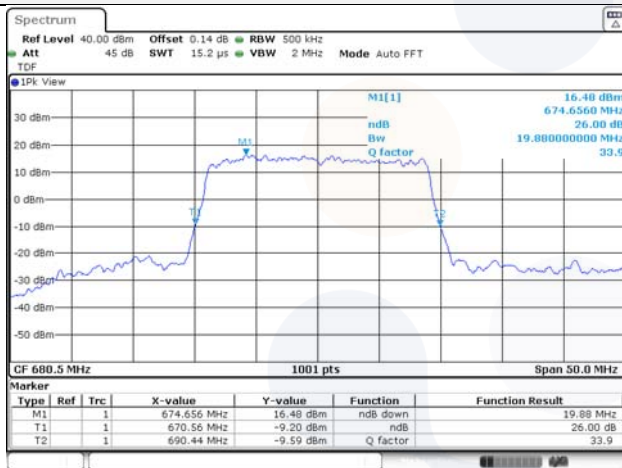
15M BW QPSK Middle channel



15M BW 16QAM Middle channel



20M BW QPSK Middle channel

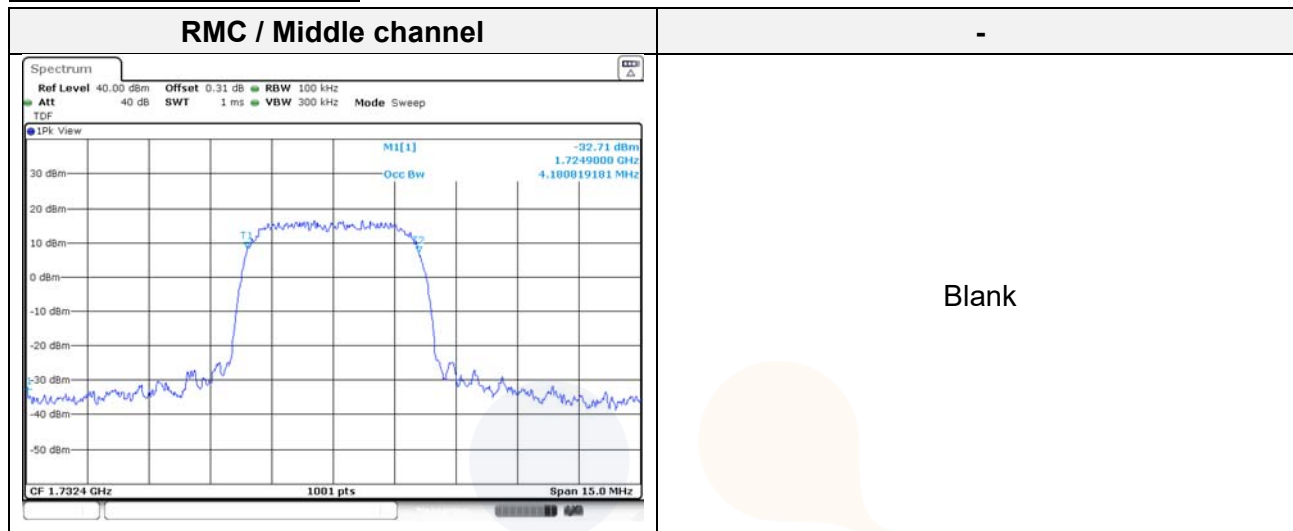


20M BW 16QAM Middle channel



99% Occupied Bandwidth

Test mode: WCDMA 1700



Test mode: LTE B12

1.4M BW QPSK Middle channel



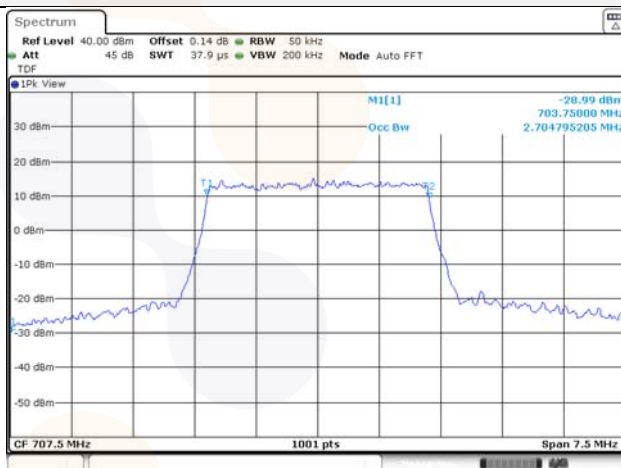
1.4M BW 16QAM Middle channel



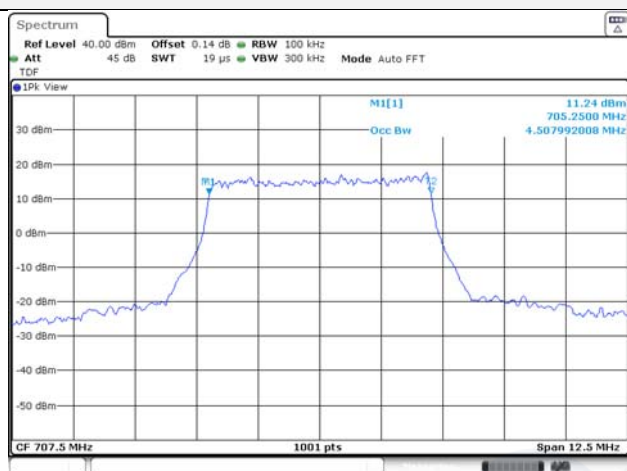
3M BW QPSK Middle channel



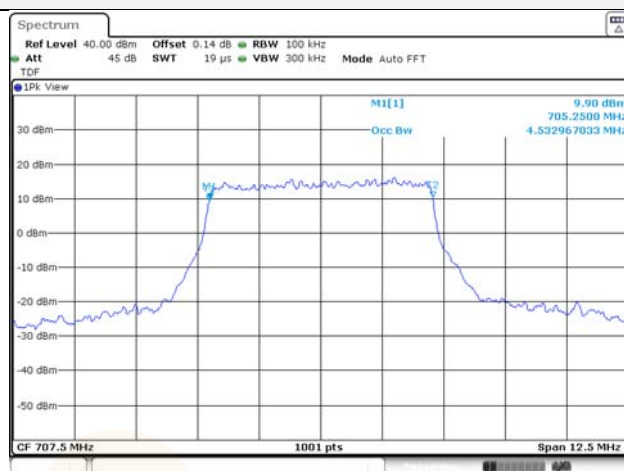
3M BW 16QAM Middle channel



5M BW QPSK Middle channel



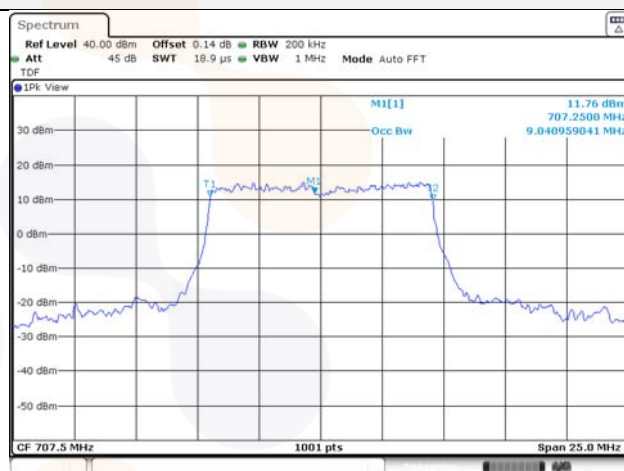
5M BW 16QAM Middle channel



10M BW QPSK Middle channel

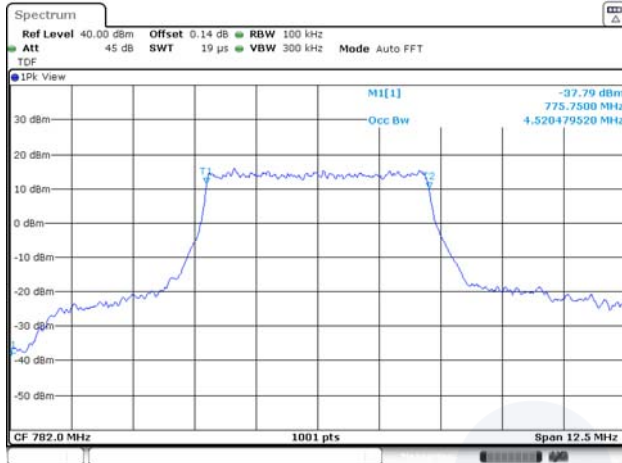


10M BW 16QAM Middle channel



Test mode: LTE B13

5M BW QPSK Middle channel



5M BW 16QAM Middle channel



10M BW QPSK Middle channel



10M BW 16QAM Middle channel



Test mode: LTE B66/4

1.4M BW QPSK Middle channel



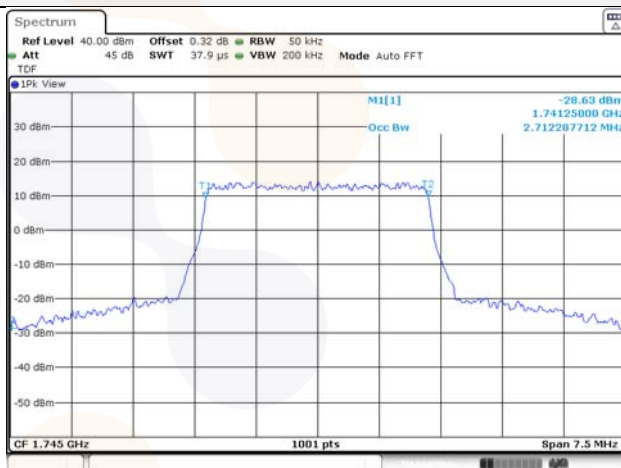
1.4M BW 16QAM Middle channel



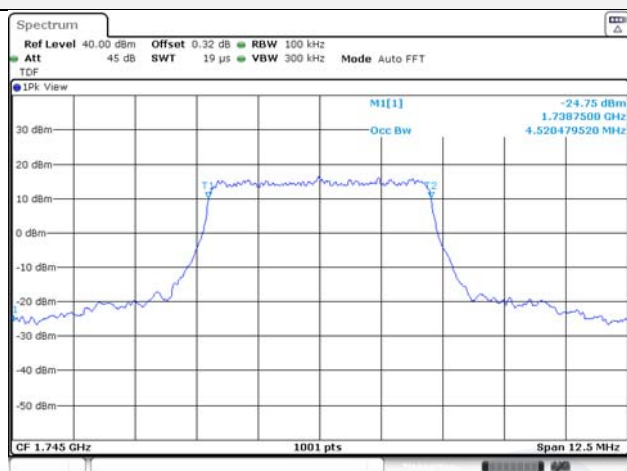
3M BW QPSK Middle channel



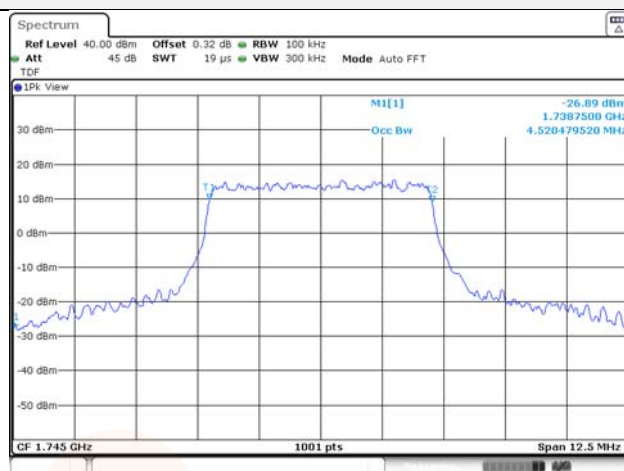
3M BW 16QAM Middle channel



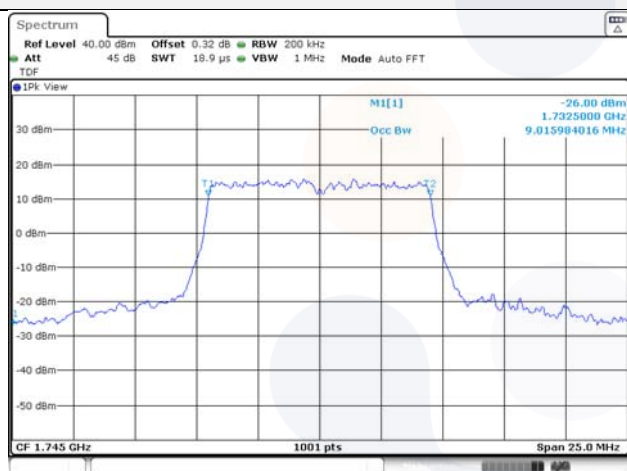
5M BW QPSK Middle channel



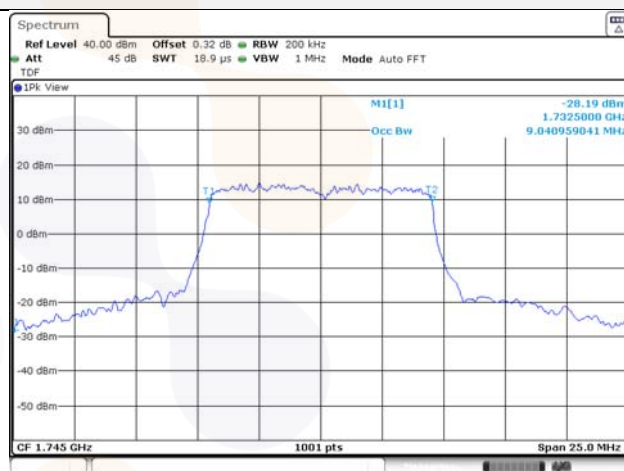
5M BW 16QAM Middle channel



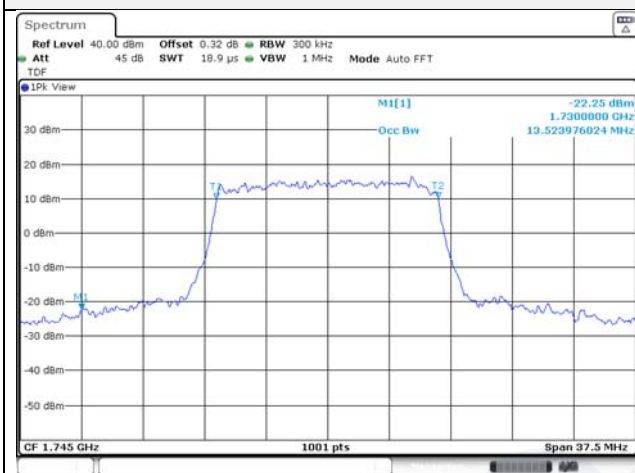
10M BW QPSK Middle channel



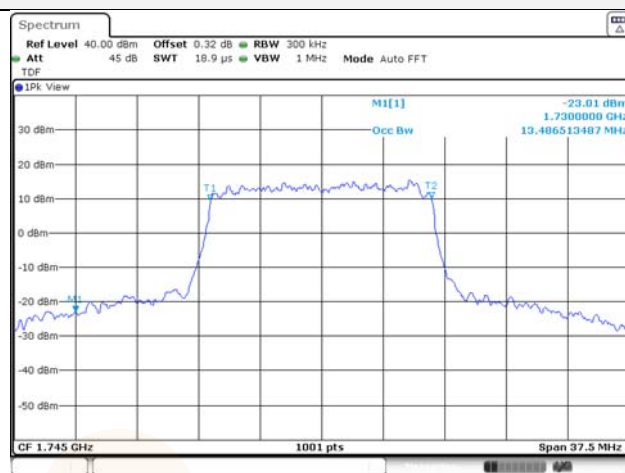
10M BW 16QAM Middle channel



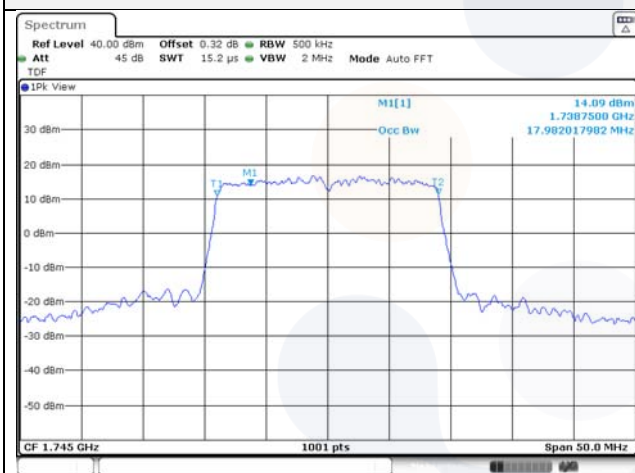
15M BW QPSK Middle channel



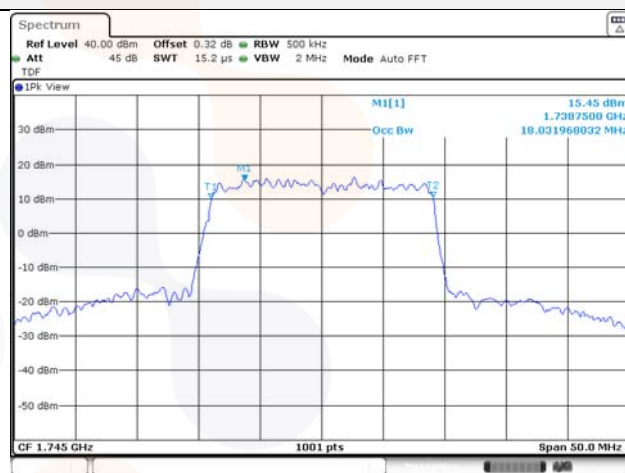
15M BW 16QAM Middle channel



20M BW QPSK Middle channel

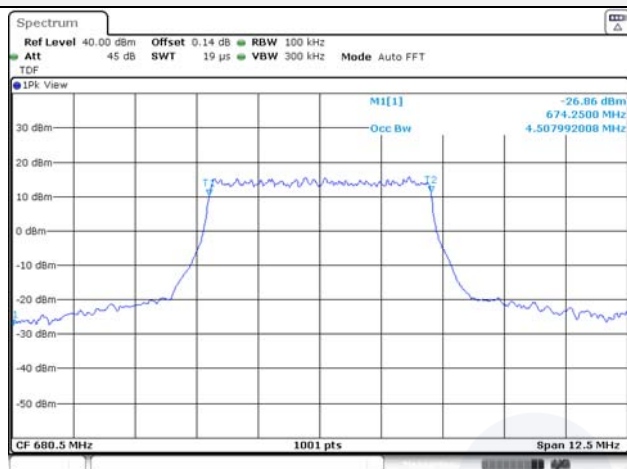


20M BW 16QAM Middle channel

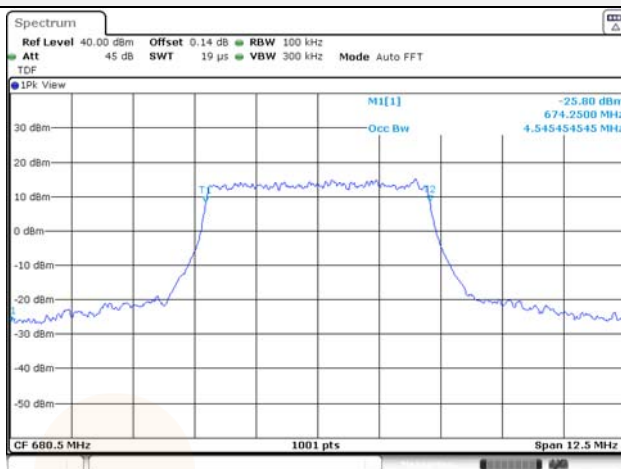


Test mode: LTE B71

5M BW QPSK Middle channel



5M BW 16QAM Middle channel



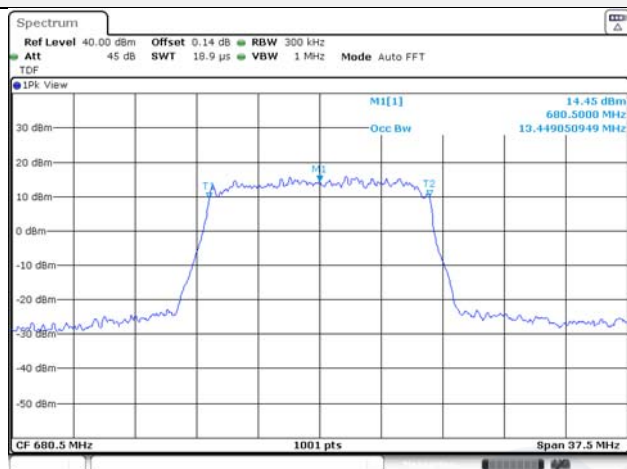
10M BW QPSK Middle channel



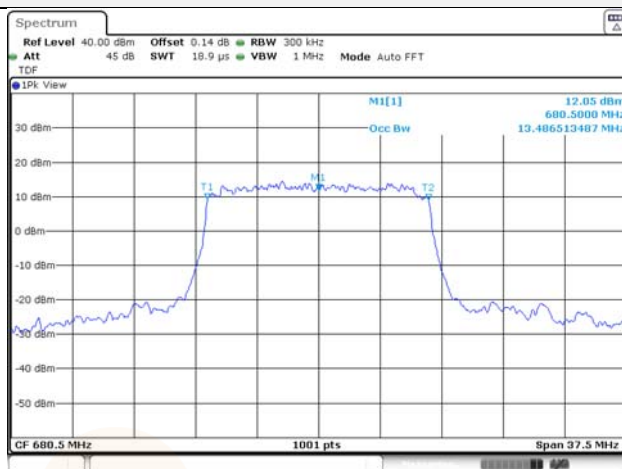
10M BW 16QAM Middle channel



15M BW QPSK Middle channel



15M BW 16QAM Middle channel



20M BW QPSK Middle channel

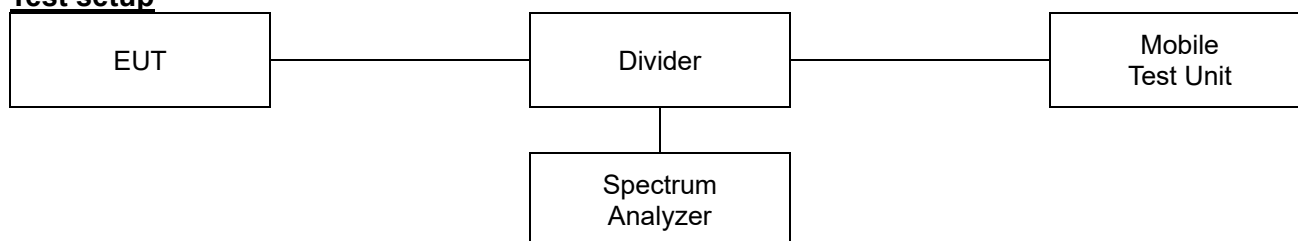


20M BW 16QAM Middle channel



7.3. Band Edge Emissions at Antenna Terminal

Test setup



Limit

According to §27.53(c)(2),

For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- (3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment

According to §27.53(g),

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P_{\text{[Watts]}})$ dB.

According to §27.53(h),

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log (P_{\text{[Watts]}})$ dB.

Test procedure

971168 D01 v03r01 - Section 6

ANSI C63.26-2015 – Section 5.7

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.: KR24-SRF0025 Page (48) of (124)	
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Test settings

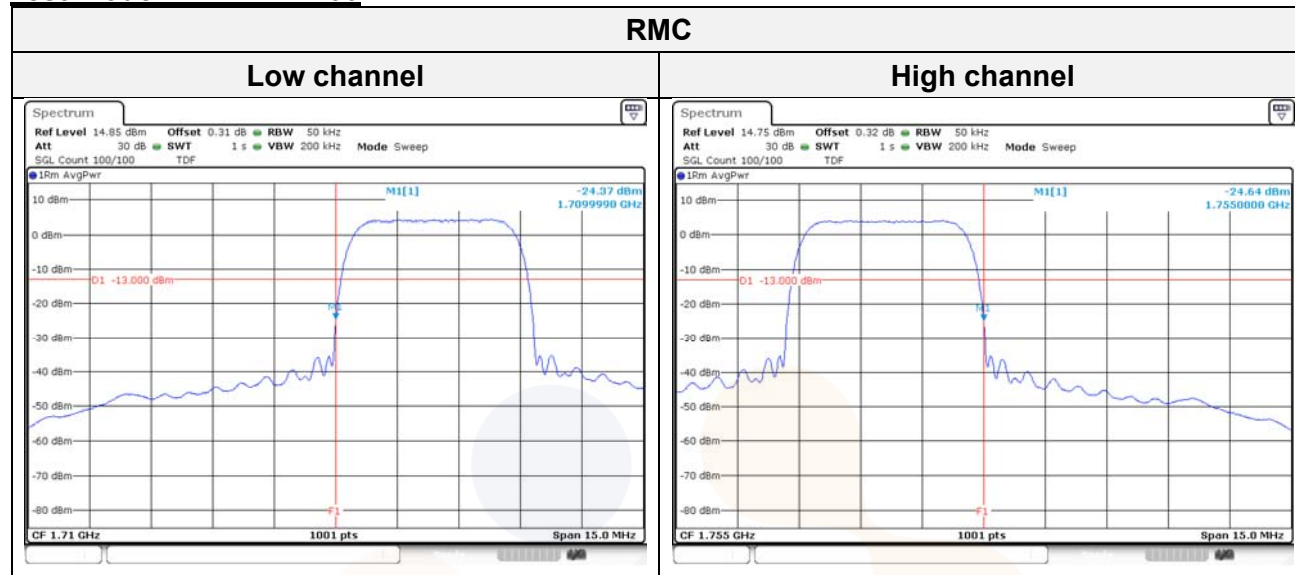
- 1) Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2) Span was set large enough so as to capture all out of band emissions near the band edge.
- 3) Set the RBW > 1% of the emission bandwidth.
- 4) Set the VBW $\geq 3 \times$ RBW.
- 5) Set the number of sweep points $\geq 2 \times$ Span/RBW
- 6) Detector = RMS
- 7) Trace mode = trace average
- 8) Sweep time should be auto for peak detection. For RMS detection the sweep time should be set as follows:
 - a) If the device can be configured to transmit continuously (duty cycle $\geq 98\%$), set the (sweep time) > (number of points in sweep) $\times$ (symbol period) (e.g., by a factor of $10 \times$ symbol period $\times$ number of points) Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols.
 - b) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) $\times$ (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time
 - c) If the device cannot be configured to transmit continuously (duty cycle > 98%), and a free-running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) $\times$ (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by $[10 \log (1/\text{duty cycle})]$. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation $\leq \pm 2\%$).
 - d) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > $\pm 2\%$), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) $\times$ (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.
- 9) Allow trace to fully stabilize.

Notes:

1. Per 27.53(c)(5), for operations in the 776-768 MHz band, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed.
2. Per 27.53(c)(6), for operation in the 763-775 MHz and 793-805 MHz, the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
3. Per 27.53(g), compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
4. Per 27.53(h)(3), compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
5. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.

Test results

Test mode: WCDMA 1700



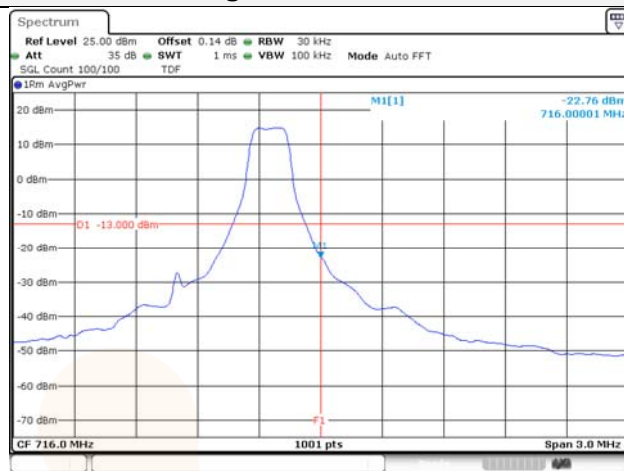
Test mode: LTE B12

1.4M BW QPSK

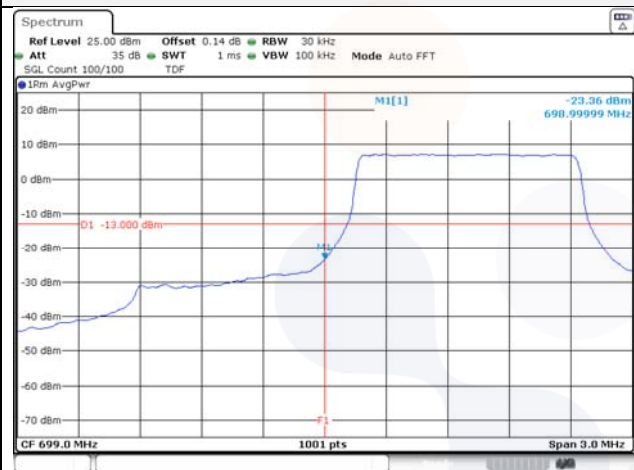
Low channel 1RB



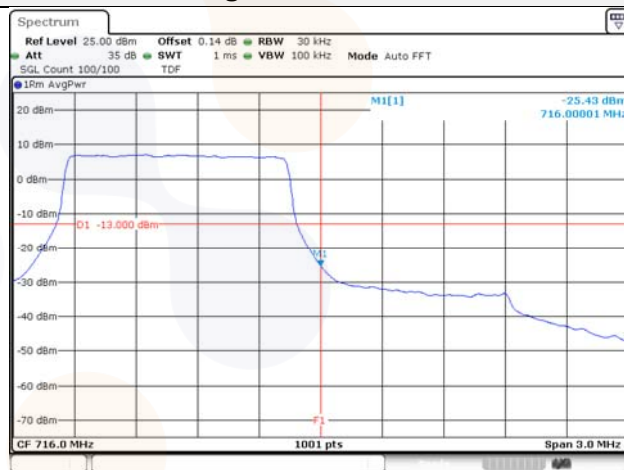
High channel 1RB



Low channel FRB



High channel FRB

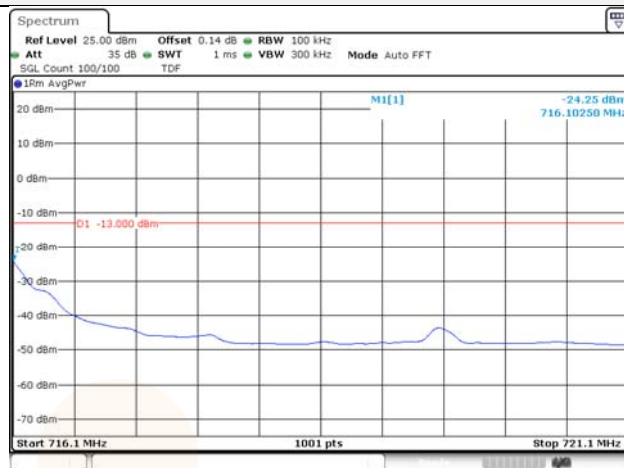


1.4M BW QPSK

Lower extended 1RB



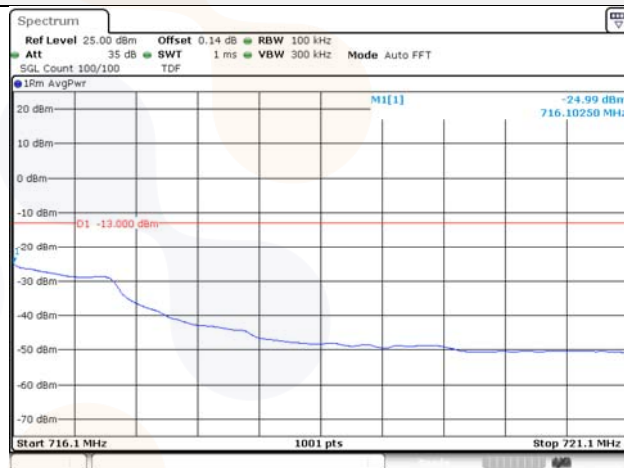
Upper extended 1RB



Lower extended FRB

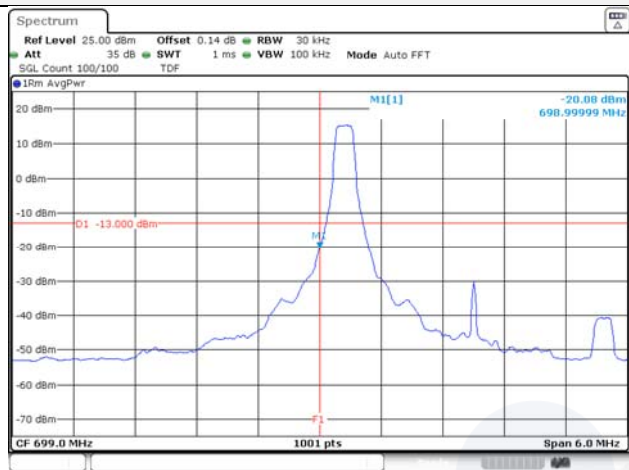


Upper extended FRB

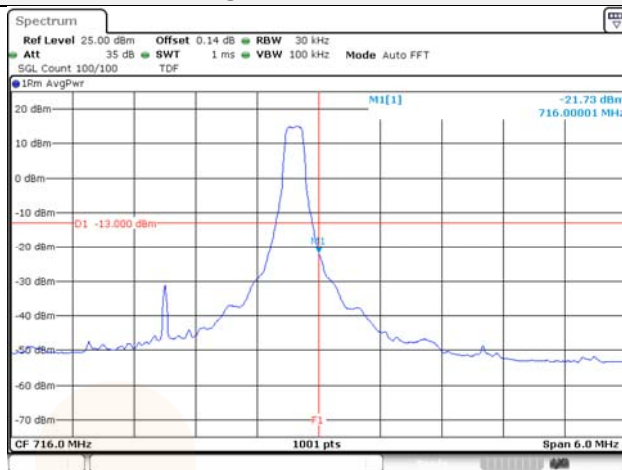


3M BW QPSK

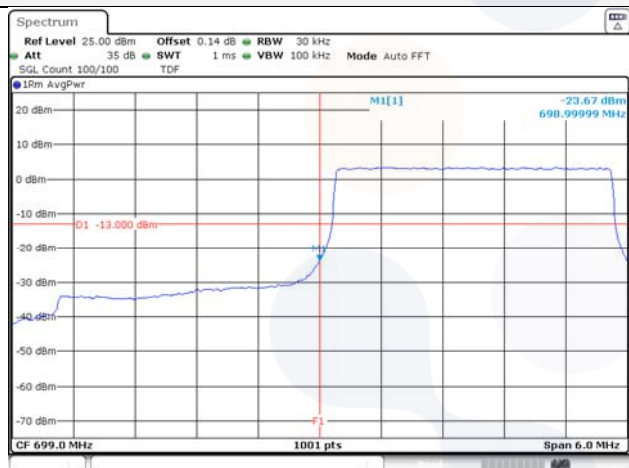
Low channel 1RB



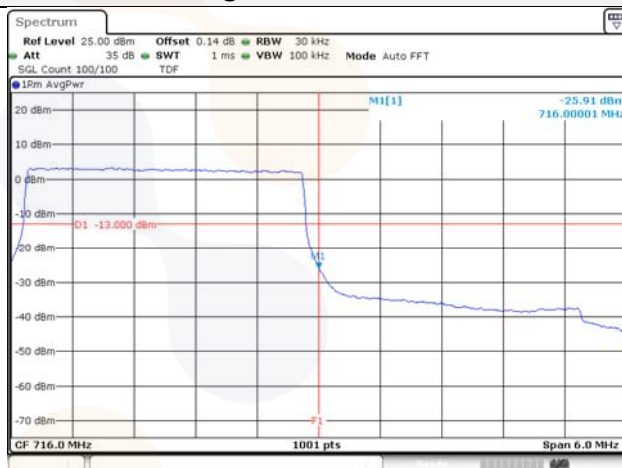
High channel 1RB



Low channel FRB



High channel FRB

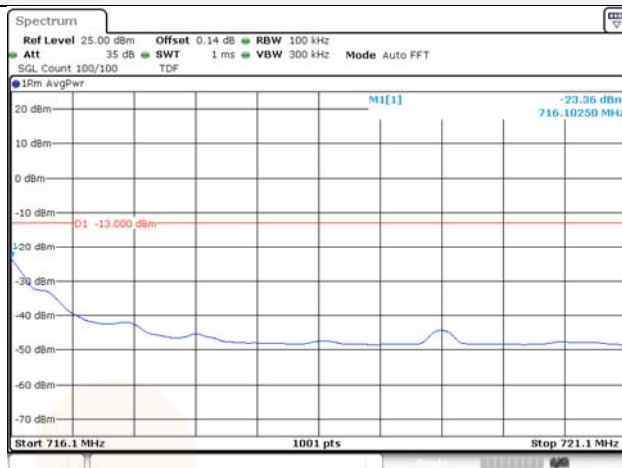


3M BW QPSK

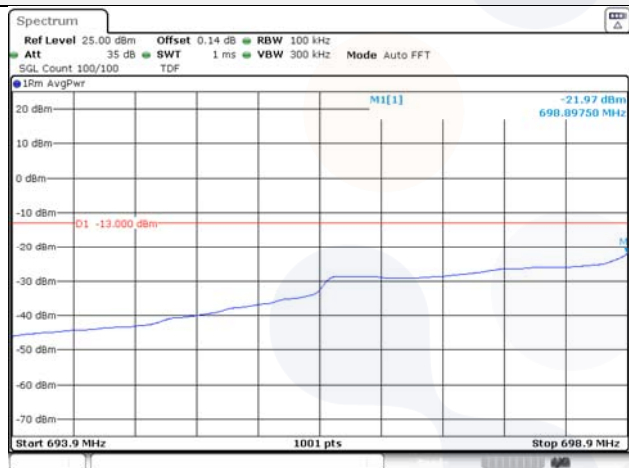
Lower extended 1RB



Upper extended 1RB



Lower extended FRB

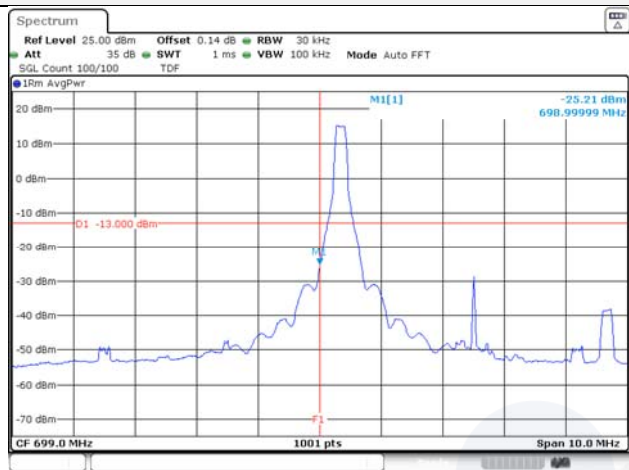


Upper extended FRB



5M BW QPSK

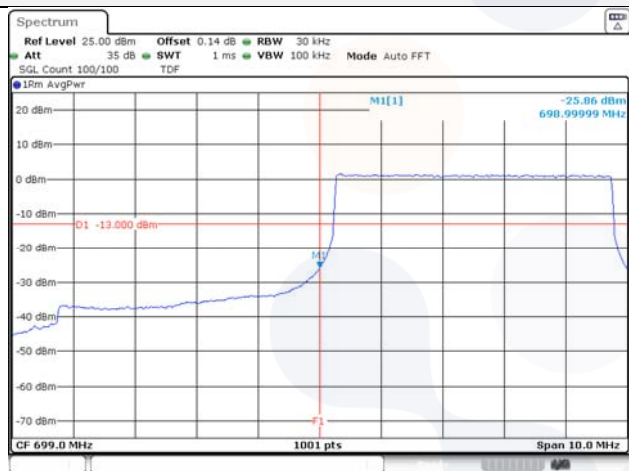
Low channel 1RB



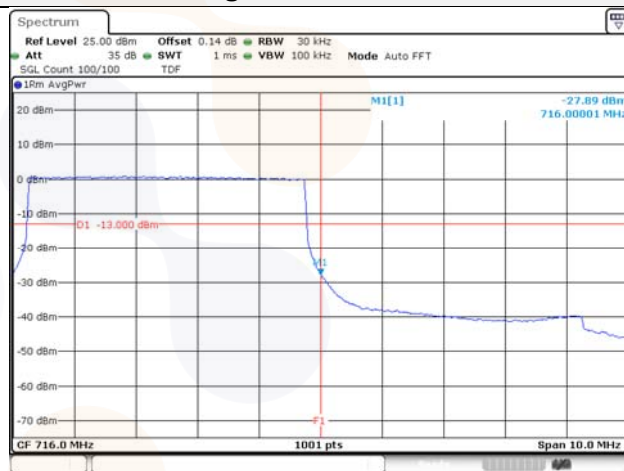
High channel 1RB



Low channel FRB



High channel FRB

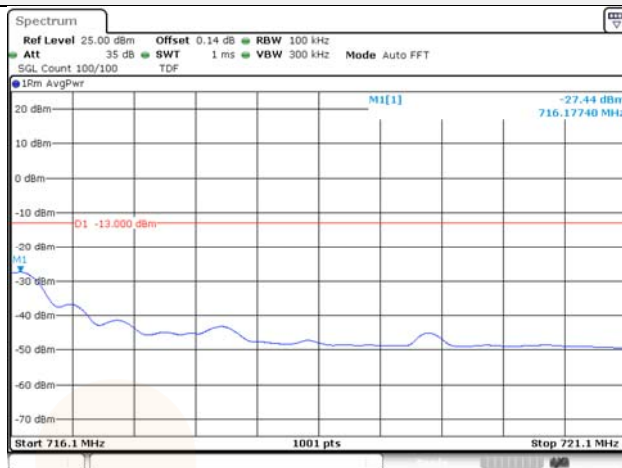


5M BW QPSK

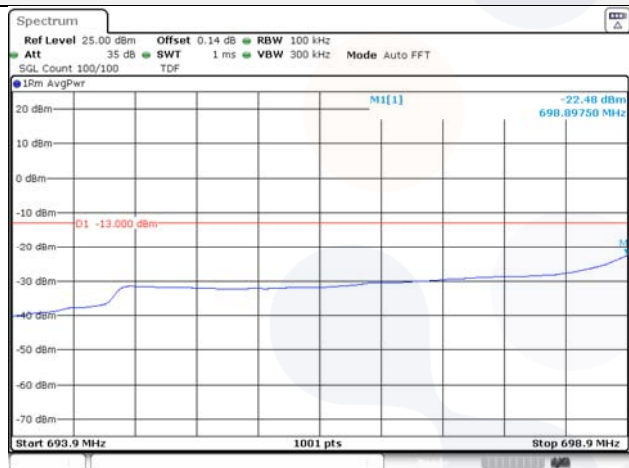
Lower extended 1RB



Upper extended 1RB



Lower extended FRB

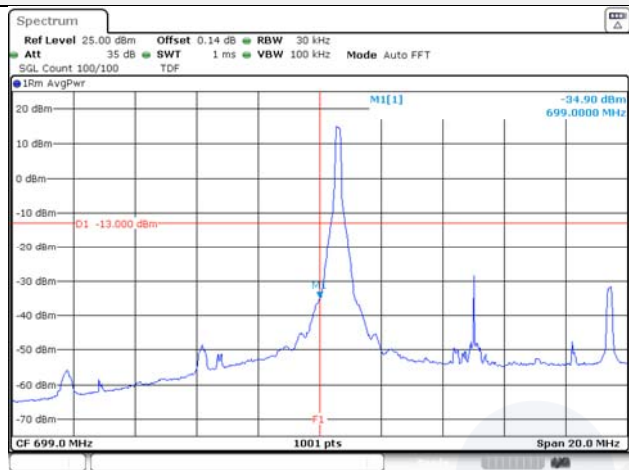


Upper extended FRB

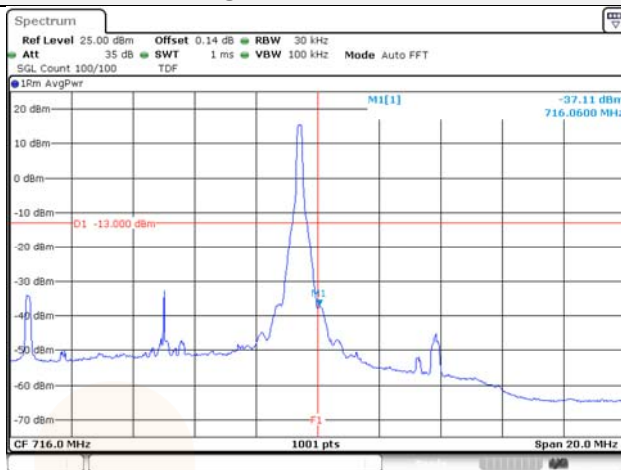


10M BW QPSK

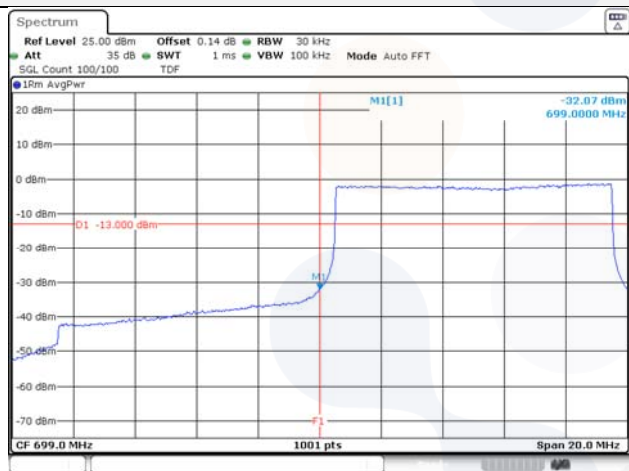
Low channel 1RB



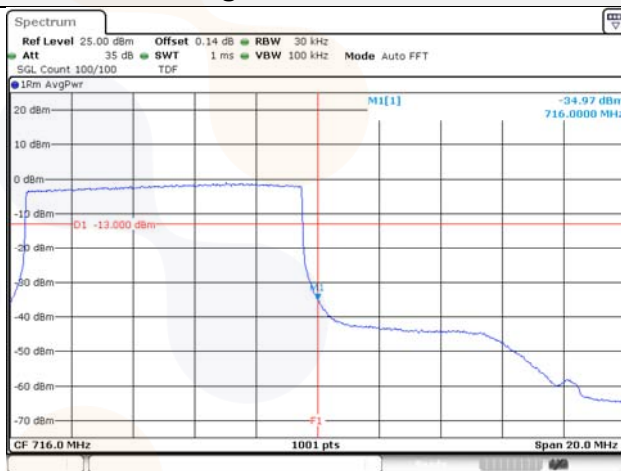
High channel 1RB



Low channel FRB

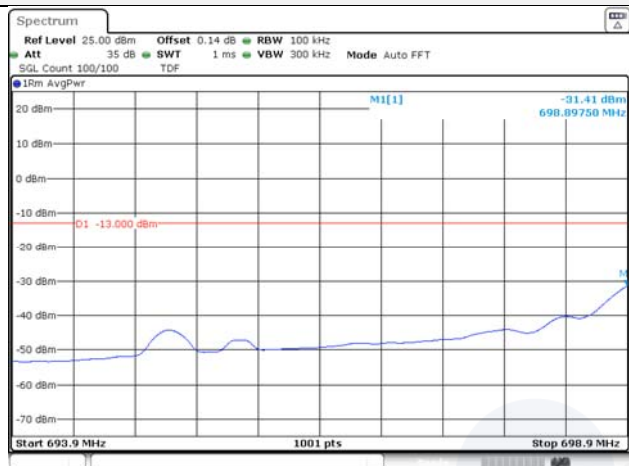


High channel FRB



10M BW QPSK

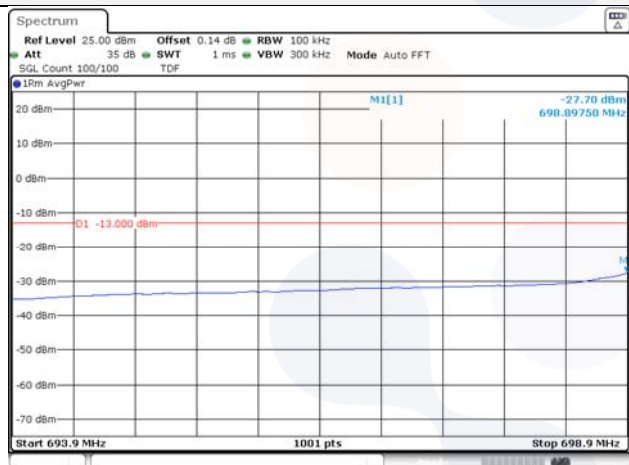
Lower extended 1RB



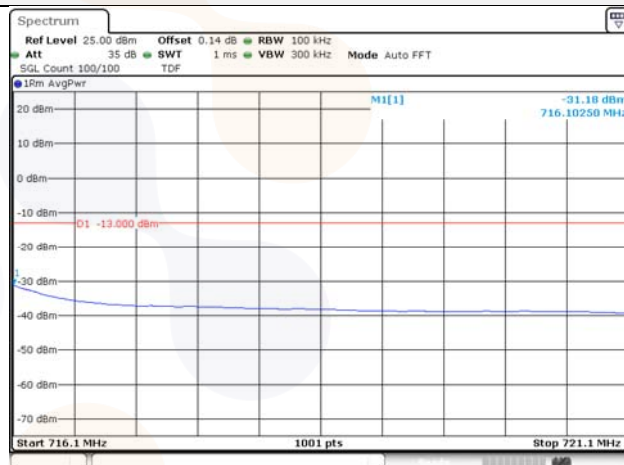
Upper extended 1RB



Lower extended FRB



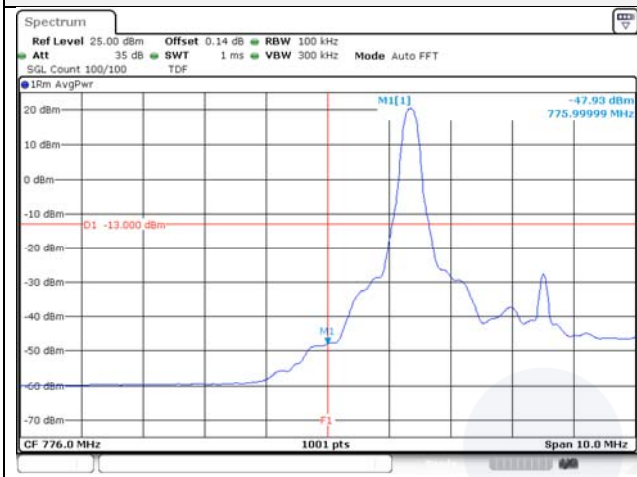
Upper extended FRB



Test mode: LTE B13

5M BW QPSK

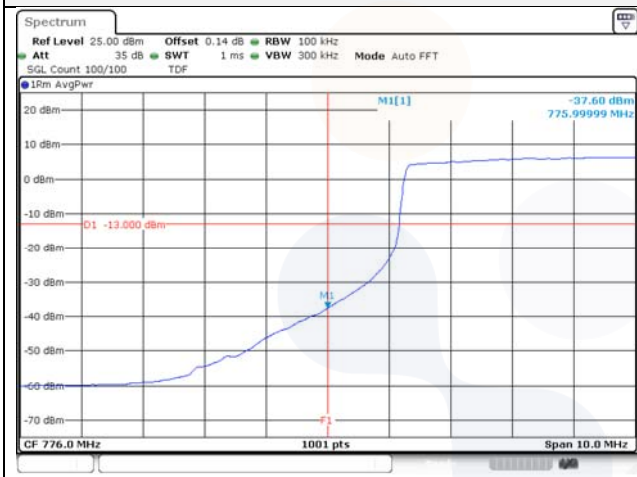
Low channel 1RB



High channel 1RB



Low channel FRB

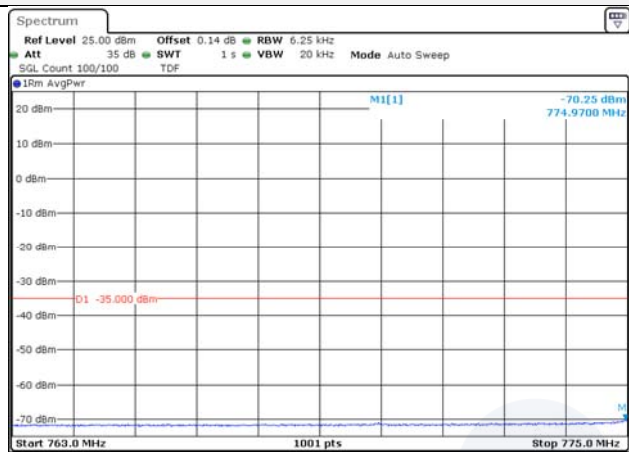


High channel FRB



5M BW QPSK

Lower extended 1RB



Upper extended 1RB



Lower extended FRB

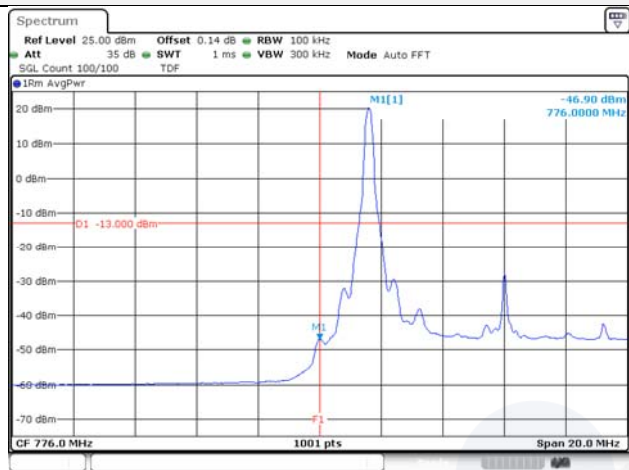


Upper extended FRB

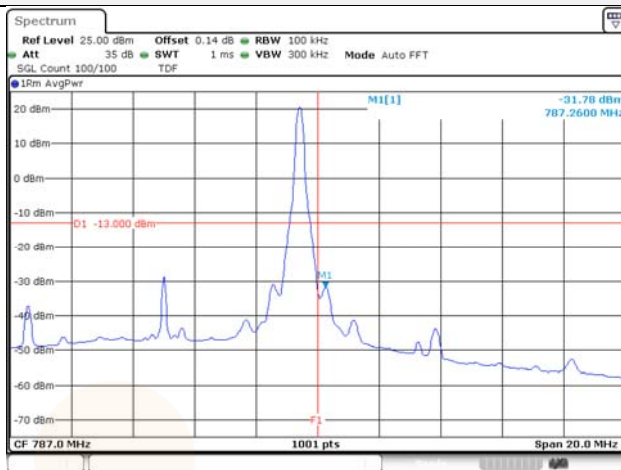


10M BW QPSK

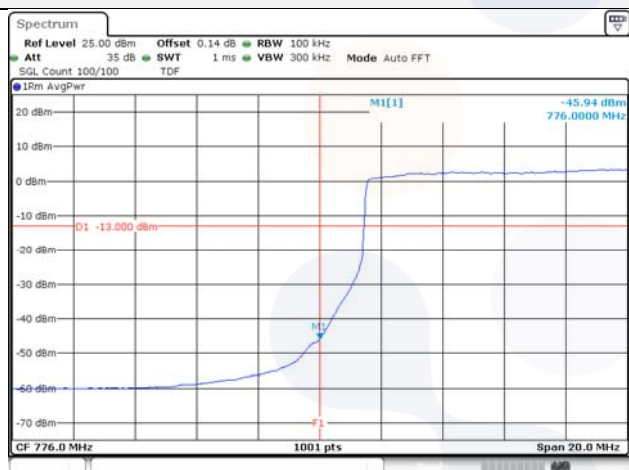
Middle channel Lower 1RB



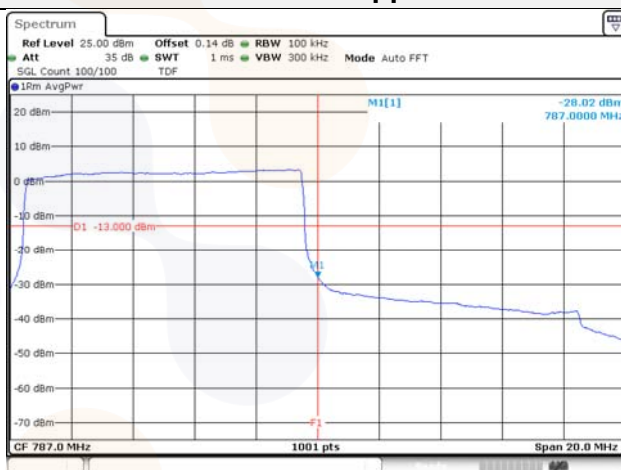
Middle channel Upper 1RB



Middle channel Lower FRB

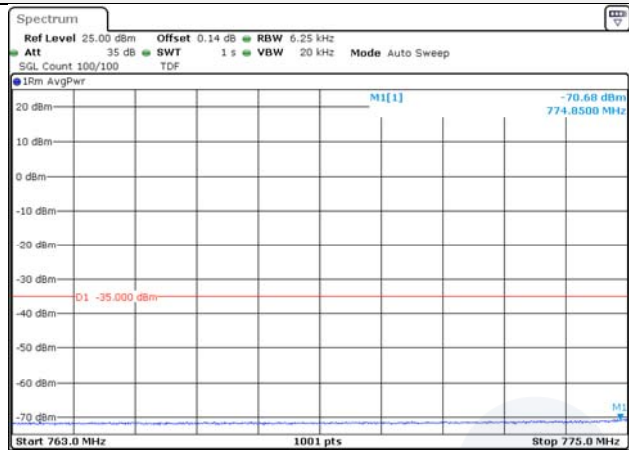


Middle channel Upper FRB

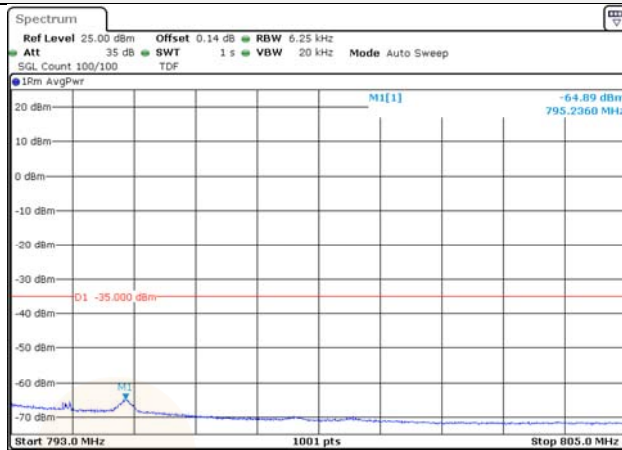


10M BW QPSK

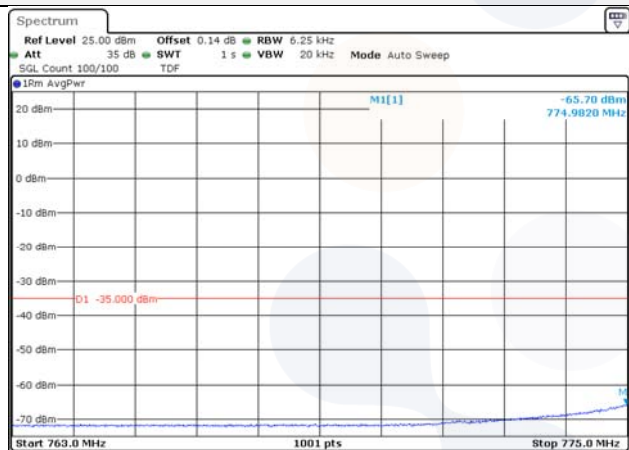
Lower extended 1RB



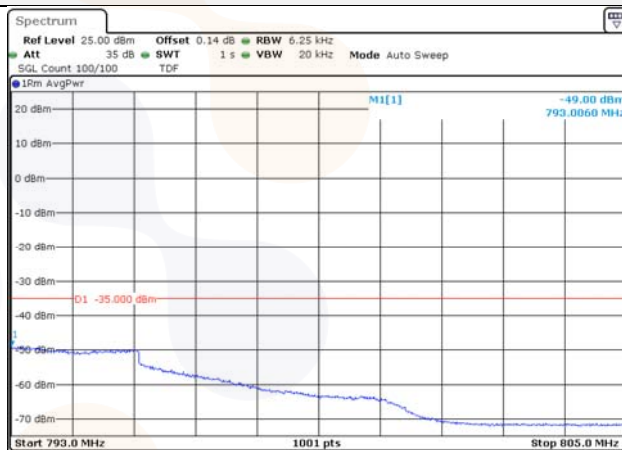
Upper extended 1RB



Lower extended FRB



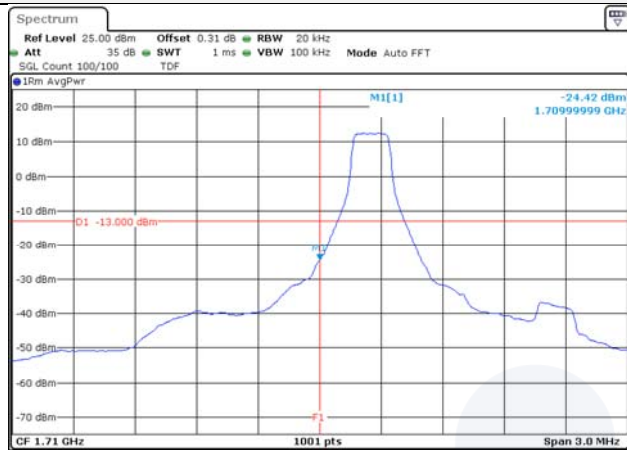
Upper extended FRB



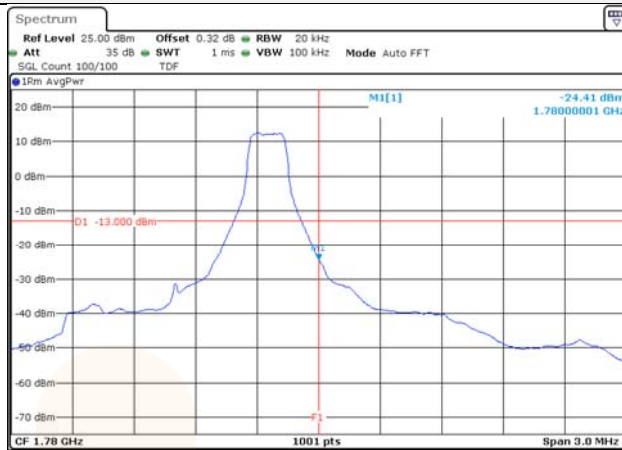
Test mode: LTE B66/4

1.4M BW QPSK

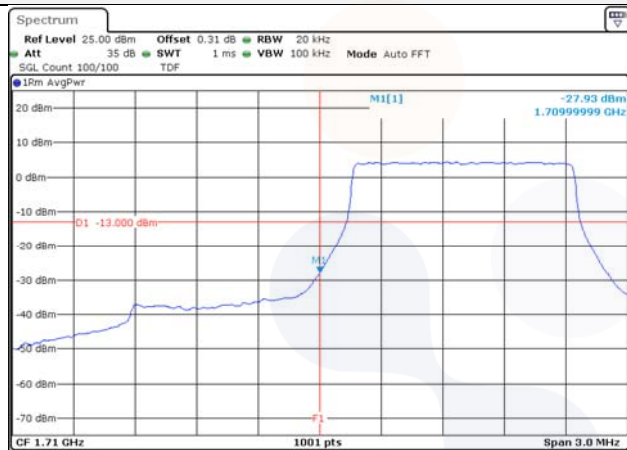
Low channel 1RB



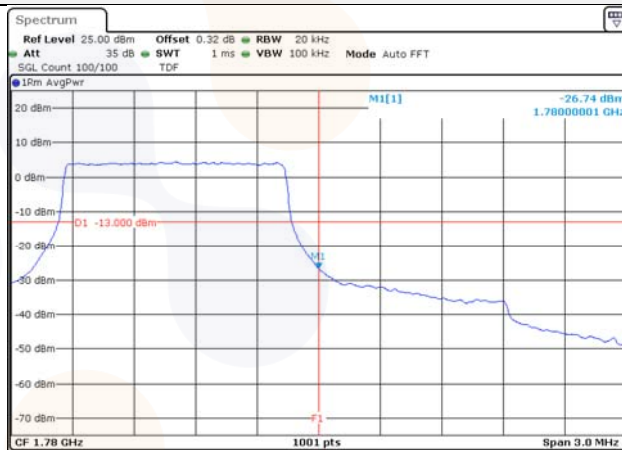
High channel 1RB



Low channel FRB

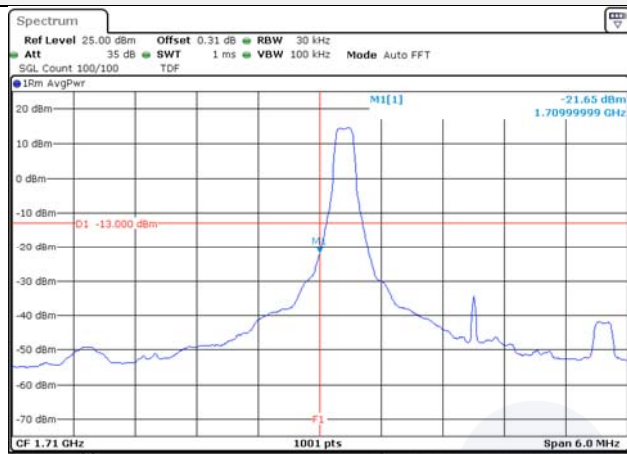


High channel FRB

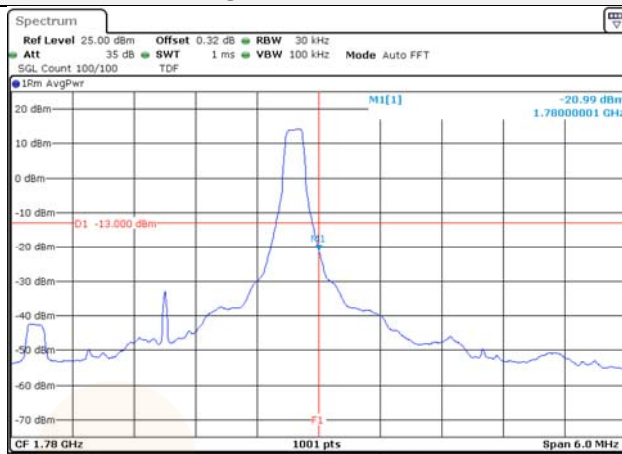


3M BW QPSK

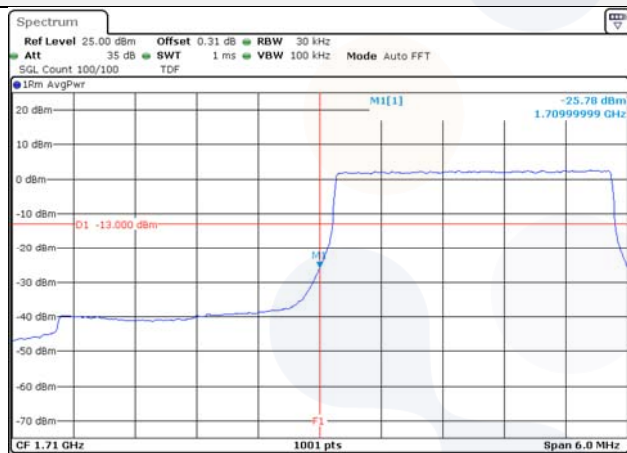
Low channel 1RB



High channel 1RB



Low channel FRB



High channel FRB

