



TEST REPORT

<p>KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p>	<p>Report No.: KR21-SRF0236 Page (1) of (104)</p>	
<p>1. Client</p> <ul style="list-style-type: none"> ◦ Name : Samsung Electronics Co., Ltd. ◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea ◦ Date of Receipt : 2021-08-09 <p>2. Use of Report : Certification</p> <p>3. Name of Product / Model : Mobile phone / SC-56B</p> <p>4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam</p> <p>5. FCC ID : A3LSMA223JPN</p> <p>7. Date of Test : 2021-08-17 to 2021-09-16</p> <p>8. Location of Test : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)</p> <p>9. Test method used : FCC Part 2 FCC Part 22 subpart H FCC Part 27 subpart C</p> <p>10. Test Result : Refer to the test result in the test report</p>		
Affirmation	<p>Tested by</p> <p>Name : Kwonse Kim (Signature)</p>	<p>Technical Manager</p> <p>Name : Seungyong Kim (Signature)</p>
<p style="text-align: right;">2021-09-29</p> <p style="text-align: center;">KCTL Inc.</p> <p>As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.</p>		

REPORT REVISION HISTORY

Date	Revision	Page No
2021-09-29	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
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-56B
Modulation technique : Bluetooth(BDR/EDR)_GFSK, $\pi/4$ DQPSK, 8DPSK
Bluetooth(BLE)_GFSK
WIFI(802.11a/b/g/n/ac)_DSSS, OFDM
LTE_QPSK, 16QAM, 64QAM
WCDMA_QPSK
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 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
UNII-2A: 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
UNII-2C: 12 ch (20 MHz), 6 ch (40 MHz), 3 ch (80 MHz)
UNII-3: 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
NFC: 1 ch
Power source : DC 3.88 V
Antenna specification : LTE/WCDMA_Metal Antenna
WIFI/Bluetooth(BDR/EDR/BLE)_LDS Antenna
NFC_LDS Antenna
Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE)_-2.95 dBi
UNII-1 : -3.06 dBi
UNII-2A : -3.06 dBi
UNII-2C : -4.03 dBi
UNII-3 : -4.80 dBi

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Frequency range : Bluetooth(BDR/EDR/BLE)_2 402 MHz ~ 2 480 MHz
2 412 MHz ~ 2 472 MHz (802.11b/g/n_HT20)
UNII-1: 5 180 MHz ~ 5 240 MHz (802.11a/n/ac_HT20/VHT20)
UNII-1: 5 190 MHz ~ 5 230 MHz (802.11n/ac_HT40/VHT40)
UNII-1: 5 210 MHz (802.11ac_VHT80)
UNII-2A: 5 260 MHz ~ 5 320 MHz (802.11a/n/ac_HT20/VHT20)
UNII-2A: 5 270 MHz ~ 5 310 MHz (802.11n/ac_HT40/VHT40)
UNII-2A: 5 290 MHz (802.11ac_VHT80)
UNII-2C: 5 500 MHz ~ 5 720 MHz (802.11a/n/ac_HT20/VHT20)
UNII-2C: 5 510 MHz ~ 5 710 MHz (802.11n/ac_HT40/VHT40)
UNII-2C: 5 530 MHz ~ 5 690 MHz (802.11ac_VHT80)
UNII-3: 5 745 MHz ~ 5 825 MHz (802.11a/n/ac_HT20/VHT20)
UNII-3: 5 755 MHz ~ 5 795 MHz (802.11n/ac_HT40/VHT40)
UNII-3: 5 775 MHz (802.11ac_VHT80)
LTE Band 5_824.7 MHz ~ 848.3 MHz
LTE Band 12_699.7 MHz ~ 715.3 MHz
LTE Band 41_2 498.5 MHz ~ 2 687.5 MHz
GSM 850_824.2 MHz ~ 848.8 MHz
GSM 1900_1 850.2 MHz ~ 1 909.8 MHz
WCDMA 850_826.4 MHz ~ 846.6 MHz
NFC_13.56 MHz

Software version : A223D.001
Hardware version : REV1.0
Test device serial No. : Conducted(R3CR70CAFJT, FD100000211C7ECE, R3CR70CAFGE,
R3CR70CALHR)
Radiated(R3CR70CAPCH, R3CR70CAPAA, R3CR70C6NHV)
Operation temperature : -30 °C ~ 50 °C

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 (MHz)
20407	824.7
20525	836.5
20643	848.3

Table 2.1.1. 1.4M BW

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

Table 2.1.2. 3M BW

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

Table 2.1.3. 5M BW

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

Table 2.1.4. 10M BW

LTE Band 12

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

Table 2.1.5. 1.4M BW

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

Table 2.1.6. 3M BW

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

Table 2.1.7. 5M BW

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

Table 2.1.8. 10M BW

LTE Band 41

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

Table 2.1.9. 5M BW

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

Table 2.1.10. 10M BW

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

Table 2.1.11. 15M BW

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

Table 2.1.12. 20M BW

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3. Maximum ERP/EIRP power

LTE Band 5

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 5	824.7 ~ 848.3	1M10G7D	20.05	0.101
		1M10W7D	19.05	0.080
	825.5 ~ 847.5	2M70G7D	20.29	0.107
		2M69W7D	19.46	0.088
	826.5 ~ 846.5	4M51G7D	20.43	0.110
		4M52W7D	19.82	0.096
	829.0 ~ 844.0	8M99G7D	20.72	0.118
		9M02W7D	19.68	0.093

LTE Band 12

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 12	699.7 ~ 715.3	1M10G7D	14.77	0.030
		1M11W7D	13.53	0.023
	700.5 ~ 714.5	2M70G7D	14.57	0.029
		2M69W7D	13.71	0.023
	701.5 ~ 713.5	4M52G7D	14.96	0.031
		4M51W7D	14.25	0.027
	704.0 ~ 711.0	8M99G7D	15.07	0.032
		8M99W7D	14.33	0.027

LTE Band 41

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 41	2 498.5 ~ 2 687.5	4M51G7D	19.40	0.087
		4M52W7D	18.96	0.079
	2 501.0 ~ 2 685.0	9M02G7D	19.55	0.090
		8M99W7D	17.81	0.060
	2 503.5 ~ 2 682.5	13M5G7D	20.06	0.101
		13M6W7D	18.58	0.072
	2 506.0 ~ 2 680.0	18M1G7D	19.82	0.096
		18M0W7D	19.23	0.084

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 27.54	Frequency stability	< 2.5 ppm		Pass
		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:

- 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 **Y** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Y** 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 **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.

Test condition	LTE Band	Modulation	Bandwidth (MHz)	RB size	RB offset
Radiated	B5	QPSK	10	1	0, 25, 49
	B12		10	1	0, 25, 49
	B41		15	1	0, 38, 74
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 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	1.6 dB	
Radiated spurious emissions	Below 1 000 MHz	4.3 dB
	1 000 MHz ~ 18 000 MHz	3.8 dB
	Above 1 8000 MHz	3.8 dB

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6. Measurement results explanation example

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	6.28	11 000	9.23
50	6.33	12 000	9.19
100	6.42	13 000	9.76
200	6.55	14 000	9.81
300	6.65	15 000	9.95
400	6.73	16 000	10.23
500	6.79	17 000	10.67
600	6.83	18 000	10.89
700	6.89	19 000	11.05
800	6.94	20 000	10.60
900	6.98	21 000	10.70
1 000	7.01	22 000	11.22
2 000	7.30	23 000	11.27
3 000	7.63	24 000	11.46
4 000	7.97	25 000	11.32
5 000	8.22	26 000	11.56
6 000	8.31	26 500	12.05
7 000	8.41	27 000	12.05
8 000	8.76	28 000	11.80
9 000	8.98	29 000	12.03
10 000	8.99	30 000	12.18

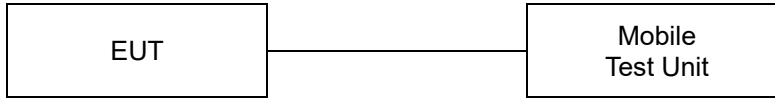
Note.

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.

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**Test results**

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (MHz)		
						Low	Middle	High
LTE Band 5	1.4	QPSK	1	0	0	23.40	23.53	23.28
			1	3	0	23.46	23.59	23.34
			1	5	0	23.38	23.55	23.30
			3	0	0	23.98	23.96	23.86
			3	1	0	23.98	23.93	23.86
			3	3	0	23.98	23.96	23.82
		16QAM	6	0	3	20.96	21.04	20.81
			1	0	1	22.68	22.85	22.61
			1	3	1	22.74	22.93	22.67
			1	5	1	22.75	22.89	22.66
			3	0	1	23.01	23.11	22.81
			3	1	1	23.03	22.95	22.80
		64QAM	3	3	1	22.98	22.99	22.74
			6	0	2	22.09	22.15	21.85
			1	0	2	21.65	21.71	21.42
			1	3	2	21.58	21.73	21.48
			1	5	2	21.61	21.77	21.43
			3	0	2	22.08	22.15	21.90
	3	QPSK	3	1	2	22.05	22.19	21.90
			3	3	2	22.04	22.14	21.91
			6	0	3	20.93	20.99	20.78
			1	0	0	23.42	23.54	23.41
			1	8	0	23.43	23.56	23.33
			1	14	0	23.43	23.49	23.30
		16QAM	8	0	3	20.94	21.01	20.83
			8	4	3	20.90	21.02	20.82
			8	7	3	20.89	20.97	20.81
			15	0	3	20.90	20.98	20.81
			1	0	1	22.67	22.74	22.60
			1	8	1	22.64	22.83	22.62
		64QAM	1	14	1	22.63	22.77	22.64
			8	0	2	22.02	22.10	21.91
			8	4	2	22.00	22.10	21.91
			8	7	2	22.05	22.11	21.88
			15	0	2	21.95	22.04	21.86
			1	0	2	21.59	21.59	21.47
64QAM	1	8	2	21.56	21.69	21.57		
	1	14	2	21.62	21.56	21.46		
	8	0	3	20.96	21.02	20.83		
	8	4	3	20.94	21.03	20.84		
	8	7	3	20.99	21.01	20.81		
	15	0	3	20.94	20.99	20.82		

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 5	5	QPSK	1	0	0	23.50	23.52	23.41	
			1	12	0	23.52	23.62	23.39	
			1	24	0	23.45	23.54	23.32	
			12	0	3	20.96	21.00	20.90	
			12	7	3	20.89	21.00	20.83	
			12	13	3	20.84	20.97	20.77	
		25	0	3	20.96	21.06	20.88		
		16QAM	1	0	1	22.71	22.80	22.60	
			1	12	1	22.69	22.85	22.62	
			1	24	1	22.67	22.77	22.59	
			12	0	2	21.99	22.03	21.94	
			12	7	2	21.94	21.99	21.84	
			12	13	2	21.83	22.03	21.77	
		25	0	2	21.94	22.04	21.84		
		64QAM	1	0	2	21.65	21.63	21.48	
			1	12	2	21.67	21.76	21.54	
			1	24	2	21.56	21.57	21.45	
			12	0	3	20.97	21.00	20.96	
	12		7	3	20.95	21.03	20.87		
	12		13	3	20.87	21.03	20.78		
	25	0	3	20.95	21.04	20.88			
	10	QPSK	1	0	0	23.52	23.46	23.48	
			1	25	0	23.48	23.62	23.43	
			1	49	0	23.44	23.49	23.33	
			25	0	3	21.05	21.03	20.92	
			25	12	3	20.94	20.99	20.91	
			25	25	3	20.92	21.08	20.78	
			50	0	3	21.02	21.04	20.88	
			16QAM	1	0	1	22.65	22.70	22.83
				1	25	1	22.73	22.92	22.68
		1		49	1	22.69	22.65	22.69	
		25		0	2	22.10	22.10	22.01	
		25		12	2	21.97	22.01	21.92	
		25		25	2	21.99	22.11	21.83	
		50	0	2	22.05	22.10	21.89		
		64QAM	1	0	2	21.61	21.61	21.58	
1			25	2	21.59	21.73	21.51		
1			49	2	21.58	21.58	21.44		
25			0	3	21.05	21.05	20.94		
25	12		3	20.96	21.03	20.87			
25	25		3	20.94	21.08	20.83			
50	0	3	21.00	21.05	20.90				

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 12	1.4	QPSK	1	0	0	23.65	23.08	23.15	
			1	3	0	23.62	23.08	23.17	
			1	5	0	23.57	23.08	23.17	
			3	0	0	23.46	23.40	23.47	
			3	1	0	23.46	23.43	23.50	
			3	3	0	23.45	23.37	23.50	
		6	0	3	20.76	20.71	20.82		
		16QAM	1	0	1	22.49	22.22	22.44	
			1	3	1	22.48	22.42	22.56	
			1	5	1	22.47	22.35	22.38	
			3	0	1	22.50	22.44	22.46	
			3	1	1	22.40	22.46	22.54	
			3	3	1	22.41	22.37	22.42	
		6	0	2	21.73	21.64	21.80		
		64QAM	1	0	2	21.42	21.40	21.45	
			1	3	2	21.41	21.31	21.35	
			1	5	2	21.45	21.34	21.35	
			3	0	2	21.56	21.47	21.58	
			3	1	2	21.54	21.45	21.58	
			3	3	2	21.52	21.40	21.55	
		6	0	3	20.76	20.70	20.76		
		3	QPSK	1	0	0	23.17	23.04	23.05
				1	8	0	23.15	23.06	23.11
				1	14	0	23.13	23.03	23.15
	8			0	3	20.80	20.73	20.77	
	8			4	3	20.73	20.70	20.72	
	8			7	3	20.77	20.66	20.77	
	15			0	3	20.75	20.67	20.74	
	16QAM			1	0	1	22.45	22.32	22.40
				1	8	1	22.48	22.27	22.42
				1	14	1	22.34	22.26	22.46
				8	0	2	21.69	21.67	21.74
				8	4	2	21.69	21.65	21.72
			8	7	2	21.71	21.60	21.70	
	15		0	2	21.66	21.61	21.66		
	64QAM		1	0	2	21.42	21.41	21.45	
			1	8	2	21.48	21.29	21.48	
			1	14	2	21.48	21.37	21.32	
			8	0	3	20.81	20.73	20.81	
			8	4	3	20.76	20.72	20.79	
			8	7	3	20.84	20.69	20.82	
			15	0	3	20.79	20.70	20.73	

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 12	5	QPSK	1	0	0	23.18	23.15	23.09	
			1	12	0	23.22	23.15	23.19	
			1	24	0	23.14	23.04	23.18	
			12	0	3	20.82	20.76	20.78	
			12	7	3	20.80	20.73	20.76	
			12	13	3	20.79	20.66	20.76	
		16QAM	25	0	3	20.81	20.72	20.76	
			1	0	1	22.51	22.37	22.27	
			1	12	1	22.48	22.33	22.50	
			1	24	1	22.45	22.34	22.40	
			12	0	2	21.70	21.63	21.61	
			12	7	2	21.67	21.59	21.61	
		64QAM	12	13	2	21.64	21.48	21.56	
			25	0	2	21.71	21.56	21.67	
			1	0	2	21.54	21.43	21.43	
			1	12	2	21.45	21.45	21.49	
			1	24	2	21.37	21.69	21.27	
			12	0	3	20.87	20.77	20.75	
		10	QPSK	12	7	3	20.79	20.72	20.77
				12	13	3	20.79	20.61	20.75
				25	0	3	20.78	20.73	20.76
				1	0	0	23.19	23.30	23.12
				1	25	0	23.17	23.11	23.13
				1	49	0	23.04	23.08	23.16
	25			0	3	20.75	20.77	20.82	
	25			12	3	20.76	20.66	20.71	
	25			25	3	20.68	20.57	20.70	
	50			0	3	20.78	20.68	20.75	
	16QAM			1	0	1	22.49	22.45	22.28
				1	25	1	22.43	22.28	22.44
			1	49	1	22.25	22.32	22.40	
			25	0	2	21.68	21.63	21.69	
			25	12	2	21.63	21.57	21.60	
			25	25	2	21.59	21.46	21.63	
	64QAM		50	0	2	21.62	21.52	21.69	
			1	0	2	21.44	21.46	21.38	
			1	25	2	21.44	21.39	21.44	
			1	49	2	21.35	21.40	21.26	
			25	0	3	20.80	20.74	20.80	
			25	12	3	20.77	20.70	20.76	
			25	25	3	20.73	20.61	20.72	
			50	0	3	20.75	20.68	20.76	

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 41	5	QPSK	1	0	0	23.78	23.40	23.40	
			1	12	0	23.32	23.40	23.17	
			1	24	0	23.64	23.33	23.11	
			12	0	1	22.03	22.31	22.92	
			12	7	1	22.66	22.23	23.00	
			12	13	1	22.57	22.21	22.76	
		25	0	1	22.55	22.24	22.26		
		16QAM	1	0	1	22.74	22.36	22.23	
			1	12	1	22.66	22.34	21.99	
			1	24	1	22.67	22.30	21.66	
			12	0	2	21.80	21.32	21.34	
			12	7	2	21.65	21.22	21.26	
			12	13	2	21.23	21.22	21.90	
		25	0	2	21.46	21.24	21.44		
		64QAM	1	0	2	21.31	21.58	21.04	
			1	12	2	21.79	21.58	20.99	
			1	24	2	21.33	21.56	21.35	
			12	0	3	20.91	20.93	20.68	
			12	7	3	20.91	20.95	20.45	
			12	13	3	20.65	20.95	20.92	
		25	0	3	20.71	20.97	20.42		
		10	QPSK	1	0	0	23.55	23.32	22.73
				1	25	0	23.88	23.31	23.22
				1	49	0	23.53	23.26	22.85
	25			0	1	22.68	22.35	22.74	
	25			12	1	22.84	22.32	22.58	
	25			25	1	22.79	22.30	22.43	
	50			0	1	22.41	22.35	22.45	
	16QAM			1	0	1	22.05	22.27	21.76
				1	25	1	22.17	22.27	22.39
				1	49	1	22.57	22.20	22.47
				25	0	2	21.29	21.29	21.87
				25	12	2	20.83	21.26	21.83
			25	25	2	21.62	21.22	21.99	
	50		0	2	21.58	21.29	21.50		
	64QAM		1	0	2	21.68	21.58	21.31	
			1	25	2	21.69	21.58	21.30	
			1	49	2	21.40	21.52	21.00	
			25	0	3	20.38	20.98	20.51	
			25	12	3	20.42	20.94	20.93	
			25	25	3	20.95	20.89	20.90	
			50	0	3	20.89	20.91	20.60	

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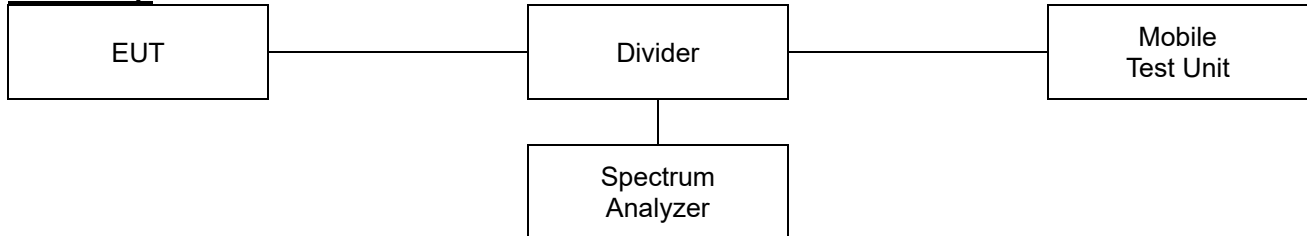
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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 41	15	QPSK	1	0	0	23.38	23.27	23.38	
			1	36	0	23.07	23.31	23.09	
			1	74	0	23.00	23.16	23.02	
			36	0	1	22.05	22.29	22.24	
			36	18	1	22.09	22.28	22.58	
			36	37	1	22.04	22.26	22.72	
			75	0	1	22.19	22.28	22.40	
		16QAM	1	0	1	21.82	22.25	21.81	
			1	36	1	22.29	22.17	21.83	
			1	74	1	21.72	22.12	22.11	
			36	0	2	21.53	21.32	21.85	
			36	18	2	21.28	21.30	21.78	
			36	37	2	21.66	21.26	21.87	
			75	0	2	21.33	21.27	21.92	
		64QAM	1	0	2	21.77	21.55	21.58	
			1	36	2	21.50	21.57	21.01	
			1	74	2	21.58	21.46	21.36	
			36	0	3	20.65	20.91	20.57	
			36	18	3	20.98	20.87	20.89	
			36	37	3	20.81	20.84	20.60	
			75	0	3	20.94	20.88	20.80	
		20	QPSK	1	0	0	23.60	23.30	23.13
				1	49	0	23.65	23.25	23.03
				1	99	0	23.49	22.98	22.93
	50			0	1	22.55	22.38	22.65	
	50			24	1	22.60	22.37	22.59	
	50			50	1	22.69	22.28	22.68	
	100			0	1	22.63	22.32	22.62	
	16QAM			1	0	1	22.11	21.87	21.69
				1	49	1	22.15	21.91	21.81
				1	99	1	21.96	21.80	21.64
				50	0	2	21.54	21.40	21.59
				50	24	2	21.60	21.35	21.55
			50	50	2	21.61	21.28	21.60	
	64QAM		100	0	2	21.54	21.30	21.58	
			1	0	2	21.57	21.52	21.06	
			1	49	2	21.57	21.57	21.20	
			1	99	2	21.53	21.45	21.15	
			50	0	3	20.96	20.97	20.86	
			50	24	3	20.83	20.96	20.84	
			50	50	3	20.81	20.86	20.94	
			100	0	3	20.98	20.89	20.89	

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 $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. 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 $1.5 \times \text{OBW}$ is sufficient).
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d) Set the detection mode to peak, and the trace mode to max-hold.
- e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.
- f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Notes:

1. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, Modulation.

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**Test results**

Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 5	1.4	824.7	QPSK	1.30	1.09
			16QAM	1.31	1.10
		836.5	QPSK	1.32	1.10
			16QAM	1.28	1.09
		848.3	QPSK	1.29	1.10
			16QAM	1.30	1.09
	3	825.5	QPSK	2.93	2.70
			16QAM	2.93	2.68
		836.5	QPSK	2.92	2.70
			16QAM	2.94	2.69
		847.5	QPSK	2.92	2.70
			16QAM	2.94	2.69
	5	826.5	QPSK	5.00	4.51
			16QAM	4.96	4.48
		836.5	QPSK	5.00	4.50
			16QAM	5.00	4.52
		846.5	QPSK	4.96	4.50
			16QAM	4.98	4.51
	10	829.0	QPSK	9.74	8.97
			16QAM	9.74	8.97
		836.5	QPSK	9.62	8.99
			16QAM	9.67	8.97
		844.0	QPSK	9.69	8.99
			16QAM	9.84	9.02

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Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 12	1.4	699.7	QPSK	1.34	1.10
			16QAM	1.30	1.11
		707.5	QPSK	1.29	1.09
			16QAM	1.31	1.10
		715.3	QPSK	1.31	1.10
			16QAM	1.28	1.09
	3	700.5	QPSK	2.92	2.70
			16QAM	2.94	2.69
		707.5	QPSK	2.91	2.70
			16QAM	2.94	2.69
		714.5	QPSK	2.93	2.70
			16QAM	2.92	2.68
	5	701.5	QPSK	5.01	4.52
			16QAM	4.95	4.50
		707.5	QPSK	4.97	4.50
			16QAM	4.97	4.51
		713.5	QPSK	4.96	4.50
			16QAM	5.01	4.50
	10	704.0	QPSK	9.64	8.94
			16QAM	9.67	8.97
		707.5	QPSK	9.79	8.99
			16QAM	9.64	8.97
		711.0	QPSK	9.74	8.97
			16QAM	9.72	8.99

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Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 41	5	2 498.5	QPSK	5.01	4.51
			16QAM	5.03	4.50
		2 593.0	QPSK	5.30	4.51
			16QAM	5.02	4.52
		2 687.5	QPSK	5.31	4.50
			16QAM	5.02	4.48
	10	2 501.0	QPSK	10.37	8.99
			16QAM	10.54	8.97
		2 593.0	QPSK	9.64	9.02
			16QAM	9.67	8.99
		2 685.0	QPSK	9.69	8.99
			16QAM	9.67	8.97
	15	2 503.5	QPSK	14.69	13.45
			16QAM	14.54	13.45
		2 593.0	QPSK	14.84	13.45
			16QAM	15.25	13.45
		2 682.5	QPSK	14.65	13.49
			16QAM	14.72	13.56
	20	2 506.0	QPSK	19.33	17.98
			16QAM	19.43	17.93
		2 593.0	QPSK	19.53	18.08
			16QAM	19.48	17.98
		2 680.0	QPSK	19.53	18.08
			16QAM	19.58	18.03

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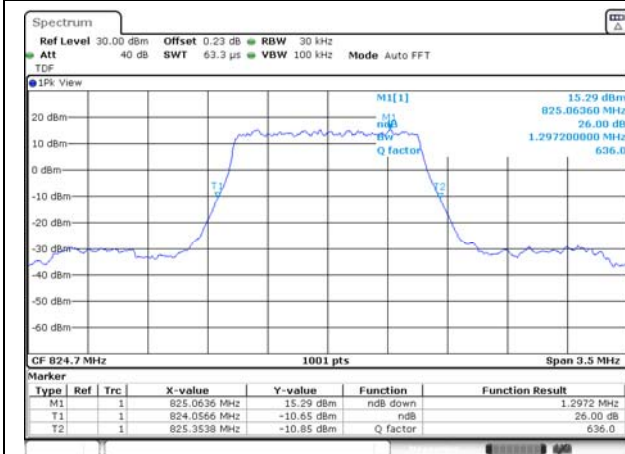
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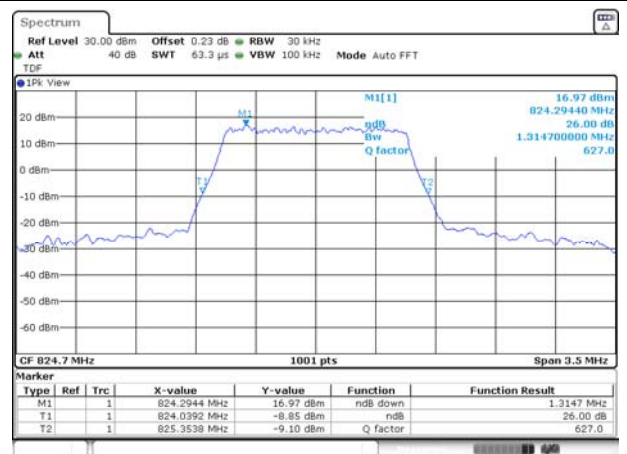
26dB Bandwidth

Test mode: LTE Band 5

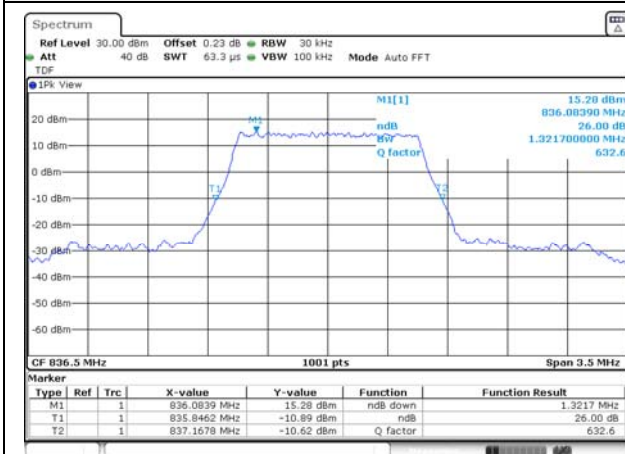
1.4M BW QPSK Low ch.



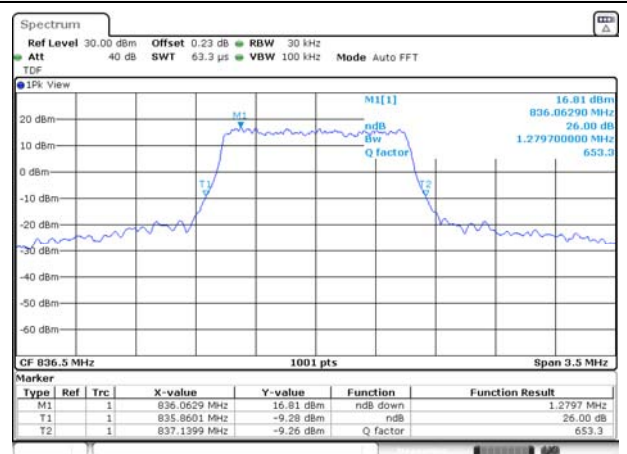
1.4M BW 16QAM Low ch.



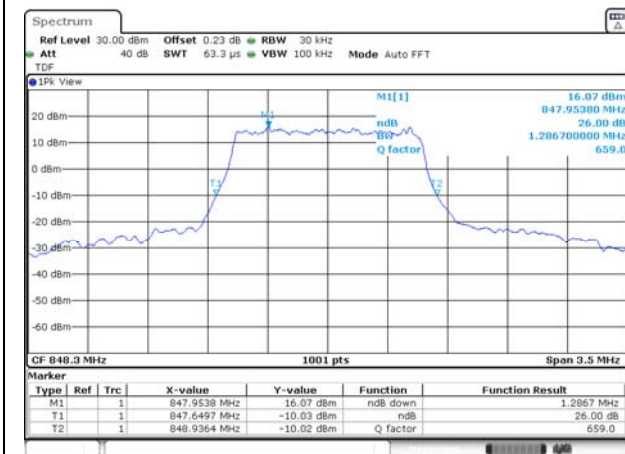
1.4M BW QPSK Mid ch.



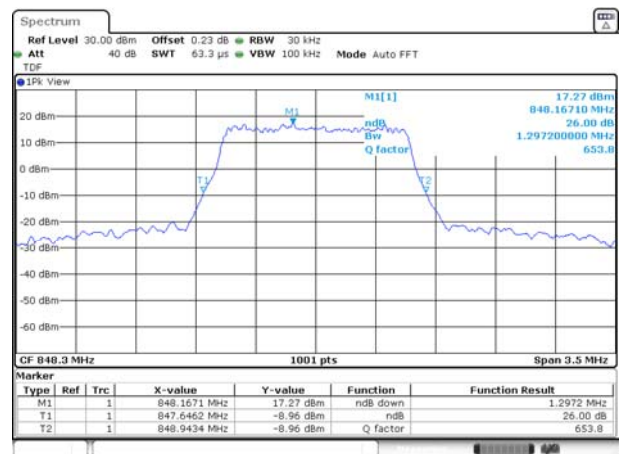
1.4M BW 16QAM Mid ch.



1.4M BW QPSK High ch.



1.4M BW 16QAM High ch.



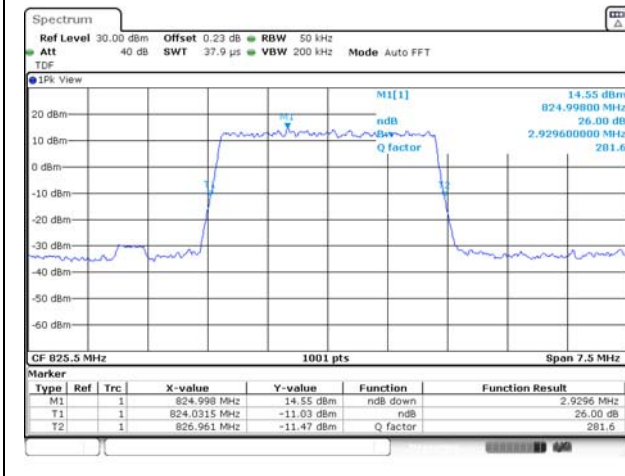
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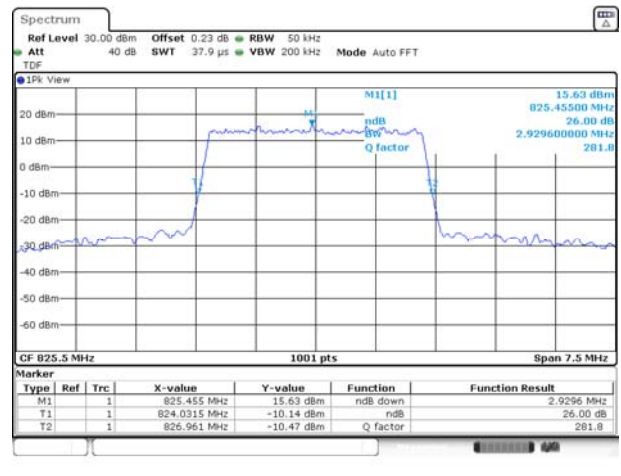
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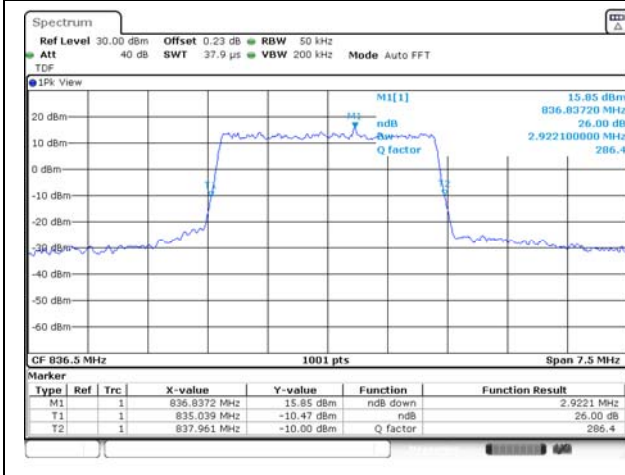
3M BW QPSK Low ch.



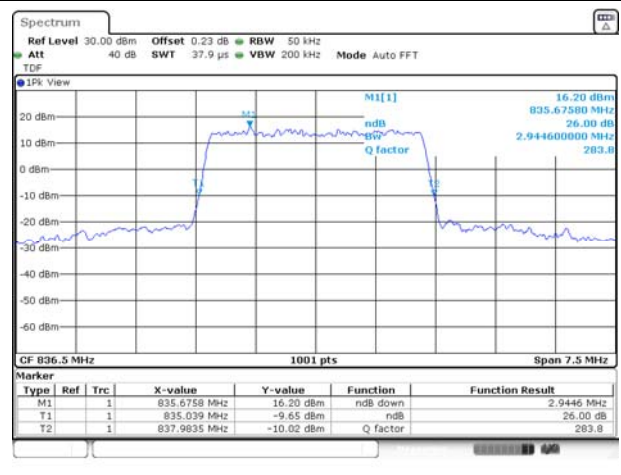
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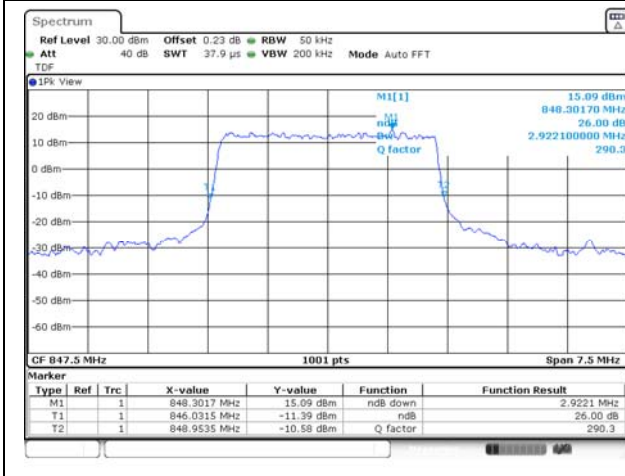
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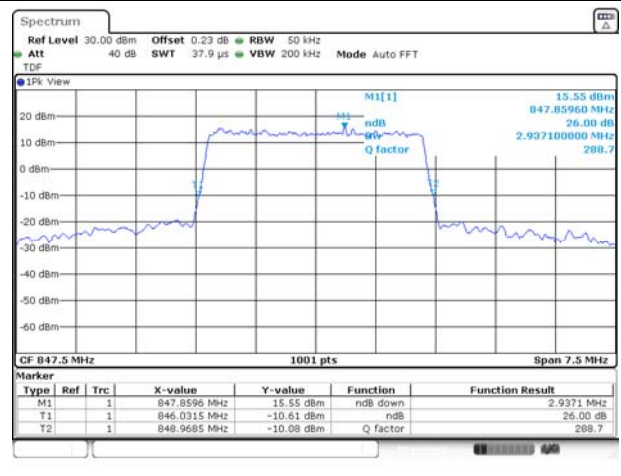
3M BW 16QAM Mid ch.



3M BW QPSK High ch.



3M BW 16QAM High ch.



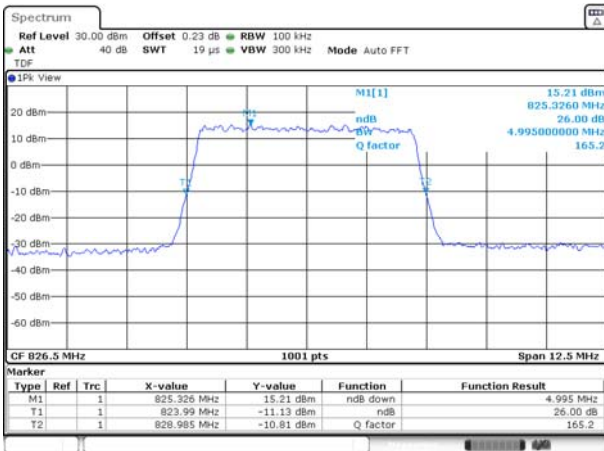
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Suwon-si, Gyeonggi-do, 16677, Korea
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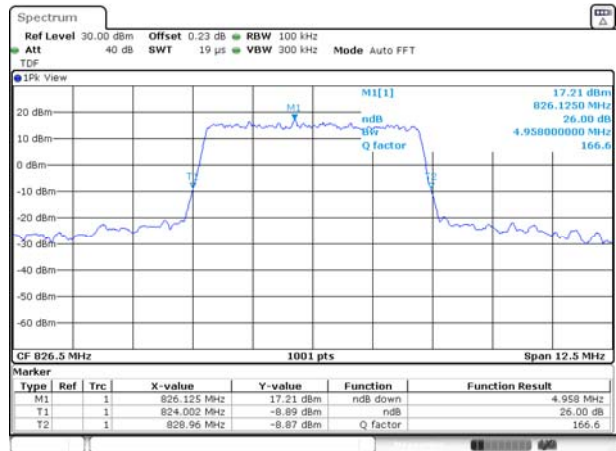
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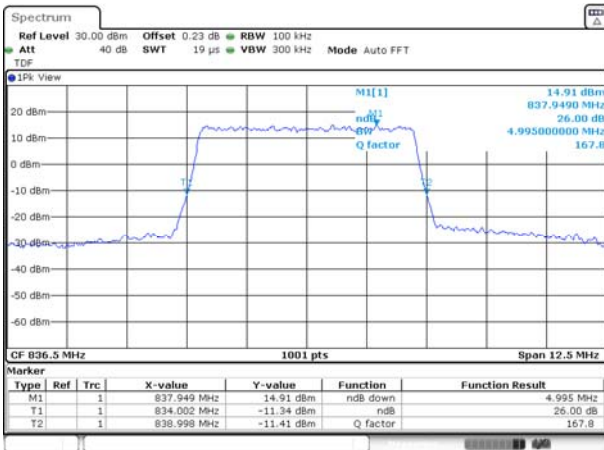
5M BW QPSK Low ch.



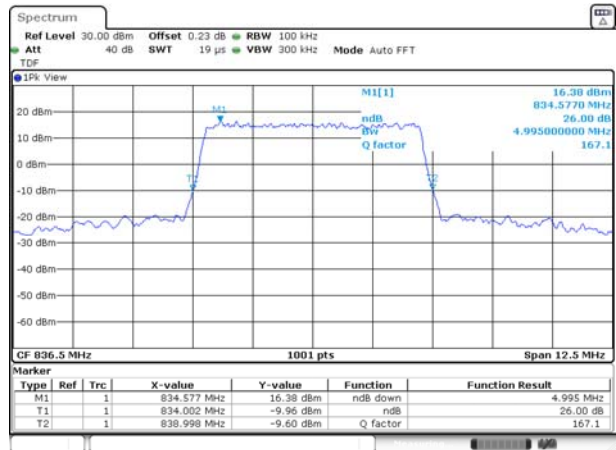
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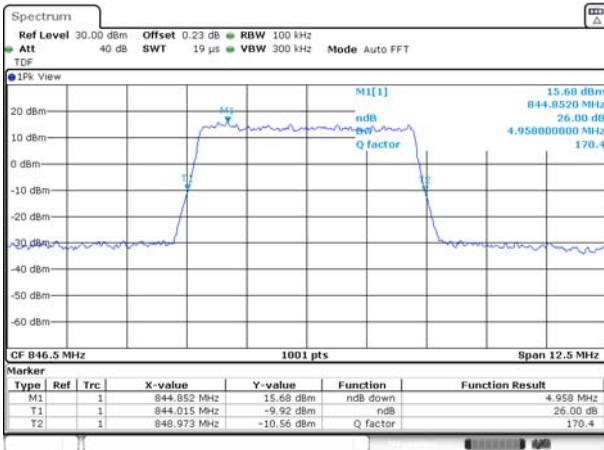
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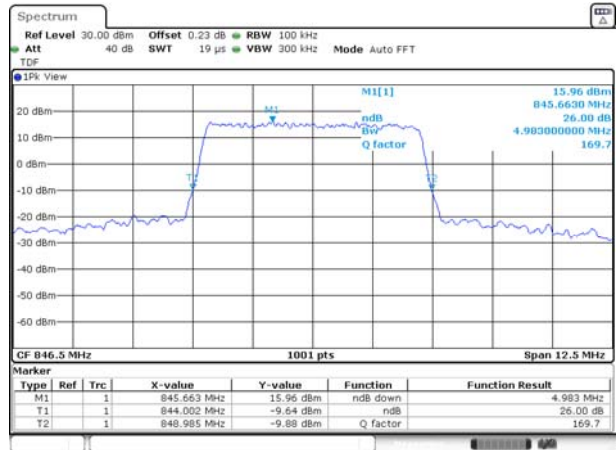
5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.



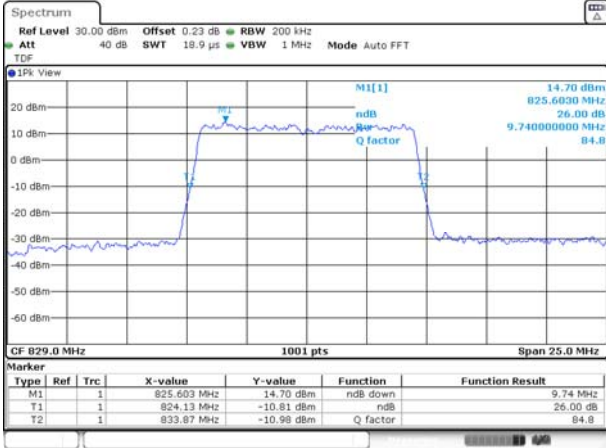
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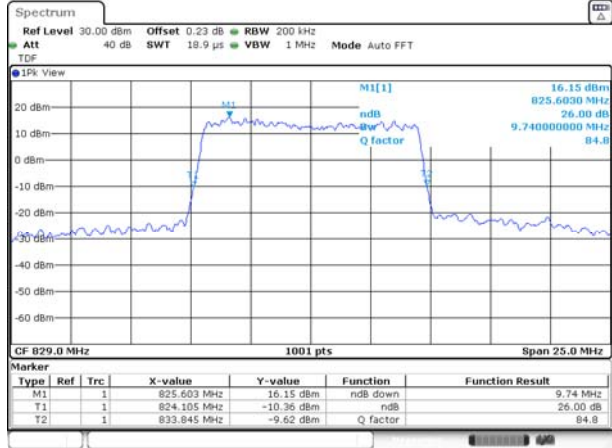
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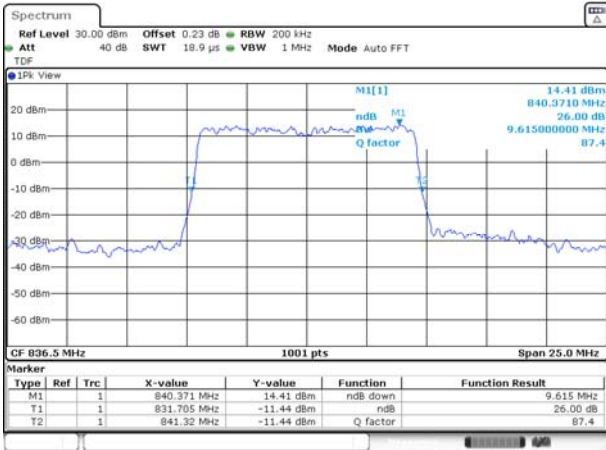
10M BW QPSK Low ch.



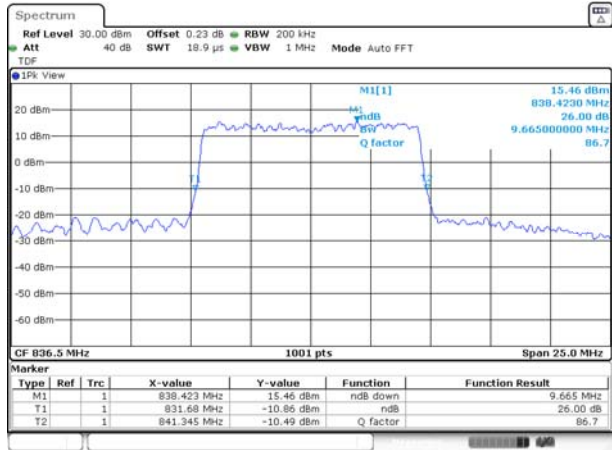
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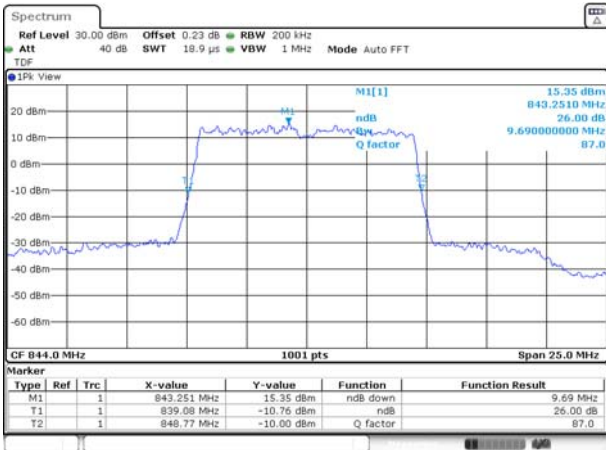
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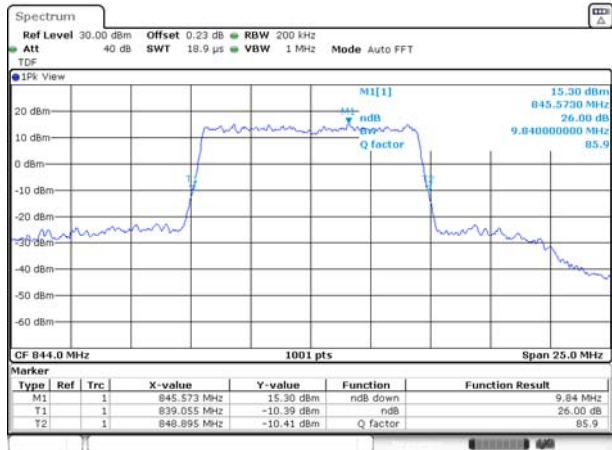
10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



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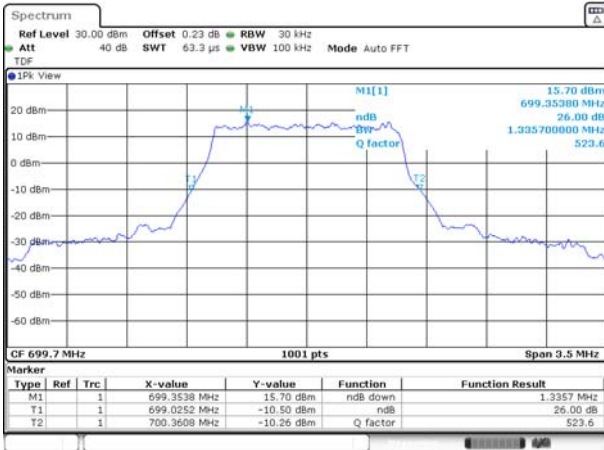
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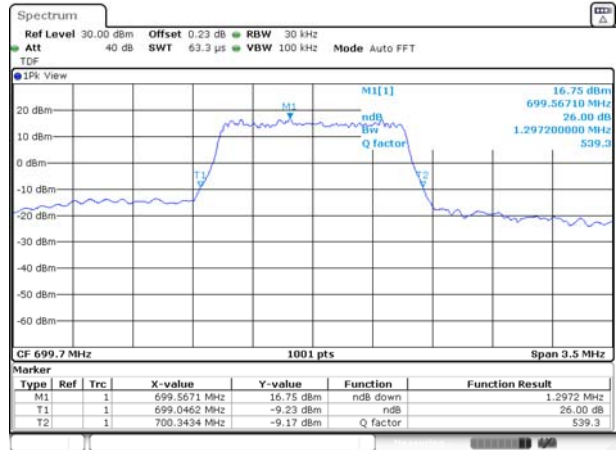


Test mode: LTE Band 12

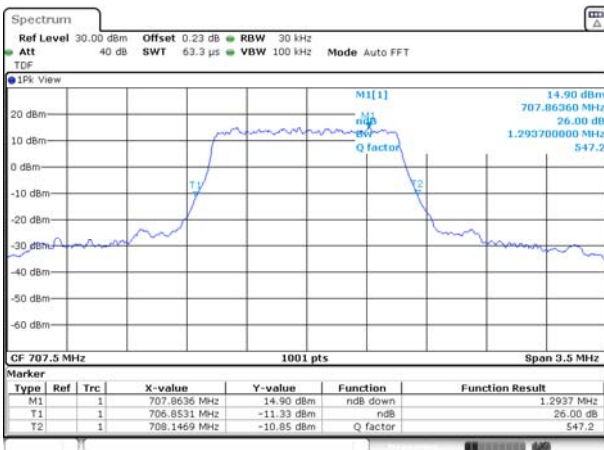
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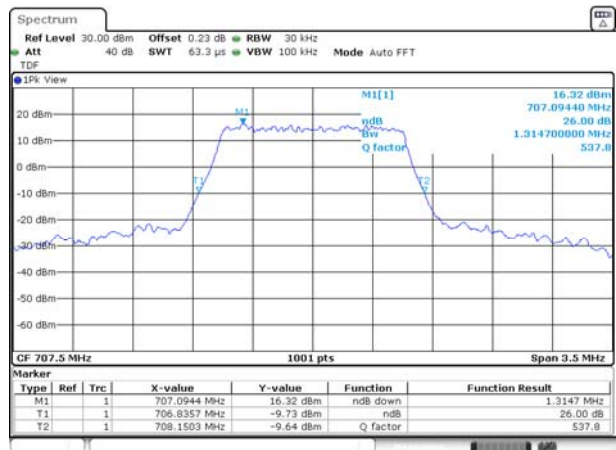
1.4M BW 16QAM Low ch.



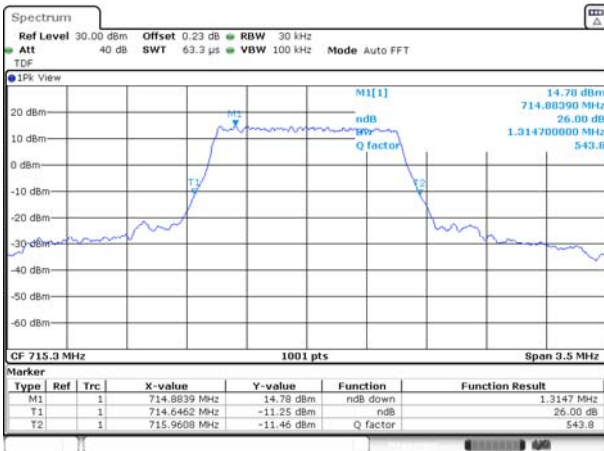
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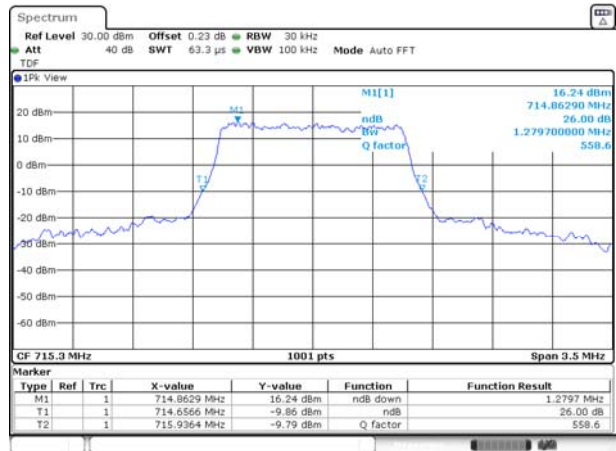
1.4M BW 16QAM Mid ch.



1.4M BW QPSK High ch.



1.4M BW 16QAM High ch.



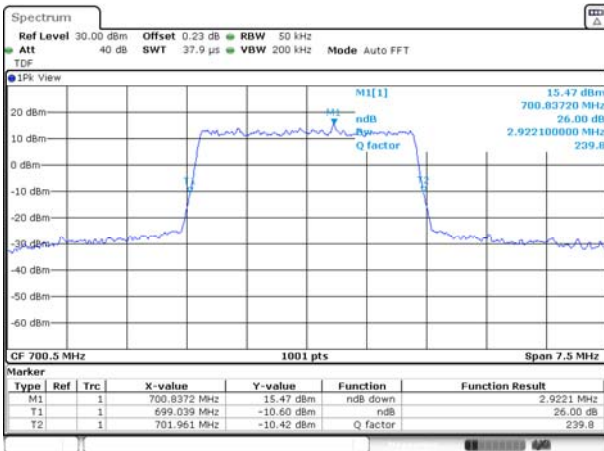
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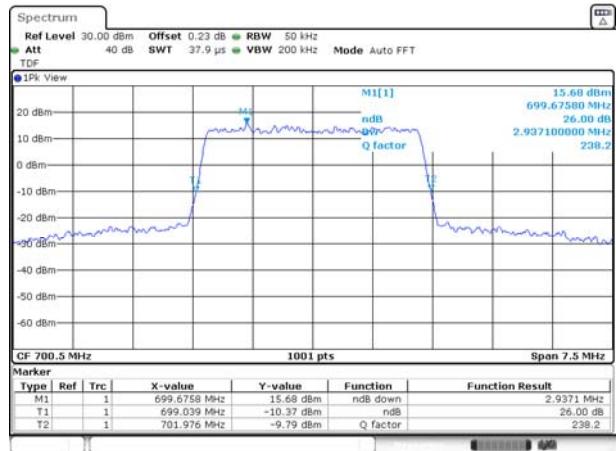
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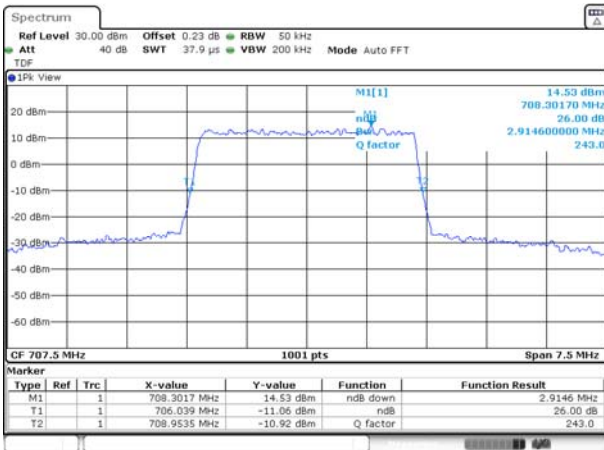
3M BW QPSK Low ch.



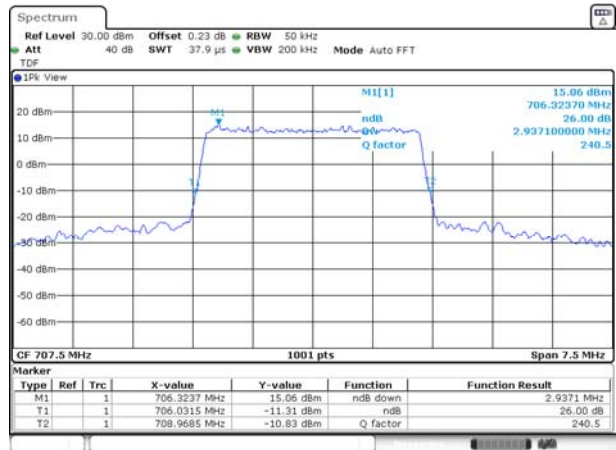
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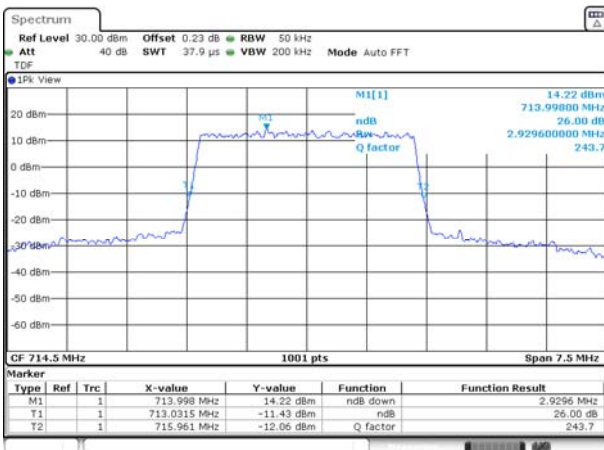
3M BW QPSK Mid ch.



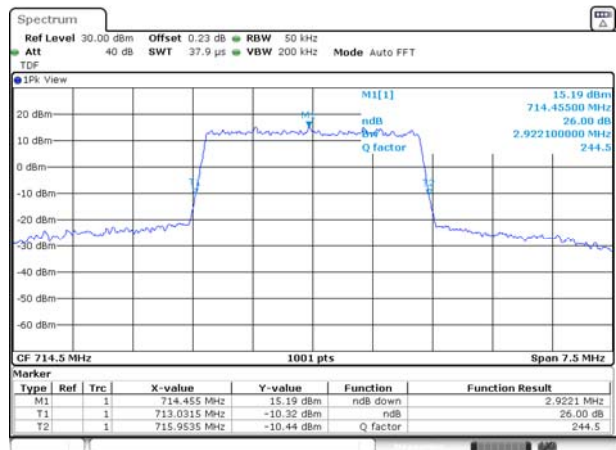
3M BW 16QAM Mid ch.



3M BW QPSK High ch.



3M BW 16QAM High ch.



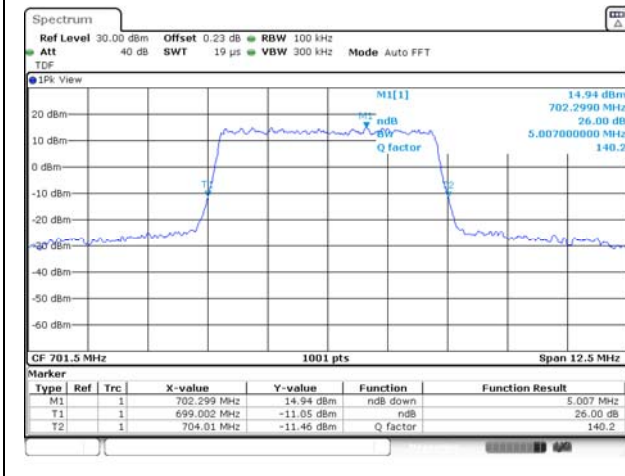
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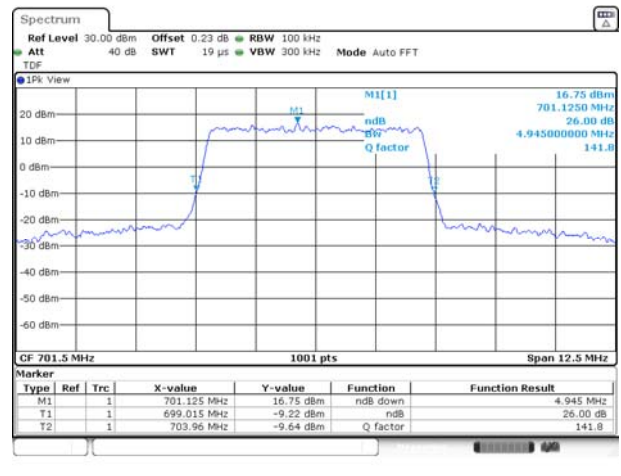
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KR21-SRF0236
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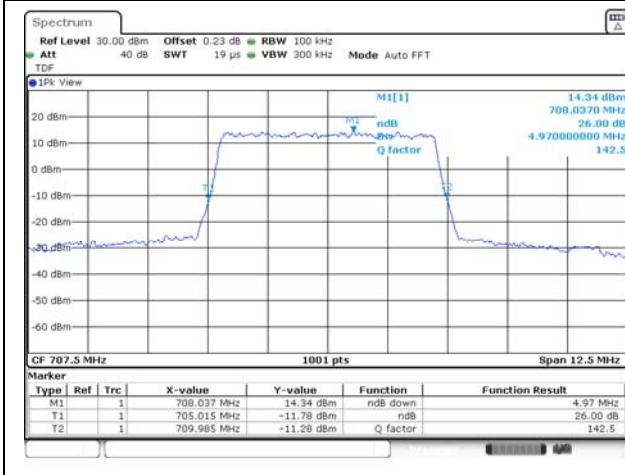
5M BW QPSK Low ch.



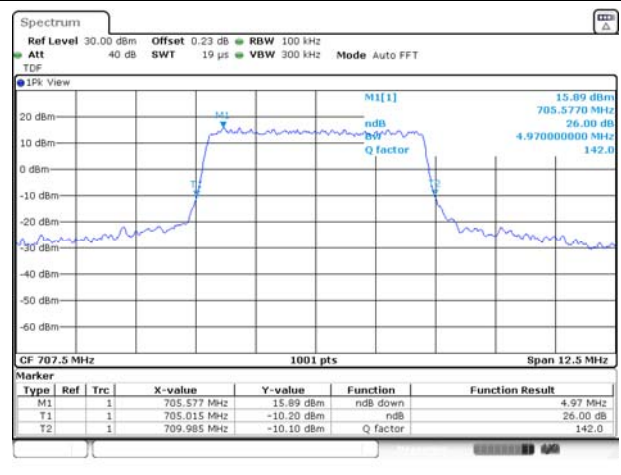
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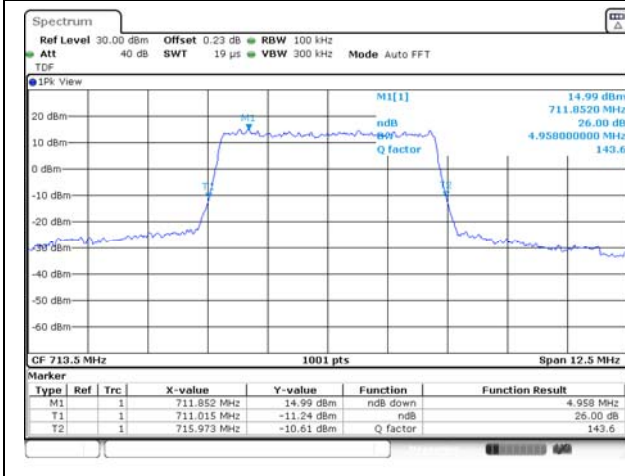
5M BW QPSK Mid ch.



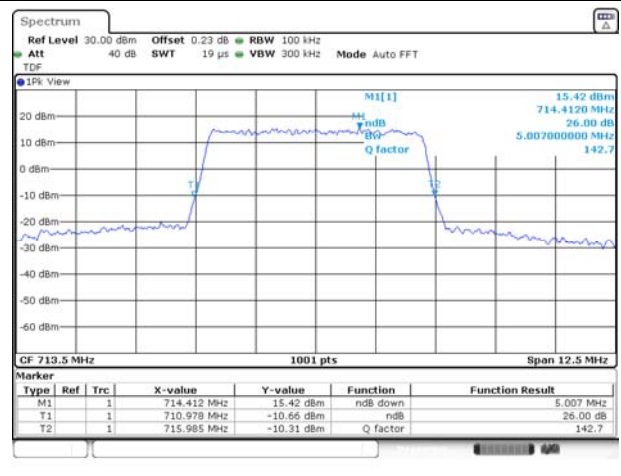
5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.



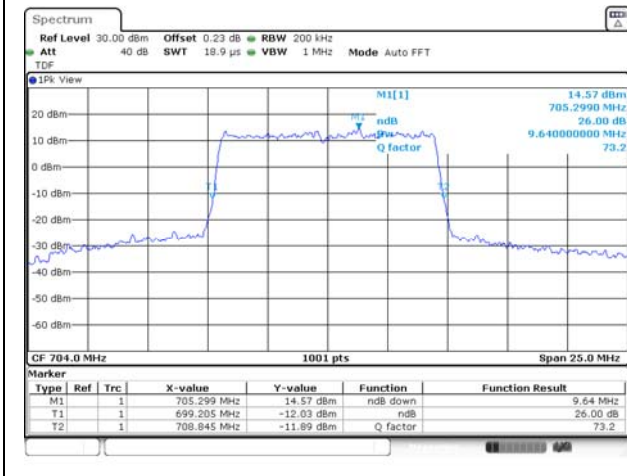
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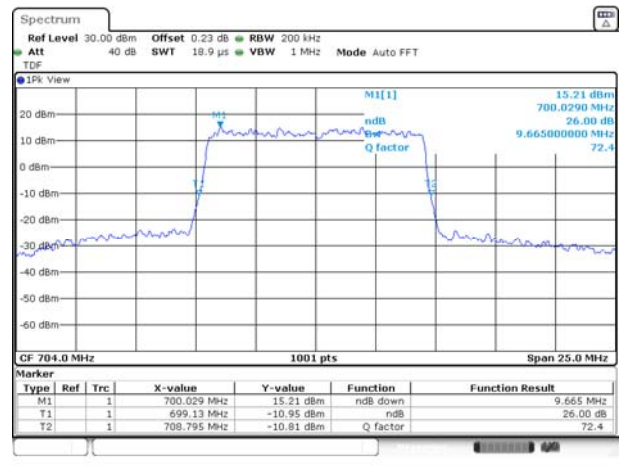
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KR21-SRF0236
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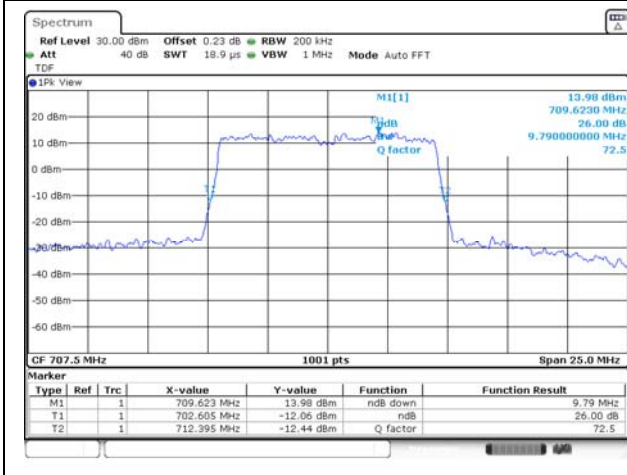
10M BW QPSK Low ch.



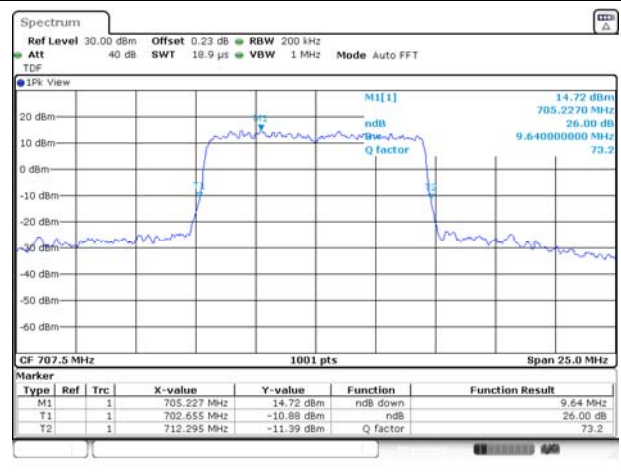
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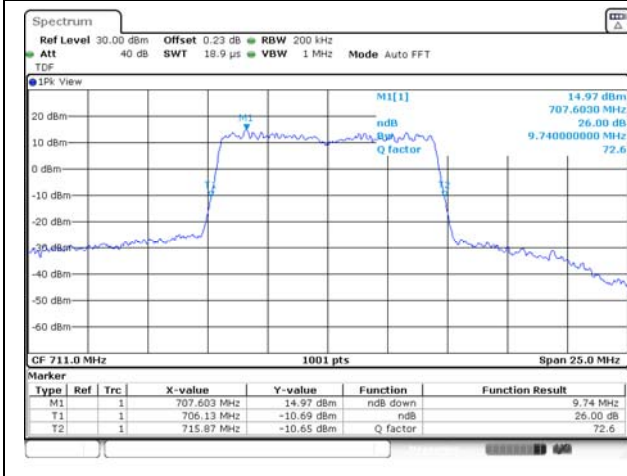
10M BW QPSK Mid ch.



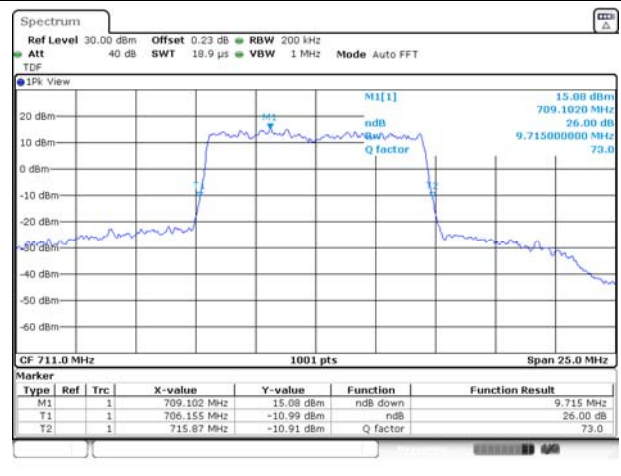
10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



KCTL Inc.

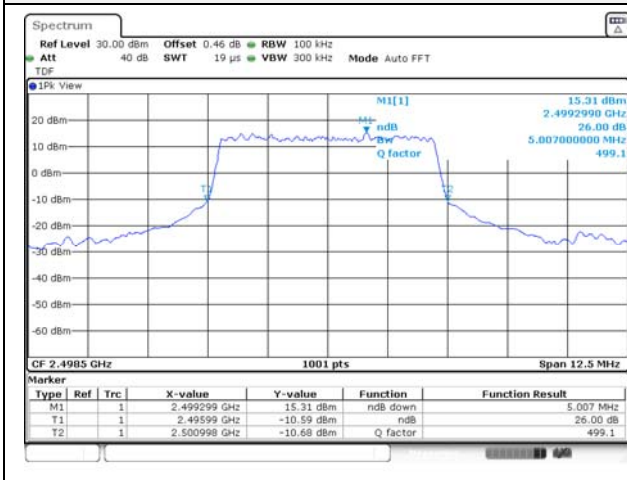
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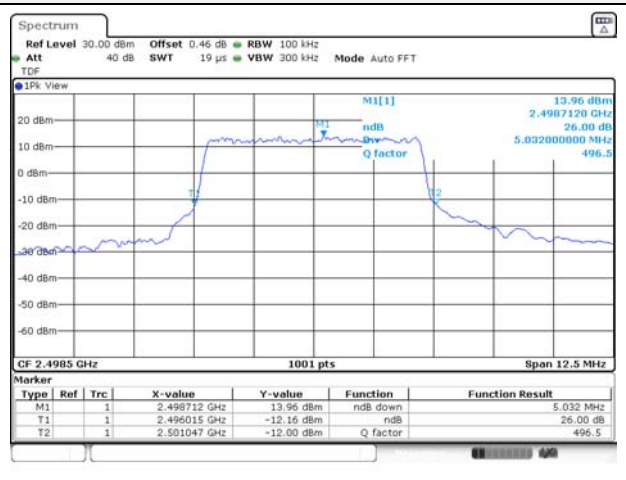


Test mode: LTE Band 41

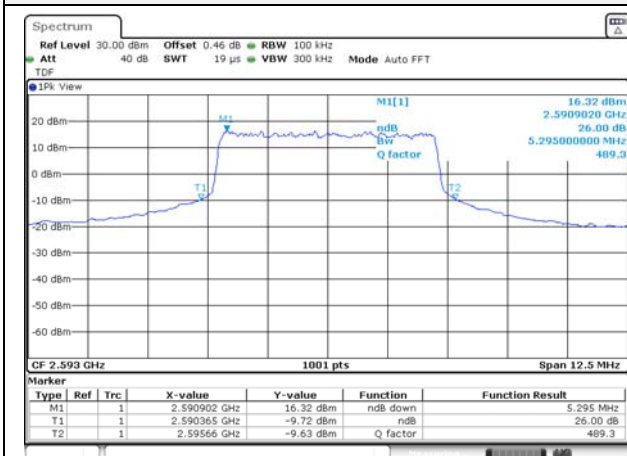
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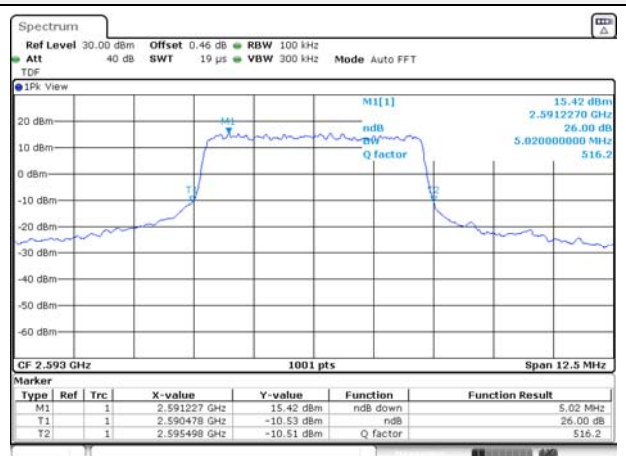
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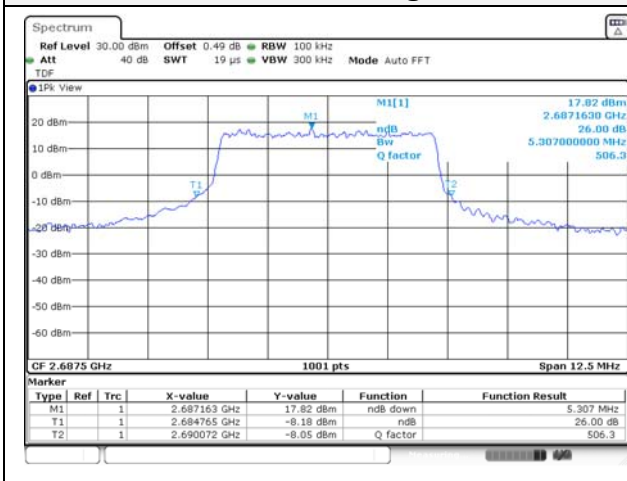
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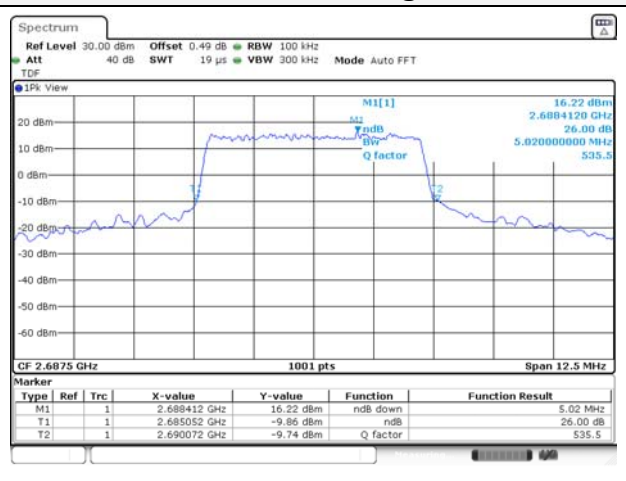
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5M BW QPSK High ch.



5M BW 16QAM High ch.



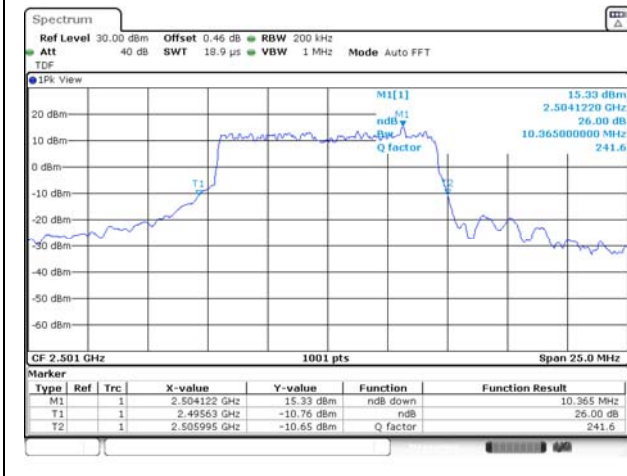
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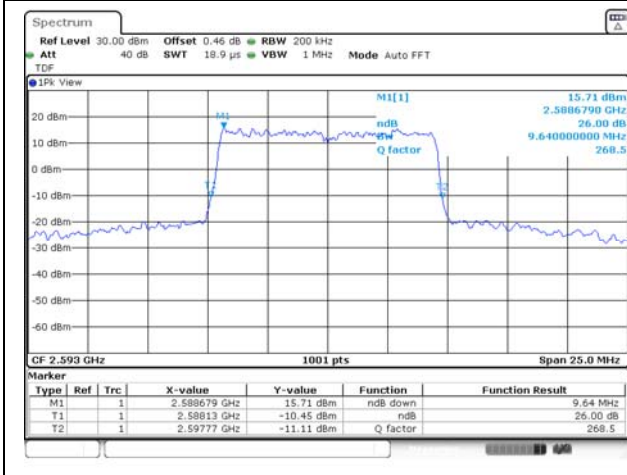
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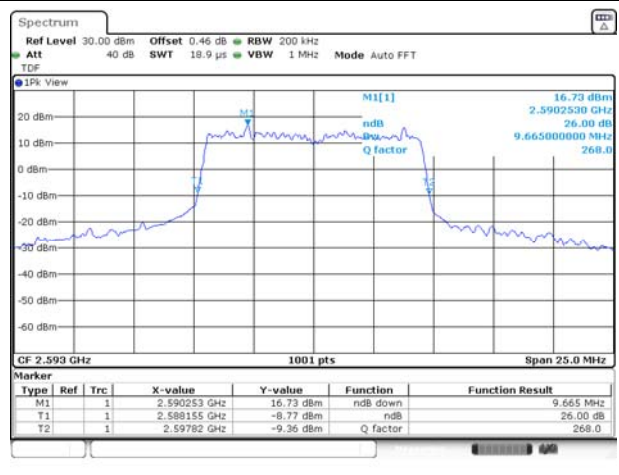
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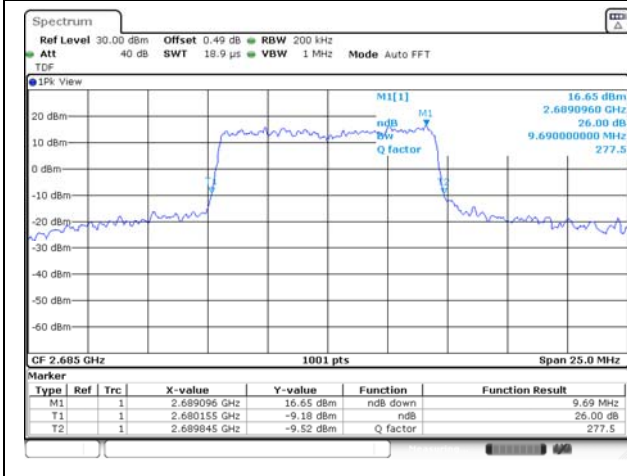
10M BW QPSK Mid ch.



10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



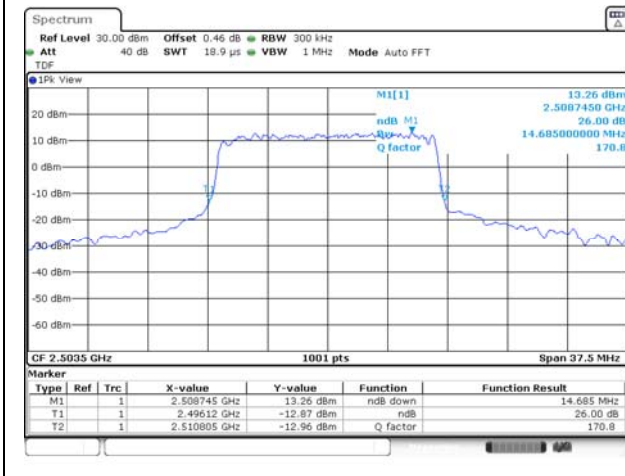
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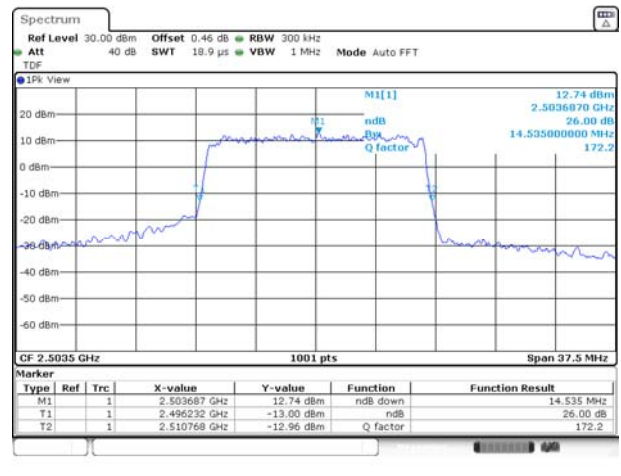
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KR21-SRF0236
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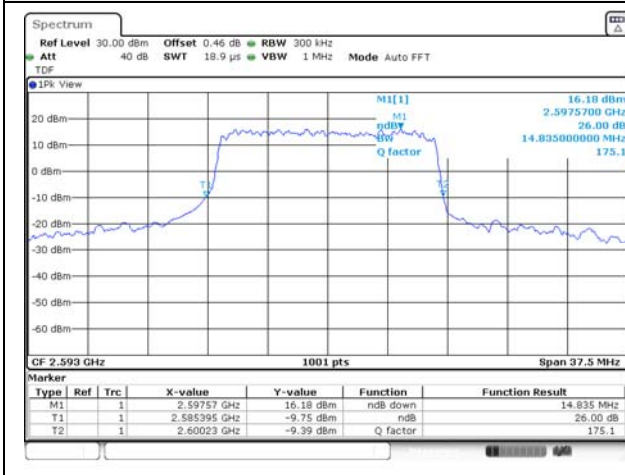
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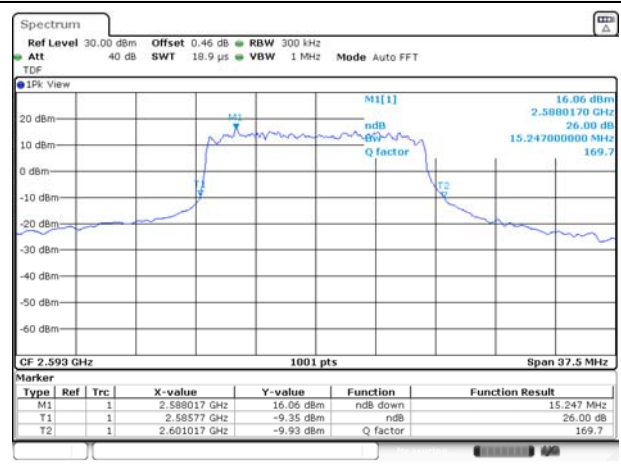
15M BW 16QAM Low ch.



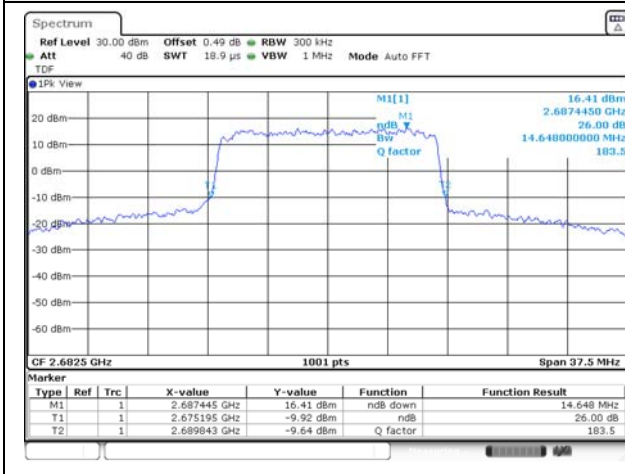
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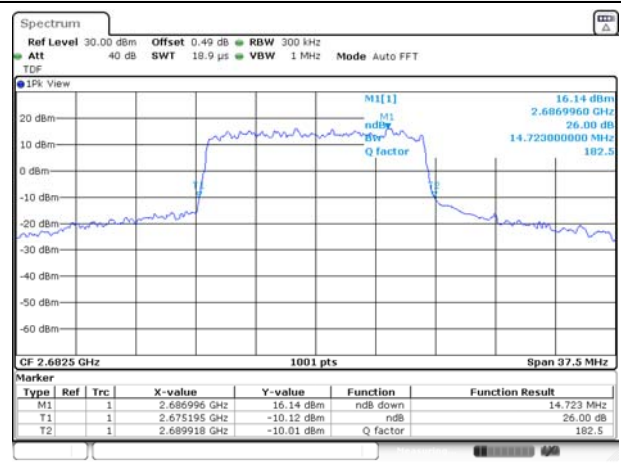
15M BW 16QAM Mid ch.



15M BW QPSK High ch.



15M BW 16QAM High ch.



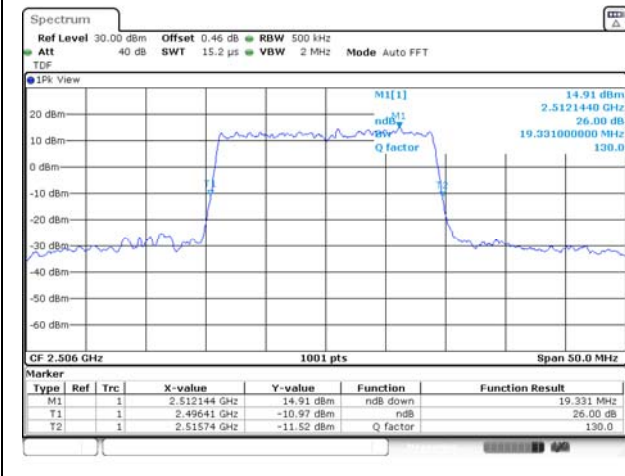
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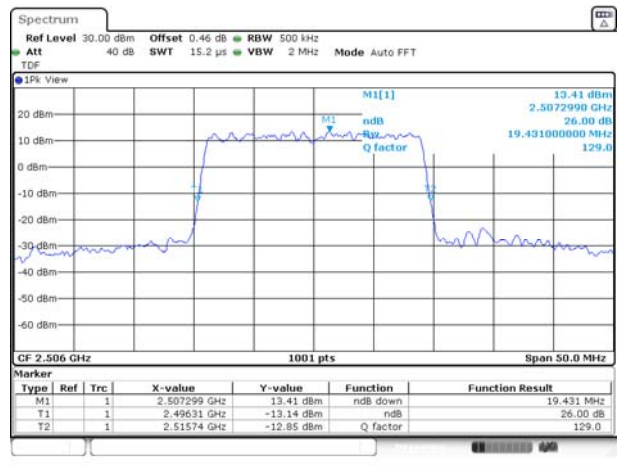
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KR21-SRF0236
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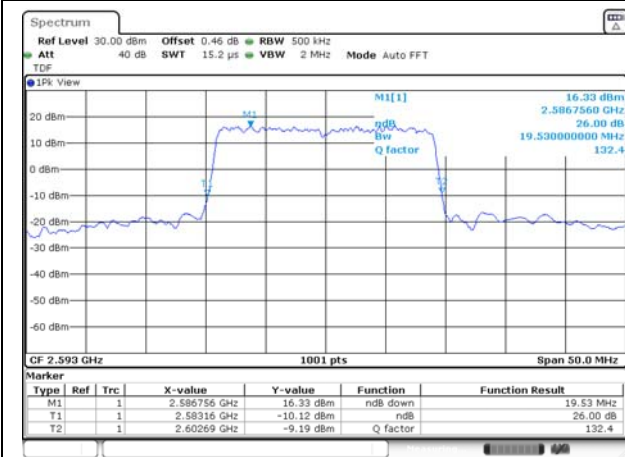
20M BW QPSK Low ch.



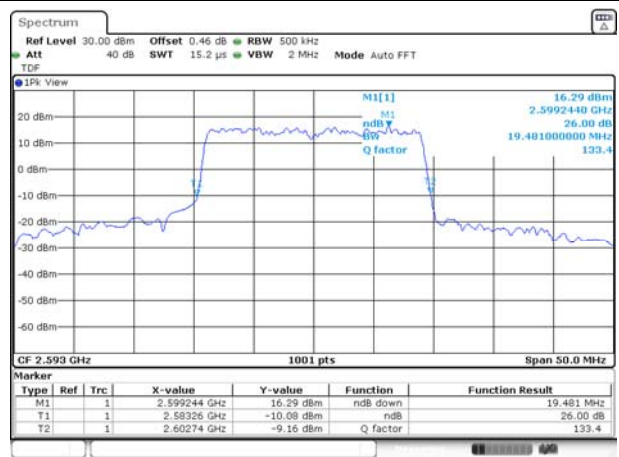
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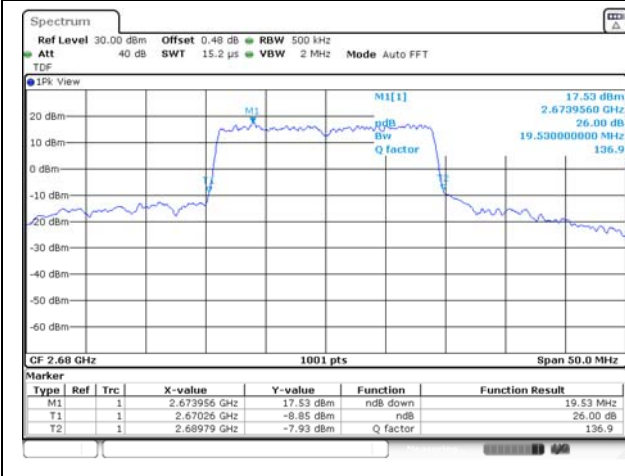
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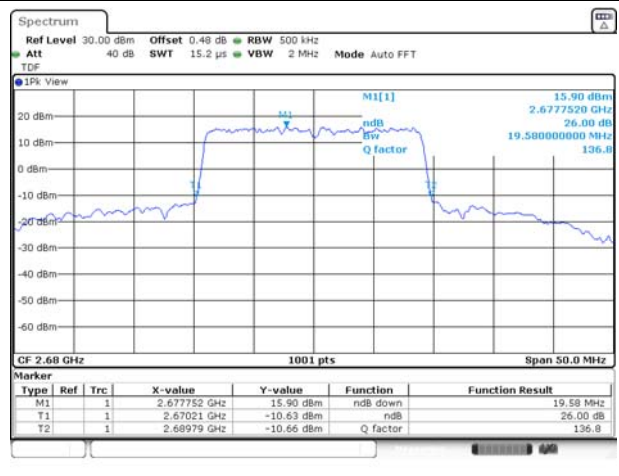
20M BW 16QAM Mid ch.



20M BW QPSK High ch.



20M BW 16QAM High ch.



KCTL Inc.

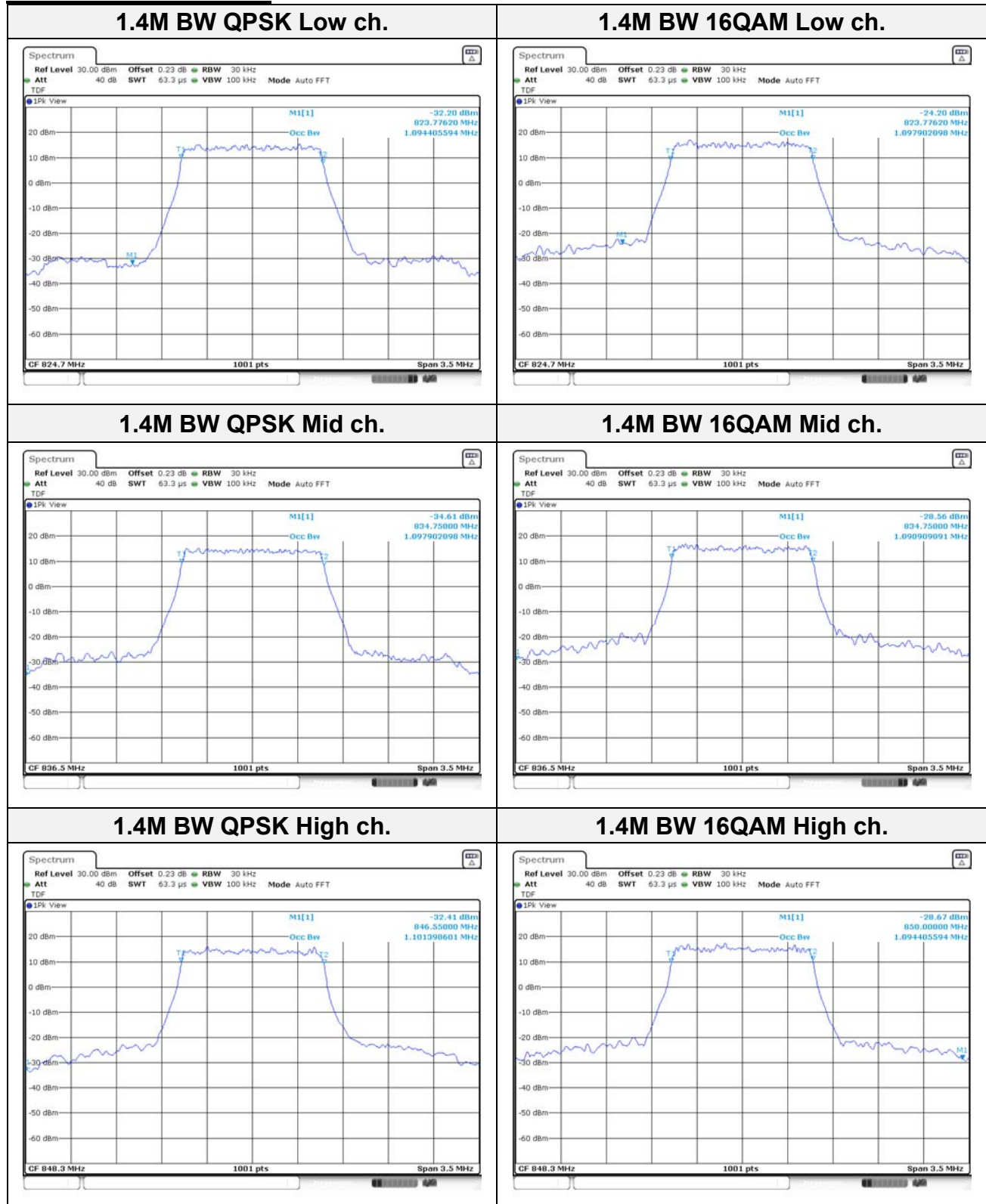
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99% Occupied Bandwidth

Test mode: LTE Band 5



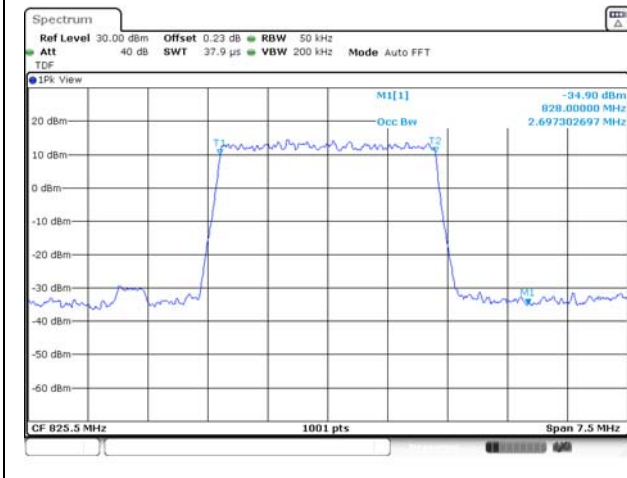
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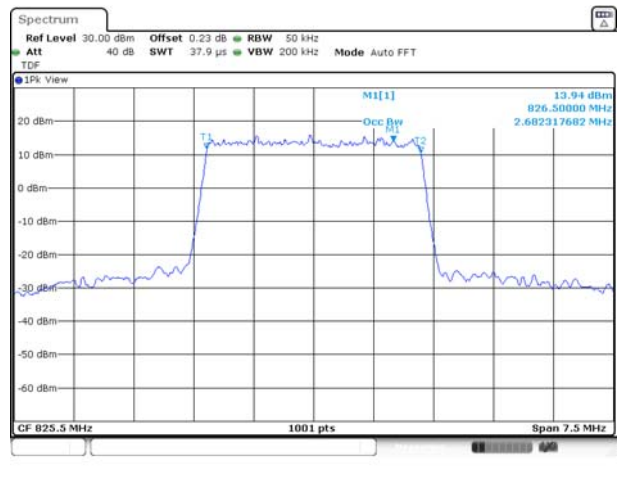
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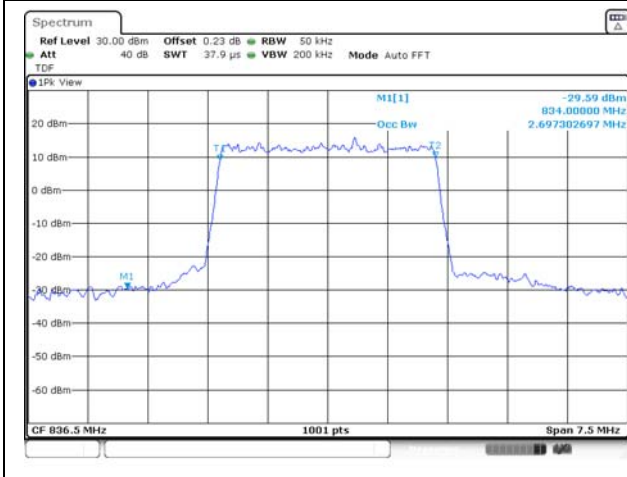
3M BW QPSK Low ch.



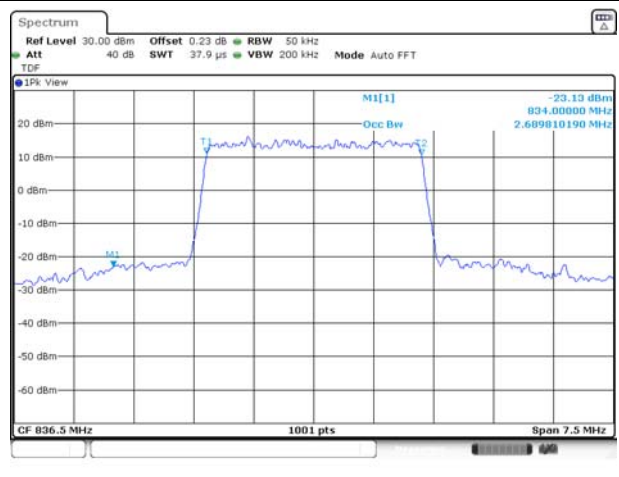
3M BW 16QAM Low ch.



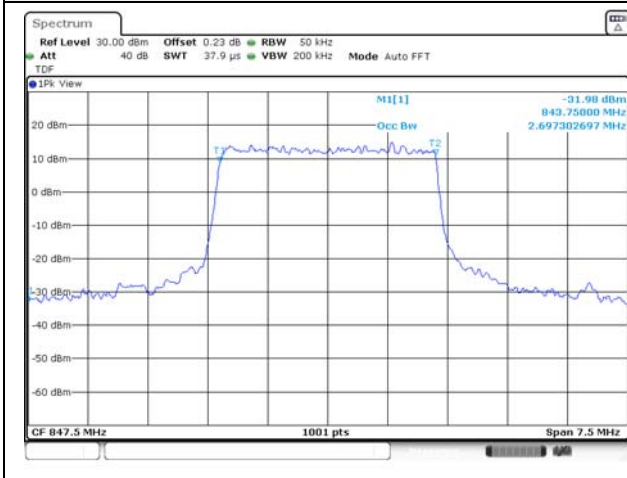
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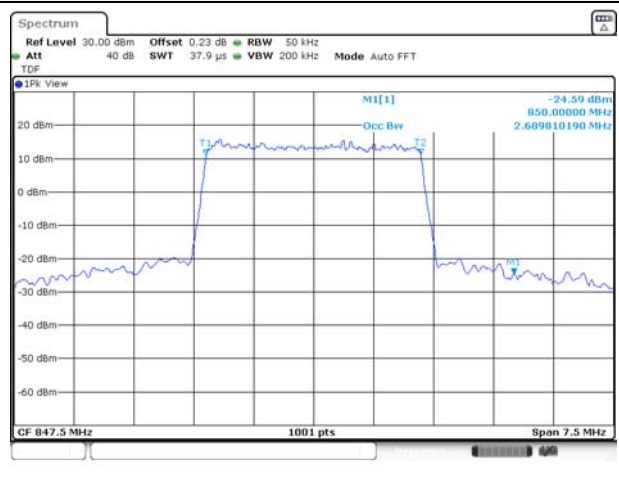
3M BW 16QAM Mid ch.



3M BW QPSK High ch.



3M BW 16QAM High ch.



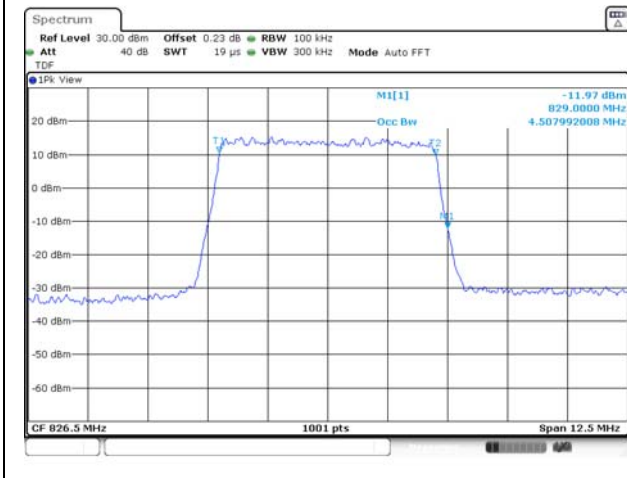
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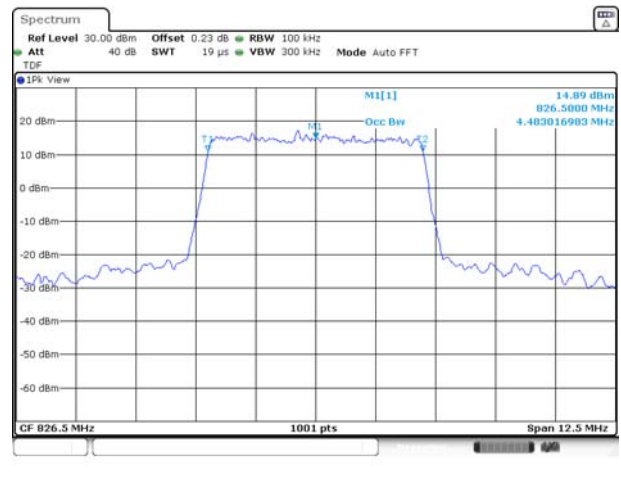
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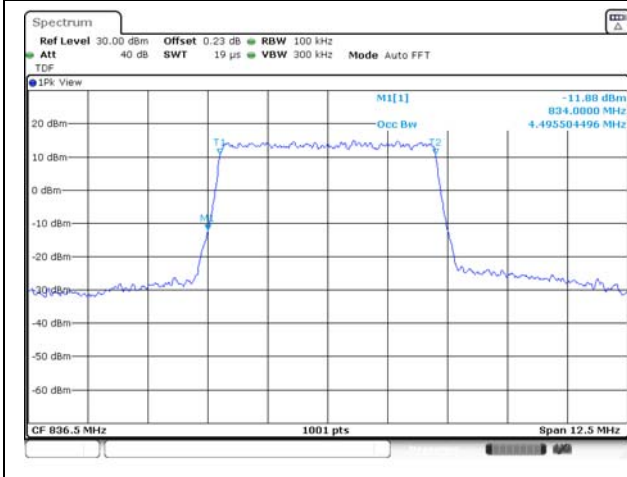
5M BW QPSK Low ch.



5M BW 16QAM Low ch.



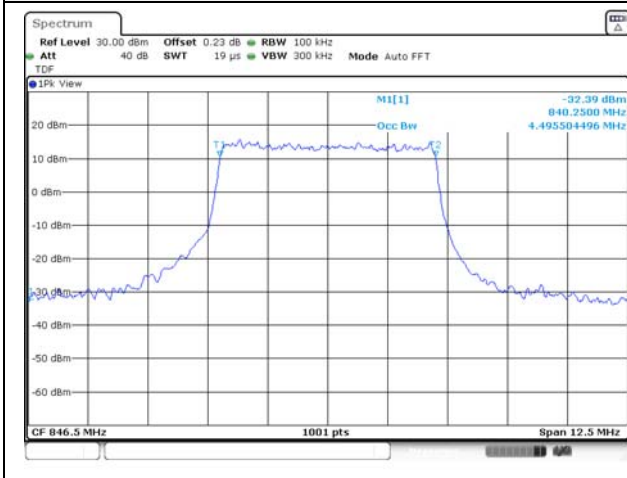
5M BW QPSK Mid ch.



5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.



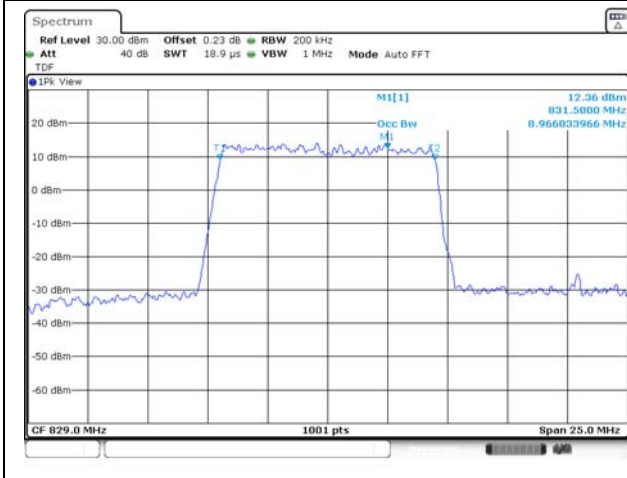
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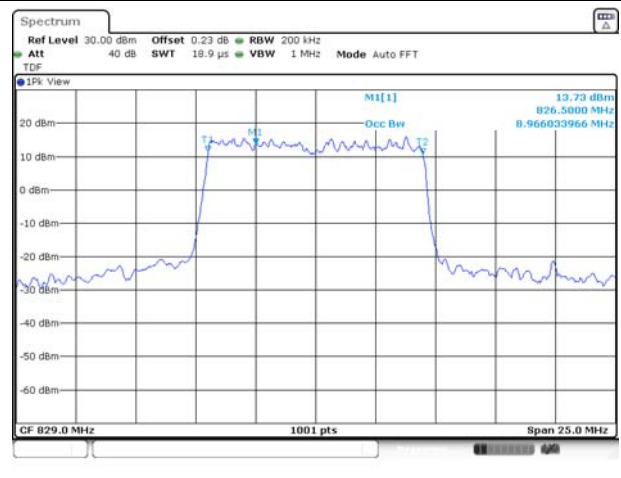
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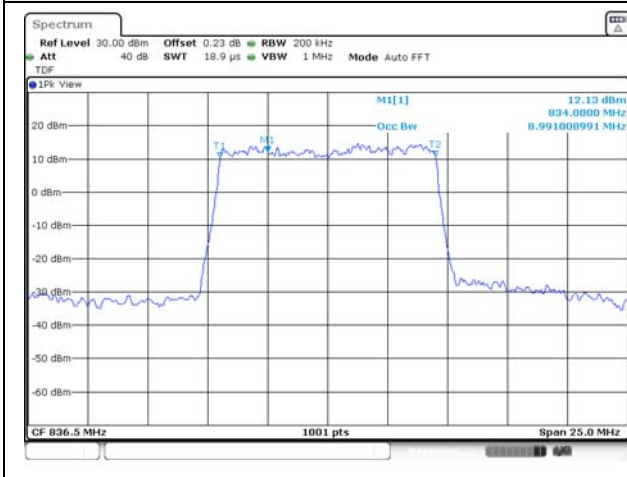
10M BW QPSK Low ch.



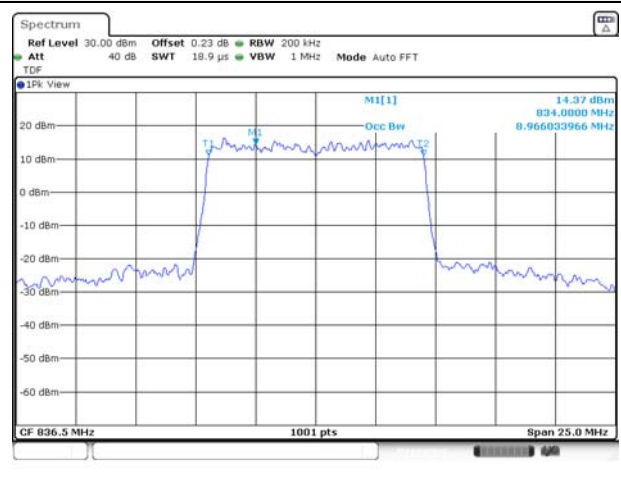
10M BW 16QAM Low ch.



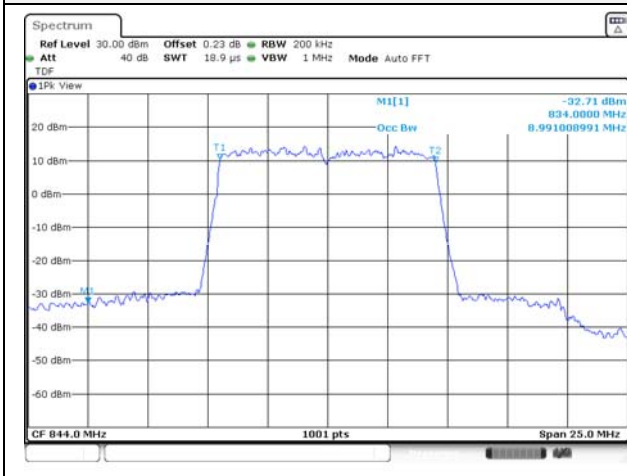
10M BW QPSK Mid ch.



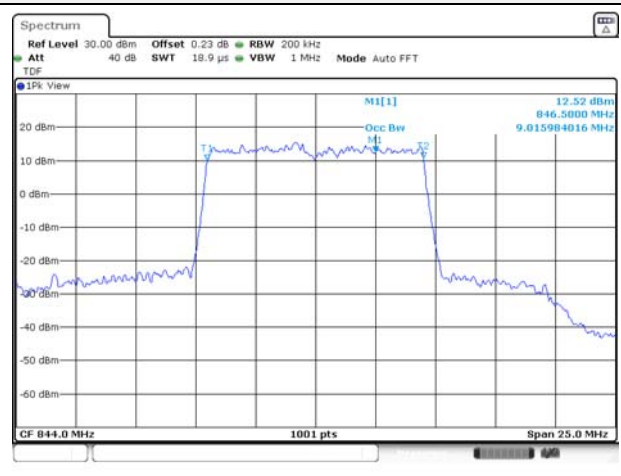
10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



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Test mode: LTE Band 12

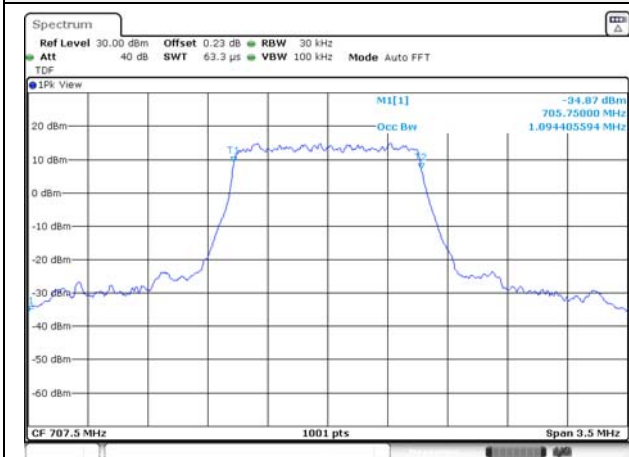
1.4M BW QPSK Low ch.



1.4M BW 16QAM Low ch.



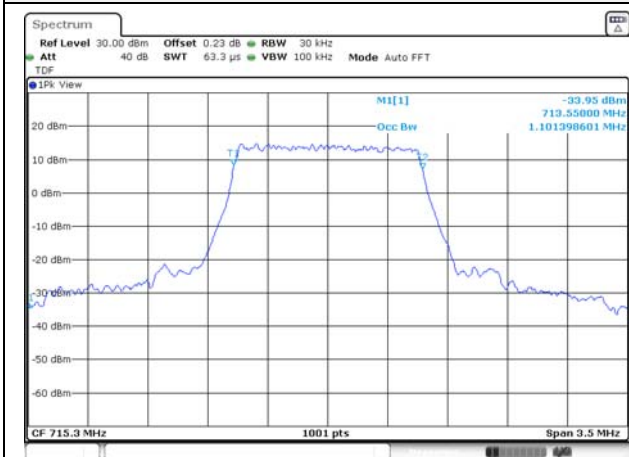
1.4M BW QPSK Mid ch.



1.4M BW 16QAM Mid ch.



1.4M BW QPSK High ch.



1.4M BW 16QAM High ch.



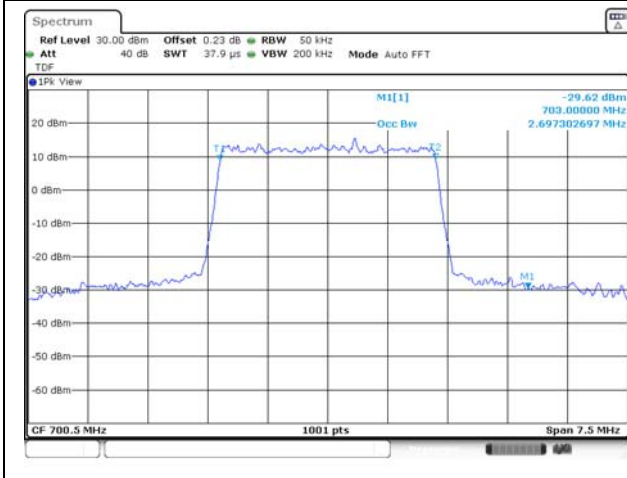
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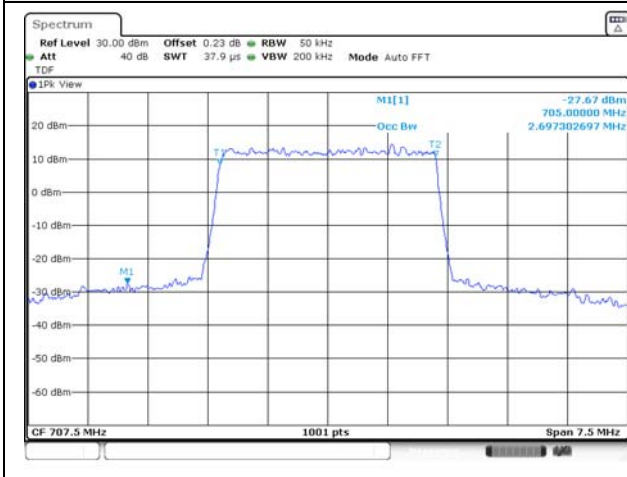
3M BW QPSK Low ch.



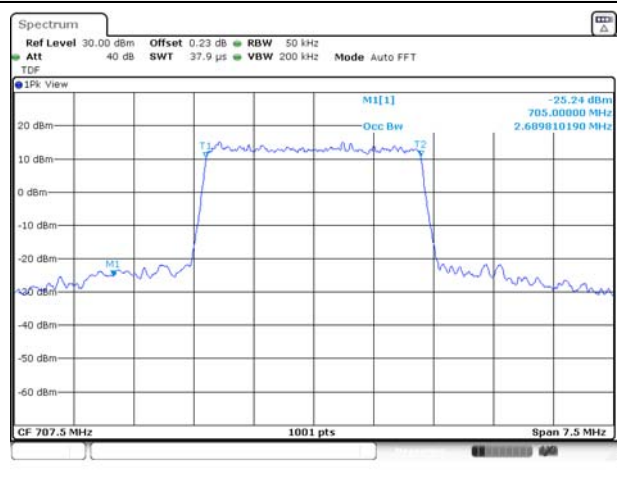
3M BW 16QAM Low ch.



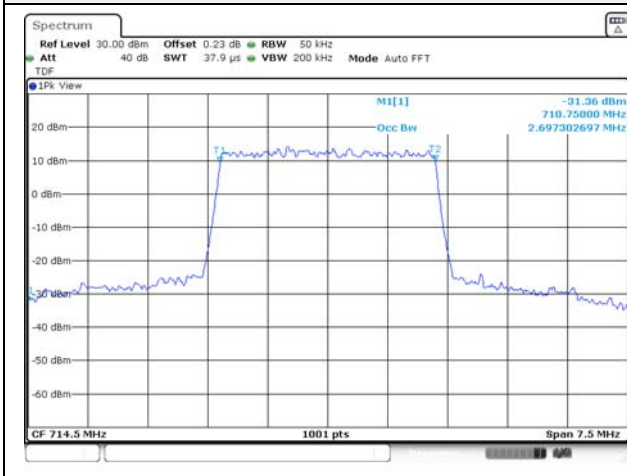
3M BW QPSK Mid ch.



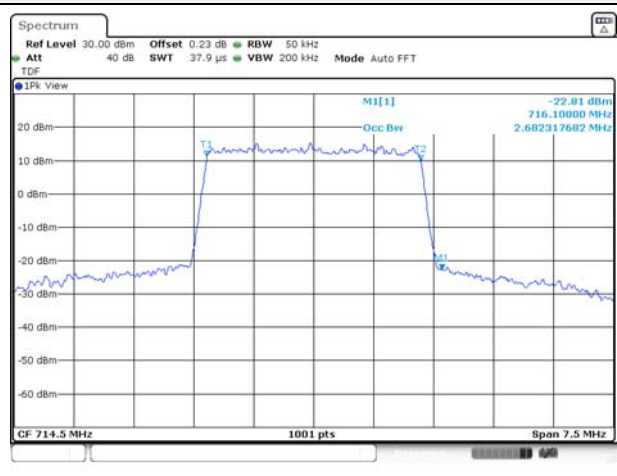
3M BW 16QAM Mid ch.



3M BW QPSK High ch.



3M BW 16QAM High ch.



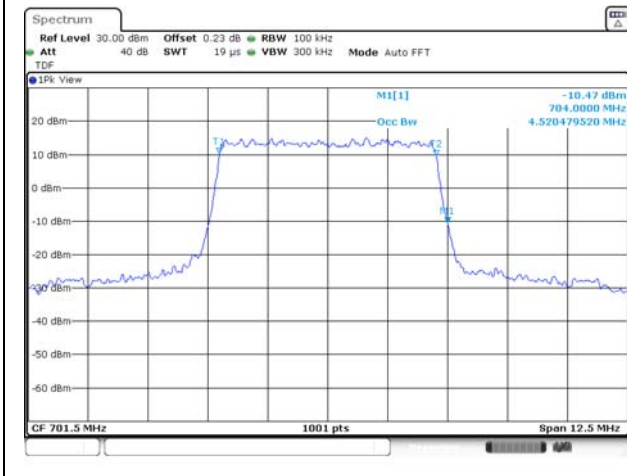
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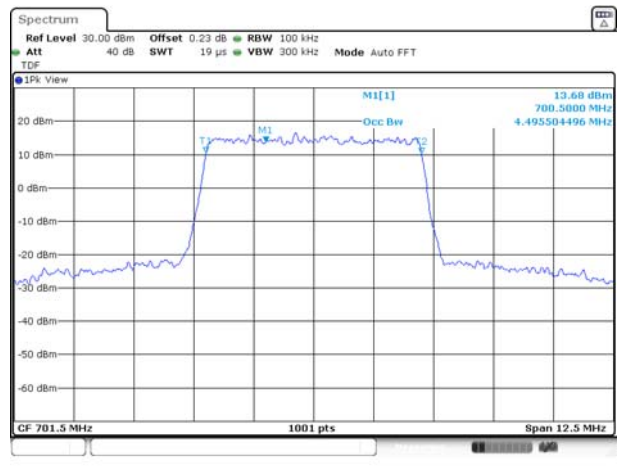
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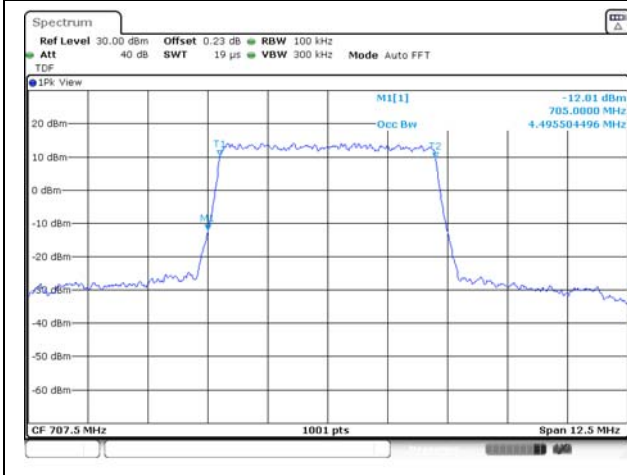
5M BW QPSK Low ch.



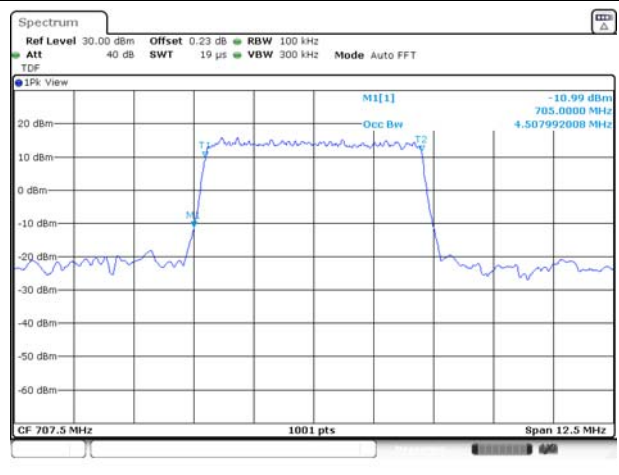
5M BW 16QAM Low ch.



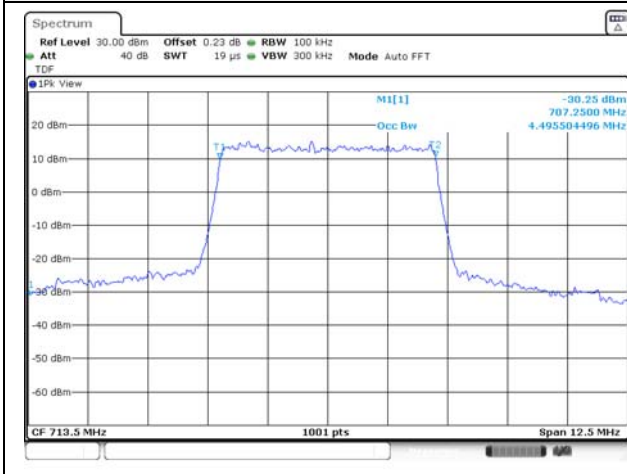
5M BW QPSK Mid ch.



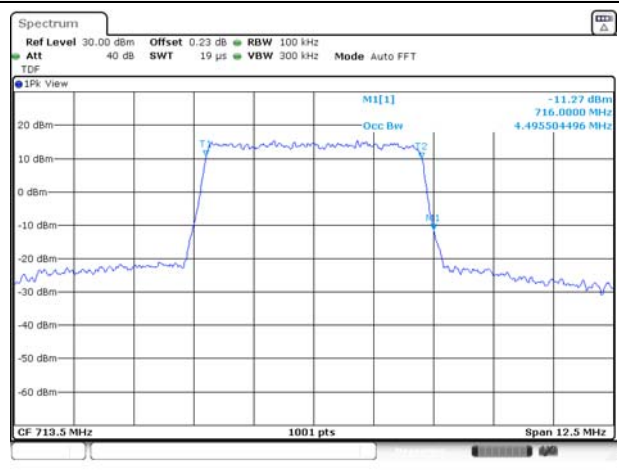
5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.



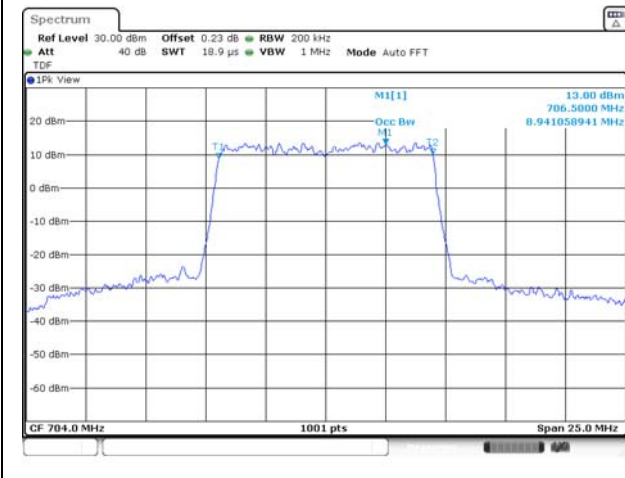
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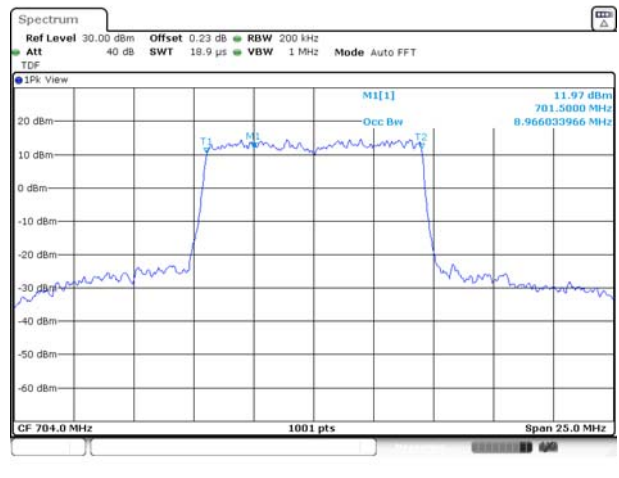
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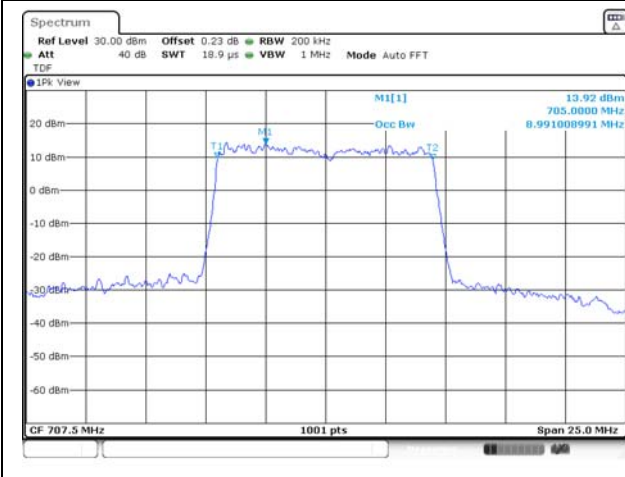
10M BW QPSK Low ch.



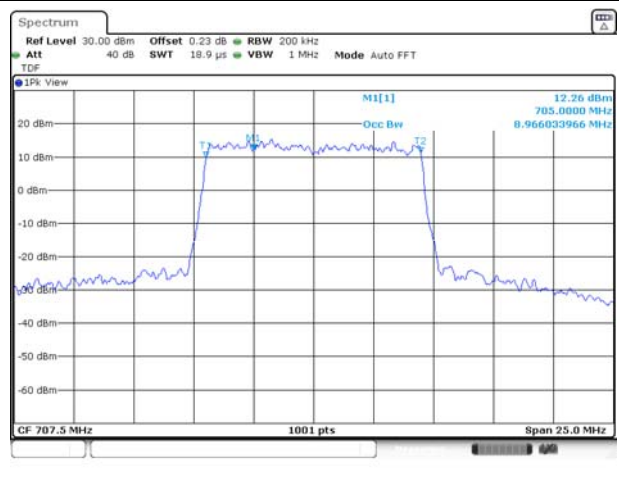
10M BW 16QAM Low ch.



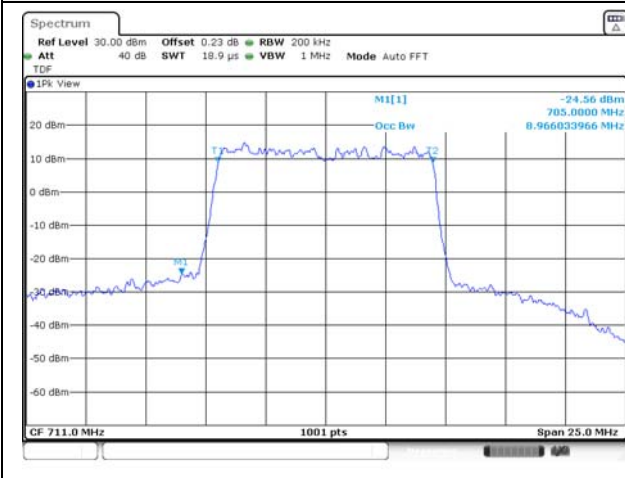
10M BW QPSK Mid ch.



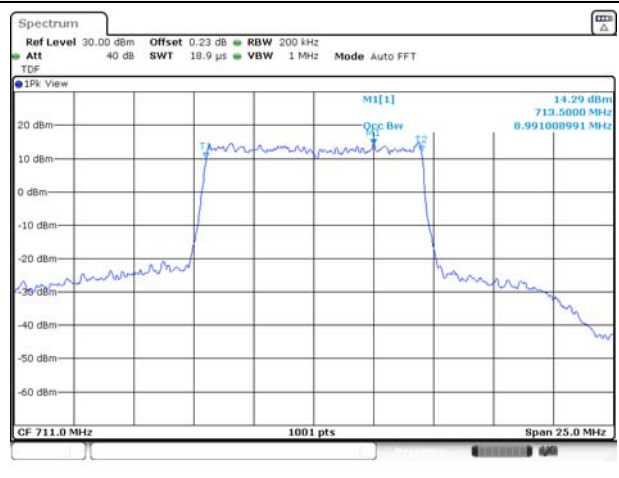
10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



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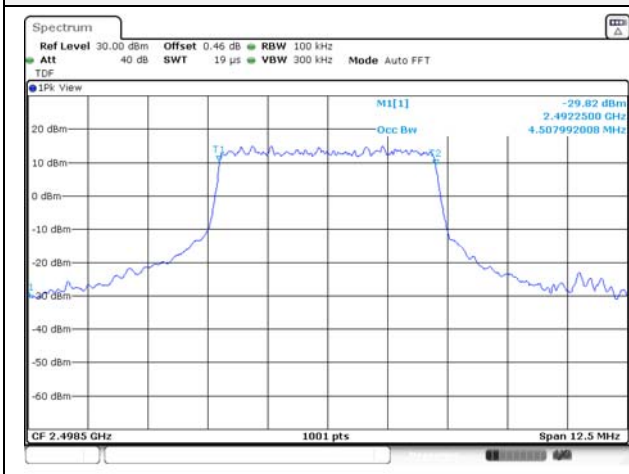
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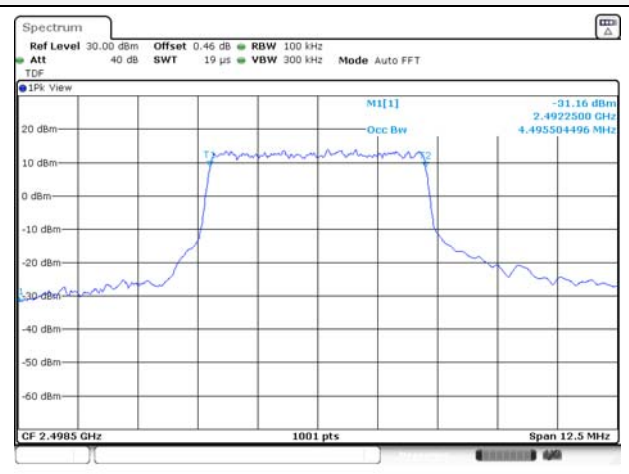


Test mode: LTE Band 41

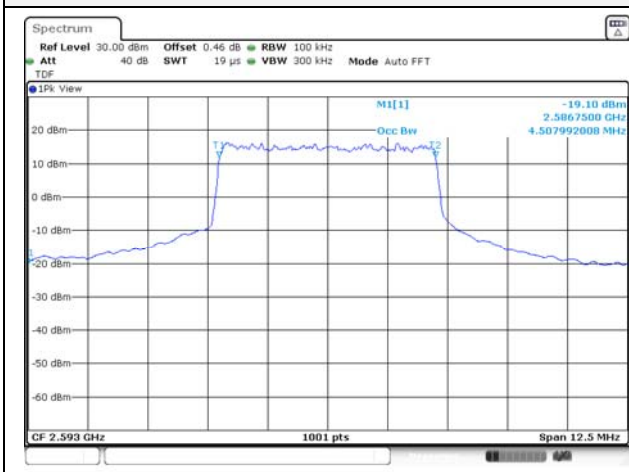
5M BW QPSK Low ch.



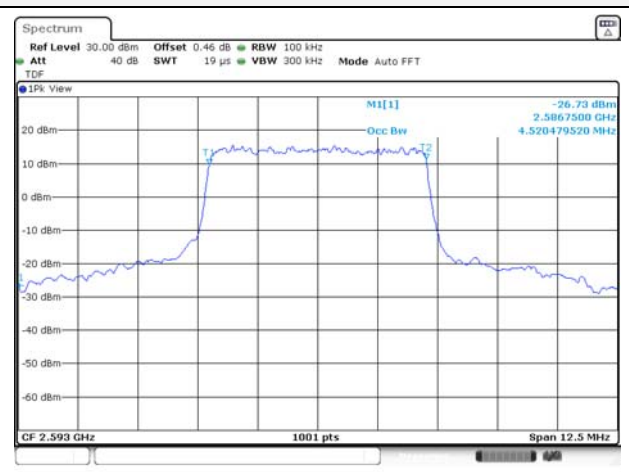
5M BW 16QAM Low ch.



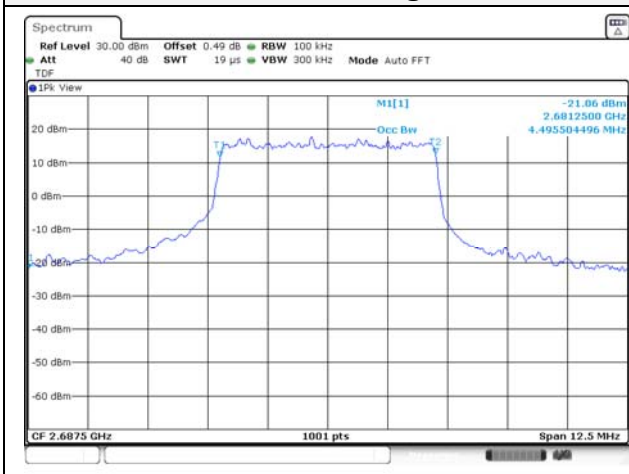
5M BW QPSK Mid ch.



5M BW 16QAM Mid ch.



5M BW QPSK High ch.



5M BW 16QAM High ch.



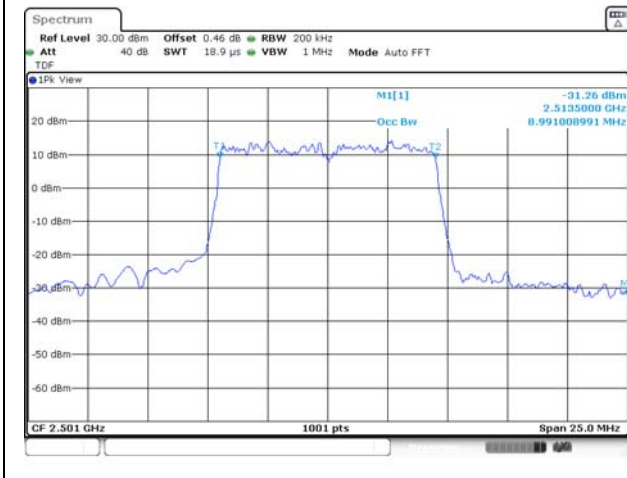
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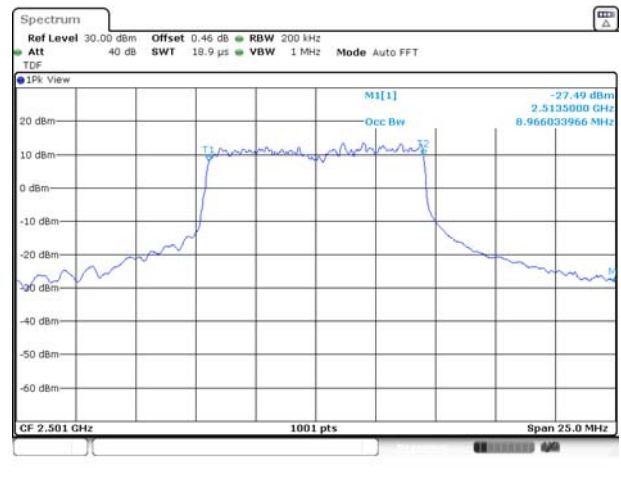
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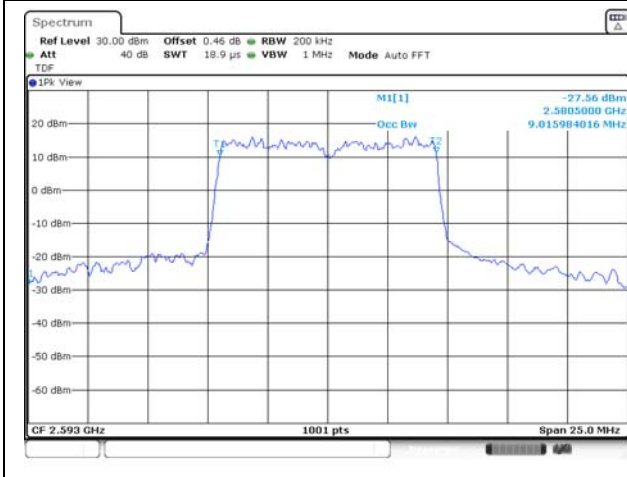
10M BW QPSK Low ch.



10M BW 16QAM Low ch.



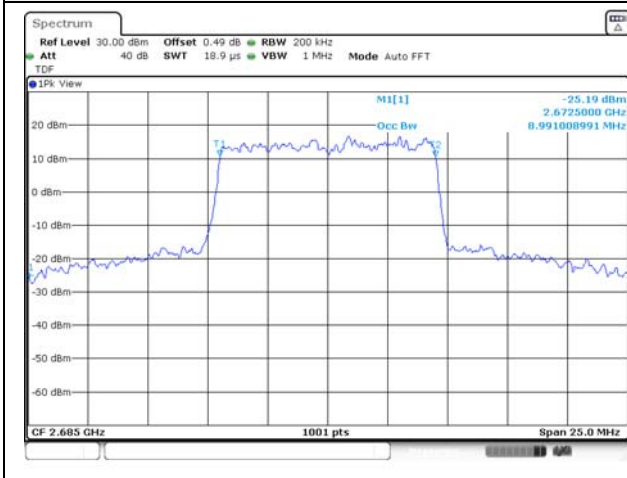
10M BW QPSK Mid ch.



10M BW 16QAM Mid ch.



10M BW QPSK High ch.



10M BW 16QAM High ch.



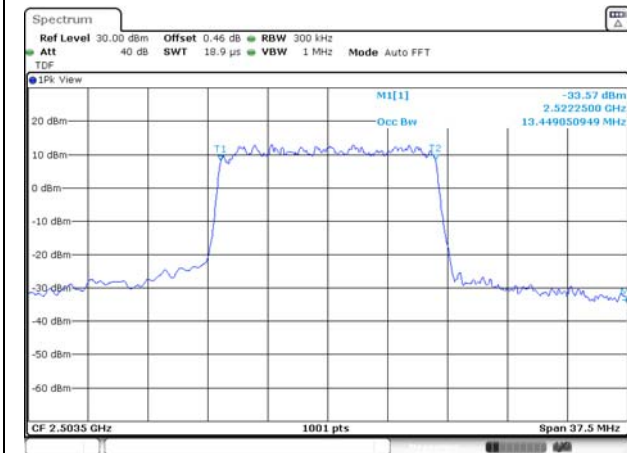
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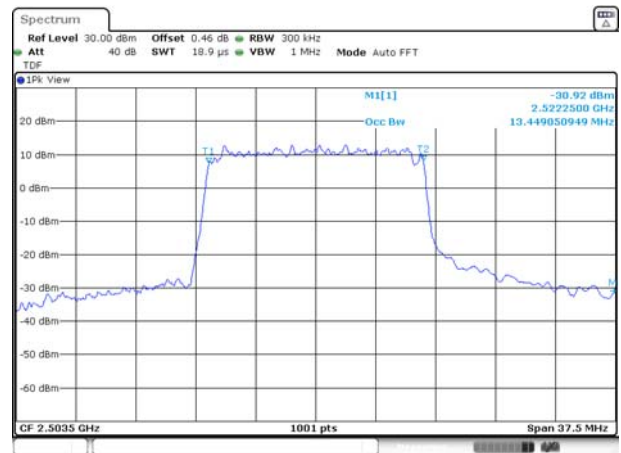
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KR21-SRF0236
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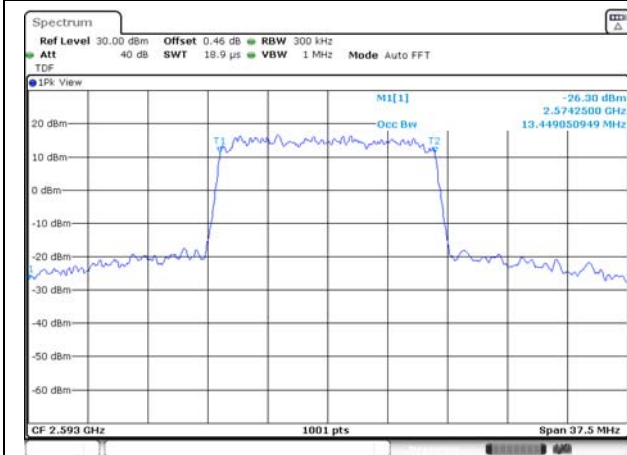
15M BW QPSK Low ch.



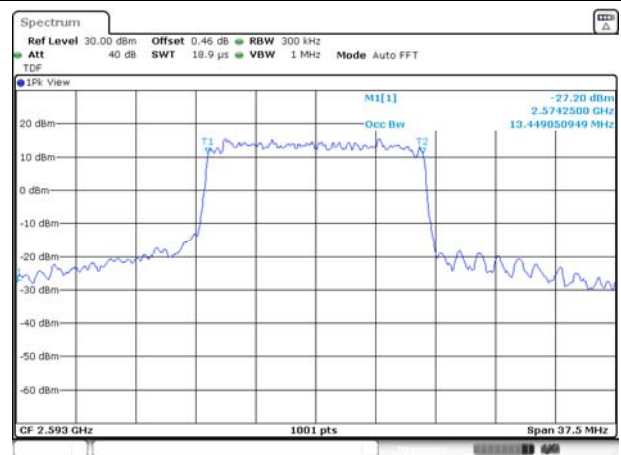
15M BW 16QAM Low ch.



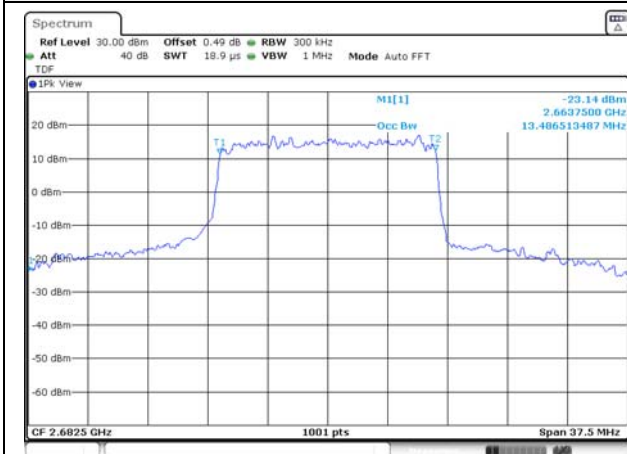
15M BW QPSK Mid ch.



15M BW 16QAM Mid ch.



15M BW QPSK High ch.



15M BW 16QAM High ch.



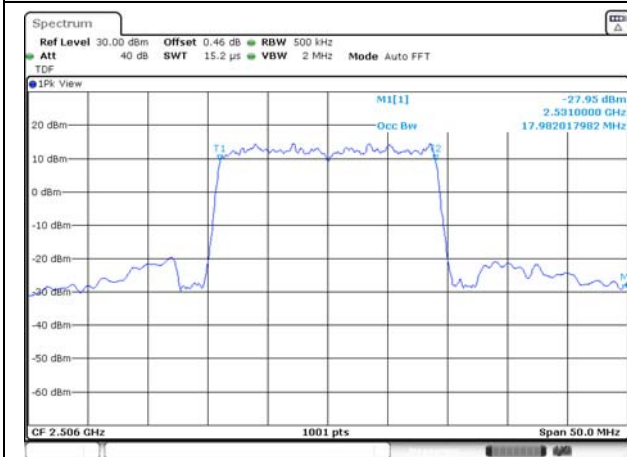
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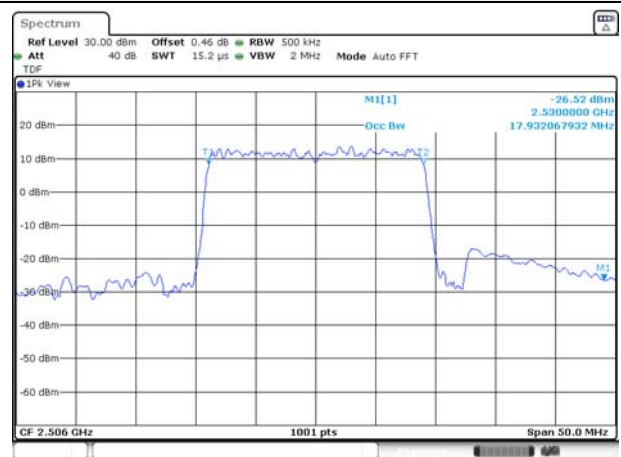
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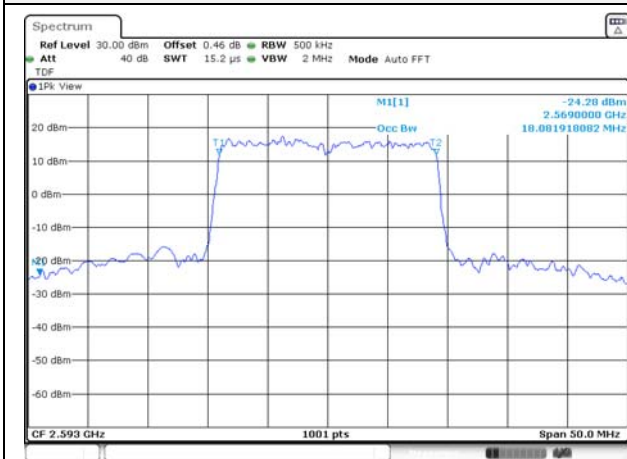
20M BW QPSK Low ch.



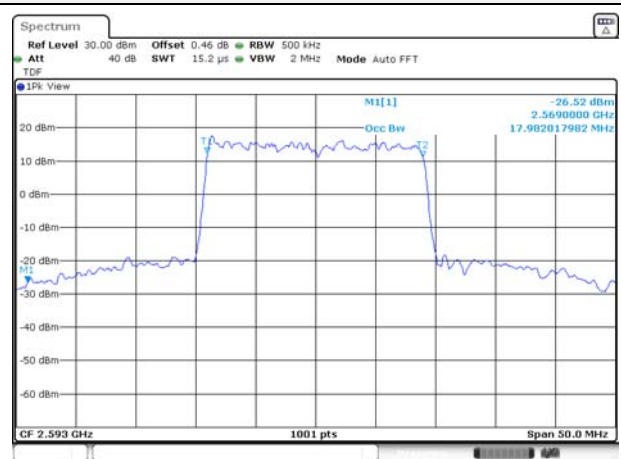
20M BW 16QAM Low ch.



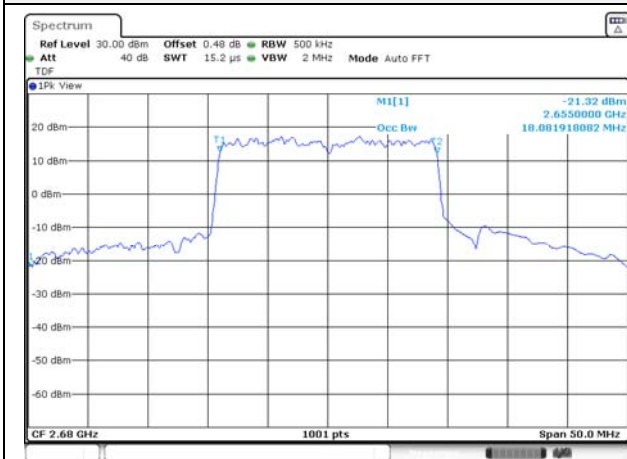
20M BW QPSK Mid ch.



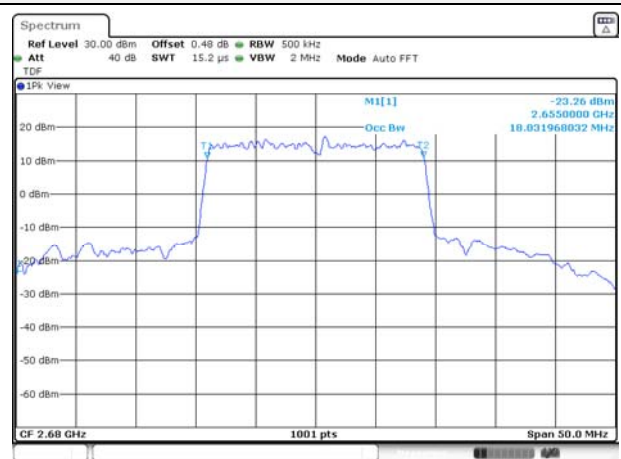
20M BW 16QAM Mid ch.



20M BW QPSK High ch.



20M BW 16QAM High ch.



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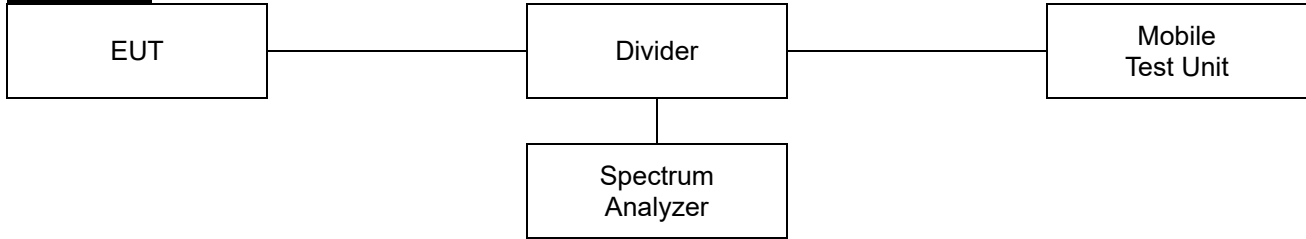
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7.3. Spurious Emissions at Antenna Terminal

Test setup



Limit

According to §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P_{\text{Watts}})$ dB.

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(m)(4), the minimum permissible attenuation level of any spurious emission is $55 + 10\log(P_{\text{Watts}})$ dB.

Test procedure

971168 D01 v03r01 - Section 6
ANSI 63.26-2015 – Section 5.7

Test settings

- 1) Start frequency was set to 30 MHz and stop frequency was set to at least 10th the fundamental frequency.
- 2) Detector = RMS
- 3) Sweep time = auto couple.
- 4) Trace mode = trace average
- 5) Allow trace to fully stabilize.
- 6) Please see test notes below RBW and VBW settings.

Notes:

1. Per 22.917(b), 27.53(g) and 27.53(m)(6), compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

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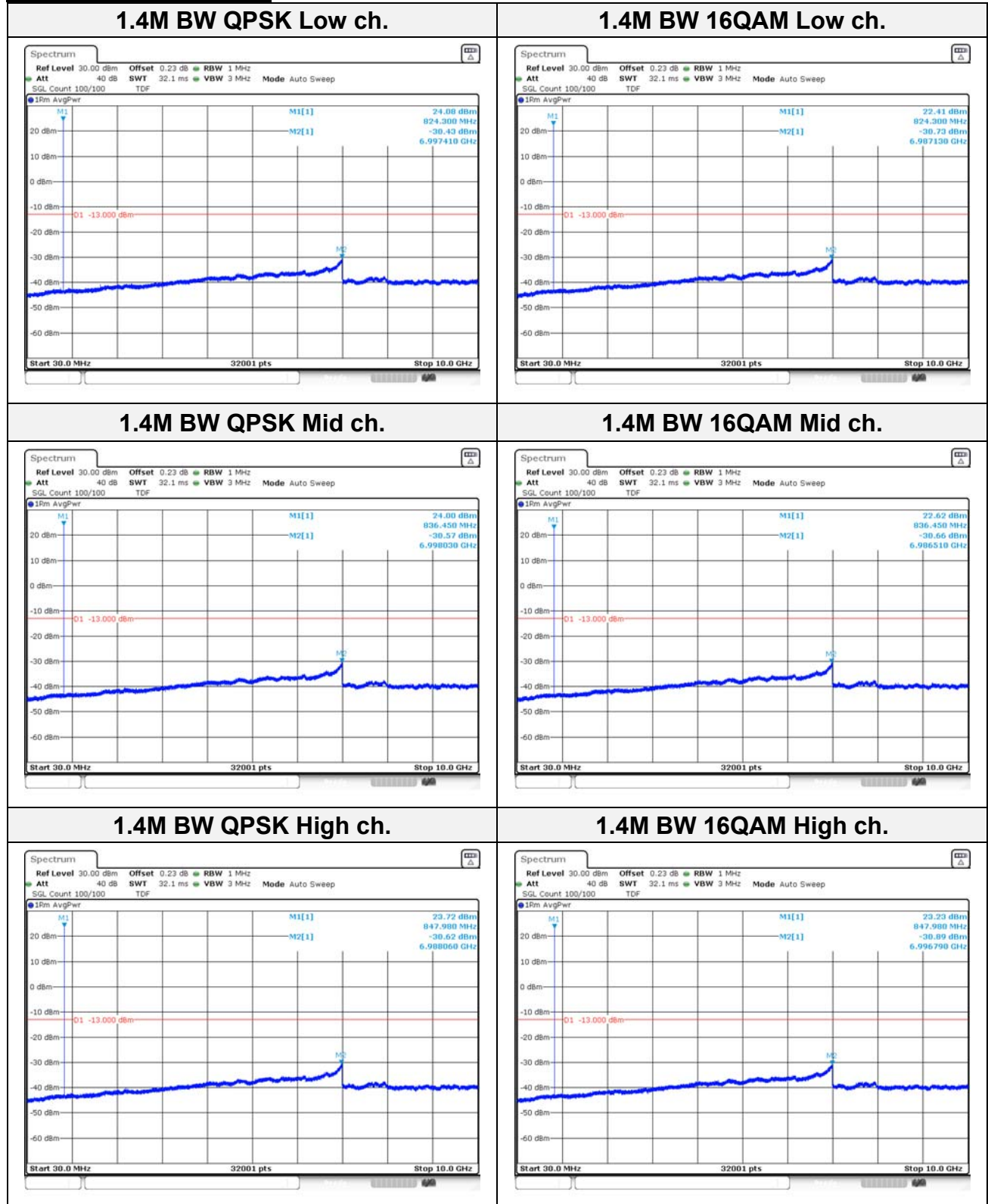
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Test results

Test mode: LTE Band 5



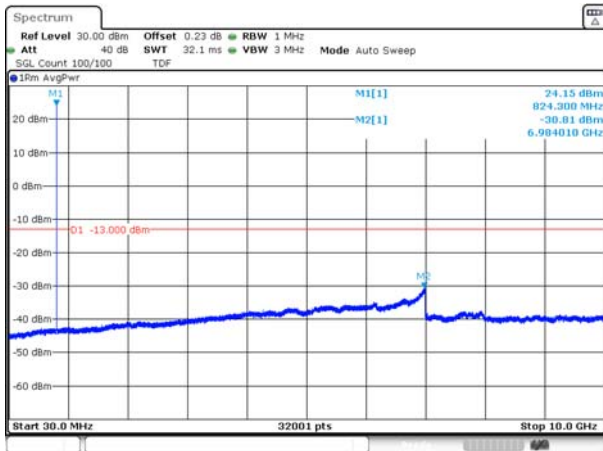
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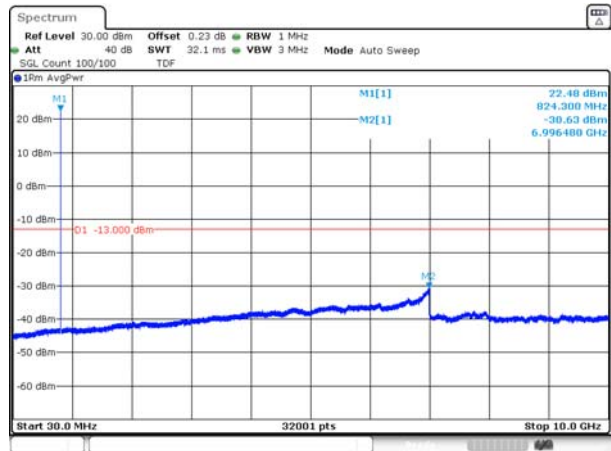
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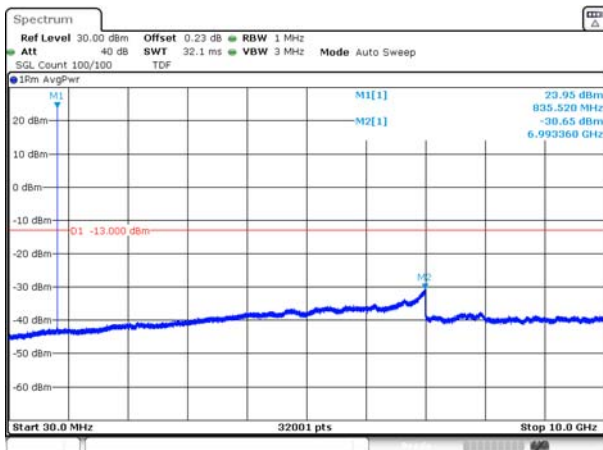
3M BW QPSK Low ch.



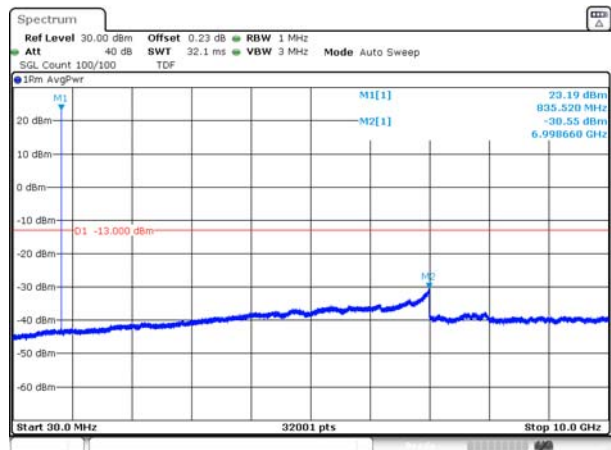
3M BW 16QAM Low ch.



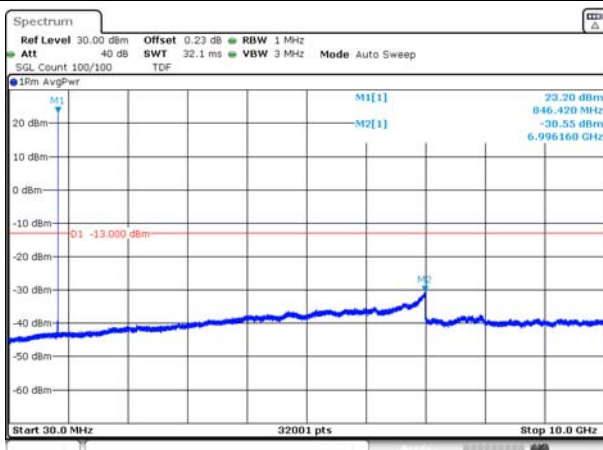
3M BW QPSK Mid ch.



3M BW 16QAM Mid ch.



3M BW QPSK High ch.



3M BW 16QAM High ch.

