




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 : 2019-10-25

2. Use of Report : -

3. Name of Product and Model : Mobile phone / SM-A515F/DS

4. Manufacturer and Country of Origin : SAMSUNG ELECTRONICS VIETNAM CO.,LTD. / Vietnam

5. FCC ID : A3LSMA515F

6. Date of Test : 2019-11-11 to 2019-11-27

7. Test Standards : FCC Part 2
 FCC Part 22 Subpart H
 FCC Part 24 Subpart E
 FCC Part 27 Subpart L

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Euijung Kim (Signature)	Name : Jaehyong Lee (Signature)

2019-11-28

KCTL Inc.

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**Report revision history**

Date	Revision	Page No
2019-11-28	Initial report	-

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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 VIETNAM CO.,LTD.
Address : Kcn Yen Binh1, huyen pho Yen Tinh Thai Nguyen Vietnam
Laboratory : KCTL Inc.
Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
Industry Canada Registration No. : 8035A
KOLAS No.: KT231

2. Device information

Equipment under test : Mobile Phone
Model : SM-A515F/DS
Derivative model : SM-A515F
Modulation technique : Bluetooth(BDR/EDR)_ GFSK, $\pi/4$ DQPSK, 8DPSK
Bluetooth(BLE), ANT+_GFSK
WIFI(802.11b/g/n20/n40/ac20/ac40/ac80)_DSSS, OFDM
LTE_QPSK, 16QAM
WCDMA_QPSK
GSM_GMSK, 8-PSK
Number of channels : Bluetooth(BDR/EDR), ANT+_79ch / Bluetooth(BLE)_40ch
11 ch: 802.11b/g/n_HT20
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)
Power source : DC 3.85 V
Antenna specification : LTE/WCDMA_FPCB Antenna
WIFI/Bluetooth(BDR/EDR/BLE)_FPCB Antenna
Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE) : -4.70 dBi
UNII-1 -4.10 dBi
UNII-2A -4.74 dBi
UNII-2C -3.92 dBi
UNII-3 -4.40 dBi

Frequency range	: Bluetooth(BDR/EDR/BLE), ANT+_2 402 MHz ~ 2 480 MHz 2 412 MHz ~ 2 462 MHz (802.11b/g/n_HT20) UNII-1: 5 180 MHz ~ 5 240 MHz (802.11a/n_HT20/ac_VHT20) UNII-1: 5 190 MHz ~ 5 230 MHz (802.11n_HT40/ac_VHT40) UNII-1: 5 210 MHz (802.11ac_VHT80) UNII-2A: 5 260 MHz ~ 5 320 MHz (802.11a/n_HT20/ac_VHT20) UNII-2A: 5 270 MHz ~ 5 310 MHz (802.11n_HT40/ac_VHT40) UNII-2A: 5 290 MHz (802.11ac_VHT80) UNII-2C: 5 500 MHz ~ 5 720 MHz (802.11a/n_HT20/ac_VHT20) UNII-2C: 5 510 MHz ~ 5 710 MHz (802.11n_HT40/ac_VHT40) UNII-2C: 5 530 MHz ~ 5 690 MHz (802.11ac_VHT80) UNII-3: 5 745 MHz ~ 5 825 MHz (802.11a/n_HT20/ac_VHT20) UNII-3: 5 755 MHz ~ 5 795 MHz (802.11n_HT40/ac_VHT40) UNII-3: 5 775 MHz (802.11ac_VHT80) LTE Band 2_1 850.7 MHz ~ 1 909.3 MHz LTE Band 4_1 710.7 MHz ~ 1 754.3 MHz LTE Band 5_824.7 MHz ~ 848.3 MHz LTE Band 12_699.7 MHz ~ 715.3 MHz LTE Band 13_779.5 MHz ~ 784.5 MHz LTE Band 17_706.5 MHz ~ 713.5 MHz LTE Band 26_824.7 MHz ~ 848.3 MHz, 814.7 MHz ~ 823.3 MHz LTE Band 41_2 498.5 MHz ~ 2 687.5 MHz LTE Band 66_1 710.7 MHz ~ 1 779.3 MHz GSM 850_824.2 MHz ~ 848.8 MHz GSM 1900_1 850.2 MHz ~ 1 909.8 MHz WCDMA 850_826.4 MHz ~ 846.6 MHz WCDMA 1700_1 712.4 MHz ~ 1 752.6 MHz WCDMA 1910_1 852.4 MHz ~ 1 907.6 MHz
Software version	: A515F.001
Hardware version	: REV0.1
Test device serial No.	: Conducted(cecbed2e6a3f7e34) Radiated(R38MA05XG0M, R38MA05WHQF)
Operation temperature	: -30 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Earphone	Samsung Electronics Co., Ltd.	EHS61ASFBE	-	-
Travel Adapter	Samsung Electronics Co., Ltd.	EP-TA200	R37M6LAKG31DK3	AC 100-240V 50-60 Hz, 9.0V-1.67A 5.0V-2.0A
Micro USB Data Cable	Samsung Electronics Co., Ltd.	-	-	-

2.2. Information about derivative model

The difference between basic model and derivative models is:

SM-A515F

- It does not support Dual-Sim card, support Single-Sim card and changed from Dual SIM tray to single SIM tray.

2.3. Frequency/channel operations

This device contains the following capabilities:

WIFI(2.4GHz band 802.11b/g/n(HT20), 5GHz band 802.11a/n(HT20/HT40)/ac(VHT/20/40/80)),

Bluetooth(BDR/EDR/BLE), ANT+

LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 13, LTE Band 17, LTE Band 26,

LTE Band41, WCDMA 850, WCDMA 1700, WCDMA 1900, GSM 850, GSM 1900

LTE Band 66(1 710 – 1 780 MHz) overlaps the entire frequency range of LTE Band 4(1 710 – 1 755 MHz)
Therefore, test data provided in this report covers Band 4 and the portion of Band 66 subpart to Part27.

LTE Band 12(698 – 716 MHz) overlaps the entire frequency range of LTE Band17(704 – 716 MHz)
Therefore, test data provided in the report covers Band 17 as well as Band 12 subpart to Part27.

LTE Band 2

Ch.	Frequency (MHz)
18607	1 850.7
18900	1 880.0
19193	1 909.3

Table 2.3.1 1.4M BW

Ch.	Frequency (MHz)
18615	1 851.5
18900	1 880.0
19185	1 908.5

Table 2.3.2 3M BW

Ch.	Frequency (MHz)
18625	1 852.5
18900	1 880.0
19175	1 907.5

Table 2.3.3 5M BW

Ch.	Frequency (MHz)
18650	1 855.0
18900	1 880.0
19150	1 905.0

Table 2.3.4 10M BW

Ch.	Frequency (MHz)
18675	1 857.5
18900	1 880.0
19125	1 902.5

Table 2.3.5 15M BW

Ch.	Frequency (MHz)
18700	1 860.0
18900	1 880.0
19100	1 900.0

Table 2.3.6 20M BW

LTE Band 4

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

Table 2.3.7 1.4M BW

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

Table 2.3.8 3M BW

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

Table 2.3.9 5M BW

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

Table 2.3.10 10M BW

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

Table 2.3.11 15M BW

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

Table 2.3.12 20M BW

LTE Band 5

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

Table 2.3.13 1.4M BW

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

Table 2.3.14 3M BW

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

Table 2.3.15 5M BW

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

Table 2.3.16 10M BW

LTE Band 12

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

Table 2.3.17 1.4M BW

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

Table 2.3.18 3M BW

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

Table 2.3.19 5M BW

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

Table 2.3.20 10M BW

LTE Band 13

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

Table 2.3.21 5M BW

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

Table 2.3.22 10M BW

LTE Band 17

Ch.	Frequency (MHz)
23755	706.5
23790	710.0
23825	713.5

Table 2.3.23 5M BW

Ch.	Frequency (MHz)
23780	709.0
23790	710.0
23800	711.0

Table 2.3.24 10M BW

LTE Band 41

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

Table 2.3.25. 5M BW

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

Table 2.3.26. 10M BW

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

Table 2.3.27. 15M BW

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

Table 2.3.28. 20M BW

LTE Band 66

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

Table 2.3.29. 1.4M BW

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

Table 2.3.30. 3M BW

Ch.	Frequency (MHz)
131997	1 712.5
132322	1 745.00
132647	1 777.5

Table 2.3.31. 5M BW

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

Table 2.3.32. 10M BW

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

Table 2.3.33. 15M BW

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

Table 2.3.34. 20M BW

3. Maximum ERP/EIRP power**LTE Band 2**

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 2	1 850.7 ~ 1 909.3	1M11G7D	20.52	0.113
		1M10W7D	19.53	0.090
	1 851.5 ~ 1 908.5	2M71G7D	20.09	0.102
		2M71W7D	19.07	0.081
	1 852.5 ~ 1 907.5	4M56G7D	20.44	0.111
		4M55W7D	19.02	0.080
	1 855.0 ~ 1 905.0	9M04G7D	20.28	0.107
		9M02W7D	19.00	0.079
	1 857.5 ~ 1 902.5	13M6G7D	20.32	0.108
		13M6W7D	19.21	0.083
	1 860.0 ~ 1 900.0	18M0G7D	20.04	0.101
		18M1W7D	19.42	0.087

LTE Band 4

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 4	1 710.7 ~ 1 754.3	1M10G7D	20.90	0.123
		1M10W7D	19.85	0.097
	1 711.5 ~ 1 753.5	2M70G7D	20.73	0.118
		2M70W7D	19.60	0.091
	1 712.5 ~ 1 752.5	4M51G7D	20.58	0.114
		4M55W7D	19.51	0.089
	1 715.0 ~ 1 750.0	9M04G7D	20.88	0.122
		8M99W7D	19.63	0.092
	1 717.5 ~ 1 747.5	13M5G7D	20.97	0.125
		13M5W7D	19.94	0.099
	1 720.0 ~ 1 745.0	18M0G7D	21.22	0.132
		18M0W7D	20.22	0.105

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**LTE Band 5**

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 5	824.7 ~ 848.3	1M10G7D	18.96	0.079
		1M10W7D	17.67	0.058
	825.5 ~ 847.5	2M71G7D	19.14	0.082
		2M72W7D	17.69	0.059
	826.5 ~ 846.5	4M54G7D	19.10	0.081
		4M57W7D	18.08	0.054
	829.0 ~ 844.0	9M02G7D	19.37	0.086
		9M04W7D	18.25	0.067

LTE Band 12

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 12	699.7 ~ 715.3	1M10G7D	19.06	0.081
		1M11W7D	18.25	0.067
	700.5 ~ 714.5	2M73G7D	19.06	0.081
		2M72W7D	17.65	0.058
	701.5 ~ 713.5	4M55G7D	18.89	0.077
		4M56W7D	17.26	0.053
	704.0 ~ 711.0	9M04G7D	18.85	0.077
		9M04W7D	17.58	0.057

LTE Band 13

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 13	779.5 ~ 784.5	4M57G7D	18.83	0.076
		4M55W7D	17.54	0.057
	782.0	9M04G7D	18.56	0.072
		9M02W7D	17.35	0.054

LTE Band 17

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 17	706.5 ~ 713.5	4M55G7D	18.96	0.079
		4M56W7D	17.71	0.059
	709.0 ~ 711.0	9M04G7D	18.76	0.075
		9M04W7D	18.04	0.064

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**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	4M52G7D	21.08	0.128
		4M55W7D	19.93	0.098
	2 501.0 ~ 2 685.0	8M99G7D	23.74	0.237
		8M99W7D	21.58	0.144
	2 503.5 ~ 2 682.5	13M6G7D	23.52	0.225
		13M5W7D	22.57	0.181
	2 506.0 ~ 2 680.0	18M0G7D	23.87	0.244
		18M1W7D	21.22	0.132

LTE Band 66

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 66	1 710.7 ~ 1 779.3	1M10G7D	22.30	0.170
		1M10W7D	21.28	0.134
	1 711.5 ~ 1 778.5	2M72G7D	22.66	0.185
		2M71W7D	21.55	0.143
	1 712.5 ~ 1 777.5	4M55G7D	22.20	0.166
		4M55W7D	20.92	0.124
	1 715.0 ~ 1 775.0	8M99G7D	22.25	0.168
		8M99W7D	21.01	0.126
	1 717.5 ~ 1 772.5	13M6G7D	21.84	0.153
		13M5W7D	20.82	0.121
	1 720.0 ~ 1 770.0	18M0G7D	19.97	0.099
		18M0W7D	19.66	0.092

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) 24.238(a) 27.53(c) 27.53(g)(h) 27.53(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
24.232(d) 27.50(d)(5)	Peak to Average Power Ratio	< 13 dB		Pass
2.1055 22.355 24.235 27.54	Frequency stability	< 2.5 ppm (Part 22) Fundamental emissions stay within authorized frequency block (Part 24, 27)		Pass
22.913(a)(5) 27.50(b)(10) 27.50(c)(10)	Effective Radiated Power	< 7 Watts max. ERP (Band 5) < 3 Watts max. ERP (Band 12, 13, 17)	Radiated	Pass
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP (Band 2, 41) < 1 Watts max. EIRP (Band 4, 66)		Pass
27.50(d)(4)				Pass
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g)(h)	Radiated Spurious Emissions	>43 + 10Log ₁₀ (P) dB for all out-of-band emissions. (Band 2, 4, 5, 12, 17, 66)		Pass
27.53(f)		<-70 dBW/MHz EIRP - Wideband <-80 dBW/MHz EIRP- Narrowband (Band 13)		Pass
27.53(m)(4)		Undesirable emissions must meet the limits detailed in 27.53(m). (Band 41)		Pass

Notes:

1. The test procedure(s) in this report were performed in accordance as following.
 - ◆ ANSI C63.26-2015
 - ◆ ANSI/TIA-603-E-2016
 - ◆ KDB 971168 D01 v03r01
2. Per evaluation report, all of the data contained herein is re-used from the reference
 FCC ID : A3LSMA515FN

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. All final radiated testing was performed with the EUT in worst case orientation.
3. For LTE Band 5, Band 12, Band 13, Band 17 and Band 41, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.
4. For LTE Band 2, Band 4, Band 66, 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	B2	QPSK	1.4	1	0
	B4		20	1	0
	B5		10	1	0
	B12		3	1	0
	B13		5	1	0
	B17		5	1	0
	B41		20	1	0
	B66		3	1	0
Conducted	B2	QPSK, 16QAM	1.4, 3, 5, 10, 15, 20	1	0, 5, 14, 24, 49, 74, 99
				Full	0
	B4		1.4, 3, 5, 10, 15, 20	1	0, 5, 14, 24, 49, 74, 99
				Full	0
	B5		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
	B13		5, 10	1	24, 49
				Full	0
	B17		5, 10	1	24, 49
				Full	0
	B41		5, 10, 15, 20	1	24, 49, 74, 99
				Full	0
	B66		1.4, 3, 5, 10, 15, 20	1	0, 5, 14, 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	1.76 dB	
Conducted spurious emissions	4.03 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.28 dB
	30 MHz ~ 1 GHz	3.68 dB
	Above 1 GHz	5.72 dB



6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	16.06	11 000	18.29
50	16.14	12 000	18.60
100	16.17	13 000	18.67
200	16.27	14 000	19.16
300	16.27	15 000	19.25
400	16.30	16 000	19.33
500	16.37	17 000	19.58
600	16.46	18 000	19.65
700	16.46	19 000	20.10
800	16.55	20 000	20.11
900	16.58	21 000	20.28
1 000	16.61	22 000	20.36
2 000	16.93	23 000	20.37
3 000	17.18	24 000	20.51
4 000	17.34	25 000	20.64
5 000	17.59	26 000	20.68
6 000	17.75	26 500	20.72
7 000	17.99	27 000	20.94
8 000	18.18	28 000	21.00
9 000	18.23	29 000	21.68
10 000	18.26	30 000	21.79

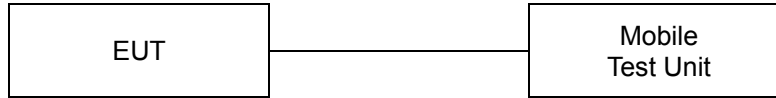
Note.

Offset(dB) = RF cable loss(dB) + Divider(dB) + Attenuator(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 2	1.4	QPSK	1	0	0	23.63	22.89	23.07	
			1	3	0	23.70	22.86	23.09	
			1	5	0	23.65	22.90	23.12	
			3	0	0	23.39	23.18	23.28	
			3	1	0	23.42	23.19	23.32	
			3	3	0	23.41	23.15	23.32	
		6	0	1	22.70	22.45	22.64		
		16QAM	1	0	1	22.86	22.52	22.35	
			1	3	1	22.75	22.36	22.38	
			1	5	1	22.79	22.39	22.41	
			3	0	1	22.76	22.33	22.66	
			3	1	1	22.78	22.39	22.66	
			3	3	1	22.87	22.32	22.71	
		3	QPSK	6	0	2	21.83	21.38	21.71
				1	0	0	23.65	23.07	23.01
				1	8	0	23.69	23.01	22.97
				1	14	0	23.67	23.13	23.00
				8	0	1	23.10	22.62	22.37
				8	4	1	23.08	22.62	22.35
			16QAM	8	7	1	23.10	22.64	22.38
				15	0	1	23.13	22.61	22.43
				1	0	1	22.86	22.88	21.91
				1	8	1	22.86	22.88	21.84
				1	14	1	22.84	22.76	22.66
	8			0	2	22.05	21.64	21.38	
	5	QPSK	8	4	2	22.25	21.66	21.40	
			8	7	2	22.18	21.57	21.31	
			15	0	2	22.12	21.66	21.43	
			1	0	0	23.65	23.08	22.95	
			1	12	0	23.69	23.10	23.02	
			1	24	0	23.65	23.08	22.94	
		16QAM	12	0	1	23.08	22.64	22.44	
			12	7	1	23.08	22.65	22.40	
			12	13	1	23.07	22.61	22.44	
			25	0	1	23.06	22.65	22.40	
			1	0	1	22.67	22.77	22.30	
			1	12	1	22.64	22.81	22.39	
	10	QPSK	1	24	1	22.64	22.52	22.26	
			12	0	2	22.04	21.58	21.44	
			12	7	2	22.02	21.52	21.42	
			12	13	2	22.05	21.57	21.45	
			25	0	2	22.11	21.60	21.46	
			1	0	0	23.63	23.65	23.04	
		16QAM	1	25	0	23.59	23.53	22.99	
			1	49	0	23.57	23.35	23.01	
			25	0	1	22.98	22.64	22.47	
			25	12	1	23.00	22.63	22.45	
			25	25	1	23.00	22.67	22.44	
			50	0	1	22.94	22.71	22.41	
	15	QPSK	1	0	1	22.80	22.67	22.12	
			1	25	1	22.81	22.59	22.14	
			1	49	1	22.80	22.51	22.15	
			25	0	2	21.92	21.73	21.43	
			25	12	2	21.95	21.70	21.46	
			25	25	2	21.92	21.67	21.48	
		16QAM	50	0	2	22.02	21.66	21.52	
			1	0	0	23.52	23.27	22.93	
			1	36	0	23.63	23.18	23.17	
			1	74	0	23.43	23.17	23.08	
			36	0	1	23.03	22.72	22.53	
			36	18	1	22.99	22.68	22.51	
	20	QPSK	36	37	1	22.91	22.62	22.50	
			75	0	1	22.93	22.66	22.51	
			1	0	1	22.78	22.74	22.43	
			1	36	1	22.82	22.56	22.38	
			1	74	1	22.67	22.52	22.32	
			36	0	2	21.93	21.71	21.52	
		16QAM	36	18	2	21.90	21.71	21.50	
			36	37	2	21.92	21.68	21.48	
			75	0	2	21.94	21.66	21.47	
			1	0	0	23.71	23.42	23.40	
			1	49	0	23.62	23.36	23.25	
			1	99	0	23.70	23.31	23.36	
	30	QPSK	50	0	1	23.10	22.88	22.74	
			50	24	1	23.03	22.83	22.70	
			50	50	1	23.09	22.79	22.67	
			100	0	1	23.03	22.84	22.69	
			1	0	1	23.18	23.03	22.92	
			1	49	1	23.19	23.04	22.92	
		16QAM	1	99	1	23.16	22.95	22.85	
			50	0	2	22.06	21.87	21.75	
			50	24	2	22.07	21.91	21.72	
			50	50	2	22.01	21.80	21.74	
			100	0	2	22.07	21.90	21.74	

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 4	1.4	QPSK	1	0	0	22.50	22.45	22.64	
			1	3	0	22.52	22.40	22.66	
			1	5	0	22.55	22.39	22.64	
			3	0	0	22.57	22.43	22.70	
			3	1	0	22.59	22.36	22.68	
			3	3	0	22.55	22.41	22.74	
		6	0	1	21.48	21.34	21.64		
		16QAM	1	0	1	21.44	21.27	21.60	
			1	3	1	21.42	21.32	21.63	
			1	5	1	21.43	21.29	21.60	
			3	0	1	21.47	21.17	21.72	
			3	1	1	21.57	21.19	21.76	
			3	3	1	21.53	21.19	21.70	
		3	QPSK	6	0	2	20.60	20.39	20.64
				1	0	0	22.50	22.48	22.74
				1	8	0	22.48	22.49	22.75
				1	14	0	22.47	22.49	22.77
				8	0	1	21.53	21.42	21.73
	8			4	1	21.48	21.35	21.68	
	16QAM		8	7	1	21.51	21.36	21.67	
			15	0	1	21.47	21.33	21.71	
			1	0	1	21.28	21.59	21.68	
			1	8	1	21.28	21.54	21.77	
			1	14	1	21.25	21.54	21.71	
			8	0	2	20.62	20.44	20.68	
	5		QPSK	8	4	2	20.61	20.43	20.75
				8	7	2	20.55	20.40	20.76
				15	0	2	20.49	20.46	20.68
				1	0	0	22.58	22.41	22.75
				1	12	0	22.54	22.38	22.75
				1	24	0	22.57	22.35	22.74
		16QAM	12	0	1	21.47	21.41	21.67	
			12	7	1	21.50	21.37	21.64	
			12	13	1	21.41	21.43	21.64	
			25	0	1	21.46	21.35	21.68	
			1	0	1	21.38	21.49	21.67	
			1	12	1	21.40	21.51	21.67	
		10	QPSK	1	24	1	21.30	21.46	21.66
				12	0	2	20.45	20.35	20.67
				12	7	2	20.49	20.40	20.75
				12	13	2	20.49	20.36	20.63
				25	0	2	20.46	20.43	20.74
				1	0	0	22.59	22.47	22.75
	16QAM		1	25	0	22.55	22.45	22.71	
			1	49	0	22.54	22.43	22.66	
			25	0	1	21.59	21.41	21.69	
			25	12	1	21.51	21.44	21.75	
			25	25	1	21.54	21.37	21.65	
			50	0	1	21.49	21.40	21.64	
	15		QPSK	1	0	1	21.43	21.46	21.89
				1	25	1	21.41	21.49	21.92
				1	49	1	21.40	21.50	21.87
				25	0	2	20.51	20.52	20.76
				25	12	2	20.49	20.50	20.76
				25	25	2	20.54	20.46	20.74
		16QAM	50	0	2	20.59	20.44	20.77	
			1	0	0	22.53	22.48	22.66	
			1	36	0	22.62	22.48	22.68	
			1	74	0	22.43	22.39	22.57	
			36	0	1	21.55	21.45	21.63	
			36	18	1	21.49	21.43	21.66	
		20	QPSK	36	37	1	21.47	21.40	21.61
				75	0	1	21.53	21.43	21.62
				1	0	1	21.20	21.44	21.64
				1	36	1	21.44	21.27	21.74
				1	74	1	21.51	21.40	21.51
				36	0	2	20.55	20.61	20.60
	16QAM		36	18	2	20.52	20.51	20.57	
			36	37	2	20.41	20.47	20.59	
			75	0	2	20.55	20.38	20.60	
			1	0	0	22.68	22.79	22.66	
			1	49	0	22.70	22.70	22.63	
			1	99	0	22.65	22.71	22.59	
	QPSK		50	0	1	21.67	21.75	21.62	
			50	24	1	21.67	21.72	21.62	
			50	50	1	21.61	21.65	21.55	
			100	0	1	21.62	21.73	21.54	
			16QAM	1	0	1	21.18	21.87	21.40
				1	49	1	21.43	21.58	21.08
		1		99	1	21.33	21.57	21.57	
		50		0	2	20.68	20.74	20.62	
		50		24	2	20.64	20.73	20.60	
		50		50	2	20.58	20.68	20.54	
		100	0	2	20.66	20.79	20.57		

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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	1.4	QPSK	1	0	0	24.38	24.33	24.06	
			1	3	0	24.33	24.33	23.93	
			1	5	0	24.31	24.32	24.10	
			3	0	0	24.32	24.32	24.29	
			3	1	0	24.33	24.32	24.34	
			3	3	0	24.39	24.32	24.26	
		6	0	1	23.55	23.56	23.31		
		16QAM	1	0	1	23.23	23.24	23.24	
			1	3	1	23.23	23.14	23.28	
			1	5	1	23.27	23.26	23.28	
			3	0	1	23.50	23.51	23.20	
			3	1	1	23.46	23.45	23.22	
			3	3	1	23.46	23.49	23.22	
		3	QPSK	6	0	2	22.37	22.38	22.22
				1	0	0	24.29	24.42	24.27
				1	8	0	24.14	24.15	23.93
				1	14	0	24.21	24.16	24.23
				8	0	1	23.47	23.36	23.15
	8			4	1	23.46	23.37	23.18	
	8		7	1	23.49	23.34	23.17		
	15		0	1	23.46	23.36	23.15		
	16QAM		1	0	1	23.12	23.52	23.28	
			1	8	1	23.43	23.54	22.96	
			1	14	1	23.06	23.26	23.28	
			8	0	2	22.51	22.36	22.02	
			8	4	2	22.41	22.36	22.19	
			8	7	2	22.42	22.26	22.13	
	5		QPSK	15	0	2	22.43	22.40	22.11
				1	0	0	24.20	24.41	23.98
				1	12	0	24.29	24.14	24.24
				1	24	0	24.34	24.09	24.22
		12		0	1	23.48	23.37	23.26	
		12		7	1	23.50	23.39	23.23	
		12	13	1	23.47	23.35	23.20		
		25	0	1	23.50	23.34	23.22		
		16QAM	1	0	1	23.13	23.50	23.11	
			1	12	1	23.13	23.54	23.01	
			1	24	1	23.12	23.49	23.30	
			12	0	2	22.42	22.33	22.23	
			12	7	2	22.42	22.25	22.21	
			12	13	2	22.39	22.31	22.22	
		10	QPSK	25	0	2	22.51	22.31	22.27
				1	0	0	24.41	24.45	24.44
				1	25	0	24.39	24.27	24.20
				1	49	0	24.30	24.19	24.39
	25			0	1	23.64	23.74	23.45	
	25			12	1	23.60	23.70	23.50	
	25		25	1	23.62	23.67	23.44		
	50		0	1	23.61	23.66	23.48		
	16QAM		1	0	1	23.52	23.59	23.64	
			1	25	1	23.48	23.58	23.32	
			1	49	1	23.45	23.62	23.54	
			25	0	2	22.64	22.65	22.47	
			25	12	2	22.62	22.63	22.52	
			25	25	2	22.62	22.61	22.50	
	50		0	2	22.74	22.62	22.47		

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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	24.03	24.21	24.06	
			1	3	0	24.02	24.20	24.02	
			1	5	0	24.03	24.21	24.10	
			3	0	0	24.13	24.28	24.21	
			3	1	0	24.11	24.21	24.15	
			3	3	0	24.12	24.16	24.19	
		6	0	1	23.33	23.34	23.25		
		16QAM	1	0	1	23.25	23.36	23.04	
			1	3	1	23.25	23.13	22.91	
			1	5	1	23.22	23.23	23.11	
			3	0	1	23.33	23.44	23.09	
			3	1	1	23.33	23.28	23.15	
			3	3	1	23.34	23.03	23.23	
		3	QPSK	6	0	2	22.28	22.21	22.13
				1	0	0	24.03	24.09	24.10
				1	8	0	24.17	24.06	24.11
				1	14	0	24.01	24.03	24.17
				8	0	1	23.40	23.33	23.35
	8			4	1	23.35	23.33	23.30	
	8		7	1	23.36	23.29	23.34		
	15		0	1	23.38	23.30	23.30		
	16QAM		1	0	1	23.16	23.52	23.43	
			1	8	1	23.02	23.37	23.32	
			1	14	1	23.29	23.53	23.68	
			8	0	2	22.52	22.23	22.25	
			8	4	2	22.53	22.23	22.22	
			8	7	2	22.50	22.31	22.22	
	5		QPSK	15	0	2	22.32	22.25	22.20
				1	0	0	24.25	24.15	24.14
				1	12	0	24.27	24.18	24.13
				1	24	0	24.20	24.20	23.98
		12		0	1	23.38	23.33	23.26	
		12		7	1	23.34	23.30	23.21	
		12	13	1	23.44	23.32	23.31		
		25	0	1	23.38	23.32	23.32		
		16QAM	1	0	1	23.36	23.53	23.37	
			1	12	1	23.39	23.42	23.38	
			1	24	1	23.14	23.52	23.37	
			12	0	2	22.34	22.17	22.25	
			12	7	2	22.29	22.18	22.23	
			12	13	2	22.31	22.15	22.22	
		10	QPSK	25	0	2	22.38	22.26	22.26
				1	0	0	24.11	24.28	24.06
				1	25	0	24.03	24.16	24.05
				1	49	0	24.03	24.23	23.96
	25			0	1	23.34	23.37	23.27	
	25			12	1	23.36	23.36	23.22	
	25		25	1	23.32	23.32	23.19		
	50		0	1	23.30	23.36	23.25		
	16QAM		1	0	1	23.49	23.03	23.24	
			1	25	1	23.49	23.33	23.14	
			1	49	1	23.45	23.21	23.15	
			25	0	2	22.32	22.28	22.27	
			25	12	2	22.33	22.28	22.32	
			25	25	2	22.24	22.28	22.24	
	50		0	2	22.26	22.35	22.25		

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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (MHz)		
						Low	Middle	High
LTE Band 13	5	QPSK	1	0	0	23.39	23.33	23.25
			1	12	0	23.33	23.39	23.24
			1	24	0	23.32	23.36	23.22
			12	0	1	22.77	22.74	22.77
			12	7	1	22.79	22.79	22.75
			12	13	1	22.80	22.74	22.76
			25	0	1	22.76	22.71	22.77
		16QAM	1	0	1	22.58	22.92	22.72
			1	12	1	22.91	22.42	22.66
			1	24	1	22.89	22.83	22.59
			12	0	2	21.78	21.77	21.84
			12	7	2	21.80	21.77	21.80
			12	13	2	21.75	21.75	21.81
			25	0	2	21.90	21.79	21.87
	10	QPSK	1	0	0	-	23.41	-
			1	25	0	-	23.32	-
			1	49	0	-	23.33	-
			25	0	1	-	22.78	-
			25	12	1	-	22.73	-
			25	25	1	-	22.75	-
			50	0	1	-	22.69	-
		16QAM	1	0	1	-	22.45	-
			1	25	1	-	22.46	-
			1	49	1	-	22.57	-
			25	0	2	-	21.83	-
			25	12	2	-	21.82	-
			25	25	2	-	21.78	-
			50	0	2	-	21.83	-

Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power		
						Frequency (MHz)		
						Low	Middle	High
LTE Band 17	5	QPSK	1	0	0	24.05	24.04	24.03
			1	12	0	24.04	23.94	24.07
			1	24	0	24.08	23.91	24.02
			12	0	1	23.45	23.35	23.39
			12	7	1	23.46	23.32	23.40
			12	13	1	23.42	23.31	23.36
			25	0	1	23.38	23.29	23.36
		16QAM	1	0	1	23.17	23.37	23.06
			1	12	1	23.15	23.27	23.68
			1	24	1	23.23	23.48	23.03
			12	0	2	22.42	22.23	22.40
			12	7	2	22.37	22.28	22.39
			12	13	2	22.35	22.27	22.36
			25	0	2	22.49	22.33	22.48
	10	QPSK	1	0	0	23.95	24.10	24.00
			1	25	0	24.00	23.94	24.07
			1	49	0	23.96	23.92	23.99
			25	0	1	23.38	23.40	23.36
			25	12	1	23.36	23.32	23.31
			25	25	1	23.33	23.29	23.30
			50	0	1	23.33	23.34	23.33
		16QAM	1	0	1	23.06	23.43	23.31
			1	25	1	23.22	23.42	23.27
			1	49	1	22.96	23.31	23.09
			25	0	2	22.38	22.37	22.36
			25	12	2	22.31	22.41	22.30
			25	25	2	22.29	22.39	22.38
			50	0	2	22.39	22.33	22.41

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-Test B-and	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 41	5	QPSK	1	0	0	23.65	24.11	24.14	
			1	12	0	23.62	24.06	24.20	
			1	24	0	23.64	24.05	24.17	
			12	0	1	23.10	23.48	23.43	
			12	7	1	23.06	23.46	23.46	
			12	13	1	23.08	23.47	23.44	
		25	0	1	23.06	23.44	23.42		
		16QAM	1	0	1	22.91	23.45	23.47	
			1	12	1	22.97	23.44	23.42	
			1	24	1	22.94	23.43	23.40	
			12	0	2	21.96	22.27	22.16	
			12	7	2	21.96	22.30	22.19	
			12	13	2	21.95	22.29	22.25	
		25	0	2	22.04	22.35	22.22		
		10	QPSK	1	0	0	23.54	24.14	24.08
				1	25	0	23.54	24.08	24.13
				1	49	0	23.56	24.05	24.11
				25	0	1	23.08	23.48	23.47
	25			12	1	23.07	23.49	23.47	
	25			25	1	23.08	23.50	23.49	
	50		0	1	23.06	23.50	23.41		
	16QAM		1	0	1	23.16	23.42	23.34	
			1	25	1	23.11	23.40	23.42	
			1	49	1	23.14	23.38	23.48	
			25	0	2	21.97	22.40	22.48	
			25	12	2	22.00	22.43	22.48	
			25	25	2	22.02	22.42	22.50	
	50		0	2	22.05	22.40	22.41		
	15		QPSK	1	0	0	23.68	23.52	24.00
				1	36	0	23.54	23.98	23.98
				1	74	0	23.53	23.43	24.11
				36	0	1	23.09	22.83	23.35
		36		18	1	23.09	22.79	23.37	
		36		37	1	23.06	22.78	23.39	
		75	0	1	23.11	22.82	23.37		
		16QAM	1	0	1	22.98	22.82	23.20	
			1	36	1	22.92	22.82	23.20	
			1	74	1	22.97	22.66	23.25	
			36	0	2	22.05	21.95	22.31	
			36	18	2	22.03	21.92	22.35	
			36	37	2	22.01	21.92	22.37	
		75	0	2	22.02	21.90	22.35		
		20	QPSK	1	0	0	23.60	23.97	24.28
				1	49	0	23.71	23.98	24.08
				1	99	0	24.15	23.42	24.44
				50	0	1	23.02	22.86	23.37
	50			24	1	23.00	22.92	23.48	
	50			50	1	23.09	22.73	23.43	
	100		0	1	23.00	22.83	23.45		
	16QAM		1	0	1	22.94	22.95	23.23	
			1	49	1	22.93	22.74	23.39	
			1	99	1	22.96	22.66	23.18	
			50	0	2	22.00	22.01	22.31	
			50	24	2	22.00	21.99	22.36	
			50	50	2	22.02	21.89	22.42	
	100		0	2	22.00	21.92	22.39		

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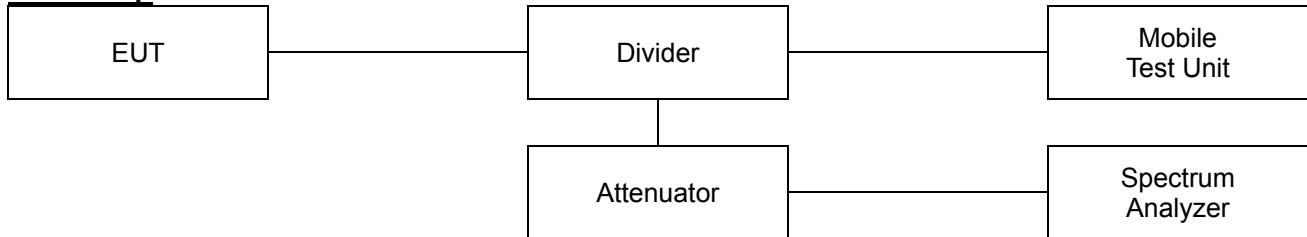
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Test Band	Bandwidth (MHz)	Test mode	RB size	RB offset	MPR	Maximum power			
						Frequency (MHz)			
						Low	Middle	High	
LTE Band 66	1.4	QPSK	1	0	0	23.17	23.21	23.43	
			1	3	0	23.16	22.98	23.44	
			1	5	0	23.13	23.07	23.45	
			3	0	0	23.47	23.44	23.42	
			3	1	0	23.45	23.44	23.44	
			3	3	0	23.38	23.45	23.45	
		6	0	1	22.77	22.38	22.70		
		16QAM	1	0	1	22.61	22.43	22.45	
			1	3	1	22.80	22.36	22.46	
			1	5	1	22.57	22.49	22.50	
			3	0	1	22.75	22.14	22.58	
			3	1	1	22.85	22.36	22.53	
			3	3	1	22.72	22.12	22.58	
		3	QPSK	6	0	2	21.54	21.32	21.51
				1	0	0	23.16	23.09	23.27
				1	8	0	23.20	23.11	23.33
				1	14	0	23.15	22.97	23.29
				8	0	1	22.76	22.42	22.68
	8			4	1	22.71	22.43	22.71	
	8		7	1	22.74	22.43	22.71		
	15		0	1	22.70	22.42	22.68		
	16QAM		1	0	1	22.50	22.56	22.48	
			1	8	1	22.32	22.42	22.45	
			1	14	1	22.50	22.80	22.84	
			8	0	2	21.48	21.53	21.57	
			8	4	2	21.68	21.38	21.53	
			8	7	2	21.62	21.52	21.56	
	5		QPSK	15	0	2	21.65	21.38	21.59
				1	0	0	23.36	23.48	23.32
				1	12	0	23.39	23.08	23.44
				1	24	0	23.30	23.45	23.31
		12		0	1	22.72	22.42	22.69	
		12		7	1	22.72	22.43	22.71	
		12	13	1	22.73	22.43	22.67		
		25	0	1	22.74	22.41	22.71		
		16QAM	1	0	1	22.84	22.40	22.76	
			1	12	1	22.46	22.47	22.50	
			1	24	1	22.59	22.31	22.62	
			12	0	2	21.66	21.34	21.59	
			12	7	2	21.59	21.33	21.60	
			12	13	2	21.63	21.33	21.55	
		10	QPSK	25	0	2	21.65	21.36	21.66
				1	0	0	23.30	23.41	23.14
				1	25	0	23.46	23.38	23.14
				1	49	0	23.47	23.03	23.13
	25			0	1	22.76	22.43	22.60	
	25			12	1	22.75	22.42	22.63	
	25		25	1	22.72	22.41	22.59		
	50		0	1	22.74	22.45	22.56		
	16QAM		1	0	1	22.58	22.70	22.56	
			1	25	1	22.57	22.65	22.64	
			1	49	1	22.54	22.57	22.54	
			25	0	2	21.71	21.39	21.53	
			25	12	2	21.61	21.42	21.48	
			25	25	2	21.58	21.32	21.58	
	15		QPSK	50	0	2	21.68	21.38	21.55
				1	0	0	23.23	23.07	23.16
				1	36	0	23.24	22.99	23.14
				1	74	0	23.18	23.00	23.48
		36		0	1	22.75	22.45	22.61	
		36		18	1	22.75	22.41	22.57	
		36	37	1	22.72	22.40	22.60		
		75	0	1	22.70	22.43	22.56		
		16QAM	1	0	1	22.48	22.51	22.45	
			1	36	1	22.45	22.49	22.37	
			1	74	1	22.38	22.46	22.31	
			36	0	2	21.66	21.39	21.47	
			36	18	2	21.63	21.41	21.48	
			36	37	2	21.61	21.37	21.48	
		20	QPSK	75	0	2	21.62	21.34	21.49
				1	0	0	23.49	22.90	22.96
				1	49	0	23.12	23.31	22.88
				1	99	0	22.94	22.84	22.86
	50			0	1	22.48	22.31	22.39	
	50			24	1	22.47	22.24	22.34	
	50		50	1	22.42	22.18	22.35		
	100		0	1	22.47	22.23	22.37		
	16QAM		1	0	1	22.41	22.23	22.55	
			1	49	1	22.42	22.21	22.48	
			1	99	1	22.38	22.12	22.46	
			50	0	2	21.36	21.12	21.30	
			50	24	2	21.32	21.17	21.31	
			50	50	2	21.31	21.02	21.23	
	100		0	2	21.38	21.16	21.27		

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

- c) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- d) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- e) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f) Determine the reference value by either of the following:
 - 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
 - 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
- g) Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

- i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- j) The spectral envelope can cross the “-X dB amplitude” at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the “-X dB amplitude.”
- 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.

Test results

Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 2	1.4	1850.7	QPSK	1.32	1.10
			16QAM	1.35	1.10
		1880.0	QPSK	1.35	1.10
			16QAM	1.33	1.10
		1909.3	QPSK	1.37	1.11
			16QAM	1.38	1.10
	3	1851.5	QPSK	3.07	2.70
			16QAM	3.11	2.71
		1880.0	QPSK	3.13	2.71
			16QAM	3.14	2.70
		1908.5	QPSK	3.16	2.71
			16QAM	3.13	2.71
	5	1852.5	QPSK	5.31	4.55
			16QAM	5.37	4.53
		1880.0	QPSK	5.41	4.52
			16QAM	5.42	4.55
		1907.5	QPSK	5.54	4.56
			16QAM	5.45	4.53
	10	1855.0	QPSK	10.44	9.04
			16QAM	10.42	8.99
		1880.0	QPSK	10.34	9.04
			16QAM	10.44	8.99
		1905.0	QPSK	10.44	8.99
			16QAM	10.24	9.02
15	1857.5	QPSK	15.32	13.60	
		16QAM	15.44	13.49	
	1880.0	QPSK	15.58	13.52	
		16QAM	15.55	13.49	
	1902.5	QPSK	15.62	13.52	
		16QAM	15.32	13.56	
20	1860.0	QPSK	19.83	17.98	
		16QAM	19.98	18.03	
	1880.0	QPSK	20.03	17.98	
		16QAM	20.18	18.03	
	1900.0	QPSK	20.18	18.03	
		16QAM	20.08	18.08	

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Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 4/66	1.4	1710.7	QPSK	1.34	1.10
			16QAM	1.34	1.10
		1745.0	QPSK	1.35	1.10
			16QAM	1.35	1.10
		1779.3	QPSK	1.34	1.10
			16QAM	1.35	1.10
	3	1711.5	QPSK	3.11	2.70
			16QAM	3.12	2.70
		1745.0	QPSK	3.15	2.70
			16QAM	3.13	2.70
		1778.5	QPSK	3.14	2.72
			16QAM	3.12	2.71
	5	1712.5	QPSK	5.33	4.51
			16QAM	5.43	4.55
		1745.0	QPSK	5.45	4.55
			16QAM	5.42	4.53
		1777.5	QPSK	5.28	4.53
			16QAM	5.43	4.55
	10	1715.0	QPSK	10.32	9.04
			16QAM	10.37	8.99
		1745.0	QPSK	10.47	8.99
			16QAM	10.29	8.99
		1775.0	QPSK	10.27	8.99
			16QAM	10.42	8.99
	15	1717.5	QPSK	15.66	13.52
			16QAM	15.32	13.49
		1745.0	QPSK	15.44	13.49
			16QAM	15.21	13.49
1772.5		QPSK	15.36	13.56	
		16QAM	15.40	13.52	
20	1720.0	QPSK	20.18	17.98	
		16QAM	20.03	17.98	
	1745.0	QPSK	20.23	18.03	
		16QAM	20.13	17.98	
	1770.0	QPSK	20.23	17.98	
		16QAM	20.18	17.98	

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Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 5	1.4	824.7	QPSK	1.34	1.10
			16QAM	1.36	1.10
		836.5	QPSK	1.34	1.10
			16QAM	1.36	1.10
		848.3	QPSK	1.35	1.10
			16QAM	1.36	1.09
	3	825.5	QPSK	3.12	2.70
			16QAM	3.13	2.72
		836.5	QPSK	3.10	2.71
			16QAM	3.11	2.71
		847.5	QPSK	3.12	2.70
			16QAM	3.12	2.71
	5	826.5	QPSK	5.43	4.53
			16QAM	5.57	4.57
		836.5	QPSK	5.46	4.54
			16QAM	5.40	4.54
		846.5	QPSK	5.35	4.52
			16QAM	5.45	4.54
	10	829.0	QPSK	10.61	9.02
			16QAM	10.47	9.04
		836.5	QPSK	10.44	9.01
			16QAM	10.47	9.01
		844.0	QPSK	10.44	9.01
			16QAM	10.59	9.04

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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	1.33	1.10
			16QAM	1.33	1.09
		707.5	QPSK	1.33	1.09
			16QAM	1.35	1.10
		715.3	QPSK	1.34	1.10
			16QAM	1.37	1.11
	3	700.5	QPSK	3.07	2.70
			16QAM	3.12	2.72
		707.5	QPSK	3.11	2.70
			16QAM	3.13	2.70
		714.5	QPSK	3.12	2.73
			16QAM	3.13	2.71
LTE Band 12/17	5	701.5	QPSK	5.37	4.55
			16QAM	5.41	4.53
		707.5	QPSK	5.37	4.52
			16QAM	5.41	4.56
		713.5	QPSK	5.26	4.51
			16QAM	5.40	4.55
	10	704.0	QPSK	10.47	9.02
			16QAM	10.39	9.04
		707.5	QPSK	10.54	9.04
			16QAM	10.29	9.02
		711.0	QPSK	10.17	8.97
			16QAM	10.24	8.97

Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 13	5	779.5	QPSK	5.50	4.57
			16QAM	5.40	4.53
		782.0	QPSK	5.36	4.53
			16QAM	5.46	4.55
		784.5	QPSK	5.46	4.53
			16QAM	5.38	4.53
	10	782.0	QPSK	10.39	9.04
			16QAM	10.44	9.02

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KCTL-TIR001-003/2

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www.kctl.co.kr

Report No.:
KR19-SRF0178

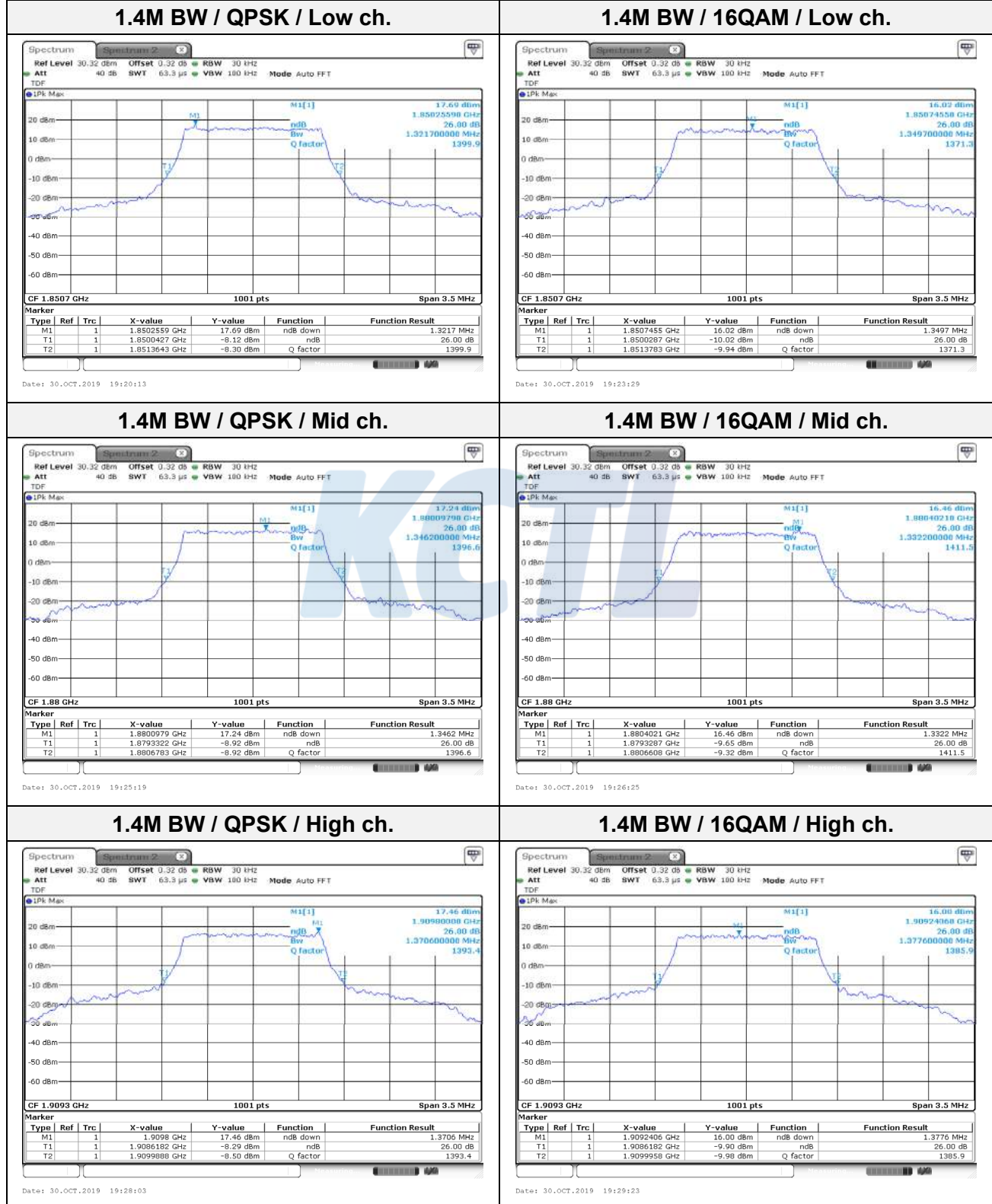
Page (30) of (216)



Test Band	Bandwidth (MHz)	Frequency (MHz)	Test mode	26dB bandwidth (MHz)	99 % bandwidth (MHz)
LTE Band 41	5	2498.5	QPSK	5.35	4.52
			16QAM	5.38	4.53
		2593.0	QPSK	5.38	4.52
			16QAM	5.43	4.52
		2687.5	QPSK	5.35	4.52
			16QAM	5.56	4.55
	10	2501.0	QPSK	10.32	8.99
			16QAM	10.42	8.99
		2593.0	QPSK	10.29	8.97
			16QAM	10.37	8.99
		2685.0	QPSK	10.39	8.97
			16QAM	10.24	8.99
	15	2503.5	QPSK	15.47	13.49
			16QAM	15.51	13.52
		2593.0	QPSK	15.10	13.49
			16QAM	15.44	13.49
		2682.5	QPSK	15.55	13.56
			16QAM	15.55	13.52
	20	2506.0	QPSK	20.23	18.03
			16QAM	20.48	18.03
		2593.0	QPSK	20.13	18.03
			16QAM	20.18	18.03
		2680.0	QPSK	20.23	18.03
			16QAM	20.08	18.08

26dB Bandwidth

Test mode: LTE Band 2



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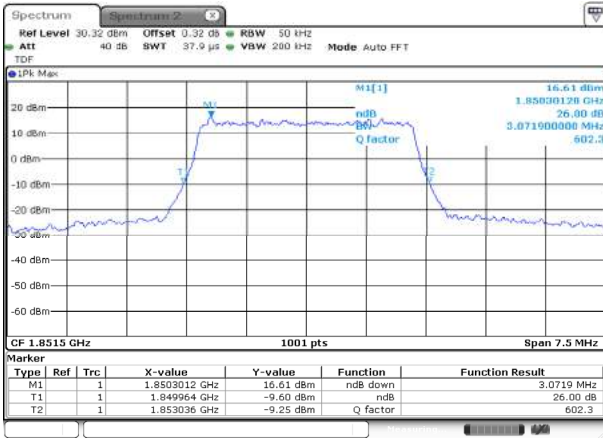
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Suwon-si, Gyeonggi-do, 16677, Korea
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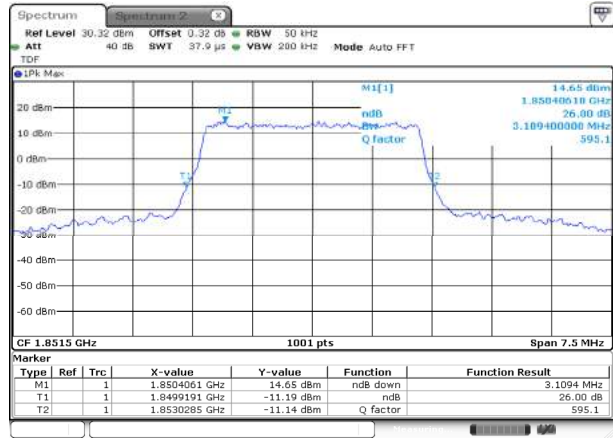
Page (32) of (216)



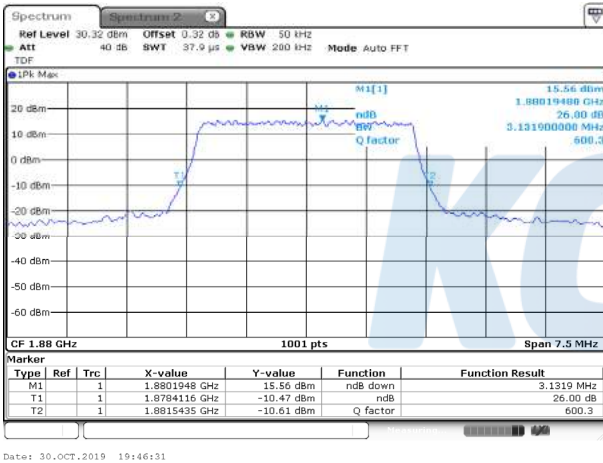
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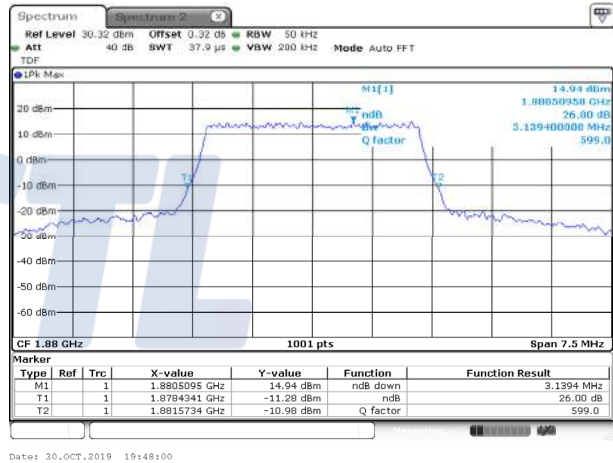
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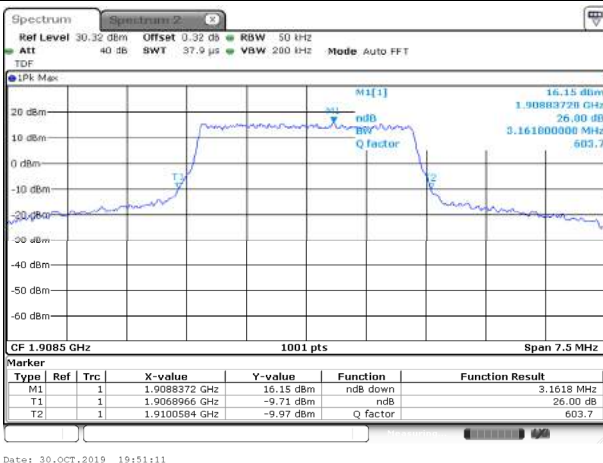
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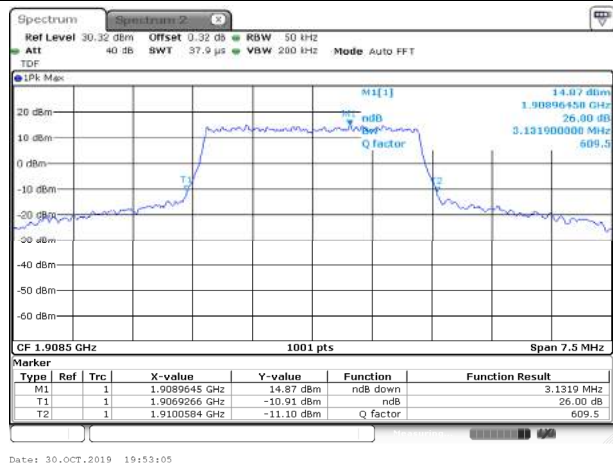
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3M BW / QPSK / High ch.



3M BW / 16QAM / High ch.



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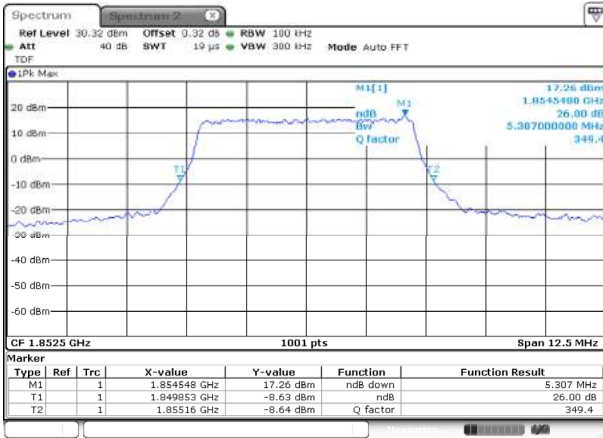
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Suwon-si, Gyeonggi-do, 16677, Korea
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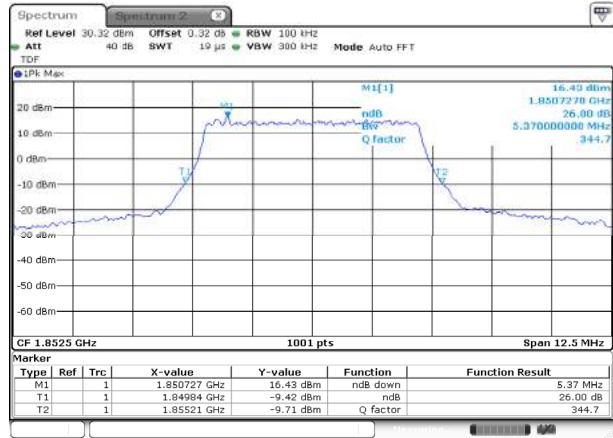
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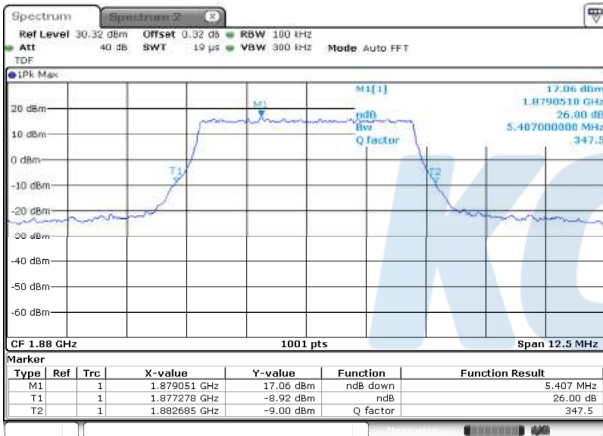
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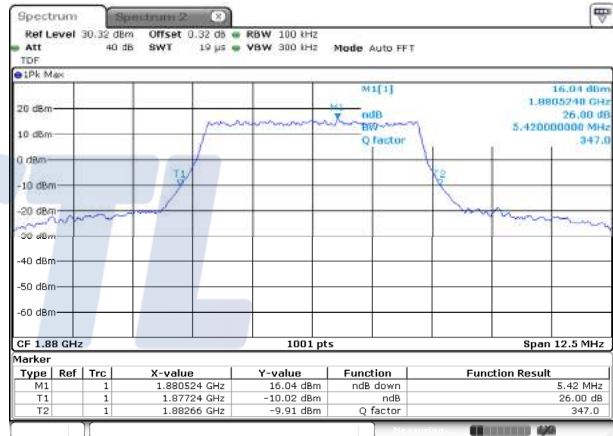
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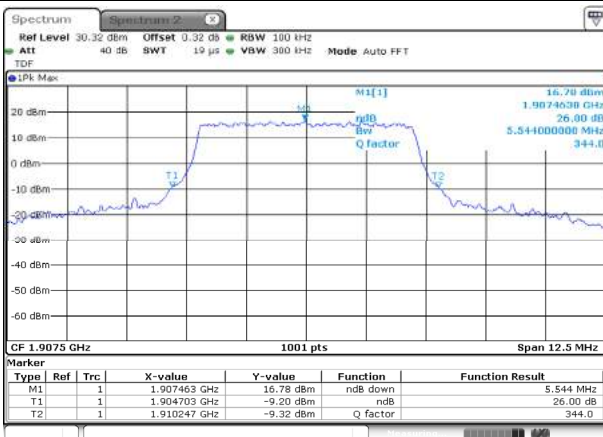
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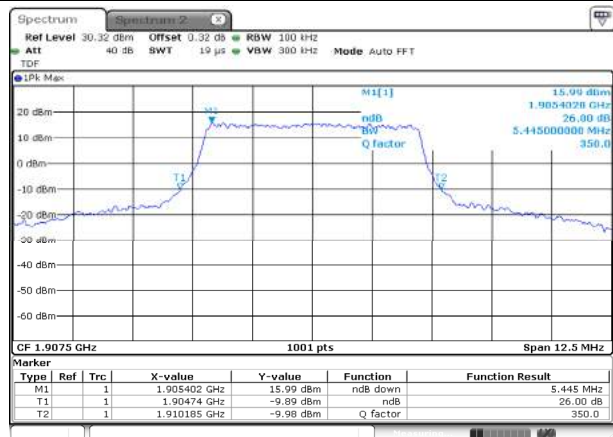
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5M BW / QPSK / High ch.



5M BW / 16QAM / High ch.



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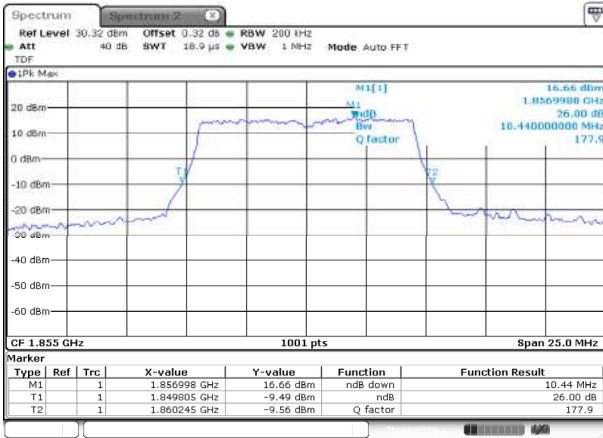
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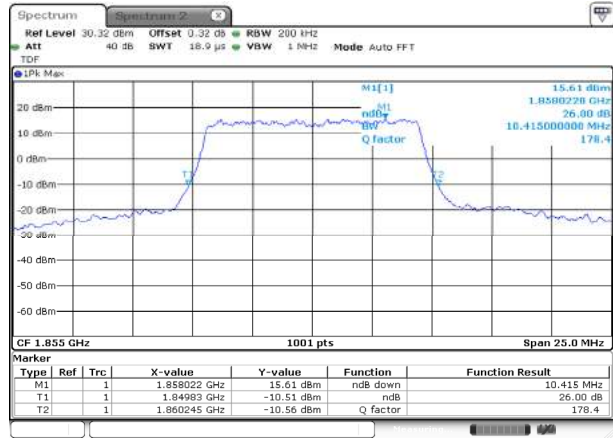


10M BW / QPSK / Low ch.



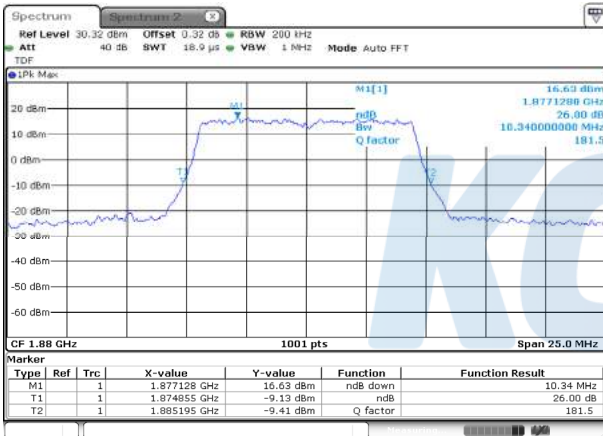
Date: 30.OCT.2019 20:12:44

10M BW / 16QAM / Low ch.



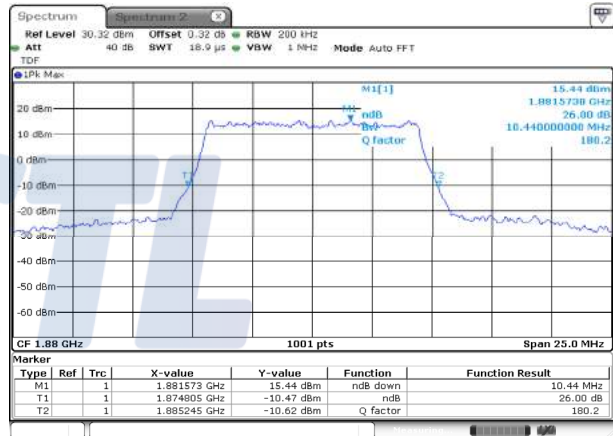
Date: 30.OCT.2019 21:33:37

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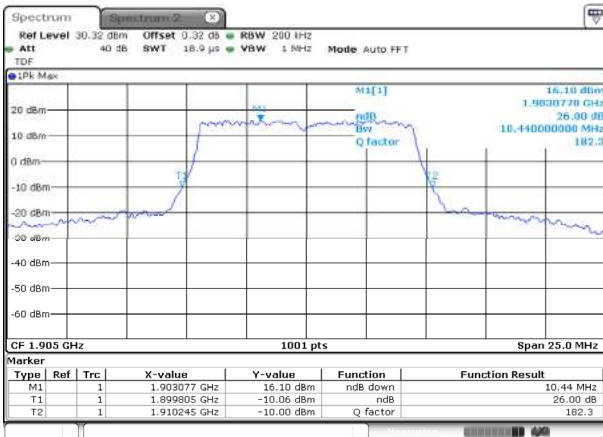
Date: 30.OCT.2019 21:35:13

10M BW / 16QAM / Mid ch.



Date: 30.OCT.2019 21:37:14

10M BW / QPSK / High ch.



Date: 30.OCT.2019 21:38:17

10M BW / 16QAM / High ch.



Date: 30.OCT.2019 21:40:58

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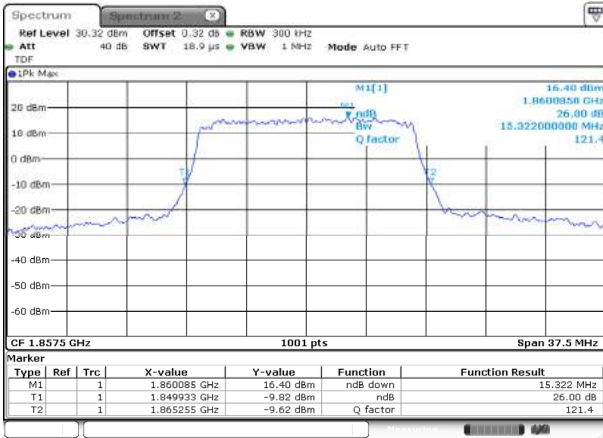
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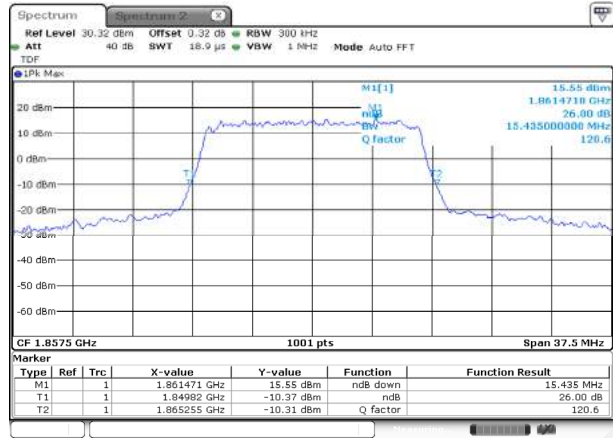
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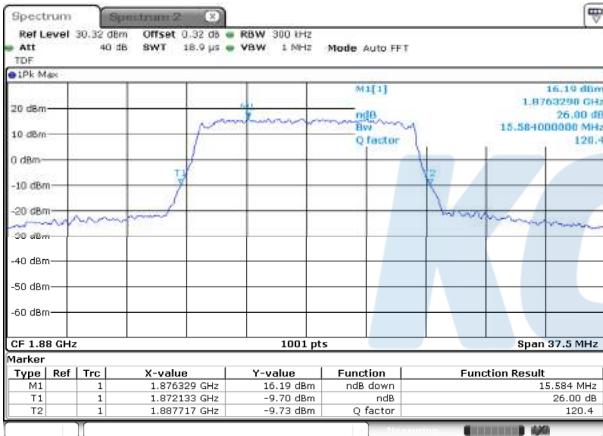
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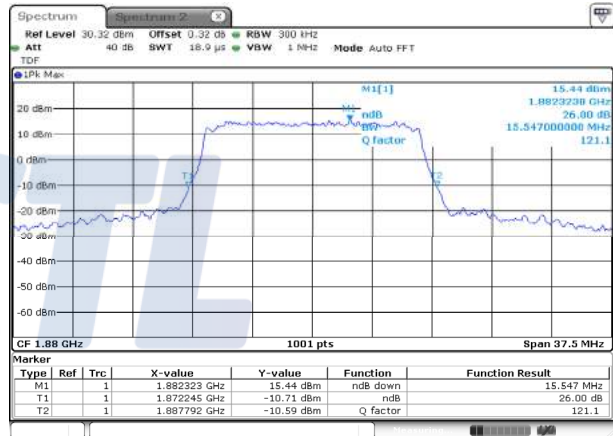
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15M BW / QPSK / Mid ch.



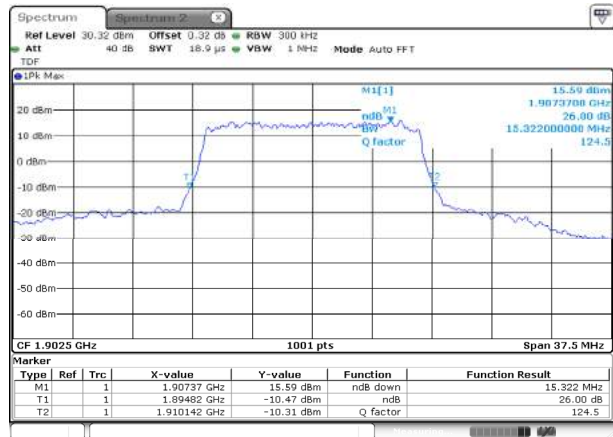
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15M BW / QPSK / High ch.



15M BW / 16QAM / High ch.



KCTL Inc.

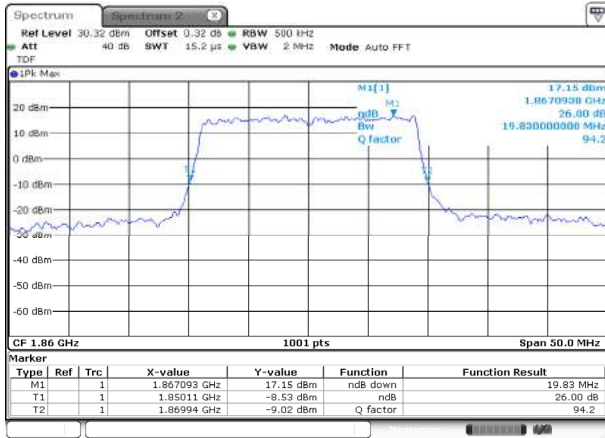
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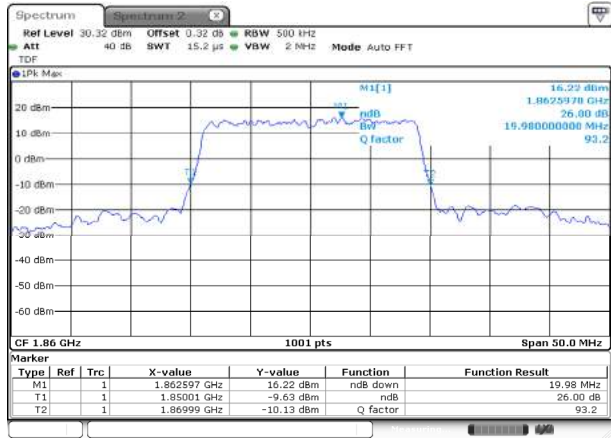


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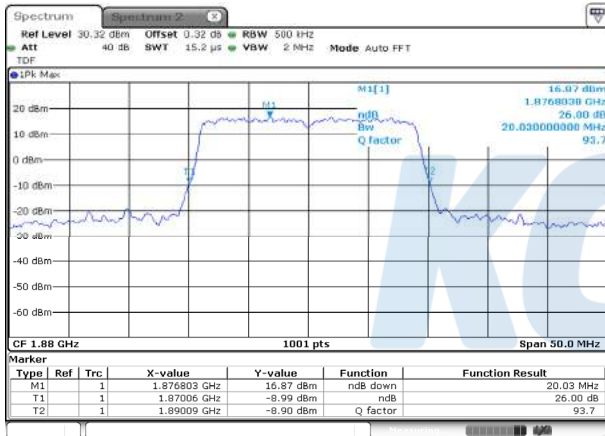
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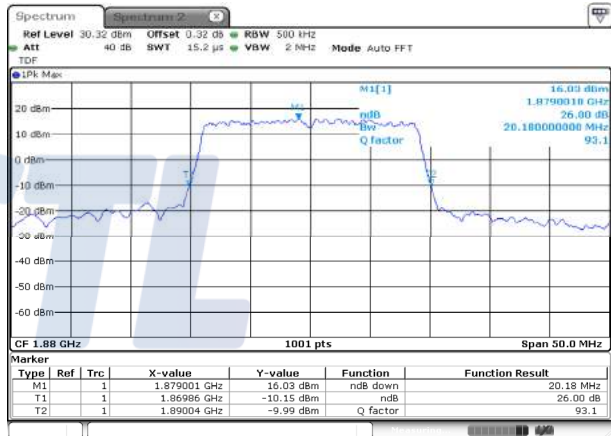
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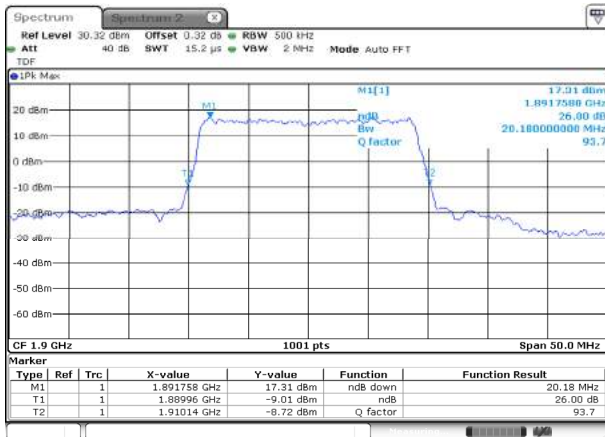
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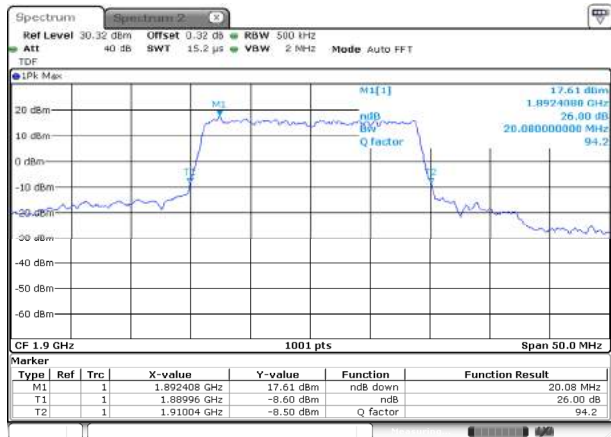
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Date: 30.OCT.2019 21:58:36

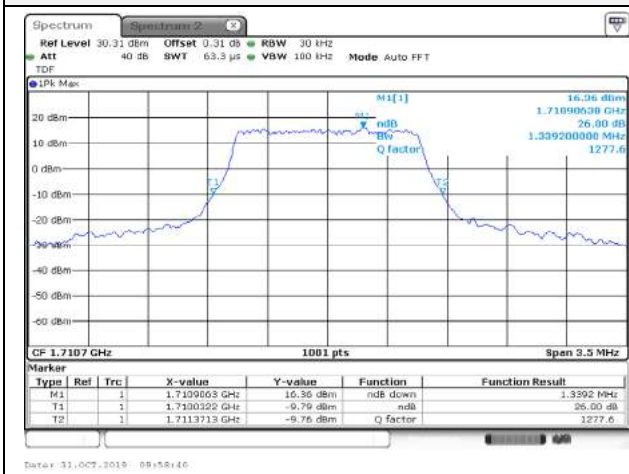
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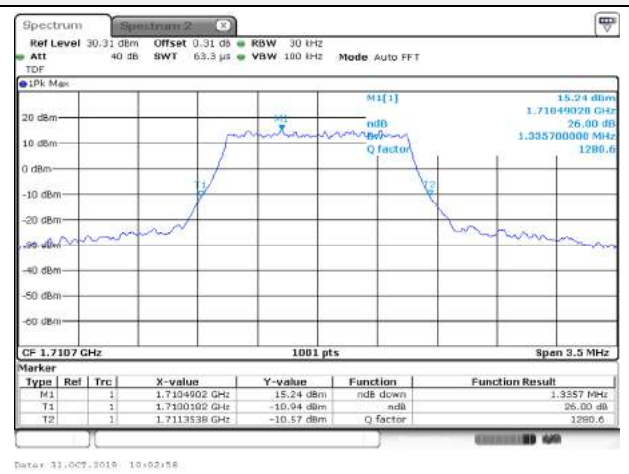
Date: 30.OCT.2019 22:00:20

Test mode: LTE Band 4/66

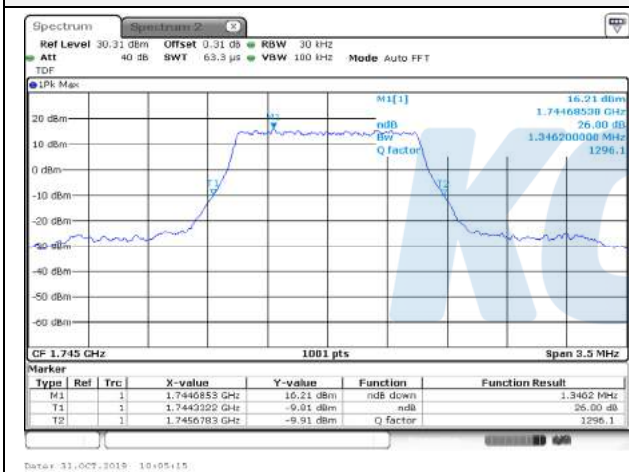
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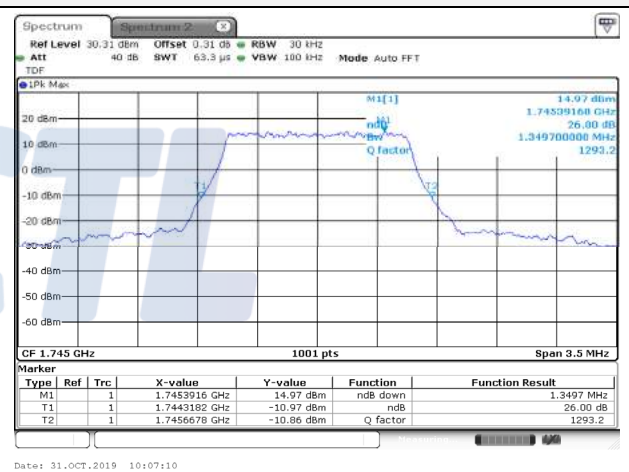
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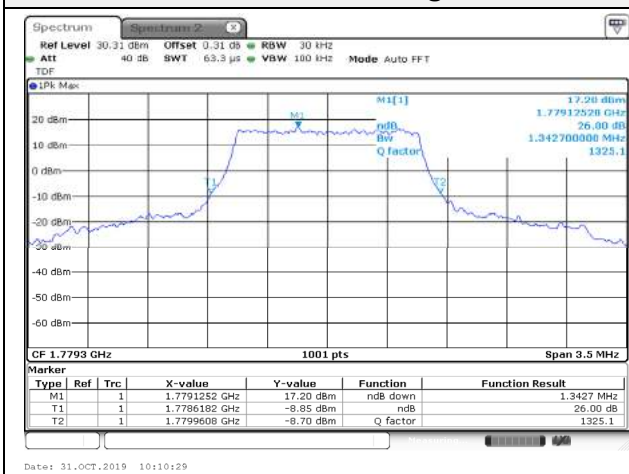
1.4M BW / QPSK / Mid ch.



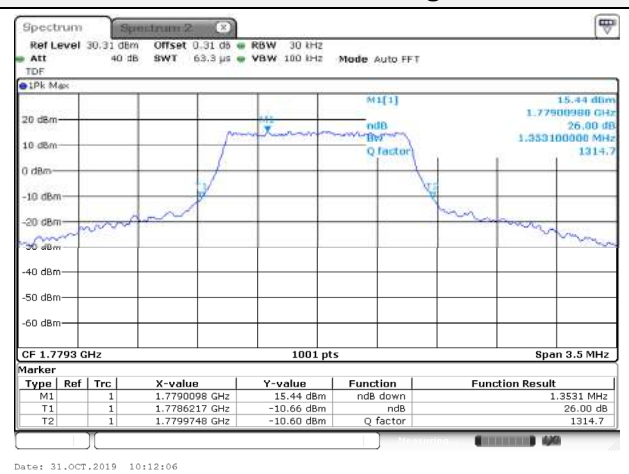
1.4M BW / 16QAM / Mid ch.



1.4M BW / QPSK / High ch.



1.4M BW / 16QAM / High ch.



KCTL Inc.

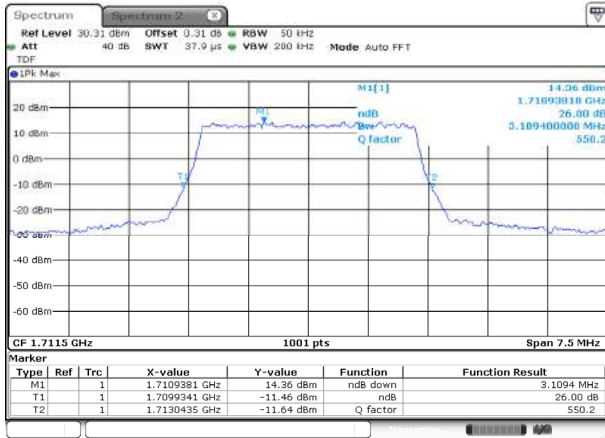
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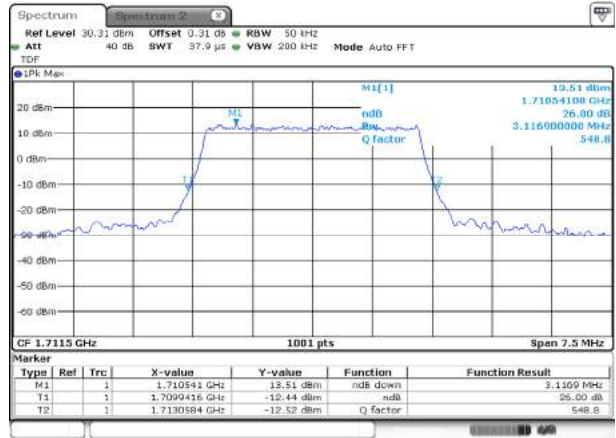


3M BW / QPSK / Low ch.



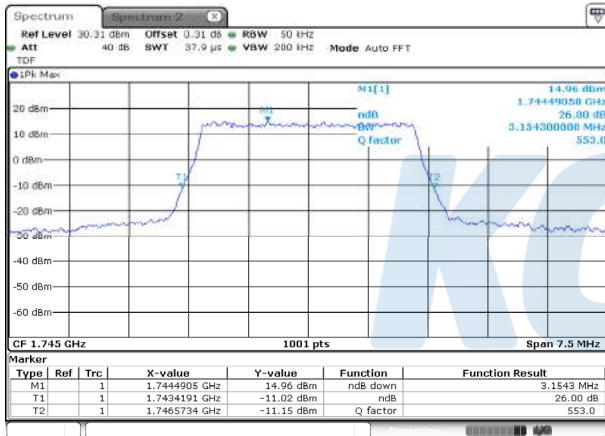
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3M BW / 16QAM / Low ch.



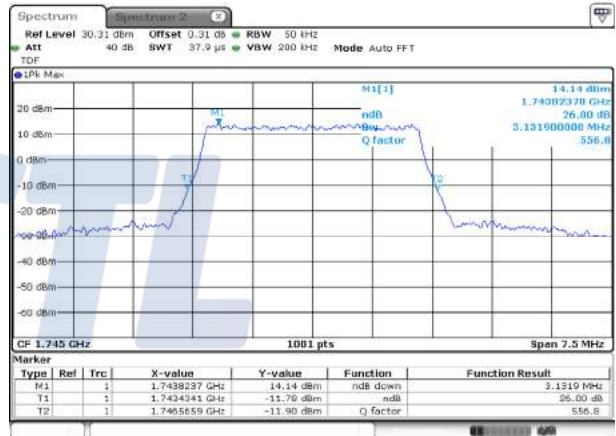
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3M BW / QPSK / Mid ch.



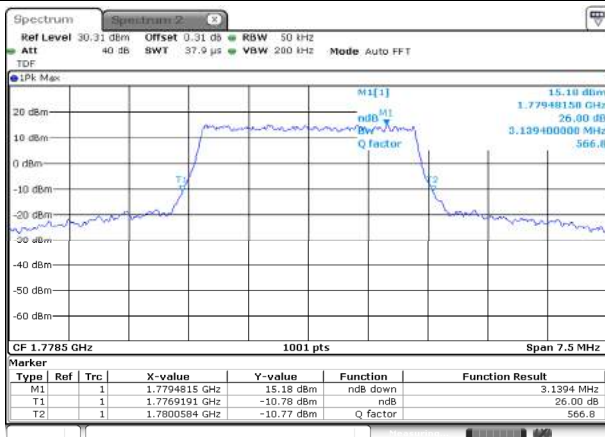
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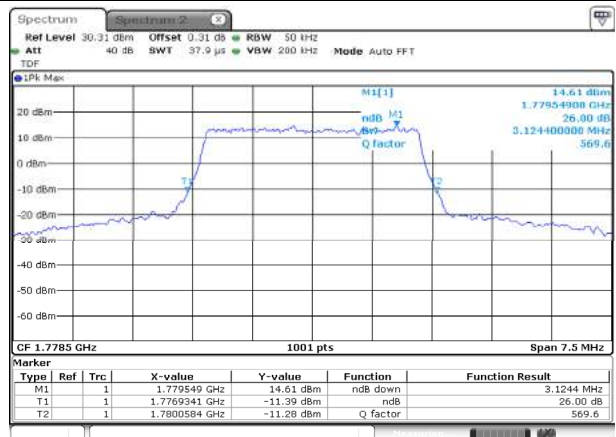
Date: 31.OCT.2019 10:49:16

3M BW / QPSK / High ch.



Date: 31.OCT.2019 10:51:47

3M BW / 16QAM / High ch.



Date: 31.OCT.2019 12:20:26

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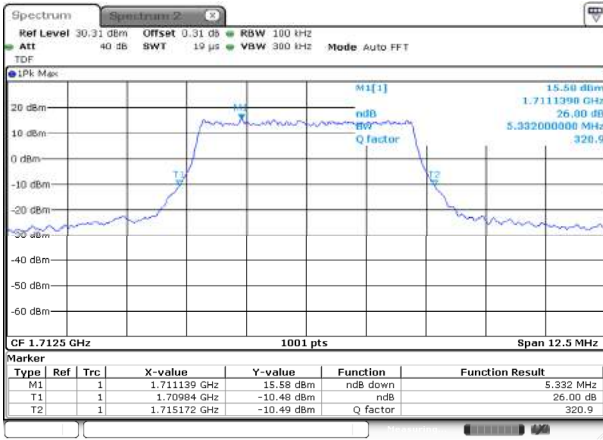
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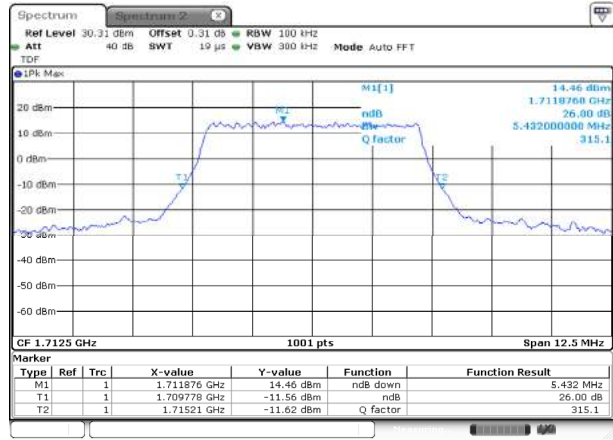


5M BW / QPSK / Low ch.



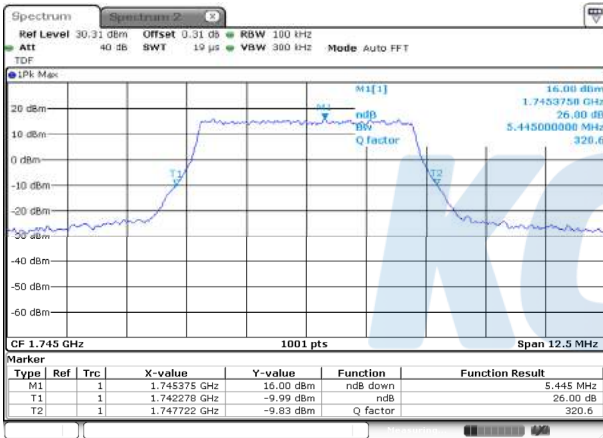
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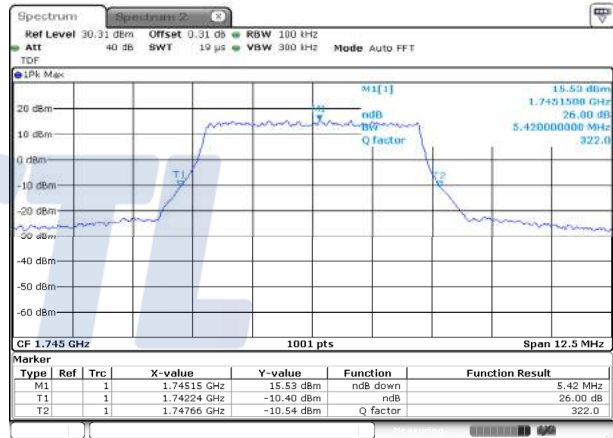
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5M BW / QPSK / Mid ch.



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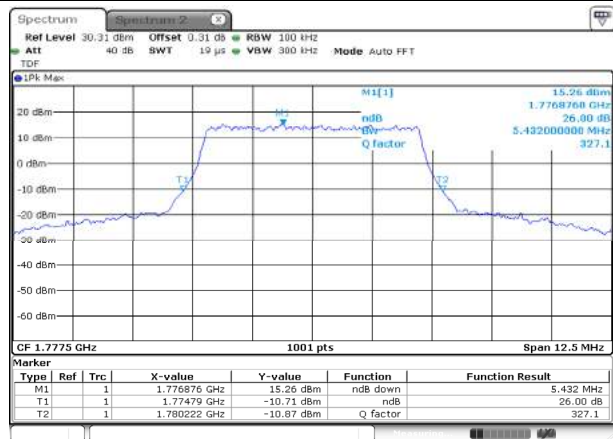
Date: 31.OCT.2019 12:37:39

5M BW / QPSK / High ch.



Date: 31.OCT.2019 12:39:32

5M BW / 16QAM / High ch.



Date: 31.OCT.2019 12:40:58

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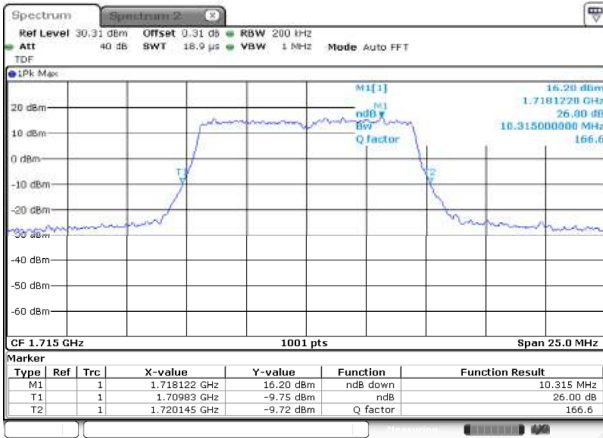
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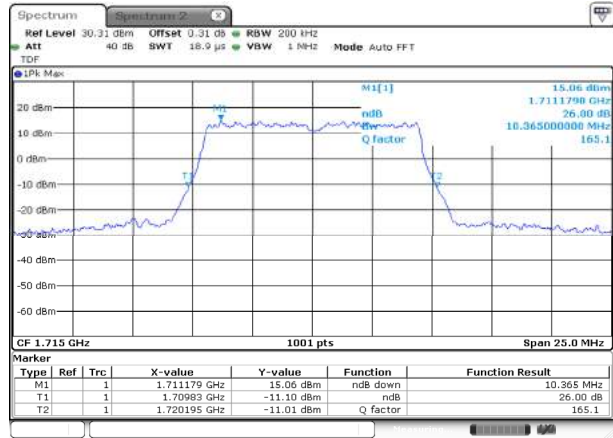
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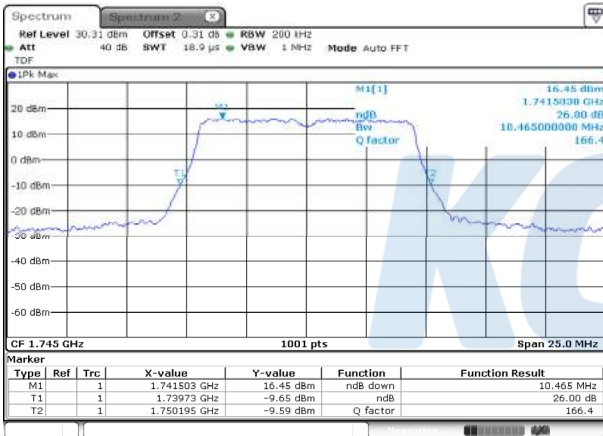
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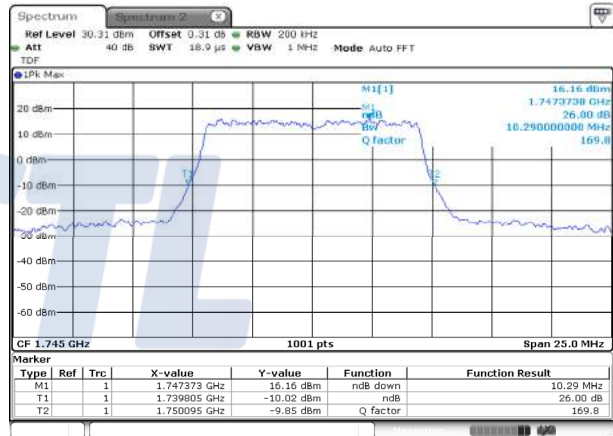
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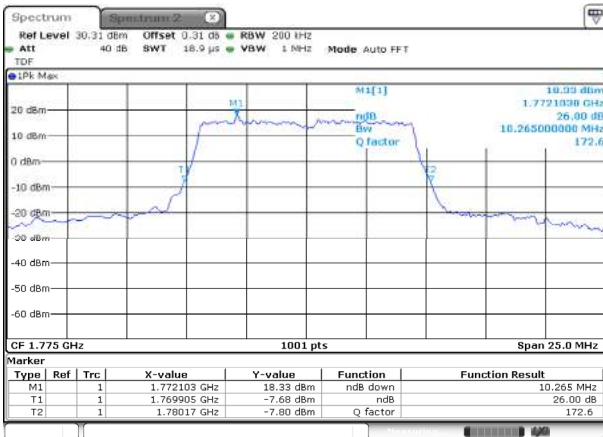
10M BW / QPSK / Mid ch.



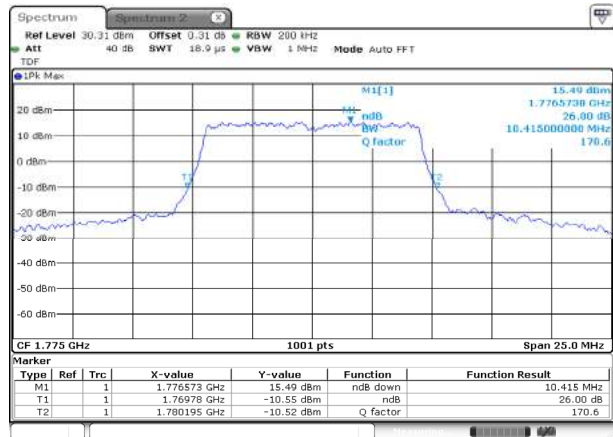
10M BW / 16QAM / Mid ch.



10M BW / QPSK / High ch.



10M BW / 16QAM / High ch.



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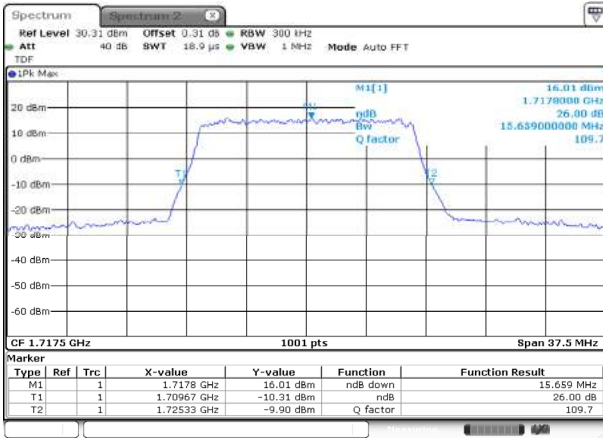
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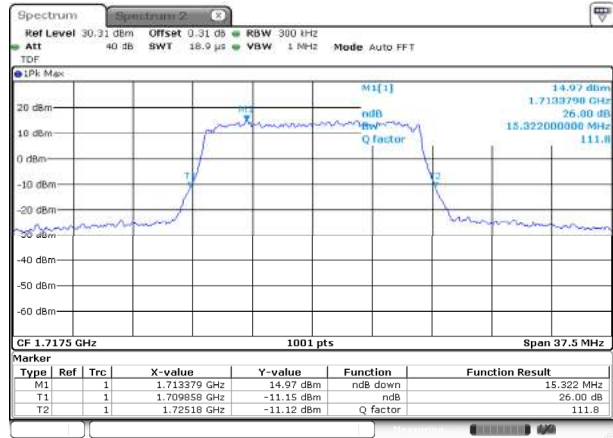


15M BW / QPSK / Low ch.



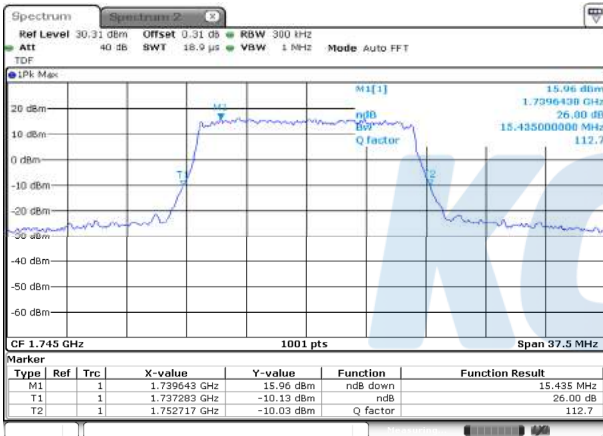
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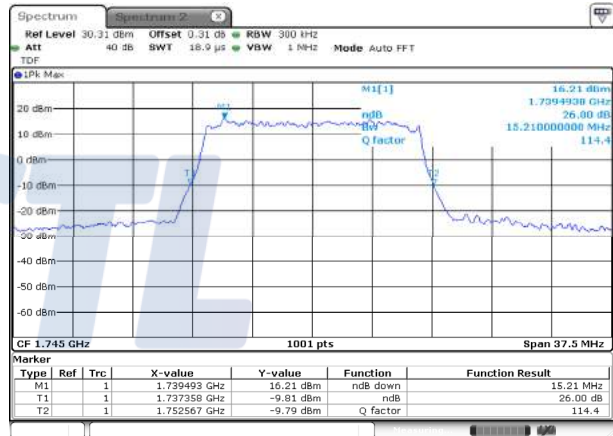
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15M BW / QPSK / Mid ch.



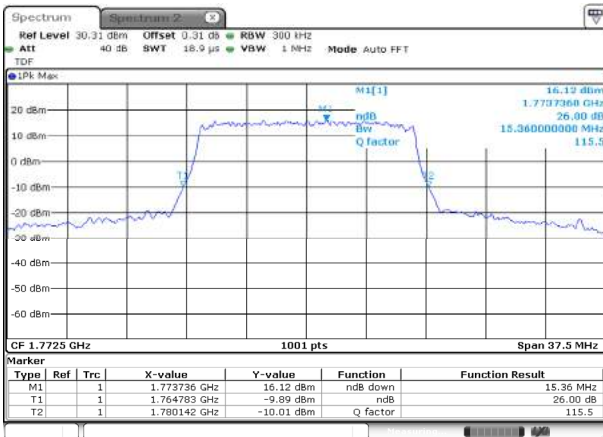
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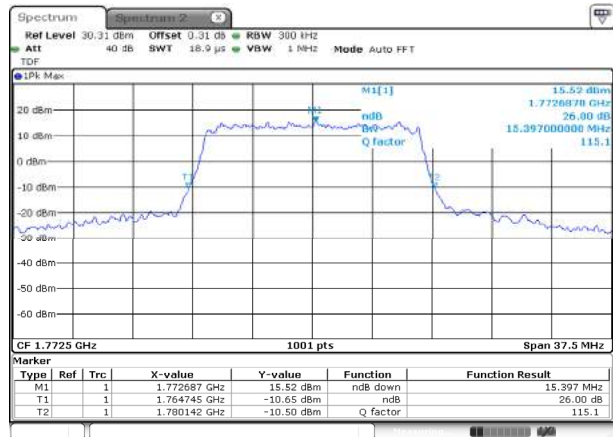
Date: 31.OCT.2019 16:45:10

15M BW / QPSK / High ch.



Date: 31.OCT.2019 16:47:12

15M BW / 16QAM / High ch.



Date: 31.OCT.2019 16:49:10

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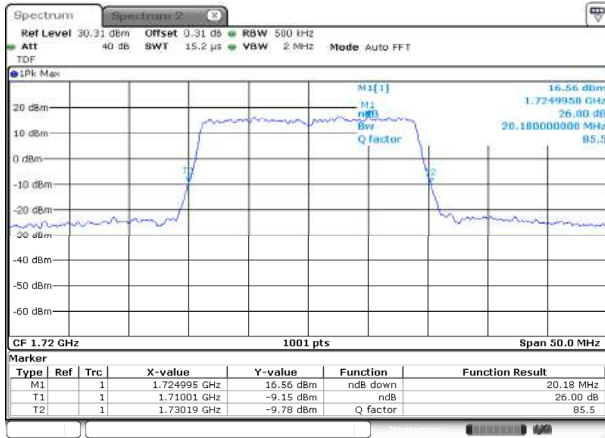
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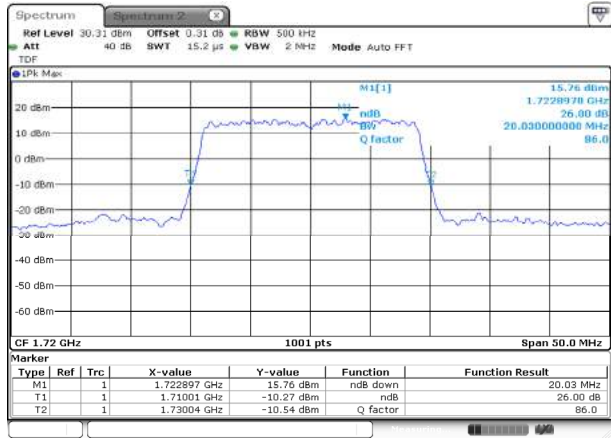


20M BW / QPSK / Low ch.



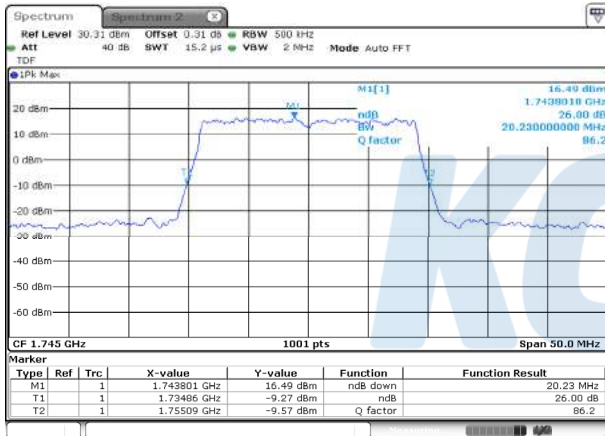
Date: 31.OCT.2019 18:15:51

20M BW / 16QAM / Low ch.



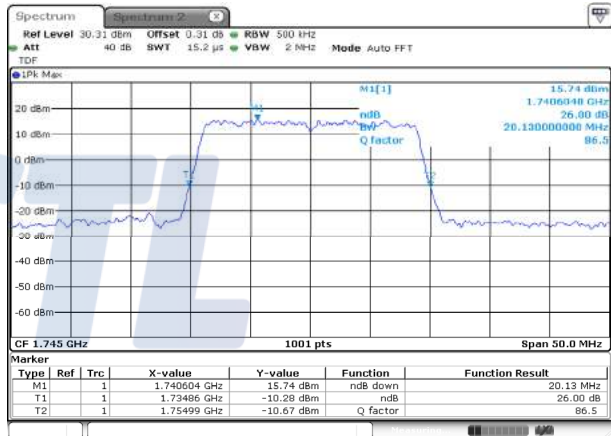
Date: 31.OCT.2019 18:17:43

20M BW / QPSK / Mid ch.



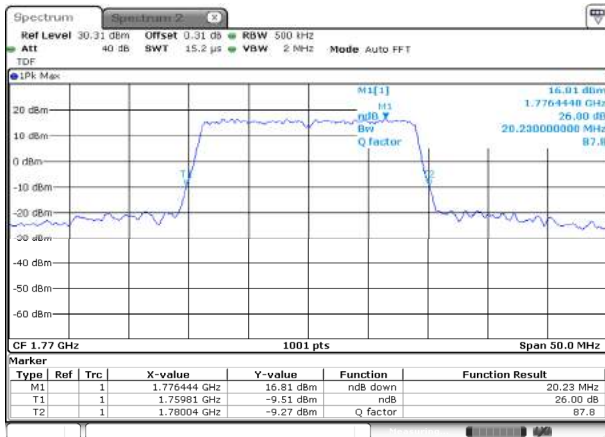
Date: 31.OCT.2019 18:20:14

20M BW / 16QAM / Mid ch.



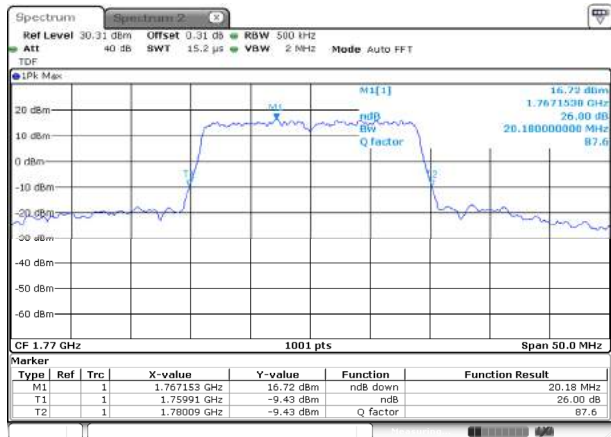
Date: 31.OCT.2019 18:21:53

20M BW / QPSK / High ch.



Date: 31.OCT.2019 18:24:36

20M BW / 16QAM / High ch.



Date: 31.OCT.2019 18:27:00

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