FCC RF Test Report

APPLICANT	:	**Motorola Mobility LLC**
EQUIPMENT	:	**Mobile Cellular Phone**
BRAND NAME	:	**Motorola**
MODEL NAME	:	**XT2005-5, XT2005-1PP, XT2005-1**
FCC ID	:	**IHDT56YA1**
STANDARD	:	**47 CFR Part 2, 22(H), 24(E), 27(L), 27(M), 27(F), 27(H)**
CLASSIFICATION	:	**PCS Licensed Transmitter Held to Ear (PCE)**

This is a data re-used report which is only valid together with the original test report. The product was received on Feb. 21, 2019 and completely tested on Mar. 11, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

James Huang

Approved by: James Huang / Manager

TESTING
NVLAP LAB CODE 600155-0

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China

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APPENDIX A. TEST RESULTS OF CONDUCTED TEST

APPENDIX B. TEST RESULTS OF RADIATED TEST

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG922110-02B	Rev. 01	Initial issue of report	May 09, 2019

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	1
	§22.913(a)(5)	Effective Radiated Power (Band 5) (Band 26)	ERP < 7 Watt	PASS	1
	§27.50(c)(10)	Effective Radiated Power (Band 12) (Band 13) (Band 17)	ERP < 3 Watt	PASS	1
	§24.232(c) §27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 2) (Band 7)	EIRP < 2Watt	PASS	1
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4) (Band 66)	EIRP < 1Watt	PASS	1
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	1
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	1
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 17) (Band 26) (Band 66)	< 43+10log10(P[Watts])	PASS	1
	§27.53(m)(4)	Conducted Band Edge Measurement (Band 7)	§27.53(m)(4)		
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 17) (Band 26) (Band 66)	< 43+10log10(P[Watts])	PASS	1
	§2.1051 §27.53(m)(4)	Conducted Spurious Emission (Band 7)	< 55+10$\log_{10}$(P[Watts])		
3.9	§2.1055 §22.355	Frequency Stability Temperature & Voltage	< 2.5 ppm for Part 22	PASS	1
	§2.1055 §24.235 §27.54		Within Authorized Band		
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 17) (Band 26) (Band 66)	< 43+10$\log_{10}$(P[Watts])	PASS	Under limit 12.59 dB at 5100.000 MHz
	§2.1053 §27.53(m)(4)	Radiated Spurious Emission (Band 7)	< 55+10$\log_{10}$(P[Watts])		

Remark 1: Only LTE B2/7/13 test item for full test, other LTE band re-uses another report detailed description please refer to section 1.7

1 General Description

1.1 Applicant

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2005-5, XT2005-1PP, XT2005-1
FCC ID	IHDT56YA1
EUT supports Radios application	CDMA/EV-DO/GSM/GPRS/EGPRS/WCDMA/HSPA/ DC-HSDPA/HSPA+(16QAM uplink is not supported)/LTE WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 Bluetooth BR / EDR / LE FM Receiver/GNSS
IMEI Code	Conducted: N/A Radiation: 352178100007267 for LTE Band 2/7/13/26 352178100007283 for LTE Band 12/66
HW Version	88941-1-12
SW Version	fastboot_surfna_oem_userdebug_9_PPB29.12_2fc78_intcfg-test-keys_oem
EUT Stage	Identical Prototype

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 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 : 824.7MHz ~ 848.3 MHz LTE Band 66 : 1710.7 MHz ~ 1779.3 MHz
Rx Frequency	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5MHz ~ 2687.5 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 17 : 736.5 MHz ~ 743.5 MHz LTE Band 26 : 869.7MHz ~ 893.3MHz LTE Band 66 : 2110.7 MHz~ 2179.3 MHz
Bandwidth	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 5 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 7 : 5MHz/ 10MHz / 15MHz / 20MHz LTE Band 12 : 1.4MHz / 3MHz / 5MHz / 10MHz LTE Band 13 : 5MHz / 10MHz LTE Band 17 : 5MHz / 10MHz LTE Band 26 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz LTE Band 66 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz
Maximum Output Power to Antenna	LTE Band 2 : 23.20 dBm LTE Band 7 : 22.95 dBm LTE Band 13 : 23.40 dBm LTE Band 17 : 23.01 dBm
Antenna Gain	LTE Band 2 : 2.10 dBi LTE Band 7 : 2.80 dBi LTE Band 13 : -0.10 dBi LTE Band 17 : -1.20 dBi
Type of Modulation	QPSK / 16QAM / 64QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Specification of Accessory

Specification of Accessory				
AC Adapter 1	**Brand Name**	Motorola(Acbel)	**Model Name**	SC-61
	Power Rating	I/P: 100-240 Vac, 130mA ; O/P: 5Vdc,1000mA		
AC Adapter 2	**Brand Name**	Motorola (Chenyang)	**Model Name**	SC-61
	Power Rating	I/P: 100-240 Vac, 130mA ; O/P: 5Vdc,1000mA		
Battery 1	**Brand Name**	Motorola(ATL)	**Model Name**	KE40
	Power Rating	3.8Vdc, 2820/3000mAh (Rated/typ)	**Type**	Li-ion
Battery 2	**Brand Name**	Motorola(Sunwoda)	**Model Name**	KE40
	Power Rating	3.8Vdc, 2820/3000mAh (Rated/typ)	**Type**	Li-ion
USB Cable	**Brand Name**	Motorola (SaiBao)	**Model Name**	711310002241
	Signal Line Type	1.0 meter, shielded cable, without ferrite core		

1.7 Re-use of Measured Data

1.7.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT2005-5, XT2005-1PP, XT2005-1, FCC ID: IHDT56YA1) is electrically identical to the reference device (Model: XT2005-3, FCC ID: IHDT56YA3) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.7.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. FG922110B for the reference device Model: XT2005-3, FCC ID: IHDT56YA3).

1.7.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
PCE (LTE)	IHDT56YA3	Part 22(H).24(E).27(L). 27(M).27(H).27(N) (FG922110B)	All Conducted sections and ERP/EIRP applicable for LTE Band 4/5/12/26/66

1.7.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the for Conducted Power, the test result were consistent with FCC ID: IHDT56YA3.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

Test Item	Mode	IHDT56YA3 Worst Result	IHDT56YA1 Worst Result	Difference (dB)
Average Conducted Power (dBm)	LTE Band 4	23.15	22.79	0.36
	LTE Band 5	23.18	22.98	0.20
	LTE Band 12	23.19	22.95	0.24
	LTE Band 26	23.27	23.02	0.25
	LTE Band 66	22.85	22.80	0.05

1.8 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

LTE Band 2		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1850.7 ~ 1909.3	1M10G7D	-	0.3381	1M09W7D	-	0.2891
3	1851.5 ~ 1908.5	2M73G7D	-	0.3381	2M73W7D	-	0.2884
5	1852.5 ~ 1907.5	4M50G7D	-	0.3548	4M52W7D	-	0.3090
10	1855.0 ~ 1905.0	9M09G7D	0.0028	0.3508	9M09W7D	-	0.3055
15	1857.5 ~ 1902.5	13M5G7D	-	0.3443	13M5W7D	-	0.2972
20	1860.0 ~ 1900.0	18M5G7D	-	0.3388	18M4W7D	-	0.2891

LTE Band 2		64QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1850.7 ~ 1909.3	1M10W7D	-	0.2163
3	1851.5 ~ 1908.5	2M73W7D	-	0.2173
5	1852.5 ~ 1907.5	4M52W7D	-	0.2213
10	1855.0 ~ 1905.0	9M03W7D	-	0.2291
15	1857.5 ~ 1902.5	13M5W7D	-	0.2234
20	1860.0 ~ 1900.0	18M5W7D	-	0.2158

LTE Band 7		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
5	2502.5 ~ 2567.5	4M50G7D	-	0.3673	4M50W7D	-	0.3141
10	2505.0 ~ 2565.0	9M05G7D	0.0032	0.3750	9M03W7D	-	0.3214
15	2507.5 ~ 2562.5	13M5G7D	-	0.3715	13M5W7D	-	0.3170
20	2510.0 ~ 2560.0	18M4G7D	-	0.3758	18M4W7D	-	0.3199

LTE Band 7		64QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
5	2502.5 ~ 2567.5	4M53W7D	-	0.2371
10	2505.0 ~ 2565.0	9M05W7D	-	0.2360
15	2507.5 ~ 2562.5	13M4W7D	-	0.2495
20	2510.0 ~ 2560.0	18M4W7D	-	0.2382

LTE Band 13		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
5	779.5 ~ 784.5	4M51G7D	-	0.1282	4M51W7D	-	0.1057
10	782.0	9M05G7D	0.0066	0.1303	8M99W7D	-	0.1117

LTE Band 13		64QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
5	779.5 ~ 784.5	4M51W7D	-	0.0811
10	782.0	9M07W7D	-	0.0845

LTE Band 17		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
5	706.5 ~ 713.5	4M51G7D	-	0.0904	4M51W7D	-	0.0785
10	709.0 ~ 711.0	9M05G7D	0.0028	0.0590	9M03W7D	-	0.0805

LTE Band 17		64QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)
5	706.5 ~ 713.5	4M51W7D	-	0.0596
10	709.0 ~ 711.0	9M03W7D	-	0.0627

Note: LTE Band 12 overlaps the entire frequency range of LTE Band 17. Therefore, the LTE Band12 test results re-uses Report No. FG922110B covers Band 17.

1.9 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0).

Test Site	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone, Jiangsu Province 215335, China TEL : 86-512-57900158 FAX : 86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC designation No.**	**FCC Test Firm Registration No.**
	TH01-KS 03CH06-KS	CN5013	630927

1.10 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22(H), 24(E), 27(L), 27(M), 27(F), 27(H)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

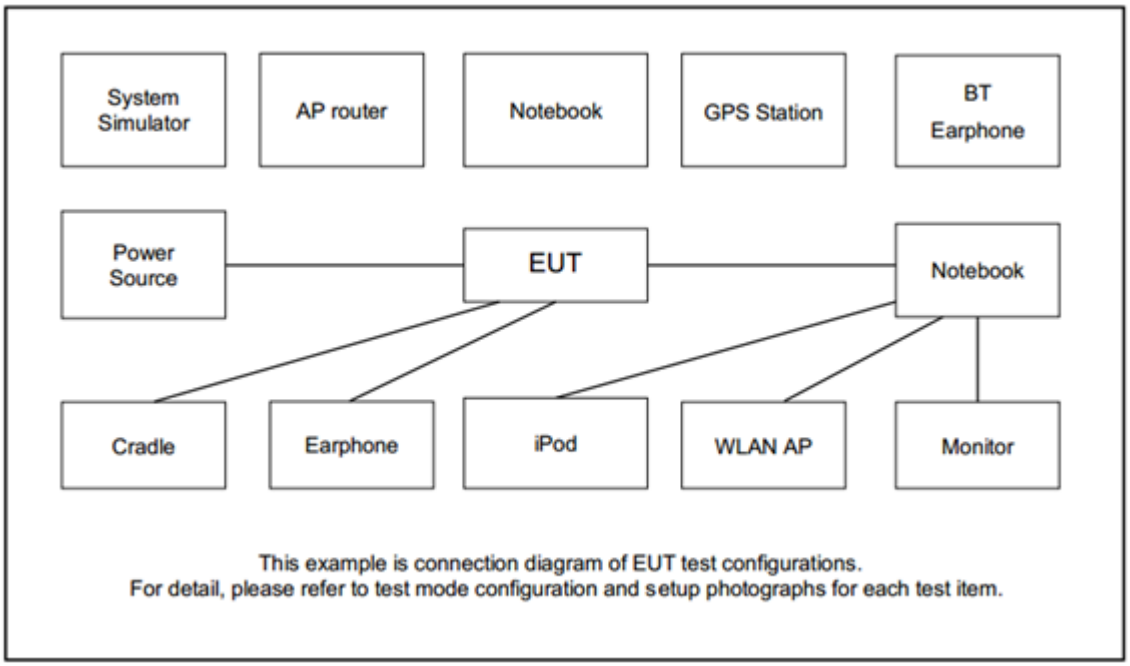
Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v	v	v	v	v	v	v	v
	17	-	-	v	v	-	-	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	2						v	v	v	v	v		v	v	v	v
	7	-	-				v	v	v	v	v		v	v	v	v
	13	-	-		v	-	-	v	v	v	v		v	v	v	v
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	v	v			v	v	v	v
	7	-	-	v	v	v	v	v	v	v			v	v	v	v
	13	-	-	v	v	-	-	v	v	v			v	v	v	v
		-	-		v	-	-	v	v	v			v		v	
Conducted Band Edge	2	v	v	v	v	v	v	v	v	v	v		v	v		v
	7	-	-	v	v	v	v	v	v	v	v		v	v		v
	13	-	-	v	v	-	-	v	v	v	v		v	v		v
		-	-		v	-	-	v	v	v	v		v		v	

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Conducted Spurious Emission	2	v	v	v	v	v	v	v	v	v	v			v	v	v
	7	-	-	v	v	v	v	v	v	v	v			v	v	v
	13	-	-	v	v	-	-	v	v	v	v			v	v	v
		-	-		v	-	-	v	v	v	v				v	
Frequency Stability	2				v			v					v		v	
	7	-	-		v			v					v		v	
	13	-	-		v	-	-	v					v		v	
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v	v	v			v	v	v
	7	-	-	v	v	v	v	v	v	v	v			v	v	v
	13	-	-	v	v	-	-	v	v	v	v			v	v	v
		-	-		v	-	-	v	v	v	v				v	
Radiated Spurious Emission	2	v	v	v	v	v	v	v			v			v	v	v
	7	-	-	v	v	v	v	v			v			v	v	v
	12	v	v	v	v	-	-	v			v			v	v	v
	13	-	-	v	v	-	-	v			v			v	v	v
	26	v	v	v	v	v	-	v			v			v	v	v
	66	v	v	v	v	v	v	v			v			v	v	v

Note

1. The mark "**v** " means that this configuration is chosen for testing
2. The mark "-" means that this bandwidth is not supported.
3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.
4. LTE Band 12 overlaps the entire frequency range of LTE Band 17. Therefore, the LTE Band12 test results re-uses Report No. FG922110B covers Band 17.
5. LTE Band 26 overlaps the entire frequency range of LTE Band 5. Therefore, the test results provided in this report covers Band 26 as well as Band 5
6. LTE Band 66 overlaps the entire frequency range of LTE Band 4. Therefore, the test results provided in this report covers Band 66 as well as Band 4

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8m
3.	Earphone	Lenovo	SH100	N/A	Unshielded,1.2m	N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss

Offset = RF cable loss

Following shows an offset computation example with cable loss 5.2 dB.

Example :

Offset(dB) = RF cable loss(dB)

= 5.2 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 7 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	20850	21100	21350
	Frequency	2510	2535	2560
15	Channel	20825	21100	21375
	Frequency	2507.5	2535	2562.5
10	Channel	20800	21100	21400
	Frequency	2505	2535	2565
5	Channel	20775	21100	21425
	Frequency	2502.5	2535	2567.5

LTE Band 13 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

LTE Band 17 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
10	Channel	23780	23790	23800
	Frequency	709	710	711
5	Channel	23755	23790	23825
	Frequency	706.5	710	713.5

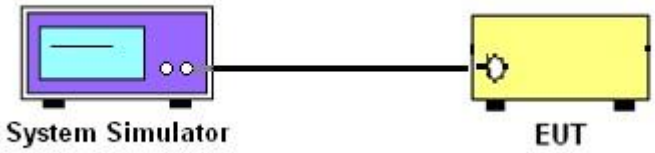
3 Conducted Test Items

3.1 Measuring Instruments

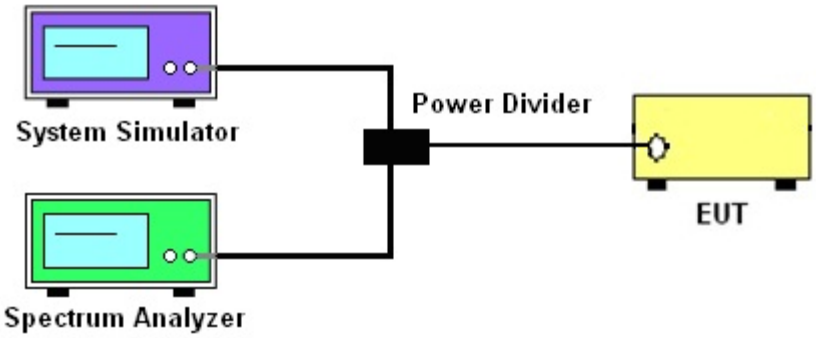
See list of measuring instruments of this test report.

3.2 Test Setup

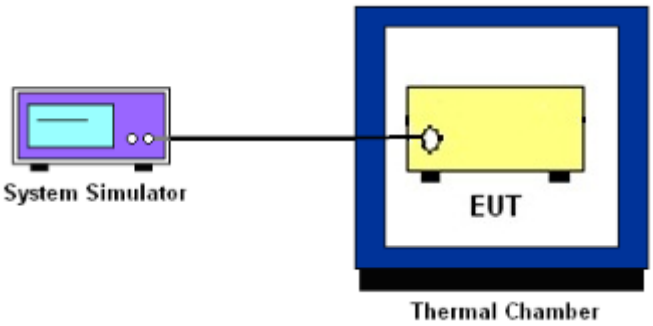
3.2.1 Conducted Output Power



3.2.2 Peak-to-Average Ratio, Occupied Bandwidth ,Conducted Band-Edge and Conducted Spurious Emission



3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 13 and Band 17.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 7.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
2. The EUT was connected to spectrum and system simulator via a power divider.
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
5. Record the deviation as Peak to Average Ratio.

3.6 Occupied Bandwidth

3.6.1 Description of Occupied Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.4
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
4. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
5. Set the detection mode to peak, and the trace mode to max hold.
6. Determine the reference value: 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)
7. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
8. 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 down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

24.238 (a)

For operations in the 1850-1910 and 1930-1990 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53 (g)

For operations in the 600MHz band and 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

27.53(m)(4)

For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

3.7.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
8. Checked that all the results comply with the emission limit line.

   Example:

   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
9. For LTE Band 7, the other 40 dB, and 55 dB have additionally applied same calculation above.

3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 7:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

1. The testing follows ANSI C63.26 section 5.7
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
7. Set spectrum analyzer with RMS detector.
8. Taking the record of maximum spurious emission.
9. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
10. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
11. For Band 7
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [55+ 10log(P)] (dB)
    = [30+ 10log(P)] (dBm) - [55+ 10log(P)] (dB)
    = -25dBm.

3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows ANSI C63.26 section 5.6.4
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

1. The testing follows ANSI C63.26 section 5.6.5
2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
5. The variation in frequency was measured for the worst case.

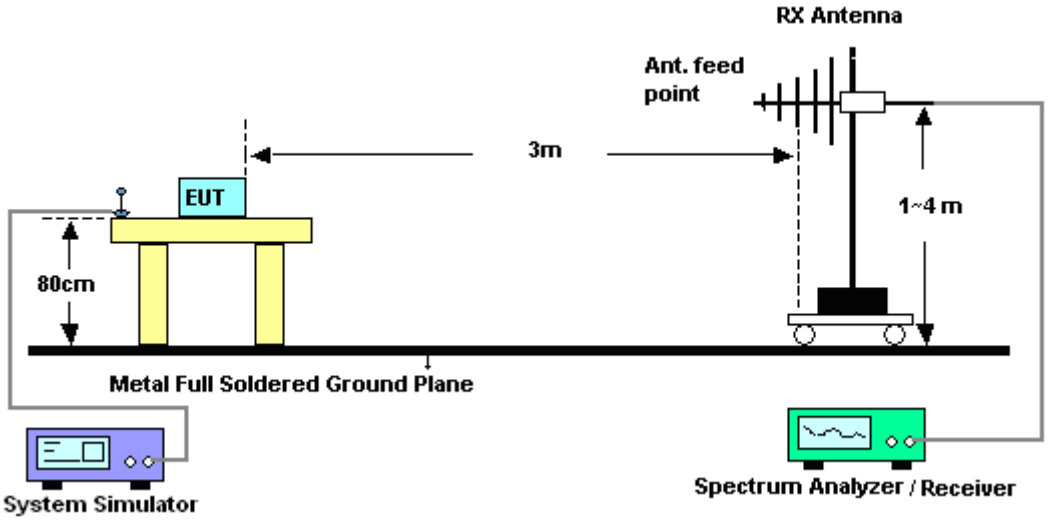
4 Radiated Test Items

4.1 Measuring Instruments

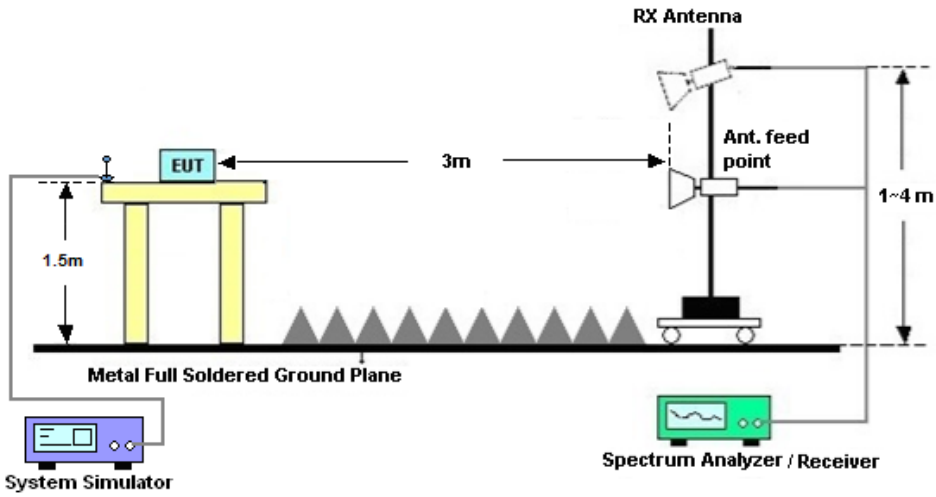
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 7

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
13. For Band 7:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	100319	10Hz~40GHz	Oct. 11, 2018	Mar. 06, 2019~ Mar. 09, 2019	Oct. 10, 2019	Conducted (TH01-KS)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jun. 27, 2018	Mar. 06, 2019~ Mar. 09, 2019	Jun. 26, 2019	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz-44GHz	Oct. 09, 2018	Mar. 08, 2019~ Mar. 11, 2019	Oct. 08, 2019	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 28, 2018	Mar. 08, 2019~ Mar. 11, 2019	Dec. 27, 2019	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 20, 2018	Mar. 08, 2019~ Mar. 11, 2019	Oct. 19, 2019	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Mar. 08, 2019~ Mar. 11, 2019	Jan. 04, 2020	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Aug. 06, 2018	Mar. 08, 2019~ Mar. 11, 2019	Aug. 05, 2019	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Mar. 08, 2019~ Mar. 11, 2019	Apr. 16, 2019	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Apr. 18, 2018	Mar. 08, 2019~ Mar. 11, 2019	Apr. 17, 2019	Radiation (03CH06-KS)
Amplifier	MITEQ	TTA1840-35 -HG	2014749	18~40GHz	Jan. 14, 2019	Mar. 08, 2019~ Mar. 11, 2019	Jan. 13, 2020	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 08, 2019~ Mar. 11, 2019	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 08, 2019~ Mar. 11, 2019	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 08, 2019~ Mar. 11, 2019	NCR	Radiation (03CH06-KS)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.5dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.0dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.0dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	23.20	23.17	23.11
20	1	49		23.18	23.07	23.02
20	1	99		22.96	23.09	23.06
20	50	0		22.13	22.02	22.06
20	50	24		22.02	22.06	22.03
20	50	50		21.96	22.06	22.10
20	100	0		22.18	21.91	22.08
20	1	0	16-QAM	22.51	22.47	22.45
20	1	49		22.34	22.33	22.24
20	1	99		22.22	22.38	22.34
20	50	0		20.92	21.11	21.07
20	50	24		21.01	21.05	21.07
20	50	50		20.95	21.04	21.12
20	100	0		20.96	21.06	21.10
20	1	0	64-QAM	21.15	21.24	21.21
20	1	49		20.74	20.87	20.95
20	1	99		21.02	21.11	21.12
20	50	0		19.86	19.98	19.97
20	50	24		19.88	19.92	19.94
20	50	50		19.82	19.91	20.02
20	100	0		19.85	19.98	19.98
15	1	0	QPSK	23.03	22.98	23.02
15	1	37		22.98	23.02	23.03
15	1	74		23.17	23.27	23.24
15	36	0		22.05	22.13	22.14
15	36	20		21.94	22.07	22.12
15	36	39		22.01	22.10	22.06
15	75	0		21.96	22.10	22.12

15	1	0		22.63	22.63	22.58
15	1	37		22.23	22.26	22.23
15	1	74		22.53	22.55	22.55
15	36	0	**16-QAM**	21.03	21.13	21.15
15	36	20		20.97	21.05	21.11
15	36	39		21.00	21.07	21.05
15	75	0		20.99	21.10	21.20
15	1	0		21.36	21.38	21.33
15	1	37		21.21	21.18	21.12
15	1	74		21.29	21.39	21.34
15	36	0	**64-QAM**	19.92	20.01	20.00
15	36	20		19.87	19.95	20.00
15	36	39		19.89	19.96	19.93
15	75	0		19.87	19.98	20.09

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	23.10	23.08	23.10
10	1	25		23.08	23.10	23.10
10	1	49		23.35	23.32	23.29
10	25	0		22.22	22.20	22.19
10	25	12		22.18	22.12	22.17
10	25	25		22.15	22.15	22.16
10	50	0		22.16	22.12	22.12
10	1	0	16-QAM	22.75	22.68	22.61
10	1	25		22.52	22.36	22.37
10	1	49		22.67	22.55	22.52
10	25	0		21.15	21.17	21.13
10	25	12		21.14	21.11	21.13
10	25	25		21.10	21.12	21.12
10	50	0		21.15	21.16	21.16
10	1	0	64-QAM	21.46	21.44	21.46
10	1	25		21.25	21.19	21.17
10	1	49		21.50	21.45	21.37
10	25	0		20.16	20.12	20.15
10	25	12		20.11	20.06	20.07
10	25	25		20.07	20.06	20.10
10	50	0		20.05	20.04	20.09
5	1	0	QPSK	23.15	23.13	23.15
5	1	12		23.13	23.15	23.15
5	1	24		23.40	23.37	23.34
5	12	0		22.27	22.25	22.24
5	12	7		22.23	22.17	22.22
5	12	13		22.20	22.20	22.21
5	25	0		22.21	22.17	22.17
5	1	0	16-QAM	22.80	22.73	22.66
5	1	12		22.57	22.41	22.42
5	1	24		22.72	22.60	22.57
5	12	0		21.20	21.22	21.18
5	12	7		21.19	21.16	21.18

5	12	13		21.15	21.17	21.17
5	25	0		21.20	21.21	21.21
5	1	0		21.35	21.33	21.29
5	1	12		21.22	21.07	21.07
5	1	24		21.14	21.12	21.14
5	12	0	**64-QAM**	20.11	20.10	20.05
5	12	7		20.08	20.00	20.06
5	12	13		20.06	20.00	20.00
5	25	0		20.07	20.08	20.03

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	23.19	23.15	23.11
3	1	8		23.19	23.12	23.12
3	1	14		23.11	23.15	23.06
3	8	0		22.26	22.19	22.15
3	8	4		22.24	22.19	22.17
3	8	7		22.15	22.13	22.10
3	15	0		22.21	22.15	22.13
3	1	0	16-QAM	22.50	22.43	22.50
3	1	8		22.49	22.47	22.44
3	1	14		22.37	22.45	22.39
3	8	0		21.35	21.25	21.20
3	8	4		21.36	21.23	21.20
3	8	7		21.31	21.16	21.20
3	15	0		21.22	21.16	21.12
3	1	0	64-QAM	21.27	21.25	21.21
3	1	8		21.26	21.25	21.18
3	1	14		21.17	21.23	21.14
3	8	0		20.15	20.07	20.06
3	8	4		20.13	20.07	20.05
3	8	7		20.07	20.01	20.07
3	15	0		20.14	20.07	20.06
1.4	1	0	QPSK	23.14	23.12	23.14
1.4	1	3		23.14	23.12	23.14
1.4	1	5		23.08	23.04	23.00
1.4	3	0		23.17	23.08	23.08
1.4	3	1		23.19	23.12	23.09
1.4	3	3		23.14	23.07	23.10
1.4	6	0		22.15	22.14	22.11
1.4	1	0	16-QAM	22.38	22.42	22.39
1.4	1	3		22.51	22.46	22.48
1.4	1	5		22.40	22.34	22.36
1.4	3	0		22.30	22.17	22.18
1.4	3	1		22.34	22.21	22.21

1.4	3	3		22.29	22.15	22.12
1.4	6	0		21.20	21.15	21.16
1.4	1	0	64-QAM	21.20	21.17	21.12
1.4	1	3		21.25	21.22	21.14
1.4	1	5		21.19	21.11	21.13
1.4	3	0		21.17	21.13	21.00
1.4	3	1		21.17	21.12	21.09
1.4	3	3		21.15	21.03	21.02
1.4	6	0		20.10	20.00	19.98

LTE Band 7 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	22.81	22.79	22.63
20	1	49		22.95	22.92	22.81
20	1	99		22.94	22.71	22.70
20	50	0		21.91	21.85	21.82
20	50	24		21.93	21.87	21.80
20	50	50		21.88	21.78	21.77
20	100	0		21.91	21.89	21.81
20	1	0	16-QAM	22.13	22.19	21.97
20	1	49		22.20	22.15	22.17
20	1	99		22.25	21.98	22.04
20	50	0		20.97	20.84	20.80
20	50	24		20.91	20.91	20.79
20	50	50		20.88	20.77	20.77
20	100	0		20.83	20.80	20.68
20	1	0	64QAM	20.84	20.94	20.73
20	1	49		20.81	20.84	20.75
20	1	99		20.97	20.82	20.80
20	50	0		19.91	19.82	19.78
20	50	24		19.89	19.87	19.78
20	50	50		19.85	19.75	19.77
20	100	0		19.86	19.80	19.69
15	1	0	QPSK	22.64	22.79	22.77
15	1	37		22.90	22.77	22.70
15	1	74		22.79	22.74	22.64
15	36	0		22.01	21.87	21.80
15	36	20		22.06	21.93	21.84
15	36	39		21.95	21.88	21.75
15	75	0		21.98	21.89	21.77
15	1	0	16-QAM	22.15	22.10	22.09
15	1	37		22.19	22.19	22.11
15	1	74		22.21	22.01	22.10
15	36	0		21.00	20.88	20.80
15	36	20		21.06	20.94	20.86

15	36	39		20.94	20.89	20.77
15	75	0		20.97	20.89	20.80
15	1	0	64QAM	20.92	20.91	20.80
15	1	37		21.17	21.04	21.07
15	1	74		20.96	20.80	20.84
15	36	0		19.89	19.78	19.68
15	36	20		19.95	19.85	19.75
15	36	39		19.82	19.78	19.65
15	75	0		19.87	19.79	19.69

LTE Band 7 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.88	22.75	22.94
10	1	25		22.94	22.69	22.75
10	1	49		22.91	22.88	22.85
10	25	0		21.89	21.69	21.78
10	25	12		21.89	21.65	21.77
10	25	25		21.79	21.68	21.74
10	50	0		21.87	21.64	21.76
10	1	0	16-QAM	22.27	22.13	22.25
10	1	25		22.12	21.92	22.13
10	1	49		22.12	22.06	22.18
10	25	0		20.86	20.68	20.73
10	25	12		20.83	20.63	20.72
10	25	25		20.74	20.64	20.70
10	50	0		20.87	20.64	20.77
10	1	0	64QAM	20.90	20.83	20.93
10	1	25		20.86	20.70	20.87
10	1	49		20.92	20.87	20.92
10	25	0		19.76	19.58	19.65
10	25	12		19.74	19.53	19.68
10	25	25		19.67	19.60	19.65
10	50	0		19.75	19.52	19.65
5	1	0	QPSK	22.68	22.66	22.62
5	1	12		22.82	22.62	22.66
5	1	24		22.85	22.68	22.70
5	12	0		21.84	21.67	21.77
5	12	7		21.82	21.63	21.70
5	12	13		21.78	21.58	21.71
5	25	0		21.87	21.68	21.74
5	1	0	16-QAM	22.17	21.96	22.09
5	1	12		22.09	21.92	21.94
5	1	24		22.11	21.96	21.99
5	12	0		20.84	20.70	20.77
5	12	7		20.85	20.65	20.80

5	12	13		20.83	20.61	20.79
5	25	0		20.78	20.62	20.68
5	1	0		20.95	20.74	20.81
5	1	12		20.85	20.70	20.76
5	1	24		20.84	20.68	20.81
5	12	0	**64QAM**	19.72	19.53	19.65
5	12	7		19.74	19.53	19.70
5	12	13		19.70	19.51	19.65
5	25	0		19.77	19.58	19.65

LTE Band 13 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	-	23.40	-
10	1	25			23.17	
10	1	49			23.23	
10	25	0			22.26	
10	25	12			22.25	
10	25	25			22.18	
10	50	0			22.32	
10	1	0	16-QAM		22.73	
10	1	25			22.50	
10	1	49			22.62	
10	25	0			21.21	
10	25	12			21.21	
10	25	25			21.24	
10	50	0			21.35	
10	1	0	64QAM		21.51	
10	1	25			21.39	
10	1	49			21.52	
10	25	0			20.29	
10	25	12			20.28	
10	25	25			20.22	
10	50	0			20.32	
5	1	0	QPSK	23.30	23.25	23.33
5	1	12		23.05	23.16	23.03
5	1	24		23.21	23.11	23.12
5	12	0		22.21	22.16	22.21
5	12	7		22.26	22.16	22.12
5	12	13		22.06	22.21	22.17
5	25	0		22.09	22.21	22.26
5	1	0	16-QAM	22.34	22.43	22.44
5	1	12		22.33	22.39	22.28
5	1	24		22.49	22.41	22.30
5	12	0		21.23	21.21	21.29
5	12	7		21.29	21.23	21.21

5	12	13		21.12	21.27	21.20
5	25	0		21.00	21.17	21.22
5	1	0		21.20	21.30	21.34
5	1	12		21.24	21.28	21.27
5	1	24		21.34	21.29	21.26
5	12	0	**64QAM**	20.18	20.20	20.23
5	12	7		20.23	20.23	20.15
5	12	13		20.09	20.26	20.16
5	25	0		20.08	20.25	20.29

LTE Band 17 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.92	22.94	22.96
10	1	25		22.98	23.01	22.95
10	1	49		22.96	22.98	22.98
10	25	0		21.69	21.61	21.62
10	25	12		21.61	21.60	21.65
10	25	25		21.60	21.71	21.72
10	50	0		21.59	21.55	21.63
10	1	0	16-QAM	22.12	22.07	22.12
10	1	25		21.89	21.88	21.90
10	1	49		22.02	22.01	21.98
10	25	0		20.62	20.54	20.61
10	25	12		20.54	20.60	20.56
10	25	25		20.51	20.62	20.70
10	50	0		20.59	20.61	20.60
10	1	0	64QAM	20.90	20.93	20.99
10	1	25		20.73	20.75	20.73
10	1	49		21.03	20.96	20.94
10	25	0		19.69	19.63	19.60
10	25	12		19.61	19.61	19.60
10	25	25		19.61	19.70	19.75
10	50	0		19.57	19.58	19.57
5	1	0	QPSK	22.64	22.75	22.66
5	1	12		22.66	22.78	22.75
5	1	24		22.64	22.80	22.76
5	12	0		21.68	21.64	21.75
5	12	7		21.70	21.66	21.71
5	12	13		21.59	21.67	21.74
5	25	0		21.68	21.67	21.78
5	1	0	16-QAM	21.89	21.88	21.99
5	1	12		21.84	21.75	21.88
5	1	24		21.94	22.03	22.03
5	12	0		20.68	20.68	20.80
5	12	7		20.75	20.70	20.77

5	12	13		20.63	20.69	20.74
5	25	0		20.65	20.62	20.74
5	1	0	64QAM	20.78	20.77	20.73
5	1	12		20.73	20.65	20.81
5	1	24		20.75	20.85	20.91
5	12	0		19.67	19.63	19.78
5	12	7		19.72	19.64	19.77
5	12	13		19.61	19.69	19.75
5	25	0		19.71	19.62	19.79

ERP/EIRP

LTE Band 2 (G_T - L_C = 2.10 dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	18607	18900	19193	18615	18900	19185	18625	18900	19175
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
Conducted Power (dBm)	23.19	23.12	23.09	23.19	23.15	23.11	23.40	23.37	23.34
Conducted Power (Watts)	0.2084	0.2051	0.2037	0.2084	0.2065	0.2046	0.2188	0.2173	0.2158
EIRP(dBm)	25.29	25.22	25.19	25.29	25.25	25.21	25.50	25.47	25.44
EIRP(Watts)	0.3381	0.3327	0.3304	0.3381	0.3350	0.3319	0.3548	0.3524	0.3499

LTE Band 2 (G_T - L_C = 2.10 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	18650	18900	19150	18675	18900	19125	18650	18900	19100
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
Conducted Power (dBm)	23.35	23.32	23.29	23.17	23.27	23.24	23.20	23.17	23.11
Conducted Power (Watts)	0.2163	0.2148	0.2133	0.2075	0.2123	0.2109	0.2089	0.2075	0.2046
EIRP(dBm)	25.45	25.42	25.39	25.27	25.37	25.34	25.30	25.27	25.21
EIRP(Watts)	0.3508	0.3483	0.3459	0.3365	0.3443	0.3420	0.3388	0.3365	0.3319

LTE Band 2 (G_T - L_C = 2.10 dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	18607	18900	19193	18615	18900	19185	18625	18900	19175
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
Conducted Power (dBm)	22.51	22.46	22.48	22.50	22.43	22.50	22.80	22.73	22.66
Conducted Power (Watts)	0.1782	0.1762	0.1770	0.1778	0.1750	0.1778	0.1905	0.1875	0.1845
EIRP(dBm)	24.61	24.56	24.58	24.60	24.53	24.60	24.90	24.83	24.76
EIRP(Watts)	0.2891	0.2858	0.2871	0.2884	0.2838	0.2884	0.3090	0.3041	0.2992

LTE Band 2 (G_T - L_C = 2.10 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	18650	18900	19150	18675	18900	19125	18650	18900	19100
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
Conducted Power (dBm)	22.75	22.68	22.61	22.63	22.63	22.58	22.51	22.47	22.45
Conducted Power (Watts)	0.1884	0.1854	0.1824	0.1832	0.1832	0.1811	0.1782	0.1766	0.1758
EIRP(dBm)	24.85	24.78	24.71	24.73	24.73	24.68	24.61	24.57	24.55
EIRP(Watts)	0.3055	0.3006	0.2958	0.2972	0.2972	0.2938	0.2891	0.2864	0.2851

LTE Band 2 (G_T - L_C = 2.10 dB) 64QAM									
Bandwidth	1.4M			3M			5M		
Channel	18607	18900	19193	18615	18900	19185	18625	18900	19175
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
Conducted Power (dBm)	21.25	21.22	21.14	21.27	21.25	21.21	21.35	21.33	21.29
Conducted Power (Watts)	0.1334	0.1324	0.1300	0.1340	0.1334	0.1321	0.1365	0.1358	0.1346
EIRP(dBm)	23.35	23.32	23.24	23.37	23.35	23.31	23.45	23.43	23.39
EIRP(Watts)	0.2163	0.2148	0.2109	0.2173	0.2163	0.2143	0.2213	0.2203	0.2183

LTE Band 2 (G_T - L_C = 2.10 dB) 64QAM									
Bandwidth	10M			15M			20M		
Channel	18650	18900	19150	18675	18900	19125	18650	18900	19100
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
Conducted Power (dBm)	21.50	21.45	21.37	21.29	21.39	21.34	21.15	21.24	21.21
Conducted Power (Watts)	0.1413	0.1396	0.1371	0.1346	0.1377	0.1361	0.1303	0.1330	0.1321
EIRP(dBm)	23.60	23.55	23.47	23.39	23.49	23.44	23.25	23.34	23.31
EIRP(Watts)	0.2291	0.2265	0.2223	0.2183	0.2234	0.2208	0.2113	0.2158	0.2143

LTE Band 7 (G_T - L_C = 2.80 dB) QPSK			
Bandwidth	5M		
Channel	20775	21100	21425
	(Low)	(Mid)	(High)
Frequency (MHz)	2502.5	2535	2567.5
Conducted Power (dBm)	22.85	22.68	22.70
Conducted Power (Watts)	0.1928	0.1854	0.1862
EIRP(dBm)	25.65	25.48	25.50
EIRP(Watts)	0.3673	0.3532	0.3548

LTE Band 7 (G_T - L_C = 2.80 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	20800	21100	21400	20825	21100	21375	20850	21100	21350
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	2505	2535	2565	2507.5	2535	2562.5	2510	2535	2560
Conducted Power (dBm)	22.94	22.69	22.75	22.90	22.77	22.70	22.95	22.92	22.81
Conducted Power (Watts)	0.1968	0.1858	0.1884	0.1950	0.1892	0.1862	0.1972	0.1959	0.1910
EIRP(dBm)	25.74	25.49	25.55	25.70	25.57	25.50	25.75	25.72	25.61
EIRP(Watts)	0.3750	0.3540	0.3589	0.3715	0.3606	0.3548	0.3758	0.3733	0.3639

LTE Band 7 (G_T - L_C = 2.80 dB) 16QAM			
Bandwidth	5M		
Channel	20775	21100	21425
	(Low)	(Mid)	(High)
Frequency (MHz)	2502.5	2535	2567.5
Conducted Power (dBm)	22.17	21.96	22.09
Conducted Power (Watts)	0.1648	0.1570	0.1618
EIRP(dBm)	24.97	24.76	24.89
EIRP(Watts)	0.3141	0.2992	0.3083

LTE Band 7 (G_T - L_C = 2.80 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	20800	21100	21400	20825	21100	21375	20850	21100	21350
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	2505	2535	2565	2507.5	2535	2562.5	2510	2535	2560
Conducted Power (dBm)	22.27	22.13	22.25	22.21	22.01	22.10	22.25	21.98	22.04
Conducted Power (Watts)	0.1687	0.1633	0.1679	0.1663	0.1589	0.1622	0.1679	0.1578	0.1600
EIRP(dBm)	25.07	24.93	25.05	25.01	24.81	24.90	25.05	24.78	24.84
EIRP(Watts)	0.3214	0.3112	0.3199	0.3170	0.3027	0.3090	0.3199	0.3006	0.3048

LTE Band 7 (G_T - L_C = 2.80 dB) 64QAM			
Bandwidth	5M		
Channel	20775	21100	21425
	(Low)	(Mid)	(High)
Frequency (MHz)	2502.5	2535	2567.5
Conducted Power (dBm)	20.95	20.74	20.81
Conducted Power (Watts)	0.1245	0.1186	0.1205
EIRP(dBm)	23.75	23.54	23.61
EIRP(Watts)	0.2371	0.2259	0.2296

LTE Band 7 (G_T - L_C = 2.80 dB) 64QAM									
Bandwidth	10M			15M			20M		
Channel	20800	21100	21400	20825	21100	21375	20850	21100	21350
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	2505	2535	2565	2507.5	2535	2562.5	2510	2535	2560
Conducted Power (dBm)	20.90	20.83	20.93	21.17	21.04	21.07	20.97	20.82	20.80
Conducted Power (Watts)	0.1230	0.1211	0.1239	0.1309	0.1271	0.1279	0.1250	0.1208	0.1202
EIRP(dBm)	23.70	23.63	23.73	23.97	23.84	23.87	23.77	23.62	23.60
EIRP(Watts)	0.2344	0.2307	0.2360	0.2495	0.2421	0.2438	0.2382	0.2301	0.2291

LTE Band 13 (G_T - L_C = -0.10 dB) QPSK						
Bandwidth	5M			10M		
Channel	23205	23230	23255	23230		
	(Low)	(Mid)	(High)	-	(Mid)	-
Frequency (MHz)	779.5	782	784.5	-	782	-
Conducted Power (dBm)	23.30	23.25	23.33	-	23.40	-
Conducted Power (Watts)	0.2138	0.2113	0.2153	-	0.2188	-
ERP(dBm)	21.05	21.00	21.08	-	21.15	-
ERP(Watts)	0.1274	0.1259	0.1282	-	0.1303	-

LTE Band 13 (G_T - L_C = -0.10 dB) 16QAM						
Bandwidth	5M			10M		
Channel	23205	23230	23255	23230		
	(Low)	(Mid)	(High)	-	(Mid)	-
Frequency (MHz)	779.5	782	784.5	-	782	-
Conducted Power (dBm)	22.49	22.41	22.30	-	22.73	-
Conducted Power (Watts)	0.1774	0.1742	0.1698	-	0.1875	-
ERP(dBm)	20.24	20.16	20.05	-	20.48	-
ERP(Watts)	0.1057	0.1038	0.1012	-	0.1117	-

LTE Band 13 (G_T - L_C = -0.10 dB) 64QAM						
Bandwidth	5M			10M		
Channel	23205	23230	23255	23230		
	(Low)	(Mid)	(High)	-	(Mid)	-
Frequency (MHz)	779.5	782	784.5	-	782	-
Conducted Power (dBm)	21.20	21.30	21.34	-	21.52	-
Conducted Power (Watts)	0.1318	0.1349	0.1361	-	0.1419	-
ERP(dBm)	18.95	19.05	19.09	-	19.27	-
ERP(Watts)	0.0785	0.0804	0.0811	-	0.0845	-

Peak-to-Average Ratio

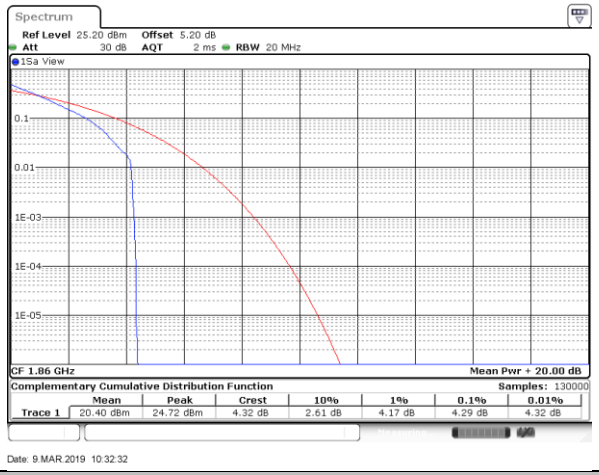
Mode	LTE Band 2 / 20MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	4.29	4.64	5.07	5.71	PASS
Middle CH	4.00	4.72	5.04	5.59	
Highest CH	4.32	4.70	4.87	5.62	
Mode	LTE Band 2 / 20MHz				
Mod.	64QAM				Limit: 13dB
RB Size	1RB	Full RB			Result
Lowest CH	6.06	6.17			PASS
Middle CH	5.86	6.06			
Highest CH	5.88	6.03			

Mode	LTE Band 7 / 20MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	3.94	4.78	4.84	5.77	PASS
Middle CH	4.41	4.70	5.25	5.74	
Highest CH	4.20	4.84	5.28	5.88	
Mode	LTE Band 7 / 20MHz				
Mod.	64QAM				Limit: 13dB
RB Size	1RB	Full RB			Result
Lowest CH	5.62	6.29			PASS
Middle CH	6.29	6.23			
Highest CH	6.26	6.43			

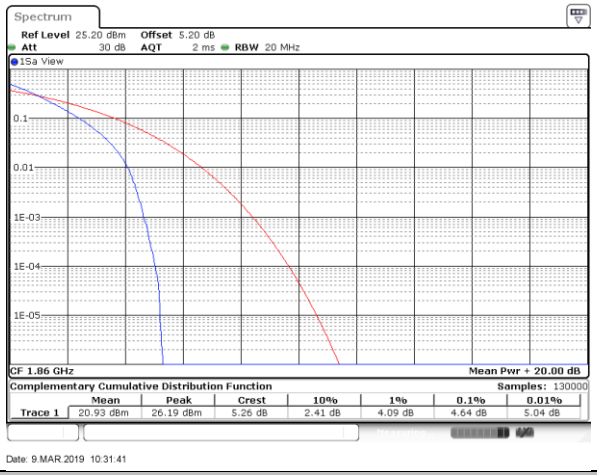
Mode	LTE Band 13 / 10MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH					PASS
Middle CH	4.00	5.19	4.64	6.17	
Highest CH					
Mode	LTE Band 13 / 10MHz				
Mod.	64QAM				Limit: 13dB
RB Size	1RB	Full RB			Result
Lowest CH					PASS
Middle CH	5.33	6.61			
Highest CH					

LTE Band 2 / 20MHz / QPSK

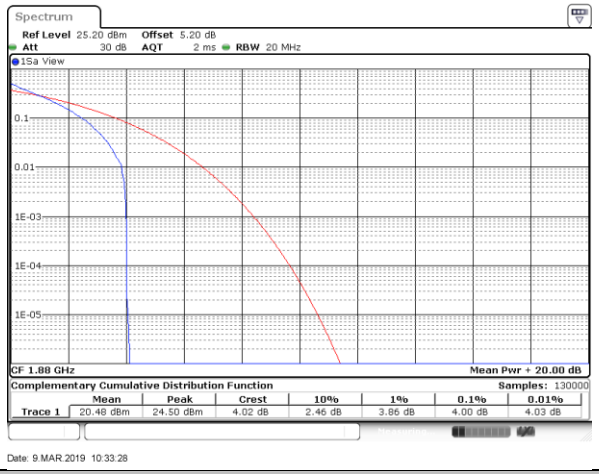
Lowest Channel / 1RB



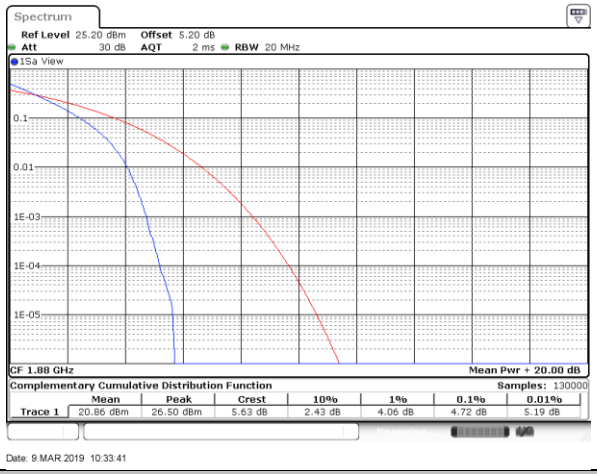
Lowest Channel / Full RB



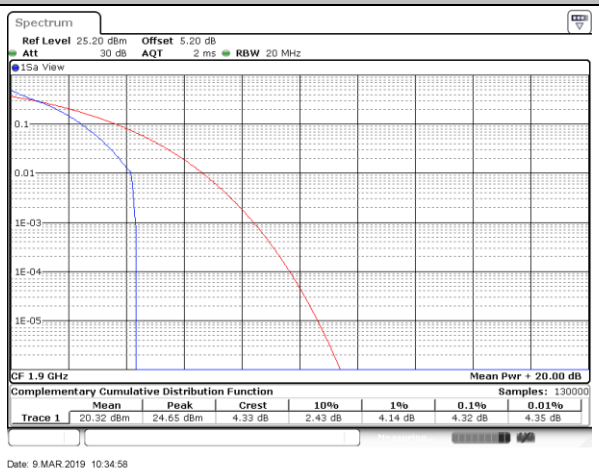
Middle Channel / 1RB



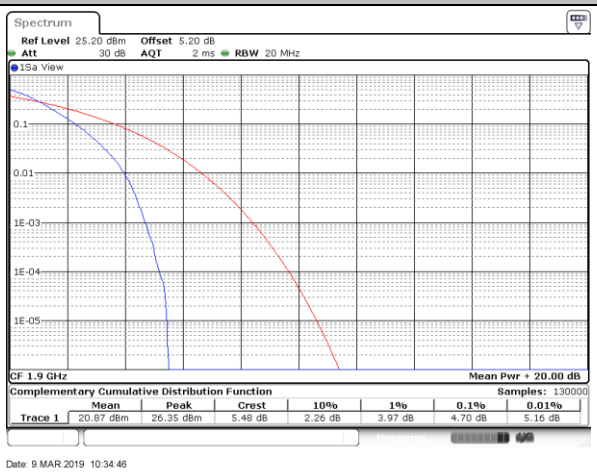
Middle Channel / Full RB



Highest Channel / 1RB

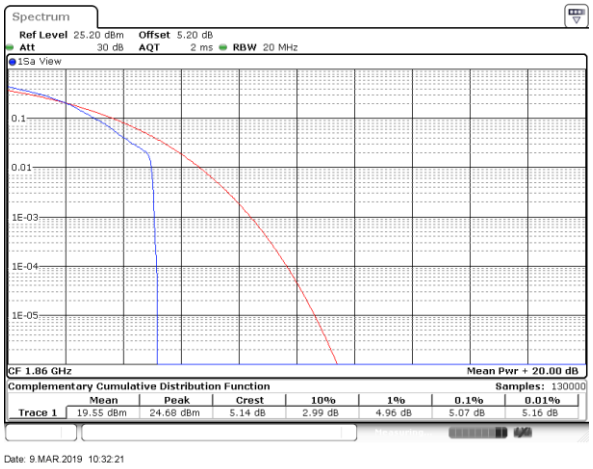


Highest Channel / Full RB

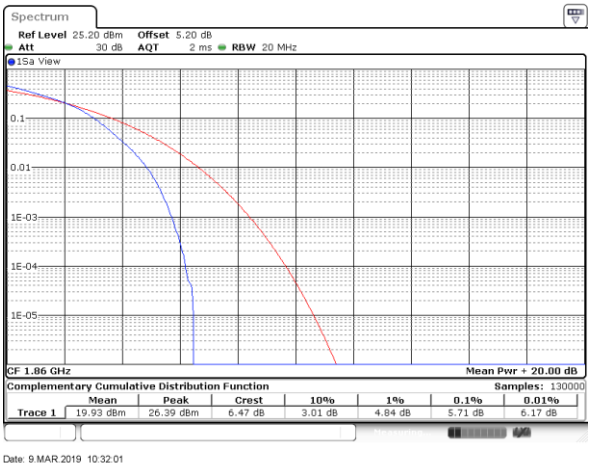


LTE Band 2 / 20MHz / 16QAM

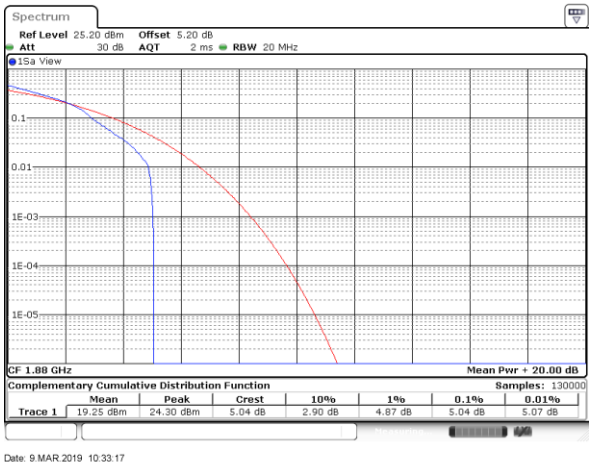
Lowest Channel / 1RB



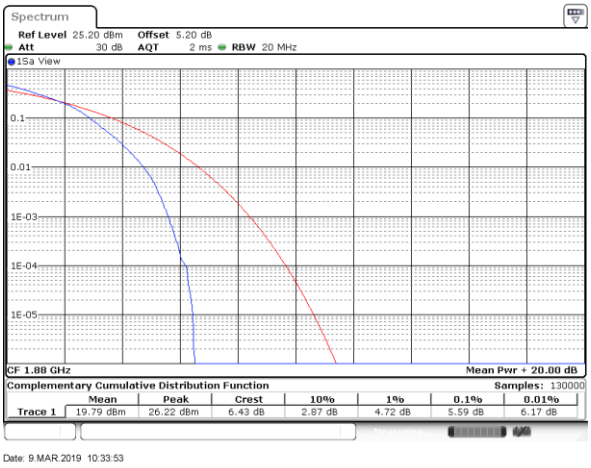
Lowest Channel / Full RB



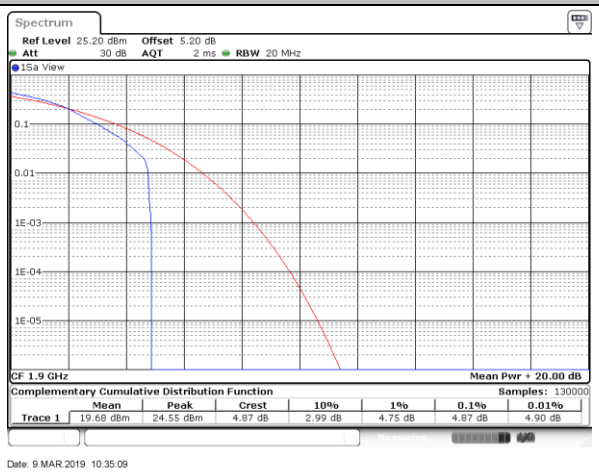
Middle Channel / 1RB



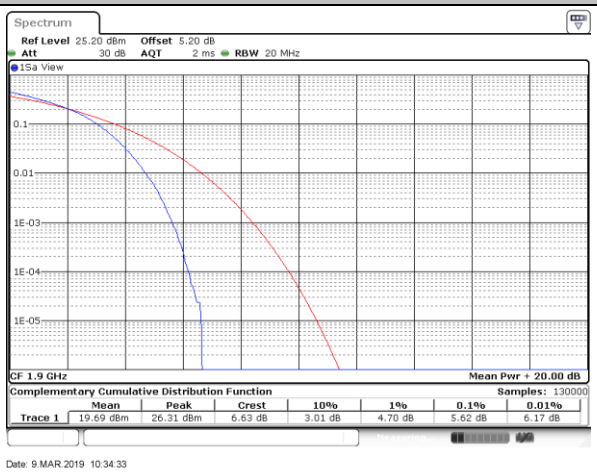
Middle Channel / Full RB



Highest Channel / 1RB

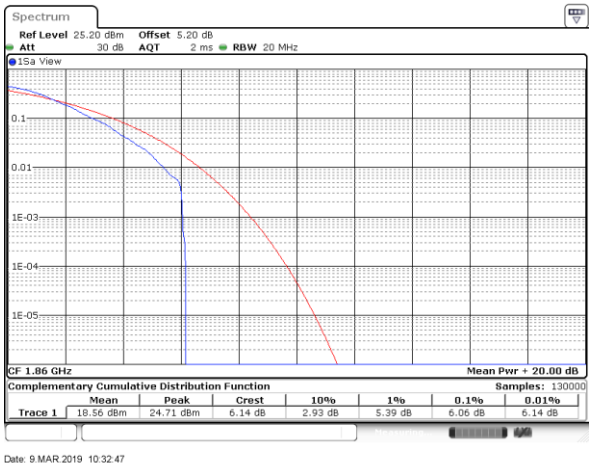


Highest Channel / Full RB

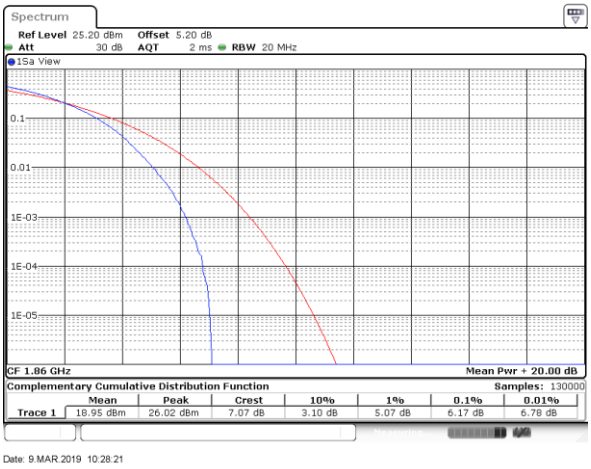


LTE Band 2 / 20MHz / 64QAM

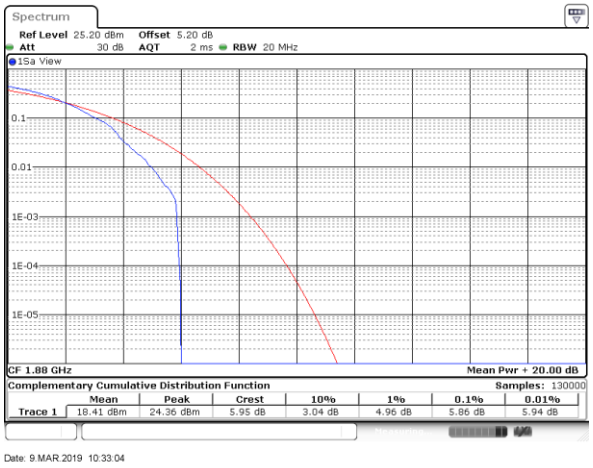
Lowest Channel / 1RB



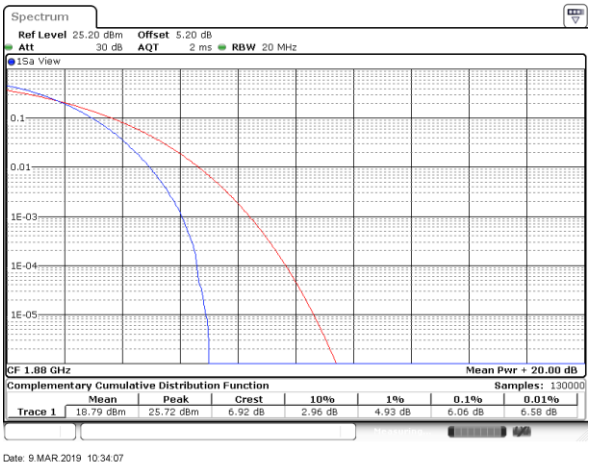
Lowest Channel / Full RB



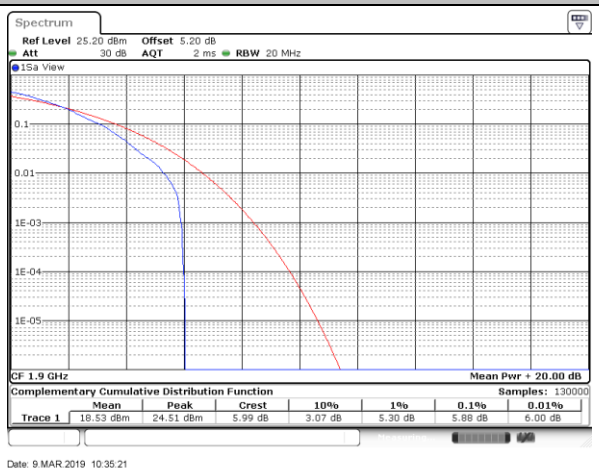
Middle Channel / 1RB



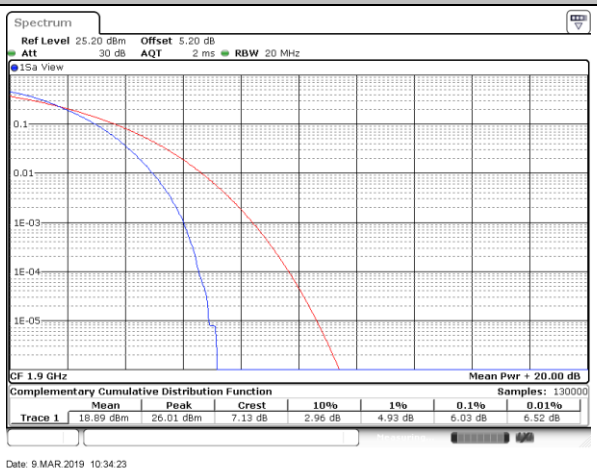
Middle Channel / Full RB



Highest Channel / 1RB

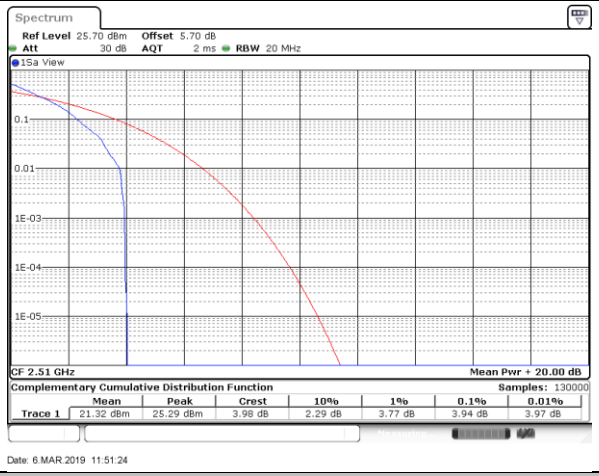


Highest Channel / Full RB

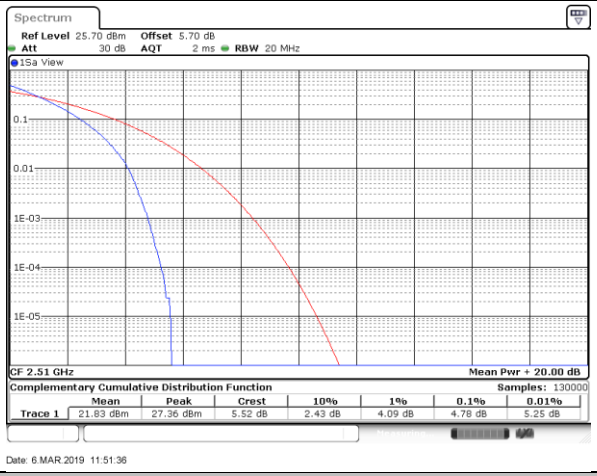


LTE Band 7 / 20MHz / QPSK

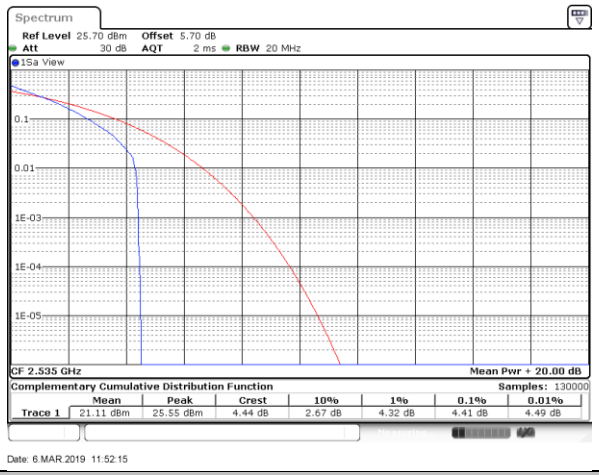
Lowest Channel / 1RB



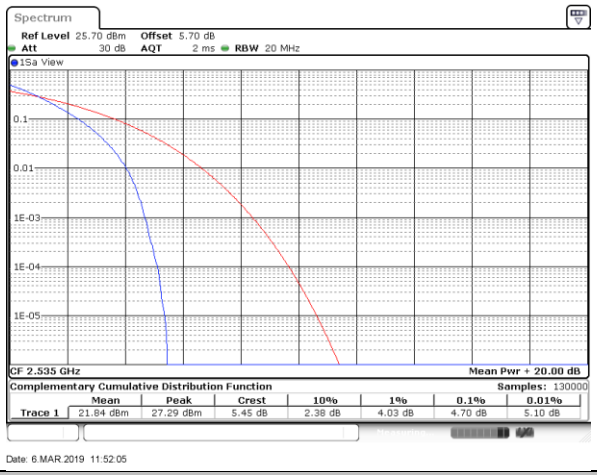
Lowest Channel / Full RB



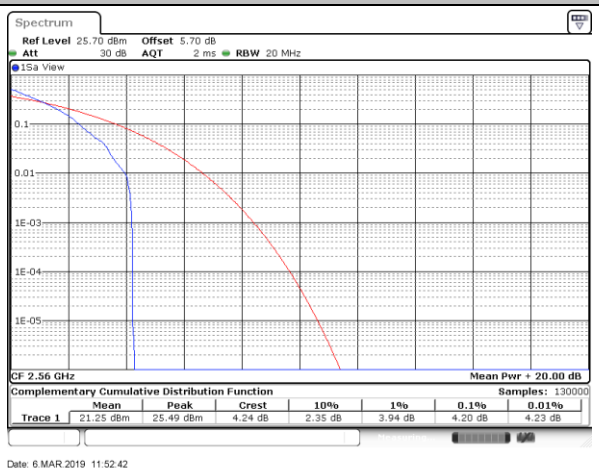
Middle Channel / 1RB



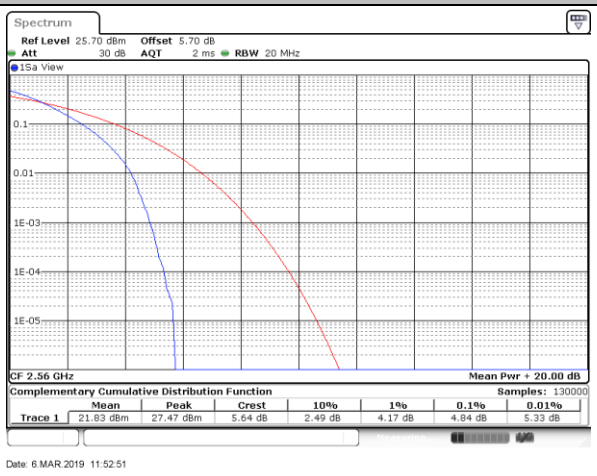
Middle Channel / Full RB



Highest Channel / 1RB

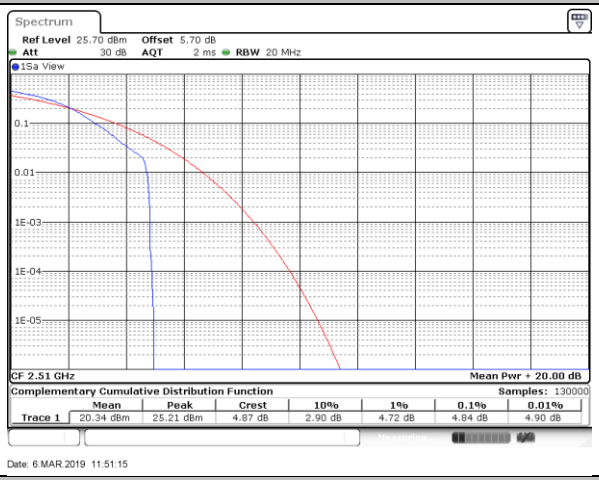


Highest Channel / Full RB

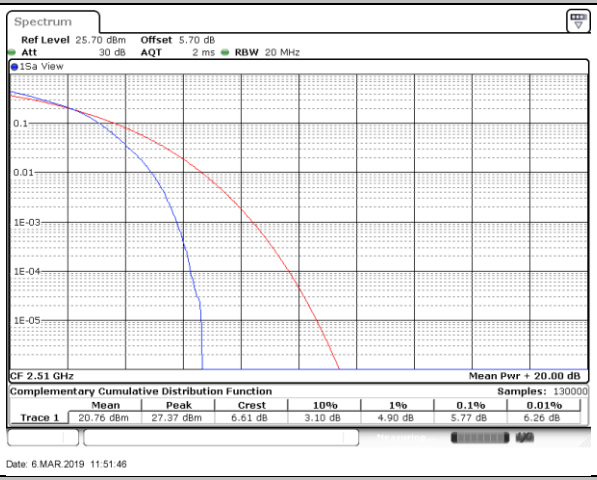


LTE Band 7 / 20MHz / 16QAM

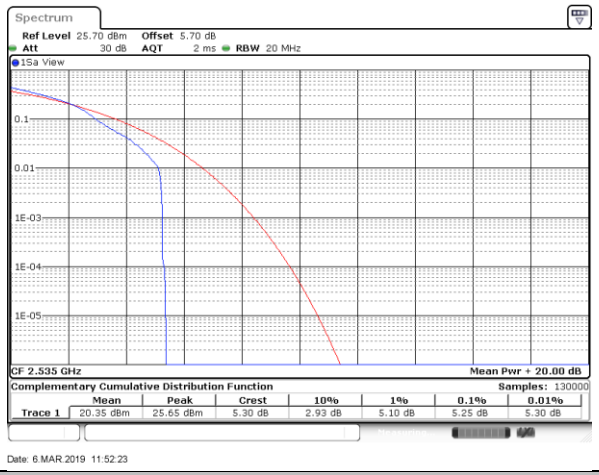
Lowest Channel / 1RB



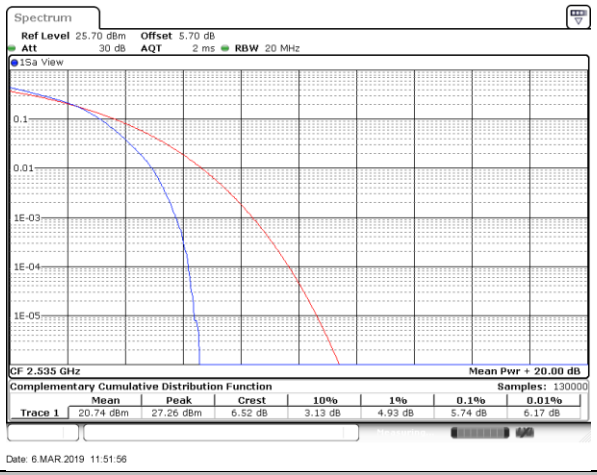
Lowest Channel / Full RB



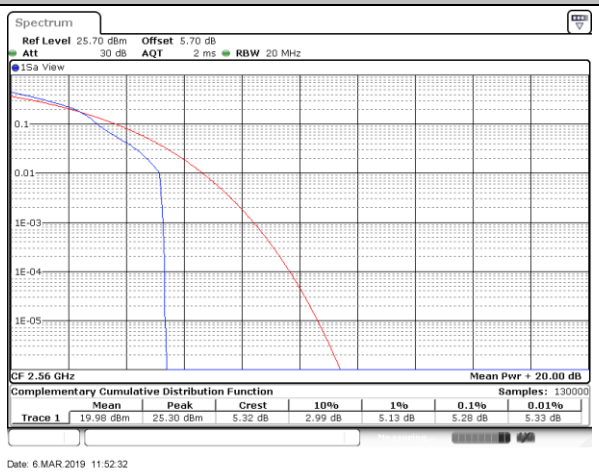
Middle Channel / 1RB



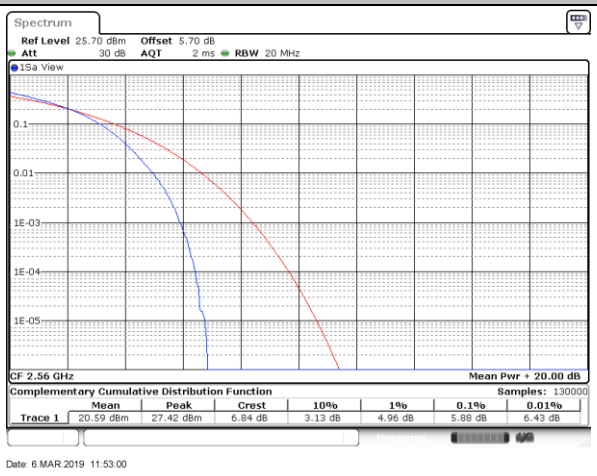
Middle Channel / Full RB



Highest Channel / 1RB

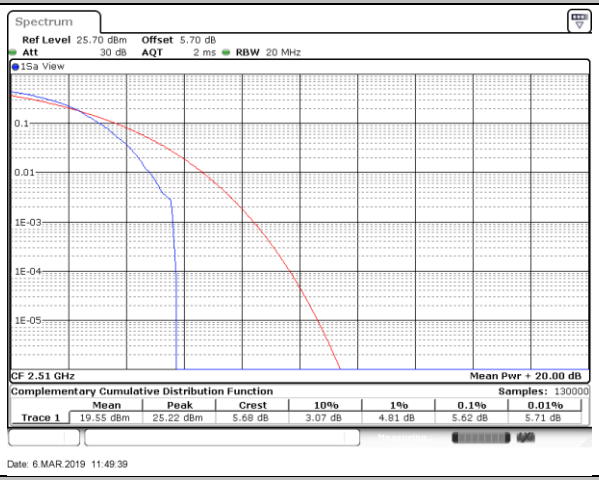


Highest Channel / Full RB

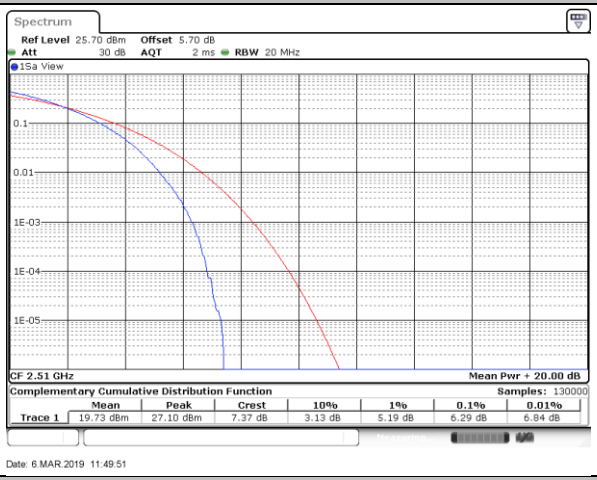


LTE Band 7 / 20MHz / 64QAM

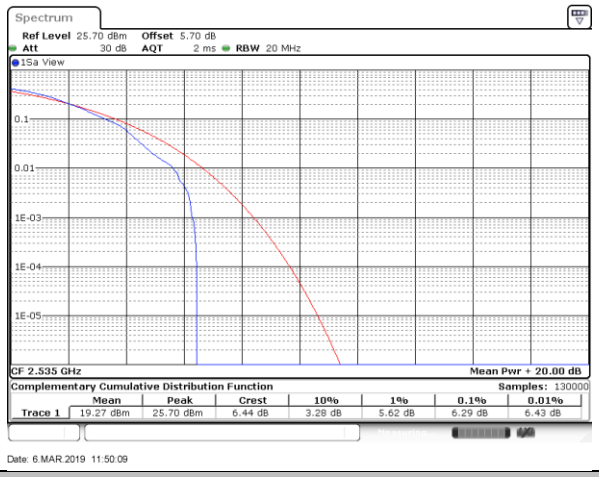
Lowest Channel / 1RB



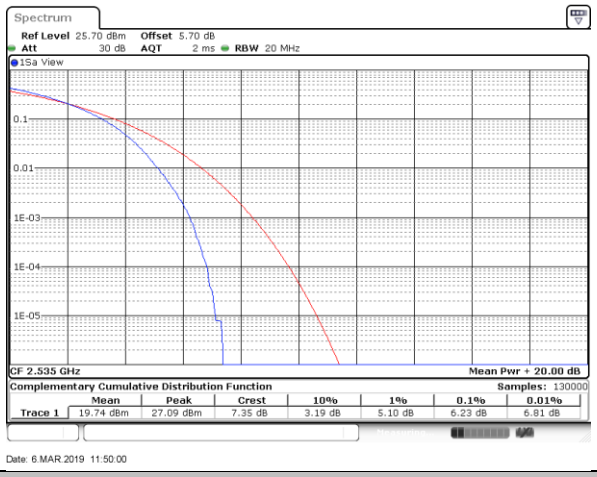
Lowest Channel / Full RB



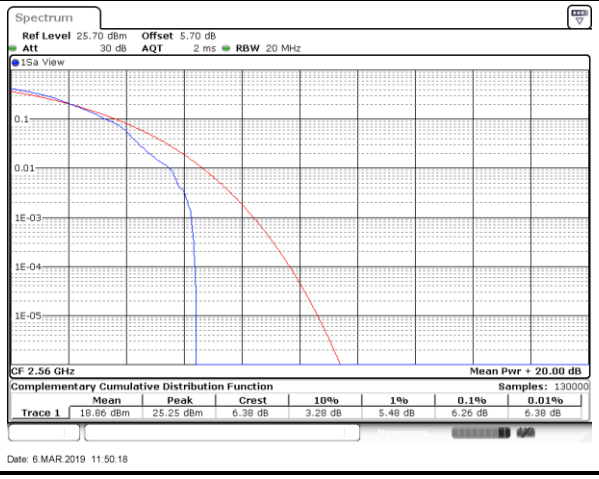
Middle Channel / 1RB



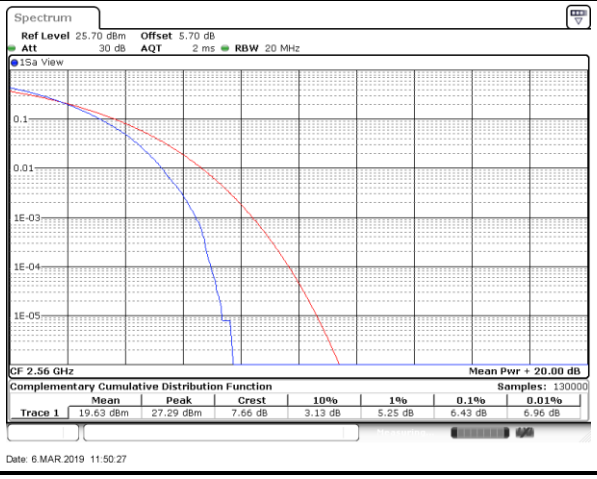
Middle Channel / Full RB



Highest Channel / 1RB

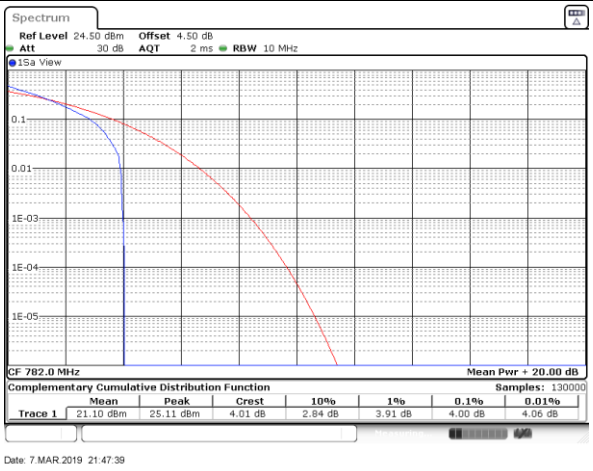


Highest Channel / Full RB

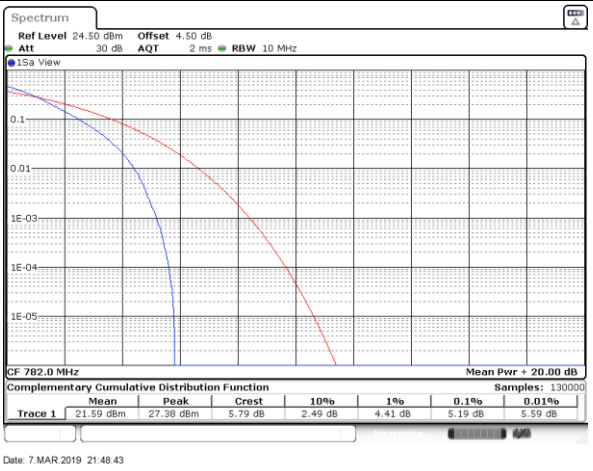


LTE Band 13 / 10MHz / QPSK

Middle Channel / 1RB

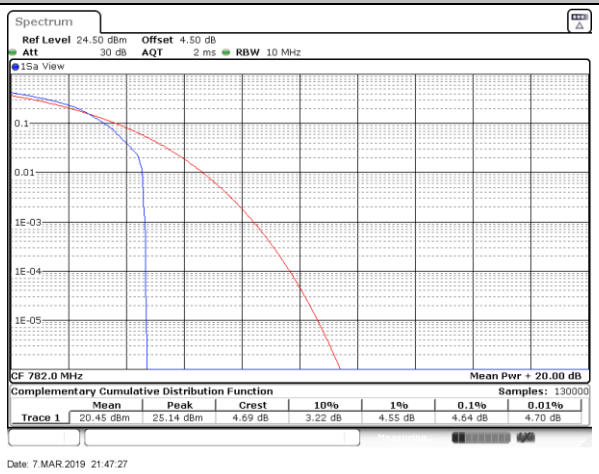


Middle Channel / Full RB

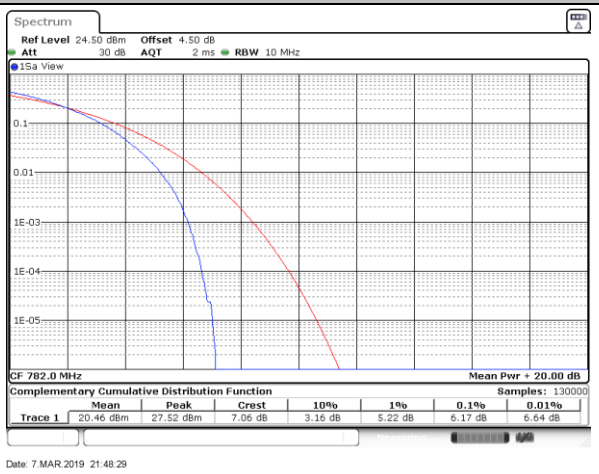


LTE Band 13 / 10MHz / 16QAM

Middle Channel / 1RB

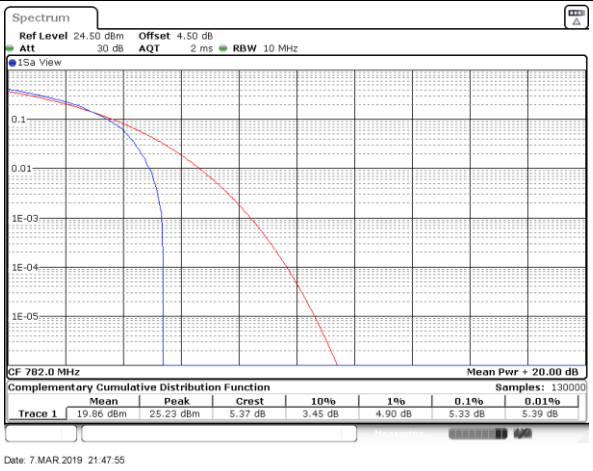


Middle Channel / Full RB

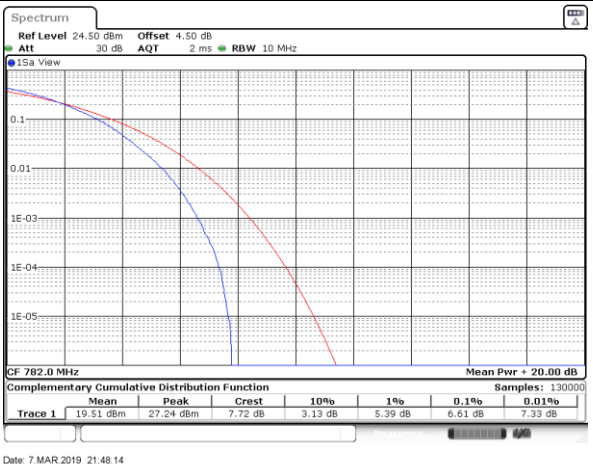


LTE Band 13 / 10MHz / 64QAM

Middle Channel / 1RB



Middle Channel / Full RB



26dB Bandwidth

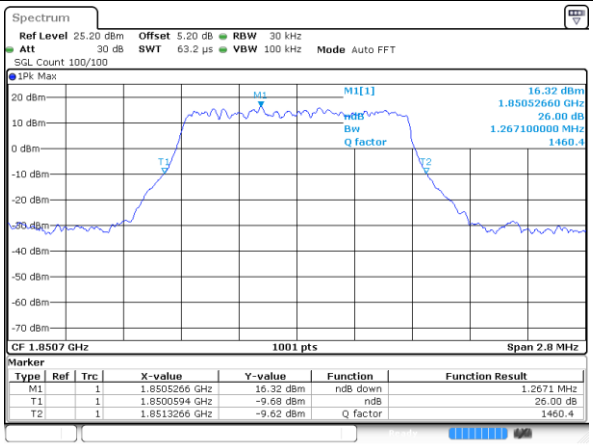
Mode	LTE Band 2 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.267	1.267	3.003	3.027	4.895	4.955	9.89	9.81	14.266	14.655	20.06	20.1
Middle CH	1.281	1.281	2.991	3.045	4.925	4.855	9.87	9.81	14.446	14.535	20.18	20.26
Highest CH	1.262	1.256	3.027	3.003	4.955	4.945	9.93	9.85	14.685	14.326	20.34	20.18
Mode	LTE Band 2 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	1.259		3.009		4.945		9.73		14.565		20.14	
Middle CH	1.301		3.979		4.815		9.77		14.625		20.1	
Highest CH	1.301		3.021		4.815		9.81		14.176		20.3	

Mode	LTE Band 7 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH					4.985	4.905	9.73	9.89	14.326	14.296	20.14	20.14
Middle CH					4.925	4.925	9.81	9.75	14.386	14.625	20.34	20.3
Highest CH					4.985	4.955	9.87	9.71	14.326	14.356	20.14	20.18
Mode	LTE Band 7 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH					4.935		9.87		14.296		20.22	
Middle CH					4.955		9.81		14.296		20.22	
Highest CH					4.905		9.67		14.535		20.34	

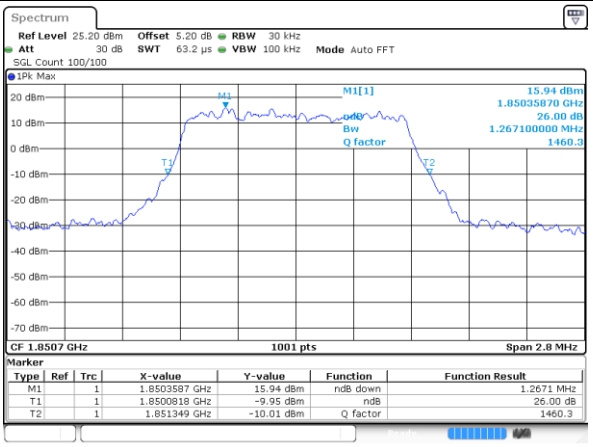
Mode	LTE Band 13 : 26dB BW(MHz)											
BW	5MHz		10MHz		5MHz	10MHz						
Mod.	QPSK	16QAM	QPSK	16QAM	64QAM	64QAM						
Lowest CH	4.985	4.895			4.885							
Middle CH	4.995	4.915	9.75	9.67	4.875	9.67						
Highest CH	5.005	4.955			4.905							

LTE Band 2

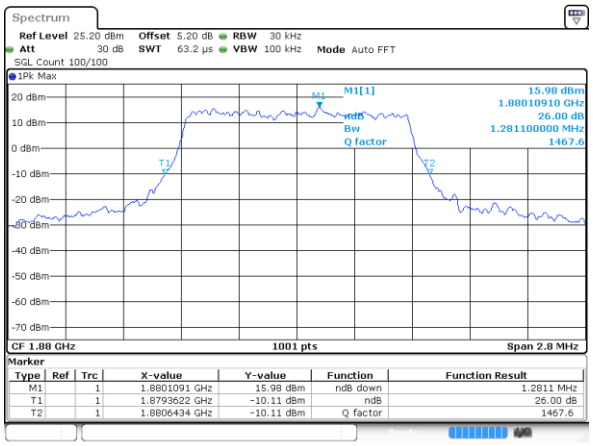
Lowest Channel / 1.4MHz / QPSK



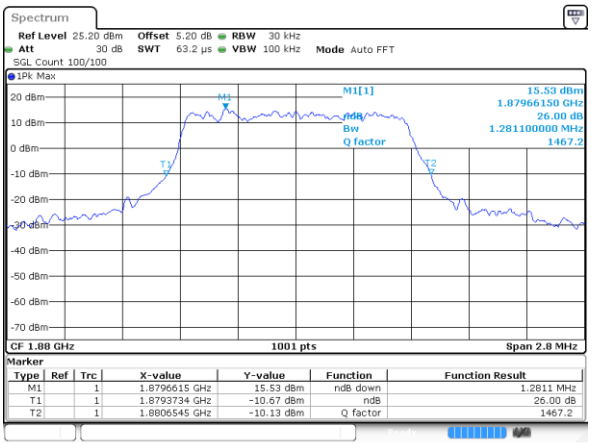
Lowest Channel / 1.4MHz / 16QAM



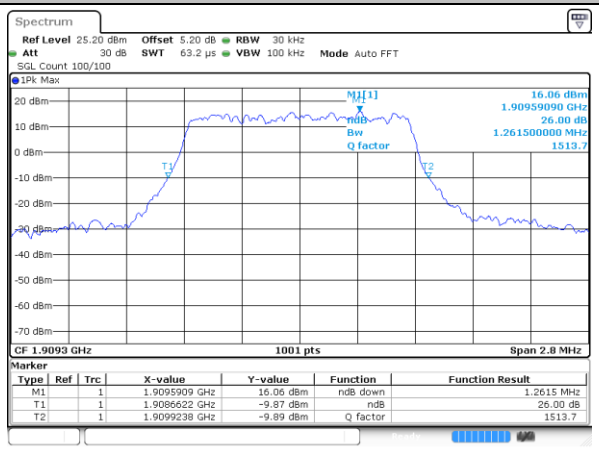
Middle Channel / 1.4MHz / QPSK



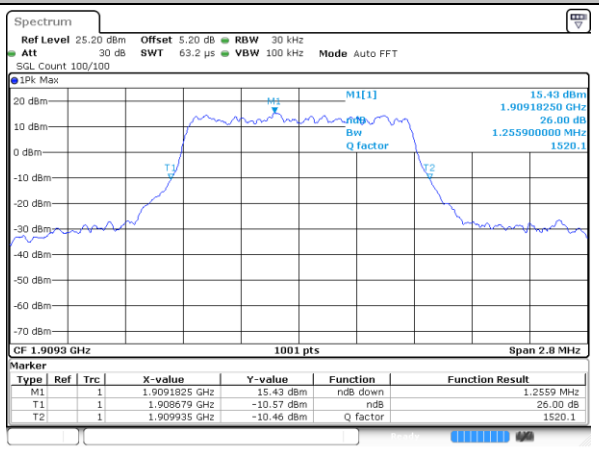
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK

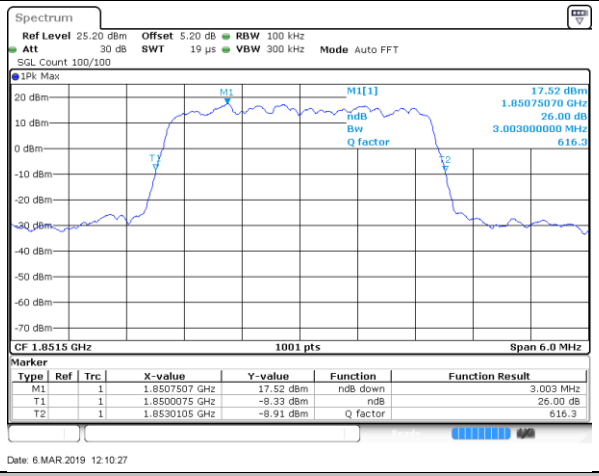


Highest Channel / 1.4MHz / 16QAM

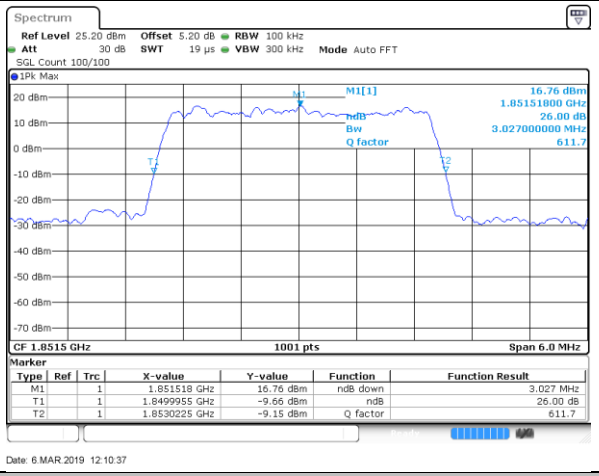


LTE Band 2

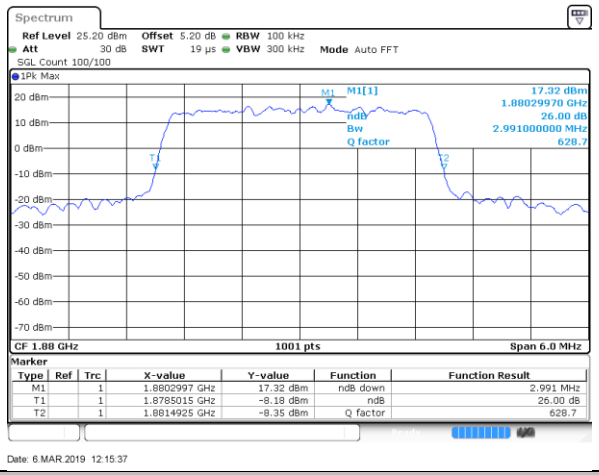
Lowest Channel / 3MHz / QPSK



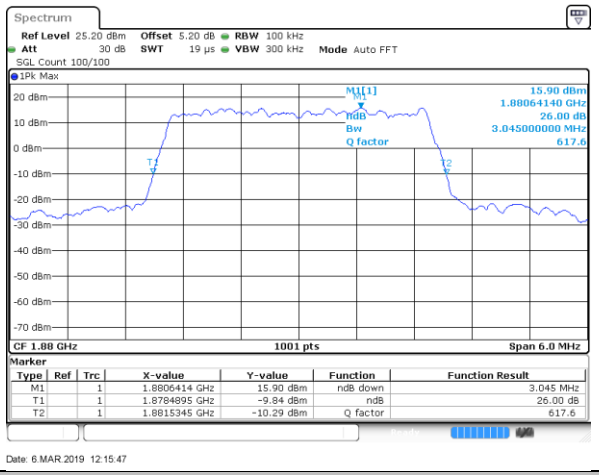
Lowest Channel / 3MHz / 16QAM



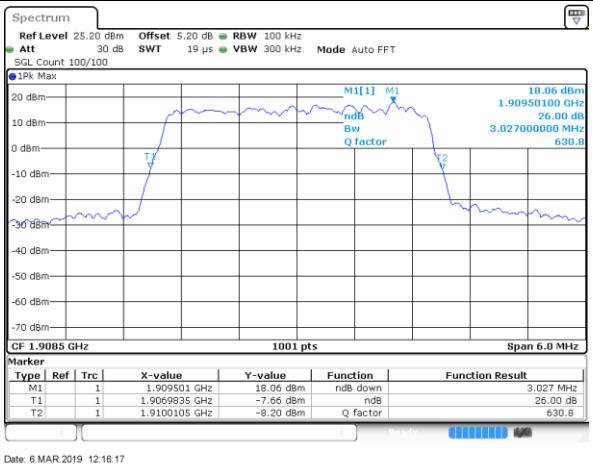
Middle Channel / 3MHz / QPSK



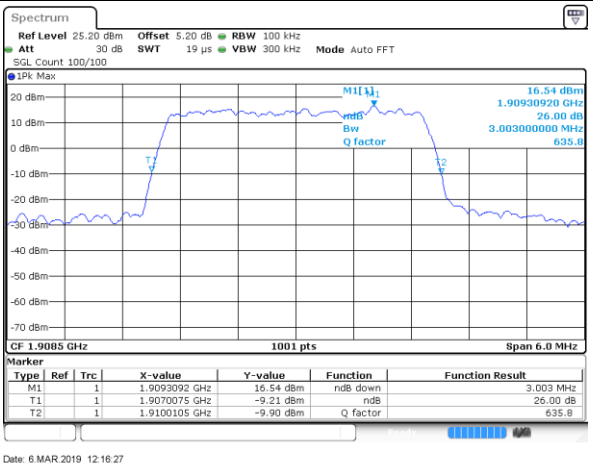
Middle Channel / 3MHz / 16QAM



Highest Channel / 3MHz / QPSK

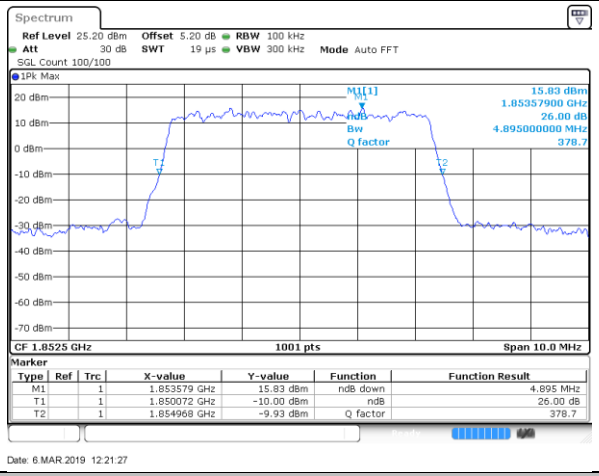


Highest Channel / 3MHz / 16QAM

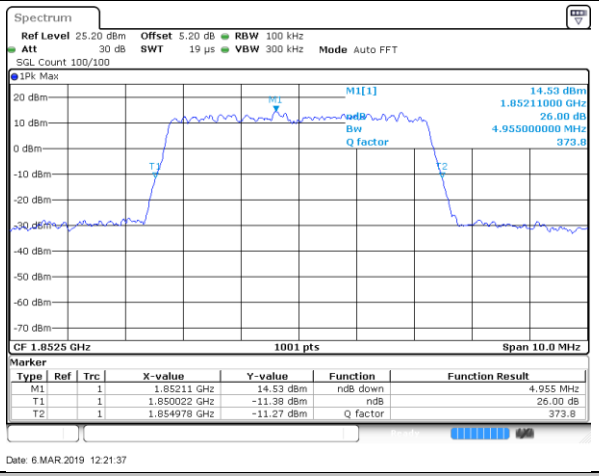


LTE Band 2

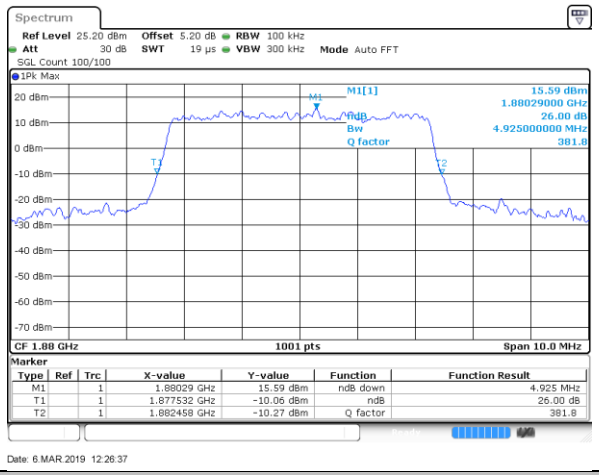
Lowest Channel / 5MHz / QPSK



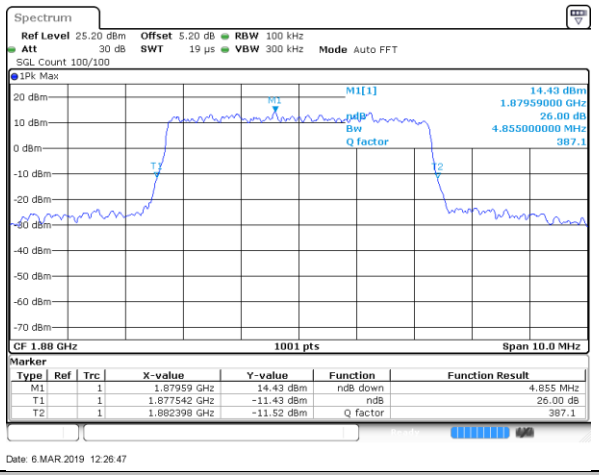
Lowest Channel / 5MHz / 16QAM



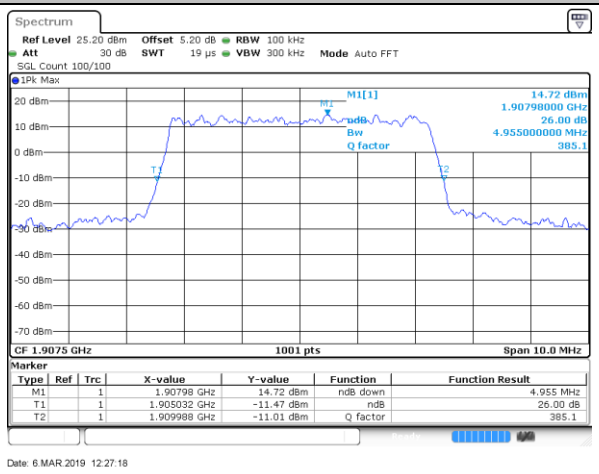
Middle Channel / 5MHz / QPSK



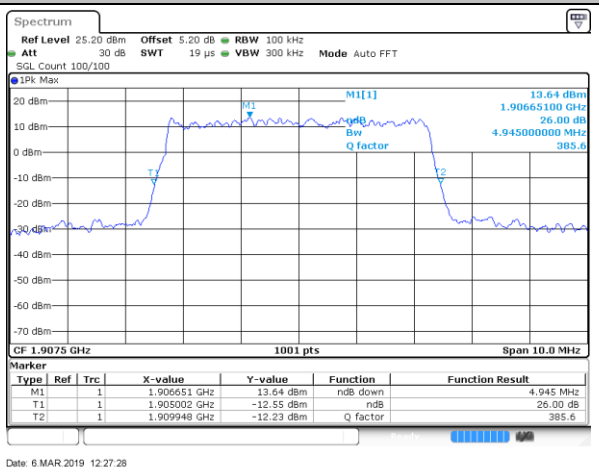
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK

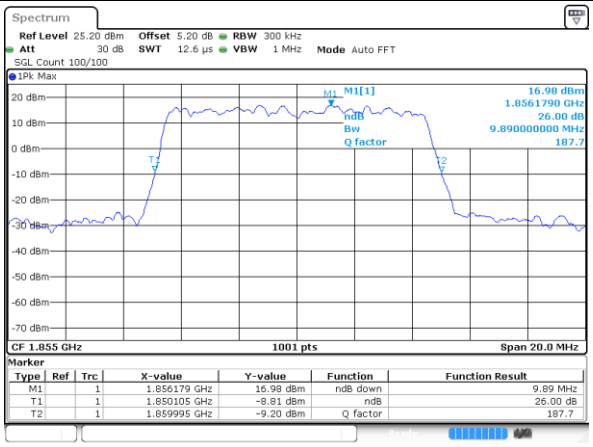


Highest Channel / 5MHz / 16QAM

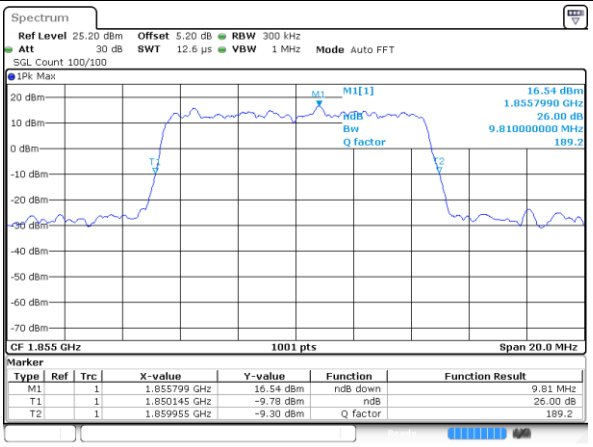


LTE Band 2

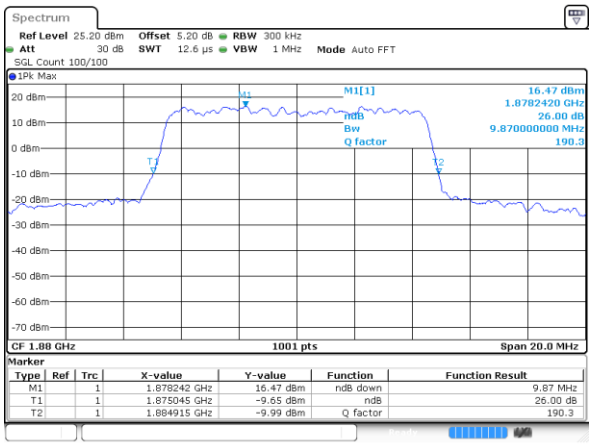
Lowest Channel / 10MHz / QPSK



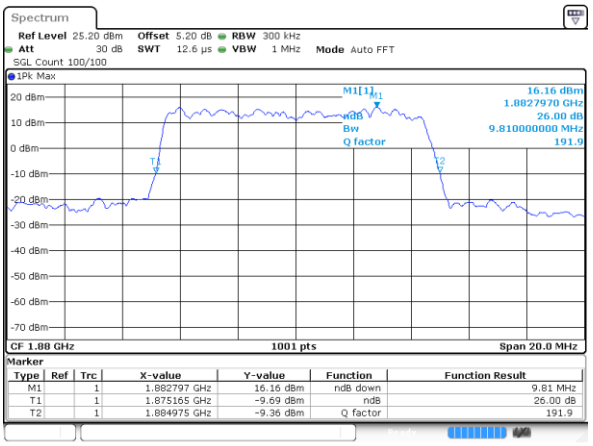
Lowest Channel / 10MHz / 16QAM



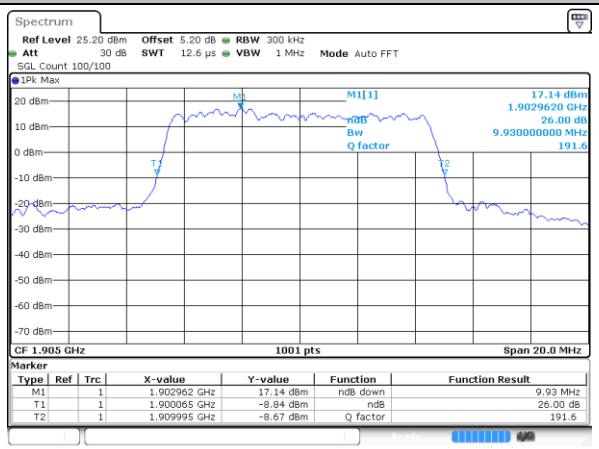
Middle Channel / 10MHz / QPSK



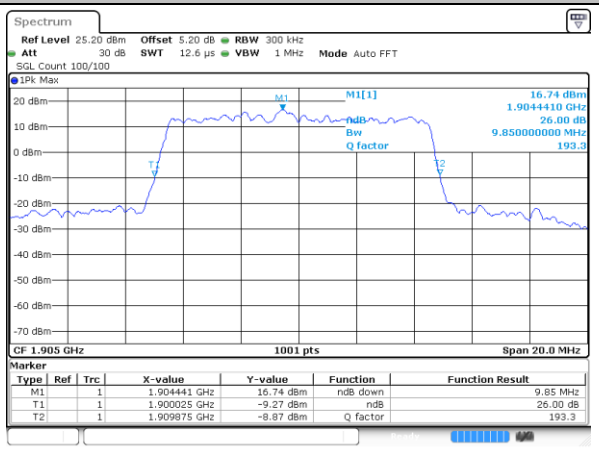
Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / QPSK

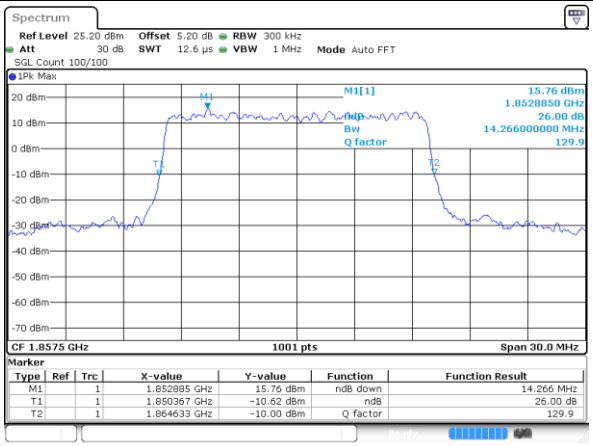


Highest Channel / 10MHz / 16QAM

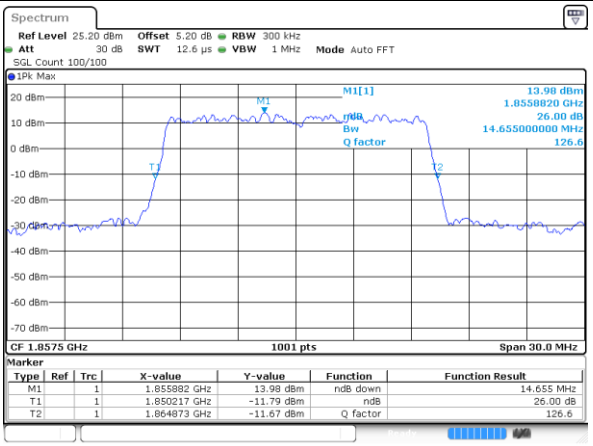


LTE Band 2

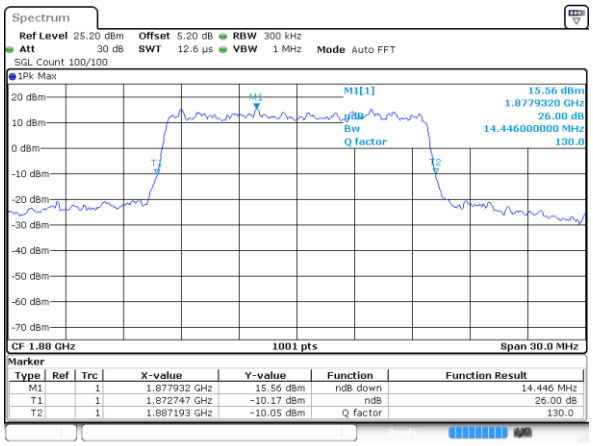
Lowest Channel / 15MHz / QPSK



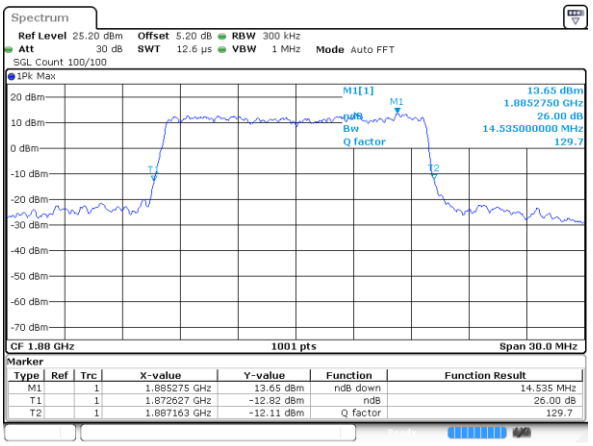
Lowest Channel / 15MHz / 16QAM



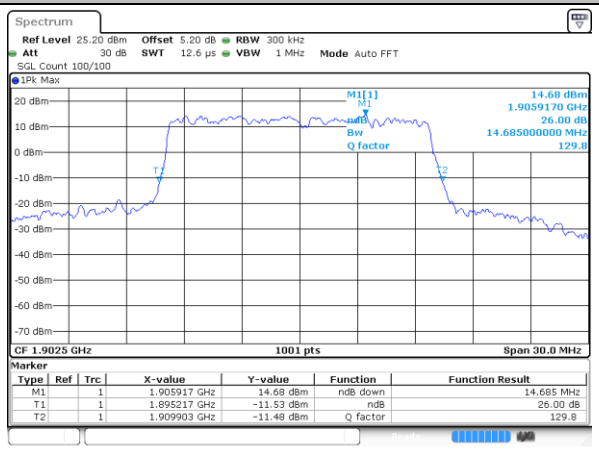
Middle Channel / 15MHz / QPSK



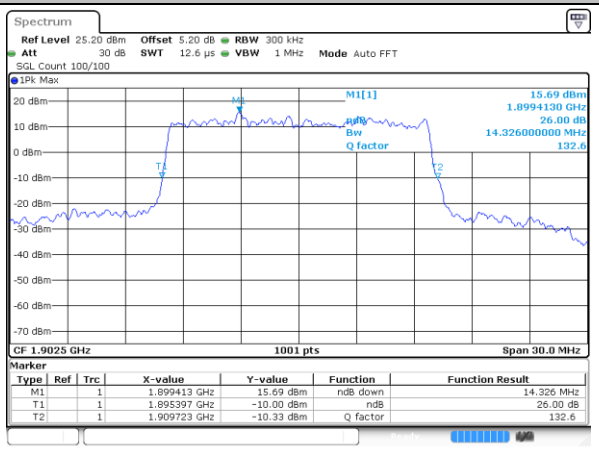
Middle Channel / 15MHz / 16QAM



Highest Channel / 15MHz / QPSK

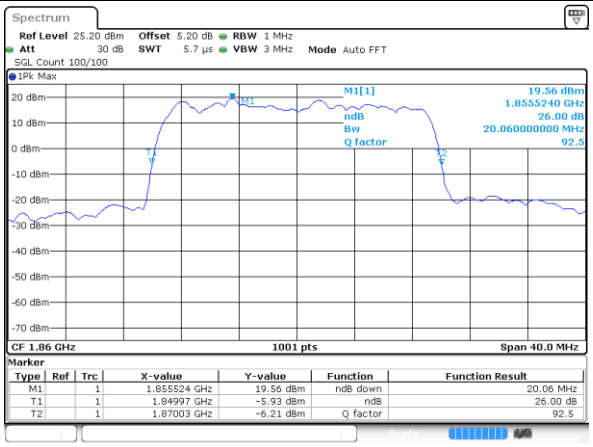


Highest Channel / 15MHz / 16QAM

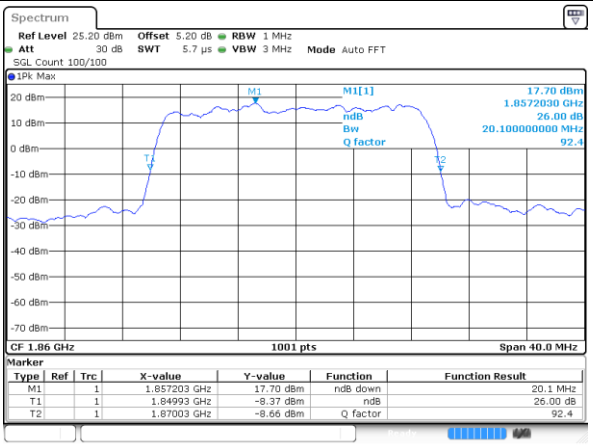


LTE Band 2

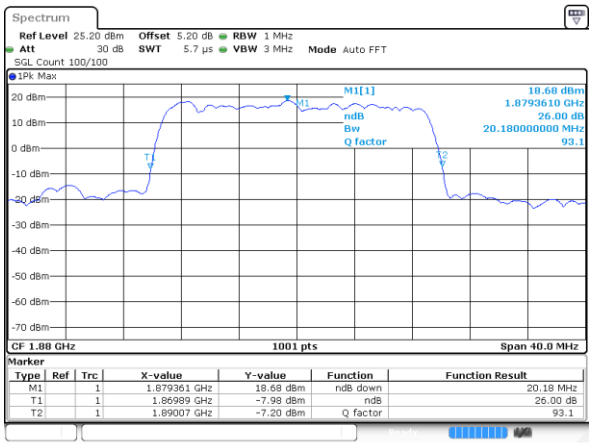
Lowest Channel / 20MHz / QPSK



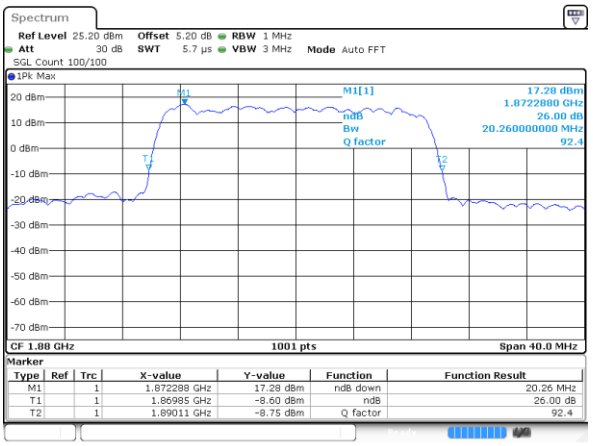
Lowest Channel / 20MHz / 16QAM



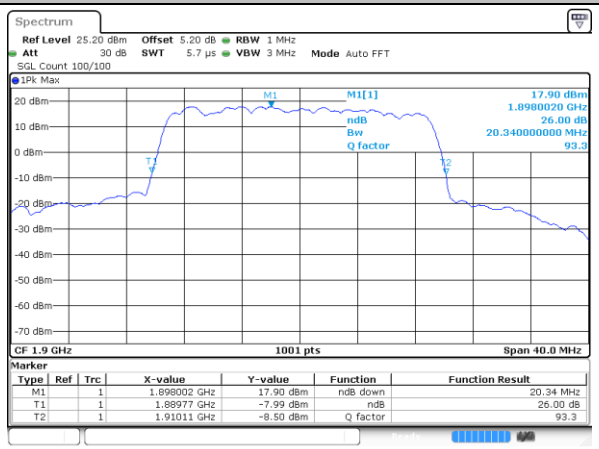
Middle Channel / 20MHz / QPSK



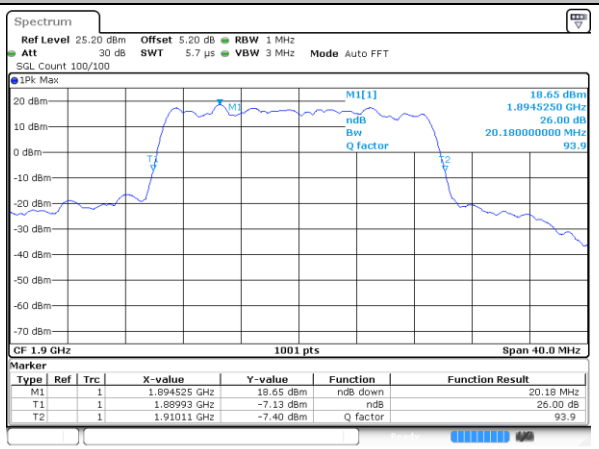
Middle Channel / 20MHz / 16QAM



Highest Channel / 20MHz / QPSK

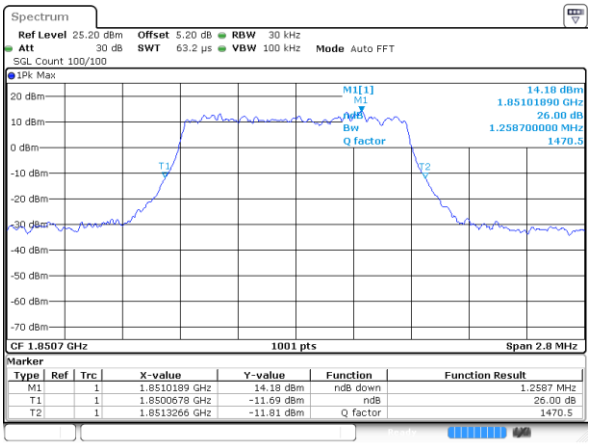


Highest Channel / 20MHz / 16QAM

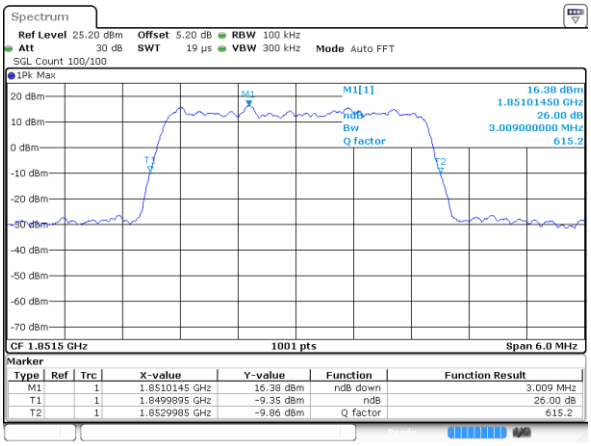


LTE Band 2

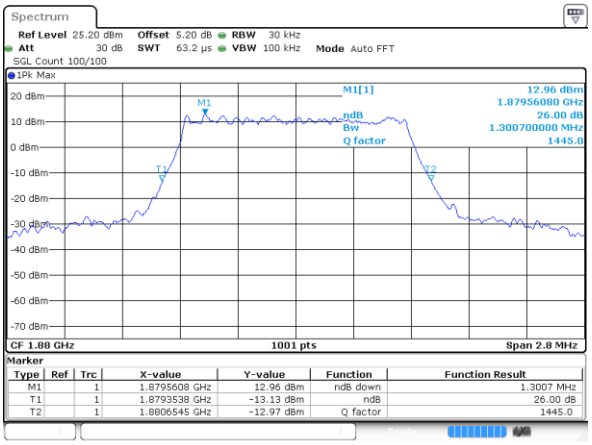
Lowest Channel / 1.4MHz / 64QAM



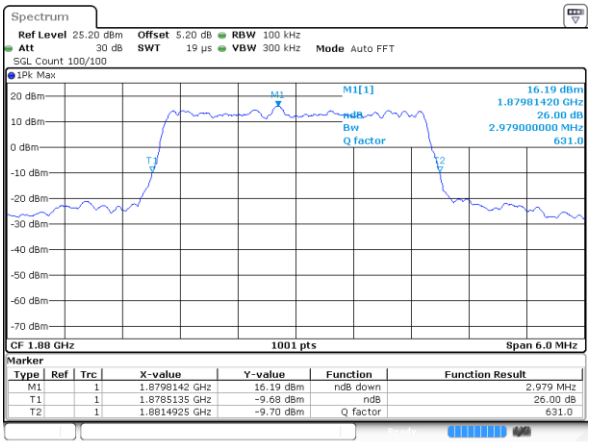
Lowest Channel / 3MHz / 64QAM



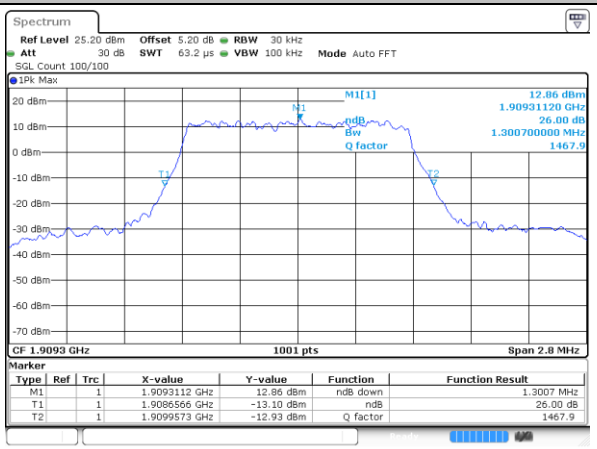
Middle Channel / 1.4MHz / 64QAM



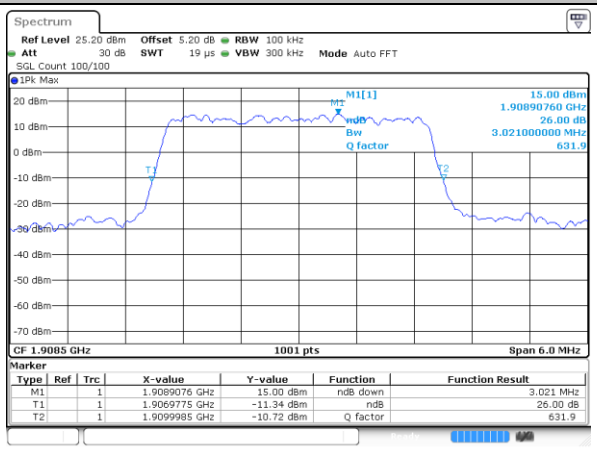
Middle Channel / 3MHz / 64QAM



Highest Channel / 1.4MHz / 64QAM

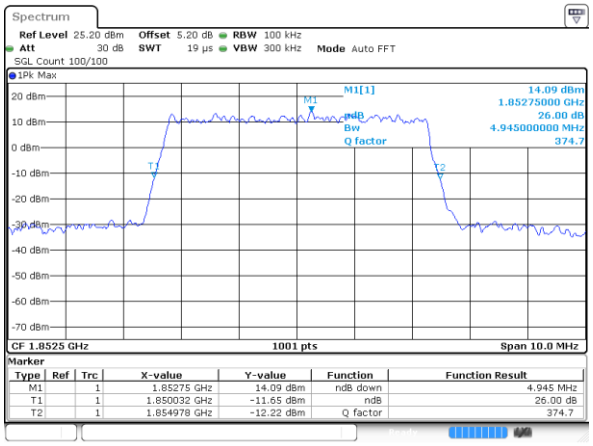


Highest Channel / 3MHz / 64QAM

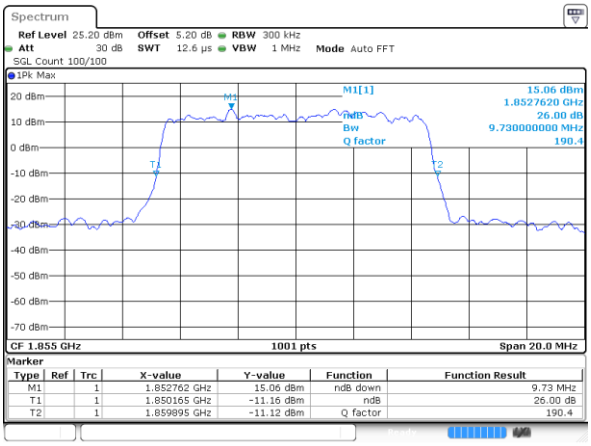


LTE Band 2

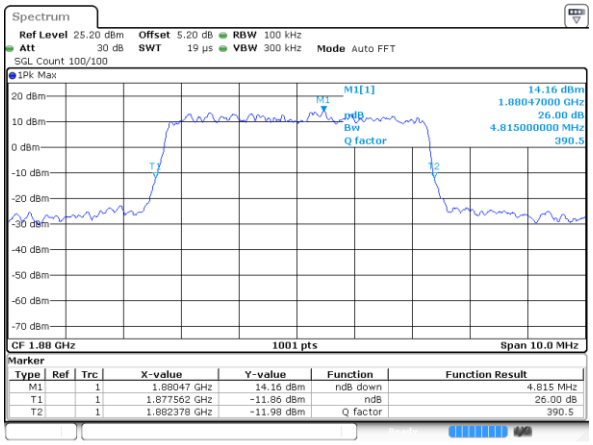
Lowest Channel / 5MHz / 64QAM



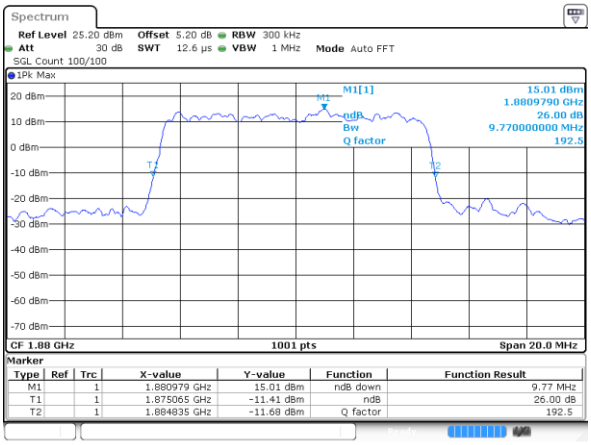
Lowest Channel / 10MHz / 64QAM



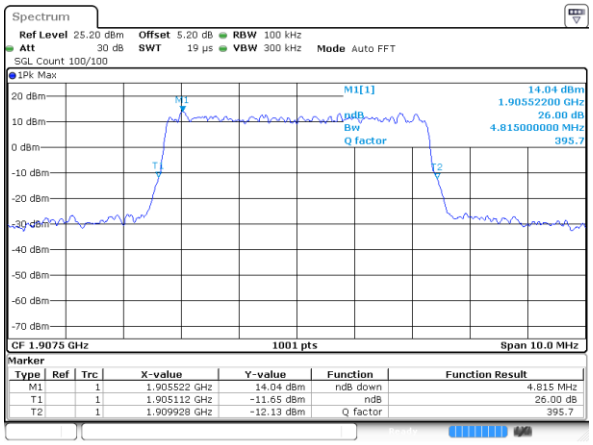
Middle Channel / 5MHz / 64QAM



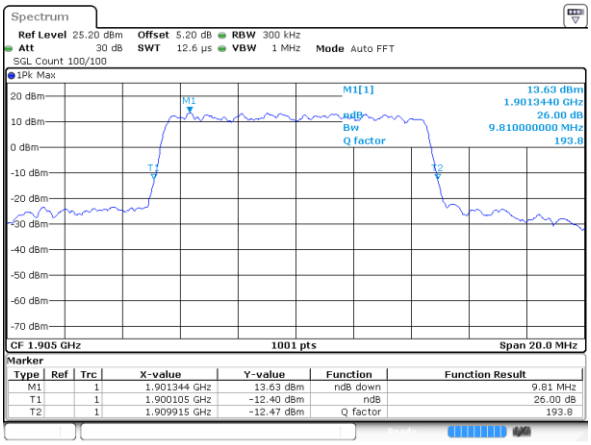
Middle Channel / 10MHz / 64QAM



Highest Channel / 5MHz / 64QAM

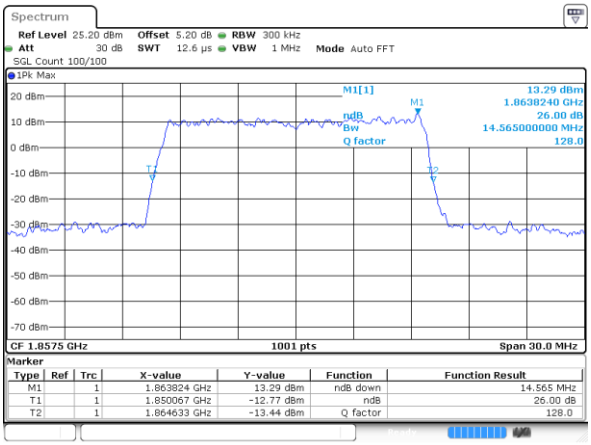


Highest Channel / 10MHz / 64QAM

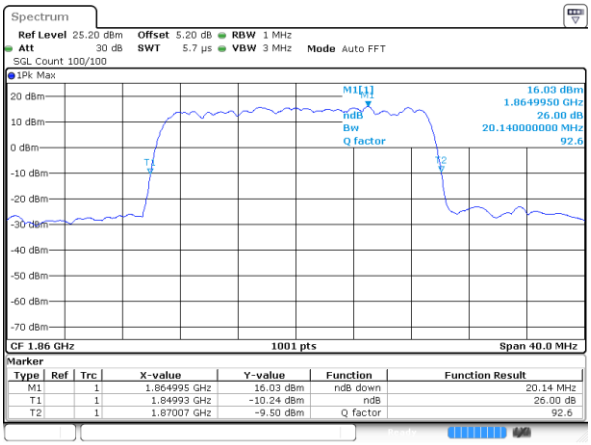


LTE Band 2

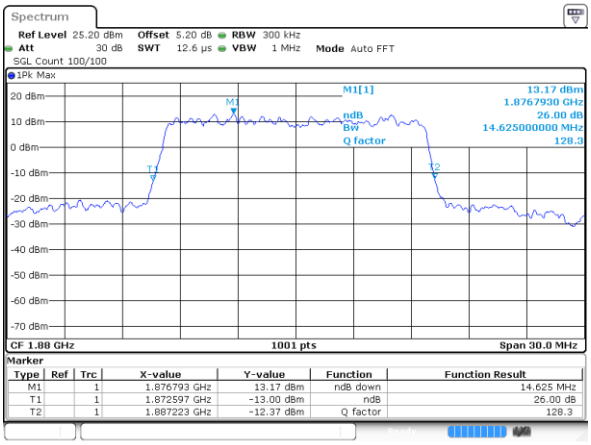
Lowest Channel / 15MHz / 64QAM



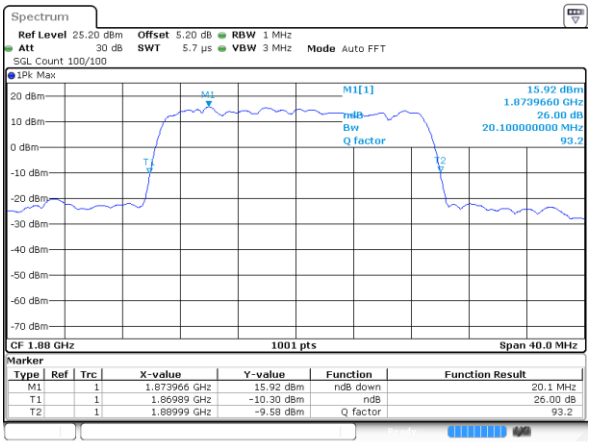
Lowest Channel / 20MHz / 64QAM



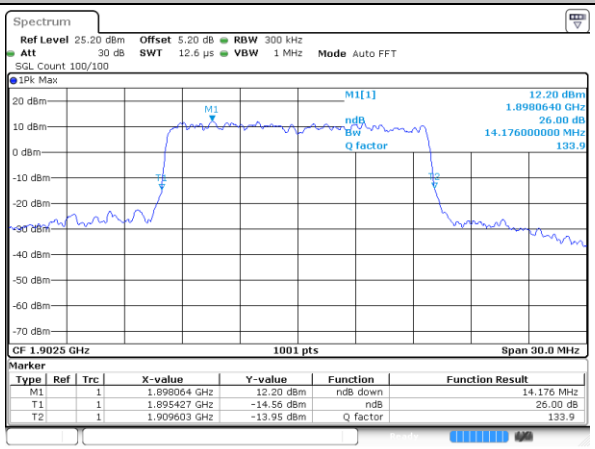
Middle Channel / 15MHz / 64QAM



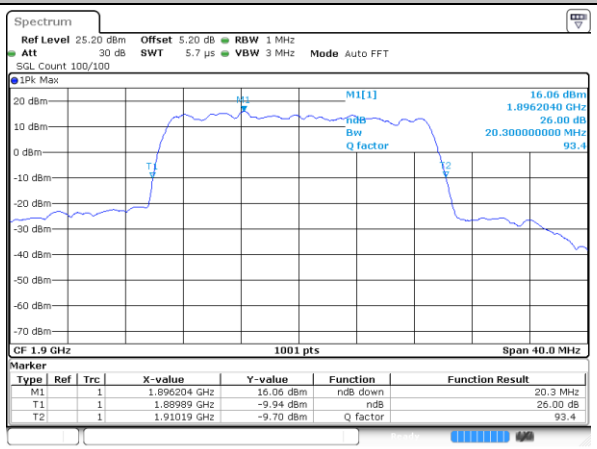
Middle Channel / 20MHz / 64QAM



Highest Channel / 15MHz / 64QAM

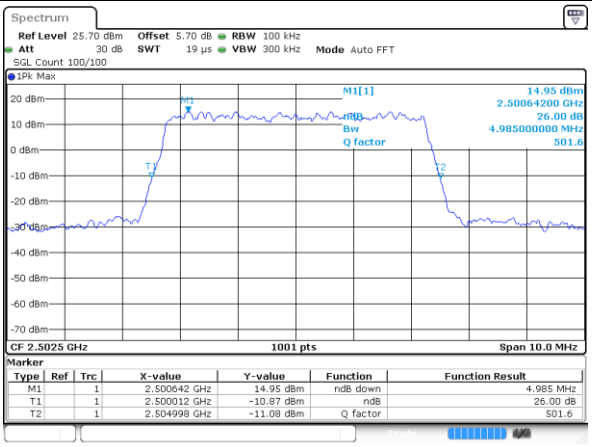


Highest Channel / 20MHz / 64QAM

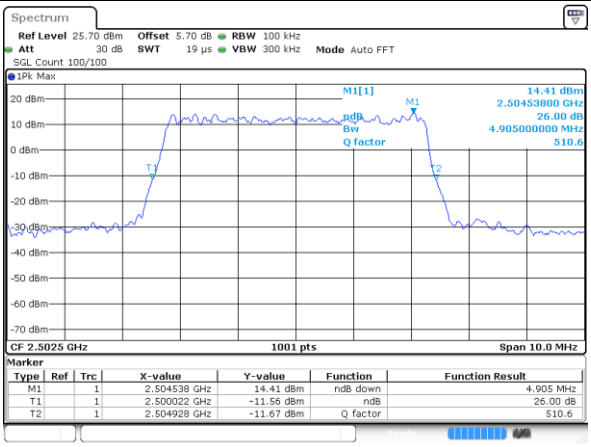


LTE Band 7

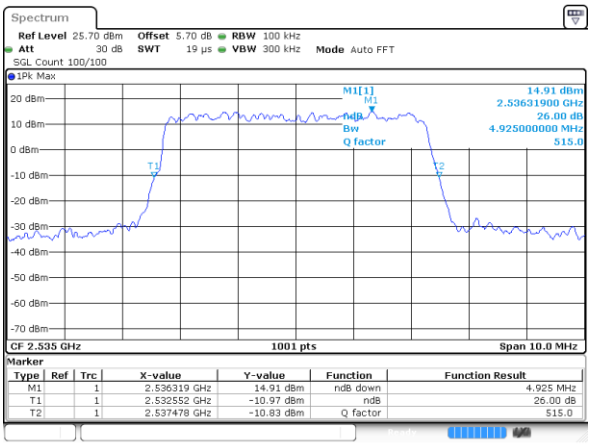
Lowest Channel / 5MHz / QPSK



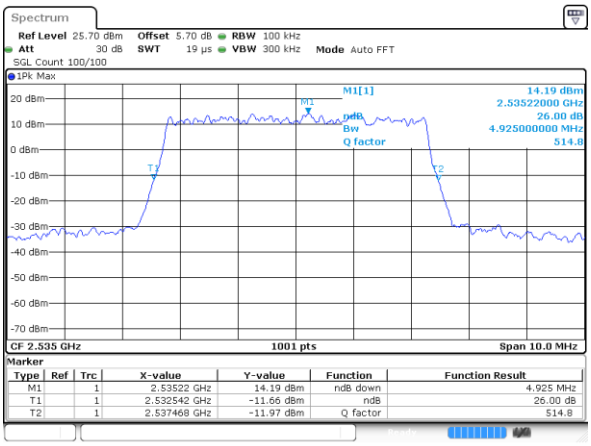
Lowest Channel / 5MHz / 16QAM



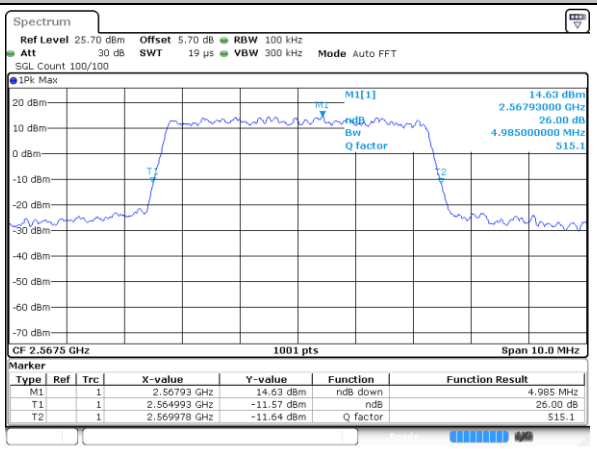
Middle Channel / 5MHz / QPSK



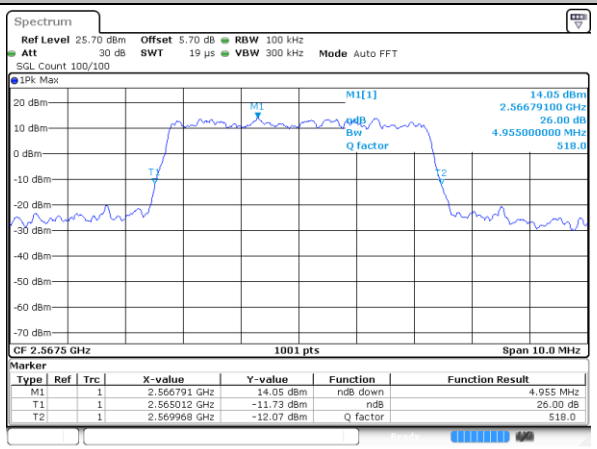
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK

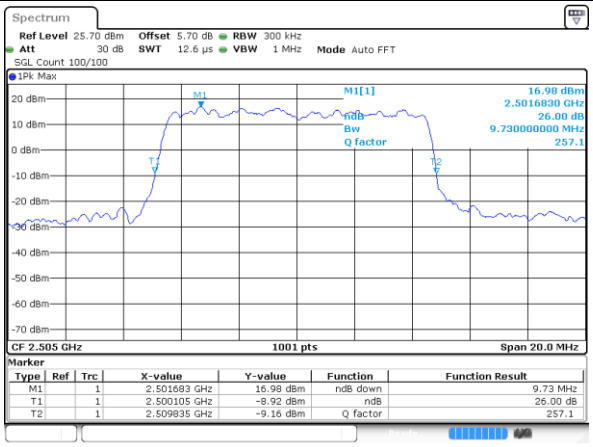


Highest Channel / 5MHz / 16QAM

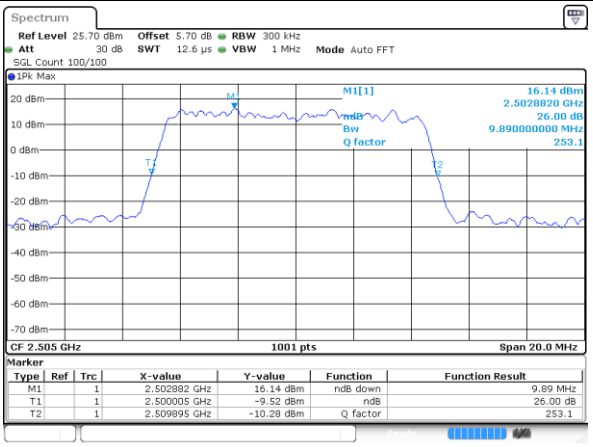


LTE Band 7

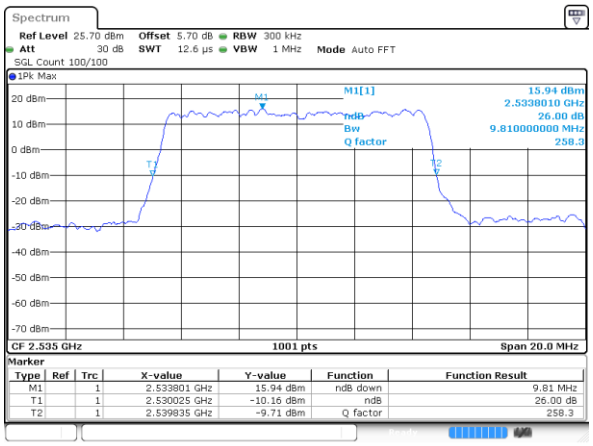
Lowest Channel / 10MHz / QPSK



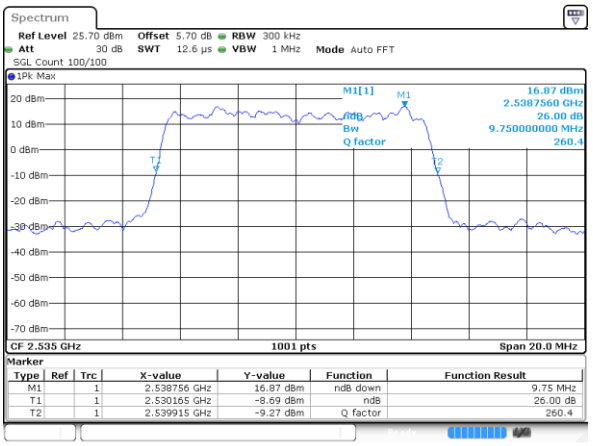
Lowest Channel / 10MHz / 16QAM



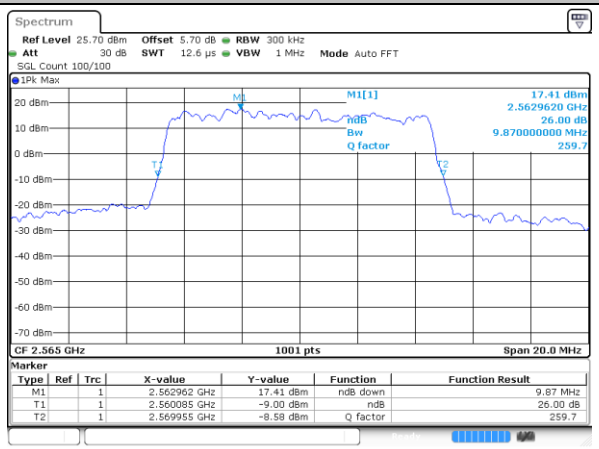
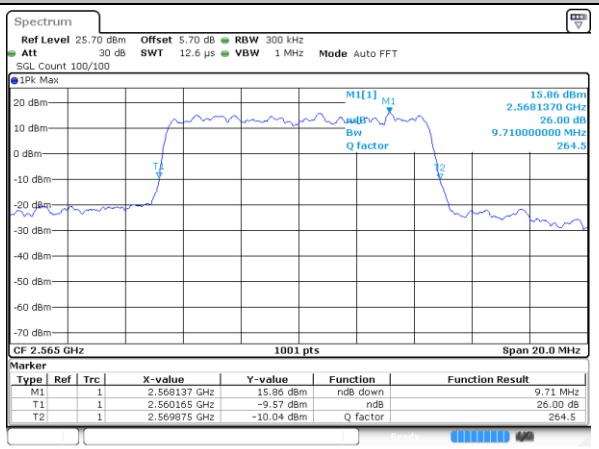
Middle Channel / 10MHz / QPSK



Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / QPSK



Highest Channel / 10MHz / 16QAM