



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : 10711, 10712
FCC ID : IHDT56WD2
STANDARD : 47 CFR Part 2, 22(H), 24(E), 27(L), 27(M)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Feb. 13, 2017 and completely tested on Mar. 15, 2017. We, SPORTON INTERNATIONAL (KunShan) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-D-2010 and the testing has shown the tested sample to be in 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

Prepared by: James Huang / Manager

Jones Tsai
SPORTON LAB.

Approved by: Jones Tsai / Manager



Sporton International (KunShan) INC.

No.3-2, Pingxiang Road, Kunshan Development Zone, Jiangsu, China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG721309-01B	Rev. 01	Initial issue of report	Mar. 31, 2017

**SUMMARY OF TEST RESULT**

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power (Band 2)	EIRP < 2Watt	PASS	-
	§27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	EIRP < 1Watt	PASS	-
3.5	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §24.238(a) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4)	< 43+10log ₁₀ (P[Watts])	PASS	-
3.8	§2.1051 §24.238(a) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4)	< 43+10log ₁₀ (P[Watts])	PASS	-
3.9	§2.1055 §24.235 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	-
4.4	§2.1053 §24.238(a) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4)	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 33.44 dB at 5184.000 MHz



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	10711, 10712
FCC ID	IHDT56WD2
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/HSPA+/ DC-HSDPA/LTE/ WLAN2.4GHz 802.11b/g/n HT20/ Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/Bluetooth v4.1 LE/Bluetooth v4.2 LE
IMEI Code	Conducted: 355635080022837/355635080031481 Radiation: 355636080002977/355636080002927
HW Version	B4-3
SW Version	nicklaus_oem_userdebug_7.0_NMA25.11_122_intcfg-test-ke ys_oem
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT sample 1 and sample 2, the differences between two samples are only for SIM slot, sample 1 is dual SIM slot, and sample 2 is single SIM slot. According to the difference, the sample 1 to perform full test.
3. After pre-scan two SIM cards power, we found test result of the SIM1 was the worse, so we chose dual SIM1 card to perform all tests.

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
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
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
Maximum Output Power to Antenna	LTE Band 2 : 22.15 dBm LTE Band 4 : 23.22 dBm
Antenna Gain	LTE Band 2 : -2.40 dBi LTE Band 4 : -2.40 dBi
Type of Modulation	QPSK / 16QAM

1.5 Modification of EUT

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



1.6 Re-use of Measured Data

1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: 10711, 10712, FCC ID: IHDT56WD2) is electrically identical to the reference device (Model: 10710, FCC ID: IHDT56WD3) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 178919 D01.

1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the product equality declaration as Appendix D.

The re-used RF data includes the following bands provided in Appendix E (Sporton RF Report No. FG721309B for the reference device Model: 10710, FCC ID: IHDT56WD3):

1.6.3 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 radiated spurious emission, Conducted Band-edge and Conducted spurious emission, the test result were consistent with FCC ID: IHDT56WD3. And adding LTE Band 2/4 to perform full test.

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.

1.6.4 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
PCE	IHDT56WD3	Part22H.27M (FG721309B)	All sections applicable for LTE Band 5/7.



1.7 Maximum 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	1M09G7D	-	0.0923	1M09W7D	-	0.0767
3	1851.5 ~ 1908.5	2M72G7D	-	0.0902	2M72W7D	-	0.0748
5	1852.5 ~ 1907.5	4M52G7D	-	0.0908	4M51W7D	-	0.0762
10	1855.0 ~ 1905.0	9M09G7D	0.0081	0.0916	9M05W7D	-	0.0778
15	1857.5 ~ 1902.5	13M6G7D	-	0.0925	13M5W7D	-	0.0782
20	1860.0 ~ 1900.0	18M5G7D	-	0.0944	18M5W7D	-	0.0798
LTE Band 4		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	1710.7 ~ 1754.3	1M10G7D	-	0.1202	1M09W7D	-	0.0991
3	1711.5 ~ 1753.5	2M72G7D	-	0.1202	2M73W7D	-	0.1002
5	1712.5 ~ 1752.5	4M50G7D	-	0.1189	4M51W7D	-	0.1016
10	1715.0 ~ 1750.0	9M07G7D	0.0023	0.1169	9M01W7D	-	0.1019
15	1717.5 ~ 1747.5	13M5G7D	-	0.1175	13M5W7D	-	0.1021
20	1720.0 ~ 1745.0	18M5G7D	-	0.1208	18M4W7D	-	0.1021

1.8 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-KS	03CH03-KS	306251

1.9 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)
- ANSI / TIA / EIA-603-D-2010
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02
- 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.

1.10 Specification of Accessory

Specification of Accessory				
AC Adapter (EU)	Brand Name	Motorola (AcBel)	Model Name	C-P36 SPN5944A
	Power Rating	I/P: 100 - 240 Vac, 0.3 A, O/P: 5.2 Vdc, 2.0 A		
AC Adapter (UK)	Brand Name	Motorola (AcBel)	Model Name	C-P37 SPN5940A
	Power Rating	I/P: 100 - 240 Vac, 0.3 A, O/P: 5.2 Vdc, 2.0 A		
AC Adapter (US)	Brand Name	Motorola (AcBel)	Model Name	C-P35 SPN5945A
	Power Rating	I/P: 100 - 240 Vac, 0.3 A, O/P: 5.2 Vdc, 2.0 A		
AC Adapter (IN)	Brand Name	Motorola (AcBel)	Model Name	C-P49 SPN5946A
	Power Rating	I/P: 100 - 240 Vac, 0.3 A, O/P: 5.2 Vdc, 2.0 A		
AC Adapter (AR)	Brand Name	Motorola (AcBel)	Model Name	C-P47 SPN5942A
	Power Rating	I/P: 100 - 240 Vac, 0.5 A, O/P: 5.2 Vdc, 2.0 A		
Battery	Brand Name	Motorola (Amperex)	Model Name	HE50
	Power Rating	0.38 Vdc, 5000 mAh	Type	Li-ion
USB Cable	Brand Name	Motorola (Li Qi)	Model Name	LQ-035050
	Signal Line Type	1.0m shielded cable without core		
Earphone 1	Brand Name	Motorola (Tenji)	Model Name	TJ-101814
	Signal Line Type	1.2m unshielded cable without core		
Earphone 2	Brand Name	Motorola(Cosonic)	Model Name	SH38C16617
	Signal Line Type	1.1m unshielded cable without core		



2 Test Configuration of Equipment Under Test

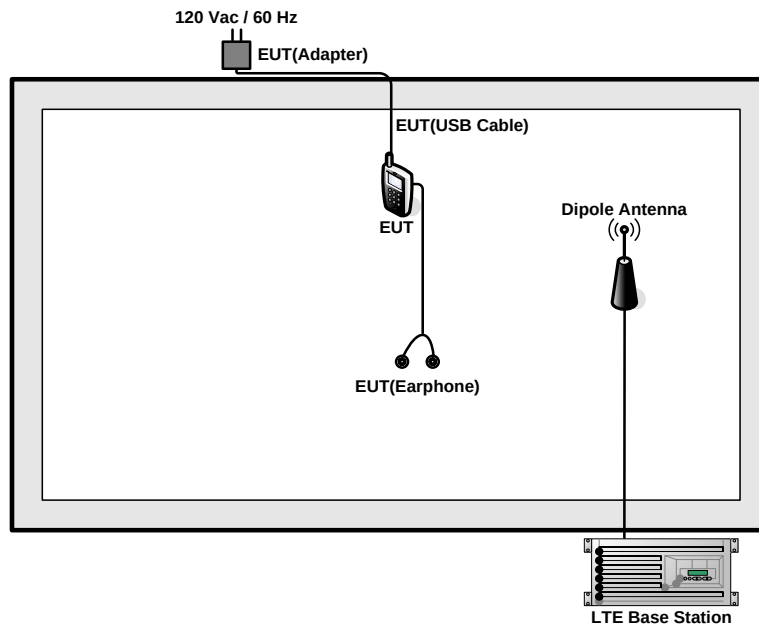
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 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	1	Half	Full	L	M	H
Max. Output Power	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peak-to-Average Ratio	2						✓	✓	✓	✓		✓	✓	✓	✓
	4						✓	✓	✓	✓		✓	✓	✓	✓
26dB and 99% Bandwidth	2	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Conducted Band Edge	2	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
Conducted Spurious Emission	2	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Frequency Stability	2				✓			✓				✓		✓	
	4				✓			✓				✓		✓	
E.I.R.P.	2	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Radiated Spurious Emission	2	✓	✓	✓	✓	✓	✓	✓		✓				✓	
	4	✓	✓	✓	✓	✓	✓	✓		✓				✓	
Note	- The mark "✓" means that this configuration is chosen for testing - The mark "-" means that this bandwidth is not supported. - 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.														

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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

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 5.4 dB.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)}. \\ &= 5.4 \text{ (dB)}\end{aligned}$$



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 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3

3 Conducted Test Items

3.1 Measuring Instruments

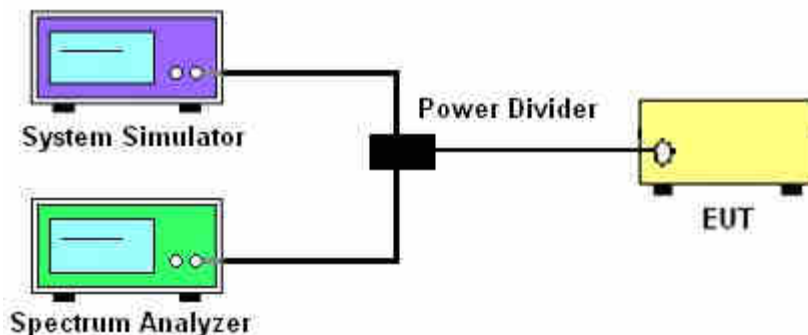
See list of measuring instruments of this test report.

3.2 Test Setup

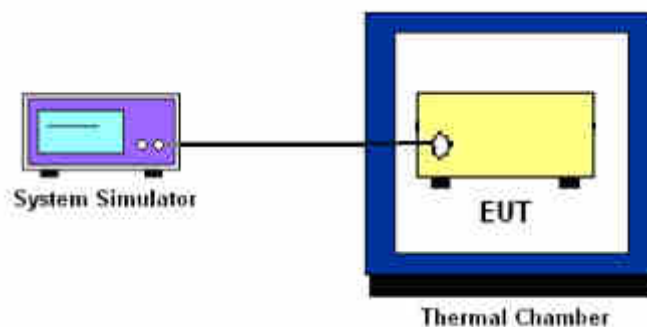
3.2.1 Conducted Output Power



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 EIRP

3.4.1 Description of the Conducted Output Power Measurement and 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 EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4.

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 transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. 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 FCC KDB 971168 v02r02 Section 5.7.1.
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 FCC KDB 971168 v02r02 Section 4.2.
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 $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power $P(\text{Watts})$ 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 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power $P(\text{Watts})$ in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

3.7.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
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 $\geq 1\%$ 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 $43 + 10\log(P)\text{dB}$ below the transmitter power $P(\text{Watts})$

$$= P(\text{W}) - [43 + 10\log(P)] (\text{dB})$$

$$= [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB}) = -13\text{dBm}.$$

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.

It is measured by means of a calibrated spectrum analyzer and scanned from 9kHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13$ dBm.

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 $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
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 FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at $20\pm 5^{\circ}\text{C}$ and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

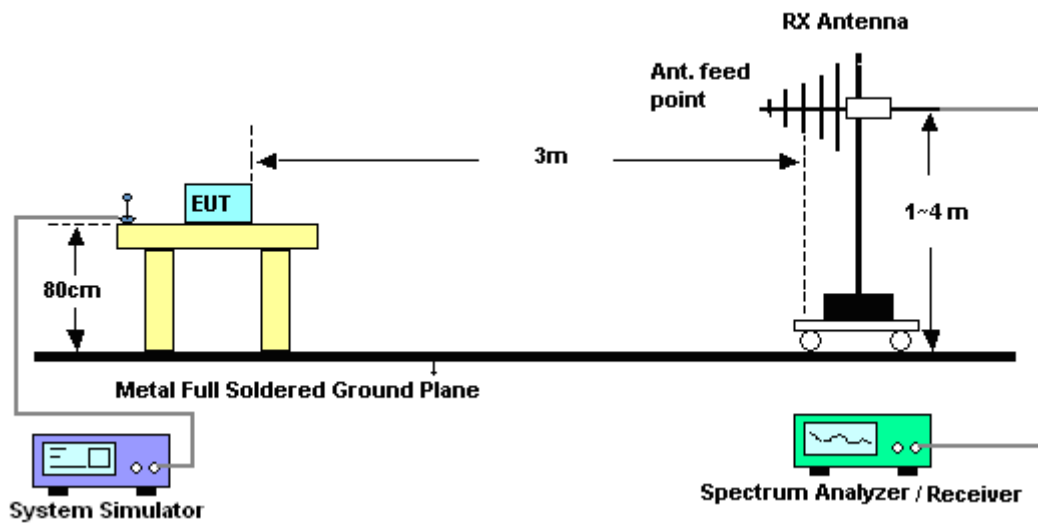
4 Radiated Test Items

4.1 Measuring Instruments

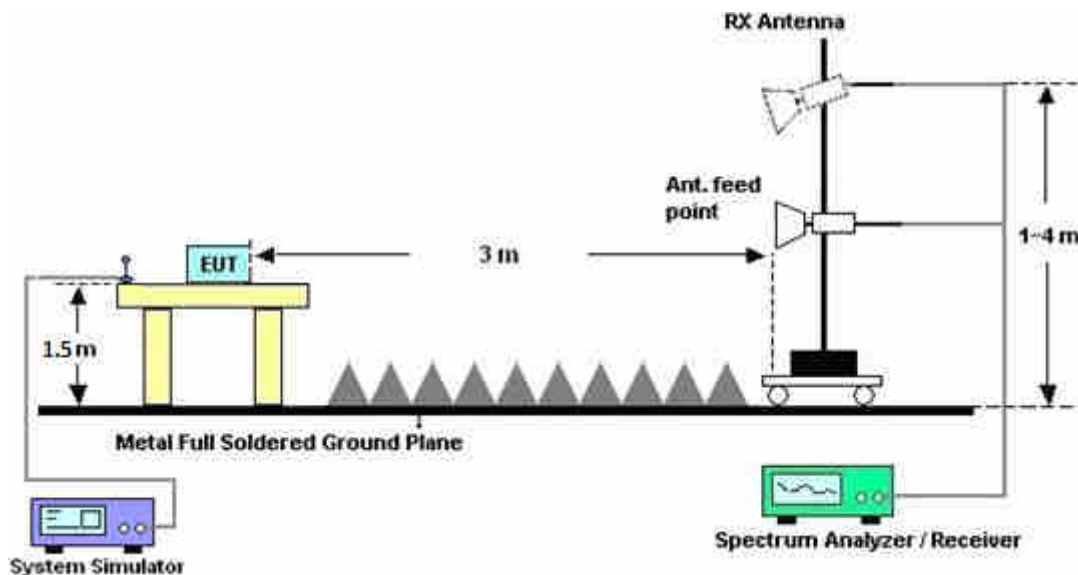
See list of measuring instruments of this test report.

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 / TIA / EIA-603-D-2010. 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.

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

4.4.2 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-D-2010 Section 2.2.12.
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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

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

$= P(W) - [43 + 10\log(P)] \text{ (dB)}$

$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$

$= -13\text{dBm}.$



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 09, 2016	Mar. 13, 2017~ Mar. 15, 2017	Aug. 08, 2017	Conducted (TH01-KS)
Radio Communicatio	Anritsu	MT8820C	6201300652	2G/3G/4G/ CDMA	Aug. 08, 2016	Mar. 13, 2017~ Mar. 15, 2017	Aug. 07, 2017	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 13, 2016	Mar. 13, 2017~ Mar. 15, 2017	Oct. 12, 2017	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 22, 2016	Mar. 03, 2017	Apr. 21, 2017	Radiation (03CH03-KS)
Bilog Antenna	TeseQ	CBL6112D	35406	25MHz~2GHz	Apr. 16, 2016	Mar. 03, 2017	Apr. 15, 2017	Radiation (03CH03-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1356	1GHz~18GHz	Apr. 16, 2016	Mar. 03, 2017	Apr. 15, 2017	Radiation (03CH03-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 15, 2017	Mar. 03, 2017	Feb. 14, 2018	Radiation (03CH03-KS)
Amplifier	SONOMA	310N	187289	9kHz~1GHz	Aug. 09, 2016	Mar. 03, 2017	Aug. 08, 2017	Radiation (03CH03-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Oct. 13, 2016	Mar. 03, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
Amplifier	MITEQ	TTA1840-35 -HG	1887435	18GHz~40GHz	Oct. 13, 2016	Mar. 03, 2017	Oct. 12, 2017	Radiation (03CH03-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Mar. 03, 2017	NCR	Radiation (03CH03-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Mar. 03, 2017	NCR	Radiation (03CH03-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Mar. 03, 2017	NCR	Radiation (03CH03-KS)

NCR: No Calibration Required



6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (25 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.8dB
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Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.3dB
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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	21.97	22.08	22.15
20	1	49		21.92	21.99	21.98
20	1	99		21.82	21.81	21.79
20	50	0		20.99	21.13	21.17
20	50	24		20.95	21.05	21.02
20	50	50		20.93	20.97	20.95
20	100	0		20.95	21.02	21.03
20	1	0	16-QAM	21.21	21.33	21.42
20	1	49		21.19	21.22	21.21
20	1	99		21.07	21.07	20.98
20	50	0		19.97	20.10	20.14
20	50	24		19.94	20.02	20.02
20	50	50		19.93	19.96	19.93
20	100	0		19.94	20.01	20.00
15	1	0	QPSK	21.96	22.04	22.06
15	1	37		21.89	21.99	21.95
15	1	74		21.85	21.82	21.78
15	36	0		20.95	21.09	21.07
15	36	20		20.94	21.03	20.99
15	36	39		20.95	21.00	20.91
15	75	0		20.96	21.04	21.00
15	1	0	16-QAM	21.19	21.30	21.33
15	1	37		21.22	21.22	21.20
15	1	74		21.15	21.11	21.01
15	36	0		19.96	20.07	20.07
15	36	20		19.94	20.03	19.98
15	36	39		19.95	20.00	19.89
15	75	0		19.95	20.02	19.97



LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	21.92	21.98	22.02
10	1	25		21.90	21.98	21.94
10	1	49		21.82	21.86	21.83
10	25	0		20.97	21.03	21.03
10	25	12		20.90	21.02	20.99
10	25	25		20.91	20.99	20.97
10	50	0		20.94	21.02	20.99
10	1	0	16-QAM	21.17	21.23	21.31
10	1	25		21.18	21.22	21.19
10	1	49		21.12	21.12	21.07
10	25	0		19.94	20.02	20.02
10	25	12		19.89	19.98	19.97
10	25	25		19.91	19.96	19.95
10	50	0		19.94	19.99	19.97
5	1	0	QPSK	21.91	21.96	21.93
5	1	12		21.90	21.98	21.91
5	1	24		21.81	21.85	21.80
5	12	0		20.99	21.04	21.01
5	12	7		20.97	21.02	20.98
5	12	13		20.95	21.03	20.94
5	25	0		20.92	21.01	20.94
5	1	0	16-QAM	21.16	21.19	21.15
5	1	12		21.21	21.22	21.13
5	1	24		21.12	21.09	21.01
5	12	0		19.99	20.03	20.00
5	12	7		19.98	20.00	19.97
5	12	13		19.96	20.02	19.93
5	25	0		19.91	19.98	19.91



LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	21.85	21.92	21.82
3	1	8		21.90	21.95	21.84
3	1	14		21.79	21.84	21.77
3	8	0		20.98	21.01	20.95
3	8	4		20.97	21.00	20.94
3	8	7		20.94	20.99	20.91
3	15	0		20.95	21.00	20.94
3	1	0	16-QAM	21.04	21.06	21.02
3	1	8		21.11	21.14	21.04
3	1	14		21.05	21.03	20.97
3	8	0		20.03	20.05	19.97
3	8	4		20.02	20.02	19.95
3	8	7		20.00	20.02	19.94
3	15	0		19.96	19.98	19.91
1.4	1	0	QPSK	21.90	21.94	21.82
1.4	1	3		21.95	22.03	21.89
1.4	1	5		21.88	21.90	21.79
1.4	3	0		21.98	22.05	21.93
1.4	3	1		21.93	21.96	21.87
1.4	3	3		21.93	21.96	21.85
1.4	6	0		20.95	21.00	20.91
1.4	1	0	16-QAM	21.15	21.16	21.05
1.4	1	3		21.20	21.25	21.10
1.4	1	5		21.13	21.10	21.02
1.4	3	0		20.98	21.01	20.88
1.4	3	1		20.93	20.95	20.83
1.4	3	3		20.90	20.93	20.83
1.4	6	0		20.01	20.05	19.97



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	23.22	23.09	22.76
20	1	49		22.96	22.74	23.01
20	1	99		22.77	22.86	23.00
20	50	0		22.27	21.99	21.96
20	50	24		22.06	21.86	22.06
20	50	50		22.00	21.82	22.17
20	100	0		22.05	21.86	22.08
20	1	0	16-QAM	22.46	22.41	22.35
20	1	49		22.49	21.73	22.37
20	1	99		21.89	22.18	22.31
20	50	0		21.20	20.98	21.01
20	50	24		21.07	20.84	21.08
20	50	50		20.96	20.86	21.12
20	100	0		21.06	20.87	20.99
15	1	0	QPSK	23.10	22.97	22.93
15	1	37		23.04	22.77	23.07
15	1	74		22.83	22.74	23.05
15	36	0		22.23	21.95	21.98
15	36	20		22.14	21.85	22.13
15	36	39		22.07	21.85	22.25
15	75	0		22.12	21.88	22.07
15	1	0	16-QAM	22.49	21.90	22.00
15	1	37		22.45	21.85	21.93
15	1	74		22.46	21.93	22.48
15	36	0		21.22	20.99	20.99
15	36	20		21.16	20.93	21.08
15	36	39		21.04	20.81	21.18
15	75	0		21.10	20.91	21.10



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	23.08	23.00	22.91
10	1	25		23.01	22.77	23.05
10	1	49		22.81	22.74	23.05
10	25	0		22.23	21.95	21.95
10	25	12		22.14	21.86	22.13
10	25	25		22.07	21.87	22.25
10	50	0		22.15	21.90	22.05
10	1	0	16-QAM	22.38	21.90	21.99
10	1	25		22.47	21.85	21.97
10	1	49		22.46	21.94	22.48
10	25	0		21.25	20.99	21.00
10	25	12		21.17	20.91	21.08
10	25	25		21.04	20.79	21.18
10	50	0		21.05	20.94	21.08
5	1	0	QPSK	23.02	22.75	23.14
5	1	12		23.15	22.89	23.15
5	1	24		23.03	22.75	23.08
5	12	0		22.15	21.88	22.23
5	12	7		22.18	21.84	22.28
5	12	13		22.09	21.85	22.31
5	25	0		22.10	21.82	22.25
5	1	0	16-QAM	22.28	22.31	22.47
5	1	12		22.39	21.95	22.10
5	1	24		22.41	21.64	22.19
5	12	0		21.20	20.94	21.26
5	12	7		21.18	20.90	21.29
5	12	13		21.12	20.83	21.31
5	25	0		21.15	20.83	21.21



LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	22.92	22.83	23.03
3	1	8		22.99	22.71	23.16
3	1	14		22.99	22.64	23.20
3	8	0		22.13	21.84	22.28
3	8	4		22.10	21.82	22.29
3	8	7		22.10	21.80	22.29
3	15	0		22.15	21.80	22.29
3	1	0	16-QAM	22.08	21.77	22.20
3	1	8		22.03	22.01	22.41
3	1	14		22.30	21.95	22.39
3	8	0		21.15	20.94	21.37
3	8	4		21.02	20.96	21.44
3	8	7		21.11	20.83	21.37
3	15	0		21.14	20.76	21.33
1.4	1	0	QPSK	22.97	22.73	23.18
1.4	1	3		23.04	22.76	23.20
1.4	1	5		23.05	22.73	23.18
1.4	3	0		23.13	22.85	23.05
1.4	3	1		23.15	22.80	23.18
1.4	3	3		23.11	22.85	23.00
1.4	6	0		22.16	21.83	22.30
1.4	1	0	16-QAM	21.92	21.93	22.33
1.4	1	3		22.12	22.03	22.18
1.4	1	5		22.36	22.25	22.22
1.4	3	0		22.02	21.86	22.20
1.4	3	1		22.05	21.85	22.28
1.4	3	3		22.09	21.87	22.27
1.4	6	0		21.26	20.97	21.44

EIRP

LTE Band 2 ($G_T - L_C = -2.40$ 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	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
(MHz)									
Conducted Power (dBm)	21.98	22.05	21.93	21.90	21.95	21.84	21.90	21.98	21.91
Conducted Power (Watts)	0.1578	0.1603	0.1560	0.1549	0.1567	0.1528	0.1549	0.1578	0.1552
EIRP(dBm)	19.58	19.65	19.53	19.50	19.55	19.44	19.50	19.58	19.51
EIRP(Watts)	0.0908	0.0923	0.0897	0.0891	0.0902	0.0879	0.0891	0.0908	0.0893

LTE Band 2 ($G_T - L_C = -2.40$ 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	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
(MHz)									
Conducted Power (dBm)	21.92	21.98	22.02	21.96	22.04	22.06	21.97	22.08	22.15
Conducted Power (Watts)	0.1556	0.1578	0.1592	0.1570	0.1600	0.1607	0.1574	0.1614	0.1641
EIRP(dBm)	19.52	19.58	19.62	19.56	19.64	19.66	19.57	19.68	19.75
EIRP(Watts)	0.0895	0.0908	0.0916	0.0904	0.0920	0.0925	0.0906	0.0929	0.0944



LTE Band 2 ($G_T - L_C = -2.40$ 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	1850.7	1880	1909.3	1851.5	1880	1908.5	1852.5	1880	1907.5
(MHz)									
Conducted Power (dBm)	21.20	21.25	21.10	21.11	21.14	21.04	21.21	21.22	21.13
Conducted Power (Watts)	0.1318	0.1334	0.1288	0.1291	0.1300	0.1271	0.1321	0.1324	0.1297
EIRP(dBm)	18.80	18.85	18.70	18.71	18.74	18.64	18.81	18.82	18.73
EIRP(Watts)	0.0759	0.0767	0.0741	0.0743	0.0748	0.0731	0.0760	0.0762	0.0746

LTE Band 2 ($G_T - L_C = -2.40$ 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	1855	1880	1905	1857.5	1880	1902.5	1860	1880	1900
(MHz)									
Conducted Power (dBm)	21.17	21.23	21.31	21.19	21.30	21.33	21.21	21.33	21.42
Conducted Power (Watts)	0.1309	0.1327	0.1352	0.1315	0.1349	0.1358	0.1321	0.1358	0.1387
EIRP(dBm)	18.77	18.83	18.91	18.79	18.90	18.93	18.81	18.93	19.02
EIRP(Watts)	0.0753	0.0764	0.0778	0.0757	0.0776	0.0782	0.0760	0.0782	0.0798



LTE Band 4 ($G_T - L_C = -2.40$ dB) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
(MHz)									
Conducted Power (dBm)	23.04	22.76	23.20	22.99	22.64	23.20	23.15	22.89	23.15
Conducted Power (Watts)	0.2014	0.1888	0.2089	0.1991	0.1837	0.2089	0.2065	0.1945	0.2065
EIRP(dBm)	20.64	20.36	20.80	20.59	20.24	20.80	20.75	20.49	20.75
EIRP(Watts)	0.1159	0.1086	0.1202	0.1146	0.1057	0.1202	0.1189	0.1119	0.1189

LTE Band 4 ($G_T - L_C = -2.40$ dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
(MHz)									
Conducted Power (dBm)	23.08	23.00	22.91	23.10	22.97	22.93	23.22	23.09	22.76
Conducted Power (Watts)	0.2032	0.1995	0.1954	0.2042	0.1982	0.1963	0.2099	0.2037	0.1888
EIRP(dBm)	20.68	20.60	20.51	20.70	20.57	20.53	20.82	20.69	20.36
EIRP(Watts)	0.1169	0.1148	0.1125	0.1175	0.1140	0.1130	0.1208	0.1172	0.1086



LTE Band 4 ($G_T - L_C = -2.40$ dB) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	19957	20175	20393	19965	20175	20385	19975	20175	20375
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
(MHz)									
Conducted Power (dBm)	22.36	22.25	22.22	22.03	22.01	22.41	22.28	22.31	22.47
Conducted Power (Watts)	0.1722	0.1679	0.1667	0.1596	0.1589	0.1742	0.1690	0.1702	0.1766
EIRP(dBm)	19.96	19.85	19.82	19.63	19.61	20.01	19.88	19.91	20.07
EIRP(Watts)	0.0991	0.0966	0.0959	0.0918	0.0914	0.1002	0.0973	0.0979	0.1016

LTE Band 4 ($G_T - L_C = -2.40$ dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	20000	20175	20350	20025	20175	20325	20050	20175	20300
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
(MHz)									
Conducted Power (dBm)	22.46	21.94	22.48	22.49	21.90	22.00	22.49	21.73	22.37
Conducted Power (Watts)	0.1762	0.1563	0.1770	0.1774	0.1549	0.1585	0.1774	0.1489	0.1726
EIRP(dBm)	20.06	19.54	20.08	20.09	19.50	19.60	20.09	19.33	19.97
EIRP(Watts)	0.1014	0.0899	0.1019	0.1021	0.0891	0.0912	0.1021	0.0857	0.0993

**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	3.94	5.16	4.9	6.09	PASS
Middle CH	4.03	5.04	4.9	5.94	
Highest CH	4.14	5.04	5.22	6.03	

Mode	LTE Band 4 / 20MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	3.91	5.25	5.01	6.17	PASS
Middle CH	4.64	5.3	5.8	6.2	
Highest CH	4.64	5.3	5.94	6.2	



LTE Band 2 / 20MHz / QPSK

Lowest Channel / 1RB



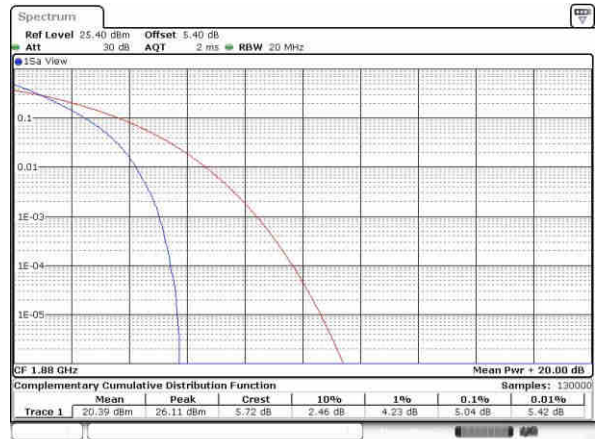
Lowest Channel / Full RB



Middle Channel / 1RB



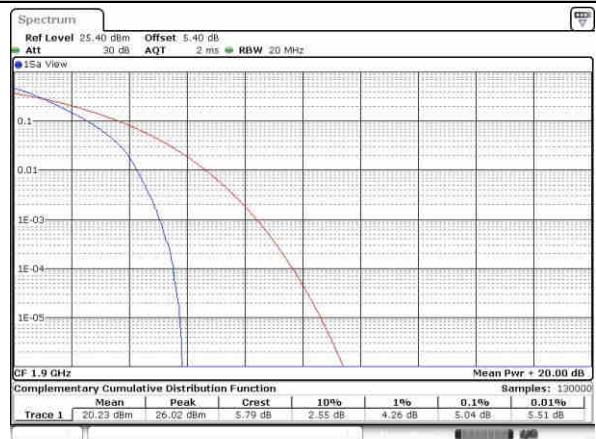
Middle Channel / Full RB



Highest Channel / 1RB



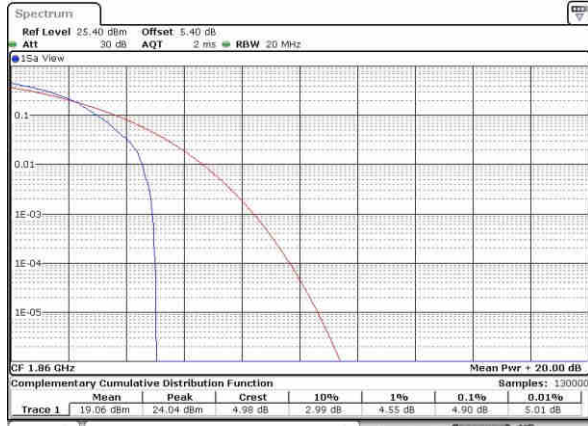
Highest Channel / Full RB





LTE Band 2 / 20MHz / 16QAM

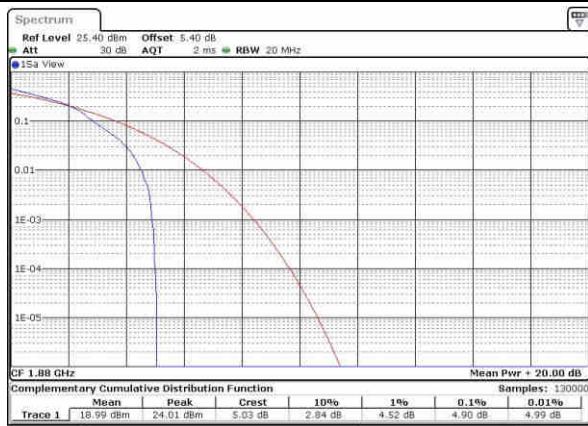
Lowest Channel / 1RB



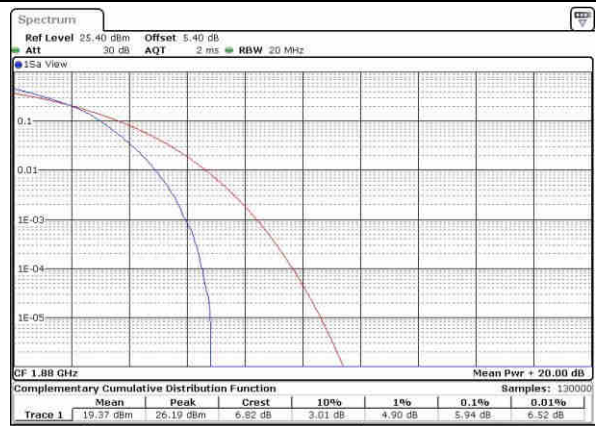
Lowest Channel / Full RB



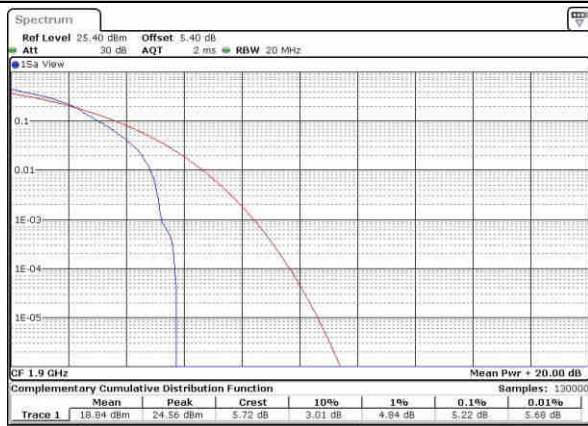
Middle Channel / 1RB



Middle Channel / Full RB



Highest Channel / 1RB



Highest Channel / Full RB



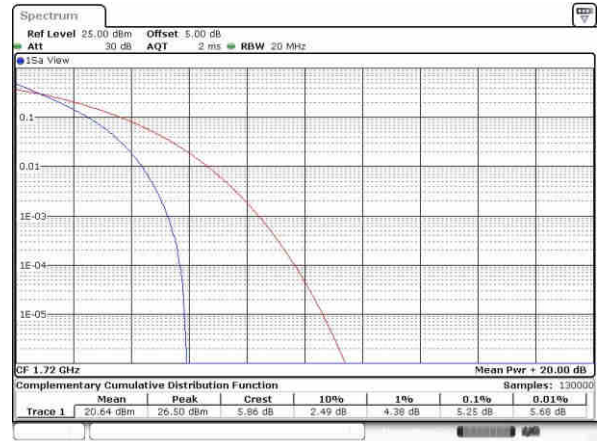


LTE Band 4 / 20MHz / QPSK

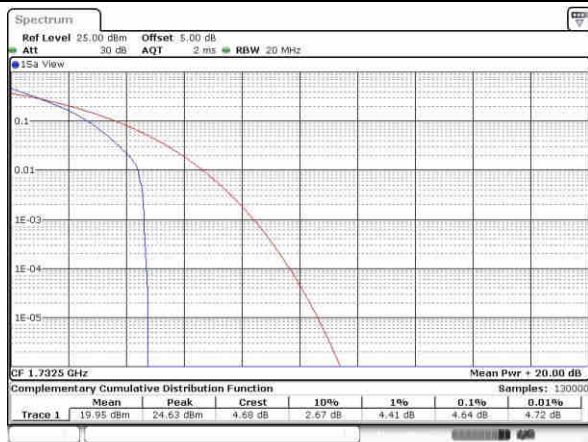
Lowest Channel / 1RB



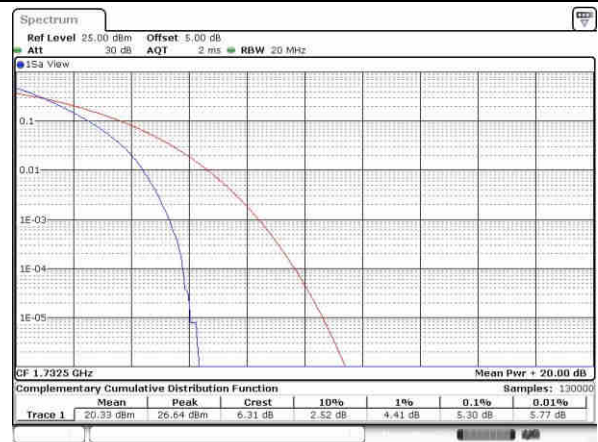
Lowest Channel / Full RB



Middle Channel / 1RB



Middle Channel / Full RB



Highest Channel / 1RB



Highest Channel / Full RB





LTE Band 4 / 20MHz / 16QAM

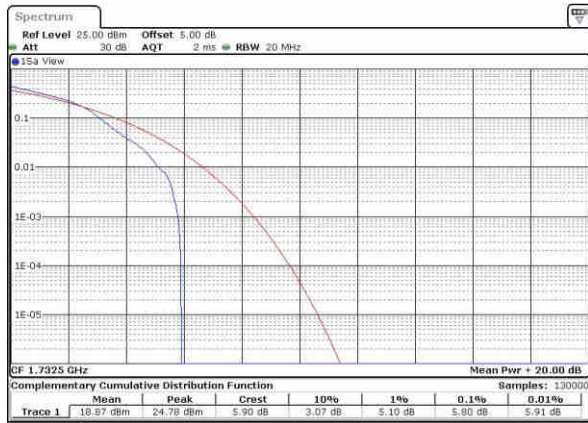
Lowest Channel / 1RB



Lowest Channel / Full RB



Middle Channel / 1RB



Middle Channel / Full RB



Highest Channel / 1RB



Highest Channel / Full RB



**26dB Bandwidth**

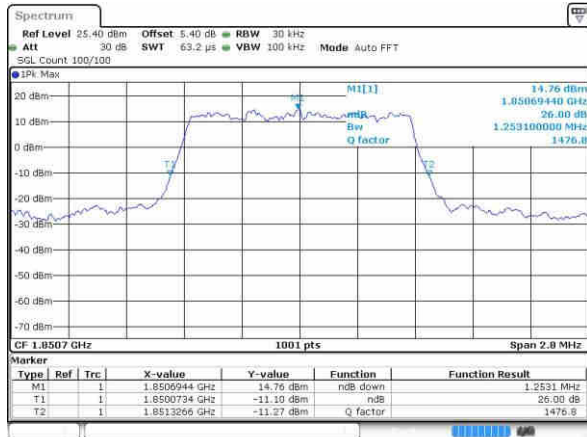
Mode	LTE Band 2 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.25	1.25	3.00	3.00	4.96	5.01	9.81	9.91	14.48	14.66	20.26	20.34
Middle CH	1.25	1.24	2.97	2.97	4.92	4.98	9.69	9.63	14.60	14.24	20.18	20.26
Highest CH	1.26	1.26	3.00	3.02	4.93	5.03	9.87	9.95	14.33	14.60	20.18	20.34

Mode	LTE Band 4 : 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	1.24	1.26	3.01	2.96	5.00	5.00	9.75	9.75	14.72	14.69	20.14	20.42
Middle CH	1.24	1.26	2.99	2.97	5.04	4.95	9.85	9.61	14.78	14.51	20.46	20.18
Highest CH	1.26	1.23	2.95	3.00	4.97	5.02	9.81	9.75	14.21	14.57	20.34	20.38



LTE Band 2

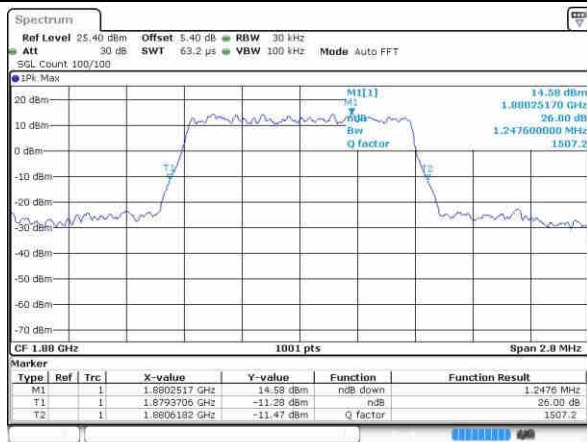
Lowest Channel / 1.4MHz / QPSK



Lowest Channel / 1.4MHz / 16QAM



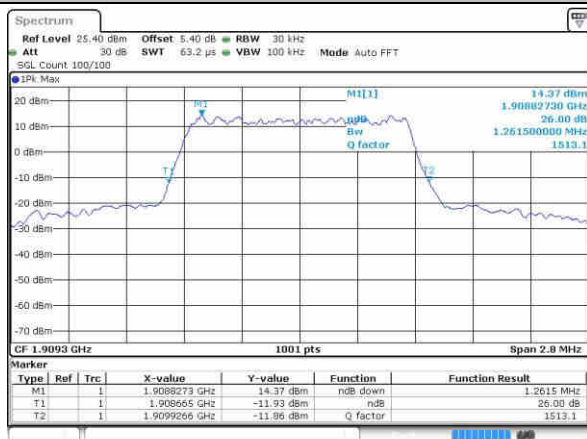
Middle Channel / 1.4MHz / QPSK



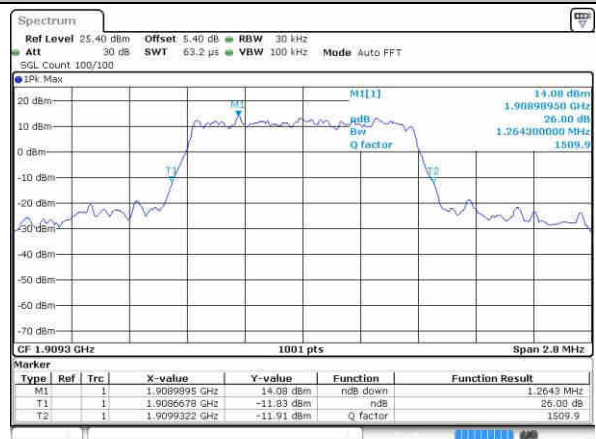
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK



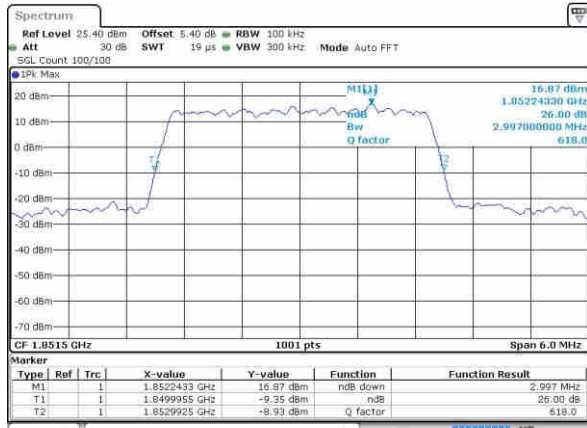
Highest Channel / 1.4MHz / 16QAM





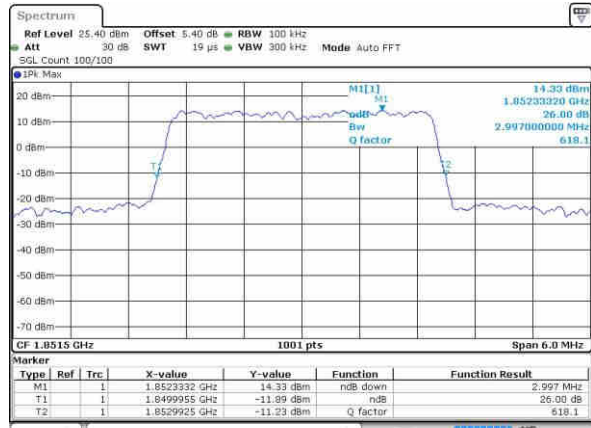
LTE Band 2

Lowest Channel / 3MHz / QPSK



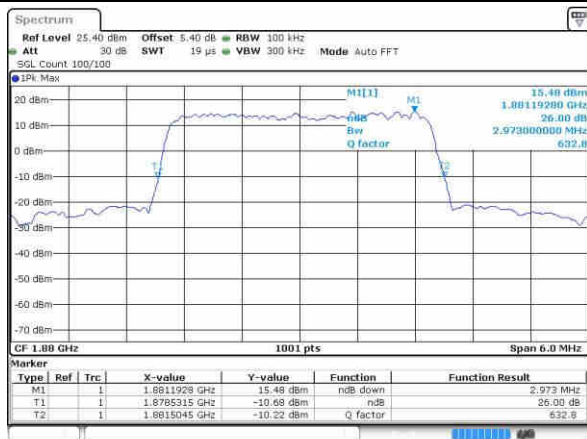
Date: 13 MAR 2017 18:21:12

Lowest Channel / 3MHz / 16QAM



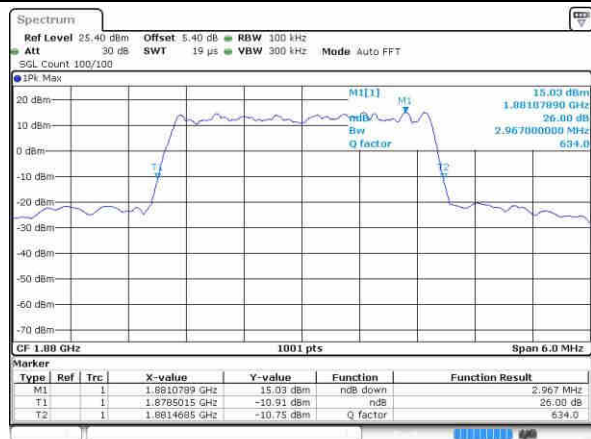
Date: 13 MAR 2017 18:21:23

Middle Channel / 3MHz / QPSK



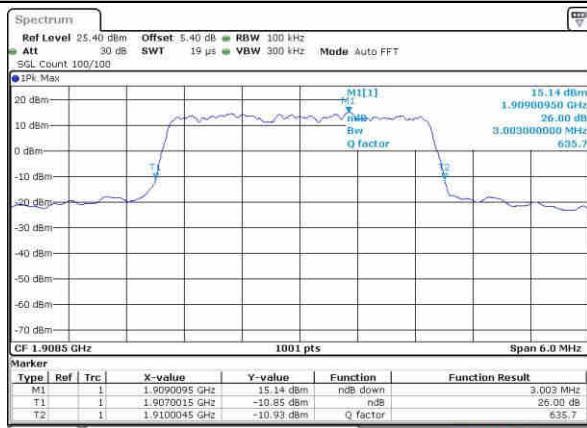
Date: 13 MAR 2017 18:26:32

Middle Channel / 3MHz / 16QAM



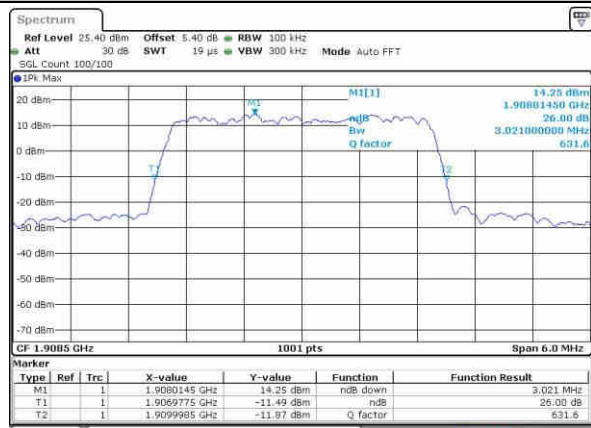
Date: 13 MAR 2017 18:26:44

Highest Channel / 3MHz / QPSK



Date: 13 MAR 2017 18:27:17

Highest Channel / 3MHz / 16QAM

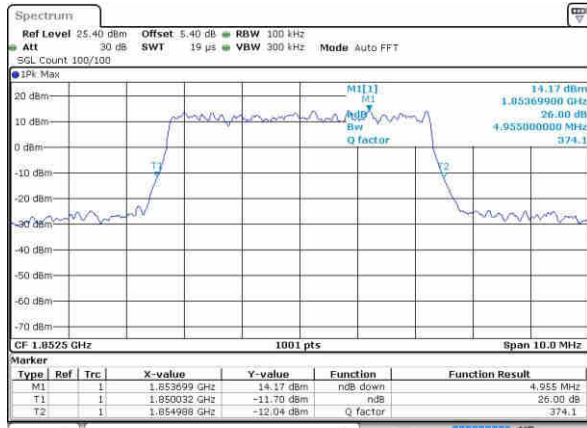


Date: 13 MAR 2017 18:27:28



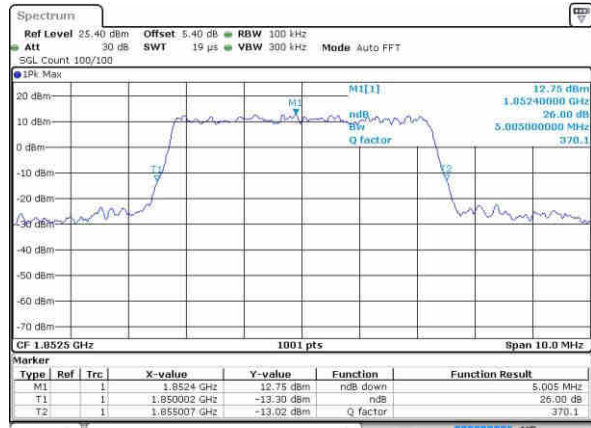
LTE Band 2

Lowest Channel / 5MHz / QPSK



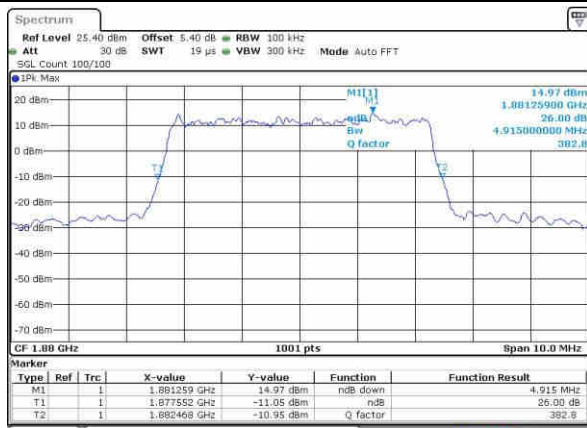
Date: 13 MAR 2017 18:32:38

Lowest Channel / 5MHz / 16QAM



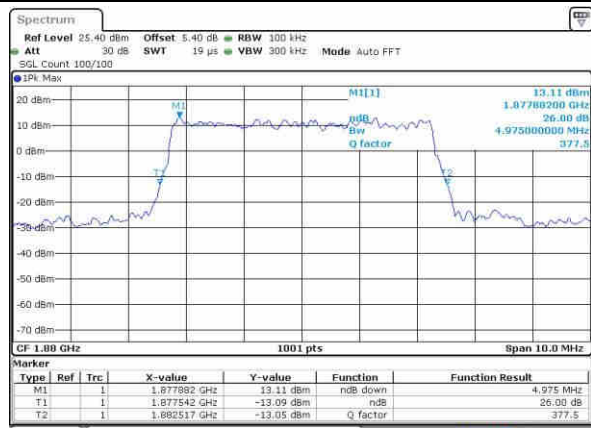
Date: 13 MAR 2017 18:32:49

Middle Channel / 5MHz / QPSK



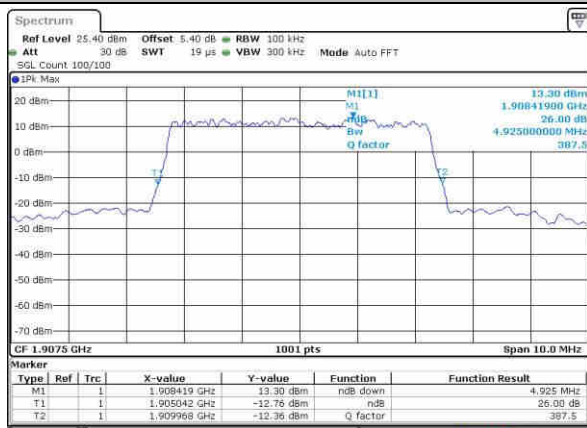
Date: 13 MAR 2017 18:37:58

Middle Channel / 5MHz / 16QAM



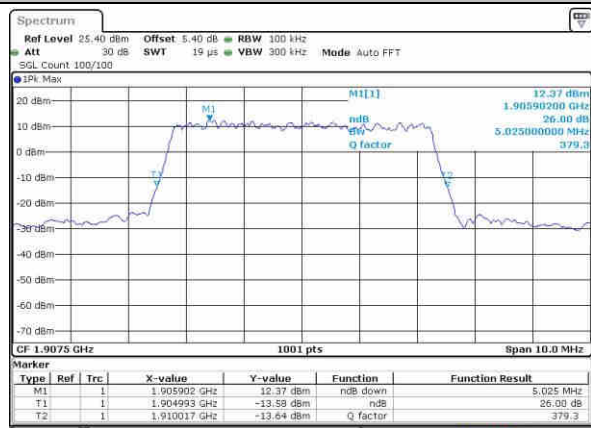
Date: 13 MAR 2017 18:38:10

Highest Channel / 5MHz / QPSK



Date: 13 MAR 2017 18:38:44

Highest Channel / 5MHz / 16QAM

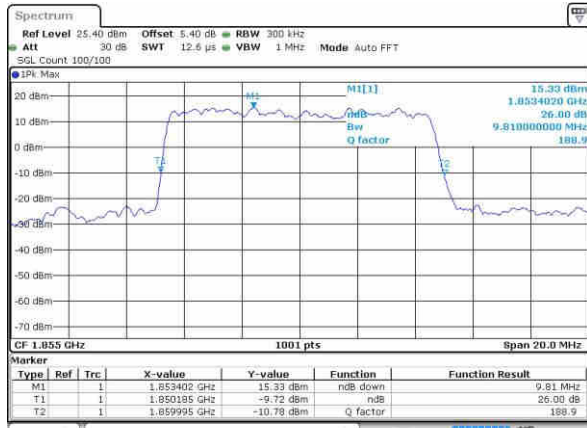


Date: 13 MAR 2017 18:38:55

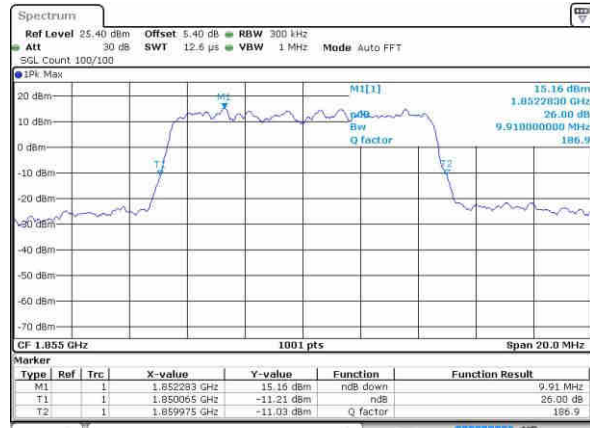


LTE Band 2

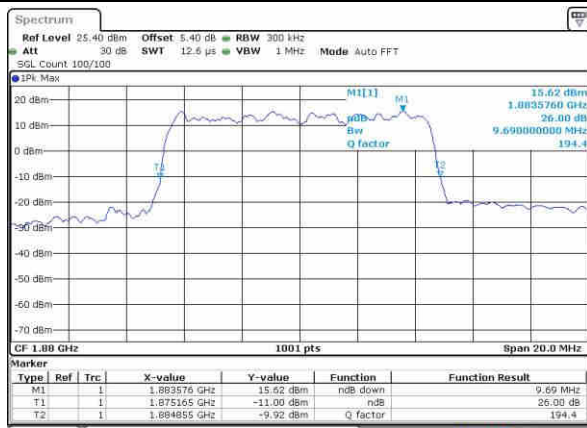
Lowest Channel / 10MHz / QPSK



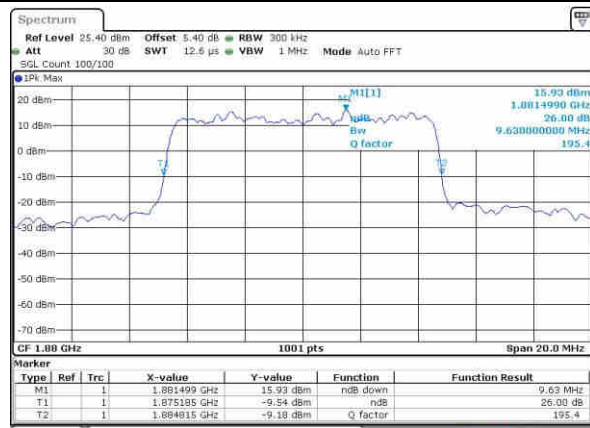
Lowest Channel / 10MHz / 16QAM



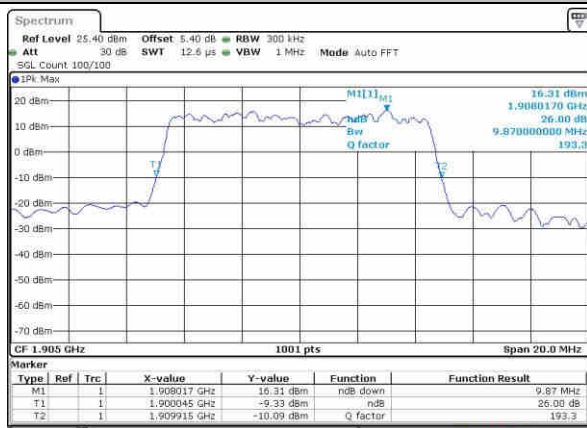
Middle Channel / 10MHz / QPSK



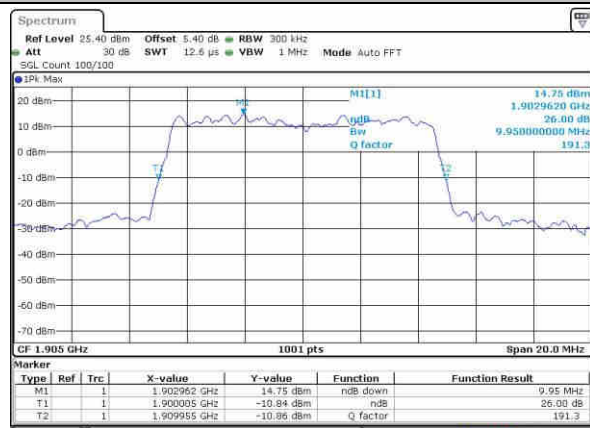
Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / QPSK



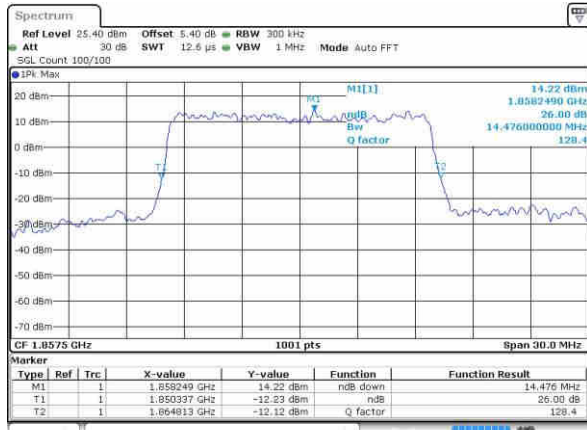
Highest Channel / 10MHz / 16QAM





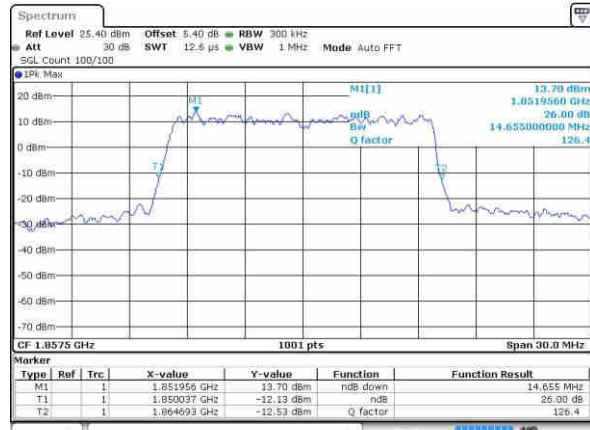
LTE Band 2

Lowest Channel / 15MHz / QPSK



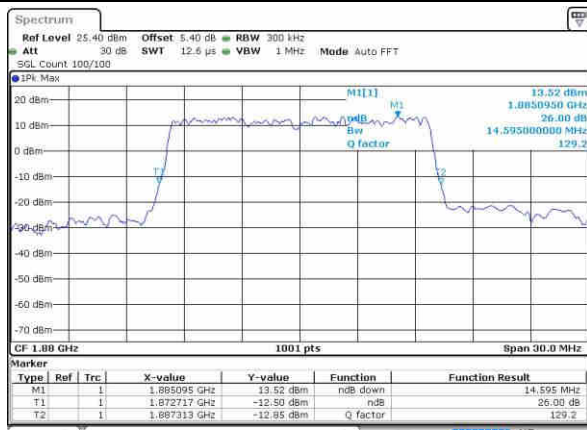
Date: 13 MAR 2017 18:55:31

Lowest Channel / 15MHz / 16QAM



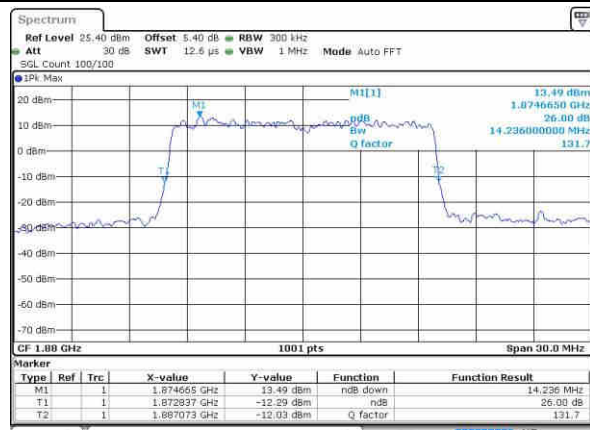
Date: 13 MAR 2017 18:55:43

Middle Channel / 15MHz / QPSK



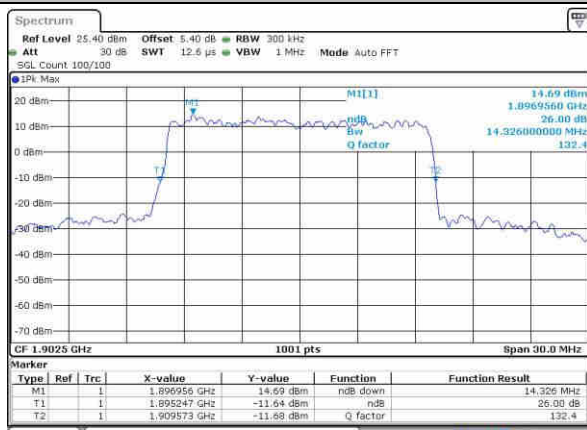
Date: 13 MAR 2017 19:00:53

Middle Channel / 15MHz / 16QAM



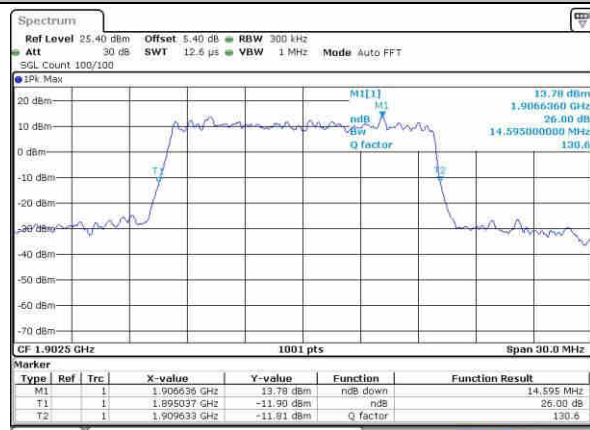
Date: 13 MAR 2017 19:01:04

Highest Channel / 15MHz / QPSK



Date: 13 MAR 2017 19:01:38

Highest Channel / 15MHz / 16QAM

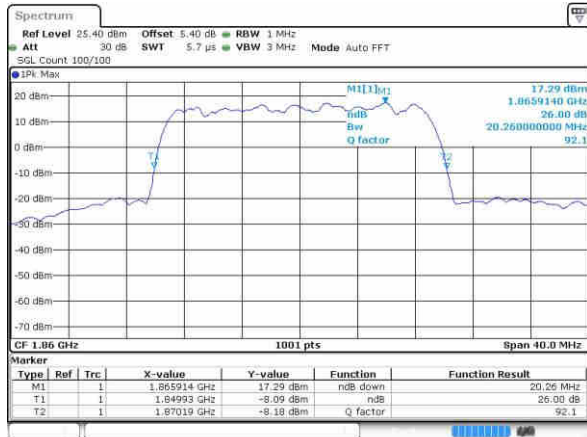


Date: 13 MAR 2017 19:01:49

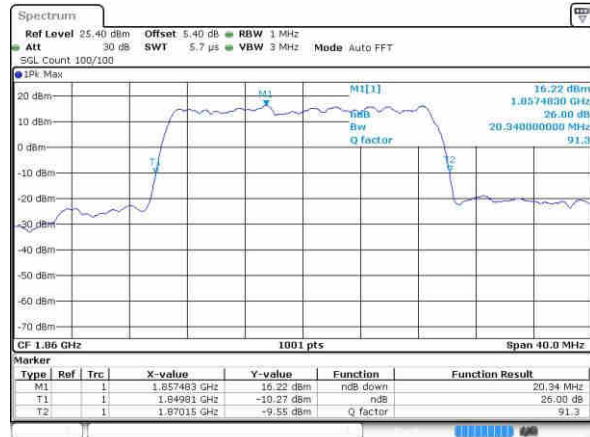


LTE Band 2

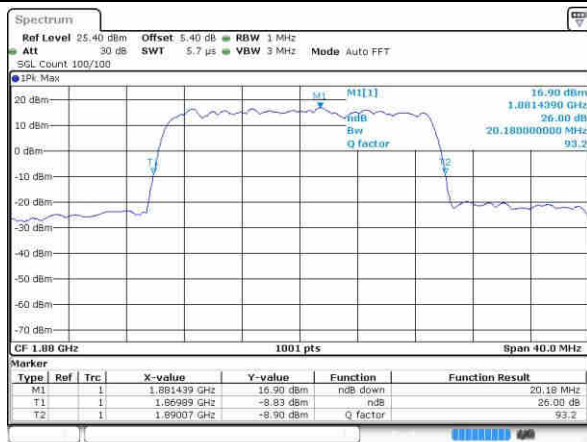
Lowest Channel / 20MHz / QPSK



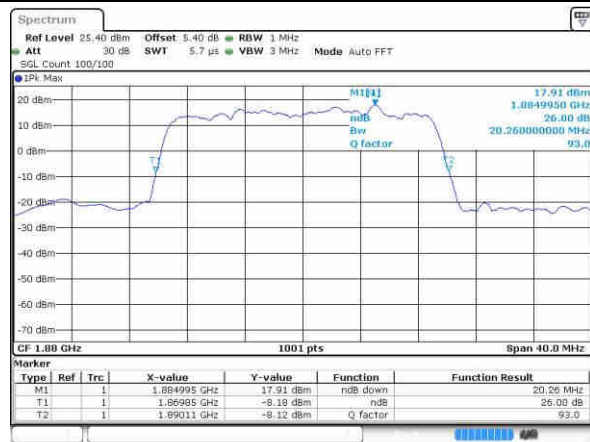
Lowest Channel / 20MHz / 16QAM



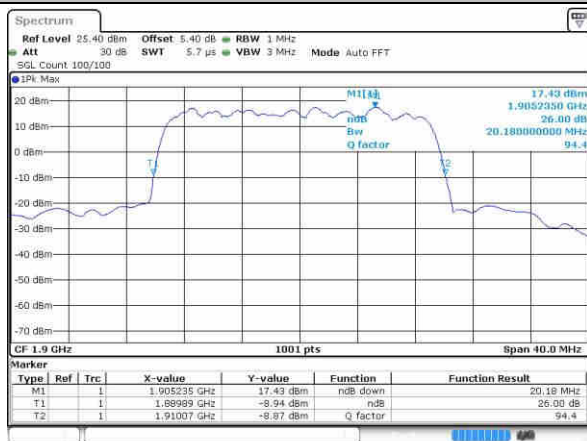
Middle Channel / 20MHz / QPSK



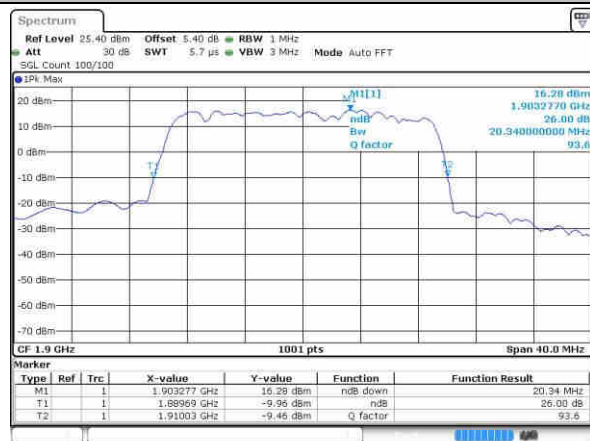
Middle Channel / 20MHz / 16QAM



Highest Channel / 20MHz / QPSK



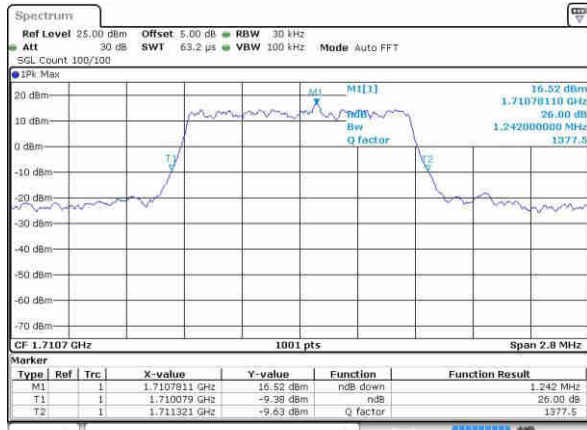
Highest Channel / 20MHz / 16QAM



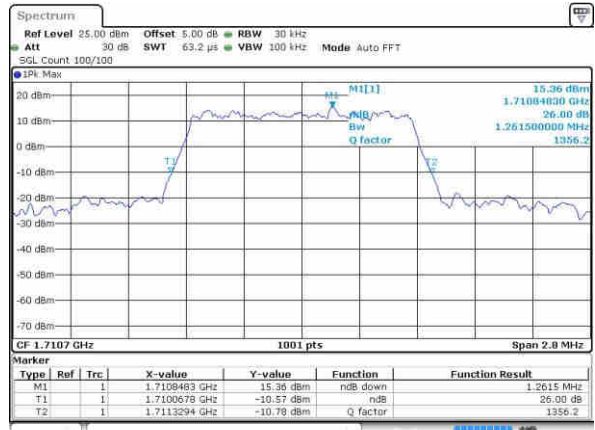


LTE Band 4

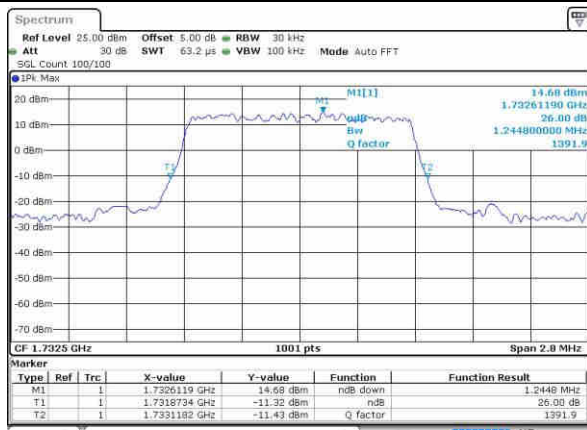
Lowest Channel / 1.4MHz / QPSK



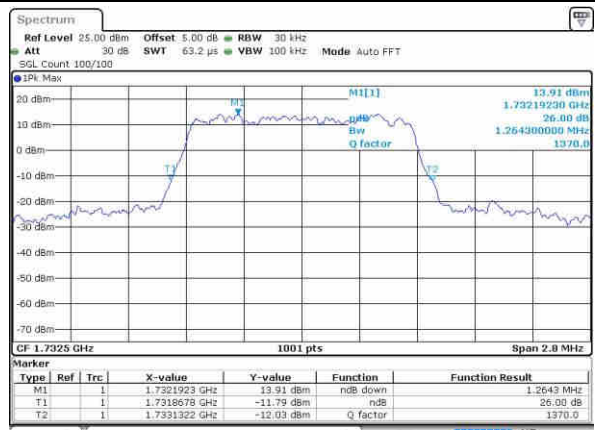
Lowest Channel / 1.4MHz / 16QAM



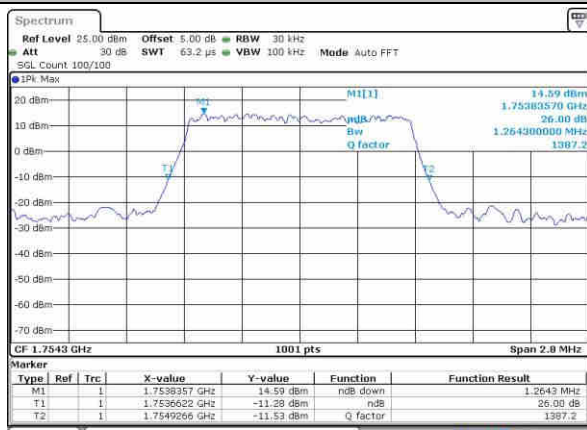
Middle Channel / 1.4MHz / QPSK



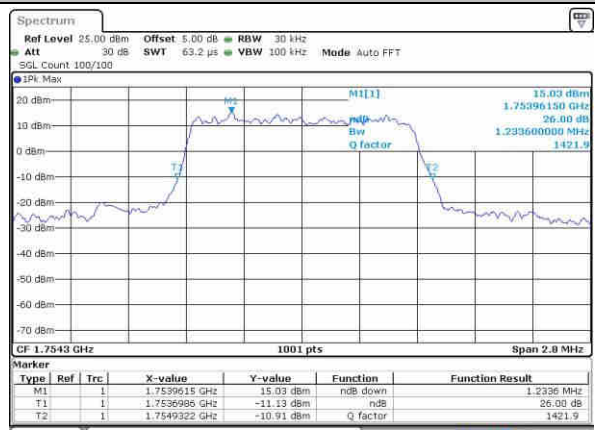
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK



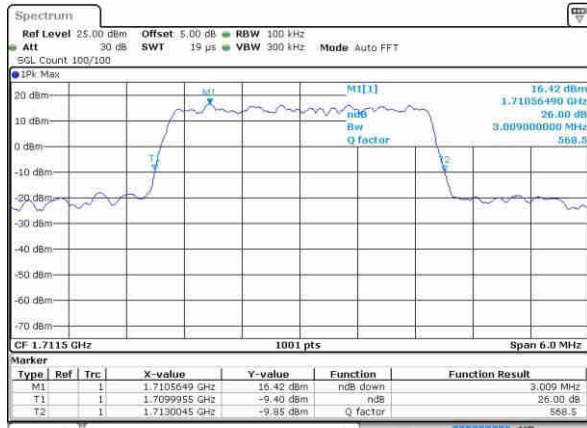
Highest Channel / 1.4MHz / 16QAM



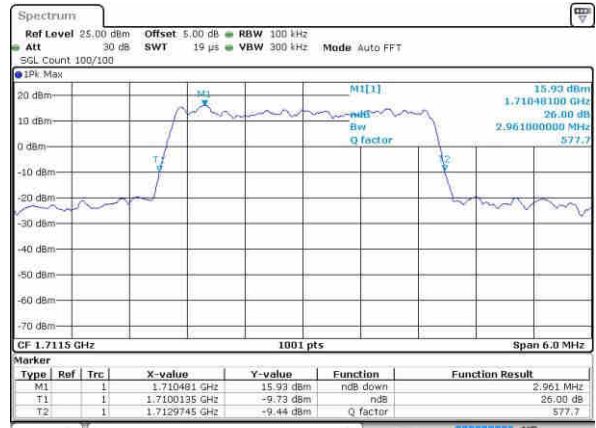


LTE Band 4

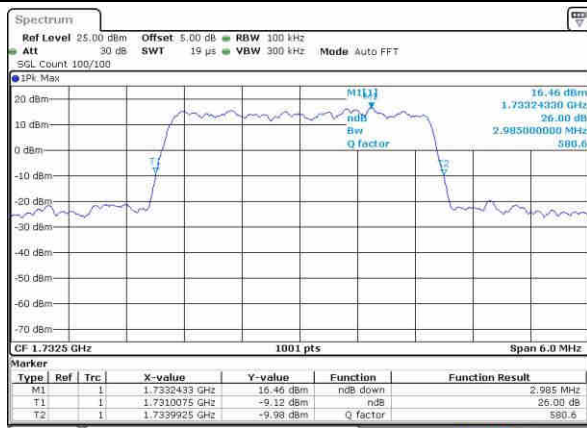
Lowest Channel / 3MHz / QPSK



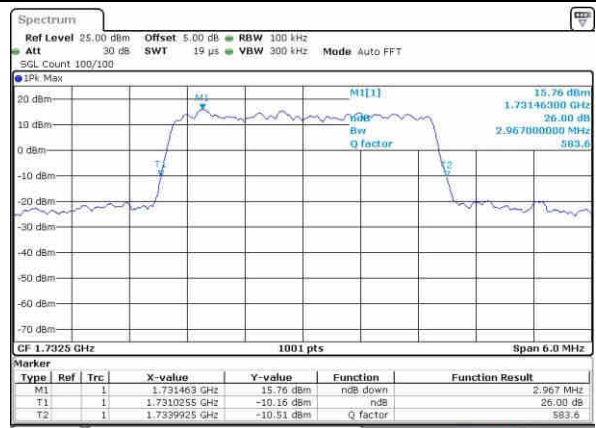
Lowest Channel / 3MHz / 16QAM



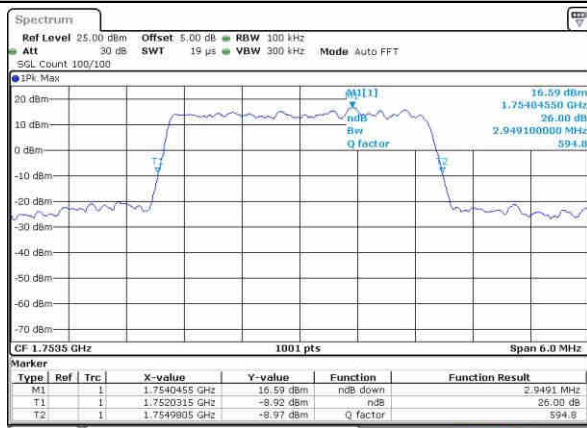
Middle Channel / 3MHz / QPSK



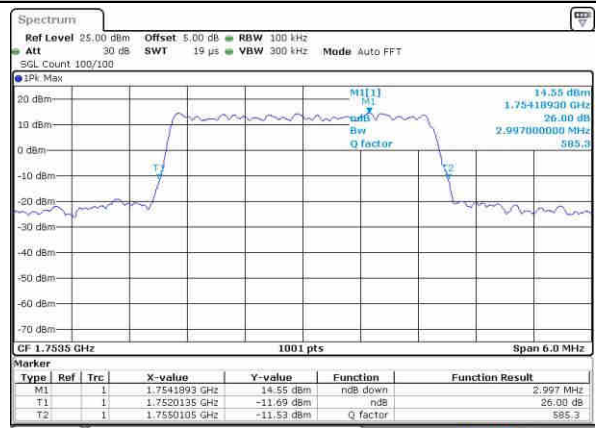
Middle Channel / 3MHz / 16QAM



Highest Channel / 3MHz / QPSK



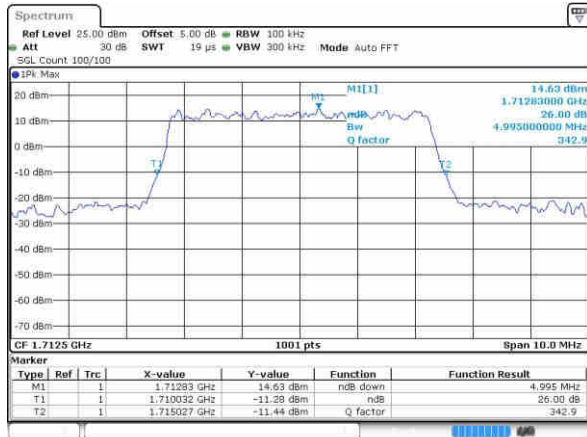
Highest Channel / 3MHz / 16QAM





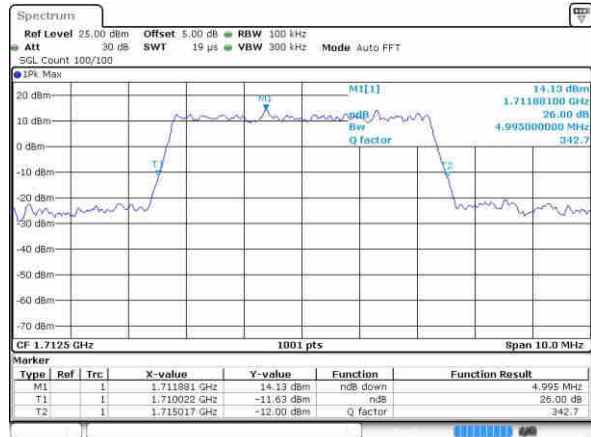
LTE Band 4

Lowest Channel / 5MHz / QPSK



Date: 14 MAR 2017 10:40:16

Lowest Channel / 5MHz / 16QAM



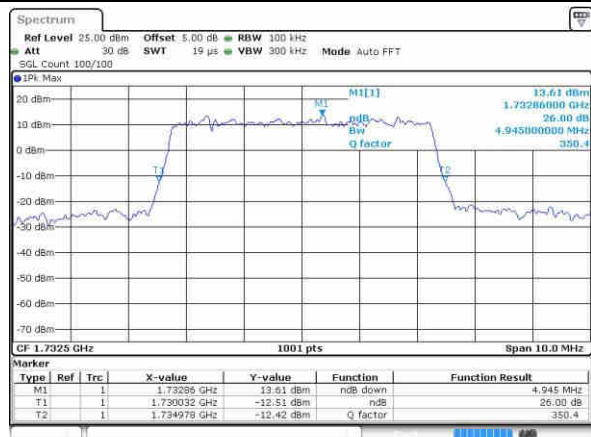
Date: 14 MAR 2017 10:40:27

Middle Channel / 5MHz / QPSK



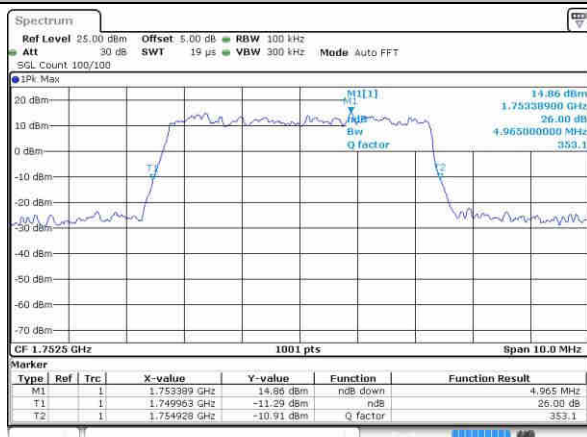
Date: 14 MAR 2017 10:47:29

Middle Channel / 5MHz / 16QAM



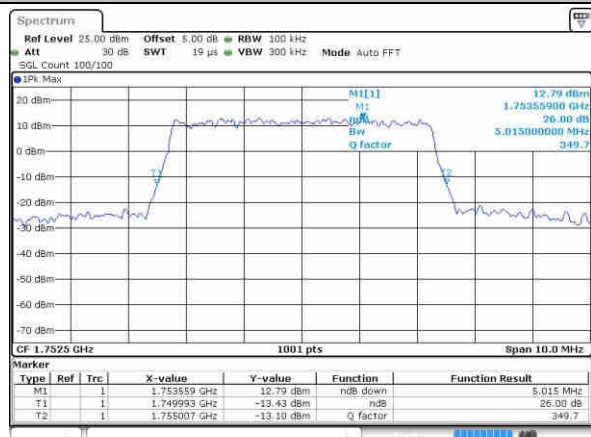
Date: 14 MAR 2017 10:47:40

Highest Channel / 5MHz / QPSK



Date: 14 MAR 2017 10:50:07

Highest Channel / 5MHz / 16QAM

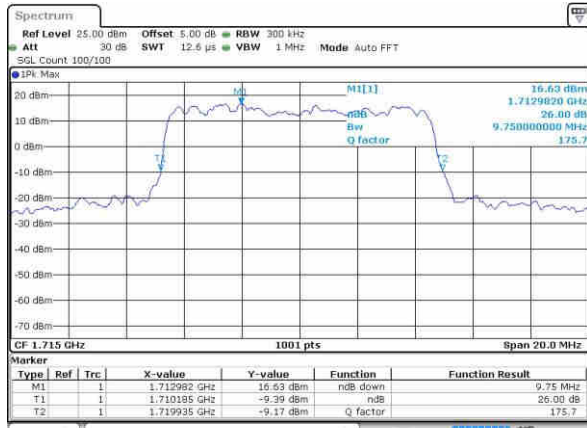


Date: 14 MAR 2017 10:50:18



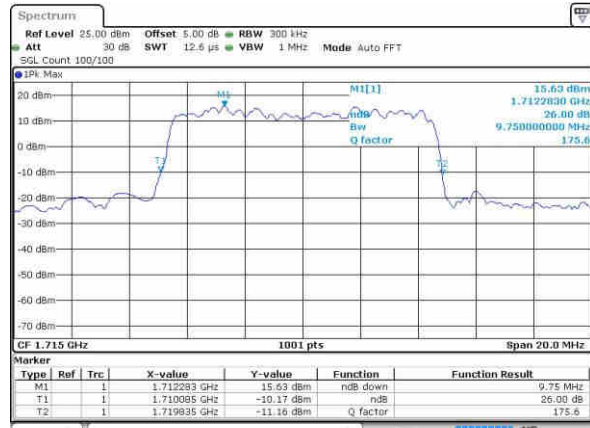
LTE Band 4

Lowest Channel / 10MHz / QPSK



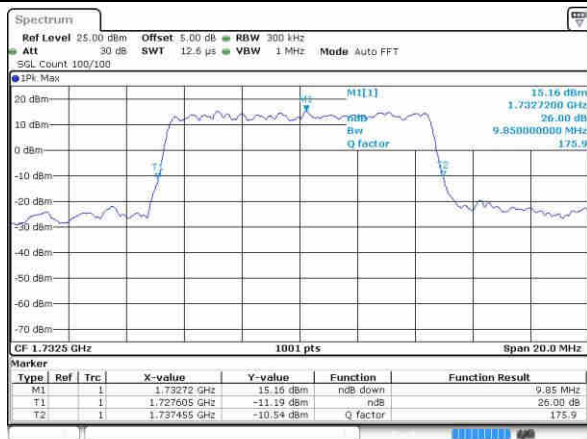
Date: 14 MAR 2017 10:57:20

Lowest Channel / 10MHz / 16QAM



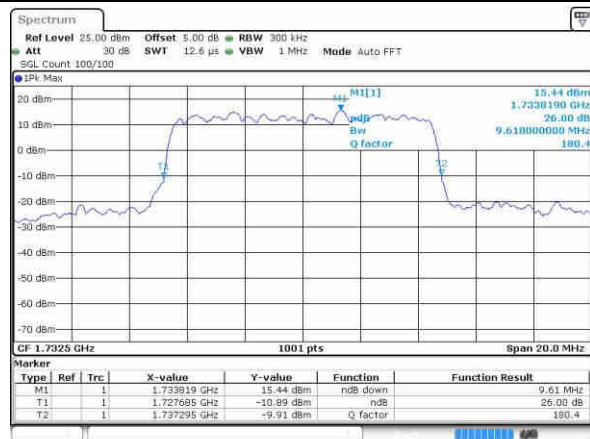
Date: 14 MAR 2017 10:57:31

Middle Channel / 10MHz / QPSK



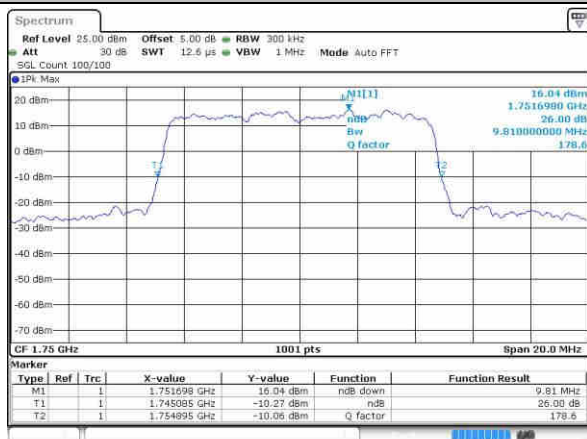
Date: 14 MAR 2017 11:04:33

Middle Channel / 10MHz / 16QAM



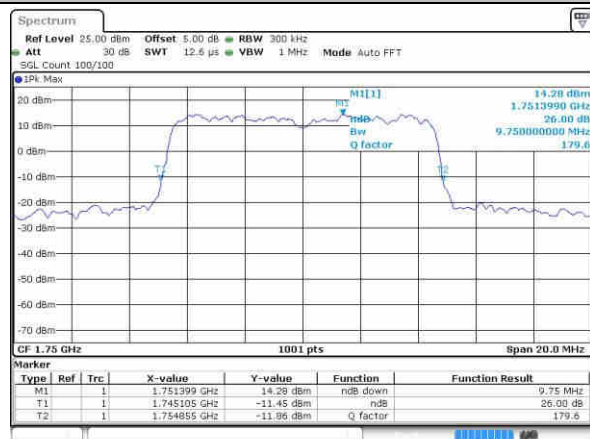
Date: 14 MAR 2017 11:04:44

Highest Channel / 10MHz / QPSK



Date: 14 MAR 2017 11:07:11

Highest Channel / 10MHz / 16QAM

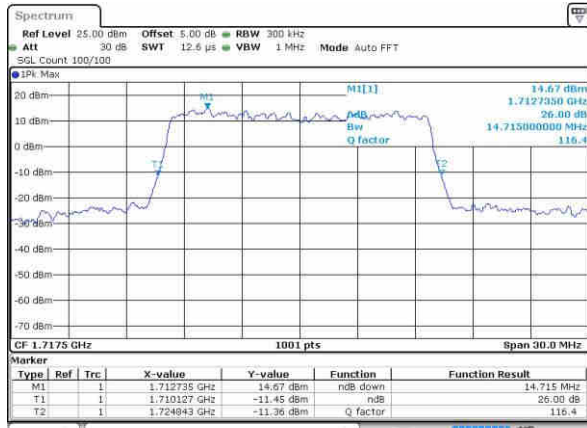


Date: 14 MAR 2017 11:07:22

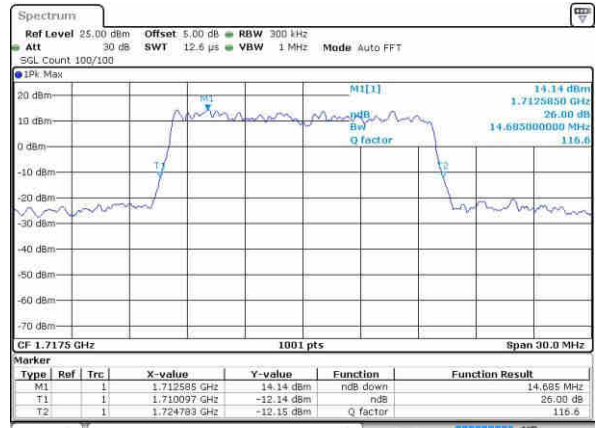


LTE Band 4

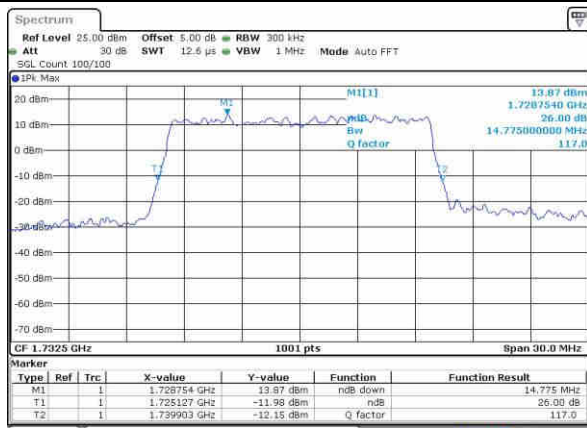
Lowest Channel / 15MHz / QPSK



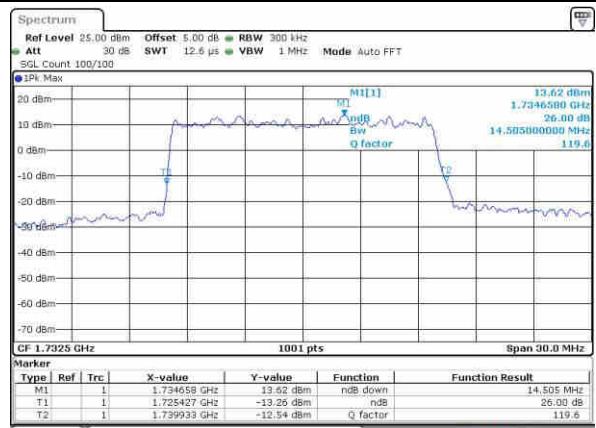
Lowest Channel / 15MHz / 16QAM



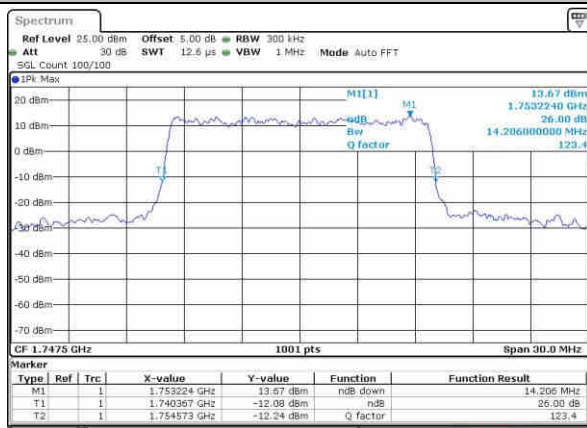
Middle Channel / 15MHz / QPSK



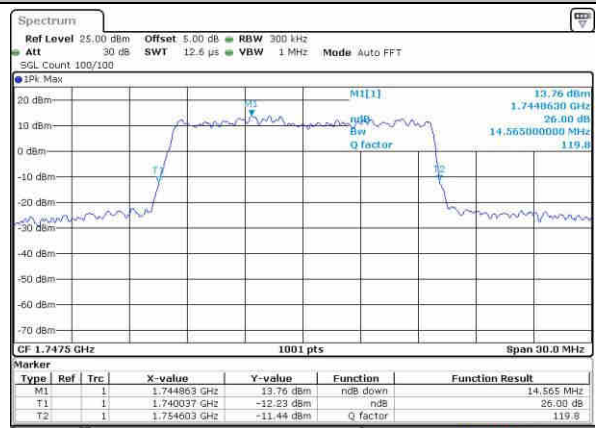
Middle Channel / 15MHz / 16QAM



Highest Channel / 15MHz / QPSK



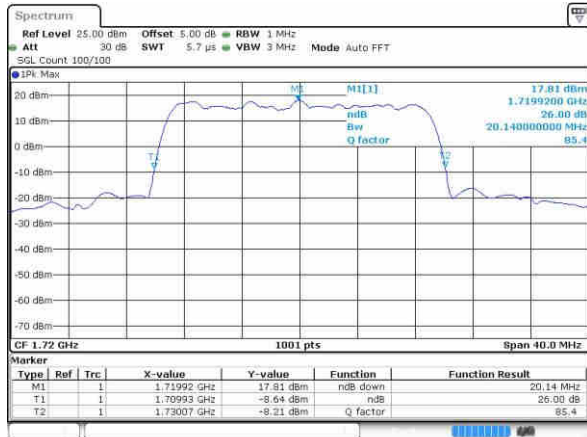
Highest Channel / 15MHz / 16QAM



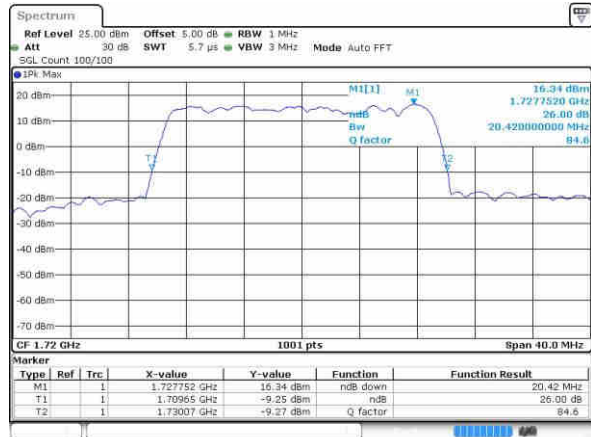


LTE Band 4

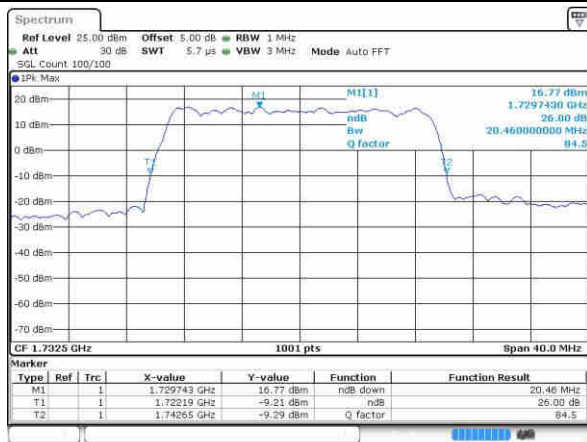
Lowest Channel / 20MHz / QPSK



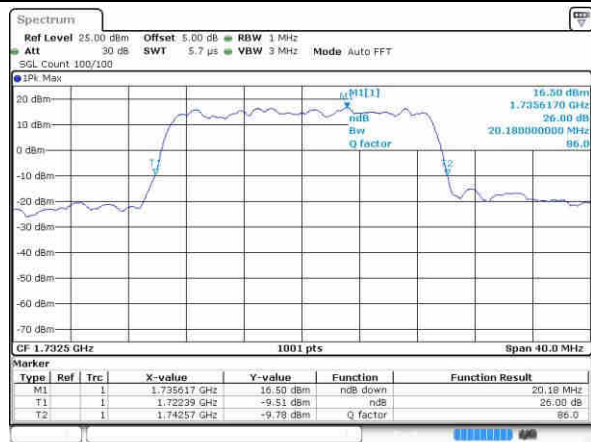
Lowest Channel / 20MHz / 16QAM



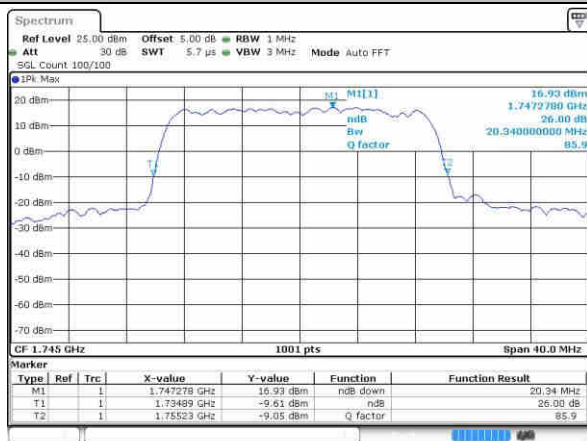
Middle Channel / 20MHz / QPSK



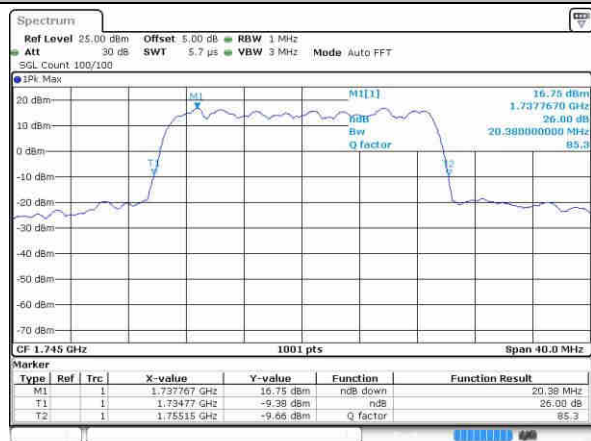
Middle Channel / 20MHz / 16QAM



Highest Channel / 20MHz / QPSK



Highest Channel / 20MHz / 16QAM



**Occupied Bandwidth**

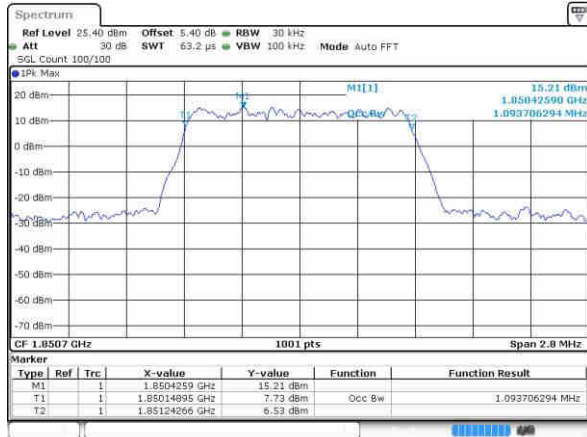
Mode	LTE Band 2 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.09	1.09	2.70	2.72	4.52	4.49	9.09	9.05	13.46	13.46	18.30	18.46
Middle CH	1.09	1.09	2.71	2.71	4.51	4.51	9.03	8.93	13.40	13.43	18.46	18.54
Highest CH	1.09	1.09	2.72	2.71	4.52	4.48	9.05	9.03	13.55	13.43	18.38	18.38

Mode	LTE Band 4 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.09	1.09	2.72	2.73	4.49	4.51	9.01	8.97	13.52	13.43	18.46	18.42
Middle CH	1.10	1.09	2.72	2.72	4.50	4.51	8.99	9.01	13.49	13.49	18.42	18.34
Highest CH	1.09	1.09	2.72	2.72	4.50	4.51	9.07	8.99	13.46	13.46	18.38	18.38

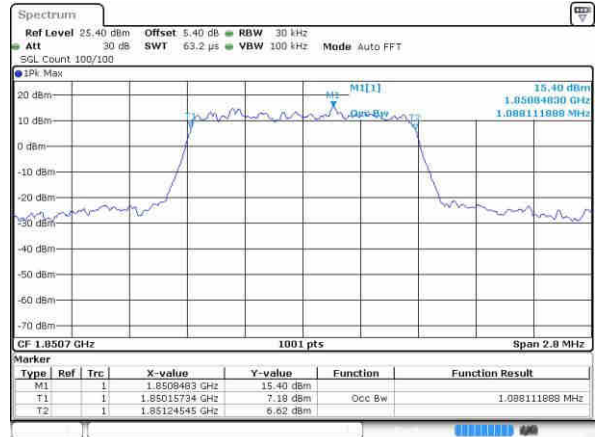


LTE Band 2

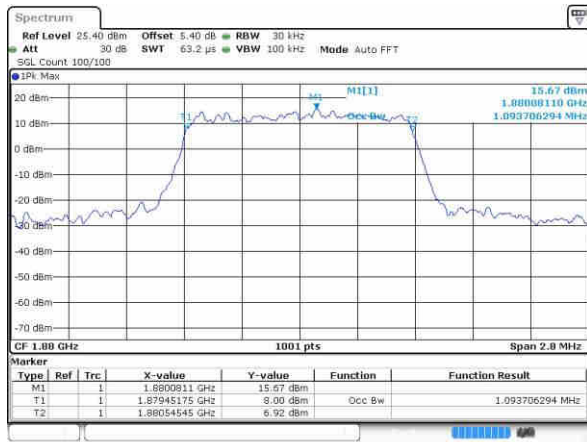
Lowest Channel / 1.4MHz / QPSK



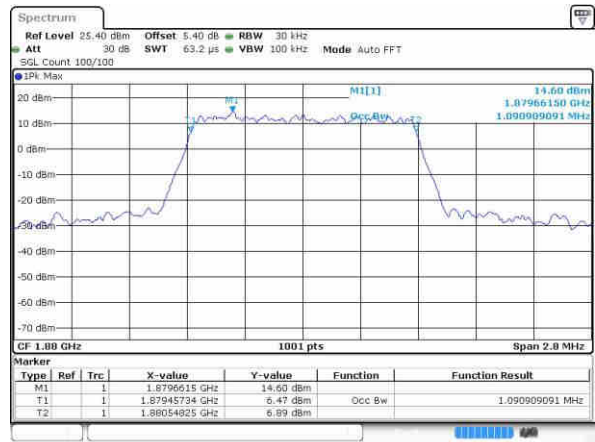
Lowest Channel / 1.4MHz / 16QAM



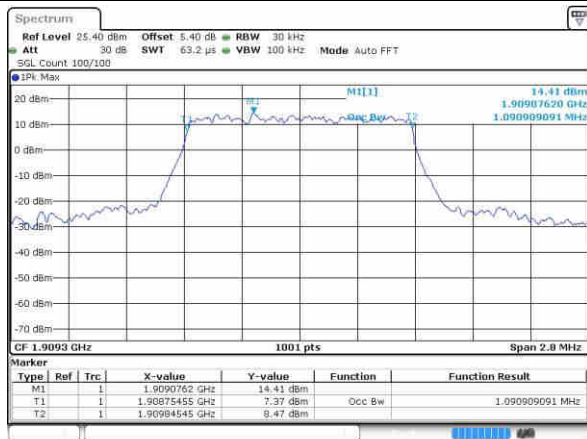
Middle Channel / 1.4MHz / QPSK



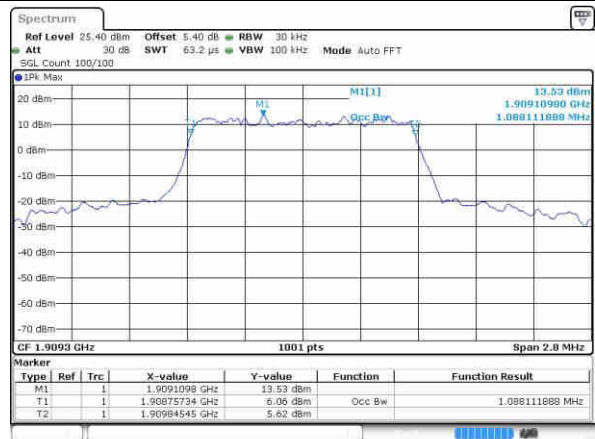
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK



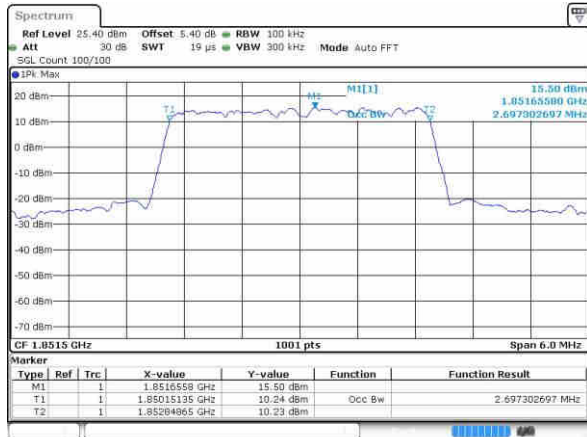
Highest Channel / 1.4MHz / 16QAM



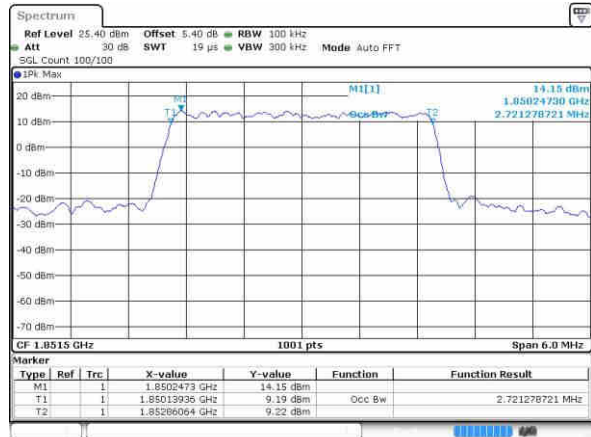


LTE Band 2

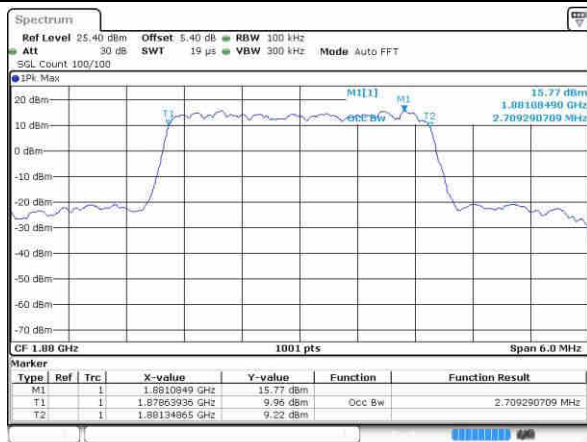
Lowest Channel / 3MHz / QPSK



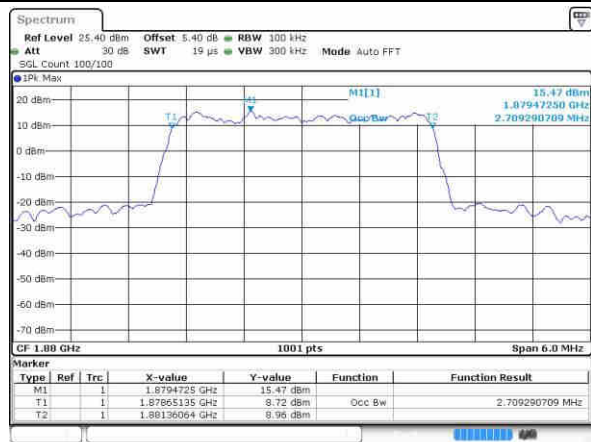
Lowest Channel / 3MHz / 16QAM



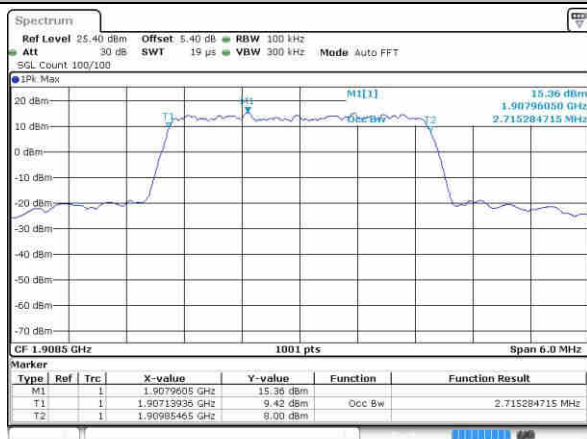
Middle Channel / 3MHz / QPSK



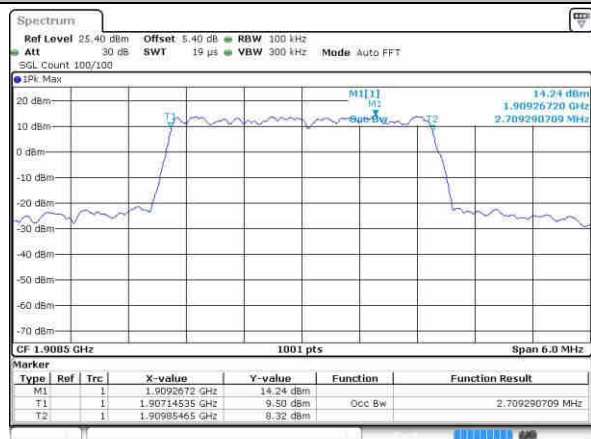
Middle Channel / 3MHz / 16QAM



Highest Channel / 3MHz / QPSK



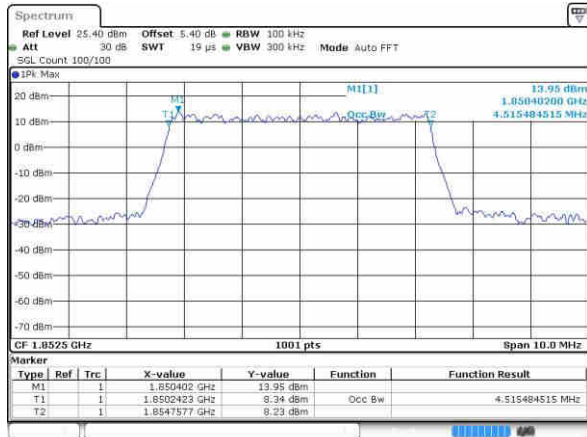
Highest Channel / 3MHz / 16QAM



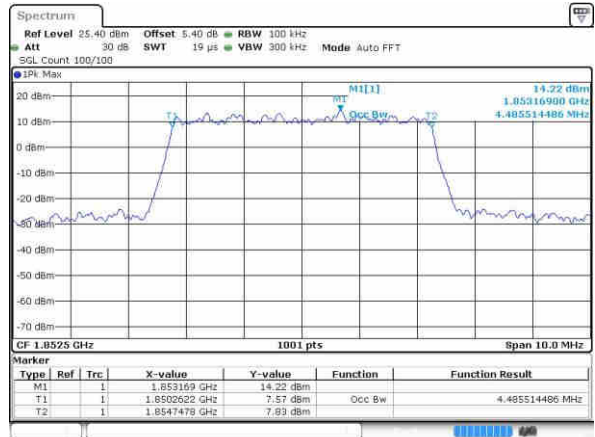


LTE Band 2

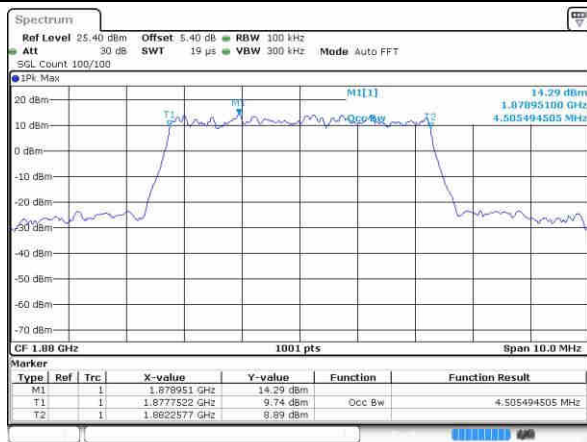
Lowest Channel / 5MHz / QPSK



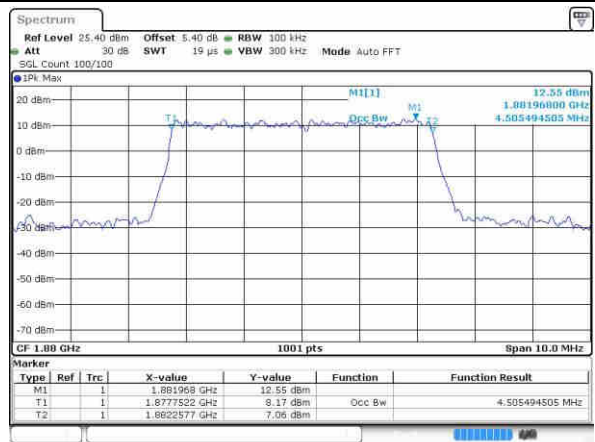
Lowest Channel / 5MHz / 16QAM



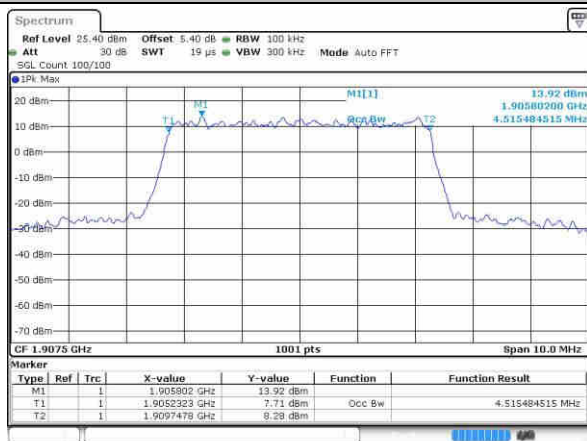
Middle Channel / 5MHz / QPSK



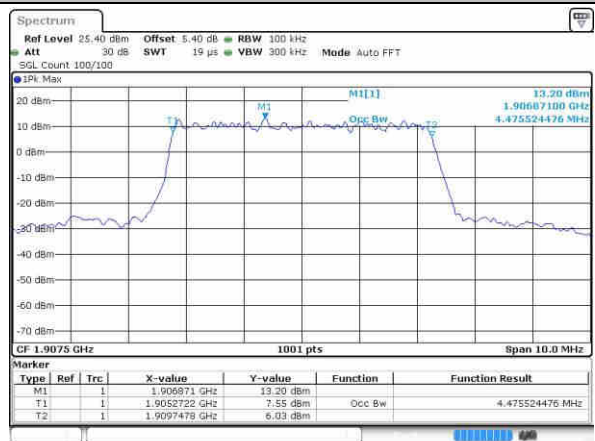
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



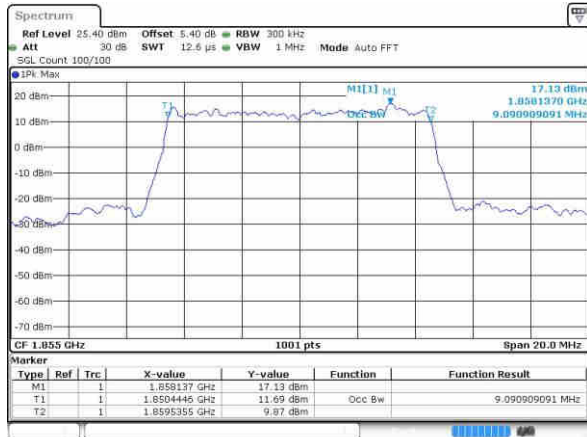
Highest Channel / 5MHz / 16QAM



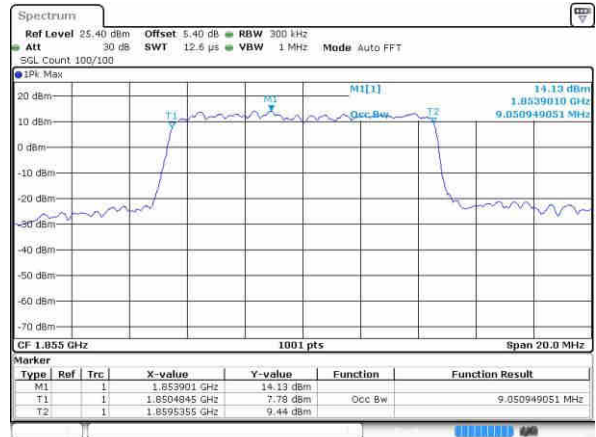


LTE Band 2

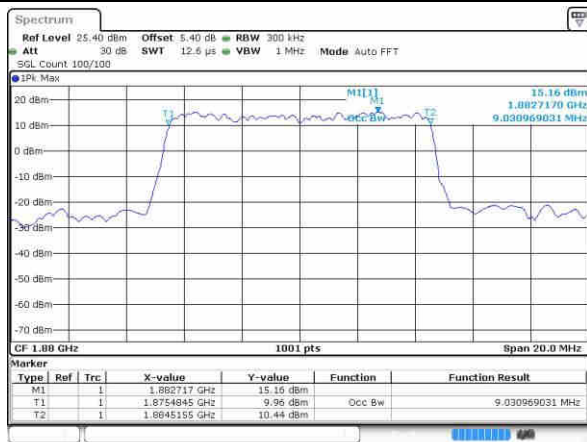
Lowest Channel / 10MHz / QPSK



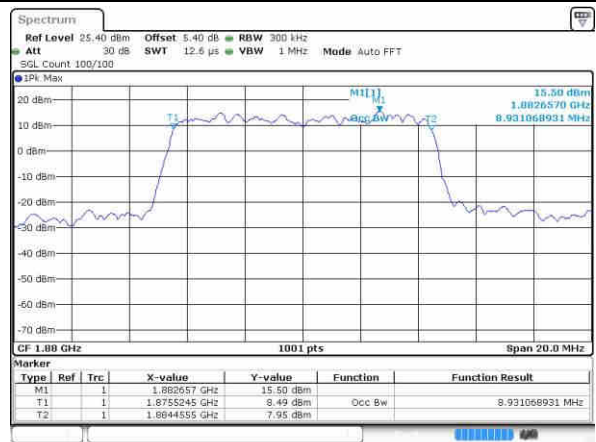
Lowest Channel / 10MHz / 16QAM



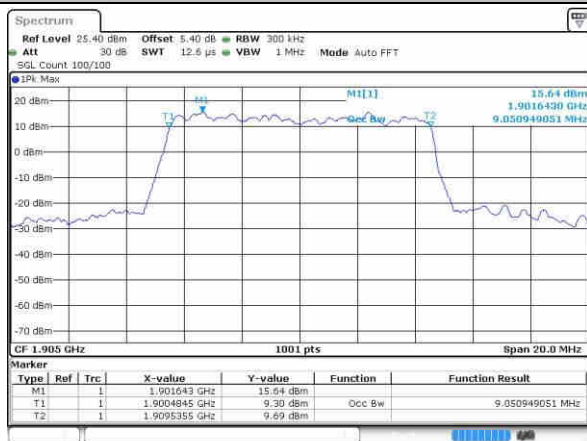
Middle Channel / 10MHz / QPSK



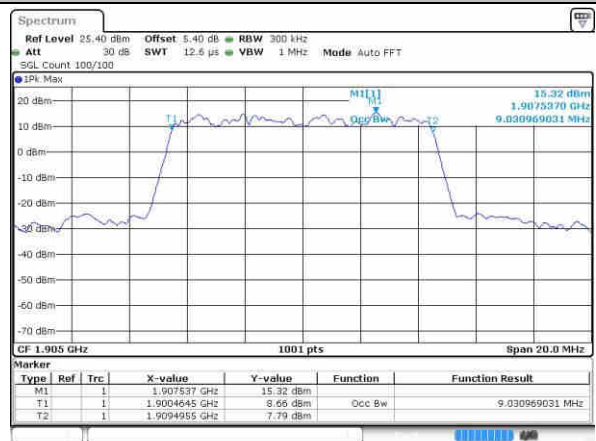
Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / QPSK



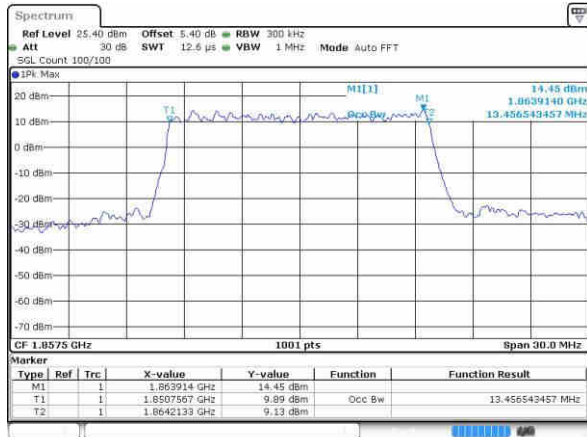
Highest Channel / 10MHz / 16QAM



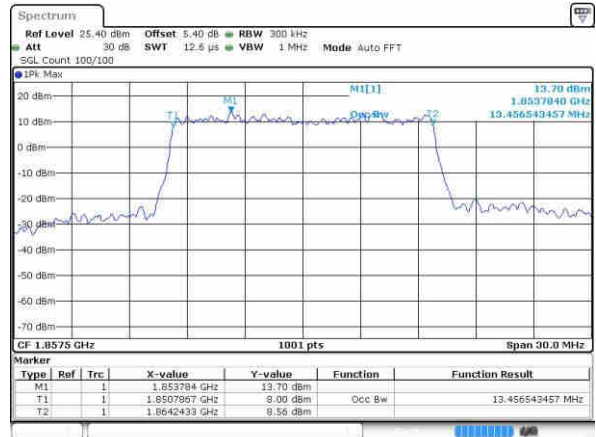


LTE Band 2

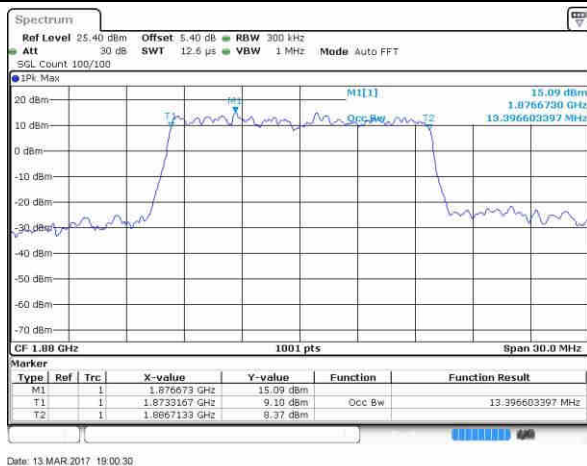
Lowest Channel / 15MHz / QPSK



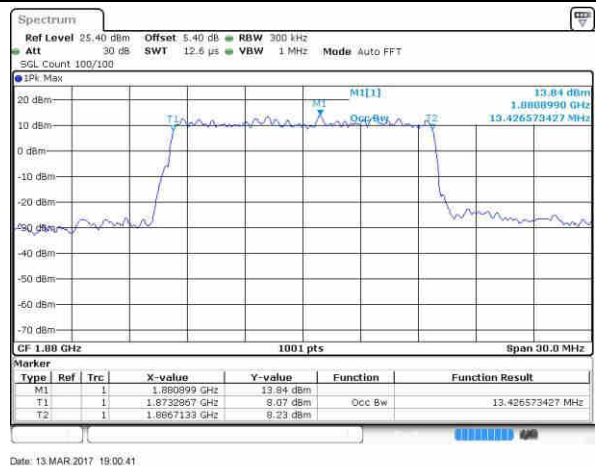
Lowest Channel / 15MHz / 16QAM



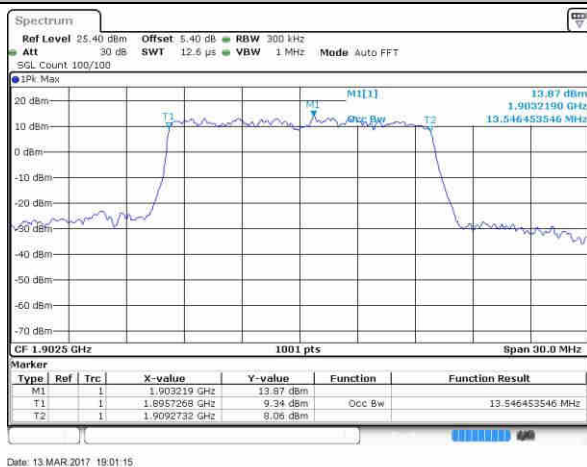
Middle Channel / 15MHz / QPSK



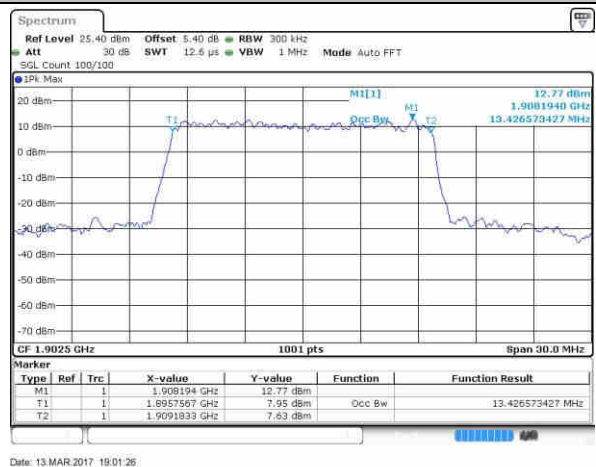
Middle Channel / 15MHz / 16QAM



Highest Channel / 15MHz / QPSK



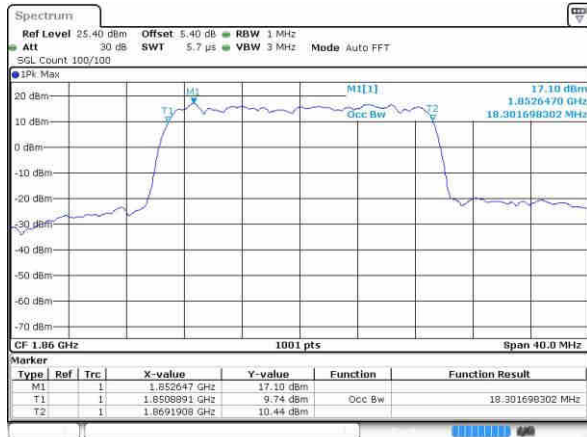
Highest Channel / 15MHz / 16QAM



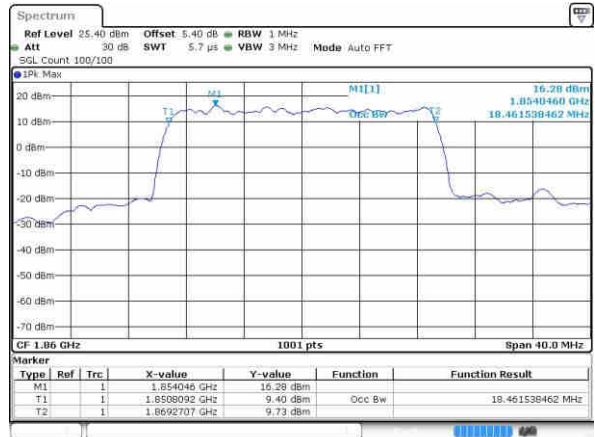


LTE Band 2

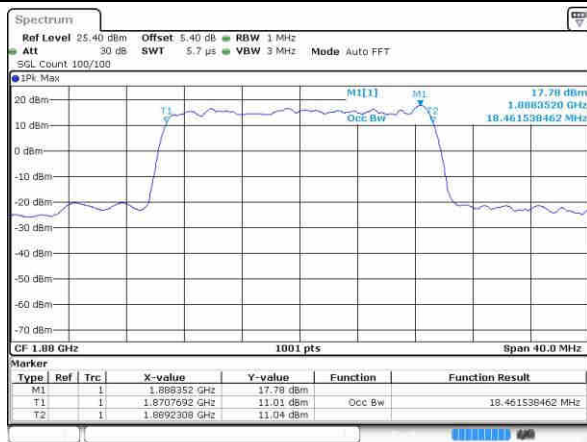
Lowest Channel / 20MHz / QPSK



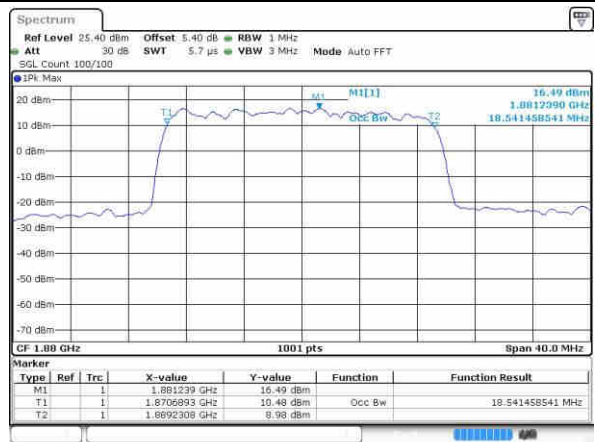
Lowest Channel / 20MHz / 16QAM



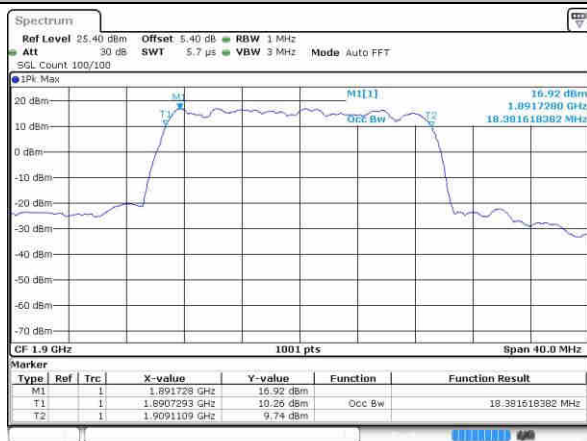
Middle Channel / 20MHz / QPSK



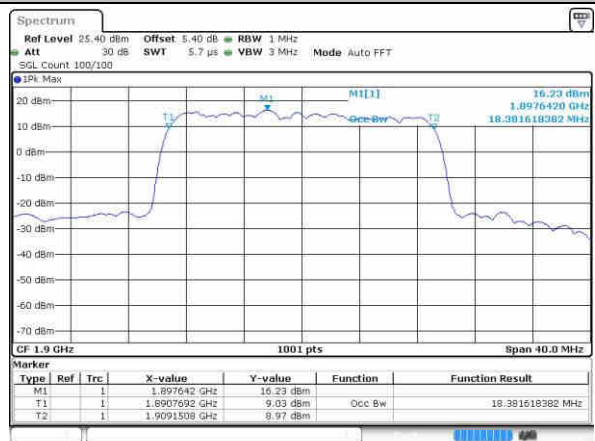
Middle Channel / 20MHz / 16QAM



Highest Channel / 20MHz / QPSK



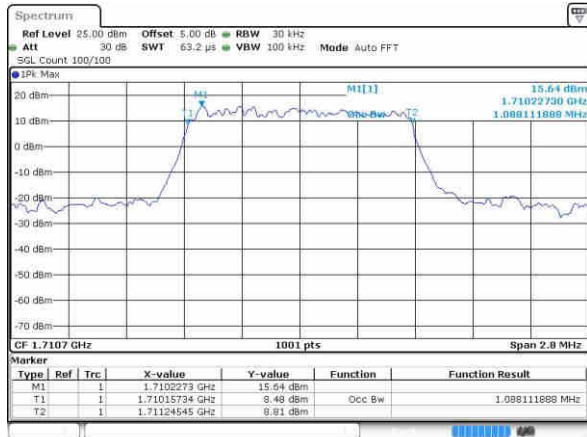
Highest Channel / 20MHz / 16QAM





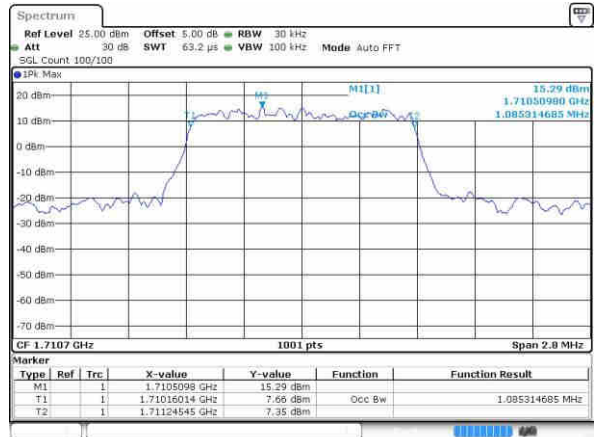
LTE Band 4

Lowest Channel / 1.4MHz / QPSK



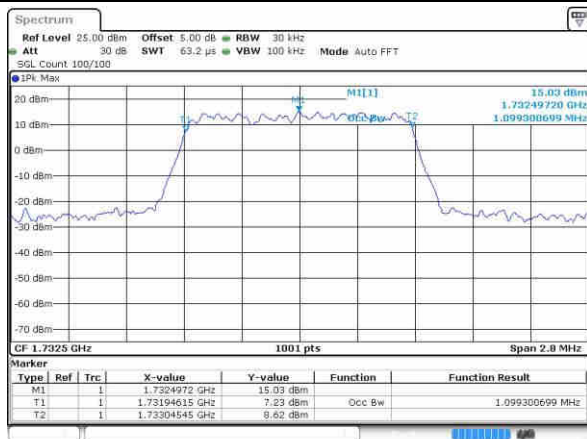
Date: 14 MAR 2017 10:05:44

Lowest Channel / 1.4MHz / 16QAM



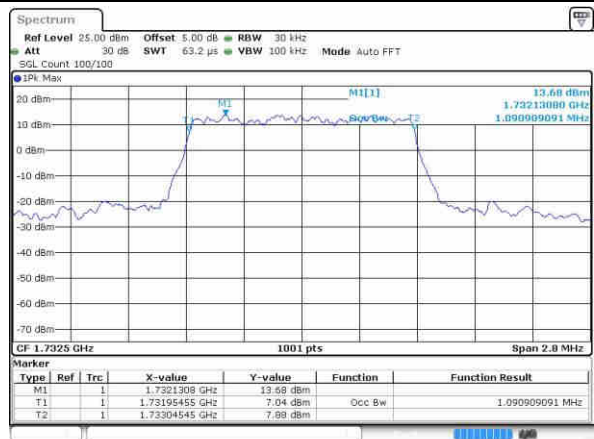
Date: 14 MAR 2017 10:05:55

Middle Channel / 1.4MHz / QPSK



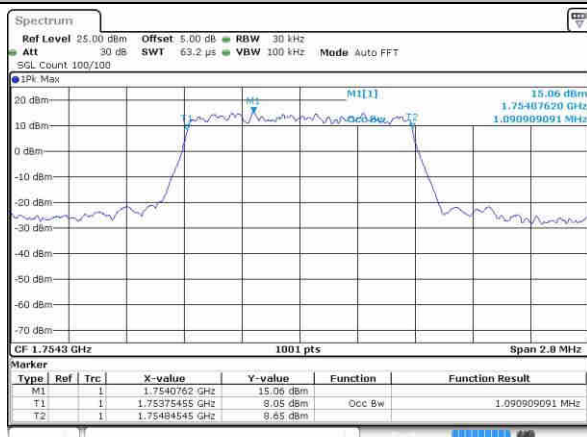
Date: 14 MAR 2017 10:12:58

Middle Channel / 1.4MHz / 16QAM



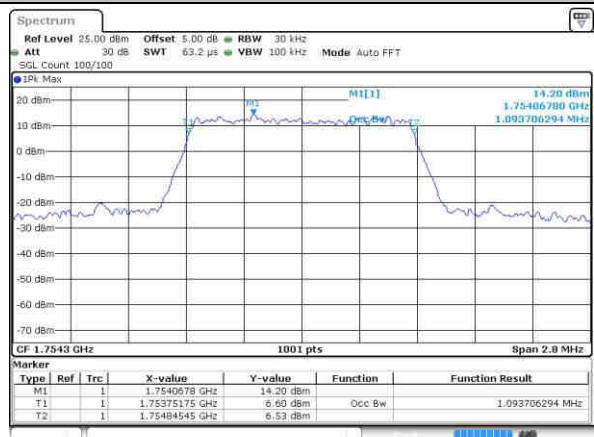
Date: 14 MAR 2017 10:13:09

Highest Channel / 1.4MHz / QPSK



Date: 14 MAR 2017 10:15:35

Highest Channel / 1.4MHz / 16QAM

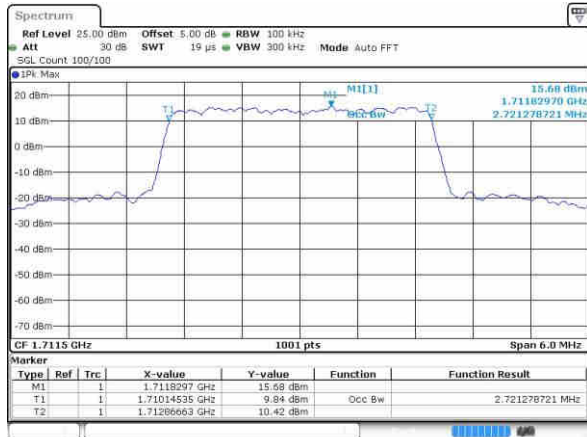


Date: 14 MAR 2017 10:15:47

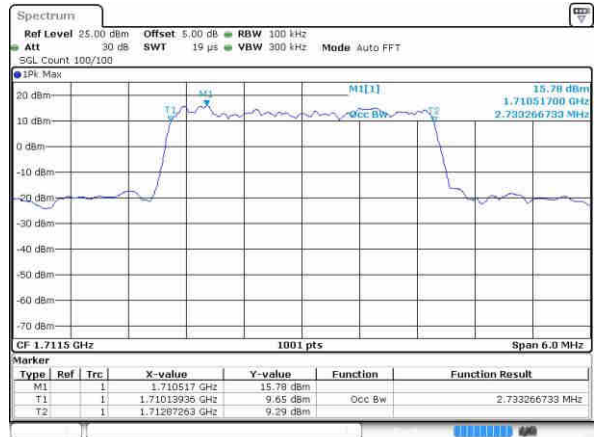


LTE Band 4

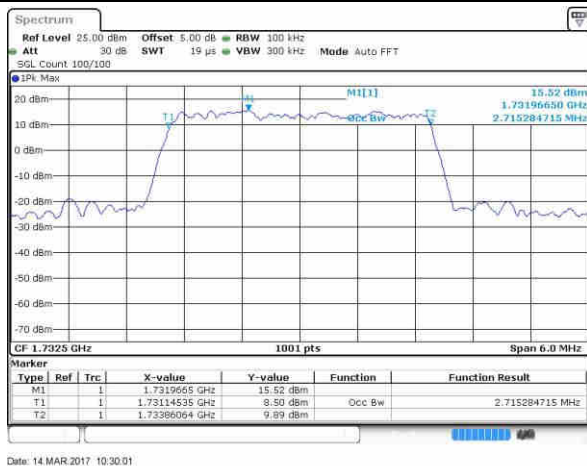
Lowest Channel / 3MHz / QPSK



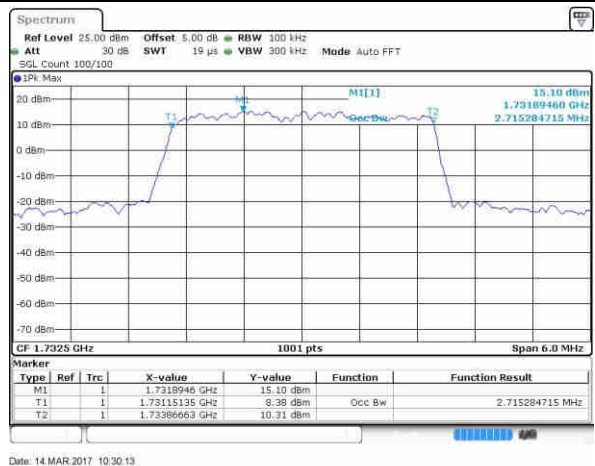
Lowest Channel / 3MHz / 16QAM



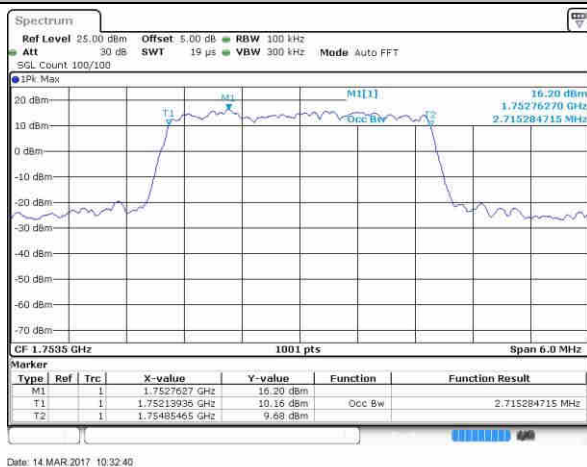
Middle Channel / 3MHz / QPSK



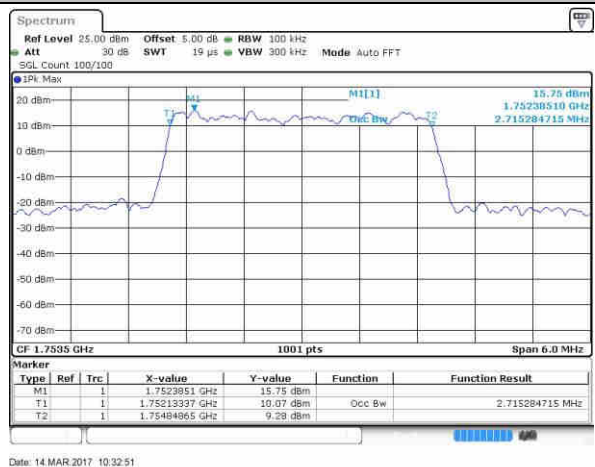
Middle Channel / 3MHz / 16QAM



Highest Channel / 3MHz / QPSK



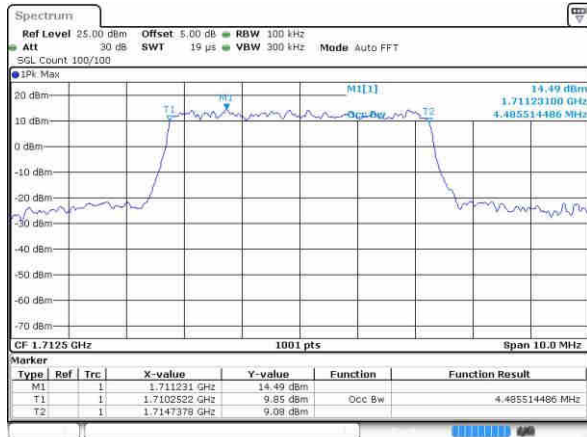
Highest Channel / 3MHz / 16QAM



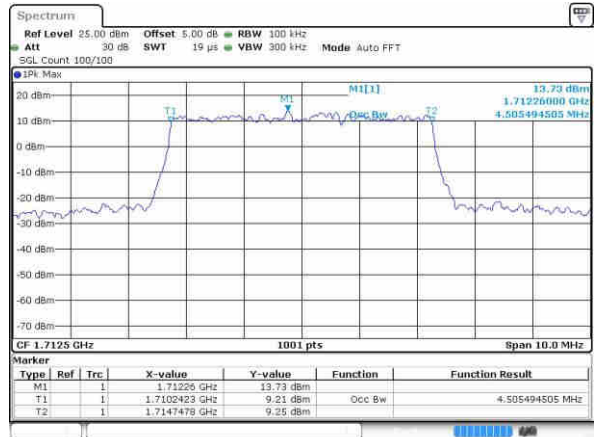


LTE Band 4

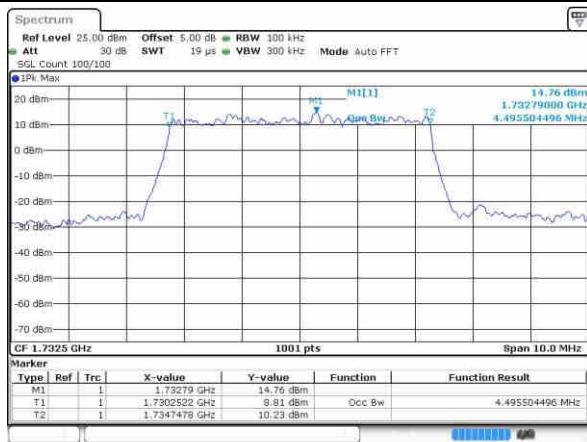
Lowest Channel / 5MHz / QPSK



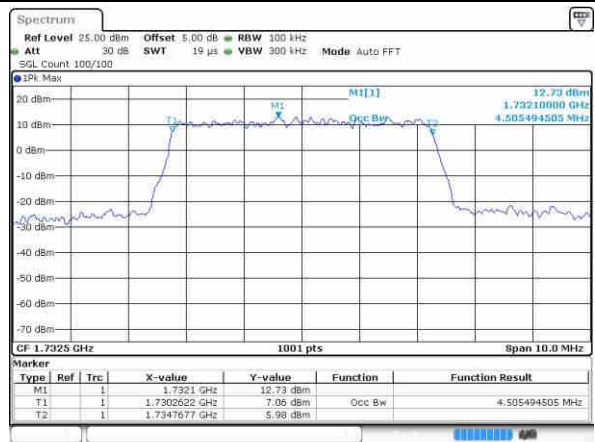
Lowest Channel / 5MHz / 16QAM



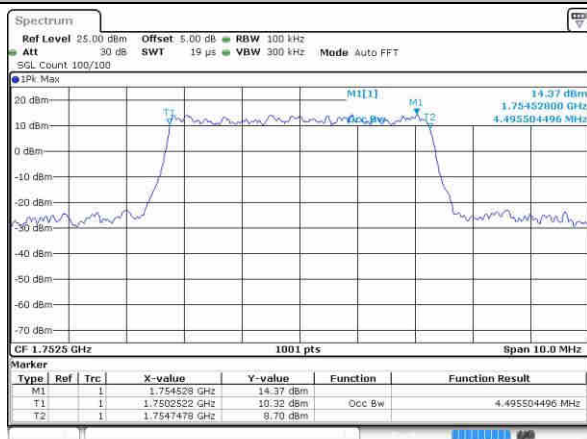
Middle Channel / 5MHz / QPSK



Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK



Highest Channel / 5MHz / 16QAM

