



# FCC RF Test Report

**APPLICANT** : Wistron NeWeb Corporation  
**EQUIPMENT** : M2M DATA MODULE  
**BRAND NAME** : WNC  
**MODEL NAME** : IMA2A  
**FCC ID** : NKRIMA2A  
**STANDARD** : 47 CFR Part 2, 24(E), 27(L), 27(H)  
**CLASSIFICATION** : PCS Licensed Transmitter (PCB)

The product was received on May 17, 2018 and completely tested on Jun. 24, 2018. 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.



Approved by: James Huang / Manager

**Sporton International (Kunshan) Inc.**

**No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China**



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§27.50(c)(10)	Effective Radiated Power (Band 12)	ERP < 3 Watt	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(g) §27.53(h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 12)	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.8	§2.1051 §24.238(a) §27.53(g) §27.53(h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 12)	< 43+10log <sub>10</sub> (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(g) §27.53(h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 12)	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 27.25 dB at 7404.00 MHz



# 1 General Description

## 1.1 Applicant

**Wistron NeWeb Corporation**

20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

## 1.2 Manufacturer

**Wistron NeWeb Corporation**

20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	M2M DATA MODULE
Brand Name	WNC
Model Name	IMA2A
FCC ID	NKRIMA2A
EUT supports Radios application	LTE Category M1
IMEI Code	Conducted: N/A Radiation: 015230000001129
HW Version	v1.0
SW Version	IMA2A_v20.13
EUT Stage	Identical Prototype



### 1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
<b>Tx Frequency</b>	LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz
<b>Rx Frequency</b>	LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz
<b>Bandwidth</b>	LTE Band 2 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 4 : 1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz LTE Band 12 : 1.4MHz / 3MHz / 5MHz / 10MHz
<b>Maximum Output Power to Antenna</b>	LTE Band 2 : 23.84 dBm LTE Band 4 : 23.96 dBm LTE Band 12 : 23.80 dBm
<b>Antenna Gain</b>	LTE Band 2 : 0.6 dBi LTE Band 4 : 0.6 dBi LTE Band 12 : -3.5 dBi
<b>Type of Modulation</b>	QPSK / 16QAM

### 1.5 Modification of EUT

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



### 1.6 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	-	-	0.2618	-	-	0.2173
3	1851.5 ~ 1908.5	-	-	0.2541	-	-	0.2009
5	1852.5 ~ 1907.5	1M11G7D	0.0054	0.2512	1M10W7D	-	0.2780
10	1855.0 ~ 1905.0	-	-	0.2570	-	-	0.2754
15	1857.5 ~ 1902.5	-	-	0.2570	-	-	0.2742
20	1860.0 ~ 1900.0	-	-	0.2564	-	-	0.2692
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	-	-	0.2472	-	-	0.2037
3	1711.5 ~ 1753.5	-	-	0.2466	-	-	0.2014
5	1712.5 ~ 1752.5	1M12G7D	0.0151	0.2455	1M11W7D	-	0.2858
10	1715.0 ~ 1750.0	-	-	0.2754	-	-	0.2754
15	1717.5 ~ 1747.5	-	-	0.2455	-	-	0.2661
20	1720.0 ~ 1745.0	-	-	0.2630	-	-	0.2844
LTE Band 12		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)
1.4	699.7 ~ 715.3	-	-	0.0526	-	-	0.0426
3	700.5 ~ 714.5	-	-	0.0514	-	-	0.0406
5	701.5 ~ 713.5	1M13G7D	0.0072	0.0582	1M11W7D	-	0.0653
10	704.0 ~ 711.0	-	-	0.0596	-	-	0.0637

Note: For LTE Category M1 that Maximum UE channel bandwidth is 1.4MHz, So we choice Bandwidth of 5MHz to full test which cover 99% OBW of other Bandwidths.



### 1.7 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600155-0) and the FCC designation No is CN5013.

<b>Test Site</b>	Sporton International (Kunshan) Inc.		
<b>Test Site Location</b>	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC Test Firm Registration No.</b>
	TH01-KS	03CH02-KS	630927

**Note:** The test site complies with ANSI C63.4 2014 requirement.

### 1.8 Applicable Standards

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

- ♦ 47 CFR Part 2, 24(E), 27(L), 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.

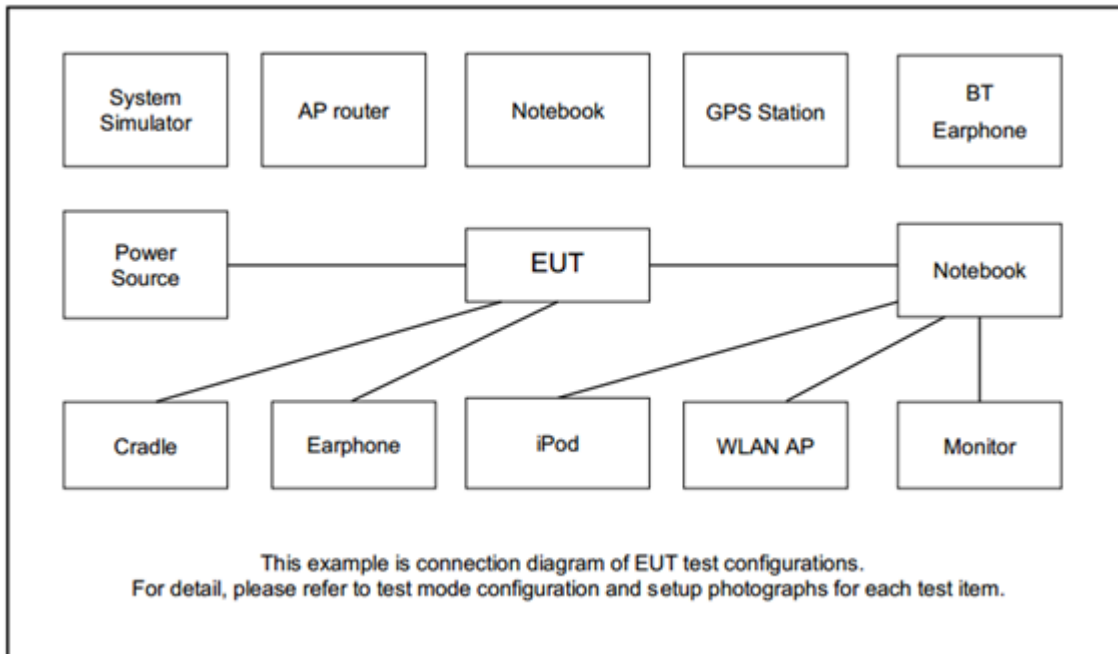
Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

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
	4	v	v	v	v	v	v	v	v		v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v		v	v	v	v	v	v
Peak-to-Average Ratio	2			v				v	v		v		v	v	v	v
	4			v				v	v		v		v	v	v	v
	12			v		-	-	v	v		v		v	v	v	v
26dB and 99% Bandwidth	2			v				v	v				v	v	v	v
	4			v				v	v				v	v	v	v
	12			v		-	-	v	v				v	v	v	v
Conducted Band Edge	2			v				v	v		v		v	v		v
	4			v				v	v		v		v	v		v
	12			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
	4			v				v	v		v			v	v	v
	12			v		-	-	v	v		v			v	v	v
Frequency Stability	2			v				v					v		v	
	4			v				v					v		v	
	12			v		-	-	v					v		v	
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v		v			v	v	v
	4	v	v	v	v	v	v	v	v		v			v	v	v
	12	v	v	v	v	-	-	v	v		v			v	v	v
Radiated Spurious Emission	2	Worst Case											v	v	v	
	4	Worst Case											v	v	v	
	12	Worst Case											v	v	v	
Note	<ol style="list-style-type: none"> <li>The mark "v" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>The maximum RB size of LTE Cat M1 is 6RB for each LTE band and bandwidth, for conducted power and ERP/EIRP we test all the bandwidth, for the other conducted test items we only test 5MHz Bandwidth.</li> <li>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.</li> </ol>															

## 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.	DC	N/A	E1884515	N/A	N/A	DC
2.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	WWAN Antenna	WNC	N/A	N/A	N/A	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	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 4.5 dB.

Example :

$Offset(dB) = RF\ cable\ loss(dB).$



= 4.5 (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 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



LTE Band 12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	23060	23095	23130
	Frequency	704	707.5	711
5	Channel	23035	23095	23155
	Frequency	701.5	707.5	713.5
3	Channel	23025	23095	23165
	Frequency	700.5	707.5	714.5
1.4	Channel	23017	23095	23173
	Frequency	699.7	707.5	715.3

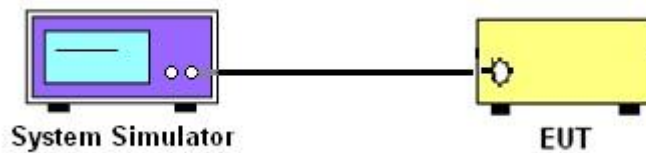
### 3 Conducted Test Items

#### 3.1 Measuring Instruments

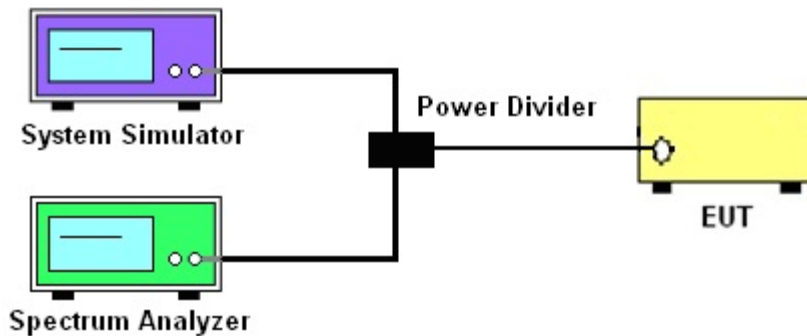
See list of measuring instruments of this test report.

#### 3.2 Test Setup

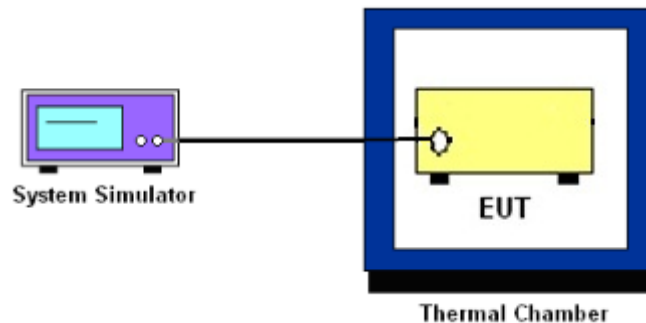
##### 3.2.1 Conducted Output Power



##### 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 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 12.

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 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  $43 + 10\log_{10}(P[\text{Watts}])$  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 (g)

For operations in the 600MHz band and 698 -746 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  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 (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 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  $\geq$  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:

$$\begin{aligned} &\text{The limit line is derived from } 43 + 10\log(P)\text{dB below the transmitter power } P(\text{Watts}) \\ &= P(\text{W}) - [43 + 10\log(P)] \text{ (dB)} \\ &= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} = -13\text{dBm}. \end{aligned}$$



### 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 30 MHz up to a frequency including its 10<sup>th</sup> 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  $43 + 10\log(P)$ dB below the transmitter power P(Watts)  
= P(W)- [43 + 10log(P)] (dB)  
= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)  
= -13dBm.



## 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 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  $-30^{\circ}\text{C}$  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  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . 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  $20\pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value 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.

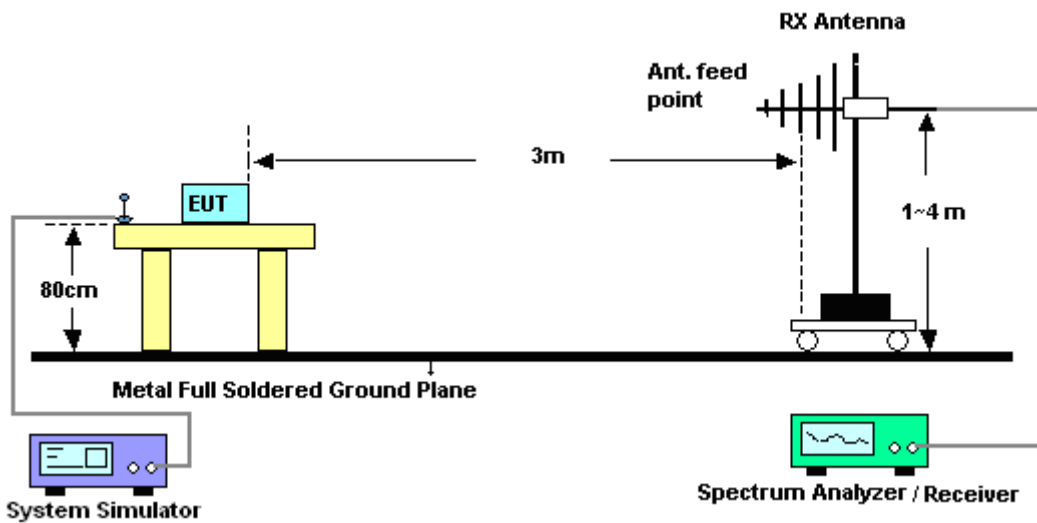
## 4 Radiated Test Items

### 4.1 Measuring Instruments

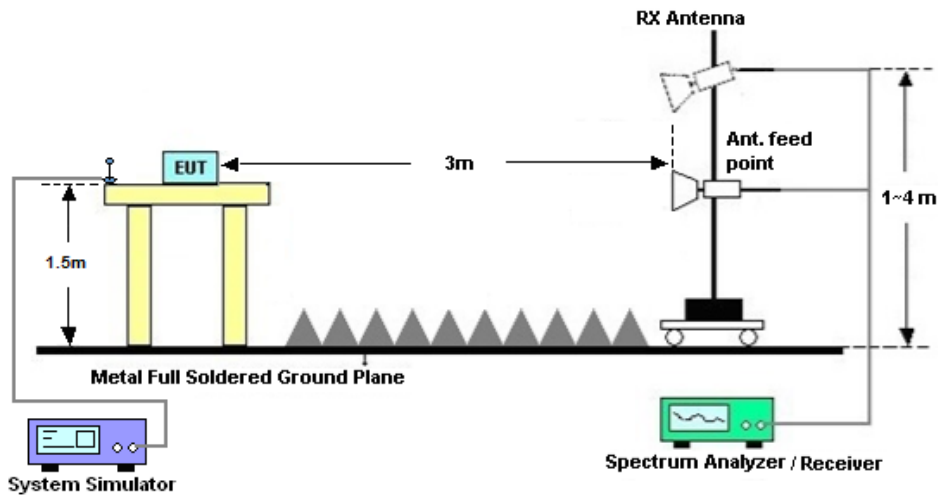
See list of measuring instruments of this test report.

### 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.

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.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
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)  
=  $P(W) - [43 + 10\log(P)] \text{ (dB)}$   
=  $[30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
= -13dBm.



## 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. 08, 2017	Jun. 25, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Radio communication	Anritsu	MT8821C	6201300652	2G/3G/LTE_ full band	Aug. 08, 2017	Jun. 25, 2018	Aug. 07, 2018	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 12, 2017	Jun. 25, 2018	Oct. 11, 2018	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Aug. 08, 2017	Jun. 24, 2018	Aug. 07, 2018	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44G,MAX 30dB	Apr. 17, 2018	Jun. 24, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	30MHz-2GHz	Jan. 29, 2018	Jun. 24, 2018	Jan. 28, 2019	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 21, 2017	Jun. 24, 2018	Oct. 20, 2018	Radiation (03CH02-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Jun. 24, 2018	Feb. 06, 2019	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Aug. 07, 2017	Jun. 24, 2018	Aug. 06, 2018	Radiation (03CH02-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	100MHz-18GHz	Apr. 17, 2018	Jun. 24, 2018	Apr. 16, 2019	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1-26.5GHz Gain 30dB	Oct. 12, 2017	Jun. 24, 2018	Oct. 11, 2018	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jun. 24, 2018	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jun. 24, 2018	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jun. 24, 2018	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required



## 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.3dB
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.8dB
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### Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.8dB
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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]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
20	QPSK	1	0	0	0	15	23.20	23.20	23.40
20		1	5	0	0	15	23.20	23.20	23.40
20		6	0	0	0	15	23.30	23.30	23.49
20	16-QAM	1	0	0	0	15	23.38	23.02	23.56
20		1	5	0	0	15	23.70	22.98	23.13
20		6	0	0	0	15	23.30	23.20	23.50
15	QPSK	1	0	0	0	11	22.90	22.90	23.20
15		1	5	0	0	11	22.90	22.90	23.20
15		6	0	0	0	11	22.90	22.90	23.50
15	16-QAM	1	0	0	0	11	23.50	23.50	23.65
15		1	5	0	0	11	23.50	23.50	23.78
15		6	0	0	0	11	23.00	22.80	22.89
10	QPSK	1	0	0	0	7	23.20	23.20	23.50
10		1	5	0	0	7	23.30	23.30	23.40
10		6	0	0	0	7	22.60	22.70	23.10
10	16-QAM	1	0	0	0	7	23.38	23.80	23.61
10		1	5	0	0	7	23.48	23.58	23.59
10		6	0	0	0	7	22.20	22.20	23.60
5	QPSK	1	0	0	0	3	23.20	23.20	23.30
5		1	5	0	0	3	23.10	23.10	23.40
5		6	0	0	0	3	22.60	22.60	23.00
5	16-QAM	1	0	0	0	3	23.84	23.70	23.58
5		1	5	0	0	3	23.60	23.60	23.57
5		6	0	0	0	3	22.10	22.10	21.36



LTE Band 2 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
3	QPSK	1	0	0	0	1	23.42	23.31	23.26
3		1	5	0	0	1	23.45	23.32	23.30
3		6	0	0	0	1	21.62	21.44	21.45
3		1	0	0	0	1	22.43	22.37	22.22
3	16-QAM	1	5	0	0	1	22.38	22.35	22.22
3		6	0	0	0	1	21.50	21.38	21.35
1.4	QPSK	1	0	0	0	0	23.56	23.17	23.39
1.4		1	5	0	0	0	23.58	23.18	23.42
1.4		6	0	0	0	0	21.13	21.10	21.32
1.4	16-QAM	1	0	0	0	0	22.77	22.10	22.62
1.4		1	5	0	0	0	22.68	22.25	22.63
1.4		6	0	0	0	0	21.48	21.37	21.56



LTE Band 4 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
20	QPSK	1	0	0	0	15	23.10	23.20	23.30
20		1	5	0	0	15	23.00	23.10	23.40
20		6	0	0	0	15	23.00	23.10	23.60
20		1	0	0	0	15	23.80	23.94	23.64
20	16-QAM	1	5	0	0	15	23.70	23.50	23.65
20		6	0	0	0	15	23.10	23.10	23.12
15	QPSK	1	0	0	0	11	22.70	22.80	23.00
15		1	5	0	0	11	22.70	22.80	23.10
15		6	0	0	0	11	22.60	22.70	23.30
15	16-QAM	1	0	0	0	11	23.40	23.40	23.56
15		1	5	0	0	11	23.40	23.50	23.65
15		6	0	0	0	11	22.70	22.80	23.15
10	QPSK	1	0	0	0	7	23.00	23.10	23.80
10		1	5	0	0	7	23.00	23.10	23.70
10		6	0	0	0	7	22.40	22.50	23.30
10		1	0	0	0	7	23.70	23.80	23.56
10	16-QAM	1	5	0	0	7	23.70	23.80	23.73
10		6	0	0	0	7	21.90	22.00	22.12
5	QPSK	1	0	0	0	3	23.00	23.10	23.20
5		1	5	0	0	3	22.90	23.00	23.30
5		6	0	0	0	3	22.30	22.40	22.80
5	16-QAM	1	0	0	0	3	23.40	23.50	23.69
5		1	5	0	0	3	23.30	23.40	23.96
5		6	0	0	0	3	21.80	22.00	22.13



LTE Band 4 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
3	QPSK	1	0	0	0	1	23.28	23.31	23.21
3		1	5	0	0	1	23.30	23.32	23.26
3		6	0	0	0	1	21.15	21.20	21.30
3		1	0	0	0	1	22.38	22.44	22.23
3	16-QAM	1	5	0	0	1	22.36	22.39	22.23
3		6	0	0	0	1	21.20	21.26	21.16
1.4	QPSK	1	0	0	0	0	23.22	23.19	23.11
1.4		1	5	0	0	0	23.33	23.30	23.24
1.4		6	0	0	0	0	20.92	20.88	20.80
1.4	16-QAM	1	0	0	0	0	22.31	22.28	22.16
1.4		1	5	0	0	0	22.49	22.43	22.32
1.4		6	0	0	0	0	20.90	20.88	20.78



LTE Band 12 Maximum Average Power [dBm]									
BW [MHz]	Mod	RB Size	RB Offset	Index			Lowest	Middle	Highest
				L	M	H			
10	QPSK	1	0	0	0	7	23.20	23.20	23.40
10		1	5	0	0	7	23.30	23.20	23.30
10		6	0	0	0	7	22.60	22.60	22.90
10		1	0	0	0	7	23.69	23.38	23.59
10	16-QAM	1	5	0	0	7	23.68	23.48	23.64
10		6	0	0	0	7	22.10	22.10	22.36
5	QPSK	1	0	0	0	3	23.20	22.80	23.30
5		1	5	0	0	3	23.10	22.80	23.30
5		6	0	0	0	3	22.50	22.20	22.90
5	16-QAM	1	0	0	0	3	23.80	23.40	23.65
5		1	5	0	0	3	23.70	23.40	23.46
5		6	0	0	0	3	22.00	21.70	22.13
3	QPSK	1	0	0	0	1	22.70	22.73	22.74
3		1	5	0	0	1	22.72	22.73	22.76
3		6	0	0	0	1	20.76	20.78	20.73
3		1	0	0	0	1	21.73	21.70	21.73
3	16-QAM	1	5	0	0	1	21.69	21.68	21.64
3		6	0	0	0	1	20.70	20.69	20.73
1.4	QPSK	1	0	0	0	0	22.86	22.71	22.83
1.4		1	5	0	0	0	22.71	22.73	22.63
1.4		6	0	0	0	0	20.46	20.55	20.65
1.4	16-QAM	1	0	0	0	0	21.83	21.94	21.79
1.4		1	5	0	0	0	21.89	21.91	21.87
1.4		6	0	0	0	0	20.81	20.84	20.77



**ERP/EIRP**

LTE Band 2 (GT - LC = 0.6 dBi) 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)	23.58	23.18	23.42	23.45	23.32	23.30	23.10	23.10	23.40
Conducted Power (Watts)	0.2280	0.2080	0.2198	0.2213	0.2148	0.2138	0.2042	0.2042	0.2188
EIRP(dBm)	24.18	23.78	24.02	24.05	23.92	23.90	23.70	23.70	24.00
EIRP(Watts)	0.2618	0.2388	0.2523	0.2541	0.2466	0.2455	0.2344	0.2344	0.2512

LTE Band 2 (GT - LC = 0.6 dBi) 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)	23.20	23.20	23.50	22.90	22.90	23.50	23.30	23.30	23.49
Conducted Power (Watts)	0.2089	0.2089	0.2239	0.1950	0.1950	0.2239	0.2138	0.2138	0.2234
EIRP(dBm)	23.80	23.80	24.10	23.50	23.50	24.10	23.90	23.90	24.09
EIRP(Watts)	0.2399	0.2399	0.2570	0.2239	0.2239	0.2570	0.2455	0.2455	0.2564



LTE Band 2 (GT - LC = 0.6 dBi) 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)	22.77	22.10	22.62	22.43	22.37	22.22	23.84	23.70	23.58
Conducted Power (Watts)	0.1892	0.1622	0.1828	0.1750	0.1726	0.1667	0.2421	0.2344	0.2280
EIRP(dBm)	23.37	22.70	23.22	23.03	22.97	22.82	24.44	24.30	24.18
EIRP(Watts)	0.2173	0.1862	0.2099	0.2009	0.1982	0.1914	0.2780	0.2692	0.2618

LTE Band 2 (GT - LC = 0.6 dBi) 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)	23.38	23.80	23.61	23.50	23.50	23.78	23.70	22.98	23.13
Conducted Power (Watts)	0.2178	0.2399	0.2296	0.2239	0.2239	0.2388	0.2344	0.1986	0.2056
EIRP(dBm)	23.98	24.40	24.21	24.10	24.10	24.38	24.30	23.58	23.73
EIRP(Watts)	0.2500	0.2754	0.2636	0.2570	0.2570	0.2742	0.2692	0.2280	0.2360



LTE Band 4 (GT - LC = 0.6 dBi) 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 (MHz)	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
Conducted Power (dBm)	23.33	23.30	23.24	23.30	23.32	23.26	22.90	23.00	23.30
Conducted Power (Watts)	0.2153	0.2138	0.2109	0.2138	0.2148	0.2118	0.1950	0.1995	0.2138
EIRP(dBm)	23.93	23.90	23.84	23.90	23.92	23.86	23.50	23.60	23.90
EIRP(Watts)	0.2472	0.2455	0.2421	0.2455	0.2466	0.2432	0.2239	0.2291	0.2455

LTE Band 4 (GT - LC = 0.6 dBi) 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 (MHz)	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
Conducted Power (dBm)	23.00	23.10	23.80	22.60	22.70	23.30	23.00	23.10	23.60
Conducted Power (Watts)	0.1995	0.2042	0.2399	0.1820	0.1862	0.2138	0.1995	0.2042	0.2291
EIRP(dBm)	23.60	23.70	24.40	23.20	23.30	23.90	23.60	23.70	24.20
EIRP(Watts)	0.2291	0.2344	0.2754	0.2089	0.2138	0.2455	0.2291	0.2344	0.2630





LTE Band 4 (GT - LC = 0.6 dBi) 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 (MHz)	1710.7	1732.5	1754.3	1711.5	1732.5	1753.5	1712.5	1732.5	1752.5
Conducted Power (dBm)	22.49	22.43	22.32	22.38	22.44	22.23	23.30	23.40	23.96
Conducted Power (Watts)	0.1774	0.1750	0.1706	0.1730	0.1754	0.1671	0.2138	0.2188	0.2489
EIRP(dBm)	23.09	23.03	22.92	22.98	23.04	22.83	23.90	24.00	24.56
EIRP(Watts)	0.2037	0.2009	0.1959	0.1986	0.2014	0.1919	0.2455	0.2512	0.2858

LTE Band 4 (GT - LC = 0.6 dBi) 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 (MHz)	1715	1732.5	1750	1717.5	1732.5	1747.5	1720	1732.5	1745
Conducted Power (dBm)	23.70	23.80	23.73	23.40	23.50	23.65	23.80	23.94	23.64
Conducted Power (Watts)	0.2344	0.2399	0.2360	0.2188	0.2239	0.2317	0.2399	0.2477	0.2312
EIRP(dBm)	24.30	24.40	24.33	24.00	24.10	24.25	24.40	24.54	24.24
EIRP(Watts)	0.2692	0.2754	0.2710	0.2512	0.2570	0.2661	0.2754	0.2844	0.2655



LTE Band 12 (GT - LC = -3.5 dBi) QPSK									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
Conducted Power (dBm)	22.86	22.71	22.83	22.72	22.73	22.76	23.20	22.80	23.30
Conducted Power (Watts)	0.1932	0.1866	0.1919	0.1871	0.1875	0.1888	0.2089	0.1905	0.2138
ERP(dBm)	17.21	17.06	17.18	17.07	17.08	17.11	17.55	17.15	17.65
ERP(Watts)	0.0526	0.0508	0.0522	0.0509	0.0511	0.0514	0.0569	0.0519	0.0582

LTE Band 12 (GT - LC = -3.5 dBi) QPSK			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency (MHz)	704	707.5	711
Conducted Power (dBm)	23.20	23.20	23.40
Conducted Power (Watts)	0.2089	0.2089	0.2188
ERP(dBm)	17.55	17.55	17.75
ERP(Watts)	0.0569	0.0569	0.0596



LTE Band 12 (GT - LC = -3.5 dBi) 16QAM									
Bandwidth	1.4M			3M			5M		
Channel	23017	23095	23173	23025	23095	23165	23035	23095	23155
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	699.7	707.5	715.3	700.5	707.5	714.5	701.5	707.5	713.5
Conducted Power (dBm)	21.83	21.94	21.79	21.73	21.70	21.73	23.80	23.40	23.65
Conducted Power (Watts)	0.1524	0.1563	0.1510	0.1489	0.1479	0.1489	0.2399	0.2188	0.2317
ERP(dBm)	16.18	16.29	16.14	16.08	16.05	16.08	18.15	17.75	18.00
ERP(Watts)	0.0415	0.0426	0.0411	0.0406	0.0403	0.0406	0.0653	0.0596	0.0631

LTE Band 12 (GT - LC = -3.5 dBi) 16QAM			
Bandwidth	10M		
Channel	23060	23095	23130
	(Low)	(Mid)	(High)
Frequency (MHz)	704	707.5	711
Conducted Power (dBm)	23.69	23.38	23.59
Conducted Power (Watts)	0.2339	0.2178	0.2286
ERP(dBm)	18.04	17.73	17.94
ERP(Watts)	0.0637	0.0593	0.0622



### Peak-to-Average Ratio

Mode	LTE Band 2 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	5.57	5.80	5.71	6.46	PASS
Middle CH	4.96	6.26	5.42	6.09	
Highest CH	6.52	5.68	6.23	6.75	

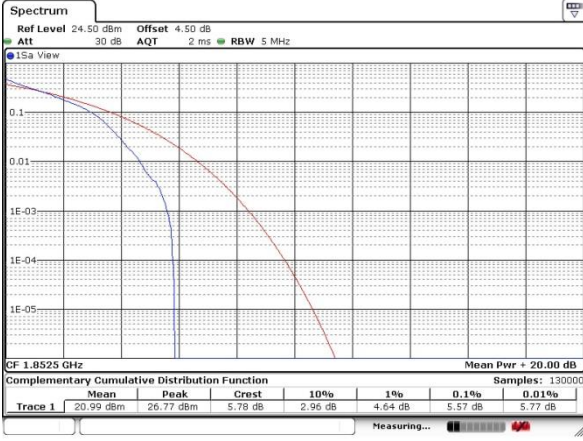
Mode	LTE Band 4 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	6.49	6.06	6.46	6.90	PASS
Middle CH	6.81	6.29	6.72	6.93	
Highest CH	5.83	6.43	6.70	7.07	

Mode	LTE Band 12 / 5MHz				
Mod.	QPSK		16QAM		Limit: 13dB
RB Size	1RB	Full RB	1RB	Full RB	Result
Lowest CH	6.00	6.67	7.16	7.16	PASS
Middle CH	6.72	6.58	7.10	7.10	
Highest CH	5.86	6.64	6.84	6.96	



LTE Band 2 / 5MHz / QPSK

Lowest Channel / 1RB



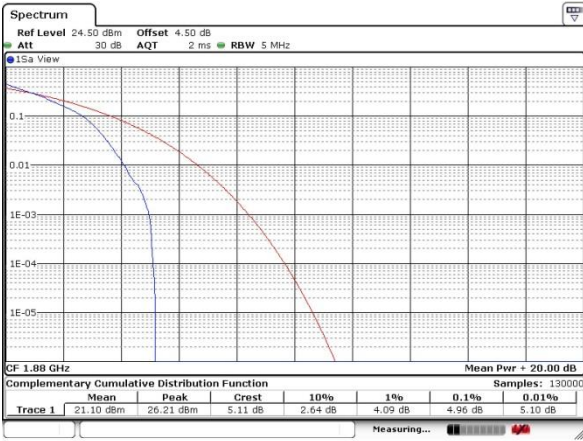
Date: 25 JUN 2018 13:40:44

Lowest Channel / Full RB



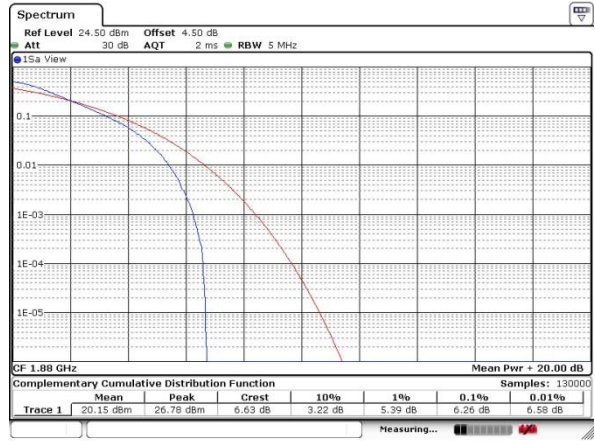
Date: 25 JUN 2018 13:37:53

Middle Channel / 1RB



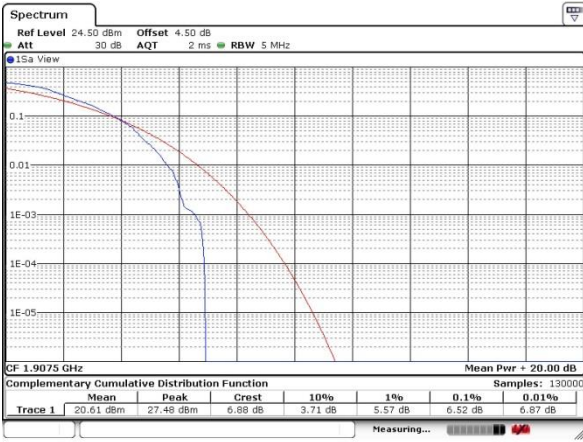
Date: 25 JUN 2018 13:42:20

Middle Channel / Full RB



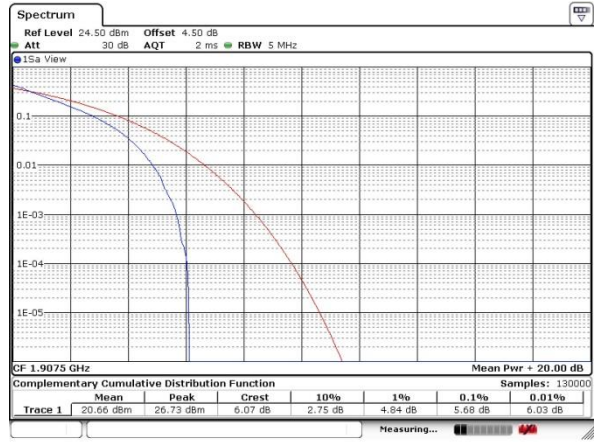
Date: 25 JUN 2018 13:44:46

Highest Channel / 1RB



Date: 25 JUN 2018 13:49:01

Highest Channel / Full RB

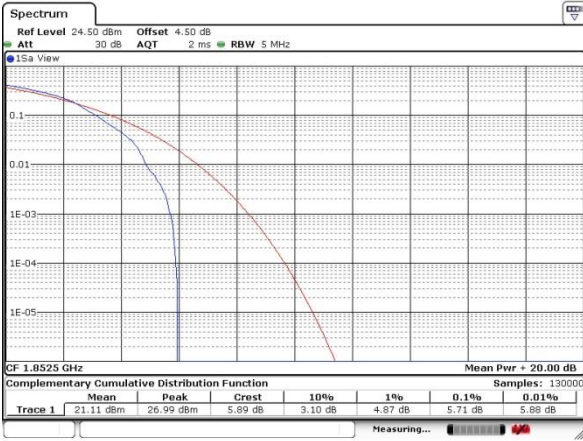


Date: 25 JUN 2018 13:46:21



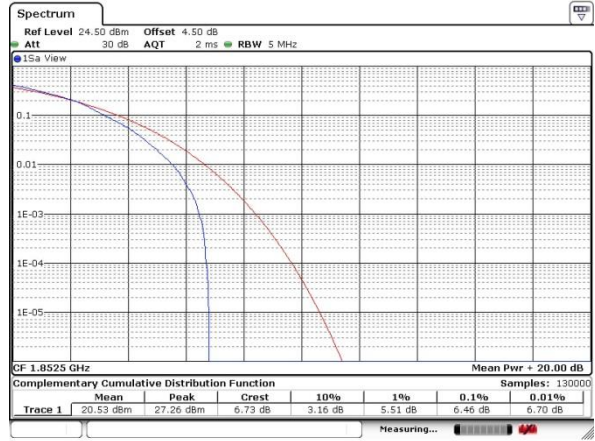
LTE Band 2 / 5MHz / 16QAM

Lowest Channel / 1RB



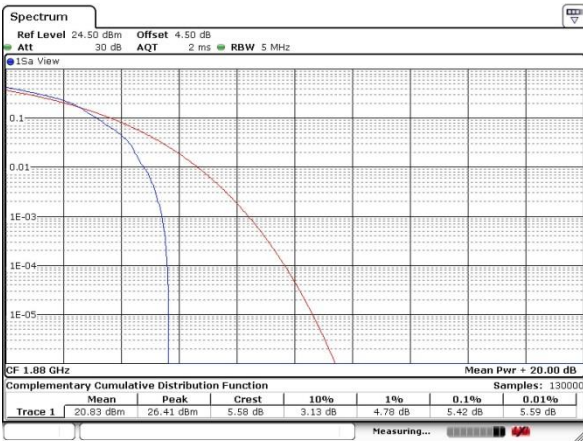
Date: 25 JUN 2018 13:40:00

Lowest Channel / Full RB



Date: 25 JUN 2018 13:38:55

Middle Channel / 1RB



Date: 25 JUN 2018 13:42:45

Middle Channel / Full RB



Date: 25 JUN 2018 13:43:59

Highest Channel / 1RB



Date: 25 JUN 2018 13:48:28

Highest Channel / Full RB

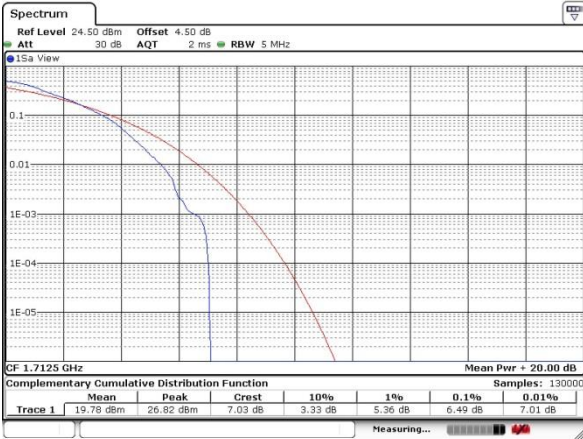


Date: 25 JUN 2018 13:47:50



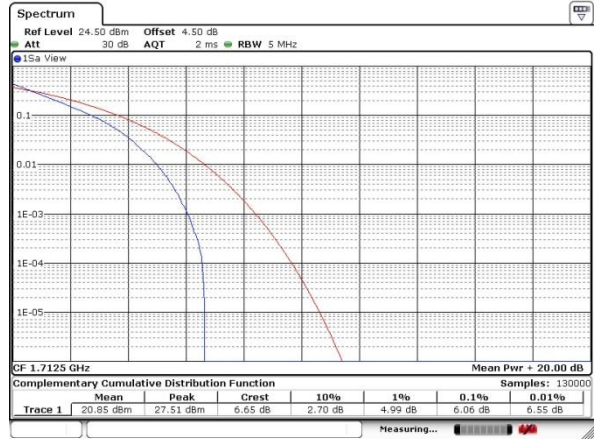
LTE Band 4 / 5MHz / QPSK

Lowest Channel / 1RB



Date: 25 JUN 2018 13:57:03

Lowest Channel / Full RB



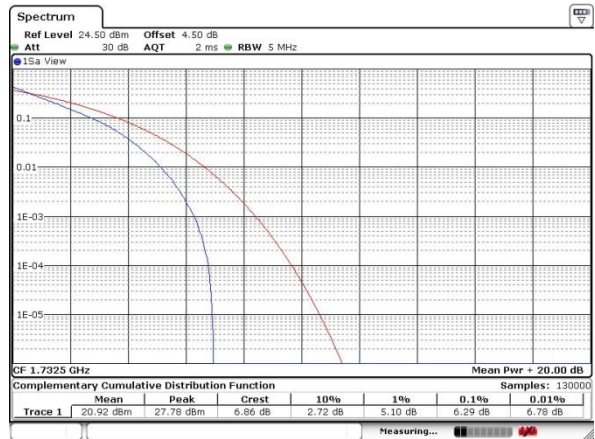
Date: 25 JUN 2018 14:00:16

Middle Channel / 1RB



Date: 25 JUN 2018 14:05:15

Middle Channel / Full RB



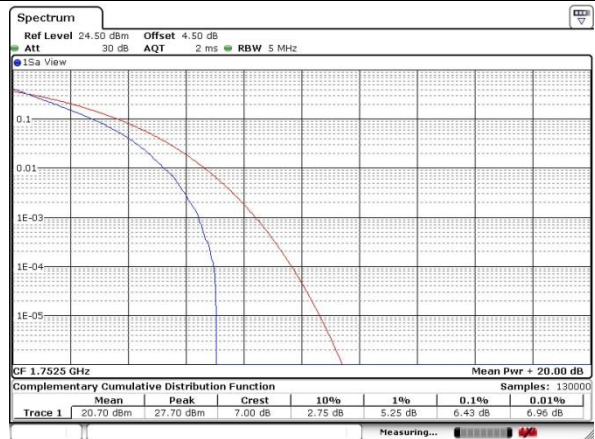
Date: 25 JUN 2018 14:01:57

Highest Channel / 1RB



Date: 25 JUN 2018 14:06:08

Highest Channel / Full RB

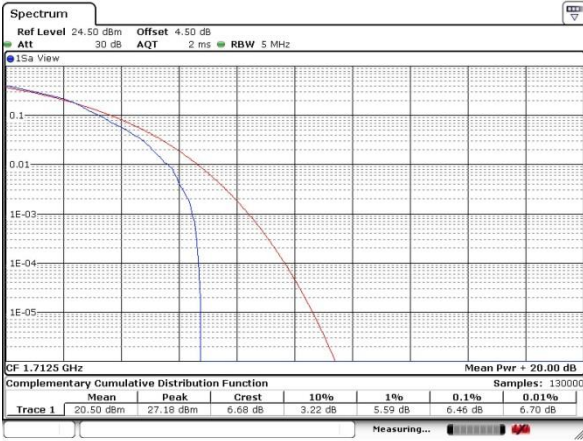


Date: 25 JUN 2018 14:09:26



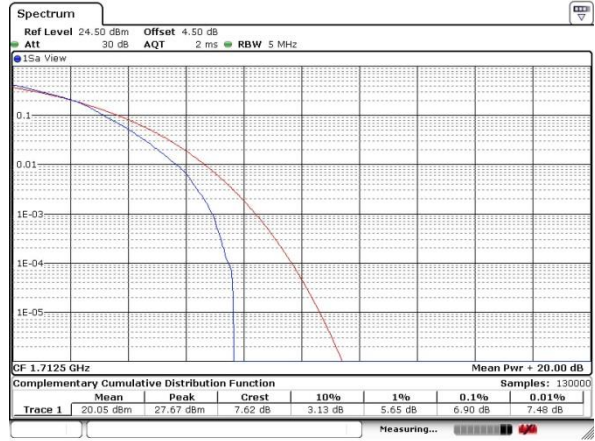
LTE Band 4 / 5MHz / 16QAM

Lowest Channel / 1RB



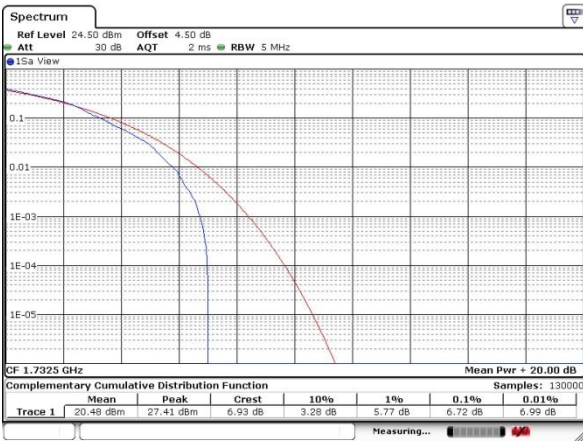
Date: 25 JUN 2018 13:57:37

Lowest Channel / Full RB



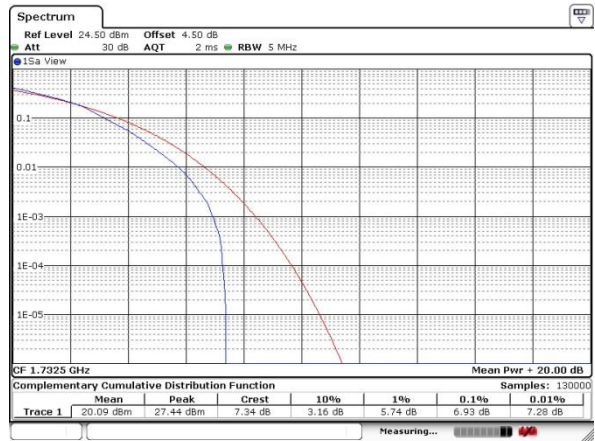
Date: 25 JUN 2018 13:58:13

Middle Channel / 1RB



Date: 25 JUN 2018 14:04:39

Middle Channel / Full RB



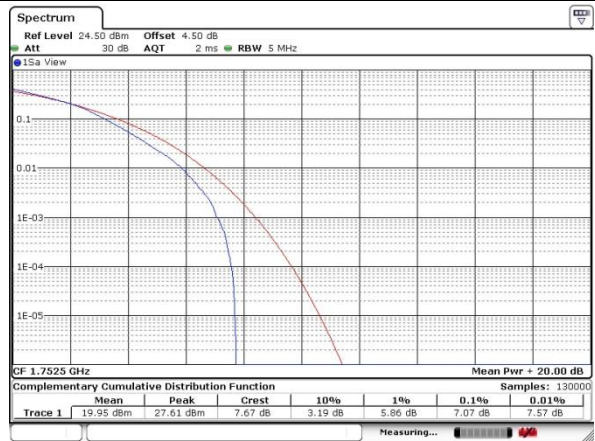
Date: 25 JUN 2018 14:03:50

Highest Channel / 1RB



Date: 25 JUN 2018 14:06:43

Highest Channel / Full RB



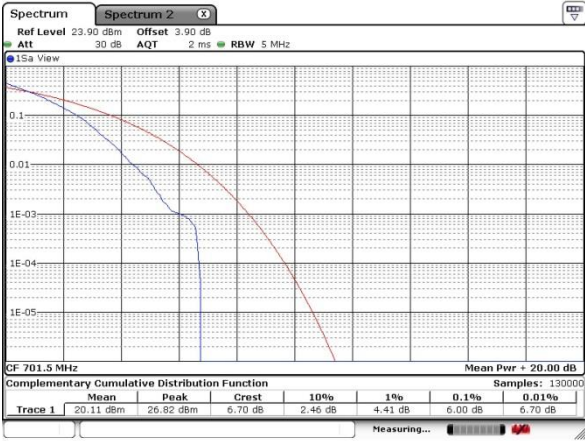
Date: 25 JUN 2018 14:08:15





LTE Band 12 / 5MHz / QPSK

Lowest Channel / 1RB



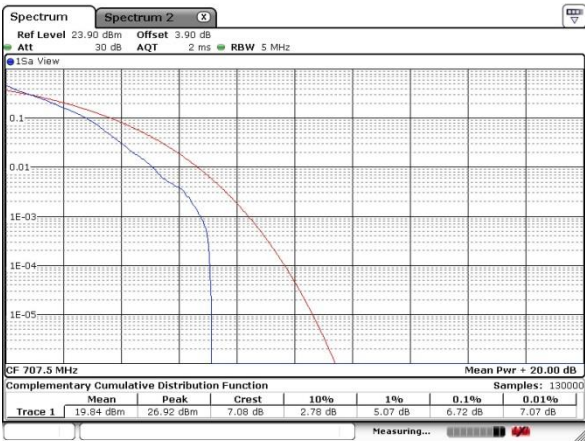
Date: 25 JUN 2018 15:49:41

Lowest Channel / Full RB



Date: 25 JUN 2018 15:51:02

Middle Channel / 1RB



Date: 25 JUN 2018 15:47:12

Middle Channel / Full RB



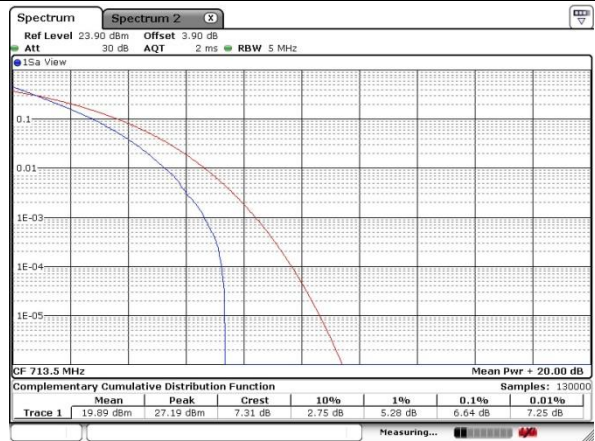
Date: 25 JUN 2018 15:46:48

Highest Channel / 1RB



Date: 25 JUN 2018 15:37:02

Highest Channel / Full RB

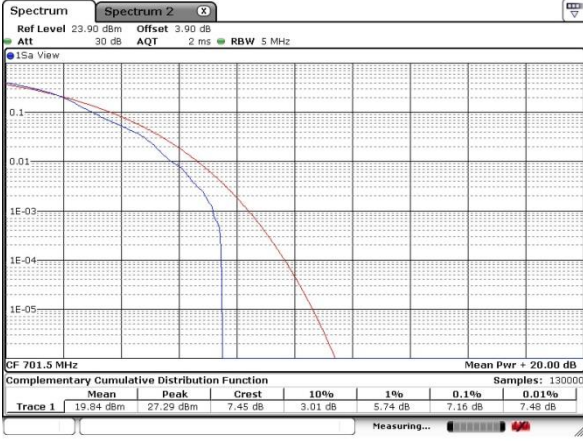


Date: 25 JUN 2018 15:38:56



LTE Band 12 / 5MHz / 16QAM

Lowest Channel / 1RB



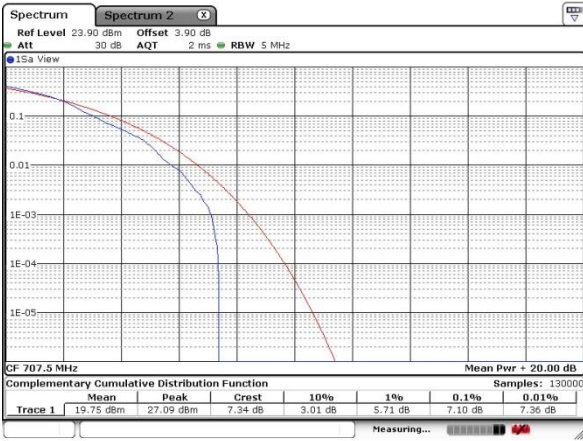
Date: 25 JUN 2018 15:49:19

Lowest Channel / Full RB



Date: 25 JUN 2018 15:52:38

Middle Channel / 1RB



Date: 25 JUN 2018 15:48:40

Middle Channel / Full RB



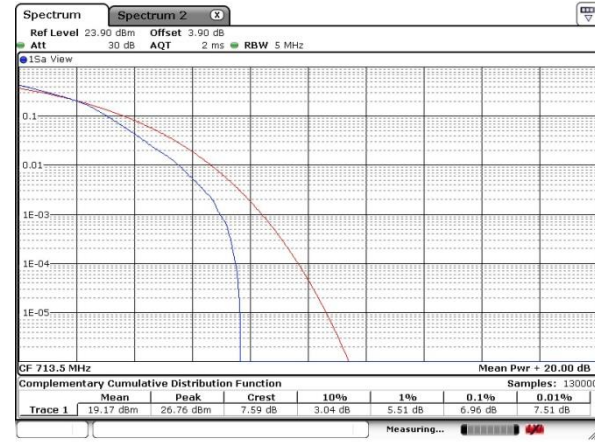
Date: 25 JUN 2018 15:46:15

Highest Channel / 1RB



Date: 25 JUN 2018 15:37:50

Highest Channel / Full RB



Date: 25 JUN 2018 15:38:34



26dB Bandwidth

Mode	LTE Band 2 : 26dB BW(MHz)											
	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH					1.309	1.299						
Middle CH					1.319	1.319						
Highest CH					1.329	1.319						

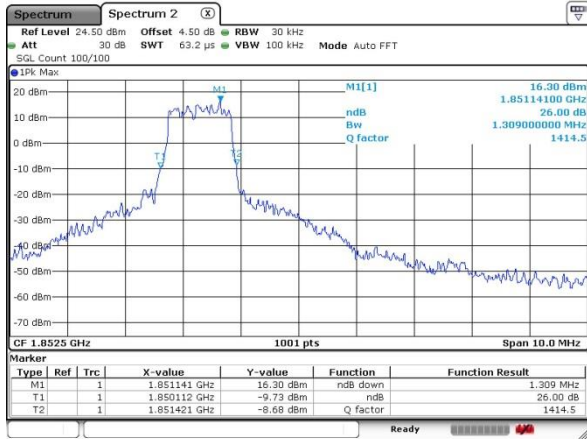
Mode	LTE Band 4 : 26dB BW(MHz)											
	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH					1.319	1.299						
Middle CH					1.269	1.309						
Highest CH					1.259	1.309						

Mode	LTE Band 12 : 26dB BW(MHz)											
	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH					1.279	1.329						
Middle CH					1.309	1.319						
Highest CH					1.249	1.309						



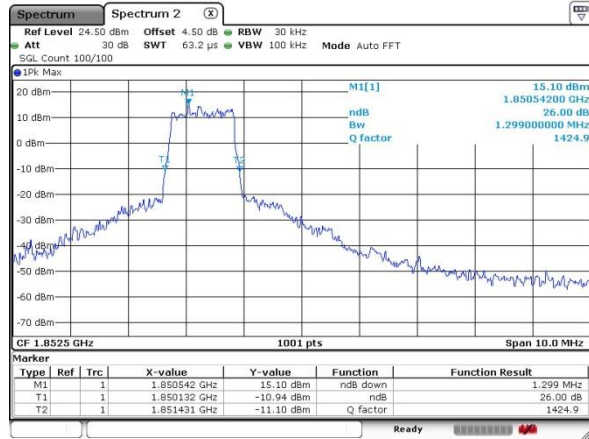
LTE Band 2

Lowest Channel / 5MHz / QPSK



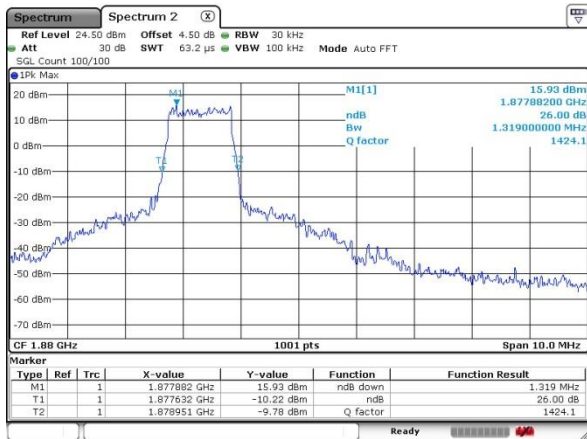
Date: 25 JUN 2018 15:09:49

Lowest Channel / 5MHz / 16QAM



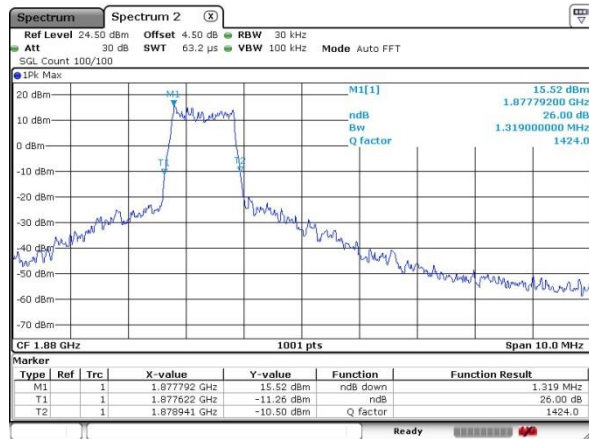
Date: 25 JUN 2018 15:10:37

Middle Channel / 5MHz / QPSK



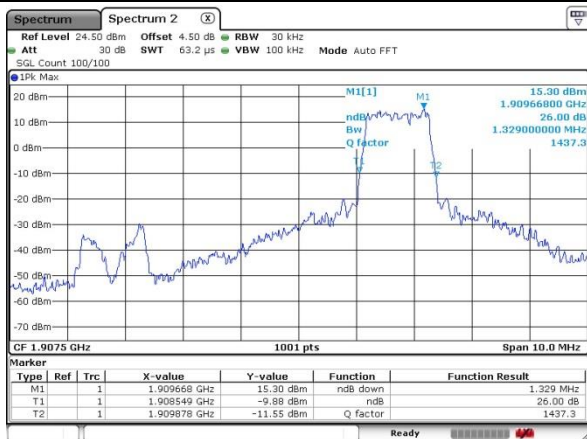
Date: 25 JUN 2018 15:11:32

Middle Channel / 5MHz / 16QAM



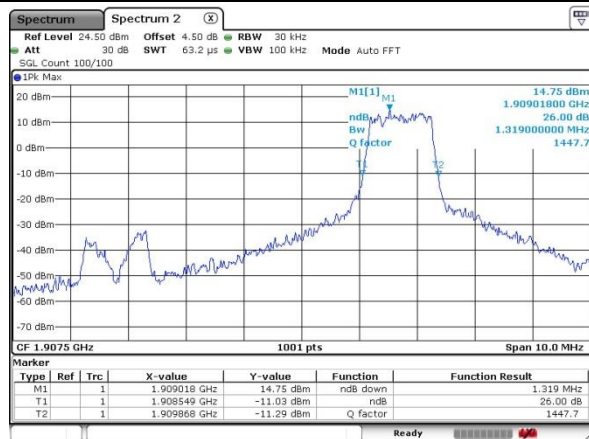
Date: 25 JUN 2018 15:11:09

Highest Channel / 5MHz / QPSK



Date: 25 JUN 2018 15:12:15

Highest Channel / 5MHz / 16QAM

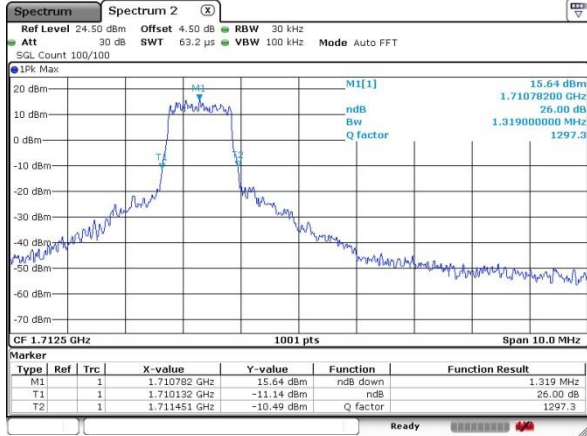


Date: 25 JUN 2018 15:12:34



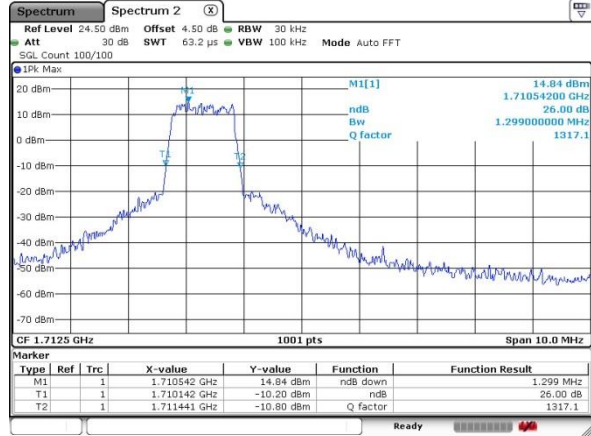
LTE Band 4

Lowest Channel / 5MHz / QPSK



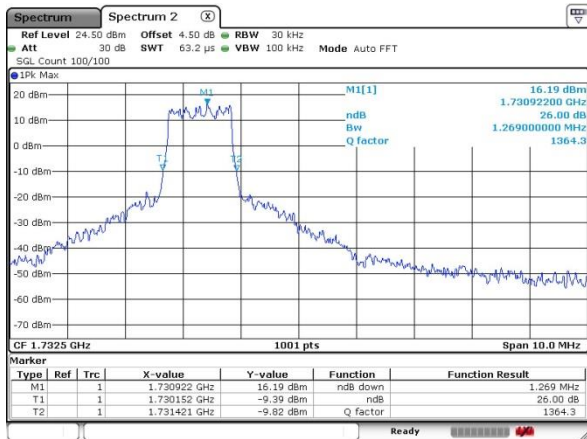
Date: 25 JUN 2018 15:17:00

Lowest Channel / 5MHz / 16QAM



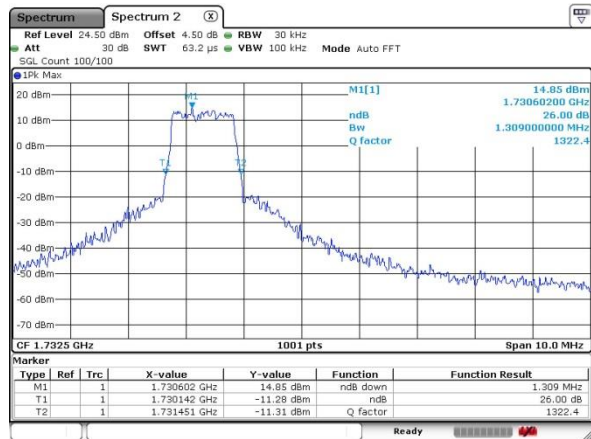
Date: 25 JUN 2018 15:16:38

Middle Channel / 5MHz / QPSK



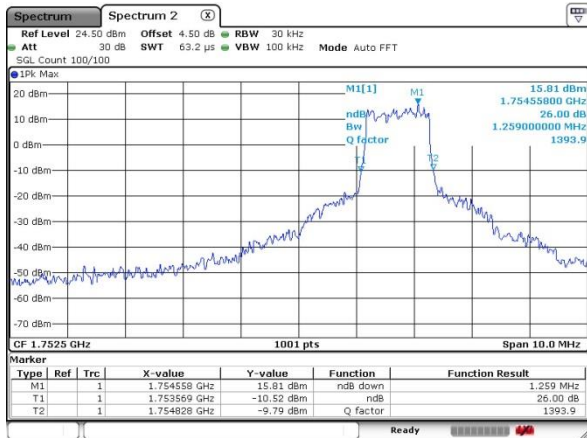
Date: 25 JUN 2018 15:15:46

Middle Channel / 5MHz / 16QAM



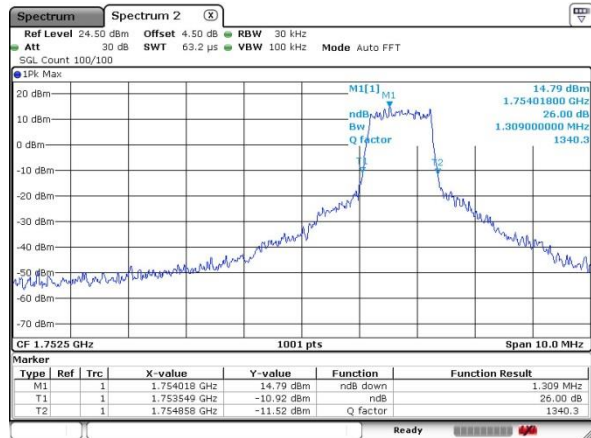
Date: 25 JUN 2018 15:16:05

Highest Channel / 5MHz / QPSK



Date: 25 JUN 2018 15:15:13

Highest Channel / 5MHz / 16QAM

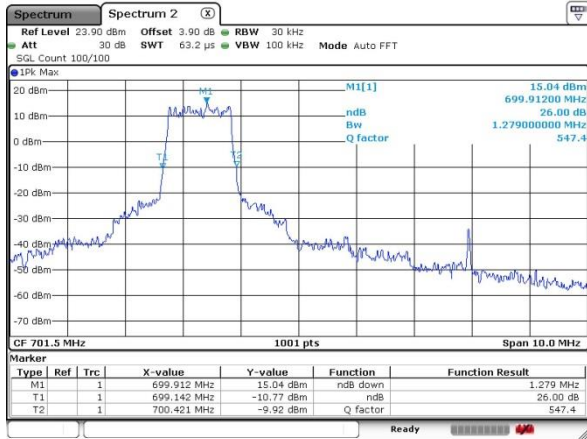


Date: 25 JUN 2018 15:14:49



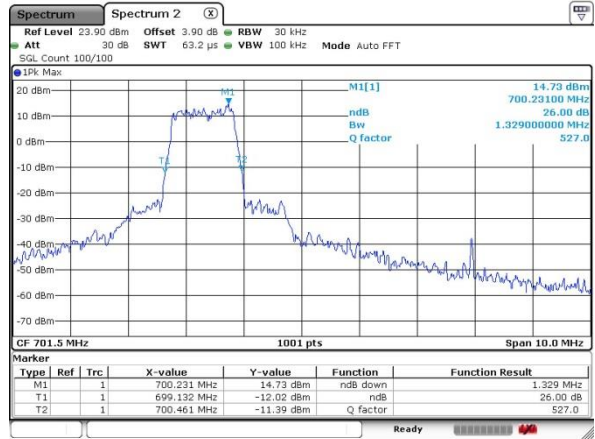
LTE Band 12

Lowest Channel / 5MHz / QPSK



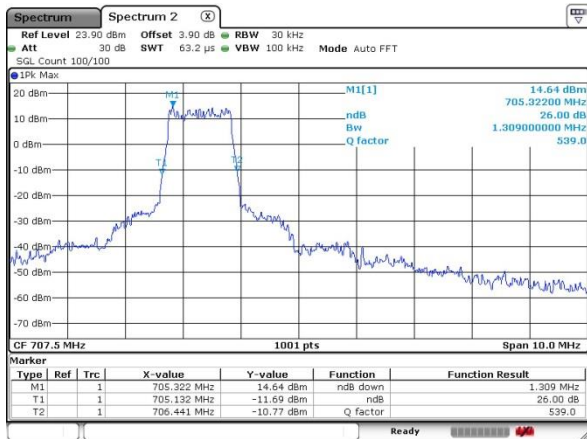
Date: 25 JUN 2018 14:58:50

Lowest Channel / 5MHz / 16QAM



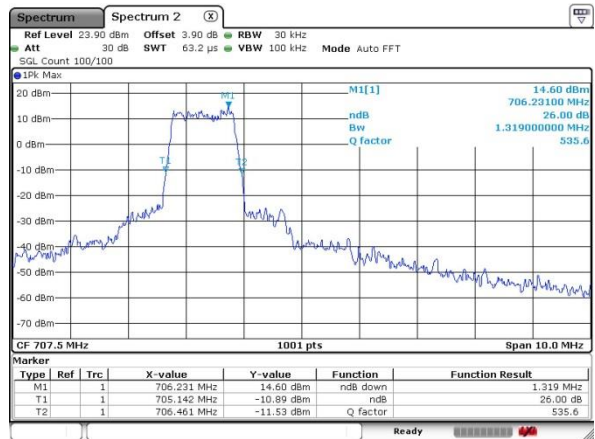
Date: 25 JUN 2018 14:59:58

Middle Channel / 5MHz / QPSK



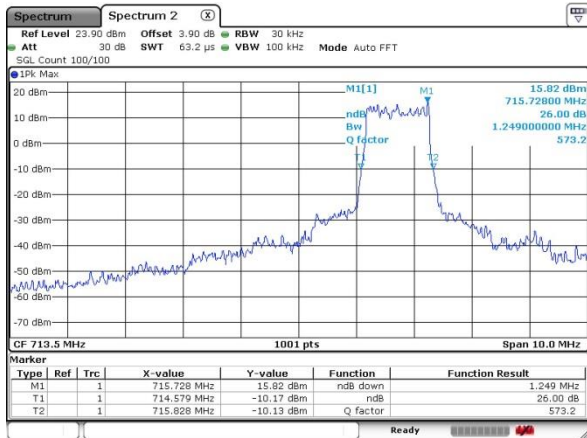
Date: 25 JUN 2018 15:02:02

Middle Channel / 5MHz / 16QAM



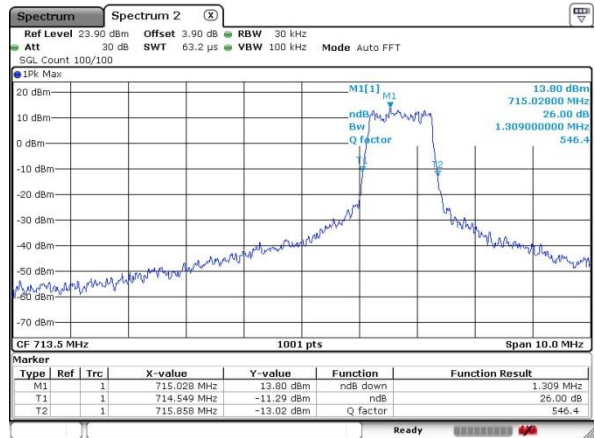
Date: 25 JUN 2018 15:00:52

Highest Channel / 5MHz / QPSK



Date: 25 JUN 2018 15:19:23

Highest Channel / 5MHz / 16QAM



Date: 25 JUN 2018 15:20:17



### 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					1.11	1.10						
Middle CH					1.10	1.08						
Highest CH					1.11	1.09						

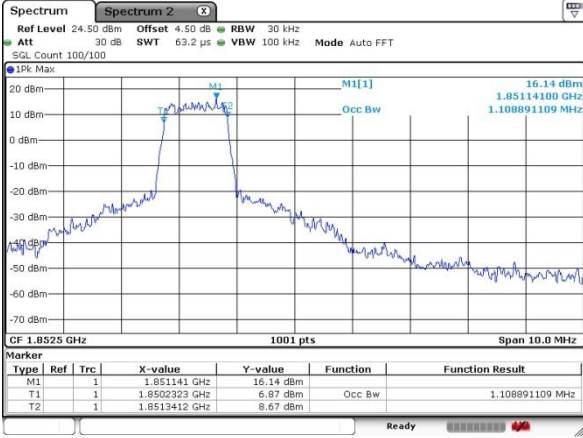
Mode	LTE Band 4 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH					1.12	1.11						
Middle CH					1.11	1.11						
Highest CH					1.11	1.10						

Mode	LTE Band 12 : 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					1.13	1.10						
Middle CH					1.10	1.10						
Highest CH					1.11	1.11						



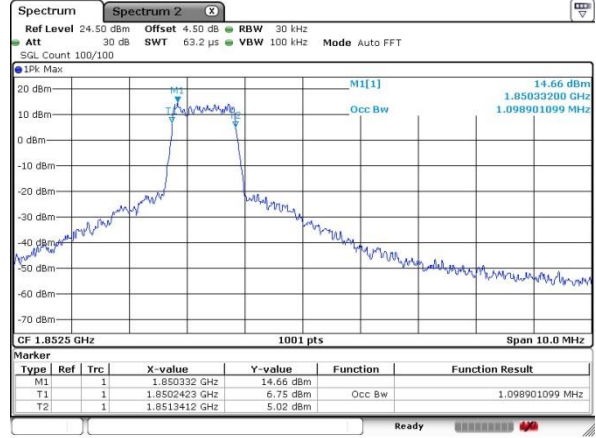
LTE Band 2

Lowest Channel / 5MHz / QPSK



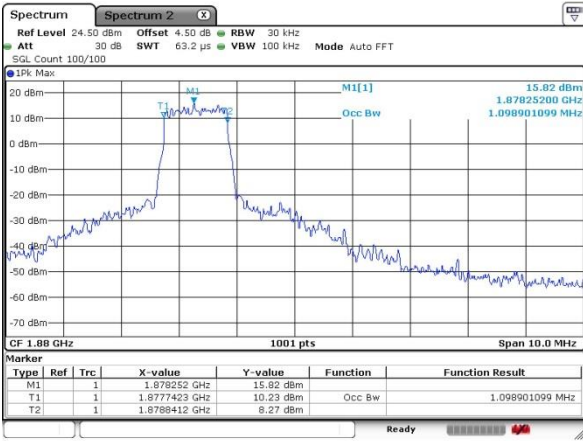
Date: 25 JUN 2018 11:37:03

Lowest Channel / 5MHz / 16QAM



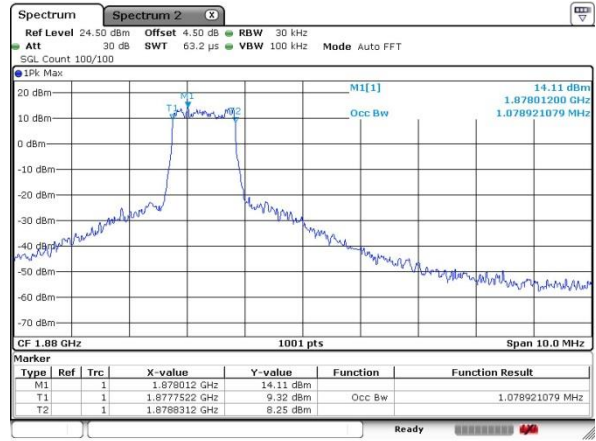
Date: 25 JUN 2018 11:38:05

Middle Channel / 5MHz / QPSK



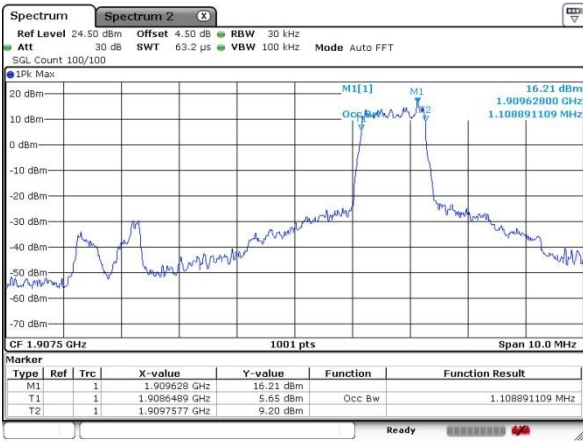
Date: 25 JUN 2018 11:36:25

Middle Channel / 5MHz / 16QAM



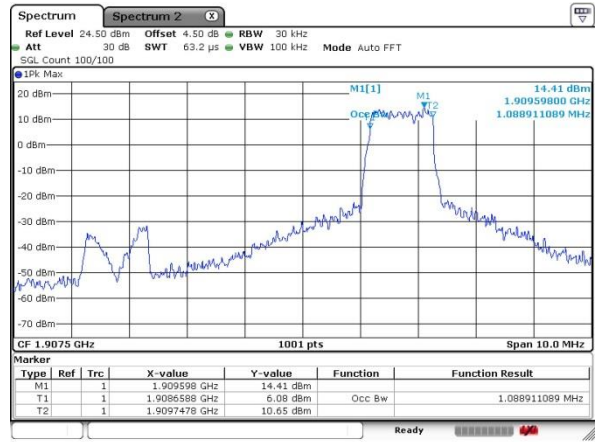
Date: 25 JUN 2018 11:35:16

Highest Channel / 5MHz / QPSK



Date: 25 JUN 2018 11:29:42

Highest Channel / 5MHz / 16QAM



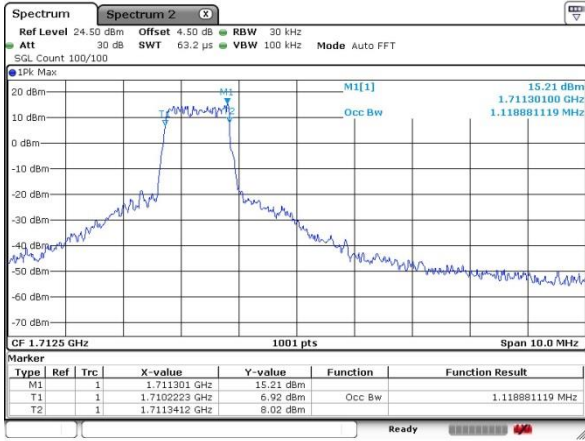
Date: 25 JUN 2018 11:34:20





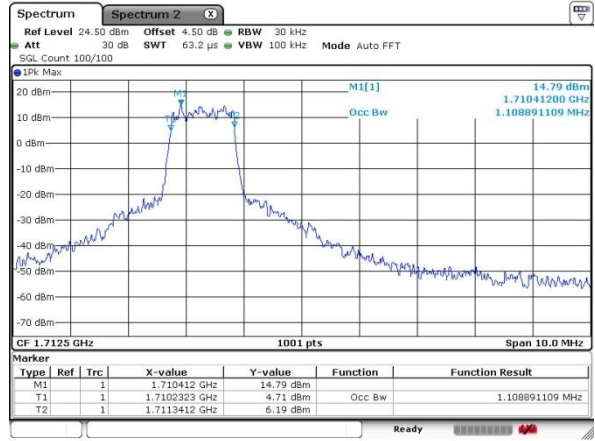
LTE Band 4

Lowest Channel / 5MHz / QPSK



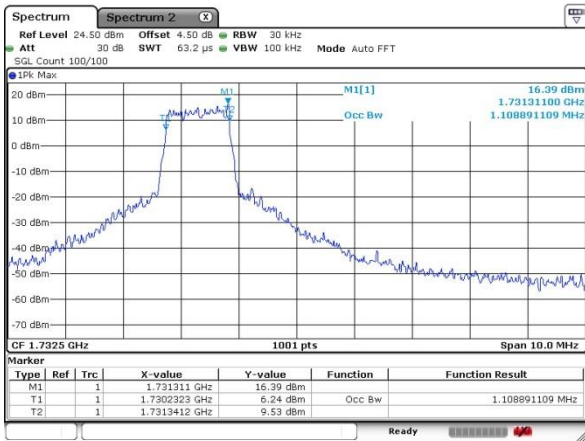
Date: 25 JUN 2018 14:24:23

Lowest Channel / 5MHz / 16QAM



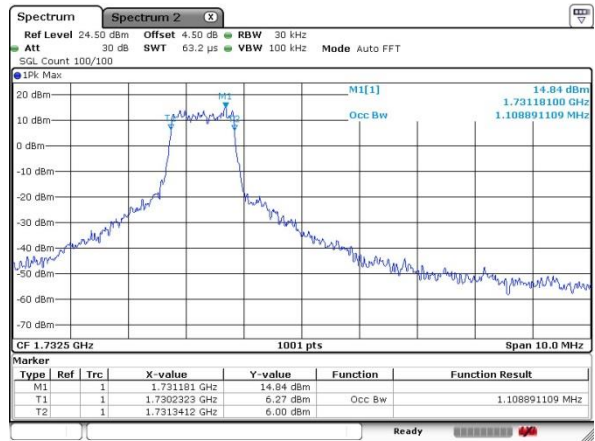
Date: 25 JUN 2018 14:24:49

Middle Channel / 5MHz / QPSK



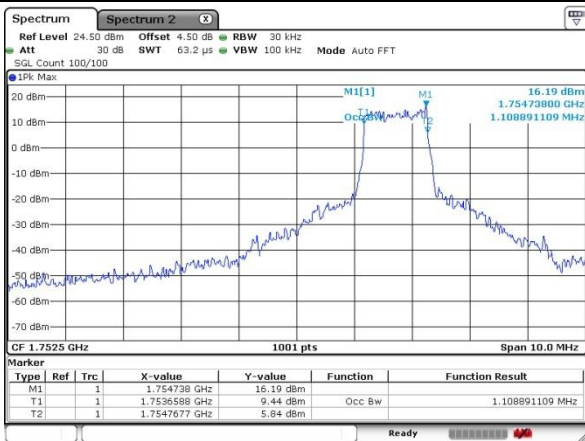
Date: 25 JUN 2018 14:22:35

Middle Channel / 5MHz / 16QAM



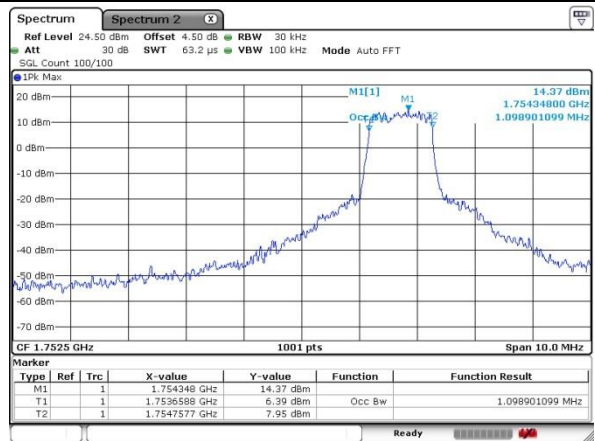
Date: 25 JUN 2018 14:21:28

Highest Channel / 5MHz / QPSK



Date: 25 JUN 2018 14:17:52

Highest Channel / 5MHz / 16QAM



Date: 25 JUN 2018 14:18:52