FCC RADIO TEST REPORT

FCC ID	:	**2AJZA-9266**
Equipment	:	**Electronic Display Device**
Model Name	:	**PQ948KJ**
Applicant	:	**Junker Parts LLC** **411 Theodore Fremd Ave, Suite 206, South Rye, New York 10580**
Standard	:	**47 CFR Part 2, 24(E), 27**

The testing was completed on Jul. 13, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Jones Tsai

Approved by: Jones Tsai

SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FG791332-01B	01	Initial issue of report	Aug. 08, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.2	§2.1046	Conducted Output Power	Reporting only
	§27.50 (c)(10)	Effective Radiated Power (Band 12	Pass
	§24.232 (c)	Equivalent Isotropic Radiated Power (Band 2)	
	§27.50 (d)(4)	Equivalent Isotropic Radiated Power (Band 4)	
3.3	§24.232 (d) §27.50 (d)(5)	Peak-to-Average Ratio	Pass
3.4	§2.1049	Occupied Bandwidth	Reporting only
3.5	§2.1051 §24.238 (a) §27.53 (g) §27.53 (h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 12)	Pass
3.6	§2.1051 §24.238 (a) §27.53 (g) §27.53 (h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 12)	Pass
3.7	§2.1055 §24.235 §27.54	Frequency Stability Temperature & Voltage	Pass
4.2	§2.1053 §24.238 (a) §27.53 (g) §27.53 (h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 12)	Pass

Reviewed by: Joseph Lin

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Electronic Display Device
Model Name	PQ948KJ
FCC ID	2AJZA-9266
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/NFC WLAN 11b/g/n HT20 Bluetooth BR/EDR

1.2 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 12 : 699.7 MHz ~ 715.3 MHz
Rx Frequency	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
Bandwidth	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
Maximum Output Power to Antenna	LTE Band 2 : 22.96 dBm LTE Band 4 : 22.86 dBm LTE Band 12 : 22.53 dBm
Antenna Gain	LTE Band 2 : 1.98 dBi LTE Band 4 : 2.18 dBi LTE Band 12 : -0.72 dBi
Type of Modulation	QPSK / 16QAM

1.3 Modification of EUT

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

1.4 Emission Designator

LTE Band 2		QPSK			16QAM		
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)
1.4	1850.7 ~ 1909.3	1M10G7D	-	0.2884	1M10W7D	-	0.2477
3	1851.5 ~ 1908.5	2M73G7D	-	0.2877	2M75W7D	-	0.2455
5	1852.5 ~ 1907.5	4M51G7D	-	0.2897	4M50W7D	-	0.2466
10	1855.0 ~ 1905.0	9M07G7D	0.0075	0.3034	9M07W7D	-	0.2495
15	1857.5 ~ 1902.5	13M5G7D	-	0.3112	13M4W7D	-	0.2477
20	1860.0 ~ 1900.0	18M5G7D	-	0.3119	18M4W7D		0.2466
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	1M11G7D	-	0.2992	1M10W7D	-	0.2541
3	1711.5 ~ 1753.5	2M72G7D	-	0.2972	2M73W7D	-	0.2512
5	1712.5 ~ 1752.5	4M50G7D	-	0.2985	4M49W7D	-	0.2559
10	1715.0 ~ 1750.0	9M15G7D	0.0069	0.3090	9M05W7D	-	0.2582
15	1717.5 ~ 1747.5	13M5G7D	-	0.3177	13M5W7D	-	0.2606
20	1720.0 ~ 1745.0	18M4G7D	-	0.3192	18M5W7D		0.2612
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	1M10G7D	-	0.0923	1M10W7D	-	0.0778
3	700.5 ~ 714.5	2M72G7D	-	0.0910	2M73W7D	-	0.0767
5	701.5 ~ 713.5	4M50G7D	-	0.0906	4M50W7D	-	0.0778
10	704.0 ~ 711.0	9M03G7D	0.0059	0.0925	9M09W7D	-	0.0783

1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

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

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH15-HY

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

1.6 Applicable Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- 47 CFR Part 2, 22(H), 24(E), 27
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

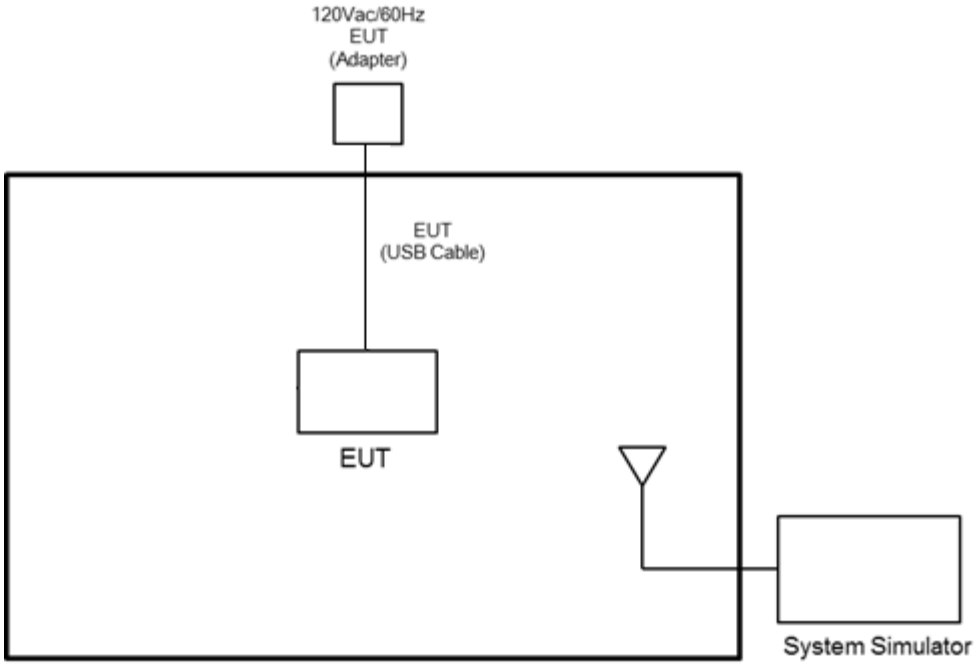
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

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	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	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
Conducted Band Edge	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
Conducted Spurious Emission	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
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	v
	4	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

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Radiated Spurious Emission	2	Worst Case											v	v	v
	4	Worst Case											v	v	v
	12	Worst Case											v	v	v
Remark	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

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

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

2.5 Frequency List of Low/Middle/High Channels

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

LTE Band 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

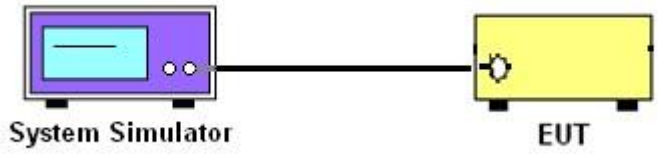
3 Conducted Test Items

3.1 Measuring Instruments

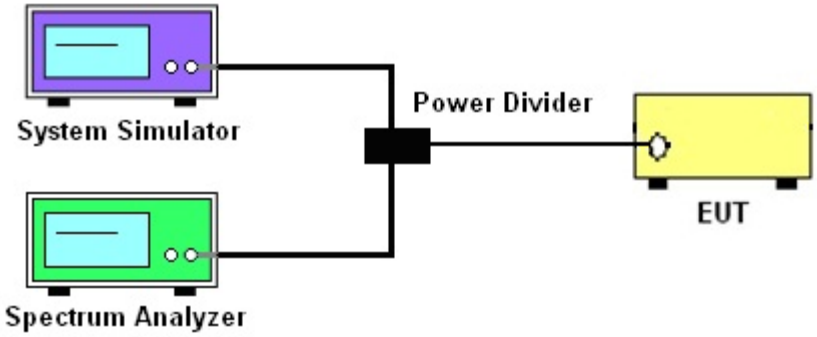
See list of measuring instruments of this test report.

3.1.1 Test Setup

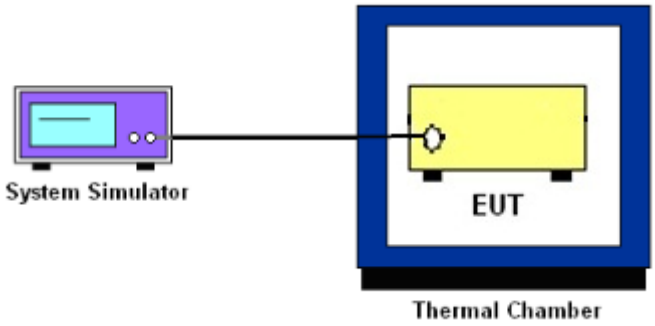
3.1.2 Conducted Output Power



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



3.1.4 Frequency Stability



3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power and ERP/EIRP

3.2.1 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

3.2.2 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.

3.3 Peak-to-Average Ratio

3.3.1 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.

3.3.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.7.1

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

3.4 Occupied Bandwidth

3.4.1 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.

3.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 4.2

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. 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.
4. Set the detection mode to peak, and the trace mode to max hold.
5. 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)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. 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.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.5 Conducted Band Edge

3.5.1 Description of Conducted Band Edge Measurement

24.238 (a)

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

27.53 (g)

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

27.53 (h)

For operations in the 1710 – 1755 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(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.

3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
5. Set spectrum analyzer with RMS detector.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. Checked that all the results comply with the emission limit line.
   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

3.6 Conducted Spurious Emission

3.6.1 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^{th} harmonic.

3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. 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.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
6. Set spectrum analyzer with RMS detector.
7. Taking the record of maximum spurious emission.
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
9. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

3.7 Frequency Stability

3.7.1 Description of Frequency Stability Measurement

24.235 & 27.54

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Test Procedures for Temperature Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. 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.
3. 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.

3.7.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

1. The EUT was placed in a temperature chamber at 20±5° C and connected with the system simulator.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

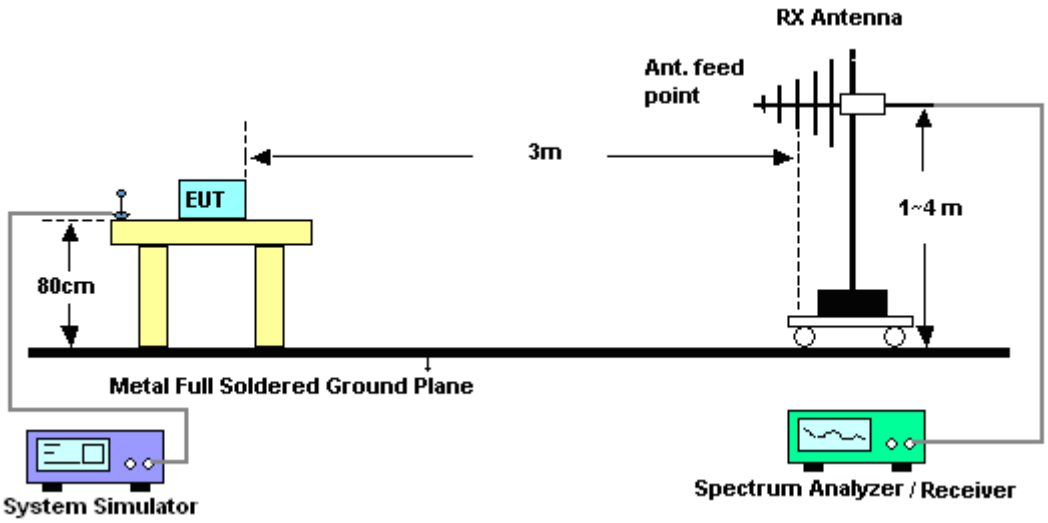
4 Radiated Test Items

4.1 Measuring Instruments

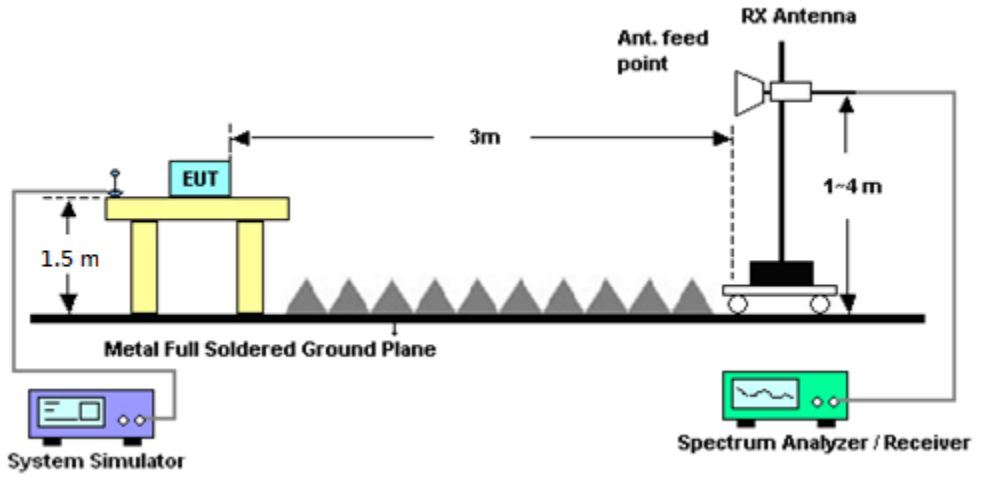
See list of measuring instruments of this test report.

4.1.1 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

4.2 Radiated Spurious Emission

4.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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.

4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8820C	6201432821	GSM/GPRS /WCDMA/LTE	Oct. 13, 2017	Jul. 12, 2018~ Jul. 13, 2018	Oct. 12, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 07, 2017	Jul. 12, 2018~ Jul. 13, 2018	Nov. 06, 2018	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-30℃~70℃	Aug. 28, 2017	Jul. 12, 2018~ Jul. 13, 2018	Aug. 27, 2018	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890001	1V~20V 0.5A~5A	Oct. 06, 2017	Jul. 12, 2018~ Jul. 13, 2018	Oct. 05, 2018	Conducted (TH05-HY)
Coupler	Warison	1-18GHz 20dB 25WSMA Directional Coupler	#B	1G~18GHz	Dec. 04, 2017	Jul. 12, 2018~ Jul. 13, 2018	Dec. 03, 2018	Conducted (TH05-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 18, 2017	Jul. 07, 2018~ Jul. 13, 2018	Jul. 17, 2018	Radiation (03CH15-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Jul. 07, 2018~ Jul. 13, 2018	Nov. 22, 2018	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	May 08, 2018	Jul. 07, 2018~ Jul. 13, 2018	May 07, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 26, 2017	Jul. 07, 2018~ Jul. 13, 2018	Dec. 25, 2018	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Jan. 10, 2018	Jul. 07, 2018~ Jul. 13, 2018	Jan. 09, 2019	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 03, 2017	Jul. 07, 2018~ Jul. 13, 2018	Oct. 02, 2018	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 21, 2017	Jul. 07, 2018~ Jul. 13, 2018	Aug. 20, 2018	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 25, 2018	Jul. 07, 2018~ Jul. 13, 2018	Apr. 24, 2019	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 07, 2018~ Jul. 13, 2018	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 07, 2018~ Jul. 13, 2018	N/A	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	3Hz~26.5GHz	Nov. 02, 2017	Jul. 07, 2018~ Jul. 13, 2018	Nov. 01, 2018	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Jul. 07, 2018~ Jul. 13, 2018	Nov. 26, 2018	Radiation (03CH15-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 21, 2018	Jul. 07, 2018~ Jul. 13, 2018	May 20, 2019	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	May 10, 2018	Jul. 07, 2018~ Jul. 13, 2018	May 09, 2019	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(K5)	ARD-SPR-000185	N/A	N/A	Jul. 07, 2018~ Jul. 13, 2018	N/A	Radiation (03CH15-HY)

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))	**3.37**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.67**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.03**

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	22.82	22.77	22.96
20	1	49		22.30	22.28	22.39
20	1	99		22.12	22.28	22.25
20	50	0		21.75	21.71	21.82
20	50	24		21.45	21.46	21.55
20	50	50		21.41	21.49	21.52
20	100	0		21.60	21.62	21.68
20	1	0	16-QAM	21.90	21.94	21.91
20	1	49		21.56	21.50	21.66
20	1	99		21.40	21.55	21.56
20	50	0		20.81	20.76	20.84
20	50	24		20.48	20.50	20.56
20	50	50		20.43	20.51	20.54
20	100	0		20.57	20.59	20.68
15	1	0	QPSK	22.85	22.80	22.95
15	1	37		22.39	22.45	22.56
15	1	74		22.38	22.47	22.48
15	36	0		21.74	21.71	21.90
15	36	20		21.50	21.49	21.64
15	36	39		21.47	21.52	21.62
15	75	0		21.60	21.61	21.75
15	1	0	16-QAM	21.92	21.90	21.96
15	1	37		21.66	21.68	21.78
15	1	74		21.71	21.82	21.81
15	36	0		20.78	20.73	20.91
15	36	20		20.52	20.51	20.66
15	36	39		20.50	20.55	20.65
15	75	0		20.58	20.63	20.75

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.73	22.64	22.84
10	1	25		22.40	22.40	22.56
10	1	49		22.41	22.44	22.49
10	25	0		21.63	21.57	21.75
10	25	12		21.49	21.46	21.61
10	25	25		21.46	21.46	21.58
10	50	0		21.55	21.53	21.68
10	1	0	16-QAM	21.92	21.92	21.99
10	1	25		21.75	21.76	21.79
10	1	49		21.68	21.72	21.77
10	25	0		20.72	20.62	20.81
10	25	12		20.57	20.49	20.66
10	25	25		20.52	20.51	20.64
10	50	0		20.60	20.56	20.73
5	1	0	QPSK	22.54	22.49	22.64
5	1	12		22.46	22.38	22.49
5	1	24		22.41	22.42	22.47
5	12	0		21.63	21.54	21.69
5	12	7		21.55	21.46	21.59
5	12	13		21.51	21.47	21.57
5	25	0		21.55	21.50	21.60
5	1	0	16-QAM	21.86	21.72	21.90
5	1	12		21.74	21.74	21.94
5	1	24		21.63	21.67	21.73
5	12	0		20.72	20.61	20.76
5	12	7		20.58	20.53	20.66
5	12	13		20.55	20.51	20.62
5	25	0		20.62	20.52	20.65

LTE Band 2 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	22.53	22.47	22.61
3	1	8		22.47	22.43	22.54
3	1	14		22.44	22.43	22.49
3	8	0		21.58	21.52	21.65
3	8	4		21.55	21.52	21.62
3	8	7		21.53	21.48	21.56
3	15	0		21.54	21.47	21.60
3	1	0	16-QAM	21.78	21.67	21.92
3	1	8		21.70	21.68	21.81
3	1	14		21.67	21.61	21.78
3	8	0		20.66	20.56	20.72
3	8	4		20.63	20.55	20.67
3	8	7		20.59	20.54	20.65
3	15	0		20.68	20.54	20.68
1.4	1	0	QPSK	22.49	22.46	22.54
1.4	1	3		22.43	22.43	22.48
1.4	1	5		22.49	22.43	22.55
1.4	3	0		22.56	22.55	22.62
1.4	3	1		22.58	22.49	22.58
1.4	3	3		22.58	22.51	22.56
1.4	6	0		21.58	21.45	21.55
1.4	1	0	16-QAM	21.74	21.70	21.85
1.4	1	3		21.85	21.80	21.96
1.4	1	5		21.76	21.66	21.83
1.4	3	0		21.59	21.58	21.68
1.4	3	1		21.54	21.58	21.70
1.4	3	3		21.60	21.55	21.61
1.4	6	0		20.69	20.61	20.68

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20	1	0	QPSK	22.55	22.86	22.80
20	1	49		22.32	22.30	22.11
20	1	99		22.09	22.11	21.92
20	50	0		21.69	21.82	21.69
20	50	24		21.48	21.51	21.33
20	50	50		21.46	21.47	21.27
20	100	0		21.59	21.62	21.52
20	1	0	16-QAM	21.78	21.95	21.99
20	1	49		21.56	21.63	21.29
20	1	99		21.39	21.42	21.11
20	50	0		20.63	20.76	20.62
20	50	24		20.47	20.44	20.28
20	50	50		20.43	20.42	20.25
20	100	0		20.56	20.55	20.43
15	1	0	QPSK	22.77	22.84	22.78
15	1	37		22.47	22.59	22.19
15	1	74		22.47	22.34	22.18
15	36	0		21.75	21.81	21.60
15	36	20		21.59	21.59	21.36
15	36	39		21.59	21.52	21.32
15	75	0		21.67	21.63	21.47
15	1	0	16-QAM	21.96	21.97	21.98
15	1	37		21.62	21.72	21.42
15	1	74		21.74	21.61	21.42
15	36	0		20.67	20.73	20.57
15	36	20		20.51	20.50	20.30
15	36	39		20.50	20.45	20.25
15	75	0		20.57	20.58	20.39

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.61	22.72	22.51
10	1	25		22.39	22.49	22.15
10	1	49		22.44	22.40	22.19
10	25	0		21.62	21.68	21.44
10	25	12		21.53	21.55	21.31
10	25	25		21.52	21.51	21.29
10	50	0		21.57	21.61	21.36
10	1	0	16-QAM	21.86	21.94	21.76
10	1	25		21.71	21.88	21.41
10	1	49		21.67	21.70	21.40
10	25	0		20.58	20.66	20.42
10	25	12		20.47	20.51	20.26
10	25	25		20.46	20.48	20.23
10	50	0		20.52	20.56	20.32
5	1	0	QPSK	22.46	22.57	22.25
5	1	12		22.46	22.45	22.27
5	1	24		22.38	22.44	22.15
5	12	0		21.59	21.65	21.37
5	12	7		21.53	21.56	21.30
5	12	13		21.52	21.54	21.28
5	25	0		21.54	21.57	21.31
5	1	0	16-QAM	21.74	21.86	21.48
5	1	12		21.61	21.90	21.40
5	1	24		21.63	21.70	21.42
5	12	0		20.53	20.62	20.29
5	12	7		20.42	20.54	20.25
5	12	13		20.43	20.50	20.19
5	25	0		20.49	20.51	20.26

LTE Band 4 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	22.45	22.55	22.22
3	1	8		22.40	22.50	22.19
3	1	14		22.38	22.46	22.16
3	8	0		21.55	21.62	21.33
3	8	4		21.50	21.58	21.27
3	8	7		21.51	21.56	21.28
3	15	0		21.50	21.57	21.28
3	1	0	16-QAM	21.64	21.82	21.41
3	1	8		21.60	21.77	21.43
3	1	14		21.64	21.75	21.36
3	8	0		20.52	20.61	20.30
3	8	4		20.48	20.57	20.26
3	8	7		20.48	20.58	20.27
3	15	0		20.49	20.56	20.26
1.4	1	0	QPSK	22.45	22.53	22.22
1.4	1	3		22.42	22.50	22.17
1.4	1	5		22.41	22.52	22.21
1.4	3	0		22.48	22.58	22.30
1.4	3	1		22.51	22.53	22.26
1.4	3	3		22.51	22.57	22.29
1.4	6	0		21.53	21.52	21.26
1.4	1	0	16-QAM	21.77	21.82	21.51
1.4	1	3		21.78	21.87	21.51
1.4	1	5		21.70	21.78	21.51
1.4	3	0		21.54	21.60	21.35
1.4	3	1		21.49	21.61	21.31
1.4	3	3		21.51	21.60	21.32
1.4	6	0		20.55	20.61	20.30

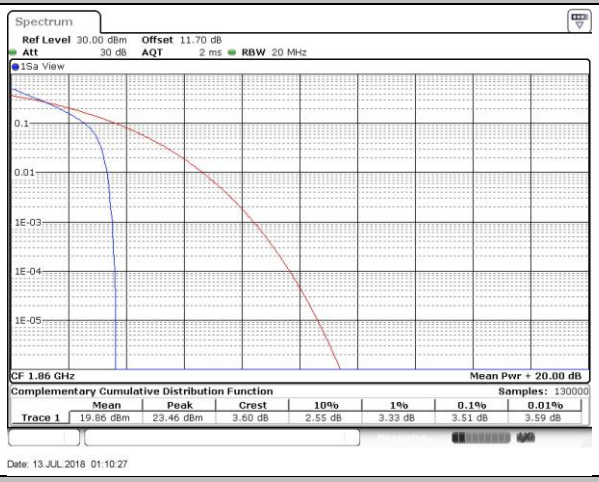
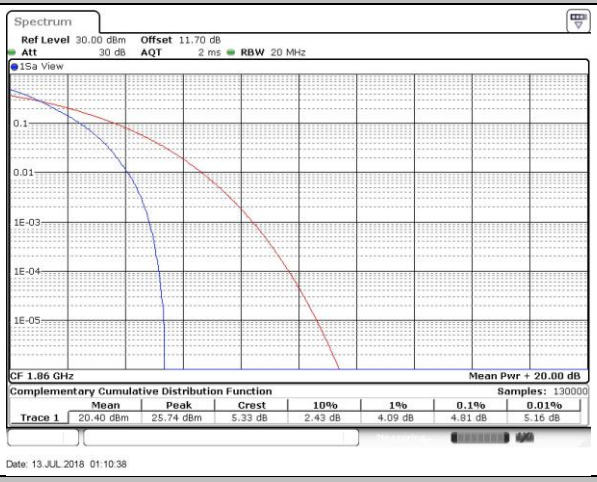
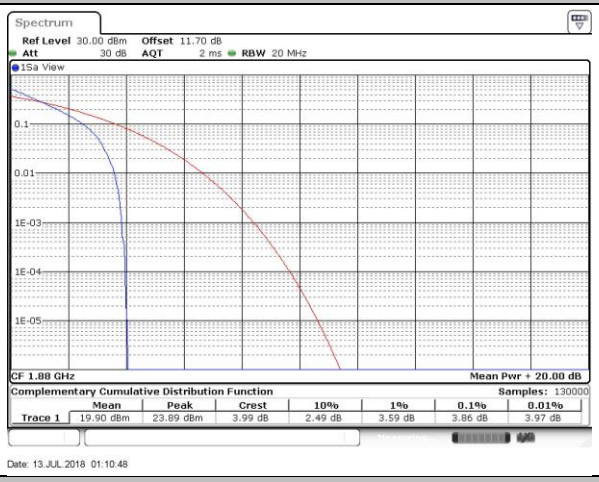
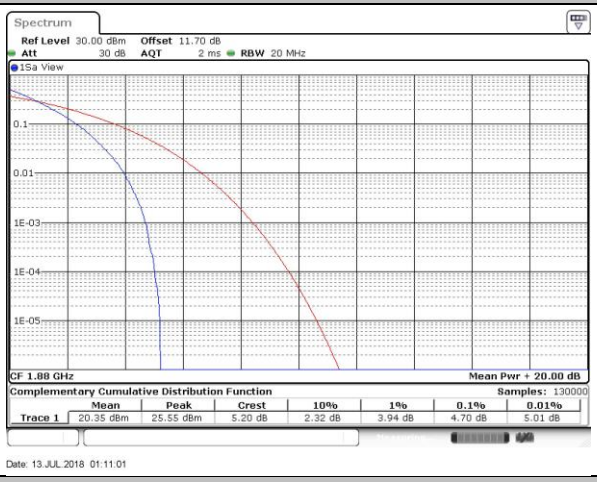
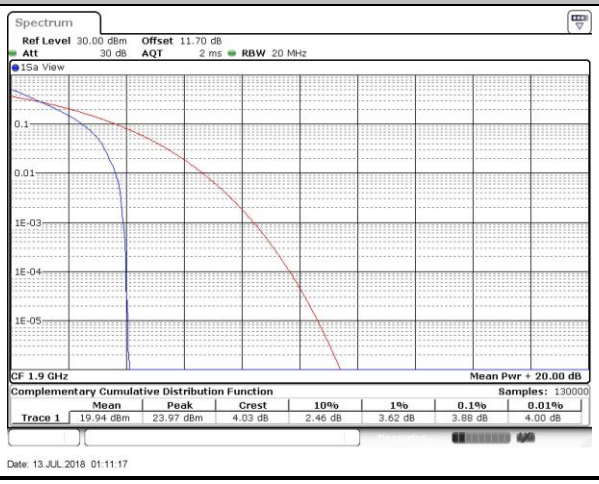
LTE Band 12 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0	QPSK	22.46	22.53	22.43
10	1	25		22.42	22.41	22.42
10	1	49		22.26	22.31	22.21
10	25	0		21.47	21.51	21.49
10	25	12		21.42	21.41	21.43
10	25	25		21.37	21.40	21.37
10	50	0		21.44	21.45	21.44
10	1	0	16-QAM	21.76	21.81	21.73
10	1	25		21.76	21.65	21.75
10	1	49		21.50	21.55	21.52
10	25	0		20.57	20.59	20.58
10	25	12		20.52	20.49	20.51
10	25	25		20.45	20.46	20.45
10	50	0		20.51	20.50	20.50
5	1	0	QPSK	22.44	22.42	22.42
5	1	12		22.42	22.40	22.40
5	1	24		22.38	22.34	22.28
5	12	0		21.55	21.48	21.46
5	12	7		21.46	21.42	21.42
5	12	13		21.46	21.41	21.39
5	25	0		21.45	21.43	21.42
5	1	0	16-QAM	21.72	21.72	21.72
5	1	12		21.78	21.70	21.73
5	1	24		21.65	21.64	21.59
5	12	0		20.61	20.54	20.56
5	12	7		20.54	20.51	20.50
5	12	13		20.56	20.47	20.47
5	25	0		20.54	20.50	20.50

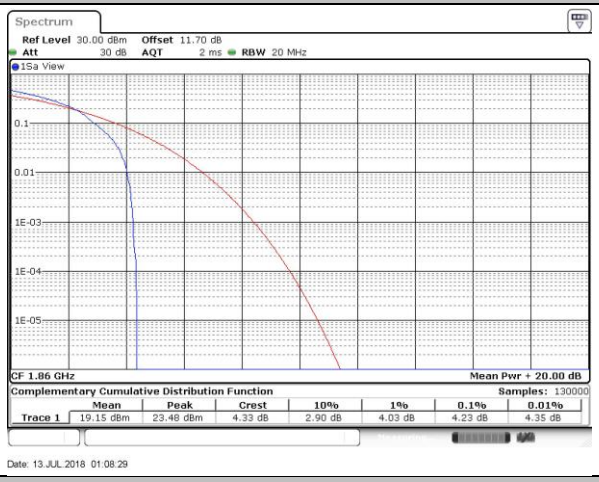
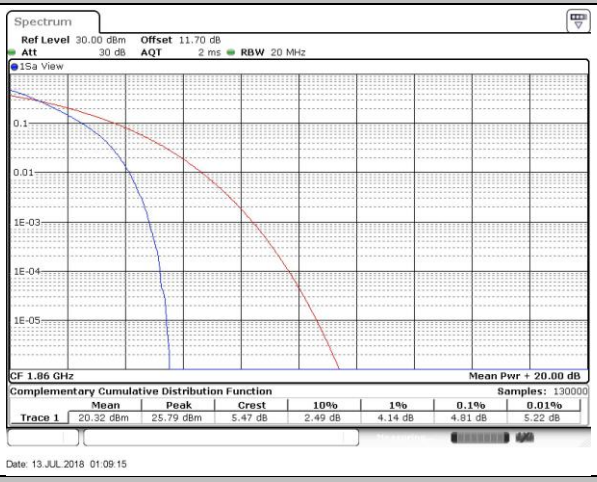
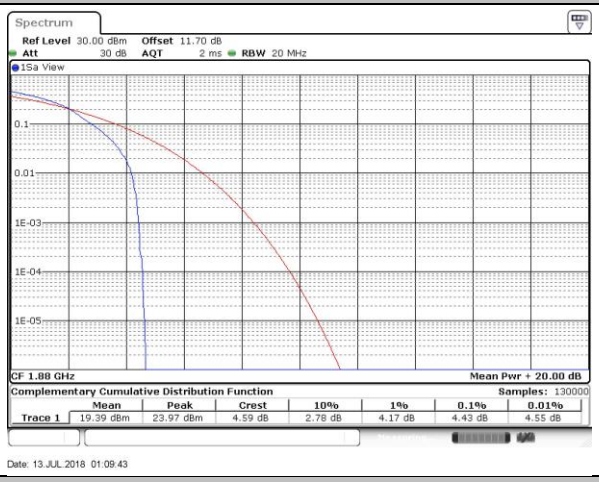
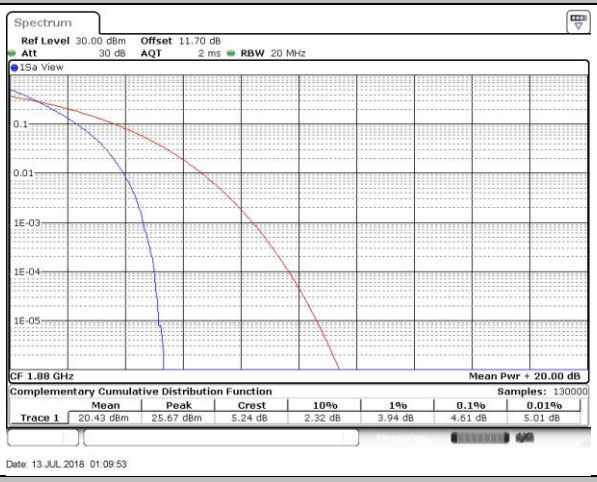
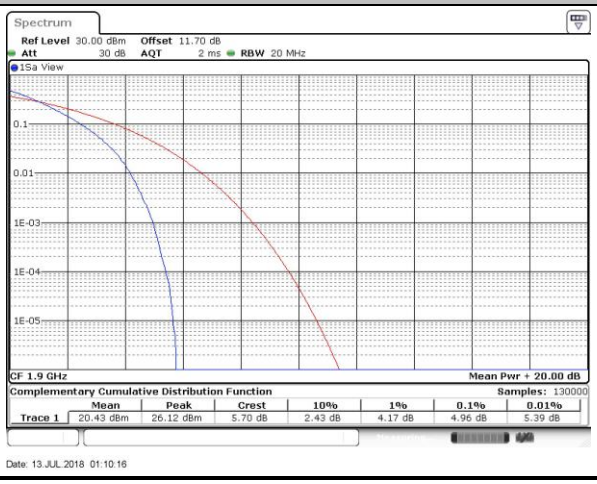
LTE Band 12 Maximum Average Power [dBm]						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
3	1	0	QPSK	22.46	22.38	22.38
3	1	8		22.44	22.39	22.37
3	1	14		22.41	22.36	22.31
3	8	0		21.50	21.45	21.43
3	8	4		21.49	21.44	21.41
3	8	7		21.47	21.43	21.37
3	15	0		21.47	21.41	21.40
3	1	0	16-QAM	21.72	21.66	21.64
3	1	8		21.70	21.61	21.64
3	1	14		21.67	21.53	21.56
3	8	0		20.59	20.52	20.54
3	8	4		20.56	20.48	20.50
3	8	7		20.56	20.48	20.47
3	15	0		20.60	20.50	20.54
1.4	1	0	QPSK	22.45	22.39	22.37
1.4	1	3		22.45	22.37	22.37
1.4	1	5		22.47	22.39	22.32
1.4	3	0		22.52	22.46	22.42
1.4	3	1		22.50	22.45	22.41
1.4	3	3		22.50	22.44	22.40
1.4	6	0		21.50	21.42	21.40
1.4	1	0	16-QAM	21.74	21.64	21.70
1.4	1	3		21.78	21.70	21.68
1.4	1	5		21.77	21.65	21.65
1.4	3	0		21.62	21.51	21.51
1.4	3	1		21.51	21.50	21.47
1.4	3	3		21.58	21.49	21.48
1.4	6	0		20.57	20.51	20.52

LTE Band 2

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	3.51	4.81	4.23	4.81	PASS
Middle CH	3.86	4.7	4.43	4.61	
Highest CH	3.88	4.9	4.75	4.96	

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**
	

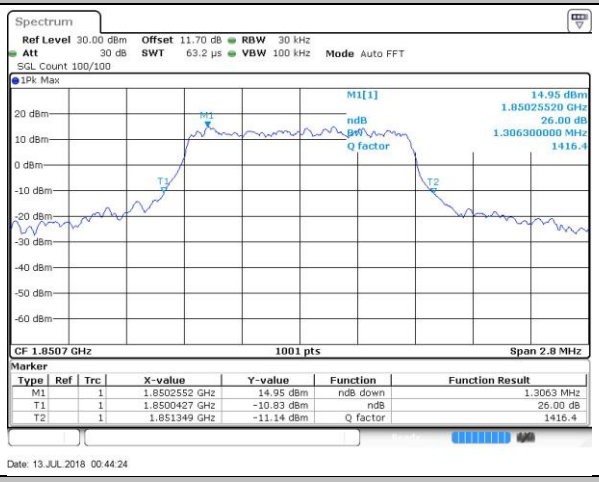
LTE Band 2 / 20MHz / 16QAM	
Lowest Channel / 1RB	**Lowest Channel / Full RB**
	
Middle Channel / 1RB	**Middle Channel / Full RB**
	
Highest Channel / 1RB	**Highest Channel / Full RB**
	

26dB Bandwidth

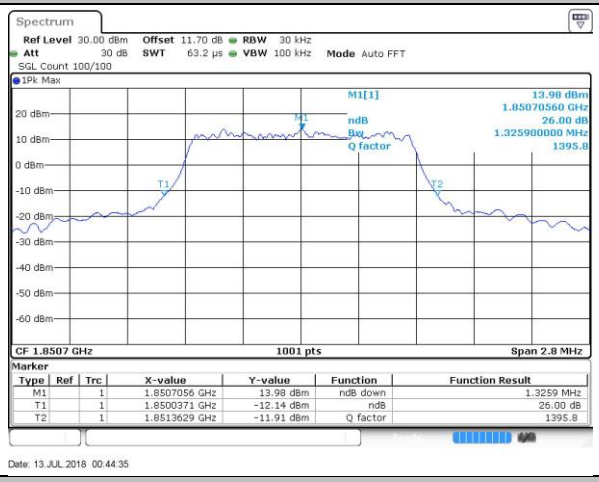
Mode	LTE Band 2 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.31	1.33	3.10	3.04	4.97	4.96	10.19	9.75	15.17	14.81	20.78	20.86
Middle CH	1.34	1.30	3.04	3.02	4.98	4.96	10.25	10.29	15.97	14.87	20.94	20.62
Highest CH	1.32	1.37	2.99	3.11	4.75	5.06	10.07	9.89	14.84	14.81	20.14	20.18

LTE Band 2

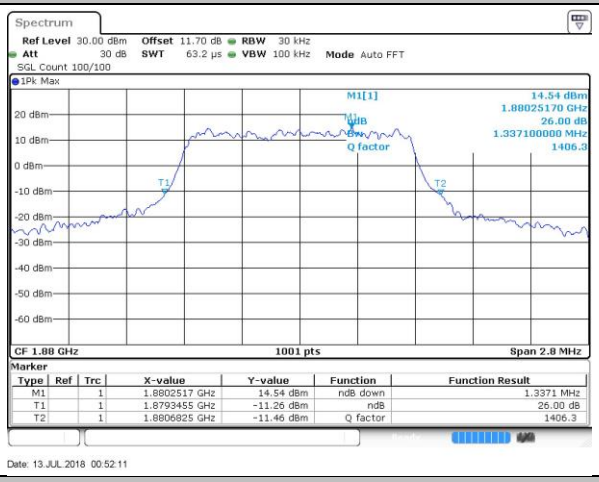
Lowest Channel / 1.4MHz / QPSK



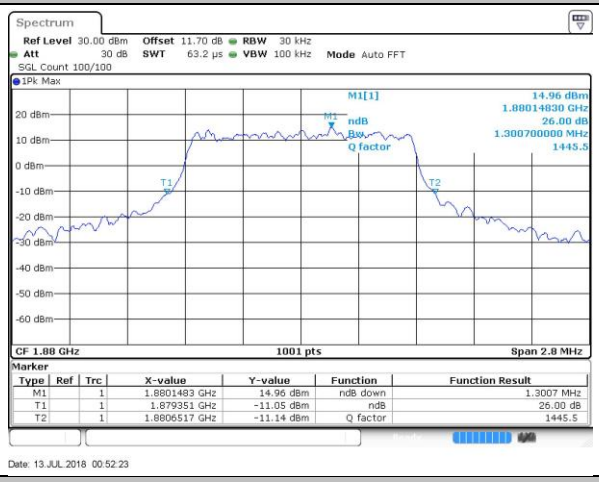
Lowest Channel / 1.4MHz / 16QAM



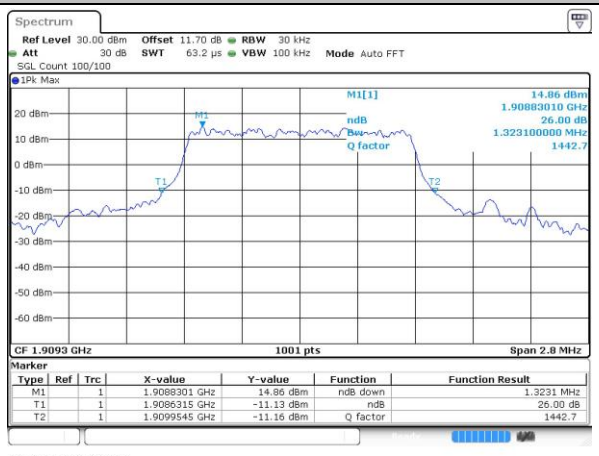
Middle Channel / 1.4MHz / QPSK



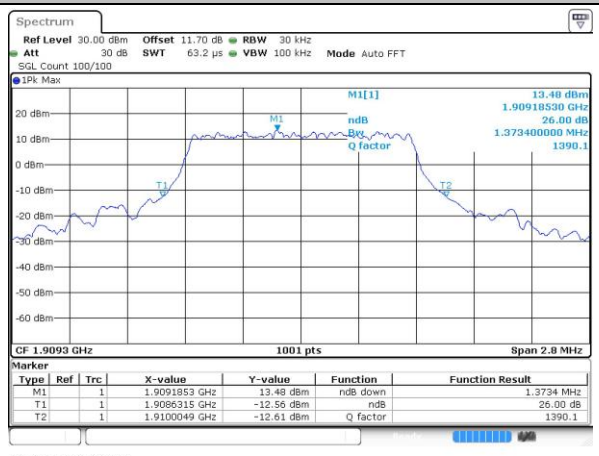
Middle Channel / 1.4MHz / 16QAM



Highest Channel / 1.4MHz / QPSK

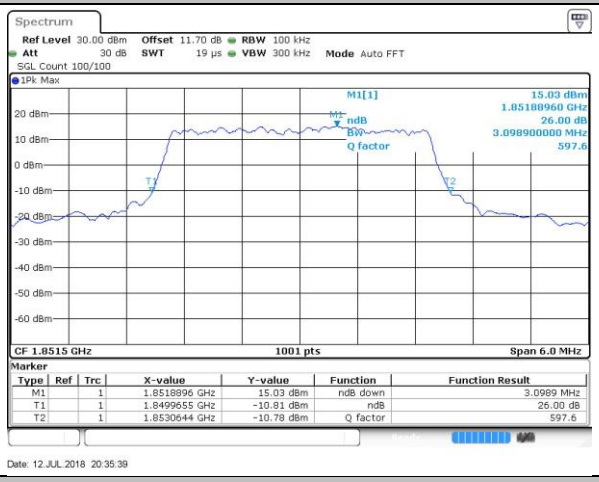


Highest Channel / 1.4MHz / 16QAM

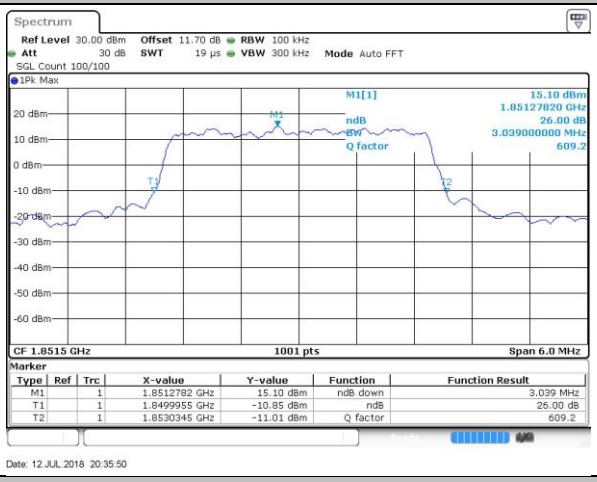


LTE Band 2

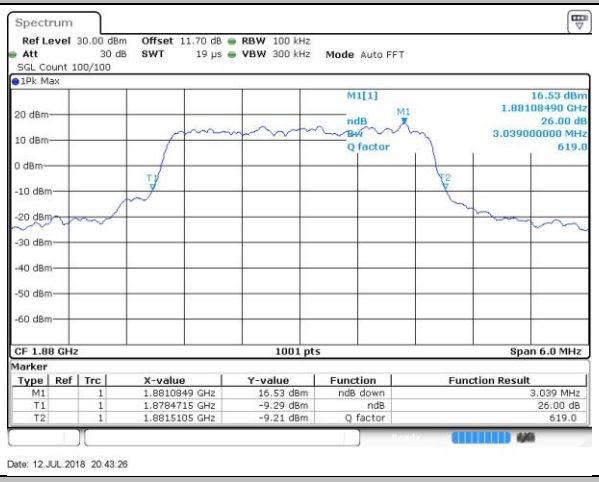
Lowest Channel / 3MHz / QPSK



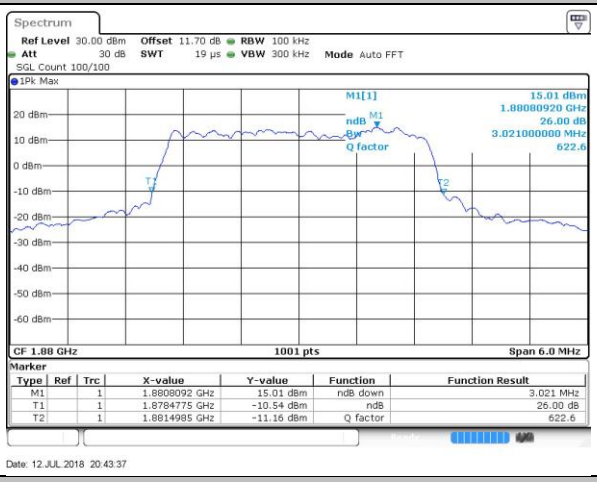
Lowest Channel / 3MHz / 16QAM



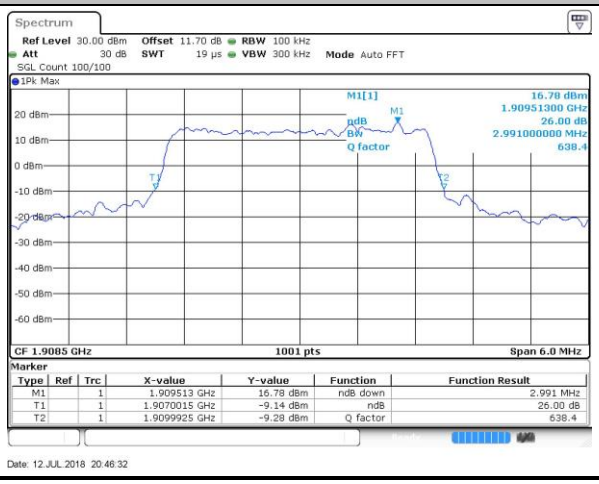
Middle Channel / 3MHz / QPSK



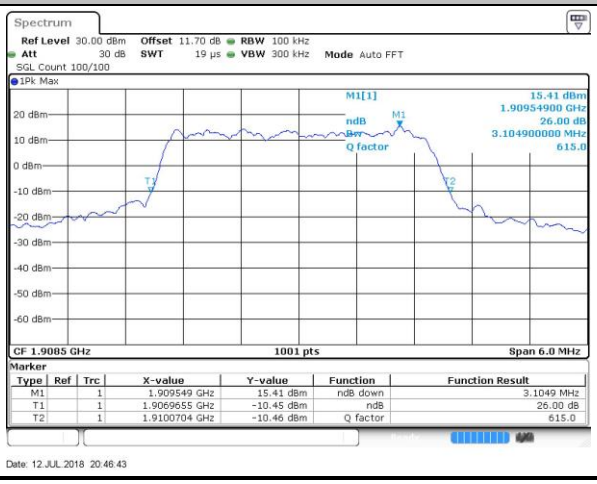
Middle Channel /3MHz / 16QAM



Highest Channel /3MHz / QPSK

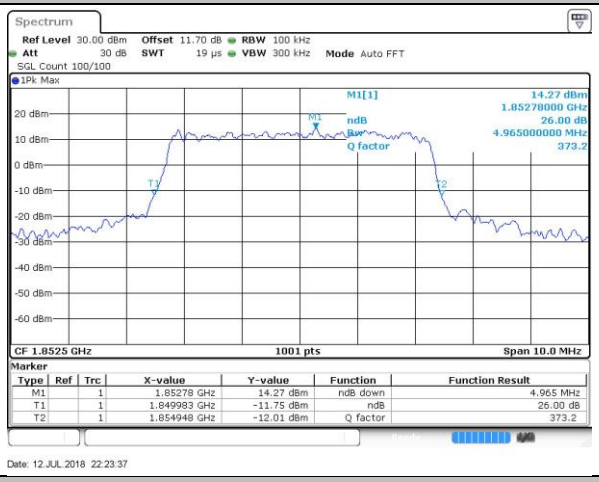


Highest Channel /3MHz / 16QAM

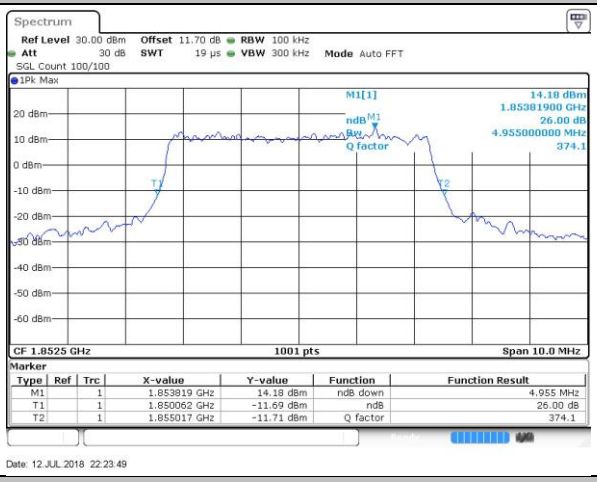


LTE Band 2

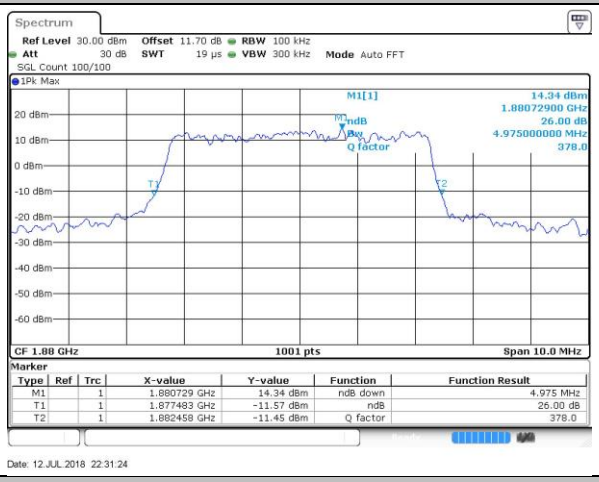
Lowest Channel / 5MHz / QPSK



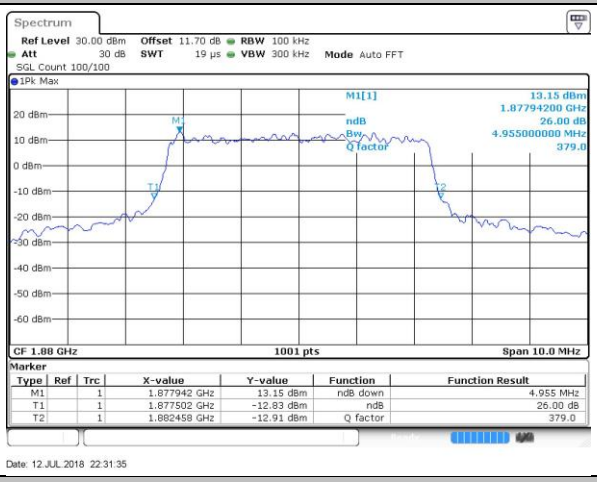
Lowest Channel / 5MHz / 16QAM



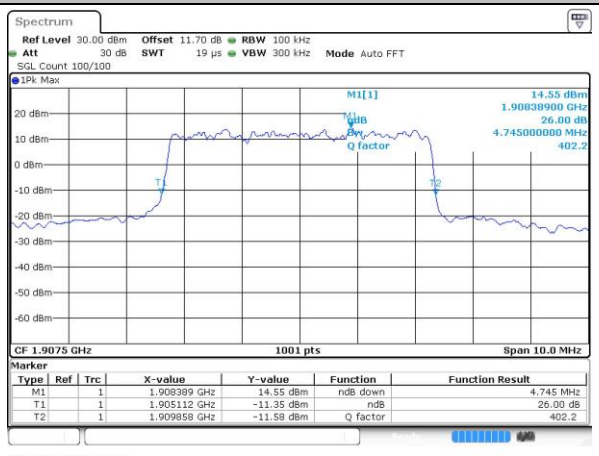
Middle Channel / 5MHz / QPSK



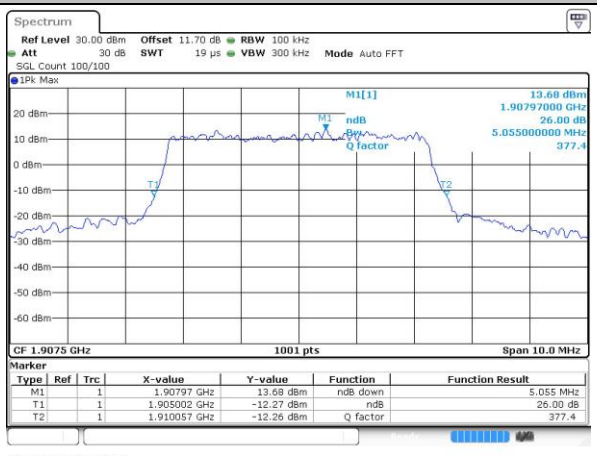
Middle Channel / 5MHz / 16QAM



Highest Channel / 5MHz / QPSK

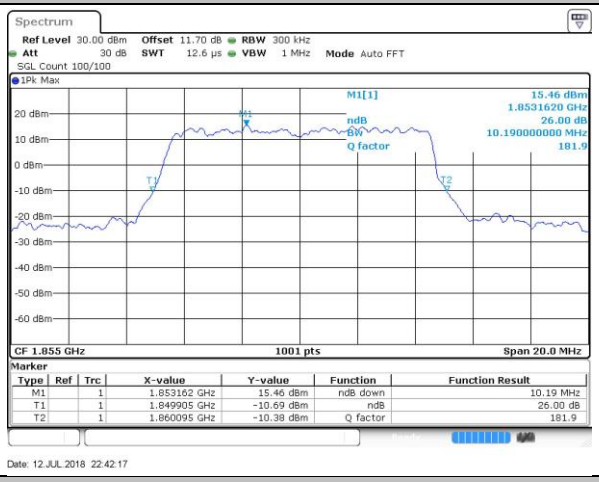


Highest Channel / 5MHz / 16QAM

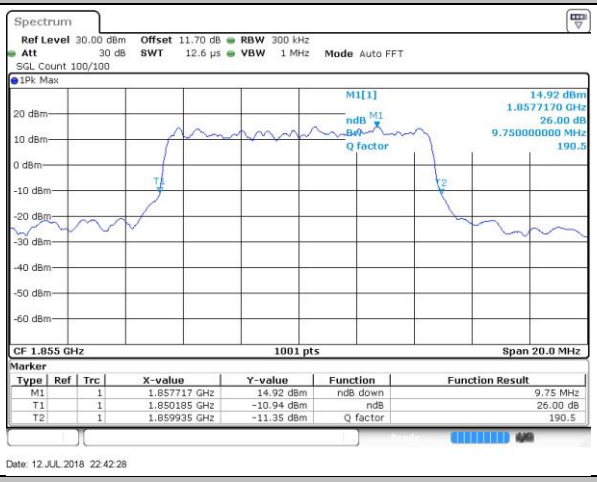


LTE Band 2

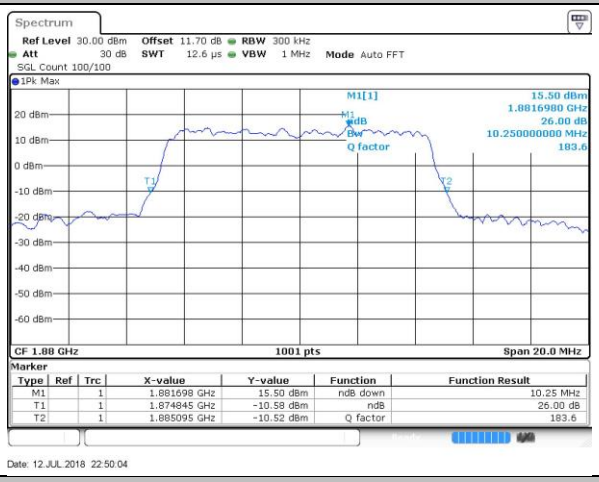
Lowest Channel / 10MHz / QPSK



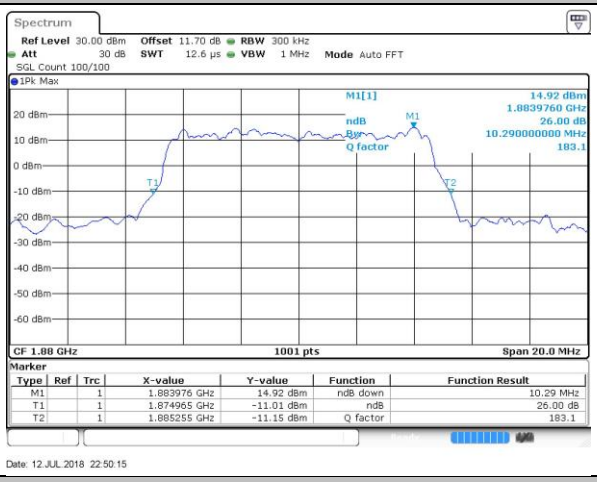
Lowest Channel / 10MHz / 16QAM



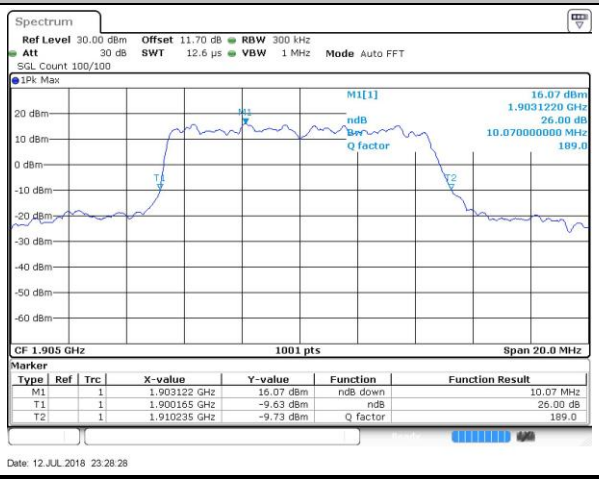
Middle Channel / 10MHz / QPSK



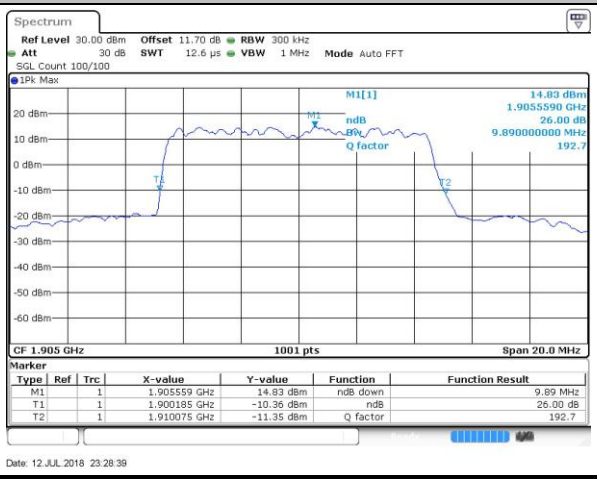
Middle Channel / 10MHz / 16QAM



Highest Channel / 10MHz / QPSK

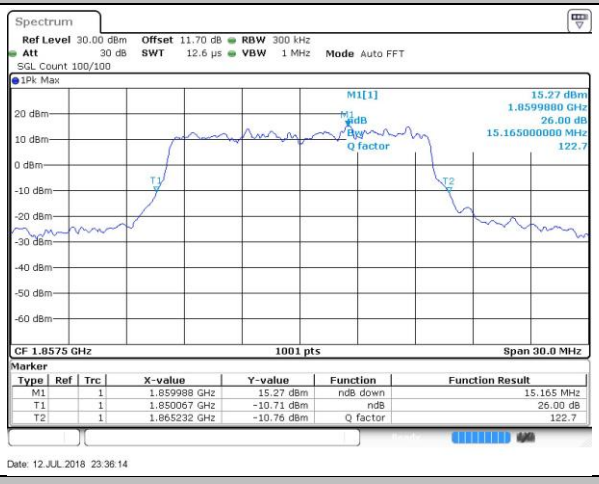


Highest Channel / 10MHz / 16QAM

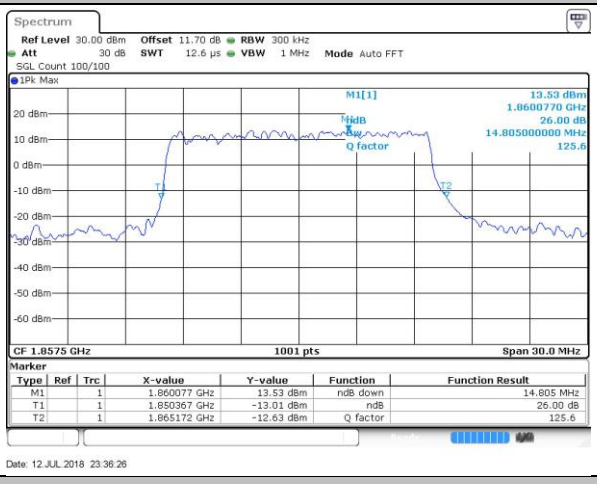


LTE Band 2

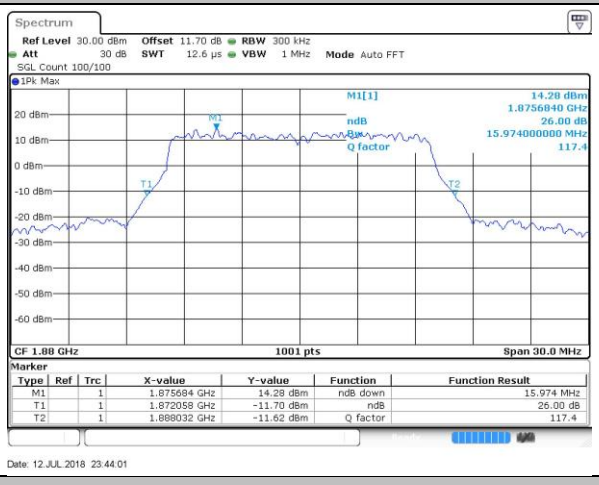
Lowest Channel / 15MHz / QPSK



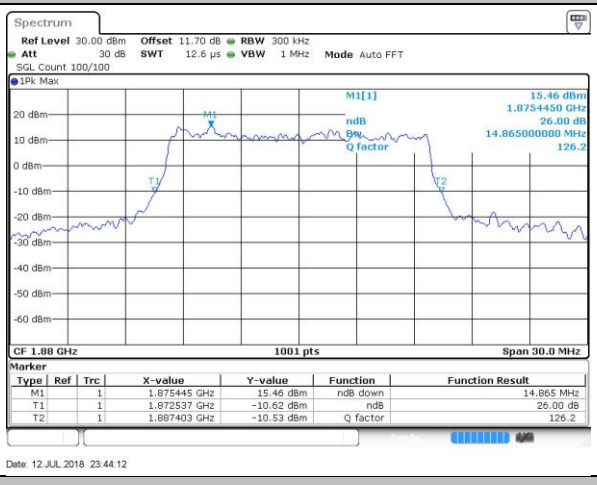
Lowest Channel / 15MHz / 16QAM



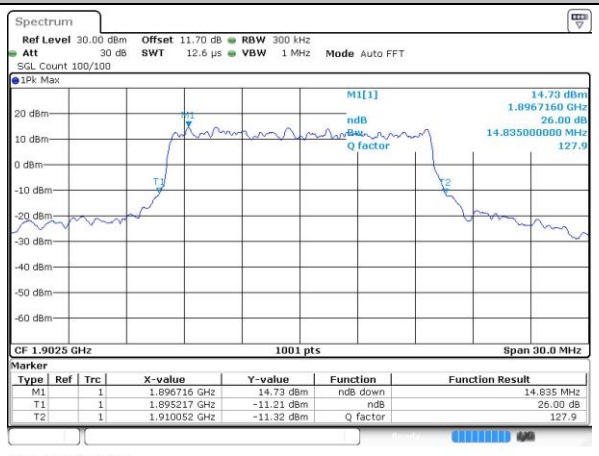
Middle Channel / 15MHz / QPSK



Middle Channel / 15MHz / 16QAM



Highest Channel / 15MHz / QPSK



Highest Channel / 15MHz / 16QAM