FCC Test Report

(PART 24)

Report No.:	RF180704C01-1
FCC ID:	ZMOL850GLD
Test Model:	L850-GL
Received Date:	Jul. 04, 2018
Test Date:	Jul. 10, 2018 ~ Jul. 17, 2018
Issued Date:	Jul. 19, 2018
Applicant:	Fibocom Wireless Inc.
Address:	5/F, Tower A, Technology Building II, 1057 Nanhai Blvd, Nanshan, Shenzhen, China
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
Test Location:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City 33383, Taiwan (R.O.C)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Table of Contents

Release Control Record **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 6
2.2 Test Site and Instruments 7

3 General Information **8**

3.1 General Description of EUT 8
3.2 Configuration of System under Test 9
3.2.1 Description of Support Units 9
3.3 Test Mode Applicability and Tested Channel Detail 10
3.4 EUT Operating Conditions 12
3.5 General Description of Applied Standards 12

4 Test Types and Results **13**

4.1 Output Power Measurement 13
4.1.1 Limits of Output Power Measurement 13
4.1.2 Test Procedures 13
4.1.3 Test Setup 13
4.1.4 Test Results 14
4.2 Modulation Characteristics Measurement 18
4.2.1 Limits of Modulation Characteristics 18
4.2.2 Test Setup 18
4.2.3 Test Procedure 18
4.2.4 Test Results 19
4.3 Frequency Stability Measurement 20
4.3.1 Limits of Frequency Stability Measurement 20
4.3.2 Test Procedure 20
4.3.3 Test Setup 20
4.3.4 Test Results 21
4.4 Occupied Bandwidth Measurement 28
4.4.1 Test Procedure 28
4.4.2 Test Setup 28
4.4.3 Test Result 29
4.5 Band Edge Measurement 33
4.5.1 Limits of Band Edge Measurement 33
4.5.2 Test Setup 33
4.5.3 Test Procedures 33
4.5.4 Test Results 34
4.6 Peak to Average Ratio 41
4.6.1 Limits of Peak to Average Ratio Measurement 41
4.6.2 Test Setup 41
4.6.3 Test Procedures 41
4.6.4 Test Results 42
4.7 Conducted Spurious Emissions 46
4.7.1 Limits of Conducted Spurious Emissions Measurement 46
4.7.2 Test Setup 46
4.7.3 Test Procedure 46
4.7.4 Test Results 47
4.8 Radiated Emission Measurement 68
4.8.1 Limits of Radiated Emission Measurement 68
4.8.2 Test Procedure 68
4.8.3 Deviation from Test Standard 68
4.8.4 Test Setup 69
4.8.5 Test Results 70

5 Pictures of Test Arrangements..... 82

Appendix – Information on the Testing Laboratories 83

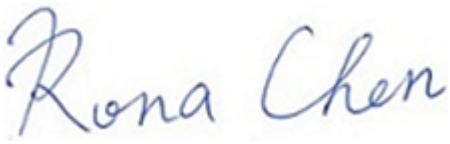
Release Control Record

Issue No.	Description	Date Issued
RF180704C01-1	Original Release	Jul. 19, 2018

1 Certificate of Conformity

Product:	LTE module
Brand:	Fibocom
Test Model:	L850-GL
Sample Status:	Identical Prototype
Applicant:	Fibocom Wireless Inc.
Test Date:	Jul. 10, 2018 ~ Jul. 17, 2018
Standards:	FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :  , **Date:** Jul. 19, 2018

Rona Chen / Specialist

Approved by : , **Date:** Jul. 19, 2018

Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -30.29 dB at 40.67 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 16, 2018	Apr. 15, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer	MT8820C	6201300640	Aug. 16, 2017	Aug. 15, 2019
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

3 General Information

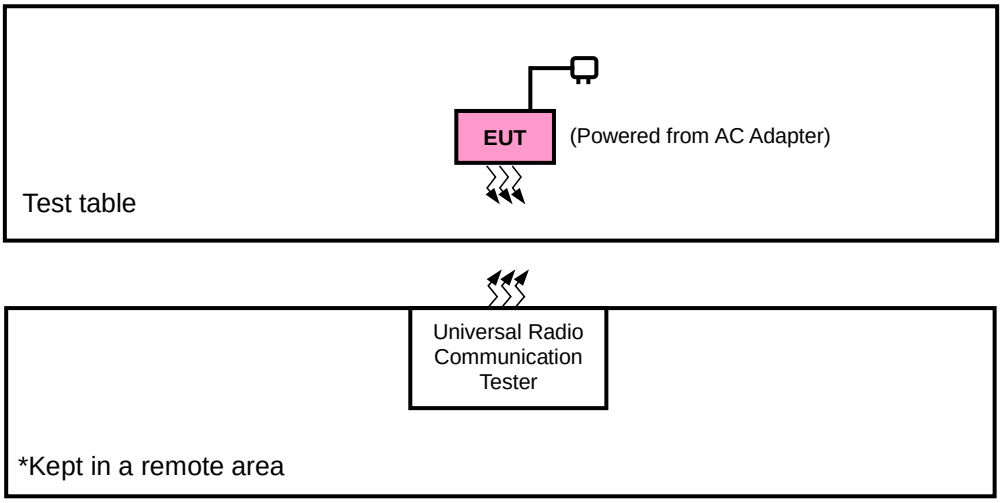
3.1 General Description of EUT

Product	LTE module	
Brand	Fibocom	
Test Model	L850-GL	
Status of EUT	Identical Prototype	
Power Supply Rating	3.3 Vdc (Host equipment)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	WCDMA	594.29 mW
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	605.34 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	610.94 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	622.30 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	623.73 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	632.41 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	639.73 mW
Emission Designator	WCDMA	4M08F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M71G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M50W7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	9M90G7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M49W7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	18M00G7D
Antenna Type	External Antenna with 5.0 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.
The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
WCDMA	Z-axis
LTE Band 2	Z-axis

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	Modulation Characteristics	9262 to 9538	9400	WCDMA
-	Frequency Stability	9262 to 9538	9262, 9538	WCDMA
-	Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
-	Band Edge	9262 to 9538	9262, 9538	WCDMA
-	Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
-	Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
-	Radiated Emission	9262 to 9538	9262, 9400, 9538	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Modulation Characteristics	18700 to 19100	18900	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			19193	1.4 MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			19185	3 MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			19175	5 MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			19150	10 MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			19125	15 MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
		18700 to 19100	18700	20 MHz	QPSK	1 RB / 0 RB Offset
						100 RB / 0 RB Offset
			19100	20 MHz	QPSK	1 RB / 99 RB Offset
						100 RB / 0 RB Offset
-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Modulation Characteristics	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Frequency Stability	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Occupied Bandwidth	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Band Edge	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Peak to Average Ratio	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Conducted Emission	26 deg. C, 58 % RH	3.3 Vdc	Getaz Yang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Thomas Wei

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 24
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

EIRP / ERP Measurement:

a. EIRP = Conducted Output power level + Antenna gain.
b. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIPR power - 2.15dBi.
c. ERP = Conducted Output power level + Antenna gain (dBi) - Isotropically Factor (2.15dB)

4.1.3 Test Setup

4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.61	22.71	22.74
HSDPA Subtest-1	20.95	21.05	20.98
HSDPA Subtest-2	20.87	21.06	21.01
HSDPA Subtest-3	20.89	21.02	21.06
HSDPA Subtest-4	20.90	21.00	21.05
HSUPA Subtest-1	18.85	18.90	18.86
HSUPA Subtest-2	18.69	18.63	18.67
HSUPA Subtest-3	18.84	18.76	18.81
HSUPA Subtest-4	18.63	18.59	18.55
HSUPA Subtest-5	18.71	18.66	18.59

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18607	Mid Ch 18900	High Ch 19193		Low Ch 18607	Mid Ch 18900	High Ch 19193	
			1850.7 MHz	1880.0 MHz	1909.3 MHz		1850.7 MHz	1880.0 MHz	1909.3 MHz	
2 / 1.4M	1	0	22.82	22.68	22.57	0	21.70	21.65	21.62	1
	1	2	22.66	22.63	22.43	0	21.67	21.54	21.53	1
	1	5	22.46	22.47	22.24	0	21.36	21.33	21.30	1
	3	0	21.63	21.63	21.45	0	20.60	20.56	20.44	1
	3	1	21.47	21.46	21.33	0	20.43	20.44	20.21	1
	3	3	21.31	21.30	21.23	0	20.41	20.20	20.20	1
	6	0	21.66	21.60	21.51	1	20.59	20.49	20.34	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18615	Mid Ch 18900	High Ch 19185		Low Ch 18615	Mid Ch 18900	High Ch 19185	
			1851.5 MHz	1880.0 MHz	1908.5 MHz		1851.5 MHz	1880.0 MHz	1908.5 MHz	
2 / 3M	1	0	22.86	22.74	22.64	0	21.67	21.45	21.27	1
	1	7	22.69	22.66	22.54	0	21.61	21.59	21.44	1
	1	14	22.47	22.33	22.38	0	21.51	21.42	21.29	1
	8	0	21.65	21.64	21.54	1	20.54	20.47	20.36	2
	8	3	21.49	21.45	21.27	1	20.54	20.26	20.25	2
	8	7	21.48	21.39	21.30	1	20.37	20.22	20.19	2
	15	0	21.62	21.71	21.49	1	20.55	20.61	20.41	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18625	Mid Ch 18900	High Ch 19175		Low Ch 18625	Mid Ch 18900	High Ch 19175	
			1852.5 MHz	1880.0 MHz	1907.5 MHz		1852.5 MHz	1880.0 MHz	1907.5 MHz	
2 / 5M	1	0	22.94	22.82	22.68	0	21.56	21.70	21.43	1
	1	12	22.71	22.67	22.57	0	21.64	21.48	21.56	1
	1	24	22.61	22.48	22.33	0	21.59	21.52	21.44	1
	12	0	21.77	21.73	21.57	1	20.72	20.48	20.51	2
	12	6	21.52	21.44	21.33	1	20.49	20.55	20.34	2
	12	13	21.44	21.40	21.29	1	20.43	20.43	20.23	2
	25	0	21.74	21.73	21.65	1	20.57	20.61	20.46	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18650	Mid Ch 18900	High Ch 19150		Low Ch 18650	Mid Ch 18900	High Ch 19150	
			1855.0 MHz	1880.0 MHz	1905.0 MHz		1855.0 MHz	1880.0 MHz	1905.0 MHz	
2 / 10M	1	0	22.95	22.90	22.81	0	21.77	21.75	21.50	1
	1	24	22.83	22.80	22.64	0	21.75	21.64	21.65	1
	1	49	22.65	22.56	22.41	0	21.54	21.39	21.48	1
	25	0	21.85	21.78	21.68	1	20.65	20.66	20.45	2
	25	12	21.67	21.57	21.52	1	20.62	20.51	20.44	2
	25	25	21.65	21.46	21.37	1	20.48	20.42	20.38	2
	50	0	21.88	21.70	21.64	1	20.74	20.59	20.51	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18675	Mid Ch 18900	High Ch 19125		Low Ch 18675	Mid Ch 18900	High Ch 19125	
			1857.5 MHz	1880.0 MHz	1902.5 MHz		1857.5 MHz	1880.0 MHz	1902.5 MHz	
2 / 15M	1	0	23.01	22.89	22.79	0	21.89	21.81	21.73	1
	1	37	22.85	22.74	22.69	0	21.79	21.70	21.58	1
	1	74	22.62	22.58	22.54	0	21.69	21.59	21.52	1
	36	0	21.88	21.80	21.65	1	20.82	20.68	20.52	2
	36	19	21.66	21.59	21.44	1	20.66	20.55	20.48	2
	36	39	21.58	21.53	21.41	1	20.59	20.47	20.33	2
	75	0	21.88	21.69	21.58	1	20.75	20.70	20.55	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18700	Mid Ch 18900	High Ch 19100		Low Ch 18700	Mid Ch 18900	High Ch 19100	
			1860.0 MHz	1880.0 MHz	1900.0 MHz		1860.0 MHz	1880.0 MHz	1900.0 MHz	
2 / 20M	1	0	23.06	22.97	22.87	0	22.01	21.94	21.80	1
	1	50	22.91	22.84	22.78	0	21.83	21.76	21.75	1
	1	99	22.76	22.62	22.58	0	21.73	21.64	21.56	1
	50	0	21.97	21.87	21.75	1	20.73	20.85	20.60	2
	50	25	21.75	21.65	21.53	1	20.67	20.69	20.53	2
	50	50	21.65	21.58	21.42	1	20.66	20.58	20.42	2
	100	0	21.96	21.84	21.71	1	20.90	20.74	20.69	2

EIRP Power (dBm)

Note: EIRP (dBm) = Max. Conducted Power (dBm) + Gain (dBi)

Band	WCDMA II		
	RMC 12.2K		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
Max. Cond. Power (dBm)	22.61	22.71	22.74
Max. EIRP Power (dBm)	27.61	27.71	27.74
Max. EIRP Power (mW)	576.77	590.20	594.29

Band 2 / 1.4M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18607	Mid Ch 18900	High Ch 19193	Low Ch 18607	Mid Ch 18900	High Ch 19193
	1850.7 MHz	1880.0 MHz	1909.3 MHz	1850.7 MHz	1880.0 MHz	1909.3 MHz
Max. Cond. Power (dBm)	22.82	22.68	22.57	21.70	21.65	21.62
Max. EIRP Power (dBm)	27.82	27.68	27.57	26.70	26.65	26.62
Max. EIRP Power (mW)	605.34	586.14	571.48	467.74	462.38	459.20

Band 2 / 3M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18615	Mid Ch 18900	High Ch 19185	Low Ch 18615	Mid Ch 18900	High Ch 19185
	1851.5 MHz	1880.0 MHz	1908.5 MHz	1851.5 MHz	1880.0 MHz	1908.5 MHz
Max. Cond. Power (dBm)	22.86	22.74	22.64	21.67	21.45	21.27
Max. EIRP Power (dBm)	27.86	27.74	27.64	26.67	26.45	26.27
Max. EIRP Power (mW)	610.94	594.29	580.76	464.52	441.57	423.64

Band 2 / 5M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18625	Mid Ch 18900	High Ch 19175	Low Ch 18625	Mid Ch 18900	High Ch 19175
	1852.5 MHz	1880.0 MHz	1907.5 MHz	1852.5 MHz	1880.0 MHz	1907.5 MHz
Max. Cond. Power (dBm)	22.94	22.82	22.68	21.56	21.70	21.43
Max. EIRP Power (dBm)	27.94	27.82	27.68	26.56	26.70	26.43
Max. EIRP Power (mW)	622.30	605.34	586.14	452.90	467.74	439.54

Band 2 / 10M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18650	Mid Ch 18900	High Ch 19150	Low Ch 18650	Mid Ch 18900	High Ch 19150
	1855.0 MHz	1880.0 MHz	1905.0 MHz	1855.0 MHz	1880.0 MHz	1905.0 MHz
Max. Cond. Power (dBm)	22.95	22.90	22.81	21.77	21.75	21.50
Max. EIRP Power (dBm)	27.95	27.90	27.81	26.77	26.75	26.50
Max. EIRP Power (mW)	623.73	616.60	603.95	475.34	473.15	446.68

Band 2 / 15M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18675	Mid Ch 18900	High Ch 19125	Low Ch 18675	Mid Ch 18900	High Ch 19125
	1857.5 MHz	1880.0 MHz	1902.5 MHz	1857.5 MHz	1880.0 MHz	1902.5 MHz
Max. Cond. Power (dBm)	23.01	22.89	22.79	21.89	21.81	21.73
Max. EIRP Power (dBm)	28.01	27.89	27.79	26.89	26.81	26.73
Max. EIRP Power (mW)	632.41	615.18	601.17	488.65	479.73	470.98

Band 2 / 20M, 1RB#0						
Test Mode	QPSK			16QAM		
	Low Ch 18700	Mid Ch 18900	High Ch 19100	Low Ch 18700	Mid Ch 18900	High Ch 19100
	1860.0 MHz	1880.0 MHz	1900.0 MHz	1860.0 MHz	1880.0 MHz	1900.0 MHz
Max. Cond. Power (dBm)	23.06	22.97	22.87	22.01	21.94	21.80
Max. EIRP Power (dBm)	28.06	27.97	27.87	27.01	26.94	26.80
Max. EIRP Power (mW)	639.73	626.61	612.35	502.34	494.31	478.63

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

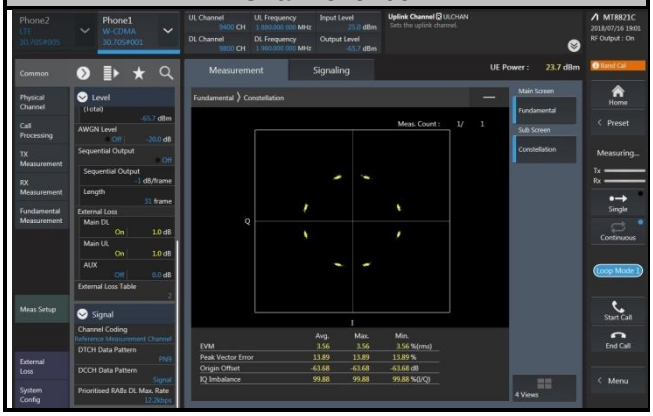
N/A

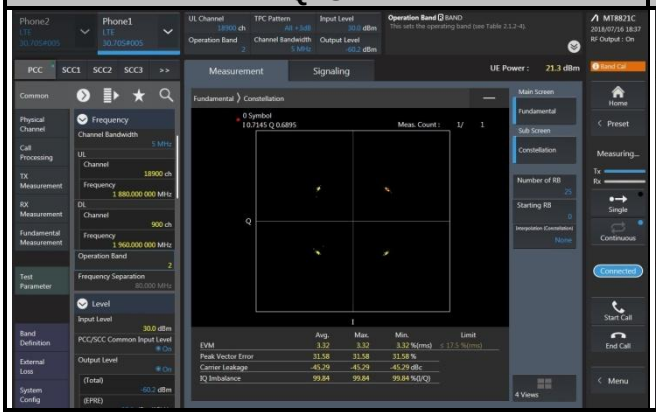
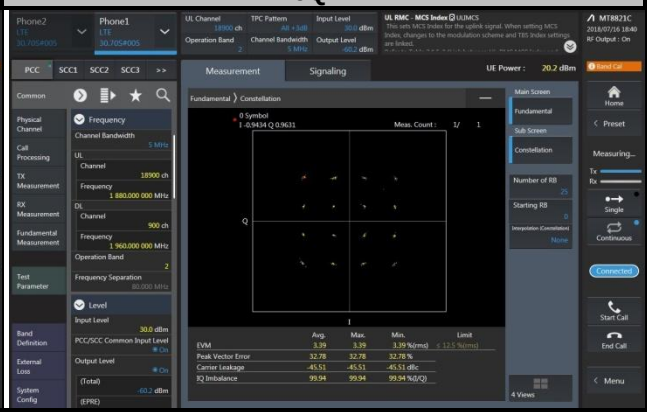
4.2.2 Test Setup

4.2.3 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.4 Test Results

Spectrum Plot of Measurement
WCDMA
Channel 9400


Spectrum Plot of Measurement	
LTE Band 2	
Channel 18900	
QPSK	16QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

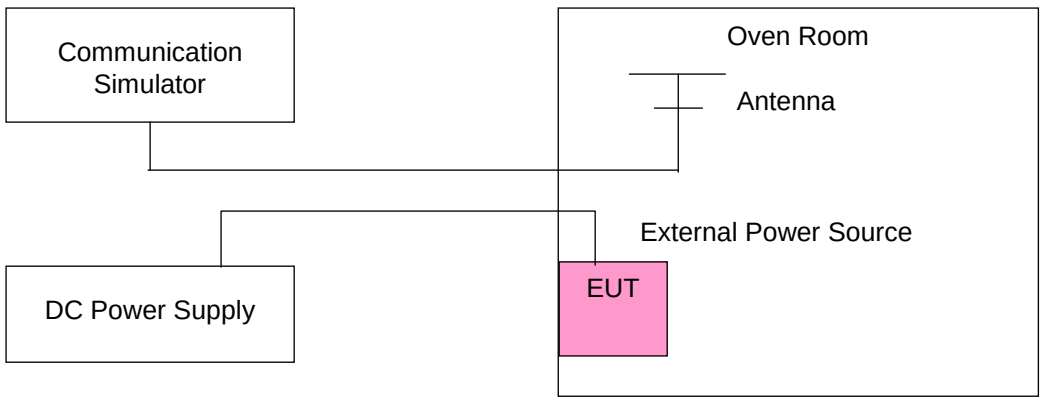
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1852.400004	0.002	1907.600004	0.002	2.5
3.135	1852.400004	0.002	1907.600003	0.002	2.5
4.4	1852.400003	0.002	1907.600002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.400003	0.002	1907.600003	0.002	2.5
-20	1852.400003	0.001	1907.600001	0.001	2.5
-10	1852.400002	0.001	1907.600002	0.001	2.5
0	1852.400003	0.002	1907.600003	0.002	2.5
10	1852.400003	0.002	1907.600001	0.001	2.5
20	1852.399998	-0.001	1907.599998	-0.001	2.5
30	1852.399997	-0.002	1907.599996	-0.002	2.5
40	1852.399997	-0.002	1907.599997	-0.002	2.5
50	1852.399998	-0.001	1907.599999	-0.001	2.5
55	1852.399997	-0.002	1907.599998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1850.700001	0.001	1909.300002	0.001	2.5
3.135	1850.700002	0.001	1909.300003	0.001	2.5
4.4	1850.700003	0.002	1909.300002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.700003	0.002	1909.300002	0.001	2.5
-20	1850.700003	0.002	1909.300002	0.001	2.5
-10	1850.700002	0.001	1909.300003	0.001	2.5
0	1850.700003	0.001	1909.300003	0.002	2.5
10	1850.700003	0.001	1909.300003	0.002	2.5
20	1850.699999	-0.001	1909.299998	-0.001	2.5
30	1850.699998	-0.001	1909.299999	-0.001	2.5
40	1850.699998	-0.001	1909.299997	-0.001	2.5
50	1850.699998	-0.001	1909.299999	-0.001	2.5
55	1850.699996	-0.002	1909.299999	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1851.500002	0.001	1908.500002	0.001	2.5
3.135	1851.500003	0.002	1908.500002	0.001	2.5
4.4	1851.500001	0.001	1908.500002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.500003	0.002	1908.500003	0.001	2.5
-20	1851.500001	0.001	1908.500002	0.001	2.5
-10	1851.500001	0.001	1908.500001	0.001	2.5
0	1851.500004	0.002	1908.500002	0.001	2.5
10	1851.500003	0.001	1908.500004	0.002	2.5
20	1851.499996	-0.002	1908.499999	-0.001	2.5
30	1851.499997	-0.002	1908.499998	-0.001	2.5
40	1851.499998	-0.001	1908.499997	-0.001	2.5
50	1851.499997	-0.002	1908.499998	-0.001	2.5
55	1851.499999	-0.001	1908.499997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1852.500002	0.001	1907.500002	0.001	2.5
3.135	1852.500003	0.002	1907.500004	0.002	2.5
4.4	1852.500002	0.001	1907.500001	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.500001	0.001	1907.500001	0.001	2.5
-20	1852.500003	0.002	1907.500002	0.001	2.5
-10	1852.500004	0.002	1907.500003	0.002	2.5
0	1852.500004	0.002	1907.500003	0.001	2.5
10	1852.500002	0.001	1907.500004	0.002	2.5
20	1852.499998	-0.001	1907.499999	-0.001	2.5
30	1852.499998	-0.001	1907.499998	-0.001	2.5
40	1852.499996	-0.002	1907.499999	-0.001	2.5
50	1852.499997	-0.002	1907.499997	-0.002	2.5
55	1852.499996	-0.002	1907.499997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1855.000002	0.001	1905.000002	0.001	2.5
3.135	1855.000002	0.001	1905.000002	0.001	2.5
4.4	1855.000003	0.001	1905.000003	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1855.000002	0.001	1905.000002	0.001	2.5
-20	1855.000003	0.002	1905.000003	0.002	2.5
-10	1855.000002	0.001	1905.000002	0.001	2.5
0	1855.000002	0.001	1905.000001	0.001	2.5
10	1855.000001	0.001	1905.000003	0.001	2.5
20	1854.999997	-0.002	1904.999998	-0.001	2.5
30	1854.999998	-0.001	1904.999998	-0.001	2.5
40	1854.999999	-0.001	1904.999996	-0.002	2.5
50	1854.999997	-0.001	1904.999999	-0.001	2.5
55	1854.999996	-0.002	1904.999997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1857.500003	0.002	1902.500002	0.001	2.5
3.135	1857.500003	0.002	1902.500003	0.002	2.5
4.4	1857.500003	0.002	1902.500004	0.002	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1857.500004	0.002	1902.500004	0.002	2.5
-20	1857.500003	0.001	1902.500003	0.001	2.5
-10	1857.500002	0.001	1902.500002	0.001	2.5
0	1857.500004	0.002	1902.500001	0.001	2.5
10	1857.500001	0.001	1902.500002	0.001	2.5
20	1857.499998	-0.001	1902.499998	-0.001	2.5
30	1857.499996	-0.002	1902.499997	-0.002	2.5
40	1857.499996	-0.002	1902.499997	-0.002	2.5
50	1857.499999	-0.001	1902.499997	-0.001	2.5
55	1857.499998	-0.001	1902.499996	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.3	1860.000001	0.001	1900.000003	0.002	2.5
3.135	1860.000002	0.001	1900.000003	0.002	2.5
4.4	1860.000003	0.002	1900.000002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.135 Vdc to 4.4 Vdc.

Frequency Error vs. Temperature

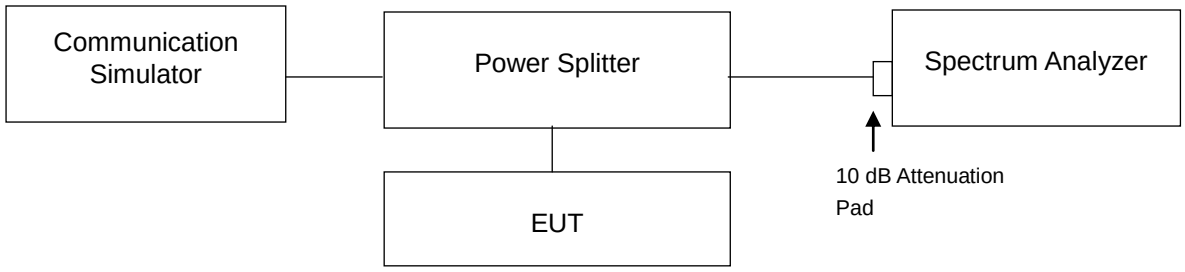
Temp. (℃)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1860.000003	0.002	1900.000002	0.001	2.5
-20	1860.000001	0.001	1900.000003	0.001	2.5
-10	1860.000003	0.002	1900.000002	0.001	2.5
0	1860.000002	0.001	1900.000003	0.001	2.5
10	1860.000003	0.002	1900.000001	0.001	2.5
20	1859.999997	-0.002	1899.999999	-0.001	2.5
30	1859.999996	-0.002	1899.999997	-0.001	2.5
40	1859.999999	-0.001	1899.999996	-0.002	2.5
50	1859.999997	-0.002	1899.999998	-0.001	2.5
55	1859.999999	-0.001	1899.999996	-0.002	2.5

4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

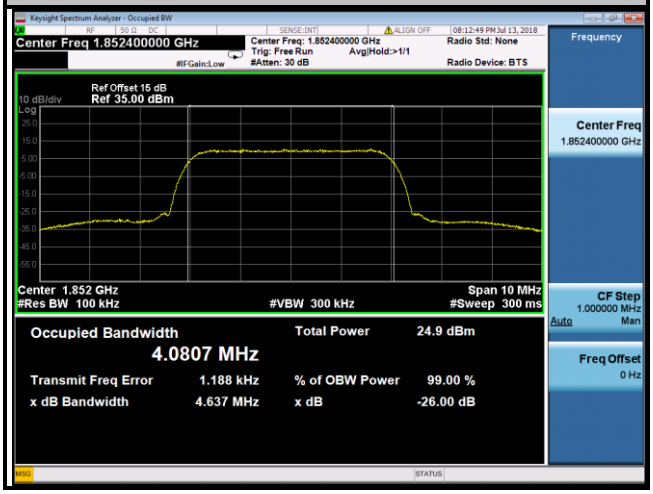
4.4.2 Test Setup



4.4.3 Test Result

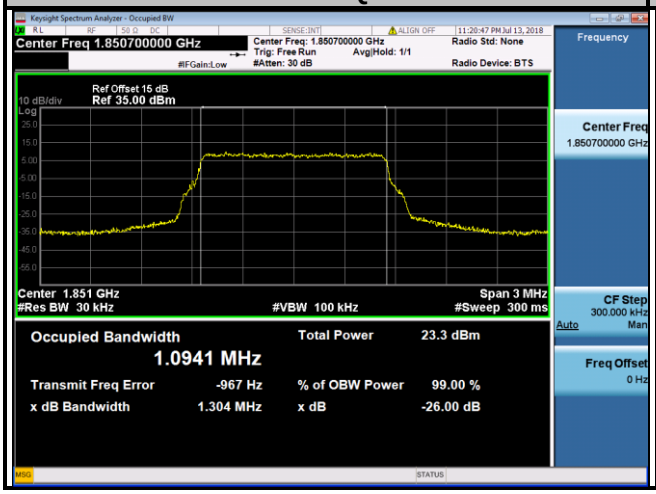
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		WCDMA
9262	1852.4	4.0807
9400	1880.0	4.0799
9538	1907.6	4.0775

Spectrum Plot of Worst Value
WCDMA



LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.09	1.09	18615	1851.5	2.71	2.70
18900	1880.0	1.09	1.09	18900	1880.0	2.70	2.70
19193	1909.3	1.09	1.09	19185	1908.5	2.70	2.70

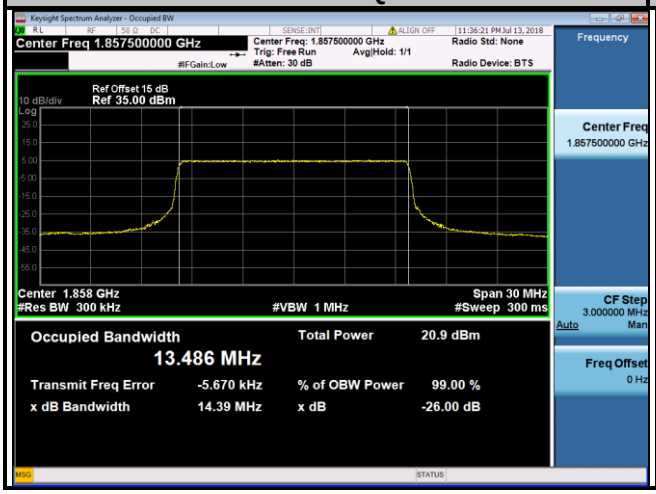
Spectrum Plot of Worst Value	
1.4 MHz / QPSK	3 MHz / QPSK



LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.49	4.50	18650	1855.0	9.00	8.99
18900	1880.0	4.49	4.50	18900	1880.0	8.99	8.98
19175	1907.5	4.49	4.50	19150	1905.0	8.99	8.98

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / QPSK

LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.47	13.49	18700	1860.0	18.00	18.00
18900	1880.0	13.45	13.48	18900	1880.0	17.95	17.95
19125	1902.5	13.45	13.46	19100	1900.0	17.96	17.97

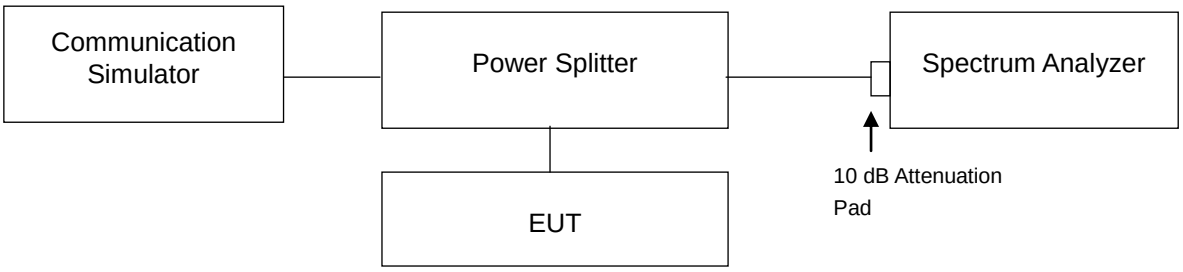
Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / QPSK
	

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. 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.

4.5.2 Test Setup

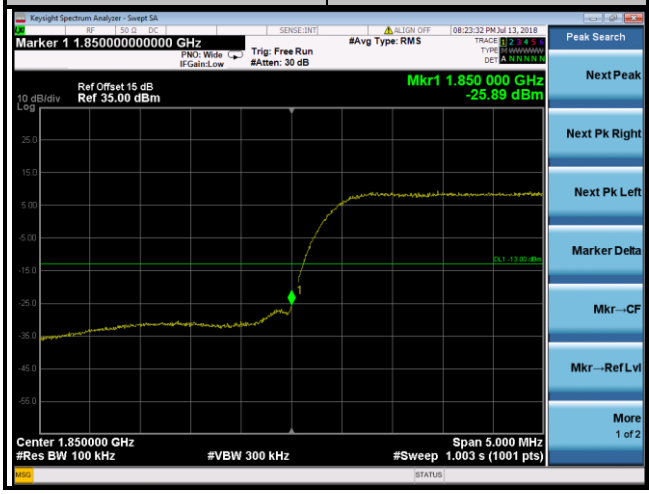


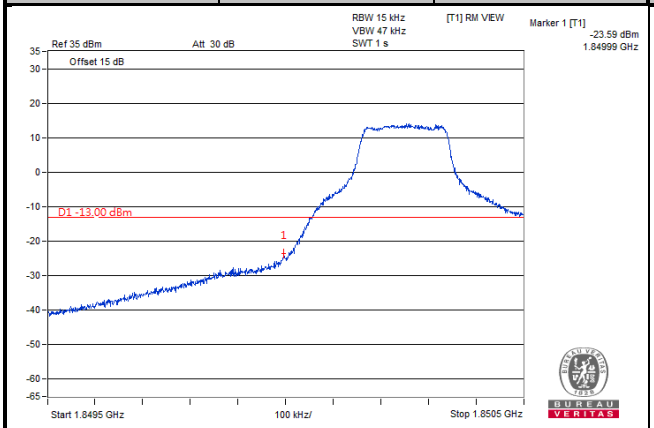
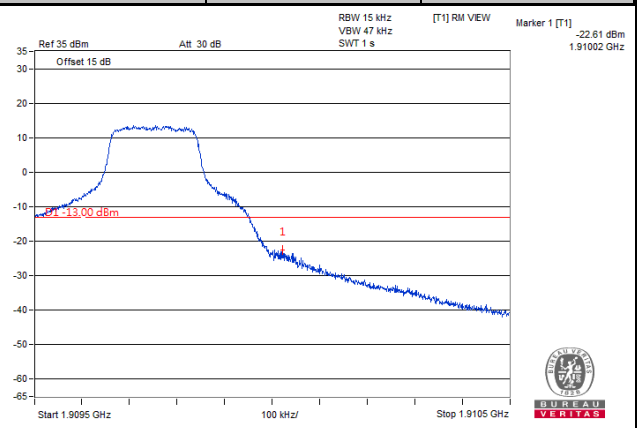
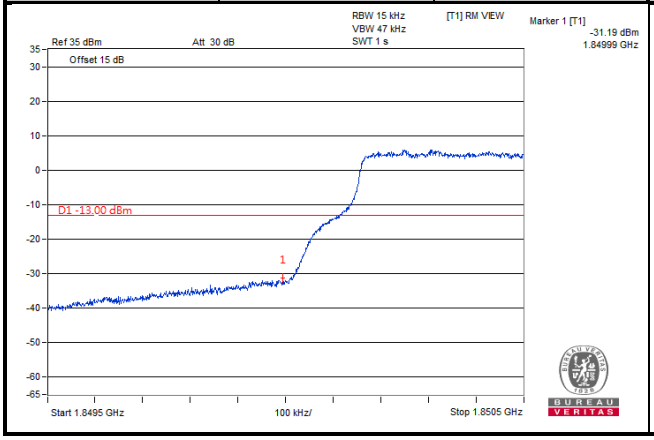
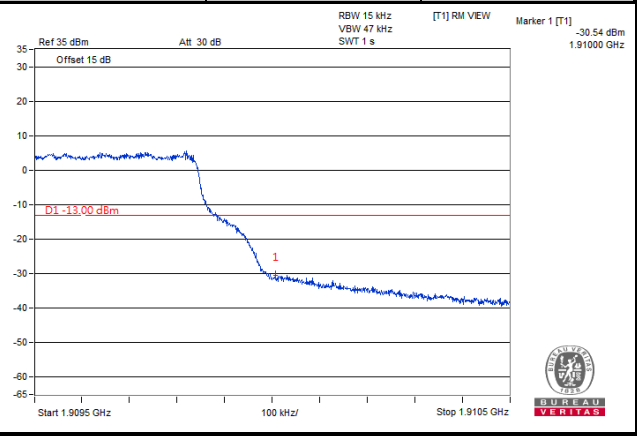
4.5.3 Test Procedures

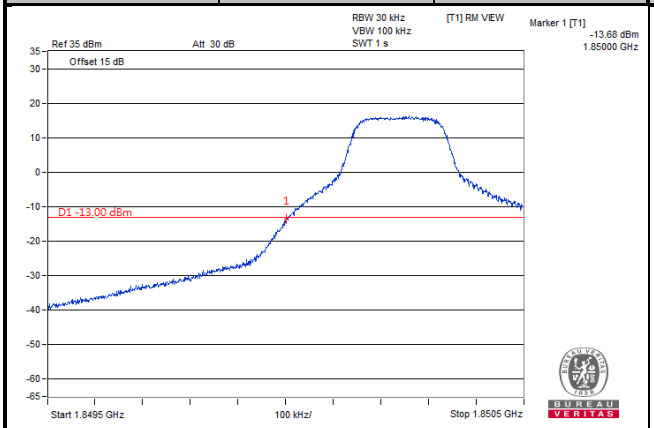
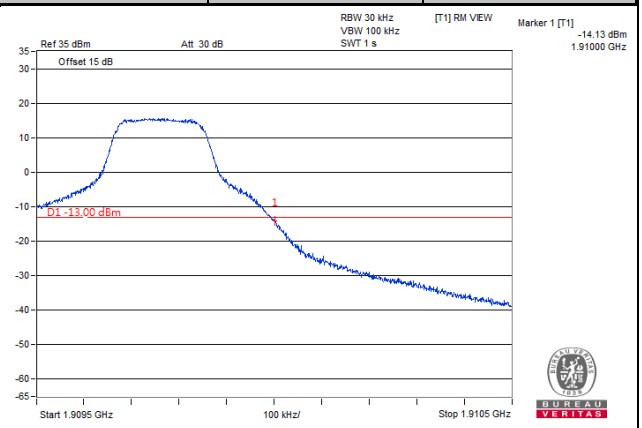
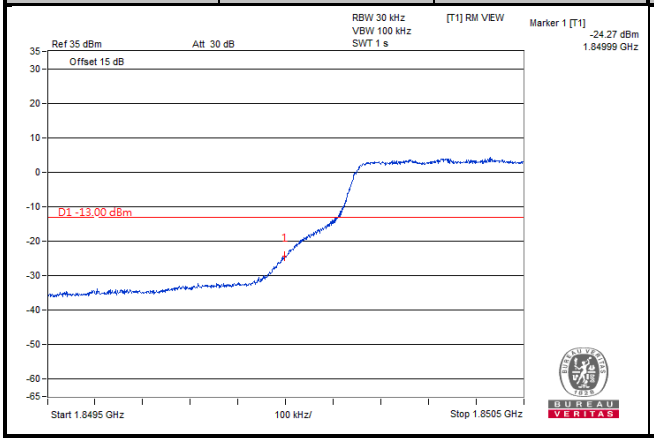
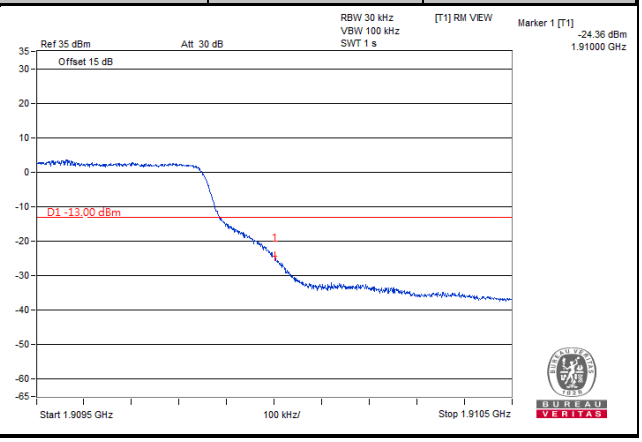
a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (WCDMA).
c. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 1.4 MHz).
d. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 62 kHz and VB of the spectrum is 200 kHz (LTE Bandwidth 3 MHz).
e. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz).
f. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 10 MHz).
g. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 15 MHz).
h. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
i. Record the max trace plot into the test report.

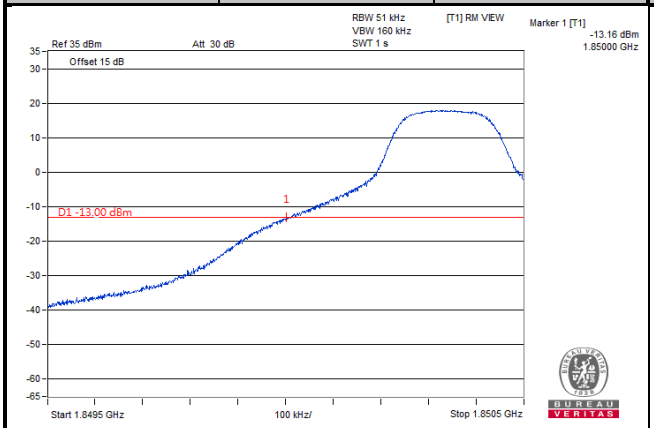
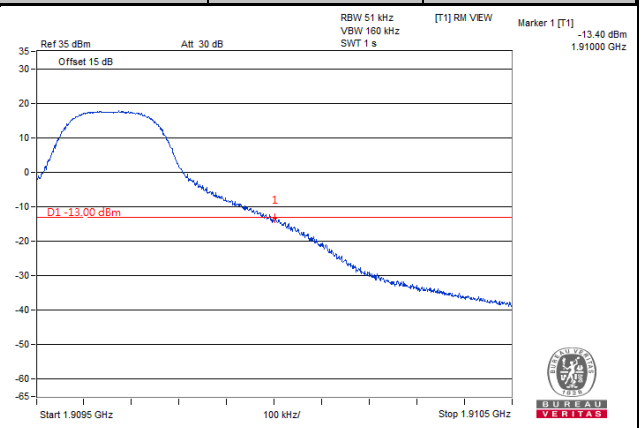
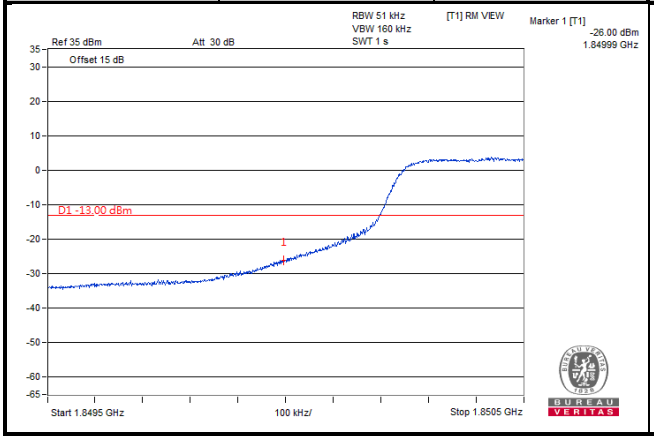
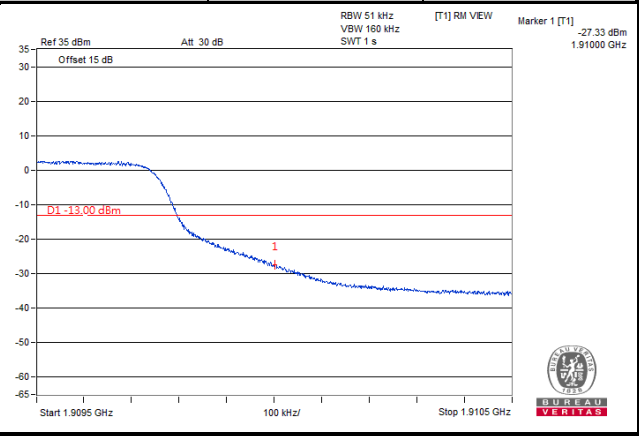
4.5.4 Test Results

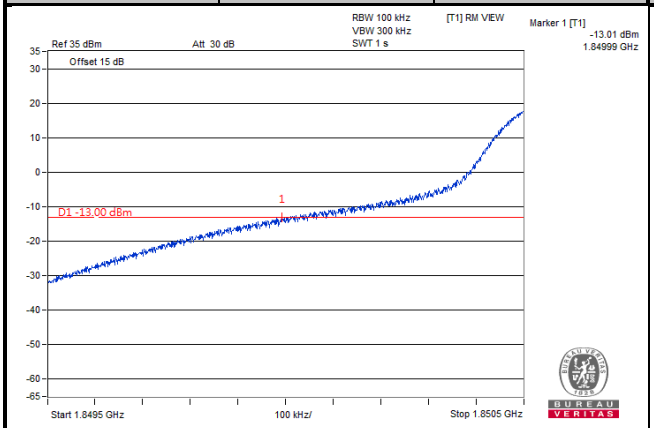
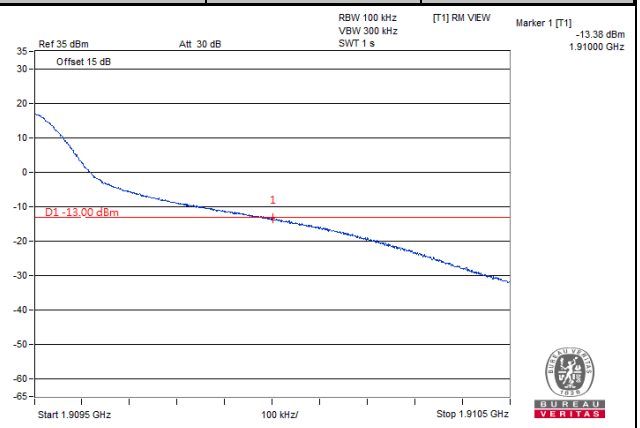
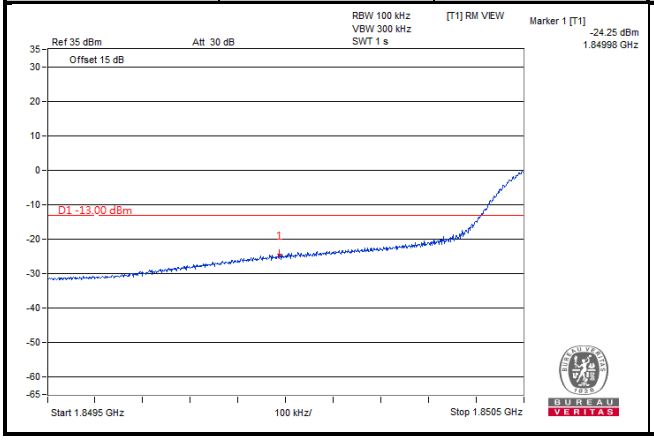
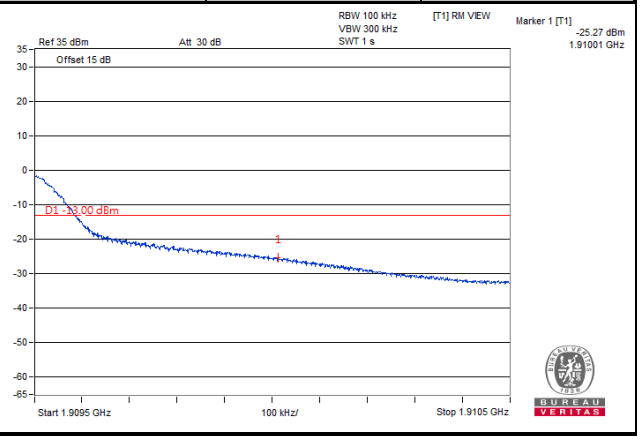
WCDMA			
Channel	9262	Channel	9538

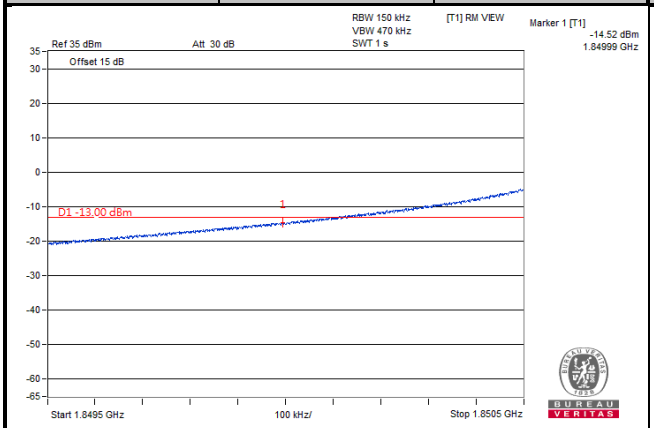
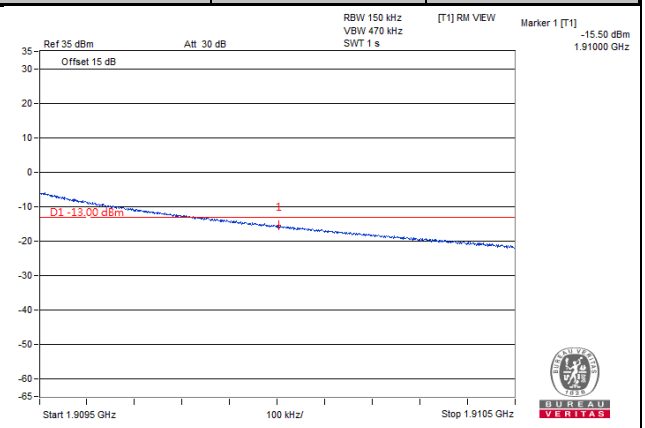
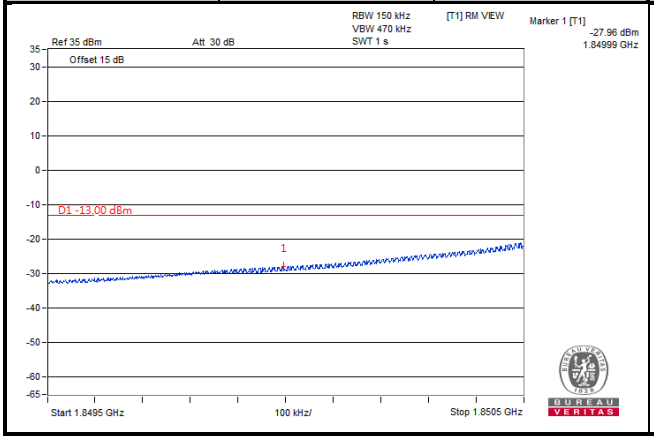
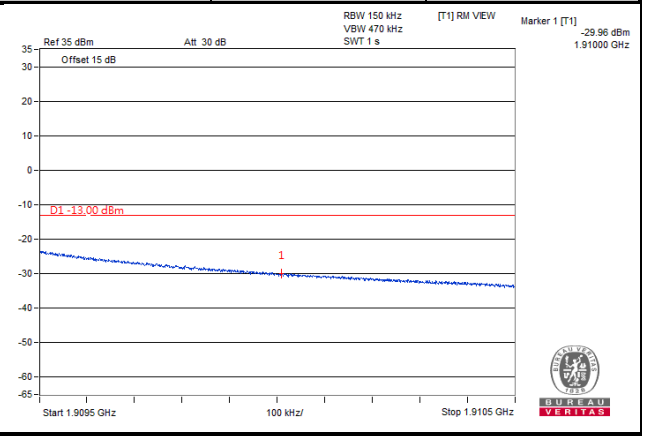


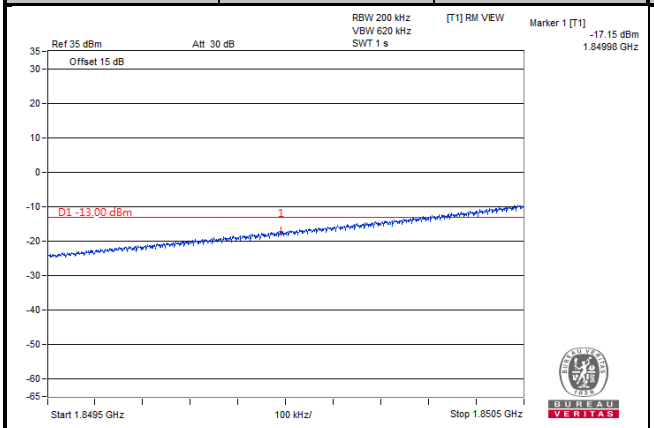
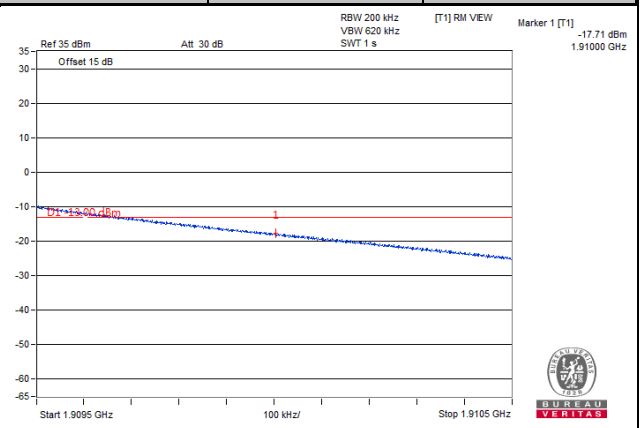
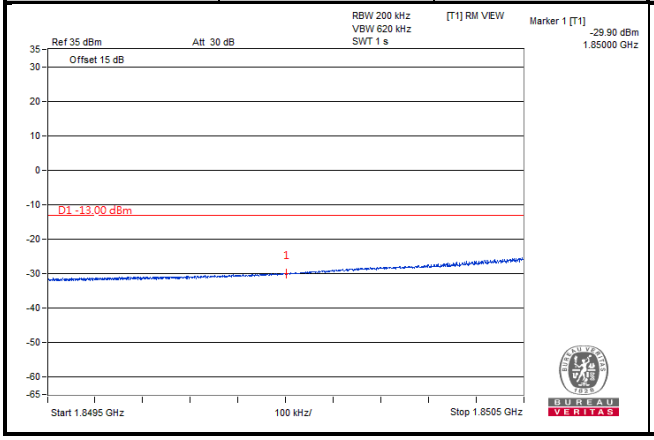
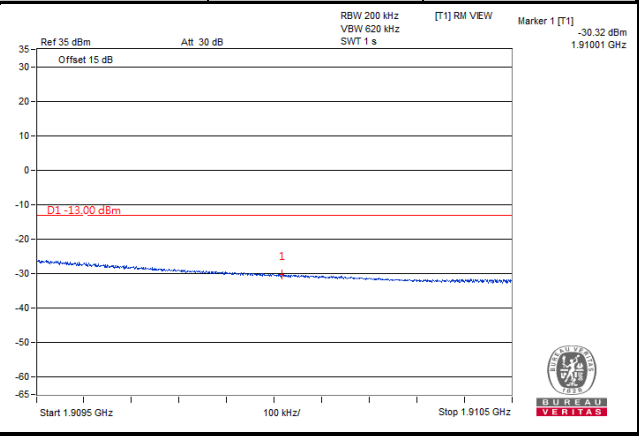
LTE Band 2					
Channel Bandwidth: 1.4 MHz					
Channel	18607	1 RB	Channel	19193	1 RB
					
Channel	18607	6 RB	Channel	19193	6 RB
					

LTE Band 2					
Channel Bandwidth: 3 MHz					
Channel	18615	1 RB	Channel	19185	1 RB
					
Channel	18615	15 RB	Channel	19185	15 RB
					

LTE Band 2					
Channel Bandwidth: 5 MHz					
Channel	18625	1 RB	Channel	19175	1 RB
					
Channel	18625	25 RB	Channel	19175	25 RB
					

LTE Band 2					
Channel Bandwidth: 10 MHz					
Channel	18650	1 RB	Channel	19150	1 RB
					
Channel	18650	50 RB	Channel	19150	50 RB
					

LTE Band 2					
Channel Bandwidth: 15 MHz					
Channel	18675	1 RB	Channel	19125	1 RB
					
Channel	18675	75 RB	Channel	19125	75 RB
					

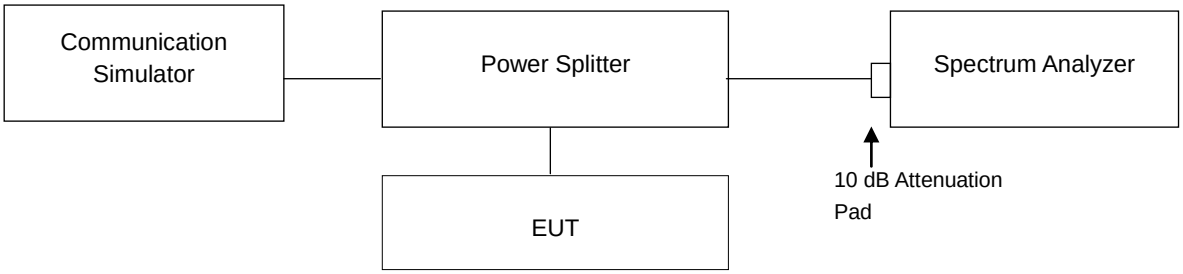
LTE Band 2					
Channel Bandwidth: 20 MHz					
Channel	18700	1 RB	Channel	19100	1 RB
					
Channel	18700	100 RB	Channel	19100	100 RB
					

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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.

4.6.2 Test Setup



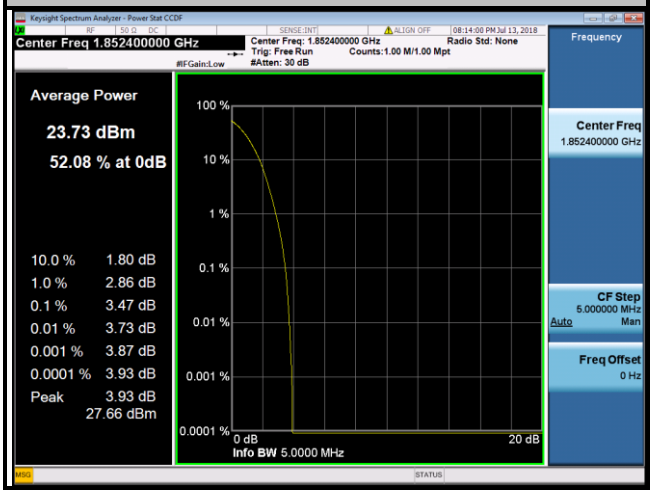
4.6.3 Test Procedures

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

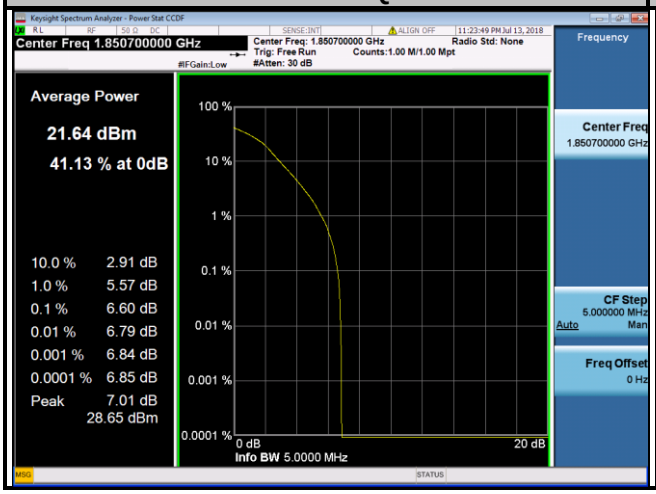
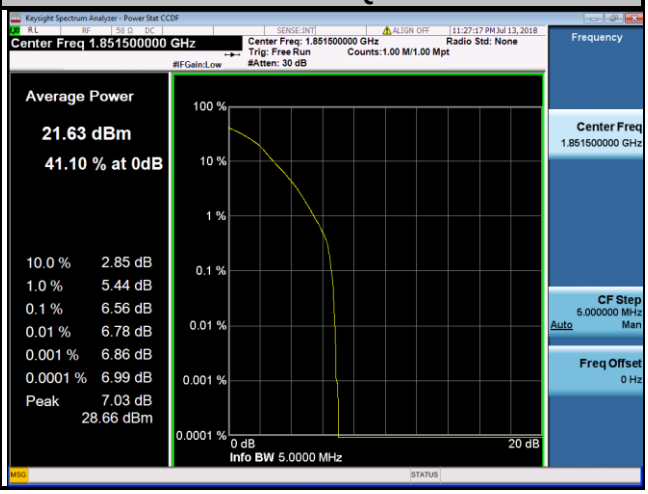
4.6.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		WCDMA
9262	1852.4	3.47
9400	1880.0	3.45
9538	1907.6	3.40

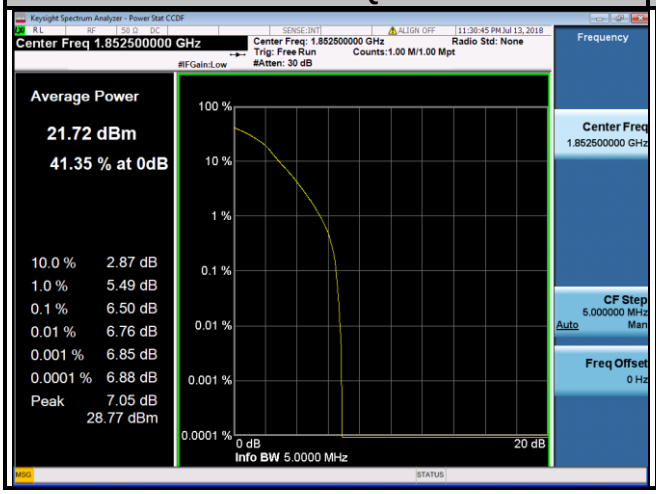
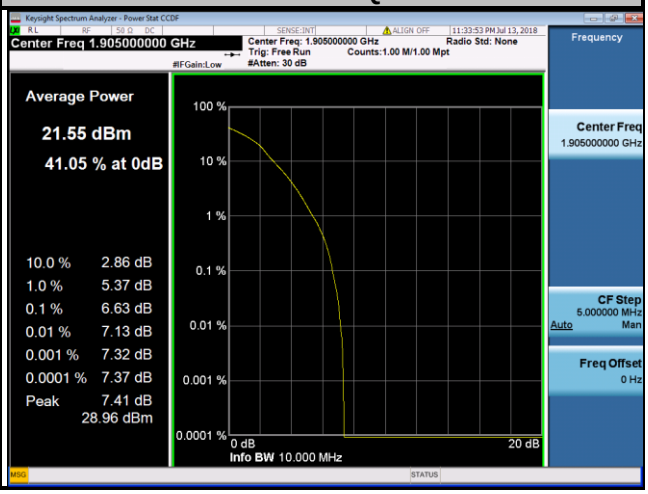
Spectrum Plot of Worst Value
WCDMA



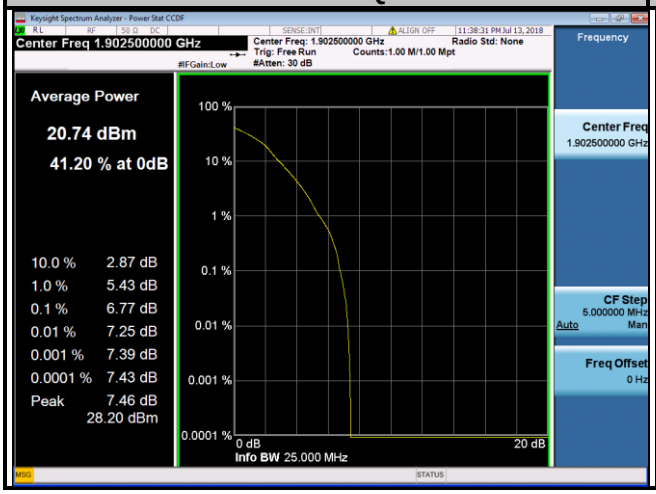
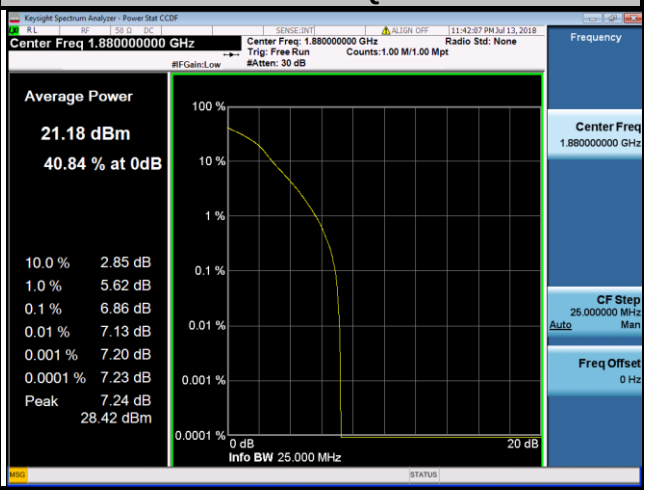
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	5.72	6.60	18615	1851.5	5.69	6.56
18900	1880.0	5.86	5.86	18900	1880.0	5.95	5.93
19193	1909.3	5.16	5.81	19185	1908.5	5.29	5.96

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

LTE Band 2							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	5.71	6.50	18650	1855.0	5.74	6.52
18900	1880.0	5.90	5.87	18900	1880.0	5.96	5.88
19175	1907.5	5.42	6.23	19150	1905.0	5.98	6.63

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

LTE Band 2							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	5.96	6.66	18700	1860.0	5.80	6.46
18900	1880.0	6.08	6.03	18900	1880.0	6.24	6.86
19125	1902.5	6.03	6.77	19100	1900.0	6.31	6.78

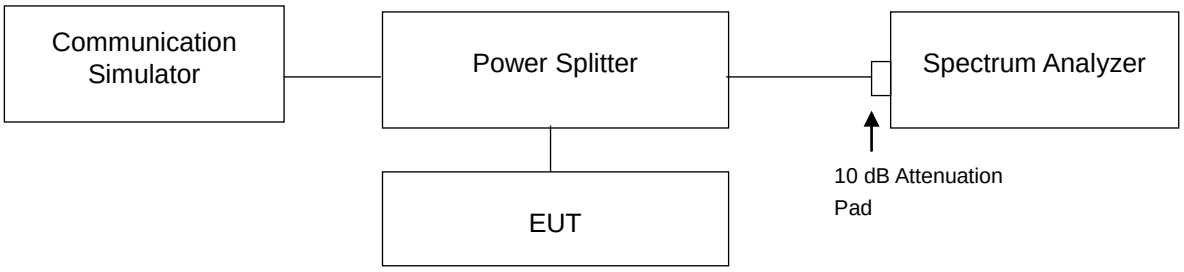
Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM
	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

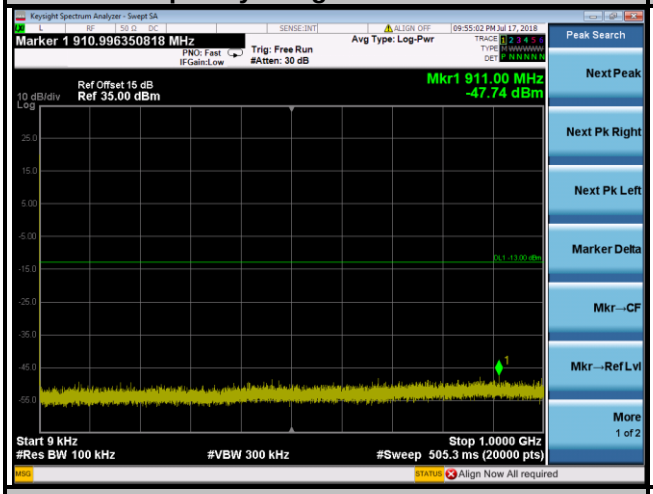
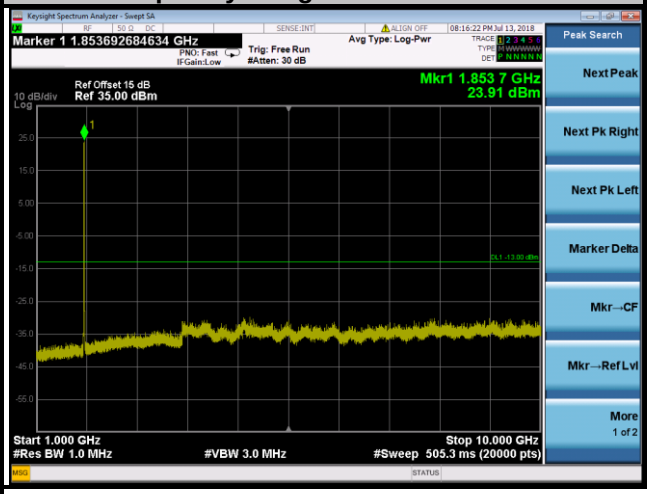
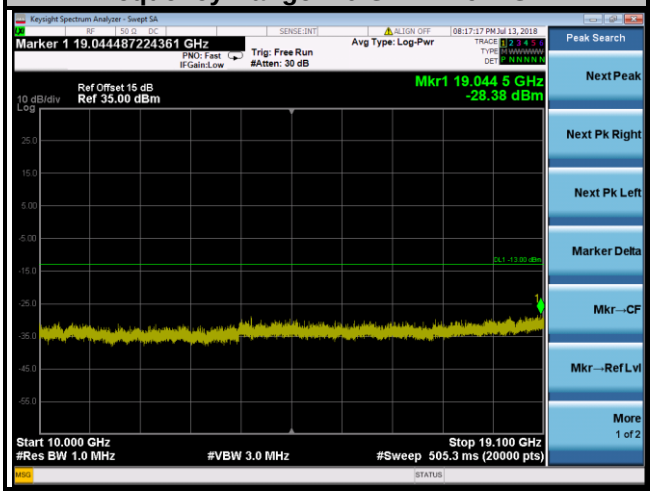
4.7.2 Test Setup

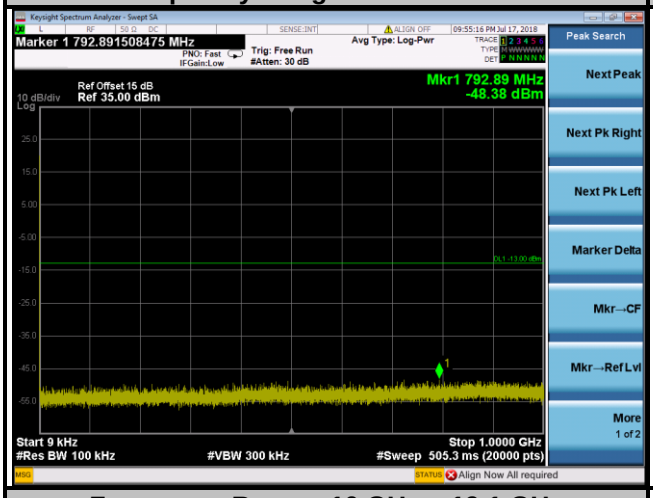
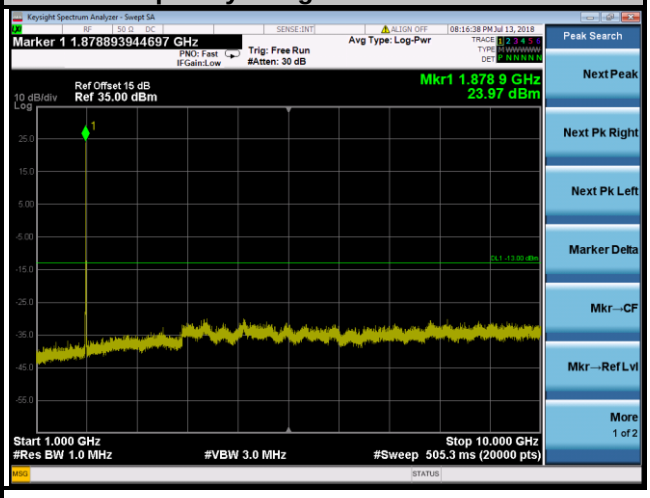
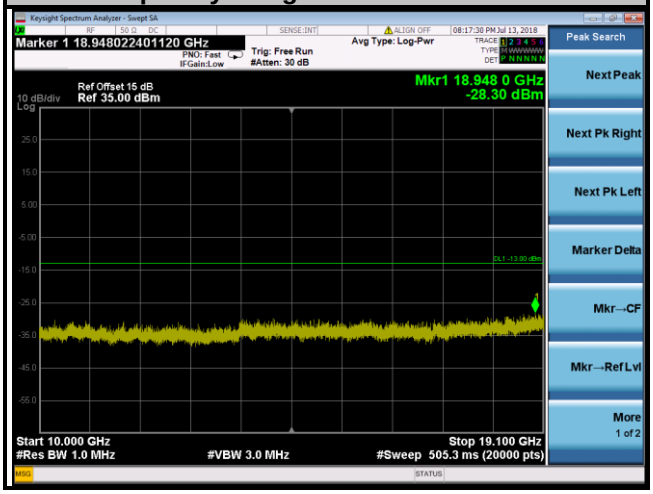


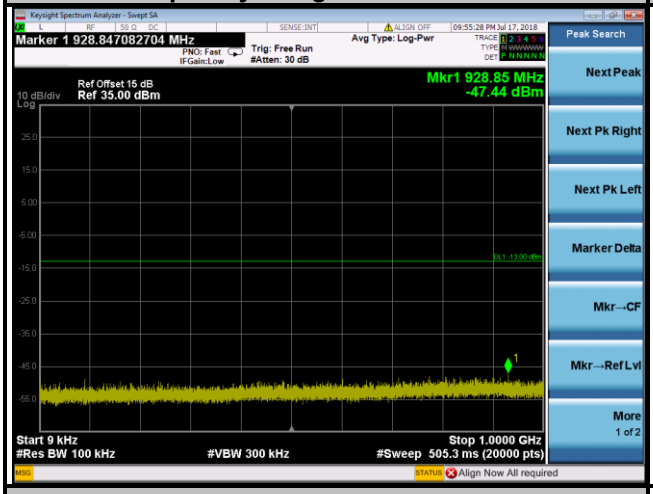
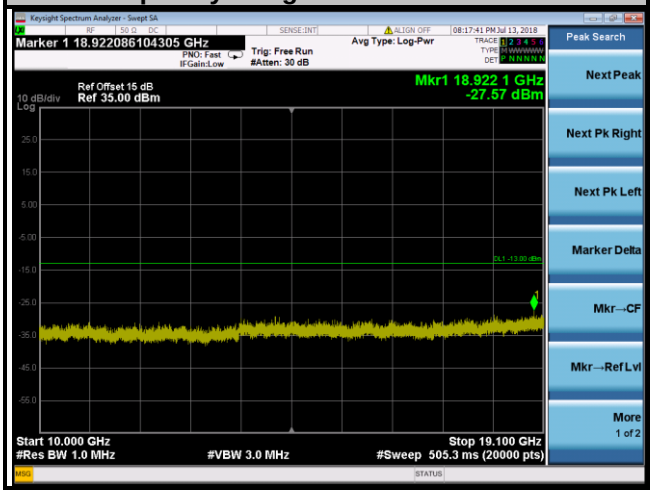
4.7.3 Test Procedure

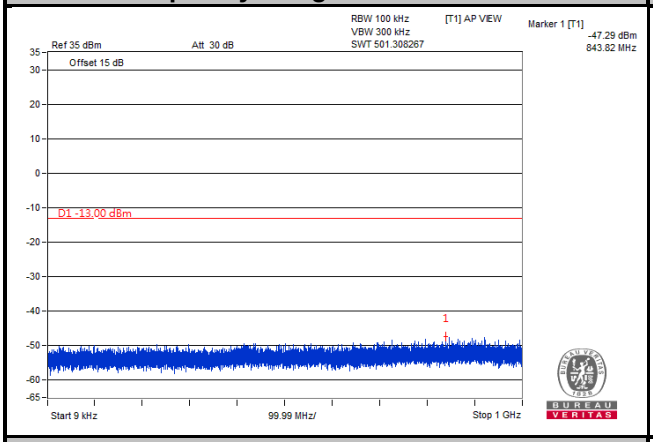
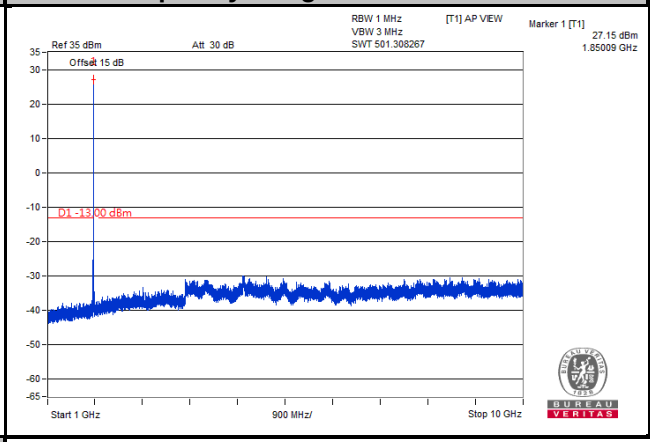
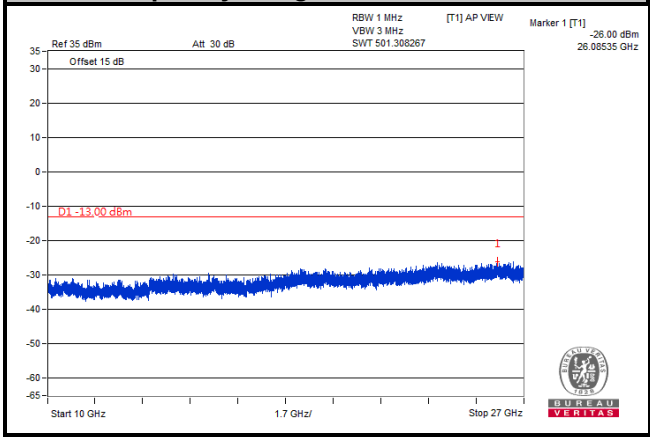
a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 27 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz for 9 kHz to 1 GHz and RBW = 1 MHz and VBW = 3 MHz for 1 GHz to 27 GHz is used for conducted emission measurement.

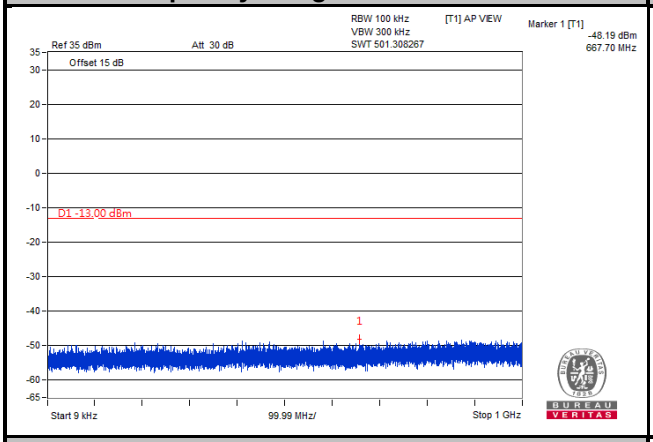
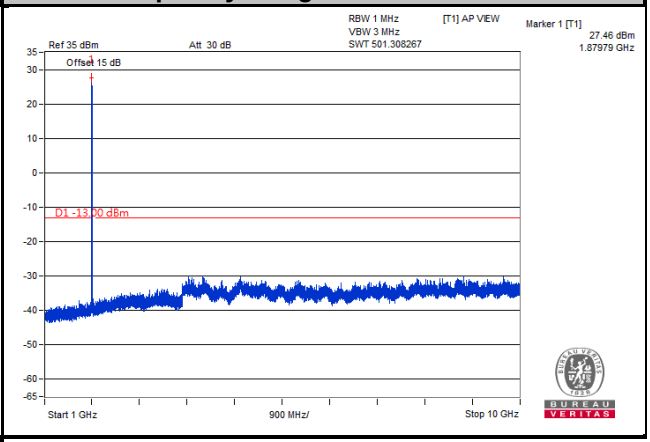
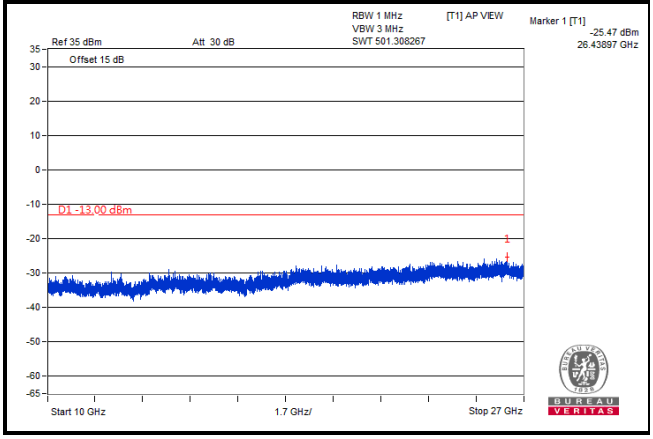
4.7.4 Test Results

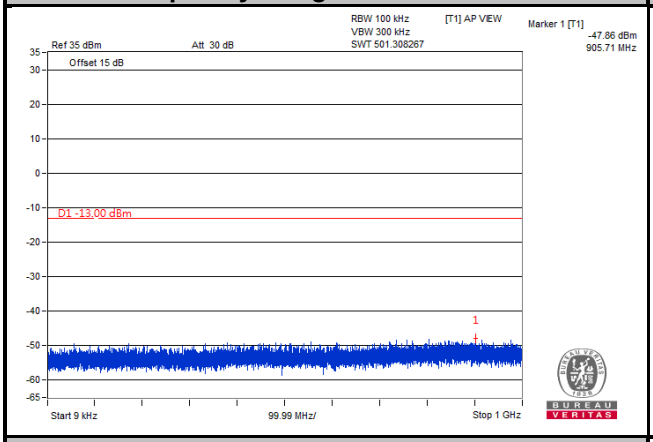
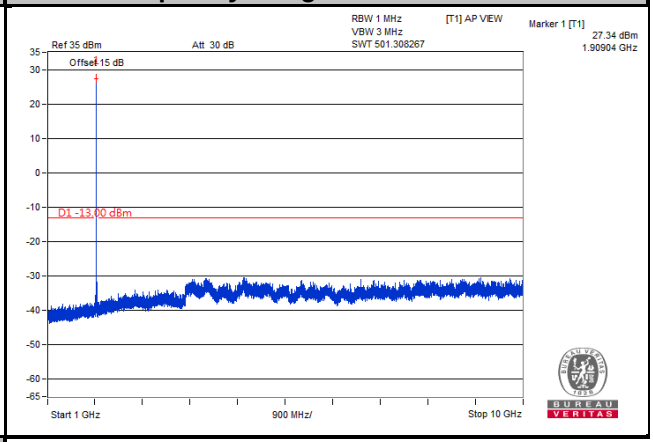
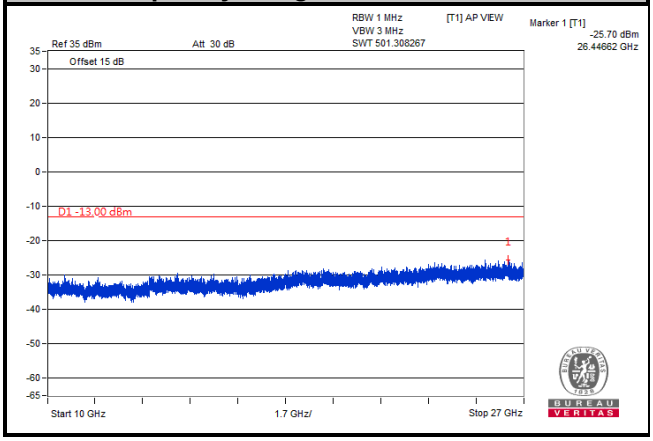
WCDMA	
Channel 9262	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 19.1 GHz	
	

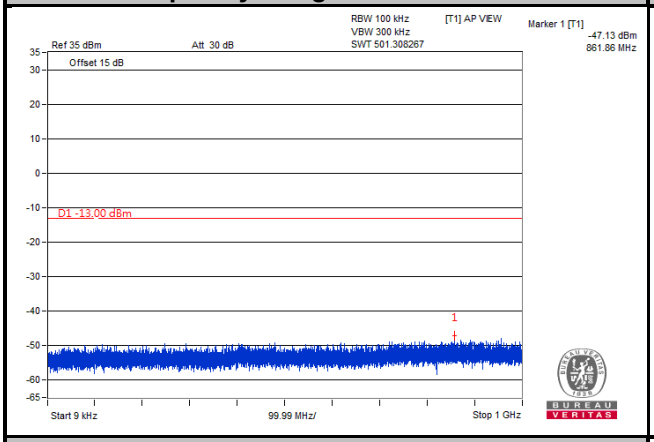
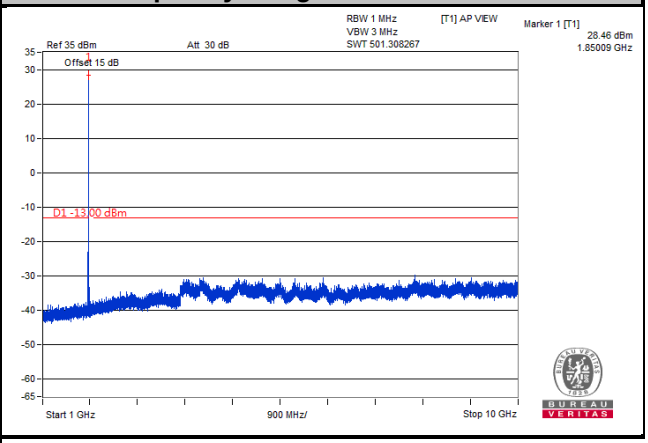
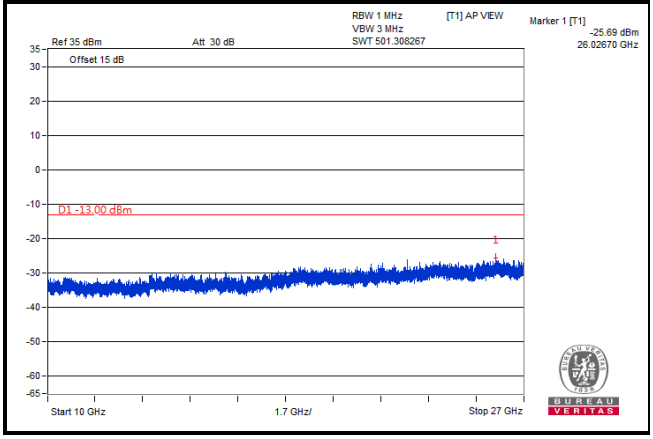
WCDMA	
Channel 9400	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 19.1 GHz	
	

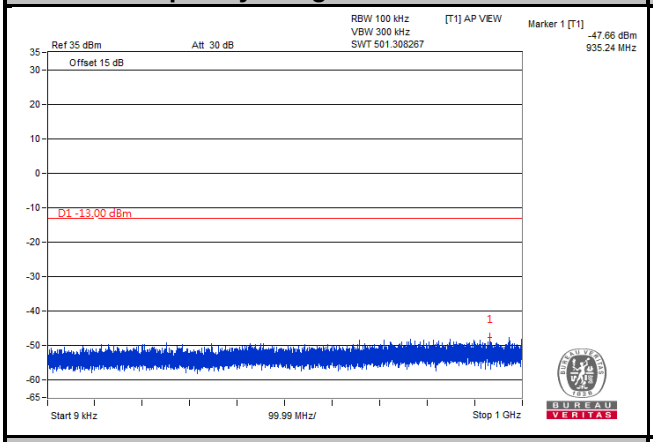
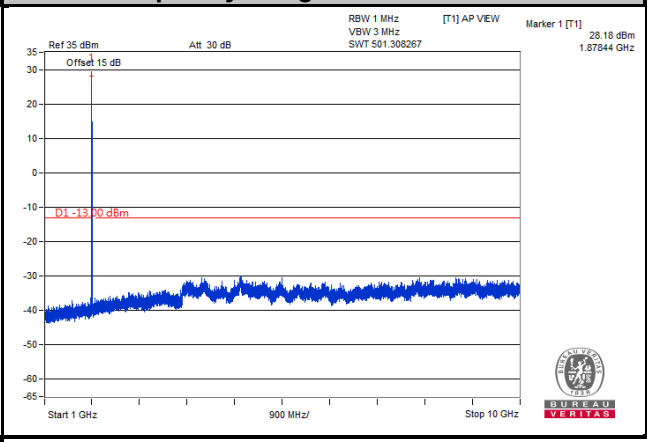
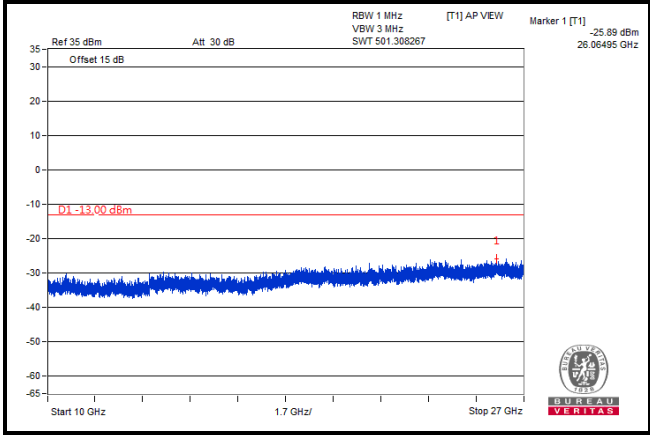
WCDMA	
Channel 9538	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 19.1 GHz	
	

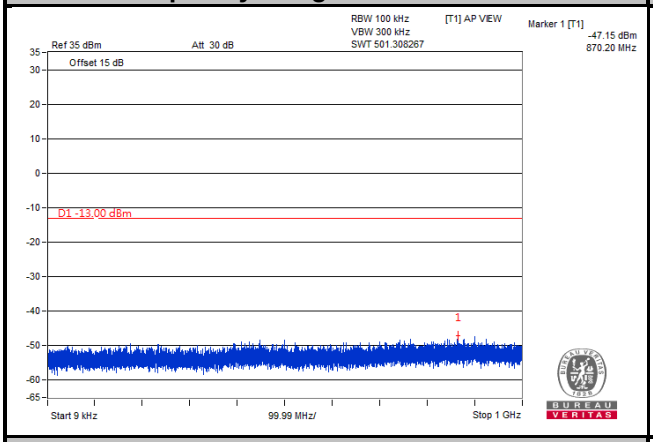
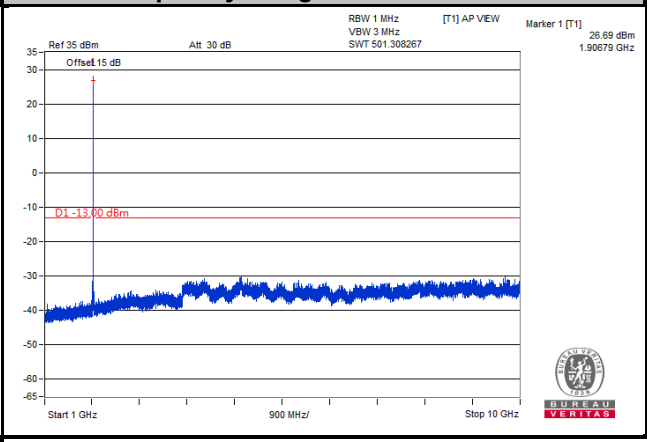
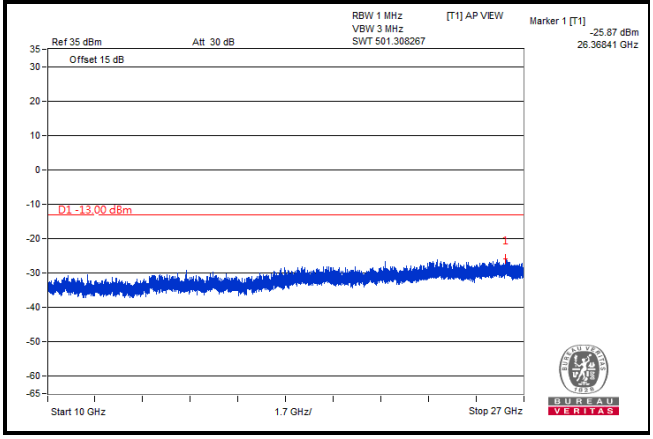
LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 18607	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

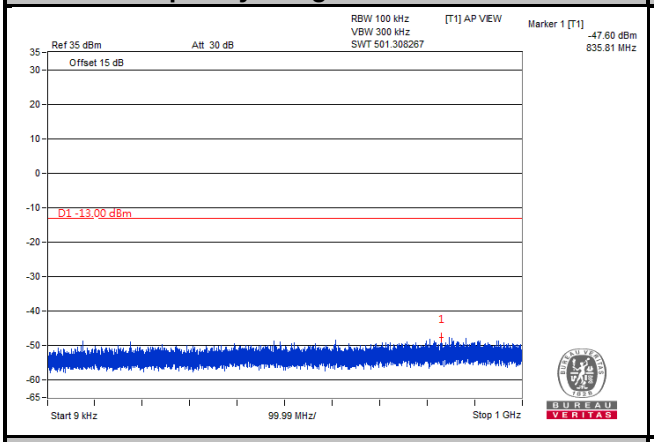
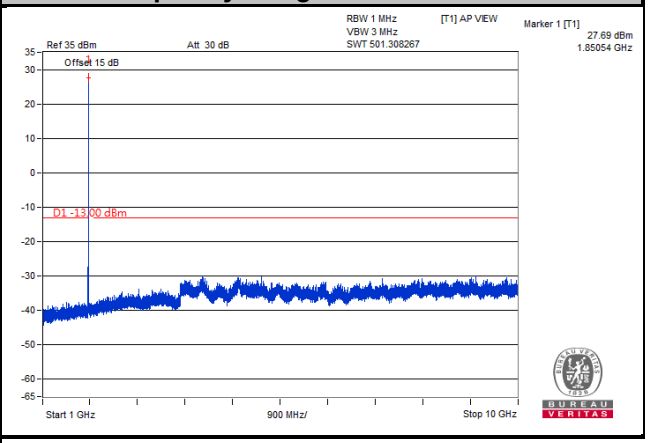
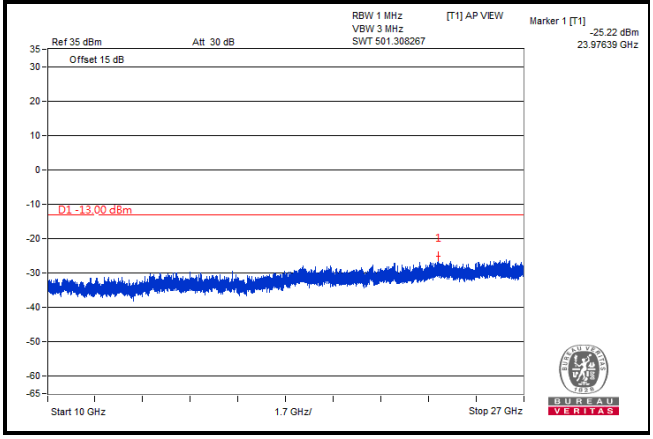
LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

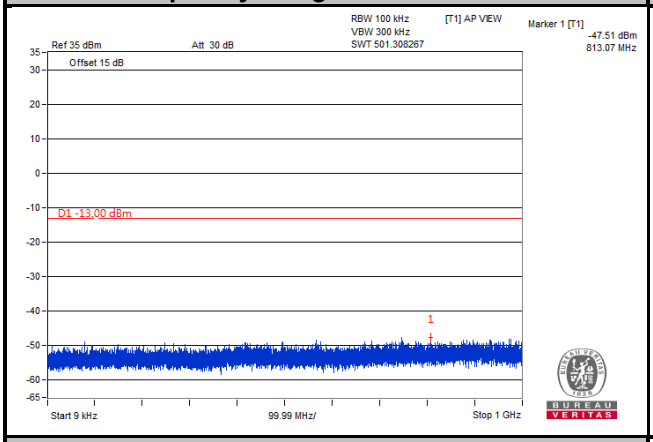
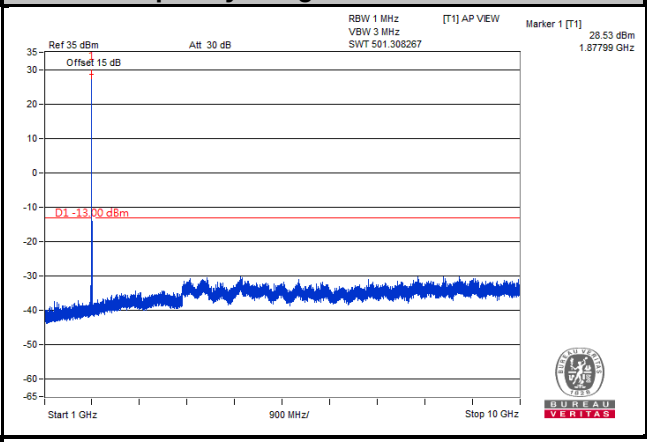
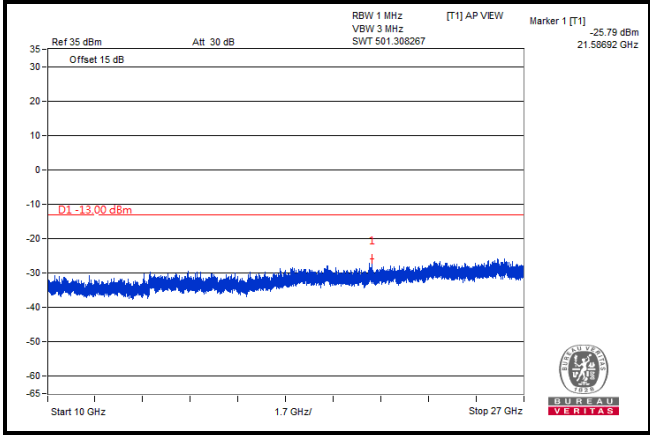
LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 19193	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

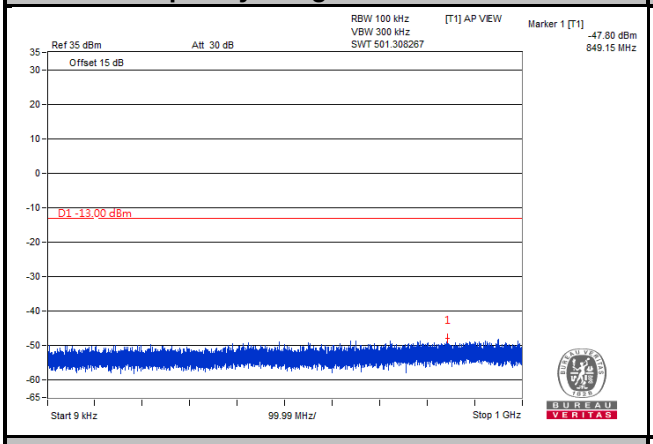
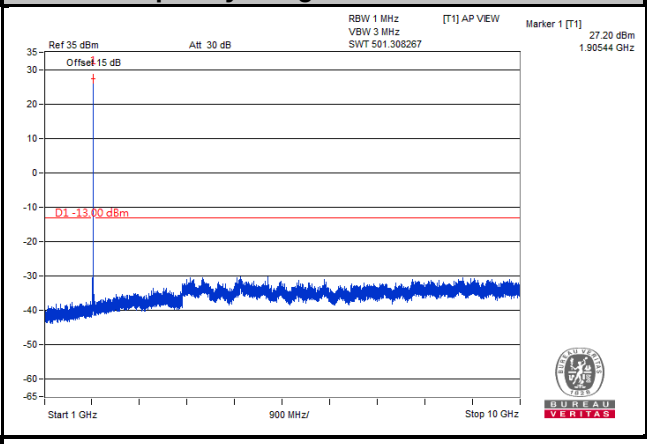
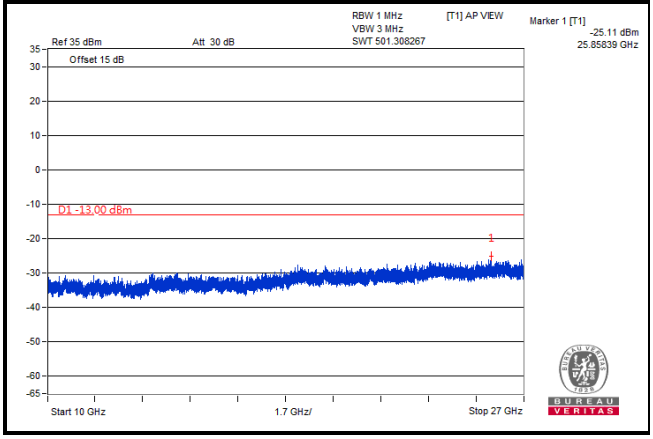
LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 18615	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

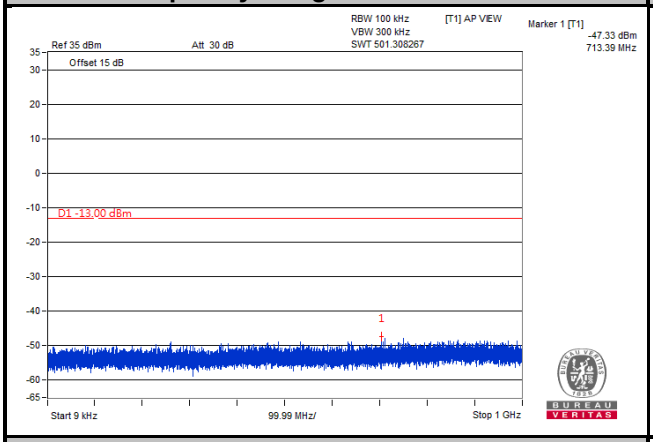
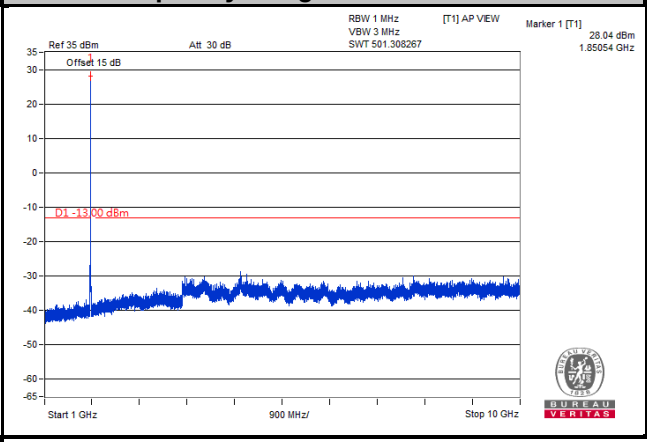
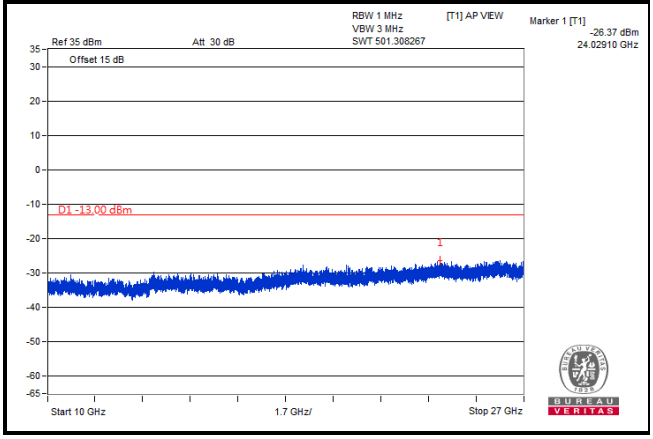
LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

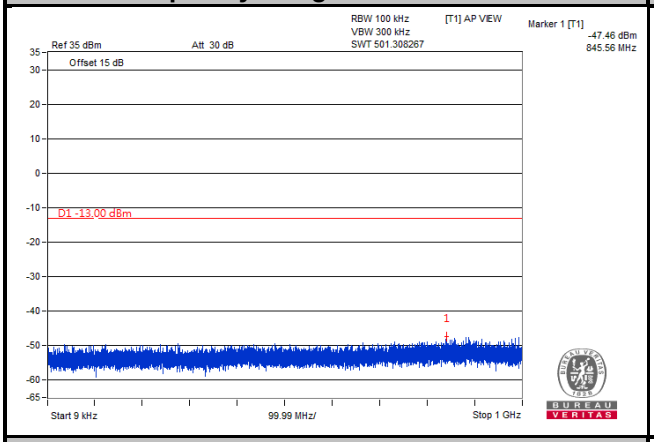
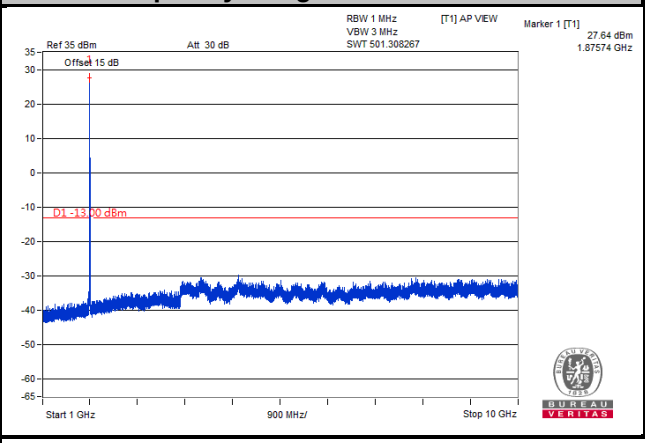
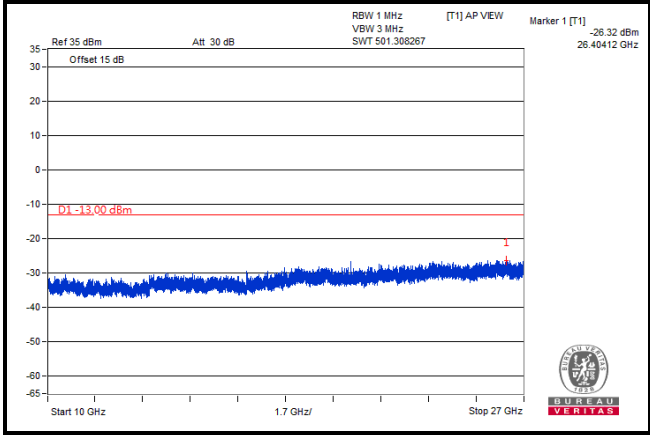
LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 19185	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

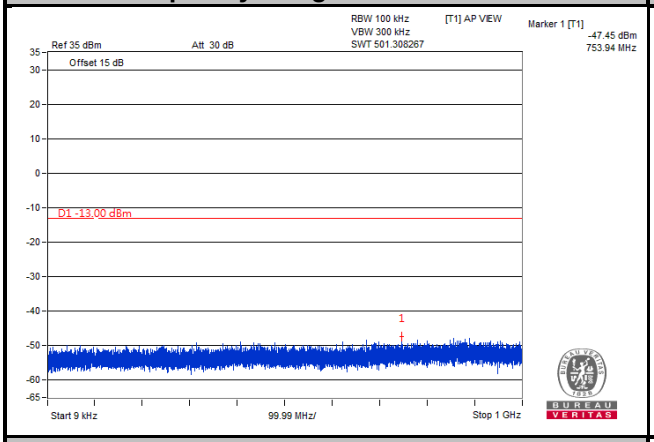
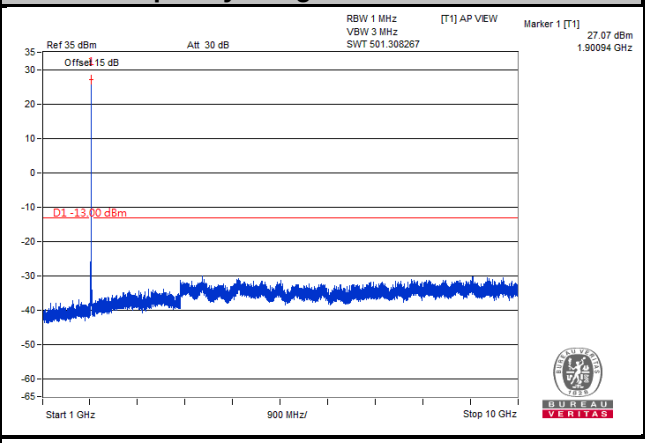
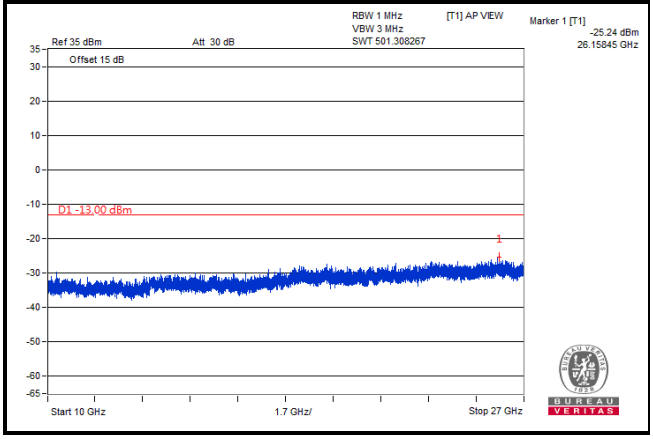
LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 18625	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

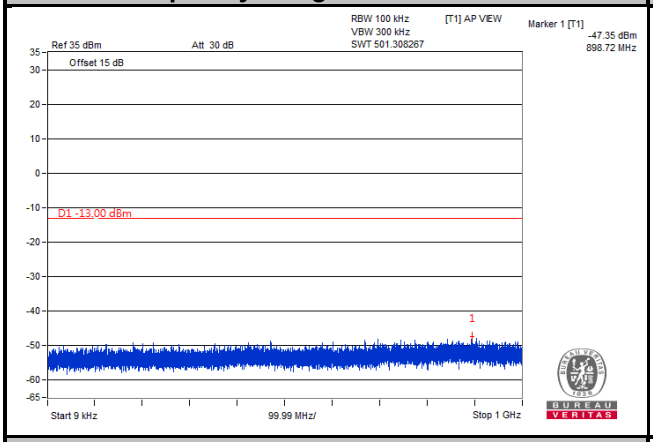
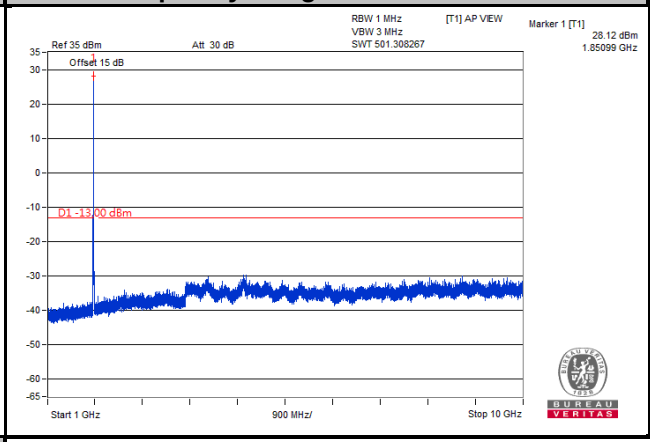
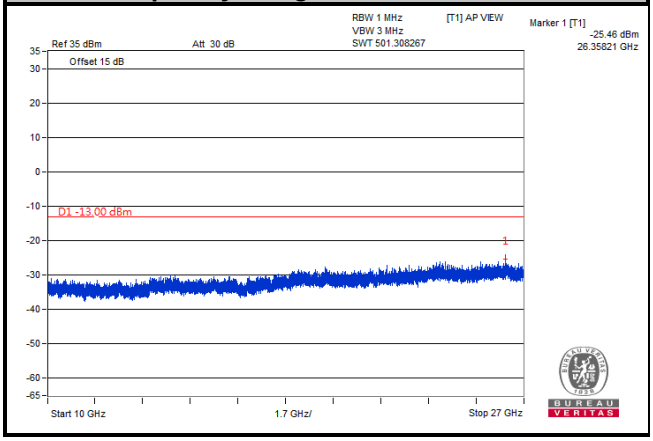
LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

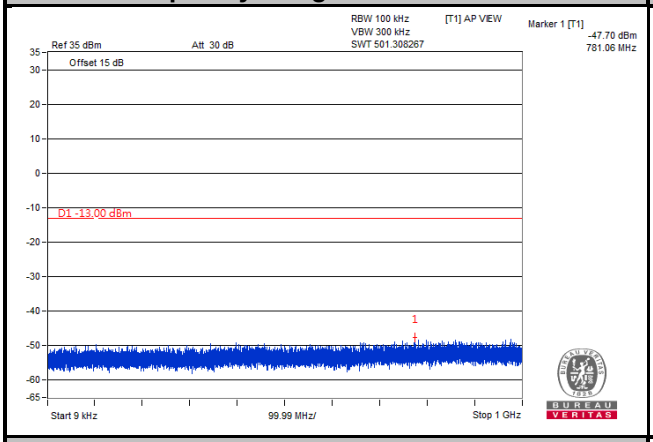
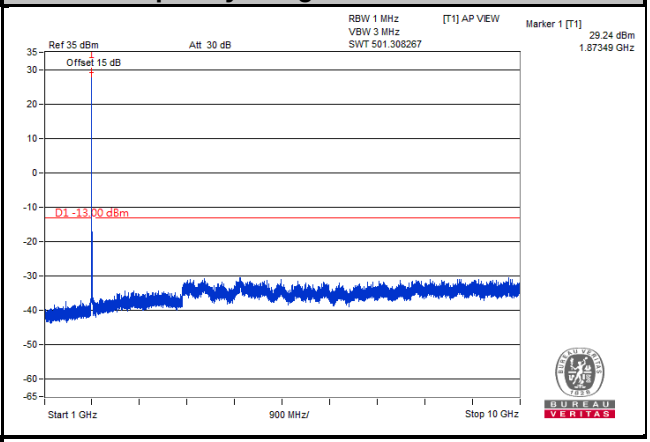
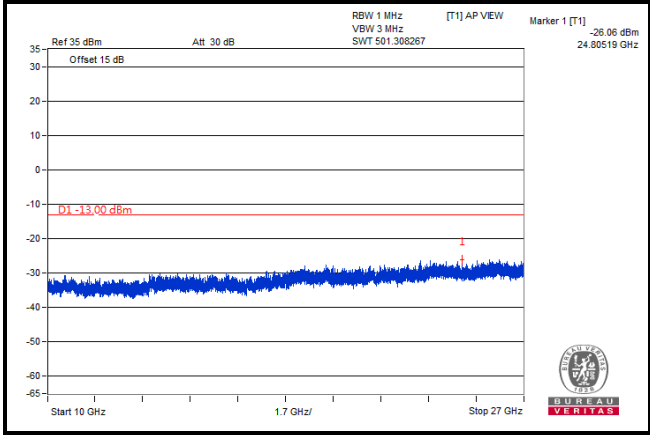
LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 19175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

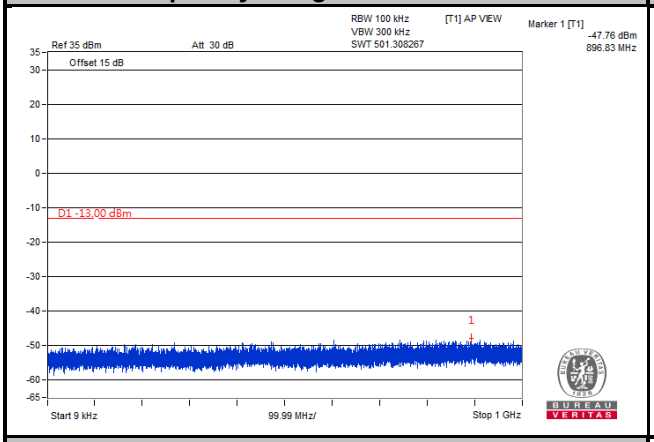
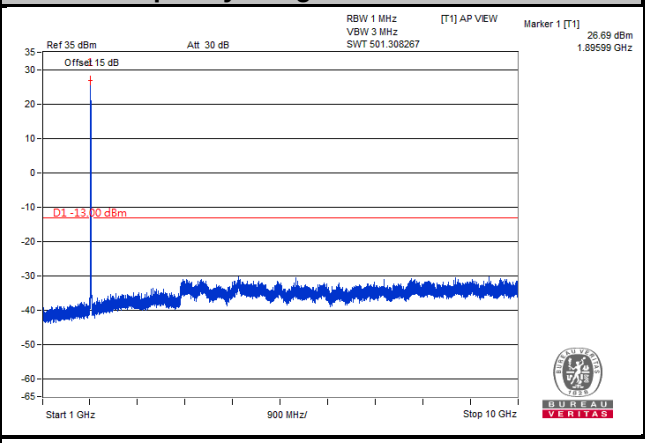
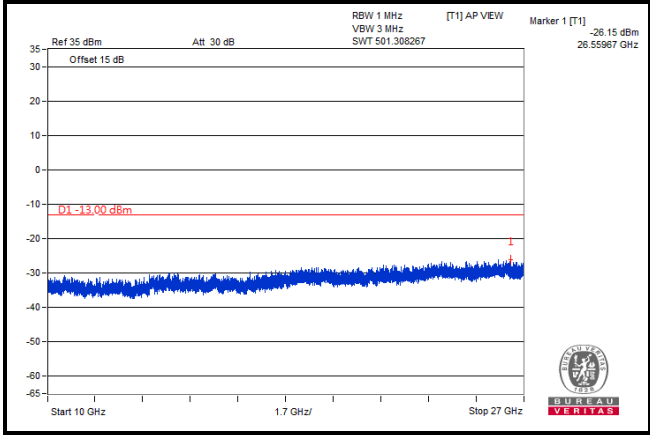
LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 18650	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

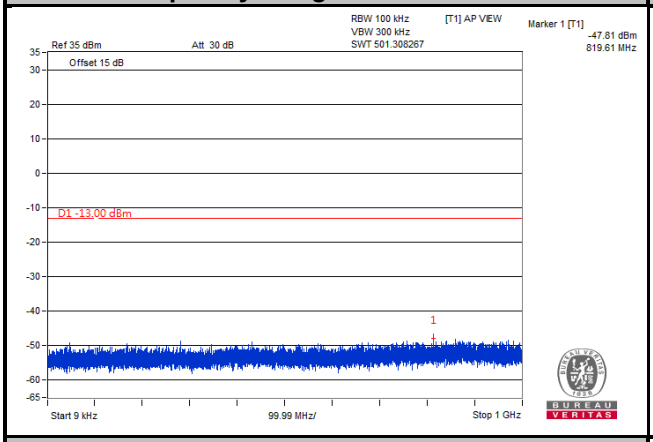
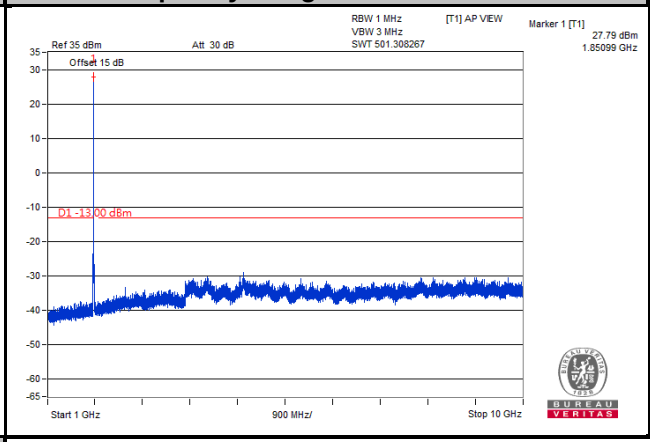
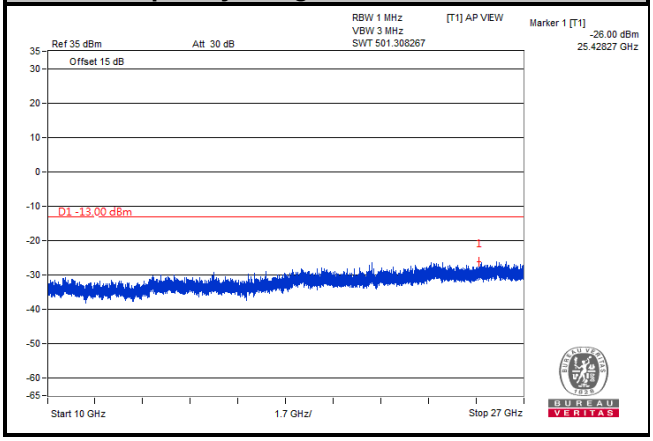
LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

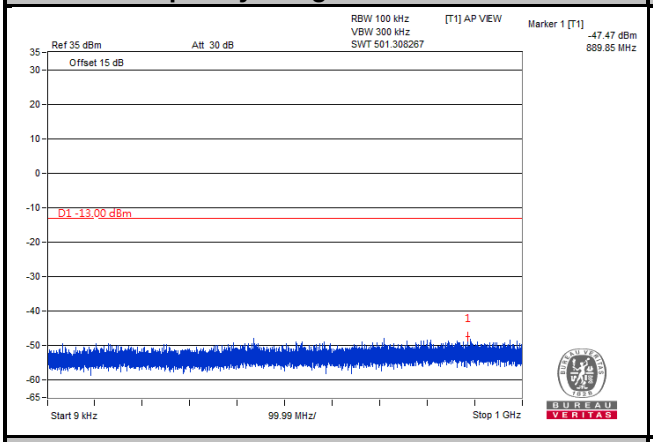
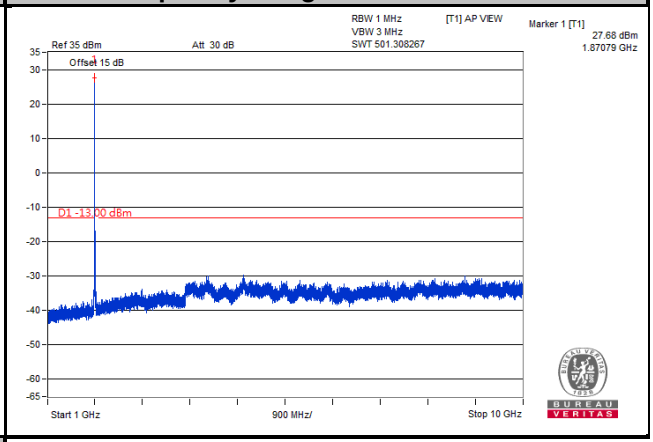
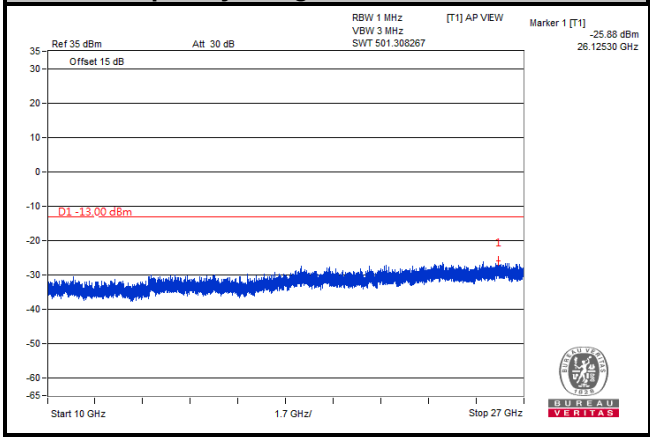
LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 19150	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

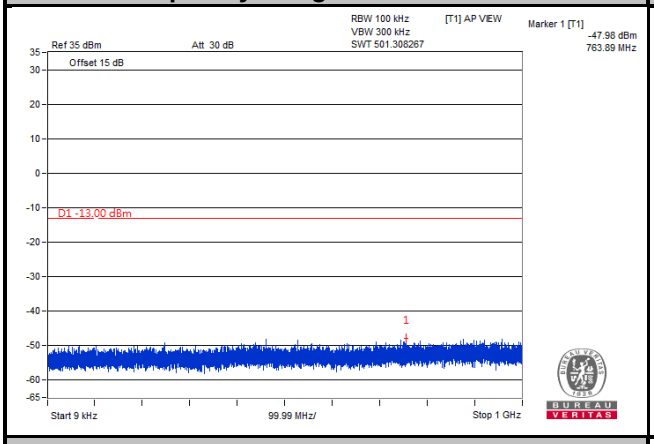
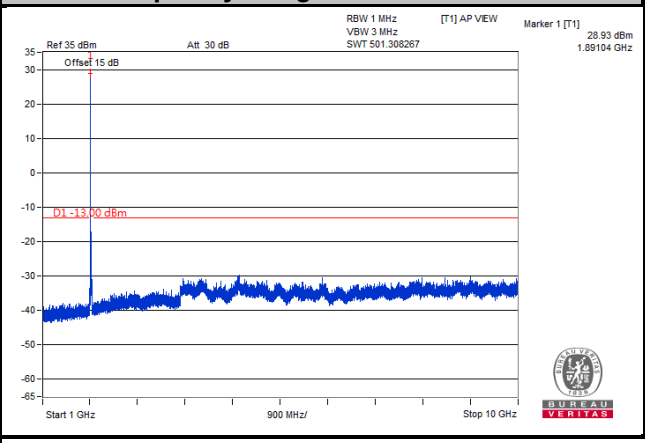
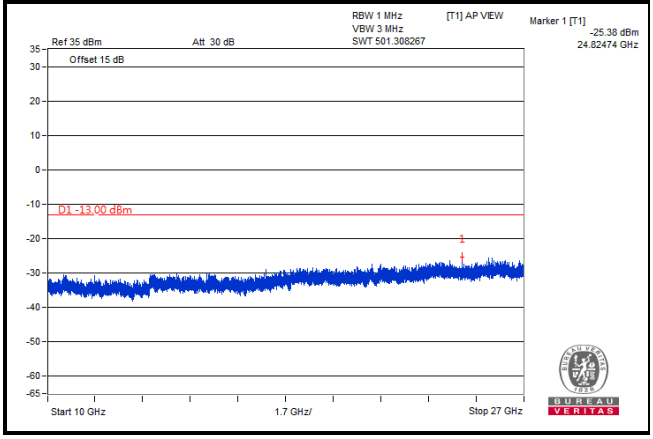
LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 18675	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 19125	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 18700	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 19100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to -13 dBm.

4.8.2 Test Procedure

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

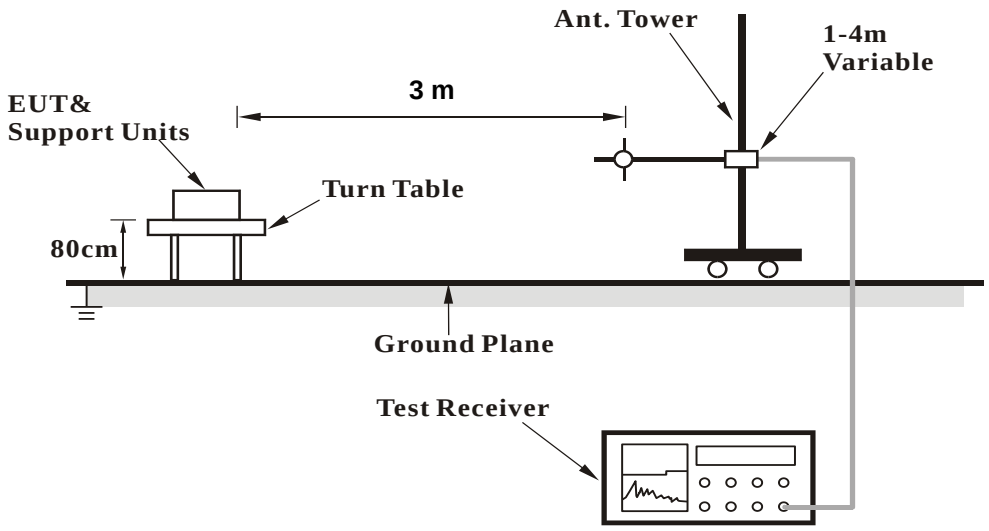
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.8.3 Deviation from Test Standard

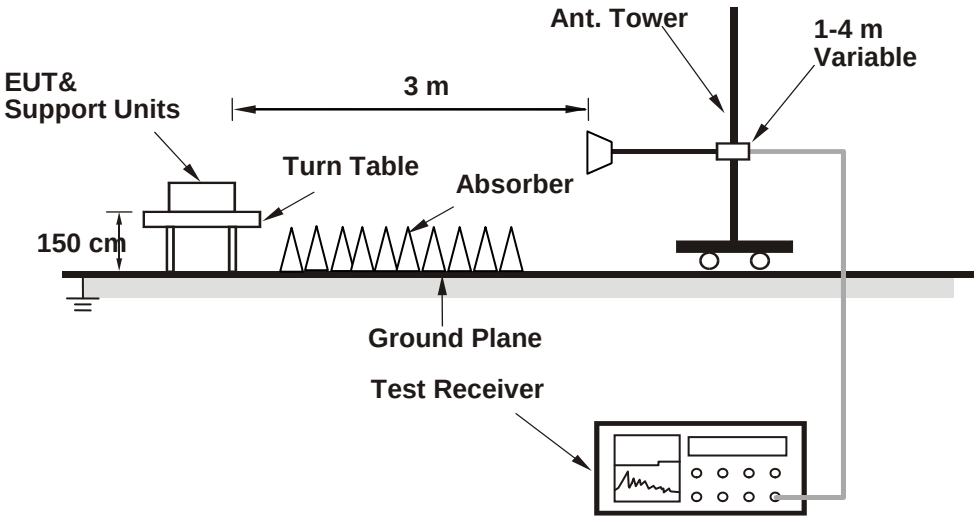
No deviation.

4.8.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 Test Results

WCDMA:

Low Channel

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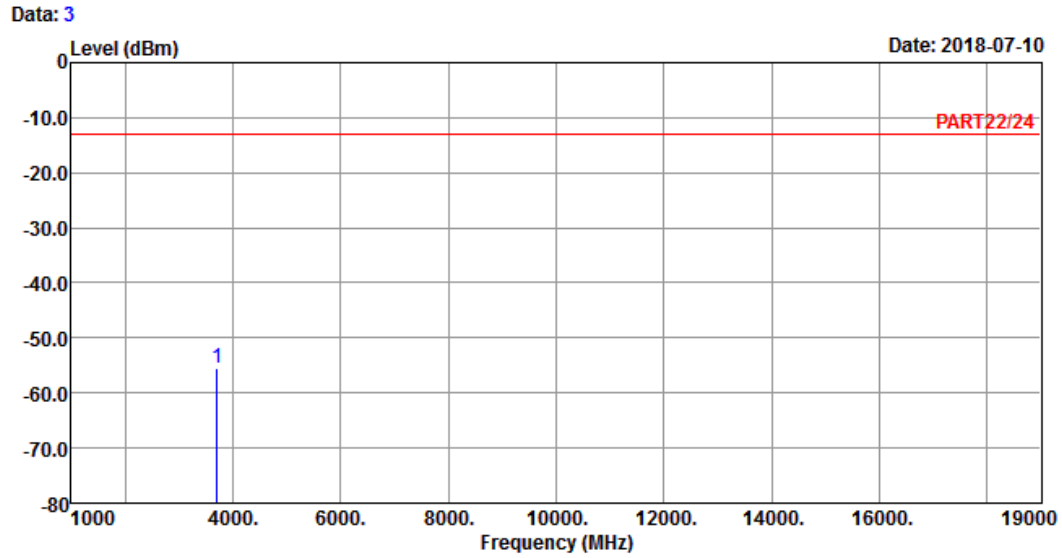
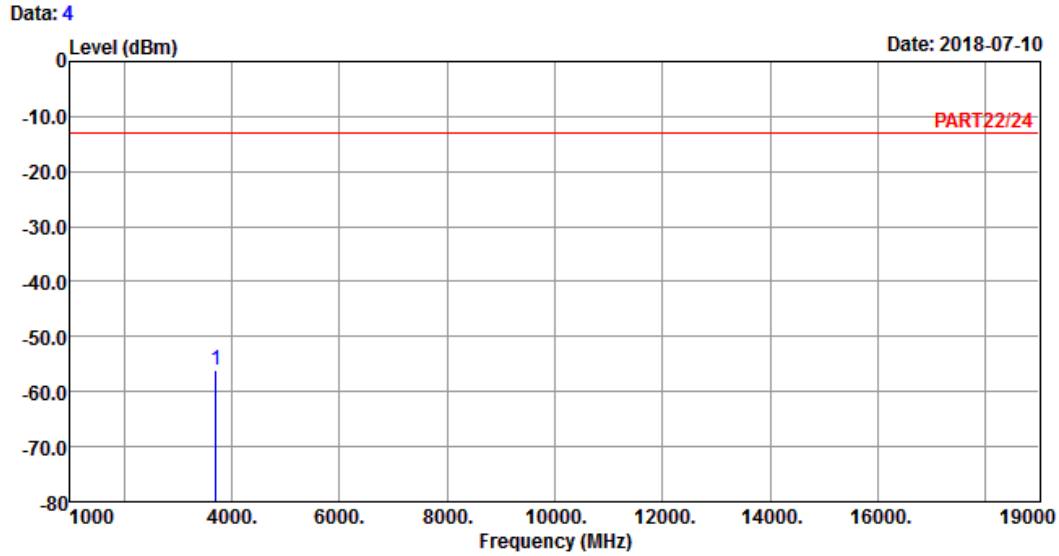


Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : WCDMA Band II_L-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-55.50	-48.57	-13.00	-42.50	-6.93	Peak



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : WCDMA Band II_L-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3704.80	-56.16	-49.23	-13.00	-43.16	-6.93	Peak

Middle Channel

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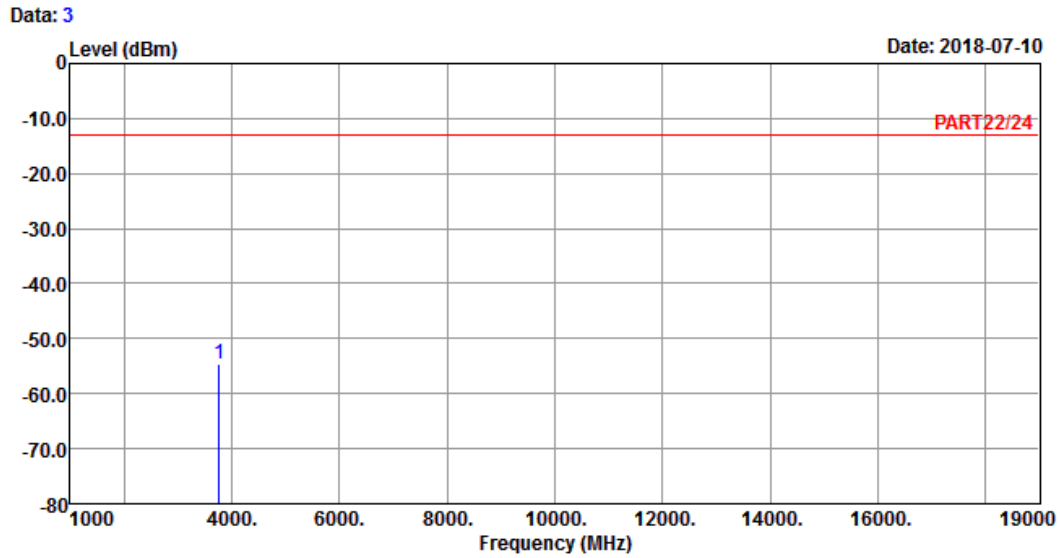
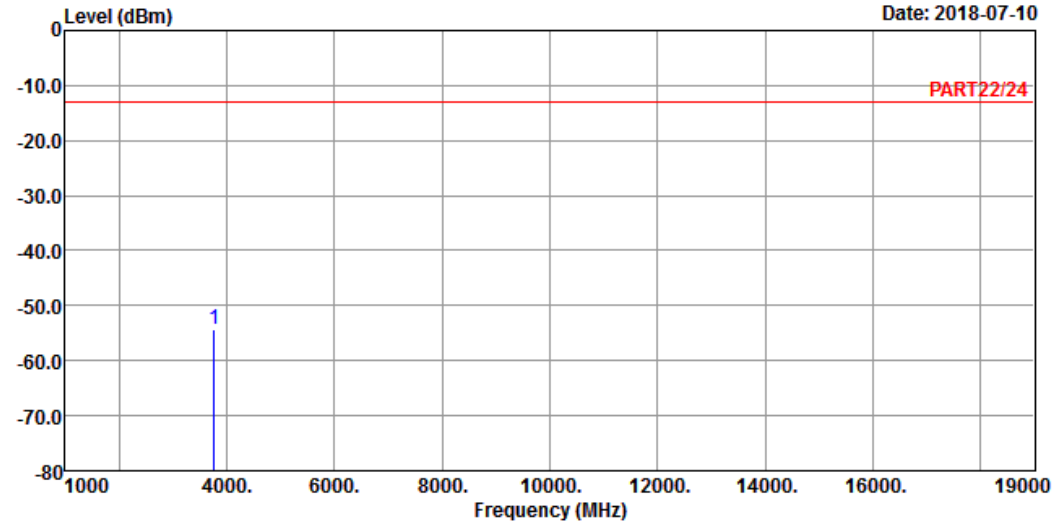


Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : WCDMA Band II_M-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-54.75	-48.10	-13.00	-41.75	-6.65	Peak

Data: 4

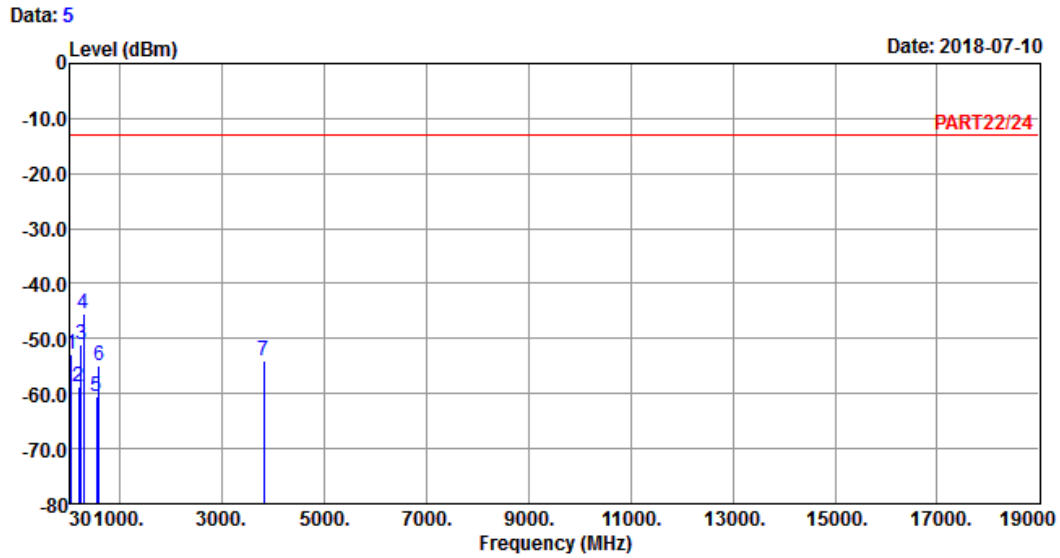


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : WCDMA Band II_M-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-54.28	-47.63	-13.00	-41.28	-6.65	Peak

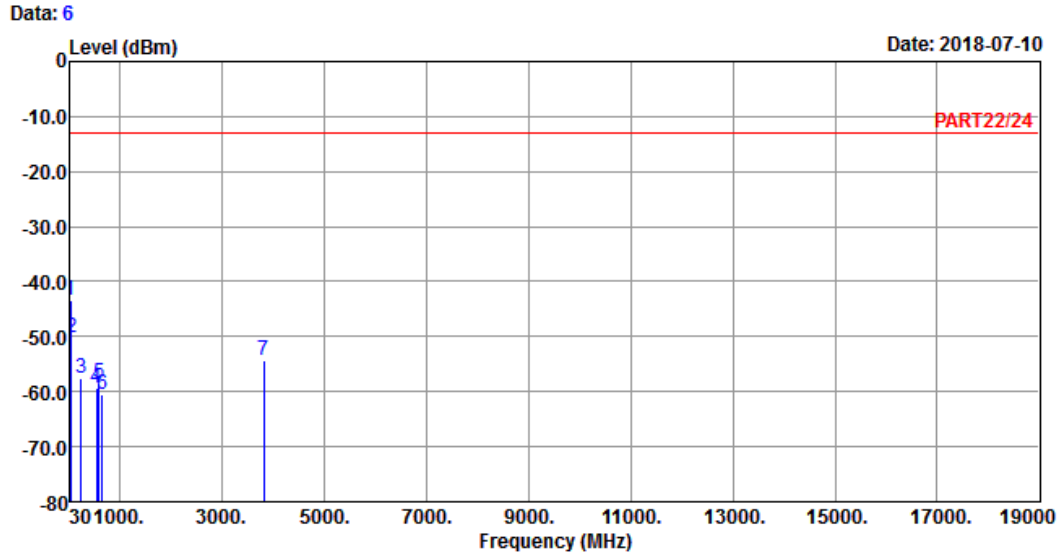
High Channel

Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : WCDMA Band II_H-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-52.75	-50.76	-13.00	-39.75	-1.99	Peak
2	196.84	-58.84	-51.10	-13.00	-45.84	-7.74	Peak
3	233.70	-51.19	-44.53	-13.00	-38.19	-6.66	Peak
4 pp	286.08	-45.46	-38.73	-13.00	-32.46	-6.73	Peak
5	546.04	-60.58	-57.59	-13.00	-47.58	-2.99	Peak
6	598.42	-54.94	-54.11	-13.00	-41.94	-0.83	Peak
7	3815.20	-54.06	-47.66	-13.00	-41.06	-6.40	Peak



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : WCDMA Band II_H-CH Link
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	40.67	-43.29	-43.41	-13.00	-30.29	0.12	Peak
2	46.49	-50.30	-47.30	-13.00	-37.30	-3.00	Peak
3	234.67	-57.65	-51.03	-13.00	-44.65	-6.62	Peak
4	546.04	-59.34	-56.35	-13.00	-46.34	-2.99	Peak
5	598.42	-58.52	-57.69	-13.00	-45.52	-0.83	Peak
6	650.80	-60.52	-59.65	-13.00	-47.52	-0.87	Peak
7	3815.20	-54.22	-47.82	-13.00	-41.22	-6.40	Peak

LTE Band 2
Channel Bandwidth: 20 MHz / QPSK
Low Channel

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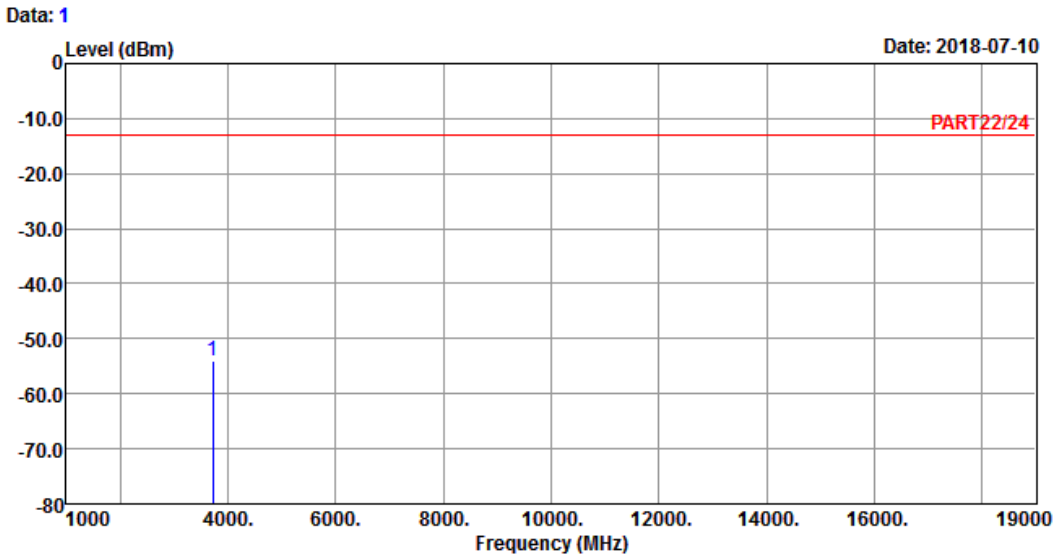
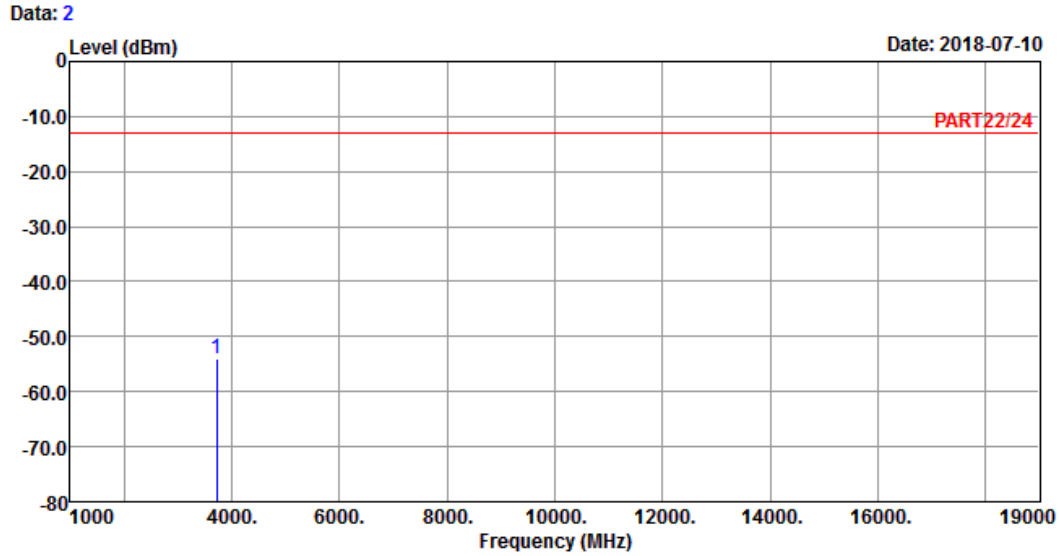



```
Site     : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak    : LTE Band 2 QPSK_20M Link_L-CH
Tested by: Thomas Wei
                        Read  Limit   Over
          Freq  Level  Level   Line  Limit Factor Remark
          ____________ _____ _____ _____ _____ _____ ____________
                 MHz    dBm   dBm    dBm    dB     dB

1 pp  3720.00 -54.03 -47.21 -13.00 -41.03  -6.82 Peak
```

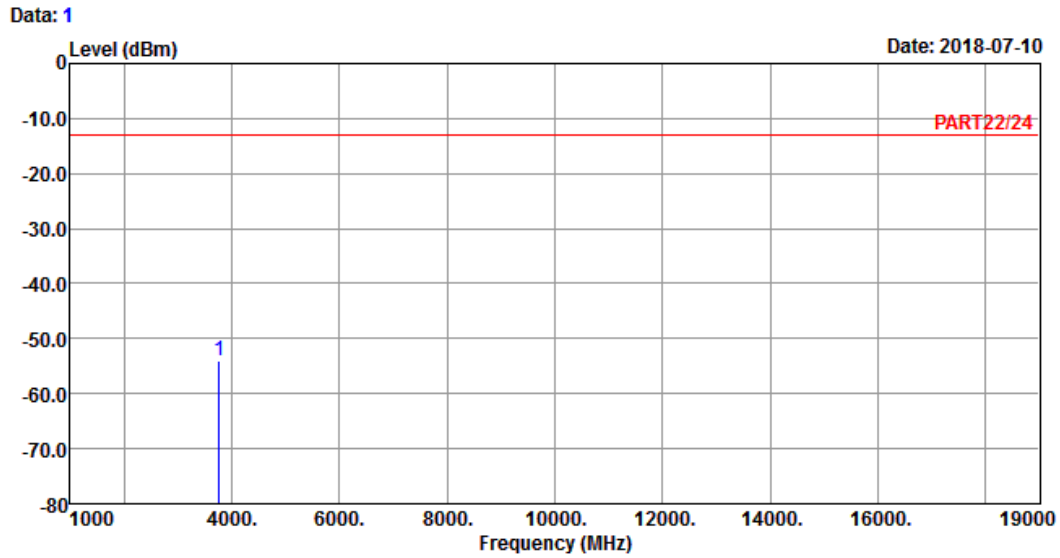


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_L-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3720.00	-54.15	-47.33	-13.00	-41.15	-6.82	Peak

Middle Channel

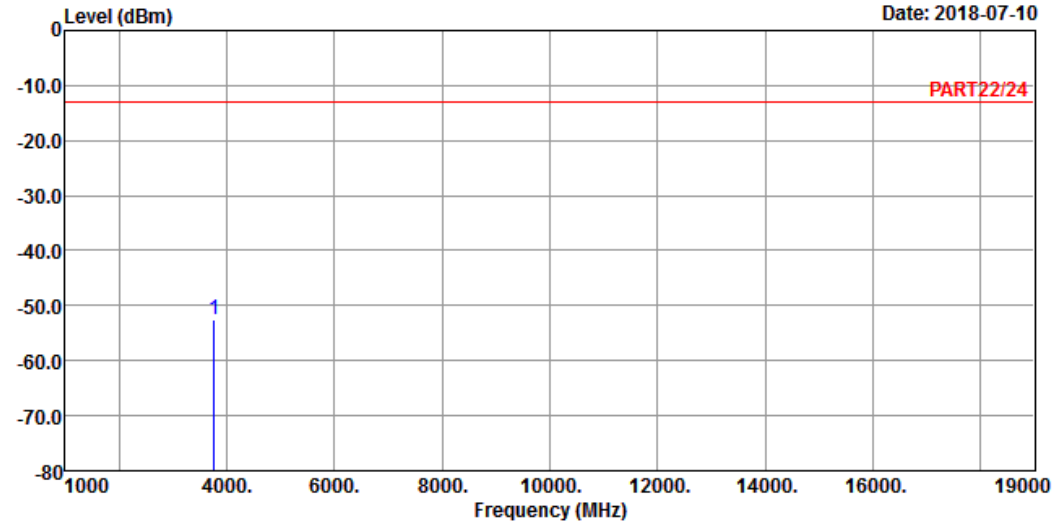
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-53.92	-47.27	-13.00	-40.92	-6.65	Peak

Data: 2

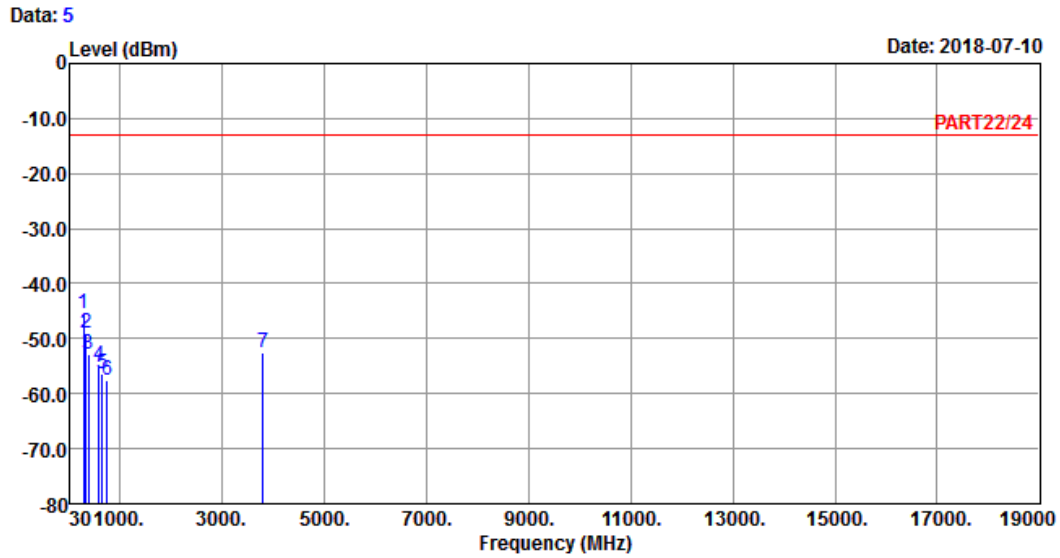


Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_M-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	3760.00	-52.51	-45.86	-13.00	-39.51	-6.65	Peak

High Channel

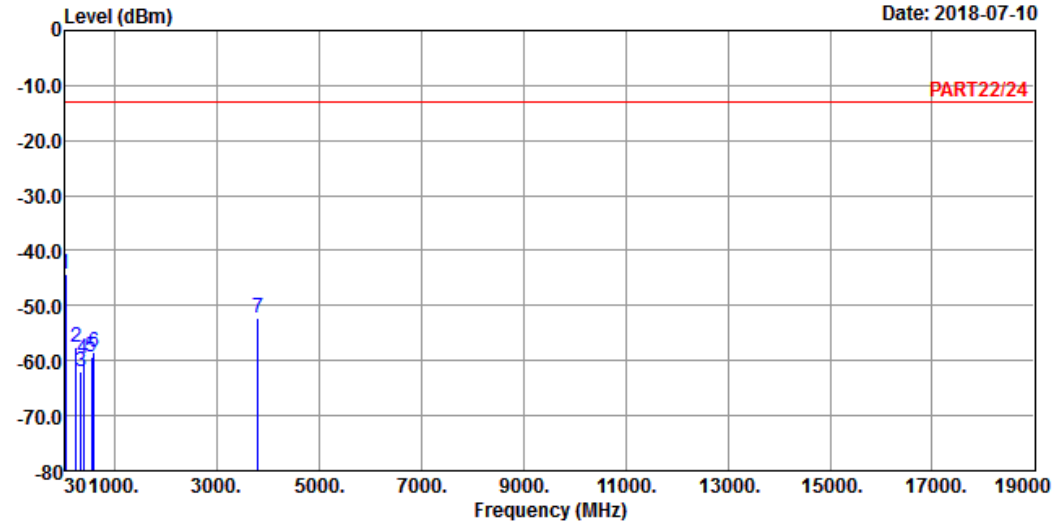
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch



Site : 966 Chamber 5
Condition: PART22/24 HORIZONTAL
Remak : LTE Band 2 QPSK_20M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	286.08	-45.46	-38.73	-13.00	-32.46	-6.73	Peak
2	338.46	-49.04	-42.62	-13.00	-36.04	-6.42	Peak
3	389.87	-52.85	-46.85	-13.00	-39.85	-6.00	Peak
4	598.42	-54.94	-54.11	-13.00	-41.94	-0.83	Peak
5	650.80	-56.39	-55.52	-13.00	-43.39	-0.87	Peak
6	754.59	-57.59	-58.46	-13.00	-44.59	0.87	Peak
7	3800.00	-52.69	-46.26	-13.00	-39.69	-6.43	Peak

Data: 6



Site : 966 Chamber 5
Condition: PART22/24 VERTICAL
Remak : LTE Band 2 QPSK_20M Link_H-CH
Tested by: Thomas Wei

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	42.61	-44.40	-43.46	-13.00	-31.40	-0.94	Peak
2	234.67	-57.65	-51.03	-13.00	-44.65	-6.62	Peak
3	338.46	-62.07	-55.65	-13.00	-49.07	-6.42	Peak
4	390.84	-59.76	-53.76	-13.00	-46.76	-6.00	Peak
5	546.04	-59.34	-56.35	-13.00	-46.34	-2.99	Peak
6	598.42	-58.52	-57.69	-13.00	-45.52	-0.83	Peak
7	3800.00	-52.32	-45.89	-13.00	-39.32	-6.43	Peak

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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