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VERITAS

Test Report No.: RF170123W004-3



# FCC TEST REPORT (PART 24)

**Product:** Industry Wireless Router

**Model Name:** R800

**FCC ID:** SRQ-R800

**Applicant:** ZTE Corporation

**Address:** ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China

**Manufacturer:** ZTE Corporation

**Address:** ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, P.R.China

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**Report No.:** RF170123W004-3

**Received Date:** Jan. 23, 2017

**Test Date:** Feb. 08, 2017 ~ Mar. 06, 2017

**Issued Date:** Mar. 08, 2017

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF170123W004-3	Original release	Mar. 08, 2017



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## 1 CERTIFICATION

**PRODUCT:** Industry Wireless Router  
**BRAND NAME:** ZTE  
**MODEL NAME:** R800  
**APPLICANT:** ZTE Corporation  
**TESTED:** Feb. 08, 2017 ~ Mar. 06, 2017  
**TEST SAMPLE:** Identical Prototype  
**STANDARDS:** **FCC Part 24, Subpart E**  
ANSI/TIA/EIA-603-D

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan 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 EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Harry, **DATE:** Mar. 08, 2017  
(Harry Li/ Engineer)

**APPROVED BY :** Sam Tung, **DATE:** Mar. 08, 2017  
( Sam Tung / Manager)

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 24 & Part 2			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
2.1046 24.232	Equivalent Isotropic Radiated Power	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.
24.232(d)	Peak to average ratio	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 -15.96dB at 32.91MHz.

### 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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.70dB
Radiated emissions	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1GHz	4.06dB
	1GHz ~ 18GHz	4.58dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



## 2.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,16	Apr. 04,17
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,16	Nov. 03,17
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Apr. 05,16	Apr. 04,17
Bilog Antenna 1	Teseq	CBL 6111D	30643	Jul. 14, 16	Jul. 13, 17
Bilog Antenna 2	Teseq	CBL 6111D	27089	Jul. 14, 16	Jul. 13, 17
Loop antenna	Daze	ZN30900A	0708	Nov. 28, 16	Nov. 27, 17
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 18,16	May 17,17
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062557	May 18,16	May 17,17
10m Semi-anechoic Chamber	CHANGLING	21.4m*12.1m*8.8m	NSEMC006	Mar. 12,16	Mar. 11,18
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 27, 16	Jul. 26, 17
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Mar. 12,16	Mar. 11,17
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Mar. 12,16	Mar. 11,17
Amplifier	Burgeon	BPA-530	100220	Apr. 05,16	Apr. 04,17
Amplifier (9kHz-1GHz)	SONOMA	310D	186955	Feb. 10,17	Feb. 09,18
Pre-Amplifier(1-18G)	HP	8449B	3008A00409	Apr. 25,16	Apr. 24,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 04,16	Nov. 03,17
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Sep.05,16	Sep. 04,17
Signal Generator	Agilent	N5183A	MY50140980	Nov. 04,16	Nov. 03,17

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
  2. The test was performed in 10m Semi-anechoic Chamber and RF Oven Room.
  3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 502831.



### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Industry Wireless Router	
<b>MODEL NAME</b>	R800	
<b>POWER SUPPLY</b>	12Vdc (from adapter)	
<b>MODULATION TYPE</b>	WCDMA : BPSK LTE Band 2: QPSK, 16QAM	
<b>FREQUENCY Range</b>	WCDMA	1852.4MHz ~ 1907.6MHz
	LTE Band 2 Channel Bandwidth: 1.4MHz	1850.7MHz ~ 1909.3MHz
	LTE Band 2 Channel Bandwidth: 3MHz	1851.5MHz ~ 1908.5MHz
	LTE Band 2 Channel Bandwidth: 5MHz	1852.5MHz ~ 1907.5MHz
	LTE Band 2 Channel Bandwidth: 10MHz	1855.0MHz ~ 1905.0MHz
	LTE Band 2 Channel Bandwidth: 15MHz	1857.5MHz ~ 1902.5MHz
	LTE Band 2 Channel Bandwidth: 20MHz	1860.0MHz ~ 1900.0MHz
<b>MAX. EIRP POWER</b>	WCDMA	295mW
	LTE Band 2 Channel Bandwidth: 1.4MHz	401mW
	LTE Band 2 Channel Bandwidth: 3MHz	395mW
	LTE Band 2 Channel Bandwidth: 5MHz	400mW
	LTE Band 2 Channel Bandwidth: 10MHz	406mW
	LTE Band 2 Channel Bandwidth: 15MHz	399mW
	LTE Band 2 Channel Bandwidth: 20MHz	360mW
<b>EMISSION DESIGNATOR</b>	WCDMA	4M14F9W
	LTE Band 2 Channel Bandwidth: 1.4MHz	QPSK: 1M09G7D
		16QAM: 1M09W7D
	LTE Band 2 Channel Bandwidth: 3MHz	QPSK: 2M69G7D
16QAM: 2M68W7D		



	LTE Band 2 Channel Bandwidth: 5MHz	QPSK: 4M48G7D 16QAM: 4M47W7D
	LTE Band 2 Channel Bandwidth: 10MHz	QPSK: 8M93G7D 16QAM: 8M93W7D
	LTE Band 2 Channel Bandwidth: 15MHz	QPSK: 13M4G7D 16QAM: 13M4W7D
	LTE Band 2 Channel Bandwidth: 20MHz	QPSK: 17M9G7D 16QAM: 17M8W7D
	ANTENNA TYPE	Fixed External antenna with 1.5dBi gain
	HW VERSION	R800X-V1.1
	SW VERSION	V1.8.8
	I/O PORTS	Refer to user's manual
DATA CABLE	N/A	

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The EUT was powered by the following adapter:

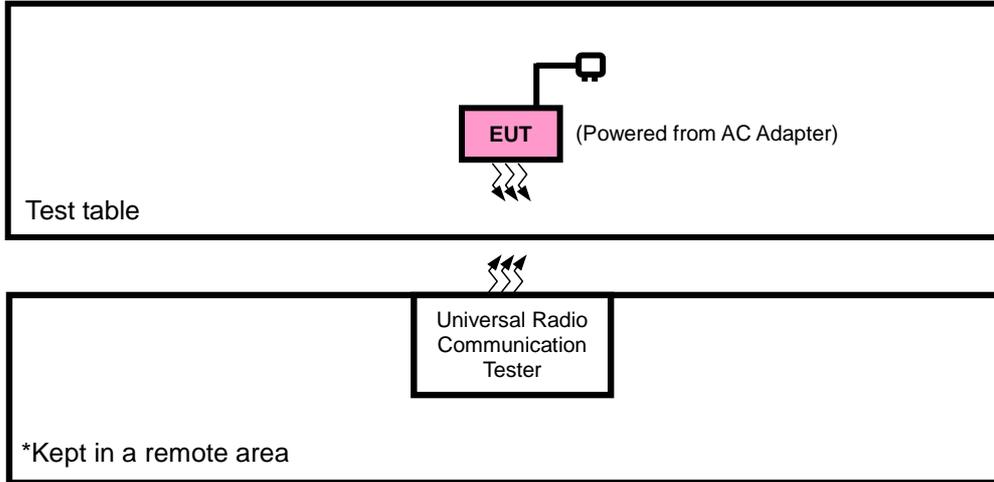
ADAPTER	
BRAND:	ZTE
MODEL:	MAU-120100X-D-16
INPUT:	AC 100-240V, 700mA
OUTPUT:	DC 12V, 1000mA

- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

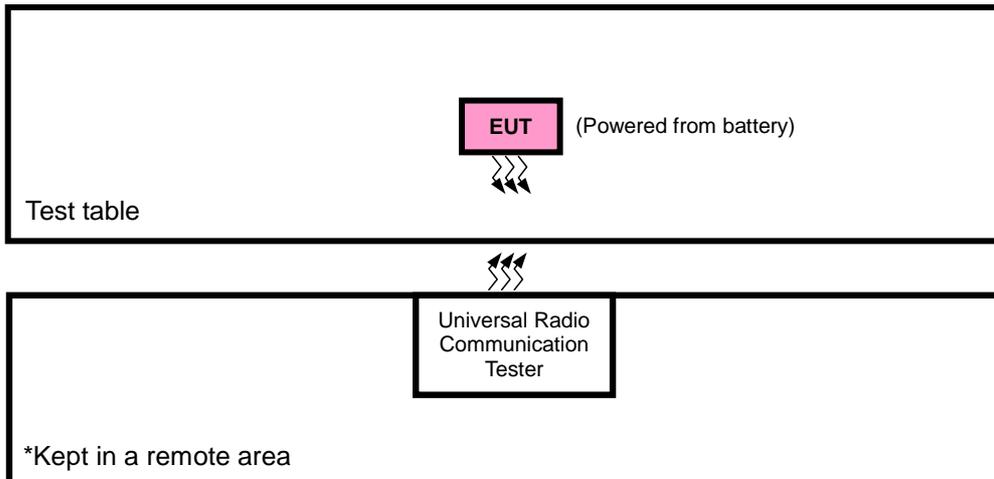


### 3.2 CONFIGURATION OF SYSTEM UNDER TEST

#### FOR RADIATION EMISSION TEST



#### FOR CONDUCTED & E.I.R.P. TEST





### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	AC Line: Unshielded, Detachable 1.5m

**NOTE:**

1. All power cords of the above support units are non shielded (1.8m).

### 3.4 TEST ITEM AND TEST CONFIGURATION

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 in EIRP and radiated emission was found when positioned on X-plane for WCDMA and Z-plane for LTE. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
-	EUT + Adapter with WCDMA or LTE link



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**WCDMA MODE**

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
-	FREQUENCY STABILITY	9262 to 9538	9262, 9400, 9538	WCDMA
-	OCCUPIED BANDWIDTH	9262 to 9538	9262, 9400, 9538	WCDMA
-	PEAK TO AVERAGE RATIO	9262 to 9538	9400	WCDMA
-	BAND EDGE	9262 to 9538	9262, 9538	WCDMA
-	CONDCUETED EMISSION	9262 to 9538	9400	WCDMA
-	RADIATED EMISSION	9262 to 9538	9400	WCDMA

**LTE BAND 2**

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
-	FREQUENCY STABILITY	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB / 0 RB Offset
-	OCCUPIED BANDWIDTH	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK,16QAM	6 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15MHz	QPSK,16QAM	75 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20MHz	QPSK,16QAM	100 RB / 0 RB Offset
-	PEAK TO AVERAGE RATIO	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615, 18900, 19185	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625, 18900, 19175	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650, 18900, 19150	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675, 18900, 19125	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700, 18900, 19100	20MHz	QPSK,16QAM	1 RB / 0 RB Offset



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	BAND EDGE	18607 to 19193	18607	1.4MHz	QPSK	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
		18615 to 19185	19193	1.4MHz	QPSK	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		18625 to 19175	18615	3MHz	QPSK	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
		18650 to 19150	19185	3MHz	QPSK	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		18675 to 19125	18625	5MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		18700 to 19100	19175	5MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		18607 to 19193	18650	10MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
		18615 to 19185	19150	10MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		18625 to 19175	18675	15MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
18650 to 19150	19125	15MHz	QPSK	1 RB / 74 RB Offset		
				75 RB / 0 RB Offset		
18675 to 19125	18700	20MHz	QPSK	1 RB / 0 RB Offset		
				100 RB / 0 RB Offset		
18700 to 19100	19100	20MHz	QPSK	1 RB / 99 RB Offset		
				100 RB / 0 RB Offset		
	CONDCUDETED EMISSION	18607 to 19193	18900	1.4MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18900	3MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18900	5MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18900	10MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18900	15MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18900	20MHz	QPSK	1 RB / 0 RB Offset
	RADIATED EMISSION	18607 to 19193	18900	1.4MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18900	3MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18900	5MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18900	10MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18900	15MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18900	20MHz	QPSK	1 RB / 0 RB Offset



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**TEST CONDITION:**

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP	25deg. C, 57%RH	12Vdc from adapter	Wenliang Wu
FREQUENCY STABILITY	23deg. C, 61%RH	12Vdc from adapter	Wenliang Wu
OCCUPIED BANDWIDTH	23deg. C, 61%RH	12Vdc from adapter	Wenliang Wu
PEAK TO AVERAGE RATIO	23deg. C, 61%RH	12Vdc from adapter	Moon Xiong
BAND EDGE	23deg. C, 61%RH	12Vdc from adapter	Moon Xiong
CONDCUDED EMISSION	23deg. C, 61%RH	12Vdc from adapter	Moon Xiong
RADIATED EMISSION	25deg. C, 57%RH	12Vdc from adapter	Tony Zou



### 3.5 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

### 3.6 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 v02r02**

**ANSI/TIA/EIA-603-D**

**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 and portable stations are limited to 2 watts EIRP.

#### 4.1.2 TEST PROCEDURES

##### EIRP MEASUREMENT:

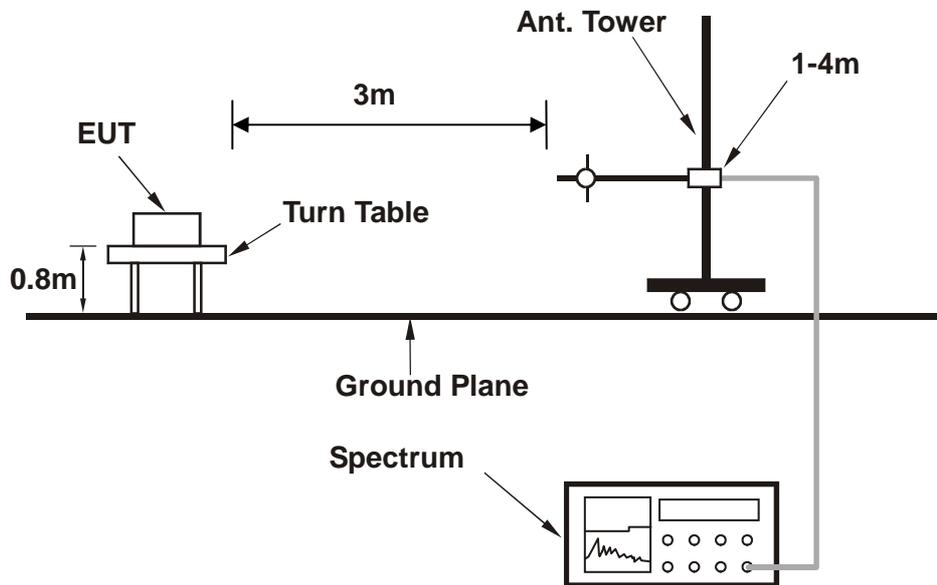
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5MHz for WCDMA mode and 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. 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 b. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$

##### CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with WCDMA & 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.

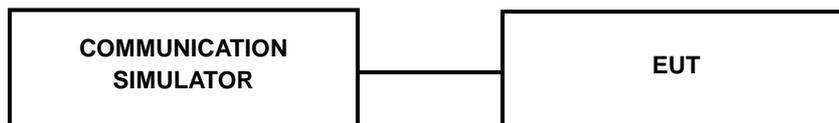
#### 4.1.3 TEST SETUP

##### EIRP MEASUREMENT:



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

##### CONDUCTED POWER MEASUREMENT:



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

#### 4.1.4 TEST RESULTS

Band	WCDMA II		
	9262	9400	9538
Channel	1852.4	1880.0	1907.6
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	21.63	21.55	21.35
HSPA			
HSDPA Subtest-1	20.80	20.72	20.52
HSDPA Subtest-2	20.77	20.69	20.49
HSDPA Subtest-3	20.27	20.19	19.99
HSDPA Subtest-4	20.23	20.15	19.95
HSUPA Subtest-1	20.35	20.27	20.07
HSUPA Subtest-2	18.41	18.33	18.13
HSUPA Subtest-3	19.37	19.29	19.09
HSUPA Subtest-4	18.39	18.31	18.11
HSUPA Subtest-5	20.29	20.21	20.01



LTE Band 2							
BW	Modulation	RB Size	RB Offset	Low CH 18607	Mid CH 18900	High CH 19193	3GPP MPR (dB)
				Frequency 1850.7 MHz	Frequency 1880 MHz	Frequency 1909.3 MHz	
1.4MHz	QPSK	1	0	21.26	21.51	21.23	0
		1	2	21.16	21.41	21.13	0
		1	5	21.09	21.34	21.06	0
		3	0	21.25	21.50	21.22	0
		3	1	21.15	21.40	21.12	0
		3	3	21.08	21.33	21.05	0
		6	0	20.33	20.58	20.30	1
	16QAM	1	0	20.21	20.46	20.18	1
		1	2	20.13	20.38	20.10	1
		1	5	20.07	20.32	20.04	1
		3	0	20.19	20.44	20.16	1
		3	1	20.11	20.36	20.08	1
		3	3	20.05	20.30	20.02	1
		6	0	19.44	19.69	19.41	2
BW	Modulation	RB Size	RB Offset	Low CH 18615	Mid CH 18900	High CH 19185	3GPP MPR (dB)
				Frequency 1851.5 MHz	Frequency 1880 MHz	Frequency 1908.5 MHz	
3 MHz	QPSK	1	0	21.29	21.54	21.26	0
		1	7	21.19	21.44	21.16	0
		1	14	21.12	21.37	21.09	0
		8	0	20.40	20.65	20.37	1
		8	3	20.33	20.58	20.30	1
		8	7	20.26	20.51	20.23	1
		15	0	20.36	20.61	20.33	1
	16QAM	1	0	20.24	20.49	20.21	1
		1	7	20.16	20.41	20.13	1
		1	14	20.10	20.35	20.07	1
		8	0	19.47	19.72	19.44	2
		8	3	19.42	19.67	19.39	2
		8	7	19.36	19.61	19.33	2
		15	0	19.47	19.72	19.44	2



LTE Band 2							
BW	Modulation	RB Size	RB Offset	Low CH 18625	Mid CH 18900	High CH 19175	3GPP MPR (dB)
				Frequency 1852.5 MHz	Frequency 1880 MHz	Frequency 1907.5 MHz	
5 MHz	QPSK	1	0	21.32	21.57	21.29	0
		1	12	21.22	21.47	21.19	0
		1	24	21.15	21.40	21.12	0
		12	0	20.43	20.68	20.40	1
		12	6	20.36	20.61	20.33	1
		12	13	20.29	20.54	20.26	1
		25	0	20.39	20.64	20.36	1
	16QAM	1	0	20.27	20.52	20.24	1
		1	12	20.19	20.44	20.16	1
		1	24	20.13	20.38	20.10	1
		12	0	19.50	19.75	19.47	2
		12	6	19.45	19.70	19.42	2
		12	13	19.39	19.64	19.36	2
		25	0	19.50	19.75	19.47	2
BW	Modulation	RB Size	RB Offset	Low CH 18650	Mid CH 18900	High CH 19150	3GPP MPR (dB)
				Frequency 1855 MHz	Frequency 1880 MHz	Frequency 1905 MHz	
10 MHz	QPSK	1	0	21.34	21.59	21.31	0
		1	24	21.24	21.49	21.21	0
		1	49	21.17	21.42	21.14	0
		25	0	20.45	20.70	20.42	1
		25	12	20.38	20.63	20.35	1
		25	25	20.31	20.56	20.28	1
		50	0	20.41	20.66	20.38	1
	16QAM	1	0	20.29	20.54	20.26	1
		1	24	20.21	20.46	20.18	1
		1	49	20.15	20.40	20.12	1
		25	0	19.52	19.77	19.49	2
		25	12	19.47	19.72	19.44	2
		25	25	19.41	19.66	19.38	2
		50	0	19.52	19.77	19.49	2



LTE Band 2							
BW	Modulation	RB Size	RB Offset	Low CH 18675	Mid CH 18900	High CH 19125	3GPP MPR (dB)
				Frequency 1857.5 MHz	Frequency 1880 MHz	Frequency 1902.5 MHz	
15 MHz	QPSK	1	0	21.37	21.62	21.34	0
		1	37	21.27	21.52	21.24	0
		1	74	21.20	21.45	21.17	0
		36	0	20.48	20.73	20.45	1
		36	19	20.41	20.66	20.38	1
		36	39	20.34	20.59	20.31	1
		75	0	20.44	20.69	20.41	1
	16QAM	1	0	20.32	20.57	20.29	1
		1	37	20.24	20.49	20.21	1
		1	74	20.18	20.43	20.15	1
		36	0	19.55	19.80	19.52	2
		36	19	19.50	19.75	19.47	2
		36	39	19.44	19.69	19.41	2
		75	0	19.55	19.80	19.52	2
BW	Modulation	RB Size	RB Offset	Low CH 18700	Mid CH 18900	High CH 19100	3GPP MPR (dB)
				Frequency 1860 MHz	Frequency 1880 MHz	Frequency 1900 MHz	
20MHz	QPSK	1	0	21.42	21.67	21.39	0
		1	50	21.32	21.57	21.29	0
		1	99	21.25	21.50	21.22	0
		50	0	20.53	20.78	20.50	1
		50	25	20.46	20.71	20.43	1
		50	50	20.39	20.64	20.36	1
		100	0	20.49	20.74	20.46	1
	16QAM	1	0	20.37	20.62	20.34	1
		1	50	20.29	20.54	20.26	1
		1	99	20.23	20.48	20.20	1
		50	0	19.60	19.85	19.57	2
		50	25	19.55	19.80	19.52	2
		50	50	19.49	19.74	19.46	2
		100	0	19.60	19.85	19.57	2



**EIRP POWER (dBm)**

**WCDMA**

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
9262	1852.4	-23.02	43.83	20.81	120.50	H
9400	1880.0	-22.17	43.57	21.40	138.04	H
9538	1907.6	-22.96	44.57	21.61	144.88	H
9262	1852.4	-23.32	46.39	23.07	202.77	V
9400	1880.0	-22.40	47.10	24.70	<b>294.99</b>	V
9538	1907.6	-23.18	45.98	22.80	190.37	V

**REMARKS:** 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).  
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss



LTE BAND 2

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18607	1850.7	-19.67	43.83	24.16	260.86	H	2
18900	1880.0	-18.84	43.57	24.73	297.17	H	2
19193	1909.3	-19.31	44.32	25.01	316.88	H	2
18607	1850.7	-21.88	46.41	24.53	283.86	V	2
18900	1880.0	-21.04	47.07	26.03	<b>400.87</b>	V	2
19193	1909.3	-22.01	45.88	23.87	244.01	V	2

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18607	1850.7	-20.54	43.83	23.29	213.50	H	2
18900	1880.0	-19.77	43.57	23.80	239.88	H	2
19193	1909.3	-20.27	44.32	24.05	254.04	H	2
18607	1850.7	-22.75	46.41	23.66	232.33	V	2
18900	1880.0	-21.97	47.07	25.10	323.59	V	2
19193	1909.3	-22.97	45.88	22.91	195.61	V	2

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18615	1851.5	-19.65	43.82	24.17	261.34	H	2
18900	1880.0	-18.90	43.57	24.67	293.09	H	2
19185	1908.5	-19.26	44.38	25.12	324.79	H	2
18615	1851.5	-21.86	46.45	24.59	287.81	V	2
18900	1880.0	-21.10	47.07	25.97	<b>395.37</b>	V	2
19185	1908.5	-21.96	45.88	23.92	246.60	V	2



CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18615	1851.5	-20.72	43.82	23.10	204.27	H	2
18900	1880.0	-19.79	43.57	23.78	238.78	H	2
19185	1908.5	-20.25	44.38	24.13	258.58	H	2
18615	1851.5	-22.93	46.45	23.52	224.96	V	2
18900	1880.0	-21.99	47.07	25.08	322.11	V	2
19185	1908.5	-22.95	45.88	22.93	196.34	V	2

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18625	1852.5	-19.71	43.83	24.12	258.11	H	2
18900	1880.0	-18.85	43.57	24.72	296.48	H	2
19175	1907.5	-19.21	44.19	24.98	314.63	H	2
18625	1852.5	-21.92	46.46	24.54	284.64	V	2
18900	1880.0	-21.05	47.07	26.02	<b>399.94</b>	V	2
19175	1907.5	-21.91	45.89	23.98	250.09	V	2

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18625	1852.5	-20.54	43.83	23.29	213.21	H	2
18900	1880.0	-19.87	43.57	23.70	234.42	H	2
19175	1907.5	-20.31	44.19	23.88	244.23	H	2
18625	1852.5	-22.75	46.46	23.71	235.13	V	2
18900	1880.0	-22.07	47.07	25.00	316.23	V	2
19175	1907.5	-23.01	45.89	22.88	194.13	V	2



CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18650	1855.0	-19.52	43.86	24.34	271.71	H	2
18900	1880.0	-18.79	43.57	24.78	300.61	H	2
19150	1905.0	-19.08	43.99	24.91	310.03	H	2
18650	1855.0	-21.73	46.28	24.55	284.97	V	2
18900	1880.0	-20.99	47.07	26.08	<b>405.51</b>	V	2
19150	1905.0	-21.78	45.92	24.14	259.54	V	2

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18650	1855.0	-20.67	43.86	23.19	208.50	H	2
18900	1880.0	-19.89	43.57	23.68	233.35	H	2
19150	1905.0	-20.24	43.99	23.75	237.36	H	2
18650	1855.0	-22.88	46.28	23.40	218.68	V	2
18900	1880.0	-22.09	47.07	24.98	314.77	V	2
19150	1905.0	-22.94	45.92	22.98	198.70	V	2

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18675	1857.5	-19.53	43.99	24.46	279.38	H	2
18900	1880.0	-18.86	43.57	24.71	295.80	H	2
19125	1902.5	-19.15	43.66	24.51	282.16	H	2
18675	1857.5	-21.74	45.93	24.19	262.24	V	2
18900	1880.0	-21.06	47.07	26.01	<b>399.02</b>	V	2
19125	1902.5	-21.85	46.20	24.35	272.40	V	2



CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18675	1857.5	-20.39	43.99	23.60	229.19	H	2
18900	1880.0	-19.73	43.57	23.84	242.10	H	2
19125	1902.5	-20.00	43.66	23.66	232.01	H	2
18675	1857.5	-22.60	45.93	23.33	215.13	V	2
18900	1880.0	-21.93	47.07	25.14	326.59	V	2
19125	1902.5	-22.70	46.20	23.50	223.98	V	2

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18700	1860.0	-20.11	43.50	23.39	218.22	H	2
18900	1880.0	-19.31	43.57	24.26	266.69	H	2
19100	1900.0	-19.73	43.62	23.89	244.68	H	2
18700	1860.0	-22.32	45.57	23.25	211.35	V	2
18900	1880.0	-21.51	47.07	25.56	<b>359.75</b>	V	2
19100	1900.0	-22.43	46.26	23.83	241.60	V	2

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	LIMIT (W)
18700	1860.0	-21.04	43.50	22.46	176.16	H	2
18900	1880.0	-20.38	43.57	23.19	208.45	H	2
19100	1900.0	-20.56	43.62	23.06	202.12	H	2
18700	1860.0	-23.25	45.57	22.32	170.61	V	2
18900	1880.0	-22.58	47.07	24.49	281.19	V	2
19100	1900.0	-23.26	46.26	23.00	199.57	V	2

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).  
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss



## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

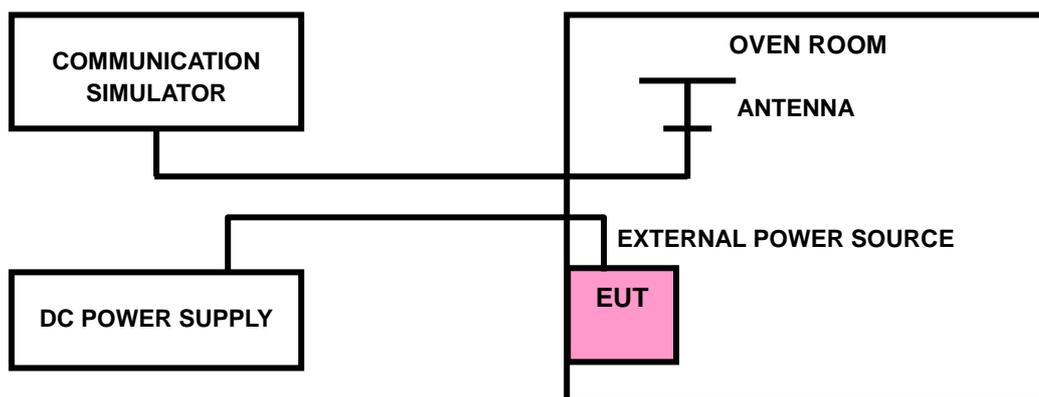
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 4.2.2 TEST PROCEDURE

- 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.
- 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.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  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.

### 4.2.3 TEST SETUP





#### 4.2.4 TEST RESULTS

##### WCDMA Band II:

##### FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)			LIMIT (ppm)
	CH 9262	CH 9400	CH 9538	
12.0	0.0013	0.0011	0.0010	2.5
10.8	-0.0018	-0.0015	-0.0013	2.5
13.2	-0.0015	-0.0013	-0.0011	2.5

**NOTE:** The applicant defined the normal working voltage of the EUT is from 10.8Vdc to 13.2Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	FREQUENCY ERROR (ppm)			LIMIT (ppm)
	CH 9262	CH 9400	CH 9538	
-30	-0.0055	-0.0058	-0.0056	2.5
-20	-0.0049	-0.0053	-0.0050	2.5
-10	-0.0044	-0.0047	-0.0044	2.5
0	-0.0037	-0.0040	-0.0038	2.5
10	-0.0031	-0.0034	-0.0032	2.5
20	-0.0025	-0.0028	-0.0026	2.5
30	-0.0018	-0.0022	-0.0019	2.5
40	-0.0012	-0.0015	-0.0013	2.5
50	-0.0005	-0.0009	-0.0006	2.5
60	0.0002	-0.0002	-0.0002	2.5



LTE BAND 2

FREQUENCY ERROR VS. VOLTAGE

FREQUENCY ERROR VS. VOLTAGE										
VOLTAGE (Volts)	FREQUENCY ERROR (ppm)									LIMIT (ppm)
	1.4MHz			3MHz			5MHz			
	CH 18607	CH 18900	CH 19193	CH 18615	CH 18900	CH 19185	CH 18625	CH 18900	CH 19175	
12.0	0.0012	0.0027	0.0013	0.0012	0.0034	0.0013	0.0012	0.0031	0.0013	2.5
10.8	-0.0016	-0.0037	-0.0017	-0.0018	-0.0043	-0.0018	-0.0020	-0.0041	-0.0015	2.5
13.2	-0.0014	-0.0032	-0.0015	-0.0017	-0.0038	-0.0017	-0.0016	-0.0038	-0.0016	2.5

NOTE: The applicant defined the normal working voltage of the EUT is from 10.8Vdc to 13.2Vdc.

FREQUENCY ERROR VS. TEMPERATURE										
TEMP. (°C)	FREQUENCY ERROR (ppm)									LIMIT (ppm)
	1.4MHz			3MHz			5MHz			
	CH 18607	CH 18900	CH 19193	CH 18615	CH 18900	CH 19185	CH 18625	CH 18900	CH 19175	
-30	-0.0058	-0.0060	-0.0067	-0.0070	-0.0062	-0.0062	-0.0061	-0.0059	-0.0061	2.5
-20	-0.0050	-0.0054	-0.0059	-0.0060	-0.0055	-0.0055	-0.0056	-0.0052	-0.0054	2.5
-10	-0.0044	-0.0046	-0.0053	-0.0053	-0.0048	-0.0048	-0.0050	-0.0045	-0.0049	2.5
0	-0.0037	-0.0039	-0.0047	-0.0046	-0.0041	-0.0042	-0.0045	-0.0039	-0.0044	2.5
10	-0.0028	-0.0033	-0.0039	-0.0039	-0.0034	-0.0036	-0.0038	-0.0032	-0.0038	2.5
20	-0.0023	-0.0025	-0.0033	-0.0032	-0.0027	-0.0028	-0.0034	-0.0025	-0.0033	2.5
30	-0.0019	-0.0017	-0.0028	-0.0024	-0.0020	-0.0020	-0.0027	-0.0017	-0.0025	2.5
40	-0.0011	-0.0011	-0.0021	-0.0012	-0.0014	-0.0011	-0.0021	-0.0011	-0.0017	2.5
50	-0.0006	-0.0005	-0.0012	-0.0005	-0.0007	-0.0010	-0.0011	-0.0004	-0.0016	2.5
60	0.0002	0.0001	-0.0007	-0.0001	-0.0001	-0.0002	-0.0004	0.0003	0.0002	2.5

**FREQUENCY ERROR VS. VOLTAGE**

FREQUENCY ERROR VS. VOLTAGE										
VOLTAGE (Volts)	FREQUENCY ERROR (ppm)									LIMIT (ppm)
	10MHz			15MHz			20MHz			
	CH 18650	CH 18900	CH 19150	CH 18675	CH 18900	CH 19125	CH 18700	CH 18900	CH 19100	
12.0	0.0010	0.0025	0.0012	0.0011	0.0029	0.0015	0.0014	0.0038	0.0015	2.5
10.8	-0.0016	-0.0036	-0.0017	-0.0013	-0.0037	-0.0018	-0.0016	-0.0043	-0.0020	2.5
13.2	-0.0016	-0.0031	-0.0020	-0.0013	-0.0034	-0.0025	-0.0015	-0.0041	-0.0017	2.5

**NOTE:** The applicant defined the normal working voltage of the EUT is from 10.8Vdc to 13.2Vdc.

FREQUENCY ERROR VS. TEMPERATURE										
TEMP. (°C)	FREQUENCY ERROR (ppm)									LIMIT (ppm)
	10MHz			15MHz			20MHz			
	CH 18650	CH 18900	CH 19150	CH 18675	CH 18900	CH 19125	CH 18700	CH 18900	CH 19100	
-30	-0.0064	-0.0058	-0.0060	-0.0062	-0.0057	-0.0062	-0.0063	-0.0059	-0.0063	2.5
-20	-0.0057	-0.0052	-0.0053	-0.0056	-0.0051	-0.0052	-0.0055	-0.0053	-0.0054	2.5
-10	-0.0050	-0.0045	-0.0049	-0.0045	-0.0045	-0.0044	-0.0051	-0.0045	-0.0052	2.5
0	-0.0043	-0.0038	-0.0045	-0.0041	-0.0039	-0.0037	-0.0043	-0.0038	-0.0044	2.5
10	-0.0034	-0.0033	-0.0037	-0.0028	-0.0033	-0.0030	-0.0036	-0.0031	-0.0037	2.5
20	-0.0026	-0.0024	-0.0031	-0.0023	-0.0026	-0.0023	-0.0029	-0.0024	-0.0031	2.5
30	-0.0017	-0.0018	-0.0022	-0.0012	-0.0020	-0.0017	-0.0017	-0.0017	-0.0023	2.5
40	-0.0012	-0.0011	-0.0015	-0.0006	-0.0013	-0.0011	-0.0007	-0.0010	-0.0016	2.5
50	-0.0010	-0.0004	-0.0006	-0.0002	-0.0007	-0.0005	-0.0002	-0.0003	-0.0010	2.5
60	-0.0004	0.0002	-0.0002	0.0002	-0.0001	-0.0003	0.0002	0.0005	-0.0002	2.5

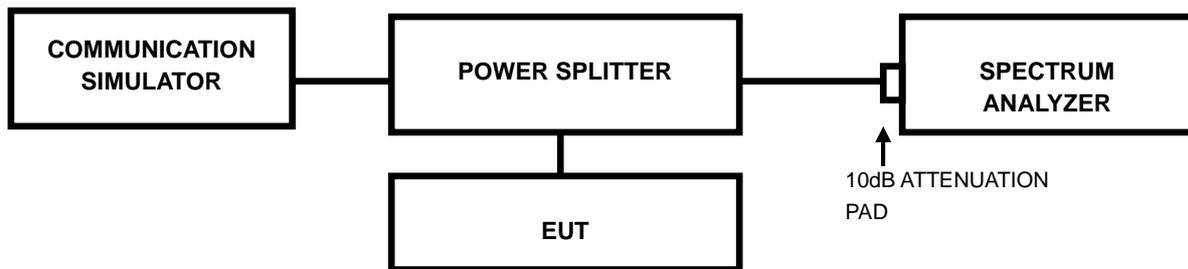


### 4.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 4.3.1 TEST PROCEDURES

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.

#### 4.3.2 TEST SETUP



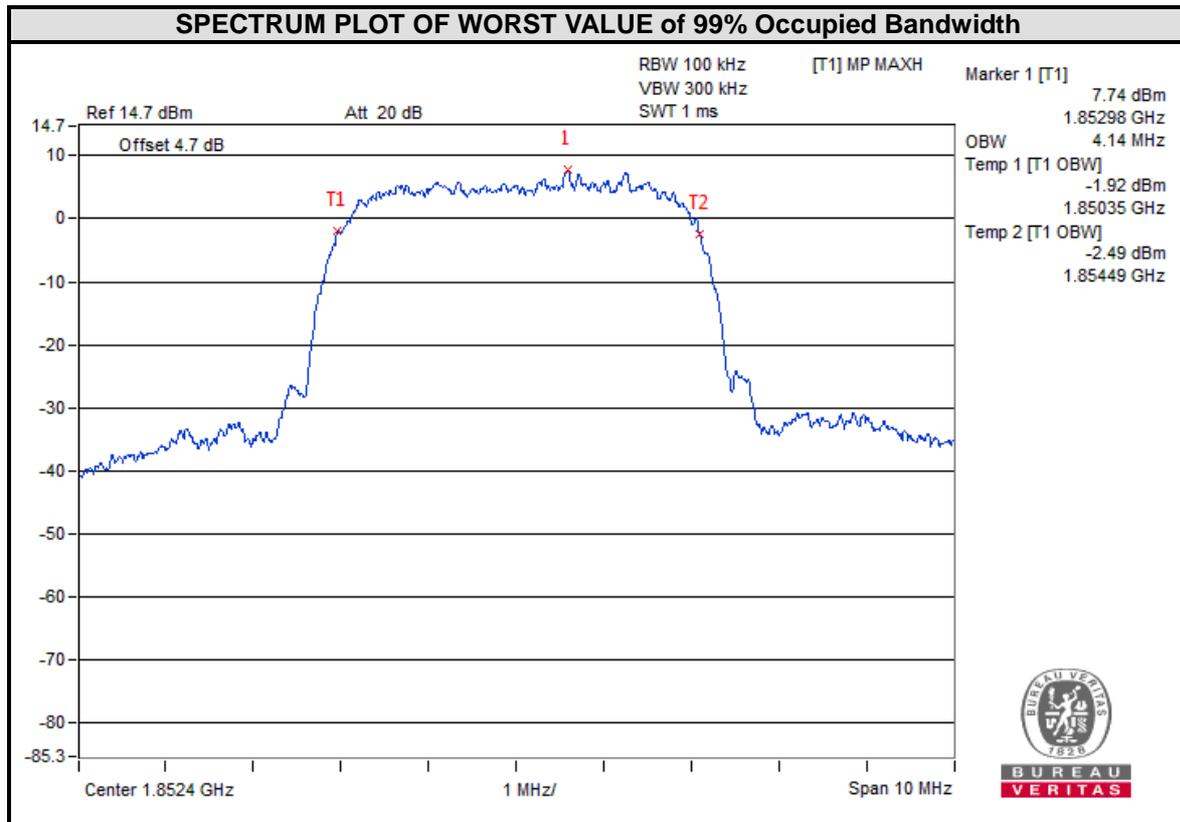


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Test Report No.: RF170123W004-3

### 4.3.3 TEST RESULTS

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)
		WCDMA
9262	1852.4	4.14
9400	1880.0	4.13
9538	1907.6	4.14

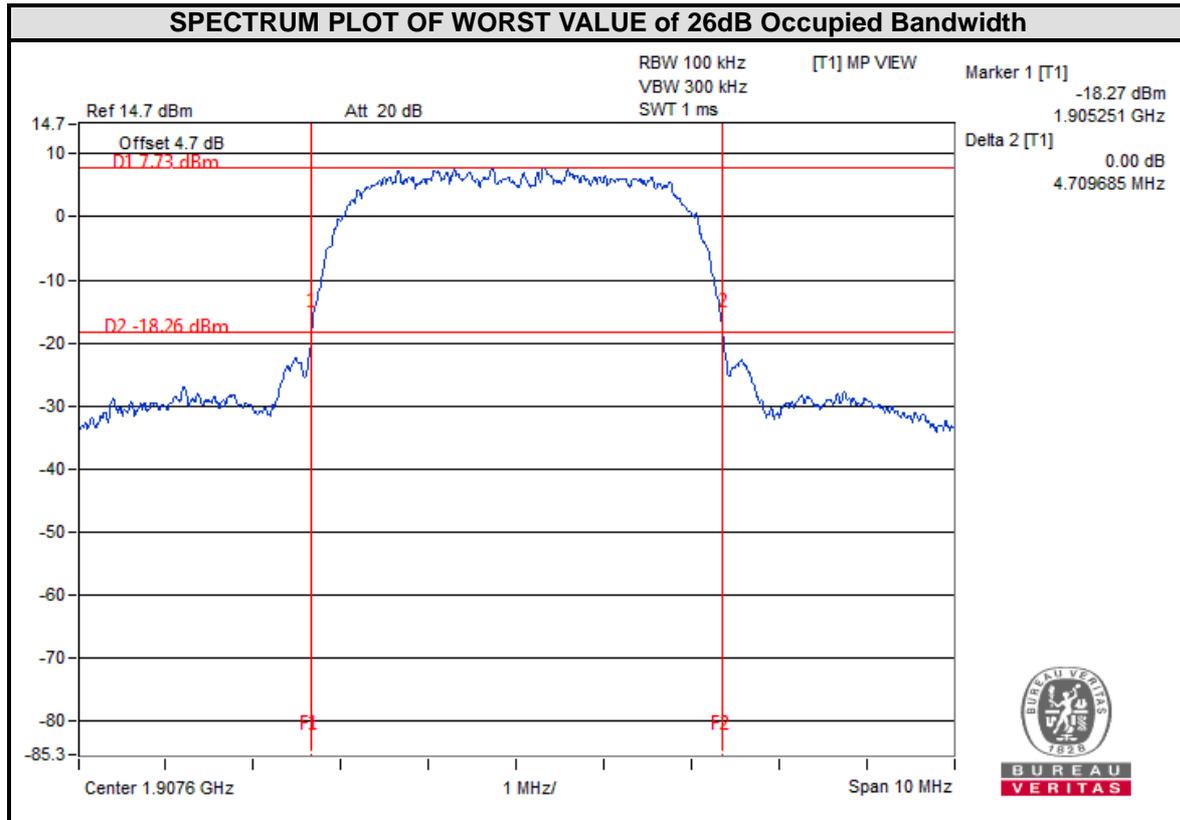




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CHANNEL	Frequency (MHz)	26dB Bandwidth (MHz)
		WCDMA
9262	1852.4	4.69
9400	1880.0	4.71
9538	1907.6	4.71

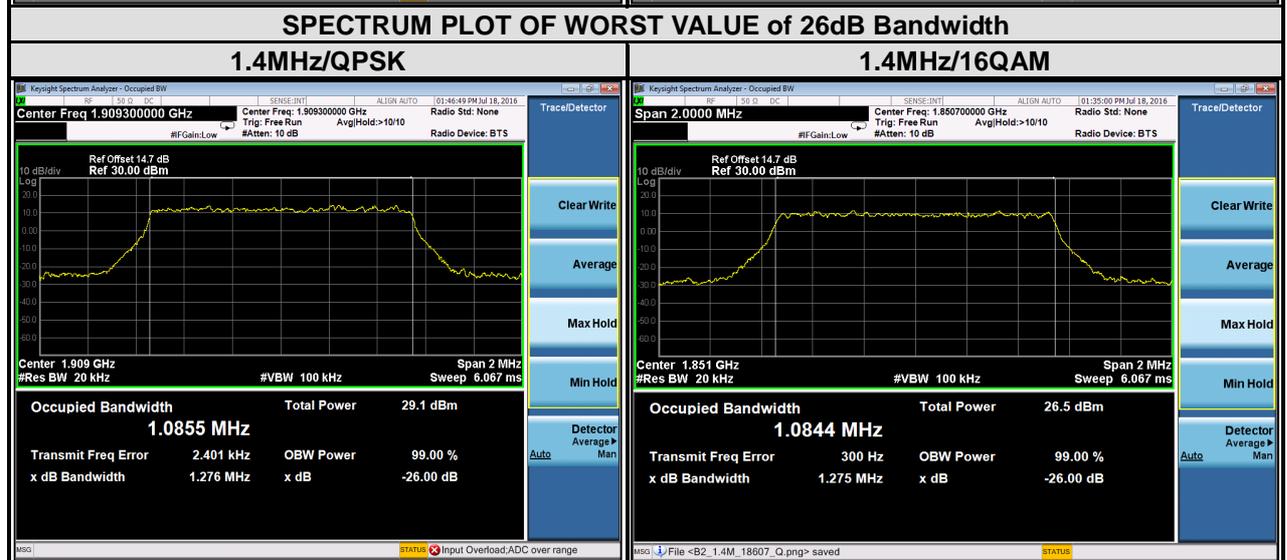
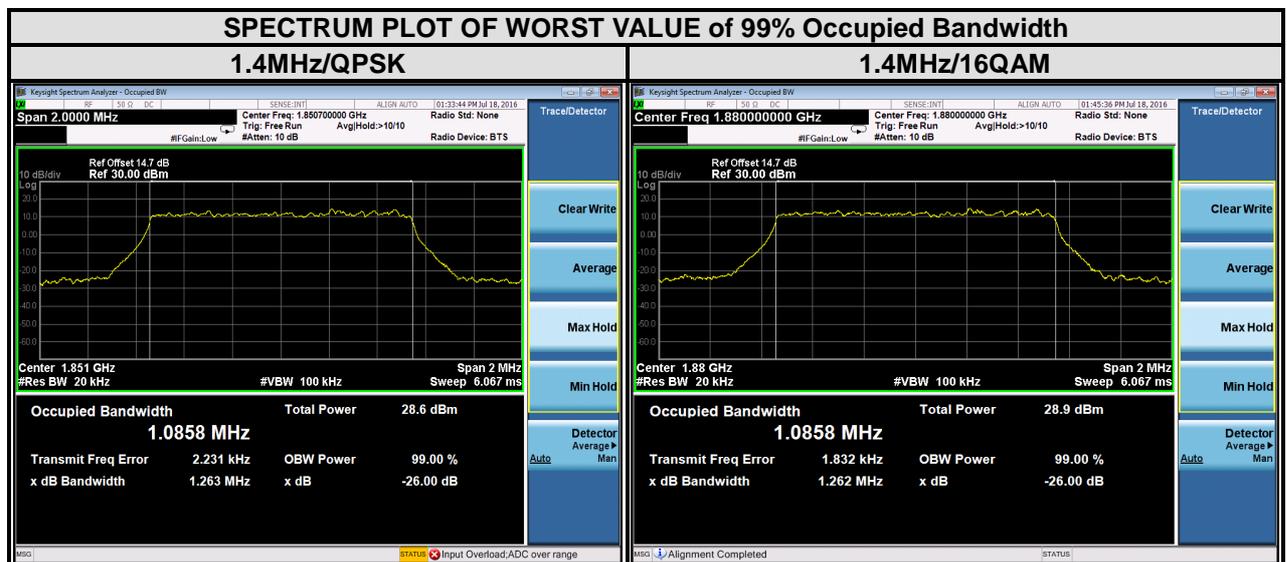




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LTE band 2							
Channel Bandwidth : 1.4MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.09	1.08	18607	1850.7	1.26	1.28
18900	1880	1.09	1.09	18900	1880	1.27	1.26
19193	1909.3	1.09	1.08	19193	1909.3	1.28	1.27



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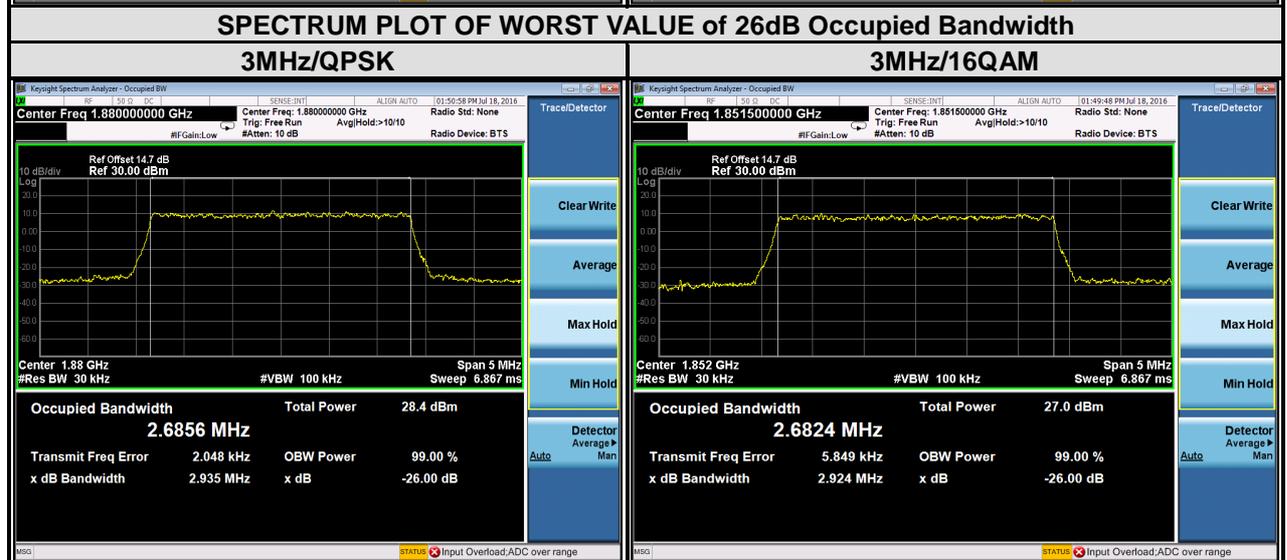
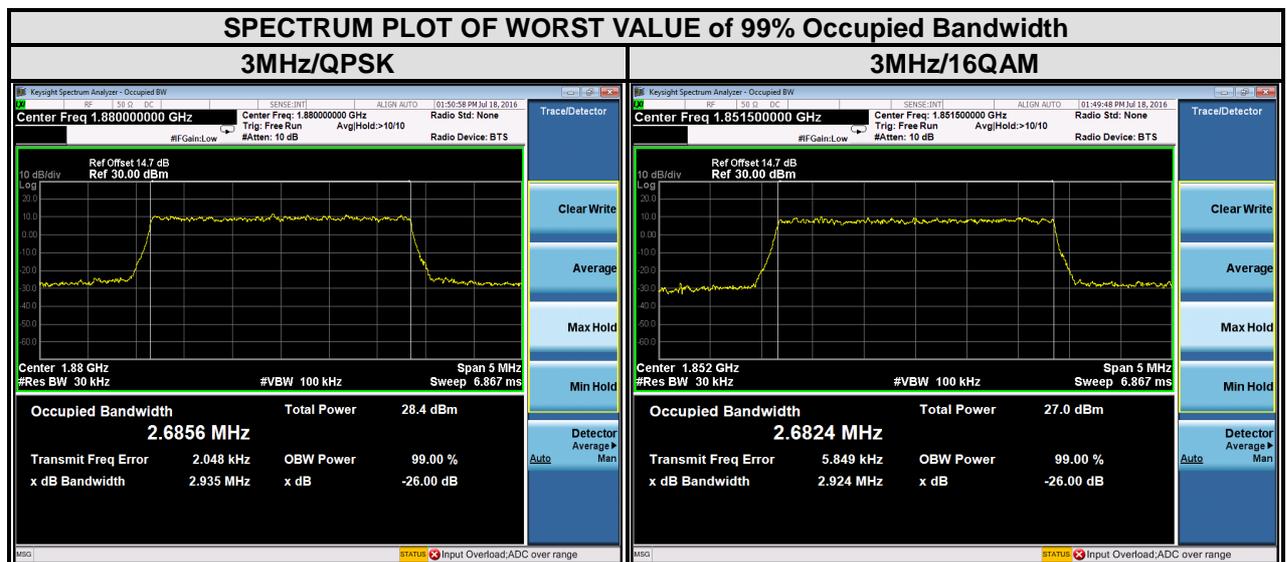
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LTE band 2							
Channel Bandwidth : 3MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18615	1851.5	2.69	2.68	18615	1851.5	2.93	2.92
18900	1880	2.69	2.68	18900	1880	2.94	2.92
19185	1908.5	2.68	2.68	19185	1908.5	2.93	2.92



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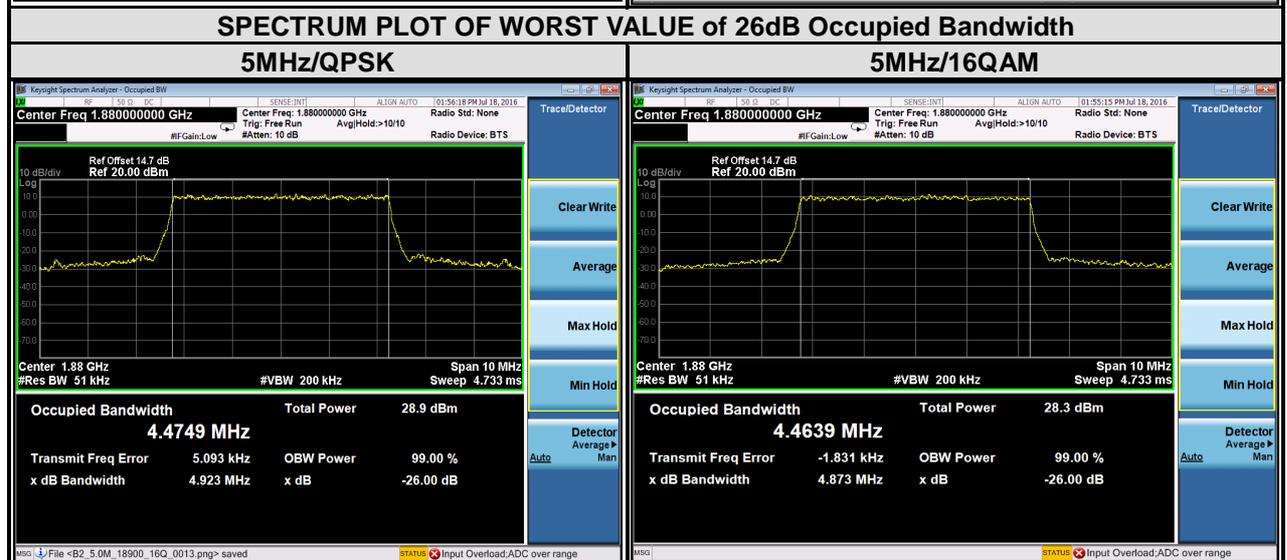
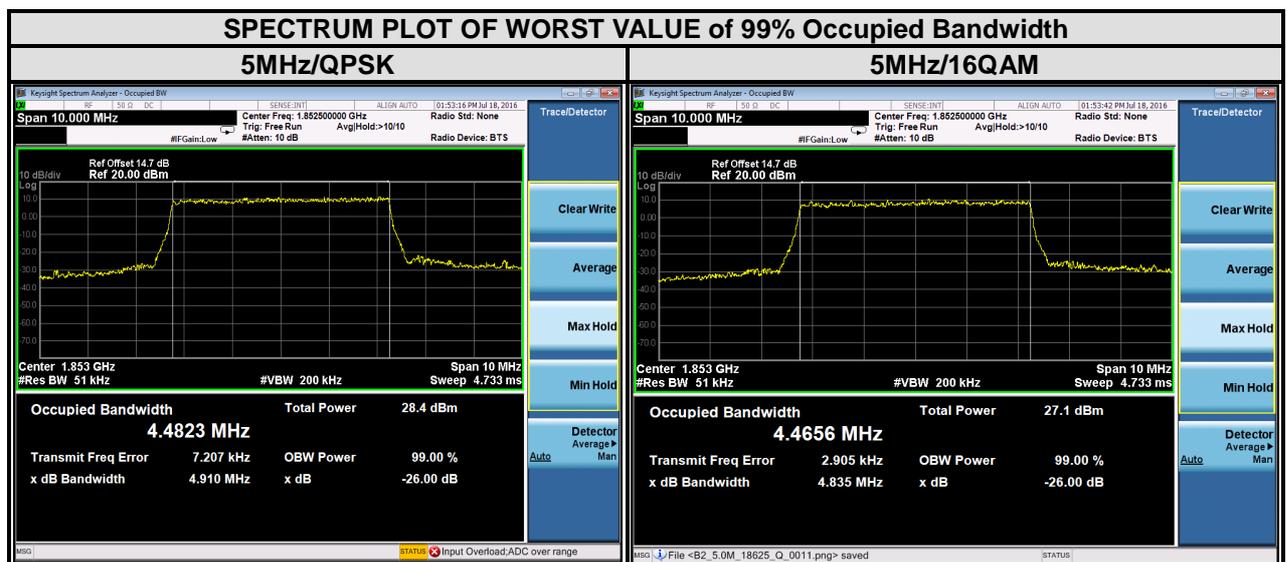
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LTE band 2							
Channel Bandwidth : 5 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.48	4.47	18625	1852.5	4.91	4.84
18900	1880	4.47	4.46	18900	1880	4.92	4.87
19175	1907.5	4.48	4.47	19175	1907.5	4.87	4.86



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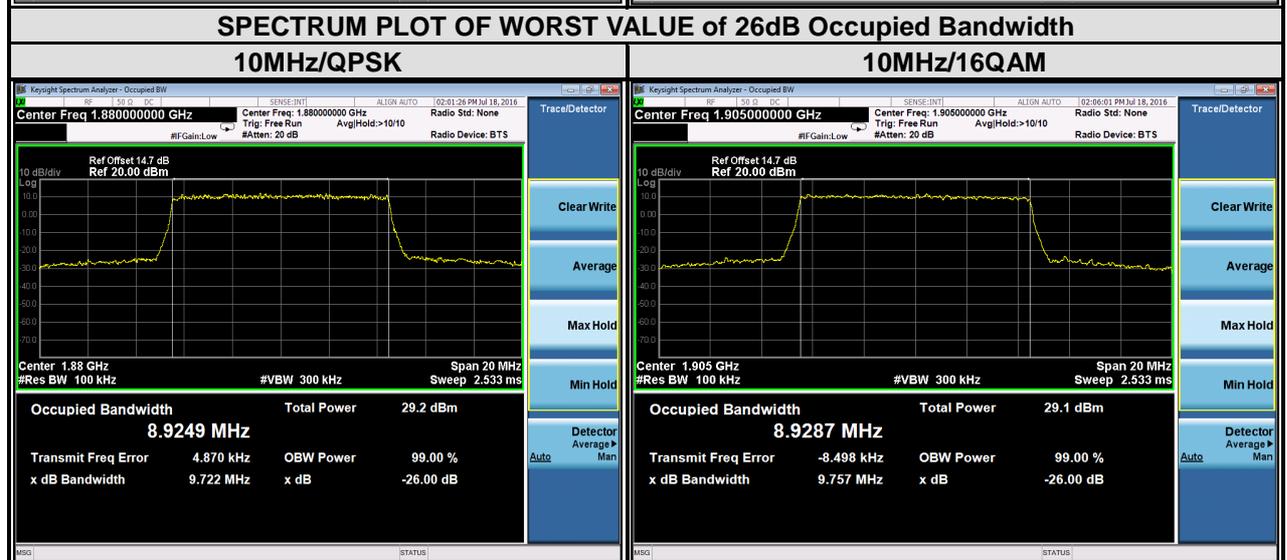
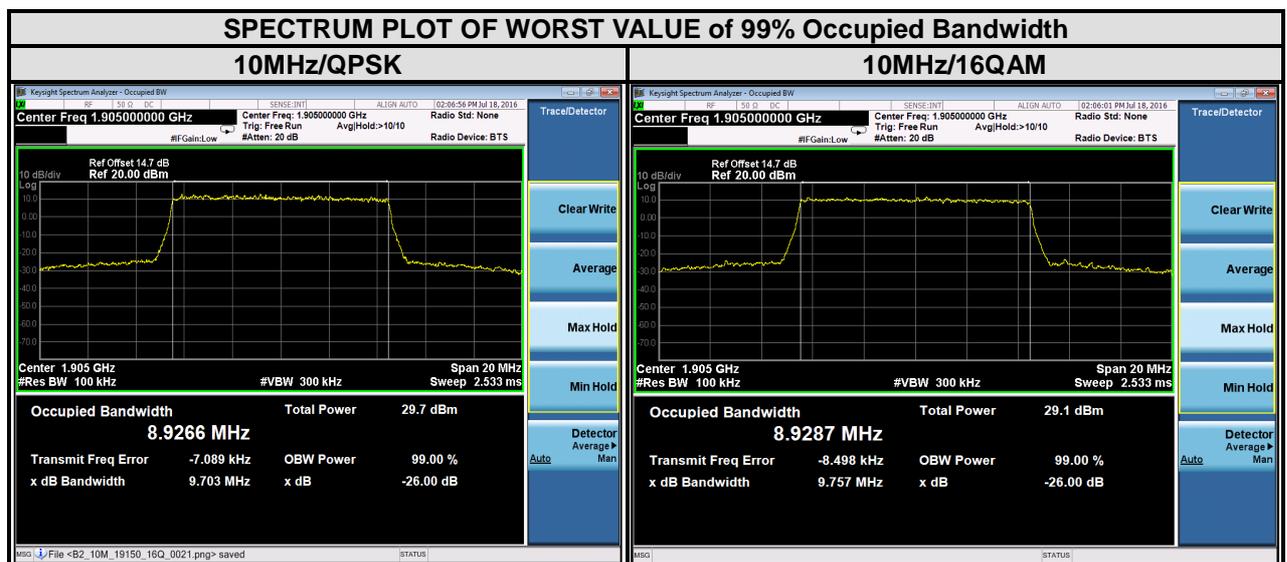
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LTE band 2							
Channel Bandwidth : 10 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18650	1855	8.91	8.89	18650	1855	9.71	9.62
18900	1880	8.92	8.93	18900	1880	9.72	9.68
19150	1905	8.93	8.93	19150	1905	9.70	9.76



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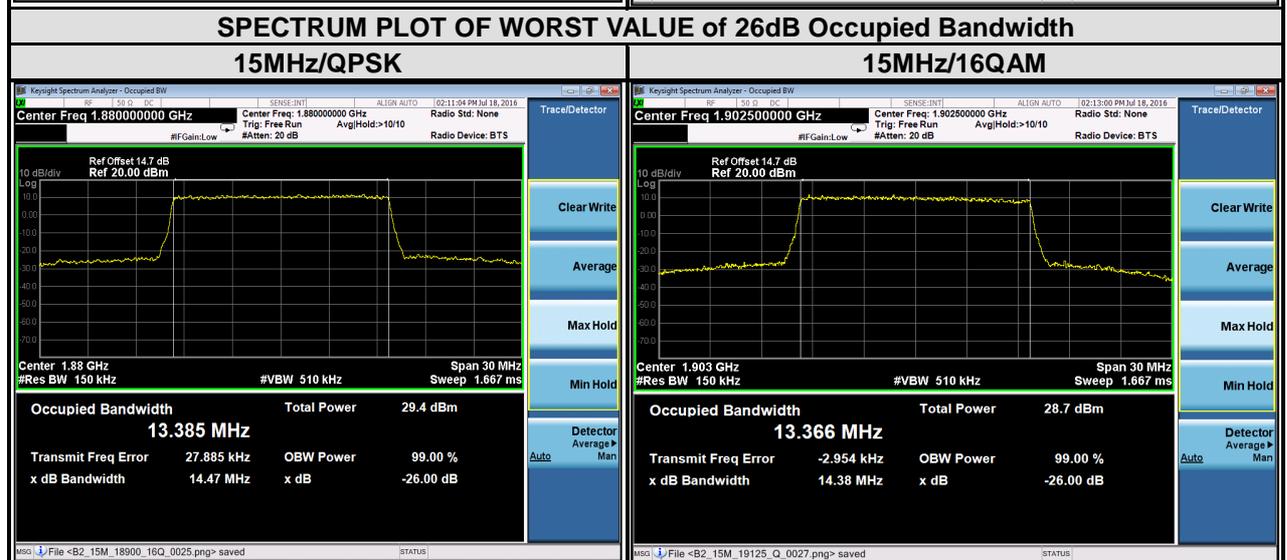
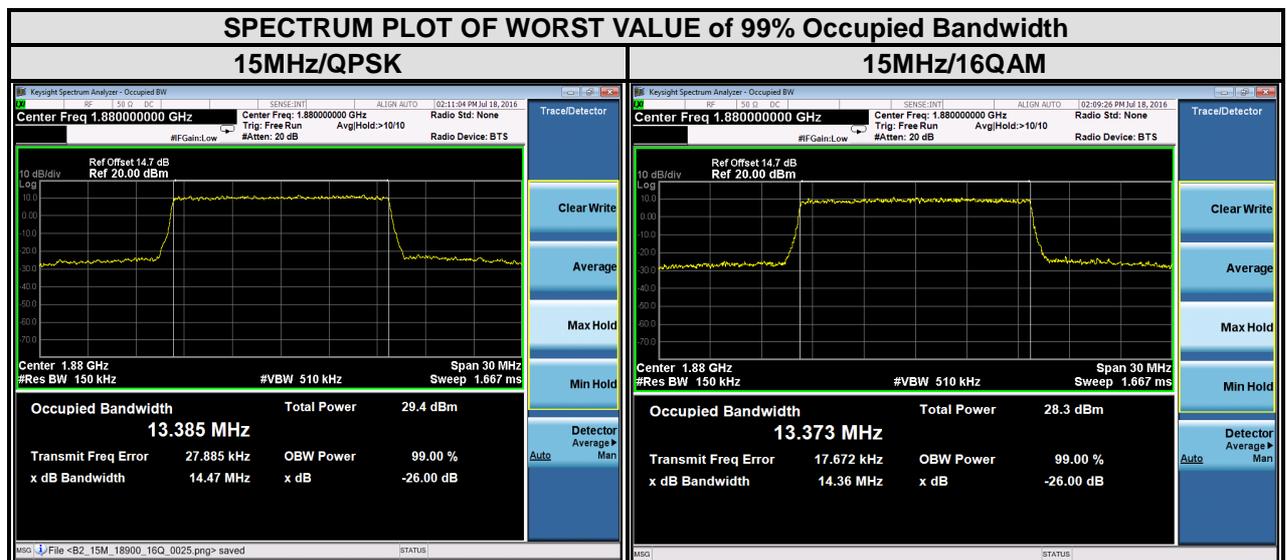
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LTE band 2							
Channel Bandwidth : 15 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.33	13.32	18675	1857.5	14.29	14.32
18900	1880	13.39	13.37	18900	1880	14.47	14.36
19125	1902.5	13.37	13.37	19125	1902.5	14.43	14.38



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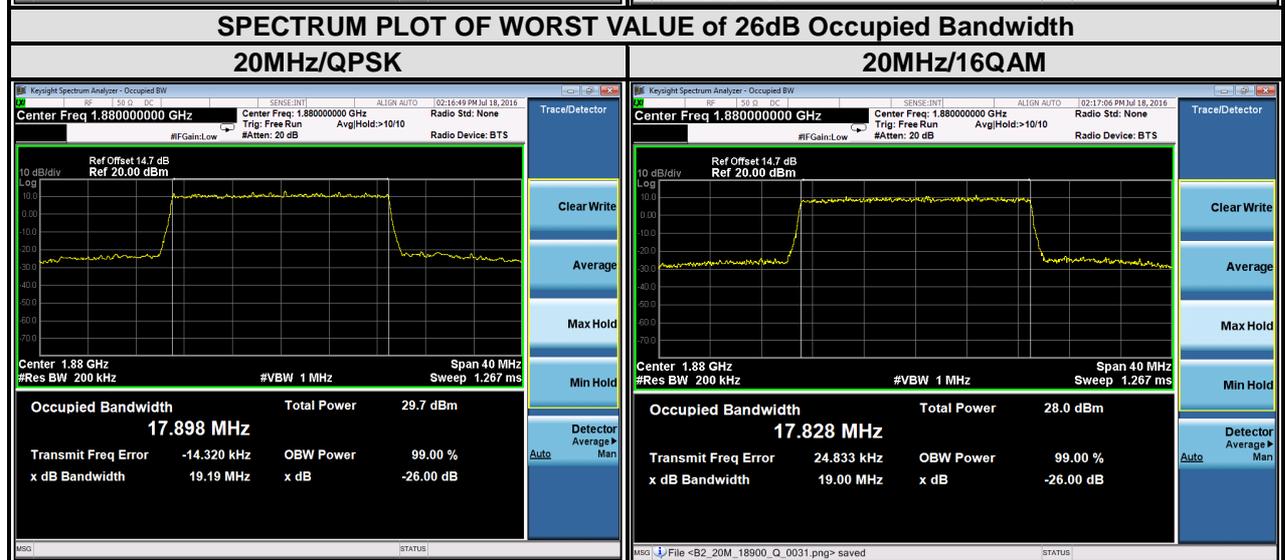
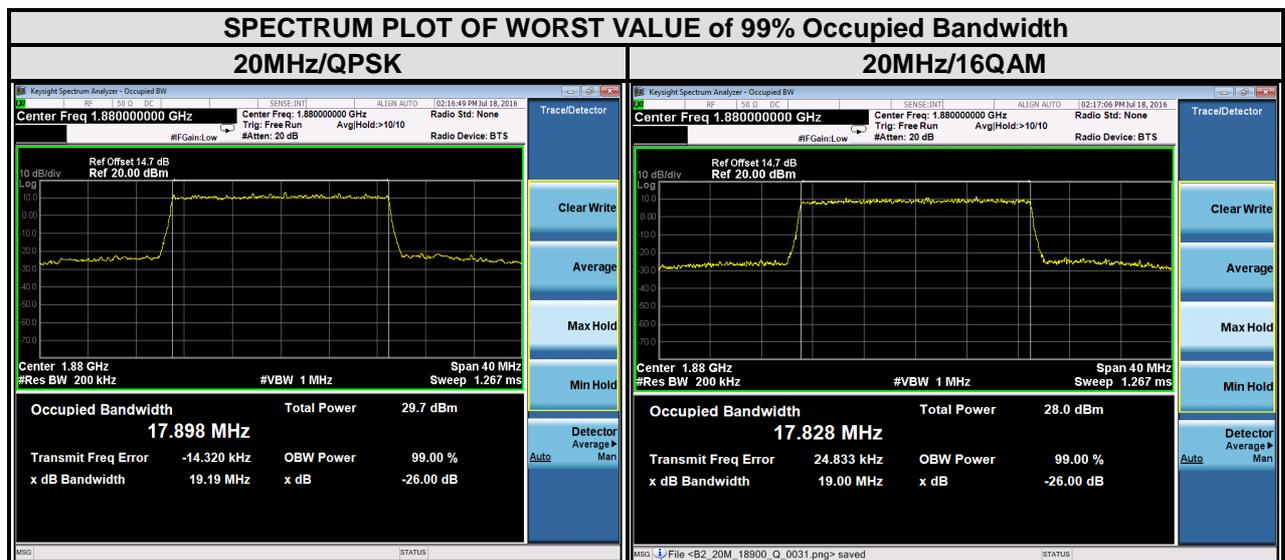
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LTE band 2							
Channel Bandwidth : 20 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18700	1860	17.80	17.75	18700	1860	18.96	18.92
18900	1880	17.90	17.83	18900	1880	19.19	19.00
19100	1900	17.83	17.74	19100	1900	18.96	18.93



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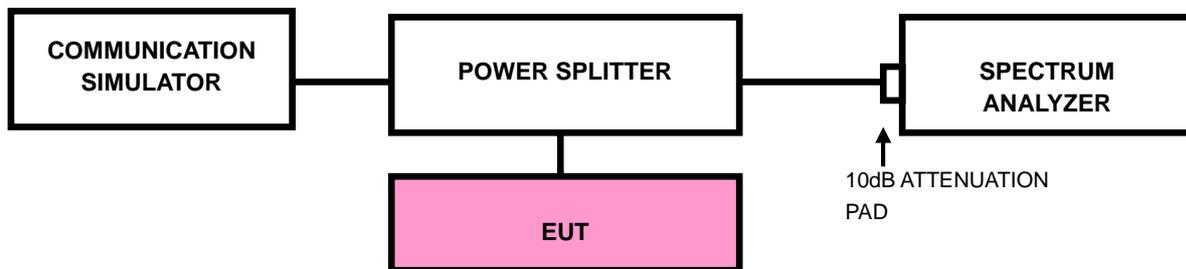


## 4.4 BAND EDGE MEASUREMENT

### 4.4.1 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.

### 4.4.2 TEST SETUP



### 4.4.3 TEST PROCEDURES

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 10MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (WCDMA).
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 50kHz and VBW of the spectrum is 200kHz. (LTE bandwidth 5MHz)



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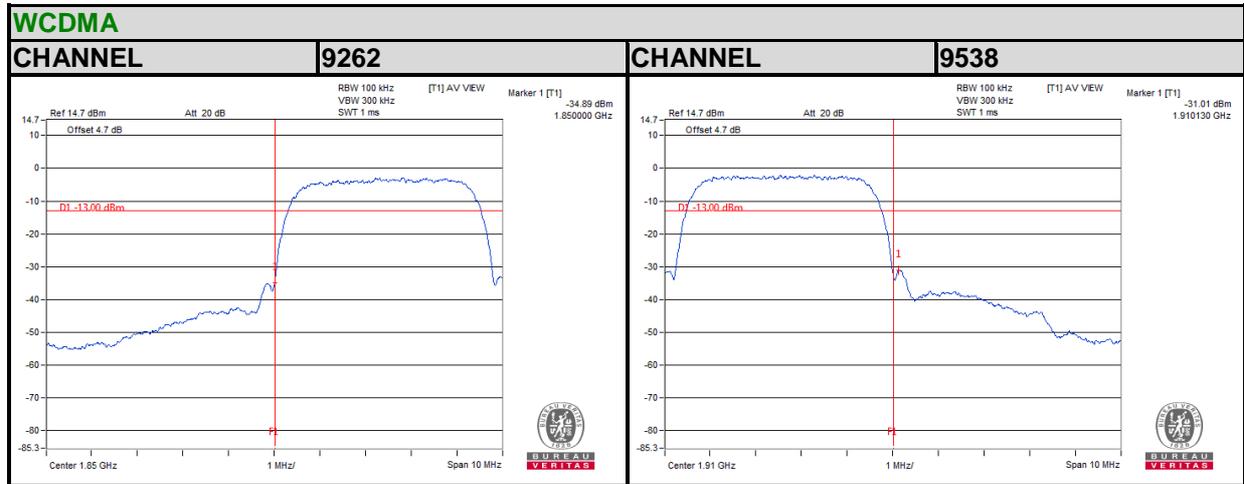
- f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)
- g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 15MHz)
- h. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 20MHz)
- i. Record the max trace plot into the test report.



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### 4.4.4. TEST RESULTS



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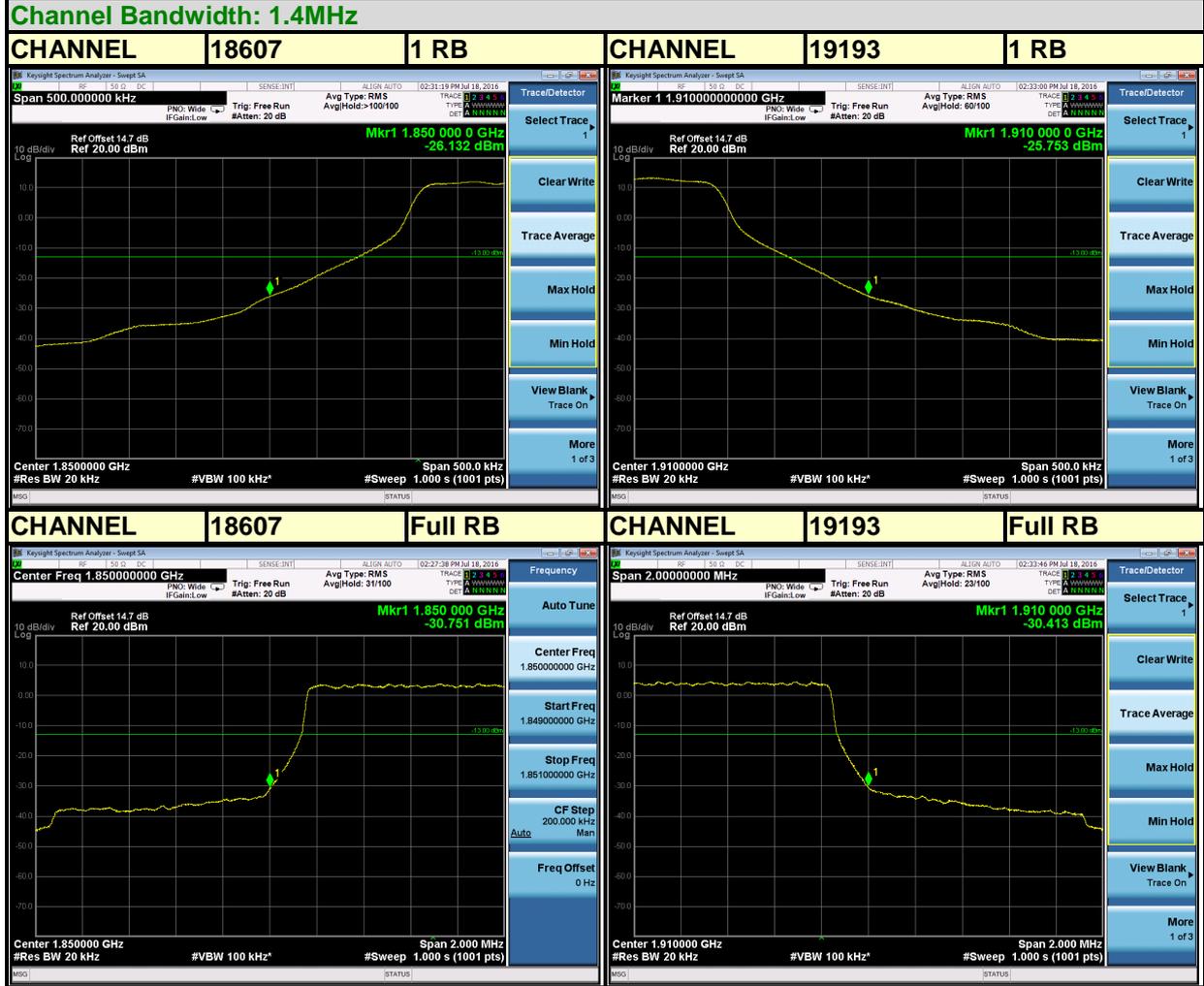
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LTE BAND 2



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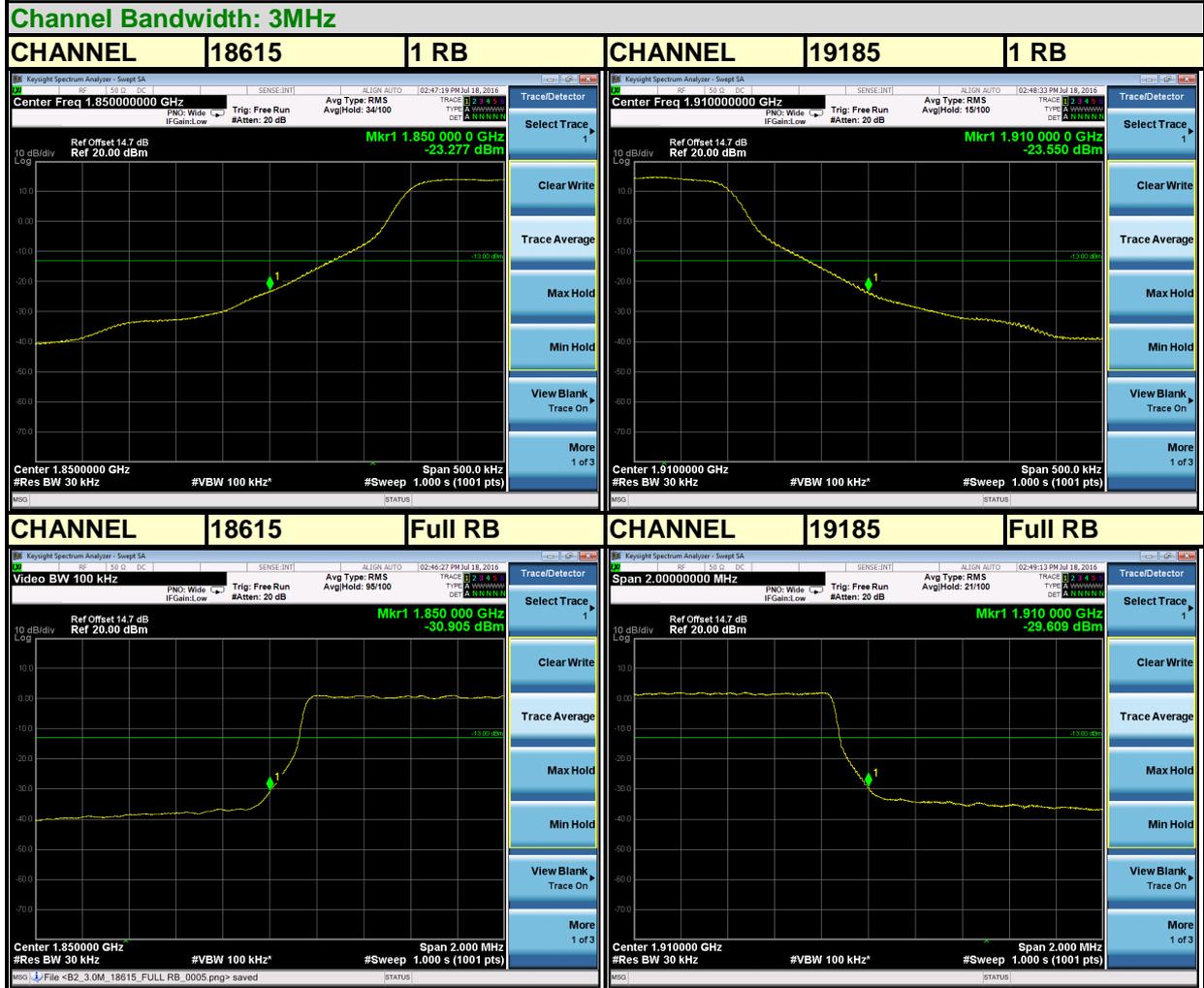
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### LTE BAND 2



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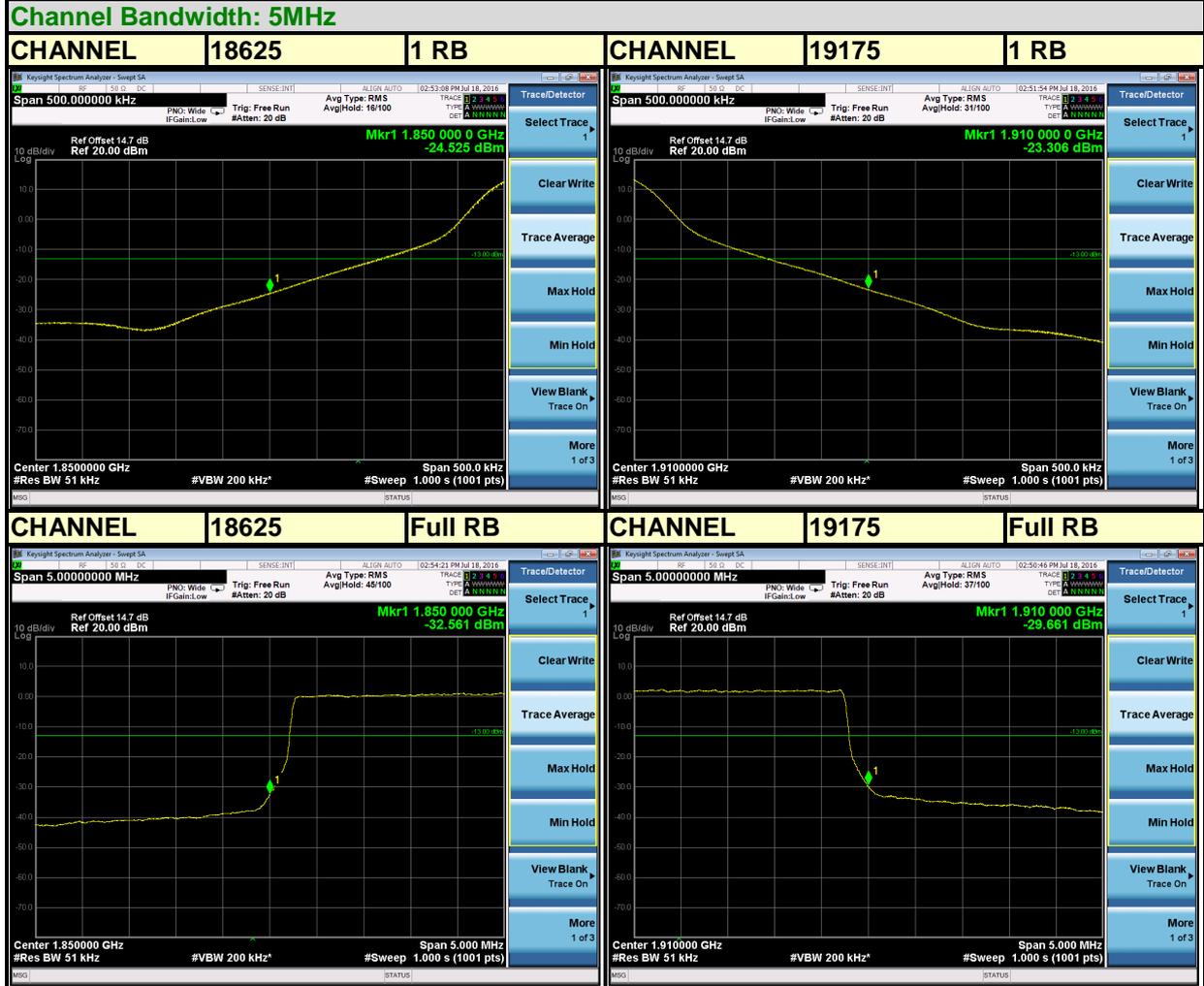
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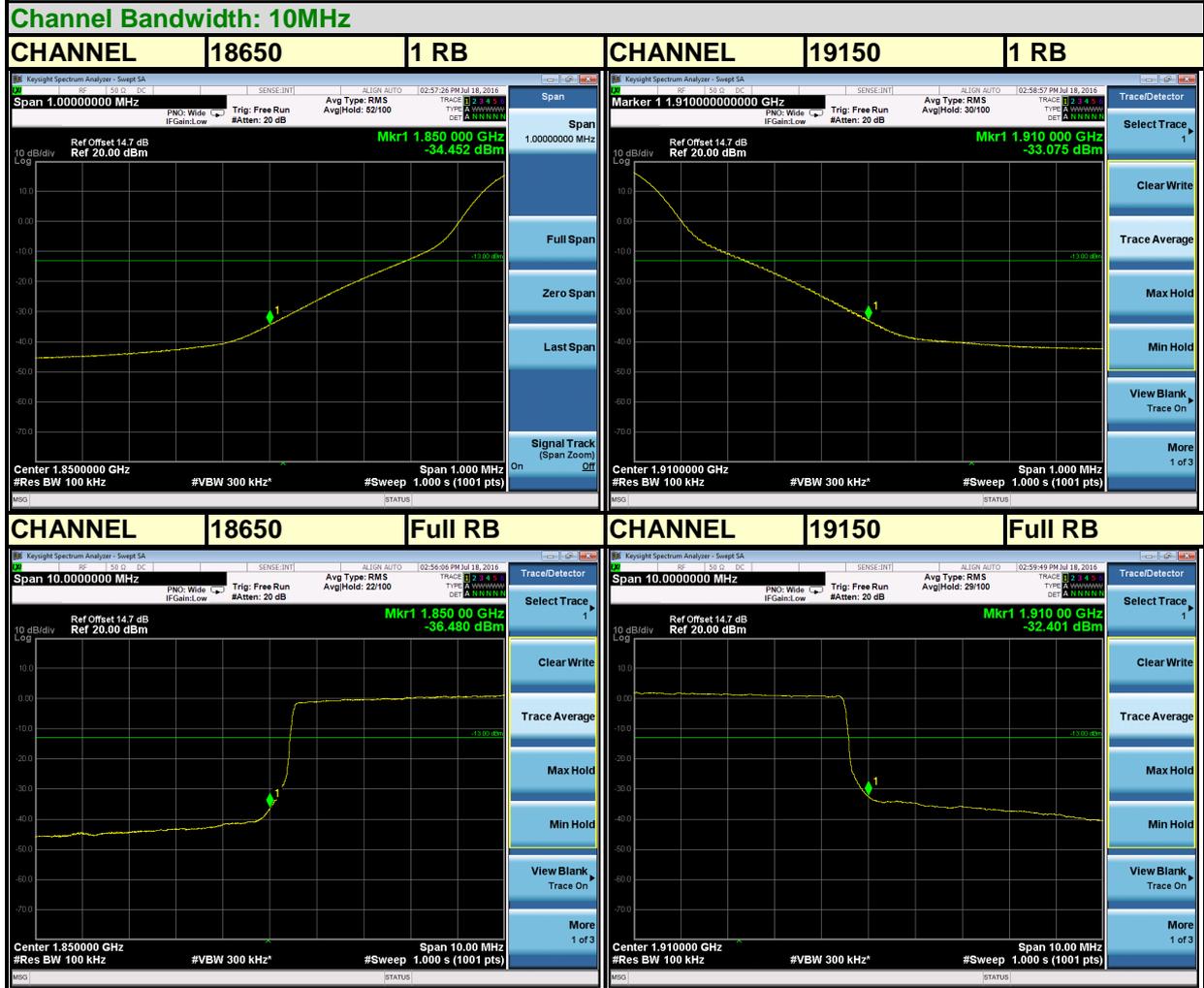
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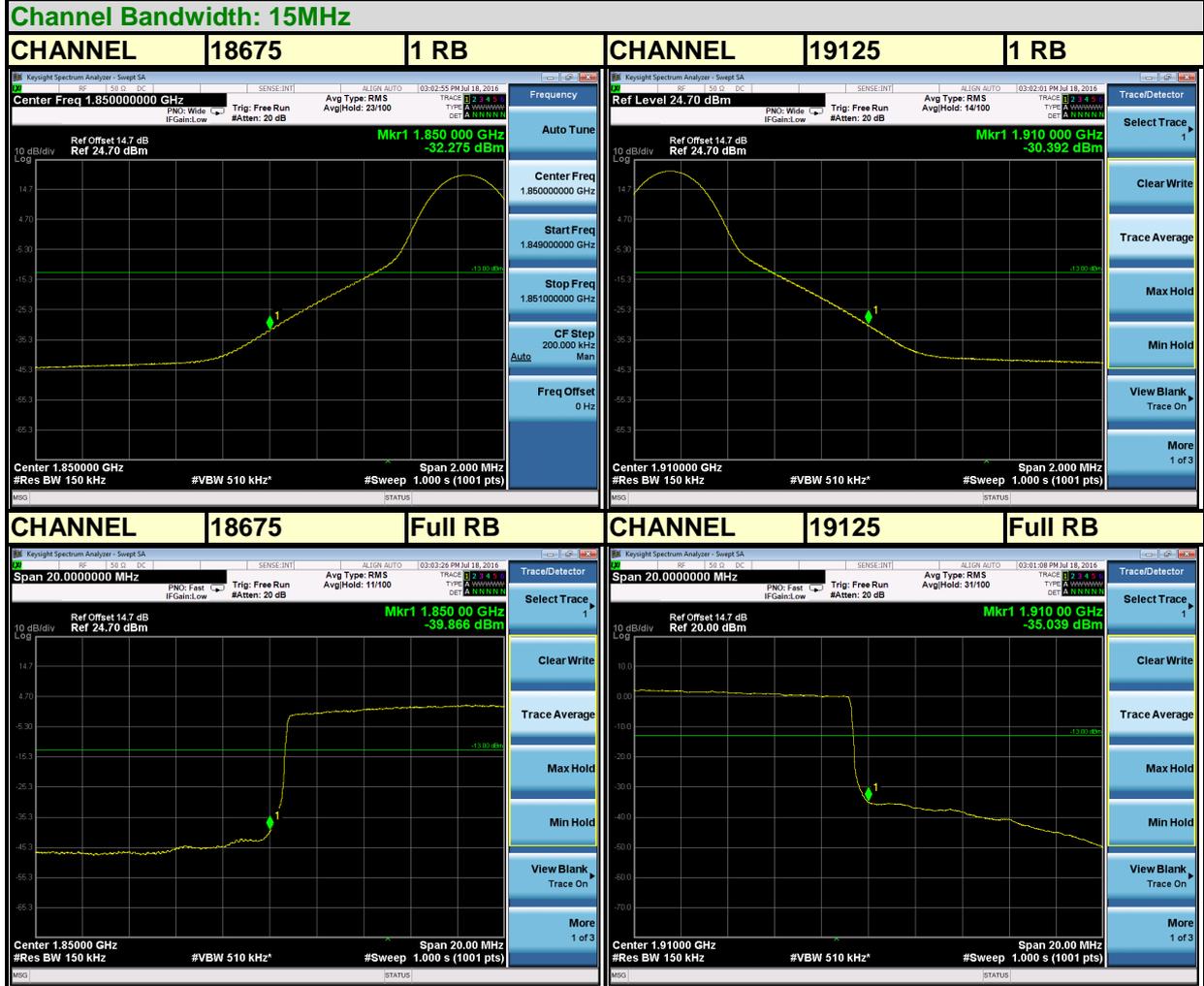
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## 4.5 CONDUCTED SPURIOUS EMISSIONS

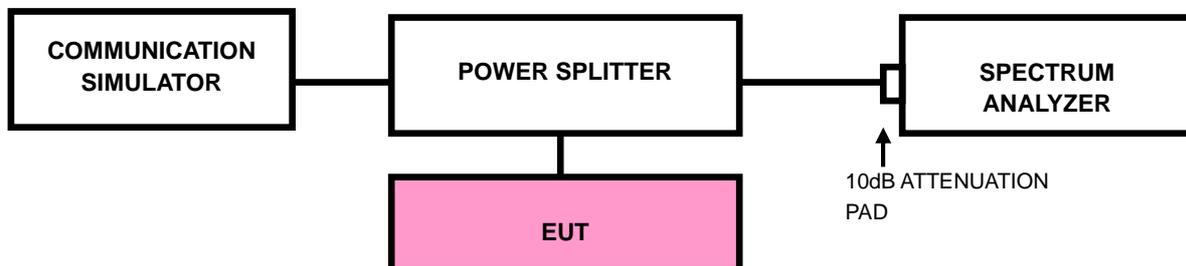
### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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  $-13\text{dBm}$ .

### 4.5.2 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 19.1GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 4.5.3 TEST SETUP

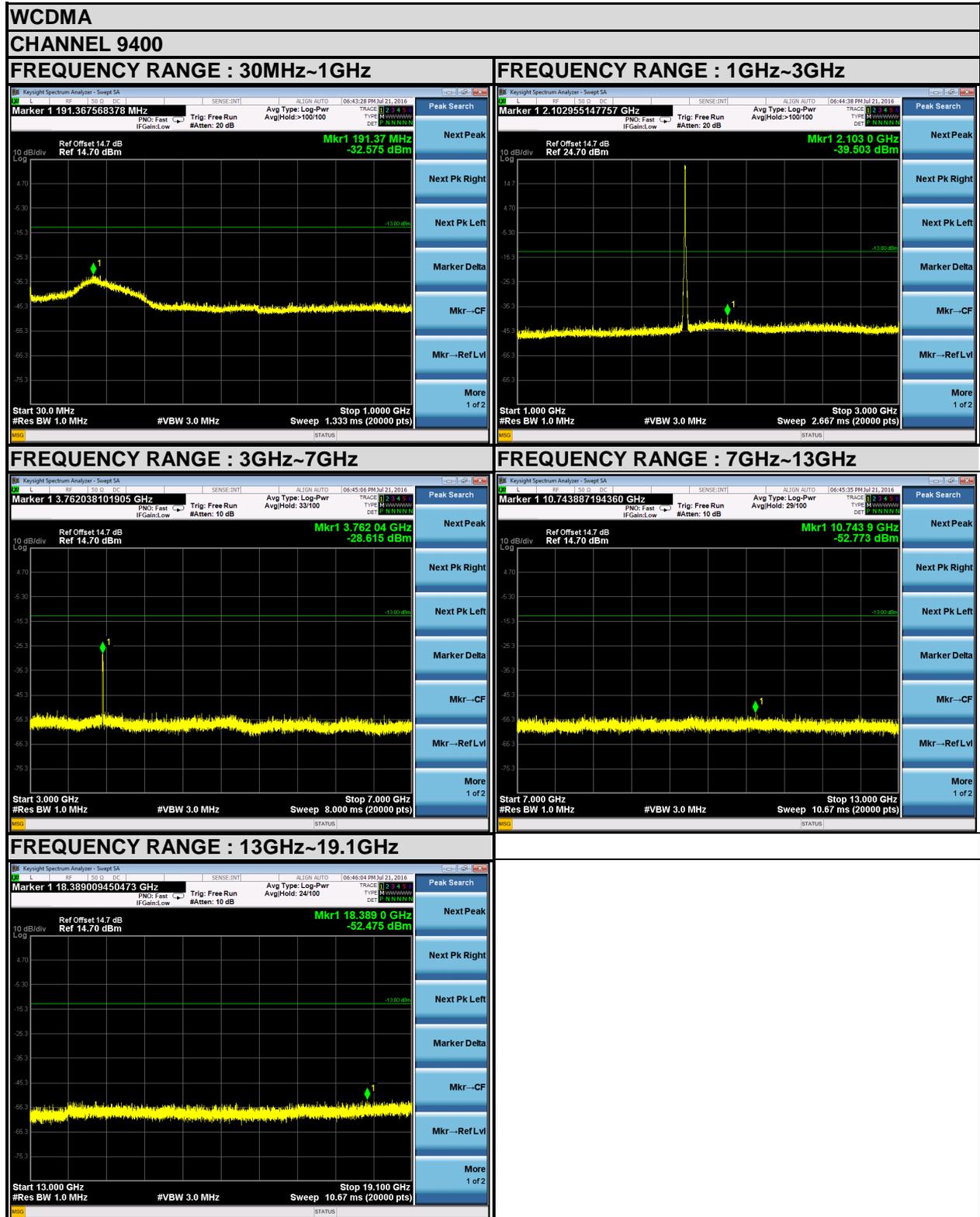




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### 4.5.4 TEST RESULTS



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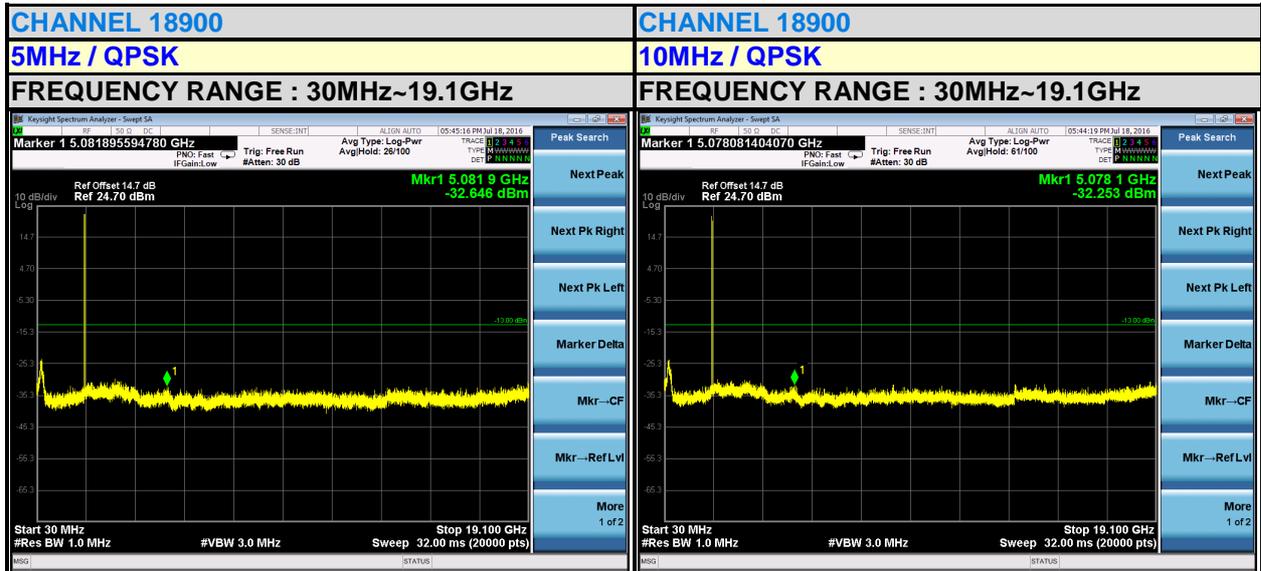
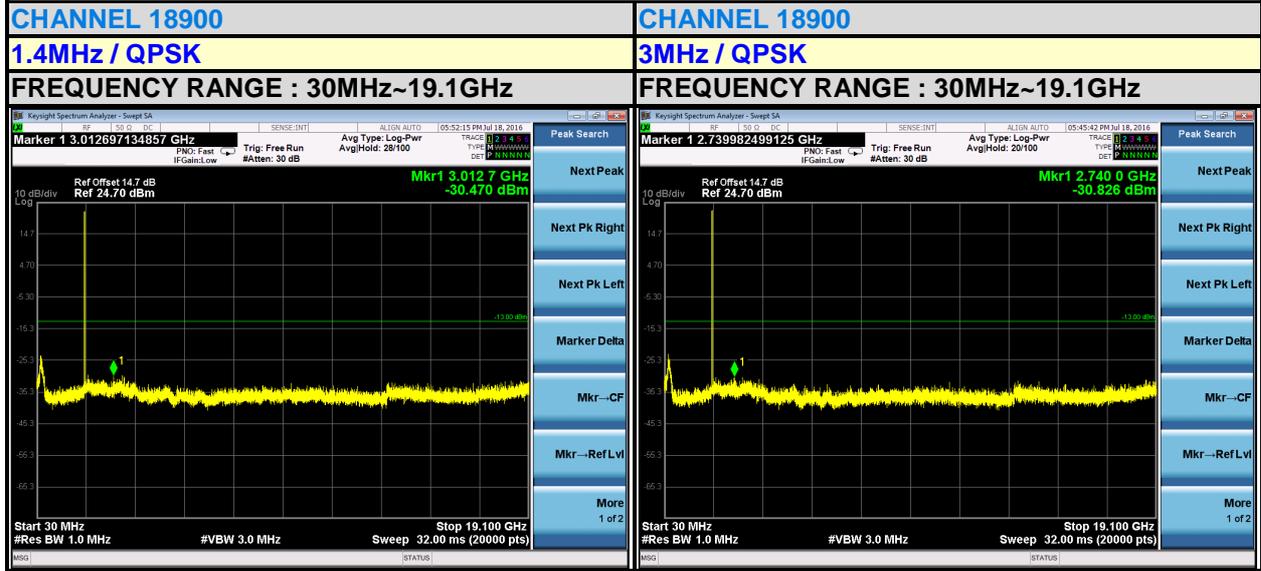
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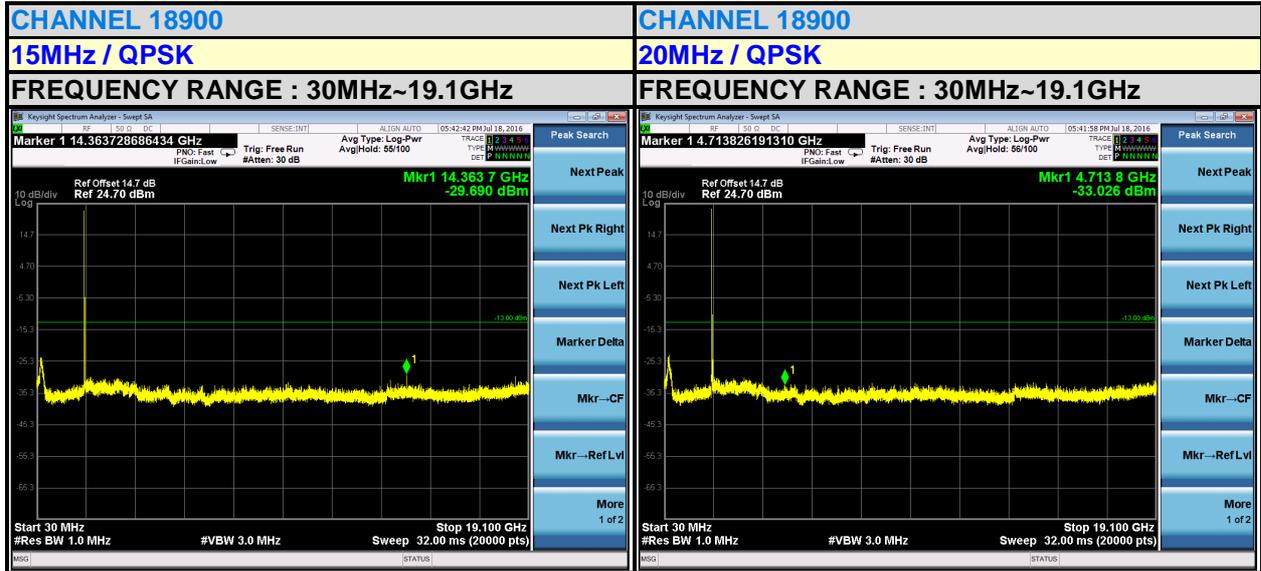
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## 4.6 RADIATED EMISSION MEASUREMENT

### 4.6.1 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 equal to  $-13\text{dBm}$ .

### 4.6.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m 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.  $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .

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

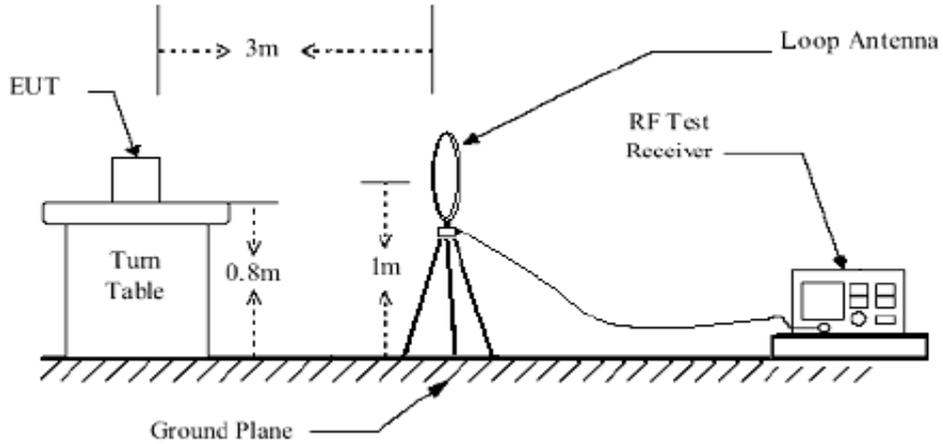
### 4.6.3 DEVIATION FROM TEST STANDARD

No deviation

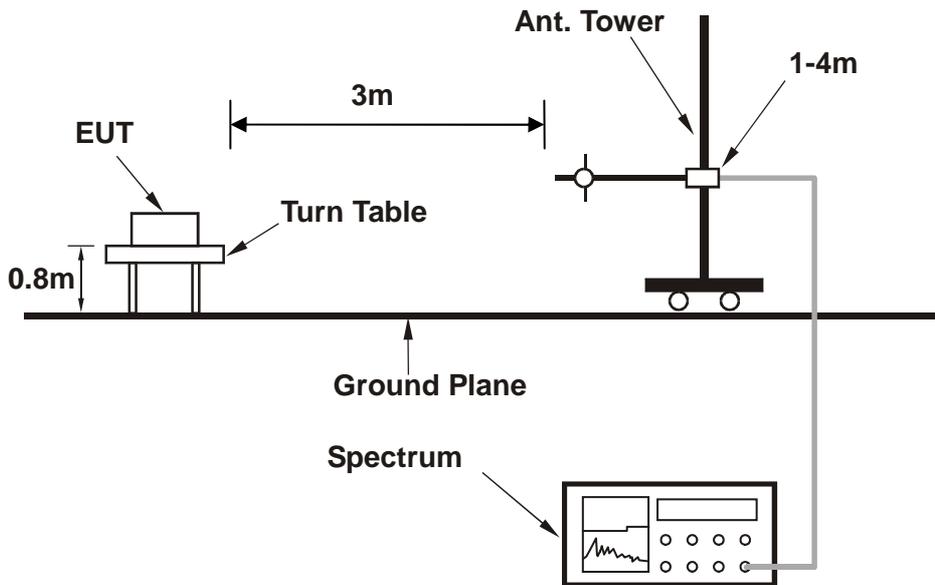


### 4.6.4 TEST SETUP

#### <Below 30MHz>



#### <Above 30MHz>



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



**4.6.5 TEST RESULTS**

**BELOW 1GHz WORST-CASE DATA**

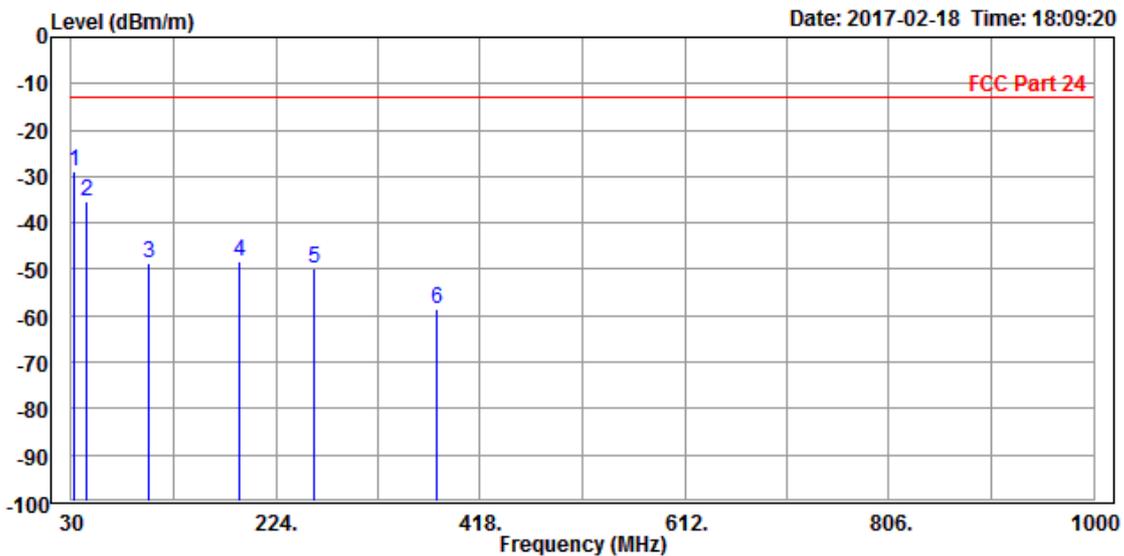
**9 KHz – 30 KHz data:** the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

**30 MHz – 1GHz data:**

**LTE Band 2:**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Below 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase	
	MHz	dBm/m	dBm	dBm/m	dB	dB/m			
1	PP	32.910	-28.96	-44.30	-13.00	-15.96	15.34	Peak	Horizontal
2		43.580	-35.31	-44.25	-13.00	-22.31	8.94	Peak	Horizontal
3		103.720	-48.70	-36.77	-13.00	-35.70	-11.93	Peak	Horizontal
4		189.080	-48.14	-30.62	-13.00	-35.14	-17.52	Peak	Horizontal
5		259.890	-49.85	-34.06	-13.00	-36.85	-15.79	Peak	Horizontal
6		376.290	-58.41	-47.16	-13.00	-45.41	-11.25	Peak	Horizontal



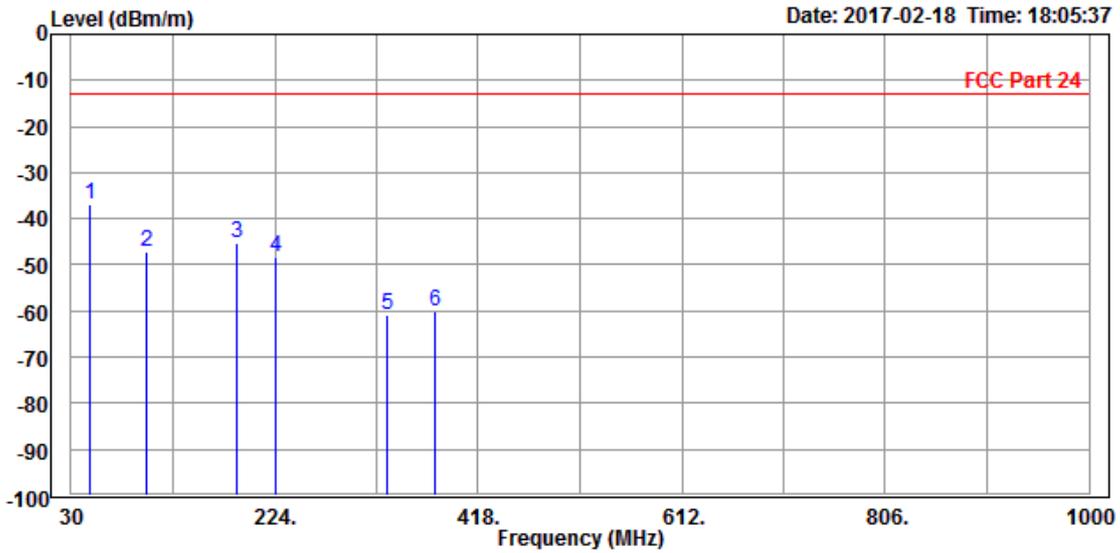


BUREAU VERITAS

Test Report No.: RF170123W004-3

MODE	TX channel 18900	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Read	Limit	Over					
Freq	Level	Level	Line	Limit	Factor	Remark	Pol/Phase	
MHz	dBm/m	dBm	dBm/m	dB	dB/m			
1 PP 48.430	-37.06	-32.83	-13.00	-24.06	-4.23	Peak	Vertical	
2 101.780	-47.28	-36.37	-13.00	-34.28	-10.91	Peak	Vertical	
3 188.110	-45.41	-33.27	-13.00	-32.41	-12.14	Peak	Vertical	
4 224.970	-48.45	-37.37	-13.00	-35.45	-11.08	Peak	Vertical	
5 330.700	-60.93	-49.75	-13.00	-47.93	-11.18	Peak	Vertical	
6 377.260	-60.17	-49.15	-13.00	-47.17	-11.02	Peak	Vertical	





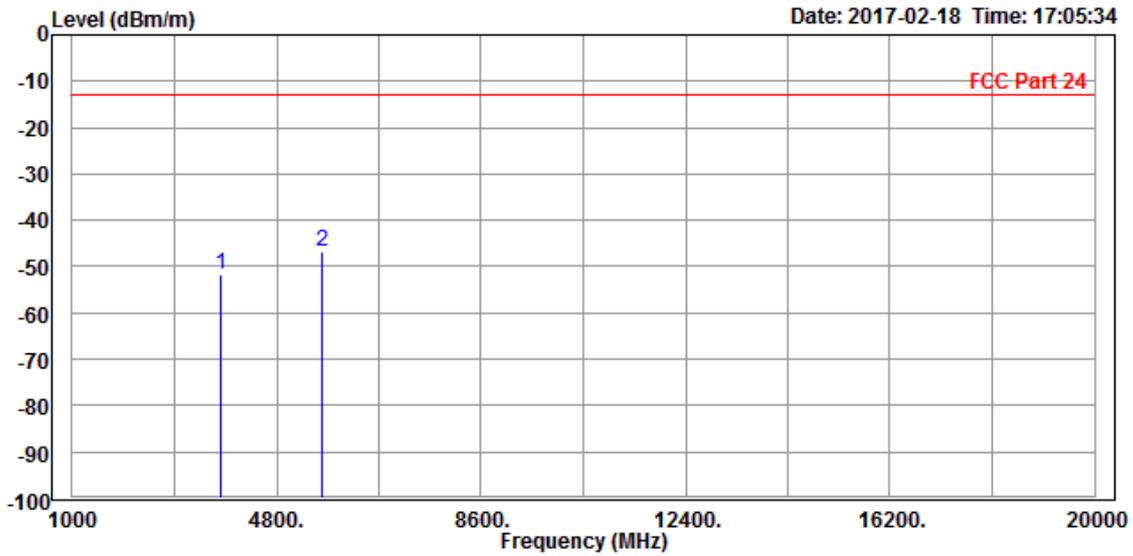
ABOVE 1GHz DATA

Note: For higher frequency, the emission is too low to be detected.

WCDMA Band II:

MODE	TX channel 9400	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-51.60	-54.99	-13.00	-38.60	3.39	Peak	Horizontal
2 PP	5640.000	-46.94	-56.06	-13.00	-33.94	9.12	Peak	Horizontal



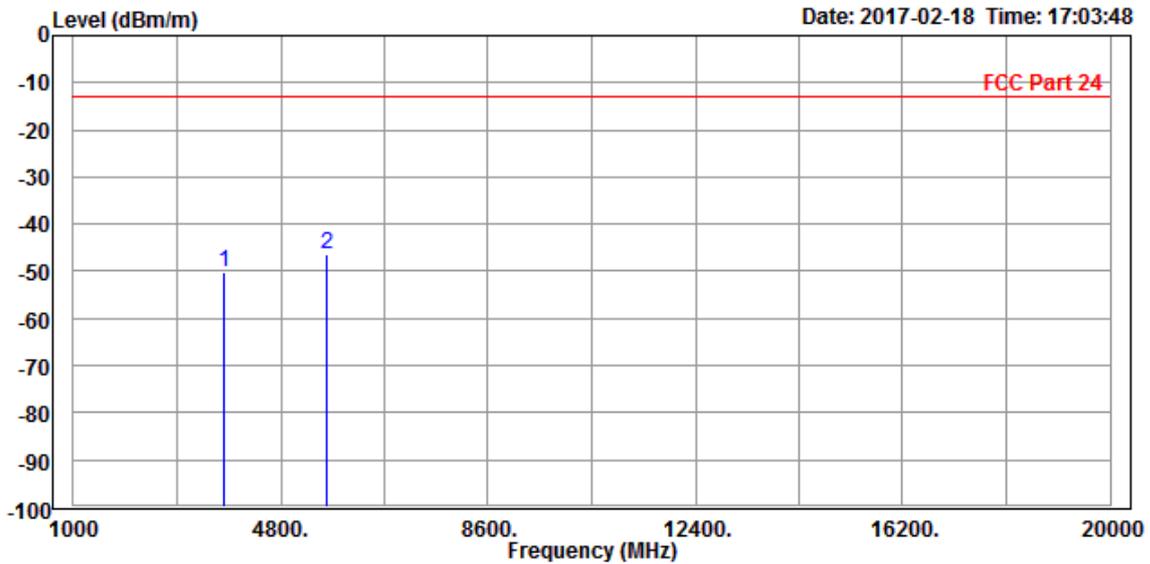


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**Test Report No.: RF170123W004-3**

<b>MODE</b>	TX channel 9400	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.14	-53.99	-13.00	-37.14	3.85	Peak	Vertical
2 PP	5640.000	-46.21	-54.47	-13.00	-33.21	8.26	Peak	Vertical





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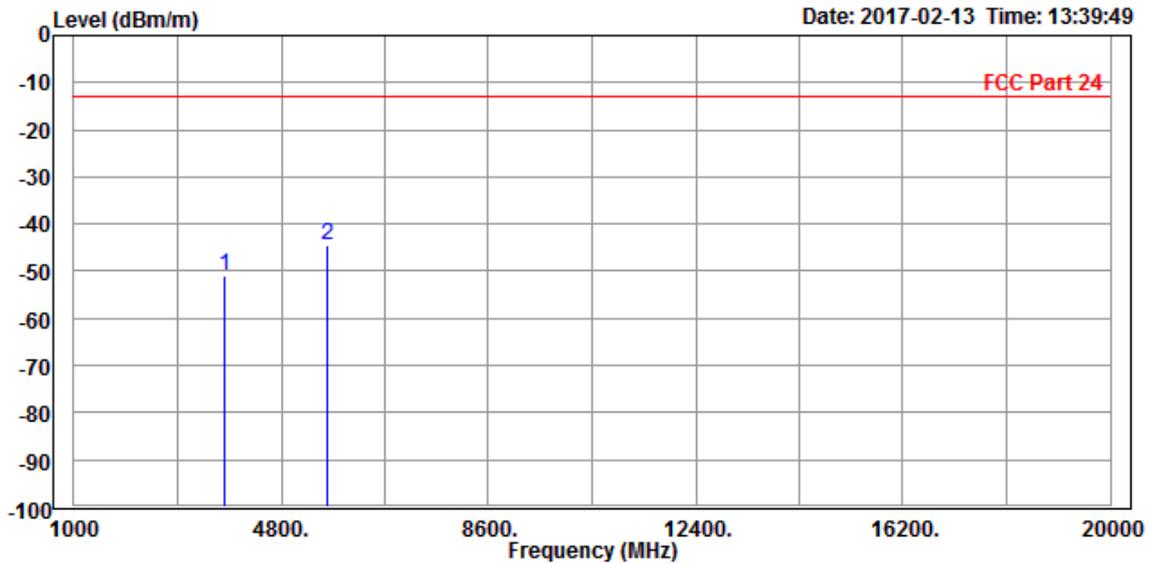
Test Report No.: RF170123W004-3

LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.92	-54.31	-13.00	-37.92	3.39	Peak	Horizontal
2 PP	5640.000	-44.54	-53.66	-13.00	-31.54	9.12	Peak	Horizontal



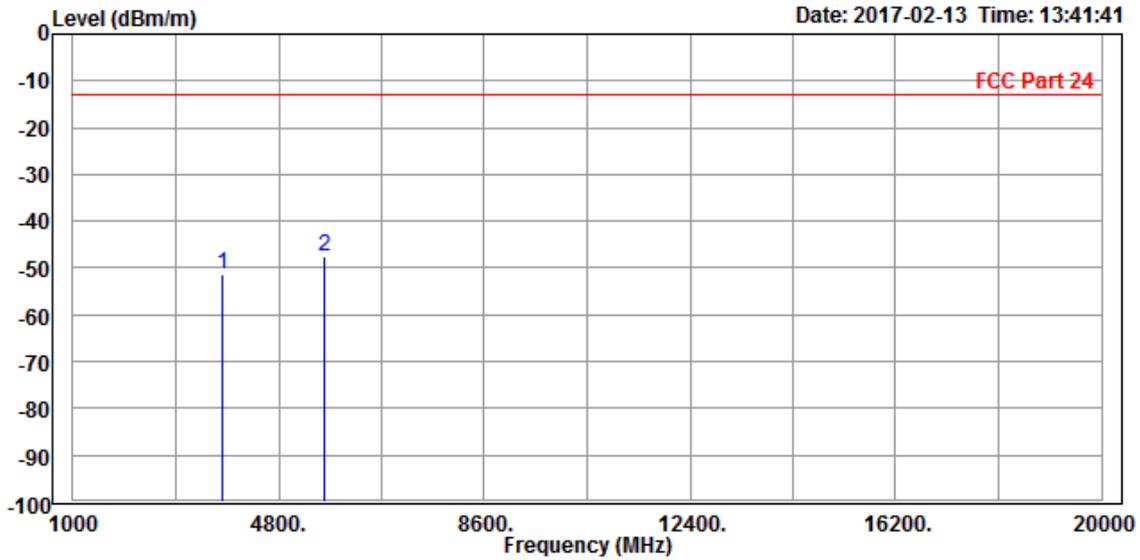


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**Test Report No.: RF170123W004-3**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-51.16	-55.01	-13.00	-38.16	3.85	Peak	Vertical
2 PP	5640.000	-47.44	-55.70	-13.00	-34.44	8.26	Peak	Vertical





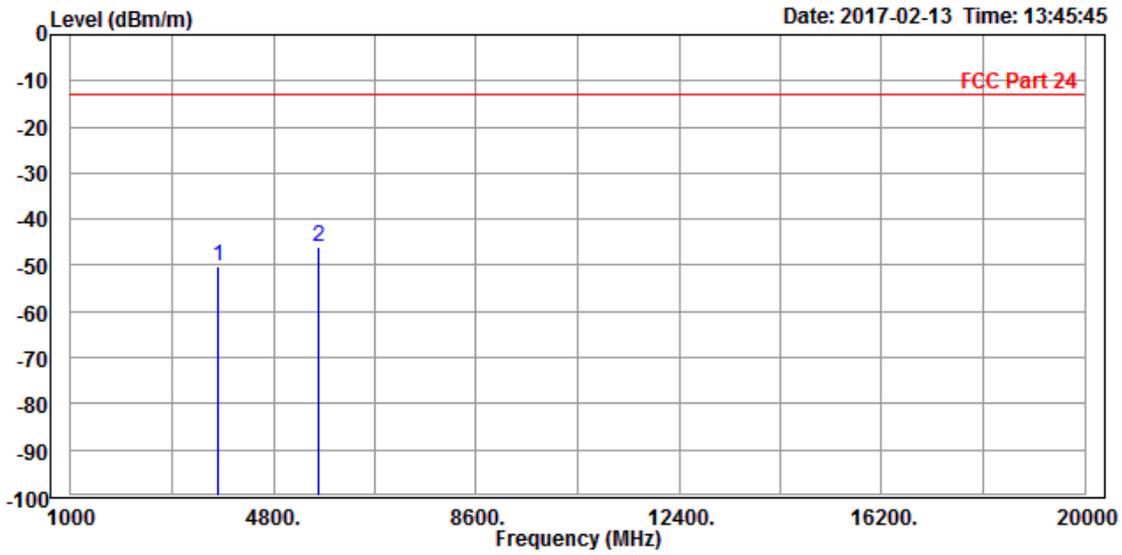
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Test Report No.: RF170123W004-3

CHANNEL BANDWIDTH: 3MHz / QPSK

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.29	-53.68	-13.00	-37.29	3.39	Peak	Horizontal
2 PP	5640.000	-45.89	-55.01	-13.00	-32.89	9.12	Peak	Horizontal



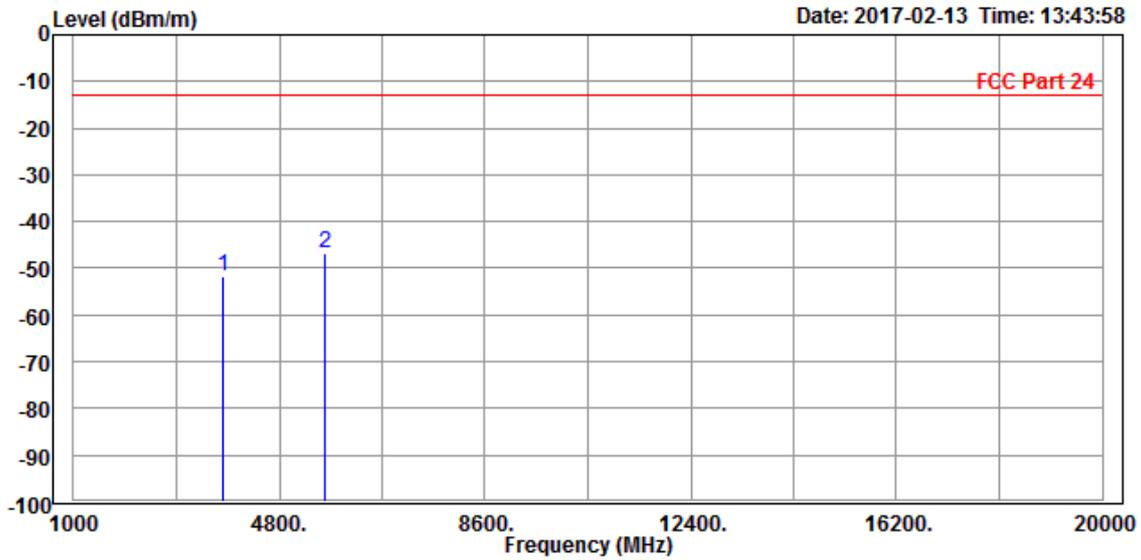


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VERITAS**

**Test Report No.: RF170123W004-3**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-51.64	-55.49	-13.00	-38.64	3.85	Peak	Vertical
2 PP	5640.000	-46.70	-54.96	-13.00	-33.70	8.26	Peak	Vertical





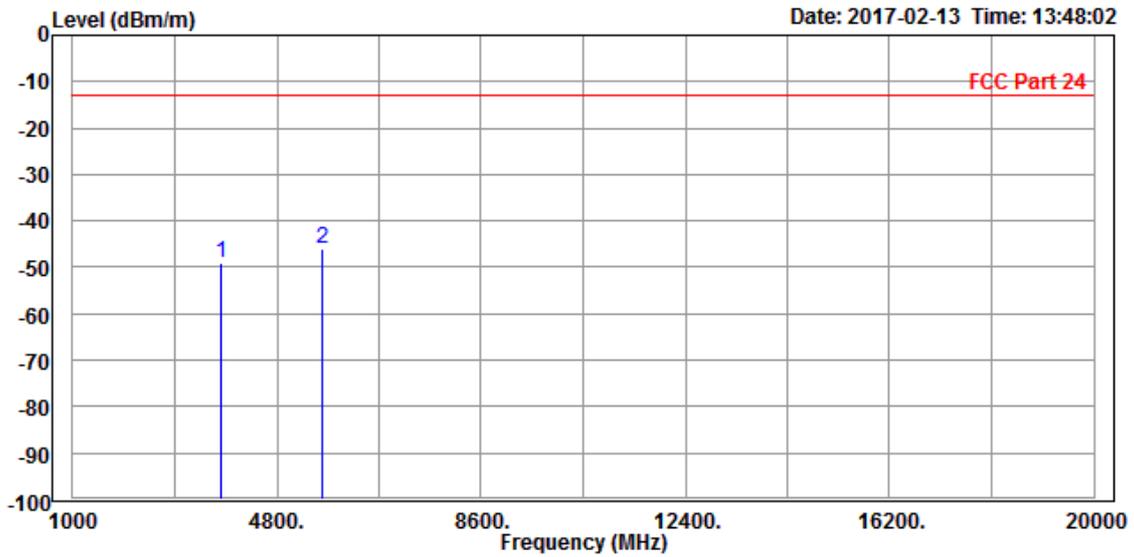
**BUREAU  
VERITAS**

Test Report No.: RF170123W004-3

**CHANNEL BANDWIDTH: 5MHz / QPSK**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-48.99	-52.38	-13.00	-35.99	3.39	Peak	Horizontal
2 PP	5640.000	-46.16	-55.28	-13.00	-33.16	9.12	Peak	Horizontal



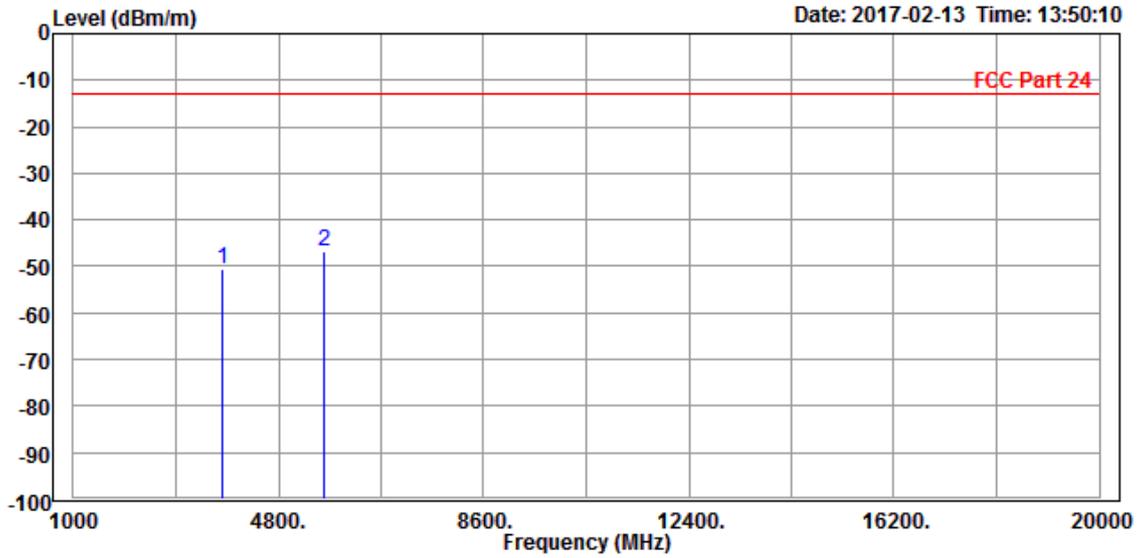


BUREAU VERITAS

Test Report No.: RF170123W004-3

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.46	-54.31	-13.00	-37.46	3.85	Peak	Vertical
2 PP	5640.000	-46.87	-55.13	-13.00	-33.87	8.26	Peak	Vertical





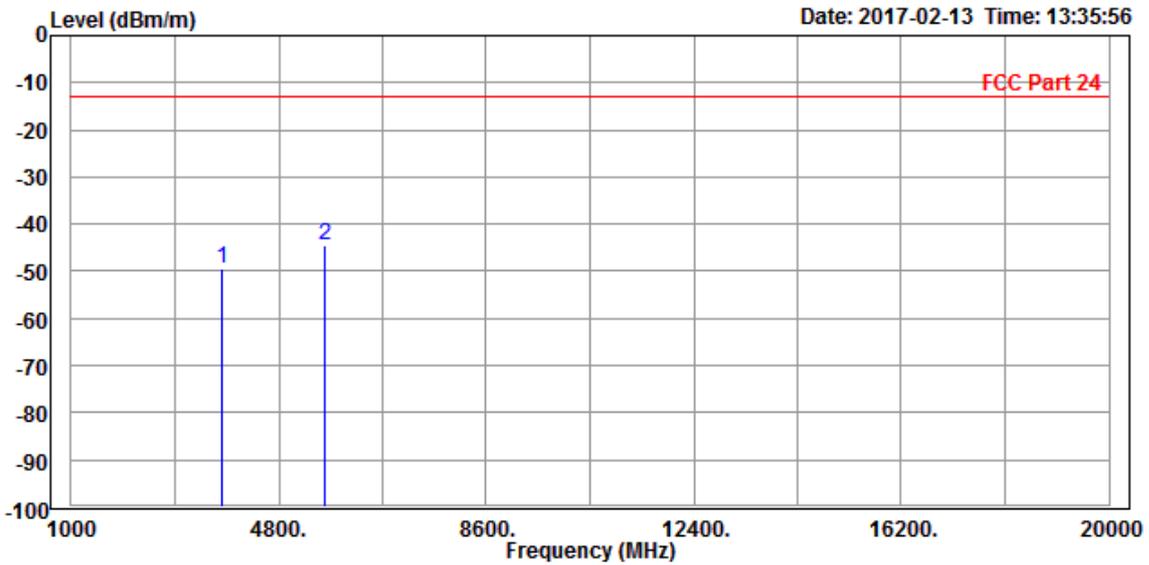
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Test Report No.: RF170123W004-3

CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-49.51	-52.90	-13.00	-36.51	3.39	Peak	Horizontal
2	PP 5640.000	-44.65	-53.77	-13.00	-31.65	9.12	Peak	Horizontal



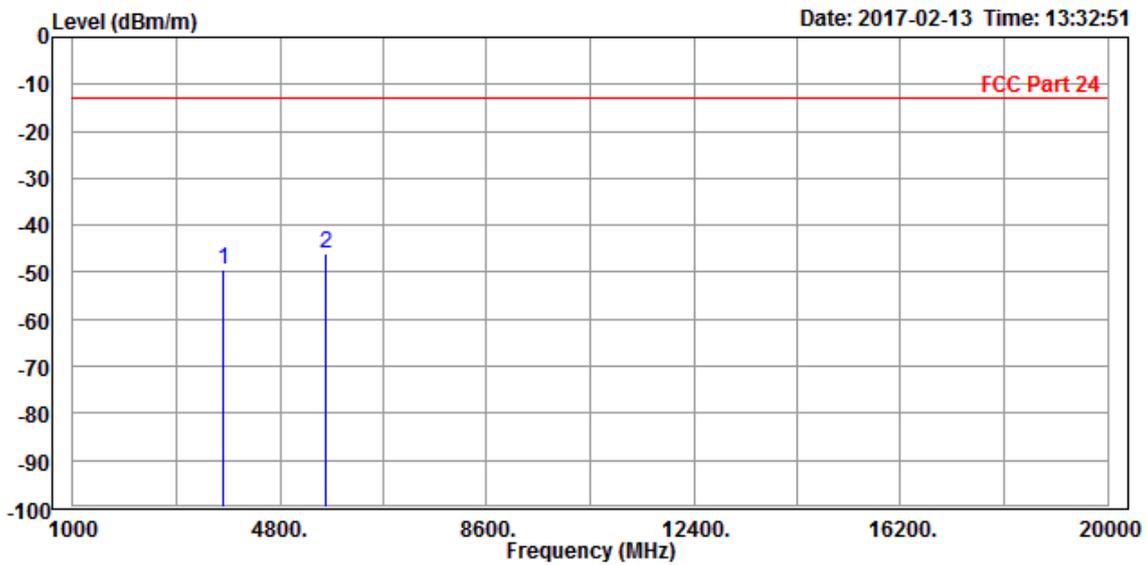


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VERITAS**

**Test Report No.: RF170123W004-3**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-49.48	-53.33	-13.00	-36.48	3.85	Peak	Vertical
2 PP	5640.000	-45.97	-54.23	-13.00	-32.97	8.26	Peak	Vertical





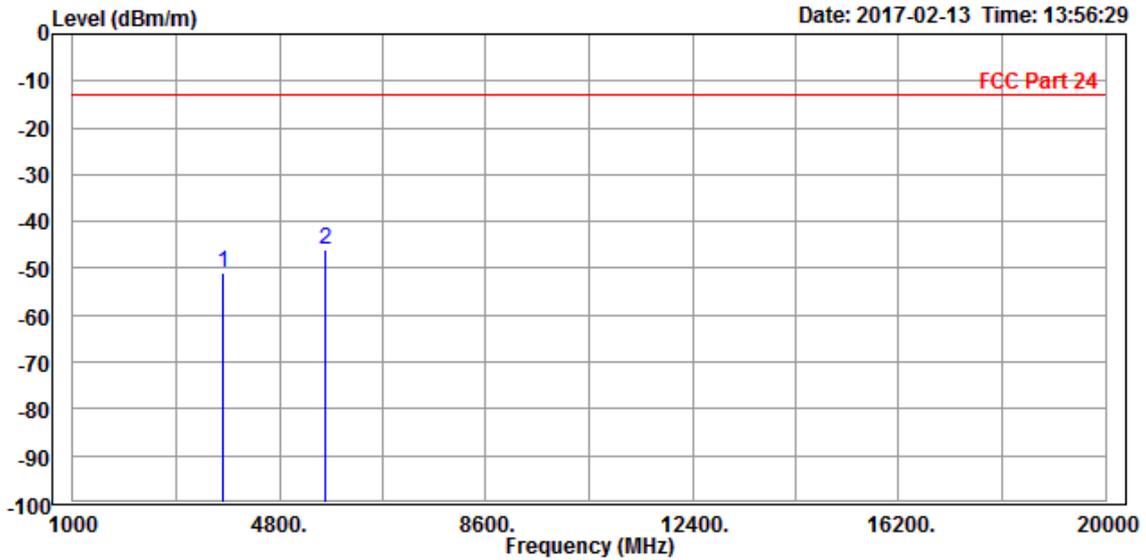
BUREAU VERITAS

Test Report No.: RF170123W004-3

CHANNEL BANDWIDTH: 15MHz / QPSK

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.91	-54.30	-13.00	-37.91	3.39	Peak	Horizontal
2 PP	5640.000	-46.05	-55.17	-13.00	-33.05	9.12	Peak	Horizontal



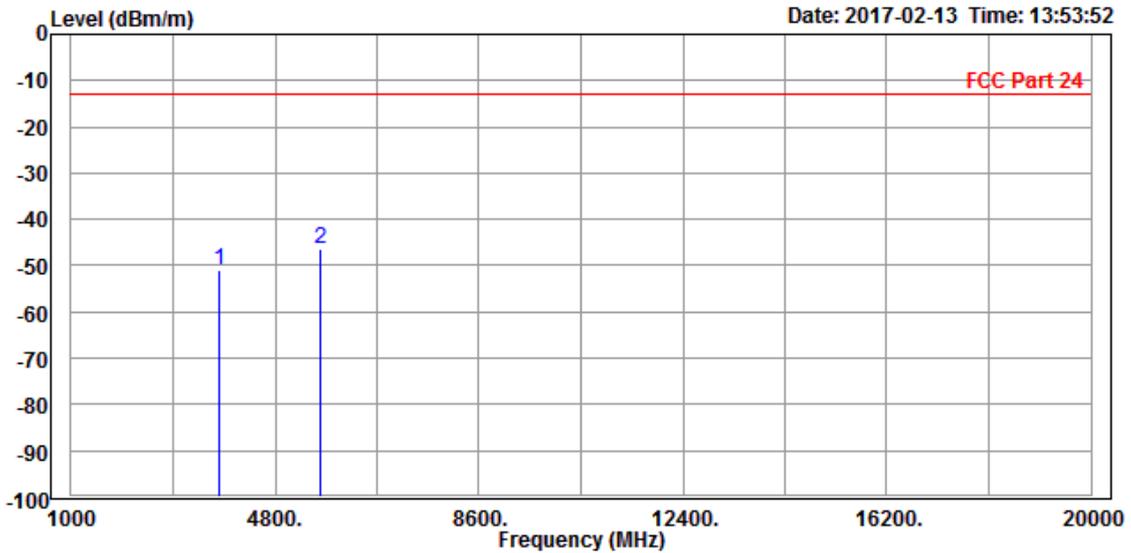


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**Test Report No.: RF170123W004-3**

<b>MODE</b>	TX channel 18900	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 56%RH	<b>INPUT POWER</b>	DC 12V from adapter
<b>TESTED BY</b>	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.86	-54.71	-13.00	-37.86	3.85	Peak	Vertical
2 PP	5640.000	-46.29	-54.55	-13.00	-33.29	8.26	Peak	Vertical





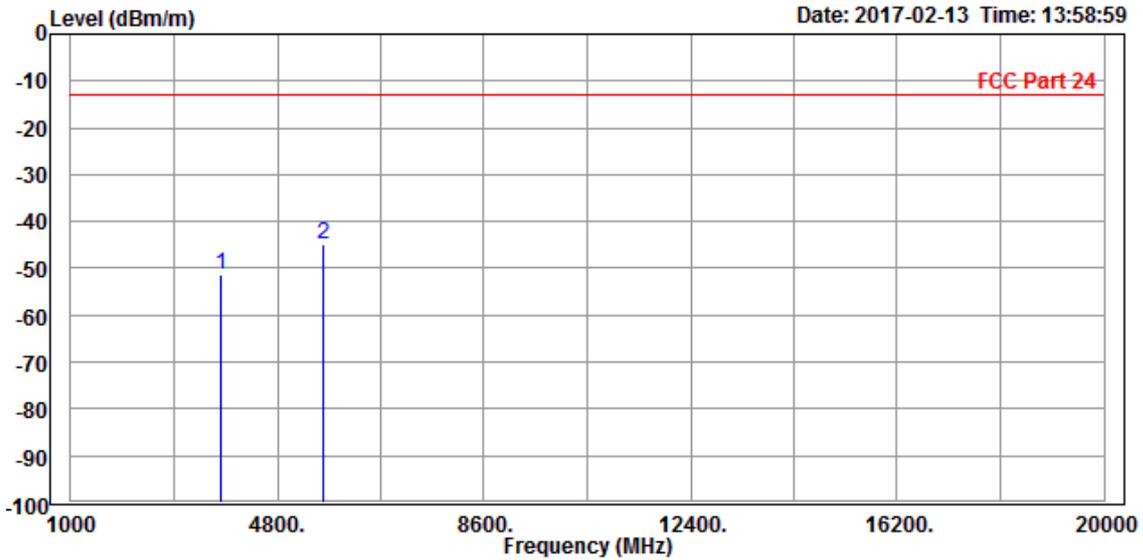
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Test Report No.: RF170123W004-3

CHANNEL BANDWIDTH: 20MHz / QPSK

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-51.48	-54.87	-13.00	-38.48	3.39	Peak	Horizontal
2	PP 5640.000	-44.92	-54.04	-13.00	-31.92	9.12	Peak	Horizontal



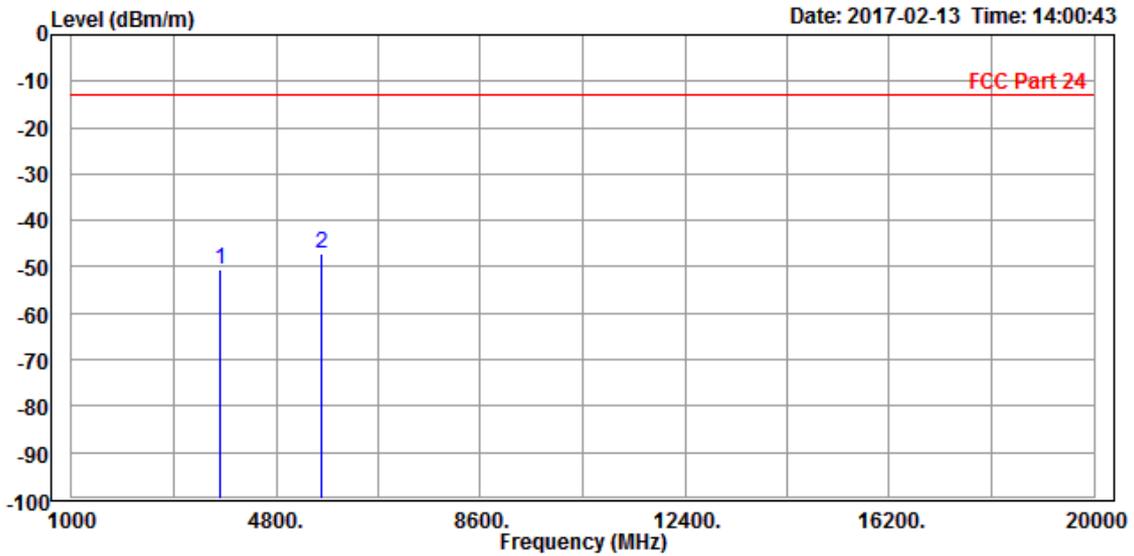


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Test Report No.: RF170123W004-3

MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 56%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Tony Zou		
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-50.74	-54.59	-13.00	-37.74	3.85	Peak	Vertical
2 PP	5640.000	-47.10	-55.36	-13.00	-34.10	8.26	Peak	Vertical

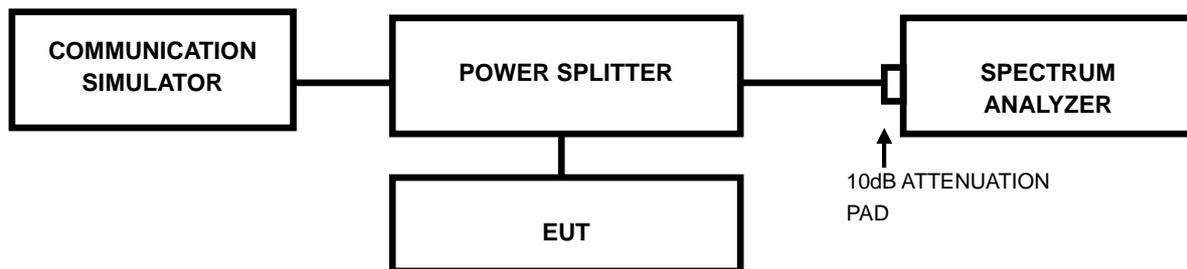


## 4.7 PEAK TO AVERAGE RATIO

### 4.7.1 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

### 4.7.2 TEST SETUP



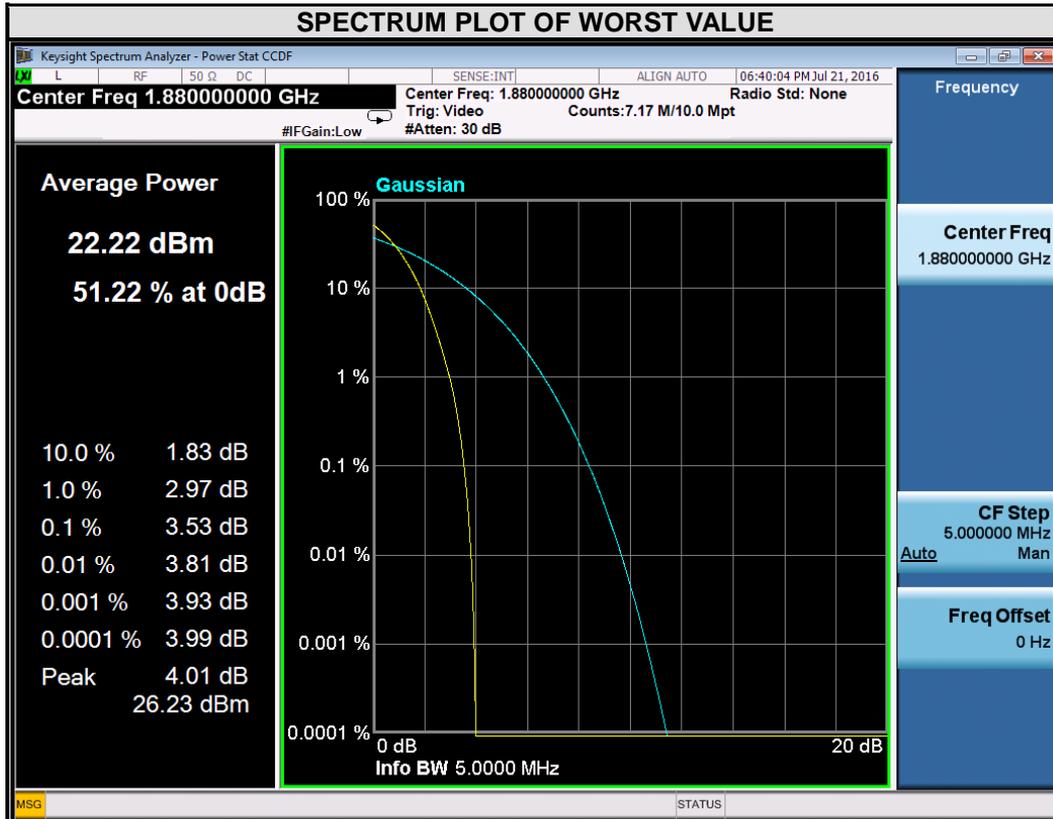
### 4.7.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth  $\geq$  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%.

#### 4.7.4 TEST RESULTS

##### WCDMA

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
9400	1880	3.53



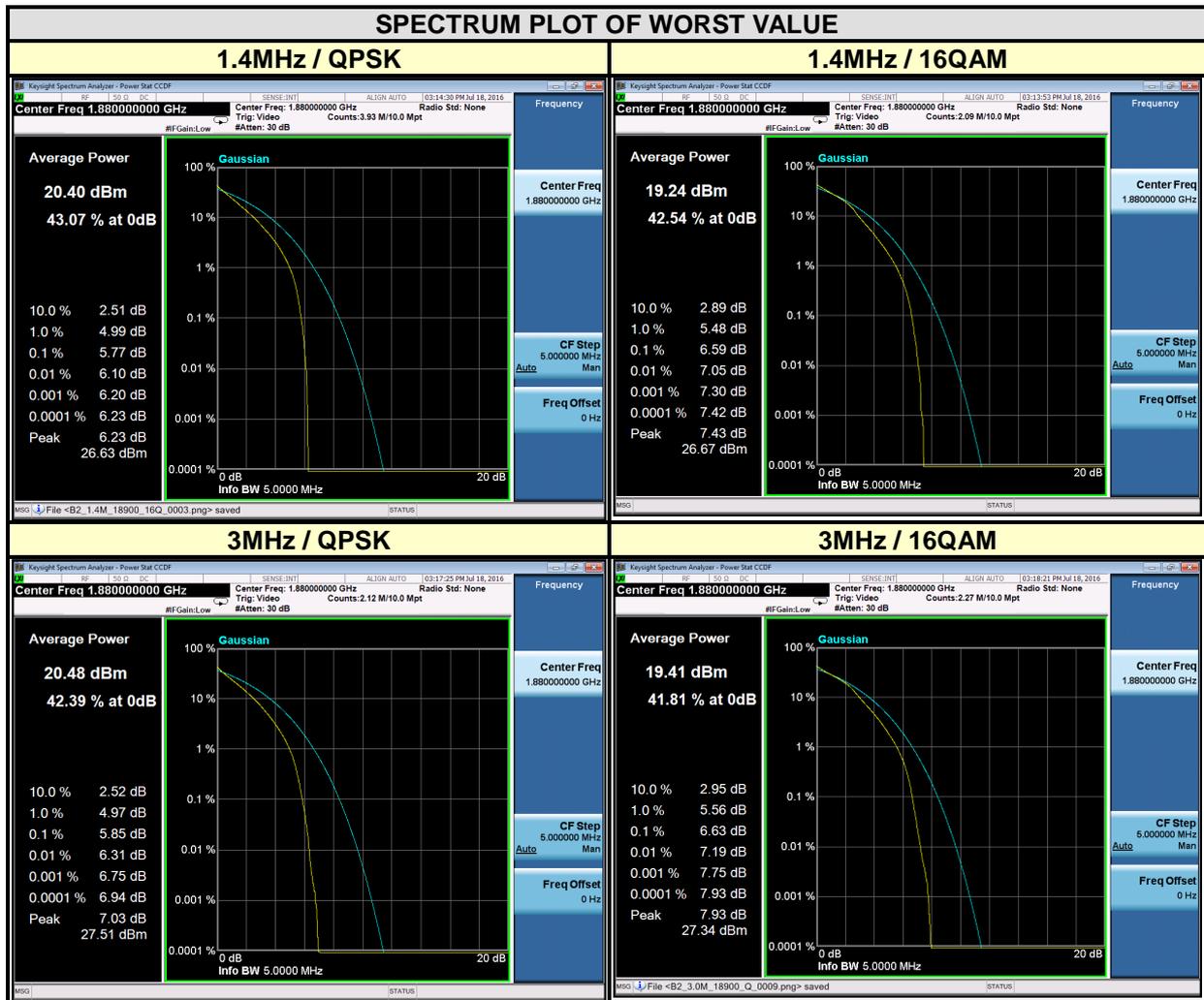


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Test Report No.: RF170123W004-3

**LTE BAND 2**

CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	5..68	6.49	18615	1851.5	5.75	6.50
18900	1880	5.77	6.59	18900	1880	5.85	6.63
19193	1909.3	5.56	6.39	19185	1908.5	5.67	6.48



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**Test Report No.: RF170123W004-3**

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	5.56	6.31	18650	1855	5.52	6.32
18900	1880	5.71	6.50	18900	1880	5.89	6.65
19175	1907.5	5.57	6.39	19150	1905	5.70	6.47



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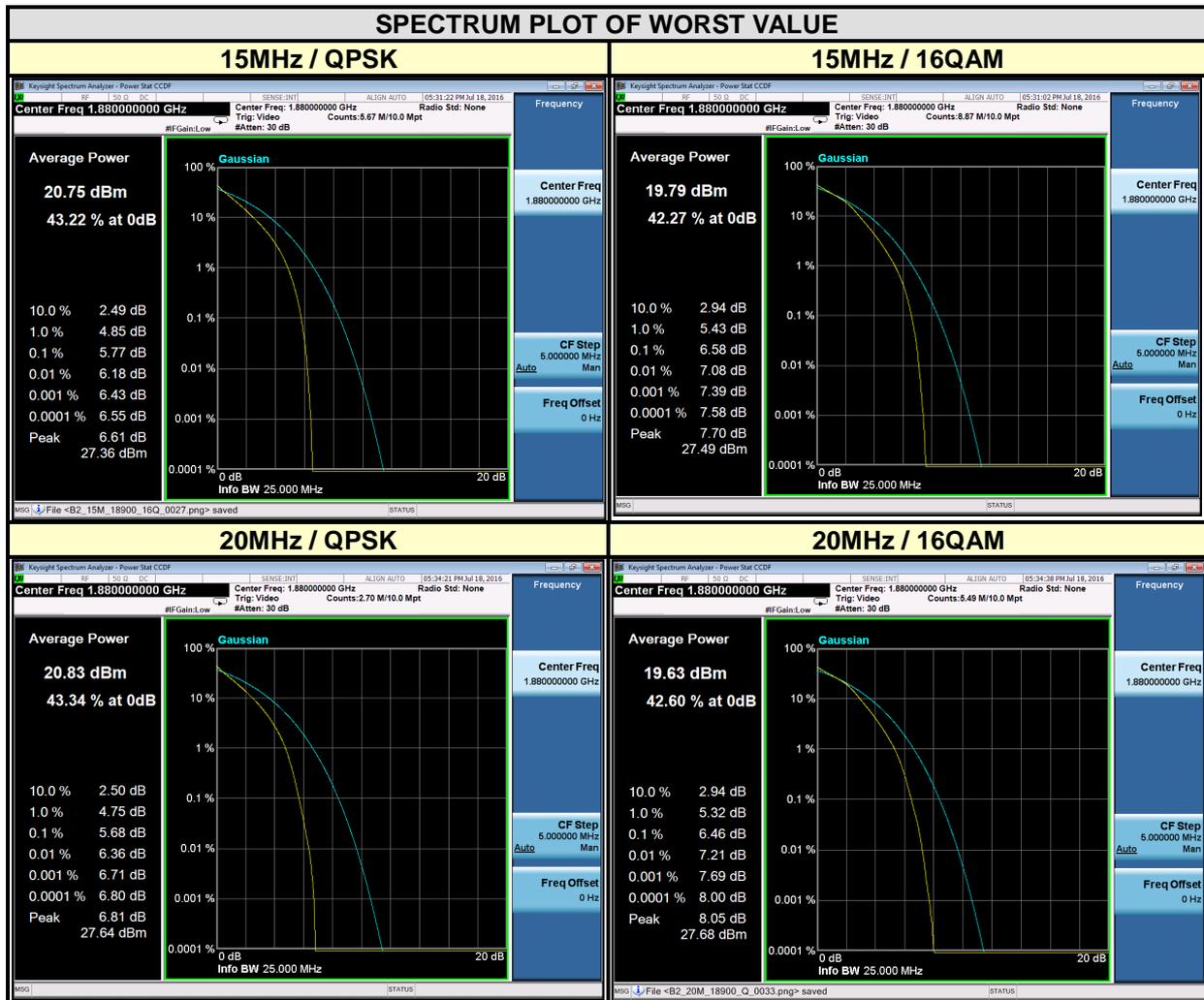
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Test Report No.: RF170123W004-3

CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	5.24	6.10	18700	1860	5.12	5.99
18900	1880	5.77	6.58	18900	1880	5.68	6.46
19125	1902.5	5.54	6.37	19100	1900	5.39	6.23



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## 5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch, were founded in 2002 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

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Tel: +86-769-85935656

Fax: +86-769-85931080

**Email:** [customerservice.dg@cn.bureauveritas.com](mailto:customerservice.dg@cn.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



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Test Report No.: RF170123W004-3

## **6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**