Test Lab
Cert 2951.01

FCC TEST REPORT

(PART 24)

Product: smartphone

Model Name: Ilium L1120

FCC ID: ZC4L1120

Applicant: Corporativo Lanix S.A. de C.V.

Address: Carretera Internacional Hermosillo-Nogales Km 8.5, Hermosillo Sonora, Mexico

Manufacturer: Shenzhen Tinno Mobile Technology Corp.

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Report No.: RF170324W002-4

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Issued Date: Apr. 14, 2017

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF170324W002-4	Original release	Apr. 14, 2017

1 CERTIFICATION

PRODUCT:	smartphone
BRAND NAME:	LANIX
MODEL NAME:	Ilium L1120
APPLICANT:	Corporativo Lanix S.A. de C.V.
TESTED:	Mar. 25, 2017 ~ Apr. 13, 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 : _____ , **DATE:** Apr. 14, 2017
(Harry Li/ Engineer)

APPROVED BY : _____ , **DATE:** Apr. 14, 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 -3.32dB at 3812MHz.

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	Mar. 05,17	Mar. 04,18
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Nov. 04,16	Nov. 03,17
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Mar. 05,17	Mar. 04,18
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. 02,17	Mar. 01,18
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	Mar. 02,17	Mar. 01,18
Amplifier	Burgeon	BPA-530	100220	Mar. 05,17	Mar. 04,18
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

PRODUCT	smartphone	
BRAND NAME	LANIX	
MODEL NAME	Ilium L1120	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.85Vdc (Li-ion, battery)	
MODULATION TYPE	**GSM, GPRS:** GMSK **EDGE:** GMSK, 8PSK **WCDMA :** BPSK **LTE Band 2:** QPSK, 16QAM	
FREQUENCY RANGE	**GSM, GPRS, EDGE:** 1850.2MHz ~ 1909.8MHz	
	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
MAX. EIRP POWER	**GSM**	863mW
	EDGE	110mW
	WCDMA	207mW
	LTE Band 2 Channel Bandwidth: 1.4MHz	362mW
	LTE Band 2 Channel Bandwidth: 3MHz	357mW
	LTE Band 2 Channel Bandwidth: 5MHz	361mW
	LTE Band 2 Channel Bandwidth: 10MHz	366mW
	LTE Band 2 Channel Bandwidth: 15MHz	361mW
	LTE Band 2 Channel Bandwidth: 20MHz	325mW

EMISSION DESIGNATOR	GSM	250KGXW
	EDGE	249KG7W
	WCDMA	4M23F9W
	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: 4M49G7D
		16QAM: 4M48W7D
	LTE Band 2 Channel Bandwidth: 10MHz	QPSK: 8M95G7D
		16QAM: 8M95W7D
	LTE Band 2 Channel Bandwidth: 15MHz	QPSK: 13M4G7D
		16QAM: 13M4W7D
	LTE Band 2 Channel Bandwidth: 20MHz	QPSK: 17M9G7D
		16QAM: 17M9W7D
ANTENNA TYPE	Fixed Internal antenna with 0.5dBi gain	
HW VERSION	V1	
SW VERSION	Ilium L1120_TELCEL_SW_01	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	USB cable: non-shielded, detachable, 1.0m Earphone cable: non-shielded, detachable, 1.0m	

NOTE:

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

ADAPTER	
BRAND:	Lanix
MODEL:	Ilium L1120-C
INPUT:	AC 100-240V, 250mA
OUTPUT:	DC 5V, 1550mA

3. The EUT matched the following USB cable and Earphone:

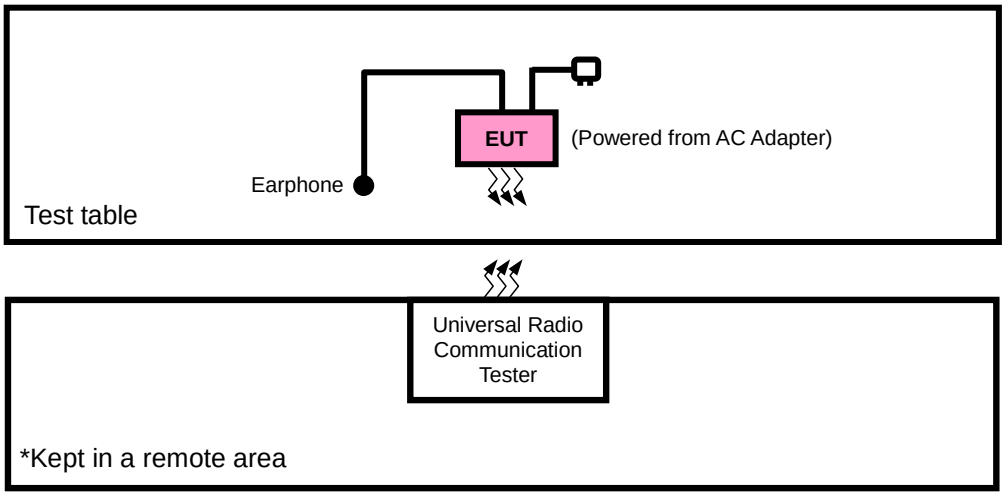
USB CABLE	
BRAND:	LANIX
MODEL:	Ilium L1120
SIGNAL LINE:	1.0 METER

EARPHONE	
BRAND:	LANIX
MODEL:	Ilium L1120
SIGNAL LINE:	1.0 METER

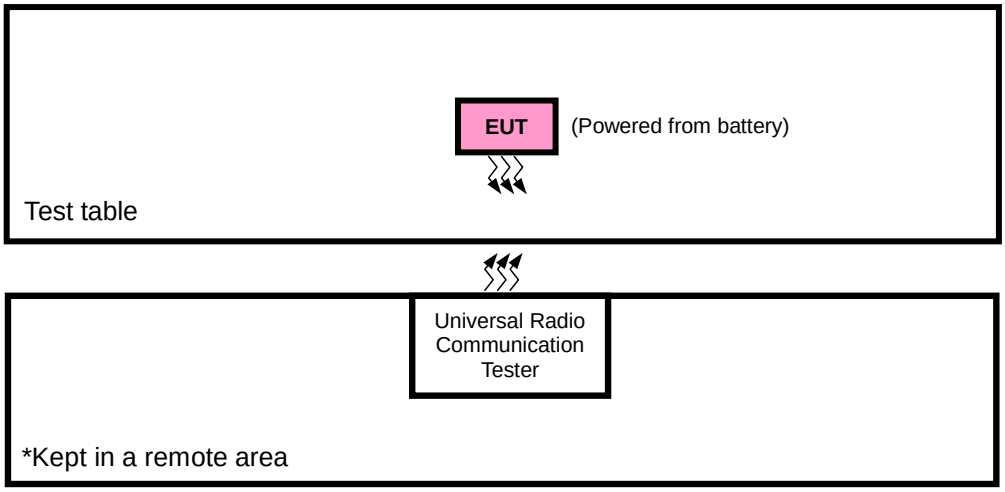
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

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 GSM/EDGE/WCDMA and Z-plane for LTE. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + Adapter + USB Cable + Earphone with GSM ,WCDMA or LTE link**
B	EUT + Battery with **GSM ,WCDMA or LTE link**

GSM MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
B	EIRP	512 to 810	512, 661, 810	GSM, EDGE
B	FREQUENCY STABILITY	512 to 810	512, 810	GSM, EDGE
B	OCCUPIED BANDWIDTH	512 to 810	512, 661, 810	GSM, EDGE
B	PEAK TO AVERAGE RATIO	512 to 810	661	GSM, EDGE
B	BAND EDGE	512 to 810	512, 810	GSM, EDGE
B	CONDCUDETED EMISSION	512 to 810	661	GSM, EDGE
A	RADIATED EMISSION	512 to 810	512, 661, 810	GSM, EDGE

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
B	EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
B	FREQUENCY STABILITY	9262 to 9538	9262, 9538	WCDMA
B	OCCUPIED BANDWIDTH	9262 to 9538	9262, 9400, 9538	WCDMA
B	PEAK TO AVERAGE RATIO	9262 to 9538	9400	WCDMA
B	BAND EDGE	9262 to 9538	9262, 9538	WCDMA
B	CONDCUDETED EMISSION	9262 to 9538	9400	WCDMA
A	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
B	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
B	FREQUENCY STABILITY	18607 to 19193	18607, 19193	1.4MHz	QPSK	1 RB / 0 RB Offset
		18615 to 19185	18615, 19185	3MHz	QPSK	1 RB / 0 RB Offset
		18625 to 19175	18625, 19175	5MHz	QPSK	1 RB / 0 RB Offset
		18650 to 19150	18650, 19150	10MHz	QPSK	1 RB / 0 RB Offset
		18675 to 19125	18675, 19125	15MHz	QPSK	1 RB / 0 RB Offset
		18700 to 19100	18700, 19100	20MHz	QPSK	1 RB / 0 RB Offset
B	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
B	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

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

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP	25deg. C, 57%RH	3.85Vdc from Battery	Wenliang Wu
FREQUENCY STABILITY	23deg. C, 61%RH	3.85Vdc from Battery	Wenliang Wu
OCCUPIED BANDWIDTH	23deg. C, 61%RH	3.85Vdc from Battery	Wenliang Wu
PEAK TO AVERAGE RATIO	23deg. C, 61%RH	3.85Vdc from Battery	Moon Xiong
BAND EDGE	23deg. C, 61%RH	3.85Vdc from Battery	Moon Xiong
CONDCUDETED EMISSION	23deg. C, 61%RH	3.85Vdc from Battery	Moon Xiong
RADIATED EMISSION	23deg. C, 60%RH	5Vdc 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 1MHz for GSM & GPRS & EDGE, 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

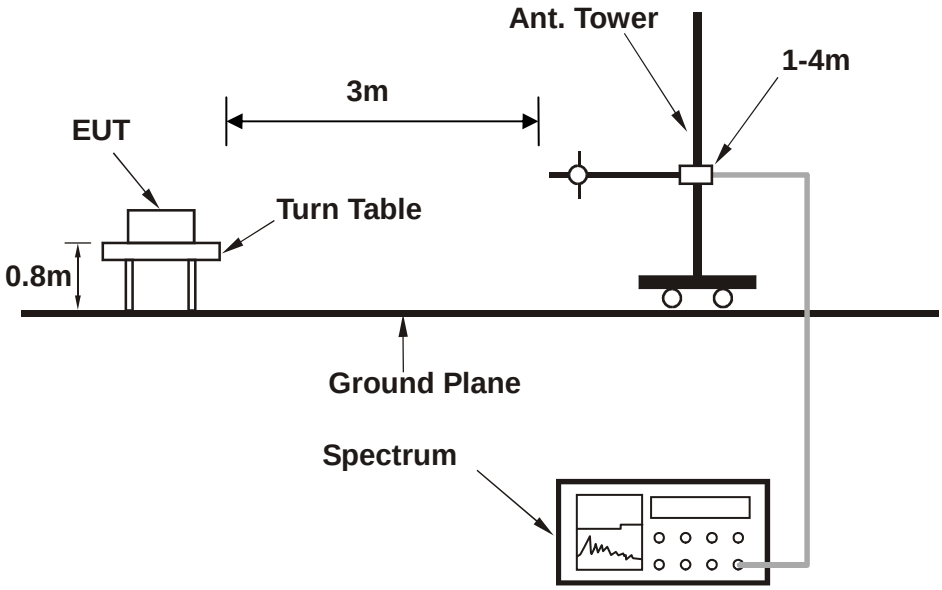
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM, GPRS, EDGE & WCDMA 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.

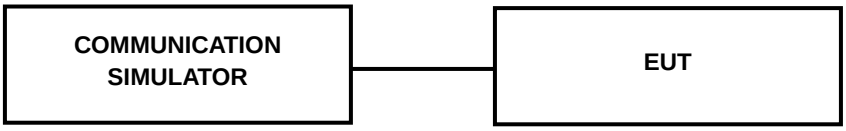
4.1.3 TEST SETUP

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

CONDUCTED OUTPUT POWER (dBm)

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GSM	**29.46**	29.32	29.40
GPRS 8	29.45	29.31	29.39
GPRS 10	28.35	28.21	28.29
GPRS 11	26.29	26.15	26.23
GPRS 12	25.34	25.20	25.28
EDGE 8 (MCS9)	26.87	26.73	26.81
EDGE 10 (MCS9)	24.98	24.84	24.92
EDGE 11 (MCS9)	22.75	22.61	22.69
EDGE 12 (MCS9)	21.56	21.42	21.50

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	21.85	**21.96**	21.89
HSPA			
HSDPA Subtest-1	20.84	20.95	20.88
HSDPA Subtest-2	20.82	20.93	20.86
HSDPA Subtest-3	20.35	20.46	20.39
HSDPA Subtest-4	20.27	20.38	20.31
HSUPA Subtest-1	20.76	20.87	20.80
HSUPA Subtest-2	18.78	18.89	18.82
HSUPA Subtest-3	19.87	19.98	19.91
HSUPA Subtest-4	18.74	18.85	18.78
HSUPA Subtest-5	20.77	20.88	20.81

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	22.86	22.70	22.62	0
		1	2	22.83	22.67	22.59	0
		1	5	22.79	22.63	22.55	0
		3	0	22.85	22.69	22.61	0
		3	1	22.82	22.66	22.58	0
		3	3	22.78	22.62	22.54	0
		6	0	21.83	21.67	21.59	1
	16QAM	1	0	22.05	21.89	21.81	1
		1	2	21.85	21.69	21.61	1
		1	5	21.83	21.67	21.59	1
		3	0	22.03	21.87	21.79	1
		3	1	21.83	21.67	21.59	1
		3	3	21.81	21.65	21.57	1
		6	0	20.76	20.60	20.52	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	22.89	22.73	22.65	0
		1	7	22.86	22.70	22.62	0
		1	14	22.82	22.66	22.58	0
		8	0	21.96	21.80	21.72	1
		8	3	21.84	21.68	21.60	1
		8	7	21.82	21.66	21.58	1
		15	0	21.86	21.70	21.62	1
	16QAM	1	0	22.08	21.92	21.84	1
		1	7	21.88	21.72	21.64	1
		1	14	21.86	21.70	21.62	1
		8	0	20.86	20.70	20.62	2
		8	3	20.78	20.62	20.54	2
		8	7	20.77	20.61	20.53	2
		15	0	20.79	20.63	20.55	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	22.92	22.76	22.68	0
		1	12	22.89	22.73	22.65	0
		1	24	22.85	22.69	22.61	0
		12	0	21.99	21.83	21.75	1
		12	6	21.87	21.71	21.63	1
		12	13	21.85	21.69	21.61	1
		25	0	21.89	21.73	21.65	1
	16QAM	1	0	22.11	21.95	21.87	1
		1	12	21.91	21.75	21.67	1
		1	24	21.89	21.73	21.65	1
		12	0	20.89	20.73	20.65	2
		12	6	20.81	20.65	20.57	2
		12	13	20.80	20.64	20.56	2
		25	0	20.82	20.66	20.58	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	22.94	22.78	22.70	0
		1	24	22.91	22.75	22.67	0
		1	49	22.87	22.71	22.63	0
		25	0	22.01	21.85	21.77	1
		25	12	21.89	21.73	21.65	1
		25	25	21.87	21.71	21.63	1
		50	0	21.91	21.75	21.67	1
	16QAM	1	0	22.13	21.97	21.89	1
		1	24	21.93	21.77	21.69	1
		1	49	21.91	21.75	21.67	1
		25	0	20.91	20.75	20.67	2
		25	12	20.83	20.67	20.59	2
		25	25	20.82	20.66	20.58	2
		50	0	20.84	20.68	20.60	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	22.97	22.81	22.73	0
		1	37	22.94	22.78	22.70	0
		1	74	22.90	22.74	22.66	0
		36	0	22.04	21.88	21.80	1
		36	19	21.92	21.76	21.68	1
		36	39	21.90	21.74	21.66	1
		75	0	21.94	21.78	21.70	1
	16QAM	1	0	22.16	22.00	21.92	1
		1	37	21.96	21.80	21.72	1
		1	74	21.94	21.78	21.70	1
		36	0	20.94	20.78	20.70	2
		36	19	20.86	20.70	20.62	2
		36	39	20.85	20.69	20.61	2
		75	0	20.87	20.71	20.63	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	**23.02**	22.86	22.78	0
		1	50	22.99	22.83	22.75	0
		1	99	22.95	22.79	22.71	0
		50	0	22.09	21.93	21.85	1
		50	25	21.97	21.81	21.73	1
		50	50	21.95	21.79	21.71	1
		100	0	21.99	21.83	21.75	1
	16QAM	1	0	22.21	22.05	21.97	1
		1	50	22.01	21.85	21.77	1
		1	99	21.99	21.83	21.75	1
		50	0	20.99	20.83	20.75	2
		50	25	20.91	20.75	20.67	2
		50	50	20.90	20.74	20.66	2
		100	0	20.92	20.76	20.68	2

EIRP POWER (dBm)

GSM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
512	1850.2	-23.75	43.83	20.08	101.86	H
661	1880.0	-23.14	43.57	20.43	110.41	H
810	1909.8	-24.06	44.57	20.51	112.46	H
512	1850.2	-18.06	46.39	28.33	680.77	V
661	1880.0	-17.74	47.10	29.36	**862.58**	V
810	1909.8	-18.56	45.98	27.42	551.57	V

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

EDGE

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
512	1850.2	-32.76	43.83	11.07	12.79	H
661	1880.0	-32.15	43.57	11.42	13.87	H
810	1909.8	-33.06	44.57	11.51	14.16	H
512	1850.2	-26.93	46.39	19.46	88.31	V
661	1880.0	-26.68	47.10	20.42	**110.10**	V
810	1909.8	-26.65	45.98	19.33	85.62	V

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

WCDMA

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
9262	1852.4	-30.42	43.83	13.41	21.93	H
9400	1880.0	-29.46	43.57	14.11	25.76	H
9538	1907.6	-30.25	44.57	14.32	27.04	H
9262	1852.4	-24.35	46.39	22.04	159.96	V
9400	1880.0	-23.93	47.10	23.17	**207.40**	V
9538	1907.6	-23.69	45.98	22.29	169.28	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	-26.72	43.83	17.11	51.45	H	2
18900	1880.0	-26.47	43.57	17.10	51.29	H	2
19193	1909.3	-27.47	44.32	16.85	48.41	H	2
18607	1850.7	-21.20	46.41	25.21	331.97	V	2
18900	1880.0	-21.48	47.07	25.59	**362.24**	V	2
19193	1909.3	-21.08	45.88	24.80	302.27	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	-27.59	43.83	16.24	42.11	H	2
18900	1880.0	-27.40	43.57	16.17	41.40	H	2
19193	1909.3	-28.43	44.32	15.89	38.81	H	2
18607	1850.7	-22.07	46.41	24.34	271.71	V	2
18900	1880.0	-22.41	47.07	24.66	292.42	V	2
19193	1909.3	-22.04	45.88	23.84	242.33	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	-26.70	43.82	17.12	51.55	H	2
18900	1880.0	-26.53	43.57	17.04	50.58	H	2
19185	1908.5	-27.42	44.38	16.96	49.61	H	2
18615	1851.5	-21.18	46.45	25.27	336.59	V	2
18900	1880.0	-21.54	47.07	25.53	**357.27**	V	2
19185	1908.5	-21.03	45.88	24.85	305.49	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	-27.77	43.82	16.05	40.29	H	2
18900	1880.0	-27.42	43.57	16.15	41.21	H	2
19185	1908.5	-28.41	44.38	15.97	39.50	H	2
18615	1851.5	-22.25	46.45	24.20	263.09	V	2
18900	1880.0	-22.43	47.07	24.64	291.07	V	2
19185	1908.5	-22.02	45.88	23.86	243.22	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	-26.76	43.83	17.07	50.91	H	2
18900	1880.0	-26.48	43.57	17.09	51.17	H	2
19175	1907.5	-27.37	44.19	16.82	48.06	H	2
18625	1852.5	-21.24	46.46	25.22	332.89	V	2
18900	1880.0	-21.49	47.07	25.58	**361.41**	V	2
19175	1907.5	-20.98	45.89	24.91	309.81	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	-27.59	43.83	16.24	42.05	H	2
18900	1880.0	-27.50	43.57	16.07	40.46	H	2
19175	1907.5	-28.47	44.19	15.72	37.31	H	2
18625	1852.5	-22.07	46.46	24.39	274.98	V	2
18900	1880.0	-22.51	47.07	24.56	285.76	V	2
19175	1907.5	-22.08	45.89	23.81	240.49	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	-26.57	43.86	17.29	53.59	H	2
18900	1880.0	-26.42	43.57	17.15	51.88	H	2
19150	1905.0	-27.24	43.99	16.75	47.36	H	2
18650	1855.0	-21.05	46.28	25.23	333.27	V	2
18900	1880.0	-21.43	47.07	25.64	**366.44**	V	2
19150	1905.0	-20.85	45.92	25.07	321.51	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	-27.72	43.86	16.14	41.12	H	2
18900	1880.0	-27.52	43.57	16.05	40.27	H	2
19150	1905.0	-28.40	43.99	15.59	36.26	H	2
18650	1855.0	-22.20	46.28	24.08	255.74	V	2
18900	1880.0	-22.53	47.07	24.54	284.45	V	2
19150	1905.0	-22.01	45.92	23.91	246.15	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	-26.58	43.99	17.41	55.11	H	2
18900	1880.0	-26.49	43.57	17.08	51.05	H	2
19125	1902.5	-27.31	43.66	16.35	43.10	H	2
18675	1857.5	-21.06	45.93	24.87	306.69	V	2
18900	1880.0	-21.50	47.07	25.57	**360.58**	V	2
19125	1902.5	-20.92	46.20	25.28	337.44	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	-27.44	43.99	16.55	45.21	H	2
18900	1880.0	-27.36	43.57	16.21	41.78	H	2
19125	1902.5	-28.16	43.66	15.50	35.44	H	2
18675	1857.5	-21.92	45.93	24.01	251.59	V	2
18900	1880.0	-22.37	47.07	24.70	295.12	V	2
19125	1902.5	-21.77	46.20	24.43	277.46	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	-27.16	43.50	16.34	43.04	H	2
18900	1880.0	-26.94	43.57	16.63	46.03	H	2
19100	1900.0	-27.89	43.62	15.73	37.38	H	2
18700	1860.0	-21.64	45.57	23.93	247.17	V	2
18900	1880.0	-21.95	47.07	25.12	**325.09**	V	2
19100	1900.0	-21.50	46.26	24.76	299.30	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	-28.09	43.50	15.41	34.75	H	2
18900	1880.0	-28.01	43.57	15.56	35.97	H	2
19100	1900.0	-28.72	43.62	14.90	30.87	H	2
18700	1860.0	-22.57	45.57	23.00	199.53	V	2
18900	1880.0	-23.02	47.07	24.05	254.10	V	2
19100	1900.0	-22.33	46.26	23.93	247.23	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 STABILIITY MEASUREMENT

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

4.2.2 TEST PROCEDURE

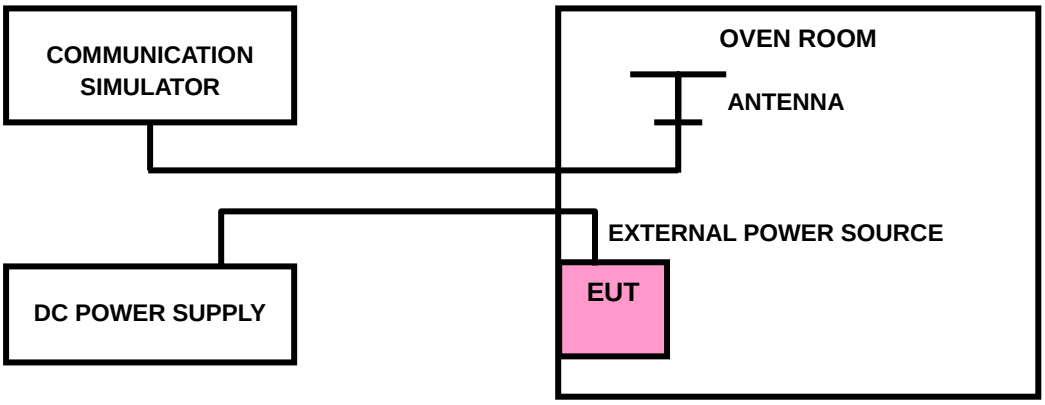
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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.

4.2.3 TEST SETUP



4.2.4 TEST RESULTS

GSM1900

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.85	0.0016	0.0016	2.5
3.44	0.0012	0.0012	2.5
4.4	0.0011	0.0009	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0055	-0.0048	2.5
-20	-0.0052	-0.0045	2.5
-10	-0.0044	-0.0038	2.5
0	-0.0040	-0.0034	2.5
10	-0.0034	-0.0028	2.5
20	-0.0027	-0.0022	2.5
30	-0.0020	-0.0016	2.5
40	-0.0014	-0.0010	2.5
50	-0.0010	-0.0007	2.5
60	-0.0006	-0.0002	2.5

EDGE 1900

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.85	0.0018	0.0017	2.5
3.44	0.0014	0.0014	2.5
4.4	0.0012	0.0011	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0054	-0.0054	2.5
-20	-0.0047	-0.0047	2.5
-10	-0.0045	-0.0045	2.5
0	-0.0039	-0.0039	2.5
10	-0.0030	-0.0031	2.5
20	-0.0023	-0.0025	2.5
30	-0.0017	-0.0019	2.5
40	-0.0015	-0.0017	2.5
50	-0.0007	-0.0010	2.5
60	-0.0004	-0.0007	2.5

WCDMA BAND II

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.85	0.0017	0.0017	2.5
3.44	0.0014	0.0014	2.5
4.4	0.0011	0.0011	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0057	-0.0056	2.5
-20	-0.0052	-0.0051	2.5
-10	-0.0049	-0.0047	2.5
0	-0.0042	-0.0040	2.5
10	-0.0035	-0.0033	2.5
20	-0.0029	-0.0027	2.5
30	-0.0024	-0.0022	2.5
40	-0.0021	-0.0019	2.5
50	-0.0017	-0.0014	2.5
60	-0.0012	-0.0010	2.5

LTE BAND 2

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0016	0.0015	2.5
3.44	0.0015	0.0012	2.5
4.4	0.0014	0.0010	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0052	-0.0055	2.5
-20	-0.0047	-0.0049	2.5
-10	-0.0044	-0.0046	2.5
0	-0.0041	-0.0042	2.5
10	-0.0034	-0.0035	2.5
20	-0.0031	-0.0033	2.5
30	-0.0025	-0.0026	2.5
40	-0.0017	-0.0017	2.5
50	-0.0011	-0.0011	2.5
60	-0.0010	-0.0010	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0017	0.0016	2.5
3.44	0.0014	0.0012	2.5
4.4	0.0011	0.0010	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0056	-0.0056	2.5
-20	-0.0052	-0.0052	2.5
-10	-0.0047	-0.0047	2.5
0	-0.0041	-0.0041	2.5
10	-0.0035	-0.0035	2.5
20	-0.0029	-0.0029	2.5
30	-0.0027	-0.0026	2.5
40	-0.0024	-0.0024	2.5
50	-0.0019	-0.0019	2.5
60	-0.0011	-0.0011	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0017	0.0017	2.5
3.44	0.0015	0.0015	2.5
4.4	0.0011	0.0012	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0053	-0.0058	2.5
-20	-0.0050	-0.0055	2.5
-10	-0.0046	-0.0050	2.5
0	-0.0044	-0.0048	2.5
10	-0.0041	-0.0045	2.5
20	-0.0004	-0.0004	2.5
30	-0.0035	-0.0038	2.5
40	-0.0029	-0.0032	2.5
50	-0.0024	-0.0026	2.5
60	-0.0011	-0.0012	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0016	0.0017	2.5
3.44	0.0011	0.0011	2.5
4.4	0.0009	0.0009	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0055	-0.0049	2.5
-20	-0.0051	-0.0045	2.5
-10	-0.0048	-0.0043	2.5
0	-0.0044	-0.0040	2.5
10	-0.0042	-0.0039	2.5
20	-0.0037	-0.0035	2.5
30	-0.0033	-0.0032	2.5
40	-0.0029	-0.0029	2.5
50	-0.0025	-0.0026	2.5
60	-0.0017	-0.0020	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0016	0.0017	2.5
3.44	0.0013	0.0016	2.5
4.4	0.0011	0.0012	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0055	-0.0053	2.5
-20	-0.0051	-0.0048	2.5
-10	-0.0047	-0.0044	2.5
0	-0.0044	-0.0042	2.5
10	-0.0042	-0.0040	2.5
20	-0.0038	-0.0034	2.5
30	-0.0031	-0.0026	2.5
40	-0.0024	-0.0021	2.5
50	-0.0020	-0.0017	2.5
60	-0.0001	0.0003	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.85	0.0016	0.0017	2.5
3.44	0.0012	0.0013	2.5
4.4	0.0011	0.0009	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.44Vdc to 4.4Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

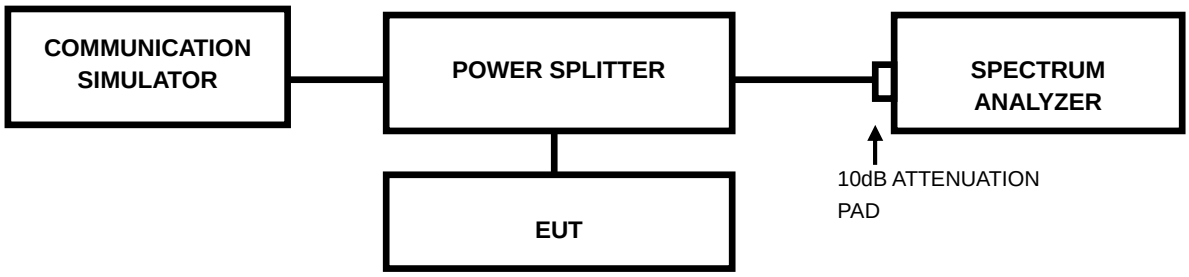
TEMP. (℃)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0055	-0.0058	2.5
-20	-0.0049	-0.0050	2.5
-10	-0.0044	-0.0046	2.5
0	-0.0039	-0.0041	2.5
10	-0.0034	-0.0035	2.5
20	-0.0029	-0.0030	2.5
30	-0.0024	-0.0025	2.5
40	-0.0022	-0.0022	2.5
50	-0.0017	-0.0018	2.5
60	-0.0012	-0.0012	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

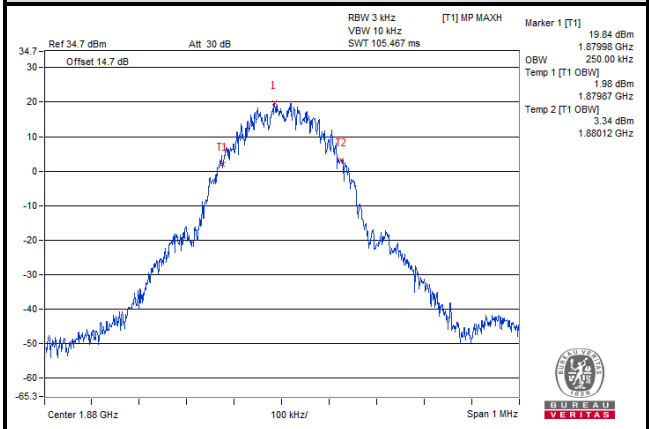


4.3.3 TEST RESULTS

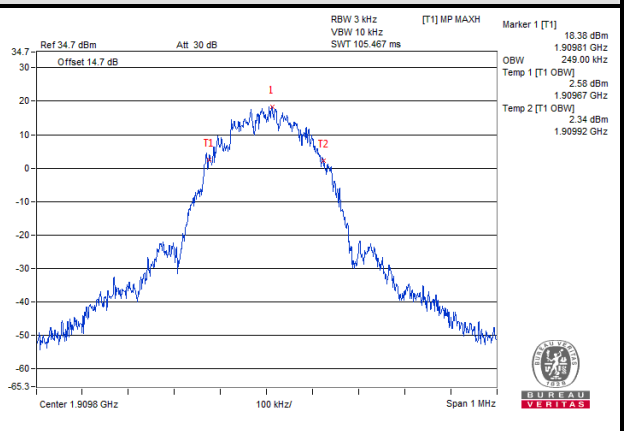
Channel	Frequency (MHz)	99% Occupied bandwidth (kHz)		Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)
		GSM	EDGE			WCDMA
512	1850.2	245.00	245.00	9262	1852.4	4.22
661	1880.0	250.00	244.00	9400	1880.0	4.22
810	1909.8	247.00	249.00	9538	1907.6	4.23

SPECTRUM PLOT OF WORST VALUE

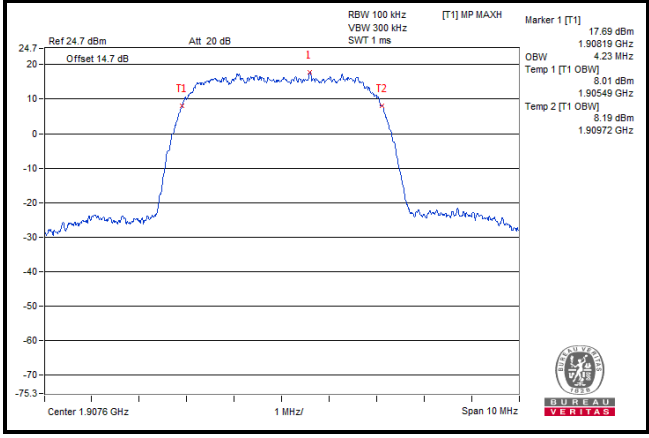
GSM



EDGE



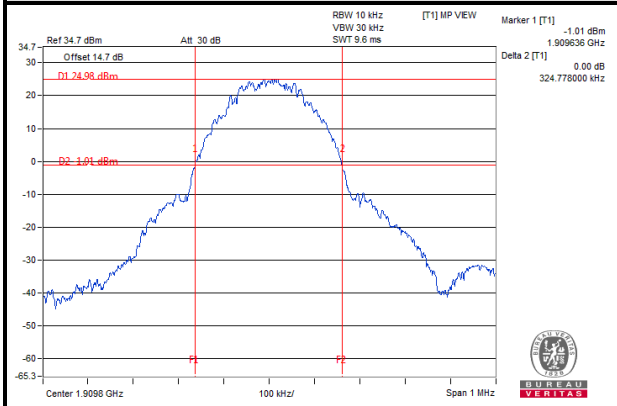
WCDMA



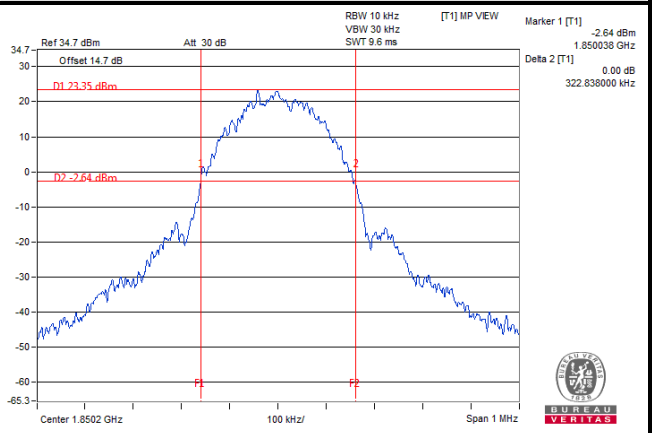
Channel	Frequency (MHz)	26dB bandwidth (kHz)		CHANNEL	FREQUENCY (MHz)	26dB bandwidth (MHz)
		GSM	EDGE			WCDMA
512	1850.2	318.51	322.84	9262	1852.4	4.91
661	1880.0	316.79	321.13	9400	1880.0	4.88
810	1909.8	324.78	321.36	9538	1907.6	4.90

SPECTRUM PLOT OF WORST VALUE

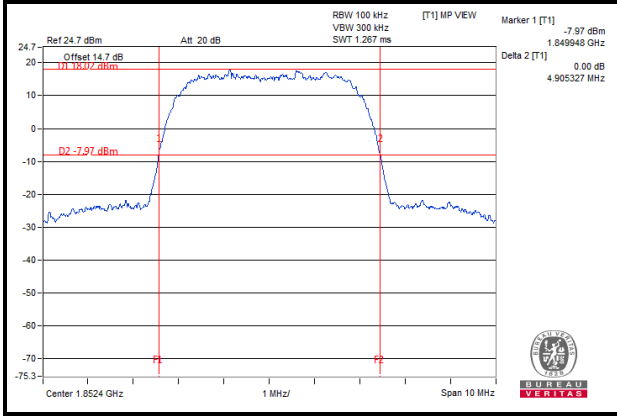
GSM



EDGE



WCDMA

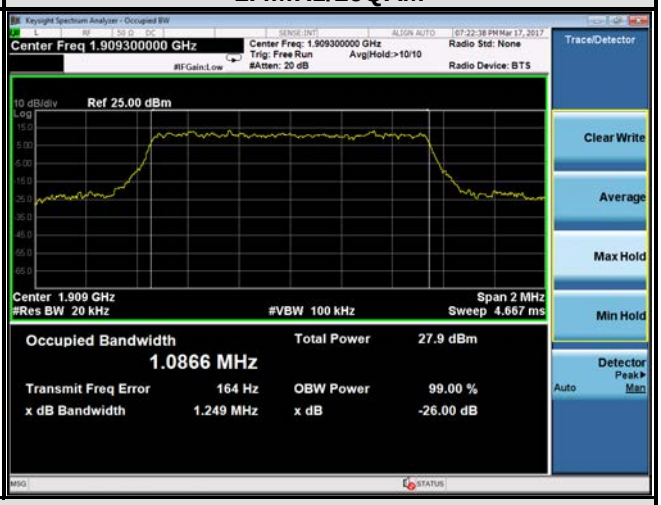


LTE band 2							
Channel Bandwidth : 1.4MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.09	0.91	18607	1850.7	1.25	1.15
18900	1880	1.09	1.09	18900	1880	1.25	1.23
19193	1909.3	1.08	1.09	19193	1909.3	1.25	1.25

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

1.4MHz/QPSK

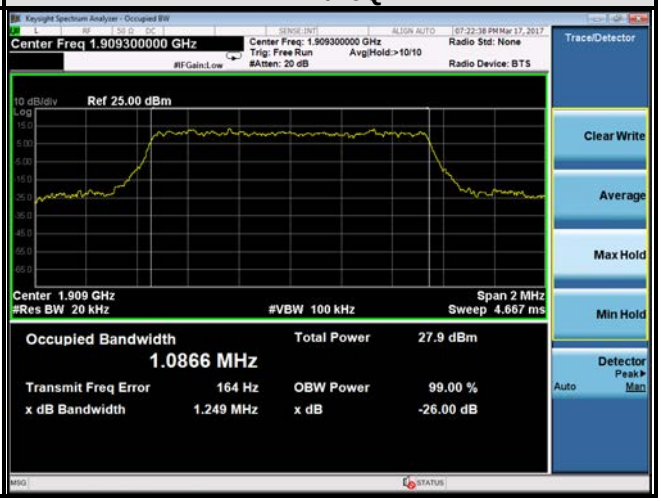
1.4MHz/16QAM



SPECTRUM PLOT OF WORST VALUE of 26dB Bandwidth

1.4MHz/QPSK

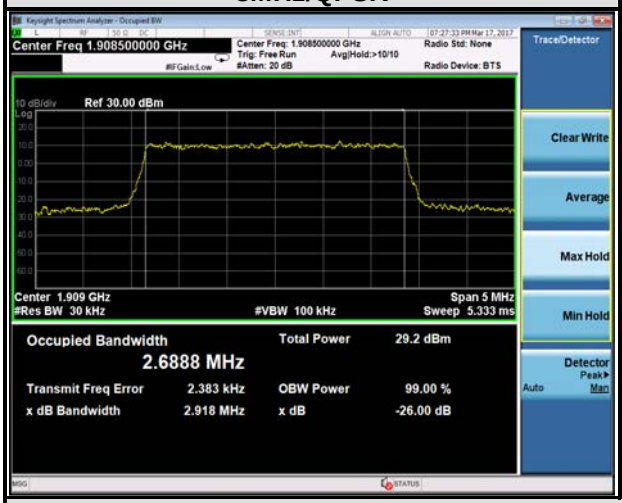
1.4MHz/16QAM



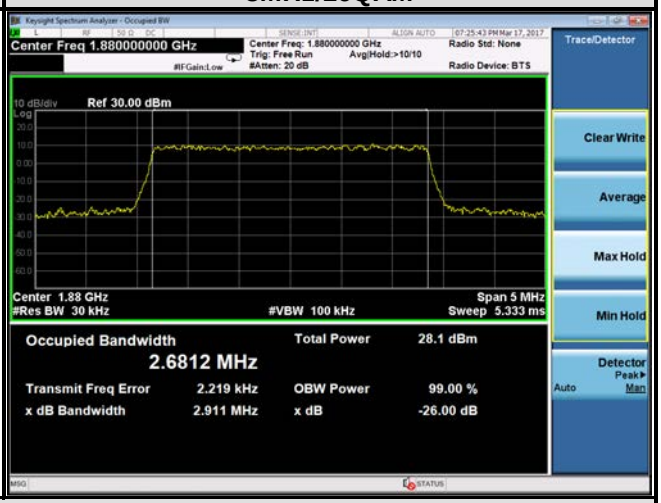
LTE band 2							
Channel Bandwidth : 3MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18615	1851.5	2.68	2.68	18615	1851.5	2.91	2.91
18900	1880	2.69	2.68	18900	1880	2.93	2.91
19185	1908.5	2.69	2.68	19185	1908.5	2.92	2.91

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

3MHz/QPSK

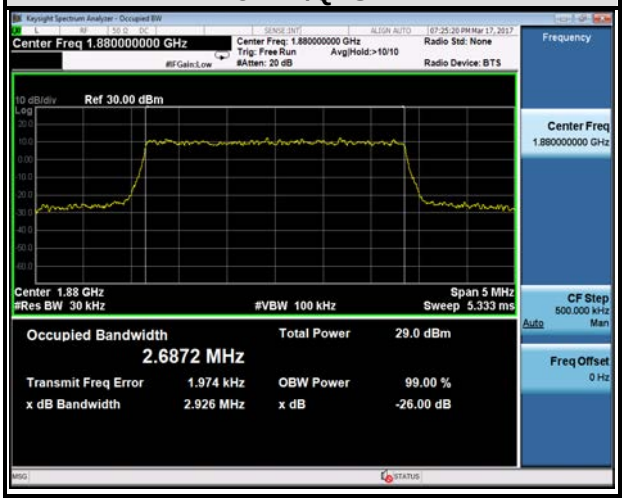


3MHz/16QAM

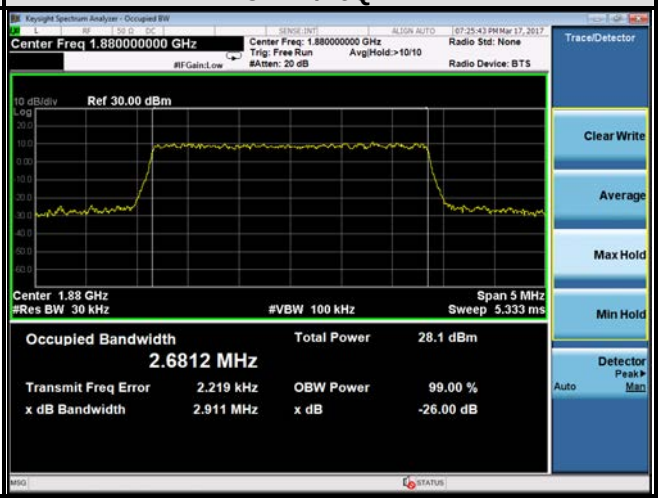


SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

3MHz/QPSK



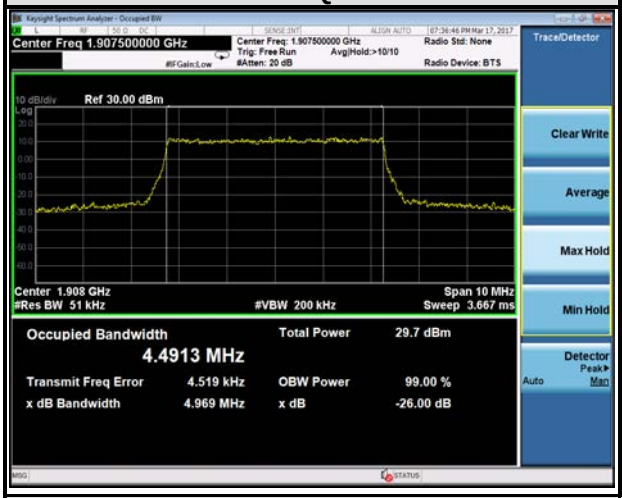
3MHz/16QAM



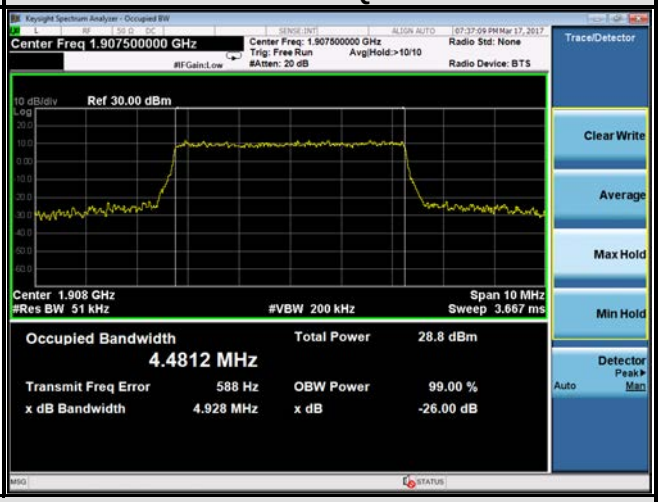
LTE band 2							
Channel Bandwidth : 5 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.49	4.48	18625	1852.5	4.98	4.94
18900	1880	4.48	4.48	18900	1880	4.96	4.96
19175	1907.5	4.49	4.48	19175	1907.5	4.97	4.93

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

5MHz/QPSK



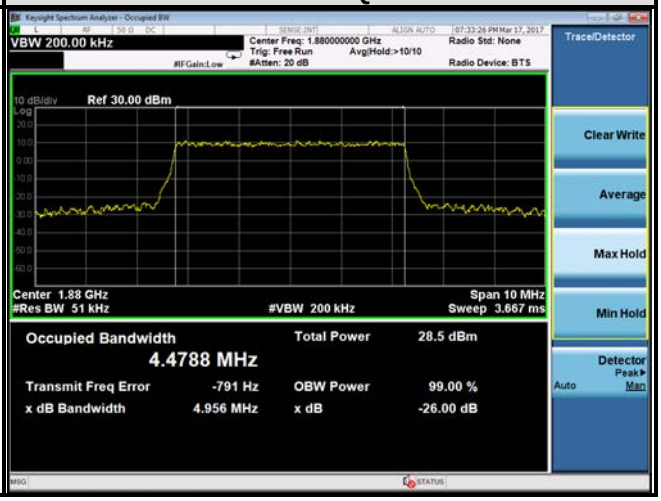
5MHz/16QAM



SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

5MHz/QPSK

5MHz/16QAM

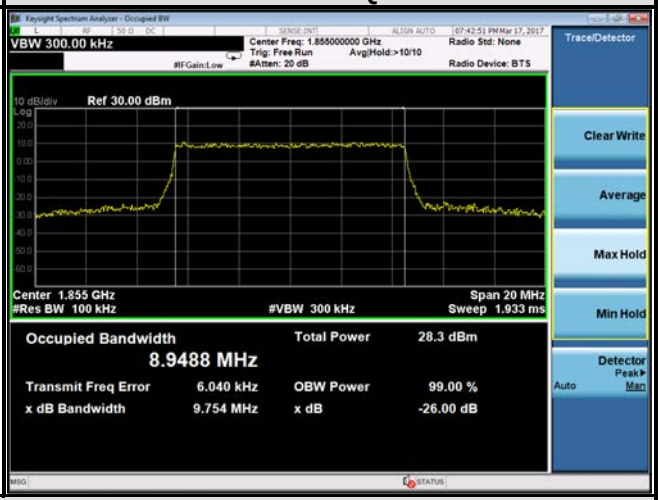


LTE band 2							
Channel Bandwidth : 10 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18650	1855	8.95	8.95	18650	1855	9.72	9.75
18900	1880	8.93	8.95	18900	1880	9.75	9.74
19150	1905	8.95	8.94	19150	1905	9.75	9.65

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

10MHz/QPSK

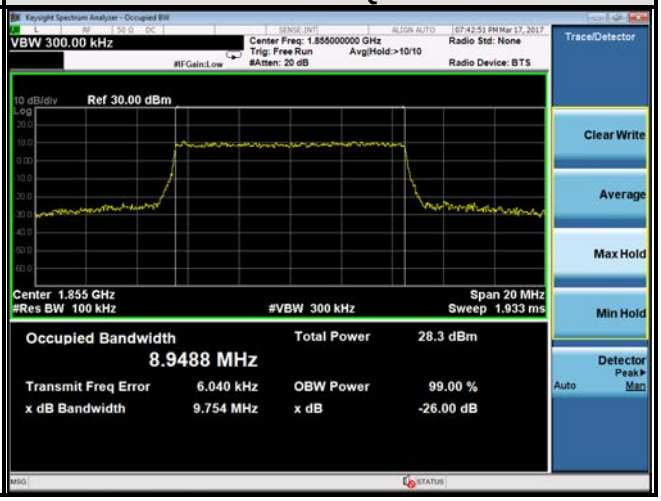
10MHz/16QAM



SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

10MHz/QPSK

10MHz/16QAM

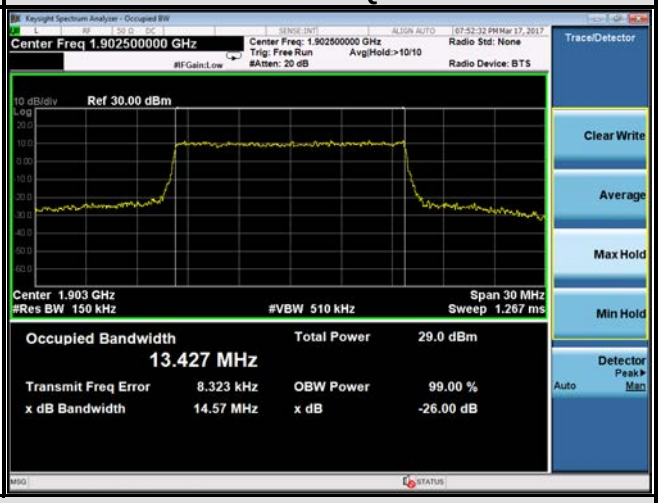


LTE band 2							
Channel Bandwidth : 15 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.42	13.41	18675	1857.5	14.58	14.60
18900	1880	13.40	13.41	18900	1880	14.52	14.48
19125	1902.5	13.44	13.43	19125	1902.5	14.67	14.57

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

15MHz/QPSK

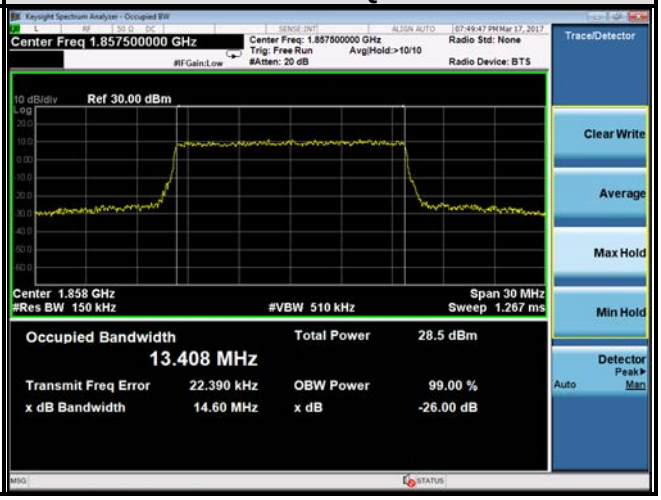
15MHz/16QAM



SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

15MHz/QPSK

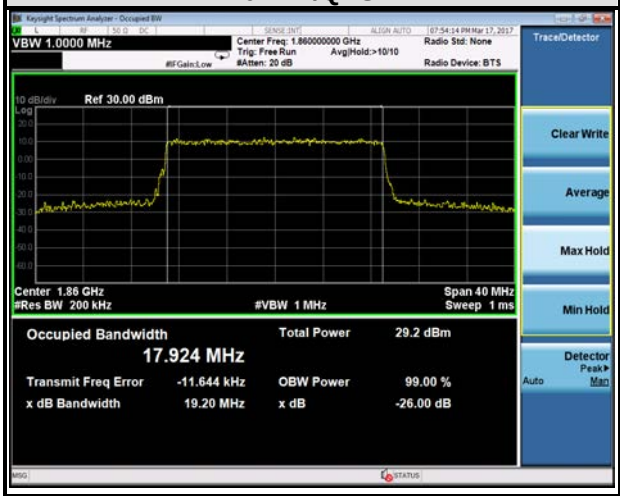
15MHz/16QAM



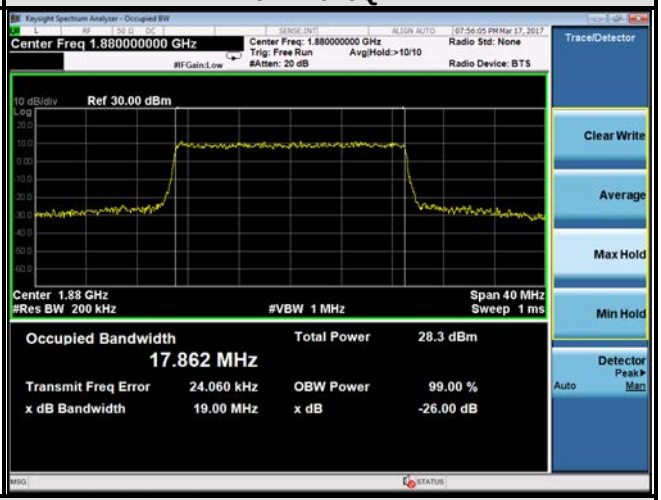
LTE band 2							
Channel Bandwidth : 20 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18700	1860	17.92	17.85	18700	1860	19.20	19.04
18900	1880	17.87	17.86	18900	1880	19.08	19.00
19100	1900	17.86	17.85	19100	1900	19.45	19.26

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

20MHz/QPSK



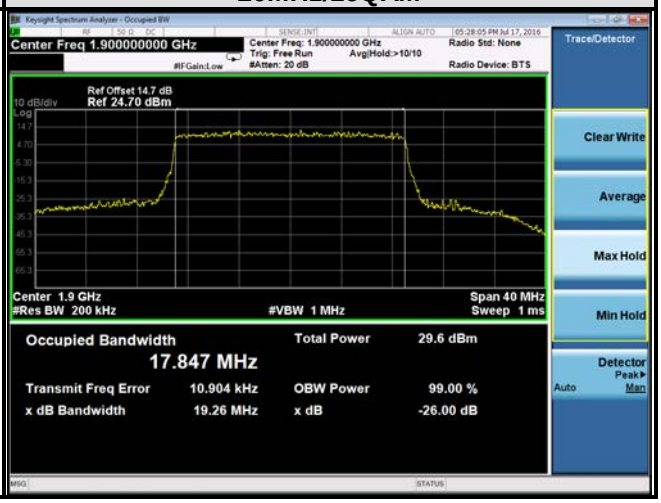
20MHz/16QAM



SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

20MHz/QPSK

20MHz/16QAM

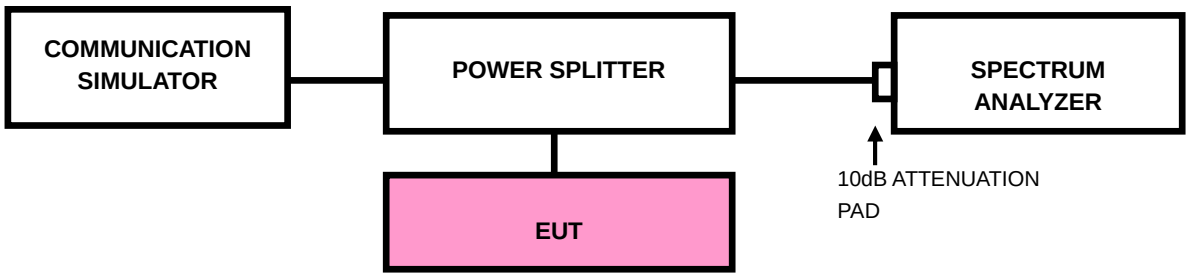


4.4 BAND EDGE MEASUREMENT

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

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 1.5 MHz. RBW of the spectrum is 10kHz and VBW of the spectrum is 30kHz (GSM/GPRS/ EDGE).

c. 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).

d. 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)

e. 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)

f. 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)

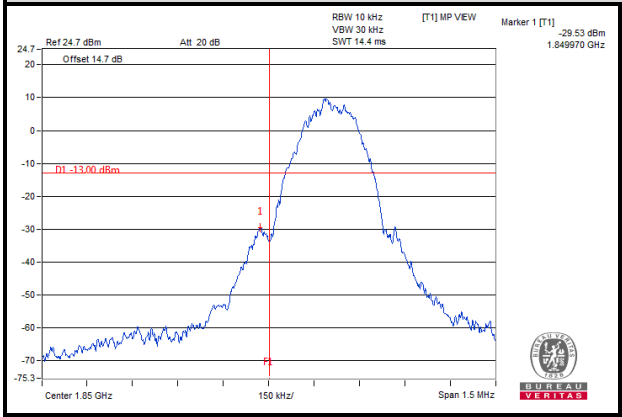
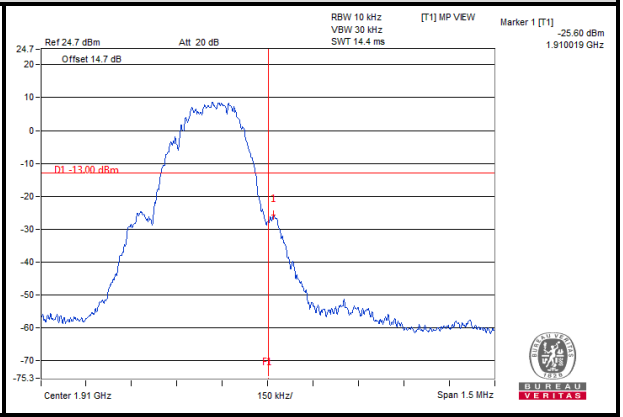
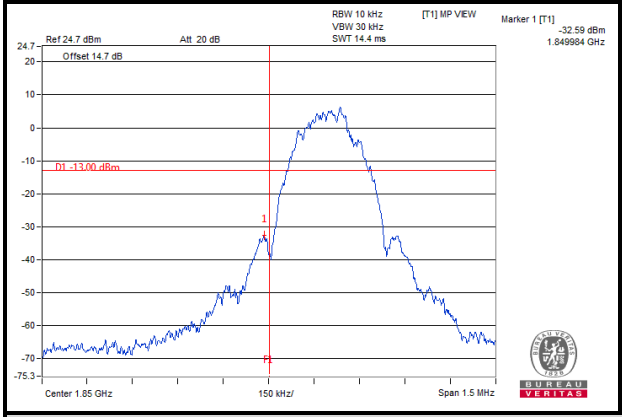
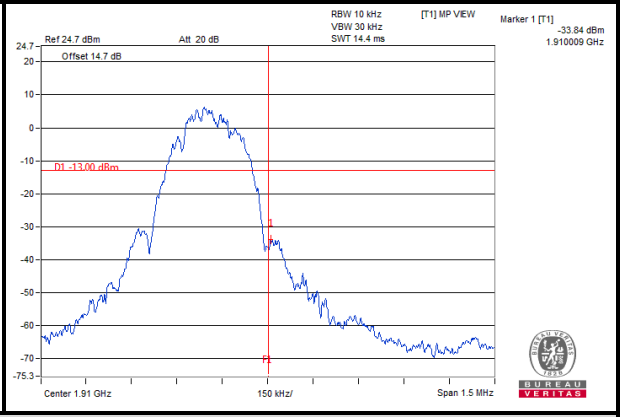
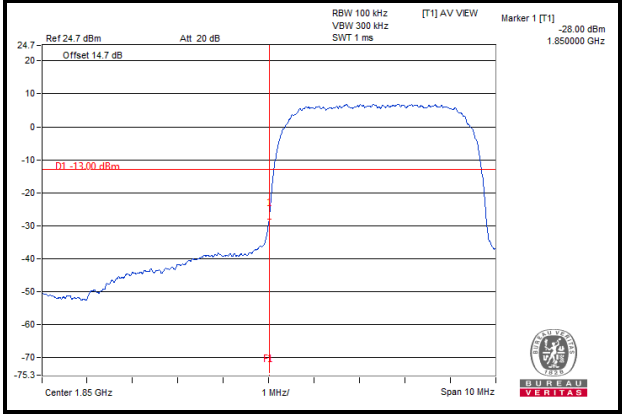
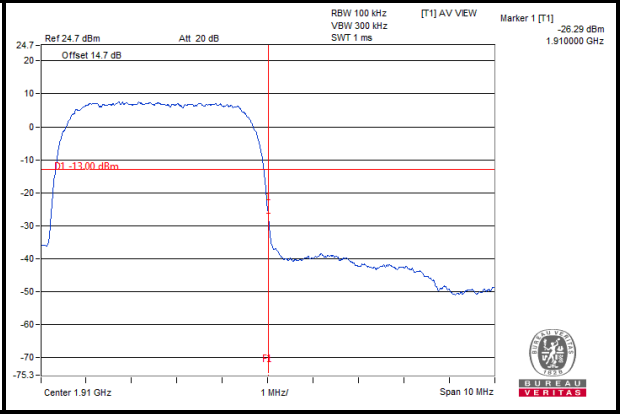
g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)

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 15MHz)

i. he 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)

j. Record the max trace plot into the test report.

4.4.4. TEST RESULTS

GSM			
CHANNEL	512	CHANNEL	810
GSM			
			
EDGE			
CHANNEL	512	CHANNEL	810
			
WCDMA			
CHANNEL	9262	CHANNEL	9538
			

LTE BAND 2

Channel Bandwidth: 1.4MHz

CHANNEL	18607	1 RB	CHANNEL	19193	1 RB

CHANNEL	18607	Full RB	CHANNEL	19193	Full RB

LTE BAND 2

Channel Bandwidth: 3MHz

CHANNEL	18615	1 RB	CHANNEL	19185	1 RB

CHANNEL	18615	Full RB	CHANNEL	19185	Full RB

LTE BAND 2

Channel Bandwidth: 5MHz

CHANNEL	18625	1 RB	CHANNEL	19175	1 RB

CHANNEL	18625	Full RB	CHANNEL	19175	Full RB

LTE BAND 2

Channel Bandwidth: 10MHz

CHANNEL	18650	1 RB	CHANNEL	19150	1 RB

CHANNEL	18650	Full RB	CHANNEL	19150	Full RB

LTE BAND 2

Channel Bandwidth: 15MHz

CHANNEL	18675	1 RB	CHANNEL	19125	1 RB

CHANNEL	18675	Full RB	CHANNEL	19125	Full RB

LTE BAND 2

Channel Bandwidth: 20MHz					
CHANNEL	18700	1 RB	CHANNEL	19100	1 RB
CHANNEL	18700	Full RB	CHANNEL	19100	Full RB

4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

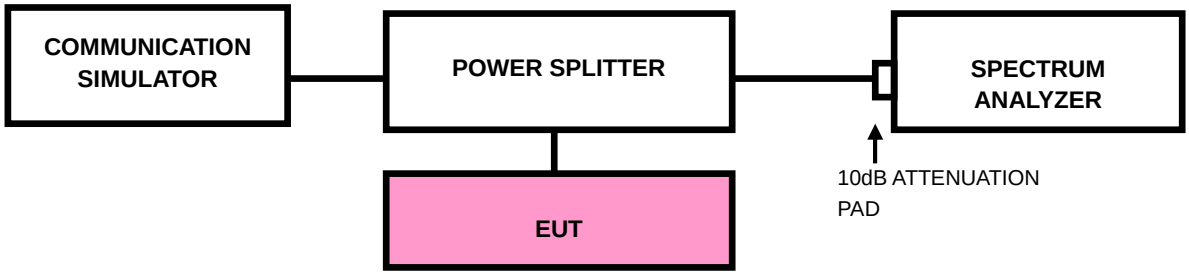
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

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

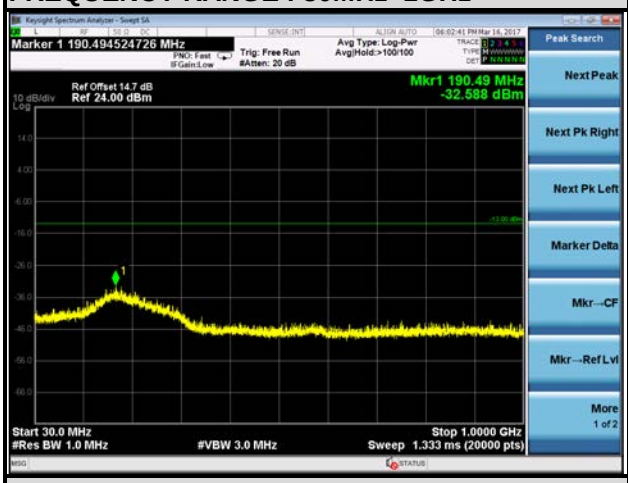


4.5.4 TEST RESULTS

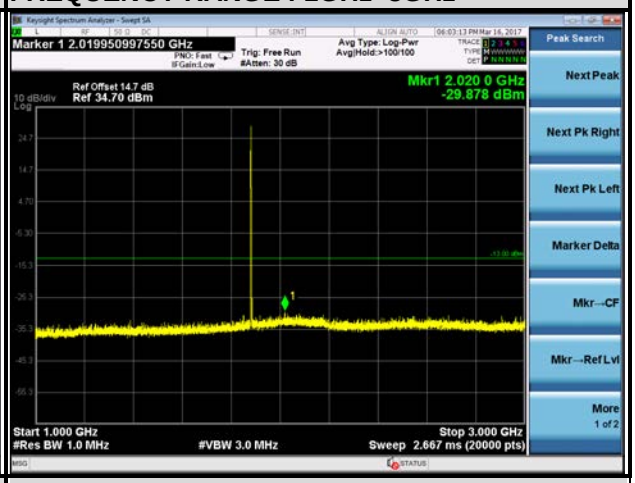
GSM

CHANNEL 661

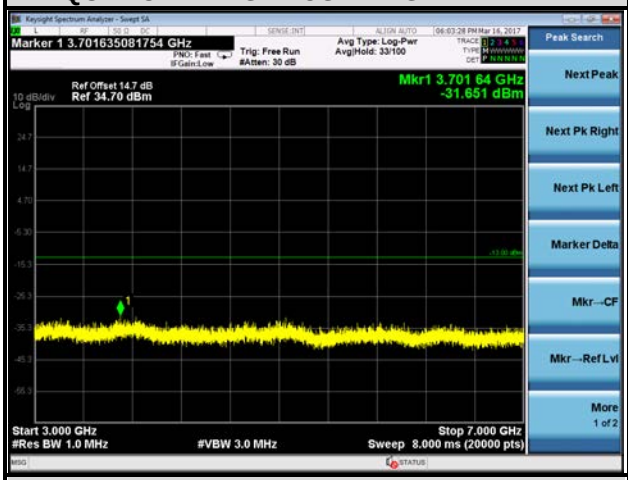
FREQUENCY RANGE : 30MHz~1GHz



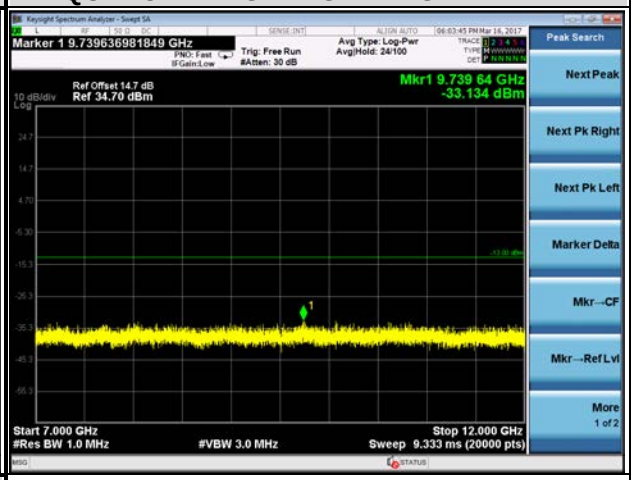
FREQUENCY RANGE : 1GHz~3GHz



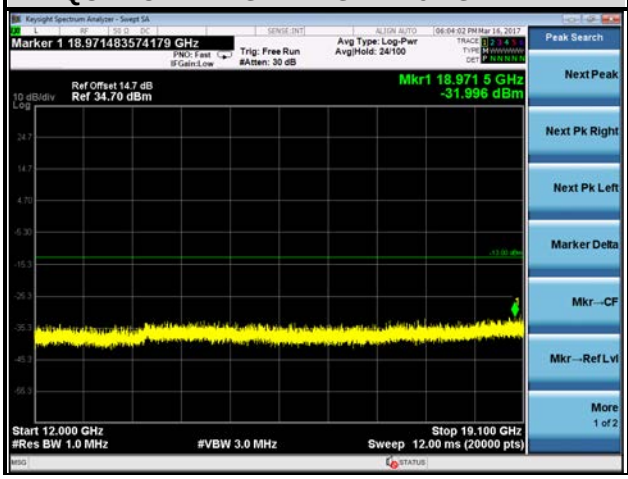
FREQUENCY RANGE : 3GHz~7GHz



FREQUENCY RANGE : 7GHz~12GHz



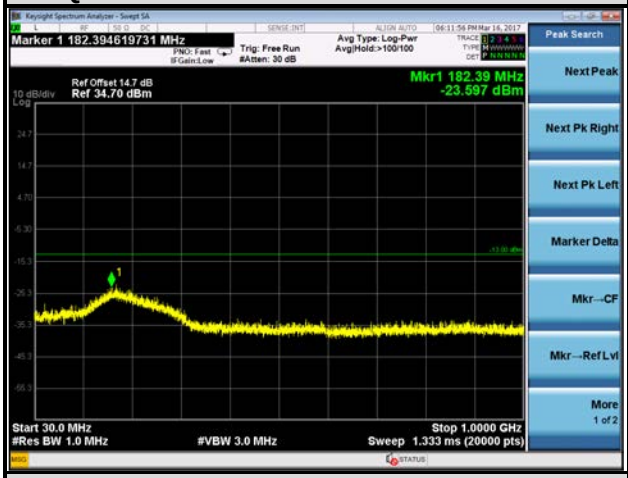
FREQUENCY RANGE : 12GHz~19.1GHz



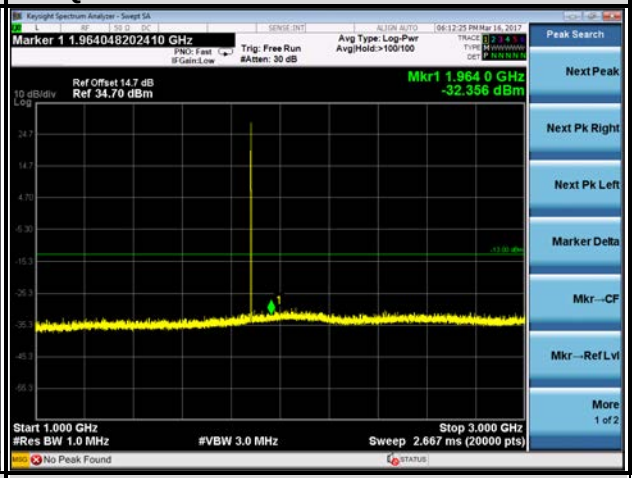
EDGE

CHANNEL 661

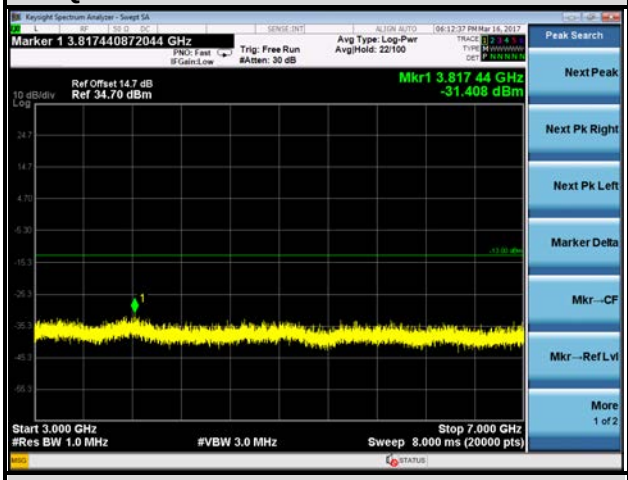
FREQUENCY RANGE : 30MHz~1GHz



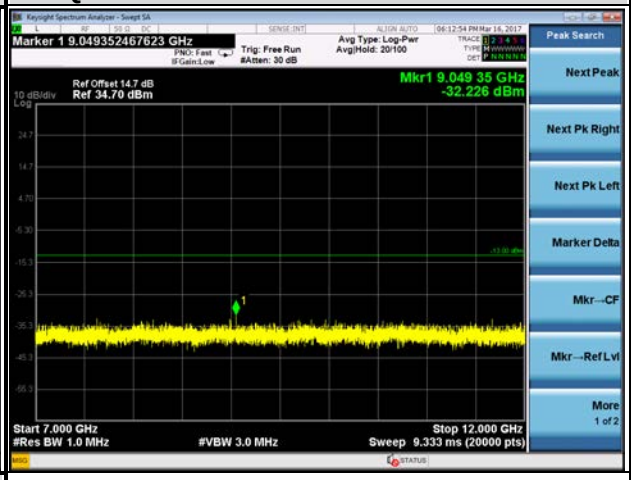
FREQUENCY RANGE : 1GHz~3GHz



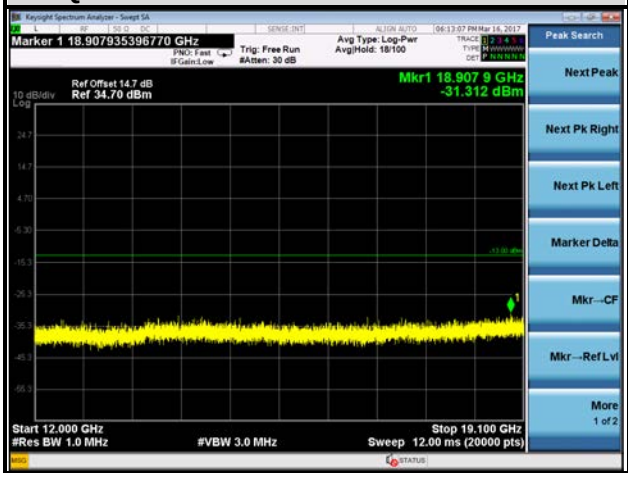
FREQUENCY RANGE : 3GHz~7GHz

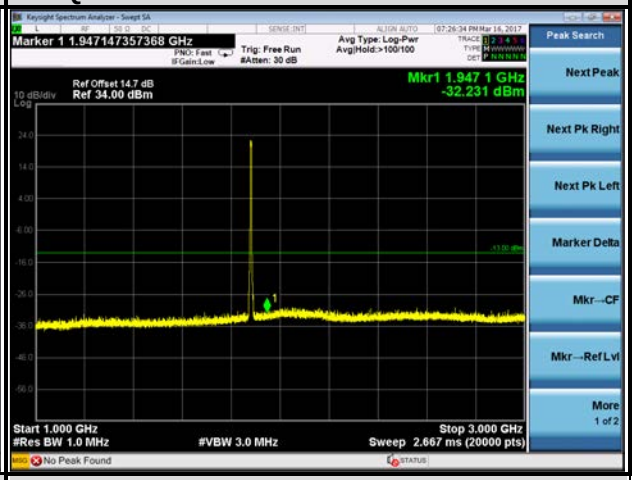
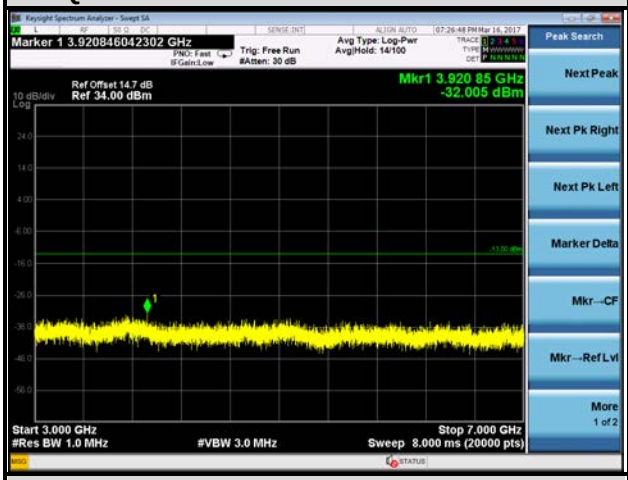
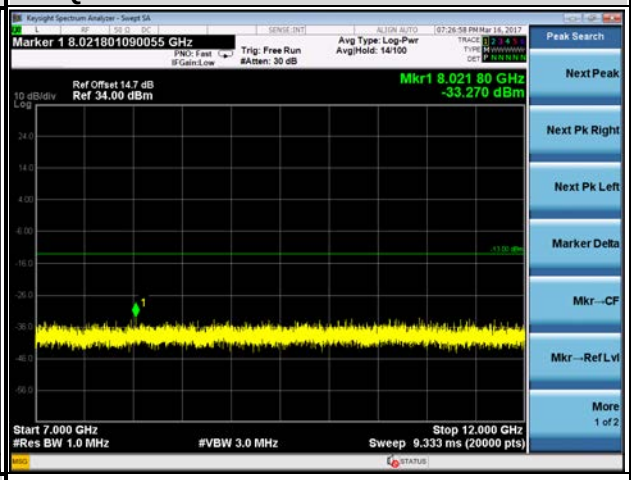
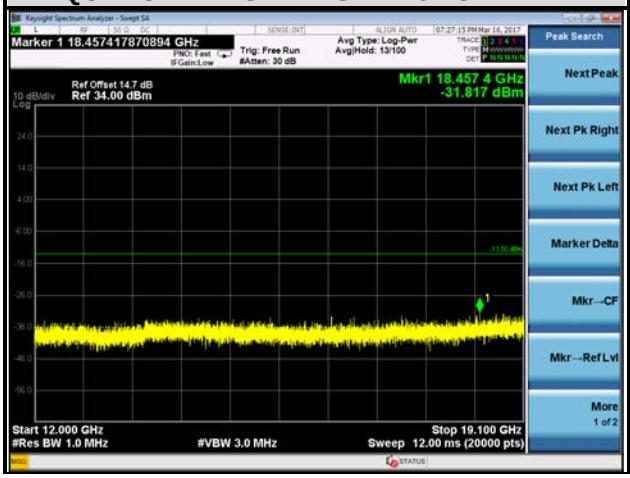


FREQUENCY RANGE : 7GHz~12GHz

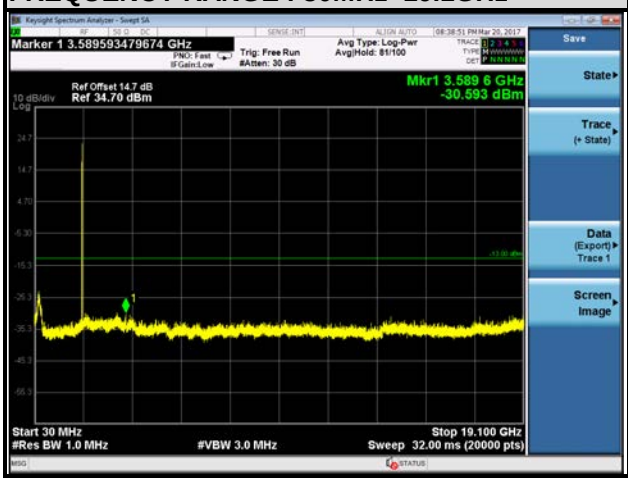
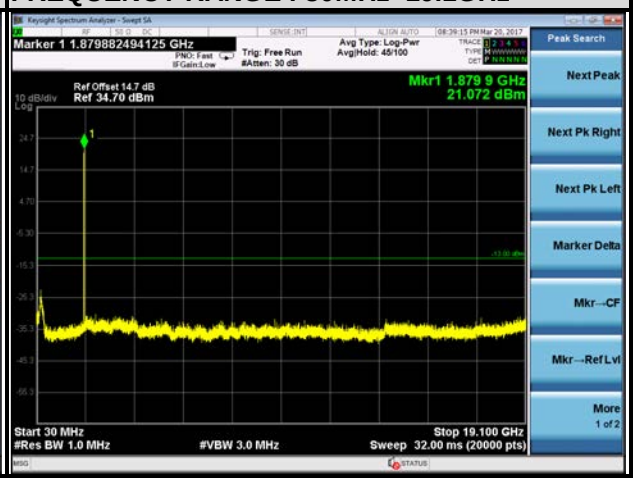


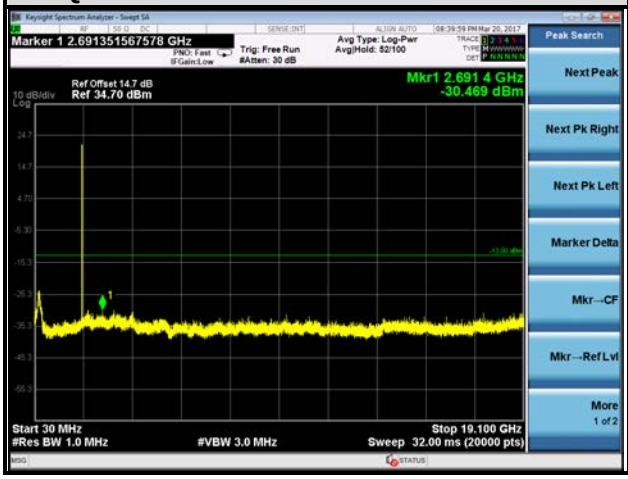
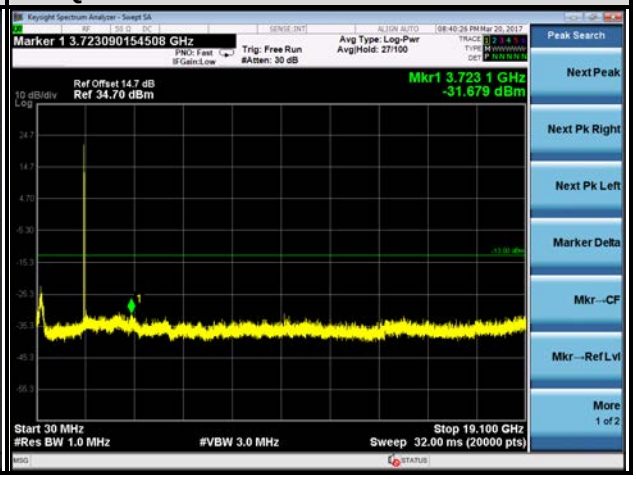
FREQUENCY RANGE : 12GHz~19.1GHz

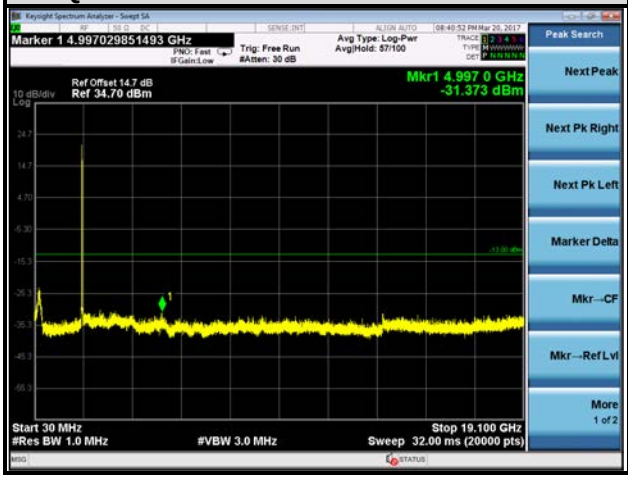
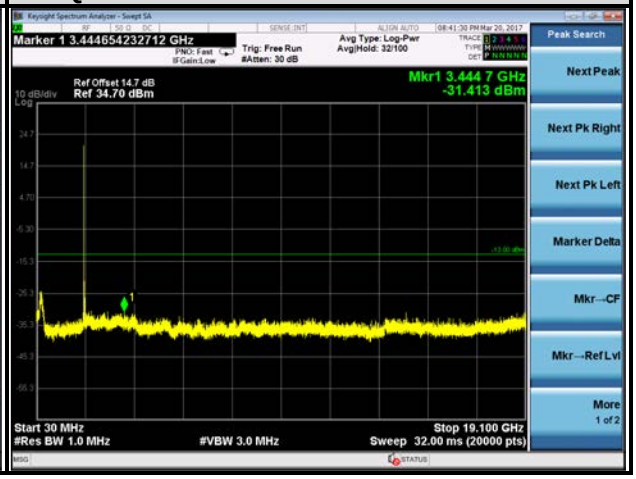


WCDMA	
CHANNEL 9400	
FREQUENCY RANGE : 30MHz~1GHz	FREQUENCY RANGE : 1GHz~3GHz
	
FREQUENCY RANGE : 3GHz~7GHz	FREQUENCY RANGE : 7GHz~12GHz
	
FREQUENCY RANGE : 12GHz~19.1GHz	
	

LTE BAND 2

CHANNEL 18900	CHANNEL 18900
1.4MHz / QPSK	3MHz / QPSK
FREQUENCY RANGE : 30MHz~19.1GHz	FREQUENCY RANGE : 30MHz~19.1GHz
	

CHANNEL 18900	CHANNEL 18900
5MHz / QPSK	10MHz / QPSK
FREQUENCY RANGE : 30MHz~19.1GHz	FREQUENCY RANGE : 30MHz~19.1GHz
	

CHANNEL 18900	CHANNEL 18900
15MHz / QPSK	20MHz / QPSK
FREQUENCY RANGE : 30MHz~19.1GHz	FREQUENCY RANGE : 30MHz~19.1GHz
	

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 –13dBm.

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. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

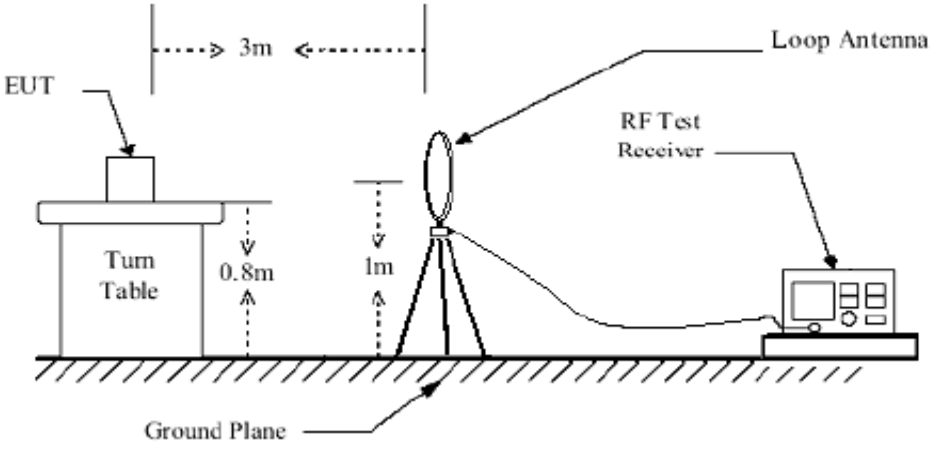
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.6.3 DEVIATION FROM TEST STANDARD

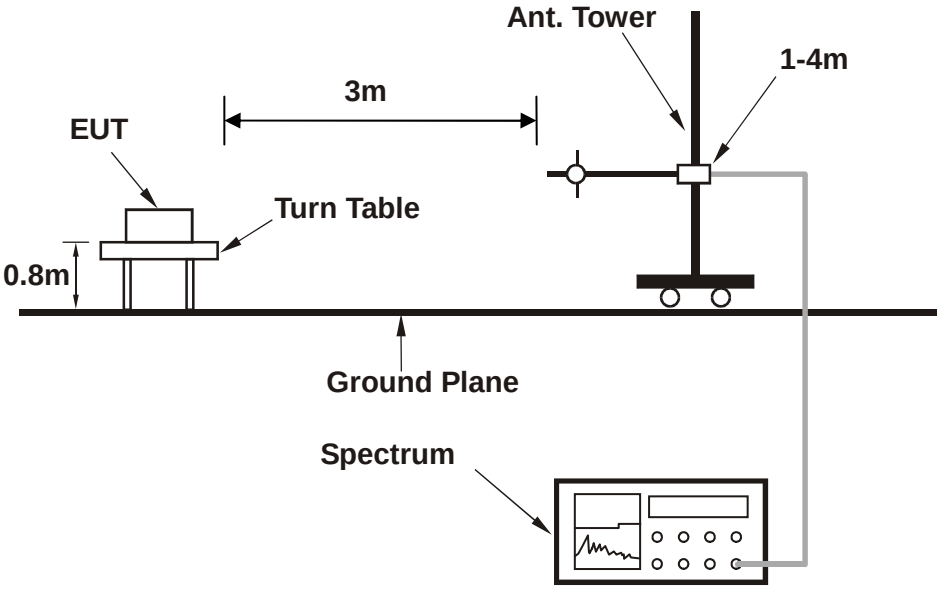
No deviation

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

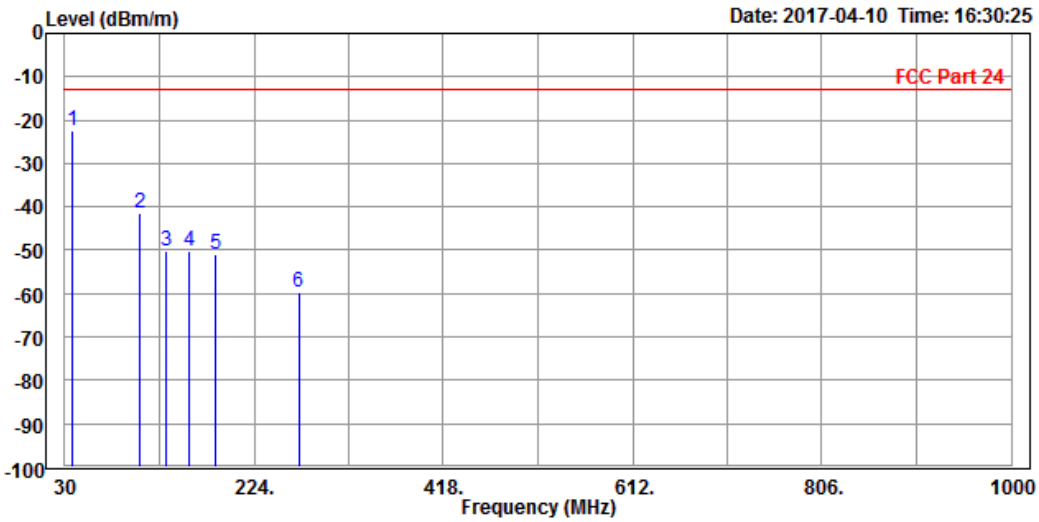
9 KHz – 30 KHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1GHz data:

PCS 1900:

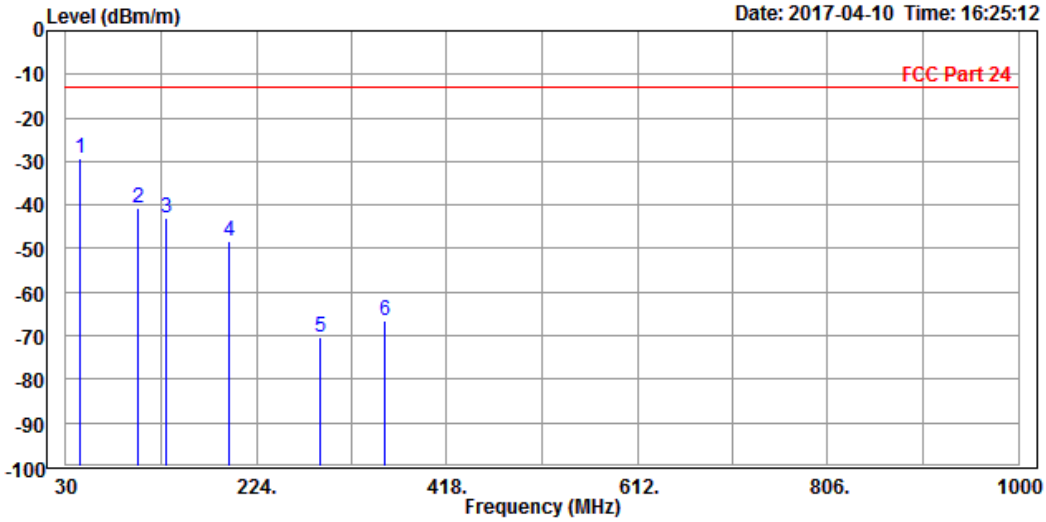
MODE	TX channel 661	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	**INPUT POWER**	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	37.760	-22.39	-34.63	-13.00	-9.39	12.24	Peak	Horizontal
2		106.630	-41.42	-28.88	-13.00	-28.42	-12.54	Peak	Horizontal
3		133.790	-50.12	-32.71	-13.00	-37.12	-17.41	Peak	Horizontal
4		158.040	-50.31	-31.71	-13.00	-37.31	-18.60	Peak	Horizontal
5		185.200	-50.94	-33.32	-13.00	-37.94	-17.62	Peak	Horizontal
6		269.590	-59.84	-44.53	-13.00	-46.84	-15.31	Peak	Horizontal



MODE	TX channel 661	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	PP	43.580	-29.25	-26.61	-13.00	-16.25	-2.64	Peak	Vertical
2		102.750	-40.65	-29.61	-13.00	-27.65	-11.04	Peak	Vertical
3		131.850	-43.07	-31.05	-13.00	-30.07	-12.02	Peak	Vertical
4		195.870	-48.23	-37.07	-13.00	-35.23	-11.16	Peak	Vertical
5		288.990	-70.51	-59.17	-13.00	-57.51	-11.34	Peak	Vertical
6		354.950	-66.66	-55.56	-13.00	-53.66	-11.10	Peak	Vertical



ABOVE 1GHz DATA

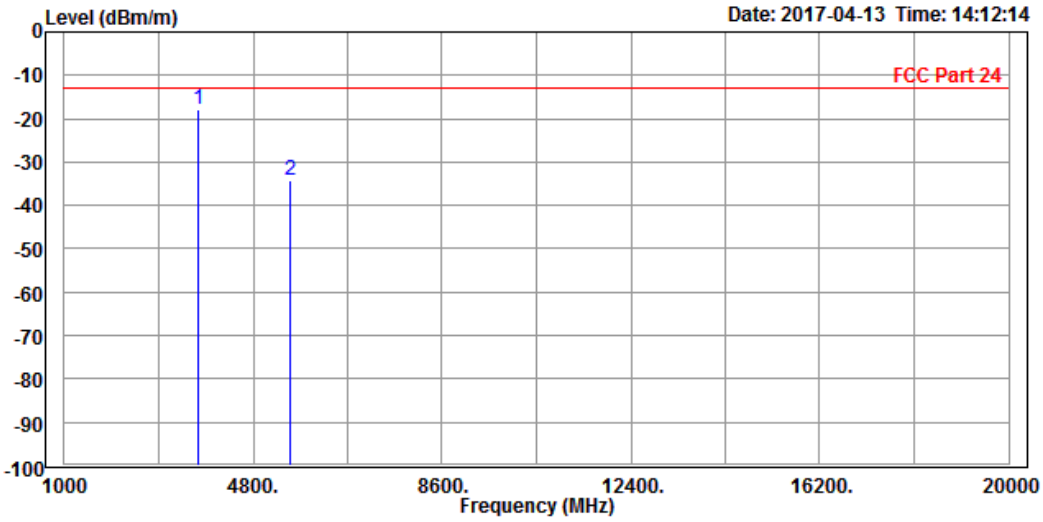
Note: For higher frequency, the emission is too low to be detected.

PCS 1900:

CH 512

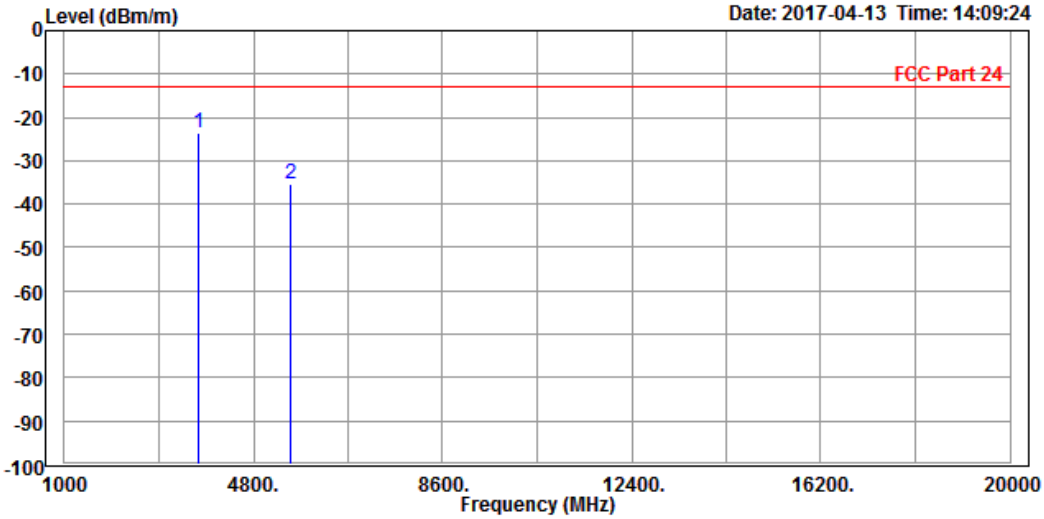
MODE	TX channel 512	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3698.000	-17.72	-20.83	-13.00	-4.72	3.11	Peak	Horizontal
2	5560.000	-34.39	-43.42	-13.00	-21.39	9.03	Peak	Horizontal



MODE	TX channel 512	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

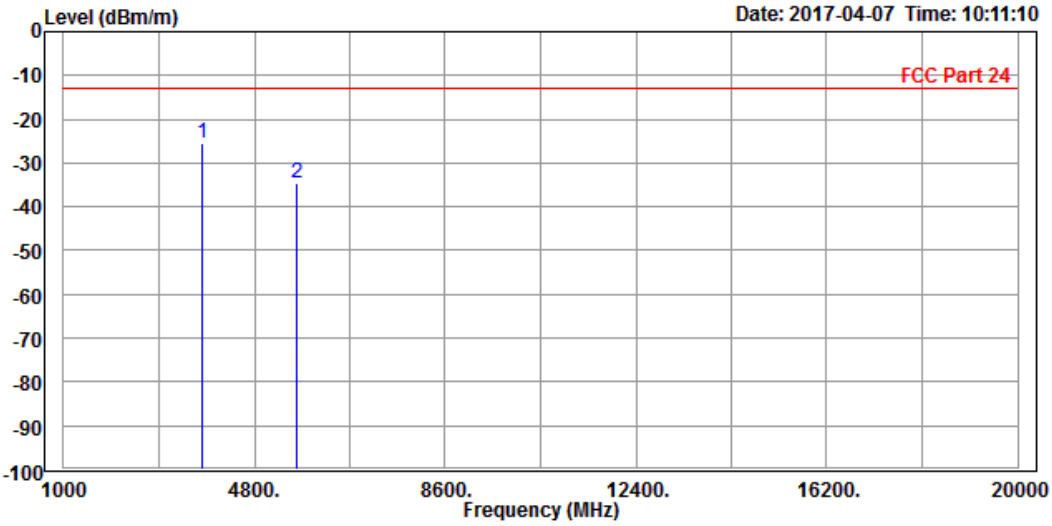
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3698.000	-23.76	-27.33	-13.00	-10.76	3.57	Peak	Vertical
2		5560.000	-35.31	-43.40	-13.00	-22.31	8.09	Peak	Vertical



CH 661

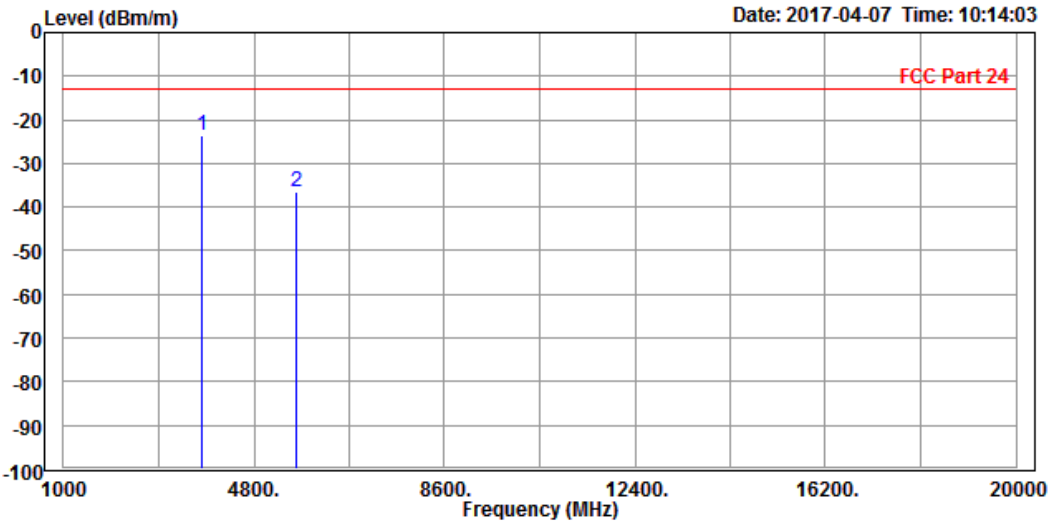
MODE	TX channel 661	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3755.000	-25.41	-28.80	-13.00	-12.41	3.39	Peak	Horizontal
2	5640.000	-34.60	-43.72	-13.00	-21.60	9.12	Peak	Horizontal



MODE	TX channel 661	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

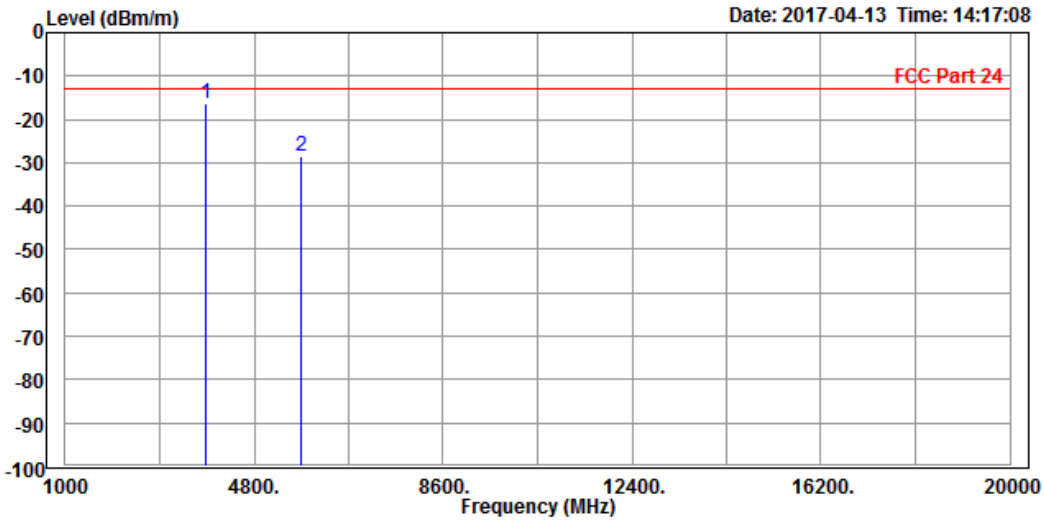
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-23.53	-27.38	-13.00	-10.53	3.85	Peak	Vertical
2		5640.000	-36.62	-44.88	-13.00	-23.62	8.26	Peak	Vertical



CH 810

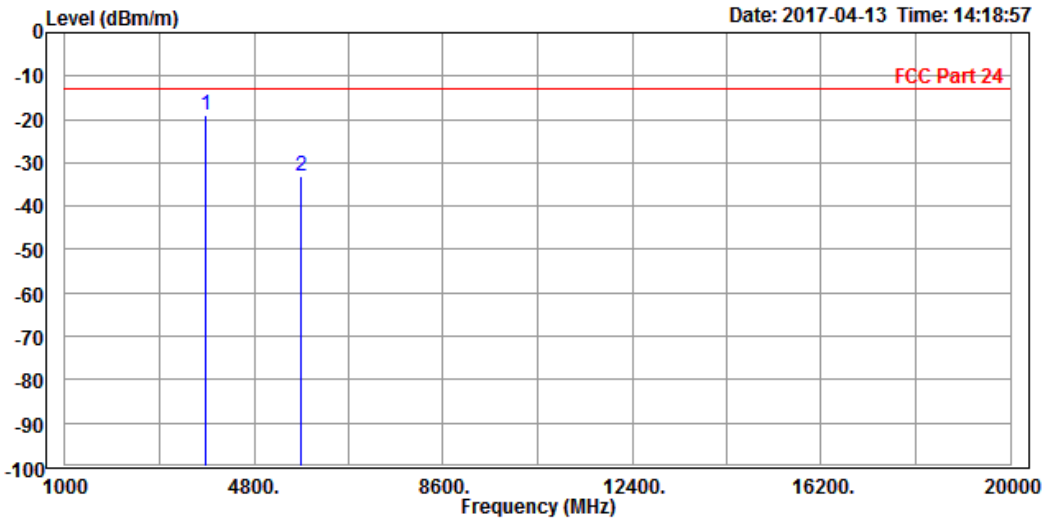
MODE	TX channel 810	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3812.000	-16.32	-19.98	-13.00	-3.32	3.66	Peak	Horizontal
2	5731.000	-28.44	-37.66	-13.00	-15.44	9.22	Peak	Horizontal



MODE	TX channel 810	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	PP	3812.000	-18.83	-22.97	-13.00	-5.83	4.14	Peak	Vertical
2		5731.000	-33.09	-41.53	-13.00	-20.09	8.44	Peak	Vertical

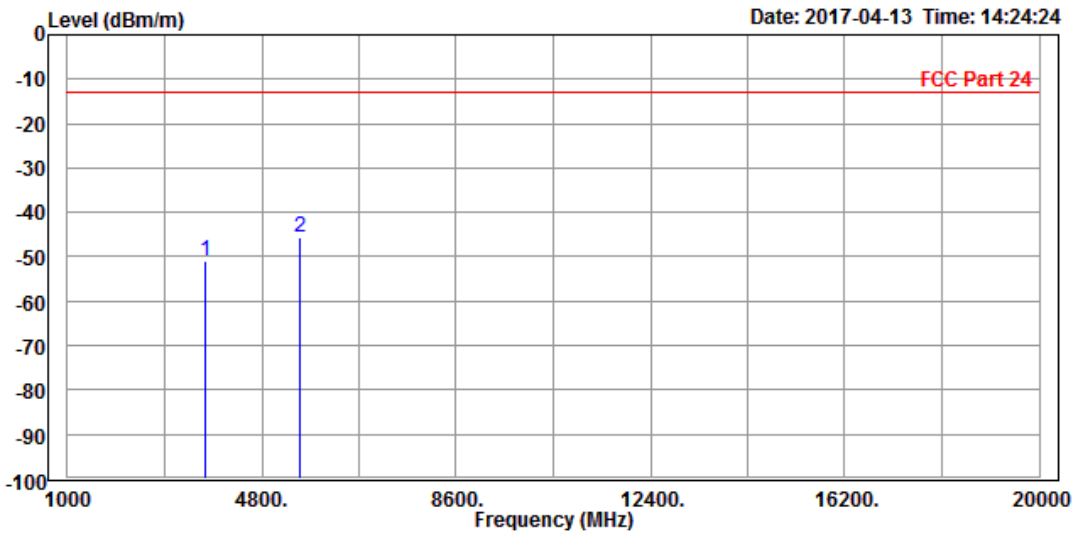


EDGE 1900:

CH 512

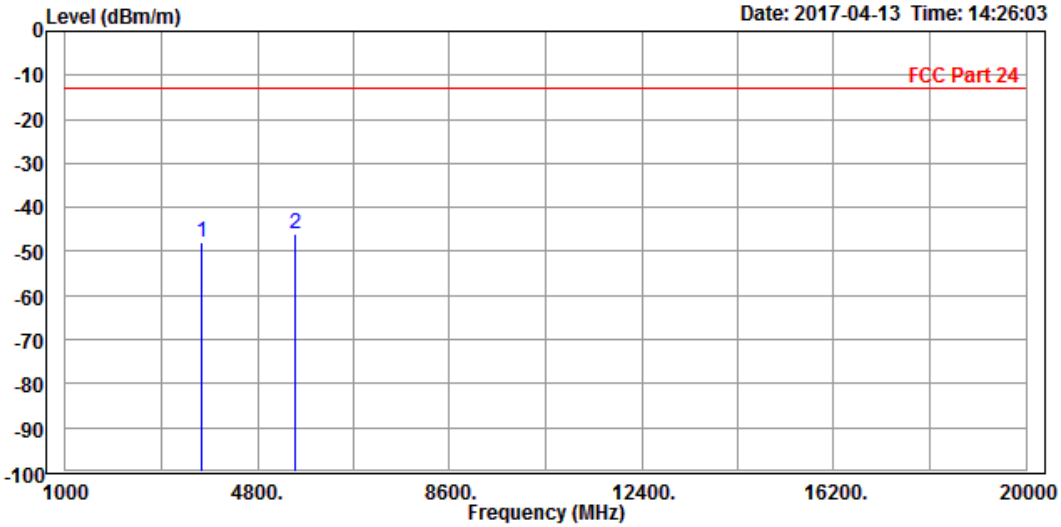
MODE	TX channel 512	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3698.000	-50.87	-53.98	-13.00	-37.87	3.11	Peak	Horizontal
2 PP	5560.000	-45.44	-54.47	-13.00	-32.44	9.03	Peak	Horizontal



MODE	TX channel 512	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

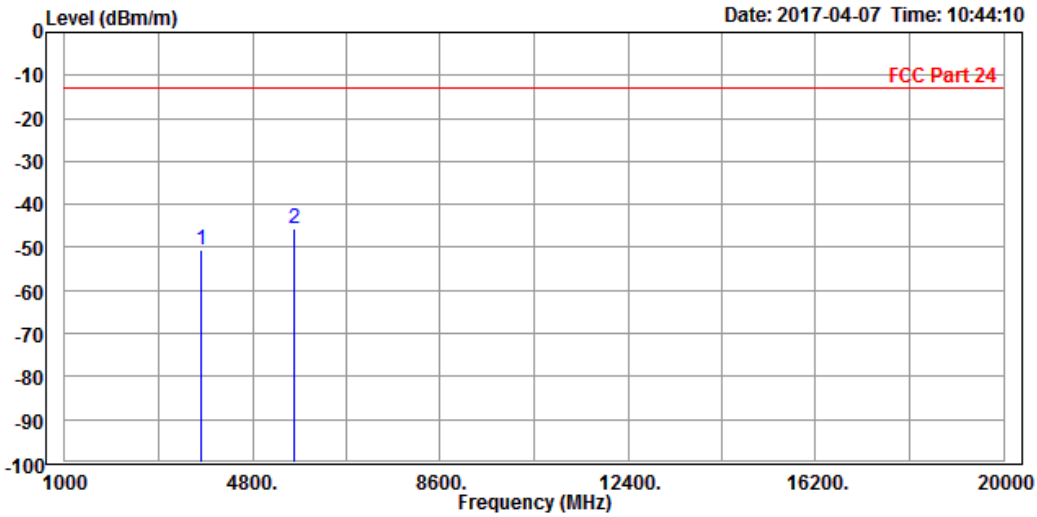
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3698.000	-48.07	-51.64	-13.00	-35.07	3.57	Peak	Vertical
2 PP	5560.000	-46.07	-54.16	-13.00	-33.07	8.09	Peak	Vertical



CH 661

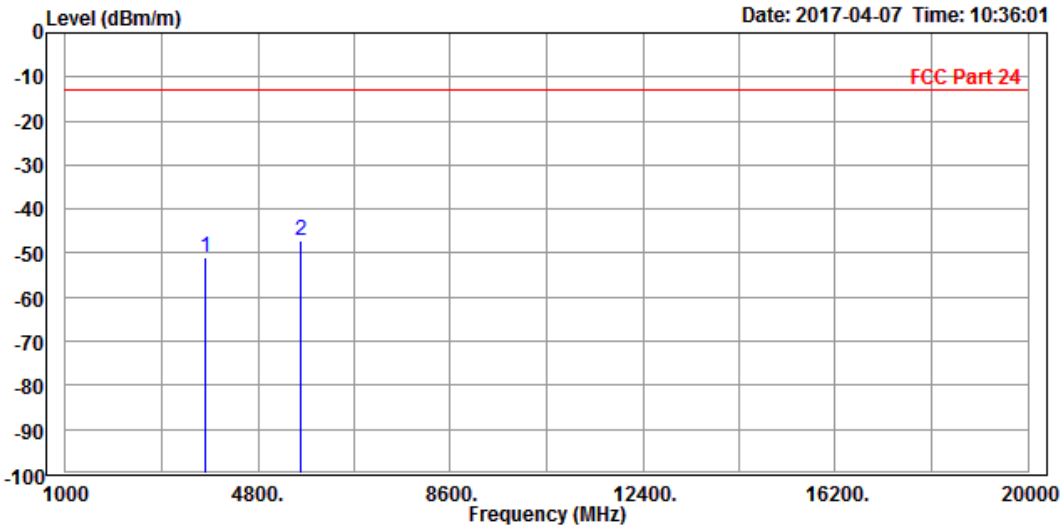
MODE	TX channel 661	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		3755.000	-50.67	-54.06	-13.00	-37.67	3.39	Peak	Horizontal
2	PP	5640.000	-45.61	-54.73	-13.00	-32.61	9.12	Peak	Horizontal



MODE	TX channel 661	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

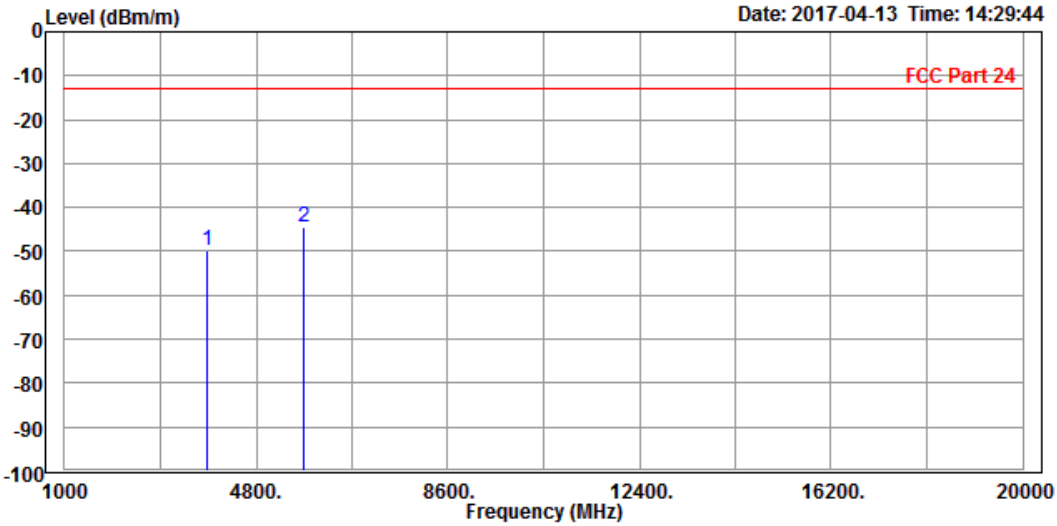
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		3755.000	-50.84	-54.69	-13.00	-37.84	3.85	Peak	Vertical
2	PP	5640.000	-46.97	-55.23	-13.00	-33.97	8.26	Peak	Vertical



CH 810

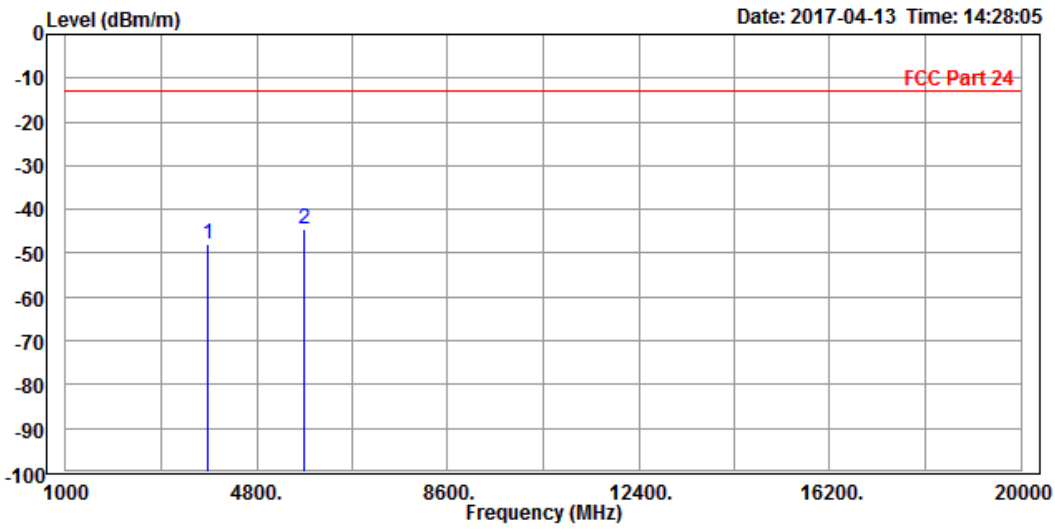
MODE	TX channel 810	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3812.000	-49.75	-53.41	-13.00	-36.75	3.66	Peak	Horizontal
2 PP	5731.000	-44.44	-53.66	-13.00	-31.44	9.22	Peak	Horizontal



MODE	TX channel 810	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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		3812.000	-47.93	-52.07	-13.00	-34.93	4.14	Peak	Vertical
2	PP	5731.000	-44.49	-52.93	-13.00	-31.49	8.44	Peak	Vertical

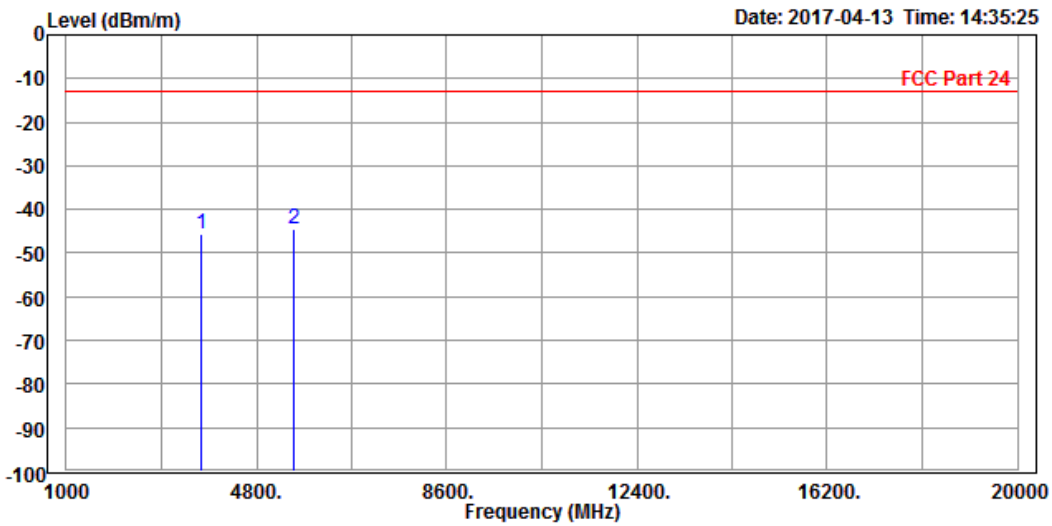


WCDMA Band II

CH 9262

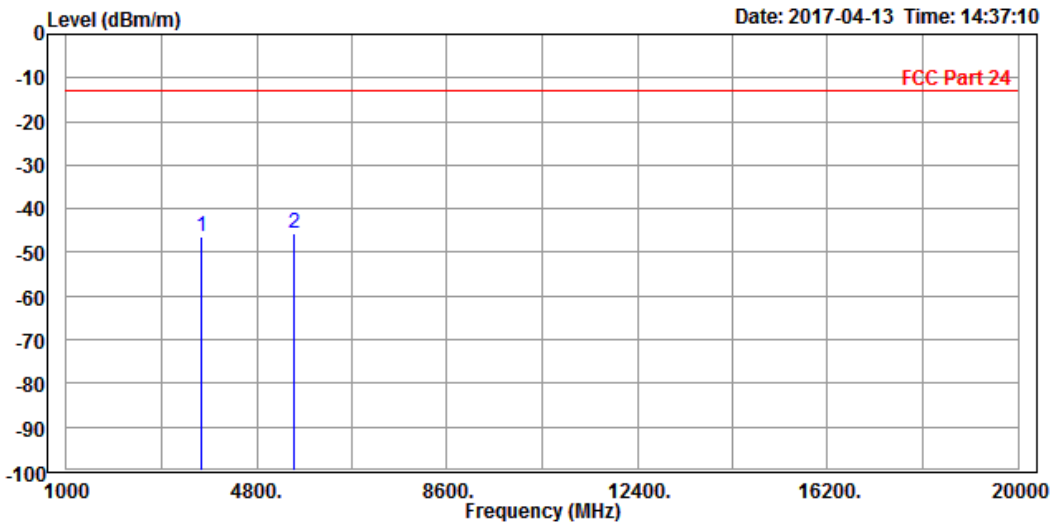
MODE	TX channel 9262	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3698.000	-45.77	-48.88	-13.00	-32.77	3.11	Peak	Horizontal
2 PP	5560.000	-44.34	-53.37	-13.00	-31.34	9.03	Peak	Horizontal



MODE	TX channel 9262	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

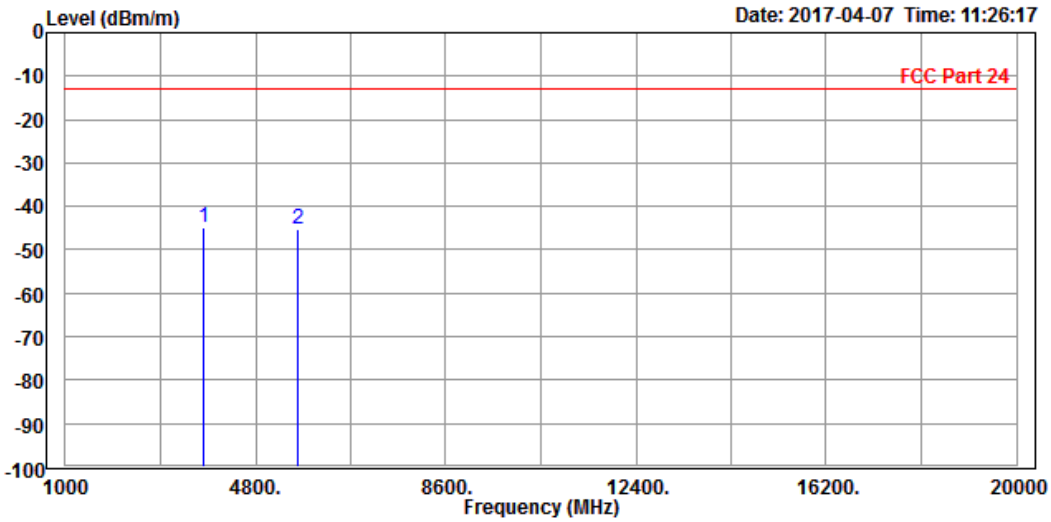
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3698.000	-46.42	-49.99	-13.00	-33.42	3.57	Peak	Vertical
2 PP	5560.000	-45.74	-53.83	-13.00	-32.74	8.09	Peak	Vertical



CH 9400

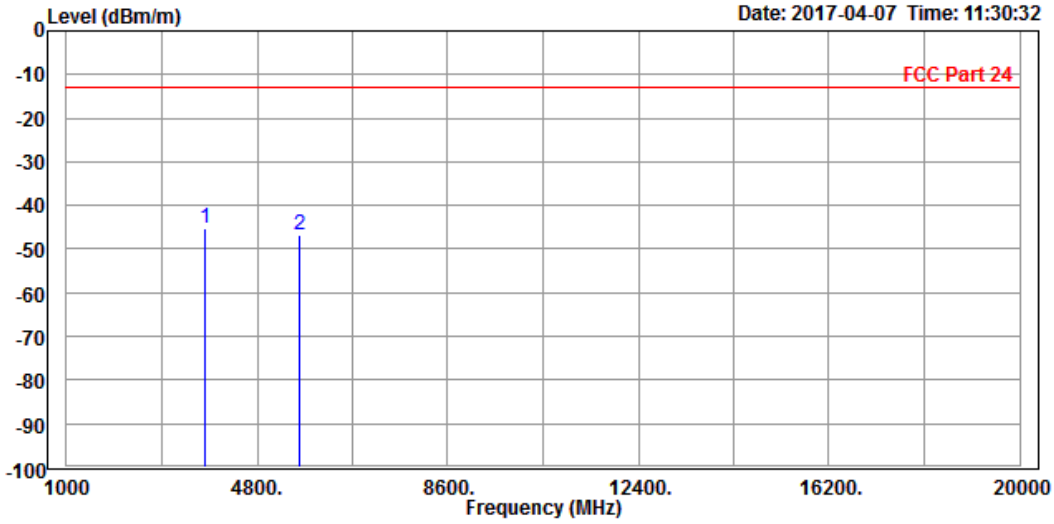
MODE	TX channel 9400	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-44.87	-48.26	-13.00	-31.87	3.39	Peak	Horizontal
2		5640.000	-45.39	-54.51	-13.00	-32.39	9.12	Peak	Horizontal



MODE	TX channel 9400	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

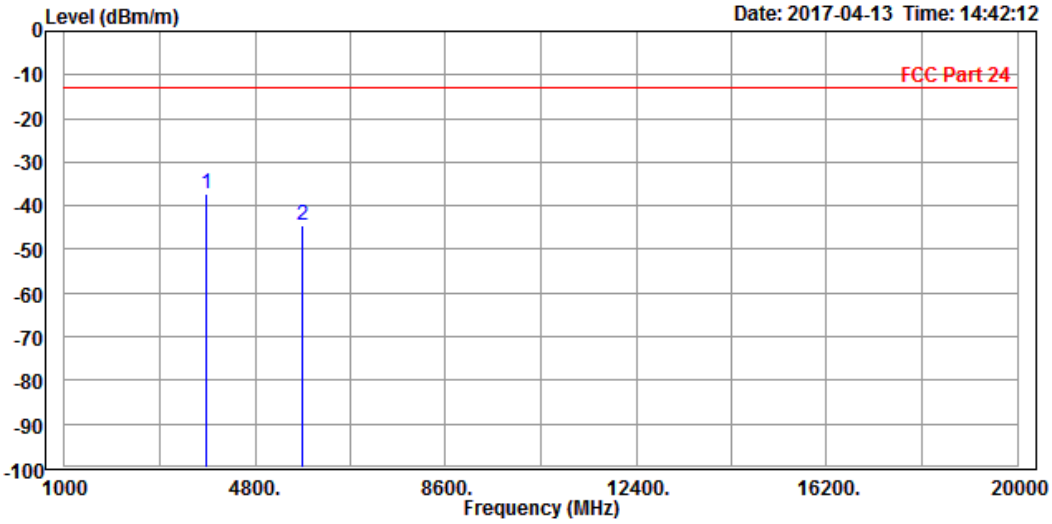
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-45.06	-48.91	-13.00	-32.06	3.85	Peak	Vertical
2		5640.000	-46.71	-54.97	-13.00	-33.71	8.26	Peak	Vertical



CH 9538

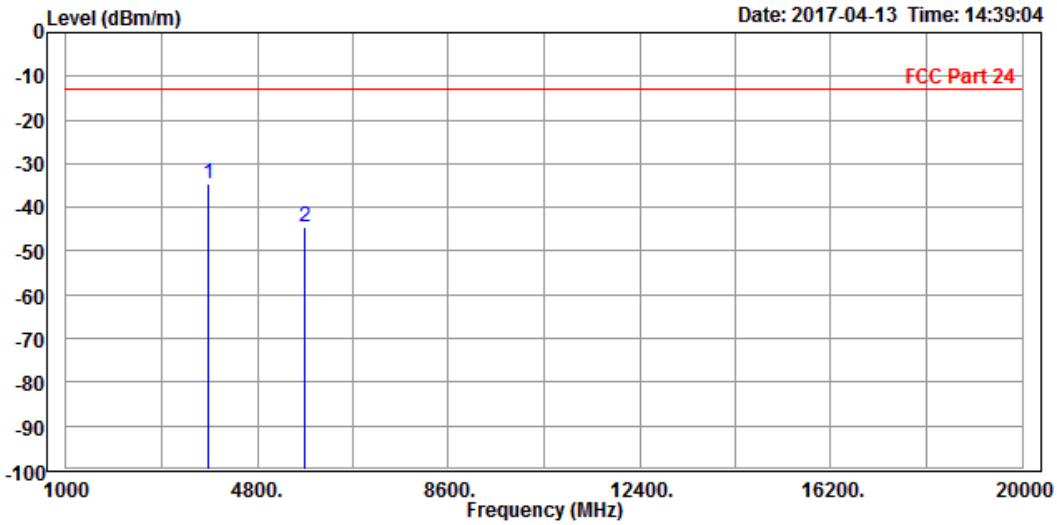
MODE	TX channel 9538	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3812.000	-37.14	-40.80	-13.00	-24.14	3.66	Peak	Horizontal
2		5731.000	-44.61	-53.83	-13.00	-31.61	9.22	Peak	Horizontal



MODE	TX channel 9538	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	PP	3812.000	-34.51	-38.65	-13.00	-21.51	4.14	Peak	Vertical
2		5731.000	-44.49	-52.93	-13.00	-31.49	8.44	Peak	Vertical

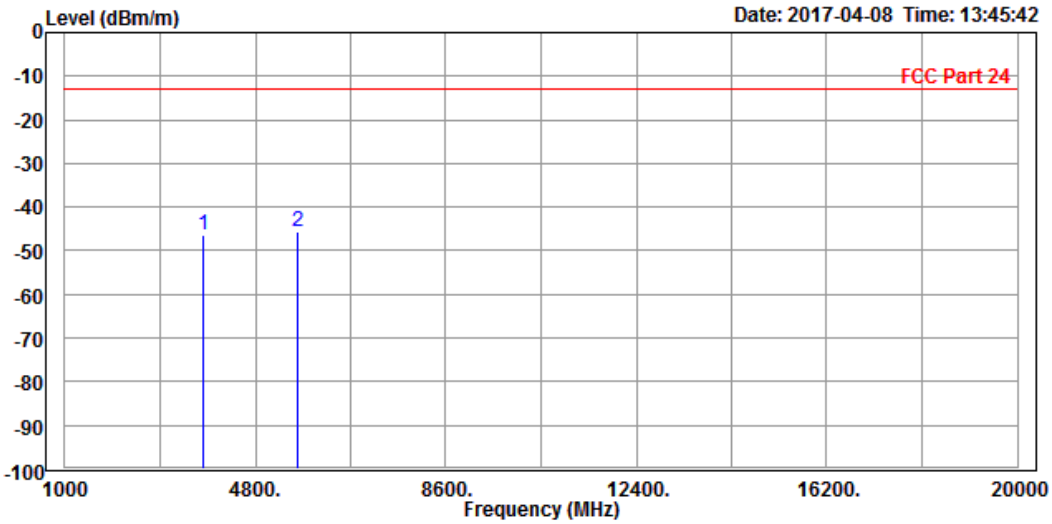


LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK

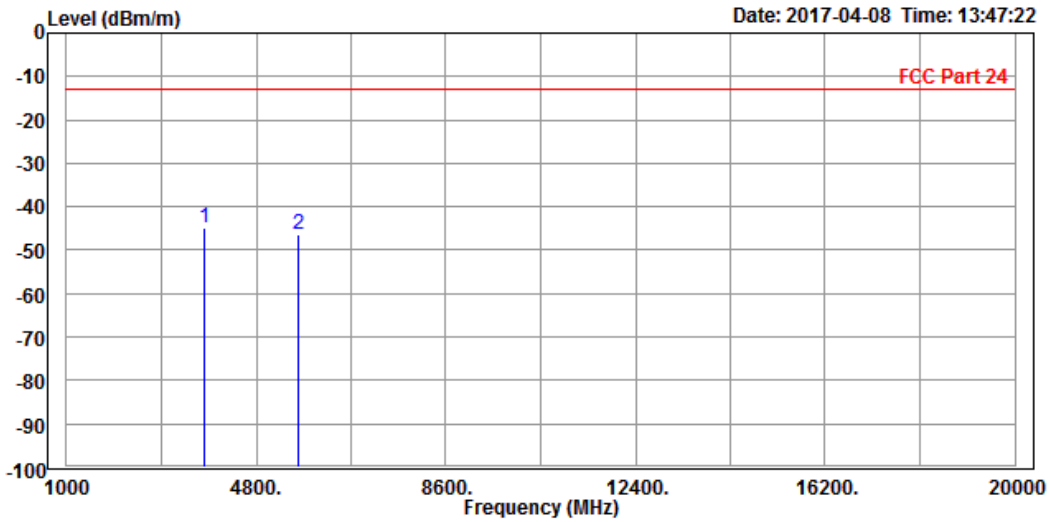
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3755.000	-46.36	-49.75	-13.00	-33.36	3.39	Peak	Horizontal
2 PP	5640.000	-45.64	-54.76	-13.00	-32.64	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

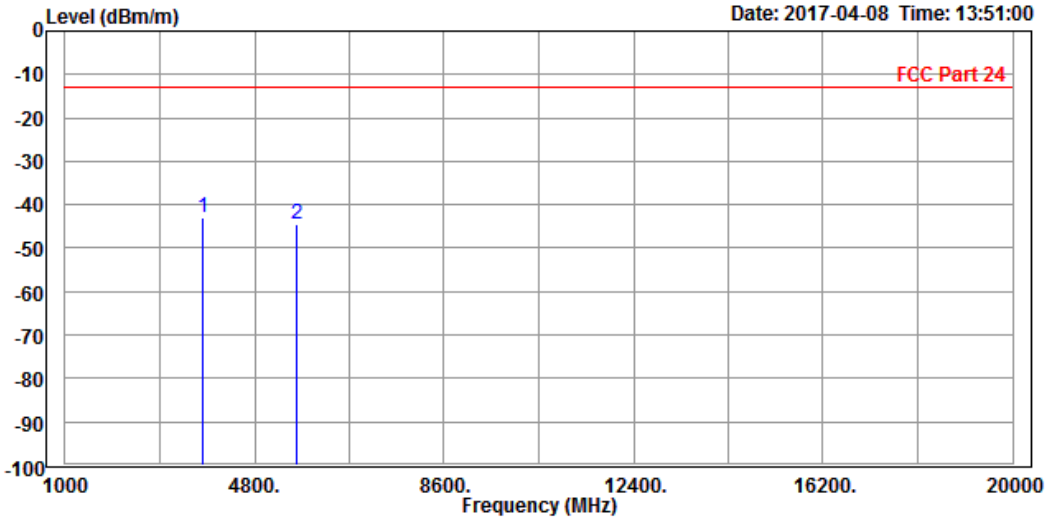
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-45.02	-48.87	-13.00	-32.02	3.85	Peak	Vertical
2		5640.000	-46.46	-54.72	-13.00	-33.46	8.26	Peak	Vertical



CHANNEL BANDWIDTH: 3MHz / QPSK

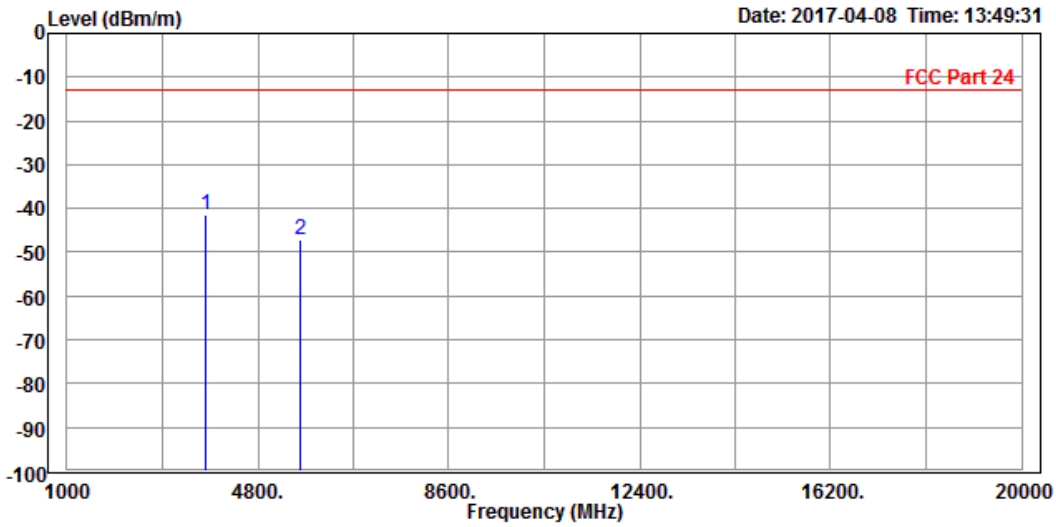
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3755.000	-43.06	-46.45	-13.00	-30.06	3.39	Peak	Horizontal
2	5640.000	-44.54	-53.66	-13.00	-31.54	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

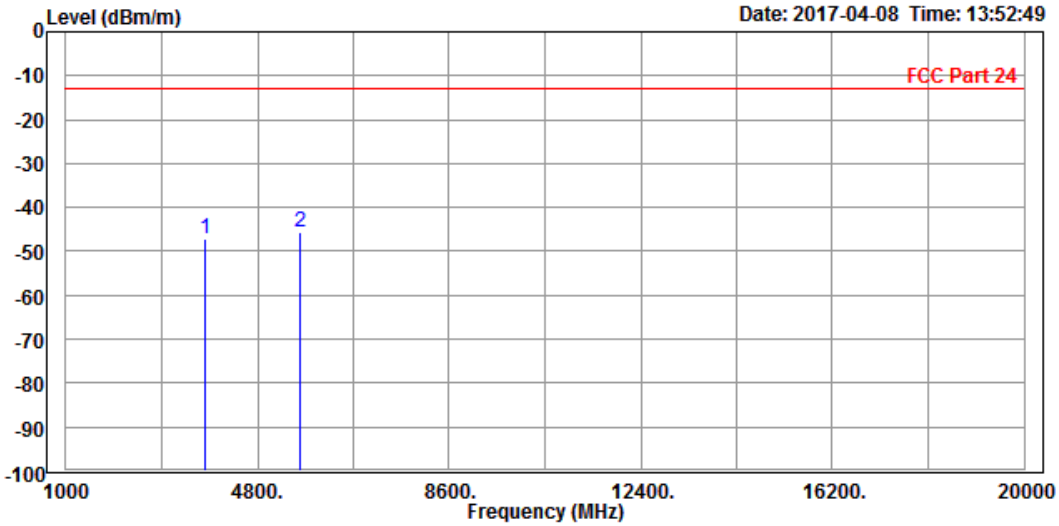
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-41.37	-45.22	-13.00	-28.37	3.85	Peak	Vertical
2		5640.000	-47.21	-55.47	-13.00	-34.21	8.26	Peak	Vertical



CHANNEL BANDWIDTH: 5MHz / QPSK

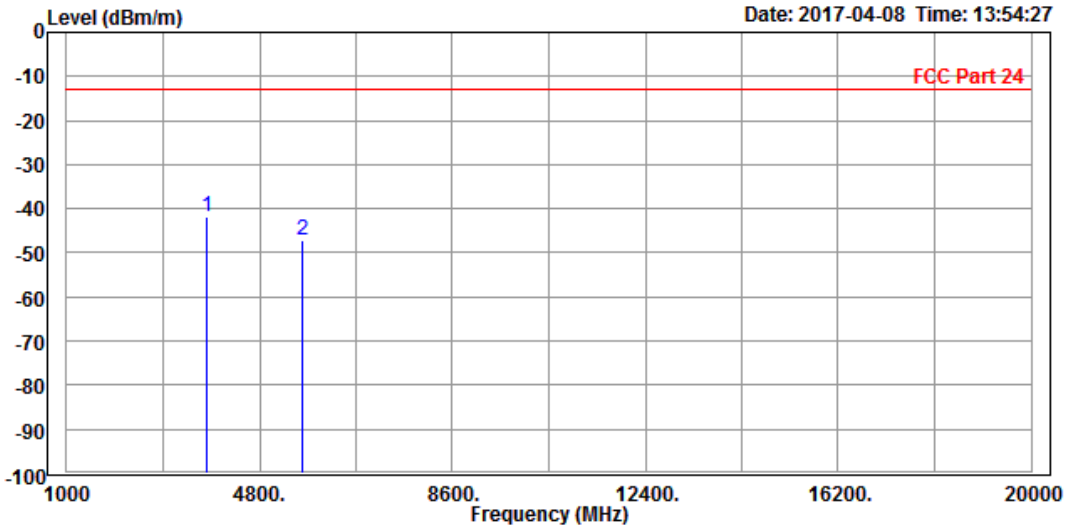
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		3755.000	-47.24	-50.63	-13.00	-34.24	3.39	Peak	Horizontal
2	PP	5640.000	-45.52	-54.64	-13.00	-32.52	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	PP	3755.000	-41.79	-45.64	-13.00	-28.79	3.85	Peak	Vertical
2		5640.000	-47.04	-55.30	-13.00	-34.04	8.26	Peak	Vertical

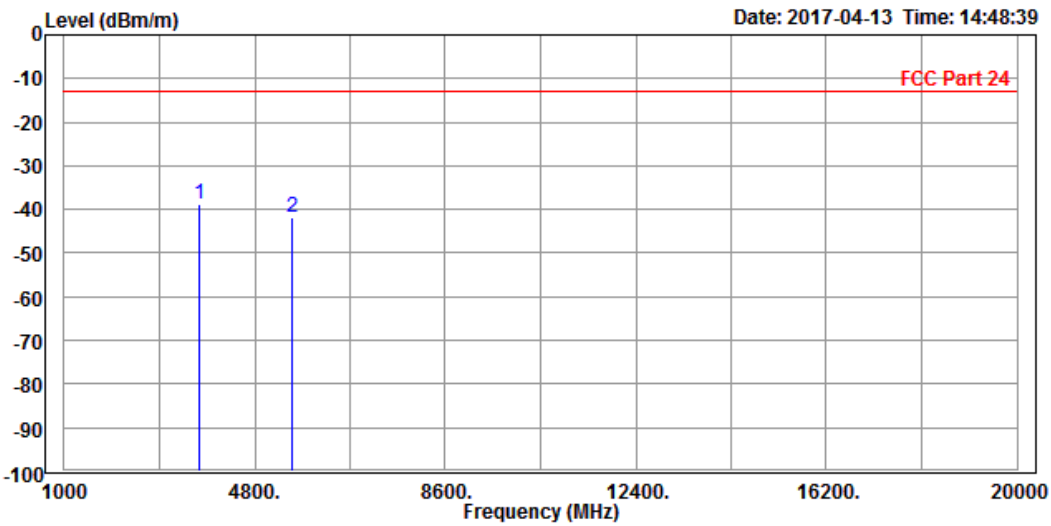


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 18650

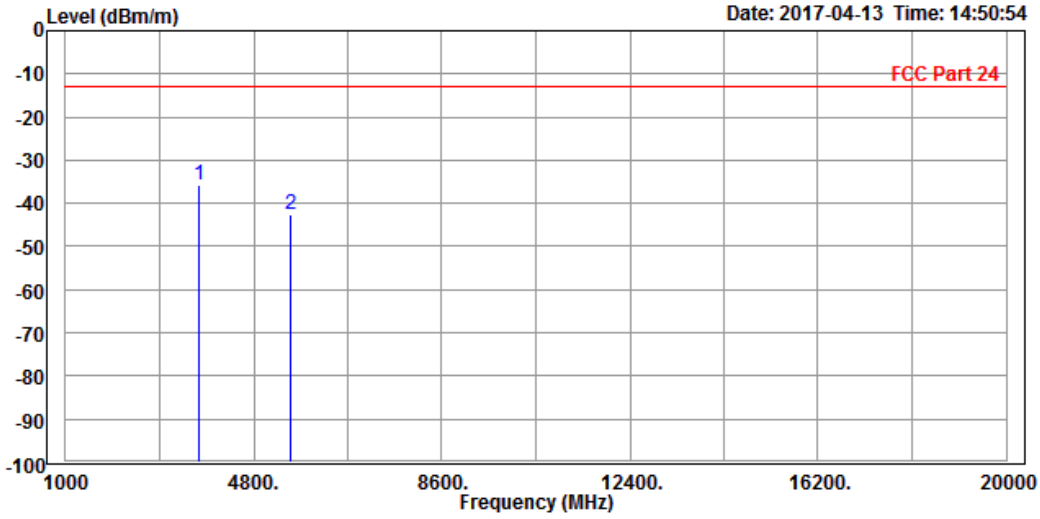
MODE	TX channel 18650	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3698.000	-38.91	-42.02	-13.00	-25.91	3.11	Peak	Horizontal
2	5560.000	-41.64	-50.67	-13.00	-28.64	9.03	Peak	Horizontal



MODE	TX channel 18650	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

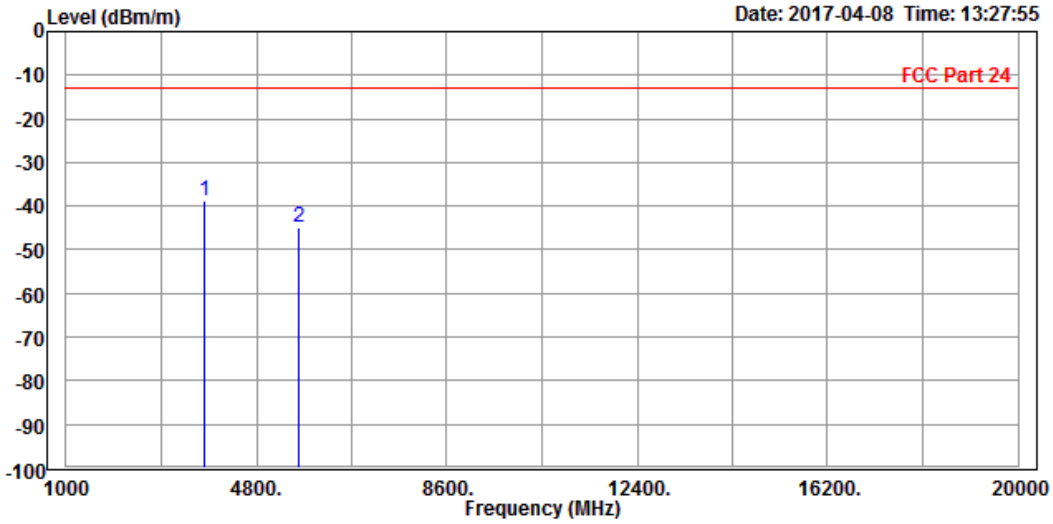
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3698.000	-35.90	-39.47	-13.00	-22.90	3.57	Peak	Vertical
2		5560.000	-42.61	-50.70	-13.00	-29.61	8.09	Peak	Vertical



CH 18900

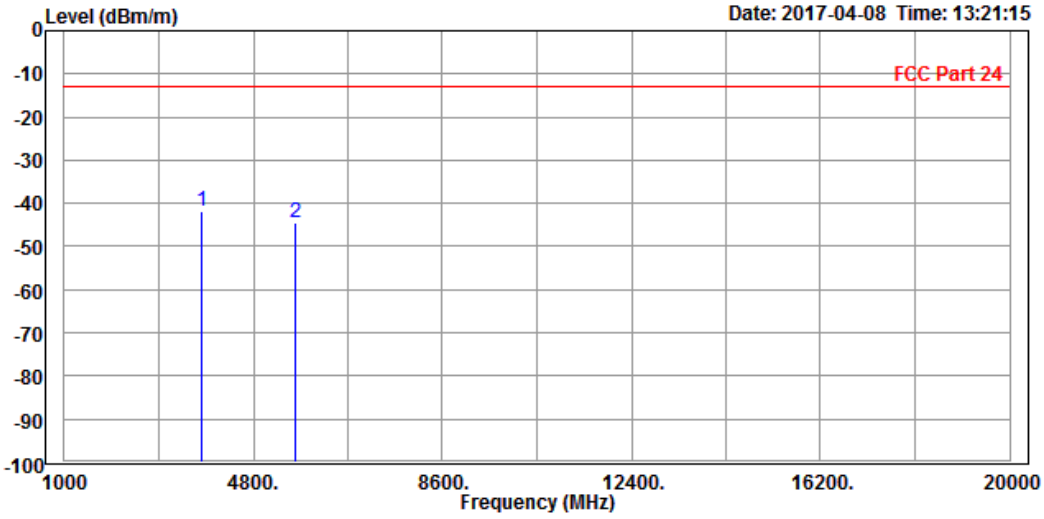
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-38.90	-42.29	-13.00	-25.90	3.39	Peak	Horizontal
2		5640.000	-44.81	-53.93	-13.00	-31.81	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

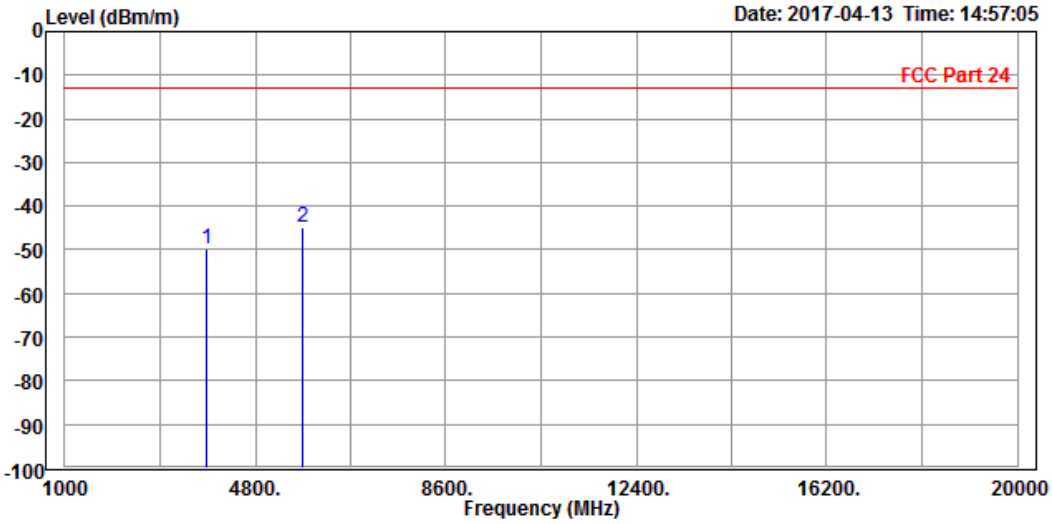
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-42.00	-45.85	-13.00	-29.00	3.85	Peak	Vertical
2		5640.000	-44.48	-52.74	-13.00	-31.48	8.26	Peak	Vertical



CH 19150

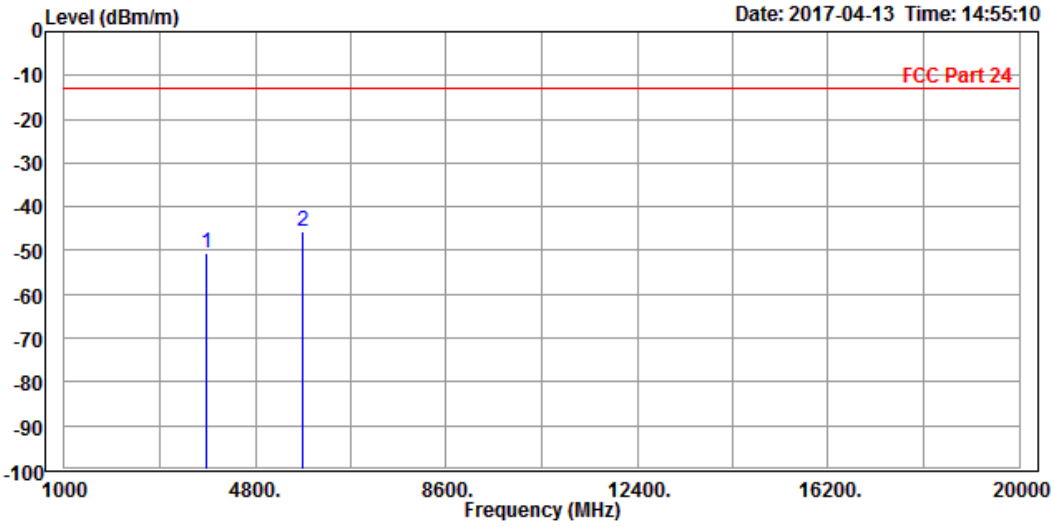
MODE	TX channel 19150	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3812.000	-49.67	-53.33	-13.00	-36.67	3.66	Peak	Horizontal
2 PP	5731.000	-44.94	-54.16	-13.00	-31.94	9.22	Peak	Horizontal



MODE	TX channel 19150	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

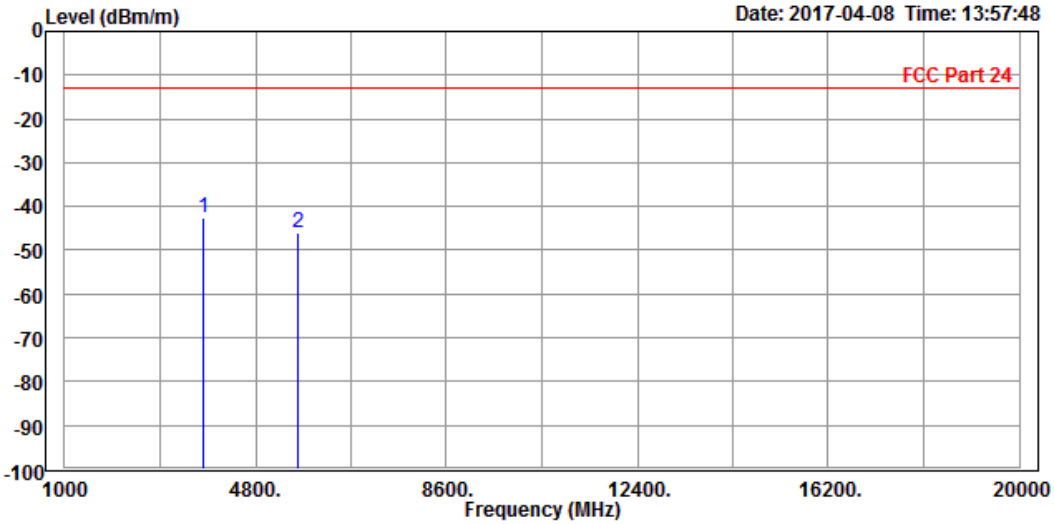
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		3812.000	-50.39	-54.53	-13.00	-37.39	4.14	Peak	Vertical
2	PP	5731.000	-45.74	-54.18	-13.00	-32.74	8.44	Peak	Vertical



CHANNEL BANDWIDTH: 15MHz / QPSK

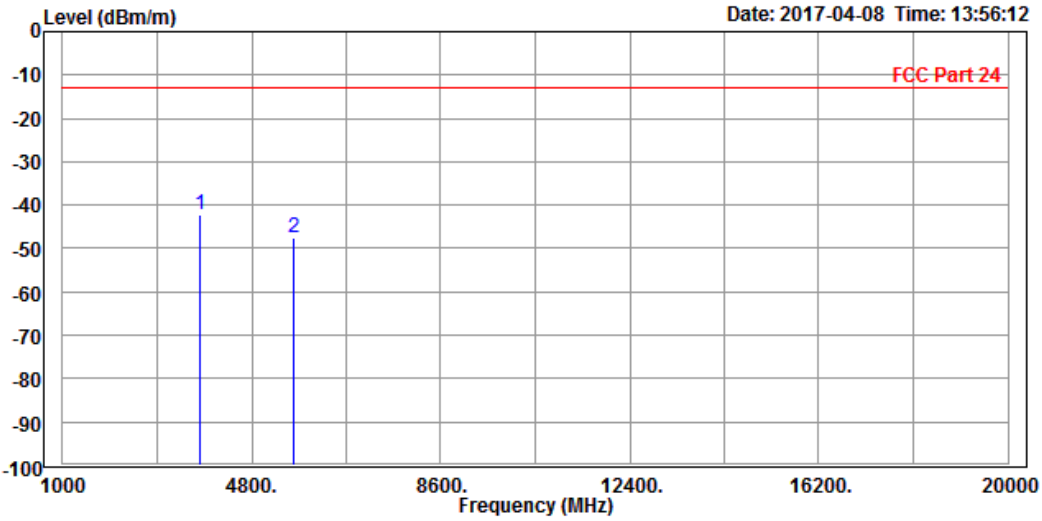
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-42.70	-46.09	-13.00	-29.70	3.39	Peak	Horizontal
2		5640.000	-46.09	-55.21	-13.00	-33.09	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

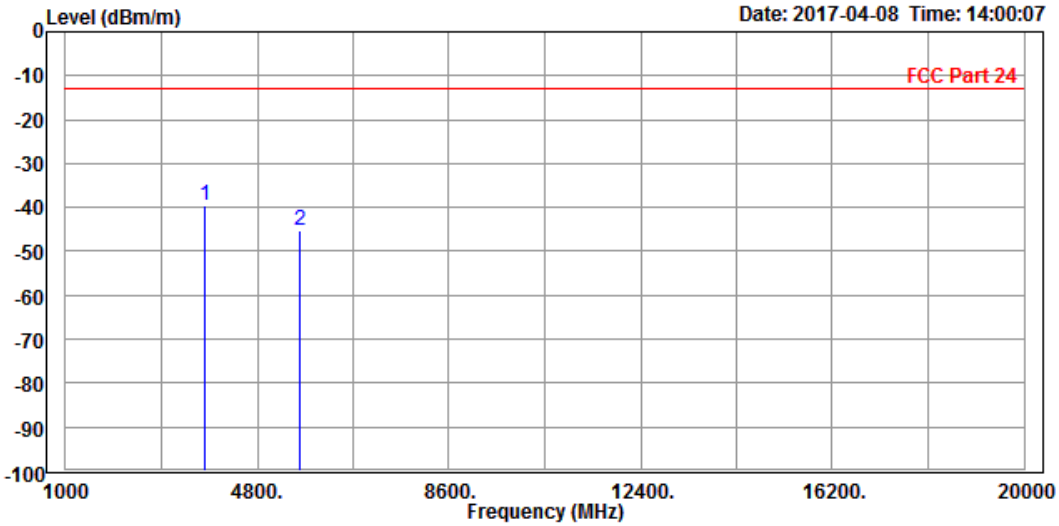
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	3755.000	-42.02	-45.87	-13.00	-29.02	3.85	Peak	Vertical
2	5640.000	-47.48	-55.74	-13.00	-34.48	8.26	Peak	Vertical



CHANNEL BANDWIDTH: 20MHz / QPSK

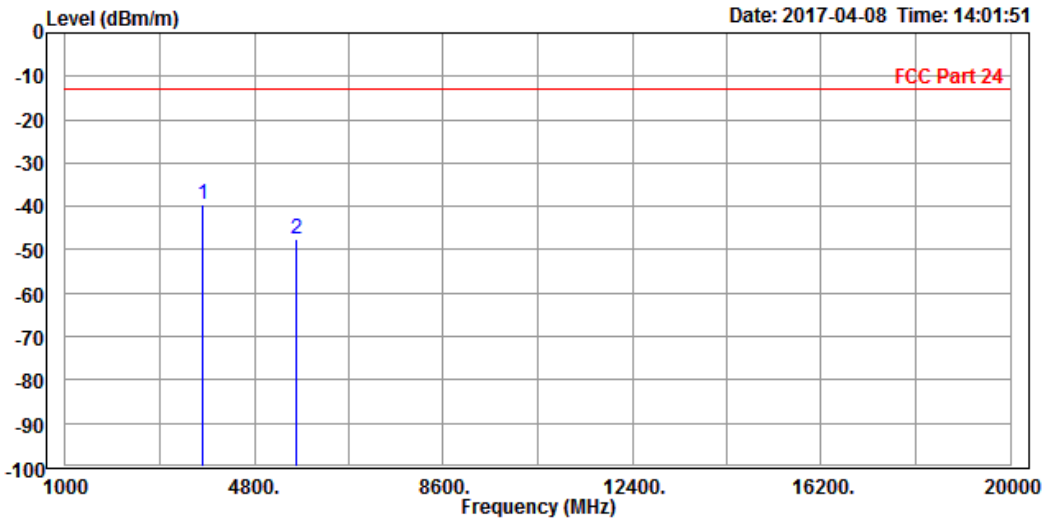
MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	3755.000	-39.46	-42.85	-13.00	-26.46	3.39	Peak	Horizontal
2		5640.000	-45.17	-54.29	-13.00	-32.17	9.12	Peak	Horizontal



MODE	TX channel 18900	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 60%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Tony Zou		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL 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	PP	3755.000	-39.66	-43.51	-13.00	-26.66	3.85	Peak	Vertical
2		5640.000	-47.44	-55.70	-13.00	-34.44	8.26	Peak	Vertical

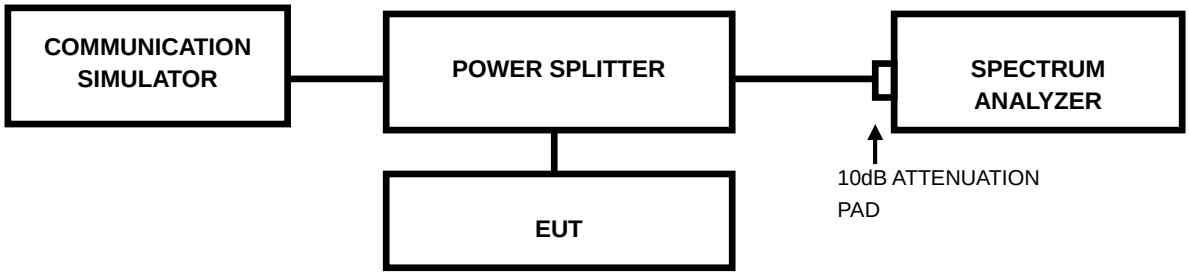


4.7 PEAK TO AVERAGE RATIO

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

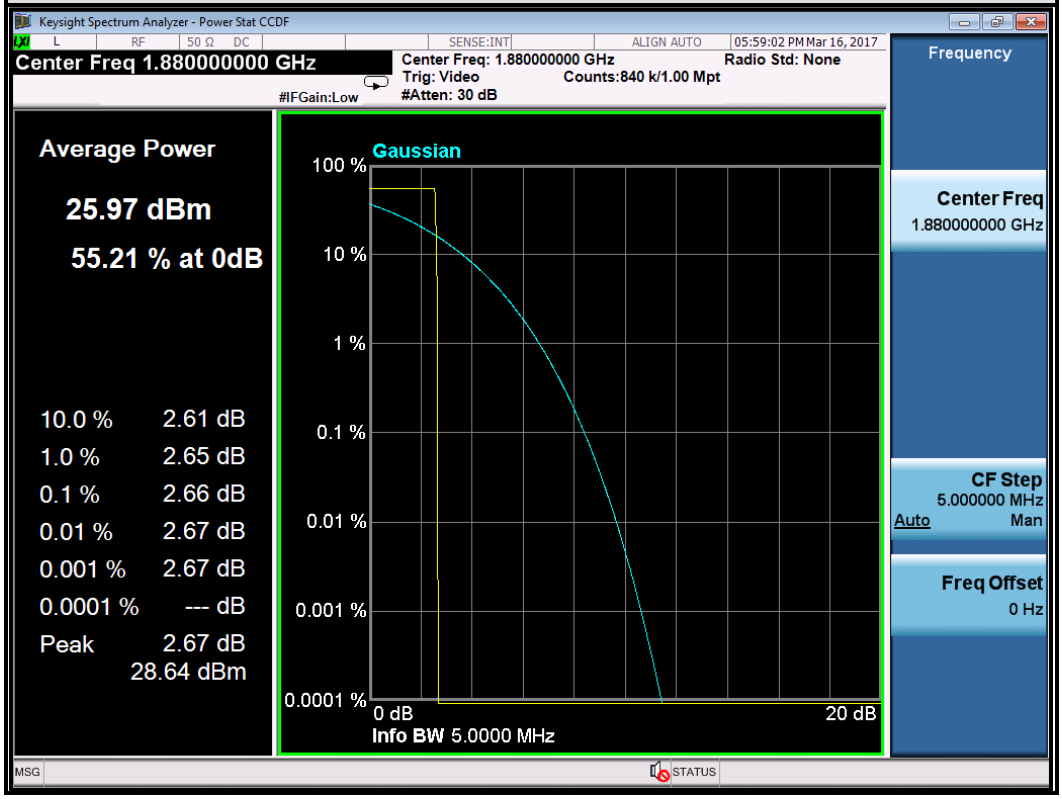
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.7.4 TEST RESULTS

GSM

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
661	1880	2.66

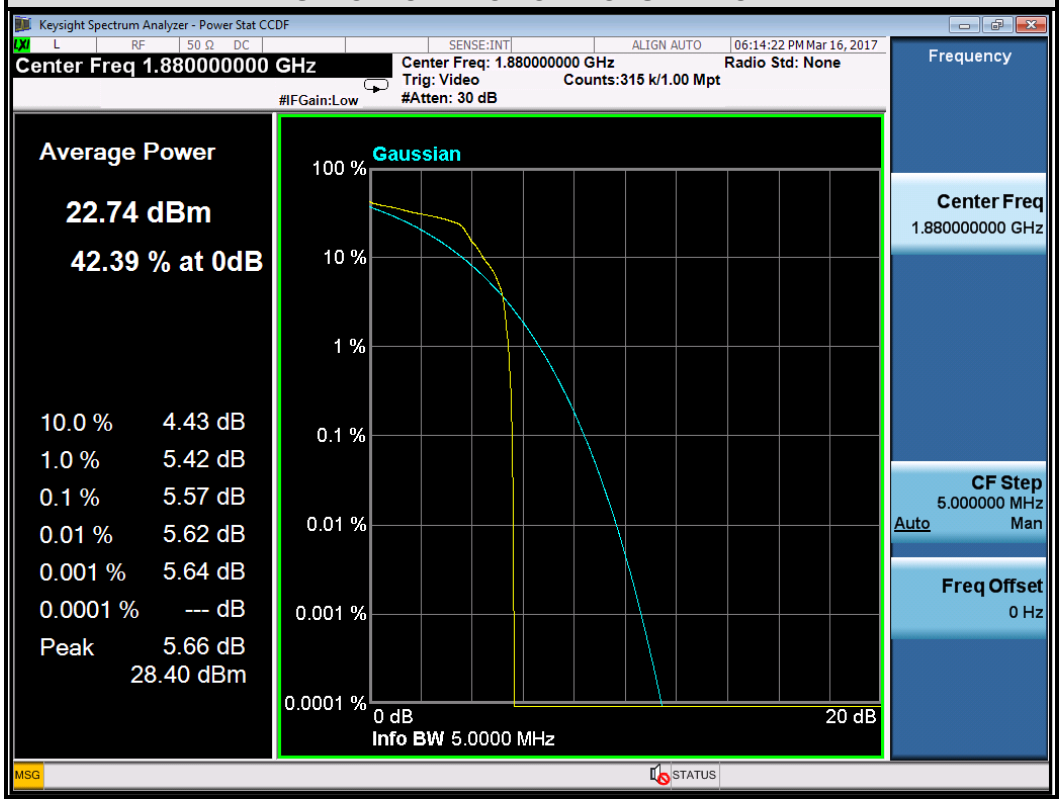
SPECTRUM PLOT OF WORST VALUE



EDGE

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
661	1880	5.57

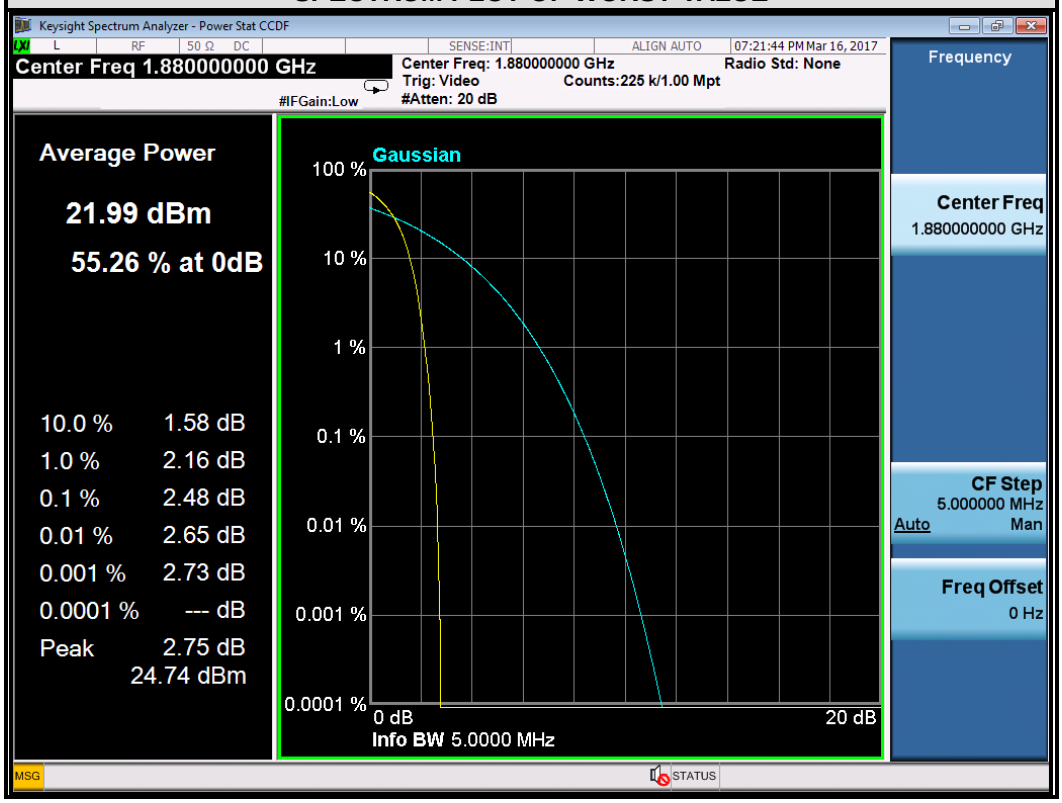
SPECTRUM PLOT OF WORST VALUE



WCDMA

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
9400	1880	2.48

SPECTRUM PLOT OF WORST VALUE

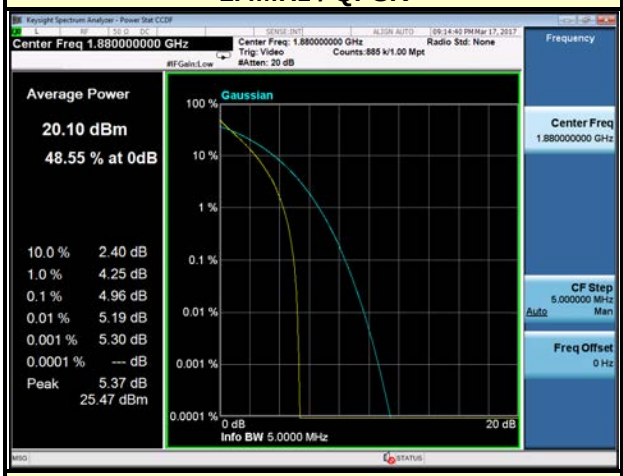


LTE BAND 2

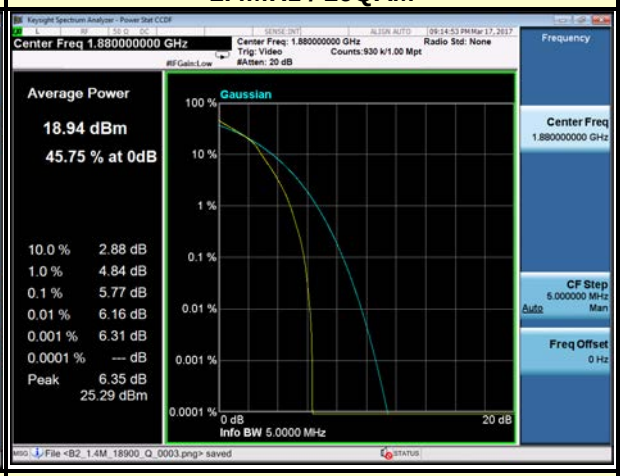
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	4.73	5.52	18615	1851.5	4.91	5.67
18900	1880	4.96	5.77	18900	1880	5.18	5.87
19193	1909.3	4.58	5.44	19185	1908.5	4.98	5.73

SPECTRUM PLOT OF WORST VALUE

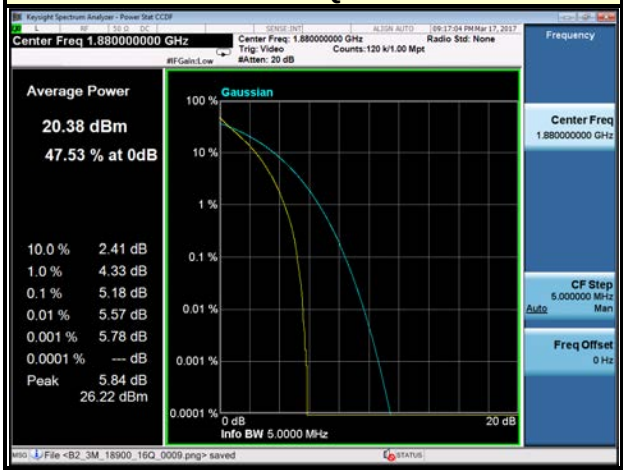
1.4MHz / QPSK



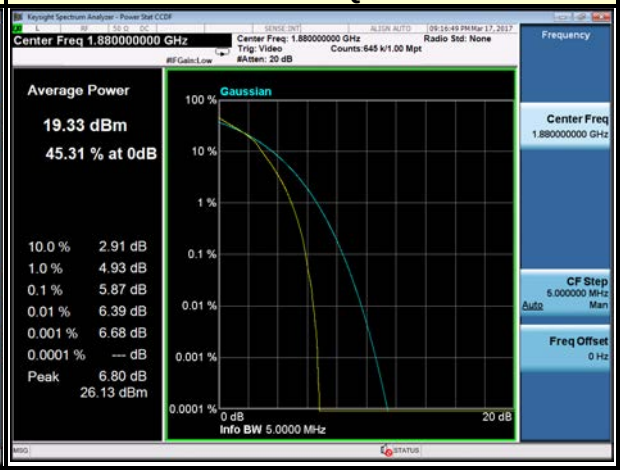
1.4MHz / 16QAM



3MHz / QPSK



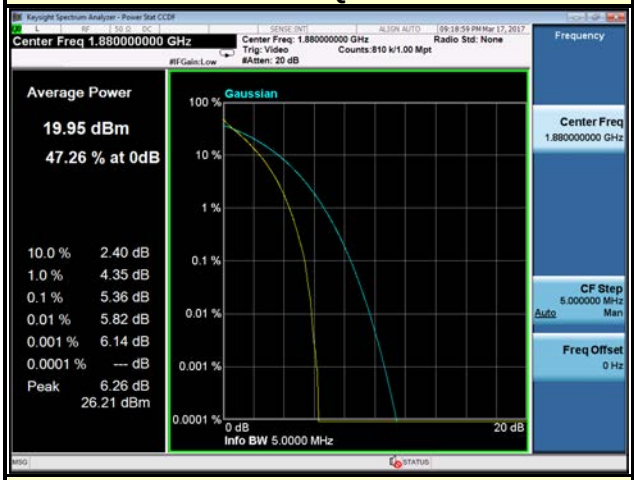
3MHz / 16QAM



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	5.18	5.91	18650	1855	4.88	5.60
18900	1880	5.36	6.02	18900	1880	5.06	5.85
19175	1907.5	5.26	5.89	19150	1905	5.02	5.84

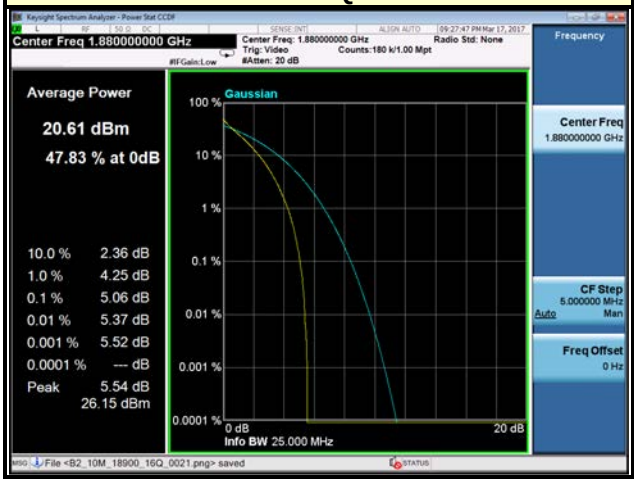
SPECTRUM PLOT OF WORST VALUE

5MHz / QPSK

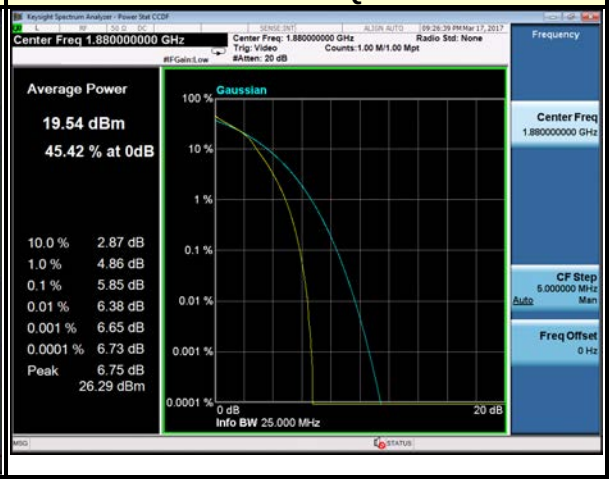


5MHz / 16QAM

10MHz / QPSK



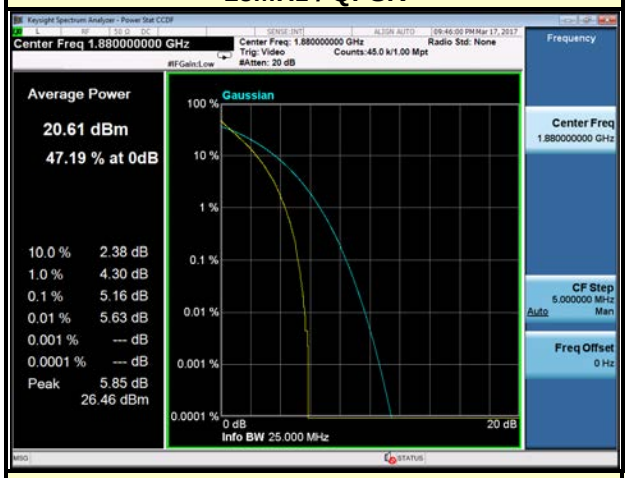
10MHz / 16QAM



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	5.02	5.75	18700	1860	5.16	5.88
18900	1880	5.16	5.85	18900	1880	5.19	5.97
19125	1902.5	5.15	5.93	19100	1900	5.23	5.98

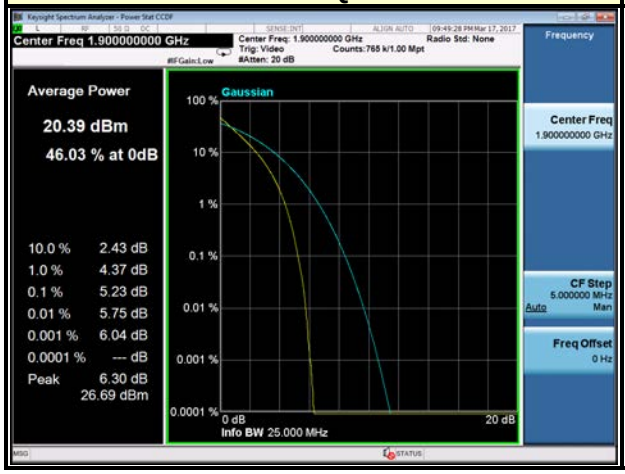
SPECTRUM PLOT OF WORST VALUE

15MHz / QPSK

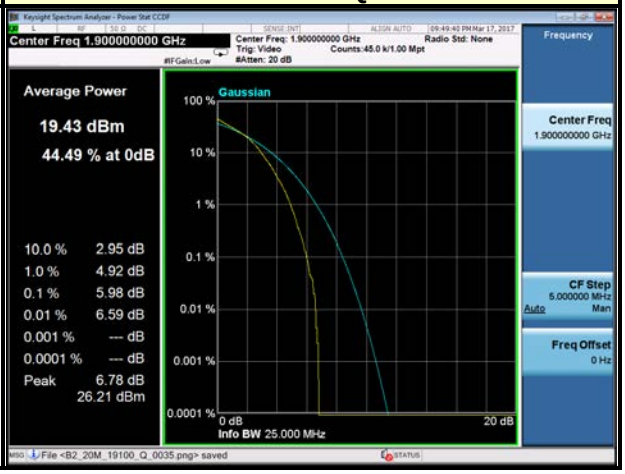


15MHz / 16QAM

20MHz / QPSK



20MHz / 16QAM



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:

Dongguan EMC/RF Lab:
Tel: +86-769-85935656
Fax: +86-769-85931080

Email: customerservice.dg@cn.bureauveritas.com
Web Site: www.adt.com.tw

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

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---