ACCREDITED
Certificate # 3939.01

FCC TEST REPORT

(PART 22)

Applicant:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China,10085

Manufacturer or Supplier:	Xiaomi Communications Co., Ltd.
Address:	#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China,10085
Product:	Mobile Phone
Brand Name:	Redmi
Model Name:	M2003J6A1G
FCC ID:	2AFZZJ6A1G
Date of tests:	Jan. 07, 2020 ~ Feb. 29, 2020

The tests have been carried out according to the requirements of the following standard:

☒ **FCC PART 22, Subpart H** ☒ **FCC Part 2**
☒ **ANSI/TIA/EIA-603-D** ☒ **ANSI C63.26-2015**
☒ **ANSI/TIA/EIA-603-E**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Alex Chen Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
Alex	Luke Lu
Date: Feb. 29, 2020	Date: Feb. 29, 2020

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF200106W008-4	Original release	Feb. 29, 2020

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2		
STANDARD SECTION	**TEST TYPE**	**RESULT**
2.1046 22.913 (a)	Effective Radiated Power	Compliance
2.1055 22.355	Frequency Stability	Compliance
2.1049 22.917 (b)	Occupied Bandwidth	Compliance
22.913 (d)	Peak to average ratio*	Compliance
22.917	Band Edge Measurements	Compliance
2.1051 22.917	Conducted Spurious Emissions	Compliance
2.1053 22.917	Radiated Spurious Emissions	Compliance

* Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

1.1 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	UNCERTAINTY
Maximum Peak Output Power	±2.06dB
Frequency Stability	±76.97Hz
Radiated emissions (30MHz~1GMHz)	±4.98dB
Radiated emissions (1GMHz ~6GMHz)	±4.70dB
Radiated emissions (6GMHz ~18GMHz)	±4.60dB
Radiated emissions (18GMHz ~40GMHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Band Edge Measurements	±4.70dB
Peak to average ratio	±0.76dB

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

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Feb. 26,20	Feb. 25,21
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 26,20	Feb. 25,21
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 26,20	Feb. 25,21
Horn Antenna (1GHz-18GHz)	ETS-LINDGREN	3117	00168692	Nov. 30, 19	Nov. 29, 20
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Nov. 21, 19	Nov. 20, 20
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 26,20	Feb. 25,21
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 08,19	Jul. 09,20
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 08,19	Jul. 09,20
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 08,19	Jul. 09,20
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Feb. 26,20	Feb. 25,21
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. 08,19	Jul. 09,20
Power Meter	Anritsu	ML2495A	1506002	Feb. 26,20	Feb. 25,21
Power Sensor	Anritsu	MA2411B	1339352	Feb. 26,20	Feb. 25,21
Humid & Temp Programmable Tester	Juyi	ITH-120-45-CP-AR	IAA1504-001	Jul. 08,19	Jul. 09,20
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 26,20	Feb. 25,21
Power Divider	MCLI/USA	PS2-15	24880	Jul. 09,19	Jul. 08,20

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 3m 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 525120; The Designation No. is CN1171.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Phone	
BRAND NAME	Redmi	
MODEL NAME	M2003J6A1G	
POWER SUPPLY	5V/9V/10V/12Vdc (adapter or host equipment) 3.87Vdc (Li-ion, battery)	
MODULATION TYPE	**GSM/GPRS/EDGE**	GMSK, 8PSK
	WCDMA	BPSK, QPSK
	LTE	QPSK, 16QAM, 64QAM
FREQUENCY RANGE	**GSM/GPRS/EDGE**	824.2MHz ~ 848.8MHz
	WCDMA	826.4MHz ~ 846.6MHz
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	824.7MHz ~ 848.3MHz
	LTE Band 5 (Channel Bandwidth: 3MHz)	825.5MHz ~ 847.5MHz
	LTE Band 5 (Channel Bandwidth: 5MHz)	826.5MHz ~ 846.5MHz
	LTE Band 5 (Channel Bandwidth: 10MHz)	829MHz ~ 844MHz
MAX. ERP POWER	**GSM**	347mW
	EDGE	88mW
	WCDMA	41mW
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	46mW
	LTE Band 5 (Channel Bandwidth: 3MHz)	41mW
	LTE Band 5 (Channel Bandwidth: 5MHz)	40mW
	LTE Band 5 (Channel Bandwidth: 10MHz)	41mW
EMISSION DESIGNATORGOGN	**GSM**	244KGXW
	EDGE	246KG7W
	WCDMA	4M17F9W
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	QPSK: 1M11G7D
		16QAM: 1M10W7D
		64QAM: 1M10W7D
	LTE Band 5 (Channel Bandwidth: 3MHz)	QPSK: 2M69G7D
		16QAM: 2M69W7D
		64QAM: 2M68W7D

	LTE Band 5 (Channel Bandwidth: 5MHz)	QPSK: 4M49G7D
		16QAM: 4M47W7D
		64QAM: 4M48W7D
	LTE Band 5 (Channel Bandwidth: 10MHz)	QPSK: 8M95G7D
		16QAM: 8M95W7D
		64QAM: 8M94W7D
ANTENNA TYPE	Main Antenna(ANT 0): Fixed Internal Antenna with -4.41dBi gain for GSM 850/WCDMA B5/LTE Band 5 DIV Antenna(ANT 1): Fixed Internal Antenna with -4.75dBi gain for GSM 850/WCDMA B5/LTE Band 5	
IMEI CODE	86590904	
HW VERSION	P1.1	
SW VERSION	MIUI 11	
I/O PORTS	Refer to user's manual	

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

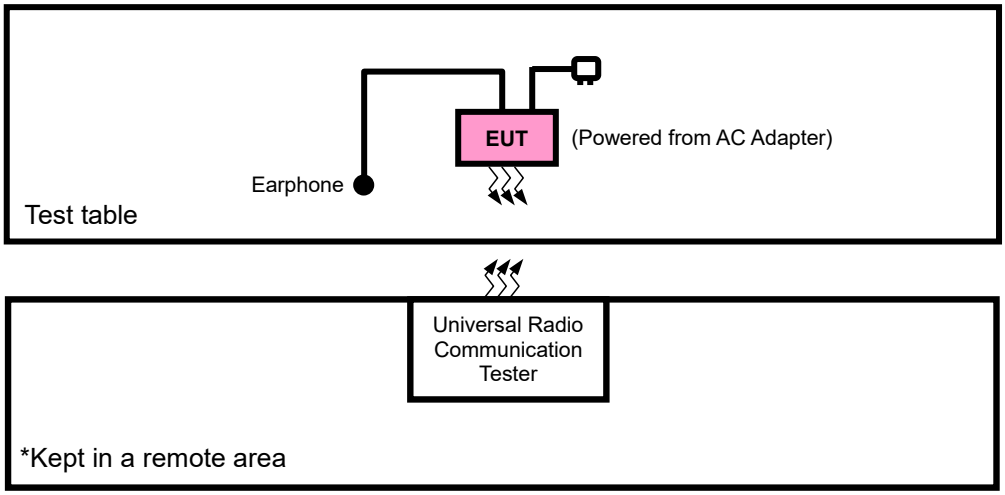
MODULATION MODE	TX FUNCTION
GSM/GPRS/EDGE	1TX/1RX diversity
WCDMA	1TX/1RX diversity
LTE	1TX/1RX diversity

List of Accessory:

ACCESSORIES	BRAND	MODEL	MANUFACTURER	SPECIFICATION
AC Adapter 1	MI	MDY-11-EQ	HUIZHOU BYD ELECTRONIC CO., LTD.	I/P: 100 - 240Vac, 600mA, O/P: 5Vdc, 3000mA/9V,2230mA/12V,1670mA/10V, 2250mA
AC Adapter 2	MI	MDY-11-EQ	Jiangsu Chenyang Electron Co., Ltd.	I/P: 100 - 240Vac, 600mA, O/P: 5Vdc, 3000mA/9V,2230mA/12V,1670mA/10V, 2250mA
Battery	MI	BN55	SUNWODA	Rating :3.87Vdc, 4920mAh, Li-ion, Y
USB Cable 1	MI	H73312	Weihai HongLin Technology Group Co., Ltd.	1.0 meter, non-shielded cable, without ferrite core
USB Cable 2	MI	L73312	Luxshare Precision Industry Co., Ltd.	1.0 meter, non-shielded cable, without ferrite core

CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



2.2 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

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.8m

2.3 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 ERP and radiated emission was found when positioned on X-plane for WCDMA/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	ERP	128 to 251	128, 189, 251	GSM, EDGE
B	FREQUENCY STABILITY	128 to 251	128, 251	GSM, EDGE
B	OCCUPIED BANDWIDTH	128 to 251	128, 189, 251	GSM, EDGE
B	BAND EDGE	128 to 251	128, 251	GSM, EDGE
B	CONDCUDETED EMISSION	128 to 251	128, 189, 251	GSM, EDGE
A	RADIATED EMISSION	128 to 251	128, 189, 251	GSM, EDGE
B	PEAK TO AVERAGE RATIO	128 to 251	128, 189, 251	GSM, EDGE

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
B	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
B	FREQUENCY STABILITY	4132 to 4233	4132, 4233	WCDMA
B	OCCUPIED BANDWIDTH	4132 to 4233	4132, 4182, 4233	WCDMA
B	BAND EDGE	4132 to 4233	4132, 4233	WCDMA
B	CONDCUDETED EMISSION	4132 to 4233	4132, 4182, 4233	WCDMA
A	RADIATED EMISSION	4132 to 4233	4132, 4182, 4233	WCDMA
B	PEAK TO AVERAGE RATIO	4132 to 4233	4132, 4182, 4233	WCDMA

LTE BAND 5 MODE

TEST ITEM	Available Channel	Tested Channel	Channel bandwidth	modulation	mode
ERP	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
FREQUENCY STABILITY	20407 to 20643	20407, 20643	1.4MHz	QPSK	1 RB / 0 RB Offset
	20415 to 20635	20415, 20635	3MHz	QPSK	1 RB / 0 RB Offset
	20425 to 20625	20425, 20625	5MHz	QPSK	1 RB / 0 RB Offset
	20450 to 20600	20450, 20600	10MHz	QPSK	1 RB / 0 RB Offset
OCCUPIED BANDWIDTH	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM,64QAM	6 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM,64QAM	15 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM,64QAM	25 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM,64QAM	50 RB / 0 RB Offset
BAND EDGE	20407 to 20643	20407	1.4 MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
					6 RB / 0 RB Offset
	20407 to 20643	20643	1.4 MHz	QPSK,16QAM, 64QAM	1 RB / 5 RB Offset
					6 RB / 0 RB Offset
	20415 to 20635	20415	3 MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
					15 RB / 0 RB Offset
	20415 to 20635	20635	3 MHz	QPSK,16QAM, 64QAM	1 RB / 14 RB Offset
					15 RB / 0 RB Offset
	20425 to 20625	20425	5MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
	20425 to 20625	20625	5MHz	QPSK,16QAM, 64QAM	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
	20450 to 20600	20450	10MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
	20450 to 20600	20600	10MHz	QPSK,16QAM, 64QAM	1 RB / 49 RB Offset
					50 RB / 0 RB Offset

CONDCUDETED EMISSION	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK	1 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK	1 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	1 RB / 0 RB Offset
RADIATED EMISSION	20407 to 20643	20525	1.4MHz	QPSK	1 RB / 0 RB Offset
	20415 to 20635	20525	3MHz	QPSK	1 RB / 0 RB Offset
	20425 to 20625	20525	5MHz	QPSK	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	1 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset

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

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	23deg. C, 70%RH	DC 3.87V By Battery	Star Le
FREQUENCY STABILITY	23deg. C, 70%RH	DC 3.6V/3.87V/4.45V	Harris Wang
OCCUPIED BANDWIDTH	23deg. C, 70%RH	DC 3.87V By Battery	Harris Wang
BAND EDGE	23deg. C, 70%RH	DC 3.87V By Battery	Harris Wang
CONDCUDETED EMISSION	23deg. C, 70%RH	DC 3.87V By Battery	Harris Wang
RADIATED EMISSION	23deg. C, 70%RH	DC 5/9/10/12V By Adapter	Star Le
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	DC 3.87V By Battery	Harris Wang

2.4 EUT OPERATING CONDITIONS

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

2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2

FCC 47 CFR Part 22

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

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

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determing the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP or EIRP = $P_{Meas} + G_T - L_C$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

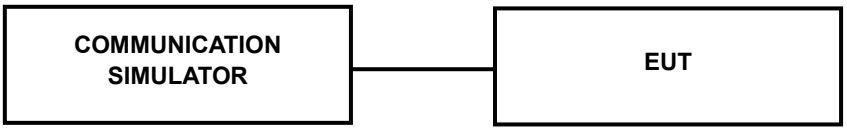
CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with 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.

3.1.3 TEST SETUP

EIRP / ERP Measurement:

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850			
Channel	128	189	251	Max. Tune-up Power
Frequency	824.2	836.4	848.8	
GSM	31.89	31.94	31.93	33.50
GPRS 1Tx Slot	31.91	31.96	31.95	33.50
GPRS 2Tx Slot	28.76	28.81	28.80	30.50
GPRS 3Tx Slot	26.75	26.80	26.79	28.50
GPRS 4Tx Slot	25.52	25.57	25.56	27.50
EDGE 1Tx Slot (MCS9)	25.97	26.02	26.01	27.50
EDGE 2Tx Slot (MCS9)	23.17	23.22	23.21	25.00
EDGE 3Tx Slot (MCS9)	21.52	21.57	21.56	23.50
EDGE 4Tx Slot (MCS9)	20.36	20.41	20.40	22.00

Band	WCDMA V			WCDMA V
TX Channel	4132	4182	4233	Max. Tune-up Power
Rx Channel	4357	4407	4458	
Frequency	826.4	836.4	846.6	
RMC 12.2K	22.60	22.65	22.69	24.00
HSDPA Subtest-1	21.57	21.59	21.64	23.00
HSDPA Subtest-2	21.51	21.53	21.58	22.00
HSDPA Subtest-3	21.08	21.10	21.15	22.00
HSDPA Subtest-4	20.99	21.01	21.06	22.00
DC-HSDPA Subtest-1	21.55	21.55	21.60	23.00
DC-HSDPA Subtest-2	21.52	21.53	21.57	22.00
DC-HSDPA Subtest-3	21.05	21.07	21.11	22.00
DC-HSDPA Subtest-4	21.03	21.05	21.08	22.00
HSUPA Subtest-1	21.56	21.58	21.63	23.00
HSUPA Subtest-2	19.52	19.54	19.59	21.50
HSUPA Subtest-3	20.53	20.55	20.60	22.50
HSUPA Subtest-4	19.47	19.49	19.54	21.00
HSUPA Subtest-5	21.58	21.60	21.65	23.00
HSPA+ Subtest-1	19.08	19.06	19.12	20.50

LTE Band 5

LTE Band 5								
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	Max. Tune-up (dBm)
		Channel		Low CH 20450	Mid CH 20525	High CH 20600		
		Frequence (MHz)		Frequency 829 MHz	Frequency 836.5 MHz	Frequency 844 MHz		
10M	QPSK	**1**	**0**	**22.56**	**22.68**	**22.62**	**0**	**24**
		1	24	22.52	22.64	22.58	0	24
		1	49	22.47	22.59	22.53	0	24
		25	0	22.07	22.19	22.13	1	23
		25	12	22.09	22.21	22.15	1	23
		25	25	22.03	22.15	22.09	1	23
		50	0	22.05	22.17	22.11	1	23
	16QAM	1	0	22.46	22.58	22.52	1	23
		1	24	22.42	22.54	22.48	1	23
		1	49	22.26	22.38	22.32	1	23
		25	0	21.17	21.29	21.23	2	22
		25	12	21.20	21.32	21.26	2	22
		25	25	21.14	21.26	21.20	2	22
		50	0	21.16	21.28	21.22	2	22
	64QAM	1	0	21.40	21.52	21.46	2	23
		1	24	21.35	21.47	21.41	2	23
		1	49	21.24	21.36	21.30	2	23
		25	0	20.22	20.34	20.28	3	22
		25	12	20.19	20.31	20.25	3	22
		25	25	20.13	20.25	20.19	3	22
		50	0	20.16	20.28	20.22	3	22

BW	MCS Index	Channel		Low CH 20425	Mid CH 20525	High CH 20625	3GPP MPR	Max. Tune-up
		Frequence (MHz)		Frequency 826.5 MHz	Frequency 836.5 MHz	Frequency 846.5 MHz		
5M	QPSK	1	0	22.51	22.61	22.57	0	24
		1	12	22.50	22.56	22.56	0	24
		1	24	22.42	22.51	22.52	0	24
		12	0	22.03	22.14	22.08	1	23
		12	6	22.01	22.20	22.10	1	23
		12	13	21.99	22.10	22.08	1	23
		25	0	21.99	22.15	22.06	1	23
	16QAM	1	0	22.39	22.53	22.50	1	23
		1	12	22.34	22.52	22.43	1	23
		1	24	22.24	22.30	22.30	1	23
		12	0	21.09	21.23	21.15	2	22
		12	6	21.14	21.30	21.20	2	22
		12	13	21.07	21.21	21.18	2	22
		25	0	21.10	21.21	21.17	2	22
	64QAM	1	0	21.33	21.47	21.44	2	23
		1	12	21.27	21.45	21.35	2	23
		1	24	21.16	21.35	21.28	2	23
		12	0	20.18	20.29	20.20	3	22
		12	6	20.11	20.30	20.23	3	22
		12	13	20.09	20.20	20.11	3	22
		25	0	20.10	20.26	20.19	3	22

BW	MCS Index	Channel		Low CH 20415	Mid CH 20525	High CH 20635	3GPP MPR	Max. Tune-up
		Frequence (MHz)		Frequency 825.5 MHz	Frequency 836.5 MHz	Frequency 847.5 MHz		
3M	QPSK	1	0	22.50	22.66	22.56	0	24
		1	7	22.45	22.59	22.56	0	24
		1	14	22.41	22.52	22.48	0	24
		8	0	22.00	22.14	22.11	1	23
		8	3	22.01	22.19	22.09	1	23
		8	7	21.95	22.14	22.07	1	23
		15	0	22.01	22.12	22.03	1	23
	16QAM	1	0	22.38	22.57	22.50	1	23
		1	7	22.37	22.49	22.44	1	23
		1	14	22.24	22.30	22.31	1	23
		8	0	21.09	21.25	21.18	2	22
		8	3	21.17	21.26	21.24	2	22
		8	7	21.12	21.19	21.15	2	22
		15	0	21.10	21.20	21.20	2	22
	64QAM	1	0	21.39	21.50	21.38	2	23
		1	7	21.30	21.39	21.35	2	23
		1	14	21.23	21.30	21.28	2	23
		8	0	20.17	20.32	20.21	3	22
		8	3	20.17	20.23	20.24	3	22
		8	7	20.05	20.21	20.14	3	22
		15	0	20.14	20.20	20.21	3	22

BW	MCS Index	Channel		Low CH 20407	Mid CH 20525	High CH 20643	3GPP MPR	Max. Tune-up
		Frequence (MHz)		Frequency 824.7 MHz	Frequency 836.5 MHz	Frequency 848.3 MHz		
1.4M	QPSK	1	0	22.48	22.64	22.57	0	24
		1	2	22.49	22.58	22.56	0	24
		1	5	22.45	22.52	22.48	0	24
		3	0	23.01	23.11	23.11	0	24
		3	1	23.08	**23.19**	23.07	0	24
		3	3	22.98	23.07	23.03	0	24
		6	0	22.04	22.11	22.09	1	23
	16QAM	1	0	22.41	22.51	22.47	1	23
		1	2	22.40	22.46	22.46	1	23
		1	5	22.21	22.30	22.31	1	23
		3	0	22.13	22.24	22.18	1	23
		3	1	22.12	22.31	22.21	1	23
		3	3	22.10	22.21	22.19	1	23
		6	0	21.10	21.26	21.17	2	22
	64QAM	1	0	21.33	21.47	21.44	2	23
		1	2	21.27	21.45	21.36	2	23
		1	5	21.22	21.28	21.28	2	23
		3	0	21.14	21.28	21.20	2	23
		3	1	21.13	21.29	21.19	2	23
		3	3	21.08	21.17	21.18	2	23
		6	0	20.12	20.23	20.17	3	22

ERP POWER (dBm)

GSM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	31.91	-4.41	25.35	342.77	7
189	836.4	31.96	-4.41	25.40	**346.74**	7
251	848.8	31.95	-4.41	25.39	345.94	7

REMARKS: 1. ERP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB) -2.15(dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

EDGE

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	25.97	-4.41	19.41	87.3	7
189	836.4	26.02	-4.41	19.46	**88.31**	7
251	848.8	26.01	-4.41	19.45	88.1	7

REMARKS: 1. ERP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB) -2.15(dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

WCDMA

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
4132	826.4	22.60	-4.41	16.04	40.18	7
4182	836.4	22.65	-4.41	16.09	40.64	7
4233	846.6	22.69	-4.41	16.13	**41.02**	7

REMARKS: 1. ERP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB) -2.15(dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	23.08	-4.41	16.52	44.87	7
20525	836.5	23.19	-4.41	16.63	**46.03**	7
20643	848.3	23.07	-4.41	16.51	44.77	7

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	22.41	-4.41	15.85	38.46	7
20525	836.5	22.51	-4.41	15.95	39.36	7
20643	848.3	22.47	-4.41	15.91	38.99	7

CHANNEL BANDWIDTH: 1.4MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20407	824.7	21.33	-4.41	14.77	29.99	7
20525	836.5	21.47	-4.41	14.91	30.97	7
20643	848.3	21.40	-4.41	14.84	30.48	7

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	22.50	-4.41	15.94	39.26	7
20525	836.5	22.66	-4.41	16.10	**40.74**	7
20635	847.5	22.56	-4.41	16.00	39.81	7

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	22.38	-4.41	15.82	38.19	7
20525	836.5	22.57	-4.41	16.01	39.90	7
20635	847.5	22.50	-4.41	15.94	39.26	7

CHANNEL BANDWIDTH: 3MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20415	825.5	21.39	-4.41	14.83	30.41	7
20525	836.5	21.50	-4.41	14.94	31.19	7
20635	847.5	21.38	-4.41	14.82	30.34	7

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	22.51	-4.41	15.95	39.36	7
20525	836.5	22.61	-4.41	16.05	**40.27**	7
20625	846.5	22.57	-4.41	16.01	39.90	7

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	22.39	-4.41	15.83	38.28	7
20525	836.5	22.53	-4.41	15.97	39.54	7
20625	846.5	22.50	-4.41	15.94	39.26	7

CHANNEL BANDWIDTH: 5MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	21.33	-4.41	14.77	29.99	7
20525	836.5	21.47	-4.41	14.91	30.97	7
20625	846.5	21.44	-4.41	14.88	30.76	7

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829.0	22.56	-4.41	16.00	39.81	7
20525	836.5	22.68	-4.41	16.12	**40.93**	7
20600	844.0	22.62	-4.41	16.06	40.36	7

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829.0	22.46	-4.41	15.90	38.90	7
20525	836.5	22.58	-4.41	16.02	39.99	7
20600	844.0	22.52	-4.41	15.96	39.45	7

CHANNEL BANDWIDTH: 10MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20450	829.0	21.40	-4.41	14.84	30.48	7
20525	836.5	21.52	-4.41	14.96	31.33	7
20600	844.0	21.46	-4.41	14.90	30.9	7

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

3.2.2 TEST PROCEDURE

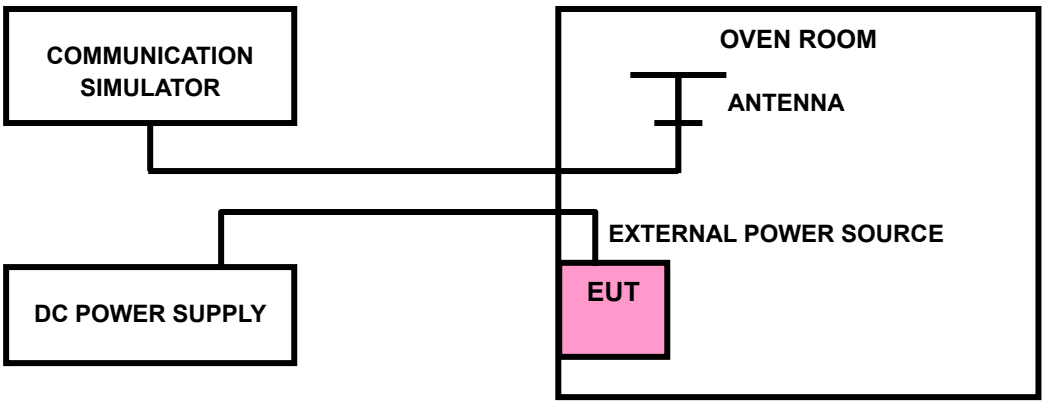
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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.

3.2.3 TEST SETUP



3.2.4 TEST RESULTS

GSM 850

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
V_{nor}	0.0023	0.0026	2.5
V_{min}	-0.0026	-0.0025	2.5
V_{max}	0.0021	0.0022	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0124	-0.0118	2.5
-20	-0.0116	-0.0110	2.5
-10	-0.0100	-0.0094	2.5
0	-0.0087	-0.0082	2.5
10	-0.0071	-0.0065	2.5
20	-0.0055	-0.0050	2.5
30	-0.0041	-0.0035	2.5
40	-0.0027	-0.0022	2.5
50	-0.0011	-0.0006	2.5

EDGE 850

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
V_{nor}	0.0021	0.0025	2.5
V_{min}	-0.0026	-0.0027	2.5
V_{max}	0.0019	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0120	-0.0109	2.5
-20	-0.0106	-0.0096	2.5
-10	-0.0088	-0.0084	2.5
0	-0.0080	-0.0070	2.5
10	-0.0063	-0.0056	2.5
20	-0.0050	-0.0041	2.5
30	-0.0035	-0.0028	2.5
40	-0.0022	-0.0007	2.5
50	0.0008	0.0002	2.5

WCDMA Band V

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
V_{nor}	0.0022	0.0026	2.5
V_{min}	-0.0026	-0.0021	2.5
V_{max}	0.0026	0.0023	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0122	-0.0110	2.5
-20	-0.0099	-0.0109	2.5
-10	-0.0086	-0.0081	2.5
0	-0.0078	-0.0076	2.5
10	-0.0053	-0.0051	2.5
20	-0.0040	-0.0042	2.5
30	-0.0027	-0.0025	2.5
40	-0.0017	-0.0018	2.5
50	-0.0005	-0.0003	2.5

LTE Band 5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0020	0.0025	2.5
V_{min}	-0.0031	-0.0030	2.5
V_{max}	0.0022	0.0020	2.5

NOTE: The applicant defined the normal working voltage of the battery is V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0117	-0.0116	2.5
-20	-0.0112	-0.0109	2.5
-10	-0.0084	-0.0080	2.5
0	-0.0074	-0.0075	2.5
10	-0.0047	-0.0048	2.5
20	-0.0042	-0.0042	2.5
30	-0.0040	-0.0037	2.5
40	-0.0019	-0.0018	2.5
50	-0.0005	-0.0002	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0021	0.0021	2.5
V_{min}	-0.0022	-0.0025	2.5
V_{max}	0.0019	0.0017	2.5

NOTE: The applicant defined the normal working voltage of the battery is V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0122	-0.0112	2.5
-20	-0.0106	-0.0099	2.5
-10	-0.0085	-0.0080	2.5
0	-0.0075	-0.0074	2.5
10	-0.0055	-0.0049	2.5
20	-0.0039	-0.0043	2.5
30	-0.0031	-0.0025	2.5
40	-0.0019	-0.0021	2.5
50	-0.0005	-0.0004	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0021	0.0024	2.5
V_{min}	-0.0024	-0.0030	2.5
V_{max}	0.0021	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0118	-0.0120	2.5
-20	-0.0108	-0.0096	2.5
-10	-0.0081	-0.0081	2.5
0	-0.0077	-0.0076	2.5
10	-0.0049	-0.0051	2.5
20	-0.0043	-0.0043	2.5
30	-0.0036	-0.0036	2.5
40	-0.0021	-0.0021	2.5
50	-0.0005	-0.0005	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0024	0.0024	2.5
V_{min}	-0.0030	-0.0030	2.5
V_{max}	0.0026	0.0028	2.5

NOTE: The applicant defined the normal working voltage of the battery is from V_{min} to V_{max}.

FREQUENCY ERROR vs. TEMPERATURE.

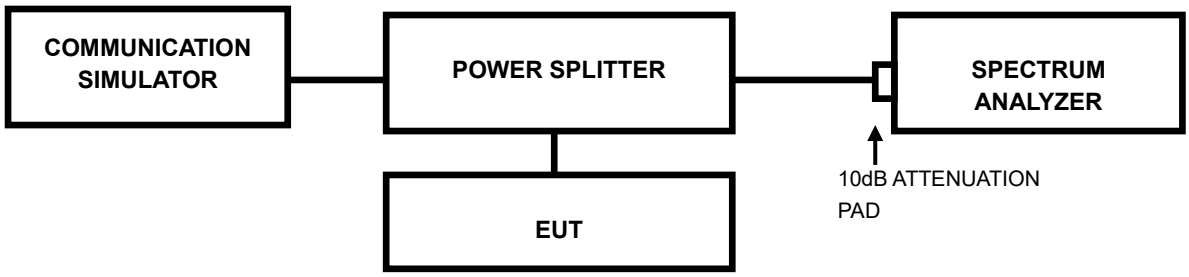
TEMP. (℃)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0112	-0.0112	2.5
-20	-0.0112	-0.0109	2.5
-10	-0.0083	-0.0084	2.5
0	-0.0078	-0.0073	2.5
10	-0.0056	-0.0052	2.5
20	-0.0040	-0.0037	2.5
30	-0.0027	-0.0031	2.5
40	-0.0018	-0.0021	2.5
50	-0.0003	-0.0002	2.5

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 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.

3.3.2 TEST SETUP



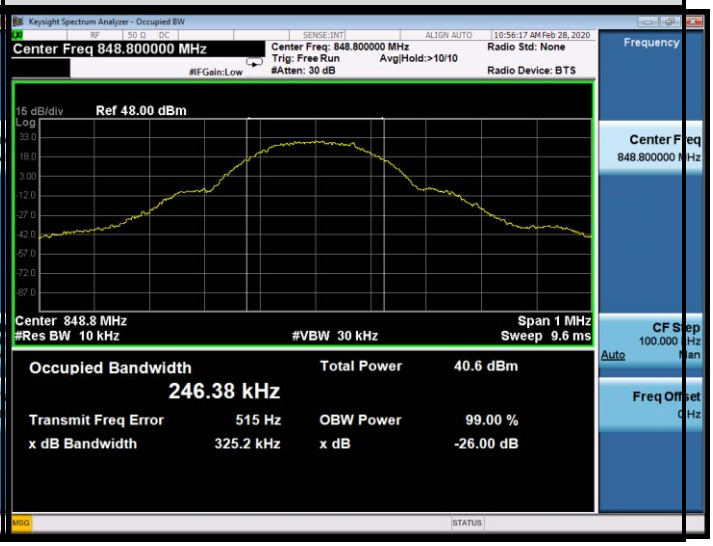
3.3.3 TEST RESULTS

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (kHz)		CHANNEL	Frequency (MHz)	26dB Bandwidth (kHz)	
		GSM	EDGE			GSM	EDGE
128	824.2	243.250	243.940	128	824.2	316.100	317.900
189	836.4	243.850	244.040	189	836.4	320.900	321.700
251	848.8	242.430	246.380	251	848.8	317.000	325.200

SPECTRUM PLOT OF WORST VALUE of 99% + 26dB Occupied Bandwidth

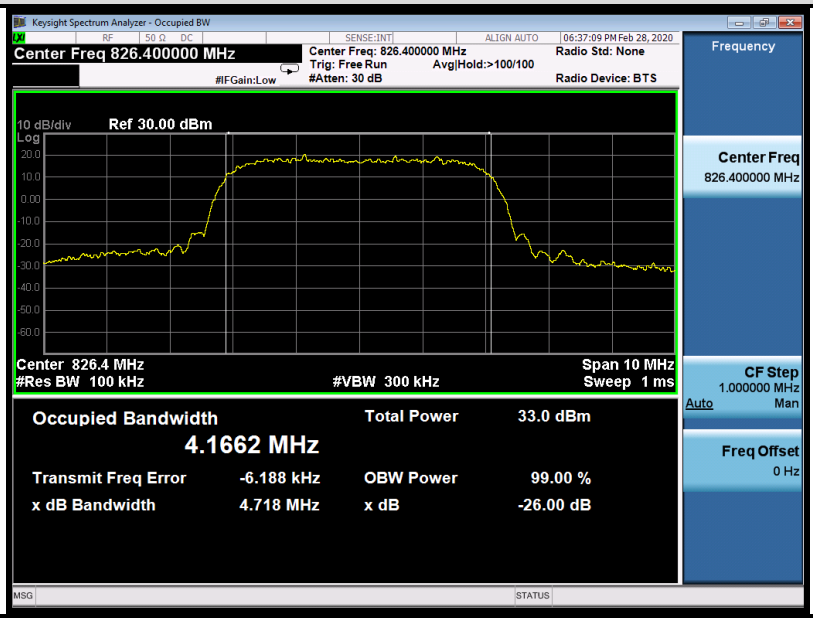
GSM

EDGE



CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (kHz)	CHANNEL	Frequency (MHz)	26dB Bandwidth (MHz)
		WCDMA			WCDMA
4132	826.4	4.166	4132	826.4	4.718
4182	836.4	4.161	4182	836.4	4.720
4233	846.6	4.157	4233	846.6	4.726

SPECTRUM PLOT OF WORST VALUE of 99% + 26dB Occupied Bandwidth
WCDMA



LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz				
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20407	824.7	1.09	1.10	1.10
20525	836.5	1.09	1.09	1.09
20643	848.3	1.11	1.09	1.09

CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20407	824.7	1.25	1.25	1.25
20525	836.5	1.25	1.23	1.22
20643	848.3	1.23	1.24	1.24

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth/26 dB Occupied Bandwidth

1.4MHz / QPSK

1.4MHz / 16QAM

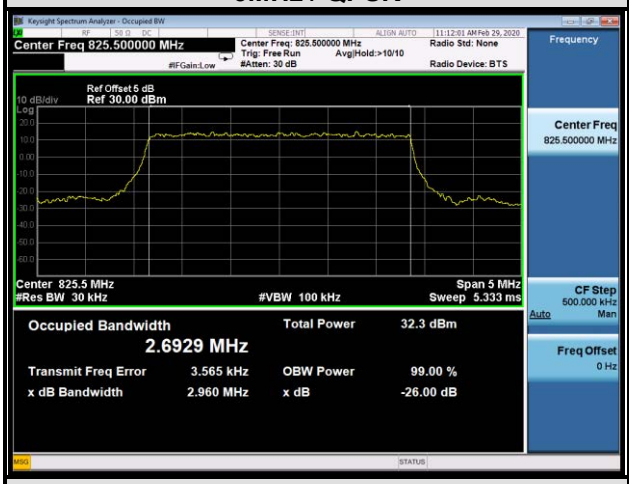
1.4MHz / 64QAM

CHANNEL BANDWIDTH: 3MHz				
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20415	825.5	2.69	2.68	2.68
20525	836.5	2.69	2.68	2.68
20635	847.5	2.69	2.69	2.68

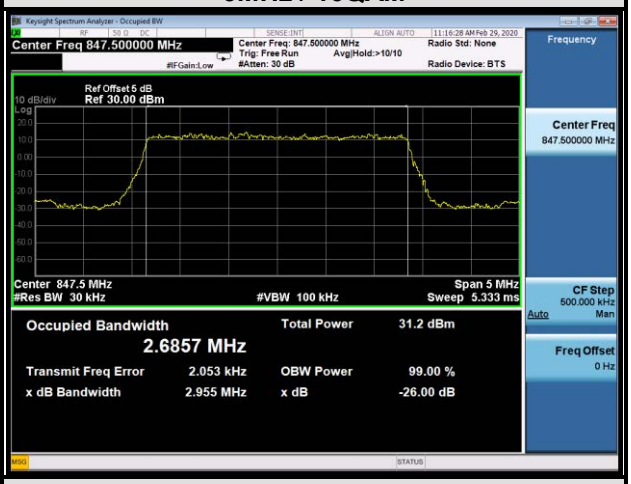
CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20415	825.5	2.96	2.93	2.93
20525	836.5	2.95	2.94	2.94
20635	847.5	2.94	2.96	2.92

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth/26 dB Occupied Bandwidth

3MHz / QPSK



3MHz / 16QAM



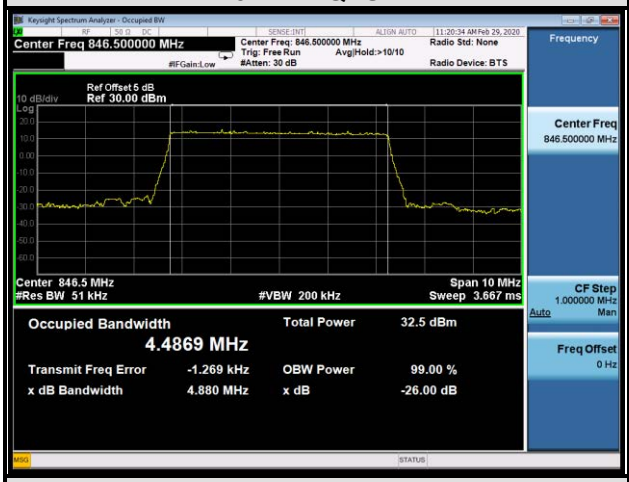
3MHz / 64QAM

CHANNEL BANDWIDTH: 5MHz				
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20425	826.5	4.49	4.46	4.47
20525	836.5	4.46	4.47	4.48
20625	846.5	4.49	4.47	4.47

CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20425	826.5	4.89	4.87	4.88
20525	836.5	4.87	4.90	4.90
20625	846.5	4.88	4.91	4.85

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth/26 dB Occupied Bandwidth

5MHz / QPSK



5MHz / 16QAM

5MHz / 64QAM

CHANNEL BANDWIDTH: 10MHz				
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20450	829	8.94	8.95	8.94
20525	836.5	8.93	8.93	8.94
20600	844	8.95	8.94	8.94

CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20450	829	9.65	9.67	9.54
20525	836.5	9.60	9.64	9.59
20600	844	9.64	9.62	9.60

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth/26 dB Occupied Bandwidth

10MHz / QPSK

10MHz / 16QAM

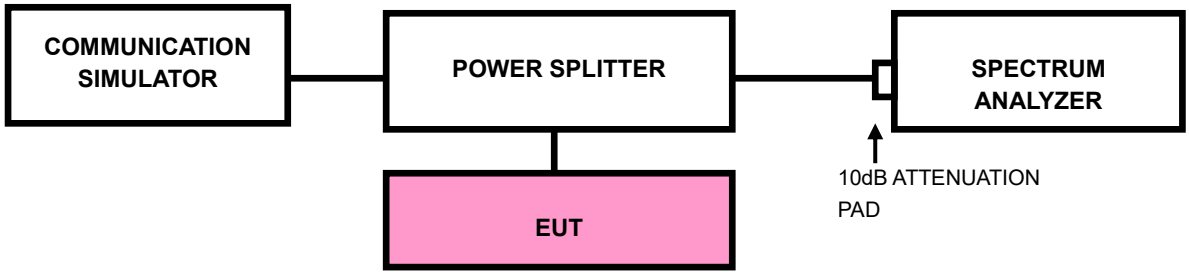
10MHz / 64QAM

3.4 BAND EDGE MEASUREMENT

3.4.1 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.

3.4.2 TEST SETUP



3.4.3 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 10MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (WCDMA).

c. 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).

d. 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)

e. 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)

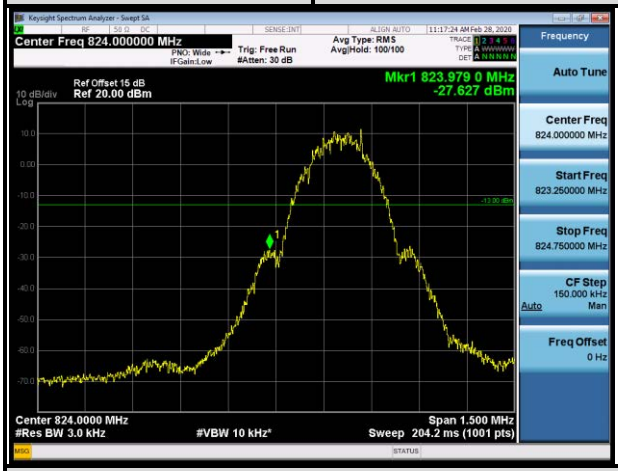
f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)

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

3.4.4 TEST RESULTS

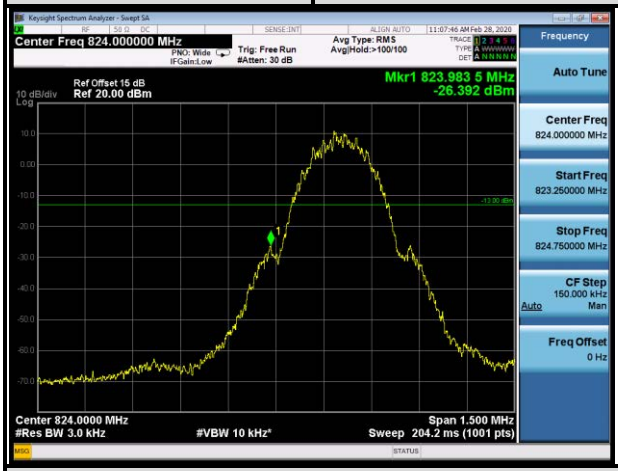
GSM

CHANNEL	128	CHANNEL	251



EDGE

CHANNEL	128	CHANNEL	251



WCDMA

CHANNEL	4132	CHANNEL	4233

LTE Band5					
Channel Bandwidth: 1.4MHz QPSK					
CHANNEL	20407	1 RB	CHANNEL	20643	1 RB

LTE Band5					
Channel Bandwidth: 1.4MHz QPSK					
CHANNEL	20407	Full RB	CHANNEL	20643	Full RB

LTE Band5

Channel Bandwidth: 1.4MHz 16QAM

CHANNEL	20407	1 RB	CHANNEL	20643	1 RB

LTE Band5

Channel Bandwidth: 1.4MHz 16QAM

CHANNEL	20407	Full RB	CHANNEL	20643	Full RB

LTE Band5					
Channel Bandwidth: 1.4MHz 64QAM					
CHANNEL	20407	1 RB	CHANNEL	20643	1 RB

LTE Band5					
Channel Bandwidth: 1.4MHz 64QAM					
CHANNEL	20407	Full RB	CHANNEL	20643	Full RB

LTE Band5

Channel Bandwidth: 3MHz QPSK

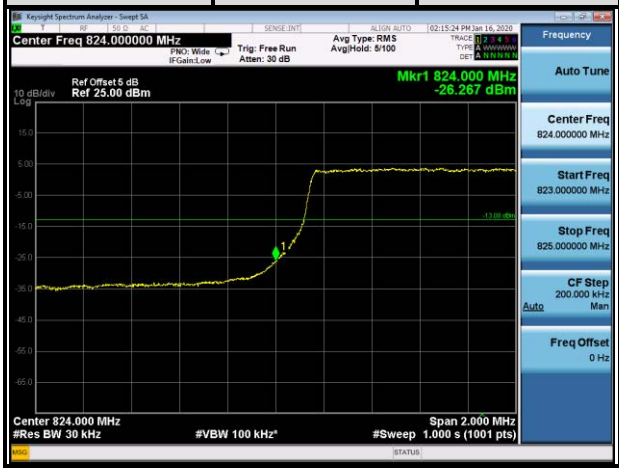
CHANNEL	20415	1 RB	CHANNEL	20635	1 RB

LTE Band5

Channel Bandwidth: 3MHz QPSK

CHANNEL	20415	Full RB	CHANNEL	20635	Full RB

LTE Band5					
Channel Bandwidth: 3MHz 16QAM					
CHANNEL	20415	1 RB	CHANNEL	20635	1 RB

LTE Band5					
Channel Bandwidth: 3MHz 16QAM					
CHANNEL	20415	Full RB	CHANNEL	20635	Full RB
					

LTE Band5

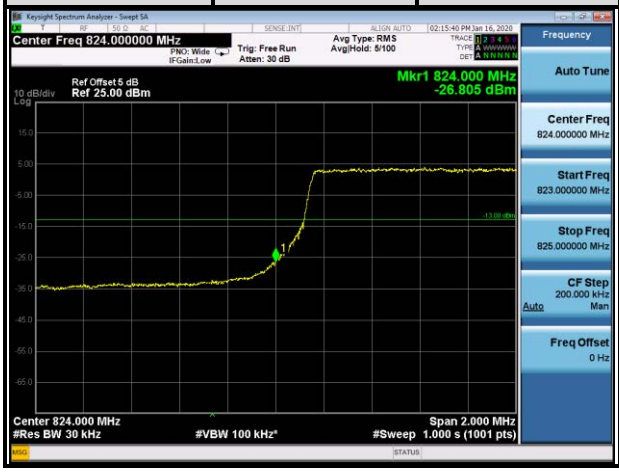
Channel Bandwidth: 3MHz 64QAM

CHANNEL	20415	1 RB	CHANNEL	20635	1 RB

LTE Band5

Channel Bandwidth: 3MHz 64QAM

CHANNEL	20415	Full RB	CHANNEL	20635	Full RB



LTE Band5					
Channel Bandwidth: 5MHz QPSK					
CHANNEL	20425	1 RB	CHANNEL	20625	1 RB

LTE Band5					
Channel Bandwidth: 5MHz QPSK					
CHANNEL	20425	Full RB	CHANNEL	20625	Full RB

LTE Band5					
Channel Bandwidth: 5MHz 16QAM					
CHANNEL	20425	1 RB	CHANNEL	20625	1 RB

LTE Band5					
Channel Bandwidth: 5MHz 16QAM					
CHANNEL	20425	Full RB	CHANNEL	20625	Full RB

LTE Band5					
Channel Bandwidth: 5MHz 64QAM					
CHANNEL	20425	1 RB	CHANNEL	20625	1 RB

LTE Band5					
Channel Bandwidth: 5MHz 64QAM					
CHANNEL	20425	Full RB	CHANNEL	20625	Full RB

LTE Band5

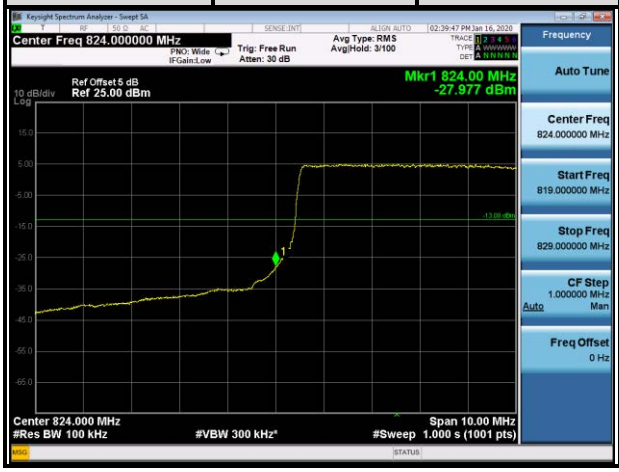
Channel Bandwidth: 10MHz QPSK

CHANNEL	20450	1 RB	CHANNEL	20600	1 RB

LTE Band5

Channel Bandwidth: 10MHz QPSK

CHANNEL	20450	Full RB	CHANNEL	20600	Full RB



LTE Band5

Channel Bandwidth: 10MHz 16QAM

CHANNEL	20450	1 RB	CHANNEL	20600	1 RB

LTE Band5

Channel Bandwidth: 10MHz 16QAM

CHANNEL	20450	Full RB	CHANNEL	20600	Full RB

LTE Band5

Channel Bandwidth: 10MHz 64QAM

CHANNEL	20450	1 RB	CHANNEL	20600	1 RB

LTE Band5

Channel Bandwidth: 10MHz 64QAM

CHANNEL	20450	Full RB	CHANNEL	20600	Full RB

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

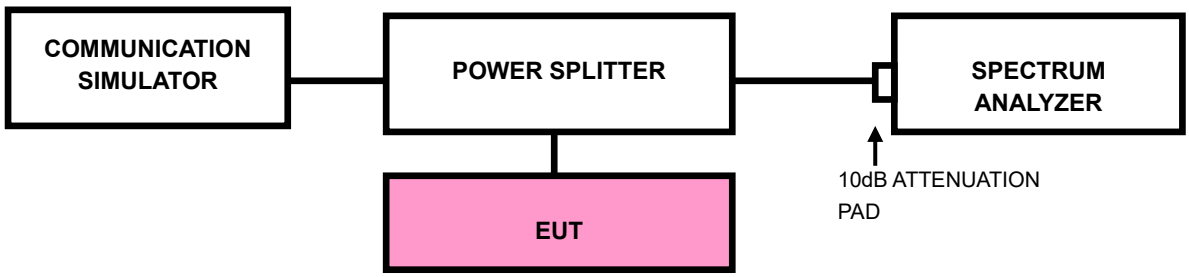
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

3.5.2 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.

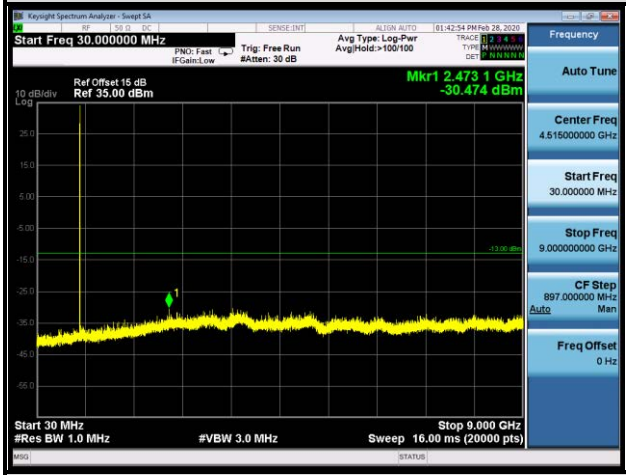
b. Measuring frequency range is from 9 kHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

3.5.3 TEST SETUP



3.5.4 TEST RESULTS

GSM	
CHANNEL 128	CHANNEL 189
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
CHANNEL 251	
FREQUENCY RANGE : 30MHz~9.0GHz	

EDGE	
CHANNEL 128	CHANNEL 189
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
	
CHANNEL 251	
FREQUENCY RANGE : 30MHz~9.0GHz	

WCDMA	
CHANNEL 4132	CHANNEL 4182
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
CHANNEL 4233	
FREQUENCY RANGE : 30MHz~9.0GHz	

LTE Band 5 (Channel Bandwidth: 1.4MHz)	
CHANNEL 20407	CHANNEL 20525
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz

LTE Band 5 (Channel Bandwidth: 1.4MHz)	
CHANNEL 20643	
FREQUENCY RANGE : 30MHz~9.0GHz	

LTE Band 5 (Channel Bandwidth: 3MHz)	
CHANNEL 20415	CHANNEL 20525
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
CHANNEL 20635	
FREQUENCY RANGE : 30MHz~9.0GHz	

LTE Band 5 (Channel Bandwidth: 5MHz)	
CHANNEL 20425	CHANNEL 20525
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
CHANNEL 20625	
FREQUENCY RANGE : 30MHz~9.0GHz	

LTE Band 5 (Channel Bandwidth: 10MHz)	
CHANNEL 20450	CHANNEL 20525
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
CHANNEL 20600	
FREQUENCY RANGE : 30MHz~9.0GHz	

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 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.

3.6.2 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.

d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

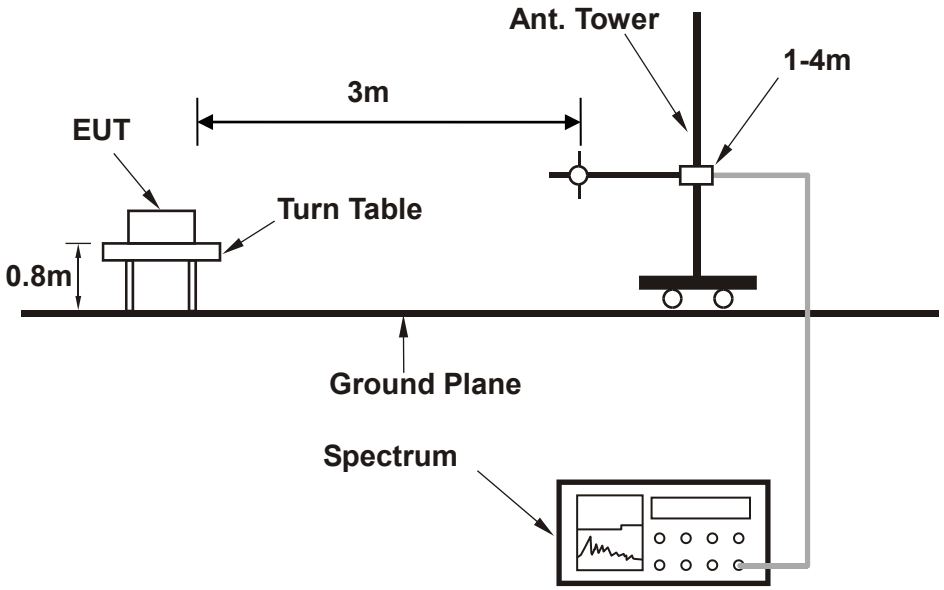
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.6.3 DEVIATION FROM TEST STANDARD

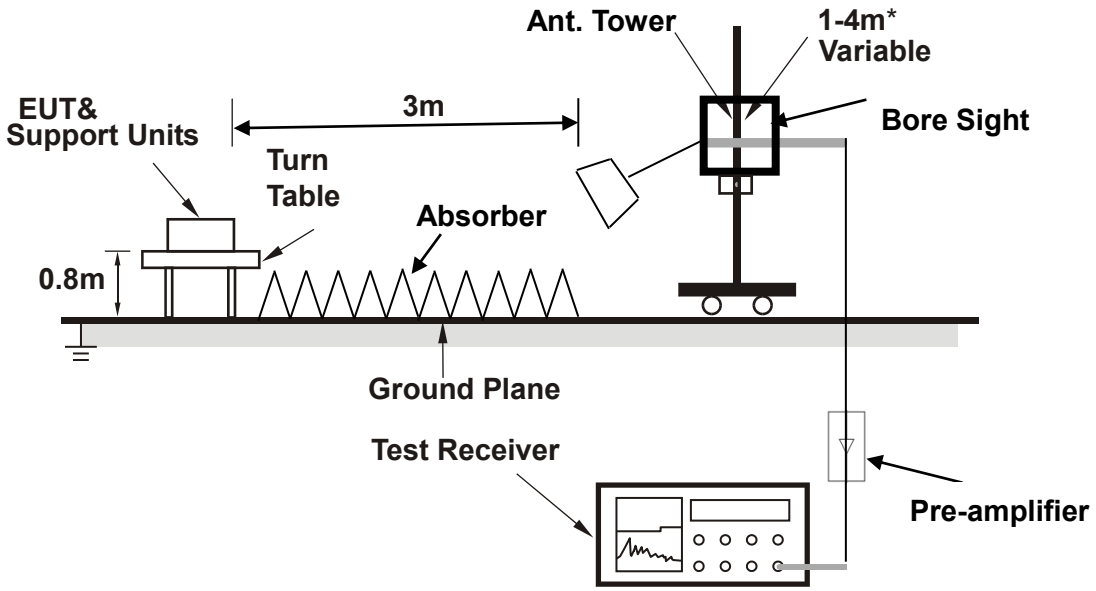
No deviation

3.6.4 TEST SETUP

< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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

3.6.5 TEST RESULTS

WWAN-ANT-0 :

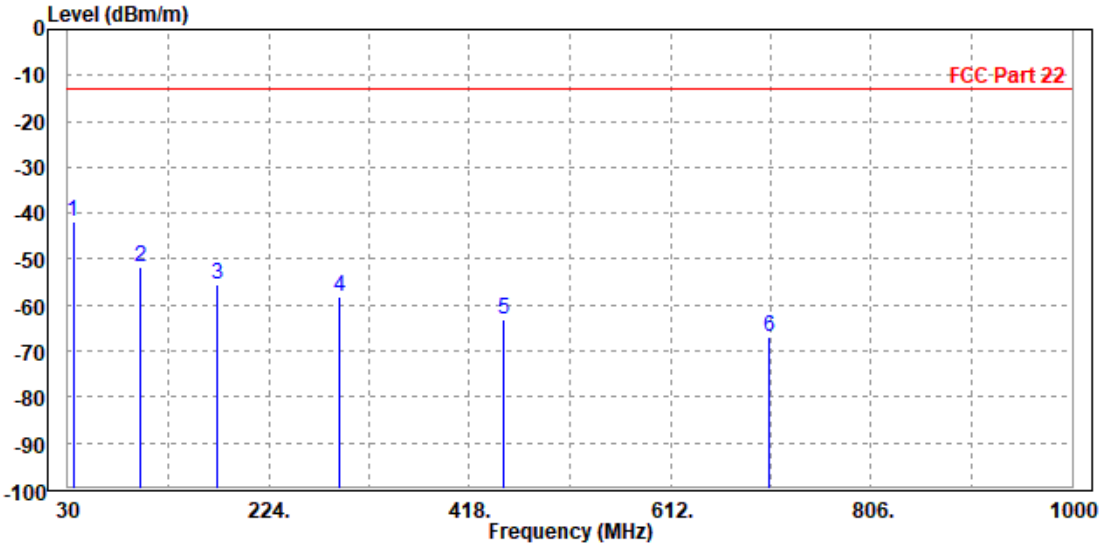
BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

GSM 850

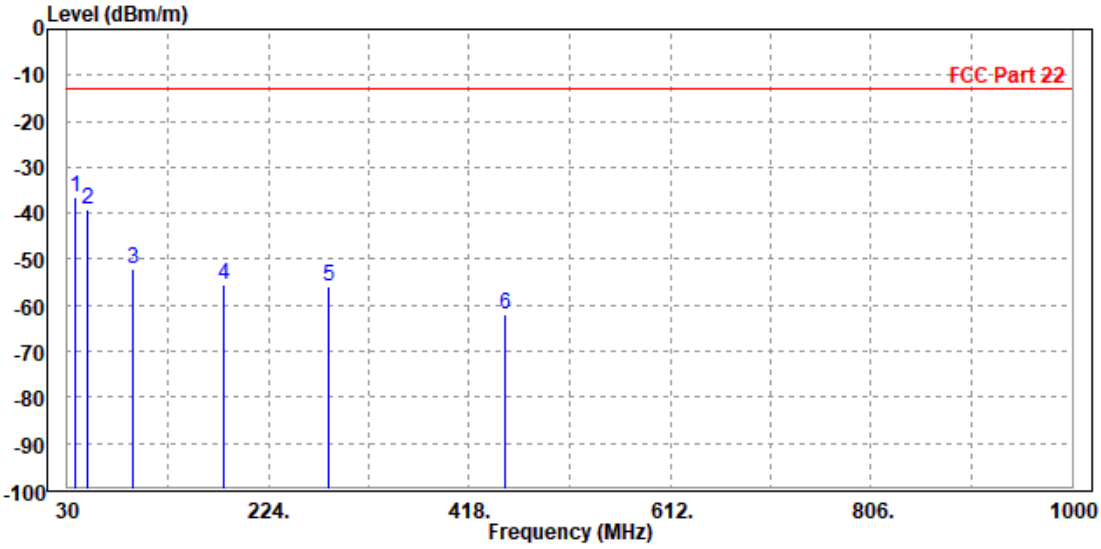
MODE	TX channel 189	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	35.110	-41.69	-54.15	-13.00	-28.69	12.46	Peak	Horizontal
2	100.210	-51.82	-40.63	-13.00	-38.82	-11.19	Peak	Horizontal
3	173.600	-55.53	-37.54	-13.00	-42.53	-17.99	Peak	Horizontal
4	292.650	-58.32	-44.15	-13.00	-45.32	-14.17	Peak	Horizontal
5	451.680	-63.29	-52.87	-13.00	-50.29	-10.42	Peak	Horizontal
6	706.580	-66.86	-61.58	-13.00	-53.86	-5.28	Peak	Horizontal



MODE	TX channel 189	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
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	36.870	-36.51	-35.21	-13.00	-23.51	-1.30	Peak	Vertical
2		49.650	-39.13	-34.52	-13.00	-26.13	-4.61	Peak	Vertical
3		93.660	-52.22	-41.63	-13.00	-39.22	-10.59	Peak	Vertical
4		181.450	-55.61	-42.63	-13.00	-42.61	-12.98	Peak	Vertical
5		282.650	-55.89	-44.52	-13.00	-42.89	-11.37	Peak	Vertical
6		452.890	-61.86	-52.88	-13.00	-48.86	-8.98	Peak	Vertical



ABOVE 1GHz DATA

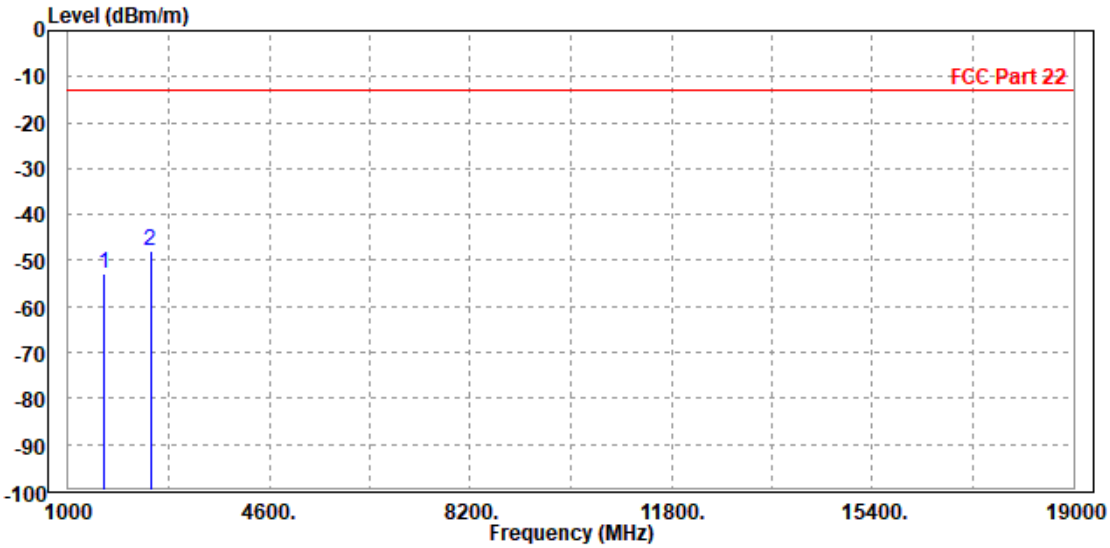
Note: For higher frequency, the emission is too low to be detected.

GSM 850

CH 128:

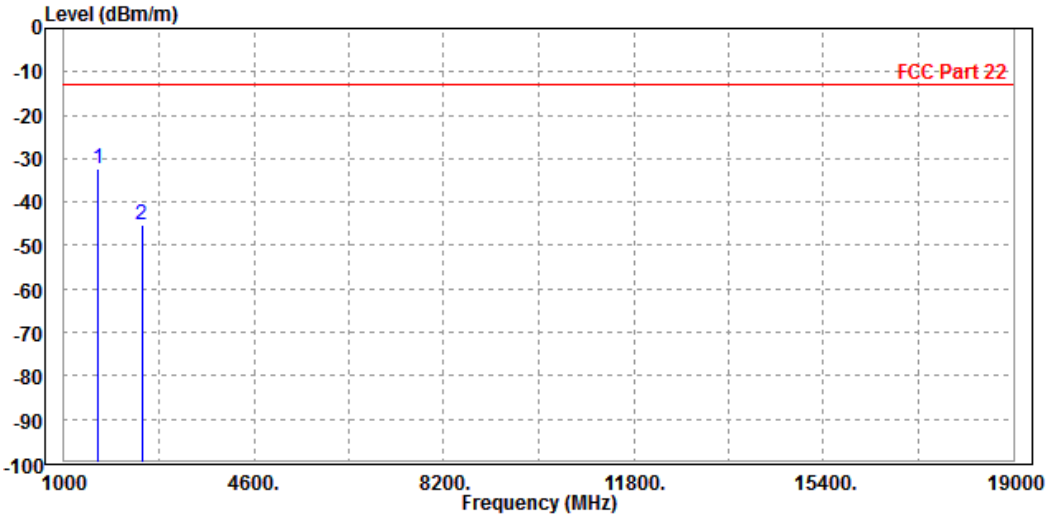
MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1648.000	-52.96	-56.21	-13.00	-39.96	3.25	Peak	Horizontal
2 PP	2472.600	-47.73	-55.75	-13.00	-34.73	8.02	Peak	Horizontal



MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

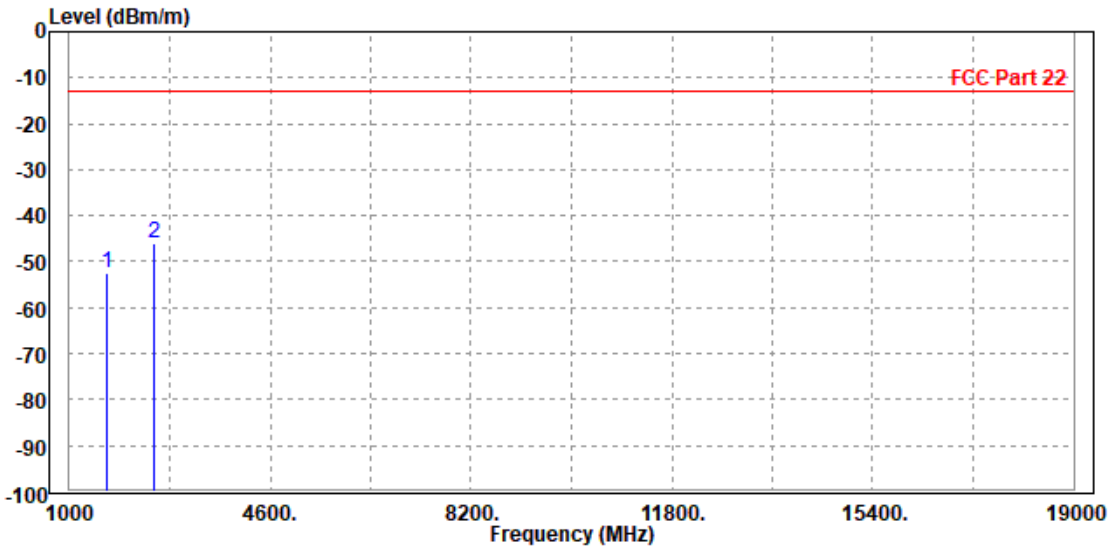
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1648.000	-32.31	-35.69	-13.00	-19.31	3.38	Peak	Vertical
2		2472.000	-45.19	-52.23	-13.00	-32.19	7.04	Peak	Vertical



CH 189:

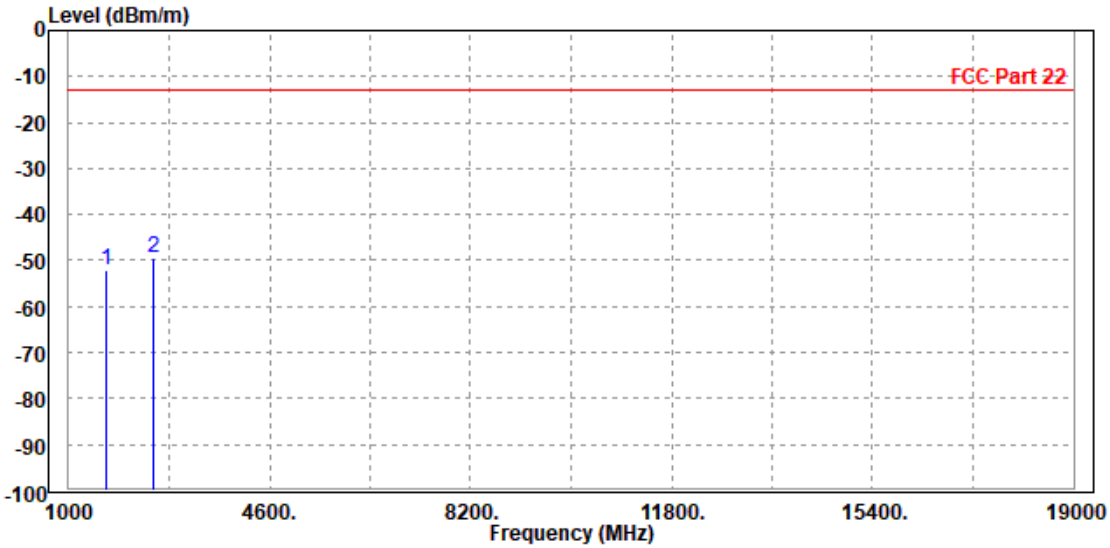
MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-52.32	-55.79	-13.00	-39.32	3.47	Peak	Horizontal
2	PP	2509.200	-45.89	-53.95	-13.00	-32.89	8.06	Peak	Horizontal



MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

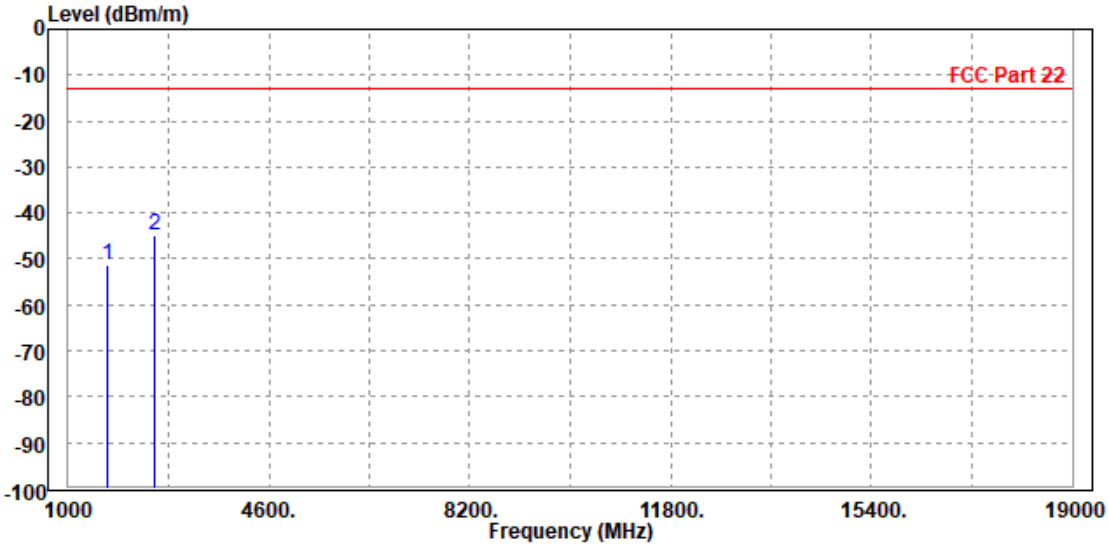
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-52.27	-55.81	-13.00	-39.27	3.54	Peak	Vertical
2	PP	2509.200	-49.38	-56.48	-13.00	-36.38	7.10	Peak	Vertical



CH 251:

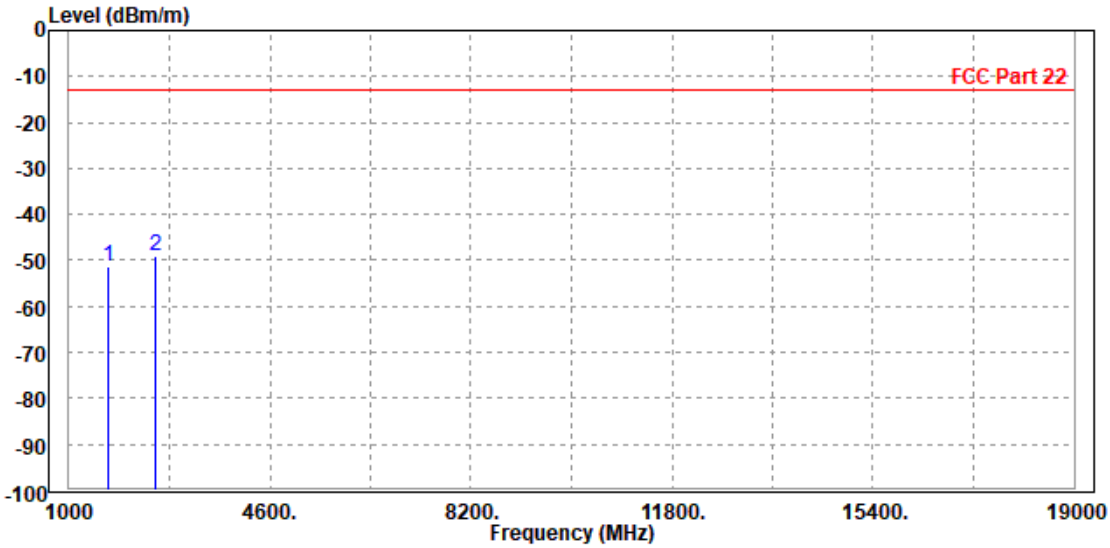
MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1702.000	-51.43	-55.34	-13.00	-38.43	3.91	Peak	Horizontal
2 PP	2546.400	-44.83	-52.94	-13.00	-31.83	8.11	Peak	Horizontal



MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
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		1702.000	-51.47	-55.34	-13.00	-38.47	3.87	Peak	Vertical
2	PP	2546.400	-48.97	-56.19	-13.00	-35.97	7.22	Peak	Vertical

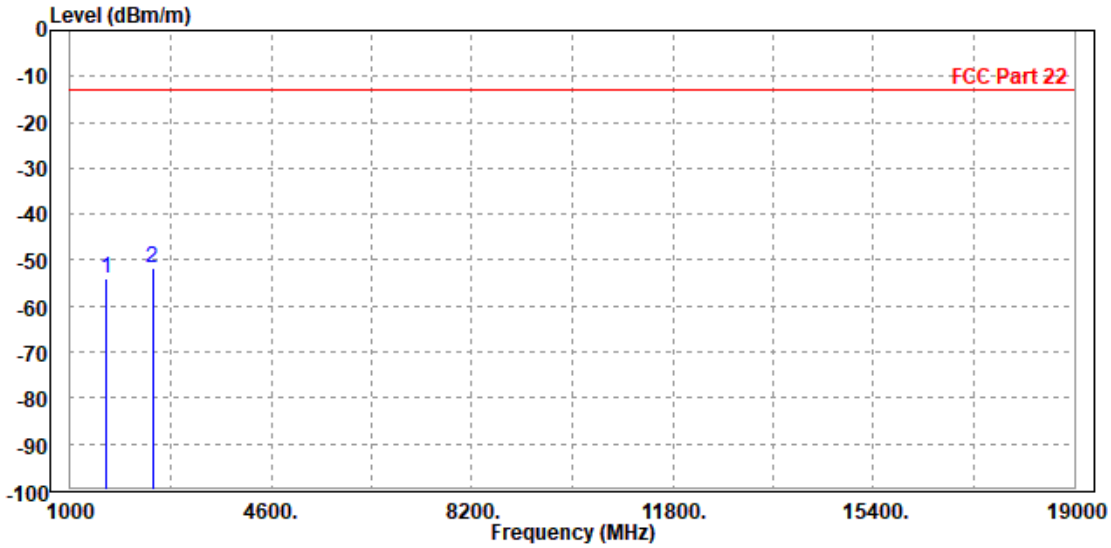


EDGE 850:

CH 128:

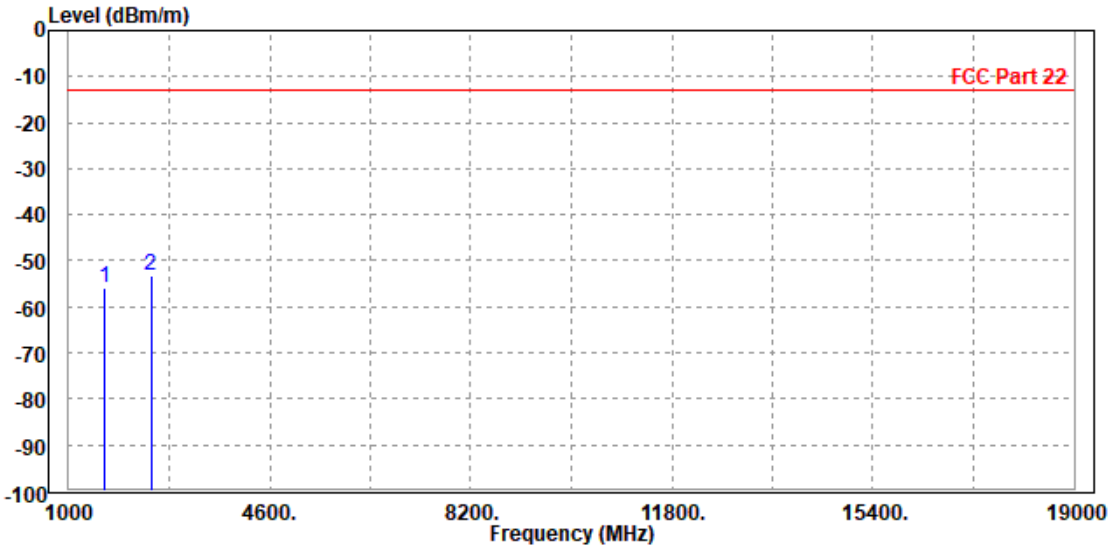
MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1648.000	-53.96	-57.21	-13.00	-40.96	3.25	Peak	Horizontal
2 PP	2472.600	-51.79	-59.81	-13.00	-38.79	8.02	Peak	Horizontal



MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

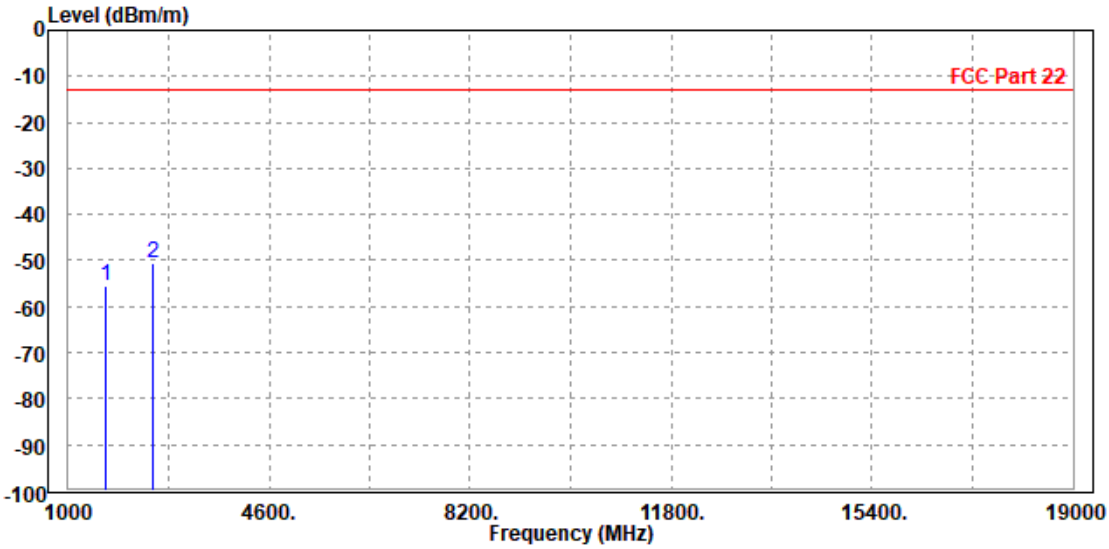
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1648.000	-55.72	-59.10	-13.00	-42.72	3.38	Peak	Vertical
2	PP	2472.600	-53.18	-60.22	-13.00	-40.18	7.04	Peak	Vertical



CH 189:

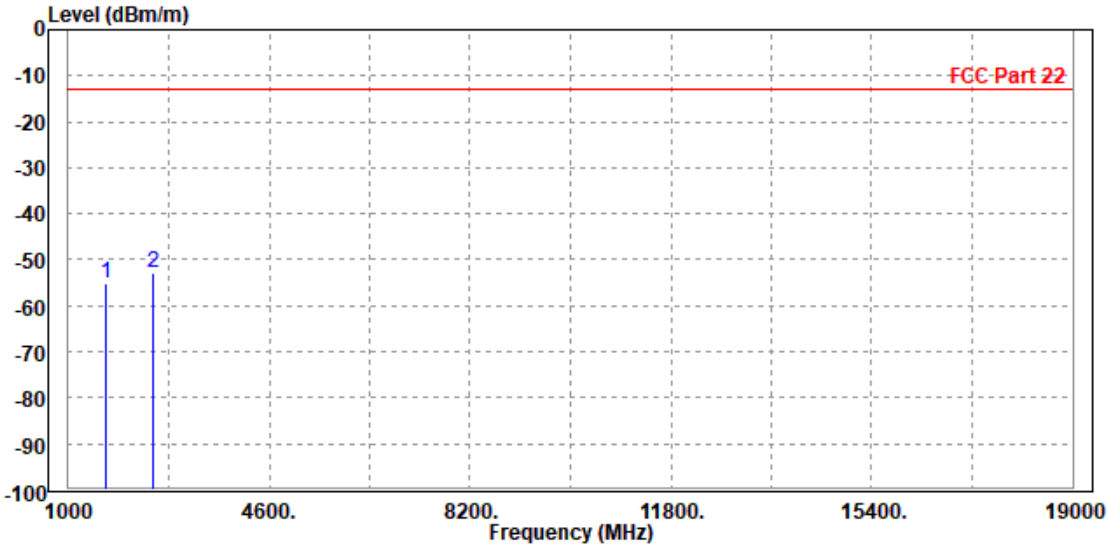
MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-55.35	-58.82	-13.00	-42.35	3.47	Peak	Horizontal
2	PP	2509.200	-50.63	-58.69	-13.00	-37.63	8.06	Peak	Horizontal



MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

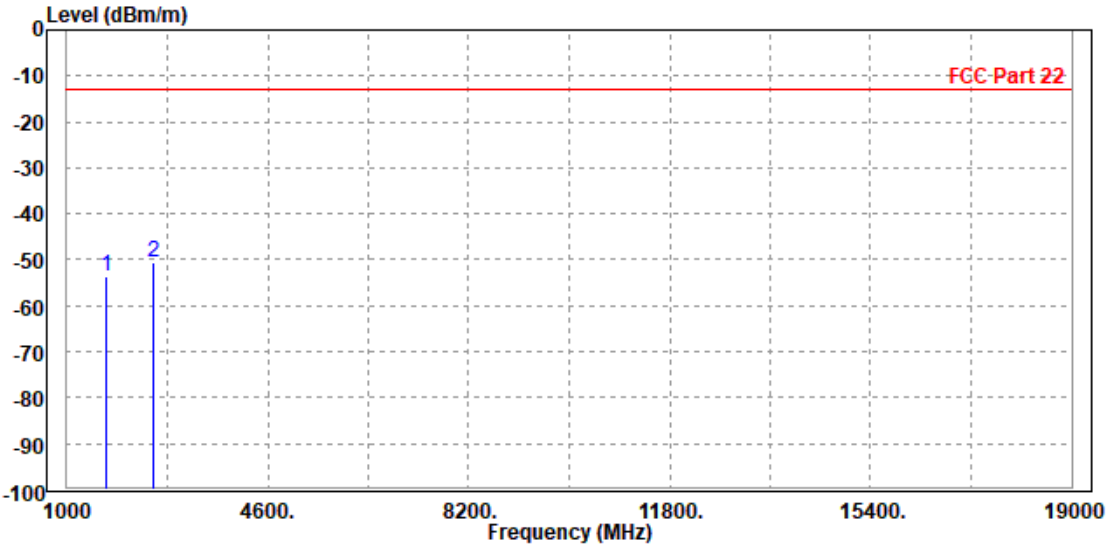
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1666.000	-55.19	-58.73	-13.00	-42.19	3.54	Peak	Vertical
2 PP	2509.200	-52.82	-59.92	-13.00	-39.82	7.10	Peak	Vertical



CH 251:

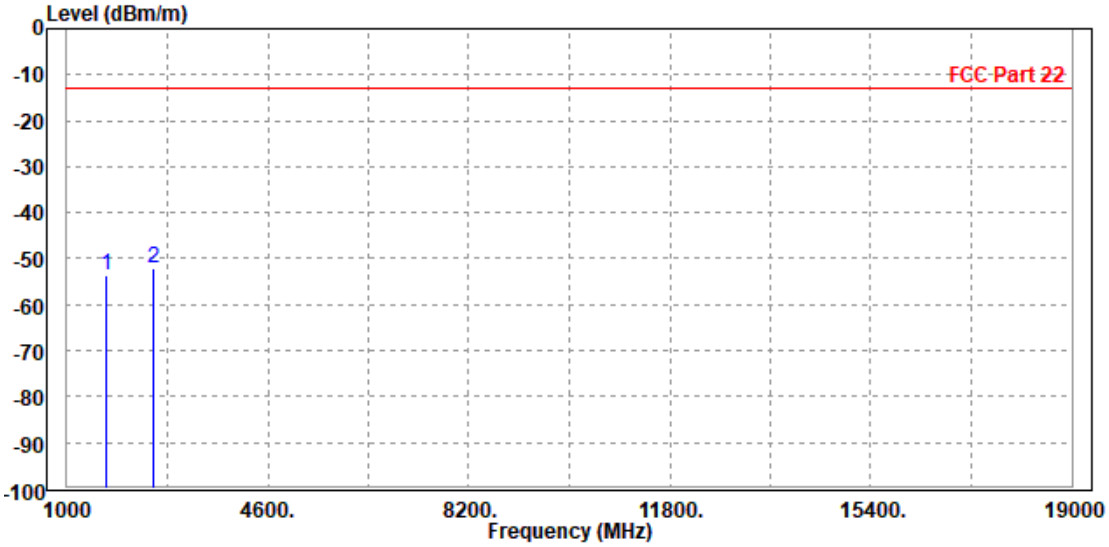
MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1702.000	-53.46	-57.37	-13.00	-40.46	3.91	Peak	Horizontal
2 PP	2539.800	-50.42	-58.52	-13.00	-37.42	8.10	Peak	Horizontal



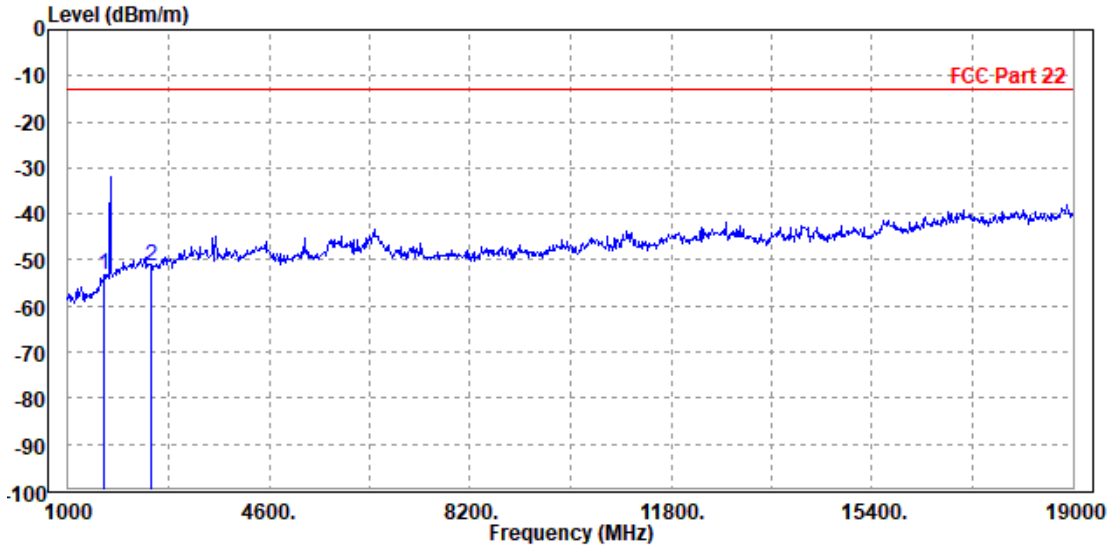
MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1702.000	-53.47	-57.34	-13.00	-40.47	3.87	Peak	Vertical
2	PP	2539.800	-52.09	-59.29	-13.00	-39.09	7.20	Peak	Vertical



WCDMA Band V:

CH 4132:

MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/10/12V from adapter
TESTED BY	Star Le		
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	1648.000	-53.28	-56.53	-13.00	-40.28	3.25	Peak	Horizontal
2 PP	2479.200	-51.38	-59.41	-13.00	-38.38	8.03	Peak	Horizontal