FCC TEST REPORT

(PART 27)

Applicant:	DataRemote Incorporated
Address:	18001 Old Cutler Rd. Suite 600, Miami, FL 33157

Manufacturer or Supplier:	DataRemote Incorporated
Address:	18001 Old Cutler Rd. Suite 600, Miami, FL 33157
Product:	LTE Cellular Router
Brand Name:	DataRemote
Model Name:	CDS-9010
FCC ID:	2AJLF-CDS-9010
Date of tests:	Mar. 23, 2019 ~ Apr. 28, 2019

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

☒ **FCC Part 27, Subpart C, L** ☒ **ANSI/TIA/EIA-603- D**
☒ **FCC Part 2** ☒ **ANSI/TIA/EIA-603-E** ☒ **ANSI C63.26-2015**

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: May 06, 2019	Date: May 06, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF190322W001-6	Original release	May 06, 2019

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1046 27.50(d)(4)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53(h)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to average ratio	PASS	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -10.72dB at 1572MHz.

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	±1dB
Frequency Stability	±39.27Hz
Radiated emissions	±4.48dB
Conducted emissions	±2 dB
Occupied Channel Bandwidth	±21.7KHz
Band Edge Measurements	±4.48dB
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. 26,19	Feb. 25,20
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 26,19	Feb. 25,20
Bilog Antenna 1	ETS-LINDGREN	3143B	00161964	Feb. 26,19	Feb. 25,20
Bilog Antenna 2	ETS-LINDGREN	3143B	00161965	Feb. 26,19	Feb. 25,20
Horn Antenna 1	ETS-LINDGREN	3117	00168728	Feb. 26,19	Feb. 25,20
Horn Antenna 2	ETS-LINDGREN	3117	00168692	Nov. 30, 18	Nov. 29, 19
Loop antenna	Daze	ZN30900A	0708	Oct. 23,18	Oct. 22, 19
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Nov. 21, 18	Nov. 20, 19
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 26,19	Feb. 25,20
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 09,18	Jul. 08,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Feb. 26,19	Feb. 25,20
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. 09,18	Jul. 08,19
Power Meter	Anritsu	ML2495A	1506002	Feb. 26,19	Feb. 25,20
Power Sensor	Anritsu	MA2411B	1339352	Feb. 26,19	Feb. 25,20
Humid & Temp Programmable Tester	Juyi	ITH-120-45-CP-AR	IAA1504-001	Jul. 09,18	Jul. 08,19
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 26,19	Feb. 25,20

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

PRODUCT	LTE Cellular Router	
MODEL NAME	CDS-9010	
POWER SUPPLY	12Vdc (adapter or host equipment) 7.3Vdc (Li-ion, battery)	
MODULATION TECHNOLOGY	**LTE**	QPSK, 16QAM
FREQUENCY RANGE	**LTE Band 12 Channel Bandwidth: 1.4MHz**	699.7MHz ~ 715.3MHz
	LTE Band 12 Channel Bandwidth: 3MHz	700.5MHz ~ 714.5MHz
	LTE Band 12 Channel Bandwidth: 5MHz	701.5MHz ~ 713.5MHz
	LTE Band 12 Channel Bandwidth: 10MHz	704.0MHz ~ 711.0MHz
	LTE Band 13 Channel Bandwidth: 5MHz	779.5MHZ ~ 784.5MHZ
	LTE Band 13 Channel Bandwidth: 10MHz	782.0MHZ
EMISSION DESIGNATOR	**LTE Band 12 Channel Bandwidth: 1.4MHz**	QPSK: 1M09G7D
		16QAM: 1M08W7D
	LTE Band 12 Channel Bandwidth: 3MHz	QPSK: 2M68G7D
		16QAM: 2M68W7D
	LTE Band 12 Channel Bandwidth: 5MHz	QPSK: 4M47G7D
		16QAM: 4M47W7D
	LTE Band 12 Channel Bandwidth: 10MHz	QPSK: 8M93G7D
		16QAM: 8M90W7D
	LTE Band 13 Channel Bandwidth: 5MHz	QPSK: 4M47G7D
		16QAM: 4M47W7D
	LTE Band 13 Channel Bandwidth: 10MHz	QPSK: 8M92G7D
		16QAM: 8M90W7D
MAX. ERP/EIRP POWER	**LTE Band 12 Channel Bandwidth: 1.4MHz**	27mW
	LTE Band 12 Channel Bandwidth: 3MHz	29mW
	LTE Band 12 Channel Bandwidth: 5MHz	29mW
	LTE Band 12 Channel Bandwidth: 10MHz	26mW
	LTE Band 13 Channel Bandwidth: 5MHz	222mW

	LTE Band 13 **Channel Bandwidth: 10MHz**	229mW
ANTENNA TYPE	Fixed External Antenna	
ANTENNA GAIN	-1.1dBi for LTE Band 12 -0.1dBi for LTE Band 13	
HW VERSION	V1.1	
SW VERSION	V3.10	
ACCESSORY DEVICE	Refer to note as below	
DATA CABLE	N/A	

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:	SHENZHEN GONGJIN ELECTRONICS CO.,LTD Electronic Limited
MODEL:	S24B72-120A200-C4
INPUT:	AC 100-240V, 800mA
OUTPUT:	DC 12V, 2000mA

3. The EUT matched the following Ethernet Cable and Telephone Cables:

ETHERNET CABLE	
BRAND:	Shenzhen Eternity Ju Electronic Co., Ltd
MODEL:	RJ45-8P8C
SIGNAL LINE:	1500±20mm

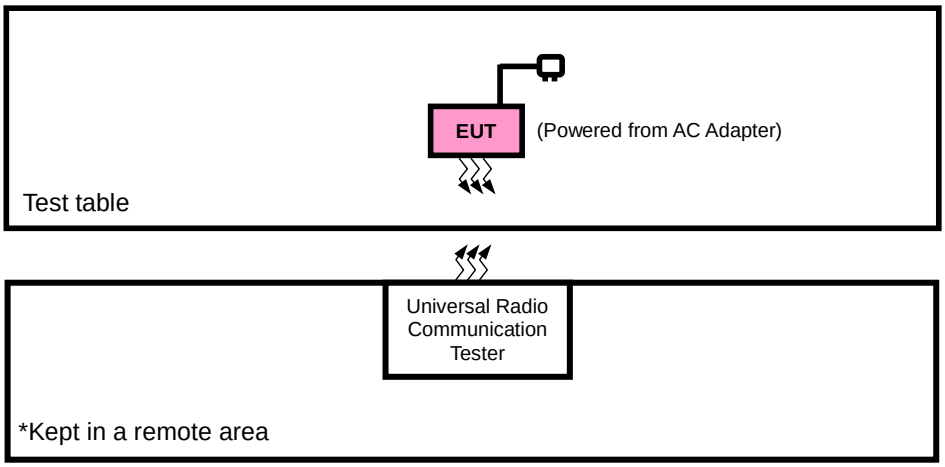
TELEPHONE CABLE 1	
BRAND:	Shenzhen Eternity Ju Electronic Co., Ltd
MODEL:	RJ11-6P2C
SIGNAL LINE:	1500±20mm

TELEPHONE CABLE 2	
BRAND:	Shenzhen Eternity Ju Electronic Co., Ltd
MODEL:	RJ11-6P2C
SIGNAL LINE:	1500±20mm

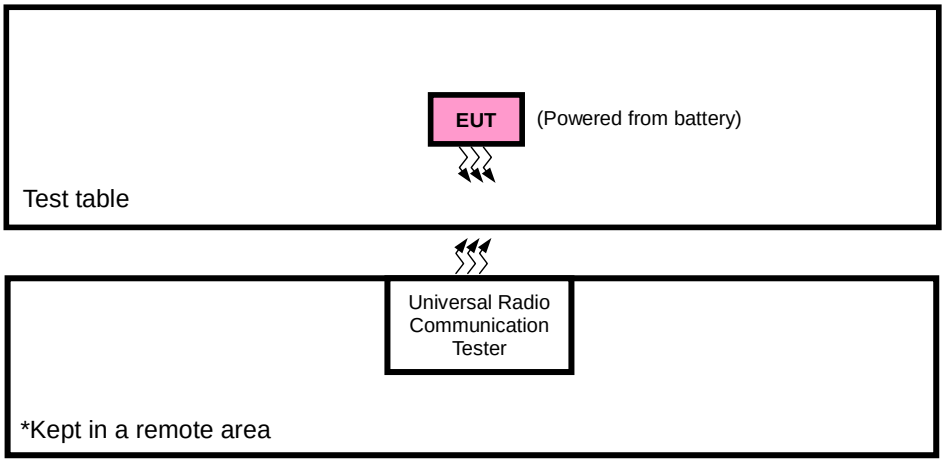
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



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



2.3 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).

2.4 DESCRIPTION OF TEST MODES

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

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + Adapter with LTE link**
B	EUT + Battery with **LTE link**

LTE BAND 12

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	ERP	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	23017 to 23173	23017, 23173	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23025, 23165	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23035, 23155	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060, 23130	10MHz	QPSK	1 RB / 0 RB Offset
B	OCCUPIED BANDWIDTH	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK,16QAM	6 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	BAND EDGE	23017 to 23173	23017	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			23173	1.4MHz	QPSK, 16QAM	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		23025 to 23165	23025	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			23165	3MHz	QPSK, 16QAM	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		23035 to 23155	23035	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23155	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23060 to 23130	23060	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			23130	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
B	CONDCUDETED EMISSION	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK	1 RB / 0 RB Offset

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

LTE BAND 13

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	ERP	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	23205 to 23255	23205, 23255	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK	1 RB / 0 RB Offset
B	OCCUPIED BANDWIDTH	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	BAND EDGE	23205 to 23255	23205	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23255	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			23230	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
B	CONDCUDETED EMISSION	23205 to 23255	23205, 23230, 23255	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23205 to 23255	23230	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK	1 RB / 0 RB Offset

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

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP(ERP)	24deg. C, 60%RH	7.3Vdc from Battery	Star
FREQUENCY STABILITY	24deg. C, 61%RH	DC 7V/15V/16V	Rain Wang
OCCUPIED BANDWIDTH	24deg. C, 61%RH	7.3Vdc from Battery	Rain Wang
PEAK TO AVERAGE RATIO	24deg. C, 61%RH	7.3Vdc from Battery	Rain Wang
BAND EDGE	24deg. C, 61%RH	7.3Vdc from Battery	Rain Wang
CONDCUDETED EMISSION	24deg. C, 61%RH	7.3Vdc from Battery	Rain Wang
RADIATED EMISSION	23deg. C, 70%RH	12Vdc from adapter	Star

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 27

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

Portable stations (hand-held devices) operating in the 699-716 MHz and 777-7887 bands are limited to 3 watts ERP.

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

a. The EUT was set up for the maximum power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range). RBW and VBW is 10MHz for LTE.

b. E.I.R.P power 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 a. Record the power level of S.G

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

e. E.R.P = E.I.R.P- 2.15 dB

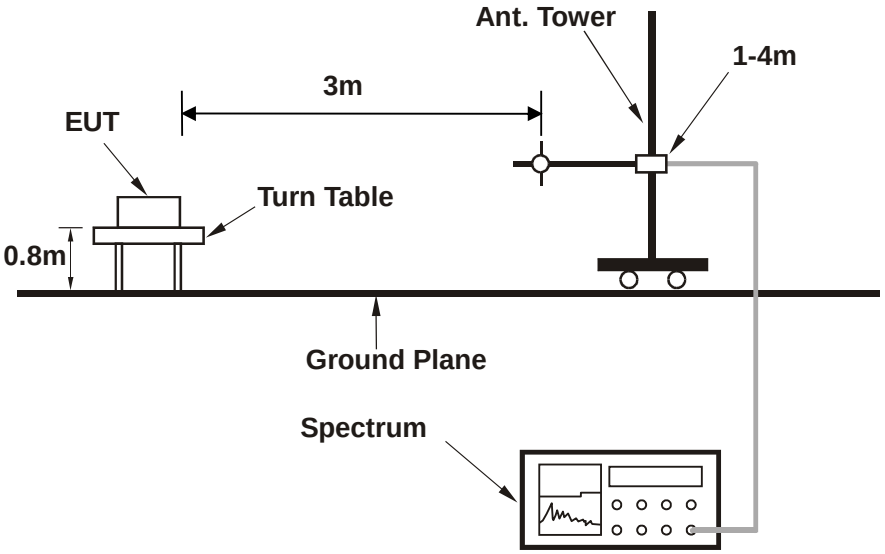
CONDUCTED POWER MEASUREMENT:

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.

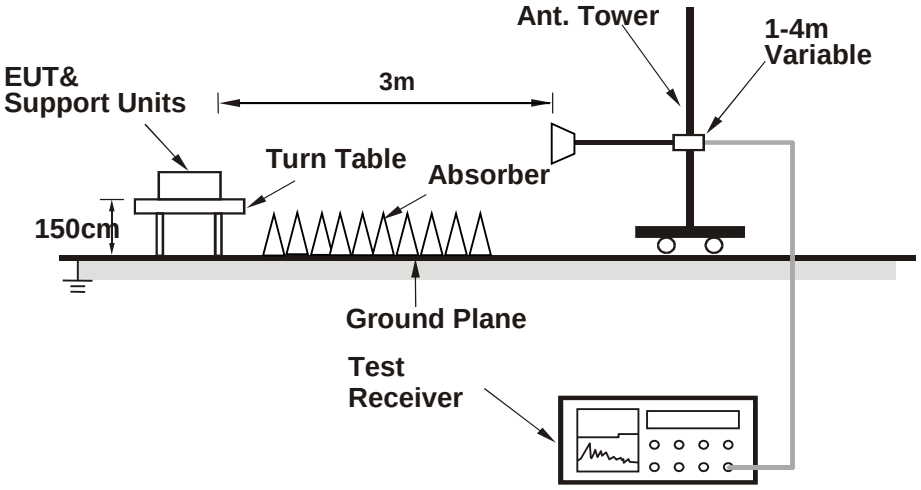
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP

EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>

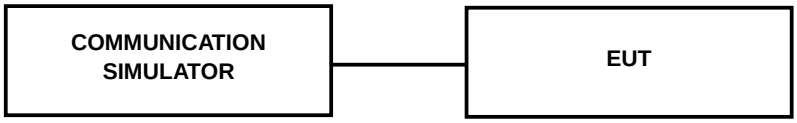


<Radiated Emission above 1 GHz>



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

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23017 Frequency 699.7 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23173 Frequency 715.3 MHz	MPR
1.4 MHz	QPSK	1	0	23.22	23.14	23.28	0
		1	2	23.43	23.35	23.49	0
		1	5	23.29	23.21	23.35	0
		3	0	22.34	22.26	22.40	1
		3	1	22.42	22.34	22.48	1
		3	3	22.29	22.21	22.35	1
		6	0	22.33	22.25	22.39	1
	16QAM	1	0	21.93	21.85	21.99	1
		1	2	22.23	22.15	22.29	1
		1	5	22.14	22.06	22.20	1
		3	0	21.21	21.13	21.27	2
		3	1	21.27	21.19	21.33	2
		3	3	21.25	21.17	21.31	2
		6	0	21.22	21.14	21.28	2
BW	Modulation	RB Size	RB Offset	Low CH 23025 Frequency 700.5 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23165 Frequency 714.5 MHz	MPR
3 MHz	QPSK	1	0	23.26	23.18	23.32	0
		1	7	23.47	23.39	23.53	0
		1	14	23.33	23.25	23.39	0
		8	0	22.36	22.28	22.42	1
		8	3	22.44	22.36	22.50	1
		8	7	22.31	22.23	22.37	1
		15	0	22.35	22.27	22.41	1
	16QAM	1	0	21.97	21.89	22.03	1
		1	7	22.27	22.19	22.33	1
		1	14	22.18	22.10	22.24	1
		8	0	21.25	21.17	21.31	2
		8	3	21.31	21.23	21.37	2
		8	7	21.29	21.21	21.35	2
		15	0	21.26	21.18	21.32	2

LTE Band 12							
BW	Modulation	RB Size	RB Offset	Low CH 23035	Mid CH 23095	High CH 23155	MPR
				Frequency 701.5 MHz	Frequency 707.5 MHz	Frequency 713.5 MHz	
5 MHz	QPSK	1	0	23.32	23.24	23.38	0
		1	12	23.53	23.45	23.59	0
		1	24	23.39	23.31	23.45	0
		12	0	22.42	22.34	22.48	1
		12	6	22.50	22.42	22.56	1
		12	13	22.37	22.29	22.43	1
		25	0	22.41	22.33	22.47	1
	16QAM	1	0	22.03	21.95	22.09	1
		1	12	22.33	22.25	22.39	1
		1	24	22.24	22.16	22.30	1
		12	0	21.31	21.23	21.37	2
		12	6	21.37	21.29	21.43	2
		12	13	21.35	21.27	21.41	2
		25	0	21.32	21.24	21.38	2
BW	Modulation	RB Size	RB Offset	Low CH 23060	Mid CH 23095	High CH 23130	MPR
				Frequency 704 MHz	Frequency 707.5 MHz	Frequency 711 MHz	
10 MHz	QPSK	1	0	23.35	23.27	23.41	0
		1	24	23.56	23.48	**23.62**	0
		1	49	23.42	23.34	23.48	0
		25	0	22.45	22.37	22.51	1
		25	12	22.53	22.45	22.59	1
		25	25	22.40	22.32	22.46	1
		50	0	22.44	22.36	22.50	1
	16QAM	1	0	22.06	21.98	22.12	1
		1	24	22.36	22.28	22.42	1
		1	49	22.27	22.19	22.33	1
		25	0	21.34	21.26	21.40	2
		25	12	21.40	21.32	21.46	2
		25	25	21.38	21.30	21.44	2
		50	0	21.35	21.27	21.41	2

LTE Band 13							
BW	Modulation	RB Size	RB Offset	Low CH 23205	Mid CH 23230	High CH 23255	MPR
				Frequency 779.5 MHz	Frequency 782.0 MHz	Frequency 784.5 MHz	
5 MHz	QPSK	1	0	22.73	23.62	22.86	0
		1	12	22.80	23.69	22.93	0
		1	24	22.65	23.54	22.78	0
		12	0	21.72	22.61	21.85	1
		12	6	21.79	22.68	21.92	1
		12	13	21.76	22.65	21.89	1
		25	0	21.73	22.62	21.86	1
	16QAM	1	0	21.54	22.43	21.67	1
		1	12	21.67	22.56	21.80	1
		1	24	21.51	22.40	21.64	1
		12	0	20.67	21.56	20.80	2
		12	6	20.76	21.65	20.89	2
		12	13	20.79	21.68	20.92	2
		25	0	20.73	21.62	20.86	2
BW	Modulation	RB Size	RB Offset	CH	CH 23230	CH	MPR
				Frequency MHz	Frequency 782.0 MHz	Frequency MHz	
10 MHz	QPSK	1	0	-	23.65	-	0
		1	24	-	**23.72**	-	0
		1	49	-	23.57	-	0
		25	0	-	22.64	-	1
		25	12	-	22.71	-	1
		25	25	-	22.68	-	1
		50	0	-	22.65	-	1
	16QAM	1	0	-	22.46	-	1
		1	24	-	22.59	-	1
		1	49	-	22.43	-	1
		25	0	-	21.59	-	2
		25	12	-	21.68	-	2
		25	25	-	21.71	-	2
		50	0	-	21.65	-	2

ERP

LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23017	699.7	-22.36	32.77	8.26	6.70	H	3
23095	707.5	-22.69	33.23	8.39	6.90	H	3
23173	715.3	-22.82	33.14	8.17	6.56	H	3
23017	699.7	-16.81	32.42	13.46	22.16	V	3
23095	707.5	-16.20	32.60	14.25	26.61	V	3
23173	715.3	-15.71	32.19	14.33	**27.08**	V	3

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23017	699.7	-23.19	32.77	7.43	5.53	H	3
23095	707.5	-23.71	33.23	7.37	5.46	H	3
23173	715.3	-23.92	33.14	7.07	5.09	H	3
23017	699.7	-17.64	32.42	12.63	18.31	V	3
23095	707.5	-17.22	32.60	13.23	21.04	V	3
23173	715.3	-16.81	32.19	13.23	21.02	V	3

LTE BAND 12

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23025	700.5	-22.17	32.63	8.31	6.78	H	3
23095	707.5	-22.63	33.23	8.45	7.00	H	3
23165	714.5	-22.69	33.21	8.37	6.86	H	3
23025	700.5	-16.62	32.33	13.56	22.68	V	3
23095	707.5	-16.14	32.60	14.31	26.98	V	3
23165	714.5	-15.58	32.30	14.57	**28.65**	V	3

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23025	700.5	-23.32	32.63	7.16	5.20	H	3
23095	707.5	-23.73	33.23	7.35	5.43	H	3
23165	714.5	-23.85	33.21	7.21	5.25	H	3
23025	700.5	-17.77	32.33	12.41	17.41	V	3
23095	707.5	-17.24	32.60	13.21	20.94	V	3
23165	714.5	-16.74	32.30	13.41	21.93	V	3

LTE BAND 12

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23035	701.5	-22.18	32.53	8.20	6.60	H	3
23095	707.5	-22.70	33.23	8.38	6.88	H	3
23155	713.5	-22.76	33.29	8.38	6.88	H	3
23035	701.5	-16.63	32.25	13.47	22.25	V	3
23095	707.5	-16.21	32.60	14.24	26.55	V	3
23155	713.5	-15.65	32.39	14.59	**28.75**	V	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23035	701.5	-23.04	32.53	7.34	5.41	H	3
23095	707.5	-23.57	33.23	7.51	5.63	H	3
23155	713.5	-23.61	33.29	7.53	5.66	H	3
23035	701.5	-17.49	32.25	12.61	18.26	V	3
23095	707.5	-17.08	32.60	13.37	21.73	V	3
23155	713.5	-16.50	32.39	13.74	23.64	V	3

LTE BAND 12

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23060	704.0	-22.76	32.68	7.77	5.99	H	3
23095	707.5	-23.15	33.23	7.93	6.21	H	3
23130	711.0	-23.34	33.39	7.90	6.16	H	3
23060	704.0	-17.21	32.37	13.01	19.99	V	3
23095	707.5	-16.66	32.60	13.79	23.93	V	3
23130	711.0	-16.23	32.56	14.18	**26.15**	V	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23060	704.0	-23.69	32.68	6.84	4.83	H	3
23095	707.5	-24.22	33.23	6.86	4.85	H	3
23130	711.0	-24.17	33.39	7.07	5.09	H	3
23060	704.0	-18.14	32.37	12.08	16.14	V	3
23095	707.5	-17.73	32.60	12.72	18.71	V	3
23130	711.0	-17.06	32.56	13.35	21.60	V	3

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 13

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23205	779.5	-7.72	32.60	22.73	187.50	H	3
23230	782.0	-7.14	32.75	23.46	**221.82**	H	3
23255	784.5	-7.48	33.08	23.45	221.31	H	3
23205	779.5	-19.36	31.54	10.03	10.07	V	3
23230	782.0	-18.98	31.70	10.57	11.40	V	3
23255	784.5	-18.64	31.97	11.18	13.12	V	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23205	779.5	-8.08	32.60	22.37	172.58	H	3
23230	782.0	-7.62	32.75	22.98	198.61	H	3
23255	784.5	-7.98	33.08	22.95	197.24	H	3
23205	779.5	-18.55	31.54	10.84	12.13	V	3
23230	782.0	-18.98	31.70	10.57	11.40	V	3
23255	784.5	-19.02	31.97	10.80	12.02	V	3

LTE BAND 13

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23230	782.0	-7.01	32.75	23.59	**228.56**	H	3
23230	782.0	-19.35	31.70	10.20	10.47	V	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
23230	782.0	-7.05	32.75	23.55	226.46	H	3
23230	782.0	-18.25	31.70	11.30	13.49	V	3

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

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.2.2 TEST PROCEDURE

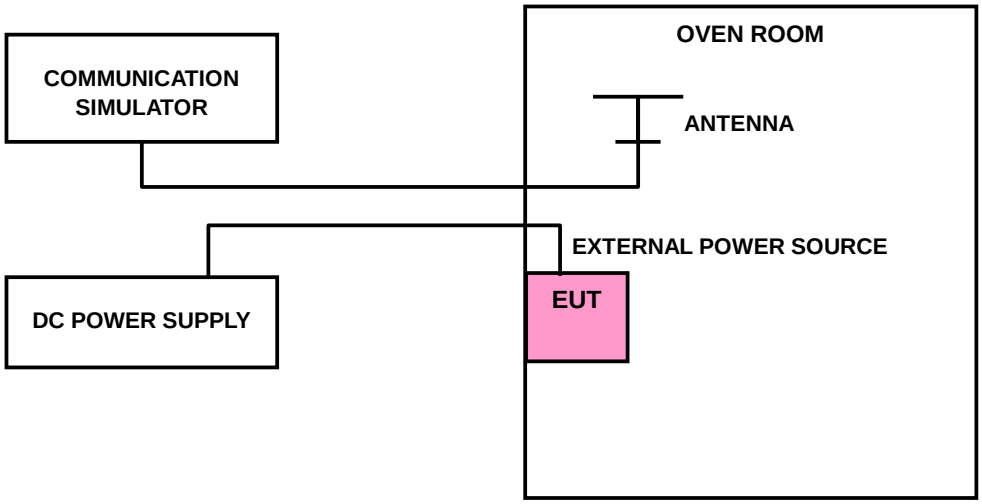
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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

LTE BAND 12

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
15	0.0017	0.0017	2.5
7	-0.0020	-0.0020	2.5
16	0.0017	0.0019	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0134	-0.0121	2.5
-20	-0.0123	-0.0104	2.5
-10	-0.0108	-0.0095	2.5
0	-0.0088	-0.0077	2.5
10	-0.0071	-0.0061	2.5
20	-0.0055	-0.0049	2.5
30	-0.0049	-0.0041	2.5
40	-0.0024	-0.0020	2.5
50	-0.0007	-0.0005	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
15	0.0021	0.0027	2.5
7	-0.0032	-0.0030	2.5
16	0.0023	0.0023	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0151	-0.0156	2.5
-20	-0.0133	-0.0137	2.5
-10	-0.0111	-0.0114	2.5
0	-0.0082	-0.0084	2.5
10	-0.0064	-0.0061	2.5
20	-0.0048	-0.0046	2.5
30	-0.0028	-0.0025	2.5
40	-0.0013	-0.0009	2.5
50	0.0006	0.0009	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
15	0.0019	0.0018	2.5
7	-0.0025	-0.0023	2.5
16	0.0020	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0131	-0.0120	2.5
-20	-0.0117	-0.0107	2.5
-10	-0.0100	-0.0090	2.5
0	-0.0089	-0.0079	2.5
10	-0.0071	-0.0070	2.5
20	-0.0053	-0.0049	2.5
30	-0.0033	-0.0030	2.5
40	-0.0022	-0.0020	2.5
50	-0.0006	-0.0005	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
15	0.0024	0.0025	2.5
7	-0.0025	-0.0025	2.5
16	0.0021	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0129	-0.0123	2.5
-20	-0.0118	-0.0108	2.5
-10	-0.0098	-0.0092	2.5
0	-0.0087	0.0083	2.5
10	-0.0060	-0.0055	2.5
20	-0.0053	-0.0050	2.5
30	-0.0035	-0.0031	2.5
40	-0.0018	-0.0016	2.5
50	0.0008	0.0010	2.5

LTE BAND 13

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
15	0.0022	0.0019	2.5
7	-0.0027	-0.0025	2.5
16	0.0021	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (℃)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0145	-0.0143	2.5
-20	-0.0132	-0.0130	2.5
-10	-0.0116	-0.0114	2.5
0	-0.0096	-0.0094	2.5
10	-0.0077	-0.0074	2.5
20	-0.0064	-0.0062	2.5
30	-0.0048	-0.0046	2.5
40	-0.0026	-0.0024	2.5
50	-0.0009	-0.0006	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Channel 23230	
15	0.0023	2.5
7	-0.0024	2.5
16	0.0021	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 7Vdc to 16Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

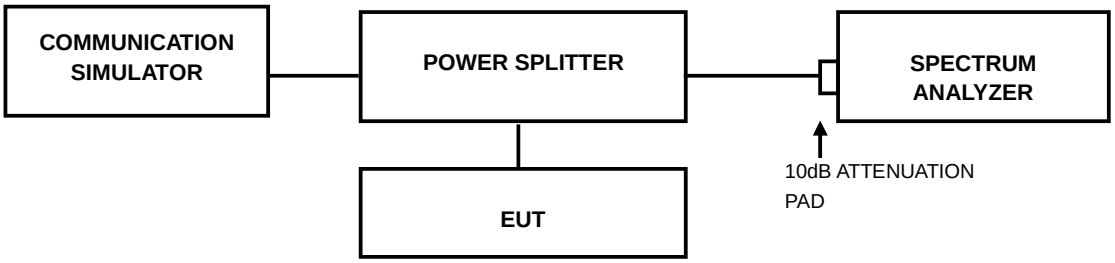
TEMP. (℃)	10MHz	LIMIT (ppm)
	FREQUENCY ERROR (ppm)	
	Channel 23230	
-30	-0.0157	2.5
-20	-0.0132	2.5
-10	-0.0113	2.5
0	-0.0085	2.5
10	-0.0065	2.5
20	-0.0048	2.5
30	-0.0029	2.5
40	-0.0013	2.5
50	0.0006	2.5

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

3.3.2 TEST SETUP



3.3.3 TEST PROCEDURES

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.4 TEST RESULTS

LTE BAND 12

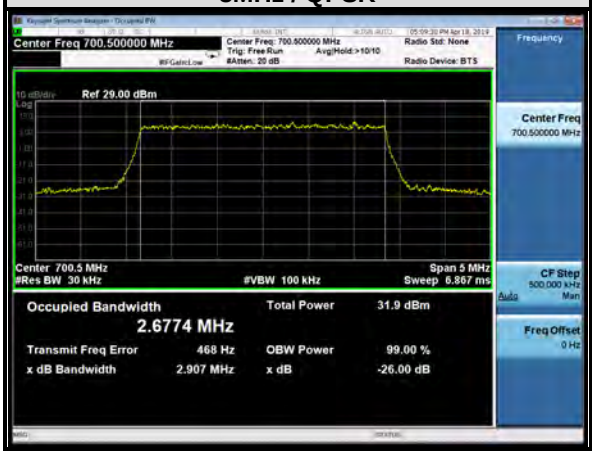
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	1.09	1.08	23025	700.5	2.68	2.68
23095	707.5	1.09	1.08	23095	707.5	2.68	2.68
23173	715.3	1.09	1.08	23165	714.5	2.68	2.68

SPECTRUM PLOT OF WORST VALUE

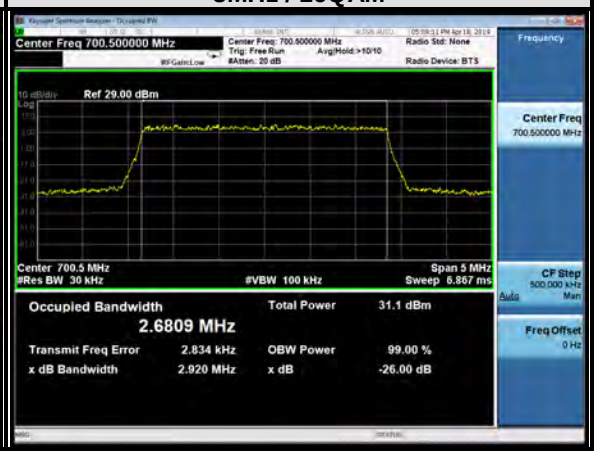
1.4MHz / QPSK

1.4MHz / 16QAM

3MHz / QPSK



3MHz / 16QAM

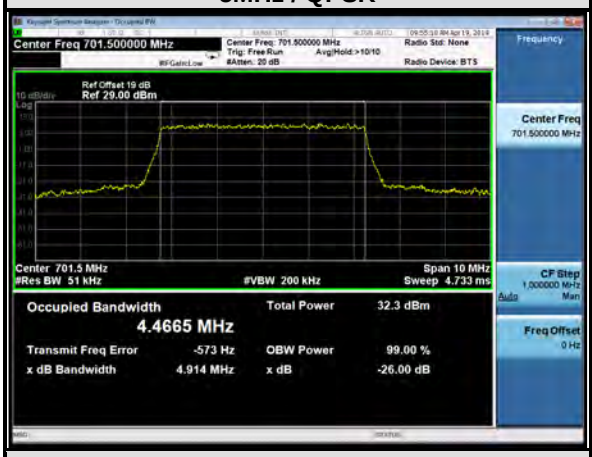


LTE BAND 12

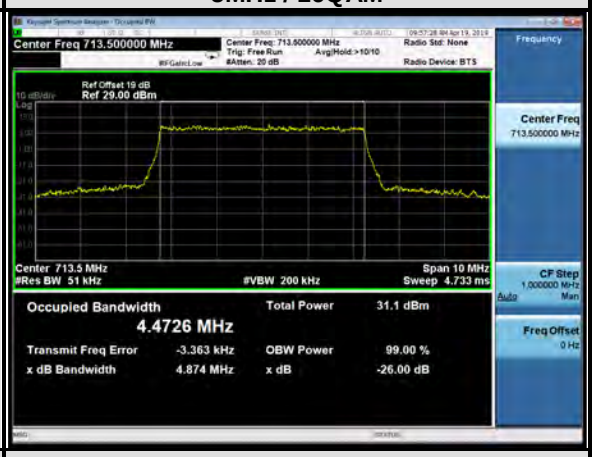
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	4.47	4.47	23060	704	8.93	8.90
23095	707.5	4.47	4.47	23095	707.5	8.93	8.90
23155	713.5	4.47	4.47	23130	711	8.92	8.90

SPECTRUM PLOT OF WORST VALUE

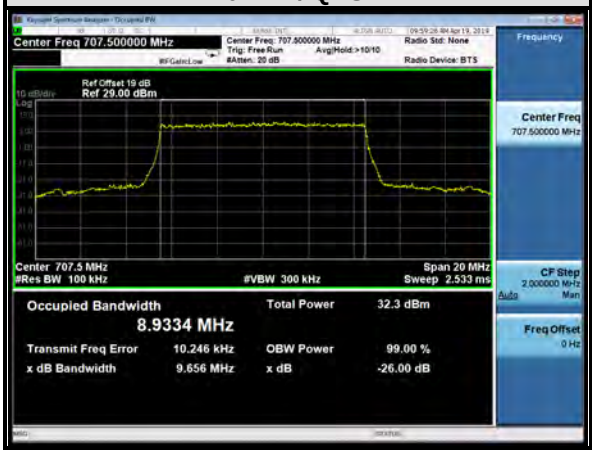
5MHz / QPSK



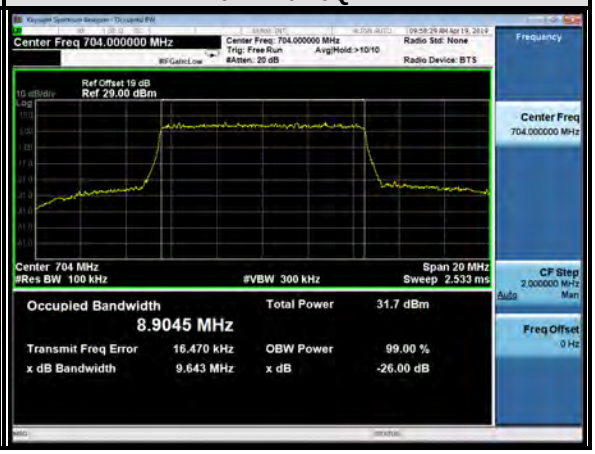
5MHz / 16QAM



10MHz / QPSK



10MHz / 16QAM



LTE BAND 13

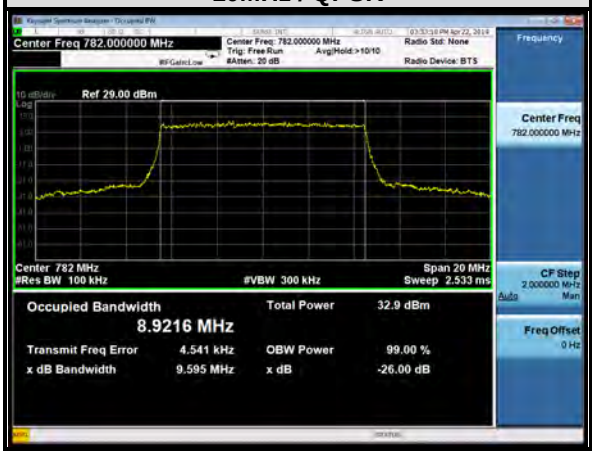
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.47	4.47	-	-	-	-
23230	782	4.47	4.47	23230	782	8.92	8.90
23255	784.5	4.47	4.47	-	-	-	-

SPECTRUM PLOT OF WORST VALUE

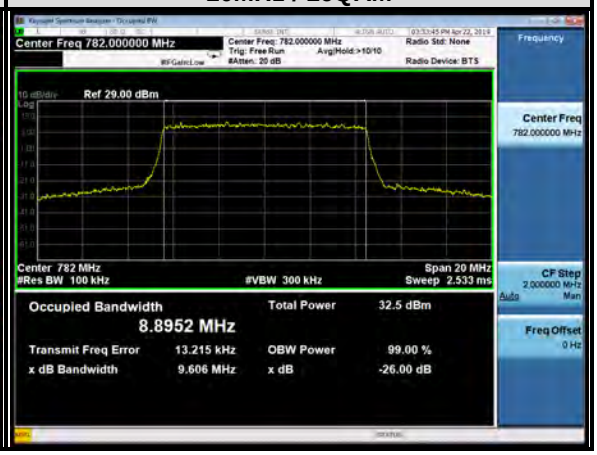
5MHz / QPSK

5MHz / 16QAM

10MHz / QPSK



10MHz / 16QAM

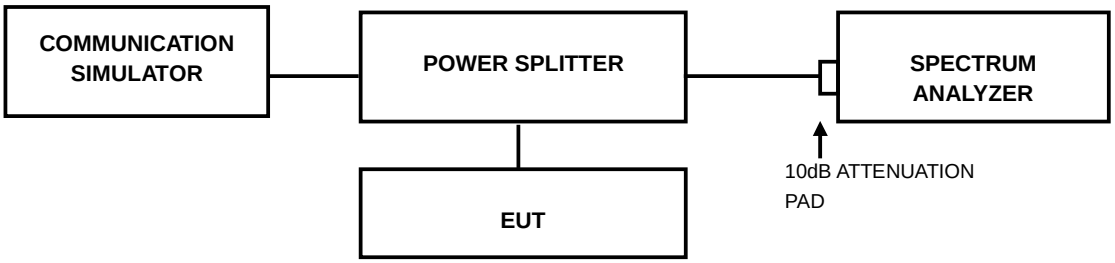


3.4 PEAK TO AVERAGE RATIO

3.4.1 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

3.4.2 TEST SETUP



3.4.3 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%.

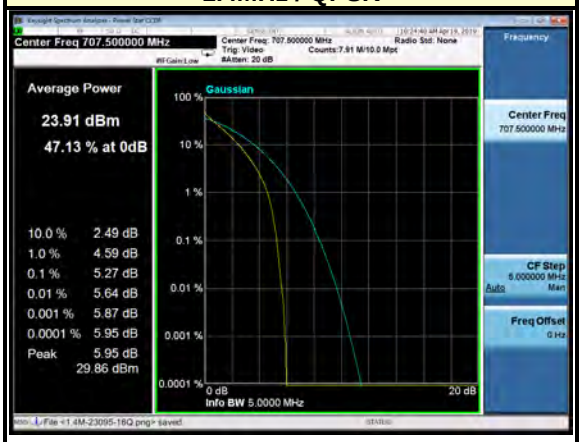
3.4.4 TEST RESULTS

LTE BAND 12

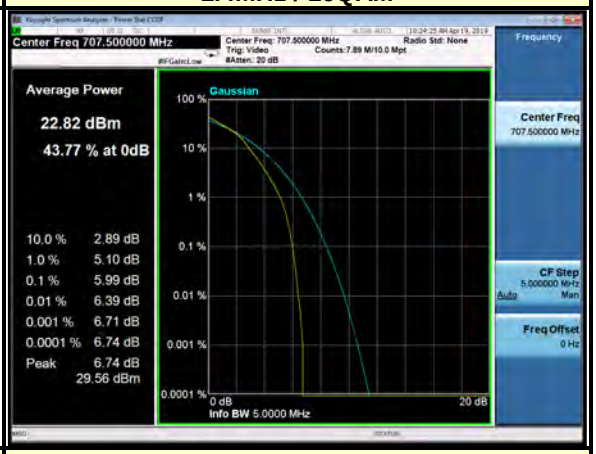
CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	5.21	5.94	23025	700.5	5.19	6.05
23095	707.5	5.27	5.99	23095	707.5	5.27	6.05
23173	715.3	5.06	5.85	23165	714.5	5.20	6.03

SPECTRUM PLOT OF WORST VALUE

1.4MHz / QPSK

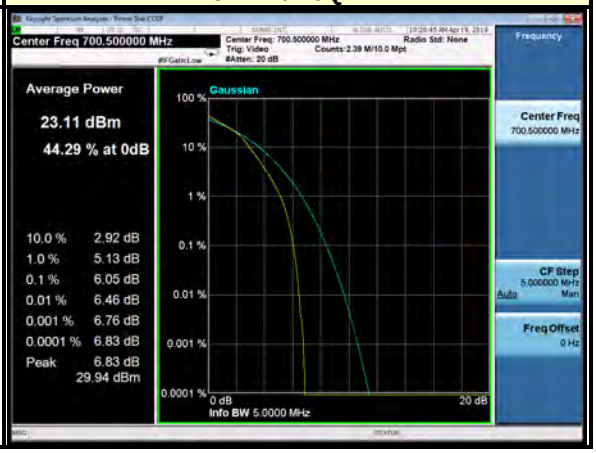


1.4MHz / 16QAM



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
23035	701.5	5.18	5.31	23060	704	5.24	5.95
23095	707.5	5.21	5.97	23095	707.5	5.22	5.98
23155	713.5	5.23	5.96	23130	711	4.99	5.19

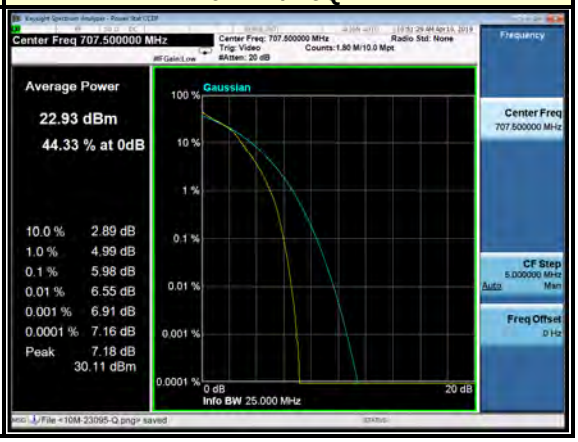
SPECTRUM PLOT OF WORST VALUE

5MHz / QPSK

5MHz / 16QAM

10MHz / QPSK

10MHz / 16QAM



LTE BAND 13

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
23205	779.5	4.98	5.71	-	-	-	-
23230	782	4.95	5.67	23230	782	4.79	5.55
23255	784.5	4.93	5.69	-	-	-	-

SPECTRUM PLOT OF WORST VALUE

5MHz / QPSK

5MHz / 16QAM

10MHz / QPSK

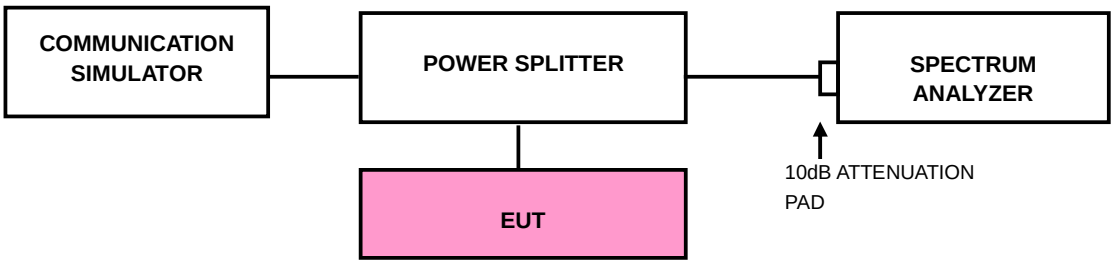
10MHz / 16QAM

3.5 BAND EDGE MEASUREMENT

3.5.1 LIMITS OF BAND EDGE MEASUREMENT

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.
However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

3.5.2 TEST SETUP



3.5.3 TEST PROCEDURES

a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).

b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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.

3.5.4 TEST RESULTS

LTE BAND 12

Channel Bandwidth: 1.4MHz QPSK

CHANNEL	23017	1 RB	CHANNEL	23173	1 RB

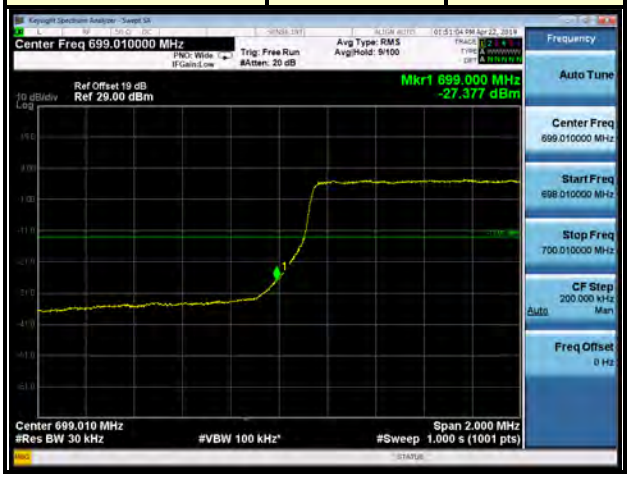
CHANNEL	23017	Full RB	CHANNEL	23173	Full RB

Channel Bandwidth: 1.4MHz 16QAM

CHANNEL	23017	1 RB	CHANNEL	23173	1 RB

CHANNEL	23017	Full RB	CHANNEL	23173	Full RB

LTE BAND 12

Channel Bandwidth: 3MHz QPSK					
CHANNEL	23025	1 RB	CHANNEL	23165	1 RB
CHANNEL	23025	Full RB	CHANNEL	23165	Full RB
					

Channel Bandwidth: 3MHz 16QAM

CHANNEL	23025	1 RB	CHANNEL	23165	1 RB

CHANNEL	23025	Full RB	CHANNEL	23165	Full RB

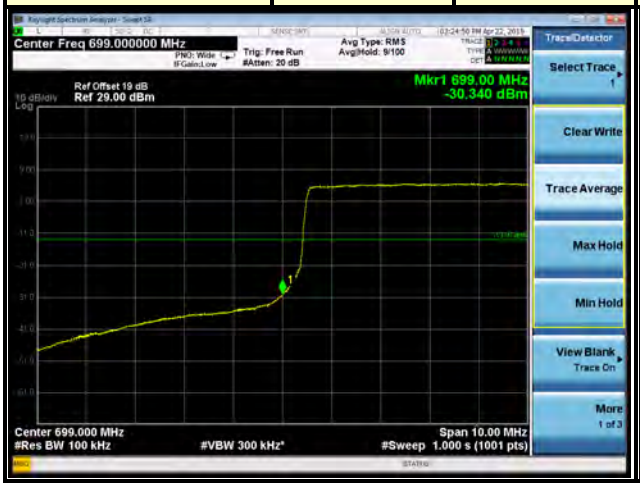
LTE BAND 12

Channel Bandwidth: 5MHz QPSK					
CHANNEL	23035	1 RB	CHANNEL	23155	1 RB
CHANNEL	23035	Full RB	CHANNEL	23155	Full RB

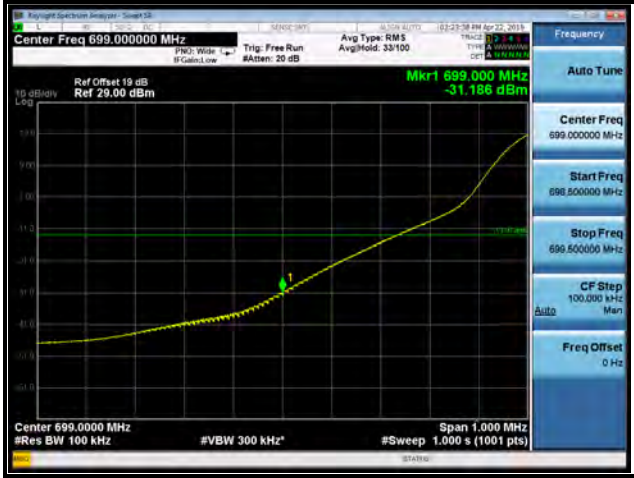
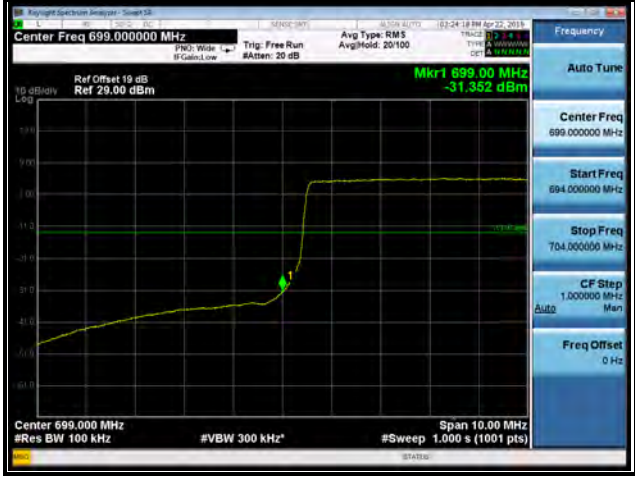
Channel Bandwidth: 5MHz 16QAM

CHANNEL	23035	1 RB	CHANNEL	23155	1 RB
CHANNEL	23035	Full RB	CHANNEL	23155	Full RB

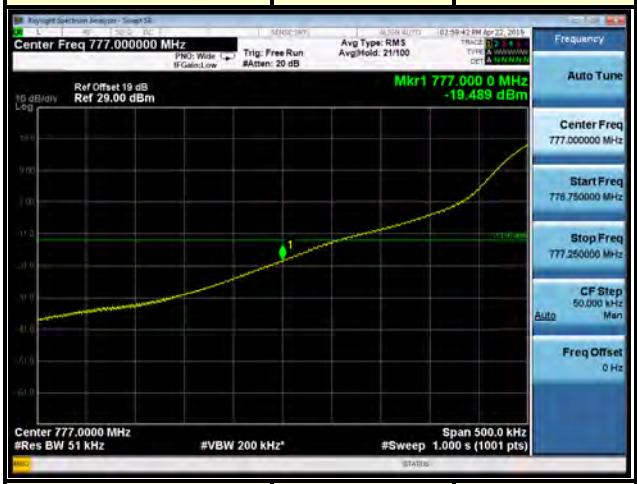
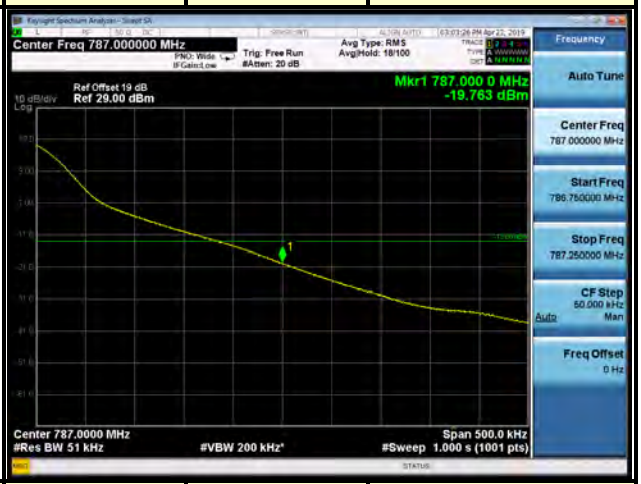
LTE BAND 12

Channel Bandwidth: 10MHz QPSK					
CHANNEL	23060	1 RB	CHANNEL	23130	1 RB
CHANNEL	23060	Full RB	CHANNEL	23130	Full RB
					

Channel Bandwidth: 10MHz 16QAM

CHANNEL	23060	1 RB	CHANNEL	23130	1 RB
					
CHANNEL	23060	Full RB	CHANNEL	23130	Full RB
					

LTE BAND 13

Channel Bandwidth: 5MHz QPSK					
CHANNEL	23205	1 RB	CHANNEL	23255	1 RB
					
CHANNEL	23205	Full RB	CHANNEL	23255	Full RB

Channel Bandwidth: 5MHz 16QAM

CHANNEL	23205	1 RB	CHANNEL	23255	1 RB

CHANNEL	23205	Full RB	CHANNEL	23255	Full RB

LTE BAND 13

Channel Bandwidth: 10MHz QPSK					
CHANNEL	23230	1 RB	CHANNEL	23230	1 RB
CHANNEL	23230	Full RB	CHANNEL	23230	Full RB

Channel Bandwidth: 10MHz 16QAM

CHANNEL	23230	1 RB	CHANNEL	23230	1 RB

CHANNEL	23230	Full RB	CHANNEL	23230	Full RB

3.6 CONDUCTED SPURIOUS EMISSIONS

3.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

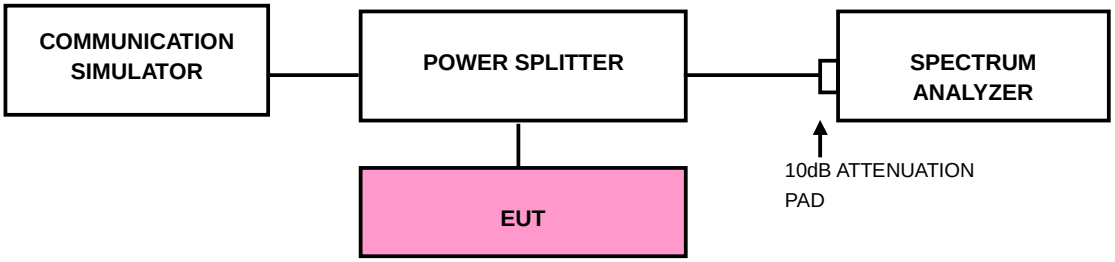
The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

3.6.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at middle operational frequency range.

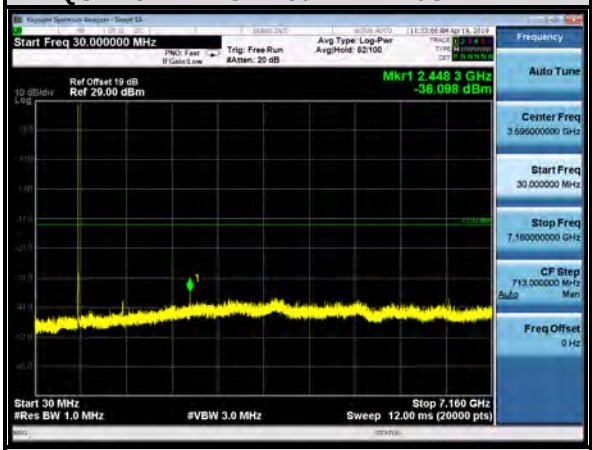
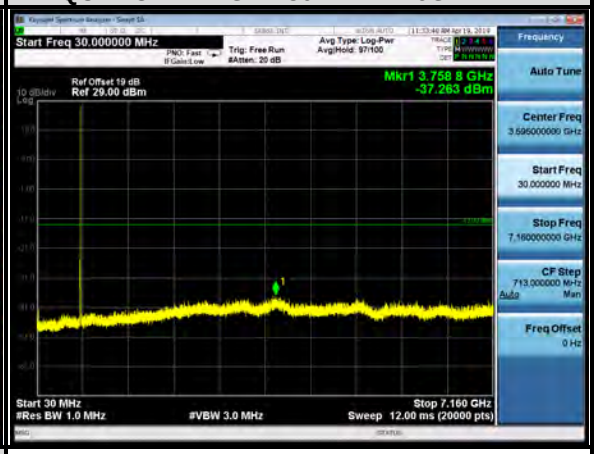
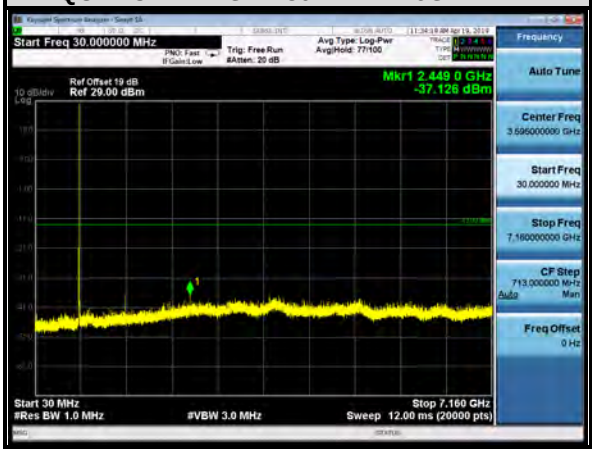
b. Measuring frequency range is from 30 MHz to 8GHz for LTE Band 12 & 13. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

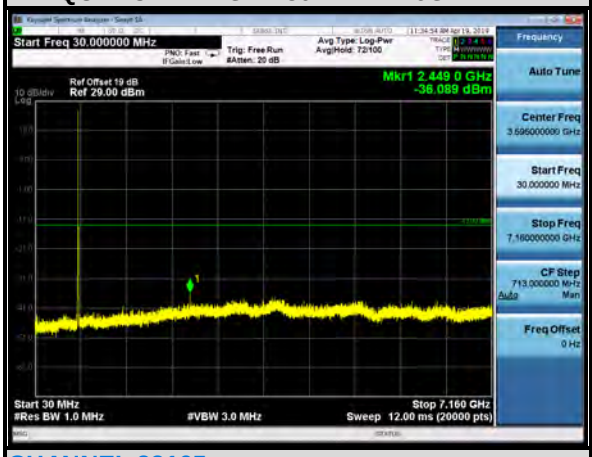
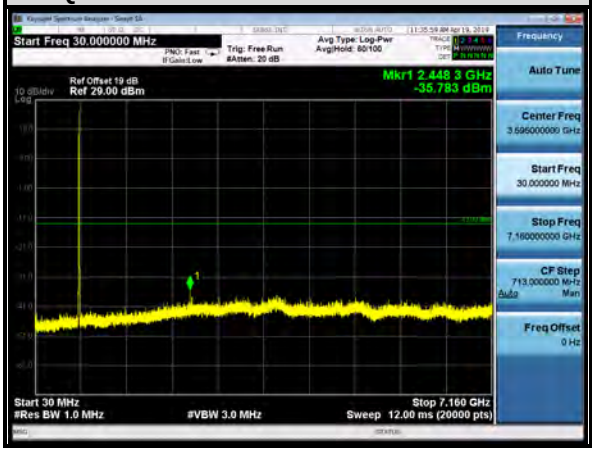
3.6.3 TEST SETUP

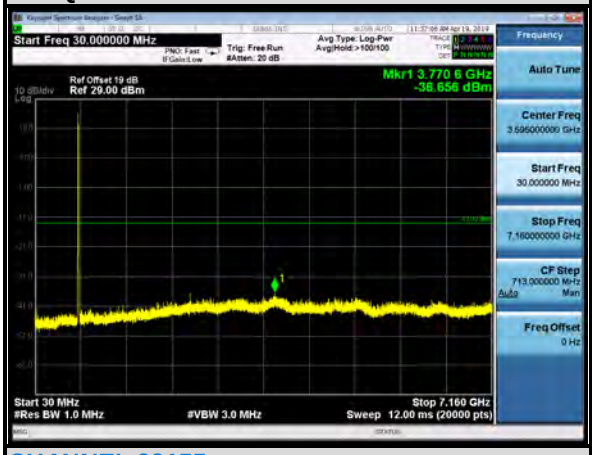
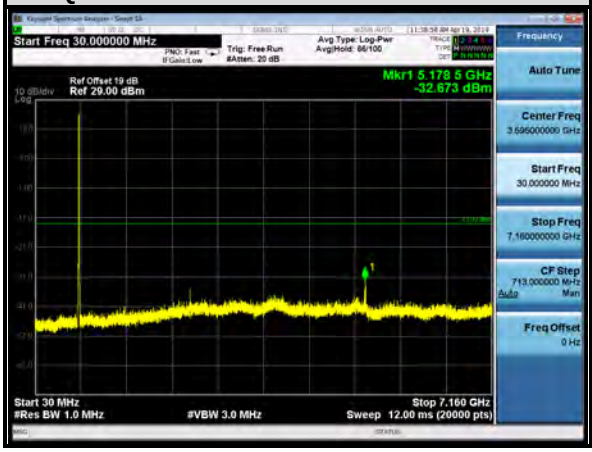


3.6.4 TEST RESULTS

LTE BAND 12

1.4MHz / QPSK	
CHANNEL 23017	**CHANNEL 23095**
FREQUENCY RANGE : 30MHz~7.16GHz	**FREQUENCY RANGE : 30MHz~7.16GHz**
	
CHANNEL 23173	
FREQUENCY RANGE : 30MHz~7.16GHz	
	

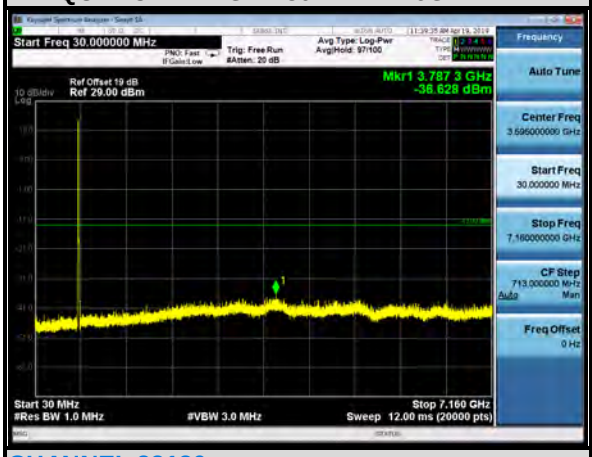
3MHz / QPSK	
CHANNEL 23025	CHANNEL 23095
FREQUENCY RANGE : 30MHz~7.16GHz	FREQUENCY RANGE : 30MHz~7.16GHz
	
CHANNEL 23165	
FREQUENCY RANGE : 30MHz~7.16GHz	
	

5MHz / QPSK	
CHANNEL 23035	CHANNEL 23095
FREQUENCY RANGE : 30MHz~7.16GHz	FREQUENCY RANGE : 30MHz~7.16GHz
	
CHANNEL 23155	
FREQUENCY RANGE : 30MHz~7.16GHz	
	

10MHz / QPSK

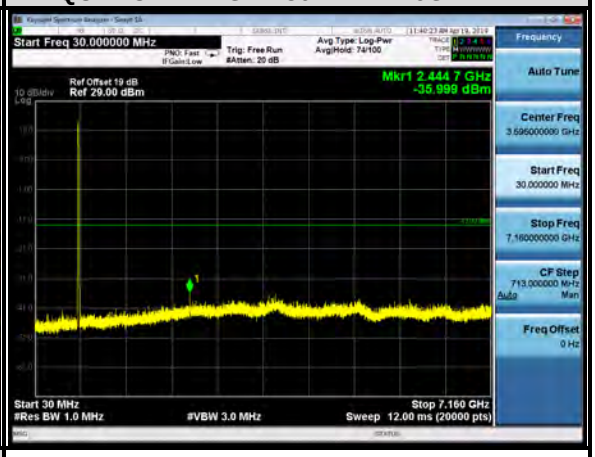
CHANNEL 23060

FREQUENCY RANGE : 30MHz~7.16GHz



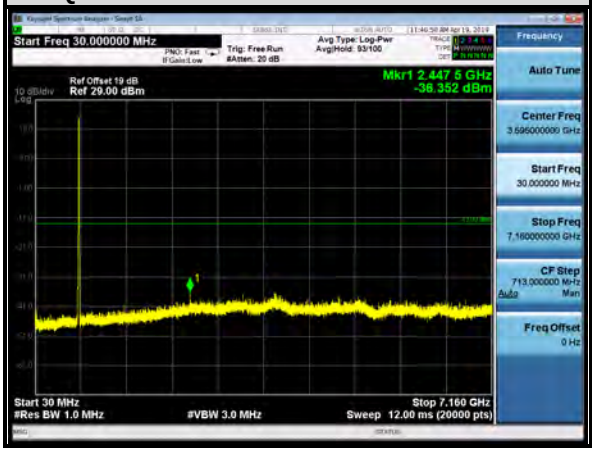
CHANNEL 23095

FREQUENCY RANGE : 30MHz~7.16GHz

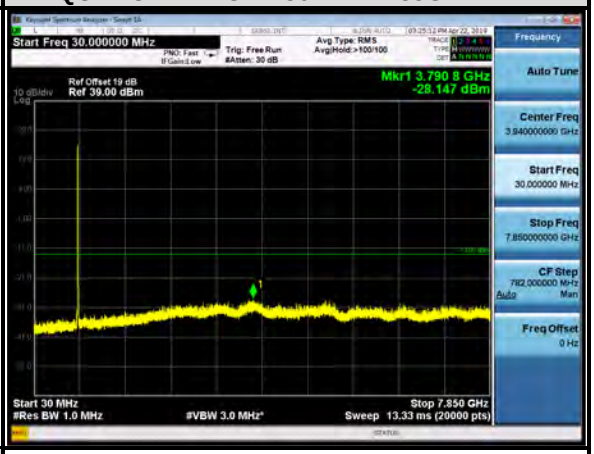


CHANNEL 23130

FREQUENCY RANGE : 30MHz~7.16GHz



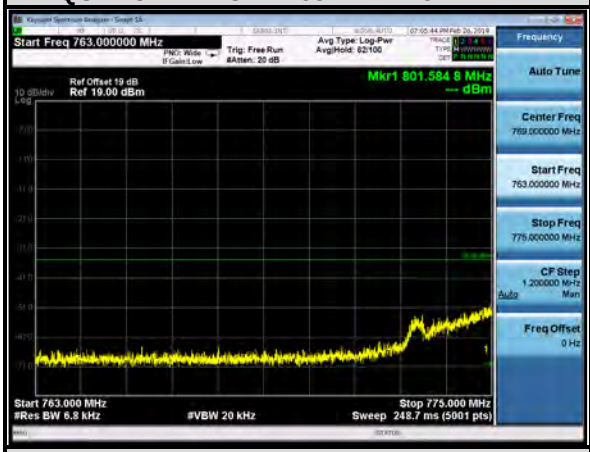
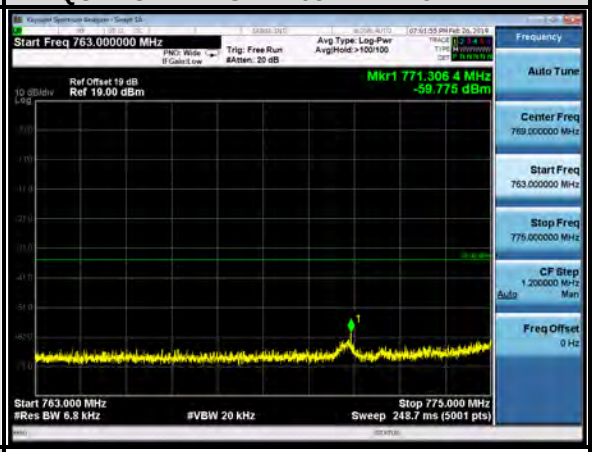
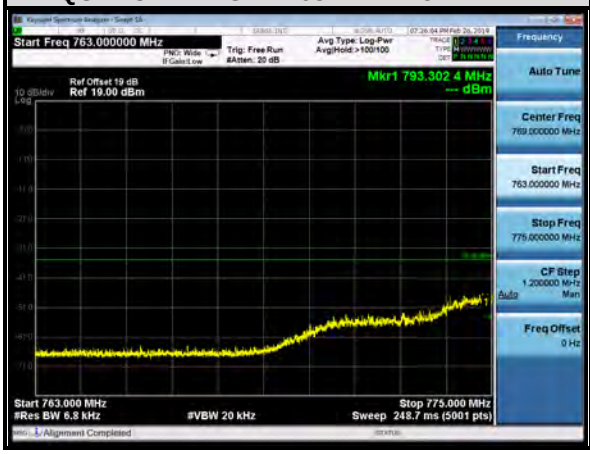
LTE Band 13

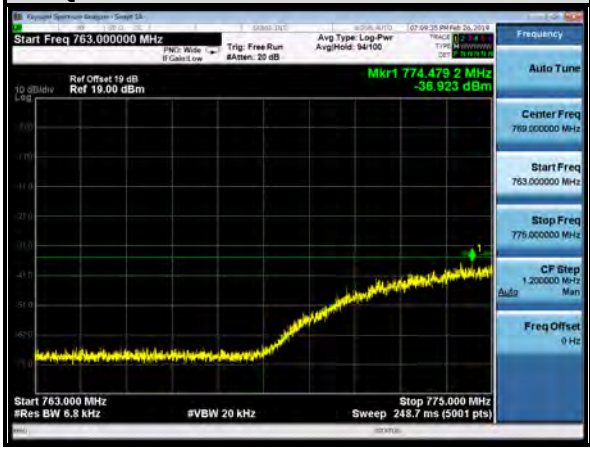
5MHz / QPSK	
CHANNEL 23205	CHANNEL 23230
FREQUENCY RANGE : 30MHz~7.85GHz	FREQUENCY RANGE : 30MHz~7.85GHz
	
CHANNEL 23255	
FREQUENCY RANGE : 30MHz~7.85GHz	

10MHz / QPSK	
CHANNEL 23230	
FREQUENCY RANGE : 30MHz~7.85GHz	

LTE BAND 13

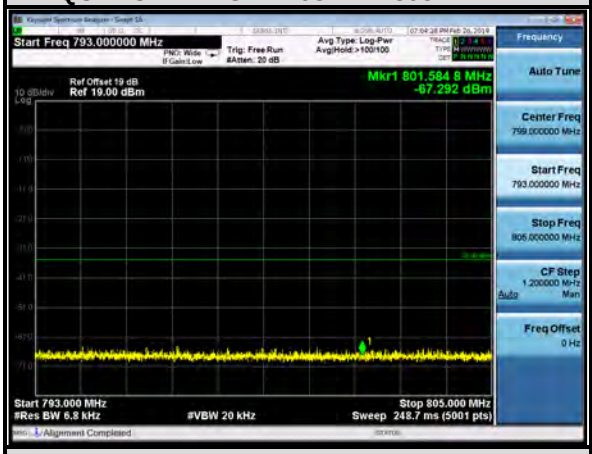
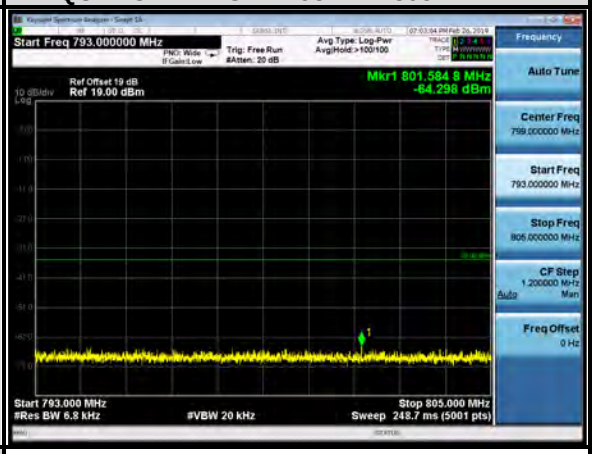
5MHz / QPSK

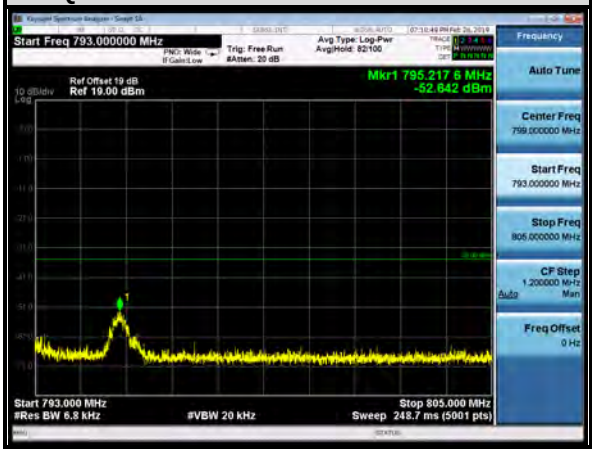
CHANNEL 23205	CHANNEL 23230
FREQUENCY RANGE : 763MHz~775MHz	FREQUENCY RANGE : 763MHz~775MHz
	
CHANNEL 23255	
FREQUENCY RANGE : 763MHz~775MHz	
	

10MHz / QPSK	
CHANNEL 23230	
FREQUENCY RANGE : 763MHz~775MHz	
	

LTE BAND 13

5MHz / QPSK

CHANNEL 23205	CHANNEL 23230
FREQUENCY RANGE : 793MHz~805MHz	FREQUENCY RANGE : 793MHz~805MHz
	
CHANNEL 23255	
FREQUENCY RANGE : 793MHz~805MHz	

10MHz / QPSK	
CHANNEL 23230	
FREQUENCY RANGE : 793MHz~805MHz	
	

3.7 RADIATED EMISSION MEASUREMENT

3.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

3.7.2 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.

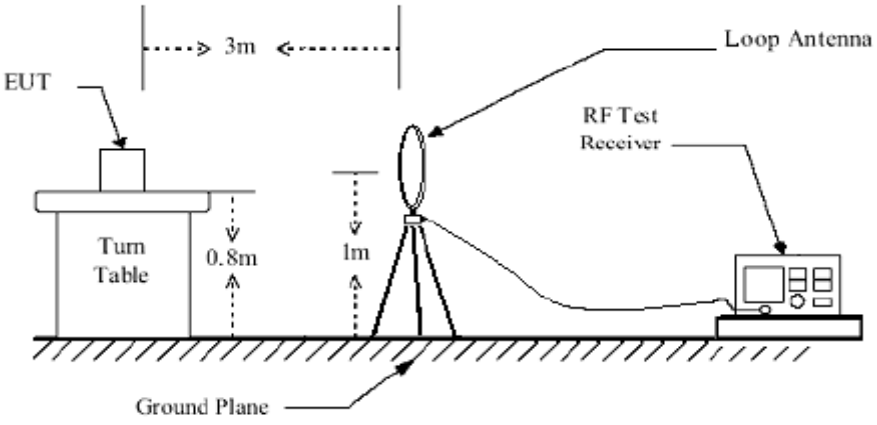
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.7.3 DEVIATION FROM TEST STANDARD

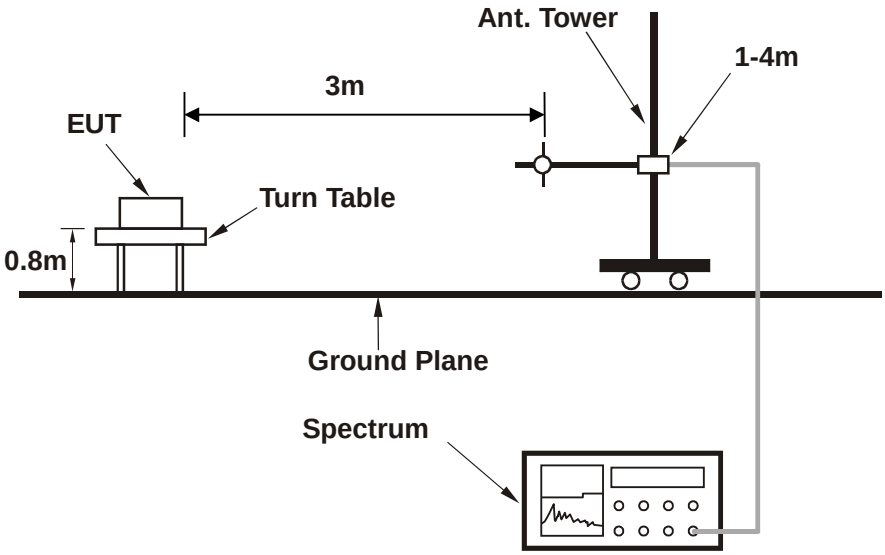
No deviation

3.7.4 TEST SETUP

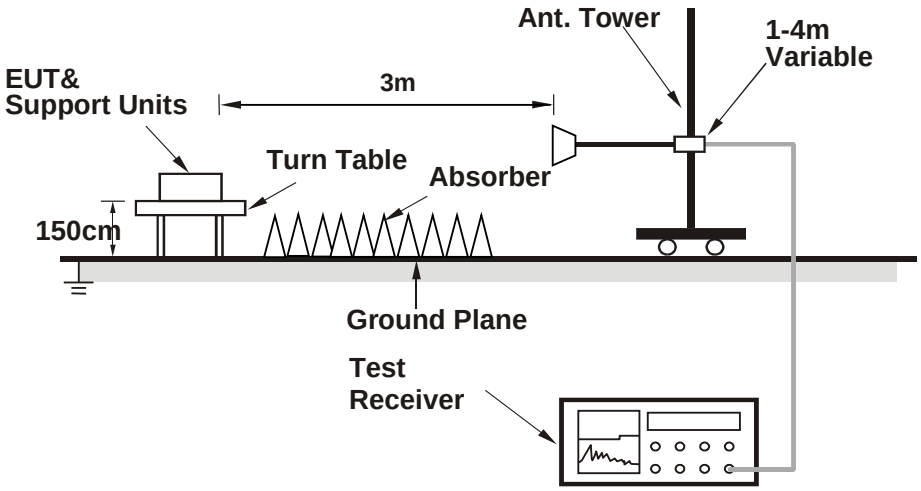
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



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

3.7.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

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

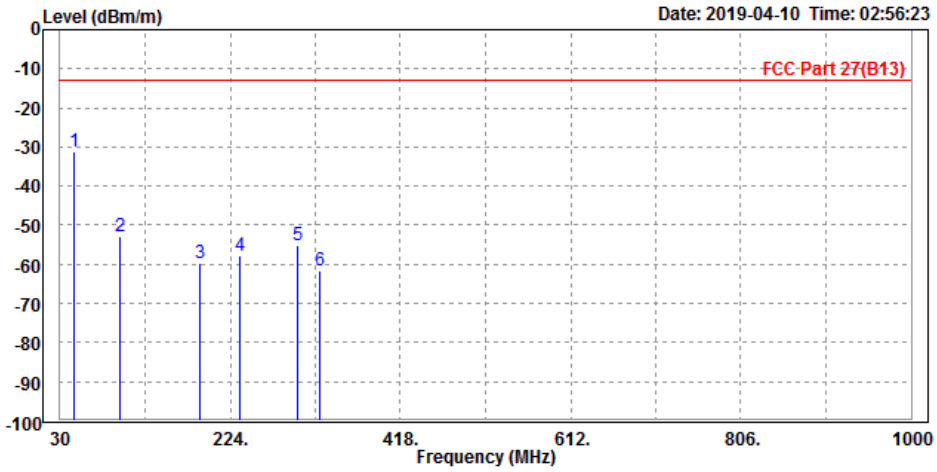
30 MHz – 1GHz data:

LTE Band 13:

CHANNEL BANDWIDTH: 10MHz / QPSK

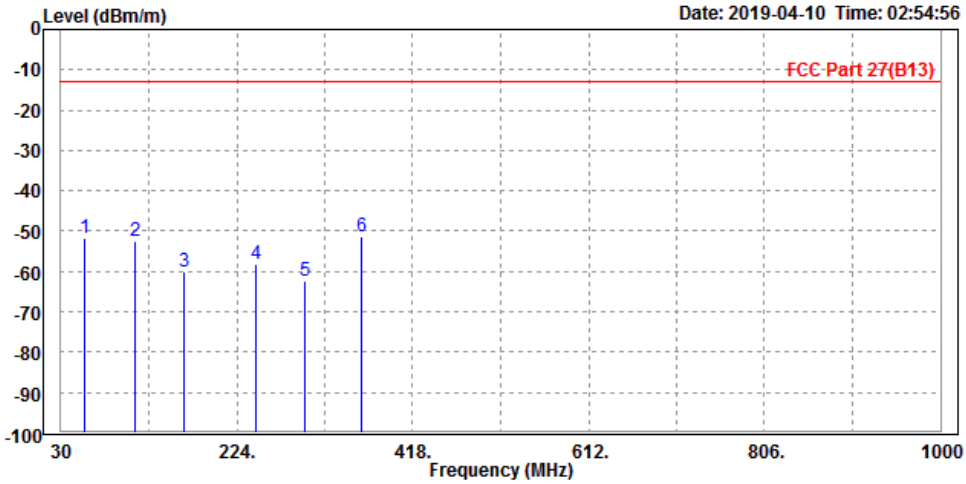
MODE	TX channel 23230	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	45.630	-31.32	-38.45	-13.00	-18.32	7.13	Peak	Horizontal
2	98.210	-52.93	-42.15	-13.00	-39.93	-10.78	Peak	Horizontal
3	189.260	-59.88	-42.36	-13.00	-46.88	-17.52	Peak	Horizontal
4	235.650	-57.83	-41.28	-13.00	-44.83	-16.55	Peak	Horizontal
5	301.220	-54.98	-41.21	-13.00	-41.98	-13.77	Peak	Horizontal
6	325.610	-61.47	-48.52	-13.00	-48.47	-12.95	Peak	Horizontal



MODE	TX channel 23230	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
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	56.210	-51.77	-42.30	-13.00	-38.77	-9.47	Peak	Vertical
2	112.350	-52.55	-40.25	-13.00	-39.55	-12.30	Peak	Vertical
3	165.240	-59.93	-45.21	-13.00	-46.93	-14.72	Peak	Vertical
4	245.150	-58.13	-46.69	-13.00	-45.13	-11.44	Peak	Vertical
5	299.560	-62.53	-51.23	-13.00	-49.53	-11.30	Peak	Vertical
6 PP	362.120	-51.42	-40.35	-13.00	-38.42	-11.07	Peak	Vertical



ABOVE 1GHz

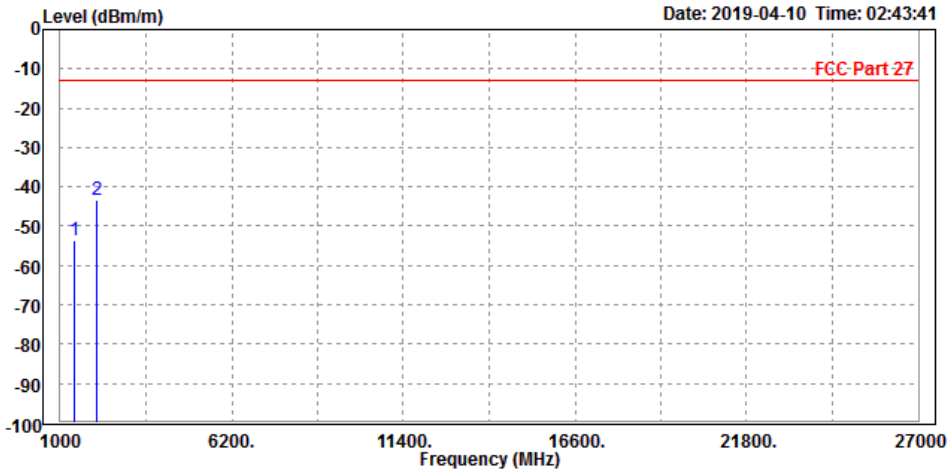
Note: For higher frequency, the emission is too low to be detected.

LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz / QPSK

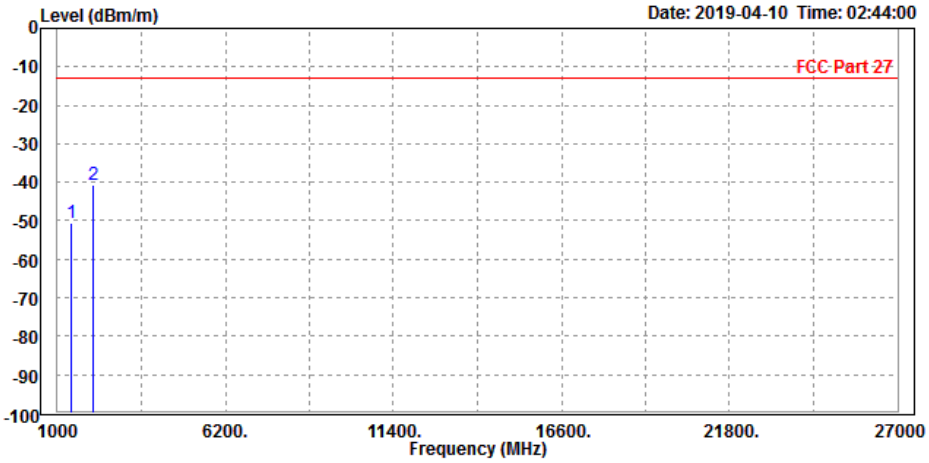
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-53.59	-46.87	-13.00	-40.59	-6.72	Peak	Horizontal
2	PP	2122.500	-43.51	-41.58	-13.00	-30.51	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

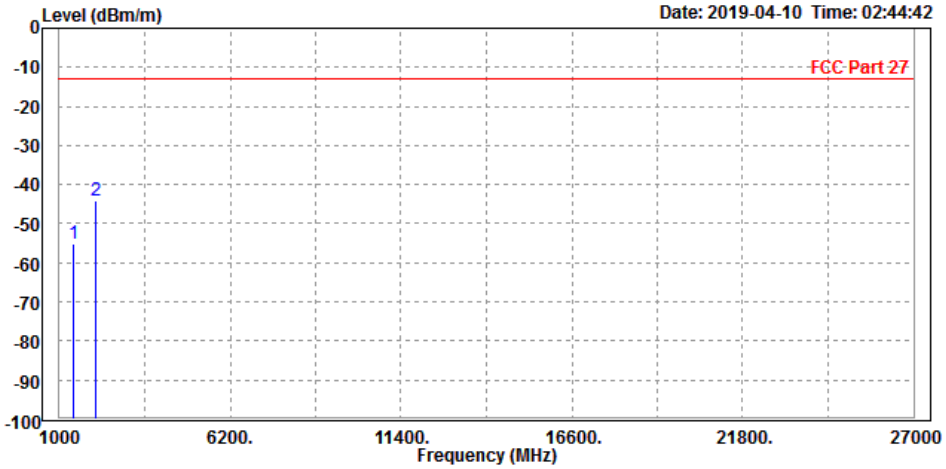
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-50.59	-45.15	-13.00	-37.59	-5.44	Peak	Vertical
2	PP	2122.500	-40.50	-40.26	-13.00	-27.50	-0.24	Peak	Vertical



CHANNEL BANDWIDTH: 3MHz / QPSK

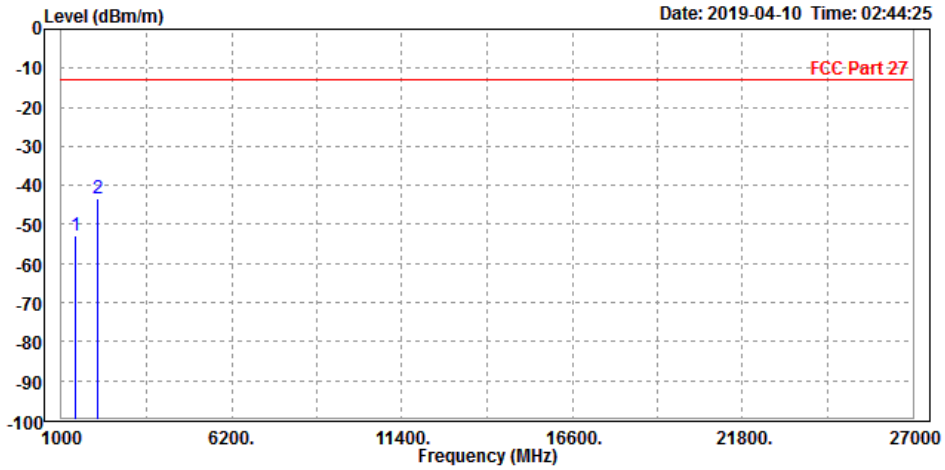
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-55.23	-48.51	-13.00	-42.23	-6.72	Peak	Horizontal
2 PP	2122.500	-44.16	-42.23	-13.00	-31.16	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

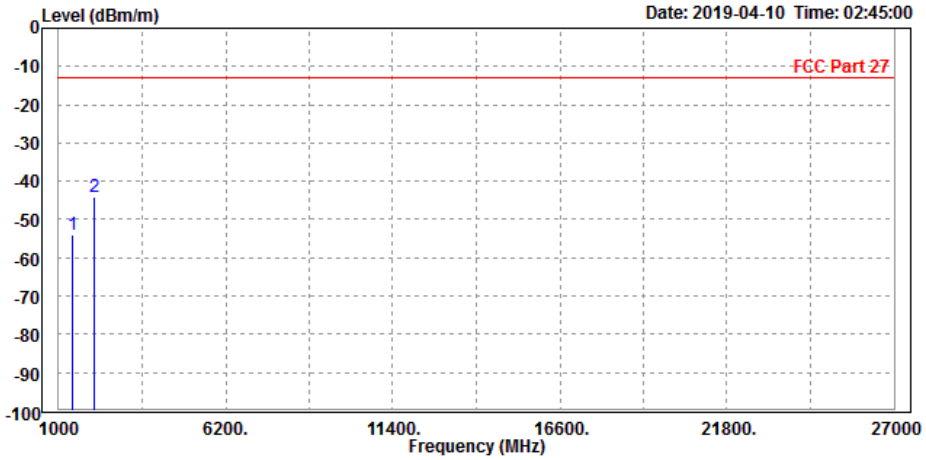
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-52.98	-47.54	-13.00	-39.98	-5.44	Peak	Vertical
2	PP	2122.500	-43.36	-43.12	-13.00	-30.36	-0.24	Peak	Vertical



CHANNEL BANDWIDTH: 5MHz / QPSK

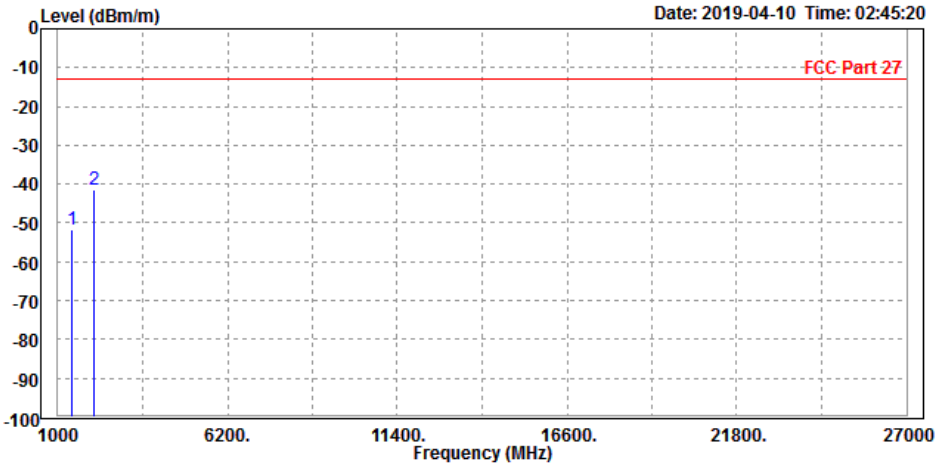
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-53.93	-47.21	-13.00	-40.93	-6.72	Peak	Horizontal
2 PP	2122.500	-44.28	-42.35	-13.00	-31.28	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
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		1416.000	-51.76	-46.32	-13.00	-38.76	-5.44	Peak	Vertical
2	PP	2122.500	-41.46	-41.22	-13.00	-28.46	-0.24	Peak	Vertical

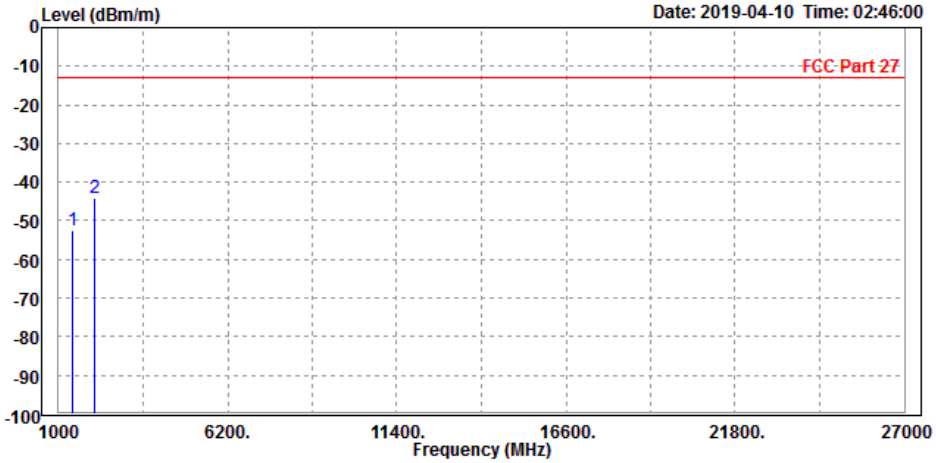


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 23060

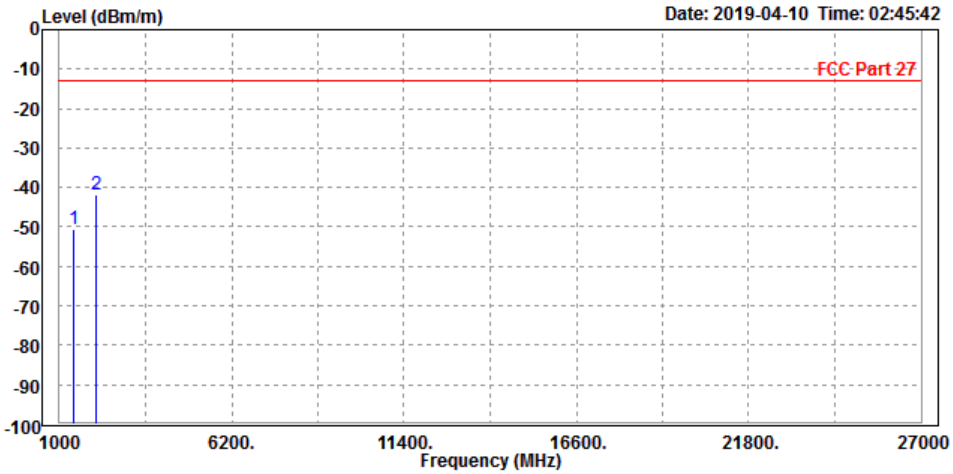
MODE	TX channel 23060	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-52.37	-45.65	-13.00	-39.37	-6.72	Peak	Horizontal
2 PP	2112.000	-44.25	-42.31	-13.00	-31.25	-1.94	Peak	Horizontal



MODE	TX channel 23060	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

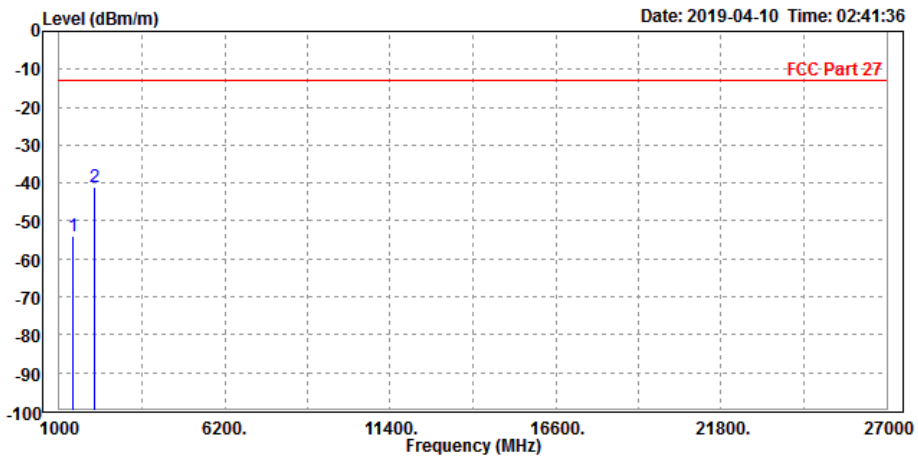
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-50.65	-45.21	-13.00	-37.65	-5.44	Peak	Vertical
2	PP	2112.000	-41.85	-41.61	-13.00	-28.85	-0.24	Peak	Vertical



CH 23095

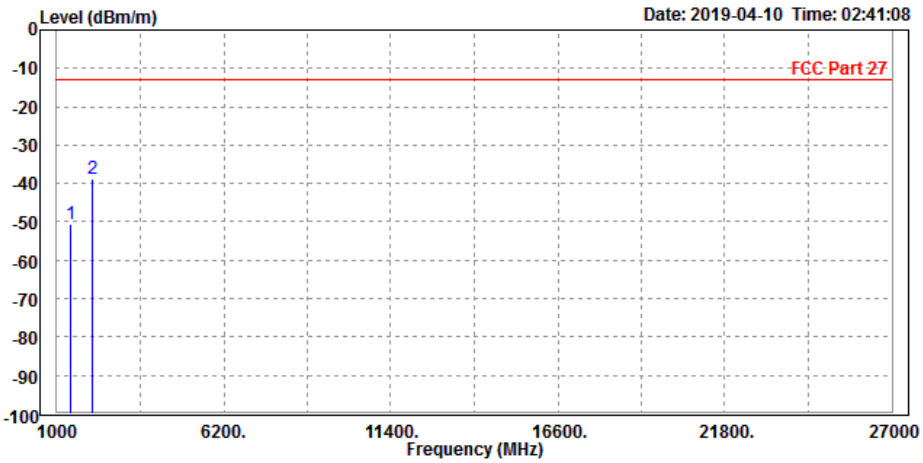
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-53.97	-47.25	-13.00	-40.97	-6.72	Peak	Horizontal
2	PP	2122.500	-41.16	-39.23	-13.00	-28.16	-1.93	Peak	Horizontal



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

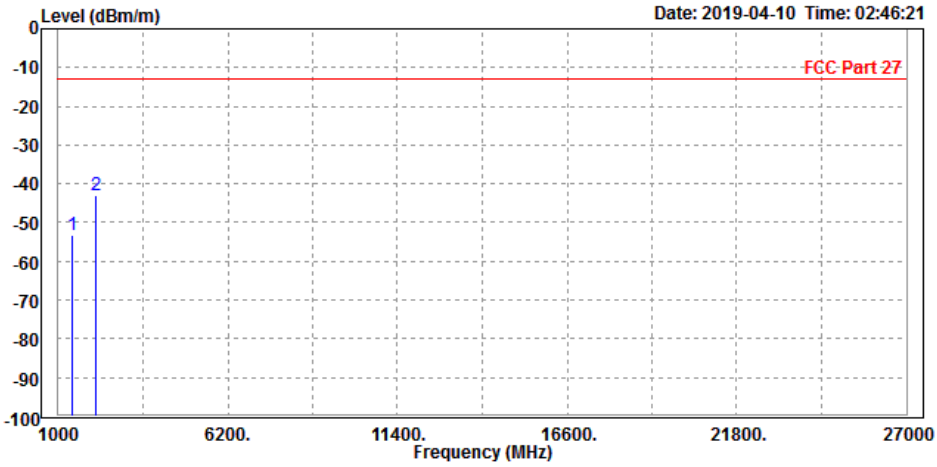
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1416.000	-50.65	-45.21	-13.00	-37.65	-5.44	Peak	Vertical
2	PP	2122.500	-38.86	-38.62	-13.00	-25.86	-0.24	Peak	Vertical



CH 23130

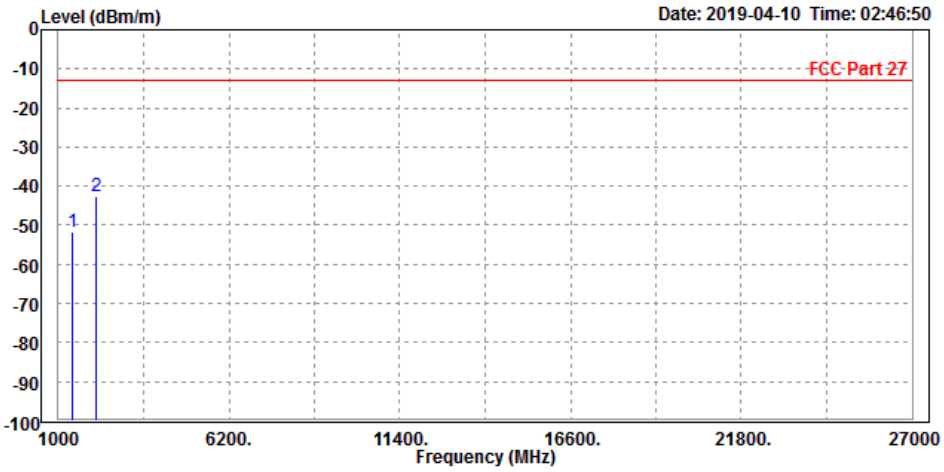
MODE	TX channel 23130	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1416.000	-53.24	-46.52	-13.00	-40.24	-6.72	Peak	Horizontal
2 PP	2133.000	-43.15	-41.22	-13.00	-30.15	-1.93	Peak	Horizontal



MODE	TX channel 23130	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
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		1416.000	-51.77	-46.33	-13.00	-38.77	-5.44	Peak	Vertical
2	PP	2133.000	-42.45	-42.21	-13.00	-29.45	-0.24	Peak	Vertical

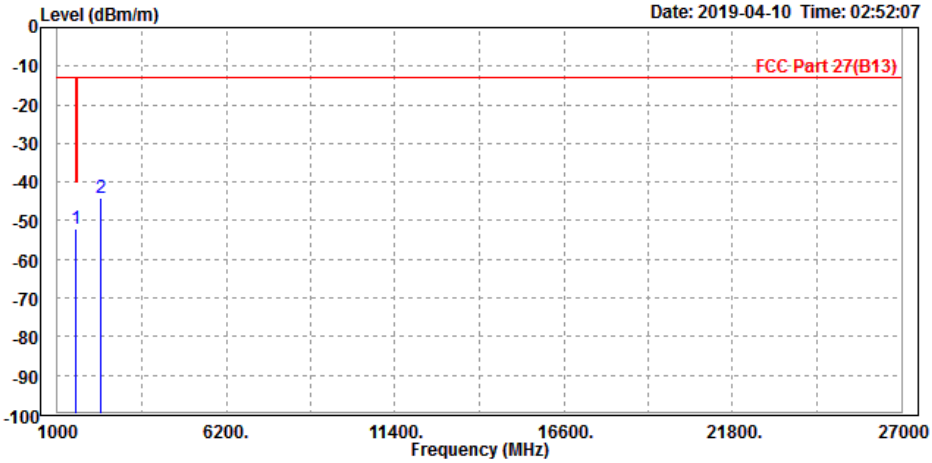


LTE BAND 13

CHANNEL BANDWIDTH: 5MHz / QPSK

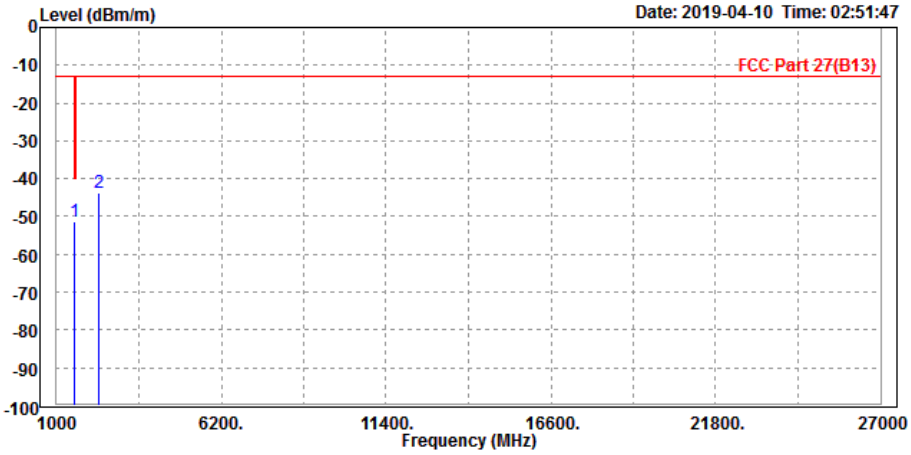
MODE	TX channel 23230	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1572.000	-52.19	-46.59	-40.00	-12.19	-5.60	Peak	Horizontal
2	2346.000	-43.98	-42.22	-13.00	-30.98	-1.76	Peak	Horizontal



MODE	TX channel 23230	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

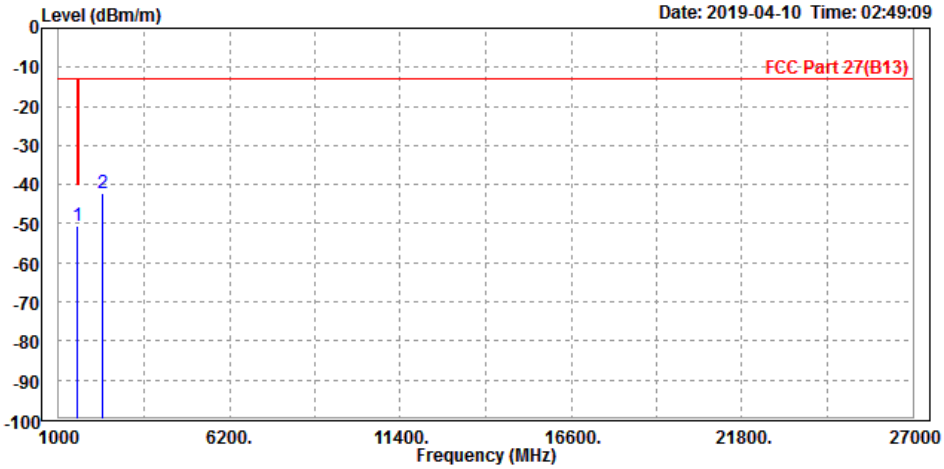
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1572.000	-51.15	-46.89	-40.00	-11.15	-4.26	Peak	Vertical
2	2346.000	-43.82	-43.62	-13.00	-30.82	-0.20	Peak	Vertical



CHANNEL BANDWIDTH: 10MHz / QPSK

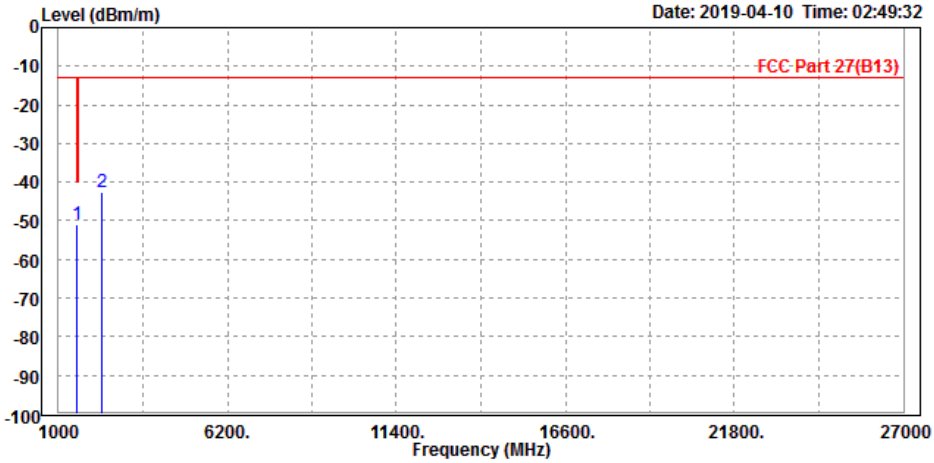
MODE	TX channel 23230	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1572.000	-50.72	-45.12	-40.00	-10.72	-5.60	Peak	Horizontal
2		2346.000	-42.07	-40.31	-13.00	-29.07	-1.76	Peak	Horizontal



MODE	TX channel 23230	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 12V from adapter
TESTED BY	Star		
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	1572.000	-50.77	-46.51	-40.00	-10.77	-4.26	Peak	Vertical
2		2346.000	-42.56	-42.36	-13.00	-29.56	-0.20	Peak	Vertical



4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

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

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Tel: +86-755-88696566
Fax: +86-755-88696577

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.

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---