ACCREDITED
Certificate # 3939.01

FCC TEST REPORT

(PART 22)

Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland

Manufacturer or Supplier:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Product:	GSM/WCDMA/LTE Mobile Phone
Brand Name:	Nokia
Model Name:	TA-1282
FCC ID:	2AJOTTA-1282
Date of tests:	Jun. 30, 2020 ~ Jul. 20, 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 Date: Jul. 20, 2020	Luke Lu Date: Jul. 20, 2020

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute you unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

TABLE OF CONTENTS

RELEASE CONTROL RECORD **4**

1 SUMMARY OF TEST RESULTS **5**

* REFER TO KDB 971168 D01 POWER MEAS LICENSE DIGITAL SYSTEMS V03R01 ..... **5**

1.1 MEASUREMENT UNCERTAINTY 5

1.2 TEST SITE AND INSTRUMENTS 6

2 GENERAL INFORMATION **7**

2.1 GENERAL DESCRIPTION OF EUT 7

2.2 CONFIGURATION OF SYSTEM UNDER TEST 9

2.3 DESCRIPTION OF SUPPORT UNITS 10

2.4 TEST ITEM AND TEST CONFIGURATION 10

2.5 EUT OPERATING CONDITIONS 13

2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS 14

3 TEST TYPES AND RESULTS **15**

3.1 OUTPUT POWER MEASUREMENT 15
3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT 15
3.1.2 TEST PROCEDURES 15
3.1.3 TEST SETUP 16
3.1.4 TEST RESULTS 16

3.2 FREQUENCY STABILITY MEASUREMENT 22
3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT 22
3.2.2 TEST PROCEDURE 22
3.2.3 TEST SETUP 22
3.2.4 TEST RESULTS 23

3.3 OCCUPIED BANDWIDTH MEASUREMENT 30
3.3.1 TEST PROCEDURES 30
3.3.2 TEST SETUP 30
3.3.3 TEST RESULTS 31

3.4 BAND EDGE MEASUREMENT 37
3.4.1 LIMITS OF BAND EDGE MEASUREMENT 37
3.4.2 TEST SETUP 37
3.4.3 TEST PROCEDURES 38
3.4.4 TEST RESULTS 39

3.5 CONDUCTED SPURIOUS EMISSIONS 48
3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT 48
3.5.2 TEST PROCEDURE 48
3.5.3 TEST SETUP 48
3.5.4 TEST RESULTS 49

3.6 RADIATED EMISSION MEASUREMENT 56
3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT 56
3.6.2 TEST PROCEDURES 56

3.6.3 DEVIATION FROM TEST STANDARD 56
3.6.4 TEST SETUP 57
3.6.5 TEST RESULTS 58

3.7 PEAK TO AVERAGE RATIO 90
3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT 90
3.7.2 TEST SETUP 90
3.7.3 TEST PROCEDURES 90
3.7.4 TEST RESULTS 91

4 PHOTOGRAPHS OF THE TEST CONFIGURATION 104

5 INFORMATION ON THE TESTING LABORATORIES 105

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 106

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF200629W001-2	Original release	Jul. 20, 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	Apr. 27,20	Apr. 26,21
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 26,20	Feb. 25,21
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 27,20	Mar. 26,21
Horn Antenna (1GHz-18GHz)	ETS-LINDGREN	3117	00168692	Mar. 27,20	Mar. 26,21
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Nov. 24, 19	Nov. 23, 20
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 27,20	Feb. 26,21
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jun. 02,20	Jun. 01,21
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jun. 02,20	Jun. 01,21
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Apr. 30,20	Apr. 29,21
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	May. 19,20	May. 18,23
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	Jun. 03,20	Jun. 02,21
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	Jun. 02,20	Jun. 01,21
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Mar. 11,20	Mar. 10,21
Power Divider	MCLI/USA	PS2-15	24880	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months or 36 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	GSM/WCDMA/LTE Mobile Phone	
BRAND NAME	Nokia	
MODEL NAME	TA-1282	
NOMINAL VOLTAGE	5.0Vdc (adapter or host equipment) 3.7Vdc (Li-ion, battery)	
MODULATION TYPE	**GSM/GPRS/EDGE**	GMSK, 8PSK
	WCDMA	BPSK, QPSK
	LTE	QPSK, 16QAM
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**	425mW
	EDGE	86mW
	WCDMA	59mW
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	51mW
	LTE Band 5 (Channel Bandwidth: 3MHz)	51mW
	LTE Band 5 (Channel Bandwidth: 5MHz)	51mW
	LTE Band 5 (Channel Bandwidth: 10MHz)	52mW
EMISSION DESIGNATORGOGN	**GSM**	240KGXW
	EDGE	240KG7W
	WCDMA	4M16F9W
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	QPSK: 1M09G7D
		16QAM: 1M09W7D
	LTE Band 5 (Channel Bandwidth: 3MHz)	QPSK: 2M70G7D
		16QAM: 2M69W7D
	LTE Band 5 (Channel Bandwidth: 5MHz)	QPSK: 4M49G7D
		16QAM: 4M49W7D

	LTE Band 5 (Channel Bandwidth: 10MHz)	QPSK: 8M98G7D
		16QAM: 8M96W7D
ANTENNA TYPE	Fixed Internal Antenna with -3.9dBi gain for GSM 850/WCDMA B5/LTE Band 5	
HW VERSION	0154	
SW VERSION	0.2025.11.05	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	USB cable: non-shielded, detachable,1meter Earphone: non-shielded, detachable, 1.5meter	

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. 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
WCDMA	1TX/1RX
LTE	1TX/1RX

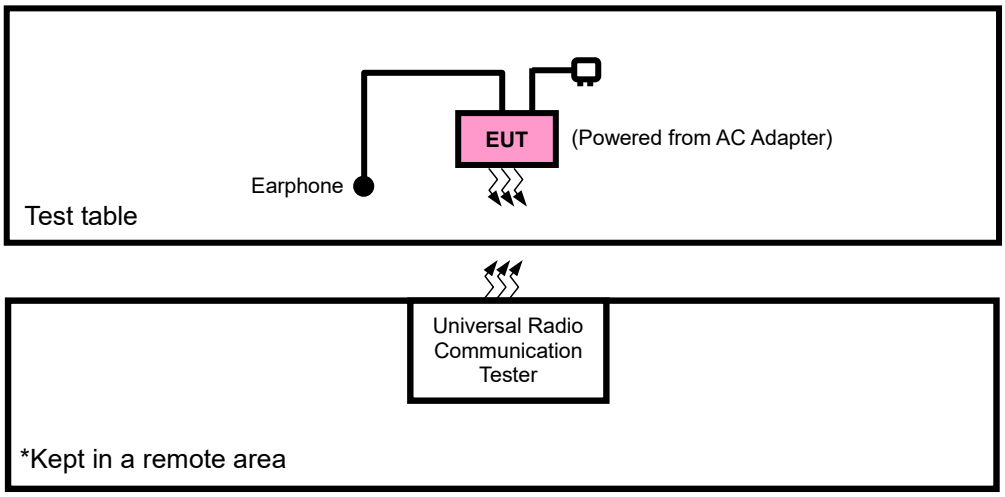
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

List of Accessory:

ACCESSORIES	BRAND	MODEL	MANUFACTURER	SPECIFICATION
Battery 1	Nokia	BL-4WL	TM	Power Rating:3.7 Vdc, 1150 mAh
AC Adapter 1	Nokia	AC-18U	DVE	I/P: 100 - 240 Vac, 100mA, O/P: 5Vdc, 550 mA
AC Adapter 2	Nokia	AC-18U	Aohai	I/P: 100 - 240 Vac, 100mA, O/P: 5Vdc, 550 mA
Earphone 1	Nokia	WH-108	RTF	1.5m non-shielded cable w/ core
USB Cable 1	Nokia	CA-190CD	RTF	1m non-shielded cable w/ core

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



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

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

2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports The worst case in ERP and radiated emission was found when positioned on X-plane for GSM /EDGE /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	1 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM	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	6 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
BAND EDGE	20407 to 20643	20407	1.4 MHz	QPSK,16QAM	1 RB / 0 RB Offset
					6 RB / 0 RB Offset
	20407 to 20643	20643	1.4 MHz	QPSK,16QAM	1 RB / 5 RB Offset
					6 RB / 0 RB Offset
	20415 to 20635	20415	3 MHz	QPSK,16QAM	1 RB / 0 RB Offset
					15 RB / 0 RB Offset
	20415 to 20635	20635	3 MHz	QPSK,16QAM	1 RB / 14 RB Offset
					15 RB / 0 RB Offset
	20425 to 20625	20425	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
	20425 to 20625	20625	5MHz	QPSK,16QAM	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
	20450 to 20600	20450	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
	20450 to 20600	20600	10MHz	QPSK,16QAM	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	1 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,16QAM	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 5V By Adapter	Star Le
FREQUENCY STABILITY	23deg. C, 70%RH	DC 3.6V/3.7V/4.2V	Kevin Zhang
OCCUPIED BANDWIDTH	23deg. C, 70%RH	DC 3.7V By Battery	Kevin Zhang
BAND EDGE	23deg. C, 70%RH	DC 3.7V By Battery	Kevin Zhang
CONDCUDETED EMISSION	23deg. C, 70%RH	DC 3.7V By Battery	Kevin Zhang
RADIATED EMISSION	23deg. C, 70%RH	DC 5V By Adapter	Star Le
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	DC 3.7V By Battery	Kevin Zhang

2.5 EUT OPERATING CONDITIONS

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

2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2

FCC 47 CFR Part 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.

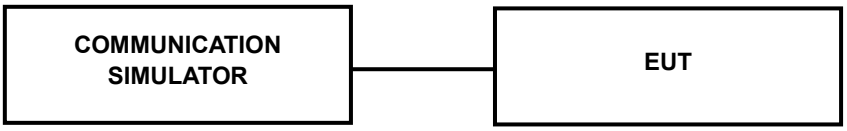
CONDUCTED POWER MEASUREMENT:

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			Max. Tune-up Power
Channel	128	189	251	
Frequency	824.2	836.4	848.8	
GSM (GMSK, 1Tx-slot)	32.32	32.25	32.22	33.5
GPRS (GMSK, 1Tx-slot)	**32.33**	32.24	32.21	33.5
GPRS (GMSK, 2Tx-slot)	29.96	29.89	29.77	30.5
GPRS (GMSK, 3Tx-slot)	27.99	27.97	27.90	28.7
GPRS (GMSK, 4Tx-slot)	25.80	25.78	25.75	27.5
EDGE (8PSK, 1Tx-slot)	25.12	25.38	24.86	26.0
EDGE (8PSK, 2Tx-slot)	24.10	24.36	24.05	25.0
EDGE (8PSK, 3Tx-slot)	21.30	21.48	21.14	22.0
EDGE (8PSK, 4Tx-slot)	18.94	19.36	18.97	20.0

Band	WCDMA V			Max. Tune-up Power
TX Channel	4132	4182	4233	
Rx Channel	4357	4407	4458	
Frequency	826.4	836.4	846.6	
RMC 12.2K	23.65	23.70	**23.77**	25.0
HSDPA Subtest-1	22.59	22.63	22.65	24.0
HSDPA Subtest-2	22.56	22.57	22.59	24.0
HSDPA Subtest-3	22.08	22.12	22.15	23.5
HSDPA Subtest-4	22.04	22.08	22.10	23.5
HSUPA Subtest-1	22.57	22.59	22.61	24.0
HSUPA Subtest-2	20.52	20.52	20.54	22.0
HSUPA Subtest-3	21.56	21.56	21.58	23.0
HSUPA Subtest-4	20.49	20.51	20.47	22.0
HSUPA Subtest-5	22.62	22.64	22.60	24.0
HSPA+ Subtest-1	23.65	23.70	**23.77**	25.0

LTE Band 5

Band/BW	Modulation	RB Size	RB Offset	Low CH 20407 Frequency 824.7 MHz	Mid CH 20525 Frequency 836.5 MHz	High CH 20643 Frequency 848.3 MHz	MPR
5/ 1.4	QPSK	1	0	23.10	22.87	22.98	0
		1	2	23.14	22.84	23.00	0
		1	5	23.11	22.79	22.93	0
		3	0	22.87	22.58	22.76	0
		3	1	22.89	22.61	22.67	0
		3	3	22.86	22.56	22.70	0
		6	0	21.91	21.59	21.75	1
	16QAM	1	0	21.77	21.48	21.62	1
		1	2	21.82	21.49	21.67	1
		1	5	21.74	21.44	21.63	1
		3	0	22.30	22.02	22.14	1
		3	1	21.94	21.74	21.82	1
		3	3	22.07	21.79	21.95	1
		6	0	20.79	20.56	20.65	2

Band/BW	Modulation	RB Size	RB Offset	Low CH 20415 Frequency 825.5 MHz	Mid CH 20525 Frequency 836.5 MHz	High CH 20635 Frequency 847.5 MHz	MPR
5/ 3	QPSK	1	0	23.12	22.89	22.97	0
		1	7	23.10	22.85	23.00	0
		1	14	23.07	22.79	22.93	0
		8	0	21.86	21.61	21.76	1
		8	3	21.82	21.61	21.69	1
		8	7	21.83	21.63	21.74	1
		15	0	21.88	21.60	21.69	1
	16QAM	1	0	21.74	21.54	21.65	1
		1	7	21.79	21.52	21.65	1
		1	14	21.77	21.44	21.63	1
		8	0	21.26	21.03	21.14	2
		8	3	20.99	20.69	20.85	2
		8	7	21.09	20.77	20.91	2
		15	0	20.79	20.50	20.68	2

Band/BW	Modulation	RB Size	RB Offset	Low CH 20425	Mid CH 20525	High CH 20625	MPR
				Frequency 826.5 MHz	Frequency 836.5 MHz	Frequency 846.5 MHz	
5/ 5	QPSK	1	0	23.13	22.84	22.98	0
		1	12	23.15	22.82	23.00	0
		1	24	23.08	22.78	22.97	0
		12	0	21.89	21.61	21.73	1
		12	6	21.82	21.62	21.70	1
		12	13	21.87	21.59	21.75	1
		25	0	21.86	21.63	21.72	1
	16QAM	1	0	21.75	21.50	21.65	1
		1	12	21.76	21.55	21.64	1
		1	24	21.77	21.44	21.62	1
		12	0	21.26	21.01	21.11	2
		12	6	20.96	20.73	20.81	2
		12	13	21.04	20.79	20.94	2
		25	0	20.79	20.51	20.65	2

Band/BW	Modulation	RB Size	RB Offset	Low CH 20450	Mid CH 20525	High CH 20600	MPR
				Frequency 829 MHz	Frequency 836.5 MHz	Frequency 844 MHz	
5/ 10	QPSK	1	0	**23.18**	22.91	23.03	0
		1	24	23.17	22.90	23.02	0
		1	49	23.13	22.86	22.98	0
		25	0	21.93	21.66	21.78	1
		25	12	21.90	21.63	21.75	1
		25	25	21.91	21.64	21.76	1
		50	0	21.92	21.65	21.77	1
	16QAM	1	0	21.82	21.55	21.67	1
		1	24	21.84	21.57	21.69	1
		1	49	21.79	21.52	21.64	1
		25	0	21.34	21.07	21.19	2
		25	12	21.02	20.75	20.87	2
		25	25	21.11	20.84	20.96	2
		50	0	20.85	20.58	20.70	2

ERP POWER (dBm)

GSM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	32.33	-3.90	26.28	**424.62**	7
189	836.4	32.25	-3.90	26.20	416.87	7
251	848.8	32.22	-3.90	26.17	414	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

EDGE

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
128	824.2	25.12	-3.90	19.07	80.72	7
189	836.4	25.38	-3.90	19.33	**85.7**	7
251	848.8	24.86	-3.90	18.81	76.03	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

WCDMA

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
4132	826.4	23.65	-3.90	17.60	57.54	7
4182	836.4	23.70	-3.90	17.65	58.21	7
4233	846.6	23.77	-3.90	17.72	**59.16**	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

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	23.14	-3.90	17.09	**51.17**	7
20525	836.5	22.87	-3.90	16.82	48.08	7
20643	848.3	23.00	-3.90	16.95	49.55	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	22.30	-3.90	16.25	42.17	7
20525	836.5	22.02	-3.90	15.97	39.54	7
20643	848.3	22.14	-3.90	16.09	40.64	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	23.12	-3.90	17.07	**50.93**	7
20525	836.5	22.89	-3.90	16.84	48.31	7
20635	847.5	23.00	-3.90	16.95	49.55	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	21.79	-3.90	15.74	37.5	7
20525	836.5	21.54	-3.90	15.49	35.4	7
20635	847.5	21.65	-3.90	15.60	36.31	7

LTE BAND 5

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
20425	826.5	23.15	-3.90	17.10	**51.29**	7
20525	836.5	22.82	-3.90	16.77	47.53	7
20625	846.5	23.00	-3.90	16.95	49.55	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	21.77	-3.90	15.72	37.33	7
20525	836.5	21.55	-3.90	15.50	35.48	7
20625	846.5	21.65	-3.90	15.60	36.31	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	23.18	-3.90	17.13	**51.64**	7
20525	836.5	22.91	-3.90	16.86	48.53	7
20600	844.0	23.03	-3.90	16.98	49.89	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	21.84	-3.90	15.79	37.93	7
20525	836.5	21.57	-3.90	15.52	35.65	7
20600	844.0	21.69	-3.90	15.64	36.64	7

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

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

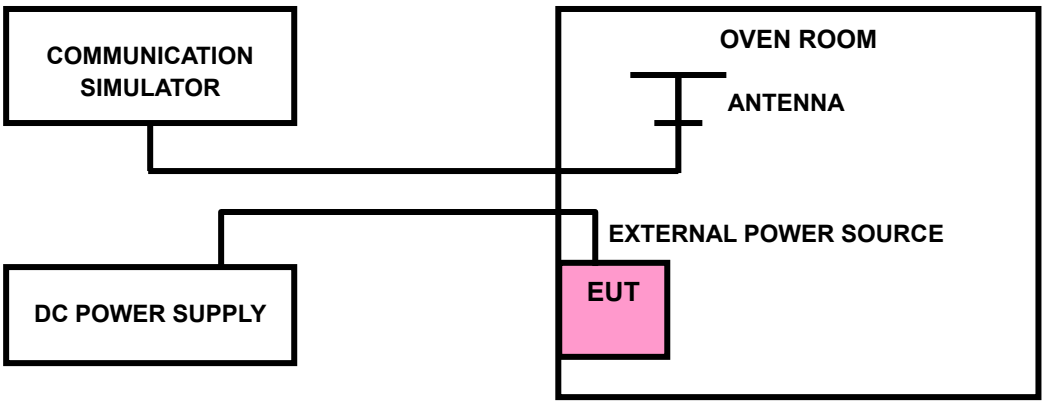
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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}	0.0021	0.0023	2.5
V_{min}	-0.0023	-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. (℃)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0120	-0.0114	2.5
-20	-0.0110	-0.0104	2.5
-10	-0.0081	-0.0076	2.5
0	-0.0074	-0.0068	2.5
10	-0.0055	-0.0050	2.5
20	-0.0041	-0.0036	2.5
30	-0.0034	-0.0029	2.5
40	-0.0021	-0.0016	2.5
50	-0.0005	0.0000	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	-0.0108	-0.0093	2.5
-10	-0.0085	-0.0075	2.5
0	-0.0075	-0.0061	2.5
10	-0.0054	-0.0045	2.5
20	-0.0042	-0.0032	2.5
30	-0.0026	-0.0022	2.5
40	-0.0016	-0.0011	2.5
50	-0.0006	-0.0056	2.5

WCDMA Band V

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
V_{nor}	0.0021	0.0024	2.5
V_{min}	-0.0026	-0.0021	2.5
V_{max}	0.0025	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	-0.0114	2.5
-20	-0.0112	-0.0106	2.5
-10	-0.0083	-0.0081	2.5
0	-0.0077	-0.0075	2.5
10	-0.0046	-0.0048	2.5
20	-0.0039	-0.0038	2.5
30	-0.0031	-0.0028	2.5
40	-0.0019	-0.0018	2.5
50	-0.0006	-0.0005	2.5

LTE Band 5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0021	0.0025	2.5
V_{min}	-0.0031	-0.0030	2.5
V_{max}	0.0021	0.0021	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	-0.0123	-0.0113	2.5
-20	-0.0102	-0.0098	2.5
-10	-0.0082	-0.0082	2.5
0	-0.0077	-0.0074	2.5
10	-0.0052	-0.0055	2.5
20	-0.0038	-0.0040	2.5
30	-0.0032	-0.0032	2.5
40	-0.0017	-0.0015	2.5
50	-0.0006	-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}	-0.0021	-0.0025	2.5
V_{max}	0.0018	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	-0.0120	-0.0113	2.5
-20	-0.0113	-0.0108	2.5
-10	-0.0086	-0.0080	2.5
0	-0.0077	-0.0073	2.5
10	-0.0055	-0.0046	2.5
20	-0.0041	-0.0040	2.5
30	-0.0038	-0.0029	2.5
40	-0.0020	-0.0021	2.5
50	-0.0004	-0.0005	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0021	0.0023	2.5
V_{min}	-0.0023	-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	-0.0116	-0.0120	2.5
-20	-0.0109	-0.0102	2.5
-10	-0.0086	-0.0082	2.5
0	-0.0078	-0.0073	2.5
10	-0.0046	-0.0044	2.5
20	-0.0038	-0.0039	2.5
30	-0.0037	-0.0025	2.5
40	-0.0021	-0.0019	2.5
50	-0.0001	-0.0003	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
V_{nor}	0.0026	0.0025	2.5
V_{min}	-0.0031	-0.0030	2.5
V_{max}	0.0026	0.0025	2.5

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

FREQUENCY ERROR vs. TEMPERATURE.

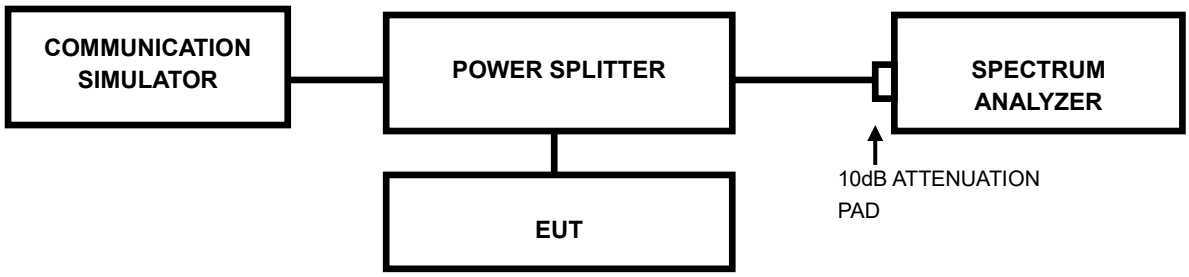
TEMP. (℃)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0120	-0.0113	2.5
-20	-0.0098	-0.0098	2.5
-10	-0.0084	-0.0083	2.5
0	-0.0077	-0.0074	2.5
10	-0.0047	-0.0049	2.5
20	-0.0043	-0.0042	2.5
30	-0.0041	-0.0030	2.5
40	-0.0020	-0.0021	2.5
50	-0.0005	-0.0003	2.5

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

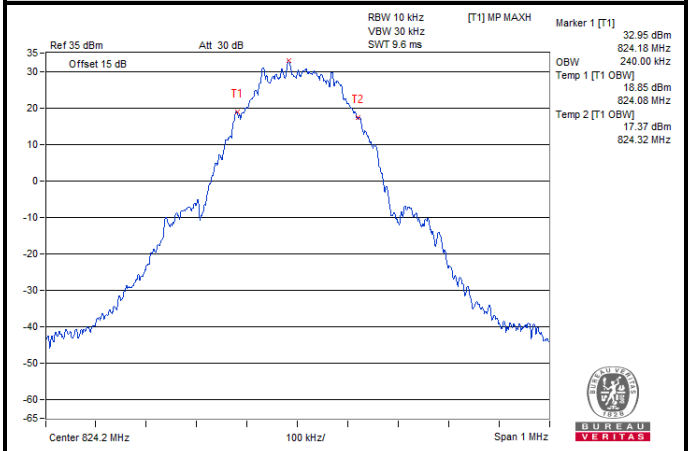


3.3.3 TEST RESULTS

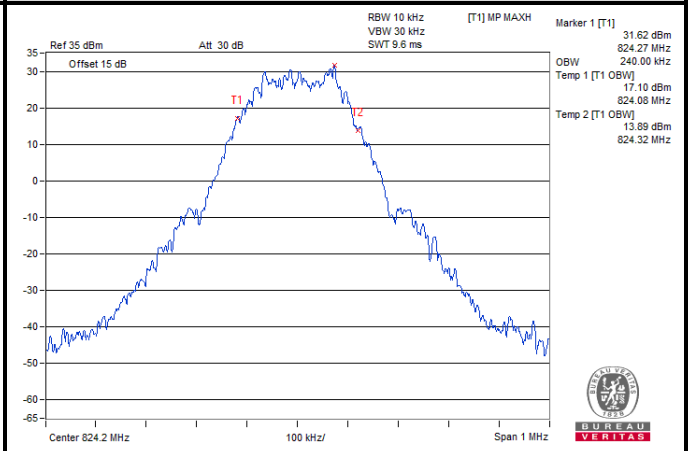
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (kHz)		CHANNEL	Frequency (MHz)	26dB Bandwidth (kHz)	
		GSM	EDGE			GSM	EDGE
128	824.2	240.0	240.0	128	824.2	314.4	321.1
189	836.4	240.0	240.0	189	836.4	318.5	313.4
251	848.8	240.0	230.0	251	848.8	308.2	311.9

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

GSM

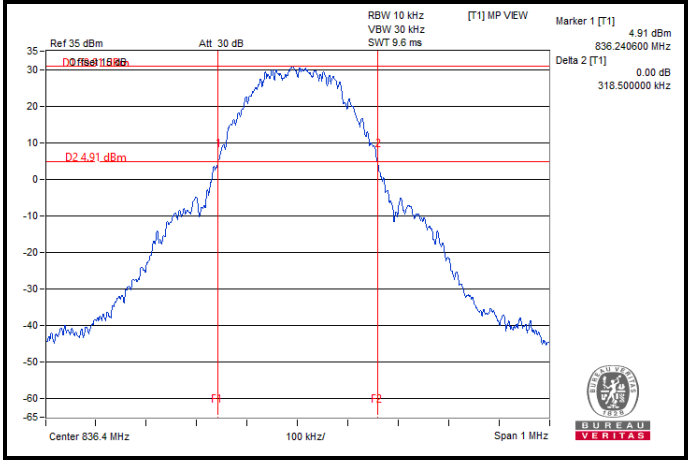


EDGE

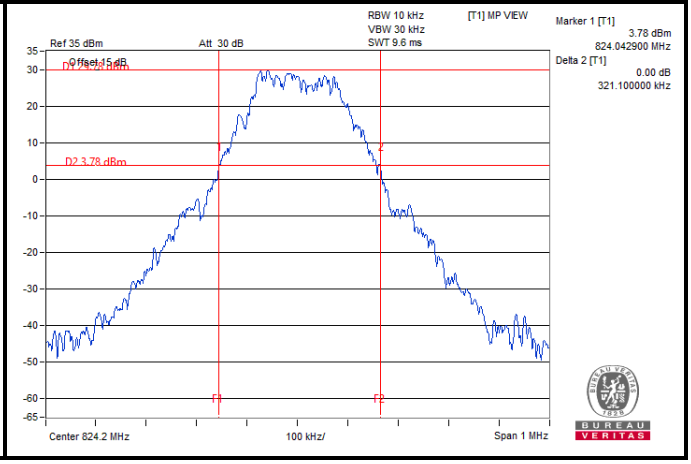


SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

GSM



EDGE



CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)	CHANNEL	Frequency (MHz)	26dB Bandwidth (MHz)
		WCDMA			WCDMA
4132	826.4	4.143	4132	826.4	4.677
4182	836.4	4.159	4182	836.4	4.688
4233	846.6	4.151	4233	846.6	4.695

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)		26 dB bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20407	824.7	1.09	1.09	1.24	1.23
20525	836.5	1.09	1.09	1.24	1.24
20643	848.3	1.09	1.09	1.24	1.24

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

1.4MHz / QPSK

1.4MHz / 16QAM

CHANNEL BANDWIDTH: 3MHz					
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		26 dB bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20415	825.5	2.70	2.69	2.98	2.98
20525	836.5	2.69	2.69	3.00	3.02
20635	847.5	2.69	2.69	2.98	3.00

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

3MHz / QPSK

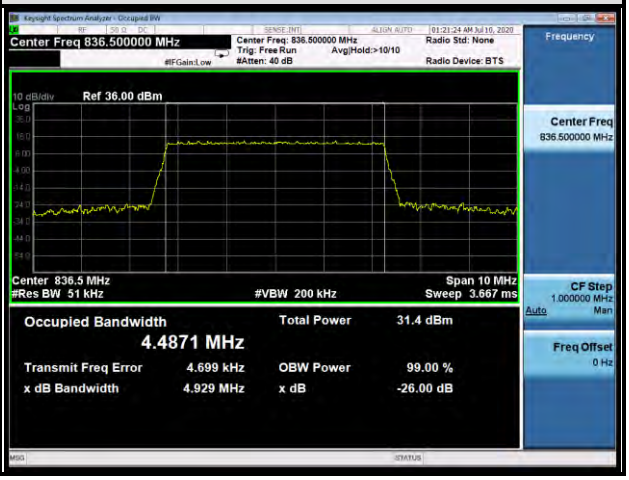
3MHz / 16QAM

CHANNEL BANDWIDTH: 5MHz					
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		26 dB bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20425	826.5	4.49	4.47	4.92	4.89
20525	836.5	4.49	4.49	4.95	4.93
20625	846.5	4.46	4.48	4.86	4.92

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

5MHz / QPSK

5MHz / 16QAM

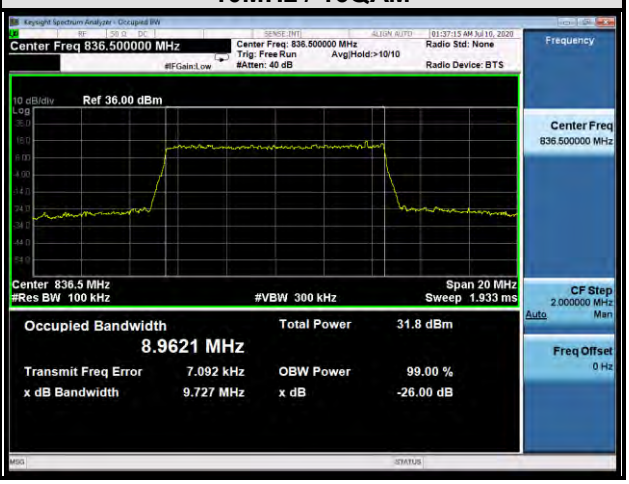


CHANNEL BANDWIDTH: 10MHz					
CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		26 dB bandwidth (MHz)	
		QPSK	16QAM	QPSK	16QAM
20450	829	8.94	8.94	9.74	9.81
20525	836.5	8.98	8.96	9.76	9.73
20600	844	8.95	8.94	9.76	9.74

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

10MHz / QPSK

10MHz / 16QAM

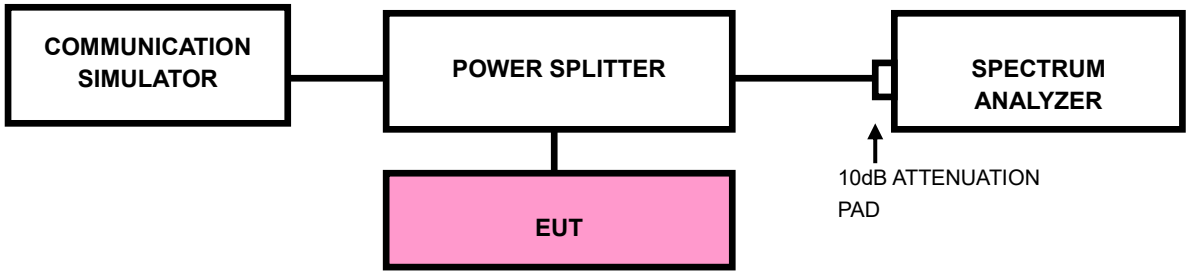


3.4 BAND EDGE MEASUREMENT

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

c. The center frequency of spectrum is the band edge frequency and span is 10MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (WCDMA).

d. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz).

e. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)

f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 50kHz and VBW of the spectrum is 200kHz. (LTE bandwidth 5MHz)

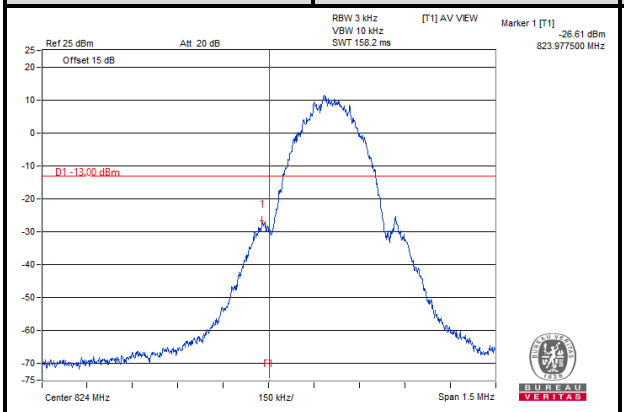
g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)

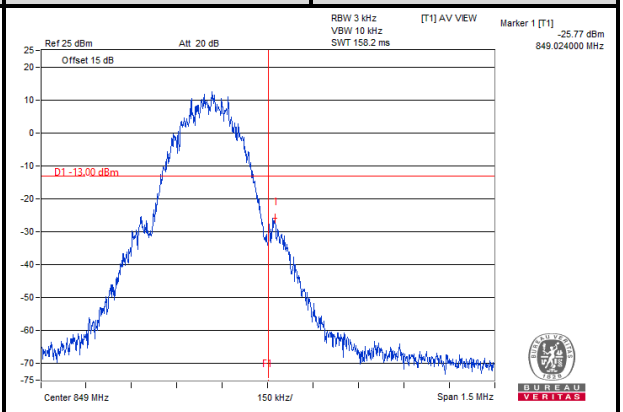
h. Record the max trace plot into the test report.

3.4.4 TEST RESULTS

GSM

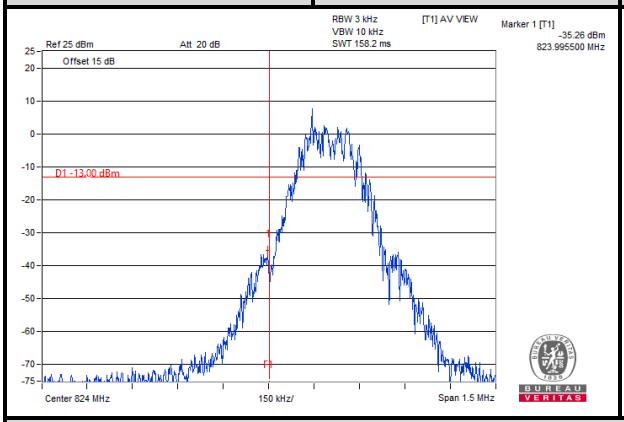
CHANNEL	128	CHANNEL	251

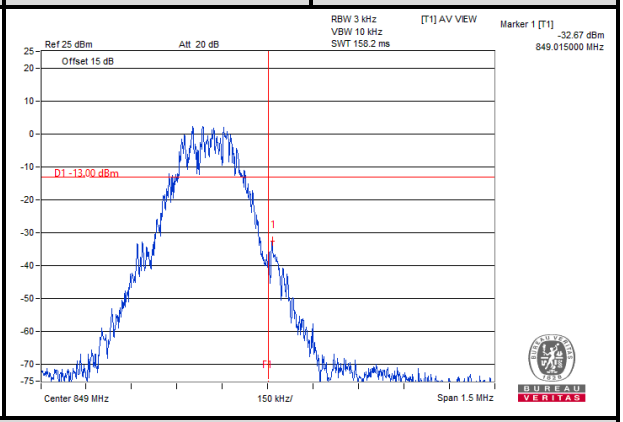




EDGE

CHANNEL	128	CHANNEL	251





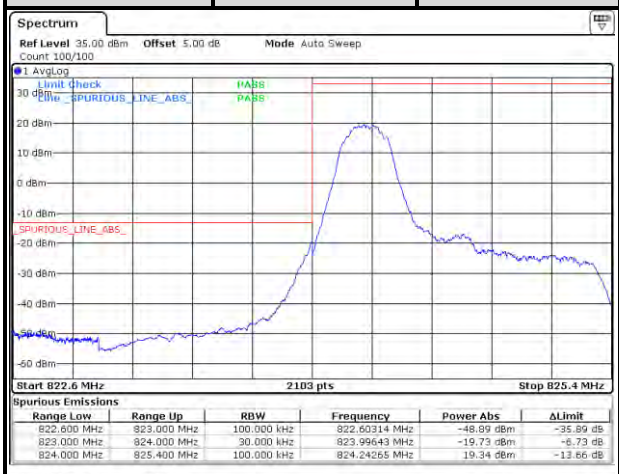
WCDMA

CHANNEL	4132	CHANNEL	4233

LTE Band5

Channel Bandwidth: 1.4MHz QPSK

CHANNEL	20407	1 RB

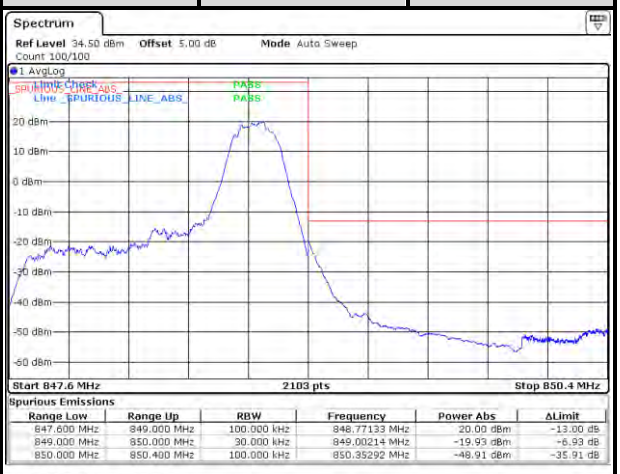


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
822.600 MHz	823.000 MHz	100.000 kHz	822.60314 MHz	-48.89 dBm	-35.89 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99643 MHz	-19.73 dBm	-6.73 dB
824.000 MHz	825.400 MHz	100.000 kHz	824.24265 MHz	19.34 dBm	-13.66 dB

Date: 14.JUL.2020 17:26:02

CHANNEL	20643	1 RB



Spurious Emissions

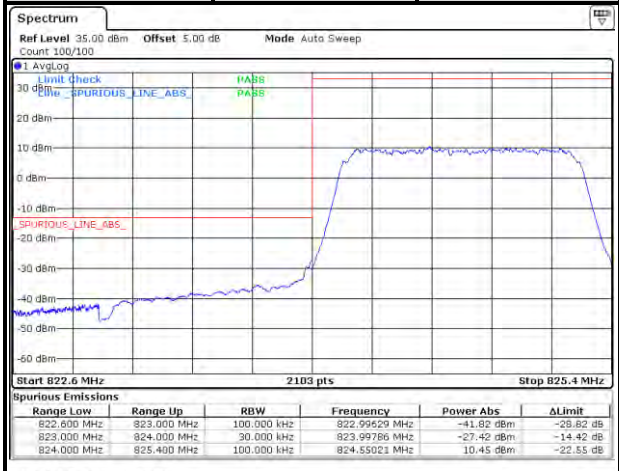
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
847.600 MHz	849.000 MHz	100.000 kHz	848.77133 MHz	20.00 dBm	-13.00 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00214 MHz	-19.93 dBm	-6.93 dB
850.000 MHz	850.400 MHz	100.000 kHz	850.35292 MHz	-48.91 dBm	-35.91 dB

Date: 14.JUL.2020 17:27:16

LTE Band5

Channel Bandwidth: 1.4MHz QPSK

CHANNEL	20407	Full RB

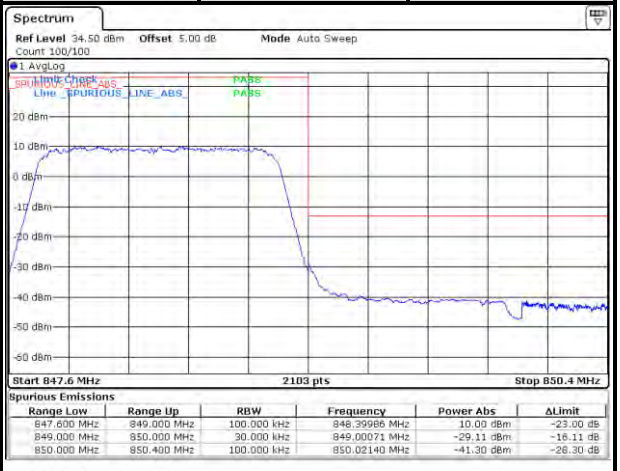


Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
822.600 MHz	823.000 MHz	100.000 kHz	822.99629 MHz	-41.82 dBm	-28.82 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-27.42 dBm	-14.42 dB
824.000 MHz	825.400 MHz	100.000 kHz	824.55021 MHz	10.45 dBm	-22.55 dB

Date: 14.JUL.2020 17:25:28

CHANNEL	20643	Full RB



Spurious Emissions

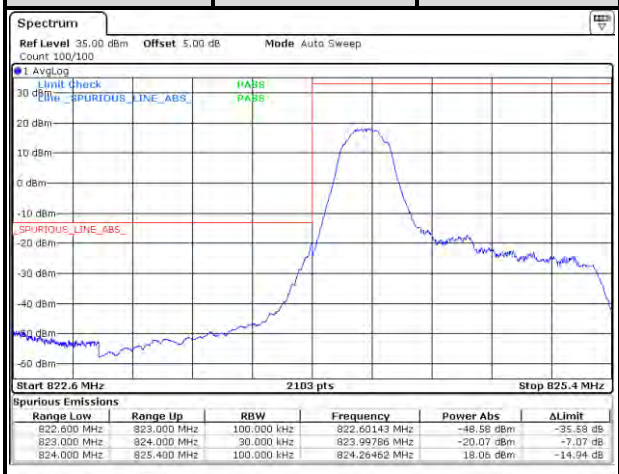
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
847.600 MHz	849.000 MHz	100.000 kHz	848.39986 MHz	10.00 dBm	-23.00 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00071 MHz	-29.11 dBm	-16.11 dB
850.000 MHz	850.400 MHz	100.000 kHz	850.02140 MHz	-41.30 dBm	-28.30 dB

Date: 14.JUL.2020 17:27:14

LTE Band5

Channel Bandwidth: 1.4MHz 16QAM

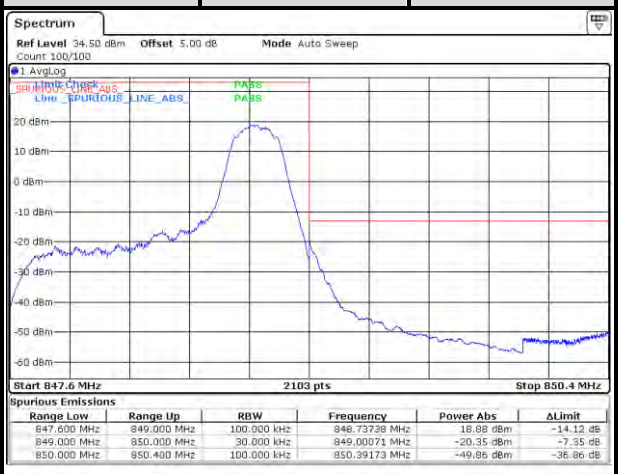
CHANNEL	20407	1 RB	CHANNEL	20643	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
822.600 MHz	823.000 MHz	100.000 kHz	822.60143 MHz	-48.58 dBm	-35.58 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-20.07 dBm	-7.07 dB
824.000 MHz	825.400 MHz	100.000 kHz	824.26462 MHz	18.06 dBm	-14.94 dB

Date: 14.JUL.2020 17:26:19



Spurious Emissions

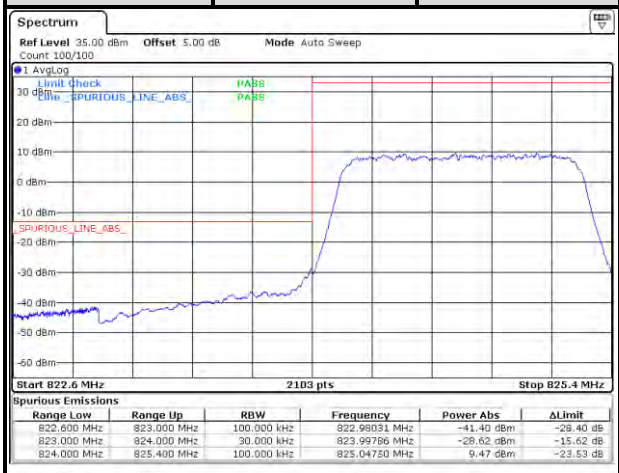
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
847.600 MHz	849.000 MHz	100.000 kHz	848.73738 MHz	18.88 dBm	-14.12 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00071 MHz	-20.35 dBm	-7.35 dB
850.000 MHz	850.400 MHz	100.000 kHz	850.39173 MHz	-49.86 dBm	-36.86 dB

Date: 14.JUL.2020 17:27:48

LTE Band5

Channel Bandwidth: 1.4MHz 16QAM

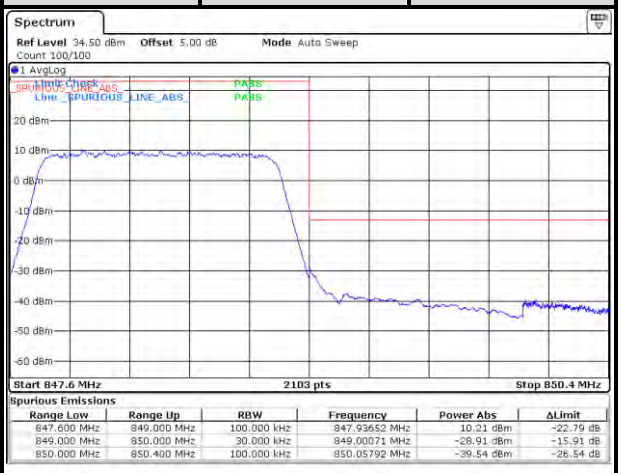
CHANNEL	20407	Full RB	CHANNEL	20643	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
822.600 MHz	823.000 MHz	100.000 kHz	822.98031 MHz	-41.40 dBm	-28.40 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-28.62 dBm	-15.62 dB
824.000 MHz	825.400 MHz	100.000 kHz	825.04750 MHz	9.47 dBm	-23.53 dB

Date: 14.JUL.2020 17:28:31



Spurious Emissions

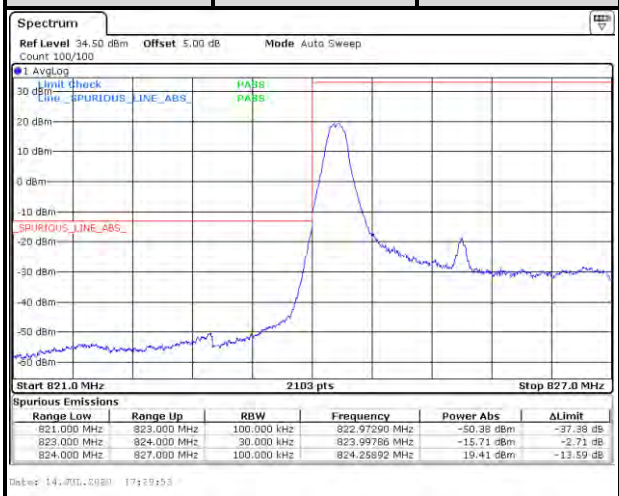
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
847.600 MHz	849.000 MHz	100.000 kHz	847.93652 MHz	10.21 dBm	-22.79 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00071 MHz	-28.91 dBm	-15.91 dB
850.000 MHz	850.400 MHz	100.000 kHz	850.05792 MHz	-39.54 dBm	-26.54 dB

Date: 14.JUL.2020 17:28:01

LTE Band5

Channel Bandwidth: 3MHz QPSK

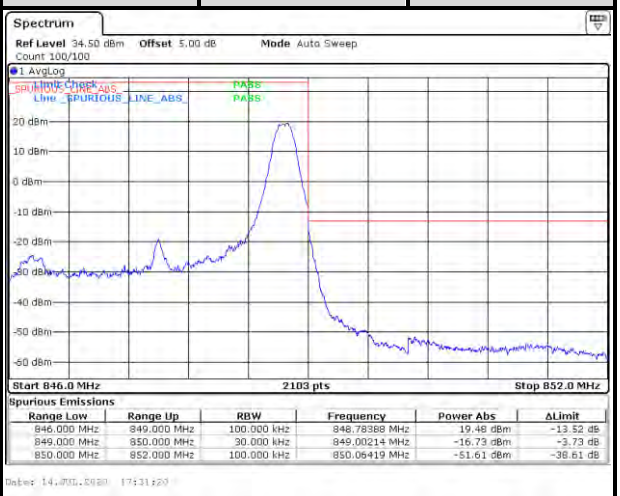
CHANNEL	20415	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
821.000 MHz	823.000 MHz	100.000 kHz	822.97290 MHz	-50.38 dBm	-37.38 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-15.71 dBm	-2.71 dB
824.000 MHz	827.000 MHz	100.000 kHz	824.25892 MHz	19.41 dBm	-13.59 dB

CHANNEL	20635	1 RB



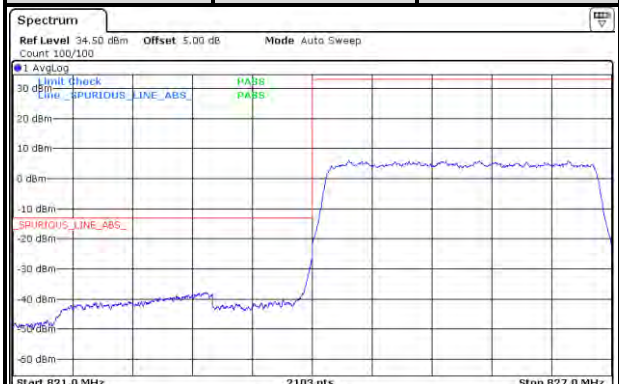
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
846.000 MHz	849.000 MHz	100.000 kHz	848.78388 MHz	19.48 dBm	-13.52 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00214 MHz	-16.73 dBm	-3.73 dB
850.000 MHz	852.000 MHz	100.000 kHz	850.06419 MHz	-51.61 dBm	-38.61 dB

LTE Band5

Channel Bandwidth: 3MHz QPSK

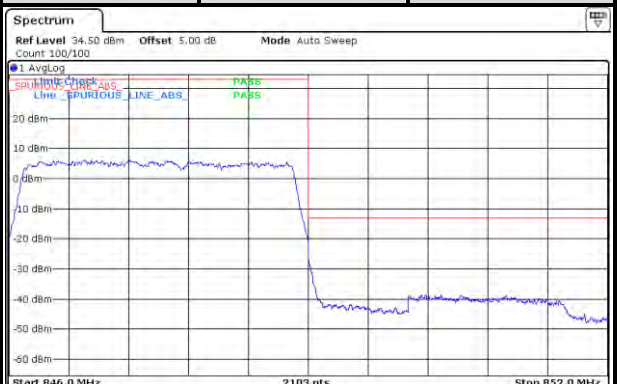
CHANNEL	20415	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
821.000 MHz	823.000 MHz	100.000 kHz	822.93295 MHz	-37.89 dBm	-24.89 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-26.82 dBm	-13.82 dB
824.000 MHz	827.000 MHz	100.000 kHz	824.36591 MHz	5.97 dBm	-27.03 dB

CHANNEL	20635	Full RB



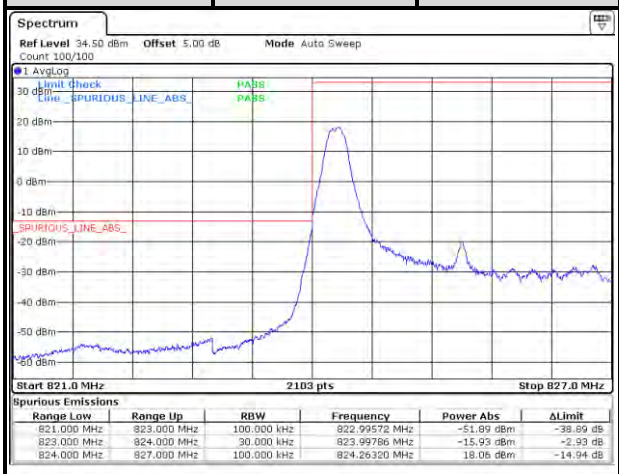
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
846.000 MHz	849.000 MHz	100.000 kHz	846.75107 MHz	6.10 dBm	-26.90 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00071 MHz	-27.04 dBm	-14.04 dB
850.000 MHz	852.000 MHz	100.000 kHz	850.17832 MHz	-38.59 dBm	-25.59 dB

LTE Band5

Channel Bandwidth: 3MHz 16QAM

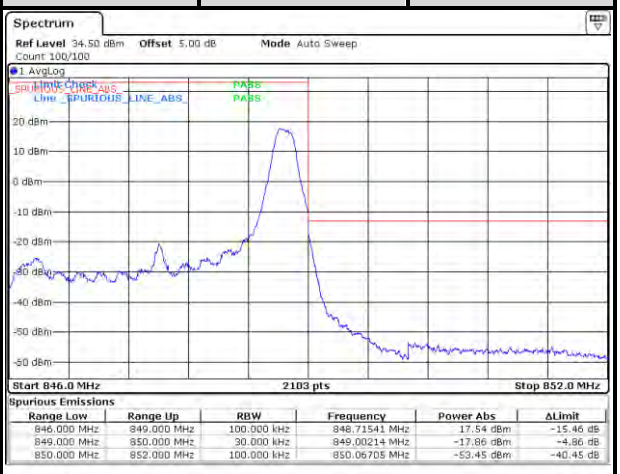
CHANNEL	20415	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
821.000 MHz	823.000 MHz	100.000 kHz	822.99572 MHz	-51.89 dBm	-38.89 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-15.93 dBm	-2.93 dB
824.000 MHz	827.000 MHz	100.000 kHz	824.26320 MHz	18.06 dBm	-14.94 dB

CHANNEL	20635	1 RB



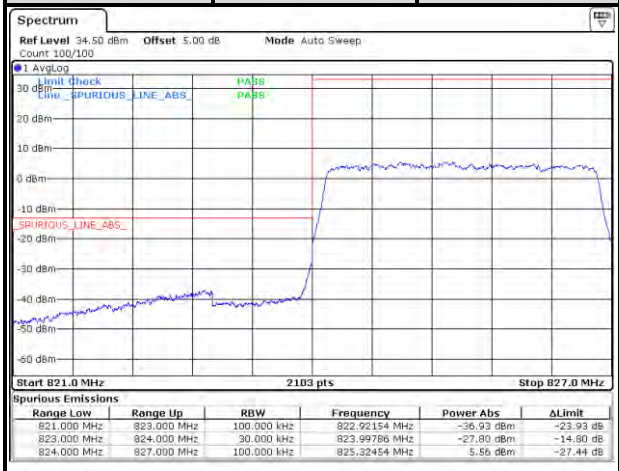
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
846.000 MHz	849.000 MHz	100.000 kHz	848.71541 MHz	17.54 dBm	-15.46 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00214 MHz	-17.86 dBm	-4.86 dB
850.000 MHz	852.000 MHz	100.000 kHz	850.06705 MHz	-53.45 dBm	-40.45 dB

LTE Band5

Channel Bandwidth: 3MHz 16QAM

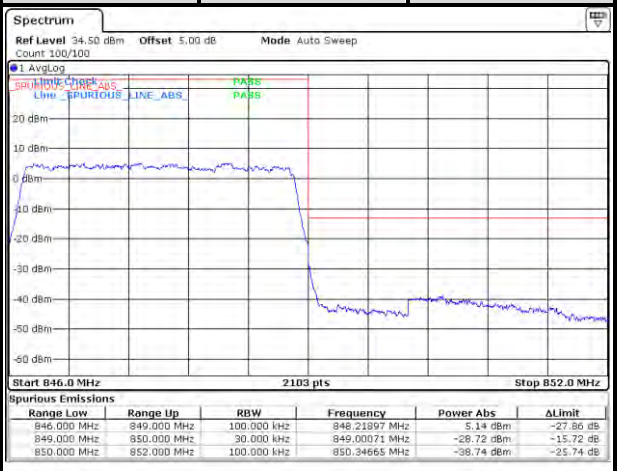
CHANNEL	20415	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
821.000 MHz	823.000 MHz	100.000 kHz	822.92154 MHz	-36.93 dBm	-23.93 dB
823.000 MHz	824.000 MHz	30.000 kHz	823.99786 MHz	-27.80 dBm	-14.80 dB
824.000 MHz	827.000 MHz	100.000 kHz	825.32454 MHz	5.56 dBm	-27.44 dB

CHANNEL	20635	Full RB



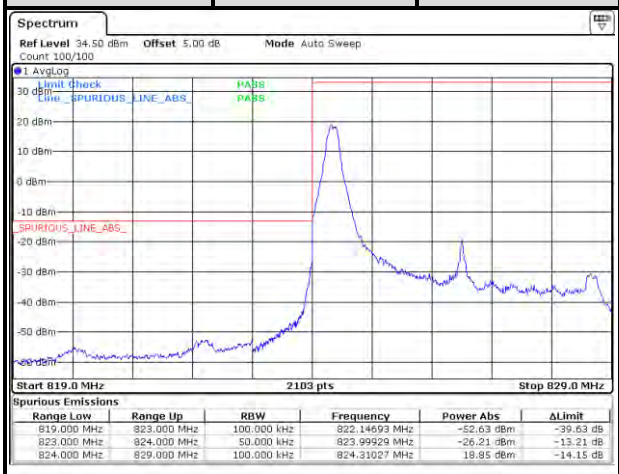
Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
846.000 MHz	849.000 MHz	100.000 kHz	848.21897 MHz	5.14 dBm	-27.86 dB
849.000 MHz	850.000 MHz	30.000 kHz	849.00071 MHz	-28.72 dBm	-15.72 dB
850.000 MHz	852.000 MHz	100.000 kHz	850.34665 MHz	-38.74 dBm	-25.74 dB

LTE Band5

Channel Bandwidth: 5MHz QPSK

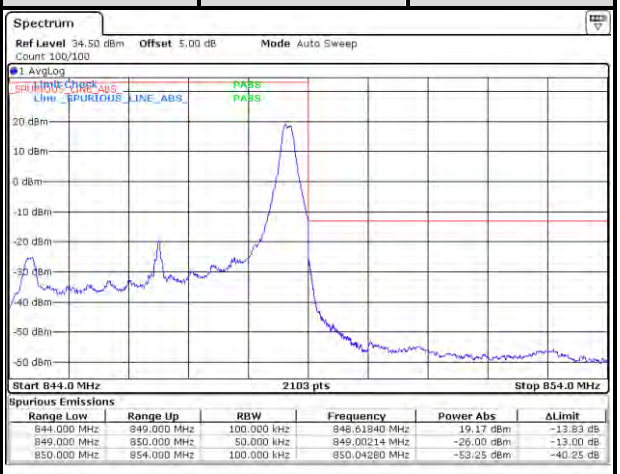
CHANNEL	20425	1 RB	CHANNEL	20625	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
819.000 MHz	823.000 MHz	100.000 kHz	822.14693 MHz	-52.63 dBm	-39.63 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.99929 MHz	-26.21 dBm	-13.21 dB
824.000 MHz	829.000 MHz	100.000 kHz	824.31027 MHz	18.85 dBm	-14.15 dB

Date: 14.JUL.2020 17:33:17



Spurious Emissions

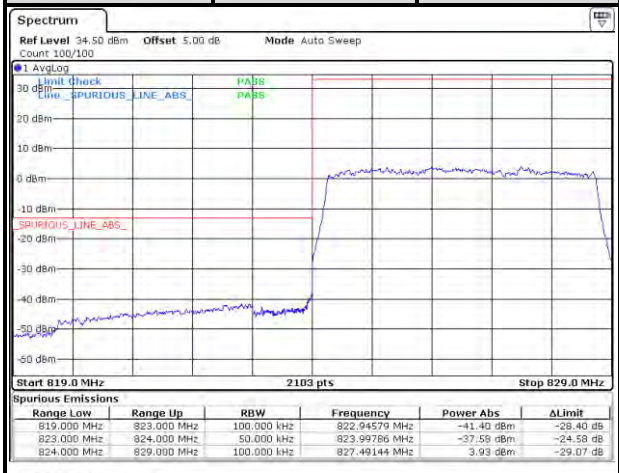
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	846.61840 MHz	19.17 dBm	-13.83 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.00214 MHz	-26.00 dBm	-13.00 dB
850.000 MHz	854.000 MHz	100.000 kHz	850.04280 MHz	-53.25 dBm	-40.25 dB

Date: 14.JUL.2020 17:35:00

LTE Band5

Channel Bandwidth: 5MHz QPSK

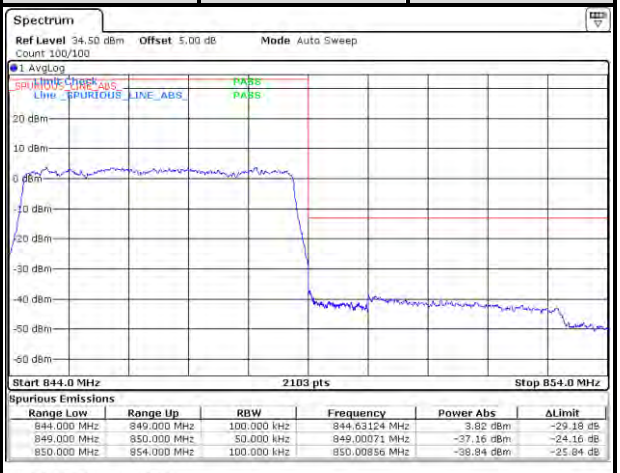
CHANNEL	20425	Full RB	CHANNEL	20625	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
819.000 MHz	823.000 MHz	100.000 kHz	822.94579 MHz	-41.40 dBm	-28.40 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.99786 MHz	-37.58 dBm	-24.58 dB
824.000 MHz	829.000 MHz	100.000 kHz	827.49144 MHz	3.93 dBm	-29.07 dB

Date: 14.JUL.2020 17:32:48



Spurious Emissions

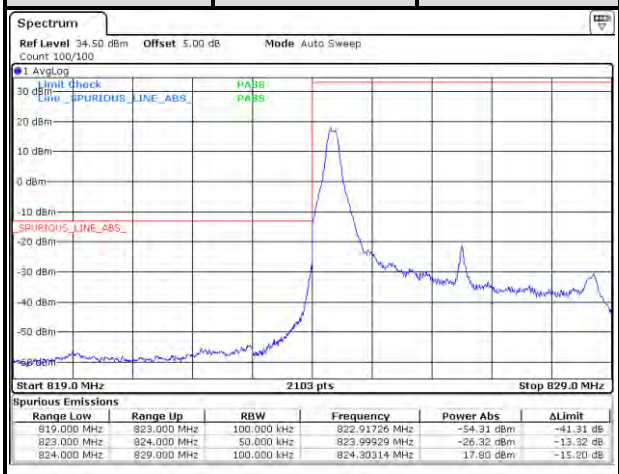
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	844.63124 MHz	3.82 dBm	-29.18 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.00071 MHz	-37.16 dBm	-24.16 dB
850.000 MHz	854.000 MHz	100.000 kHz	850.00856 MHz	-38.84 dBm	-25.84 dB

Date: 14.JUL.2020 17:34:37

LTE Band5

Channel Bandwidth: 5MHz 16QAM

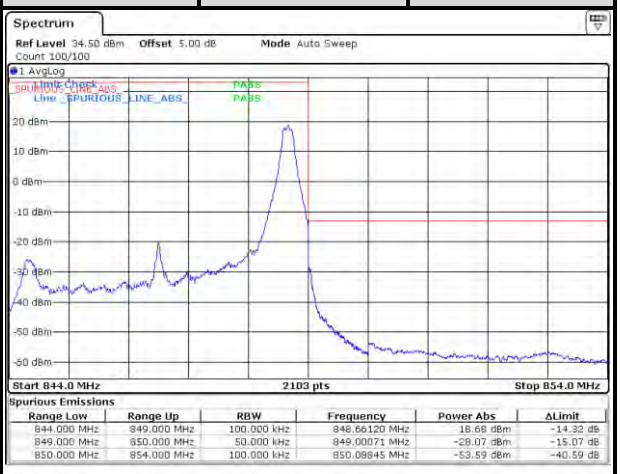
CHANNEL	20425	1 RB	CHANNEL	20625	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
819.000 MHz	823.000 MHz	100.000 kHz	822.91726 MHz	-54.31 dBm	-41.31 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.99929 MHz	-26.32 dBm	-13.32 dB
824.000 MHz	829.000 MHz	100.000 kHz	824.30314 MHz	17.80 dBm	-15.20 dB

Date: 14.JUL.2020 17:33:30



Spurious Emissions

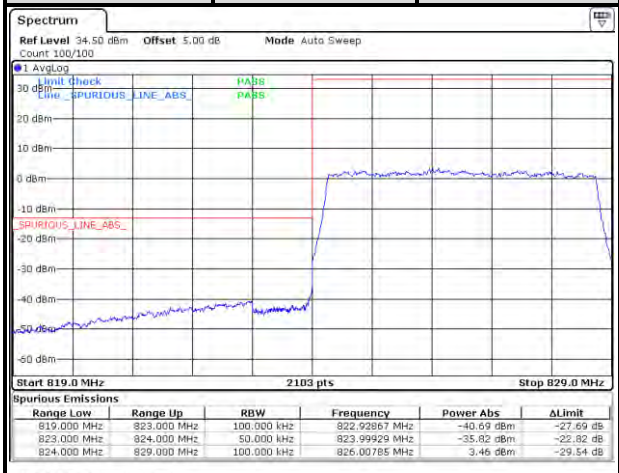
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	846.66120 MHz	16.68 dBm	-14.32 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.00071 MHz	-28.07 dBm	-15.07 dB
850.000 MHz	854.000 MHz	100.000 kHz	850.08845 MHz	-53.59 dBm	-40.59 dB

Date: 14.JUL.2020 17:35:16

LTE Band5

Channel Bandwidth: 5MHz 16QAM

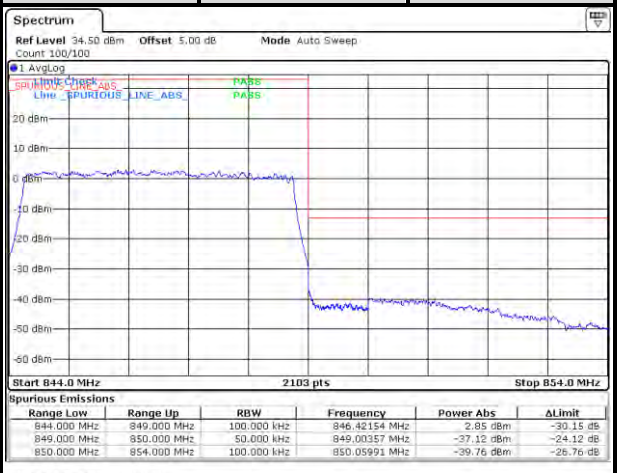
CHANNEL	20425	Full RB	CHANNEL	20625	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
819.000 MHz	823.000 MHz	100.000 kHz	822.92867 MHz	-40.69 dBm	-27.69 dB
823.000 MHz	824.000 MHz	50.000 kHz	823.99929 MHz	-35.82 dBm	-22.82 dB
824.000 MHz	829.000 MHz	100.000 kHz	826.00785 MHz	3.46 dBm	-29.54 dB

Date: 14.JUL.2020 17:33:46



Spurious Emissions

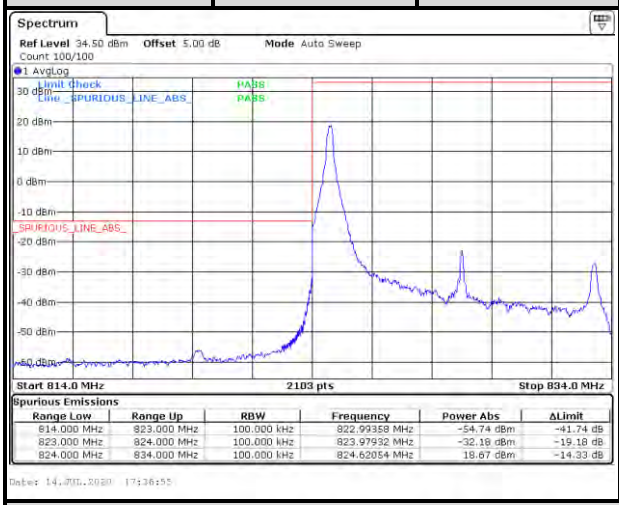
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
844.000 MHz	849.000 MHz	100.000 kHz	846.42154 MHz	2.85 dBm	-30.15 dB
849.000 MHz	850.000 MHz	50.000 kHz	849.00357 MHz	-37.12 dBm	-24.12 dB
850.000 MHz	854.000 MHz	100.000 kHz	850.05991 MHz	-39.76 dBm	-26.76 dB

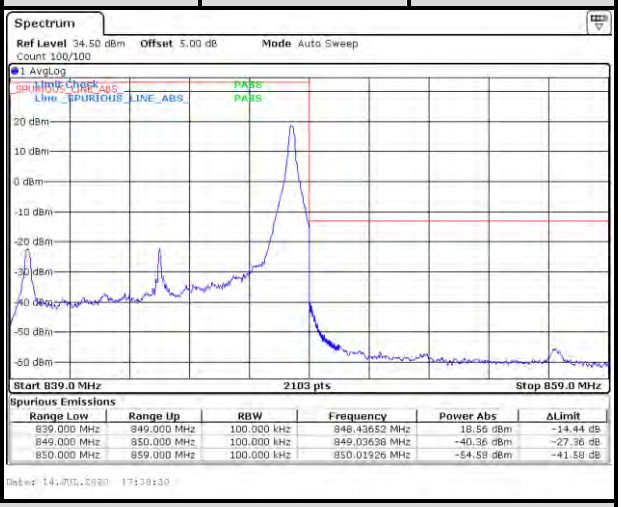
Date: 14.JUL.2020 17:35:35

LTE Band5

Channel Bandwidth: 10MHz QPSK

CHANNEL	20450	1 RB	CHANNEL	20600	1 RB

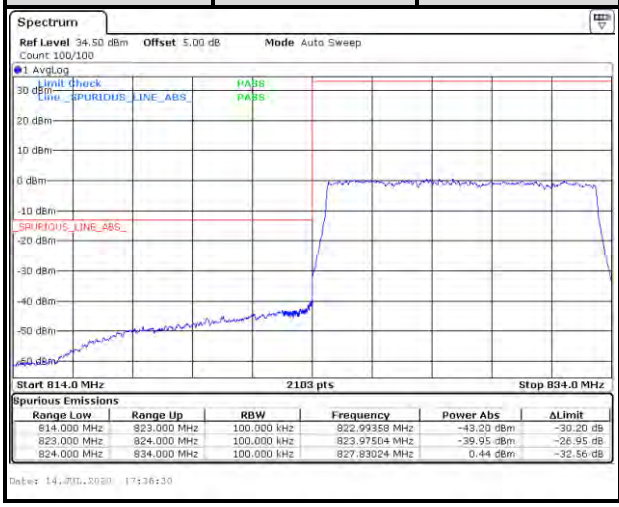


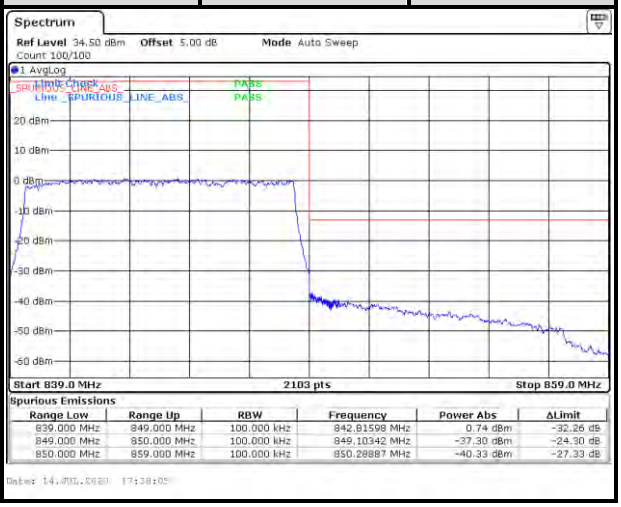


LTE Band5

Channel Bandwidth: 10MHz QPSK

CHANNEL	20450	Full RB	CHANNEL	20600	Full RB

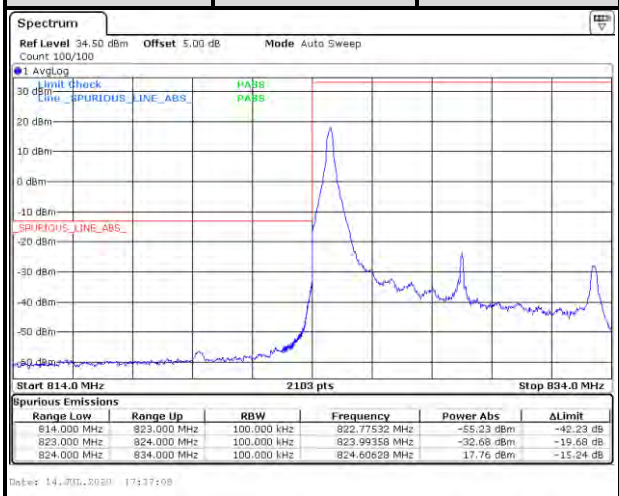




LTE Band5

Channel Bandwidth: 10MHz 16QAM

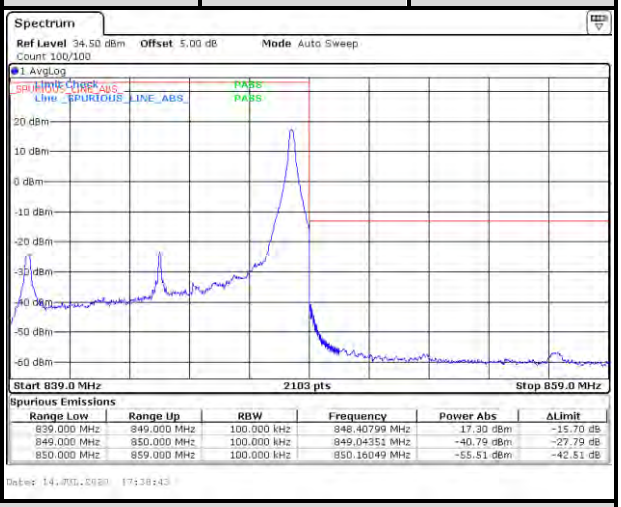
CHANNEL	20450	1 RB	CHANNEL	20600	1 RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
814.000 MHz	823.000 MHz	100.000 kHz	822.77532 MHz	-55.23 dBm	-42.23 dB
823.000 MHz	824.000 MHz	100.000 kHz	823.99358 MHz	-32.68 dBm	-19.68 dB
824.000 MHz	834.000 MHz	100.000 kHz	824.60629 MHz	17.76 dBm	-15.24 dB

Date: 14.JUL.2020 17:37:08



Spurious Emissions

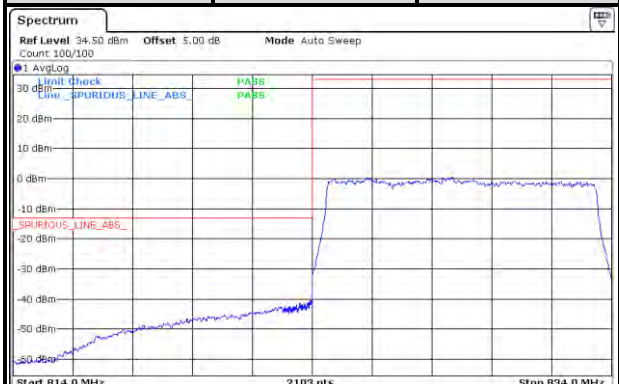
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
839.000 MHz	849.000 MHz	100.000 kHz	848.40799 MHz	17.30 dBm	-15.70 dB
849.000 MHz	850.000 MHz	100.000 kHz	849.04351 MHz	-40.79 dBm	-27.79 dB
850.000 MHz	859.000 MHz	100.000 kHz	850.16049 MHz	-55.51 dBm	-42.51 dB

Date: 14.JUL.2020 17:38:43

LTE Band5

Channel Bandwidth: 10MHz 16QAM

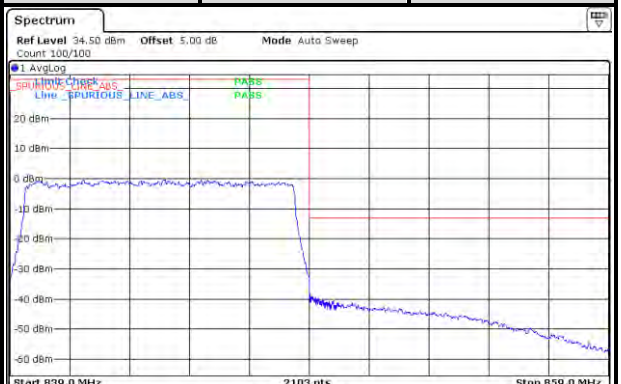
CHANNEL	20450	Full RB	CHANNEL	20600	Full RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
814.000 MHz	823.000 MHz	100.000 kHz	822.89087 MHz	-42.61 dBm	-29.61 dB
823.000 MHz	824.000 MHz	100.000 kHz	823.99929 MHz	-39.73 dBm	-26.73 dB
824.000 MHz	834.000 MHz	100.000 kHz	828.70043 MHz	0.52 dBm	-32.48 dB

Date: 14.JUL.2020 17:37:22



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
839.000 MHz	849.000 MHz	100.000 kHz	844.12839 MHz	-0.41 dBm	-33.41 dB
849.000 MHz	850.000 MHz	100.000 kHz	849.02068 MHz	-38.20 dBm	-25.20 dB
850.000 MHz	859.000 MHz	100.000 kHz	850.43010 MHz	-41.44 dBm	-28.44 dB

Date: 14.JUL.2020 17:39:01

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

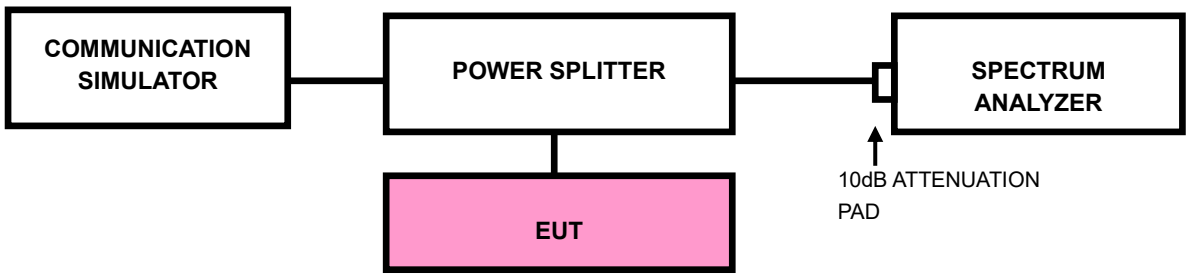
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

3.5.2 TEST PROCEDURE

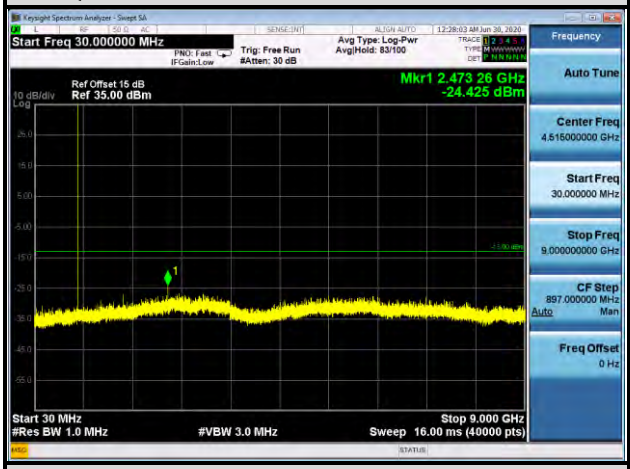
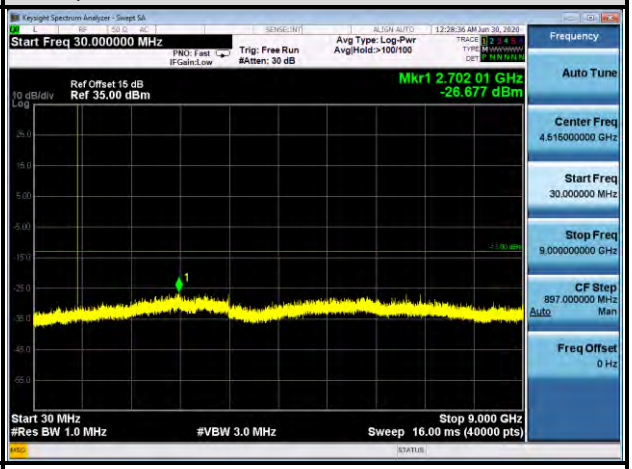
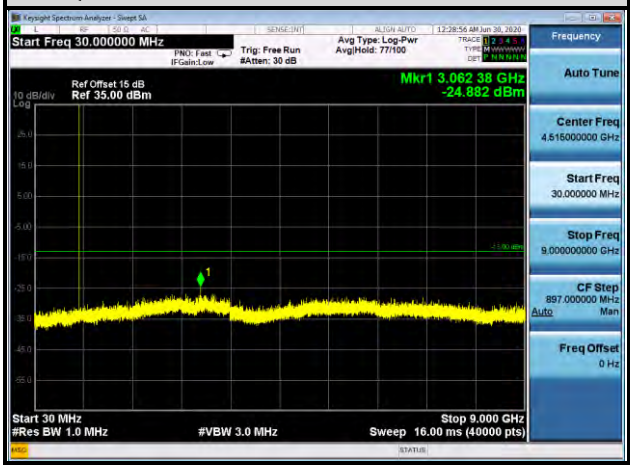
a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

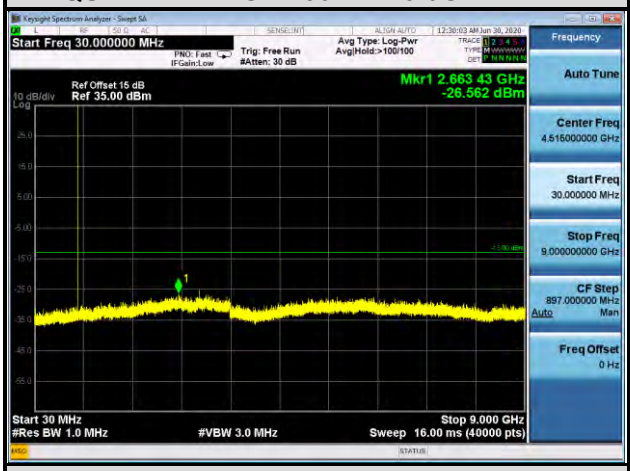
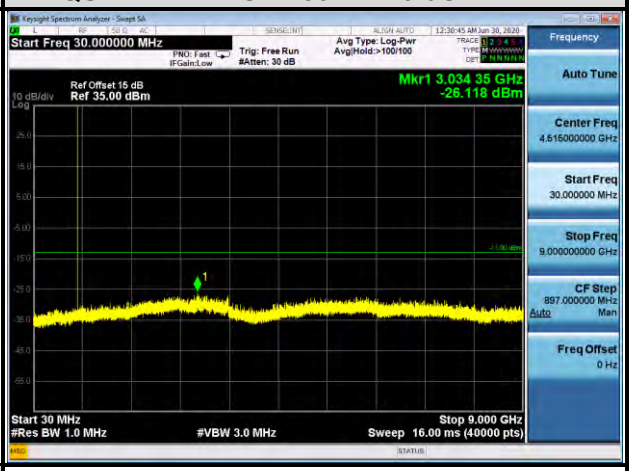
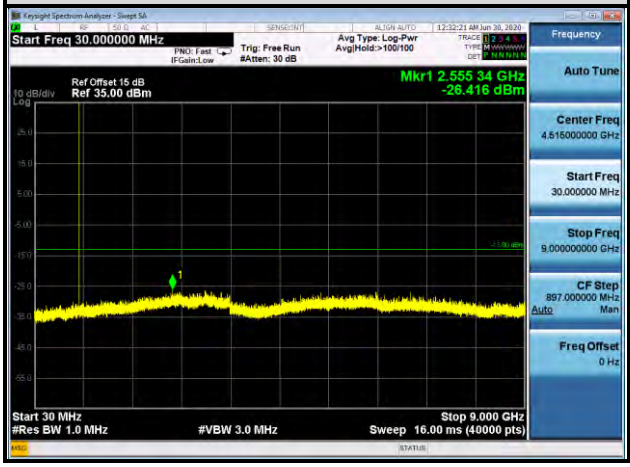
b. Measuring frequency range is from 9 kHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

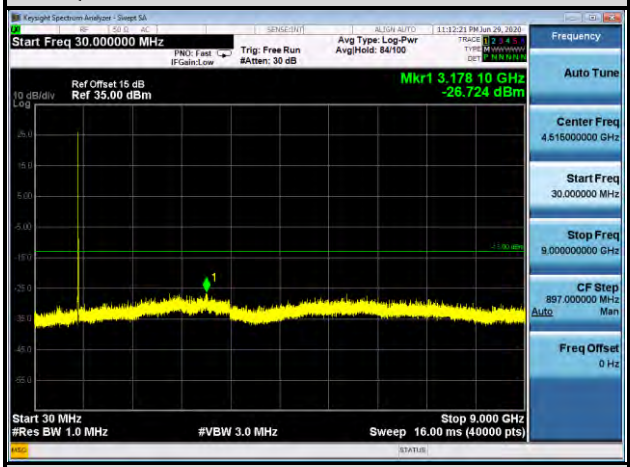
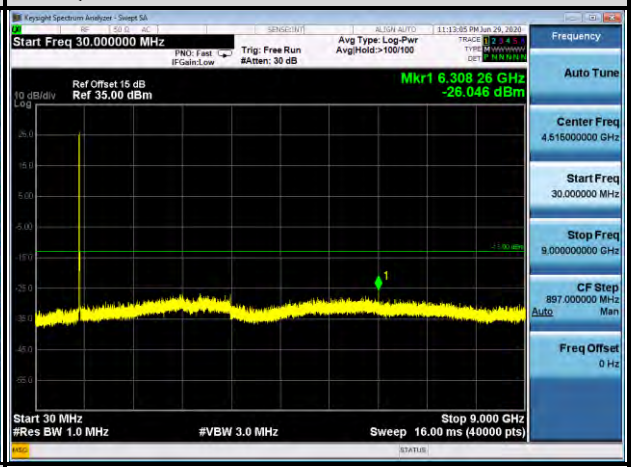
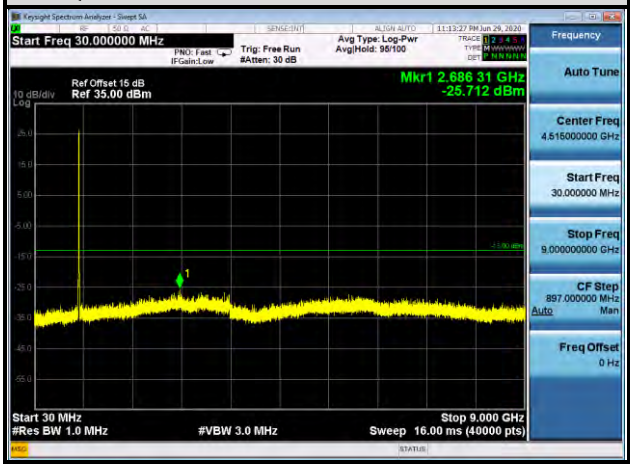
3.5.3 TEST SETUP

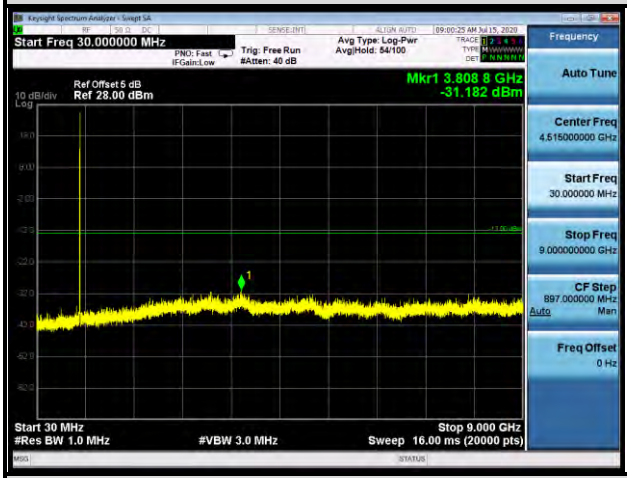


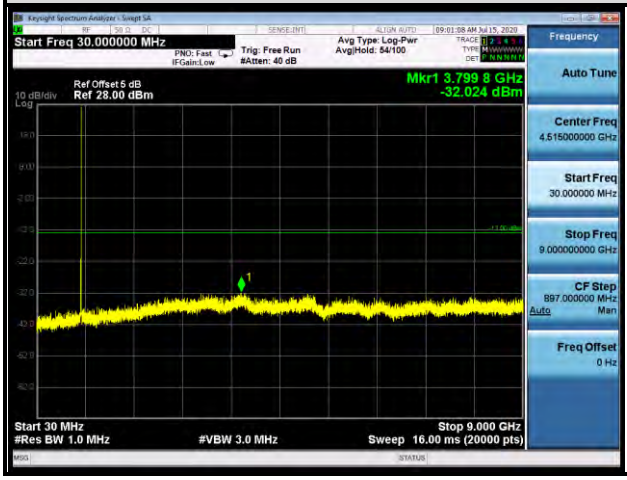
3.5.4 TEST RESULTS

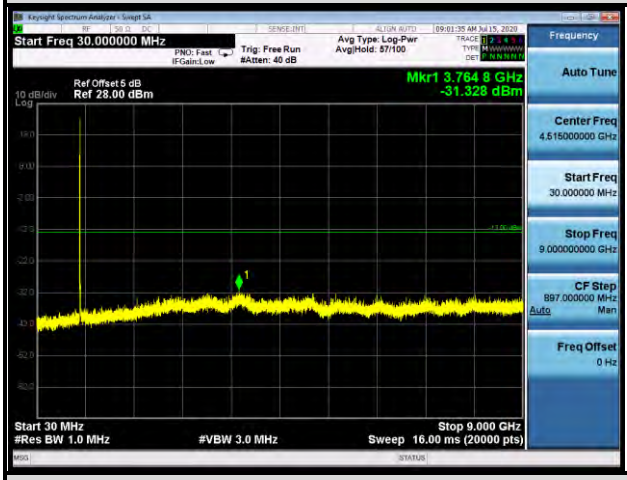
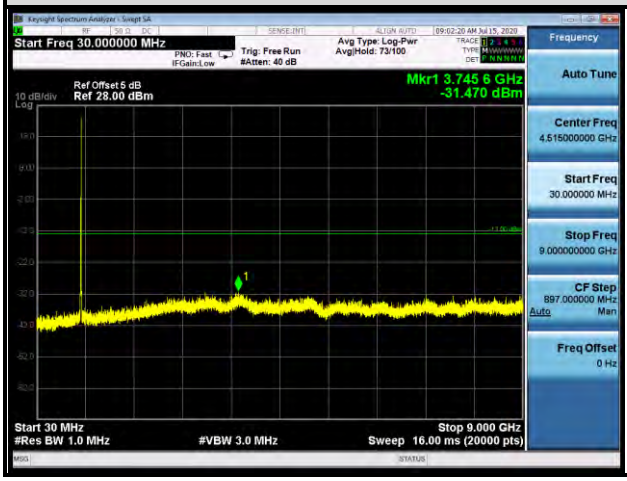
GSM	
CHANNEL 128	**CHANNEL 189**
FREQUENCY RANGE : 30MHz~9.0GHz	**FREQUENCY RANGE : 30MHz~9.0GHz**
	
CHANNEL 251	
FREQUENCY RANGE : 30MHz~9.0GHz	
	

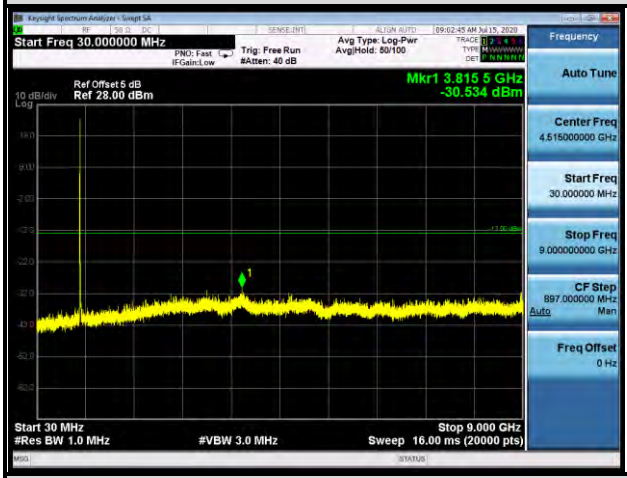
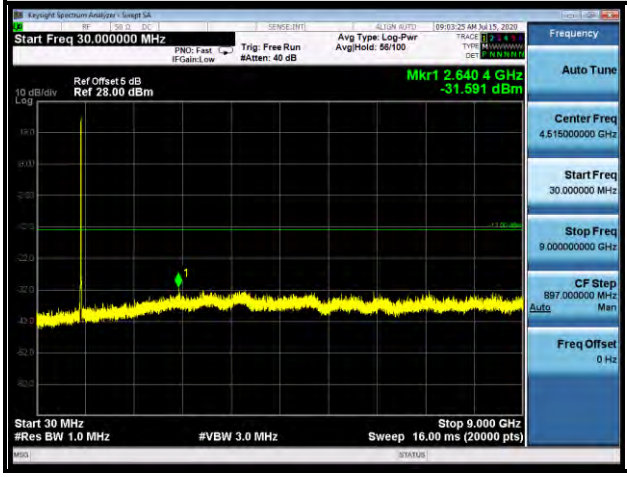
EDGE	
CHANNEL 128	CHANNEL 189
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
	
CHANNEL 251	
FREQUENCY RANGE : 30MHz~9.0GHz	
	

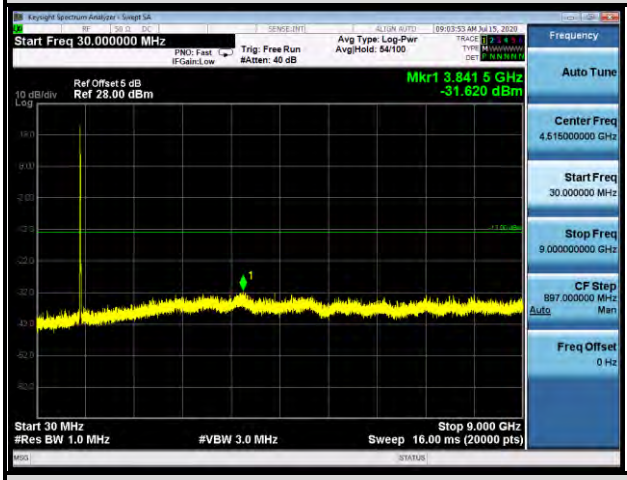
WCDMA	
CHANNEL 4132	CHANNEL 4182
FREQUENCY RANGE : 30MHz~9.0GHz	FREQUENCY RANGE : 30MHz~9.0GHz
	
CHANNEL 4233	
FREQUENCY RANGE : 30MHz~9.0GHz	
	

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.

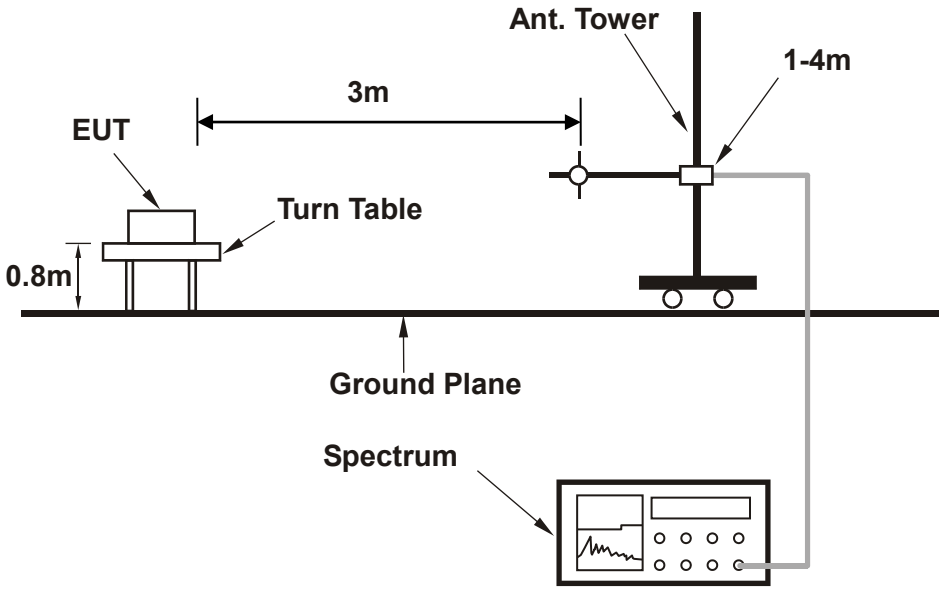
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.6.3 DEVIATION FROM TEST STANDARD

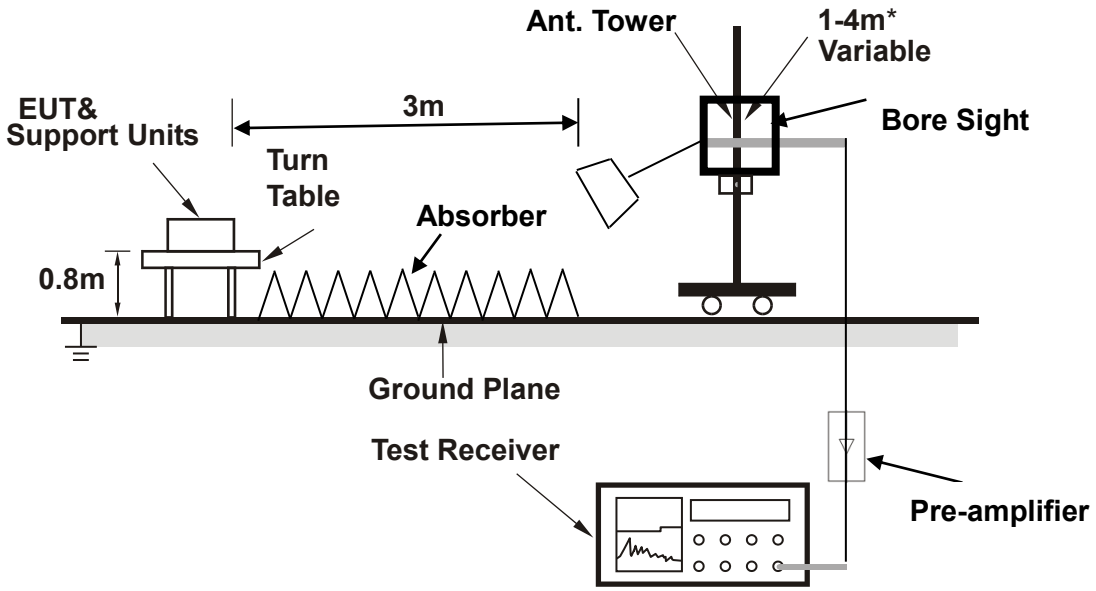
No deviation

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

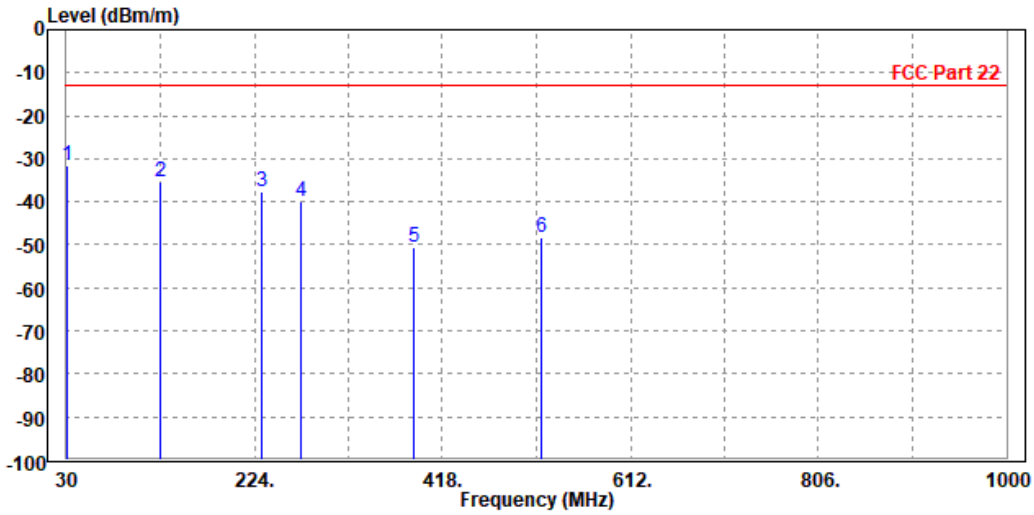
BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

EDGE 850

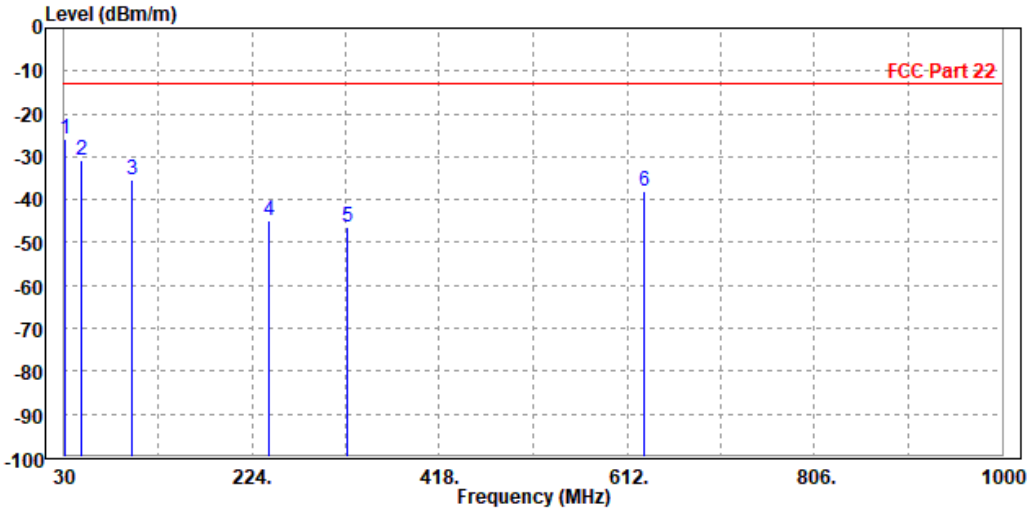
MODE	TX channel 189	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	31.650	-31.57	-51.64	-13.00	-18.57	20.07	Peak	Horizontal
2		126.330	-35.23	-42.58	-13.00	-22.23	7.35	Peak	Horizontal
3		231.220	-37.49	-49.68	-13.00	-24.49	12.19	Peak	Horizontal
4		272.440	-39.85	-53.39	-13.00	-26.85	13.54	Peak	Horizontal
5		388.020	-50.46	-66.88	-13.00	-37.46	16.42	Peak	Horizontal
6		520.140	-48.35	-67.69	-13.00	-35.35	19.34	Peak	Horizontal



MODE	TX channel 189	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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	30.470	-25.69	-46.35	-13.00	-12.69	20.66	Peak	Vertical
2		47.220	-30.76	-40.52	-13.00	-17.76	9.76	Peak	Vertical
3		99.650	-35.19	-44.26	-13.00	-22.19	9.07	Peak	Vertical
4		241.260	-44.76	-57.65	-13.00	-31.76	12.89	Peak	Vertical
5		322.140	-46.29	-60.60	-13.00	-33.29	14.31	Peak	Vertical
6		630.147	-37.88	-58.65	-13.00	-24.88	20.77	Peak	Vertical



ABOVE 1GHz DATA

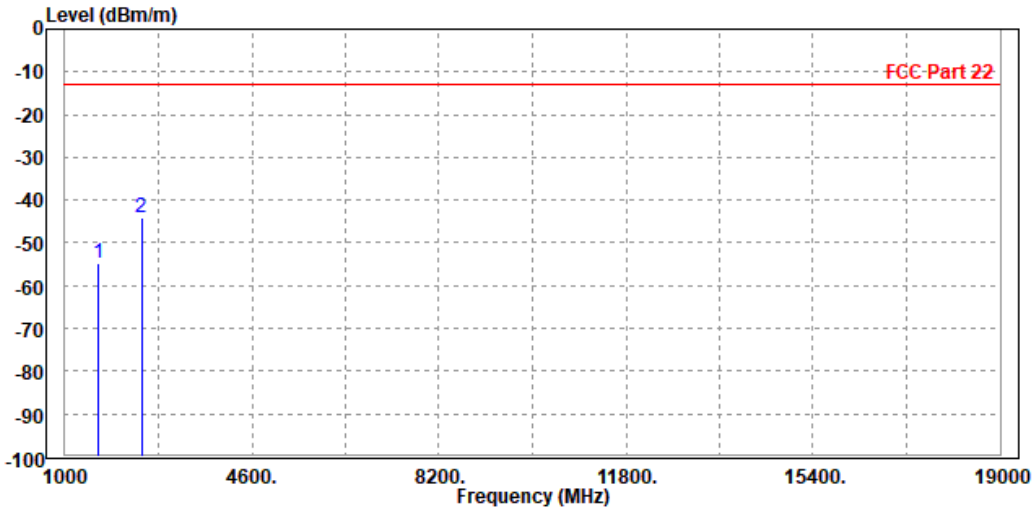
Note: For higher frequency, the emission is too low to be detected.

GSM 850

CH 128:

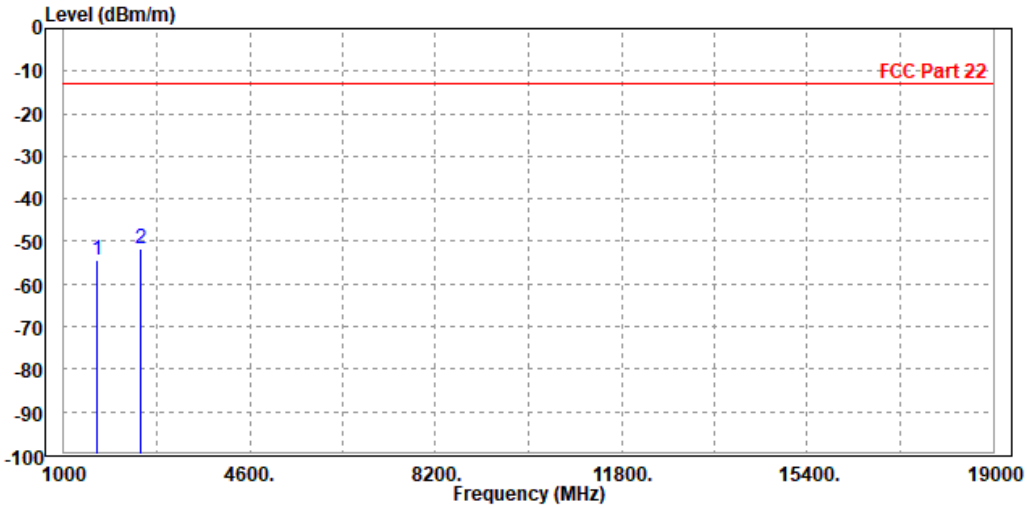
MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1648.000	-54.77	-58.02	-13.00	-41.77	3.25	Peak	Horizontal
2	PP	2472.000	-43.98	-52.00	-13.00	-30.98	8.02	Peak	Horizontal



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

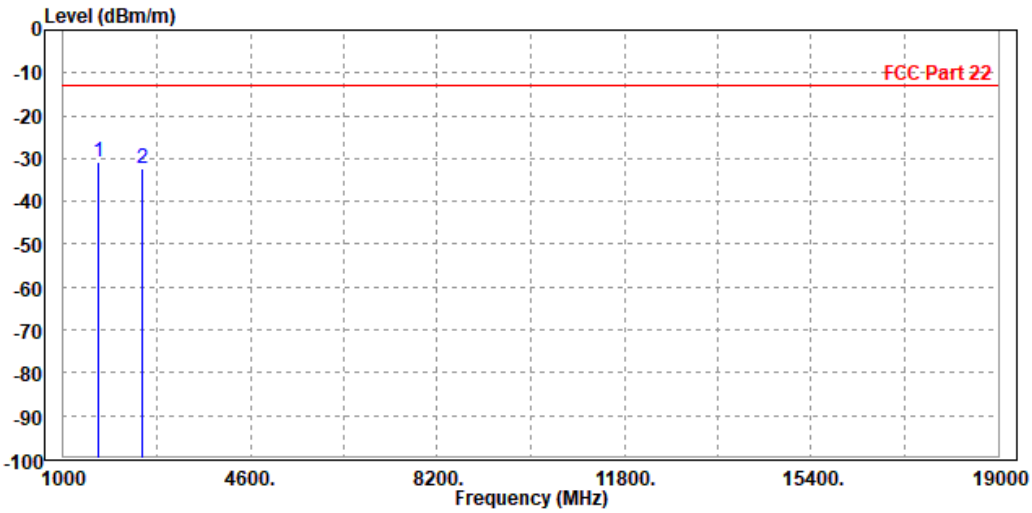
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1648.000	-54.53	-57.91	-13.00	-41.53	3.38	Peak	Vertical
2	PP	2476.000	-51.63	-58.67	-13.00	-38.63	7.04	Peak	Vertical



CH 189:

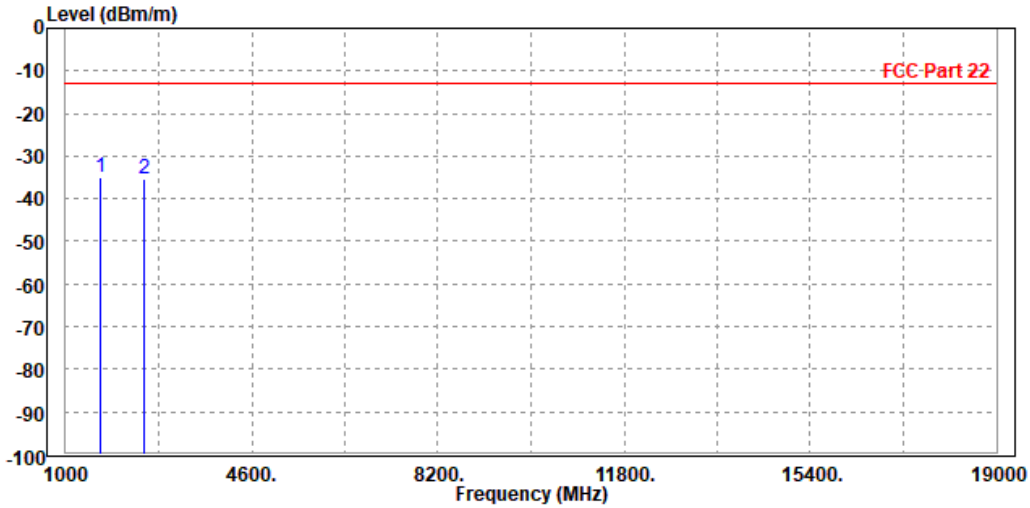
MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-30.87	-34.34	-13.00	-17.87	3.47	Peak	Horizontal
2		2512.000	-32.47	-40.53	-13.00	-19.47	8.06	Peak	Horizontal



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

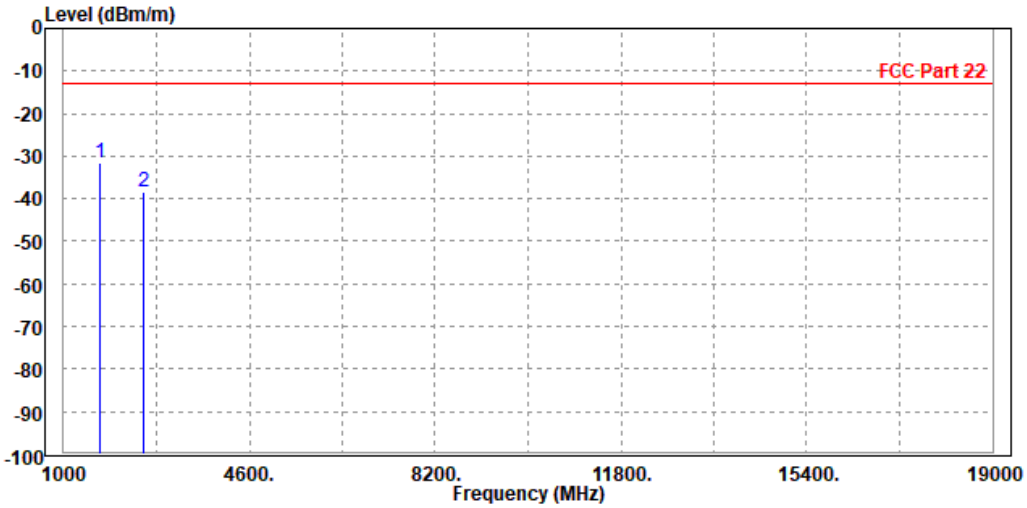
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-34.86	-38.40	-13.00	-21.86	3.54	Peak	Vertical
2		2512.000	-35.38	-42.49	-13.00	-22.38	7.11	Peak	Vertical



CH 251:

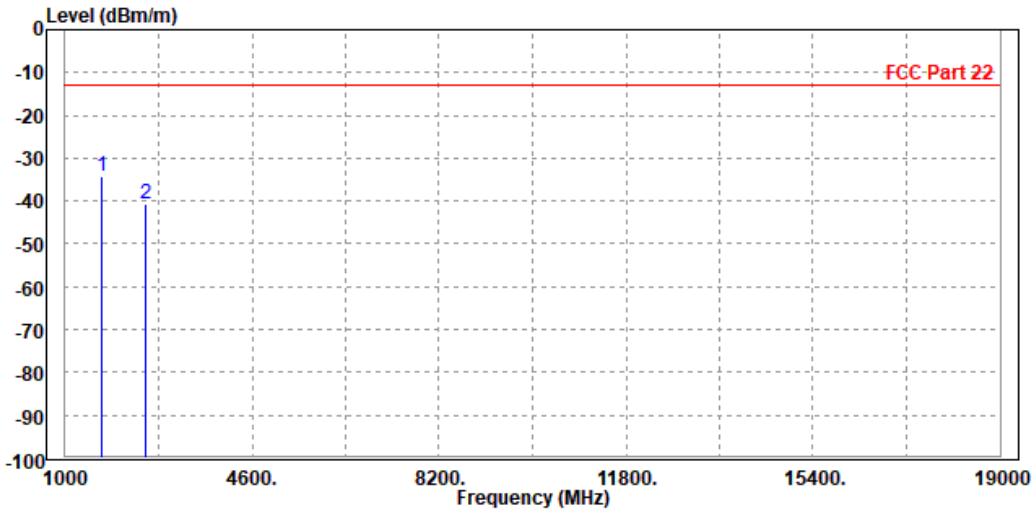
MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1702.000	-31.69	-35.60	-13.00	-18.69	3.91	Peak	Horizontal
2	2546.000	-38.47	-46.58	-13.00	-25.47	8.11	Peak	Horizontal



MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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	1702.000	-34.30	-38.17	-13.00	-21.30	3.87	Peak	Vertical
2		2546.000	-40.71	-47.93	-13.00	-27.71	7.22	Peak	Vertical

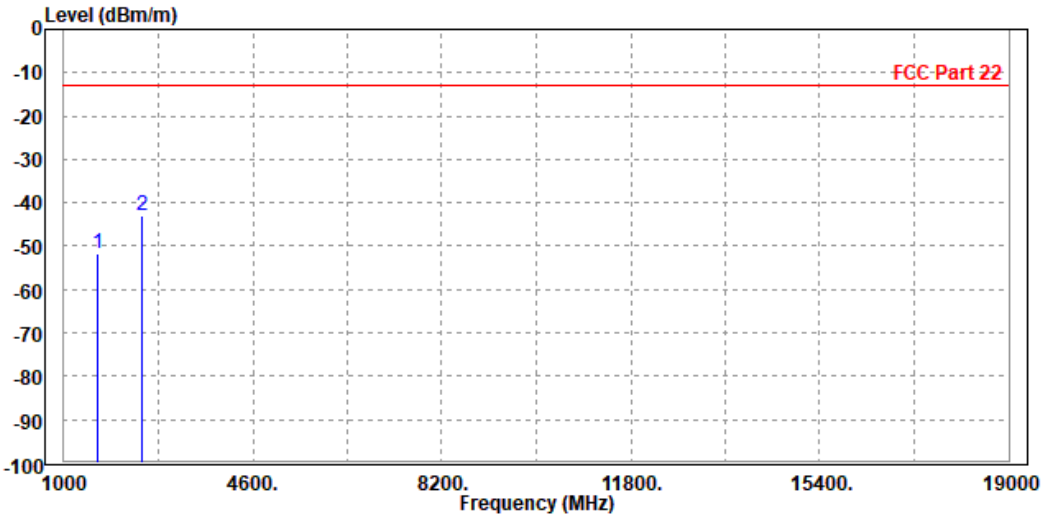


EDGE 850:

CH 128:

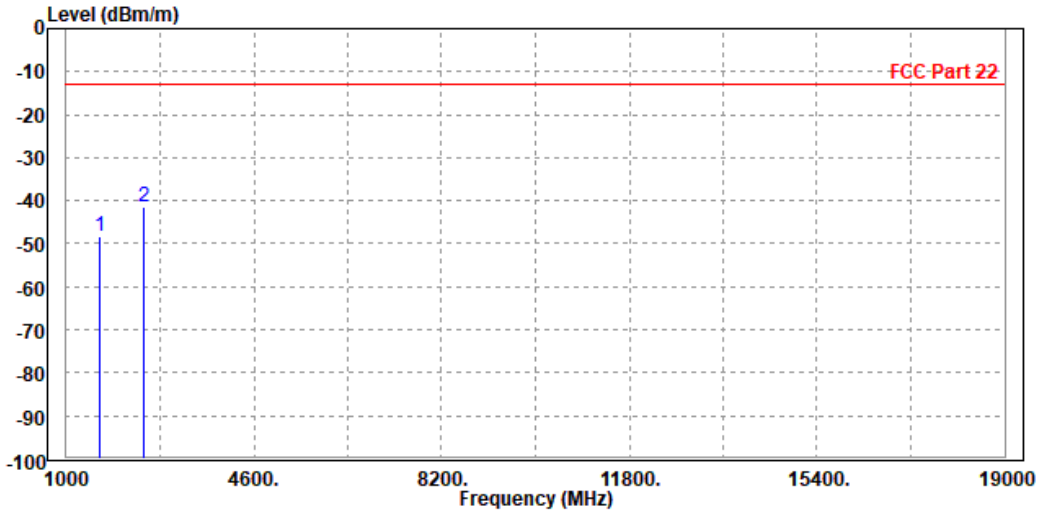
MODE	TX channel 128	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1648.000	-51.57	-54.82	-13.00	-38.57	3.25	Peak	Horizontal
2	PP	2476.000	-42.82	-50.85	-13.00	-29.82	8.03	Peak	Horizontal



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

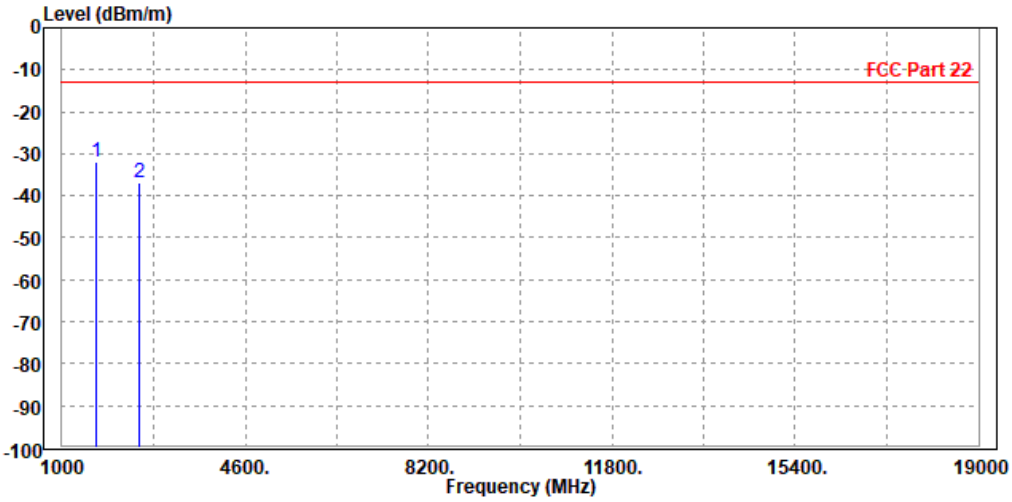
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1648.000	-48.25	-51.63	-13.00	-35.25	3.38	Peak	Vertical
2 PP	2476.000	-41.58	-48.62	-13.00	-28.58	7.04	Peak	Vertical



CH 189:

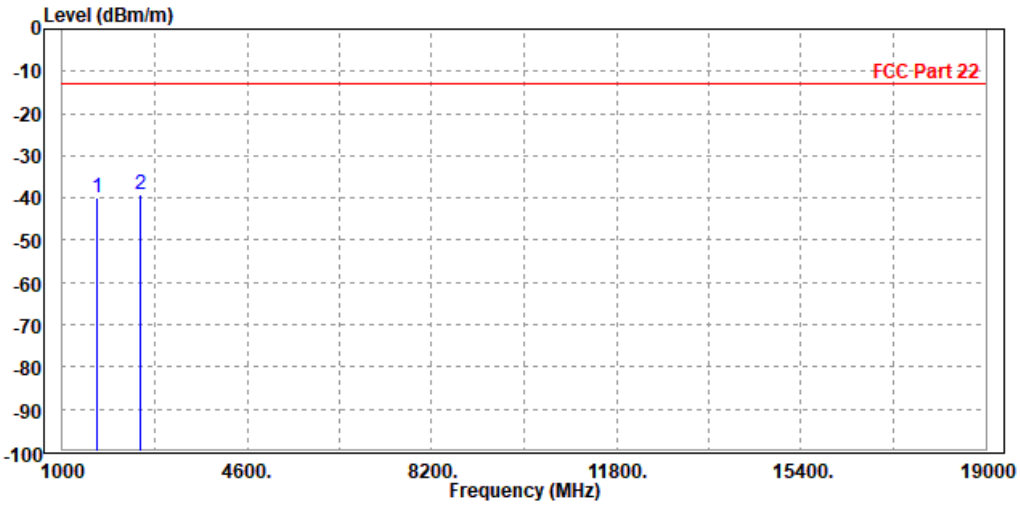
MODE	TX channel 189	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-32.11	-35.58	-13.00	-19.11	3.47	Peak	Horizontal
2		2512.000	-36.78	-44.84	-13.00	-23.78	8.06	Peak	Horizontal



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

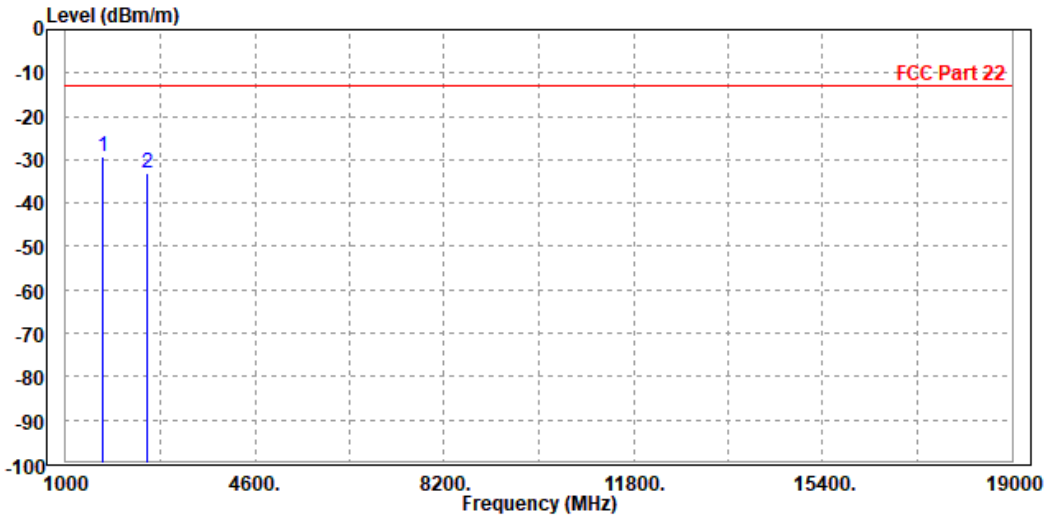
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1666.000	-39.86	-43.40	-13.00	-26.86	3.54	Peak	Vertical
2 PP	2512.000	-39.00	-46.11	-13.00	-26.00	7.11	Peak	Vertical



CH 251:

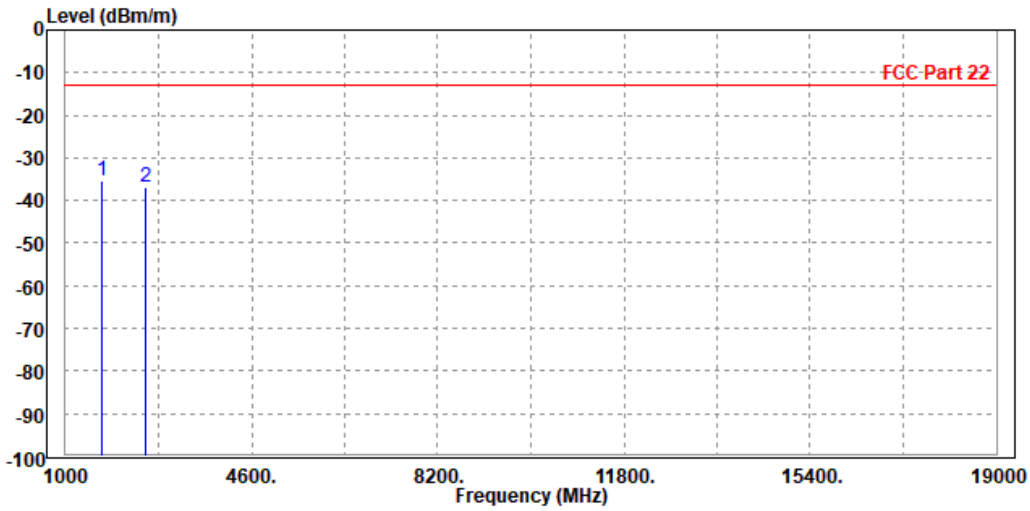
MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1702.000	-29.16	-33.07	-13.00	-16.16	3.91	Peak	Horizontal
2	2546.000	-33.04	-41.15	-13.00	-20.04	8.11	Peak	Horizontal



MODE	TX channel 251	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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	1702.000	-35.25	-39.12	-13.00	-22.25	3.87	Peak	Vertical
2		2546.000	-36.91	-44.13	-13.00	-23.91	7.22	Peak	Vertical

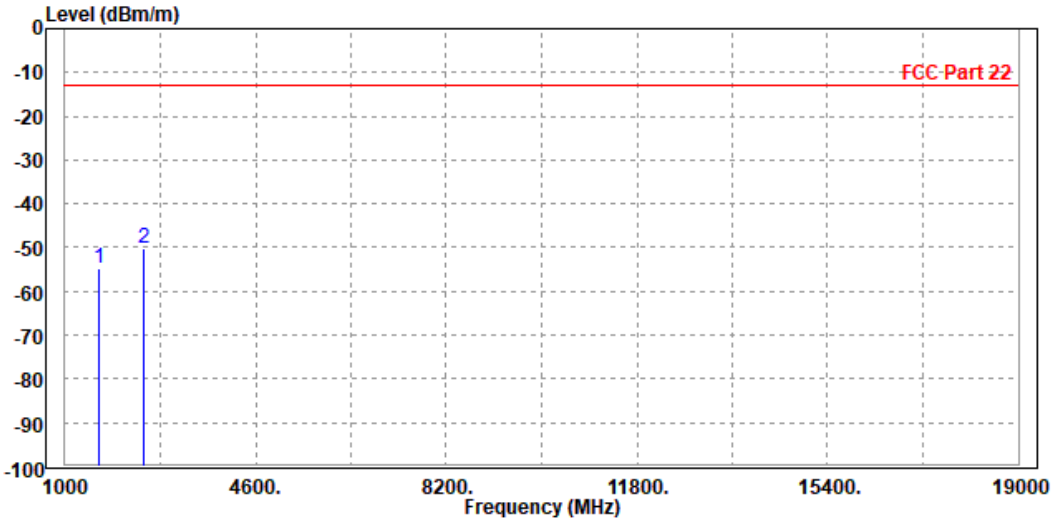


WCDMA Band V:

CH 4132:

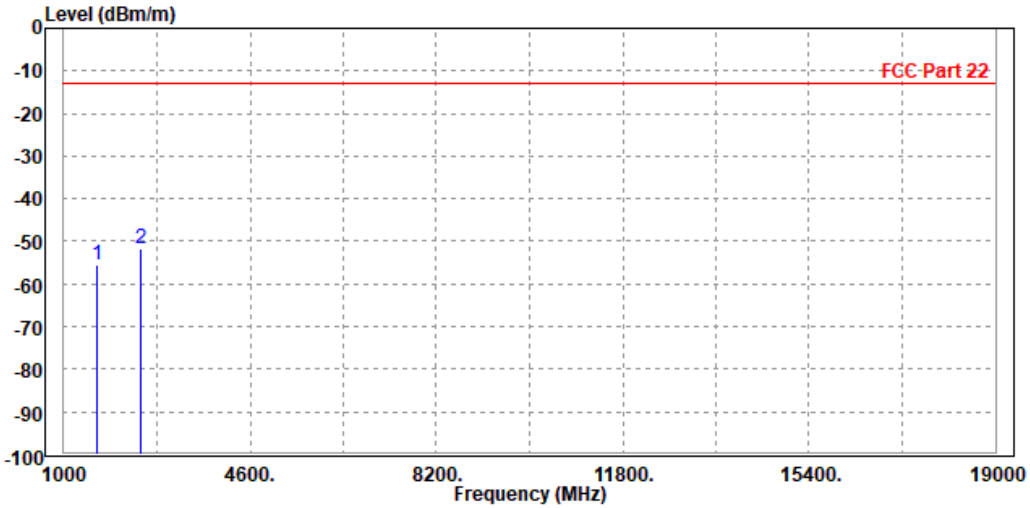
MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1648.000	-54.82	-58.07	-13.00	-41.82	3.25	Peak	Horizontal
2 PP	2479.000	-50.06	-58.09	-13.00	-37.06	8.03	Peak	Horizontal



MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

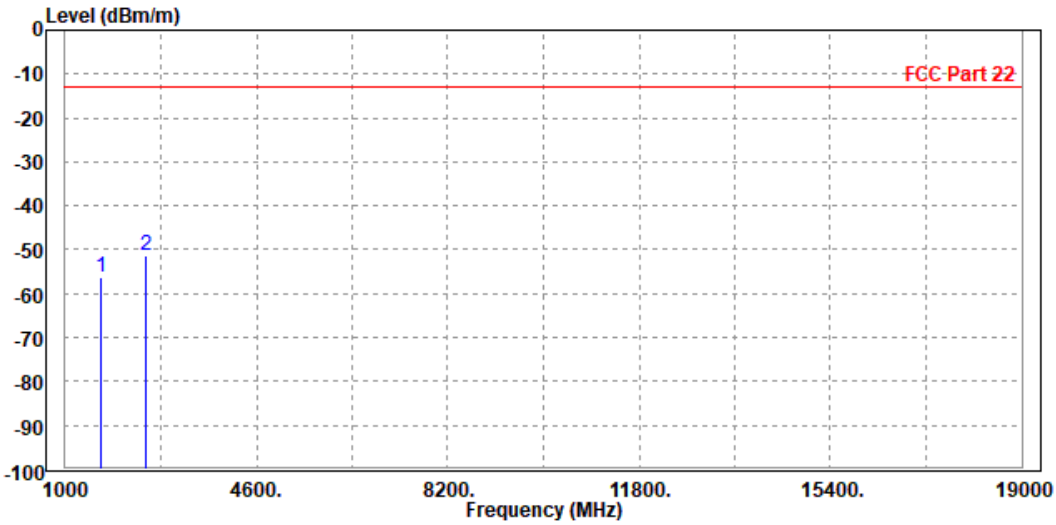
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1648.000	-55.69	-59.07	-13.00	-42.69	3.38	Peak	Vertical
2	PP	2479.000	-51.58	-58.62	-13.00	-38.58	7.04	Peak	Vertical



CH 4182:

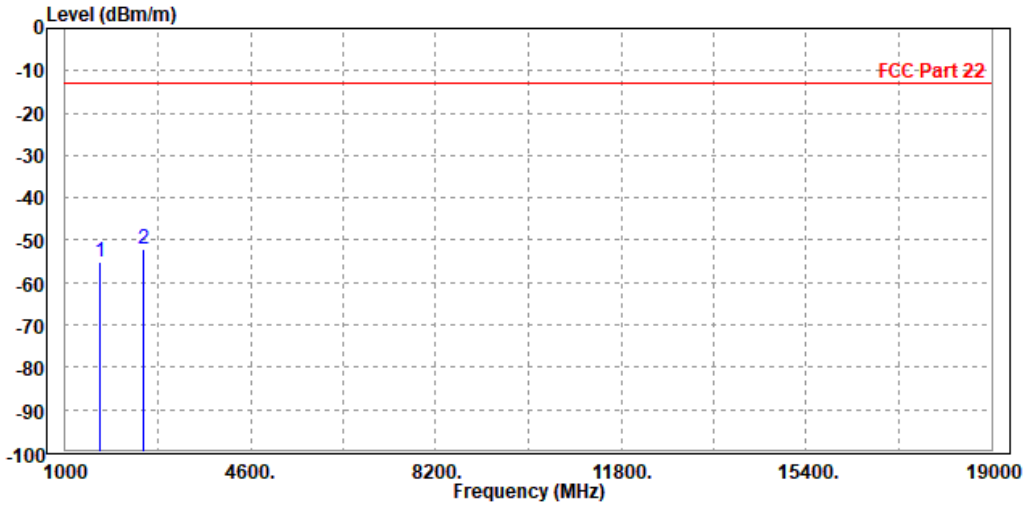
MODE	TX channel 4182	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-56.35	-59.82	-13.00	-43.35	3.47	Peak	Horizontal
2	PP	2512.000	-51.47	-59.53	-13.00	-38.47	8.06	Peak	Horizontal



MODE	TX channel 4182	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

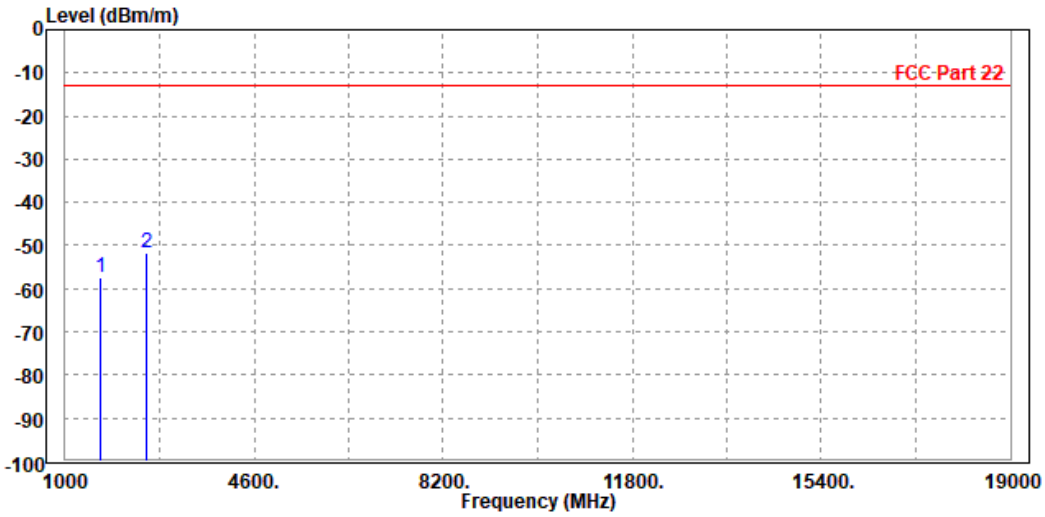
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-55.25	-58.79	-13.00	-42.25	3.54	Peak	Vertical
2	PP	2512.000	-52.03	-59.14	-13.00	-39.03	7.11	Peak	Vertical



CH 4233:

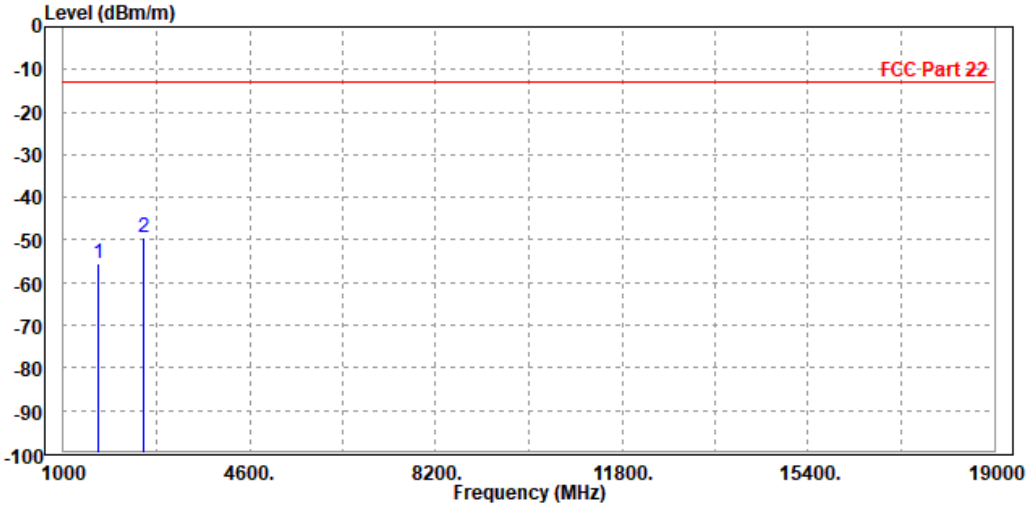
MODE	TX channel 4233	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	1684.000	-57.47	-61.16	-13.00	-44.47	3.69	Peak	Horizontal
2 PP	2539.000	-51.64	-59.74	-13.00	-38.64	8.10	Peak	Horizontal



MODE	TX channel 4233	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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		1684.000	-55.40	-59.11	-13.00	-42.40	3.71	Peak	Vertical
2	PP	2539.000	-49.58	-56.77	-13.00	-36.58	7.19	Peak	Vertical

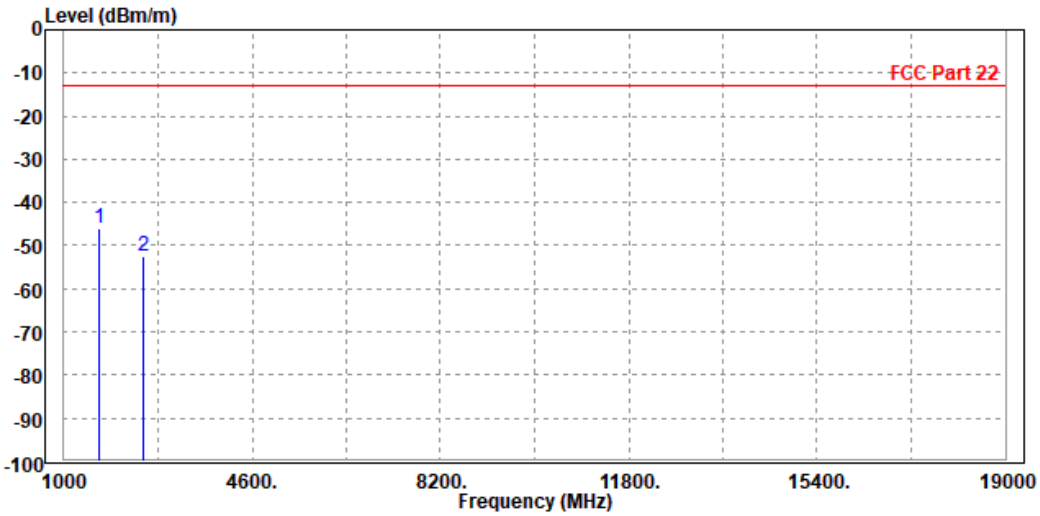


LTE Band 5

CHANNEL BANDWIDTH: 1.4MHz / QPSK

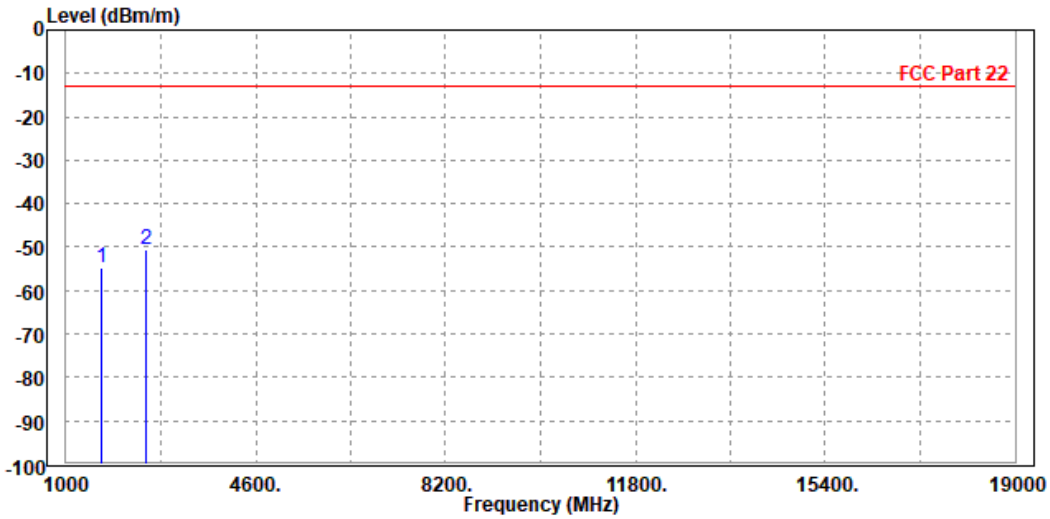
MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1666.000	-45.91	-49.38	-13.00	-32.91	3.47	Peak	Horizontal
2	2512.000	-52.45	-60.51	-13.00	-39.45	8.06	Peak	Horizontal



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

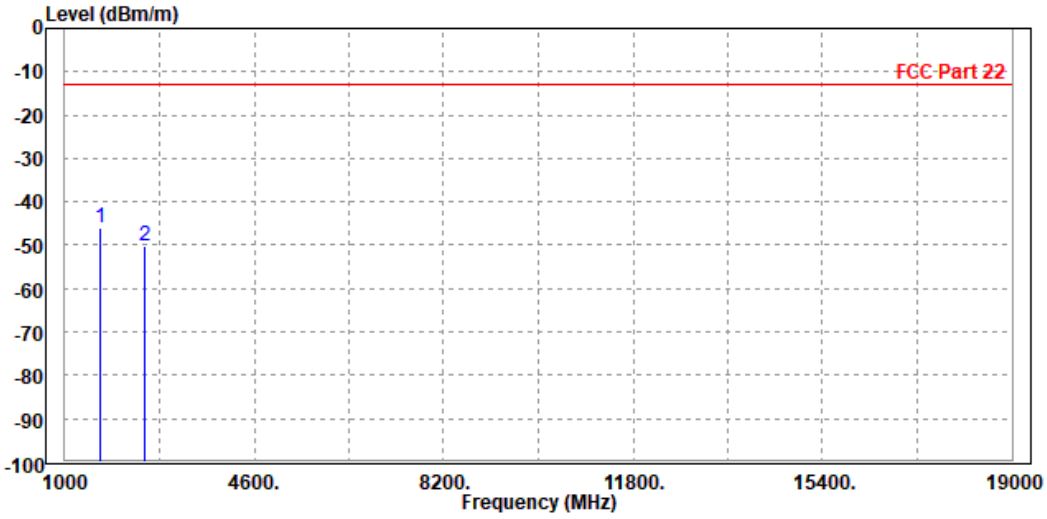
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1666.000	-54.68	-58.22	-13.00	-41.68	3.54	Peak	Vertical
2	PP	2512.000	-50.70	-57.81	-13.00	-37.70	7.11	Peak	Vertical



CHANNEL BANDWIDTH: 3MHz / QPSK

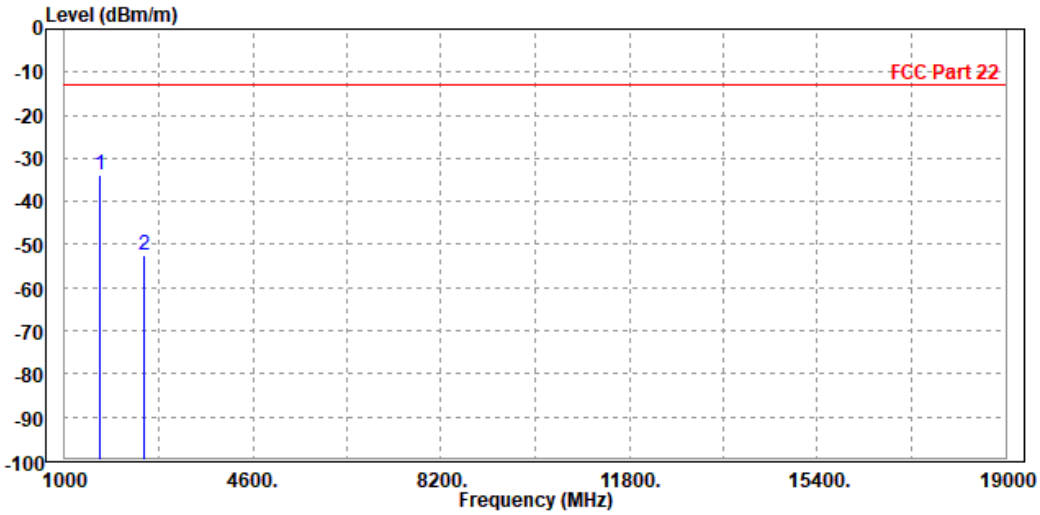
MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-45.99	-49.46	-13.00	-32.99	3.47	Peak	Horizontal
2		2512.000	-50.16	-58.22	-13.00	-37.16	8.06	Peak	Horizontal



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

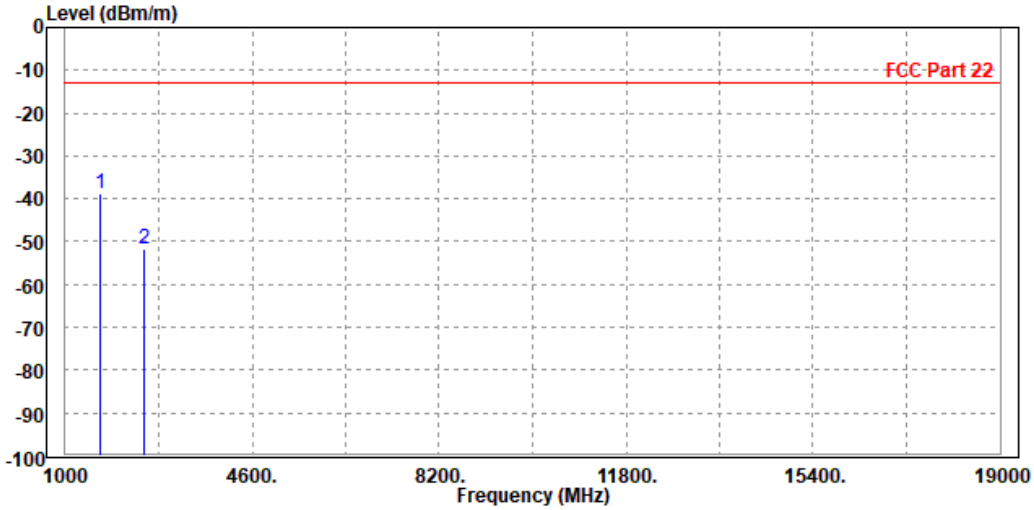
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-34.03	-37.57	-13.00	-21.03	3.54	Peak	Vertical
2		2512.000	-52.60	-59.71	-13.00	-39.60	7.11	Peak	Vertical



CHANNEL BANDWIDTH: 5MHz / QPSK

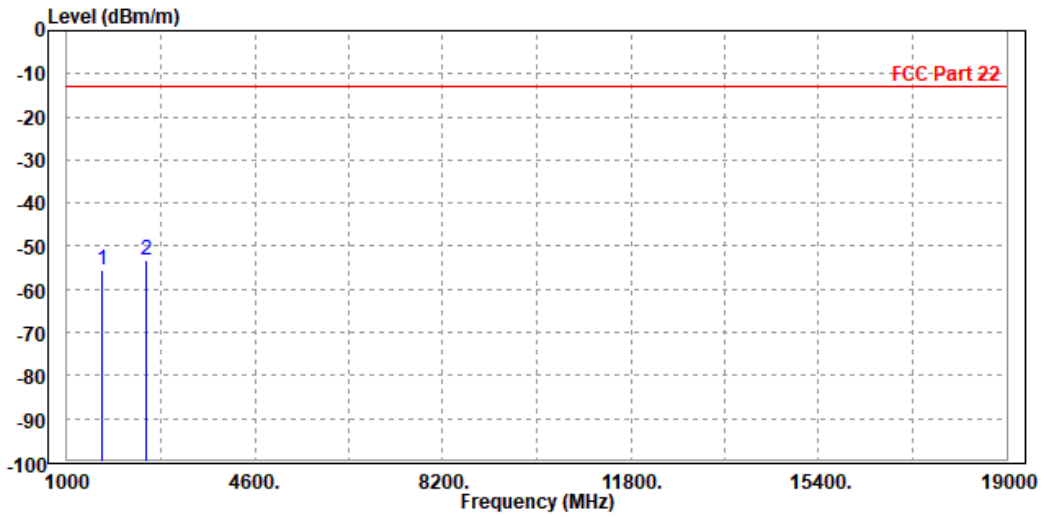
MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1666.000	-38.83	-42.30	-13.00	-25.83	3.47	Peak	Horizontal
2	2512.000	-51.73	-59.79	-13.00	-38.73	8.06	Peak	Horizontal



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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	-55.54	-59.08	-13.00	-42.54	3.54	Peak	Vertical
2	PP	2512.000	-53.27	-60.38	-13.00	-40.27	7.11	Peak	Vertical

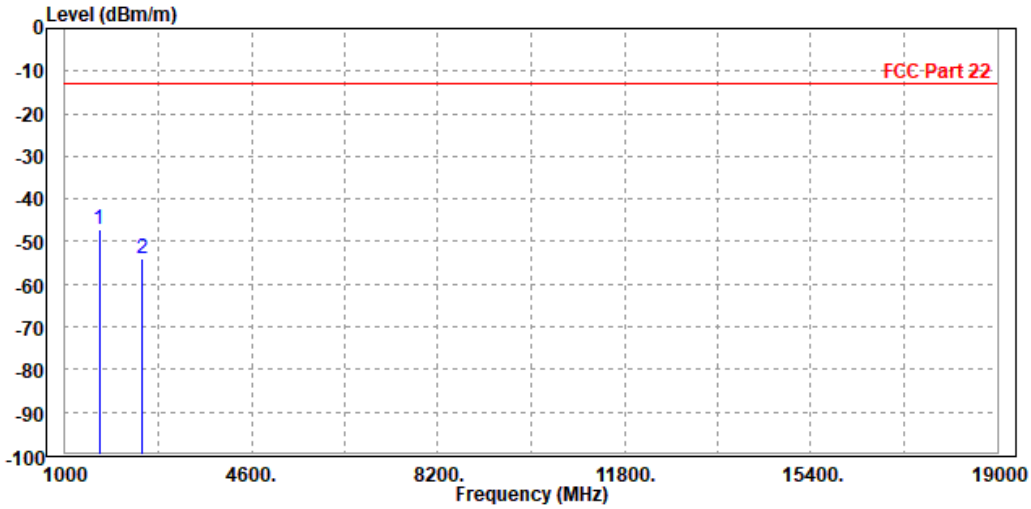


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 20450

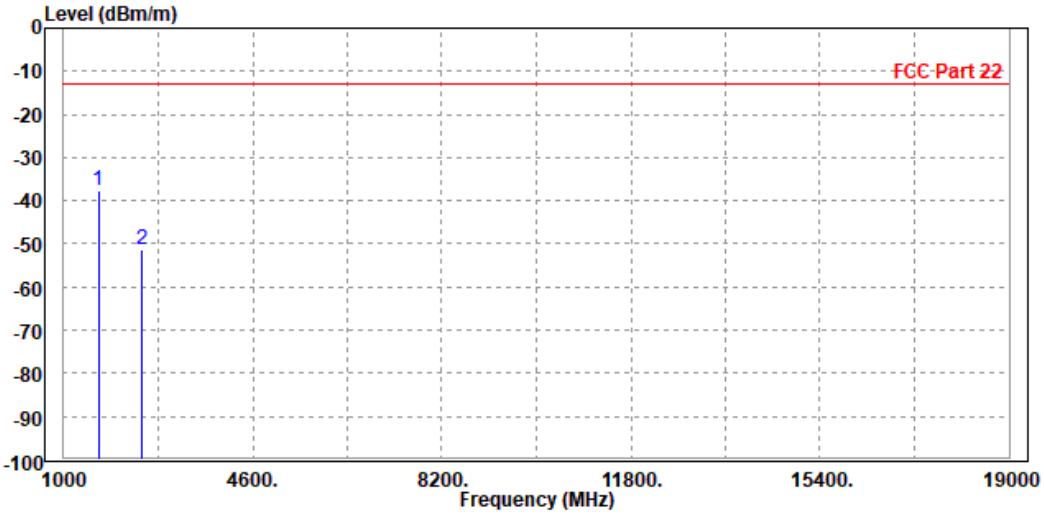
MODE	TX channel 20450	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1658.000	-47.21	-50.58	-13.00	-34.21	3.37	Peak	Horizontal
2		2487.000	-53.81	-61.85	-13.00	-40.81	8.04	Peak	Horizontal



MODE	TX channel 20450	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

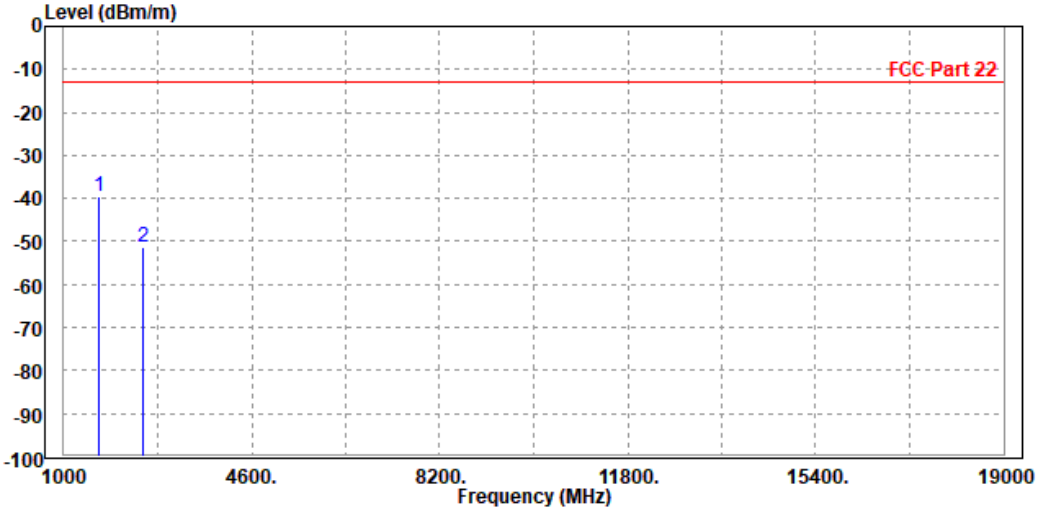
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1658.000	-37.60	-41.07	-13.00	-24.60	3.47	Peak	Vertical
2		2487.000	-51.26	-58.31	-13.00	-38.26	7.05	Peak	Vertical



CH 20525

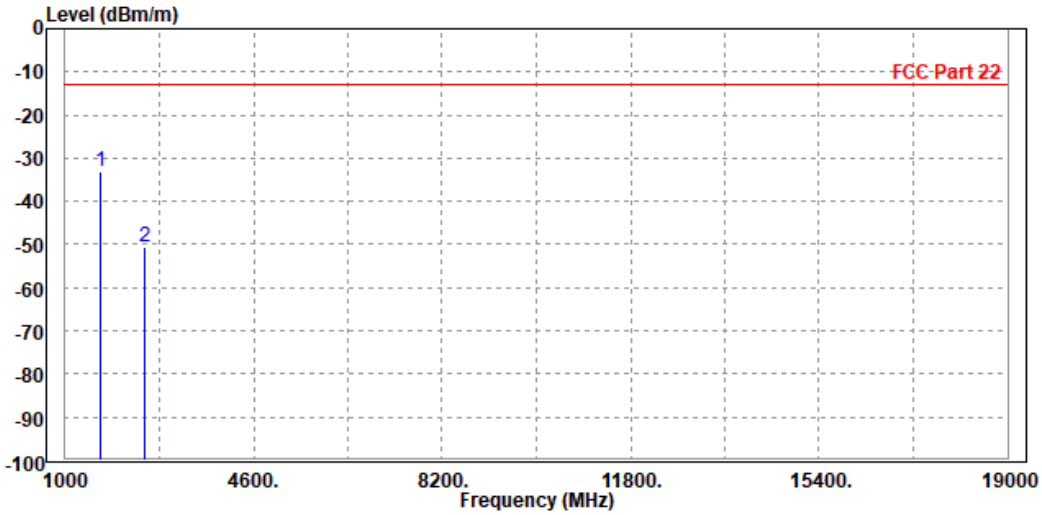
MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-39.65	-43.12	-13.00	-26.65	3.47	Peak	Horizontal
2		2512.000	-51.42	-59.48	-13.00	-38.42	8.06	Peak	Horizontal



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

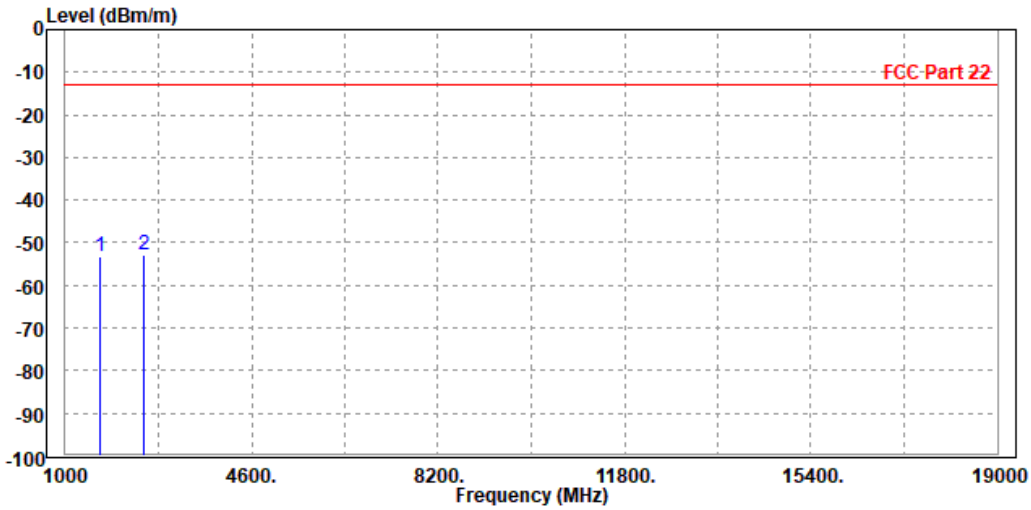
		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-32.93	-36.47	-13.00	-19.93	3.54	Peak	Vertical
2		2512.000	-50.58	-57.69	-13.00	-37.58	7.11	Peak	Vertical



CH 20600

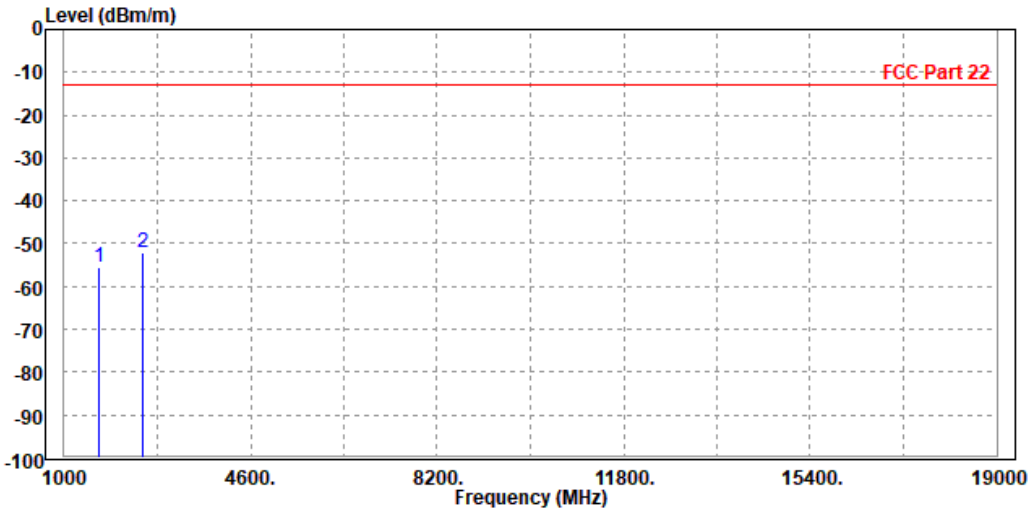
MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

		Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1		1684.000	-53.10	-56.79	-13.00	-40.10	3.69	Peak	Horizontal
2	PP	2532.000	-52.92	-61.01	-13.00	-39.92	8.09	Peak	Horizontal



MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5V 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		1684.000	-55.43	-59.14	-13.00	-42.43	3.71	Peak	Vertical
2	PP	2532.000	-51.94	-59.11	-13.00	-38.94	7.17	Peak	Vertical

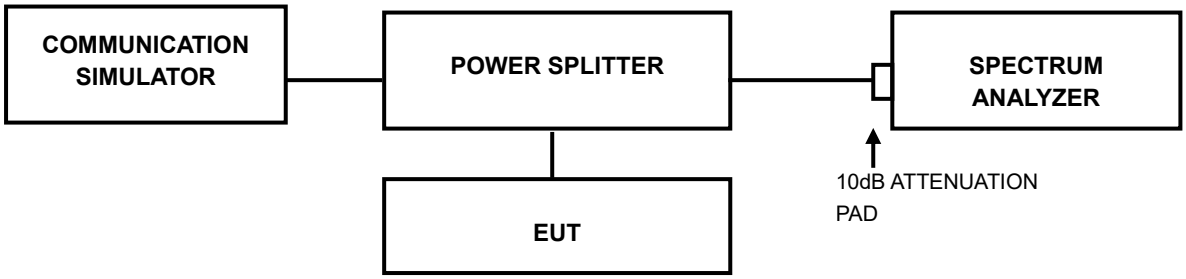


3.7 PEAK TO AVERAGE RATIO

3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

3.7.2 TEST SETUP



3.7.3 TEST PROCEDURES

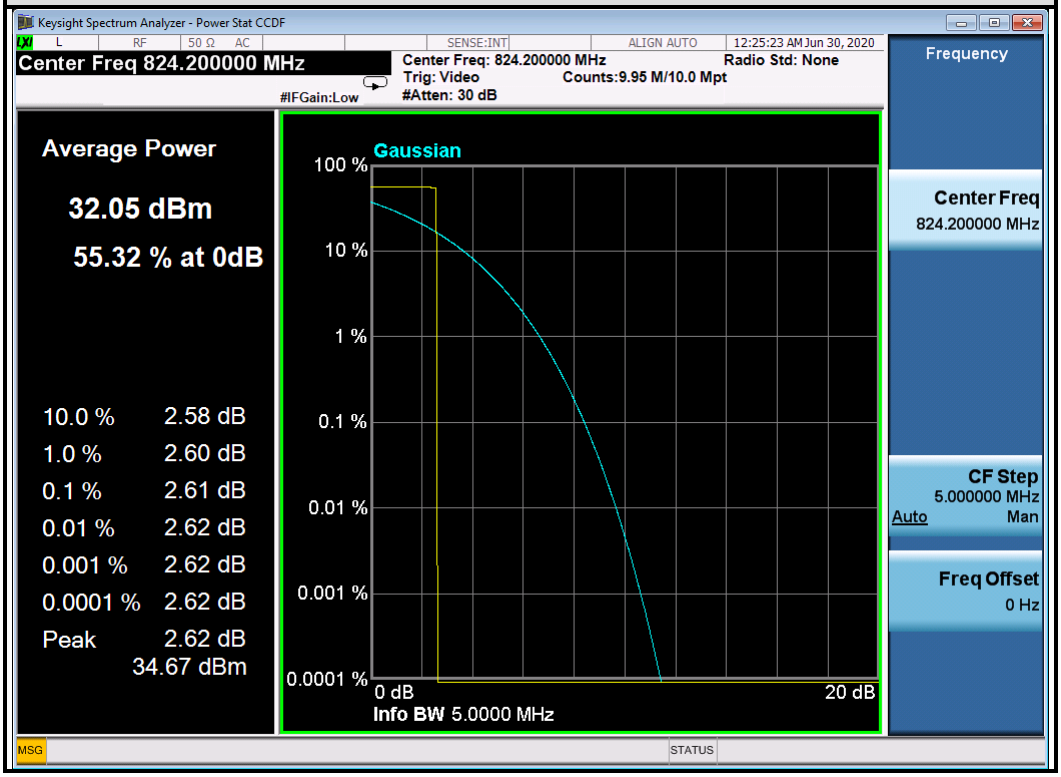
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.7.4 TEST RESULTS

GSM

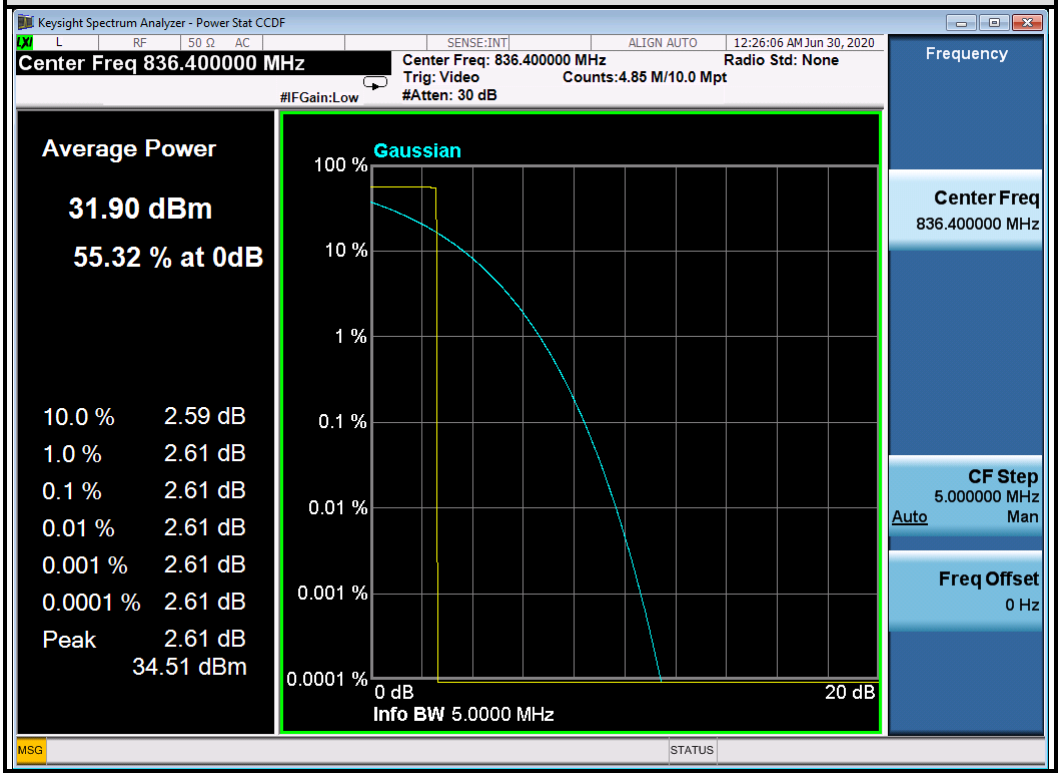
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	2.61

SPECTRUM PLOT OF WORST VALUE



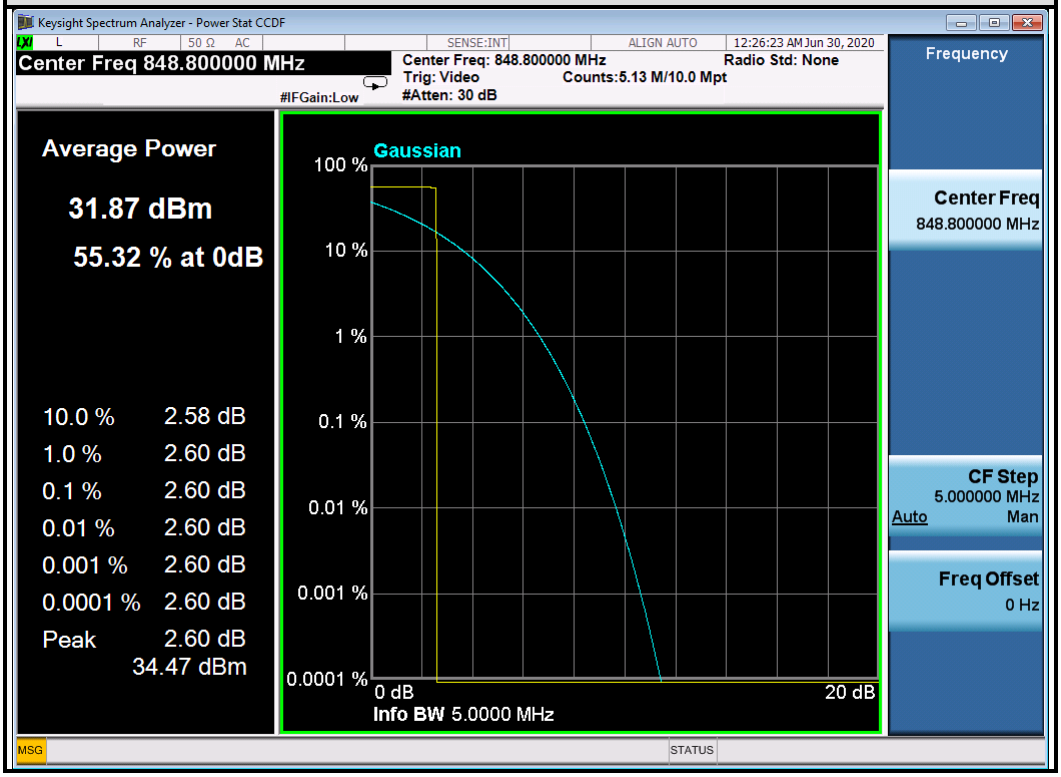
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	2.61

SPECTRUM PLOT OF WORST VALUE



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	2.60

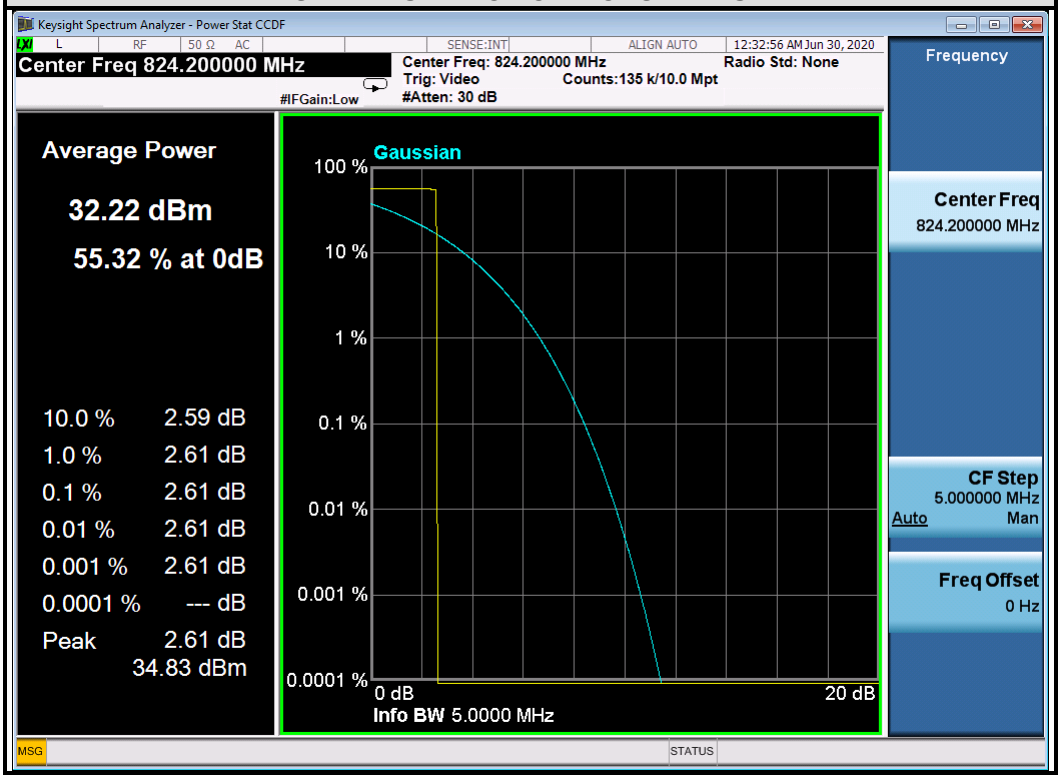
SPECTRUM PLOT OF WORST VALUE



EDGE

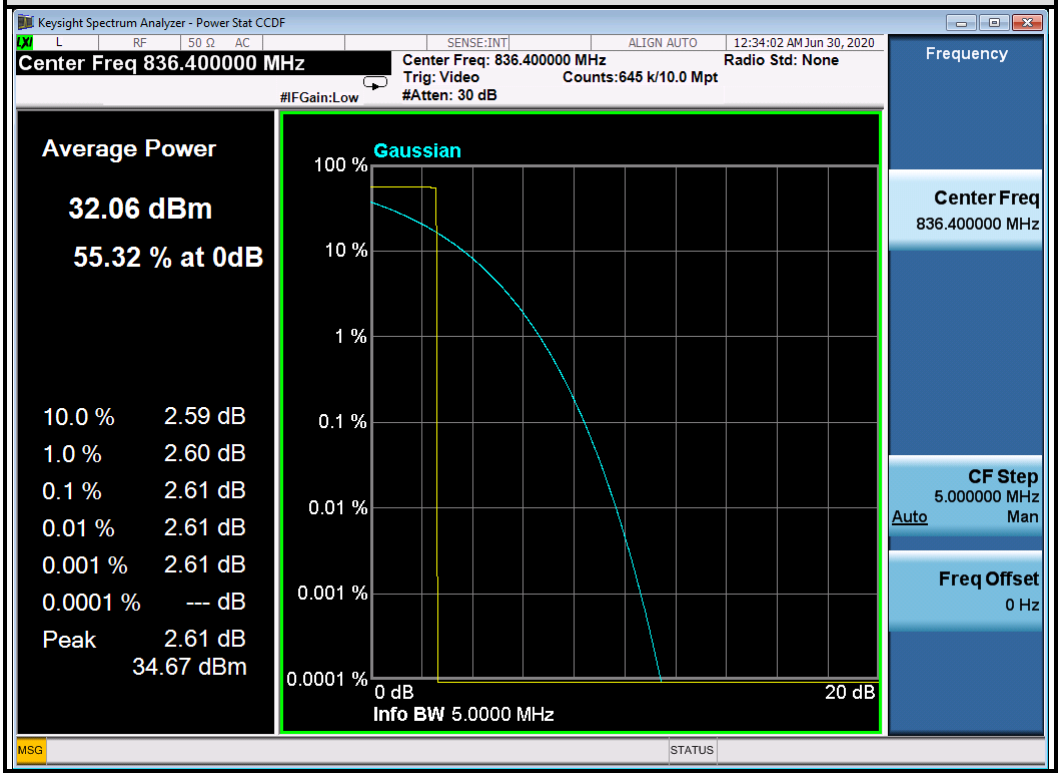
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	2.61

SPECTRUM PLOT OF WORST VALUE



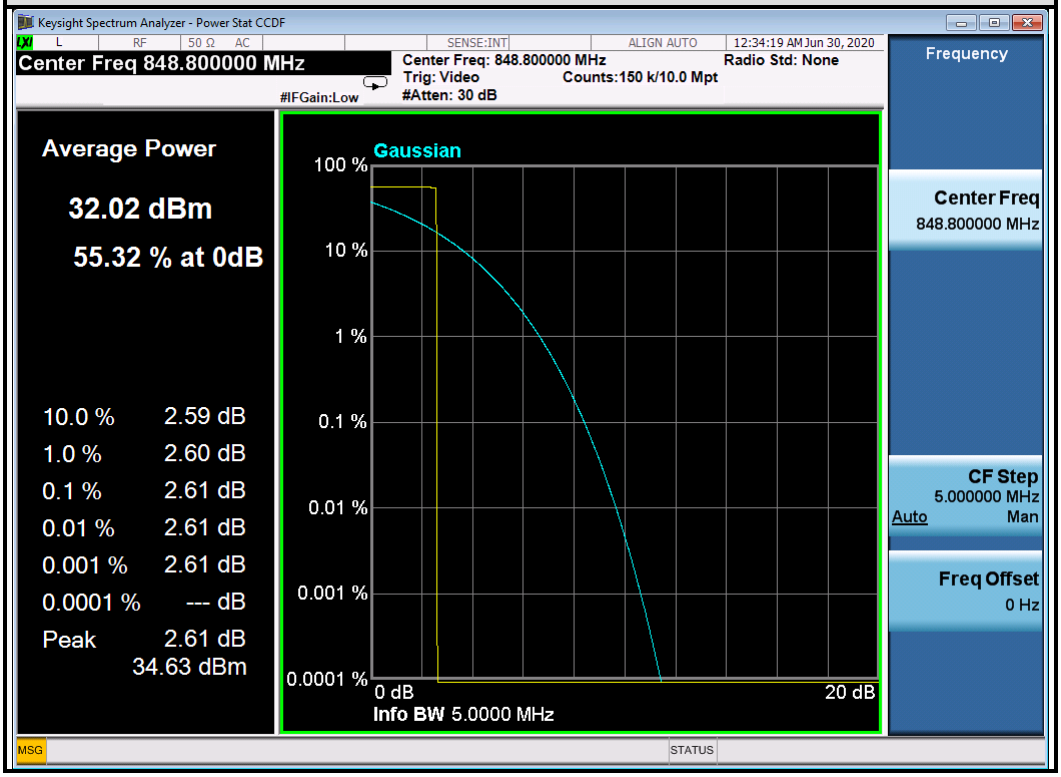
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	2.61

SPECTRUM PLOT OF WORST VALUE



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	2.61

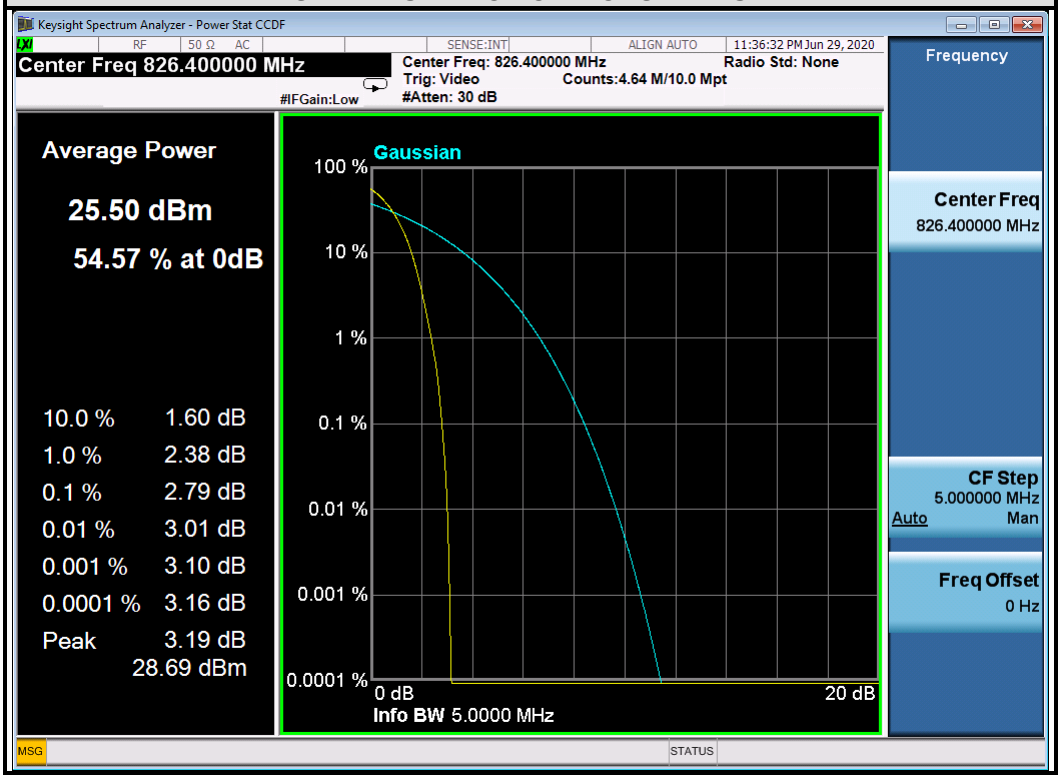
SPECTRUM PLOT OF WORST VALUE



WCDMA

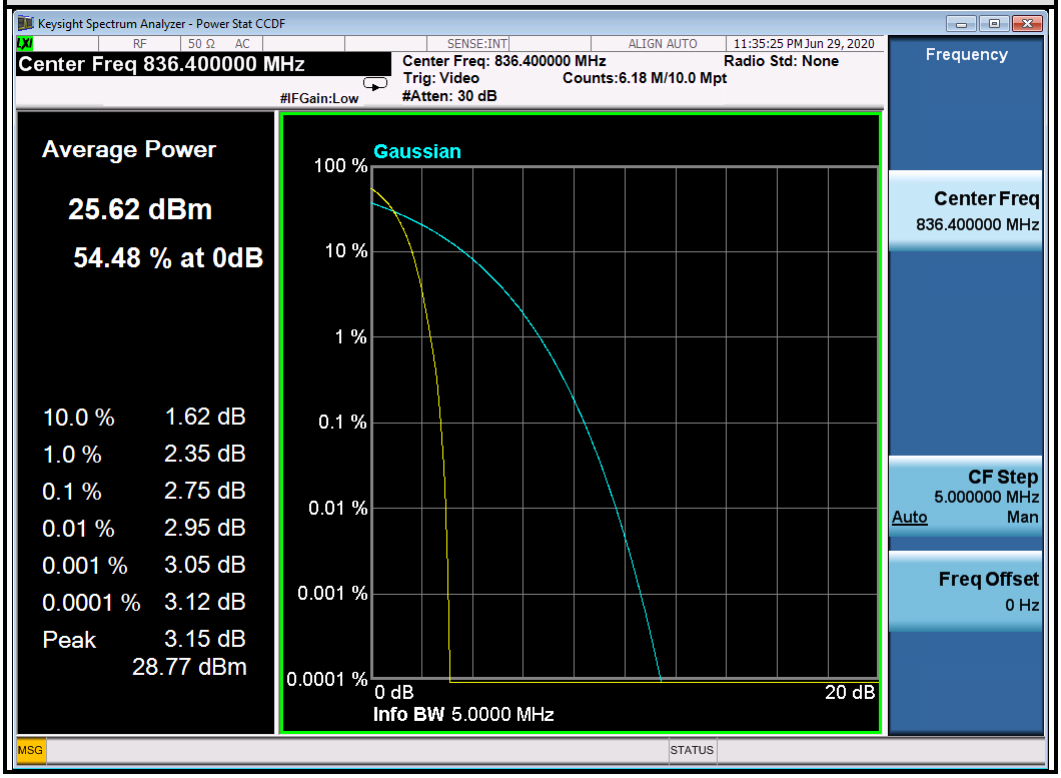
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4132	826.4	2.79

SPECTRUM PLOT OF WORST VALUE



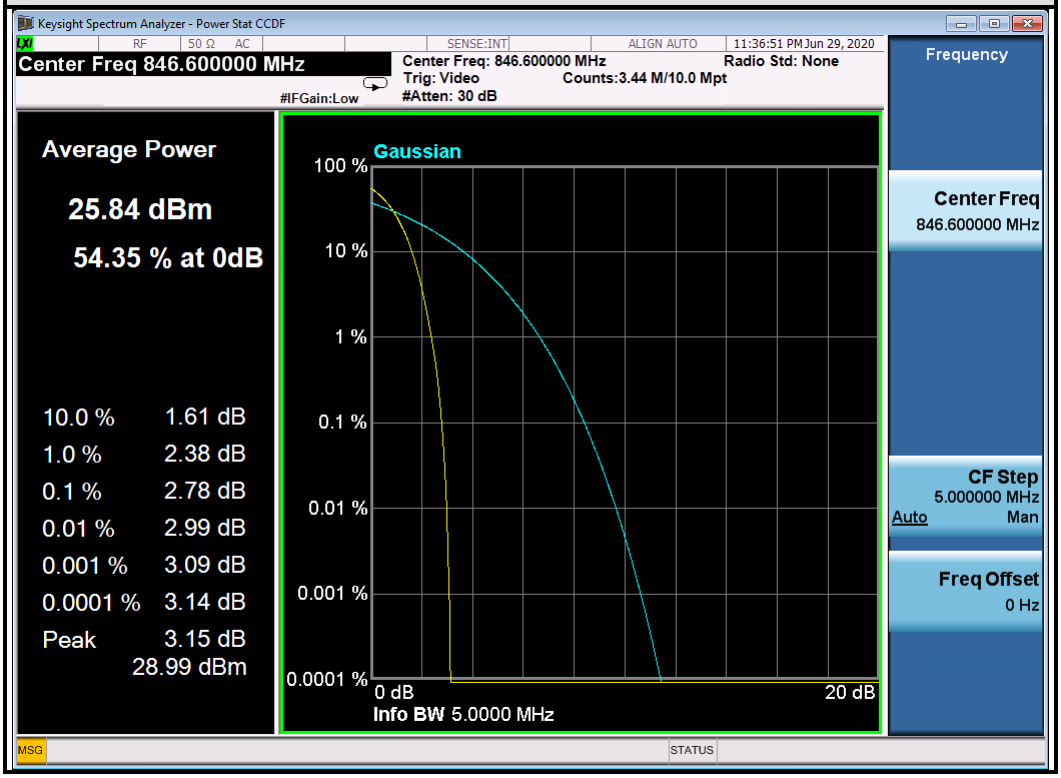
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4182	836.4	2.75

SPECTRUM PLOT OF WORST VALUE



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4233	846.6	2.78

SPECTRUM PLOT OF WORST VALUE

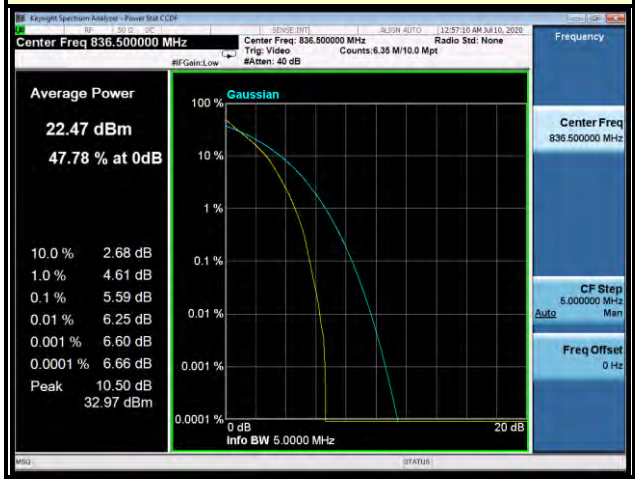


LTE BAND 5

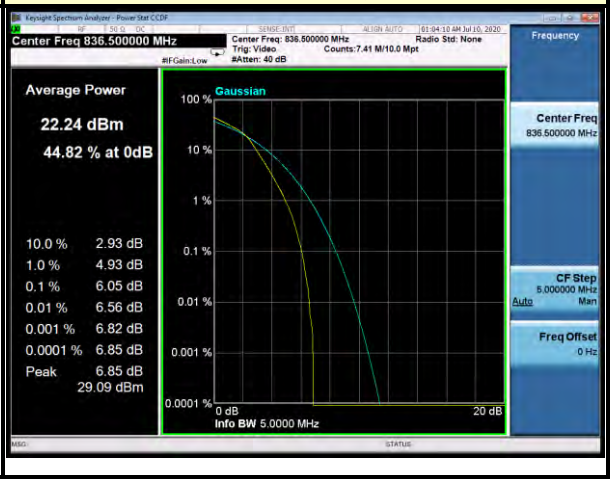
CHANNEL BANDWIDTH: 1.4MHz			
CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
20407	824.7	5.03	5.75
20525	836.5	5.59	6.05
20643	848.3	5.28	5.76

SPECTRUM PLOT OF WORST VALUE

1.4MHz / QPSK



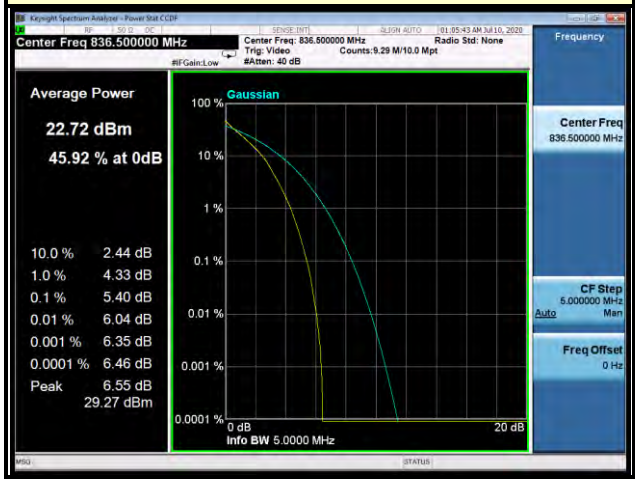
1.4MHz / 16QAM



CHANNEL BANDWIDTH: 3MHz			
CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
20415	825.5	5.27	5.97
20525	836.5	5.40	6.13
20635	847.5	5.21	6.07

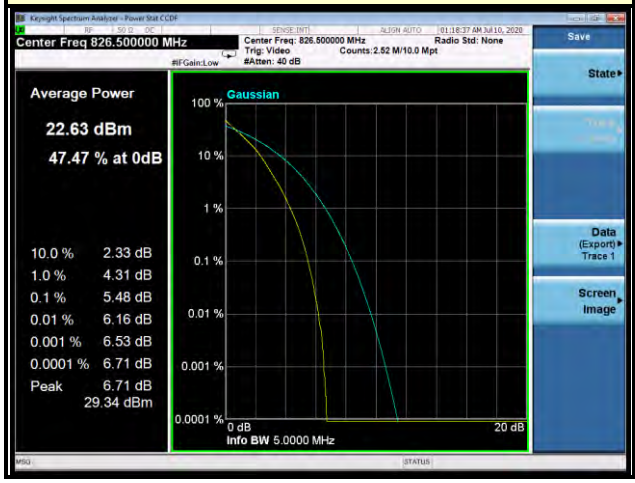
SPECTRUM PLOT OF WORST VALUE

3MHz / QPSK



3MHz / 16QAM

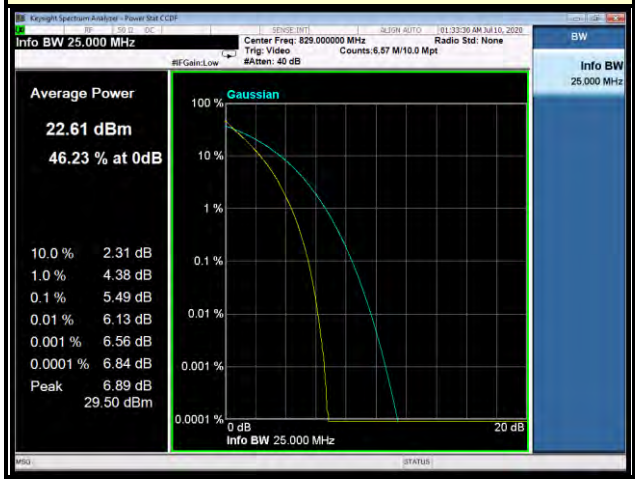
CHANNEL BANDWIDTH: 5MHz			
CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
20425	826.5	5.48	6.01
20525	836.5	5.47	6.14
20625	846.5	5.20	5.96

SPECTRUM PLOT OF WORST VALUE	
5MHz / QPSK	5MHz / 16QAM
	

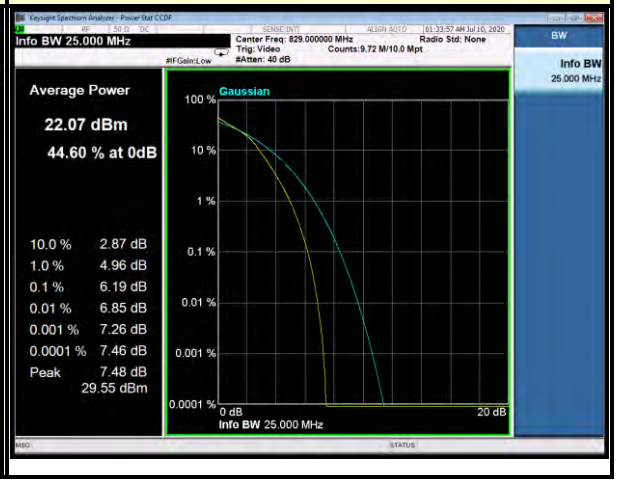
CHANNEL BANDWIDTH: 10MHz			
CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
20450	829	5.49	6.19
20525	836.5	5.41	6.06
20600	844	5.06	5.84

SPECTRUM PLOT OF WORST VALUE

10MHz / QPSK



10MHz / 16QAM



4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

5 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:

Shenzhen EMC/RF Lab:
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.

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

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

---END---