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Test Report No.: RF190823W003-4



Certificate # 3939.01

FCC TEST REPORT

(PART 22)

Applicant:	Xiaomi Communications Co., Ltd.
Address:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China

Manufacturer or Supplier:	Xiaomi Communications Co., Ltd.
Address:	The Rainbow City of China Resources, NO.68, Qinghe Middle Street, Haidian District, Beijing, China
Product:	Mobile Phone
Brand Name:	Redmi
Model Name:	M1908C3XG
FCC ID:	2AFZZC3XG
Date of tests:	Aug. 24, 2019 ~ Sep. 17, 2019

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

Date: Sep. 25, 2019

Date: Sep. 25, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF190823W003-4	Original release	Sep. 25, 2019

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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~1GHz)	±4.98dB
Radiated emissions (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±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.

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1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Feb. 26,19	Feb. 25,20
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510322	Feb. 26,19	Feb. 25,20
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 26,19	Feb. 25,20
Horn Antenna (1GHz-18GHz)	ETS-LINDGREN	3117	00168692	Nov. 30, 18	Nov. 29, 19
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00 361	15433	Nov. 21, 18	Nov. 20, 19
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 26,19	Feb. 25,20
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 08,19	Jul. 09,20
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 08,19	Jul. 09,20
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 08,19	Jul. 09,20
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Feb. 26,19	Feb. 25,20
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SM A	1505	Jul. 08,19	Jul. 09,20
Power Meter	Anritsu	ML2495A	1506002	Feb. 26,19	Feb. 25,20
Power Sensor	Anritsu	MA2411B	1339352	Feb. 26,19	Feb. 25,20
Humid & Temp Programmable Tester	Juyi	ITH-120-45-CP-AR	IAA1504-001	Jul. 08,19	Jul. 09,20
MXG Analog Microwave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 26,19	Feb. 25,20
Power Divider	MCLI/USA	PS2-15	24880	Jul. 09,19	Jul. 08,20

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
 3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

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2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Phone	
BRAND NAME	Redmi	
MODEL NAME	M1908C3XG	
POWER SUPPLY	5V/9V/12V (adapter or host equipment) 3.85Vdc (Li-ion, battery)	
MODULATION TYPE	GSM/GPRS/EDGE	GMSK, 8PSK
	WCDMA	BPSK, QPSK
	LTE	QPSK, 16QAM, 64QAM
FREQUENCY RANGE	GSM/GPRS/EDGE	824.2MHz ~ 848.8MHz
	WCDMA	826.4MHz ~ 846.6MHz
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	824.7MHz ~ 848.3MHz
	LTE Band 5 (Channel Bandwidth: 3MHz)	825.5MHz ~ 847.5MHz
	LTE Band 5 (Channel Bandwidth: 5MHz)	826.5MHz ~ 846.5MHz
	LTE Band 5 (Channel Bandwidth: 10MHz)	829MHz ~ 844MHz
MAX. ERP POWER	GSM	262mW
	EDGE	220mW
	WCDMA	79mW
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	232mW
	LTE Band 5 (Channel Bandwidth: 3MHz)	246mW
	LTE Band 5 (Channel Bandwidth: 5MHz)	243mW
	LTE Band 5 (Channel Bandwidth: 10MHz)	215mW
EMISSION DESIGNATOR GOGN	GSM	246KGXW
	EDGE	325KG7W
	WCDMA	4M15F9W
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	QPSK: 1M08G7D
		16QAM: 1M08W7D
		64QAM: 1M08W7D
	LTE Band 5 (Channel Bandwidth: 3MHz)	QPSK: 2M68G7D
		16QAM: 2M69W7D
		64QAM: 2M68W7D

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	LTE Band 5 (Channel Bandwidth: 5MHz)	QPSK: 4M47G7D
		16QAM: 4M48W7D
		64QAM: 4M49W7D
	LTE Band 5 (Channel Bandwidth: 10MHz)	QPSK: 8M93G7D
		16QAM: 8M93W7D
		64QAM: 8M94W7D
ANTENNA TYPE	Main Antenna(ANT 0): Fixed Internal Antenna with -4.8dBi gain for GSM 850/WCDMA B5/LTE Band 5	
HW VERSION	P2	
SW VERSION	MIUI 10	
I/O PORTS	Refer to user's manual	

NOTE:

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

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

List of Accessory:

ACCESSORIES	BRAND	MODEL	MANUFACTURER	SPECIFICATION
AC Adapter	MI	MDY-10-ED	Chenyang	I/P: 100 - 240Vac,500mA, O/P: 5Vdc, 3000mA/9V,2A/12V,1.5A
Battery	MI	BN46	CosMX	Rating: 3.85Vdc, Min. 3900mAh,Typ.4000 mAh, Li-ion, Y
USB Cable 1	MI	L23312	LUXSHARE Precision Industry Co., Ltd.	1.0 meter, shielded cable, without ferrite core
USB Cable 2	MI	K23312	SU ZHOU KELI SCIENCE&TECHNOLOGY DEVELOPMENT CO.,LTD	1.0 meter, shielded cable, without ferrite core

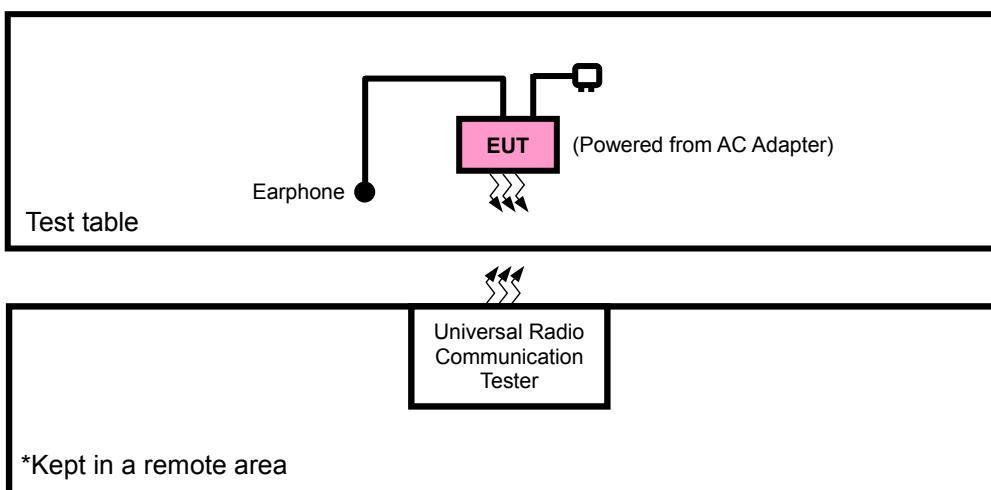


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CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



*Kept in a remote area



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2.2 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A

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

2.3 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case in ERP and radiated emission was found when positioned on X-plane for WCDMA/LTE. Following channel(s) was (were) selected for the final test as listed below:

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



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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	CONDUCDETED 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	CONDUCDETED 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

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LTE BAND 5 MODE

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



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

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

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	23deg. C, 70%RH	3.85Vdc from Battery	Star Le
FREQUENCY STABILITY	23deg. C, 70%RH	DC 3.65V/3.85V/4.4V	Kevin Zhang
OCCUPIED BANDWIDTH	23deg. C, 70%RH	3.85Vdc from Battery	Kevin Zhang
BAND EDGE	23deg. C, 70%RH	3.85Vdc from Battery	Kevin Zhang
CONDUCED EMISSION	23deg. C, 70%RH	3.85Vdc from Battery	Kevin Zhang
RADIATED EMISSION	23deg. C, 70%RH	5/9/12Vdc from adapter	Star Le
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	3.85Vdc from Battery	Kevin Zhang

2.4 EUT OPERATING CONDITIONS

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



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2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2

FCC 47 CFR Part 22

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

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



3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

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

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5MHz for WCDMA mode and 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}$.

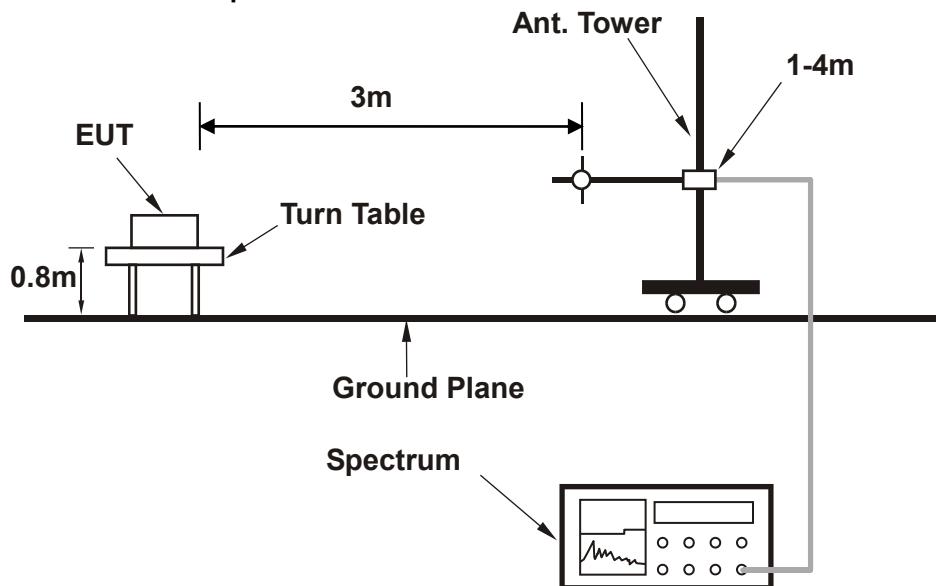
CONDUCTED POWER MEASUREMENT:

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.

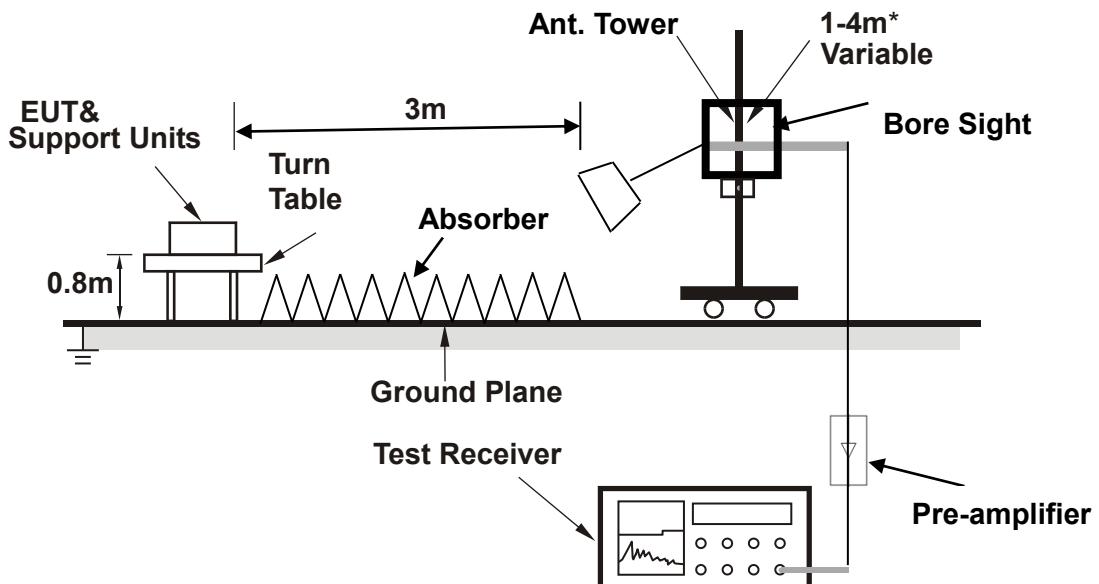
3.1.3 TEST SETUP

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>



<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.

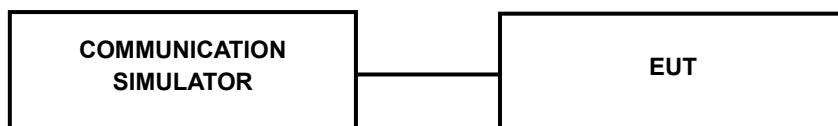
For the actual test configuration, please refer to the attached file (Test Setup Photo).



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CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	33.42	33.49	33.39
GPRS 1Tx Slot	33.41	33.48	33.38
GPRS 2Tx Slot	29.94	30.13	29.88
GPRS 3Tx Slot	27.92	28.11	27.86
GPRS 4Tx Slot	26.75	26.94	26.69
EDGE 1Tx Slot (MCS9)	26.58	26.77	26.52
EDGE 2Tx Slot (MCS9)	24.43	24.62	24.37
EDGE 3Tx Slot (MCS9)	22.73	22.92	22.67
EDGE 4Tx Slot (MCS9)	21.92	22.11	21.86

Band	WCDMA V			
TX Channel	4132	4182	4233	Max. Tune-up Power
Rx Channel	4357	4407	4458	
Frequency	826.4	836.4	846.6	
RMC 12.2K	23.58	23.57	23.71	24.0
HSDPA Subtest-1	22.57	22.62	22.68	23.0
HSDPA Subtest-2	22.55	22.61	22.67	23.0
HSDPA Subtest-3	22.09	22.11	22.23	22.5
HSDPA Subtest-4	22.06	22.18	22.21	22.5
DC-HSDPA Subtest-1	22.51	22.57	22.63	23.0
DC-HSDPA Subtest-2	22.47	22.55	22.60	23.0
DC-HSDPA Subtest-3	22.03	22.03	22.18	22.5
DC-HSDPA Subtest-4	21.99	22.11	22.15	22.5
HSUPA Subtest-1	22.52	22.62	22.68	23.0
HSUPA Subtest-2	20.59	20.63	20.75	21.0
HSUPA Subtest-3	21.55	21.57	21.76	22.0
HSUPA Subtest-4	20.58	20.58	20.68	21.0
HSUPA Subtest-5	22.61	22.51	22.72	23.0
HSUPA+ Subtest-1	20.05	20.01	20.12	20.5



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LTE Band 5

LTE Band 5								
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	Max. Tune-up (dBm)
		Channel		20450	20525	20600		
		Frequence (MHz)		829	836.5	844		
10M	QPSK	1	0	23.45	23.51	23.38	0	24
		1	24	23.41	23.47	23.34	0	24
		1	49	23.39	23.45	23.32	0	24
		25	0	22.07	22.13	22.00	1	23
		25	12	22.05	22.11	21.98	1	23
		25	25	22.02	22.08	21.95	1	23
		50	0	22.06	22.12	21.99	1	23
	16QAM	1	0	22.28	22.37	22.17	1	23
		1	24	22.28	22.35	22.22	1	23
		1	49	22.26	22.36	22.17	1	23
		25	0	21.12	21.27	21.05	2	22
		25	12	21.14	21.22	21.02	2	22
		25	25	21.06	21.18	21.01	2	22
		50	0	21.07	21.21	21.02	2	22
	64QAM	1	0	20.23	20.32	20.18	2	22
		1	24	20.27	20.36	20.14	2	22
		1	49	20.16	20.27	20.11	2	22
		25	0	20.10	20.25	20.12	2	22
		25	12	20.09	20.23	20.04	2	22
		25	25	20.10	20.18	20.05	2	22
		50	0	20.01	20.16	20.03	2	22



BUREAU
VERITAS

Test Report No.: RF190823W003-4

BW	MCS Index	Channel		20425	20525	20625	3GPP MPR	Max. Tune-up
		Frequency (MHz)		826.5	836.5	846.5		
5M	QPSK	1	0	23.44	23.44	23.36	0	24
		1	12	23.36	23.42	23.24	0	24
		1	24	23.35	23.36	23.24	0	24
		12	0	22.04	22.04	21.91	1	23
		12	6	21.98	22.02	21.97	1	23
		12	13	22.01	22.01	21.88	1	23
		25	0	21.97	22.04	21.99	1	23
	16QAM	1	0	22.20	22.28	22.12	1	23
		1	12	22.20	22.29	22.15	1	23
		1	24	22.23	22.28	22.13	1	23
		12	0	21.10	21.22	20.97	2	22
		12	6	21.08	21.19	20.92	2	22
		12	13	21.02	21.11	20.99	2	22
		25	0	21.03	21.14	20.92	2	22
	64QAM	1	0	20.19	20.30	20.14	2	22
		1	12	20.22	20.29	20.07	2	22
		1	24	20.09	20.27	20.04	2	22
		12	0	20.05	20.20	20.10	2	22
		12	6	20.08	20.18	20.05	2	22
		12	13	20.05	20.09	20.03	2	22
		25	0	20.01	20.13	20.01	2	22



BUREAU
VERITAS

Test Report No.: RF190823W003-4

BW	MCS Index	Channel		20415	20525	20635	3GPP MPR	Max. Tune-up
		Frequence (MHz)		825.5	836.5	847.5		
3M	QPSK	1	0	23.33	23.37	23.24	0	24
		1	7	23.40	23.36	23.24	0	24
		1	14	23.20	23.41	23.24	0	24
		8	0	21.97	22.01	21.93	1	23
		8	3	21.93	22.01	21.80	1	23
		8	7	21.89	22.04	21.94	1	23
		15	0	21.93	22.00	21.96	1	23
	16QAM	1	0	22.15	22.26	22.10	1	23
		1	7	22.09	22.18	22.19	1	23
		1	14	22.07	22.29	22.02	1	23
		8	0	20.97	21.11	20.85	2	22
		8	3	20.94	21.12	20.91	2	22
		8	7	20.93	21.03	20.88	2	22
		15	0	20.94	21.11	20.93	2	22
	64QAM	1	0	20.08	20.26	20.11	2	22
		1	7	20.21	20.25	20.01	2	22
		1	14	20.12	20.09	20.08	2	22
		8	0	20.07	20.12	20.07	2	22
		8	3	20.04	20.10	20.02	2	22
		8	7	20.01	20.03	20.05	2	22
		15	0	20.02	20.01	20.04	2	22



BUREAU
VERITAS

Test Report No.: RF190823W003-4

BW	MCS Index	Channel		20407	20525	20643	3GPP MPR	Max. Tune-up
		Frequency (MHz)		824.7	836.5	848.3		
1.4M	QPSK	1	0	23.38	23.48	23.35	0	24
		1	2	23.28	23.33	23.29	0	24
		1	5	23.21	23.36	23.28	0	24
		3	0	22.90	23.01	22.85	0	24
		3	1	22.81	23.01	22.94	0	24
		3	3	22.83	22.95	22.75	0	24
		6	0	21.89	21.96	21.92	1	23
	16QAM	1	0	22.11	22.32	22.01	1	23
		1	2	22.15	22.32	22.16	1	23
		1	5	22.19	22.28	21.95	1	23
		3	0	22.01	22.21	21.84	1	23
		3	1	22.01	22.08	21.87	1	23
		3	3	21.97	22.14	21.93	1	23
		6	0	20.95	21.13	20.96	2	22
	64QAM	1	0	20.09	20.14	20.05	2	22
		1	2	20.18	20.22	20.04	2	22
		1	5	20.15	20.11	20.01	2	22
		3	0	20.07	20.14	20.11	2	22
		3	1	20.09	20.15	20.05	2	22
		3	3	20.08	20.08	20.04	2	22
		6	0	20.04	20.11	20.01	2	22

BUREAU
VERITAS

Test Report No.: RF190823W003-4

ERP POWER (dBm)**GSM**

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
128	824.2	-7.23	33.56	24.18	261.76	H
189	836.4	-7.51	33.63	23.97	249.40	H
251	848.8	-8.02	33.57	23.40	218.68	H
128	824.2	-10.69	34.24	21.40	137.91	V
189	836.4	-10.21	34.59	22.23	166.96	V
251	848.8	-11.28	34.62	21.19	131.61	V

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

EDGE

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
128	824.2	-8.42	33.56	22.99	199.02	H
189	836.4	-8.05	33.63	23.43	220.24	H
251	848.8	-8.61	33.57	22.81	190.90	H
128	824.2	-11.75	34.24	20.34	108.04	V
189	836.4	-11.23	34.59	21.21	132.01	V
251	848.8	-12.36	34.62	20.11	102.64	V

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

WCDMA

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
4132	826.4	-12.45	33.56	18.96	78.69	H
4182	836.4	-12.79	33.63	18.69	73.94	H
4233	846.6	-12.53	33.57	18.89	77.41	H
4132	826.4	-23.64	34.24	8.45	6.99	V
4182	836.4	-24.11	34.59	8.33	6.80	V
4233	846.6	-24.32	34.62	8.15	6.54	V

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



BUREAU
VERITAS

Test Report No.: RF190823W003-4

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20407	824.7	-7.86	33.67	23.66	232.43	H
20525	836.5	-8.52	33.62	22.95	197.42	H
20643	848.3	-8.63	33.65	22.87	193.42	H
20407	824.7	-15.38	34.25	16.72	46.97	V
20525	836.5	-15.89	34.60	16.56	45.27	V
20643	848.3	-16.24	34.63	16.24	42.07	V

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20407	824.7	-8.69	33.67	22.83	192.00	H
20525	836.5	-9.54	33.62	21.93	156.10	H
20643	848.3	-9.73	33.65	21.77	150.14	H
20407	824.7	-16.21	34.25	15.89	38.80	V
20525	836.5	-16.91	34.60	15.54	35.79	V
20643	848.3	-17.34	34.63	15.14	32.66	V

CHANNEL BANDWIDTH: 1.4MHz 64QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20407	824.7	-8.89	33.67	22.63	183.36	H
20525	836.5	-9.65	33.62	21.82	152.19	H
20643	848.3	-9.91	33.65	21.59	144.05	H
20407	824.7	-16.41	34.25	15.69	37.05	V
20525	836.5	-17.10	34.60	15.35	34.26	V
20643	848.3	-17.54	34.63	14.94	31.19	V



BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20415	825.5	-7.67	33.72	23.90	245.53	H
20525	836.5	-8.46	33.62	23.01	200.17	H
20635	847.5	-8.50	33.65	23.00	199.48	H
20415	825.5	-15.19	34.30	16.96	49.67	V
20525	836.5	-15.83	34.60	16.62	45.90	V
20635	847.5	-16.11	34.57	16.31	42.77	V

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20415	825.5	-8.82	33.72	22.75	188.41	H
20525	836.5	-9.56	33.62	21.91	155.38	H
20635	847.5	-9.66	33.65	21.84	152.72	H
20415	825.5	-16.34	34.30	15.81	38.12	V
20525	836.5	-16.93	34.60	15.52	35.63	V
20635	847.5	-17.27	34.57	15.15	32.74	V

CHANNEL BANDWIDTH: 3MHz 64QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20415	825.5	-8.92	33.72	22.65	184.12	H
20525	836.5	-9.77	33.62	21.70	148.05	H
20635	847.5	-9.77	33.65	21.73	148.90	H
20415	825.5	-16.41	34.30	15.74	37.51	V
20525	836.5	-17.16	34.60	15.29	33.79	V
20635	847.5	-17.46	34.57	14.96	31.34	V



BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20425	826.5	-7.68	33.69	23.86	243.44	H
20525	836.5	-8.53	33.62	22.94	196.97	H
20625	846.5	-8.57	33.66	22.94	196.83	H
20425	826.5	-15.20	34.85	17.50	56.22	V
20525	836.5	-15.90	34.60	16.55	45.16	V
20625	846.5	-16.18	34.59	16.26	42.31	V

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20425	826.5	-8.54	33.69	23.00	199.71	H
20525	836.5	-9.40	33.62	22.07	161.21	H
20625	846.5	-9.42	33.66	22.09	161.85	H
20425	826.5	-16.06	34.85	16.64	46.12	V
20525	836.5	-16.77	34.60	15.68	36.97	V
20625	846.5	-17.03	34.59	15.41	34.79	V

CHANNEL BANDWIDTH: 5MHz 64QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20425	826.5	-8.62	33.69	22.92	196.06	H
20525	836.5	-9.60	33.62	21.87	153.96	H
20625	846.5	-9.58	33.66	21.93	155.99	H
20425	826.5	-16.23	34.85	16.47	44.35	V
20525	836.5	-16.90	34.60	15.55	35.88	V
20625	846.5	-17.11	34.59	15.33	34.15	V



BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20450	829.0	-8.26	33.73	23.32	214.54	H
20525	836.5	-8.98	33.62	22.49	177.58	H
20600	844.0	-9.15	33.51	22.21	166.46	H
20450	829.0	-15.78	34.54	16.61	45.77	V
20525	836.5	-16.35	34.60	16.10	40.72	V
20600	844.0	-16.76	34.46	15.55	35.85	V

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20450	829.0	-9.19	33.73	22.39	173.18	H
20525	836.5	-10.05	33.62	21.42	138.80	H
20600	844.0	-9.98	33.51	21.38	137.50	H
20450	829.0	-16.71	34.54	15.68	36.95	V
20525	836.5	-17.42	34.60	15.03	31.83	V
20600	844.0	-17.59	34.46	14.72	29.61	V

CHANNEL BANDWIDTH: 10MHz 64QAM

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
20450	829.0	-9.48	33.73	22.10	161.99	H
20525	836.5	-10.25	33.62	21.22	132.56	H
20600	844.0	-10.28	33.51	21.08	128.32	H
20450	829.0	-16.99	34.54	15.40	34.64	V
20525	836.5	-17.62	34.60	14.83	30.39	V
20600	844.0	-17.89	34.46	14.42	27.64	V



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Test Report No.: RF190823W003-4

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

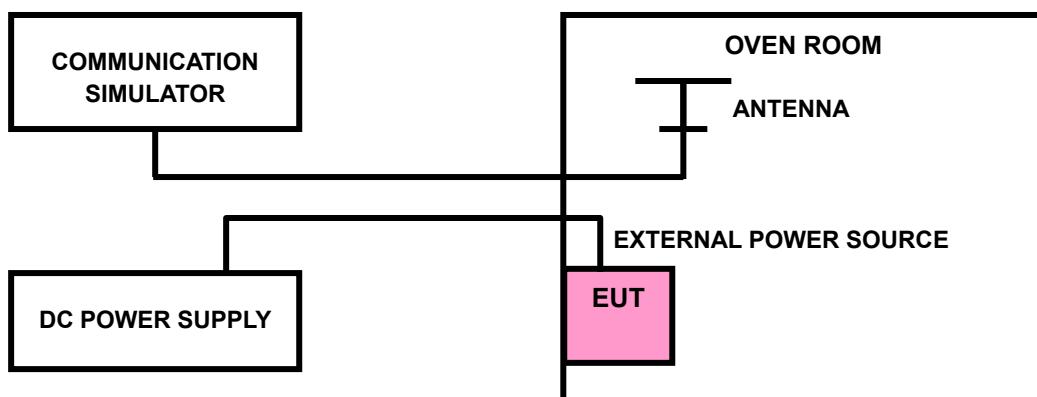
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

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 $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

3.2.3 TEST SETUP



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Test Report No.: RF190823W003-4

3.2.4 TEST RESULTS

GSM 850

FREQUENCY ERROR VS. VOLTAGE

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

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

FREQUENCY ERROR vs. TEMPERATURE.

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



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Test Report No.: RF190823W003-4

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

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VERITAS

Test Report No.: RF190823W003-4

WCDMA Band V

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	-0.0020	2.5
V _{max}	0.0025	0.0024	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. (°C)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0116	-0.0111	2.5
-20	-0.0102	-0.0097	2.5
-10	-0.0085	-0.0083	2.5
0	-0.0074	-0.0074	2.5
10	-0.0049	-0.0044	2.5
20	-0.0043	-0.0043	2.5
30	-0.0034	-0.0030	2.5
40	-0.0017	-0.0022	2.5
50	-0.0003	-0.0003	2.5

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Test Report No.: RF190823W003-4

LTE Band 5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
V _{nor}	0.0020	0.0024	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. (°C)	1.4MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
-30	-0.0121	-0.0119	2.5	
-20	-0.0107	-0.0099	2.5	
-10	-0.0082	-0.0084	2.5	
0	-0.0078	-0.0076	2.5	
10	-0.0047	-0.0050	2.5	
20	-0.0040	-0.0037	2.5	
30	-0.0034	-0.0033	2.5	
40	-0.0018	-0.0017	2.5	
50	-0.0003	-0.0003	2.5	



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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}	0.0019	0.0018	2.5	

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

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	3MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
-30	-0.0120	-0.0116	2.5	
-20	-0.0103	-0.0105	2.5	
-10	-0.0082	-0.0084	2.5	
0	-0.0074	-0.0076	2.5	
10	-0.0045	-0.0046	2.5	
20	-0.0043	-0.0037	2.5	
30	-0.0039	-0.0025	2.5	
40	-0.0019	-0.0015	2.5	
50	-0.0004	-0.0004	2.5	



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Test Report No.: RF190823W003-4

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
V _{nor}	0.0021	0.0026	2.5	
V _{min}	-0.0024	-0.0030	2.5	
V _{max}	0.0022	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. (°C)	5MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
-30	-0.0119	-0.0117	2.5	
-20	-0.0108	-0.0104	2.5	
-10	-0.0083	-0.0084	2.5	
0	-0.0075	-0.0076	2.5	
10	-0.0051	-0.0053	2.5	
20	-0.0041	-0.0040	2.5	
30	-0.0033	-0.0032	2.5	
40	-0.0019	-0.0017	2.5	
50	-0.0006	-0.0004	2.5	



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Test Report No.: RF190823W003-4

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
V _{nor}	0.0027	0.0026	2.5	
V _{min}	-0.0031	-0.0030	2.5	
V _{max}	0.0025	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. (°C)	10MHz		LIMIT (ppm)	
	FREQUENCY ERROR (ppm)			
	Low Channel	High Channel		
-30	-0.0121	-0.0113	2.5	
-20	-0.0105	-0.0107	2.5	
-10	-0.0082	-0.0080	2.5	
0	-0.0074	-0.0073	2.5	
10	-0.0052	-0.0050	2.5	
20	-0.0044	-0.0041	2.5	
30	-0.0040	-0.0035	2.5	
40	-0.0018	-0.0020	2.5	
50	-0.0006	-0.0003	2.5	



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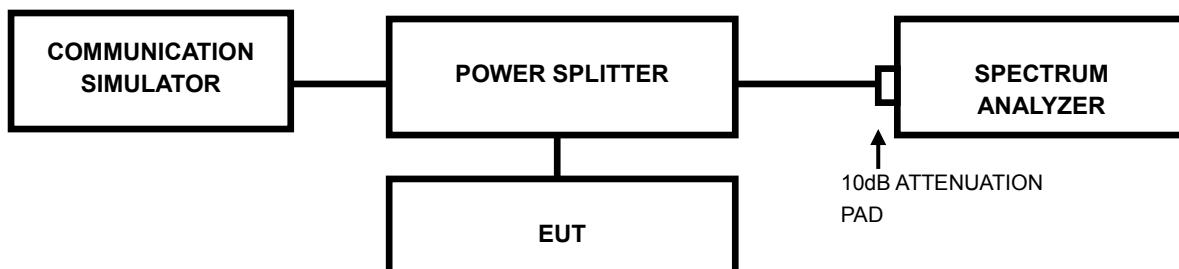
Test Report No.: RF190823W003-4

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

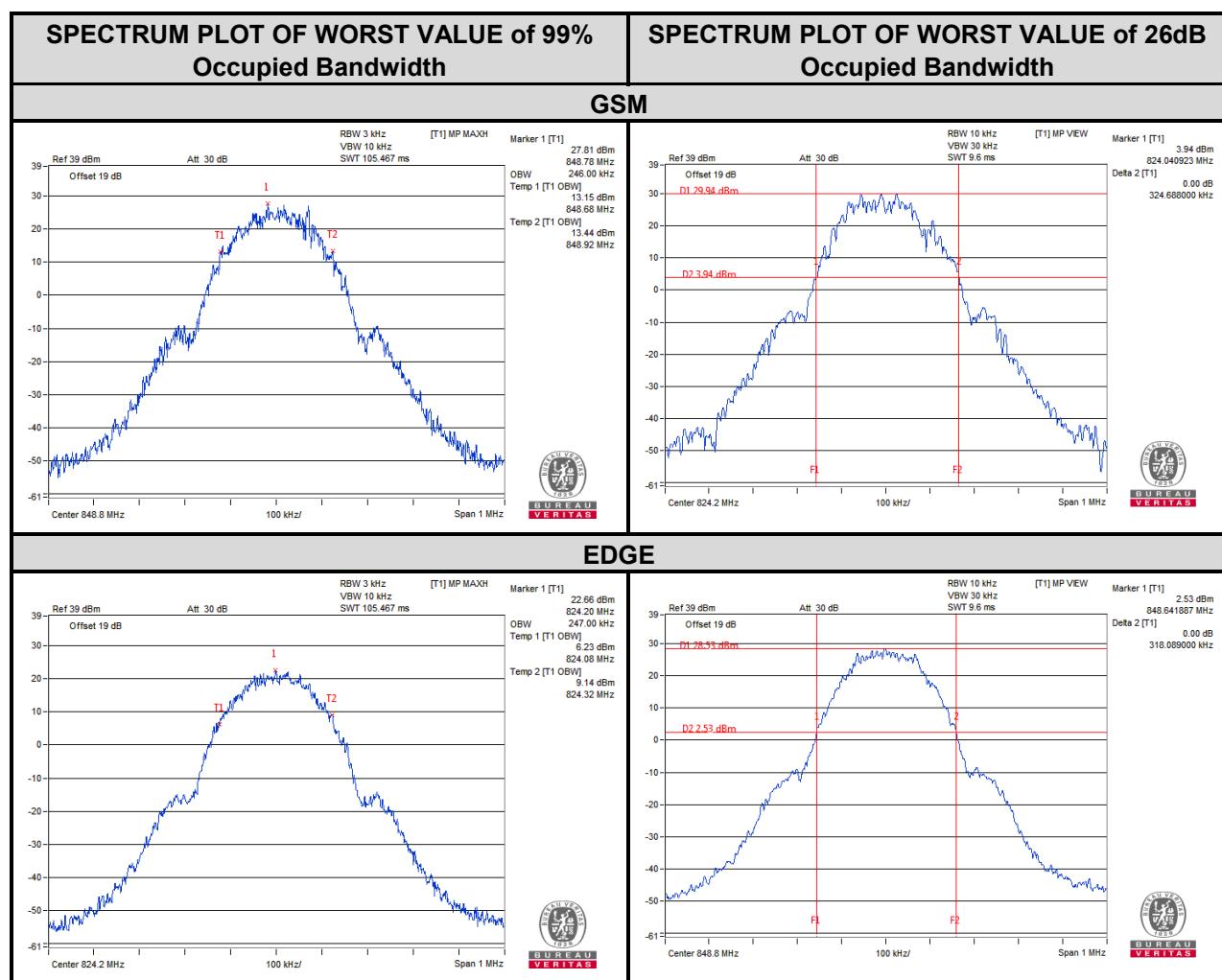


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Test Report No.: RF190823W003-4

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	245.000	247.000	128	824.2	324.688	315.428
189	836.4	243.000	245.000	189	836.4	319.576	315.047
251	848.8	246.000	246.000	251	848.8	309.708	318.089

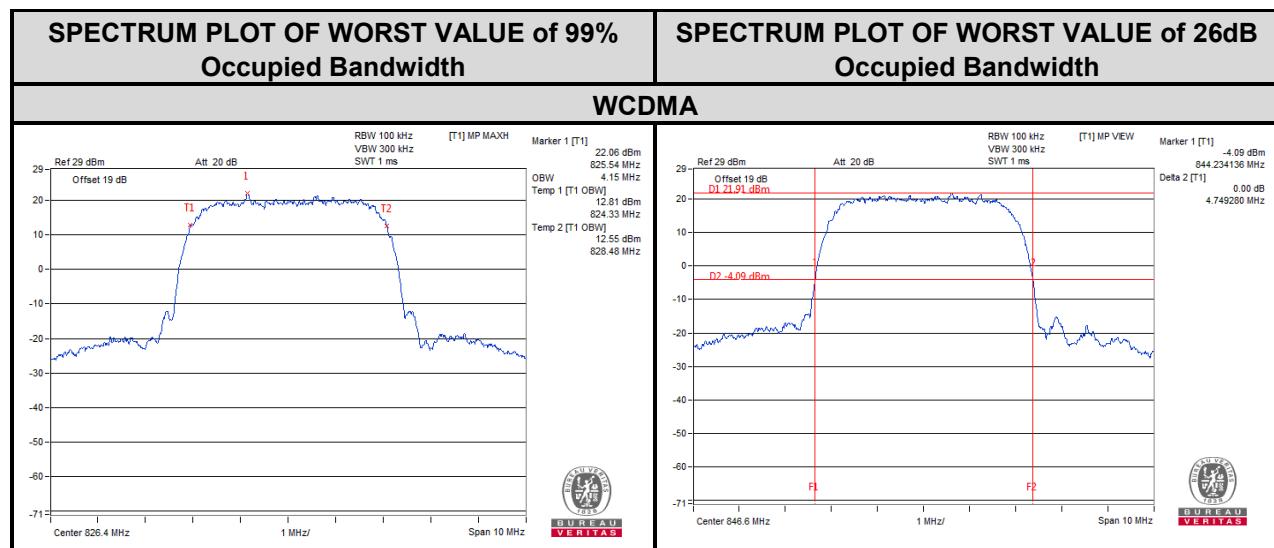




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Test Report No.: RF190823W003-4

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (kHz)	CHANNEL	Frequency (MHz)	26dB Bandwidth (MHz)
		WCDMA			WCDMA
4132	826.4	4.150	4132	826.4	4.718
4182	836.4	4.150	4182	836.4	4.733
4233	846.6	4.150	4233	846.6	4.749





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Test Report No.: RF190823W003-4

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20407	824.7	1.08	1.08	1.08
20525	836.5	1.08	1.08	1.08
20643	848.3	1.08	1.08	1.08

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





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Test Report No.: RF190823W003-4

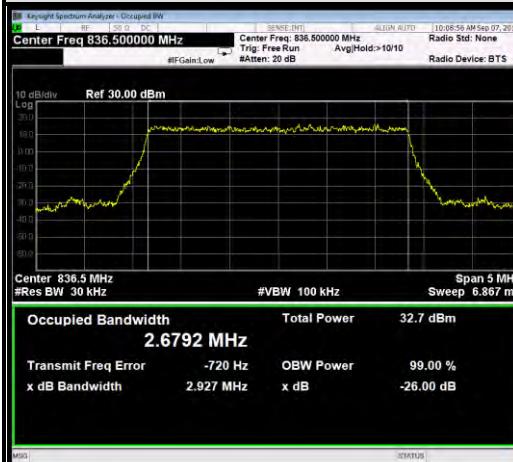
CHANNEL BANDWIDTH: 3MHz

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20415	825.5	2.67	2.68	2.68
20525	836.5	2.68	2.69	2.68
20635	847.5	2.67	2.68	2.68

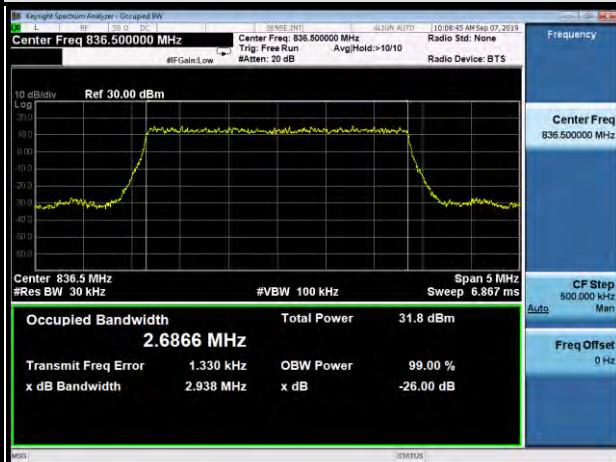
CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20415	825.5	2.92	2.93	2.91
20525	836.5	2.93	2.94	2.91
20635	847.5	2.91	2.93	2.90

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

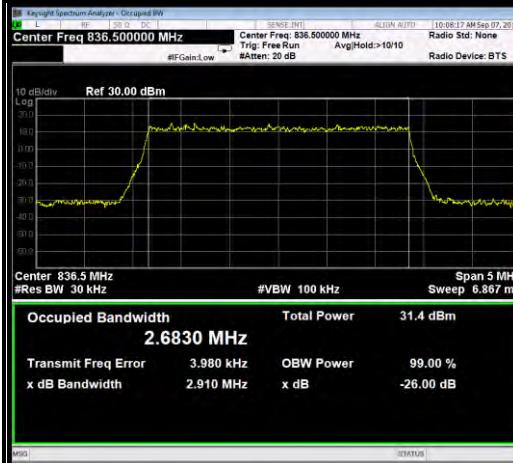
3MHz / QPSK



3MHz / 16QAM



3MHz / 64QAM





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Test Report No.: RF190823W003-4

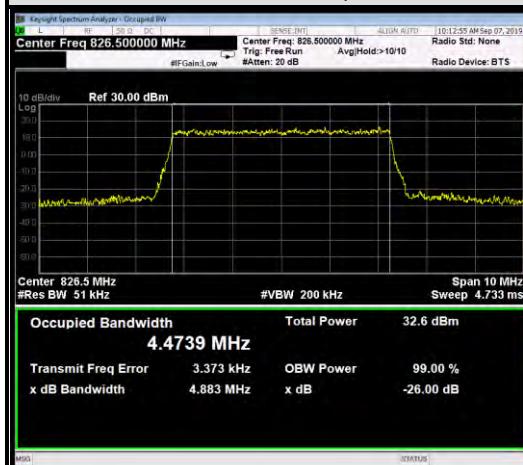
CHANNEL BANDWIDTH: 5MHz

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

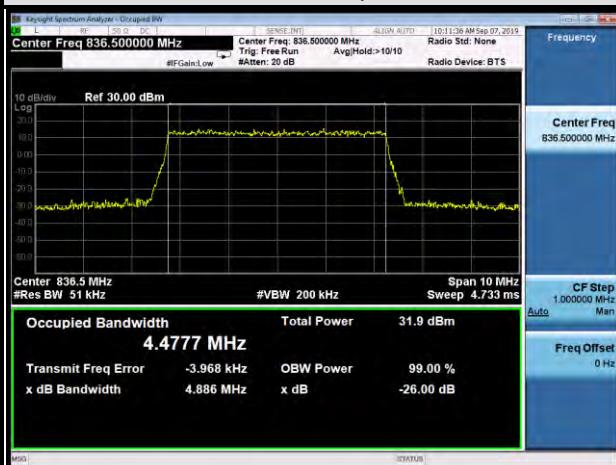
CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20425	826.5	4.88	4.94	4.88
20525	836.5	4.91	4.89	4.89
20625	846.5	4.87	4.85	4.82

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

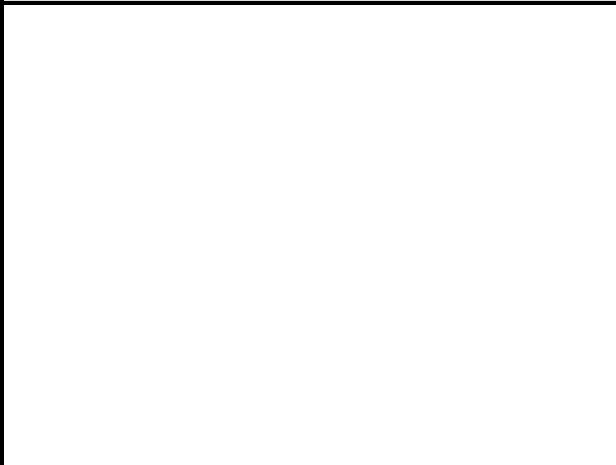
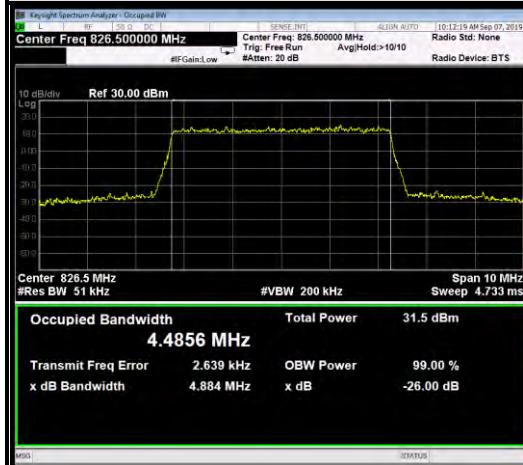
5MHz / QPSK



5MHz / 16QAM



5MHz / 64QAM





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Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 10MHz

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)		
		QPSK	16QAM	64QAM
20450	829	8.92	8.90	8.94
20525	836.5	8.92	8.93	8.94
20600	844	8.93	8.91	8.93

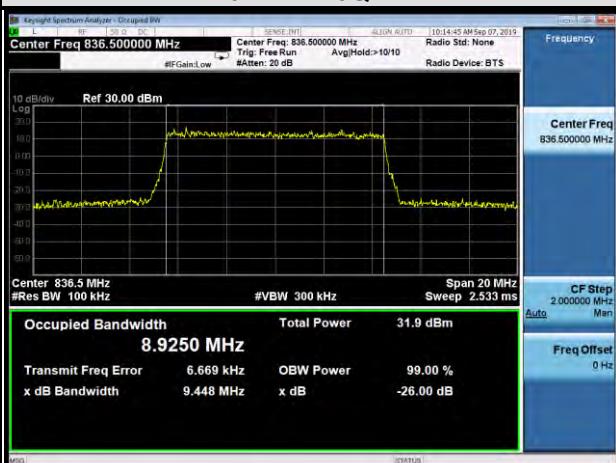
CHANNEL	Frequency (MHz)	26 dB bandwidth (MHz)		
		QPSK	16QAM	64QAM
20450	829	9.56	9.52	9.58
20525	836.5	9.58	9.45	9.60
20600	844	9.55	9.54	9.57

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

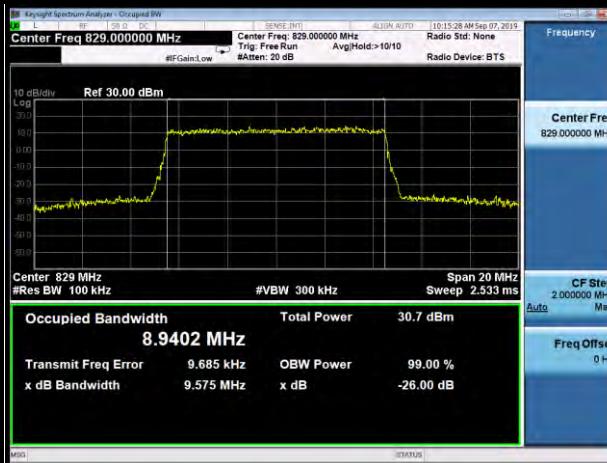
10MHz / QPSK



10MHz / 16QAM



10MHz / 64QAM





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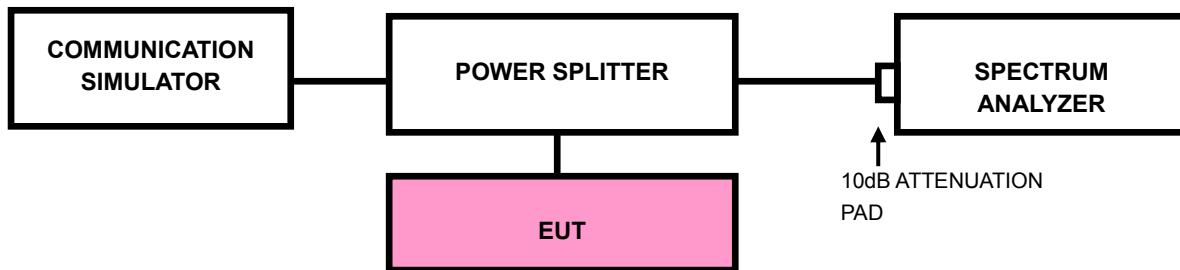
Test Report No.: RF190823W003-4

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





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Test Report No.: RF190823W003-4

3.4.3 TEST PROCEDURES

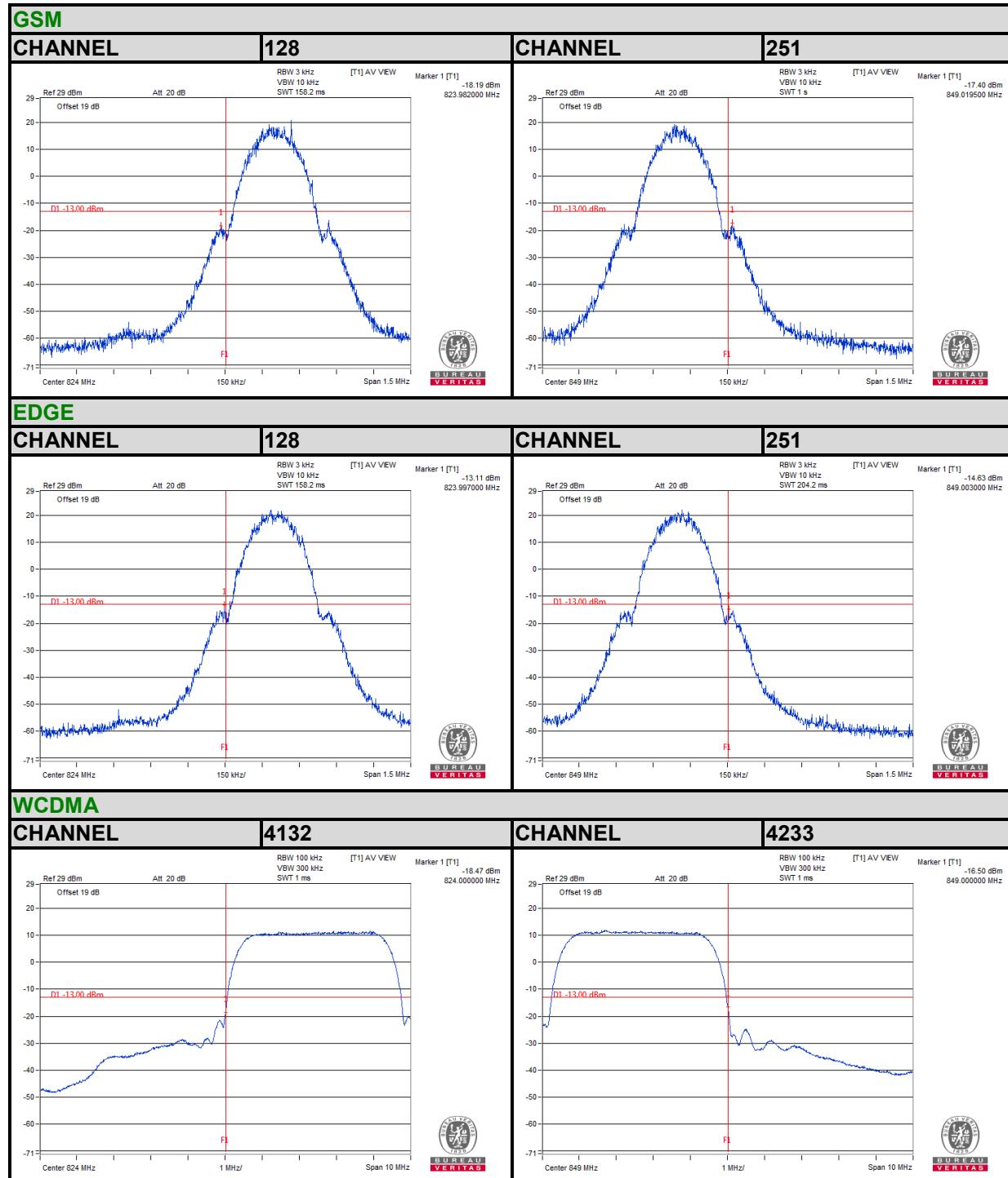
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 10MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (WCDMA).
- c. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- e. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 50kHz and VBW of the spectrum is 200kHz. (LTE bandwidth 5MHz)
- f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)
- g. Record the max trace plot into the test report.



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Test Report No.: RF190823W003-4

3.4.4 TEST RESULTS





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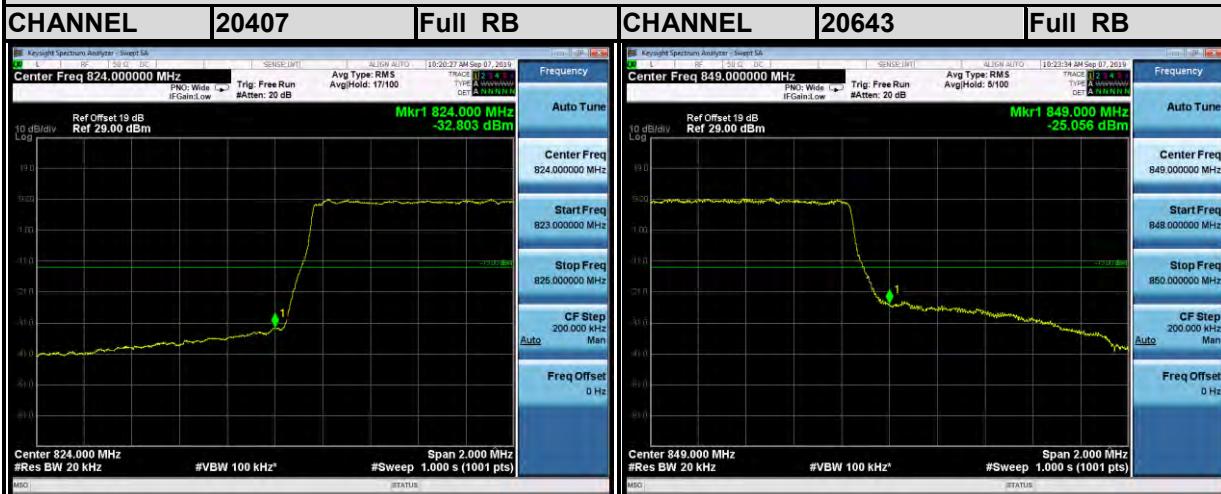
LTE Band5

Channel Bandwidth: 1.4MHz QPSK



LTE Band5

Channel Bandwidth: 1.4MHz QPSK





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Test Report No.: RF190823W003-4

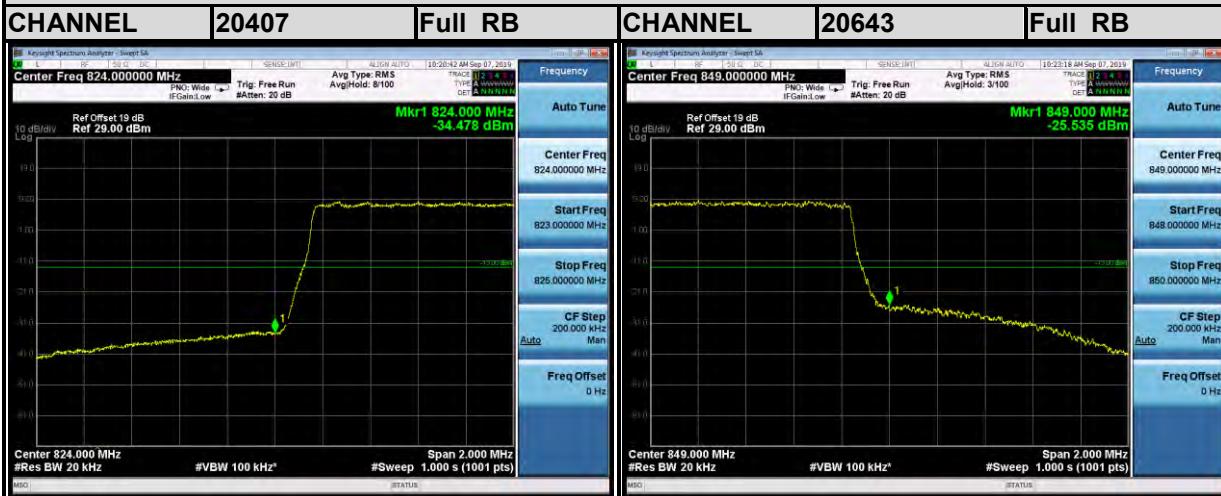
LTE Band5

Channel Bandwidth: 1.4MHz 16QAM



LTE Band5

Channel Bandwidth: 1.4MHz 16QAM





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Test Report No.: RF190823W003-4

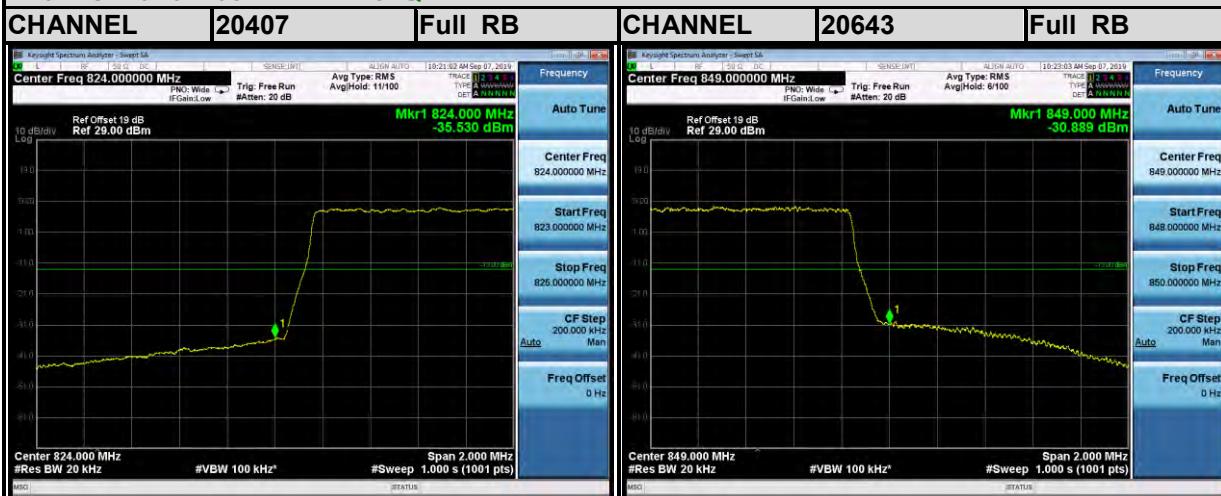
LTE Band5

Channel Bandwidth: 1.4MHz 64QAM



LTE Band5

Channel Bandwidth: 1.4MHz 64QAM





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Test Report No.: RF190823W003-4

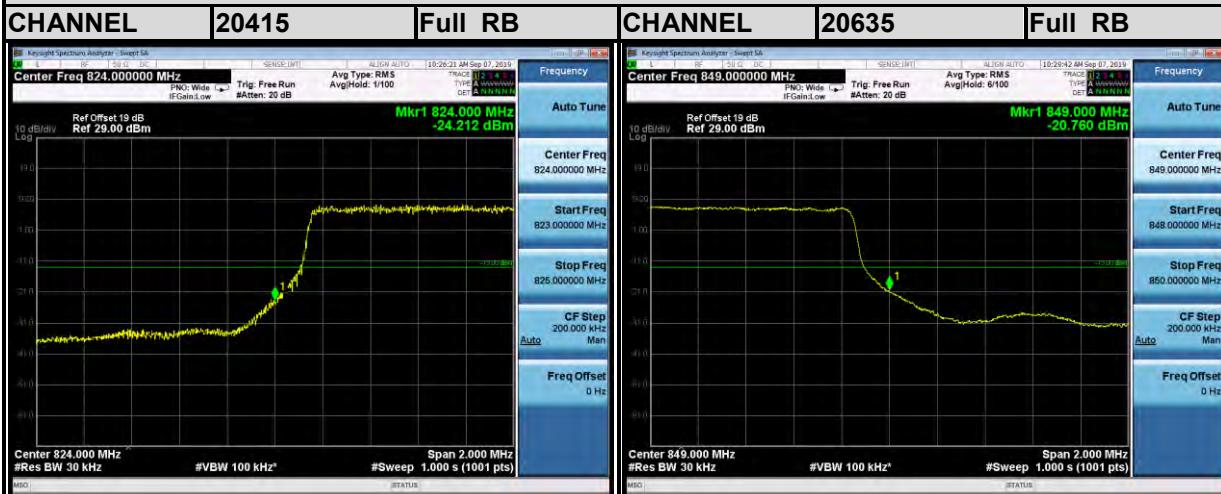
LTE Band5

Channel Bandwidth: 3MHz QPSK



LTE Band5

Channel Bandwidth: 3MHz QPSK



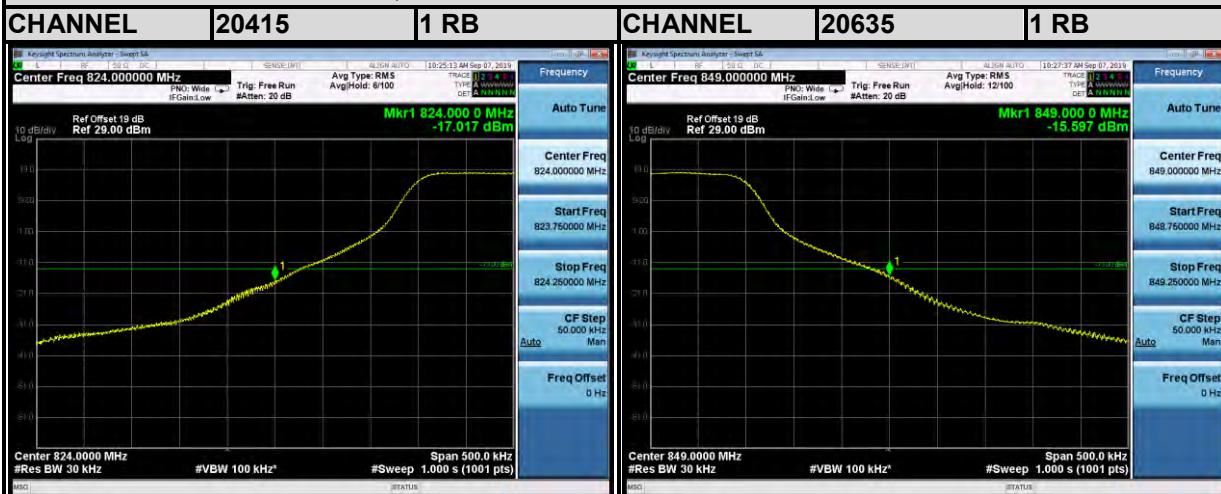


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Test Report No.: RF190823W003-4

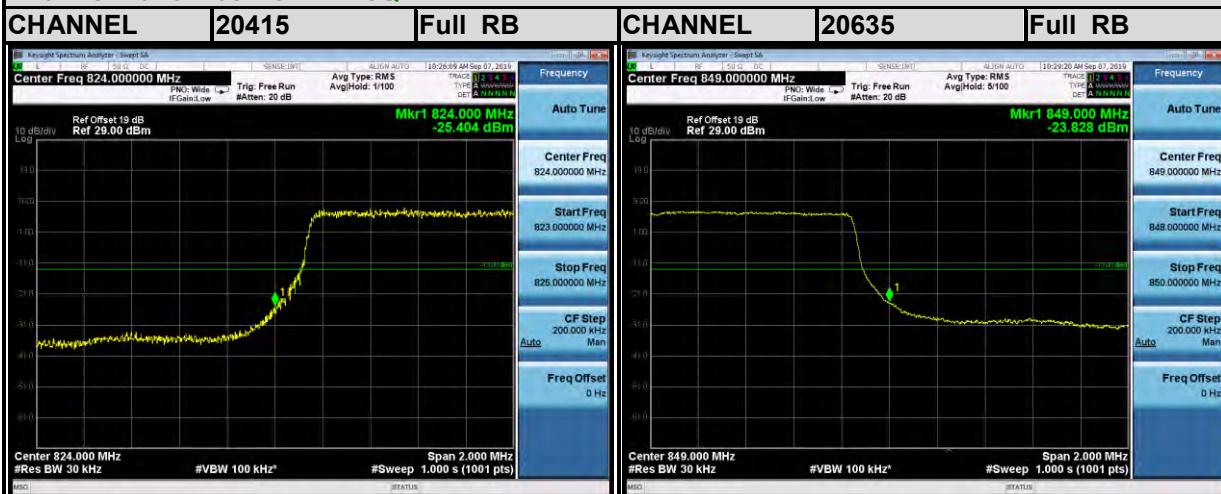
LTE Band5

Channel Bandwidth: 3MHz 16QAM



LTE Band5

Channel Bandwidth: 3MHz 16QAM



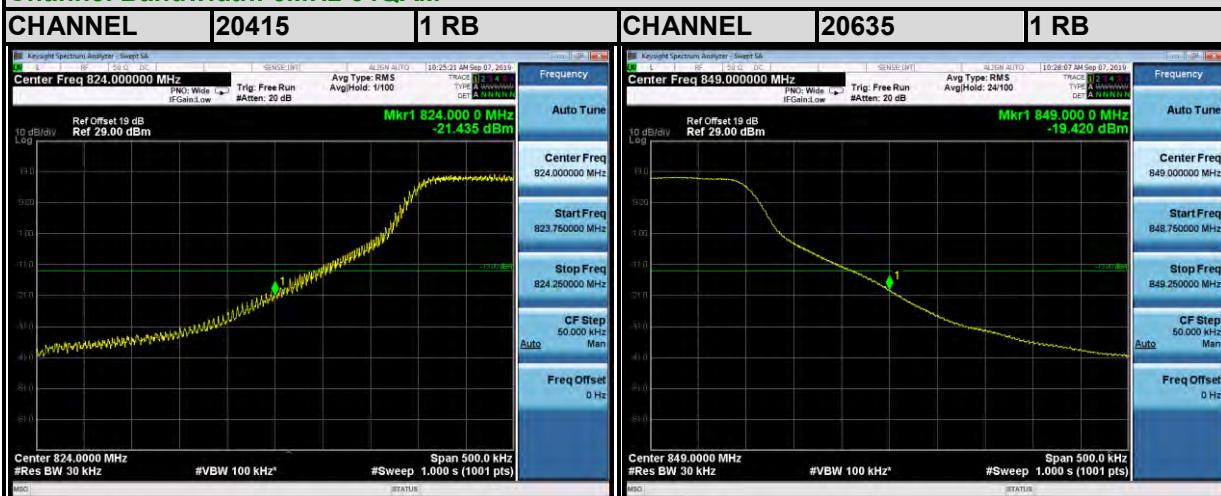


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Test Report No.: RF190823W003-4

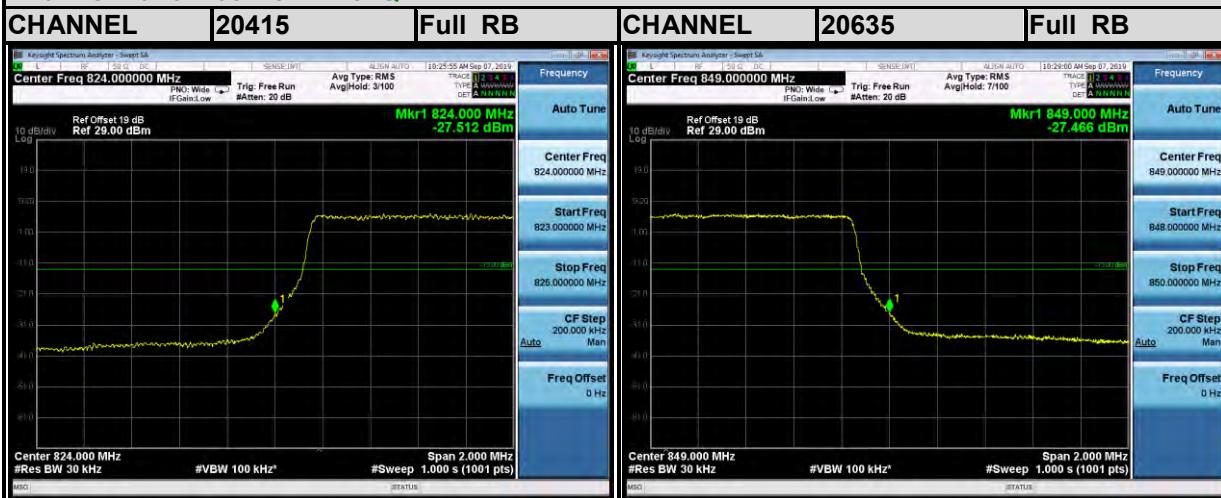
LTE Band5

Channel Bandwidth: 3MHz 64QAM



LTE Band5

Channel Bandwidth: 3MHz 64QAM



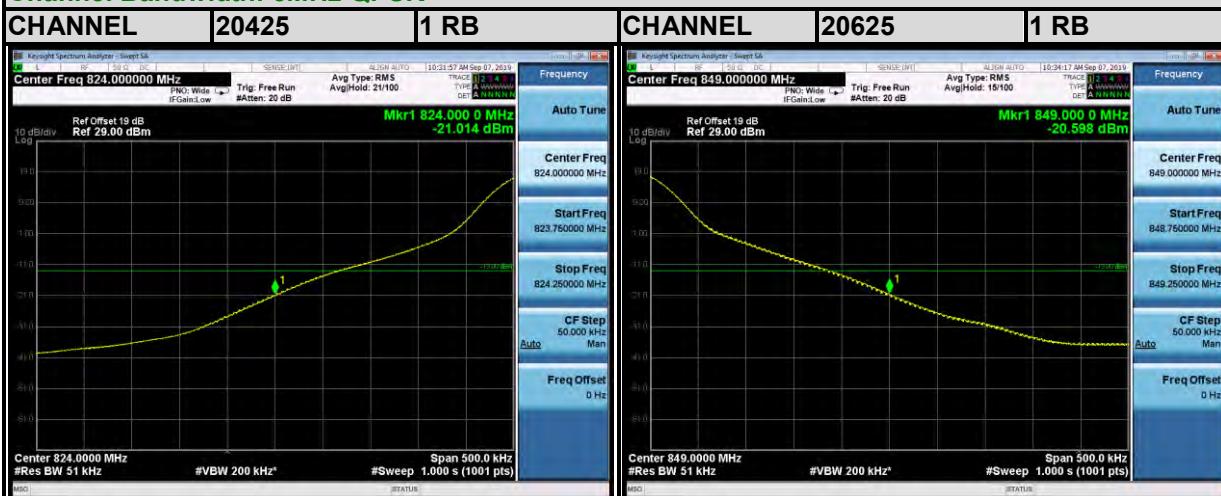


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Test Report No.: RF190823W003-4

LTE Band5

Channel Bandwidth: 5MHz QPSK



LTE Band5

Channel Bandwidth: 5MHz QPSK



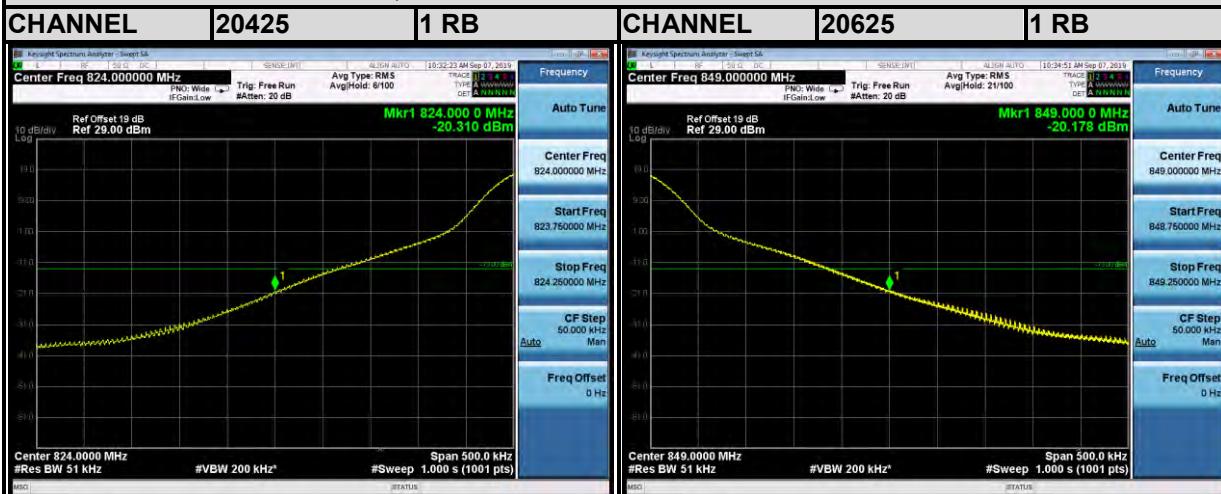


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Test Report No.: RF190823W003-4

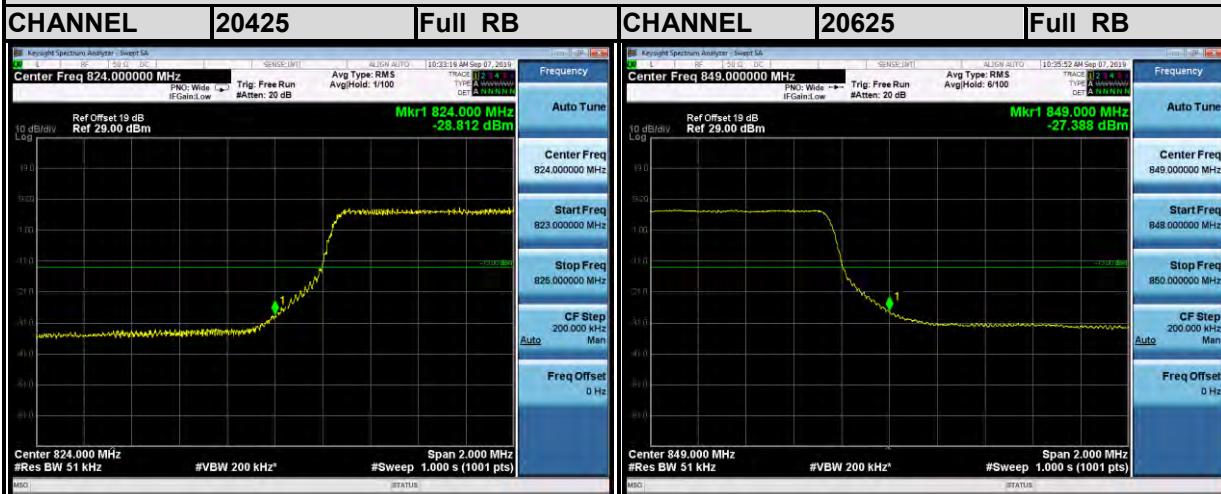
LTE Band5

Channel Bandwidth: 5MHz 16QAM



LTE Band5

Channel Bandwidth: 5MHz 16QAM





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Test Report No.: RF190823W003-4

LTE Band5

Channel Bandwidth: 5MHz 64QAM



LTE Band5

Channel Bandwidth: 5MHz 64QAM



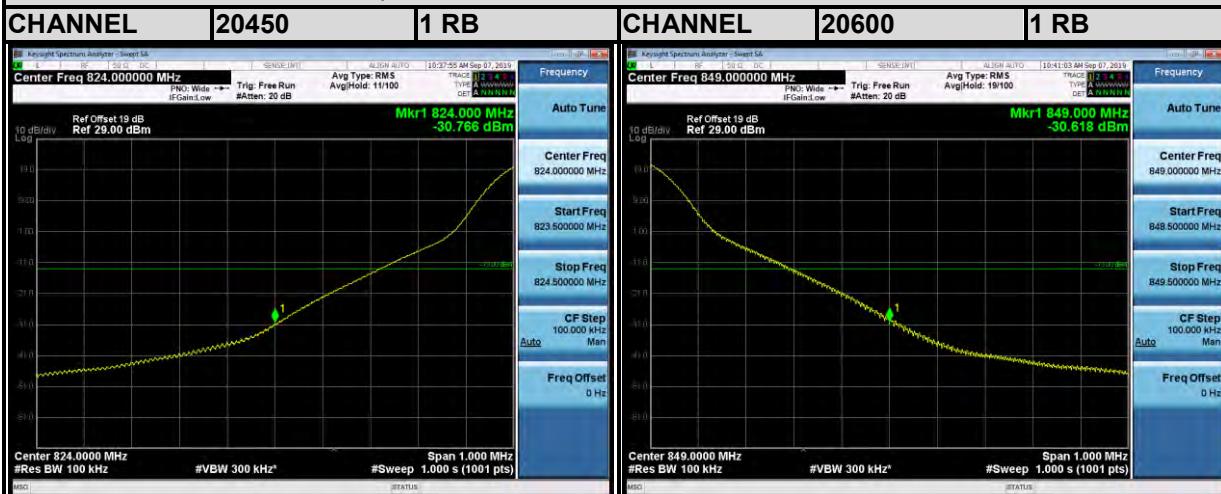


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Test Report No.: RF190823W003-4

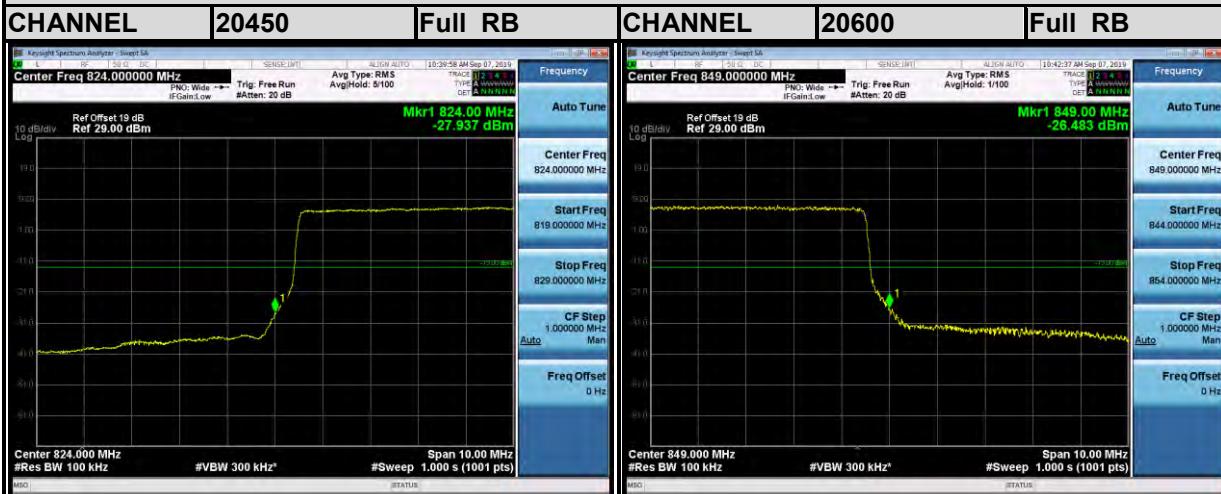
LTE Band5

Channel Bandwidth: 10MHz QPSK



LTE Band5

Channel Bandwidth: 10MHz QPSK



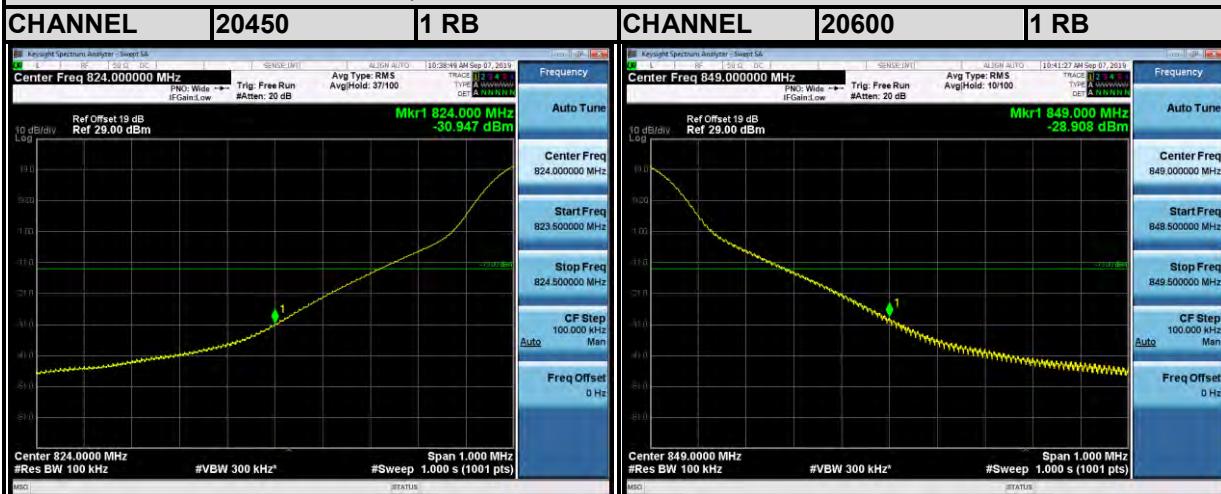


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Test Report No.: RF190823W003-4

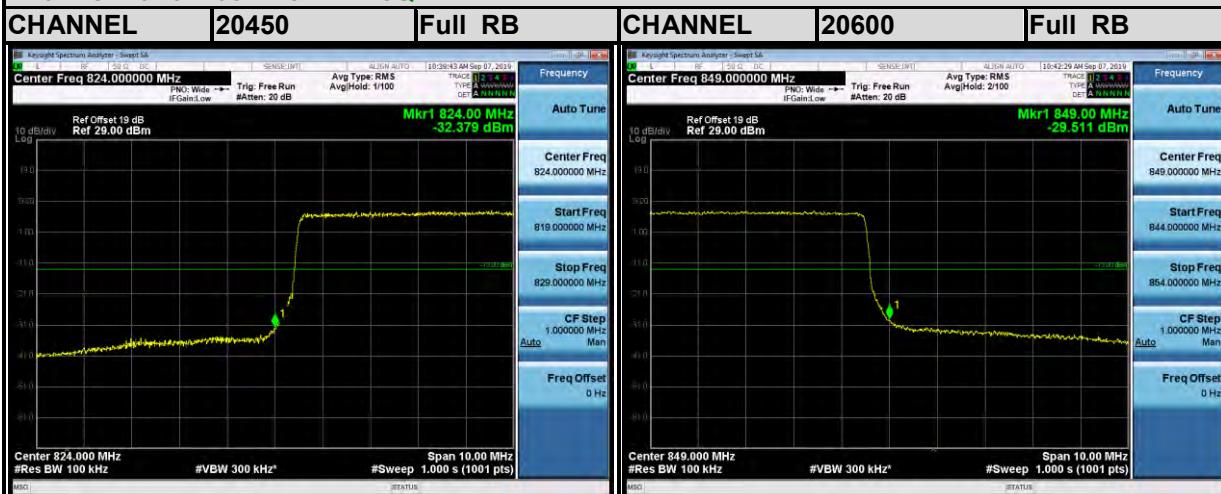
LTE Band5

Channel Bandwidth: 10MHz 16QAM



LTE Band5

Channel Bandwidth: 10MHz 16QAM



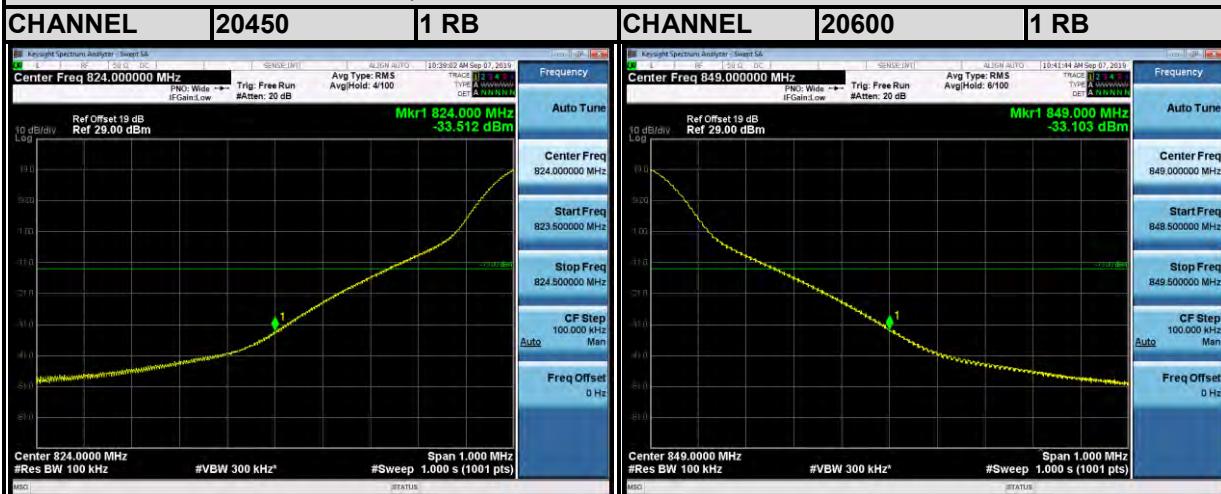


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Test Report No.: RF190823W003-4

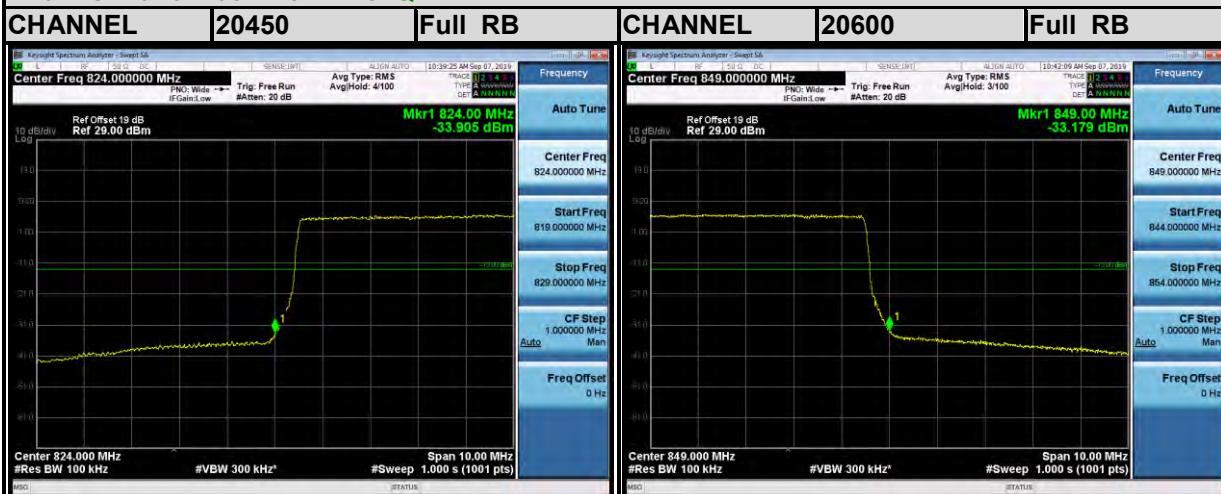
LTE Band5

Channel Bandwidth: 10MHz 64QAM



LTE Band5

Channel Bandwidth: 10MHz 64QAM





3.5 CONDUCTED SPURIOUS EMISSIONS

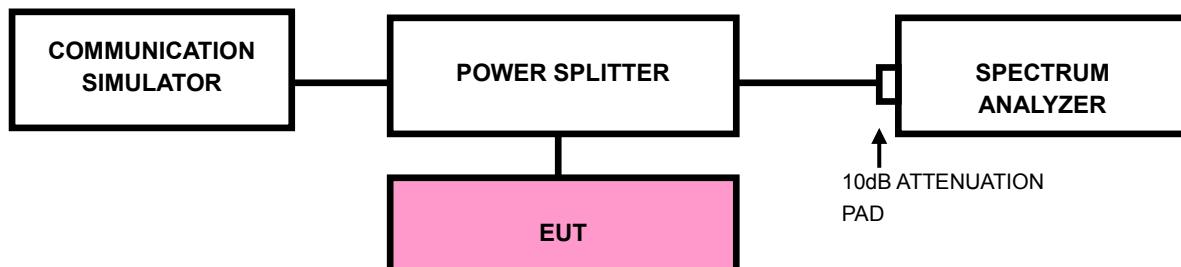
3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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

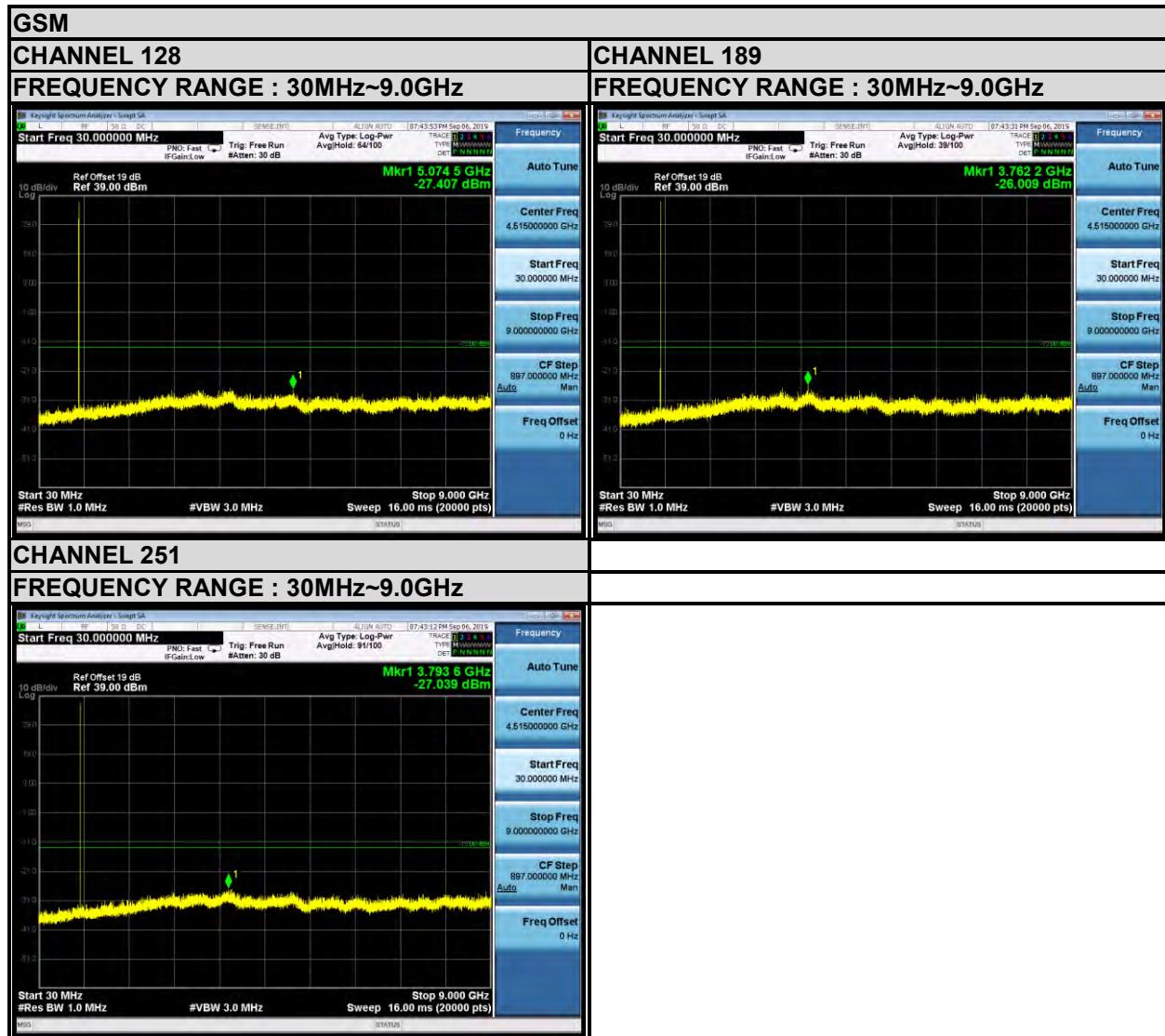




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Test Report No.: RF190823W003-4

3.5.4 TEST RESULTS





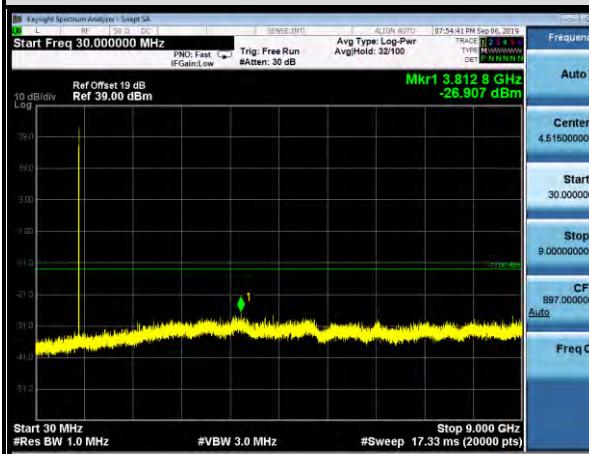
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Test Report No.: RF190823W003-4

EDGE

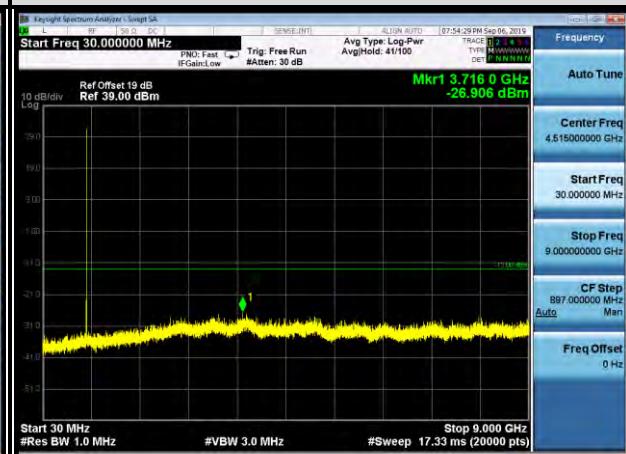
CHANNEL 128

FREQUENCY RANGE : 30MHz~9.0GHz



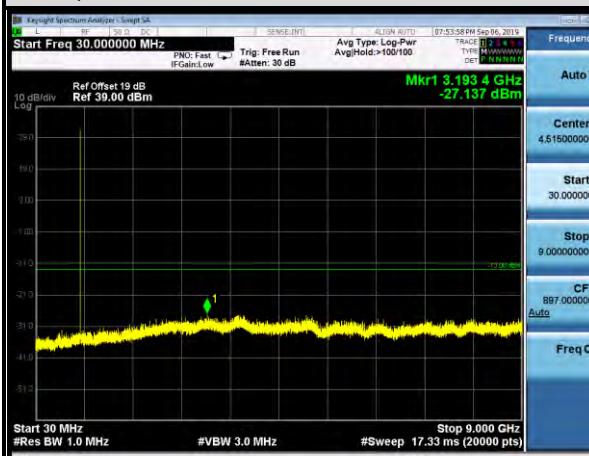
CHANNEL 189

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 251

FREQUENCY RANGE : 30MHz~9.0GHz





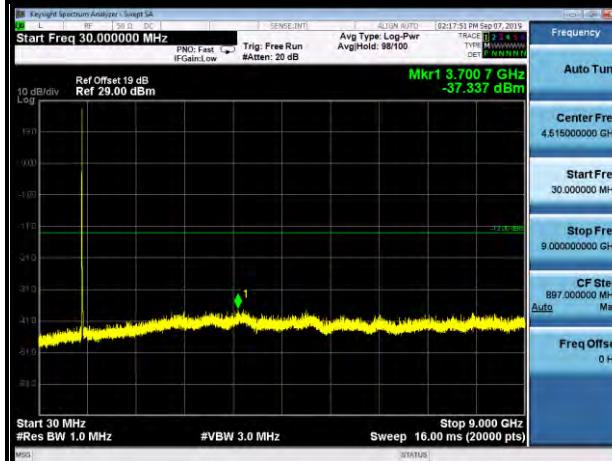
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Test Report No.: RF190823W003-4

WCDMA

CHANNEL 4132

FREQUENCY RANGE : 30MHz~9.0GHz



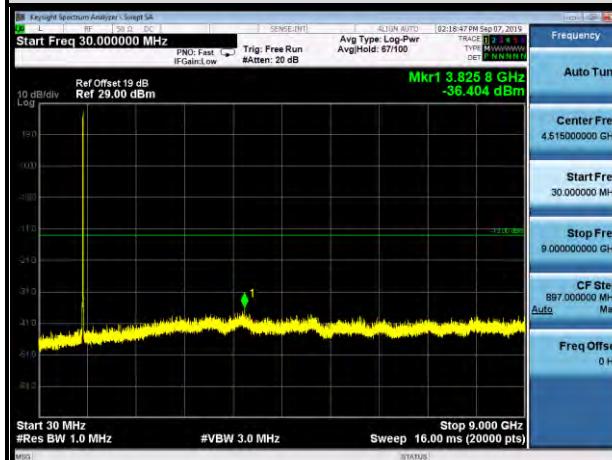
CHANNEL 4182

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 4233

FREQUENCY RANGE : 30MHz~9.0GHz





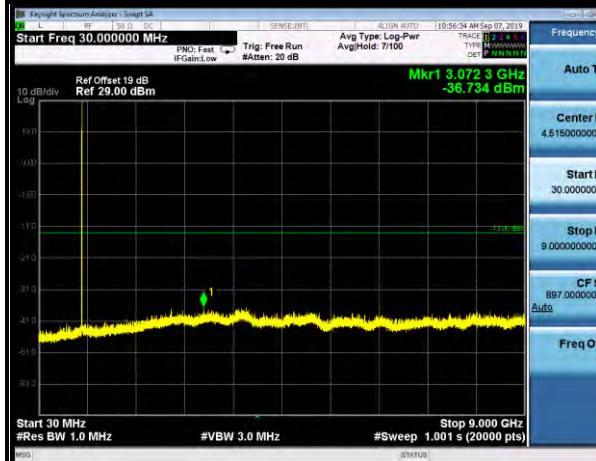
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Test Report No.: RF190823W003-4

LTE Band 5 (Channel Bandwidth: 1.4MHz)

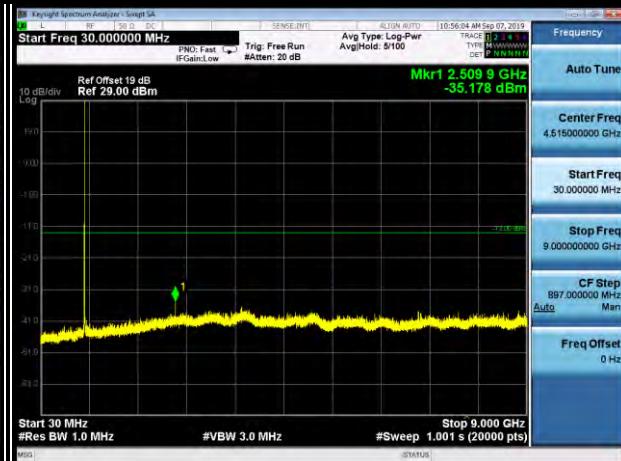
CHANNEL 20407

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



LTE Band 5 (Channel Bandwidth: 1.4MHz)

CHANNEL 20643

FREQUENCY RANGE : 30MHz~9.0GHz





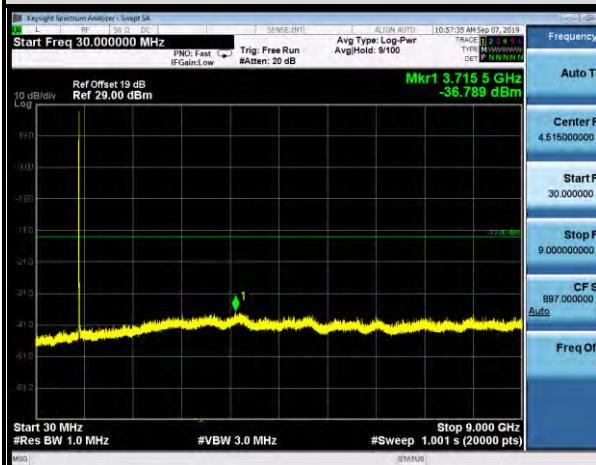
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Test Report No.: RF190823W003-4

LTE Band 5 (Channel Bandwidth: 3MHz)

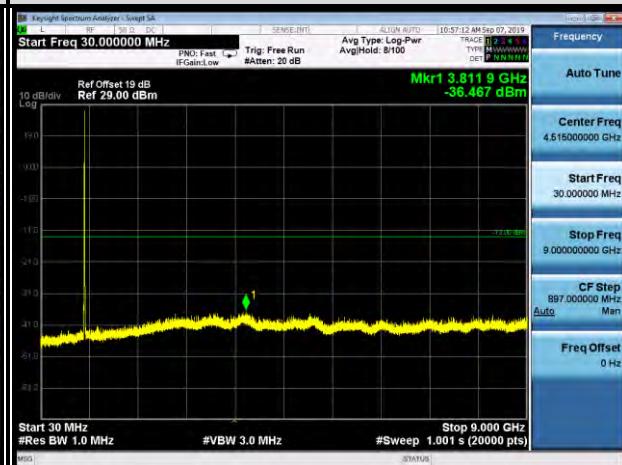
CHANNEL 20415

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20635

FREQUENCY RANGE : 30MHz~9.0GHz





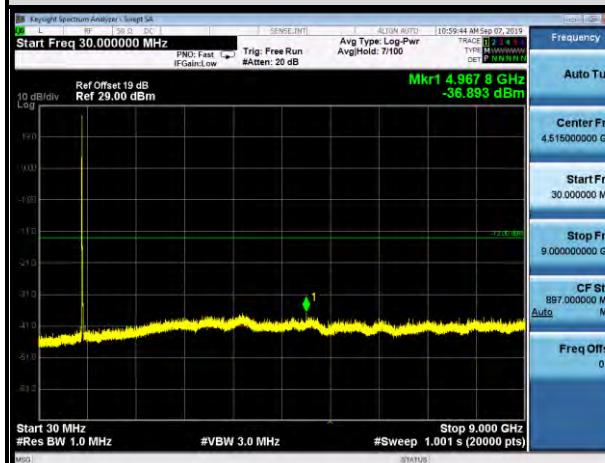
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Test Report No.: RF190823W003-4

LTE Band 5 (Channel Bandwidth: 5MHz)

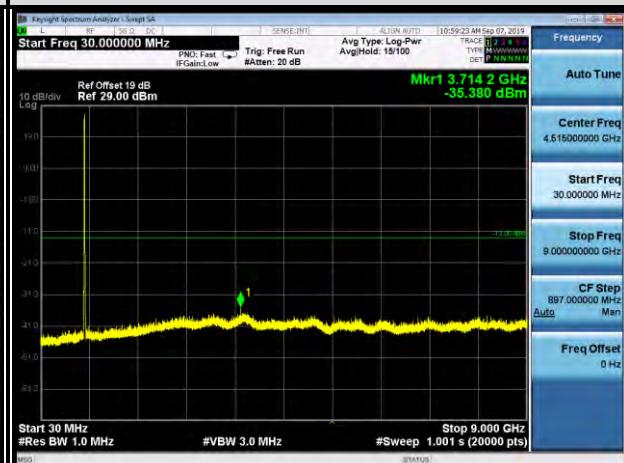
CHANNEL 20425

FREQUENCY RANGE : 30MHz~9.0GHz



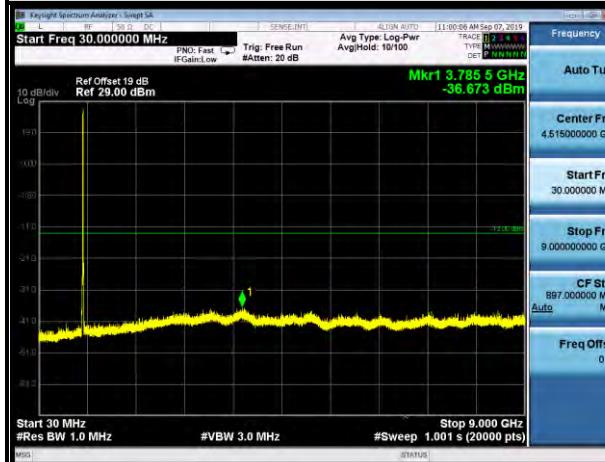
CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20625

FREQUENCY RANGE : 30MHz~9.0GHz





BUREAU
VERITAS

Test Report No.: RF190823W003-4

LTE Band 5 (Channel Bandwidth: 10MHz)

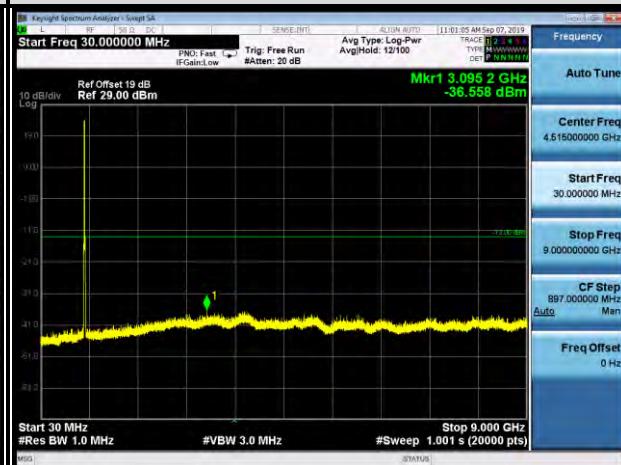
CHANNEL 20450

FREQUENCY RANGE : 30MHz~9.0GHz



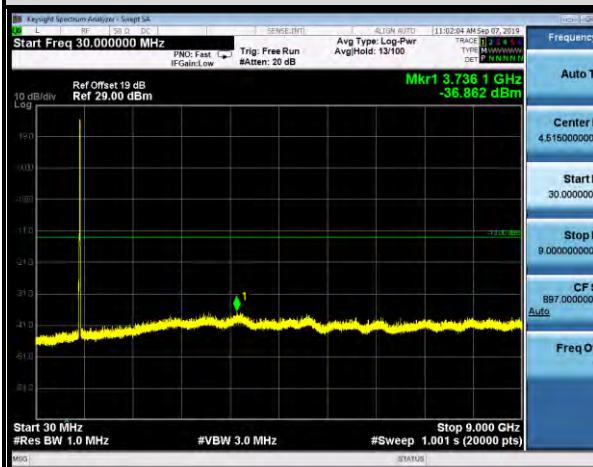
CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20600

FREQUENCY RANGE : 30MHz~9.0GHz





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Test Report No.: RF190823W003-4

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

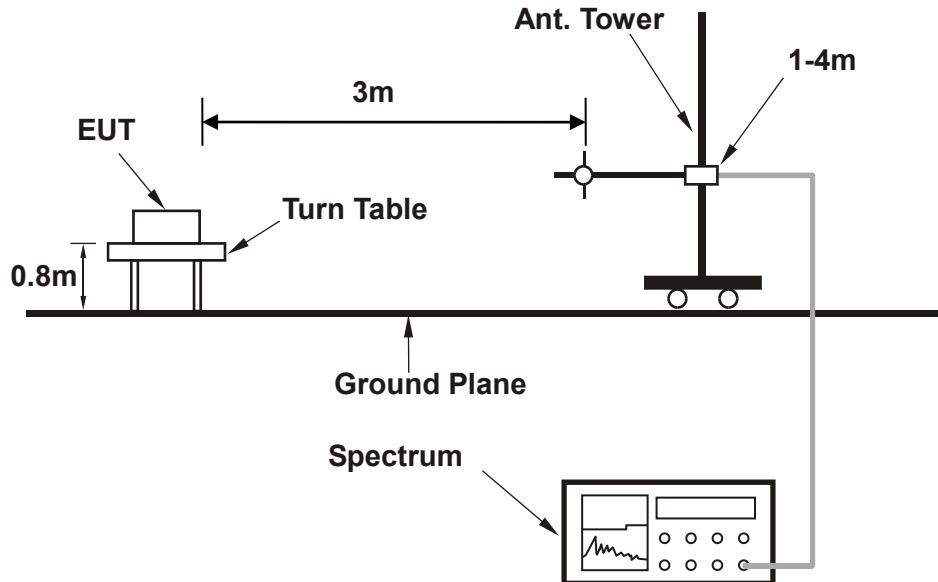


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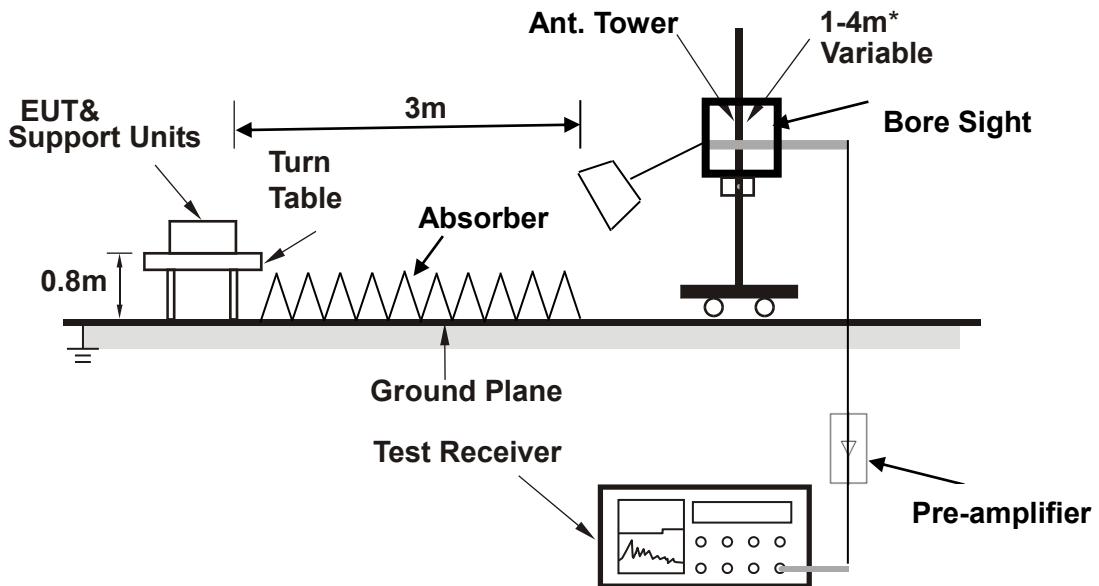
Test Report No.: RF190823W003-4

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).



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Test Report No.: RF190823W003-4

3.6.5 TEST RESULTS

WWAN-ANT-0 :

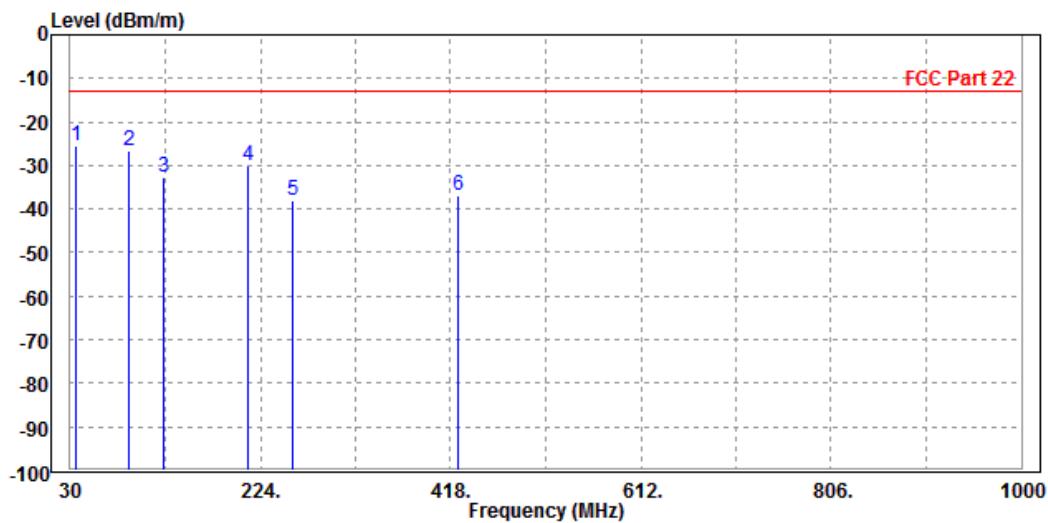
BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

GSM 850

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

Freq MHz	Read Level dBm/m	Limit Level dBm	Over Line Limit dBm/m	Over Factor	Over dB	Over dB/m	Pol/Phase	
							PP	Peak
1	36.540	-25.54	-39.59	-13.00	-12.54	14.05		Horizontal
2	89.630	-26.77	-35.26	-13.00	-13.77	8.49	Peak	Horizontal
3	125.420	-32.57	-41.23	-13.00	-19.57	8.66	Peak	Horizontal
4	211.450	-29.91	-41.21	-13.00	-16.91	11.30	Peak	Horizontal
5	256.340	-38.14	-51.28	-13.00	-25.14	13.14	Peak	Horizontal
6	425.610	-36.83	-54.36	-13.00	-23.83	17.53	Peak	Horizontal



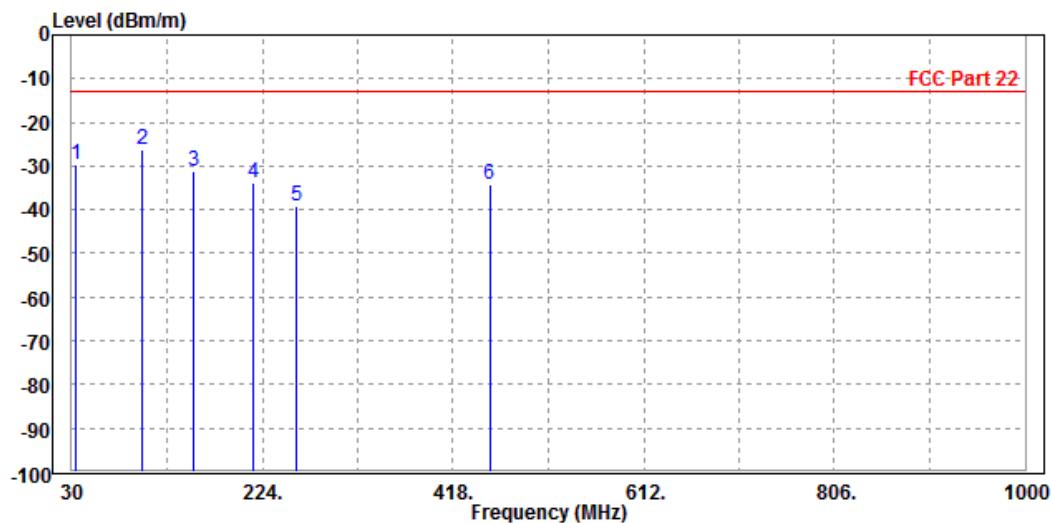


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VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Level	Line	Limit Factor		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	34.850	-29.57	-43.67	-13.00	-16.57	14.10 Peak Vertical
2 PP	102.340	-26.22	-35.89	-13.00	-13.22	9.67 Peak Vertical
3	154.670	-31.20	-41.23	-13.00	-18.20	10.03 Peak Vertical
4	214.350	-33.72	-45.21	-13.00	-20.72	11.49 Peak Vertical
5	258.640	-38.99	-52.36	-13.00	-25.99	13.37 Peak Vertical
6	455.160	-34.24	-52.31	-13.00	-21.24	18.07 Peak Vertical





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Test Report No.: RF190823W003-4

ABOVE 1GHz DATA

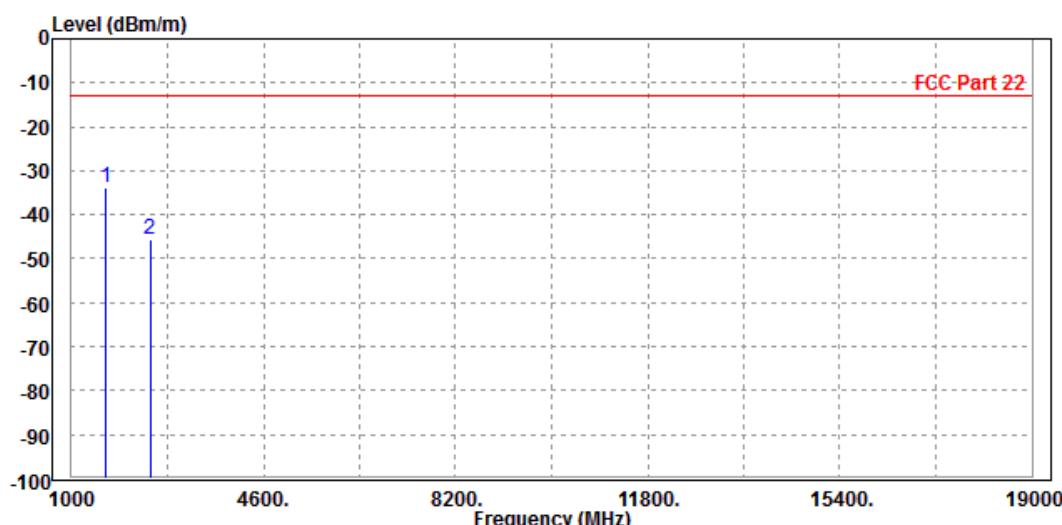
Note: For higher frequency, the emission is too low to be detected.

GSM 850

CH 128:

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1648.000	-33.87	-37.12	-13.00	-20.87	3.25	Peak	Horizontal
2 2472.000	-45.62	-53.64	-13.00	-32.62	8.02	Peak	Horizontal



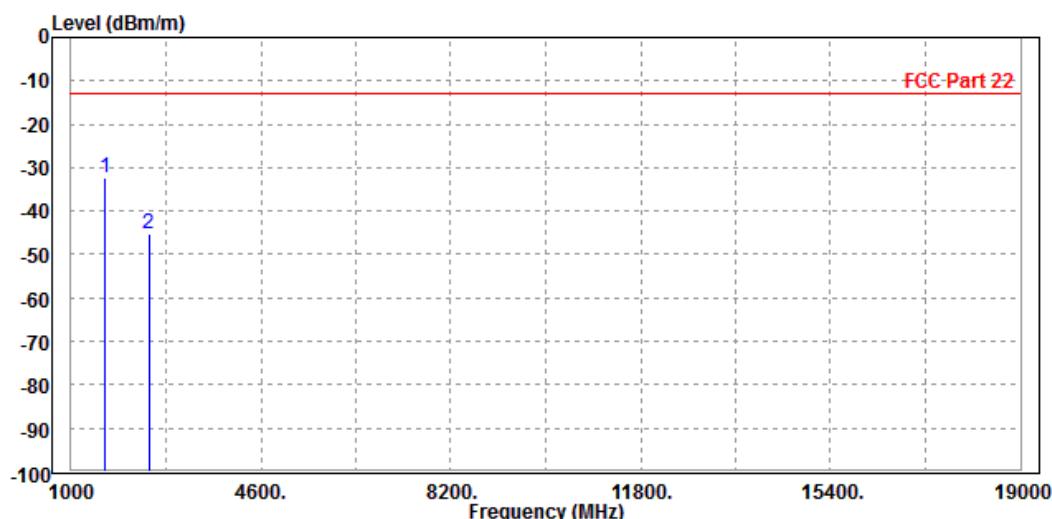


BUREAU
VERITAS

Test Report No.: RF190823W003-4

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

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





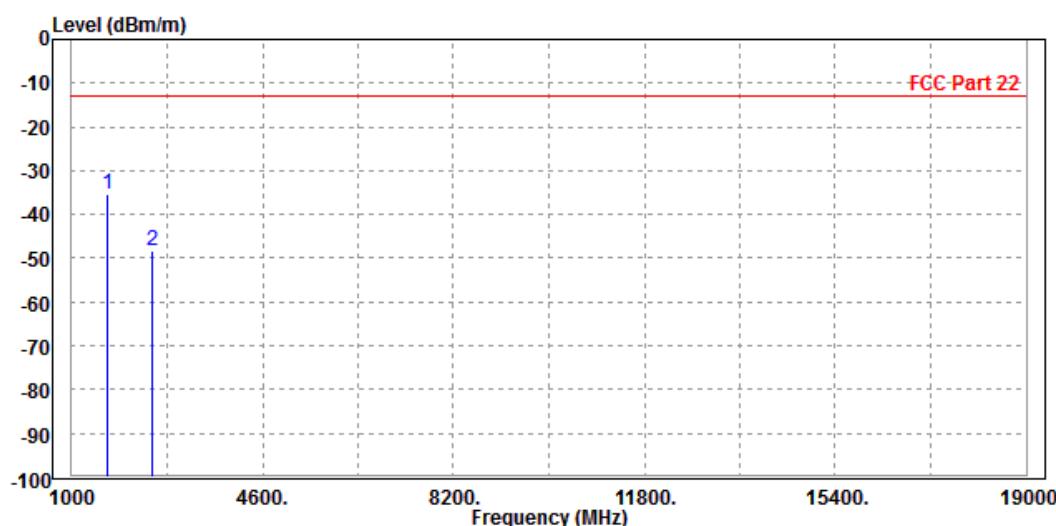
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 189:

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

Freq	Read	Limit	Over	Remark	Pol/Phase
	Level	Level	Line		
MHz	dBm/m	dBm	dBm/m	dB	dB/m
1 PP 1666.000	-35.18	-38.65	-13.00	-22.18	3.47 Peak
2 2512.000	-48.24	-56.30	-13.00	-35.24	8.06 Peak



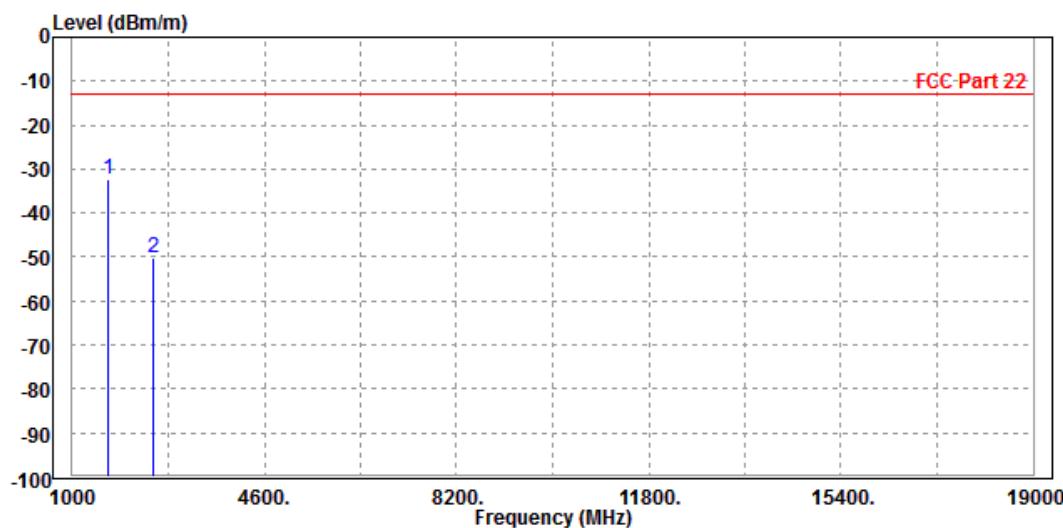


BUREAU
VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1666.000	-32.26	-35.80	-13.00	-19.26	3.54 Peak	Vertical
2	2512.000	-50.15	-57.26	-13.00	-37.15	7.11 Peak	Vertical





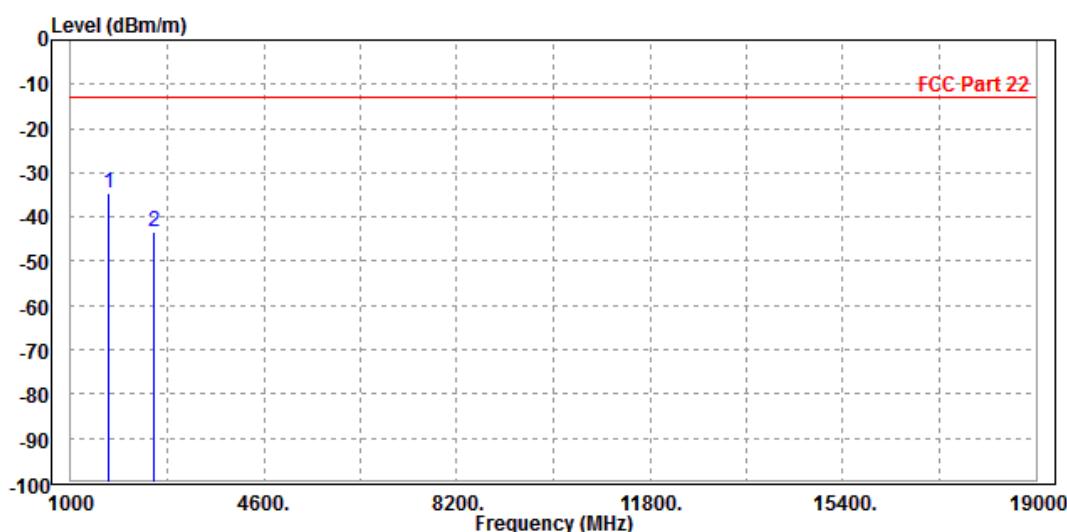
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 251:

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

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Line	dBm	dBm/m		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP 1702.000	-34.54	-38.45	-13.00	-21.54	3.91 Peak	Horizontal
2 2548.000	-43.30	-51.41	-13.00	-30.30	8.11 Peak	Horizontal



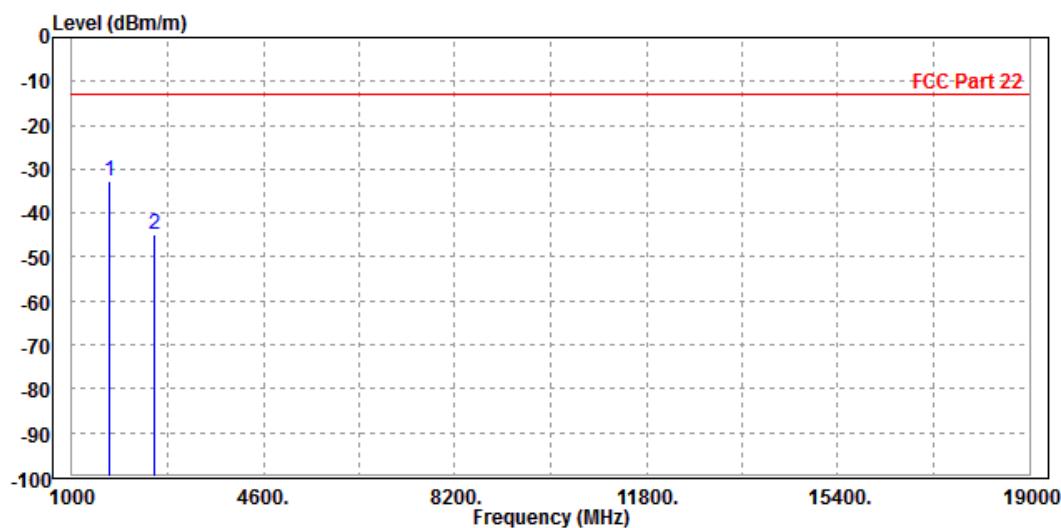


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VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1702.000	-32.69	-36.56	-13.00	-19.69	3.87 Peak	Vertical
2	2548.000	-44.91	-52.13	-13.00	-31.91	7.22 Peak	Vertical





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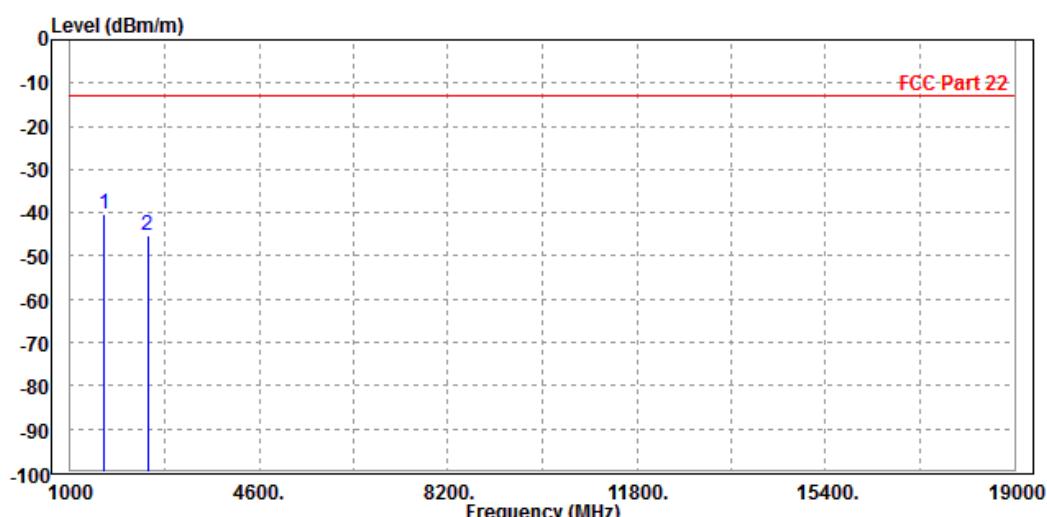
Test Report No.: RF190823W003-4

EDGE 850:

CH 128:

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

Freq	Level	Read	Limit	Over	Remark	Pol/Phase		
		Line	dBm/m	dB				
MHz	dBm/m	dBm	dBm/m	dB	dB/m			
1	PP	1648.000	-40.42	-43.67	-13.00	-27.42	3.25 Peak	Horizontal
2		2472.000	-45.11	-53.13	-13.00	-32.11	8.02 Peak	Horizontal



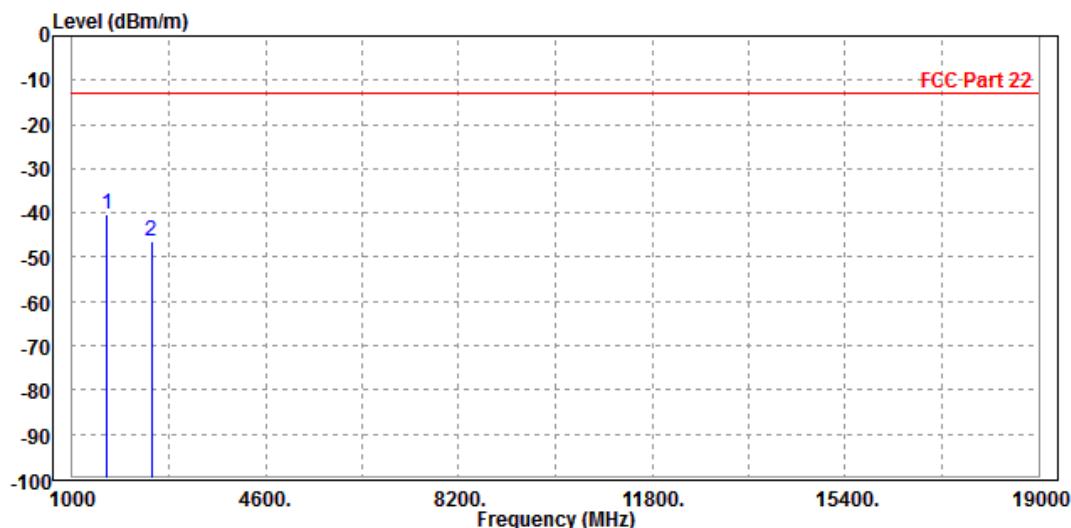


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VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1648.000	-40.31	-43.69	-13.00	-27.31	3.38 Peak
2		2472.000	-46.28	-53.32	-13.00	-33.28	7.04 Peak





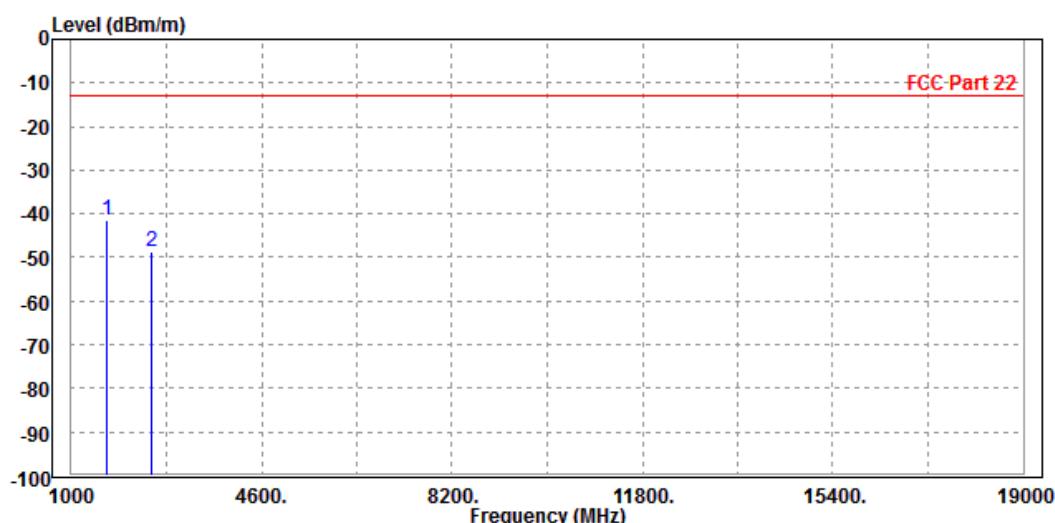
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 189:

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	dBm	dBm/m			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1666.000	-41.35	-44.82	-13.00	-28.35	3.47	Peak	Horizontal
2 2512.000	-48.75	-56.81	-13.00	-35.75	8.06	Peak	Horizontal



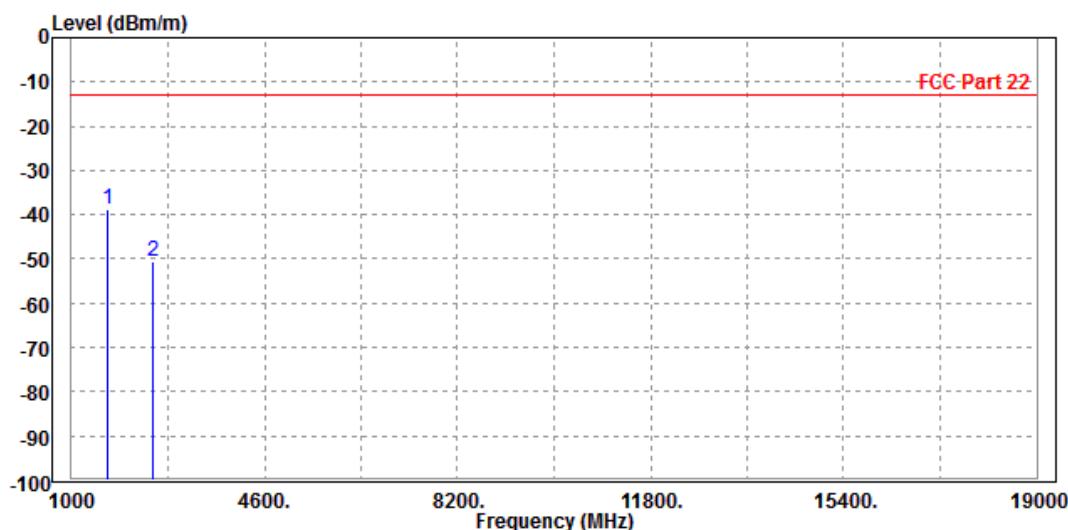


BUREAU
VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Level	Line	Limit Factor		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	PP 1666.000	-38.97	-42.51	-13.00	-25.97	3.54 Peak Vertical
2	2512.000	-50.69	-57.80	-13.00	-37.69	7.11 Peak Vertical





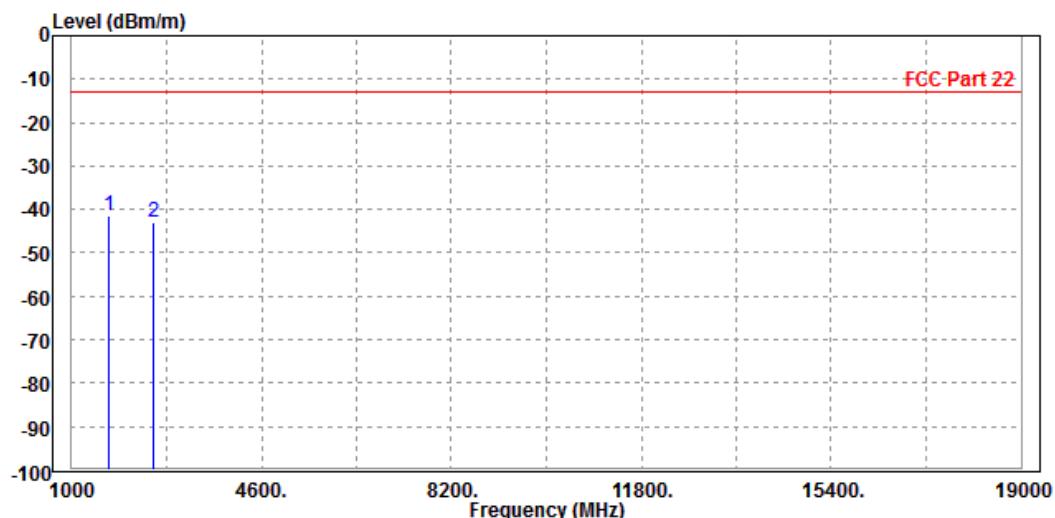
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 251:

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

Freq MHz	Read Level dBm/m	Limit Level dBm	Over Line dBm/m	Over Limit dB	Factor	Remark	Pol/Phase
							Line
1 PP 1702.000	-41.60	-45.51	-13.00	-28.60	3.91	Peak	Horizontal
2 2548.000	-43.15	-51.26	-13.00	-30.15	8.11	Peak	Horizontal



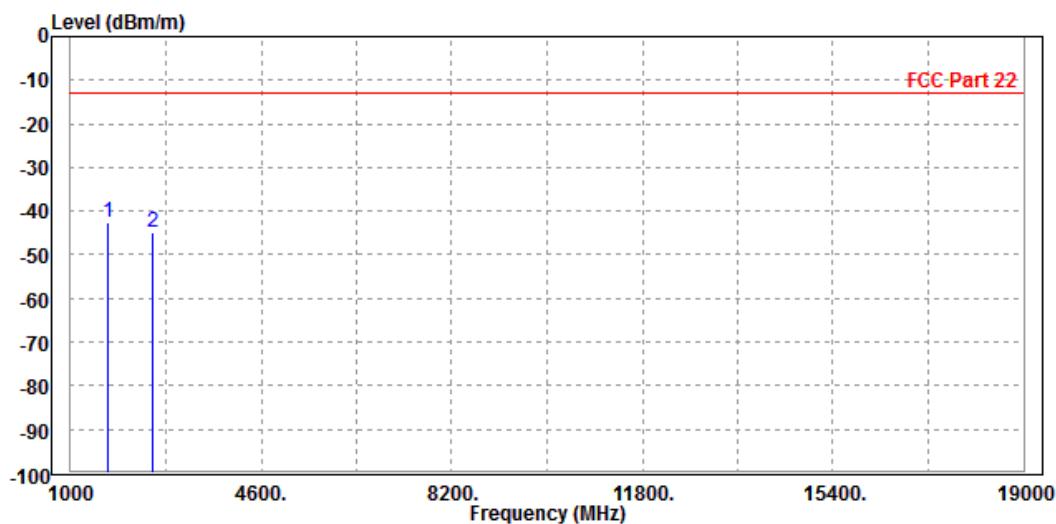


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VERITAS

Test Report No.: RF190823W003-4

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

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1702.000	-42.48	-46.35	-13.00	-29.48	3.87	Peak	Vertical
2 2548.000	-44.93	-52.15	-13.00	-31.93	7.22	Peak	Vertical





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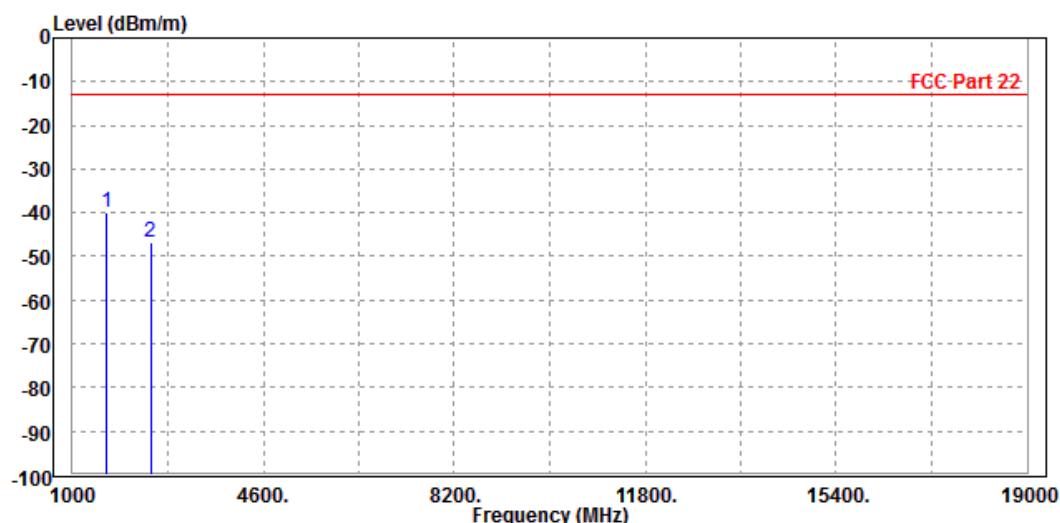
Test Report No.: RF190823W003-4

WCDMA Band V:

CH 4132:

MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	Line	Limit Factor			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1648.000	-40.01	-43.26	-13.00	-27.01	3.25 Peak	Horizontal
2	2472.000	-46.63	-54.65	-13.00	-33.63	8.02 Peak	Horizontal



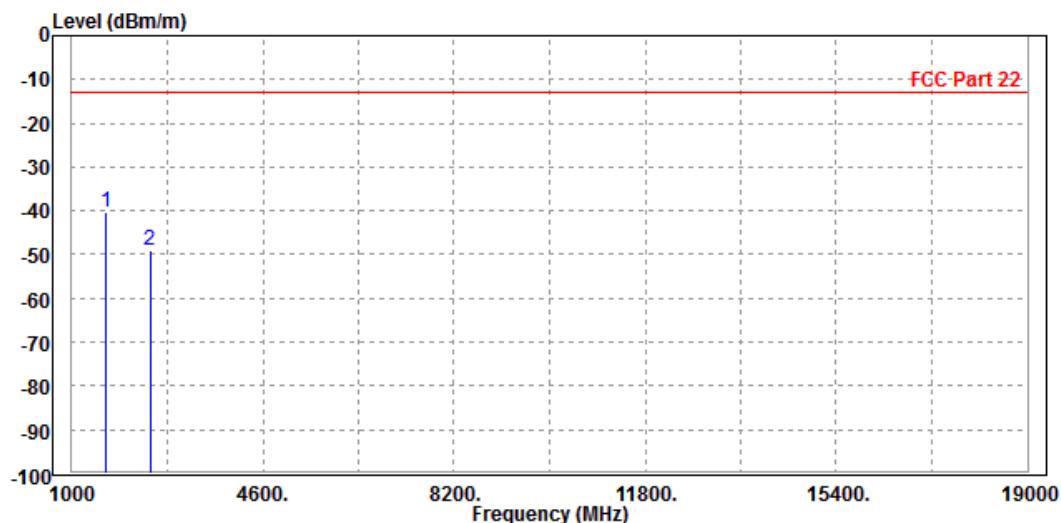


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VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 4132	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Level	Line	Limit Factor		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP	1648.000	-40.20	-43.58	-13.00	-27.20	3.38 Peak Vertical
2	2472.000	-49.13	-56.17	-13.00	-36.13	7.04 Peak Vertical





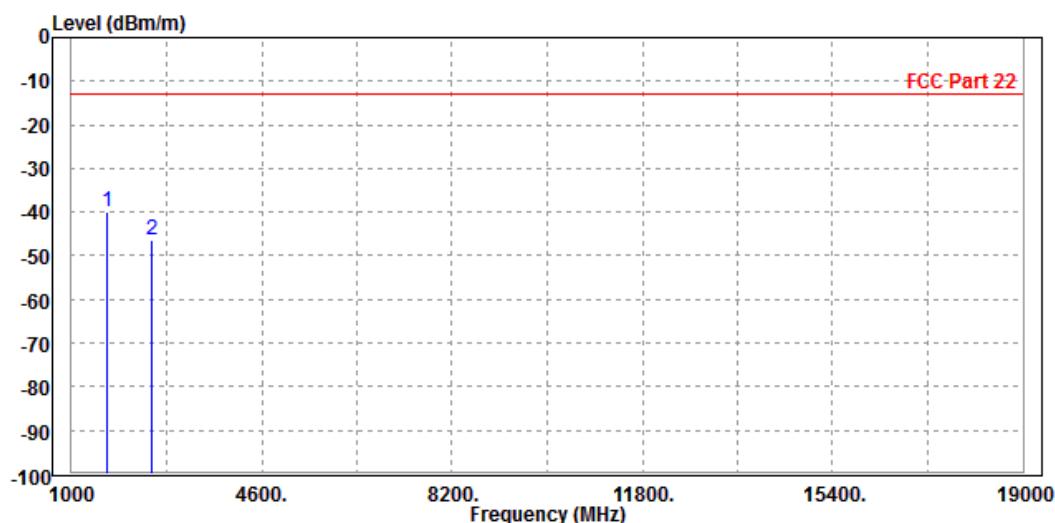
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 4182:

MODE	TX channel 4182	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq MHz	Level dBm/m	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		dBm	dBm/m	dB			
1 PP 1666.000	-39.76	-43.23	-13.00	-26.76	3.47	Peak	Horizontal
2 2512.000	-46.57	-54.63	-13.00	-33.57	8.06	Peak	Horizontal



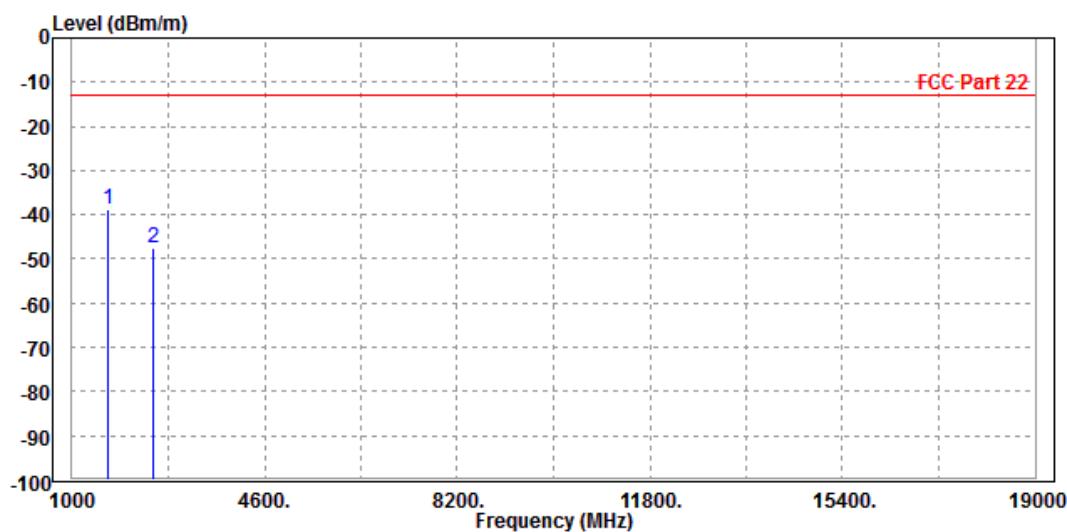


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VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 4182	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Level	Line	Limit Factor		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP 1666.000	-38.61	-42.15	-13.00	-25.61	3.54 Peak	Vertical
2 2512.000	-47.58	-54.69	-13.00	-34.58	7.11 Peak	Vertical





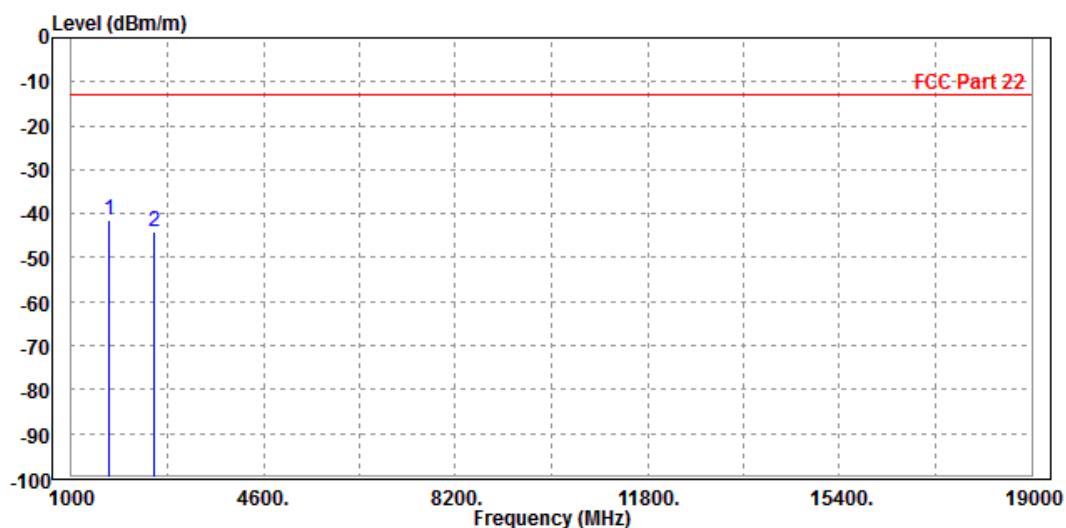
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 4233:

MODE	TX channel 4233	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	dBm	dBm/m			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1702.000	-41.30	-45.21	-13.00	-28.30	3.91	Peak	Horizontal
2 2548.000	-44.20	-52.31	-13.00	-31.20	8.11	Peak	Horizontal



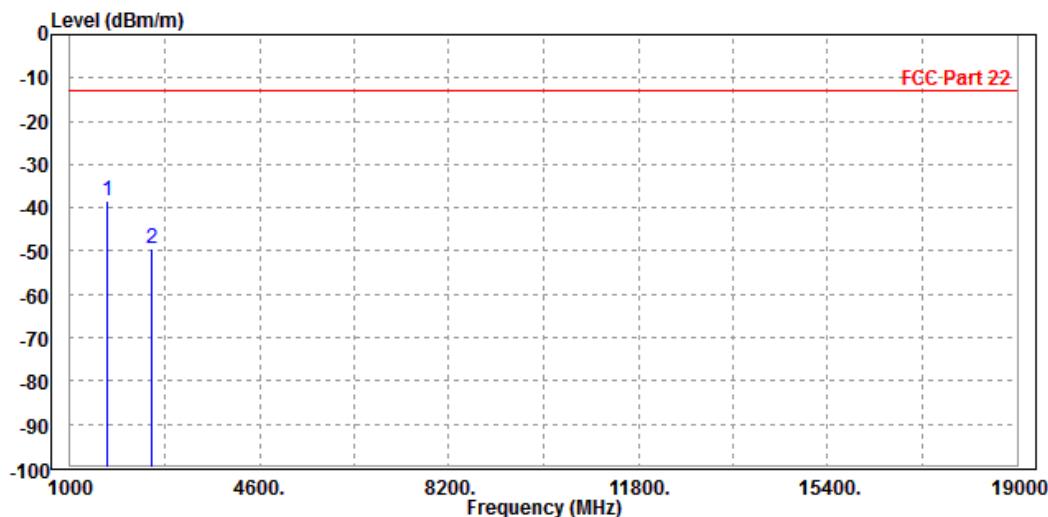


BUREAU
VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 4233	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Level	Line	Limit Factor		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP 1702.000	-38.49	-42.36	-13.00	-25.49	3.87 Peak	Vertical
2 2548.000	-49.26	-56.48	-13.00	-36.26	7.22 Peak	Vertical





BUREAU
VERITAS

Test Report No.: RF190823W003-4

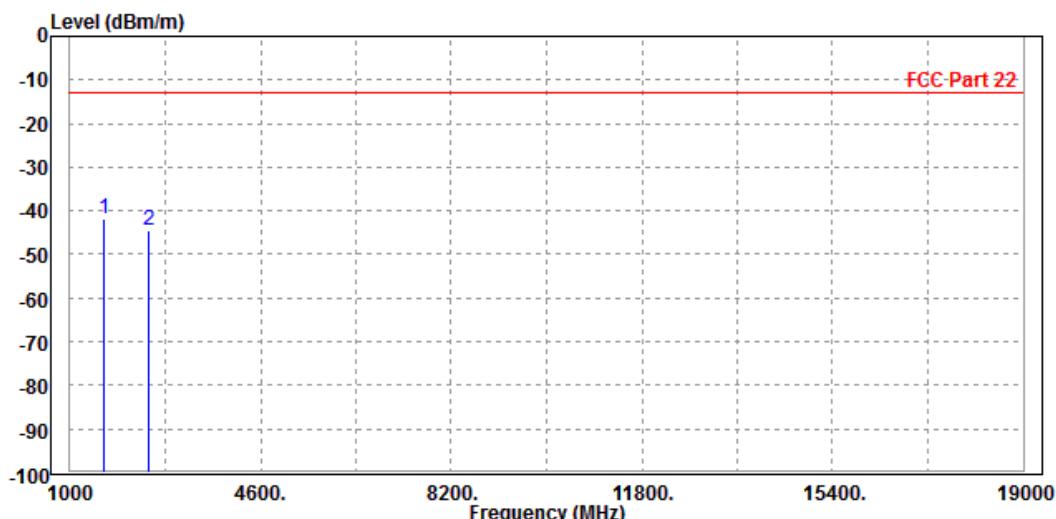
LTE Band 5

CHANNEL BANDWIDTH: 1.4MHz / QPSK

CH 20407

MODE	TX channel 20407	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
1	PP	1653.000	-42.01	-45.32	-13.00	-29.01	3.31 Peak
2		2479.500	-44.61	-52.64	-13.00	-31.61	8.03 Peak



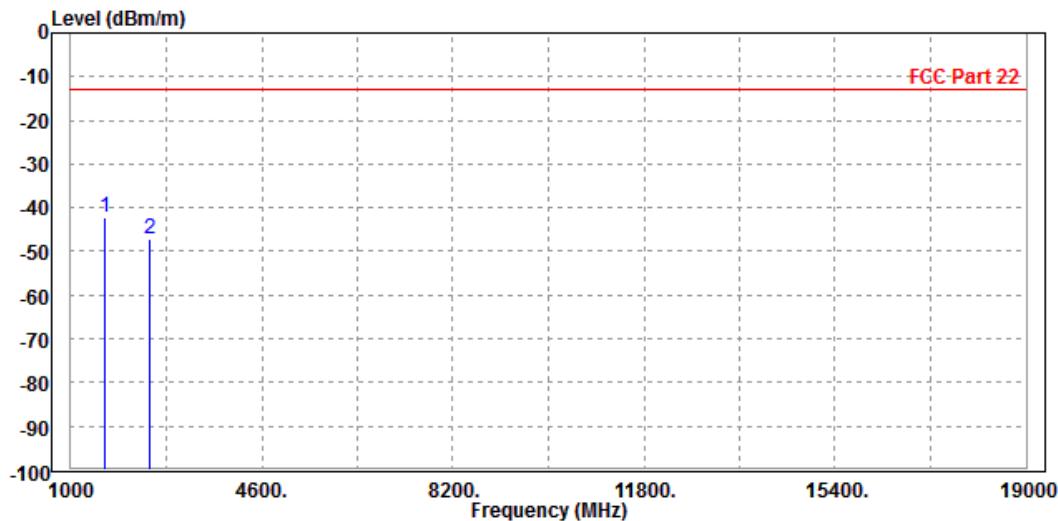


BUREAU
VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20407	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq MHz	Level dBm/m	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
		dBm	dBm/m	dB			
1 PP 1653.000	-42.18	-45.61	-13.00	-29.18	3.43	Peak	Vertical
2 2479.500	-47.07	-54.12	-13.00	-34.07	7.05	Peak	Vertical





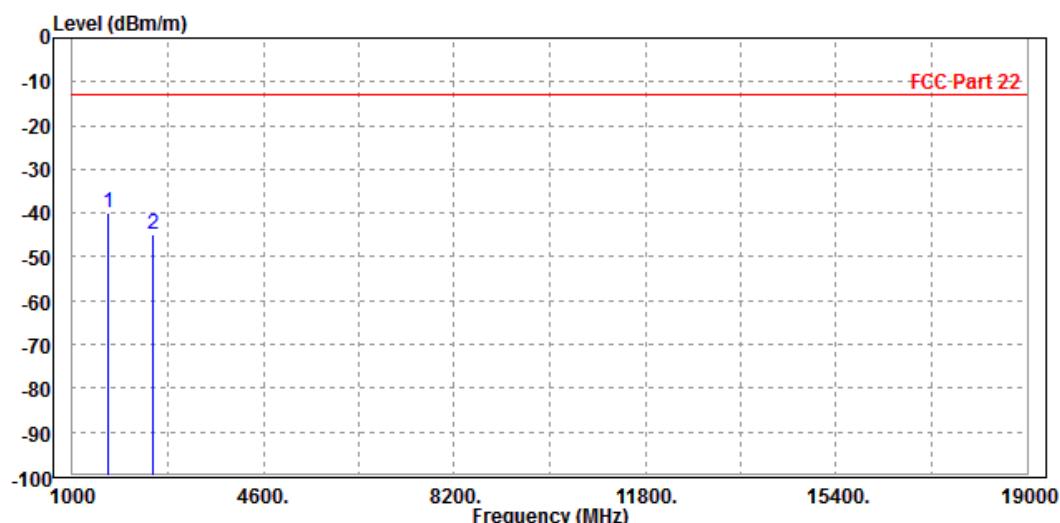
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 20525

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
1	PP	1666.000	-39.74	-43.21	-13.00	-26.74	3.47 Peak
2		2509.500	-44.76	-52.82	-13.00	-31.76	8.06 Peak



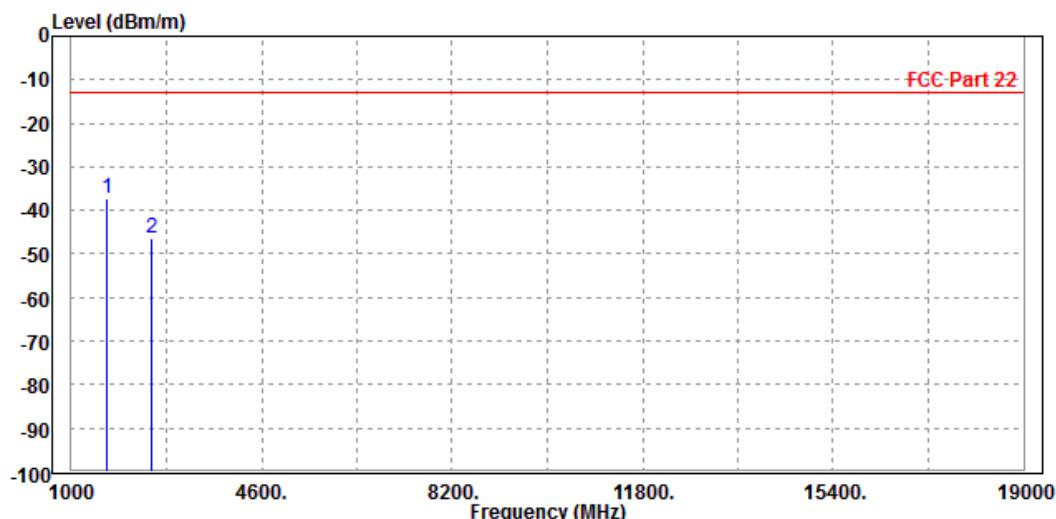


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VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Line	Factor	dB/m		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP 1666.000	-37.24	-40.78	-13.00	-24.24	3.54 Peak	Vertical
2 2509.500	-46.22	-53.32	-13.00	-33.22	7.10 Peak	Vertical





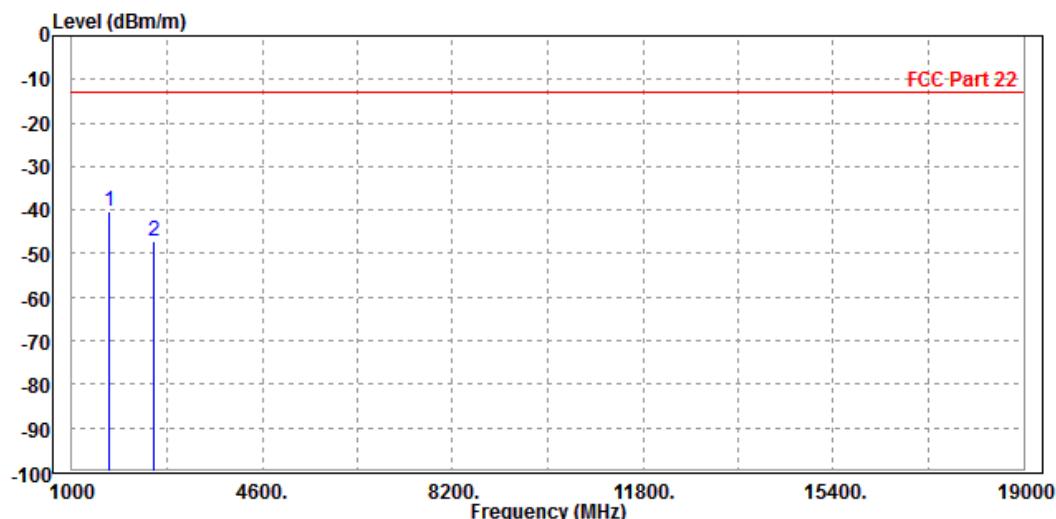
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CH 20643

MODE	TX channel 20643	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1696.600	-40.42	-44.26	-13.00	-27.42	3.84 Peak	Horizontal
2	2539.500	-47.03	-55.13	-13.00	-34.03	8.10 Peak	Horizontal



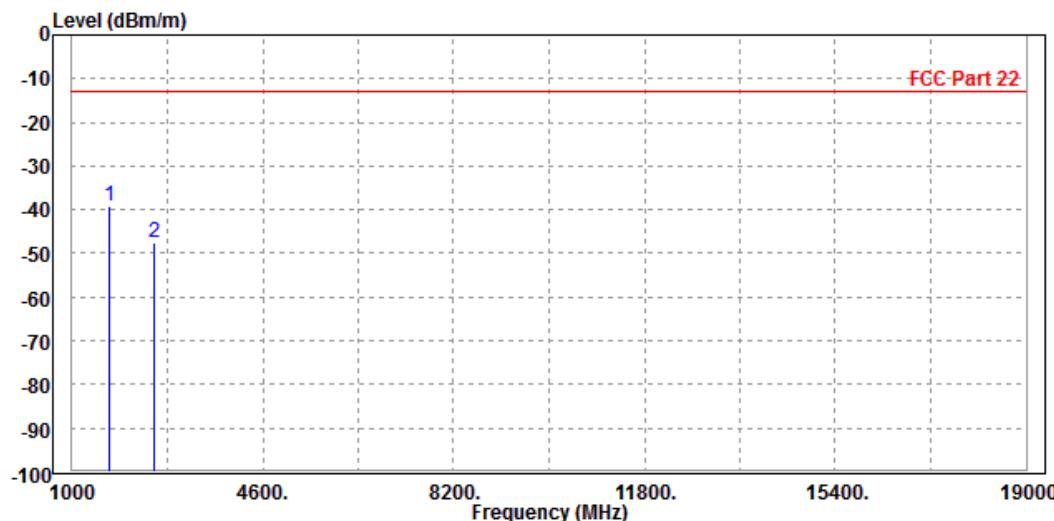


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VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20643	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1693.000	-39.33	-43.12	-13.00	-26.33	3.79 Peak Vertical
2		2539.500	-47.43	-54.63	-13.00	-34.43	7.20 Peak Vertical





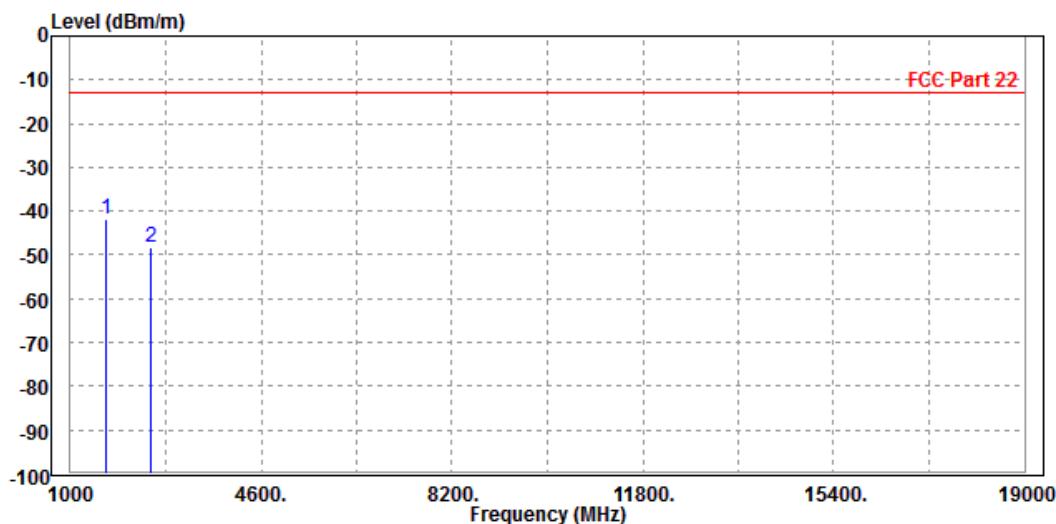
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 3MHz / QPSK

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1666.000	-41.74	-45.21	-13.00	-28.74	3.47 Peak	Horizontal
2	2509.500	-48.32	-56.38	-13.00	-35.32	8.06 Peak	Horizontal



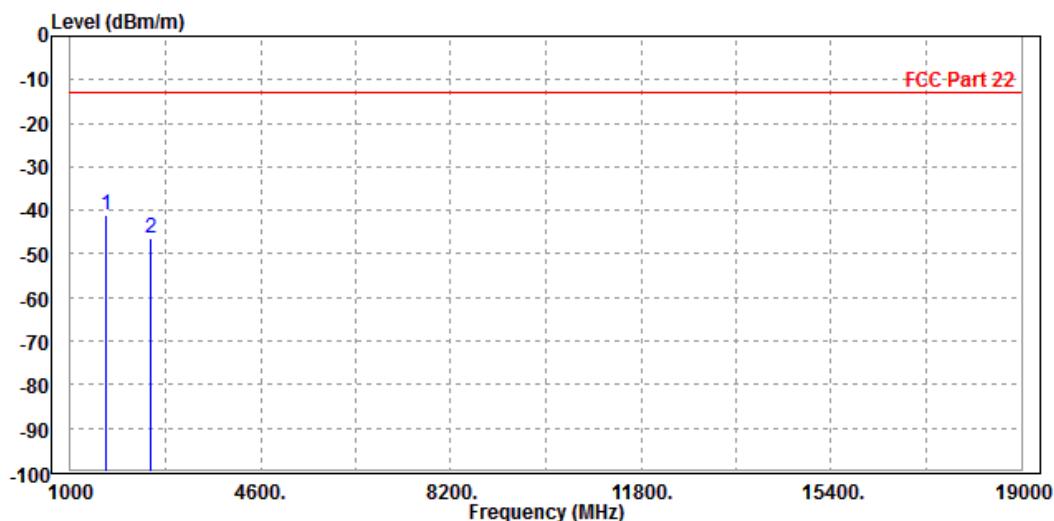


BUREAU
VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP	1666.000	-41.05	-44.59	-13.00	-28.05	3.54 Peak Vertical
2		2509.500	-46.35	-53.45	-13.00	-33.35	7.10 Peak Vertical





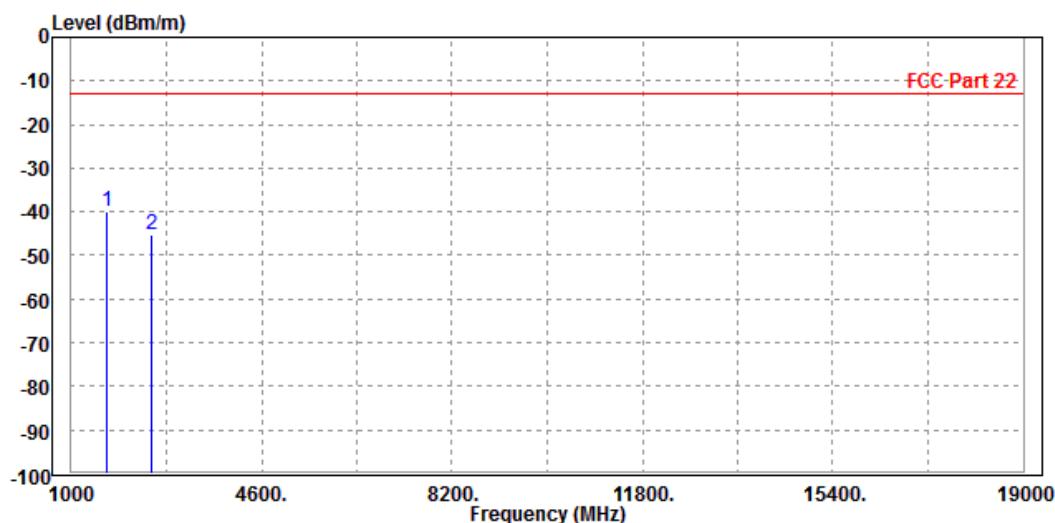
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 5MHz / QPSK

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	dBm	dBm/m			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1666.000	-39.78	-43.25	-13.00	-26.78	3.47	Peak	Horizontal
2 2509.500	-45.40	-53.46	-13.00	-32.40	8.06	Peak	Horizontal



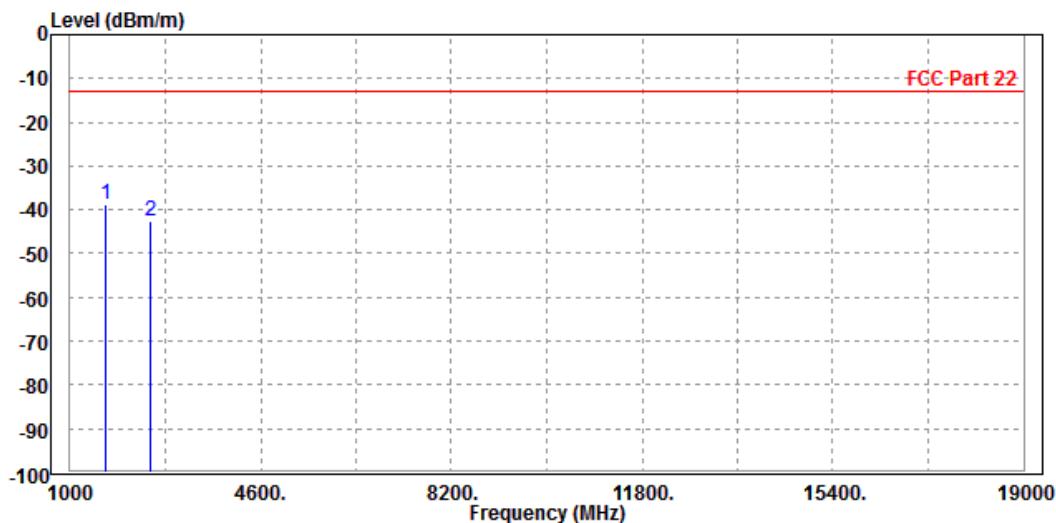


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VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Level	Line	Limit			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1666.000	-38.64	-42.18	-13.00	-25.64	3.54 Peak	Vertical
2	2509.500	-42.49	-49.59	-13.00	-29.49	7.10 Peak	Vertical





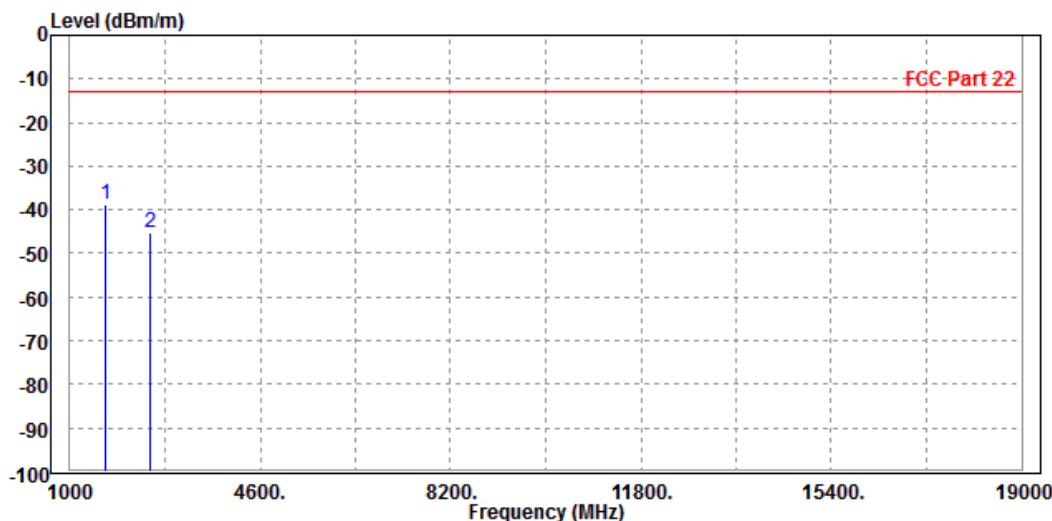
BUREAU
VERITAS

Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Freq	Level	Read	Limit	Over	Factor	Remark	Pol/Phase
		Line	dBm/m	dBm			
MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP 1666.000	-38.74	-42.21	-13.00	-25.74	3.47	Peak	Horizontal
2 2509.500	-45.10	-53.16	-13.00	-32.10	8.06	Peak	Horizontal



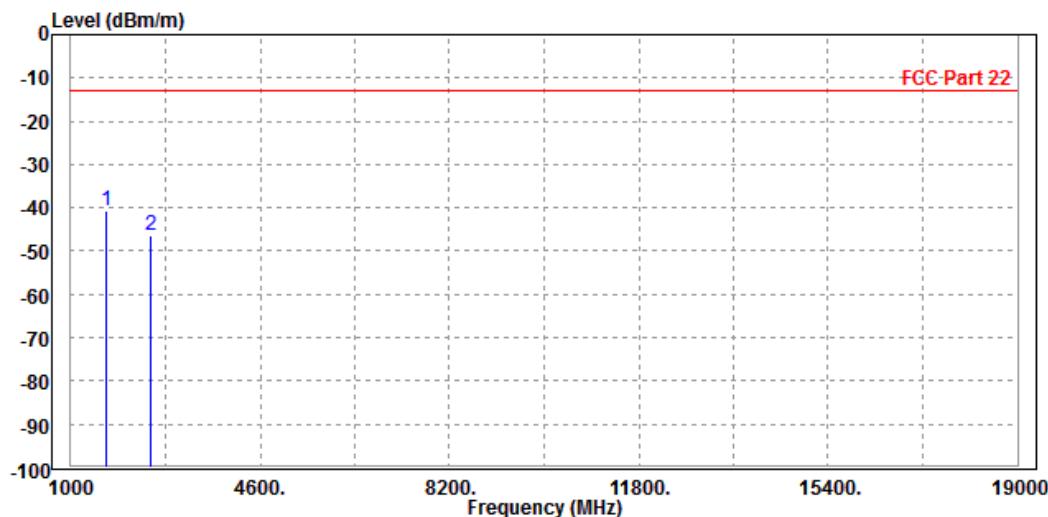


BUREAU
VERITAS

Test Report No.: RF190823W003-4

MODE	TX channel 20525	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 5/9/12V from adapter
TESTED BY	Star Le		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Freq	Level	Read	Limit	Over	Remark	Pol/Phase
		Line	Factor	dB		
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 PP 1666.000	-40.69	-44.23	-13.00	-27.69	3.54 Peak	Vertical
2 2509.500	-46.52	-53.62	-13.00	-33.52	7.10 Peak	Vertical





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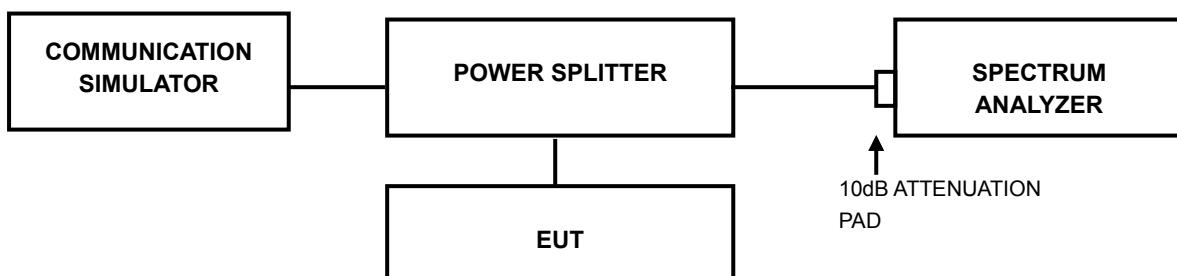
Test Report No.: RF190823W003-4

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



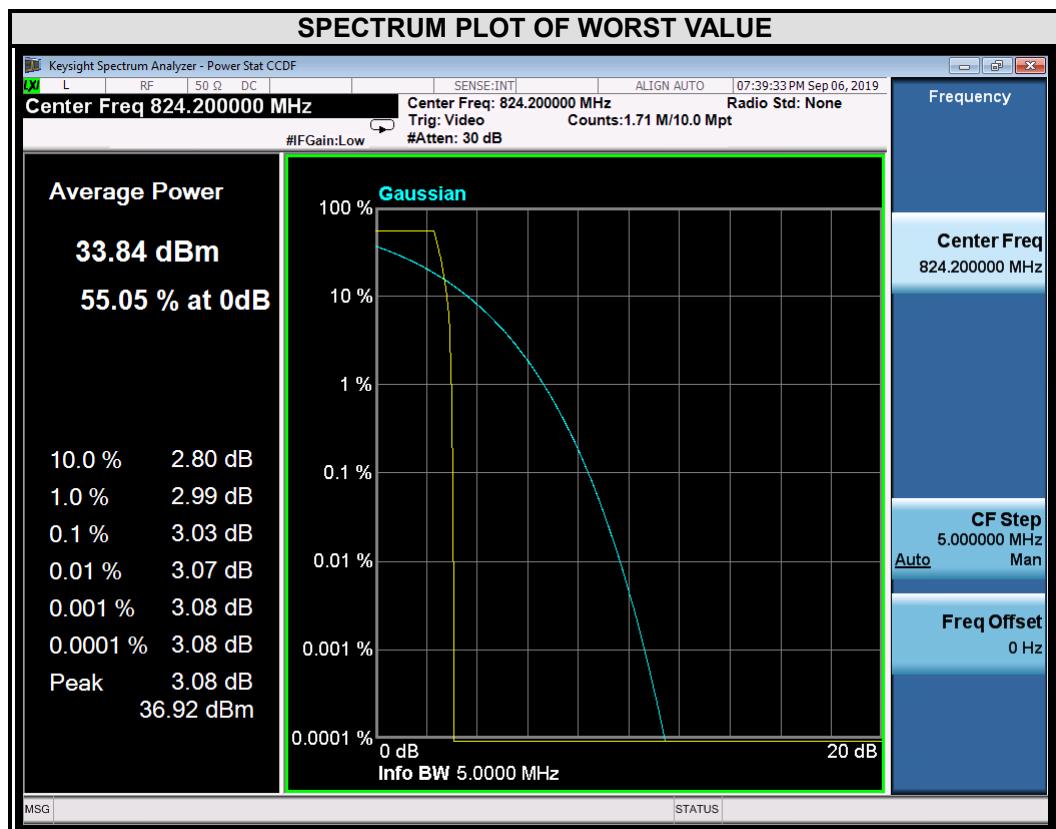
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Test Report No.: RF190823W003-4

3.7.4 TEST RESULTS

GSM

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	3.03

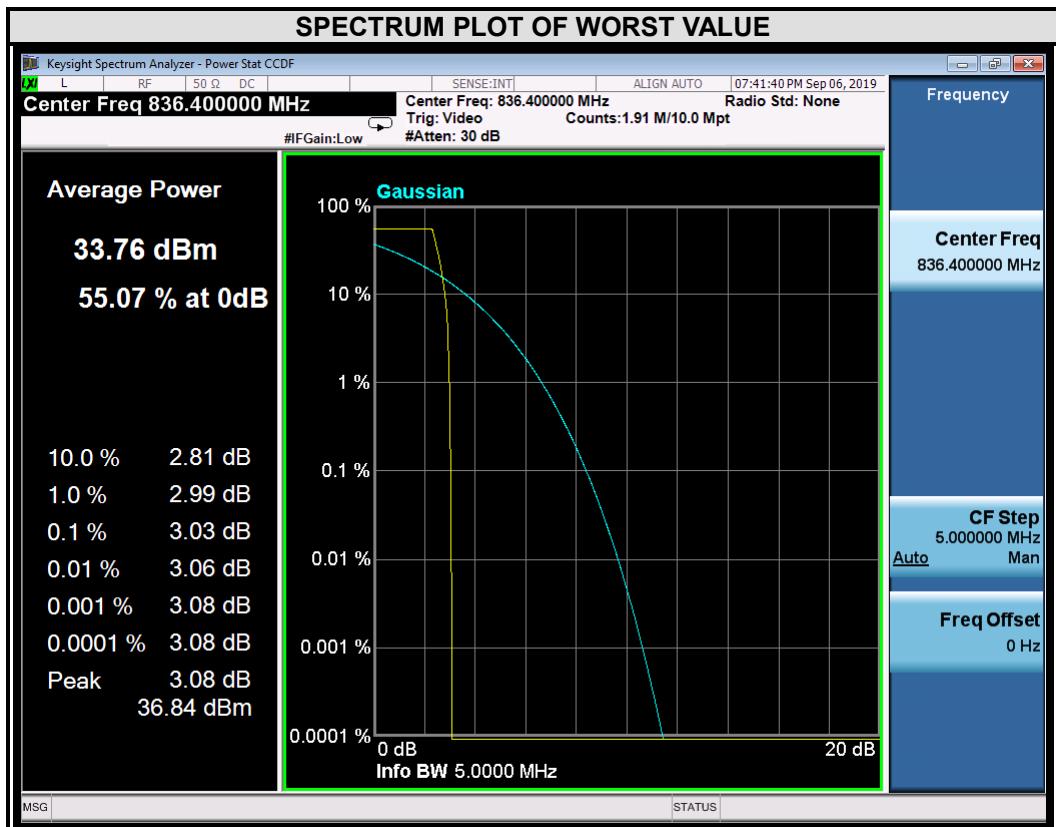




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Test Report No.: RF190823W003-4

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	3.03

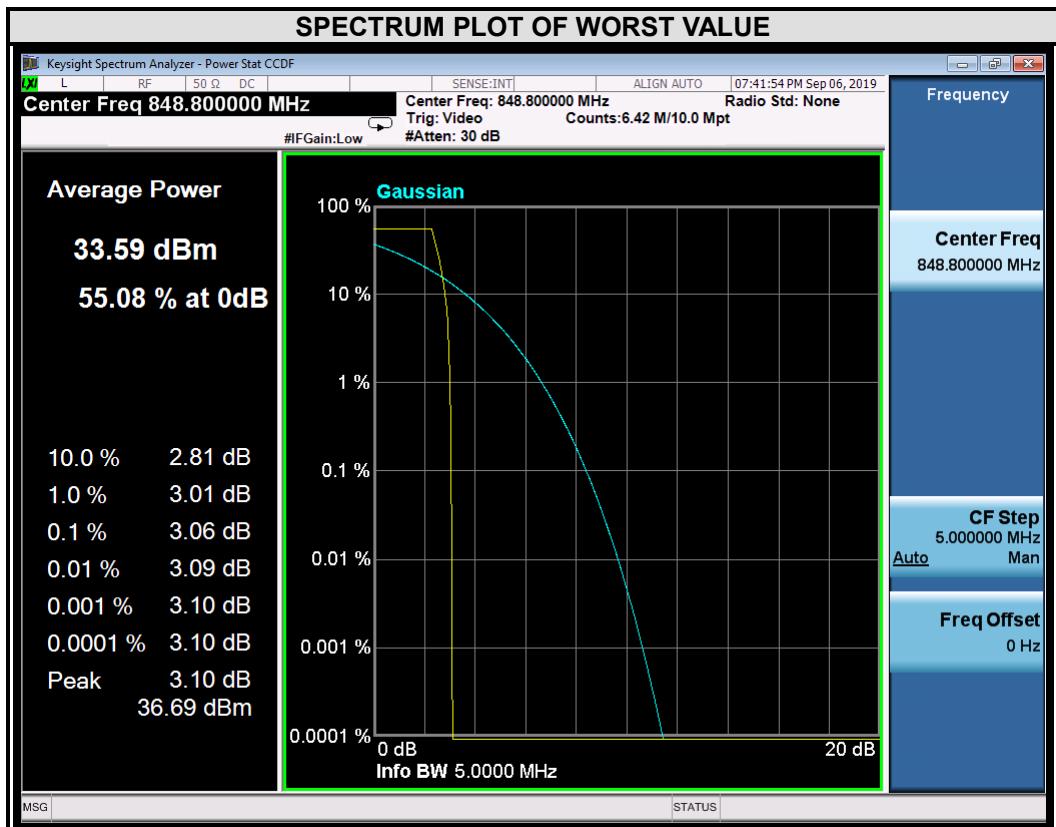




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Test Report No.: RF190823W003-4

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	3.06



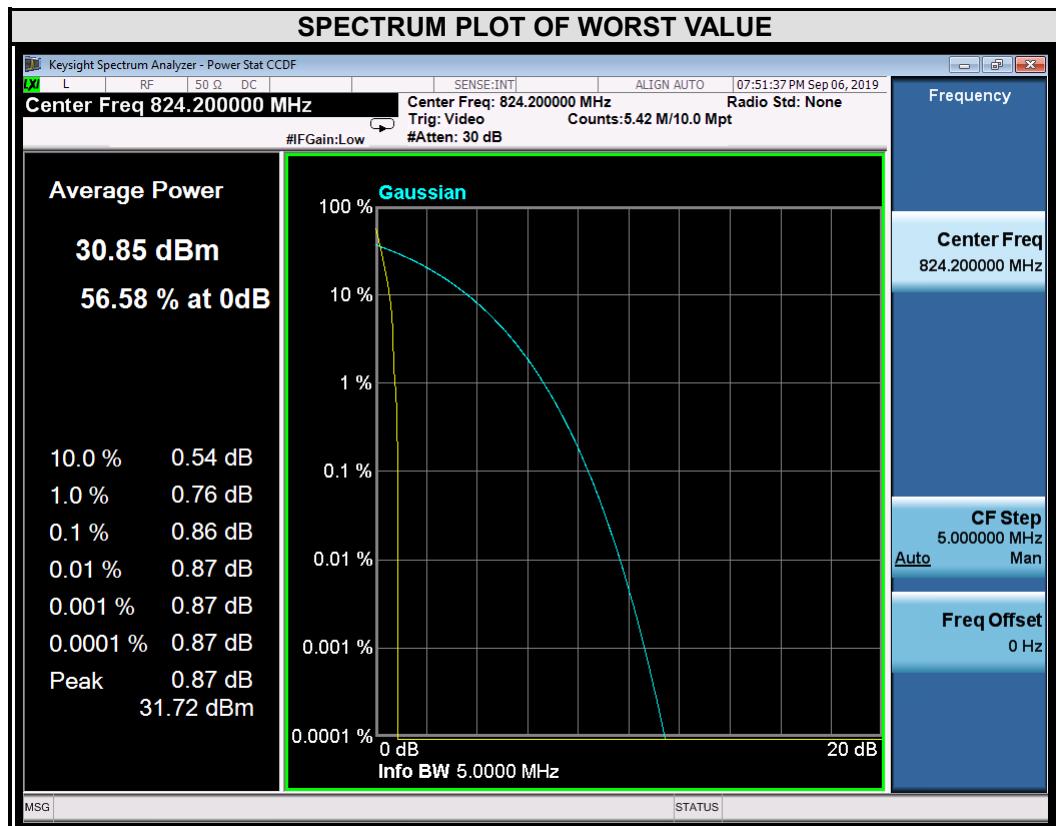


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Test Report No.: RF190823W003-4

EDGE

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	0.86

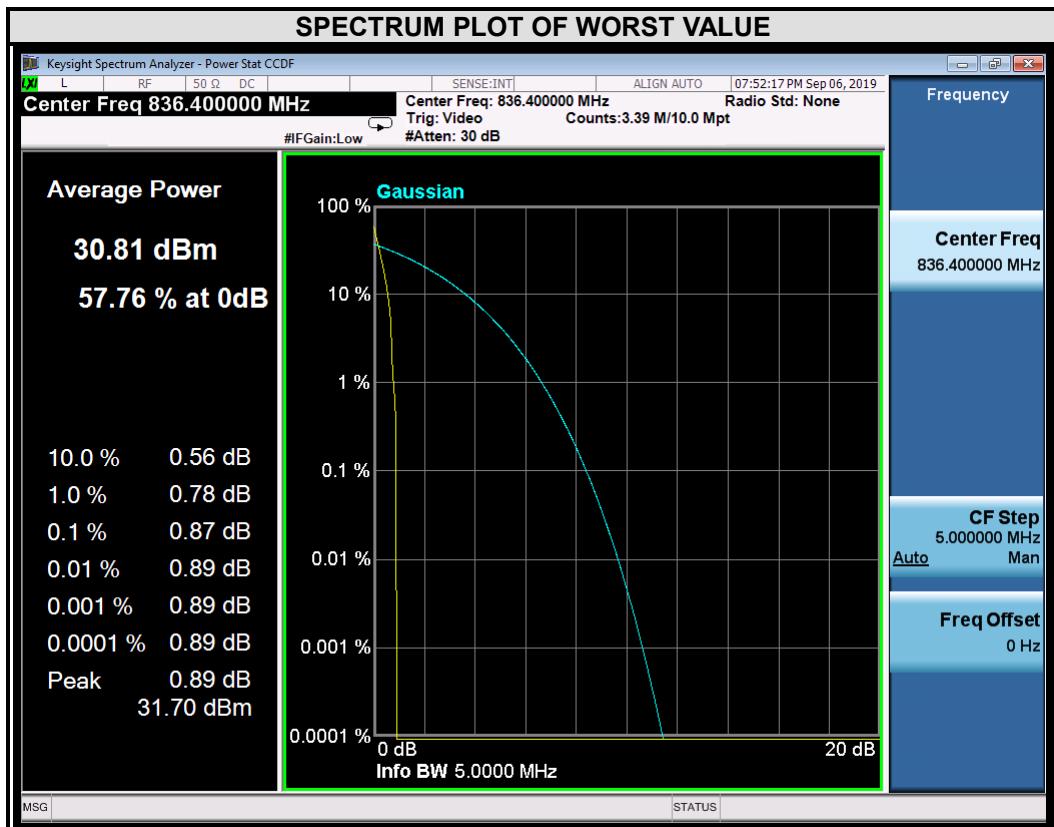




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VERITAS

Test Report No.: RF190823W003-4

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	0.87

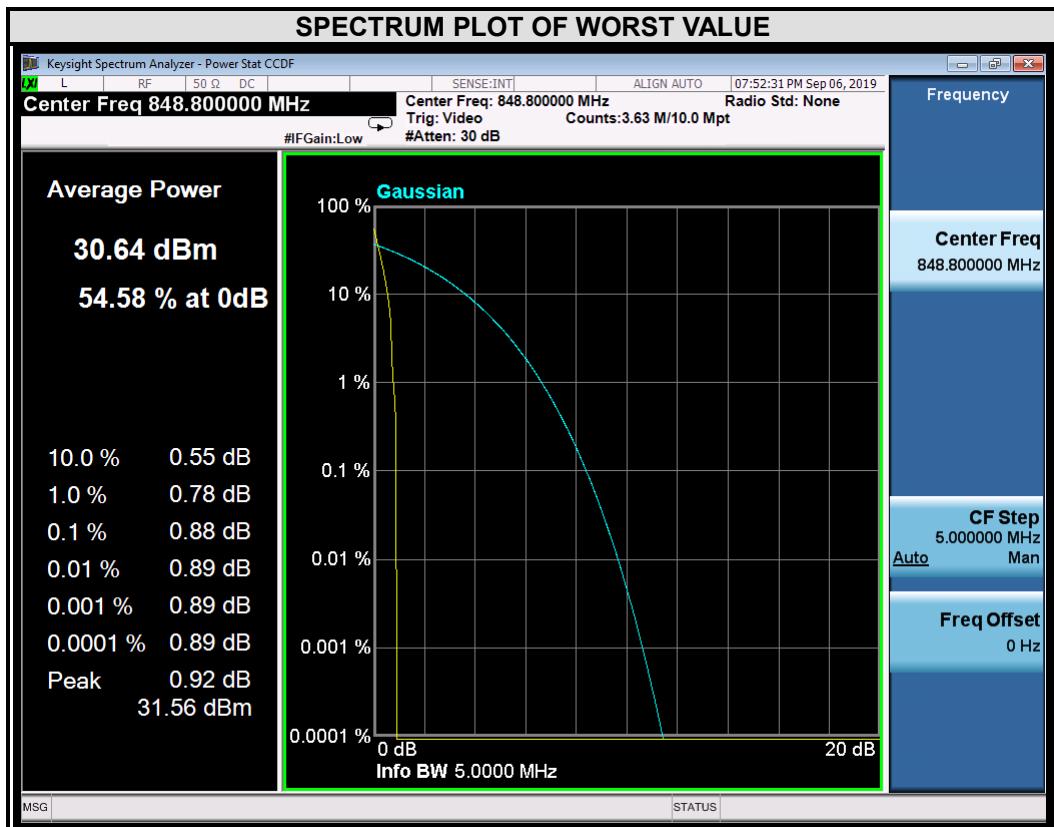




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VERITAS

Test Report No.: RF190823W003-4

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	0.88



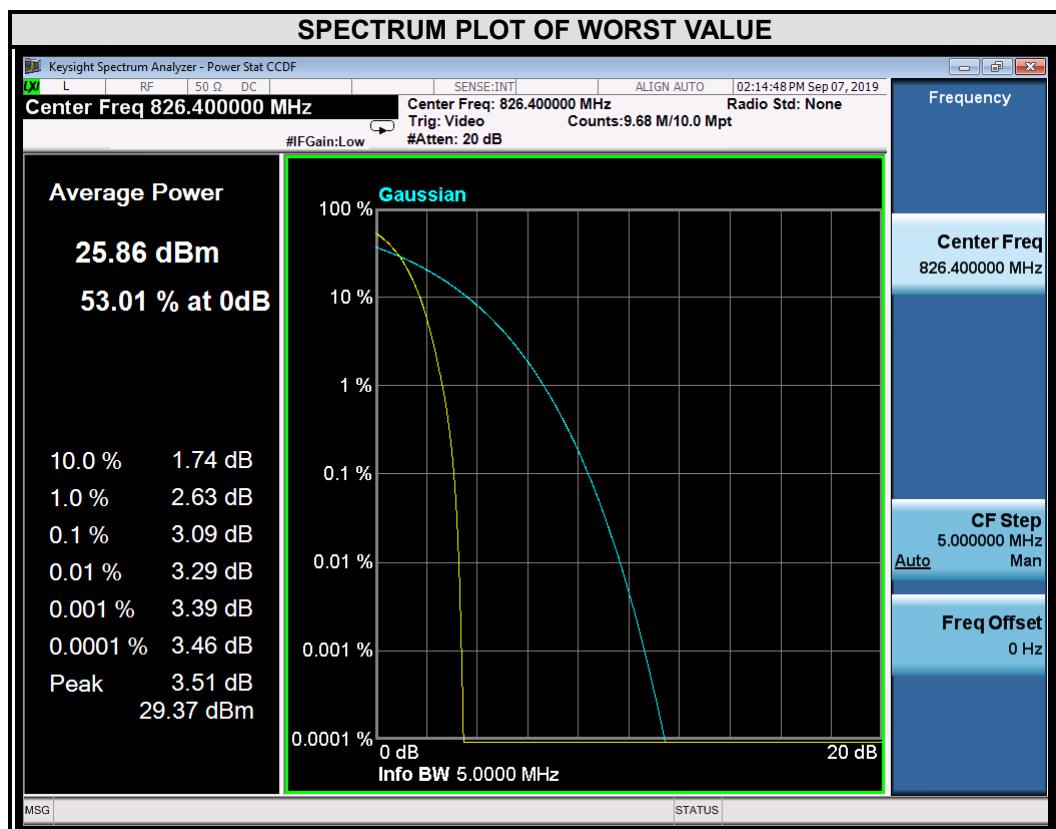


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VERITAS

Test Report No.: RF190823W003-4

WCDMA

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4132	826.4	3.09

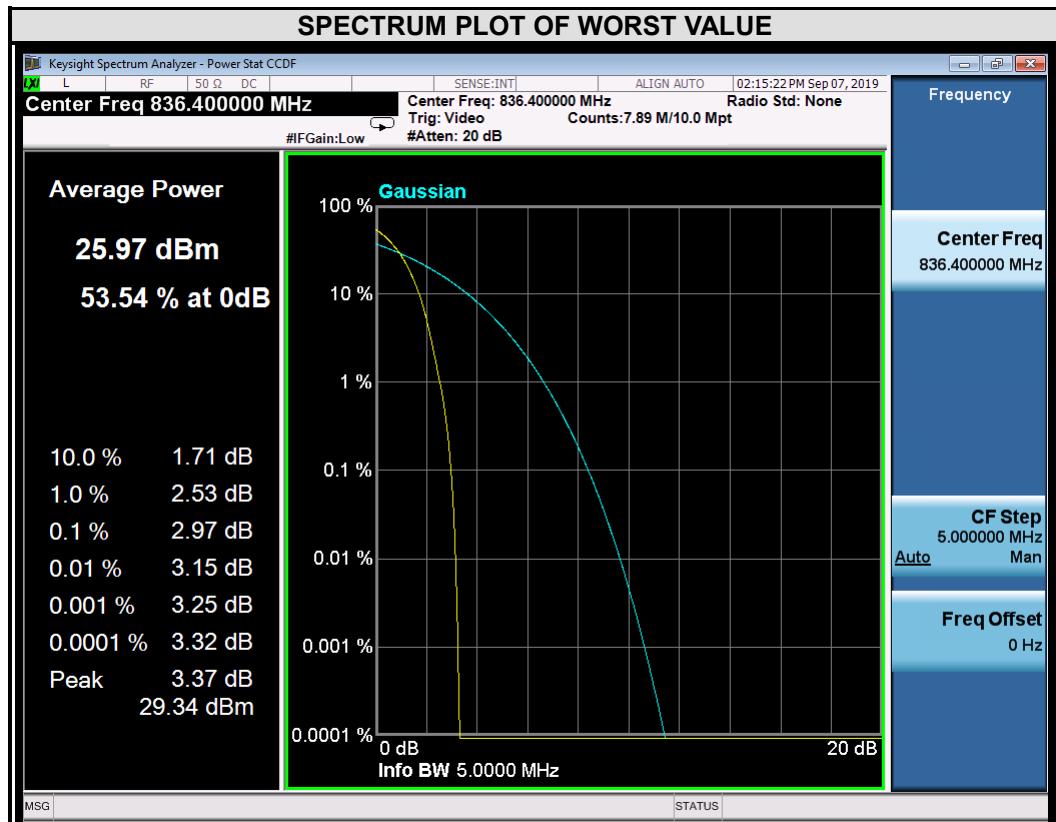




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Test Report No.: RF190823W003-4

CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4182	836.4	2.97

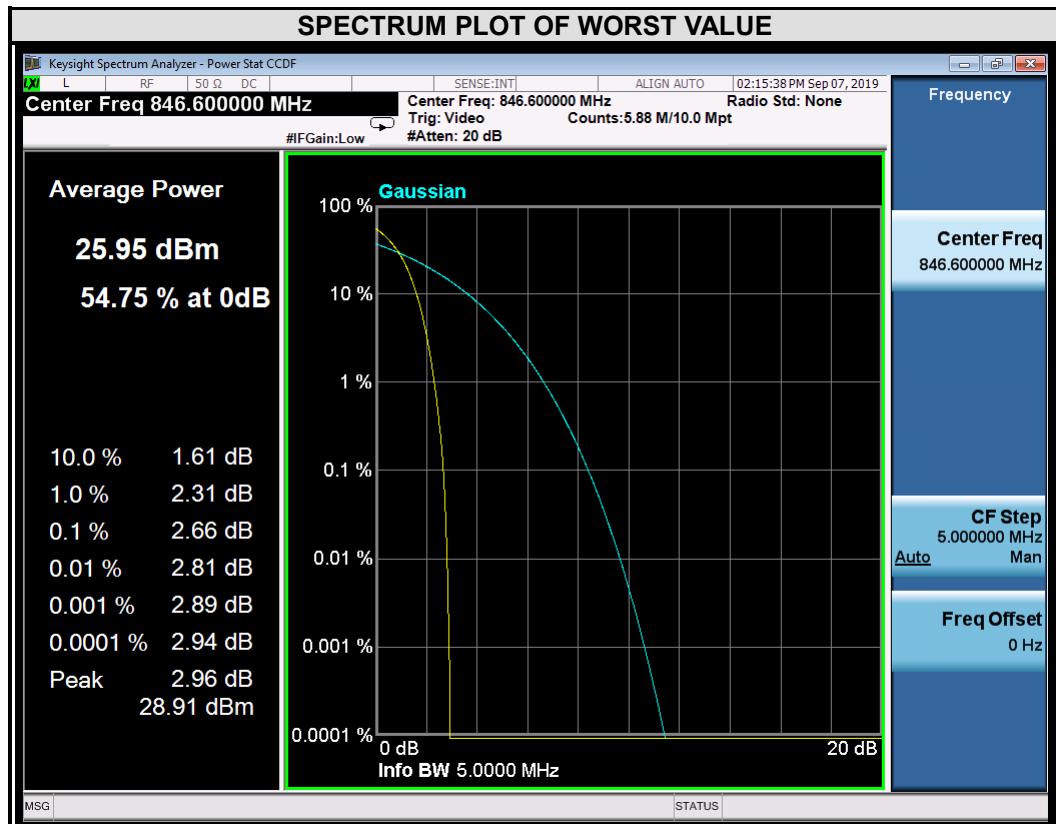




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CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4233	846.6	2.66



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LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz

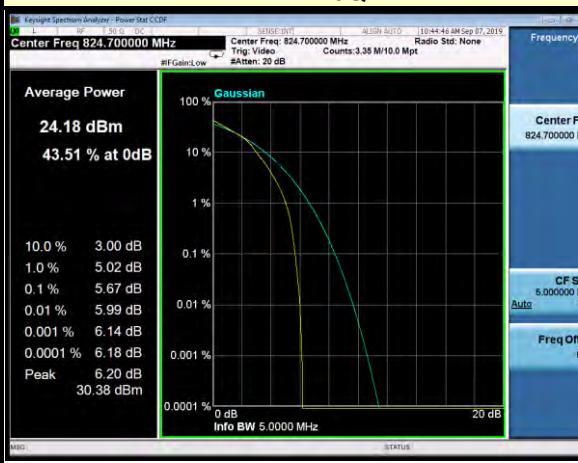
CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)		
		QPSK	16QAM	64QAM
20407	824.7	4.71	5.67	6.46
20525	836.5	4.68	5.63	6.43
20643	848.3	3.76	4.72	5.59

SPECTRUM PLOT OF WORST VALUE

1.4MHz / QPSK



1.4MHz / 16QAM



1.4MHz / 64QAM





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Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 3MHz

CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)		
		QPSK	16QAM	64QAM
20415	825.5	4.71	5.92	6.53
20525	836.5	4.65	5.79	6.43
20635	847.5	3.89	4.97	5.73

SPECTRUM PLOT OF WORST VALUE





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Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 5MHz

CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)		
		QPSK	16QAM	64QAM
20425	826.5	4.89	5.95	6.60
20525	836.5	4.84	5.82	6.48
20625	846.5	4.39	5.34	6.08

SPECTRUM PLOT OF WORST VALUE





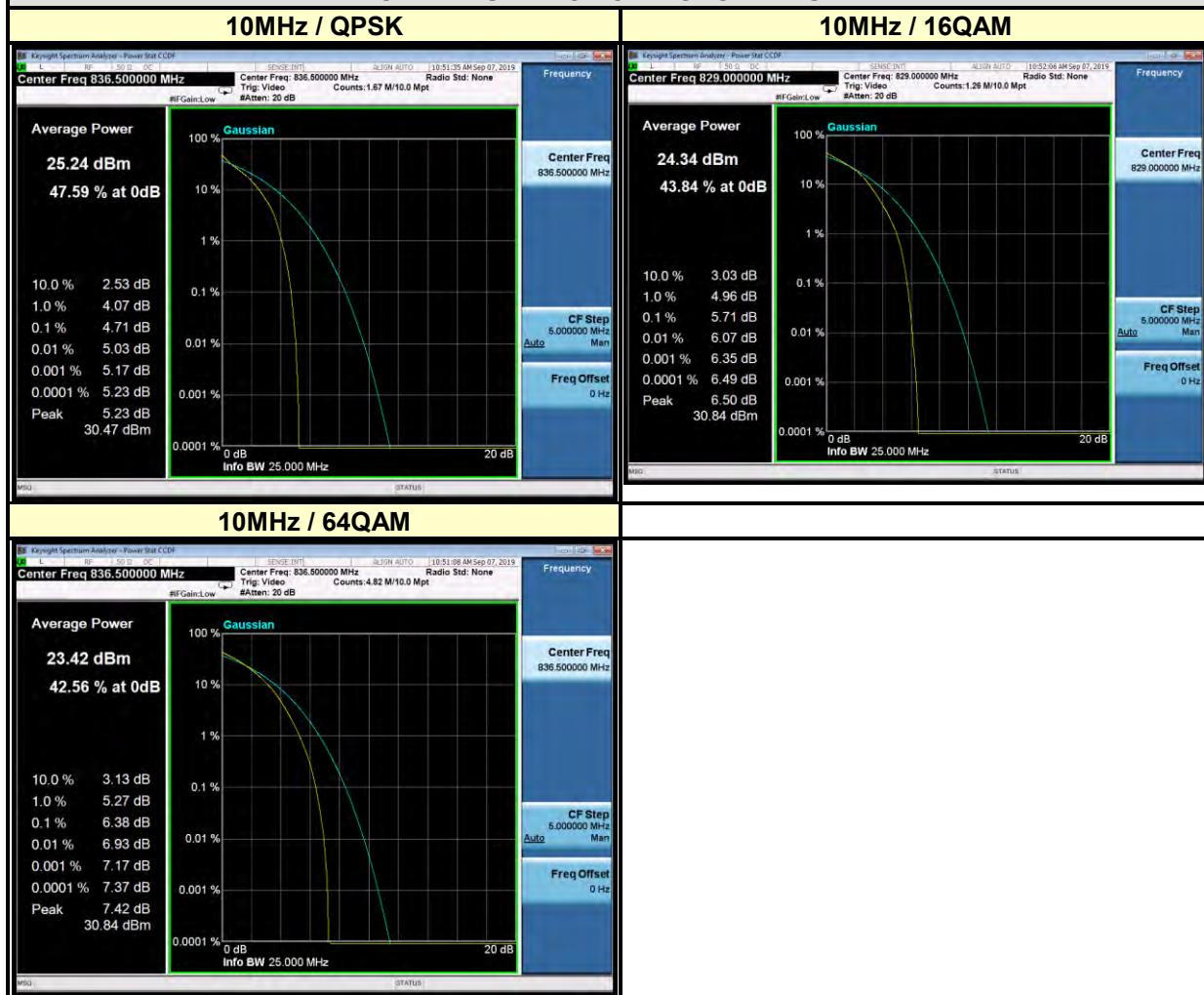
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Test Report No.: RF190823W003-4

CHANNEL BANDWIDTH: 10MHz

CHANNEL	Frequency (MHz)	PEAK TO AVERAGE RATIO (dB)		
		QPSK	16QAM	64QAM
20450	829	4.67	5.71	6.37
20525	836.5	4.71	5.69	6.38
20600	844	4.43	5.46	6.22

SPECTRUM PLOT OF WORST VALUE





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Test Report No.: RF190823W003-4

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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Test Report No.: RF190823W003-4

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:

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Tel: +86-755-88696566

Fax: +86-755-88696577

Email: customerservice.dg@cn.bureauveritas.com

Web Site: www.adt.com.tw

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



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Test Report No.: RF190823W003-4

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---