

FCC TEST REPORT

(PART 22)

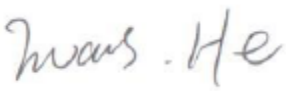
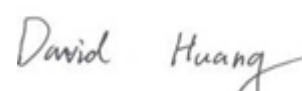
Applicant:	PUNDI X LABS PTE. LTD.
Address:	6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594

Manufacturer or Supplier:	PUNDI X LABS PTE. LTD.
Address:	6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594
Product:	XPOS
Brand Name:	Pundi X
Model Name:	X2
FCC ID:	2ASTH-X2
Date of tests:	Dec. 19, 2018 ~ Mar. 07, 2019

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

- ☒ **FCC PART 22, Subpart H**
- ☒ **ANSI/TIA/EIA-603-D**
- ☒ **ANSI/TIA/EIA-603-E**

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

Issued by Evans He Engineer / Mobile Department	Approved by David Huang Manager / Mobile Department
 Date: Mar. 07, 2019	 Date: Mar. 07, 2019

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 your 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 V02R02.....	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	13
3 TEST TYPES AND RESULTS.....	14
3.1 OUTPUT POWER MEASUREMENT	14
3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT	14
3.1.2 TEST PROCEDURES	14
3.1.3 TEST SETUP	15
3.1.4 TEST RESULTS	17
3.2 FREQUENCY STABILITY MEASUREMENT	24
3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT	24
3.2.2 TEST PROCEDURE.....	24
3.2.3 TEST SETUP	24
3.2.4 TEST RESULTS	25
3.3 OCCUPIED BANDWIDTH MEASUREMENT	32
3.3.1 TEST PROCEDURES	32
3.3.2 TEST SETUP	32
3.3.3 TEST RESULTS	33
3.4 BAND EDGE MEASUREMENT	39
3.4.1 LIMITS OF BAND EDGE MEASUREMENT	39
3.4.2 TEST SETUP	39
3.4.3 TEST PROCEDURES	40
3.4.4 TEST RESULTS	41
3.5 CONDUCTED SPURIOUS EMISSIONS	46
3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT	46
3.5.2 TEST PROCEDURE.....	46
3.5.3 TEST SETUP	46
3.5.4 TEST RESULTS	47
3.6 RADIATED EMISSION MEASUREMENT.....	54
3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT	54



**BUREAU
VERITAS**

Test Report No.: RF181102N040-7_R1

3.6.2	TEST PROCEDURES	54
3.6.3	DEVIATION FROM TEST STANDARD	54
3.6.4	TEST SETUP	55
3.6.5	TEST RESULTS	57
3.7	PEAK TO AVERAGE RATIO	64
3.7.1	LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT	64
3.7.2	TEST SETUP	64
3.7.3	TEST PROCEDURES	64
3.7.4	TEST RESULTS	65
4	PHOTOGRAPHS OF THE TEST CONFIGURATION	76
5	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	77



Test Report No.: RF181102N040-7_R1

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF181102N040-7	Original release	Mar. 07, 2019
RF181102N040-7_R1	Updated the applicant and manufacturer address from "99 DUXTON ROAD 089543, Singapor" to "6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594"	Apr. 24, 2019

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	REMARK
2.1046 22.913 (a)	Effective Radiated Power	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 22.917b	Occupied Bandwidth	PASS	Meet the requirement of limit.
--	Peak to average ratio*	PASS	Meet the requirement of limit.
22.917	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -13.24dB at 1670MHz.

* Refer to KDB 971168 D01 Power Meas License Digital Systems v02r02.

NOTE : Test Lab Information:

Lab: Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Test Lab Address: Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong, 518108, People's Republic of China

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	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	3.11dB
Radiated emissions	9KHz ~ 30MHz	3.11dB
	30MHz ~ 1GHz	5.12dB
	1GHz ~ 18GHz	5.34dB
	18GHz ~ 40GHz	5.02dB

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

Instrument	Model	Serial #	Cal Date	Cal Due
EMI test receiver	ESL6	100262	Jan. 04, 19	Jan. 03, 20
Active Antenna	AL-130	121031	Feb. 07, 19	Feb. 06, 20
3m Semi-anechoic Chamber	9m*6m*6m	N/A	Oct. 18, 18	Oct. 17, 19
Signal Amplifier	8447E	443008	Jan. 24, 19	Jan. 23, 20
MXA signal analyzer	N9020A	MY49100060	Jan. 04, 19	Jan. 03, 20
Horn Antenna	HAH-118	71259	Jan. 25, 19	Jan. 24, 20
Horn Antenna	HAH-118	71283	Feb. 01, 19	Jan. 31, 20
AMPLIFIER	EM01G26G	60613	Jan. 24, 19	Jan. 23, 20
AMPLIFIER	Emc012645	980077	Jan. 04, 19	Jan. 03, 20
Bilog Antenna (30MHz~6GHz)	JB6	A110712	Feb. 07, 19	Feb. 06, 20
DC Power Supply	E3640A	MY40004013	Jan. 04, 19	Jan. 03, 20
MXA Signal Analyzer	N9020A	MY49100060	Jan. 04, 19	Jan. 03, 20
MXG Vector Signal Generator	N5182A	MY50140530	Jan. 04, 19	Jan. 03, 20
Series Signal Generator	E4421B	US40051152	May. 12, 18	May. 11, 19
RF control unit	JS0806-0806-2	188060112	Apr. 25, 18	Apr. 24, 19
Wireless Connectivity Tester	CMW270	1201.0002K75-101 601-PE	Apr. 25, 18	Apr. 24, 19
Universal Radio Communication Tester	CMU200	121393	Jan. 04, 19	Jan. 03, 20
Programmable Temperature & Humidity Chamber	HYL-TH-225DH	DG-180746	Jul. 15, 18	Jul. 14, 19
Test Software	EZ-EMC	ver.lcp-03A1	N/A	N/A

- 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 749762.



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	XPOS	
MODEL NAME	X2	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion, 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 (FOR WCDMA Band 5)
	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	1364.58mW
	EDGE	198.61mW
	WCDMA	159.59mW
	LTE Band 5 (Channel Bandwidth: 1.4MHz)	197.24mW
	LTE Band 5 (Channel Bandwidth: 3MHz)	198.61mW
	LTE Band 5 (Channel Bandwidth: 5MHz)	225.42mW
	LTE Band 5 (Channel Bandwidth: 10MHz)	203.24mW
EMISSION DESIGNATOR	GSM	245KGXW
	EDGE	254KG7W
	WCDMA	4M23F9W
	LTE Band 5	QPSK: 1M09G7D



	(Channel Bandwidth: 1.4MHz)	16QAM: 1M09W7D
	LTE Band 5 (Channel Bandwidth: 3MHz)	QPSK: 2M68G7D
		16QAM: 2M68W7D
	LTE Band 5 (Channel Bandwidth: 5MHz)	QPSK: 4M47G7D
		16QAM: 4M49W7D
	LTE Band 5 (Channel Bandwidth: 10MHz)	QPSK: 8M95G7D
		16QAM: 8M94W7D
ANTENNA TYPE	FPC Antenna with -0.3dBi gain	
HW VERSION	JP800_MB_V1.1	
SW VERSION	JP800_MB_V1.1	
I/O PORTS	Refer to user's manual	
DATA CABLE	Power cable: non-shielded, detachable, 1.4m	

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.
- Please refer to the EUT photo document (Reference No.: 181102N040) for detailed product photo.
- The EUT was powered by the following adapter:

ADAPTER	
BRAND:	N/A
INPUT:	AC 100-240V~50/60Hz
OUTPUT:	DC 5V,2.0A

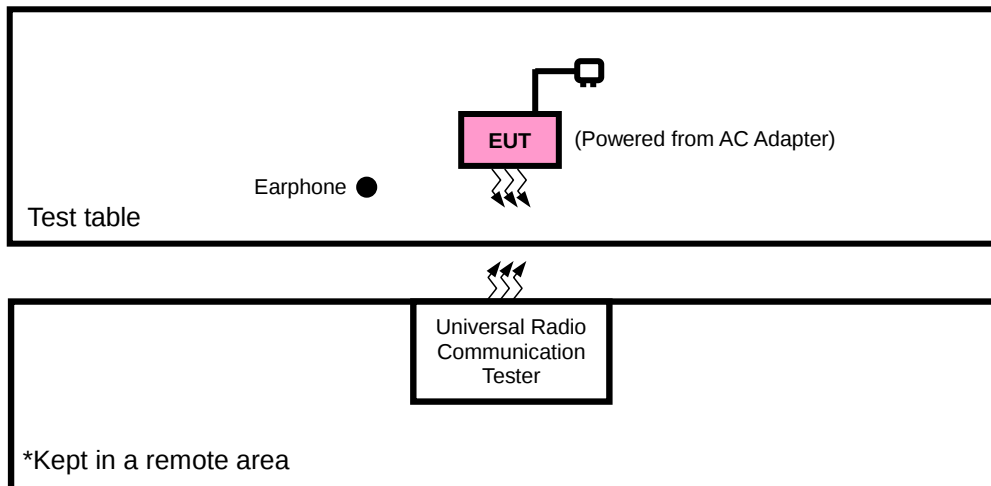
- The EUT matched the following Power cable:

USB CABLE	
RAND:	N/A
MODEL:	N/A
SIGNAL LINE:	1.4 METER

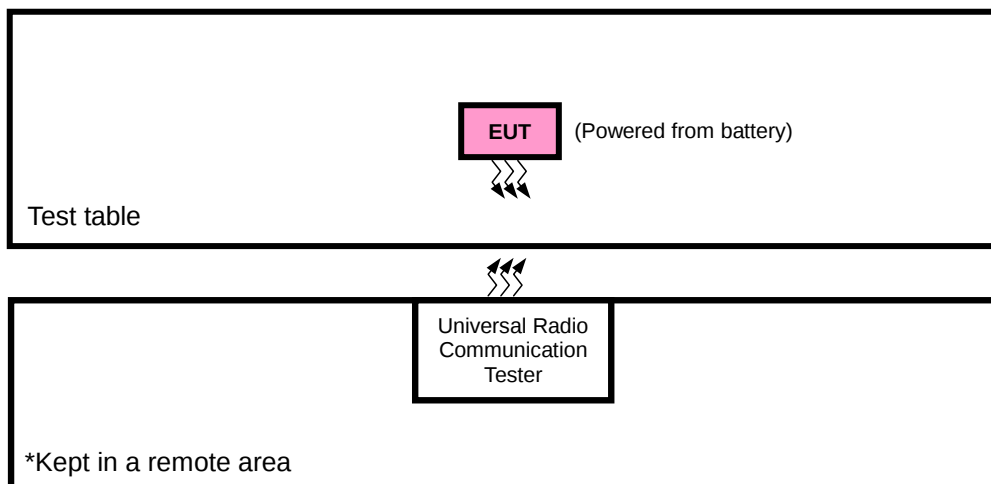
- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



FOR CONDUCTED & E.R.P. TEST



2.3 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	N/A

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 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	CONDUCTED EMISSION	128 to 251	128, 189, 251	GSM, EDGE
A	RADIATED EMISSION	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	PEAK TO AVERAGE RATIO	4132 to 4233	4132, 4182, 4233	WCDMA
B	BAND EDGE	4132 to 4233	4132, 4233	WCDMA
B	CONDCUETED EMISSION	4132 to 4233	4132, 4182, 4233	WCDMA
A	RADIATED EMISSION	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,16QAM	1 RB / 0 RB Offset
	20415 to 20635	20415, 20635	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20425 to 20625	20425, 20625	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
	20450 to 20600	20450, 20600	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
OCCUPIED BANDWIDTH	20407 to 20643	20407, 20525, 20643	1.4MHz	QPSK	6 RB / 0 RB Offset
				16QAM	6 RB / 0 RB Offset
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK	15 RB / 0 RB Offset
				16QAM	15 RB / 0 RB Offset
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK	25 RB / 0 RB Offset
				16QAM	25 RB / 0 RB Offset
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK	50 RB / 0 RB Offset
				16QAM	50 RB / 0 RB Offset

BAND EDGE	20407 to 20643	20407	1.4 MHz	QPSK	1 RB / 0 RB Offset
					6 RB / 0 RB Offset
	20407 to 20643	20643	1.4 MHz	QPSK	1 RB / 5 RB Offset
					6 RB / 0 RB Offset
	20415 to 20635	20415	3 MHz	QPSK	1 RB / 0 RB Offset
					15 RB / 0 RB Offset
	20415 to 20635	20635	3 MHz	QPSK	1 RB / 14 RB Offset
					15 RB / 0 RB Offset
	20425 to 20625	20425	5MHz	QPSK	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
	20425 to 20625	20625	5MHz	QPSK	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
CONDCUDED 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	20525	10MHz	QPSK	1 RB / 0 RB Offset

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	25deg. C, 58%RH	3.8Vdc from Battery	Evans He
FREQUENCY STABILITY	25deg. C, 58%RH	DC 3.3V/3.8V/4.3V	Aaron Liang
OCCUPIED BANDWIDTH	25deg. C, 58%RH	3.8Vdc from Battery	Aaron Liang
BAND EDGE	25deg. C, 58%RH	3.8Vdc from Battery	Aaron Liang
CONDCUDED EMISSION	25deg. C, 58%RH	3.8Vdc from Battery	Evans He
RADIATED EMISSION	25deg. C, 61%RH	5Vdc from adapter	Evans He



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 v03

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

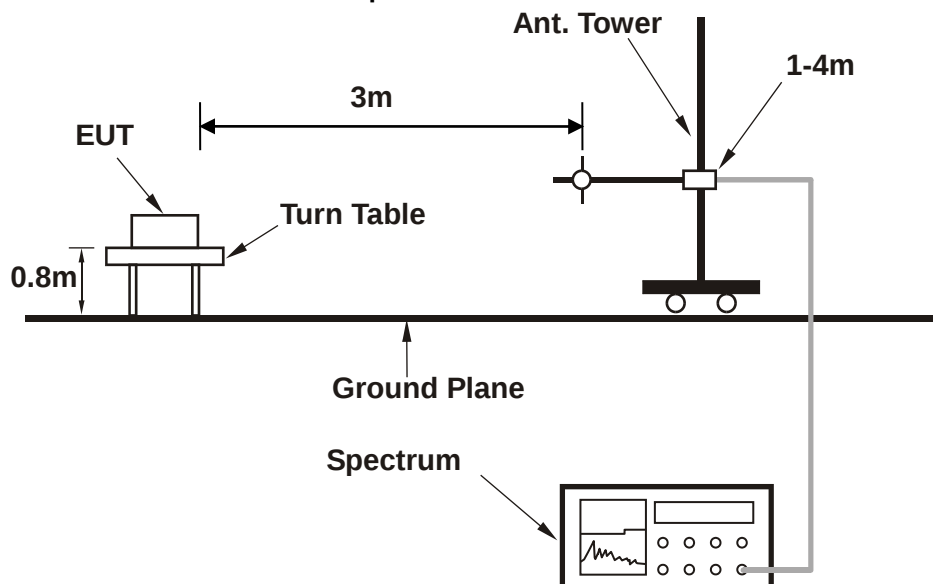
CONDUCTED POWER MEASUREMENT:

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.

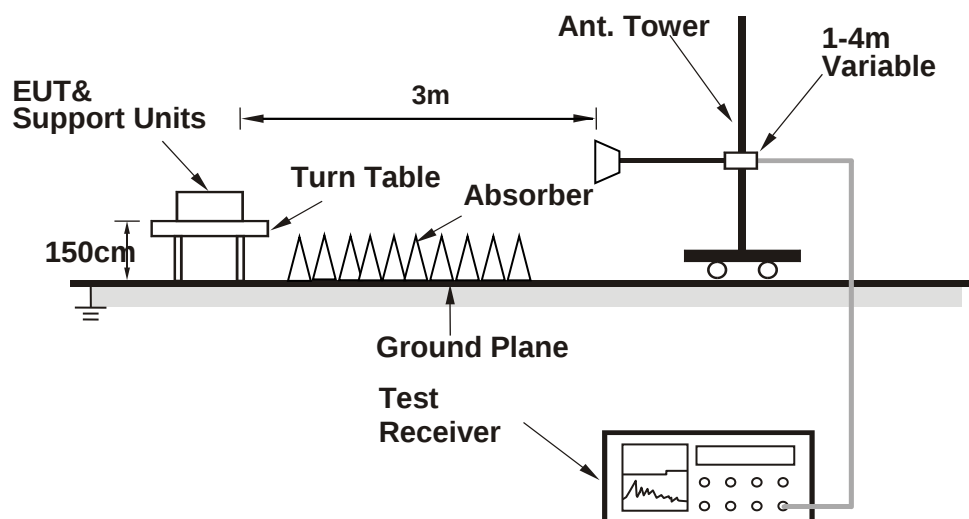
3.1.3 TEST SETUP

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

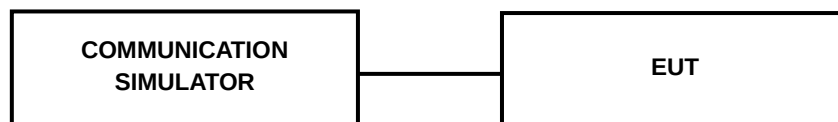


<Radiated Emission above 1 GHz>



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

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GPRS 8	32.54	32.59	32.55
GPRS 10	30.20	30.25	30.21
GPRS 11	28.37	28.42	28.38
GPRS 12	27.82	27.87	27.83
EDGE 8 (MCS9)	27.20	27.25	27.21
EDGE 10 (MCS9)	26.40	26.45	26.41
EDGE 11 (MCS9)	24.71	24.76	24.72
EDGE 12 (MCS9)	23.72	23.77	23.73

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	22.94	23.12	22.96
HSPA			
HSDPA Subtest-1	22.88	23.06	22.90
HSDPA Subtest-2	22.86	23.04	22.88
HSDPA Subtest-3	22.74	22.92	22.76
HSDPA Subtest-4	22.12	22.30	22.14
HSUPA Subtest-1	22.42	22.60	22.44
HSUPA Subtest-2	22.20	22.38	22.22
HSUPA Subtest-3	22.87	23.05	22.89
HSUPA Subtest-4	22.19	22.37	22.21
HSUPA Subtest-5	22.67	22.85	22.69

LTE Band 5

Band/BW	Modulation	RB Size	RB Offset	Low CH 20407	Mid CH 20525	High CH 20643	3GPP MPR (dB)
				Frequency 824.7 MHz	Frequency 836.5 MHz	Frequency 848.3 MHz	
5/1.4	QPSK	1	0	23.48	23.52	23.51	0
		1	2	23.42	23.46	23.45	0
		1	5	22.90	22.94	22.93	0
		3	0	22.60	22.64	22.63	0
		3	1	22.58	22.62	22.61	0
		3	3	22.41	22.45	22.44	0
		6	0	22.43	22.47	22.46	1
	16QAM	1	0	22.59	22.63	22.62	1
		1	2	22.66	22.70	22.69	1
		1	5	22.26	22.30	22.29	1
		3	0	21.52	21.56	21.55	1
		3	1	21.60	21.64	21.63	1
		3	3	21.50	21.54	21.53	1
		6	0	21.54	21.58	21.57	2
Band/BW	Modulation	RB Size	RB Offset	Low CH 20415	Mid CH 20525	High CH 20635	3GPP MPR (dB)
				Frequency 825.5 MHz	Frequency 836.5 MHz	Frequency 847.5 MHz	
5/3	QPSK	1	0	23.52	23.56	23.55	0
		1	7	23.46	23.50	23.49	0
		1	14	22.94	22.98	22.97	0
		8	0	22.62	22.66	22.65	1
		8	3	22.60	22.64	22.63	1
		8	7	22.43	22.47	22.46	1
		15	0	22.45	22.49	22.48	1
	16QAM	1	0	22.63	22.67	22.66	1
		1	7	22.70	22.74	22.73	1
		1	14	22.30	22.34	22.33	1
		8	0	21.53	21.57	21.56	2
		8	3	21.61	21.65	21.64	2
		8	7	21.51	21.55	21.54	2
		15	0	21.55	21.59	21.58	2

Band/BW	Modulation	RB Size	RB Offset	Low CH 20425	Mid CH 20525	High CH 20625	3GPP MPR (dB)
				Frequency 826.5 MHz	Frequency 836.5 MHz	Frequency 846.5 MHz	
5/5	QPSK	1	0	23.58	23.62	23.61	0
		1	12	23.52	23.56	23.55	0
		1	24	23.00	23.04	23.03	0
		12	0	22.68	22.72	22.71	1
		12	6	22.66	22.70	22.69	1
		12	13	22.49	22.53	22.52	1
		25	0	22.51	22.55	22.54	1
	16QAM	1	0	22.69	22.73	22.72	1
		1	12	22.76	22.80	22.79	1
		1	24	22.36	22.40	22.39	1
		12	0	21.59	21.63	21.62	2
		12	6	21.67	21.71	21.70	2
		12	13	21.57	21.61	21.60	2
		25	0	21.61	21.65	21.64	2
Band/BW	Modulation	RB Size	RB Offset	Low CH 20450	Mid CH 20525	High CH 20600	3GPP MPR (dB)
				Frequency 829 MHz	Frequency 836.5 MHz	Frequency 844 MHz	
5/10	QPSK	1	0	23.61	23.65	23.64	0
		1	24	23.55	23.59	23.58	0
		1	49	23.03	23.07	23.06	0
		25	0	22.71	22.75	22.74	1
		25	12	22.69	22.73	22.72	1
		25	25	22.52	22.56	22.55	1
		50	0	22.54	22.58	22.57	1
	16QAM	1	0	22.72	22.76	22.75	1
		1	24	22.79	22.83	22.82	1
		1	49	22.39	22.43	22.42	1
		25	0	21.62	21.66	21.65	2
		25	12	21.70	21.74	21.73	2
		25	25	21.60	21.64	21.63	2
		50	0	21.64	21.68	21.67	2

ERP POWER (dBm)

GSM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
128	824.2	-3.8	34.43	28.48	704.69	H
189	836.4	-5.06	35.66	28.45	699.84	H
251	848.8	-5.39	35.73	28.19	659.17	H
128	824.2	-2.19	35.21	30.87	1221.8	V
189	836.4	-2.53	36.03	31.35	1364.58	V
251	848.8	-1.46	34.89	31.28	1342.76	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)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
128	824.2	-11.17	34.43	21.11	129.12	H
189	836.4	-13.12	35.66	20.39	109.4	H
251	848.8	-11.61	35.73	21.97	157.4	H
128	824.2	-11.09	35.21	21.97	157.4	V
189	836.4	-12.1	36.03	21.78	150.66	V
251	848.8	-9.76	34.89	22.98	198.61	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

WCDMA

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
4132	826.4	-13.06	35.05	19.84	96.38	H
4182	836.4	-12.2	34.84	20.49	111.94	H
4233	846.6	-11.92	34.51	20.44	110.66	H
4132	826.4	-11.19	35.36	22.02	159.22	V
4182	836.4	-11.19	35.18	21.84	152.76	V
4233	846.6	-10.61	34.79	22.03	159.59	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

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20407	824.7	-9.51	33.81	22.15	164.06	H	7
20525	836.5	-9.8	33.81	21.86	153.46	H	7
20643	848.3	-8.66	32.81	22	158.49	H	7
20407	824.7	-9.65	34.63	22.83	191.87	V	7
20525	836.5	-9.05	33.81	22.61	182.39	V	7
20643	848.3	-10.86	34.83	21.82	152.05	V	7

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20407	824.7	-9.95	33.53	21.43	139	H	7
20525	836.5	-9.69	33.81	21.97	157.4	H	7
20643	848.3	-9.17	33.11	21.79	151.01	H	7
20407	824.7	-9.94	34.43	22.34	171.4	V	7
20525	836.5	-9.17	33.81	22.49	177.42	V	7
20643	848.3	-10.02	35.12	22.95	197.24	V	7

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20415	825.5	-10.16	34.09	21.78	150.66	H	7
20525	836.5	-9.69	33.81	21.97	157.4	H	7
20635	847.5	-9.57	33.55	21.83	152.41	H	7
20415	825.5	-10.2	34.48	22.13	163.31	V	7
20525	836.5	-9.74	33.81	21.92	155.6	V	7
20635	847.5	-9.64	34.77	22.98	198.61	V	7

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20415	825.5	-32.29	34.2	21.89	154.53	H	7
20525	836.5	-9.17	33.81	22.49	177.42	H	7
20635	847.5	-8.89	33.31	22.27	168.66	H	7
20415	825.5	-10.42	34.63	22.06	160.69	V	7
20525	836.5	-9.46	33.81	22.2	165.96	V	7
20635	847.5	-10.1	34.62	22.37	172.58	V	7

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20425	826.5	-10.4	33.71	21.16	130.62	H	7
20525	836.5	-10.05	33.81	21.61	144.88	H	7
20625	846.5	-9.87	33.76	21.74	149.28	H	7
20425	826.5	-9.54	34.92	23.23	210.38	V	7
20525	836.5	-9.6	33.81	22.06	160.69	V	7
20625	846.5	-10.33	34.47	21.99	158.12	V	7

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20425	826.5	-9.62	33.49	21.72	148.59	H	7
20525	836.5	-10.14	33.81	21.52	141.91	H	7
20625	846.5	-9.61	34.03	22.27	168.66	H	7
20425	826.5	-10.86	34.67	21.66	146.55	V	7
20525	836.5	-14.96	40.64	23.53	225.42	V	7
20625	846.5	-10.17	34.27	21.95	156.68	V	7

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20450	829	-9.68	33.37	21.54	142.56	H	7
20525	836.5	-10.09	33.81	21.57	143.55	H	7
20600	844	-8.76	33.06	22.15	164.06	H	7
20450	829	-10.88	35.02	21.99	158.12	V	7
20525	836.5	-8.58	33.81	23.08	203.24	V	7
20600	844	-10.54	34.82	22.13	163.31	V	7

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)	LIMIT (W)
20450	829	-8.58	33.06	22.33	171	H	7
20525	836.5	-9.94	33.81	21.72	148.59	H	7
20600	844	-7.95	32.6	22.5	177.83	H	7
20450	829	-9.9	34.69	22.64	183.65	V	7
20525	836.5	-9.15	33.81	22.51	178.24	V	7
20600	844	-10.19	34.92	22.58	181.13	V	7

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

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

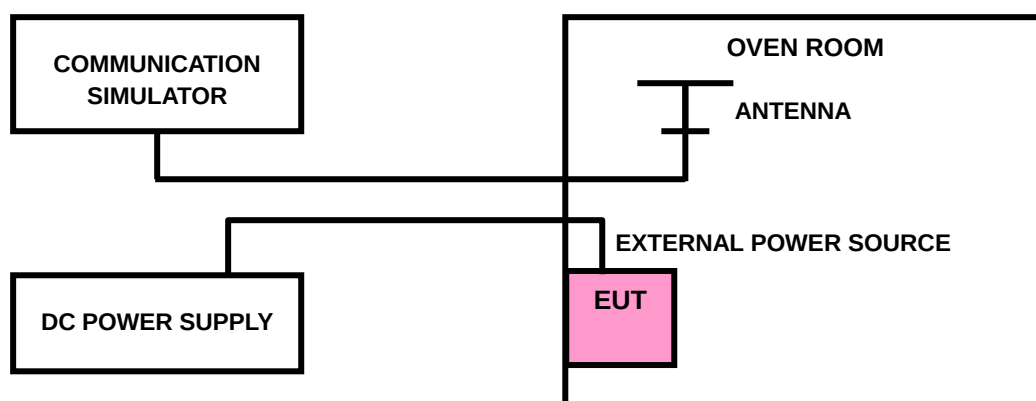
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

3.2.2 TEST PROCEDURE

- 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.
- 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.
- 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



**3.2.4 TEST RESULTS****GSM 850****FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.8	-0.0047	0.0020	2.5
3.3(BEP)	-0.0031	0.0017	2.5
4.3	0.0052	0.0005	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	0.0032	-0.0042	2.5
-20	0.0041	-0.0001	2.5
-10	0.0049	0.0015	2.5
0	0.0012	-0.0011	2.5
10	0.0043	0.0026	2.5
20	0.0042	-0.0010	2.5
30	0.0035	-0.0035	2.5
40	0.0017	0.0026	2.5
50	0.0063	-0.0015	2.5
60	0.0078	-0.0045	2.5

**EDGE 850****FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.8	-0.0055	-0.0043	2.5
3.3(BEP)	-0.0050	-0.0036	2.5
4.3	0.0088	-0.0005	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	-0.0028	-0.0016	2.5
-20	-0.0045	0.0041	2.5
-10	0.0024	0.0021	2.5
0	-0.0032	-0.0019	2.5
10	0.0017	-0.0016	2.5
20	0.0023	-0.0019	2.5
30	0.0021	0.0022	2.5
40	-0.0044	-0.0012	2.5
50	0.0044	-0.0014	2.5
60	0.0042	-0.0037	2.5



WCDMA

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
3.8	0.0004	0.0040	2.5
3.3(BEP)	-0.0008	-0.0034	2.5
4.3	0.0035	-0.0020	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	FREQUENCY ERROR (ppm)		LIMIT (ppm)
	Low Channel	High Channel	
-30	0.0045	0.0014	2.5
-20	0.0024	-0.0010	2.5
-10	0.0031	-0.0015	2.5
0	0.0034	-0.0050	2.5
10	0.0042	-0.0026	2.5
20	0.0056	0.0005	2.5
30	-0.0046	0.0001	2.5
40	-0.0049	-0.0006	2.5
50	0.0043	0.0043	2.5



LTE Band 5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0055	0.0008	2.5
3.3(BEP)	0.0020	-0.0022	2.5
4.3	0.0016	-0.0028	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	1.4MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	0.0048	0.0039	2.5
-20	-0.0021	-0.0044	2.5
-10	0.0024	-0.0016	2.5
0	0.0030	-0.0042	2.5
10	0.0041	-0.0002	2.5
20	0.0045	-0.0005	2.5
30	-0.0037	-0.0016	2.5
40	0.0015	0.0046	2.5
50	0.0065	0.0005	2.5

**FREQUENCY ERROR VS. VOLTAGE**

VOLTAGE (Volts)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0015	0.0005	2.5
3.3(BEP)	-0.0019	0.0008	2.5
4.3	0.0086	-0.0014	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	3MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0021	-0.0021	2.5
-20	-0.0017	0.0031	2.5
-10	0.0014	-0.0044	2.5
0	-0.0015	0.0034	2.5
10	-0.0022	0.0032	2.5
20	0.0052	0.0003	2.5
30	0.0036	-0.0055	2.5
40	-0.0025	0.0040	2.5
50	0.0072	0.0010	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0038	0.0039	2.5
3.3(BEP)	0.0020	0.0007	2.5
4.3	0.0052	0.0040	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	0.0007	-0.0005	2.5
-20	-0.0028	-0.0045	2.5
-10	0.0011	-0.0035	2.5
0	0.0027	0.0005	2.5
10	-0.0021	0.0039	2.5
20	0.0060	-0.0020	2.5
30	-0.0041	-0.0009	2.5
40	-0.0029	0.0008	2.5
50	0.0090	-0.0041	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0026	0.0039	2.5
3.3(BEP)	0.0046	-0.0006	2.5
4.3	0.0028	-0.0013	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

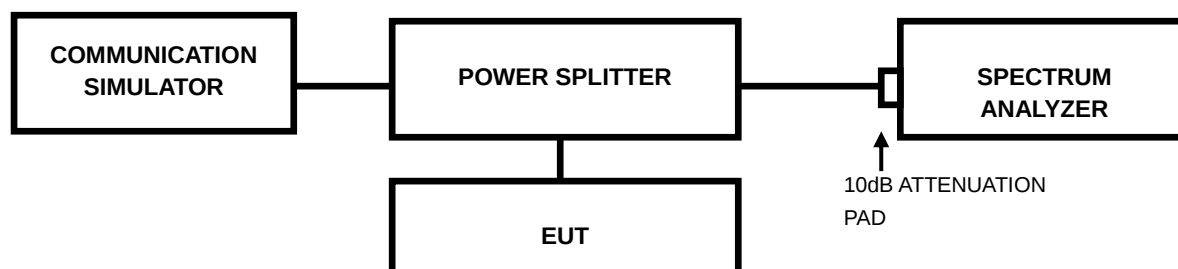
TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0007	0.0003	2.5
-20	-0.0024	-0.0025	2.5
-10	0.0044	0.0035	2.5
0	-0.0030	0.0018	2.5
10	-0.0041	0.0042	2.5
20	0.0057	0.0000	2.5
30	-0.0008	0.0018	2.5
40	0.0031	0.0046	2.5
50	0.0062	0.0026	2.5

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.

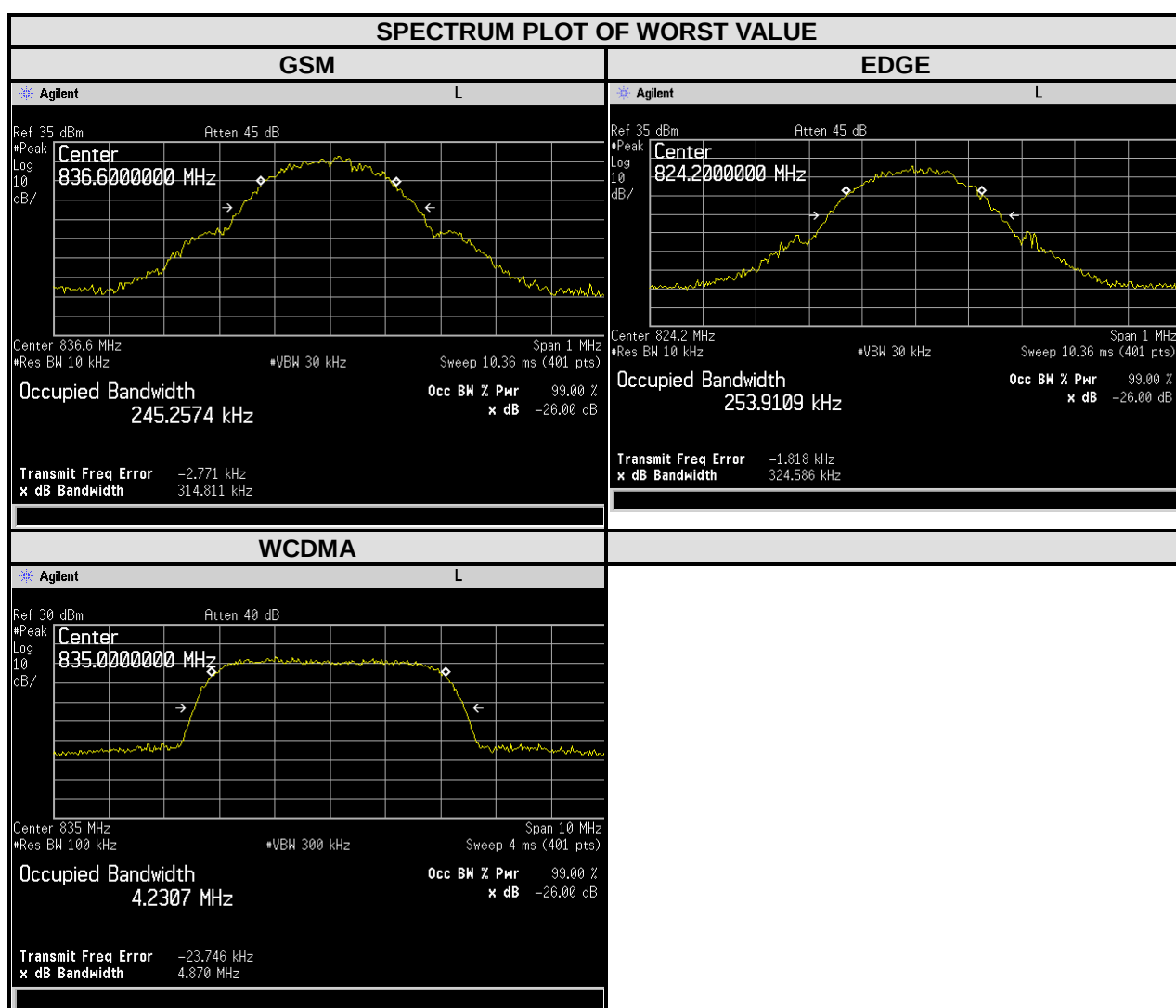
3.3.2 TEST SETUP



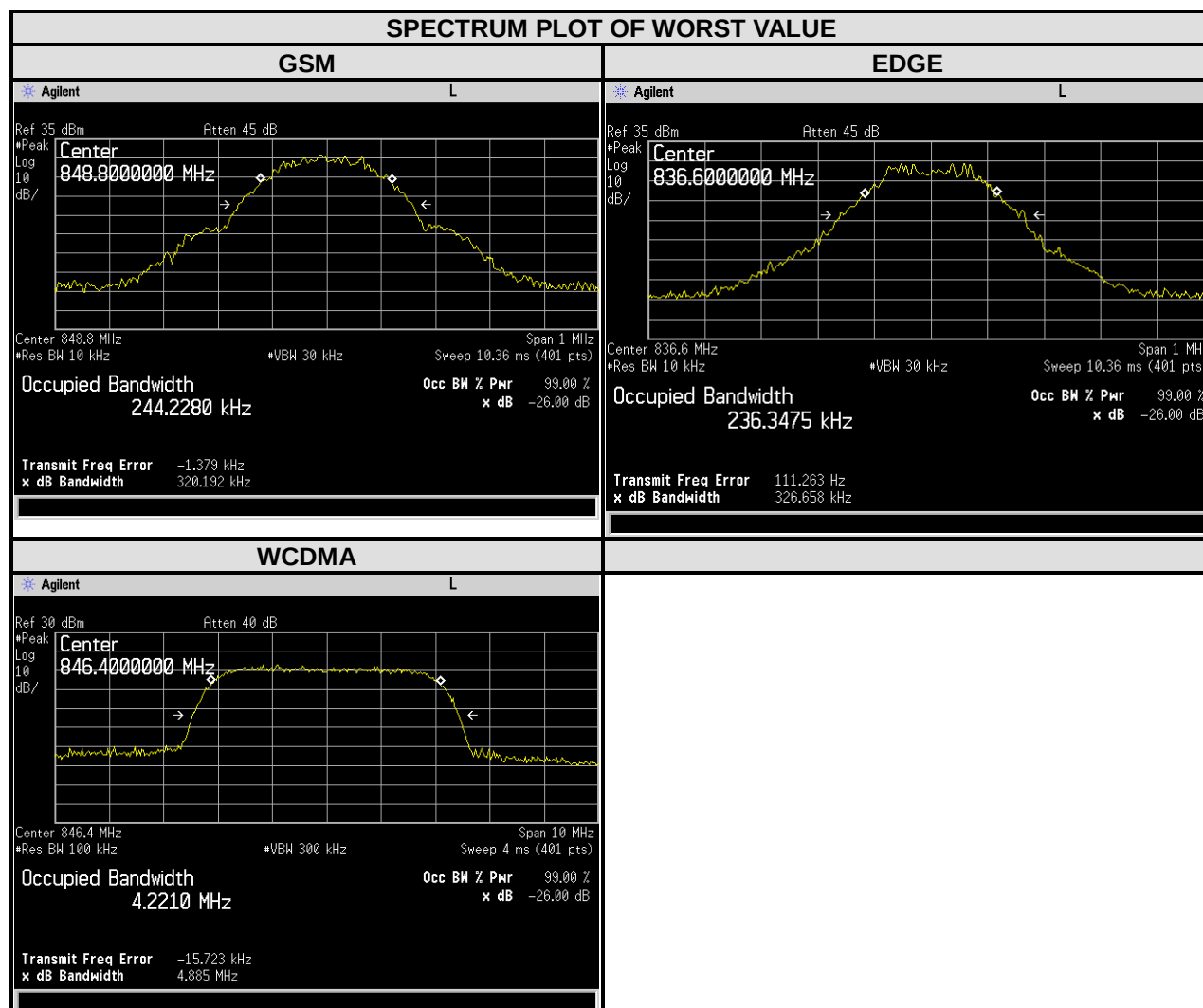
3.3.3 TEST RESULTS

GSM

CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (kHz)		CHANNEL	Frequency (MHz)	99% OCCUPIED Bandwidth (MHz)
		GSM	EDGE			WCDMA
128	824.2	245.000	253.911	4132	826.6	4.198
189	836.6	245.257	236.348	4182	835	4.231
251	848.8	244.228	248.807	4233	846.4	4.221



CHANNEL	Frequency (MHz)	26dB Bandwidth (kHz)		CHANNEL	Frequency (MHz)	26dB Bandwidth (MHz)
		GSM	EDGE			
128	824.2	317.187	324.586	4132	826.6	4.868
189	836.6	314.811	326.658	4182	835	4.870
251	848.8	320.192	312.752	4233	846.4	4.885



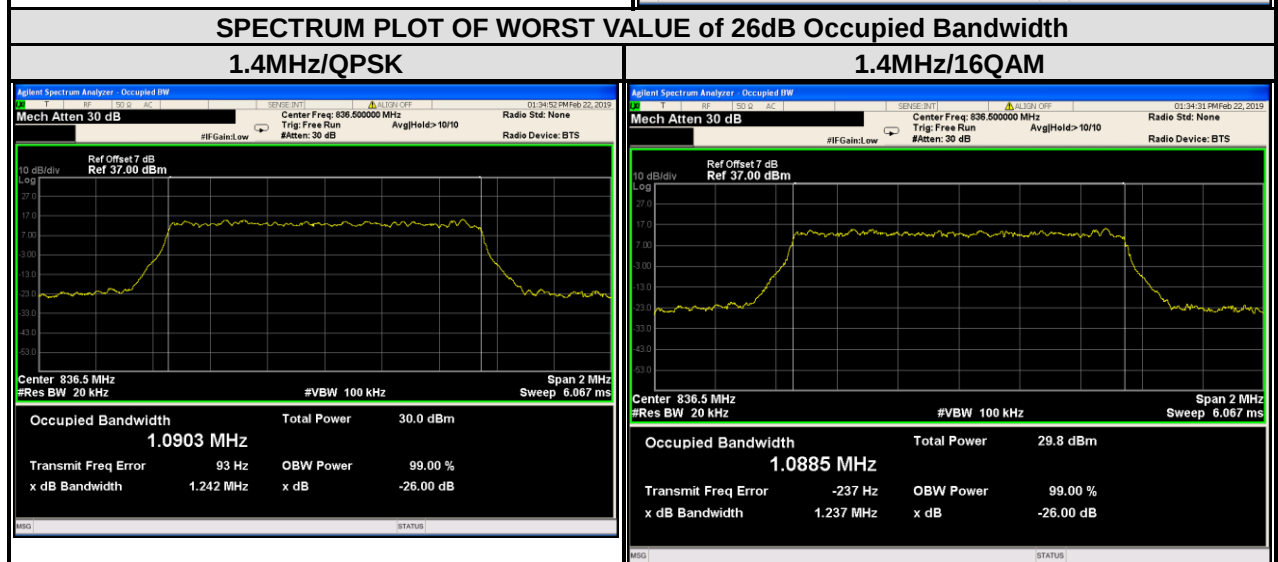
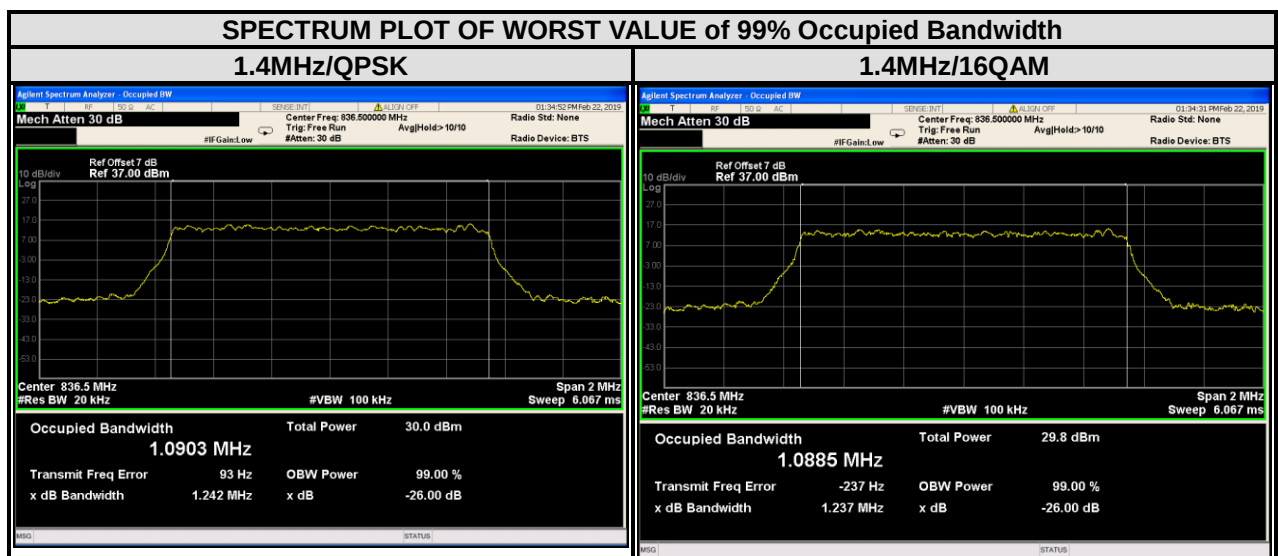


BUREAU
VERITAS

Test Report No.: RF181102N040-7_R1

LTE BAND 5

LTE band 5							
Channel Bandwidth : 1.4MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26 dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20407	824.7	1.0832	1.0862	20407	824.7	1.210	1.201
20525	836.5	1.0903	1.0885	20525	836.5	1.242	1.237
20643	848.3	1.0866	1.0824	20643	848.3	1.232	1.215



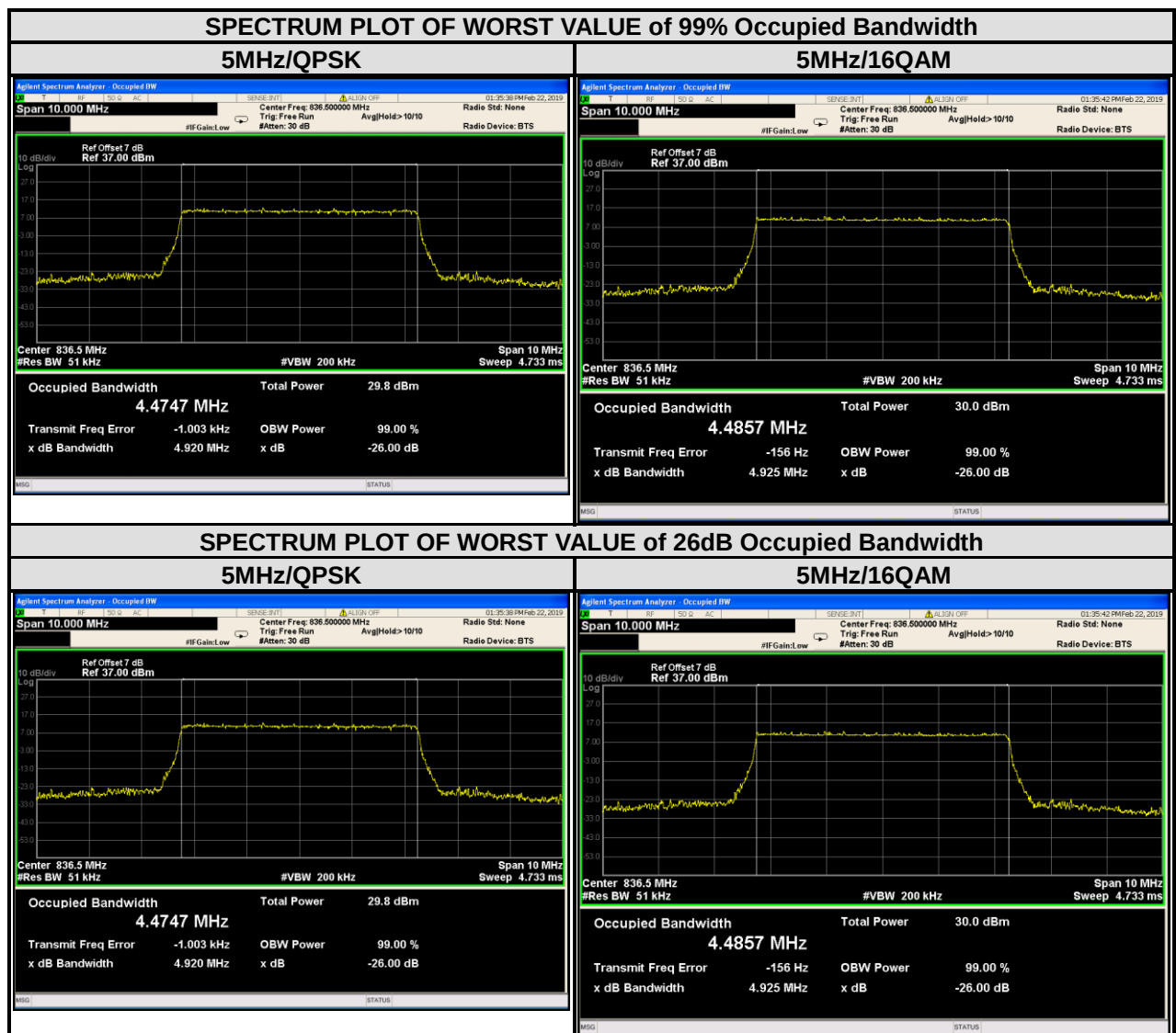


LTE band 5							
Channel Bandwidth : 3MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26 dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20415	825.5	2.6733	2.6822	20415	825.5	2.821	2.814
20525	836.5	2.6784	2.6808	20525	836.5	2.885	2.887
20635	847.5	2.6712	2.6833	20635	847.5	2.830	2.830



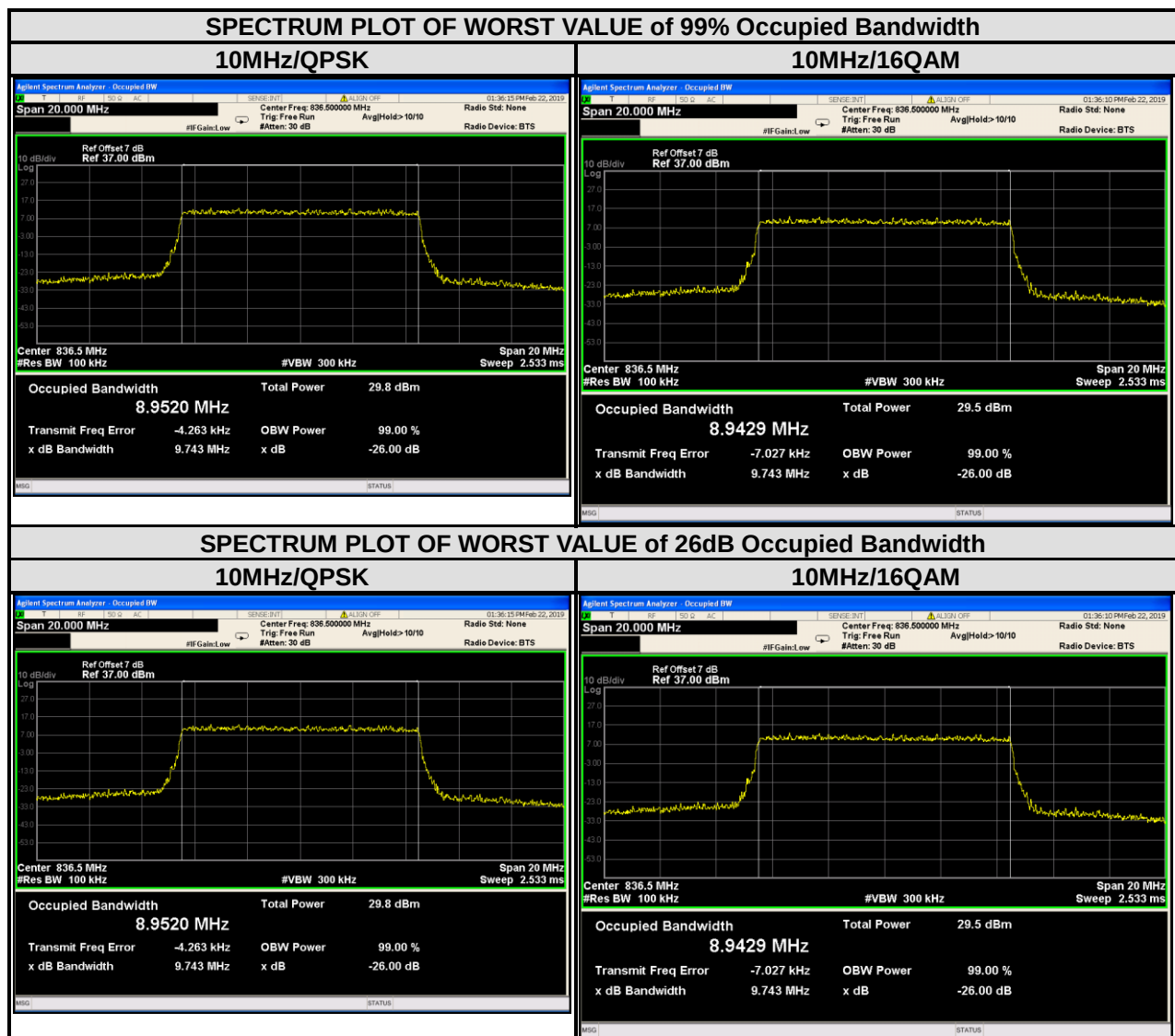


LTE band 5							
Channel Bandwidth : 5 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26 dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20425	826.5	4.4735	4.4836	20425	826.5	4.830	4.875
20525	836.5	4.4747	4.4857	20525	836.5	4.920	4.925
20625	846.5	4.4715	4.4827	20625	846.5	4.892	4.871





LTE band 5							
Channel Bandwidth : 10 MHz							
Channel	Frequency (MHz)	99% Occupied bandwidth (MHz)		Channel	Frequency (MHz)	26 dB bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
20450	829	8.9268	8.9233	20450	829	9.701	9.602
20525	836.5	8.9520	8.9429	20525	836.5	9.743	9.743
20600	844	8.9345	8.9410	20600	844	9.710	9.721

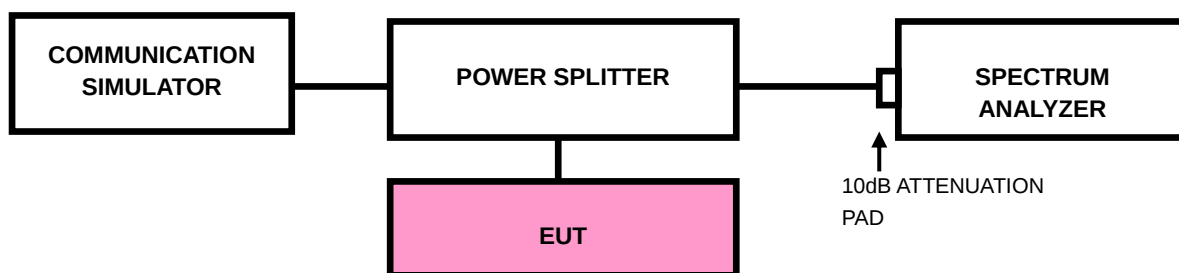


3.4 BAND EDGE MEASUREMENT

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

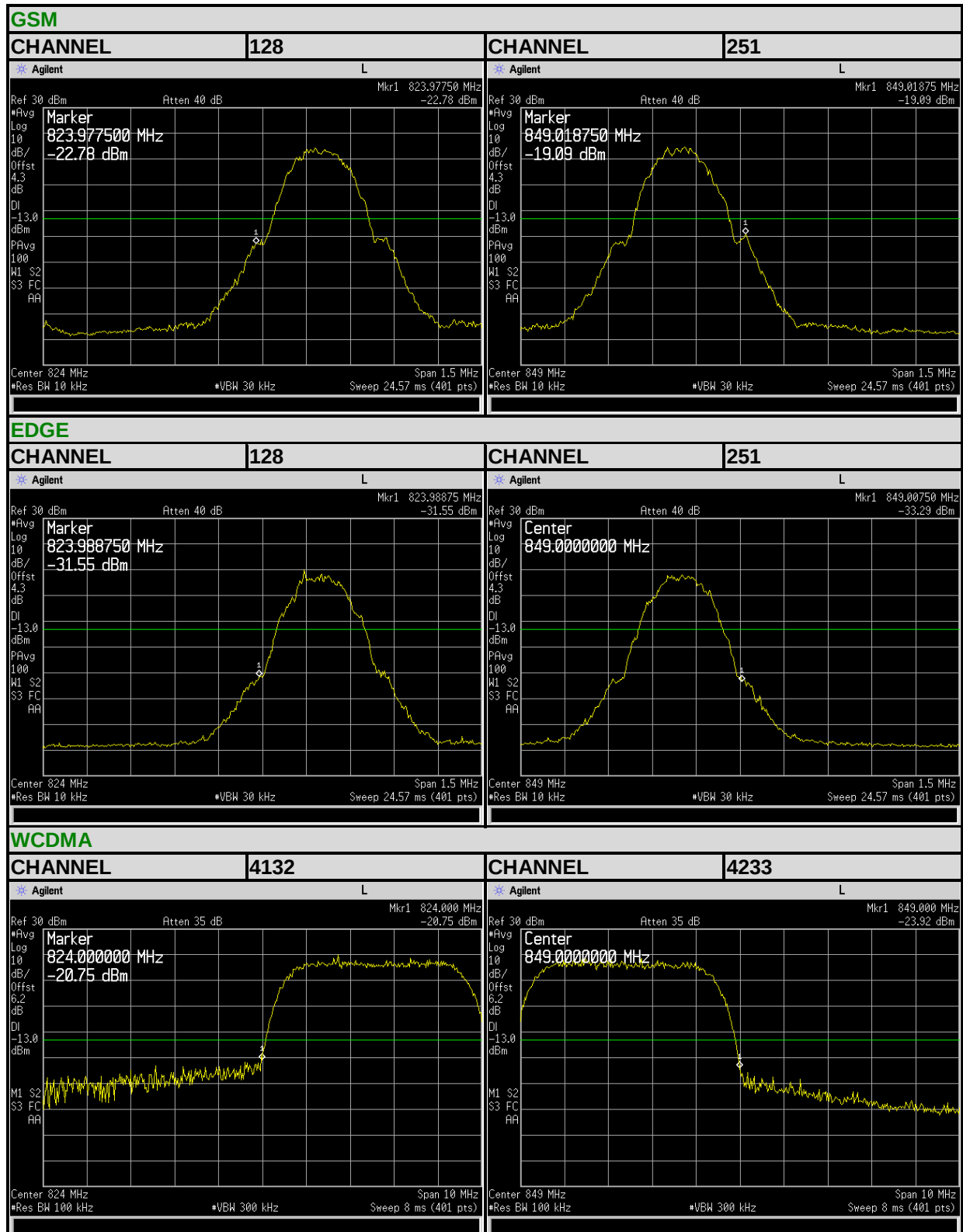


3.4.3 TEST PROCEDURES

- 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





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Test Report No.: RF181102N040-7_R1

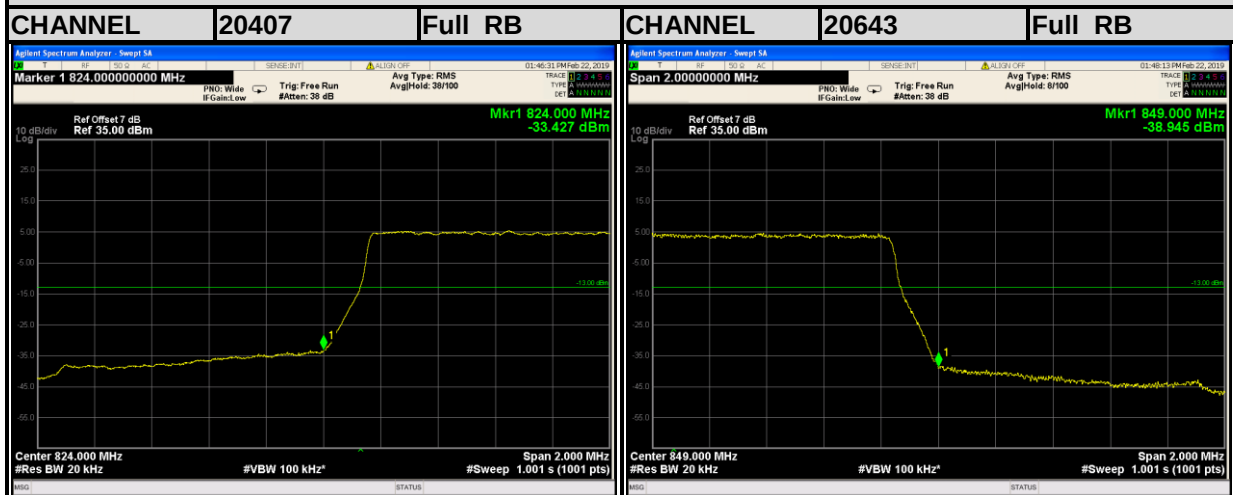
LTE Band5

Channel Bandwidth: 1.4MHz



LTE Band5

Channel Bandwidth: 1.4MHz





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Test Report No.: RF181102N040-7_R1

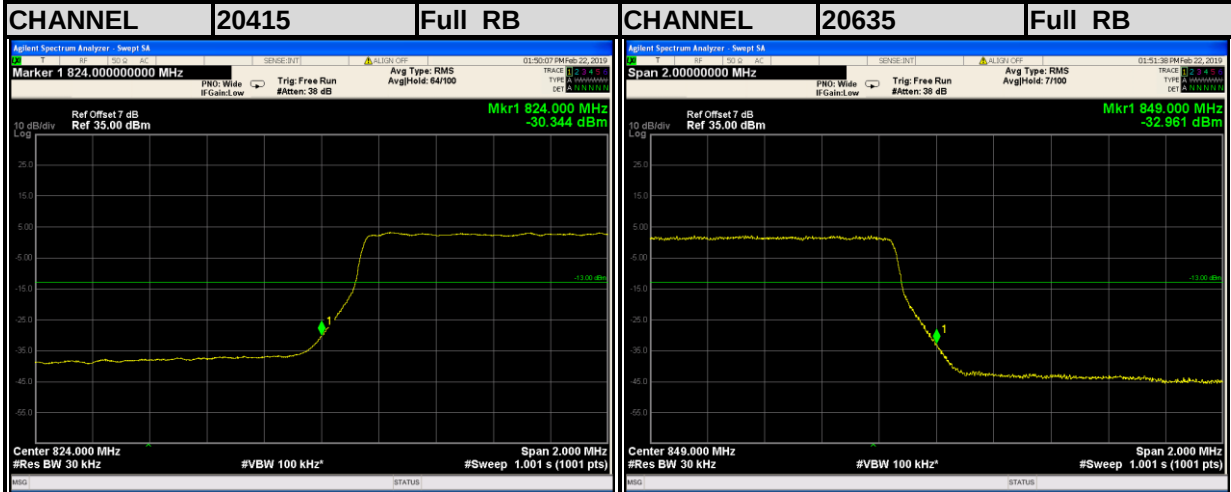
LTE Band5

Channel Bandwidth: 3MHz



LTE Band5

Channel Bandwidth: 3MHz





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Test Report No.: RF181102N040-7_R1

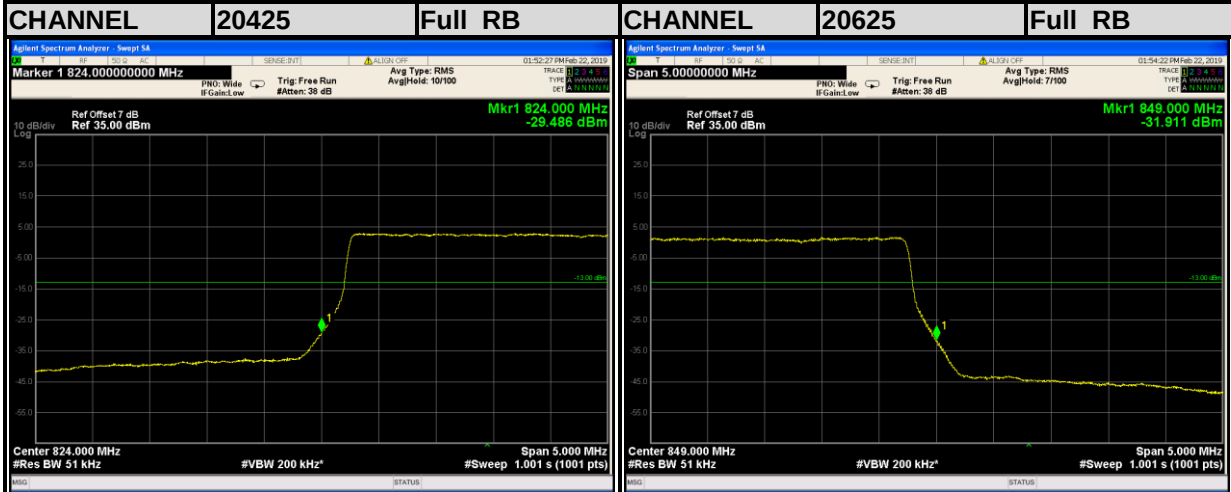
LTE Band5

Channel Bandwidth: 5MHz



LTE Band5

Channel Bandwidth: 5MHz





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Test Report No.: RF181102N040-7_R1

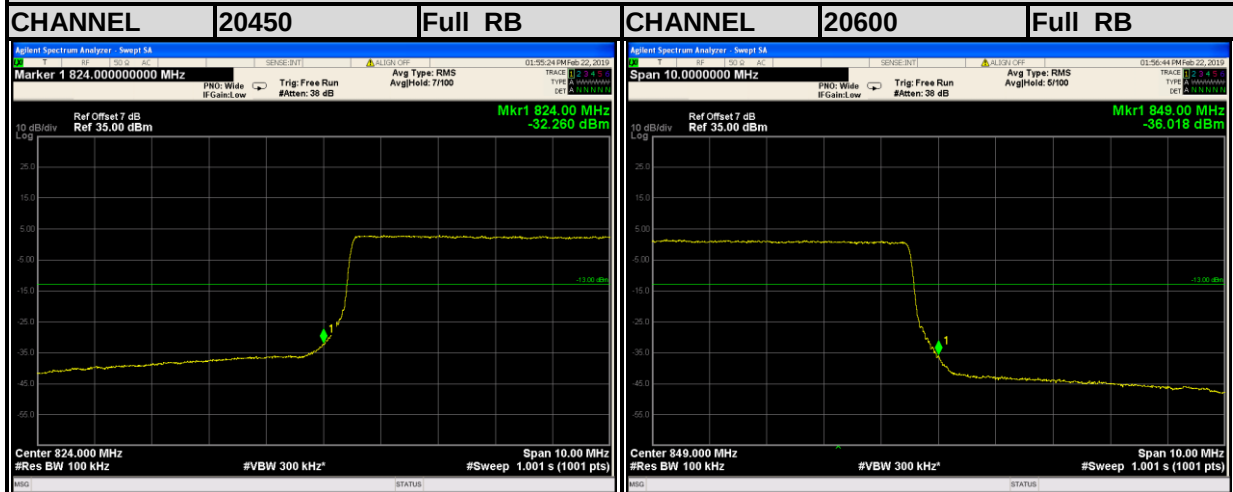
LTE Band5

Channel Bandwidth: 10MHz



LTE Band5

Channel Bandwidth: 10MHz



3.5 CONDUCTED SPURIOUS EMISSIONS

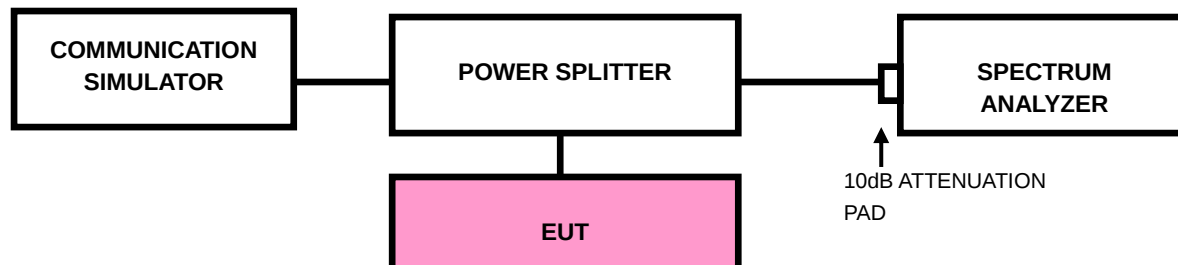
3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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

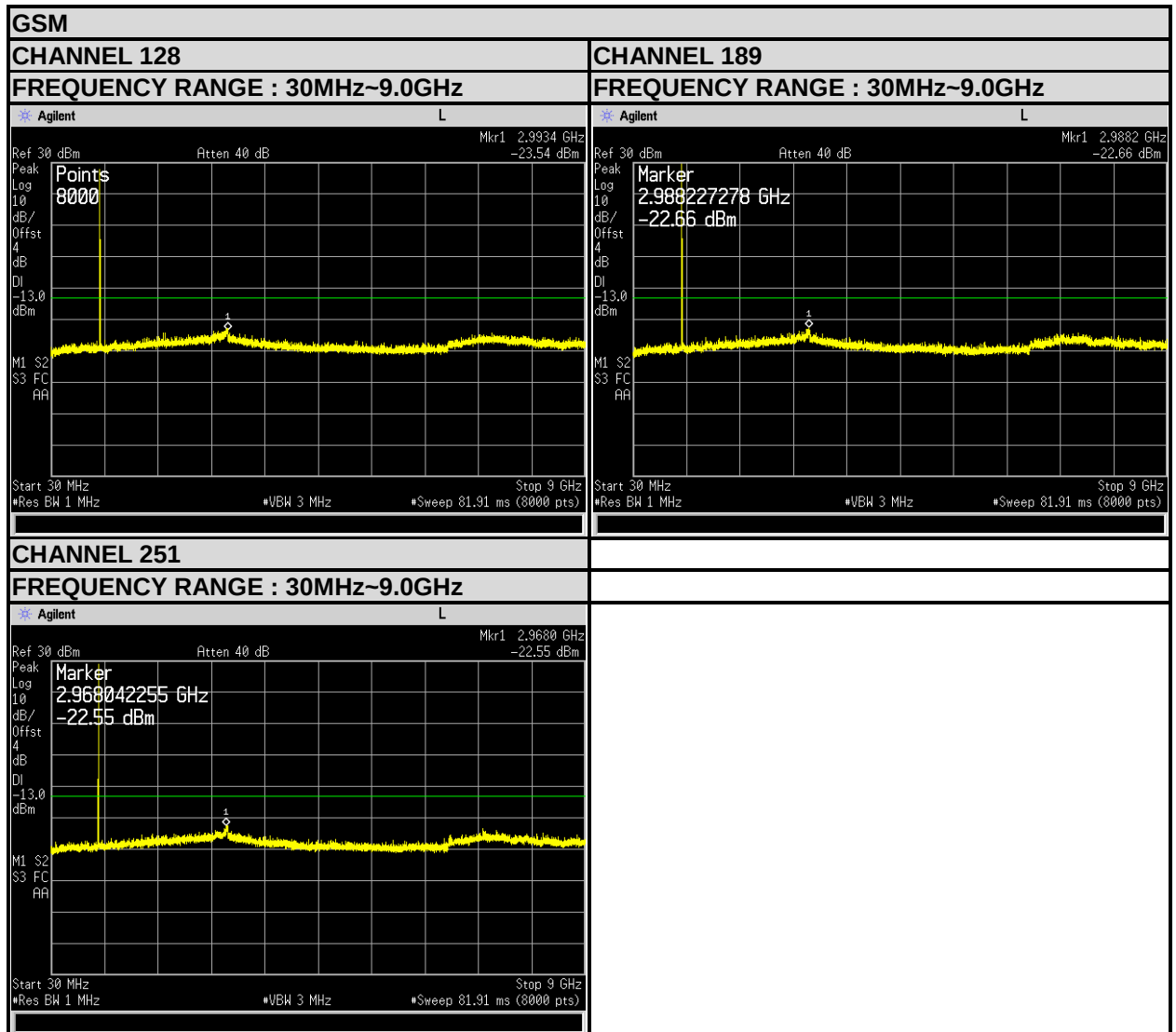
- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 9 kHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

3.5.3 TEST SETUP





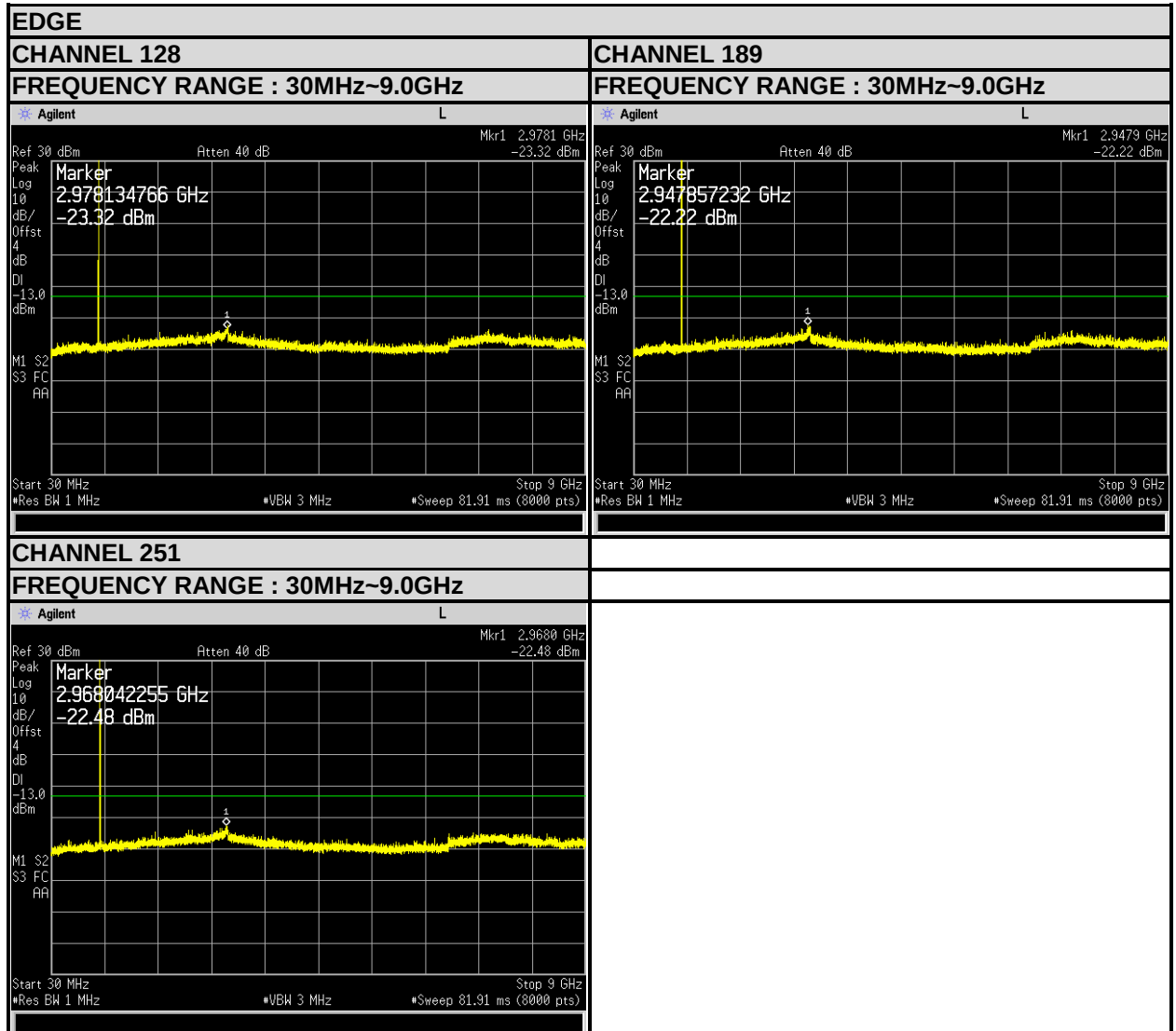
3.5.4 TEST RESULTS

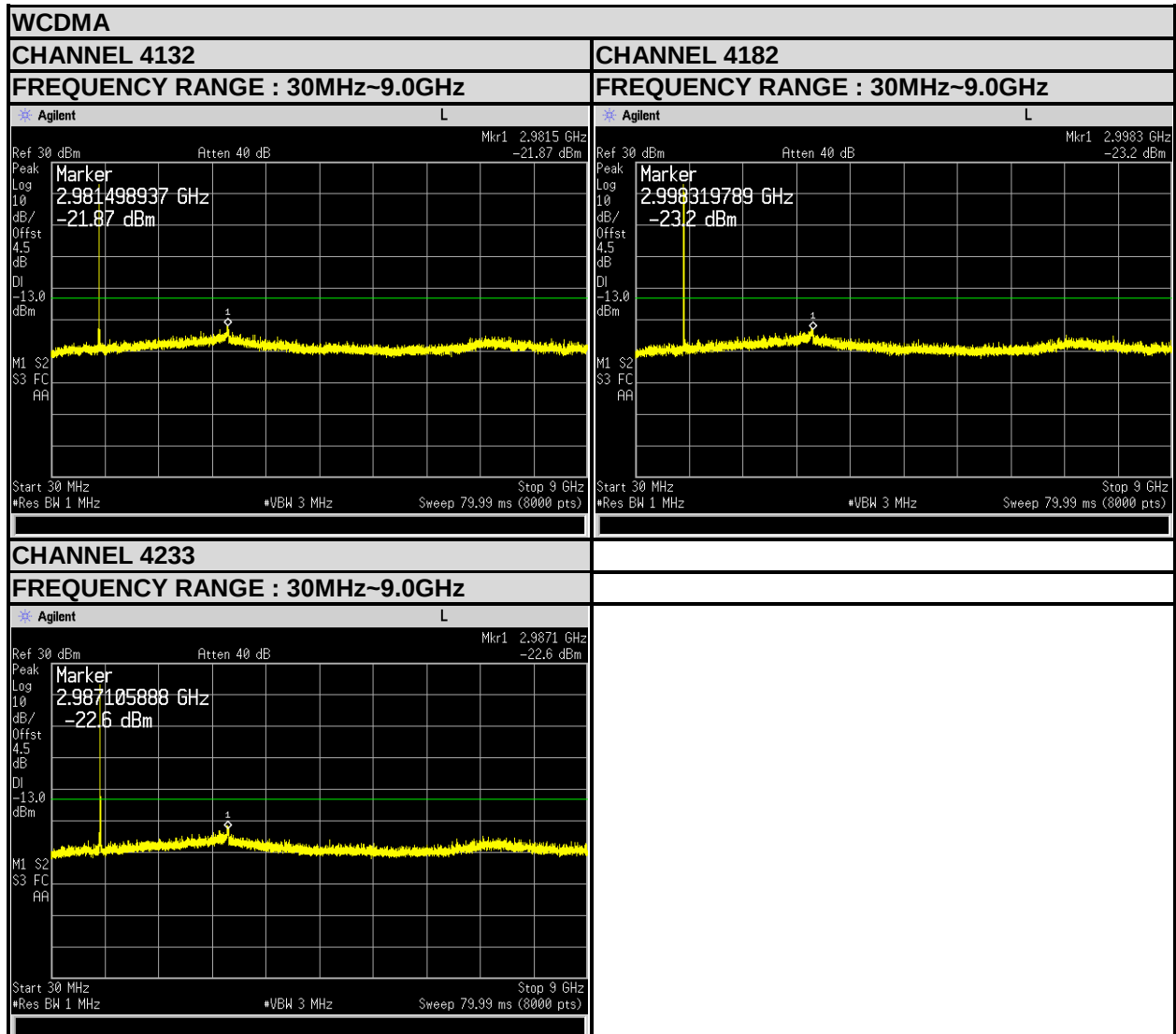




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Test Report No.: RF181102N040-7_R1

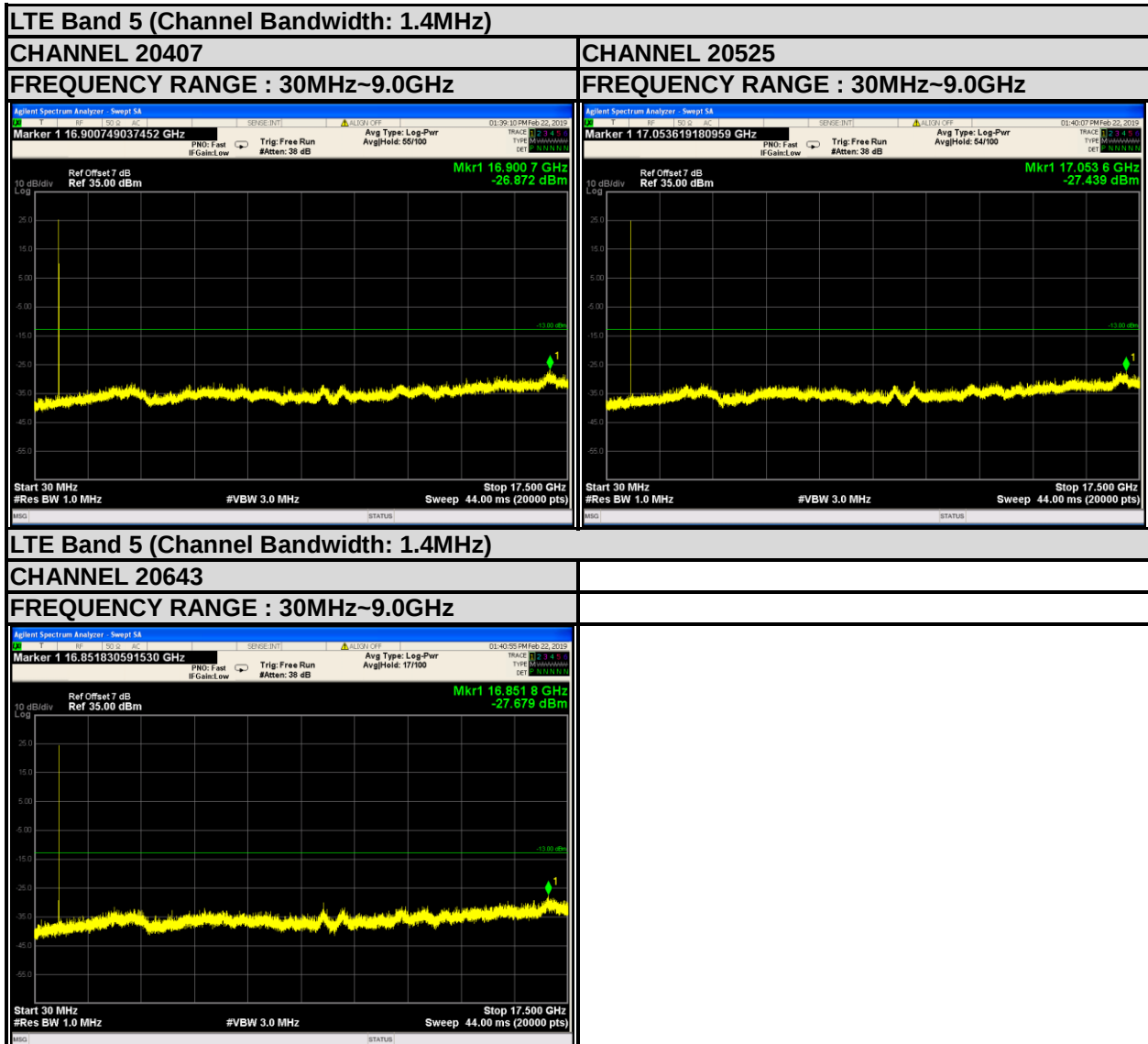






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Test Report No.: RF181102N040-7_R1





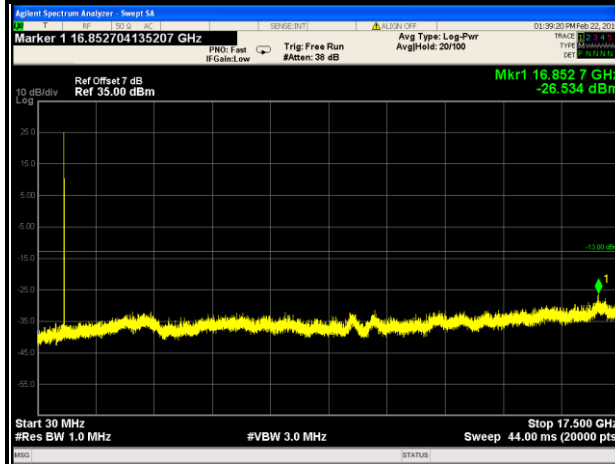
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LTE Band 5 (Channel Bandwidth: 3MHz)

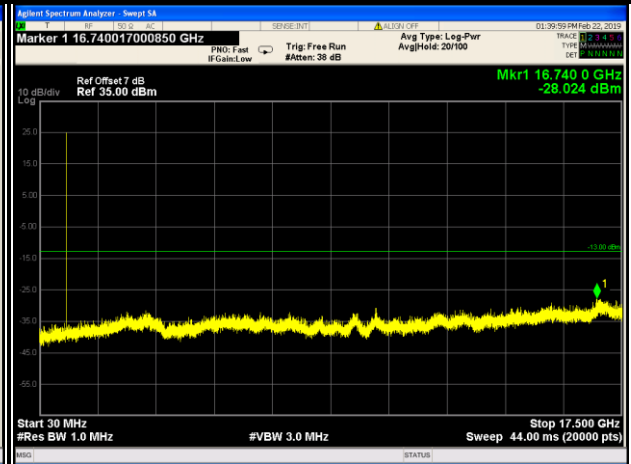
CHANNEL 20415

FREQUENCY RANGE : 30MHz~9.0GHz



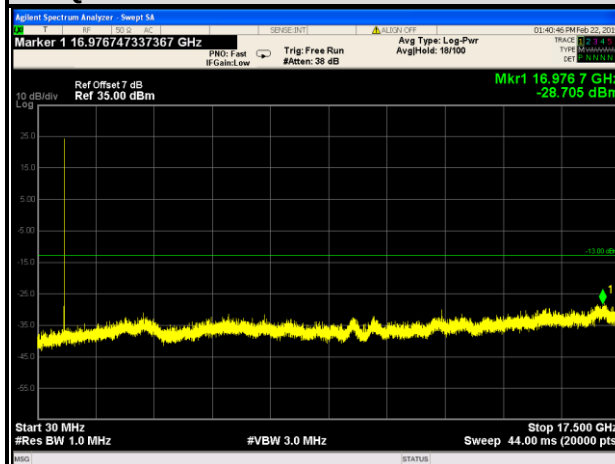
CHANNEL 20525

FREQUENCY RANGE : 30MHz~9.0GHz



CHANNEL 20635

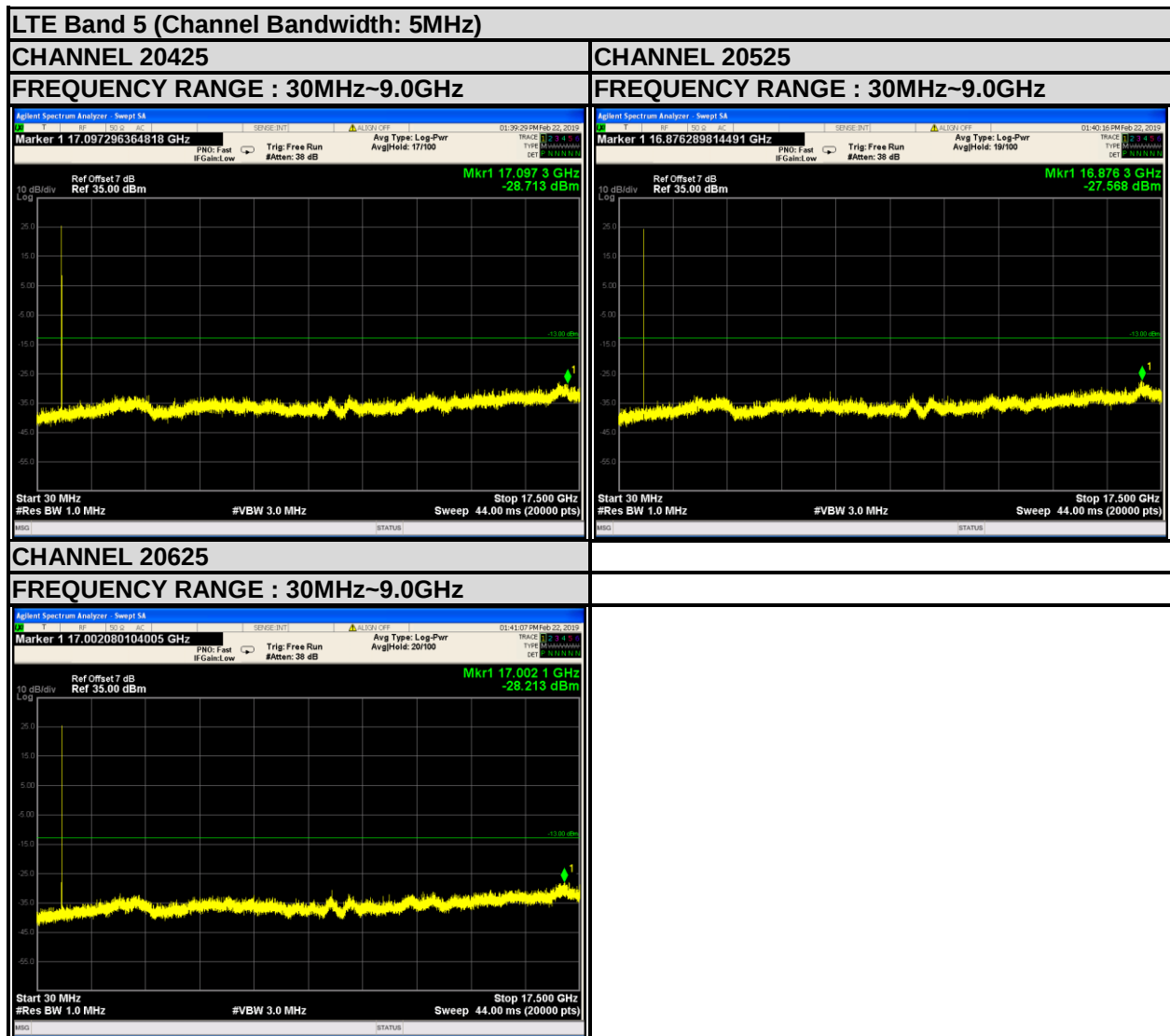
FREQUENCY RANGE : 30MHz~9.0GHz





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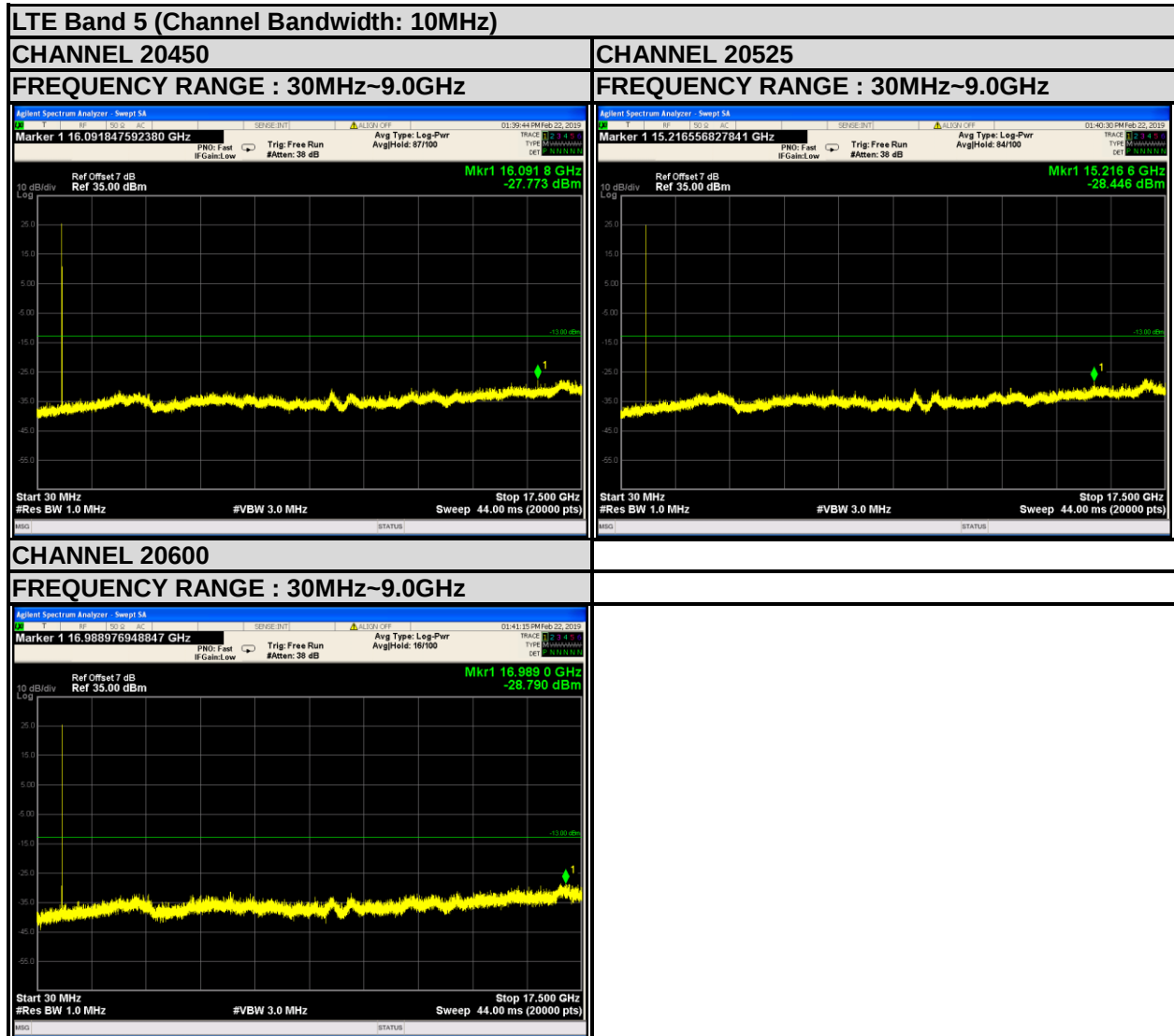
Test Report No.: RF181102N040-7_R1





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Test Report No.: RF181102N040-7_R1



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. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,
 $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}$.

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

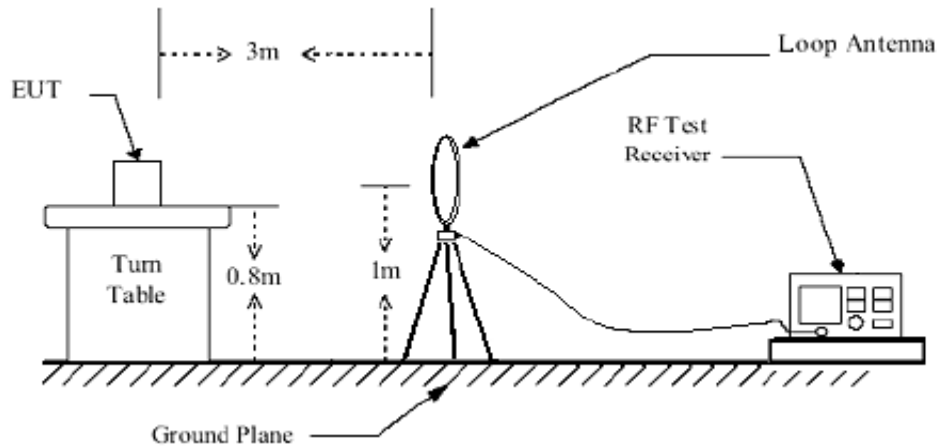
3.6.3 DEVIATION FROM TEST STANDARD

No deviation

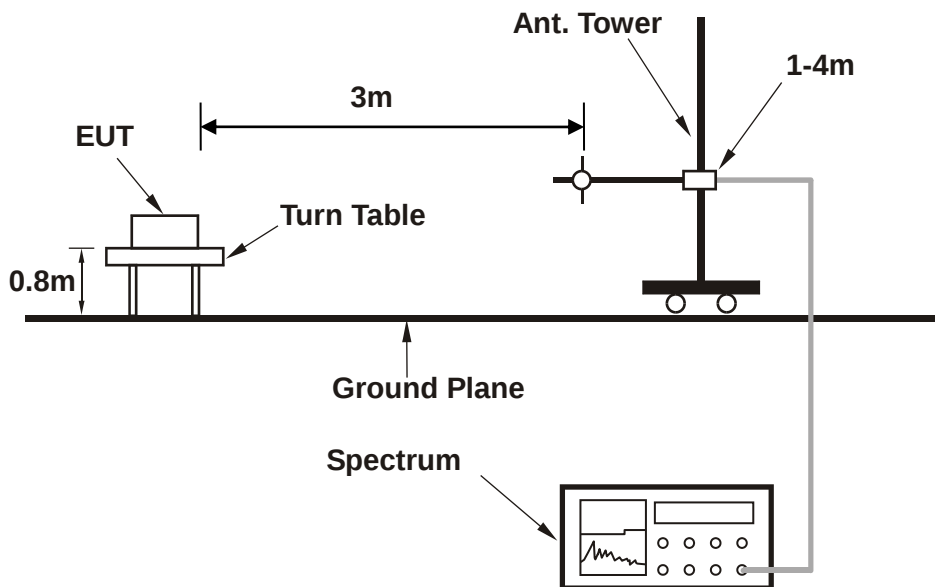


3.6.4 TEST SETUP

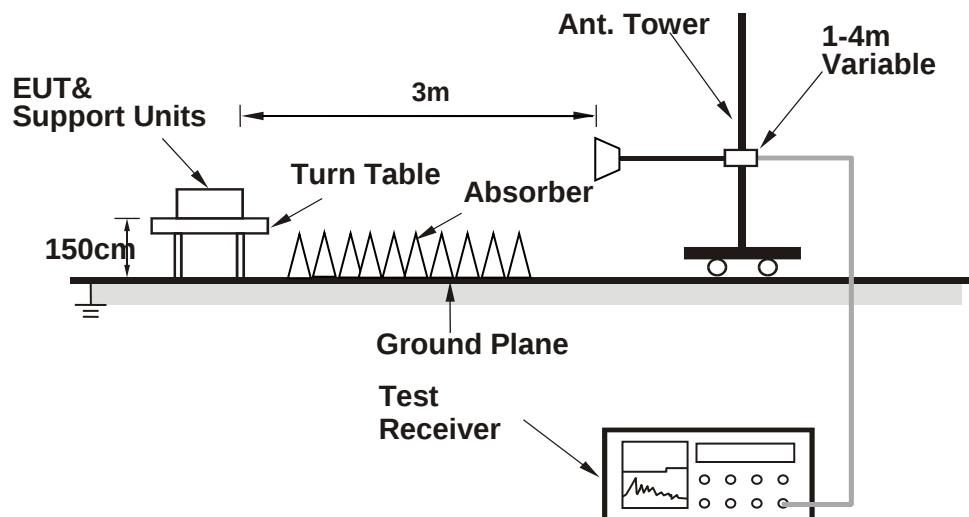
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



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

3.6.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

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

30 MHz – 1GHz data:

EDGE 850:

MODE	TX channel 189	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Simon Lin		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			



No.	Frequency (MHz)	Reading (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
1	206.3976	-63.12	-62.83	-13.00	-49.83
2	115.3205	-70.99	-72.23	-13.00	-59.23
3	74.9191	-72.27	-75.00	-13.00	-62.00
4	240.8304	-69.71	-68.91	-13.00	-55.91
5	284.9767	-70.46	-69.18	-13.00	-56.18
6	393.4724	-73.52	-70.54	-13.00	-57.54

MODE	TX channel 189	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 69%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Simon Lin		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			



No.	Frequency (MHz)	Reading (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
1	212.2695	-60.93	-57.97	-13.00	-44.97
2	118.6014	-66.51	-61.23	-13.00	-48.23
3	57.9993	-61.27	-64.86	-13.00	-51.86
4	67.2022	-64.14	-66.02	-13.00	-53.02
5	135.0319	-67.58	-62.50	-13.00	-49.50
6	197.2001	-61.77	-58.33	-13.00	-45.33



ABOVE 1GHz DATA

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

GSM 850:

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	V	-33.48	-13	-20.48
1648.4	H	-32.87	-13	-19.87
1672.359	V	-27.59	-13	-14.59
2511.711	H	-38.73	-13	-25.73

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	V	-37.49	-13	-24.49
1673.2	H	-31.31	-13	-18.31
7384.54	V	-35.3	-13	-22.3
6927.59	H	-36.06	-13	-23.06

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	V	-38.84	-13	-25.84
1697.6	H	-35.63	-13	-22.63
7166.82	V	-34	-13	-21
5409.06	H	-36.17	-13	-23.17

Note:

- 1, The testing has been conformed to $10 \times 848.8 \text{ MHz} = 8,488 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

EDGE 850:

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	V	-32.1	-13	-19.1
1648.4	H	-30.62	-13	-17.62
4486.38	V	-37.34	-13	-24.34
3536.73	H	-42.02	-13	-29.02

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1672.8	V	-32.45	-13	-19.45
1672.8	H	-35.64	-13	-22.64
1647.73	V	-39.06	-13	-26.06
4370.74	H	-36.2	-13	-23.2

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	V	-33.1	-13	-20.1
1697.6	H	-30.68	-13	-17.68
7034	V	-38.77	-13	-25.77
5310.29	H	-38.03	-13	-25.03

Note:

- 1, The testing has been conformed to $10 \times 848.8 \text{ MHz} = 8,488 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



WCDMA:

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1652.8	V	-27.36	-13	-14.36
1652.8	H	-33	-13	-20
265.69	V	-34.31	-13	-21.31
743.66	H	-39.78	-13	-26.78

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1670	V	-28.74	-13	-15.74
1670	H	-26.24	-13	-13.24
516.93	V	-39.83	-13	-26.83
339.87	H	-37.45	-13	-24.45

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1693.2	V	-31.2	-13	-18.2
1693.2	H	-29.69	-13	-16.69
559.62	V	-36.95	-13	-23.95
466.11	H	-39.29	-13	-26.29

Note:

- 1, The testing has been conformed to $10 \times 848.31 \text{ MHz} = 8,483 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.



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LTE Band 5:

1.4M QPSK

Middle channel

Frequency	Antenna Polarization	-36.51	Limit	Margin
(MHz)	(H/V)	-36.94	(dBm)	(dB)
694.9	V	-40.5	-13	-27.5
294.5	H	-31.88	-13	-18.88
224.4	V	-37.69	-13	-24.69
687.5	H	-37.2	-13	-24.2

3M QPSK

Middle channel

Frequency	Antenna Polarization	-36.51	Limit	Margin
(MHz)	(H/V)	-36.94	(dBm)	(dB)
431	V	-32.45	-13	-19.45
595.6	H	-34.79	-13	-21.79
325.7	V	-37.61	-13	-24.61
847.8	H	-38.21	-13	-25.21

5M QPSK

Middle channel

Frequency	Antenna Polarization	-36.51	Limit	Margin
(MHz)	(H/V)	-36.94	(dBm)	(dB)
130.6	V	-31.47	-13	-18.47
621.3	H	-33.42	-13	-20.42
422.4	V	-39.38	-13	-26.38
486	H	-32.64	-13	-19.64



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Test Report No.: RF181102N040-7_R1

10M QPSK

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	-36.51 -36.94	Limit (dBm)	Margin (dB)
422.9	V	-31.16	-13	-18.16
910.1	H	-39.07	-13	-26.07
421.5	V	-42.04	-13	-29.04
328.2	H	-33.53	-13	-20.53

Note:

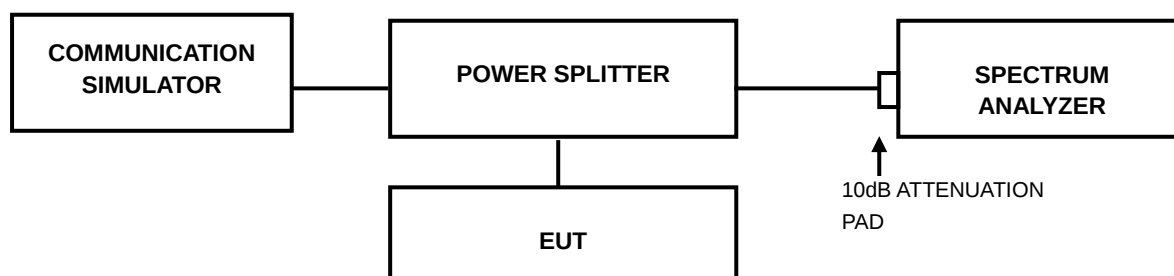
- 1, The testing has been conformed to $10 \times 848.31 \text{ MHz} = 8,483 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

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



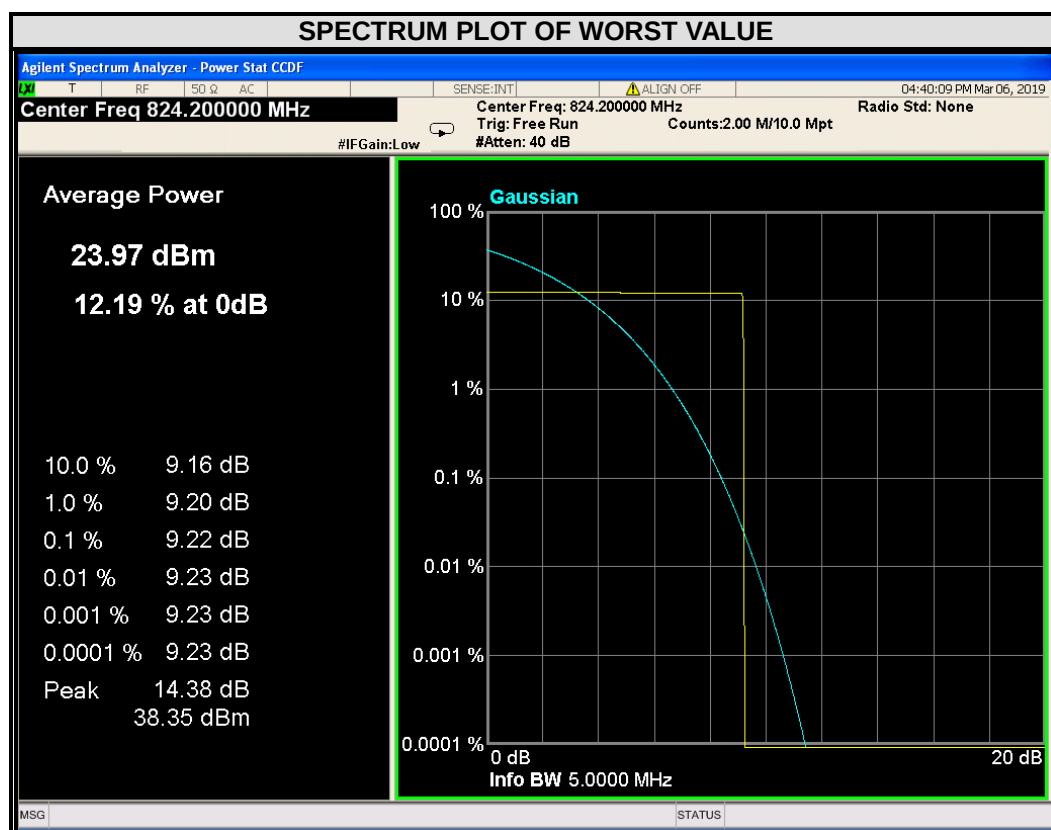
3.7.3 TEST PROCEDURES

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%.

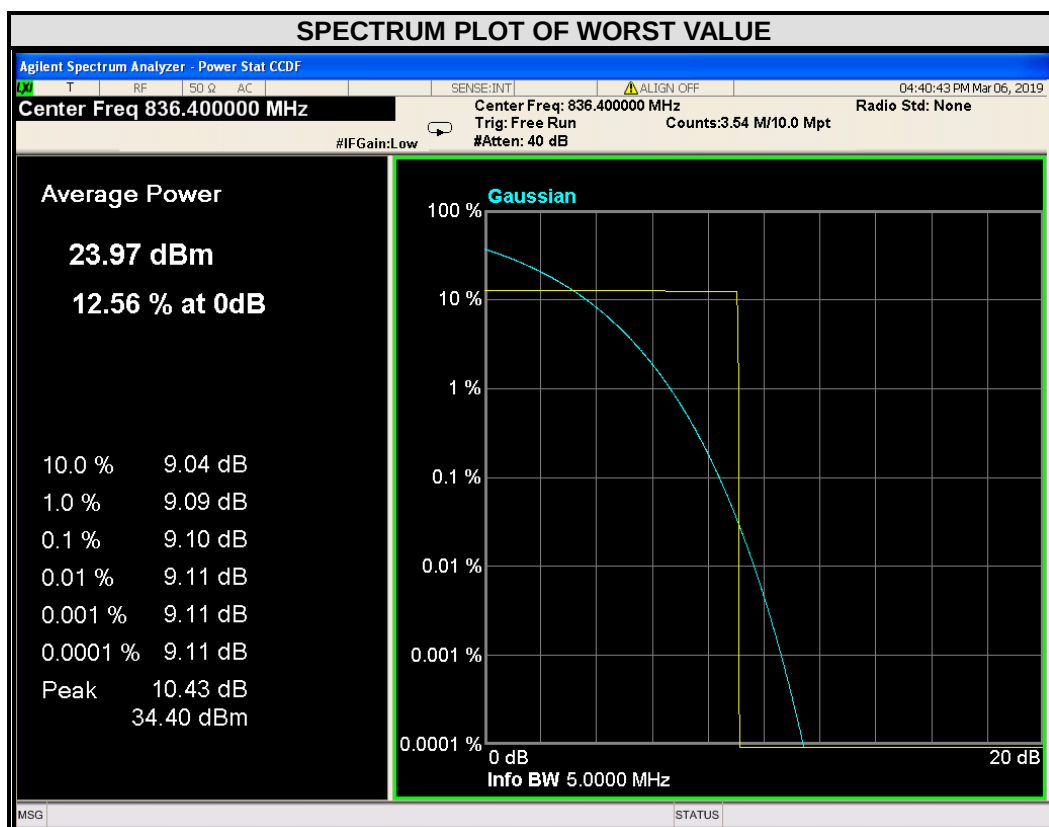
3.7.4 TEST RESULTS

GSM

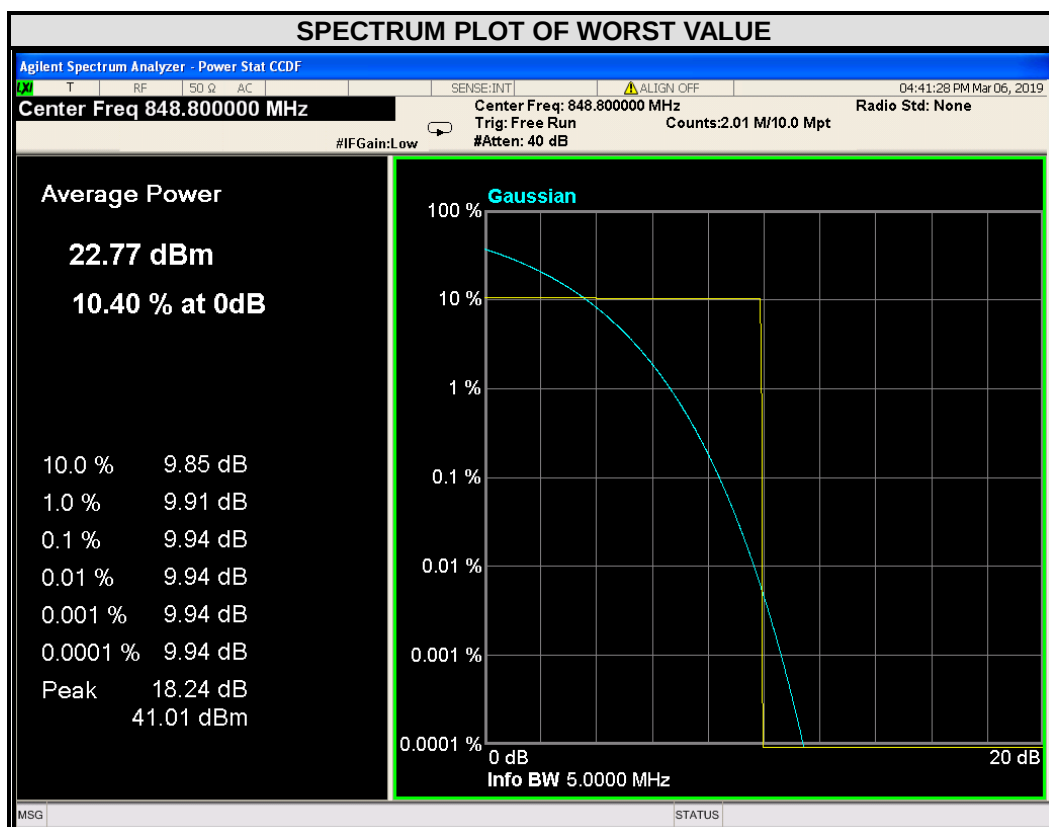
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	9.22



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	9.10

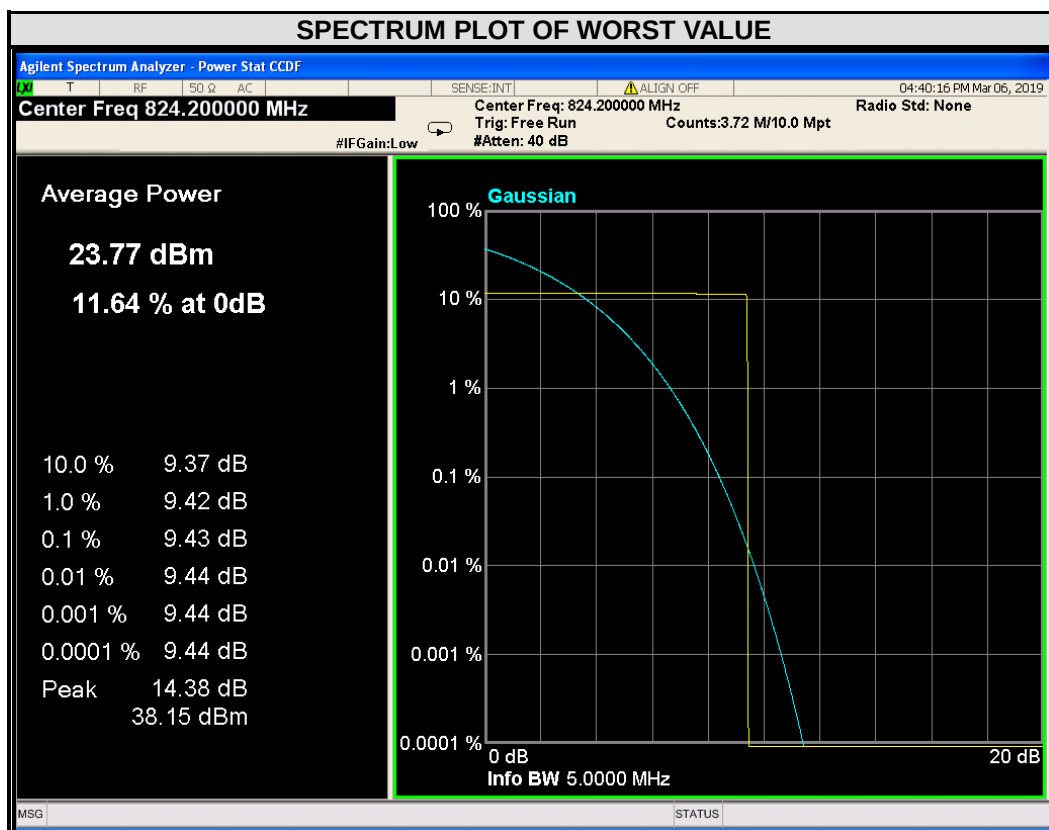


CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	9.94

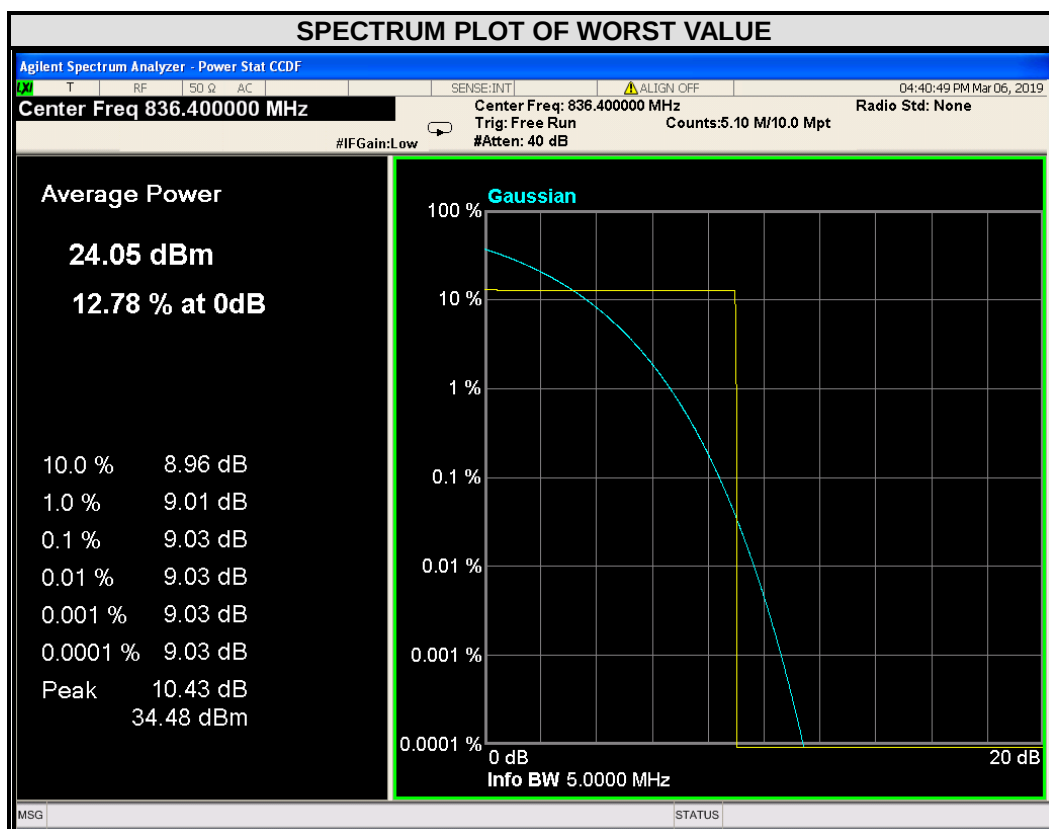


EDGE

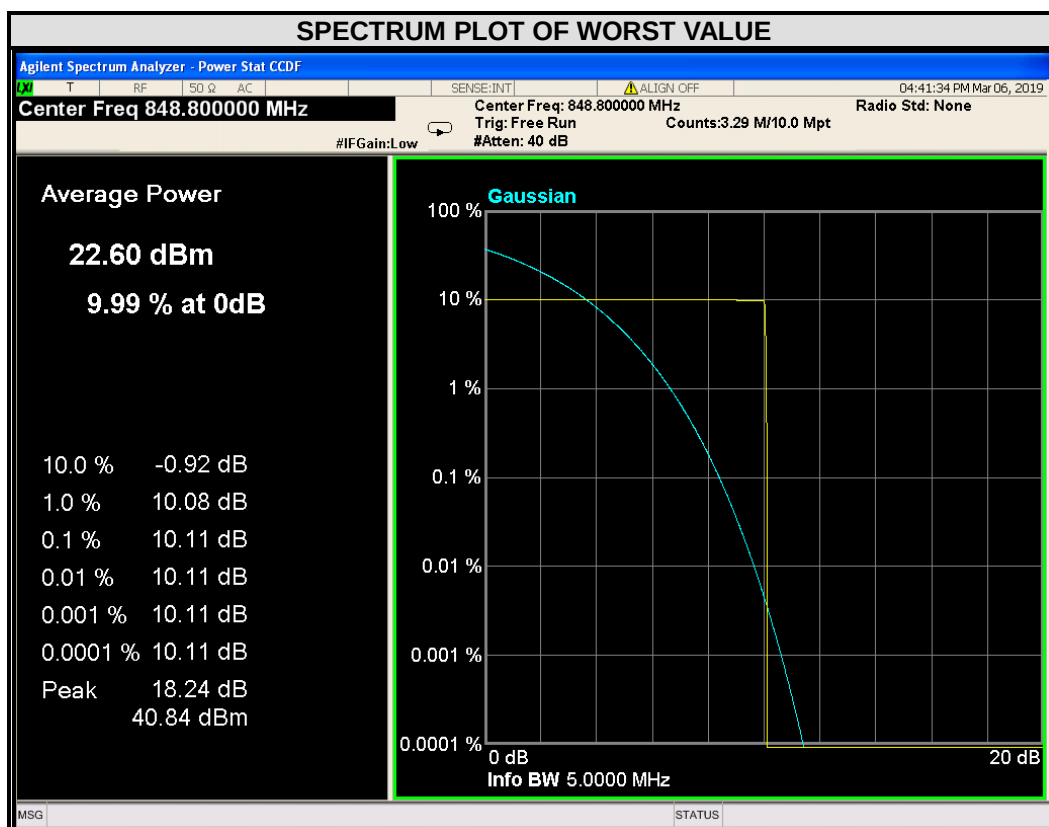
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
128	824.2	9.43



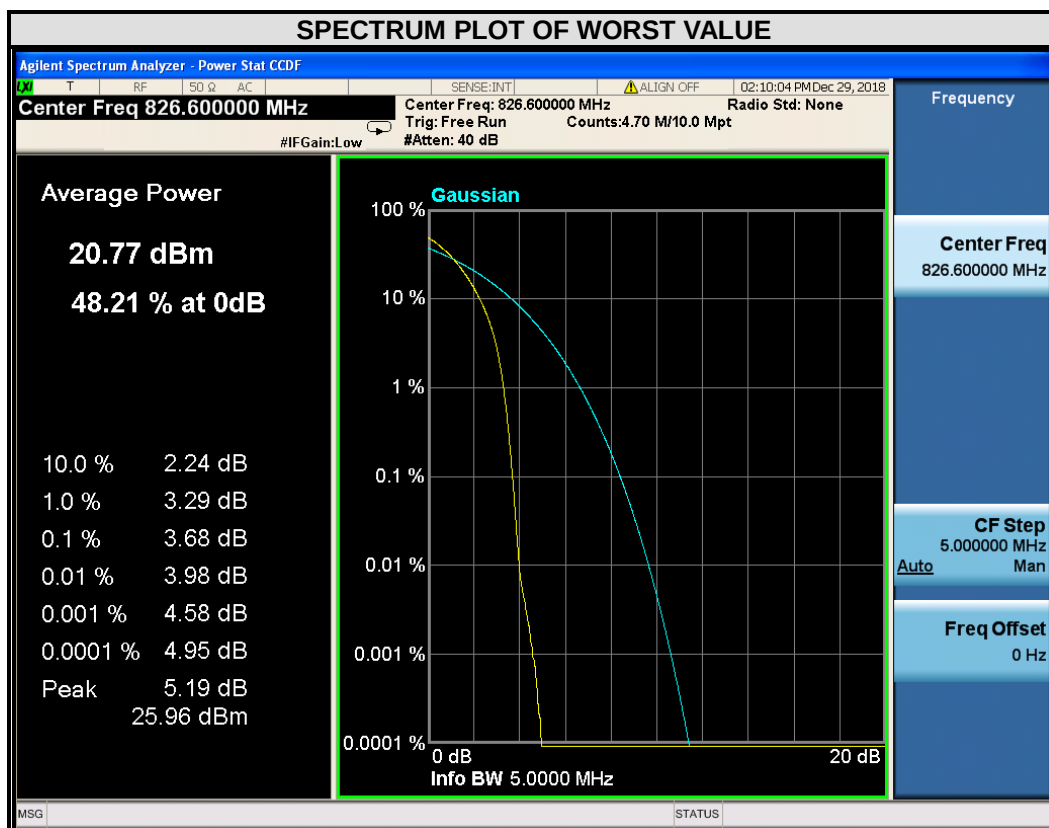
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
189	836.4	9.03



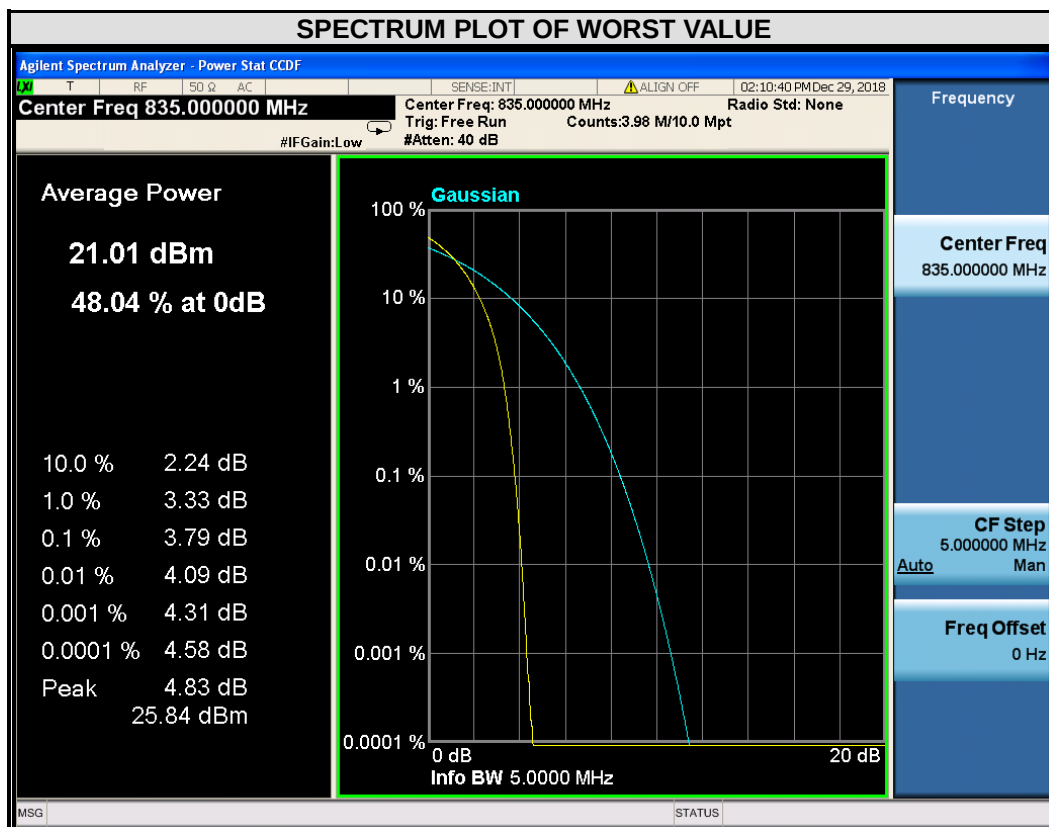
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
251	848.8	10.11



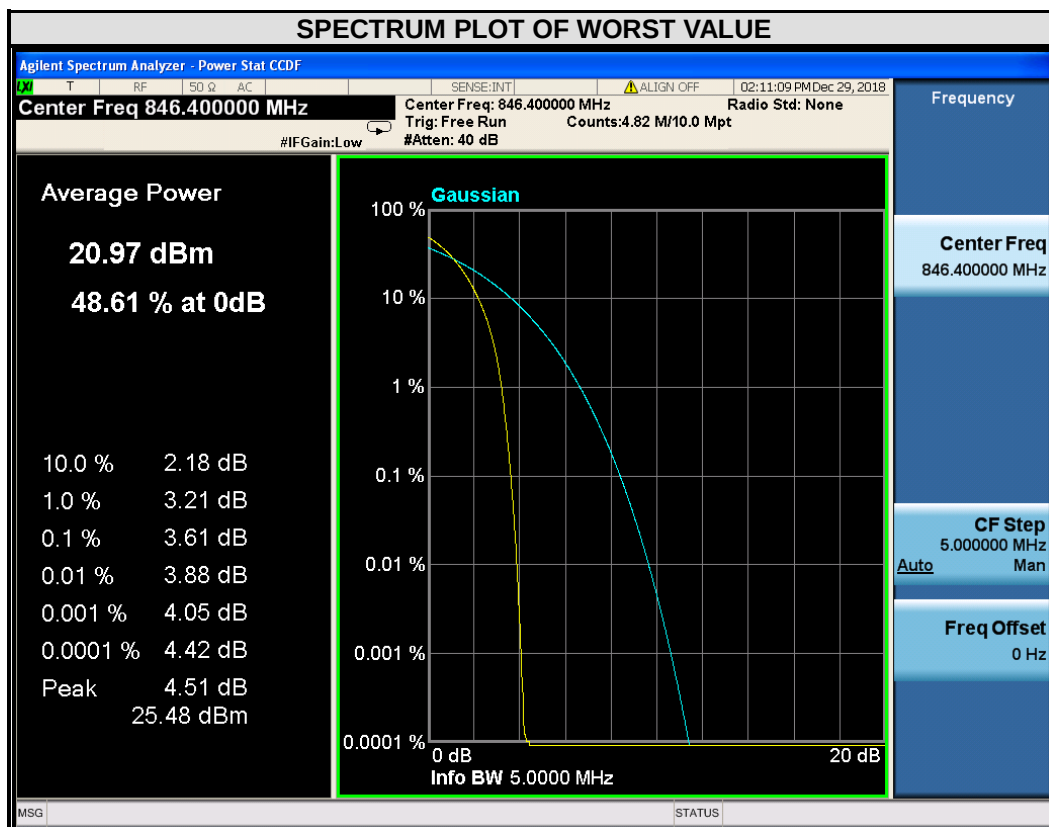
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4132	826.6	3.68



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4182	835	3.79



CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)
4233	846.4	3.61





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Test Report No.: RF181102N040-7_R1

LTE BAND 5

CHANNEL BANDWIDTH: 1.4MHz				CHANNEL BANDWIDTH: 3MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20407	824.7	5.21	5.35	20415	825.5	5.41	4.35
20525	836.5	5.59	5.86	20525	836.5	5.99	4.90
20643	848.3	5.30	5.15	20635	847.5	5.57	4.21

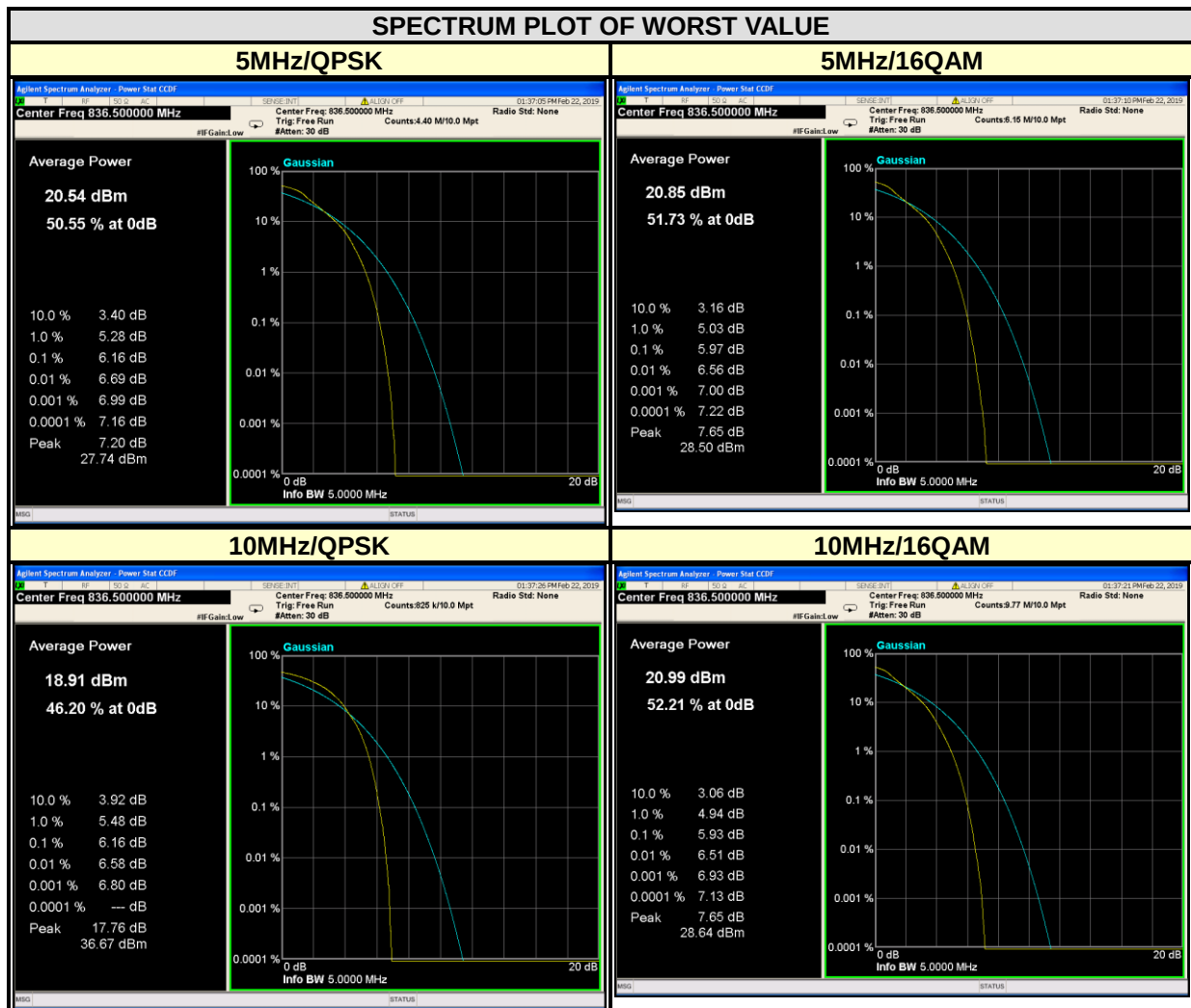




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Test Report No.: RF181102N040-7_R1

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20425	826.5	5.88	5.18	20450	829	5.61	4.78
20525	836.5	6.16	5.97	20525	836.5	6.16	5.93
20625	846.5	5.67	6.35	20600	844	5.63	4.88





Test Report No.: RF181102N040-7_R1

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: RF181102N040-7_R1

5 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---