

Report No.: RF180307E03A-4

FCC ID: KA2CHG601A1

Test Model: DCH-G601

Received Date: Mar. 12, 2018

Test Date: Mar. 20 to 27, 2018

Issued Date: Apr. 24, 2018

Applicant: D-Link Corporation

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF180307E03A-4	Original release.	Apr. 24, 2018

1 Certificate of Conformity

Product: LTE Bluetooth Hub

Brand: D-Link

Test Model: DCH-G601

Sample Status: ENGINEERING SAMPLE

Applicant: D-Link Corporation

Test Date: Mar. 20 to 27, 2018

Standards: FCC Part 24

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Wendy Wu , **Date:** Apr. 24, 2018
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Apr. 24, 2018
May Chen / Manager

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Equivalent Isotropically Radiated Power	PASS	Meet the requirement of limit.
2.1046 24.232(d)	Peak To Average Ratio	PASS	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -26.05dB at 17168.4MHz.

2.1 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	Expanded Uncertainty (k=2) ($\pm$)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Test Site and Instruments

For radiated spurious emissions test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980385	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: Mar. 21, 2018

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	July 01, 2017	June 30, 2018
Spectrum Analyzer Agilent	E4446A	MY48250254	Nov. 21, 2017	Nov. 20, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
DC Power Supply Topward	6603D	795558	NA	NA
True RMS Clamp Meter FLUKE	325	31130711WS	May 29, 2017	May 28, 2018
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	Nov. 26, 2017	Nov. 25, 2018
ESG Vector signal generator Agilent	E4438C	MY47271330 506 602 UNJ	Oct. 11, 2017	Oct. 10, 2018
Mech Switch Absorptive Mini-Circuits	MSP4TA-18+	0140	Feb. 12, 2018	Feb. 11, 2019
FXD ATTEN Mini-Circuits	BW-S3W2+	MN71981	Feb. 12, 2018	Feb. 11, 2019
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

- NOTE:**
1. The test was performed in Oven room 2.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: Mar. 23 to 27, 2018

3 General Information

3.1 General Description of EUT

Product	LTE Bluetooth Hub	
Brand	D-Link	
Test Model	DCH-G601	
Status of EUT	ENGINEERING SAMPLE	
Power Supply Rating	5Vdc from power adapter or 3.7Vdc from battery	
Modulation Type	WCDMA, HSDPA, HSUPA	BPSK
	LTE Band 2	QPSK, 16QAM
Operating Frequency	WCDMA, HSDPA, HSUPA	1852.4MHz ~1907.6MHz
	LTE Band 2	1850.7MHz ~ 1909.3MHz
Max. EIRP Power	WCDMA Band 2	805.38mW(29.06dBm)
	LTE Band 2 (Channel Bandwidth 1.4MHz)	568.85mW(27.55dBm)
	LTE Band 2 (Channel Bandwidth 3MHz)	566.24mW(27.53dBm)
	LTE Band 2 (Channel Bandwidth 5MHz)	563.64mW(27.51dBm)
	LTE Band 2 (Channel Bandwidth 10MHz)	591.56mW(27.72dBm)
	LTE Band 2 (Channel Bandwidth 15MHz)	620.87mW(27.93dBm)
	LTE Band 2 (Channel Bandwidth 20MHz)	619.44mW(27.92dBm)
Emission Designator	WCDMA	4M09F9W
	LTE Band 2 (Channel Bandwidth 1.4MHz)	QPSK: 1M09G7D 16QAM: 1M09D7W
	LTE Band 2 (Channel Bandwidth 3MHz)	QPSK: 2M70G7D 16QAM: 2M70D7W
	LTE Band 2 (Channel Bandwidth 5MHz)	QPSK: 4M49G7D 16QAM: 4M49D7W
	LTE Band 2 (Channel Bandwidth 10MHz)	QPSK: 8M98G7D 16QAM: 8M98D7W
	LTE Band 2 (Channel Bandwidth 15MHz)	QPSK: 13M5G7D 16QAM: 13M5D7W
	LTE Band 2 (Channel Bandwidth 20MHz)	QPSK: 18M0G7D 16QAM: 18M0D7W
Antenna Type	Refer to Note	
Antenna Connector	Refer to Note	
Accessory Device	Adapter x 1	
Data Cable Supplied	NA	

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	3G/LTE
2	Bluetooth	3G/LTE

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

2. The EUT must be supplied with a power adapter or battery as following table:

Adapter		
Brand	Model No.	Spec.
Asian Power Device Inc	WB-10E05R	Input: 100-240Vac, 0.4A, 50/60Hz Output: 5Vdc, 2A DC output cable (Unshielded, 1.2m)
Battery		
Brand	Model No.	Spec.
GPI International Limited	NTA3555	3.7Vdc / 1490mAh

3. For the radiated emissions, the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Power from adapter
Mode B	Power from battery

From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

4. The antennas provided to the EUT, please refer to the following table:

WLAN & Bluetooth					
Ant No.	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	290-20327	1.6	2.4~2.4835	PIFA	NA
2	C037-511302-A	4.55	2.4~2.4835	PIFA	NA

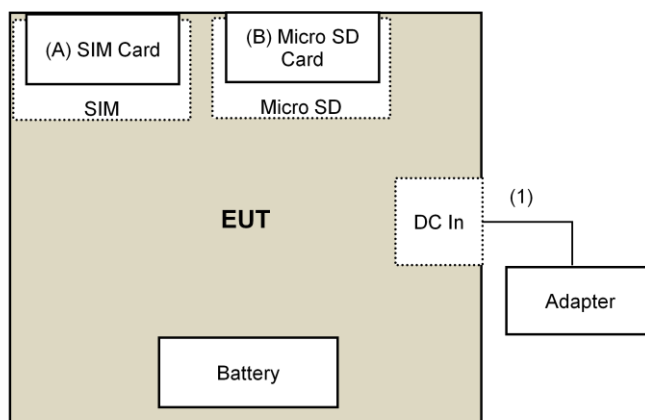
Note: Ant No. 2 was selected as representative antenna for the final test.

WWAN						
Ant No.	Model	Antenna Gain (dBi)	Frequency rang	Antenna type	Connector type	*Cable Length (mm)
1 (Aux)	290-328	0.15	699~894MHz	PCB	i-pex(MHF)	88.7
		5.58	1.71~2.16GHz			
2 (Main)	290-329	0.39	699~894MHz	PCB	i-pex(MHF)	43.7
		4.38	1.71~2.16GHz			

Note: The WWAN mode will fix transmission on Antenna No.: 2.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



3.2.1 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	SIM Card	NA	NA	NA	NA	Provided by Lab
B.	MicroSD Card	Transcend	8GB	NA	NA	Provided by Lab
C.	Simulator	R&S	CMW500	151084	NA	Provided by Lab

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.2	No	0	Supplied by client

3.3 Test Mode Applicability and Tested Channel Detail

WCDMA Band II

Test Item	Available Channel	Tested Channel	Mode
EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
Frequency Stability	9262 to 9538	9400	WCDMA
Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA
Band Edge	9262 to 9538	9262, 9538	WCDMA
Peak to Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
Radiated Emission Below 1GHz	9262 to 9538	9262, 9400, 9538	WCDMA
Radiated Emission Above 1GHz	9262 to 9538	9262, 9400, 9538	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power (System)	Tested By
EIRP	25deg. C, 63%RH	120Vac, 60Hz	Jyunchun Lin
Frequency Stability	23deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
Occupied Bandwidth	23deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
Band Edge	23deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
Peak to Average Ratio	23deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
Conducted Emission	23deg. C, 68%RH	120Vac, 60Hz	Jyunchun Lin
Radiated Emission Below 1GHz	22deg. C, 63%RH	120Vac, 60Hz	Eason Tseng
Radiated Emission Above 1GHz	22deg. C, 63%RH	120Vac, 60Hz	Eason Tseng

LTE BAND 2

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	18607 to 19193	18607, 18900 19193	1.4MHz	QPSK / 16QAM	1RB / 0 RB offset
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK / 16QAM	1RB / 0 RB offset
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK / 16QAM	1RB / 0 RB offset
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK / 16QAM	1RB / 0 RB offset
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK / 16QAM	1RB / 0 RB offset
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK / 16QAM	1RB / 0 RB offset
Frequency Stability	18607 to 19193	18900	1.4MHz	QPSK	-
	18615 to 19185	18900	3MHz	QPSK	-
	18625 to 19175	18900	5MHz	QPSK	-
	18650 to 19150	18900	10MHz	QPSK	-
	18675 to 19125	18900	15MHz	QPSK	-
	18700 to 19100	18900	20MHz	QPSK	-
Occupied Bandwidth	18607 to 19193	18607, 18900 19193	1.4MHz	QPSK / 16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK / 16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK / 16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK / 16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK / 16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK / 16QAM	Full RB
Peak to Average Ratio	18607 to 19193	18607, 18900 19193	1.4MHz	QPSK / 16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK / 16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK / 16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK / 16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK / 16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK / 16QAM	Full RB
Band Edge	18607 to 19193	18607	1.4MHz	QPSK	1 RB / 0 RB Offset
		19193			1 RB / 5 RB Offset
		18607, 19193			6 RB / 0 RB Offset
	18615 to 19185	18615	3MHz	QPSK	1 RB / 0 RB Offset
		19185			1 RB / 14 RB Offset
		18615, 19185			15 RB / 0 RB Offset
	18625 to 19175	18625,	5MHz	QPSK	1 RB / 0 RB Offset
		19175			1 RB / 24 RB Offset
		18625, 19175			25 RB / 0 RB Offset
	18650 to 19150	18650	10MHz	QPSK	1 RB / 0 RB Offset
		19150			1 RB / 49 RB Offset
		18650, 19150			50 RB / 0 RB Offset
	18675 to 19125	18675,	15MHz	QPSK	1 RB / 0 RB Offset
		19125			1 RB / 74 RB Offset
		18675, 19125			75 RB / 0 RB Offset
	18700 to 19100	18700.	20MHz	QPSK	1 RB / 0 RB Offset
		19100			1 RB / 99 RB Offset
		18700. 19100			100 RB / 0 RB Offset

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
Conducted Emission	18607 to 19193	18607, 18900 19193	1.4MHz	QPSK	1 RB / 0 RB Offset
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK	1 RB / 0 RB Offset
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK	1 RB / 0 RB Offset
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK	1 RB / 0 RB Offset
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK	1 RB / 0 RB Offset
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB / 0 RB Offset
Radiated Emission	18607 to 19193	18607, 18900 19193	1.4MHz	QPSK	1 RB / 0 RB Offset
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK	1 RB / 0 RB Offset
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK	1 RB / 0 RB Offset
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK	1 RB / 0 RB Offset
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK	1 RB / 0 RB Offset
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB / 0 RB Offset

NOTE:

All supported modulation types were evaluated. The Worst case of QPSK was selected. Therefore, the Output power, Frequency Stability, Emission Mask, Conducted Emission and Radiated Emission were presented under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power (System)	Tested By
EIRP	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Frequency Stability	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Occupied Bandwidth	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Band Edge	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Peak to Average Ratio	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Conducted Emission	25deg. C, 63%RH	120Vac, 60Hz	Allen Chuang
Radiated Emission Below 1GHz	24deg. C, 70%RH	120Vac, 60Hz	Eason Tseng
Radiated Emission Above 1GHz	24deg. C, 70%RH	120Vac, 60Hz	Eason Tseng

3.4 EUT Operating Conditions

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

3.5 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 24

KDB 971168 D01 Power Meas License Digital Systems v03

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

The EUT was set up for the maximum power with WCDMA & LTE 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.

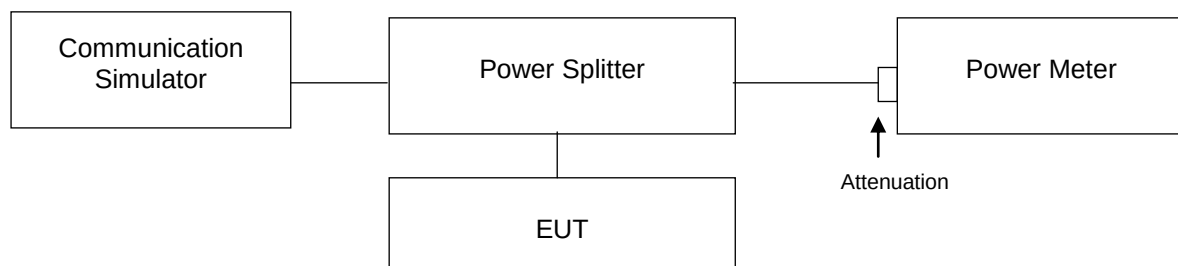
Conducted Power Measurement:

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

EIRP / ERP Measurement:

1. EIRP = Conducted output power level + Antenna gain

4.1.3 Test Setup



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

4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

WCDMA II

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC	23.11	23.14	23.34
HSDPA Subtest-1	21.64	21.69	21.61
HSDPA Subtest-2	22.05	22.08	22.01
HSDPA Subtest-3	21.56	21.60	21.52
HSDPA Subtest-4	21.55	21.58	21.51
HSUPA Subtest-1	20.46	20.49	20.60
HSUPA Subtest-2	21.29	21.29	21.41
HSUPA Subtest-3	20.70	20.71	20.81
HSUPA Subtest-4	19.01	19.02	19.12
HSUPA Subtest-5	21.10	21.10	21.23

LTE Band 2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18607	18900	19193		18607	18900	19193	
			1850.7	1880	1909.3		1850.7	1880	1909.3	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 1.4M	1	0	23.17	23.09	23.06	0	23.01	23.18	22.99	1
	1	2	23.12	23.07	22.57	0	22.34	22.35	22.98	1
	1	5	23.14	23.08	22.17	0	22.39	22.59	22.06	1
	3	0	23.11	23.01	22.68	0	22.12	22.16	22.02	1
	3	1	23.04	23.02	22.96	0	21.94	22.20	22.07	1
	3	3	22.08	22.97	22.72	0	21.87	22.19	22.12	1
	6	0	22.02	22.03	21.95	1	21.02	21.03	21.10	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18615	18900	19185		18615	18900	19185	
			1851.5	1880	1908.5		1851.5	1880	1908.5	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 3M	1	0	23.15	23.13	23.13	0	22.53	22.45	22.43	1
	1	7	23.08	23.09	22.92	0	22.39	22.34	22.11	1
	1	14	22.96	23.09	22.98	0	21.99	22.16	22.04	1
	8	0	21.96	22.00	22.04	1	20.93	21.14	21.00	2
	8	3	21.99	21.99	21.85	1	20.99	21.06	20.98	2
	8	7	21.94	22.02	21.90	1	20.98	20.96	21.05	2
	15	0	21.85	22.00	22.01	1	21.11	21.23	21.12	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18625	18900	19175		18625	18900	19175	
			1852.5	1880	1907.5		1852.5	1880	1907.5	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 5M	1	0	23.12	23.13	23.10	0	22.47	22.65	22.46	1
	1	12	23.07	23.12	22.96	0	22.15	22.40	22.14	1
	1	24	22.87	23.06	22.92	0	22.05	22.57	22.21	1
	12	0	22.07	22.10	22.03	1	21.09	21.16	21.12	2
	12	6	21.97	21.95	22.03	1	21.03	21.19	21.04	2
	12	13	21.93	21.98	21.93	1	20.99	21.06	20.95	2
	25	0	21.98	22.01	22.07	1	21.05	21.17	20.95	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18650	18900	19150		18650	18900	19150	
			1855	1880	1905		1855	1880	1905	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 10M	1	0	23.30	23.34	23.33	0	22.83	22.84	22.64	1
	1	24	23.19	23.24	22.87	0	22.06	22.16	22.39	1
	1	49	22.97	23.08	22.89	0	22.41	22.25	22.35	1
	25	0	22.13	22.17	22.09	1	21.14	21.24	21.22	2
	25	12	21.88	22.01	21.96	1	20.91	21.02	21.09	2
	25	25	21.90	22.05	21.90	1	20.90	20.96	20.92	2
	50	0	22.00	22.08	21.95	1	20.97	21.09	21.06	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18675	18900	19125		18675	18900	19125	
			1857.5	1880	1902.5		1857.5	1880	1902.5	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 15M	1	0	23.55	23.38	23.34	0	22.42	22.55	22.55	1
	1	37	23.23	23.12	23.10	0	22.41	22.51	22.07	1
	1	74	22.90	22.98	22.97	0	22.22	21.93	22.37	1
	36	0	22.19	22.23	22.31	1	21.13	21.31	21.36	2
	36	19	22.00	22.04	22.00	1	20.91	21.10	21.05	2
	36	39	21.96	22.08	21.89	1	20.91	21.01	20.98	2
	75	0	22.06	22.27	22.15	1	21.06	21.00	21.16	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			18700	18900	19100		18700	18900	19100	
			1860	1880	1900		1860	1880	1900	
			MHz	MHz	MHz		MHz	MHz	MHz	
2 / 20M	1	0	23.38	23.29	23.54	0	22.43	22.45	22.63	1
	1	50	22.78	22.93	22.94	0	21.89	22.04	21.86	1
	1	99	22.51	22.77	22.65	0	21.73	22.20	22.03	1
	50	0	22.18	22.26	22.28	1	21.17	21.25	21.32	2
	50	25	21.85	22.02	22.00	1	20.87	20.95	21.04	2
	50	50	21.94	21.94	21.89	1	20.72	21.02	20.96	2
	100	0	22.02	22.11	22.12	1	20.95	21.07	21.03	2

EIRP POWER**WCDMA II**

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
9262	1852.4	24.56	4.38	28.94	783.43	Pass	Max
9400	1880	24.54	4.38	28.92	779.83	Pass	Max
9538	1907.6	24.68	4.38	29.06	805.38	Pass	Max

LTE Band 2

QPSK

1.4MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18607	1850.7	23.17	4.38	27.55	568.85	Pass	Max
18900	1880	23.09	4.38	27.47	558.47	Pass	Max
19193	1909.3	23.06	4.38	27.44	554.63	Pass	Max

3MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18615	1851.5	23.15	4.38	27.53	566.24	Pass	Max
18900	1880	23.13	4.38	27.51	563.64	Pass	Max
19185	1908.5	23.13	4.38	27.51	563.64	Pass	Max

5MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18625	1852.5	23.12	4.38	27.50	562.34	Pass	Max
18900	1880	23.13	4.38	27.51	563.64	Pass	Max
19175	1907.5	23.10	4.38	27.48	559.76	Pass	Max

10MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18650	1855	23.30	4.38	27.68	586.14	Pass	Max
18900	1880	23.34	4.38	27.72	591.56	Pass	Max
19150	1905	23.33	4.38	27.71	590.20	Pass	Max

15MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18675	1857.5	23.55	4.38	27.93	620.87	Pass	Max
18900	1880	23.38	4.38	27.76	597.04	Pass	Max
19125	1902.5	23.34	4.38	27.72	591.56	Pass	Max

20MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18700	1860	23.38	4.38	27.76	597.04	Pass	Max
18900	1880	23.39	4.38	27.77	598.41	Pass	Max
19100	1900	23.54	4.38	27.92	619.44	Pass	Max

16QAM

1.4MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18607	1850.7	23.01	4.38	27.39	548.28	Pass	Max
18900	1880	23.18	4.38	27.56	570.16	Pass	Max
19193	1909.3	22.99	4.38	27.37	545.76	Pass	Max

3MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18615	1851.5	22.53	4.38	26.91	490.91	Pass	Max
18900	1880	22.45	4.38	26.83	481.95	Pass	Max
19185	1908.5	22.43	4.38	26.81	479.73	Pass	Max

5MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18625	1852.5	22.47	4.38	26.85	484.17	Pass	Max
18900	1880	22.65	4.38	27.03	504.66	Pass	Max
19175	1907.5	22.46	4.38	26.84	483.06	Pass	Max

10MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18650	1855	22.83	4.38	27.21	526.02	Pass	Max
18900	1880	22.84	4.38	27.22	527.23	Pass	Max
19150	1905	22.64	4.38	27.02	503.50	Pass	Max

15MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18675	1857.5	22.42	4.38	26.80	478.63	Pass	Max
18900	1880	22.55	4.38	26.93	493.17	Pass	Max
19125	1902.5	22.55	4.38	26.93	493.17	Pass	Max

20MHz

Channel Number	Freq. (MHz)	Conducted Average Power (dBm)	Gain	EIRP(dBm)	EIRP(mW)	Pass /Fail	Setting
18700	1860	22.43	4.38	26.81	479.73	Pass	Max
18900	1880	22.45	4.38	26.83	481.95	Pass	Max
19100	1900	22.63	4.38	27.01	502.34	Pass	Max

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

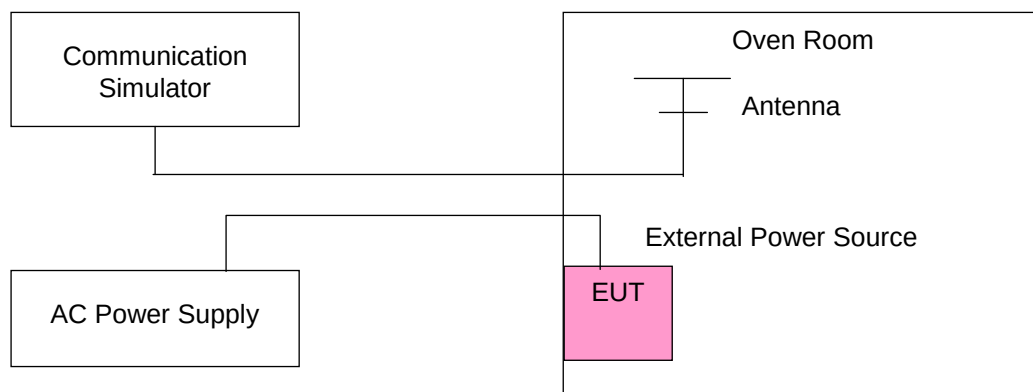
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 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 AC 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 ± 0.5 °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.

4.2.3 Test Setup



4.2.4 Test Results

WCDMA

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (MHz)
	WCDMA
102	1880.000024
138	1880.000022

Frequency Error vs. Temperature.

TEMP. (°C)	Frequency Error (MHz)
	WCDMA
75	1880.000033
70	1880.000024
60	1880.000020
50	1880.000036
40	1880.000034
30	1880.000021
20	1880.000046
10	1880.000026
0	1880.000041
-10	1880.000021
-20	1880.000043
-30	1880.000045

LTE

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (MHz)					
	LTE Band 2					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
102	1880.000026	1880.000045	1880.000048	1880.000043	1880.000027	1880.000037
138	1880.000032	1880.000020	1880.000023	1880.000023	1880.000039	1880.000049

Frequency Error vs. Temperature

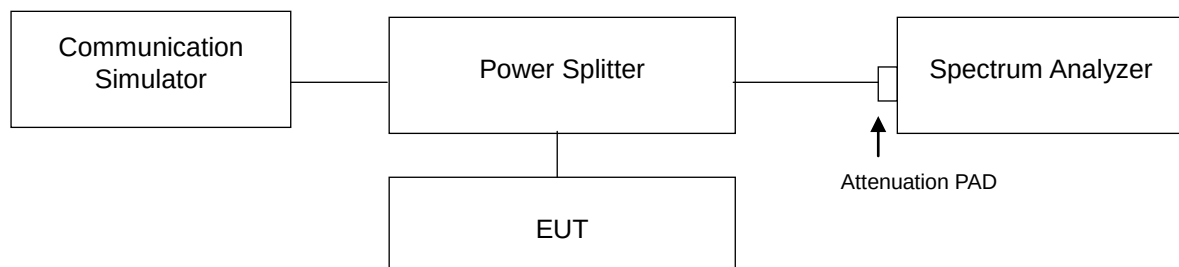
Temp. (°C)	Frequency Error (MHz)					
	LTE Band 2					
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
75	1880.000049	1880.000035	1880.000022	1880.000046	1880.000038	1880.000027
70	1880.000047	1880.000033	1880.000048	1880.000039	1880.000023	1880.000041
60	1880.000038	1880.000047	1880.000038	1880.000045	1880.000039	1880.000026
50	1880.000048	1880.000033	1880.000044	1880.000036	1880.000023	1880.000035
40	1880.000038	1880.000025	1880.000039	1880.000025	1880.000030	1880.000025
30	1880.000031	1880.000048	1880.000036	1880.000033	1880.000022	1880.000028
20	1880.000046	1880.000033	1880.000032	1880.000021	1880.000038	1880.000022
10	1880.000046	1880.000033	1880.000041	1880.000039	1880.000020	1880.000042
0	1880.000044	1880.000032	1880.000043	1880.000025	1880.000020	1880.000042
-10	1880.000049	1880.000041	1880.000036	1880.000042	1880.000041	1880.000038
-20	1880.000039	1880.000039	1880.000034	1880.000040	1880.000026	1880.000045
-30	1880.000044	1880.000036	1880.000043	1880.000034	1880.000025	1880.000023

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

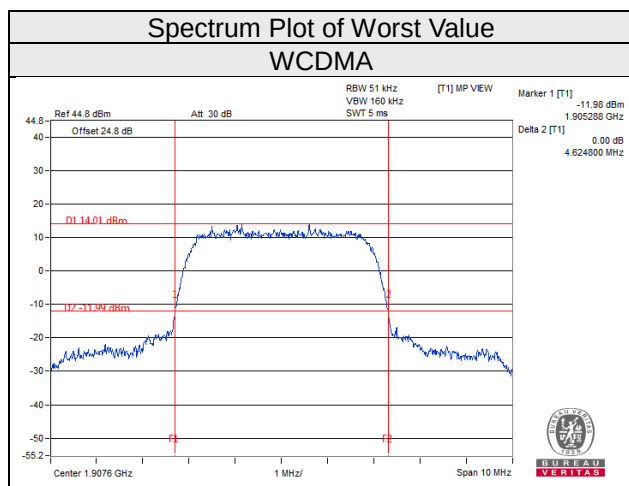
All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup



4.3.3 Test Result (-26dB Bandwidth)

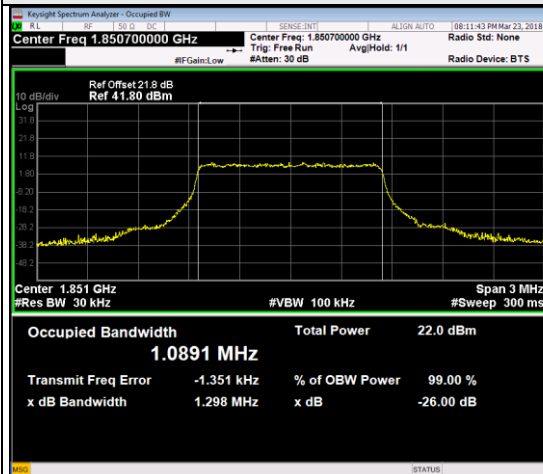
Channel	FREQ. (MHz)	-26dB Bandwidth (MHz)
		WCDMA
9262	1852.4	4.60
9400	1880.0	4.61
9538	1907.6	4.62



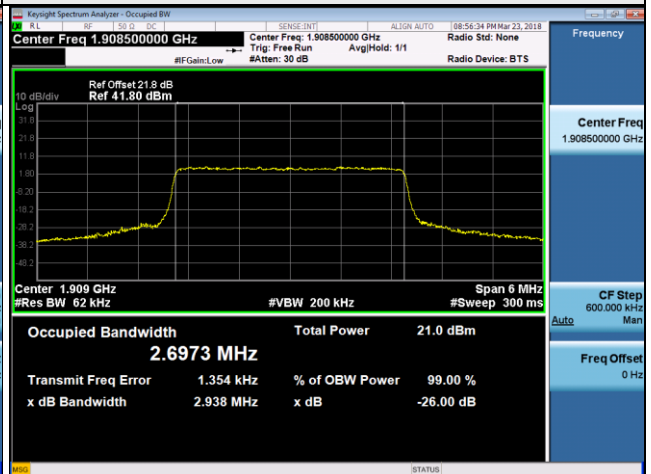
LTE Band 2							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.30	1.28	18615	1851.5	2.92	2.92
18900	1880	1.30	1.28	18900	1880	2.93	2.93
19193	1909.3	1.30	1.29	19185	1908.5	2.92	2.94
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.80	4.82	18650	1855	9.55	9.55
18900	1880	4.81	4.81	18900	1880	9.55	9.58
19175	1907.5	4.81	4.81	19150	1905	9.54	9.58
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	-26dB Bandwidth (MHz)		Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	14.20	14.33	18700	1860	19.06	19.04
18900	1880	14.31	14.32	18900	1880	19.13	19.07
19125	1902.5	14.31	14.41	19100	1900	19.07	19.10

Spectrum Plot of Worst Value

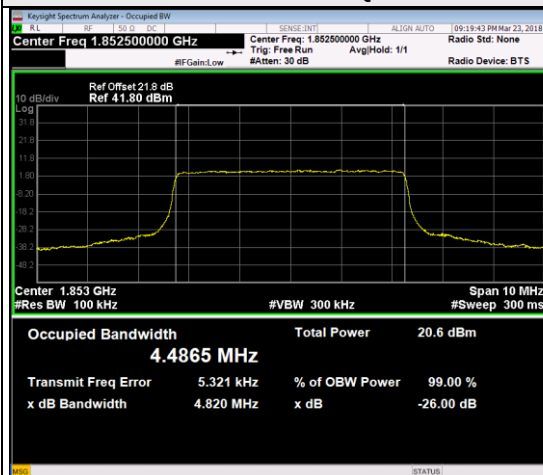
1.4MHz / QPSK



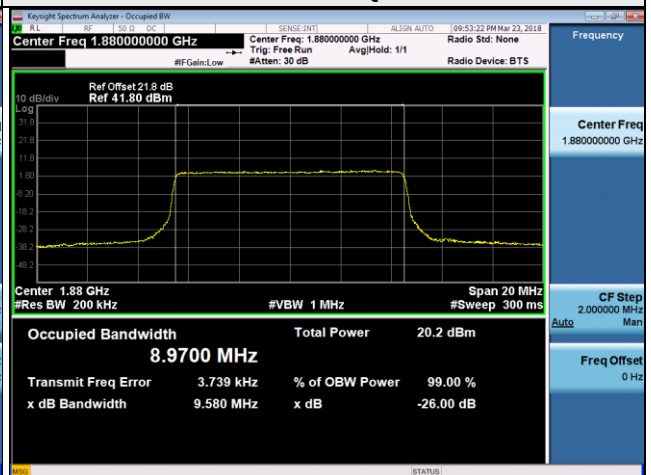
3MHz / 16QAM



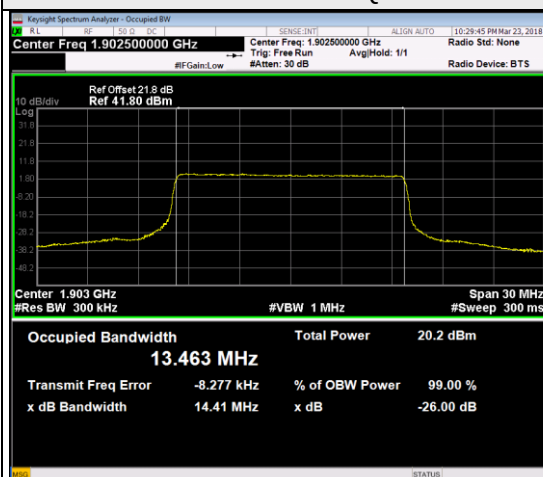
5MHz / 16QAM



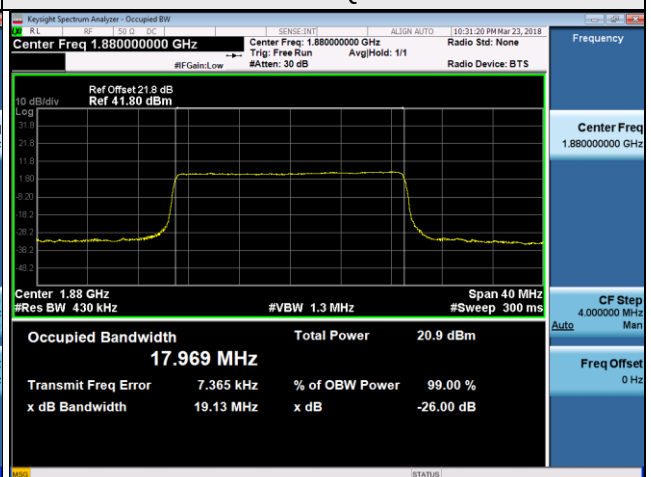
10MHz / 16QAM



15MHz / 16QAM

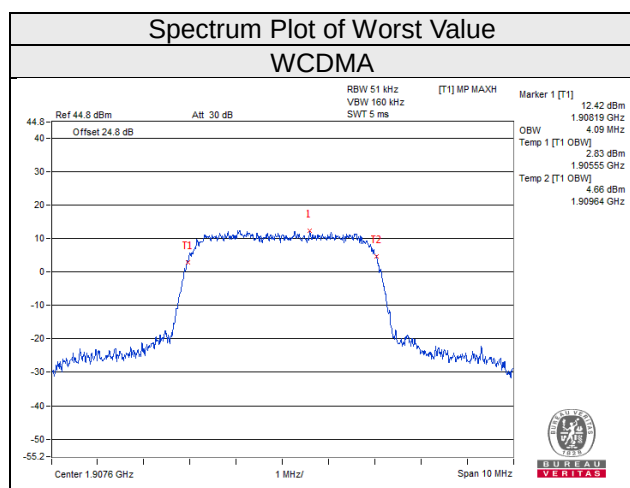


20MHz / QPSK



4.3.4 Test Result (Occupied Bandwidth)

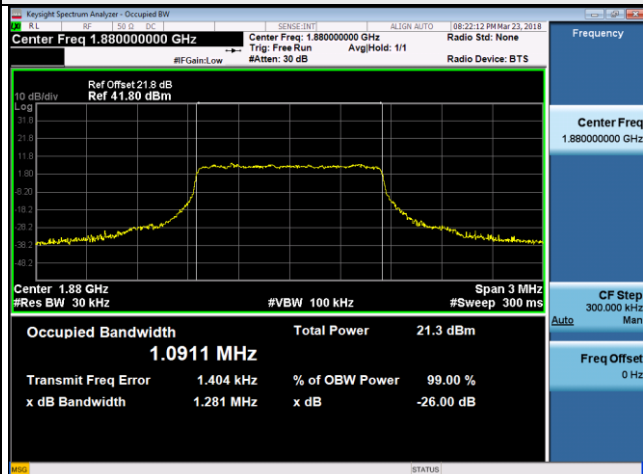
Channel	FREQ. (MHz)	99% Occupied Bandwidth (MHz)
		WCDMA
9262	1852.4	4.08
9400	1880.0	4.07
9538	1907.6	4.09



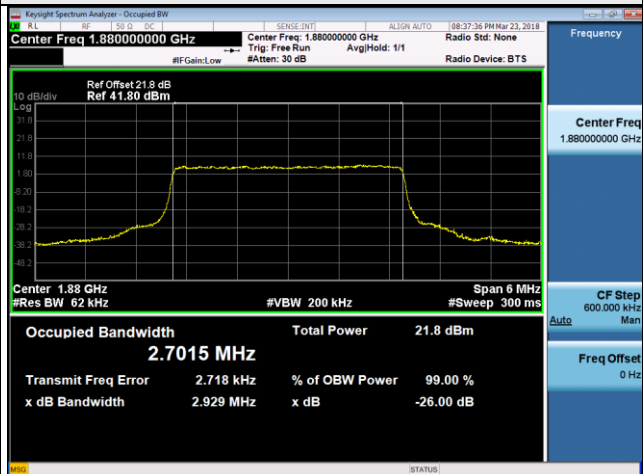
LTE Band 2							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.0891	1.0908	18615	1851.5	2.6996	2.6965
18900	1880	1.0890	1.0911	18900	1880	2.7015	2.6975
19193	1909.3	1.0895	1.0907	19185	1908.5	2.6993	2.6973
Channel Bandwidth 5MHz				Channel Bandwidth 10MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	4.4819	4.4865	18650	1855	8.9645	8.9654
18900	1880	4.4852	4.4875	18900	1880	8.9698	8.9700
19175	1907.5	4.4850	4.4884	19150	1905	8.9754	8.9764
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	13.424	13.436	18700	1860	17.903	17.918
18900	1880	13.475	13.464	18900	1880	17.969	17.984
19125	1902.5	13.424	13.463	19100	1900	17.942	17.960

Spectrum Plot of Worst Value

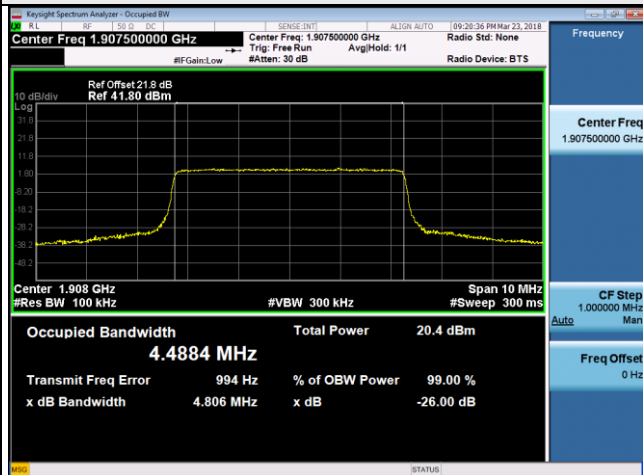
1.4MHz / 16QAM



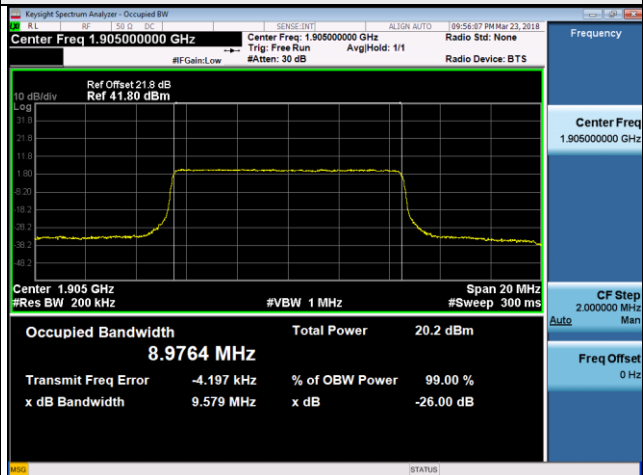
3MHz / QPSK



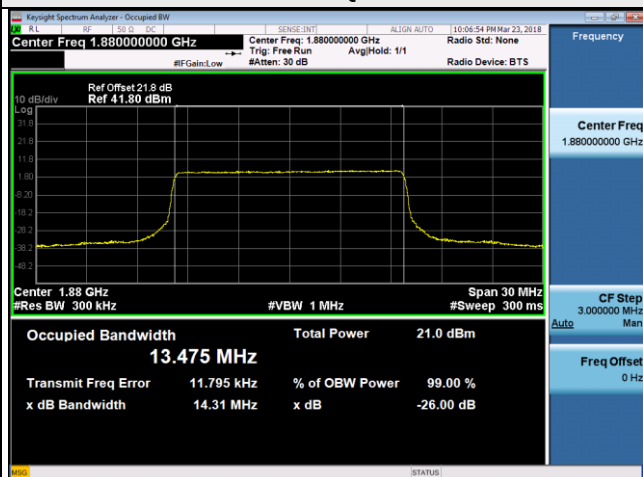
5MHz / 16QAM



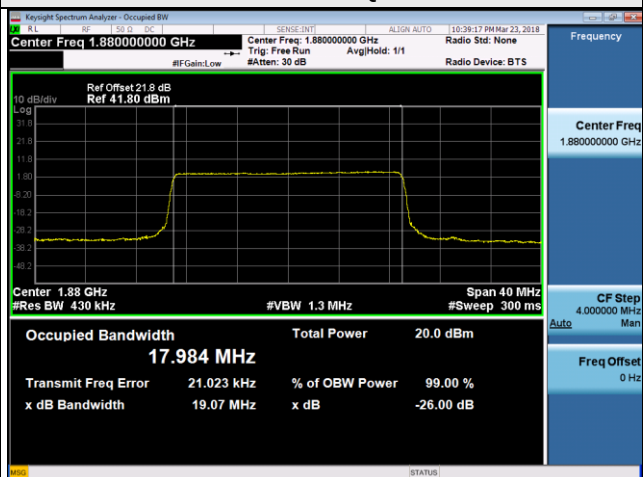
10MHz / 16QAM



15MHz / QPSK



20MHz / 16QAM

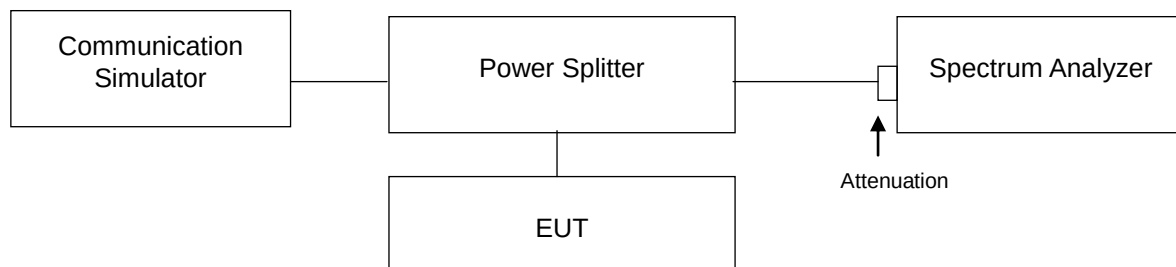


4.4 Band Edge Measurement

4.4.1 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.

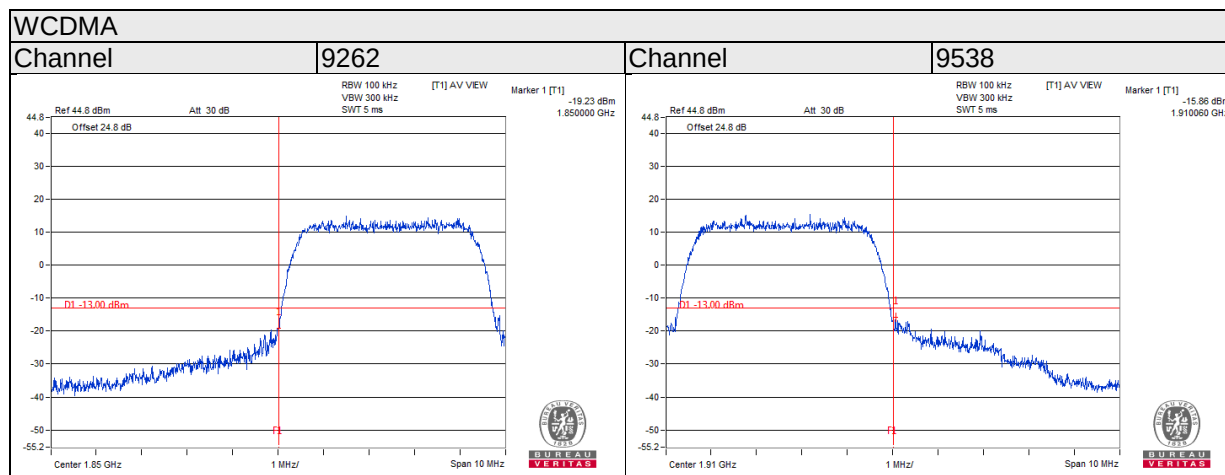
4.4.2 Test Setup



4.4.3 Test Procedures

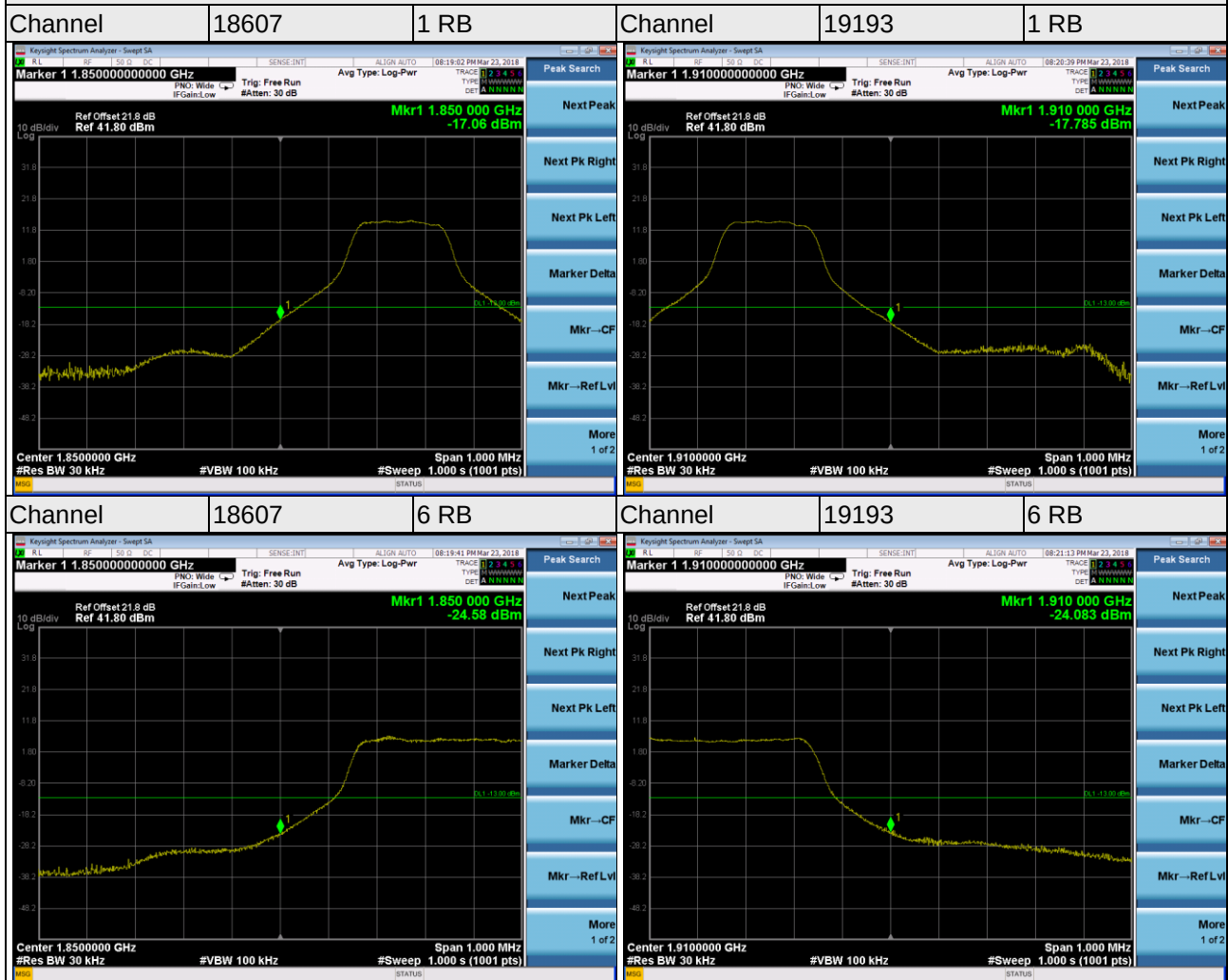
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and s RB of the spectrum is $>1\%$ EMISSION BANDWIDTH and VB of the spectrum is $\geq 3 \times RB$.
- Record the max trace plot into the test report.

4.4.4 Test Results



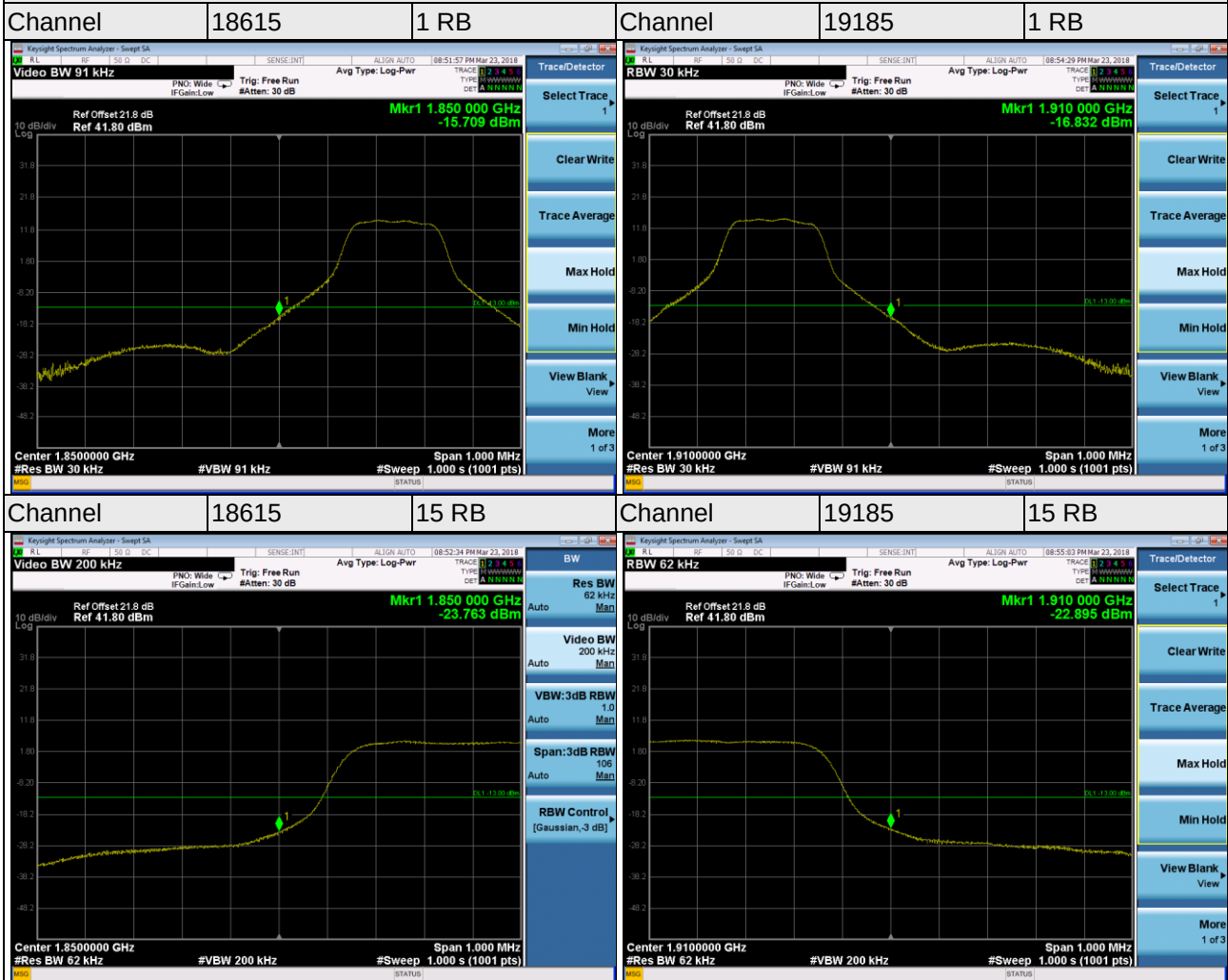
LTE Band 2

Channel Bandwidth 1.4MHz



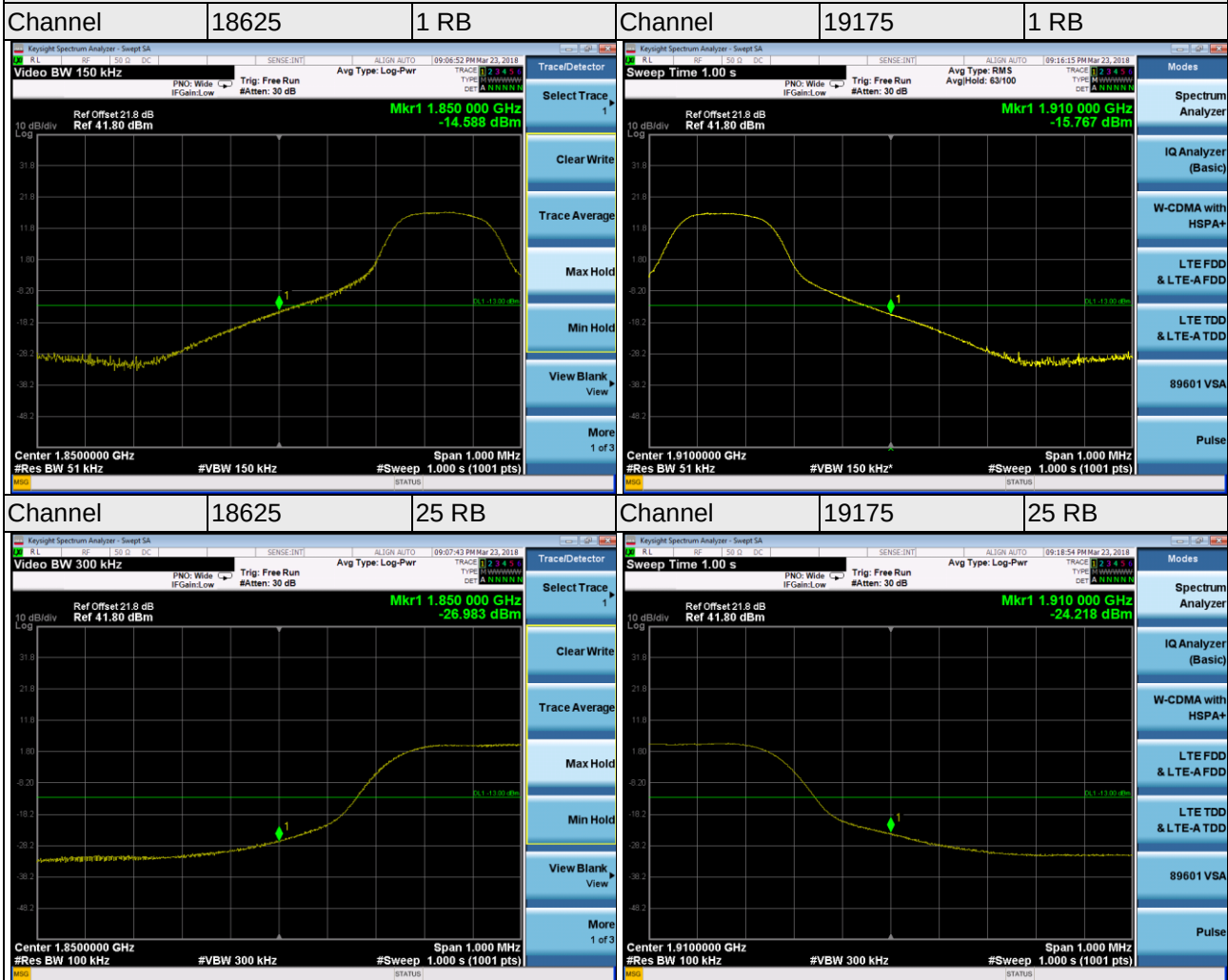
LTE Band 2

Channel Bandwidth 3MHz



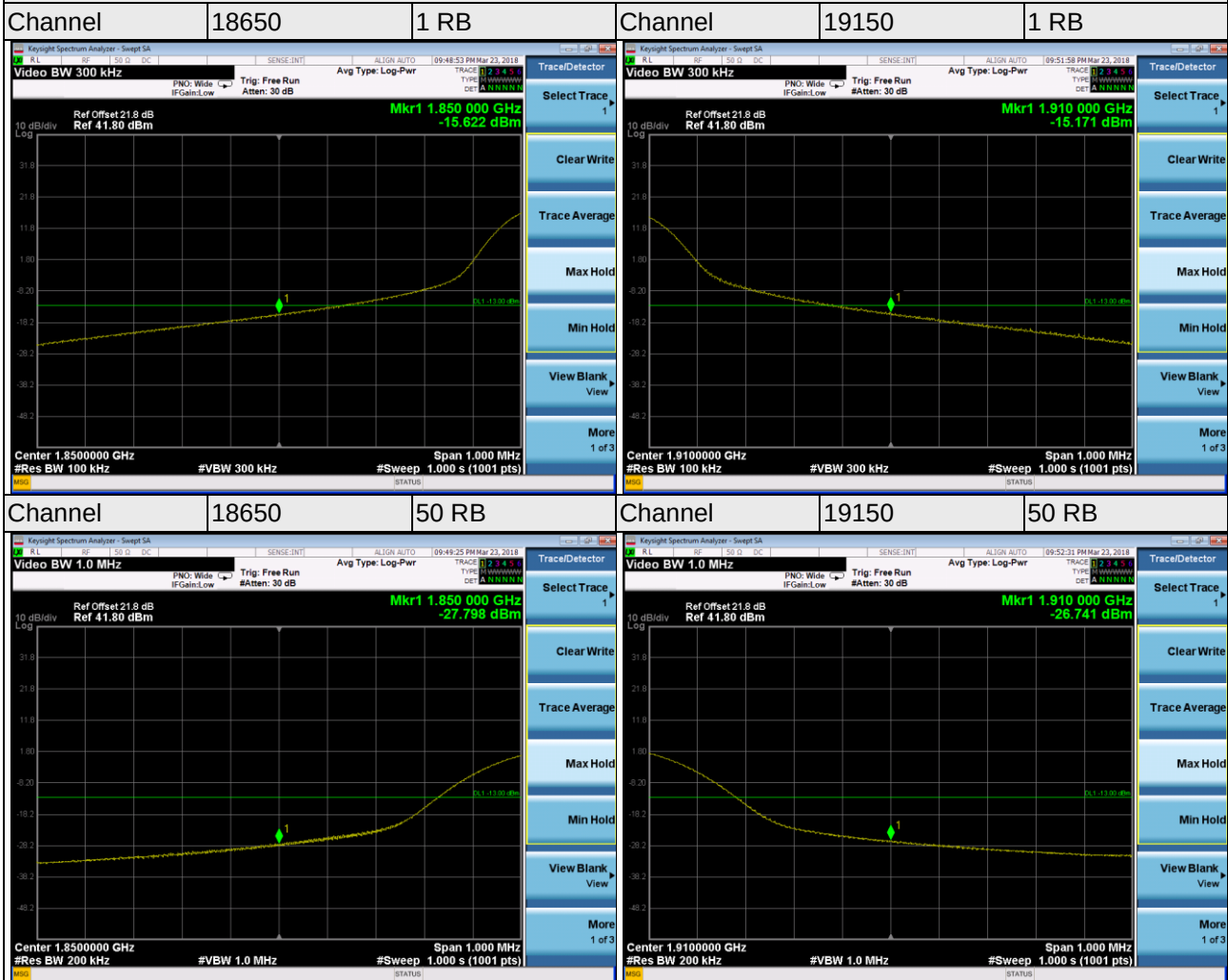
LTE Band 2

Channel Bandwidth 5MHz



LTE Band 2

Channel Bandwidth 10MHz



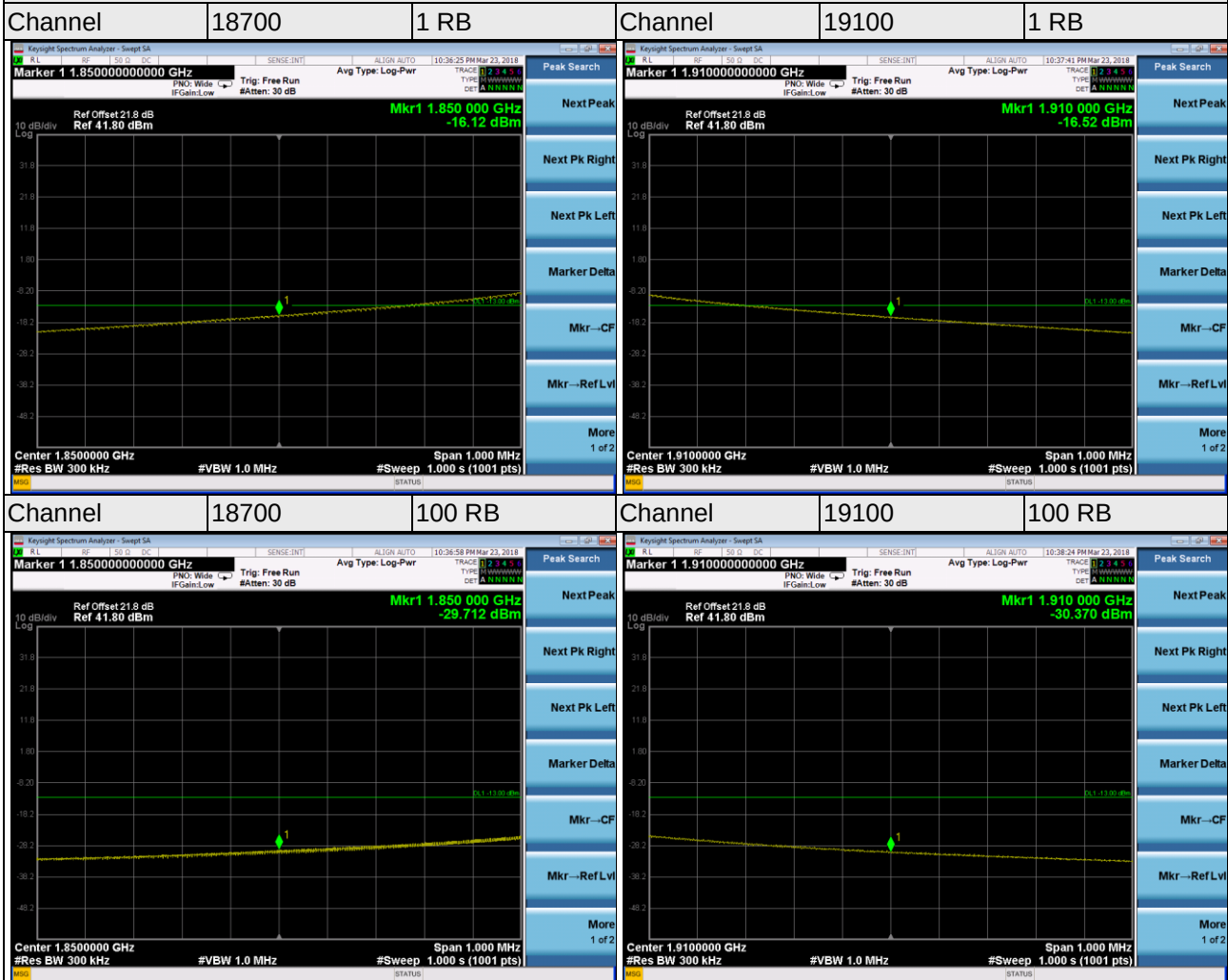
LTE Band 2

Channel Bandwidth 15MHz



LTE Band 2

Channel Bandwidth 20MHz

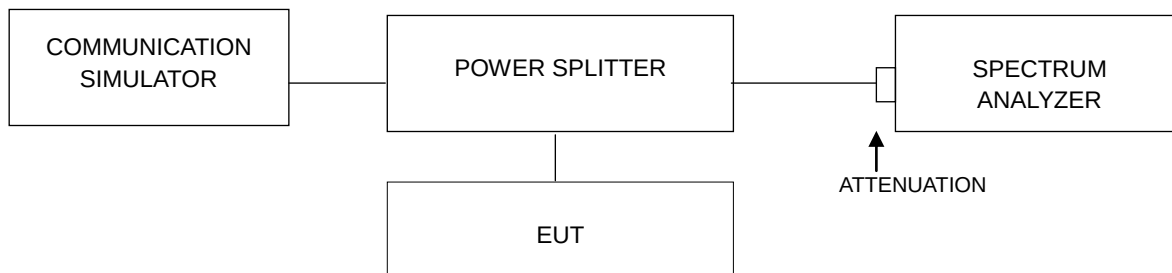


4.5 Peak to Average Ratio

4.5.1 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

4.5.2 Test Setup

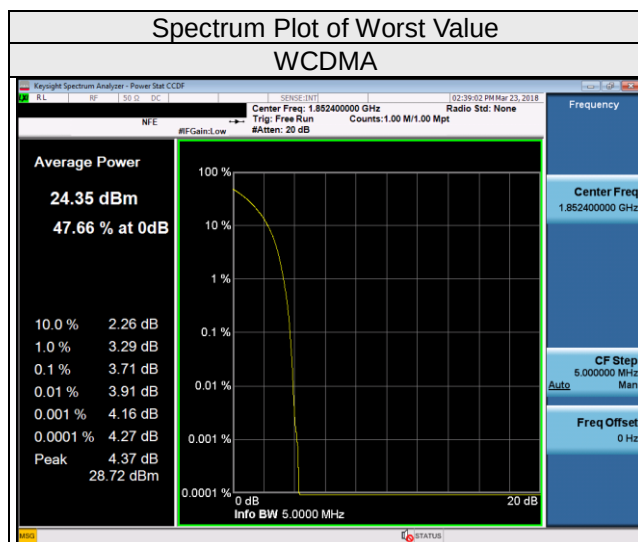


4.5.3 Test Procedures

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%.

4.5.4 Test Results

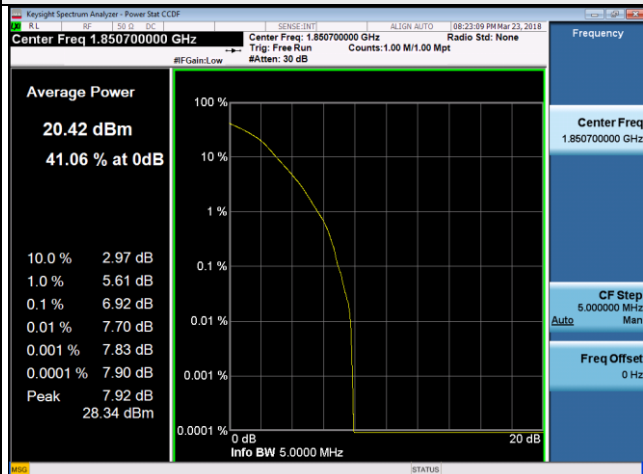
Channel	Freq. (MHz)	Peak to Average Ratio (dB)
		WCDMA II
9262	1852.4	3.71
9400	1880	3.70
9538	1907.6	3.61



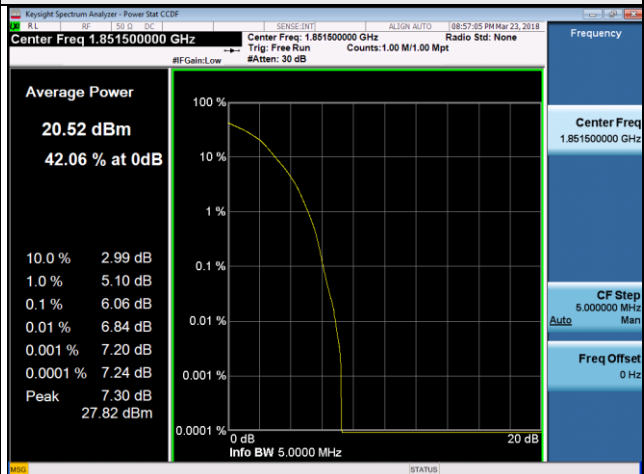
LTE Band 2							
Channel Bandwidth 1.4MHz				Channel Bandwidth 3MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	5.89	6.92	18615	1851.5	5.29	6.06
18900	1880	5.53	6.53	18900	1880	5.01	5.89
19193	1909.3	5.24	6.24	19185	1908.5	4.51	5.37
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
18625	1852.5	5.43	6.31	18650	1855	5.36	6.15
18900	1880	4.87	5.78	18900	1880	4.71	5.59
19175	1907.5	4.58	5.45	19150	1905	4.32	5.14
Channel Bandwidth 15MHz				Channel Bandwidth 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	5.15	6.13	18700	1860	5.33	6.04
18900	1880	4.45	5.24	18900	1880	4.55	5.25
19125	1902.5	4.48	5.17	19100	1900	4.60	5.44

Spectrum Plot of Worst Value

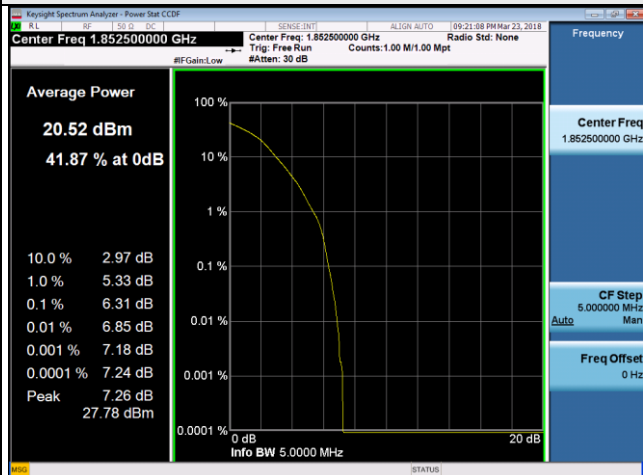
1.4MHz / 16QAM



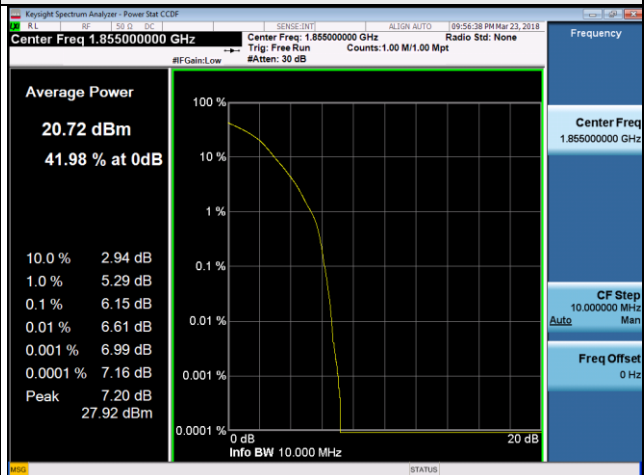
3MHz / 16QAM



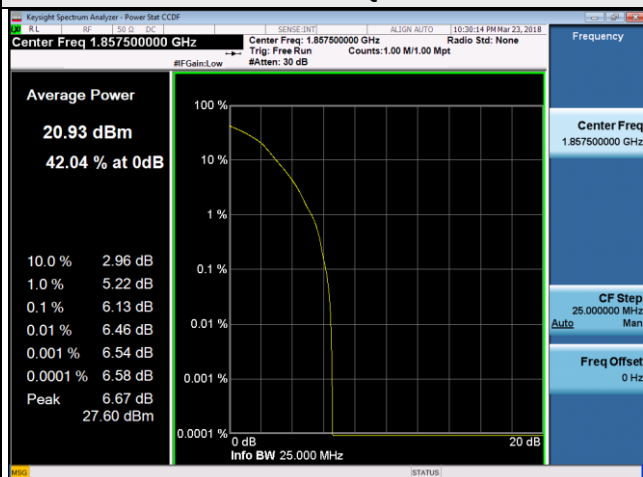
5MHz / 16QAM



10MHz / 16QAM



15MHz / 16QAM



20MHz / 16QAM

