

## FCC Test Report

### (PART 24)

**Report No.:** RFBFMG-WTW-P22060328-7

**FCC ID:** B32V2104GPLUS

**Test Model:** V210 4G Plus

**Received Date:** Jun. 09, 2022

**Test Date:** Jul. 13, 2022 ~ Jul. 20, 2022

**Issued Date:** Sep. 08, 2022

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**FCC Registration /** 788550 / TW0003

**Designation Number:** 281270 / TW0032



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### Release Control Record

Issue No.	Description	Date Issued
RFBFMG-WTW-P22060328-7	Original Release	Sep. 08, 2022



## 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.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
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	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238	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 -21.58 dB at 70.74 MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 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) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~ 200MHz	2.91 dB
	200MHz ~ 1000MHz	2.92 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

## 2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver Rohde & Schwarz	ESR3	102579	Jul. 01, 2022	Jun. 30, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110462	Dec. 21, 2021	Dec. 20, 2022
BILOG Antenna SCHWARZBECK	VULB9168	995	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-404	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	995	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2021	Sep. 15, 2022
Preamplifier EMCI	EMC330N	980783	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980810	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980787	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(900 0+2000+1000)	201230+ 201242+ 210101	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-NM -(9000+300+500)	201252+ 201250+ 201245	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5 000+3000+2000)	201261+201258+ 201249	Jan. 17, 2022	Jan. 16, 2023
Software BV CPS	ADT_Radiated_V7.6.1 5.9.5	NA	NA	NA
Turn Table Max-Full	MFT-151SS-0.5T	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208675	NA	NA
Antenna Tower KaiTuo	NA	NA	NA	NA
Antenna Tower Controller KaiTuo	KT-2000	NA	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5 5190004/MY55190 007/MY55210005	Jul. 12, 2021	Jul. 11, 2022
			Jul. 13, 2022	Jul. 12, 2023
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Feb. 16, 2022	Feb. 15, 2023

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 WM Chamber 7.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Point of Sale Terminal	
<b>Brand</b>	Verifone	
<b>Test Model</b>	V210 4G Plus	
<b>Status of EUT</b>	Engineering Sample	
<b>Power Supply Rating</b>	5 Vdc (from adapter) 3.7 Vdc (from Li-ion battery)	
<b>Modulation Type</b>	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
	LTE	QPSK, 16QAM
<b>Frequency Range</b>	GSM/GPRS/EDGE	1850.2 ~ 1909.8 MHz
	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
<b>Max. EIRP Power</b>	GSM/GPRS	1342.765 mW (31.28dBm)
	EDGE	548.277 mW (27.39dBm)
	WCDMA	492.040 mW (26.92dBm)
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	466.659 mW (26.69dBm)
	LTE Band 2 (Channel Bandwidth: 3 MHz)	468.813 mW (26.71dBm)
	LTE Band 2 (Channel Bandwidth: 5 MHz)	470.977 mW (26.73dBm)
	LTE Band 2 (Channel Bandwidth: 10 MHz)	473.151 mW (26.75dBm)
	LTE Band 2 (Channel Bandwidth: 15 MHz)	475.335 mW (26.77dBm)
	LTE Band 2 (Channel Bandwidth: 20 MHz)	477.529 mW (26.79dBm)
<b>Emission Designator</b>	GSM/GPRS	250KGXW
	EDGE	249KG7W
	WCDMA	4M19F9W
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	2M70G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	4M49D7W
	LTE Band 2 (Channel Bandwidth: 10 MHz)	8M96D7W
	LTE Band 2 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	17M9D7W

Note:

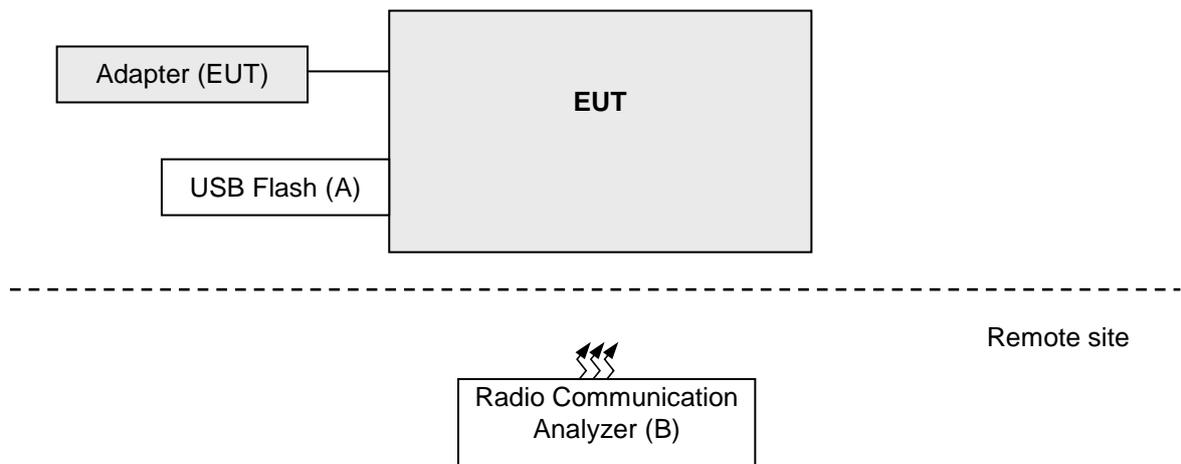
1. The antenna information is listed as below.

Ant. Type	Ant.	Antenna Peak Gain (dBi)				
		GSM850 / WCDMA 5 / LTE 5	GSM1900 / WCDMA 2 / LTE 2	WCDMA 4 / LTE 4	LTE 7	LTE 66
Dipole	1	0	3.6	3.2	2.0	3.2
	2	1.9	3.8	2.7	2.2	2.7

\* The Max antenna gain was chosen for final test.

2. Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers 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	USB Flash	SanDisk	SDDDC3-032G	N/A	N/A	Supplied by lab
B	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	N/A	Supplied by lab

### 3.3 Test Mode Applicability and Tested Channel Detail

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 was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GSM	X-plane
EDGE	X-plane
WCDMA	X-plane
LTE Band 2	X-plane

#### GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	512 to 810	512, 661, 810	GSM, EDGE
-	Modulation Characteristics	512 to 810	661	GSM, EDGE
-	Frequency Stability	512 to 810	512, 810	GSM, EDGE
-	Occupied Bandwidth	512 to 810	512, 661, 810	GSM, EDGE
-	Band Edge	512 to 810	512, 810	GSM, EDGE
-	Peak to Average Ratio	512 to 810	512, 661, 810	GSM, EDGE
-	Conducted Emission	512 to 810	512, 661, 810	GSM, EDGE
-	Radiated Emission Below 1GHz	512 to 810	661	GSM, EDGE
-	Radiated Emission Above 1GHz	512 to 810	512, 661, 810	GSM, EDGE

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

## WCDMA

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

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

### LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK / 16QAM	1 Half Full
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK / 16QAM	1 Half Full
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK / 16QAM	1 Half Full
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK / 16QAM	1 Half Full
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK / 16QAM	1 Half Full
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK / 16QAM	1 Half Full
-	Modulation Characteristics	18700 to 19100	18900	20 MHz	QPSK / 16QAM	Full
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	Full
		18615 to 19185	18615, 19185	3 MHz	QPSK	Full
		18625 to 19175	18625, 19175	5 MHz	QPSK	Full
		18650 to 19150	18650, 19150	10 MHz	QPSK	Full
		18675 to 19125	18675, 19125	15 MHz	QPSK	Full
		18700 to 19100	18700, 19100	20 MHz	QPSK	Full
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK / 16QAM	Full
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK / 16QAM	Full
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK / 16QAM	Full
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK / 16QAM	Full
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK / 16QAM	Full
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK / 16QAM	Full
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK / 16QAM	1
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK / 16QAM	1
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK / 16QAM	1
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK / 16QAM	1
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK / 16QAM	1
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK / 16QAM	1

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	RB #
-	Band Edge	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 Half Full
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 Half Full
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 Half Full
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 Half Full
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 Half Full
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 Half Full
-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1
-	Radiated Emission Below 1GHz	18700 to 19100	18900	20 MHz	QPSK	1
-	Radiated Emission Above 1GHz	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1

**Note:**

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation. Therefore, only EIRP, modulation characteristics, occupied bandwidth and peak to average ratio items had been tested under QPSK, 16QAM mode, the other items were performed under QPSK mode only.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.
3. For radiated emissions below 1 GHz, select the worst radiated emission channel for final testing.

**Test Condition:**

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Modulation Characteristics	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Frequency Stability	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Occupied Bandwidth	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Band Edge	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Peak to Average Ratio	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Conducted Emission	25 deg. C, 65 % RH	3.7 Vdc	James Yang
Radiated Emission Below 1GHz	23 deg. C, 68 % RH	120 Vac, 60 Hz	Edison Lee
Radiated Emission Above 1GHz	23 deg. C, 68 % RH	120 Vac, 60 Hz	Edison Lee

**3.4 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

**3.5 General Description of Applied Standards and references**

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

**Test Standard:**

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 24**

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

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

**References Test Guidance:**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

**NOTE:** All test items have been performed as a reference to the above KDB test guidance.

## 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

##### **Conducted Power Measurement:**

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, and 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.

##### **Maximum EIRP / ERP**

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

$$\text{ERP} = P_{\text{Meas}} + G_T - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

$P_{\text{Meas}}$  measured transmitter output power or PSD, in dBm or dBW

$G_T$  gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

#### 4.1.3 Test Setup

##### **Conducted Power Measurement:**



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GSM (GMSK, 1Tx-slot)	29.62	29.41	29.50
GPRS (GMSK, 1Tx-slot)	29.63	29.43	29.52
GPRS (GMSK, 2Tx-slot)	29.61	29.40	29.49
GPRS (GMSK, 3Tx-slot)	28.04	27.92	28.07
GPRS (GMSK, 4Tx-slot)	26.08	26.02	26.18
EDGE (8PSK, 1Tx-slot)	25.05	25.02	25.74
EDGE (8PSK, 2Tx-slot)	24.93	24.84	25.46
EDGE (8PSK, 3Tx-slot)	23.12	23.29	23.64
EDGE (8PSK, 4Tx-slot)	21.01	21.21	21.52

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	22.86	22.56	23.12
HSDPA Subtest-1	21.53	21.54	22.10
HSDPA Subtest-2	21.52	21.51	22.02
HSDPA Subtest-3	21.12	21.09	21.54
HSDPA Subtest-4	21.08	21.06	21.62
HSUPA Subtest-1	21.51	21.53	22.09
HSUPA Subtest-2	20.52	20.62	21.18
HSUPA Subtest-3	21.47	21.57	22.13
HSUPA Subtest-4	19.91	20.01	20.57

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	22.57	22.89	22.59
		1	2	22.51	22.63	22.47
		1	5	22.28	22.43	22.39
		3	0	22.65	22.51	22.55
		3	1	22.64	22.55	22.50
		3	3	22.30	22.39	22.21
	16QAM	6	0	21.49	21.53	21.46
		1	0	21.89	21.88	21.89
		1	2	21.84	21.84	21.85
		1	5	21.55	21.70	21.58
		3	0	21.71	21.67	21.66
		3	1	21.60	21.66	21.47
		3	3	21.46	21.54	21.46
		6	0	20.40	20.47	20.29

LTE Band 2						
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
		3M	QPSK	1	0	22.62
1	7			22.60	22.61	22.49
1	14			22.33	22.34	22.27
8	0			21.68	21.53	21.44
8	3			21.53	21.50	21.54
8	7			21.32	21.47	21.28
15	0			21.59	21.42	21.39
16QAM	1		0	21.81	21.82	21.83
	1		7	21.79	21.75	21.82
	1		14	21.54	21.72	21.49
	8		0	20.63	20.68	20.69
	8		3	20.64	20.57	20.61
	8		7	20.46	20.52	20.51
	15		0	20.43	20.50	20.36

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	22.56	22.93	22.69
		1	12	22.54	22.58	22.54
		1	24	22.22	22.45	22.26
		12	0	21.61	21.55	21.54
		12	6	21.64	21.53	21.49
		12	13	21.36	21.50	21.16
		25	0	21.57	21.39	21.37
	16QAM	1	0	21.75	21.73	21.71
		1	12	21.68	21.68	21.69
		1	24	21.61	21.65	21.51
		12	0	20.74	20.72	20.73
		12	6	20.64	20.60	20.48
		12	13	20.48	20.53	20.52
		25	0	20.37	20.52	20.28

LTE Band 2						
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	22.59	22.95	22.73
		1	24	22.58	22.67	22.58
		1	49	22.29	22.46	22.35
		25	0	21.57	21.60	21.54
		25	12	21.55	21.54	21.53
		25	25	21.36	21.35	21.30
		50	0	21.49	21.43	21.50
	16QAM	1	0	21.75	21.79	21.76
		1	24	21.73	21.77	21.75
		1	49	21.56	21.62	21.61
		25	0	20.70	20.67	20.70
		25	12	20.65	20.57	20.50
		25	25	20.42	20.56	20.44
		50	0	20.43	20.57	20.31

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	22.63	22.97	22.74
		1	37	22.66	22.67	22.58
		1	74	22.35	22.49	22.41
		36	0	21.71	21.65	21.56
		36	19	21.67	21.59	21.63
		36	39	21.40	21.50	21.36
		75	0	21.61	21.54	21.53
	16QAM	1	0	21.85	21.81	21.82
		1	37	21.88	21.75	21.79
		1	74	21.64	21.74	21.64
		36	0	20.77	20.77	20.76
		36	19	20.75	20.70	20.62
		36	39	20.52	20.58	20.54
		75	0	20.50	20.59	20.41

LTE Band 2						
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	22.73	22.99	22.79
		1	50	22.71	22.71	22.62
		1	99	22.44	22.54	22.43
		50	0	21.71	21.73	21.68
		50	25	21.68	21.69	21.67
		50	50	21.48	21.52	21.41
		100	0	21.61	21.63	21.54
	16QAM	1	0	21.88	21.86	21.84
		1	50	21.86	21.85	21.83
		1	99	21.73	21.82	21.72
		50	0	20.86	20.86	20.83
		50	25	20.78	20.79	20.71
		50	50	20.58	20.58	20.57
		100	0	20.55	20.62	20.49

### EIRP Power (dBm)

Band	GSM1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GSM (GMSK, 1Tx-slot)	31.27	31.06	31.15
GPRS (GMSK, 1Tx-slot)	<b>31.28</b>	31.08	31.17
GPRS (GMSK, 2Tx-slot)	31.26	31.05	31.14
GPRS (GMSK, 3Tx-slot)	29.69	29.57	29.72
GPRS (GMSK, 4Tx-slot)	27.73	27.67	27.83
EDGE (8PSK, 1Tx-slot)	26.70	26.67	<b>27.39</b>
EDGE (8PSK, 2Tx-slot)	26.58	26.49	27.11
EDGE (8PSK, 3Tx-slot)	24.77	24.94	25.29
EDGE (8PSK, 4Tx-slot)	22.66	22.86	23.17

\*EIRP = Conducted + antenna gain (3.8dBi)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC 12.2K	26.66	26.36	<b>26.92</b>
HSDPA Subtest-1	25.33	25.34	25.90
HSDPA Subtest-2	25.32	25.31	25.82
HSDPA Subtest-3	24.92	24.89	25.34
HSDPA Subtest-4	24.88	24.86	25.42
HSUPA Subtest-1	25.31	25.33	25.89
HSUPA Subtest-2	24.32	24.42	24.98
HSUPA Subtest-3	25.27	25.37	25.93
HSUPA Subtest-4	23.71	23.81	24.37

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		18607	18900	19193
		Frequency (MHz)		1850.7	1880	1909.3
1.4M	QPSK	1	0	26.37	<b>26.69</b>	26.39
		1	2	26.31	26.43	26.27
		1	5	26.08	26.23	26.19
		3	0	26.45	26.31	26.35
		3	1	26.44	26.35	26.30
		3	3	26.10	26.19	26.01
		6	0	25.29	25.33	25.26
	16QAM	1	0	25.69	25.68	25.69
		1	2	25.64	25.64	25.65
		1	5	25.35	25.50	25.38
		3	0	25.51	25.47	25.46
		3	1	25.40	25.46	25.27
		3	3	25.26	25.34	25.26
		6	0	24.20	24.27	24.09

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	Channel		18615	18900	19185
		Frequency (MHz)		1851.5	1880	1908.5
		3M	QPSK	1	0	26.42
1	7			26.40	26.41	26.29
1	14			26.13	26.14	26.07
8	0			25.48	25.33	25.24
8	3			25.33	25.30	25.34
8	7			25.12	25.27	25.08
15	0			25.39	25.22	25.19
16QAM	1		0	25.61	25.62	25.63
	1		7	25.59	25.55	25.62
	1		14	25.34	25.52	25.29
	8		0	24.43	24.48	24.49
	8		3	24.44	24.37	24.41
	8		7	24.26	24.32	24.31
	15		0	24.23	24.30	24.16

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	Channel		18625	18900	19175
		Frequency (MHz)		1852.5	1880	1907.5
5M	QPSK	1	0	26.36	<b>26.73</b>	26.49
		1	12	26.34	26.38	26.34
		1	24	26.02	26.25	26.06
		12	0	25.41	25.35	25.34
		12	6	25.44	25.33	25.29
		12	13	25.16	25.30	24.96
		25	0	25.37	25.19	25.17
	16QAM	1	0	25.55	25.53	25.51
		1	12	25.48	25.48	25.49
		1	24	25.41	25.45	25.31
		12	0	24.54	24.52	24.53
		12	6	24.44	24.40	24.28
		12	13	24.28	24.33	24.32
		25	0	24.17	24.32	24.08

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	Channel		18650	18900	19150
		Frequency (MHz)		1855	1880	1905
10M	QPSK	1	0	26.39	<b>26.75</b>	26.53
		1	24	26.38	26.47	26.38
		1	49	26.09	26.26	26.15
		25	0	25.37	25.40	25.34
		25	12	25.35	25.34	25.33
		25	25	25.16	25.15	25.10
		50	0	25.29	25.23	25.30
	16QAM	1	0	25.55	25.59	25.56
		1	24	25.53	25.57	25.55
		1	49	25.36	25.42	25.41
		25	0	24.50	24.47	24.50
		25	12	24.45	24.37	24.30
		25	25	24.22	24.36	24.24
		50	0	24.23	24.37	24.11

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	Channel		18675	18900	19125
		Frequency (MHz)		1857.5	1880	1902.5
15M	QPSK	1	0	26.43	<b>26.77</b>	26.54
		1	37	26.46	26.47	26.38
		1	74	26.15	26.29	26.21
		36	0	25.51	25.45	25.36
		36	19	25.47	25.39	25.43
		36	39	25.20	25.30	25.16
		75	0	25.41	25.34	25.33
	16QAM	1	0	25.65	25.61	25.62
		1	37	25.68	25.55	25.59
		1	74	25.44	25.54	25.44
		36	0	24.57	24.57	24.56
		36	19	24.55	24.50	24.42
		36	39	24.32	24.38	24.34
		75	0	24.30	24.39	24.21

\*EIRP = Conducted + antenna gain (3.8dBi)

LTE Band 2						
BW	MCS Index	Channel		18700	18900	19100
		Frequency (MHz)		1860	1880	1900
20M	QPSK	1	0	26.53	<b>26.79</b>	26.59
		1	50	26.51	26.51	26.42
		1	99	26.24	26.34	26.23
		50	0	25.51	25.53	25.48
		50	25	25.48	25.49	25.47
		50	50	25.28	25.32	25.21
		100	0	25.41	25.43	25.34
	16QAM	1	0	25.68	25.66	25.64
		1	50	25.66	25.65	25.63
		1	99	25.53	25.62	25.52
		50	0	24.66	24.66	24.63
		50	25	24.58	24.59	24.51
		50	50	24.38	24.38	24.37
		100	0	24.35	24.42	24.29

\*EIRP = Conducted + antenna gain (3.8dBi)

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

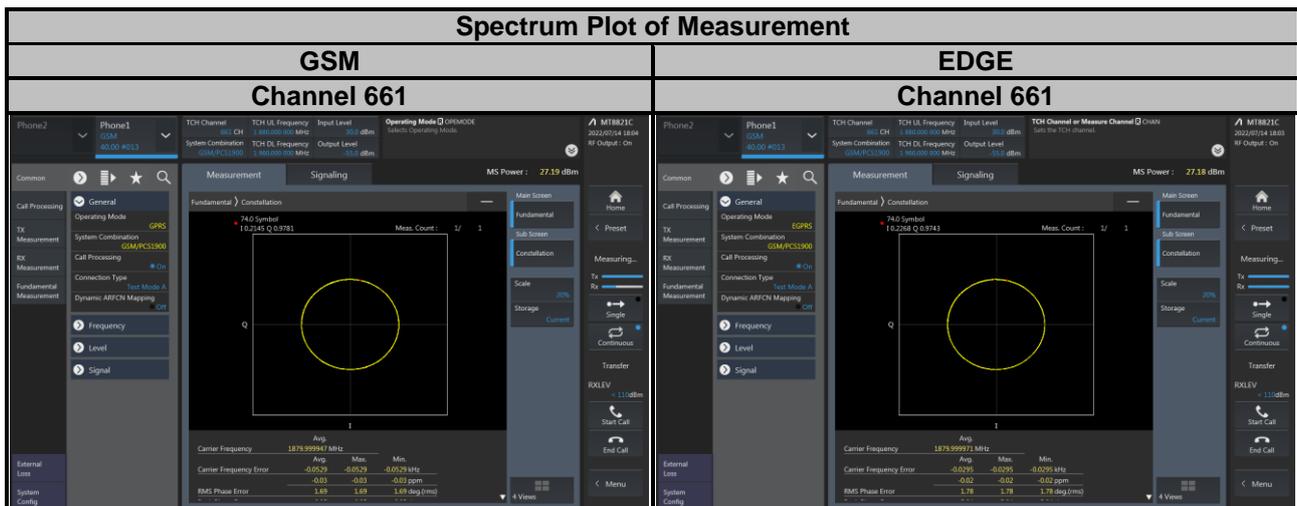
### 4.2.2 Test Setup



### 4.2.3 Test Procedure

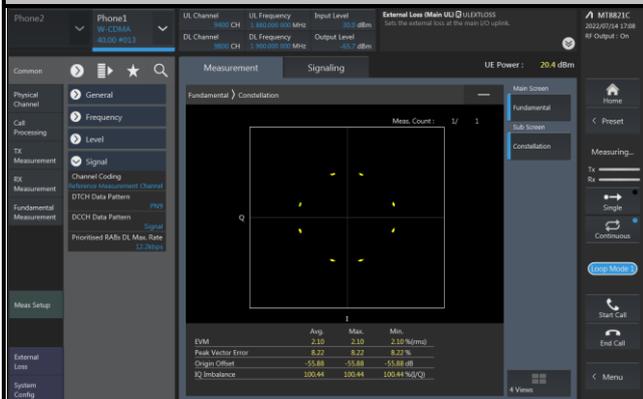
Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

### 4.2.4 Test Results

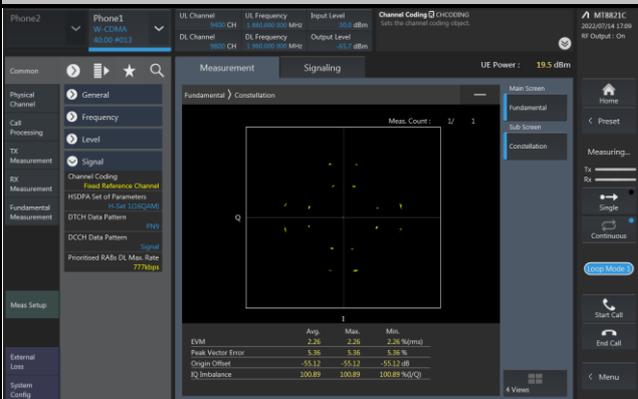


### Spectrum Plot of Measurement Channel 9400

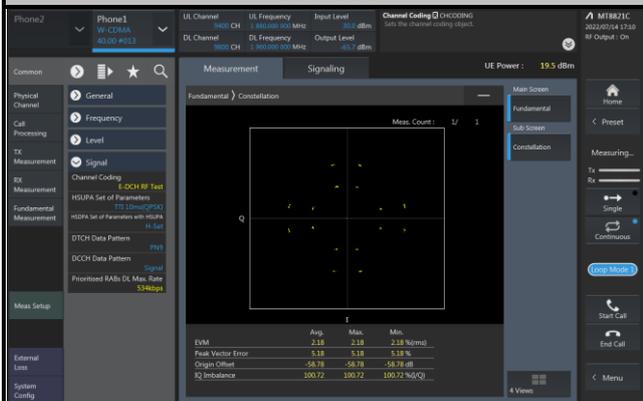
#### WCDMA



#### HSDPA

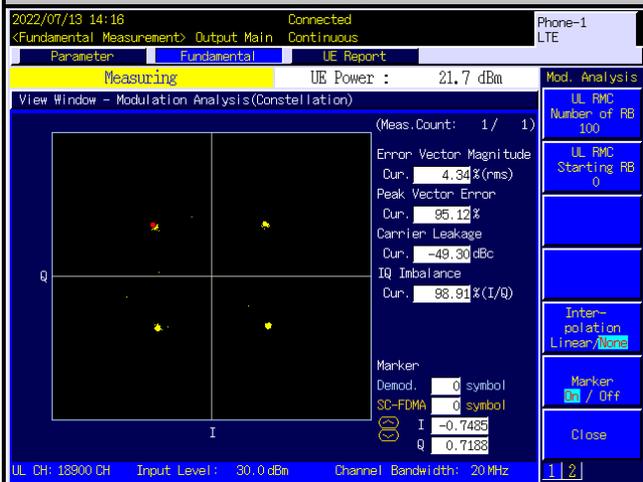


#### HSUPA

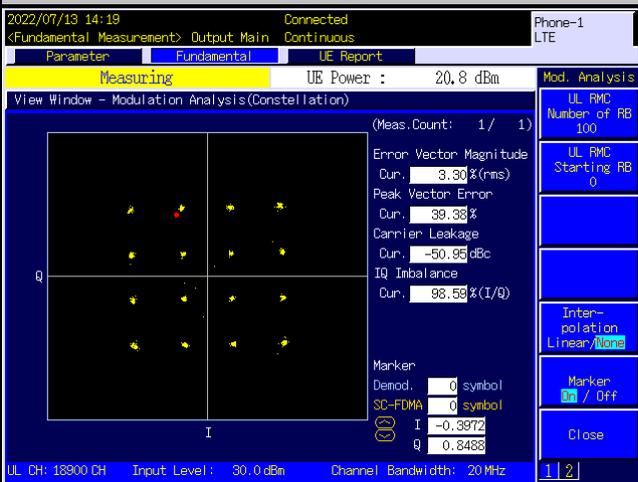


### Spectrum Plot of Measurement LTE Band 2 Channel 18900

#### QPSK



#### 16QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

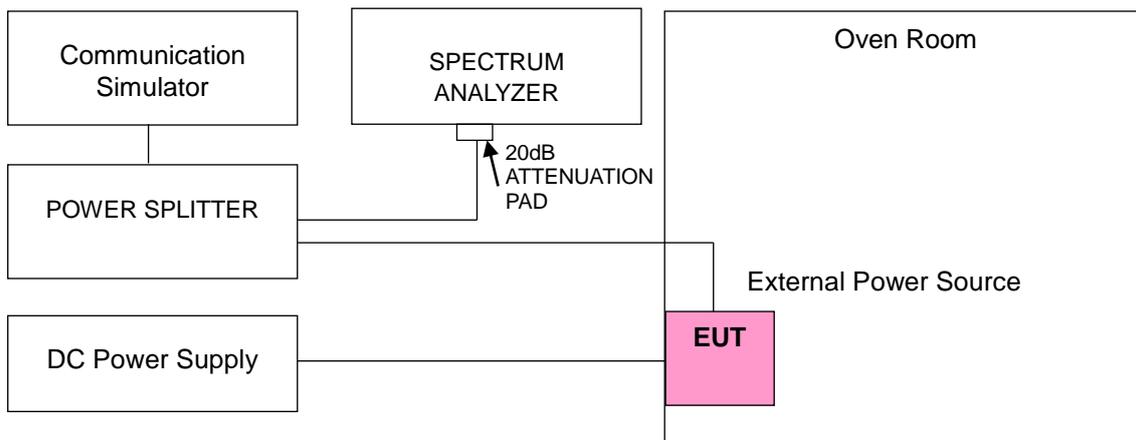
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### 4.3.2 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.

#### 4.3.3 Test Setup



#### 4.3.4 Test Results

##### Frequency Error vs. Voltage

Voltage (Volts)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1850.200003	0.002	1909.800002	0.001
3.15	1850.200003	0.002	1909.800001	0.001
4.26	1850.200004	0.002	1909.800003	0.002

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

##### Frequency Error vs. Temperature

Temp. (°C)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.200002	0.001	1909.800002	0.001
-20	1850.200002	0.001	1909.800002	0.001
-10	1850.200002	0.001	1909.800003	0.002
0	1850.200004	0.002	1909.800002	0.001
10	1850.200004	0.002	1909.800001	0.001
20	1850.199996	-0.002	1909.799998	-0.001
30	1850.199999	-0.001	1909.799997	-0.001
40	1850.199999	-0.001	1909.799999	-0.001
50	1850.199998	-0.001	1909.799999	-0.001

## Frequency Error vs. Voltage

Voltage (Volts)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1850.200002	0.001	1909.800002	0.001
3.15	1850.200003	0.002	1909.800003	0.002
4.26	1850.200003	0.002	1909.800004	0.002

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.200002	0.001	1909.800004	0.002
-20	1850.200002	0.001	1909.800001	0.001
-10	1850.200003	0.002	1909.800002	0.001
0	1850.200002	0.001	1909.800001	0.001
10	1850.200001	0.001	1909.800001	0.001
20	1850.199997	-0.001	1909.799998	-0.001
30	1850.199997	-0.002	1909.799997	-0.002
40	1850.199997	-0.002	1909.799999	-0.001
50	1850.199996	-0.002	1909.799999	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1852.400003	0.001	1907.600001	0.001
3.15	1852.400004	0.002	1907.600002	0.001
4.26	1852.400002	0.001	1907.600003	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.400004	0.002	1907.600002	0.001
-20	1852.400004	0.002	1907.600004	0.002
-10	1852.400004	0.002	1907.600002	0.001
0	1852.400003	0.002	1907.600002	0.001
10	1852.400002	0.001	1907.600001	0.001
20	1852.399997	-0.002	1907.599998	-0.001
30	1852.399999	-0.001	1907.599998	-0.001
40	1852.399998	-0.001	1907.599997	-0.001
50	1852.399997	-0.001	1907.599998	-0.001

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1850.700003	0.002	1909.300000	0.002
3.15	1850.700002	0.001	1909.300001	0.001
4.26	1850.700003	0.002	1909.300001	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1850.700003	0.001	1909.300004	0.002
-20	1850.700003	0.002	1909.300004	0.002
-10	1850.700003	0.001	1909.300003	0.001
0	1850.700003	0.002	1909.300003	0.002
10	1850.700001	0.001	1909.300003	0.001
20	1850.699998	-0.001	1909.299997	-0.002
30	1850.699997	-0.002	1909.299999	-0.001
40	1850.699999	-0.001	1909.299996	-0.002
50	1850.699998	-0.001	1909.299998	-0.001

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1851.500004	0.002	1908.500002	0.001
3.15	1851.500003	0.001	1908.500003	0.001
4.26	1851.500001	0.001	1908.500004	0.002

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1851.500004	0.002	1908.500003	0.002
-20	1851.500003	0.001	1908.500002	0.001
-10	1851.500003	0.002	1908.500003	0.001
0	1851.500003	0.001	1908.500003	0.002
10	1851.500003	0.002	1908.500002	0.001
20	1851.499996	-0.002	1908.499999	-0.001
30	1851.499998	-0.001	1908.499996	-0.002
40	1851.499996	-0.002	1908.499999	-0.001
50	1851.499998	-0.001	1908.499997	-0.002

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1852.500003	0.002	1907.500004	0.002
3.15	1852.500002	0.001	1907.500003	0.002
4.26	1852.500002	0.001	1907.500002	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1852.500002	0.001	1907.500002	0.001
-20	1852.500003	0.002	1907.500003	0.002
-10	1852.500004	0.002	1907.500003	0.001
0	1852.500002	0.001	1907.500003	0.001
10	1852.500002	0.001	1907.500001	0.001
20	1852.499997	-0.002	1907.499996	-0.002
30	1852.499999	-0.001	1907.499998	-0.001
40	1852.499999	-0.001	1907.499998	-0.001
50	1852.499998	-0.001	1907.499998	-0.001

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1855.000002	0.001	1905.000002	0.001
3.15	1855.000002	0.001	1905.000002	0.001
4.26	1855.000003	0.002	1905.000002	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1855.000002	0.001	1905.000002	0.001
-20	1855.000001	0.001	1905.000002	0.001
-10	1855.000002	0.001	1905.000001	0.001
0	1855.000003	0.001	1905.000002	0.001
10	1855.000003	0.002	1905.000004	0.002
20	1854.999998	-0.001	1904.999997	-0.002
30	1854.999997	-0.002	1904.999998	-0.001
40	1854.999998	-0.001	1904.999998	-0.001
50	1854.999999	-0.001	1904.999998	-0.001

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1857.500002	0.001	1902.500001	0.001
3.15	1857.500003	0.002	1902.500003	0.001
4.26	1857.500002	0.001	1902.500002	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1857.500003	0.002	1902.500001	0.001
-20	1857.500001	0.001	1902.500001	0.001
-10	1857.500003	0.002	1902.500003	0.002
0	1857.500003	0.002	1902.500004	0.002
10	1857.500004	0.002	1902.500003	0.001
20	1857.499999	-0.001	1902.499996	-0.002
30	1857.499998	-0.001	1902.499998	-0.001
40	1857.499998	-0.001	1902.499998	-0.001
50	1857.499998	-0.001	1902.499997	-0.001

## Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.7	1860.000001	0.001	1900.000003	0.001
3.15	1860.000004	0.002	1900.000003	0.001
4.26	1860.000002	0.001	1900.000001	0.001

**Note:** The applicant defined the normal working voltage is from 3.15 Vdc to 4.26 Vdc.

## Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2			
	Channel Bandwidth: 20 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1860.000003	0.002	1900.000004	0.002
-20	1860.000002	0.001	1900.000002	0.001
-10	1860.000002	0.001	1900.000002	0.001
0	1860.000002	0.001	1900.000001	0.001
10	1860.000004	0.002	1900.000002	0.001
20	1859.999996	-0.002	1899.999996	-0.002
30	1859.999997	-0.001	1899.999999	-0.001
40	1859.999998	-0.001	1899.999998	-0.001
50	1859.999997	-0.002	1899.999996	-0.002

## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Limits of Occupied Bandwidth Measurement

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

### 4.4.2 Test Procedure

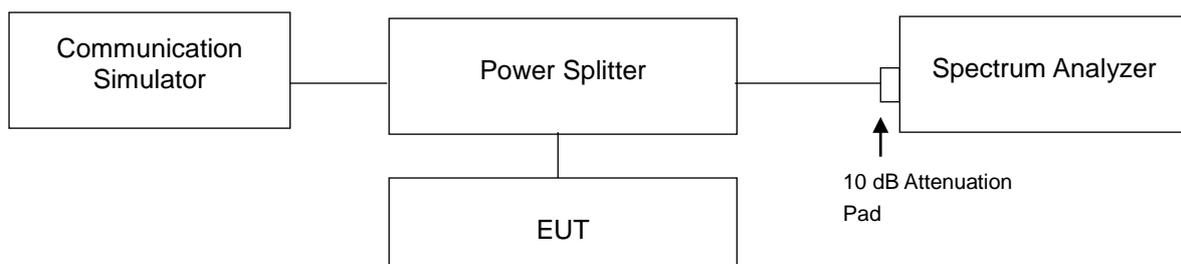
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times$  RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f) Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- g) Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- i) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

### 4.4.3 Test Setup

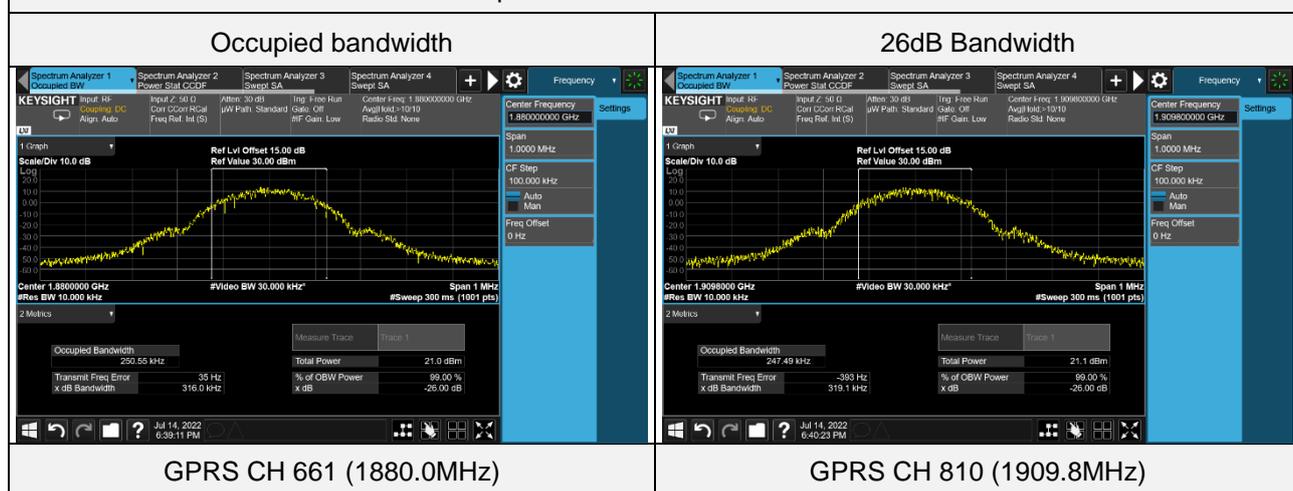


#### 4.4.4 Test Result

#### GP RS, EDGE

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (kHz)	26dB Bandwidth (kHz)
GPRS	512	1850.2	249.57	312.50
GPRS	661	1880	250.55	316.00
GPRS	810	1909.8	247.49	319.10
EDGE	512	1850.2	249.28	316.90
EDGE	661	1880	248.75	313.70
EDGE	810	1909.8	245.96	311.00

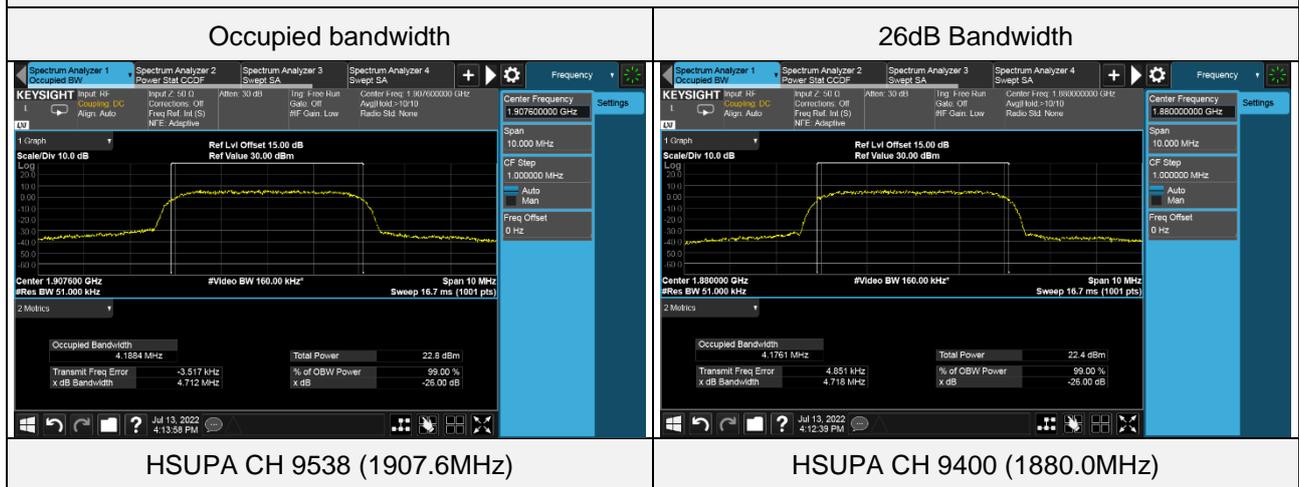
#### Spectrum Plot of Worst Value



WCDMA Band 2

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA	9262	1852.4	4.18	4.71
WCDMA	9400	1880.0	4.17	4.69
WCDMA	9538	1907.6	4.17	4.69
HSDPA	9262	1852.4	4.17	4.70
HSDPA	9400	1880.0	4.17	4.68
HSDPA	9538	1907.6	4.18	4.71
HSUPA	9262	1852.4	4.19	4.72
HSUPA	9400	1880.0	4.18	4.72
HSUPA	9538	1907.6	4.19	4.71

Spectrum Plot of Worst Value

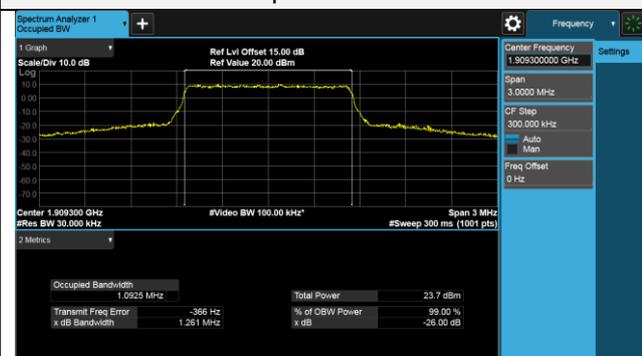


LTE Band 2 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18607	1850.7	1.0893	1.244
QPSK	18900	1880	1.0886	1.247
QPSK	19193	1909.3	1.0925	1.261
16QAM	18607	1850.7	1.0878	1.239
16QAM	18900	1880	1.0890	1.248
16QAM	19193	1909.3	1.0915	1.265

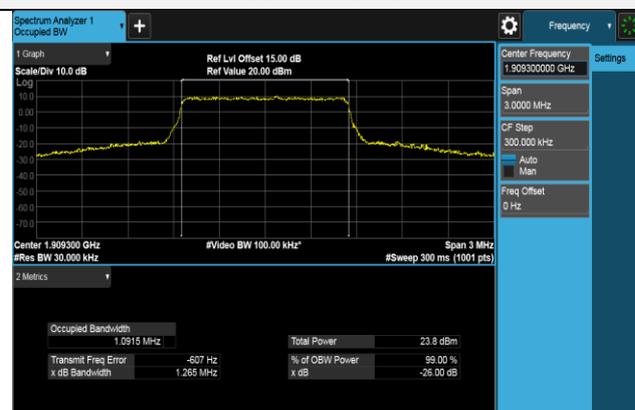
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 19193 (1909.3MHz)

26 dB Bandwidth



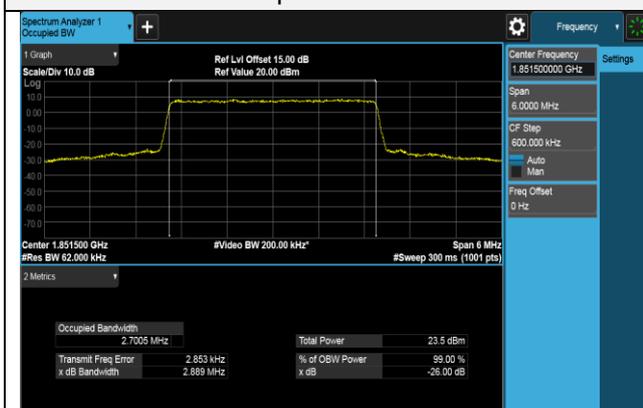
16QAM CH 19193 (1909.3MHz)

### LTE Band 2 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18615	1851.5	2.7005	2.889
QPSK	18900	1880	2.6987	2.888
QPSK	19185	1908.5	2.6995	2.894
16QAM	18615	1851.5	2.6984	2.895
16QAM	18900	1880	2.6994	2.889
16QAM	19185	1908.5	2.7003	2.899

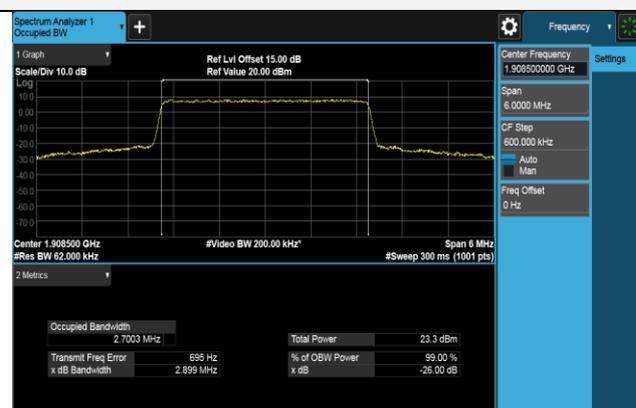
### Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 18615 (1851.5MHz)

26 dB Bandwidth



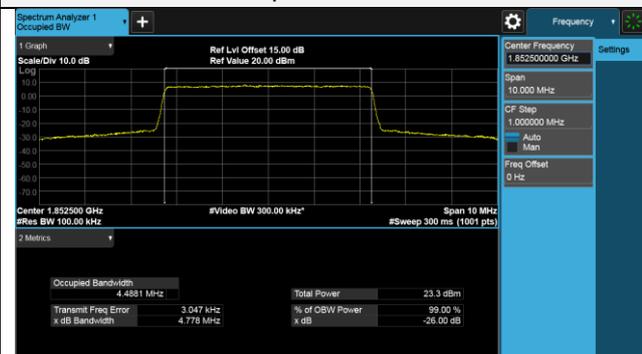
QPSK CH 19185 (1908.5MHz)

LTE Band 2 (Channel Bandwidth 5MHz)

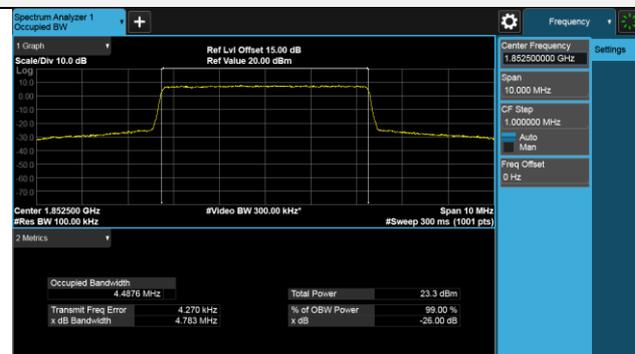
Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18625	1852.5	4.4876	4.783
QPSK	18900	1880	4.4872	4.778
QPSK	19175	1907.5	4.4877	4.779
16QAM	18625	1852.5	4.4881	4.778
16QAM	18900	1880	4.4871	4.775
16QAM	19175	1907.5	4.4878	4.780

Spectrum Plot of Worst Value

Occupied bandwidth



26 dB Bandwidth



16QAM CH 18625 (1852.5MHz)

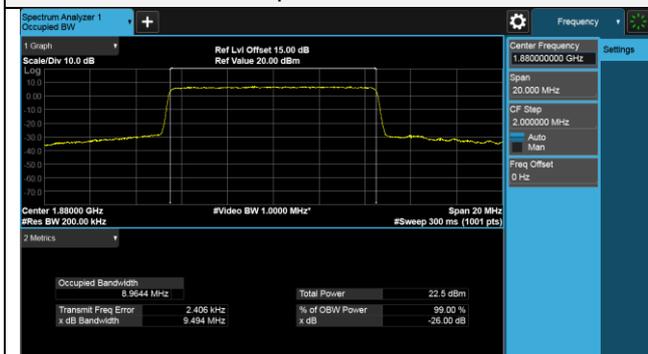
QPSK CH 18625 (1852.5MHz)

LTE Band 2 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18650	1855	8.9565	9.486
QPSK	18900	1880	8.9591	9.495
QPSK	19150	1905	8.9627	9.490
16QAM	18650	1855	8.9564	9.490
16QAM	18900	1880	8.9644	9.494
16QAM	19150	1905	8.9621	9.491

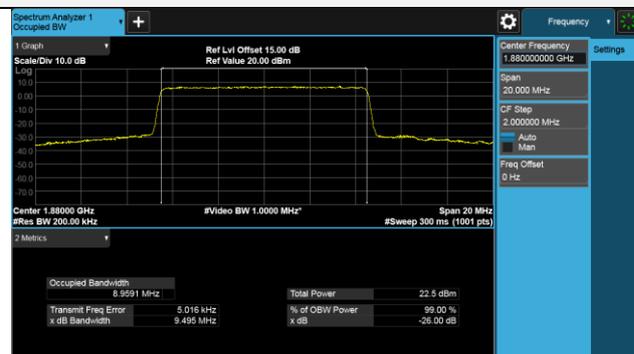
Spectrum Plot of Worst Value

Occupied bandwidth



16QAM CH 1890 (1880MHz)

26 dB Bandwidth



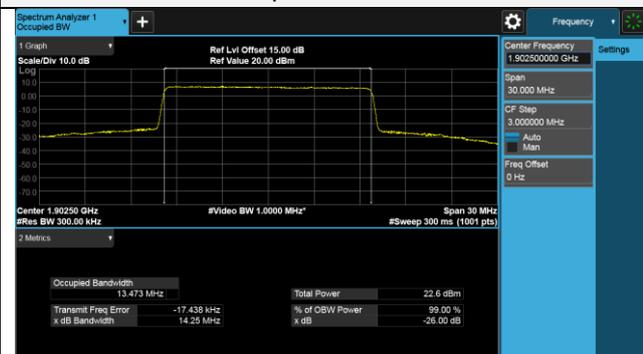
QPSK CH 1890 (1880MHz)

LTE Band 2 (Channel Bandwidth 15MHz)

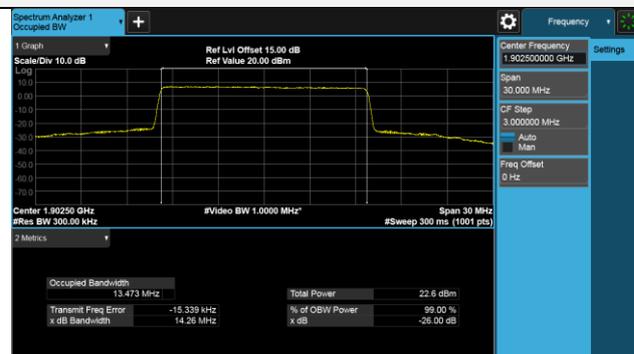
Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18675	1857.5	13.447	14.23
QPSK	18900	1880	13.464	14.24
QPSK	19125	1902.5	13.473	14.25
16QAM	18675	1857.5	13.448	14.24
16QAM	18900	1880	13.459	14.25
16QAM	19125	1902.5	13.473	14.26

Spectrum Plot of Worst Value

Occupied bandwidth



26 dB Bandwidth



QPSK CH 19125 (1902.5MHz)

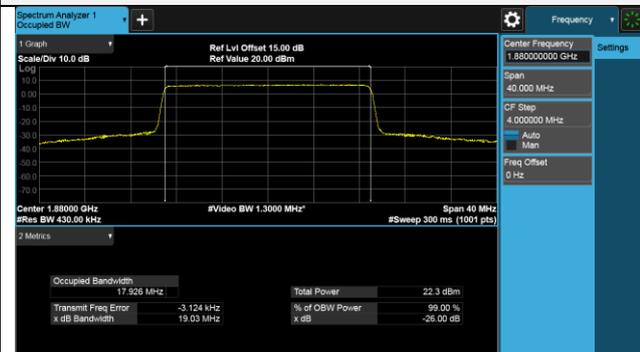
QPSK CH 19125 (1902.5MHz)

### LTE Band 2 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	18700	1860	17.899	19.01
QPSK	18900	1880	17.924	19.02
QPSK	19100	1900	17.923	19.04
16QAM	18700	1860	17.897	19.03
16QAM	18900	1880	17.926	19.03
16QAM	19100	1900	17.925	19.03

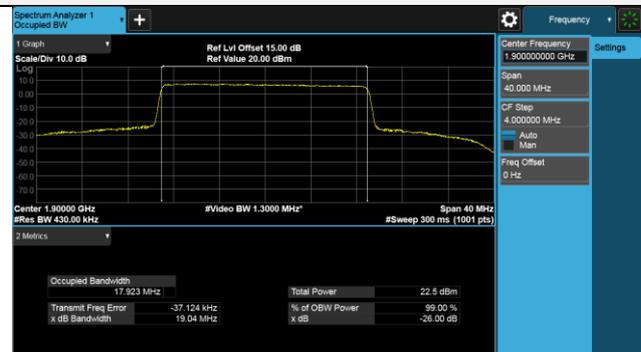
### Spectrum Plot of Worst Value

Occupied bandwidth



16QAM CH 18900 (1880MHz)

26 dB Bandwidth



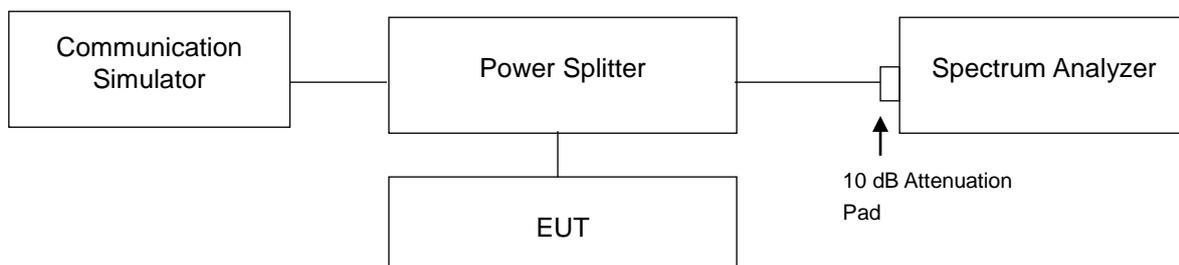
QPSK CH 19100 (1900MHz)

## 4.5 Band Edge Measurement

### 4.5.1 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.

### 4.5.2 Test Setup



### 4.5.3 Test Procedures

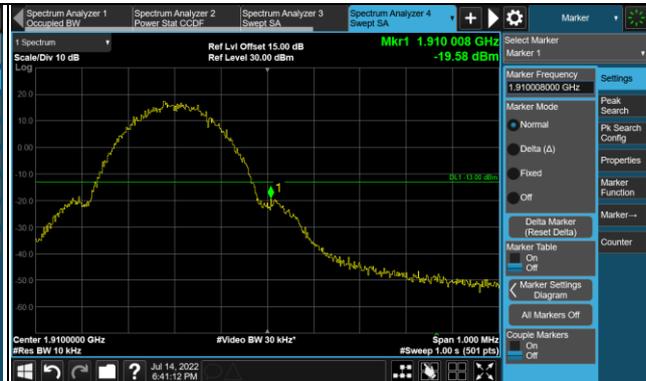
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 10 kHz and VB of the spectrum is 30 kHz (GSM/GPRS/EDGE).
- The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (LTE Channel Bandwidth 1.4MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 3MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (LTE Channel Bandwidth 5MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Channel Bandwidth 15MHz).
- The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz (LTE Channel Bandwidth 20MHz).
- Record the max trace plot into the test report.

## 4.5.4 Test Results

### GPRS



1850.2MHz



1909.8MHz

### EDGE



1850.2MHz



1909.8MHz

## WCDMA Band 2



1852.4MHz



1907.6MHz

## HSDPA



1852.4MHz



1907.6MHz

## HSUPA

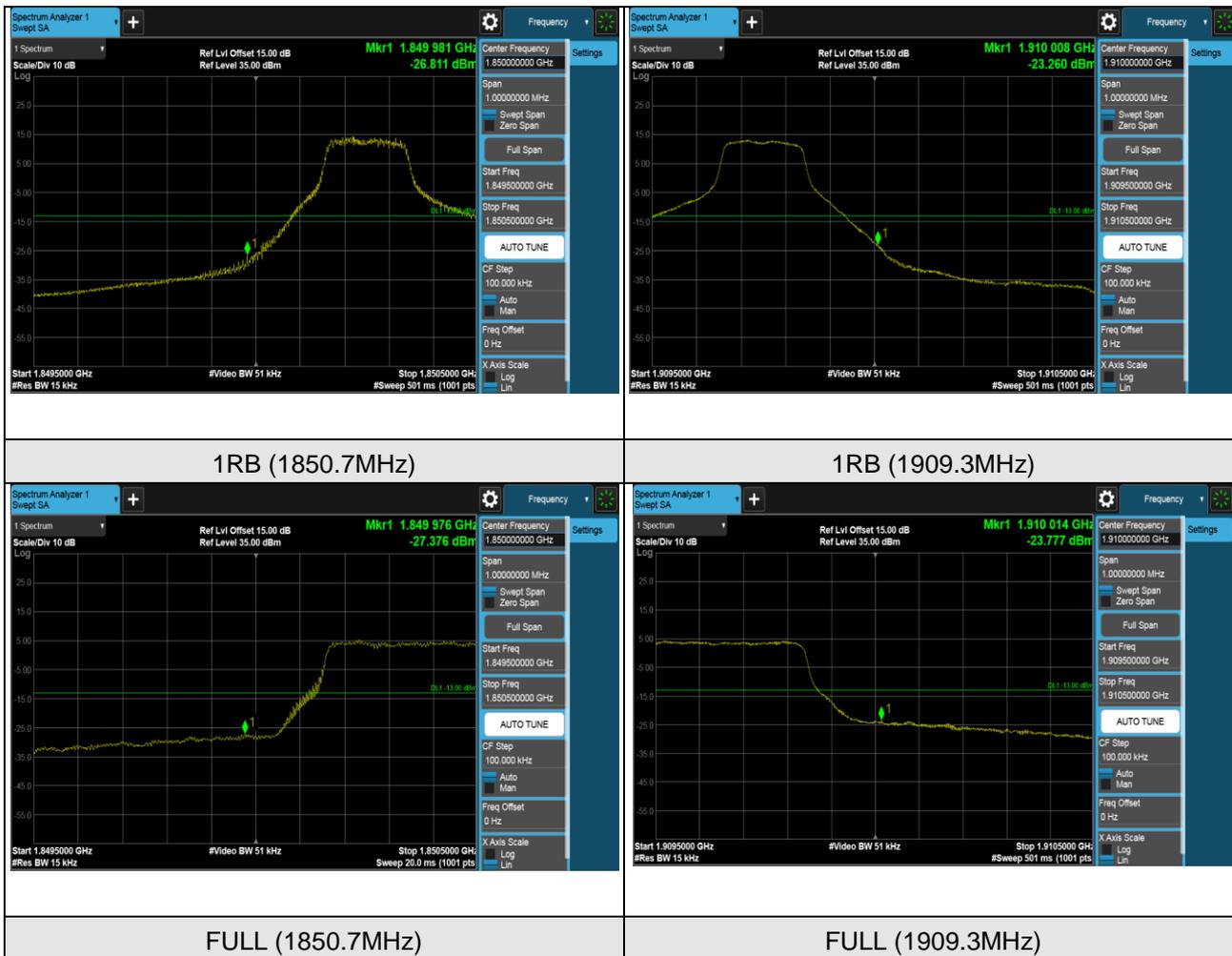


1852.4MHz

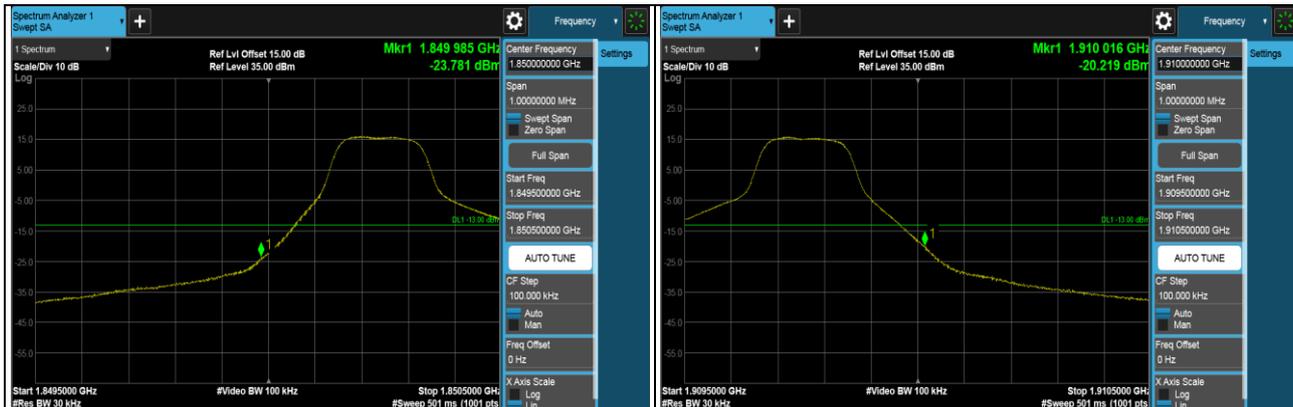


1907.6MHz

### LTE Band 2 (Channel Bandwidth 1.4MHz)

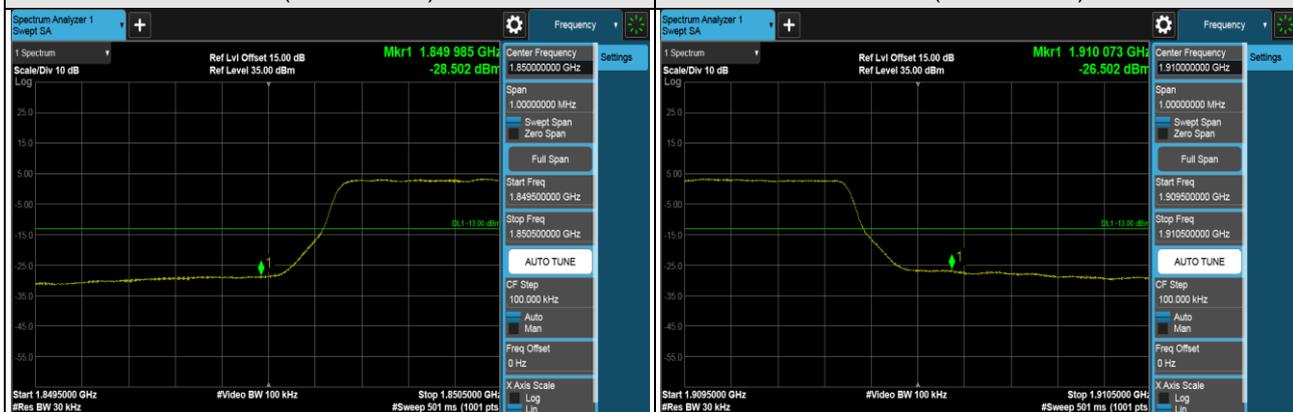


### LTE Band 2 (Channel Bandwidth 3MHz)



1RB (1851.5MHz)

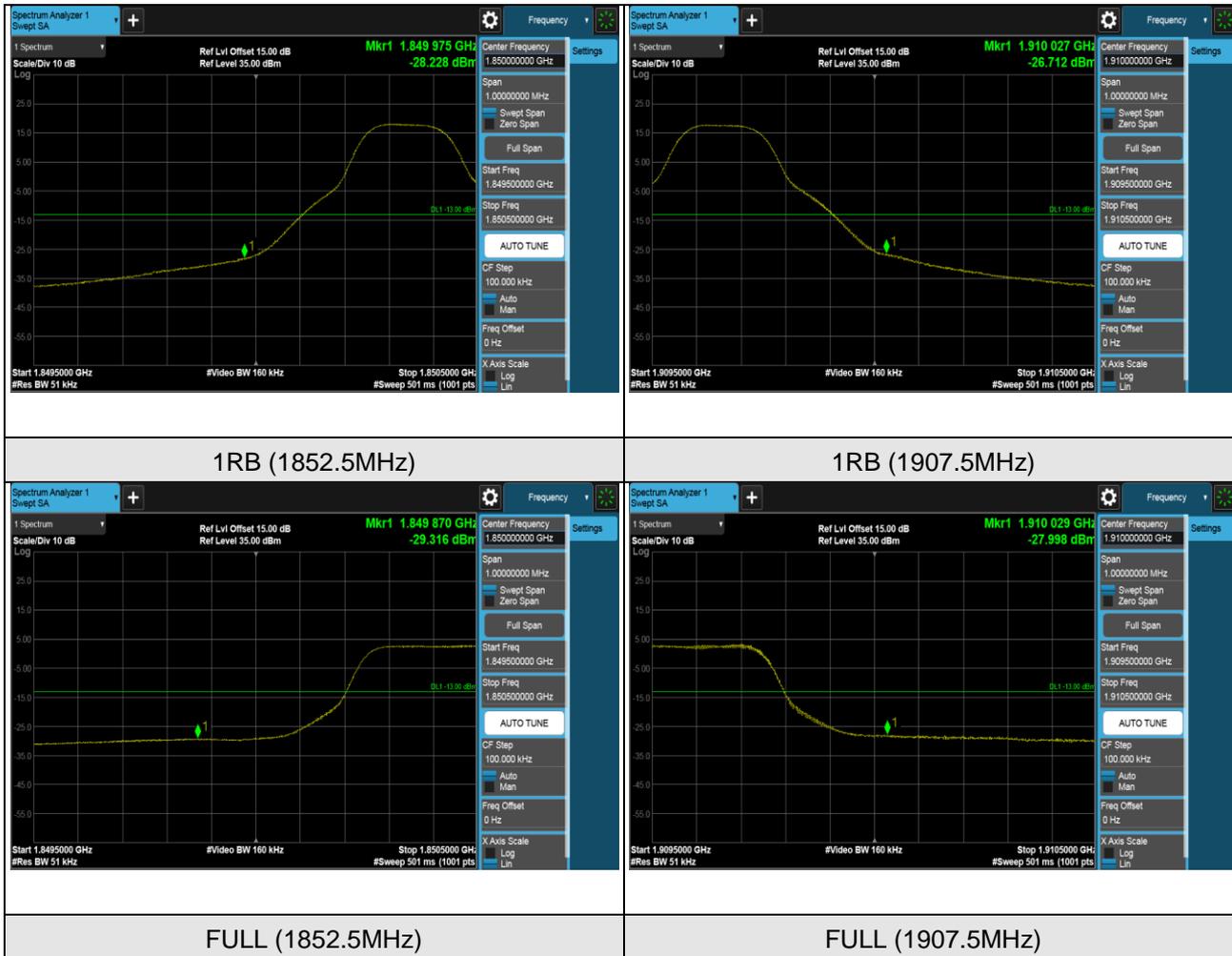
1RB (1908.5MHz)



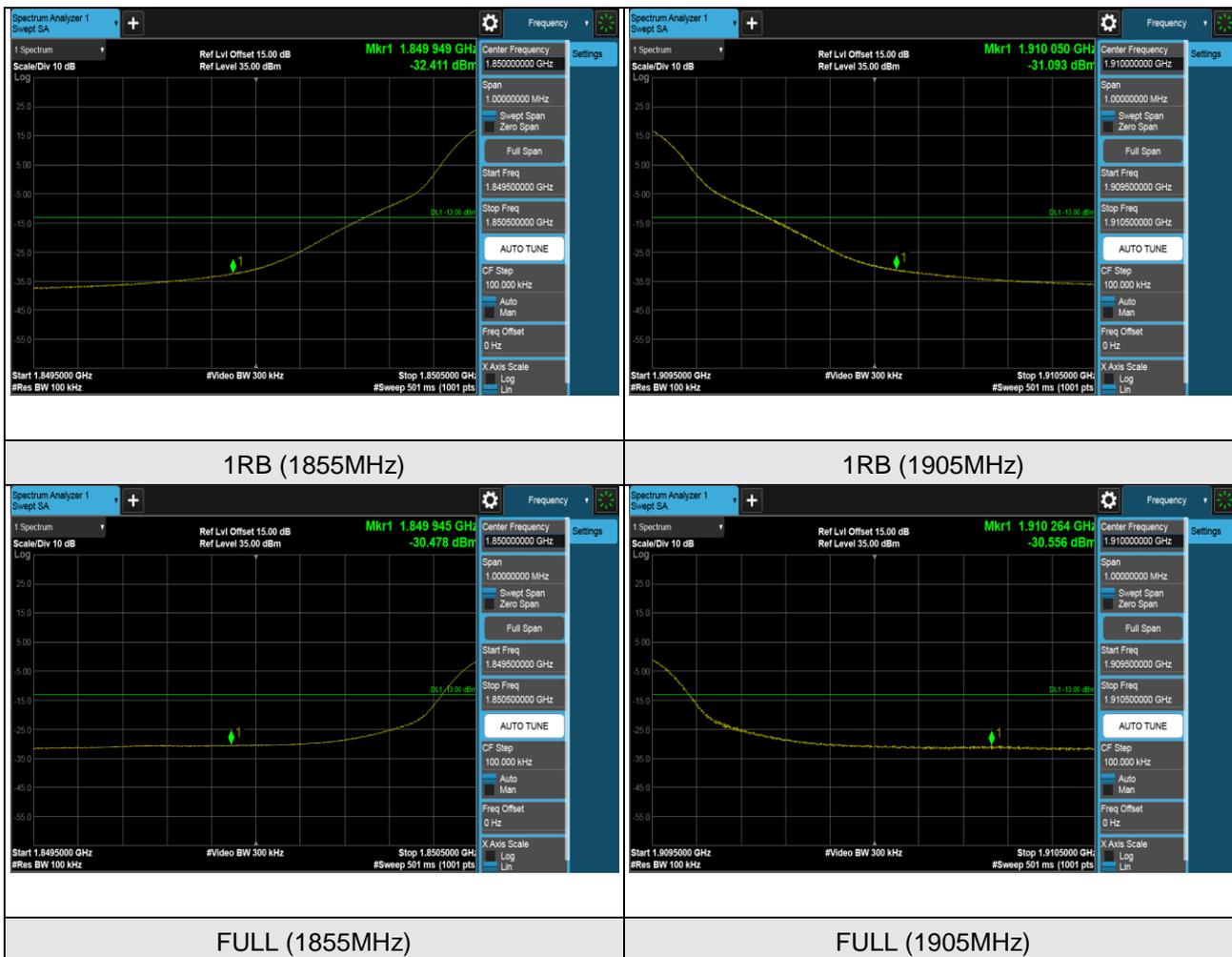
FULL (1851.5MHz)

FULL (1908.5MHz)

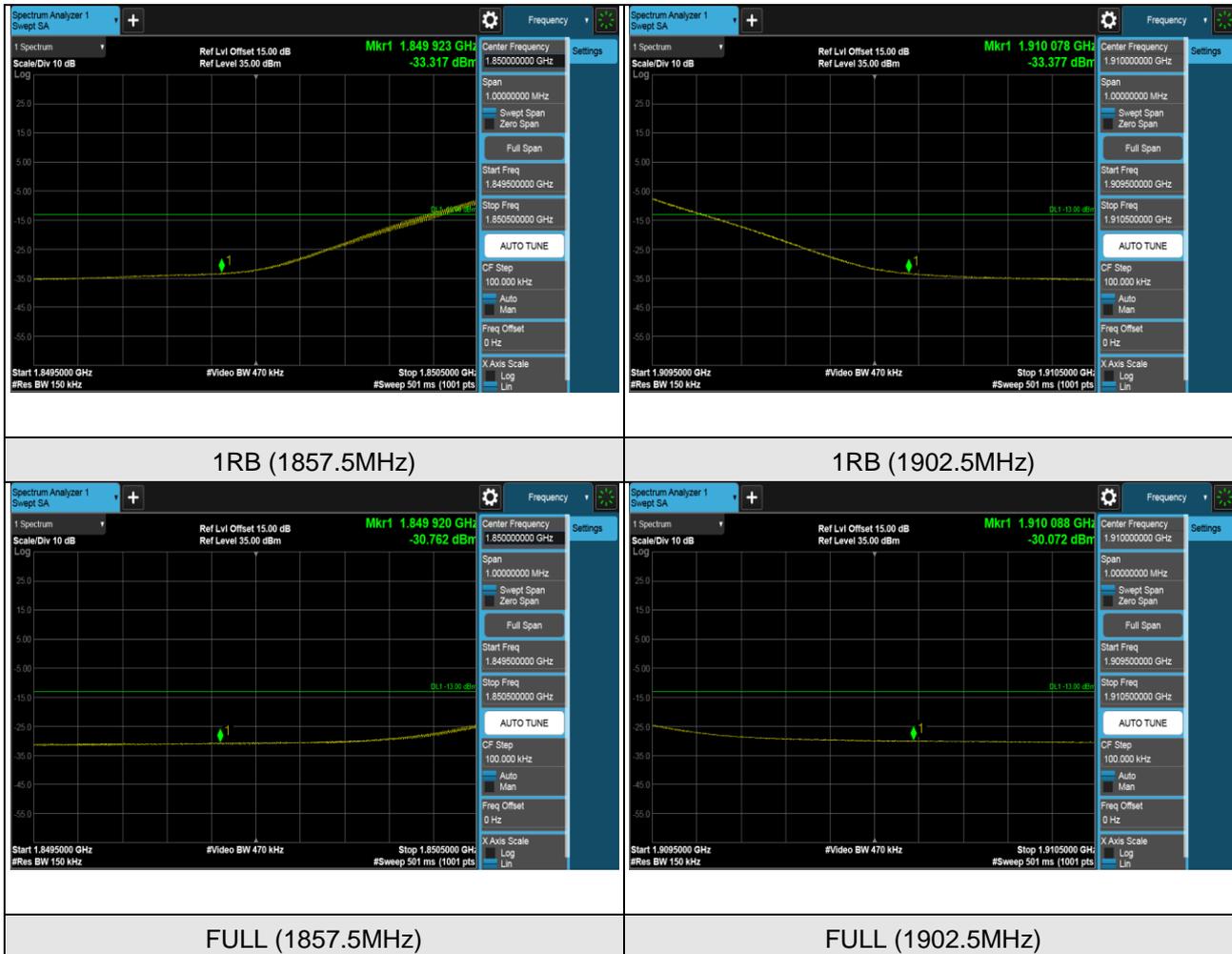
### LTE Band 2 (Channel Bandwidth 5MHz)



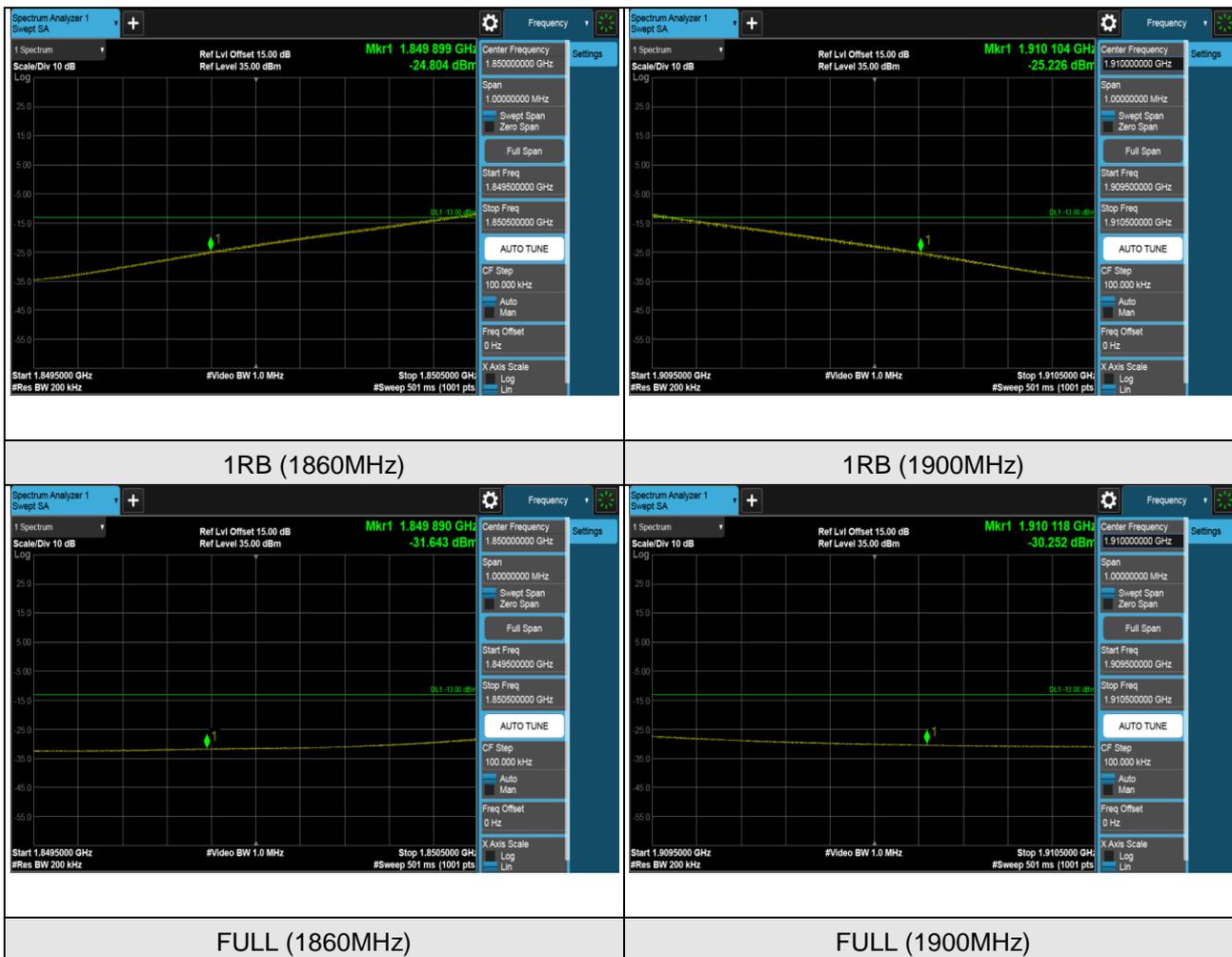
### LTE Band 2 (Channel Bandwidth 10MHz)



### LTE Band 2 (Channel Bandwidth 15MHz)



### LTE Band 2 (Channel Bandwidth 20MHz)

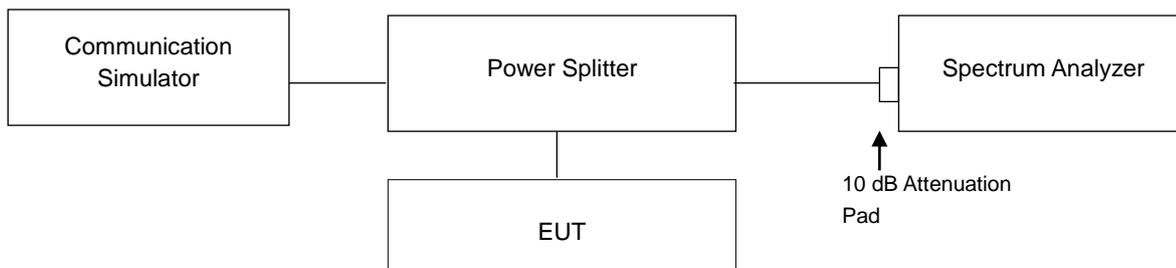


## 4.6 Peak to Average Ratio

### 4.6.1 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.

### 4.6.2 Test Setup



### 4.6.3 Test Procedures

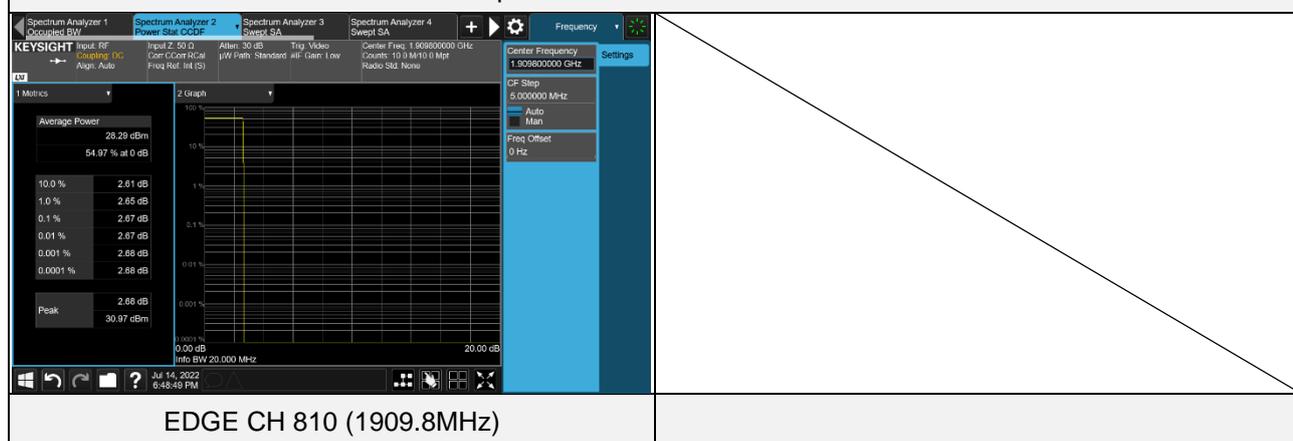
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

#### 4.6.4 Test Results

#### GPRS, EDGE

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
GPRS	512	1850.2	2.64	13	Pass
GPRS	661	1880	2.64	13	Pass
GPRS	810	1909.8	2.64	13	Pass
EDGE	512	1850.2	2.65	13	Pass
EDGE	661	1880	2.64	13	Pass
EDGE	810	1909.8	2.67	13	Pass

Spectrum Plot of Worst Value

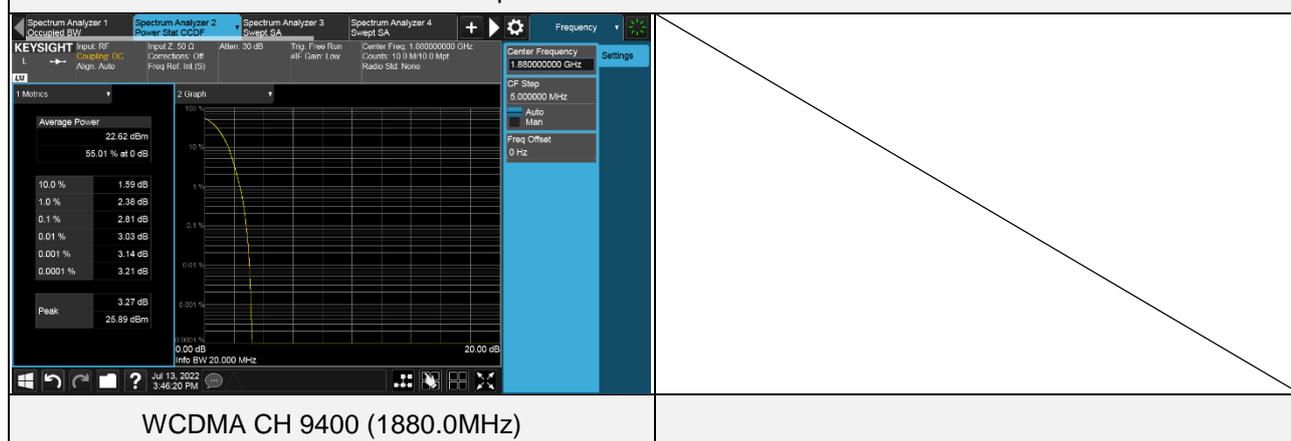


EDGE CH 810 (1909.8MHz)

### WCDMA Band 2

Test Condition	Channel	Frequency (MHz)	Measure. Value (dB)	Limit (dB)	Result
WCDMA	9262	1852.4	2.71	13	Pass
WCDMA	9400	1880.0	2.81	13	Pass
WCDMA	9538	1907.6	2.60	13	Pass
HSDPA	9262	1852.4	2.71	13	Pass
HSDPA	9400	1880.0	2.80	13	Pass
HSDPA	9538	1907.6	2.62	13	Pass
HSUPA	9262	1852.4	2.70	13	Pass
HSUPA	9400	1880.0	2.79	13	Pass
HSUPA	9538	1907.6	2.60	13	Pass

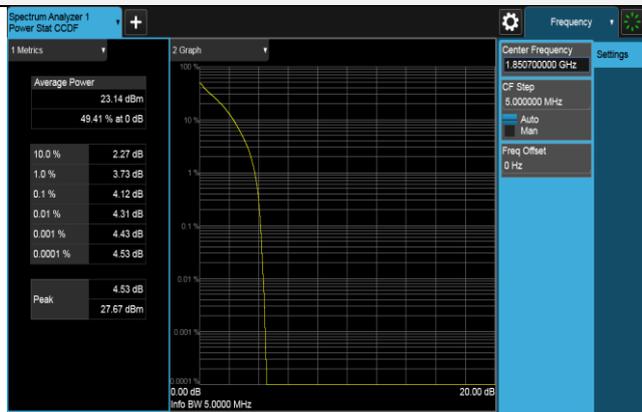
Spectrum Plot of Worst Value



LTE Band 2 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18607	1850.7	4.12	13	PASS
QPSK	18900	1880	4.04	13	PASS
QPSK	19193	1909.3	3.06	13	PASS
16QAM	18607	1850.7	4.06	13	PASS
16QAM	18900	1880	4.03	13	PASS
16QAM	19193	1909.3	3.08	13	PASS

Spectrum Plot of Worst Value

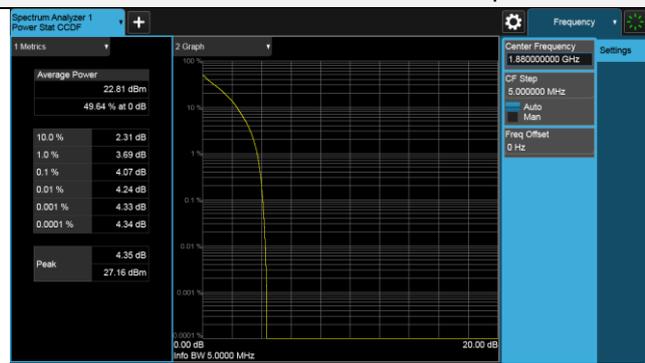


QPSK CH 18607 (1850.7MHz)

LTE Band 2 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18615	1851.5	3.93	13	PASS
QPSK	18900	1880	4.05	13	PASS
QPSK	19185	1908.5	3.36	13	PASS
16QAM	18615	1851.5	3.92	13	PASS
16QAM	18900	1880	4.07	13	PASS
16QAM	19185	1908.5	3.38	13	PASS

Spectrum Plot of Worst Value

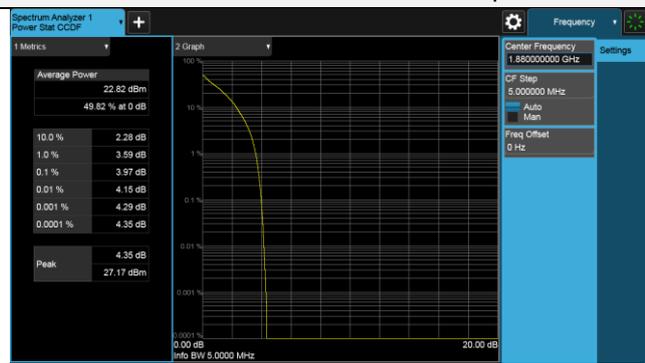


16QAM CH 18900 (1880MHz)

LTE Band 2 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18625	1852.5	3.89	13	PASS
QPSK	18900	1880	3.97	13	PASS
QPSK	19175	1907.5	3.59	13	PASS
16QAM	18625	1852.5	3.91	13	PASS
16QAM	18900	1880	3.96	13	PASS
16QAM	19175	1907.5	3.61	13	PASS

Spectrum Plot of Worst Value

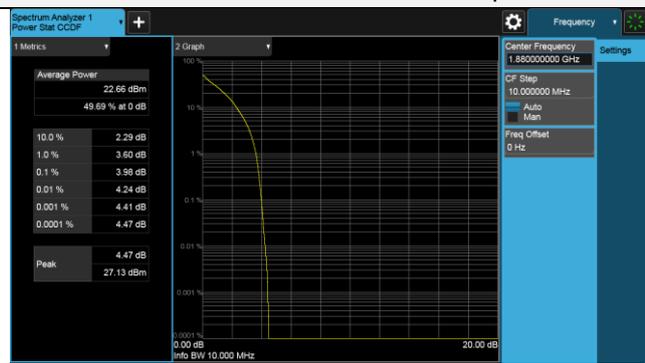


QPSK CH 18900 (1880MHz)

LTE Band 2 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18650	1855	3.92	13	PASS
QPSK	18900	1880	3.97	13	PASS
QPSK	19150	1905	3.42	13	PASS
16QAM	18650	1855	3.91	13	PASS
16QAM	18900	1880	3.98	13	PASS
16QAM	19150	1905	3.50	13	PASS

Spectrum Plot of Worst Value

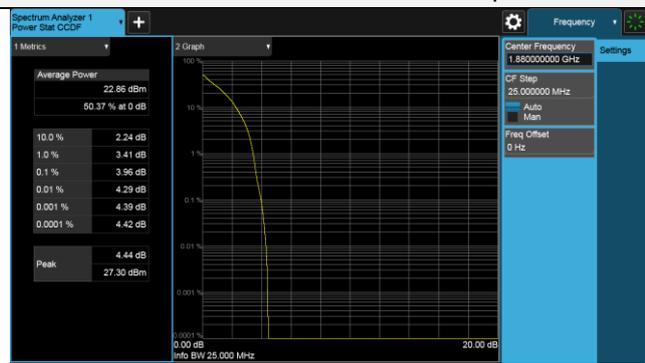


16QAM CH 18900 (1880MHz)

LTE Band 2 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18675	1857.5	3.93	13	PASS
QPSK	18900	1880	3.96	13	PASS
QPSK	19125	1902.5	3.40.	13	PASS
16QAM	18675	1857.5	3.93	13	PASS
16QAM	18900	1880	3.95	13	PASS
16QAM	19125	1902.5	3.33	13	PASS

Spectrum Plot of Worst Value

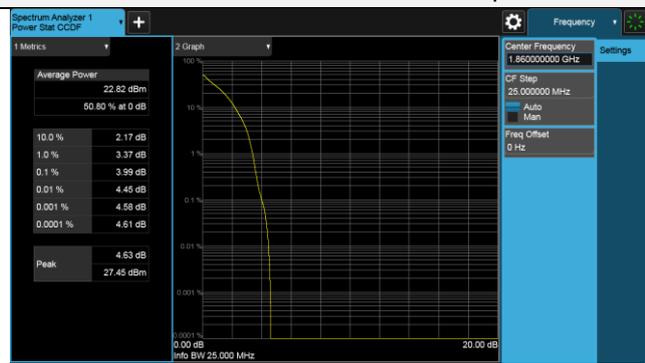


QPSK CH 18900 (1880MHz)

LTE Band 2 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Measure. Value(dB)	Limit dB	Result
QPSK	18700	1860	3.91	13	PASS
QPSK	18900	1880	3.98	13	PASS
QPSK	19100	1900	3.68	13	PASS
16QAM	18700	1860	3.99	13	PASS
16QAM	18900	1880	3.93	13	PASS
16QAM	19100	1900	3.75	13	PASS

Spectrum Plot of Worst Value



16QAM CH 18700 (1860MHz)