



RF MEASUREMENT REPORT

FCC ID: YY3-14249P
Application: Handheld Group AB
Product: Nautiz X9
Model No.: NX9V2-RF1-AS0, NX9V2-RF1-A00
Brand Name: Handheld
FCC Rule Part(s): Part 2, 22 (H), 24 (E), 27
Test Date: October 20 ~ November 29, 2021

Reviewed By:


Kevin Guo

Approved By:


Robin Wu



Revision History

Report No.	Version	Description	Issue Date	Note
2109RSU034-U7	Rev. 01	Initial Report	11-29-2021	

CONTENTS

Description	Page
1. General Information	5
1.1. Applicant	5
1.2. Manufacturer	5
1.3. Testing Facility	5
1.4. Equipment Description	6
1.5. Radio Specification	7
1.6. Maximum Power, Frequency Tolerance, and Emission Designator	7
1.7. Antenna Details	9
2. Test Configuration	10
2.1. Test System Connection Diagram	10
2.2. Applied Standards	10
2.3. Test Environment Condition	10
3. Measuring Instrument	11
4. Measurement Uncertainty	13
5. Test Result	14
5.1. Summary	14
5.2. Occupied Bandwidth	15
5.2.1. Test Limit	15
5.2.2. Test Procedure	15
5.2.3. Test Setting	15
5.2.4. Test Setup	15
5.2.5. Test Result	16
5.3. Frequency Stability Measurement	33
5.3.1. Test Limit	33
5.3.2. Test Procedures Used	33
5.3.3. Test Setting	33
5.3.4. Test Setup	34
5.3.5. Test Result	35
5.4. Equivalent Isotropically Radiated Power Measurement	40
5.4.1. Test Limit	40
5.4.2. Test Procedures Used	40
5.4.3. Test Setting	40
5.4.4. Test Setup	41
5.4.5. Test Result	42
5.5. Band Edge Measurement	78
5.5.1. Test Limit	78

5.5.2.	Test Procedure Used	78
5.5.3.	Test Setting	78
5.5.4.	Test Setup	79
5.5.5.	Test Result	80
5.6.	Peak to Average Ratio	102
5.6.1.	Test Limit	102
5.6.2.	Test Procedure Used	102
5.6.3.	Test Setting	102
5.6.4.	Test Setup	102
5.6.5.	Test Result	103
5.7.	Conducted Spurious Emissions	108
5.7.1.	Test Limit	108
5.7.2.	Test Procedure Used	108
5.7.3.	Test Setting	108
5.7.4.	Test Setup	109
5.7.5.	Test Result	110
5.8.	Radiated Spurious Emissions Measurements	127
5.8.1.	Test Limit	127
5.8.2.	Test Procedure Used	127
5.8.3.	Test Setting	127
5.8.4.	Test Setup	127
5.8.5.	Test Result	129
6.	Conclusion	134

1. General Information

1.1. Applicant

Handheld Group AB

Strandgatan 40 531 30 LIDKÖPING Sweden

1.2. Manufacturer

Handheld Group AB

Strandgatan 40 531 30 LIDKÖPING Sweden

1.3. Testing Facility

☒	Test Site - MRT Suzhou Laboratory Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China Laboratory Location (Suzhou - SIP) 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China Laboratory Accreditations A2LA: 3628.01 CNAS: L10551 FCC: CN1166 ISED: CN0001 VCCI: ☐ R-20025 ☐ G-20034 ☐ C-20020 ☐ T-20020 ☐ R-20141 ☐ G-20134 ☐ C-20103 ☐ T-20104
☐	Test Site - MRT Shenzhen Laboratory Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China Laboratory Accreditations A2LA: 3628.02 CNAS: L10551 FCC: CN1284 ISED: CN0105
☐	Test Site - MRT Taiwan Laboratory Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) Laboratory Accreditations TAF: L3261-190725 FCC: 291082, TW3261 ISED: TW3261

1.4. Equipment Description

Product Name	Nautiz X9
Model No.	NX9V2-RF1-AS0, NX9V2-RF1-A00
Brand Name	Handheld
Wi-Fi Specification	802.11a/b/g/n/ac
Bluetooth Version	Bluetooth v5.0 Dual Mode
Wi-Fi Specification	802.11a/b/g/n/ac
GSM Bands	GSM850 / 1900
WCDMA Bands	Band II / IV / V
LTE Bands	FDD Band: 2, 4, 5,12, 17 TDD Band: 41
NFC Specification	13.56MHz
GNSS Specification	GPS / GLONASS / Beidou / Galileo
Software version	V000.06.00
Hardware version	DVT
Antenna Information	Refer to section 1.7
IMEI No.	Conducted Measurement: 358591250000136 Radiated Measurement: 35859125000698
Accessories	
Battery	Brand Name: Handheld Model: NX9V2-1004 Capacity: Typical 3.8V, 4800mAh, 18.24Wh
Power Adapter	MFR: Phihong Technology Co. Ltd. Model: PSAF10R-050Q Input: AC 100-240V~0.3A, 50-60Hz Output: DC 5V-2.0A
Micro USB Cable	Length: Shielded, 1.0m
Remark:	
1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

Note:

1. Model Difference Description (declared by the manufacturer)

Model Number	Model Difference	Note
NX9V2-RF1-AS0	Support Barcode	--
NX9V2-RF1-A00	Not Barcode	Remove barcode hardware

2.The difference does not affect the RF test result, so we selected NX9V2-RF1-AS0 for all RF testing.

1.5. Radio Specification

FDD Tx Frequency Range	Band 2:1850 ~ 1910 MHz; Band 4: 1710 ~ 1755 MHz Band 5: 824 ~ 849 MHz; Band 12: 699 ~ 716 MHz Band 17: 704 ~ 716 MHz
FDD Rx Frequency Range	Band 2: 1930 ~ 1990 MHz; Band 4: 2110 ~ 2155 MHz Band 5: 869 ~ 894 MHz; Band 12: 729 ~ 746 MHz Band 17: 734 ~ 746 MHz
TDD Tx & Rx Frequency Range	Band 41: 2555 ~ 2655 MHz;

1.6. Maximum Power, Frequency Tolerance, and Emission Designator

LTE Band 2		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
1.4	1850.7 ~ 1909.3	1M08G7D	-	0.2655	1M08W7D	-	0.2065
3	1851.5 ~ 1908.5	2M68G7D	-	0.2748	2M68W7D	-	0.2143
5	1852.5 ~ 1907.5	4M48G7D	-	0.2754	4M47W7D	-	0.2183
10	1855.0 ~ 1905.0	8M94G7D	-	0.2673	8M95W7D	-	0.2153
15	1857.5 ~ 1902.5	13M4G7D	-	0.2761	13M4W7D	-	0.2183
20	1860.0 ~ 1900.0	17M9G7D	-0.0089	0.2636	17M9W7D	-	0.2213
LTE Band 2		64QAM			-		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	-	-	-
1.4	1850.7 ~ 1909.3	1M08W7D	-	0.1718	-	-	-
3	1851.5 ~ 1908.5	2M68W7D	-	0.1766	-	-	-
5	1852.5 ~ 1907.5	4M48W7D	-	0.1722	-	-	-
10	1855.0 ~ 1905.0	8M94W7D	-	0.1730	-	-	-
15	1857.5 ~ 1902.5	13M4W7D	-	0.1762	-	-	-
20	1860.0 ~ 1900.0	17M9W7D	-	0.1803	-	-	-
LTE Band 4		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
1.4	1710.7 ~ 1754.3	1M09G7D	-	0.2698	1M09W7D	-	0.2188
3	1711.5 ~ 1753.5	2M69G7D	-	0.2748	2M69W7D	-	0.2249
5	1712.5 ~ 1752.5	4M48G7D	-	0.2735	4M48W7D	-	0.2328
10	1715.0 ~ 1750.0	8M98G7D	-	0.2748	8M97W7D	-	0.2183
15	1717.5 ~ 1747.5	13M5G7D	-	0.2748	13M5W7D	-	0.2265
20	1720.0 ~ 1745.0	17M9G7D	-0.0061	0.2735	17M9W7D	-	0.2291

LTE Band 4		64QAM			-		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	-	-	-
1.4	1710.7 ~ 1754.3	1M08W7D	-	0.1858	-	-	-
3	1711.5 ~ 1753.5	2M68W7D	-	0.1811	-	-	-
5	1712.5 ~ 1752.5	4M48W7D	-	0.1866	-	-	-
10	1715.0 ~ 1750.0	8M94W7D	-	0.1879	-	-	-
15	1717.5 ~ 1747.5	13M4W7D	-	0.1928	-	-	-
20	1720.0 ~ 1745.0	17M9W7D	-	0.1811	-	-	-
LTE Band 5		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
1.4	824.7 ~ 848.3	1M08G7D	-	0.0311	1M08W7D	-	0.0250
3	825.5 ~ 847.5	2M68G7D	-	0.0323	2M68W7D	-	0.0256
5	826.5 ~ 846.5	4M48G7D	-	0.0322	4M48W7D	-	0.0251
10	829.0 ~ 844.0	8M95G7D	-0.0122	0.0313	8M95W7D	-	0.0249
LTE Band 5		64QAM			-		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	-	-	-
1.4	824.7 ~ 848.3	1M08W7D	-	0.0209	-	-	-
3	825.5 ~ 847.5	2M68W7D	-	0.0202	-	-	-
5	826.5 ~ 846.5	4M47W7D	-	0.0211	-	-	-
10	829.0 ~ 844.0	8M96W7D	-	0.0201	-	-	-
LTE Band 12		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
1.4	699.7 ~ 715.3	1M08G7D	-	0.0351	1M08W7D	-	0.0287
3	700.5 ~ 714.5	2M68G7D	-	0.0362	2M68W7D	-	0.0285
5	701.5 ~ 713.5	4M47G7D	-	0.0333	4M48W7D	-	0.0295
10	704.0 ~ 711.0	8M91G7D0	-0.0185	0.0348	8M96W7D	-	0.0269
LTE Band 12		64QAM			-		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	-	-	-
1.4	699.7 ~ 715.3	1M08W7D	-	0.0245	-	-	-
3	700.5 ~ 714.5	2M67W7D	-	0.0214	-	-	-
5	701.5 ~ 713.5	4M49W7D	-	0.0205	-	-	-
10	704.0 ~ 711.0	8M95W7D	-	0.0228	-	-	-

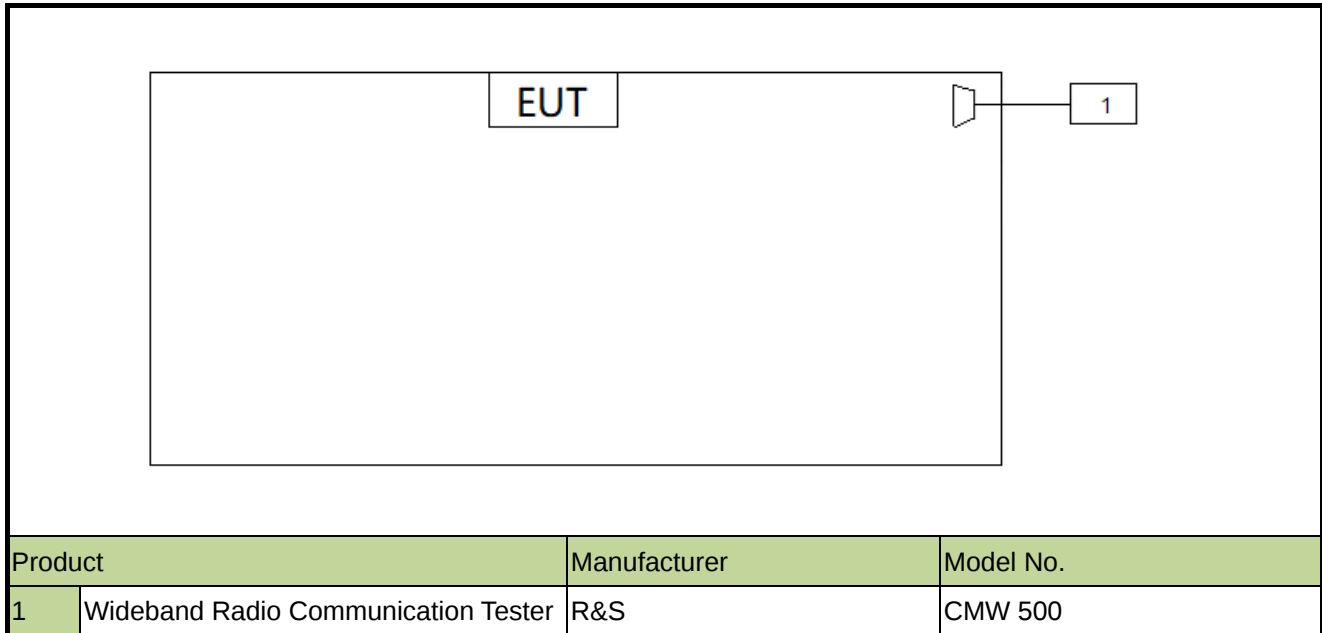
LTE Band 17		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
5	706.5 ~ 713.5	4M47G7D	-	0.0333	4M48W7D	-	0.0295
10	709.0 ~ 711.0	8M91G7D0	-0.0185	0.0348	8M96W7D	-	0.0269
LTE Band 17		64QAM			-		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	-	-	-
5	706.5 ~ 713.5	4M49W7D	-	0.0205	-	-	-
10	709.0 ~ 711.0	8M95W7D	-	0.0228	-	-	-
LTE Band 41		QPSK			16QAM		
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
5	2557.5 ~ 2652.5	4M45G7D	-	0.1560	4M48W7D	-	0.1245
10	2560.0 ~ 2650.0	8M99G7D	-	0.1644	8M96W7D	-	0.1282
15	2562.5 ~ 2647.5	13M5G7D	-	0.1563	13M5W7D	-	0.1211
20	2565.0 ~ 2645.0	17M8G7D	-0.0081	0.1656	17M9W7D	-	0.1377
LTE Band 41		64QAM					
BW (MHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)			
5	2557.5 ~ 2652.5	4M48W7D	-	0.0935			
10	2560.0 ~ 2650.0	8M93W7D	-	0.0859			
15	2562.5 ~ 2647.5	13M4W7D	-	0.0933			
20	2565.0 ~ 2645.0	17M9W7D	-	0.0933			

1.7. Antenna Details

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
LTE Band 2	1850 ~ 1910	FPC Antenna	1.07
LTE Band 4	1710 ~ 1755		1.07
LTE Band 5	824 ~ 849		-6.34
LTE Band 12	699 ~ 716		-4.64
LTE Band 17	704 ~ 716		-4.64
LTE Band 41	2555 ~ 2655		0.92

2. Test Configuration

2.1. Test System Connection Diagram



2.2. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ANSI C63.26:2015
- FCC CFR 47 Part 22, Part 24, Part 27
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP

2.3. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

3. Measuring Instrument

No.	Instrument	Manufacturer	Model No.	Asset No.	Last Cali. Date	Cali. Due Date	Test Site
1	Temperature Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2022/10/10	WZ-TR3
2	EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/1/12	SIP-AC1/SIP-AC2/SIP-AC3
3	Vibration Test System	DongLing	ES-1-150	MRTSUE06206	1 year	2022/8/8	WZ-TR3
4	Thermohygrometer	testo	608-H1	MRTSUE06362	1 year	2022/2/25	WZ-SR6
5	Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2022/6/28	WZ-TR3
6	Shielding Room	HUAMING	WZ-SR6	MRTSUE06443	/	/	WZ-SR6
7	Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2022/6/24	SIP-AC1/SIP-AC2/SIP-AC3/SIP-SR1
8	Signal Analyzer	Keysight	N9020B	MRTSUE06583	1 year	2022/10/10	WZ-SR6
9	Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06599	1 year	2022/10/20	SIP-AC2
10	Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2022/10/11	SIP-AC2
11	Signal Analyzer	Keysight	N9010B	MRTSUE06603	1 year	2022/10/31	SIP-AC1/SIP-AC2/SIP-AC3/SIP-SR1
12	Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2022/9/7	SIP-AC1/SIP-AC2/SIP-AC3/SIP-SR1
13	Signal Generator	Keysight	N5173B	MRTSUE06606	1 year	2021/12/3	WZ-SR6
14	EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2022/6/24	SIP-AC1/SIP-AC2/SIP-AC3
15	Thermohygrometer	testo	608-H1	MRTSUE06623	1 year	2021/12/3	SIP-AC2
16	Thermohygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/3	SIP-AC2
17	Preamplifier	EMCI	EMC001330	MRTSUE06643	1 year	2022/1/14	SIP-AC1/SIP-AC2/SIP-AC3
18	Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2022/11/8	SIP-AC2
19	TRILOG Antenna	Schwarzbeck	VULB 9168	MRTSUE06647	1 year	2022/8/5	SIP-AC2
20	Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06648	1 year	2022/11/9	SIP-AC2/SIP-AC4
21	Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24	SIP-AC2
22	Loop Antenna	Schwarzbeck	FMZB 1519 B	MRTSUE06937	1 year	2022/3/9	SIP-AC1/SIP-AC2/SIP-AC3
23	5G Wireless Test Platform	Keysight	E7515B	MRTSUE06942	1 year	2022/3/29	WZ-SR6

No.	Instrument	Manufacturer	Model No.	Asset No.	Last Cali. Date	Cali. Due Date	Test Site
24	Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2022/7/1	WZ-SR6
25	Radio Communication Test Station	Anritsu	MT8000A	MRTSUE06961	1 year	2022/7/1	WZ-SR6

Software	Version	Function
EMI Software	V3	EMI Test Software

4. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Spurious Emissions
Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):
Horizontal:
9kHz ~ 300MHz: 5.04dB
300MHz ~ 1GHz: 4.95dB
1GHz ~ 40GHz: 6.40dB
Vertical:
9kHz ~ 300MHz: 5.24dB
300MHz ~ 1GHz: 6.03dB
1GHz ~ 40GHz: 6.40dB
Conducted Spurious Emissions
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):
0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):
1.13dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):
0.28%
Frequency Stability
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):
76.2Hz

5. Test Result

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
2.1049	Occupied Bandwidth	Conducted	Pass
2.1055, 22.355, 24.235, 27.54	Frequency Stability		Pass
22.913(a)(5), 27.50(b)(9), 27.50(c)(9)	Equivalent Radiated Power		Pass
24.232(c) 27.50(h)(2), 27.50(d)(4)	Equivalent Isotropic Radiated Power		Pass
2.1051, 22.917(a) 24.238(a), 27.53(g), 27.53(m)	Band Edge		Pass
24.232(d), 27.50(d)(5)	Peak to Average Ratio		Pass
2.1051, 22.917(a) 24.238(a), 27.53(g), 27.53(m)	Spurious Emission		Pass
2.1051, 22.917(a) 24.238(a), 27.53(g), 27.53(m)	Spurious Emissions	Radiated	Pass

Notes:

- The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Channel Band Edge, Radiated & Conducted Spurious Emission were presented worst-case in the test report.

5.2. Occupied Bandwidth

5.2.1. Test Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

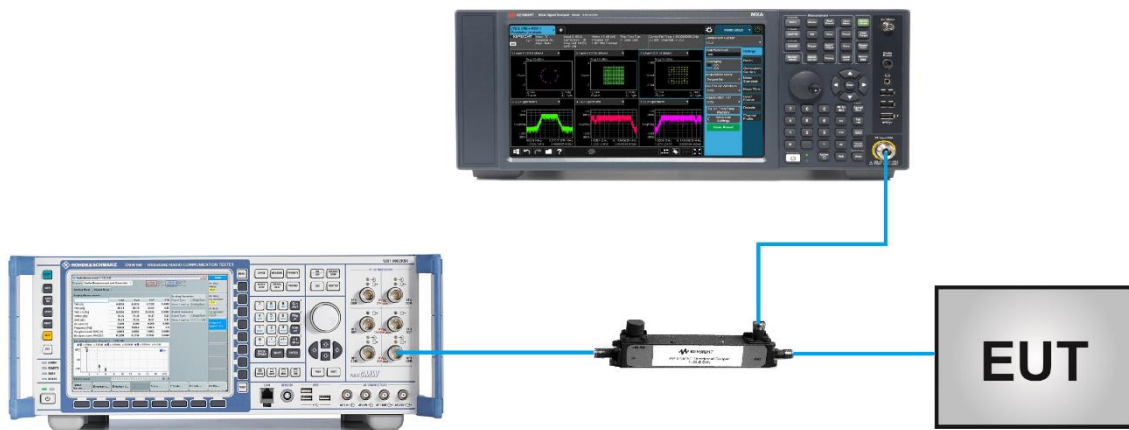
5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4

5.2.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW
3. VBW $\geq 3 \times$ RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

5.2.4. Test Setup



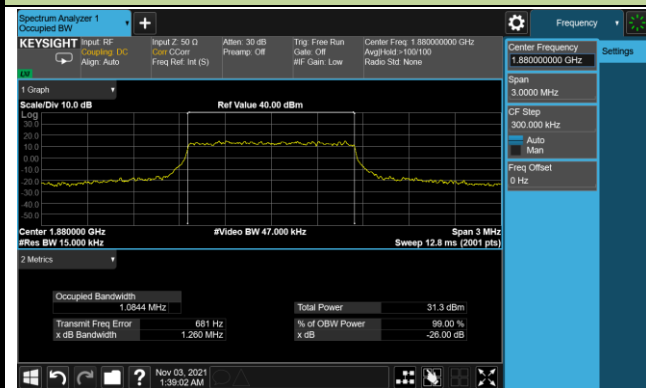
5.2.5. Test Result

Test Site	WZ-SR6	Test Engineer	Candy Luo
Test Date	2021/11/03	Test Band	LTE Band 2

Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK			
18900	1880.0	1.4	1.08
		3	2.68
		5	4.48
		10	8.94
		15	13.44
		20	17.86
16QAM			
18900	1880.0	1.4	1.08
		3	2.68
		5	4.47
		10	8.95
		15	13.41
		20	17.89
64QAM			
18900	1880.0	1.4	1.08
		3	2.68
		5	4.48
		10	8.94
		15	13.40
		20	17.88

99% Bandwidth - QPSK

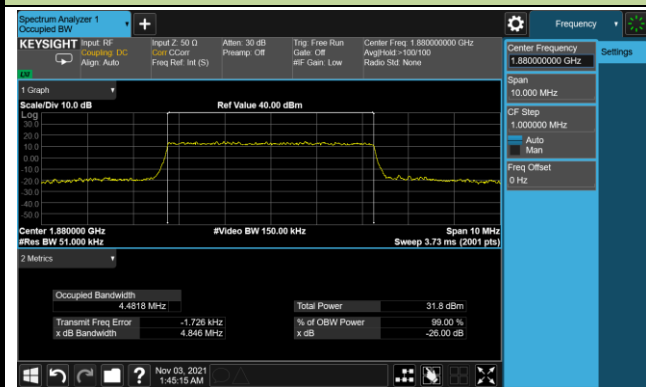
1.4MHz Channel Bandwidth



3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth



99% Bandwidth - 16QAM

1.4MHz Channel Bandwidth



3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth



15MHz Channel Bandwidth

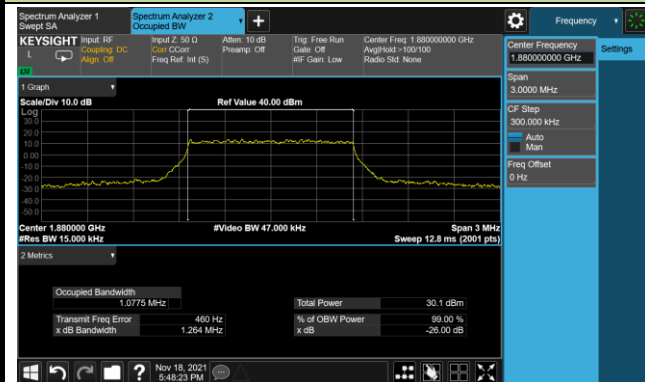


20MHz Channel Bandwidth

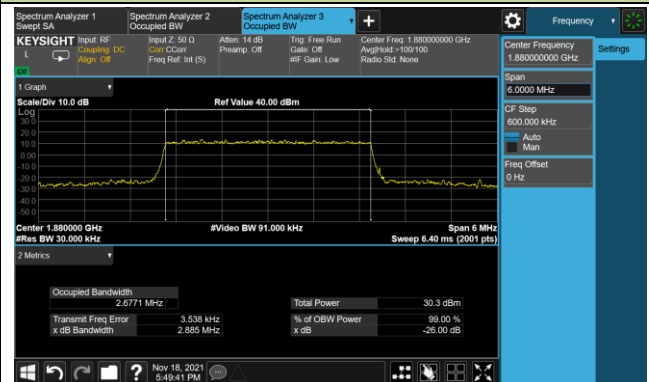


99% Bandwidth - 64QAM

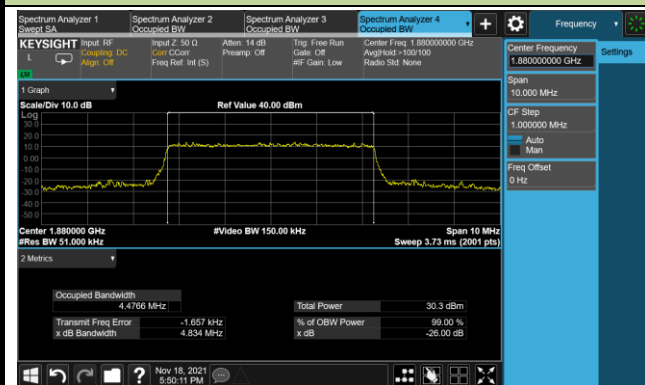
1.4MHz Channel Bandwidth



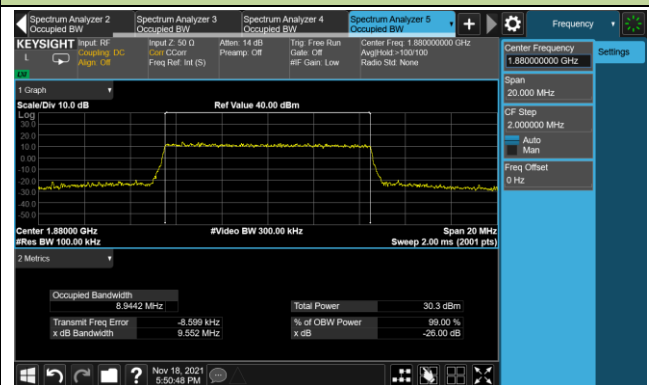
3MHz Channel Bandwidth



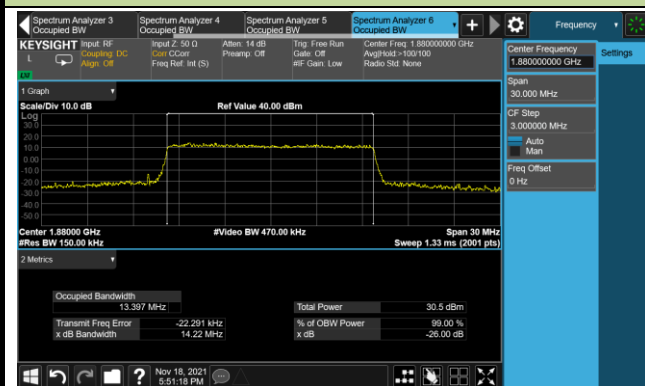
5MHz Channel Bandwidth



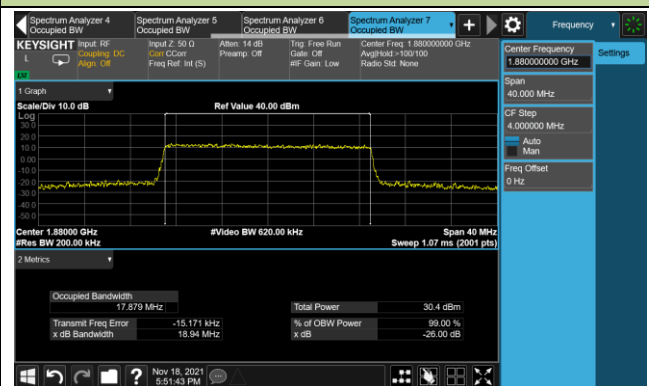
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth



Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 4

Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK			
20175	1732.5	1.4	1.09
		3	2.69
		5	4.48
		10	8.98
		15	13.51
		20	17.90
16QAM			
20175	1732.5	1.4	1.09
		3	2.69
		5	4.48
		10	8.97
		15	13.45
		20	17.89
64QAM			
20175	1732.5	1.4	1.08
		3	2.68
		5	4.48
		10	8.94
		15	13.40
		20	17.88

99% Bandwidth - QPSK

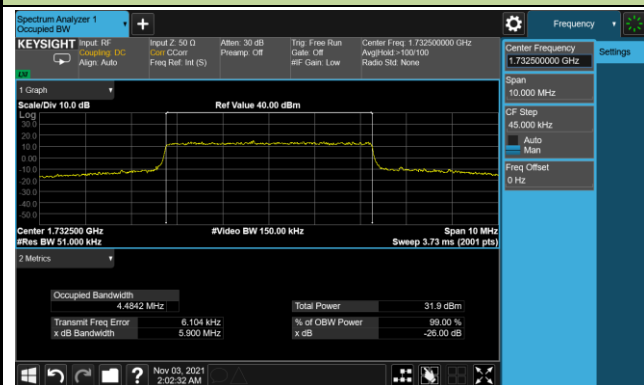
1.4MHz Channel Bandwidth



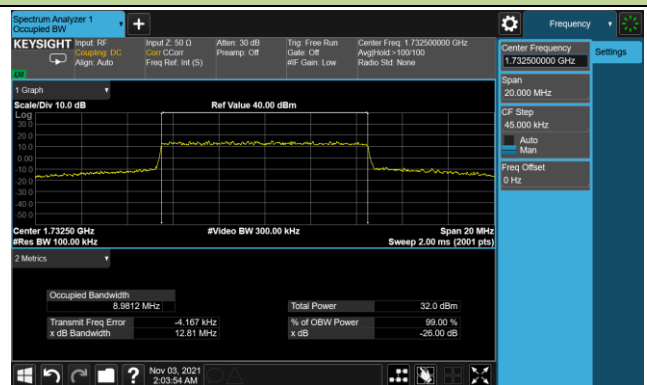
3MHz Channel Bandwidth



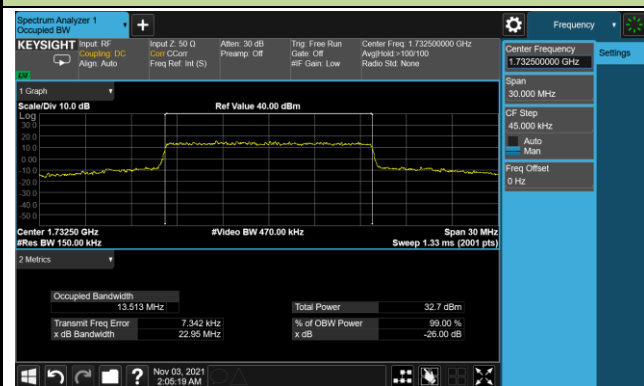
5MHz Channel Bandwidth



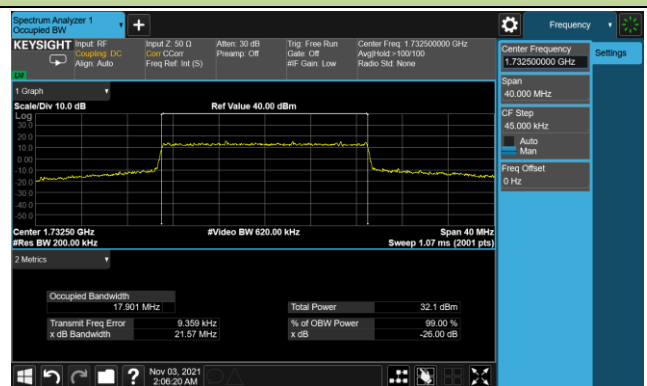
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth



99% Bandwidth - 16QAM

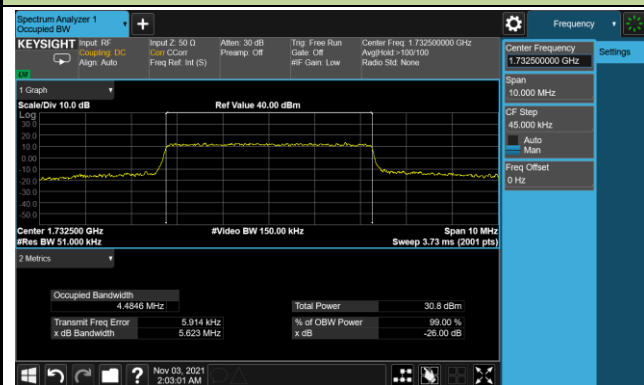
1.4MHz Channel Bandwidth



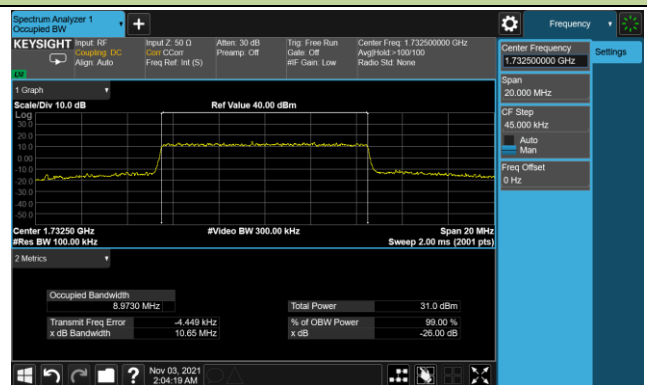
3MHz Channel Bandwidth



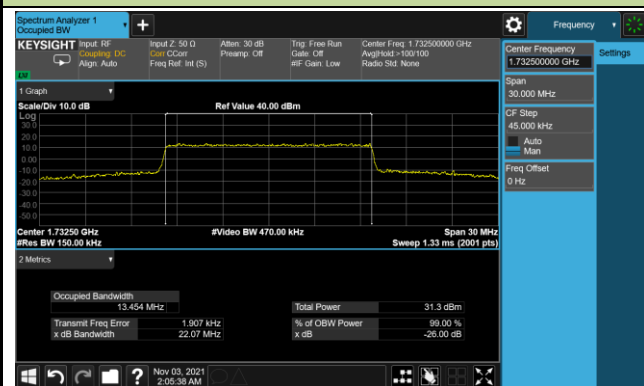
5MHz Channel Bandwidth



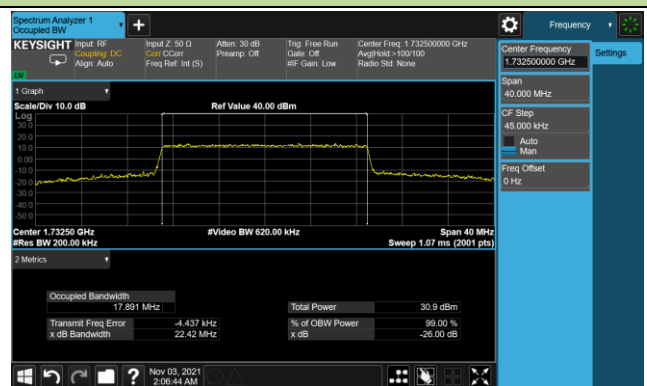
10MHz Channel Bandwidth



15MHz Channel Bandwidth

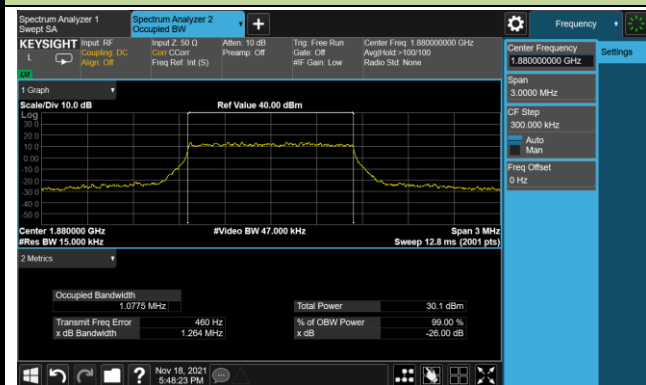


20MHz Channel Bandwidth

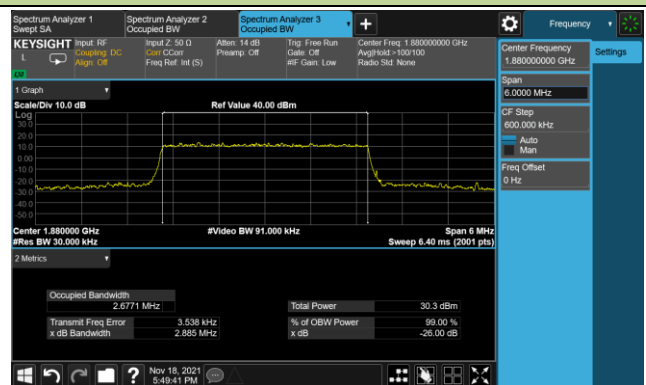


99% Bandwidth - 64QAM

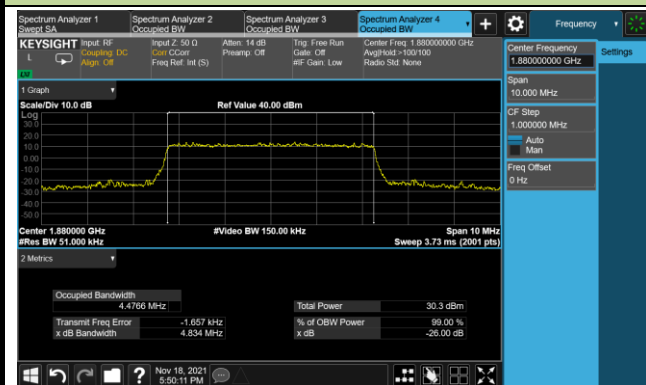
1.4MHz Channel Bandwidth



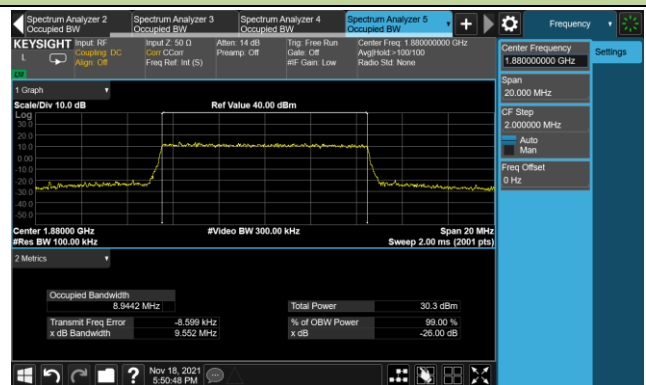
3MHz Channel Bandwidth



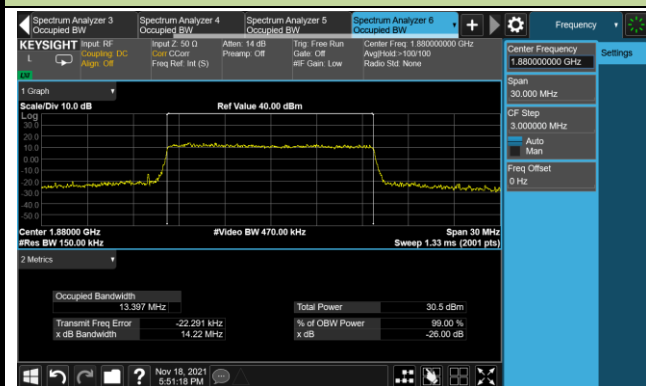
5MHz Channel Bandwidth



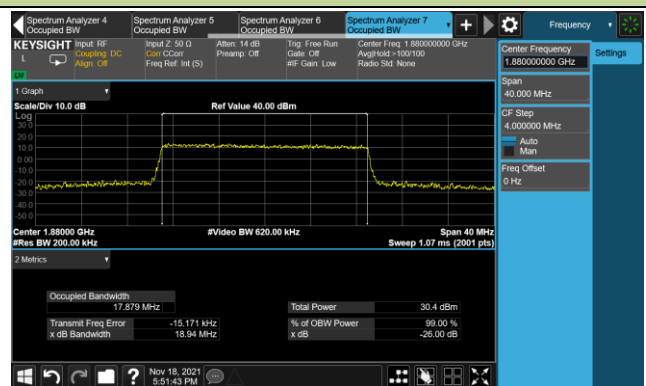
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth



Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 5

Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK			
26915	836.5	1.4	1.08
		3	2.68
		5	4.48
		10	8.95
16QAM			
26915	836.5	1.4	1.08
		3	2.68
		5	4.48
		10	8.95
64QAM			
26915	836.5	1.4	1.08
		3	2.68
		5	4.47
		10	8.96

99% Bandwidth - QPSK

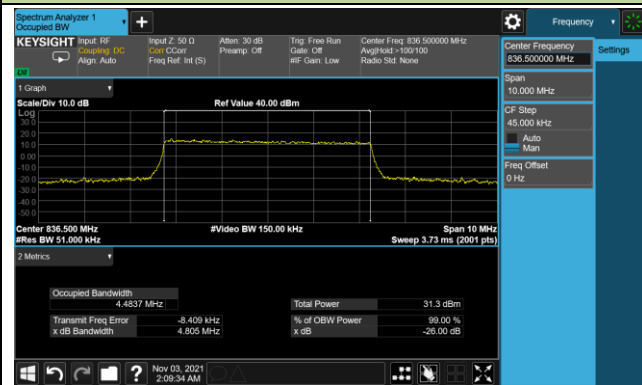
1.4MHz Channel Bandwidth



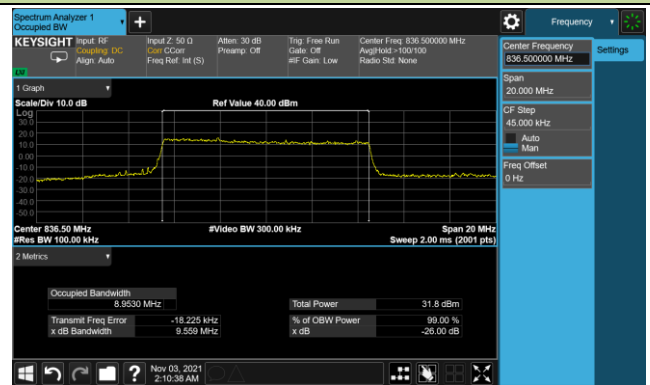
3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth



99% Bandwidth -16QAM

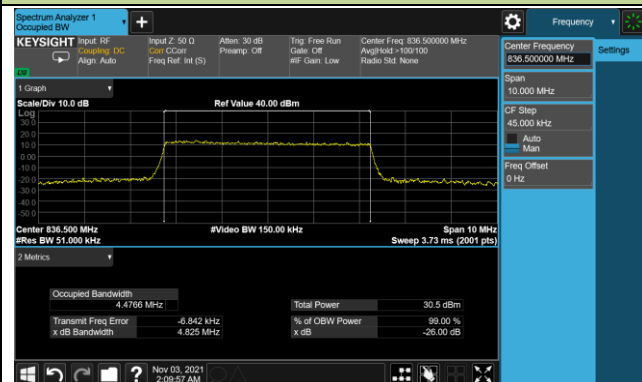
1.4MHz Channel Bandwidth



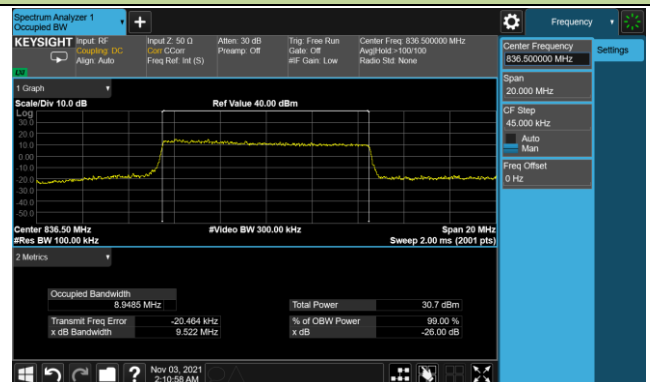
3MHz Channel Bandwidth



5MHz Channel Bandwidth

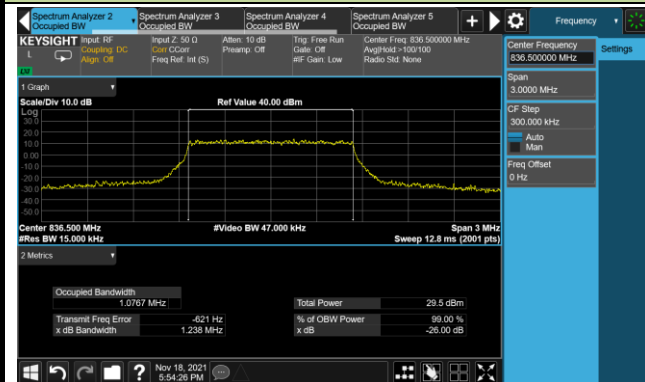


10MHz Channel Bandwidth

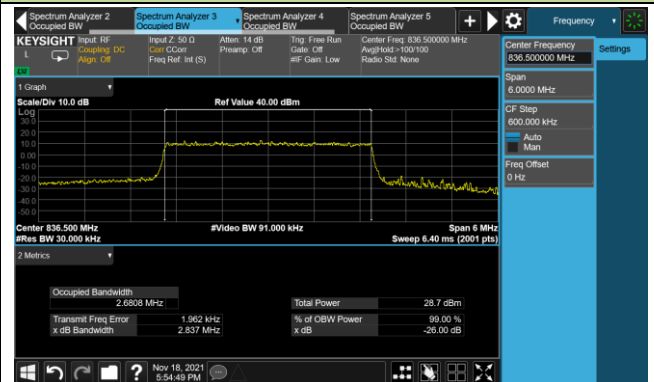


99% Bandwidth - 64QAM

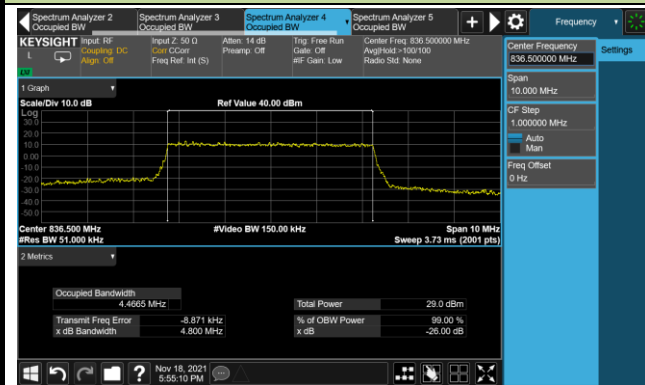
1.4MHz Channel Bandwidth



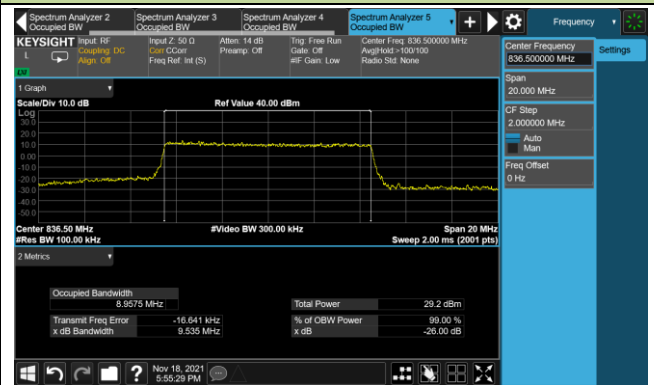
3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth



Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 12/17

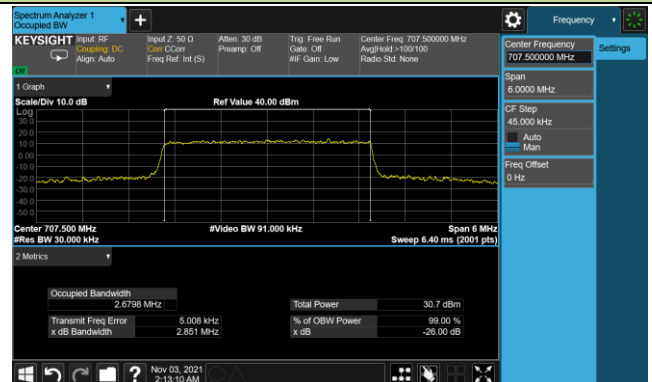
Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK			
23095	707.5	1.4	1.08
		3	2.68
		5	4.47
		10	8.91
16QAM			
23095	707.5	1.4	1.08
		3	2.68
		5	4.48
		10	8.96
64QAM			
23095	707.5	1.4	1.08
		3	2.67
		5	4.49
		10	8.95

99% Bandwidth - QPSK

1.4MHz Channel Bandwidth



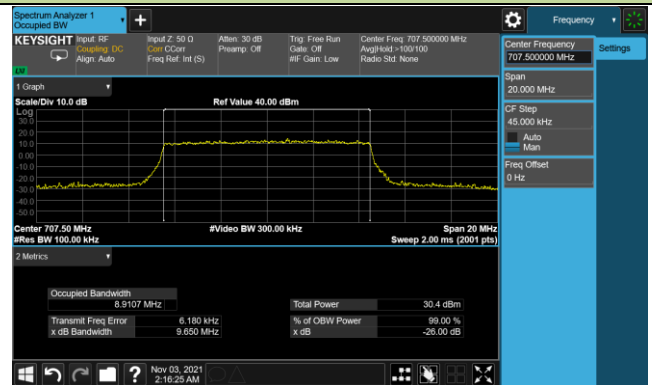
3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth



99% Bandwidth - 16QAM

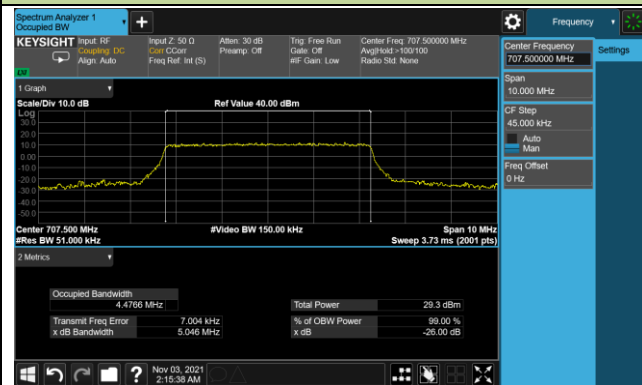
1.4MHz Channel Bandwidth



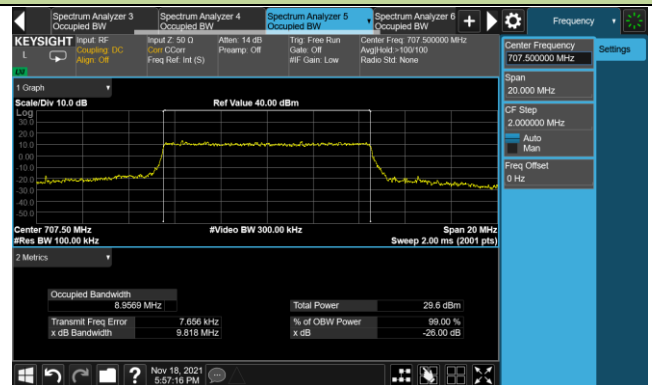
3MHz Channel Bandwidth



5MHz Channel Bandwidth

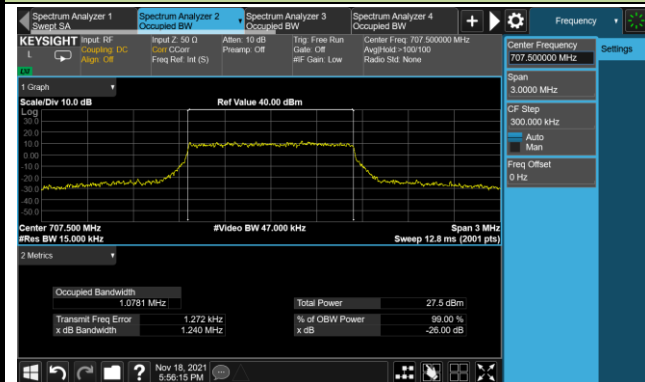


10MHz Channel Bandwidth

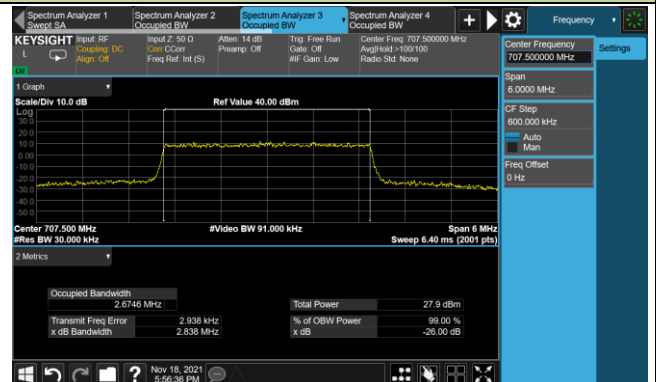


99% Bandwidth - 64QAM

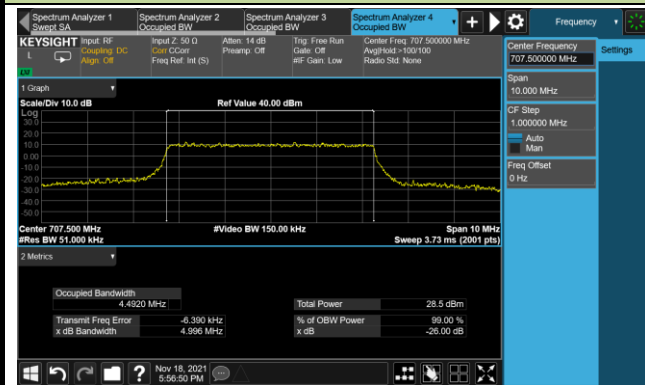
1.4MHz Channel Bandwidth



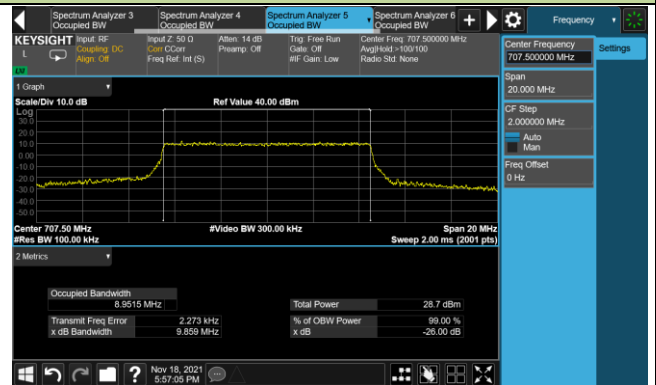
3MHz Channel Bandwidth



5MHz Channel Bandwidth



10MHz Channel Bandwidth

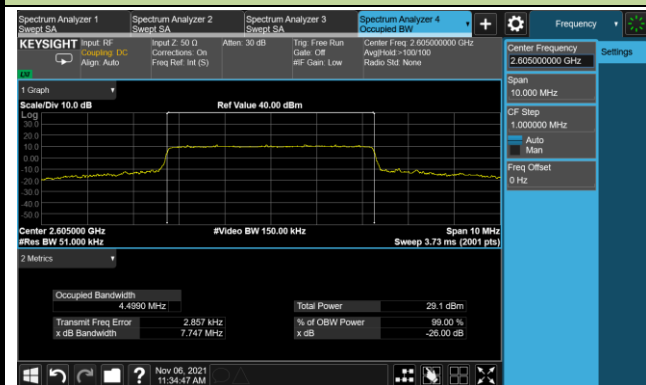


Test Site	WZ-SR6	Test Engineer	Caitlin Chen
Test Date	2021/11/06	Test Band	LTE Band 41

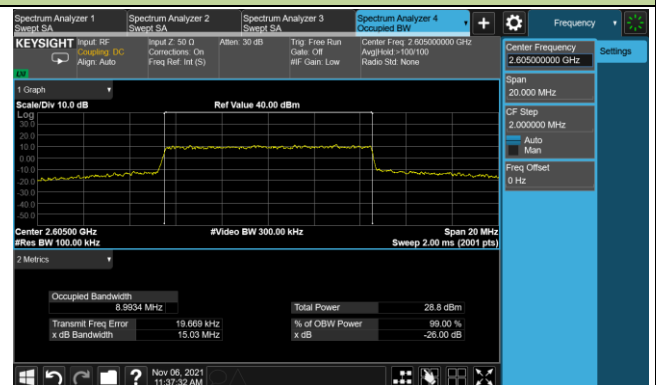
Channel	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK			
40740	2605.0	5	4.50
		10	8.99
		15	13.54
		20	17.99
16QAM			
40740	2605.0	5	4.48
		10	8.96
		15	13.50
		20	17.92
64QAM			
40740	2605.0	5	4.48
		10	8.93
		15	13.37
		20	17.87

99% Bandwidth - QPSK

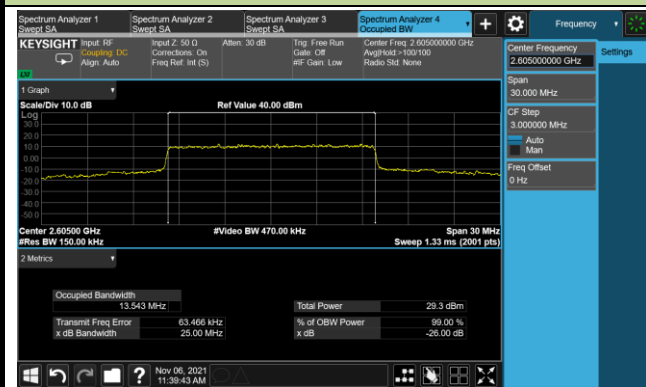
5MHz Channel Bandwidth



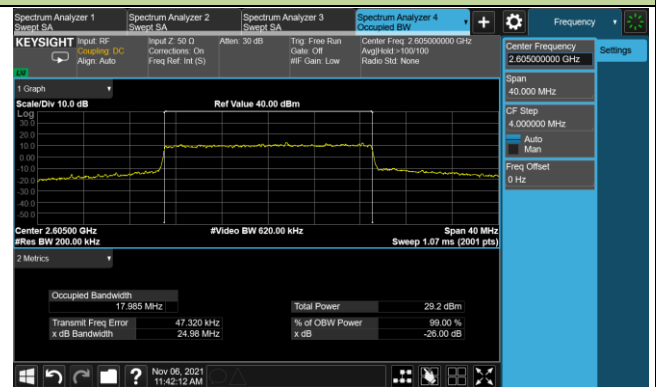
10MHz Channel Bandwidth



15MHz Channel Bandwidth

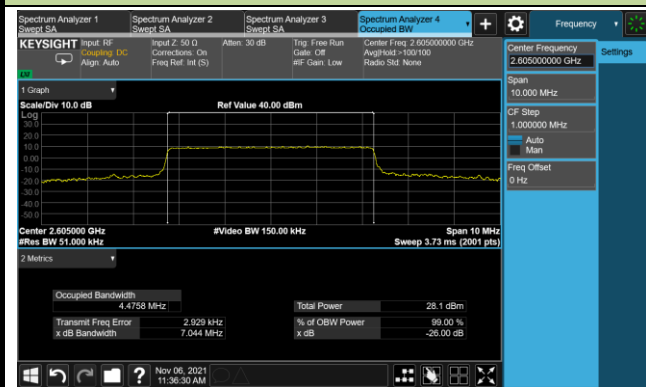


20MHz Channel Bandwidth

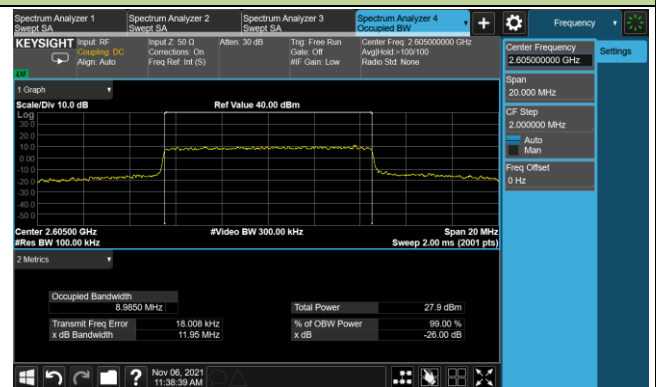


99% Bandwidth - 16QAM

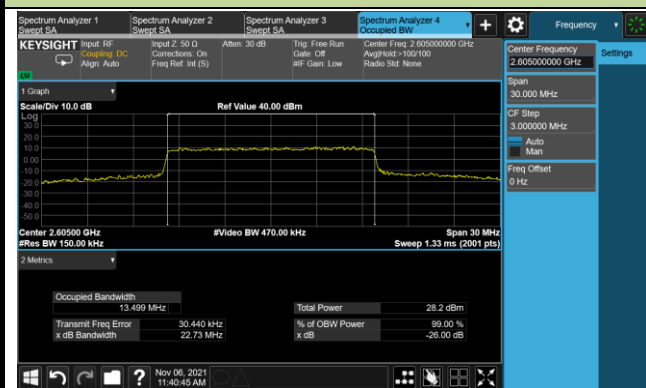
5MHz Channel Bandwidth



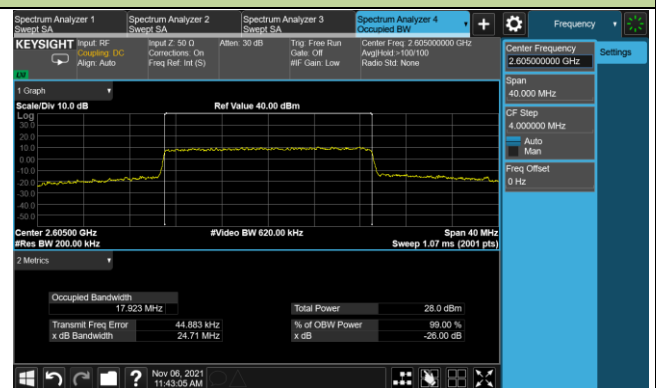
10MHz Channel Bandwidth



15MHz Channel Bandwidth

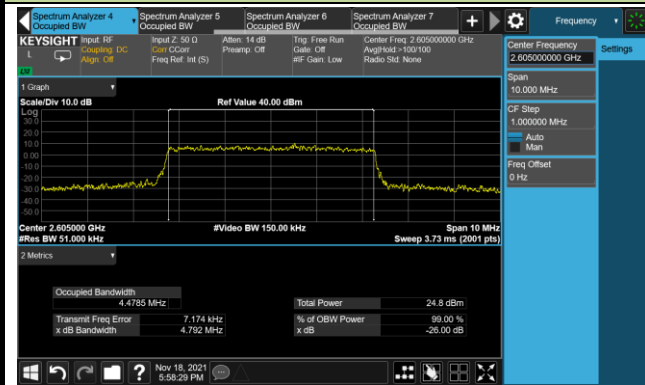


20MHz Channel Bandwidth

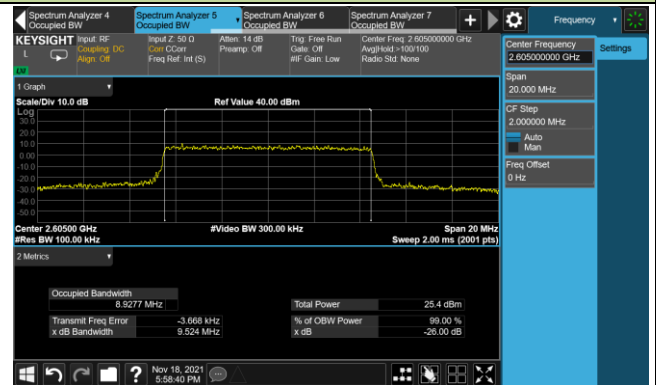


99% Bandwidth - 64QAM

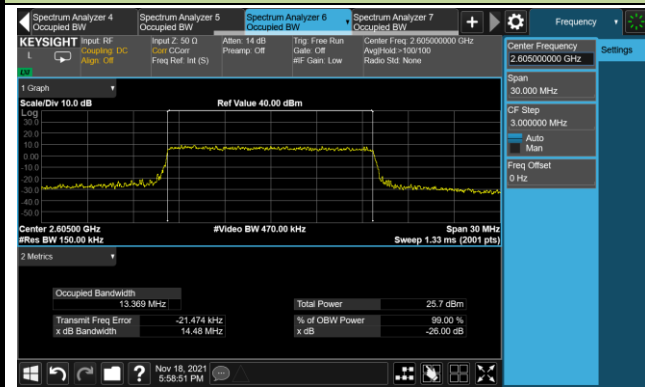
5MHz Channel Bandwidth



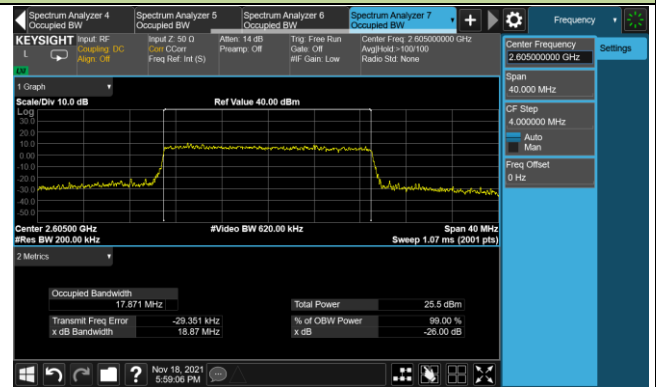
10MHz Channel Bandwidth



15MHz Channel Bandwidth



20MHz Channel Bandwidth



5.3. Frequency Stability Measurement

5.3.1. Test Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

5.3.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.6

5.3.3. Test Setting

Frequency Stability Under Temperature Variations:

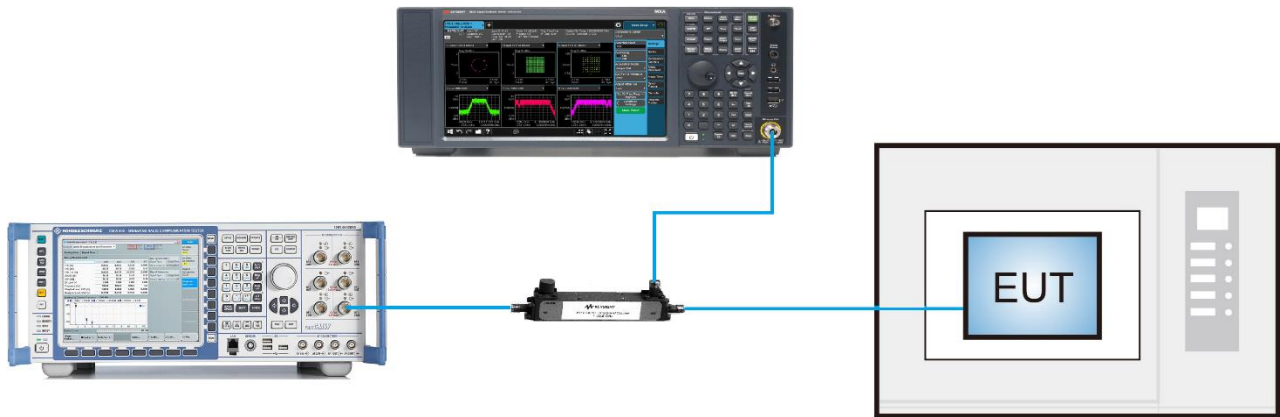
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

5.3.4. Test Setup



5.3.5. Test Result

Test Site	WZ-TR3	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 2

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
3.8	- 30	-0.0070
	- 20	-0.0085
	- 10	-0.0064
	0	-0.0027
	+ 10	-0.0089
	+ 20 (Ref)	-0.0071
	+ 30	-0.0024
	+ 40	-0.0055
	+ 50	-0.0091
4.4	+ 20	-0.0072
3.6	+ 20	-0.0046

Note: Normal Voltage =3.8V; Battery End point (BEP) =3.6V.

Test Site	WZ-TR3	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 4

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
3.8	- 30	0.0038
	- 20	0.0035
	- 10	-0.0022
	0	0.0012
	+ 10	0.0061
	+ 20 (Ref)	-0.0014
	+ 30	0.0036
	+ 40	-0.0018
	+ 50	0.0024
4.4	+ 20	-0.0034
3.6	+ 20	-0.0025

Note: Normal Voltage =3.8V; Battery End point (BEP) =3.6V.

Test Site	WZ-TR3	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 5

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
3.8	- 30	-0.0116
	- 20	-0.0085
	- 10	-0.0066
	0	-0.0084
	+ 10	0.0039
	+ 20 (Ref)	-0.0099
	+ 30	-0.0112
	+ 40	-0.0030
	+ 50	-0.0122
4.4	+ 20	-0.0060
3.6	+ 20	-0.0075

Note: Normal Voltage =3.8V; Battery End point (BEP) =3.6V.

Test Site	WZ-TR3	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 12/17

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
3.8	- 30	-0.0185
	- 20	-0.0141
	- 10	-0.0086
	0	-0.0049
	+ 10	-0.0147
	+ 20 (Ref)	-0.0150
	+ 30	-0.0144
	+ 40	-0.0027
	+ 50	-0.0057
4.4	+ 20	-0.0117
3.6	+ 20	-0.0124

Note: Normal Voltage =3.8V; Battery End point (BEP) =3.6V.

Test Site	WZ-TR3	Test Engineer	Caitlin Chen
Test Date	2021/11/03	Test Band	LTE Band 41

Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
3.8	- 30	-0.0074
	- 20	-0.0032
	- 10	-0.0048
	0	-0.0023
	+ 10	0.0034
	+ 20 (Ref)	-0.0081
	+ 30	-0.0064
	+ 40	-0.0047
	+ 50	0.0016
4.4	+ 20	-0.0045
3.6	+ 20	0.0009

Note: Normal Voltage =3.8V; Battery End point (BEP) =3.6V.

5.4. Equivalent Isotropically Radiated Power Measurement

5.4.1. Test Limit

Band 5

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

Band 12,17

Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 30 watts ERP.

Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.

Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

Band 2,41:

Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

Band 4:

Fixed, mobile stations operating in the 1710-1755 MHz band and mobile in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

5.4.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.2

5.4.3. Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

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

where

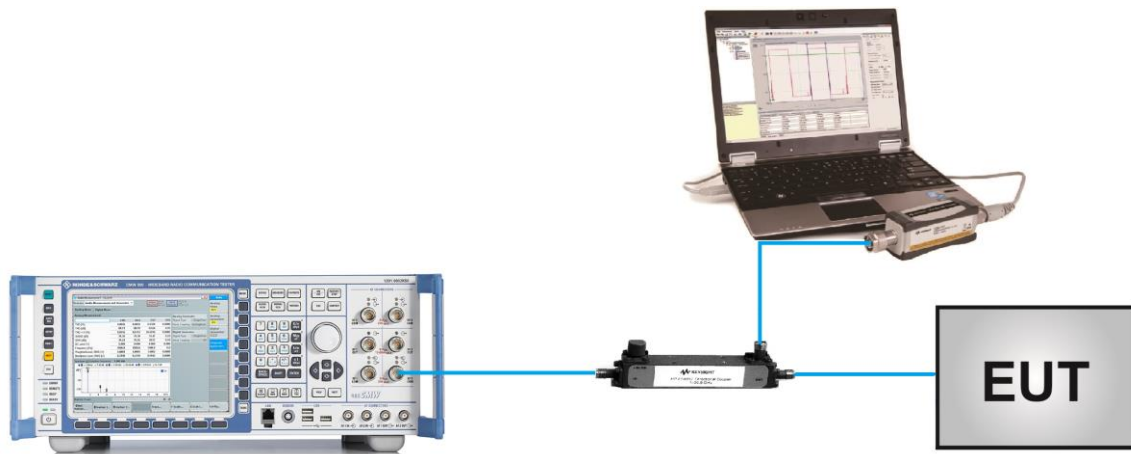
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas} , e.g., dBm or dBW)

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

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

$ERP = EIRP - 2.15$

5.4.4. Test Setup



5.4.5. Test Result

Test Site	WZ-SR6	Test Engineer	Candy Luo
Test Date	2021/10/27 ~ 2021/11/03	Test Band	LTE Band 2

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
QPSK							
18607	1850.7	1.4	1	0	22.75	23.82	< 33.01
18900	1880.0				22.83	23.90	< 33.01
19193	1909.3				23.00	24.07	< 33.01
18607	1850.7	1.4	1	2	22.85	23.92	< 33.01
18900	1880.0				22.97	24.04	< 33.01
19193	1909.3				23.17	24.24	< 33.01
18607	1850.7	1.4	1	6	22.73	23.80	< 33.01
18900	1880.0				22.87	23.94	< 33.01
19193	1909.3				23.03	24.10	< 33.01
18607	1850.7	1.4	6	0	21.83	22.90	< 33.01
18900	1880.0				21.98	23.05	< 33.01
19193	1909.3				22.12	23.19	< 33.01
18615	1851.5	3	1	0	22.79	23.86	< 33.01
18900	1880.0				22.91	23.98	< 33.01
19185	1908.5				23.07	24.14	< 33.01
18615	1851.5	3	1	7	22.98	24.05	< 33.01
18900	1880.0				23.11	24.18	< 33.01
19185	1908.5				23.32	24.39	< 33.01
18615	1851.5	3	1	14	22.75	23.82	< 33.01
18900	1880.0				22.89	23.96	< 33.01
19185	1908.5				23.12	24.19	< 33.01
18615	1851.5	3	15	0	21.86	22.93	< 33.01
18900	1880.0				21.99	23.06	< 33.01
19185	1908.5				22.18	23.25	< 33.01
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
QPSK							
18625	1852.5	5	1	0	22.75	23.82	< 33.01
18900	1880.0				22.82	23.89	< 33.01
19175	1907.5				23.01	24.08	< 33.01
18625	1852.5	5	1	12	22.94	24.01	< 33.01
18900	1880.0				23.06	24.13	< 33.01
19175	1907.5				23.33	24.40	< 33.01
18625	1852.5	5	1	24	22.74	23.81	< 33.01
18900	1880.0				22.88	23.95	< 33.01
19175	1907.5				22.96	24.03	< 33.01
18625	1852.5	5	25	0	21.91	22.98	< 33.01
18900	1880.0				21.99	23.06	< 33.01
19175	1907.5				22.17	23.24	< 33.01
18650	1855.0	10	1	0	22.82	23.89	< 33.01
18900	1880.0				22.88	23.95	< 33.01
19150	1905.0				23.08	24.15	< 33.01
18650	1855.0	10	1	24	22.92	23.99	< 33.01
18900	1880.0				23.01	24.08	< 33.01
19150	1905.0				23.20	24.27	< 33.01
18650	1855.0	10	1	49	22.80	23.87	< 33.01
18900	1880.0				23.00	24.07	< 33.01
19150	1905.0				23.10	24.17	< 33.01
18650	1855.0	10	50	0	21.99	23.06	< 33.01
18900	1880.0				22.12	23.19	< 33.01
19150	1905.0				22.20	23.27	< 33.01
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
QPSK							
18675	1857.5	15	1	0	22.77	23.84	< 33.01
18900	1880.0				22.87	23.94	< 33.01
19125	1902.5				22.99	24.06	< 33.01
18675	1857.5	15	1	37	23.02	24.09	< 33.01
18900	1880.0				23.10	24.17	< 33.01
19125	1902.5				23.34	24.41	< 33.01
18675	1857.5	15	1	74	22.84	23.91	< 33.01
18900	1880.0				22.98	24.05	< 33.01
19125	1902.5				23.09	24.16	< 33.01
18675	1857.5	15	75	0	21.93	23.00	< 33.01
18900	1880.0				22.09	23.16	< 33.01
19125	1902.5				22.13	23.20	< 33.01
18700	1860.0	20	1	0	22.70	23.77	< 33.01
18900	1880.0				22.73	23.80	< 33.01
19100	1900.0				22.96	24.03	< 33.01
18700	1860.0	20	1	49	22.88	23.95	< 33.01
18900	1880.0				23.03	24.10	< 33.01
19100	1900.0				23.14	24.21	< 33.01
18700	1860.0	20	1	99	22.71	23.78	< 33.01
18900	1880.0				22.94	24.01	< 33.01
19100	1900.0				22.99	24.06	< 33.01
18700	1860.0	20	100	0	21.84	22.91	< 33.01
18900	1880.0				22.07	23.14	< 33.01
19100	1900.0				22.20	23.27	< 33.01
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
16QAM							
18607	1850.7	1.4	1	0	21.94	23.01	< 33.01
18900	1880.0				21.87	22.94	< 33.01
19193	1909.3				21.98	23.05	< 33.01
18607	1850.7	1.4	1	2	22.04	23.11	< 33.01
18900	1880.0				21.94	23.01	< 33.01
19193	1909.3				21.99	23.06	< 33.01
18607	1850.7	1.4	1	6	21.84	22.91	< 33.01
18900	1880.0				21.89	22.96	< 33.01
19193	1909.3				22.08	23.15	< 33.01
18607	1850.7	1.4	6	0	20.89	21.96	< 33.01
18900	1880.0				21.00	22.07	< 33.01
19193	1909.3				21.23	22.30	< 33.01
18615	1851.5	3	1	0	22.01	23.08	< 33.01
18900	1880.0				21.86	22.93	< 33.01
19185	1908.5				22.10	23.17	< 33.01
18615	1851.5	3	1	7	22.10	23.17	< 33.01
18900	1880.0				22.09	23.16	< 33.01
19185	1908.5				22.24	23.31	< 33.01
18615	1851.5	3	1	14	22.10	23.17	< 33.01
18900	1880.0				22.03	23.10	< 33.01
19185	1908.5				22.21	23.28	< 33.01
18615	1851.5	3	15	0	20.83	21.90	< 33.01
18900	1880.0				20.94	22.01	< 33.01
19185	1908.5				21.07	22.14	< 33.01
Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)							