TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 27** **47 CFR FCC Part 2**
Report No.:	RFBFOK-WTW-P23030724-4
FCC ID:	RYQGW23
Product:	Smartwatch
Brand:	Gabb
Model No.:	GW23
Received Date:	2023/3/31
Test Date:	2023/6/8 ~ 2023/8/2
Issued Date:	2023/8/2
Applicant:	FIH CO., LTD.
Address:	No.4, Minsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan
FCC Registration / Designation Number:	788550 / TW0003 427177 / TW0011

Approved by: Jeremy Lin , **Date:** 2023/8/2

Jeremy Lin / Project Engineer

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Prepared by : Polly Chien / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBFOK-WTW-P23030724-4	Original release.	2023/8/2

1 Certificate

Product:	Smartwatch
Brand:	Gabb
Test Model:	GW23
Sample Status:	Identical Prototype
Applicant:	FIH CO., LTD.
Test Date:	2023/6/8 ~ 2023/8/2
Standard:	47 CFR FCC Part 27 47 CFR FCC Part 2
Measurement procedure:	ANSI/TIA/EIA-603-E 2016 ANSI C63.26-2015 KDB 971168 D01 Power Meas License Digital Systems v03r01 KDB 971168 D02 Misc Rev Approv License Devices v02r02

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

2 Summary of Test Results

47 CFR FCC Part 27 47 CFR FCC Part 2			
Standard / Clause	Test Item	Result	Remark
FCC 47 CFR Part 2.1046 FCC 47 CFR Part 27.50(d) FCC 47 CFR Part 27.50(b)	Effective Radiated Power and Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
FCC 47 CFR Part 27.50(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1049	Bandwidth	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1051 FCC 47 CFR Part 27.53(h) FCC 47 CFR Part 27.53(c)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 27.53(h) FCC 47 CFR Part 27.53(c)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -39.16 dB at 30.63 MHz
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 27.53(h) FCC 47 CFR Part 27.53(c)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -4.41 dB at 1564.00 MHz
FCC 47 CFR Part 2.1055 FCC 47 CFR Part 27.54	Frequency Stability	Pass	Meet the requirement of limit.

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	Specification	Expanded Uncertainty (k=2) (±)
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	2.44 dB
	30 MHz ~ 1 GHz	2.02 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	1.01 dB
	18 GHz ~ 40 GHz	1.15 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smartwatch
Brand	Gabb
Test Model	GW23
Status of EUT	Identical Prototype
Power Supply Rating	5Vdc or 9Vdc or 12Vdc (From adapter) 3.87Vdc (From battery)

Note:

1. EUT overview.

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power		Emission Designator	
		QPSK	16QAM	QPSK	16QAM
LTE Band 4 (Channel Bandwidth 1.4MHz)	1710.7-1754.3	183.231mW (22.63dBm)	131.826mW (21.20dBm)	1M09G7D	1M09D7W
LTE Band 4 (Channel Bandwidth 3MHz)	1711.5-1753.5	164.437mW (22.16dBm)	119.950mW (20.79dBm)	2M70G7D	2M70D7W
LTE Band 4 (Channel Bandwidth 5MHz)	1712.5-1752.5	159.956mW (22.04dBm)	121.339mW (20.84dBm)	4M50G7D	4M49D7W
LTE Band 4 (Channel Bandwidth 10MHz)	1715.0-1750.0	163.305mW (22.13dBm)	122.462mW (20.88dBm)	8M96G7D	4M57D7W
LTE Band 4 (Channel Bandwidth 15MHz)	1717.5-1747.5	164.816mW (22.17dBm)	124.165mW (20.94dBm)	13M4G7D	4M67D7W
LTE Band 4 (Channel Bandwidth 20MHz)	1720.0-1745.0	190.985mW (22.81dBm)	124.165mW (20.94dBm)	17M9G7D	4M82D7W

*16QAM only support up to 25RB for bandwidth modes ≤ 10 MHz, up to 1RB for > 10 MHz.

Band / Bandwidth	TX Frequency Range (MHz)	Max. ERP Power		Emission Designator	
		QPSK	16QAM	QPSK	16QAM
LTE Band 13 (Channel Bandwidth 5MHz)	779.5-784.5	68.391mW (18.35dBm)	48.978mW (16.90dBm)	4M50G7D	4M50D7W
LTE Band 13 (Channel Bandwidth 10MHz)	782.0	72.111mW (18.58dBm)	52.000mW (17.16dBm)	8M96G7D	4M58D7W

*16QAM only support up to 25RB for bandwidth modes ≤ 10 MHz, up to 1RB for > 10 MHz.

2. The EUT uses following accessories.

Battery		
Manufacturer	Model	Specification
SHEN ZHEN UTILITY ENERGY CO.,LTD.	HE409	Rating: 3.87Vdc
WPC		
Brand	Model	Specification
Gabb	WX013	DC Input: 5V, 0.65A DC Output: 0.5A, 2.5W
USB cable attached on WPC		
Manufacturer	Model	Specification
Hubei Hongzhanxin Electronics Co,. LTD	P04-0109000005-HF	900±20mm, non-shielded w/o core

3. The EUT uses following support unit only.

Adapter (Support unit)		
Manufacturer	Model	Specification
JiangSu ChenYang Electron Co., Ltd	CK18W02U	AC Input: 100-240 Vac, 50/60 Hz, 0.5A DC Output: 5Vdc, 3A; 9Vdc, 2A; 12Vdc, 1.5A

4. 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 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	PIFA
Antenna Connector	none(like solder)
Band	Gain (dBi)
Band 4	-0.97079
Band 13	-3.48059

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition.
Worst Case:	X-axis/ Y-axis/ Z-axis Worst Condition: X-axis

For LTE Band 4

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM	1 RB Half RB Full RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM	1 RB Half RB Full RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM	1 RB Half RB Full RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK	1 RB Half RB Full RB
			16QAM	1 RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK	1 RB Half RB Full RB
			16QAM	1 RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	1 RB Half RB Full RB
			16QAM	1 RB
Modulation Characteristics	20175 (1732.50 MHz)	20 MHz	QPSK / 16QAM	Full RB
Frequency Stability	19957 (1710.70 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK	Full RB
	19965 (1711.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK	Full RB
	19975 (1712.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK	Full RB
	20000 (1715.00 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK	Full RB
	20025 (1717.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK	Full RB
	20050 (1720.00 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	Full RB
Occupied Bandwidth	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM	Full RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM	Full RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM	Full RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK / 16QAM	Full RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK / 16QAM	Full RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK / 16QAM	Full RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Peak to Average Ratio	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK / 16QAM	1 RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK / 16QAM	1 RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK / 16QAM	1 RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK / 16QAM	1 RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK / 16QAM	1 RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK / 16QAM	1 RB
Conducted Emission	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK	1 RB Full RB
	19965 (1711.50 MHz) 20175 (1732.50 MHz) 20385 (1753.50 MHz)	3 MHz	QPSK	1 RB Full RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK	1 RB Full RB
	20000 (1715.00 MHz) 20175 (1732.50 MHz) 20350 (1750.00 MHz)	10 MHz	QPSK	1 RB Full RB
	20025 (1717.50 MHz) 20175 (1732.50 MHz) 20325 (1747.50 MHz)	15 MHz	QPSK	1 RB Full RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	20375 (1752.50 MHz)	5 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	19957 (1710.70 MHz) 20175 (1732.50 MHz) 20393 (1754.30 MHz)	1.4 MHz	QPSK	1 RB
	19975 (1712.50 MHz) 20175 (1732.50 MHz) 20375 (1752.50 MHz)	5 MHz	QPSK	1 RB
	20050 (1720.00 MHz) 20175 (1732.50 MHz) 20300 (1745.00 MHz)	20 MHz	QPSK	1 RB

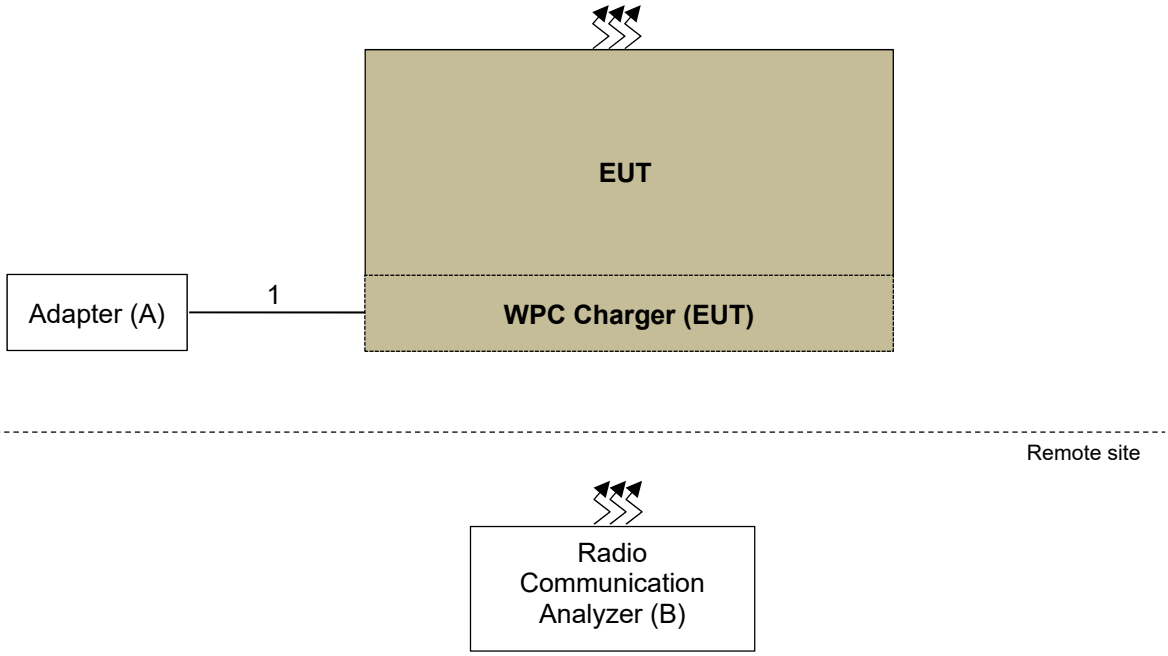
For LTE Band 13

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
ERP	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM	1 RB Half RB Full RB
	23230 (782.00 MHz)	10 MHz	QPSK	1 RB Half RB Full RB
			16QAM	1 RB
Modulation Characteristics	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM	Full RB
Frequency Stability	23205 (779.50 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	Full RB
	23230 (782.00 MHz)	10 MHz	QPSK	Full RB
Occupied Bandwidth	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM	Full RB
	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM	Full RB
Peak to Average Ratio	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK / 16QAM	1 RB
	23230 (782.00 MHz)	10 MHz	QPSK / 16QAM	1 RB
Conducted Emission	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	1 RB Full RB
	23230 (782.00 MHz)	10 MHz	QPSK	1 RB Full RB
Radiated Spurious Emissions below 1GHz	23230 (782.00 MHz)	10 MHz	QPSK	1 RB
Radiated Spurious Emissions above 1GHz	23205 (779.50 MHz) 23230 (782.00 MHz) 23255 (784.50 MHz)	5 MHz	QPSK	1 RB
	23230 (782.00 MHz)	10 MHz	QPSK	1 RB

3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

3.5 Connection Diagram of EUT and Peripheral Devices



3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Adapter	JiangSu ChenYang Electron Co., Ltd	CK18W02U	N/A	N/A	Supplied by applicant
B	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (mm)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	900±20	N	0	USB cable attached on WPC Accessory of EUT

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
N9030B - PXA Signal Analyzer KEYSIGHT	N9030B	MY57140488	2023/3/6	2024/3/5
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/6/15~2023/8/2

4.2 Modulation Characteristics

Refer to section 4.1 to get information of the instruments.

4.3 Peak to Average Ratio

Refer to section 4.1 to get information of the instruments.

4.4 Bandwidth

Refer to section 4.1 to get information of the instruments.

4.5 Conducted Spurious Emissions

Refer to section 4.1 to get information of the instruments.

4.6 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB9168	9168-616	2022/10/26	2023/10/25
Loop Antenna EMCI	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-amplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
Preamplifier Agilent	310N	187226	2022/6/14	2023/6/13
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver Agilent	N9038A	MY52260177	2022/9/19	2023/9/18
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/6/8

4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	UNAT_5+	PAD-CH6-01	N/A	N/A
Antenna Tower Controller Max-Full	MF-7802	N/A	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	8	N/A	N/A
Horn Antenna ETS-Lindgren	3117	00143293	2022/11/13	2023/11/12
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170241	2022/10/20	2023/10/19
Pre-Ammlifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Preamplifier Agilent	83017A	MY39501373	2022/6/14	2023/6/13
RF Coaxial Cable ETS-Lindgren	EMC104-SM-SM-10000	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-4	2022/6/14	2023/6/13
	RFC-SMS-100-SMS-24-IN	Cable-CH1-02(RFC-SMS-100-SMS-24)	2022/6/14	2023/6/13
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2023/1/7	2024/1/6
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2023/1/7	2024/1/6
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Test Receiver Agilent	N9038A	MY52260177	2022/9/19	2023/9/18
Turn Table Max-Full	TT-1510	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802	N/A	N/A	N/A
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in XD - 966 chamber 6.
2. Tested Date: 2023/6/8

4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	87-III	70360742	2022/6/23	2023/6/22
Signal and spectrum analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2022/12/27	2023/12/26
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2023/3/3	2024/3/2

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/6/16

5 Limits of Test Items

5.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

For LTE Band 4

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

For LTE Band 13:

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.

5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

5.3 Peak to Average Ratio

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.

5.4 Bandwidth

According to FCC 47 CFR part 2.1049, 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% of the total mean power radiated by a given emission.

5.5 Conducted Spurious Emissions

For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
According to FCC 47 CFR part 27.53(c)(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.
For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

5.6 Radiated Spurious Emissions below 1GHz

For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB. The limit of emission is equal to -13 dBm.

For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.
For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

5.7 Radiated Spurious Emissions above 1GHz

For LTE Band 4:

According to FCC 47 CFR part 27.53(h), for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB. The limit of emission is equal to -13 dBm.

For LTE Band 13:

According to FCC 47 CFR part 27.53(c)(2), for on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.
For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

5.8 Frequency Stability

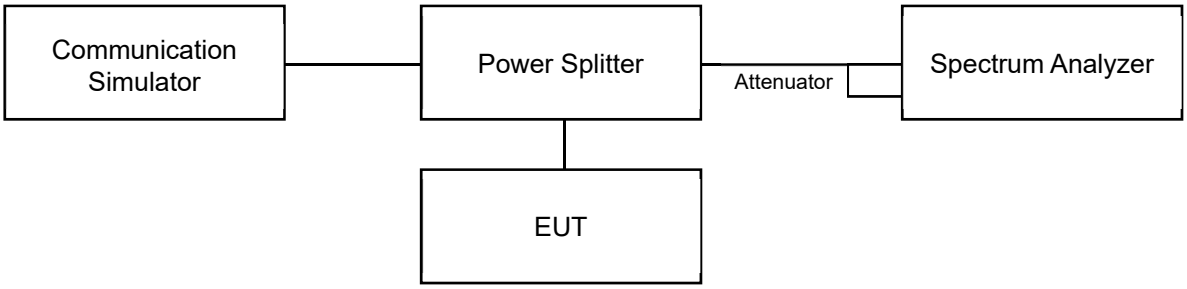
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

6 Test Arrangements

6.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

6.1.1 Test Setup

Conducted Power Measurement:



6.1.2 Test Procedure

Conducted Power Measurement:

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology. The power measurement was performed on emulator and power value was measured from power function on emulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Measurement method refers to ANSI C63.26 section 5.2.4.4.

a. Set span to 2 × to 3 × the OBW.
b. Set RBW = 1% to 5% of the OBW.
c. Set VBW ≥ 3 × RBW.
d. Set number of measurement points in sweep ≥ 2 × span / RBW.
e. Set Sweep time = auto-couple.
f. Detector = power averaging (rms).
g. Set sweep trigger to “free run.”
h. Trace average at least 100 traces in power averaging (rms) mode.
i. Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band or channel power measurement function with band/channel limits set equal to the OBW band edges.
j. If Duty cycle < 98%, Add 10 log (1/duty cycle) to the measured power level to compute the average power during continuous transmission.

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:

$EIRP = P_{Meas} + G_T$

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

where

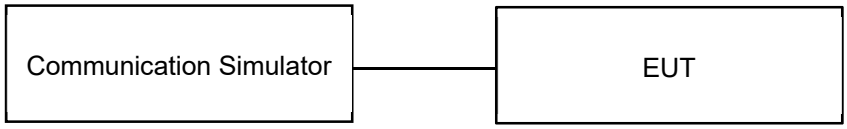
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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)

6.2 Modulation Characteristics

6.2.1 Test Setup

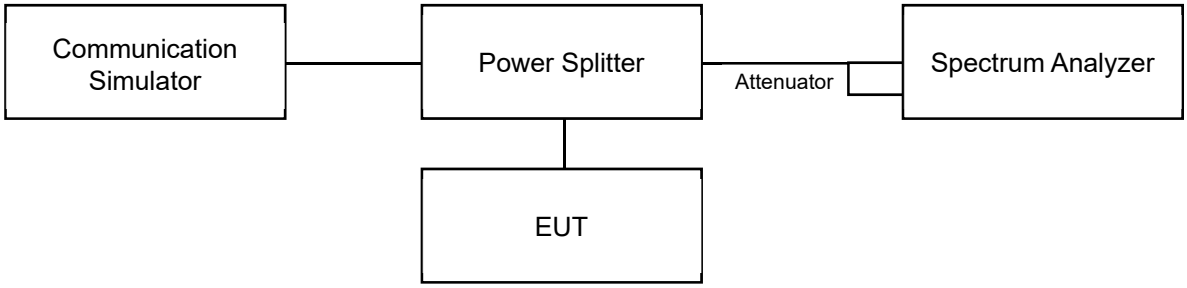


6.2.2 Test Procedure

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.

6.3 Peak to Average Ratio

6.3.1 Test Setup

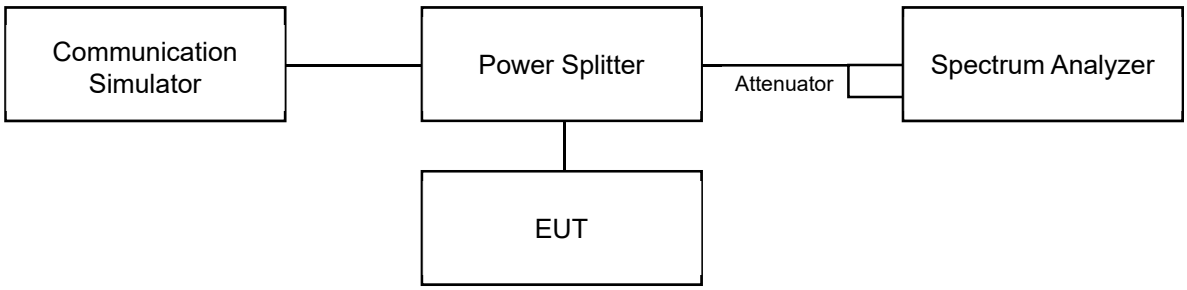


6.3.2 Test Procedure

a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b. Set the number of counts to a value that stabilizes the measured CCDF curve;
c. Record the maximum PAPR level associated with a probability of 0.1%.

6.4 Bandwidth

6.4.1 Test Setup



6.4.2 Test Procedure

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

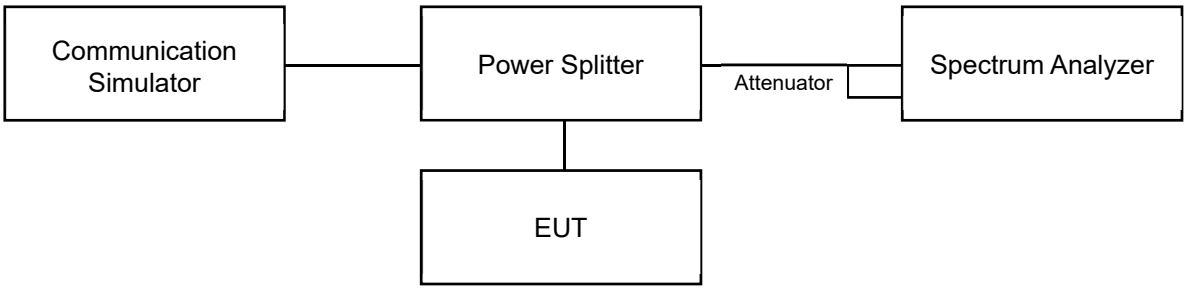
a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × 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.

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 ≥ 3 × 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 reference value by either of the following:
g. 1) 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).
h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
i. 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.
j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
k. 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. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."
l. 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).

6.5 Conducted Spurious Emissions

6.5.1 Test Setup



6.5.2 Test Procedure

a. Measurement refer to ANSI C63.26 section 5.7.
b. All measurements were done at 3 channels: low, middle and high operational frequency range.
c. Measuring frequency range is from 9 kHz up to the tenth harmonic of the hightest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
d. The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
e. The fundamental frequency below 1 GHz, the spectrum set RBW ≥ 100 kHz, VBW ≥ 3 x RBW, Detector = Average.
f. Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.

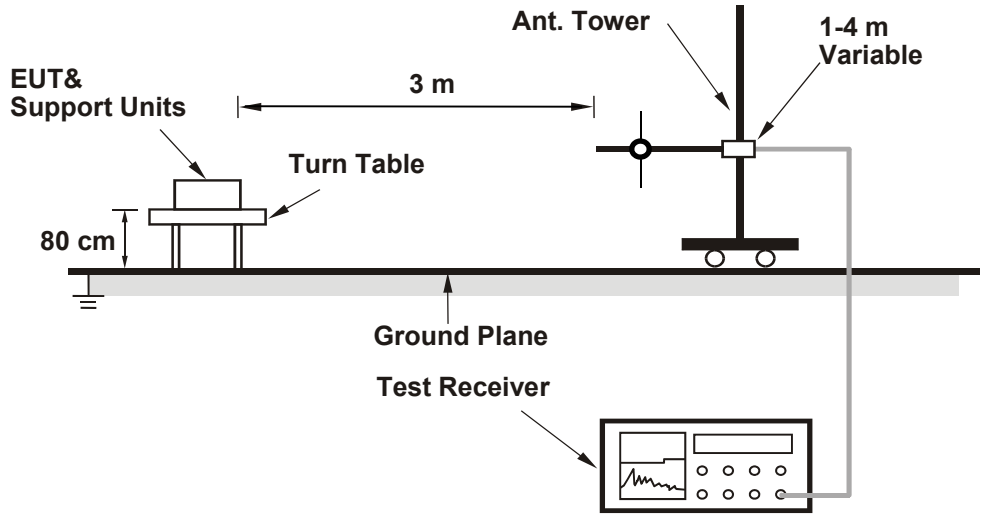
For Emission Mask:

a. Measurement refer to ANSI C63.26 section 5.7.
b. All measurements were done at 2 channels: low and high operational frequency range.
c. Record the maximum power value test plot.

6.6 Radiated Spurious Emissions below 1GHz

6.6.1 Test Setup

For radiated emission 30 MHz to 1 GHz



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

6.6.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

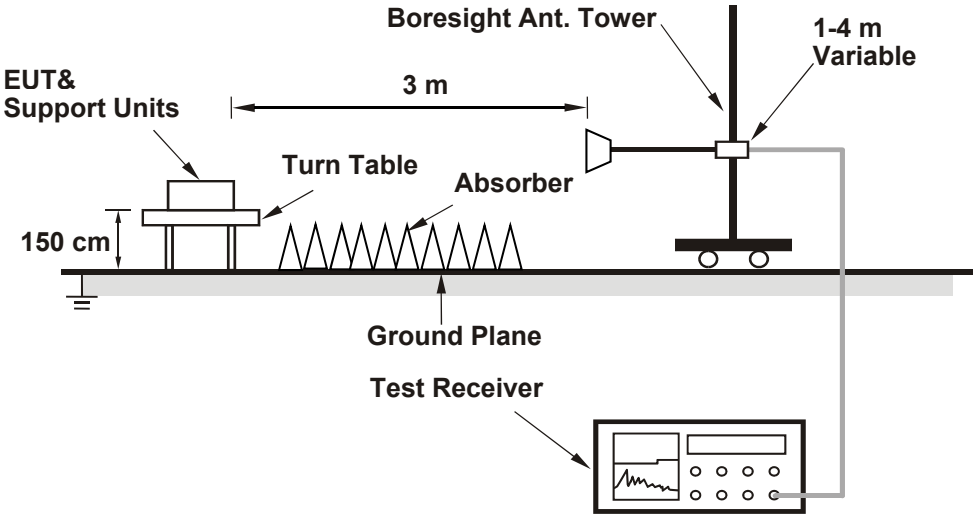
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

6.7 Radiated Spurious Emissions above 1GHz

6.7.1 Test Setup

For radiated emission above 1 GHz



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

6.7.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

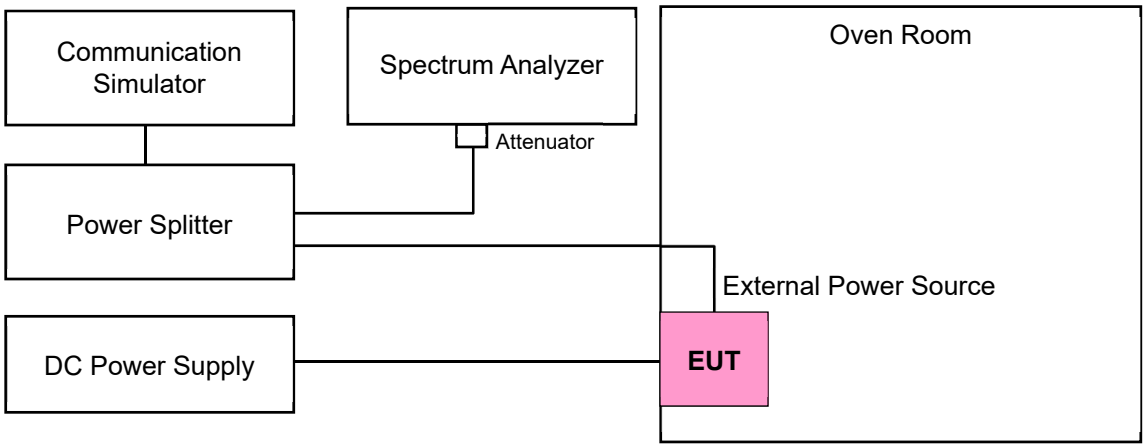
f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz. Set detector = average.

6.8 Frequency Stability

6.8.1 Test Setup



6.8.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ 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.

7 Test Results of Test Item

7.1 Effective Radiated Power and Equivalent Isotropically Radiated Power

Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 71% RH	Tested By:	Willy Cheng

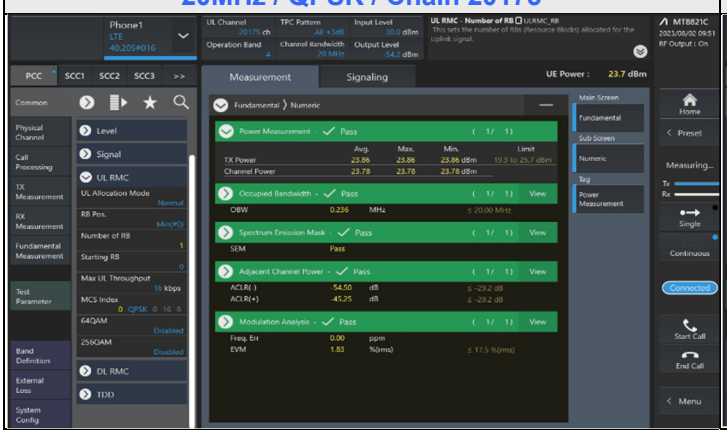
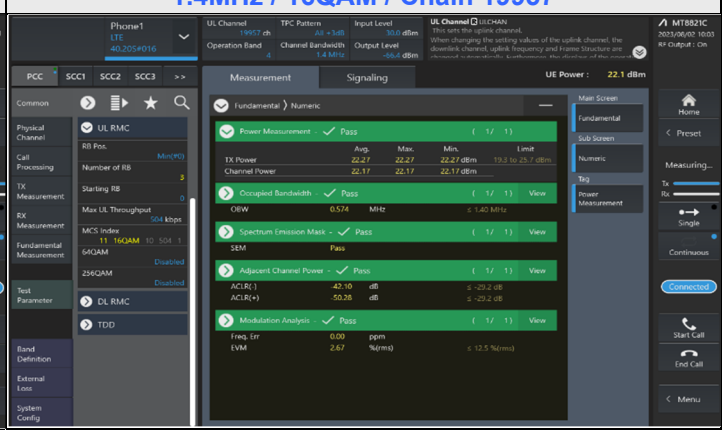
7.1.1 LTE Band 4

Conducted Output Power (dBm)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	23.54	23.78	23.65
		1	50	23.14	22.89	23.01
		1	99	22.96	22.87	22.83
		50	0	22.88	22.94	22.81
		50	25	21.95	21.85	21.82
		50	50	21.92	21.76	21.79
		100	0	21.83	21.86	21.71
20M	16QAM	1	0	21.91	21.47	21.77
		1	50	21.54	21.45	21.41
		1	99	21.52	21.21	21.39
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	23.14	23.00	22.91
		1	37	23.13	22.88	22.99
		1	74	22.87	22.82	22.74
		36	0	22.90	21.79	22.74
		36	19	21.85	21.76	21.81
		36	39	21.90	21.67	21.79
		75	0	21.80	21.79	21.71
15M	16QAM	1	0	21.91	21.41	21.71
		1	37	21.48	21.37	21.34
		1	74	21.48	21.11	21.39

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	23.04	22.92	22.86
		1	24	23.10	22.85	22.88
		1	49	22.80	22.75	22.61
		25	0	22.89	21.68	22.64
		25	12	21.85	21.73	21.77
		25	25	21.84	21.60	21.72
		50	0	21.75	21.66	21.59
10M	16QAM	1	0	21.85	21.27	21.62
		1	24	21.37	21.30	21.27
		1	49	21.36	21.09	21.36
		25	0	21.18	20.90	21.05
		25	12	20.83	20.61	20.79
		25	25	20.68	20.70	20.61
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	23.01	22.88	22.74
		1	12	23.01	22.80	22.86
		1	24	22.85	22.67	22.55
		12	0	22.83	21.71	22.49
		12	6	21.76	21.73	21.69
		12	13	21.87	21.54	21.57
		25	0	21.76	21.78	21.48
5M	16QAM	1	0	21.81	21.34	21.57
		1	12	21.48	21.37	21.27
		1	24	21.35	21.29	21.24
		12	0	21.12	20.77	20.92
		12	6	20.87	20.60	20.76
		12	13	20.73	20.65	20.51
		25	0	20.83	20.75	20.36

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	23.13	22.90	22.81
		1	7	23.02	22.87	22.88
		1	14	22.85	22.78	22.69
		8	0	22.90	21.77	22.68
		8	3	21.71	21.65	21.69
		8	7	21.84	21.65	21.77
		15	0	21.69	21.70	21.64
3M	16QAM	1	0	21.76	21.30	21.63
		1	7	21.40	21.28	21.26
		1	14	21.44	21.08	21.35
		8	0	21.17	20.89	20.94
		8	3	20.89	20.69	20.81
		8	7	20.73	20.66	20.68
		15	0	20.78	20.67	20.57
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	23.10	22.94	22.83
		1	2	23.00	22.88	22.94
		1	5	22.75	22.71	22.63
		3	0	22.73	22.71	23.60
		3	1	22.79	22.68	22.76
		3	3	22.89	22.55	22.69
		6	0	21.77	21.67	21.68
1.4M	16QAM	1	0	21.87	21.38	21.64
		1	2	21.37	21.33	21.30
		1	5	21.45	21.25	21.27
		3	0	22.17	21.87	22.08
		3	1	21.90	21.71	21.73
		3	3	21.76	21.78	21.61
		6	0	20.84	20.70	20.63

Spectrum Plot of Worst Value	
20MHz / QPSK / Chain 20175	1.4MHz / 16QAM / Chain 19957
	

EIRP Power (dBm)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	22.57	**22.81**	22.68
		1	50	22.17	21.92	22.04
		1	99	21.99	21.90	21.86
		50	0	21.91	21.97	21.84
		50	25	20.98	20.88	20.85
		50	50	20.95	20.79	20.82
		100	0	20.86	20.89	20.74
20M	16QAM	1	0	**20.94**	20.50	20.80
		1	50	20.57	20.48	20.44
		1	99	20.55	20.24	20.42
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20025	20175	20325
		Frequency (MHz)		1717.5	1732.5	1747.5
15M	QPSK	1	0	**22.17**	22.03	21.94
		1	37	22.16	21.91	22.02
		1	74	21.90	21.85	21.77
		36	0	21.93	20.82	21.77
		36	19	20.88	20.79	20.84
		36	39	20.93	20.70	20.82
		75	0	20.83	20.82	20.74
15M	16QAM	1	0	**20.94**	20.44	20.74
		1	37	20.51	20.40	20.37
		1	74	20.51	20.14	20.42

*EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	22.07	21.95	21.89
		1	24	**22.13**	21.88	21.91
		1	49	21.83	21.78	21.64
		25	0	21.92	20.71	21.67
		25	12	20.88	20.76	20.80
		25	25	20.87	20.63	20.75
		50	0	20.78	20.69	20.62
10M	16QAM	1	0	**20.88**	20.30	20.65
		1	24	20.40	20.33	20.30
		1	49	20.39	20.12	20.39
		25	0	20.21	19.93	20.08
		25	12	19.86	19.64	19.82
		25	25	19.71	19.73	19.64
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19975	20175	20375
		Frequency (MHz)		1712.5	1732.5	1752.5
5M	QPSK	1	0	**22.04**	21.91	21.77
		1	12	22.04	21.83	21.89
		1	24	21.88	21.70	21.58
		12	0	21.86	20.74	21.52
		12	6	20.79	20.76	20.72
		12	13	20.90	20.57	20.60
		25	0	20.79	20.81	20.51
5M	16QAM	1	0	**20.84**	20.37	20.60
		1	12	20.51	20.40	20.30
		1	24	20.38	20.32	20.27
		12	0	20.15	19.80	19.95
		12	6	19.90	19.63	19.79
		12	13	19.76	19.68	19.54
		25	0	19.86	19.78	19.39

*EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19965	20175	20385
		Frequency (MHz)		1711.5	1732.5	1753.5
3M	QPSK	1	0	**22.16**	21.93	21.84
		1	7	22.05	21.90	21.91
		1	14	21.88	21.81	21.72
		8	0	21.93	20.80	21.71
		8	3	20.74	20.68	20.72
		8	7	20.87	20.68	20.80
		15	0	20.72	20.73	20.67
3M	16QAM	1	0	**20.79**	20.33	20.66
		1	7	20.43	20.31	20.29
		1	14	20.47	20.11	20.38
		8	0	20.20	19.92	19.97
		8	3	19.92	19.72	19.84
		8	7	19.76	19.69	19.71
		15	0	19.81	19.70	19.60
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		19957	20175	20393
		Frequency (MHz)		1710.7	1732.5	1754.3
1.4M	QPSK	1	0	22.13	21.97	21.86
		1	2	22.03	21.91	21.97
		1	5	21.78	21.74	21.66
		3	0	21.76	21.74	**22.63**
		3	1	21.82	21.71	21.79
		3	3	21.92	21.58	21.72
		6	0	20.80	20.70	20.71
1.4M	16QAM	1	0	20.90	20.41	20.67
		1	2	20.40	20.36	20.33
		1	5	20.48	20.28	20.30
		3	0	**21.20**	20.90	21.11
		3	1	20.93	20.74	20.76
		3	3	20.79	20.81	20.64
		6	0	19.87	19.73	19.66

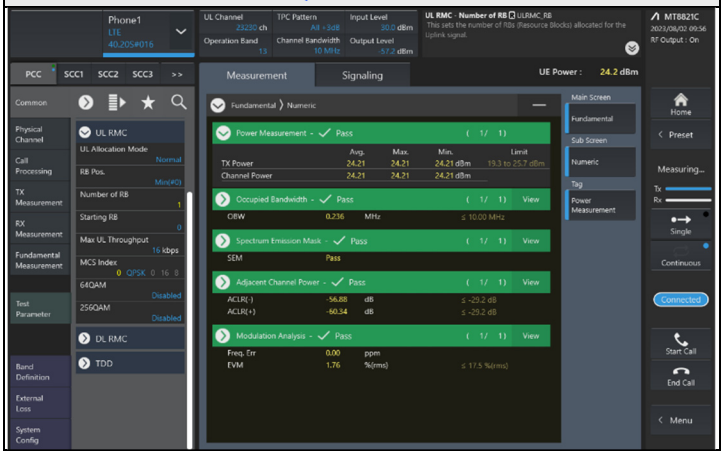
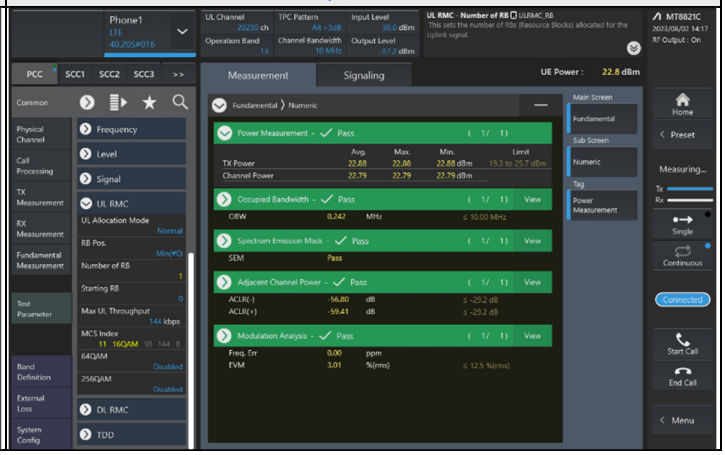
*EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

7.1.2 LTE Band 13

Conducted Output Power (dBm)

BW	MCS Index	RB Size	RB Offset	Mid
		Channel		23230
		Frequency (MHz)		782
10M	QPSK	1	0	24.21
		1	24	24.19
		1	49	24.15
		25	0	23.14
		25	12	23.12
		25	25	23.09
		50	0	23.11
10M	16QAM	1	0	22.79
		1	24	22.77
		1	49	22.72
		25	0	22.18
		25	12	22.16
		25	25	22.13

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	23.97	23.98	23.90
		1	12	23.91	23.90	23.92
		1	24	23.84	23.89	23.88
		12	0	22.84	22.89	22.80
		12	6	22.86	22.90	22.80
		12	13	22.82	22.86	22.78
		25	0	22.78	22.81	22.75
5M	16QAM	1	0	22.50	22.52	22.44
		1	12	22.53	22.49	22.47
		1	24	22.41	22.49	22.37
		12	0	21.88	21.88	21.91
		12	6	21.93	21.94	21.81
		12	13	21.86	21.84	21.81
		25	0	21.86	21.81	21.79

Spectrum Plot of Worst Value	
10MHz / QPSK / Chain 23230	10MHz / 16QAM / Chain 23230
	

ERP Power (dBm)

BW	MCS Index	RB Size	RB Offset	Mid
		Channel		23230
		Frequency (MHz)		782
10M	QPSK	1	0	**18.58**
		1	24	18.56
		1	49	18.52
		25	0	17.51
		25	12	17.49
		25	25	17.46
		50	0	17.48
10M	16QAM	1	0	**17.16**
		1	24	17.14
		1	49	17.09
		25	0	16.55
		25	12	16.53
		25	25	16.50

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23205	23230	23255
		Frequency (MHz)		779.5	782	784.5
5M	QPSK	1	0	18.34	**18.35**	18.27
		1	12	18.28	18.27	18.29
		1	24	18.21	18.26	18.25
		12	0	17.21	17.26	17.17
		12	6	17.23	17.27	17.17
		12	13	17.19	17.23	17.15
		25	0	17.15	17.18	17.12
5M	16QAM	1	0	16.87	16.89	16.81
		1	12	**16.90**	16.86	16.84
		1	24	16.78	16.86	16.74
		12	0	16.25	16.25	16.28
		12	6	16.30	16.31	16.18
		12	13	16.23	16.21	16.18
		25	0	16.23	16.18	16.16

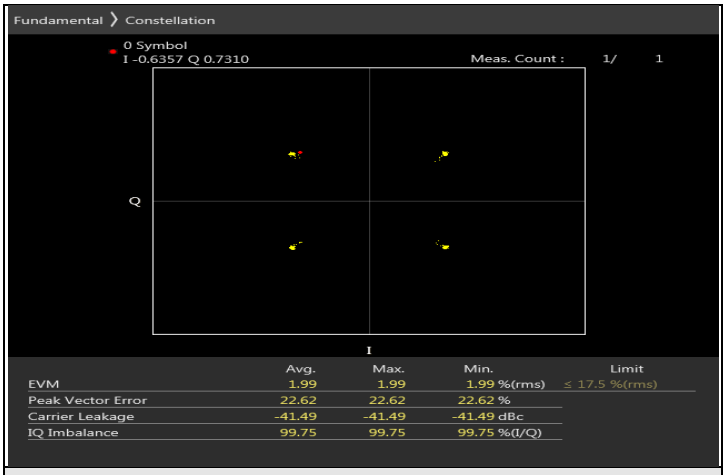
*ERP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi) - 2.15

7.2 Modulation Characteristics

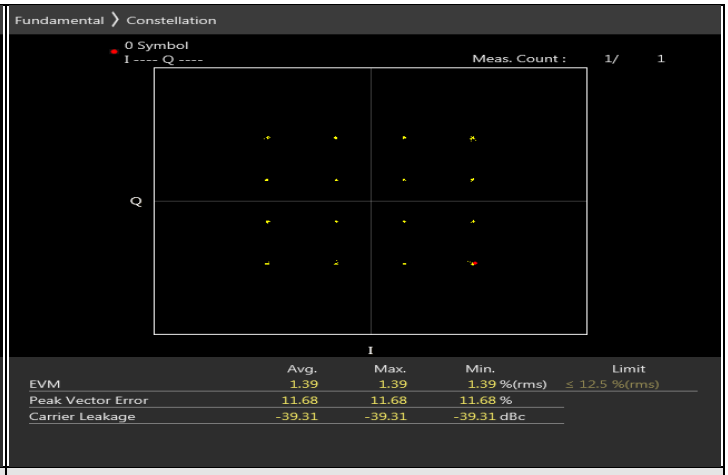
Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 71% RH	Tested By:	Willy Cheng

7.2.1 LTE Band 4

LTE Band 4, Channel Bandwidth: 20 MHz



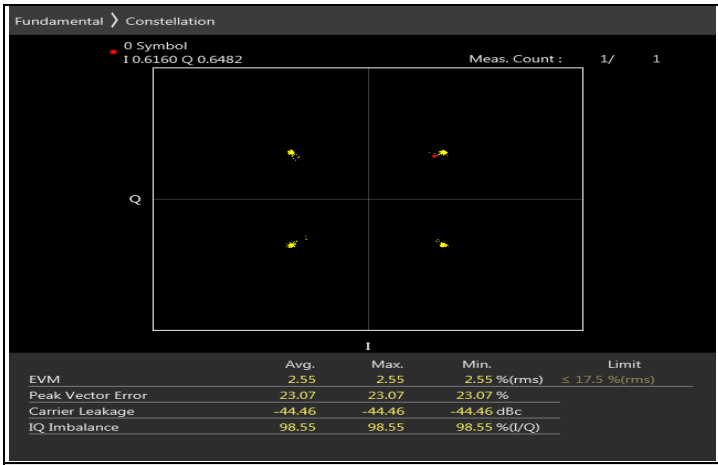
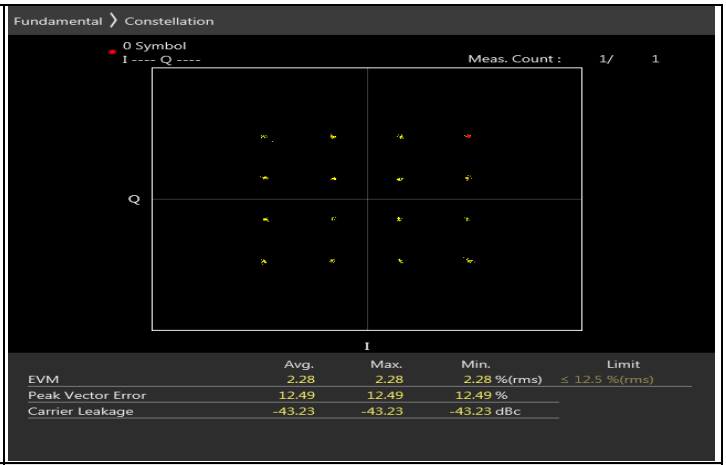
QPSK CH 20175 (1732.5 MHz)



16QAM CH 20175 (1732.5 MHz)

7.2.2 LTE Band 13

LTE Band 13, Channel Bandwidth: 10 MHz

	
QPSK CH 23230 (782 MHz)	16QAM CH 23230 (782 MHz)

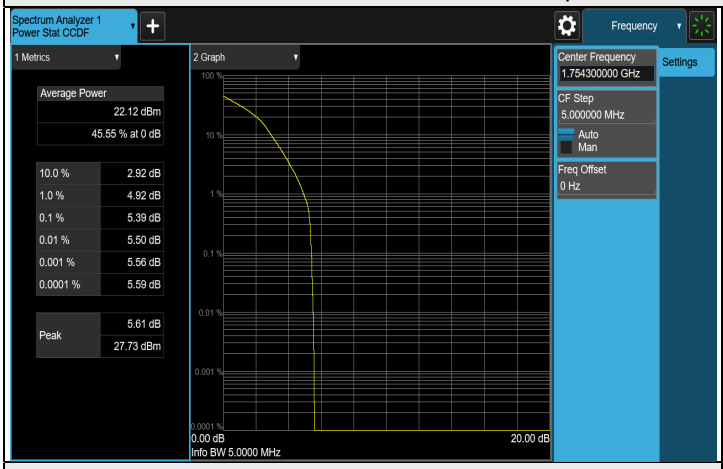
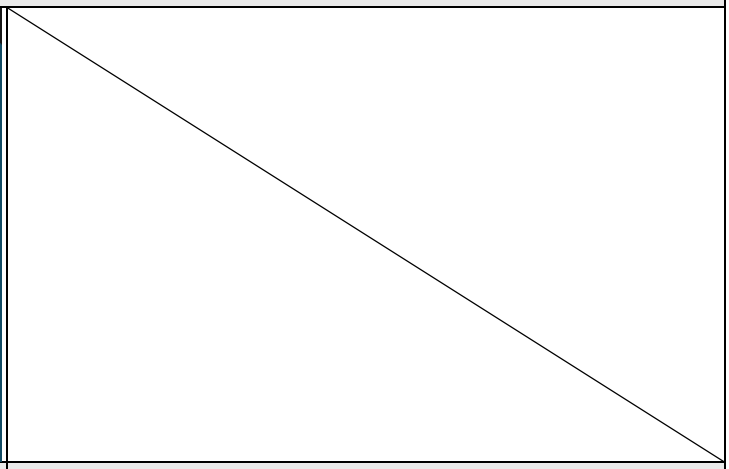
7.3 Peak to Average Ratio

Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 71% RH	Tested By:	Willy Cheng

7.3.1 LTE Band 4

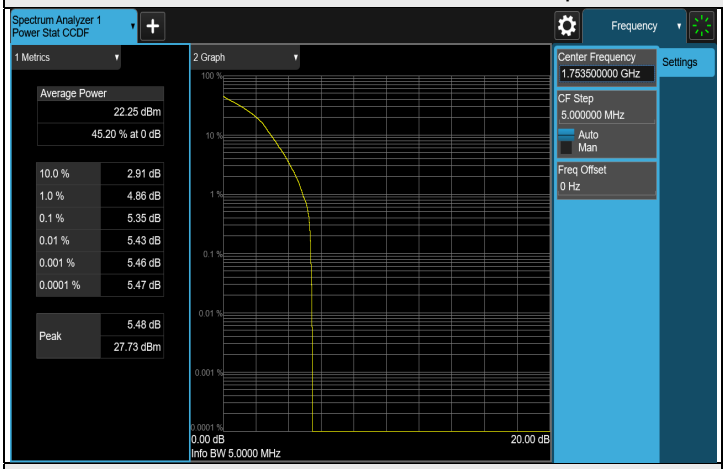
LTE Band 4, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value (dB)	Limit (dB)	Result
QPSK	19957	1710.7	4.37	13	Pass
QPSK	20175	1732.5	4.25	13	Pass
QPSK	20393	1754.3	4.36	13	Pass
16QAM	19957	1710.7	5.33	13	Pass
16QAM	20175	1732.5	5.30	13	Pass
16QAM	20393	1754.3	5.39	13	Pass

Spectrum Plot of Worst Value	
	
16QAM CH 20393 (1754.3 MHz)	

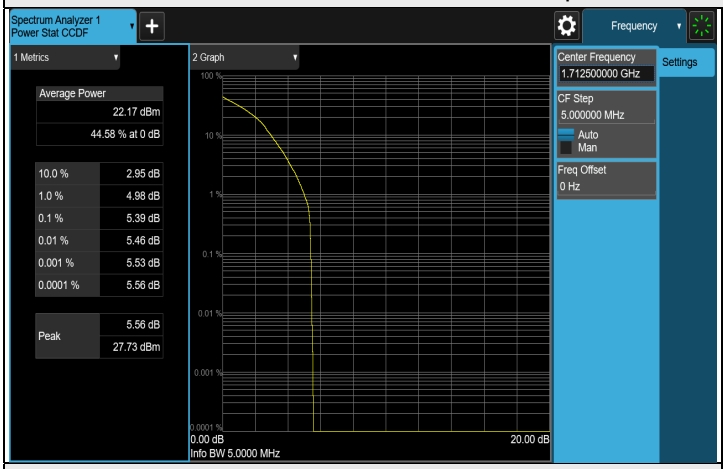
LTE Band 4, Channel Bandwidth: 3 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	19965	1711.5	4.39	13	PASS
QPSK	20175	1732.5	4.36	13	PASS
QPSK	20385	1753.5	4.38	13	PASS
16QAM	19965	1711.5	5.32	13	PASS
16QAM	20175	1732.5	5.33	13	PASS
16QAM	20385	1753.5	5.35	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 20385 (1753.5 MHz)	

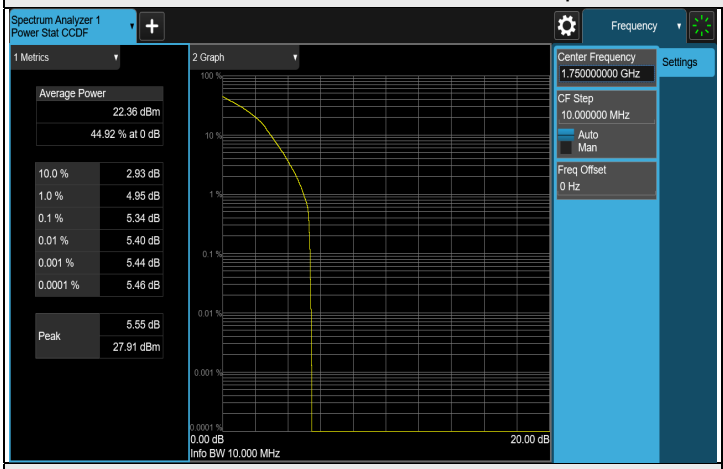
LTE Band 4, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	19975	1712.5	4.34	13	PASS
QPSK	20175	1732.5	4.31	13	PASS
QPSK	20375	1752.5	4.31	13	PASS
16QAM	19975	1712.5	5.39	13	PASS
16QAM	20175	1732.5	5.24	13	PASS
16QAM	20375	1752.5	5.29	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 19975 (1712.5 MHz)	

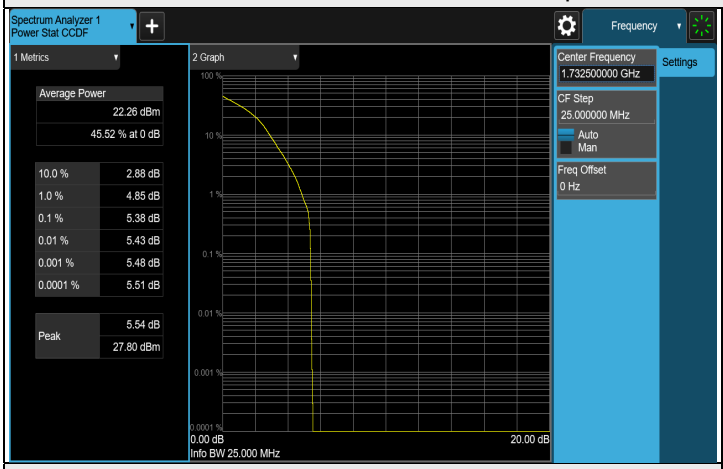
LTE Band 4, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	20000	1715	4.34	13	PASS
QPSK	20175	1732.5	4.36	13	PASS
QPSK	20350	1750	4.18	13	PASS
16QAM	20000	1715	5.28	13	PASS
16QAM	20175	1732.5	5.28	13	PASS
16QAM	20350	1750	5.34	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 20350 (1750 MHz)	

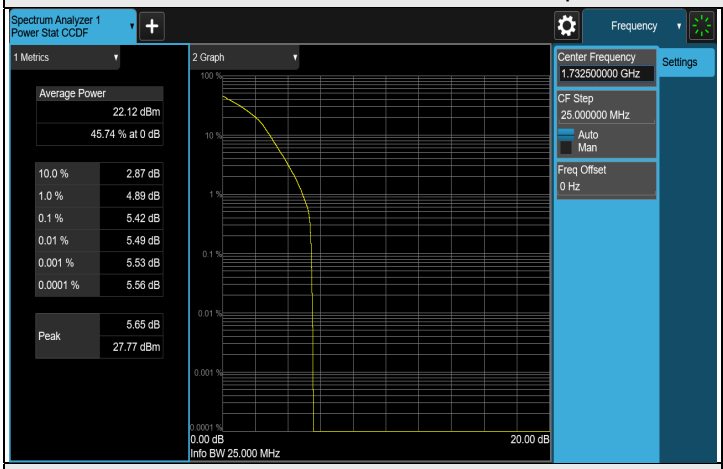
LTE Band 4, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	20025	1717.5	4.31	13	PASS
QPSK	20175	1732.5	4.34	13	PASS
QPSK	20325	1747.5	4.24	13	PASS
16QAM	20025	1717.5	5.24	13	PASS
16QAM	20175	1732.5	5.38	13	PASS
16QAM	20325	1747.5	5.30	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 20175 (1732.5 MHz)	

LTE Band 4, Channel Bandwidth: 20 MHz

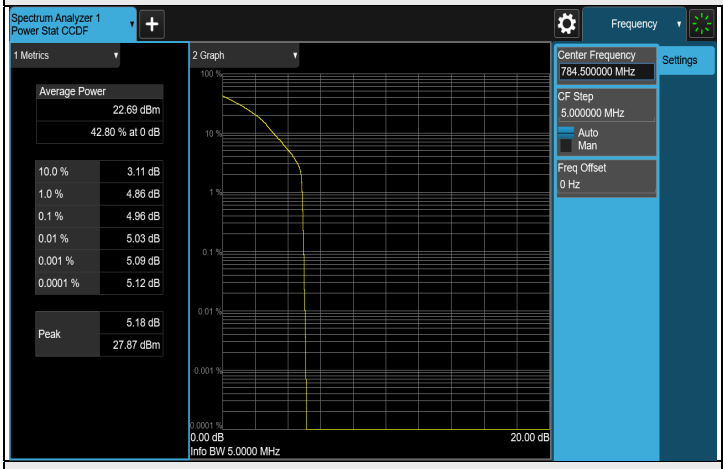
Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	20050	1720	4.34	13	PASS
QPSK	20175	1732.5	4.37	13	PASS
QPSK	20300	1745	4.27	13	PASS
16QAM	20050	1720	5.29	13	PASS
16QAM	20175	1732.5	5.42	13	PASS
16QAM	20300	1745	5.39	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 20175 (1732.5 MHz)	

7.3.2 LTE Band 13

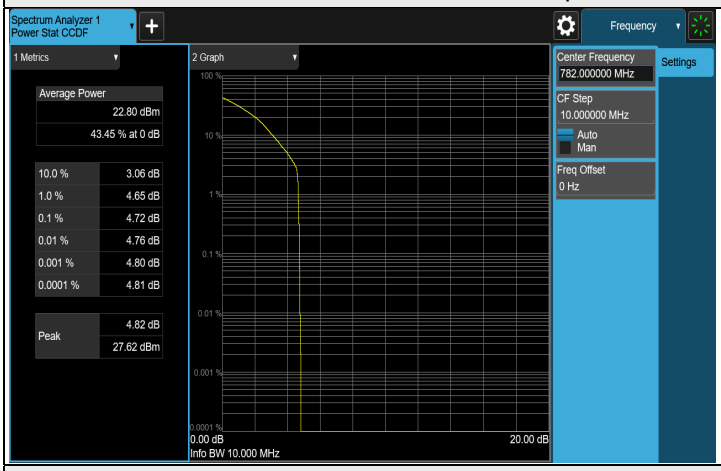
LTE Band 13, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	23205	779.5	3.77	13	PASS
QPSK	23230	782	3.77	13	PASS
QPSK	23255	784.5	3.94	13	PASS
16QAM	23205	779.5	4.76	13	PASS
16QAM	23230	782	4.88	13	PASS
16QAM	23255	784.5	4.96	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 23255 (784.5 MHz)	

LTE Band 13, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit (\n(dB))	Result
QPSK	23230	782	3.73	13	PASS
16QAM	23230	782	4.72	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 23230 (782 MHz)	

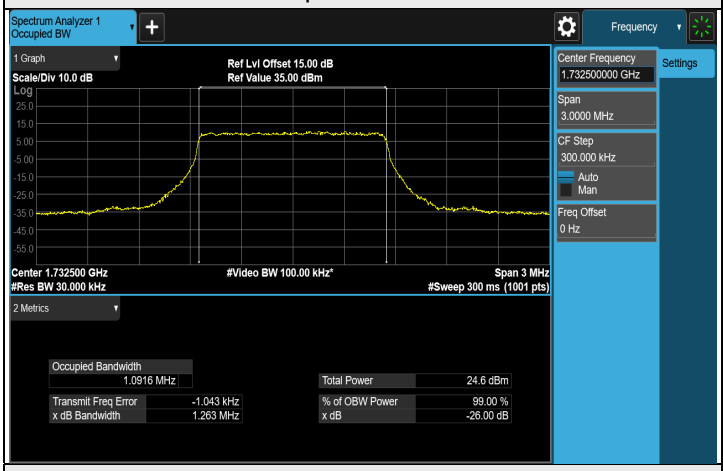
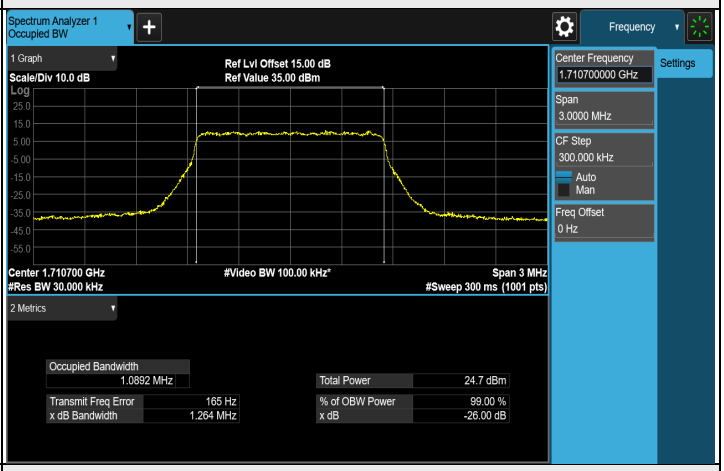
7.4 Bandwidth

Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 71% RH	Tested By:	Willy Cheng

7.4.1 LTE Band 4

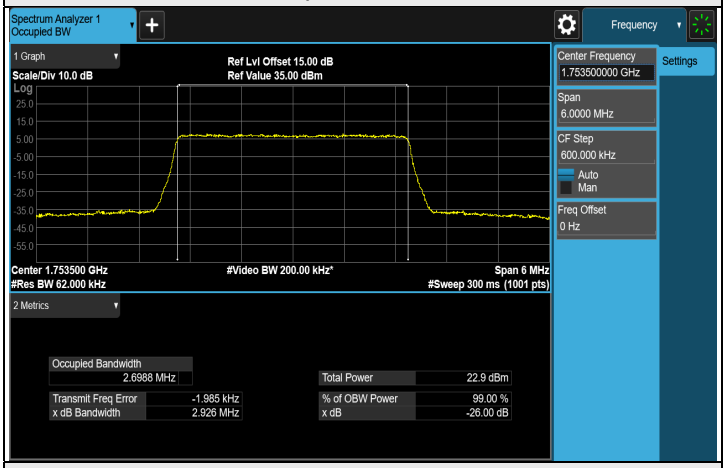
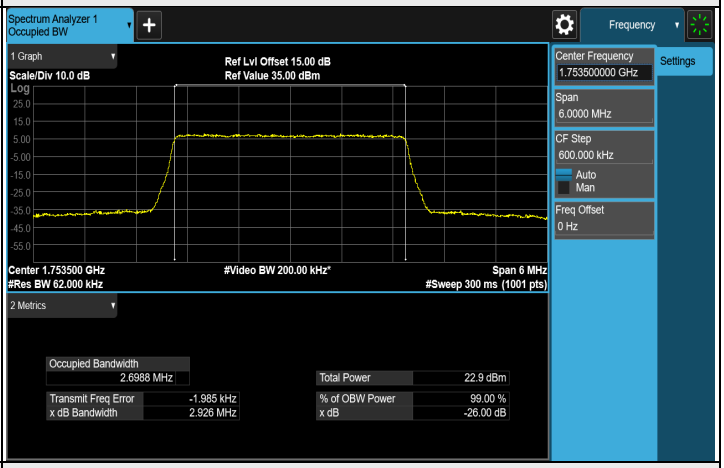
LTE Band 4, Channel Bandwidth: 1.4 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19957	1710.7	1.0892	1.264
QPSK	20175	1732.5	1.0916	1.263
QPSK	20393	1754.3	1.0904	1.260
16QAM	19957	1710.7	1.0875	1.239
16QAM	20175	1732.5	1.0882	1.241
16QAM	20393	1754.3	1.0872	1.244

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 20175 (1732.5 MHz)	QPSK CH 19957 (1710.7 MHz)

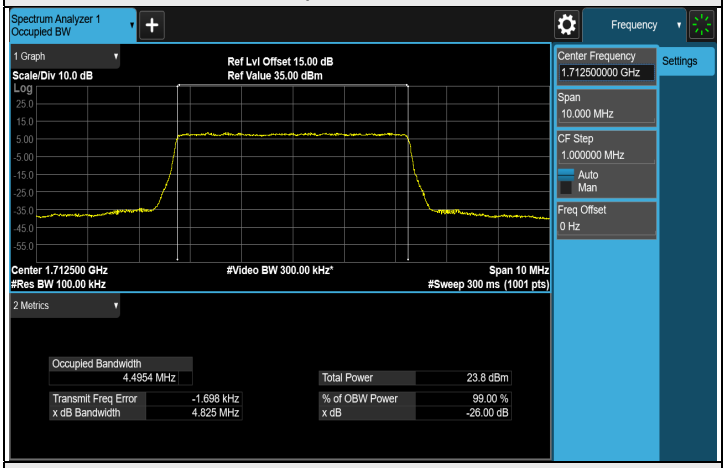
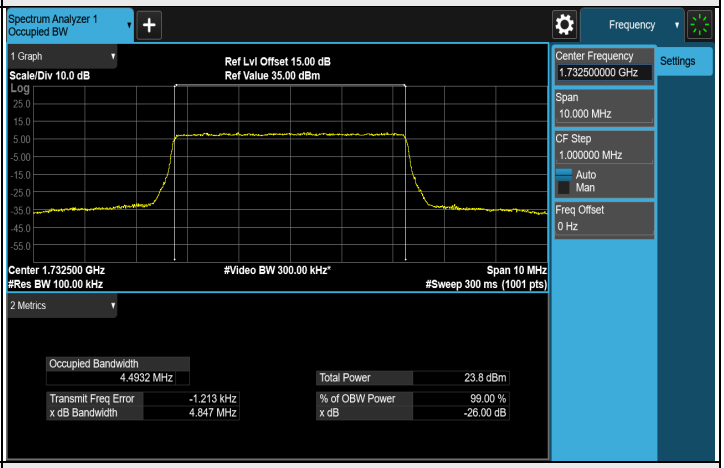
LTE Band 4, Channel Bandwidth: 3 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19965	1711.5	2.6964	2.918
QPSK	20175	1732.5	2.6962	2.915
QPSK	20385	1753.5	2.6953	2.923
16QAM	19965	1711.5	2.6976	2.925
16QAM	20175	1732.5	2.6967	2.925
16QAM	20385	1753.5	2.6988	2.926

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
16QAM CH 20385 (1753.5 MHz)	16QAM CH 20385 (1753.5 MHz)

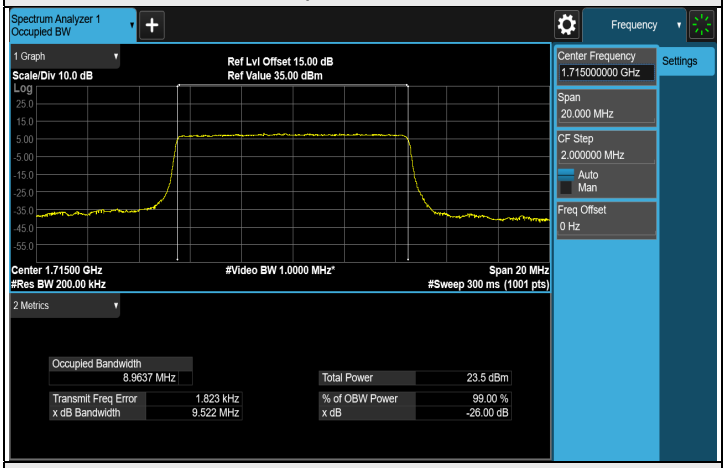
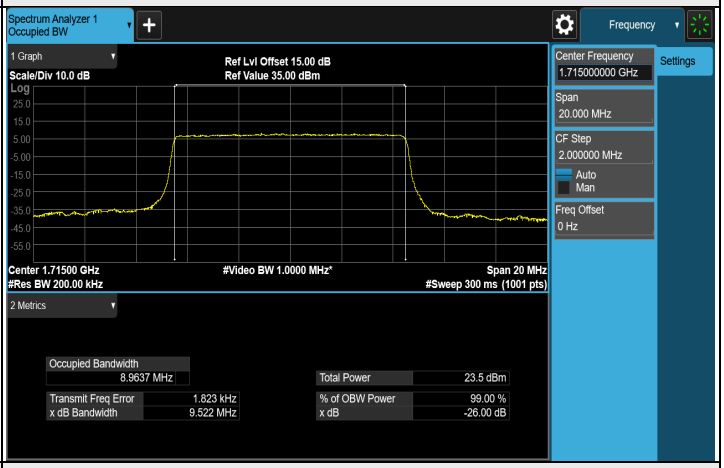
LTE Band 4, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19975	1712.5	4.4954	4.825
QPSK	20175	1732.5	4.4932	4.847
QPSK	20375	1752.5	4.4932	4.819
16QAM	19975	1712.5	4.4928	4.824
16QAM	20175	1732.5	4.4897	4.817
16QAM	20375	1752.5	4.4915	4.817

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 19975 (1712.5 MHz)	QPSK CH 20175 (1732.5 MHz)

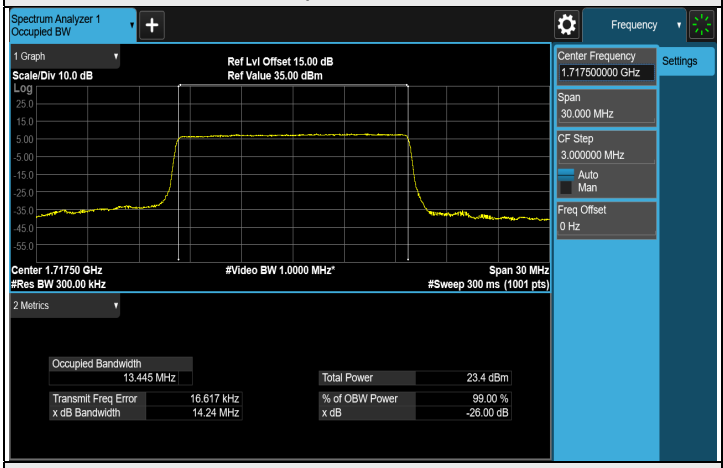
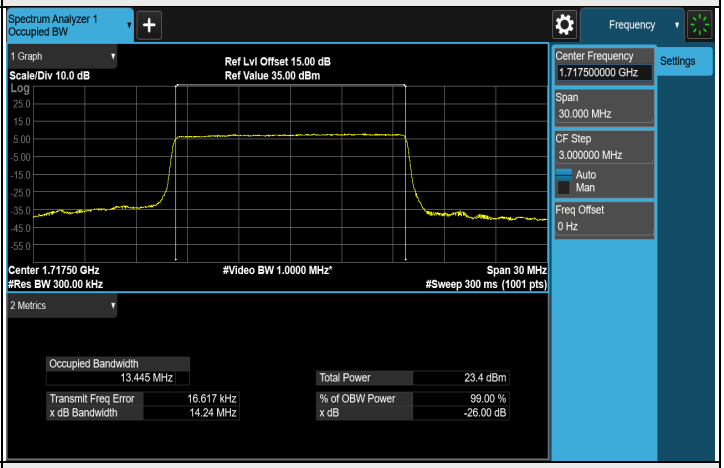
LTE Band 4, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20000	1715	8.9637	9.522
QPSK	20175	1732.5	8.9481	9.501
QPSK	20350	1750	8.9549	9.510
16QAM	20000	1715	4.5740	5.088
16QAM	20175	1732.5	4.5655	5.102
16QAM	20350	1750	4.5690	5.116

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 20000 (1715 MHz)	QPSK CH 20000 (1715 MHz)

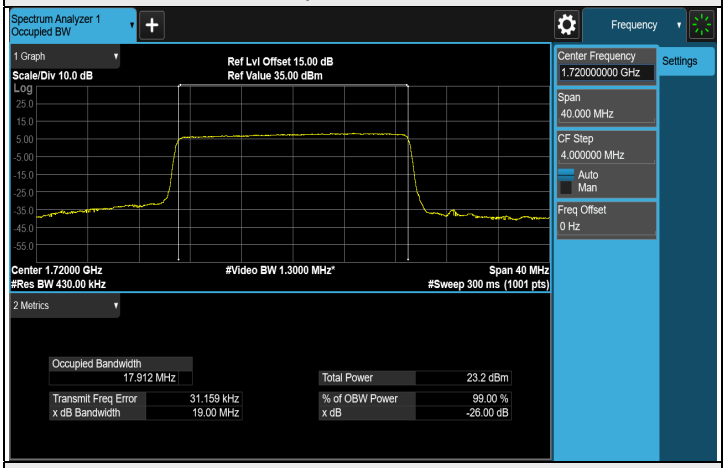
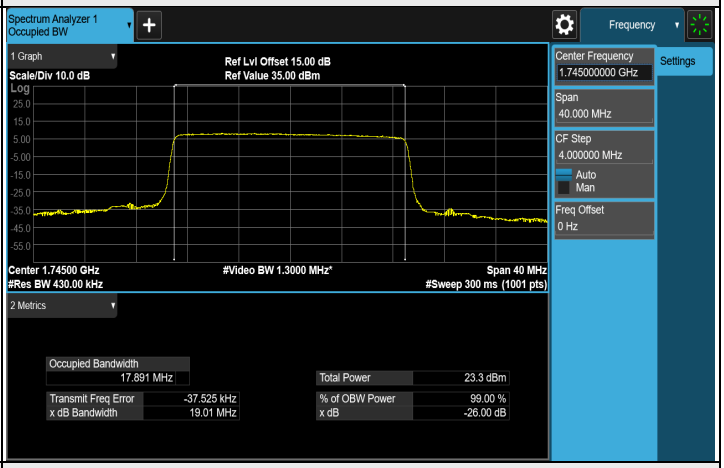
LTE Band 4, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20025	1717.5	13.4449	14.237
QPSK	20175	1732.5	13.4118	14.208
QPSK	20325	1747.5	13.4265	14.223
16QAM	20025	1717.5	4.6676	5.309
16QAM	20175	1732.5	4.6646	5.328
16QAM	20325	1747.5	4.6708	5.374

<table>
<tr><th colspan="2">Spectrum Plot of Worst Value</th></tr>
<tr><th>Occupied bandwidth</th><th>26 dB Bandwidth</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>QPSK CH 20025 (1717.5 MHz)</td><td>QPSK CH 20025 (1717.5 MHz)</td></tr>
</table>

LTE Band 4, Channel Bandwidth: 20 MHz

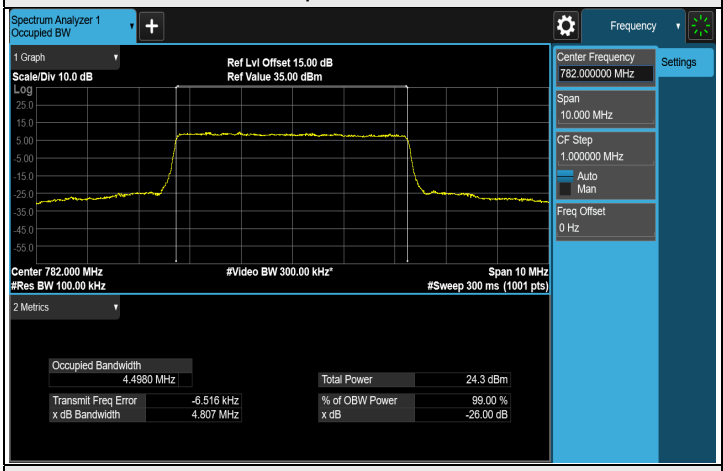
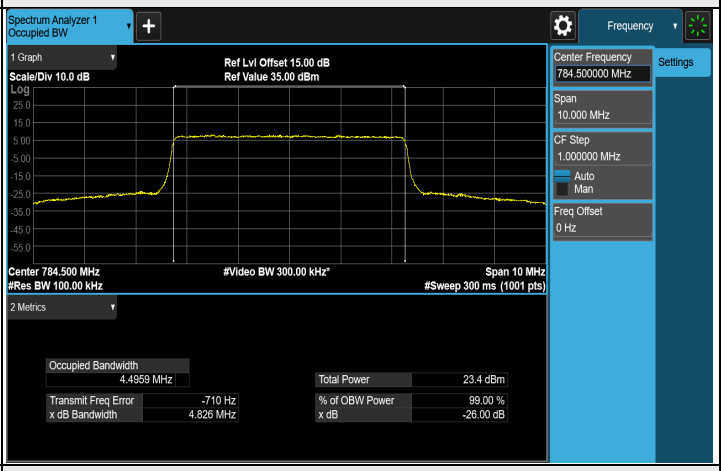
Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20050	1720	17.9117	19.005
QPSK	20175	1732.5	17.8512	18.965
QPSK	20300	1745	17.8914	19.014
16QAM	20050	1720	4.8105	5.574
16QAM	20175	1732.5	4.8096	5.627
16QAM	20300	1745	4.8151	5.583

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 20050 (1720 MHz)	QPSK CH 20300 (1745 MHz)

7.4.2 LTE Band 13

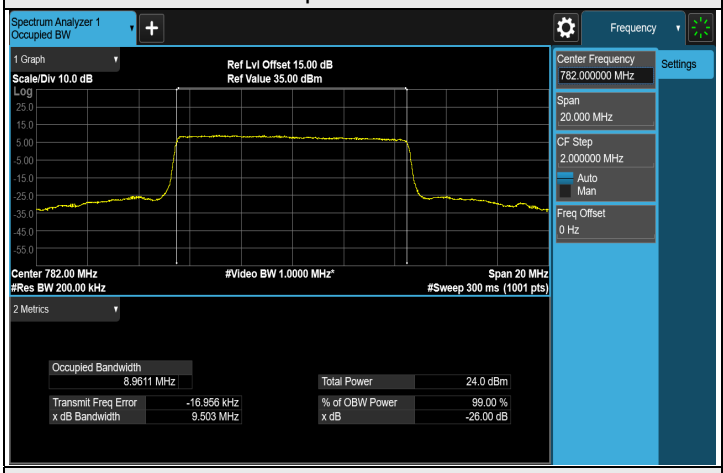
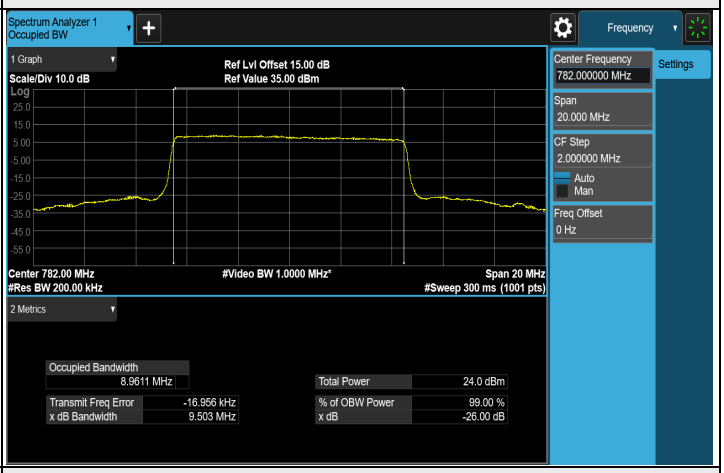
LTE Band 13, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23205	779.5	4.4888	4.806
QPSK	23230	782	4.4980	4.807
QPSK	23255	784.5	4.4956	4.815
16QAM	23205	779.5	4.4856	4.804
16QAM	23230	782	4.4946	4.822
16QAM	23255	784.5	4.4959	4.826

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23230 (782 MHz)	16QAM CH 23255 (784.5 MHz)

LTE Band 13, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23230	782	8.9611	9.503
16QAM	23230	782	4.5778	5.113

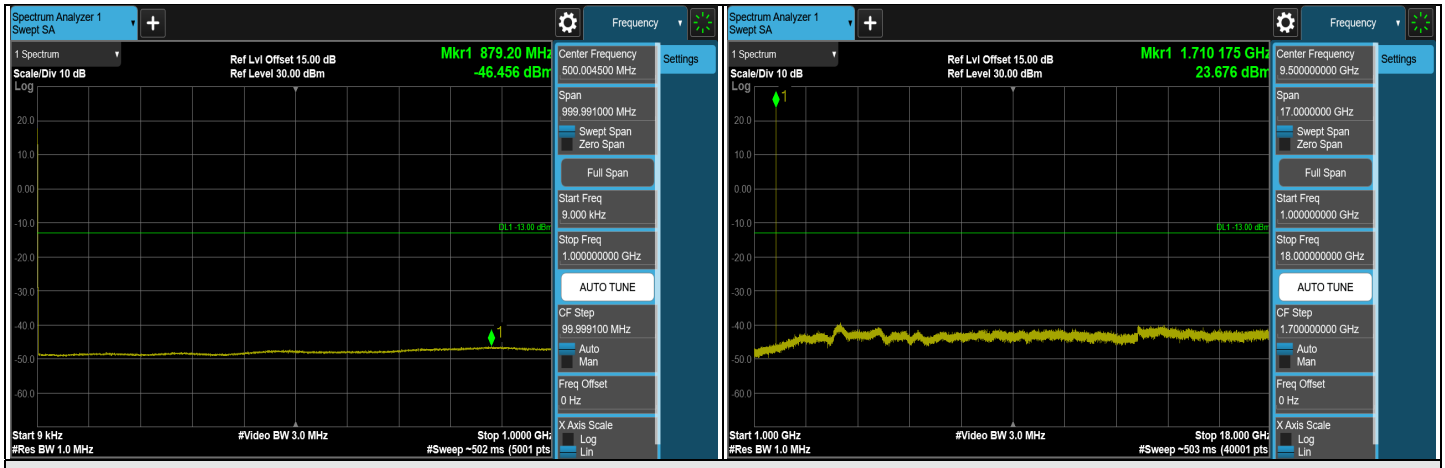
Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23230 (782 MHz)	QPSK CH 23230 (782 MHz)

7.5 Conducted Spurious Emissions

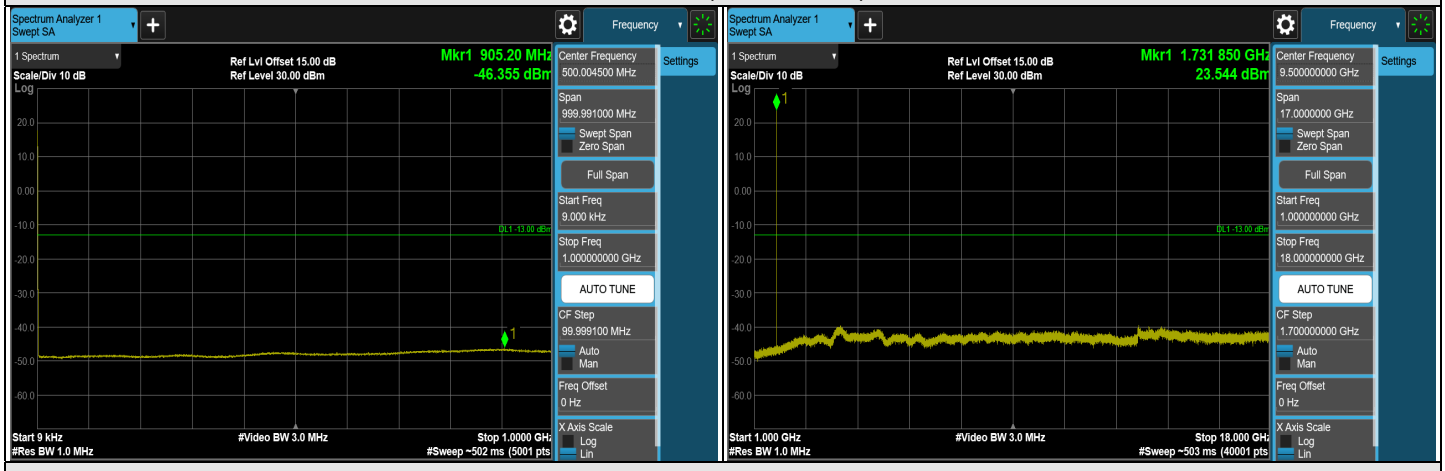
Input Power:	3.87 Vdc	Environmental Conditions:	24°C, 71% RH	Tested By:	Willy Cheng

7.5.1 LTE Band 4

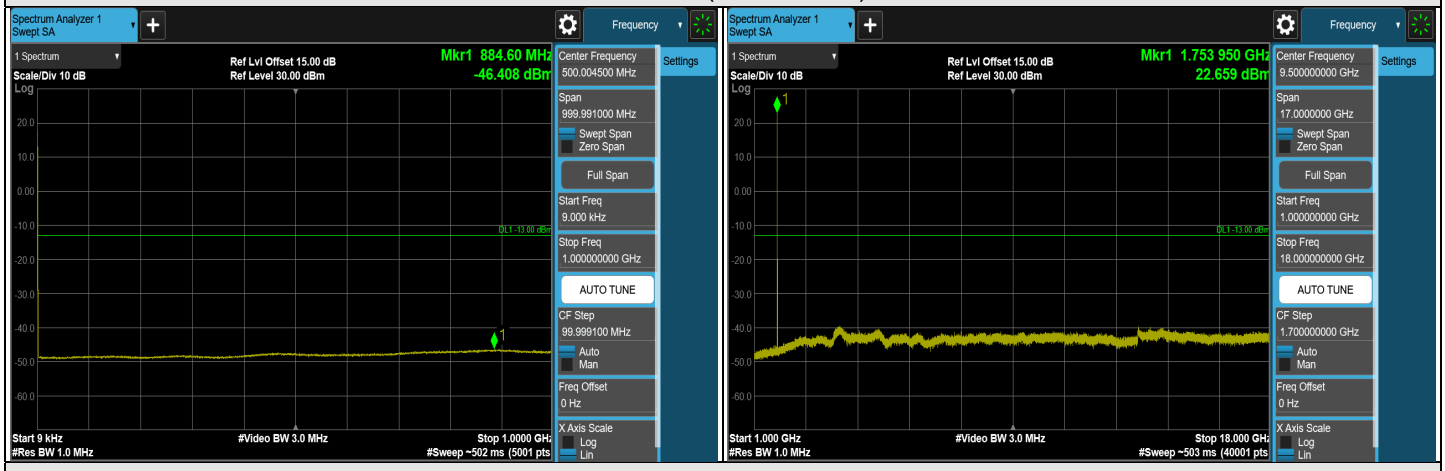
LTE Band 4, Channel Bandwidth: 1.4 MHz



CH 19957 (1710.7 MHz)

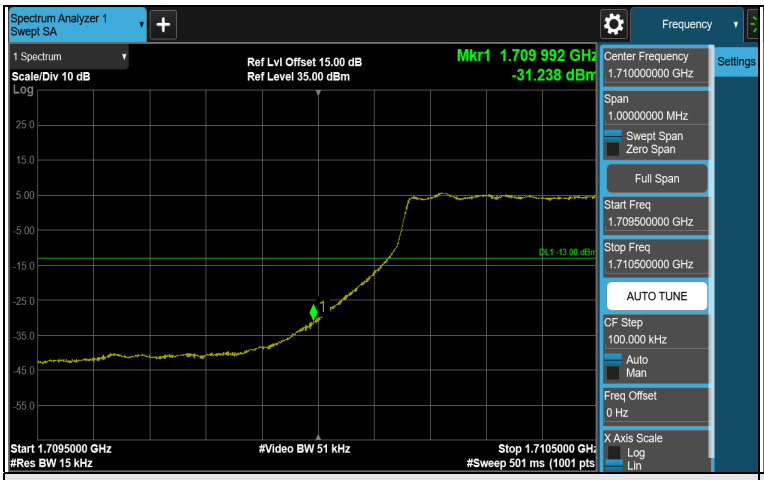


CH 20175 (1732.5 MHz)

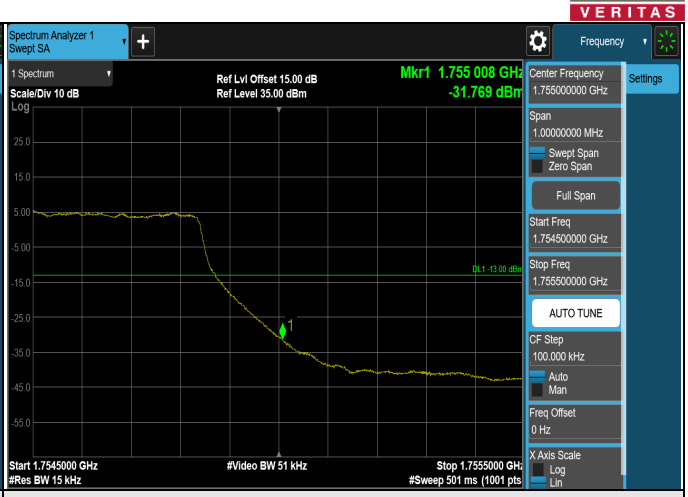


CH 20393 (1754.3 MHz)

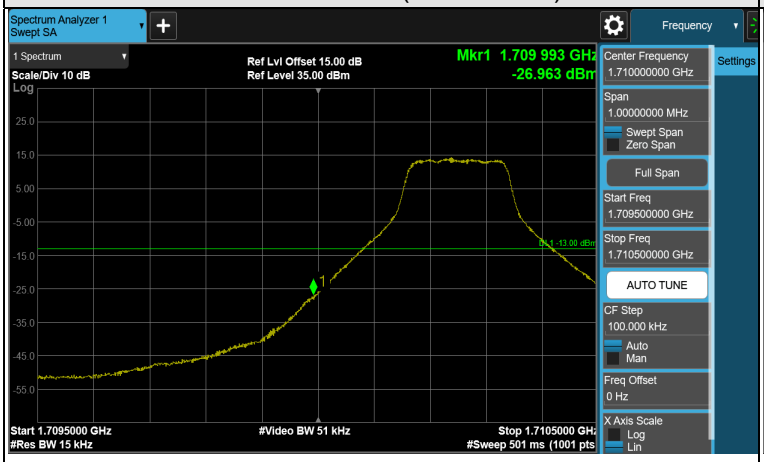
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



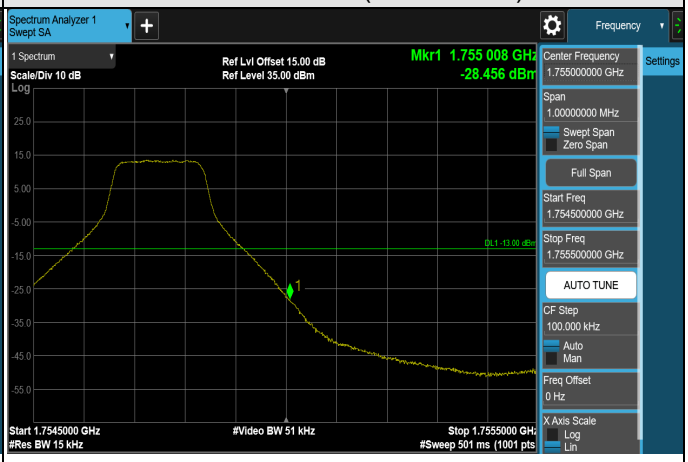
FULL CH 19957 (1710.7 MHz)



FULL CH 20393 (1754.3 MHz)

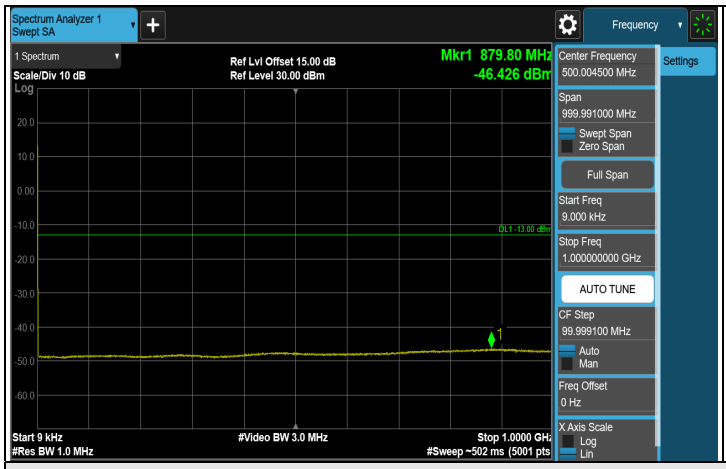


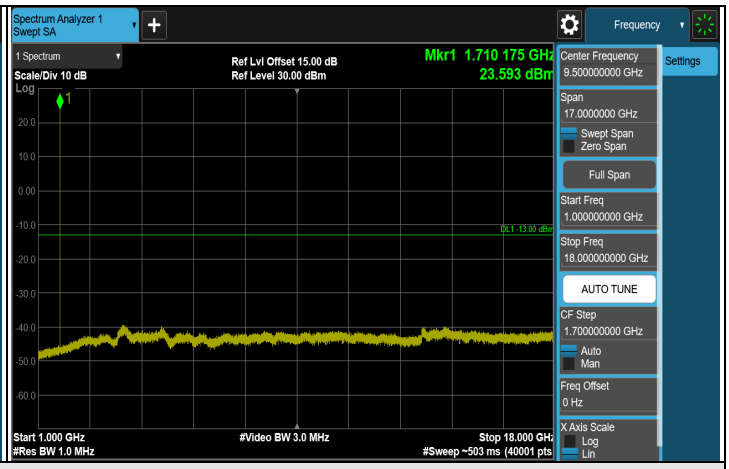
1RB CH 19957 (1710.7 MHz)



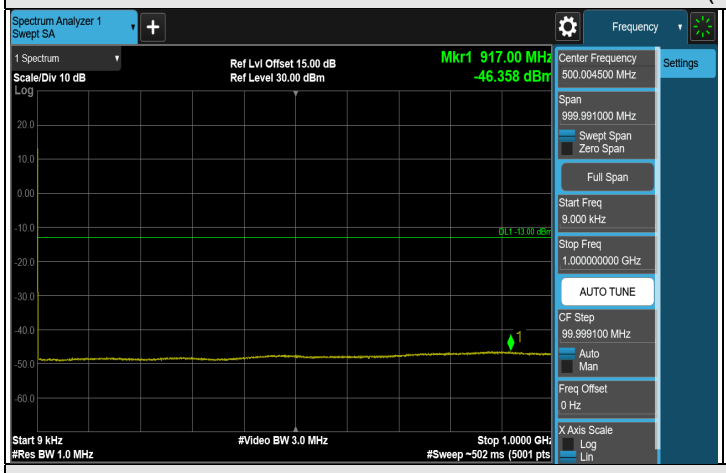
1RB CH 20393 (1754.3 MHz)

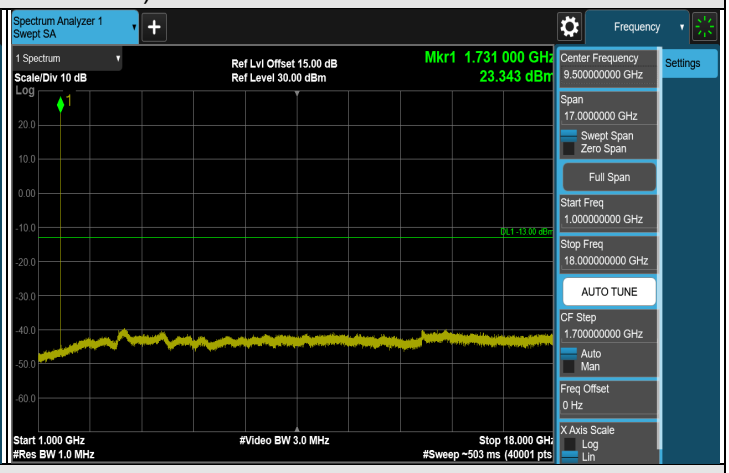
LTE Band 4, Channel Bandwidth: 3 MHz



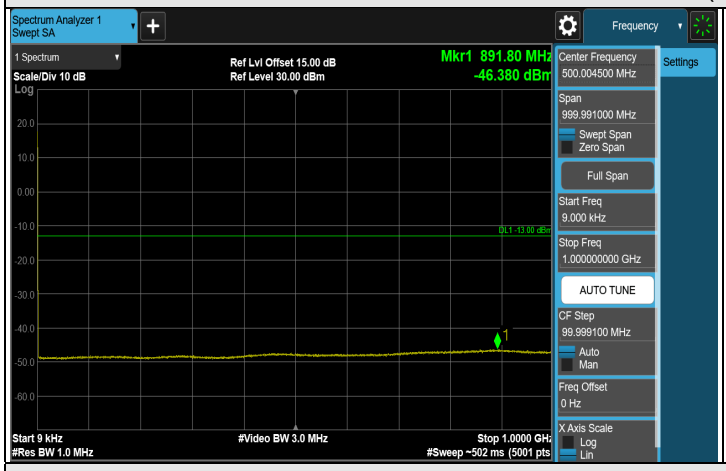


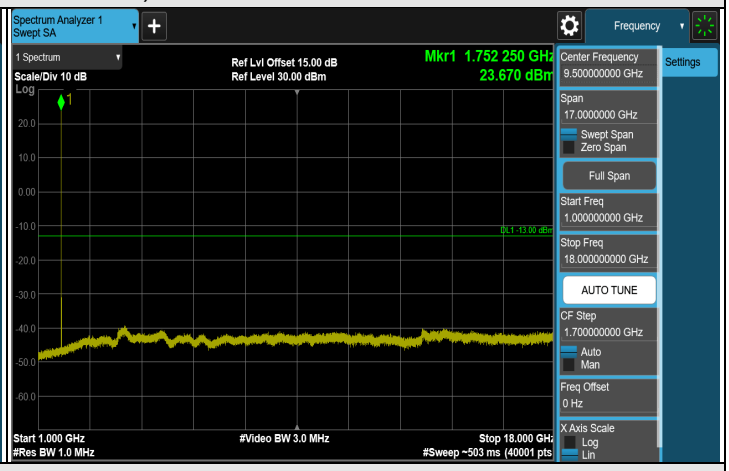
CH 19965 (1711.5 MHz)





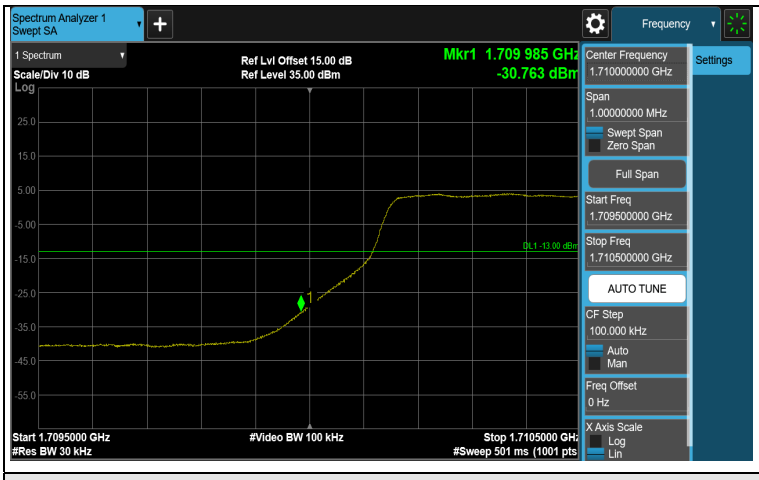
CH 20175 (1732.5 MHz)



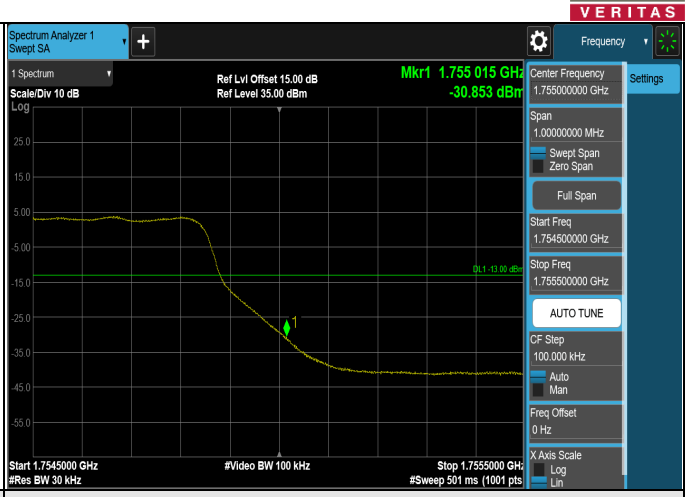


CH 20385 (1753.5 MHz)

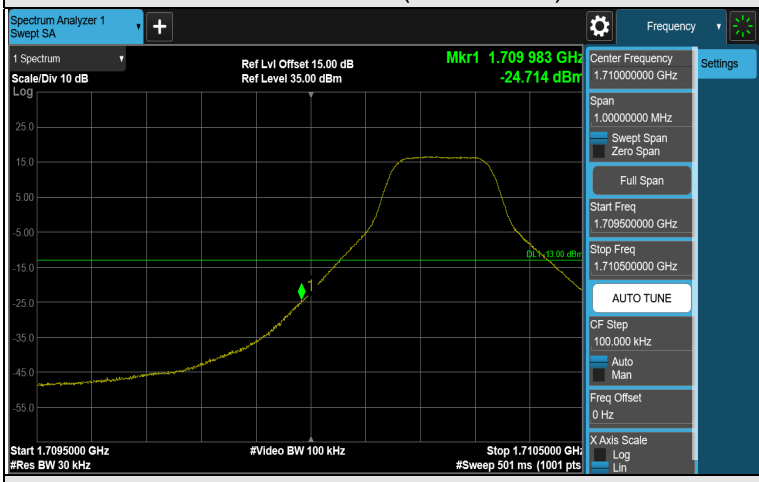
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



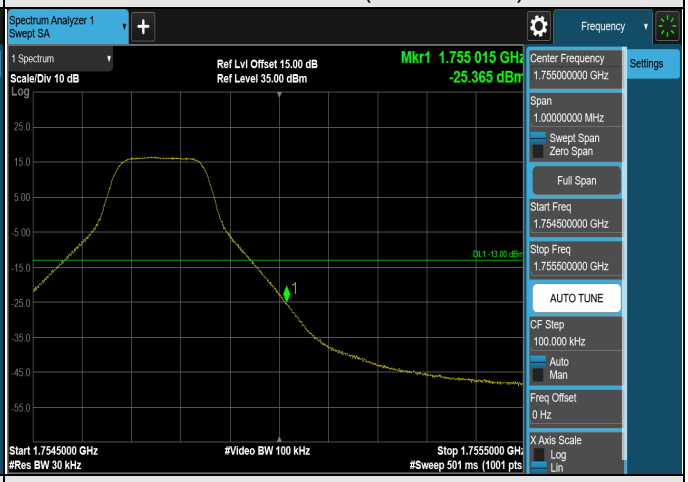
FULL CH 19965 (1711.5 MHz)



FULL CH 20385 (1753.5 MHz)

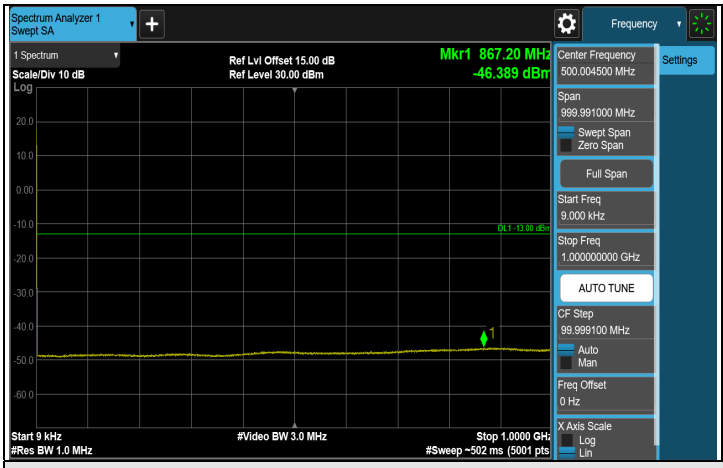


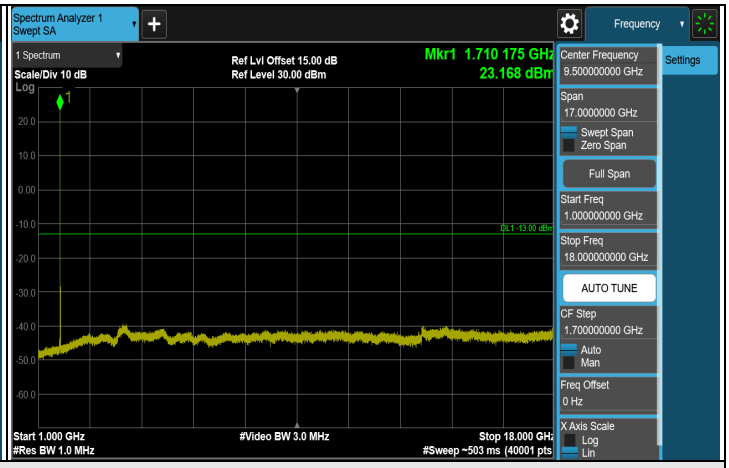
1RB CH 19965 (1711.5 MHz)



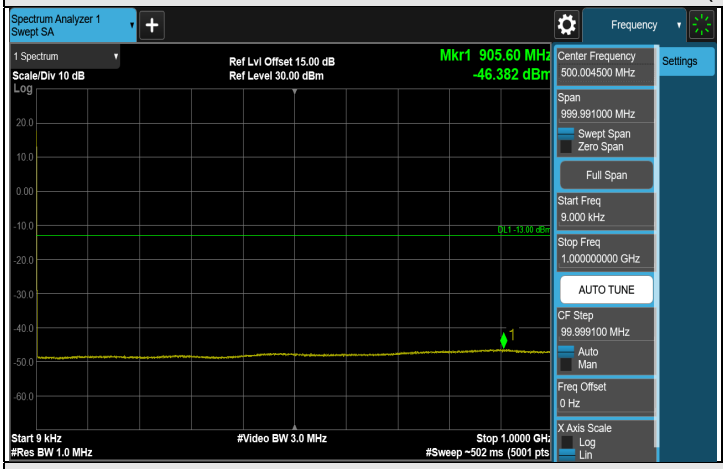
1RB CH 20385 (1753.5 MHz)

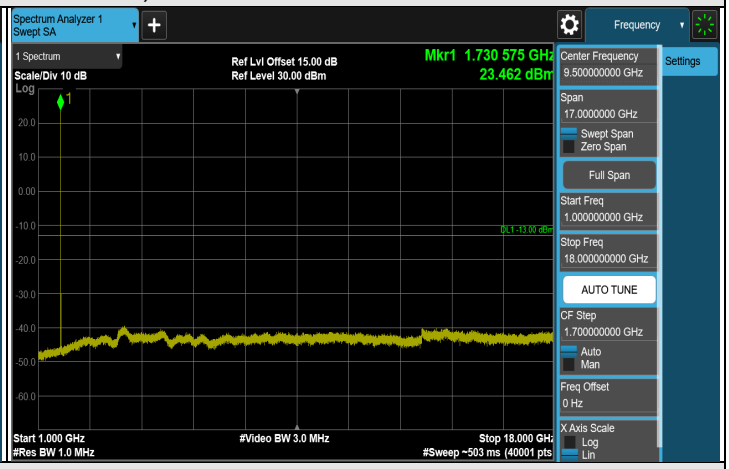
LTE Band 4, Channel Bandwidth: 5 MHz



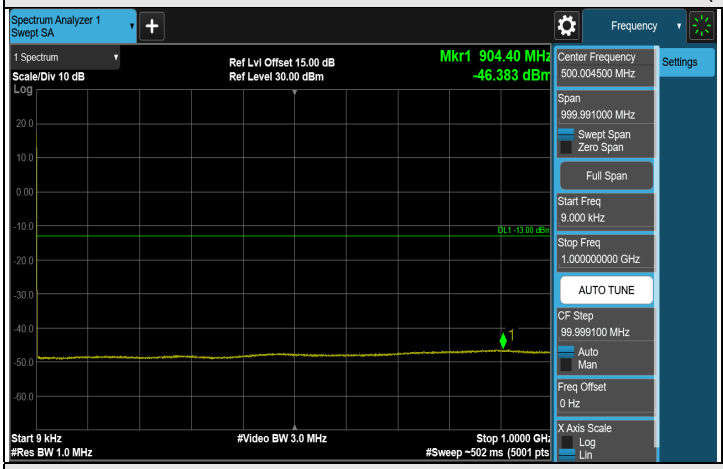


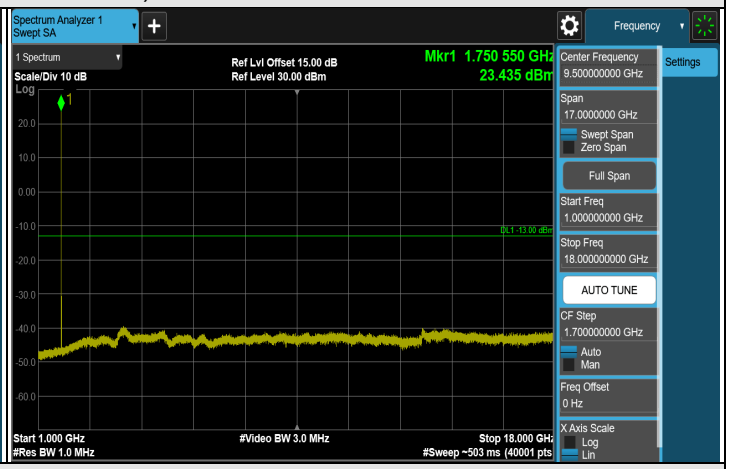
CH 19975 (1712.5 MHz)





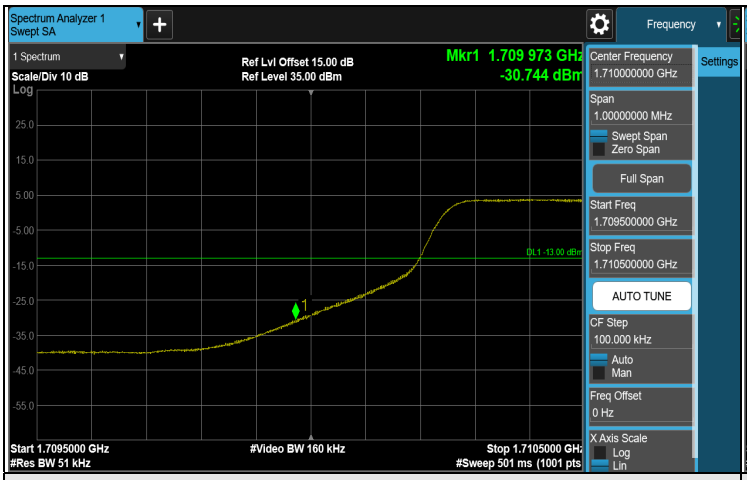
CH 20175 (1732.5 MHz)



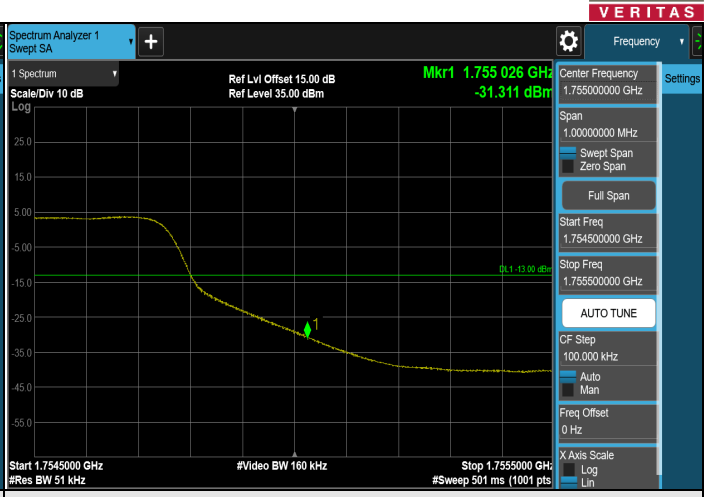


CH 20375 (1752.5 MHz)

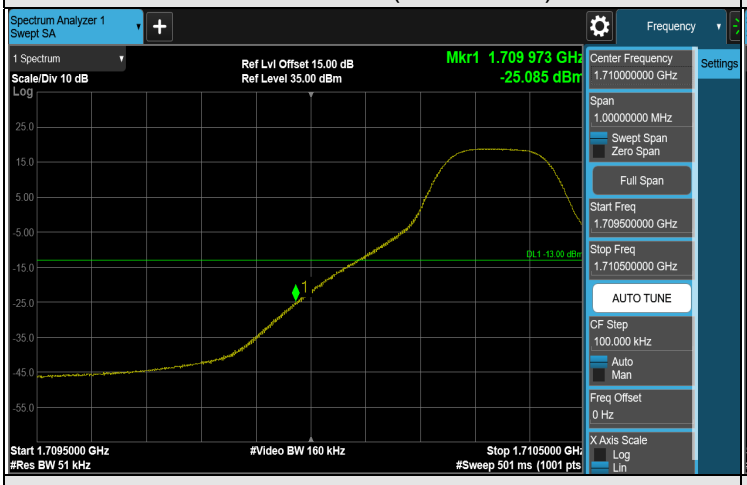
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



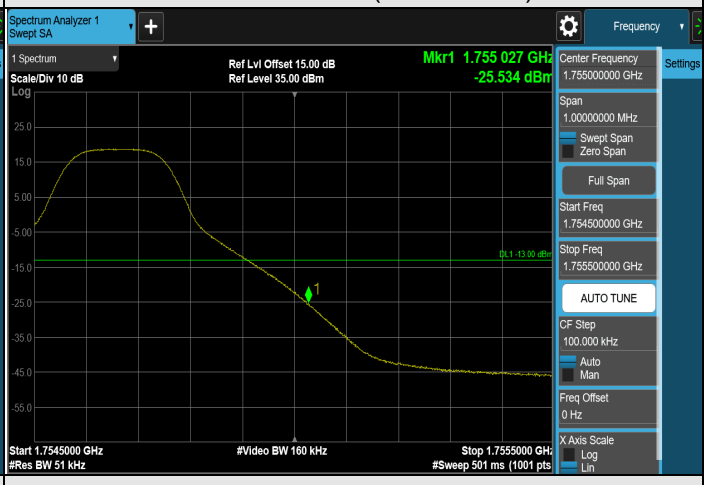
FULL CH 19975 (1712.5 MHz)



FULL CH 20375 (1752.5 MHz)

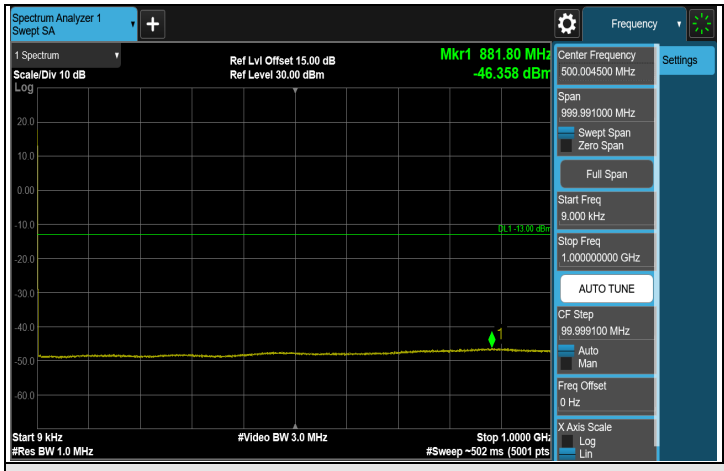


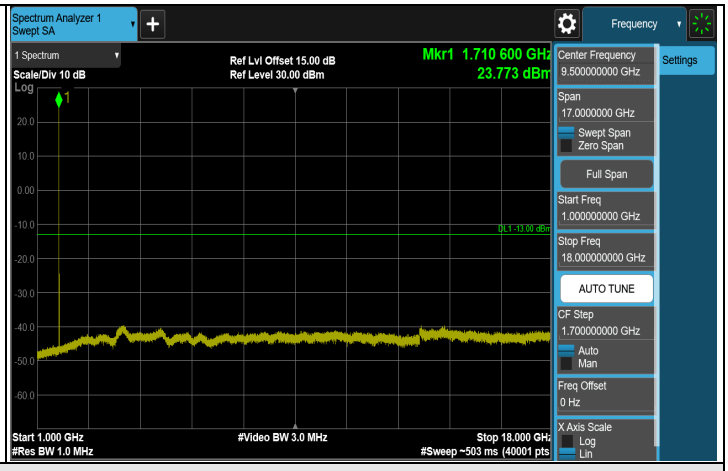
1RB CH 19975 (1712.5 MHz)



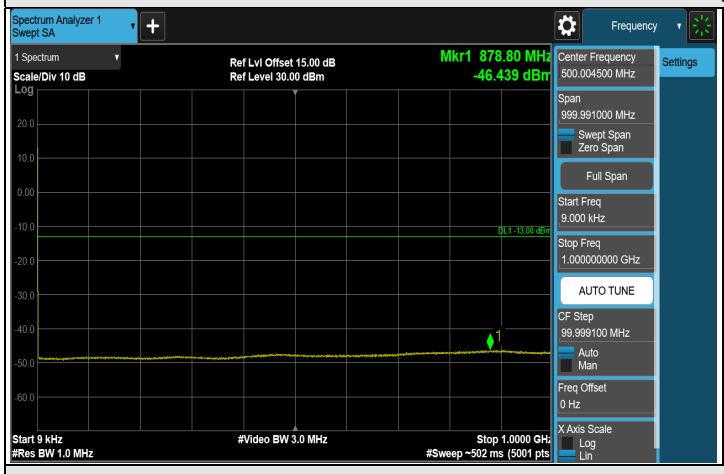
1RB CH 20375 (1752.5 MHz)

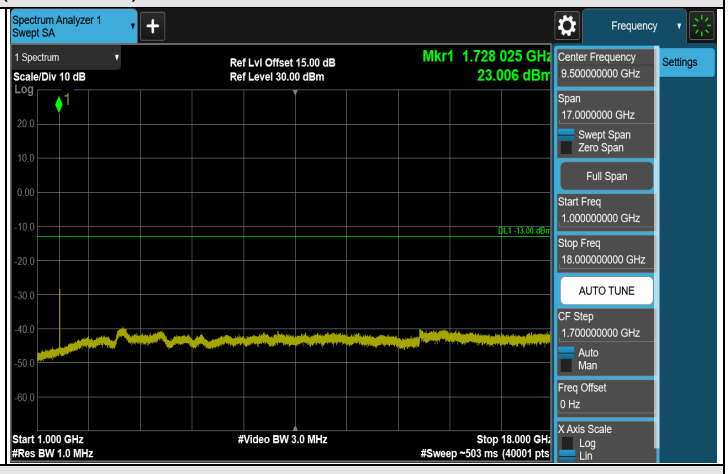
LTE Band 4, Channel Bandwidth: 10 MHz



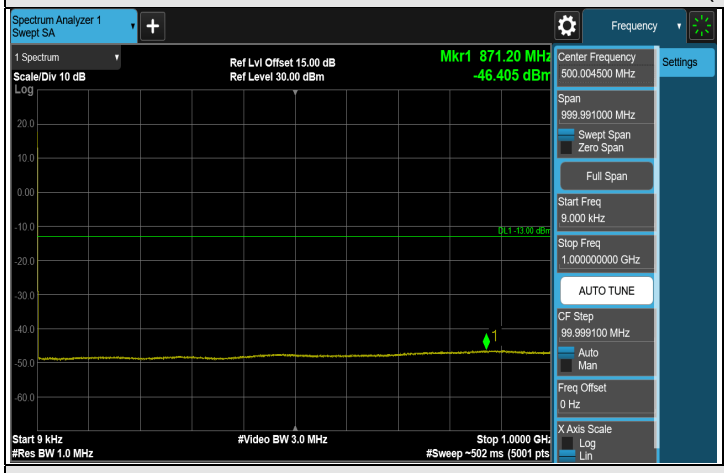


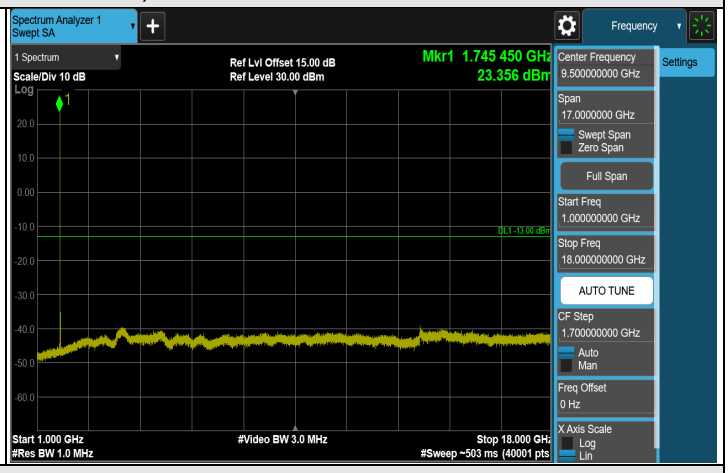
CH 20000 (1715 MHz)





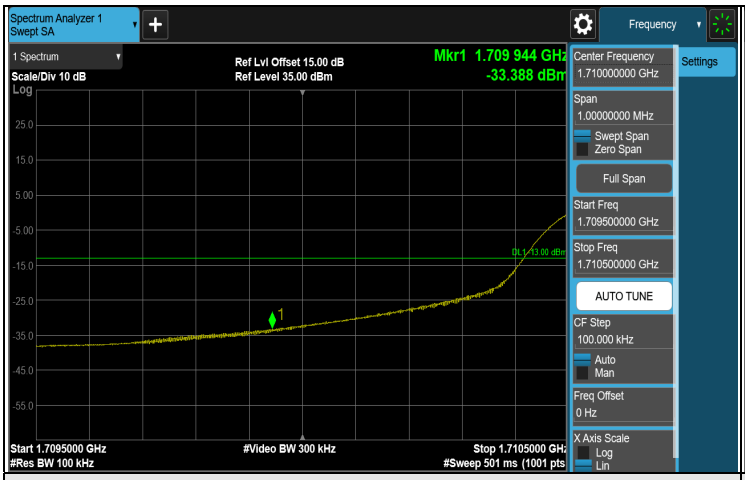
CH 20175 (1732.5 MHz)



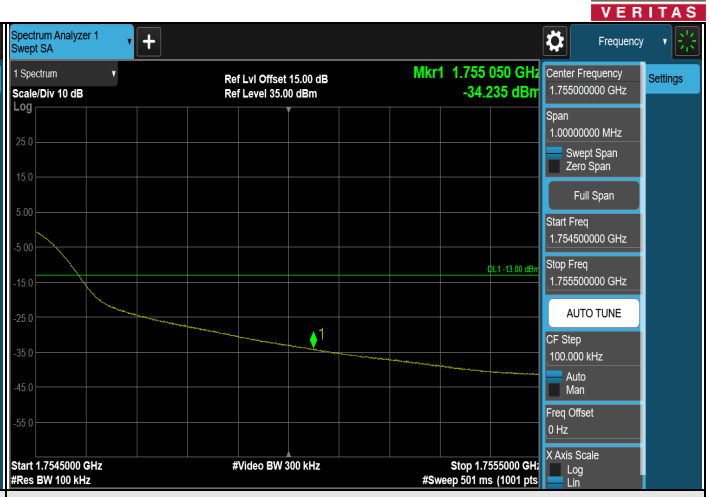


CH 20350 (1750 MHz)

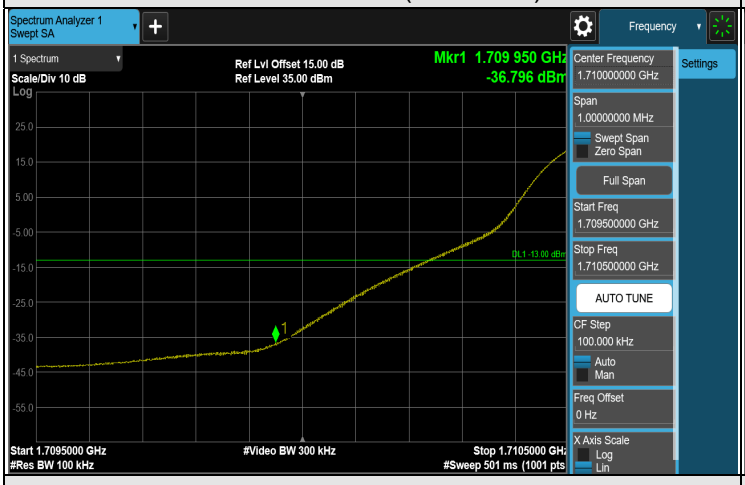
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



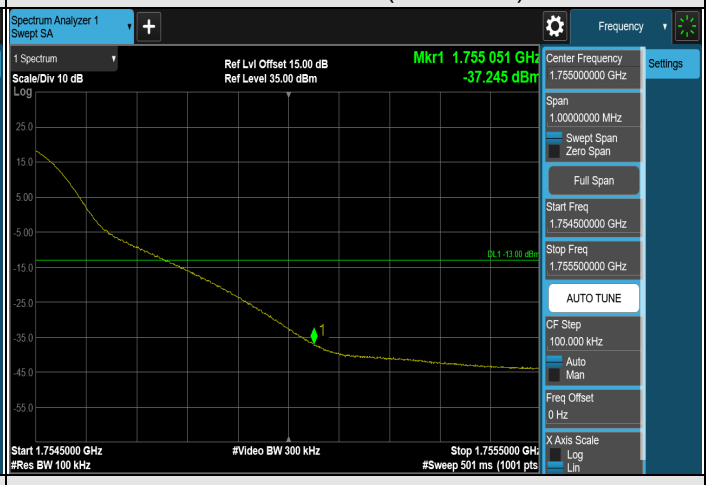
FULL CH 20000 (1715 MHz)



FULL CH 20350 (1750 MHz)

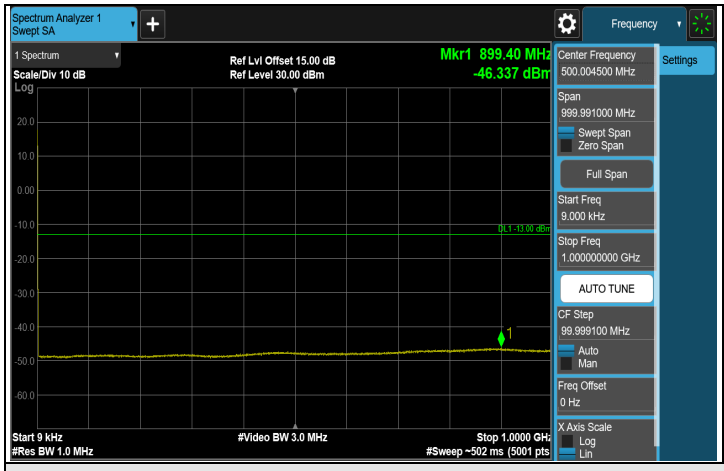


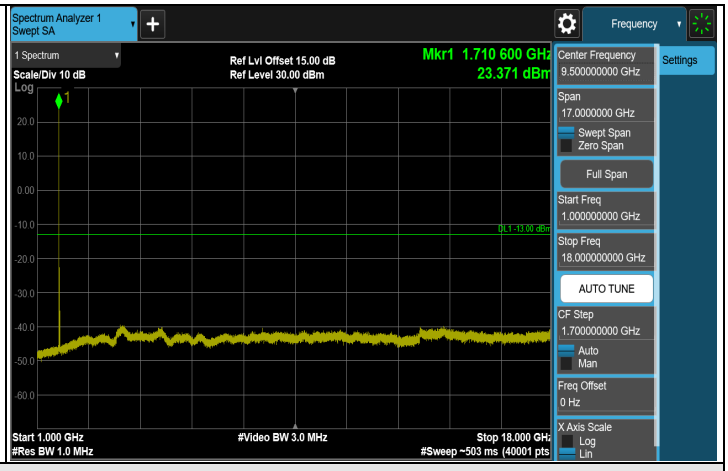
1RB CH 20000 (1715 MHz)



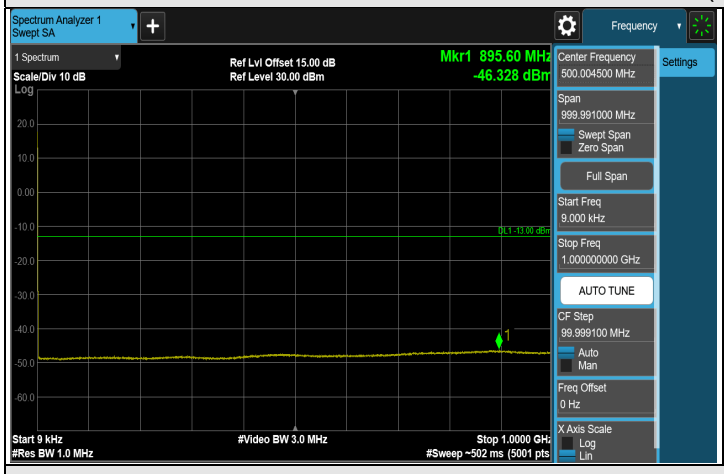
1RB CH 20350 (1750 MHz)

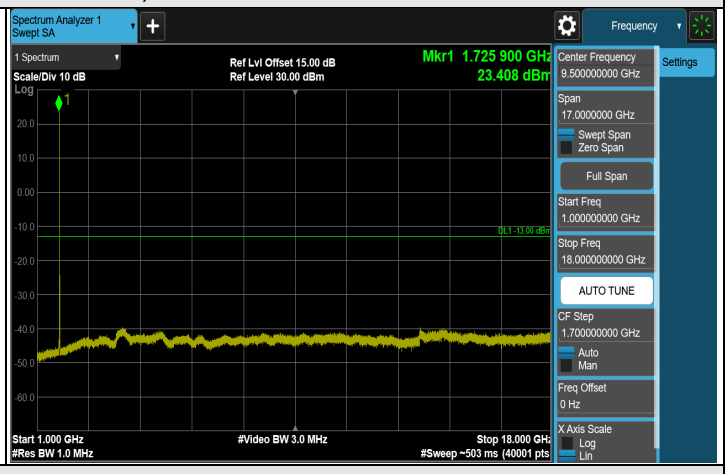
LTE Band 4, Channel Bandwidth: 15 MHz



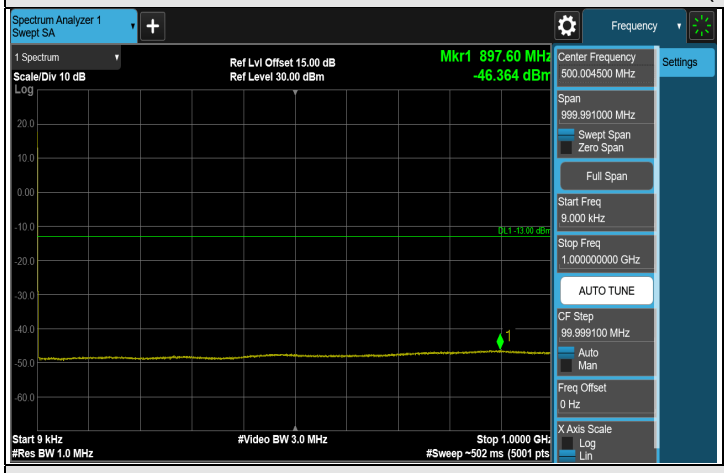


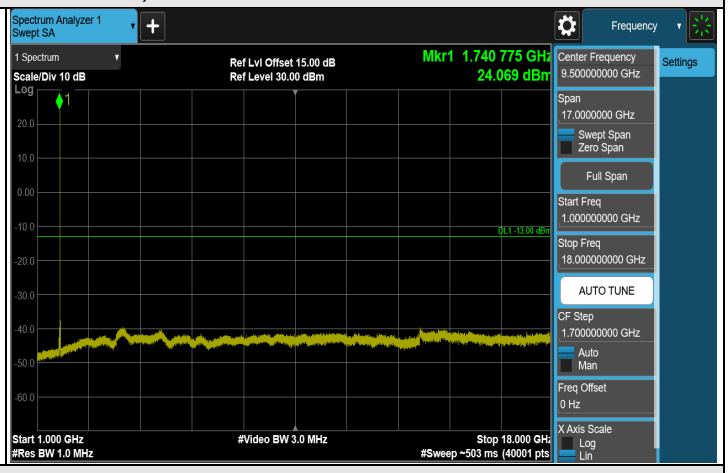
CH 20025 (1717.5 MHz)





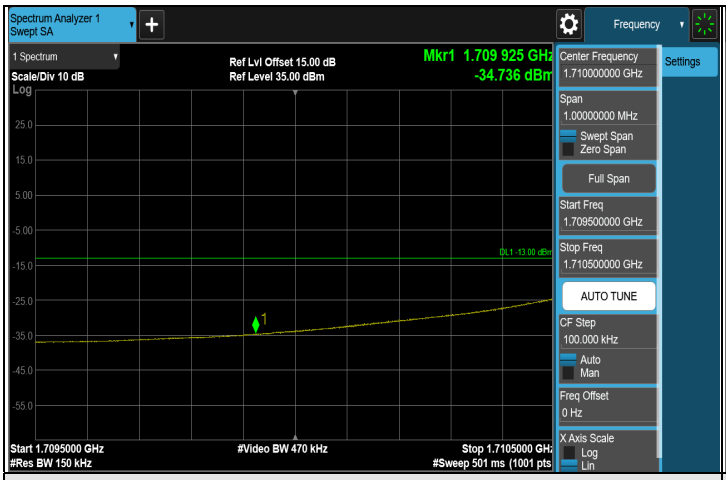
CH 20175 (1732.5 MHz)



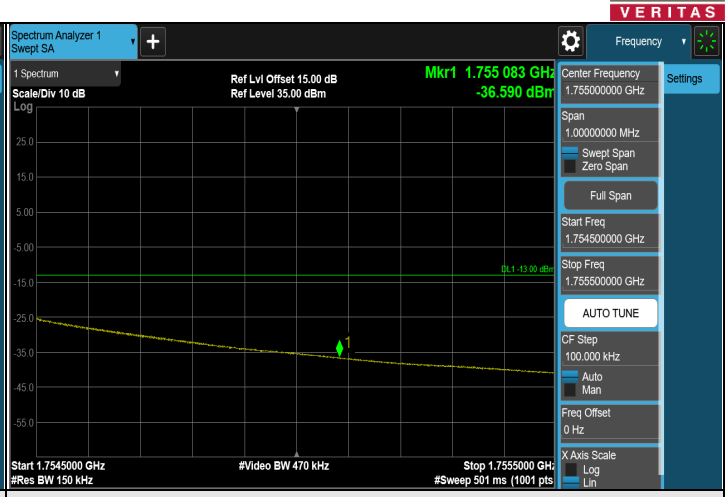


CH 20325 (1747.5 MHz)

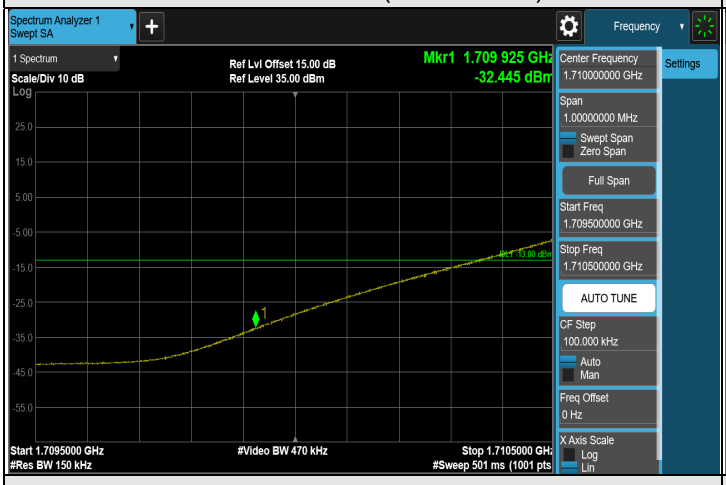
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



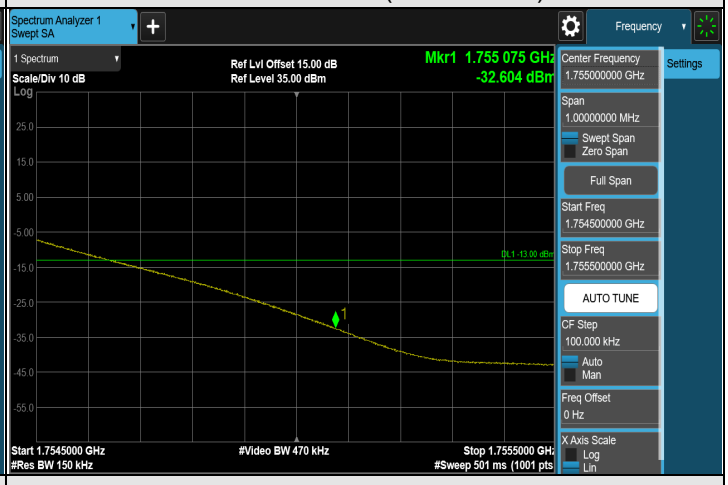
FULL CH 20025 (1717.5 MHz)



FULL CH 20325 (1747.5 MHz)

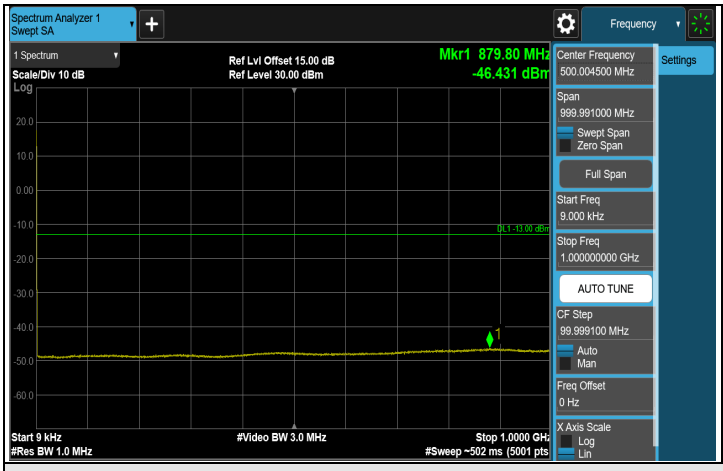


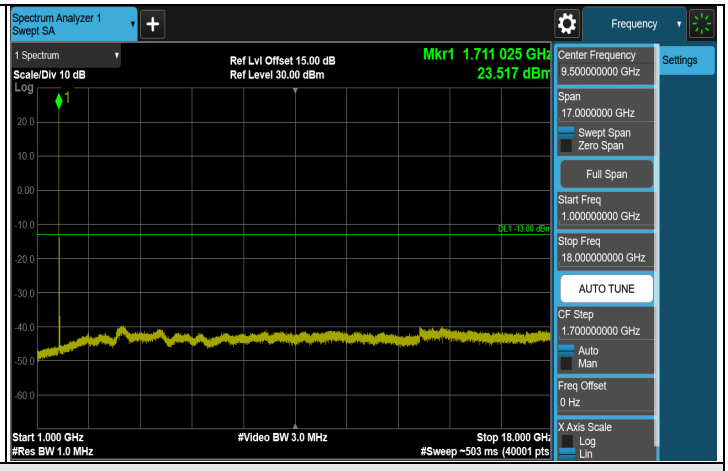
1RB CH 20025 (1717.5 MHz)



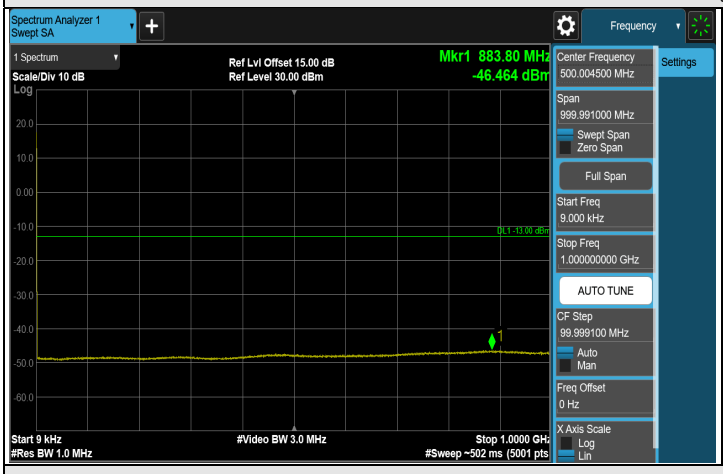
1RB CH 20325 (1747.5 MHz)

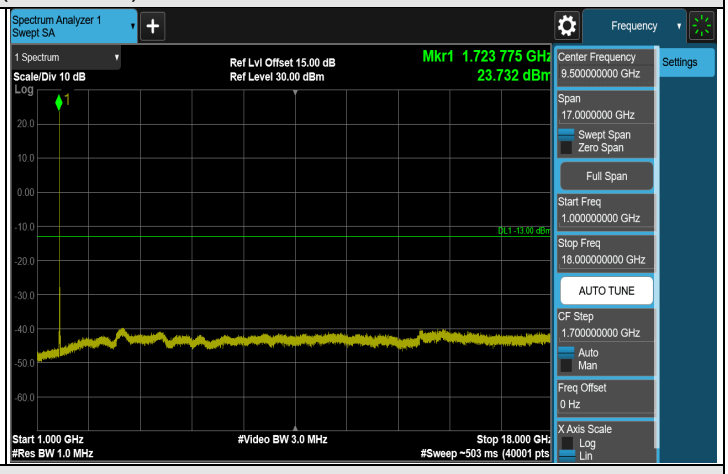
LTE Band 4, Channel Bandwidth: 20 MHz



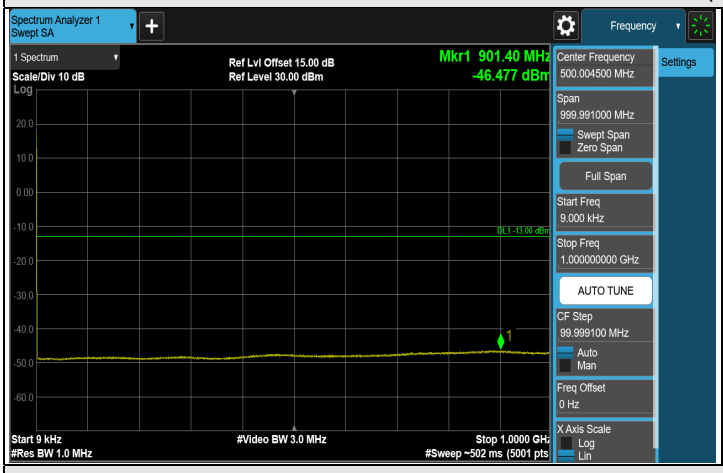


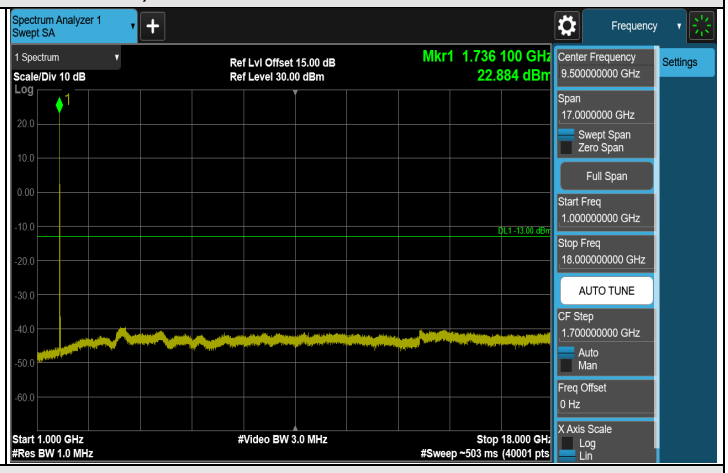
CH 20050 (1720 MHz)





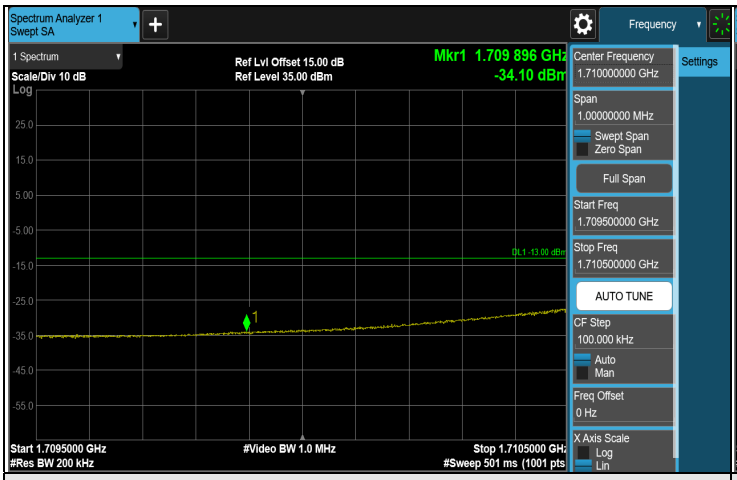
CH 20175 (1732.5 MHz)



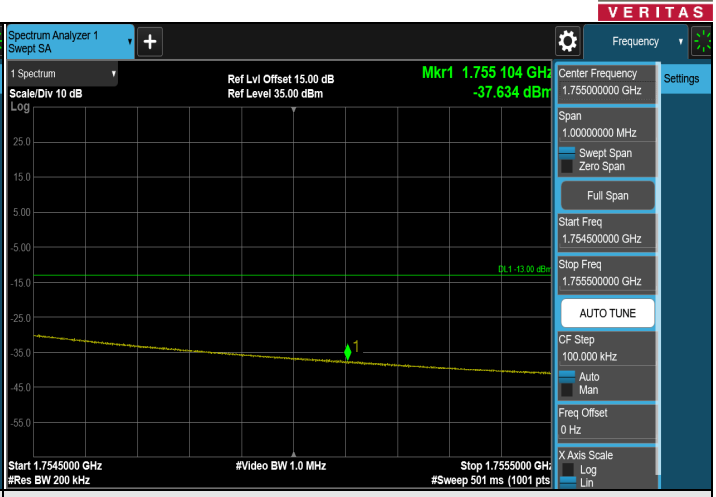


CH 20300 (1745 MHz)

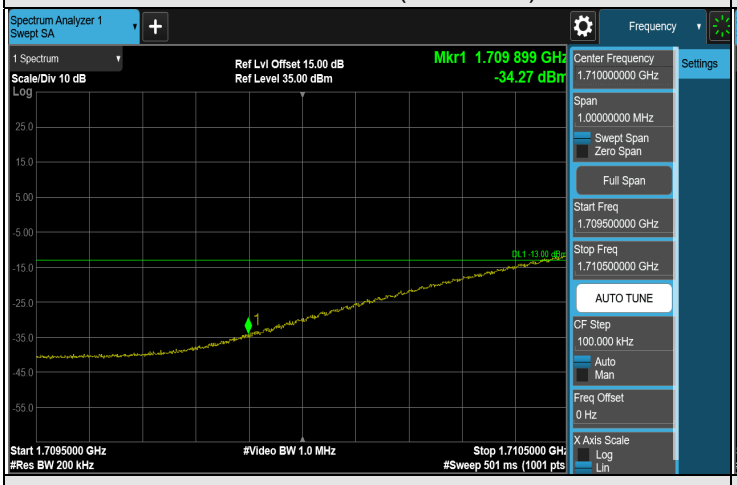
Note: The signal at 9 kHz is IF signal from spectrum analyzer.



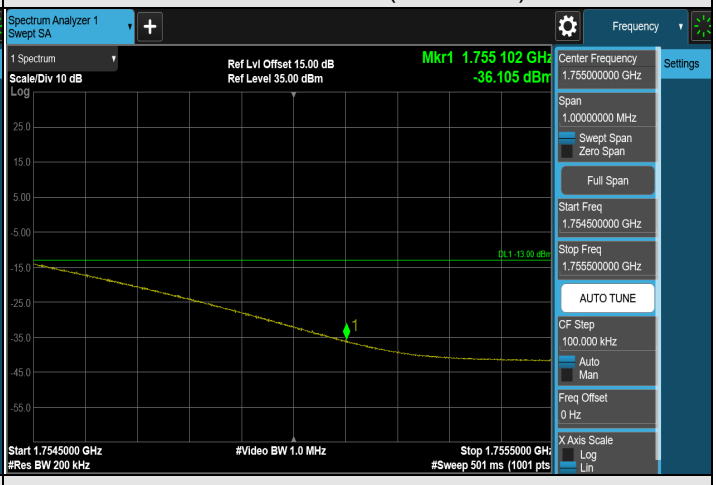
FULL CH 20050 (1720 MHz)



FULL CH 20300 (1745 MHz)



1RB CH 20050 (1720 MHz)



1RB CH 20300 (1745 MHz)