FCC Test Report
(Part 27 – WCDMA B4, LTE B4/B12/B13)

Report No.:	RFBDKX-WTW-P22120419-5
FCC ID:	2ATIO4
Test Model:	H4
Received Date:	Dec. 13, 2022
Test Date:	Jan. 10, 2023 ~ Feb. 07, 2023
Issued Date:	Mar. 31, 2023
Applicant:	Level Home Inc.
Address:	935 Main Street, Redwood City, California 94063, United States of America
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., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number (1):	788550 / TW0003
Test Location(2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number(2):	281270 / TW0032

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RFBDKX-WTW-P22120419-5	Original Release	Mar. 31, 2023

1 Certificate of Conformity

Product:	Home IOT Gateway
Brand:	Level
Test Model:	H4
Sample Status:	Engineering Sample
Applicant:	Level Home Inc.
Test Date:	Jan. 10, 2023 ~ Feb. 07, 2023
Standards:	FCC Part 27, Subpart C, H, F, L

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.

Prepared by : Vera Huang , **Date:** Mar. 31, 2023

Vera Huang / Specialist

Approved by : Jeremy Lin , **Date:** Mar. 31, 2023

Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2					
FCC Clause			Test Item	Result	Remarks
WCDMA B4 / LTE B4	LTE B12	LTE B13			
2.1046 27.50 (d)(4)	2.1046 27.50 (c)	2.1046 27.50 (b)	Equivalent Isotropically Radiated Power / Effective Radiated Power	Pass	Meet the requirement of limit.
2.1047	2.1047	2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
27.50 (d)(5)	----	----	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 27.54	2.1055 27.54	2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	Pass	Meet the requirement of limit.
2.1049	2.1049	2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53 (h)	2.1051 27.53 (g)	2.1051 27.53 (c)	Band Edge / Out of Band Emissions Measurements	Pass	Meet the requirement of limit.
2.1051 27.53 (h)	2.1051 27.53 (g)	2.1051 27.53 (c)(f)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53 (h)	2.1053 27.53 (g)	2.1053 27.53 (c)(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -10.92dB at 1569.00MHz.

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

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3 dB
	30MHz ~ 1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038B	MY60180018	Feb. 18, 2022	Feb. 17, 2023
Spectrum Analyzer KEYSIGHT	N9020B	MY60110513	Dec. 26, 2022	Dec. 25, 2023
BILOG Antenna SCHWARZBECK	VULB9168	9168-1214	Oct. 20, 2022	Oct. 19, 2023
HORN Antenna RF SPIN	DRH18-E	210101A18E	Nov. 13, 2022	Nov. 12, 2023
HORN Antenna SCHWARZBECK	BBHA 9170	9170-1048	Nov. 13, 2022	Nov. 12, 2023
Loop Antenna TESEQ	HLA 6121	45745	Jul. 27, 2022	Jul. 26, 2023
Preamplifier EMCI	EMC330N	980798	Jan. 17, 2022	Jan. 16, 2023
			Jan. 16, 2023	Jan. 15, 2024
Preamplifier EMCI	EMC 012645	980115	Oct. 01, 2022	Sep. 30, 2023
Preamplifier EMCI	EMC184045SE	980786	Jan. 17, 2022	Jan. 16, 2023
			Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMC104-SM-SM-(9000+3000+1000)	201244+ 201232+ 210103	Jan. 17, 2022	Jan. 16, 2023
			Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMCCFD400-NM-NM-(9000+300+500)	201251+ 201249+ 201248	Jan. 17, 2022	Jan. 16, 2023
			Jan. 16, 2023	Jan. 15, 2024
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201255	Jan. 17, 2022	Jan. 16, 2023
			Jan. 16, 2023	Jan. 15, 2024
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower Max-Full	MFA-515BSN	NA	NA	NA
Turn Table Max-Full	MFT-201SS	NA	NA	NA
Turn Table Controller Max-Full	MF-7802BS	MF780208676	NA	NA
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Mar. 03, 2022	Mar. 02, 2023
DC power supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2022	Jun. 22, 2023
Spectrum Analyzer KEYSIGHT	N9030B	MY57140953	Jul. 01, 2022	Jun. 30, 2023
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Dec. 27, 2022	Dec. 26, 2023
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 26, 2022	Dec. 25, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in WM Chamber 9.

3 General Information

3.1 General Description of EUT

Product	Home IOT Gateway	
Brand	Level	
Test Model	H4	
Sample Status	Engineering Sample	
Power Supply Rating	5 Vdc (From adapter) 3.6 Vdc (From battery)	
Modulation Type	WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM	
Operating Frequency	WCDMA Band 4	1712.4MHz ~ 1752.6MHz
	LTE Band 4 (Channel Bandwidth 1.4MHz)	1710.7MHz ~ 1754.3MHz
	LTE Band 4 (Channel Bandwidth 3MHz)	1711.5MHz ~ 1753.5MHz
	LTE Band 4 (Channel Bandwidth 5MHz)	1712.5MHz ~ 1752.5MHz
	LTE Band 4 (Channel Bandwidth 10MHz)	1715.0MHz ~ 1750.0MHz
	LTE Band 4 (Channel Bandwidth 15MHz)	1717.5MHz ~ 1747.5MHz
	LTE Band 4 (Channel Bandwidth 20MHz)	1720.0MHz ~ 1745.0MHz
	LTE Band 12 (Channel Bandwidth 1.4MHz)	699.7MHz ~ 715.3MHz
	LTE Band 12 (Channel Bandwidth 3MHz)	700.5MHz ~ 714.5MHz
	LTE Band 12 (Channel Bandwidth 5MHz)	701.5MHz ~ 713.5MHz
	LTE Band 12 (Channel Bandwidth 10MHz)	704.0MHz ~ 711.0MHz
	LTE Band 13 (Channel Bandwidth 5MHz)	779.5MHz ~ 784.5MHz
	LTE Band 13 (Channel Bandwidth 10MHz)	782.0MHz
Max. EIRP Power	WCDMA Band 4	217.270mW (23.37dBm)
	LTE Band 4 (Channel Bandwidth 1.4MHz)	223.872mW (23.50dBm)
	LTE Band 4 (Channel Bandwidth 3MHz)	218.273mW (23.39dBm)
	LTE Band 4 (Channel Bandwidth 5MHz)	222.844mW (23.48dBm)
	LTE Band 4 (Channel Bandwidth 10MHz)	219.786mW (23.42dBm)
	LTE Band 4 (Channel Bandwidth 15MHz)	222.844mW (23.48dBm)
	LTE Band 4 (Channel Bandwidth 20MHz)	224.905mW (23.52dBm)
Max. ERP Power	LTE Band 12 (Channel Bandwidth 1.4MHz)	80.168mW (19.04dBm)
	LTE Band 12 (Channel Bandwidth 3MHz)	83.560mW (19.22dBm)
	LTE Band 12 (Channel Bandwidth 5MHz)	83.368mW (19.21dBm)
	LTE Band 12 (Channel Bandwidth 10MHz)	84.333mW (19.26dBm)
	LTE Band 13 (Channel Bandwidth 5MHz)	135.519mW (21.32dBm)
	LTE Band 13 (Channel Bandwidth 10MHz)	136.773mW (21.36dBm)

Emission Designator	WCDMA Band 4	4M14F9W
	LTE Band 4 (Channel Bandwidth 1.4MHz)	1M09G7D
	LTE Band 4 (Channel Bandwidth 3MHz)	2M70D7W
	LTE Band 4 (Channel Bandwidth 5MHz)	4M50G7D
	LTE Band 4 (Channel Bandwidth 10MHz)	8M96G7D
	LTE Band 4 (Channel Bandwidth 15MHz)	13M5G7D
	LTE Band 4 (Channel Bandwidth 20MHz)	17M9G7D
	LTE Band 12 (Channel Bandwidth 1.4MHz)	1M09G7D
	LTE Band 12 (Channel Bandwidth 3MHz)	2M70G7D
	LTE Band 12 (Channel Bandwidth 5MHz)	4M50G7D
	LTE Band 12 (Channel Bandwidth 10MHz)	8M96G7D
	LTE Band 13 (Channel Bandwidth 5MHz)	4M50G7D
	LTE Band 13 (Channel Bandwidth 10MHz)	8M95G7D
Antenna Type	Refer to note	
Accessory Device	Refer to note	
Cable Supplied	Refer to note	

Note:

1. The antenna information is listed as below.

Antenna Type	Antenna Gain (dBi)			
	WCDMA B4	LTE B4	LTE B12	LTE B13
PIFA	0.95	0.95	-2.13	0.05

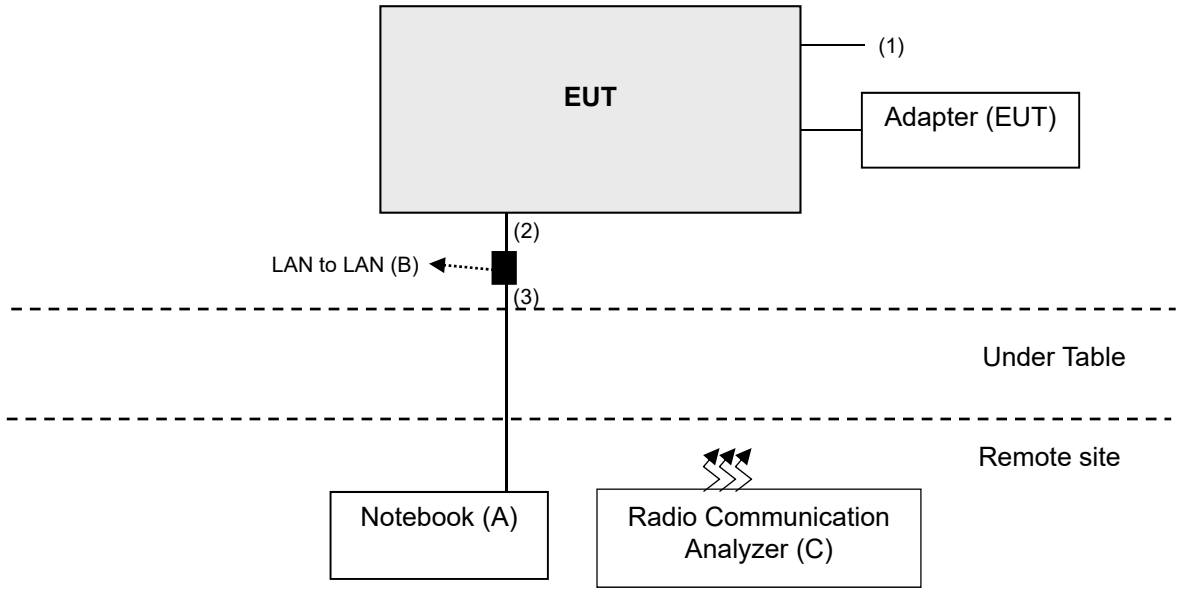
* Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

2. The EUT contains following accessory devices.

Battery	Brand	Grand-Pro
	Model	INR18650
	Power Rating	3.6Vdc, 3350mAh, 12.06Wh
AC Adapter	Brand	TENPO
	Model	S024AMP0500350
	AC Input	100-240Vac, 50/60Hz, 0.6A
	DC Output	5.0Vdc, 3.5A, 17.5W
	DC Output Cable	Non-shielded without cord, 1.0m
	AC Cable	Non-shielded without cord, 1.0m
Lan Cable	Signal Line	Non-shielded without cord, 1.0m

3. For WWAN 16QAM modulation bandwidths ≥ 10MHz, EUT only supports up to 25RB.
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 Configuration of System under Test



3.2.1 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	Lenovo	20J4 MD A003TW	PF-11H9AK	N/A	Provided by Lab
B	LAN to LAN	N/A	N/A	N/A	N/A	Provided by Lab
C	Radio Communication Analyzer	Anritsu	MT8820C	6201010284	N/A	Provided by Lab

Note: Item C acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Micro USB	1	1	N	0	Provided by Lab
2.	RJ45	1	1	N	0	Provided by client
3.	RJ45	1	6	N	0	Provided by Lab

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, and antenna ports. The EUT is designed to be positioned on the X-plane only.

WCDMA Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	1312 to 1513	1312 (1712.4MHz), 1413 (1732.6MHz), 1513 (1752.6MHz)	WCDMA, HSDPA, HSUPA
-	Modulation Characteristics	1312 to 1513	1413 (1732.6MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	1312 to 1513	1312 (1712.4MHz), 1513 (1752.6MHz)	WCDMA
-	Occupied Bandwidth	1312 to 1513	1312 (1712.4MHz), 1413 (1732.6MHz), 1513 (1752.6MHz)	WCDMA, HSDPA, HSUPA
-	Band Edge	1312 to 1513	1312 (1712.4MHz), 1513 (1752.6MHz)	WCDMA, HSDPA, HSUPA
-	Peak To Average Ratio	1312 to 1513	1312 (1712.4MHz), 1413 (1732.6MHz), 1513 (1752.6MHz)	WCDMA, HSDPA, HSUPA
-	Conducted Emission	1312 to 1513	1312 (1712.4MHz), 1413 (1732.6MHz), 1513 (1752.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission Below 1GHz	1312 to 1513	1513 (1752.6MHz)	WCDMA
-	Radiated Emission Above 1GHz	1312 to 1513	1312 (1712.4MHz), 1413 (1732.6MHz), 1513 (1752.6MHz)	WCDMA

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

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	1 Half Full
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	1 Half Full
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	1 Half Full
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	1 Half Full
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	1 Half Full
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	1 Half Full
-	Modulation Characteristics	20050 to 20300	20175 (1732.5MHz)	20MHz	QPSK / 16QAM	Full
-	Frequency Stability	19957 to 20393	19957 (1710.7MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	Full
		19965 to 20385	19965 (1711.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	Full
		19975 to 20375	19975 (1712.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	Full
		20000 to 20350	20000 (1715.0MHz), 20350 (1750.0MHz)	10MHz	QPSK	Full
		20025 to 20325	20025 (1717.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	Full
		20050 to 20300	20050 (1720.0MHz), 20300 (1745.0MHz)	20MHz	QPSK	Full

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Emission Bandwidth	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	Full
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	Full
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	Full
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	Full
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	Full
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	Full
-	Band Edge	19957 to 20393	19957 (1710.7MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1 Half Full
		19965 to 20385	19965 (1711.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	1 Half Full
		19975 to 20375	19975 (1712.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1 Half Full
		20000 to 20350	20000 (1715.0MHz), 20350 (1750.0MHz)	10MHz	QPSK	1 Half Full
		20025 to 20325	20025 (1717.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	1 Half Full
		20050 to 20300	20050 (1720.0MHz), 20300 (1745.0MHz)	20MHz	QPSK	1 Half Full

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Peak To Average Ratio	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK / 16QAM	1
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK / 16QAM	1
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK / 16QAM	1
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK / 16QAM	1
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK / 16QAM	1
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK / 16QAM	1
-	Conducted Emission	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1
		19965 to 20385	19965 (1711.5MHz), 20175 (1732.5MHz), 20385 (1753.5MHz)	3MHz	QPSK	1
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1
		20000 to 20350	20000 (1715.0MHz), 20175 (1732.5MHz), 20350 (1750.0MHz)	10MHz	QPSK	1
		20025 to 20325	20025 (1717.5MHz), 20175 (1732.5MHz), 20325 (1747.5MHz)	15MHz	QPSK	1
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK	1

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	20050 to 20300	20175 (1732.5MHz)	20MHz	QPSK	1
-	Radiated Emission Above 1GHz	19957 to 20393	19957 (1710.7MHz), 20175 (1732.5MHz), 20393 (1754.3MHz)	1.4MHz	QPSK	1
		19975 to 20375	19975 (1712.5MHz), 20175 (1732.5MHz), 20375 (1752.5MHz)	5MHz	QPSK	1
		20050 to 20300	20050 (1720.0MHz), 20175 (1732.5MHz), 20300 (1745.0MHz)	20MHz	QPSK	1

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 12

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	1 Half Full
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	1 Half Full
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	1 Half Full
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0 MHz)	10MHz	QPSK / 16QAM	1 Half Full
-	Modulation Characteristics	23060 to 23130	23095 (707.5MHz)	10MHz	QPSK / 16QAM	Full
-	Frequency Stability	23017 to 23173	23017 (699.7MHz), 23173 (715.3MHz)	1.4MHz	QPSK	Full
		23025 to 23165	23025 (700.5MHz), 23165 (714.5MHz)	3MHz	QPSK	Full
		23035 to 23155	23035 (701.5MHz), 23155 (713.5MHz)	5MHz	QPSK	Full
		23060 to 23130	23060 (704.0MHz), 23130 (711.0MHz)	10MHz	QPSK	Full
-	Emission Bandwidth	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	Full
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	Full
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	Full
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK / 16QAM	Full

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	23017 to 23173	23017 (699.7MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1 Half Full
		23025 to 23165	23025 (700.5MHz), 23165 (714.5MHz)	3MHz	QPSK	1 Half Full
		23035 to 23155	23035 (701.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1 Half Full
		23060 to 23130	23060 (704.0MHz), 23130 (711.0MHz)	10MHz	QPSK	1 Half Full
-	Peak to Average Ratio	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK / 16QAM	1
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK / 16QAM	1
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK / 16QAM	1
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK / 16QAM	1
-	Conducted Emission	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1
		23025 to 23165	23025 (700.5MHz), 23095 (707.5MHz), 23165 (714.5MHz)	3MHz	QPSK	1
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK	1

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	23035 to 23155	23035 (701.5MHz)	5MHz	QPSK	1
-	Radiated Emission Above 1GHz	23017 to 23173	23017 (699.7MHz), 23095 (707.5MHz), 23173 (715.3MHz)	1.4MHz	QPSK	1
		23035 to 23155	23035 (701.5MHz), 23095 (707.5MHz), 23155 (713.5MHz)	5MHz	QPSK	1
		23060 to 23130	23060 (704.0MHz), 23095 (707.5MHz), 23130 (711.0MHz)	10MHz	QPSK	1

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 13

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	1 Half Full
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	1 Half Full
-	Modulation Characteristics	23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	Full
-	Frequency Stability	23205 to 23255	23205 (779.5MHz), 23255 (784.5MHz)	5MHz	QPSK	Full
		23230	23230 (782.0MHz),	10MHz	QPSK	Full
-	Emission Bandwidth	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	Full
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	Full
-	Band Edge	23205 to 23255	23205 (779.5MHz), 23255 (784.5MHz)	5MHz	QPSK	1 Half Full
		23230	23230 (782.0MHz)	10MHz	QPSK	1 Half Full
-	Peak to Average Ratio	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK / 16QAM	1
		23230	23230 (782.0MHz)	10MHz	QPSK / 16QAM	1
-	Conducted Emission	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Below 1GHz	23205 to 23255	23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	23205 to 23255	23205 (779.5MHz), 23230 (782.0MHz), 23255 (784.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230 (782.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK and 16QAM modes, the other test items were performed under worse mode according to the maximum output power.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP / ERP	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Modulation Characteristics	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Frequency Stability	25deg. C, 60%RH	3.6Vdc	Willy Cheng
Occupied Bandwidth	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Band Edge	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Peak To Average Ratio	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Conducted Emission	25deg. C, 60%RH	120Vac, 60Hz	Willy Cheng
Radiated Emission	23deg. C, 67%RH 25deg. C, 70%RH 25deg. C, 70%RH	120Vac, 60Hz	Adair Peng Noah Chang Edison Lee

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and References

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

For WCDMA Band 4, LTE Band 4:
Mobile / Portable station are limited to 1 watts e.i.r.p.

For LTE Band 12:
Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.
Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

For LTE Band 13:
Control stations and mobile stations in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands 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.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with WCDMA, LTE link data modulation and link up with simulator. The average (rms) 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.

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

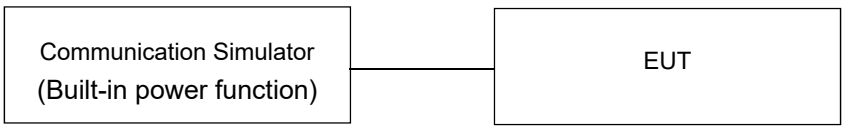
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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)

4.1.3 Test Setup

Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA IV		
TX Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	22.41	22.31	22.42
HSDPA	22.08	22.10	22.21
HSUPA	21.78	21.68	21.75

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	22.26	22.57	22.40
		1	50	22.32	22.51	22.46
		1	99	22.19	22.38	22.22
		50	0	22.24	22.26	22.26
		50	25	22.24	22.07	22.07
		50	50	22.17	22.25	22.25
		100	0	21.15	21.18	21.18
20M	16QAM	1	0	21.37	21.39	21.39
		1	50	21.12	21.32	21.32
		1	99	21.32	21.02	21.02
		25	0	20.24	20.46	20.35
		25	12	20.30	20.39	20.34
		25	25	20.30	20.22	20.29
		100	0	-	-	-

LTE Band 4						
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	22.03	22.26	22.49
		1	37	22.07	22.47	22.53
		1	74	22.12	22.10	22.30
		36	0	22.15	22.25	22.09
		36	19	22.08	22.13	22.33
		36	39	22.05	22.27	22.37
		75	0	21.01	21.04	21.30
15M	16QAM	1	0	21.32	21.13	21.24
		1	37	21.19	20.98	21.22
		1	74	21.30	21.15	20.97
		25	0	20.47	20.31	20.36
		25	12	20.36	20.27	20.22
		25	25	20.43	20.18	20.33
		75	0	-	-	-

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	22.08	22.19	22.46
		1	24	22.25	22.38	22.47
		1	49	22.08	22.14	22.34
		25	0	22.21	22.26	22.13
		25	12	22.16	22.08	22.35
		25	25	22.07	22.20	22.21
		50	0	21.08	21.11	21.36
10M	16QAM	1	0	21.45	21.13	21.32
		1	24	21.08	20.89	21.09
		1	49	21.21	21.11	21.20
		25	0	21.24	21.12	21.33
		25	12	21.30	21.33	21.20
		25	25	21.14	21.56	21.33
		50	0	-	-	-

LTE Band 4						
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	22.06	22.21	22.34
		1	12	21.97	22.23	22.53
		1	24	22.02	22.19	22.14
		12	0	21.98	22.34	22.26
		12	6	22.27	22.21	22.31
		12	13	22.04	22.38	22.21
		25	0	20.97	21.21	21.39
5M	16QAM	1	0	21.25	21.26	21.45
		1	12	21.20	20.94	21.13
		1	24	21.24	21.19	21.02
		12	0	21.15	21.10	21.27
		12	6	21.16	21.41	21.15
		12	13	21.22	21.56	21.22
		25	0	19.75	20.04	20.18

LTE Band 4						
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	22.11	22.34	22.33
		1	7	22.09	22.41	22.44
		1	14	21.96	22.20	22.15
		8	0	21.95	22.34	22.33
		8	3	22.29	22.06	22.33
		8	7	22.06	22.31	22.36
		15	0	21.11	21.24	21.17
3M	16QAM	1	0	21.35	21.21	21.26
		1	7	21.04	20.88	21.21
		1	14	21.23	21.01	21.10
		8	0	21.06	21.08	21.20
		8	3	21.30	21.16	21.19
		8	7	21.11	21.57	21.27
		15	0	19.90	20.13	20.17

LTE Band 4						
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	22.07	22.24	22.46
		1	2	22.13	22.37	22.55
		1	5	22.05	22.13	22.28
		3	0	22.11	22.23	22.20
		3	1	22.23	22.19	22.23
		3	3	22.18	22.25	22.25
		6	0	21.03	21.14	21.26
1.4M	16QAM	1	0	21.33	21.21	21.39
		1	2	21.17	21.04	21.23
		1	5	21.20	21.06	21.10
		3	0	21.19	21.24	21.29
		3	1	21.29	21.32	21.27
		3	3	21.12	21.47	21.23
		6	0	19.91	20.07	20.22

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	23.25	23.54	23.19
		1	24	23.16	23.06	23.47
		1	49	23.19	23.08	22.83
		25	0	23.38	23.50	22.04
		25	12	22.06	23.22	23.09
		25	25	23.08	23.42	23.27
		50	0	22.22	22.37	21.72
10M	16QAM	1	0	22.26	22.44	22.72
		1	24	22.77	22.43	22.42
		1	49	22.31	22.09	21.93
		25	0	22.28	22.11	22.49
		25	12	22.40	22.43	22.30
		25	25	22.34	22.34	22.27
		50	0	-	-	-

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	23.47	23.49	23.26
		1	12	23.29	23.07	23.25
		1	24	23.15	23.16	23.00
		12	0	23.37	23.47	22.24
		12	6	22.23	23.11	23.29
		12	13	23.14	23.34	23.28
		25	0	22.26	22.33	21.81
5M	16QAM	1	0	22.43	22.22	22.67
		1	12	22.58	22.21	22.31
		1	24	22.36	22.25	22.05
		12	0	22.20	22.09	22.52
		12	6	22.50	22.24	22.39
		12	13	22.35	22.15	22.13
		25	0	21.38	21.16	21.28

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	23.32	23.50	23.30
		1	7	23.43	23.30	23.27
		1	14	23.16	23.01	23.04
		8	0	23.41	23.32	22.39
		8	3	22.14	23.26	23.27
		8	7	23.19	23.41	22.92
		15	0	22.04	22.22	22.23
3M	16QAM	1	0	22.41	22.37	22.62
		1	7	22.47	22.12	22.49
		1	14	22.17	22.20	22.09
		8	0	22.17	22.13	22.36
		8	3	22.79	22.20	22.42
		8	7	22.35	22.19	22.24
		15	0	21.54	21.20	21.26

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	23.26	23.32	23.17
		1	2	23.22	23.28	23.06
		1	5	23.23	23.22	23.22
		3	0	23.26	23.30	22.18
		3	1	22.21	23.28	23.23
		3	3	23.25	23.29	23.10
		6	0	22.22	22.21	22.00
1.4M	16QAM	1	0	22.47	22.36	22.54
		1	2	22.46	22.32	22.27
		1	5	22.30	22.26	22.05
		3	0	22.34	22.28	22.45
		3	1	22.56	22.38	22.44
		3	3	22.53	22.36	22.18
		6	0	21.34	21.21	21.38

LTE Band 13				
BW	MCS Index	RB Size	RB Offset	Low
		Channel		23230
		Frequency (MHz)		782
10M	QPSK	1	0	23.46
		1	24	23.22
		1	49	23.32
		25	0	22.85
		25	12	22.52
		25	25	22.5
		50	0	22.41
10M	16QAM	1	0	22.32
		1	24	22.56
		1	49	21.94
		25	0	21.22
		25	12	21.34
		25	25	21.35
		50	0	-

LTE Band 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	23.42	23.32	23.21
		1	12	23.38	23.38	23.41
		1	24	23.24	23.33	23.16
		12	0	22.69	22.49	22.49
		12	6	22.57	22.42	22.45
		12	13	22.31	22.24	22.02
		25	0	22.41	22.34	22.31
5M	16QAM	1	0	22.22	22.40	22.55
		1	12	22.55	22.33	22.13
		1	24	22.13	22.13	22.26
		12	0	21.37	21.45	21.51
		12	6	21.32	21.42	21.61
		12	13	21.38	21.33	21.36
		25	0	21.41	21.54	21.45

EIRP / ERP Power (dBm)

Band	WCDMA IV		
TX Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	23.36	23.26	**23.37**
HSDPA	23.03	23.05	23.16
HSUPA	22.73	22.63	22.70

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

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20050	20175	20300
		Frequency (MHz)		1720	1732.5	1745
20M	QPSK	1	0	23.21	**23.52**	23.35
		1	50	23.27	23.46	23.41
		1	99	23.14	23.33	23.17
		50	0	23.19	23.21	23.21
		50	25	23.19	23.02	23.02
		50	50	23.12	23.20	23.20
		100	0	22.10	22.13	22.13
20M	16QAM	1	0	22.32	22.34	22.34
		1	50	22.07	22.27	22.27
		1	99	22.27	21.97	21.97
		25	0	21.19	21.41	21.30
		25	12	21.25	21.34	21.29
		25	25	21.25	21.17	21.24
		100	0	-	-	-

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

LTE Band 4						
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	22.98	23.21	23.44
		1	37	23.02	23.42	**23.48**
		1	74	23.07	23.05	23.25
		36	0	23.10	23.20	23.04
		36	19	23.03	23.08	23.28
		36	39	23.00	23.22	23.32
		75	0	21.96	21.99	22.25
15M	16QAM	1	0	22.27	22.08	22.19
		1	37	22.14	21.93	22.17
		1	74	22.25	22.10	21.92
		25	0	21.42	21.26	21.31
		25	12	21.31	21.22	21.17
		25	25	21.38	21.13	21.28
		75	0	-	-	-

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

LTE Band 4						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20000	20175	20350
		Frequency (MHz)		1715	1732.5	1750
10M	QPSK	1	0	23.03	23.14	23.41
		1	24	23.20	23.33	**23.42**
		1	49	23.03	23.09	23.29
		25	0	23.16	23.21	23.08
		25	12	23.11	23.03	23.30
		25	25	23.02	23.15	23.16
		50	0	22.03	22.06	22.31
10M	16QAM	1	0	22.40	22.08	22.27
		1	24	22.03	21.84	22.04
		1	49	22.16	22.06	22.15
		25	0	22.19	22.07	22.28
		25	12	22.25	22.28	22.15
		25	25	22.09	22.51	22.28
		50	0	-	-	-

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

LTE Band 4						
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	23.16	23.29
		1	12	22.92	23.18	**23.48**
		1	24	22.97	23.14	23.09
		12	0	22.93	23.29	23.21
		12	6	23.22	23.16	23.26
		12	13	22.99	23.33	23.16
		25	0	21.92	22.16	22.34
5M	16QAM	1	0	22.20	22.21	22.40
		1	12	22.15	21.89	22.08
		1	24	22.19	22.14	21.97
		12	0	22.10	22.05	22.22
		12	6	22.11	22.36	22.10
		12	13	22.17	22.51	22.17
		25	0	20.70	20.99	21.13

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

LTE Band 4						
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	23.06	23.29	23.28
		1	7	23.04	23.36	**23.39**
		1	14	22.91	23.15	23.10
		8	0	22.90	23.29	23.28
		8	3	23.24	23.01	23.28
		8	7	23.01	23.26	23.31
		15	0	22.06	22.19	22.12
3M	16QAM	1	0	22.30	22.16	22.21
		1	7	21.99	21.83	22.16
		1	14	22.18	21.96	22.05
		8	0	22.01	22.03	22.15
		8	3	22.25	22.11	22.14
		8	7	22.06	22.52	22.22
		15	0	20.85	21.08	21.12

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

LTE Band 4						
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	23.02	23.19	23.41
		1	2	23.08	23.32	**23.50**
		1	5	23.00	23.08	23.23
		3	0	23.06	23.18	23.15
		3	1	23.18	23.14	23.18
		3	3	23.13	23.20	23.20
		6	0	21.98	22.09	22.21
1.4M	16QAM	1	0	22.28	22.16	22.34
		1	2	22.12	21.99	22.18
		1	5	22.15	22.01	22.05
		3	0	22.14	22.19	22.24
		3	1	22.24	22.27	22.22
		3	3	22.07	22.42	22.18
		6	0	20.86	21.02	21.17

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

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23060	23095	23130
		Frequency (MHz)		704	707.5	711
10M	QPSK	1	0	18.97	**19.26**	18.91
		1	24	18.88	18.78	19.19
		1	49	18.91	18.80	18.55
		25	0	19.10	19.22	17.76
		25	12	17.78	18.94	18.81
		25	25	18.80	19.14	18.99
		50	0	17.94	18.09	17.44
10M	16QAM	1	0	17.98	18.16	18.44
		1	24	18.49	18.15	18.14
		1	49	18.03	17.81	17.65
		25	0	18.00	17.83	18.21
		25	12	18.12	18.15	18.02
		25	25	18.06	18.06	17.99
		50	0	-	-	-

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

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23035	23095	23155
		Frequency (MHz)		701.5	707.5	713.5
5M	QPSK	1	0	19.19	**19.21**	18.98
		1	12	19.01	18.79	18.97
		1	24	18.87	18.88	18.72
		12	0	19.09	19.19	17.96
		12	6	17.95	18.83	19.01
		12	13	18.86	19.06	19.00
		25	0	17.98	18.05	17.53
5M	16QAM	1	0	18.15	17.94	18.39
		1	12	18.30	17.93	18.03
		1	24	18.08	17.97	17.77
		12	0	17.92	17.81	18.24
		12	6	18.22	17.96	18.11
		12	13	18.07	17.87	17.85
		25	0	17.10	16.88	17.00

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

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23025	23095	23165
		Frequency (MHz)		700.5	707.5	714.5
3M	QPSK	1	0	19.04	**19.22**	19.02
		1	7	19.15	19.02	18.99
		1	14	18.88	18.73	18.76
		8	0	19.13	19.04	18.11
		8	3	17.86	18.98	18.99
		8	7	18.91	19.13	18.64
		15	0	17.76	17.94	17.95
3M	16QAM	1	0	18.13	18.09	18.34
		1	7	18.19	17.84	18.21
		1	14	17.89	17.92	17.81
		8	0	17.89	17.85	18.08
		8	3	18.51	17.92	18.14
		8	7	18.07	17.91	17.96
		15	0	17.26	16.92	16.98

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

LTE Band 12						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23017	23095	23173
		Frequency (MHz)		699.7	707.5	715.3
1.4M	QPSK	1	0	18.98	**19.04**	18.89
		1	2	18.94	19.00	18.78
		1	5	18.95	18.94	18.94
		3	0	18.98	19.02	17.90
		3	1	17.93	19.00	18.95
		3	3	18.97	19.01	18.82
		6	0	17.94	17.93	17.72
1.4M	16QAM	1	0	18.19	18.08	18.26
		1	2	18.18	18.04	17.99
		1	5	18.02	17.98	17.77
		3	0	18.06	18.00	18.17
		3	1	18.28	18.10	18.16
		3	3	18.25	18.08	17.90
		6	0	17.06	16.93	17.10

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

LTE Band 13				
BW	MCS Index	RB Size	RB Offset	Low
		Channel		23230
		Frequency (MHz)		782
10M	QPSK	1	0	**21.36**
		1	24	21.12
		1	49	21.22
		25	0	20.75
		25	12	20.42
		25	25	20.40
		50	0	20.31
10M	16QAM	1	0	20.22
		1	24	20.46
		1	49	19.84
		25	0	19.12
		25	12	19.24
		25	25	19.25
		50	0	-

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

LTE Band 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	**21.32**	21.22	21.11
		1	12	21.28	21.28	21.31
		1	24	21.14	21.23	21.06
		12	0	20.59	20.39	20.39
		12	6	20.47	20.32	20.35
		12	13	20.21	20.14	19.92
		25	0	20.31	20.24	20.21
5M	16QAM	1	0	20.12	20.30	20.45
		1	12	20.45	20.23	20.03
		1	24	20.03	20.03	20.16
		12	0	19.27	19.35	19.41
		12	6	19.22	19.32	19.51
		12	13	19.28	19.23	19.26
		25	0	19.31	19.44	19.35

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

4.2 Modulation Characteristics Measurement

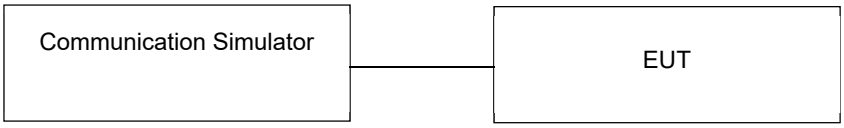
4.2.1 Limits of Modulation Characteristics

N/A

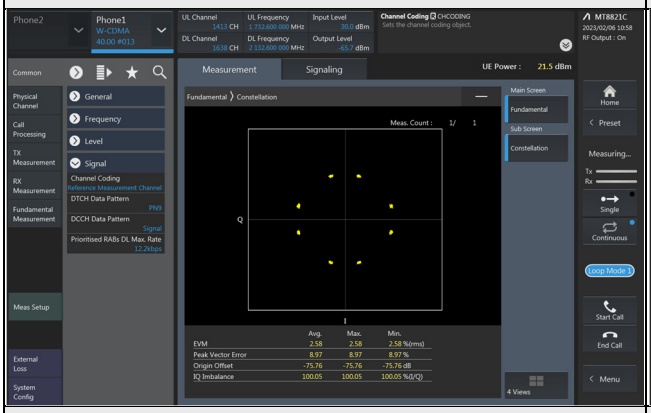
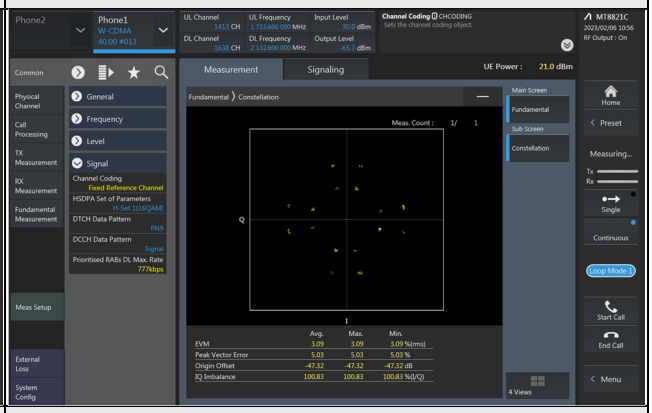
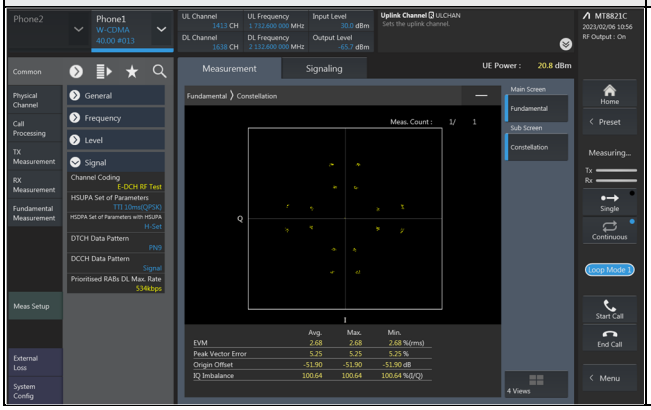
4.2.2 Test Procedure

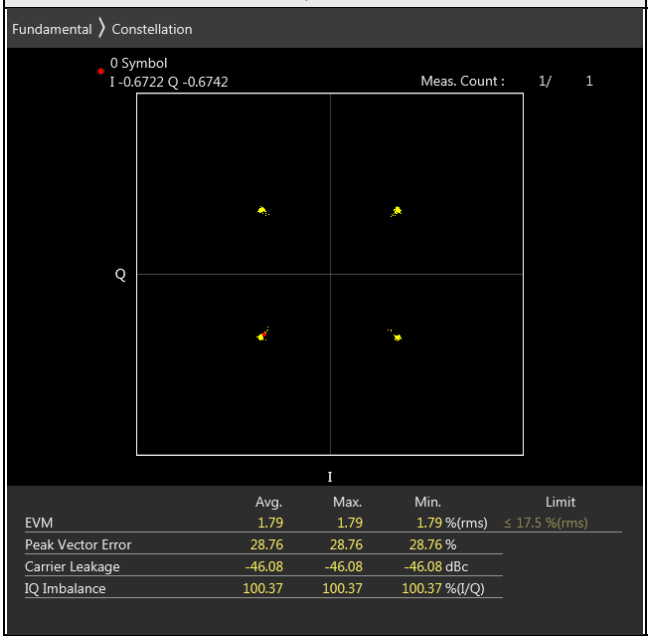
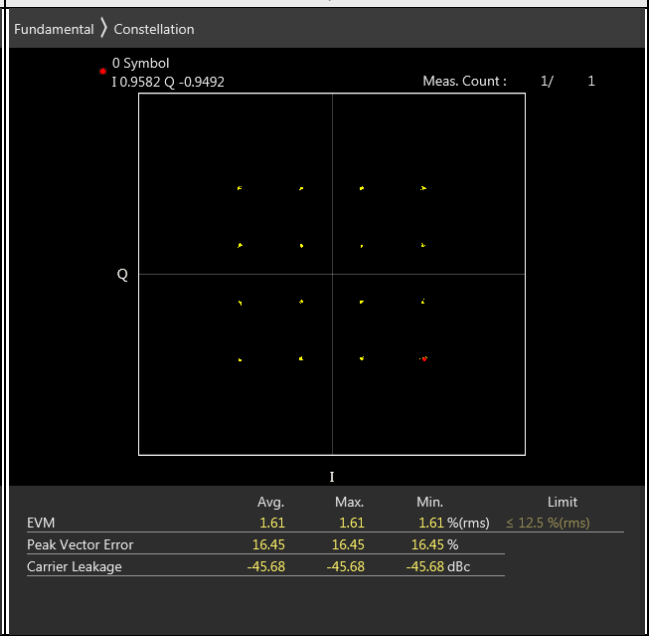
Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

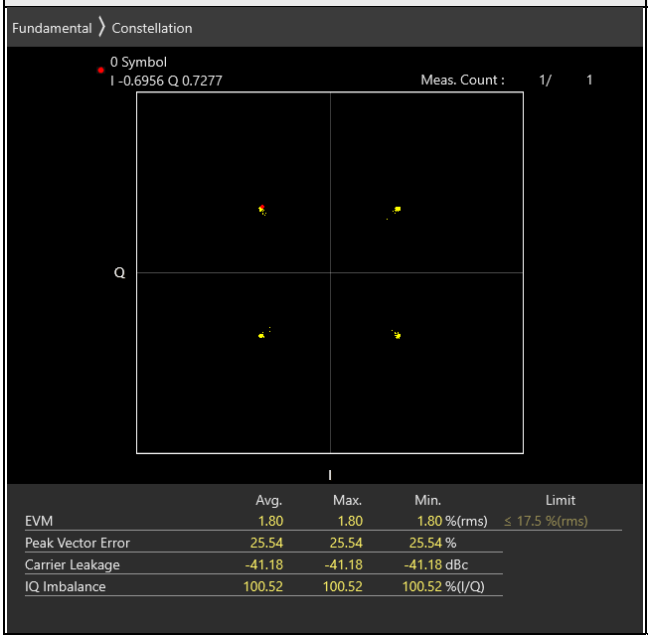
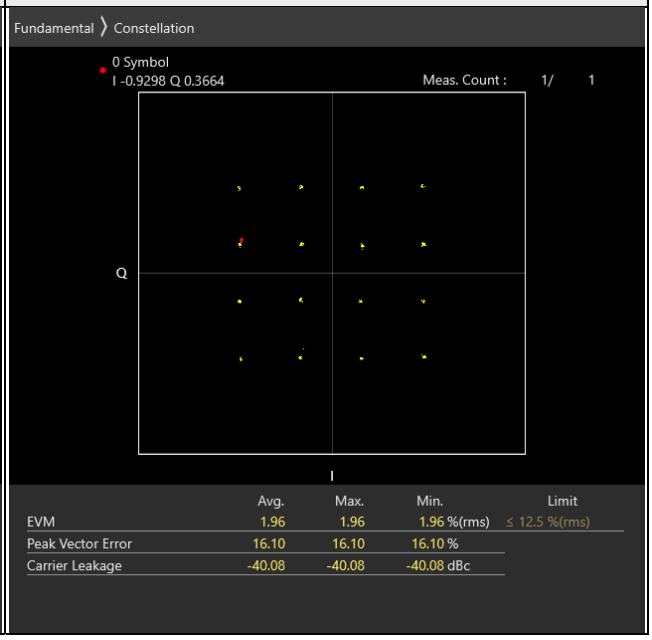
4.2.3 Test Setup



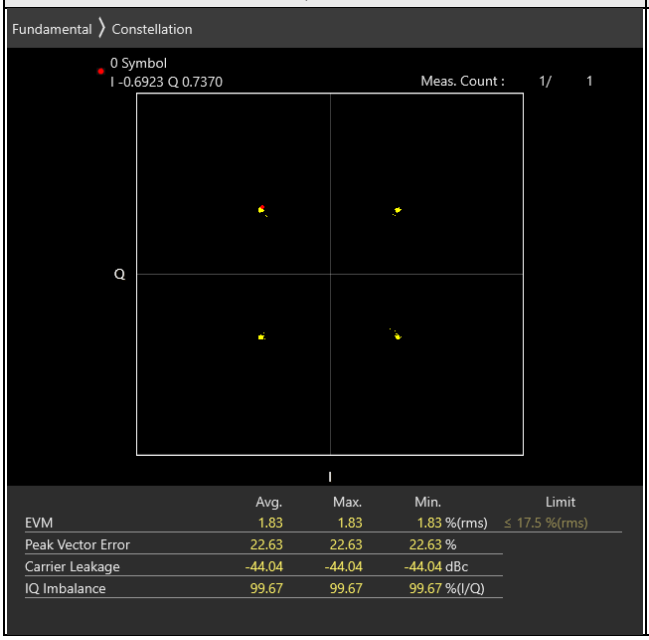
4.2.4 Test Results

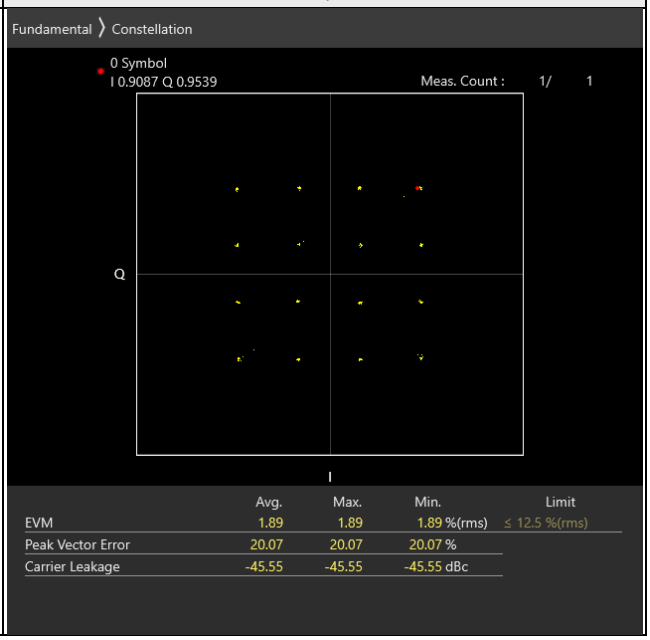
WCDMA Band 4	
Spectrum Plot of Measurement Value	
Channel: 1413 / Frequency (MHz): 1732.6MHz	
WCDMA	HSDPA
	
HSUPA	
	

LTE Band 4	
Spectrum Plot of Measurement Value	
Channel: 20175 / Frequency (MHz): 1732.5MHz	
QPSK	16QAM
	

LTE Band 12	
Spectrum Plot of Measurement Value	
Channel: 23095 / Frequency (MHz): 707.5MHz	
QPSK	16QAM
	

LTE Band 13	
Spectrum Plot of Measurement Value	
Channel: 23230 / Frequency (MHz): 782.0MHz	
QPSK	16QAM





4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

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

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT -30℃ ~ 50℃.

4.3.2 Test Procedure

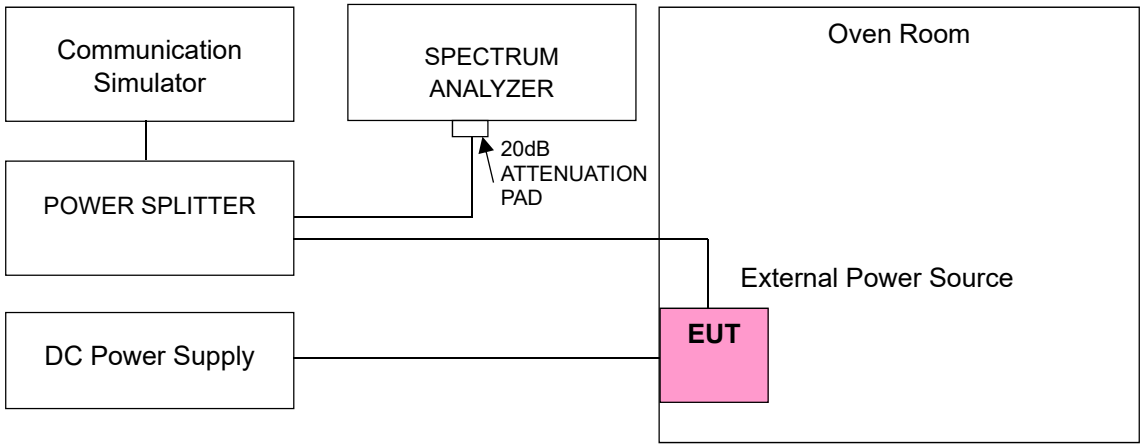
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	WCDMA Band 4			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1712.4000020	0.001	1752.6000040	0.002
3.60	1712.3999990	-0.001	1752.5999970	-0.002
4.14	1712.4000040	0.002	1752.6000030	0.002

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA Band 4			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.3999990	-0.001	1752.6000010	0.001
-20	1712.4000010	0.001	1752.5999980	-0.001
-10	1712.3999970	-0.002	1752.6000030	0.002
0	1712.4000030	0.002	1752.5999960	-0.002
10	1712.4000040	0.002	1752.6000030	0.002
20	1712.4000030	0.002	1752.6000020	0.001
30	1712.4000010	0.001	1752.5999990	-0.001
40	1712.4000040	0.002	1752.6000010	0.001
50	1712.4000020	0.001	1752.5999990	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1710.7000010	0.001	1754.2999990	-0.001
3.60	1710.6999980	-0.001	1754.3000020	0.001
4.14	1710.7000040	0.002	1754.2999980	-0.001

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1710.7000010	0.001	1754.3000020	0.001
-20	1710.6999990	-0.001	1754.3000030	0.002
-10	1710.6999990	-0.001	1754.2999960	-0.002
0	1710.7000030	0.002	1754.3000020	0.001
10	1710.7000040	0.002	1754.2999970	-0.002
20	1710.6999960	-0.002	1754.3000010	0.001
30	1710.6999990	-0.001	1754.3000040	0.002
40	1710.6999980	-0.001	1754.3000020	0.001
50	1710.6999980	-0.001	1754.2999990	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1711.5000040	0.002	1753.4999980	-0.001
3.60	1711.5000010	0.001	1753.5000030	0.002
4.14	1711.4999960	-0.002	1753.5000040	0.002

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1711.5000020	0.001	1753.4999980	-0.001
-20	1711.4999980	-0.001	1753.5000020	0.001
-10	1711.5000020	0.001	1753.4999990	-0.001
0	1711.5000010	0.001	1753.4999990	-0.001
10	1711.5000010	0.001	1753.4999970	-0.002
20	1711.4999980	-0.001	1753.4999970	-0.002
30	1711.4999990	-0.001	1753.4999980	-0.001
40	1711.4999970	-0.002	1753.5000030	0.002
50	1711.4999970	-0.002	1753.5000040	0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1712.5000020	0.001	1752.4999980	-0.001
3.60	1712.4999990	-0.001	1752.5000040	0.002
4.14	1712.4999970	-0.002	1752.4999990	-0.001

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1712.5000010	0.001	1752.4999980	-0.001
-20	1712.4999960	-0.002	1752.5000030	0.002
-10	1712.4999960	-0.002	1752.5000030	0.002
0	1712.5000030	0.002	1752.5000020	0.001
10	1712.4999990	-0.001	1752.4999990	-0.001
20	1712.5000020	0.001	1752.5000020	0.001
30	1712.4999980	-0.001	1752.5000010	0.001
40	1712.5000040	0.002	1752.4999960	-0.002
50	1712.5000030	0.002	1752.5000030	0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1714.9999990	-0.001	1749.9999980	-0.001
3.60	1715.0000040	0.002	1750.0000010	0.001
4.14	1714.9999970	-0.002	1749.9999980	-0.001

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1715.0000040	0.002	1749.9999980	-0.001
-20	1715.0000040	0.002	1749.9999990	-0.001
-10	1715.0000030	0.002	1749.9999990	-0.001
0	1714.9999990	-0.001	1749.9999970	-0.002
10	1714.9999970	-0.002	1749.9999960	-0.002
20	1715.0000010	0.001	1750.0000010	0.001
30	1714.9999970	-0.002	1750.0000010	0.001
40	1714.9999980	-0.001	1750.0000020	0.001
50	1714.9999960	-0.002	1750.0000010	0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1717.5000030	0.002	1747.4999980	-0.001
3.60	1717.5000010	0.001	1747.5000030	0.002
4.14	1717.5000010	0.001	1747.5000040	0.002

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1717.4999990	-0.001	1747.5000030	0.002
-20	1717.4999960	-0.002	1747.5000020	0.001
-10	1717.5000040	0.002	1747.5000030	0.002
0	1717.4999960	-0.002	1747.4999960	-0.002
10	1717.5000020	0.001	1747.5000020	0.001
20	1717.4999980	-0.001	1747.5000040	0.002
30	1717.5000020	0.001	1747.4999970	-0.002
40	1717.5000010	0.001	1747.5000010	0.001
50	1717.5000020	0.001	1747.5000040	0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 4			
	Channel Bandwidth 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	1720.0000040	0.002	1745.0000010	0.001
3.60	1720.0000040	0.002	1744.9999970	-0.002
4.14	1719.9999970	-0.002	1744.9999970	-0.002

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 4			
	Channel Bandwidth 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	1720.0000030	0.002	1745.0000030	0.002
-20	1719.9999980	-0.001	1744.9999980	-0.001
-10	1719.9999970	-0.002	1745.0000020	0.001
0	1719.9999960	-0.002	1745.0000020	0.001
10	1719.9999990	-0.001	1744.9999960	-0.002
20	1720.0000030	0.002	1745.0000020	0.001
30	1720.0000030	0.002	1744.9999990	-0.001
40	1719.9999970	-0.002	1745.0000010	0.001
50	1720.0000020	0.001	1745.0000030	0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	699.7000040	0.006	715.3000010	0.001
3.60	699.6999980	-0.003	715.2999980	-0.003
4.14	699.7000040	0.006	715.3000030	0.004

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	699.6999990	-0.001	715.3000020	0.003
-20	699.7000010	0.001	715.3000040	0.006
-10	699.6999970	-0.004	715.3000030	0.004
0	699.7000040	0.006	715.2999990	-0.001
10	699.6999960	-0.006	715.3000020	0.003
20	699.7000030	0.004	715.2999980	-0.003
30	699.6999970	-0.004	715.2999990	-0.001
40	699.6999980	-0.003	715.2999990	-0.001
50	699.6999980	-0.003	715.2999990	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	700.4999960	-0.006	714.4999960	-0.006
3.60	700.5000020	0.003	714.4999970	-0.004
4.14	700.5000010	0.001	714.5000040	0.006

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	700.4999970	-0.004	714.5000010	0.001
-20	700.5000040	0.006	714.4999960	-0.006
-10	700.5000030	0.004	714.4999970	-0.004
0	700.5000010	0.001	714.4999990	-0.001
10	700.4999980	-0.003	714.5000040	0.006
20	700.4999990	-0.001	714.5000010	0.001
30	700.5000020	0.003	714.4999990	-0.001
40	700.4999990	-0.001	714.4999970	-0.004
50	700.4999960	-0.006	714.5000020	0.003

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	701.4999960	-0.006	713.4999970	-0.004
3.60	701.4999990	-0.001	713.4999990	-0.001
4.14	701.5000010	0.001	713.5000010	0.001

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	701.5000030	0.004	713.5000010	0.001
-20	701.4999990	-0.001	713.5000020	0.003
-10	701.5000040	0.006	713.4999990	-0.001
0	701.4999990	-0.001	713.4999970	-0.004
10	701.4999970	-0.004	713.4999970	-0.004
20	701.4999970	-0.004	713.5000040	0.006
30	701.5000020	0.003	713.5000020	0.003
40	701.5000030	0.004	713.5000030	0.004
50	701.4999980	-0.003	713.5000040	0.006

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 12			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	703.9999990	-0.001	711.0000020	0.003
3.60	704.0000020	0.003	710.9999960	-0.006
4.14	703.9999980	-0.003	710.9999970	-0.004

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 12			
	Channel Bandwidth 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	704.0000020	0.003	711.0000020	0.003
-20	703.9999970	-0.004	710.9999970	-0.004
-10	703.9999960	-0.006	711.0000030	0.004
0	704.0000030	0.004	711.0000030	0.004
10	703.9999990	-0.001	710.9999960	-0.006
20	704.0000040	0.006	711.0000010	0.001
30	704.0000020	0.003	710.9999970	-0.004
40	704.0000030	0.004	711.0000010	0.001
50	703.9999980	-0.003	710.9999970	-0.004

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 13			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.06	779.5000020	0.003	784.4999960	-0.005
3.60	779.4999990	-0.001	784.4999970	-0.004
4.14	779.4999970	-0.004	784.4999980	-0.003

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13			
	Channel Bandwidth 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	779.5000010	0.001	784.4999990	-0.001
-20	779.4999990	-0.001	784.4999960	-0.005
-10	779.5000020	0.003	784.5000020	0.003
0	779.5000040	0.005	784.4999970	-0.004
10	779.5000010	0.001	784.4999960	-0.005
20	779.5000030	0.004	784.4999990	-0.001
30	779.5000040	0.005	784.5000040	0.005
40	779.4999990	-0.001	784.4999990	-0.001
50	779.5000010	0.001	784.4999960	-0.005

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 13	
	Channel Bandwidth 10MHz	
	Frequency (MHz)	Frequency Error (ppm)
3.06	781.9999960	-0.005
3.60	782.0000020	0.003
4.14	781.9999970	-0.004

Note: The applicant defined the normal working voltage is from 3.06Vdc to 4.14Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 13	
	Channel Bandwidth 10MHz	
	Frequency (MHz)	Frequency Error (ppm)
-30	781.9999980	-0.003
-20	782.0000040	0.005
-10	781.9999990	-0.001
0	781.9999960	-0.005
10	782.0000040	0.005
20	781.9999970	-0.004
30	782.0000030	0.004
40	781.9999960	-0.005
50	781.9999980	-0.003

4.4 Occupied Bandwidth Measurement

4.4.1 Limits of Occupied Bandwidth Measurement

The occupied bandwidth (OBW), 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.

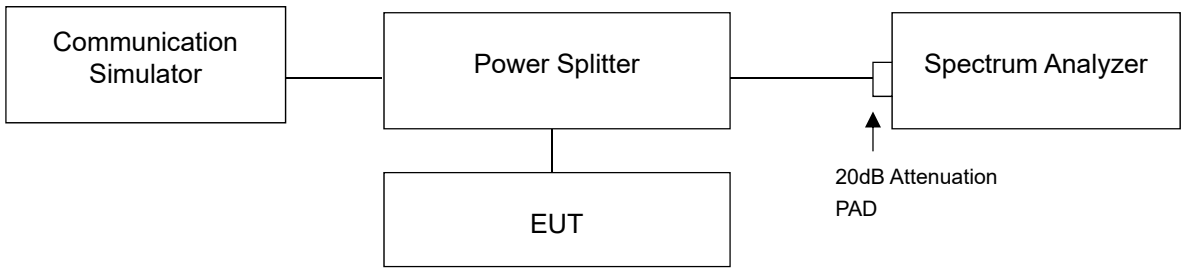
4.4.2 Test Procedure

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

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

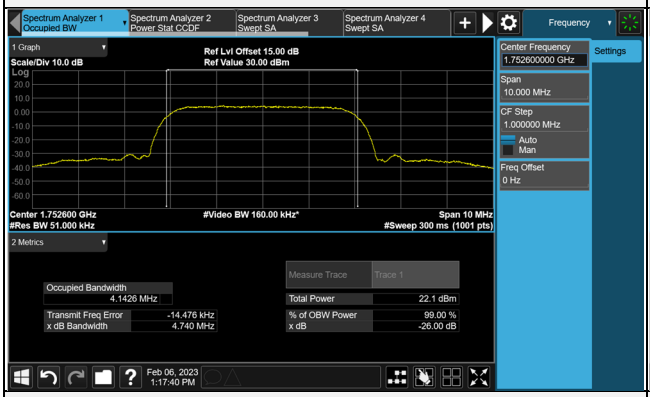
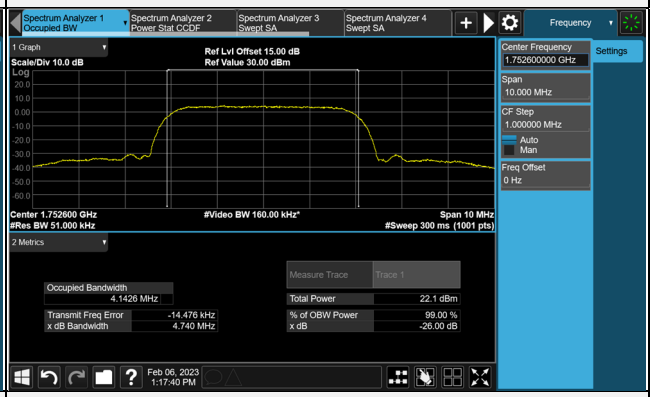
4.4.3 Test Setup



4.4.4 Test Result

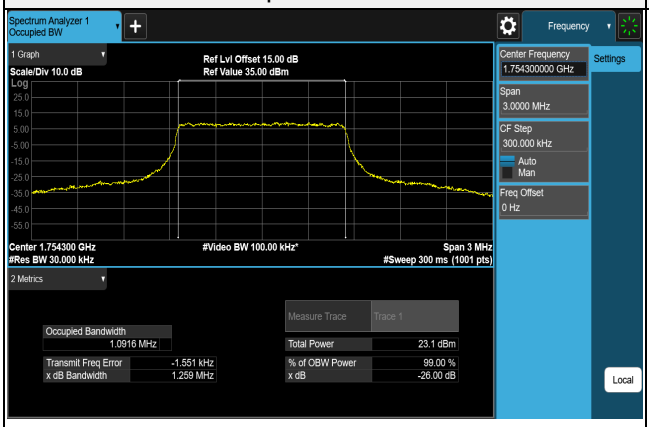
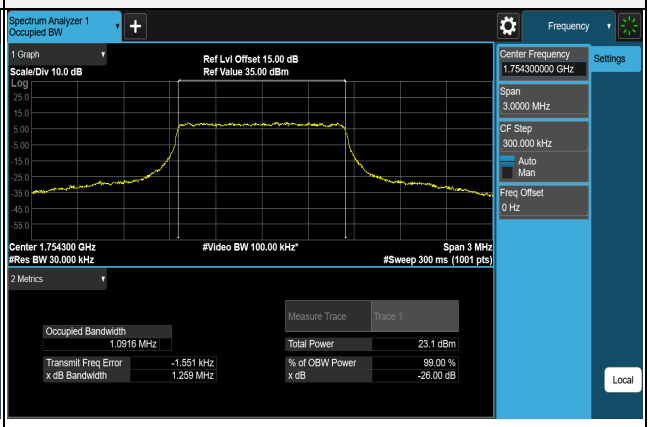
WCDMA Band 4

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA	1312	1712.4	4.1348	4.687
WCDMA	1413	1732.6	4.1310	4.695
WCDMA	1513	1752.6	4.1426	4.740
HSDPA	1312	1712.4	4.1367	4.705
HSDPA	1413	1732.6	4.1390	4.724
HSDPA	1513	1752.6	4.1383	4.693
HSUPA	1312	1712.4	4.1338	4.699
HSUPA	1413	1732.6	4.1307	4.708
HSUPA	1513	1752.6	4.1326	4.702

Spectrum Plot of Worst Value	
Occupied bandwidth	26dB Bandwidth
	
WCDMA CH 1513 (1752.6MHz)	WCDMA CH 1513 (1752.6MHz)

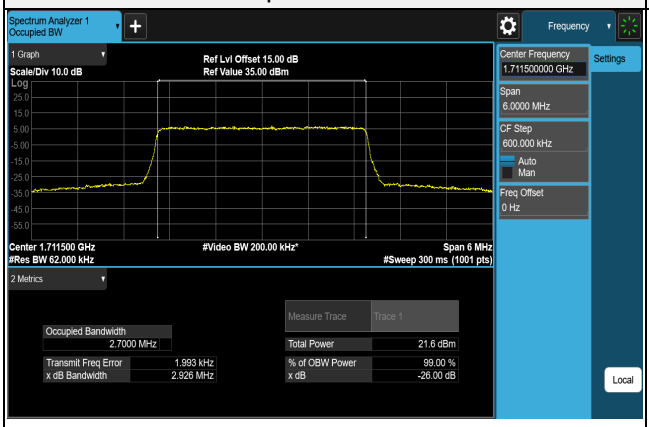
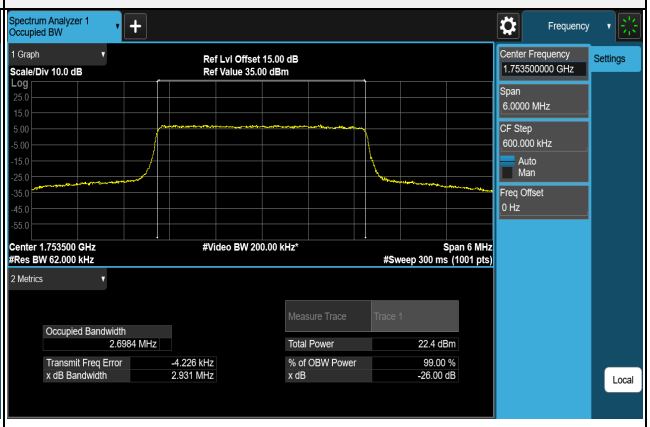
LTE Band 4 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19957	1710.7	1.0878	1.250
QPSK	20175	1732.5	1.0904	1.257
QPSK	20393	1754.3	1.0916	1.259
16QAM	19957	1710.7	1.0885	1.249
16QAM	20175	1732.5	1.0891	1.241
16QAM	20393	1754.3	1.0889	1.257

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 20393 (1754.3MHz)	QPSK CH 20393 (1754.3MHz)

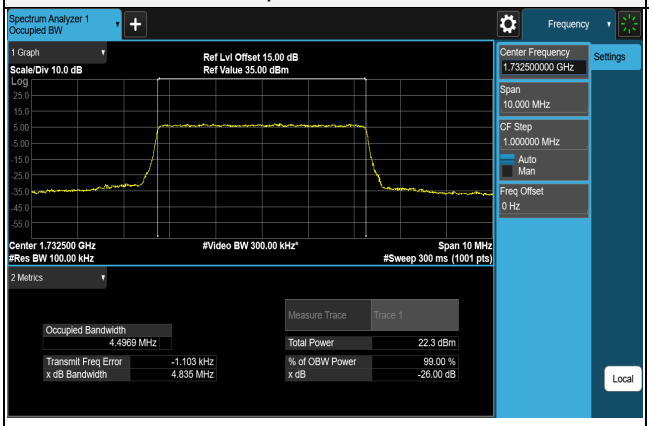
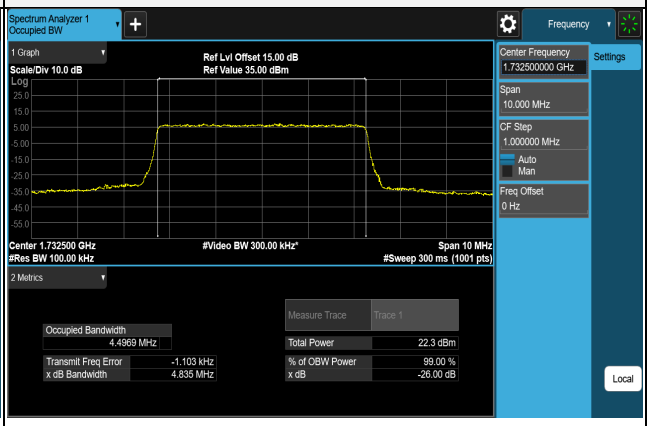
LTE Band 4 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19965	1711.5	2.6961	2.914
QPSK	20175	1732.5	2.6968	2.919
QPSK	20385	1753.5	2.6984	2.931
16QAM	19965	1711.5	2.7000	2.926
16QAM	20175	1732.5	2.7000	2.921
16QAM	20385	1753.5	2.6957	2.914

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
16QAM CH 19965 (1711.5MHz)	QPSK CH 20385 (1753.5MHz)

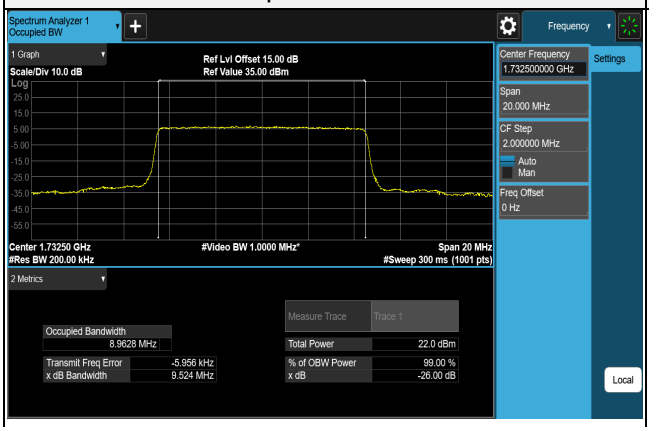
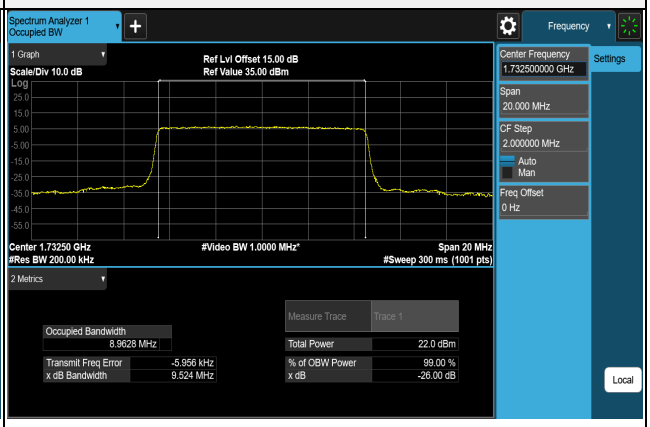
LTE Band 4 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	19975	1712.5	4.4949	4.820
QPSK	20175	1732.5	4.4969	4.835
QPSK	20375	1752.5	4.4922	4.814
16QAM	19975	1712.5	4.4880	4.818
16QAM	20175	1732.5	4.4935	4.819
16QAM	20375	1752.5	4.4919	4.813

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

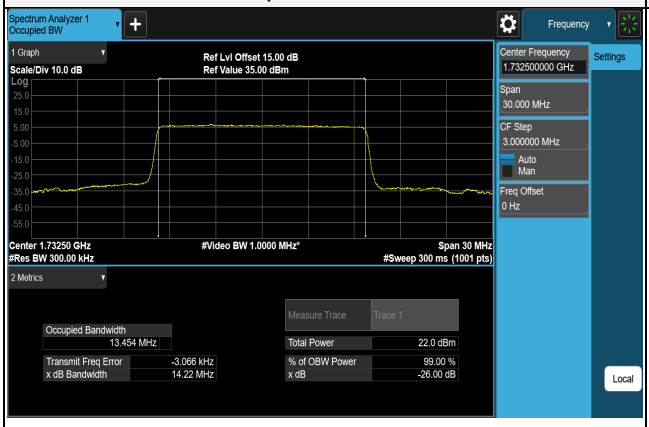
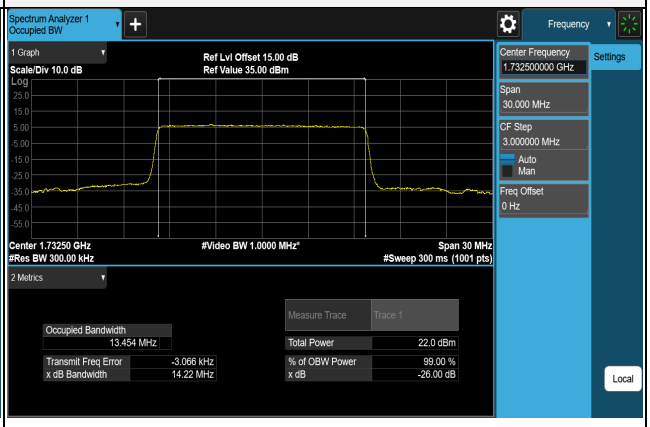
LTE Band 4 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20000	1715	8.9516	9.505
QPSK	20175	1732.5	8.9628	9.524
QPSK	20350	1750	8.9430	9.514
16QAM	20000	1715	4.5707	5.062
16QAM	20175	1732.5	4.5679	5.101
16QAM	20350	1750	4.5670	5.124

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

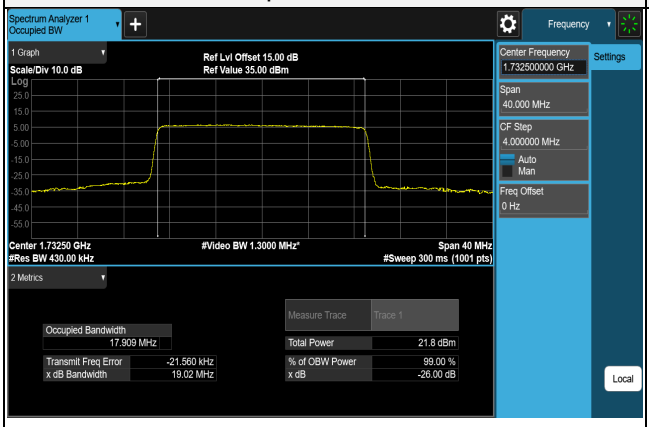
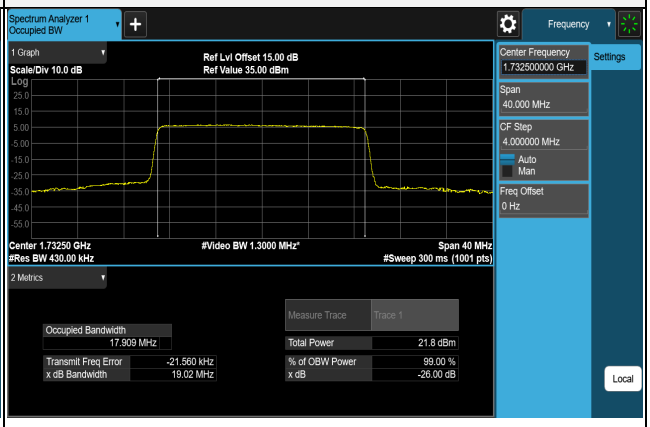
LTE Band 4 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20025	1717.5	13.4267	14.208
QPSK	20175	1732.5	13.4542	14.217
QPSK	20325	1747.5	13.4097	14.206
16QAM	20025	1717.5	4.6692	5.355
16QAM	20175	1732.5	4.6671	5.367
16QAM	20325	1747.5	4.6707	5.358

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

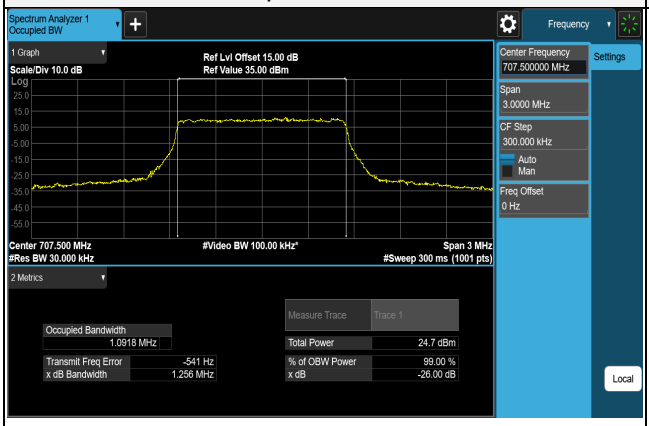
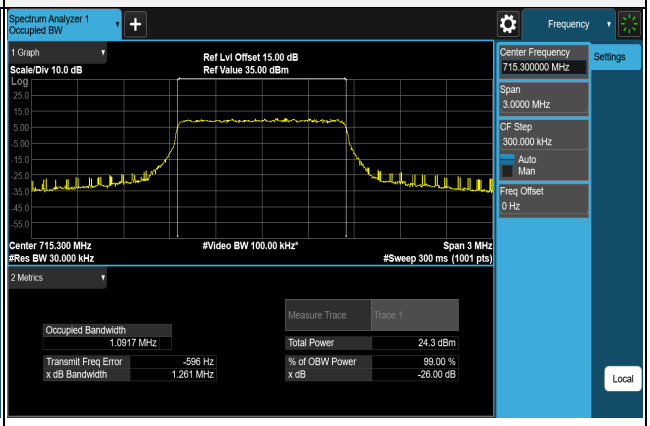
LTE Band 4 (Channel Bandwidth 20MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	20050	1720	17.8518	18.984
QPSK	20175	1732.5	17.9086	19.016
QPSK	20300	1745	17.8662	19.004
16QAM	20050	1720	4.8168	5.602
16QAM	20175	1732.5	4.8211	5.598
16QAM	20300	1745	4.8158	5.598

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

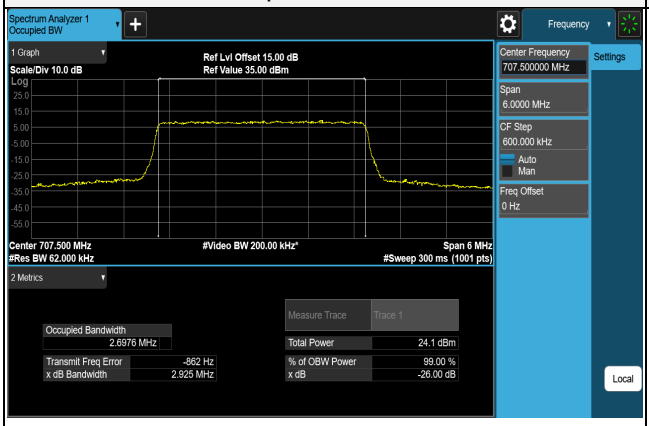
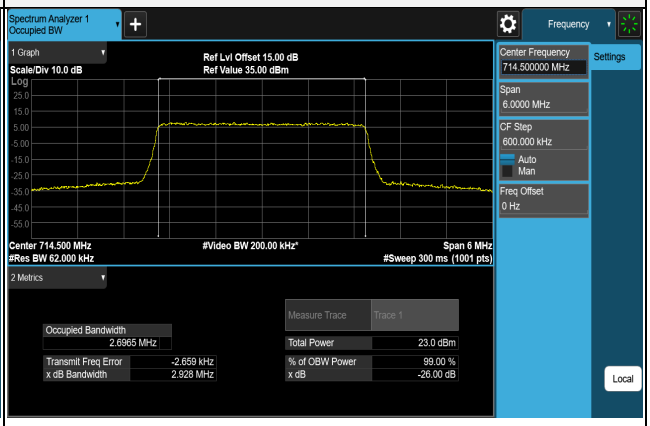
LTE Band 12 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23017	699.7	1.0874	1.253
QPSK	23095	707.5	1.0918	1.256
QPSK	23173	715.3	1.0917	1.261
16QAM	23017	699.7	1.0887	1.254
16QAM	23095	707.5	1.0884	1.248
16QAM	23173	715.3	1.0883	1.251

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23095 (707.5MHz)	QPSK CH 23173 (715.3MHz)

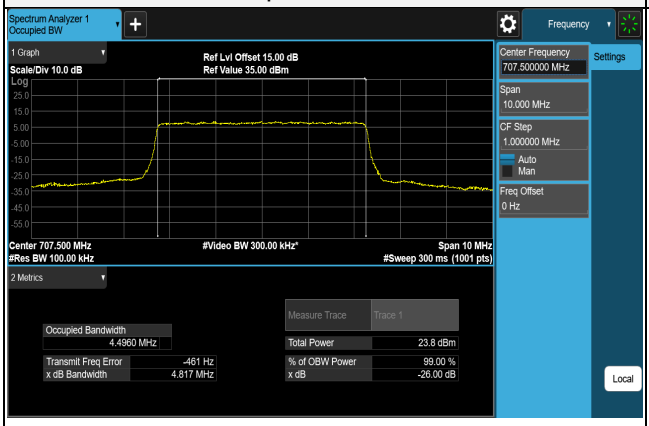
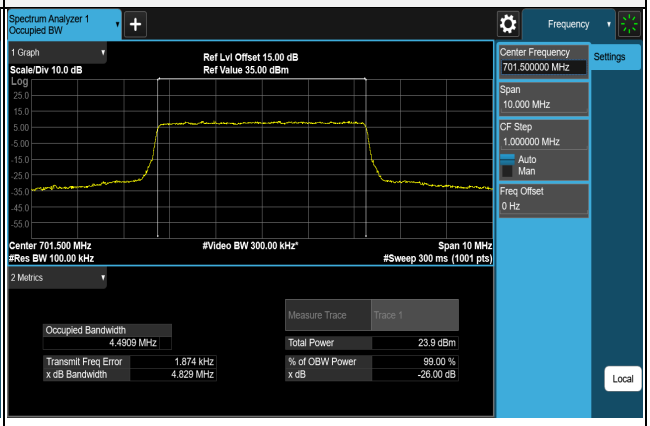
LTE Band 12 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23025	700.5	2.6944	2.890
QPSK	23095	707.5	2.6976	2.925
QPSK	23165	714.5	2.6953	2.916
16QAM	23025	700.5	2.6919	2.917
16QAM	23095	707.5	2.6957	2.916
16QAM	23165	714.5	2.6965	2.928

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23095 (707.5MHz)	16QAM CH 23165 (714.5MHz)

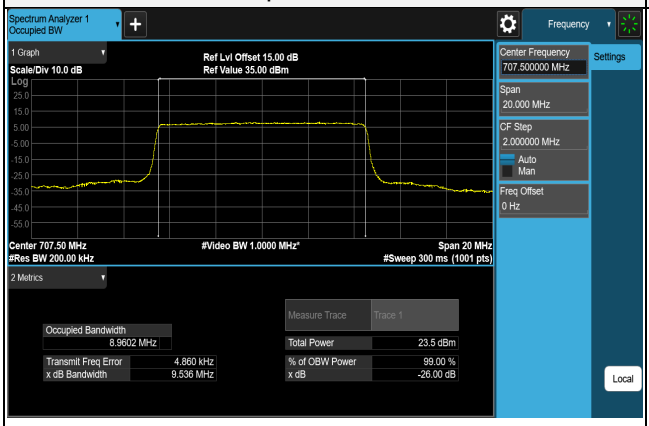
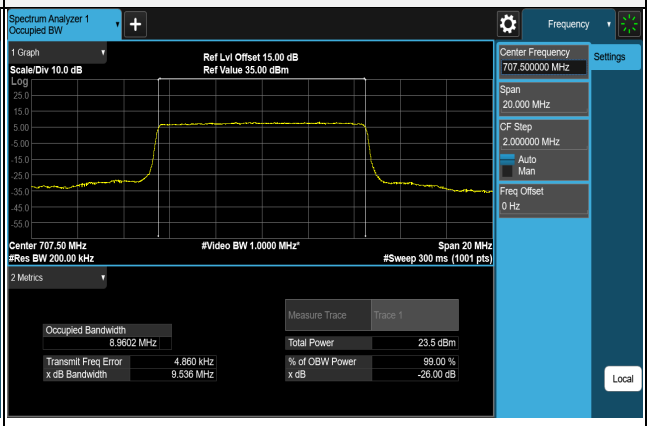
LTE Band 12 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23035	701.5	4.4909	4.829
QPSK	23095	707.5	4.4960	4.817
QPSK	23155	713.5	4.4906	4.814
16QAM	23035	701.5	4.4890	4.814
16QAM	23095	707.5	4.4888	4.815
16QAM	23155	713.5	4.4907	4.814

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23095 (707.5MHz)	QPSK CH 23035 (701.5MHz)

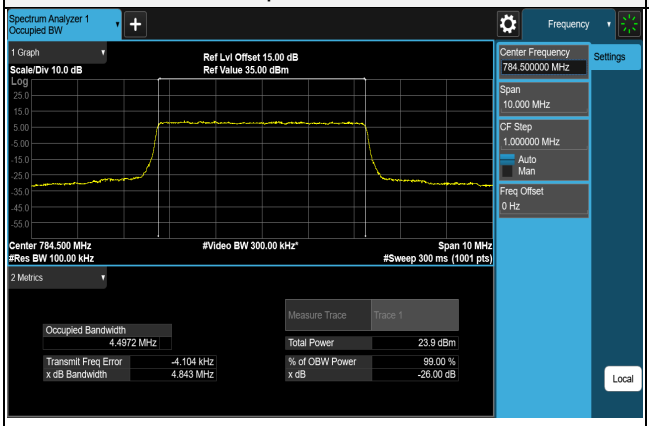
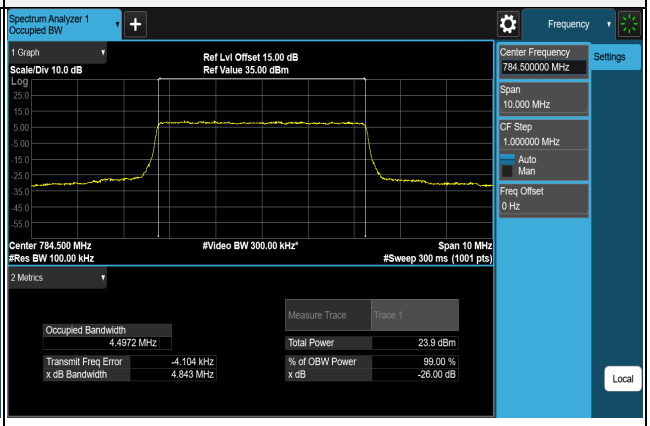
LTE Band 12 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23060	704	8.9576	9.511
QPSK	23095	707.5	8.9602	9.536
QPSK	23130	711	8.9564	9.521
16QAM	23060	704	4.5721	5.152
16QAM	23095	707.5	4.5732	5.110
16QAM	23130	711	4.5718	5.093

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 23095 (707.5MHz)	QPSK CH 23095 (707.5MHz)

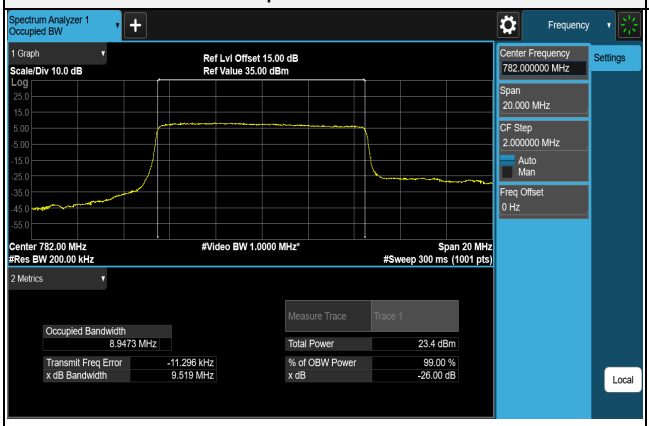
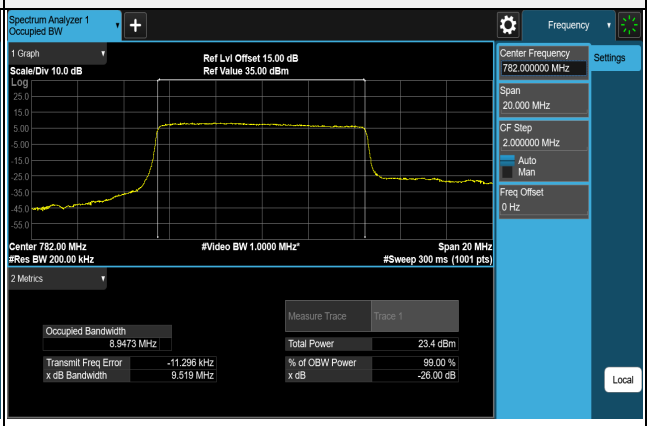
LTE Band 13 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23205	779.5	4.4884	4.816
QPSK	23230	782	4.4936	4.822
QPSK	23255	784.5	4.4972	4.843
16QAM	23205	779.5	4.4820	4.798
16QAM	23230	782	4.4901	4.805
16QAM	23255	784.5	4.4932	4.824

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

LTE Band 13 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26 dB Bandwidth (MHz)
QPSK	23230	782	8.9473	9.519
16QAM	23230	782	4.5670	5.100

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

4.5 Channel Edge / Out-of-Band Emissions Measurement

4.5.1 Limits of Band Edge / Out-of-Band Emissions Measurement

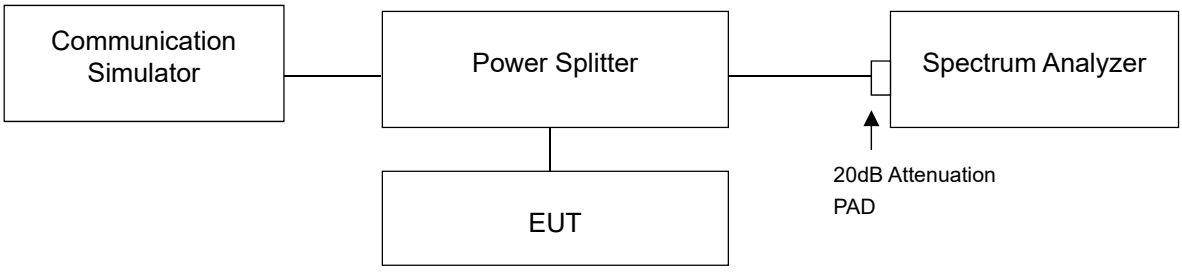
For WCDMA Band 4, LTE Band 4:
According to FCC 27.53(h) for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz, 1915-1920MHz, 1995-2000 MHz, 2000-2020MHz, 2110-2155MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

For LTE Band 12:
According to FCC 27.53(g) for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, 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.

For LTE Band 13:
According to FCC 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.

According to 27.53(c)(4) On all frequencies between 763-775MHz and 793-805MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations

4.5.2 Test Setup



4.5.3 Test Procedures

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. Band edge measurements were done at 2 channels: low and high operational frequency range.

b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).

c. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (LTE Channel Bandwidth 1.4MHz).

d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 3MHz).

e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (LTE Channel Bandwidth 5MHz).

f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).

g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 150kHz and VB of the spectrum is 470kHz (LTE Channel Bandwidth 15MHz).

h. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 200kHz and VB of the spectrum is 1MHz (LTE Channel Bandwidth 20MHz).

i. Except LTE Band 12 measurement procedure refer 27.53(g).

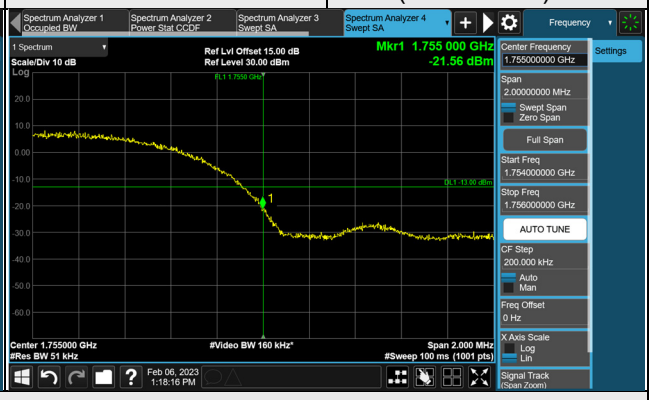
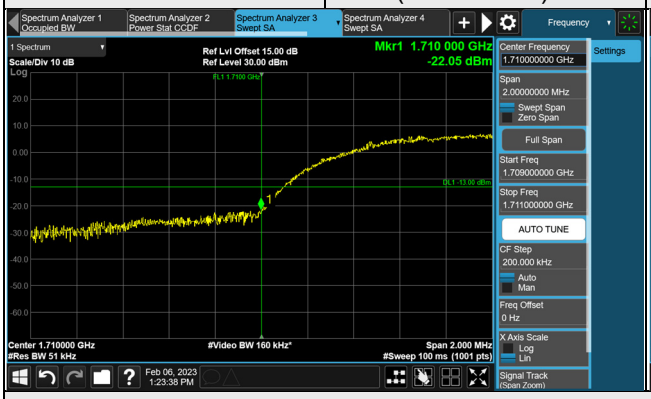
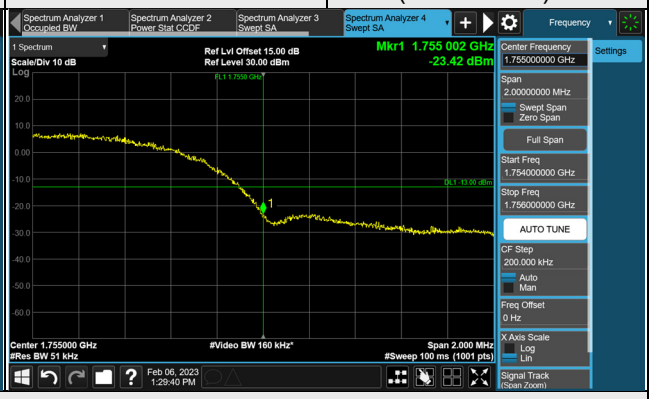
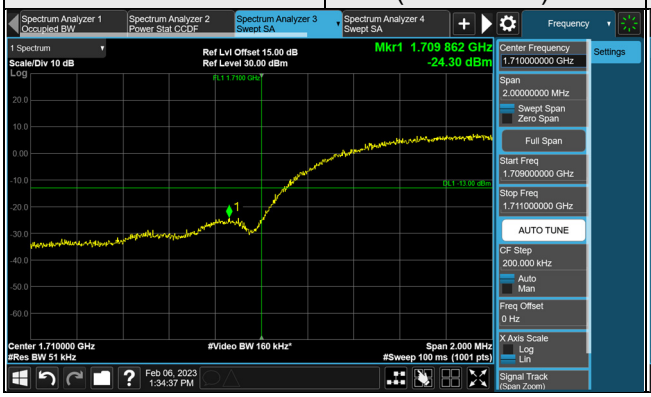
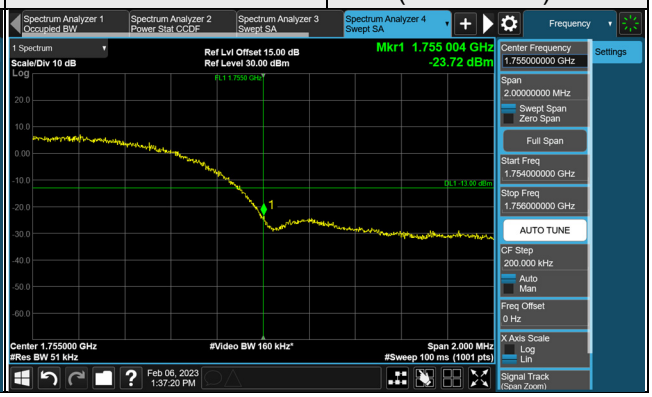
j. LTE Band 13 measurements in the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is 65 + 10 log (P[watt]) in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 6.8 kHz was used instead to show compliance, and the correction factor is compensated at the spectrum.

k. Set the detector to power averaging (rms) detector.

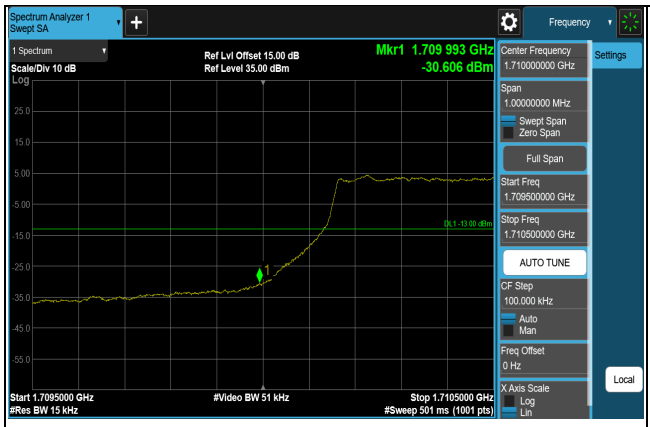
l. Record the max trace plot into the test report.

4.5.4 Test Results

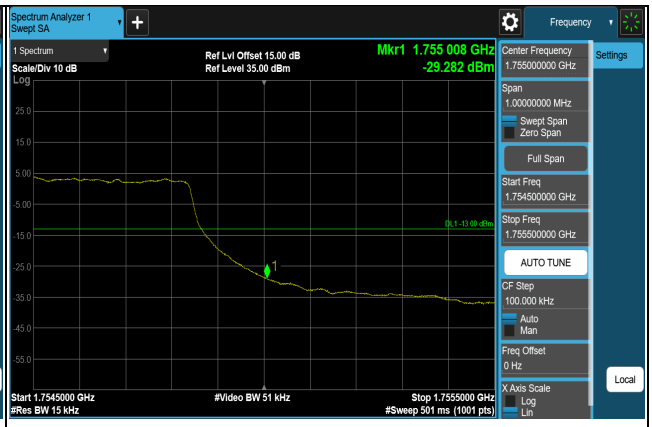
Band Edge

WCDMA Band 4			
Channel	1312 (1712.4MHz)	Channel	1513 (1752.6MHz)
			
HSDPA			
Channel	1312 (1712.4MHz)	Channel	1513 (1752.6MHz)
			
HSUPA			
Channel	1312 (1712.4MHz)	Channel	1513 (1752.6MHz)
			

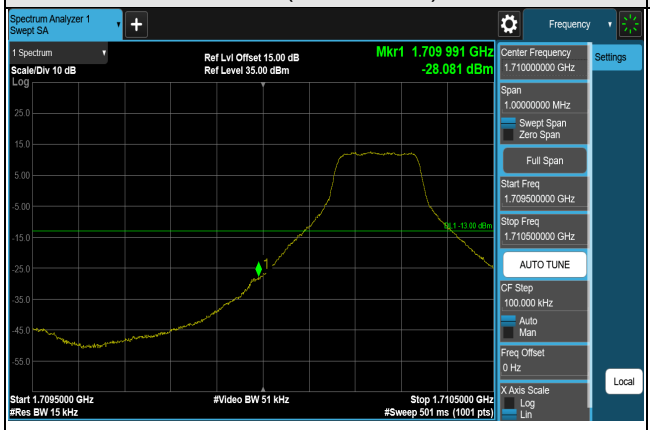
LTE Band 4 (Channel Bandwidth 1.4MHz)



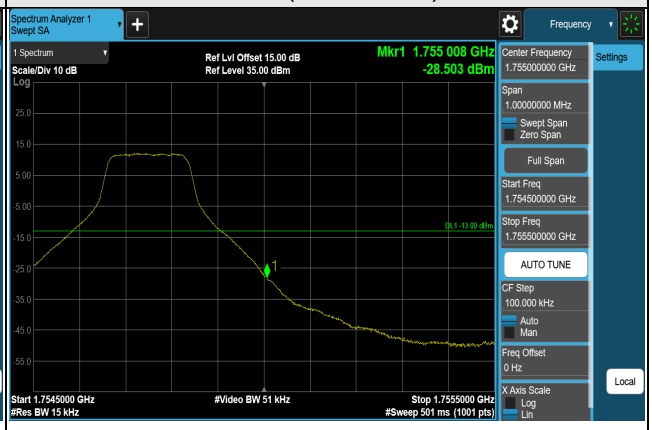
FULL (1710.7MHz)



FULL (1754.3MHz)

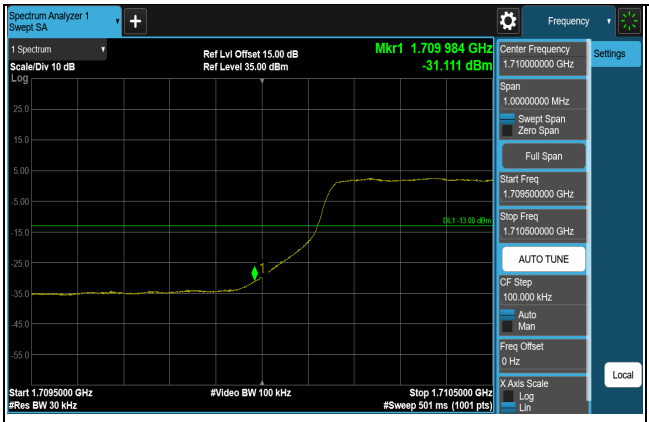


1RB (1710.7MHz)



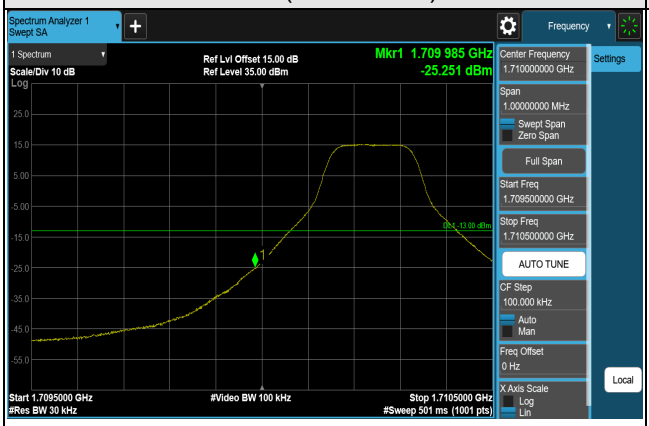
1RB (1754.3MHz)

LTE Band 4 (Channel Bandwidth 3MHz)

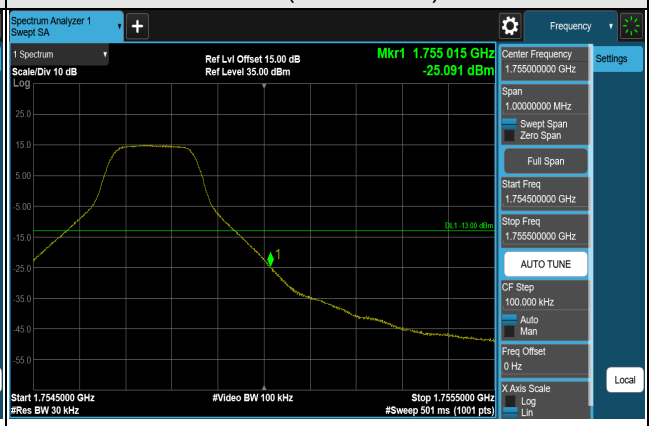


FULL (1711.5MHz)

FULL (1753.5MHz)

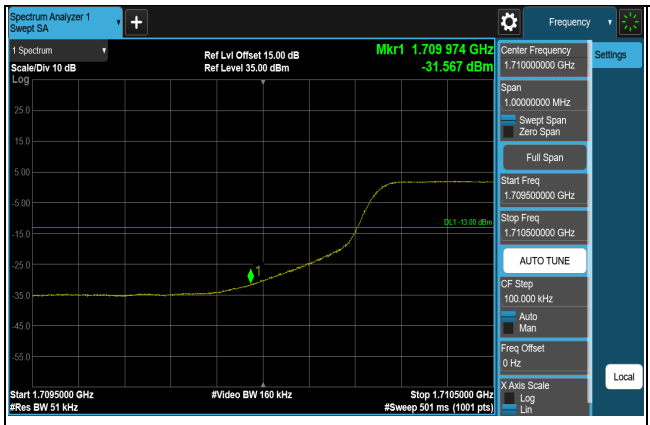


1RB (1711.5MHz)

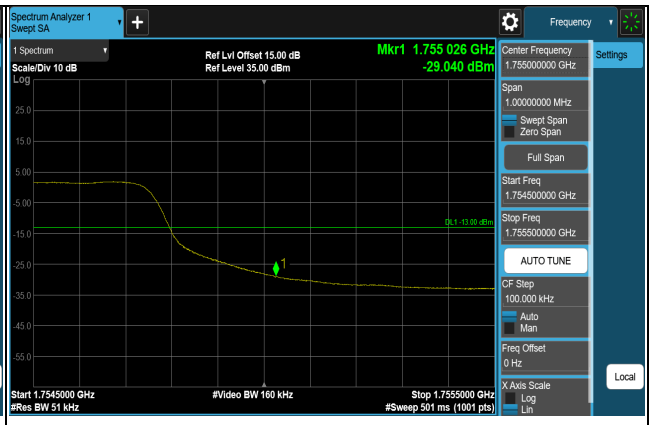


1RB (1753.5MHz)

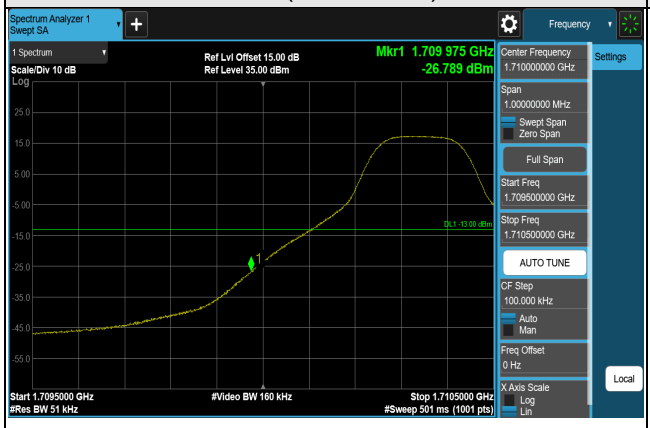
LTE Band 4 (Channel Bandwidth 5MHz)



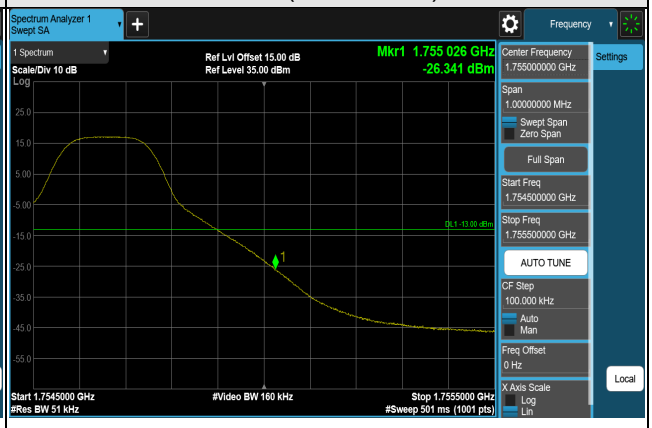
FULL (1712.5MHz)



FULL (1752.5MHz)

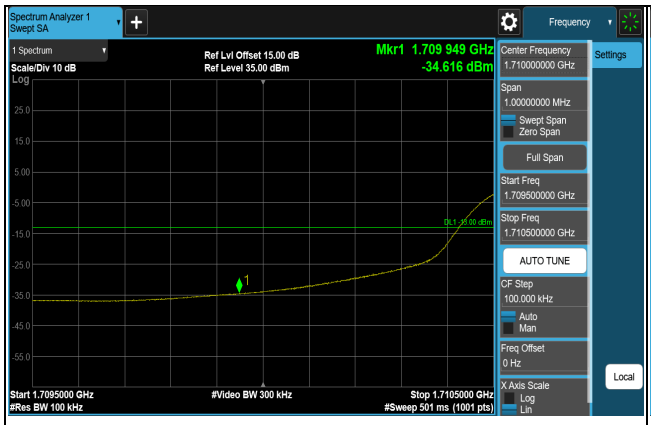


1RB (1712.5MHz)

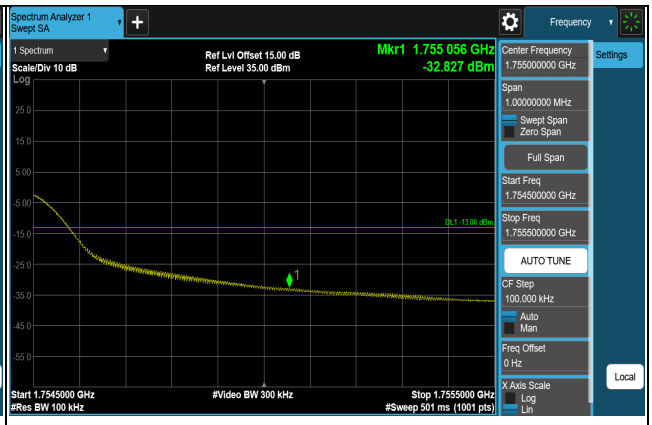


1RB (1752.5MHz)

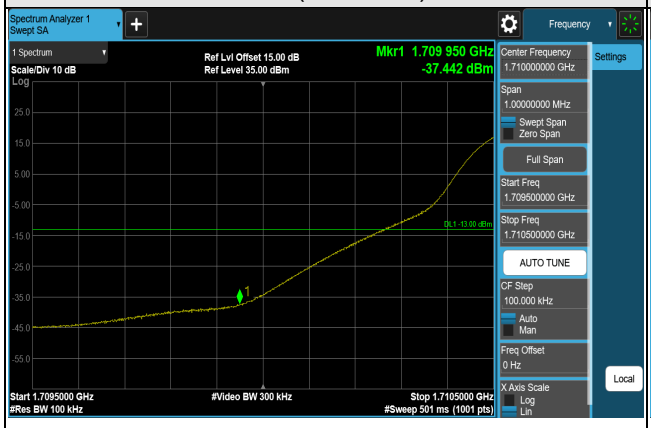
LTE Band 4 (Channel Bandwidth 10MHz)



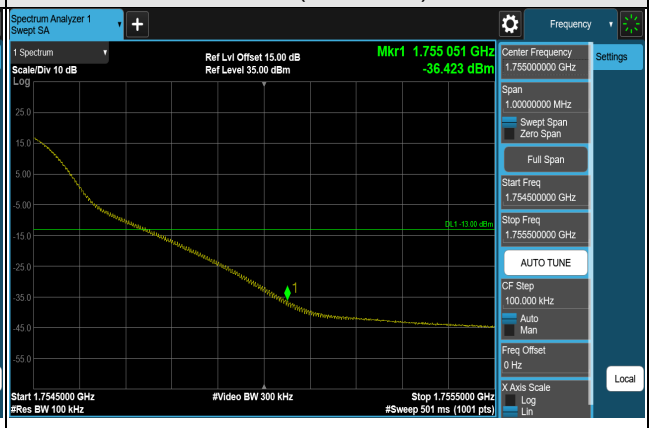
FULL (1715MHz)



FULL (1750MHz)

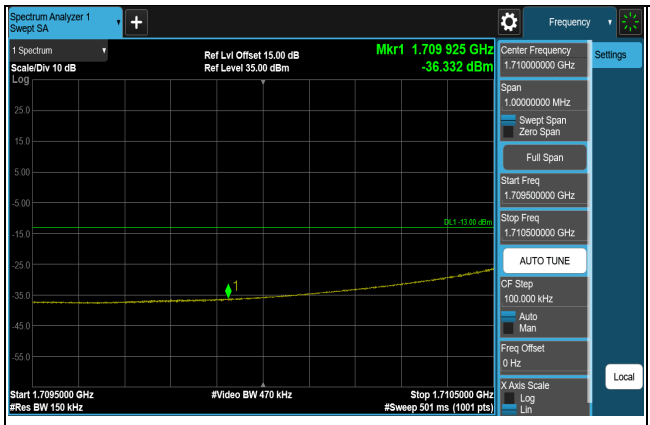


1RB (1715MHz)

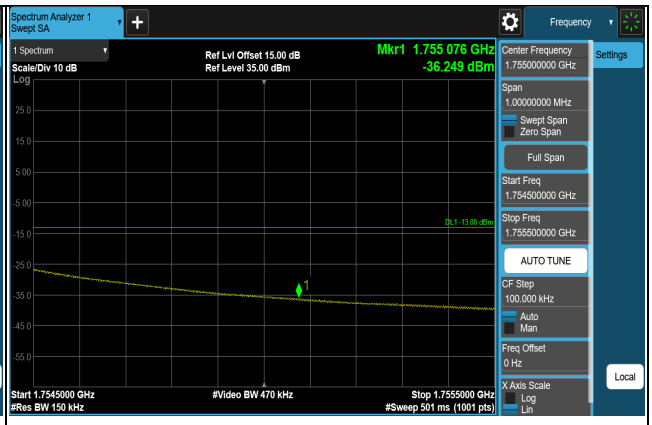


1RB (1750MHz)

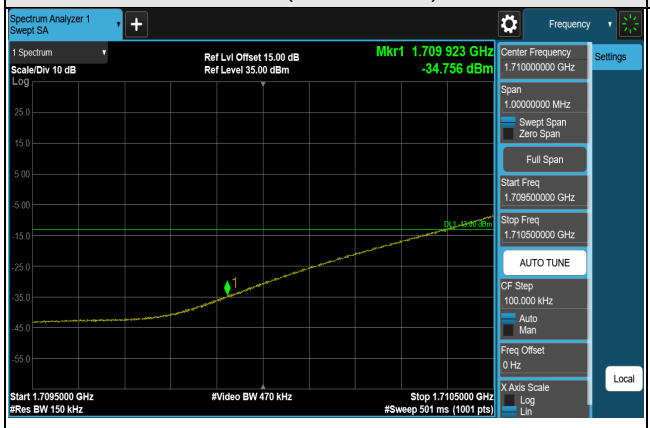
LTE Band 4 (Channel Bandwidth 15MHz)



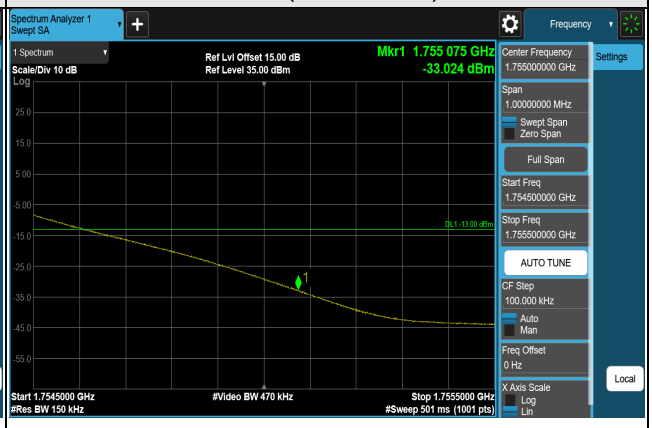
FULL (1717.5MHz)



FULL (1747.5MHz)

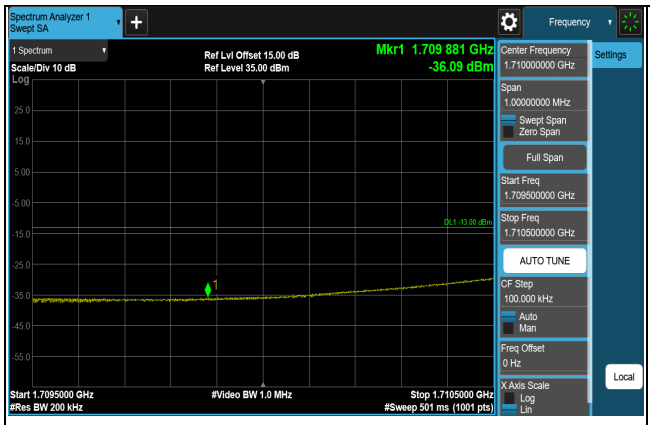


1RB (1717.5MHz)

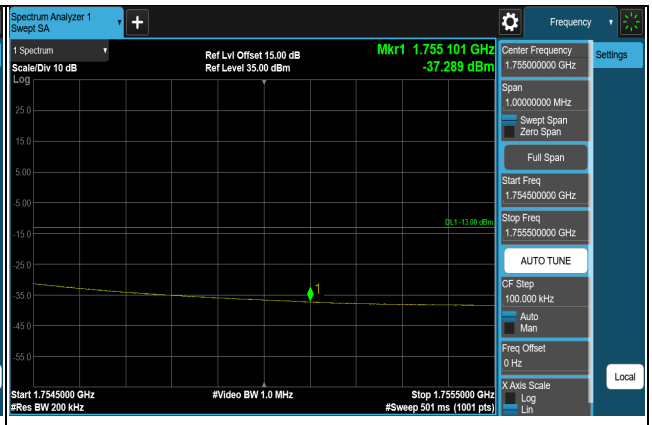


1RB (1747.5MHz)

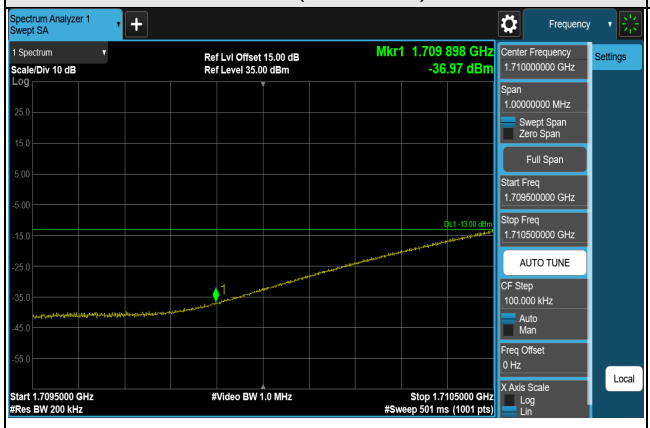
LTE Band 4 (Channel Bandwidth 20MHz)



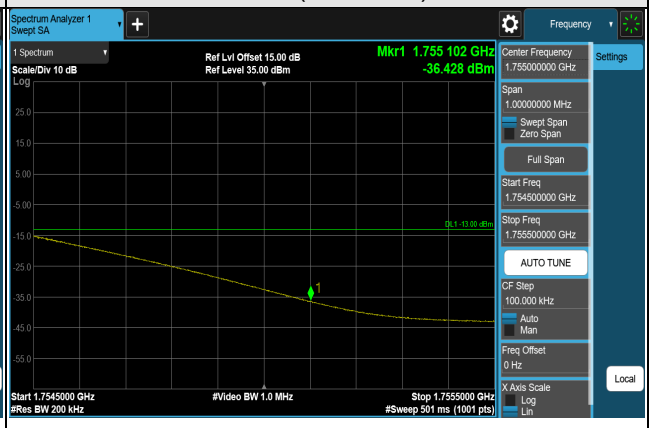
FULL (1720MHz)



FULL (1745MHz)

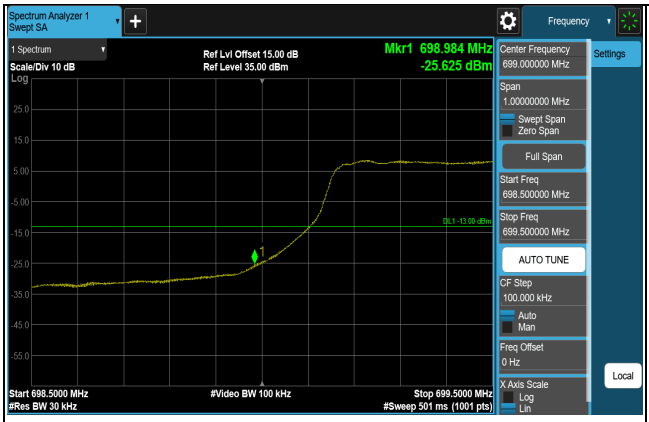


1RB (1720MHz)

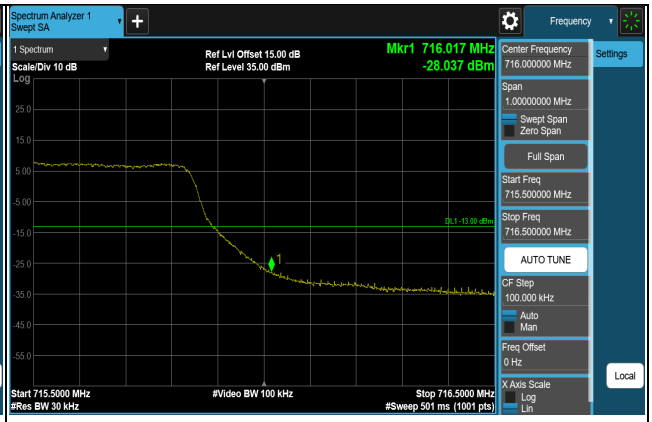


1RB (1745MHz)

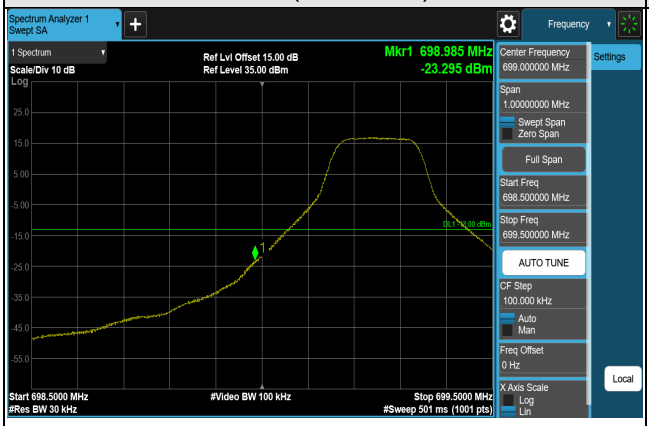
LTE Band 12 (Channel Bandwidth 1.4MHz)



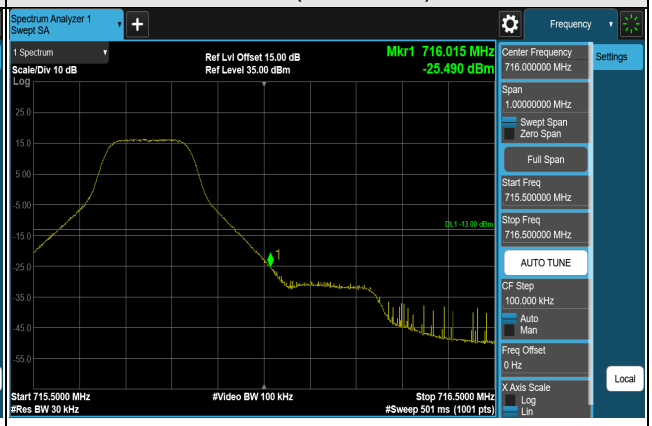
FULL (699.7MHz)



FULL (715.3MHz)

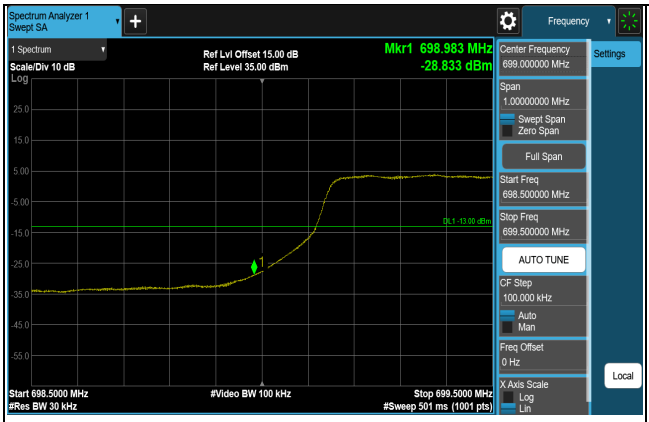


1RB (699.7MHz)

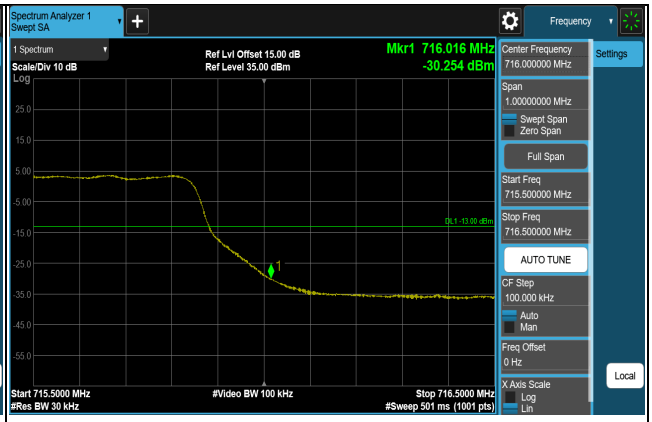


1RB (715.3MHz)

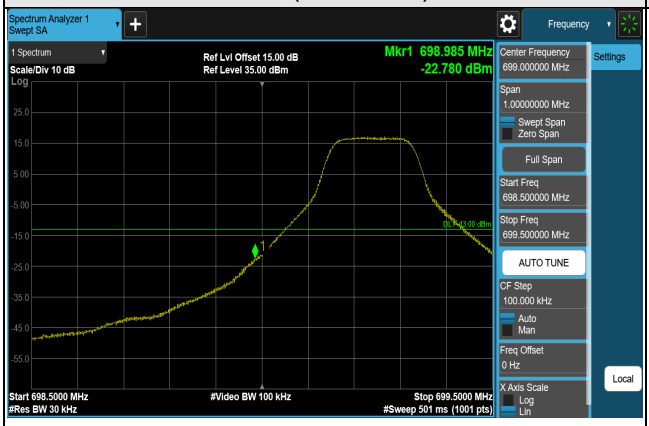
LTE Band 12 (Channel Bandwidth 3MHz)



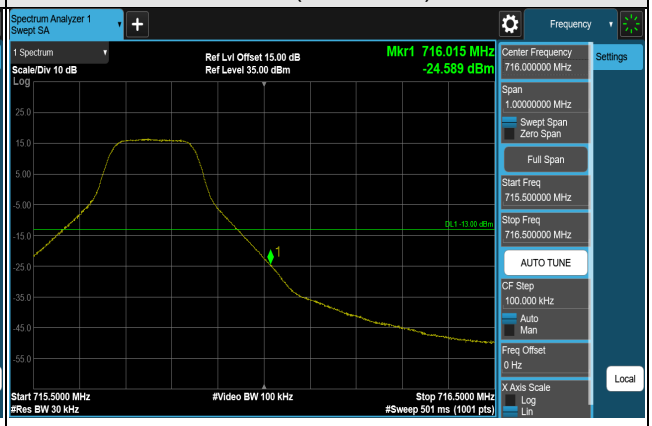
FULL (700.5MHz)



FULL (714.5MHz)

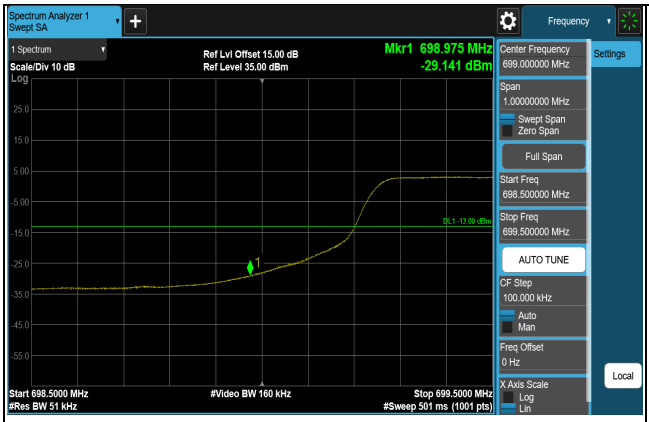


1RB (700.5MHz)



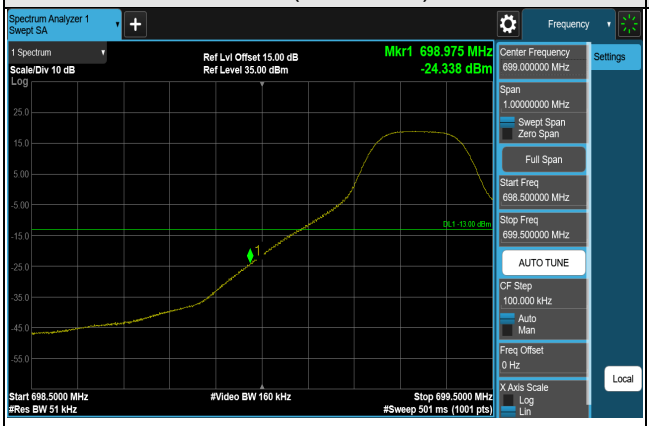
1RB (714.5MHz)

LTE Band 12 (Channel Bandwidth 5MHz)

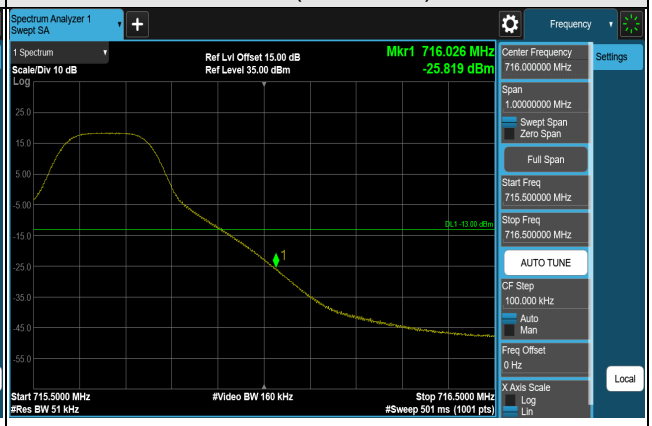


FULL (701.5MHz)

FULL (713.5MHz)

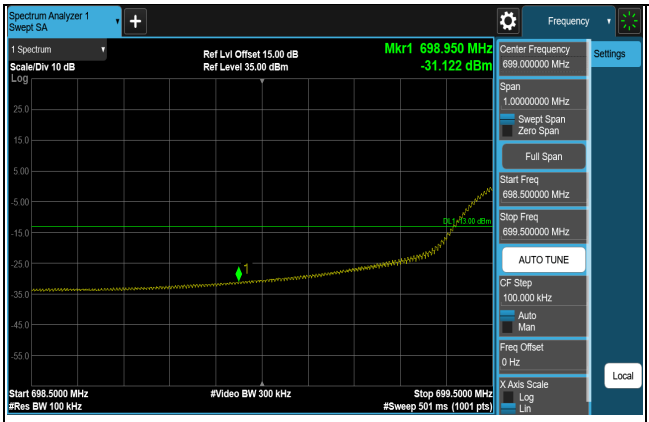


1RB (701.5MHz)

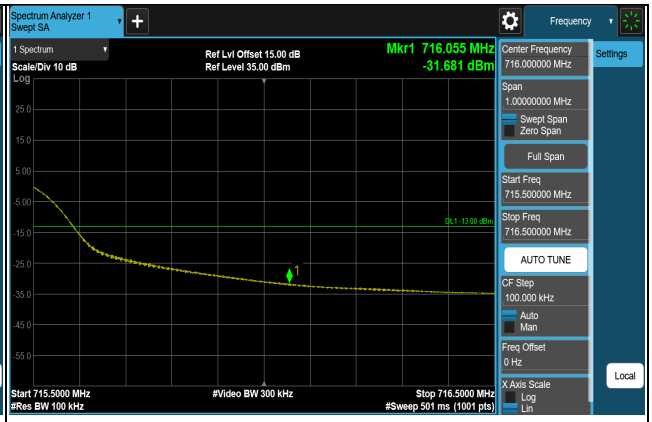


1RB (713.5MHz)

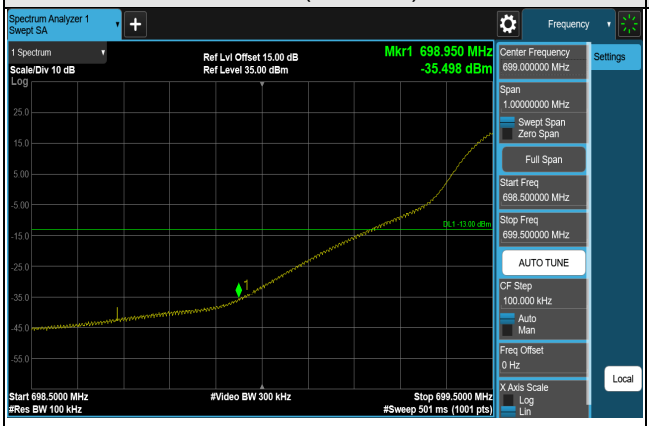
LTE Band 12 (Channel Bandwidth 10MHz)



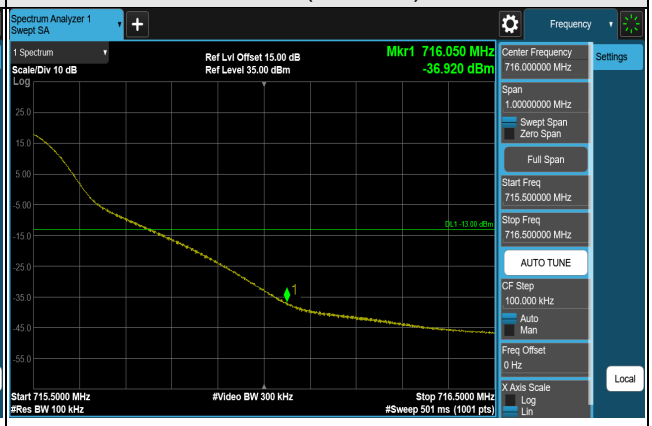
FULL (704MHz)



FULL (711MHz)



1RB (704MHz)



1RB (711MHz)