

FCC Test Report

(Part 22 – GPRS, EDGE, WCDMA, LTE Band 5 / 26)

Report No.: RFBHKI-WTW-P22030766

FCC ID: NKRUMC-STD31LFN

Test Model: UMC-STD31LFN

Received Date: Mar. 18, 2022

Test Date: Apr. 06 ~ Apr. 15, 2022

Issued Date: Jul. 04, 2022

Applicant: Wistron NeWeb Corporation

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**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



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Release Control Record

Issue No.	Description	Date Issued
RFBHKI-WTW-P22030766	Original release	Jul. 04, 2022

1 Certificate of Conformity

Product: Cellular module
Brand: WNC
Test Model: UMC-STD31LFN
Sample Status: Engineering sample
Applicant: Wistron NeWeb Corporation
Test Date: Apr. 06 ~ Apr. 15, 2022
Standards: FCC Part 22, Subpart H

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 : Pettie Chen , **Date:** Jul. 04, 2022
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** Jul. 04, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
22.913 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -21.21dB at 63.95MHz.

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) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 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. 24, 2021	Dec. 23, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-1214	Oct. 27, 2021	Oct. 26, 2022
HORN Antenna RF SPIN	DRH18-E	210101A18E	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	9170-1049	Nov. 14, 2021	Nov. 13, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
Preamplifier EMCI	EMC330N	980798	Jan. 17, 2022	Jan. 16, 2023
Preamplifier EMCI	EMC118A45SE	980809	Dec. 30, 2021	Dec. 29, 2022
Preamplifier EMCI	EMC184045SE	980786	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC104-SM-SM-(9 000+3000+1000)	201244+ 201232+ 210103	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMCCFD400-NM-N M-(9000+3000+500)	201251+ 201249+ 201248	Jan. 17, 2022	Jan. 16, 2023
RF signal cable EMCI	EMC101G-KM-KM-(5000+3000+2000)	201261+201258+ 201255	Jan. 17, 2022	Jan. 16, 2023
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	6261806803	Feb. 16, 2022	Feb. 15, 2023
Spectrum Analyzer KEYSIGHT	N9030B	MY57140953	Jul. 06, 2021	Jul. 05, 2022
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Jan. 03, 2022	Jan. 02, 2023
DC power supply KEYSIGHT	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360755	Jul. 08, 2021	Jul. 07, 2022

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	Cellular module			
Brand	WNC			
Test Model	UMC-STD31LFN			
Sample Status	Engineering sample			
Power Supply Rating	4.0Vdc			
Modulation Type	GPRS: GMSK EDGE: 8PSK WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM			
Operating Frequency	GPRS, EDGE	824.2MHz ~ 848.8MHz		
	WCDMA Band 5	826.4MHz ~ 846.6MHz		
	LTE Band 5 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz		
	LTE Band 5 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz		
	LTE Band 5 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz		
	LTE Band 5 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz		
	LTE Band 26 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz		
	LTE Band 26 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz		
	LTE Band 26 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz		
	LTE Band 26 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz		
	LTE Band 26 (Channel Bandwidth 15MHz)	831.5MHz ~ 841.5MHz		
Max. ERP Power	GPRS	1923.092mW (32.84dBm)		
	EDGE	1918.669mW (32.83dBm)		
	WCDMA Band 5	196.789mW (22.94dBm)		
		QPSK	16QAM	64QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	200.909mW (23.03dBm)	161.436mW (22.08dBm)	127.938mW (21.07dBm)
	LTE Band 5 (Channel Bandwidth 3MHz)	195.884mW (22.92dBm)	155.955mW (21.93dBm)	121.339mW (20.84dBm)
	LTE Band 5 (Channel Bandwidth 5MHz)	198.609mW (22.98dBm)	161.065mW (22.07dBm)	127.350mW (21.05dBm)
	LTE Band 5 (Channel Bandwidth 10MHz)	194.536mW (22.89dBm)	157.398mW (21.97dBm)	122.744mW (20.89dBm)
	LTE Band 26 (Channel Bandwidth 1.4MHz)	197.242mW (22.95dBm)	159.221mW (22.02dBm)	126.474mW (21.02dBm)
	LTE Band 26 (Channel Bandwidth 3MHz)	200.447mW (23.02dBm)	159.956mW (22.04dBm)	126.765mW (21.03dBm)
	LTE Band 26 (Channel Bandwidth 5MHz)	195.884mW (22.92dBm)	156.315mW (21.94dBm)	123.027mW (20.90dBm)
	LTE Band 26 (Channel Bandwidth 10MHz)	196.789mW (22.94dBm)	156.675mW (21.95dBm)	124.165mW (20.94dBm)
	LTE Band 26 (Channel Bandwidth 15MHz)	197.242mW (22.95dBm)	157.761mW (21.98dBm)	123.310mW (20.91dBm)

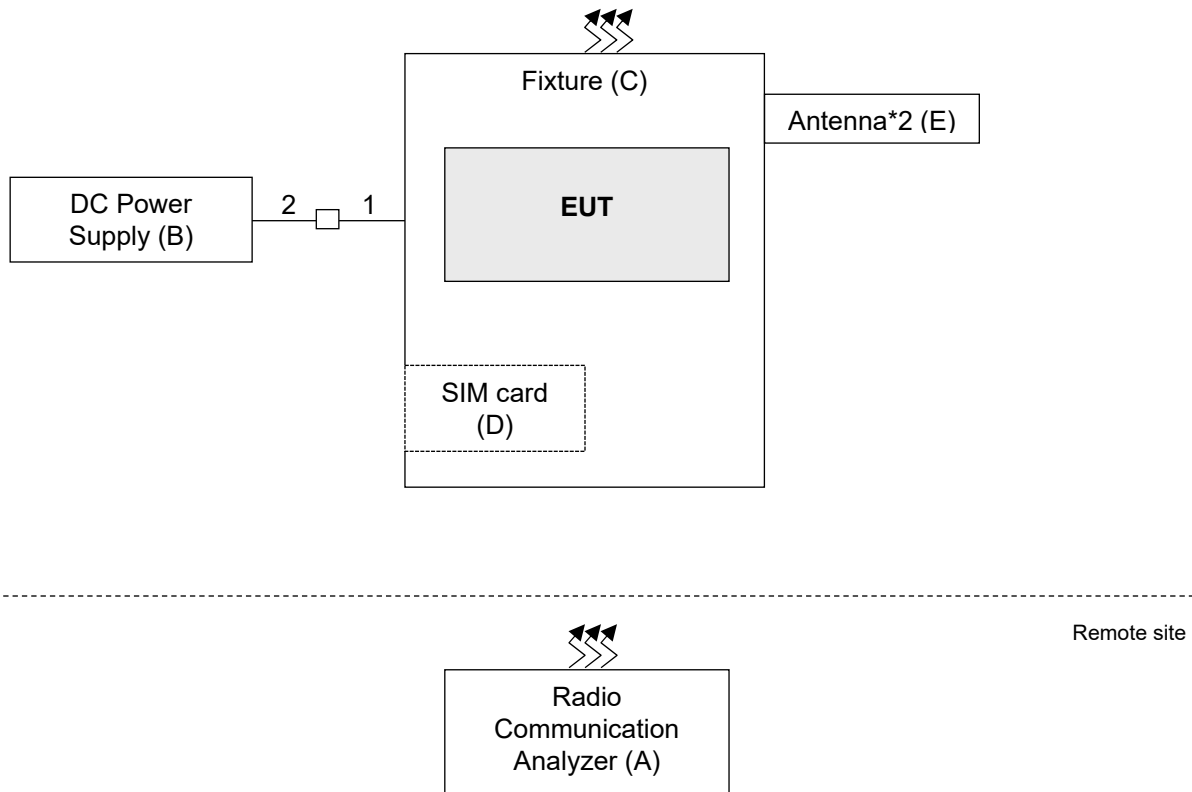
Emission Designator	GPRS	248KGXW		
	EDGE	249KG7W		
	WCDMA Band 5	4M19F9W		
		QPSK	16QAM	64QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W
	LTE Band 5 (Channel Bandwidth 3MHz)	2M69G7D	2M69D7W	2M70D7W
	LTE Band 5 (Channel Bandwidth 5MHz)	4M50G7D	4M49D7W	4M50D7W
	LTE Band 5 (Channel Bandwidth 10MHz)	9M01G7D	8M98D7W	8M98D7W
	LTE Band 26 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W
	LTE Band 26 (Channel Bandwidth 3MHz)	2M69G7D	2M69D7W	2M69D7W
	LTE Band 26 (Channel Bandwidth 5MHz)	4M50G7D	4M49D7W	4M49D7W
	LTE Band 26 (Channel Bandwidth 10MHz)	8M99G7D	8M98D7W	8M98D7W
	LTE Band 26 (Channel Bandwidth 15MHz)	13M5G7D	13M4D7W	13M5D7W
	Antenna Type	Refer to note		
Antenna Connector	Refer to note			
Accessory Device	NA			
Cable Supplied	NA			

Note: The antenna information is listed as below.

Type	Connector	Gain (dBi)													
		GSM 850	GSM 1900	WCDMA B2	WCDMA B5	LTE B2	LTE B4	LTE B5	LTE B7	LTE B12	LTE B17	LTE B25	LTE B26	LTE B66	LTE B71
Dipole	SMA	1.82	1.80	1.80	1.82	1.80	1.57	1.82	2.15	2.02	2.02	1.80	1.82	1.57	2.02

* 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.

3.2 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.	Radio Communication Analyzer	Anritsu	MT8820C	6201240432	NA	For LTE
		R&S	CMU200	101095	NA	For GPRS, EDGE, WCDMA
B.	DC Power Supply	TOP WARD	6603A	725906	NA	-
C.	Fixture	NA	NA	NA	NA	Supplied by applicant
D.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab
E.	Antenna*2	NA	NA	NA	NA	Supplied by applicant

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Power Cable	1	0.1	N	0	-
2.	DC Power Cable	1	1.0	N	0	-

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GPRS, EDGE	Z-plane
WCDMA Band 5	Z-plane
LTE Band 5	Z-plane
LTE Band 26	Z-plane

GPRS, EDGE Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Modulation
-	ERP	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GPRS, EDGE
-	Modulation Characteristics	128 to 251	128 (824.2MHz)	GPRS, EDGE
-	Frequency Stability	128 to 251	128 (824.2MHz), 251 (848.8MHz)	GPRS, EDGE
-	Occupied Bandwidth	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GPRS, EDGE
-	Band Edge	128 to 251	128(824.2MHz), 251(848.8MHz)	GPRS, EDGE
-	Peak To Average Ratio	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GPRS, EDGE
-	Conducted Emission	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GPRS, EDGE
-	Radiated Emission Below 1GHz	128 to 251	189 (836.4MHz)	GPRS, EDGE
-	Radiated Emission Above 1GHz	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GPRS, EDGE

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

WCDMA Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Modulation Characteristics	4132 to 4233	4182 (836.4MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA
-	Occupied Bandwidth	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Band Edge	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Peak To Average Ratio	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Conducted Emission	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission Below 1GHz	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Radiated Emission Above 1GHz	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA

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

LTE Band 5

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	RB #
-	ERP	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1 Half Full
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1 Half Full
-	Modulation Characteristics	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK / 16QAM / 64QAM	Full
-	Frequency Stability	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	Full
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	Full
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	Full
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	Full
-	Occupied Bandwidth	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	Full
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	Full
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	Full
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	Full
-	Band Edge	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1 Half Full
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1 Half Full
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 Half Full
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	1 Half Full

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	RB #
-	Peak to Average Ratio	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1
-	Conducted Emission	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK	1
-	Radiated Emission Below 1GHz	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK	1
-	Radiated Emission Above 1GHz	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	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 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM and 64QAM, measured value of QPSK is higher than 16QAM, and 64QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM and 64QAM modes, the other test items were performed under worse mode according to the maximum output power.

LTE Band 26

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	RB #
-	ERP	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1 Half Full
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1 Half Full
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1 Half Full
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1 Half Full
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM	1 Half Full
-	Modulation Characteristics	26865 to 26965	26915 (836.5MHz)	15MHz	QPSK / 16QAM / 64QAM	Full
-	Frequency Stability	26797 to 27033	26797 (824.7MHz), 27033 (848.3MHz)	1.4MHz	QPSK	Full
		26805 to 27025	26805 (825.5MHz), 27025 (847.5MHz)	3MHz	QPSK	Full
		26815 to 27015	26815 (826.5MHz), 27015 (846.5MHz)	5MHz	QPSK	Full
		26840 to 26990	26840 (829.0MHz), 26990 (844.0MHz)	10MHz	QPSK	Full
		26865 to 26965	26865 (831.5MHz), 26965 (841.5MHz)	15MHz	QPSK	Full
-	Occupied Bandwidth	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	Full
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	Full
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	Full
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	Full
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM	Full

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	RB #
-	Band Edge	26797 to 27033	26797 (824.7MHz), 27033 (848.3MHz)	1.4MHz	QPSK	1 Half Full
		26805 to 27025	26805 (825.5MHz), 27025 (847.5MHz)	3MHz	QPSK	1 Half Full
		26815 to 27015	26815 (826.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1 Half Full
		26840 to 26990	26840 (829.0MHz), 26990 (844.0MHz)	10MHz	QPSK	1 Half Full
		26865 to 26965	26865 (831.5MHz), 26965 (841.5MHz)	15MHz	QPSK	1 Half Full
-	Peak to Average Ratio	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM	1
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM	1
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM	1
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM	1
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK / 16QAM / 64QAM	1
-	Conducted Emission	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK	1
		26805 to 27025	26805 (825.5MHz), 26915 (836.5MHz), 27025 (847.5MHz)	3MHz	QPSK	1
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1
		26840 to 26990	26840 (829.0MHz), 26915 (836.5MHz), 26990 (844.0MHz)	10MHz	QPSK	1
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	QPSK	1

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	RB #
-	Radiated Emission Below 1GHz	26865 to 26965	26915 (836.5MHz)	15MHz	QPSK	1
-	Radiated Emission Above 1GHz	26797 to 27033	26797 (824.7MHz), 26915 (836.5MHz), 27033 (848.3MHz)	1.4MHz	QPSK	1
		26815 to 27015	26815 (826.5MHz), 26915 (836.5MHz), 27015 (846.5MHz)	5MHz	QPSK	1
		26865 to 26965	26865 (831.5MHz), 26915 (836.5MHz), 26965 (841.5MHz)	15MHz	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 36.521-1 Section 6.6.3.1.4.1, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The output power for QPSK, 16QAM and 64QAM, measured value of QPSK is higher than 16QAM, and 64QAM mode. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM and 64QAM 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
ERP	25deg. C, 60%RH	4.0Vdc	Noah Chang
Modulation Characteristics	25deg. C, 60%RH	4.0Vdc	Noah Chang
Frequency Stability	25deg. C, 60%RH	4.0Vdc	Noah Chang
Occupied Bandwidth	25deg. C, 60%RH	4.0Vdc	Noah Chang
Band Edge	25deg. C, 60%RH	4.0Vdc	Noah Chang
Peak To Average Ratio	25deg. C, 60%RH	4.0Vdc	Noah Chang
Conducted Emission	25deg. C, 60%RH	4.0Vdc	Noah Chang
Radiated Emission	21deg. C, 67%RH	4.0Vdc	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:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

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 and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with GPRS, EDGE, WCDMA, LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Maximum EIRP / ERP

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

$$\text{EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

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

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	GPRS, EDGE 850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GPRS	33.17	33.00	32.90
EDGE	33.16	32.99	32.93

Band	WCDMA V		
TX Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	23.20	23.12	23.27
HSDPA	22.19	22.19	22.40
HSUPA	22.08	22.15	22.28

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.22	23.15	23.08
		1	24	23.12	23.09	23.11
		1	49	23.15	23.16	23.22
		25	0	22.30	22.26	22.30
		25	12	22.13	22.13	22.17
		25	25	22.18	22.10	22.12
		50	0	22.18	22.09	21.99
10M	16QAM	1	0	22.23	22.25	22.08
		1	24	22.12	22.11	22.16
		1	49	22.17	22.24	22.30
		25	0	21.40	21.34	21.32
		25	12	21.23	21.18	21.22
		25	25	21.27	21.20	21.16
		50	0	21.19	21.13	21.07
10M	64QAM	1	0	21.20	21.22	21.01
		1	24	21.04	21.09	21.10
		1	49	21.12	21.22	21.20
		25	0	20.32	20.24	20.28
		25	12	20.21	20.18	20.13
		25	25	20.23	20.18	20.15
		50	0	20.13	20.08	20.03

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	23.31	23.21	23.21
		1	12	23.07	23.15	23.09
		1	24	23.26	23.20	23.19
		12	0	22.06	22.10	22.10
		12	6	22.32	22.22	22.29
		12	13	22.10	22.19	22.26
		25	0	22.19	22.16	22.15
5M	16QAM	1	0	22.40	22.29	22.26
		1	12	22.13	22.19	22.16
		1	24	22.28	22.28	22.23
		12	0	21.11	21.13	21.14
		12	6	21.41	21.26	21.39
		12	13	21.11	21.21	21.26
		25	0	21.28	21.22	21.22
5M	64QAM	1	0	21.38	21.22	21.16
		1	12	21.08	21.16	21.15
		1	24	21.27	21.24	21.21
		12	0	20.05	20.13	20.11
		12	6	20.38	20.25	20.32
		12	13	20.05	20.14	20.26
		25	0	20.28	20.14	20.13

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	23.12	23.06	23.08
		1	7	23.05	23.10	23.01
		1	14	23.25	23.15	23.05
		8	0	22.20	22.22	22.24
		8	3	22.10	22.19	22.20
		8	7	22.23	22.15	22.16
		15	0	22.28	22.21	22.11
3M	16QAM	1	0	22.16	22.07	22.14
		1	7	22.11	22.18	22.04
		1	14	22.26	22.21	22.10
		8	0	21.24	21.32	21.34
		8	3	21.18	21.29	21.20
		8	7	21.30	21.24	21.20
		15	0	21.33	21.28	21.18
3M	64QAM	1	0	21.11	20.97	21.12
		1	7	21.02	21.13	20.96
		1	14	21.17	21.14	21.04
		8	0	20.14	20.30	20.24
		8	3	20.10	20.25	20.17
		8	7	20.26	20.14	20.17
		15	0	20.30	20.19	20.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	22.96	23.02	23.01
		1	2	23.24	23.26	23.36
		1	5	23.10	23.01	23.03
		3	0	23.17	23.12	23.13
		3	1	23.14	23.18	23.20
		3	3	23.22	23.16	23.13
		6	0	22.18	22.25	22.16
1.4M	16QAM	1	0	22.05	22.06	22.07
		1	2	22.27	22.27	22.41
		1	5	22.13	22.02	22.07
		3	0	22.25	22.13	22.14
		3	1	22.23	22.26	22.26
		3	3	22.31	22.17	22.20
		6	0	21.22	21.29	21.21
1.4M	64QAM	1	0	21.04	20.99	21.03
		1	2	21.27	21.18	21.40
		1	5	21.05	21.02	21.07
		3	0	21.23	21.06	21.04
		3	1	21.14	21.19	21.18
		3	3	21.26	21.11	21.12
		6	0	20.17	20.24	20.21

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26865	26915	26965
		Frequency (MHz)		831.5	836.5	841.5
15M	QPSK	1	0	23.21	23.16	23.19
		1	37	23.17	23.23	23.28
		1	74	23.19	23.11	23.09
		36	0	21.04	21.13	21.14
		36	19	21.31	21.26	21.33
		36	39	21.19	21.21	21.26
		75	0	20.97	21.06	21.07
15M	16QAM	1	0	22.24	22.19	22.24
		1	37	22.25	22.23	22.31
		1	74	22.28	22.21	22.13
		36	0	20.10	20.21	20.20
		36	19	20.38	20.35	20.37
		36	39	20.26	20.25	20.27
		75	0	20.02	20.06	20.08
15M	64QAM	1	0	21.23	21.10	21.14
		1	37	21.20	21.21	21.23
		1	74	21.24	21.17	21.11
		36	0	19.10	19.14	19.16
		36	19	19.36	19.33	19.27
		36	39	19.24	19.21	19.24
		75	0	18.94	18.96	19.08

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26840	26915	26990
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.23	23.20	23.27
		1	24	23.19	23.21	23.17
		1	49	23.21	23.22	23.20
		25	0	21.08	21.16	21.15
		25	12	21.35	21.30	21.27
		25	25	21.15	21.24	21.28
		50	0	21.23	21.25	21.28
10M	16QAM	1	0	22.26	22.22	22.28
		1	24	22.28	22.25	22.20
		1	49	22.27	22.23	22.20
		25	0	20.17	20.23	20.19
		25	12	20.41	20.35	20.31
		25	25	20.23	20.30	20.37
		50	0	20.29	20.34	20.33
10M	64QAM	1	0	21.18	21.13	21.18
		1	24	21.27	21.25	21.18
		1	49	21.20	21.21	21.19
		25	0	19.08	19.22	19.10
		25	12	19.39	19.25	19.25
		25	25	19.15	19.24	19.36
		50	0	19.26	19.24	19.27

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26815	26915	27015
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	23.15	23.15	23.20
		1	12	23.15	23.16	23.25
		1	24	23.07	23.06	23.14
		12	0	22.13	22.20	22.26
		12	6	22.08	22.15	22.08
		12	13	22.04	22.13	22.14
		25	0	22.17	22.21	22.15
5M	16QAM	1	0	22.18	22.18	22.20
		1	12	22.19	22.18	22.27
		1	24	22.10	22.09	22.23
		12	0	21.16	21.29	21.27
		12	6	21.13	21.22	21.11
		12	13	21.13	21.16	21.18
		25	0	21.20	21.31	21.16
5M	64QAM	1	0	21.17	21.17	21.19
		1	12	21.09	21.14	21.23
		1	24	21.08	21.05	21.16
		12	0	20.09	20.24	20.27
		12	6	20.09	20.13	20.05
		12	13	20.06	20.09	20.13
		25	0	20.17	20.31	20.14

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26805	26915	27025
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	23.19	23.20	23.29
		1	7	23.23	23.19	23.15
		1	14	23.20	23.25	23.35
		8	0	22.16	22.15	22.13
		8	3	22.30	22.26	22.34
		8	7	22.18	22.16	22.10
		15	0	22.07	22.13	22.06
3M	16QAM	1	0	22.19	22.22	22.30
		1	7	22.27	22.27	22.15
		1	14	22.28	22.35	22.37
		8	0	21.19	21.23	21.16
		8	3	21.40	21.28	21.38
		8	7	21.21	21.17	21.10
		15	0	21.10	21.20	21.16
3M	64QAM	1	0	21.12	21.21	21.24
		1	7	21.24	21.20	21.10
		1	14	21.21	21.26	21.36
		8	0	20.19	20.20	20.15
		8	3	20.36	20.19	20.35
		8	7	20.18	20.08	20.10
		15	0	20.08	20.12	20.16

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26797	26915	27033
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	23.28	23.25	23.17
		1	2	23.17	23.10	23.04
		1	5	23.17	23.16	23.21
		3	0	23.11	23.21	23.25
		3	1	23.19	23.15	23.18
		3	3	23.23	23.13	23.17
		6	0	22.04	22.12	22.22
1.4M	16QAM	1	0	22.32	22.35	22.17
		1	2	22.19	22.13	22.11
		1	5	22.26	22.25	22.30
		3	0	22.17	22.21	22.26
		3	1	22.25	22.25	22.28
		3	3	22.33	22.15	22.17
		6	0	21.09	21.15	21.30
1.4M	64QAM	1	0	21.29	21.35	21.12
		1	2	21.19	21.06	21.10
		1	5	21.24	21.21	21.25
		3	0	21.11	21.14	21.22
		3	1	21.17	21.25	21.18
		3	3	21.25	21.15	21.07
		6	0	20.09	20.07	20.24

ERP Power (dBm)

Band	GPRS, EDGE 850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GPRS	32.84	32.67	32.57
EDGE	32.83	32.66	32.60

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

Band	WCDMA V		
TX Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	22.87	22.79	22.94
HSDPA	21.86	21.86	22.07
HSUPA	21.75	21.82	21.95

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	22.89	22.82	22.75
		1	24	22.79	22.76	22.78
		1	49	22.82	22.83	22.89
		25	0	21.97	21.93	21.97
		25	12	21.80	21.80	21.84
		25	25	21.85	21.77	21.79
		50	0	21.85	21.76	21.66
10M	16QAM	1	0	21.90	21.92	21.75
		1	24	21.79	21.78	21.83
		1	49	21.84	21.91	21.97
		25	0	21.07	21.01	20.99
		25	12	20.90	20.85	20.89
		25	25	20.94	20.87	20.83
		50	0	20.86	20.80	20.74
10M	64QAM	1	0	20.87	20.89	20.68
		1	24	20.71	20.76	20.77
		1	49	20.79	20.89	20.87
		25	0	19.99	19.91	19.95
		25	12	19.88	19.85	19.80
		25	25	19.90	19.85	19.82
		50	0	19.80	19.75	19.70

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	22.98	22.88	22.88
		1	12	22.74	22.82	22.76
		1	24	22.93	22.87	22.86
		12	0	21.73	21.77	21.77
		12	6	21.99	21.89	21.96
		12	13	21.77	21.86	21.93
		25	0	21.86	21.83	21.82
5M	16QAM	1	0	22.07	21.96	21.93
		1	12	21.80	21.86	21.83
		1	24	21.95	21.95	21.90
		12	0	20.78	20.80	20.81
		12	6	21.08	20.93	21.06
		12	13	20.78	20.88	20.93
		25	0	20.95	20.89	20.89
5M	64QAM	1	0	21.05	20.89	20.83
		1	12	20.75	20.83	20.82
		1	24	20.94	20.91	20.88
		12	0	19.72	19.80	19.78
		12	6	20.05	19.92	19.99
		12	13	19.72	19.81	19.93
		25	0	19.95	19.81	19.80

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	22.79	22.73	22.75
		1	7	22.72	22.77	22.68
		1	14	22.92	22.82	22.72
		8	0	21.87	21.89	21.91
		8	3	21.77	21.86	21.87
		8	7	21.90	21.82	21.83
		15	0	21.95	21.88	21.78
3M	16QAM	1	0	21.83	21.74	21.81
		1	7	21.78	21.85	21.71
		1	14	21.93	21.88	21.77
		8	0	20.91	20.99	21.01
		8	3	20.85	20.96	20.87
		8	7	20.97	20.91	20.87
		15	0	21.00	20.95	20.85
3M	64QAM	1	0	20.78	20.64	20.79
		1	7	20.69	20.80	20.63
		1	14	20.84	20.81	20.71
		8	0	19.81	19.97	19.91
		8	3	19.77	19.92	19.84
		8	7	19.93	19.81	19.84
		15	0	19.97	19.86	19.82

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	22.63	22.69	22.68
		1	2	22.91	22.93	23.03
		1	5	22.77	22.68	22.70
		3	0	22.84	22.79	22.80
		3	1	22.81	22.85	22.87
		3	3	22.89	22.83	22.80
		6	0	21.85	21.92	21.83
1.4M	16QAM	1	0	21.72	21.73	21.74
		1	2	21.94	21.94	22.08
		1	5	21.80	21.69	21.74
		3	0	21.92	21.80	21.81
		3	1	21.90	21.93	21.93
		3	3	21.98	21.84	21.87
		6	0	20.89	20.96	20.88
1.4M	64QAM	1	0	20.71	20.66	20.70
		1	2	20.94	20.85	21.07
		1	5	20.72	20.69	20.74
		3	0	20.90	20.73	20.71
		3	1	20.81	20.86	20.85
		3	3	20.93	20.78	20.79
		6	0	19.84	19.91	19.88

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26865	26915	26965
		Frequency (MHz)		831.5	836.5	841.5
15M	QPSK	1	0	22.88	22.83	22.86
		1	37	22.84	22.90	22.95
		1	74	22.86	22.78	22.76
		36	0	20.71	20.80	20.81
		36	19	20.98	20.93	21.00
		36	39	20.86	20.88	20.93
		75	0	20.64	20.73	20.74
15M	16QAM	1	0	21.91	21.86	21.91
		1	37	21.92	21.90	21.98
		1	74	21.95	21.88	21.80
		36	0	19.77	19.88	19.87
		36	19	20.05	20.02	20.04
		36	39	19.93	19.92	19.94
		75	0	19.69	19.73	19.75
15M	64QAM	1	0	20.90	20.77	20.81
		1	37	20.87	20.88	20.90
		1	74	20.91	20.84	20.78
		36	0	18.77	18.81	18.83
		36	19	19.03	19.00	18.94
		36	39	18.91	18.88	18.91
		75	0	18.61	18.63	18.75

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26840	26915	26990
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	22.90	22.87	22.94
		1	24	22.86	22.88	22.84
		1	49	22.88	22.89	22.87
		25	0	20.75	20.83	20.82
		25	12	21.02	20.97	20.94
		25	25	20.82	20.91	20.95
		50	0	20.90	20.92	20.95
10M	16QAM	1	0	21.93	21.89	21.95
		1	24	21.95	21.92	21.87
		1	49	21.94	21.90	21.87
		25	0	19.84	19.90	19.86
		25	12	20.08	20.02	19.98
		25	25	19.90	19.97	20.04
		50	0	19.96	20.01	20.00
10M	64QAM	1	0	20.85	20.80	20.85
		1	24	20.94	20.92	20.85
		1	49	20.87	20.88	20.86
		25	0	18.75	18.89	18.77
		25	12	19.06	18.92	18.92
		25	25	18.82	18.91	19.03
		50	0	18.93	18.91	18.94

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26815	26915	27015
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	22.82	22.82	22.87
		1	12	22.82	22.83	22.92
		1	24	22.74	22.73	22.81
		12	0	21.80	21.87	21.93
		12	6	21.75	21.82	21.75
		12	13	21.71	21.80	21.81
		25	0	21.84	21.88	21.82
5M	16QAM	1	0	21.85	21.85	21.87
		1	12	21.86	21.85	21.94
		1	24	21.77	21.76	21.90
		12	0	20.83	20.96	20.94
		12	6	20.80	20.89	20.78
		12	13	20.80	20.83	20.85
		25	0	20.87	20.98	20.83
5M	64QAM	1	0	20.84	20.84	20.86
		1	12	20.76	20.81	20.90
		1	24	20.75	20.72	20.83
		12	0	19.76	19.91	19.94
		12	6	19.76	19.80	19.72
		12	13	19.73	19.76	19.80
		25	0	19.84	19.98	19.81

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26805	26915	27025
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	22.86	22.87	22.96
		1	7	22.90	22.86	22.82
		1	14	22.87	22.92	23.02
		8	0	21.83	21.82	21.80
		8	3	21.97	21.93	22.01
		8	7	21.85	21.83	21.77
		15	0	21.74	21.80	21.73
3M	16QAM	1	0	21.86	21.89	21.97
		1	7	21.94	21.94	21.82
		1	14	21.95	22.02	22.04
		8	0	20.86	20.90	20.83
		8	3	21.07	20.95	21.05
		8	7	20.88	20.84	20.77
		15	0	20.77	20.87	20.83
3M	64QAM	1	0	20.79	20.88	20.91
		1	7	20.91	20.87	20.77
		1	14	20.88	20.93	21.03
		8	0	19.86	19.87	19.82
		8	3	20.03	19.86	20.02
		8	7	19.85	19.75	19.77
		15	0	19.75	19.79	19.83

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26797	26915	27033
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	22.95	22.92	22.84
		1	2	22.84	22.77	22.71
		1	5	22.84	22.83	22.88
		3	0	22.78	22.88	22.92
		3	1	22.86	22.82	22.85
		3	3	22.90	22.80	22.84
		6	0	21.71	21.79	21.89
1.4M	16QAM	1	0	21.99	22.02	21.84
		1	2	21.86	21.80	21.78
		1	5	21.93	21.92	21.97
		3	0	21.84	21.88	21.93
		3	1	21.92	21.92	21.95
		3	3	22.00	21.82	21.84
		6	0	20.76	20.82	20.97
1.4M	64QAM	1	0	20.96	21.02	20.79
		1	2	20.86	20.73	20.77
		1	5	20.91	20.88	20.92
		3	0	20.78	20.81	20.89
		3	1	20.84	20.92	20.85
		3	3	20.92	20.82	20.74
		6	0	19.76	19.74	19.91

*ERP = Conducted + antenna gain (1.82dBi) - 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



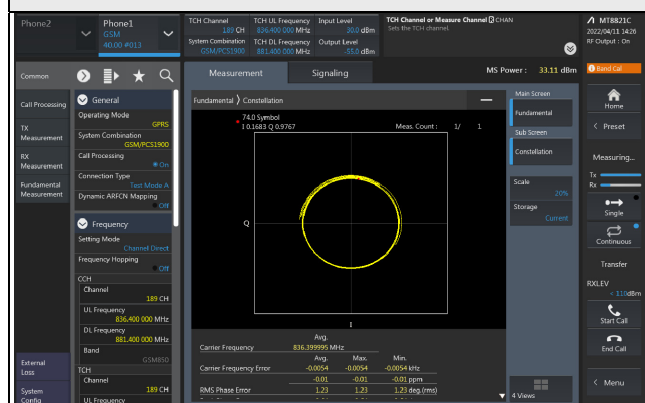
4.2.4 Test Results

GPRS, EDGE

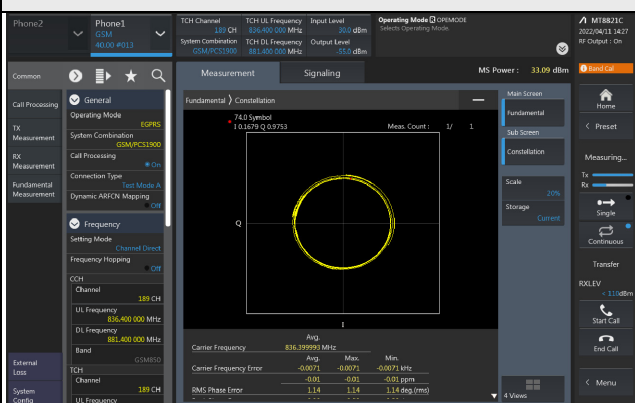
Spectrum Plot of Measurement Value

Channel: 128 / Frequency (MHz): 824.2MHz

GPRS



EDGE

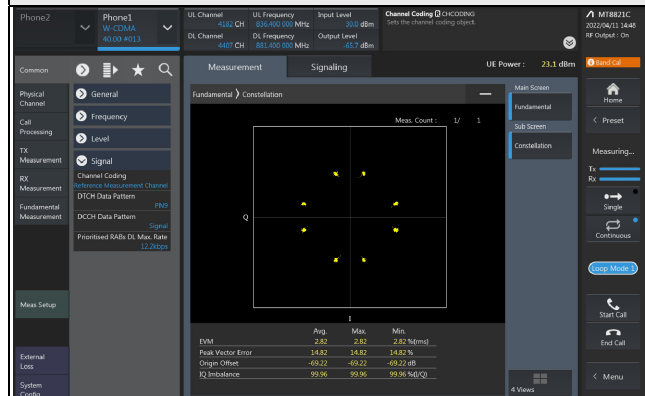


WCDMA Band 5

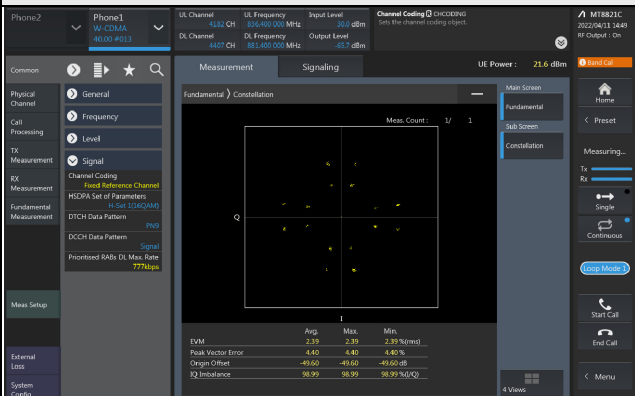
Spectrum Plot of Measurement Value

Channel: 4182 / Frequency (MHz): 836.4MHz

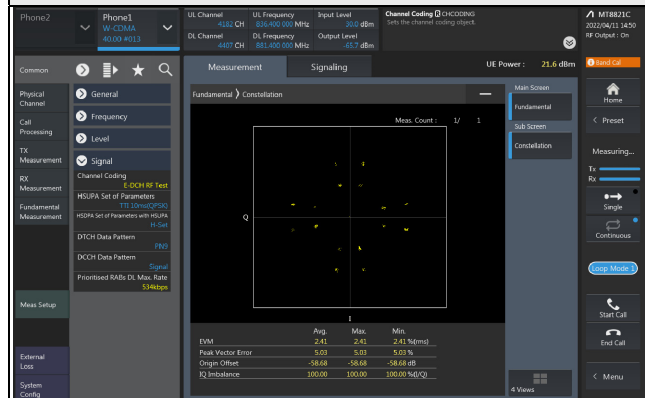
WCDMA



HSDPA



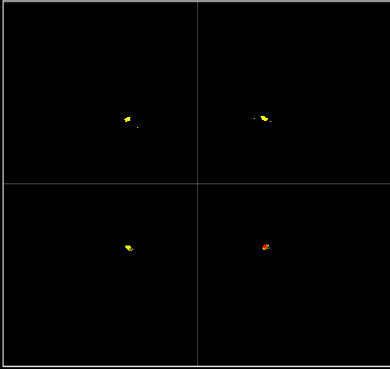
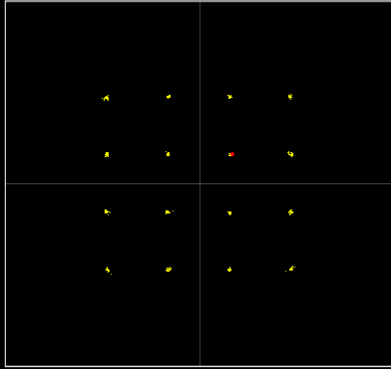
HSUPA



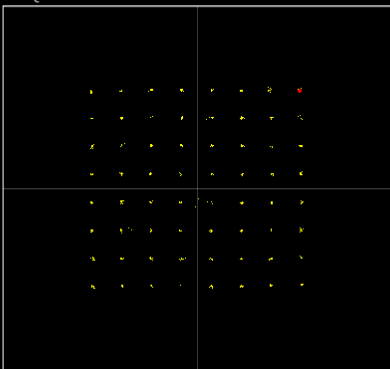
LTE Band 5

Spectrum Plot of Measurement Value

Channel: 20525 / Frequency (MHz): 836.5MHz

QPSK	16QAM																																																		
<p>Fundamental > Constellation</p> <p>0 Symbol I 0.7005 Q -0.7012 Meas. Count : 1/ 1</p>  <p style="text-align: center;">I</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>1.48</td> <td>1.48</td> <td>1.48 %(rms)</td> <td>≤ 17.5 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>19.09</td> <td>19.09</td> <td>19.09 %</td> <td></td> </tr> <tr> <td>Carrier Leakage</td> <td>-54.02</td> <td>-54.02</td> <td>-54.02 dBc</td> <td></td> </tr> <tr> <td>IQ Imbalance</td> <td>99.61</td> <td>99.61</td> <td>99.61 %(I/Q)</td> <td></td> </tr> </tbody> </table>		Avg.	Max.	Min.	Limit	EVM	1.48	1.48	1.48 %(rms)	≤ 17.5 %(rms)	Peak Vector Error	19.09	19.09	19.09 %		Carrier Leakage	-54.02	-54.02	-54.02 dBc		IQ Imbalance	99.61	99.61	99.61 %(I/Q)		<p>Fundamental > Constellation</p> <p>0 Symbol I 0.3362 Q 0.3246 Meas. Count : 1/ 1</p>  <p style="text-align: center;">I</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>1.61</td> <td>1.61</td> <td>1.61 %(rms)</td> <td>≤ 12.5 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>15.68</td> <td>15.68</td> <td>15.68 %</td> <td></td> </tr> <tr> <td>Carrier Leakage</td> <td>-57.74</td> <td>-57.74</td> <td>-57.74 dBc</td> <td></td> </tr> <tr> <td>IQ Imbalance</td> <td>99.58</td> <td>99.58</td> <td>99.58 %(I/Q)</td> <td></td> </tr> </tbody> </table>		Avg.	Max.	Min.	Limit	EVM	1.61	1.61	1.61 %(rms)	≤ 12.5 %(rms)	Peak Vector Error	15.68	15.68	15.68 %		Carrier Leakage	-57.74	-57.74	-57.74 dBc		IQ Imbalance	99.58	99.58	99.58 %(I/Q)	
	Avg.	Max.	Min.	Limit																																															
EVM	1.48	1.48	1.48 %(rms)	≤ 17.5 %(rms)																																															
Peak Vector Error	19.09	19.09	19.09 %																																																
Carrier Leakage	-54.02	-54.02	-54.02 dBc																																																
IQ Imbalance	99.61	99.61	99.61 %(I/Q)																																																
	Avg.	Max.	Min.	Limit																																															
EVM	1.61	1.61	1.61 %(rms)	≤ 12.5 %(rms)																																															
Peak Vector Error	15.68	15.68	15.68 %																																																
Carrier Leakage	-57.74	-57.74	-57.74 dBc																																																
IQ Imbalance	99.58	99.58	99.58 %(I/Q)																																																

64QAM

<p>Fundamental > Constellation</p> <p>0 Symbol I 1.0585 Q 1.0712 Meas. Count : 1/ 1</p>  <p style="text-align: center;">I</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Avg.</th> <th>Max.</th> <th>Min.</th> <th>Limit</th> </tr> </thead> <tbody> <tr> <td>EVM</td> <td>1.60</td> <td>1.60</td> <td>1.60 %(rms)</td> <td>≤ 8.0 %(rms)</td> </tr> <tr> <td>Peak Vector Error</td> <td>15.18</td> <td>15.18</td> <td>15.18 %</td> <td></td> </tr> <tr> <td>Carrier Leakage</td> <td>-56.43</td> <td>-56.43</td> <td>-56.43 dBc</td> <td></td> </tr> <tr> <td>IQ Imbalance</td> <td>99.53</td> <td>99.53</td> <td>99.53 %(I/Q)</td> <td></td> </tr> </tbody> </table>		Avg.	Max.	Min.	Limit	EVM	1.60	1.60	1.60 %(rms)	≤ 8.0 %(rms)	Peak Vector Error	15.18	15.18	15.18 %		Carrier Leakage	-56.43	-56.43	-56.43 dBc		IQ Imbalance	99.53	99.53	99.53 %(I/Q)		
	Avg.	Max.	Min.	Limit																						
EVM	1.60	1.60	1.60 %(rms)	≤ 8.0 %(rms)																						
Peak Vector Error	15.18	15.18	15.18 %																							
Carrier Leakage	-56.43	-56.43	-56.43 dBc																							
IQ Imbalance	99.53	99.53	99.53 %(I/Q)																							

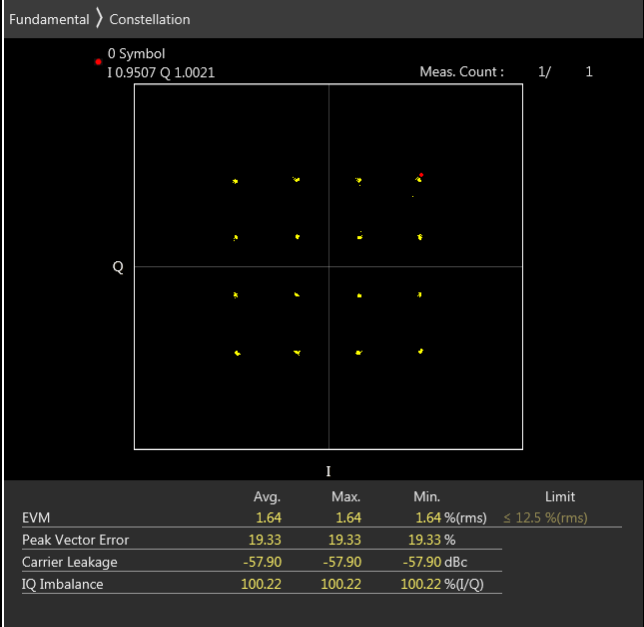
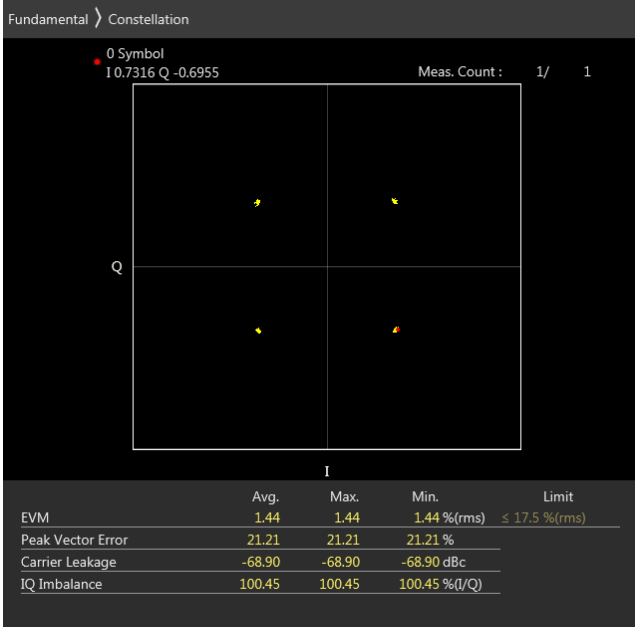
LTE Band 26

Spectrum Plot of Measurement Value

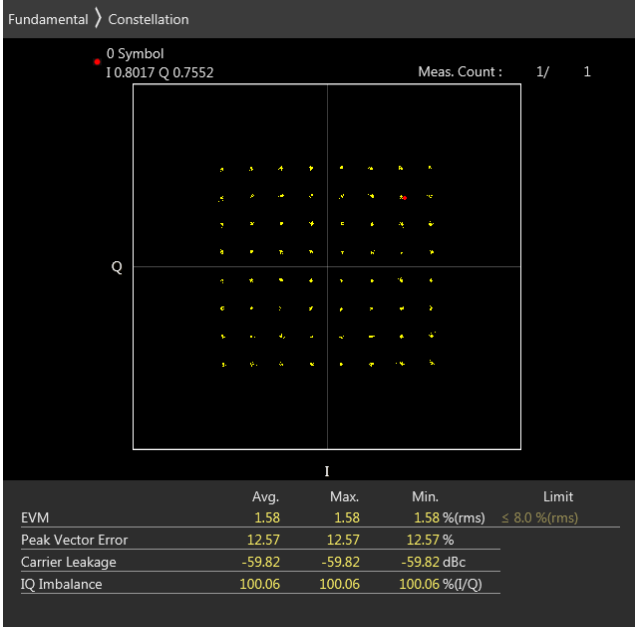
Channel: 26915 / Frequency (MHz): 836.5MHz

QPSK

16QAM



64QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

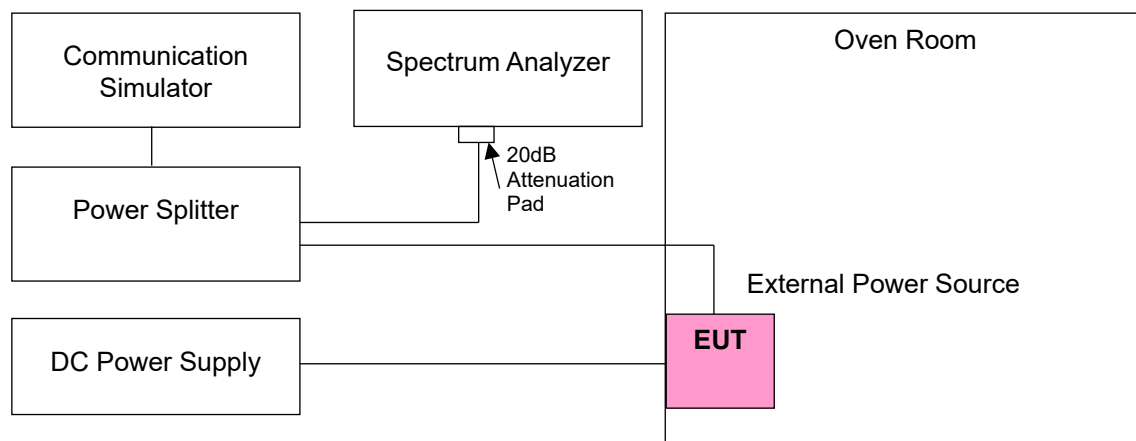
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	GPRS			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	824.200003	0.004	848.800001	0.001
3.4	824.200004	0.005	848.800002	0.002
4.6	824.200004	0.005	848.800002	0.002

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	GPRS			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	824.200001	0.001	848.800003	0.004
-30	824.200002	0.002	848.800001	0.001
-20	824.200002	0.002	848.800002	0.002
-10	824.200003	0.004	848.800004	0.005
0	824.200001	0.001	848.800001	0.001
10	824.199997	-0.004	848.800003	0.004
20	824.199996	-0.005	848.800001	0.001
30	824.199996	-0.005	848.800003	0.004
40	824.199996	-0.005	848.800002	0.002
50	824.199997	-0.004	848.799999	-0.001
60	824.199998	-0.002	848.799999	-0.001
70	824.199998	-0.002	848.799998	-0.002
80	824.199996	-0.005	848.799996	-0.005
85	824.199999	-0.001	848.799996	-0.005

Frequency Error vs. Voltage

Voltage (Vdc)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	824.200002	0.002	848.800002	0.002
3.4	824.199996	-0.005	848.800001	0.001
4.6	824.199999	-0.001	848.800003	0.004

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	824.199996	-0.005	848.800005	0.006
-30	824.200003	0.004	848.799998	-0.002
-20	824.200005	0.006	848.799999	-0.001
-10	824.199999	-0.001	848.800002	0.002
0	824.200003	0.004	848.800004	0.005
10	824.199995	-0.006	848.799997	-0.004
20	824.200004	0.005	848.800002	0.002
30	824.199997	-0.004	848.800003	0.004
40	824.199997	-0.004	848.799999	-0.001
50	824.200001	0.001	848.800003	0.004
60	824.199998	-0.002	848.799999	-0.001
70	824.199995	-0.006	848.799998	-0.002
80	824.199995	-0.006	848.799999	-0.001
85	824.199997	-0.004	848.800005	0.006

Frequency Error vs. Voltage

Voltage (Vdc)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	826.400004	0.005	846.600003	0.004
3.4	826.399997	-0.004	846.600001	0.001
4.6	826.399998	-0.002	846.599996	-0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	826.400002	0.002	846.599997	-0.004
-30	826.399999	-0.001	846.600005	0.006
-20	826.400002	0.002	846.599996	-0.005
-10	826.400003	0.004	846.599997	-0.004
0	826.400003	0.004	846.599995	-0.006
10	826.400002	0.002	846.599998	-0.002
20	826.399999	-0.001	846.599996	-0.005
30	826.399996	-0.005	846.599999	-0.001
40	826.400004	0.005	846.599995	-0.006
50	826.400002	0.002	846.599995	-0.006
60	826.399997	-0.004	846.599999	-0.001
70	826.400004	0.005	846.600002	0.002
80	826.400001	0.001	846.600005	0.006
85	826.399995	-0.006	846.599995	-0.006

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	824.700003	0.004	848.299996	-0.005
3.4	824.699995	-0.006	848.300005	0.006
4.6	824.699998	-0.002	848.300002	0.002

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	824.699997	-0.004	848.299999	-0.001
-30	824.700004	0.005	848.299998	-0.002
-20	824.699998	-0.002	848.300005	0.006
-10	824.700004	0.005	848.299999	-0.001
0	824.700002	0.002	848.299996	-0.005
10	824.699996	-0.005	848.300002	0.002
20	824.699995	-0.006	848.300005	0.006
30	824.700002	0.002	848.300005	0.006
40	824.700004	0.005	848.299997	-0.004
50	824.699996	-0.005	848.300004	0.005
60	824.699997	-0.004	848.300004	0.005
70	824.700003	0.004	848.300002	0.002
80	824.700002	0.002	848.299995	-0.006
85	824.699998	-0.002	848.300001	0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	825.499997	-0.004	847.500002	0.002
3.4	825.499999	-0.001	847.500005	0.006
4.6	825.500003	0.004	847.499996	-0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	825.499997	-0.004	847.500003	0.004
-30	825.500004	0.005	847.500002	0.002
-20	825.499996	-0.005	847.500002	0.002
-10	825.499998	-0.002	847.500002	0.002
0	825.499997	-0.004	847.500003	0.004
10	825.500004	0.005	847.500003	0.004
20	825.500002	0.002	847.499996	-0.005
30	825.499995	-0.006	847.500001	0.001
40	825.499996	-0.005	847.500002	0.002
50	825.499996	-0.005	847.500004	0.005
60	825.500004	0.005	847.500002	0.002
70	825.500002	0.002	847.499998	-0.002
80	825.499996	-0.005	847.499995	-0.006
85	825.499999	-0.001	847.500001	0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	826.499997	-0.004	846.500003	0.004
3.4	826.500004	0.005	846.499996	-0.005
4.6	826.500002	0.002	846.500005	0.006

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	826.499997	-0.004	846.499998	-0.002
-30	826.500002	0.002	846.500005	0.006
-20	826.499996	-0.005	846.500001	0.001
-10	826.499997	-0.004	846.500002	0.002
0	826.499999	-0.001	846.499999	-0.001
10	826.499999	-0.001	846.500001	0.001
20	826.499995	-0.006	846.499997	-0.004
30	826.500003	0.004	846.499995	-0.006
40	826.499996	-0.005	846.499998	-0.002
50	826.500004	0.005	846.499995	-0.006
60	826.499996	-0.005	846.500002	0.002
70	826.499999	-0.001	846.499995	-0.006
80	826.499996	-0.005	846.499999	-0.001
85	826.500005	0.006	846.499999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	829.000004	0.005	843.999999	-0.001
3.4	828.999995	-0.006	843.999997	-0.004
4.6	829.000002	0.002	844.000004	0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	828.999995	-0.006	843.999999	-0.001
-30	829.000002	0.002	843.999997	-0.004
-20	828.999997	-0.004	843.999996	-0.005
-10	829.000003	0.004	843.999996	-0.005
0	828.999997	-0.004	844.000004	0.005
10	828.999997	-0.004	844.000004	0.005
20	828.999998	-0.002	843.999999	-0.001
30	828.999997	-0.004	844.000003	0.004
40	829.000003	0.004	844.000001	0.001
50	829.000005	0.006	844.000002	0.002
60	828.999998	-0.002	844.000004	0.005
70	829.000001	0.001	843.999996	-0.005
80	828.999995	-0.006	843.999998	-0.002
85	828.999995	-0.006	843.999998	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	824.699999	-0.001	848.299999	-0.001
3.4	824.700001	0.001	848.299998	-0.002
4.6	824.700005	0.006	848.299995	-0.006

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	824.700003	0.004	848.300004	0.005
-30	824.700003	0.004	848.300005	0.006
-20	824.700003	0.004	848.300002	0.002
-10	824.700003	0.004	848.299997	-0.004
0	824.699997	-0.004	848.300001	0.001
10	824.700004	0.005	848.300002	0.002
20	824.700005	0.006	848.300002	0.002
30	824.699995	-0.006	848.299999	-0.001
40	824.700002	0.002	848.300002	0.002
50	824.699996	-0.005	848.300005	0.006
60	824.699996	-0.005	848.299995	-0.006
70	824.700003	0.004	848.300002	0.002
80	824.700001	0.001	848.300002	0.002
85	824.699996	-0.005	848.299999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	825.499995	-0.006	847.500001	0.001
3.4	825.500003	0.004	847.500002	0.002
4.6	825.500004	0.005	847.499995	-0.006

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	825.500005	0.006	847.500002	0.002
-30	825.500002	0.002	847.500003	0.004
-20	825.500002	0.002	847.499998	-0.002
-10	825.500001	0.001	847.500002	0.002
0	825.500002	0.002	847.499995	-0.006
10	825.500002	0.002	847.499999	-0.001
20	825.500004	0.005	847.500004	0.005
30	825.500004	0.005	847.500002	0.002
40	825.499999	-0.001	847.499997	-0.004
50	825.500002	0.002	847.500003	0.004
60	825.500002	0.002	847.500004	0.005
70	825.500005	0.006	847.500004	0.005
80	825.500004	0.005	847.500005	0.006
85	825.499995	-0.006	847.499998	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	826.500004	0.005	846.499999	-0.001
3.4	826.499995	-0.006	846.499999	-0.001
4.6	826.499998	-0.002	846.499997	-0.004

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	826.499996	-0.005	846.499999	-0.001
-30	826.500004	0.005	846.500001	0.001
-20	826.499995	-0.006	846.500004	0.005
-10	826.499999	-0.001	846.500003	0.004
0	826.500003	0.004	846.500001	0.001
10	826.500002	0.002	846.500004	0.005
20	826.499999	-0.001	846.499995	-0.006
30	826.499995	-0.006	846.499997	-0.004
40	826.500002	0.002	846.500002	0.002
50	826.500001	0.001	846.500001	0.001
60	826.500001	0.001	846.500001	0.001
70	826.499998	-0.002	846.499996	-0.005
80	826.499997	-0.004	846.500005	0.006
85	826.500002	0.002	846.499998	-0.002

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	829.000002	0.002	844.000002	0.002
3.4	829.000003	0.004	843.999997	-0.004
4.6	829.000004	0.005	844.000004	0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	828.999999	-0.001	843.999997	-0.004
-30	829.000005	0.006	844.000001	0.001
-20	829.000004	0.005	843.999995	-0.006
-10	829.000001	0.001	843.999996	-0.005
0	829.000004	0.005	843.999999	-0.001
10	828.999999	-0.001	843.999996	-0.005
20	829.000004	0.005	843.999996	-0.005
30	828.999995	-0.006	843.999996	-0.005
40	829.000002	0.002	844.000001	0.001
50	829.000001	0.001	843.999998	-0.002
60	828.999998	-0.002	843.999999	-0.001
70	829.000003	0.004	844.000004	0.005
80	829.000004	0.005	844.000004	0.005
85	829.000005	0.006	844.000003	0.004

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	831.499997	-0.004	841.499998	-0.002
3.4	831.500001	0.001	841.500002	0.002
4.6	831.499996	-0.005	841.500003	0.004

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 15 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	831.499995	-0.006	841.500005	0.006
-30	831.499998	-0.002	841.500004	0.005
-20	831.499995	-0.006	841.499995	-0.006
-10	831.500002	0.002	841.500002	0.002
0	831.499997	-0.004	841.499995	-0.006
10	831.499995	-0.006	841.500004	0.005
20	831.500003	0.004	841.500004	0.005
30	831.500004	0.005	841.500002	0.002
40	831.500002	0.002	841.500001	0.001
50	831.500003	0.004	841.499996	-0.005
60	831.500001	0.001	841.500003	0.004
70	831.499995	-0.006	841.499995	-0.006
80	831.499997	-0.004	841.499998	-0.002
85	831.500004	0.005	841.499997	-0.004

4.4 Occupied Bandwidth Measurement

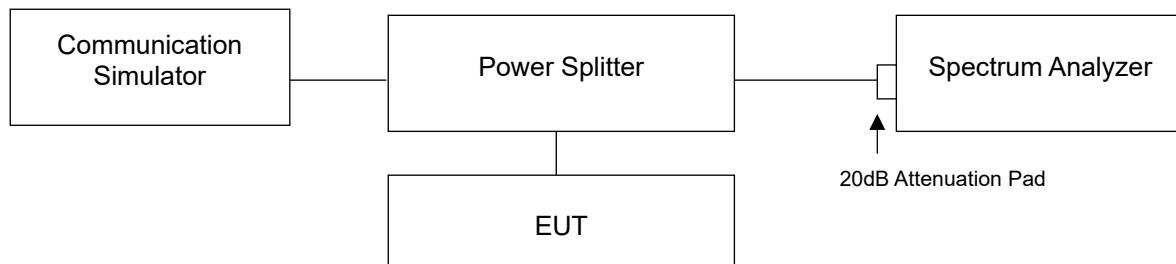
4.4.1 Test Procedure

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

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

4.4.2 Test Setup

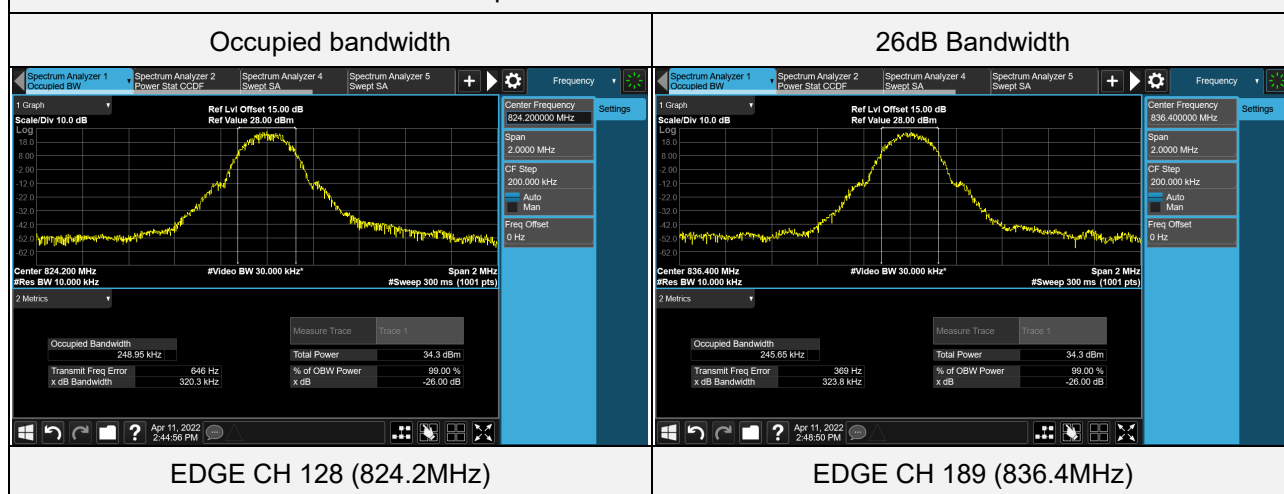


4.4.3 Test Result

GPRS, EDGE

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (kHz)	26dB Bandwidth (kHz)
GPRS	128	824.2	246.27	316.80
GPRS	189	836.4	247.25	319.00
GPRS	251	848.8	248.26	311.20
EDGE	128	824.2	248.95	320.30
EDGE	189	836.4	245.65	323.80
EDGE	251	848.8	246.90	314.40

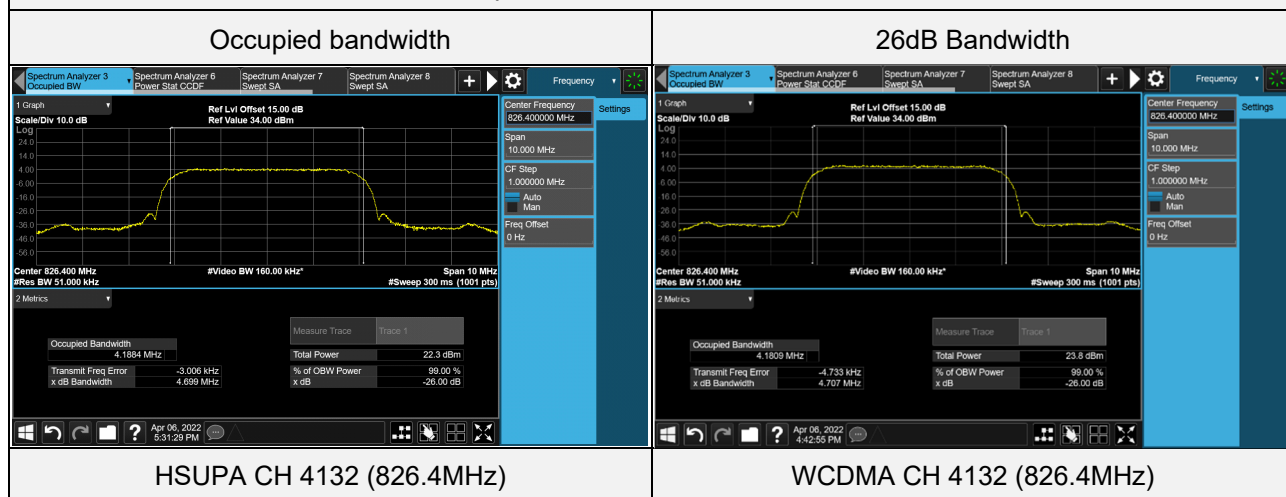
Spectrum Plot of Worst Value



WCDMA Band 5

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
WCDMA	4132	826.4	4.1809	4.707
WCDMA	4182	836.4	4.1797	4.694
WCDMA	4233	846.6	4.1726	4.701
HSDPA	4132	826.4	4.1807	4.696
HSDPA	4182	836.4	4.1766	4.696
HSDPA	4233	846.6	4.1723	4.690
HSUPA	4132	826.4	4.1884	4.699
HSUPA	4182	836.4	4.1802	4.696
HSUPA	4233	846.6	4.1778	4.684

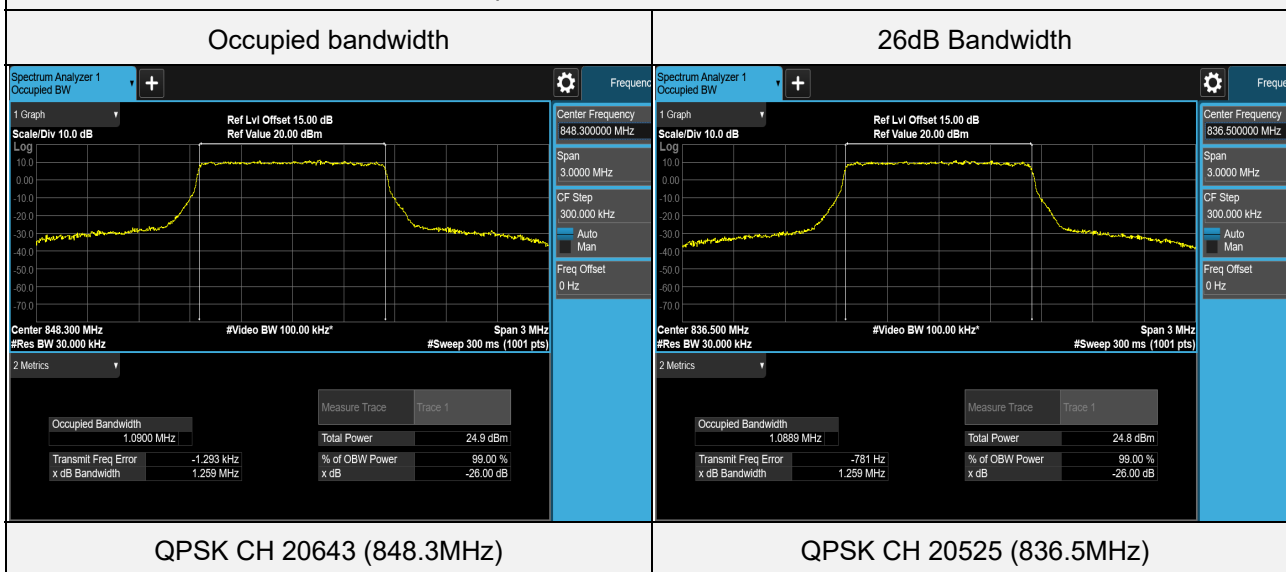
Spectrum Plot of Worst Value



LTE Band 5 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	20407	824.7	1.0878	1.251
QPSK	20525	836.5	1.0889	1.259
QPSK	20643	848.3	1.0900	1.259
16QAM	20407	824.7	1.0859	1.245
16QAM	20525	836.5	1.0870	1.249
16QAM	20643	848.3	1.0860	1.249
64QAM	20407	824.7	1.0881	1.249
64QAM	20525	836.5	1.0870	1.246
64QAM	20643	848.3	1.0880	1.255

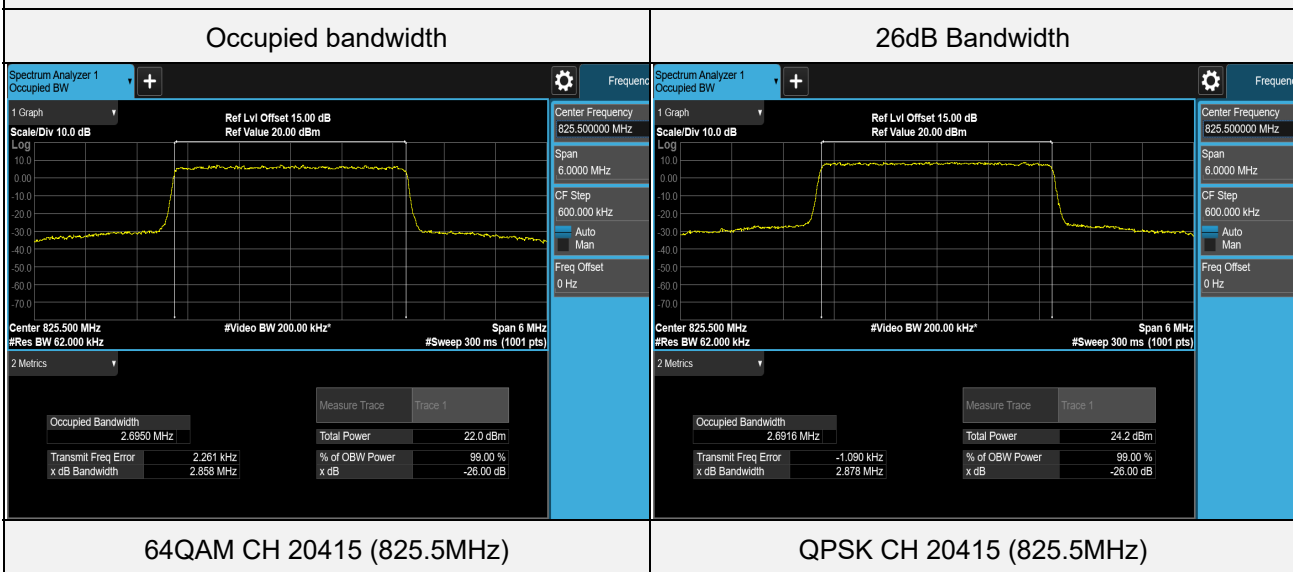
Spectrum Plot of Worst Value



LTE Band 5 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	20415	825.5	2.6916	2.878
QPSK	20525	836.5	2.6906	2.872
QPSK	20635	847.5	2.6899	2.869
16QAM	20415	825.5	2.6917	2.875
16QAM	20525	836.5	2.6910	2.871
16QAM	20635	847.5	2.6902	2.869
64QAM	20415	825.5	2.6950	2.858
64QAM	20525	836.5	2.6868	2.858
64QAM	20635	847.5	2.6893	2.858

Spectrum Plot of Worst Value

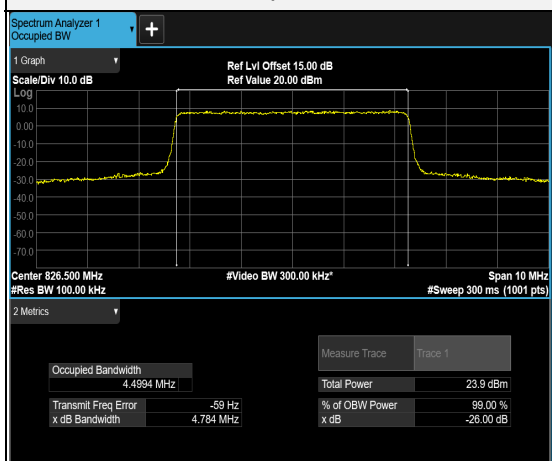


LTE Band 5 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	20425	826.5	4.4994	4.784
QPSK	20525	836.5	4.4940	4.775
QPSK	20625	846.5	4.4922	4.774
16QAM	20425	826.5	4.4925	4.777
16QAM	20525	836.5	4.4903	4.763
16QAM	20625	846.5	4.4870	4.761
64QAM	20425	826.5	4.4980	4.783
64QAM	20525	836.5	4.4927	4.785
64QAM	20625	846.5	4.4904	4.762

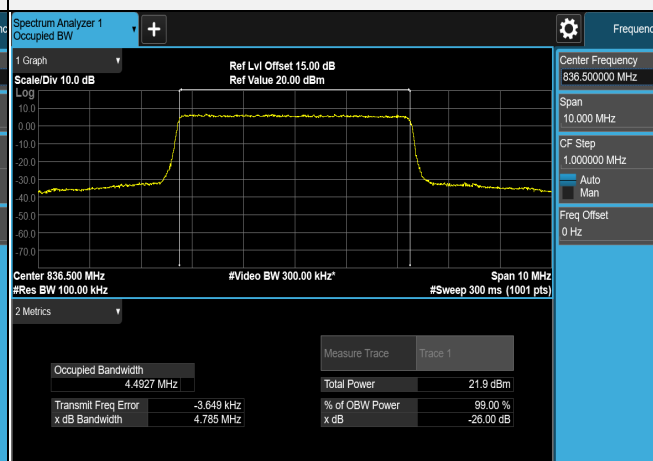
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 20425 (826.5MHz)

26dB Bandwidth



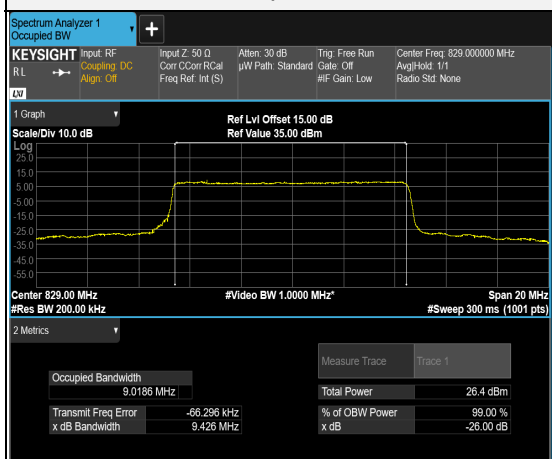
64QAM CH 20525 (836.5MHz)

LTE Band 5 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	20450	829	9.0186	9.426
QPSK	20525	836.5	8.9708	9.492
QPSK	20600	844	8.9670	9.496
16QAM	20450	829	8.9844	9.493
16QAM	20525	836.5	8.9685	9.496
16QAM	20600	844	8.9697	9.491
64QAM	20450	829	8.9839	9.507
64QAM	20525	836.5	8.9765	9.514
64QAM	20600	844	8.9697	9.498

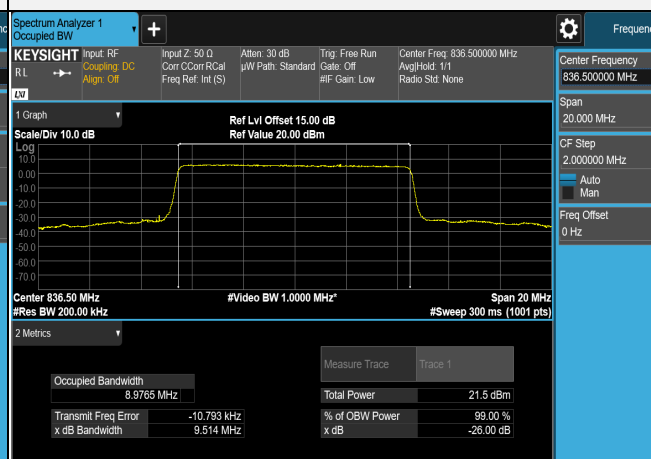
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 20450 (829MHz)

26dB Bandwidth



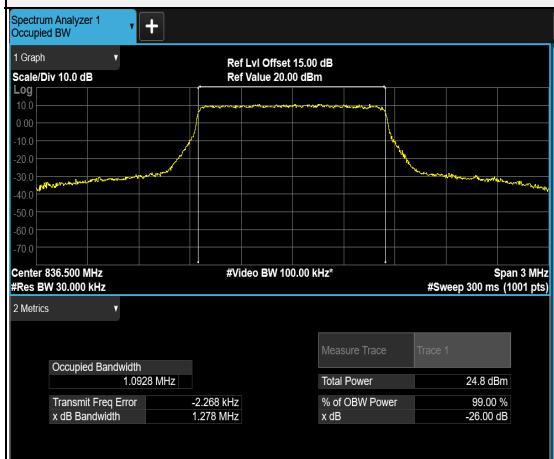
64QAM CH 20525 (836.5MHz)

LTE Band 26 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26797	824.7	1.0853	1.251
QPSK	26915	836.5	1.0928	1.278
QPSK	27033	848.3	1.0900	1.261
16QAM	26797	824.7	1.0877	1.246
16QAM	26915	836.5	1.0868	1.243
16QAM	27033	848.3	1.0870	1.243
64QAM	26797	824.7	1.0873	1.250
64QAM	26915	836.5	1.0879	1.250
64QAM	27033	848.3	1.0883	1.247

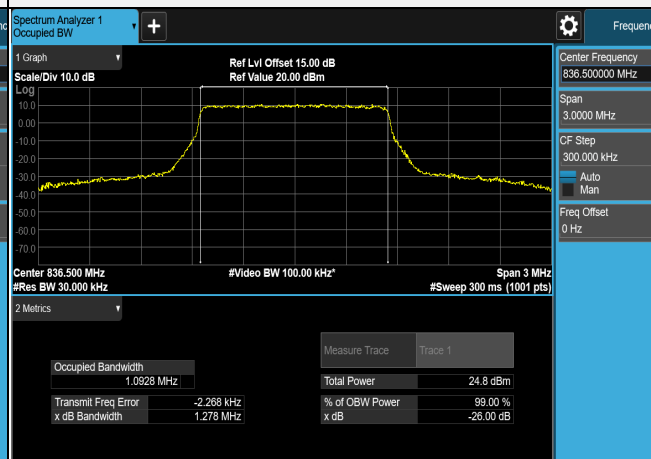
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 26915 (836.5MHz)

26dB Bandwidth



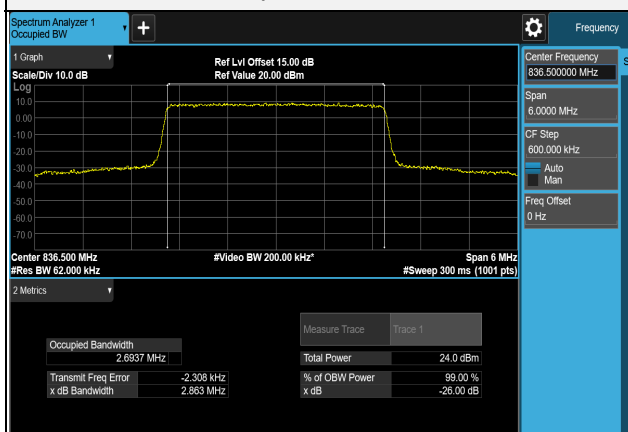
QPSK CH 26915 (836.5MHz)

LTE Band 26 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26805	825.5	2.6931	2.870
QPSK	26915	836.5	2.6937	2.863
QPSK	27025	847.5	2.6894	2.864
16QAM	26805	825.5	2.6916	2.868
16QAM	26915	836.5	2.6901	2.871
16QAM	27025	847.5	2.6929	2.858
64QAM	26805	825.5	2.6885	2.861
64QAM	26915	836.5	2.6894	2.860
64QAM	27025	847.5	2.6883	2.858

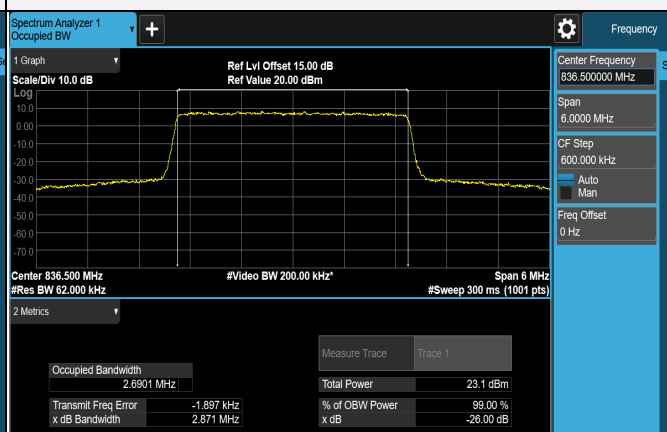
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 26915 (836.5MHz)

26dB Bandwidth



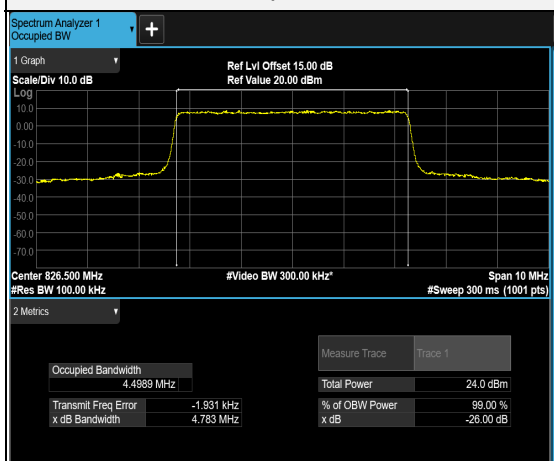
16QAM CH 26915 (836.5MHz)

LTE Band 26 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26815	826.5	4.4989	4.783
QPSK	26915	836.5	4.4913	4.779
QPSK	27015	846.5	4.4901	4.769
16QAM	26815	826.5	4.4920	4.770
16QAM	26915	836.5	4.4910	4.770
16QAM	27015	846.5	4.4869	4.760
64QAM	26815	826.5	4.4947	4.782
64QAM	26915	836.5	4.4906	4.773
64QAM	27015	846.5	4.4878	4.780

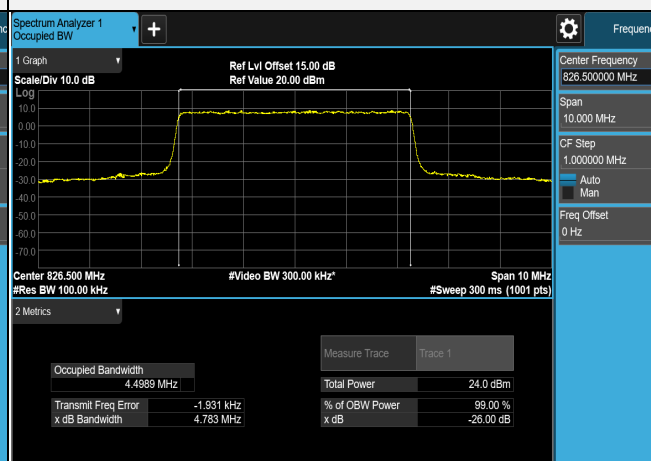
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 26815 (826.5MHz)

26dB Bandwidth



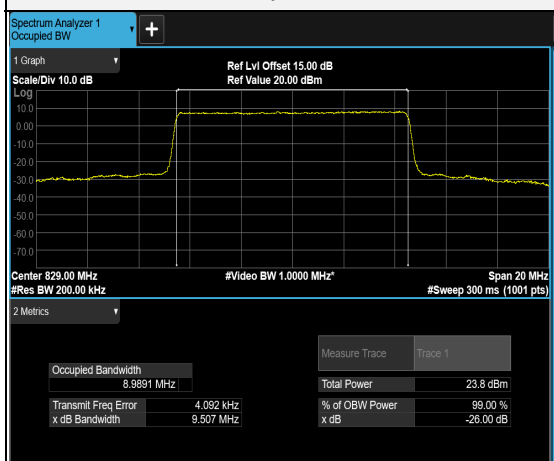
QPSK CH 26815 (826.5MHz)

LTE Band 26 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26840	829	8.9891	9.507
QPSK	26915	836.5	8.9725	9.497
QPSK	26990	844	8.9676	9.499
16QAM	26840	829	8.9816	9.498
16QAM	26915	836.5	8.9718	9.490
16QAM	26990	844	8.9684	9.490
64QAM	26840	829	8.9847	9.510
64QAM	26915	836.5	8.9757	9.505
64QAM	26990	844	8.9660	9.502

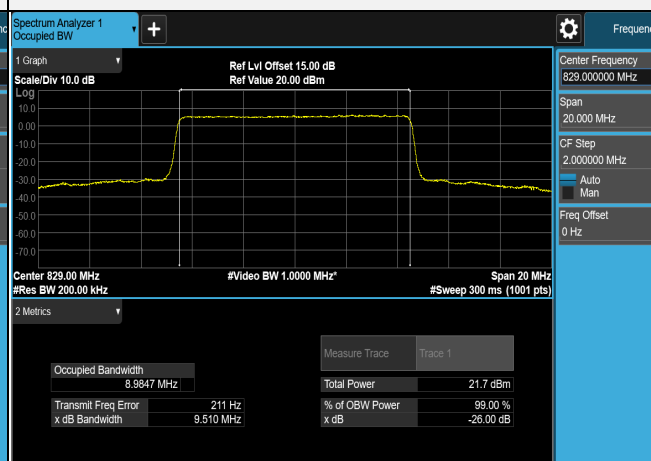
Spectrum Plot of Worst Value

Occupied bandwidth



QPSK CH 26840 (829MHz)

26dB Bandwidth



64QAM CH 26840 (829MHz)

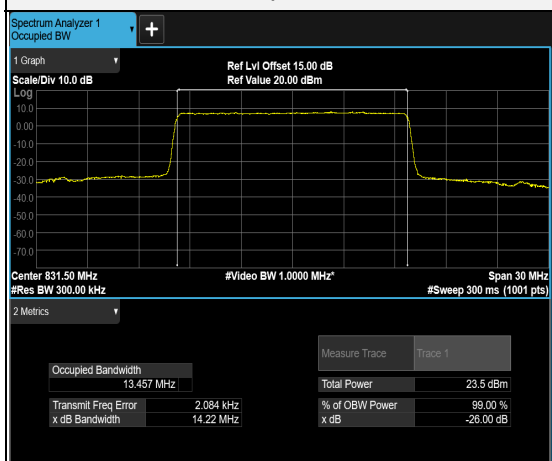
LTE Band 26 (Channel Bandwidth 15MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26865	831.5	13.4568	14.224
QPSK	26915	836.5	13.4527	14.218
QPSK	26965	841.5	13.4515	14.219
16QAM	26865	831.5	13.4465	14.229
16QAM	26915	836.5	13.4437	14.220
16QAM	26965	841.5	13.4445	14.225
64QAM	26865	831.5	13.4414	14.218
64QAM	26915	836.5	13.4419	14.224
64QAM	26965	841.5	13.4460	14.219

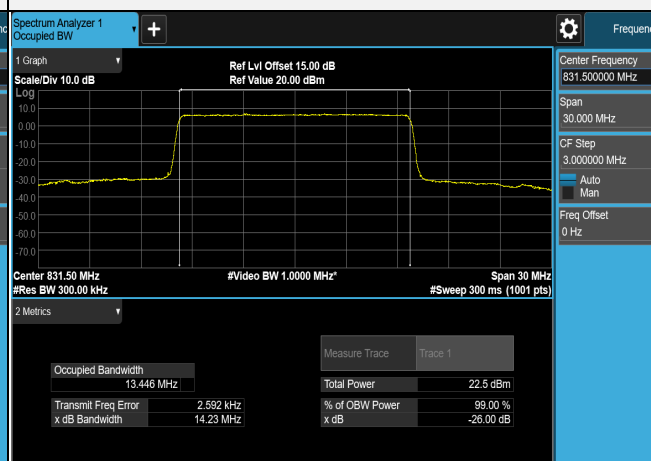
Spectrum Plot of Worst Value

Occupied bandwidth

26dB Bandwidth



QPSK CH 26865 (831.5MHz)



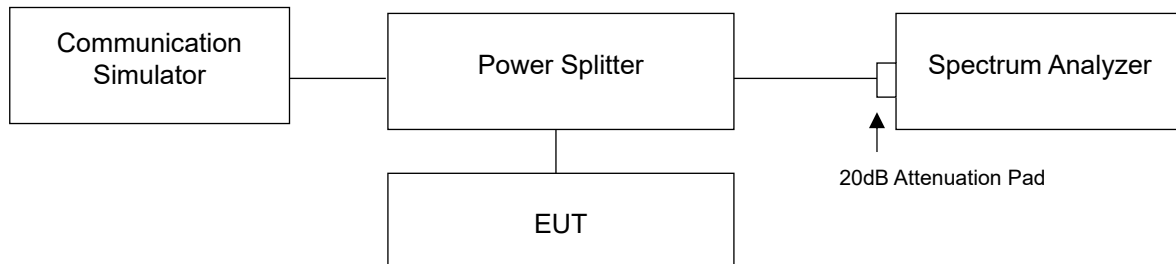
16QAM CH 26865 (831.5MHz)

4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.5.2 Test Setup

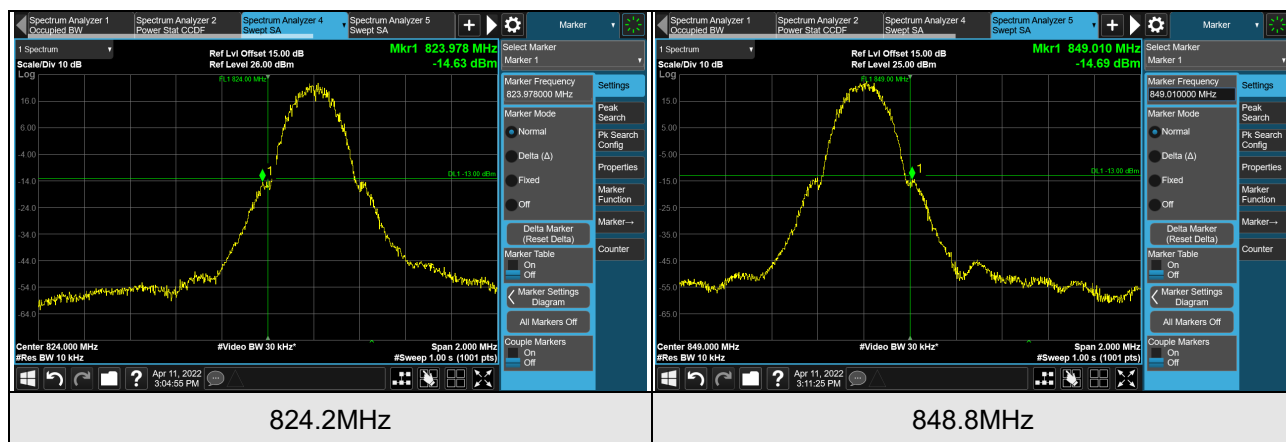


4.5.3 Test Procedures

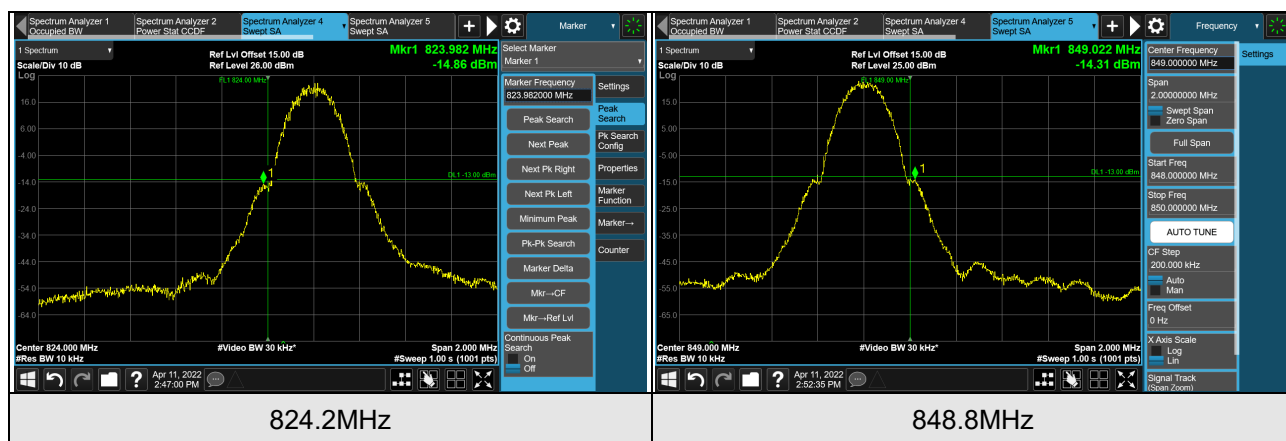
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30kHz (GPRS / EDGE).
- c. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).
- d. 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).
- e. 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).
- f. 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).
- g. 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).
- h. 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).
- i. Record the max trace plot into the test report.

4.5.4 Test Results

GPRS



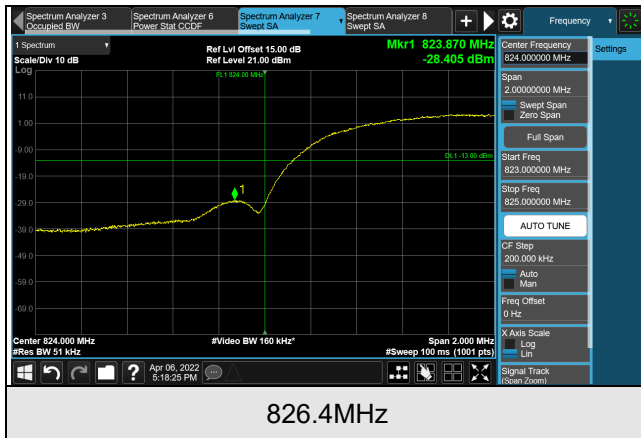
EDGE



WCDMA



HSDPA

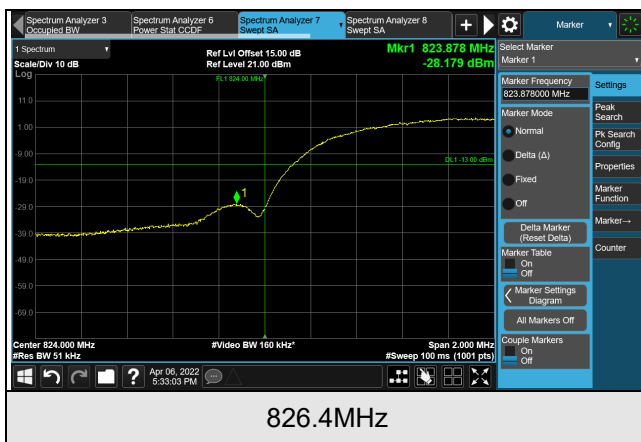


826.4MHz

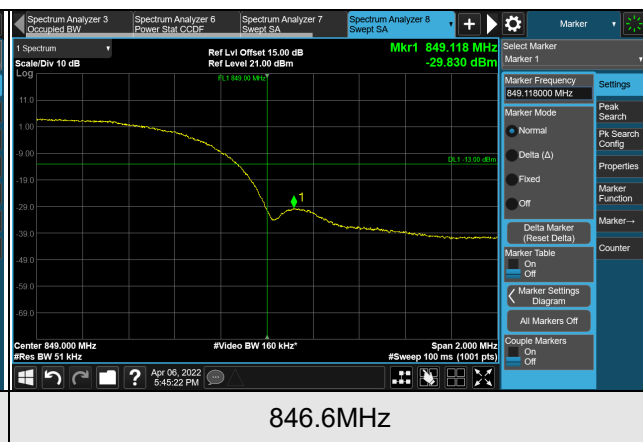


846.6MHz

HSUPA

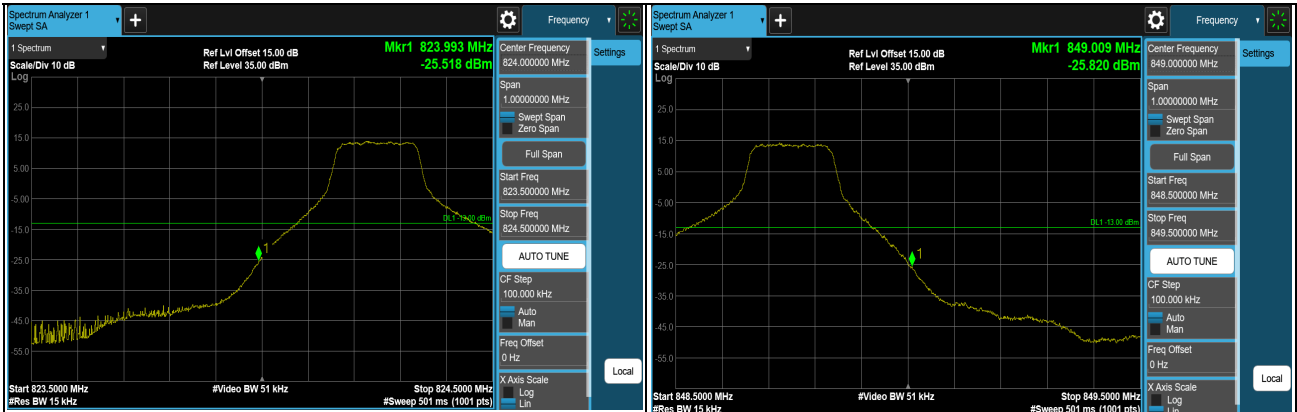


826.4MHz



846.6MHz

LTE Band 5 (Channel Bandwidth 1.4MHz)



1RB (824.7MHz)

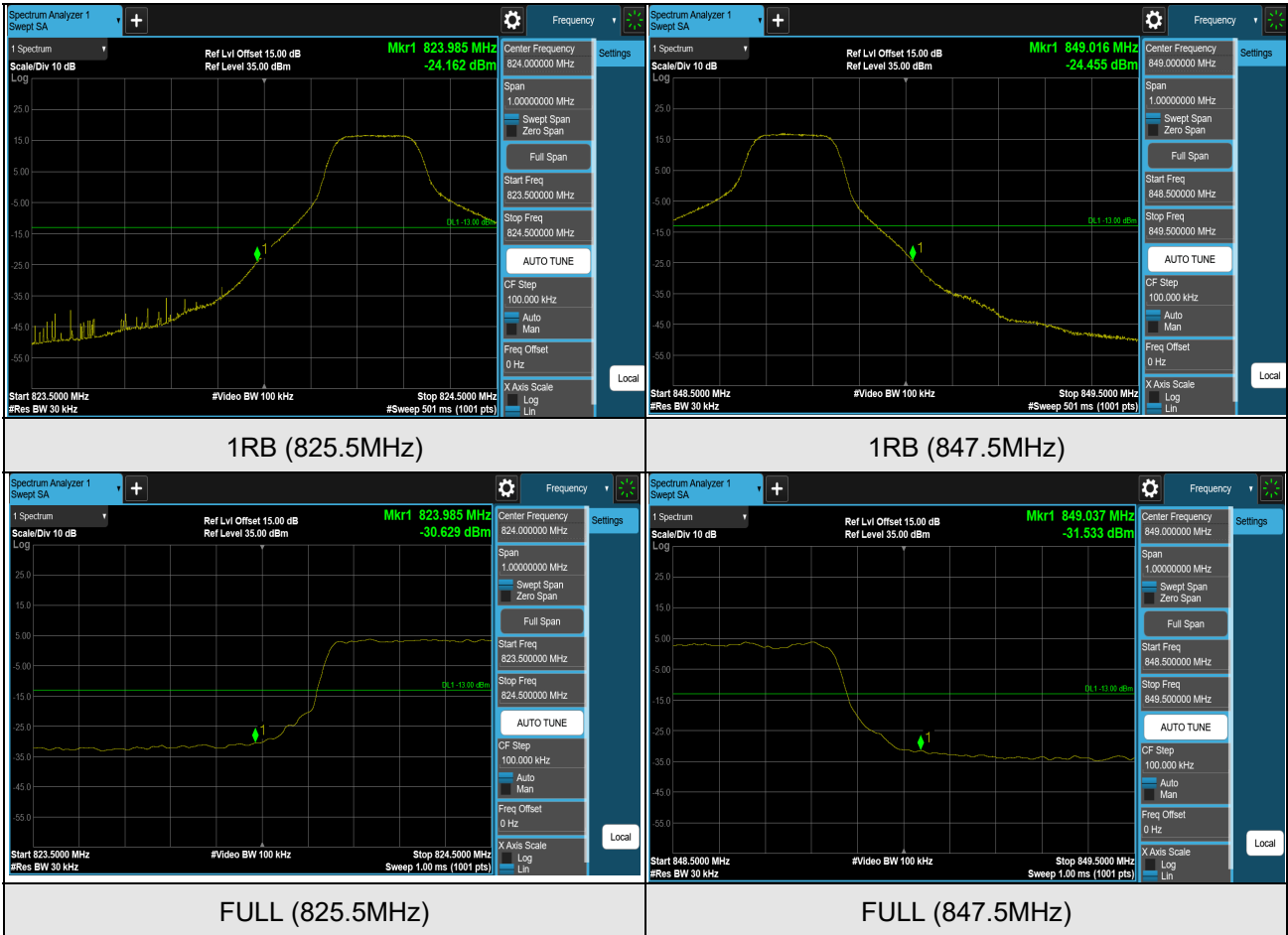
1RB (848.3MHz)



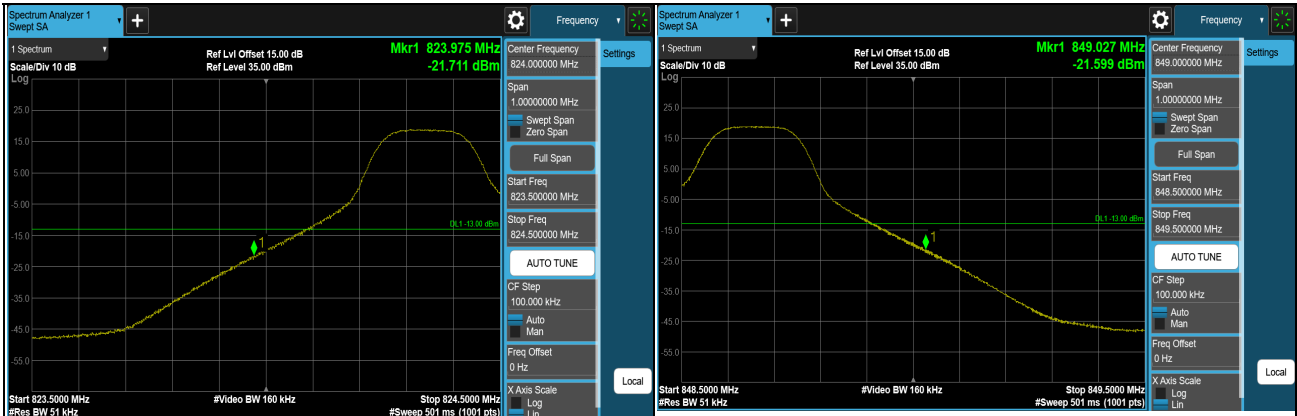
FULL (824.7MHz)

FULL (848.3MHz)

LTE Band 5 (Channel Bandwidth 3MHz)

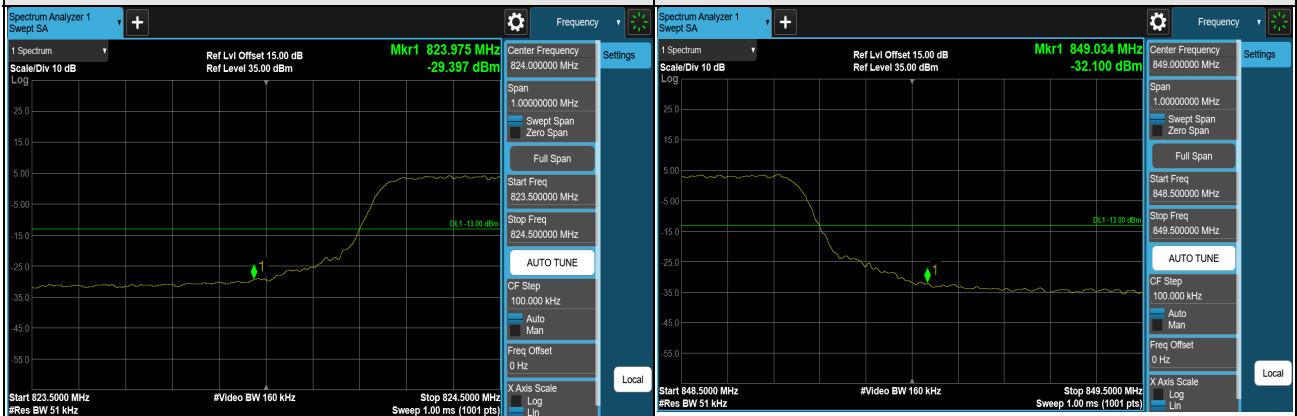


LTE Band 5 (Channel Bandwidth 5MHz)



1RB (826.5MHz)

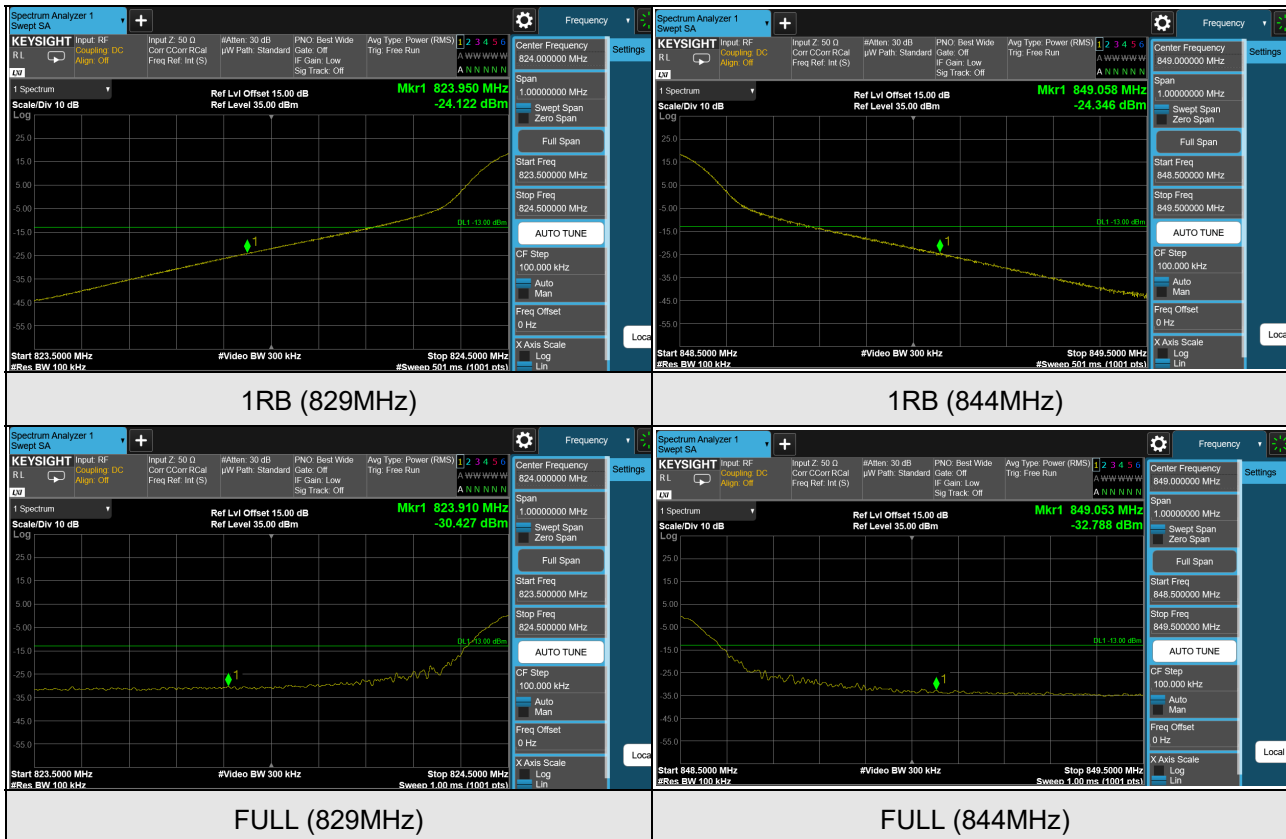
1RB (846.5MHz)



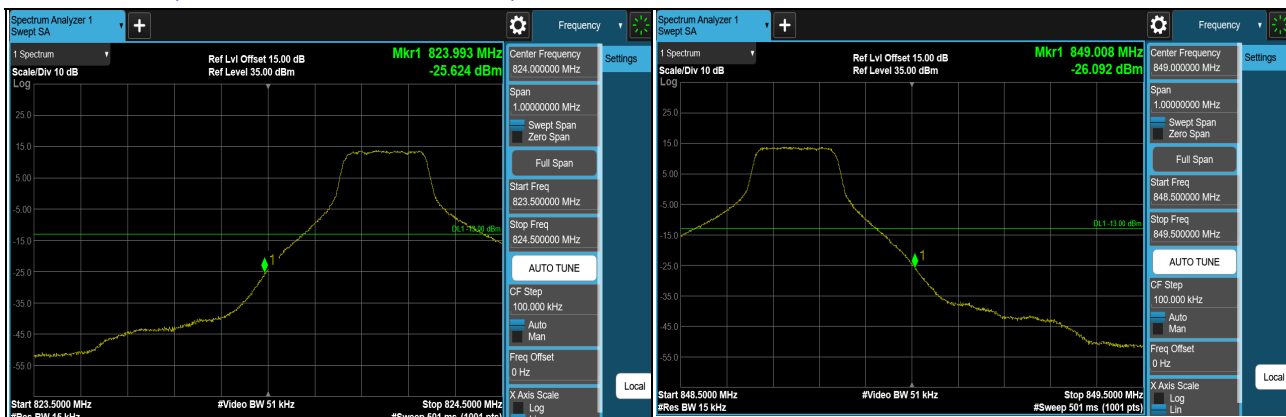
FULL (826.5MHz)

FULL (846.5MHz)

LTE Band 5 (Channel Bandwidth 10MHz)

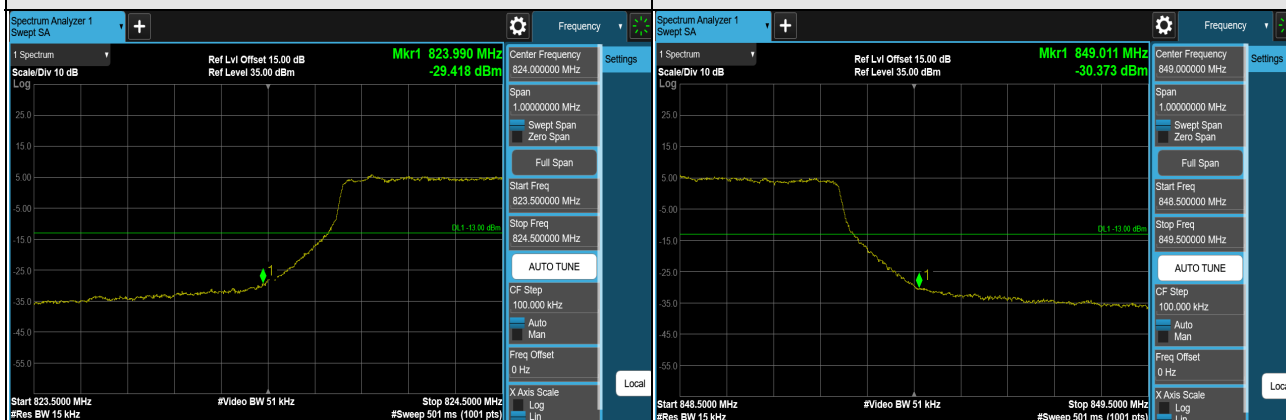


LTE Band 26 (Channel Bandwidth 1.4MHz)



1RB (824.7MHz)

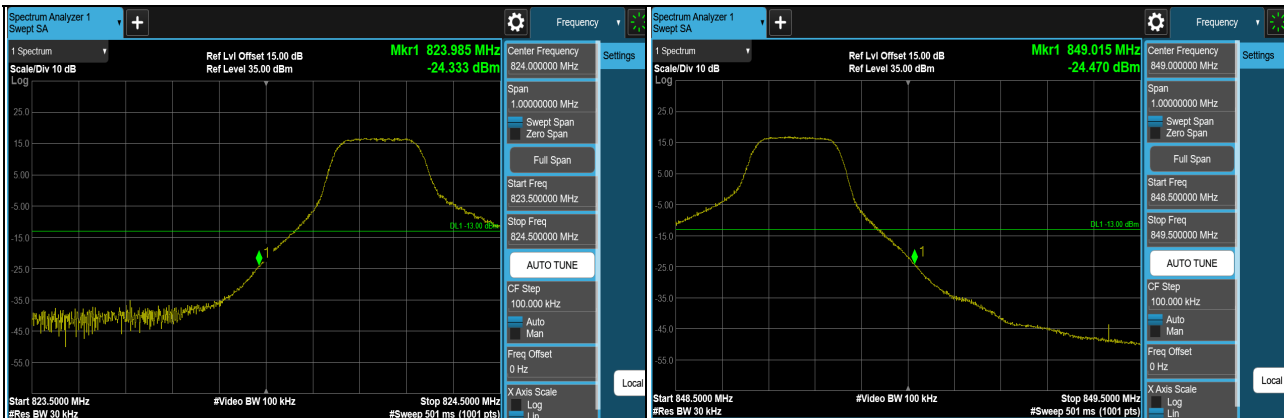
1RB (848.3MHz)



FULL (824.7MHz)

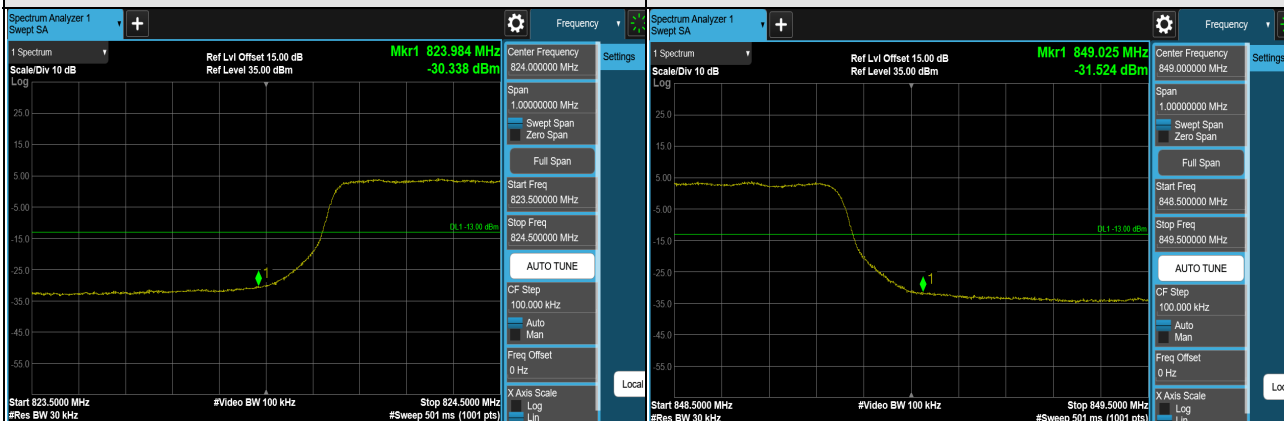
FULL (848.3MHz)

LTE Band 26 (Channel Bandwidth 3MHz)



1RB (825.5MHz)

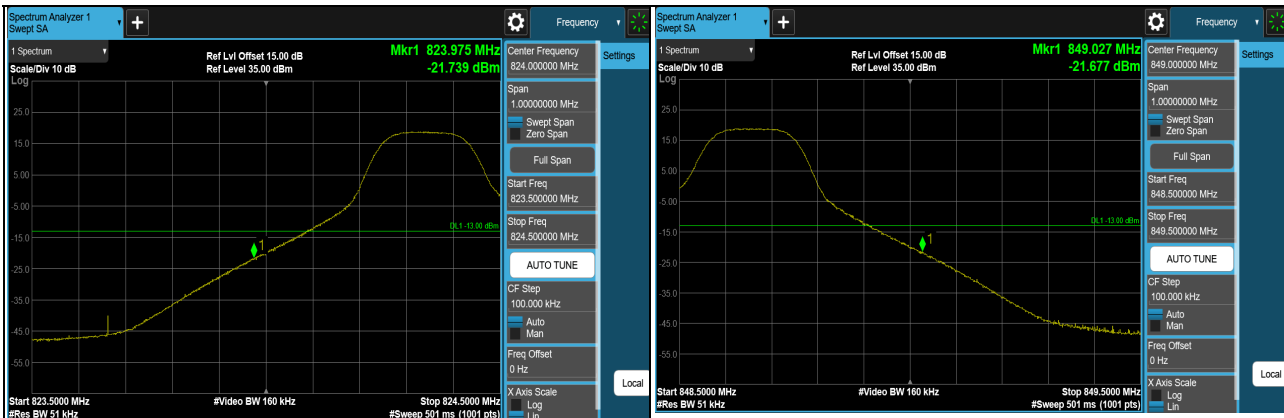
1RB (847.5MHz)



FULL (825.5MHz)

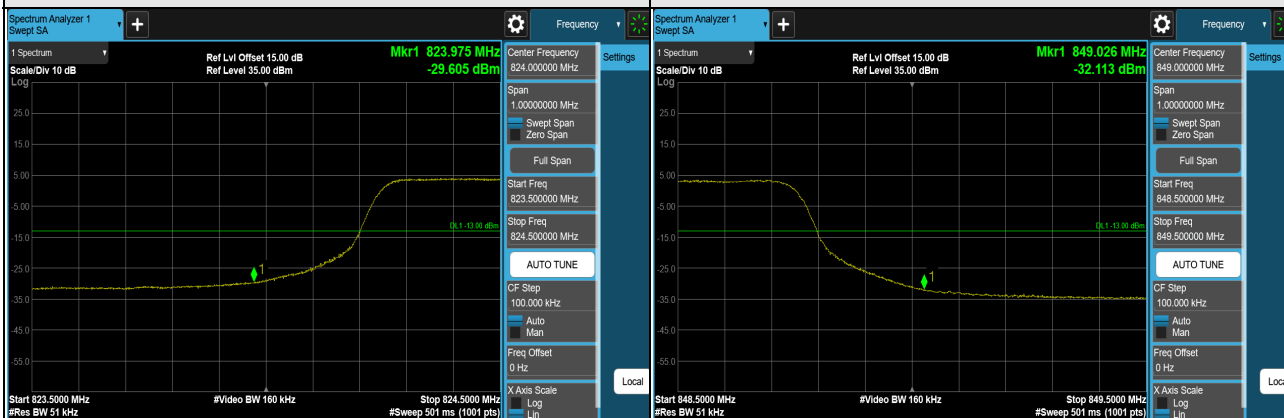
FULL (847.5MHz)

LTE Band 26 (Channel Bandwidth 5MHz)



1RB (826.5MHz)

1RB (846.5MHz)



FULL (826.5MHz)

FULL (846.5MHz)