



TEST REPORT

REPORT NUMBER: I22W00049-LTE RF-Rev2

ON

Type of Equipment: LTE Module
Type of Designation: L506
Brand Name: LYNQ
Manufacturer: Shanghai MobileTek Communication Ltd.
FCC ID: 2AK9DL506

ACCORDING TO

FCC CFR Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;
GENERAL RULES AND REGULATIONS, e-CFR, 2020
PART 22, PUBLIC MOBILE SERVICES, e-CFR, 2020
PART 24, PERSONAL COMMUNICATIONS SERVICES, e-CFR, 2020
PART 27, MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES, e-CFR, 2020
ANSI C63.26-2015

Chongqing Academy of Information and Communications Technology

Month date, year

Jul 7, 2022

Signature



Xiang Luoyong
Director

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of Chongqing Academy of Information and Communications Technology.



Report No.: I22W00049-LTE RF-Rev2

Revision Version

Report Number	Revision	Date	Memo
I22W00049-LTE RF	00	2022-06-24	Initial creation of test report
I22W00049-LTE RF-Rev1	01	2022-06-30	--
I22W00049-LTE RF-Rev2	02	2022-07-07	--

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1. Test Laboratory

1.1. Testing Location

Name:	Chongqing Academy of Information and Communications Technology
FCC Registration number:	CN1239
Address:	Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China
	No.19 East Road, Xiantao Big-data Valley, Yubei District, Chongqing, People's Republic of China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

1.2. Testing Environment

Normal Temperature:	15-35°C
Relative Humidity:	30-60%

1.3. Project data

Testing Start Date:	2022-06-20
Testing End Date:	2022-07-07

1.4. Signature



2022-07-07

Dong Junxin
(Prepared this test report)

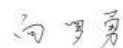
Date



2022-07-07

Li Xu
(Reviewed this test report)

Date



2022-07-07

Xiang Luoyong
Director of the laboratory
(Approved this test report)

Date

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2. Client Information

2.1. Applicant Information

Company Name:	Shanghai MobileTek Communication Ltd.
Address /Post:	Free Trade Zone No. 33, No. 17 building 6H3 Xiya Road China (Shanghai)
City:	Shanghai
Country:	China
Telephone:	021-54453657
Fax:	--
Email:	b.yang@mobiletek.cn
Contact Person:	yangbin

2.2. Manufacturer Information

Company Name:	Shanghai MobileTek Communication Ltd.
Address /Post:	Free Trade Zone No. 33, No. 17 building 6H3 Xiya Road China (Shanghai)
City:	Shanghai
Country:	China
Telephone:	021-54453657
Fax:	--
Email:	b.yang@mobiletek.cn
Contact Person:	yangbin

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3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	LTE Module
Model name	L506
Brand name	LYNQ
LTE Frequency Band	2/4/5/12/13
Type of modulation	QPSK/16QAM
Extreme Temperature	-40/+85°C
Nominal Voltage	3.8
Extreme High Voltage	4.2
Extreme Low Voltage	3.4

Note: Photographs of EUT are shown in ANNEX A of this test report.

Note: High and low voltage values in extreme condition test are given by manufacturer.

3.2. Internal Identification of EUT used during the test

EUT ID	SN or IMEI	HW Version	SW Version	Date of receipt
S1	865699038738798	V1	L506Av07.01b01.00	2022-06-14
S2	865699038738780	V1	L506Av07.01b01.00	2022-06-14

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Outline of Equipment under Test

Technology	Band	UL Freq.(MHz)	DL Freq.(MHz)	Note
LTE	B2	1850-1909.9	1930-1989.9	--
	B4	1710-1754.9	2110-2154.9	--
	B5	824-848.9	869-893.9	--
	B12	699-715.9	729-745.9	--
	B13	746-755.9	777-786.9	--

3.4. Internal Identification of AE used during the test

AE ID*	Description	dB*
AE1	--	--

*AE ID: is used to identify the test sample in the lab internally.

dB*: is provided customer.

4. Reference Documents

4.1. Documents supplied by applicant

PICS/PIXIT, referring to Annex B for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC CFR Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS, e-CFR	2020
PART 22	PUBLIC MOBILE SERVICES	2020
PART 24	PERSONAL COMMUNICATIONS SERVICES, e-CFR	2020
PART 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES, e-CFR	2020
ANSI C63.26	--	2015

5. Test Equipments Utilized

5.1. RF Test System

No.	Equipment	Model	SN	HW Version	SW Version	Manufacture	Cal.Due Date
1	spectrum analyzer	FSQ 26	201137/026	--	--	R&S	2023-06-29
2	DC Power Supply	3303D	801128	--	--	Topward	2023-06-29
3	Universal Radio Communication Tester	CMW500	152395	--	--	R&S	2023-06-29

5.2. RSE Test System

No.	Equipment	Model	SN	HW Version	SW Version	Manufacture	Cal.Due Date
1	Test Receiver	ESU26	100367	01	4.43 SP3	R&S	2023-06-29
2	Ultra-wideband Log Periodic Antenna	VULB 9163	01392	--	--	Schwarzbeck	2024-05-04
3	Double Ridged Guide Antenna	HF907	100357	--	--	R&S	2023-02-10
4	Universal Radio Communication Tester	CMW500	128181	--	--	R&S	2023-06-29

5.3. Climate Chamber

No.	Name	Type	SN	Manufacture	Cal.Due Date
1	Climate chamber	SH-241	92010759	ESPEC	2023-06-29
2	Fully-Anechoic Chamber	FACT3-2	--	ETS	2025-04-29

5.4. Vibration table

No.	Name	Type	SN	Manufacture	Cal.Due Date
--	--	--	--	--	--

5.5. Test software

No.	Name	version	SN	Manufacture
1	EMC32	V 8.51.00	--	R&S
2	T-RFS500	V2.0	--	Manufacturer:Beijing Zhiwang Xince Technology Co., Ltd.

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6. Test Results

6.1. Summary of Test Results

A brief summary of the tests carried out is shown as following.

FCC Rules	Name of Test	Result
2.1046,27.50	Conducted RF Power Output	Pass
2.1046,27.50	ERP and EIRP	Pass
2.1049	Occupied Bandwidth	*Note 1
2.1051,2.1053, 27.53	Conducted spurious emissions	Pass
2.1051,2.1053, 27.53	Radiated Spurious Emission	Pass
2.1051, 2.1053, 27.53	Band Edge	Pass
2.1055, 27.54	Frequency Stability	Pass
27.50	Peak to Average Ratio	Pass
Note 1: No applicable performance criteria. Note 2: Explanation of worst-case configuration The worst-case scenario for all measurements is based on the conducted output power. Output power was measured on QPSK,16QAM modulations. It was found that QPSK was the worst case. All testing was performed using QPSK modulations to represent the worst case unless otherwise stated. The test results shown in the following sections represent the worst case emission.According to the product change description of the product, Only the following test cases were repeated , Other test results refer to the reference report RSHA170821002-00A.		

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6.2. Conducted RF Power Output

Specifications:	FCC Part 2.1046, 27.50
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

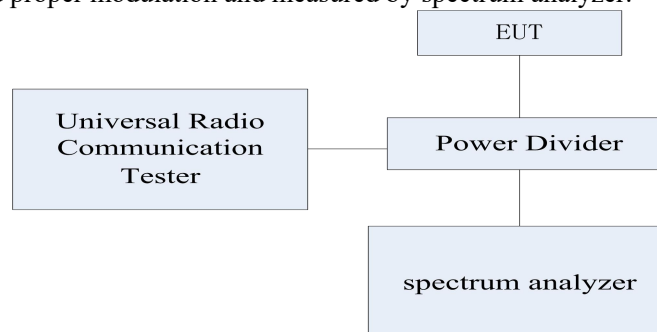
According to Part 27.50(c), portable stations (hand-held devices) in the 600 MHz uplink Band and the 698-746 MHz Band, and fixed and mobile stations in the 600 MHz uplink Band are limited to 3 watts ERP.

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.62 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Telecommunications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Test Method:

- 1) The EUT was coupled to the spectrum analyzer and the Wireless Telecommunications Test Set through a power divider. The loss of the RF cables of the test system is calibrated to correct the readings.
- 2) For RMS power test, the spectrum analyzer was set to RMS Detector function and Maximum hold mode.
- 3) For Peak power test, the spectrum analyzer was set to Maxpeak Detector function and Maximum hold mode.
- 4) The resolution Bandwidth of the spectrum analyzer was comparable to the emission Bandwidth.

Note: --

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6.2.1 Conducted RF Power Output Results

LTE Band 12

Bandwidth	RB size/offset	Frequency (MHz)	Modulation	Power (dBm)	Peak Power (dBm)
1.4MHz	1 RB low	699.7	QPSK	22.78	27.76
1.4MHz	1 RB mid	699.7	QPSK	22.68	27.47
1.4MHz	1 RB high	699.7	QPSK	22.86	27.68
1.4MHz	100% RB	699.7	QPSK	21.64	27.05
1.4MHz	1 RB low	699.7	16QAM	21.41	27.15
1.4MHz	1 RB mid	699.7	16QAM	22.26	27.83
1.4MHz	1 RB high	699.7	16QAM	21.95	27.61
1.4MHz	100% RB	699.7	16QAM	20.55	27.09
1.4MHz	1 RB low	707.5	QPSK	22.31	26.81
1.4MHz	1 RB mid	707.5	QPSK	22.31	26.83
1.4MHz	1 RB high	707.5	QPSK	22.35	27.06
1.4MHz	100% RB	707.5	QPSK	21.45	26.86
1.4MHz	1 RB low	707.5	16QAM	21.95	27.33
1.4MHz	1 RB mid	707.5	16QAM	22.05	27.54
1.4MHz	1 RB high	707.5	16QAM	21.52	27.30
1.4MHz	100% RB	707.5	16QAM	20.57	26.64
1.4MHz	1 RB low	715.3	QPSK	22.47	26.41
1.4MHz	1 RB mid	715.3	QPSK	22.34	26.51
1.4MHz	1 RB high	715.3	QPSK	22.24	26.63
1.4MHz	100% RB	715.3	QPSK	21.35	26.57
1.4MHz	1 RB low	715.3	16QAM	21.33	26.21
1.4MHz	1 RB mid	715.3	16QAM	21.22	26.20
1.4MHz	1 RB high	715.3	16QAM	21.32	26.55
1.4MHz	100% RB	715.3	16QAM	19.99	26.16
3MHz	1 RB low	700.5	QPSK	22.65	27.60
3MHz	1 RB mid	700.5	QPSK	22.98	27.45
3MHz	1 RB high	700.5	QPSK	22.72	26.97
3MHz	100% RB	700.5	QPSK	21.73	27.05
3MHz	1 RB low	700.5	16QAM	21.61	27.27
3MHz	1 RB mid	700.5	16QAM	22.58	27.72
3MHz	1 RB high	700.5	16QAM	21.75	26.76
3MHz	100% RB	700.5	16QAM	20.59	26.72
3MHz	1 RB low	707.5	QPSK	22.45	26.70

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3MHz	1 RB mid	707.5	QPSK	22.31	26.85
3MHz	1 RB high	707.5	QPSK	22.44	27.26
3MHz	100% RB	707.5	QPSK	21.49	27.02
3MHz	1 RB low	707.5	16QAM	21.54	26.79
3MHz	1 RB mid	707.5	16QAM	21.52	27.13
3MHz	1 RB high	707.5	16QAM	21.64	27.57
3MHz	100% RB	707.5	16QAM	20.32	27.02
3MHz	1 RB low	714.5	QPSK	22.91	26.86
3MHz	1 RB mid	714.5	QPSK	22.34	26.25
3MHz	1 RB high	714.5	QPSK	22.23	26.68
3MHz	100% RB	714.5	QPSK	21.54	26.59
3MHz	1 RB low	714.5	16QAM	21.93	26.71
3MHz	1 RB mid	714.5	16QAM	21.41	26.10
3MHz	1 RB high	714.5	16QAM	21.05	26.37
3MHz	100% RB	714.5	16QAM	20.42	26.70
5MHz	1 RB low	701.5	QPSK	22.50	27.27
5MHz	1 RB mid	701.5	QPSK	22.66	26.79
5MHz	1 RB high	701.5	QPSK	22.67	26.39
5MHz	100% RB	701.5	QPSK	21.74	26.91
5MHz	1 RB low	701.5	16QAM	21.11	26.85
5MHz	1 RB mid	701.5	16QAM	21.53	26.67
5MHz	1 RB high	701.5	16QAM	21.55	26.25
5MHz	100% RB	701.5	16QAM	20.61	26.81
5MHz	1 RB low	707.5	QPSK	22.38	26.34
5MHz	1 RB mid	707.5	QPSK	22.19	26.70
5MHz	1 RB high	707.5	QPSK	22.47	27.23
5MHz	100% RB	707.5	QPSK	21.46	27.28
5MHz	1 RB low	707.5	16QAM	21.65	26.46
5MHz	1 RB mid	707.5	16QAM	21.75	27.16
5MHz	1 RB high	707.5	16QAM	21.58	27.34
5MHz	100% RB	707.5	16QAM	20.30	26.54
5MHz	1 RB low	713.5	QPSK	22.85	27.41
5MHz	1 RB mid	713.5	QPSK	22.69	26.46
5MHz	1 RB high	713.5	QPSK	22.41	26.70
5MHz	100% RB	713.5	QPSK	21.44	26.66
5MHz	1 RB low	713.5	16QAM	21.41	26.68
5MHz	1 RB mid	713.5	16QAM	21.48	26.09
5MHz	1 RB high	713.5	16QAM	20.47	25.59

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5MHz	100% RB	713.5	16QAM	20.35	26.45
10MHz	1 RB low	704	QPSK	22.61	27.43
10MHz	1 RB mid	704	QPSK	22.63	26.37
10MHz	1 RB high	704	QPSK	22.41	27.19
10MHz	100% RB	704	QPSK	21.65	27.49
10MHz	1 RB low	704	16QAM	21.57	27.16
10MHz	1 RB mid	704	16QAM	22.32	26.56
10MHz	1 RB high	704	16QAM	21.38	26.92
10MHz	100% RB	704	16QAM	20.30	26.81
10MHz	1 RB low	707.5	QPSK	22.86	26.71
10MHz	1 RB mid	707.5	QPSK	22.32	26.88
10MHz	1 RB high	707.5	QPSK	22.57	27.16
10MHz	100% RB	707.5	QPSK	21.35	27.57
10MHz	1 RB low	707.5	16QAM	21.76	26.64
10MHz	1 RB mid	707.5	16QAM	21.65	27.28
10MHz	1 RB high	707.5	16QAM	22.42	27.95
10MHz	100% RB	707.5	16QAM	20.32	27.07
10MHz	1 RB low	711	QPSK	22.27	26.68
10MHz	1 RB mid	711	QPSK	22.88	27.61
10MHz	1 RB high	711	QPSK	22.36	26.50
10MHz	100% RB	711	QPSK	21.44	27.38
10MHz	1 RB low	711	16QAM	21.47	26.65
10MHz	1 RB mid	711	16QAM	22.17	27.71
10MHz	1 RB high	711	16QAM	21.18	26.22
10MHz	100% RB	711	16QAM	20.27	26.66

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6.3. ERP and EIRP

Limit Level Construction:

This is the test for the maximum radiated power from the EUT.

According to Part 27.50(c), specifies “Portable stations (hand-held de-vices) are limited to 3 watts ERP.”.

Conducted RF Power (dBm) +Antenna Gain (dBi) =ERIP (dBm)

Conducted RF Power (dBm) +Antenna Gain (dBi) -2.15dB=ERP (dBm)

Frequency Band	AntennaGain (dBi)	AntennaGain (dBd)
LTE Band 12	3	--

6.3.1 LTE Band 12 result

LTE band 12

ERP Limits 34.8dBm(3w)

Max ERP:23.83dBm

Bandwidth	RB size/offset	Frequency (MHz)	Modulation	Power (dBm)	Radiated Power(dBm) G _T = 3 dBi
1.4MHz	1 RB low	699.7	QPSK	22.78	23.63
1.4MHz	1 RB mid	699.7	QPSK	22.68	23.53
1.4MHz	1 RB high	699.7	QPSK	22.86	23.71
1.4MHz	100% RB	699.7	QPSK	21.64	22.49
1.4MHz	1 RB low	699.7	16QAM	21.41	22.26
1.4MHz	1 RB mid	699.7	16QAM	22.26	23.11
1.4MHz	1 RB high	699.7	16QAM	21.95	22.80
1.4MHz	100% RB	699.7	16QAM	20.55	21.40
1.4MHz	1 RB low	707.5	QPSK	22.31	23.16
1.4MHz	1 RB mid	707.5	QPSK	22.31	23.16
1.4MHz	1 RB high	707.5	QPSK	22.35	23.20
1.4MHz	100% RB	707.5	QPSK	21.45	22.30
1.4MHz	1 RB low	707.5	16QAM	21.95	22.80
1.4MHz	1 RB mid	707.5	16QAM	22.05	22.90
1.4MHz	1 RB high	707.5	16QAM	21.52	22.37
1.4MHz	100% RB	707.5	16QAM	20.57	21.42
1.4MHz	1 RB low	715.3	QPSK	22.47	23.32

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1.4MHz	1 RB mid	715.3	QPSK	22.34	23.19
1.4MHz	1 RB high	715.3	QPSK	22.24	23.09
1.4MHz	100% RB	715.3	QPSK	21.35	22.20
1.4MHz	1 RB low	715.3	16QAM	21.33	22.18
1.4MHz	1 RB mid	715.3	16QAM	21.22	22.07
1.4MHz	1 RB high	715.3	16QAM	21.32	22.17
1.4MHz	100% RB	715.3	16QAM	19.99	20.84
3MHz	1 RB low	700.5	QPSK	22.65	23.50
3MHz	1 RB mid	700.5	QPSK	22.98	23.83
3MHz	1 RB high	700.5	QPSK	22.72	23.57
3MHz	100% RB	700.5	QPSK	21.73	22.58
3MHz	1 RB low	700.5	16QAM	21.61	22.46
3MHz	1 RB mid	700.5	16QAM	22.58	23.43
3MHz	1 RB high	700.5	16QAM	21.75	22.60
3MHz	100% RB	700.5	16QAM	20.59	21.44
3MHz	1 RB low	707.5	QPSK	22.45	23.30
3MHz	1 RB mid	707.5	QPSK	22.31	23.16
3MHz	1 RB high	707.5	QPSK	22.44	23.29
3MHz	100% RB	707.5	QPSK	21.49	22.34
3MHz	1 RB low	707.5	16QAM	21.54	22.39
3MHz	1 RB mid	707.5	16QAM	21.52	22.37
3MHz	1 RB high	707.5	16QAM	21.64	22.49
3MHz	100% RB	707.5	16QAM	20.32	21.17
3MHz	1 RB low	714.5	QPSK	22.91	23.76
3MHz	1 RB mid	714.5	QPSK	22.34	23.19
3MHz	1 RB high	714.5	QPSK	22.23	23.08
3MHz	100% RB	714.5	QPSK	21.54	22.39
3MHz	1 RB low	714.5	16QAM	21.93	22.78
3MHz	1 RB mid	714.5	16QAM	21.41	22.26
3MHz	1 RB high	714.5	16QAM	21.05	21.90
3MHz	100% RB	714.5	16QAM	20.42	21.27
5MHz	1 RB low	701.5	QPSK	22.50	23.35
5MHz	1 RB mid	701.5	QPSK	22.66	23.51
5MHz	1 RB high	701.5	QPSK	22.67	23.52
5MHz	100% RB	701.5	QPSK	21.74	22.59
5MHz	1 RB low	701.5	16QAM	21.11	21.96
5MHz	1 RB mid	701.5	16QAM	21.53	22.38
5MHz	1 RB high	701.5	16QAM	21.55	22.40

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5MHz	100% RB	701.5	16QAM	20.61	21.46
5MHz	1 RB low	707.5	QPSK	22.38	23.23
5MHz	1 RB mid	707.5	QPSK	22.19	23.04
5MHz	1 RB high	707.5	QPSK	22.47	23.32
5MHz	100% RB	707.5	QPSK	21.46	22.31
5MHz	1 RB low	707.5	16QAM	21.65	22.50
5MHz	1 RB mid	707.5	16QAM	21.75	22.60
5MHz	1 RB high	707.5	16QAM	21.58	22.43
5MHz	100% RB	707.5	16QAM	20.30	21.15
5MHz	1 RB low	713.5	QPSK	22.85	23.70
5MHz	1 RB mid	713.5	QPSK	22.69	23.54
5MHz	1 RB high	713.5	QPSK	22.41	23.26
5MHz	100% RB	713.5	QPSK	21.44	22.29
5MHz	1 RB low	713.5	16QAM	21.41	22.26
5MHz	1 RB mid	713.5	16QAM	21.48	22.33
5MHz	1 RB high	713.5	16QAM	20.47	21.32
5MHz	100% RB	713.5	16QAM	20.35	21.20
10MHz	1 RB low	704	QPSK	22.61	23.46
10MHz	1 RB mid	704	QPSK	22.63	23.48
10MHz	1 RB high	704	QPSK	22.41	23.26
10MHz	100% RB	704	QPSK	21.65	22.50
10MHz	1 RB low	704	16QAM	21.57	22.42
10MHz	1 RB mid	704	16QAM	22.32	23.17
10MHz	1 RB high	704	16QAM	21.38	22.23
10MHz	100% RB	704	16QAM	20.30	21.15
10MHz	1 RB low	707.5	QPSK	22.86	23.71
10MHz	1 RB mid	707.5	QPSK	22.32	23.17
10MHz	1 RB high	707.5	QPSK	22.57	23.42
10MHz	100% RB	707.5	QPSK	21.35	22.20
10MHz	1 RB low	707.5	16QAM	21.76	22.61
10MHz	1 RB mid	707.5	16QAM	21.65	22.50
10MHz	1 RB high	707.5	16QAM	22.42	23.27
10MHz	100% RB	707.5	16QAM	20.32	21.17
10MHz	1 RB low	711	QPSK	22.27	23.12
10MHz	1 RB mid	711	QPSK	22.88	23.73
10MHz	1 RB high	711	QPSK	22.36	23.21
10MHz	100% RB	711	QPSK	21.44	22.29
10MHz	1 RB low	711	16QAM	21.47	22.32

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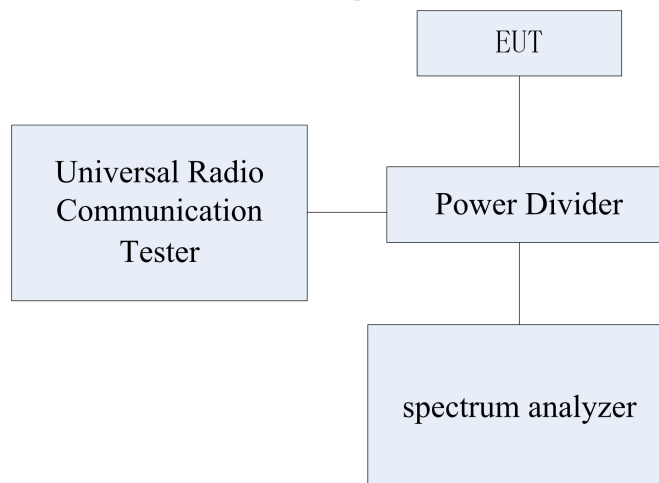
10MHz	1 RB mid	711	16QAM	22.17	23.02
10MHz	1 RB high	711	16QAM	21.18	22.03
10MHz	100% RB	711	16QAM	20.27	21.12

6.4. Occupied Bandwidth

Specifications:	FCC Part 2.1049
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	--

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	500 kHz (k=2)

Test Method

The 99% occupied Bandwidth was calculated from the spectrum analyzer. Markers in the spectrum analyzer were then placed between the calculated frequencies to show the calculated 99% power Band. The 26dB Bandwidth was also measured and recorded.

Note: --

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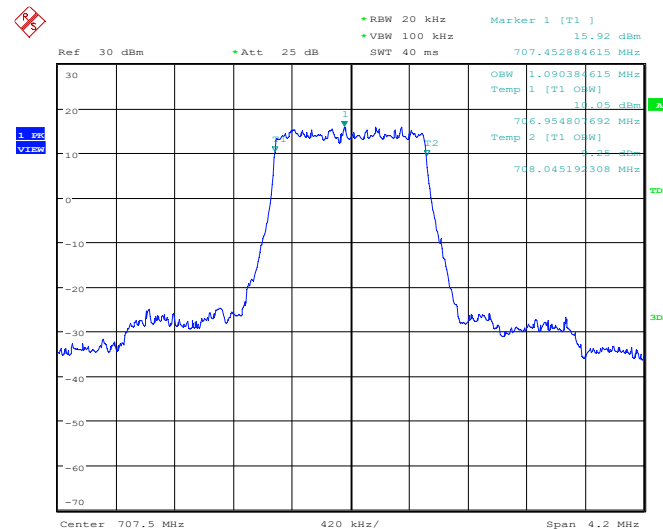
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6.4.1 occupied bandwidth Results

LTE band 12,1.4MHz(99%)

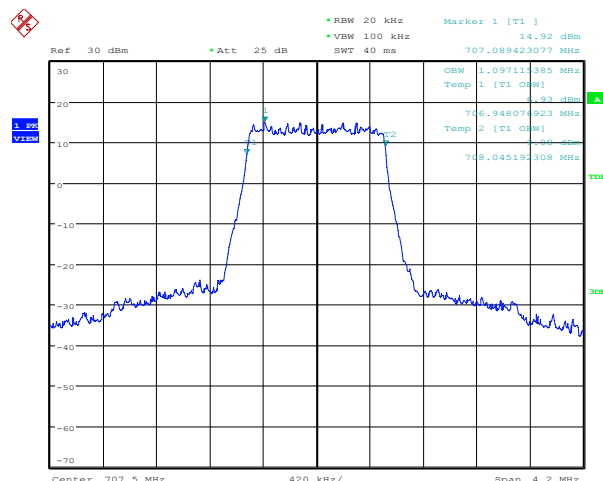
Frequency (MHz)	Occupied Bandwidth (99%)(MHz)	
	QPSK	16QAM
707.5	1.090	1.097

LTE band 12 , 1.4MHz Bandwidth,QPSK (99% BW)



Date: 17.JUN.2022 23:33:39

LTE band 12 , 1.4MHz Bandwidth,16QAM (99% BW)



Date: 17.JUN.2022 23:34:00

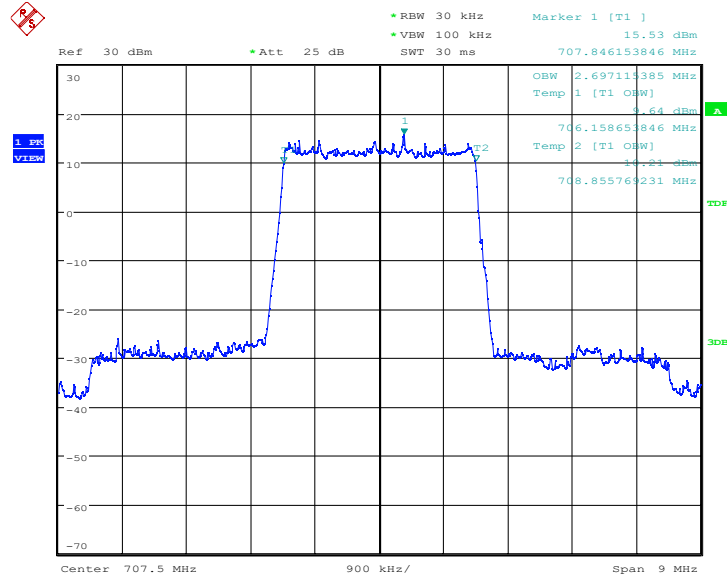
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LTE band 12,3MHz(99%)

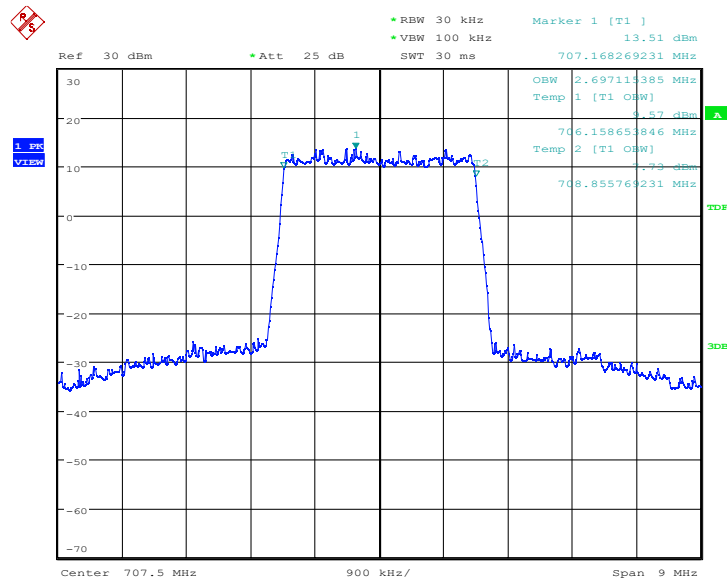
Frequency (MHz)	Occupied Bandwidth (99%)(MHz)	
	QPSK	16QAM
707.5	2.697	2.697

LTE band 12 , 3MHz Bandwidth,QPSK (99% BW)



Date: 17.JUN.2022 23:34:30

LTE band 12 , 3MHz Bandwidth,16QAM (99% BW)



Date: 17.JUN.2022 23:34:53

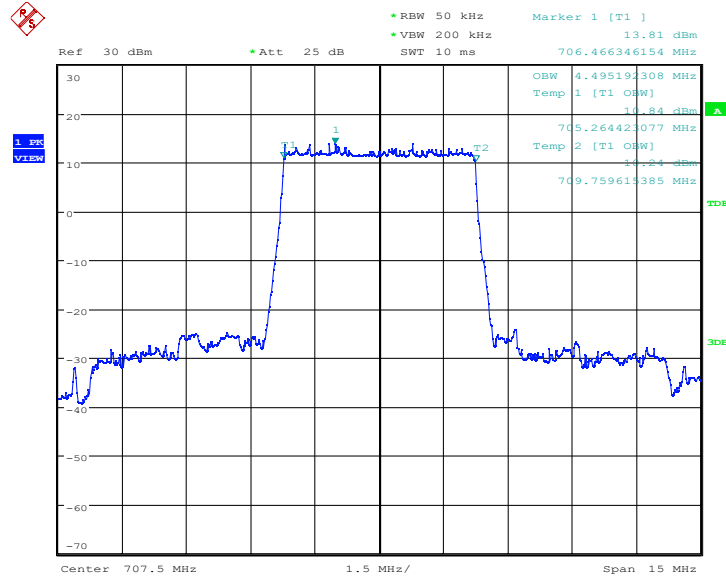
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LTE band 12,5MHz(99%)

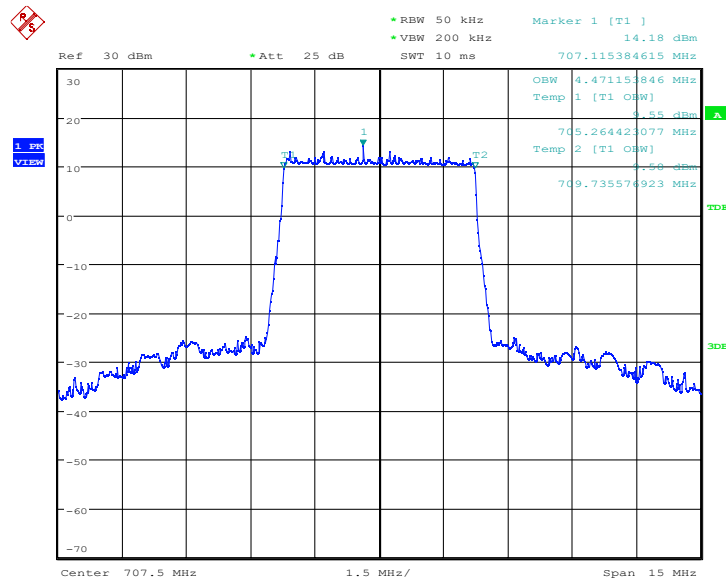
Frequency (MHz)	Occupied Bandwidth (99%)(MHz)	
	QPSK	16QAM
707.5	4.495	4.471

LTE band 12 , 5MHz Bandwidth,QPSK (99% BW)



Date: 17.JUN.2022 23:35:19

LTE band 12 , 5MHz Bandwidth,16QAM (99% BW)



Date: 17.JUN.2022 23:35:44

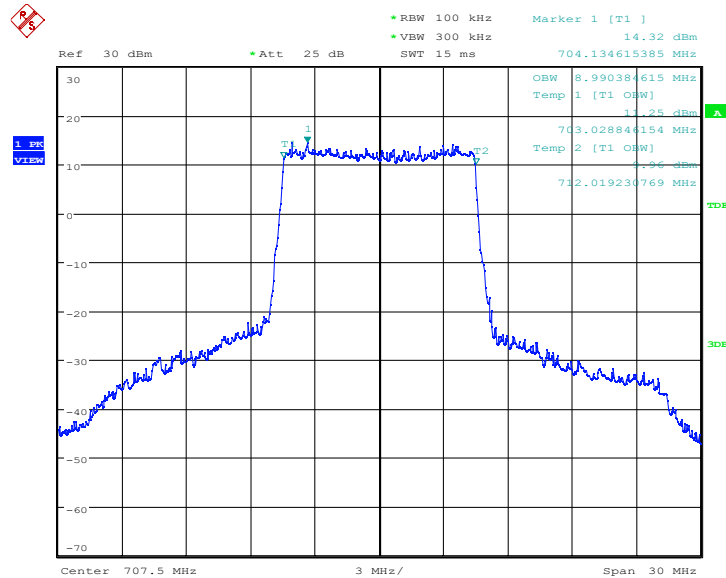
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LTE band 12,10MHz(99%)

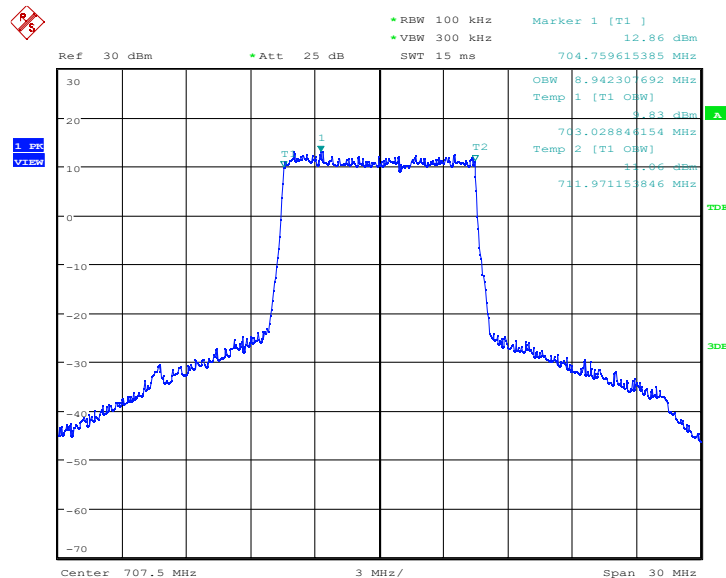
Frequency (MHz)	Occupied Bandwidth (99%)(MHz)	
	QPSK	16QAM
707.5	8.990	8.942

LTE band 12 , 10MHz Bandwidth,QPSK (99% BW)



Date: 17.JUN.2022 23:36:12

LTE band 12 , 10MHz Bandwidth,16QAM (99% BW)



Date: 18.JUN.2022 21:02:40

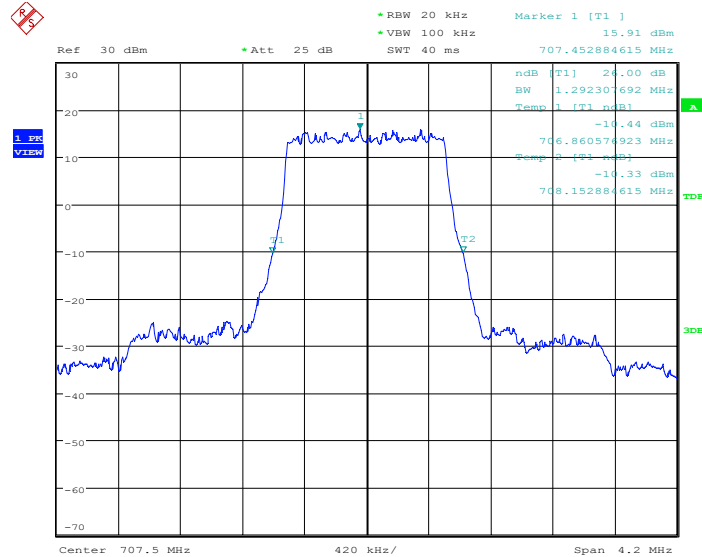
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LTE band 12,1.4MHz(-26dBc)

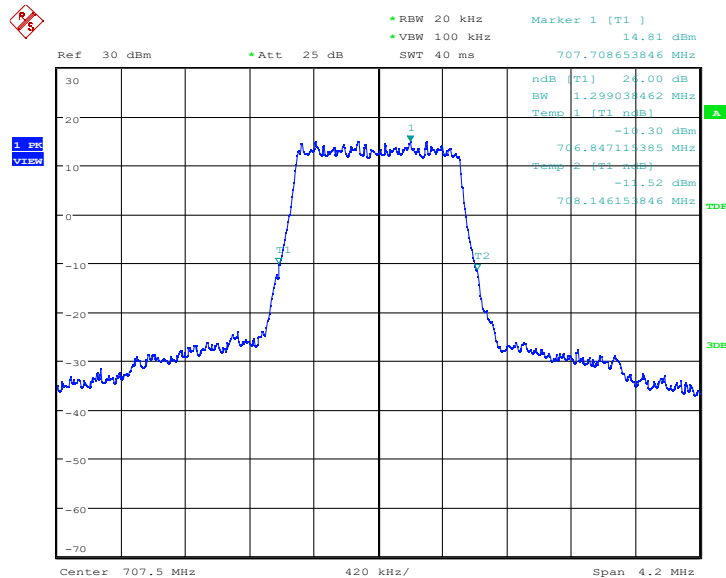
Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
707.5	1.292	1.299

LTE band 12 , 1.4MHz Bandwidth,QPSK (-26dBc BW)



Date: 17.JUN.2022 23:39:30

LTE band 12 , 1.4MHz Bandwidth,16QAM (-26dBc BW)



Date: 17.JUN.2022 23:39:53

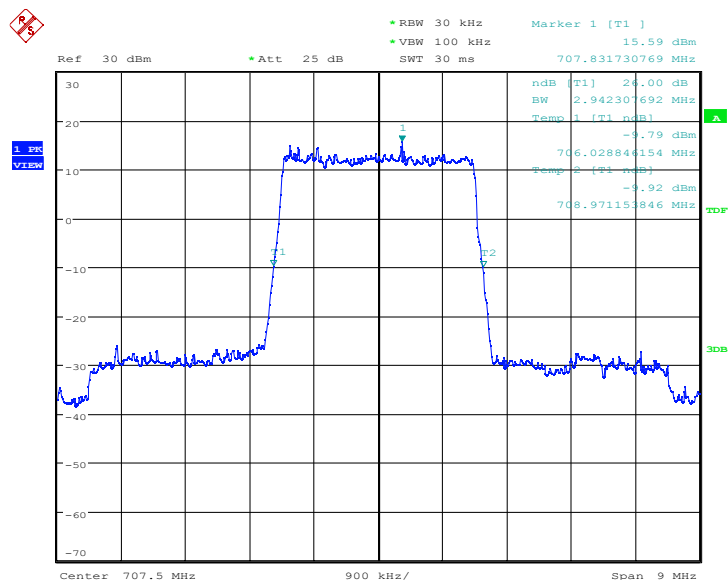
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LTE band 12,3MHz(-26dBc)

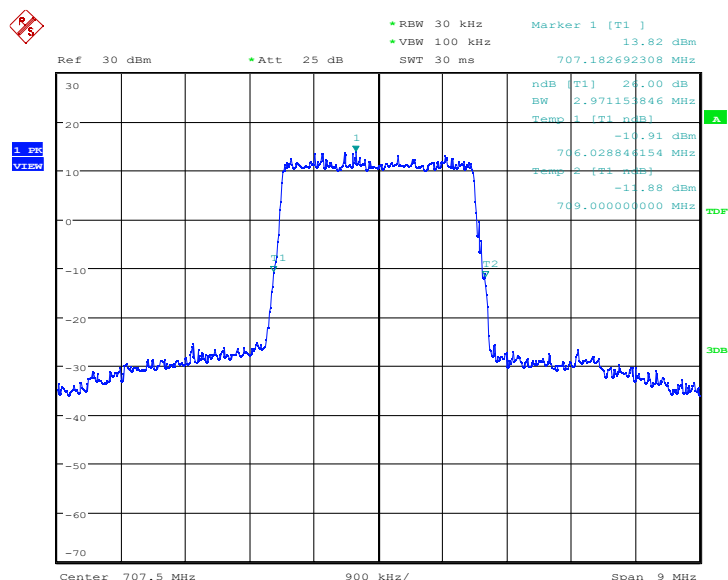
Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
707.5	2.942	2.971

LTE band 12 , 3MHz Bandwidth,QPSK (-26dBc BW)



Date: 17.JUN.2022 23:40:21

LTE band 12 , 3MHz Bandwidth,16QAM (-26dBc BW)



Date: 17.JUN.2022 23:40:43

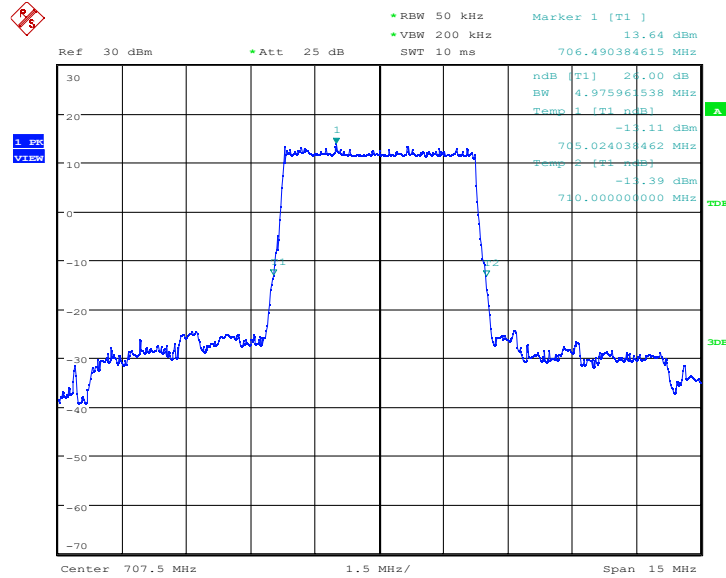
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LTE band 12,5MHz(-26dBc)

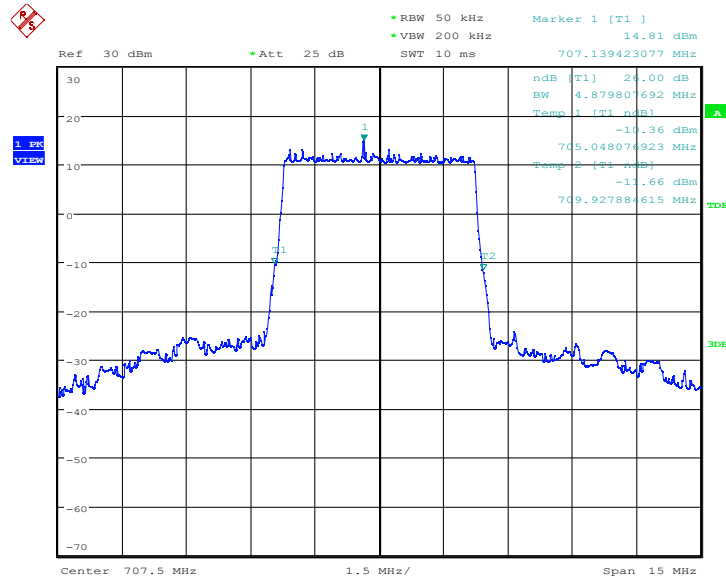
Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
707.5	4.976	4.880

LTE band 12 , 5MHz Bandwidth,QPSK (-26dBc BW)



Date: 17.JUN.2022 23:41:08

LTE band 12 , 5MHz Bandwidth,16QAM (-26dBc BW)



Date: 17.JUN.2022 23:41:32

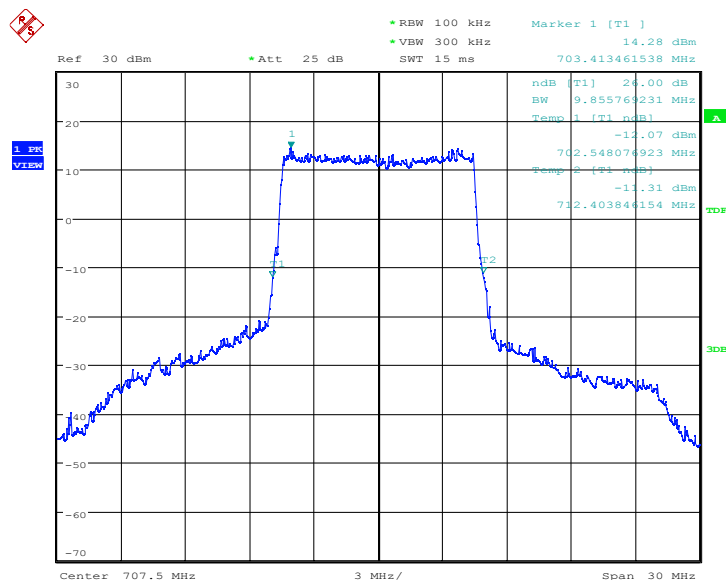
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LTE band 12,10MHz(-26dBc)

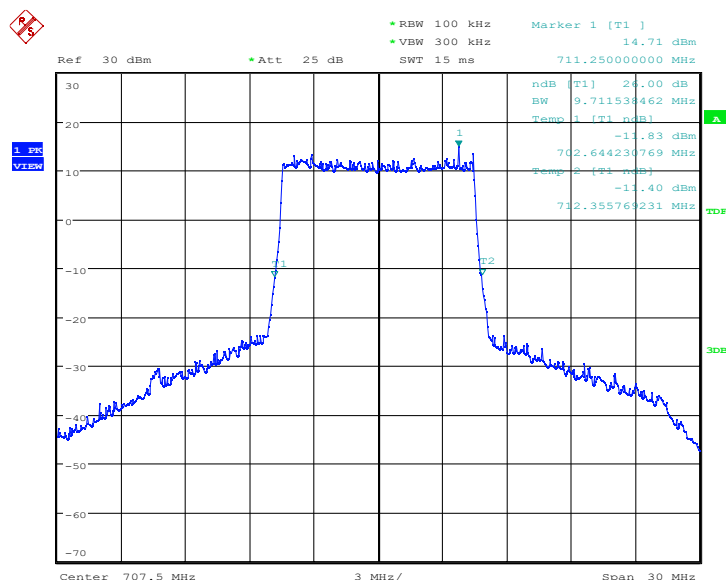
Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
707.5	9.856	9.712

LTE band 12 , 10MHz Bandwidth,QPSK (-26dBc BW)



Date: 17.JUN.2022 23:42:00

LTE band 12 , 10MHz Bandwidth,16QAM (-26dBc BW)



Date: 18.JUN.2022 21:03:29

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6.5. Conducted spurious emissions

Specifications:	FCC Part 2.1051, 2.1053, 27.53
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:24.1°C-27.2°C Relative Humidity:57.0%-59.0% Air pressure: 97.4kPa
Test Results:	Pass

Limit Level Construction:

According to Part 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. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

Measurement Uncertainty:

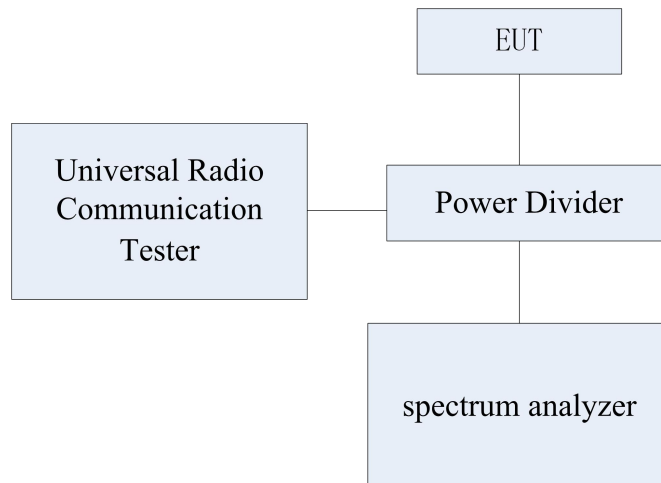
Item	Uncertainty	
Expanded Uncertainty	$9\text{kHz} < f \leq 4\text{GHz}$	0.71 dB (k=2)
	$4\text{GHz} \leq f < 12.75\text{GHz}$	0.74 dB (k=2)
	$12.75\text{GHz} \leq f < 26\text{GHz}$	2.70 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.

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**Test Method:**

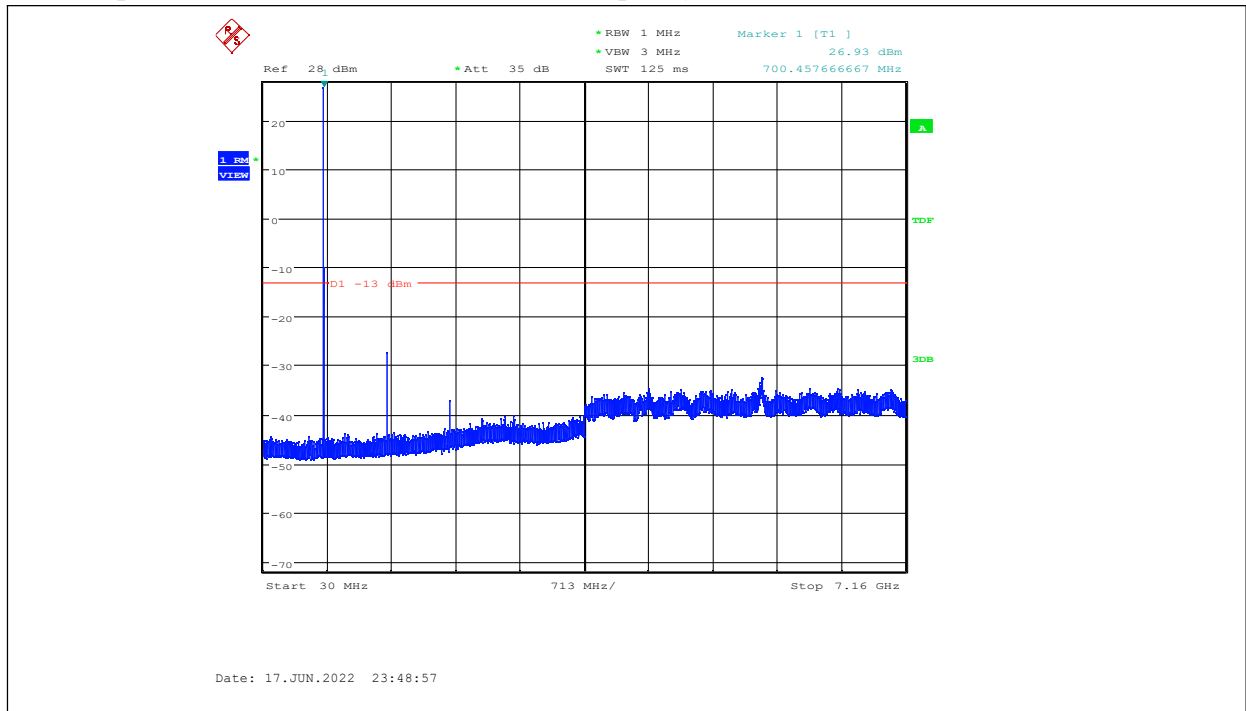
The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-Band emissions, if any, up to 10th harmonic. The EUT was scanned for spurious emissions from 30MHz to 20GHz with sufficient Bandwidth and video resolution. The spectrum analyzer was set to Maximum hold mode to ensure that the worst-case emissions were captured.

Note: --

6.5.1 Conducted Spurious Emission Results

LTE band 12

NOTE: peak above the limit line is the carrier frequency.



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6.6. Radiated Spurious Emission

Specifications:	FCC Part 2.1051, 2.1053, 27.53, 24.238, 22.917
DUT Serial Number:	865699038738780
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 24.238 (a), i.e., Out of Band emissions. The 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, so the limit level is: $P(\text{dBm}) - (43 + 10 \log(P)) \text{ dB} = -13 \text{ dBm}$.

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 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 $43 + 10 \log_{10}(P)$ dB.

According to Part 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. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 22.917 (a), i.e., Out of Band emissions. The 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.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the

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center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Limits for Radiated spurious emissions(UE)	
Frequency range	Limit Level /Resolution Bandwidth
30 MHz to 20000 MHz	-13dBm/1MHz

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty (30MHz-150MHz)	5.15 dB (k=2)
Expanded Uncertainty (150MHz-1GHz)	4.09dB (k=2)
Expanded Uncertainty (1GHz-3GHz)	2.92dB (k=2)
Expanded Uncertainty (3GHz-6GHz)	2.93dB (k=2)
Expanded Uncertainty (3GHz-12.75GHz)	2.69dB (k=2)

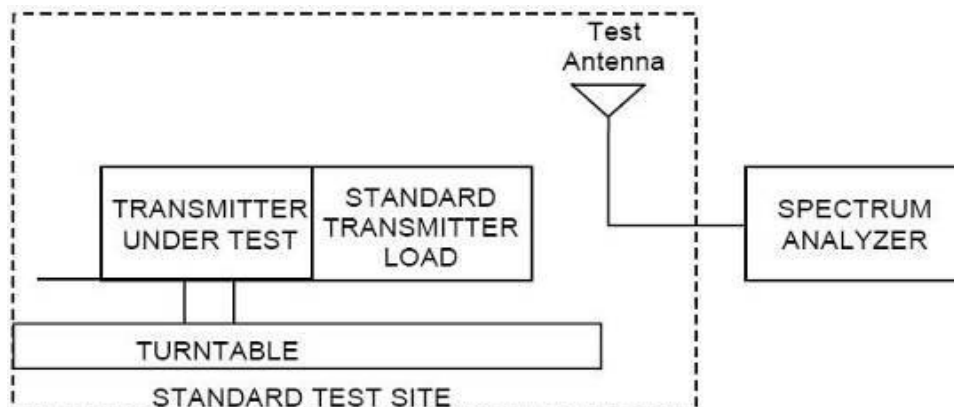
Test Setup:

The EUT was placed in an anechoic chamber. The Wireless Communications Test Set was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

Test Method:

The measurement method is substitution method accordance with section 2.2.12 of ANSI/TIA-603-E: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

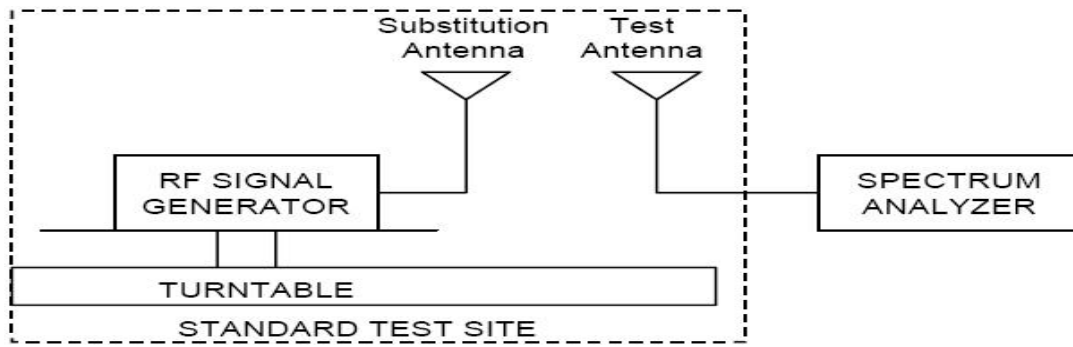
(a) Connect the equipment as illustrated and measure the spurious emissions as the method as above. The distance from the device to the antenna is 3 m .



(b) Reconnect the equipment as illustrated.

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(c) Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter.

(d) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

(e) Repeat step d) with both antennas vertically polarized for each spurious frequency.

(f) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps d) and e) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where:

P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

Note: The evaluation of radiated spurious emission under the transmission of WWAN .

6.6.1 LTE B2 Radiated Spurious Emission Results

Test Data (1.4MHz bandwidth 18900 QPSK Mode)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
3760.0	-72.1	1.6	9.2	-64.5	V
5640.0	-71.9	2.3	10.5	-63.7	V
7520.0	-70.2	2.5	11.9	-60.8	V
9400.0	-67.1	3.3	11.8	-58.6	V
11280.0	-67.4	3.3	12.2	-58.5	V
13160.0	-62.9	4.1	9.2	-57.8	V

LTE B4 Radiated Spurious Emission Results

Test Data (1.4MHz bandwidth 20175 QPSK Mode)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
3465.0	-74.0	1.5	8.9	-66.6	V
5197.5	-71.0	2.0	9.9	-63.1	V
6930.0	-71.6	2.6	11.9	-62.3	V
8662.5	-67.8	3.2	11.2	-59.8	V
10395.0	-67.5	3.5	12.2	-58.8	V
12127.5	-67.2	3.6	12.2	-58.6	V

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LTE B5 Radiated Spurious Emission Results

Test Data (1.4MHz bandwidth 20525 QPSK Mode)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1673.0	-71.8	1.0	8.0	-64.8	V
2509.5	-65.3	1.3	6.9	-59.7	V
3346.0	-74.5	1.5	8.9	-67.1	V
4182.5	-71.8	1.7	9.2	-64.3	V
5019.0	-71.4	2.0	9.9	-63.5	V
5855.5	-71.4	2.2	10.9	-62.7	V

LTE B12 Radiated Spurious Emission Results

Test Data (5MHz bandwidth 23095 QPSK Mode)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1415.0	-74.9	0.9	8.3	-67.5	H
2122.5	-67.9	1.2	6.6	-62.5	V
2830.0	-66.4	1.4	8.0	-59.8	V
3537.5	-72.0	1.6	8.9	-64.7	V
4245.0	-70.9	1.7	9.5	-63.1	V
4952.5	-68.0	1.9	9.9	-60.0	V

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LTE B13 Radiated Spurious Emission Results

Test Data (5MHz bandwidth 23205 QPSK Mode)

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
1559.0	-73.9	1.0	8.5	-66.4	V
2338.5	-67.1	1.2	8.1	-60.2	V
3118.0	-75.9	1.5	8.9	-68.5	V
3897.5	-71.2	1.7	9.2	-63.7	V
4677.0	-72.2	1.9	9.5	-64.6	V
5456.5	-71.3	2.2	10.5	-63.0	V

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6.7. Band Edge

Specifications:	FCC Part 2.1051, 2.1053, 27.53
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 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. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

Measurement Uncertainty:

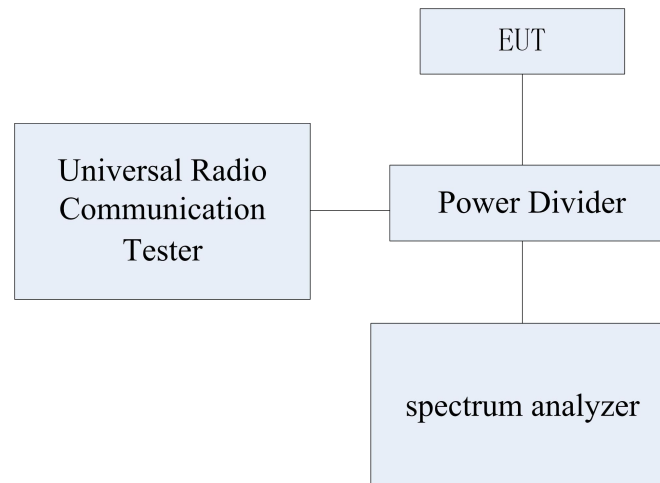
Item	Uncertainty	
Expanded Uncertainty	$9\text{kHz} < f \leq 4\text{GHz}$	0.71 dB (k=2)
	$4\text{GHz} \leq f < 12.75\text{GHz}$	0.74 dB (k=2)
	$12.75\text{GHz} \leq f < 26\text{GHz}$	2.70 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.

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**Test Method:**

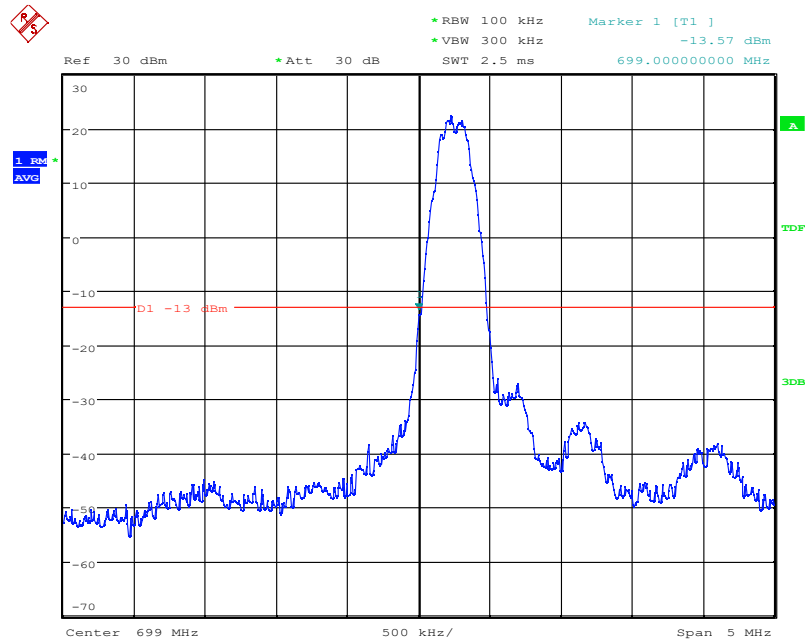
- 1) The EUT was coupled to the EMI test receiver analyzer mode and the base station simulator through a power divider. The loss of the cables the test system is calibrated to correct the readings.
- 2) The spectrum analyzer was set to Average Detector function and Maximum hold mode.
- 3) The resolution Bandwidth of the spectrum analyzer was a little greater than 1% of the 26dB emission Bandwidth.

Note: In the graphical result description (X, Y), X represents the number of RB, Y represents the RB offset.

6.7.1 Band Edge Results

LTE band 12

LOW BAND EDGE BLOCK-1RB-1.4M_offset

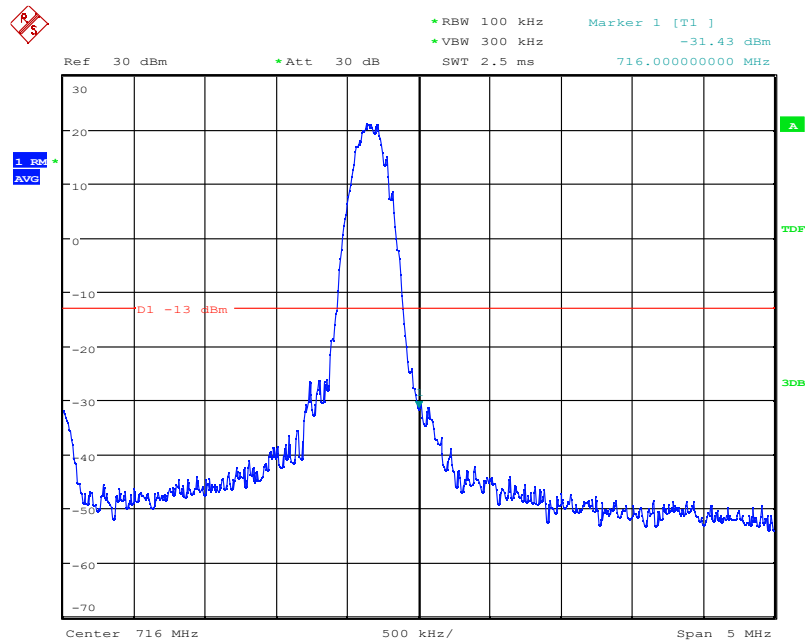


Date: 7.JUL.2022 15:22:06

HIGH BAND EDGE BLOCK-1RB-5M_offset

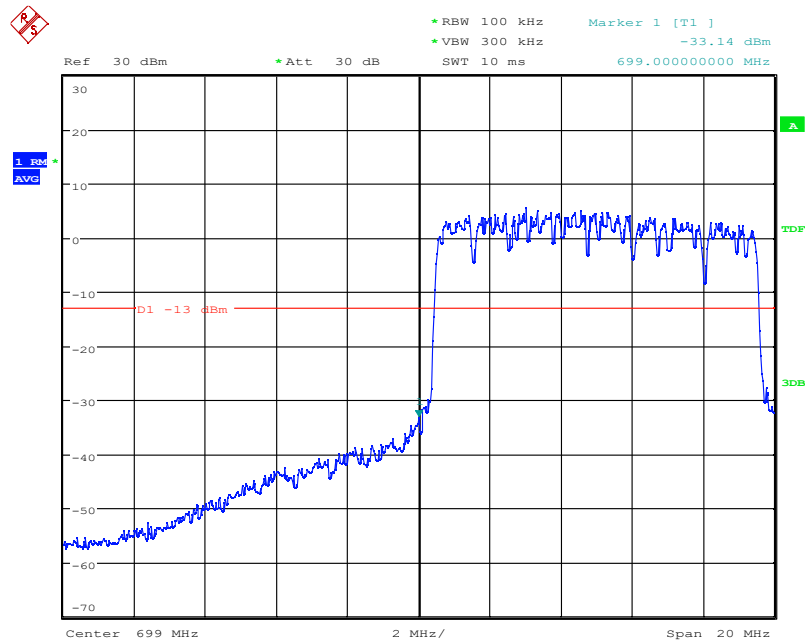
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Date: 7.JUL.2022 15:27:36

LOW BAND EDGE BLOCK-1RB-10M_offset

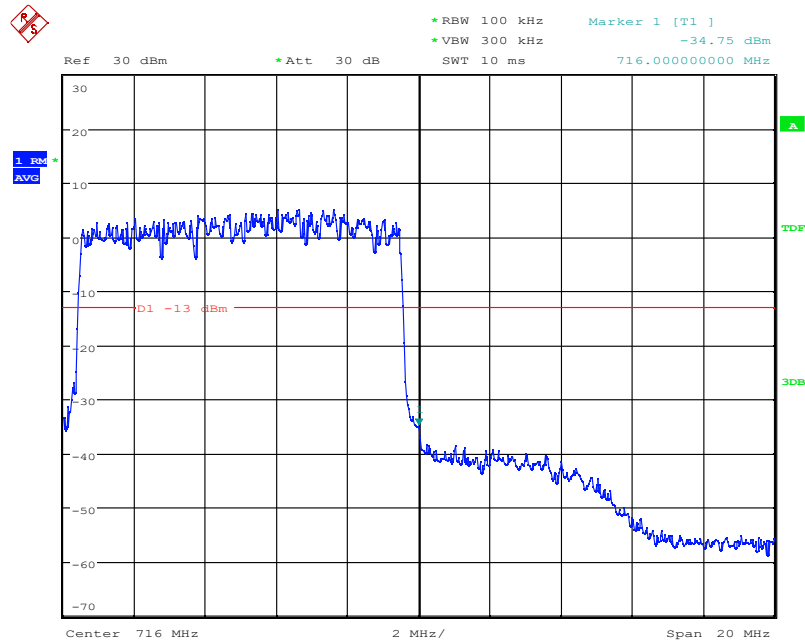


Date: 7.JUL.2022 15:29:27

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HIGH BAND EDGE BLOCK-1RB-10M_offset



Date: 7.JUL.2022 15:29:43

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6.8. Frequency Stability

Specifications:	FCC Part 2.1055, 27.54
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit	
Frequency deviation [ppm]	±2.5

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.54 Hz (k=2)

Test Method

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as FL and FH respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.

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6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

6.8.1 Frequency Stability over Temperature Variation Results

LTE band 12, 10MHz bandwidth QPSK(worst case of all bandwidths)

Frequency Error vs Temperature

Temperature(°C)	Voltage(V)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
20	3.8	699.480	715.520		
50				-0.04	0.0001
40				0.26	0.0004
30				0.07	0.0001
10				0.36	0.0005
0				0.37	0.0005
-10				0.10	0.0001
-20				0.20	0.0003
-30				0.53	0.0007

Frequency Error vs Voltage

Voltage(V)	Temperature(°C)	FL(MHz)	FH(MHz)	Offset(Hz)	Frequency error(ppm)
3.4	20	699.480	715.520	1.05	0.0015
4.2				0.57	0.0008

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6.9. Peak to Average Ratio

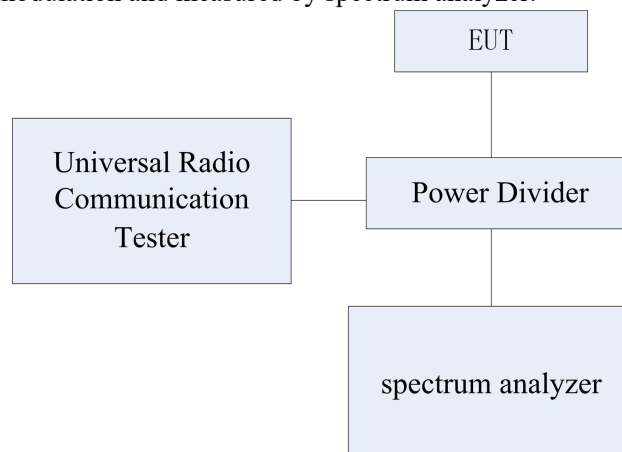
Specifications:	FCC Part 27.50
DUT Serial Number:	865699038738798
Test conditions:	Ambient Temperature:15°C-35°C Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit

The EUT meets the requirement of having a peak to average ratio of less than 13dB.

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.62 dB (k=2)

Test Method

The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

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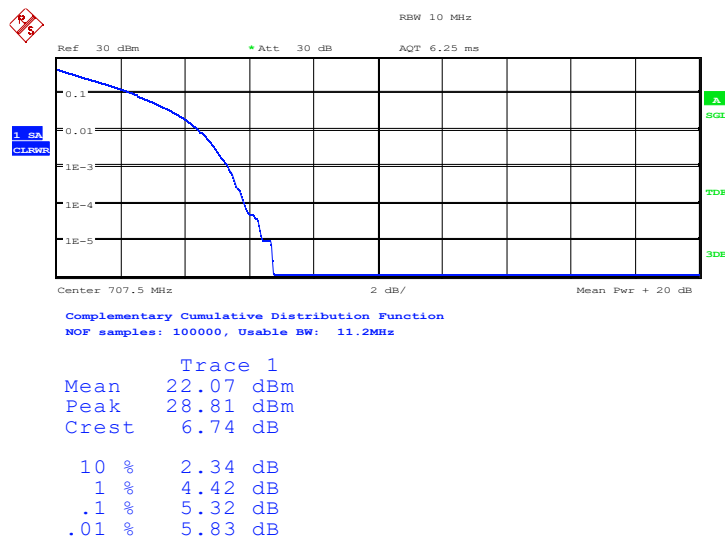
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6.9.1 Peak to Average Ratio Results

LTE Band 12, 10MHz

Frequency (MHz)	RB	PAPR (dB)	
		QPSK	16QAM
707.5	100%,0	5.32	6.12

LTE band 12 , 10MHz Bandwidth,QPSK

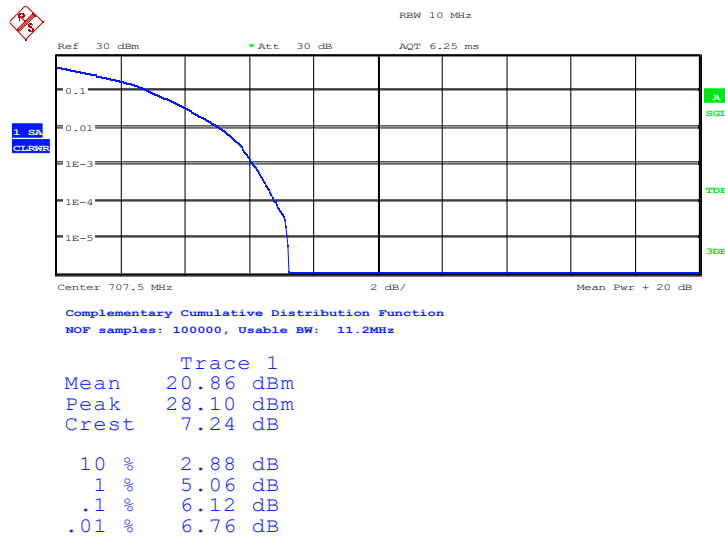


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LTE band 12 , 10MHz Bandwidth,16QAM

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Date: 18.JUN.2022 21:04:59

Annex A EUT Photos

See the document "I22W00049-External Photos".

See the document "I22W00049-Internal Photos".



Report No.: I22W00049-LTE RF-Rev2

ANNEX B Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*****END OF REPORT*****

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