

**TEST REPORT**
FCC Part 27**Report Reference No.**.....: HK2109063340-3E**FCC ID**.....: 2A3MB-VT3500-AI**Compiled by**
(position+printed name+signature)...: File administrators Gary Qian**Supervised by**
(position+printed name+signature)...: Technique principal Eden Hu**Approved by**
(position+printed name+signature)...: Manager Jason Zhou**Date of issue**.....: Sept. 29, 2021**Testing Laboratory Name**: **Shenzhen HUAKE Testing Technology Co., Ltd.****Address**: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park,
Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong,
China**Applicant's name**.....: **VISIONTRACK LIMITED****Address**: MARKERSTUDY HOUSE, 45 WESTERHAM ROAD,
SEVENOAKS, KENT, TN13 2QB United Kingdom**Test specification****Standard**: **FCC CFR Title 47 Part 2, Part 27****TRF Originator**.....: Shenzhen HUAKE Testing Technology Co., Ltd.**Shenzhen HUAKE Testing Technology Co., Ltd. All rights reserved.**

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Test item description: Camera**Trade Mark**: **Manufacturer**.....: **VISIONTRACK LIMITED****Model/Type reference**.....: VT3500-AI (NA)**Listed Models**: N/A**Modulation Type**.....: QPSK, 16QAM**Rating**: DC 8-36V**Hardware version**: V2.0**Software version**: V2.0**Result**.....: **PASS**

**TEST REPORT****Test Report No. :****HK2109063340-3E**

Sept. 29, 2021

Date of issue

Equipment under Test : Camera

Model /Type : VT3500-AI (NA)

Listed Models : N/A

Applicant : VISIONTRACK LIMITEDAddress : MARKERSTUDY HOUSE, 45 WESTERHAM ROAD,
SEVENOAKS, KENT, TN13 2QB United Kingdom**Manufacturer : VISIONTRACK LIMITED**Address : MARKERSTUDY HOUSE, 45 WESTERHAM ROAD,
SEVENOAKS, KENT, TN13 2QB United Kingdom**Test result****Pass**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Sept. 29, 2021	Jason Zhou



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1 SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

[FCC Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[TIA/EIA 603 D June 2010](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

47 CFR FCC Part 15 Subpart B: - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[KDB971168 D01: v02r02](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

1.2 Test Description

Test Item	Section in CFR 47	Result
RF Output Power	Part 2.1046 Part 27.50(d)(4)	Pass
Peak-to-Average Ratio	Part 27.50(d)(4)	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 27.53(h)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 27.53(h)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 27.53(h)	Pass
Out of band emission, Band Edge	Part 2.1051 Part 27.53(h)	Pass
Frequency stability	Part 2.1055 Part 27.54	Pass



1.3 Information of The Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

1.4 Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4:Uncertainty in EMC Measurements“ and is documented in the Shenzhen HUAKE Testing Technology Co., Ltd.quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen HUAKE Testing Technology Co., Ltd.is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



2 GENERAL INFORMATION

2.1 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2 Description of Test Modes

The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

Note:

1. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.
2. Test method and refer to 3GPP TS136521.

2.3 Test frequency list

TX Channel Bandwidth	Frequency (MHz)	channel
1.4 MHz	1710.7	19957
	1732.5	20175
	1754.3	20393
3 MHz	1711.5	19965
	1732.5	20175
	1753.5	20385
5 MHz	1712.	19975
	1732.5	20175
	1752.5	20375
10 MHz	1715.0	20000
	1732.5	20175
	1750.0	20350
15 MHz	1717.5	20025
	1732.5	20175
	1747.5	20325
20 MHz	1720.0	20050
	1732.5	20175
	1745.0	20300



2.4 Equipments Used During The Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	ENV216	R&S	HKE-059	2020/12/10	2021/12/09
LISN	R&S	ENV216	HKE-002	2020/12/10	2021/12/09
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2020/12/10	2021/12/09
Receiver	R&S	ESCI 7	HKE-010	2020/12/10	2021/12/09
Spectrum analyzer	Agilent	N9020A	HKE-048	2020/12/10	2021/12/09
RF automatic control unit	Tonscend	JS0806-2	HKE-060	2020/12/10	2021/12/09
Horn antenna	Schwarzbeck	9120D	HKE-013	2020/12/10	2021/12/09
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	2020/12/10	2021/12/09
Preamplifier	EMCI	EMC051845SE	HKE-015	2020/12/10	2021/12/09
Preamplifier	Agilent	83051A	HKE-016	2020/12/10	2021/12/09
Temperature and humidity meter	Boyang	HTC-1	HKE-075	2020/12/10	2021/12/09
High pass filter unit	Tonscend	JS0806-F	HKE-055	2020/12/10	2021/12/09
RF cable	Times	1-40G	HKE-034	2020/12/10	2021/12/09
Power meter	Agilent	E4419B	HKE-085	2020/12/10	2021/12/09
Power Sensor	Agilent	E9300A	HKE-086	2020/12/10	2021/12/09
Wireless Communication Test Set	R&S	CMU200	HKE-026	2020/12/10	2021/12/09
High gain antenna	Schwarzbeck	LB-180400KF	HKE-054	2020/12/10	2021/12/09
Horn antenna	Schwarzbeck	9120D	HKE-135	2020/12/10	2021/12/09
High gain antenna	Schwarzbeck	LB-180400KF	HKE-128	2020/12/10	2021/12/09
Broadband antenna	Schwarzbeck	VULB 9163	HKE-087	2020/12/10	2021/12/09
Signal generator	Agilent	E4433B	HKE-120	2020/12/10	2021/12/09
Signal generator	Agilent	E4421B	HKE-121	2020/12/10	2021/12/09

2.5 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2A3MB-VT3500-AI filing to comply with of the FCC Part 27 Rules.

2.6 Modifications

No modifications were implemented to meet testing criteria.



3 TEST CONDITIONS AND RESULTS

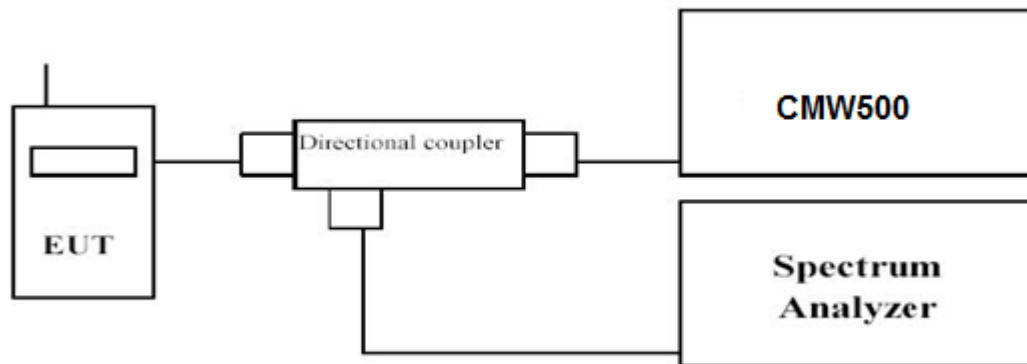
3.1 Output Power

LIMIT

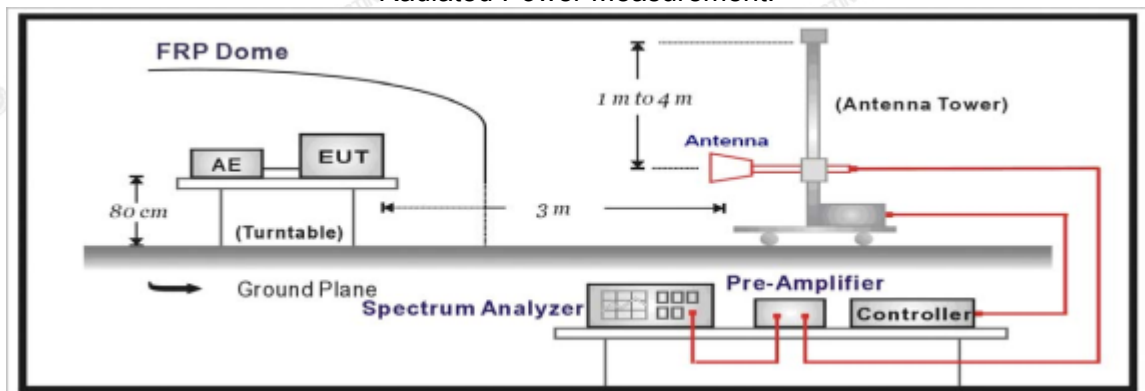
According to §27.50 (d) (4): Fixed, mobile, and portable (hand- held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

TEST CONFIGURATION

Conducted Power Measurement



Radiated Power Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Conducted Power Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

- The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.
- The output of the test antenna shall be connected to the measuring receiver.
- The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- The test antenna shall be raised and lowered through the specified range of height until a maximum signal

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- level is detected by the measuring receiver.
- The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
 - The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
 - The maximum signal level detected by the measuring receiver shall be noted.
 - The transmitter shall be replaced by a substitution antenna.
 - The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
 - The substitution antenna shall be connected to a calibrated signal generator.
 - If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
 - The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
 - The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
 - The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
 - The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
 - Test site anechoic chamber refer to ANSI C63.4.

TEST RESULTS

Conducted Measurement:

LTE FDD Band 4				
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	Average Power [dBm]	
			QPSK	16QAM
1.4 MHz	1710.7	1 RB low	22.11	21.13
		1 RB high	22.19	21.74
		50% RB mid	22.08	21.30
		100% RB	22.27	20.97
	1732.5	1 RB low	22.59	21.21
		1 RB high	22.65	21.90
		50% RB mid	22.48	21.59
		100% RB	22.60	21.44
	1754.3	1 RB low	22.01	21.20
		1 RB high	22.29	21.02
		50% RB mid	22.11	21.42
		100% RB	22.38	21.25
3 MHz	1711.5	1 RB low	22.28	21.43
		1 RB high	22.10	20.94
		50% RB mid	22.18	20.85
		100% RB	21.37	20.29
	1732.5	1 RB low	22.61	21.48
		1 RB high	22.47	21.45
		50% RB mid	22.54	21.51
		100% RB	21.50	21.00
	1753.5	1 RB low	22.21	21.22
		1 RB high	22.10	20.77
		50% RB mid	22.11	20.85
		100% RB	21.26	20.15
5 MHz	1712.	1 RB low	22.40	21.49
		1 RB high	22.37	21.34
		50% RB mid	22.53	21.24
		100% RB	21.24	20.39
	1732.5	1 RB low	22.63	21.15
		1 RB high	22.69	21.51

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		1752.5	50% RB mid	22.77	21.46
			100% RB	21.47	20.43
			1 RB low	22.41	21.27
			1 RB high	22.46	20.75
			50% RB mid	22.34	21.11
			100% RB	21.35	20.49
			1 RB low	22.18	21.25
			1 RB high	22.39	21.78
			50% RB mid	22.47	21.95
			100% RB	21.22	20.42
10 MHz	1715.0	1732.5	1 RB low	22.50	21.53
			1 RB high	22.90	21.83
			50% RB mid	22.65	22.25
			100% RB	21.43	20.61
	1750.0		1 RB low	22.30	21.58
			1 RB high	22.42	21.57
			50% RB mid	22.19	21.33
			100% RB	21.34	20.30
	1717.5		1 RB low	22.07	21.24
			1 RB high	22.26	21.66
			50% RB mid	22.55	21.57
			100% RB	21.52	21.52
15 MHz	1732.5		1 RB low	22.18	21.21
			1 RB high	22.27	21.38
			50% RB mid	23.02	22.37
			100% RB	22.01	22.12
	1747.5		1 RB low	22.34	21.45
			1 RB high	21.96	20.41
			50% RB mid	21.84	20.35
			100% RB	21.35	21.34
20 MHz	1720.0		1 RB low	22.06	21.16
			1 RB high	22.20	21.85
			50% RB mid	22.36	21.88
			100% RB	21.07	20.18
	1732.5		1 RB low	22.29	22.02
			1 RB high	22.30	22.21
			50% RB mid	22.23	22.03
			100% RB	21.24	20.22
	1745.0		1 RB low	22.25	21.23
			1 RB high	22.03	21.74
			50% RB mid	21.92	21.66
			100% RB	21.21	20.31

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3.2 Radiated Measurement:

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4.
2. $EIRP = P_{Mea}(dBm) - P_{cl}(dB) + P_{Ag}(dB) + G_a(dBi)$

LTE FDD Band 4_Channel Bandwidth 1.4MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-17.87	3.06	9.68	34.80	23.55	30.00	6.45	V
1732.5	-18.56	3.17	9.68	34.80	22.75	30.00	7.25	V
1754.3	-19.05	3.22	9.75	34.80	22.28	30.00	7.72	V

LTE FDD Band 4_Channel Bandwidth 3MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-18.35	3.06	9.68	34.80	23.07	30.00	6.93	V
1732.5	-20.13	3.17	9.68	34.80	21.18	30.00	8.82	V
1753.5	-19.25	3.22	9.75	34.80	22.08	30.00	7.92	V

LTE FDD Band 4_Channel Bandwidth 5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-19.39	3.06	9.68	34.80	22.03	30.00	7.97	V
1732.5	-18.43	3.17	9.68	34.80	22.88	30.00	7.12	V
1752.5	-18.23	3.22	9.75	34.80	23.10	30.00	6.90	V

LTE FDD Band 4_Channel Bandwidth 10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-18.98	3.06	9.68	34.80	22.44	30.00	7.56	V
1732.5	-18.43	3.17	9.68	34.80	22.88	30.00	7.12	V
1750.0	-18.99	3.22	9.75	34.80	22.34	30.00	7.66	V

LTE FDD Band 4_Channel Bandwidth 15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-19.05	3.06	9.68	34.80	22.37	30.00	7.63	V
1732.5	-17.96	3.17	9.68	34.80	23.35	30.00	6.65	V
1747.5	-19.10	3.22	9.75	34.80	22.23	30.00	7.77	V

LTE FDD Band 4_Channel Bandwidth 20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-19.06	3.06	9.68	34.80	22.36	30.00	7.64	V
1732.5	-18.45	3.17	9.68	34.80	22.86	30.00	7.14	V
1745.0	-18.37	3.22	9.75	34.80	22.96	30.00	7.04	V

*LTE FDD Band 4_Channel Bandwidth 1.4MHz_16QAM*

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-19.17	3.06	9.68	34.80	22.25	30.00	7.75	V
1732.5	-18.53	3.17	9.68	34.80	22.78	30.00	7.22	V
1754.3	-18.85	3.22	9.75	34.80	22.48	30.00	7.52	V

LTE FDD Band 4_Channel Bandwidth 3MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-18.59	3.06	9.68	34.80	22.83	30.00	7.17	V
1732.5	-18.20	3.17	9.68	34.80	23.11	30.00	6.89	V
1753.5	-18.58	3.22	9.75	34.80	22.75	30.00	7.25	V

LTE FDD Band 4_Channel Bandwidth 5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-18.58	3.06	9.68	34.80	22.84	30.00	7.16	V
1732.5	-18.25	3.17	9.68	34.80	23.06	30.00	6.94	V
1752.5	-19.01	3.22	9.75	34.80	22.32	30.00	7.68	V

LTE FDD Band 4_Channel Bandwidth 10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-19.16	3.06	9.68	34.80	22.26	30.00	7.74	V
1732.5	-19.00	3.17	9.68	34.80	22.31	30.00	7.69	V
1750.0	-18.64	3.22	9.75	34.80	22.69	30.00	7.31	V

LTE FDD Band 4_Channel Bandwidth 15MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-19.07	3.06	9.68	34.80	22.35	30.00	7.65	V
1732.5	-18.40	3.17	9.68	34.80	22.91	30.00	7.09	V
1747.5	-19.46	3.22	9.75	34.80	21.87	30.00	8.13	V

LTE FDD Band 4_Channel Bandwidth 20MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)	G _a Antenna Gain(dB)	P _{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-19.04	3.06	9.68	34.80	22.38	30.00	7.62	V
1732.5	-18.30	3.17	9.68	34.80	23.01	30.00	6.99	V
1745.0	-18.77	3.22	9.75	34.80	22.56	30.00	7.44	V

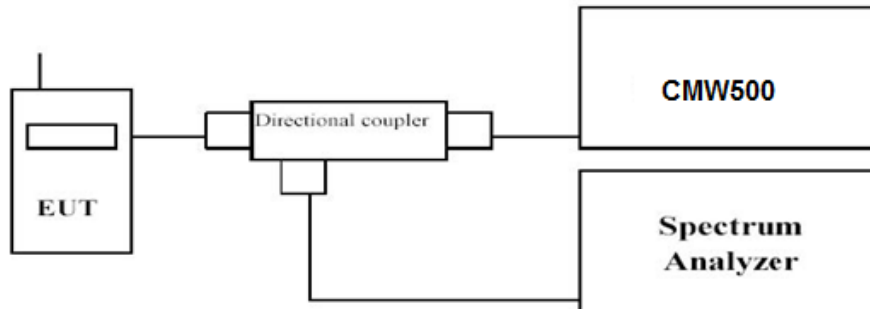


3.3 Peak-to-Average Ratio (PAR)

LIMIT

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

TEST CONFIGURATION



TEST PROCEDURE

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:
 - 1). for continuous transmissions, set to 1 ms,
 - 2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
5. Record the maximum PAPR level associated with a probability of 0.1%.

TEST RESULTS

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4.

LTE FDD Band 4				
TX Channel Bandwidth	Frequency (MHz)	RB Size/Offset	PAPR (dB)	
			QPSK	16QAM
1.4 MHz	1710.7	1RB#0	3.61	4.68
	1732.5		4.57	5.56
	1754.3		4.58	5.38
3 MHz	1711.5	1RB#0	3.66	4.57
	1732.5		4.64	5.44
	1753.5		4.59	5.57
5 MHz	1712.5	1RB#0	3.67	4.62
	1732.5		4.66	5.56
	1752.5		4.48	5.37
10 MHz	1715.0	1RB#0	3.28	4.23
	1732.5		4.73	5.60
	1750.0		4.27	5.28
15 MHz	1717.5	1RB#0	3.79	4.73
	1732.5		4.65	5.60
	1747.5		4.27	5.22
20 MHz	1720.0	1RB#0	3.79	4.59
	1732.5		4.55	5.49
	1745.0		4.33	5.35

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LTE FDD Band 4-1.4MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

High Channel

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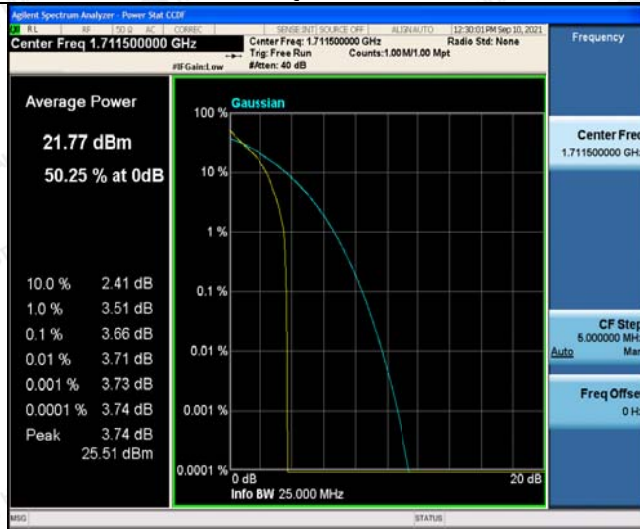
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LTE FDD Band 4-3MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

High Channel

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LTE FDD Band 4-5MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

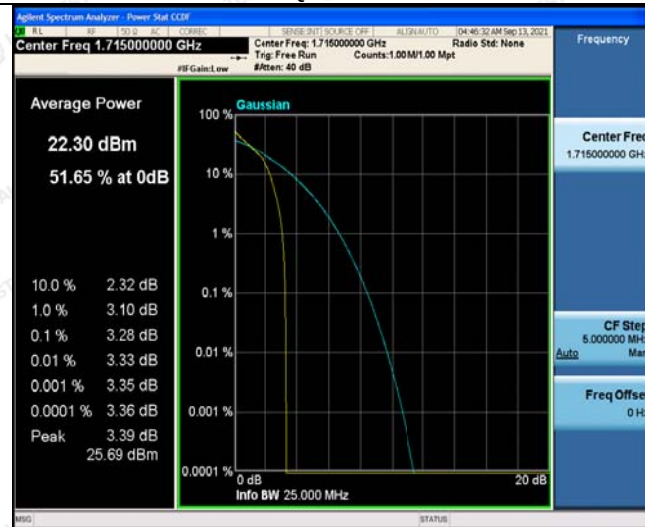
High Channel

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LTE FDD Band 4-10MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

High Channel

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LTE FDD Band 4-15MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

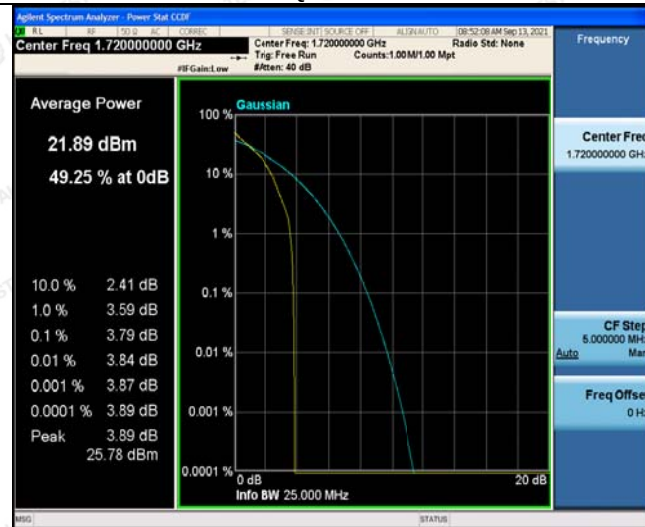
High Channel

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LTE FDD Band 4-20MHz Channel Bandwidth PAPR

QPSK



1RB#0

16QAM



1RB#0

Low Channel



1RB#0



1RB#0

Middle Channel



1RB#0



1RB#0

High Channel

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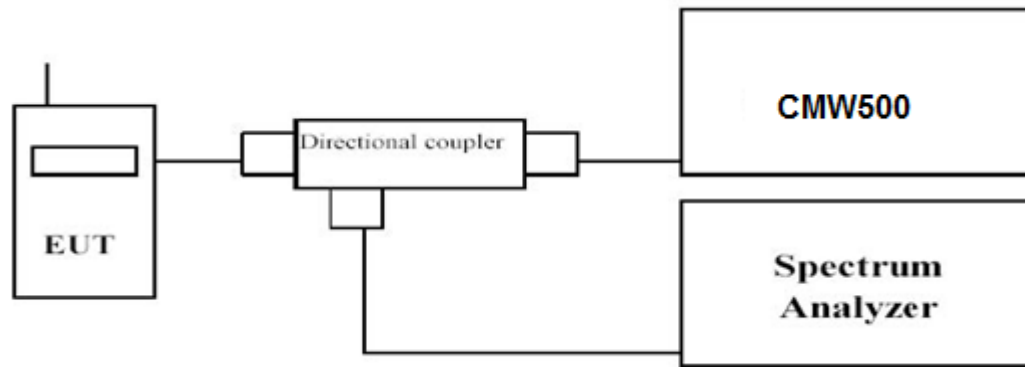


3.4 Occupied Bandwidth and Emission Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded.

Set RBW was set to about 1% of emission BW, VBW≥3 times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4.

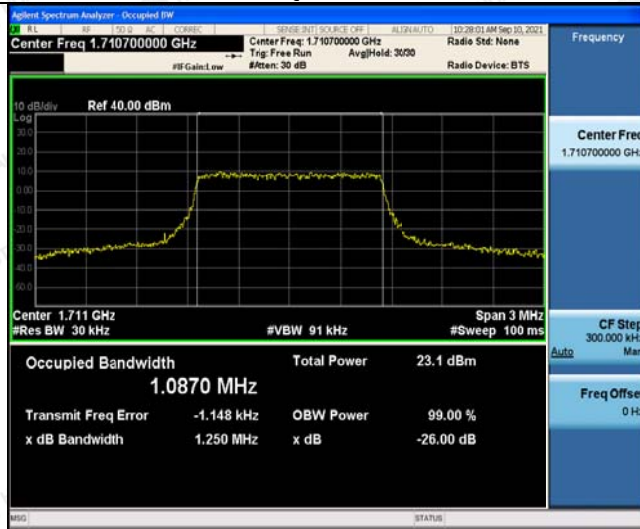
LTE FDD Band 4						
TX Channel Bandwidth	RB Size/Offset	Frequency (MHz)	-26dBc Emission bandwidth (MHz)		99% Occupied bandwidth (MHz)	
			QPSK	16QAM	QPSK	16QAM
1.4 MHz	6RB#0	1710.7	1.250	1.272	1.0870	1.0905
		1732.5	1.263	1.261	1.0895	1.0906
		1754.3	1.266	1.264	1.0902	1.0890
3 MHz	15RB#0	1711.5	2.923	2.905	2.6889	2.6913
		1732.5	2.918	2.916	2.6992	2.6926
		1753.5	2.921	2.930	2.7014	2.6924
5 MHz	25RB#0	1712.5	4.904	4.865	4.4997	4.4930
		1732.5	4.915	4.879	4.4968	4.5050
		1752.5	4.832	4.867	4.4952	4.5066
10 MHz	50RB#0	1715.0	9.581	9.529	8.9655	8.9634
		1732.5	9.560	9.519	8.9647	8.9661
		1750.0	9.544	9.517	8.9622	8.9672
15 MHz	75RB#0	1717.5	14.32	14.28	13.452	13.449
		1732.5	14.31	14.23	13.448	13.425
		1747.5	14.27	14.24	13.425	13.421
20 MHz	100RB#0	1720.0	19.00	19.00	17.934	17.950
		1732.5	18.94	18.94	17.890	17.878
		1745.0	18.95	18.93	17.864	17.867

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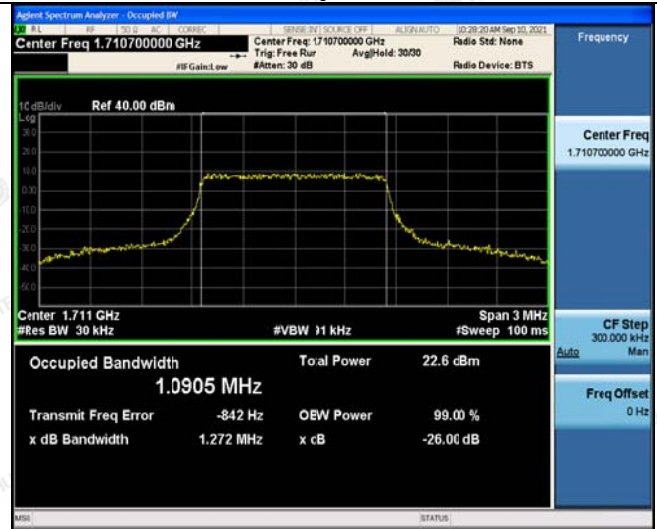


LTE FDD Band 4-1.4MHz Channel Bandwidth

QPSK



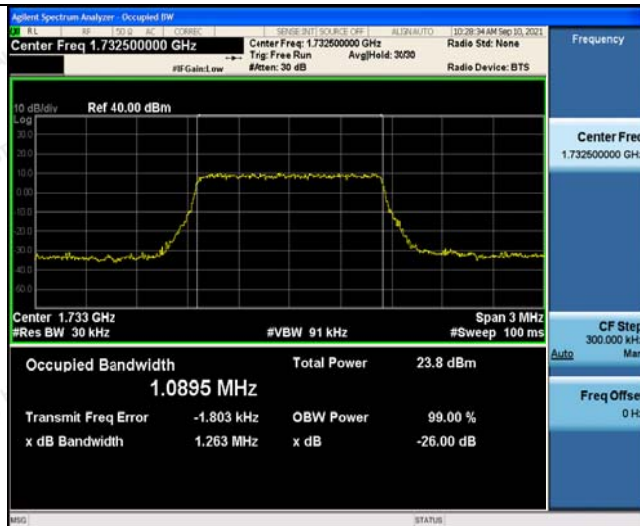
16QAM



6RB#0

6RB#0

Low Channel



6RB#0



6RB#0

Middle Channel



6RB#0



6RB#0

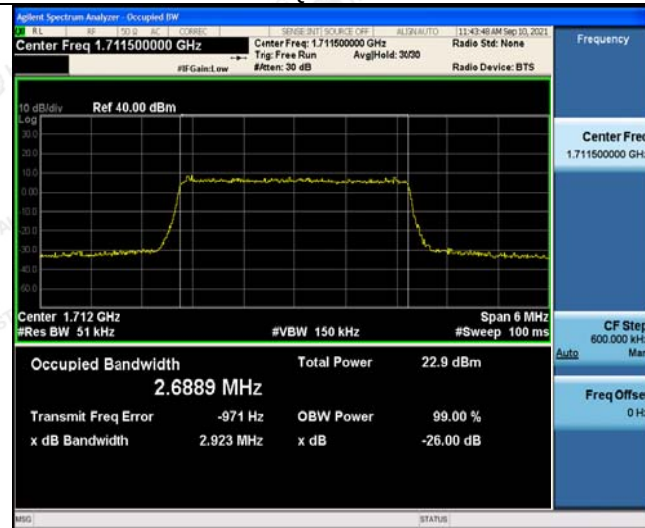
High Channel

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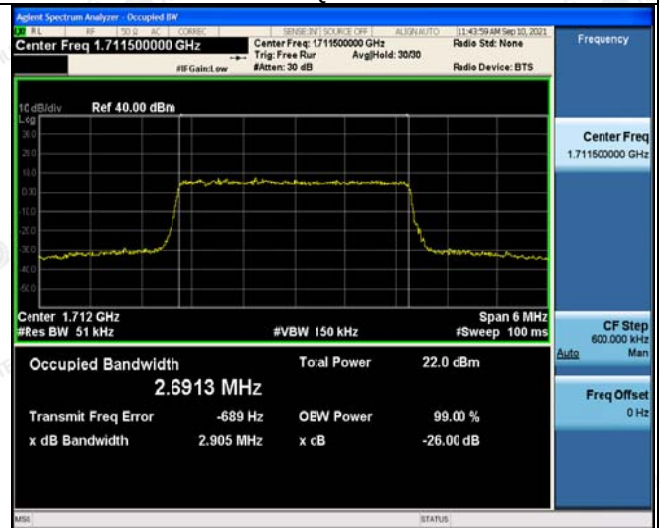


LTE FDD Band 4-3MHz Channel Bandwidth

QPSK



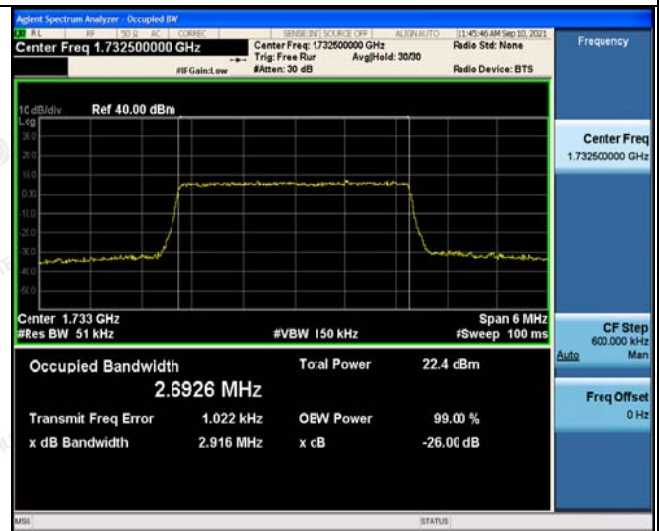
16QAM



15RB#0

15RB#0

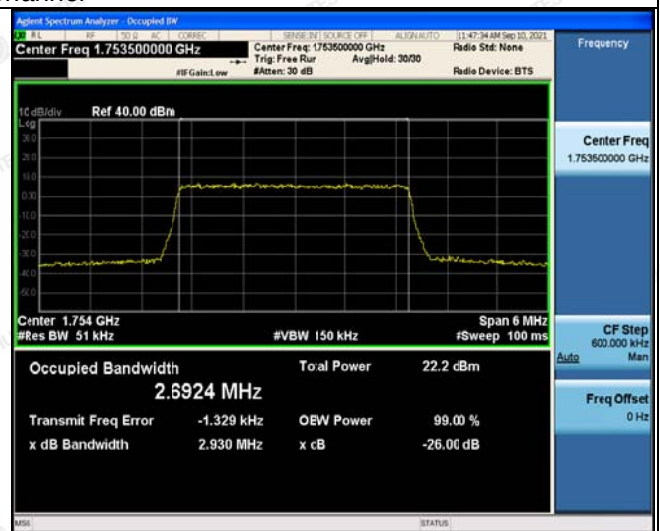
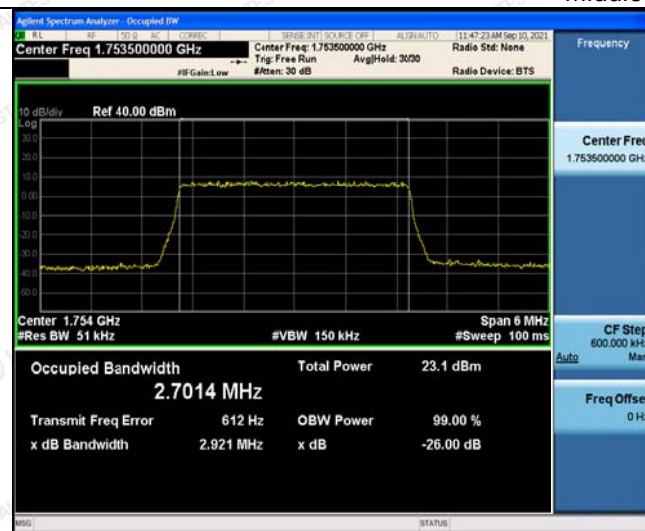
Low Channel



15RB#0

15RB#0

Middle Channel



15RB#0

15RB#0

High Channel

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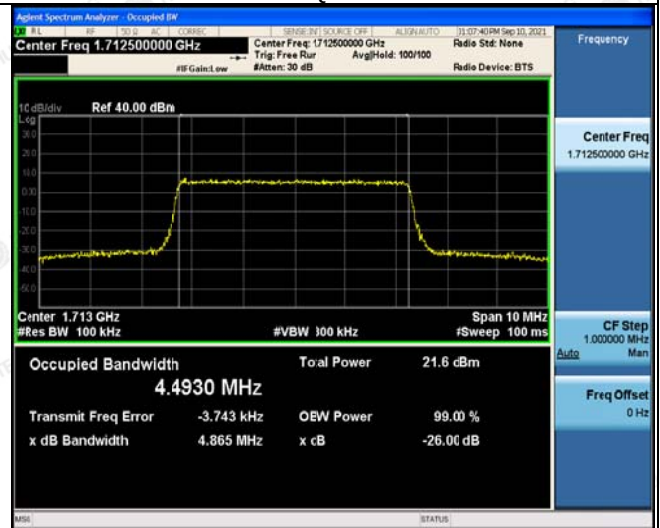


LTE FDD Band 4-5MHz Channel Bandwidth

QPSK



16QAM



25RB#0

25RB#0

Low Channel

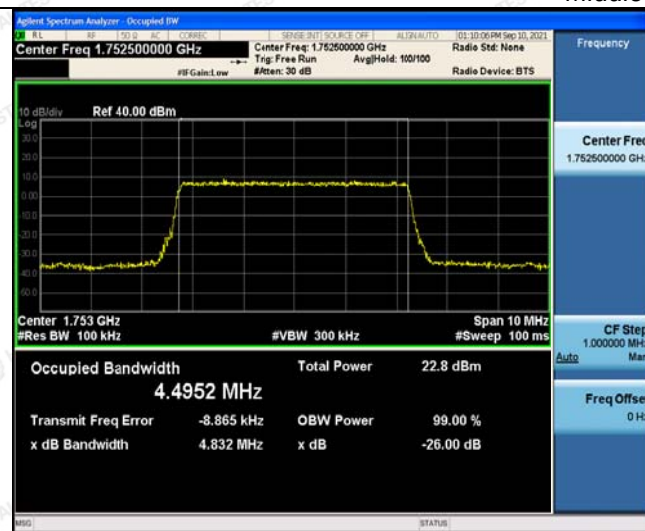


25RB#0



25RB#0

Middle Channel



25RB#0



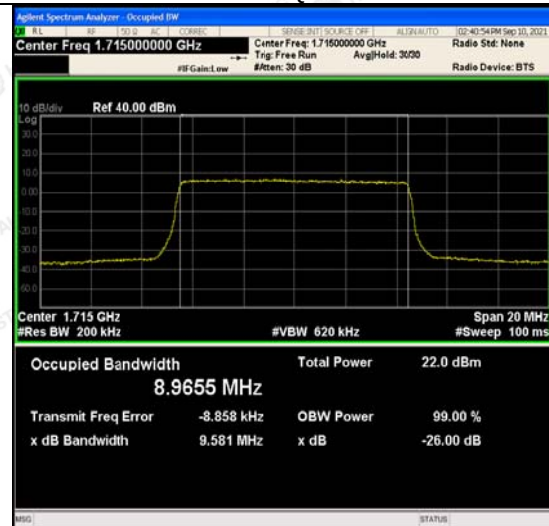
25RB#0

High Channel

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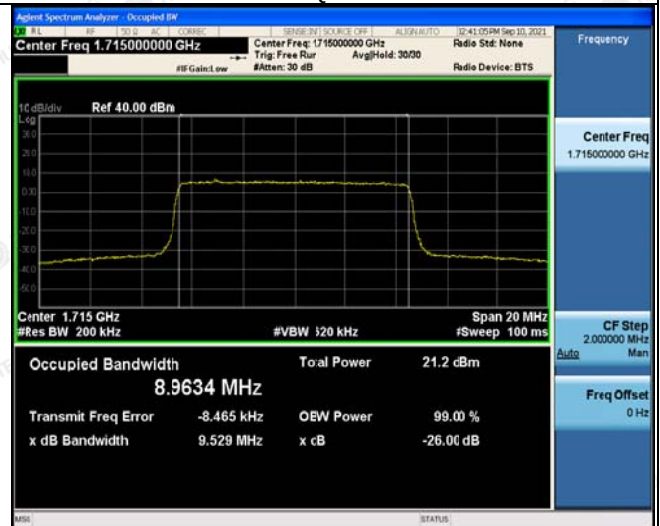
LTE FDD Band 4-10MHz Channel Bandwidth

QPSK



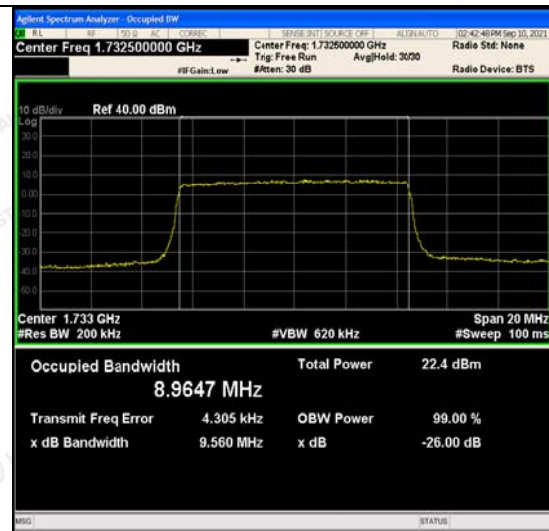
50RB#0

16QAM

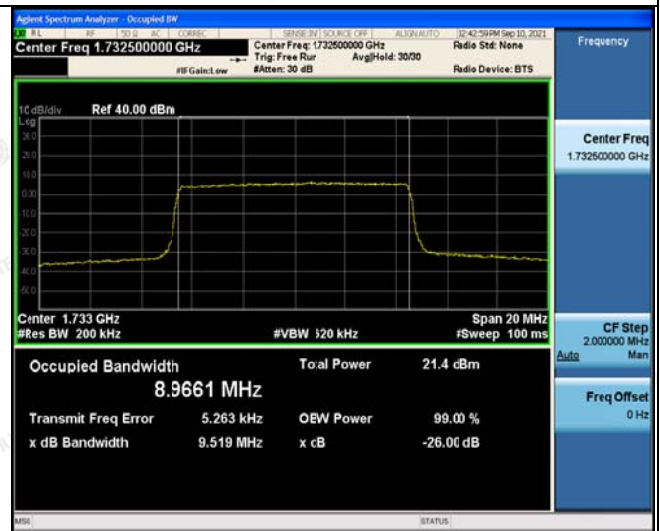


50RB#0

Low Channel

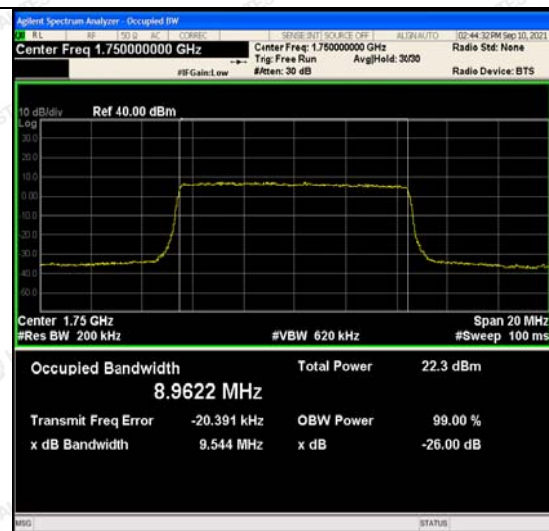


50RB#0

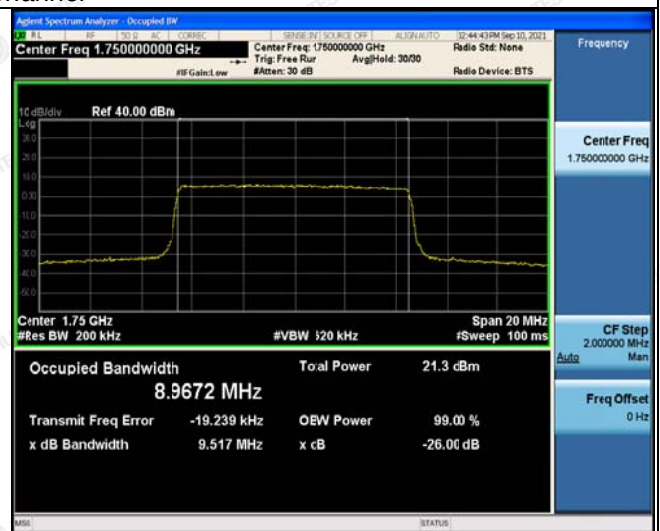


50RB#0

Middle Channel



50RB#0



50RB#0

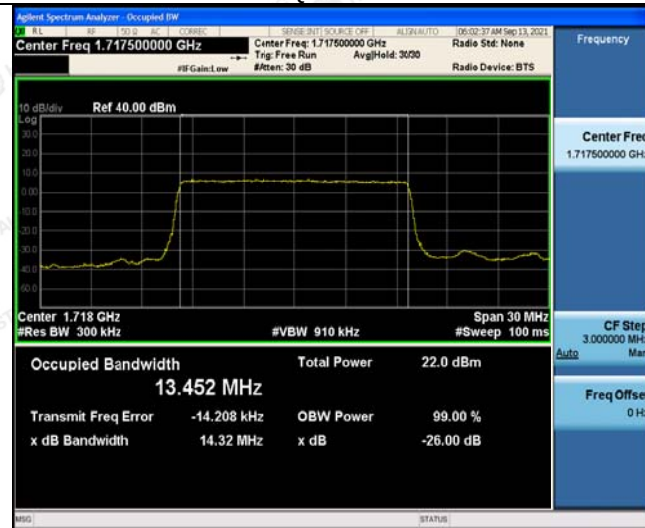
High Channel

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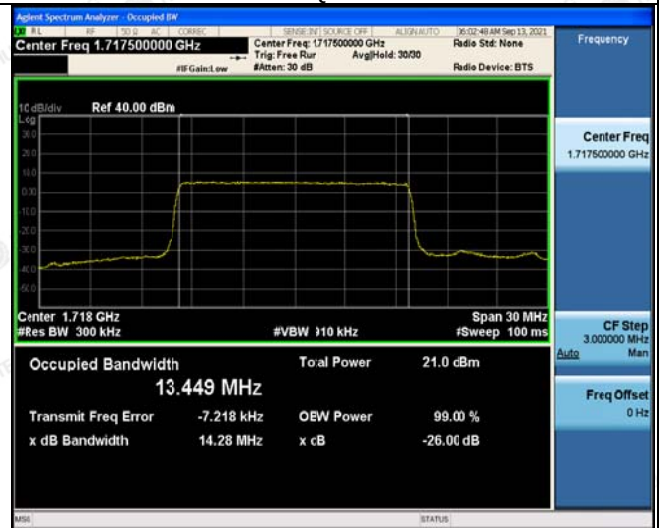
LTE FDD Band 4-15MHz Channel Bandwidth

QPSK



75RB#0

16QAM

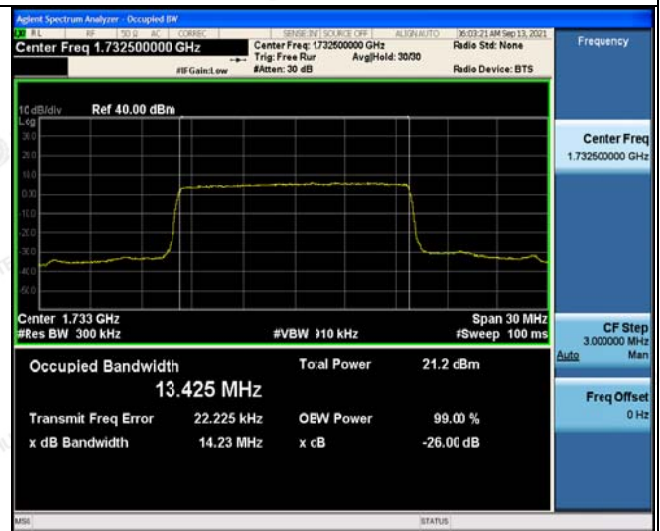


75RB#0

Low Channel

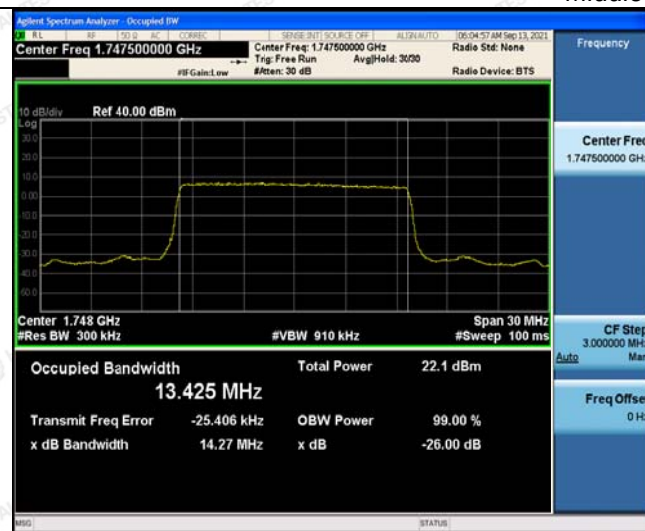


75RB#0

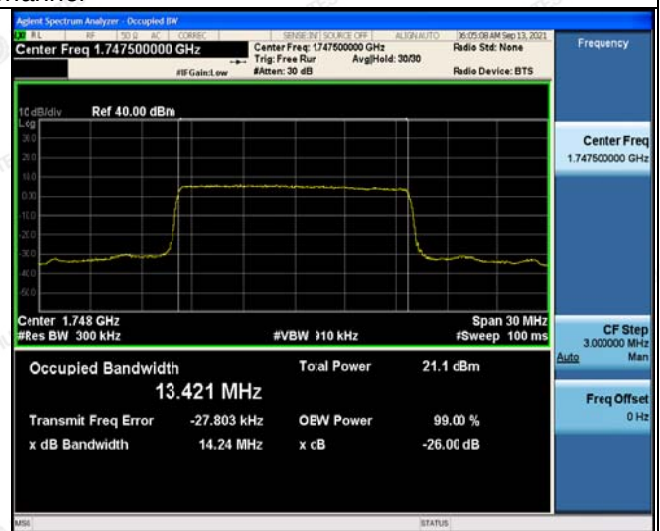


75RB#0

Middle Channel



75RB#0



75RB#0

High Channel

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LTE FDD Band 4-20MHz Channel Bandwidth

QPSK

Center Freq 1.72000000 GHz

Occupied Bandwidth 17.934 MHz

Total Power 21.8 dBm

Transmit Freq Error -4.266 kHz

OBW Power 99.00 %

x dB Bandwidth 19.00 MHz

x dB -26.00 dB

16QAM

Center Freq 1.72000000 GHz

Occupied Bandwidth 17.950 MHz

Total Power 20.7 dBm

Transmit Freq Error -5.119 kHz

OBW Power 99.00 %

x dB Bandwidth 19.00 MHz

x dB -26.00 dB

100RB#0

Low Channel

100RB#0

Center Freq 1.73250000 GHz

Occupied Bandwidth 17.890 MHz

Total Power 21.9 dBm

Transmit Freq Error 38.283 kHz

OBW Power 99.00 %

x dB Bandwidth 18.94 MHz

x dB -26.00 dB

100RB#0

Middle Channel

100RB#0

Center Freq 1.74500000 GHz

Occupied Bandwidth 17.864 MHz

Total Power 22.0 dBm

Transmit Freq Error -33.035 kHz

OBW Power 99.00 %

x dB Bandwidth 18.95 MHz

x dB -26.00 dB

100RB#0

High Channel

100RB#0

Center Freq 1.74500000 GHz

Occupied Bandwidth 17.867 MHz

Total Power 21.0 dBm

Transmit Freq Error -34.788 kHz

OBW Power 99.00 %

x dB Bandwidth 18.93 MHz

x dB -26.00 dB

100RB#0

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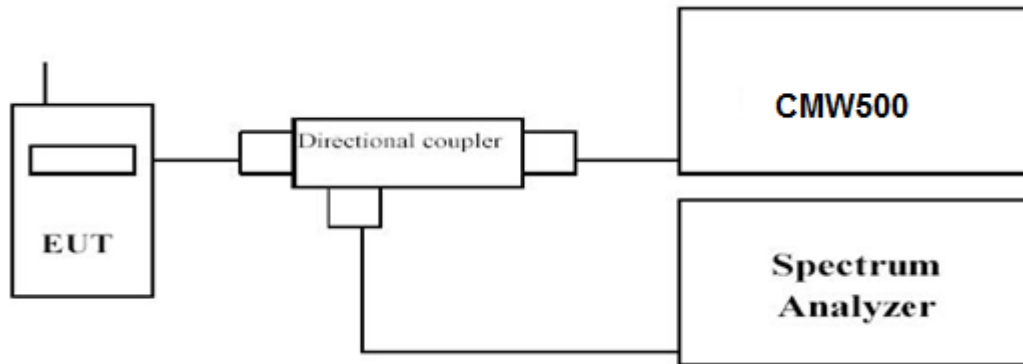


3.5 Band Edge Compliance

LIMIT

According to §27.53 (h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest and highest channels for each band and different modulation.
5. Measure Band edge using RMS (Average) detector by spectrum

TEST RESULTS

Remark:

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4.



LTE FDD Band 4-1.4MHz Channel Bandwidth Band Edge Compliance

QPSK

16QAM



6RB#0



6RB#0

Low Channel



6RB#0



6RB#0

High Channel



LTE FDD Band 4-3MHz Channel Bandwidth Band Edge Compliance

QPSK

16QAM



15RB#0



15RB#0

Low Channel

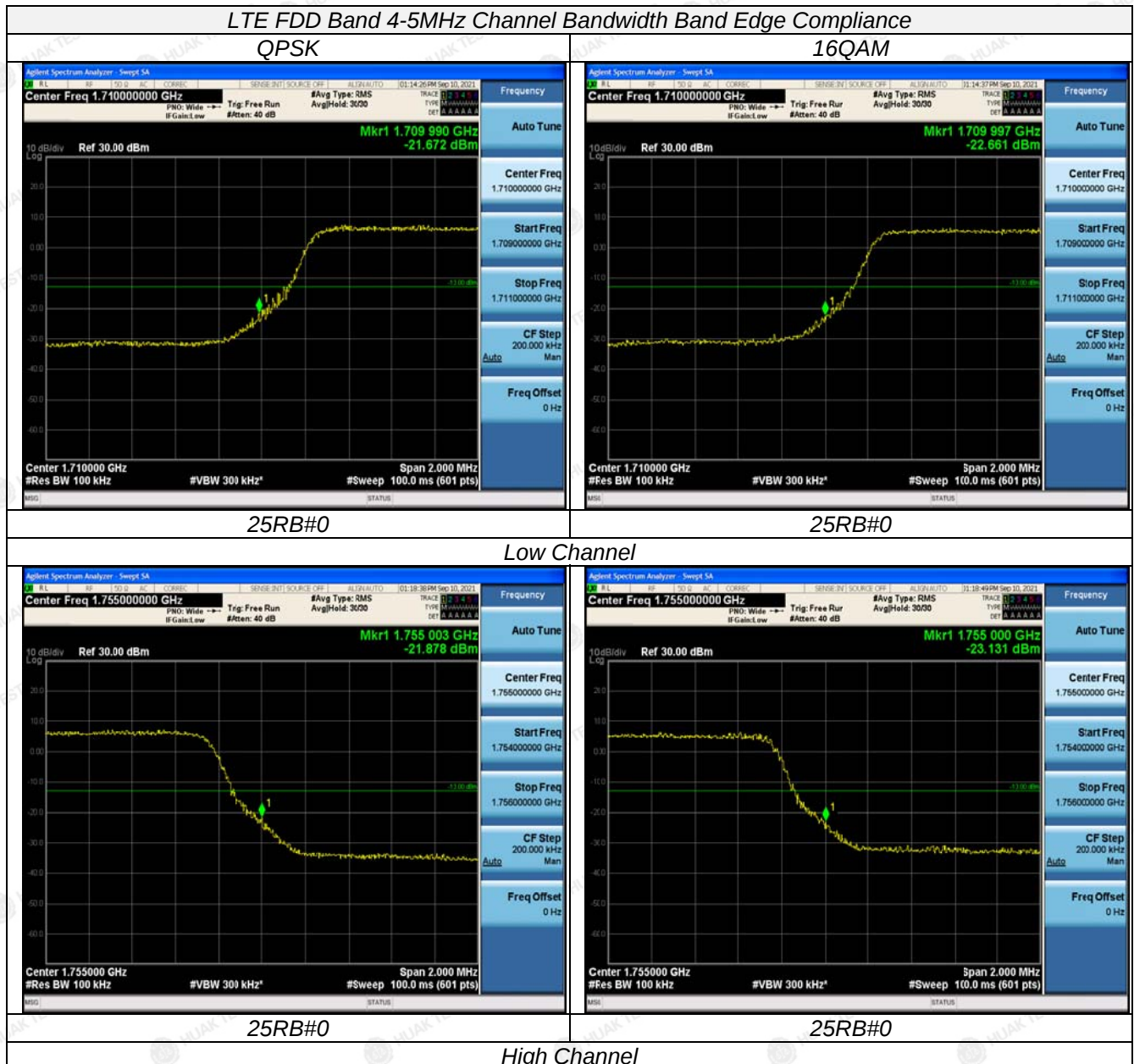


15RB#0



15RB#0

High Channel



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LTE FDD Band 4-10MHz Channel Bandwidth Band Edge Compliance

QPSK



16QAM



50RB#0

50RB#0

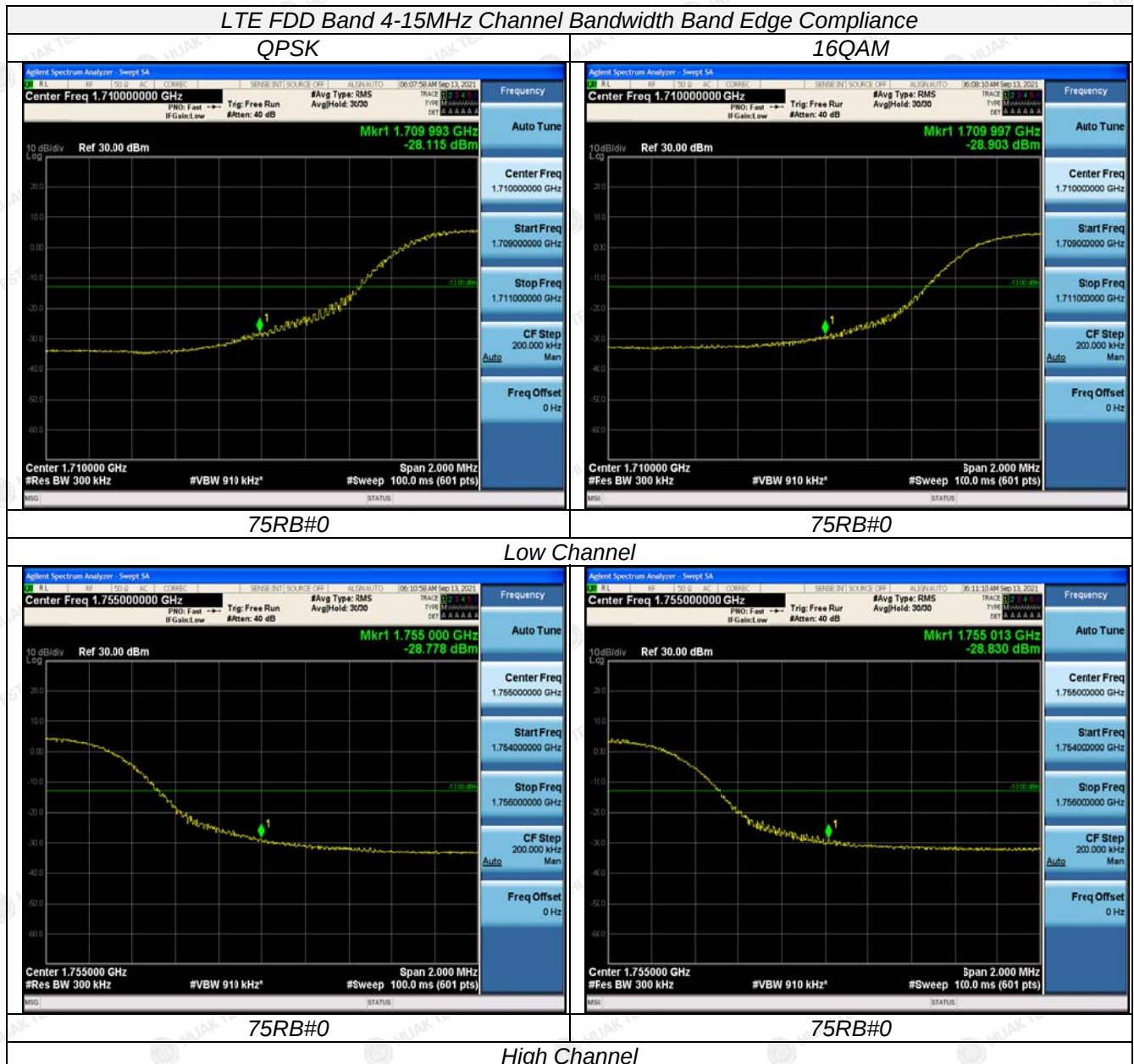
Low Channel



50RB#0

50RB#0

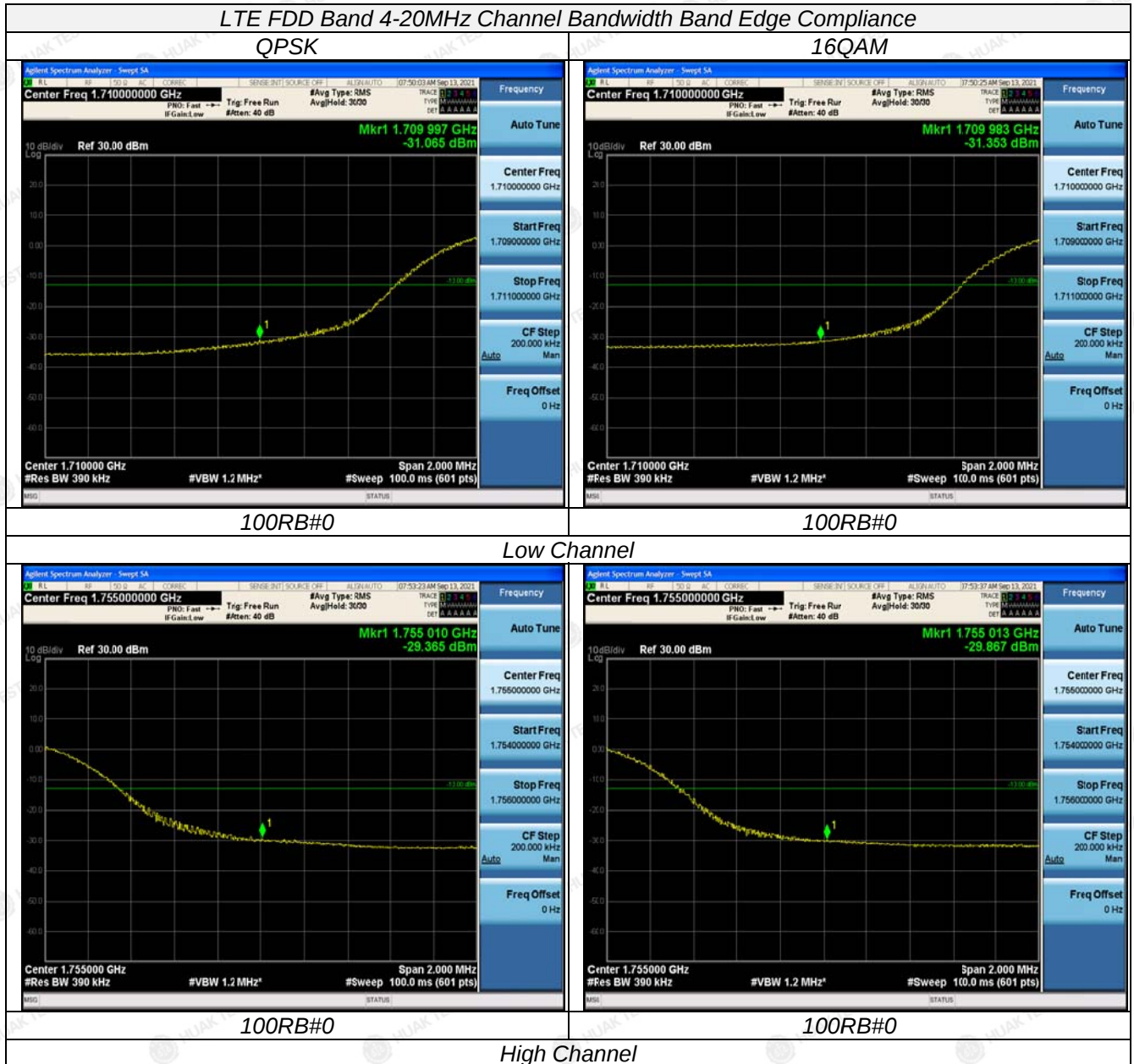
High Channel



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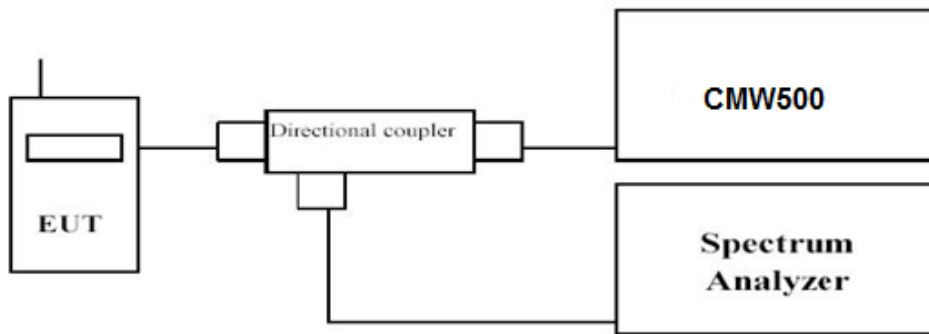
3.6 Spurious Emission

LIMIT

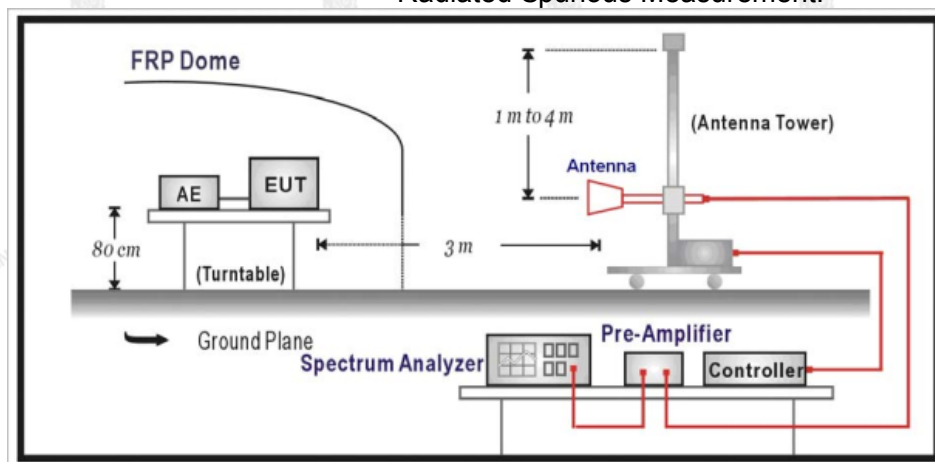
According to §27.53 (h): For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

Conducted Spurious Measurement:

- Place the EUT on a bench and set it in transmitting mode.
- Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- EUT Communicate with CMW500, then select a channel for testing.
- Add a correction factor to the display of spectrum, and then test.
- The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to 10^{th} harmonic.
- Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 4	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26.5	1 MHz	3 MHz	Auto

**Radiated Spurious Measurement:**

- a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c. The output of the test antenna shall be connected to the measuring receiver.
- d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h. The maximum signal level detected by the measuring receiver shall be noted.
- i. The transmitter shall be replaced by a substitution antenna.
- j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k. The substitution antenna shall be connected to a calibrated signal generator.
- l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- q. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.
- r. Test site anechoic chamber refer to ANSI C63.

TEST RESULTS**Remark:**

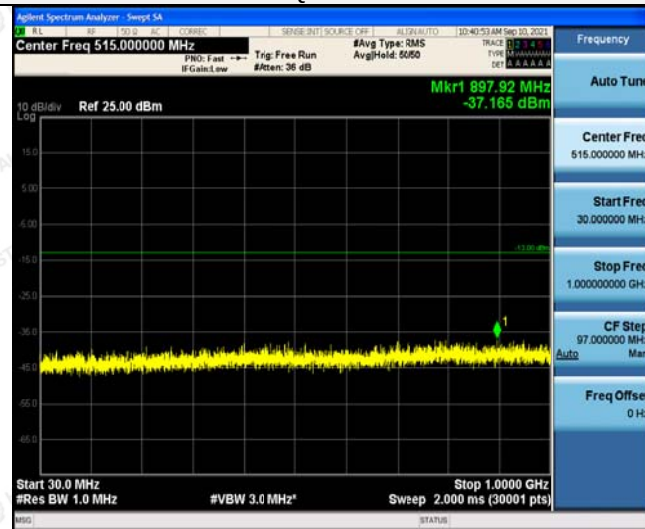
1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4.

Conducted Measurement:

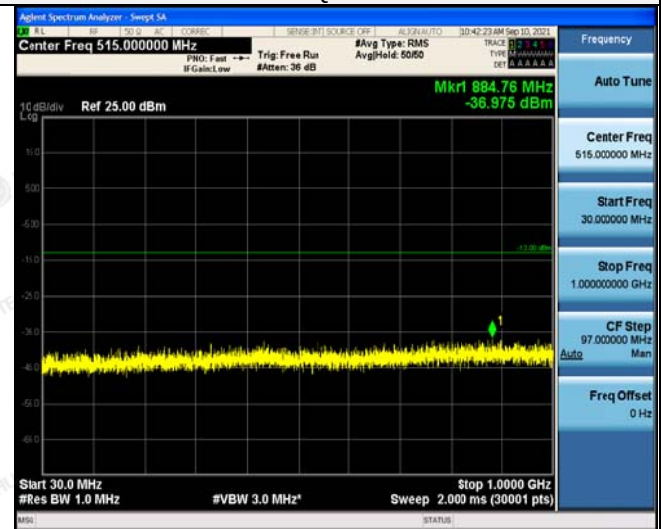


LTE FDD Band 4-1.4MHz Channel Bandwidth Low Channel

QPSK



16QAM



30~1000MHz



30~1000MHz



1000~5000MHz



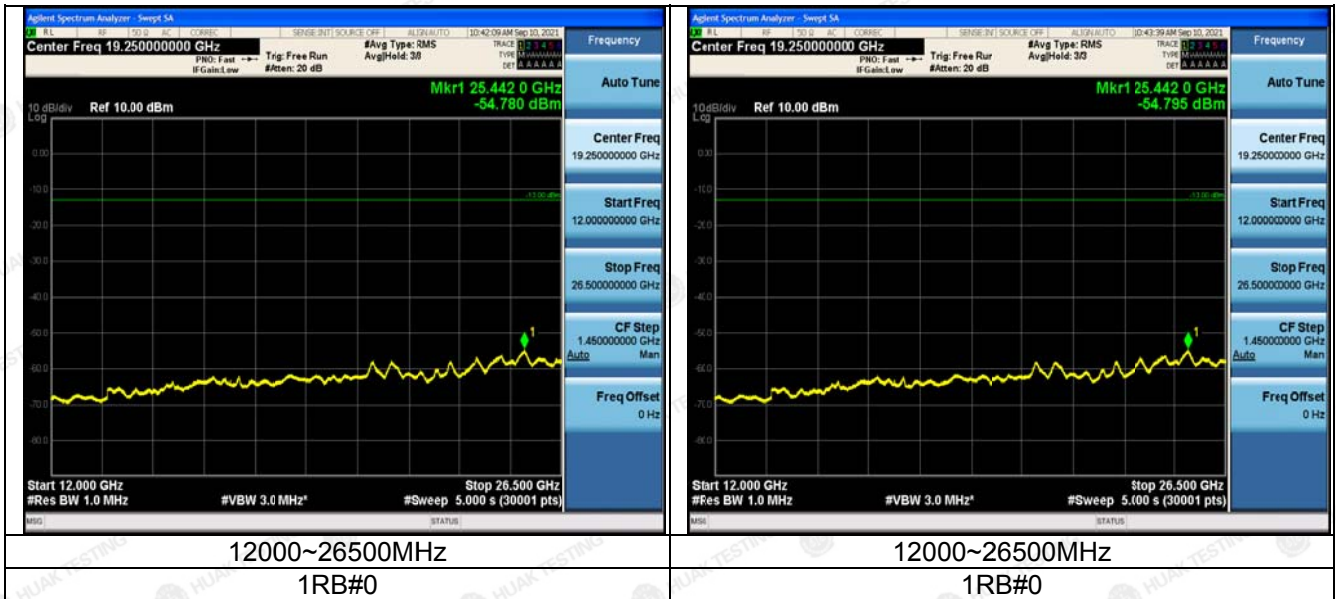
1000~5000MHz



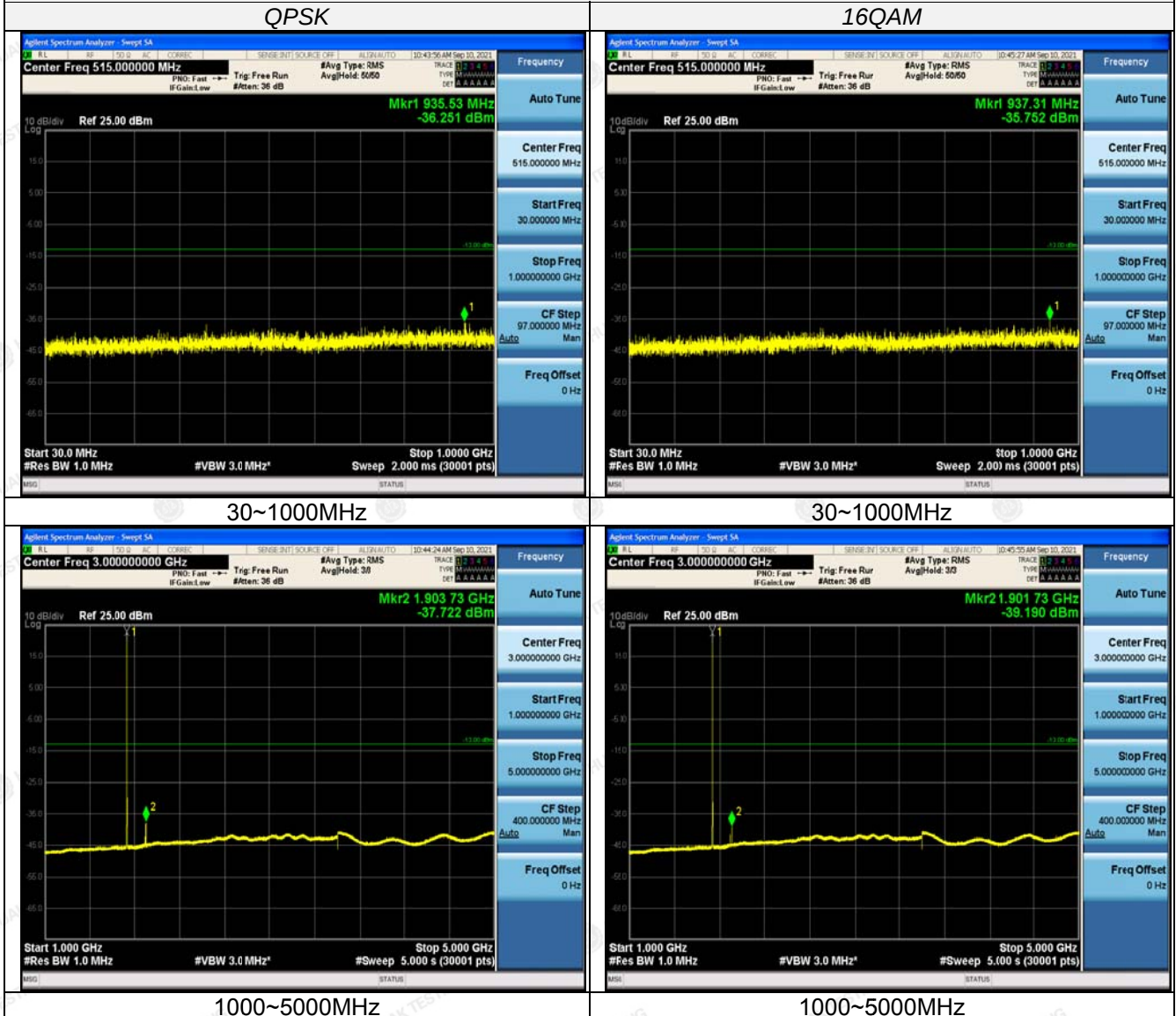
5000~12000MHz

5000~12000MHz

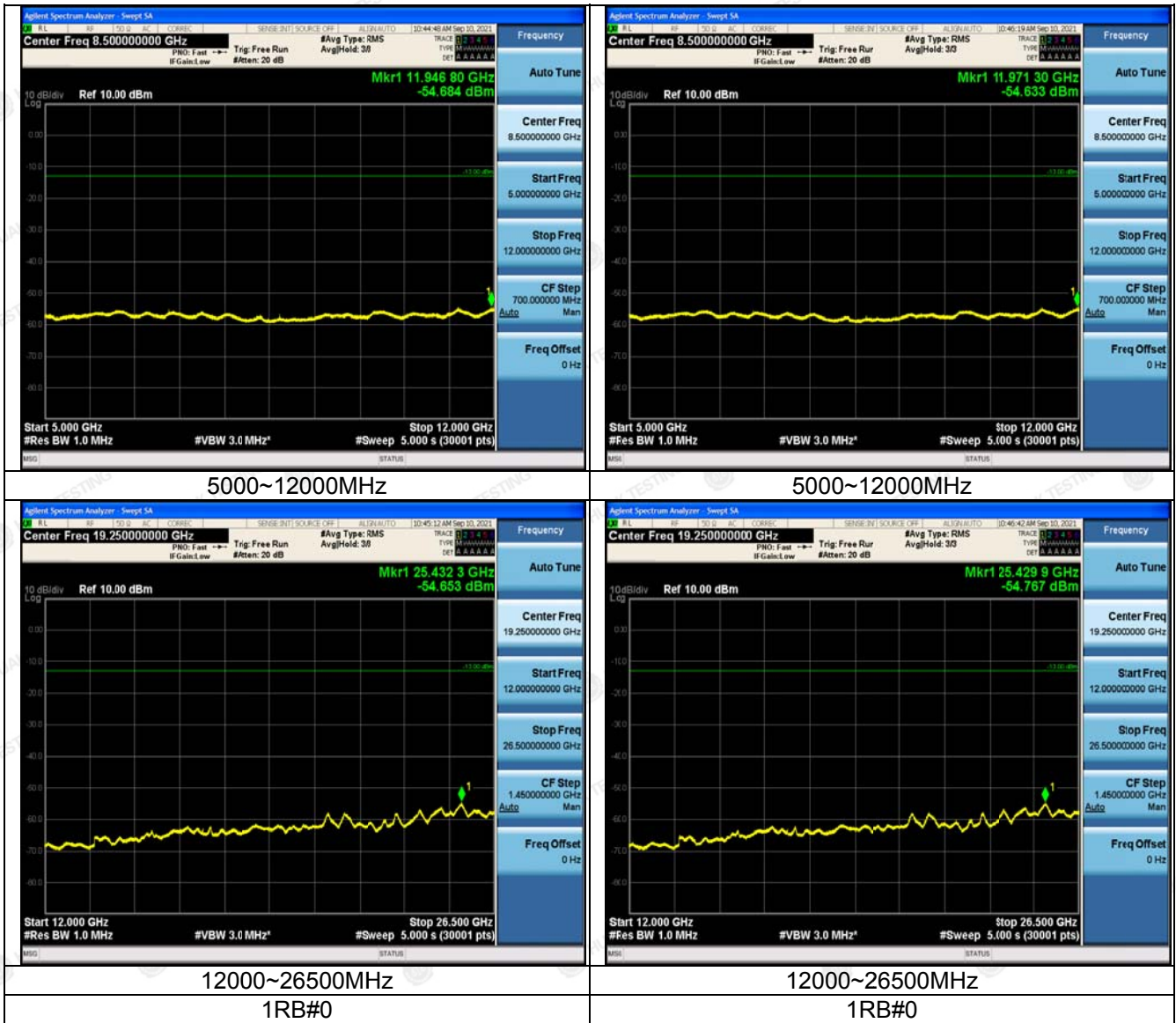
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LTE FDD Band 4-1.4MHz Channel Bandwidth
Middle Channel



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12000~26500MHz

12000~26500MHz

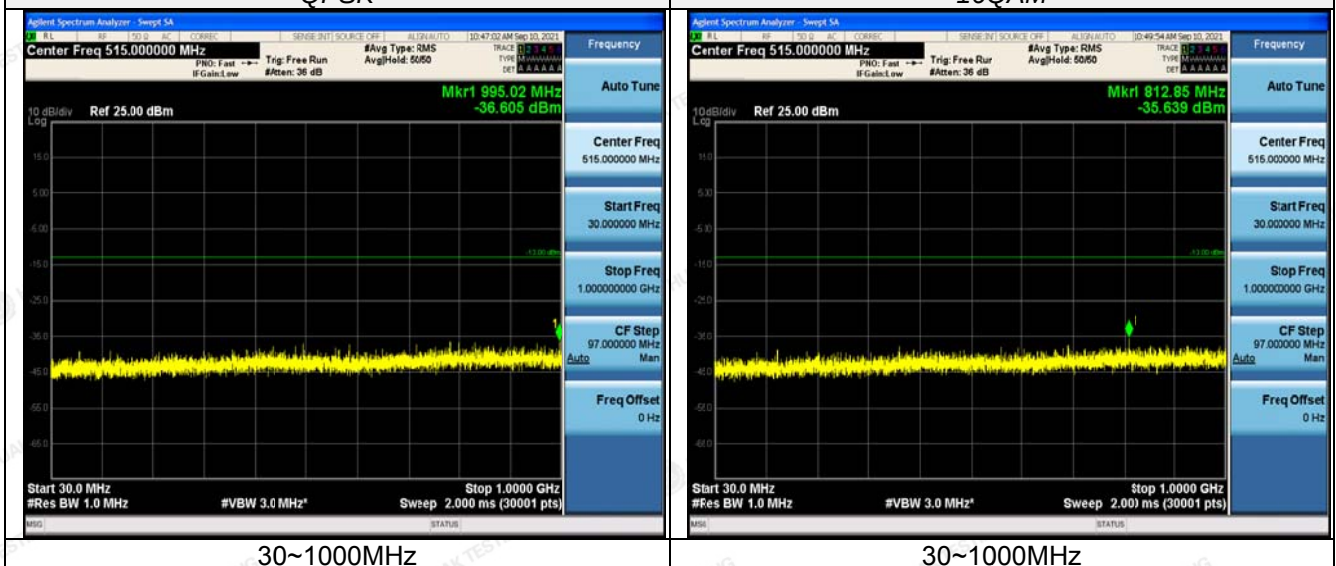
1RB#0

1RB#0

LTE FDD Band 4-1.4MHz Channel Bandwidth
High Channel

QPSK

16QAM



30~1000MHz

30~1000MHz

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