RADIO PERFORMANCE TEST REPORT

Test Report No.	**: OT-245-RWD-027**
Reception No.	**: 2308002605**
Applicant	**: LANDROAD Inc.**
Address	**: B-107, 109, Ballyong-ro, Deokjin-gu, jeonju-si, Jeollabuk-do, South Korea**
Manufacturer	**: LANDROAD Inc.**
Address	**: B-107, 109, Ballyong-ro, Deokjin-gu, jeonju-si, Jeollabuk-do, South Korea**
Type of Equipment	**: LTE CatM1 based Sensor node**
FCC ID	**: 2BGJWROADRAINLTEN**
Model Name	**: RoaDrain LTEN**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 96 pages (including this page)**
Date of Incoming	**: January 15, 2024**
Date of Issuing	**: May 23, 2024**

SUMMARY

The equipment complies with the regulation; **Part 2, Part 27 Subpart C**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

Tested by	Reviewed by	Approved by
Ju-Yun, Park / Sr. Engineer	Tae-Ho, Kim / Chief Engineer	Jae-Ho, Lee / Chief Engineer
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-245-RWD-027	May 23, 2024	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: LANDROAD Inc.
Address	: B-107, 109, Ballyong-ro, Deokjin-gu, jeonju-si, Jeollabuk-do, South Korea
Contact Person	: Juhwan Lee
Telephone No.	: +82-10-6319-4565
FCC ID	: 2BGJWROADRAINLTEN
Model Name	: RoaDrain LTEN
Serial Number	: N/A
Date	: May 23, 2024

EQUIPMENT CLASS	PCB-PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	LTE CatM1 based Sensor node
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.26:2015, KDB Publication 971168 D01
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC Part 2, Part 27 Subpart C
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
2.1049	Occupied Bandwidth	Met the Limit / PASS
2.1051, 27.53(g), 27.53(f), 27.53(h)	Band Edge / Spurious and Harmonic Emissions at Antenna Termianl	Met the Limit / PASS
2.1046	Conducted Output Power	Met the Limit / PASS
27.50(d)(5), KDB Publication 971168 D01	Peak-to-Average Ratio	Met the Limit / PASS
2.1055, 27.54	Frequency stability	Met the Limit / PASS
27.50(d)(4)	Equivalent Isotropic Radiated Power	Met the Limit / PASS
27.50(b)(10), 27.50(c)(10)	EFFECTIVE RADIATED POWER	Met the Limit / PASS
2.1053, 27.53(g), 27.53(f), 27.53(h)	Radiated Spurious and Harmonic Emissions	Met the Limit / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in Part 27 Subpart C.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.26:2015. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The LANDROAD Inc., Model RoaDrain LTEN (referred to as the EUT in this report) is a LTE CatM1 based Sensor node. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	LTE CatM1 based Sensor node		
OPERATING FREQUENCY	LTE Band 2	TX	1 850 MHz ~ 1 910 MHz
		RX	1 930 MHz ~ 1 990 MHz
	LTE Band 12	TX	699 MHz ~ 716 MHz
		RX	729 MHz ~ 746 MHz
LTE Channel Bandwidth	LTE Band 2	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz	
	LTE Band 12	1.4 MHz, 3 MHz, 5 MHz, 10 MHz	
Modulation Type	QPSK, 16QAM		
Maximum EIRP Power	LTE Band 2	22.45 dBm	
	LTE Band 12	22.91 dBm	
ANTENNA TYPE	Dipole Antenna		
ANTENNA GAIN	LTE Band 2	3.5 dBi	
	LTE Band 12	2.5 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32.768 kHz, 8.0 MHz		

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

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5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	N/A	N/A
Battery	N/A	N/A	N/A
Antenna	N/A	N/A	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
PWS-3003D	Protek	DC Power Supply	EUT

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5.3 Mode of operation during the test

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	EIRP	Radiated Emission
LTE Band 12	X-plane	X-axis

Test Mode: LTE Band 12

Test Item	Channel Bandwdith	Modulation	Mode	Test Channel
Equivalent Isotropic Radiated Power	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			Middle Channel
	10 MHz			
	-			High Channel
	-			
Frequency stability	1.4 MHz	QPSK	6 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			-
	10 MHz			
	-			High Channel
	-			
Occupied Bandwidth	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			Middle Channel
	10 MHz			
	-			High Channel
	-			

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Test Item	Channel Bandwdith	Modulation	Mode	Test Channel
Band Edge	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index	Low Channel
			6 RB / 0 RB Offset / 0 RB Index	
			1 RB / 5 RB Offset / 0 RB Index	High Channel
			6 RB / 0 RB Offset / 0 RB Index	
	3 MHz		1 RB / 0 RB Offset / 0 RB Index	Low Channel
			6 RB / 0 RB Offset / 0 RB Index	
			1 RB / 5 RB Offset / 1 RB Index	High Channel
			6 RB / 0 RB Offset / 1 RB Index	
	5 MHz		1 RB / 0 RB Offset / 0 RB Index	Low Channel
			6 RB / 0 RB Offset / 0 RB Index	
			1 RB / 5 RB Offset / 3 RB Index	High Channel
			6 RB / 0 RB Offset / 3 RB Index	
	10 MHz		1 RB / 0 RB Offset / 0 RB Index	Low Channel
			6 RB / 0 RB Offset / 0 RB Index	
			1 RB / 5 RB Offset / 7 RB Index	High Channel
			6 RB / 0 RB Offset / 7 RB Index	

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Test Item	Channel Bandwdith	Modulation	Mode	Test Channel
Peak-to-Average Ratio	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index 6 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			Middle Channel
	10 MHz			
	-			High Channel
	-			
Spurious and Harmonic Emissions at Antenna Termianl	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			Middle Channel
	10 MHz			
	-			High Channel
	-			
Radiated Spurious and Harmonic Emissions	1.4 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index	Low Channel
	3 MHz			
	5 MHz			Middle Channel
	10 MHz			
	-			High Channel
	-			

Test Item	Channel Bandwdith	QPSK	16QAM
Emission Designator	1.4 MHz	1M12G7D	1M09W7D
	3 MHz	1M12G7D	1M10W7D
	5 MHz	1M12G7D	1M14W7D
	10 MHz	1M14G7D	1M12W7D

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5.4 Frequency List of Low/Middle/High Channels

LTE Band 12 Channel and Frequency List				
Bandwidth	Channel / Frequency	Low	Middle	High
1.4 MHz	Channel	23017	23095	23173
	Frequency	699.7 MHz	707.5 MHz	715.3 MHz
3 MHz	Channel	23025	23095	23165
	Frequency	700.5 MHz	707.5 MHz	714.5 MHz
5 MHz	Channel	23035	23095	23155
	Frequency	701.5 MHz	707.5 MHz	713.5 MHz
10 MHz	Channel	23060	23095	23130
	Frequency	704.0 MHz	707.5 MHz	711.0 MHz

5.5 Configuration of Test System

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

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6. PRELIMINARY TEST

6.1 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Output Power	0.68
Conducted Spurious Emission < 26.5 GHz	1.60
Radiated Disturbance (9 kHz ~ 30 MHz)	4.09
Radiated Disturbance (30 MHz ~ 1 GHz)	3.98
Radiated Disturbance (1 GHz ~ 18 GHz)	5.56
Radiated Disturbance (18 GHz ~ 40 GHz)	5.65

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7. CONDUCTED OUTPUT POWER

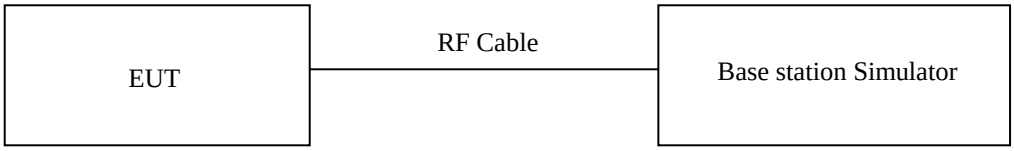
7.1 Operating environment

Temperature	:	22 °C
Relative humidity	:	45 % R.H.

7.2 Test set-up

Conducted Output Power is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03, April 9, 2018, Section 5.2.

A base station simulator was used to establish communication with the EUT, and Spectrum analyzer was used for test results. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



7.3 Test Date

January 15, 2024 ~ February 08, 2024

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7.4 Test for Band 12_Bandwidth 1.4 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	RB Index	QPSK			16QAM		
			LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
			699.7 MHz	707.5 MHz	715.3 MHz	699.7 MHz	707.5 MHz	715.3 MHz
1	0	0	22.71	22.65	22.63	21.65	21.56	21.56
1	5	0	22.69	22.58	22.54	21.57	21.52	21.48
4	0	0	21.38	21.47	21.43	20.87	20.81	20.76
4	2	0	21.57	21.56	21.48	20.92	20.83	20.79
6	0	0	20.73	20.69	20.65	20.77	20.77	20.69

7.5 Test for Band 12_Bandwidth 3 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	RB Index	QPSK			16QAM		
			LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
			700.5 MHz	707.5 MHz	714.5 MHz	700.5 MHz	707.5 MHz	714.5 MHz
1	0	0	22.63	22.60	22.53	21.58	21.55	21.53
1	5	0	22.61	22.56	22.52	21.46	21.45	21.41
1	0	1	22.61	22.58	22.52	21.57	21.54	21.48
1	5	1	22.58	22.55	22.51	21.47	21.42	21.39
4	0	0	21.59	21.55	21.52	20.87	20.89	20.88
4	2	0	21.72	21.69	21.65	20.87	20.88	20.83
4	0	1	21.55	21.55	21.48	20.91	20.88	20.86
4	2	1	21.68	21.66	21.62	20.86	20.84	20.81
6	0	0	20.65	20.65	20.62	20.94	20.91	20.85
6	0	1	20.65	20.65	20.59	20.94	20.88	20.84

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7.6 Test for Band 12_Bandwidth 5 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	RB Index	QPSK			16QAM		
			LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
			701.5 MHz	707.5 MHz	713.5 MHz	701.5 MHz	707.5 MHz	713.5 MHz
1	0	0	22.61	22.59	22.55	22.91	22.86	22.85
1	5	0	22.45	22.57	22.54	22.85	22.79	22.76
1	0	1	22.60	22.45	22.53	22.88	22.85	22.83
1	5	1	22.59	22.54	22.51	22.88	22.81	22.79
1	0	3	22.58	22.58	22.54	22.89	22.83	22.81
1	5	3	22.43	22.40	22.43	22.73	22.67	22.67
4	0	0	21.62	21.51	21.48	20.89	20.89	20.81
4	2	0	21.60	21.57	21.51	20.91	20.91	20.86
4	0	3	21.61	21.53	21.54	20.87	20.88	20.85
4	2	3	21.52	21.48	21.44	20.86	20.85	20.82
6	0	0	21.56	21.52	21.45	20.52	20.67	20.62
6	0	3	21.58	21.50	21.51	20.56	20.66	20.58

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7.7 Test for Band 12_Bandwidth 10 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	RB Index	QPSK			16QAM		
			LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
			704.0 MHz	707.5 MHz	711.0 MHz	704.0 MHz	707.5 MHz	711.0 MHz
1	0	0	22.61	22.59	22.59	22.86	22.84	22.85
1	5	0	22.58	22.58	22.53	22.79	22.79	22.77
1	0	3	22.59	22.57	22.56	22.79	22.81	22.82
1	5	3	22.56	22.56	22.54	22.77	22.78	22.79
1	0	7	22.54	22.54	22.50	22.76	22.79	22.78
1	5	7	22.49	22.52	22.51	22.71	22.73	22.76
4	0	0	22.54	22.56	22.58	21.91	21.87	21.88
4	2	0	22.54	22.59	22.56	21.87	21.85	21.83
4	0	7	22.47	22.50	22.51	21.82	21.78	21.76
4	2	7	22.54	22.52	22.51	21.79	21.8	21.77
6	0	0	21.57	21.54	21.56	20.88	20.71	20.69
6	0	7	21.44	21.48	21.46	20.73	20.66	20.57

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8. EFFECTIVE RADIATED POWER

8.1 Operating environment

Temperature	:	22 °C
Relative humidity	:	45 % R.H.

8.2 Methods of Measurement

1. The testing follows ANSI C63.26 (2015) Section 5.5.3.
2. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
3. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step 2. Record the power level of S.G.
4. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna power can be Calculated. E.R.P power = E.I.P.R power - 2.15 dBi.

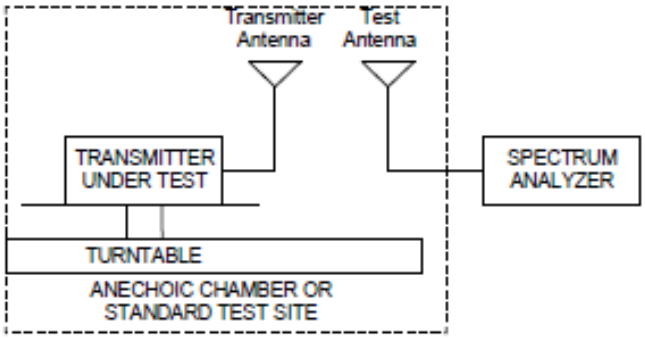
8.3 Limits

Rule Part 27.50(c) (10) specifies that “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”

Limit	3 W (34.77 dBm)

8.4 Test set-up

The EUT and measurement equipment were set up as shown in the diagram below.



8.5 Test Date

January 15, 2024 ~ February 08, 2024

8.6 Test data for Band 12_Bandwidth 1.4 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBd)	EIRP (dBm)	ERP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK								
699.7	19.16	H	2.14	1.50	18.52	16.37	34.77	18.40
	16.51	V	2.14	1.50	15.87	13.72	34.77	21.05
707.5	19.22	H	2.23	1.50	18.49	16.34	34.77	18.43
	16.22	V	2.23	1.50	15.49	13.34	34.77	21.43
715.3	18.56	H	2.23	1.50	17.83	15.68	34.77	19.09
	16.05	V	2.23	1.50	15.32	13.17	34.77	21.60
Test Data for 16QAM								
699.7	17.55	H	2.14	1.50	16.91	14.76	34.77	20.01
	14.55	V	2.14	1.50	13.91	11.76	34.77	23.01
707.5	17.62	H	2.23	1.50	16.89	14.74	34.77	20.03
	14.95	V	2.23	1.50	14.22	12.07	34.77	22.70
715.3	17.38	H	2.23	1.50	16.65	14.50	34.77	20.27
	13.85	V	2.23	1.50	13.12	10.97	34.77	23.80

Remark: “H”: Horizontal, “V”: Vertical

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8.7 Test data for Band 12_Bandwidth 3 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBd)	EIRP (dBm)	ERP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK								
699.7	16.95	H	2.14	1.50	16.31	14.16	34.77	20.61
	13.75	V	2.14	1.50	13.11	10.96	34.77	23.81
707.5	16.71	H	2.23	1.50	15.98	13.83	34.77	20.94
	13.65	V	2.23	1.50	12.92	10.77	34.77	24.00
715.3	16.05	H	2.23	1.50	15.32	13.17	34.77	21.60
	13.35	V	2.23	1.50	12.62	10.47	34.77	24.30
Test Data for 16QAM								
699.7	16.16	H	2.14	1.50	15.52	13.37	34.77	21.40
	13.61	V	2.14	1.50	12.97	10.82	34.77	23.95
707.5	16.22	H	2.23	1.50	15.49	13.34	34.77	21.43
	13.56	V	2.23	1.50	12.83	10.68	34.77	24.09
715.3	15.83	H	2.23	1.50	15.10	12.95	34.77	21.82
	13.16	V	2.23	1.50	12.43	10.28	34.77	24.49

Remark: “H”: Horizontal, “V”: Vertical

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8.8 Test data for Band 12_Bandwidth 5 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBd)	EIRP (dBm)	ERP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK								
699.7	17.95	H	2.14	1.50	17.31	15.16	34.77	19.61
	14.86	V	2.14	1.50	14.22	12.07	34.77	22.70
707.5	16.85	H	2.23	1.50	16.12	13.97	34.77	20.80
	13.51	V	2.23	1.50	12.78	10.63	34.77	24.14
715.3	16.31	H	2.23	1.50	15.58	13.43	34.77	21.34
	13.38	V	2.23	1.50	12.65	10.50	34.77	24.27
Test Data for 16QAM								
699.7	17.53	H	2.14	1.50	16.89	14.74	34.77	20.03
	14.38	V	2.14	1.50	13.74	11.59	34.77	23.18
707.5	17.33	H	2.23	1.50	16.60	14.45	34.77	20.32
	14.38	V	2.23	1.50	13.65	11.50	34.77	23.27
715.3	17.13	H	2.23	1.50	16.40	14.25	34.77	20.52
	13.95	V	2.23	1.50	13.22	11.07	34.77	23.70

Remark: “H”: Horizontal, “V”: Vertical

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8.9 Test data for Band 12_Bandwidth 10 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBd)	EIRP (dBm)	ERP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK								
699.7	17.66	H	2.23	1.50	16.93	14.78	34.77	19.99
	14.56	V	2.23	1.50	13.83	11.68	34.77	23.09
707.5	16.44	H	2.23	1.50	15.71	13.56	34.77	21.21
	13.38	V	2.23	1.50	12.65	10.50	34.77	24.27
715.3	17.59	H	2.23	1.50	16.86	14.71	34.77	20.06
	14.65	V	2.23	1.50	13.92	11.77	34.77	23.00
Test Data for 16QAM								
699.7	18.15	H	2.23	1.50	17.42	15.27	34.77	19.50
	15.06	V	2.23	1.50	14.33	12.18	34.77	22.59
707.5	17.22	H	2.23	1.50	16.49	14.34	34.77	20.43
	13.98	V	2.23	1.50	13.25	11.10	34.77	23.67
715.3	18.63	H	2.23	1.50	17.90	15.75	34.77	19.02
	15.28	V	2.23	1.50	14.55	12.40	34.77	22.37

Remark: “H”: Horizontal, “V”: Vertical

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9. RADIATED SPURIOUS EMISSIONS

9.1 Operating environment

Temperature : 22 °C

Relative humidity : 45 % R.H.

9.2 Test set-up

Radiated emission measurements are performed in the Semi-Anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI C63.26 (2015) Section 5.5.3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using RMS detector.

A vertically polarized half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

$$Pd(dBm) = Pg(dBm) – \text{cable loss (dB)} + \text{antenna gain (dB)}$$

Where: Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value.

These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Limits

LTE -12 Rule 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.

Limit	-13 dBm

Radiated spurious emissions

1. Frequency Range : 9 kHz ~ 10th Harmonics of highest channel fundamental frequency.

2. The EUT was setup to maximum output power. The 100 kHz RBW was used to scan from 30 MHz to 1 GHz.

Also, the 1 MHz RBW was used to scan from 1 GHz to 20 GHz. The high, low and a middle channel were tested for out of band measurements.

9.3 Test Date

January 15, 2024 ~ February 08, 2024

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9.4 Test data for Band 12_Bandwidth 1.4 MHz

-. Detector : RMS

-. Measurement distance : 3 m

-. Result : PASSED

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	Corrected Readiang (dBm)	Limits (dBm)	Margin (dB)
Test Data for Low Channel							
1 399.40	-53.05	H	3.06	6.60	-49.51	-13.00	36.51
2 099.10	-71.78	V	3.83	10.20	-65.41	-13.00	52.41
2 798.80	-69.63	V	4.48	10.90	-63.21	-13.00	50.21
3 498.50	-75.99	V	5.02	12.50	-68.51	-13.00	55.51
4 198.20	-74.52	V	5.62	12.70	-67.44	-13.00	54.44
Test Data for Middle Channel							
1 415.00	-53.86	H	3.17	7.00	-50.03	-13.00	37.03
2 122.50	-72.90	V	3.92	9.40	-67.42	-13.00	54.42
2 830.00	-71.64	V	4.58	11.10	-65.12	-13.00	52.12
3 537.50	-77.35	V	5.23	12.30	-70.28	-13.00	57.28
4 245.00	-75.65	V	5.71	12.80	-68.55	-13.00	55.55
Test Data for High Channel							
1 430.60	-52.36	H	3.17	7.00	-48.53	-13.00	35.53
2 145.90	-69.70	V	3.92	9.40	-64.22	-13.00	51.22
2 861.20	-71.70	V	4.58	11.10	-65.18	-13.00	52.18
3 576.50	-73.57	V	5.23	12.30	-66.50	-13.00	53.50
4 291.80	-73.65	V	5.71	12.80	-66.55	-13.00	53.55

Remark: 1. The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst case was found in QPSK modulation

3. Rule 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.

Limit : 34.77 - 43+10log(3.00) = -13 dBm

"C.L" : Cable Loss, "H": Horizontal, "V": Vertical

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9.5 Test data for Band 12_Bandwidth 3 MHz

-. Detector : RMS

-. Measurement distance : 3 m

-. Result : PASSED

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	Corrected Readiang (dBm)	Limits (dBm)	Margin (dB)
Test Data for Low Channel							
1 401.00	-61.45	H	3.17	7.00	-57.62	-13.00	44.62
2 101.50	-72.63	V	3.92	9.40	-67.15	-13.00	54.15
2 802.00	-70.73	V	4.58	11.10	-64.21	-13.00	51.21
3 502.50	-74.61	V	5.23	12.30	-67.54	-13.00	54.54
4 203.00	-72.34	H	5.71	12.80	-65.24	-13.00	52.24
Test Data for Middle Channel							
1 415.00	-62.05	H	3.17	7.00	-58.22	-13.00	45.22
2 122.50	-73.72	V	3.92	9.40	-68.24	-13.00	55.24
2 830.00	-71.80	V	4.58	11.10	-65.28	-13.00	52.28
3 537.50	-75.46	V	5.23	12.30	-68.39	-13.00	55.39
4 245.00	-75.91	V	5.71	12.80	-68.81	-13.00	55.81
Test Data for High Channel							
1 429.00	-58.95	H	3.17	7.00	-55.12	-13.00	42.12
2 143.50	-72.83	V	3.92	9.40	-67.35	-13.00	54.35
2 858.00	-70.47	V	4.58	11.10	-63.95	-13.00	50.95
3 572.50	-73.92	V	5.23	12.30	-66.85	-13.00	53.85
4 287.00	-74.62	V	5.71	12.80	-67.52	-13.00	54.52

Remark: 1. The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst case was found in QPSK modulation

3. Rule 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.

Limit : 34.77 - 43+10log(3.00) = -13 dBm

"C.L" : Cable Loss, "H": Horizontal, "V": Vertical

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9.6 Test data for Band 12_Bandwidth 5 MHz

-. Detector : RMS

-. Measurement distance : 3 m

-. Result : PASSED

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	Corrected Readiang (dBm)	Limits (dBm)	Margin (dB)
Test Data for Low Channel							
1 403.00	-53.38	H	3.17	7.00	-49.55	-13.00	36.55
2 104.50	-75.88	V	3.92	9.40	-70.40	-13.00	57.40
2 806.00	-71.16	V	4.58	11.10	-64.64	-13.00	51.64
3 507.50	-77.32	V	5.23	12.30	-70.25	-13.00	57.25
4 209.00	-76.07	V	5.71	12.80	-68.97	-13.00	55.97
Test Data for Middle Channel							
1 415.00	-55.14	H	3.17	7.00	-51.31	-13.00	38.31
2 122.50	-73.06	H	3.92	9.40	-67.58	-13.00	54.58
2 830.00	-70.86	V	4.58	11.10	-64.34	-13.00	51.34
3 537.50	-77.26	V	5.23	12.30	-70.19	-13.00	57.19
4 245.00	-75.41	V	5.71	12.80	-68.31	-13.00	55.31
Test Data for High Channel							
1 427.00	-57.43	H	3.17	7.00	-53.60	-13.00	40.60
2 140.50	-74.82	H	3.92	9.40	-69.34	-13.00	56.34
2 854.00	-73.06	V	4.58	11.10	-66.54	-13.00	53.54
3 567.50	-77.50	V	5.23	12.30	-70.43	-13.00	57.43
4 281.00	-76.68	V	5.71	12.80	-69.58	-13.00	56.58

Remark: 1. The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst case was found in QPSK modulation

3. Rule 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.

Limit : 34.77 - 43+10log(3.00) = -13 dBm

"C.L" : Cable Loss, "H": Horizontal, "V": Vertical

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9.7 Test data for Band 12_Bandwidth 10 MHz

-. Detector : RMS

-. Measurement distance : 3 m

-. Result : PASSED

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	Corrected Readiang (dBm)	Limits (dBm)	Margin (dB)
Test Data for Low Channel							
1 408.00	-56.54	H	3.17	7.00	-52.71	-13.00	39.71
2 112.00	-67.26	H	3.92	9.40	-61.78	-13.00	48.78
2 816.00	-68.95	V	4.58	11.10	-62.43	-13.00	49.43
3 520.00	-77.49	V	5.23	12.30	-70.42	-13.00	57.42
4 224.00	-75.24	V	5.71	12.80	-68.14	-13.00	55.14
Test Data for Middle Channel							
1 415.00	-53.03	H	3.17	7.00	-49.20	-13.00	36.20
2 122.50	-65.42	H	3.92	9.40	-59.94	-13.00	46.94
2 830.00	-69.37	V	4.58	11.10	-62.85	-13.00	49.85
3 537.50	-77.55	V	5.23	12.30	-70.48	-13.00	57.48
4 245.00	-75.35	V	5.71	12.80	-68.25	-13.00	55.25
Test Data for High Channel							
1 422.00	-53.68	H	3.17	7.00	-49.85	-13.00	36.85
2 133.00	-70.14	V	3.92	9.40	-64.66	-13.00	51.66
2 844.00	-71.14	V	4.58	11.10	-64.62	-13.00	51.62
3 555.00	-77.56	V	5.23	12.30	-70.49	-13.00	57.49
4 266.00	-76.04	V	5.71	12.80	-68.94	-13.00	55.94

Remark: 1. The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst case was found in QPSK modulation

3. Rule 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.

Limit : 34.77 - 43+10log(3.00) = -13 dBm

"C.L" : Cable Loss, "H": Horizontal, "V": Vertical

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10. PEAK-TO-AVERAGE RATIO

10.1 Operating environment

Temperature	:	22 °C
Relative humidity	:	45 % R.H.

10.2 Test set-up

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03, April 9, 2018, Section 5.7.

- Section 5.7.2 Measurement of peak power in a broadband noise-like signal using CCDF

a) Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.

b) Set the number of counts to a value that stabilizes the measured CCDF curve.

c) Set the measurement interval as follows:

1) For continuous transmissions, set to the greater of [10 × (number of points in sweep) × (transmission symbol period)] or 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. Set the measurement interval to a time that is less than or equal to the burst duration.
3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.

d) Record the maximum PAPR level associated with a probability of 0.1%.

e) The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.

- Section 5.7.3 Alternate Procedure for PAPR

Some regulatory requirements specify a PAPR limit when the output power limits are specified in terms of average power. If it becomes necessary to provide measurement data to demonstrate compliance to a PAPR limit, then the appropriate procedure from those provided in 5.2.3 shall be utilized to determine the peak power (or peak PSD) and the appropriate procedure from those provided in 5.2.4 shall be used to determine the average power (or average PSD). The data from these measurements is then used in Equation (2) to determine the PAPR of a narrowband CW-like signal. See 5.2.3.4 for guidance on determining the PAPR of a broadband noise-like signal.

$$\text{PAPR (dB)} = P_{Pk}\ \text{(dBm or dBW)} - P_{Avg}\ \text{(dBm or dBW)}$$

where

PAPR peak-to-average power ratio, in dB

P_{Pk} measured peak power or peak PSD level, in dBm or dBW

P_{Avg} measured average power or average PSD level, in dBm or dBW

10.3 Test Date

January 15, 2024 ~ February 08, 2024

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10.4 Test data for Band 12_Bandwidth 1.4 MHz

-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 12 QPSK				
1 RB	699.7 MHz	6.12	13.00	Pass
	707.5 MHz	5.97	13.00	Pass
	715.3 MHz	5.91	13.00	Pass
6 RB	699.7 MHz	6.46	13.00	Pass
	707.5 MHz	6.38	13.00	Pass
	715.3 MHz	6.35	13.00	Pass
LTE Band 12 16QAM				
1 RB	699.7 MHz	7.59	13.00	Pass
	707.5 MHz	7.39	13.00	Pass
	715.3 MHz	7.28	13.00	Pass
6 RB	699.7 MHz	7.36	13.00	Pass
	707.5 MHz	7.30	13.00	Pass
	715.3 MHz	7.22	13.00	Pass

Remark: Measured the using CCDFof spectrum analyzer.

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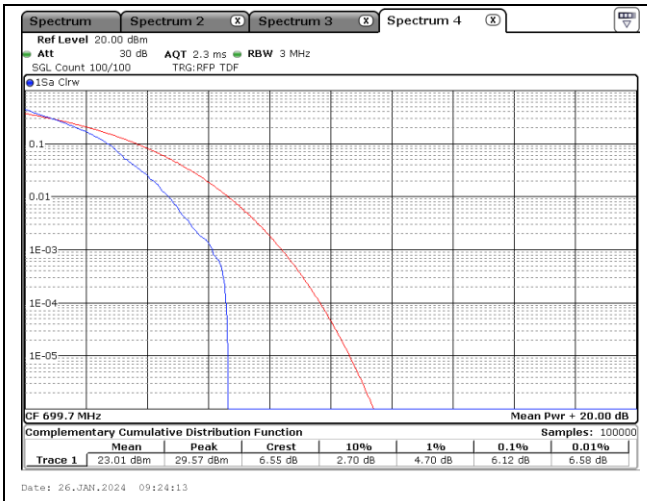
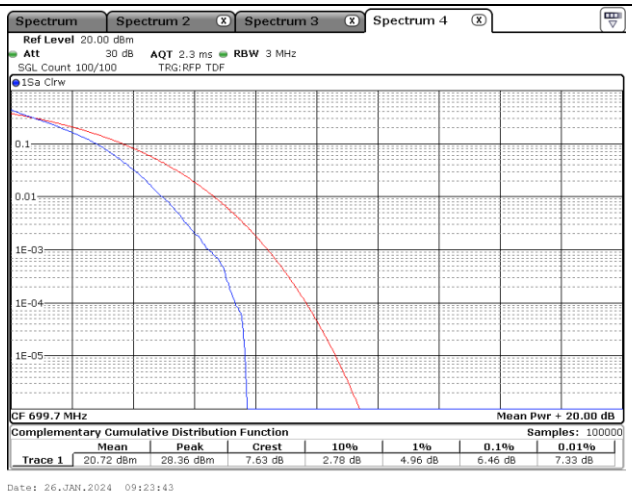
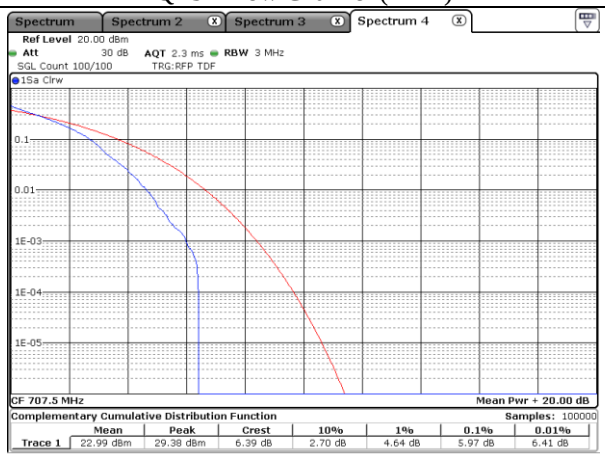


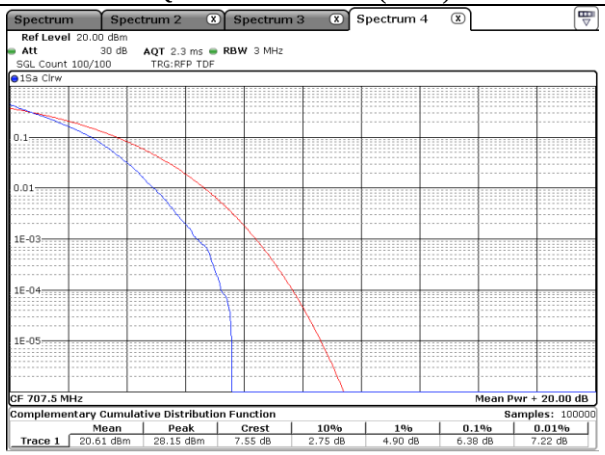
QPSK Low Channel (1 RB)



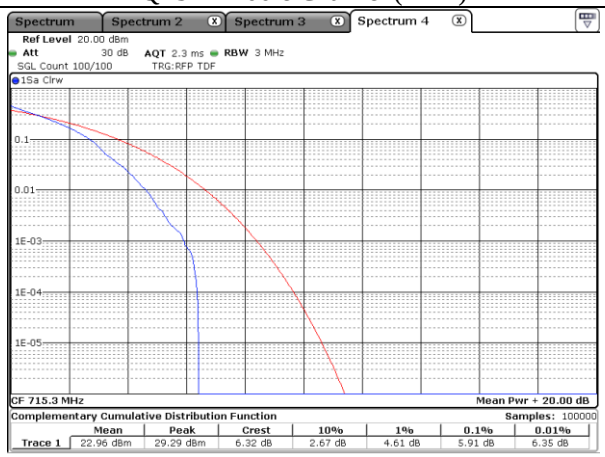
QPSK Low Channel (6 RB)



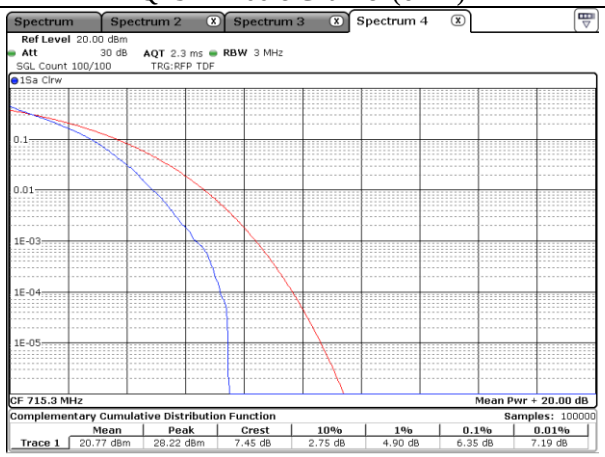
QPSK Middle Channel (1 RB)



QPSK Middle Channel (6 RB)



QPSK High Channel (1 RB)



QPSK High Channel (6 RB)

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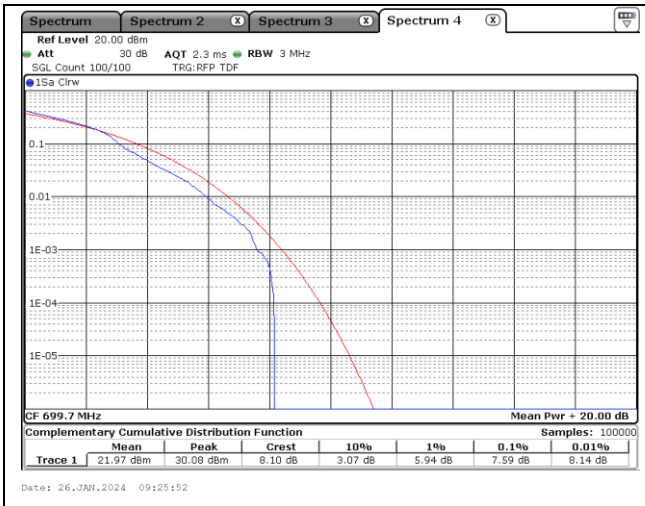
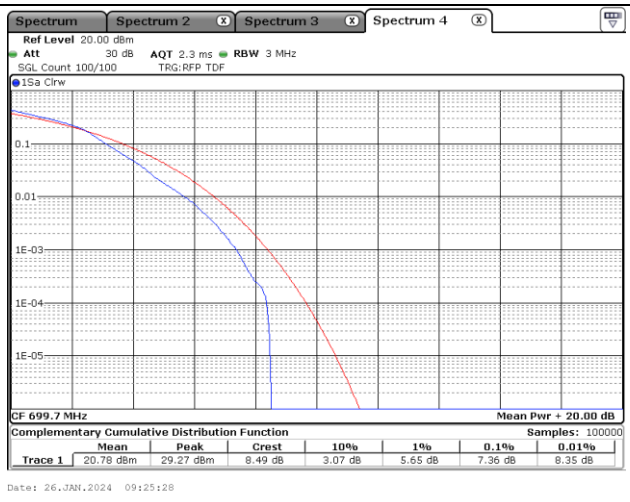
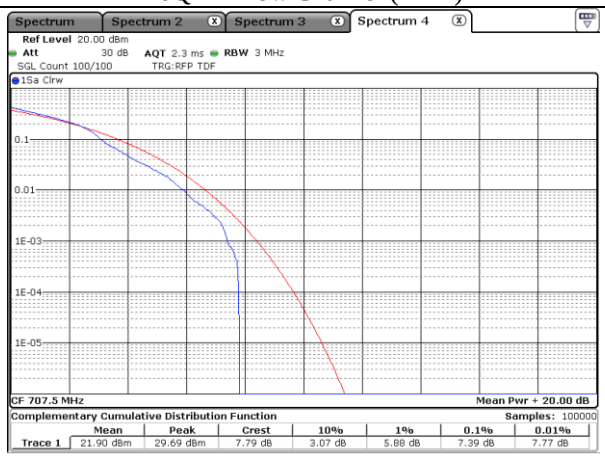


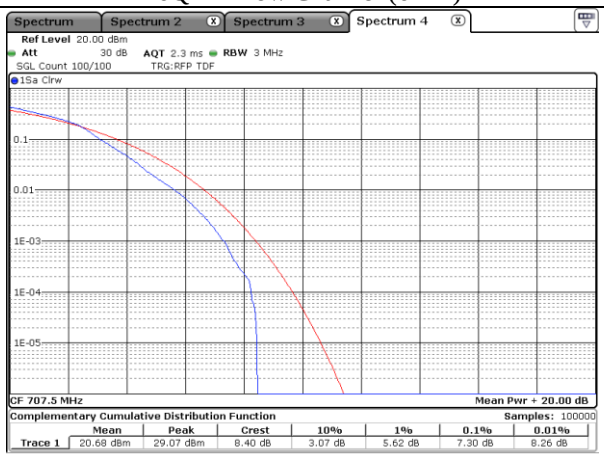
16QAM Low Channel (1 RB)



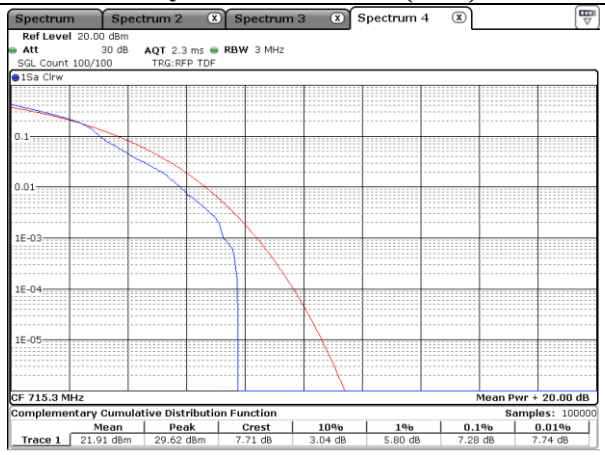
16QAM Low Channel (6 RB)



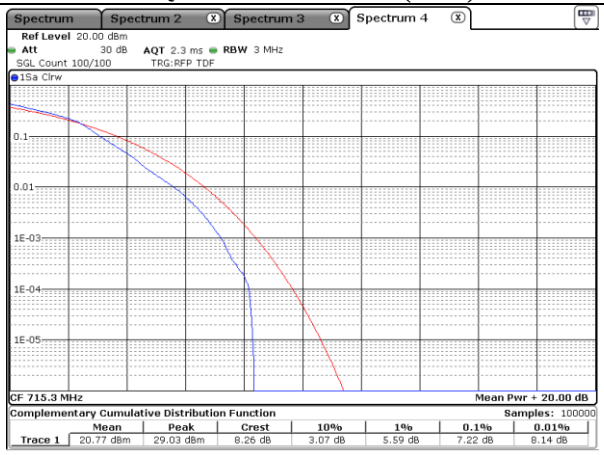
16QAM Middle Channel (1 RB)



16QAM Middle Channel (6 RB)



16QAM High Channel (1 RB)



16QAM High Channel (6 RB)

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10.5 Test data for Band 12_Bandwidth 3 MHz

-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 12 QPSK				
1 RB	700.5 MHz	6.14	13.00	Pass
	707.5 MHz	6.06	13.00	Pass
	714.5 MHz	5.97	13.00	Pass
6 RB	700.5 MHz	6.41	13.00	Pass
	707.5 MHz	6.35	13.00	Pass
	714.5 MHz	6.29	13.00	Pass
LTE Band 12 16QAM				
1 RB	700.5 MHz	7.62	13.00	Pass
	707.5 MHz	7.57	13.00	Pass
	714.5 MHz	7.39	13.00	Pass
6 RB	700.5 MHz	7.28	13.00	Pass
	707.5 MHz	7.19	13.00	Pass
	714.5 MHz	7.10	13.00	Pass

Remark: Measured the using CCDFof spectrum analyzer.

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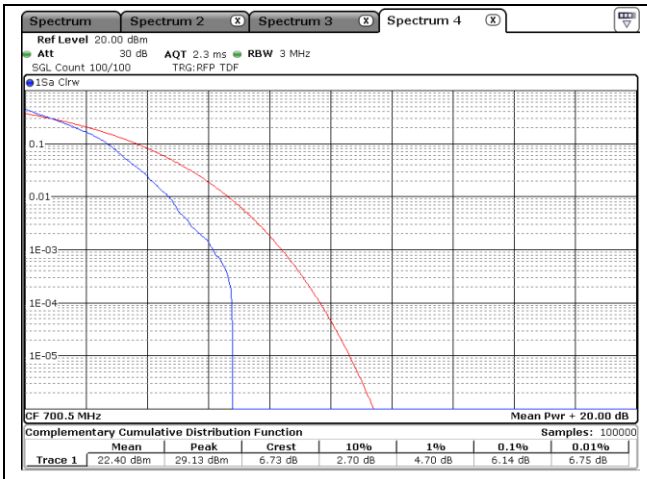
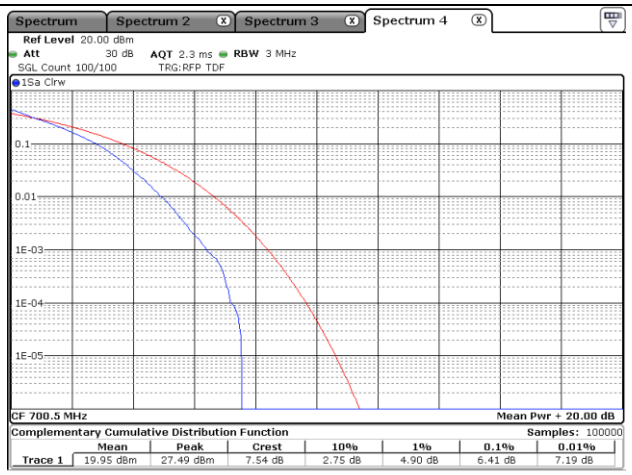
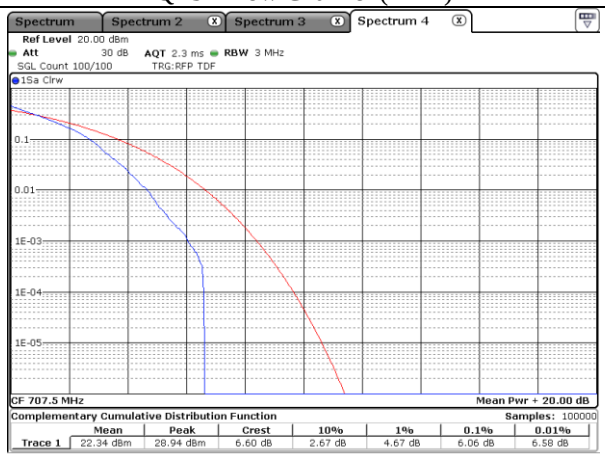


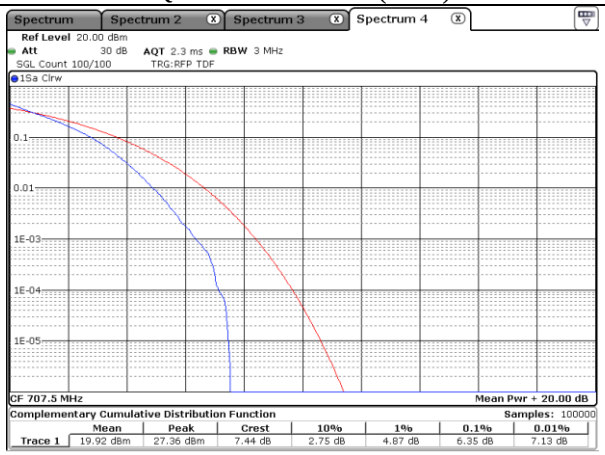
QPSK Low Channel (1 RB)



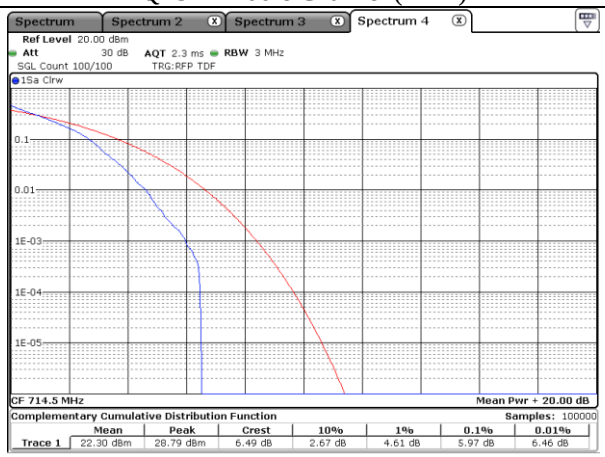
QPSK Low Channel (6 RB)



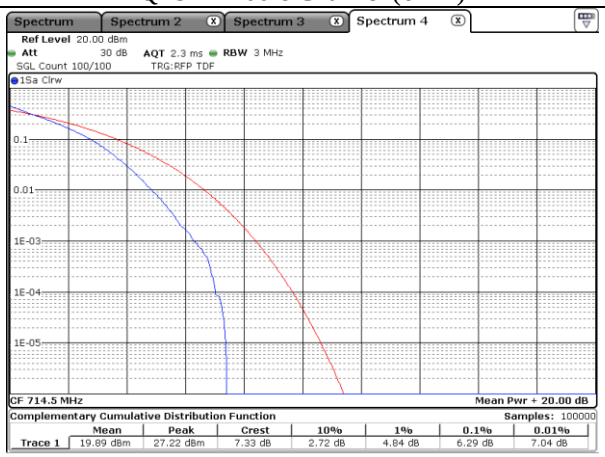
QPSK Middle Channel (1 RB)



QPSK Middle Channel (6 RB)



QPSK High Channel (1 RB)



QPSK High Channel (6 RB)

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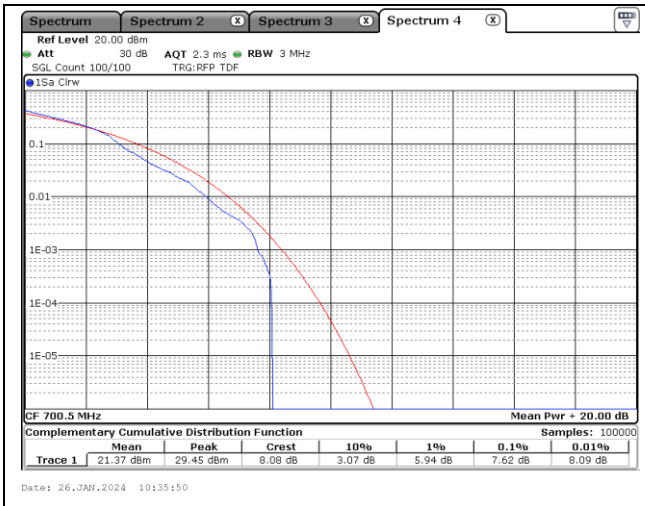
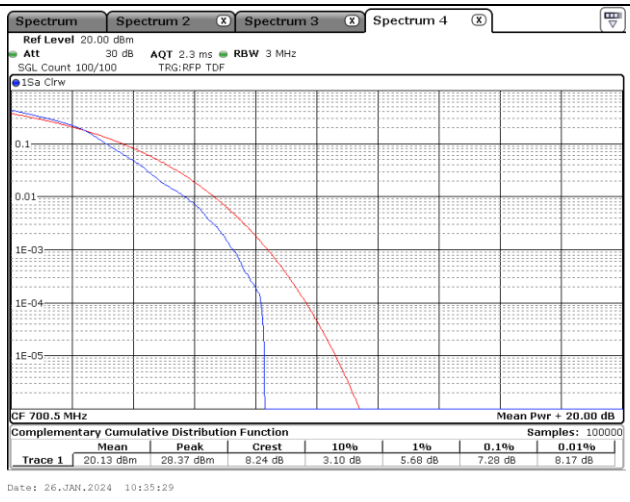
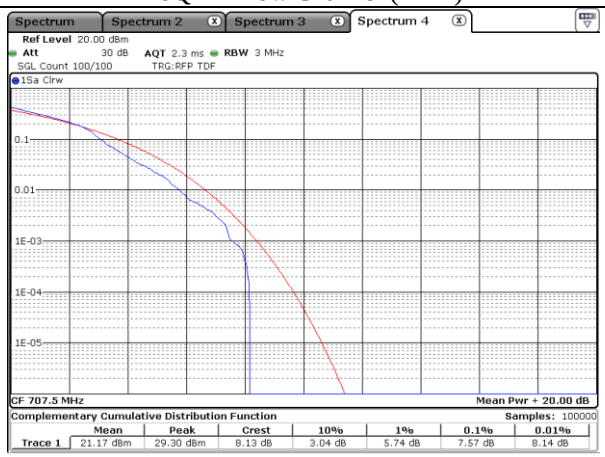


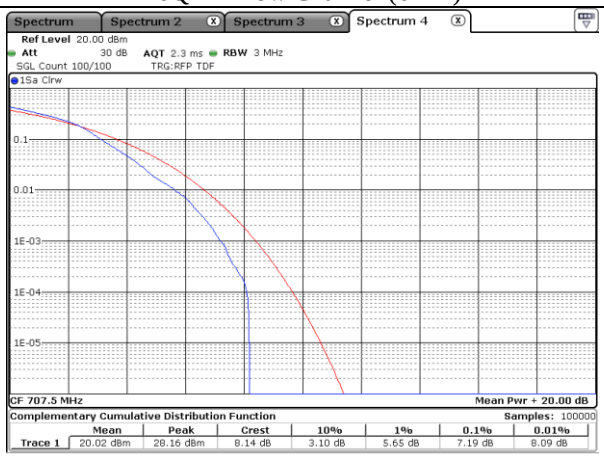
16QAM Low Channel (1 RB)



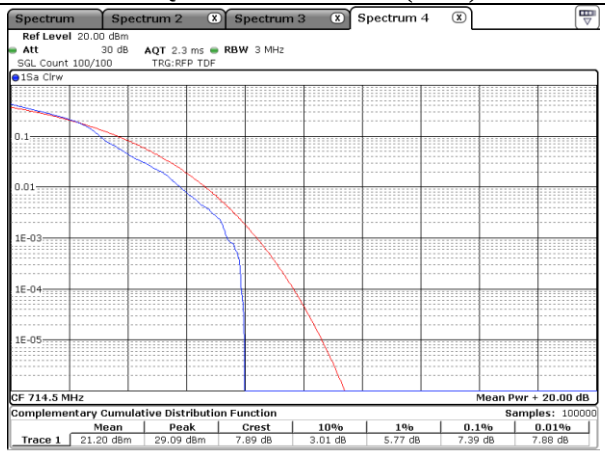
16QAM Low Channel (6 RB)



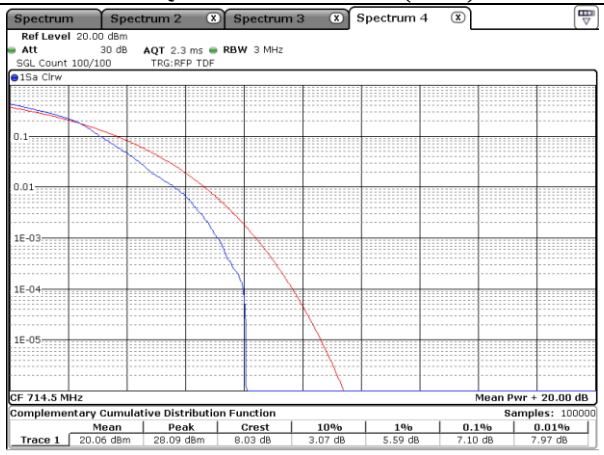
16QAM Middle Channel (1 RB)



16QAM Middle Channel (6 RB)



16QAM High Channel (1 RB)



16QAM High Channel (6 RB)

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10.6 Test data for Band 12_Bandwidth 5 MHz

-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 12 QPSK				
1 RB	701.5 MHz	6.06	13.00	Pass
	707.5 MHz	5.94	13.00	Pass
	713.5 MHz	5.88	13.00	Pass
6 RB	701.5 MHz	6.32	13.00	Pass
	707.5 MHz	6.20	13.00	Pass
	713.5 MHz	6.17	13.00	Pass
LTE Band 12 16QAM				
1 RB	701.5 MHz	6.78	13.00	Pass
	707.5 MHz	6.61	13.00	Pass
	713.5 MHz	6.52	13.00	Pass
6 RB	701.5 MHz	7.10	13.00	Pass
	707.5 MHz	7.01	13.00	Pass
	713.5 MHz	6.96	13.00	Pass

Remark: Measured the using CCDFof spectrum analyzer.

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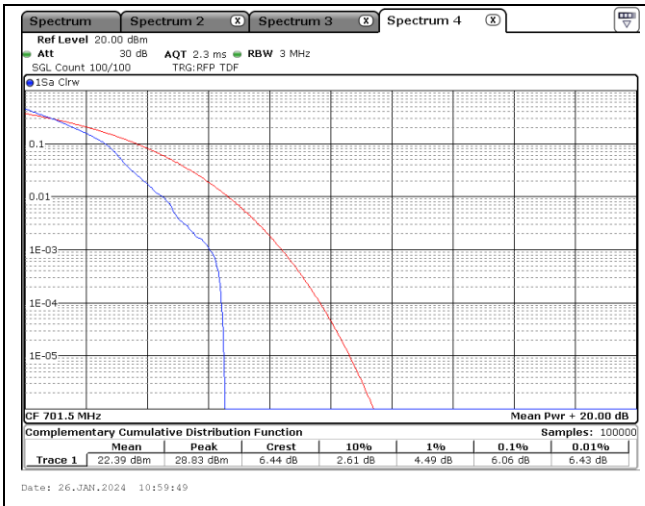
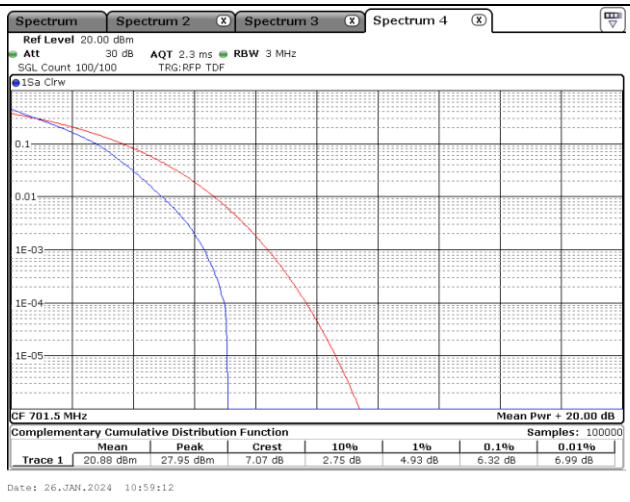
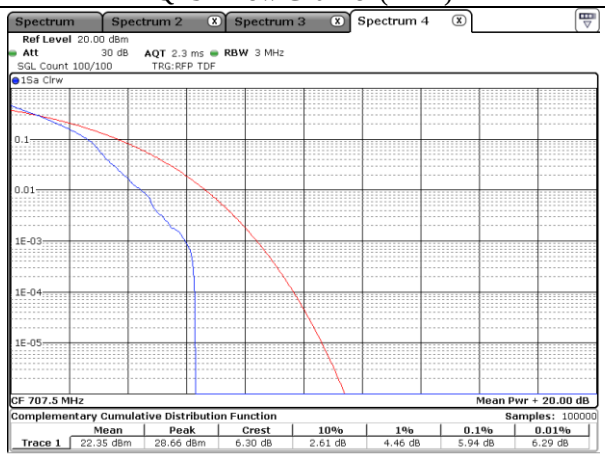


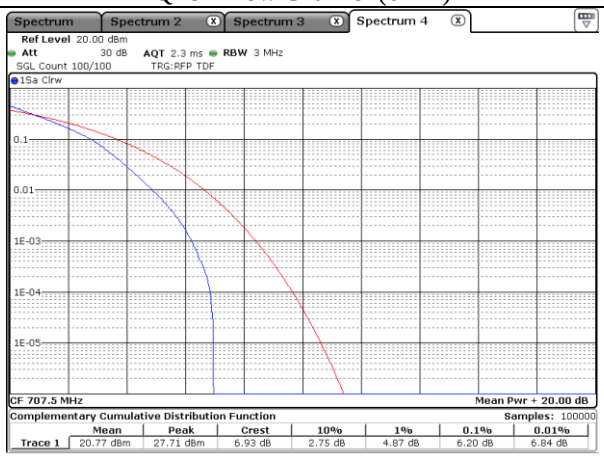
QPSK Low Channel (1 RB)



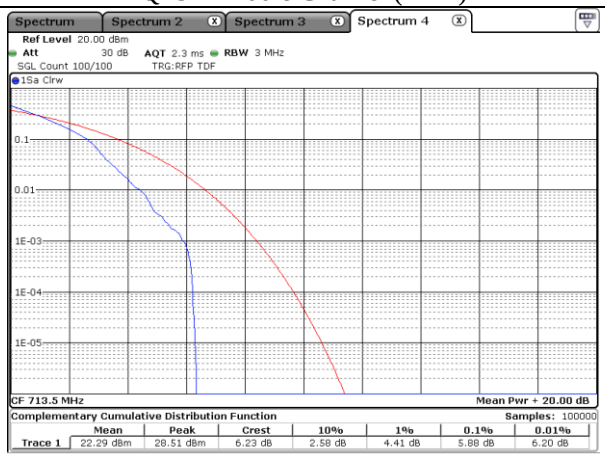
QPSK Low Channel (6 RB)



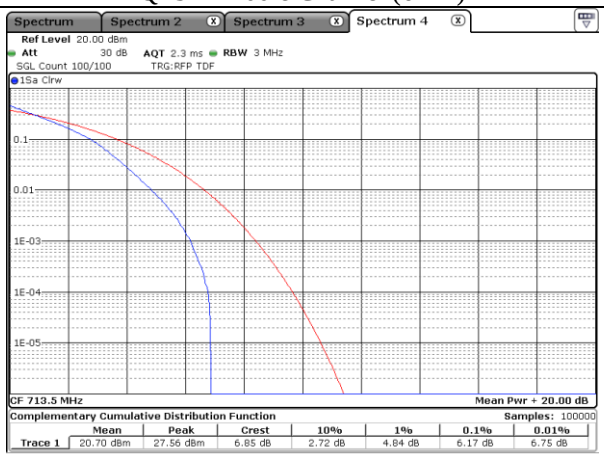
QPSK Middle Channel (1 RB)



QPSK Middle Channel (6 RB)



QPSK High Channel (1 RB)



QPSK High Channel (6 RB)

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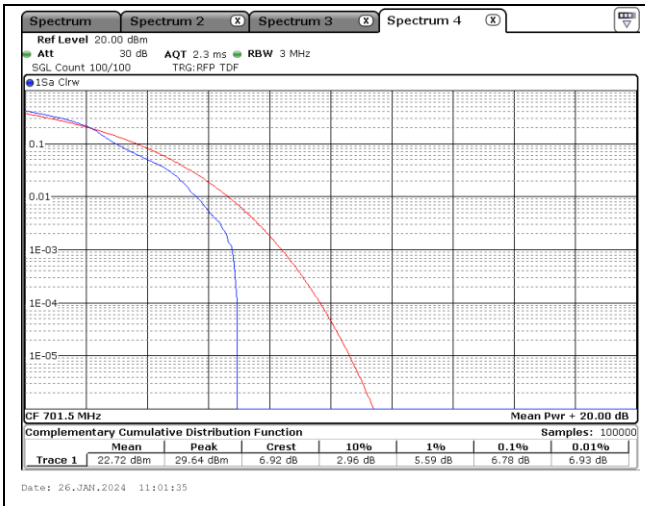
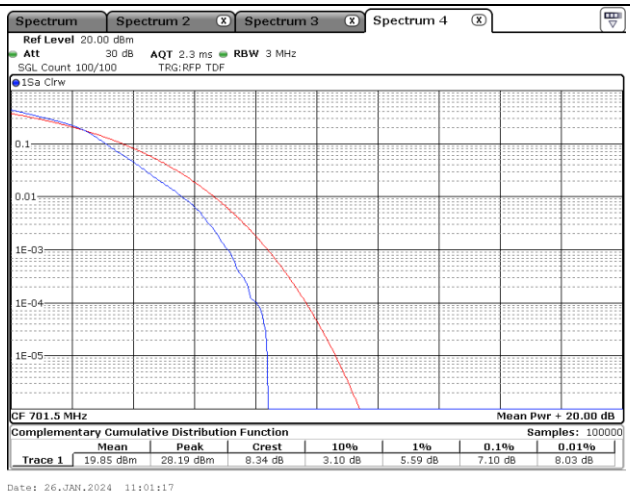
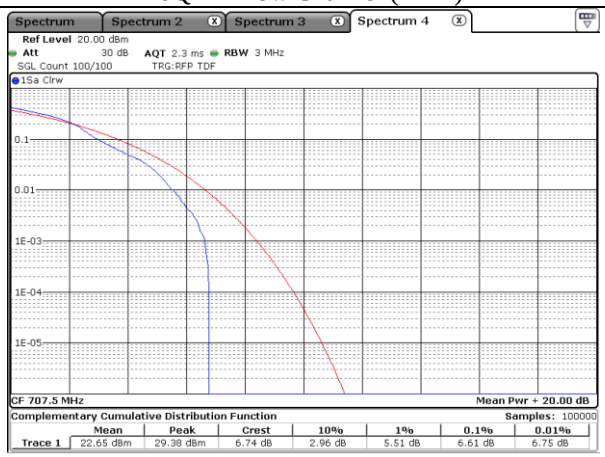


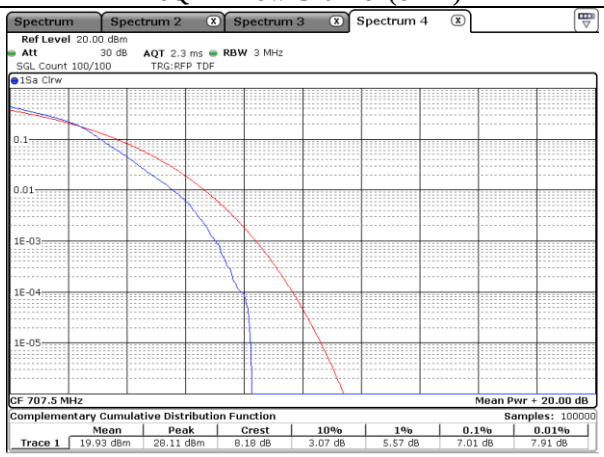
16QAM Low Channel (1 RB)



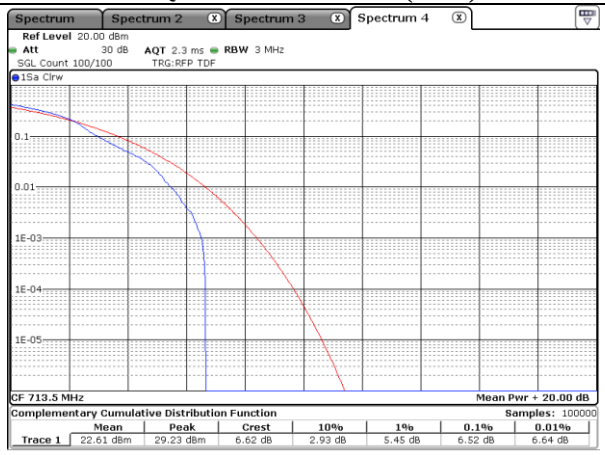
16QAM Low Channel (6 RB)



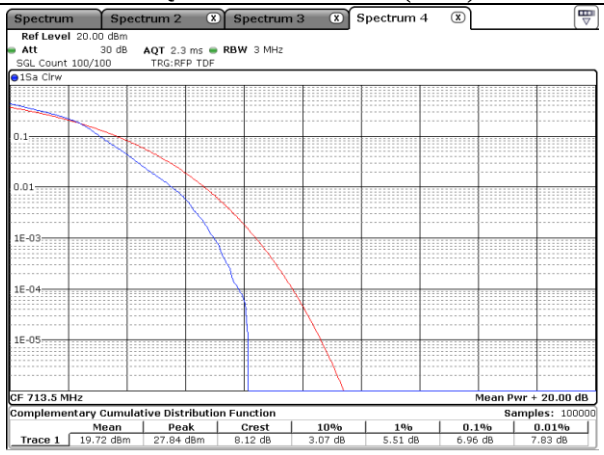
16QAM Middle Channel (1 RB)



16QAM Middle Channel (6 RB)



16QAM High Channel (1 RB)



16QAM High Channel (6 RB)

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10.7 Test data for Band 12_Bandwidth 10 MHz

-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 12 QPSK				
1 RB	704.0 MHz	5.91	13.00	Pass
	707.5 MHz	5.86	13.00	Pass
	711.0 MHz	5.68	13.00	Pass
6 RB	704.0 MHz	6.35	13.00	Pass
	707.5 MHz	6.29	13.00	Pass
	711.0 MHz	6.26	13.00	Pass
LTE Band 12 16QAM				
1 RB	704.0 MHz	6.78	13.00	Pass
	707.5 MHz	6.67	13.00	Pass
	711.0 MHz	6.61	13.00	Pass
6 RB	704.0 MHz	7.16	13.00	Pass
	707.5 MHz	7.13	13.00	Pass
	711.0 MHz	7.07	13.00	Pass

Remark: Measured the using CCDFof spectrum analyzer.

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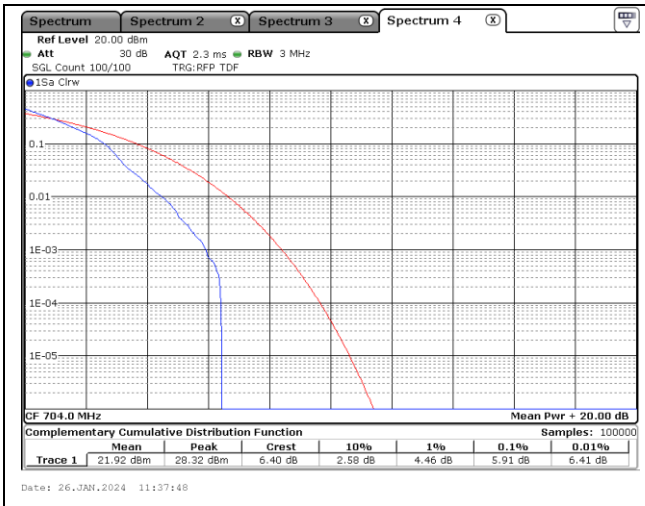
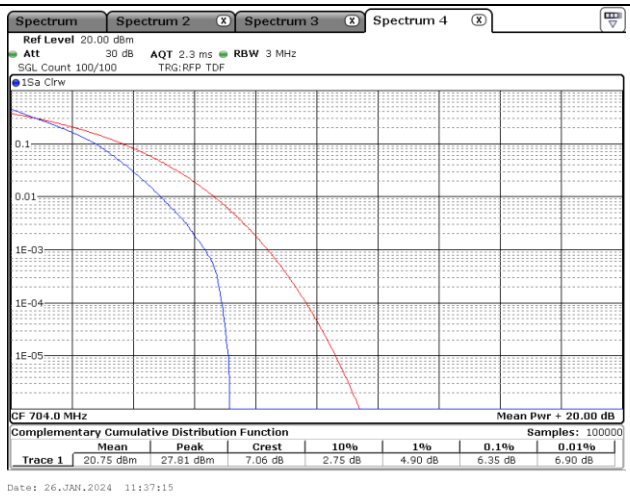
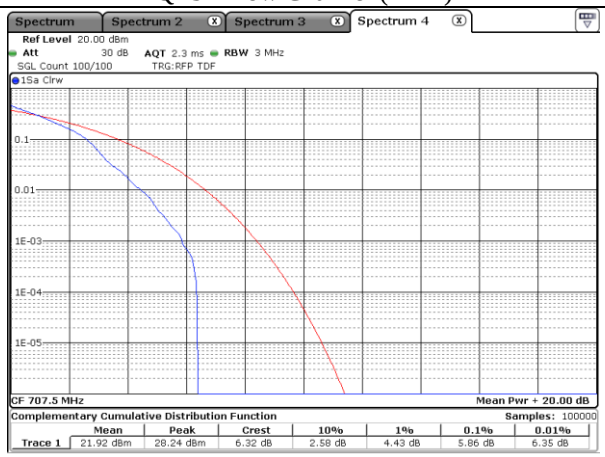


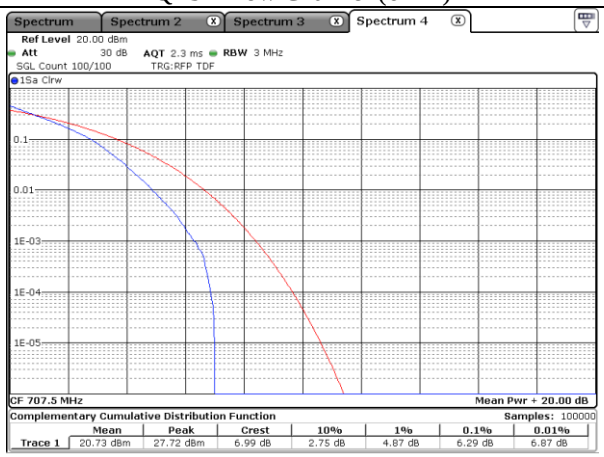
QPSK Low Channel (1 RB)



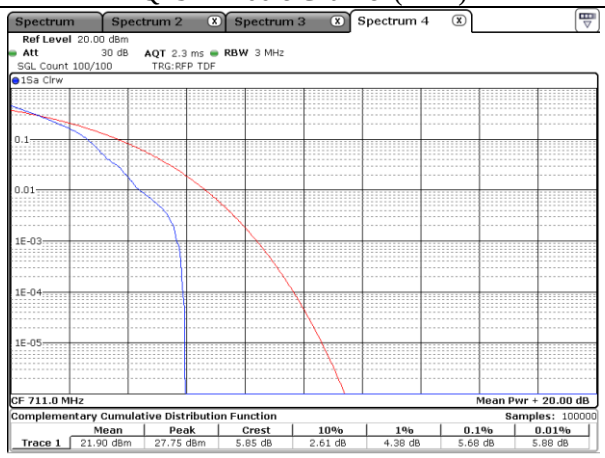
QPSK Low Channel (6 RB)



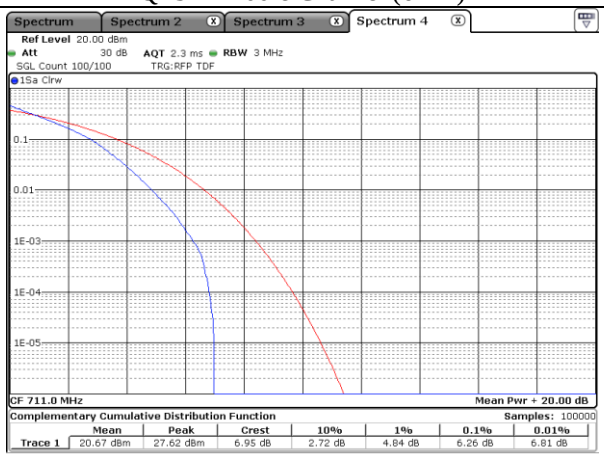
QPSK Middle Channel (1 RB)



QPSK Middle Channel (6 RB)



QPSK High Channel (1 RB)



QPSK High Channel (6 RB)

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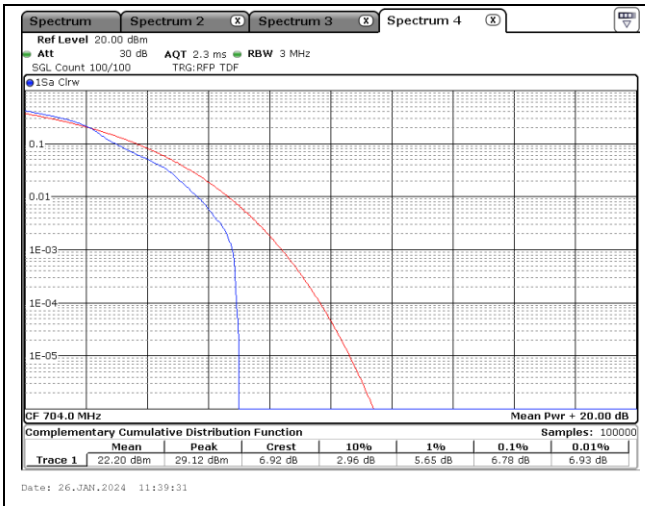
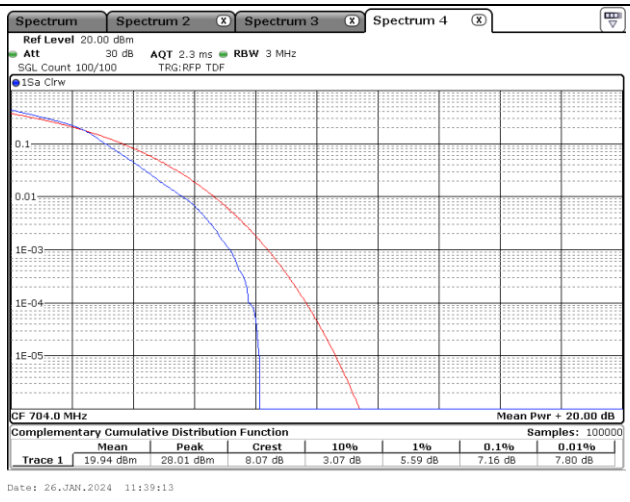
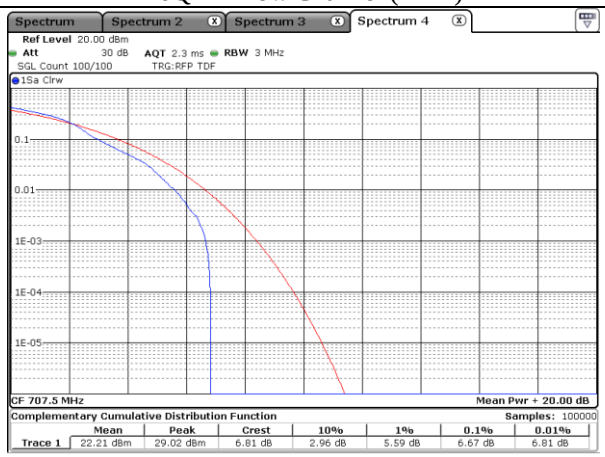


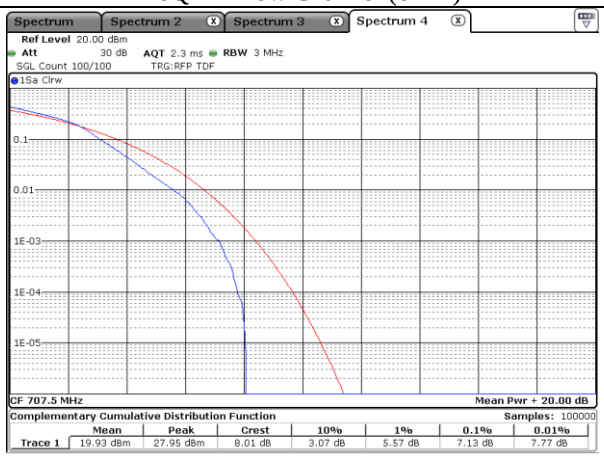
16QAM Low Channel (1 RB)



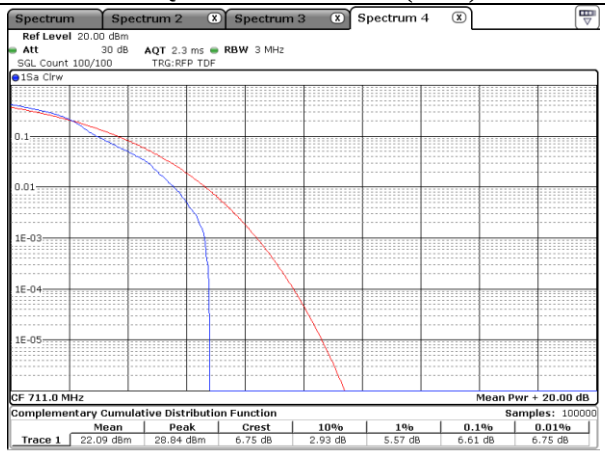
16QAM Low Channel (6 RB)



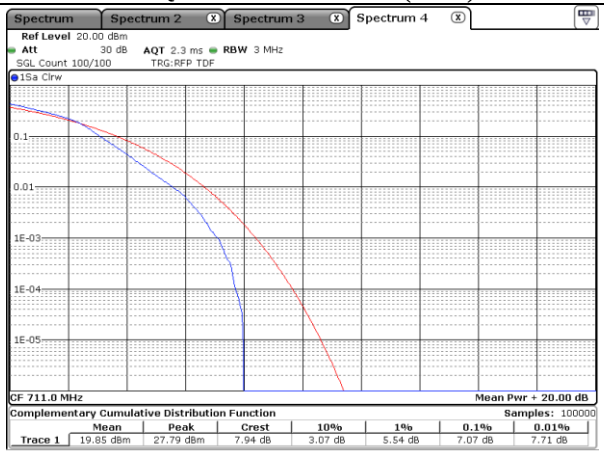
16QAM Middle Channel (1 RB)



16QAM Middle Channel (6 RB)



16QAM High Channel (1 RB)



16QAM High Channel (6 RB)

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11. OCCUPIED BANDWIDTH

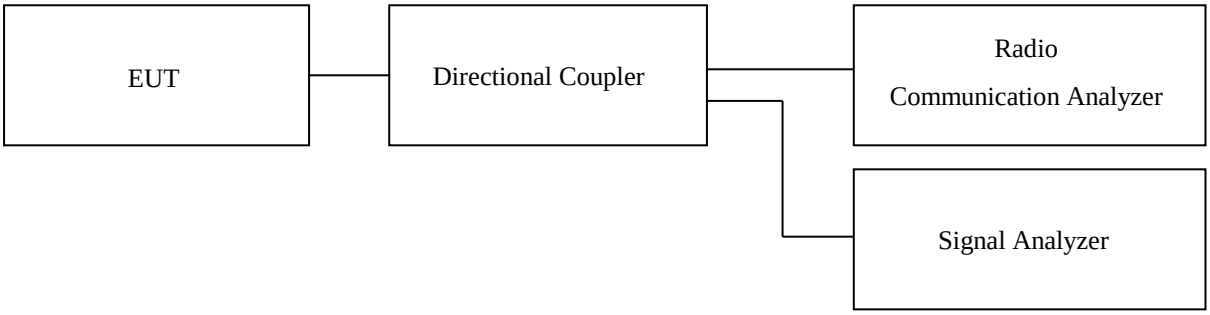
11.1 Operating environment

Temperature	:	22 °C
Relative humidity	:	45 % R.H.

11.2 Test set-up

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth. When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3×RBW.



11.3 Test Date

January 15, 2024 ~ February 08, 2024

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11.4 Test data for Band 12_Bandwidth 1.4 MHz

-. Test Result : Pass

Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	699.7 MHz	1.31	1.11	PASS
	707.5 MHz	1.31	1.12	PASS
	715.3 MHz	1.32	1.12	PASS
16QAM	699.7 MHz	1.32	1.09	PASS
	707.5 MHz	1.32	1.09	PASS
	715.3 MHz	1.33	1.09	PASS

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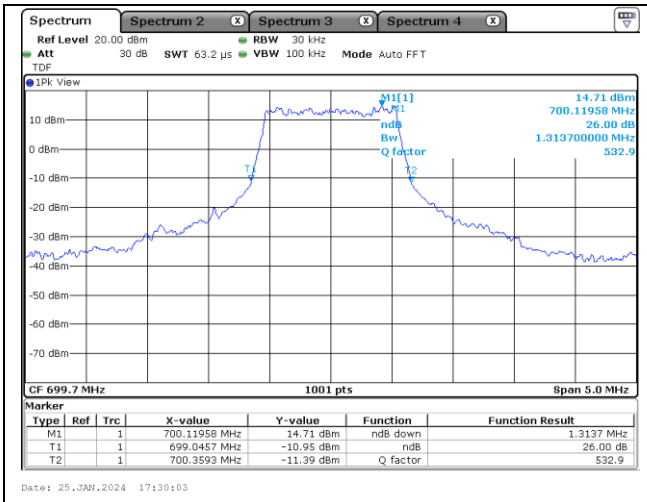
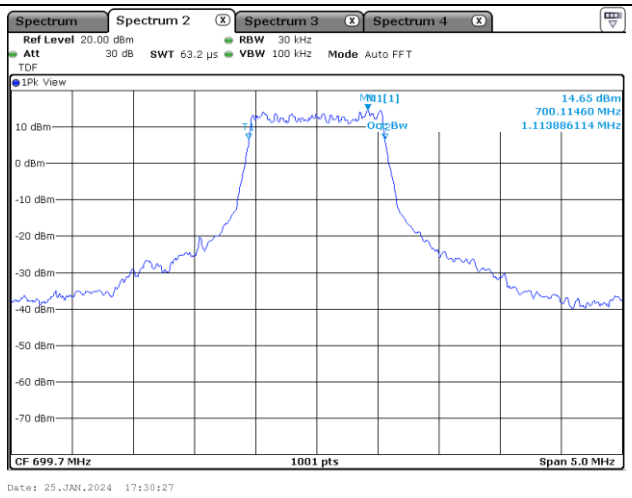
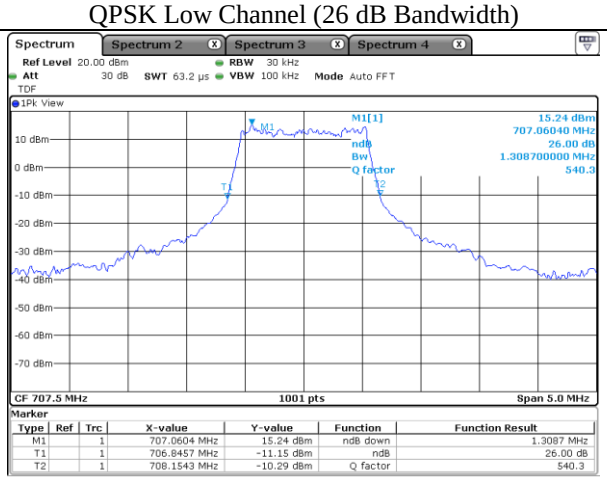


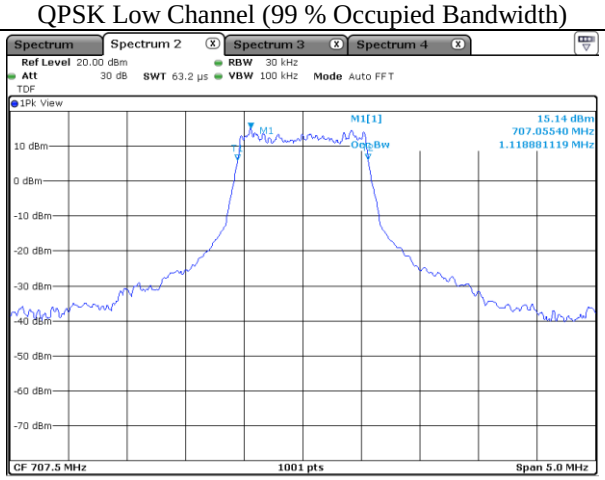
QPSK Low Channel (26 dB Bandwidth)



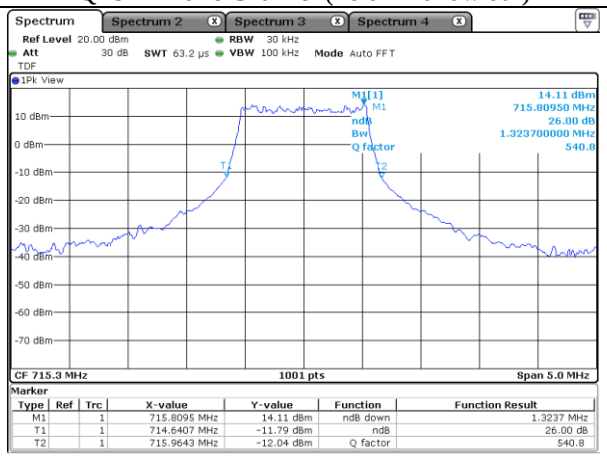
QPSK Low Channel (99 % Occupied Bandwidth)



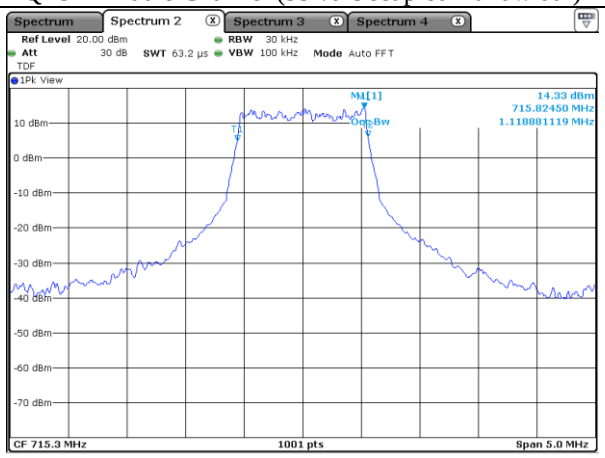
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)



QPSK High Channel (26 dB Bandwidth)



QPSK High Channel (99 % Occupied Bandwidth)

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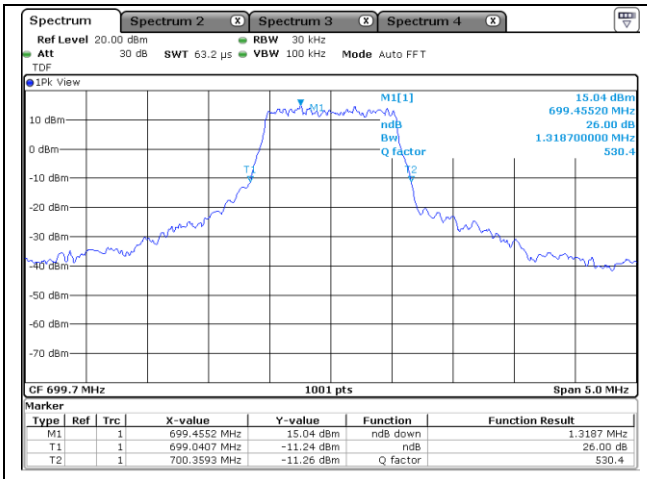
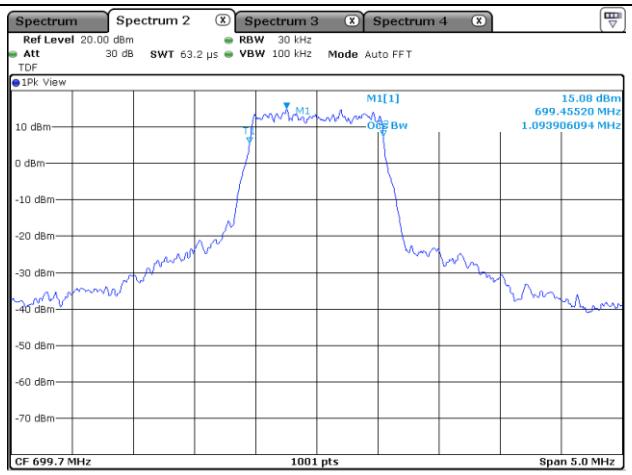
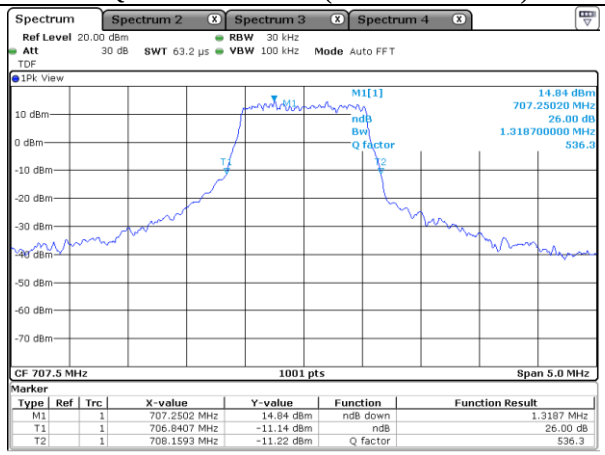
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



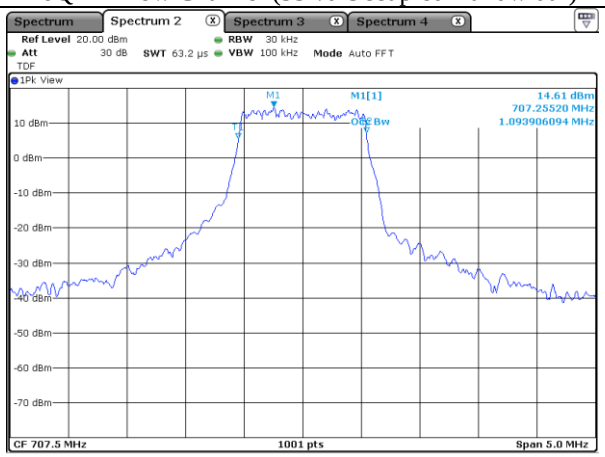
16QAM Low Channel (26 dB Bandwidth)



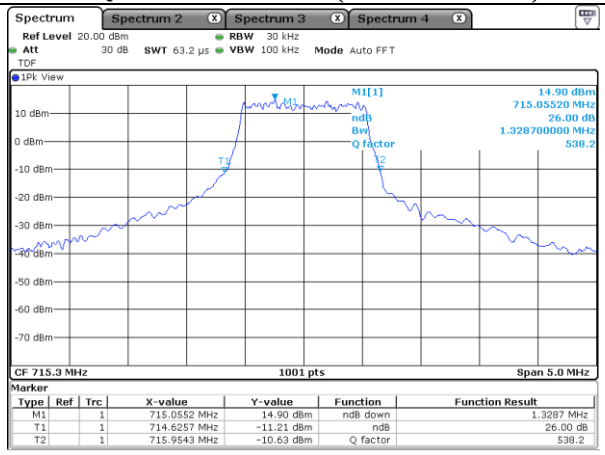
16QAM Low Channel (99 % Occupied Bandwidth)



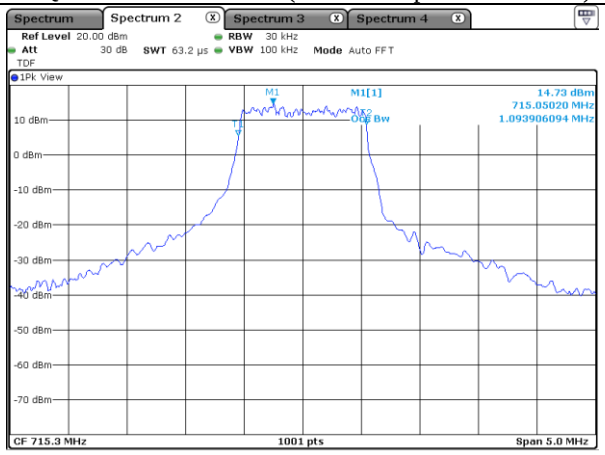
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



16QAM High Channel (99 % Occupied Bandwidth)

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11.5 Test data for Band 12_Bandwidth 3 MHz

-. Test Result : Pass

Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	699.7 MHz	1.32	1.12	PASS
	707.5 MHz	1.32	1.12	PASS
	715.3 MHz	1.32	1.12	PASS
16QAM	699.7 MHz	1.33	1.10	PASS
	707.5 MHz	1.33	1.10	PASS
	715.3 MHz	1.33	1.10	PASS

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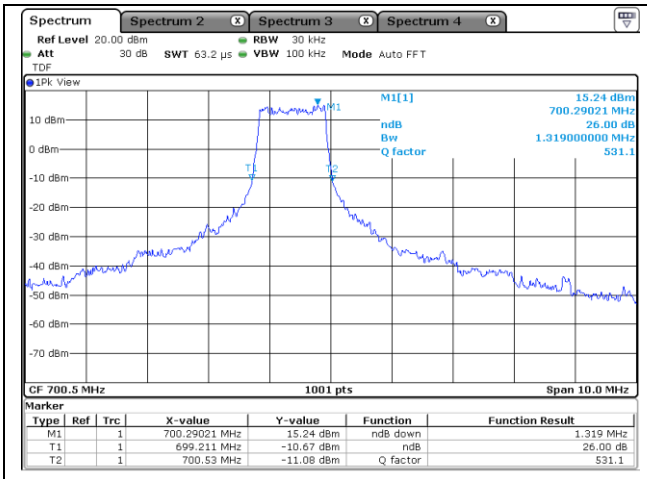
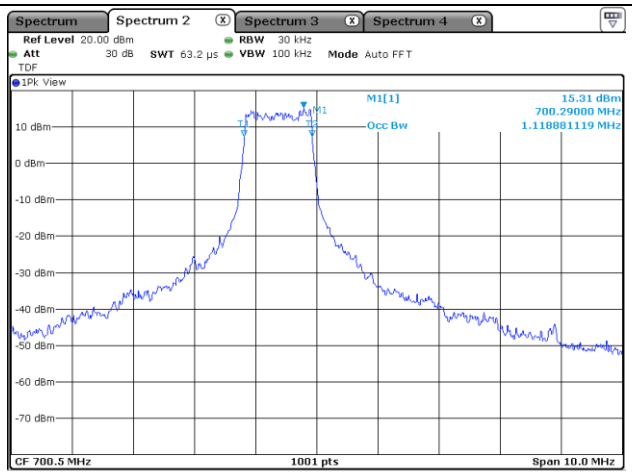
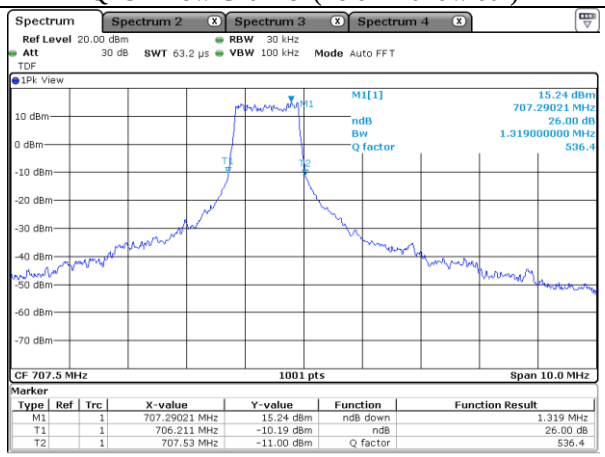


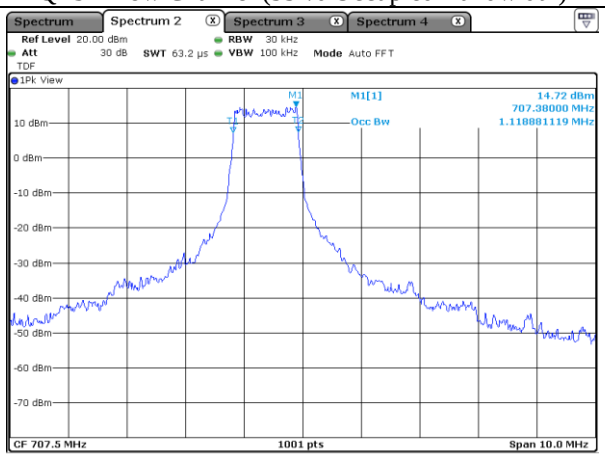
QPSK Low Channel (26 dB Bandwidth)



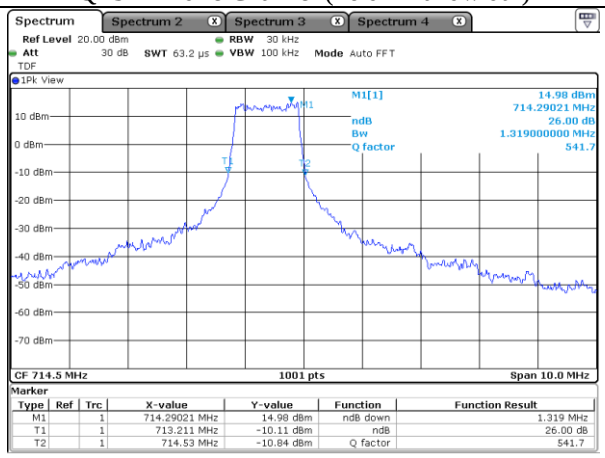
QPSK Low Channel (99 % Occupied Bandwidth)



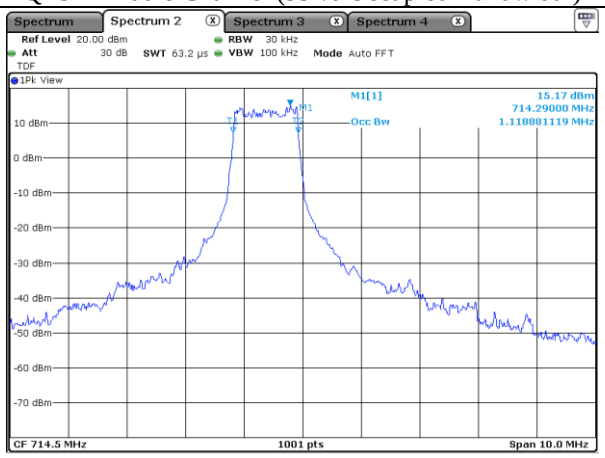
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)



QPSK High Channel (26 dB Bandwidth)



QPSK High Channel (99 % Occupied Bandwidth)

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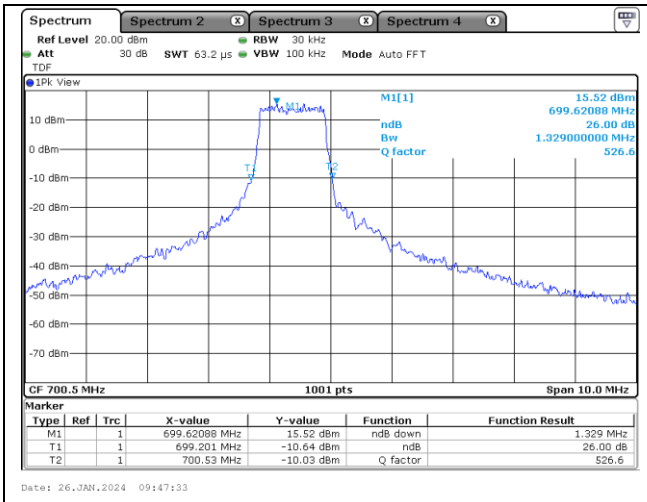
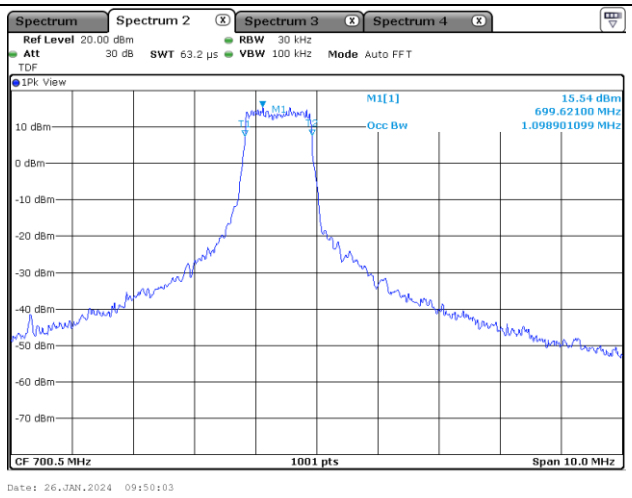
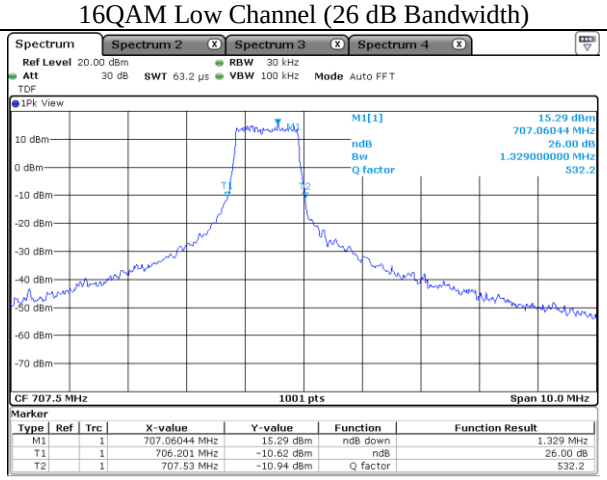


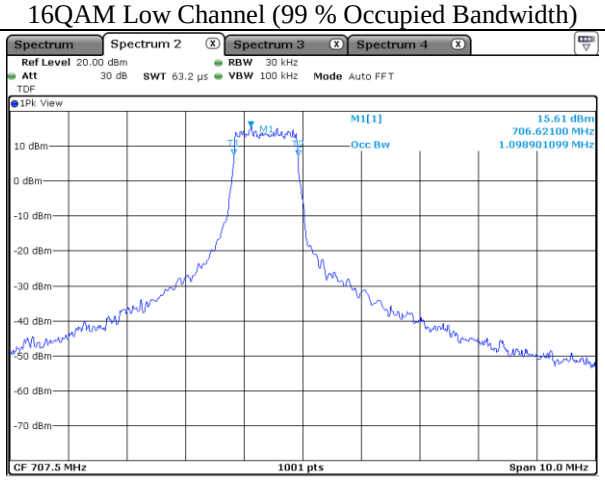
16QAM Low Channel (26 dB Bandwidth)



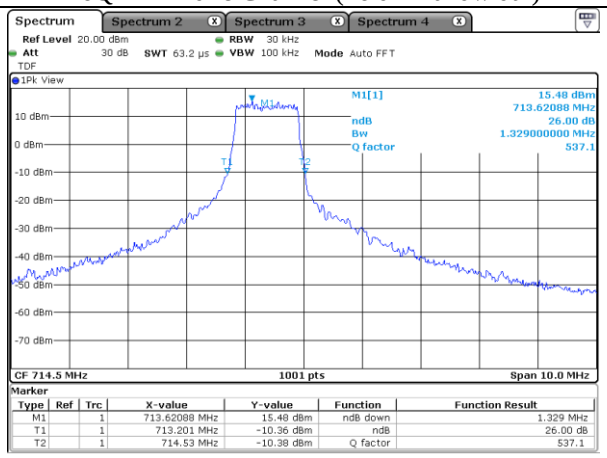
16QAM Low Channel (99 % Occupied Bandwidth)



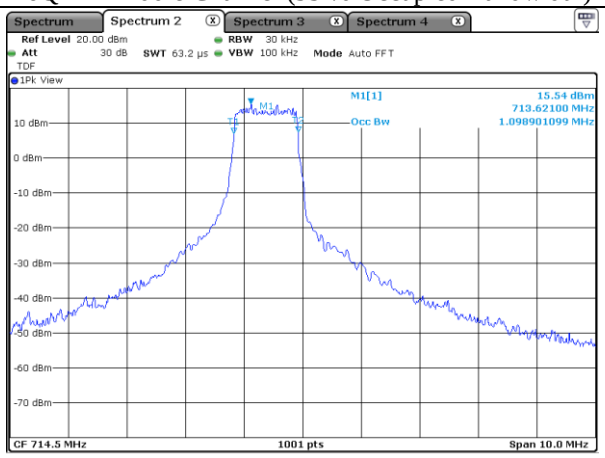
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



16QAM High Channel (99 % Occupied Bandwidth)

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11.6 Test data for Band 12_Bandwidth 5 MHz

-. Test Result : Pass

Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	699.7 MHz	1.30	1.12	PASS
	707.5 MHz	1.30	1.12	PASS
	715.3 MHz	1.32	1.12	PASS
16QAM	699.7 MHz	1.35	1.14	PASS
	707.5 MHz	1.35	1.14	PASS
	715.3 MHz	1.35	1.14	PASS

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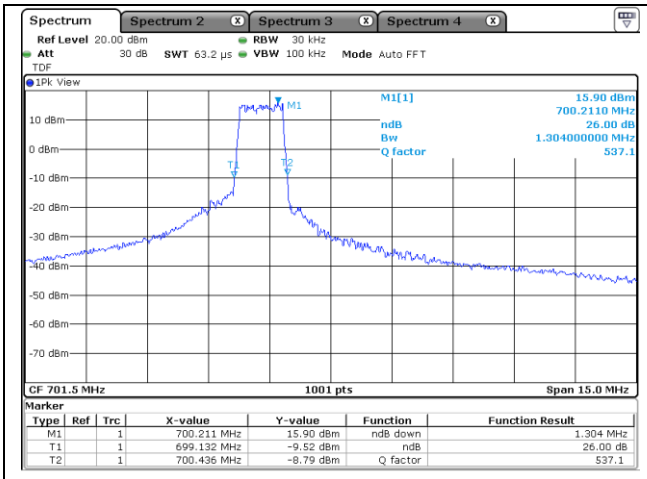
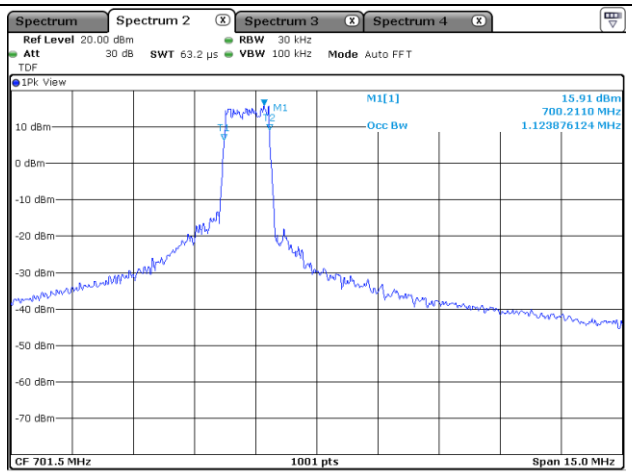
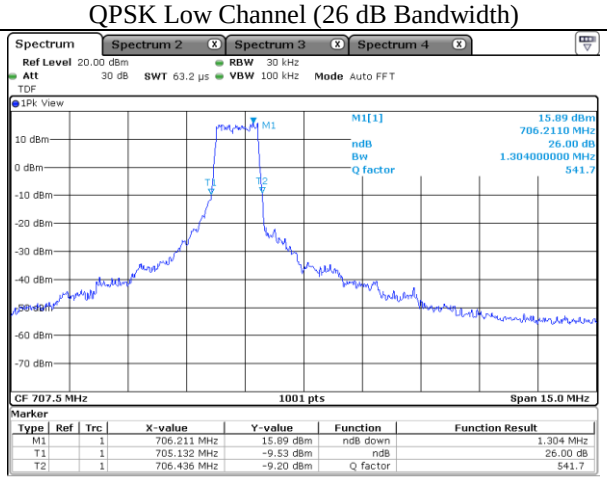


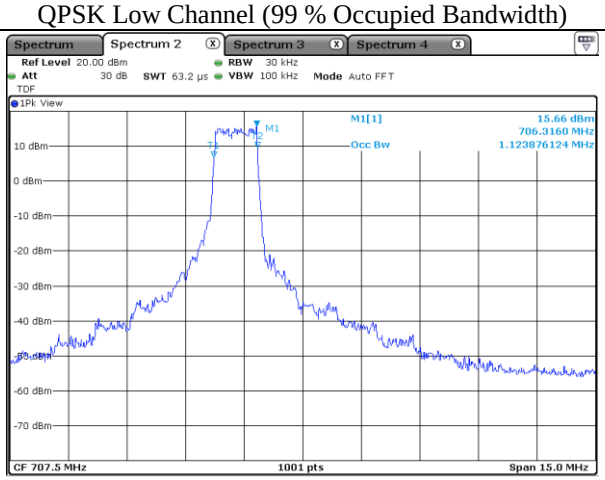
QPSK Low Channel (26 dB Bandwidth)



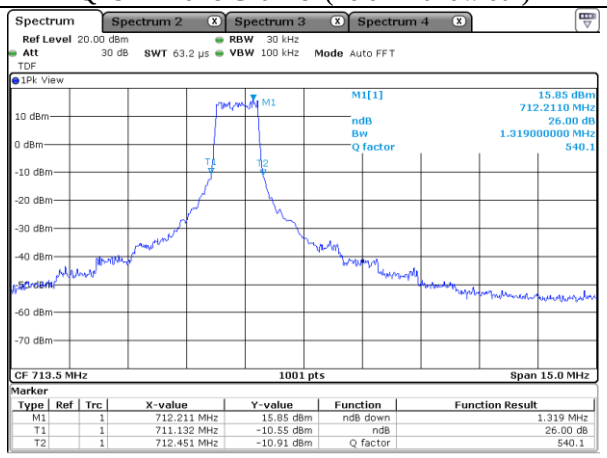
QPSK Low Channel (99 % Occupied Bandwidth)



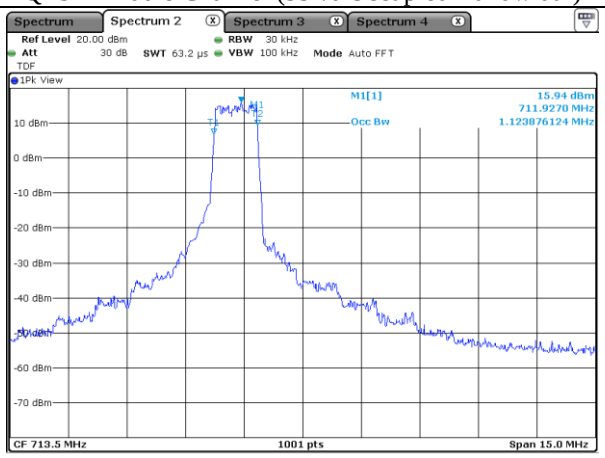
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)



QPSK High Channel (26 dB Bandwidth)



QPSK High Channel (99 % Occupied Bandwidth)

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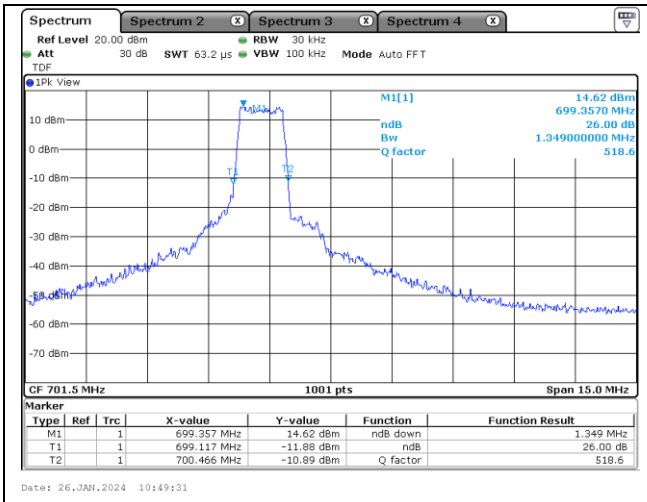
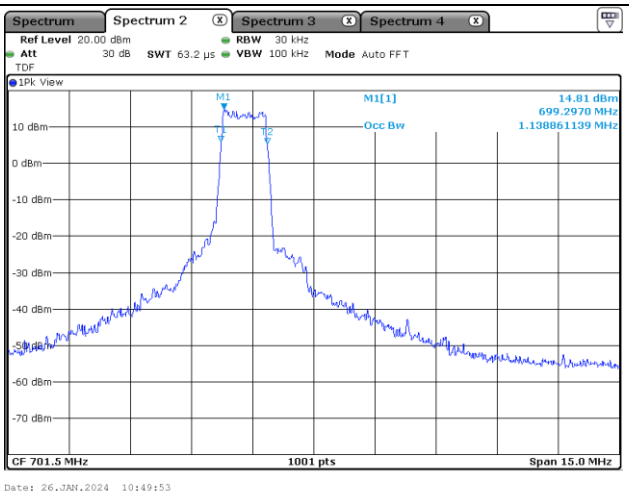
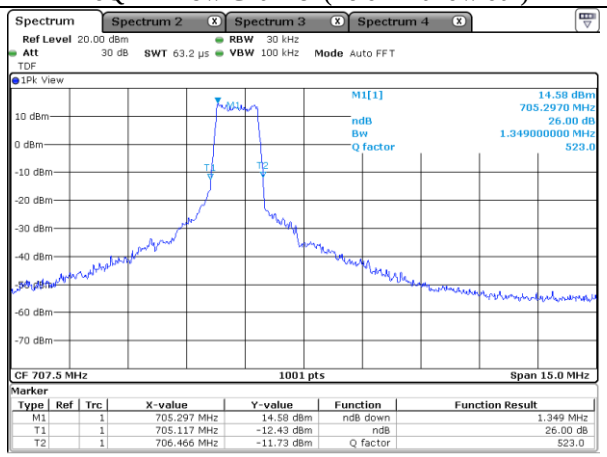


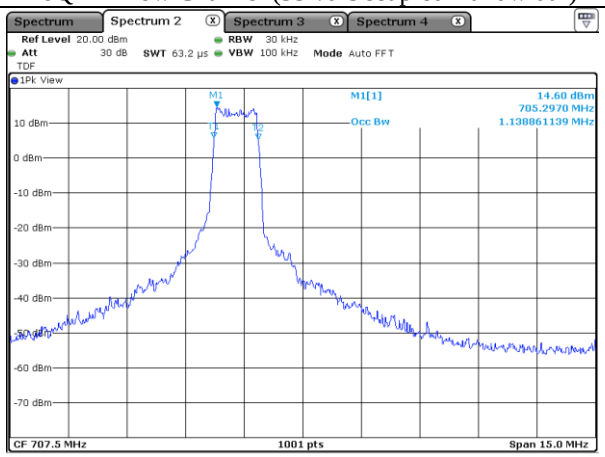
16QAM Low Channel (26 dB Bandwidth)



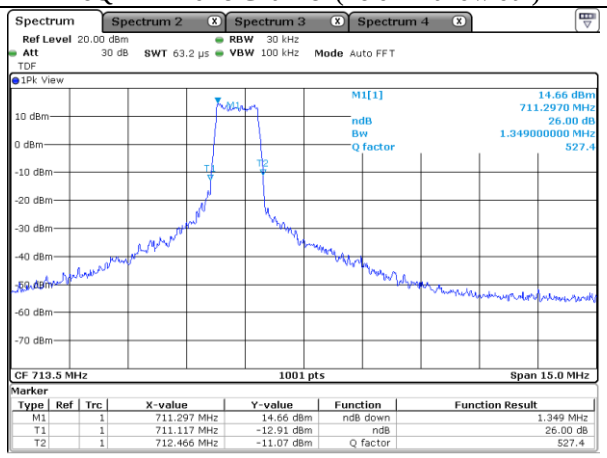
16QAM Low Channel (99 % Occupied Bandwidth)



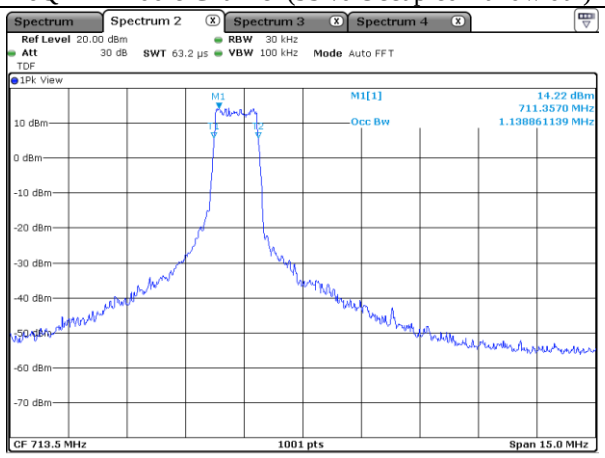
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



16QAM High Channel (99 % Occupied Bandwidth)

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11.7 Test data for Band 12_Bandwidth 10 MHz

-. Test Result : Pass

Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	699.7 MHz	1.34	1.12	PASS
	707.5 MHz	1.34	1.14	PASS
	715.3 MHz	1.34	1.14	PASS
16QAM	699.7 MHz	1.36	1.12	PASS
	707.5 MHz	1.36	1.12	PASS
	715.3 MHz	1.36	1.12	PASS

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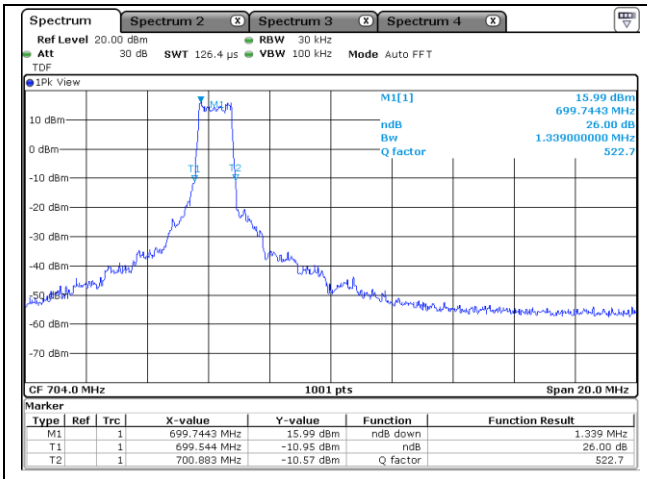
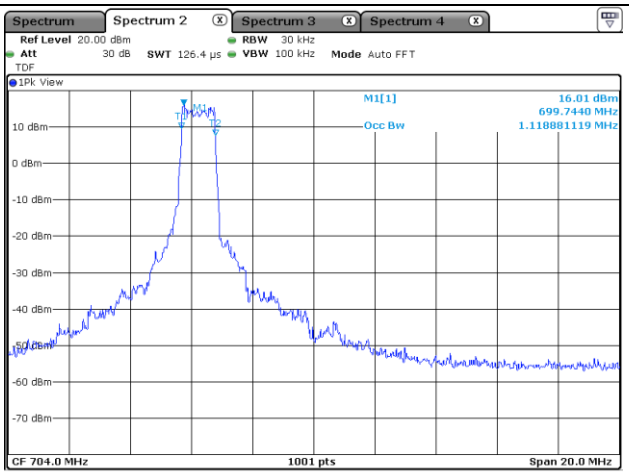
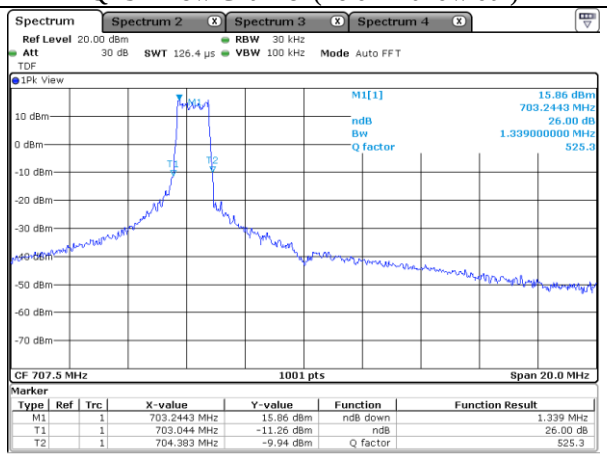


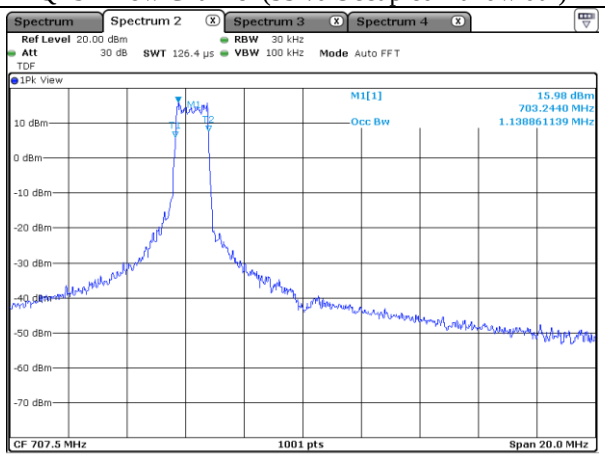
QPSK Low Channel (26 dB Bandwidth)



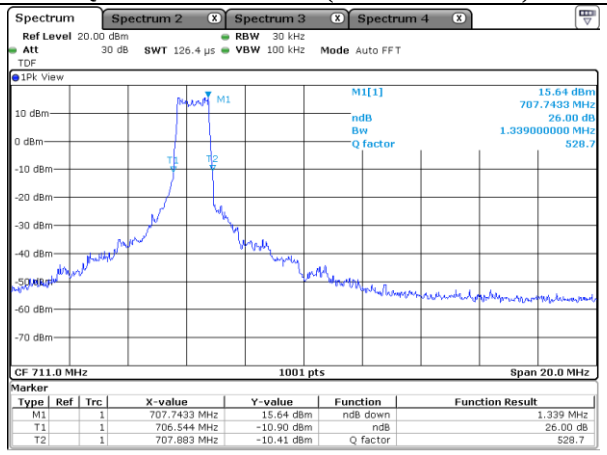
QPSK Low Channel (99 % Occupied Bandwidth)



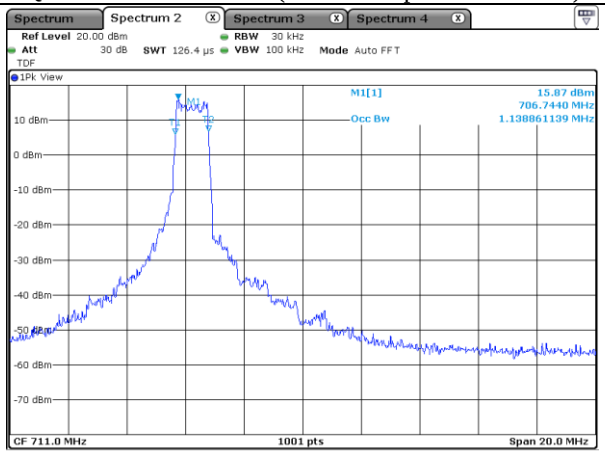
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)

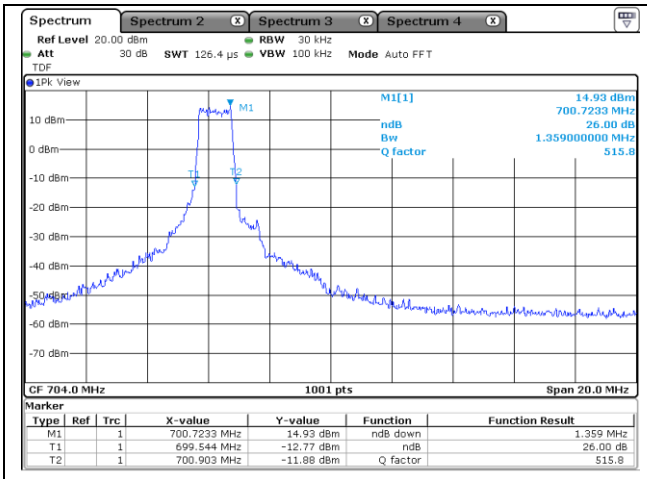


QPSK High Channel (26 dB Bandwidth)

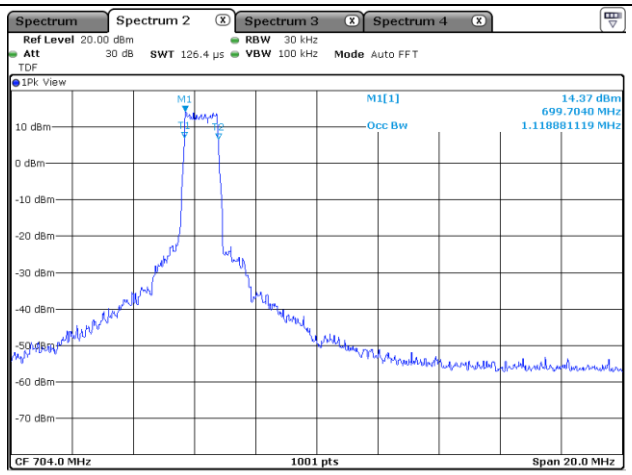


QPSK High Channel (99 % Occupied Bandwidth)

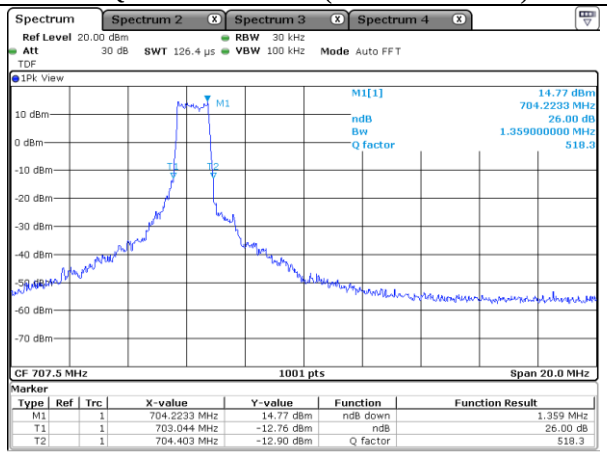
It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)



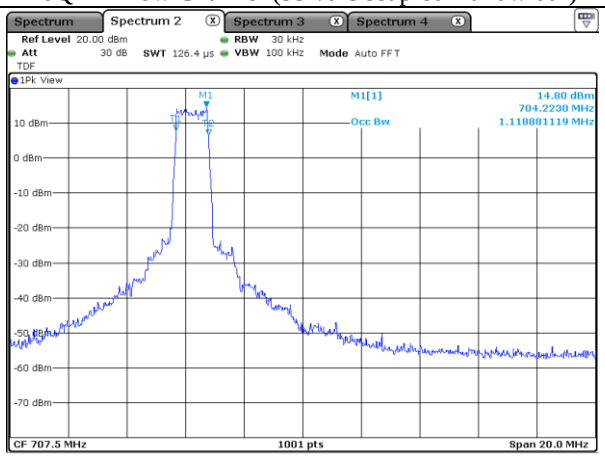
16QAM Low Channel (26 dB Bandwidth)



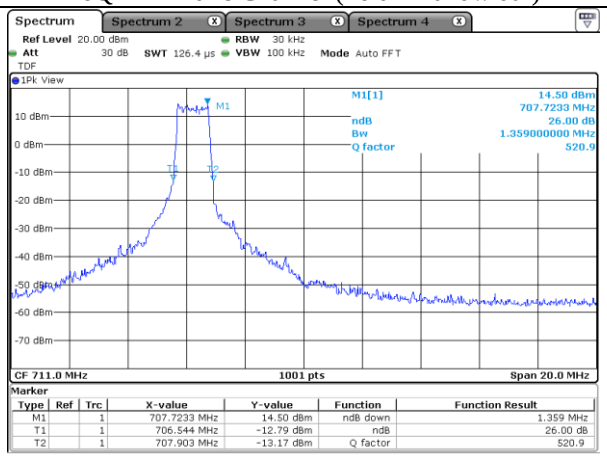
16QAM Low Channel (99 % Occupied Bandwidth)



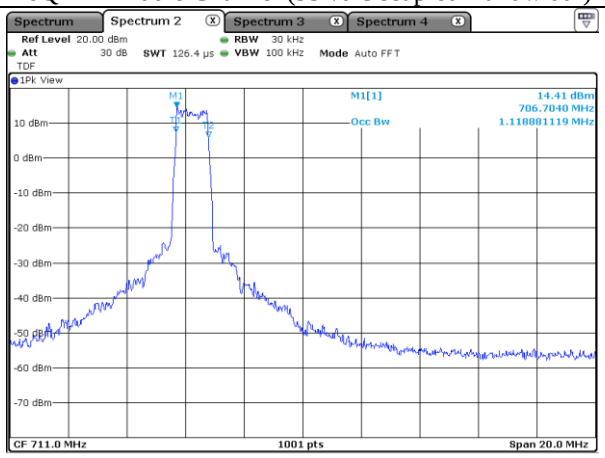
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



16QAM High Channel (99 % Occupied Bandwidth)

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