ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LICENSED TRANSMITTER

Test Report No.	**: OT-215-RWD-038**
Reception No.	**: 2104001581**
Applicant	**: LG Innotek Co., Ltd.**
Address	**: 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea**
Manufacturer	**: LG Innotek Co., Ltd.**
Address	**: 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea**
Type of Equipment	**: Telematics Modem**
FCC ID.	**: YZP-BK1110**
Model Name	**: LTD-BK1110**
Serial number	**: N/A**
Total page of Report	**: 104 pages (including this page)**
Date of Incoming	**: April 20, 2021**
Date of issue	**: May 18, 2021**

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.

Tested by	Reviewed by	Approved by
Myeong-Hwa, Jang / Manager	Tae-Ho, Kim / Senior Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-215-RWD-038	May 18, 2021	Class II Permissive Change	All

1. VERIFICATION OF COMPLIANCE

Applicant	: LG Innotek Co., Ltd.
Address	: 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea
Contact Person	: Jeong Inchang / Senior Research Engineer
Telephone No.	: +82-62-950-0332
FCC ID	: YZP-BK1110
Model Name	: LTD-BK1110
Serial Number	: N/A
Date	: May 18, 2021

EQUIPMENT CLASS	PCB-PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	Telematics Modem
THIS REPORT CONCERNS	Class II Permissive Change
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.

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(m)(4)	Band Edge / Spurious and Harmonic Emissions at Antenna Termianl	Met the Limit / PASS
2.1046	Conducted Output Power	Met the Limit / PASS
KDB Publication 971168 D01	Peak-to-Average Ratio	Met the Limit / PASS
2.1055, 27.54	Frequency stability	Met the Limit / PASS
27.50(h)(2)	Equivalent Isotropic Radiated Power	Met the Limit / PASS
2.1053, 27.53(m)(4)	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)

-. CLASS II Permissive Change:

The EUT was granted on February 11, 2019 but only following modifications and/or changed items are implemented into the device.

Changed item	Change duplexer of LTE band 7 because of component end of life.

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

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

3. GENERAL INFORMATION

3.1 Product Description

The LG Innotek Co., Ltd., Model LTD-BK1110 (referred to as the EUT in this report) is a Telematics Modem. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Telematics Modem		
OPERATING FREQUENCY	WCDMA Band 2	TX	1 850 MHz ~ 1 910 MHz
		RX	1 930 MHz ~ 1 990 MHz
	WCDMA Band 5	TX	824 MHz ~ 849 MHz
		RX	869 MHz ~ 894 MHz
	LTE Band 2	TX	1 850 MHz ~ 1 910 MHz
		RX	1 930 MHz ~ 1 990 MHz
	LTE Band 4	TX	1 710 MHz ~ 1 755 MHz
		RX	2 110 MHz ~ 2 155 MHz
	LTE Band 5	TX	824 MHz ~ 849 MHz
		RX	869 MHz ~ 894 MHz
	LTE Band 7	TX	2 500 MHz ~ 2 570 MHz
		RX	2 620 MHz ~ 2 690 MHz
	LTE Band 12	TX	699 MHz ~ 716 MHz
		RX	729 MHz ~ 746 MHz
	LTE Band 17	TX	704 MHz ~ 716 MHz
		RX	734 MHz ~ 746 MHz
LTE Channel Bandwidth	LTE Band 2	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz	
	LTE Band 4	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz	
	LTE Band 5	1.4 MHz, 3 MHz, 5 MHz, 10 MHz	
	LTE Band 7	5 MHz, 10 MHz, 15 MHz, 20 MHz	
	LTE Band 12	1.4 MHz, 3 MHz, 5 MHz, 10 MHz	
	LTE Band 17	5 MHz, 10 MHz	
Modulation Type	QPSK, 16QAM		

Maximum Output Power	WCDMA Band 2	23.95 dBm
	WCDMA Band 5	24.23 dBm
	LTE Band 2	23.62 dBm
	LTE Band 4	24.19 dBm
	LTE Band 5	24.22 dBm
	LTE Band 7	23.29 dBm
	LTE Band 12	23.54 dBm
	LTE Band 17	23.44 dBm
Rated Power	WCDMA Band 2	24 dBm
	WCDMA Band 5	24 dBm
	LTE Band 2	23 dBm
	LTE Band 4	23 dBm
	LTE Band 5	23 dBm
	LTE Band 7	23 dBm
	LTE Band 12	23 dBm
	LTE Band 17	23 dBm
Antenna Type	Dipole Antenna	
Antenna Gain	WCDMA Band 2	2.0 dBi
	WCDMA Band 5	4.5 dBi
	LTE Band 2	2.0 dBi
	LTE Band 4	2.0 dBi
	LTE Band 5	4.5 dBi
	LTE Band 7	2.0 dBi
	LTE Band 12	4.5 dBi
	LTE Band 17	4.5 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	19.2 MHz	

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

-. None

4. EUT MODIFICATIONS

-. None

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
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
LTD-BK1110	LG Innotek Co., Ltd.	Telematics Modem	-
GP-4303D	LG Precision Co.,Ltd	DC Power Supply	EUT

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 7	Y-plane	Y-axis

Test Mode : LTE Band 7

Test Item	Channel Bandwdith	Modulation	Mode	Test Channel
Conducted Output Power	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset	2 502.5 MHz 2 535.0 MHz 2 567.5 MHz
			1 RB / 12 RB Offset	
			1 RB / 24 RB Offset	
			12 RB / 0 RB Offset	
			12 RB / 7 RB Offset	
			12 RB / 13 RB Offset	
			25 RB / 0 RB Offset	
	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset	2 505.0 MHz 2 535.0 MHz 2 565.0 MHz
			1 RB / 25 RB Offset	
			1 RB / 49 RB Offset	
			25 RB / 0 RB Offset	
			25 RB / 12 RB Offset	
			25 RB / 25 RB Offset	
			50 RB / 0 RB Offset	

Conducted Output Power	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset	2 507.5 MHz 2 535.0 MHz 2 562.5 MHz
			1 RB / 36 RB Offset	
			1 RB / 74 RB Offset	
			36 RB / 0 RB Offset	
			36 RB / 18 RB Offset	
			36 RB / 37 RB Offset	
			75 RB / 0 RB Offset	
	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset	2 510.0 MHz 2 535.0 MHz 2 560.0 MHz
			1 RB / 49 RB Offset	
			1 RB / 99 RB Offset	
			50 RB / 0 RB Offset	
			50 RB / 24 RB Offset	
			50 RB / 50 RB Offset	
			100 RB / 0 RB Offset	
Effective Radiated Power	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset	2 502.5 MHz
			1 RB / 24 RB Offset	2 535.0 MHz
			1 RB / 12 RB Offset	2 567.5 MHz
	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset	2 505.0 MHz
			1 RB / 49 RB Offset	2 535.0 MHz
			1 RB / 25 RB Offset	2 565.0 MHz
	15 MHz	QPSK, 16QAM	1 RB / 74 RB Offset	2 507.5 MHz
			1 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 0 RB Offset	2 562.5 MHz
	20 MHz	QPSK, 16QAM	1 RB / 49 RB Offset	2 510.0 MHz
			1 RB / 49 RB Offset	2 535.0 MHz
			1 RB / 49 RB Offset	2 560.0 MHz

Frequency stability	5 MHz	QPSK	25 RB / 0 RB Offset	2 535.0 MHz
Occupied Bandwidth	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset	2 502.5 MHz
				2 535.0 MHz
				2 567.5 MHz
	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset	2 505.0 MHz
				2 535.0 MHz
				2 565.0 MHz
	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset	2 507.5 MHz
				2 535.0 MHz
				2 562.5 MHz
	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset	2 510.0 MHz
				2 535.0 MHz
				2 560.0 MHz
Peak-to-Average Ratio	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset 25 RB / 0 RB Offset	2 502.5 MHz
			1 RB / 24 RB Offset 25 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 12 RB Offset 25 RB / 0 RB Offset	2 567.5 MHz
	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset 50 RB / 0 RB Offset	2 505.0 MHz
			1 RB / 49 RB Offset 50 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 25 RB Offset 50 RB / 0 RB Offset	2 565.0 MHz
	15 MHz	QPSK, 16QAM	1 RB / 74 RB Offset 75 RB / 0 RB Offset	2 507.5 MHz
			1 RB / 0 RB Offset 75 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 0 RB Offset 75 RB / 0 RB Offset	2 562.5 MHz
	20 MHz	QPSK, 16QAM	1 RB / 49 RB Offset 100 RB / 0 RB Offset	2 510.0 MHz
			1 RB / 49 RB Offset 100 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 49 RB Offset 100 RB / 0 RB Offset	2 560.0 MHz

Band Edge	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset	2 502.5 MHz
			1 RB / 24 RB Offset 25 RB / 0 RB Offset	2 567.5 MHz
	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset	2 505.0 MHz
			1 RB / 49 RB Offset 50 RB / 0 RB Offset	2 565.0 MHz
	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 75 RB / 0 RB Offset	2 507.5 MHz
			1 RB / 74 RB Offset 75 RB / 0 RB Offset	2 562.5 MHz
	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 100 RB / 0 RB Offset	2 510.0 MHz
			1 RB / 99 RB Offset 100 RB / 0 RB Offset	2 560.0 MHz
Spurious and Harmonic Emissions at Antenna Termianl & Radiated Spurious and Harmonic Emissions	5 MHz	QPSK (Note 1)	1 RB / 12 RB Offset	2 502.5 MHz
			1 RB / 24 RB Offset	2 535.0 MHz
			1 RB / 12 RB Offset	2 567.5 MHz
	10 MHz	QPSK (Note 1)	1 RB / 49 RB Offset	2 505.0 MHz
			1 RB / 49 RB Offset	2 535.0 MHz
			1 RB / 25 RB Offset	2 565.0 MHz
	15 MHz	QPSK (Note 1)	1 RB / 74 RB Offset	2 507.5 MHz
			1 RB / 0 RB Offset	2 535.0 MHz
			1 RB / 0 RB Offset	2 562.5 MHz
	20 MHz	QPSK (Note 1)	1 RB / 49 RB Offset	2 510.0 MHz
			1 RB / 49 RB Offset	2 535.0 MHz
			1 RB / 49 RB Offset	2 560.0 MHz

Note 1 : Of all modulation, We have tested modulation of the high Conducted Output Power.

5.4 Frequency List of Low/Middle/High Channels

LTE Band 7 Channel and Frequency List				
Bandwidth	Channel / Frequency	Low	Middle	High
5 MHz	Channel	20775	21100	21425
	Frequency	2 502.5 MHz	2 535.0 MHz	2 567.5 MHz
10 MHz	Channel	20800	21100	21400
	Frequency	2 505.0 MHz	2 535.0 MHz	2 565.0 MHz
15 MHz	Channel	20825	21100	21375
	Frequency	2 507.5 MHz	2 535.0 MHz	2 562.5 MHz
20 MHz	Channel	20850	21100	21350
	Frequency	2 510.0 MHz	2 535.0 MHz	2 560.0 MHz

5.5 Configuration of Test System

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.26: 2015 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.

6. PRELIMINARY TEST

6.1General 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

7. CONDUCTED OUTPUT POWER

7.1 Operating environment

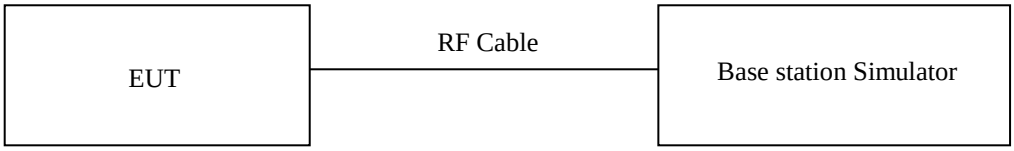
Temperature : 23 °C

Relative humidity : 47 % R.H.

7.2 Test set-up

Conducted Output Power is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v04, 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

April 20, 2021 ~ April 30, 2021

7.4 Test data for Band 7_Bandwidth 5 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	QPSK			16QAM		
		LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
		2 502.5 MHz	2 535.0 MHz	2 567.5 MHz	2 502.5 MHz	2 535.0 MHz	2 567.5 MHz
1	0	22.57	22.54	22.87	21.21	21.25	21.84
1	12	22.60	22.69	22.95	21.50	21.65	21.65
1	24	22.49	22.74	22.91	21.42	21.34	21.64
12	0	21.33	21.67	21.86	20.16	20.77	21.04
12	7	21.37	21.71	21.83	20.51	20.68	21.02
12	13	21.33	21.69	21.83	20.30	20.68	20.82
25	0	21.37	21.63	21.90	20.52	20.82	20.95

7.5 Test data for Band 7_Bandwidth 10 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	QPSK			16QAM		
		LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
		2 505.0 MHz	2 535.0 MHz	2 565.0 MHz	2 505.0 MHz	2 535.0 MHz	2 565.0 MHz
1	0	22.42	22.76	23.23	21.77	21.73	22.25
1	25	22.70	22.66	23.25	21.70	21.89	22.07
1	49	22.75	22.84	22.83	21.71	21.69	22.03
25	0	21.40	21.84	22.01	20.61	20.89	21.22
25	12	21.49	21.82	22.03	20.68	20.96	21.16
25	25	21.50	21.85	22.01	20.80	20.93	21.04
50	0	21.48	21.77	22.02	20.77	20.80	20.96

7.6 Test data for Band 7_Bandwidth 15 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	QPSK			16QAM		
		LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
		2 507.5 MHz	2 535.0 MHz	2 562.5 MHz	2 507.5 MHz	2 535.0 MHz	2 562.5 MHz
1	0	22.31	22.82	23.29	21.64	21.70	22.27
1	36	22.64	22.69	22.96	21.79	21.99	22.10
1	74	22.79	22.78	22.77	22.07	21.76	22.15
36	0	21.32	21.75	22.34	20.44	20.75	21.51
36	18	21.65	21.75	22.02	20.54	20.79	21.27
36	37	21.79	21.86	22.04	20.59	20.78	21.00
75	0	21.65	21.84	22.13	20.74	20.88	21.29

7.7 Test data for Band 7_Bandwidth 20 MHz

-. Test Result : Pass

Conducted Average Output Power (dBm)

RB Size	RB Offset	QPSK			16QAM		
		LOW	MIDDLE	HIGH	LOW	MIDDLE	HIGH
		2 510.0 MHz	2 535.0 MHz	2 560.0 MHz	2 510.0 MHz	2 535.0 MHz	2 560.0 MHz
1	0	22.40	22.75	23.17	21.30	22.01	22.11
1	49	22.83	22.79	23.28	21.72	22.08	22.38
1	99	22.81	22.67	22.82	21.65	22.24	22.11
50	0	21.41	21.78	22.29	20.80	20.91	21.52
50	24	21.68	21.82	22.17	20.77	21.22	21.46
50	50	21.73	21.77	22.06	20.83	20.98	21.08
100	0	21.62	21.84	21.97	20.79	20.83	21.27

8. EQUIVALENT ISOTROPIC RADIATED POWER

8.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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.

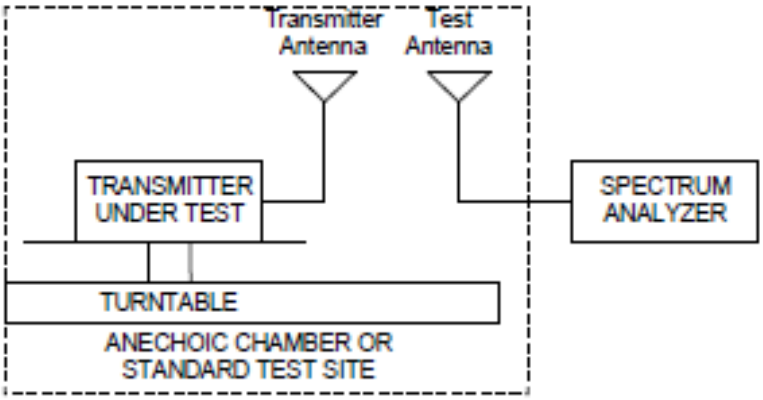
8.3 Limits

Rule Part 27.50(h) (2) specifies that “Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.”

Limit	2 W (33 dBm)

8.4 Test set-up

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



8.5 Test Date

April 20, 2021 ~ April 30, 2021

8.6 Test data for Band 7_Bandwidth 5 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	EIRP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK							
2 502.5	13.09	H	1.20	10.60	22.49	33.00	10.51
2 502.5	13.67	V	1.20	10.60	23.07	33.00	9.93
2 535.0	14.79	H	1.20	10.60	24.19	33.00	8.81
2 535.0	15.17	V	1.20	10.60	24.57	33.00	8.43
2 567.5	13.17	H	1.20	11.10	23.07	33.00	9.93
2 567.5	14.37	V	1.20	11.10	24.27	33.00	8.73
Test Data for 16QAM							
2 502.5	11.78	H	1.20	10.60	21.18	33.00	11.82
2 502.5	13.04	V	1.20	10.60	22.44	33.00	10.56
2 535.0	14.41	H	1.20	10.60	23.81	33.00	9.19
2 535.0	14.25	V	1.20	10.60	23.65	33.00	9.35
2 567.5	12.43	H	1.20	11.10	22.33	33.00	10.67
2 567.5	13.49	V	1.20	11.10	23.39	33.00	9.61

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

8.7 Test data for Band 7_Bandwidth 10 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	EIRP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK							
2 505.0	12.45	H	1.20	10.60	21.85	33.00	11.15
2 505.0	14.05	V	1.20	10.60	23.45	33.00	9.55
2 535.0	12.42	H	1.20	10.60	21.82	33.00	11.18
2 535.0	13.11	V	1.20	10.60	22.51	33.00	10.49
2 565.0	10.56	H	1.20	11.10	20.46	33.00	12.54
2 565.0	11.19	V	1.20	11.10	21.09	33.00	11.91
Test Data for 16QAM							
2 505.0	11.63	H	1.20	10.60	21.03	33.00	11.97
2 505.0	13.08	V	1.20	10.60	22.48	33.00	10.52
2 535.0	11.28	H	1.20	10.60	20.68	33.00	12.32
2 535.0	12.21	V	1.20	10.60	21.61	33.00	11.39
2 565.0	9.86	H	1.20	11.10	19.76	33.00	13.24
2 565.0	9.55	V	1.20	11.10	19.45	33.00	13.55

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

8.8 Test data for Band 7_Bandwidth 15 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	EIRP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK							
2 507.5	12.45	H	1.20	10.60	21.85	33.00	11.15
2 507.5	14.05	V	1.20	10.60	23.45	33.00	9.55
2 535.0	12.42	H	1.20	10.60	21.82	33.00	11.18
2 535.0	13.11	V	1.20	10.60	22.51	33.00	10.49
2 562.5	10.56	H	1.20	11.10	20.46	33.00	12.54
2 562.5	11.19	V	1.20	11.10	21.09	33.00	11.91
Test Data for 16QAM							
2 507.5	11.63	H	1.20	10.60	21.03	33.00	11.97
2 507.5	13.08	V	1.20	10.60	22.48	33.00	10.52
2 535.0	11.28	H	1.20	10.60	20.68	33.00	12.32
2 535.0	12.21	V	1.20	10.60	21.61	33.00	11.39
2 562.5	9.86	H	1.20	11.10	19.76	33.00	13.24
2 562.5	9.55	V	1.20	11.10	19.45	33.00	13.55

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

8.9 Test data for Band 7_Bandwidth 20 MHz

-. Test Result : Pass

Frequency (MHz)	Substituted Level (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Ant Gain (dBi)	EIRP (dBm)	Limits (dBm)	Margin (dB)
Test Data for QPSK							
2 510.0	11.52	H	1.20	10.60	20.92	33.00	12.08
2 510.0	14.18	V	1.20	10.60	23.58	33.00	9.42
2 535.0	12.52	H	1.20	10.60	21.92	33.00	11.08
2 535.0	14.03	V	1.20	10.60	23.43	33.00	9.57
2 560.0	11.13	H	1.20	11.10	21.03	33.00	11.97
2 560.0	11.81	V	1.20	11.10	21.71	33.00	11.29
Test Data for 16QAM							
2 510.0	10.56	H	1.20	10.60	19.96	33.00	13.04
2 510.0	13.24	V	1.20	10.60	22.64	33.00	10.36
2 535.0	11.88	H	1.20	10.60	21.28	33.00	11.72
2 535.0	13.22	V	1.20	10.60	22.62	33.00	10.38
2 560.0	9.50	H	1.20	11.10	19.40	33.00	13.60
2 560.0	10.34	V	1.20	11.10	20.24	33.00	12.76

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

9. RADIATED SPURIOUS EMISSIONS

9.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % 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 -7 Rule Part 27.53(m)(4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 26 GHz. The high, low and a middle channel were tested for out of band measurements.

9.3 Test Date

April 20, 2021 ~ April 30, 2021

9.4 Test data for Band 7_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							
5 005.00	-73.35	H	1.60	12.30	-62.65	-25.00	37.65
7 507.50	-66.85	H	1.90	11.10	-57.65	-25.00	32.65
10 010.00	-64.09	H	2.30	11.00	-55.39	-25.00	30.39
12 512.50	-68.26	H	2.30	13.70	-56.86	-25.00	31.86
15 015.00	-68.76	V	2.80	13.20	-58.36	-25.00	33.36
Test Data for Middle Channel							
5 070.00	-72.61	H	1.60	12.30	-61.91	-25.00	36.91
7 605.00	-67.94	H	1.90	11.50	-58.34	-25.00	33.34
10 140.00	-63.36	V	2.30	11.00	-54.66	-25.00	29.66
12 675.00	-66.76	V	2.30	13.70	-55.36	-25.00	30.36
15 210.00	-70.98	V	2.80	14.60	-59.18	-25.00	34.18
Test Data for High Channel							
5 135.00	-72.66	H	1.60	12.60	-61.66	-25.00	36.66
7 702.50	-67.90	H	1.90	11.50	-58.30	-25.00	33.30
10 270.00	-62.11	H	2.30	10.90	-53.51	-25.00	28.51
12 837.50	-70.46	H	2.60	13.30	-59.76	-25.00	34.76
15 405.00	-69.74	V	2.80	15.70	-56.84	-25.00	31.84

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(m)(4) specifies that “For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log10 (P) dB on all frequencies more than X megaherz from the channel edge.”

Limit : 33.00 – [55+10log(2.00)] = -25 dBm

“H”: Horizontal, “V”: Vertical

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9.5 Test data for Band 7_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							
5 010.00	-74.37	V	1.60	12.60	-63.37	-25.00	38.37
7 515.00	-66.93	H	1.90	11.10	-57.73	-25.00	32.73
10 020.00	-64.49	H	2.30	11.00	-55.79	-25.00	30.79
12 525.00	-69.40	H	2.30	13.80	-57.90	-25.00	32.90
15 030.00	-68.90	V	2.80	13.40	-58.30	-25.00	33.30
Test Data for Middle Channel							
5 070.00	-73.65	H	1.60	12.30	-62.95	-25.00	37.95
7 605.00	-68.51	H	1.90	11.50	-58.91	-25.00	33.91
10 140.00	-64.51	V	2.30	11.00	-55.81	-25.00	30.81
12 675.00	-67.98	H	2.30	13.70	-56.58	-25.00	31.58
15 210.00	-71.36	V	2.80	14.60	-59.56	-25.00	34.56
Test Data for High Channel							
5 130.00	-72.81	H	1.60	12.60	-61.81	-25.00	36.81
7 695.00	-68.42	V	1.90	11.50	-58.82	-25.00	33.82
10 260.00	-63.71	H	2.30	10.90	-55.11	-25.00	30.11
12 825.00	-70.93	H	2.60	13.30	-60.23	-25.00	35.23
15 390.00	-71.42	V	2.80	15.70	-58.52	-25.00	33.52

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(m)(4) specifies that “For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log10 (P) dB on all frequencies more than X megaherz from the channel edge.”

Limit : 33.00 – [55+10log(2.00)] = -25 dBm

“H”: Horizontal, “V”: Vertical

9.6 Test data for Band 7_Bandwidth 15 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							
5 015.00	-74.23	V	1.60	12.60	-63.23	-25.00	38.23
7 522.50	-67.20	H	1.90	11.10	-58.00	-25.00	33.00
10 030.00	-63.32	H	2.30	11.00	-54.62	-25.00	29.62
12 537.50	-69.00	H	2.30	13.80	-57.50	-25.00	32.50
15 045.00	-69.56	V	2.80	13.40	-58.96	-25.00	33.96
Test Data for Middle Channel							
5 070.00	-73.44	H	1.60	12.30	-62.74	-25.00	37.74
7 605.00	-68.58	H	1.90	11.50	-58.98	-25.00	33.98
10 140.00	-64.35	V	2.30	11.00	-55.65	-25.00	30.65
12 675.00	-67.87	V	2.30	13.70	-56.47	-25.00	31.47
15 210.00	-71.24	V	2.80	14.60	-59.44	-25.00	34.44
Test Data for High Channel							
5 125.00	-72.89	H	1.60	12.60	-61.89	-25.00	36.89
7 687.50	-68.29	H	1.90	11.50	-58.69	-25.00	33.69
10 250.00	-62.94	V	2.30	10.90	-54.34	-25.00	29.34
12 812.50	-70.56	H	2.60	13.30	-59.86	-25.00	34.86
15 375.00	-70.11	V	2.80	15.70	-57.21	-25.00	32.21

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(m)(4) specifies that “For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log10 (P) dB on all frequencies more than X megaherz from the channel edge.”

Limit : 33.00 – [55+10log(2.00)] = -25 dBm

“H”: Horizontal, “V”: Vertical

9.7 Test data for Band 7_Bandwidth 20 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							
5 020.00	-74.00	H	1.60	12.60	-63.00	-25.00	38.00
7 530.00	-67.12	H	1.90	11.10	-57.92	-25.00	32.92
10 040.00	-64.26	V	2.30	11.00	-55.56	-25.00	30.56
12 550.00	-69.18	H	2.30	13.80	-57.68	-25.00	32.68
15 060.00	-69.28	V	2.80	13.40	-58.68	-25.00	33.68
Test Data for Middle Channel							
5 070.00	-73.28	H	1.60	12.30	-62.58	-25.00	37.58
7 605.00	-68.42	H	1.90	11.50	-58.82	-25.00	33.82
10 140.00	-64.10	V	2.30	11.00	-55.40	-25.00	30.40
12 675.00	-67.43	V	2.30	13.70	-56.03	-25.00	31.03
15 210.00	-71.08	V	2.80	14.60	-59.28	-25.00	34.28
Test Data for High Channel							
5 120.00	-73.71	V	1.60	12.60	-62.71	-25.00	37.71
7 680.00	-68.33	V	1.90	11.50	-58.73	-25.00	33.73
10 240.00	-63.15	V	2.30	10.90	-54.55	-25.00	29.55
12 800.00	-70.73	H	2.60	13.30	-60.03	-25.00	35.03
15 360.00	-70.21	V	2.80	15.70	-57.31	-25.00	32.31

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(m)(4) specifies that “For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log10 (P) dB on all frequencies more than X megaherz from the channel edge.”

Limit : 33.00 – [55+10log(2.00)] = -25 dBm

“H”: Horizontal, “V”: Vertical

10. PEAK-TO-AVERAGE RATIO

10.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % R.H.

10.2 Test set-up

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v04, 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.

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

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

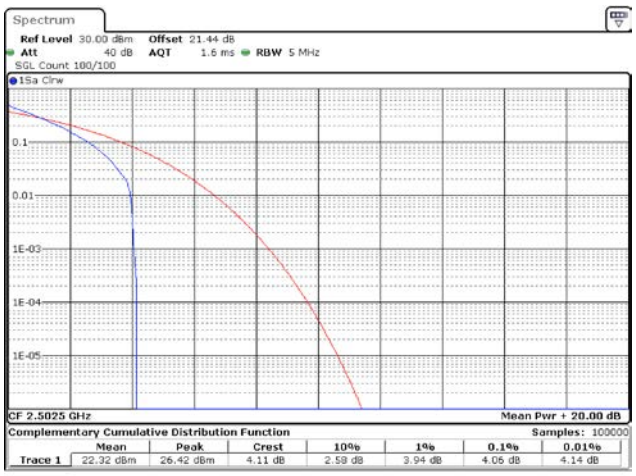
April 20, 2021 ~ April 30, 2021

10.4 Test data for Band 7_Bandwidth 5 MHz

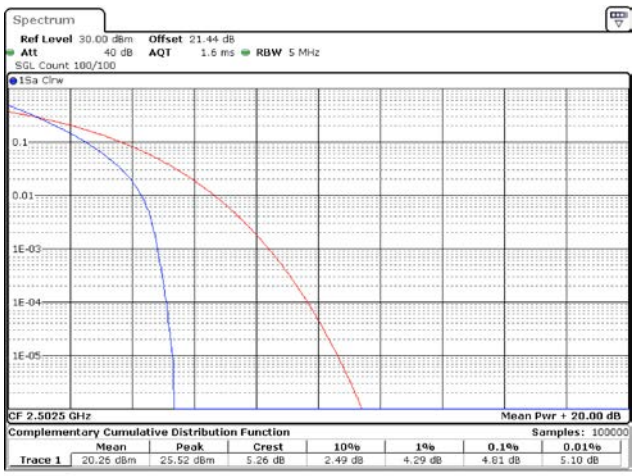
-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 7 QPSK				
1 RB	20775	4.06	13.00	Pass
	21100	4.00	13.00	Pass
	21425	3.01	13.00	Pass
Full RB	20775	4.81	13.00	Pass
	21100	4.64	13.00	Pass
	21425	4.12	13.00	Pass
LTE Band 7 16QAM				
1 RB	20775	5.25	13.00	Pass
	21100	5.36	13.00	Pass
	21425	4.43	13.00	Pass
Full RB	20775	5.74	13.00	Pass
	21100	5.68	13.00	Pass
	21425	5.10	13.00	Pass

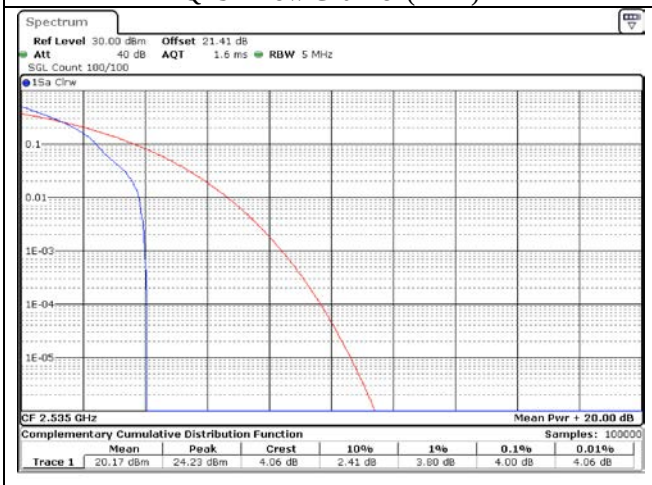
Remark: Measured the using CCDFof spectrum analyzer.



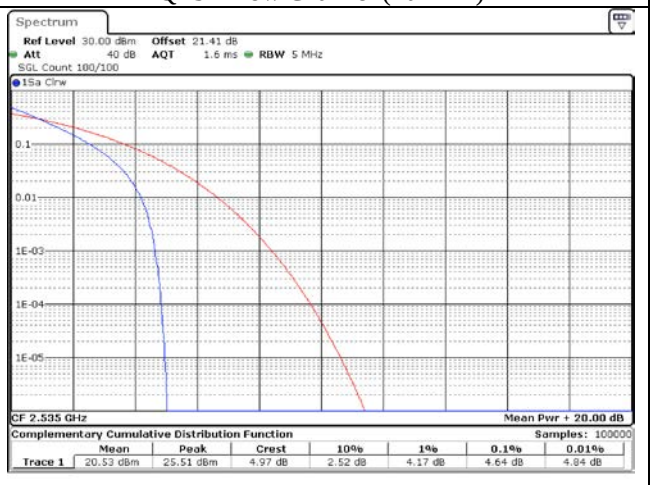
QPSK Low Channel (1 RB)



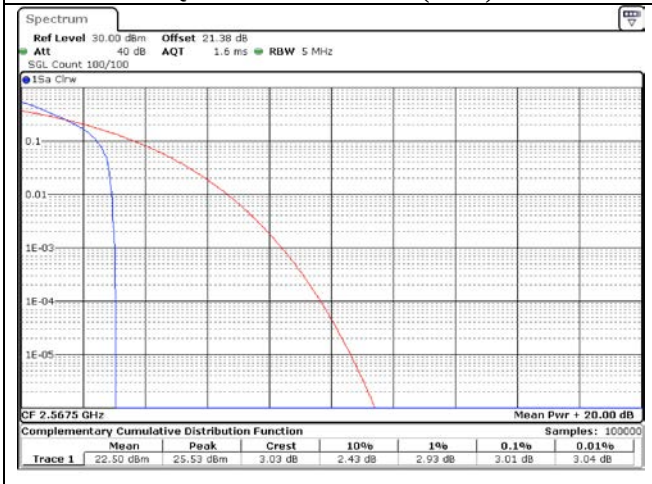
QPSK Low Channel (Full RB)



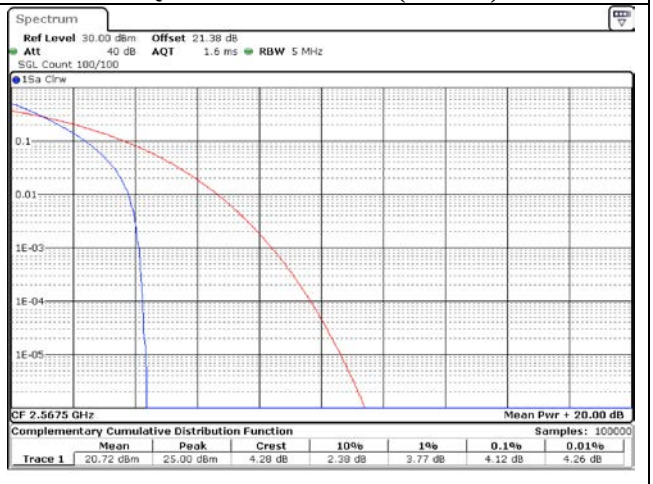
QPSK Middle Channel (1 RB)



QPSK Middle Channel (Full RB)



QPSK High Channel (1 RB)



QPSK High Channel (Full RB)

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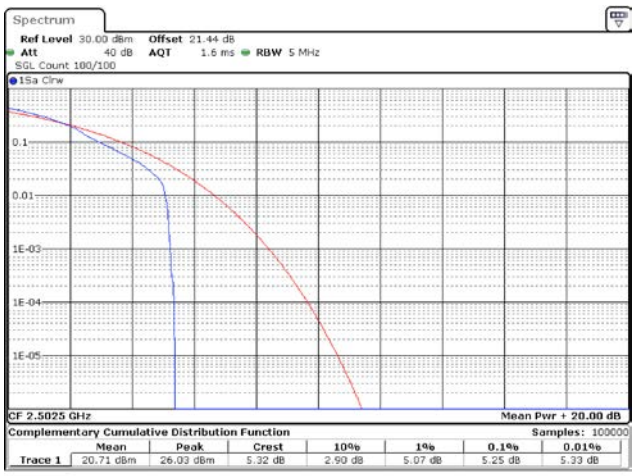
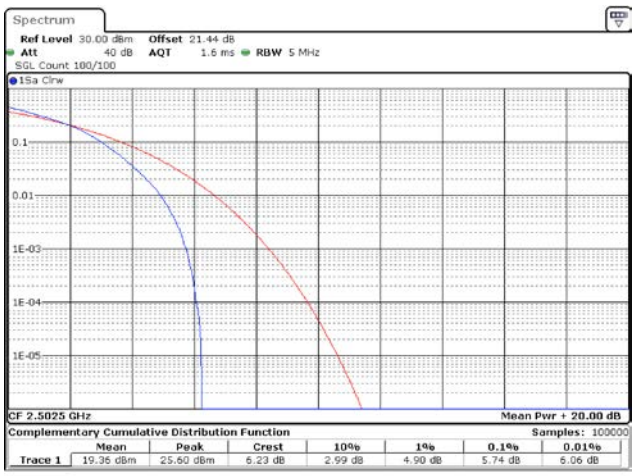
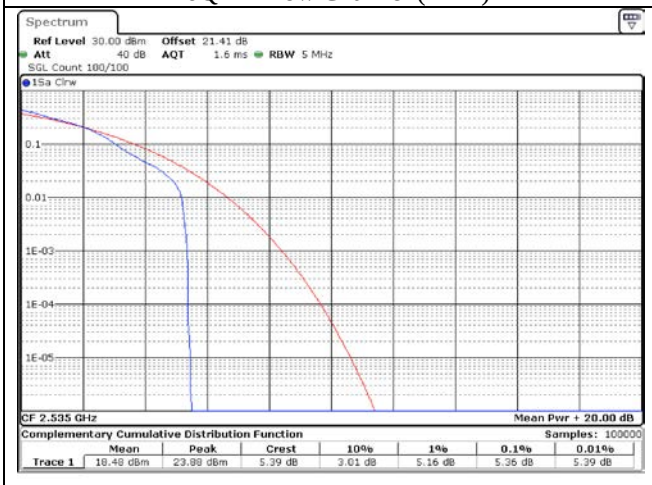


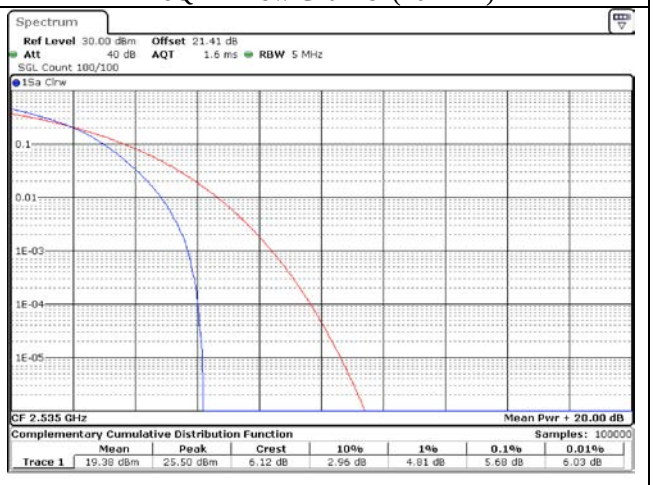
16QAM Low Channel (1 RB)



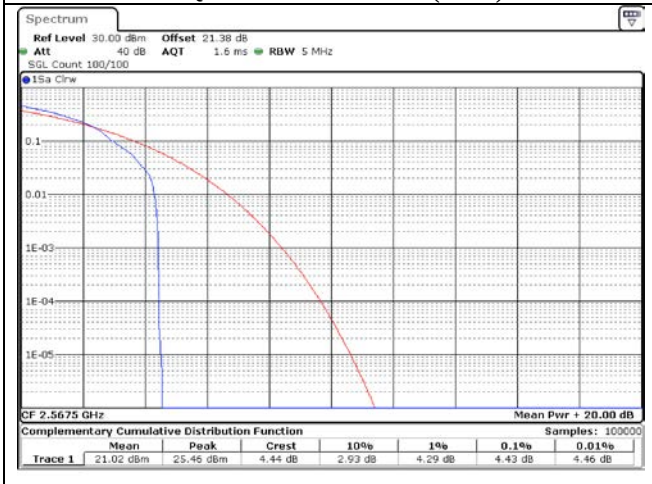
16QAM Low Channel (Full RB)



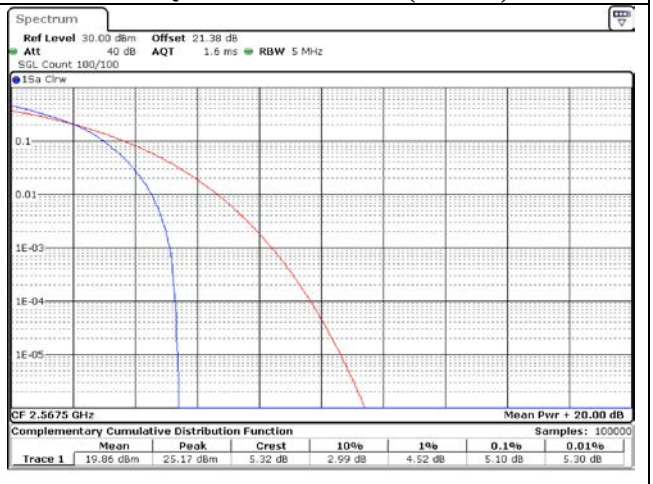
16QAM Middle Channel (1 RB)



16QAM Middle Channel (Full RB)



16QAM High Channel (1 RB)



16QAM High Channel (Full RB)

10.5 Test data for Band 7_Bandwidth 10 MHz

-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 7 QPSK				
1 RB	20800	4.32	13.00	Pass
	21100	4.06	13.00	Pass
	21400	3.07	13.00	Pass
Full RB	20800	4.84	13.00	Pass
	21100	4.75	13.00	Pass
	21400	4.35	13.00	Pass
LTE Band 7 16QAM				
1 RB	20800	5.10	13.00	Pass
	21100	5.04	13.00	Pass
	21400	4.29	13.00	Pass
Full RB	20800	5.80	13.00	Pass
	21100	5.71	13.00	Pass
	21400	5.25	13.00	Pass

Remark: Measured the using CCDFof spectrum analyzer.

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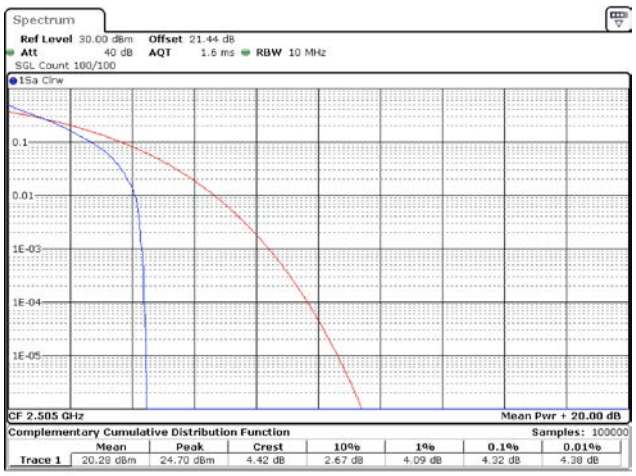
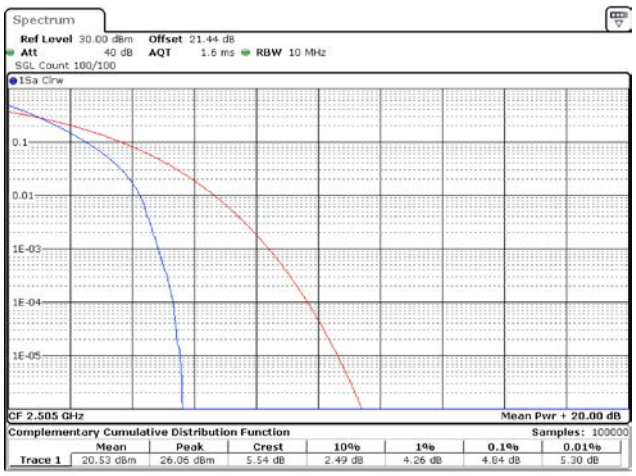
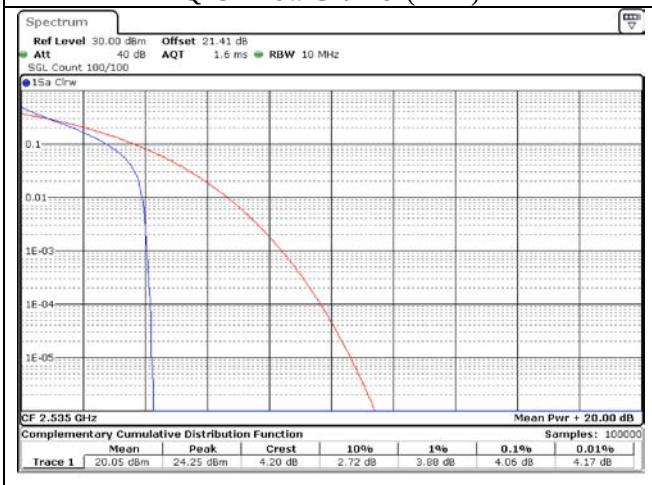


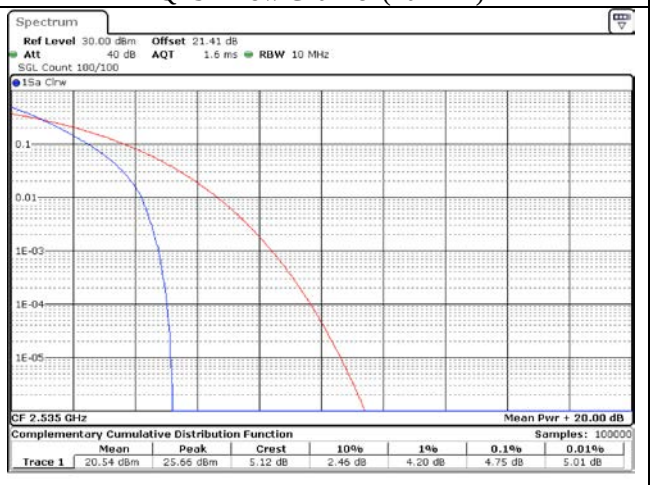
QPSK Low Channel (1 RB)



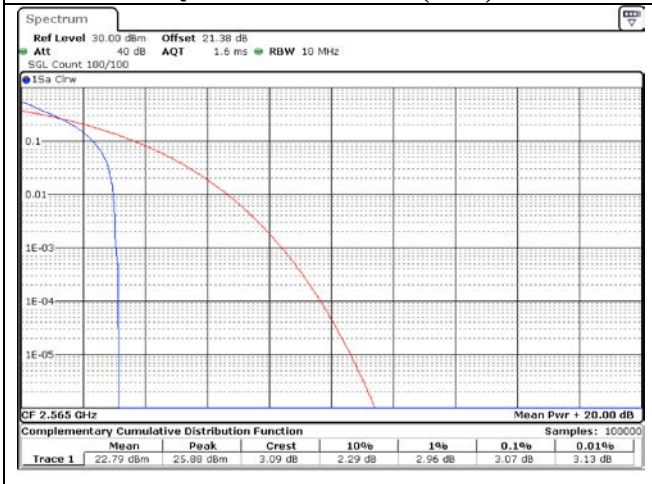
QPSK Low Channel (Full RB)



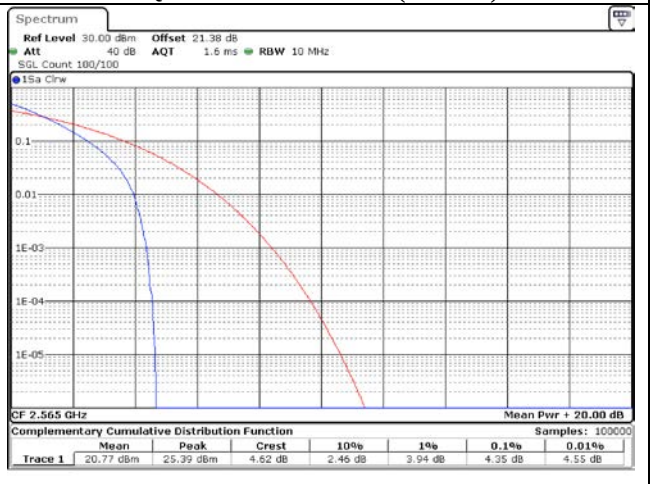
QPSK Middle Channel (1 RB)



QPSK Middle Channel (Full RB)



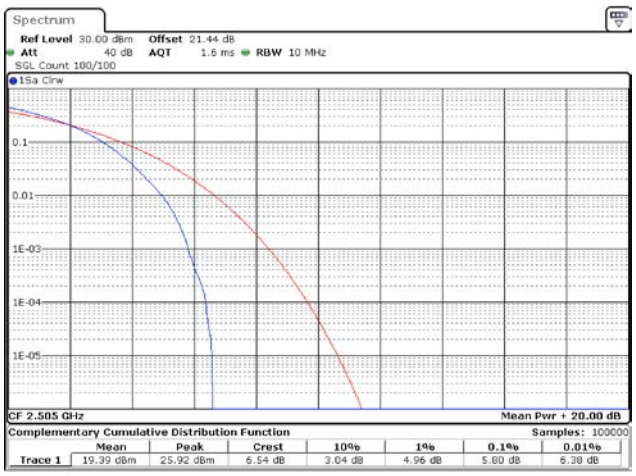
QPSK High Channel (1 RB)



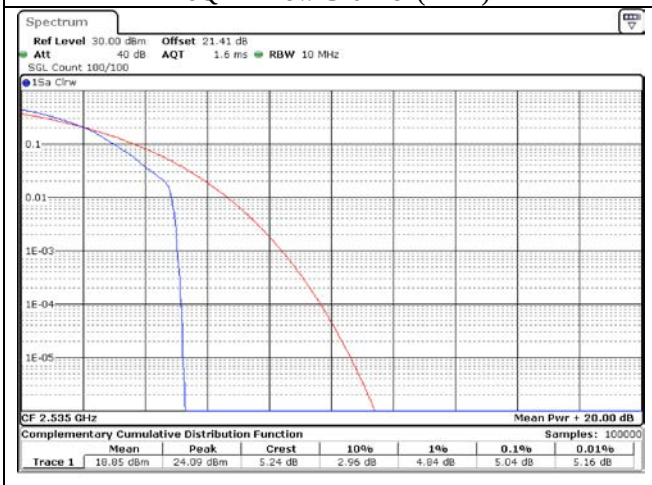
QPSK High Channel (Full RB)

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

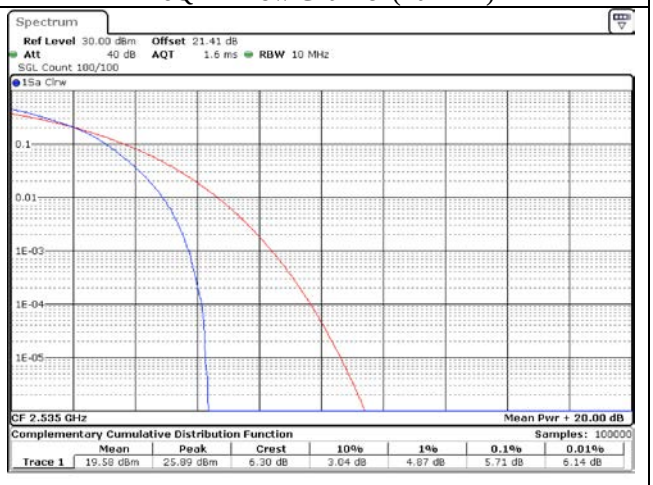
16QAM Low Channel (1 RB)



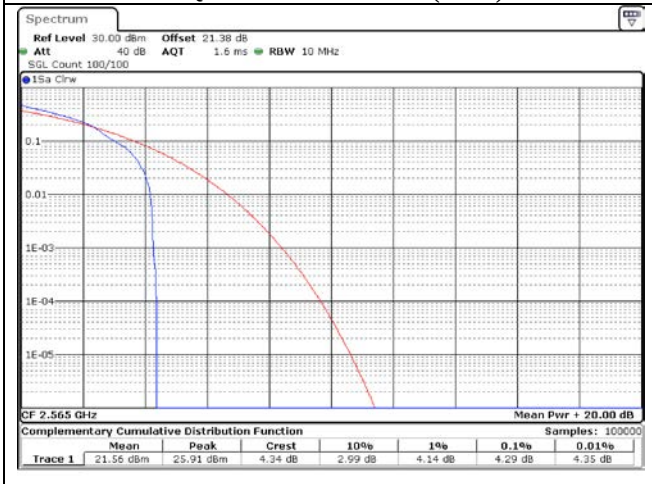
16QAM Low Channel (Full RB)



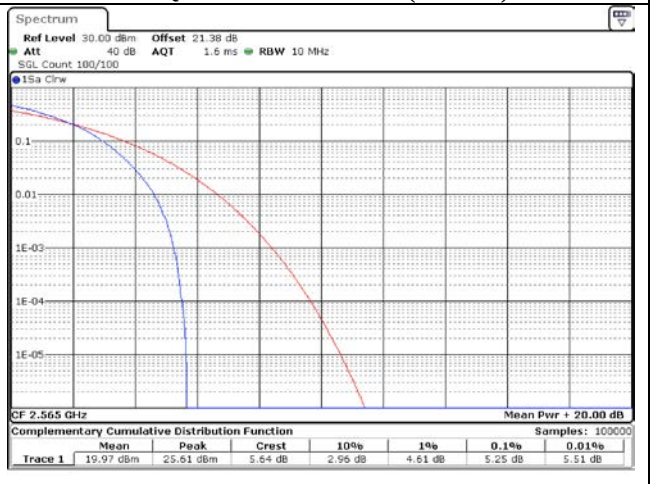
16QAM Middle Channel (1 RB)



16QAM Middle Channel (Full RB)



16QAM High Channel (1 RB)



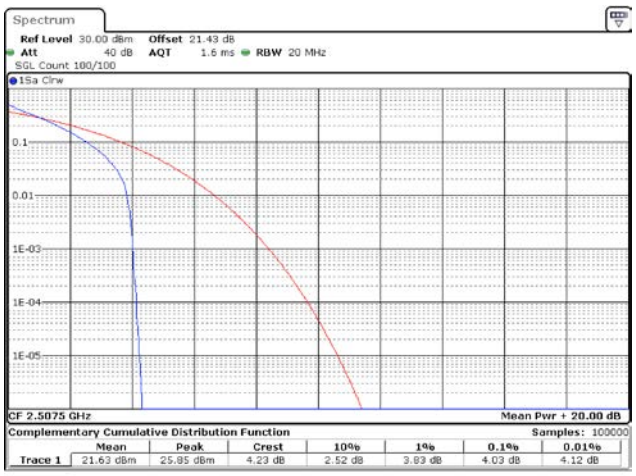
16QAM High Channel (Full RB)

10.6 Test data for Band 7_Bandwidth 15 MHz

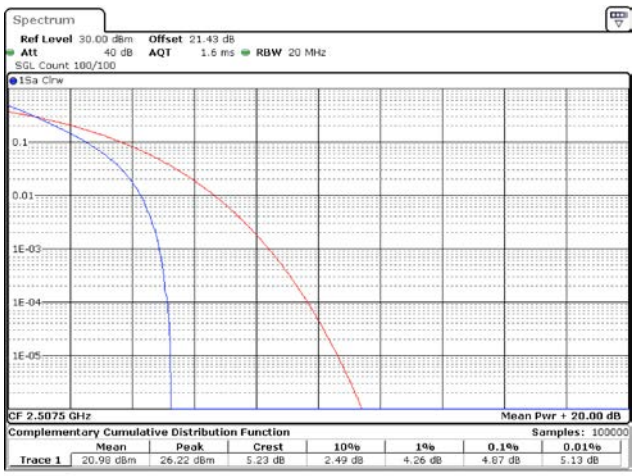
-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 7 QPSK				
1 RB	20825	4.03	13.00	Pass
	21100	4.17	13.00	Pass
	21375	3.71	13.00	Pass
Full RB	20825	4.87	13.00	Pass
	21100	4.78	13.00	Pass
	21375	4.35	13.00	Pass
LTE Band 7 16QAM				
1 RB	20825	4.87	13.00	Pass
	21100	5.01	13.00	Pass
	21375	4.46	13.00	Pass
Full RB	20825	5.80	13.00	Pass
	21100	5.65	13.00	Pass
	21375	5.36	13.00	Pass

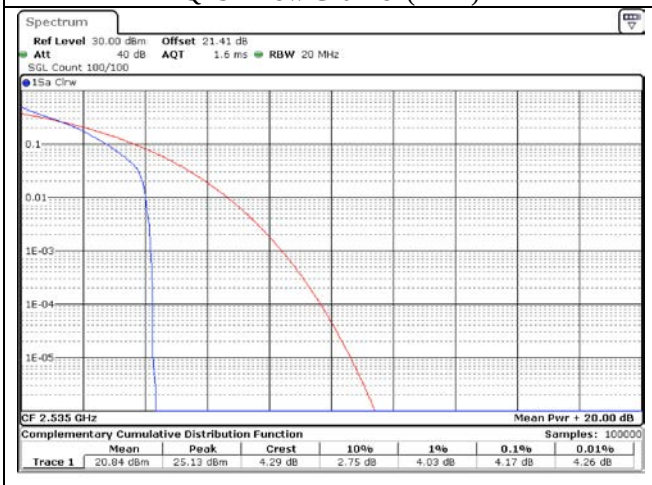
Remark: Measured the using CCDFof spectrum analyzer.



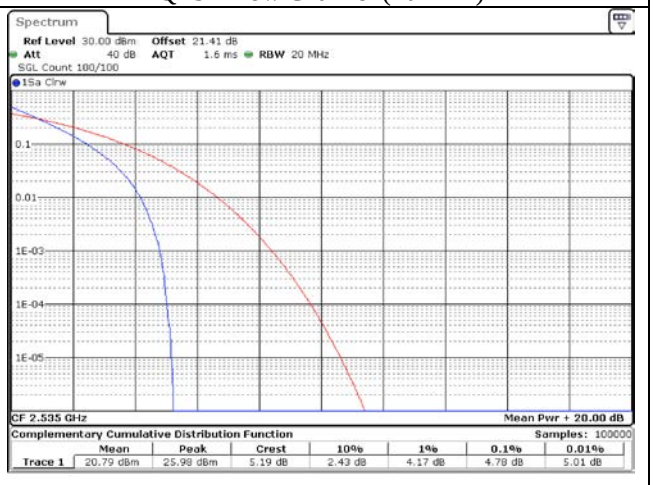
QPSK Low Channel (1 RB)



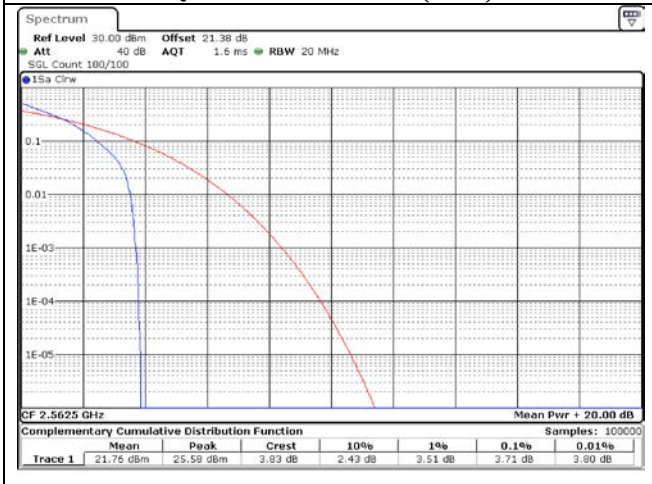
QPSK Low Channel (Full RB)



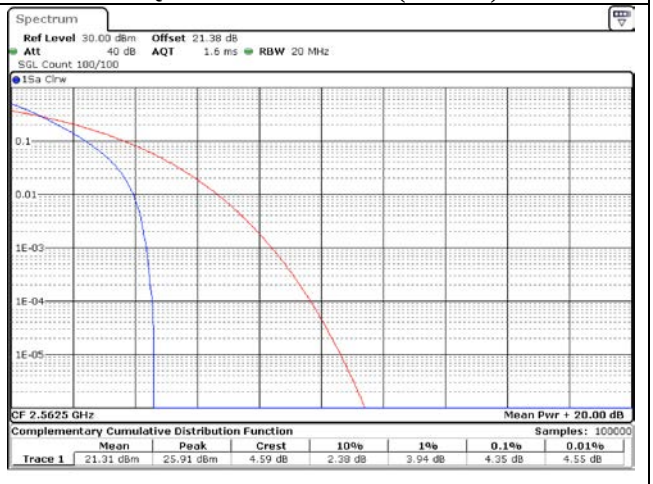
QPSK Middle Channel (1 RB)



QPSK Middle Channel (Full RB)

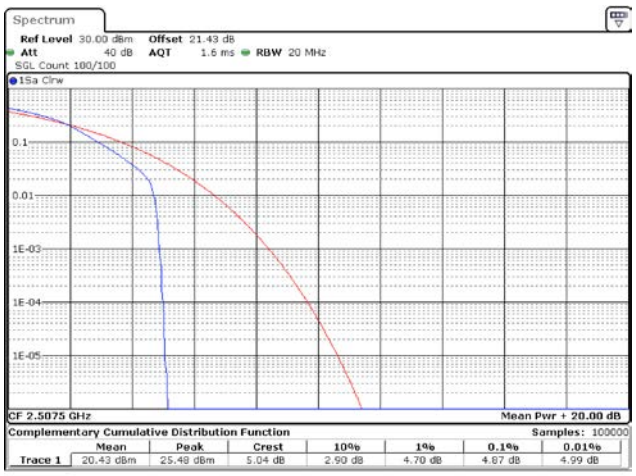


QPSK High Channel (1 RB)

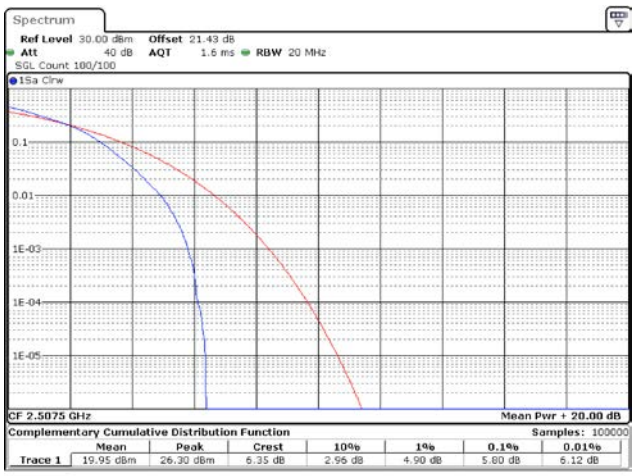


QPSK High Channel (Full RB)

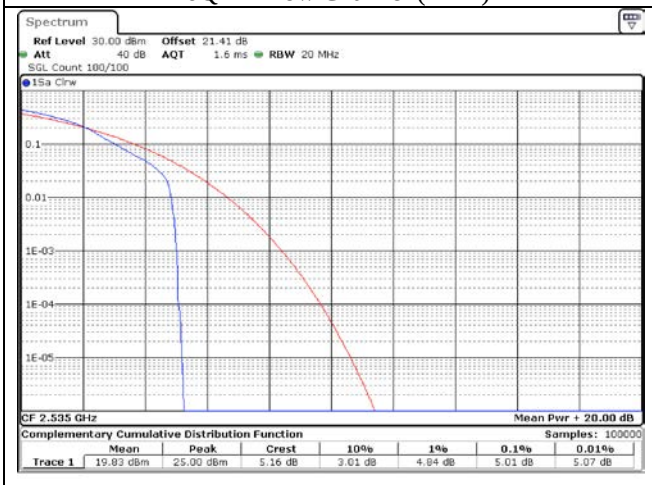
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



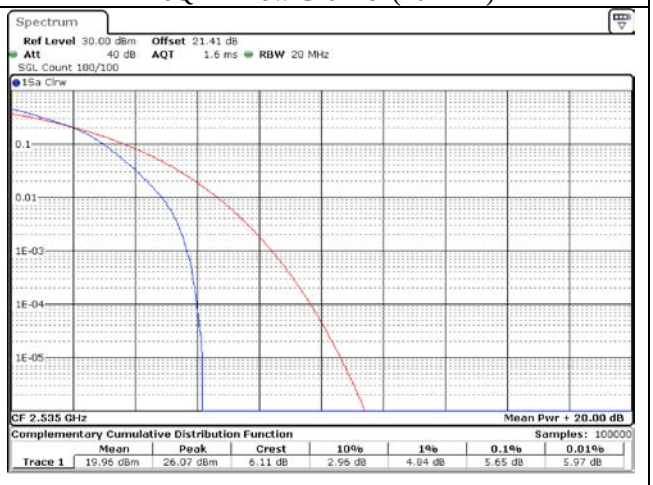
16QAM Low Channel (1 RB)



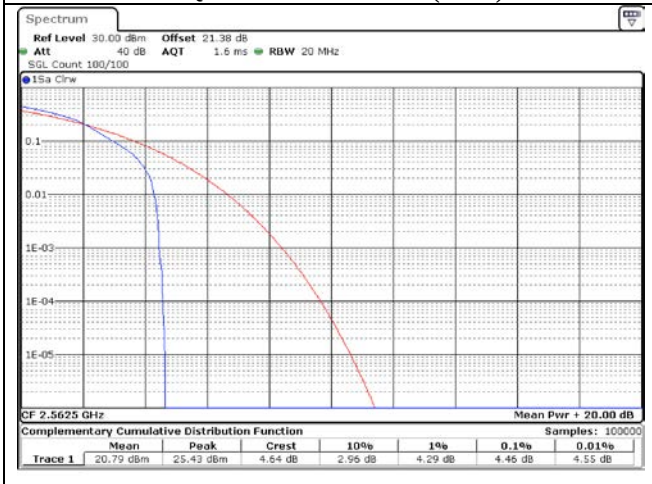
16QAM Low Channel (Full RB)



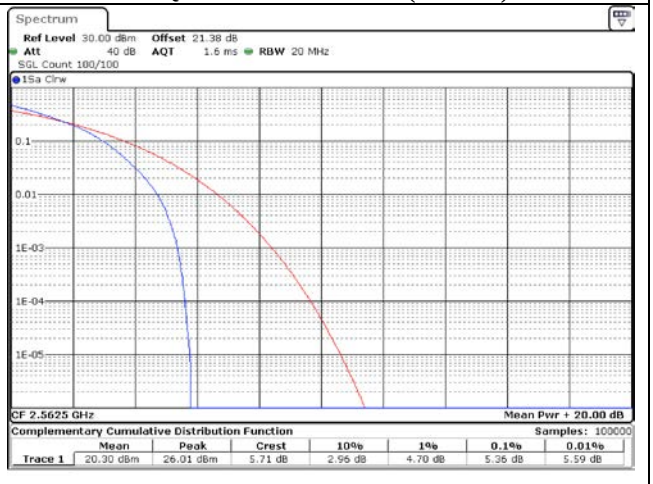
16QAM Middle Channel (1 RB)



16QAM Middle Channel (Full RB)



16QAM High Channel (1 RB)



16QAM High Channel (Full RB)

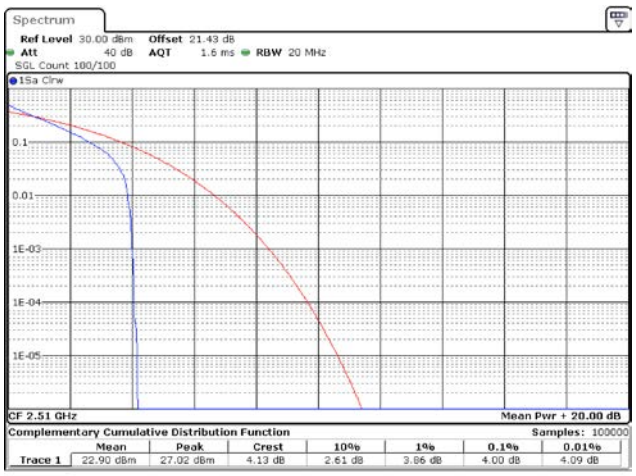
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

10.7 Test data for Band 7_Bandwidth 20 MHz

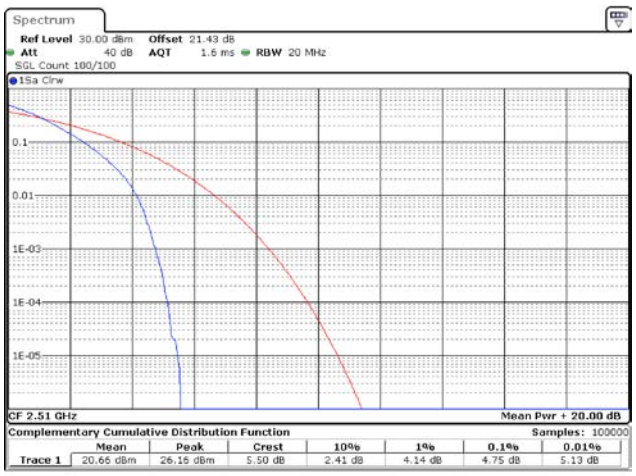
-. Test Result : Pass

Test Mode	Channel	Peak-Average Ratio(PAR) CCDF 0.1 %	Limit (dB)	Result
LTE Band 7 QPSK				
1 RB	20850	4.00	13.00	Pass
	21100	3.74	13.00	Pass
	21350	3.39	13.00	Pass
Full RB	20850	4.75	13.00	Pass
	21100	4.61	13.00	Pass
	21350	4.41	13.00	Pass
LTE Band 7 16QAM				
1 RB	20850	4.72	13.00	Pass
	21100	5.13	13.00	Pass
	21350	4.70	13.00	Pass
Full RB	20850	5.74	13.00	Pass
	21100	5.65	13.00	Pass
	21350	5.45	13.00	Pass

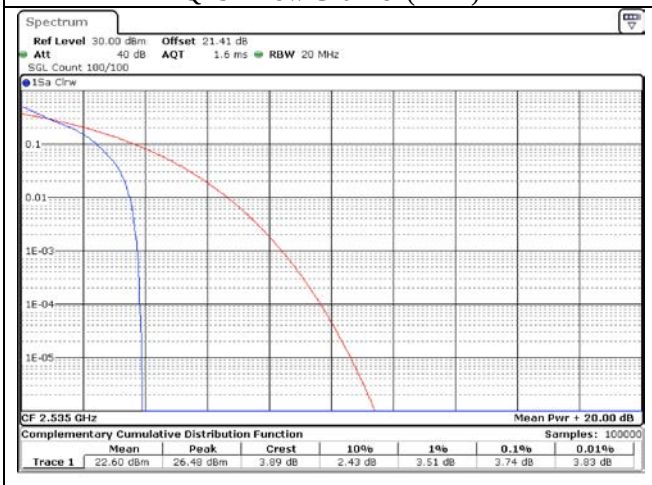
Remark: Measured the using CCDFof spectrum analyzer.



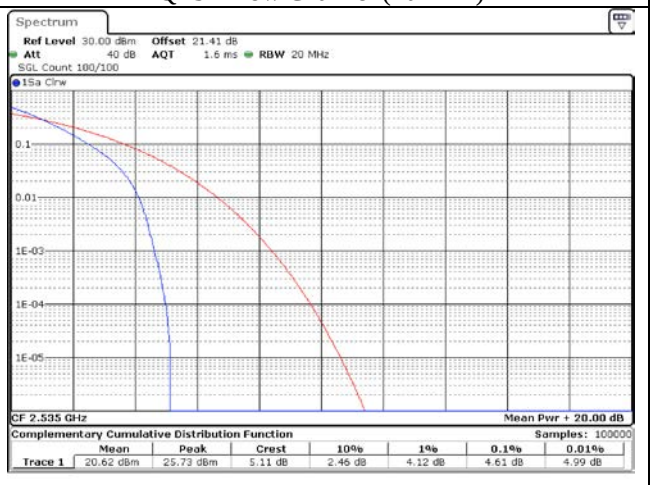
QPSK Low Channel (1 RB)



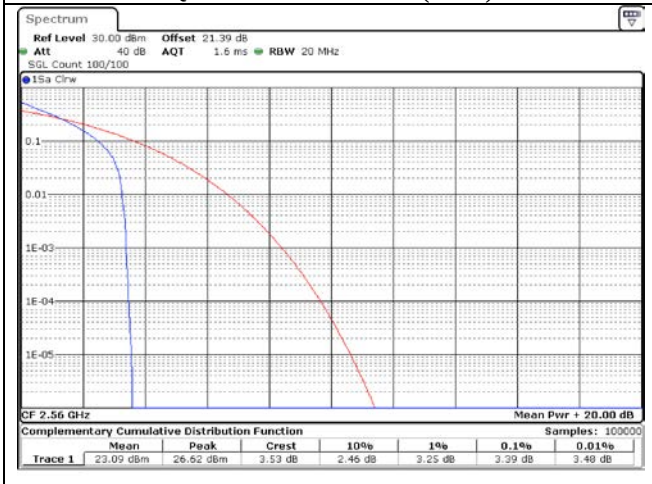
QPSK Low Channel (Full RB)



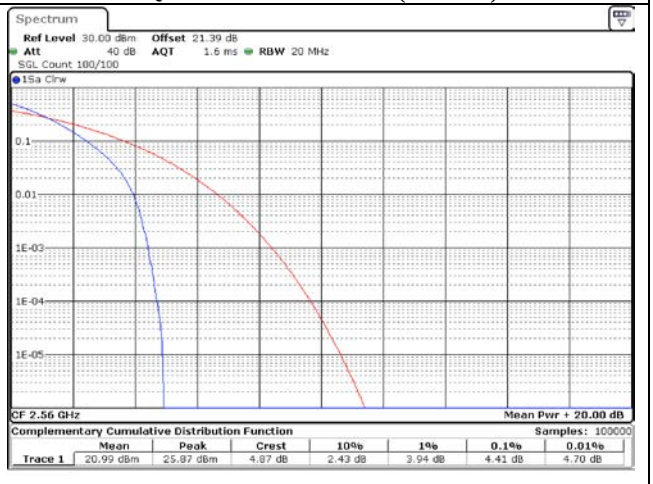
QPSK Middle Channel (1 RB)



QPSK Middle Channel (Full RB)

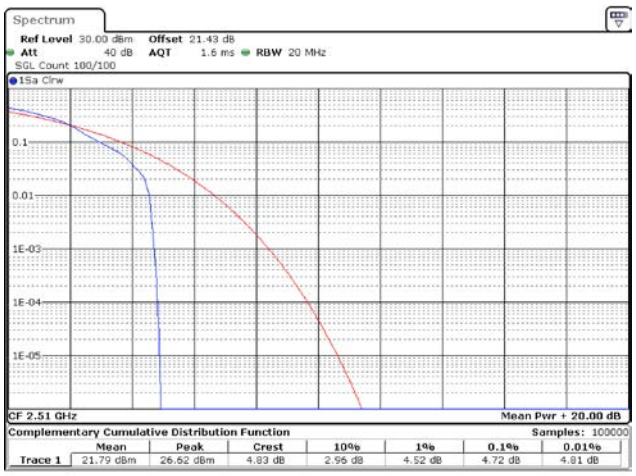


QPSK High Channel (1 RB)

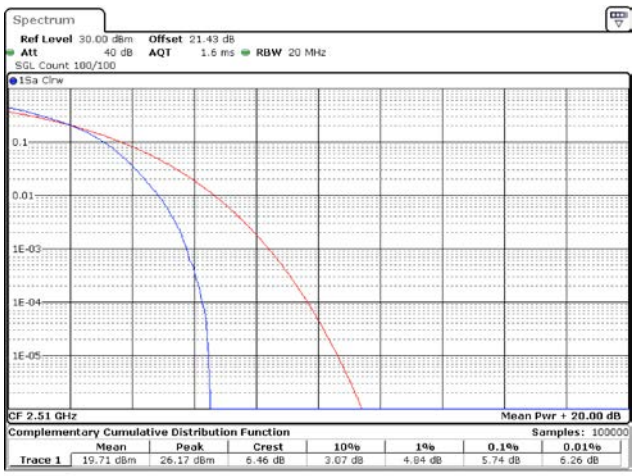


QPSK High Channel (Full RB)

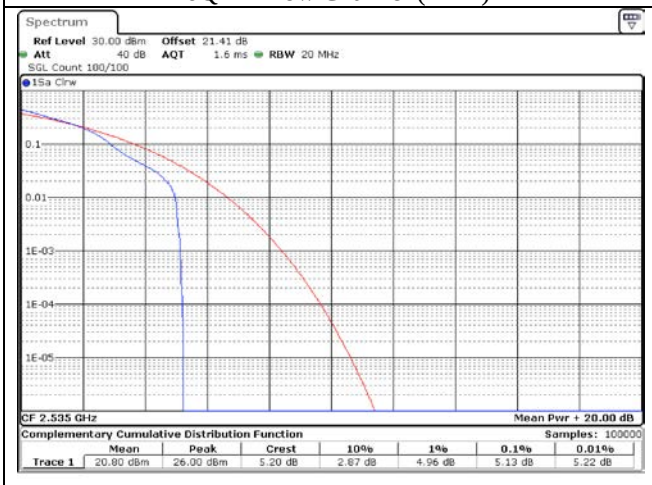
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



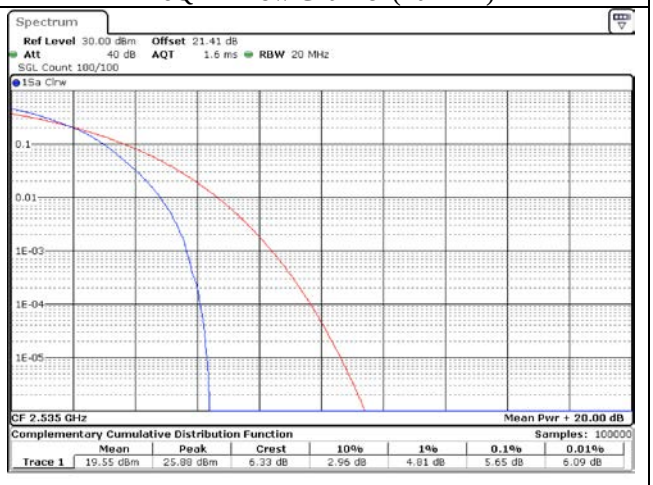
16QAM Low Channel (1 RB)



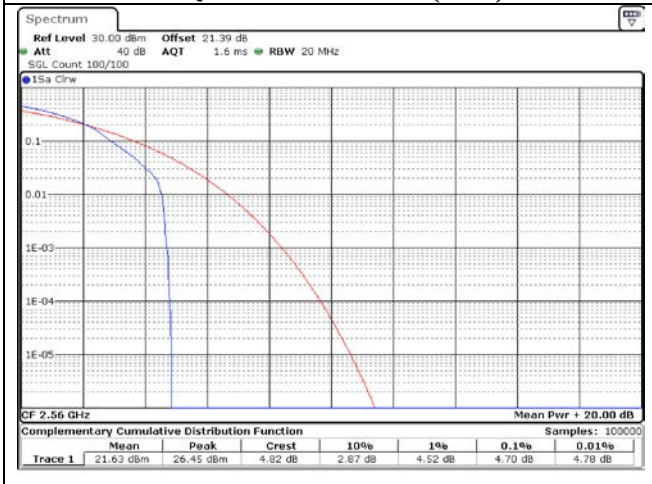
16QAM Low Channel (Full RB)



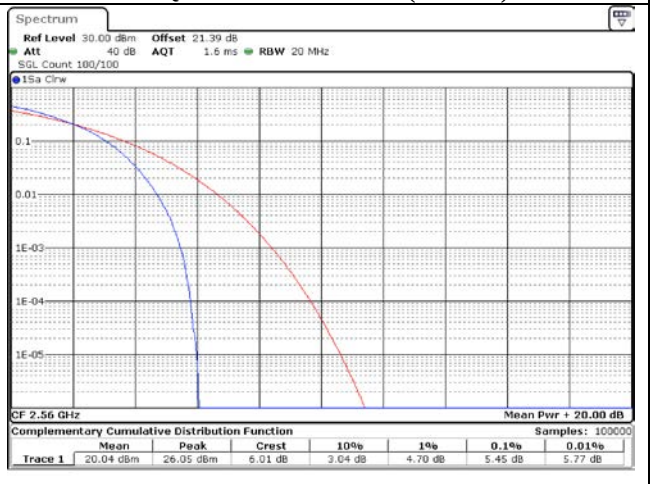
16QAM Middle Channel (1 RB)



16QAM Middle Channel (Full RB)



16QAM High Channel (1 RB)



16QAM High Channel (Full RB)

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

11. OCCUPIED BANDWIDTH

11.1 Operating environment

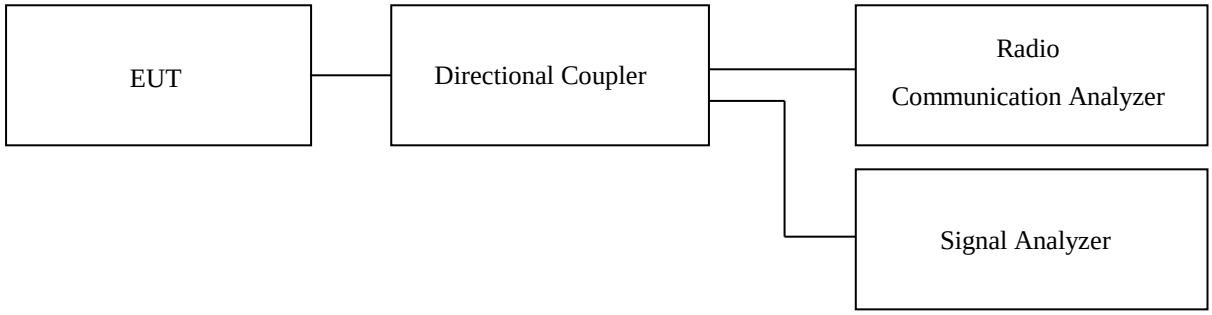
Temperature : 23 °C

Relative humidity : 47 % 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.



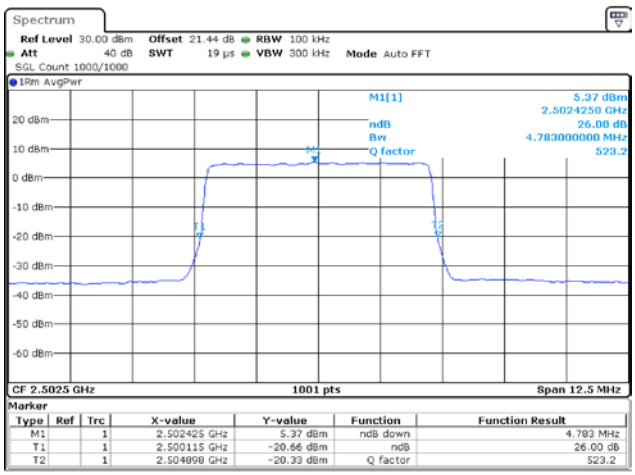
11.3 Test Date

April 20, 2021 ~ April 30, 2021

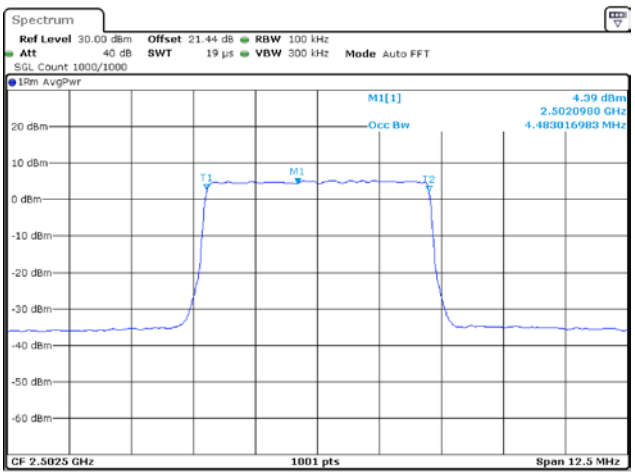
11.4 Test data for Band 7_Bandwidth 5 MHz

-. Test Result : Pass

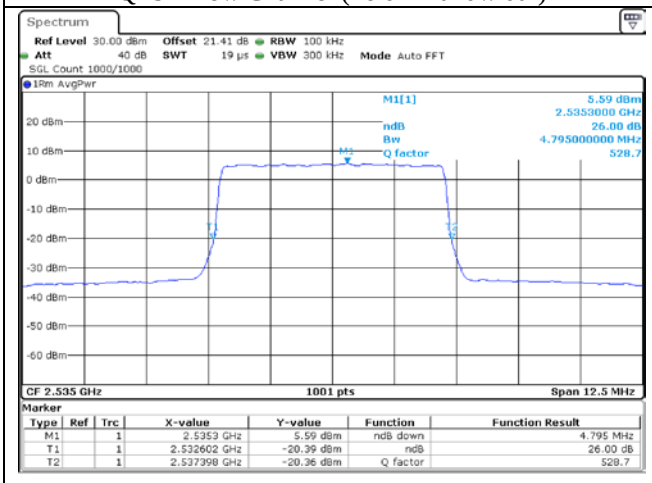
Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	20775	4.78	4.48	PASS
	21100	4.80	4.50	PASS
	21425	4.82	4.50	PASS
16QAM	20775	4.80	4.48	PASS
	21100	4.78	4.47	PASS
	21425	4.80	4.48	PASS



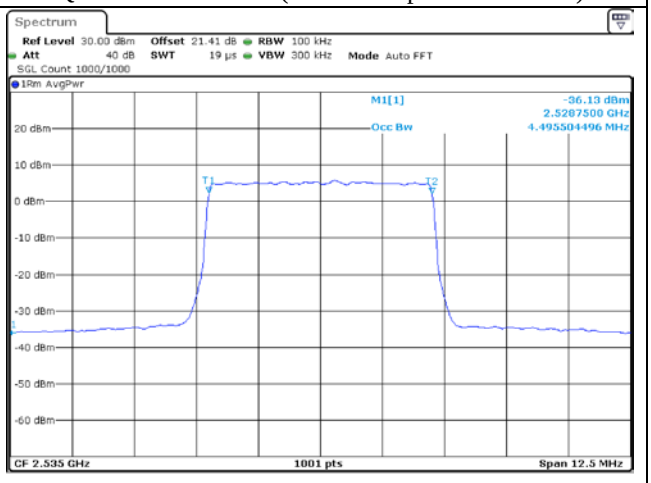
QPSK Low Channel (26 dB Bandwidth)



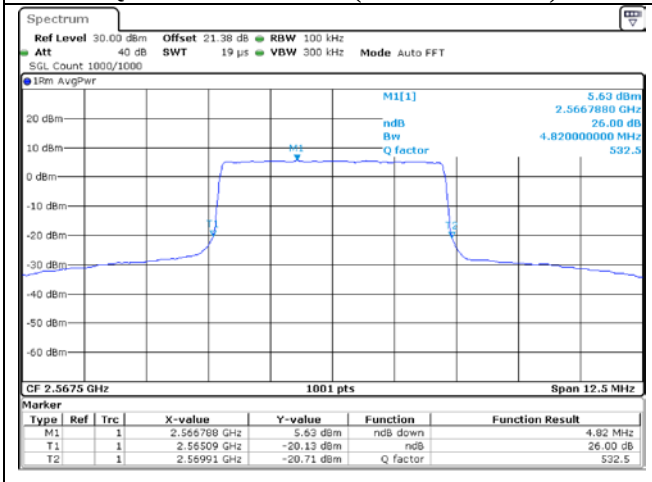
QPSK Low Channel (99 % Occupied Bandwidth)



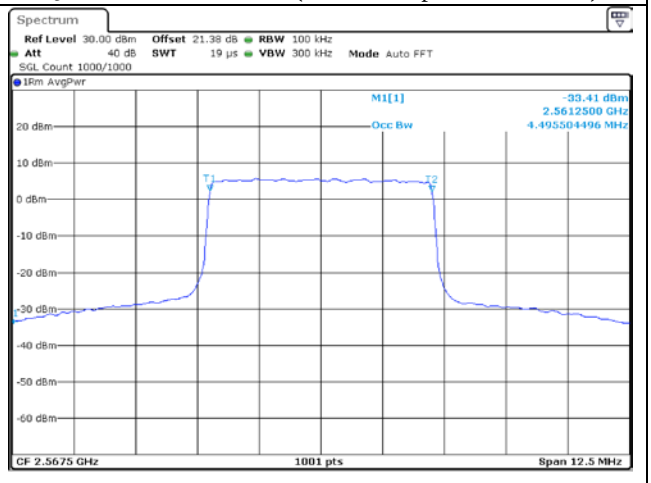
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)

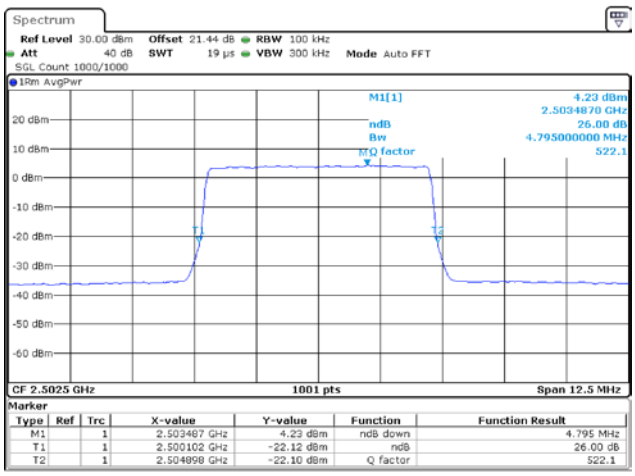


QPSK High Channel (26 dB Bandwidth)

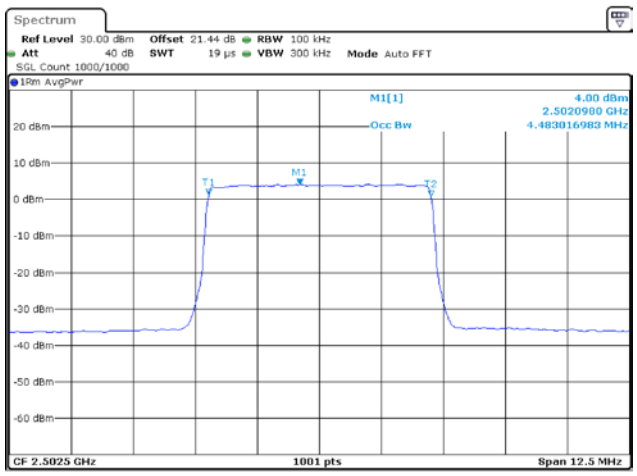


QPSK High Channel (99 % Occupied Bandwidth)

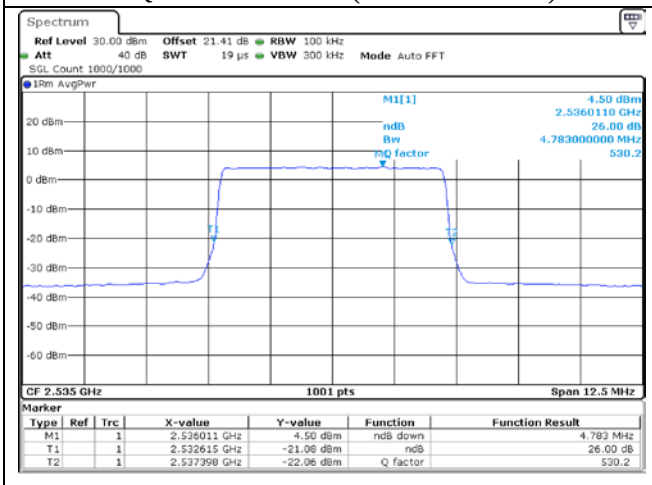
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



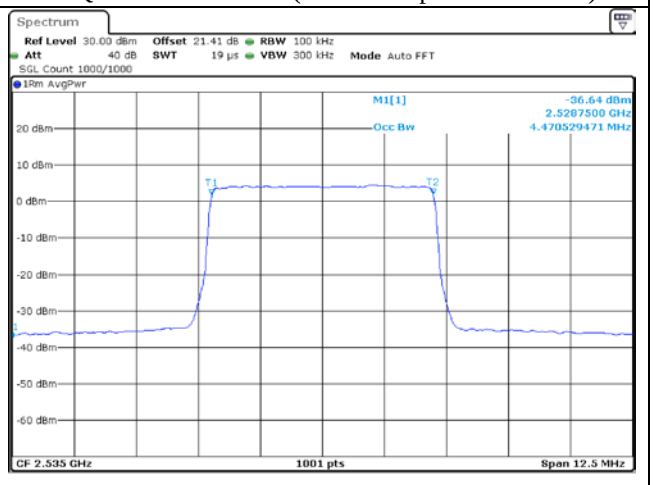
16QAM Low Channel (26 dB Bandwidth)



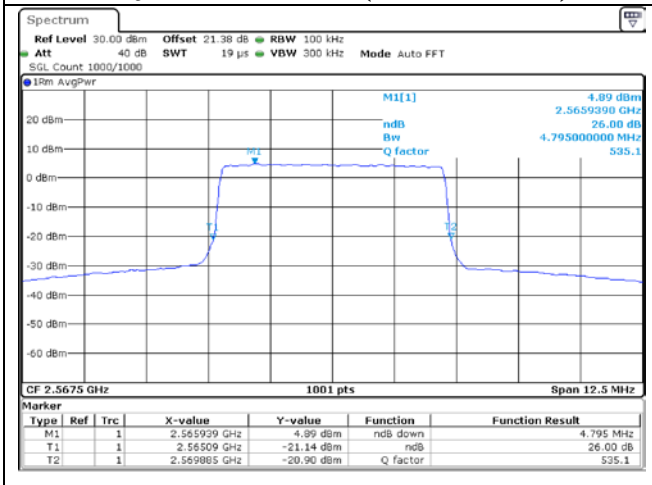
16QAM Low Channel (99 % Occupied Bandwidth)



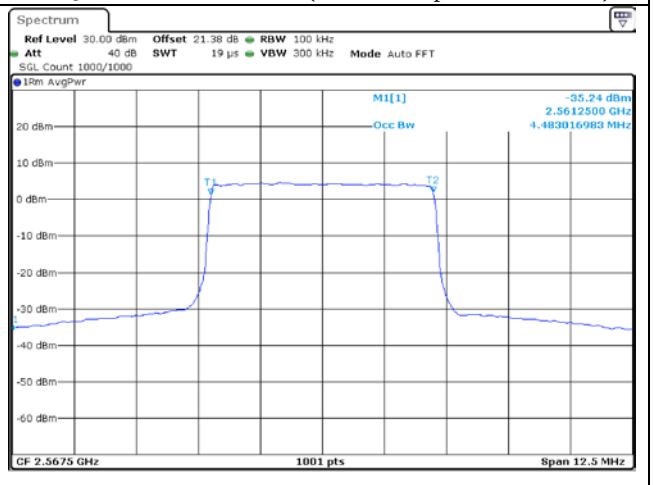
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



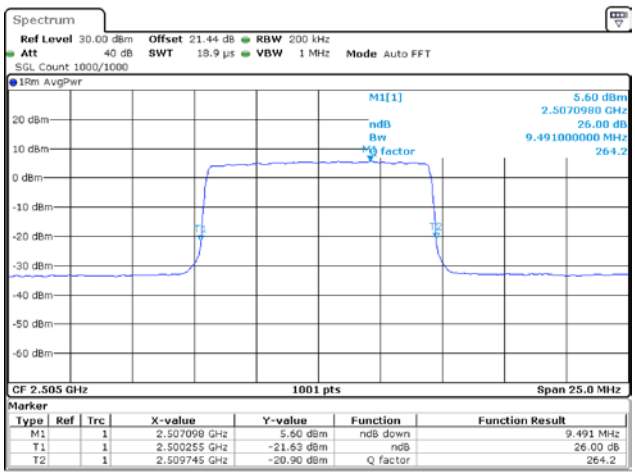
16QAM High Channel (99 % Occupied Bandwidth)

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

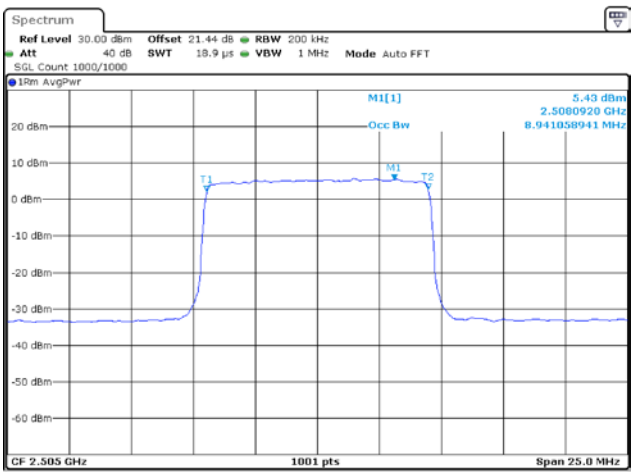
11.5 Test data for Band 7_Bandwidth 10 MHz

-. Test Result : Pass

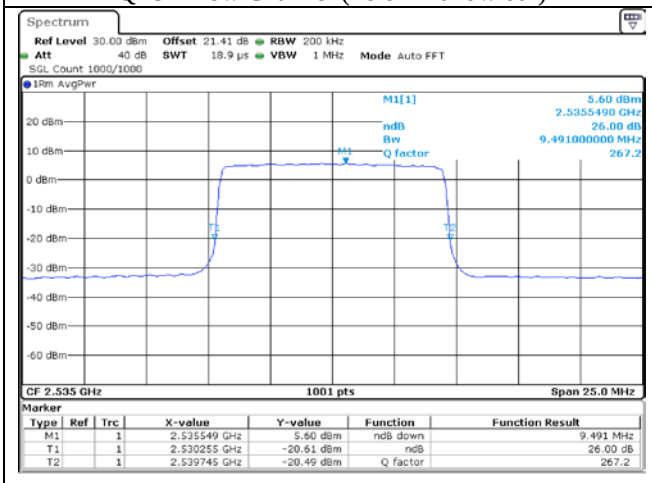
Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	20800	9.49	8.94	PASS
	21100	9.49	8.94	PASS
	21400	9.49	8.94	PASS
16QAM	20800	9.49	8.94	PASS
	21100	9.49	8.94	PASS
	21400	9.49	8.94	PASS



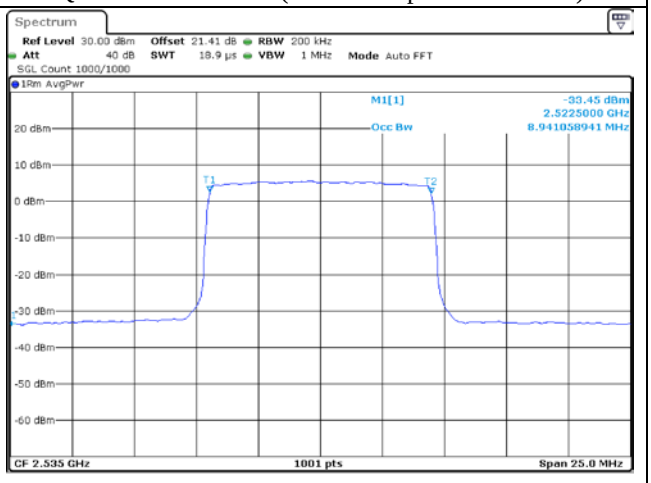
QPSK Low Channel (26 dB Bandwidth)



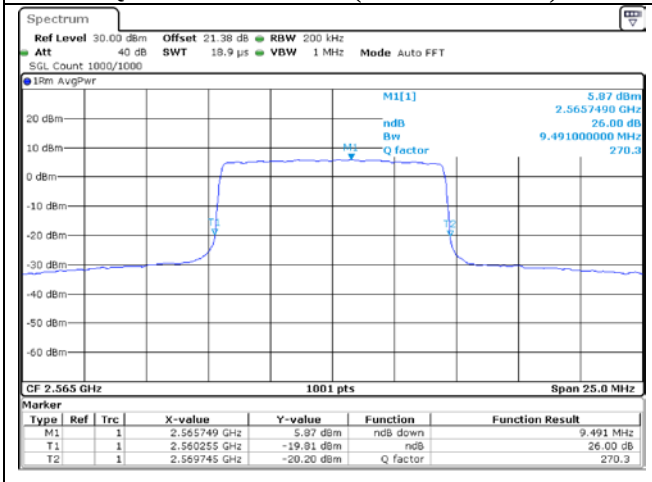
QPSK Low Channel (99 % Occupied Bandwidth)



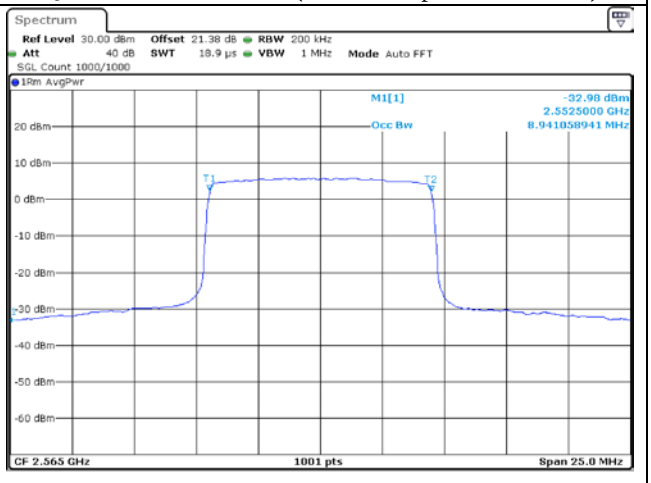
QPSK Midlle Channel (26 dB Bandwidth)



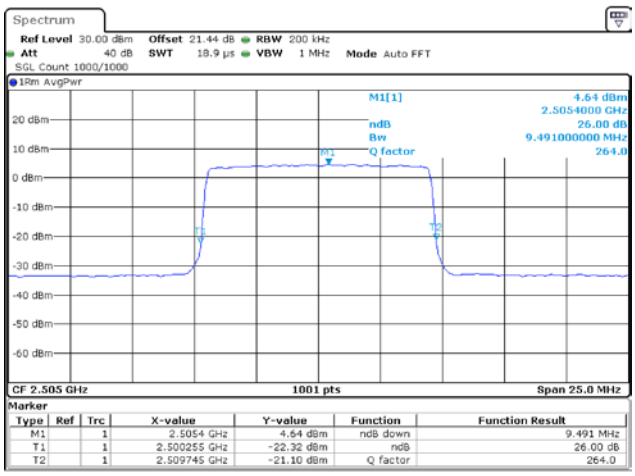
QPSK Middle Channel (99 % Occupied Bandwidth)



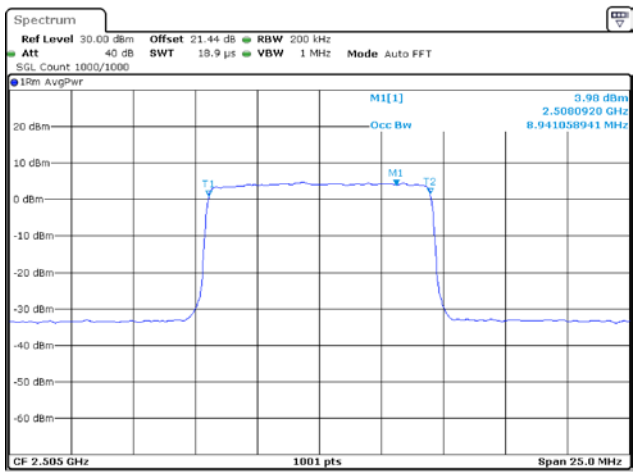
QPSK High Channel (26 dB Bandwidth)



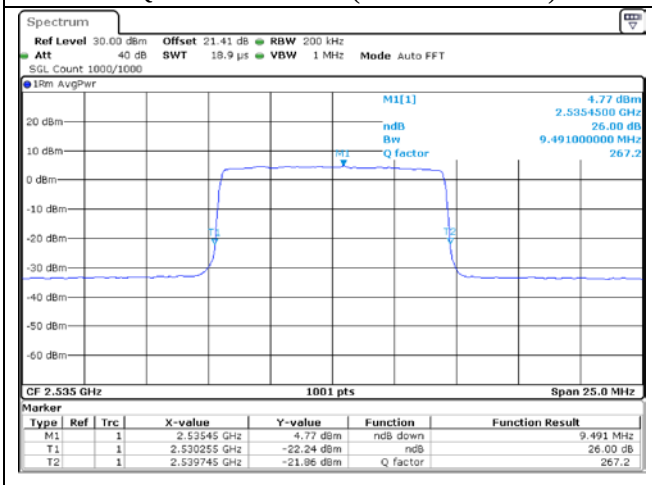
QPSK High Channel (99 % Occupied Bandwidth)



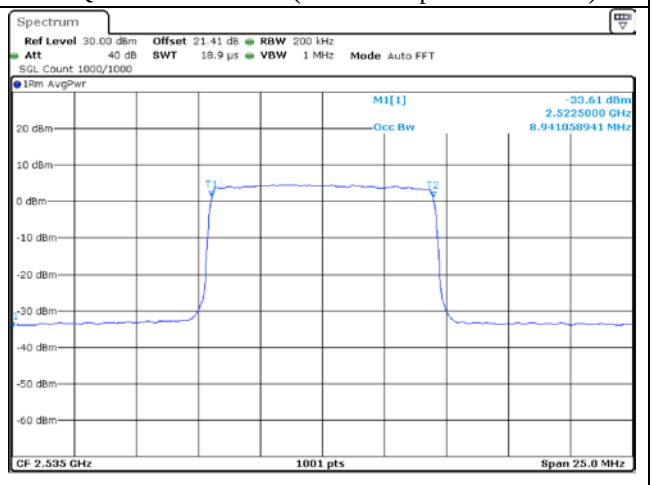
16QAM Low Channel (26 dB Bandwidth)



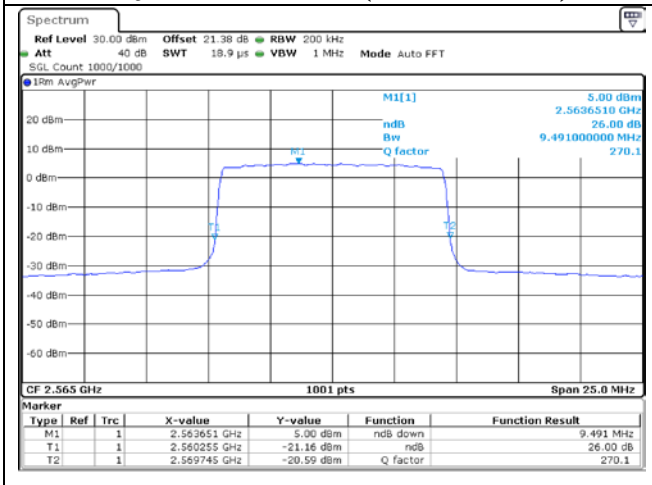
16QAM Low Channel (99 % Occupied Bandwidth)



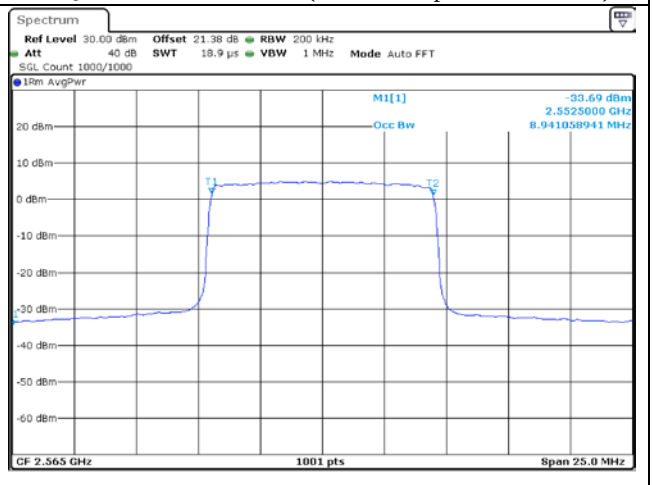
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



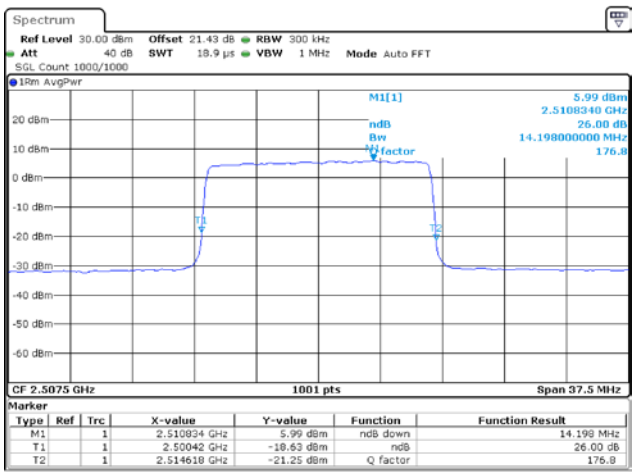
16QAM High Channel (99 % Occupied Bandwidth)

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

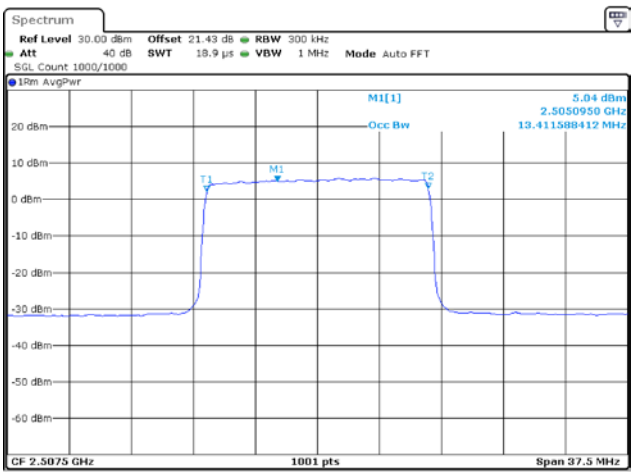
11.6 Test data for Band 7_Bandwidth 15 MHz

-. Test Result : Pass

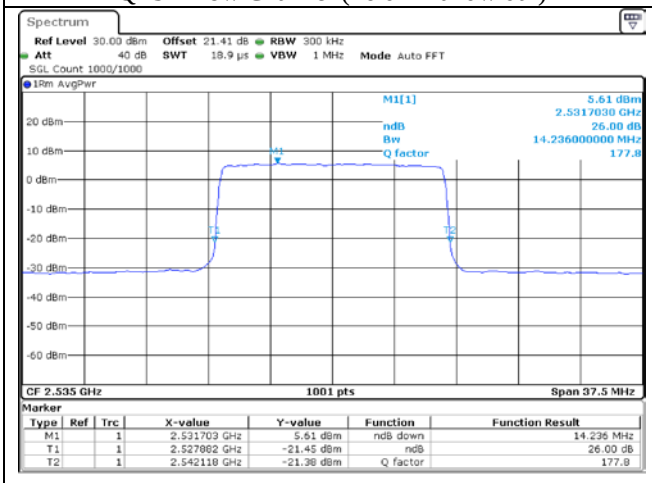
Test Mode	Channel	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Result
QPSK	20825	14.20	13.41	PASS
	21100	14.24	13.41	PASS
	21375	14.24	13.41	PASS
16QAM	20825	14.24	13.45	PASS
	21100	14.24	13.41	PASS
	21375	14.24	13.41	PASS



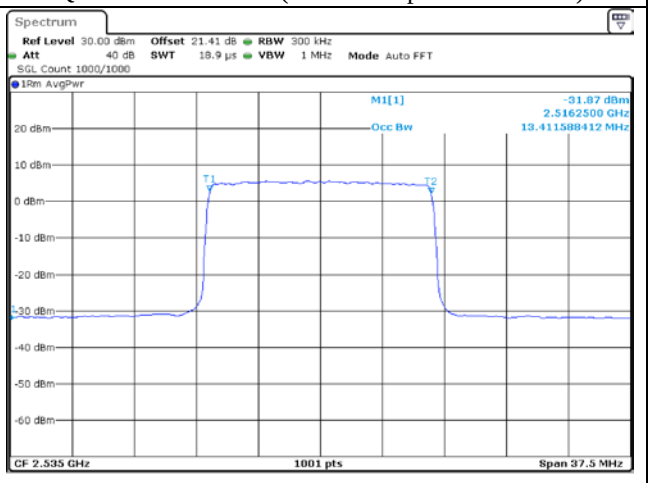
QPSK Low Channel (26 dB Bandwidth)



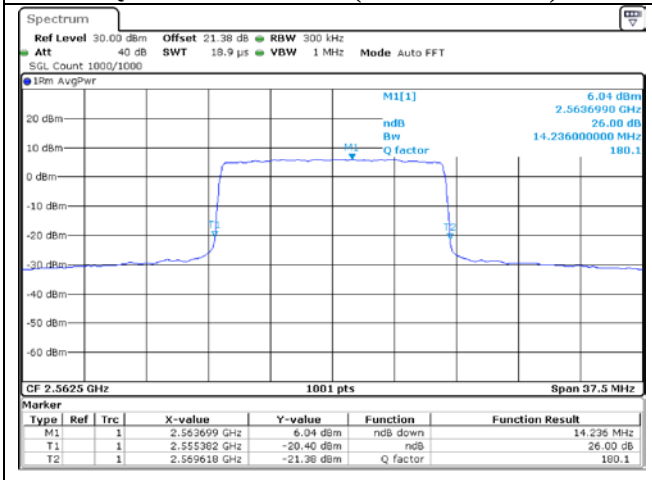
QPSK Low Channel (99 % Occupied Bandwidth)



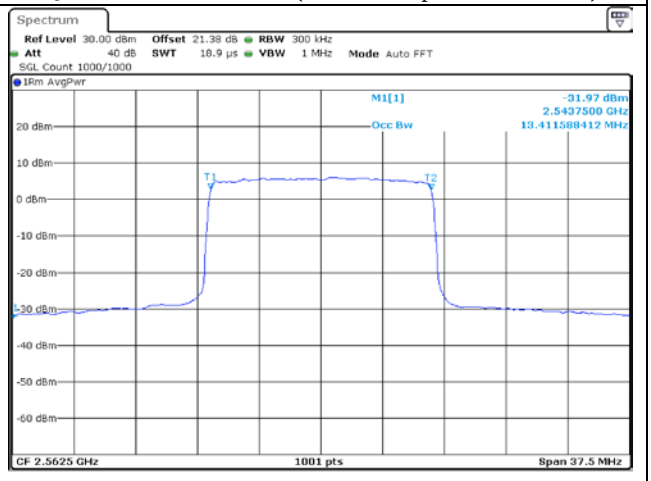
QPSK Midlle Channel (26 dB Bandwidth)



QPSK Middle Channel (99 % Occupied Bandwidth)

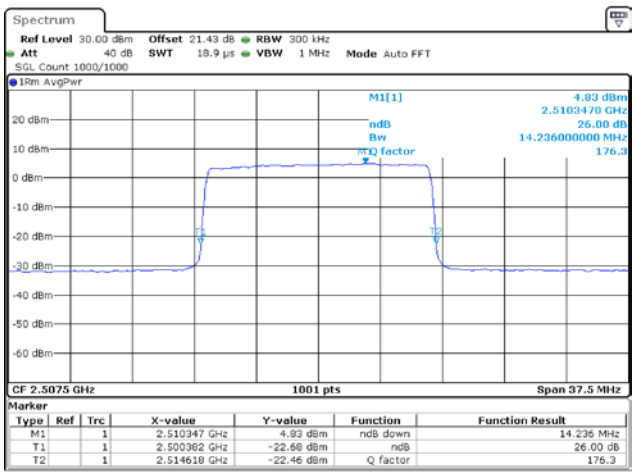


QPSK High Channel (26 dB Bandwidth)

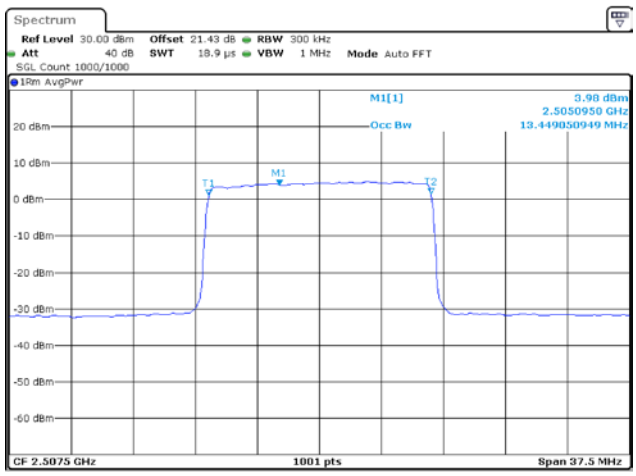


QPSK High Channel (99 % Occupied Bandwidth)

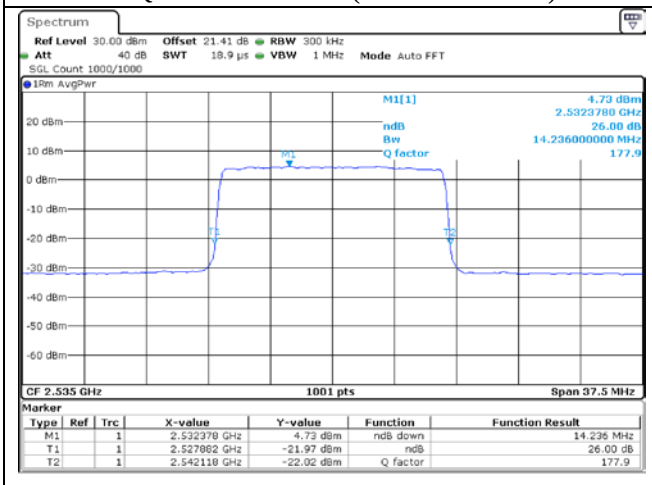
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



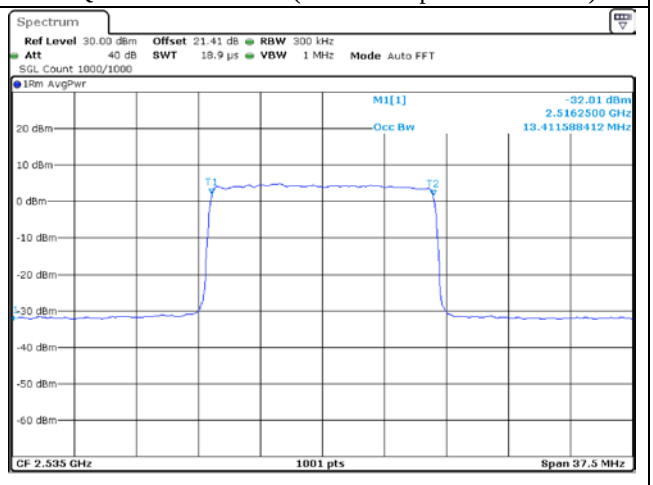
16QAM Low Channel (26 dB Bandwidth)



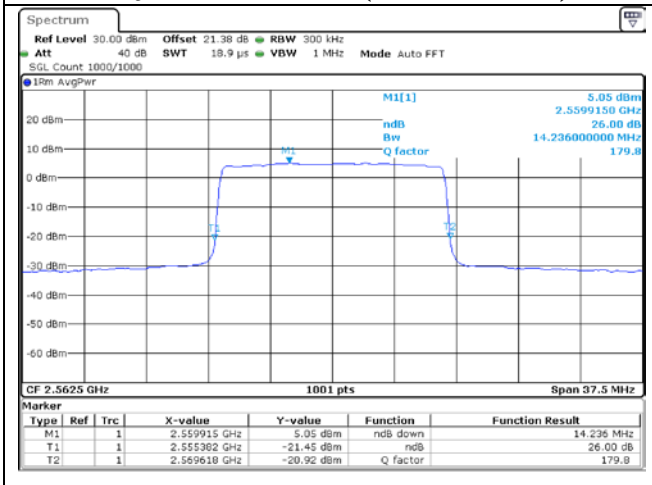
16QAM Low Channel (99 % Occupied Bandwidth)



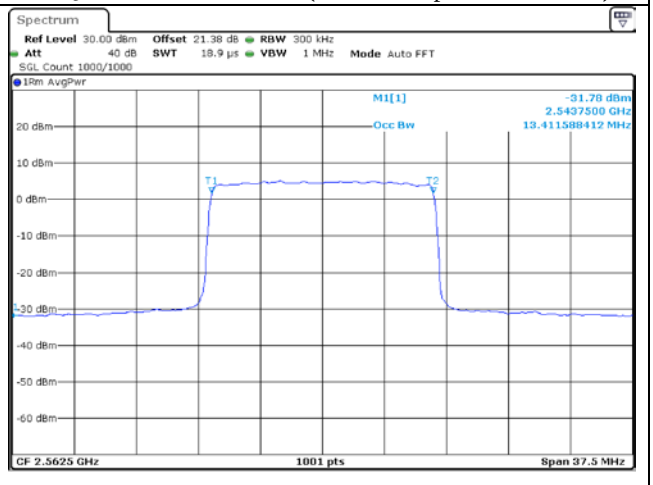
16QAM Midlle Channel (26 dB Bandwidth)



16QAM Middle Channel (99 % Occupied Bandwidth)



16QAM High Channel (26 dB Bandwidth)



16QAM High Channel (99 % Occupied Bandwidth)