FCC Part 24E
Measurement and Test Report

For

Shenzhen Pisoftware Technology Co.,Ltd.

C11-102, TCL International E City, 1001 Zhongshanyuan Road, Nanshan District, Shenzhen City, P.R.China

FCC ID:2ARZ2-PILOT-BASE

FCC Rule(s):	FCC Part 24E
Product Description:	Panoramic camera
Model:	Pilot Era
Brand:	N/A
Report No.:	BSL11347006RF
Tested Date:	November 11-13, 2018
Issued Date:	November 22, 2018
Tested By:	Messi Wang / Engineer
Reviewed By:	Lisa. Li / EMC Manager
Approved & Authorized By:	Mike mo / PSQ Manager
Prepared By:	

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Shenzhen Pisoftware Technology Co.,Ltd.
Address of applicant:	C11-102, TCL International E City, 1001 Zhongshanyuan Road, Nanshan District, Shenzhen City, P.R.China
Manufacturer:	BYD Precision Manufacture Co., Ltd.
Address of manufacturer:	No.1 Baoping Road, Baolong Industry Town, Longgang District, Shenzhen, P.R. China

General Description of EUT:	
Product Name:	Panoramic camera
Brand Name:	/
Model No.:	Pilot Era,Pilot Era S,Pilot Era Nano,Pilot Era Pro
Hardware version:	V1.0
Software version:	V1.0
Rated Voltage:	DC 5V from USB
Battery:	/
The EUT Main board support LTE Band 2 function..	
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT: Main board	
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 2
Uplink Frequency:	FDD-LTE Band 2: Tx: 1850-1910MHz,
Downlink Frequency:	FDD-LTE Band 2: Rx: 1930-1990MHz,
Type of Emission:	FDD-LTE Band 2: 18M7G7D, 18M7W7D
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 2: 0dBi,

1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Pisoftware Technology Co.,Ltd. in accordance with FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 24 subpart E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI/TIA-603-D: 2010 and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v02r02 shall be performed also.

1.4 Test Facility

BSL Testing Co.,LTD.
NO. 24, ZH Park, Nantou, Shenzhen, 518000 China
Designation Number : CN1217
Test Firm Registration Number: 866035

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	FDD-LTE Band 2	Low, Middle, High Channels

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.0	Unshielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Radiated	±5.1dB
Transmitter Spurious Emissions	Conducted	±0.42dB

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
Communication Tester	Rohde & Schwarz	CMW500	100358	2018-11-08	2019-11-07
Spectrum Analyzer	R&S	FSP40	100550	2018-10-08	2019-10-07
Test Receiver	R&S	ESCI7	US47140102	2018-10-08	2019-10-07
Signal Generator	HP	83630B	3844A01028	2018-10-08	2019-10-07
Test Receiver	R&S	ESPI-3	100180	2018-10-08	2019-10-07
Amplifier	Agilent	8449B	4035A00116	2018-10-08	2019-10-07
Amplifier	HP	8447E	2945A02770	2018-10-08	2019-10-07
Signal Generator	IFR	2023A	202307/242	2018-10-08	2019-10-07
Broadband Antenna	SCHAFFNER	2774	2774	2018-10-21	2019-10-20
Biconical and log periodic antennas	ELECTRO-METRICS	EM-6917B-1	171	2018-10-21	2019-10-20
Horn Antenna	R&S	HF906	100253	2018-10-21	2019-10-20
Horn Antenna	EM	EM-6961	6462	2018-10-21	2019-10-20
LISN	R&S	ESH3-Z5	100196	2018-10-08	2019-10-07
LISN	COM-POWER	LI-115	02027	2018-10-08	2019-10-07
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	2018-10-08	2019-10-07
Horn Antenna	Schwarzbeck	BBHA9170	00814	2018-10-21	2019-10-20

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§ 24.232 (c)	RF Output Power	Compliant
§ 24.51	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§ 24.238 (b)	Emission Bandwidth	Compliant
§ 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§ 24.238 (a)	Spurious Radiation Emissions	Compliant
§ 24.238 (a)	Out of Band Emissions	Compliant
§ 24.235	Frequency Stability	Compliant

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.

4. RF Output Power

4.1 Standard Applicable

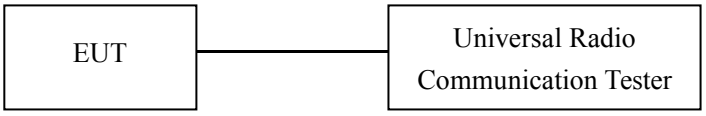
According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

According to §27.50(c)(10), Portable stations (hand-held devices) in the 698-746 MHz band are limited to 3 watts ERP.

4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

4.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.4 Summary of Test Results/Plots

FDD-LTE Band 2

Max. Conducted Output Power

Test result: Pass

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	1850.7	1	0	23.50	23.32
		1	3	23.22	22.49
		1	5	23.10	22.80
		3	0	23.03	22.67
		3	2	22.99	22.92
		3	3	22.87	22.91
		6	0	22.21	21.85
	1880.0	1	0	23.44	23.21
		1	3	23.26	23.10
		1	5	23.27	22.58
		3	0	23.32	23.21
		3	2	23.29	22.62
		3	3	23.36	23.15
		6	0	22.54	21.71
	1909.3	1	0	21.49	21.43
		1	3	21.27	20.48
		1	5	21.25	21.09
		3	0	21.40	20.88
		3	2	21.32	20.89
		3	3	21.28	21.02
		6	0	20.64	20.01

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
3	1851.5	1	0	22.71	22.38
		1	7	22.36	22.29
		1	14	22.29	22.34
		8	0	22.08	21.99
		8	4	21.93	21.39
		8	7	21.83	21.42
		15	0	21.93	21.21
	1880.0	1	0	23.02	22.33
		1	7	22.90	22.48
		1	14	22.95	22.32
		8	0	22.28	22.11
		8	4	22.20	21.46
		8	7	22.33	21.68
		15	0	22.28	21.42
	1908.5	1	0	21.46	20.97
		1	7	21.27	20.60
		1	14	21.03	20.22
		8	0	20.76	20.12
		8	4	20.62	20.29
		8	7	20.56	19.76
		15	0	20.58	19.82

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	1852.5	1	0	22.62	22.36
		1	12	21.96	21.47
		1	24	22.07	22.03
		12	0	21.64	20.82
		12	6	21.41	20.94
		12	13	21.44	20.60
		25	0	21.49	20.80
	1880.0	1	0	22.95	22.38
		1	12	22.57	21.80
		1	24	22.85	22.46
		12	0	21.96	21.84
		12	6	21.79	21.06
		12	13	21.83	21.36
		25	0	21.85	21.55
	1907.5	1	0	21.71	21.74
		1	12	21.23	20.41
		1	24	21.15	21.01
		12	0	20.68	19.93
		12	6	20.40	19.79
		12	13	20.31	19.54
		25	0	20.49	20.15

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
10	1855.0	1	0	22.06	21.97
		1	24	21.71	21.73
		1	49	21.37	20.73
		25	0	21.39	21.05
		25	12	21.19	21.05
		25	25	21.04	20.52
		50	0	21.25	20.67
	1880.0	1	0	22.37	22.17
		1	24	22.47	22.27
		1	49	21.90	21.68
		25	0	21.71	20.89
		25	12	21.70	21.08
		25	25	21.49	20.93
		50	0	21.63	21.54
	1905.0	1	0	20.20	19.88
		1	24	21.18	20.70
		1	49	20.62	20.59
		25	0	20.22	19.49
		25	12	20.53	20.38
		25	25	20.48	20.40
		50	0	20.34	19.70

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
15	1857.5	1	0	22.20	22.22
		1	37	21.58	21.16
		1	74	21.59	21.11
		37	0	21.39	20.80
		37	18	21.18	20.76
		37	38	20.97	20.56
		75	0	21.19	20.38
	1880.0	1	0	22.41	22.30
		1	37	22.48	22.49
		1	74	21.71	20.89
		37	0	21.77	21.42
		37	18	21.58	21.05
		37	38	21.37	21.22
		75	0	21.50	20.73
	1902.5	1	0	20.39	19.85
		1	37	20.48	19.89
		1	74	20.79	20.58
		37	0	19.83	18.98
		37	18	20.05	19.42
		37	38	20.30	20.18
		75	0	20.13	19.78

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
20	1860.0	1	0	22.29	21.59
		1	49	21.55	21.50
		1	99	21.85	21.71
		50	0	21.33	21.08
		50	25	21.08	20.69
		50	50	21.09	20.97
		100	0	21.31	20.82
	1880.0	1	0	22.42	21.78
		1	49	22.51	21.79
		1	99	21.32	21.04
		50	0	21.69	21.07
		50	25	21.58	21.24
		50	50	21.18	20.54
		100	0	21.30	20.64
	1900.0	1	0	21.26	20.72
		1	49	20.08	19.31
		1	99	20.82	20.76
		50	0	20.07	20.00
		50	25	19.78	18.98
		50	50	20.21	20.16
		100	0	20.19	20.09

FDD-LTE Band 2

Max. Radiated Power:

Test result: Pass

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	1850.7	1	0	23.15	23.02
		1	3	23.23	22.89
		1	5	23.58	22.98
		3	0	23.11	22.72
		3	2	22.89	22.91
		3	3	22.78	22.89
		6	0	22.12	21.58
	1880.0	1	0	23.58	23.30
		1	3	23.47	23.11
		1	5	23.17	22.68
		3	0	23.23	23.12
		3	2	23.58	22.41
		3	3	23.63	23.47
		6	0	22.47	21.69
	1909.3	1	0	21.48	21.35
		1	3	21.56	20.63
		1	5	21.41	21.15
		3	0	21.63	20.87
		3	2	21.25	20.87
		3	3	21.36	21.22
		6	0	20.51	20.10

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
3	1851.5	1	0	22.82	22.51
		1	7	22.12	22.30
		1	14	22.45	22.81
		8	0	22.02	21.87
		8	4	21.85	21.24
		8	7	21.74	21.24
		15	0	21.62	21.28
	1880.0	1	0	23.28	22.31
		1	7	22.88	22.57
		1	14	22.57	22.47
		8	0	22.36	22.22
		8	4	22.15	21.50
		8	7	22.37	21.69
		15	0	22.55	21.27
	1908.5	1	0	21.62	20.71
		1	7	21.28	20.84
		1	14	21.30	20.21
		8	0	20.85	20.23
		8	4	20.71	20.29
		8	7	20.73	19.67
		15	0	20.83	19.29

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	1852.5	1	0	22.58	22.34
		1	12	21.96	21.45
		1	24	22.70	22.42
		12	0	21.46	20.27
		12	6	21.58	20.43
		12	13	21.62	20.02
		25	0	21.96	20.88
	1880.0	1	0	22.97	22.23
		1	12	22.63	21.84
		1	24	22.87	22.60
		12	0	21.89	21.32
		12	6	21.97	21.86
		12	13	21.75	21.38
		25	0	21.59	21.30
	1907.5	1	0	21.72	21.48
		1	12	21.38	20.46
		1	24	21.51	21.10
		12	0	20.88	19.32
		12	6	20.12	19.88
		12	13	20.42	19.84
		25	0	20.28	20.51

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
10	1855.0	1	0	22.62	21.77
		1	24	21.27	21.58
		1	49	21.34	20.74
		25	0	21.92	21.28
		25	12	21.56	21.12
		25	25	21.01	20.68
		50	0	21.47	20.66
	1880.0	1	0	22.25	22.47
		1	24	22.24	22.10
		1	49	21.88	21.61
		25	0	21.85	20.96
		25	12	21.15	21.27
		25	25	21.83	20.74
		50	0	21.85	21.57
	1905.0	1	0	20.35	19.89
		1	24	21.52	20.87
		1	49	20.26	20.32
		25	0	20.03	19.47
		25	12	20.35	20.19
		25	25	20.58	20.27
		50	0	20.42	19.79

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
15	1857.5	1	0	22.41	22.25
		1	37	21.68	21.29
		1	74	21.61	21.28
		37	0	21.84	20.71
		37	18	21.23	20.68
		37	38	20.25	20.47
		75	0	21.74	20.69
	1880.0	1	0	22.62	22.24
		1	37	22.36	22.47
		1	74	21.96	20.51
		37	0	21.42	21.28
		37	18	21.67	21.07
		37	38	21.32	21.11
		75	0	21.39	20.74
	1902.5	1	0	20.27	19.52
		1	37	20.38	19.99
		1	74	20.32	20.84
		37	0	19.75	18.88
		37	18	20.37	19.75
		37	38	20.38	20.72
		75	0	20.37	19.89

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
20	1860.0	1	0	22.25	21.63
		1	49	21.52	21.35
		1	99	21.74	21.29
		50	0	21.66	21.07
		50	25	21.35	20.86
		50	50	21.88	20.92
		100	0	21.13	20.28
	1880.0	1	0	22.57	21.87
		1	49	22.24	21.82
		1	99	21.10	21.42
		50	0	21.82	21.70
		50	25	21.80	21.41
		50	50	21.81	20.45
		100	0	21.30	20.74
	1900.0	1	0	21.36	20.28
		1	49	20.61	19.33
		1	99	20.74	20.82
		50	0	20.25	20.87
		50	25	19.85	18.91
		50	50	20.47	20.63
		100	0	20.85	20.92

5. Peak-to-average Ratio (PAR) of Transmitter

5.1 Standard Applicable

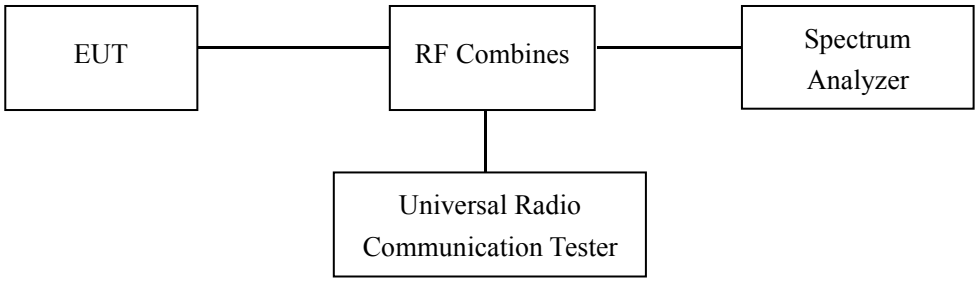
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

5.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

Test Configuration for the emission bandwidth testing:



5.3 Environmental Conditions

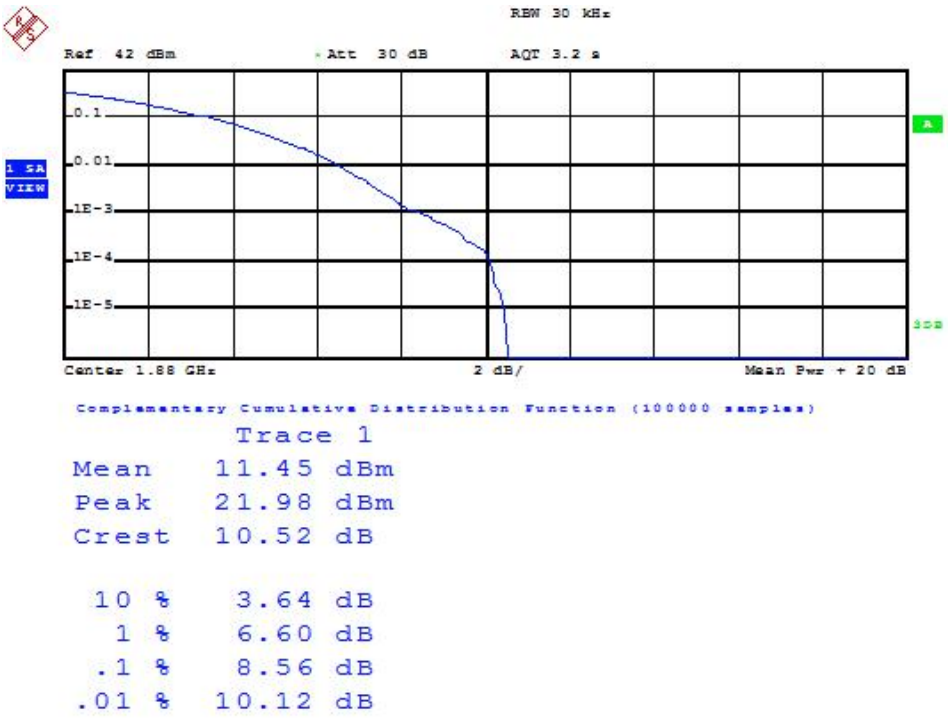
Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results

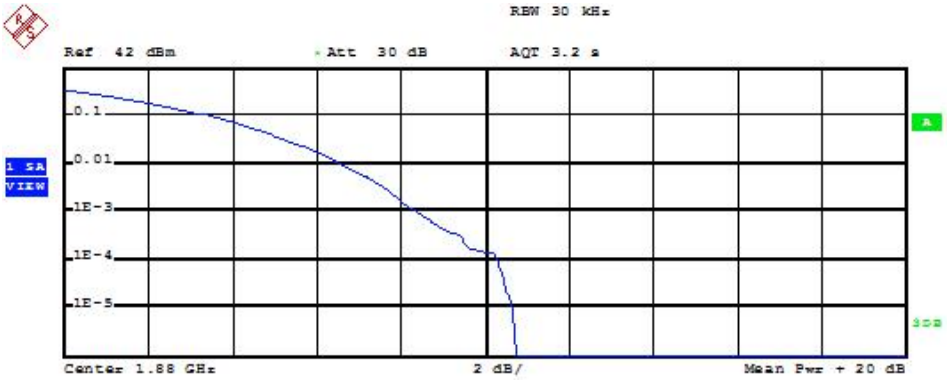
Modulation	Middle Channel (dB)	Limit (dB)	Result
16QAM (1RB Size)	8.56	≦ 13	PASS
16QAM (100RB Size)	8.40	≦ 13	PASS

Note: scan with all model and conditions,only show the worst case in the report.

16QAM (1RB Size)



16QAM (100RB Size)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	11.47 dBm
Peak	22.19 dBm
Crest	10.72 dB
10 %	3.60 dB
1 %	6.64 dB
.1 %	8.40 dB
.01 %	10.36 dB

6. Emission Bandwidth

6.1 Standard Applicable

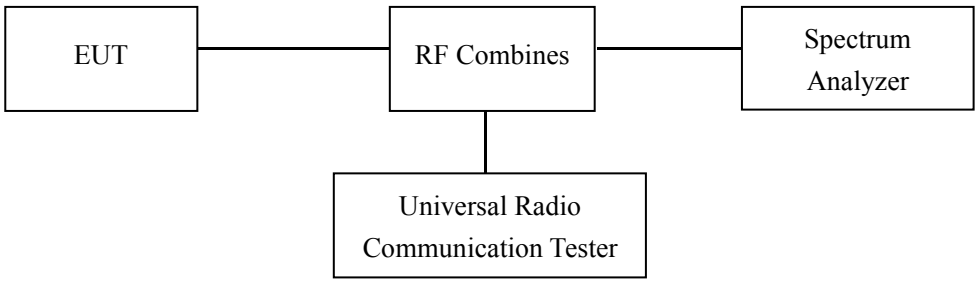
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

LTE Band 2:

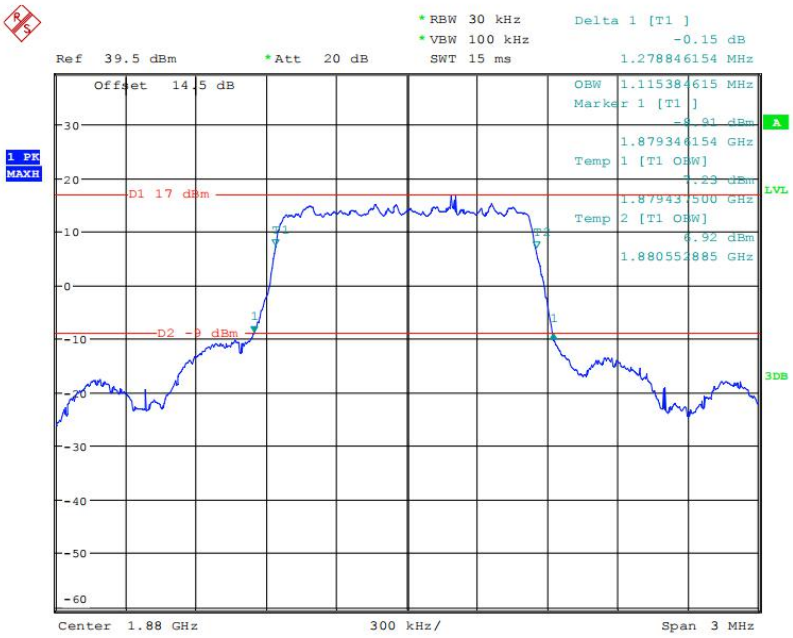
Middle channel

Note: scan with all model and conditions,only show the worst case in the report.

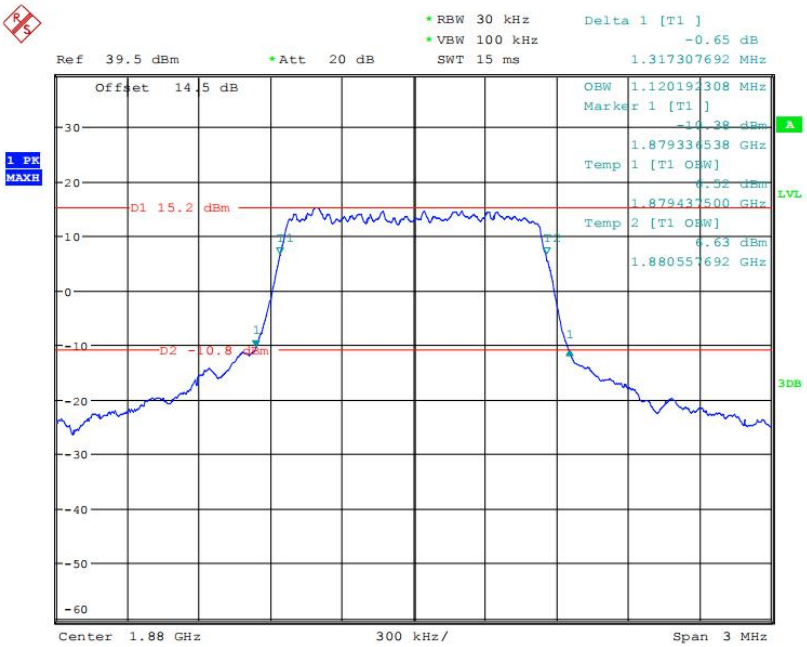
Test result: Pass

Bandwidth	Modulation	99% Occupied Bandwidth （MHz）	26dB Emission Bandwidth （MHz）
1.4 MHz	QPSK	1.115	1.279
	16QAM	1.120	1.317
3.0 MHz	QPSK	2.721	3.058
	16QAM	2.702	2.990
5.0 MHz	QPSK	4.535	5.067
	16QAM	4.519	5.404
10.0 MHz	QPSK	8.960	9.872
	16QAM	8.942	9.779
15.0 MHz	QPSK	13.510	15.083
	16QAM	13.462	14.891
20.0 MHz	QPSK	17.949	19.378
	16QAM	18.000	19.635

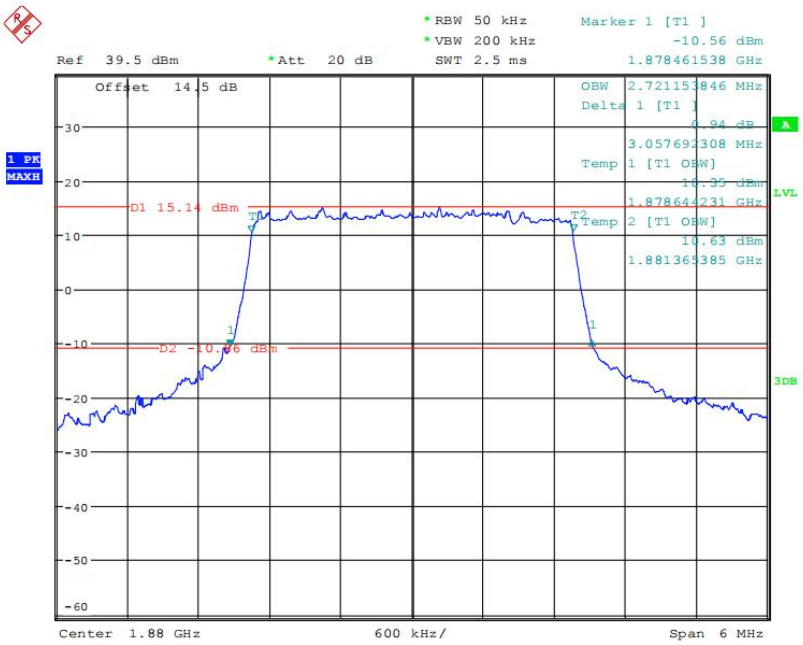
QPSK (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



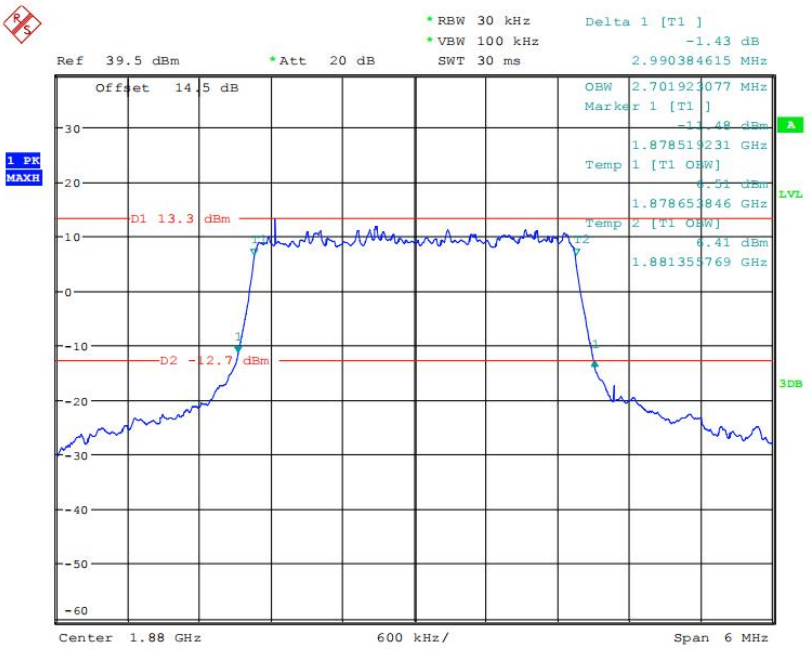
16-QAM (1.4 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



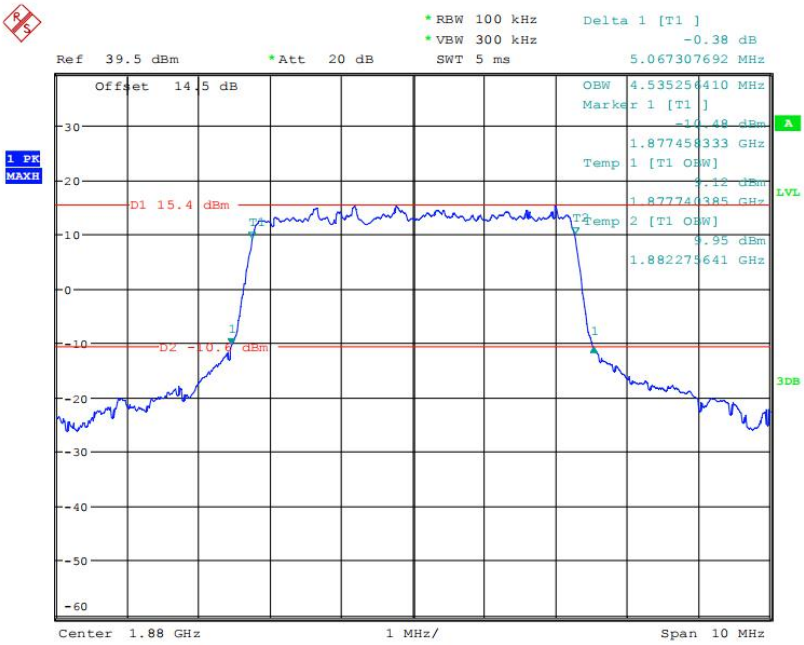
QPSK (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



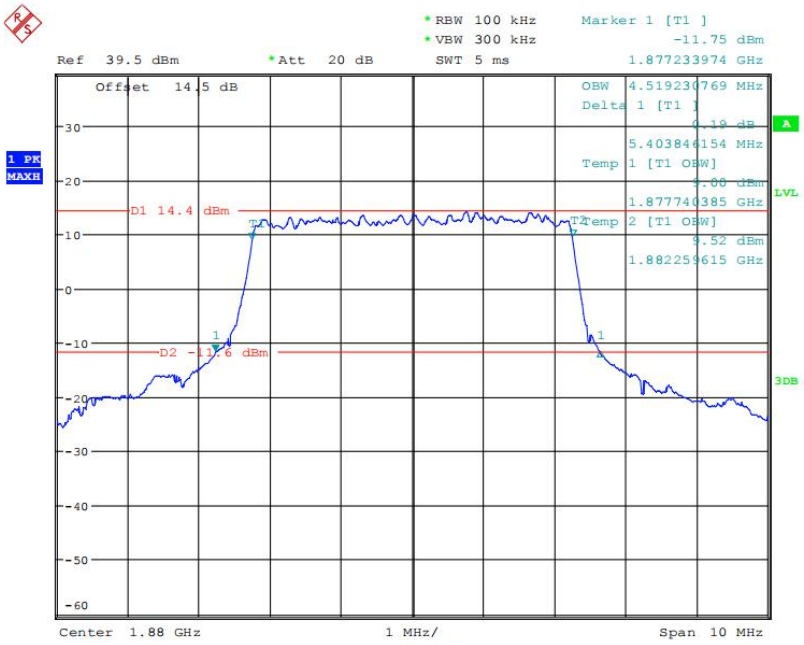
16-QAM (3.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



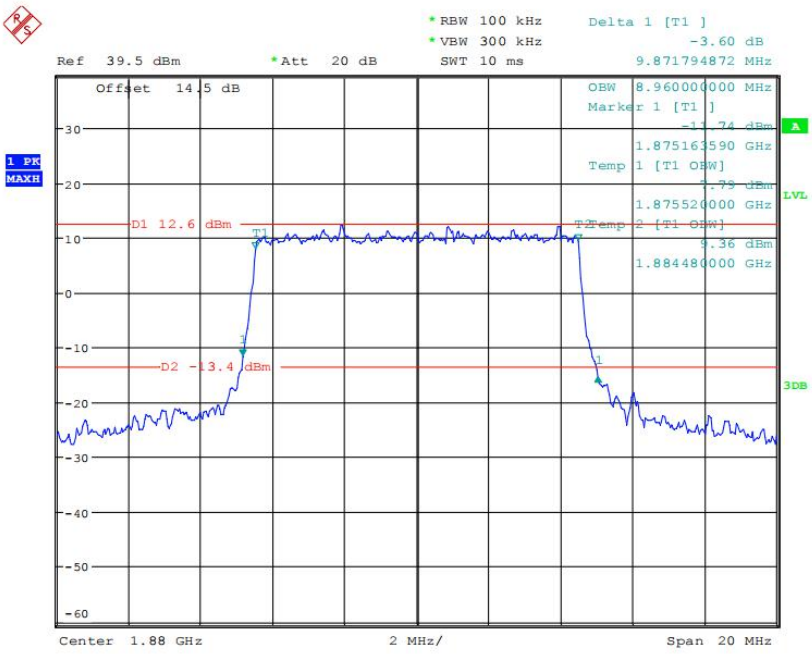
QPSK (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



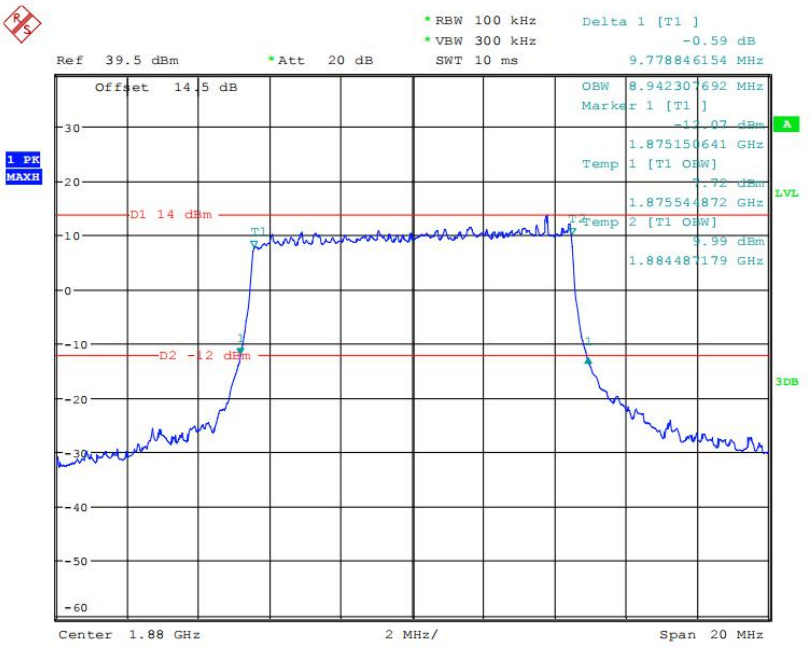
16-QAM (5.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



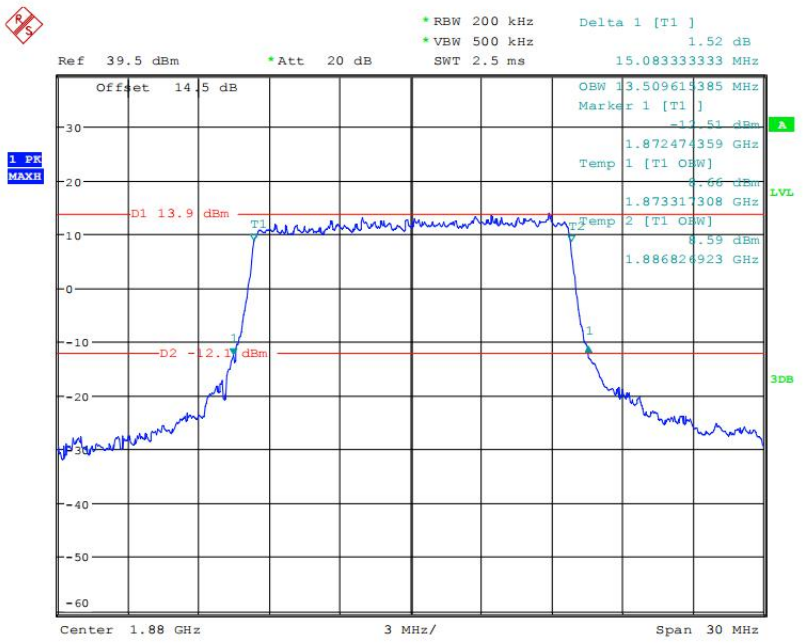
QPSK (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



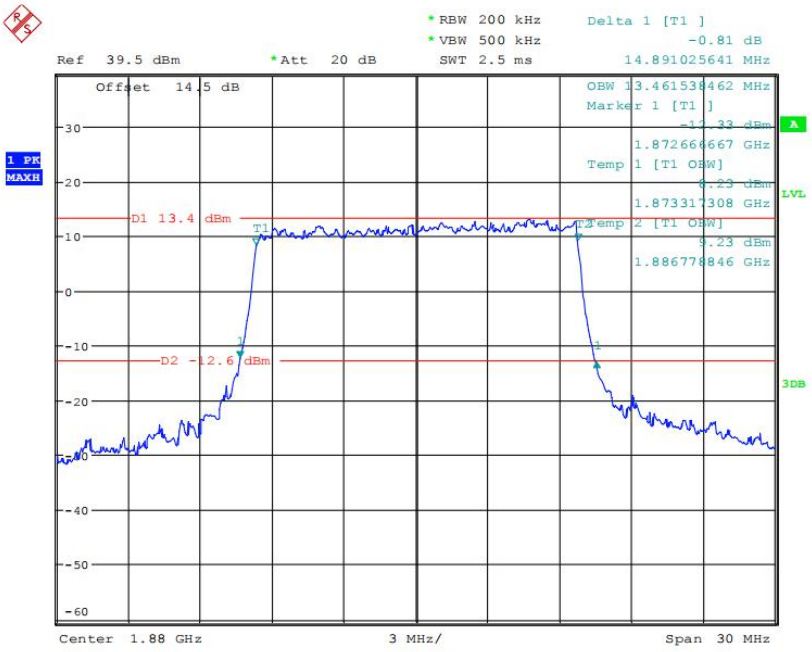
16-QAM (10.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



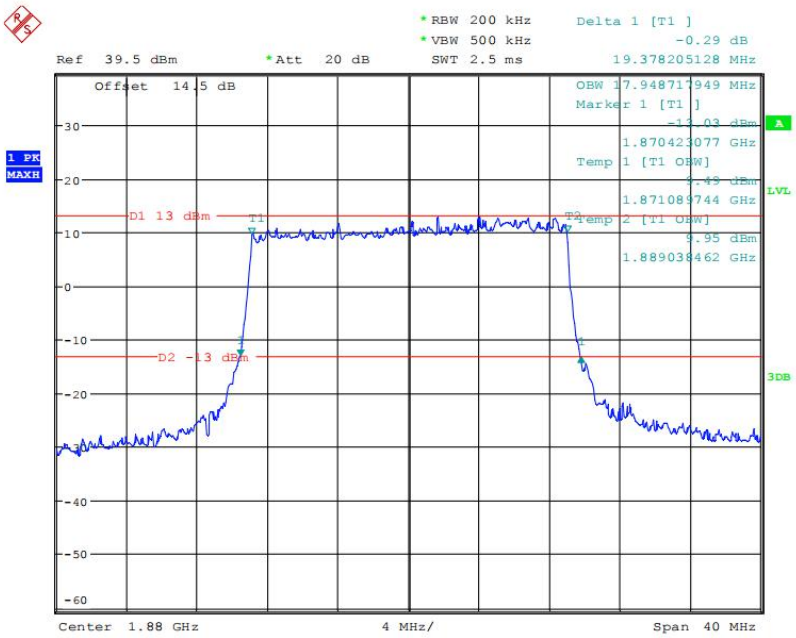
QPSK (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



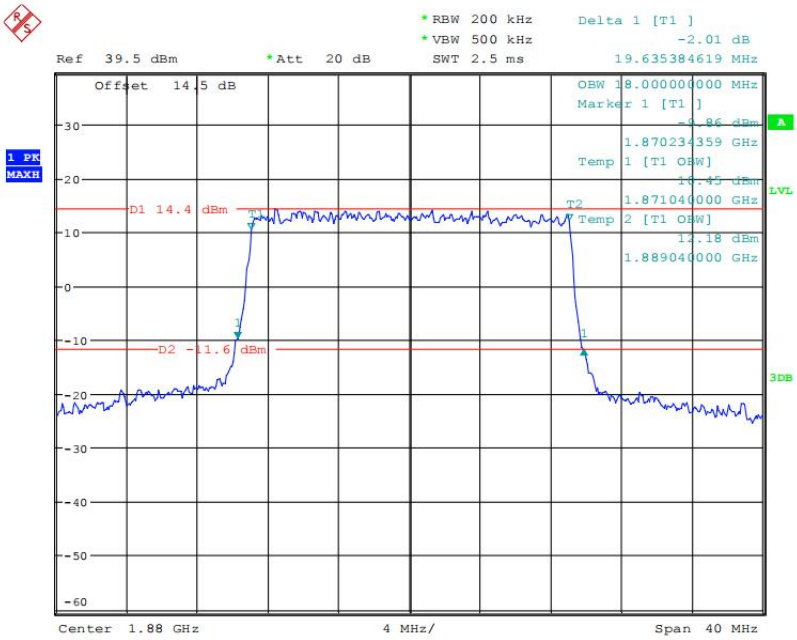
16-QAM (15.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



QPSK (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



16-QAM (20.0 MHz) - 26 dB Bandwidth & 99% Occupied Bandwidth, Middle channel



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

According to §24.238(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

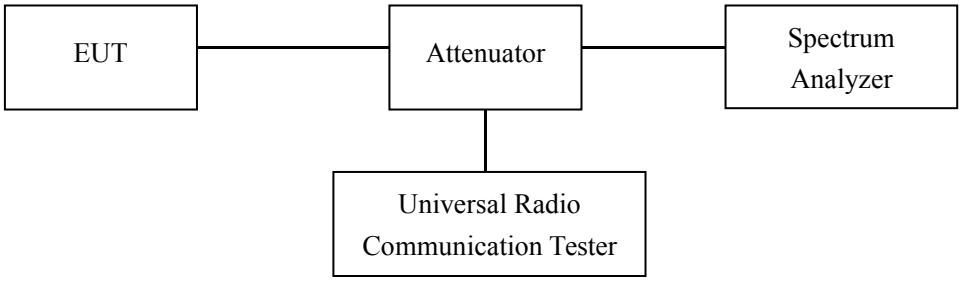
According to §27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

According to §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.

7.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

7.4 Summary of Test Results/Plots

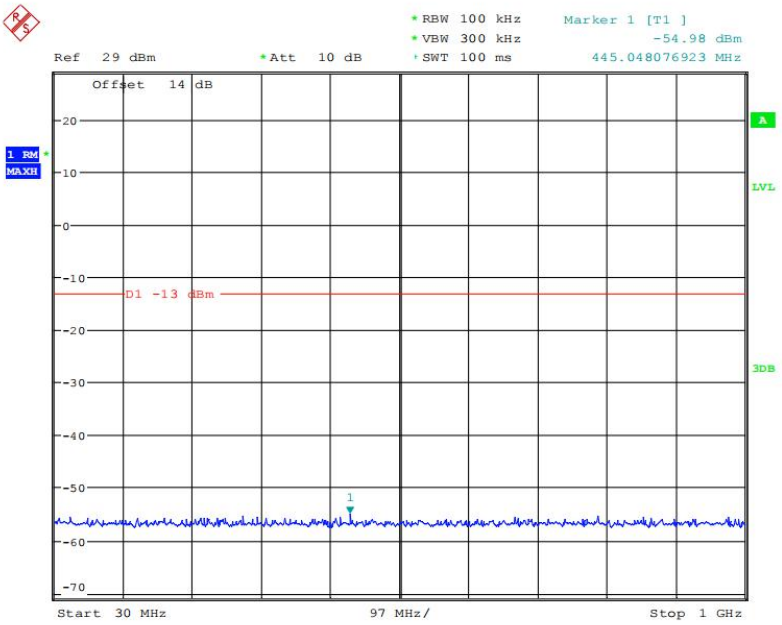
Test result: Pass

LTE Band 2: (QPSK)

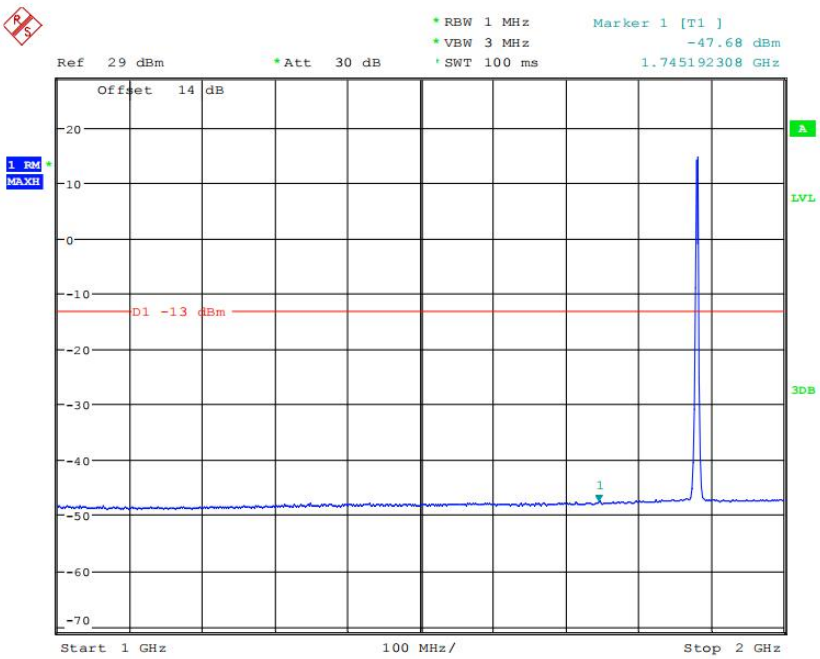
Middle channel

Note: scan with all model and conditions,only show the worst case in the report.

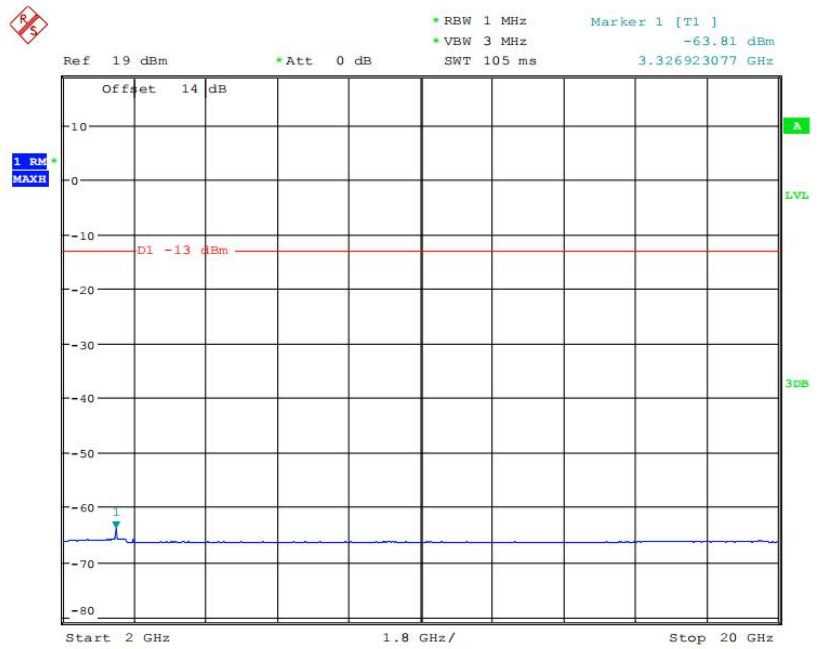
30 MHz - 1 GHz (1.4 MHz, Middle Channel)



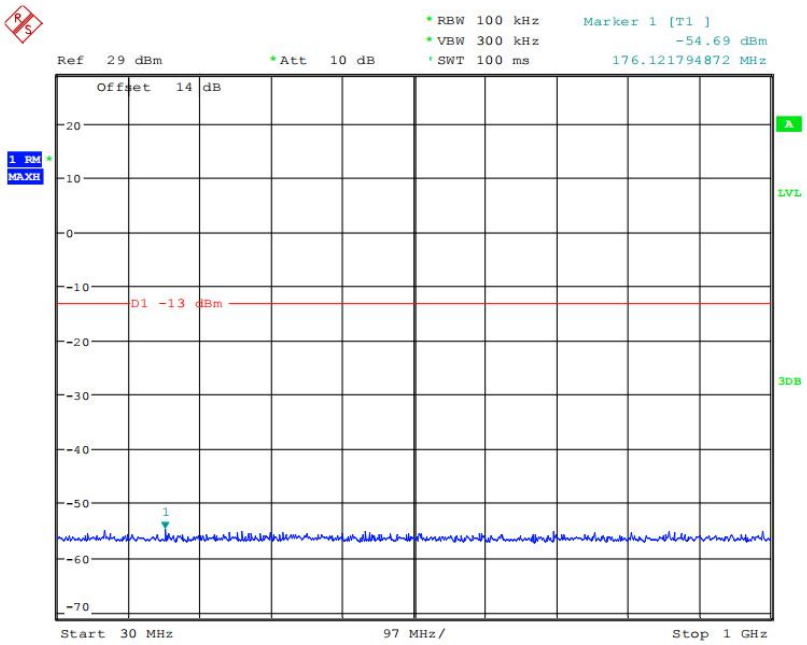
1 GHz - 2 GHz (1.4 MHz, Middle Channel)



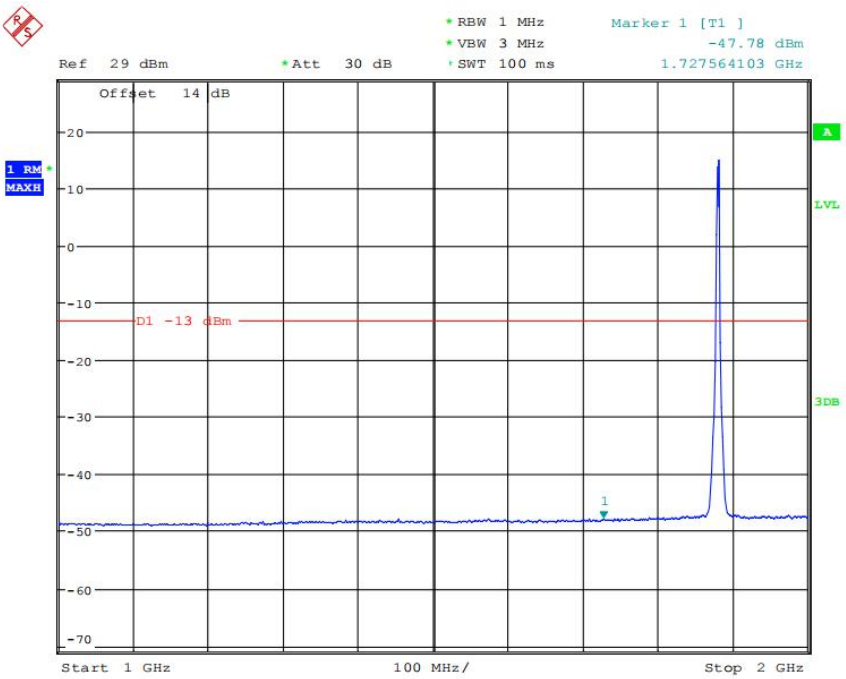
2 GHz - 20 GHz (1.4 MHz, Middle Channel)



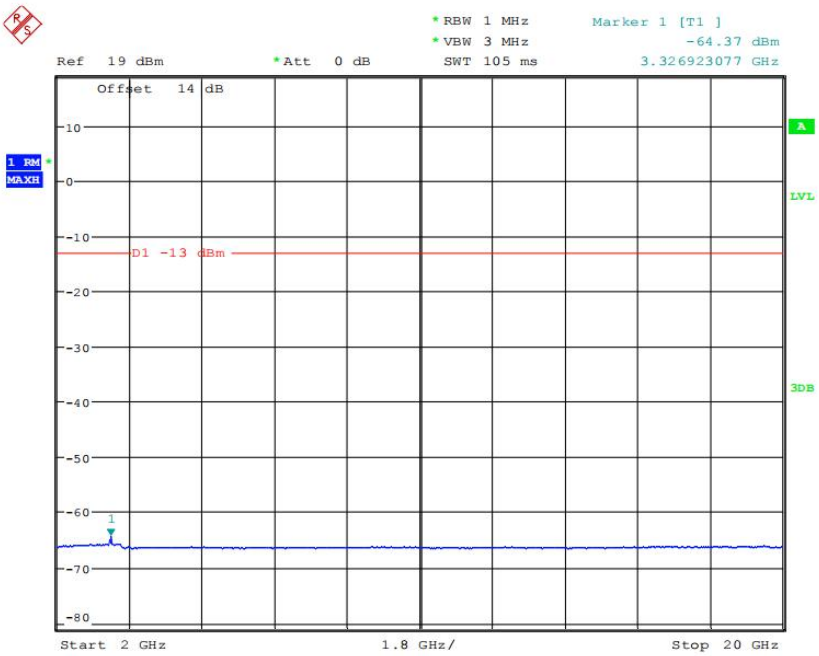
30 MHz - 1 GHz (3.0 MHz, Middle Channel)



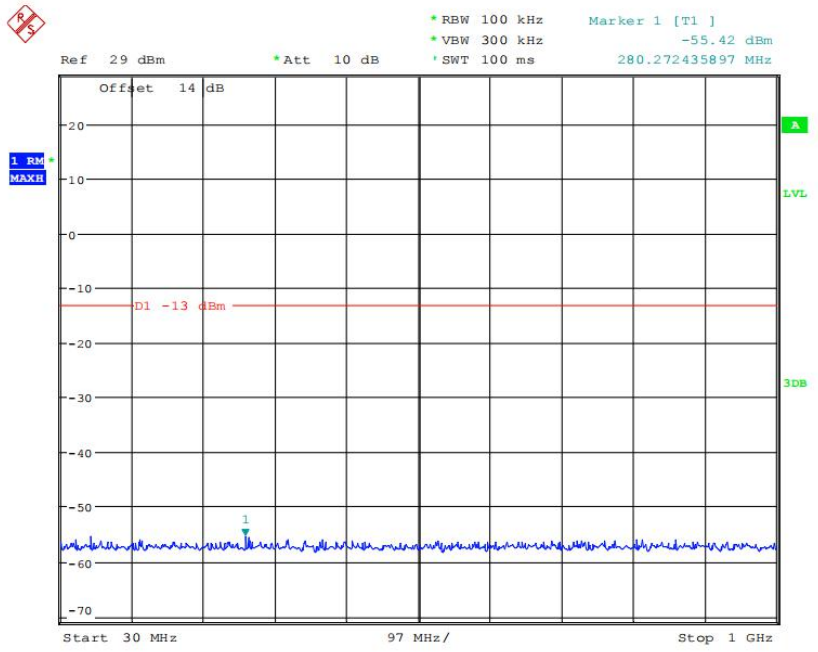
1 GHz - 2 GHz (3.0 MHz, Middle Channel)



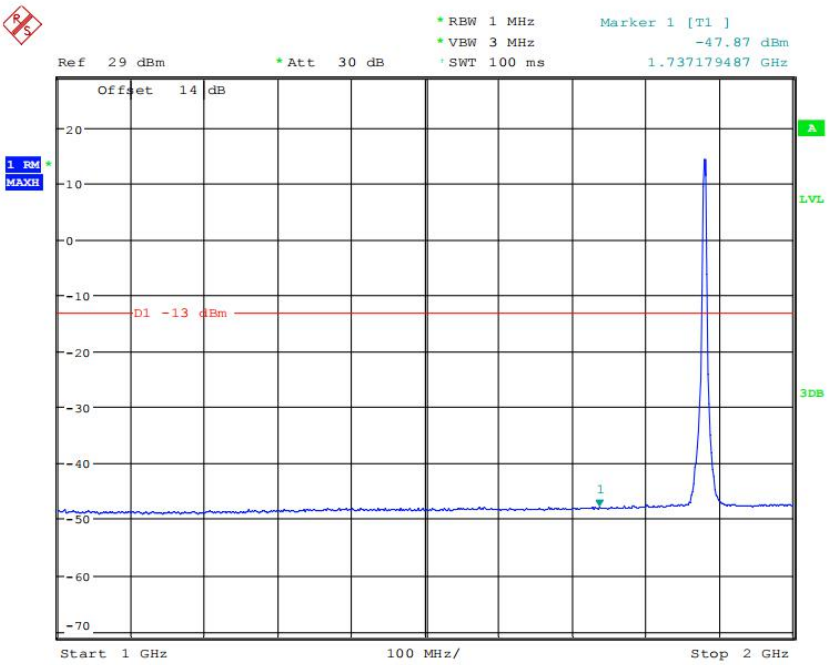
2 GHz - 20 GHz (3.0 MHz, Middle Channel)



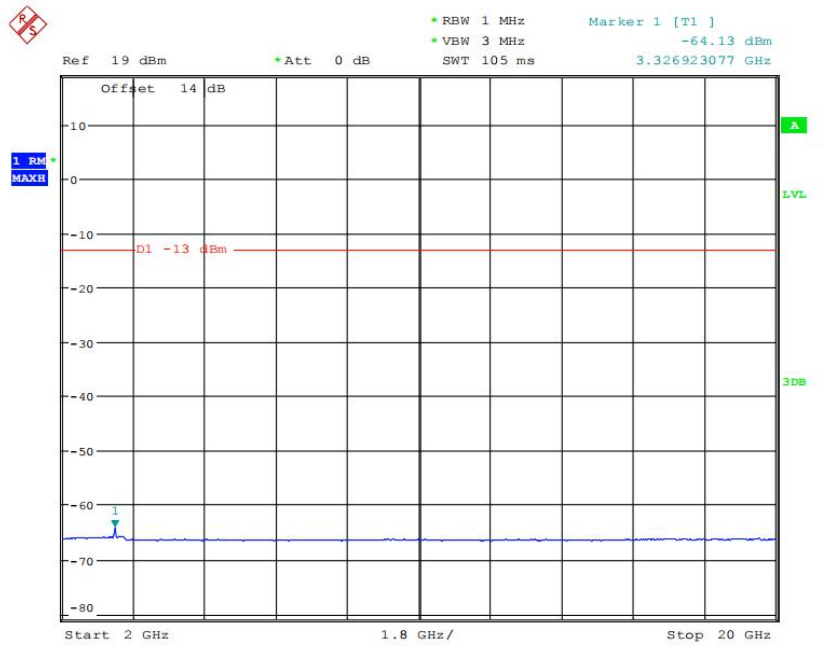
30 MHz - 1 GHz (5.0 MHz, Middle Channel)



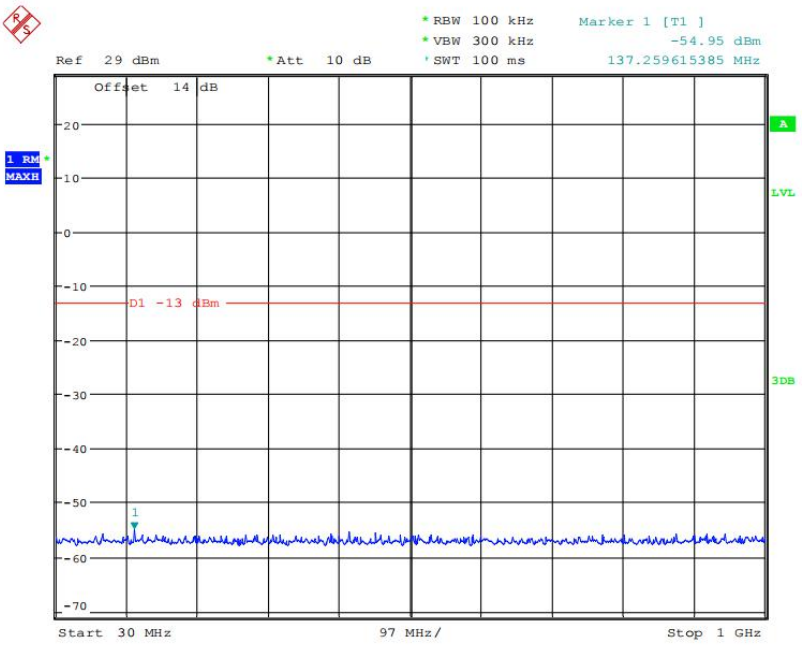
1 GHz - 2 GHz (5.0 MHz, Middle Channel)



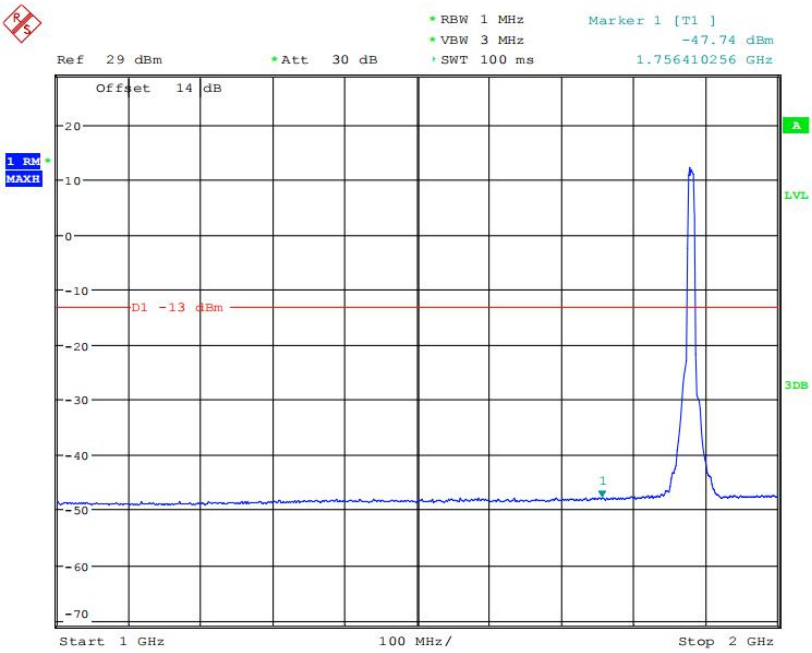
2 GHz - 20 GHz (5.0 MHz, Middle Channel)



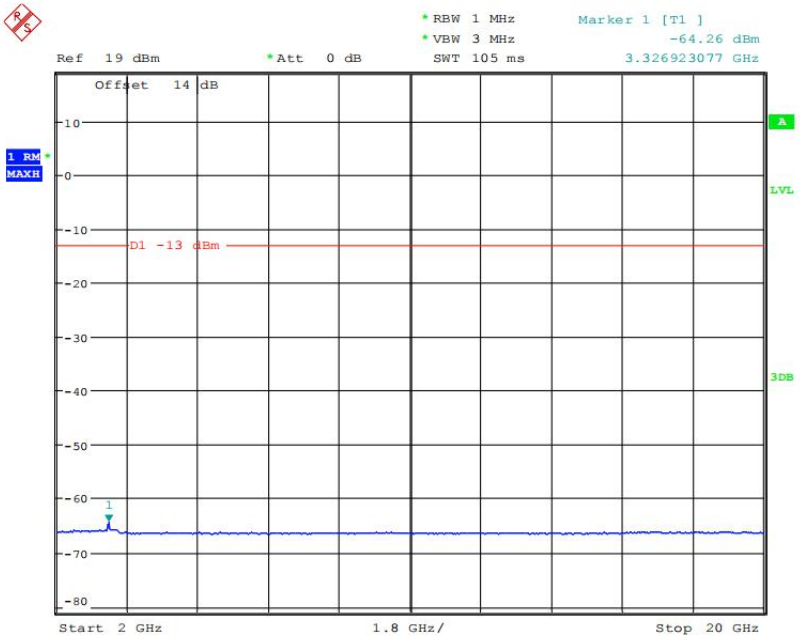
30 MHz - 1 GHz (10.0 MHz, Middle Channel)



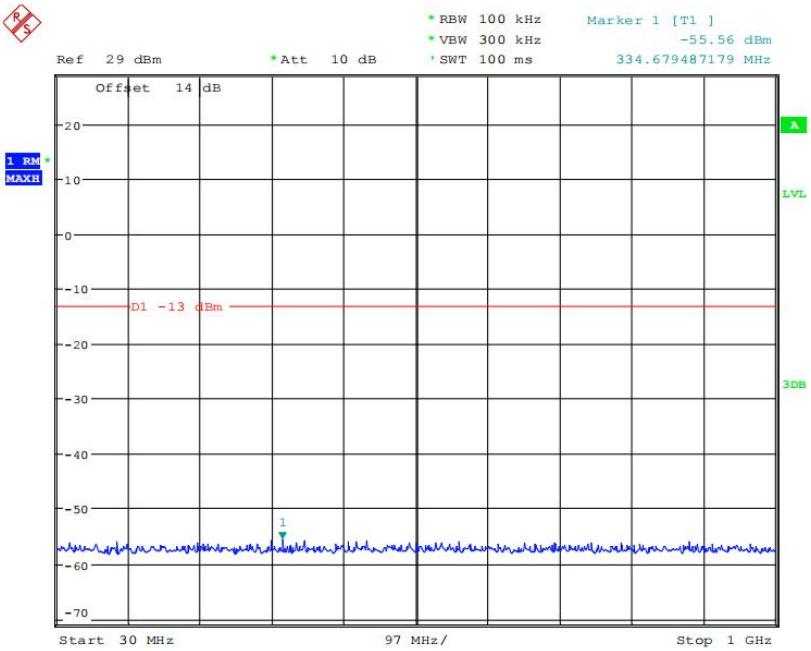
1 GHz - 2 GHz (10.0 MHz, Middle Channel)



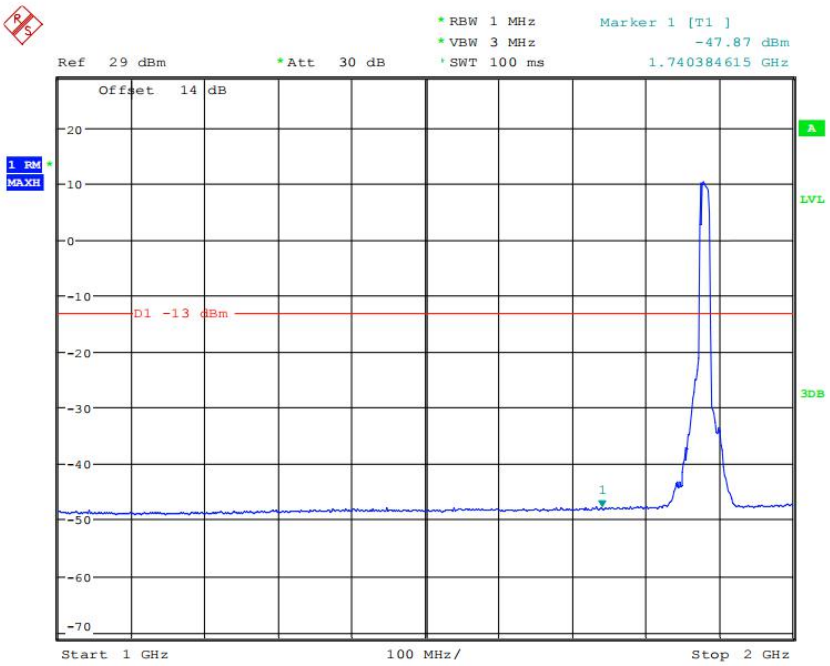
2 GHz - 20 GHz (10.0 MHz, Middle Channel)



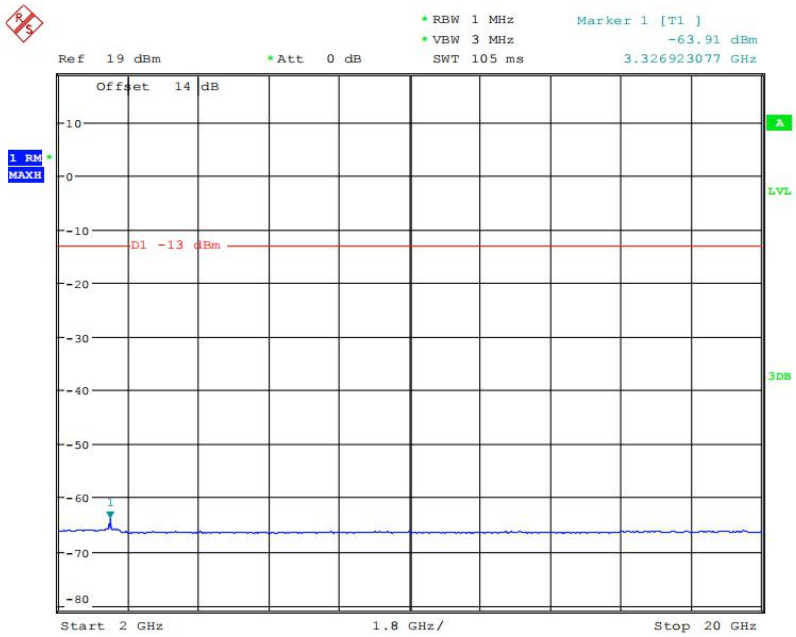
30 MHz - 1 GHz (15.0 MHz, Middle Channel)



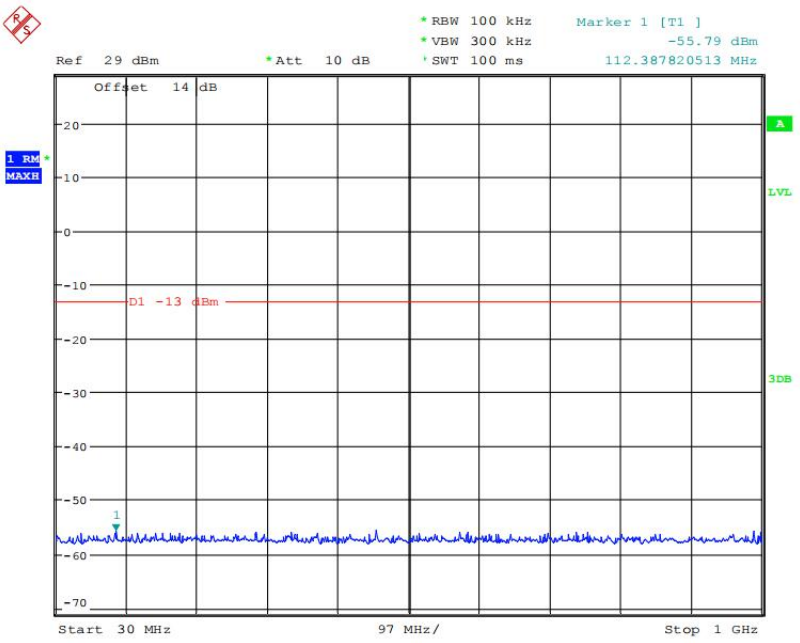
1 GHz - 2 GHz (15.0 MHz, Middle Channel)



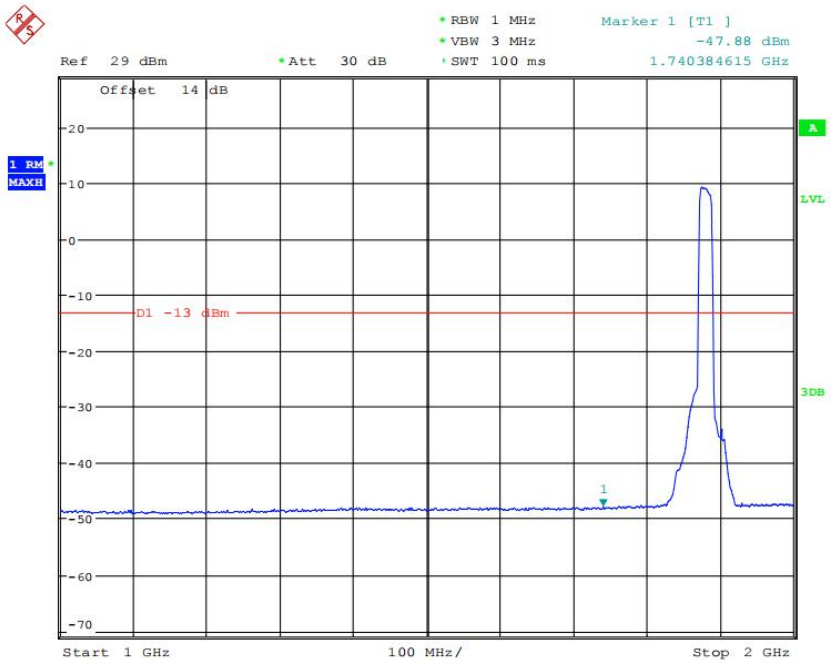
2 GHz - 20 GHz (15.0 MHz, Middle Channel)



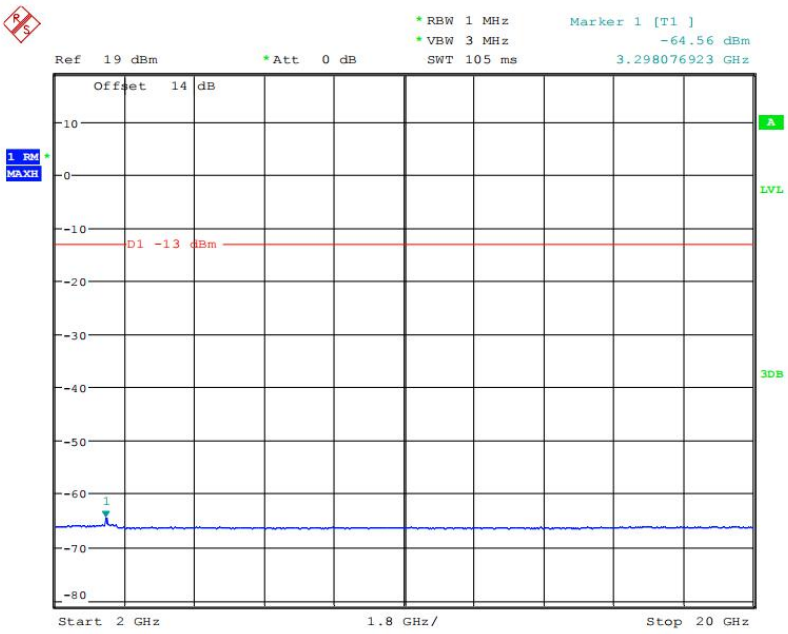
30 MHz - 1 GHz (20.0 MHz, Middle Channel)



1 GHz - 2 GHz (20.0 MHz, Middle Channel)



2 GHz - 20 GHz (20.0 MHz, Middle Channel)



8. Spurious Radiated Emissions

8.1 Standard Applicable

According to §24.238(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

According to §27.53 (g) 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.

8.2 Test Procedure

1. The setup of EUT is according with per ANSI/TIA-603-D: 2010 and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

8.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.4 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

2. All test modes (different bandwidth and different modulation) are performed, but only the worst case is recorded in this report.

Spurious Emission From 30MHz to 1GHz
For FDD_LTE Band 2 Mode(Pre-scan with all the bandwidth, and worse case as below)
Horizontal:

No.	Frequency	Reading	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)	
1	46.5030	-69.41	-65.07	-13.00	-52.07	ERP
2	93.1132	-67.79	-66.56	-13.00	-53.56	ERP
3	929.0082	-67.54	-50.04	-13.00	-37.04	ERP

Vertical:

No.	Frequency	Reading	Result	Limit	Margin	Remark
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)	
1	50.9420	-68.9	-64.64	-13.00	-51.64	ERP
2	109.7960	-69.28	-67.08	-13.00	-54.08	ERP
3	942.1305	-68.22	-50.58	-13.00	-37.58	ERP

Note: Result= Reading+ Correct
Margin=Result-Limit

Spurious Emissions Above 1GHz
For FDD_LTE Band 2 Mode(Pre-scan with all the bandwidth, and worse case as below)

Frequency	Reading	Result	Limit	Margin	Polar
(MHz)	(dBm)	(dBm)	(dBm)	(dB)	H/V
Low Channel (1852.4MHz)					
3704.80	-45.91	-35.99	-13.00	-22.99	H
5557.20	-50.56	-37.09	-13.00	-24.09	H
3704.80	-49.43	-39.51	-13.00	-26.51	V
5557.20	-61.5	-48.03	-13.00	-35.03	V
Middle Channel (1880.0MHz)					
3760.00	-52.57	-42.49	-13	-29.49	H
5640.00	-58.63	-45.1	-13	-32.1	H
3760.00	-54.86	-44.78	-13	-31.78	V
5640.00	-61	-47.47	-13	-34.47	V
High Channel (1907.6MHz)					
3815.20	-48.57	-38.65	-13	-25.65	H
5722.80	-57.13	-43.66	-13	-30.66	H
3815.20	-57.18	-47.26	-13	-34.26	V
5722.80	-60.74	-47.27	-13	-34.27	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Testing is carried out with frequency rang 9kHz to 20GHz, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so the data is not display.

9. Frequency Stability

9.1 Standard Applicable

According to §24.235, The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

9.2 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	DC 4.5-5.5V declared by manufacturer
-30°C to +50°C	Normal

9.3 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

LTE Band 2:

Middle channel

Note: scan with all model and conditions,only show the worst case in the report.

Test result: Pass

	Temperature(°C)	QPSK(Hz)	QPSK (ppm)
20.0 MHz, Middle Channel, 1880MHz	-30	18	-0.00933
	-20	15	-0.00813
	-10	16	-0.00853
	0	15	-0.00773
	10	13	-0.00693
	20	18	-0.00973
	30	18	-0.00933
	40	17	-0.00893
	50	16	-0.00853
	Voltage(Volt)	QPSK(Hz)	QPSK (ppm)
	5.0	18	-0.00973
	4.5	17	-0.00893
	5.5	16	-0.00853

10. FCC § 24.238 (a);- BAND EDGES

10.1 Standard Applicable

According to §24.238(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

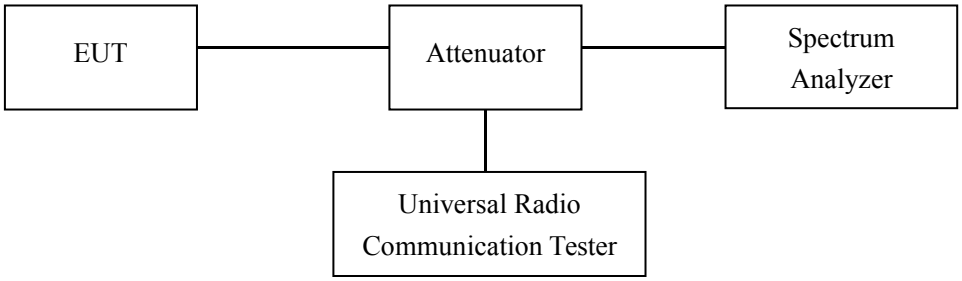
According to §27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

According to §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.

10.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



10.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

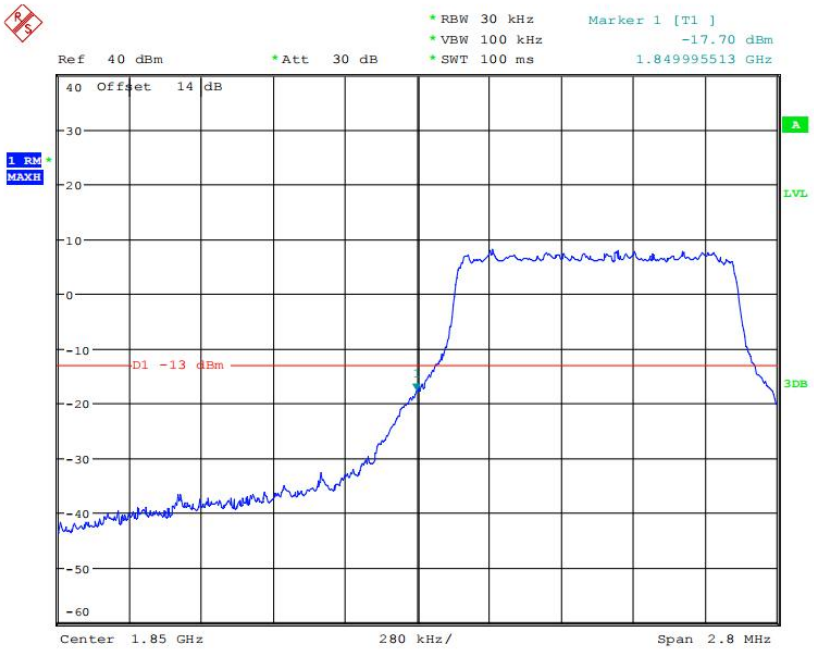
10.4 Summary of Test Results/Plots

Test result: Pass

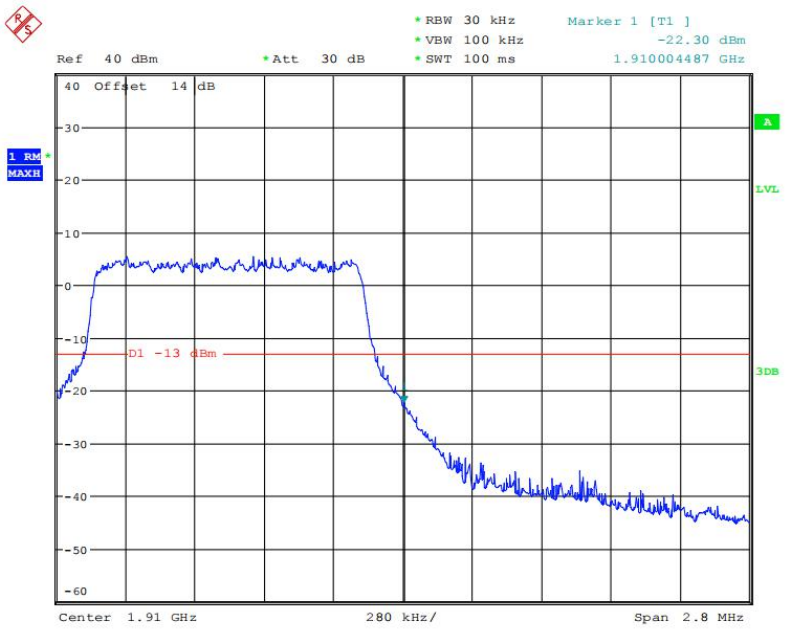
LTE Band 2: (QPSK)

Note: scan with all model and conditions,only show the worst case in the report.

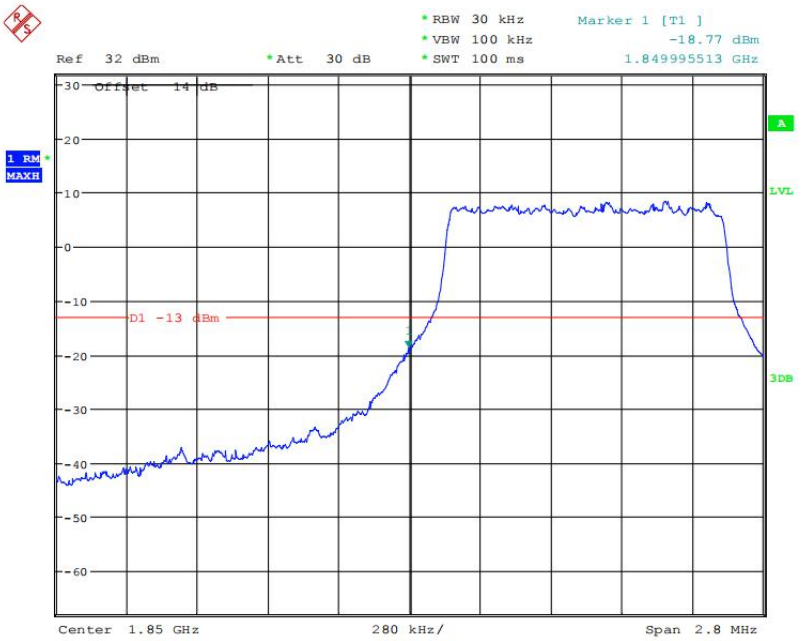
QPSK (1.4 MHz, FULL RB) - Left Band Edge



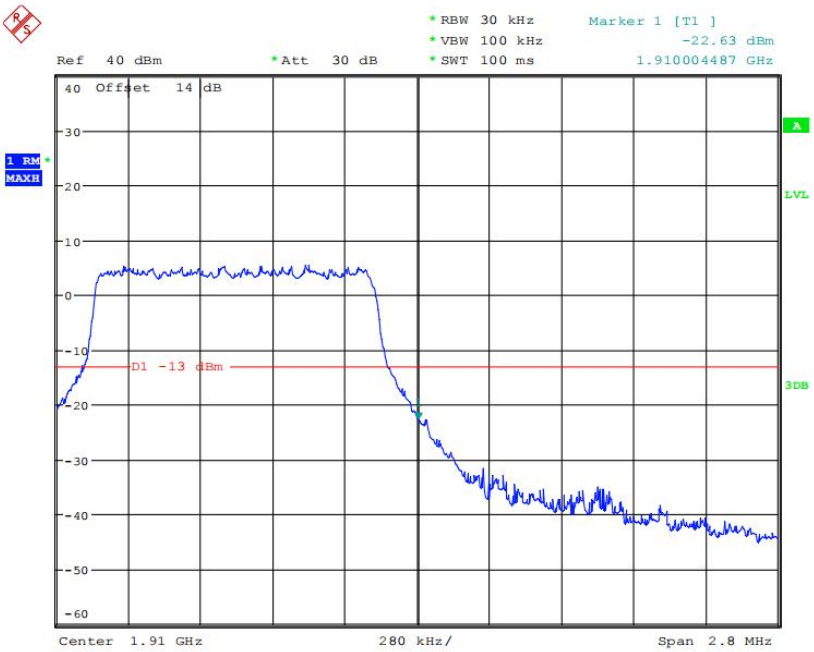
QPSK (1.4 MHz, FULL RB) - Right Band Edge



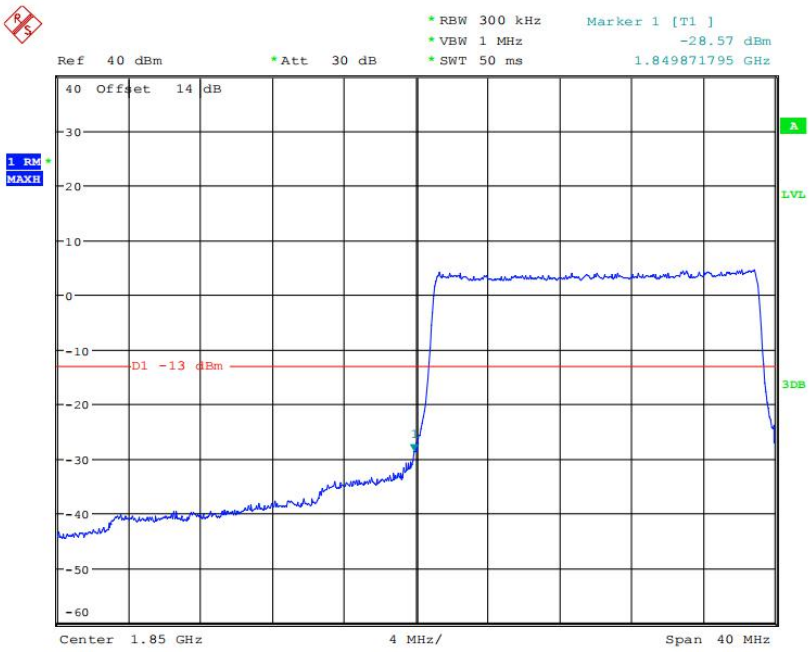
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



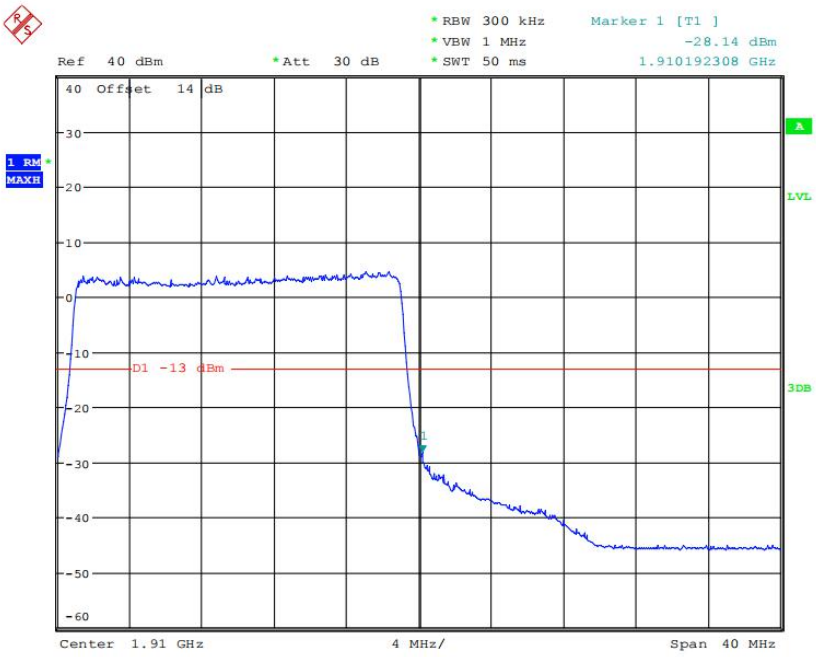
16-QAM (1.4 MHz, FULL RB) - Right Band Edge



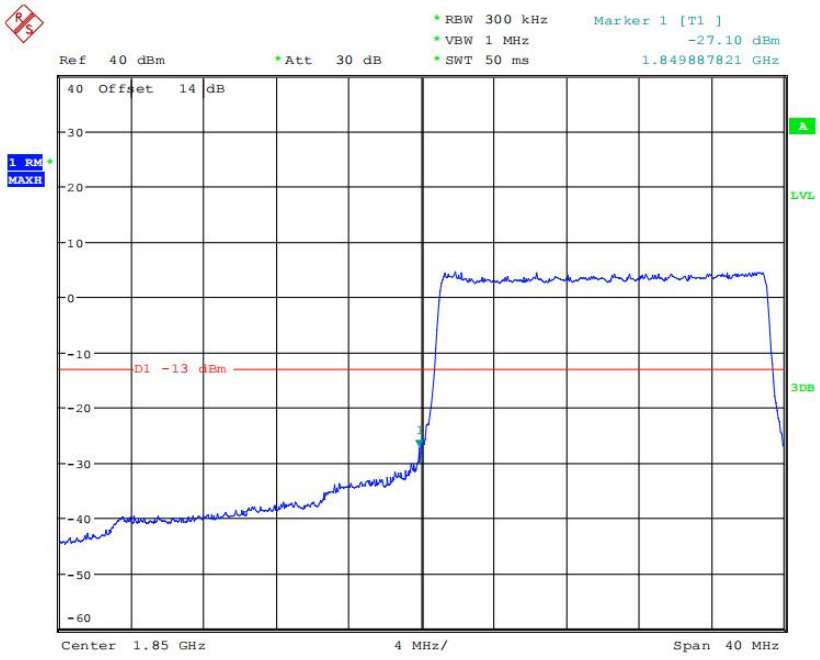
QPSK (20.0 MHz, FULL RB) - Left Band Edge



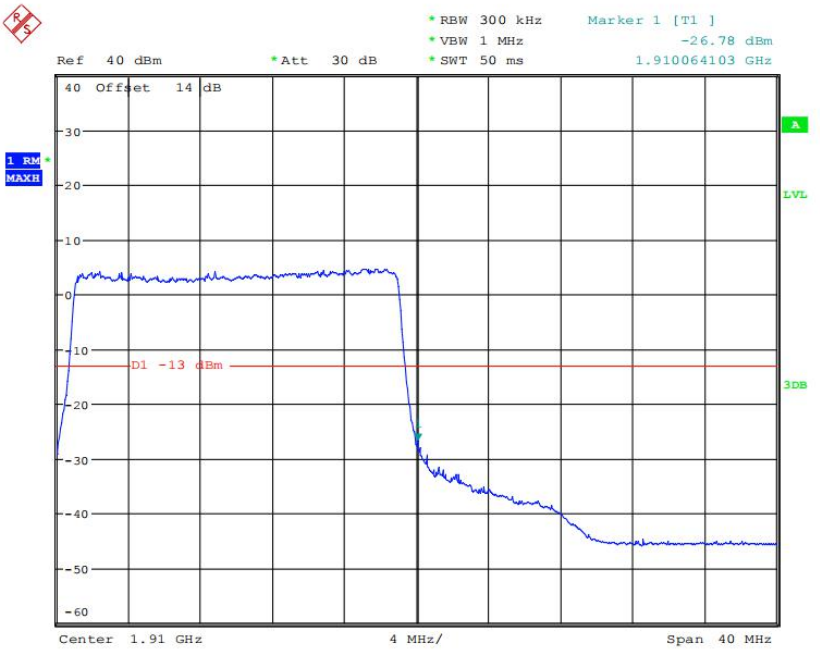
QPSK (20.0 MHz, FULL RB) - Right Band Edge



16-QAM (20.0 MHz, FULL RB) - Left Band Edge



16-QAM (20.0 MHz, FULL RB) - Right Band Edge



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