LTE TEST REPORT

Report Number: C21T00125-RF02-V01

Applicant	Shanghai Sunmi Technology Co., Ltd.
Product Name	Wireless data POS System
Model Name	T5930
Brand Name	SUNMI
FCC ID	2AH25T 5930

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part 2/27, ANSI/TIA-603-E, ANSI C63.26, KDB 971168 D01.

Prepared by	范宇航	Reviewed by	王长青
Approved by		Issue Date	2022-02-23

Industrial Internet Innovation Center (Shanghai) Co., Ltd.

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Test Laboratory:
Industrial Internet Innovation Center (Shanghai) Co., Ltd.
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Revision Version

Report Number	Revision	Date	Memo
C21T00125-RF02-V00	00	2022-01-25	Initial creation of test report
C21T00125-RF01-V01	01	2022-02-23	Revised the description of Section 5.2

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1. Test Laboratory

1.1. Testing Location

Company Name	Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Address	Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
FCC Registration No.	958356
FCC Degistration No.	CN1177

1.2. Testing Environment

Normal Temperature	15℃~35℃
Relative Humidity	30%RH~60%RH
Supply Voltage	120V/60Hz

1.3. Project Information

Project Leader	Wang Wenwen
Testing Start Date	2021-10-22
Testing End Date	2022-01-23

2. Client Information

2.1. Applicant Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

2.2. Manufacturer Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	+86 18501703215

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

3.1. About EUT

Product Name	Wireless data POS System
Model name	T5930
Supported Radio Technology and Bands	GSM850/GSM900/GSM1800/GSM1900 WCDMA Band I/II/ IV/V LTE Band 2/3/4/7/17/28 WLAN 802.11a,b,g,n
Hardware Version	V3
Software Version	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC
FCC ID	2AH25T 5930
Extreme Temperature	-10℃~50℃
Nominal Voltage	7.60V
Extreme High Voltage	8.70V
Extreme Low Voltage	6.80V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N01 (Mainly Supply)	863123056610518	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2021-10-22
N03	863123056610450	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2021-10-22
N08 (Secondary Supply)	N/A	V3	ZAP1522_769_DEV_dailybuild_20181205071714_userdebug_DCC	2022-01-12

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
AE1	RF cable	N/A	N/A

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

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	2020-10-01
FCC Part 22	PUBLIC MOBILE SERVICES	2020-10-01
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	2020-10-01
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	2020-10-01
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI C63.26	American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio	2015
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v03r01

4.2. Reference Information from client

Antenna gain Information of the test sample provided by Shanghai Sunmi Technology Co., Ltd.
Maximum of Antenna Gain:
LTE Band 2：2.3dBi
LTE Band 3：1.2dBi
LTE Band 4：1.18dBi
LTE Band 7：-2.5dBi
LTE Band 17：-2.4dBi
LTE Band 28：-2.1dBi

5. Test Summary

5.1. Summary of Test Results

LTE Band 2

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	24.232(c)	Pass
2	Emission Limit	24.238(a), 2.1051	Pass
3	Frequency Stability	24.235, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	24.238(a)	Pass
6	Band Edge Compliance	24.238(a)	Pass
7	Conducted Spurious Emission	24.238, 2.1057	Pass
8	Peak to Average Power Ratio	24.232 (d)	Pass

LTE Band 4

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 7

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(m), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(m)	Pass

6	Band Edge Compliance	27.53(m)	Pass
7	Conducted Spurious Emission	27.53(m), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

LTE Band 17

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50(d)(4)	Pass
2	Emission Limit	27.53(h), 2.1051	Pass
3	Frequency Stability	27.54, 2.1055	Pass
4	Occupied Bandwidth	2.1049(h)(i)	Pass
5	Emission Bandwidth	27.53(h)	Pass
6	Band Edge Compliance	27.53(h)	Pass
7	Conducted Spurious Emission	27.53(h), 2.1057	Pass
8	Peak to Average Power Ratio	27.50(a)	Pass

Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	25℃
Voltage	Vnom	3.7V
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

5.2. Statements

The T5930, manufactured by Shanghai Sunmi Technology Co., Ltd. is a variant product for testing.

This project is a variant project based on the original report C21T00009-RF02-V00-LTE. According to the product change description (Annex B) of the product, we tested the all band.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Measurement Results

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω
Temperature	Min. = 15 ℃, Max. = 35 ℃

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

6.1. Output Power

6.1.1. Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

In all cases, output power is within the specified limits.

CMW500 setting：

1: CMW500 is connected to the DUT

2: Set RX Expected PEP to 30 dBm

6.1.2. Conducted

6.1.2.1. Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

6.1.2.2 Measurement result

LTE band 2

LTE 2			Output power (dBm)			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				18607	18900	19193
QPSK	1	Low	23.5	22.27	22.47	22.49
		Middle		22.35	22.62	22.59
		High		22.18	22.47	22.50
	50%	Low	23	22.27	22.60	22.57
		Middle		22.35	22.62	22.62
		High		22.29	22.59	22.54
	100%	/	22.5	21.30	21.61	21.62
16QAM	1	Low	22.5	21.35	21.64	21.67
		Middle		21.51	21.77	21.76
		High		21.37	21.69	21.66
	5	Low	22	21.21	21.69	21.64
		Middle		21.45	21.71	21.64
		High		21.33	21.61	21.64
	100%	/	21.5	20.42	20.64	20.64
Modulation	RB	RB Offset	Tune up	3MHz		
				18615	18900	19185
QPSK	1	Low	23.5	22.26	22.58	22.65
		Middle		22.32	22.98	22.61
		High		22.26	22.62	22.55
	50%	Low	23	21.31	21.60	21.61
		Middle		21.32	21.61	21.66
		High		21.35	21.57	21.62
	100%	/	22.5	21.34	21.57	21.62
16QAM	1	Low	22.5	21.46	21.95	22.03

		Middle		21.75	22.08	22.12
		High		21.50	21.87	22.00
	50%	Low	22	20.40	20.68	20.64
		Middle		20.38	20.68	20.65
		High		20.36	20.62	20.64
	100%	/	21.5	20.36	20.58	20.56
Modulation	RB	RB Offset	Tune up	5MHz		
				18625	18900	19175
QPSK	1	Low	23.5	22.11	22.51	22.57
		Middle		22.31	22.62	22.72
		High		22.18	22.56	22.58
	50%	Low	23	21.30	21.55	21.70
		Middle		21.42	21.63	21.71
		High		21.27	21.65	21.61
	100%	/	22.5	21.48	21.59	21.69
16QAM	1	Low	22.5	21.57	22.03	21.96
		Middle		21.97	22.26	21.98
		High		21.52	21.89	21.82
	50%	Low	22	20.36	20.57	20.67
		Middle		20.38	20.64	20.70
		High		20.24	20.60	20.70
	100%	/	21.5	20.29	20.61	20.73
Modulation	RB	RB Offset	Tune up	10MHz		
				18650	18900	19150
QPSK	1	Low	23.5	22.44	22.67	22.71
		Middle		22.53	22.75	22.82
		High		22.42	22.57	22.67
	50%	Low	23	21.48	21.66	21.86
		Middle		21.53	21.71	21.74
		High		21.36	21.70	21.73
	100%	/	22.5	21.42	21.68	21.80
16QAM	1	Low	22.5	21.51	21.94	21.92
		Middle		21.65	21.91	22.00
		High		21.59	21.98	21.66
	50%	Low	22	20.42	20.63	20.84
		Middle		20.44	20.63	20.75
		High		20.34	20.70	20.67
	100%	/	21.5	20.45	20.72	20.77
Modulation	RB	RB Offset	Tune up	15MHz		
				18675	18900	19125
QPSK	1	Low	23.5	22.47	22.62	22.61
		Middle		22.57	22.66	22.71

		High		22.47	22.56	22.59
	50%	Low	23	21.54	21.68	21.77
		Middle		21.51	21.67	21.78
		High		21.49	21.76	21.79
	100%	/	22.5	21.55	21.76	21.84
16QAM	1	Low	22.5	21.51	21.94	21.96
		Middle		21.67	22.02	21.93
		High		21.55	21.85	21.91
	50%	Low	22	20.53	20.67	20.85
		Middle		20.55	20.66	20.77
		High		20.53	20.74	20.71
	100%	/	21.5	20.50	20.67	20.84
Modulation	RB	RB Offset	Tune up	20MHz		
				18700	18900	19100
QPSK	1	Low	23.5	22.24	22.49	22.55
		Middle		22.59	22.74	22.82
		High		22.34	22.35	22.44
	50%	Low	23	21.78	21.66	21.96
		Middle		21.65	21.78	21.83
		High		21.52	21.82	21.64
	100%	/	22.5	21.67	21.79	21.84
16QAM	1	Low	22.5	21.48	21.72	21.69
		Middle		21.92	22.01	21.93
		High		21.58	21.59	21.64
	50%	Low	22	20.72	20.68	20.92
		Middle		20.59	20.67	20.80
		High		20.52	20.82	20.67
	100%	/	21.5	20.58	20.72	20.78

LTE band 4

LTE 4				Output power (dBm)		
Modulation	RB	RB Offset	Tune up	1.4MHz		
				19957	20175	20393
QPSK	1	Low	22	21.33	21.27	21.28
		Middle		21.37	21.38	21.29
		High		21.30	21.29	21.21
	50%	Low	22	21.34	21.35	21.29
		Middle		21.35	21.34	21.40
		High		21.32	21.36	21.37
	100%	/	21	20.35	20.35	20.38
16QAM	1	Low	21.5	20.68	20.70	20.34
		Middle		20.83	20.72	20.58
		High		20.49	20.60	20.52

	5	Low	21	20.43	20.41	20.42
		Middle		20.49	20.49	20.52
		High		20.51	20.39	20.35
	100%	/	20	19.46	19.49	19.33
Modulation	RB	RB Offset	Tune up	3MHz		
				19965	20175	20385
QPSK	1	Low	22	21.36	21.35	21.29
		Middle		21.39	21.33	21.51
		High		21.37	21.34	21.34
	50%	Low	22	20.40	20.41	20.35
		Middle		20.45	20.39	20.35
		High		20.39	20.39	20.39
	100%	/	21	20.40	20.39	20.36
16QAM	1	Low	21.5	20.79	20.56	20.64
		Middle		20.83	20.55	20.72
		High		20.77	20.46	20.54
	50%	Low	21	19.43	19.51	19.36
		Middle		19.45	19.55	19.44
		High		19.33	19.44	19.37
	100%	/	20	19.40	19.34	19.30
Modulation	RB	RB Offset	Tune up	5MHz		
				19975	20175	20375
QPSK	1	Low	22	21.30	21.25	21.16
		Middle		21.64	21.59	21.28
		High		21.25	21.17	21.16
	50%	Low	22	20.40	20.33	20.31
		Middle		20.42	20.41	20.39
		High		20.41	20.30	20.29
	100%	/	21	20.38	20.31	20.34
16QAM	1	Low	21.5	20.57	20.55	20.57
		Middle		20.80	20.95	20.65
		High		20.52	20.55	20.45
	50%	Low	21	19.42	19.44	19.29
		Middle		19.48	19.45	19.45
		High		19.45	19.35	19.26
	100%	/	20	19.43	19.43	19.29
Modulation	RB	RB Offset	Tune up	10MHz		
				20000	20175	20350
QPSK	1	Low	22	21.30	21.34	21.37
		Middle		21.46	21.47	21.40
		High		21.22	21.21	21.23
	50%	Low	22	20.48	20.45	20.29

		Middle		20.46	20.40	20.37
		High		20.51	20.35	20.38
	100%	/	21	20.50	20.46	20.35
16QAM	1	Low	21.5	20.94	20.58	20.77
		Middle		20.97	20.70	20.94
		High		20.85	20.49	20.79
	50%	Low	21	19.40	19.46	19.38
		Middle		19.39	19.38	19.38
		High		19.47	19.31	19.40
	100%	/	20	19.42	19.36	19.39
Modulation	RB	RB Offset	Tune up	15MHz		
				20025	20175	20325
QPSK	1	Low	22	21.37	21.39	21.29
		Middle		21.39	21.39	21.33
		High		21.24	21.20	21.13
	50%	Low	22	20.38	20.41	20.35
		Middle		20.46	20.42	20.41
		High		20.41	20.30	20.37
	100%	/	21	20.46	20.43	20.36
16QAM	1	Low	21.5	20.56	20.51	20.57
		Middle		20.61	20.69	20.63
		High		20.43	20.50	20.47
	50%	Low	21	19.38	19.51	19.45
		Middle		19.38	19.45	19.40
		High		19.46	19.42	19.37
	100%	/	20	19.39	19.32	19.36
Modulation	RB	RB Offset	Tune up	20MHz		
				20050	20175	20300
QPSK	1	Low	22	21.19	21.14	21.08
		Middle		21.35	21.50	21.41
		High		20.96	20.92	20.89
	50%	Low	22	20.32	20.54	20.44
		Middle		20.40	20.38	20.44
		High		20.43	20.29	20.46
	100%	/	21	20.34	20.41	20.48
16QAM	1	Low	21.5	20.61	20.57	20.50
		Middle		20.85	20.61	20.76
		High		20.46	20.16	20.34
	50%	Low	21	19.30	19.52	19.44
		Middle		19.45	19.46	19.44
		High		19.35	19.23	19.39
	100%	/	20	19.33	19.38	19.43

LTE band 7

LTE 7				Output power (dBm)		
Modulation	RB	RB Offset	Tune up	5MHz		
				20775	21100	21425
QPSK	1	Low	23	22.23	22.10	22.17
		Middle		22.52	22.43	22.44
		High		22.13	22.10	22.17
	50%	Low	22	21.23	21.09	21.33
		Middle		21.30	21.18	21.36
		High		21.41	21.16	21.32
	100%	/	22	21.27	21.24	21.30
16QAM	1	Low	22.5	21.47	21.24	21.56
		Middle		21.66	21.52	21.87
		High		21.45	21.14	21.53
	5	Low	21	20.33	20.23	20.39
		Middle		20.45	20.29	20.45
		High		20.44	20.19	20.37
	100%	/	21	20.30	20.17	20.39
Modulation	RB	RB Offset	Tune up	10MHz		
				20800	21100	21400
QPSK	1	Low	23	22.25	22.07	22.22
		Middle		22.27	22.20	22.44
		High		22.28	22.17	22.26
	50%	Low	22	21.30	21.17	21.35
		Middle		21.42	21.22	21.35
		High		21.43	21.25	21.39
	100%	/	22	21.35	21.23	21.37
16QAM	1	Low	22.5	21.48	21.56	21.80
		Middle		21.61	21.69	21.88
		High		21.46	21.56	21.65
	50%	Low	21	20.24	20.21	20.38
		Middle		20.39	20.23	20.45
		High		20.46	20.22	20.42
	100%	/	21	20.39	20.27	20.43
Modulation	RB	RB Offset	Tune up	15MHz		
				20825	21100	21375
QPSK	1	Low	23	22.12	22.04	22.03
		Middle		22.27	22.12	22.28
		High		22.15	22.10	22.23
	50%	Low	22	21.26	21.13	21.33
		Middle		21.33	21.29	21.33
		High		21.32	21.19	21.37

	100%	/	22	21.27	21.21	21.40
16QAM	1	Low	22.5	21.34	21.39	21.30
		Middle		21.49	21.49	21.55
		High		21.38	21.36	21.44
	50%	Low	21	20.28	20.20	20.36
		Middle		20.37	20.31	20.35
		High		20.34	20.27	20.41
	100%	/	21	20.33	20.21	20.29
Modulation	RB	RB Offset	Tune up	20MHz		
				20850	21100	21350
QPSK	1	Low	23	21.98	21.92	21.92
		Middle		22.31	22.37	22.35
		High		22.04	21.96	22.00
	50%	Low	22	21.19	21.08	21.23
		Middle		21.40	21.23	21.38
		High		21.38	21.23	21.32
	100%	/	22	21.23	21.19	21.28
16QAM	1	Low	22.5	21.33	20.95	21.21
		Middle		21.61	21.40	21.75
		High		21.34	21.15	21.40
	50%	Low	21	20.22	20.15	20.25
		Middle		20.36	20.29	20.33
		High		20.38	20.21	20.31
	100%	/	21	20.32	20.15	20.24

LTE band 17

LTE 17				Output power (dBm)		
Modulation	RB	RB Offset	Tune up	5MHz		
				23755	23790	23825
QPSK	1	Low	23.5	22.58	22.64	22.67
		Middle		22.88	22.94	22.90
		High		22.71	22.59	22.66
	50%	Low	22.5	21.67	21.79	21.77
		Middle		21.77	21.79	21.80
		High		21.71	21.81	21.63
	100%	/	22	21.79	21.79	21.76
16QAM	1	Low	23	21.98	22.05	21.90
		Middle		22.42	22.35	22.22
		High		22.12	22.06	21.84
	5	Low	21.5	20.78	20.76	20.86
		Middle		20.81	20.75	20.82
		High		20.70	20.72	20.69
	100%	/	21.5	20.77	20.80	20.72

Modulation	RB	RB Offset	Tune up	10MHz		
				23780	23790	23800
QPSK	1	Low	23.5	22.12	22.17	22.19
		Middle		22.31	22.46	22.36
		High		22.26	22.30	22.25
	50%	Low	22.5	21.31	21.39	21.38
		Middle		21.30	21.32	21.32
		High		21.35	21.31	21.30
	100%	/	22	21.35	21.29	21.38
16QAM	1	Low	23	21.46	21.61	21.43
		Middle		21.77	21.78	21.61
		High		21.75	21.64	21.42
	50%	Low	21.5	20.30	20.34	20.36
		Middle		20.30	20.34	20.36
		High		20.36	20.34	20.25
	100%	/	21.5	20.78	20.30	20.33

6.1.3 Radiated

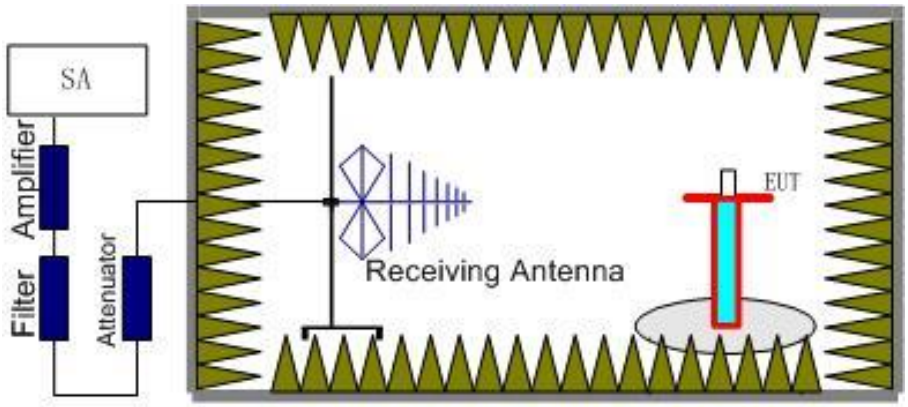
6.1.3.1 Description

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

Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 27.50(d) specifies “Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”.

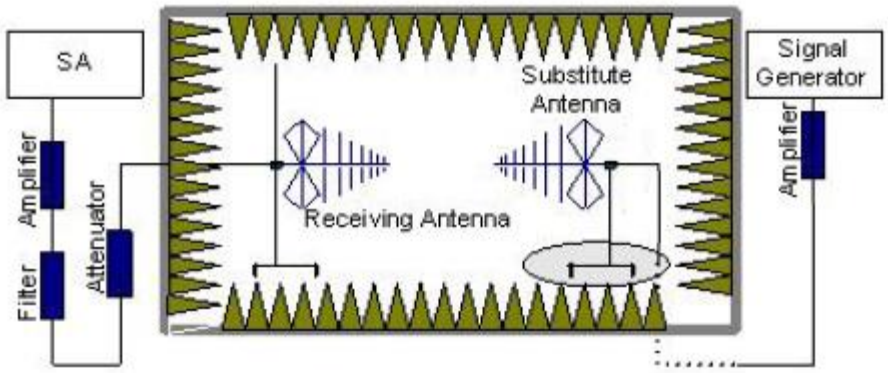
6.1.3.2 Method of Measurement



The measurements procedures in TIA-603E-2016 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.

2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = $P_{Mea} + P_{Ag} - P_{cl} + G_a$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

6.1.3.3 Measurement result

LTE Band 2- EIRP 24. 232(b)

Limits: ≤33dBm (2W)

LTE Band 2_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	24.65	33.00	H
1880	24.92	33.00	H
1909.3	24.92	33.00	H

LTE Band 2_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	24.62	33.00	H
1880	25.28	33.00	H
1908.5	24.95	33.00	H

LTE Band 2_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	24.61	33.00	H
1880	24.92	33.00	H
1907.5	25.02	33.00	H

LTE Band 2_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	24.83	33.00	H
1880	25.05	33.00	H
1905	25.12	33.00	H

LTE Band 2_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1857.5	24.87	33.00	H
1880	24.96	33.00	H
1902.5	25.01	33.00	H

LTE Band 2_20 MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	24.89	33.00	H
1880	25.04	33.00	H
1900	25.12	33.00	H

LTE Band 2_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1850.7	23.81	33.00	H
1880	24.07	33.00	H
1909.3	24.06	33.00	H

LTE Band 2_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1851.5	24.05	33.00	H

1880	24.38	33.00	H
1908.5	24.42	33.00	H

LTE Band 2_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1852.5	24.27	33.00	H
1880	24.56	33.00	H
1907.5	24.28	33.00	H

LTE Band 2_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1855	23.95	33.00	H
1880	24.28	33.00	H
1905	24.30	33.00	H

LTE Band 2_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1857.5	23.97	33.00	H
1880	24.32	33.00	H
1902.5	24.26	33.00	H

LTE Band 2_20 MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1860	24.22	33.00	H
1880	24.31	33.00	H
1900	24.23	33.00	H

LTE Band 4- EIRP 27.50(d)

Limits: ≤30dBm (1W)

LTE Band 4_1.4MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1710.7	22.55	30.00	H
1732.5	22.56	30.00	H
1754.3	22.58	30.00	H

LTE Band 4_3MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1711.5	22.57	30.00	H
1732.5	22.53	30.00	H
1753.5	22.69	30.00	H

LTE Band 4_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1712.5	22.82	30.00	H
1732.5	22.77	30.00	H
1752.5	22.46	30.00	H

LTE Band 4_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1715	22.64	30.00	H
1732.5	22.65	30.00	H
1750	22.58	30.00	H

LTE Band 4_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1717.5	22.57	30.00	H
1732.5	22.57	30.00	H
1747.5	22.51	30.00	H

LTE Band 4_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1720	22.53	30.00	H
1732.5	22.68	30.00	H
1745	22.59	30.00	H

LTE Band 4_1.4MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1710.7	22.01	30.00	H
1732.5	21.90	30.00	H
1754.3	21.76	30.00	H

LTE Band 4_3MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1711.5	22.01	30.00	H
1732.5	21.74	30.00	H
1753.5	21.90	30.00	H

LTE Band 4_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1712.5	21.98	30.00	H
1732.5	22.13	30.00	H
1752.5	21.83	30.00	H

LTE Band 4_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1715	22.15	30.00	H
1732.5	21.88	30.00	H
1750.5	22.12	30.00	H

LTE Band 4_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1717.5	21.79	30.00	H
1732.5	21.87	30.00	H
1747.5	21.81	30.00	H

LTE Band 4_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
1720	22.03	30.00	H
1732.5	21.79	30.00	H
1745	21.94	30.00	H

LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2502.5	20.02	33.00	H
2535	19.93	33.00	H
2567.5	19.94	33.00	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2505	19.78	33.00	H
2535	19.70	33.00	H
2565	19.94	33.00	H

LTE Band 7_15MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2507.5	19.77	33.00	H
2535	19.62	33.00	H
2562.5	19.78	33.00	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2510	19.81	33.00	H
2535	19.87	33.00	H
2560	19.85	33.00	H

LTE Band 7_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2502.5	19.16	33.00	H
2535	19.02	33.00	H
2567.5	19.37	33.00	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2505	19.11	33.00	H
2535	19.19	33.00	H
2565	19.38	33.00	H

LTE Band 7_15MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2507.5	18.99	33.00	H

2535	18.99	33.00	H
2562.5	19.05	33.00	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
2510	19.11	33.00	H
2535	18.90	33.00	H
2560	19.25	33.00	H

LTE Band 17- ERP 27.50(c)(10)

Limits: ≤34.77dBm (3W)

LTE Band 17_5MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
706.5	20.48	34.77	H
710	20.54	34.77	H
713.5	20.50	34.77	H

LTE Band 17_10MHz_QPSK

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
709	19.91	34.77	H
710	20.06	34.77	H
711	19.96	34.77	H

LTE Band 17_5MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
706.5	20.02	34.77	H
710	19.95	34.77	H
713.5	19.82	34.77	H

LTE Band 17_10MHz_16QAM

Frequency(MHz)	EIRP(dBm)	Limit(dBm)	Polarization
709	19.37	34.77	H
710	19.38	34.77	H
711	19.21	34.77	H

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwdiths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

6.2. Emission Limt

Reference

CFR 2.1051, 24.238(a),27.53(g), 27.53(h), 27.53(m).

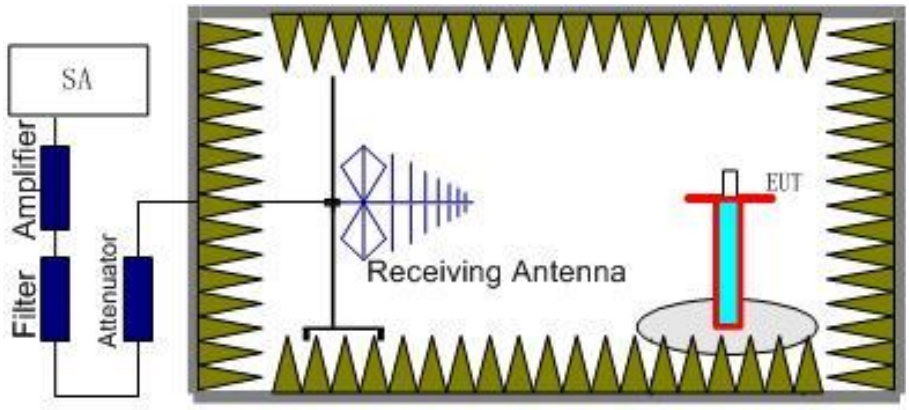
6.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

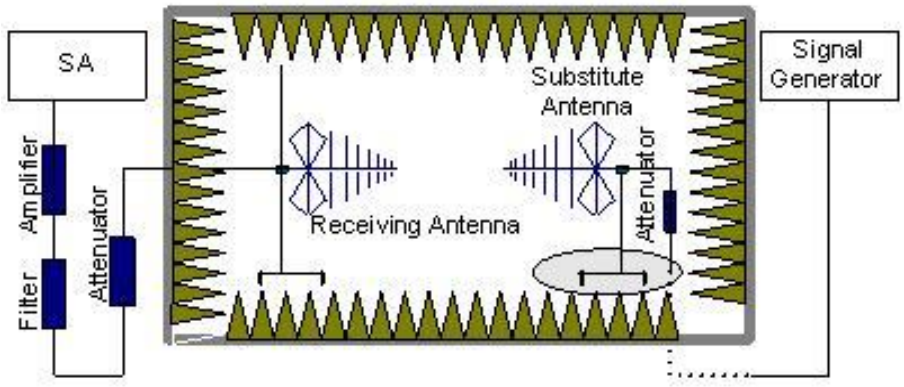
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 27.53(g), Part 27.53(h), Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2/4/7/17.

The procedure of radiated spurious emissions is as follows:

1. Below 1 GHz, EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna.EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power (EIRP) =P_{Mea}- P_{pl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

6.2.2 Measurement Limit

Part 27.53(g),27.53(h), 27.53(m) state that on any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

According to KDB 971168 6, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

Part 27.53(m) states that 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.

6.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands.It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands. Into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The evaluated frequency range is from 30MHz to 26GHz.

BAND	Channel		Result
2	L	18607	Pass
	M	18900	Pass
	H	19193	Pass
4	L	19957	Pass
	M	20175	Pass
	H	20393	Pass
7	L	20775	Pass
	M	21100	Pass
	H	21425	Pass
17	L	23755	Pass
	M	23790	Pass
	H	23825	Pass

RSE-LTE2-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3700.8	-35.99	6.6	7.9	-34.69	-13	H
5551.2	-51.2	8.2	9.8	-49.6	-13	V
7402.4	-52.98	9.7	11.6	-51.08	-13	V
9252.8	-51.36	10.7	12.7	-49.36	-13	V
11103.6	-47.77	12.1	12.3	-47.57	-13	V
12950.2	-45.01	13.2	12.3	-45.91	-13	V

RSE-LTE2-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3755.6	-34.79	6.6	7.9	-33.49	-13	H
5634.0	-50.31	8.3	10.2	-48.41	-13	H
7518.8	-52.55	9.7	11.6	-50.65	-13	V
9384.4	-50.08	10.7	12.7	-48.08	-13	V
11268.8	-46.68	12.1	12.3	-46.48	-13	H
13402.4	-42.45	13.7	12.3	-43.85	-13	H

RSE-LTE2-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3810.4	-39.41	6.7	7.9	-38.21	-13	H
5716.4	-51.51	8.5	10.2	-49.81	-13	H
7619.6	-53.32	9.7	11.6	-51.42	-13	H
9513.2	-50.41	10.7	12.7	-48.41	-13	V
11428.4	-47.73	12.1	12.3	-47.53	-13	V
13332.4	-43.94	13.6	12.3	-45.24	-13	V

RSE-LTE4-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3420.4	-46.91	6.3	7.8	-45.41	-13	H
5130.8	-47.05	7.9	9.4	-45.55	-13	H
6841.6	-53.31	9.2	10.9	-51.61	-13	H
8550.4	-53.48	10.3	12.6	-51.18	-13	V
10262.8	-48.47	11.5	12.3	-47.67	-13	H
11968.8	-47.03	12.6	12.3	-47.33	-13	H

RSE-LTE4-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3464.0	-45.75	6.4	7.8	-44.35	-13	H
5196.8	-47.19	8.0	9.4	-45.79	-13	H
6922.0	-51.64	9.3	11.1	-49.84	-13	H
8658.4	-51.98	10.3	12.7	-49.58	-13	V
10392.4	-48.53	11.6	12.3	-47.83	-13	H
12219.4	-45.46	12.6	12.3	-45.76	-13	V

RSE-LTE4-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3507.6	-46.3	6.4	7.8	-44.9	-13	H
5261.6	-45.62	8.0	9.4	-44.22	-13	H
7018.8	-52.31	9.3	11.1	-50.51	-13	V
8768.8	-50.92	10.4	12.7	-48.62	-13	V
10531.6	-46.95	11.6	12.3	-46.25	-13	H
12279.6	-45.21	12.7	12.3	-45.61	-13	H

RSE-LTE7-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3830.0	-50.91	6.7	7.9	-49.71	-25	H
5000.4	-39.12	7.8	9.6	-37.32	-25	H
7500.8	-42.44	9.7	11.6	-40.54	-25	H
10002.0	-46.31	11.2	12.5	-45.01	-25	V
12499.8	-42.33	12.7	12.3	-42.73	-25	H
15011.0	-37.98	14.4	12.3	-40.08	-25	H

RSE-LTE7-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3701.6	-51.14	6.6	7.9	-49.84	-25	H
5065.6	-35.04	7.8	9.6	-33.24	-25	H
7598.4	-41.61	9.7	11.6	-39.71	-25	V
10131.2	-46.05	11.3	12.5	-44.85	-25	H
12664.2	-40.98	12.7	12.3	-41.38	-25	V
15175.5	-36.23	14.5	12.3	-38.43	-25	H

RSE-LTE7-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
4012.4	-52.04	6.9	8.6	-50.34	-25	H
5130.4	-36.65	7.9	9.4	-35.15	-25	H
7695.6	-43.01	9.8	11.8	-41.01	-25	V
10260.8	-44.84	11.5	12.3	-44.04	-25	H
12820.0	-41.57	12.5	12.3	-41.77	-25	H
15387.2	-35.03	14.4	12.3	-37.13	-25	H

RSE-LTE17-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
1408.8	-51.4	4.0	5.3	-50.1	-13	V
2112.3	-46.37	4.9	4.5	-46.77	-13	H
2816.9	-42.96	5.7	6.1	-42.56	-13	H
3521.6	-55.02	6.4	7.8	-53.62	-13	H
4223.6	-54.75	7.0	8.9	-52.85	-13	V
4926.4	-54.41	7.7	9.6	-52.51	-13	H

RSE-LTE17-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
1415.3	-50.48	4.0	5.3	-49.18	-13	V
2123.5	-47.51	4.9	4.5	-47.91	-13	V
2830.0	-42.33	5.8	6.1	-42.03	-13	V
3531.6	-54.06	6.4	7.8	-52.66	-13	H
4243.6	-54.04	7.1	8.9	-52.24	-13	H
4952.0	-54.02	7.7	9.6	-52.12	-13	H

RSE-LTE17-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
1422.6	-49.99	4.0	5.3	-48.69	-13	V
2135.0	-46.91	5.0	5.1	-46.81	-13	V
2846.2	-42.39	5.8	6.1	-42.09	-13	H
3561.2	-54.35	6.4	7.8	-52.95	-13	H
4267.6	-54.76	7.1	8.9	-52.96	-13	H
4979.6	-55.25	7.8	9.6	-53.45	-13	H

RSE-LTE2-L

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3704.8	-49.84	6.6	7.9	-48.54	-13	V
5558.8	-50.12	8.2	9.8	-48.52	-13	H
7580.8	-51.59	9.7	11.6	-49.69	-13	V
9842.0	-49.42	11.0	12.5	-47.92	-13	V
12421.0	-45.79	12.5	12.3	-45.99	-13	H
15286.8	-40.27	14.4	12.3	-42.37	-13	H

RSE-LTE2-M

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3756.8	-51.51	6.6	7.9	-50.21	-13	V
5106.0	-52.59	7.9	9.6	-50.89	-13	H
7035.2	-52.36	9.4	11.1	-50.66	-13	H
9190.8	-49.05	10.5	12.6	-46.95	-13	V
11814.8	-46.12	12.5	12.3	-46.32	-13	V
14949.4	-43.16	14.3	12.3	-45.16	-13	H

RSE-LTE2-H

Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBd)	Peak ERP (dBm)	Limit （dBm）	Polarization
3812.4	-51.5	6.7	7.9	-50.3	-13	H
5403.2	-51.95	8.1	9.8	-50.25	-13	H
7023.6	-52.76	9.3	11.1	-50.96	-13	V
8927.6	-51.99	10.4	12.6	-49.79	-13	V
11362.6	-46.92	12.1	12.3	-46.72	-13	V
14375.4	-45.17	13.9	12.3	-46.77	-13	V

6.3. Frquency Stability

Reference

CFR Part 2.1055, 24.235,27.54.

6.3.1 Method of Measurement

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

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -10℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 7. Measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -10℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ decrements from +50℃ to -10℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

6.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.35VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. For the purposes of measuring frequency stability these voltage limits are to be used.

6.3.3 Measurement results

LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
6.8	-16.108	-75.631	0.009	0.040
7.6	-12.717	-76.976	0.007	0.041
8.7	-7.911	-79.551	0.004	0.042

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-9.012	-80.738	0.005	0.043
40	-15.421	-62.585	0.008	0.033
30	-17.939	-76.747	0.010	0.041
20	-14.963	-80.066	0.008	0.043
10	-12.331	-77.362	0.007	0.041
0	11.272	-79.336	0.006	0.042
-10	-15.507	-81.797	0.008	0.044
- 20	-18.082	-79.808	0.010	0.042
- 30	-17.581	-54.288	0.009	0.029

LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
6.8	-10.729	-75.917	0.006	0.044
7.6	-10.128	-71.440	0.006	0.041
8.7	-9.999	-72.184	0.006	0.042

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-12.617	-71.111	0.007	0.041
40	-16.208	-72.999	0.009	0.042
30	-11.258	-74.129	0.006	0.043
20	138.130	-65.846	0.080	0.038
10	-11.344	-72.856	0.007	0.042
0	-10.471	-75.617	0.006	0.044
-10	-15.292	-77.147	0.009	0.045
- 20	22.244	-74.058	0.013	0.043
- 30	-16.694	-77.934	0.010	0.045

LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
6.8	-10.099	26.822	0.004	0.011
7.6	-10.185	29.097	0.004	0.011
8.7	-6.638	33.302	0.003	0.013

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-18.654	34.375	0.007	0.014
40	-17.409	30.141	0.007	0.012
30	-15.464	27.580	0.006	0.011
20	-16.479	34.504	0.007	0.014
10	-14.863	27.266	0.006	0.011
0	-12.746	32.687	0.005	0.013
-10	-15.635	28.677	0.006	0.011
- 20	-19.813	32.916	0.008	0.013
- 30	12.059	29.855	0.005	0.012

LTE Band 17, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
6.8	-11.859	20.070	0.017	0.028
7.6	-8.383	25.506	0.012	0.036
8.7	-9.155	19.813	0.013	0.028

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-10.171	21.315	0.014	0.030
40	-10.800	25.778	0.015	0.036
30	-7.424	20.657	0.010	0.029
20	-8.311	22.531	0.012	0.032
10	-13.432	20.056	0.019	0.028
0	-8.769	24.033	0.012	0.034
-10	-8.154	22.688	0.011	0.032
- 20	-12.002	23.632	0.017	0.033
- 30	-13.118	23.861	0.018	0.034

6.4. Occupied Bandwidth

Reference

CFR Part 2.1049(h) (i)

6.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

The measurement method is from KDB 971168 4:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

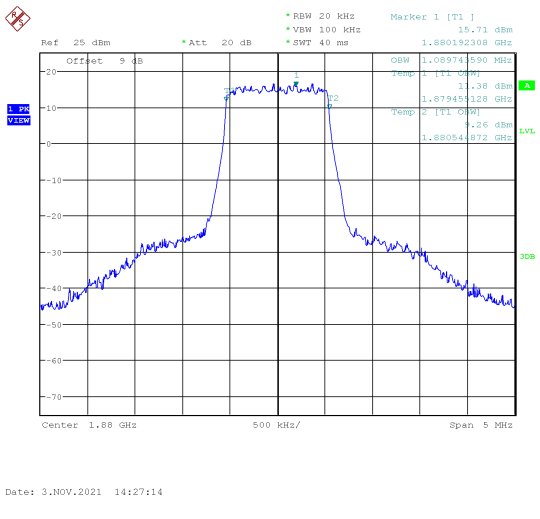
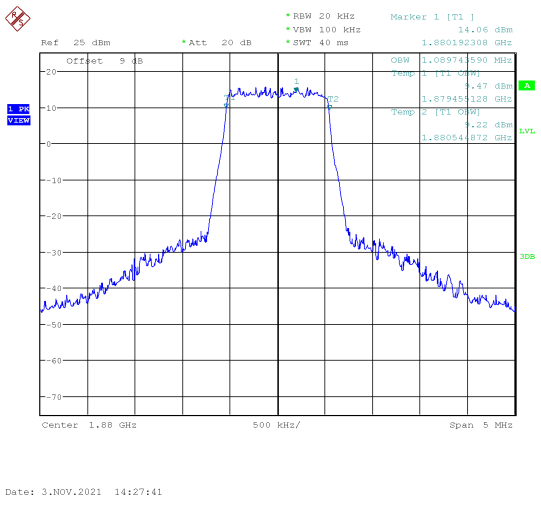
c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) Set the detection mode to peak, and the trace mode to max hold.

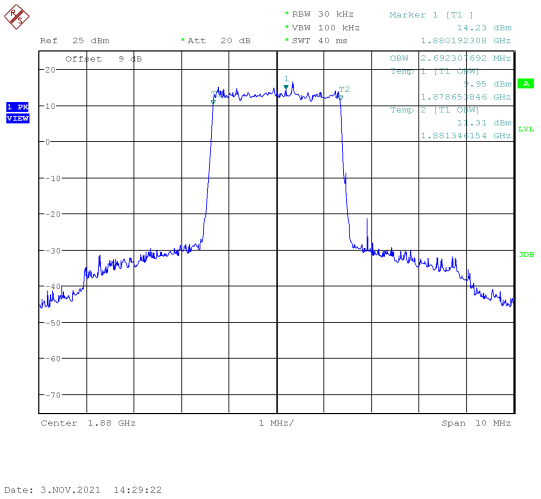
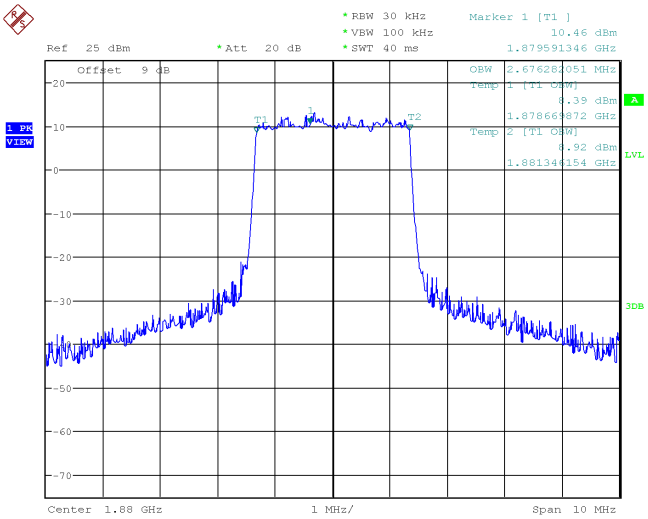
e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

Occupied Bandwidth Measurement Results:

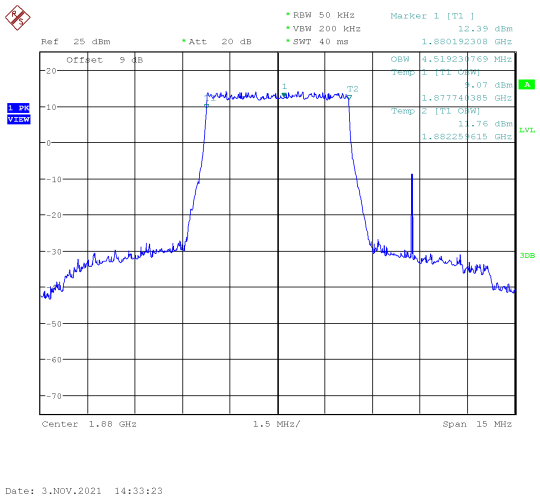
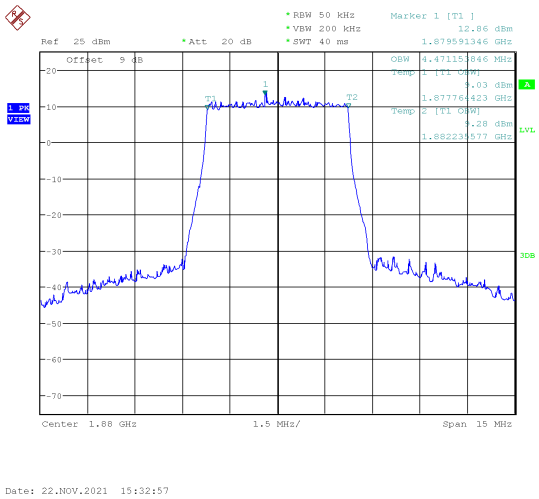
LTE band 2, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	1.09	1.09
QPSK(99% BW)	16QAM(99% BW)	
		

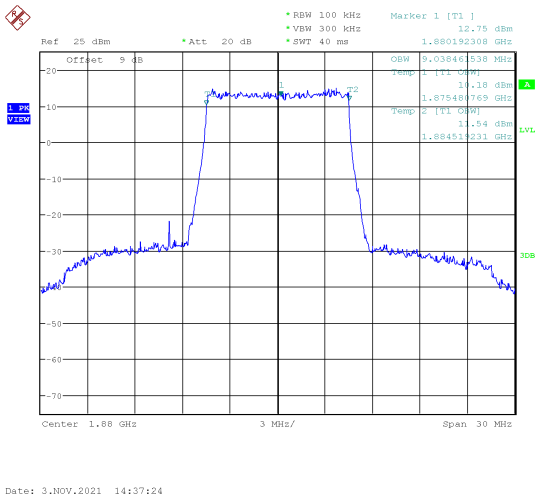
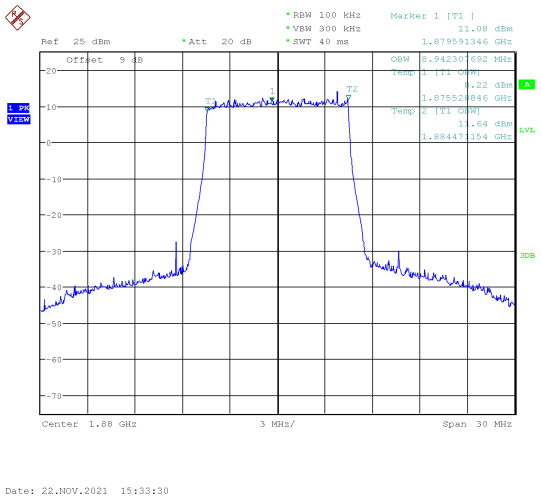
LTE band 2, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	2.69	2.68
QPSK(99% BW)	16QAM(99% BW)	
		

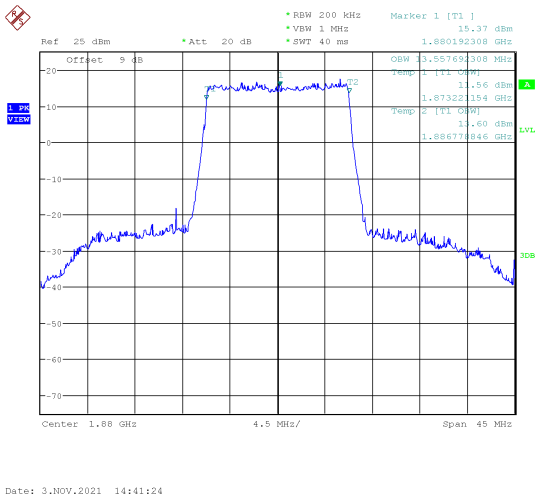
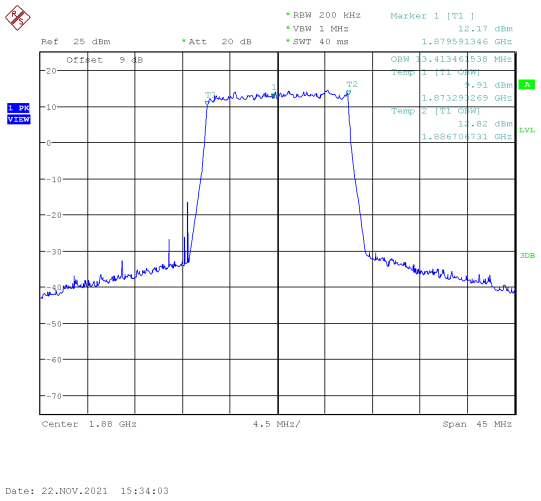
LTE band 2, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	4.52	4.47
QPSK(99% BW)	16QAM(99% BW)	
		

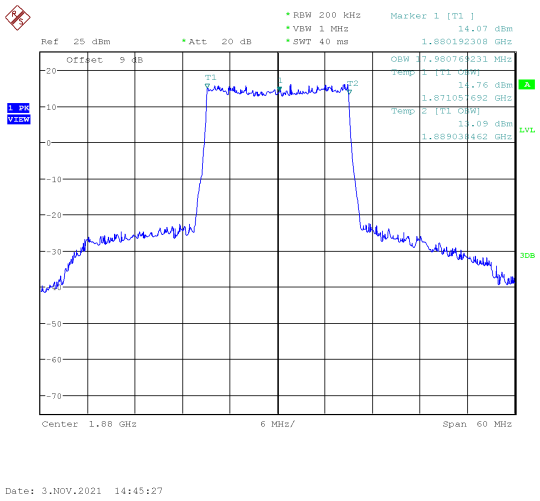
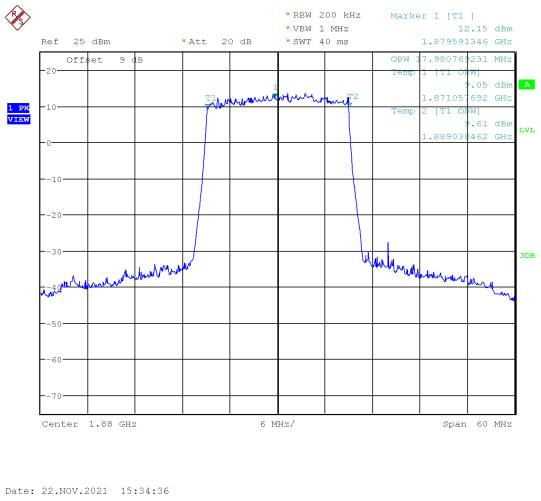
LTE band 2, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	9.03	8.94
QPSK(99% BW)	16QAM(99% BW)	
		

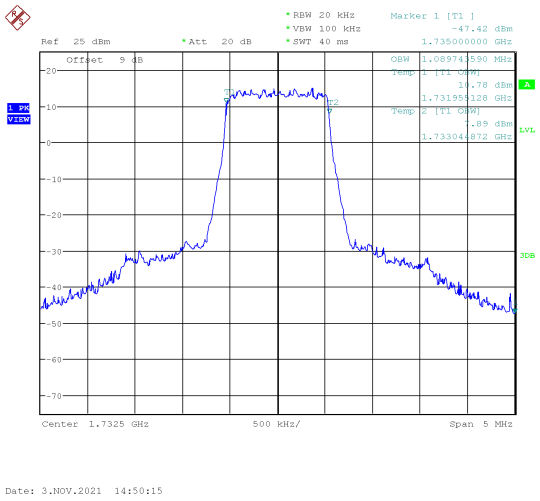
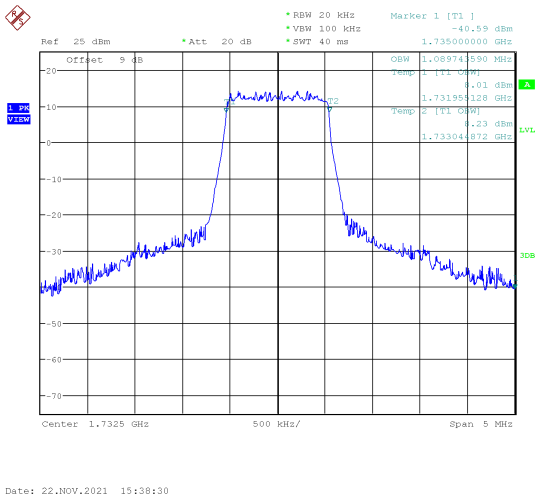
LTE band 2, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	13.56	13.41
QPSK(99% BW)	16QAM(99% BW)	
		

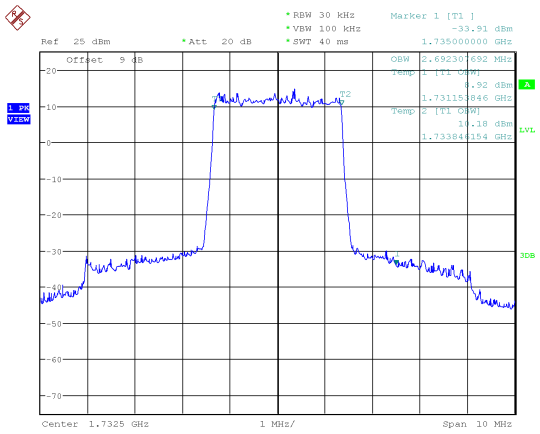
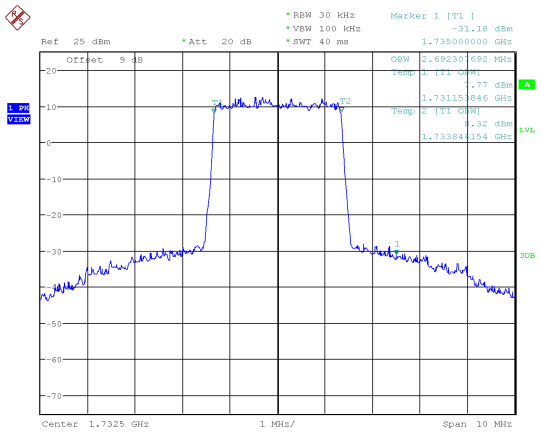
LTE band 2, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1880.0	QPSK	16QAM
	17.98	17.98
QPSK(99% BW)	16QAM(99% BW)	
		

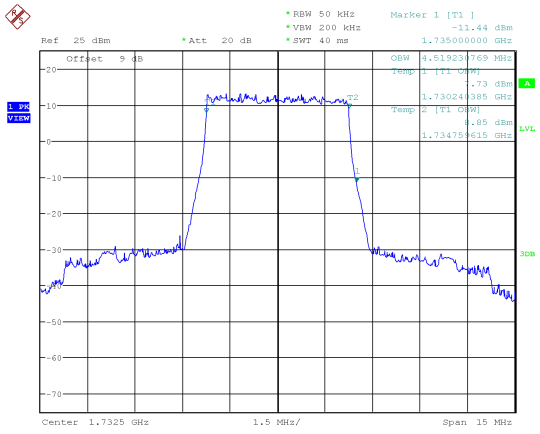
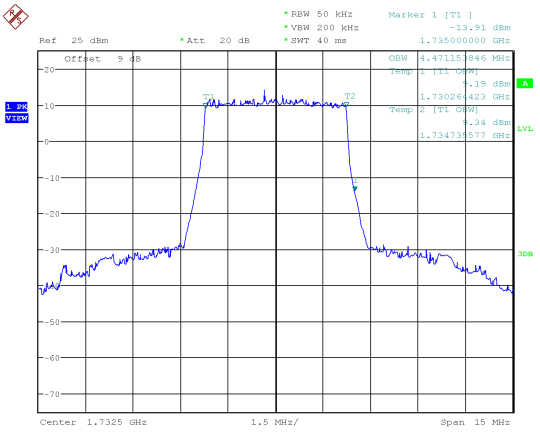
LTE band 4, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	1.09	1.09
QPSK(99% BW)	16QAM(99% BW)	
		

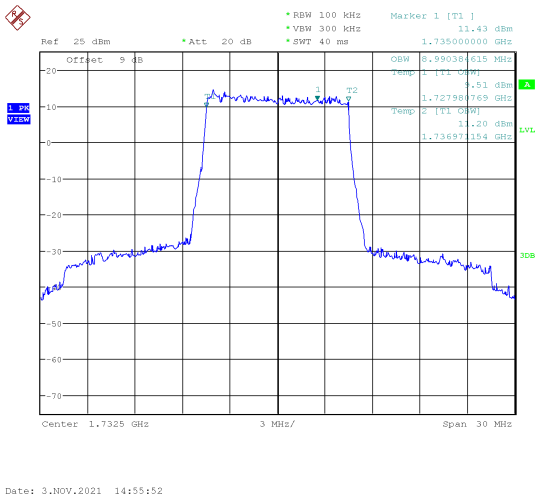
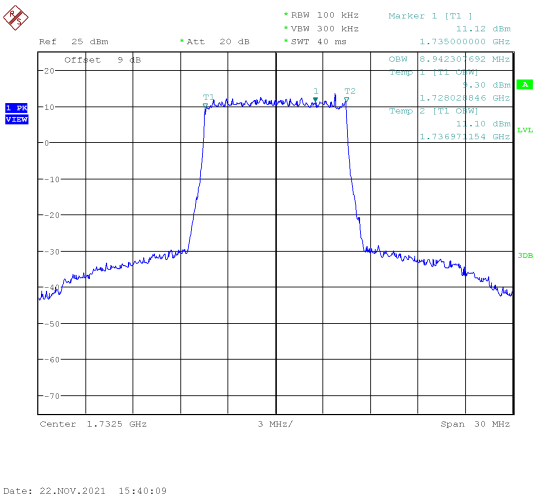
LTE band 4, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	2.69	2.70
QPSK(99% BW)	16QAM(99% BW)	
		

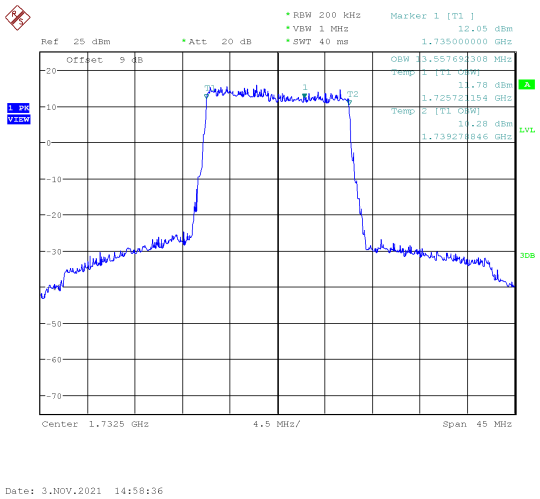
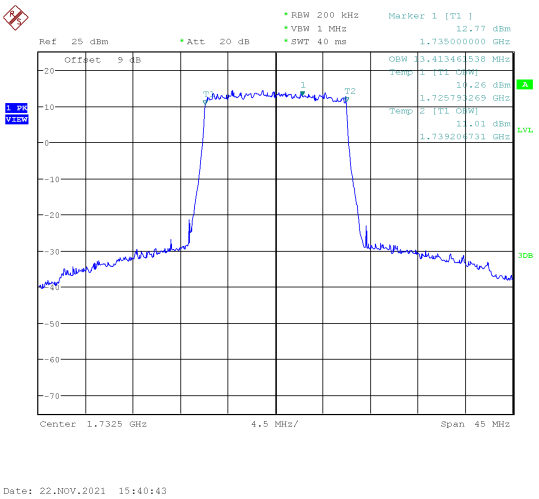
LTE band 4, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	4.52	4.47
QPSK(99% BW)	16QAM(99% BW)	
		

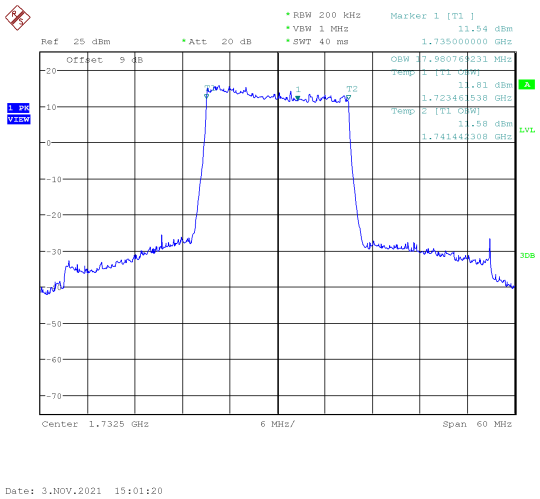
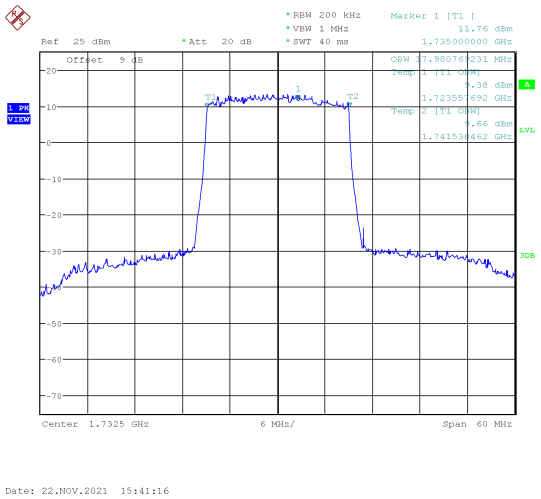
LTE band 4, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	8.99	8.94
QPSK(99% BW)	16QAM(99% BW)	
		

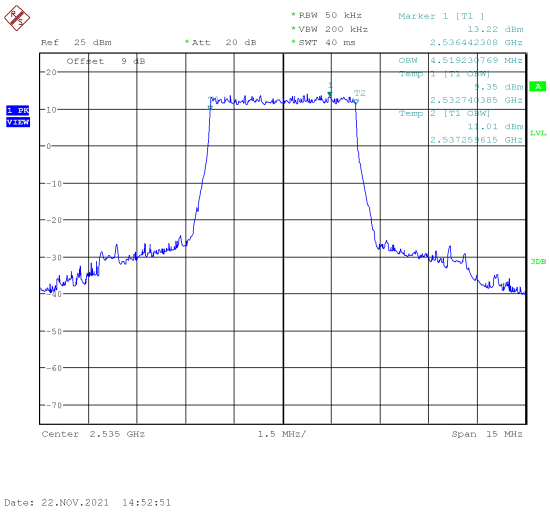
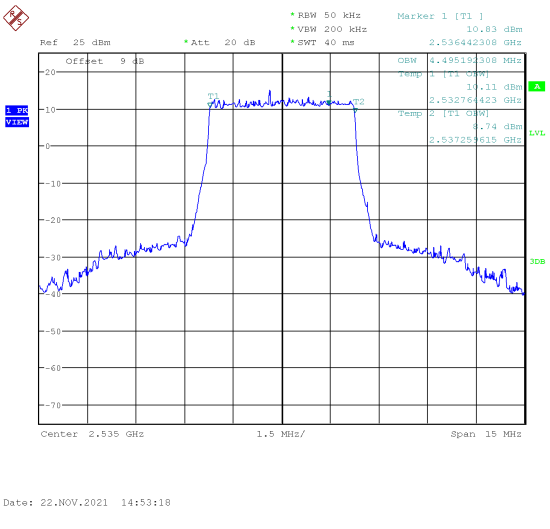
LTE band 4, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	13.56	13.41
QPSK(99% BW)	16QAM(99% BW)	
		

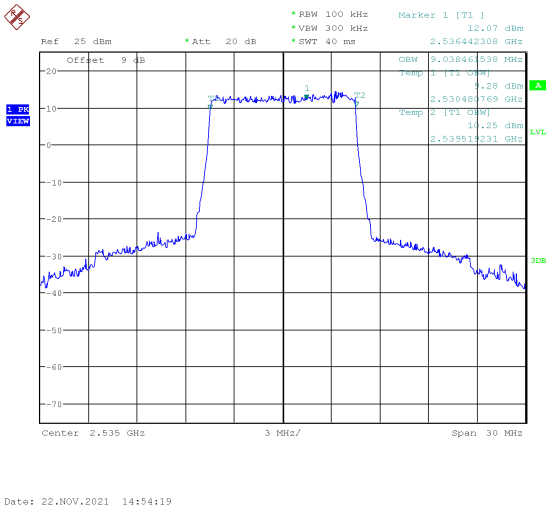
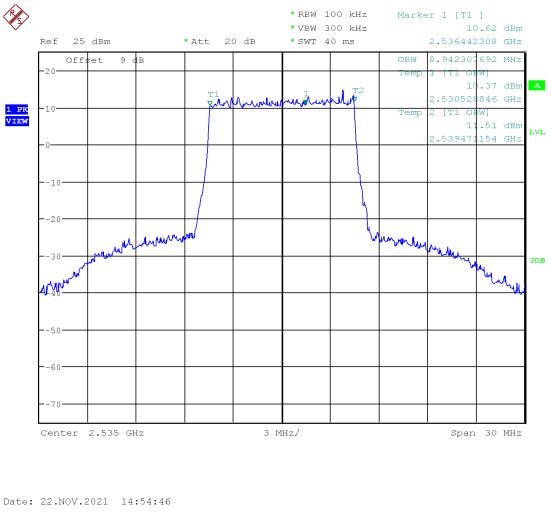
LTE band 4, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
1732.5	QPSK	16QAM
	17.98	17.98
QPSK(99% BW)	16QAM(99% BW)	
		

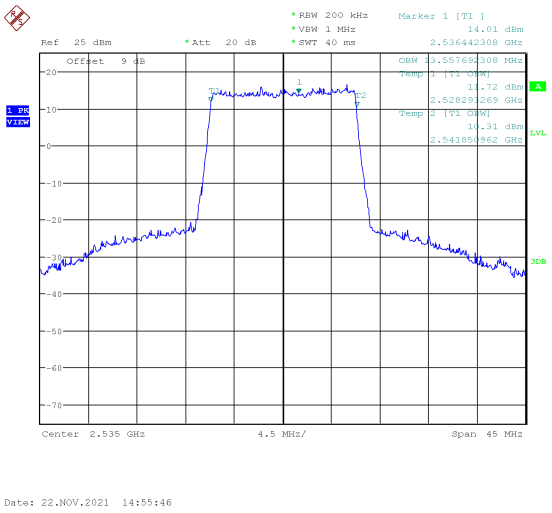
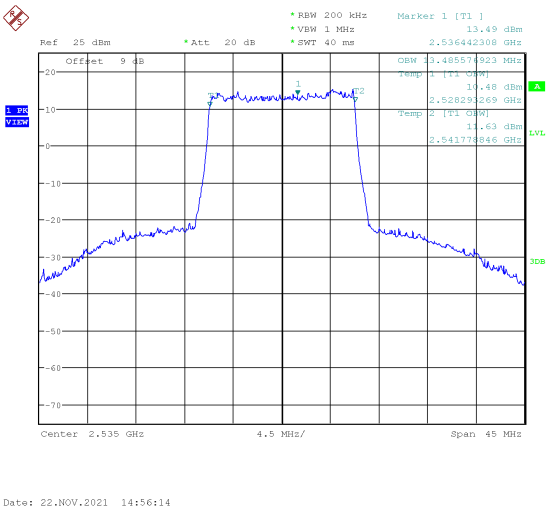
LTE band 7, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
2535.0	QPSK	16QAM
	4.52	4.50
QPSK (99% BW)	16QAM (99% BW)	
		

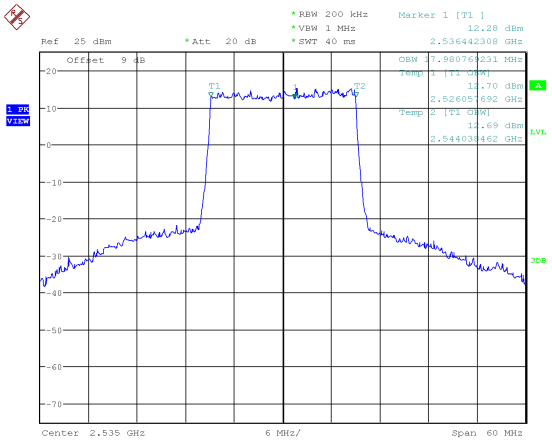
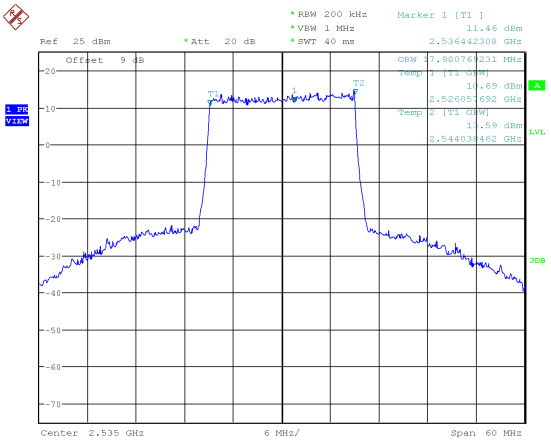
LTE band 7, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
2535.0	QPSK	16QAM
	9.04	8.94
QPSK (99% BW)	16QAM (99% BW)	
		

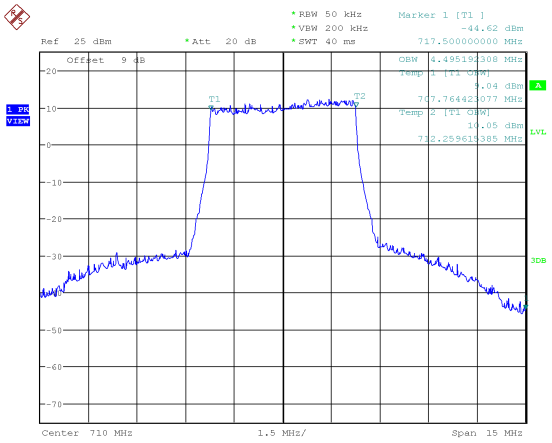
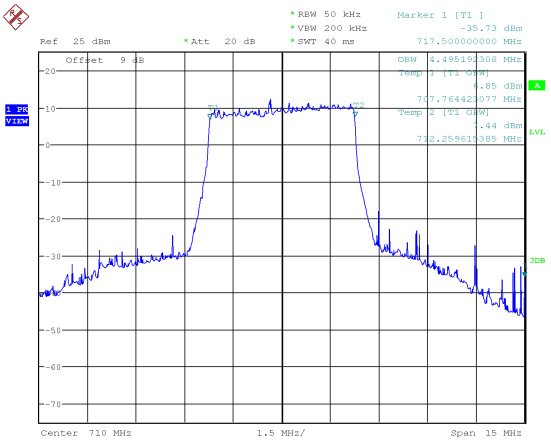
LTE band 7, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
2535.0	QPSK	16QAM
	13.56	13.49
QPSK (99% BW)	16QAM (99% BW)	
		

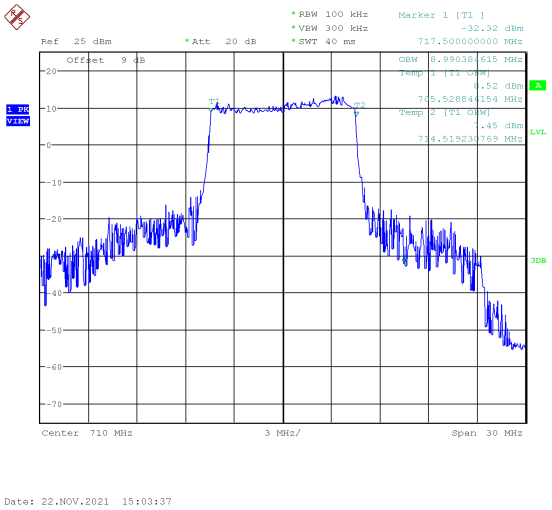
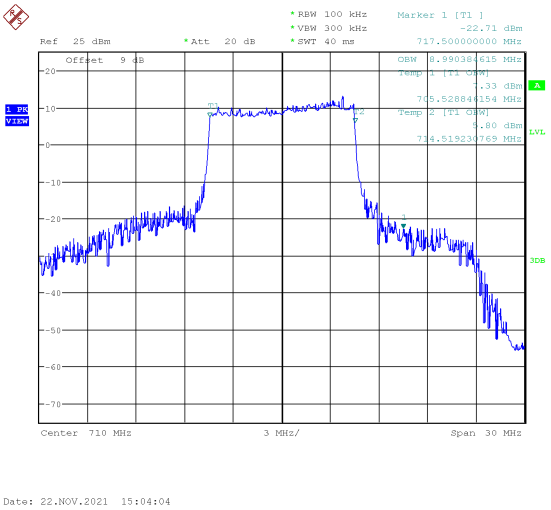
LTE band 7, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
2535.0	QPSK	16QAM
	17.98	17.98
QPSK (99% BW)	16QAM (99% BW)	
		

LTE band 17, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
710.0	QPSK	16QAM
	4.50	4.50
QPSK (99% BW)	16QAM (99% BW)	
		

LTE band 17, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(MHz)	
710.0	QPSK	16QAM
	8.99	8.99
QPSK (99% BW)	16QAM (99% BW)	
		

6.5. Emission Bandwidth

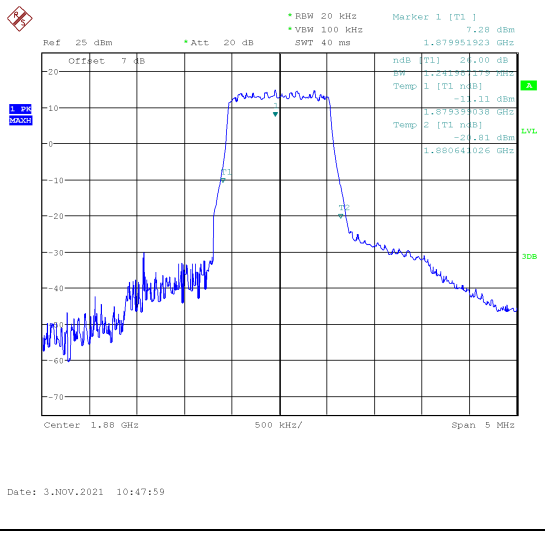
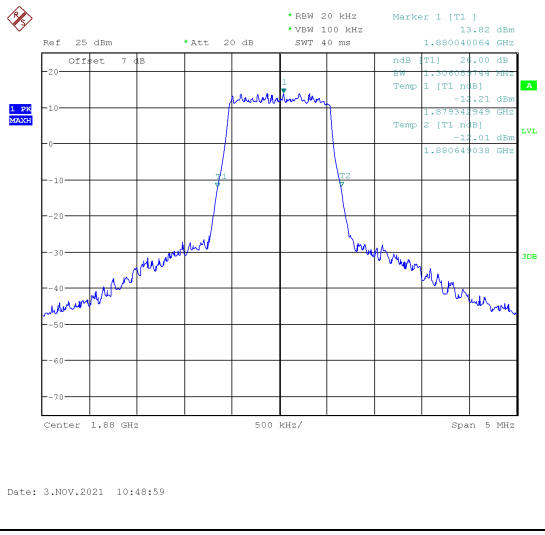
Reference

CFR Part 24.238(a), 27.53(h)

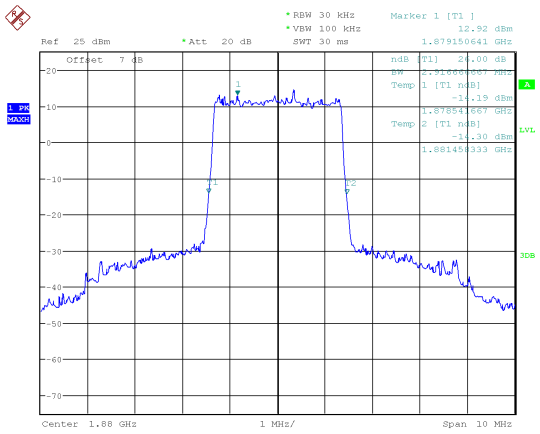
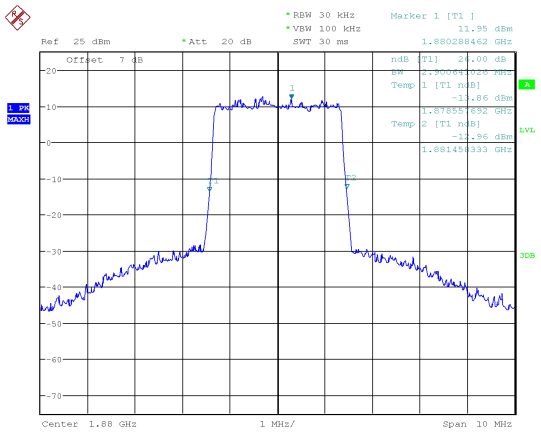
6.5.1Emission Bandwidth Results

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. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

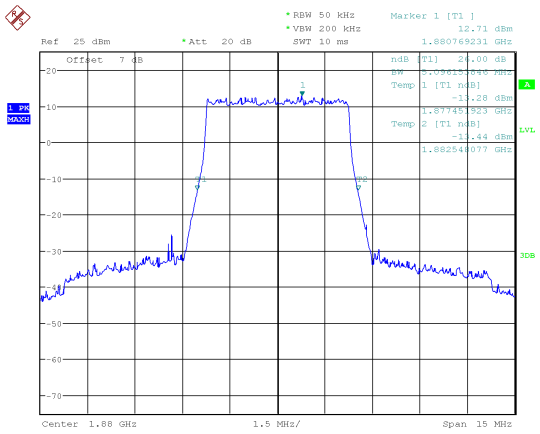
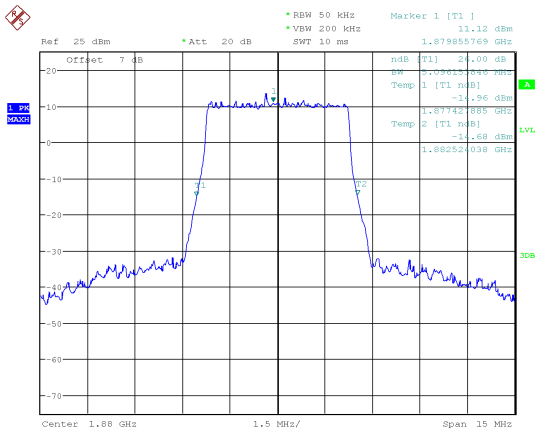
LTE band 2, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1880.0	QPSK	16QAM
	1.24	1.31
QPSK (-26dBc)	16QAM (-26dBc)	
		

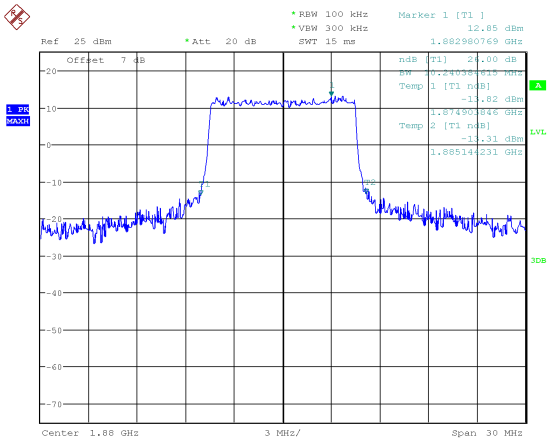
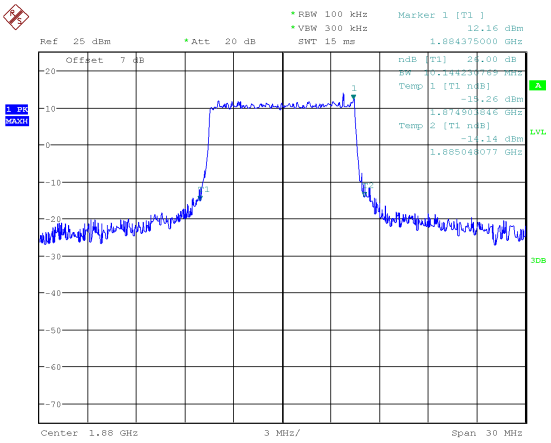
LTE band 2, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1880.0	QPSK	16QAM
	2.92	2.90
QPSK (-26DBC)	16QAM (-26dBc)	
		

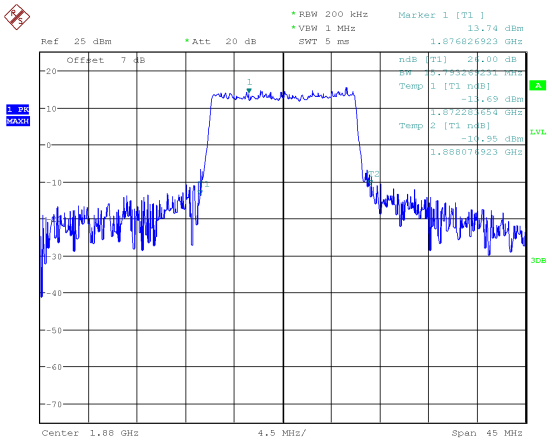
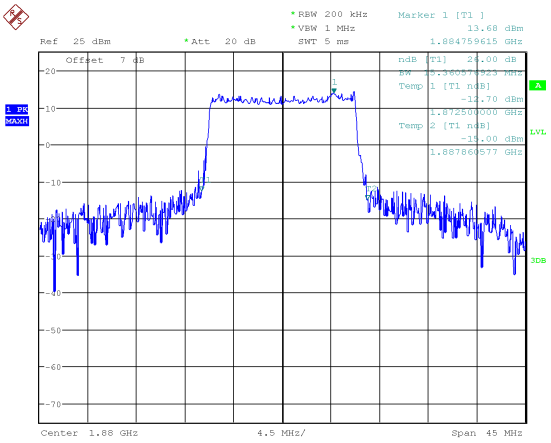
LTE band 2, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1880.0	QPSK	16QAM
	5.10	5.10
QPSK (-26DBC)	16QAM (-26dBc)	
		

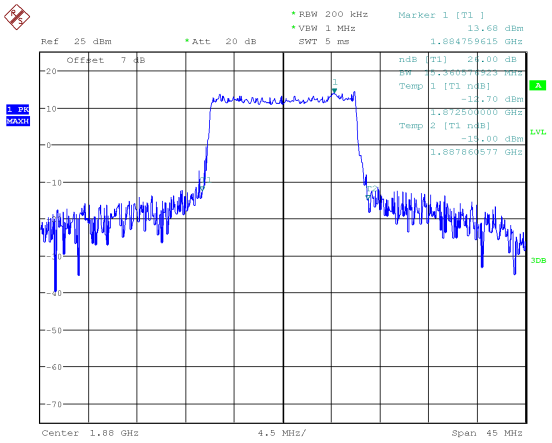
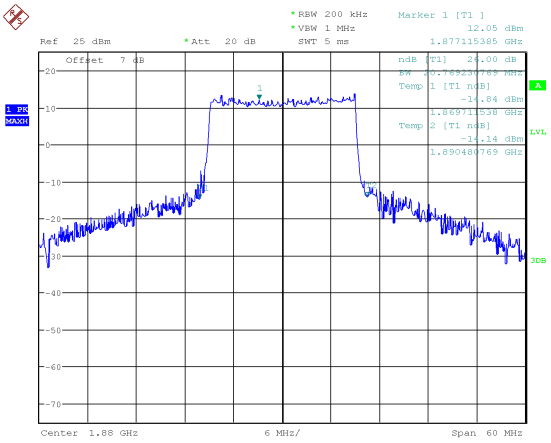
LTE band 2, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
1880.0	10.24	10.14
QPSK (-26DBC)	16QAM (-26dBc)	
		

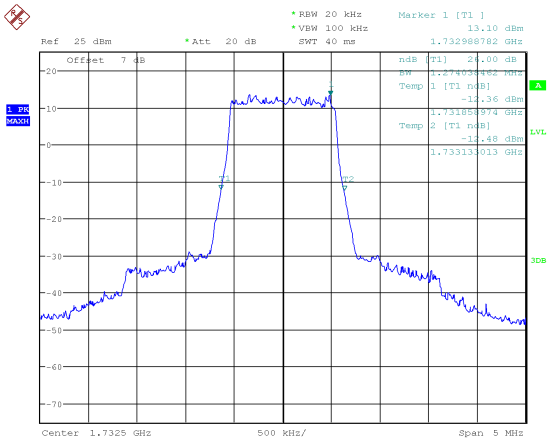
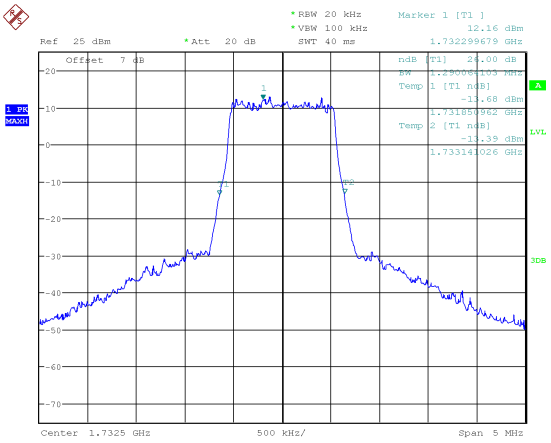
LTE band 2, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
	QPSK	16QAM
1880.0	15.79	15.36
QPSK (-26DBC)	16QAM (-26dBc)	
		

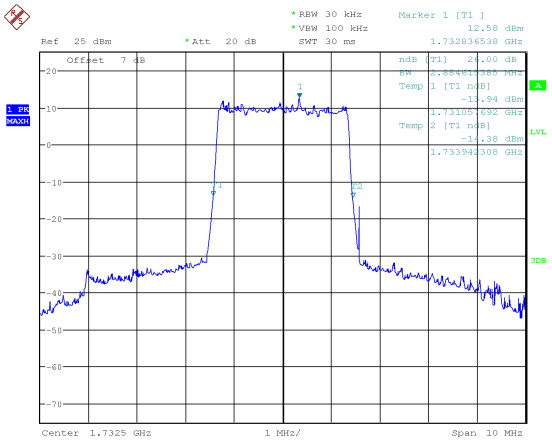
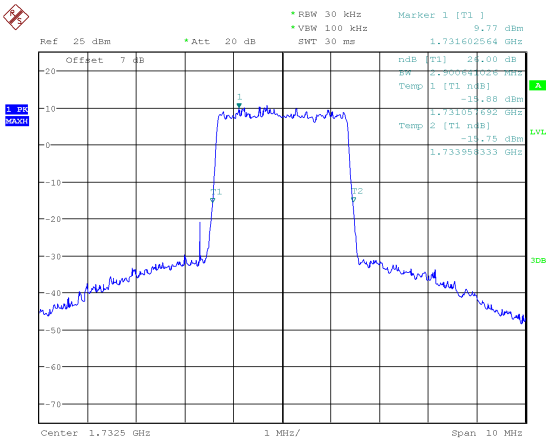
LTE band 2, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1880.0	QPSK	16QAM
	15.36	20.77
QPSK (-26DBC)	16QAM (-26dBc)	
		

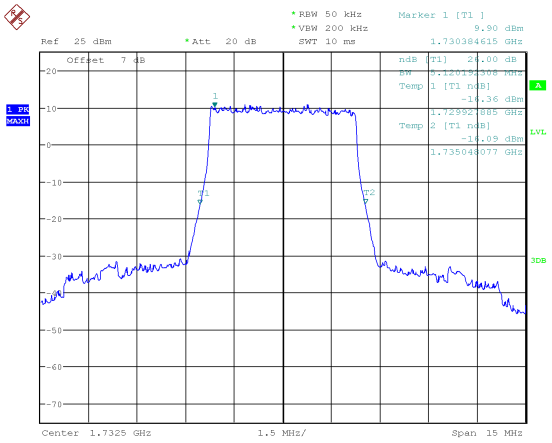
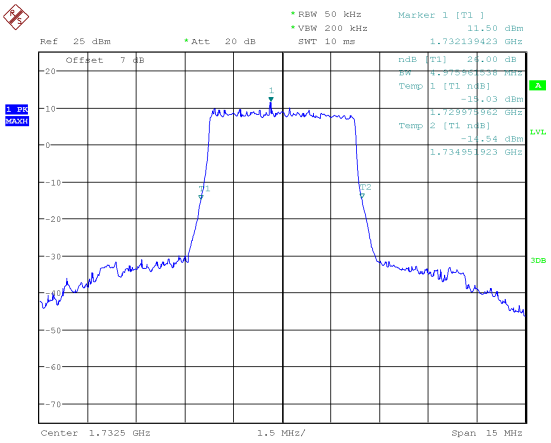
LTE band 4, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	1.27	1.29
QPSK (-26DBC)	16QAM (-26dBc)	
		

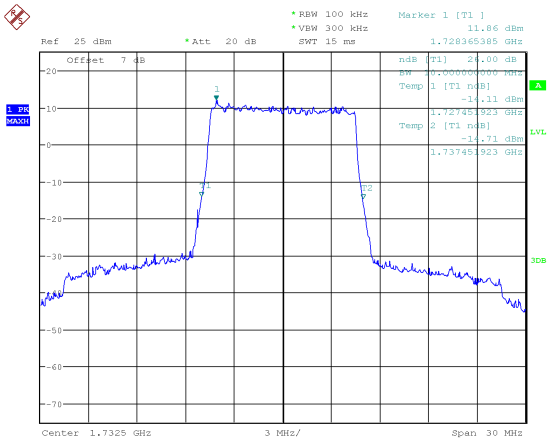
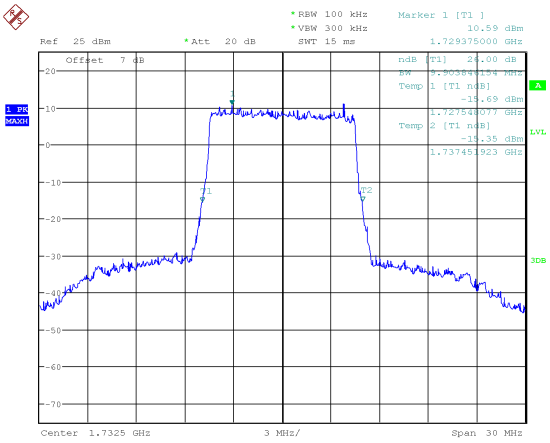
LTE band 4, 3MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	2.88	2.90
QPSK (-26DBC)	16QAM (-26dBc)	
		

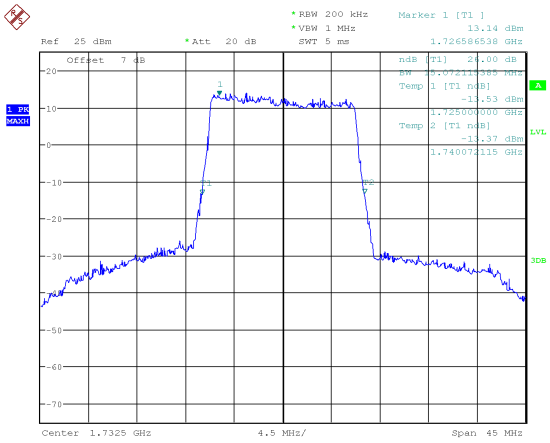
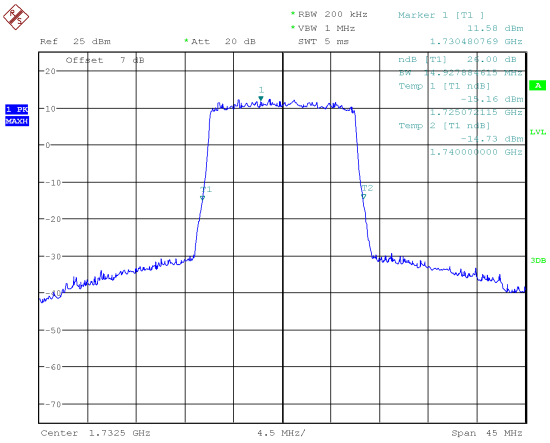
LTE band 4, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	5.12	4.98
QPSK (-26DBC)	16QAM (-26dBc)	
		

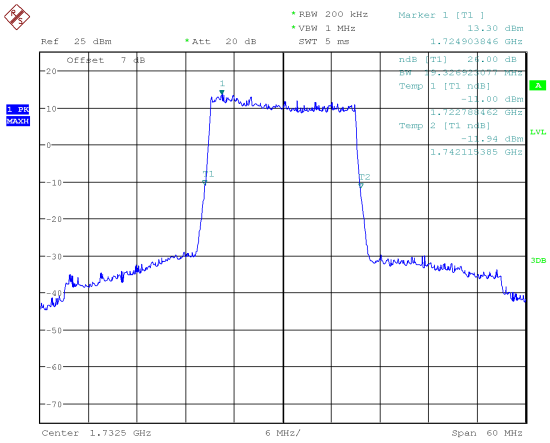
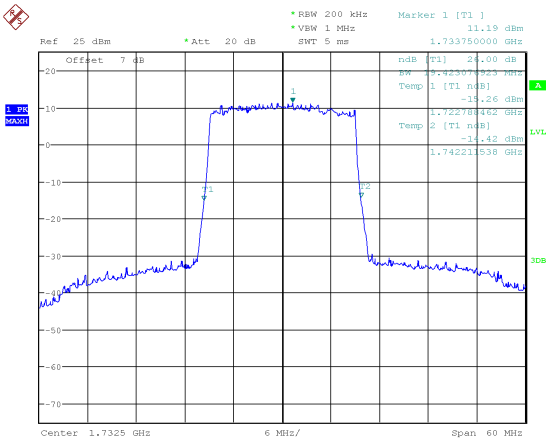
LTE band 4, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	10.00	9.90
QPSK (-26DBC)	16QAM (-26dBc)	
		

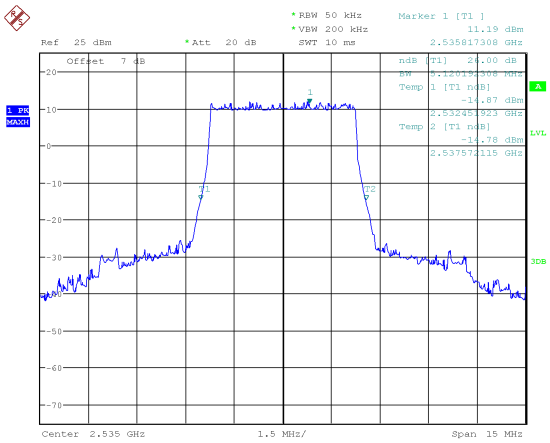
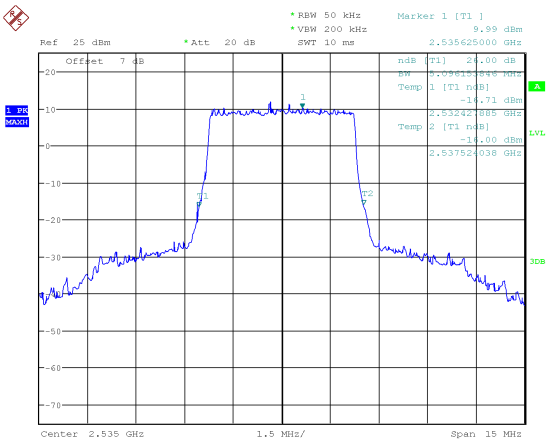
LTE band 4, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	15.07	14.93
QPSK (-26DBC)	16QAM (-26dBc)	
		

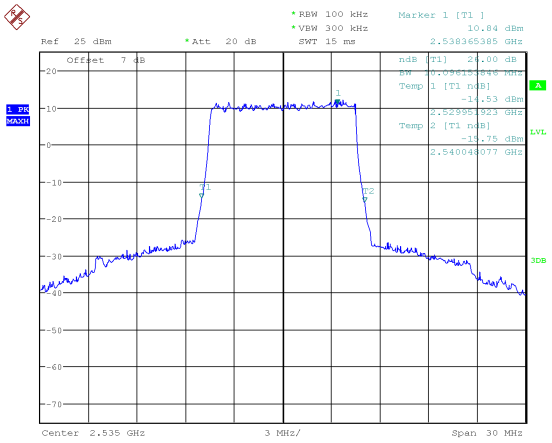
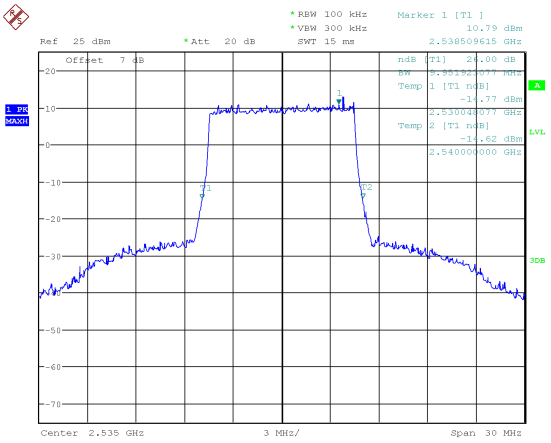
LTE band 4, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
1732.5	QPSK	16QAM
	19.33	19.42
QPSK (-26DBC)	16QAM (-26dBc)	
		

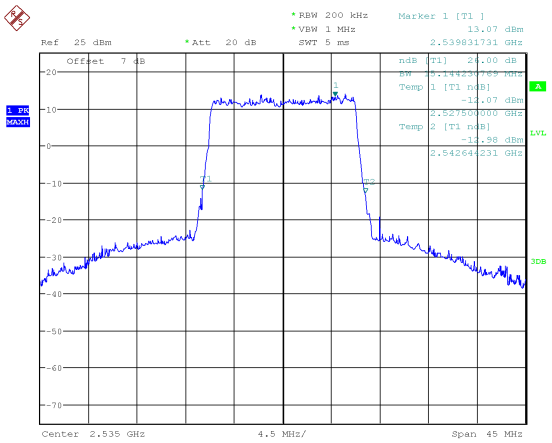
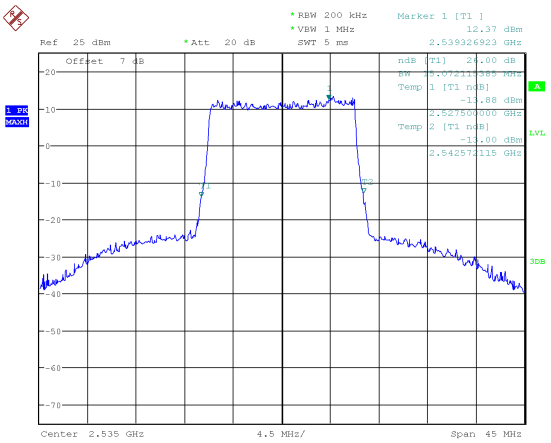
LTE band 7, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
2535.0	QPSK	16QAM
	5.12	5.10
QPSK (99% BW)	16QAM (99% BW)	
		

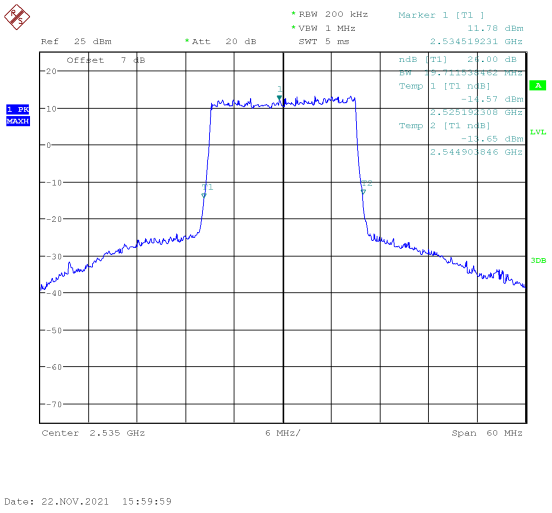
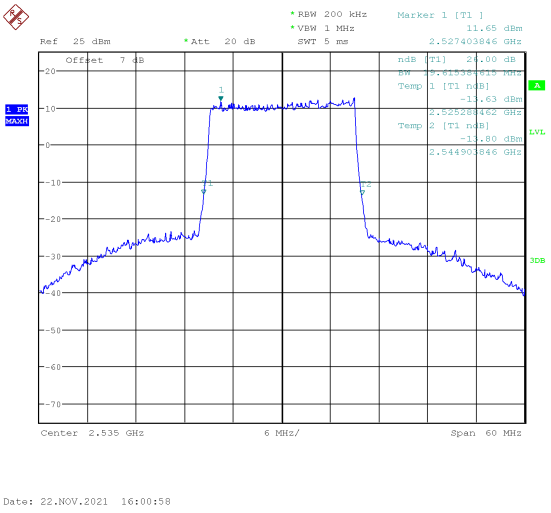
LTE band 7, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
2535.0	QPSK	16QAM
	10.10	9.95
QPSK (99% BW)	16QAM (99% BW)	
		

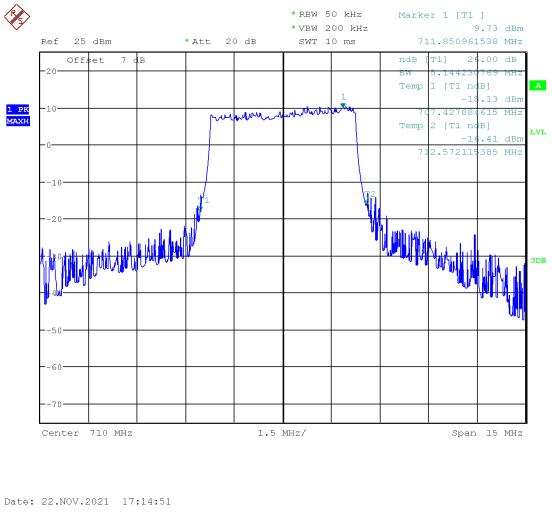
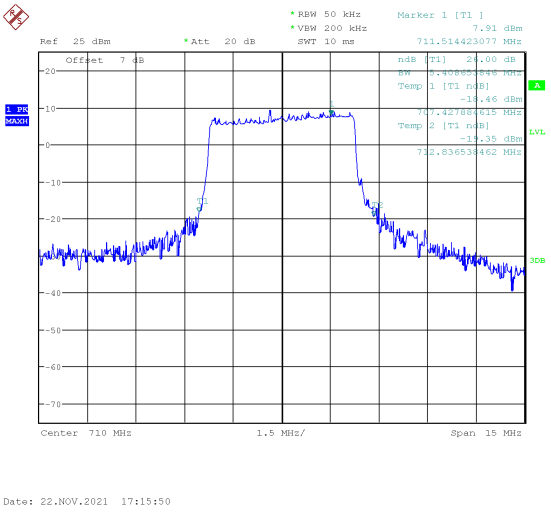
LTE band 7, 15MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
2535.0	QPSK	16QAM
	15.14	15.07
QPSK (99% BW)	16QAM (99% BW)	
		

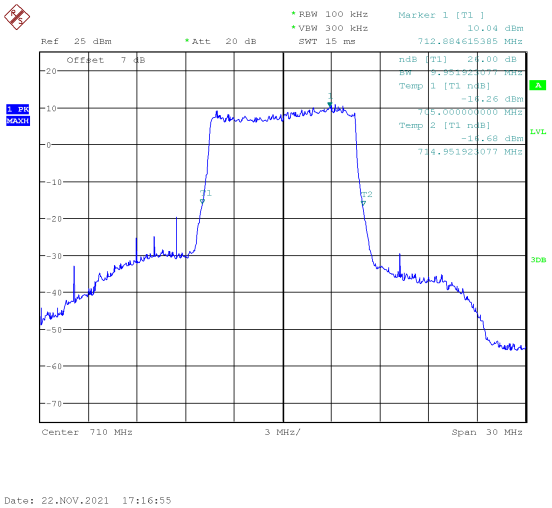
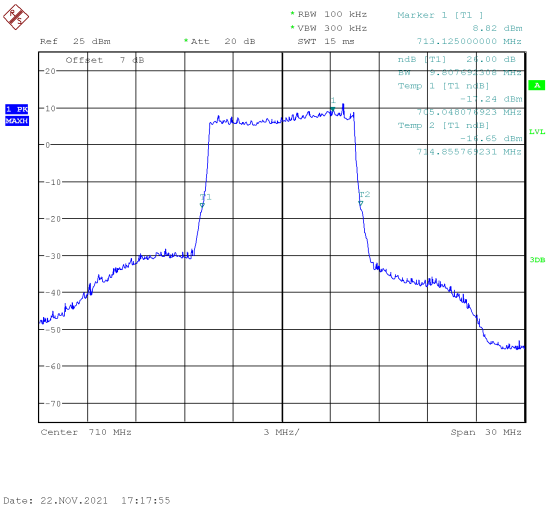
LTE band 7, 20MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
2535.0	QPSK	16QAM
	29.72	29.62
QPSK (99% BW)	16QAM (99% BW)	
		

LTE band 17, 5MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
710.0	QPSK	16QAM
	5.14	5.41
QPSK (99% BW)	16QAM (99% BW)	
		

LTE band 17, 10MHz (99%)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(MHz)	
710.0	QPSK	16QAM
	9.95	9.81
QPSK (99% BW)	16QAM (99% BW)	
		

7.1. Band Edge Compliance

Reference

CFR Part 24.238(a),27.53(h)

6.6.1 Measurement limit

Part 27.53(g),27.53(h), 27.53(m) state that on any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

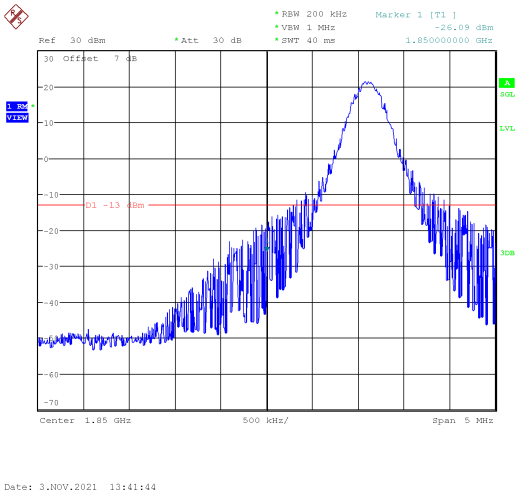
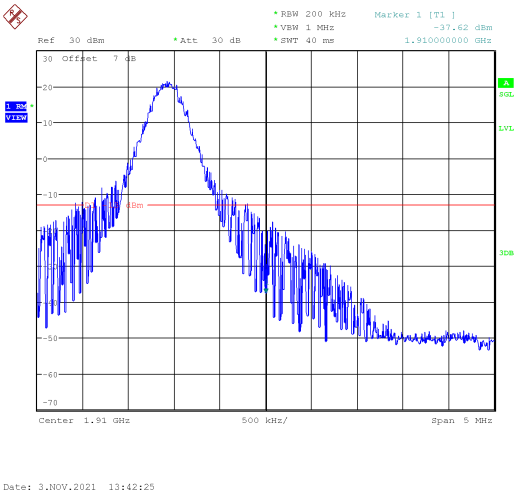
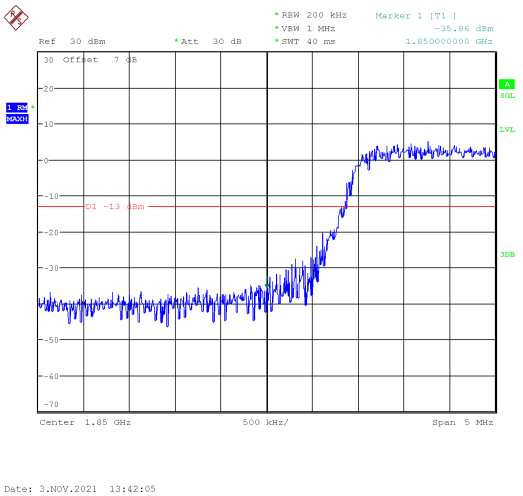
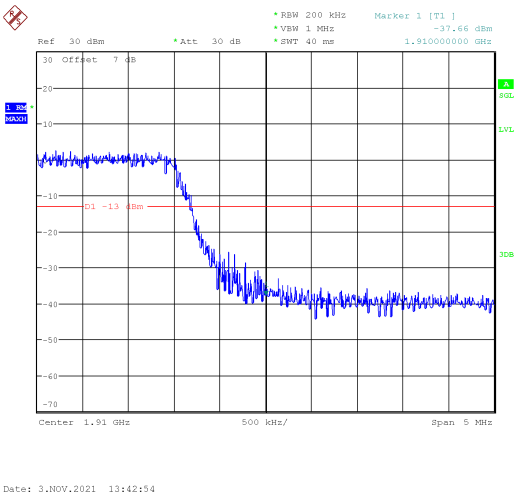
According to KDB 971168 6, a relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

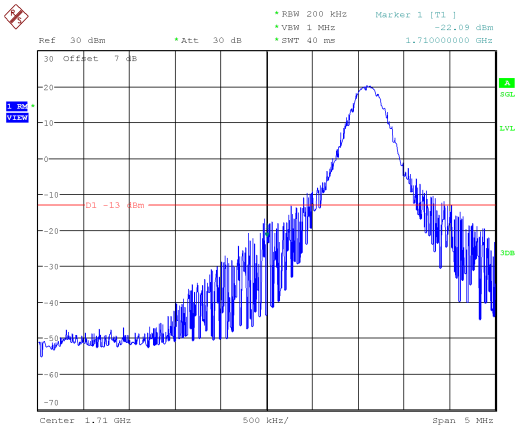
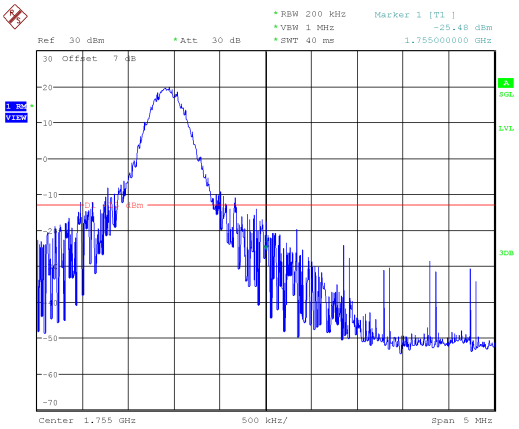
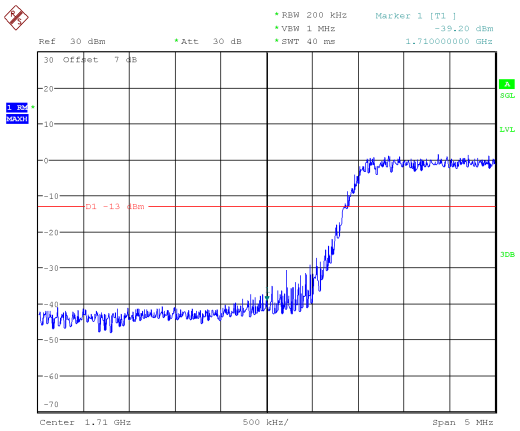
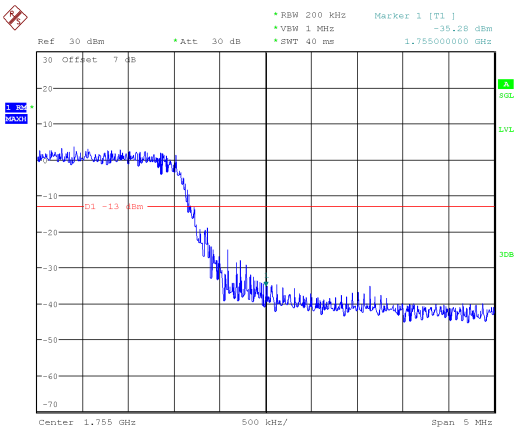
Part 27.53(m) states that for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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.

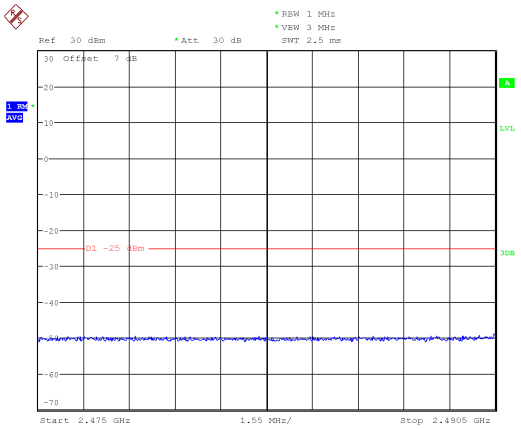
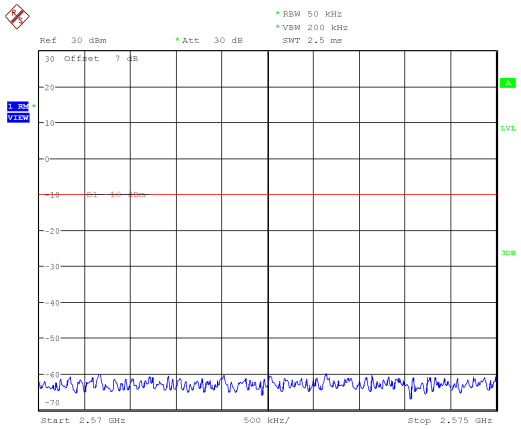
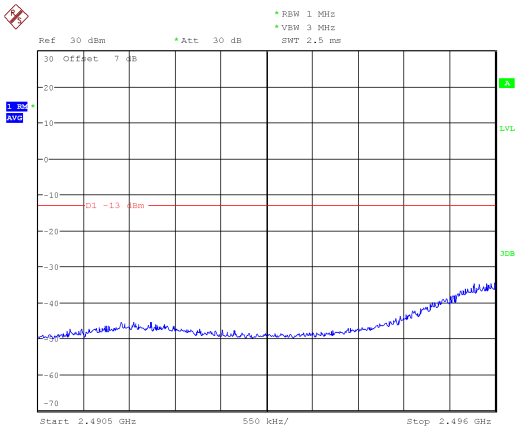
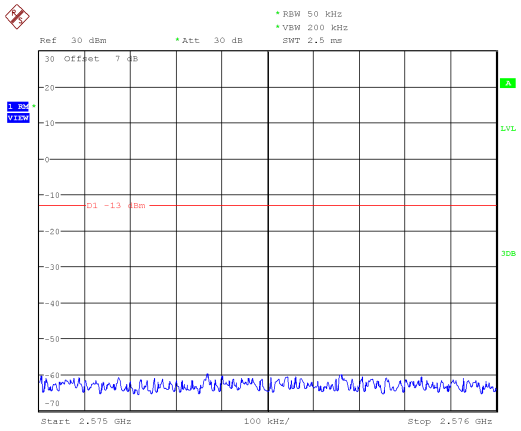
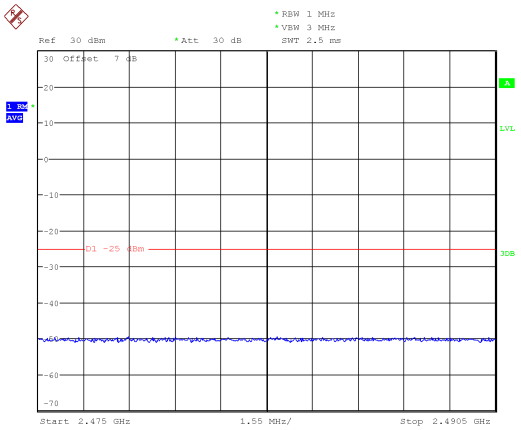
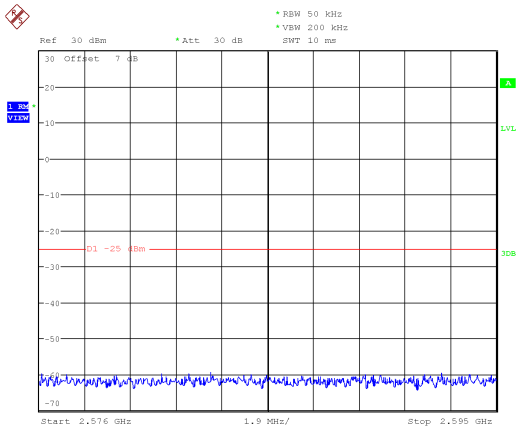
6.6.2 Measurement result

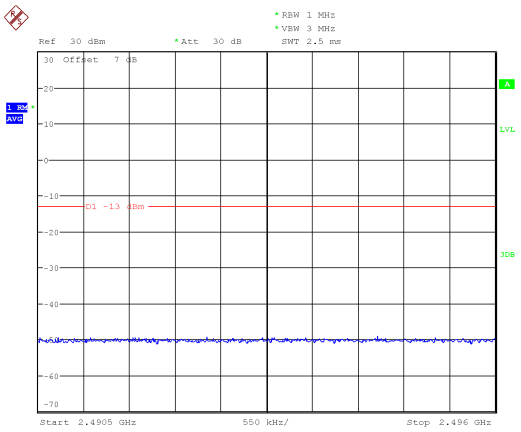
Only worst case result is given below

LTE band 2

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 22.NOV.2021 16:49:25	 Date: 22.NOV.2021 16:48:32
 Date: 22.NOV.2021 16:49:35	 Date: 22.NOV.2021 16:48:43
 Date: 22.NOV.2021 16:51:30	 Date: 22.NOV.2021 16:48:53



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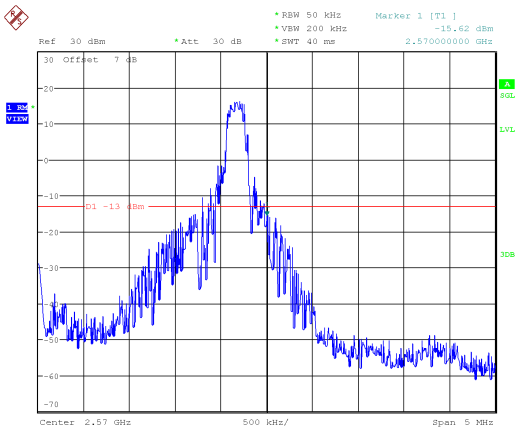

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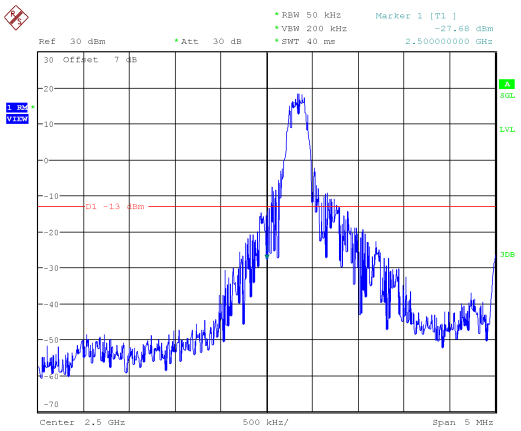

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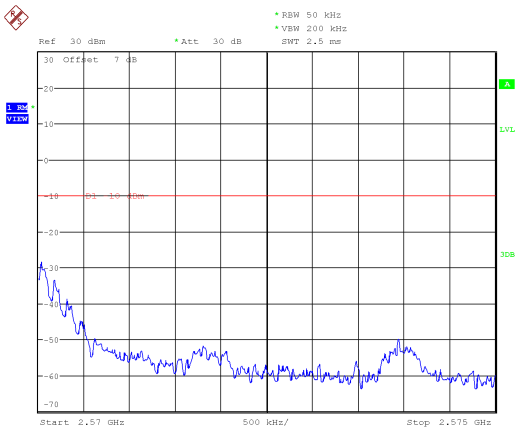

Date: 22.NOV.2021 16:50:49

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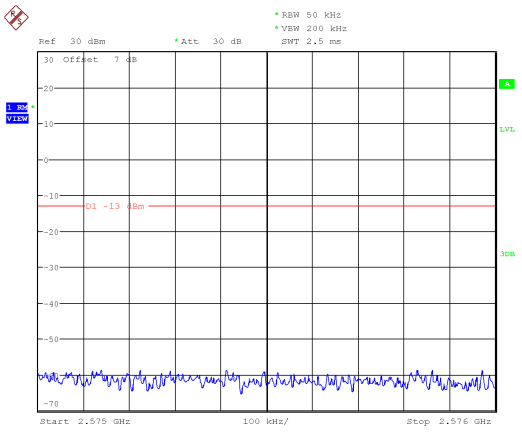
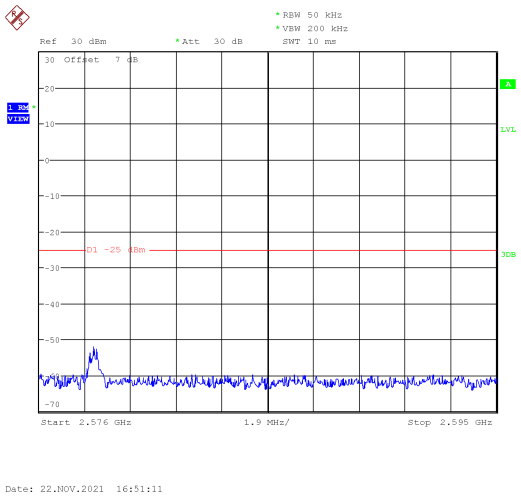
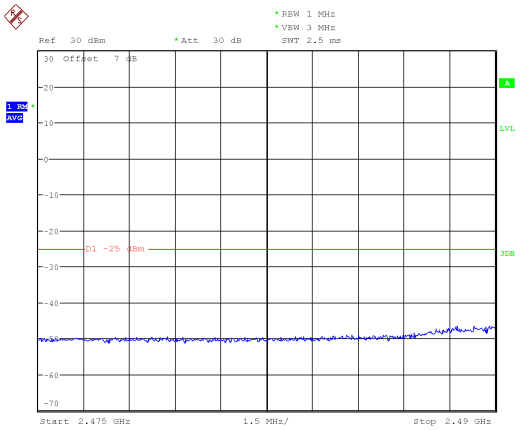
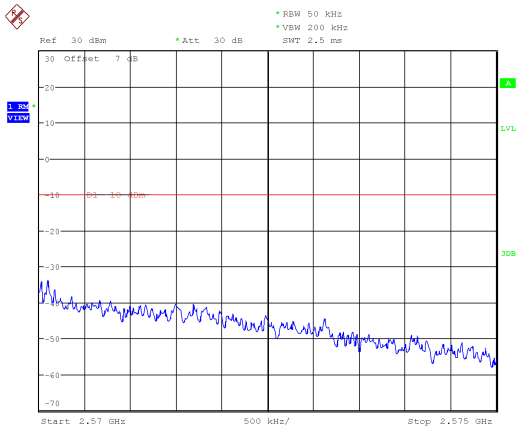
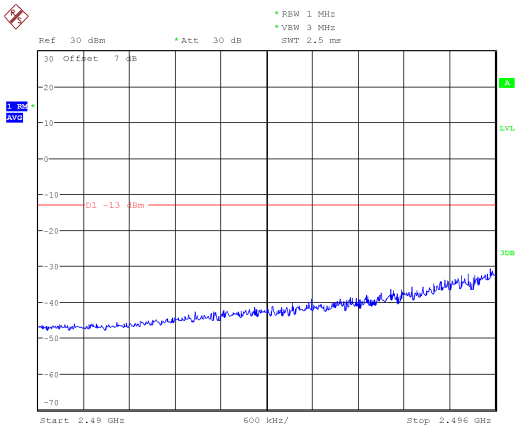
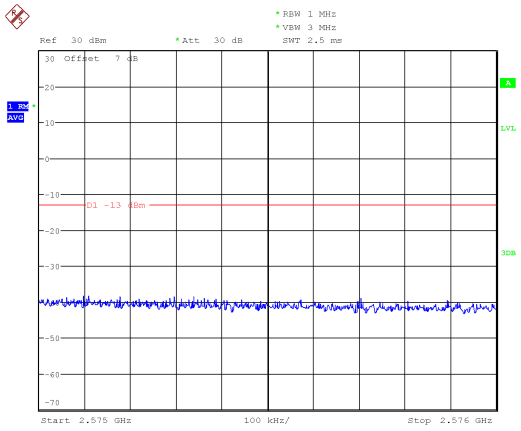
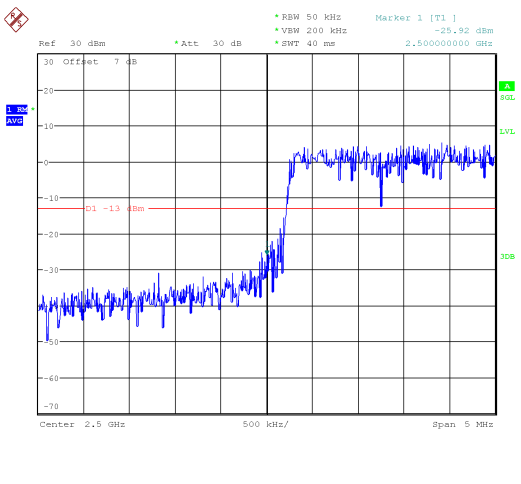
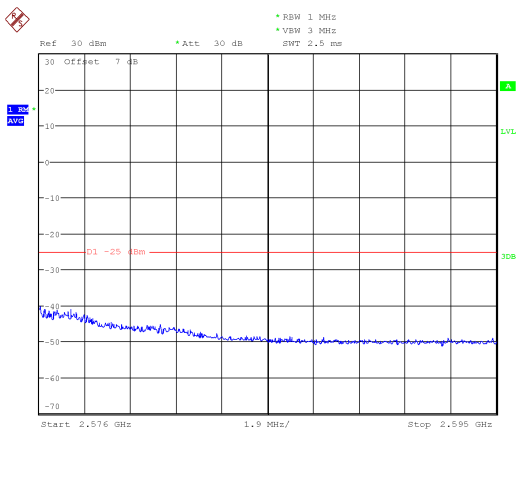


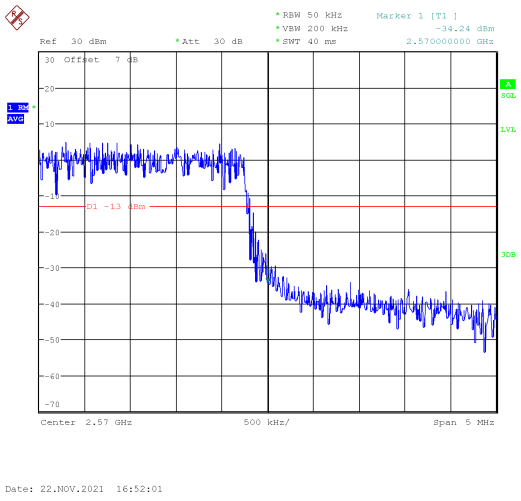
Date: 22.NOV.2021 16:51:00

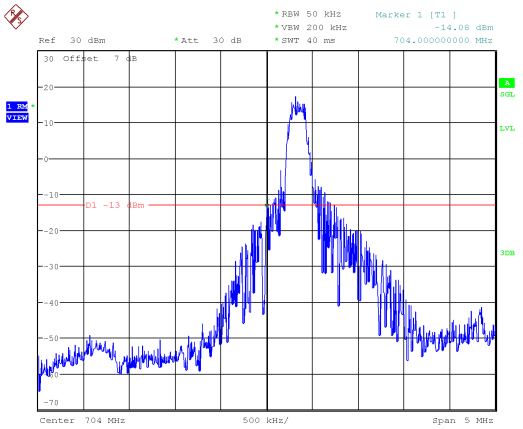
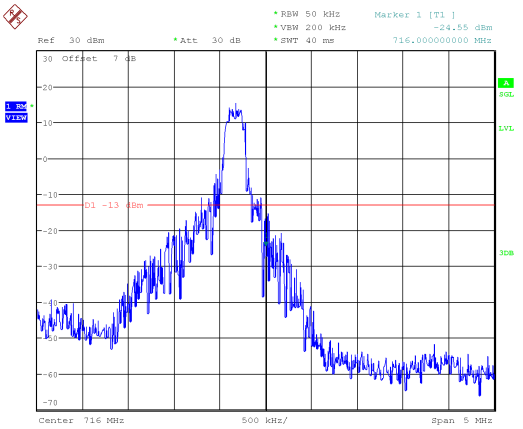
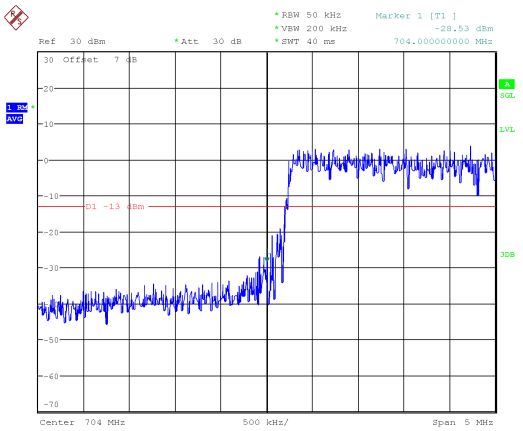
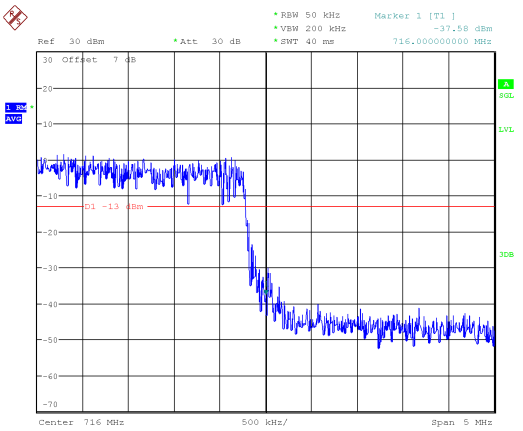
/	 Date: 22.NOV.2021 16:51:11
LOW BAND EDGE BLOCK-15MHz-100%RB	HIGH BAND EDGE BLOCK-15MHz-100%RB
 Date: 22.NOV.2021 16:50:06	 Date: 22.NOV.2021 16:52:12
 Date: 22.NOV.2021 16:50:17	 Date: 22.NOV.2021 16:52:22


RBW 50 kHz
VBW 200 kHz
SWT 40 ms
Marker 1 [T1]
-25.92 dBm
2.500000000 GHz
Ref 30 dBm
Att 30 dB
30 Offset 7 dB
D1 -13 dBm
Center 2.5 GHz
500 kHz/
Span 5 MHz
Date: 22.NOV.2021 16:49:56


RBW 1 MHz
VBW 3 MHz
SWT 2.5 ms
Ref 30 dBm
Att 30 dB
30 Offset 7 dB
D1 -25 dBm
Start 2.576 GHz
1.9 MHz/
Stop 2.595 GHz
Date: 22.NOV.2021 16:52:33

/


RBW 50 kHz
VBW 200 kHz
SWT 40 ms
Marker 1 [T1]
-34.24 dBm
2.570000000 GHz
Ref 30 dBm
Att 30 dB
30 Offset 7 dB
D1 -13 dBm
Center 2.57 GHz
500 kHz/
Span 5 MHz
Date: 22.NOV.2021 16:52:01

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

7.2. Conducted Spurious Emission

6.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

6.7.2 Measurement Limit

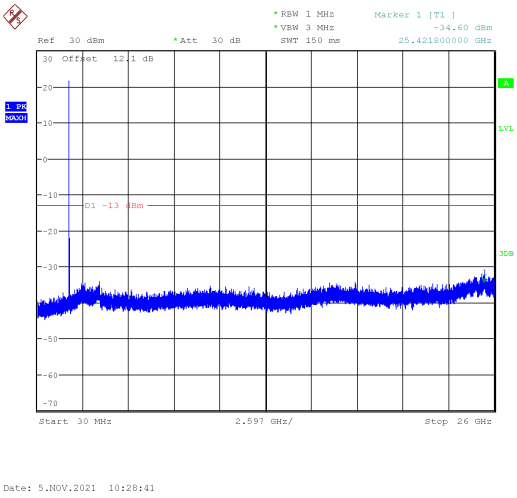
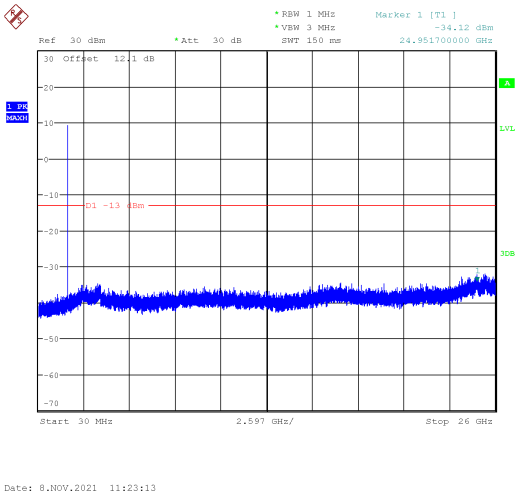
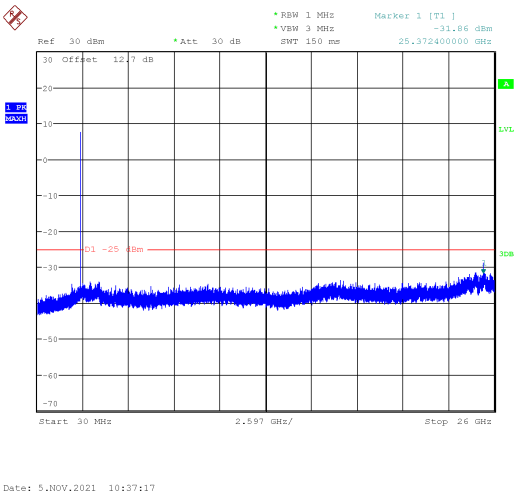
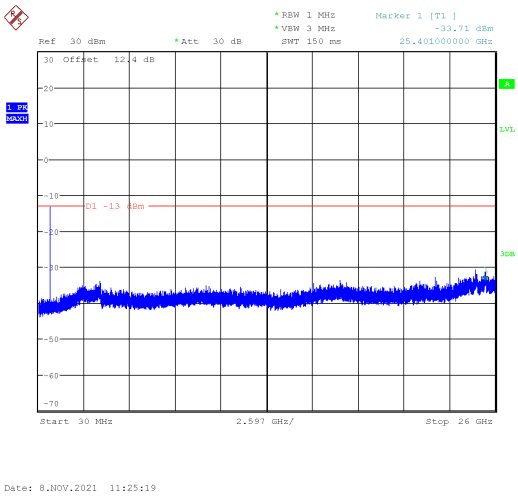
Part 27.53(g),27.53(h), 27.53(m) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Part 27.53(m)(4) specifies 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.

6.7.3 Measurement result

Only worst case result is given below

<table>
<tr><th colspan="2">Spurious emission limit –13dBm.(30MHz – 26GHz)</th></tr>
<tr><th>LTE band 2</th><th>LTE band 4</th></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><th>LTE band 7</th><th>LTE band 17</th></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

7.3. Peak-To-Average Power Ratio

Reference

CFR Part 24.232 (d), 27.50(a)

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.

According to KDB 971168 5.7:

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

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

6.8.1 Measurement results

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)	
1880.0	QPSK	16QAM
	4.97	6.28

LTE band 4, 20MHz

Frequency(MHz)	PAPR(dB)	
1732.5	QPSK	16QAM
	4.90	6.31

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)	
2535.0	QPSK	16QAM
	8.33	8.64

LTE band 17, 10MHz

Frequency(MHz)	PAPR(dB)	
710.0	QPSK	16QAM
	5.58	6.31

7.4. Test Equipment List

Conducted Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMW500	148874	R&S	2021-05-10	1 year
2	Vector Signal Analyzer	FSQ26	101091	R&S	2021-05-10	1 year
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2021-05-09	1 year
4	Eagle Test Software	Eagle V3.1 FCC BT/WIFI	N/A	ECIT	N/A	N/A

Radiated Emission Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMW500	104178	R&S	2021-05-10	1 year
2	Test Receiver	ESU40	100307	R&S	2021-05-10	1 year
3	TRILOG Antenna	VULB9163	VULB9163-515	Schwarzbeck	2020-02-28	2 years
4	Double Ridged Guide Antenna	ETS-3117	135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2021-05-10	1 year
6	RF Signal Generator	SMF100A	102314	R&S	2021-05-10	1 year
7	Amplifier	SCU08	10146	R&S	2021-05-10	1 year
8	EMI Test Software	EMC32 V9.15.00	N/A	R&S	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS.

Annex A: Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty to see the column, k=2

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2412MHz-2462MHz	95%	0.544dB
Peak Power Spectral Density	2412MHz-2462MHz	95%	0.502dB
Occupied 6dB Bandwidth	2412MHz-2462MHz	95%	69.26kHz
Band Edges-Conducted	2412MHz-2462MHz	95%	0.544dB
Conducted Emission	30MHz-2GHz	95%	0.90dB
Conducted Emission	2GHz-3.6GHz	95%	0.88dB
Conducted Emission	3.6GHz-8GHz	95%	0.96dB
Conducted Emission	8GHz-20GHz	95%	0.94dB
Conducted Emission	20GHz-22GHz	95%	0.88dB
Conducted Emission	22GHz-26GHz	95%	0.86dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	5.20dB
AC Power line Conducted Emission	0.15MHz-30MHz	95%	3.66 dB

Annex B: Product Change Description

Product Change Description

As the applicant of the below model, [Shanghai Sunmi Technology Co.,Ltd.] declares that the product,

[T5930，FCC ID：2AH25T5930]

is the variant of the initial certified product,

[V2，FCC ID：2AH25V2]

SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO
MMS/STK changes: NO
JAVA changes: NO
Other changes detailed: NO

HARDWARE MODIFICATION:

Band changes: NO
Power Amplifier changes: YES

1、 HQ11161014000 / AP7219M - 41 - R95MOG/Airoha replacement for HQ111L0007000 / NZ5627GTR1 / Lansus fly Xiang (national), a U3411
2、 HQ11161053000 / AP6712M - 51 - R95MOG/Airoha replacement for HQ111L0008000 / NZ5596GTR1 / Lansus fly Xiang (national), a U3302
3、 HQ11160242000 AW5005DNR/Awinic (ai) replacement for HQ111M0102000 / MXDLN16GF/Maxscend (micro) Maxscend technologies inc, a U3605

Antenna changes: NO
PCB Layout changes: NO
Components on PCB changes: NO
LCD changes: NO
Speaker changes: NO
Camera changes:NO
Vibrator changes: NO
Bluetooth changes: NO
FM changes: NO
Other changes: NO

MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO

Mechanical shell changes: NO
Other changes detailed: NO

ACCESSORY MODIFICATIONS:

Battery changes: NO
AC Adaptor changes: NO
Earphone changes: NO

Fang Lu

APPROVED BY:

Date:2021/10/21

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Annex C: Accreditation Certificate

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