

FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES

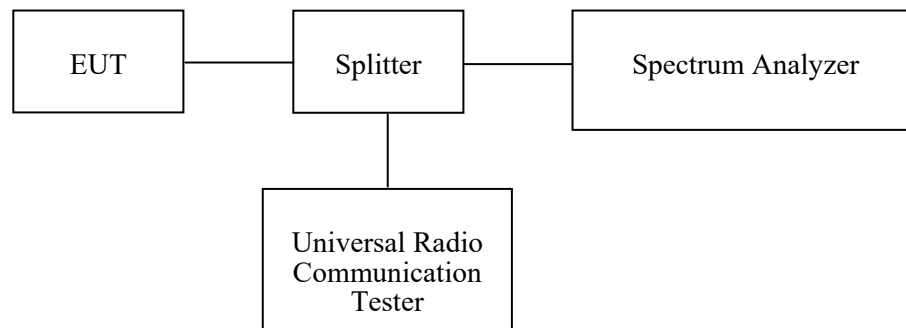
Applicable Standard

FCC § 2.1053, § 22.917, § 24.238 and § 27.53

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021-01-09	2022-01-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	N/A
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	Each time	N/A
Unknown	Attenuator	UNAT-3+	15529	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

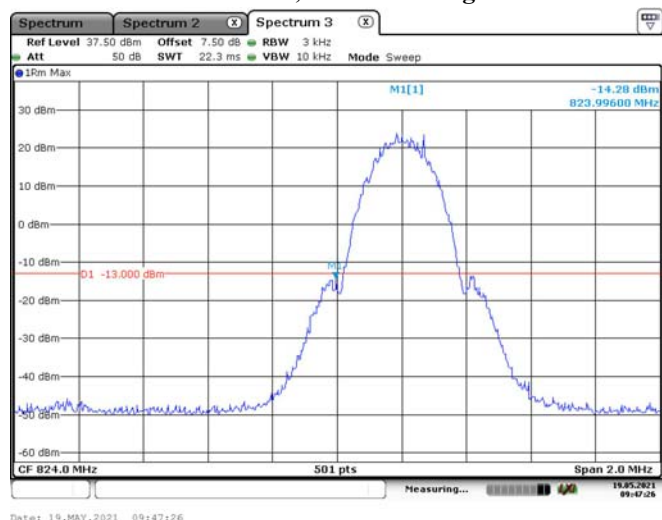
Environmental Conditions

Temperature:	24.2~27.5 °C
Relative Humidity:	47~70 %
ATM Pressure:	100~100.8kPa
Tester:	Lay Lei
Test Date:	2021.05.19~2021-06-07

Test Mode: Transmitting

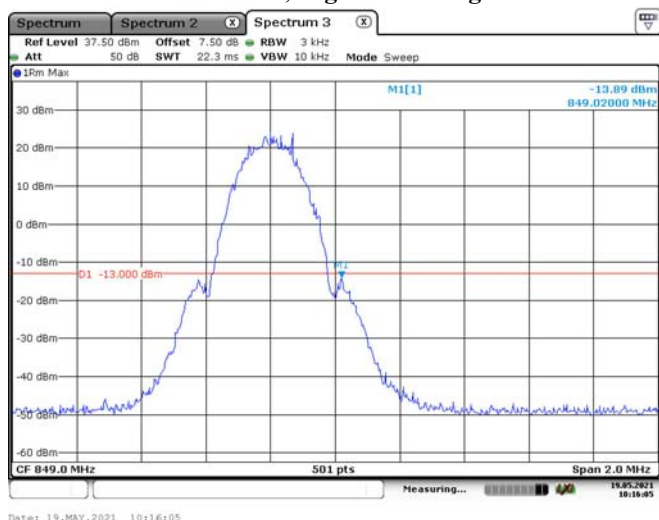
Test Result: Compliance. Please refer to the following plots.

GSM 850, Left Band Edge



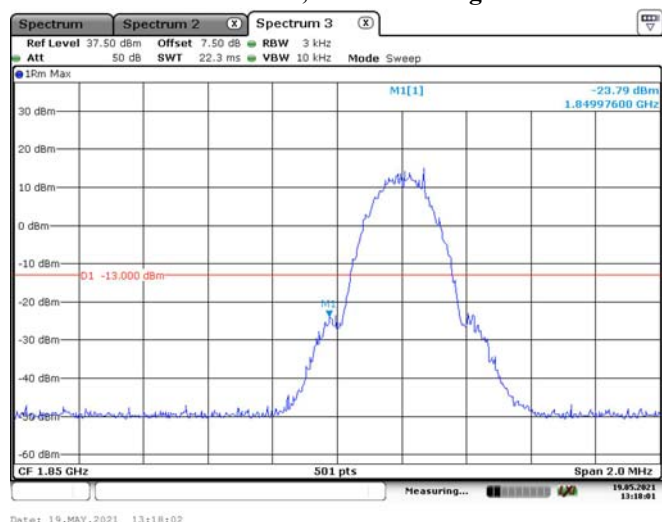
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GSM 850, Right Band Edge



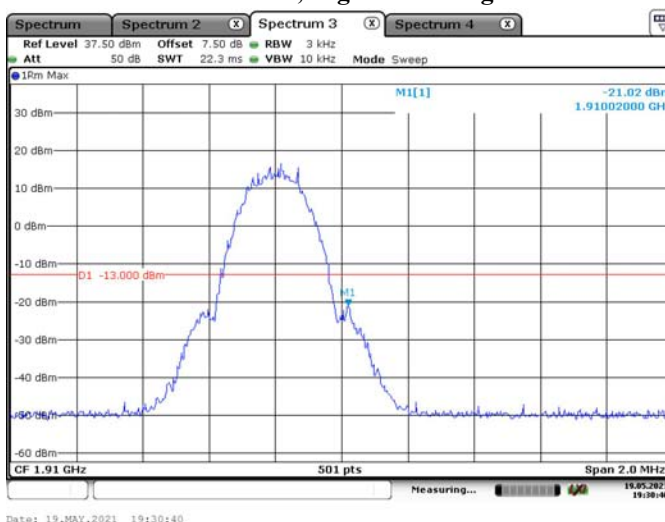
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GSM 1900, Left Band Edge



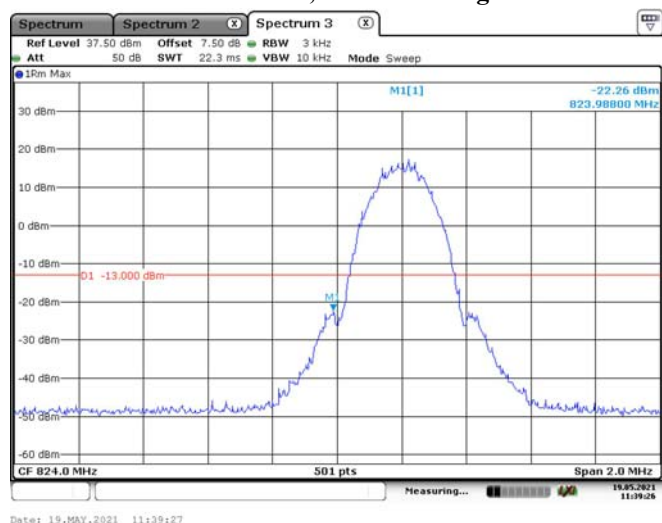
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GSM 1900, Right Band Edge



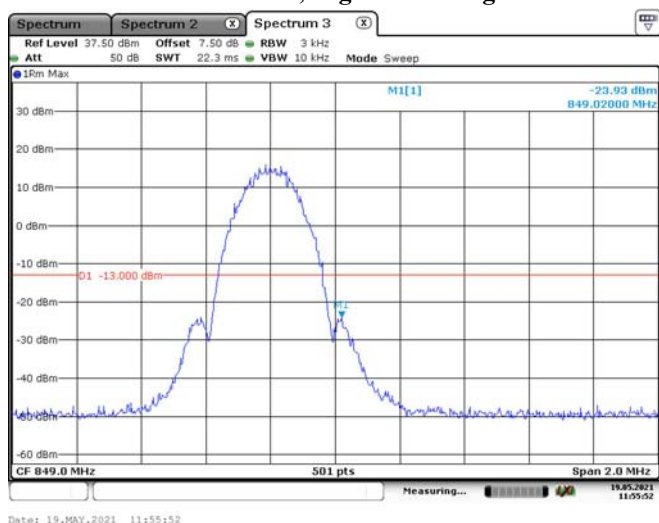
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EGPRS 850, Left Band Edge



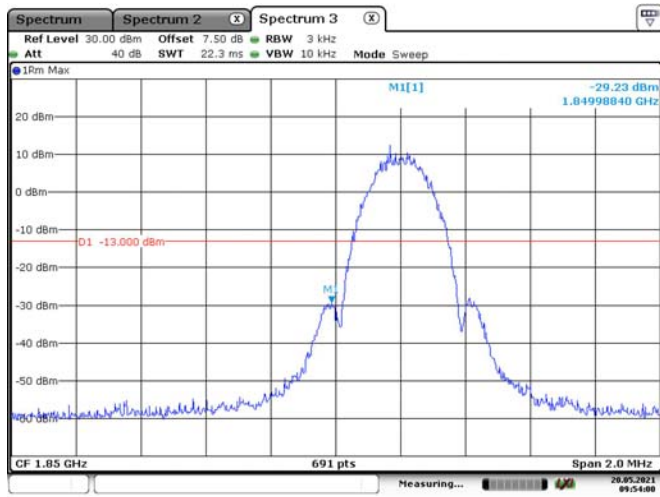
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EGPRS 850, Right Band Edge



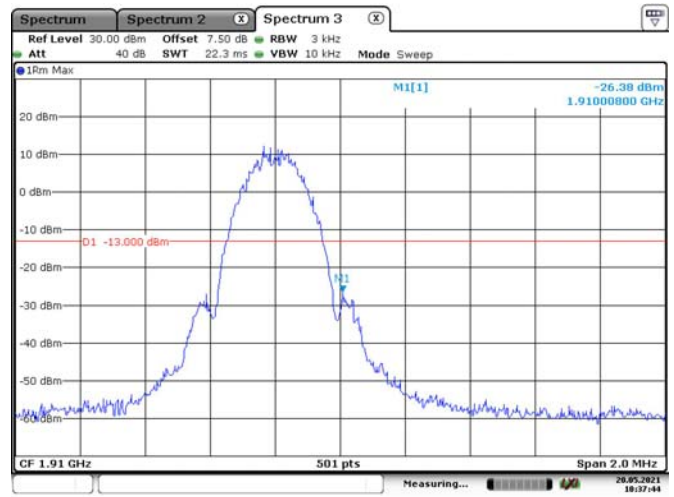
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EGPRS 1900, Left Band Edge



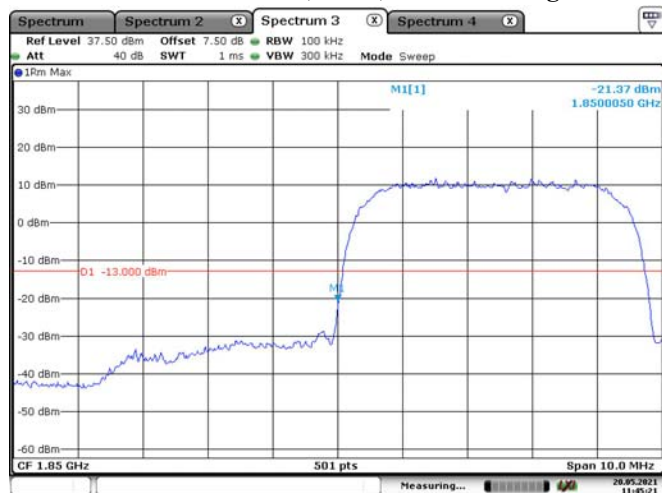
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EGPRS 1900, Right Band Edge

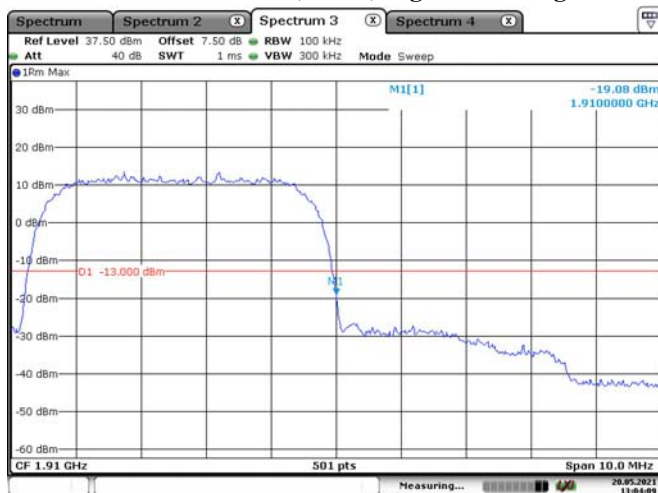


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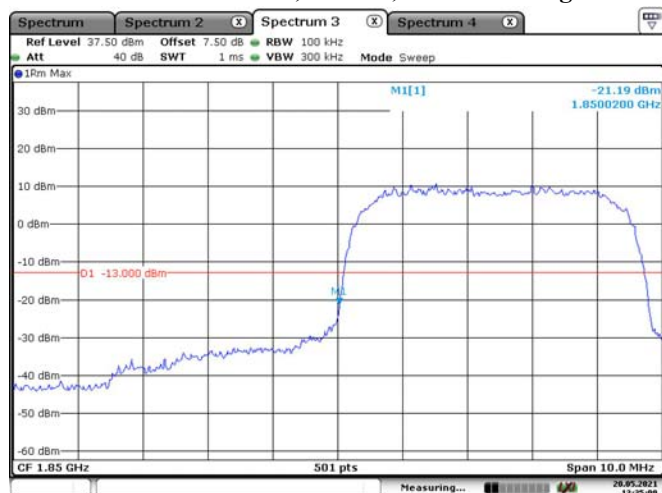
WCDMA Band II,Rel99, Left Band Edge



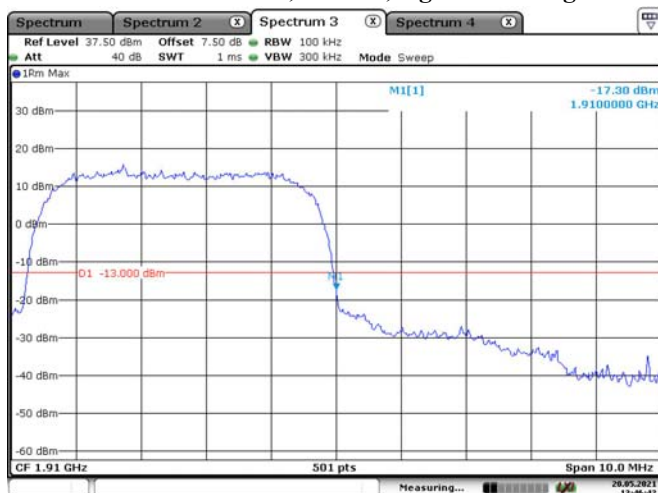
WCDMA Band II,Rel99, Right Band Edge



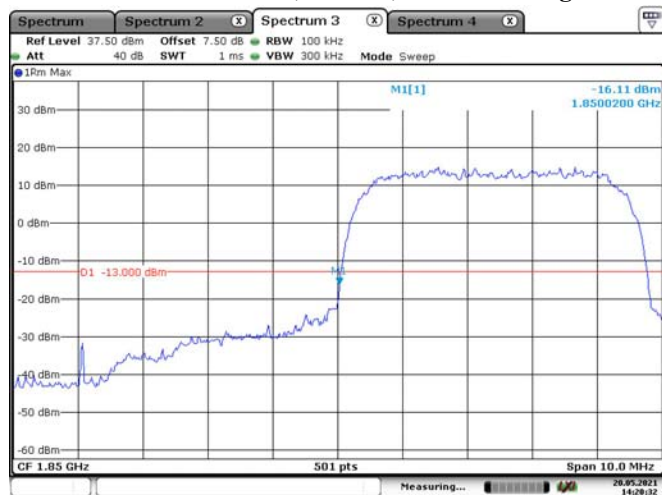
WCDMA Band II,HSDPA, Left Band Edge



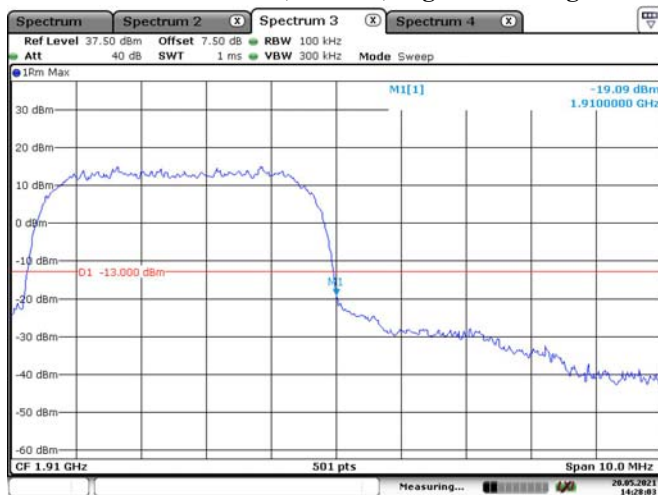
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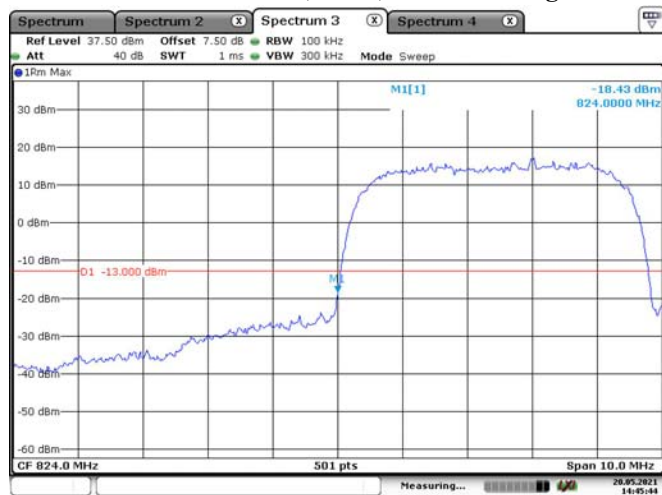
WCDMA Band II,HSUPA, Left Band Edge



WCDMA Band II,HSUPA, Right Band Edge



WCDMA Band V, Rel99, Left Band Edge



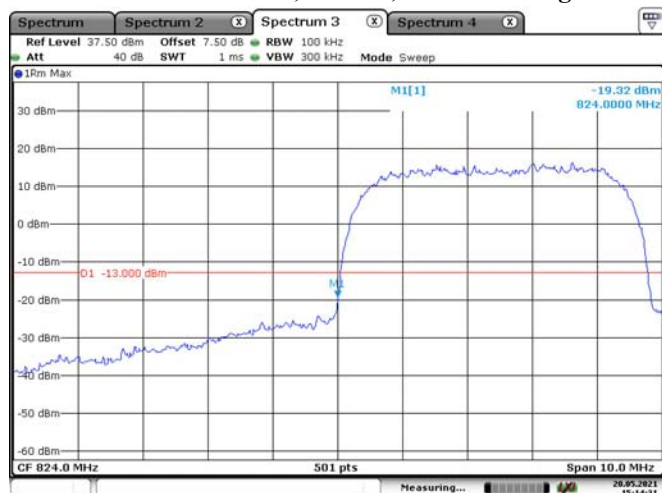
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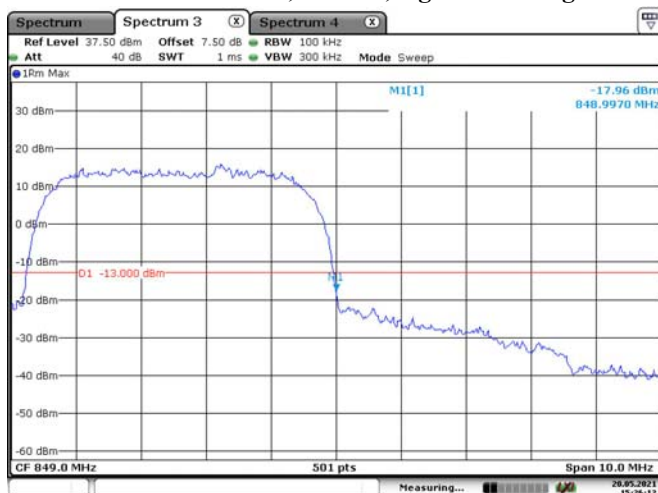
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WCDMA Band V, HSDPA, Left Band Edge



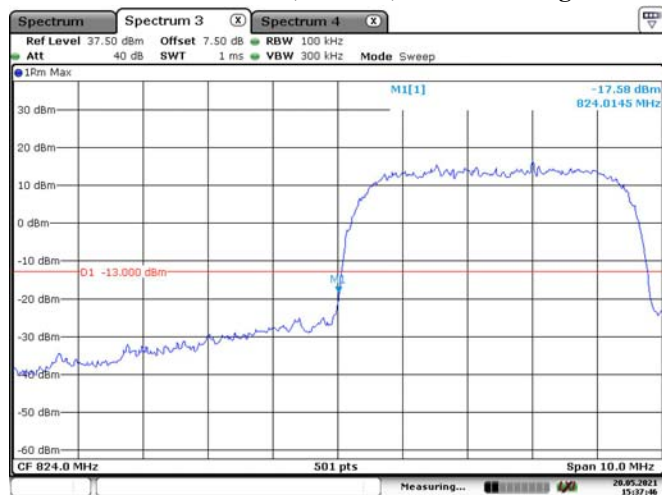
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WCDMA Band V, HSDPA, Right Band Edge



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WCDMA Band V, HSUPA, Left Band Edge

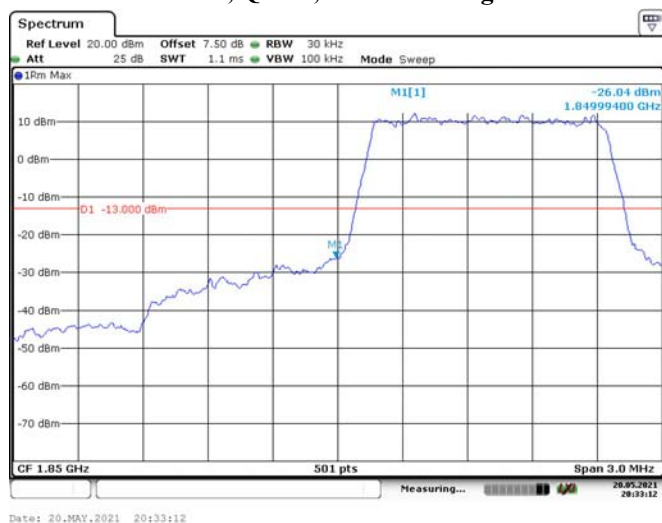
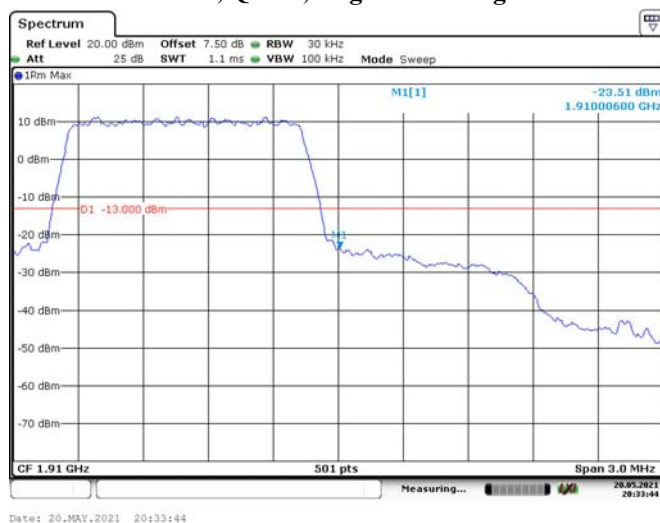
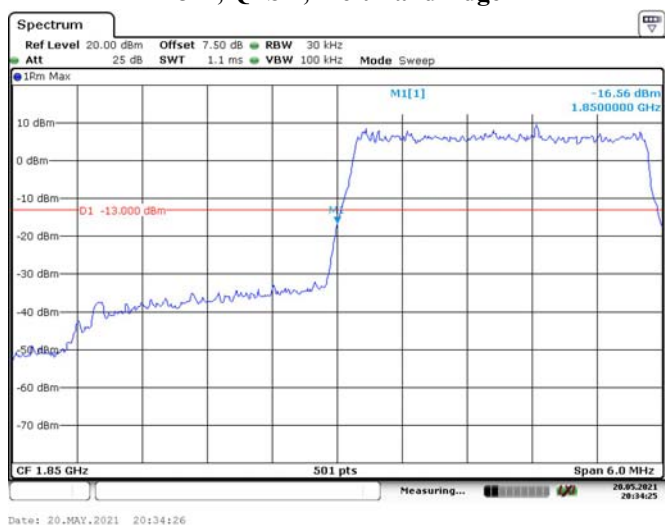
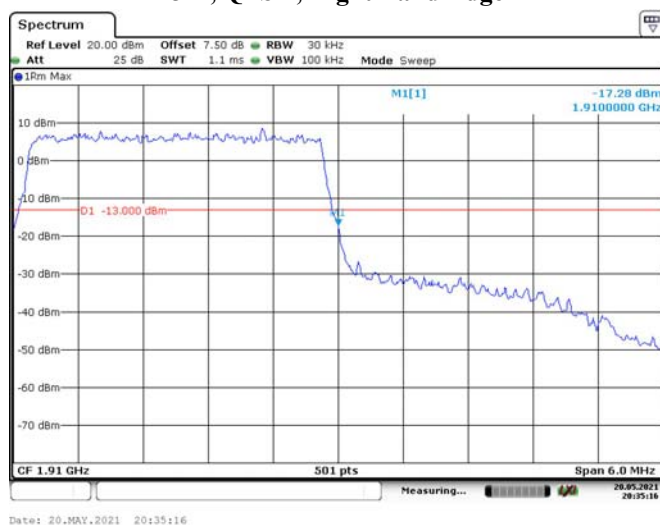
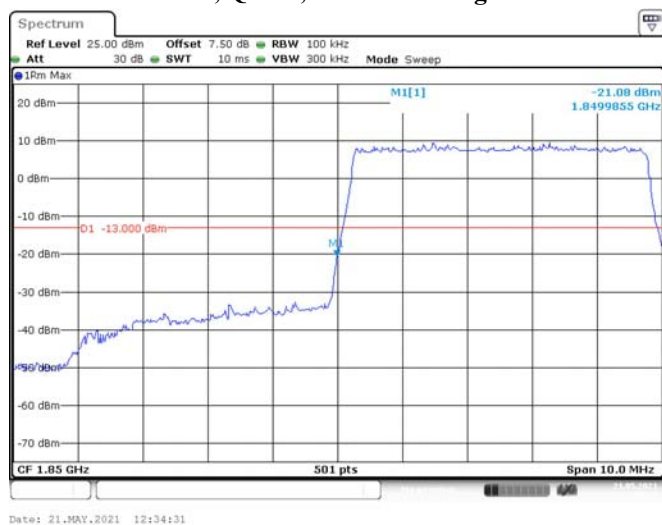
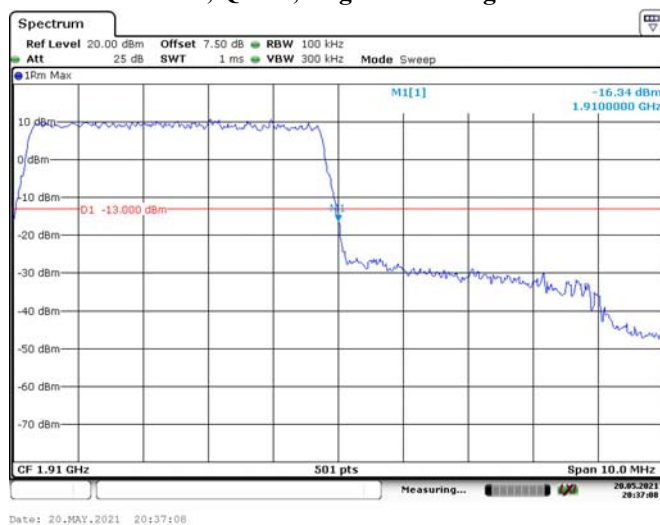


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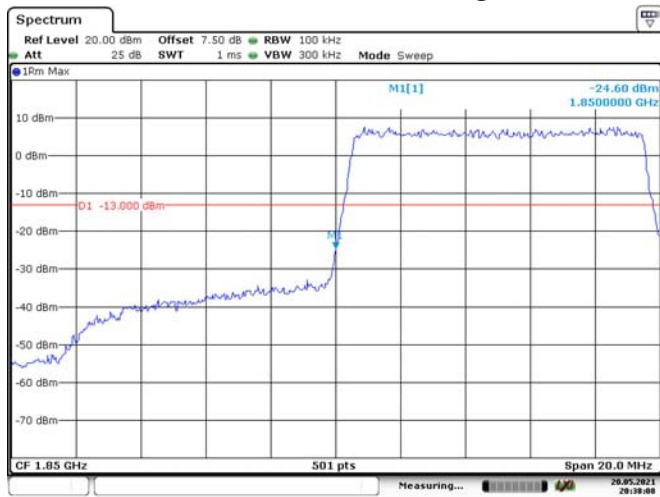
WCDMA Band V, HSUPA, Right Band Edge



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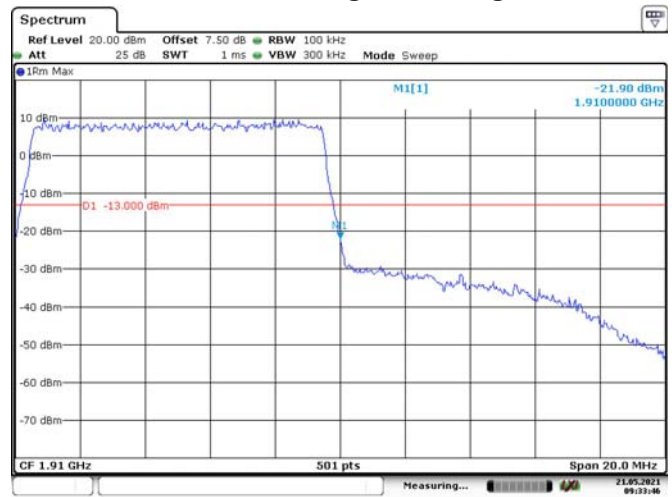
LTE Band 2:**1.4M, QPSK, Left Band Edge****1.4M, QPSK, Right Band Edge****3M, QPSK, Left Band Edge****3M, QPSK, Right Band Edge****5M, QPSK, Left Band Edge****5M, QPSK, Right Band Edge**

10M, QPSK, Left Band Edge



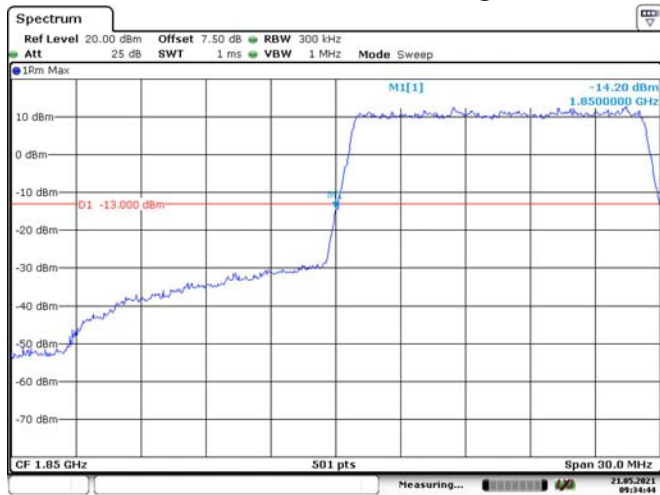
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10M, QPSK, Right Band Edge



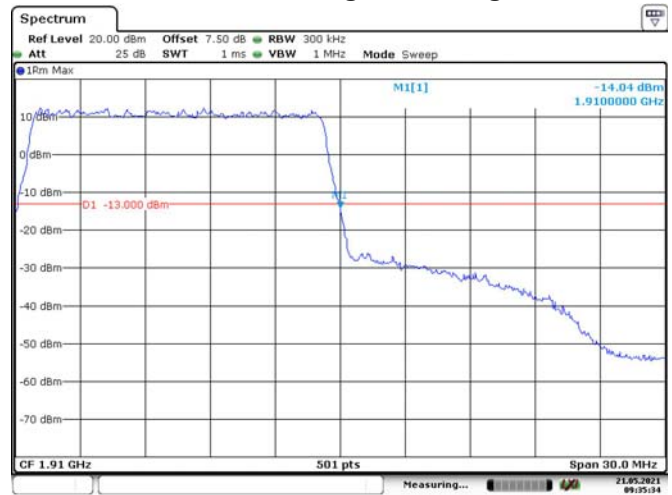
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15M, QPSK, Left Band Edge



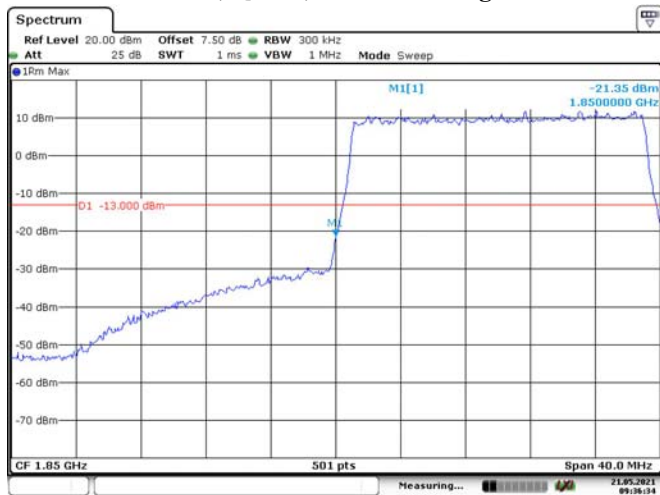
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15M, QPSK, Right Band Edge



Date: 21.MAY.2021 09:35:34

20M, QPSK, Left Band Edge



Date: 21.MAY.2021 09:36:34

20M, QPSK, Right Band Edge



Date: 21.MAY.2021 09:37:40

1.4M, 16QAM, Left Band Edge



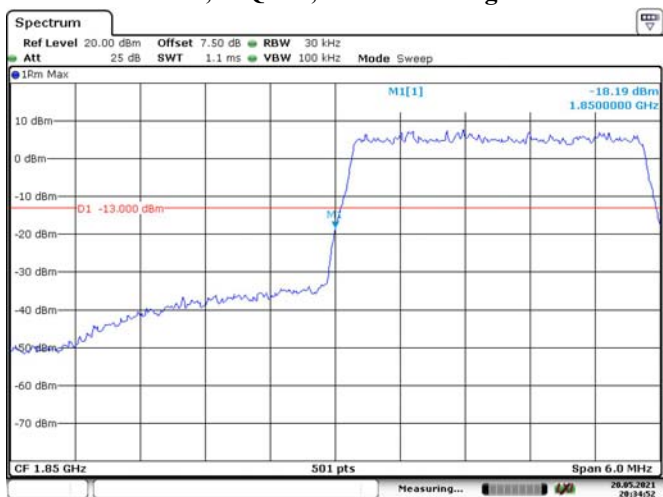
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1.4M, 16QAM, Right Band Edge



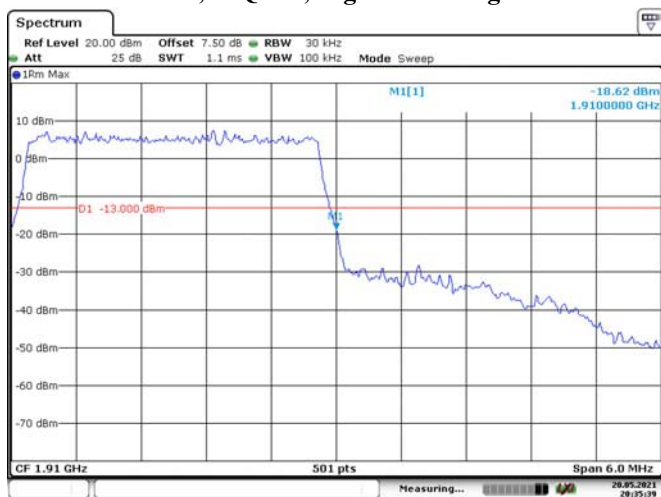
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3M, 16QAM, Left Band Edge



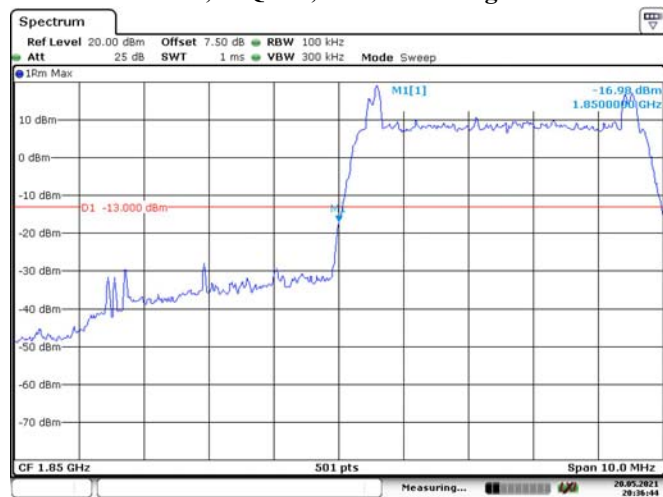
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3M, 16QAM, Right Band Edge



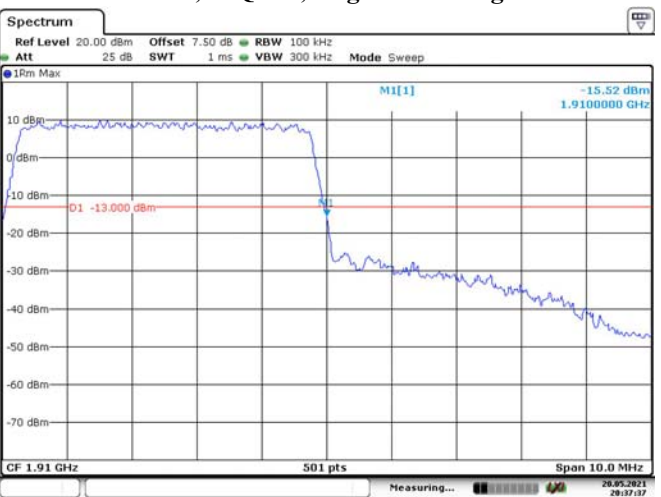
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5M, 16QAM, Left Band Edge



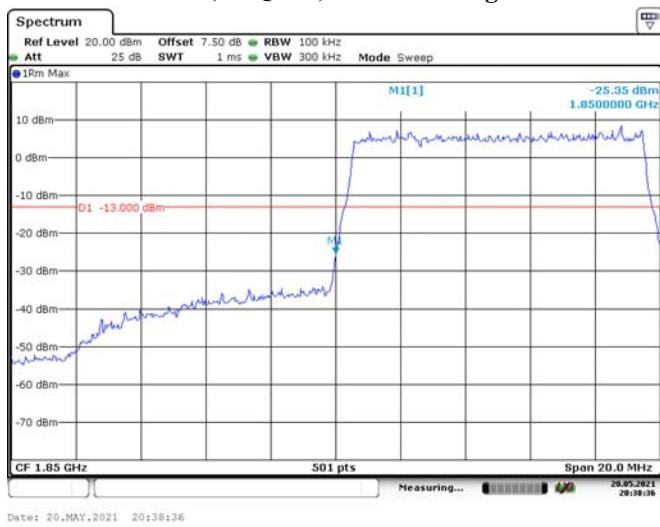
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5M, 16QAM, Right Band Edge

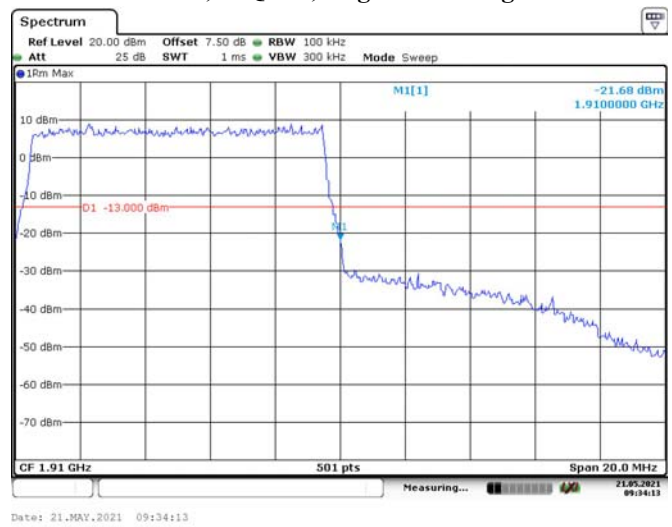


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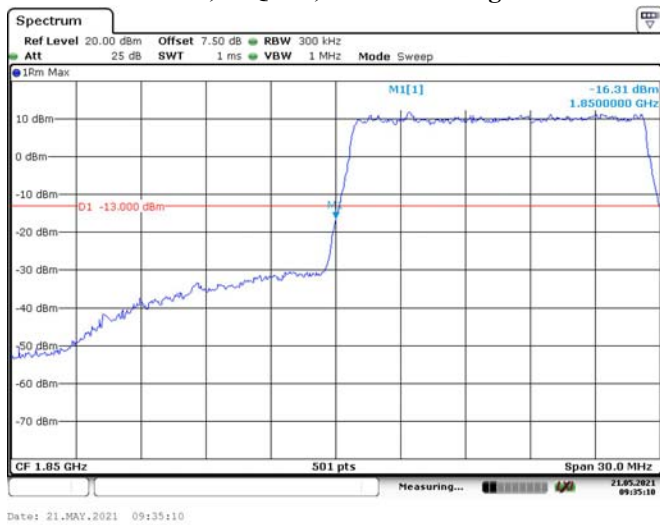
10M, 16QAM, Left Band Edge



10M, 16QAM, Right Band Edge



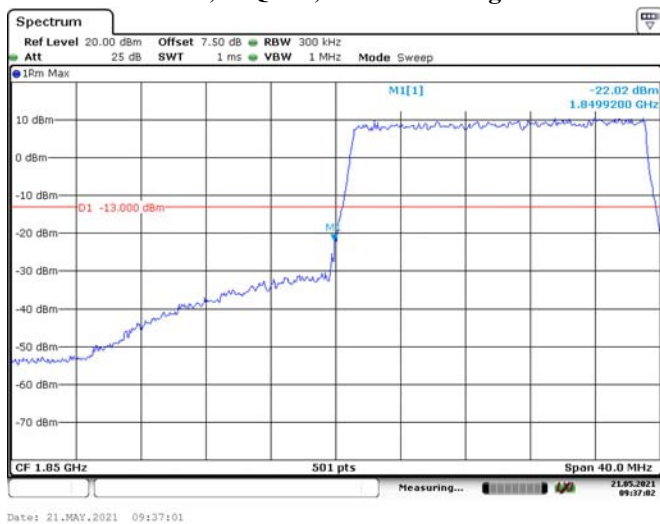
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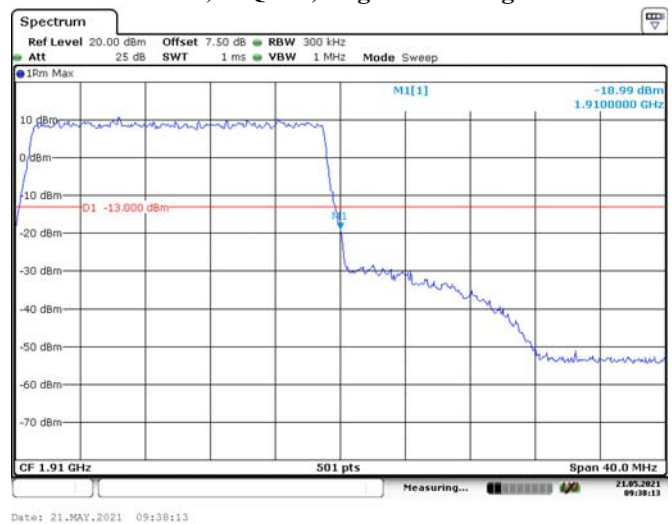
15M, 16QAM, Right Band Edge

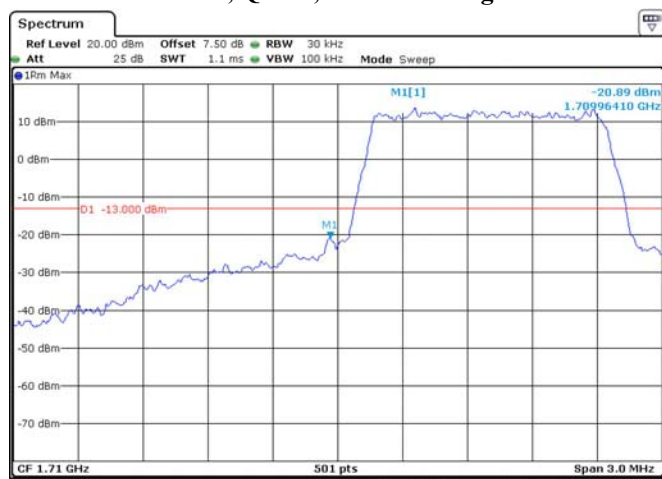
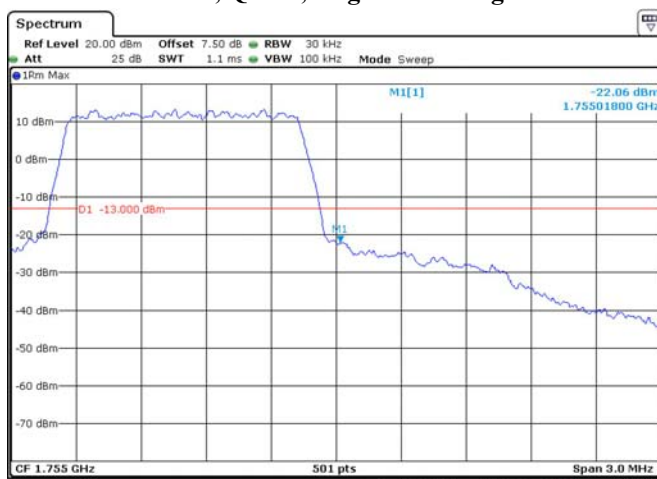
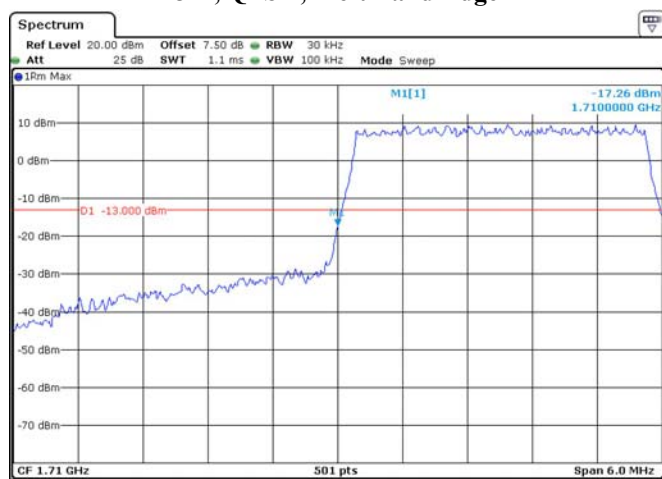
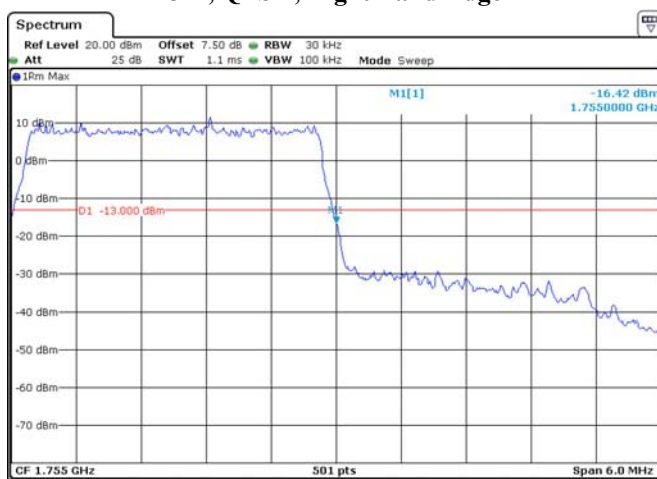
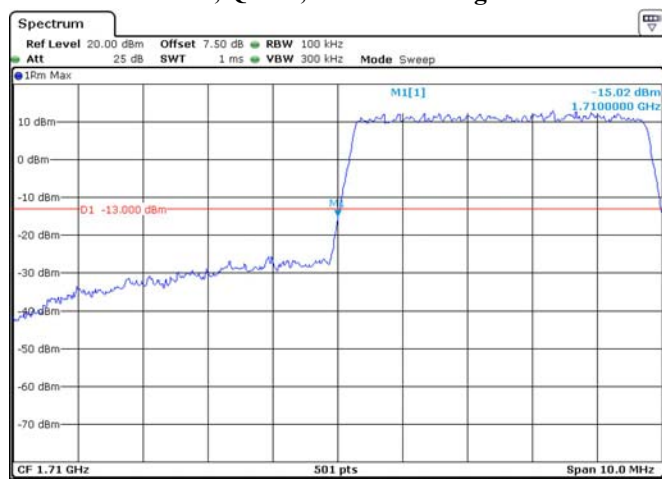
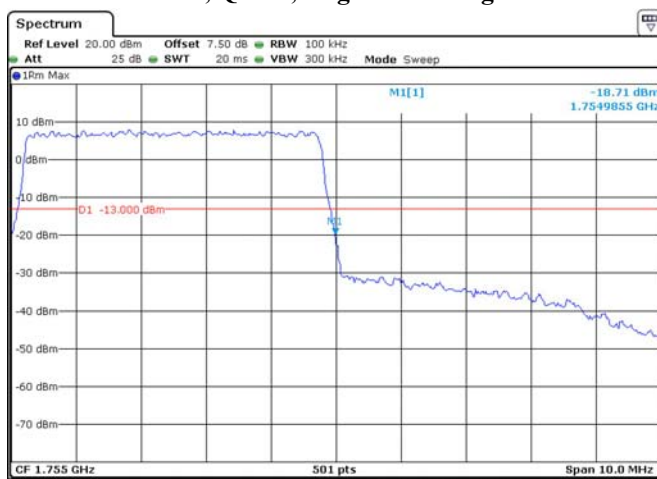


20M, 16QAM, Left Band Edge

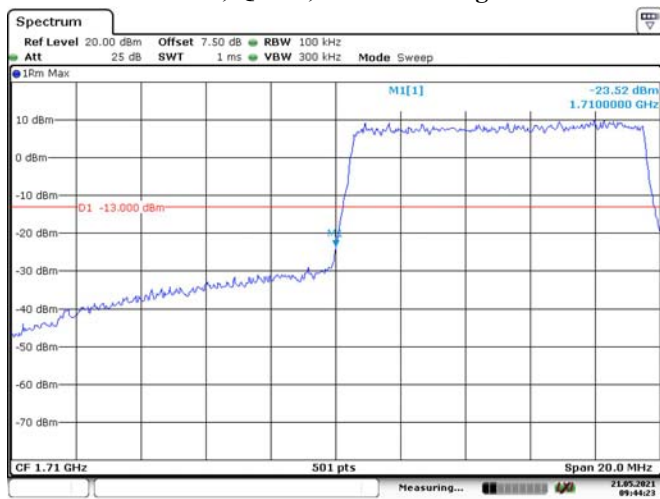


20M, 16QAM, Right Band Edge



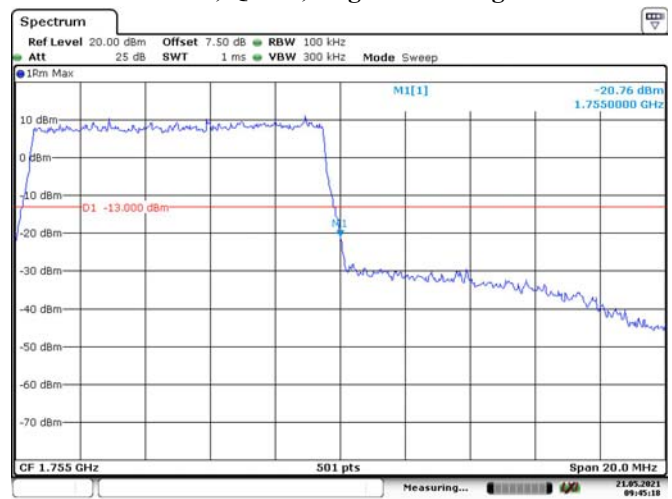
LTE Band 4:**1.4M, QPSK, Left Band Edge****1.4M, QPSK, Right Band Edge****3M, QPSK, Left Band Edge****3M, QPSK, Right Band Edge****5M, QPSK, Left Band Edge****5M, QPSK, Right Band Edge**

10M, QPSK, Left Band Edge



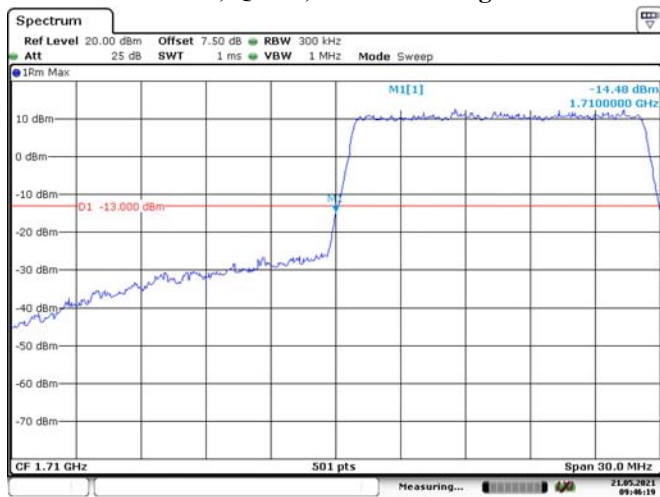
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10M, QPSK, Right Band Edge



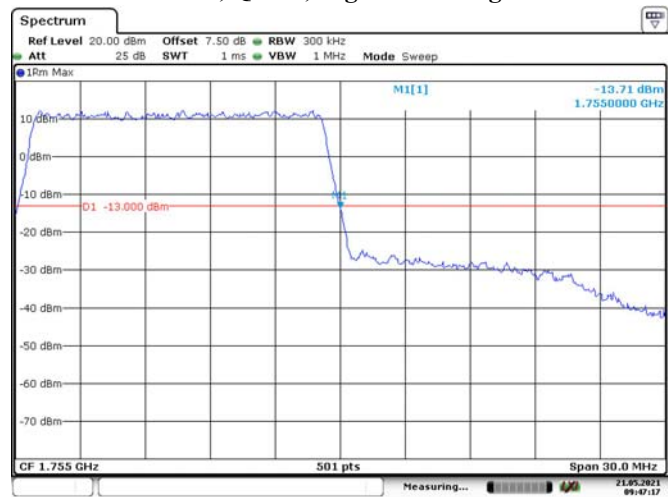
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15M, QPSK, Left Band Edge



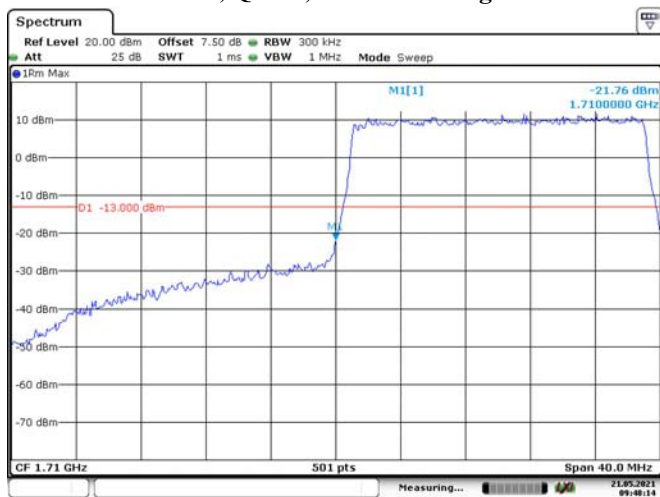
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15M, QPSK, Right Band Edge



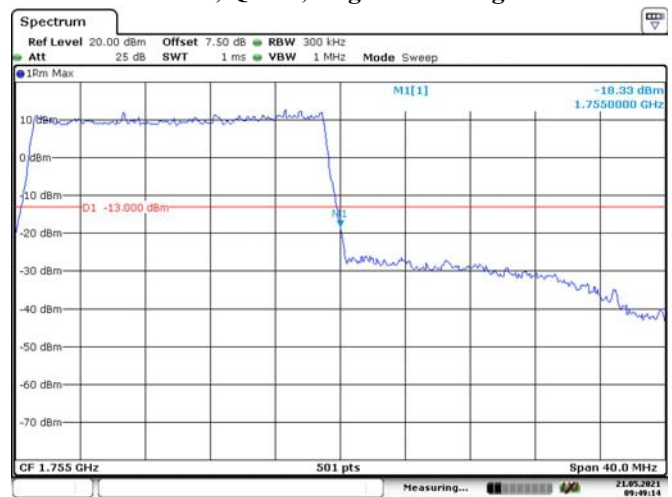
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20M, QPSK, Left Band Edge



Date: 21.MAY.2021 09:48:14

20M, QPSK, Right Band Edge



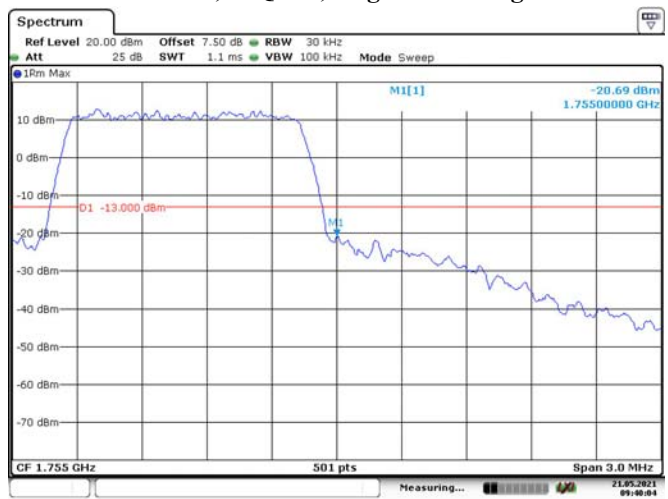
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1.4M, 16QAM, Left Band Edge



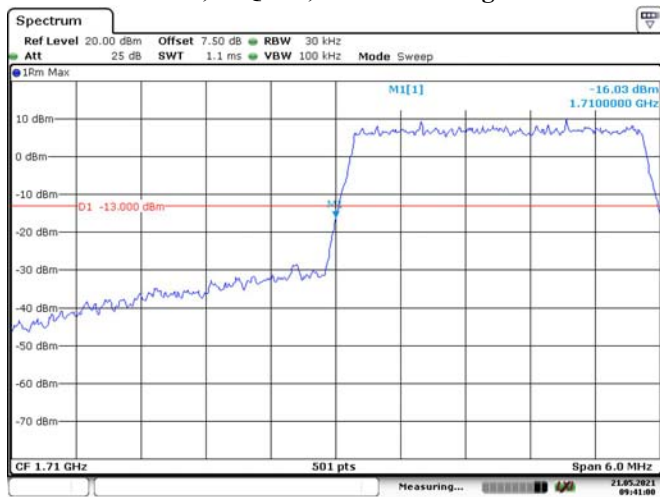
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1.4M, 16QAM, Right Band Edge



Date: 21.MAY.2021 09:40:03

3M, 16QAM, Left Band Edge



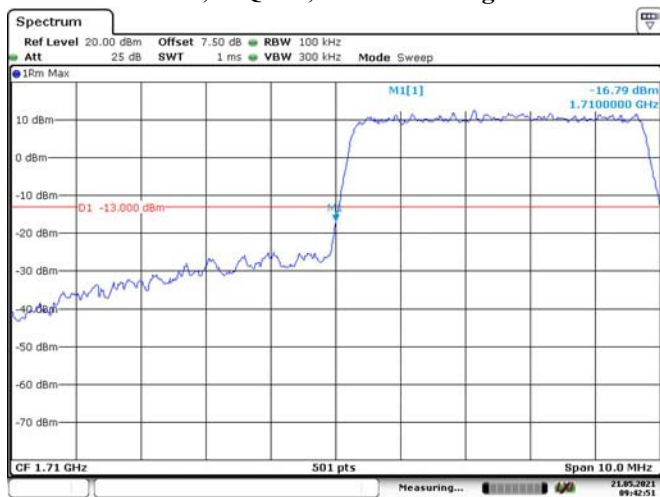
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3M, 16QAM, Right Band Edge



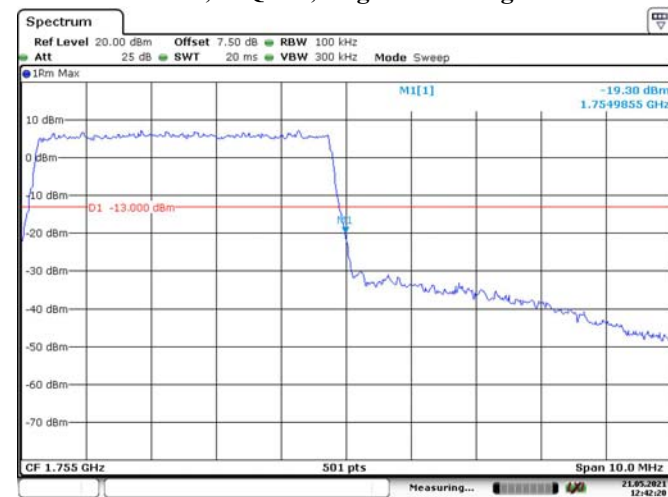
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5M, 16QAM, Left Band Edge



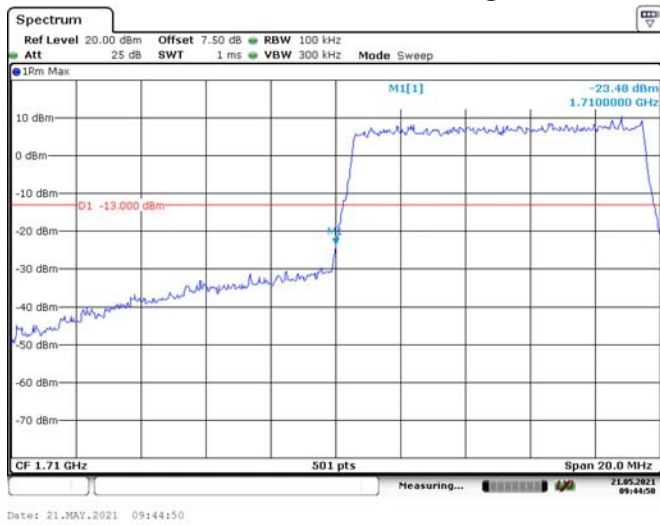
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5M, 16QAM, Right Band Edge

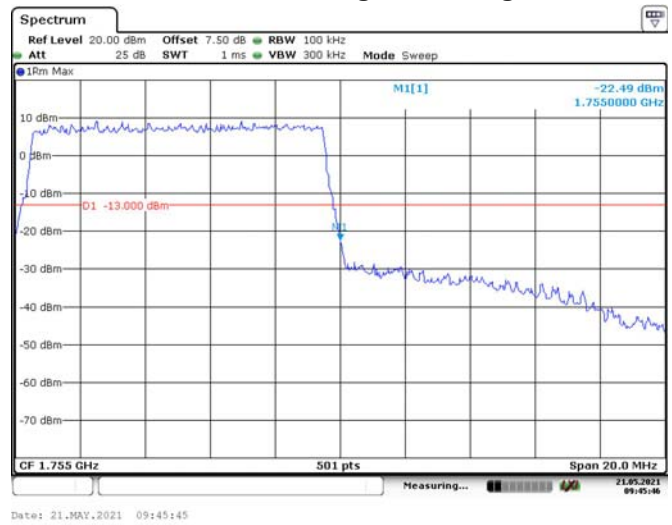


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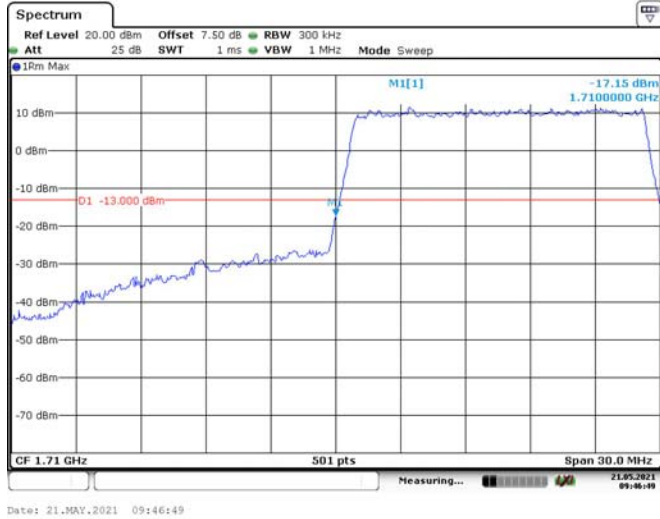
10M, 16QAM, Left Band Edge



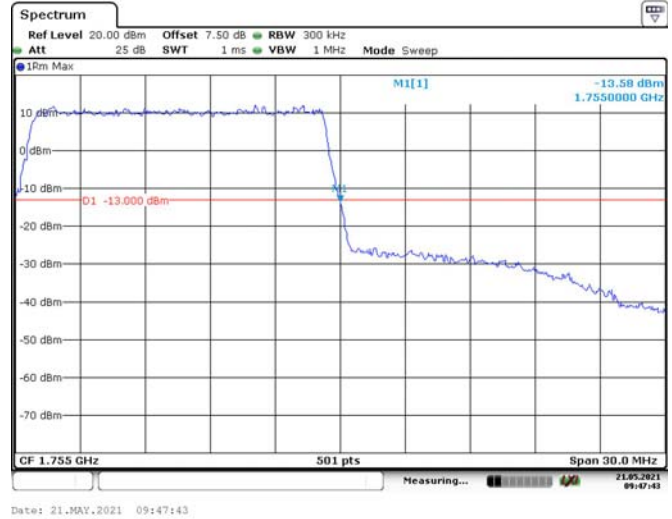
10M, 16QAM, Right Band Edge



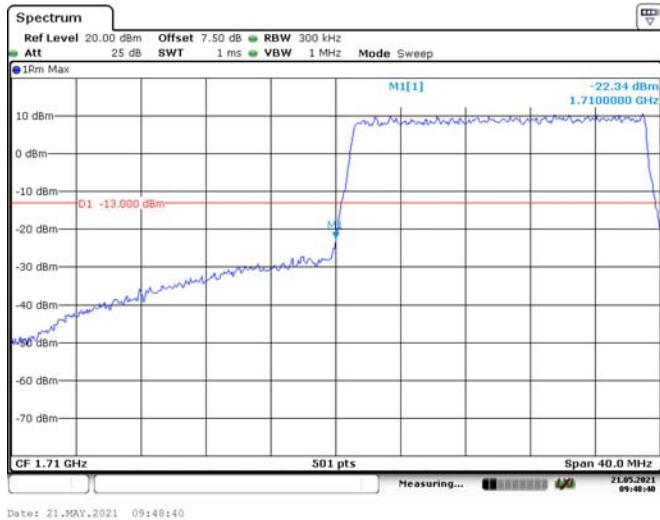
15M, 16QAM, Left Band Edge



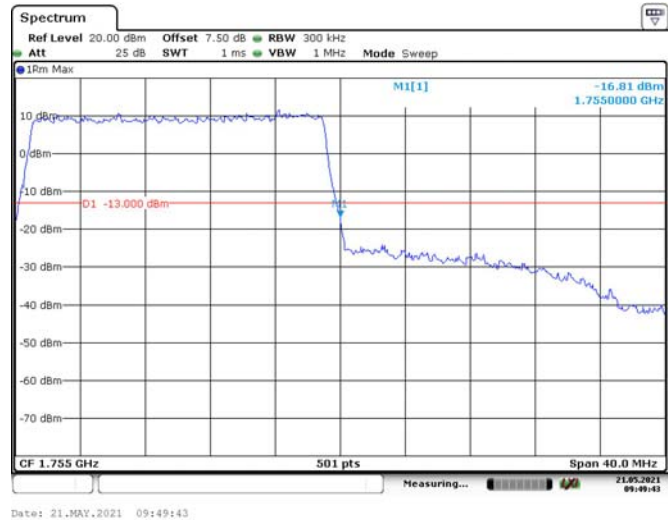
15M, 16QAM, Right Band Edge

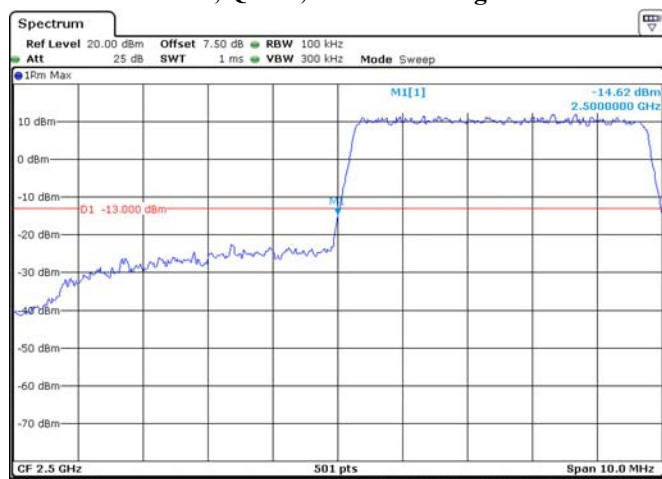


20M, 16QAM, Left Band Edge

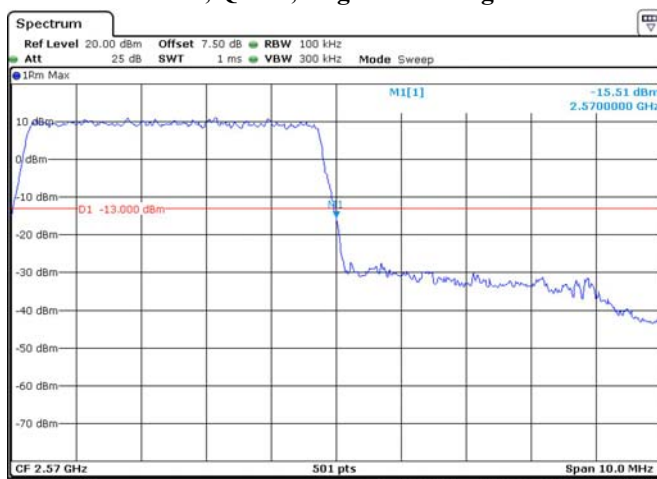


20M, 16QAM, Right Band Edge

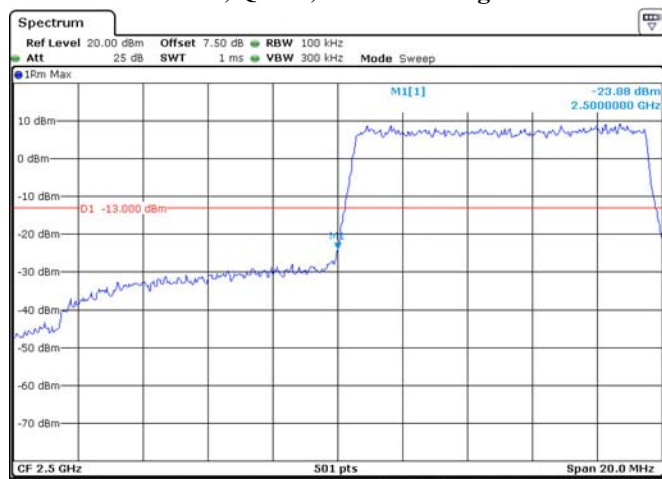


LTE Band 7:**5M, QPSK, Left Band Edge**

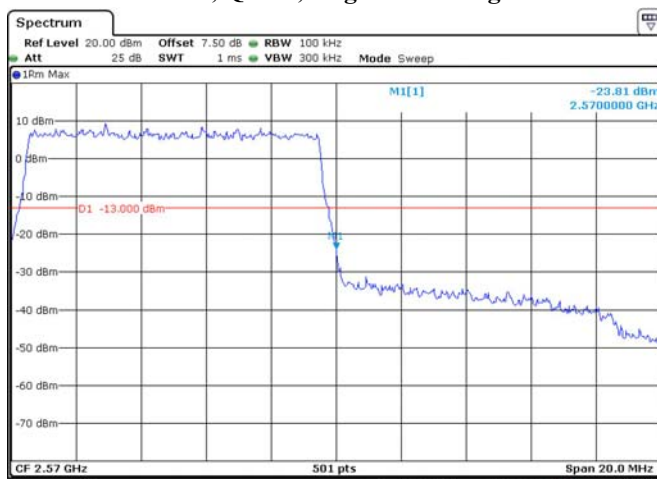
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5M, QPSK, Right Band Edge

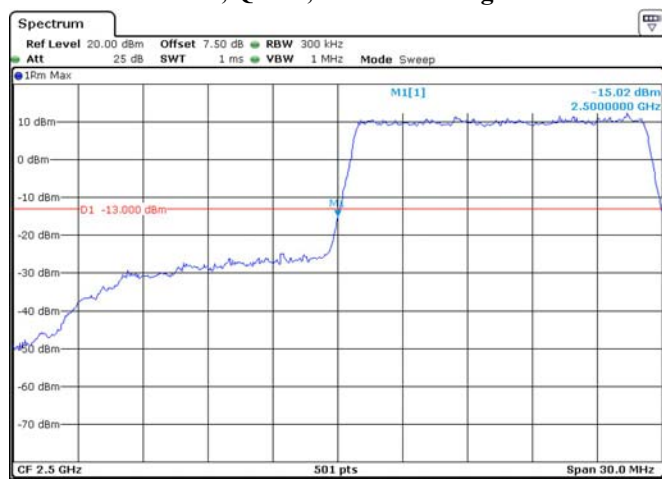
Date: 21.MAY.2021 09:51:05

10M, QPSK, Left Band Edge

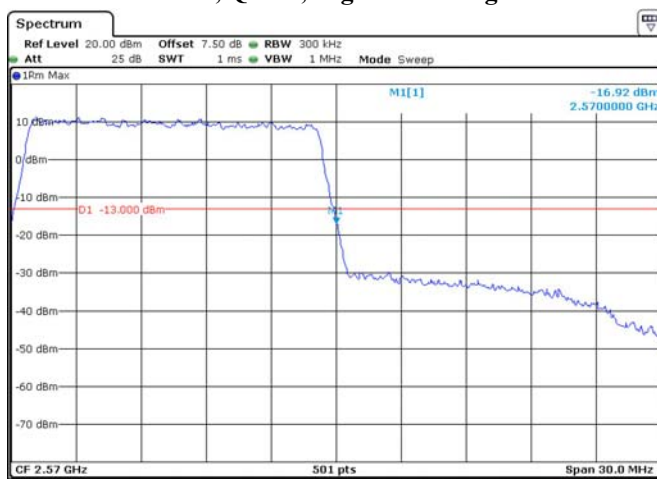
Date: 21.MAY.2021 09:52:06

10M, QPSK, Right Band Edge

Date: 21.MAY.2021 09:53:04

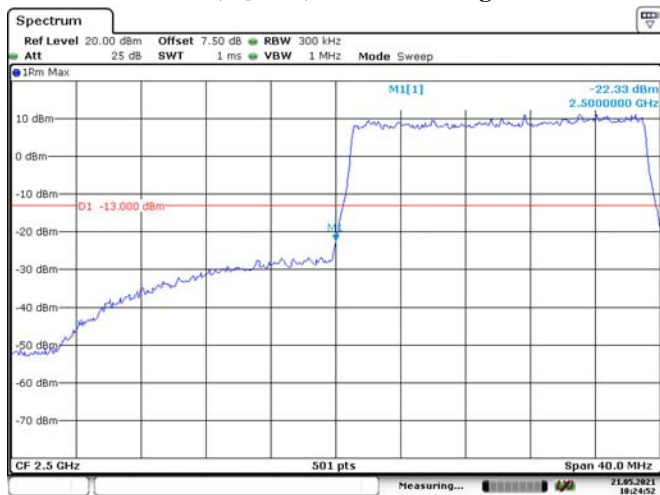
15M, QPSK, Left Band Edge

Date: 21.MAY.2021 09:54:20

15M, QPSK, Right Band Edge

Date: 21.MAY.2021 09:55:23

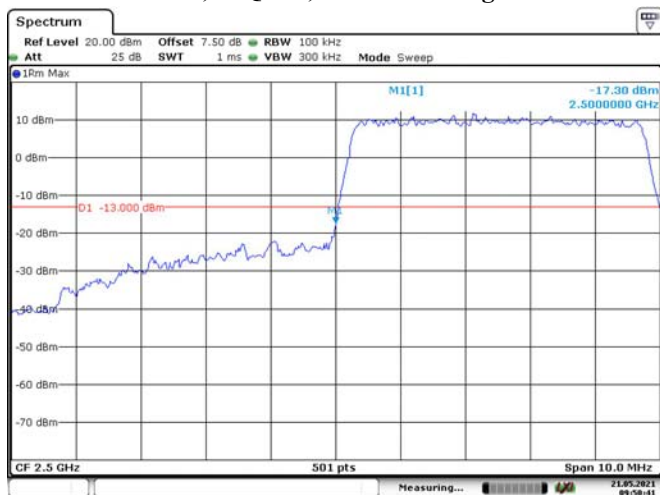
20M, QPSK, Left Band Edge



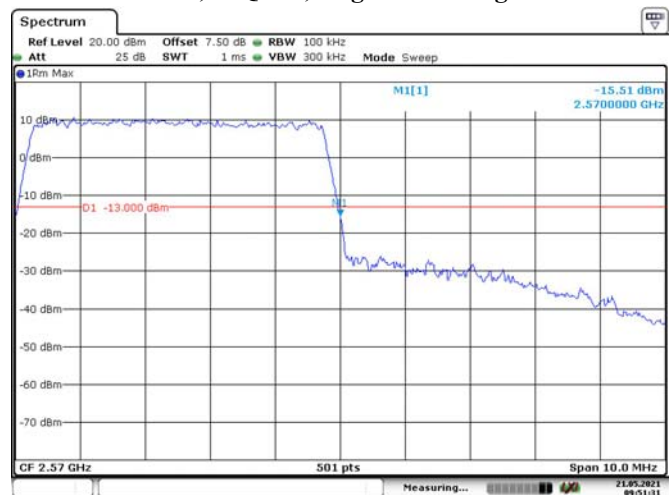
20M, QPSK, Right Band Edge



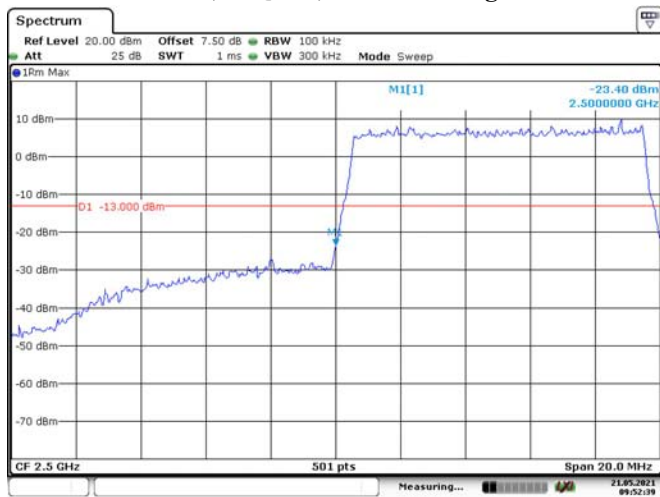
5M, 16QAM, Left Band Edge



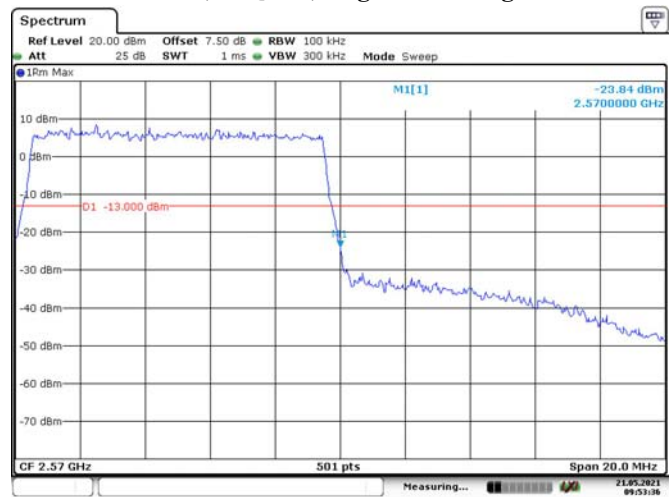
5M, 16QAM, Right Band Edge



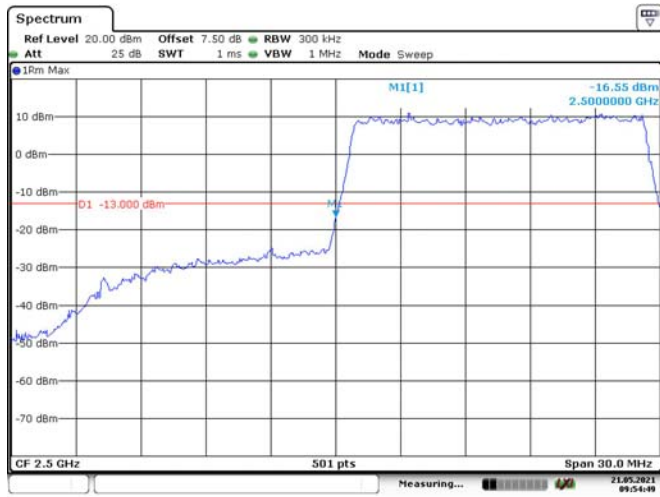
10M, 16QAM, Left Band Edge



10M, 16QAM, Right Band Edge

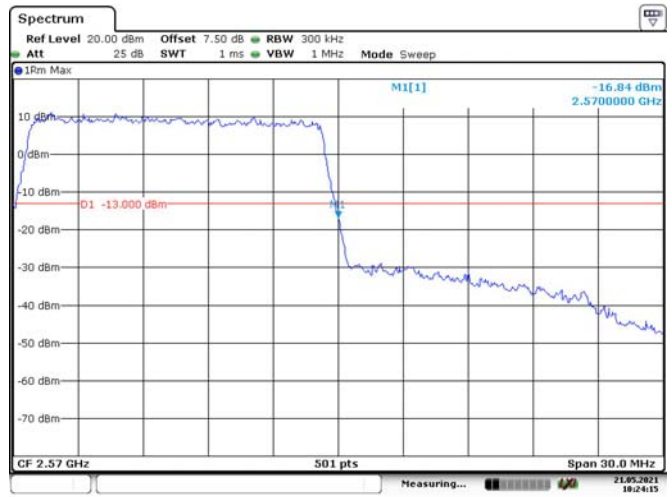


15M, 16QAM, Left Band Edge



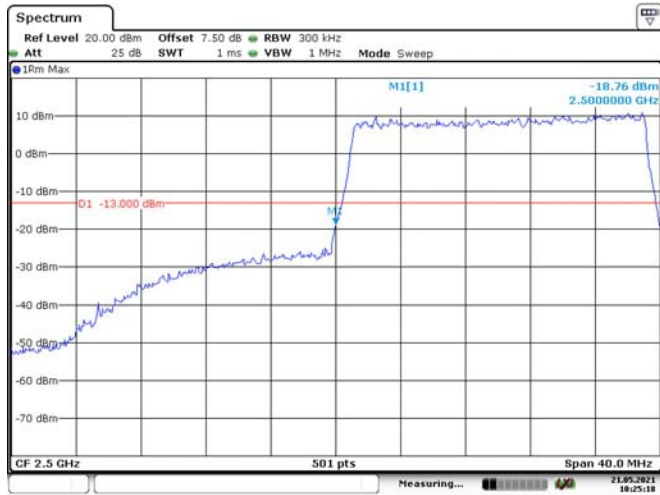
Date: 21.MAY.2021 09:54:49

15M, 16QAM, Right Band Edge



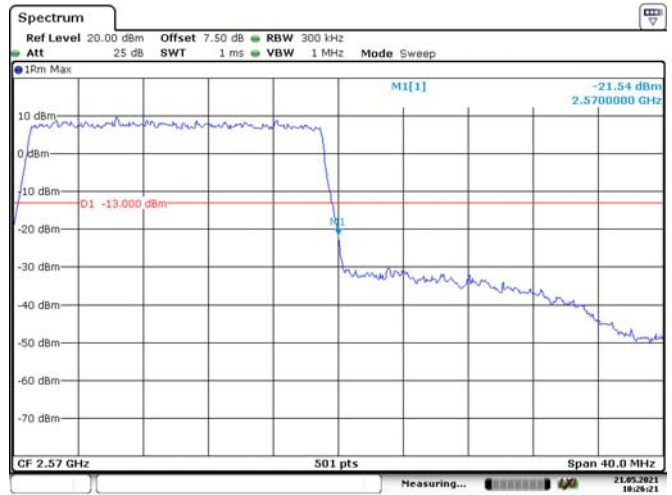
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20M, 16QAM, Left Band Edge

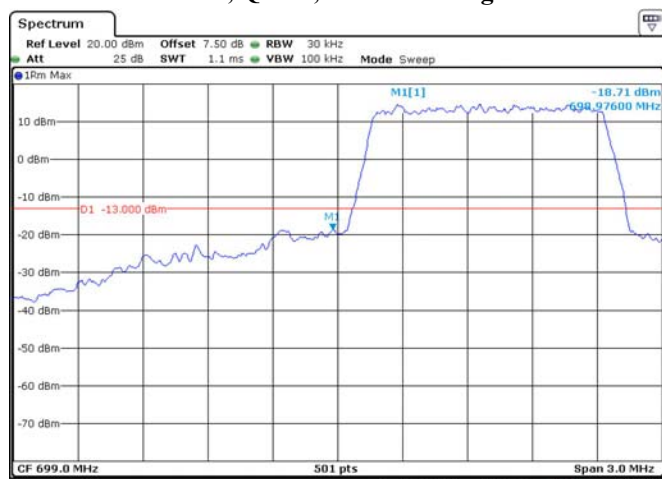
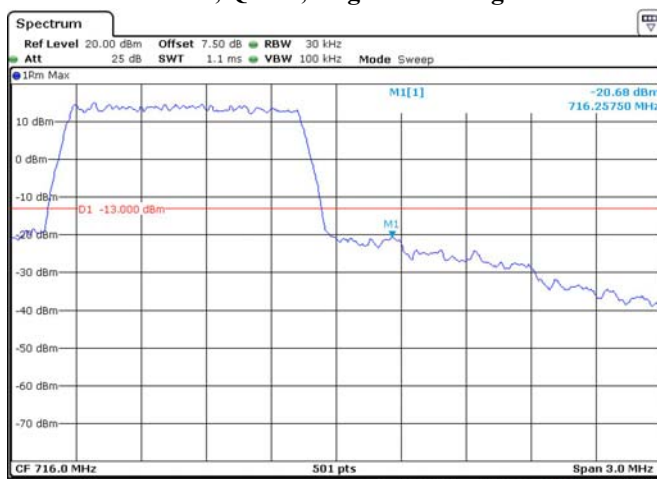
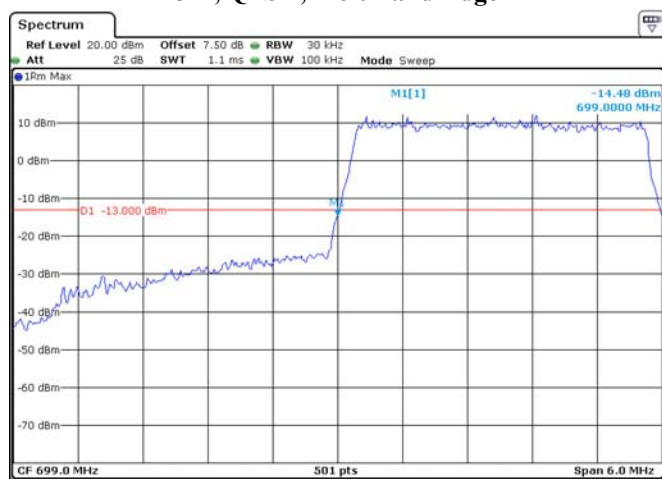
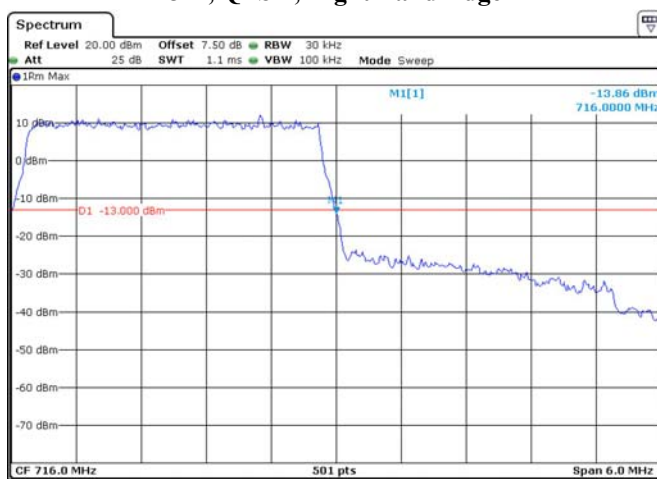
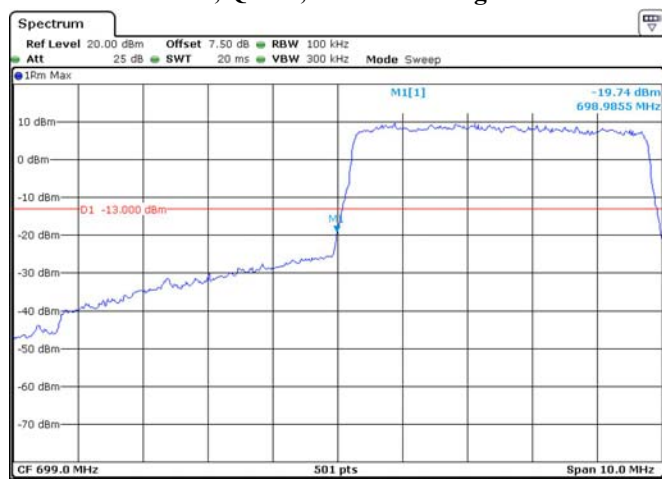
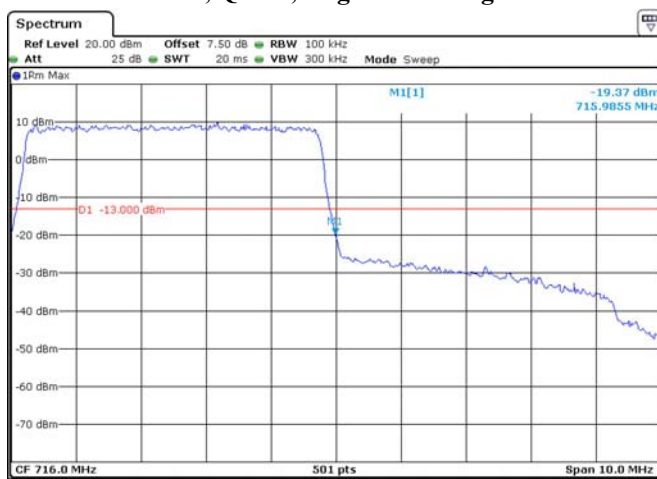


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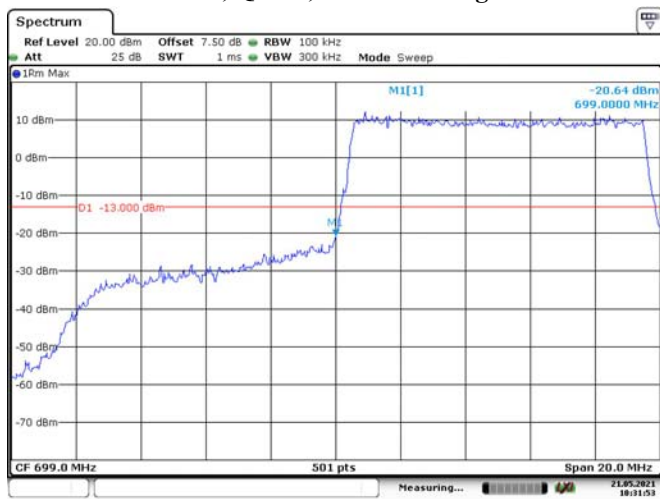
20M, 16QAM, Right Band Edge



Date: 21.MAY.2021 10:26:21

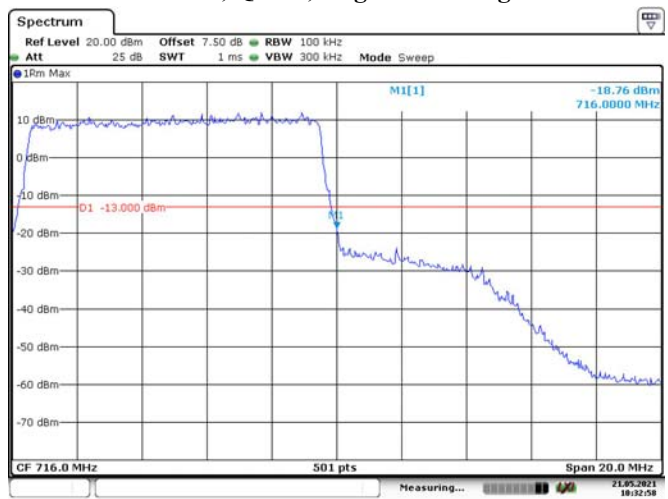
LTE Band 12:**1.4M, QPSK, Left Band Edge****1.4M, QPSK, Right Band Edge****3M, QPSK, Left Band Edge****3M, QPSK, Right Band Edge****5M, QPSK, Left Band Edge****5M, QPSK, Right Band Edge**

10M, QPSK, Left Band Edge



Date: 21.MAY.2021 10:31:53

10M, QPSK, Right Band Edge



Date: 21.MAY.2021 10:32:58

1.4M, 16QAM, Left Band Edge



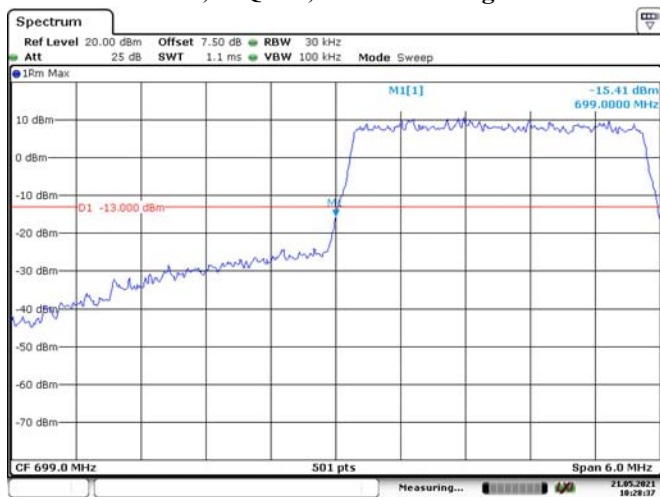
Date: 21.MAY.2021 10:27:09

1.4M, 16QAM, Right Band Edge



Date: 21.MAY.2021 10:27:44

3M, 16QAM, Left Band Edge



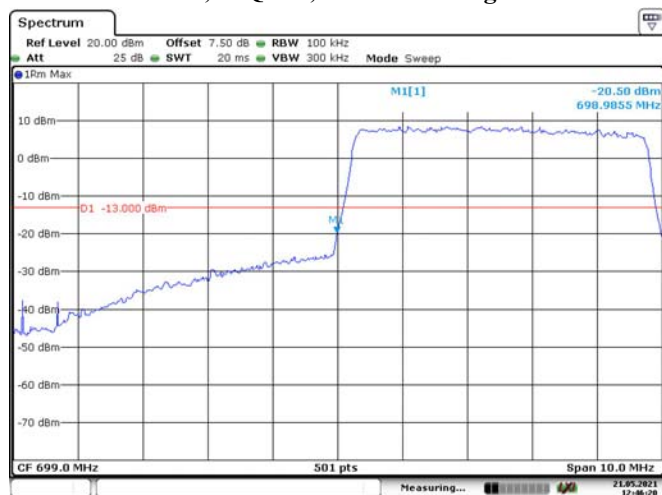
Date: 21.MAY.2021 10:28:37

3M, 16QAM, Right Band Edge



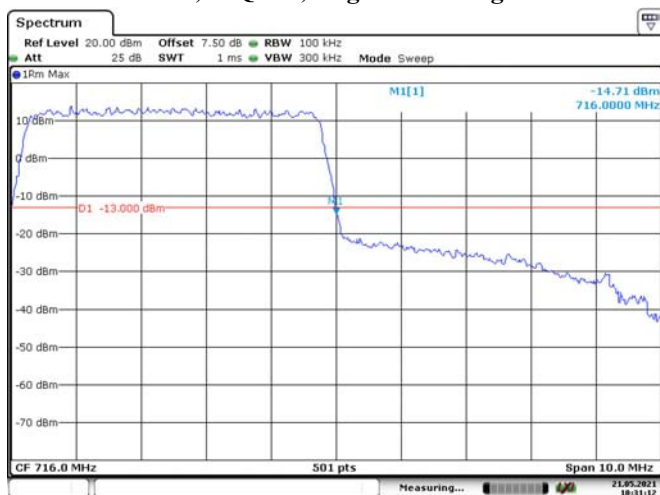
Date: 21.MAY.2021 10:29:24

5M, 16QAM, Left Band Edge



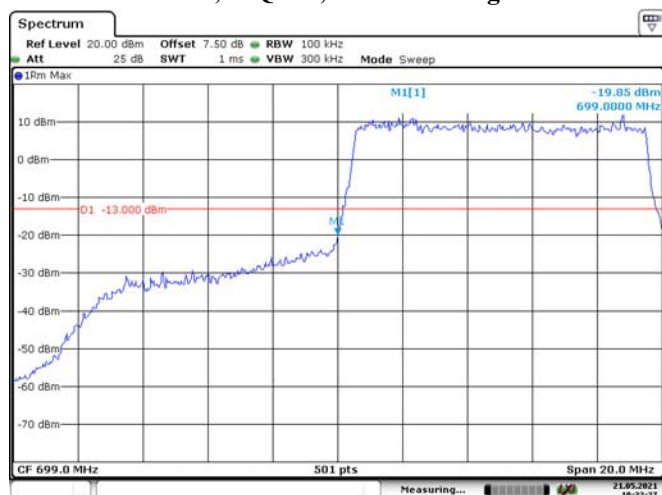
Date: 21.MAY.2021 12:46:20

5M, 16QAM, Right Band Edge



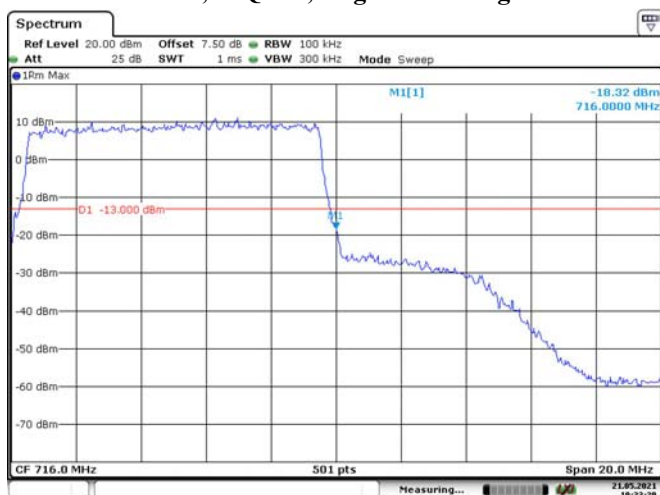
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10M, 16QAM, Left Band Edge

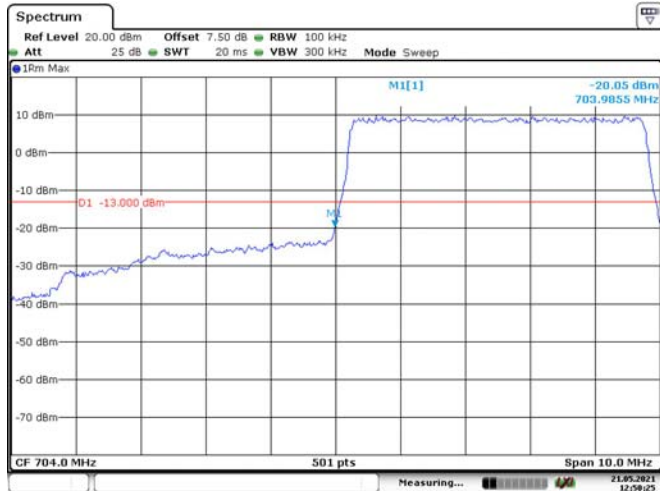
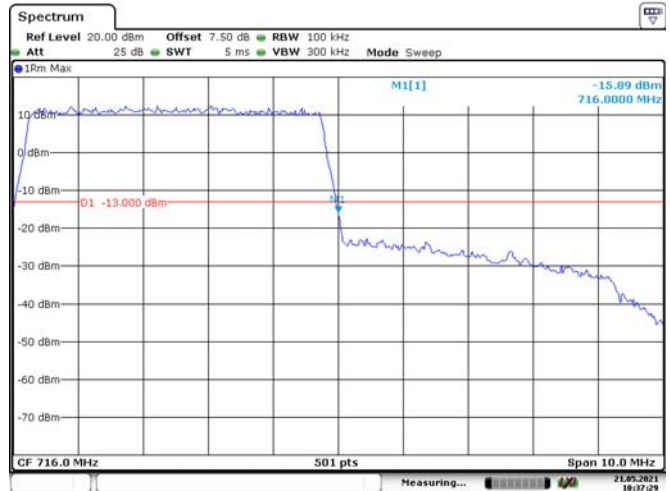
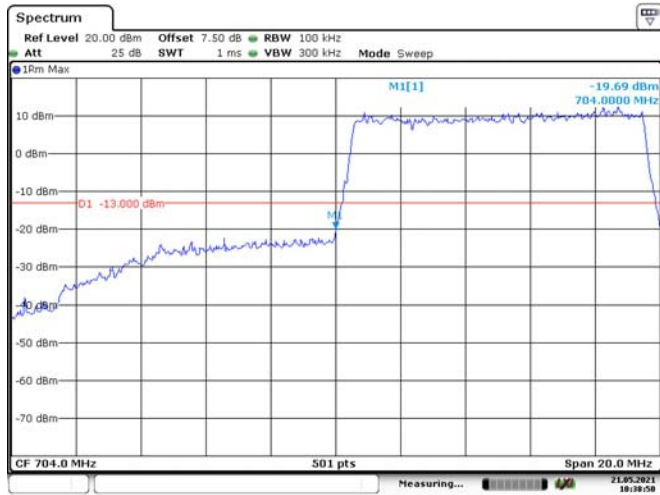
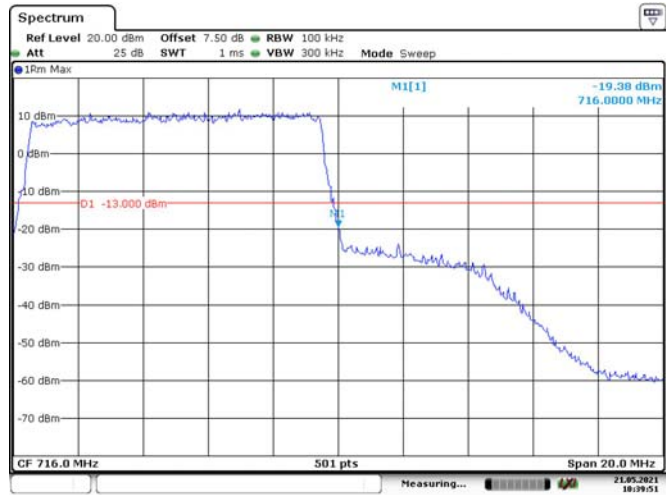
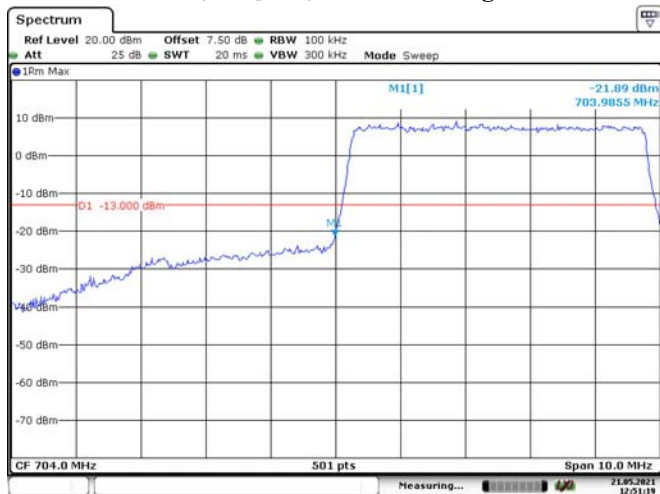
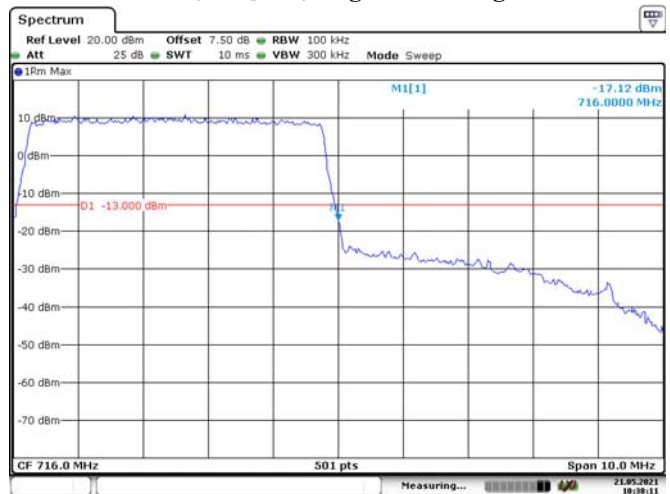


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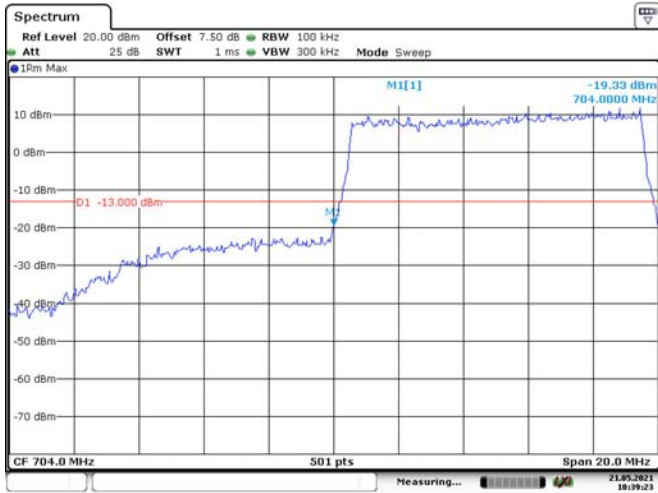
10M, 16QAM, Right Band Edge



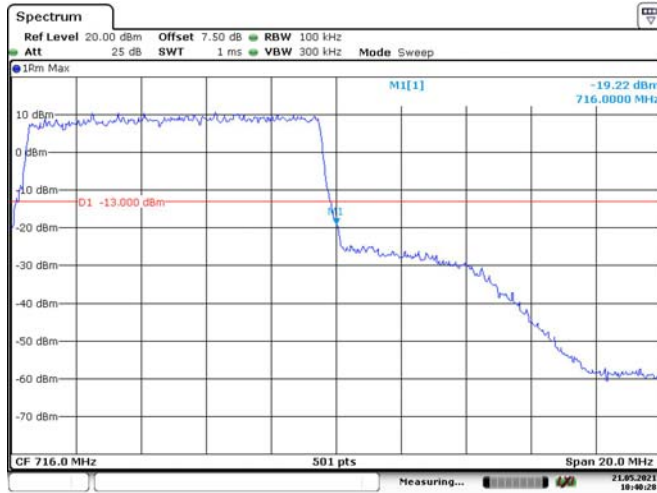
Date: 21.MAY.2021 10:33:29

LTE Band 17:**5M, QPSK, Left Band Edge****5M, QPSK, Right Band Edge****10M, QPSK, Left Band Edge****10M, QPSK, Right Band Edge****5M, 16QAM, Left Band Edge****5M, 16QAM, Right Band Edge**

10M, 16QAM, Left Band Edge



10M, 16QAM, Right Band Edge



FCC §2.1055, §22.355 & §24.235 & §27.54- FREQUENCY STABILITY

Applicable Standard

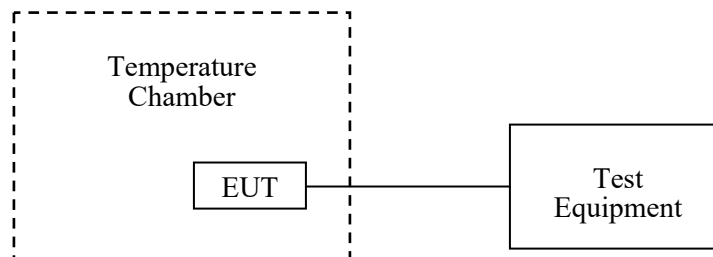
FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235, §27.54

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2020-07-07	2021-07-07
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	147473	2020-09-23	2021-09-22
E-Microwave	Blocking Control	EMDCB-00036	0E01201047	Each time	N/A
Unknown	Attenuator	UNAT-3+	15529	Each time	N/A
R&S	Universal Radio Communication Tester	CMU200	106 891	2020-09-12	2021-09-12
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2021-03-10	2022-03-09
UNI-T	Multimeter	UT39A	M130199938	2020-07-24	2021-07-24
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24.2~27.5 °C
Relative Humidity:	47~70 %
ATM Pressure:	100~100.8kPa
Tester:	Lay Lei
Test Date:	2021.05.19~2021-06-07

Test Result: Compliance.

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.85	6	0.00717	2.5
-20		2	0.00239	
-10		5	0.00598	
0		4	0.00478	
10		5	0.00598	
20		7	0.00837	
30		4	0.00478	
40		3	0.00359	
50		6	0.00717	
20	3.6	7	0.00837	
20	4.3	9	0.01076	

GMSK, Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V _{DC}	Hz	ppm	
-30	3.85	16	0.00851	Pass
-20		15	0.00798	
-10		11	0.00585	
0		11	0.00585	
10		9	0.00479	
20		15	0.00798	
30		7	0.00372	
40		8	0.00426	
50		6	0.00319	
20	3.6	17	0.00904	
20	4.3	14	0.00745	

8PSK, Middle Channel, $f_c = 836.6\text{MHz}$				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
$^{\circ}\text{C}$	V_{DC}	Hz	ppm	ppm
-30	3.85	12	0.01434	2.5
-20		7	0.00837	
-10		11	0.01315	
0		9	0.01076	
10		14	0.01673	
20		13	0.01554	
30		9	0.01076	
40		7	0.00837	
50		8	0.00956	
20	3.6	12	0.01434	
20	4.3	7	0.00837	

8PSK, Middle Channel, $f_c = 1880\text{ MHz}$				
Temperature	Voltage	Frequency Error	Frequency Error	Result
$^{\circ}\text{C}$	V_{DC}	Hz	ppm	
-30	3.85	11	0.00585	Pass
-20		7	0.00372	
-10		11	0.00585	
0		17	0.00904	
10		15	0.00798	
20		16	0.00851	
30		19	0.01011	
40		17	0.00904	
50		6	0.00319	
20	3.6	11	0.00585	
20	4.3	16	0.00851	

WCDMA Band II: R99

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V _{DC}	Hz	ppm	
-30	3.85	-11	-0.00585	Pass
-20		-13	-0.00691	
-10		-16	-0.00851	
0		20	0.01064	
10		-19	-0.01011	
20		-21	-0.01117	
30		-22	-0.01170	
40		-11	-0.00585	
50		-12	-0.00638	
20	3.6	-11	-0.00585	
20	4.3	-12	-0.00638	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.85	-14	-0.00808	2.5
-20		-13	-0.00750	
-10		-19	-0.01097	
0		-18	-0.01039	
10		-16	-0.00923	
20		-16	-0.00923	
30		-14	-0.00808	
40		-11	-0.00635	
50		-13	-0.00750	
20	3.6	-18	-0.01039	
20	4.3	-11	-0.00635	

LTE Band 2:

QPSK, Channel Bandwidth:20MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.85	-16.31	-0.0087	Pass
-20		9.23	0.0049	
-10		8.50	0.0045	
0		-5.42	-0.0029	
10		-5.29	-0.0028	
20		8.69	0.0046	
30		9.38	0.005	
40		9.69	0.0052	
50		-5.78	-0.0031	
20	3.6	6.17	0.0033	
20	4.3	8.27	0.0044	

16QAM, Channel Bandwidth:20MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.85	-16.34	-0.0087	Pass
-20		-9.53	-0.0051	
-10		-5.70	-0.003	
0		-9.10	-0.0048	
10		9.34	0.005	
20		8.40	0.0045	
30		7.33	0.0039	
40		8.32	0.0044	
50		-7.39	-0.0039	
20	3.6	7.35	0.0039	
20	4.3	9.07	0.0048	

LTE Band 4

QPSK, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	1710.528300	1710	1754.512500	1755
	-20	1710.524700		1754.515600	
	-10	1710.528600		1754.518600	
	0	1710.523200		1754.514600	
	10	1710.528700		1754.512300	
	20	1710.528900		1754.511000	
	30	1710.528400		1754.511600	
	40	1710.524500		1754.511400	
	50	1710.524600		1754.511200	
3.6	20	1710.522300	1710	1754.511800	1755
4.3	20	1710.527600		1754.511700	

16-QAM, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	1710.563100	1710	1754.515200	1755
	-20	1710.569000		1754.517700	
	-10	1710.563500		1754.515600	
	0	1710.567200		1754.516300	
	10	1710.558800		1754.512800	
	20	1710.528900		1754.511000	
	30	1710.566700		1754.515600	
	40	1710.564800		1754.514500	
	50	1710.562400		1754.518900	
3.6	20	1710.562700	1710	1754.514800	1755
4.3	20	1710.567800		1754.517500	

LTE Band 7

QPSK, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	2500.526300	2500	2569.475600	2570
	-20	2500.527500		2569.478200	
	-10	2500.528900		2569.474600	
	0	2500.522700		2569.475700	
	10	2500.527600		2569.479300	
	20	2500.528900		2569.471100	
	30	2500.528700		2569.477600	
	40	2500.527200		2569.472800	
	50	2500.524600		2569.477600	
3.6	20	2500.528200		2569.473500	
4.3	20	2500.526900		2569.474600	

16-QAM, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	2500.522600	2500	2569.476300	2570
	-20	2500.527800		2569.475400	
	-10	2500.525900		2569.475600	
	0	2500.524100		2569.470300	
	10	2500.525300		2569.471800	
	20	2500.528900		2569.471100	
	30	2500.522800		2569.478300	
	40	2500.524600		2569.474600	
	50	2500.527300		2569.474200	
3.6	20	2500.527500		2569.477600	
4.3	20	2500.528300		2569.474200	

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	℃	MHz	MHz	MHz	MHz
3.85	-30	699.517600	699	715.482700	716
	-20	699.518500		715.483300	
	-10	699.518500		715.484100	
	0	699.517500		715.483600	
	10	699.516900		715.483000	
	20	699.489000		715.511000	
	30	699.512800		715.488400	
	40	699.511900		715.489000	
	50	699.513100		715.489000	
3.6	20	699.513100		715.488000	
4.3	20	699.512500		715.489200	

16-QAM, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	℃	MHz	MHz	MHz	MHz
3.85	-30	699.527100	699	715.518500	716
	-20	699.526300		715.511600	
	-10	699.528500		715.517600	
	0	699.522700		715.514500	
	10	699.529300		715.517800	
	20	699.528900		715.511000	
	30	699.527400		715.514600	
	40	699.522800		715.517200	
	50	699.526200		715.512900	
3.6	20	699.521800		715.513400	
4.3	20	699.527600		715.511600	

LTE Band 17:

QPSK, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	704.524300	704	715.512600	716
	-20	704.528700		715.518600	
	-10	704.529200		715.514600	
	0	704.522700		715.513400	
	10	704.526400		715.517600	
	20	704.528900		715.511000	
	30	704.527600		715.514600	
	40	704.528300		715.517300	
	50	704.527100		715.518200	
3.6	20	704.522800		715.519200	
4.3	20	704.529600		715.517600	

16-QAM, Channel Bandwidth:10MHz					
Power Supplied	Temperature	F_L	Limit	F_H	Limit
Vdc	°C	MHz	MHz	MHz	MHz
3.85	-30	704.518600	704	715.512800	716
	-20	704.515200		715.518300	
	-10	704.516300		715.517600	
	0	704.517200		715.514900	
	10	704.527600		715.514600	
	20	704.528900		715.511000	
	30	704.521900		715.518600	
	40	704.517500		715.517500	
	50	704.514600		715.514900	
3.6	20	704.517600		715.518600	
4.3	20	704.518300		715.517200	

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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