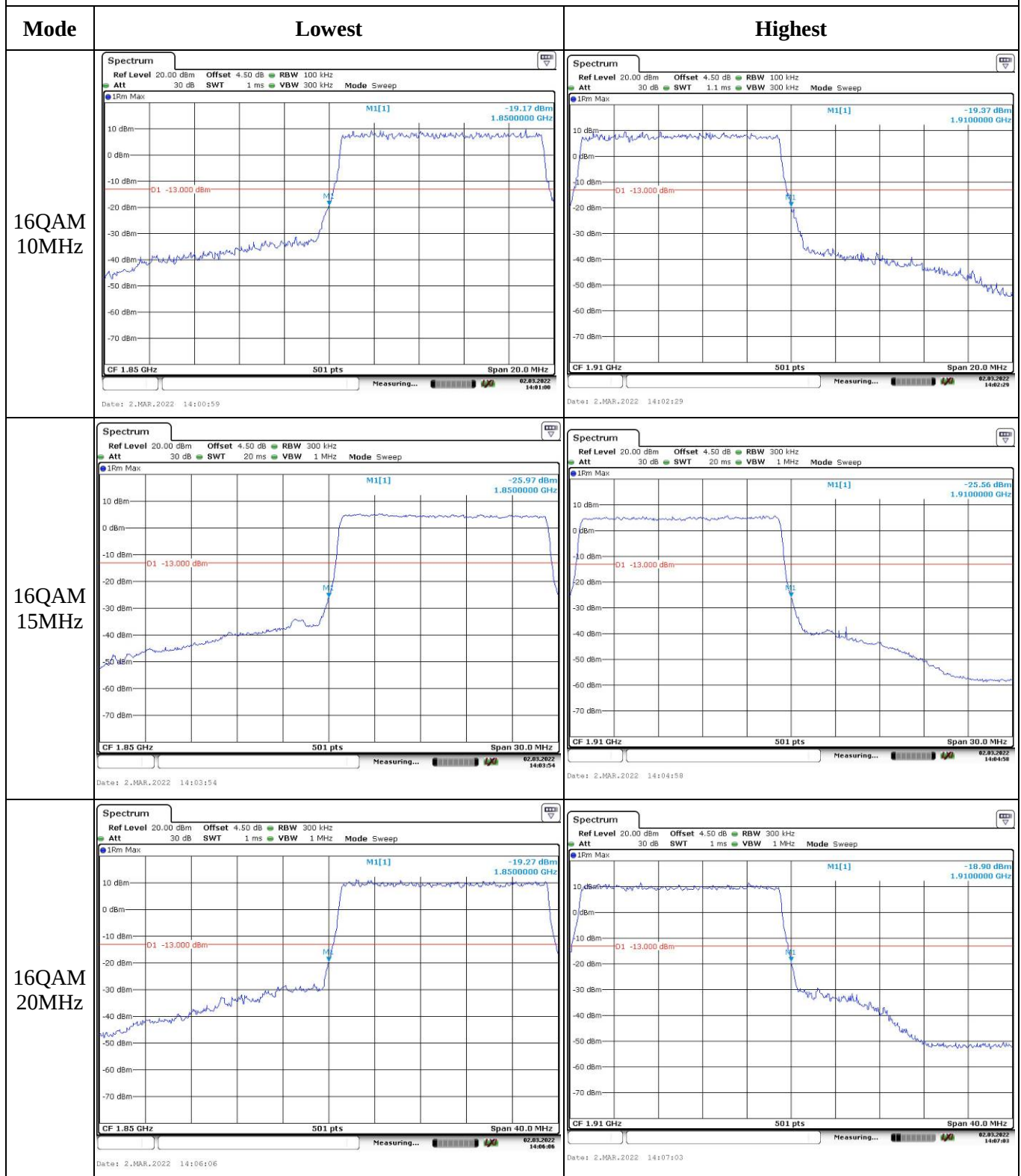


Out of band emission, Band Edge



4.7 Antenna Port Test Data and Results for LTE Band 4

Serial Number:	CR22020002-RF-S1/3	Test Date:	2022-02-12~2022-03-02
Test Site:	RF	Test Mode:	Transmitting
Tester:	Le Qiao	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	21~23.1	Relative Humidity: (%)	51~62	ATM Pressure: (kPa)	100.8~101.2
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
Weinschel	Coaxial Attenuators	53-20-34	LN751	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2021/7/22	2022/7/21
BACL	TEMP&HUMI Test Chamber	BTH-150	30026	2021/7/22	2022/7/22
UNI-T	Multimeter	UT39A+	C210582554	2021/9/30	2022/9/30
E-Microwave	Two-way Splitter	ODP-1-6	OE0120176	Each Time	N/A

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

EUT Information@ LTE Band 4▲:

Antenna Gain (dBi):	1	Cable Loss (dB):	0.1
Operation Voltage(V _{DC}):			
Lowest:	3.6	Normal:	3.8
		Highest:	4.3

Test Frequency For Each Mode:

Operation Bandwidth	Lowest Frequency (MHz)	Middle Frequency (MHz)	Highest Frequency (MHz)
1.4MHz	1710.7	1732.5	1754.3
3MHz	1711.5	1732.5	1753.5
5MHz	1712.5	1732.5	1752.5
10MHz	1715	1732.5	1750
15MHz	1717.5	1732.5	1747.5
20MHz	1720	1732.5	1745

Test Data:**FCC§2.1046;§ 27.50(d)(4)****RF Output Power:**

Test Bandwidth & Modulation	Resource Block & RB offset	Conducted Average Output Power(dBm)			Maximum EIRP (dBm)	EIRP Limit (dBm)
		Lowest Channel	Middle Channel	Highest Channel		
1.4MHz QPSK	RB1#0	21.82	21.78	21.75	22.9	30
	RB1#3	22.00	21.94	21.91		
	RB1#5	21.80	21.73	21.69		
	RB3#0	21.92	21.86	21.80		
	RB3#3	21.89	21.88	21.82		
	RB6#0	20.89	20.80	20.78		
1.4MHz 16QAM	RB1#0	20.83	20.87	20.72	22.04	30
	RB1#3	20.98	21.04	20.91		
	RB1#5	20.81	20.88	20.75		
	RB3#0	21.14	20.84	20.96		
	RB3#3	21.13	20.86	20.90		
	RB6#0	19.89	19.81	19.70		
3MHz QPSK	RB1#0	21.89	21.82	21.81	22.83	30
	RB1#8	21.93	21.87	21.86		
	RB1#14	21.86	21.82	21.80		
	RB6#0	20.83	20.79	20.75		
	RB6#9	20.87	20.79	20.76		
	RB15#0	20.90	20.84	20.80		
3MHz 16QAM	RB1#0	21.44	20.99	20.78	22.37	30
	RB1#8	21.47	20.96	20.81		
	RB1#14	21.45	20.93	20.73		
	RB6#0	19.92	19.76	19.74		
	RB6#9	19.91	19.80	19.71		
	RB15#0	19.94	19.80	19.86		
5MHz QPSK	RB1#0	21.79	21.68	21.66	22.88	30
	RB1#13	21.98	21.88	21.82		
	RB1#24	21.83	21.70	21.69		
	RB15#0	20.90	20.80	20.81		
	RB15#10	20.96	20.82	20.84		
	RB25#0	20.90	20.80	20.79		
5MHz 16QAM	RB1#0	20.68	20.98	20.74	22.06	30
	RB1#13	20.85	21.16	20.93		
	RB1#24	20.64	20.98	20.75		
	RB15#0	19.95	19.80	19.85		
	RB15#10	20.01	19.82	19.85		
	RB25#0	19.98	19.77	19.83		

10MHz QPSK	RB1#0	21.84	21.79	21.72	22.86	30
	RB1#25	21.92	21.96	21.92		
	RB1#49	21.83	21.81	21.77		
	RB25#0	20.89	20.85	20.83		
	RB25#25	21.01	20.82	20.84		
	RB50#0	20.97	20.83	20.83		
10MHz 16QAM	RB1#0	21.42	20.88	20.73	22.47	30
	RB1#25	21.57	21.18	20.90		
	RB1#49	21.45	20.89	20.80		
	RB25#0	19.94	19.88	19.97		
	RB25#25	20.03	19.88	19.97		
	RB50#0	19.97	19.85	19.89		
15MHz QPSK	RB1#0	21.77	21.77	21.68	22.8	30
	RB1#38	21.90	21.83	21.79		
	RB1#74	21.73	21.71	21.74		
	RB36#0	20.92	20.84	20.82		
	RB36#39	20.96	20.84	20.82		
	RB75#0	20.96	20.87	20.88		
15MHz 16QAM	RB1#0	21.37	20.87	21.09	22.4	30
	RB1#38	21.50	20.94	21.22		
	RB1#74	21.35	20.84	21.13		
	RB36#0	19.96	19.87	19.80		
	RB36#39	20.01	19.89	19.82		
	RB75#0	19.97	19.85	19.83		
20MHz QPSK	RB1#0	21.63	21.61	21.49	22.95	30
	RB1#50	22.05	21.99	21.90		
	RB1#99	21.62	21.61	21.56		
	RB50#0	20.86	20.81	20.92		
	RB50#50	20.96	20.79	20.82		
	RB100#0	20.89	20.77	20.87		
20MHz 16QAM	RB1#0	20.92	20.79	21.06	22.38	30
	RB1#50	21.31	21.17	21.48		
	RB1#99	20.89	20.80	21.11		
	RB50#0	19.82	19.81	19.92		
	RB50#50	19.95	19.79	19.79		
	RB100#0	19.92	19.76	19.90		

Note: EIRP=Conducted Power(dBm) - Cable loss(dB) + Antenna Gain(dBi)

Result:

Pass

Peak-to-average Ratio(PAR)					
Test Bandwidth & Modulation	Resource Block & RB offset	Peak-to-average Ratio(dB)			Limit (dB)
		Lowest Channel	Middle Channel	Highest Channel	
20MHz QPSK	RB1#0	5.30	6.12	5.83	13
	RB100#0	5.59	5.51	5.48	13
20MHz 16QAM	RB1#0	5.88	7.07	6.96	13
	RB100#0	6.39	6.38	6.55	13
Result:					Pass

FCC §2.1049, §27.53:Occupied Bandwidth						
Operation Mode	99% Occupied Bandwidth (MHz)			26 dB Occupied Bandwidth (MHz)		
	Low Channel	Middle channel	High Channel	Low Channel	Middle Channel	High Channel
1.4MHz QPSK	1.096	1.096	1.102	1.290	1.320	1.290
1.4MHz 16QAM	1.096	1.090	1.096	1.326	1.284	1.296
3MHz QPSK	2.683	2.695	2.683	2.880	2.880	2.892
3MHz 16QAM	2.683	2.683	2.683	2.892	2.880	2.880
5MHz QPSK	4.551	4.511	4.511	5.200	5.160	5.180
5MHz 16QAM	4.511	4.551	4.551	5.140	5.240	5.220
10MHz QPSK	8.981	8.942	8.981	9.920	9.880	9.960
10MHz 16QAM	8.942	8.981	8.981	9.840	9.920	9.880
15MHz QPSK	13.533	13.473	13.533	14.880	14.820	15.060
15MHz 16QAM	13.533	13.533	13.593	14.880	14.820	14.820
20MHz QPSK	17.964	17.964	17.964	19.440	19.680	19.680
20MHz 16QAM	18.044	17.964	17.964	19.680	19.760	19.760
Note: The test plots please refer to the Plots of Occupied Bandwidth						

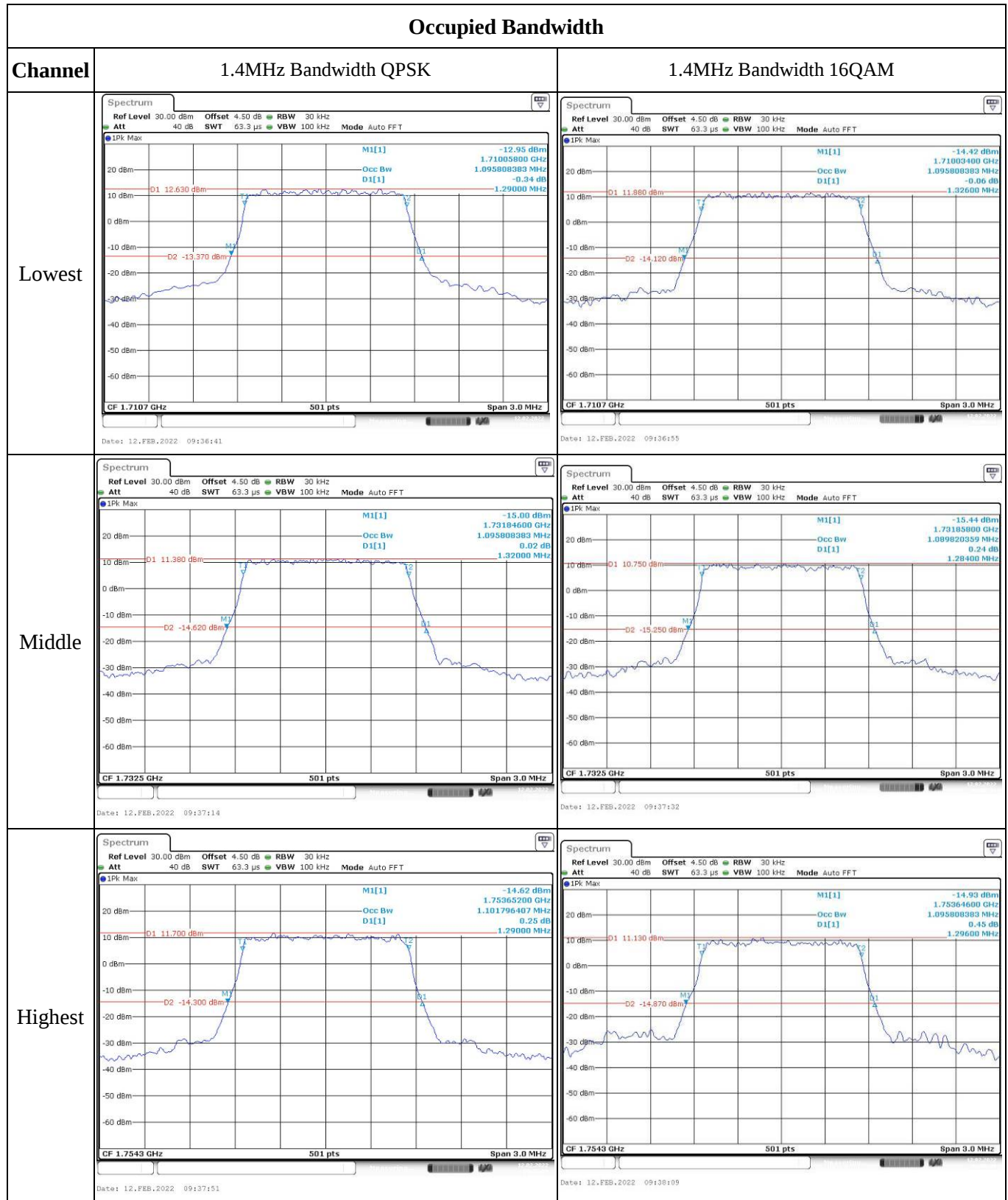
FCC §2.1051, § 27.53:Spurious Emissions at Antenna Terminal	
Result:	Pass, Please refer to the test plots of Spurious Emissions at Antenna Terminal.

FCC §2.1051, § 27.53:Out of band emission, Band Edge	
Result:	Pass, Please refer to the test plots of Out of band emission, Band Edge.

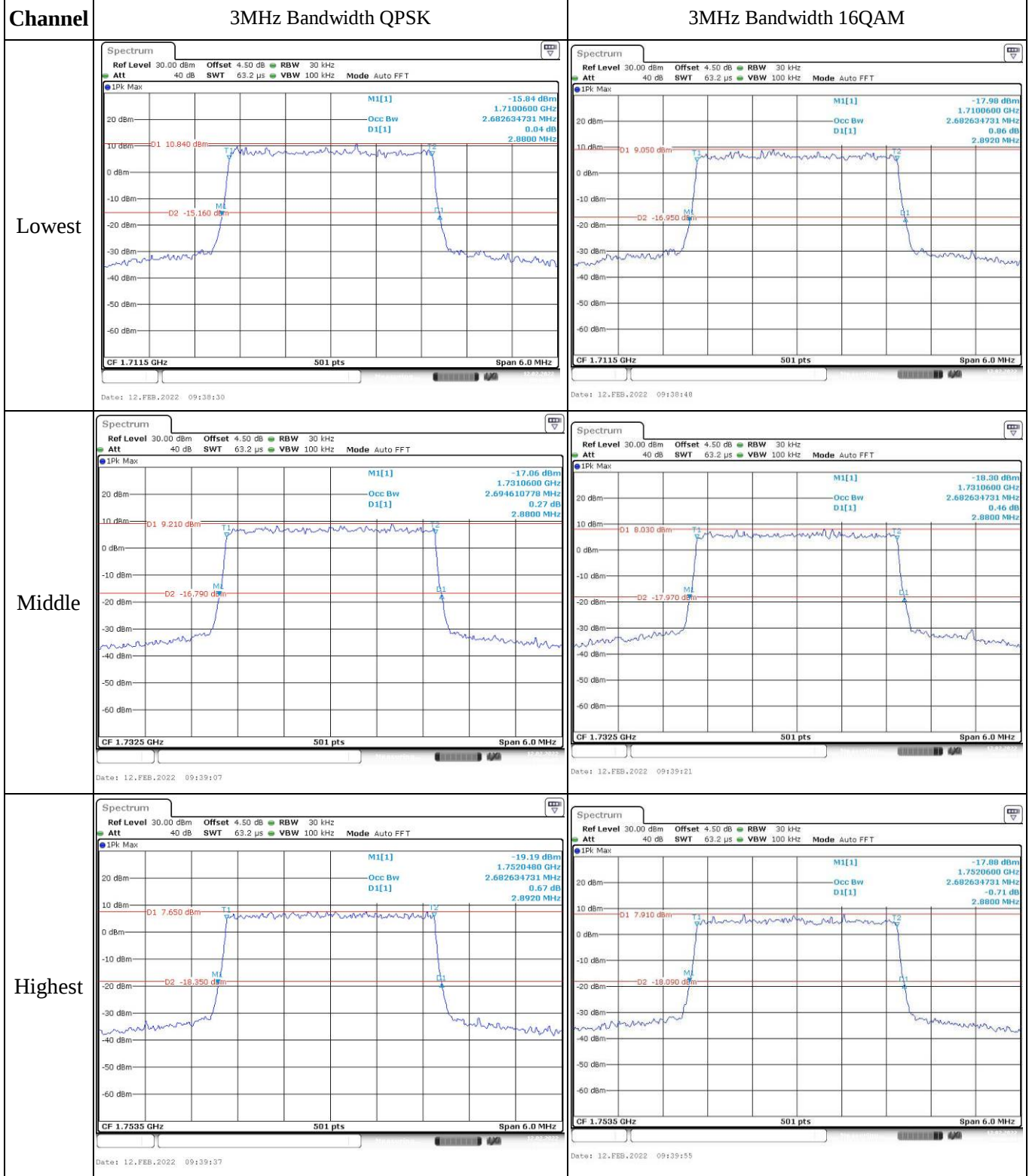
FCC §2.1055, §27.54: Frequency Stability						
Test Mode:	20M QPSK	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V _{DC})	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	3.8	1710.514	1710.00	1754.457	1755
	-20	3.8	1710.513	1710.00	1754.456	1755
	-10	3.8	1710.514	1710.00	1754.457	1755
	0	3.8	1710.512	1710.00	1754.451	1755
	10	3.8	1710.511	1710.00	1754.453	1755
	20	3.8	1710.514	1710.00	1754.457	1755
	30	3.8	1710.512	1710.00	1754.458	1755
	40	3.8	1710.514	1710.00	1754.457	1755
	50	3.8	1710.516	1710.00	1754.456	1755
Frequency Stability vs. Voltage	20	3.6	1710.514	1710.00	1754.457	1755
	20	4.3	1710.511	1710.00	1754.451	1755
					Result:	Pass

Test Mode:	20M 16QAM	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V _{DC})	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	3.8	1710.514	1710.00	1754.457	1755
	-20	3.8	1710.513	1710.00	1754.456	1755
	-10	3.8	1710.514	1710.00	1754.457	1755
	0	3.8	1710.516	1710.00	1754.454	1755
	10	3.8	1710.512	1710.00	1754.456	1755
	20	3.8	1710.514	1710.00	1754.457	1755
	30	3.8	1710.517	1710.00	1754.459	1755
	40	3.8	1710.514	1710.00	1754.457	1755
	50	3.8	1710.518	1710.00	1754.450	1755
Frequency Stability vs. Voltage	20	3.6	1710.514	1710.00	1754.457	1755
	20	4.3	1710.512	1710.00	1754.456	1755
					Result:	Pass

Test Plots:



Occupied Bandwidth



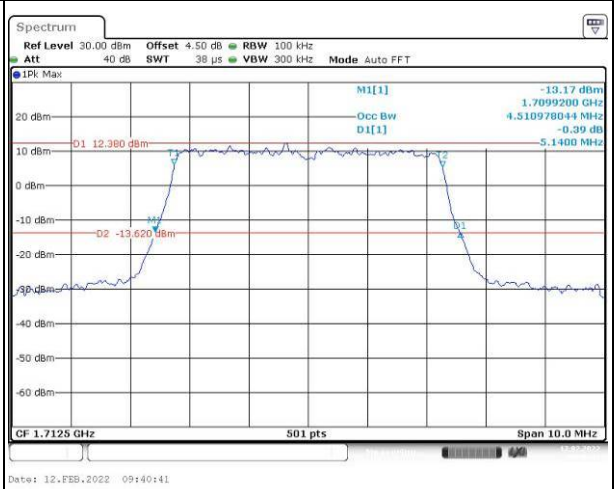
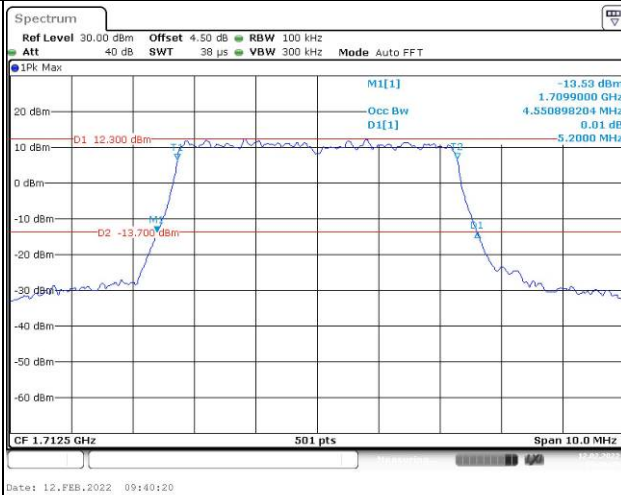
Occupied Bandwidth

Channel

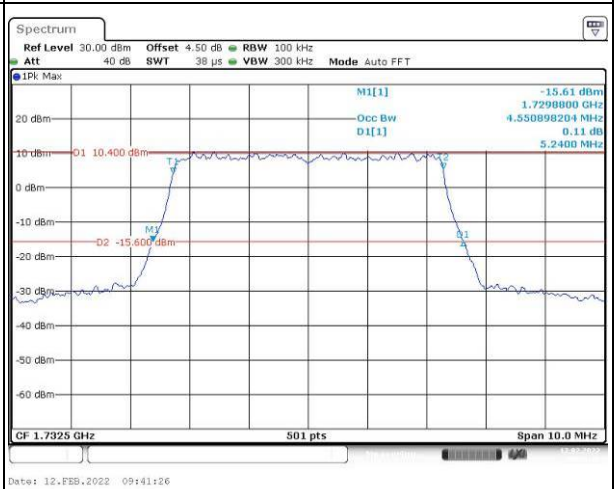
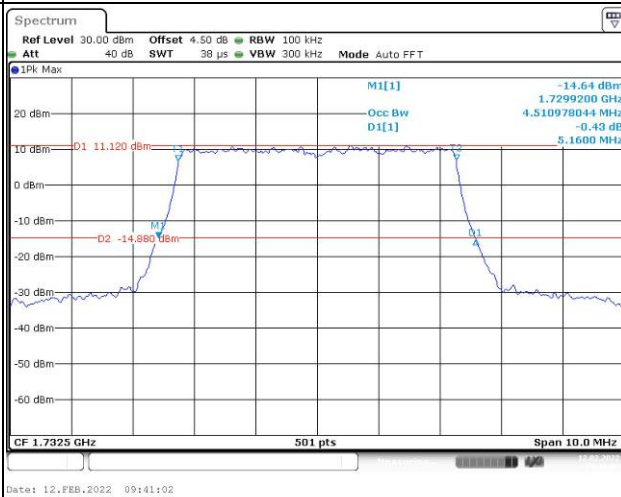
5MHz Bandwidth QPSK

5MHz Bandwidth 16QAM

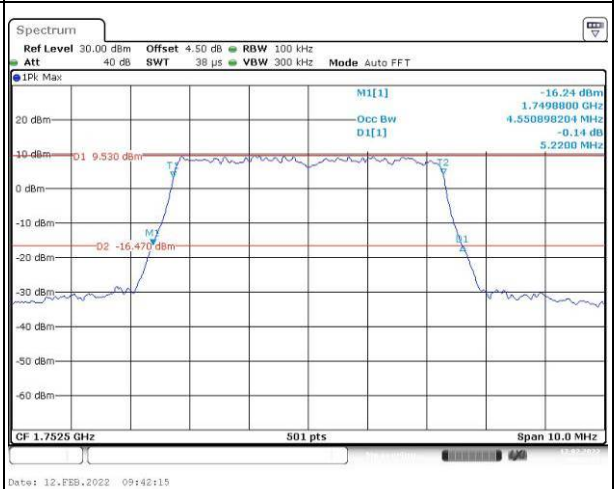
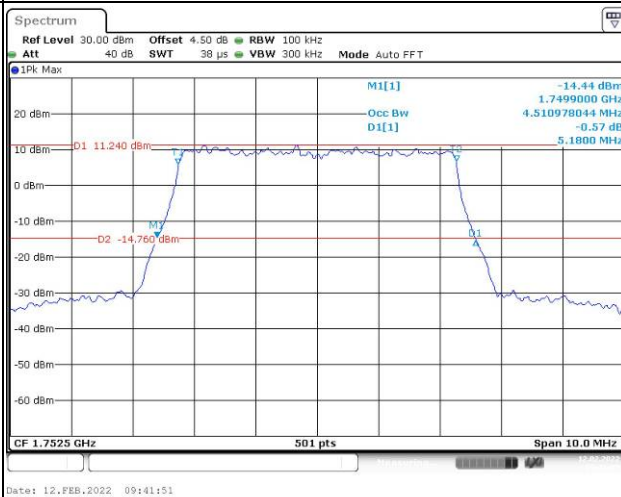
Lowest



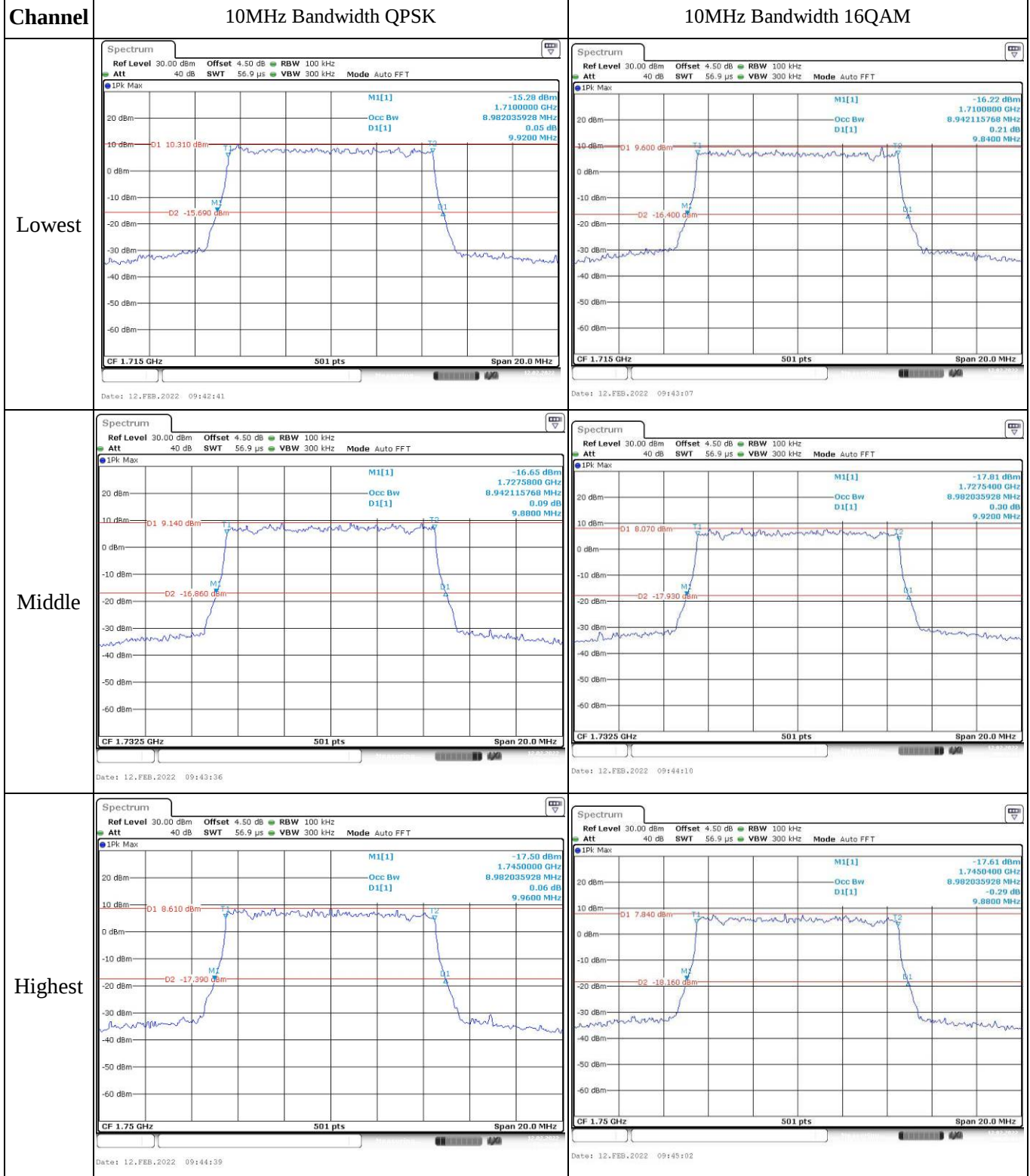
Middle



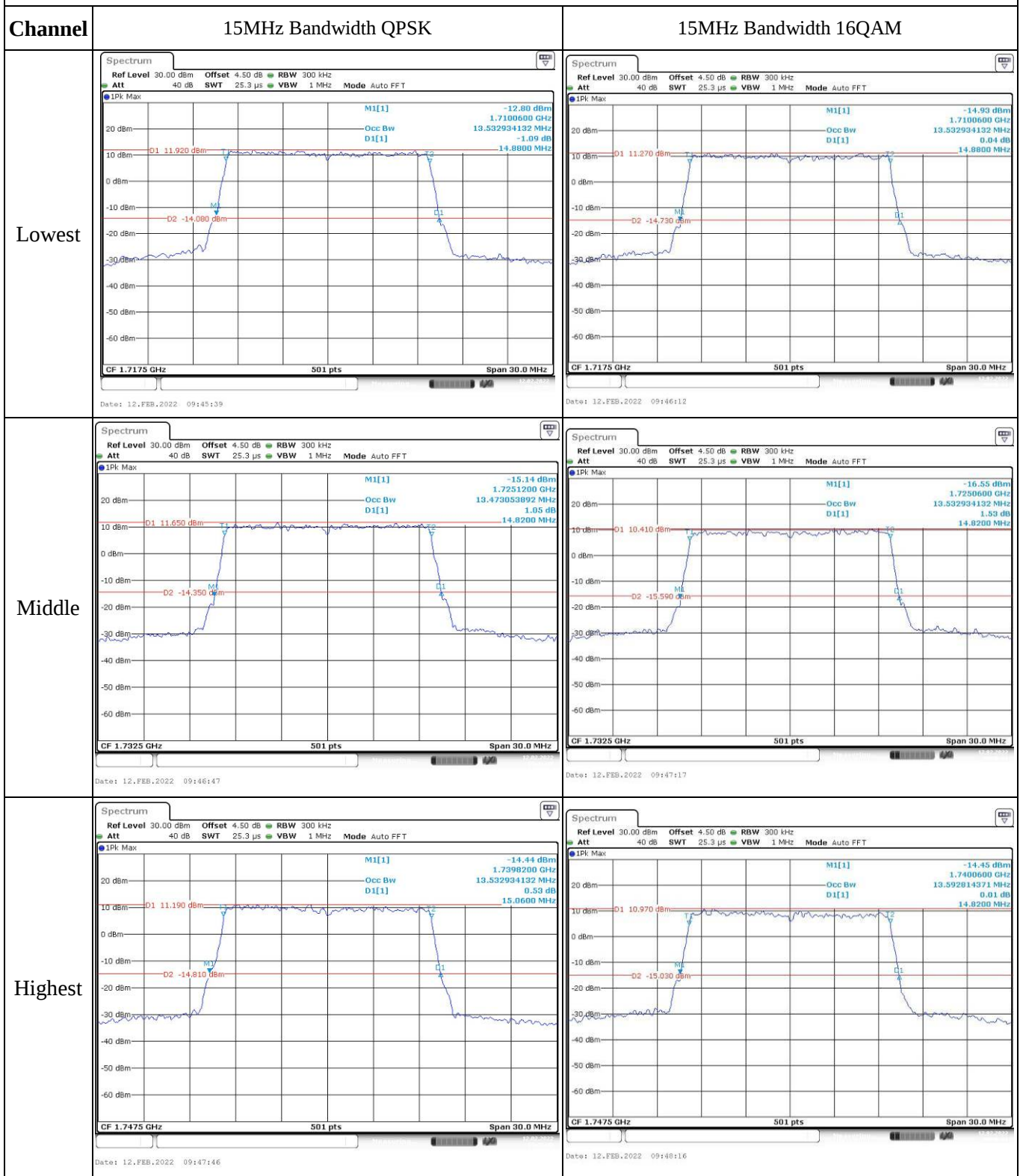
Highest



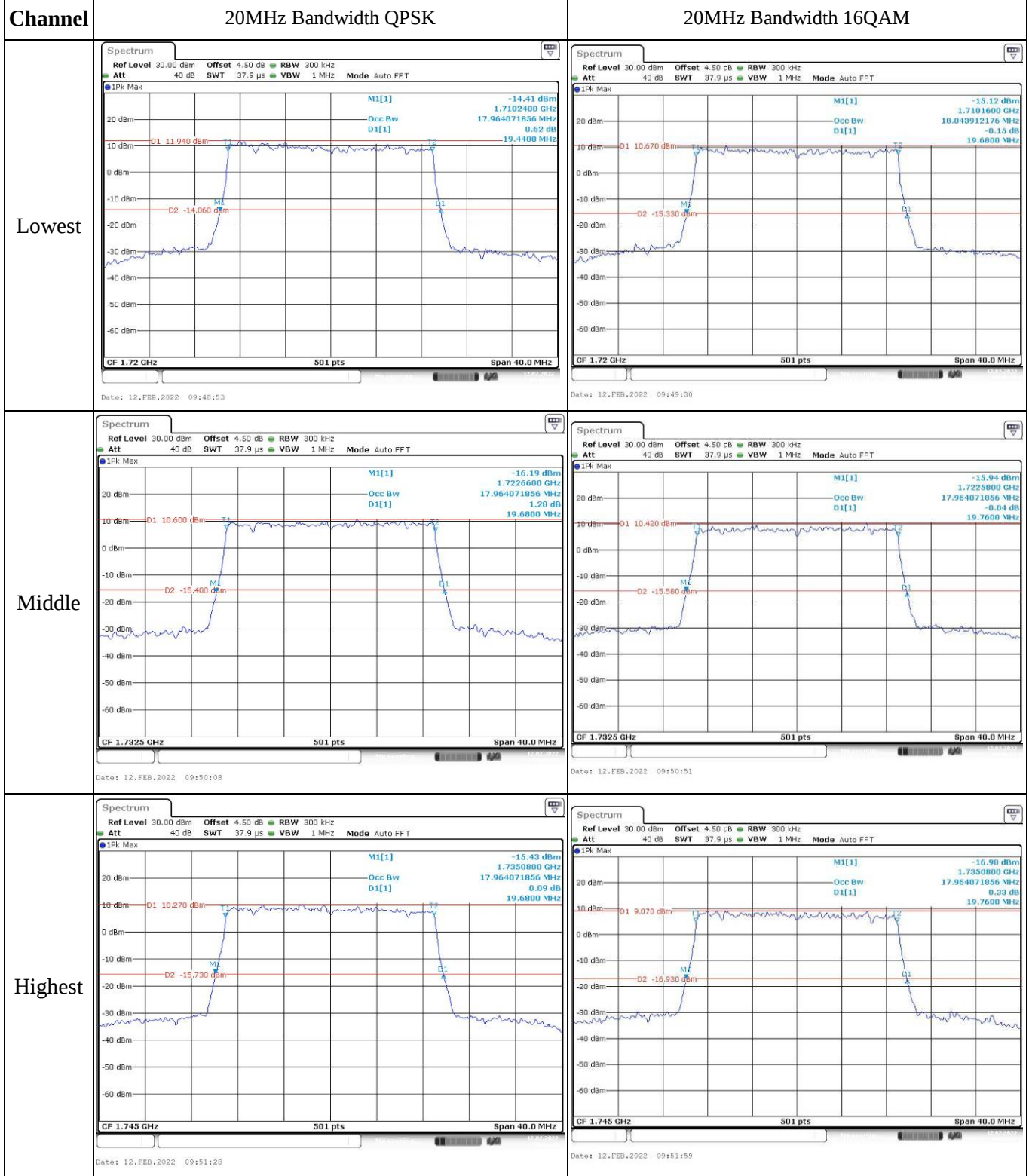
Occupied Bandwidth



Occupied Bandwidth



Occupied Bandwidth

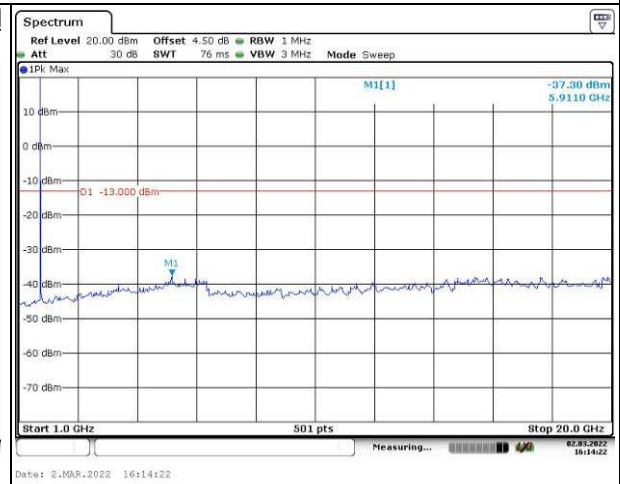
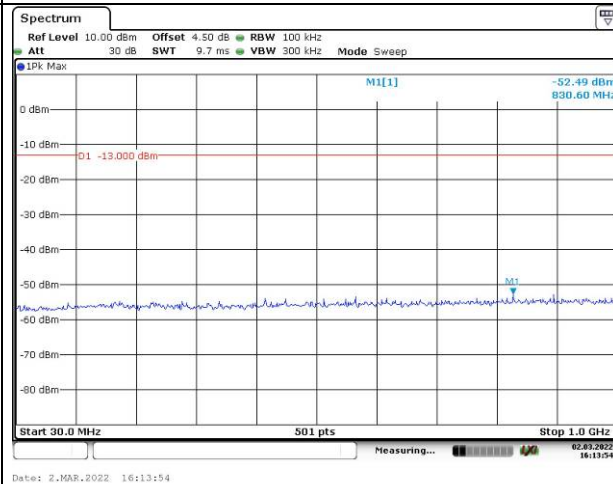


Spurious Emissions at Antenna Terminal

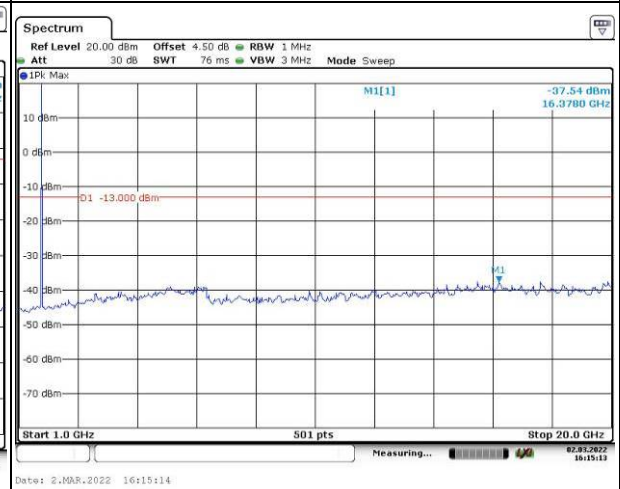
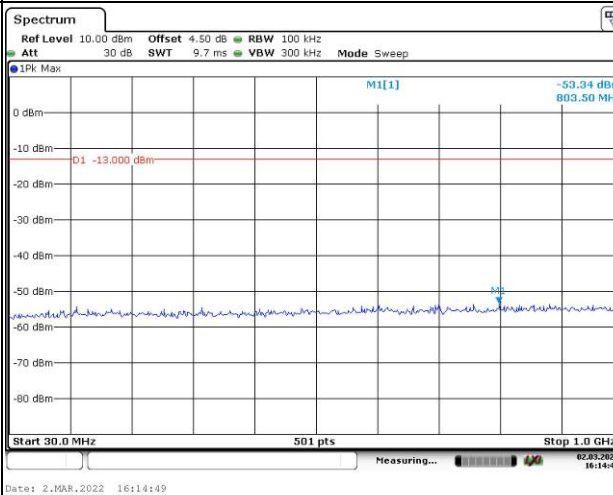
Channel

1.4MHz Bandwidth QPSK

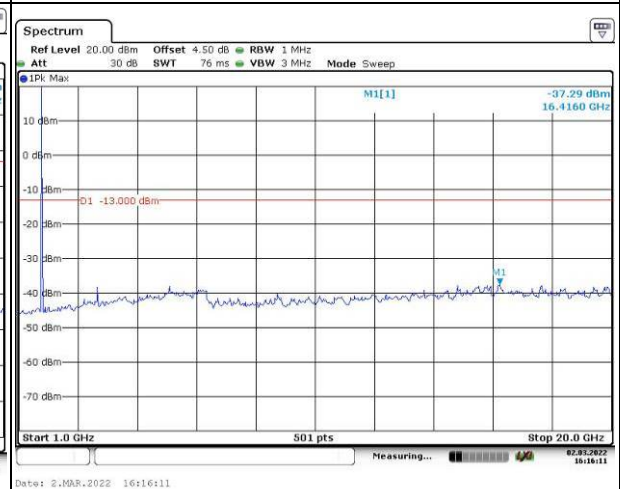
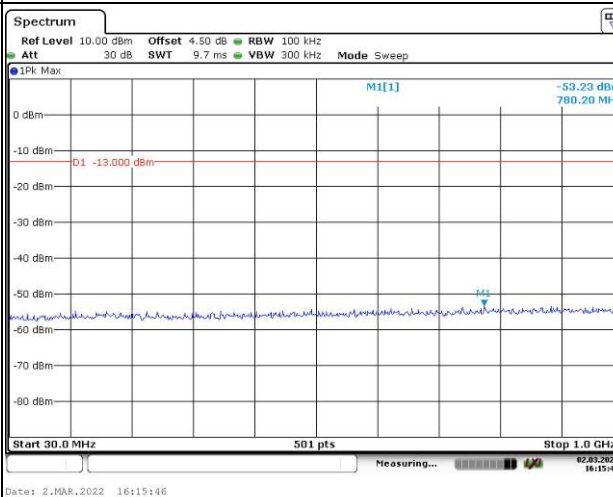
Lowest



Middle



Highest

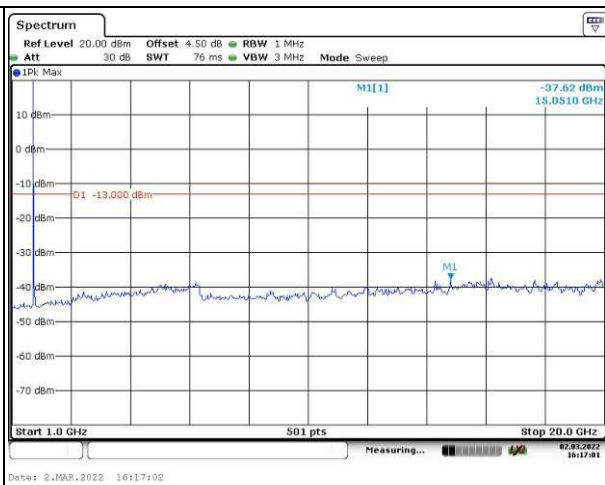
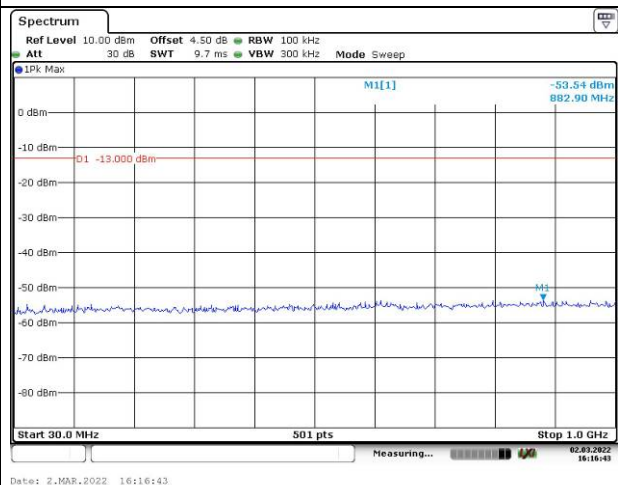


Spurious Emissions at Antenna Terminal

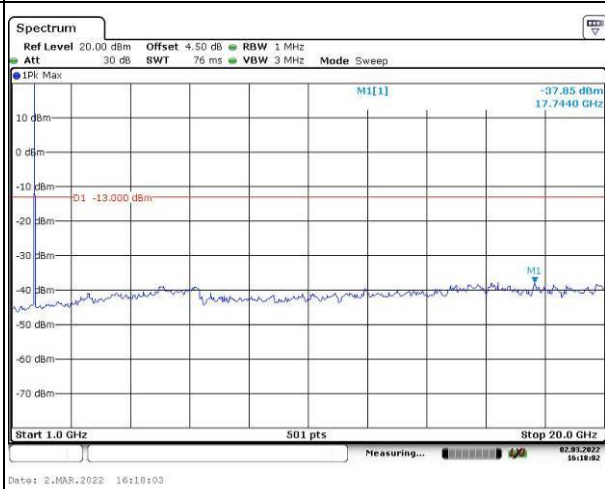
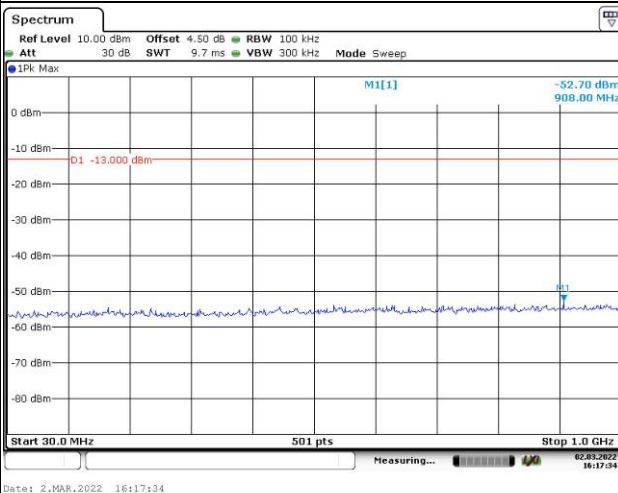
Channel

3MHz Bandwidth QPSK

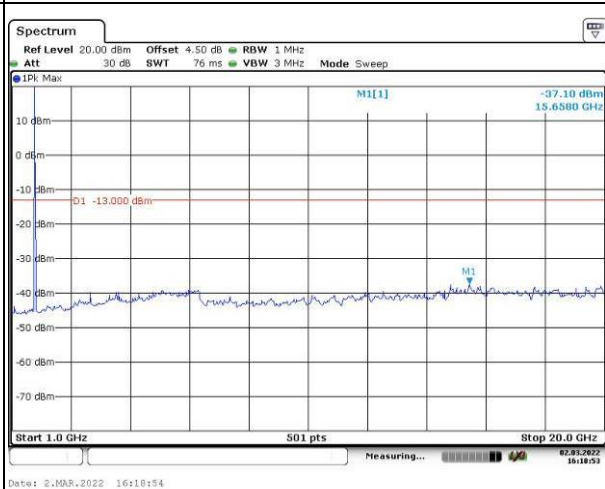
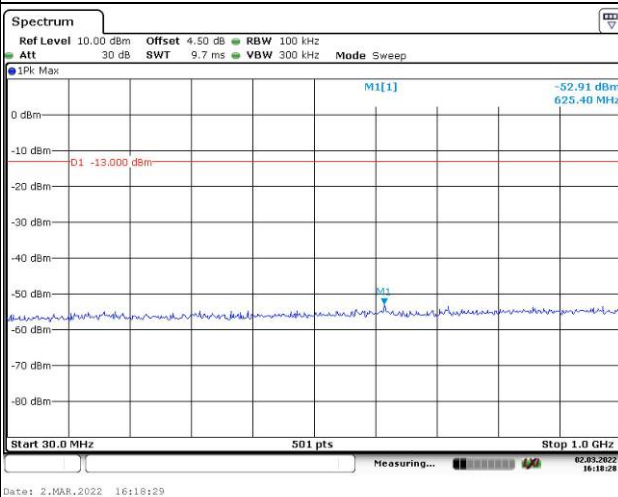
Lowest



Middle



Highest

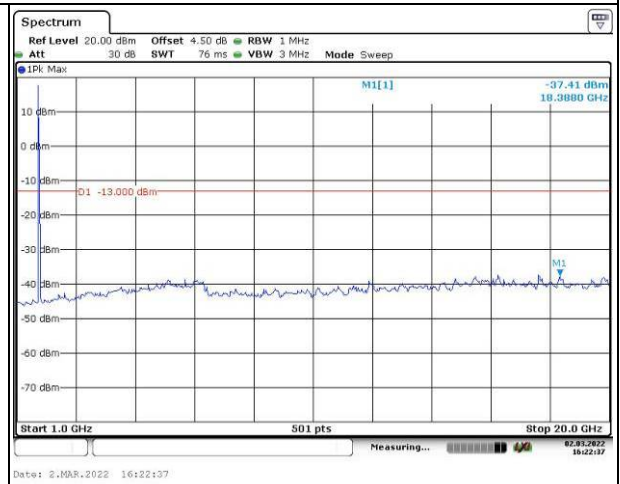
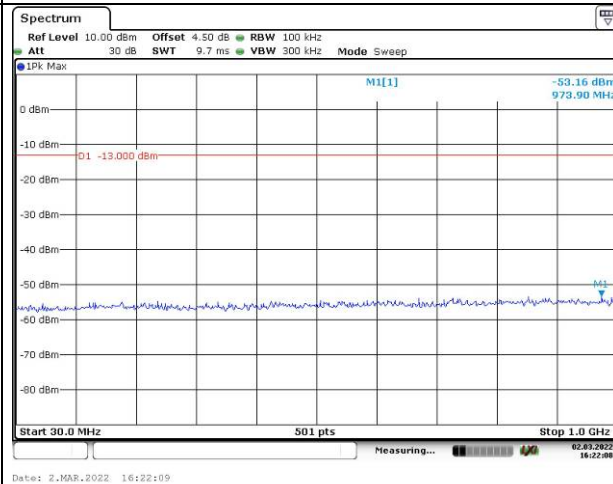


Spurious Emissions at Antenna Terminal

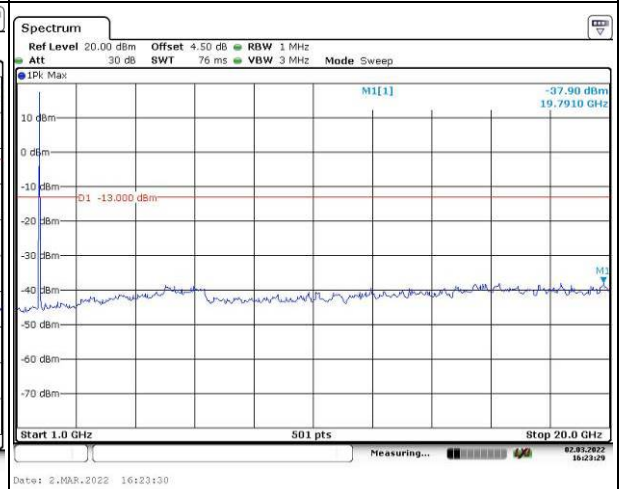
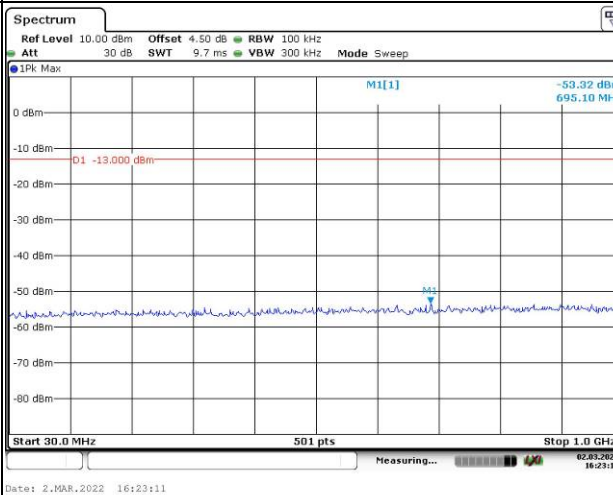
Channel

10MHz Bandwidth QPSK

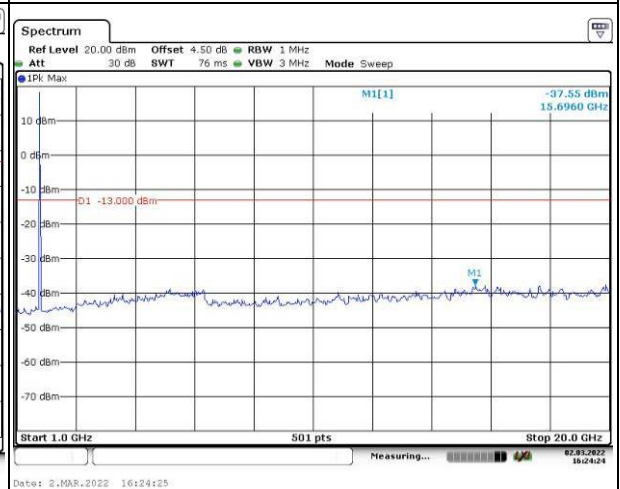
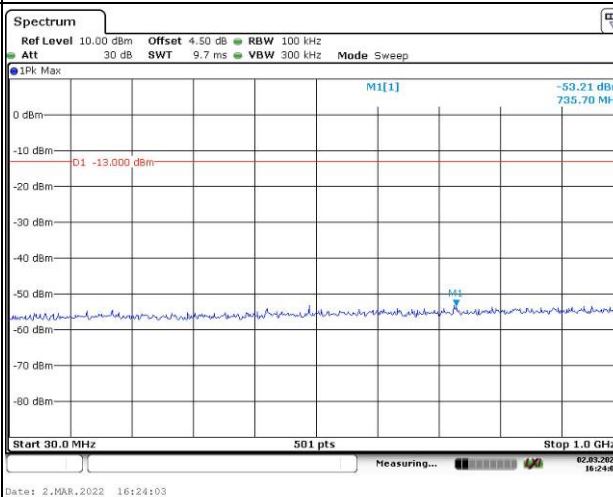
Lowest



Middle



Highest

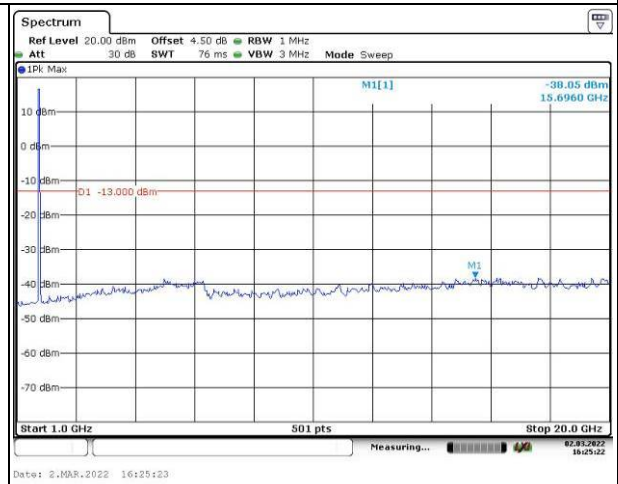
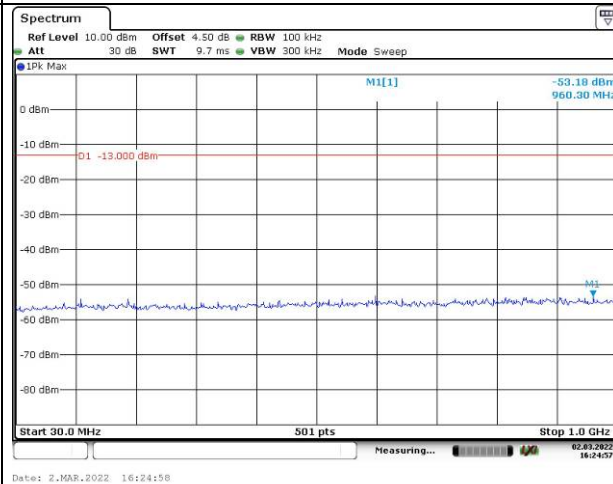


Spurious Emissions at Antenna Terminal

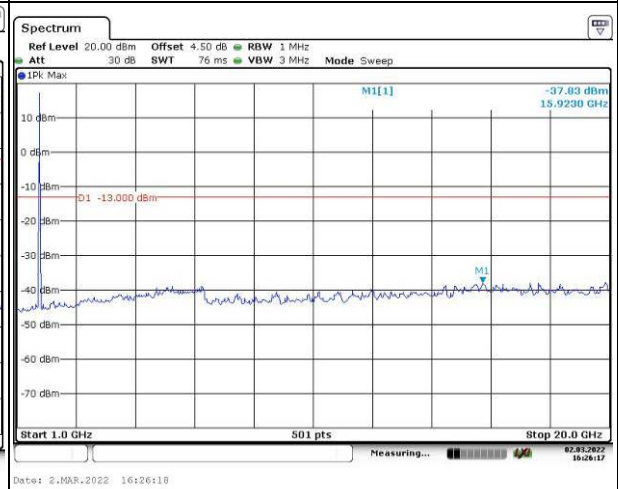
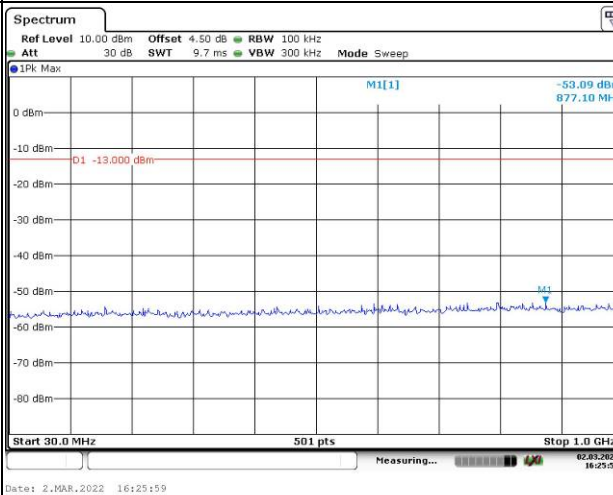
Channel

15MHz Bandwidth QPSK

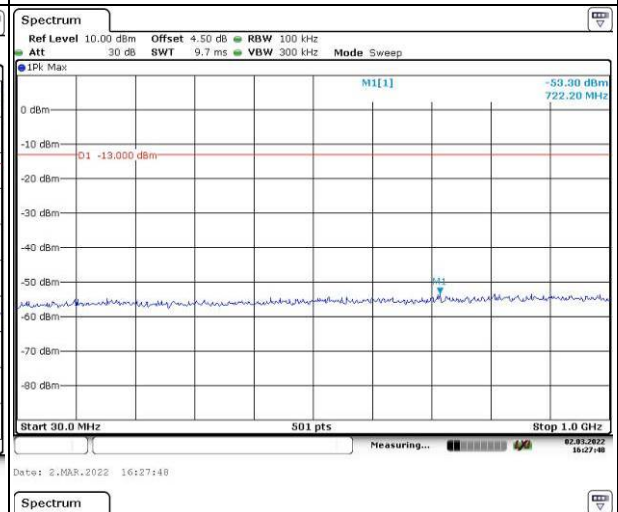
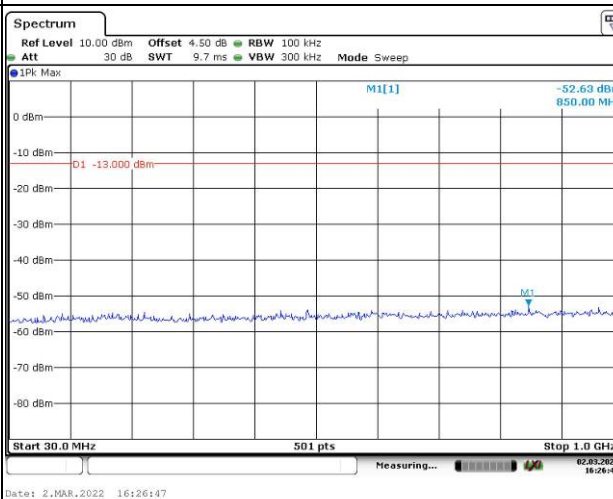
Lowest



Middle



Highest

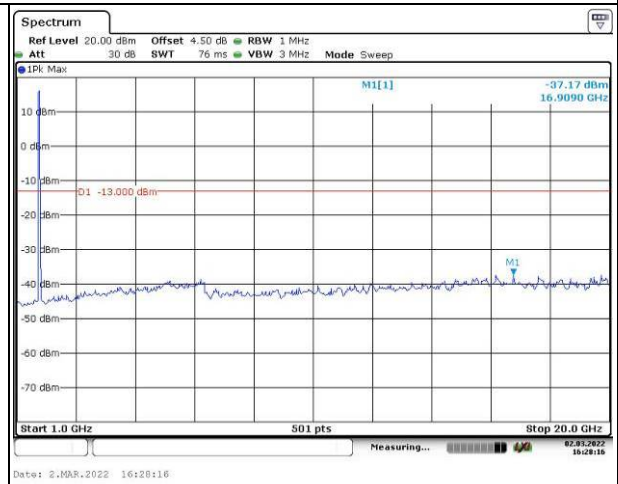
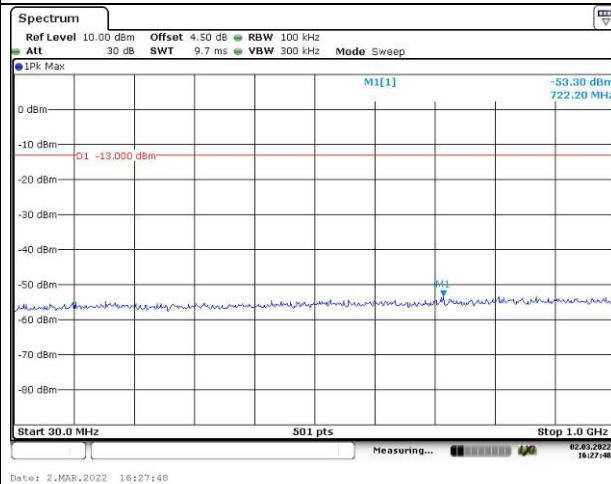


Spurious Emissions at Antenna Terminal

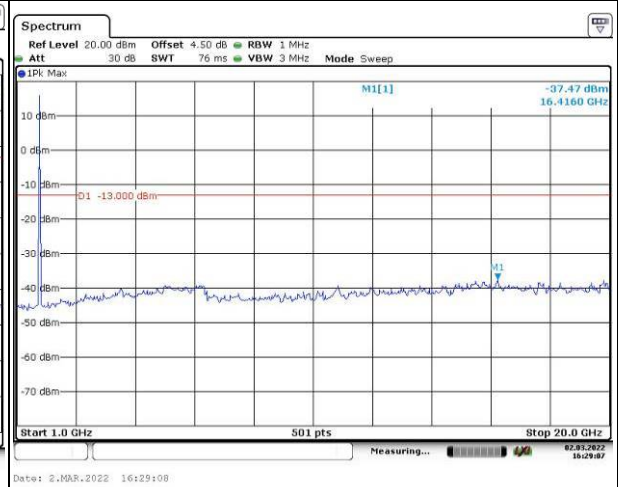
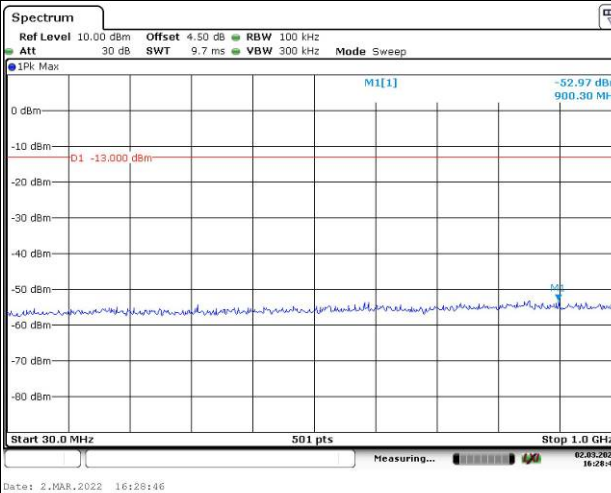
Channel

20MHz Bandwidth QPSK

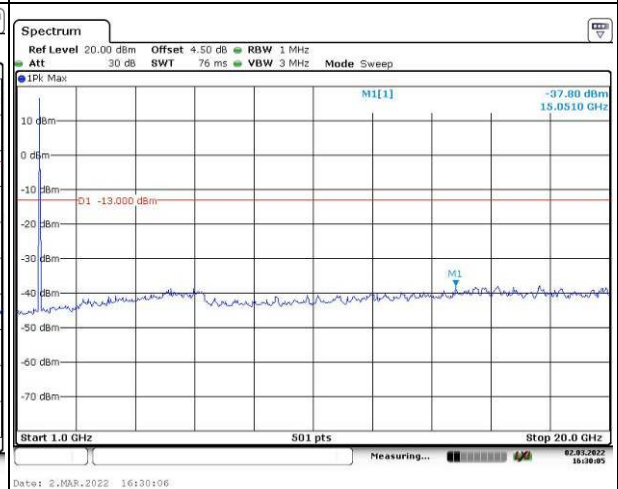
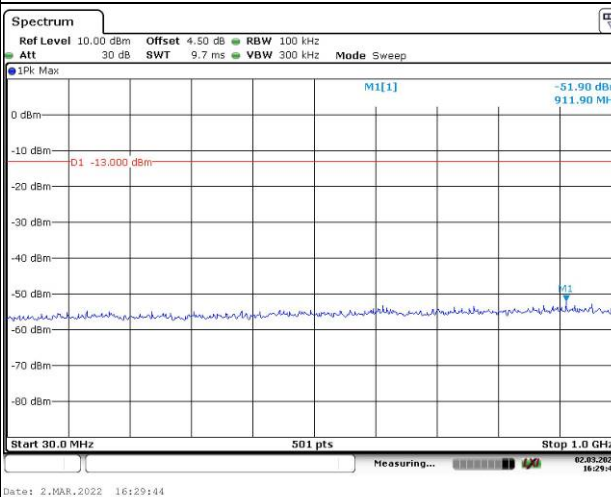
Lowest



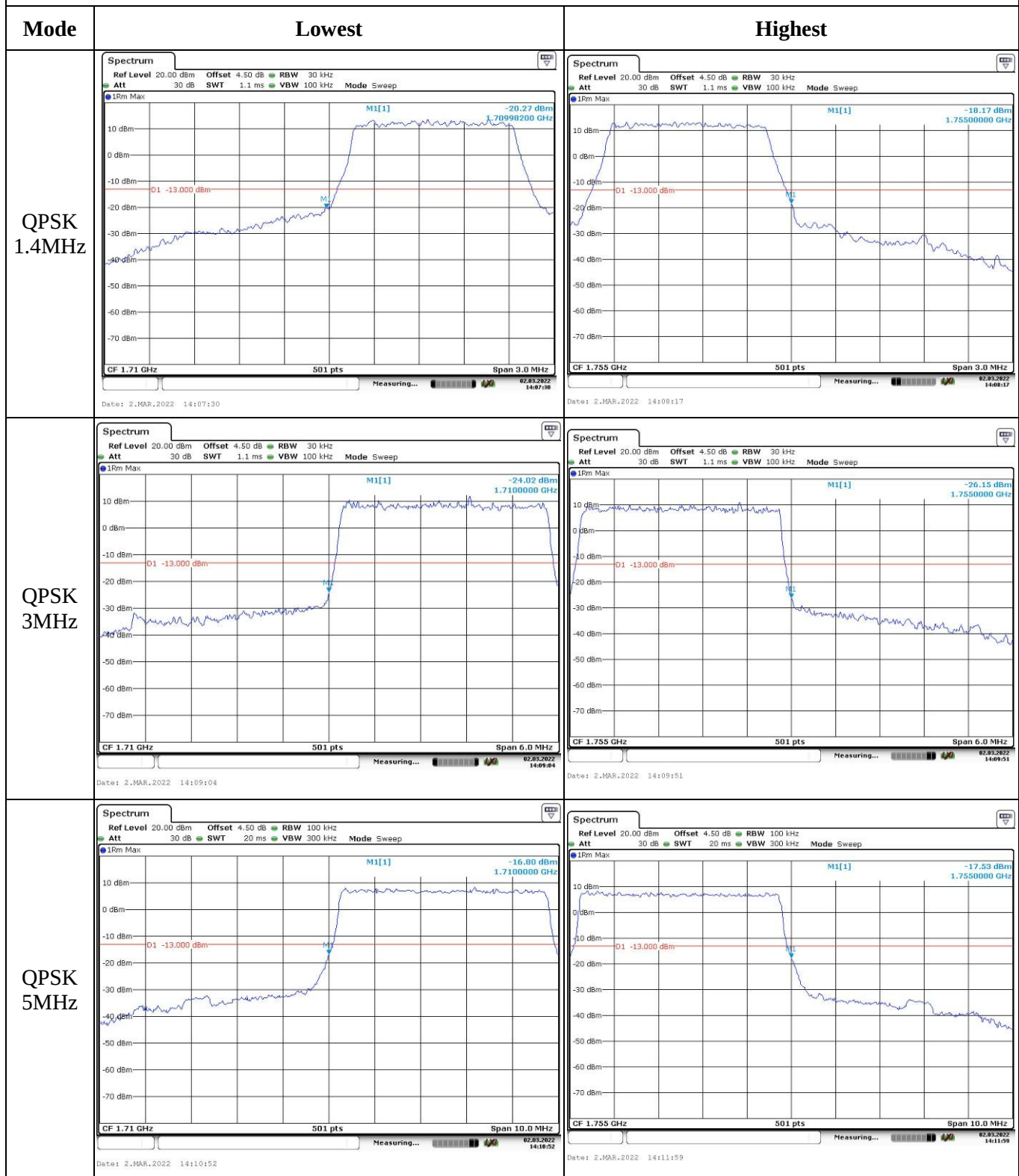
Middle



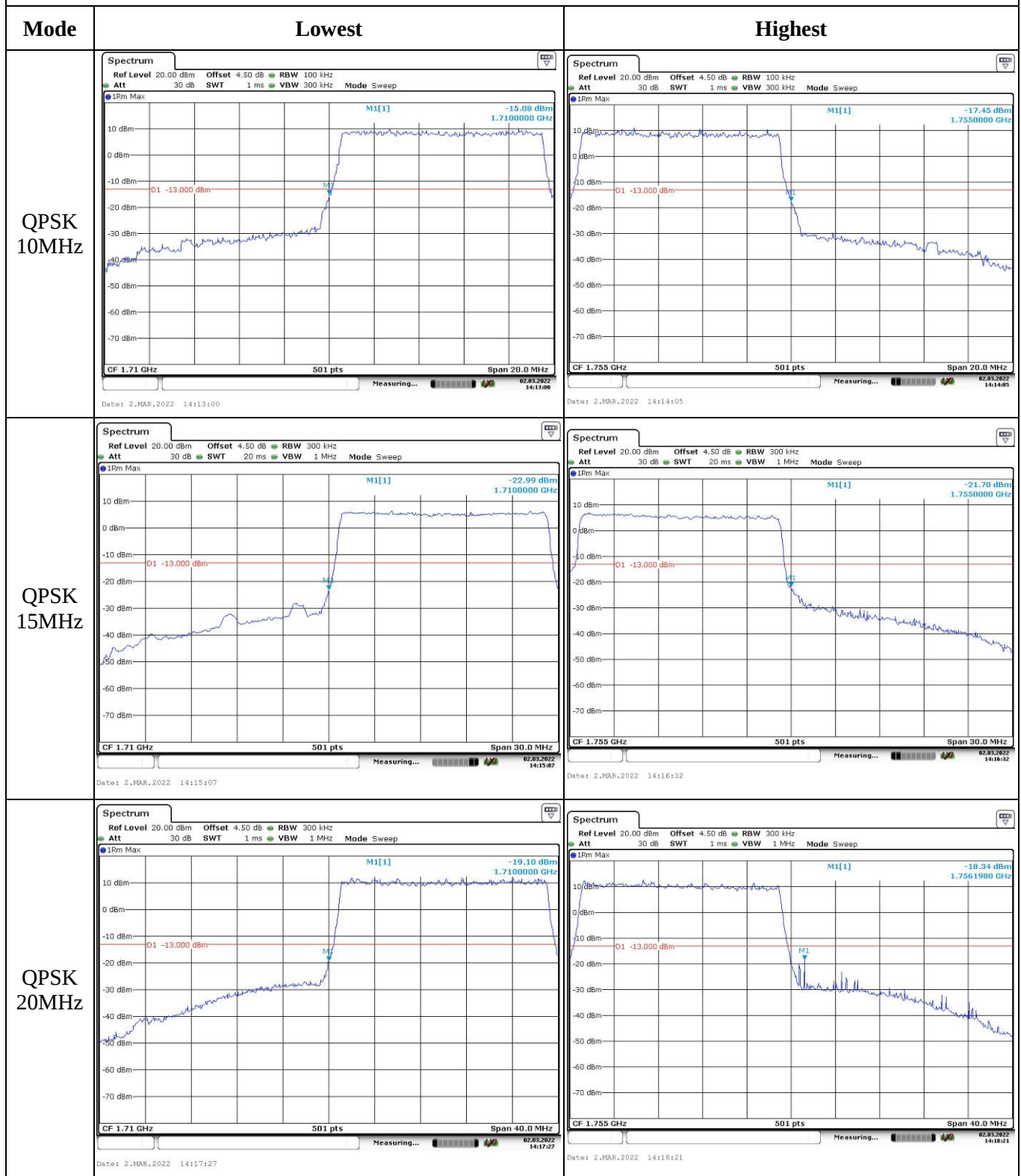
Highest



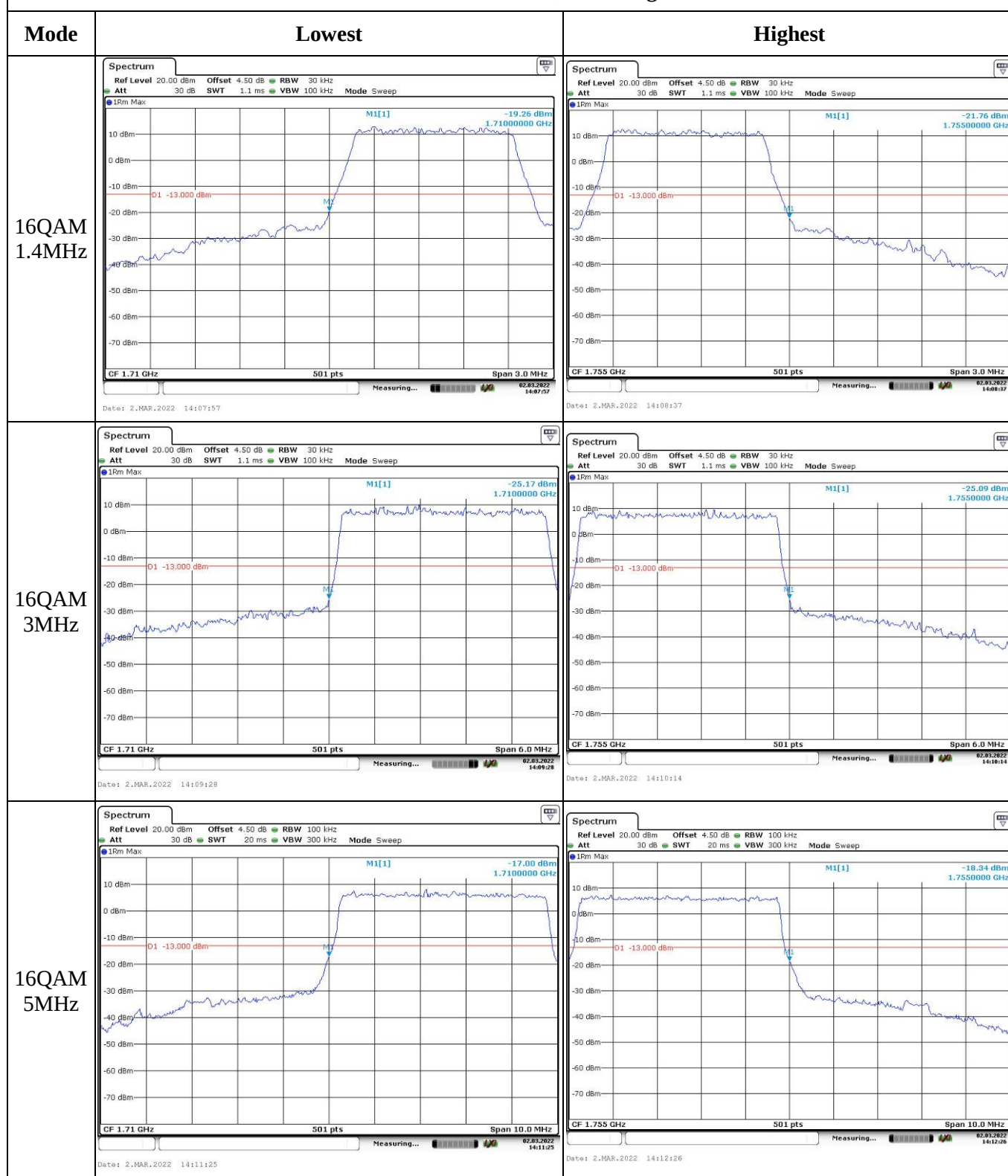
Out of band emission, Band Edge



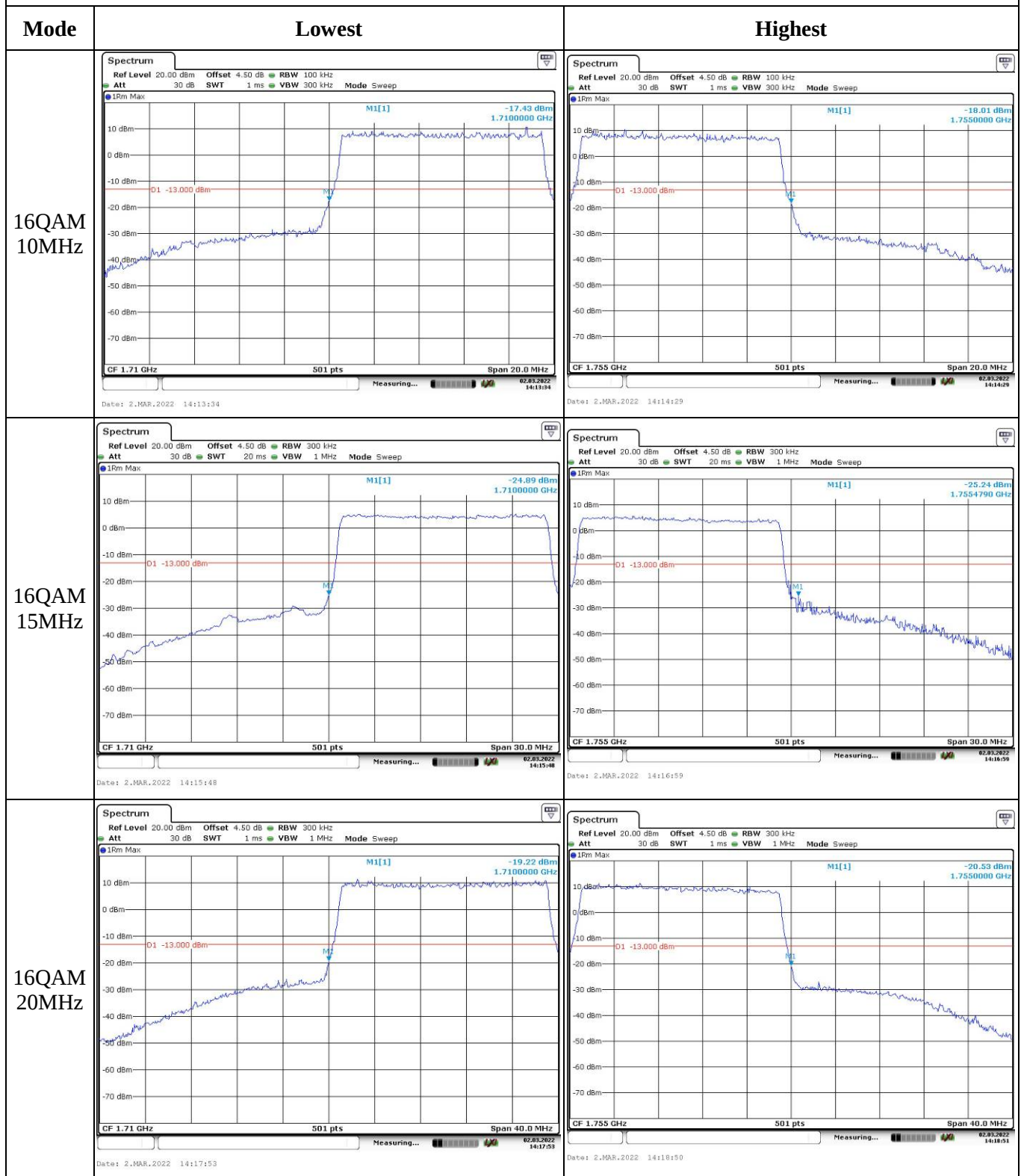
Out of band emission, Band Edge



Out of band emission, Band Edge



Out of band emission, Band Edge



4.8 Antenna Port Test Data and Results for LTE Band 5

Serial Number:	CR22020002-RF-S1/3	Test Date:	2022-02-12~2022-03-03
Test Site:	RF	Test Mode:	Transmitting
Tester:	Le Qiao	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	21~23.1	Relative Humidity: (%)	51~62	ATM Pressure: (kPa)	100.8~101.2
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSV40	101474	2021/7/22	2022/7/21
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
Weinschel	Coaxial Attenuators	53-20-34	LN751	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2021/7/22	2022/7/21
BACL	TEMP&HUMI Test Chamber	BTH-150	30026	2021/7/22	2022/7/22
UNI-T	Multimeter	UT39A+	C210582554	2021/9/30	2022/9/30
E-Microwave	Two-way Splitter	ODP-1-6	OE0120176	Each Time	N/A

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

EUT Information@ LTE Band 5▲:

Antenna Gain (dBi):	0.7	Antenna Gain (dBd):	-1.45	Cable Loss (dB):	0.1
Operation Voltage(V _{DC}):					
Lowest:	3.6	Normal:	3.8	Highest:	4.3

Test Frequency For Each Mode:

Operation Bandwidth	Lowest Frequency (MHz)	Middle Frequency (MHz)	Highest Frequency (MHz)
1.4MHz	824.7	836.5	848.3
3MHz	825.5	836.5	847.5
5MHz	826.5	836.5	846.5
10MHz	829	836.5	844

Test Data:**FCC§2.1046;§ 22.913 (a)****RF Output Power:**

Test Bandwidth & Modulation	Resource Block & RB offset	Conducted Average Output Power(dBm)			Maximum ERP (dBm)	ERP Limit (dBm)
		Lowest Channel	Middle Channel	Highest Channel		
1.4MHz QPSK	RB1#0	22.83	22.79	22.73	21.43	38.45
	RB1#3	22.98	22.96	22.97		
	RB1#5	22.81	22.78	22.81		
	RB3#0	22.89	22.84	22.85		
	RB3#3	22.88	22.83	22.98		
	RB6#0	21.97	21.88	21.86		
1.4MHz 16QAM	RB1#0	21.87	21.87	21.76	20.61	38.45
	RB1#3	22.09	22.09	21.98		
	RB1#5	21.85	21.88	21.80		
	RB3#0	22.13	21.83	21.97		
	RB3#3	22.16	21.80	21.98		
	RB6#0	20.97	20.90	20.87		
3MHz QPSK	RB1#0	22.89	22.85	22.84	21.34	38.45
	RB1#8	22.88	22.83	22.85		
	RB1#14	22.82	22.79	22.86		
	RB6#0	21.90	21.78	21.79		
	RB6#9	21.90	21.80	21.82		
	RB15#0	21.90	21.82	21.85		
3MHz 16QAM	RB1#0	22.42	21.94	21.82	20.87	38.45
	RB1#8	22.40	21.94	21.83		
	RB1#14	22.42	21.88	21.85		
	RB6#0	20.94	20.89	20.78		
	RB6#9	20.93	20.89	20.81		
	RB15#0	20.96	20.82	20.93		
5MHz QPSK	RB1#0	22.79	22.75	22.67	21.36	38.45
	RB1#13	22.91	22.87	22.85		
	RB1#24	22.81	22.75	22.75		
	RB15#0	21.94	21.86	21.90		
	RB15#10	21.89	21.85	21.80		
	RB25#0	21.88	21.81	21.81		
5MHz 16QAM	RB1#0	21.73	22.03	21.72	20.57	38.45
	RB1#13	21.85	22.12	21.88		
	RB1#24	21.66	22.02	21.83		
	RB15#0	20.94	20.83	21.01		
	RB15#10	20.91	20.88	20.89		
	RB25#0	20.92	20.86	20.93		

10MHz QPSK	RB1#0	22.85	22.84	22.78	21.44	38.45
	RB1#25	22.97	22.99	22.98		
	RB1#49	22.85	22.81	22.89		
	RB25#0	21.98	21.85	21.90		
	RB25#25	21.89	21.84	21.81		
	RB50#0	21.93	21.85	21.85		
10MHz 16QAM	RB1#0	22.42	21.91	21.69	20.99	38.45
	RB1#25	22.54	22.07	21.97		
	RB1#49	22.36	21.89	21.84		
	RB25#0	21.02	20.96	21.05		
	RB25#25	21.02	20.91	20.88		
	RB50#0	21.01	20.92	20.91		
Note: ERP=Conducted Power(dBm) - Cable loss(dB) + Antenna Gain(dBd)						
					Result:	Pass

Peak-to-average Ratio(PAR)

Test Bandwidth & Modulation	Resource Block & RB offset	Peak-to-average Ratio(dB)			Limit (dB)
		Lowest Channel	Middle Channel	Highest Channel	
10MHz QPSK	RB1#0	5.62	4.78	5.28	13
	RB50#0	5.36	5.19	5.36	13
10MHz 16QAM	RB1#0	6.58	5.48	6.67	13
	RB50#0	6.20	6.14	6.32	13
Result:					Pass

FCC §2.1049, §22.905:Occupied Bandwidth

Operation Mode	99% Occupied Bandwidth (MHz)			26 dB Occupied Bandwidth (MHz)		
	Low Channel	Middle channel	High Channel	Low Channel	Middle Channel	High Channel
1.4MHz QPSK	1.096	1.096	1.102	1.296	1.308	1.290
1.4MHz 16QAM	1.096	1.090	1.096	1.320	1.284	1.290
3MHz QPSK	2.683	2.683	2.683	2.868	2.868	2.892
3MHz 16QAM	2.683	2.683	2.671	2.892	2.880	2.868
5MHz QPSK	4.531	4.511	4.511	5.180	5.280	5.140
5MHz 16QAM	4.511	4.531	4.511	5.180	5.160	5.220
10MHz QPSK	9.022	8.942	8.981	10.040	9.840	9.920
10MHz 16QAM	8.942	8.942	8.981	9.760	9.800	9.880

Note: The test plots please refer to the Plots of Occupied Bandwidth

FCC §2.1051, §22.917(a):Spurious Emissions at Antenna Terminal

Result:	Pass, Please refer to the test plots of Spurious Emissions at Antenna Terminal.
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FCC §2.1051, §22.917(a):Out of band emission, Band Edge

Result:	Pass, Please refer to the test plots of Out of band emission, Band Edge.
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FCC §2.1055, §22.355: Frequency Stability

Test Mode:	10 MHz QPSK		Test Channel:	836.5	MHz
Test Item	Temperature (°C)	Voltage (V _{DC})	Frequency Error		Limit
			(Hz)	(ppm)	(ppm)
Frequency Stability vs. Temperature	-30	3.8	-3.82	-0.005	2.5
	-20	3.8	-6.29	-0.008	2.5
	-10	3.8	-5.83	-0.007	2.5
	0	3.8	-6.65	-0.008	2.5
	10	3.8	-5.87	-0.007	2.5
	20	3.8	9.52	0.011	2.5
	30	3.8	5.13	0.006	2.5
	40	3.8	9.64	0.012	2.5
	50	3.8	9.15	0.011	2.5
Frequency Stability vs. Voltage	20	3.6	5.41	0.006	2.5
	20	4.3	-8.64	-0.010	2.5
Result:				Pass	

Test Mode:	10 MHz 16QAM		Test Channel:	836.5	MHz
Test Item	Temperature (°C)	Voltage (V _{DC})	Frequency Error		Limit
			(Hz)	(ppm)	(ppm)
Frequency Stability vs. Temperature	-30	3.8	-8.14	-0.010	2.5
	-20	3.8	-5.86	-0.007	2.5
	-10	3.8	5.97	0.007	2.5
	0	3.8	-6.29	-0.008	2.5
	10	3.8	7.40	0.009	2.5
	20	3.8	8.19	0.010	2.5
	30	3.8	8.66	0.010	2.5
	40	3.8	-6.57	-0.008	2.5
	50	3.8	8.06	0.010	2.5
Frequency Stability vs. Voltage	20	3.6	-6.65	-0.008	2.5
	20	4.3	-7.17	-0.009	2.5
Result:				Pass	

Test Plots:

