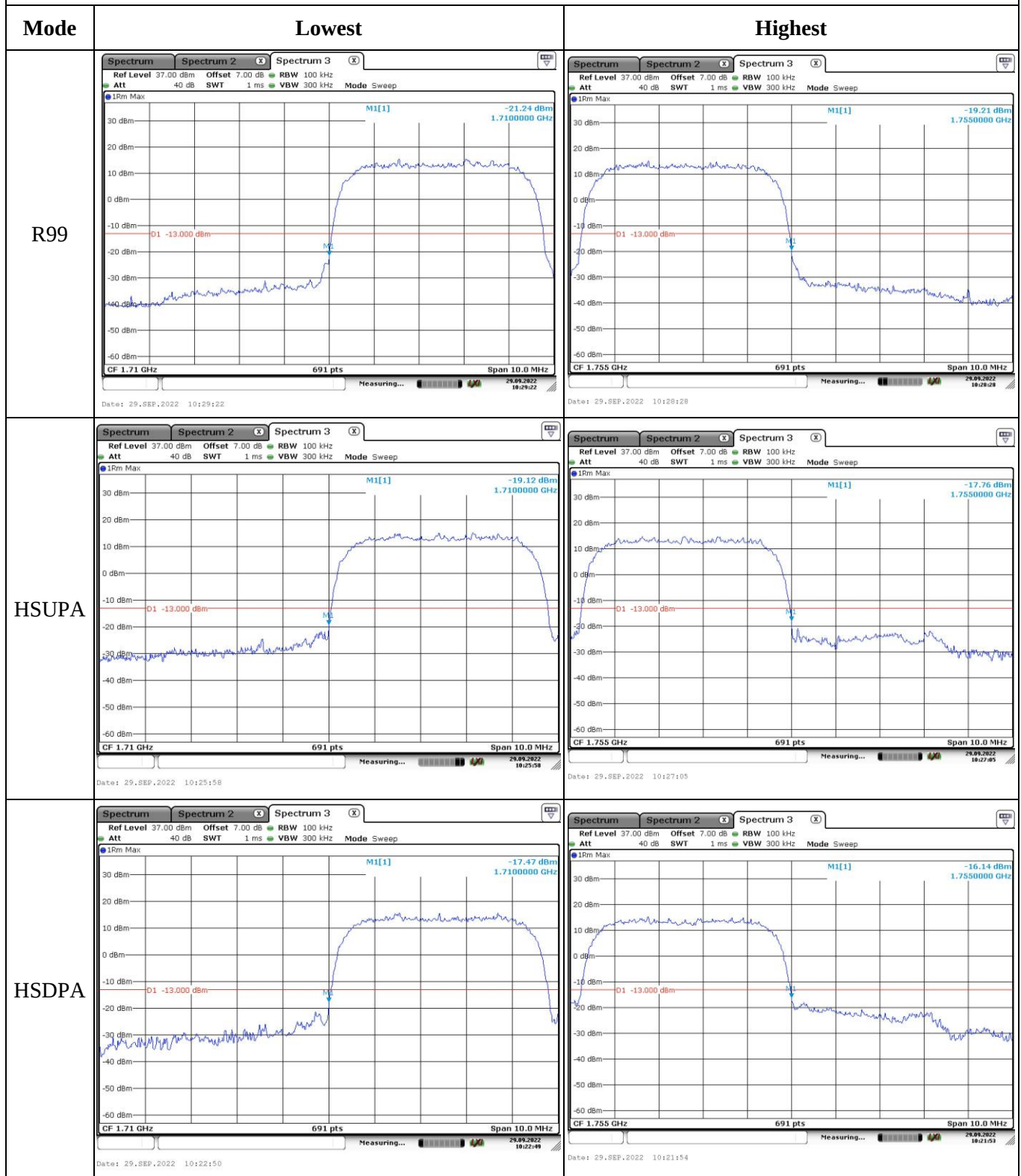


Out of band emission, Band Edge



4.5 Antenna Port Test Data and Results for WCDMA Band 5:

Serial Number:	CR22090019-RF-S1	Test Date:	2022-09-29~2022-10-01
Test Site:	RF	Test Mode:	Transmitting
Tester:	George Chen	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	27.1~28.2	Relative Humidity: (%)	46~58	ATM Pressure: (kPa)	100.2~100.9
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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	2022-07-15	2023-07-14
zhuoxiang	Coaxial Cable	SMA-178	211002	Each time	N/A
YINSAIGE	Coaxial Cable	SS402	SJ0100002	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554404	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2022-07-15	2023-07-14
Weinschel	Power Splitter	1515	RA915	Each time	N/A
UNI-T	Multimeter	UT39A+	C210582554	2022-09-23	2023-09-23
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2022-04-06	2023-04-05

* 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@ WCDMA Band V▲:

Antenna Gain G_T (dBi):	-1.77	Antenna Gain G_T (dBd):	-3.92	Path Loss L_C (dB):	0.2
Operation Voltage(V_{DC}):					
Lowest:	3.6	Normal:	3.85	Highest:	4.4

Test Frequency For Each Mode:

Operation Modes	Lowest Frequency (MHz)	Middle Frequency (MHz)	Highest Frequency (MHz)
WCDMA	826.4	836.6	846.6

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

Test Mode	Conducted Average Output Power(dBm)			Maximum ERP(dBm)	ERP Limit(dBm)
	Lowest Channel	Middle Channel	Highest Channel		
WCDMA R99 Subtest 1	22.21	22.24	22.49	18.37	38.45
HSDPA Subtest 1	22.09	21.96	22.23	18.11	38.45
HSDPA Subtest 2	21.84	21.83	22.06	17.94	38.45
HSDPA Subtest 3	21.83	21.59	21.8	17.71	38.45
HSDPA Subtest 4	21.75	21.53	21.73	17.63	38.45
HSUPA Subtest 1	21.93	21.83	22.13	18.01	38.45
HSUPA Subtest 2	21.81	21.62	21.97	17.85	38.45
HSUPA Subtest 3	21.53	21.32	21.88	17.76	38.45
HSUPA Subtest 4	21.35	21.25	21.75	17.63	38.45
HSUPA Subtest 5	21.15	21.12	21.58	17.46	38.45
Note: ERP=Conducted Power(dBm) - Cable loss(dB) + Antenna Gain(dBd)					
				Result:	Pass

Peak-to-average Ratio(PAR)

Test Mode	Peak-to-average Ratio(dB)			Limit (dB)
	Lowest Channel	Middle Channel	Highest Channel	
WCDMA R99	2.38	4.41	2.43	13
HSDPA	3.25	5.01	4.14	13
HSUPA	3.45	5.3	4.29	13
			Result:	Pass

FCC §2.1049, §22.917, §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
WCDMA R99	4.168	4.168	4.182	4.761	4.718	4.776
HSDPA	4.211	4.168	4.226	6.078	4.689	6.122
HSUPA	4.211	4.168	4.226	6.671	4.732	5.962
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

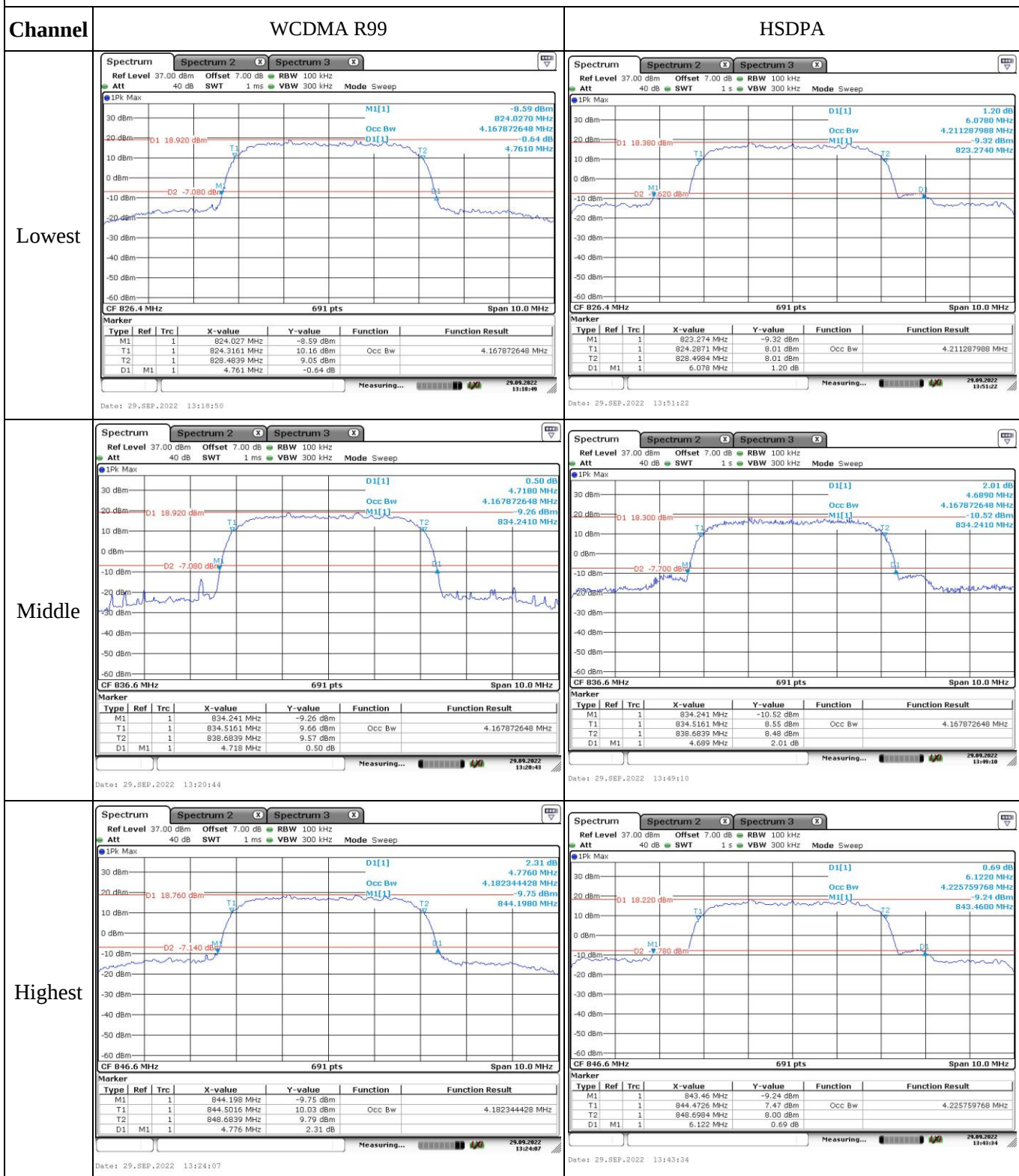
Result:	Pass, Please refer to the test plots of Out of band emission, Band Edge.
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FCC §2.1055, §22.355: Frequency Stability

Test Modulation:	WCDMA R99		Test Channel:	836.6	MHz
Test Item	Temperature (°C)	Voltage (V _{DC})	Frequency Error		Limit
			(Hz)	(ppm)	(ppm)
Frequency Stability vs. Temperature	-30	3.85	-15.18	-0.018	2.5
	-20	3.85	8.1	0.010	2.5
	-10	3.85	-8.59	-0.010	2.5
	0	3.85	9.33	0.011	2.5
	10	3.85	-6.94	-0.008	2.5
	20	3.85	7.54	0.009	2.5
	30	3.85	6.43	0.008	2.5
	40	3.85	-6.17	-0.007	2.5
	50	3.85	-6.44	-0.008	2.5
Frequency Stability vs. Voltage	20	3.6	6.34	0.008	2.5
	20	4.4	-6.89	-0.008	2.5
Result:				Pass	

Test Plots(Note:7.0dB is the Insertion loss of the RF cable, coaxial tee connector and DC Block, which was offset into the Spectrum Analyzer):

Occupied Bandwidth

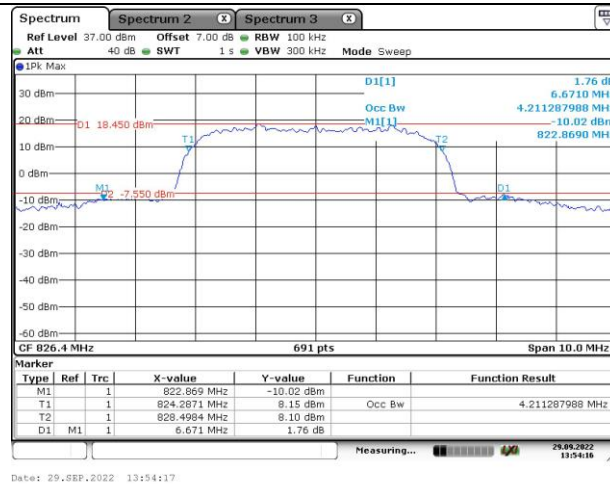


Occupied Bandwidth

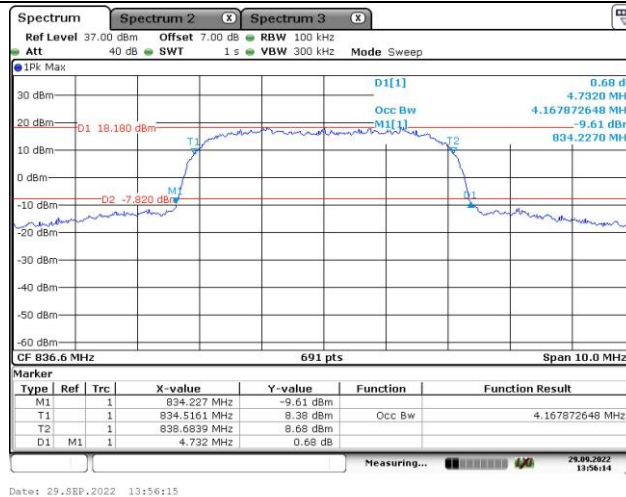
Channel

HSUPA

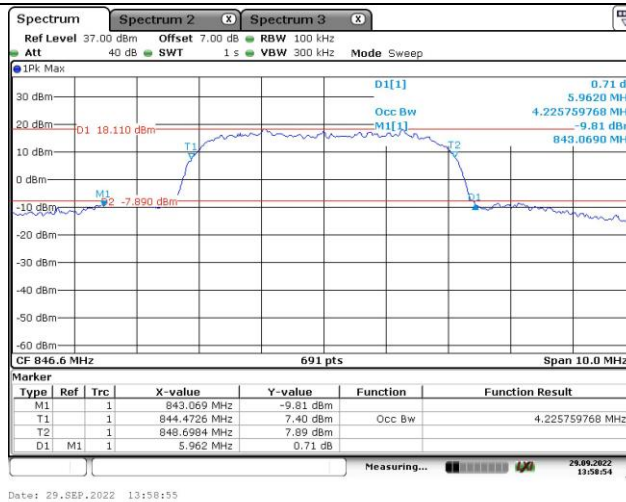
Lowest



Middle



Highest

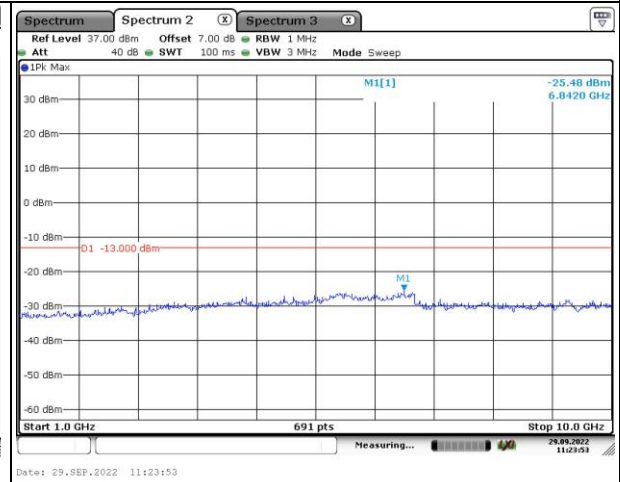
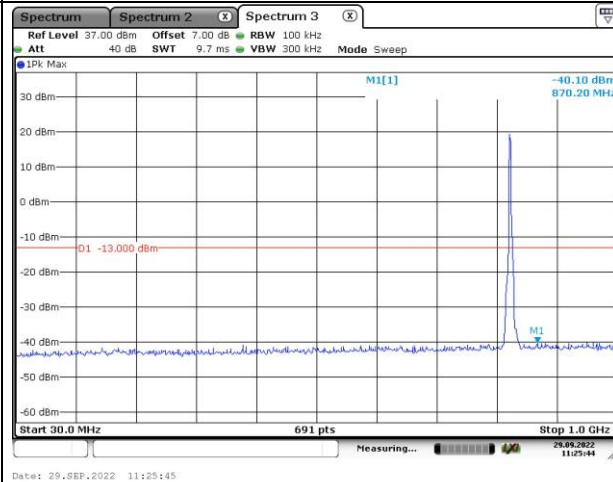


Spurious Emissions at Antenna Terminal

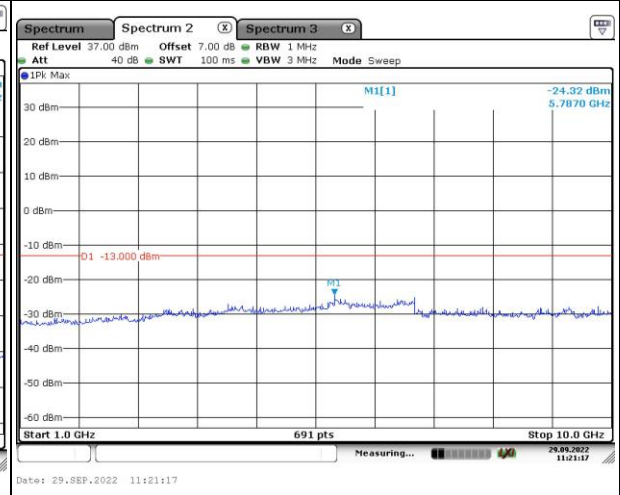
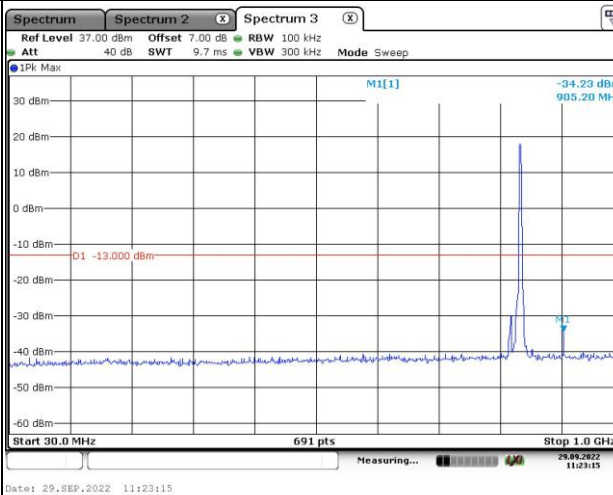
Channel

WCDMA R99

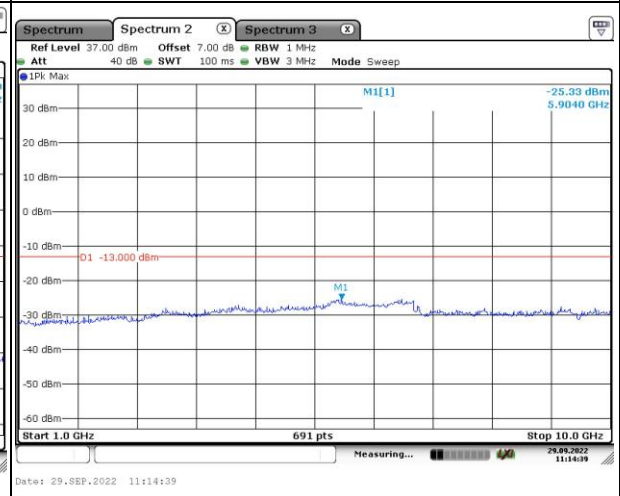
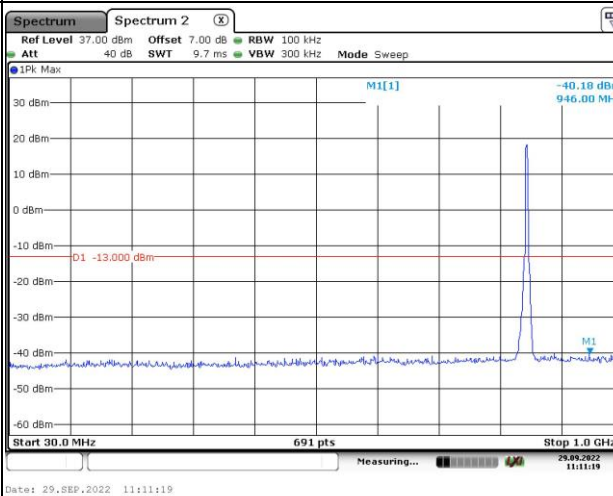
Lowest



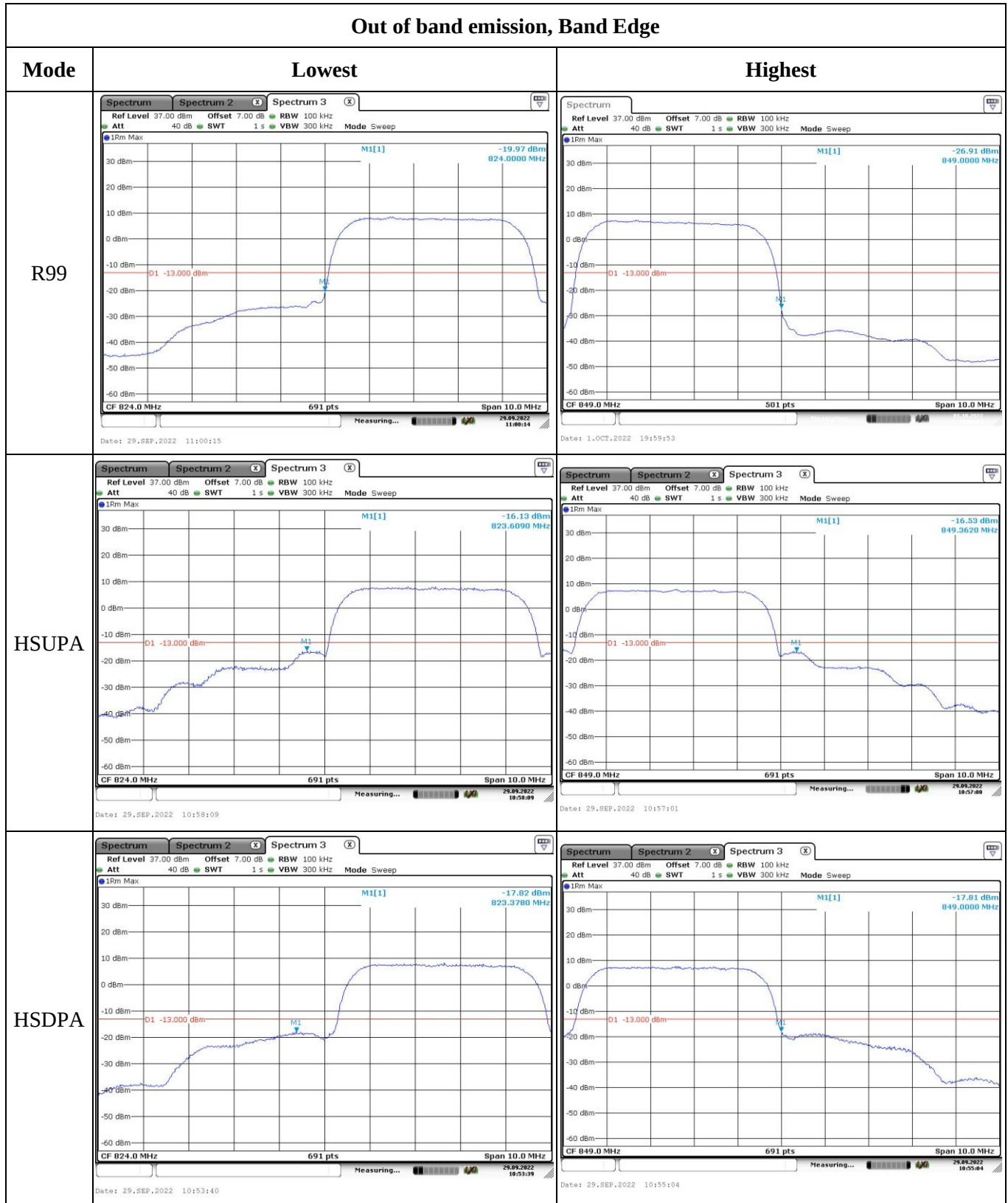
Middle



Highest



Out of band emission, Band Edge



4.6 Antenna Port Test Data and Results for LTE Band 2

Serial Number:	CR22090019-RF-S1	Test Date:	2022-9-20-2022-10-18
Test Site:	RF	Test Mode:	Transmitting
Tester:	Rinka Li	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	25.9	Relative Humidity: (%)	48.6	ATM Pressure: (kPa)	100.2
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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	2022-07-15	2023-07-14
zhuoxiang	Coaxial Cable	SMA-178	211002	Each time	N/A
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554404	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2022-07-15	2023-07-14
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2022-04-06	2023-04-05
UNI-T	Multimeter	UT39A+	C210582554	2021-09-30	2022-09-29
UNI-T	Multimeter	UT39A+	C210582554	2022-09-23	2023-09-23
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
Weinschel	Power Splitter	1515	RA914	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 2▲:

Antenna Gain G_T (dBi):	0.51	Path Loss L_C (dB):	0.3
Operation Voltage(V_{DC}):			
Lowest:	3.6	Normal:	3.85
		Highest:	4.4

Test Frequency For Each Mode:

Operation Bandwidth	Lowest Frequency (MHz)	Middle Frequency (MHz)	Highest Frequency (MHz)
1.4MHz	1850.7	1880	1909.3
3MHz	1851.5	1880	1908.5
5MHz	1852.5	1880	1907.5
10MHz	1855	1880	1905
15MHz	1857.5	1880	1902.5
20MHz	1860	1880	1900

Test Data:**FCC §2.1046; § 24.232****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	22.57	22.21	22.11	22.85	33
	RB1#3	22.54	22.2	22.05		
	RB1#5	22.6	22.16	22.09		
	RB3#0	22.63	22.34	22.19		
	RB3#3	22.64	22.27	22.23		
	RB6#0	21.7	21.3	21.18		
1.4MHz 16QAM	RB1#0	22.34	20.98	21.3	22.6	33
	RB1#3	22.39	20.97	21.29		
	RB1#5	22.39	20.95	21.28		
	RB3#0	21.56	21.11	21.12		
	RB3#3	21.51	21.16	21.13		
	RB6#0	20.8	20.29	20.32		
3MHz QPSK	RB1#0	22.46	22.17	22.11	22.72	33
	RB1#8	22.51	22.23	22.09		
	RB1#14	22.51	22.24	22.07		
	RB6#0	21.6	21.27	21.13		
	RB6#9	21.51	21.3	21.18		
	RB15#0	21.61	21.3	21.19		
3MHz 16QAM	RB1#0	22.02	21.83	20.99	22.25	33
	RB1#8	22.04	21.88	21.02		
	RB1#14	22	21.97	21.04		
	RB6#0	20.65	20.54	20.46		
	RB6#9	20.85	20.55	20.51		
	RB15#0	20.8	20.39	20.39		
5MHz QPSK	RB1#0	22.49	22.15	22.11	22.75	33
	RB1#13	22.54	22.06	22		
	RB1#24	21.91	22.12	22.05		
	RB15#0	21.59	21.33	21.23		
	RB15#10	21.64	21.25	21.27		
	RB25#0	21.56	21.34	21.13		
5MHz 16QAM	RB1#0	21.75	21.43	20.27	21.99	33
	RB1#13	21.74	21.37	20.32		
	RB1#24	21.78	21.43	20.36		
	RB15#0	20.64	20.32	20.38		
	RB15#10	20.59	20.38	20.34		
	RB25#0	20.65	20.51	20.4		
10MHz QPSK	RB1#0	22.45	22.38	22.08	22.66	33
	RB1#25	22.37	22.37	22.08		
	RB1#49	22.41	22.38	22.16		

	RB25#0	21.51	21.25	21.21		
	RB25#25	21.58	21.33	21.21		
	RB50#0	21.5	21.31	21.16		
10MHz 16QAM	RB1#0	21.84	22.07	21.01	22.28	33
	RB1#25	21.82	22.03	20.97		
	RB1#49	21.83	22.03	21.04		
	RB25#0	20.64	20.45	20.45		
	RB25#25	20.64	20.44	20.43		
	RB50#0	20.73	20.46	20.35		
15MHz QPSK	RB1#0	22.09	22.35	22.34	22.73	33
	RB1#38	22.2	22.42	22.33		
	RB1#74	22.23	22.52	22.42		
	RB36#0	21.19	21.33	21.51		
	RB36#39	21.38	21.3	21.55		
	RB75#0	21.26	21.33	21.52		
15MHz 16QAM	RB1#0	21.7	21.38	21.79	22.12	33
	RB1#38	21.73	21.42	21.85		
	RB1#74	21.76	21.55	21.91		
	RB36#0	20.37	20.52	20.56		
	RB36#39	20.47	20.61	20.66		
	RB75#0	20.44	20.55	20.67		
20MHz QPSK	RB1#0	22.35	22.24	22.43	22.85	33
	RB1#50	22.41	22.41	22.52		
	RB1#99	22.49	22.56	22.64		
	RB50#0	21.26	21.24	21.55		
	RB50#50	21.36	21.54	21.44		
	RB100#0	21.29	21.47	21.56		
20MHz 16QAM	RB1#0	21.21	22.13	21.6	22.56	33
	RB1#50	21.29	22.18	21.71		
	RB1#99	21.43	22.35	21.78		
	RB50#0	20.4	20.43	20.65		
	RB50#50	20.48	20.62	20.73		
	RB100#0	20.43	20.53	20.62		

Note: EIRP= Conducted Power(dBm) - L_C(dB) + G_T(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	4.23	4.87	4.72	13
	RB100#0	5.25	5.16	5.04	13
20MHz 16QAM	RB1#0	4.87	5.45	5.62	13
	RB100#0	6.12	6.23	6.09	13
				Result:	Pass

FCC §2.1049, §24.238: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	1.102	1.102	1.102	1.278	1.242	1.266
1.4MHz 16QAM	1.108	1.102	1.102	1.278	1.26	1.254
3MHz QPSK	2.695	2.683	2.707	3	2.904	3
3MHz 16QAM	2.683	2.683	2.695	3.024	3.024	3.036
5MHz QPSK	4.511	4.511	4.511	5	5	5
5MHz 16QAM	4.531	4.531	4.511	5.04	4.86	4.98
10MHz QPSK	8.942	8.942	8.942	9.8	9.76	9.76
10MHz 16QAM	8.982	8.942	8.942	9.84	9.84	9.72
15MHz QPSK	13.473	13.533	13.473	15.06	15.06	15
15MHz 16QAM	13.593	13.413	13.533	14.64	14.46	15
20MHz QPSK	18.044	17.964	17.964	19.28	19.68	19.6
20MHz 16QAM	18.044	17.884	17.964	19.84	19.76	19.68

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

FCC §2.1051, § 24.238 (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, § 24.238 (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, §24.235: Frequency Stability

Test Mode:	20 MHz QPSK		Test Channel:	1880	MHz
Test Item	Temperature (°C)	Voltage (V _{DC})	Frequency Error		Result
			(Hz)	(ppm)	
Frequency Stability vs. Temperature	-30	3.85	0.23	0.000	Pass
	-20	3.85	-9.97	-0.005	Pass
	-10	3.85	-6.13	-0.003	Pass
	0	3.85	6.17	0.003	Pass
	10	3.85	7.92	0.004	Pass
	20	3.85	6.46	0.003	Pass
	30	3.85	-6.52	-0.003	Pass
	40	3.85	7.18	0.004	Pass
	50	3.85	-9.7	-0.005	Pass
Frequency Stability vs. Voltage	20	3.6	-8.17	-0.004	Pass
	20	4.4	-7.05	-0.004	Pass
Result:				Pass	

Test Mode:	20 MHz 16QAM		Test Channel:	1880	MHz
Test Item	Temperature (°C)	Voltage (V _{DC})	Frequency Error		Result
			(Hz)	(ppm)	
Frequency Stability vs. Temperature	-30	3.85	-17.82	-0.009	Pass
	-20	3.85	-6.68	-0.004	Pass
	-10	3.85	9.77	0.005	Pass
	0	3.85	-7.62	-0.004	Pass
	10	3.85	-9.91	-0.005	Pass
	20	3.85	-9.82	-0.005	Pass
	30	3.85	-6.68	-0.004	Pass
	40	3.85	-8.86	-0.005	Pass
Frequency Stability vs. Voltage	20	3.6	6.05	0.003	Pass
	20	4.4	7.52	0.004	Pass
	Result:				Pass

Test Plots(Note:6.5dB is the Insertion loss of the RF cable, coaxial tee connector and DC Block, which was offset into the Spectrum Analyzer):

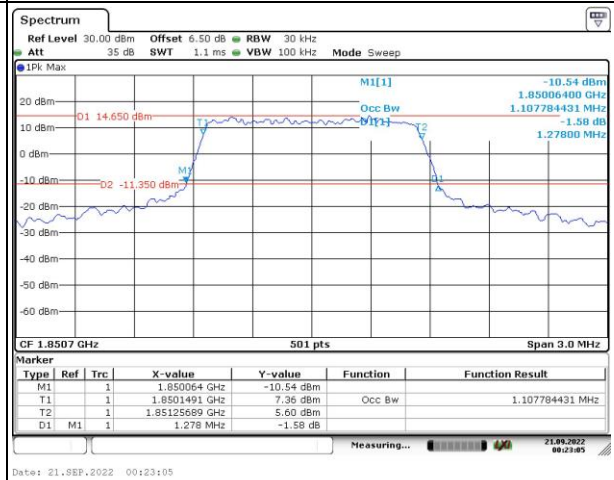
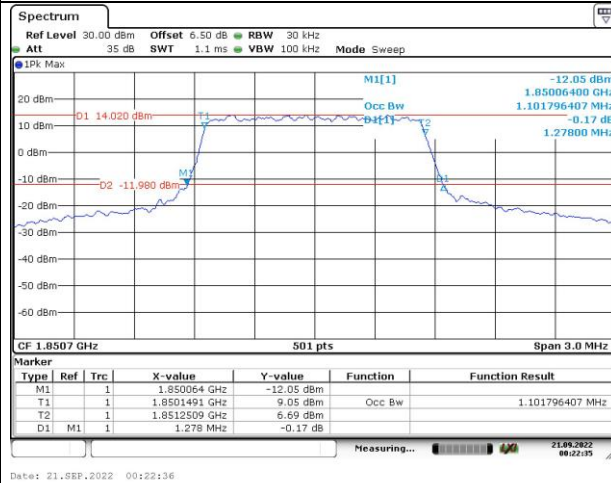
Occupied Bandwidth

Channel

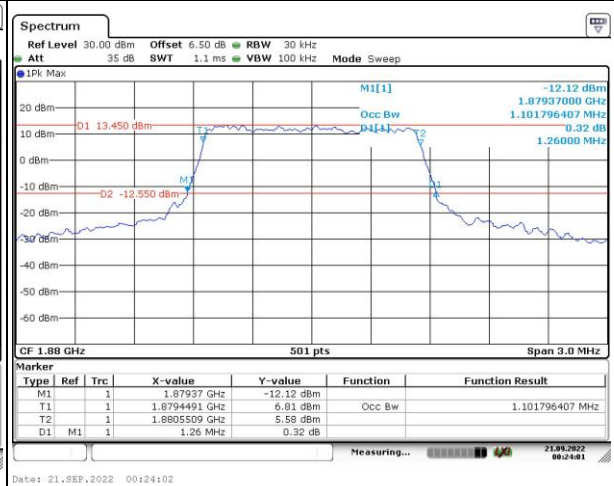
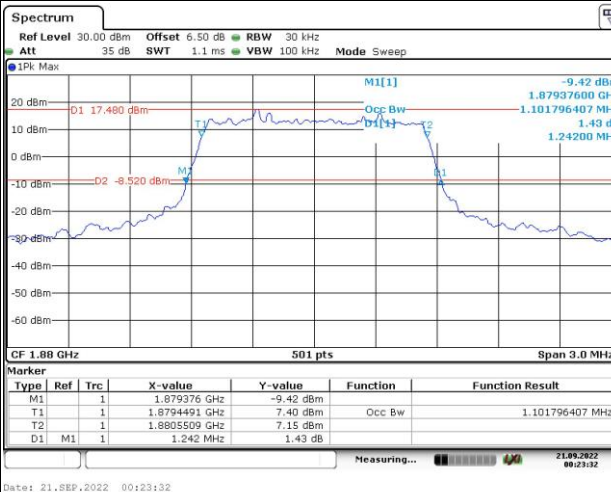
1.4MHz Bandwidth QPSK

1.4MHz Bandwidth 16QAM

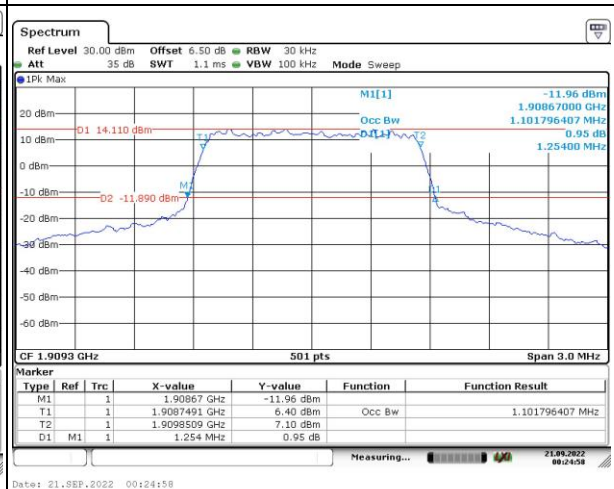
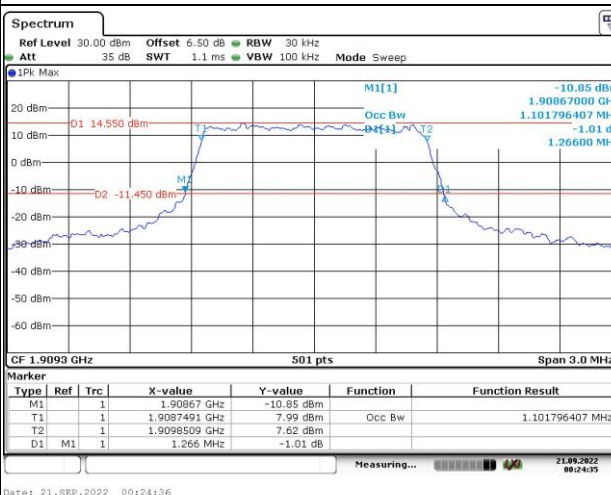
Lowest



Middle



Highest



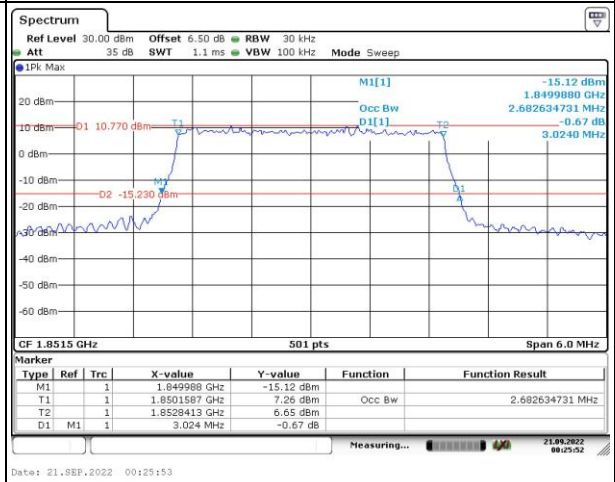
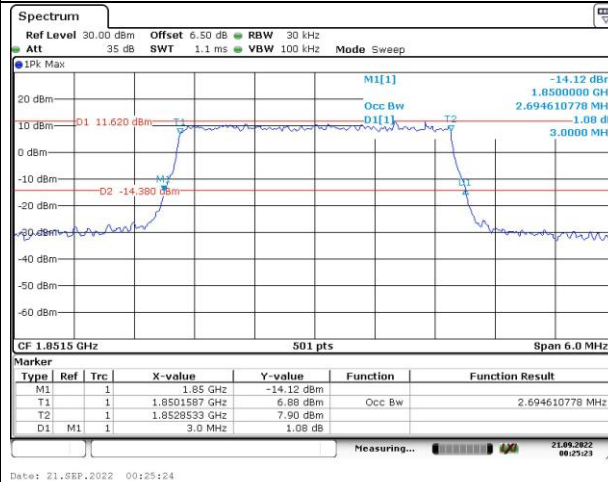
Occupied Bandwidth

Channel

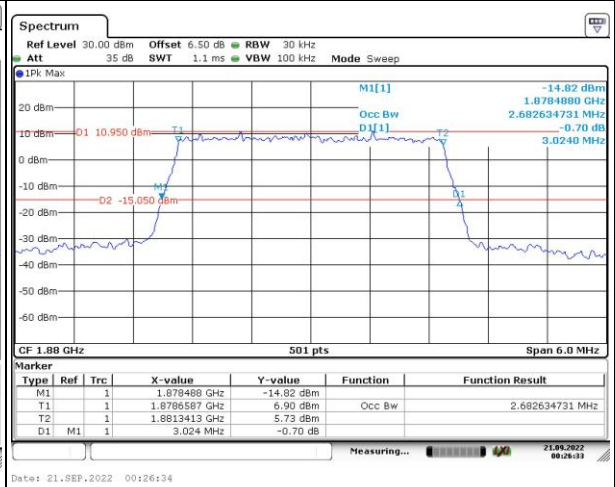
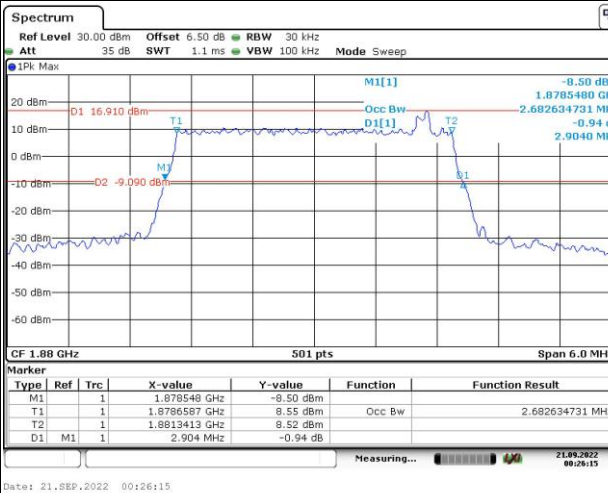
3MHz Bandwidth QPSK

3MHz Bandwidth 16QAM

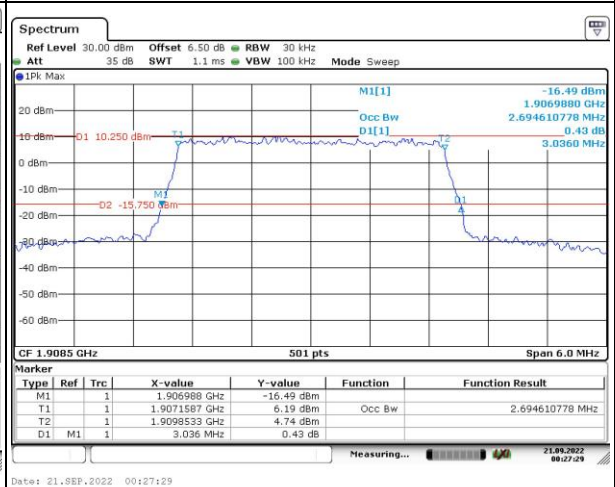
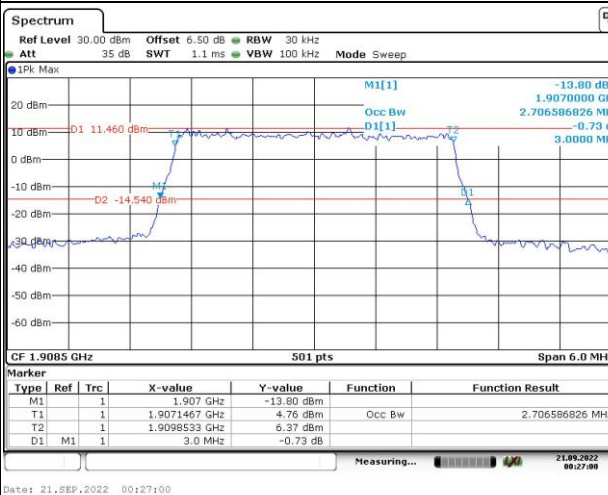
Lowest



Middle



Highest



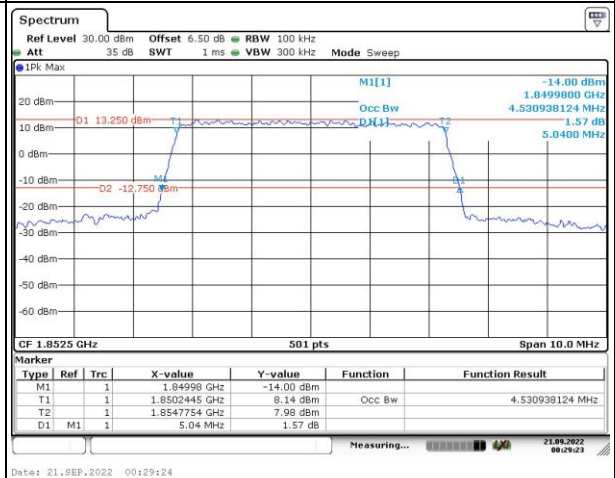
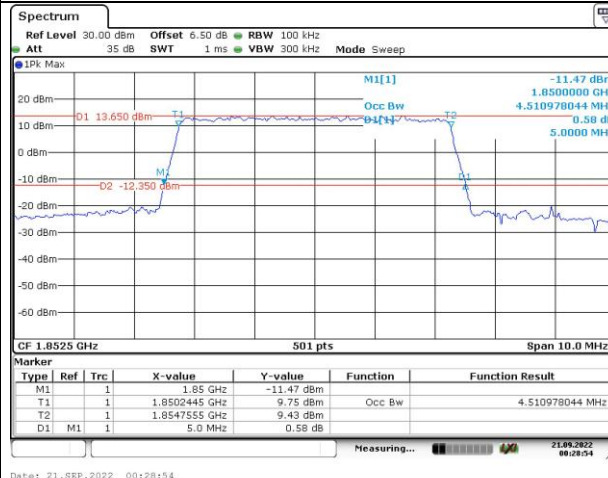
Occupied Bandwidth

Channel

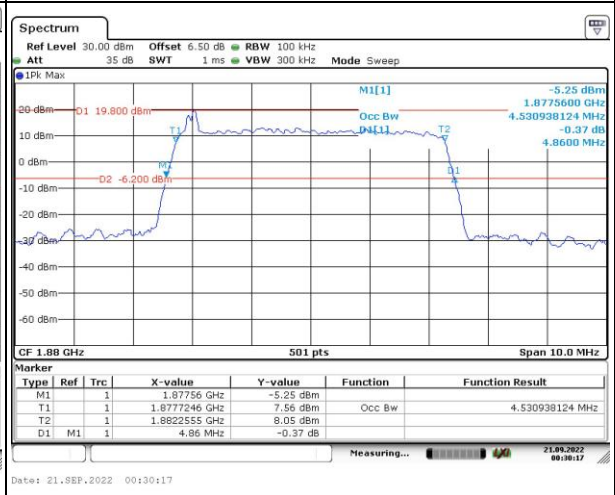
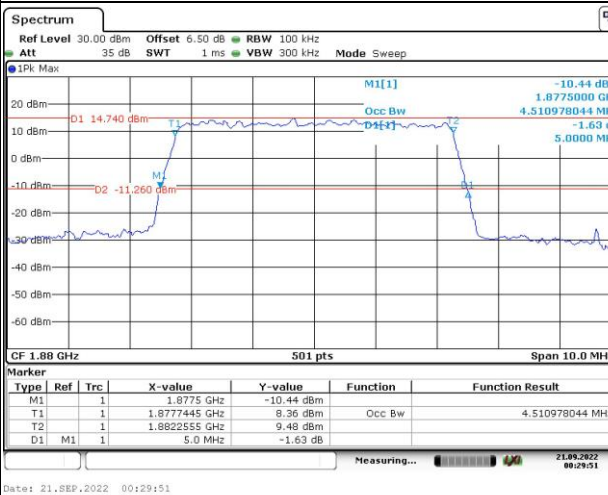
5MHz Bandwidth QPSK

5MHz Bandwidth 16QAM

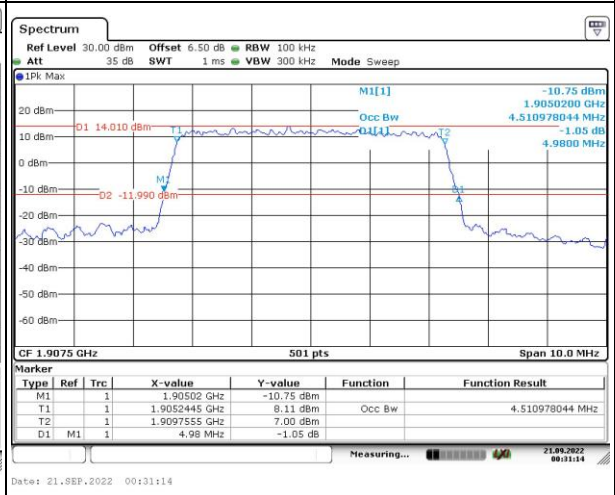
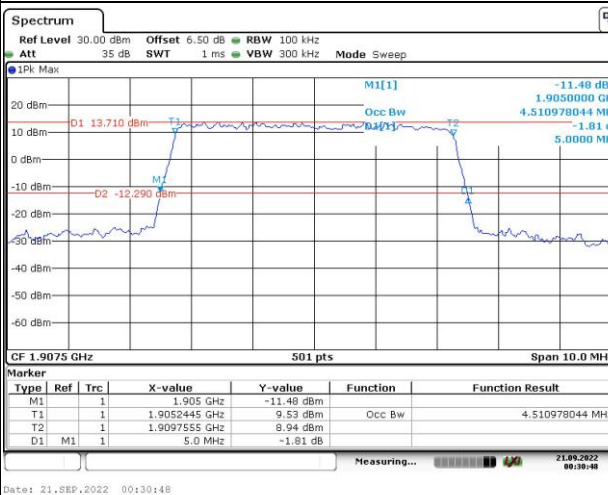
Lowest



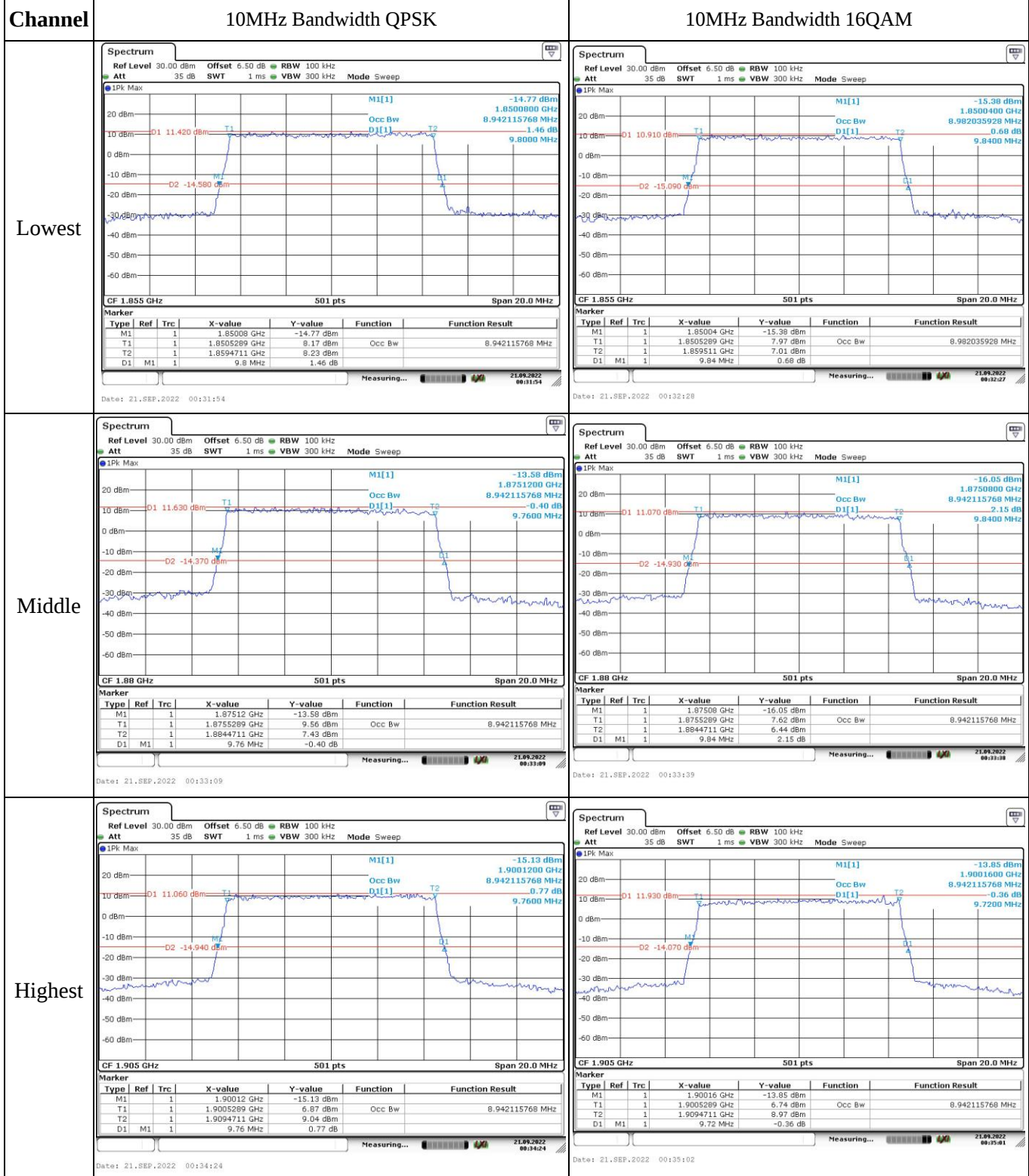
Middle



Highest



Occupied Bandwidth



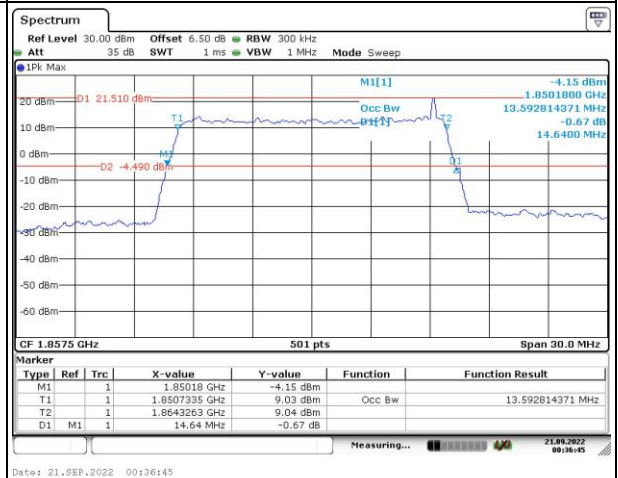
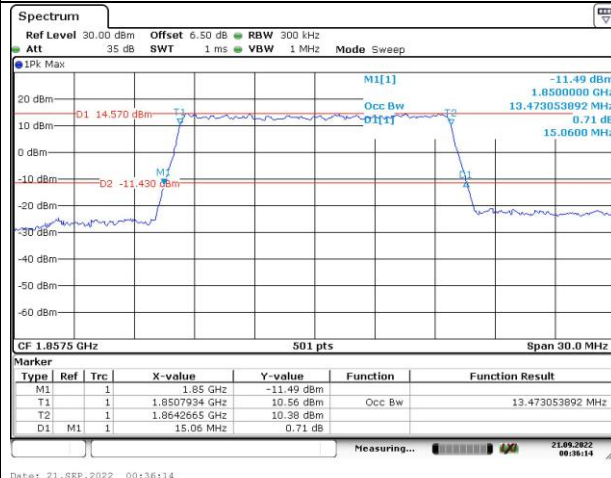
Occupied Bandwidth

Channel

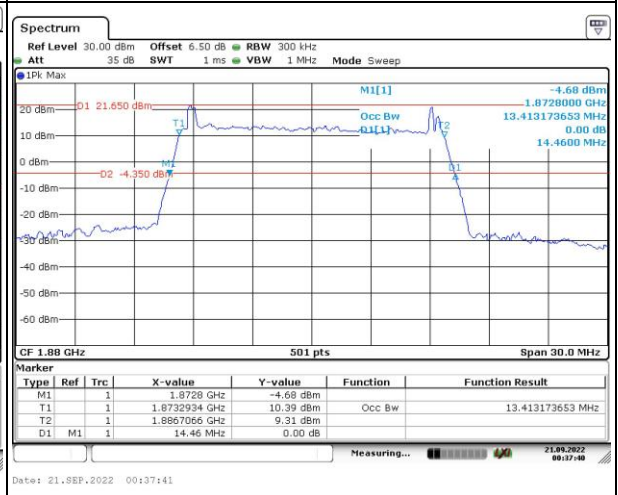
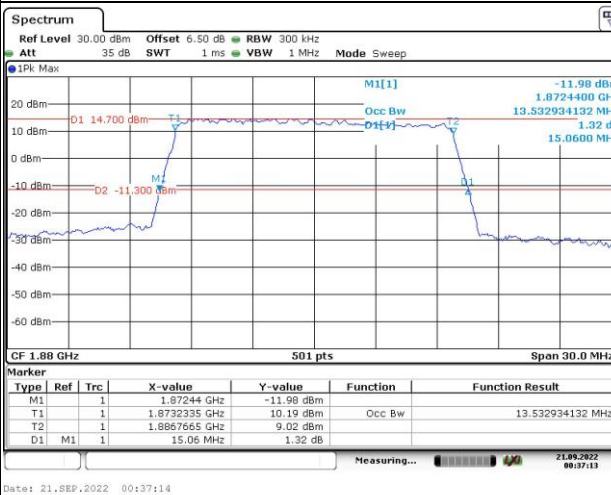
15MHz Bandwidth QPSK

15MHz Bandwidth 16QAM

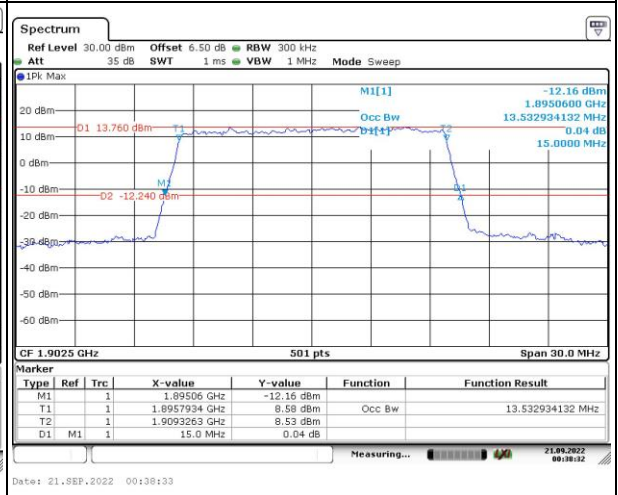
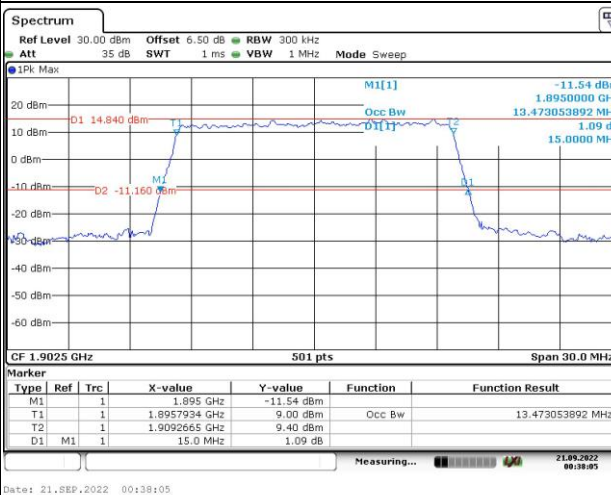
Lowest



Middle



Highest



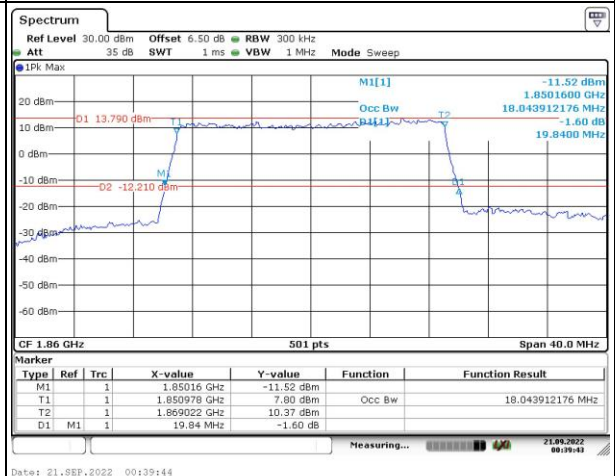
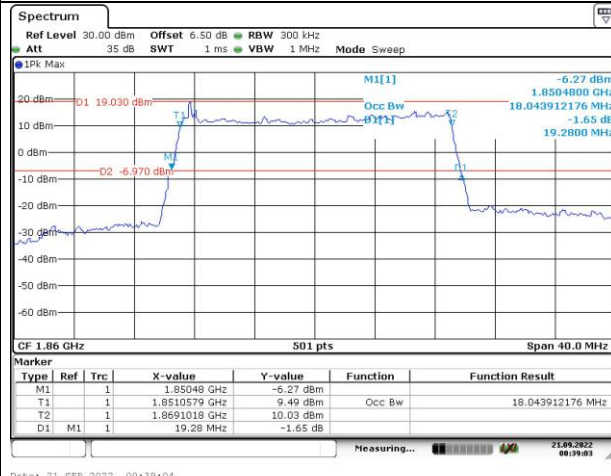
Occupied Bandwidth

Channel

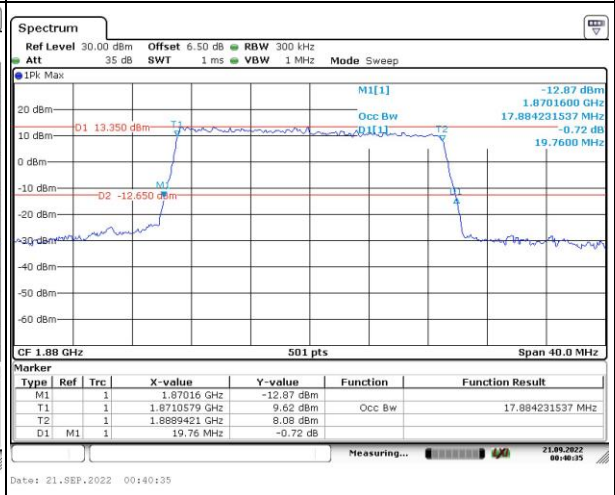
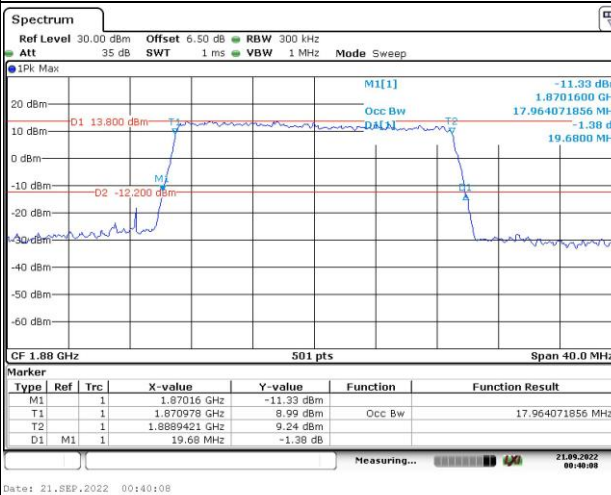
20MHz Bandwidth QPSK

20MHz Bandwidth 16QAM

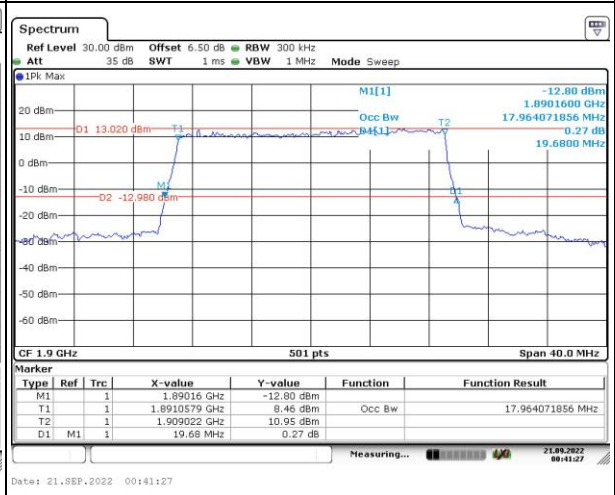
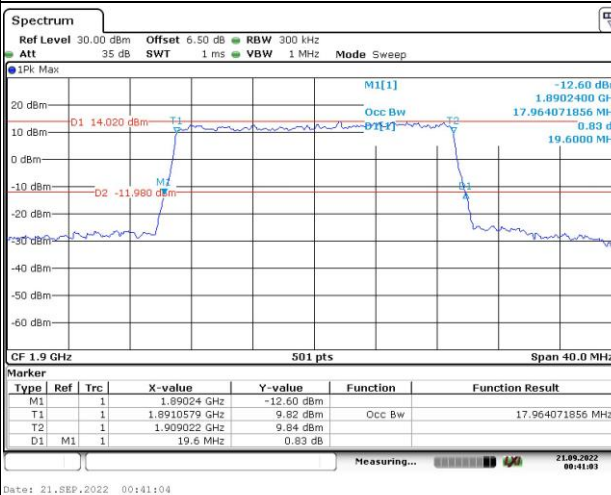
Lowest



Middle



Highest

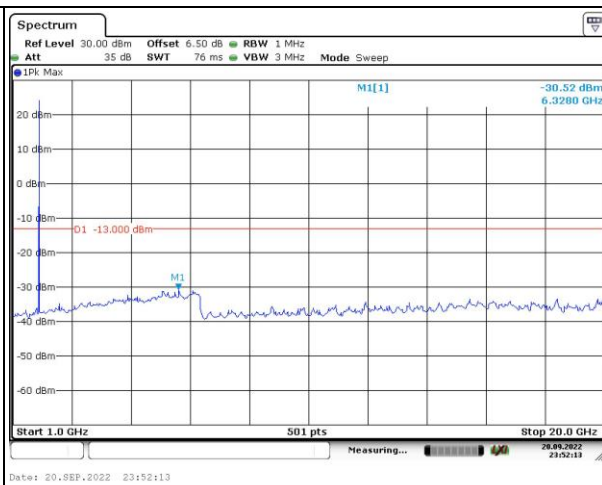
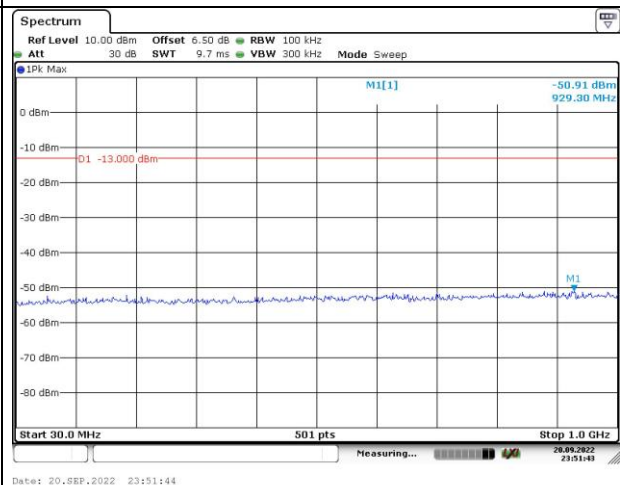


Spurious Emissions at Antenna Terminal

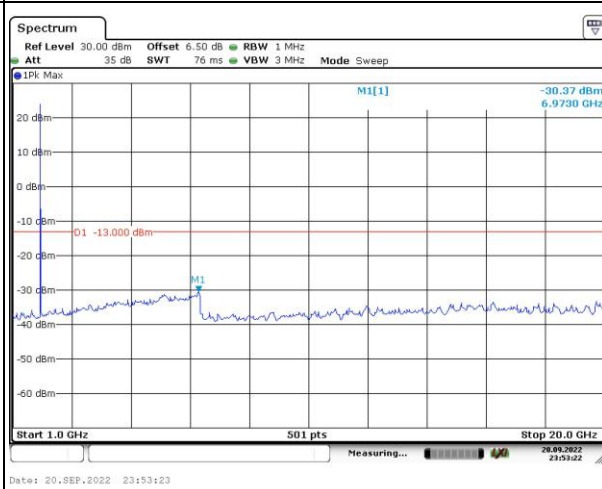
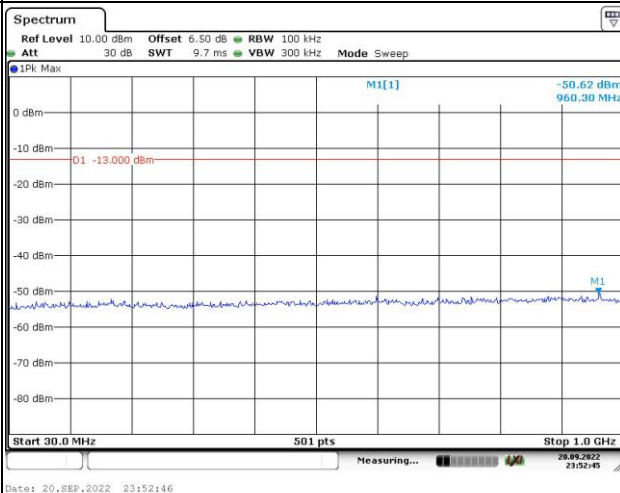
Channel

1.4MHz Bandwidth QPSK

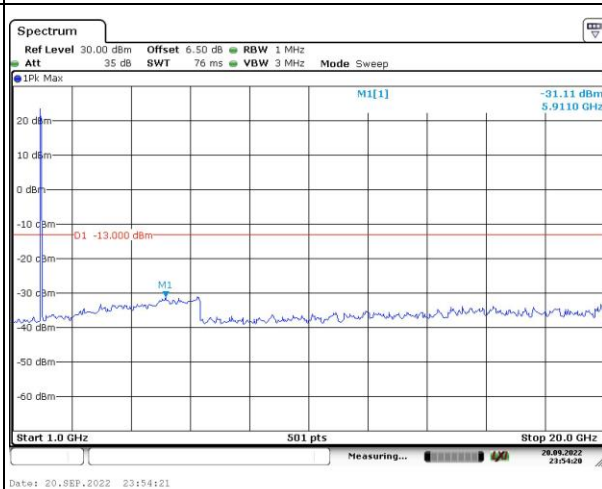
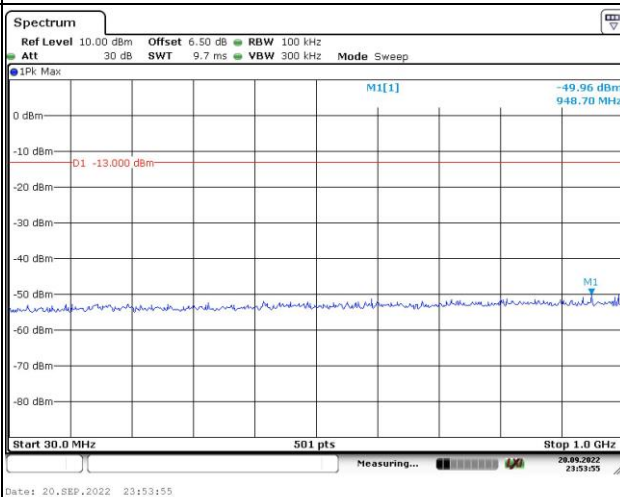
Lowest



Middle



Highest

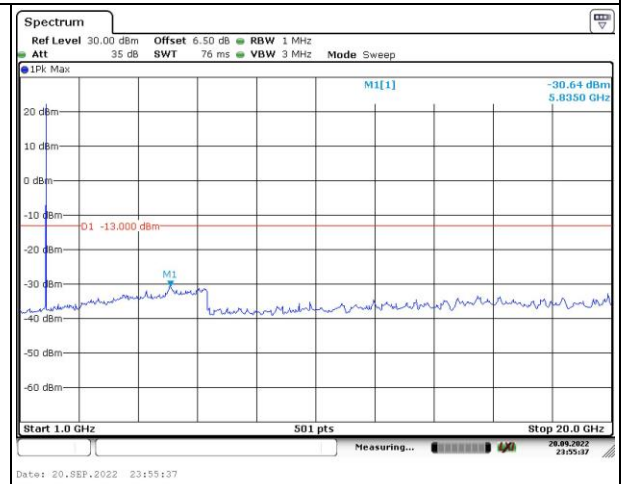
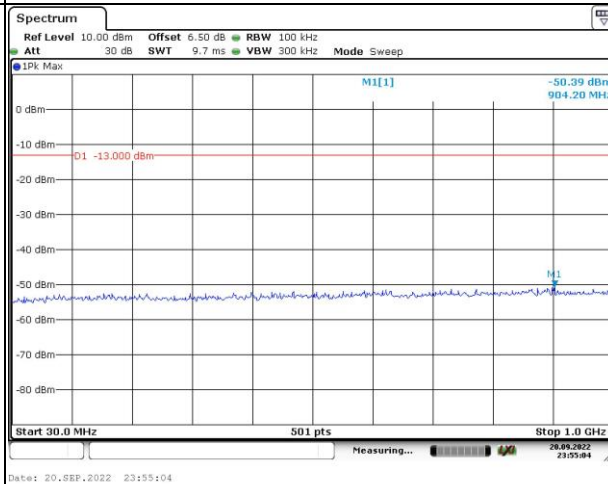


Spurious Emissions at Antenna Terminal

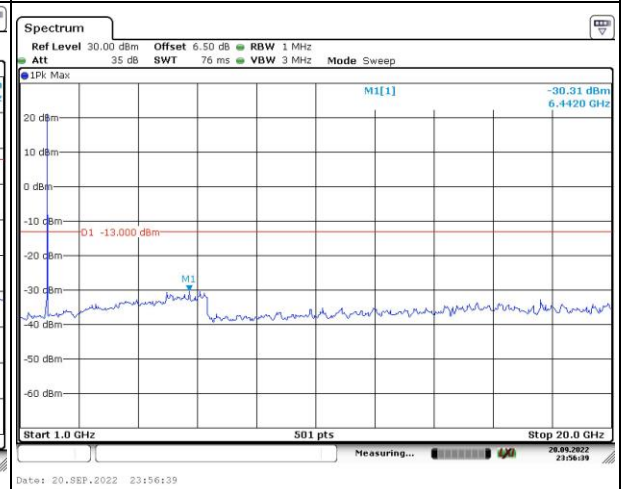
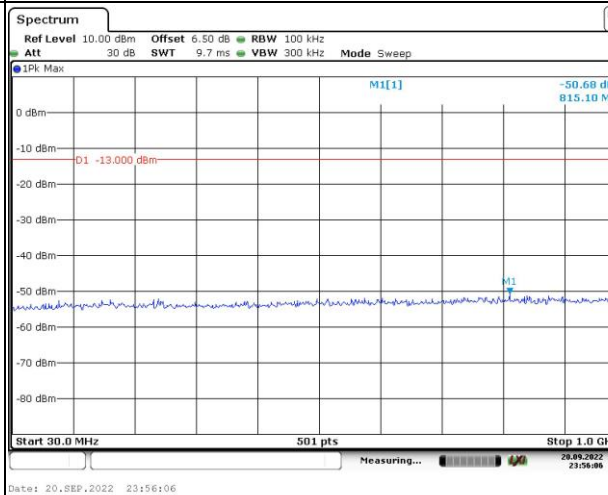
Channel

3MHz Bandwidth QPSK

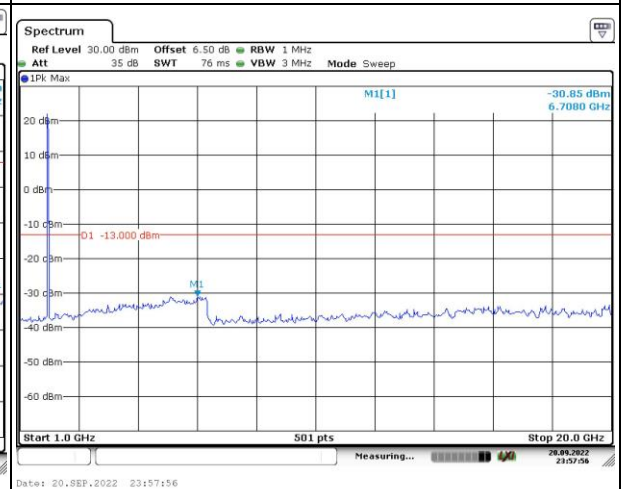
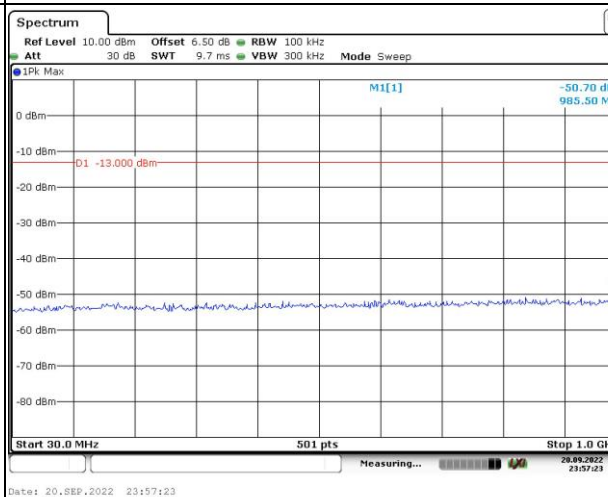
Lowest



Middle



Highest

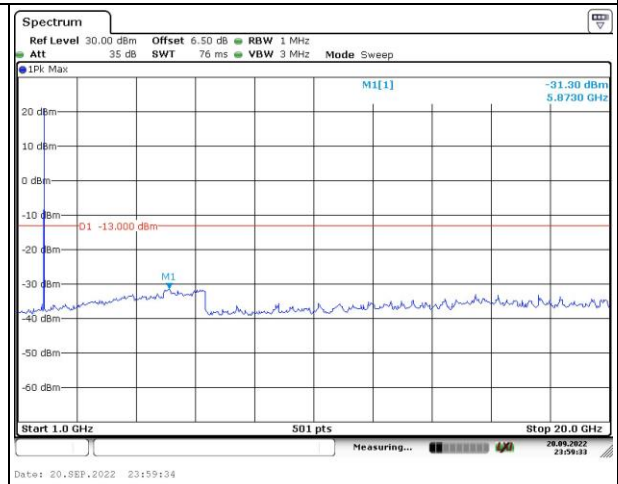
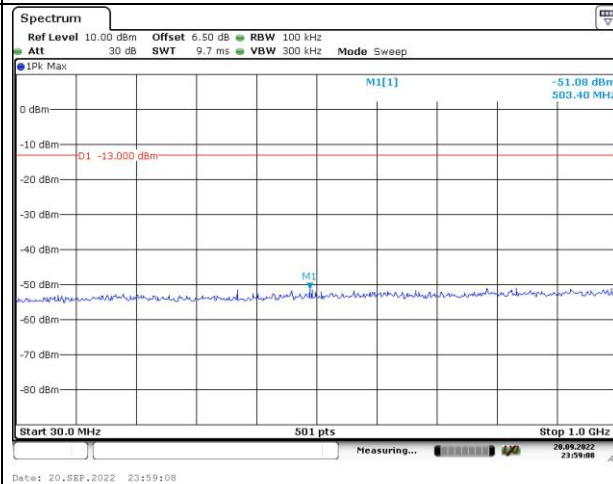


Spurious Emissions at Antenna Terminal

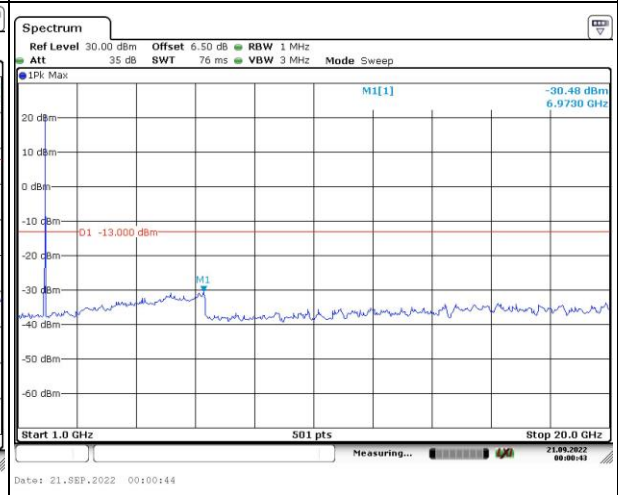
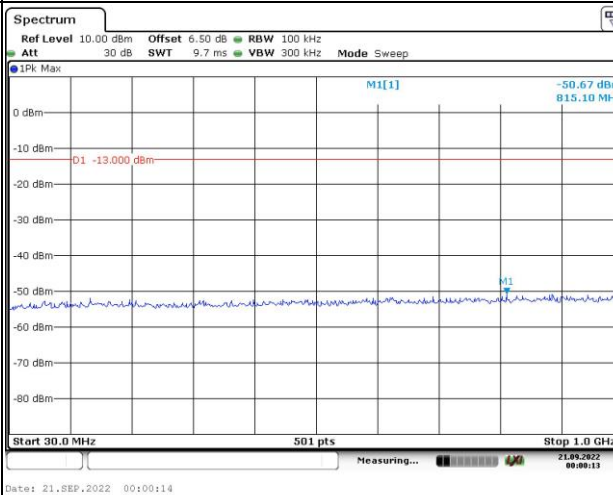
Channel

5MHz Bandwidth QPSK

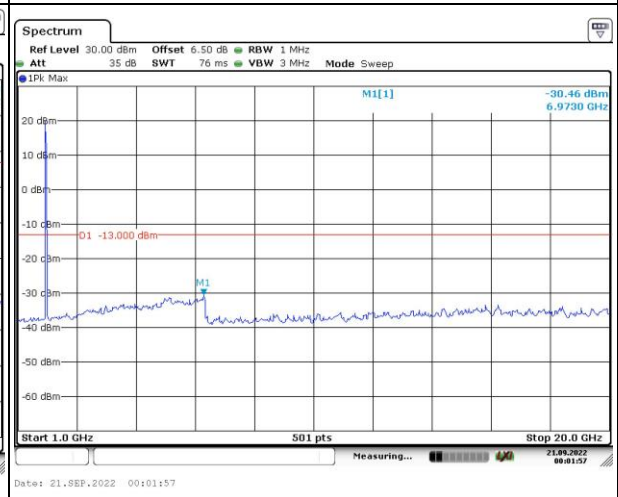
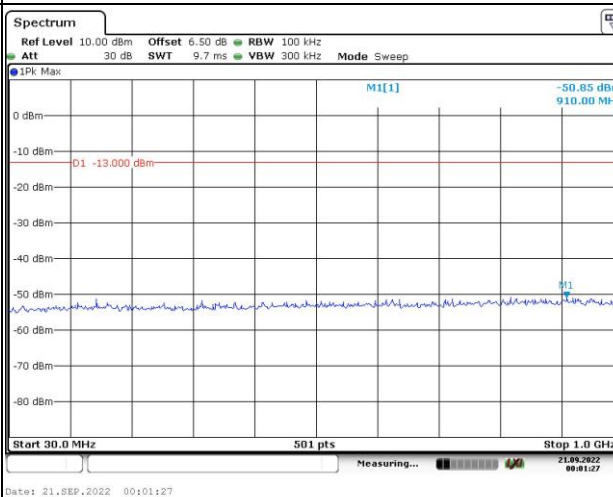
Lowest



Middle



Highest

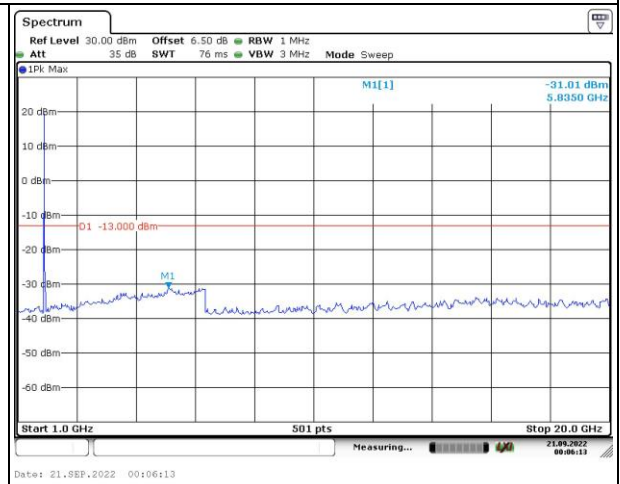
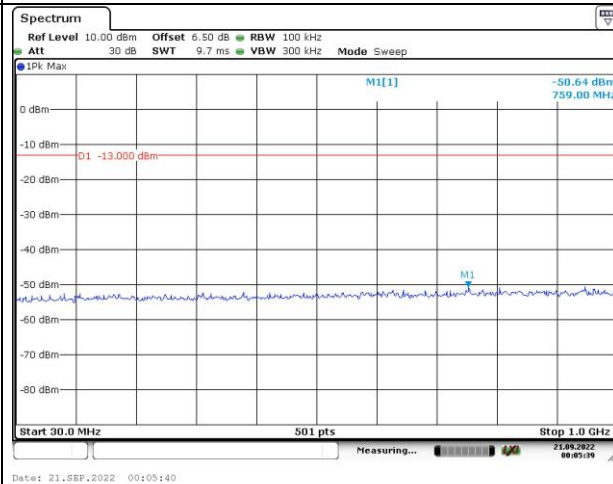


Spurious Emissions at Antenna Terminal

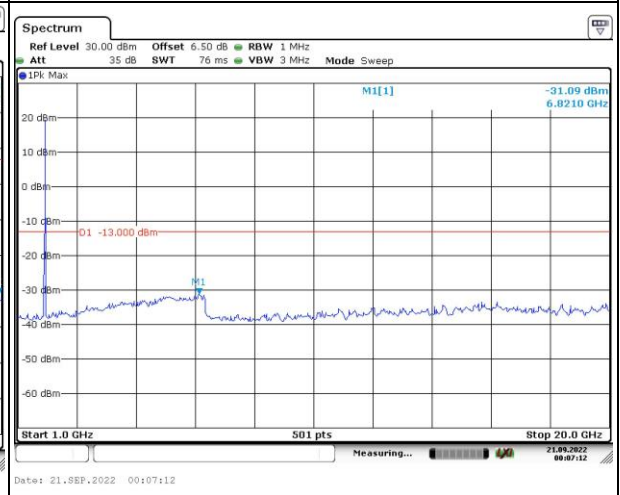
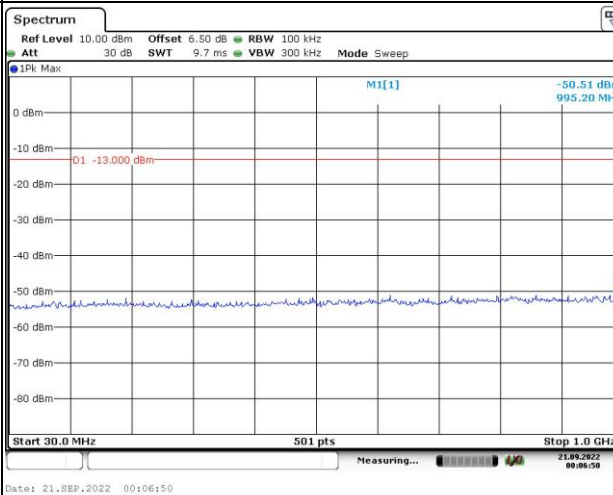
Channel

10MHz Bandwidth QPSK

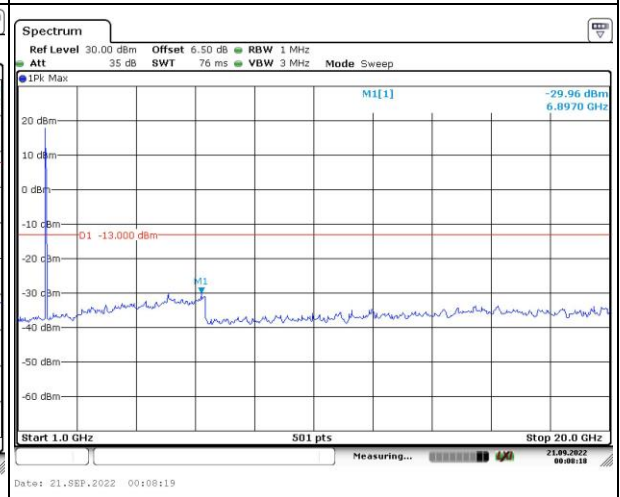
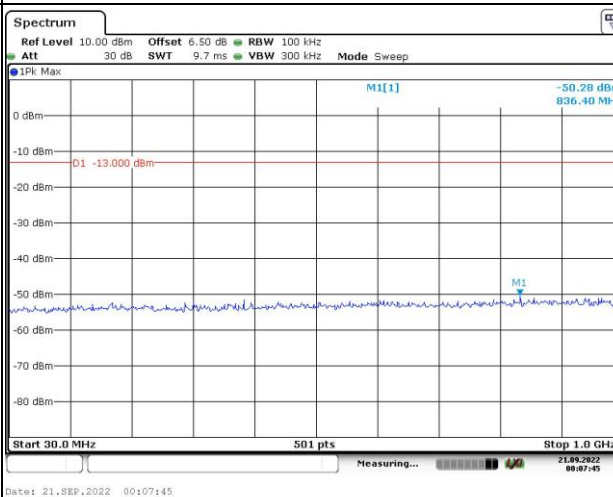
Lowest



Middle



Highest

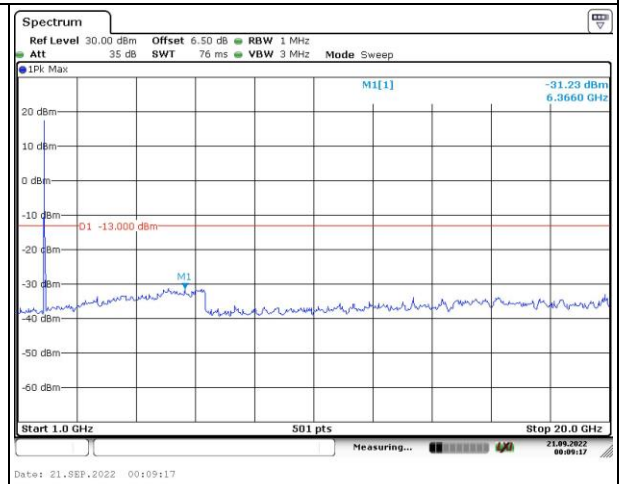
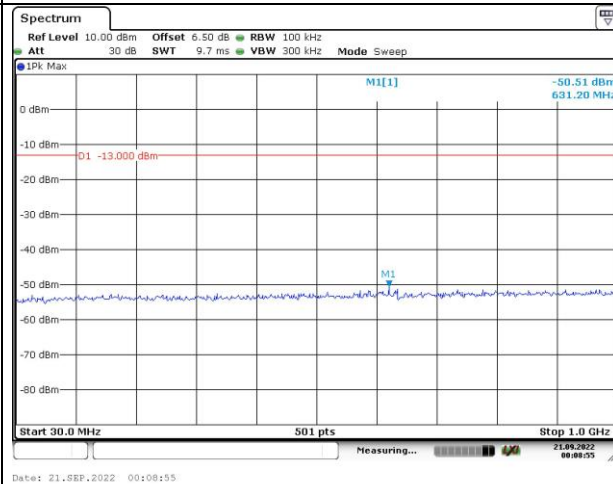


Spurious Emissions at Antenna Terminal

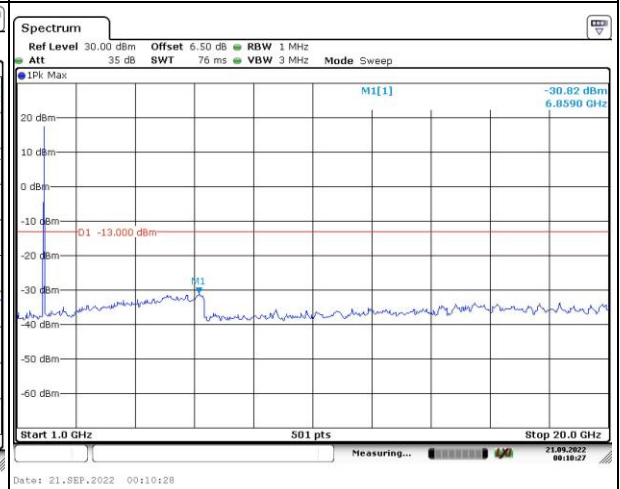
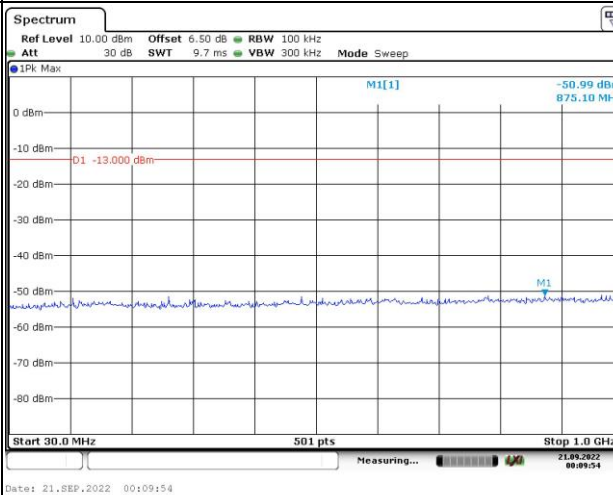
Channel

15MHz Bandwidth QPSK

Lowest



Middle



Highest

