

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

Serial Number:	27Z1-3	Test Date:	2023/7/29~2023/8/1
Test Site:	RF	Test Mode:	Transmitting
Tester:	One Luo	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	25.2~26.4	Relative Humidity: (%)	48~52	ATM Pressure: (kPa)	99.9~100
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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	2023/7/15	2024/7/14
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
YINSAIGE	Coaxial Cable	SS402	SJ0100001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
Weinschel	Power Splitter	1515	RA914	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2023/7/15	2024/7/14
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2023/3/31	2024/3/30
UNI-T	Multimeter	UT39A+	C210582554	2022/9/29	2023/9/28
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	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).

**Test Frequency:**

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	22.31	22.27	22.82	20.45	38.45
HSDPA Subtest 1	22.28	22.41	22.62	20.25	38.45
HSDPA Subtest 2	22.27	22.37	22.29	20	38.45
HSDPA Subtest 3	22.12	22.09	22.25	19.88	38.45
HSDPA Subtest 4	22.02	22.53	22.44	20.16	38.45
HSUPA Subtest 1	22.18	22.5	22.77	20.4	38.45
HSUPA Subtest 2	22.08	22.59	22.1	20.22	38.45
HSUPA Subtest 3	21.9	22.38	22.02	20.01	38.45
HSUPA Subtest 4	21.71	22.09	22.03	19.72	38.45
HSUPA Subtest 5	21.65	21.6	21.79	19.42	38.45
DC-HSDPA Subtest 1	21.74	21.96	21.83	19.59	38.45
DC-HSDPA Subtest 2	21.72	21.7	22.17	19.8	38.45
DC-HSDPA Subtest 3	21.55	21.57	21.69	19.32	38.45
DC-HSDPA Subtest 4	21.49	21.57	21.96	19.59	38.45
HSPA+ Subtest 1	21.42	21.4	21.73	19.36	38.45

Note:

ERP= Conducted Power(dBm) - Lc(dB) + Gr(dBd)

Gr(dBd)=Gr(dBi)-2.15

**Result: Pass****Peak-to-average Ratio(PAR)**

Test Mode	Peak-to-average Ratio(dB)			Limit (dB)
	Lowest Channel	Middle Channel	Highest Channel	
WCDMA R99	3.22	3.65	3.19	13
HSDPA	5.36	4.61	4.23	13
HSUPA	5.07	5.8	5.94	13

**Result: Pass**

<b>FCC §2.1049, §22.917, §22.905: Occupied Bandwidth</b>						
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	4.124	4.124	4.11	4.732	4.718	4.718
HSDPA	4.11	4.096	4.124	4.732	4.732	4.732
HSUPA	4.124	4.124	4.11	4.747	4.732	4.747

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

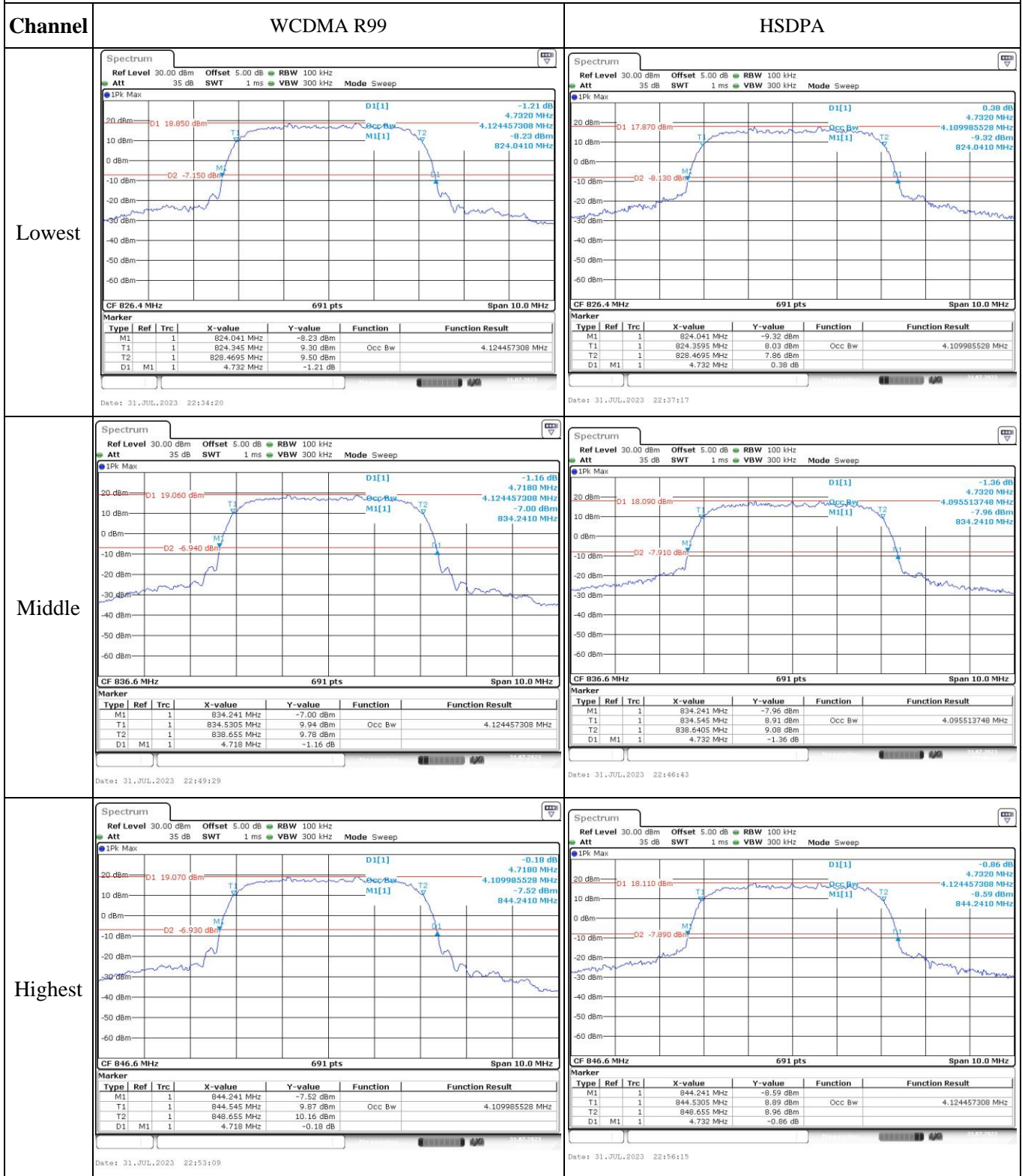
<b>FCC §2.1051, §22.917(a): Spurious Emissions at Antenna Terminal</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Spurious Emissions at Antenna Terminal.</b>

<b>FCC §2.1051, §22.917(a): Out of band emission, Band Edge</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Out of band emission, Band Edge.</b>

<b>FCC §2.1055, §22.355: Frequency Stability</b>					
Test Modulation:	WCDMA R99		Test Channel:	836.6	MHz
Test Item	Temperature (°C)	Voltage (V <sub>DC</sub> )	Frequency Error		Limit
			(Hz)	(ppm)	(ppm)
Frequency Stability vs. Temperature	-30	7.6	8.71	0.010	2.5
	-20	7.6	-7.34	-0.009	2.5
	-10	7.6	6.95	0.008	2.5
	0	7.6	7.92	0.009	2.5
	10	7.6	7.8	0.009	2.5
	20	7.6	-9.46	-0.011	2.5
	30	7.6	-7.74	-0.009	2.5
	40	7.6	-5.56	-0.007	2.5
Frequency Stability vs. Voltage	50	7.6	-8.8	-0.011	2.5
	20	6.5	-6.69	-0.008	2.5
	20	8.7	6.5	0.008	2.5
				<b>Result:</b>	<b>Pass</b>

**Test Plots**(Note: The 5.0dB is the Insertion loss of the RF cable, Power Splitter and DC Block, which was offset into the Spectrum Analyzer):

**Occupied Bandwidth**

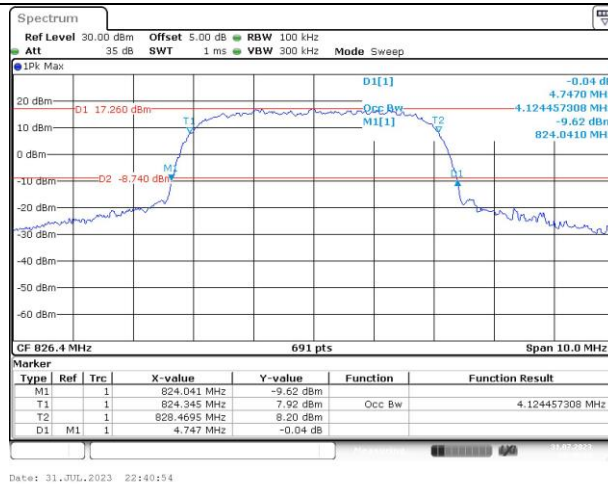


### Occupied Bandwidth

Channel

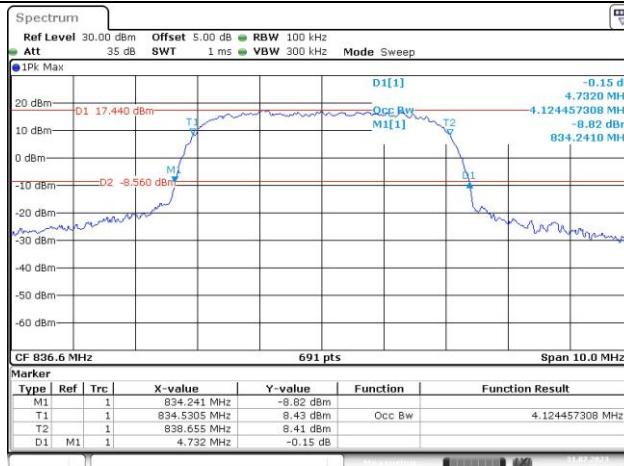
HSUPA

Lowest



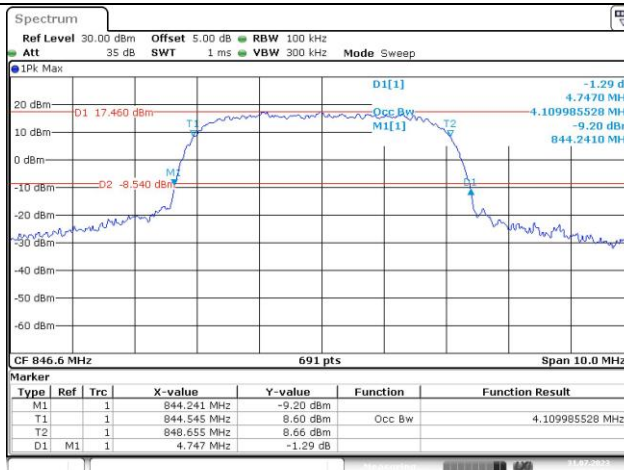
Date: 31.JUL.2023 22:40:54

Middle



Date: 31.JUL.2023 22:44:24

Highest



Date: 31.JUL.2023 22:58:56

### Spurious Emissions at Antenna Terminal

Channel	WCDMA R99	
Lowest	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 100 kHz Att 35 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPk Max M1[1] -47.82 dBm 458.80 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p> <p>Date: 31.JUL.2023 23:09:02</p>	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 1 MHz Att 35 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>IPk Max M1[1] -31.80 dBm 5.8260 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</p> <p>Date: 31.JUL.2023 23:08:10</p>
	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 100 kHz Att 35 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPk Max M1[1] -48.13 dBm 552.90 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p> <p>Date: 31.JUL.2023 23:06:34</p>	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 1 MHz Att 35 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>IPk Max M1[1] -31.49 dBm 5.8390 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</p> <p>Date: 31.JUL.2023 23:07:13</p>
Highest	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 100 kHz Att 35 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPk Max M1[1] -47.43 dBm 731.20 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p> <p>Date: 31.JUL.2023 23:05:27</p>	<p>Ref Level 30.00 dBm Offset 5.00 dB RBW 1 MHz Att 35 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>IPk Max M1[1] -31.20 dBm 6.9850 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</p> <p>Date: 31.JUL.2023 23:04:30</p>



Out of band emission, Band Edge

Mode	Lowest	Highest
R99		
HSUPA		
HSDPA		

**4.6 Antenna Port Test Data and Results for LTE Band 2**

Serial Number:	27Z1-3	Test Date:	2023/7/29~2023/8/1
Test Site:	RF	Test Mode:	Transmitting
Tester:	One Luo	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	25.2~26.4	Relative Humidity: (%)	48~52	ATM Pressure: (kPa)	99.9~100
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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	2023/7/15	2024/7/14
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A
YINSAIGE	Coaxial Cable	SS402	SJ0100001	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554403	Each time	N/A
Weinschel	Power Splitter	1515	RA914	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2023/7/15	2024/7/14
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2023/3/31	2024/3/30
UNI-T	Multimeter	UT39A+	C210582554	2022/9/29	2023/9/28
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A
eastsheep	Coaxial Attenuator	2W-SMA-JK-18G	21060301	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).

**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	22.41	22.24	22.21	22.9	33
	RB1#3	22.27	22.34	22.64		
	RB1#5	22.21	22.29	22.62		
	RB3#0	22.1	22.21	22.52		
	RB3#3	22.1	22.41	22.44		
	RB6#0	21.13	21.31	21.55		
1.4MHz 16QAM	RB1#0	21.45	21.18	21.77	22.14	33
	RB1#3	21.55	21.32	21.88		
	RB1#5	21.31	21.24	21.69		
	RB3#0	21.23	21.44	21.49		
	RB3#3	21.19	21.48	21.62		
	RB6#0	19.93	20.16	20.27		
3MHz QPSK	RB1#0	22.03	22.27	22.27	22.72	33
	RB1#8	21.95	22.29	22.46		
	RB1#14	22.05	22.31	22.36		
	RB6#0	21.09	21.4	21.4		
	RB6#9	21.1	21.4	21.35		
	RB15#0	21.09	21.39	21.39		
3MHz 16QAM	RB1#0	21.48	21.16	21.85	22.12	33
	RB1#8	21.58	21.56	21.86		
	RB1#14	21.49	21.53	21.67		
	RB6#0	20.33	20.14	20.33		
	RB6#9	20.39	20.05	20.31		
	RB15#0	20.44	20.37	20.28		
5MHz QPSK	RB1#0	21.77	22.19	22.03	22.63	33
	RB1#13	21.83	22.37	22.11		
	RB1#24	21.87	22.06	22.13		
	RB15#0	21.1	21.36	21.34		
	RB15#10	21.2	21.39	21.46		
	RB25#0	21.18	21.37	21.4		
5MHz 16QAM	RB1#0	21.55	21.05	20.96	22.25	33
	RB1#13	21.99	21.05	20.69		
	RB1#24	21.44	21.02	20.67		
	RB15#0	20.01	20.12	20.34		
	RB15#10	20.06	20.23	20.22		
	RB25#0	20.15	20.19	20.32		
10MHz QPSK	RB1#0	22.02	22.51	22.37	22.92	33
	RB1#25	22.23	22.66	22.47		

	RB1#49	22.12	22.37	22.39		
	RB25#0	21.15	21.33	21.39		
	RB25#25	21.29	21.35	21.46		
	RB50#0	21.3	21.32	21.42		
10MHz 16QAM	RB1#0	21.92	21.18	21.95	22.42	33
	RB1#25	21.67	22.16	21.99		
	RB1#49	21.59	21.55	21.75		
	RB25#0	20.25	20.42	20.47		
	RB25#25	20.16	20.49	20.43		
15MHz QPSK	RB1#0	22.05	22.06	22.23	22.67	33
	RB1#38	22.37	22.22	22.41		
	RB1#74	22.16	22.21	22.33		
	RB36#0	21.13	21.36	21.46		
	RB36#39	21.11	21.38	21.47		
15MHz 16QAM	RB1#0	21.84	21.26	22.04	22.3	33
	RB1#38	21.88	21.55	21.99		
	RB1#74	22.01	21.38	21.01		
	RB36#0	20.08	20.07	20.4		
	RB36#39	20.17	20.38	20.32		
20MHz QPSK	RB1#0	22	22.36	22.48	22.86	33
	RB1#50	22.41	22.6	22.55		
	RB1#99	21.96	22.48	22.23		
	RB50#0	21.17	21.23	21.41		
	RB50#50	21.22	21.39	21.48		
20MHz 16QAM	RB100#0	21.16	21.36	21.4		
	RB1#0	21.23	21.38	22.23	23.3	33
	RB1#50	22.09	21.46	23.04		
	RB1#99	21.48	21.39	22.21		
	RB50#0	20.15	20.26	20.35		
RB50#50	20.25	20.41	20.43			
	RB100#0	20.19	20.31	20.36		

Note: EIRP=Conducted Power(dBm) - Lc(dB) + G<sub>T</sub>(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	5.48	5.97	5.68	13
	RB100#0	4.43	4.23	4.43	13
20MHz 16QAM	RB1#0	6.26	6.38	6.49	13
	RB100#0	6.14	6.03	6.12	13
<b>Result:</b>					<b>Pass</b>

<b>FCC §2.1049, §24.238:Occupied Bandwidth</b>						
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	1.108	1.108	1.108	1.296	1.32	1.29
1.4MHz 16QAM	1.102	1.096	1.102	1.302	1.296	1.308
3MHz QPSK	2.695	2.683	2.695	2.94	2.952	2.928
3MHz 16QAM	2.683	2.683	2.695	2.94	2.94	2.928
5MHz QPSK	4.491	4.531	4.511	5.02	5.04	5.02
5MHz 16QAM	4.531	4.491	4.531	5.04	4.98	5.04
10MHz QPSK	8.942	8.942	8.942	9.72	9.8	9.8
10MHz 16QAM	8.942	8.942	8.942	9.72	9.72	9.68
15MHz QPSK	13.413	13.413	13.473	14.88	14.64	14.88
15MHz 16QAM	13.473	13.473	13.533	14.76	14.76	14.82
20MHz QPSK	17.884	17.964	17.884	19.36	19.6	19.36
20MHz 16QAM	17.884	17.884	17.964	19.52	19.36	19.44

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

<b>FCC §2.1051, §24.238 (a):Spurious Emissions at Antenna Terminal</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Spurious Emissions at Antenna Terminal.</b>

<b>FCC §2.1051, §24.238 (a):Out of band emission, Band Edge</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Out of band emission, Band Edge.</b>

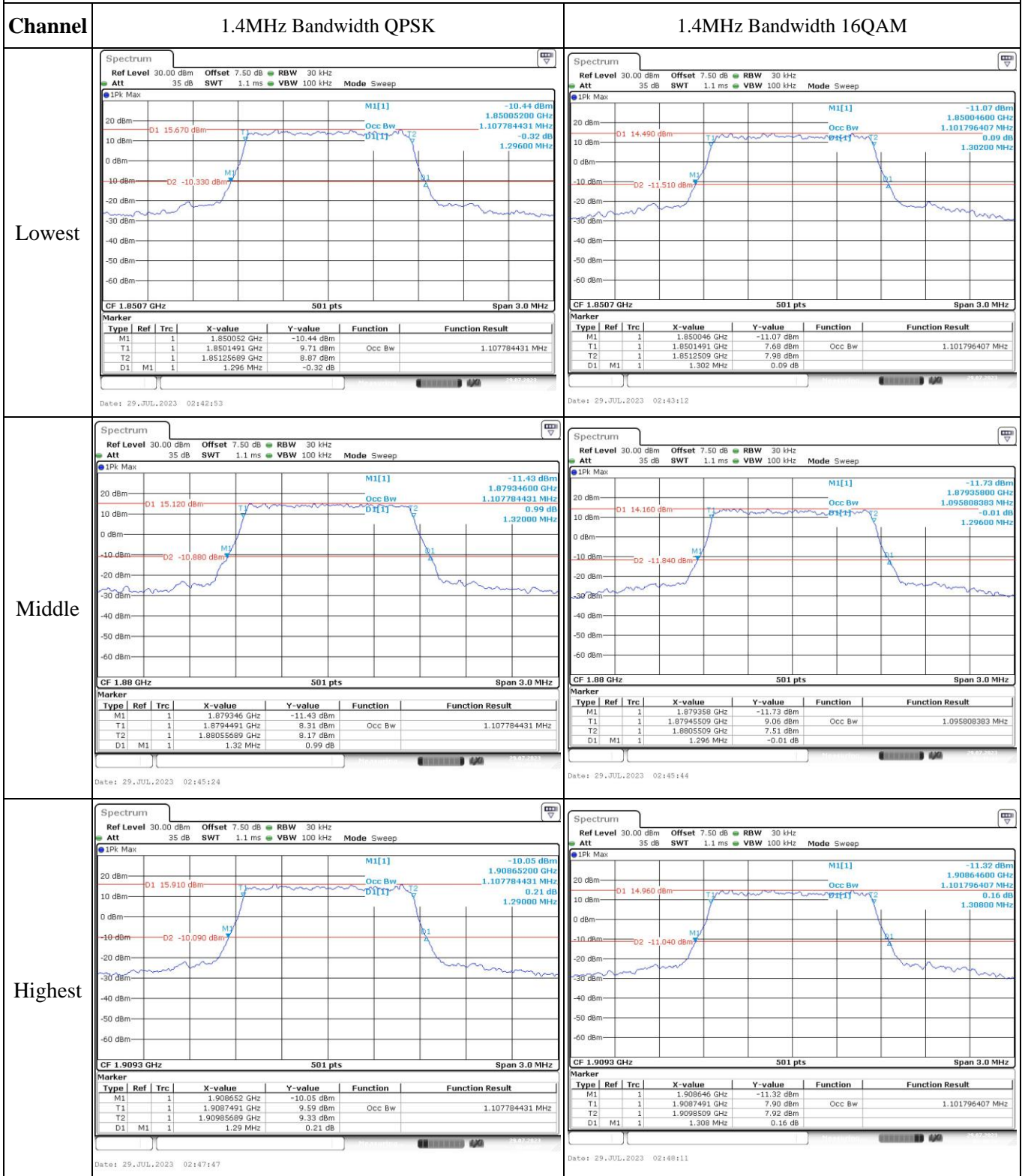
#### **FCC §2.1055, §24.235: Frequency Stability**

Test Mode:	20M QPSK	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V <sub>DC</sub> )	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	7.6	1851.086	1850.000	1908.967	1910.000
	-20	7.6	1851.039	1850.000	1908.905	1910.000
	-10	7.6	1851.055	1850.000	1908.915	1910.000
	0	7.6	1851.089	1850.000	1908.900	1910.000
	10	7.6	1851.073	1850.000	1908.990	1910.000
	20	7.6	1851.058	1850.000	1908.942	1910.000
	30	7.6	1851.011	1850.000	1908.977	1910.000
	40	7.6	1851.067	1850.000	1908.968	1910.000
Frequency Stability vs. Voltage	20	6.5	1851.089	1850.000	1908.951	1910.000
	20	8.7	1851.051	1850.000	1908.995	1910.000
	<b>Result:</b>					<b>Pass</b>

Test Mode:	20M 16QAM	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V <sub>DC</sub> )	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	7.6	1851.073	1850.000	1909.072	1910.000
	-20	7.6	1851.022	1850.000	1909.055	1910.000
	-10	7.6	1851.005	1850.000	1909.047	1910.000
	0	7.6	1851.039	1850.000	1909.057	1910.000
	10	7.6	1851.059	1850.000	1909.026	1910.000
	20	7.6	1851.058	1850.000	1909.022	1910.000
	30	7.6	1851.080	1850.000	1909.075	1910.000
	40	7.6	1851.045	1850.000	1909.009	1910.000
	50	7.6	1851.087	1850.000	1909.015	1910.000
Frequency Stability vs. Voltage	20	6.5	1851.046	1850.000	1909.047	1910.000
	20	8.7	1851.092	1850.000	1909.059	1910.000
					<b>Result:</b>	<b>Pass</b>

**Test Plots**(Note: The 5.8dB is the Insertion loss of the RF cable, Power Splitter and DC Block, which was offset into the Spectrum Analyzer):

**Occupied Bandwidth**



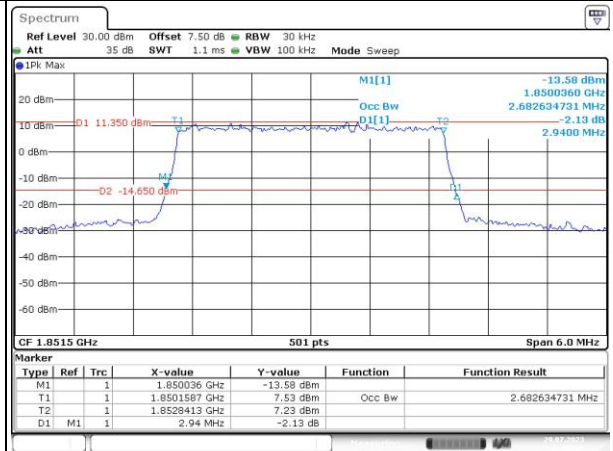
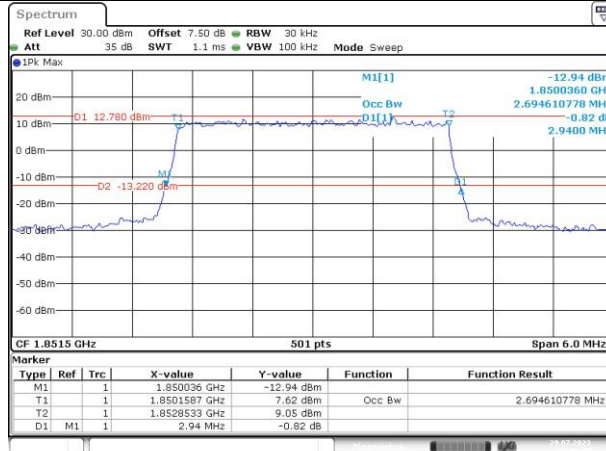
### Occupied Bandwidth

Channel

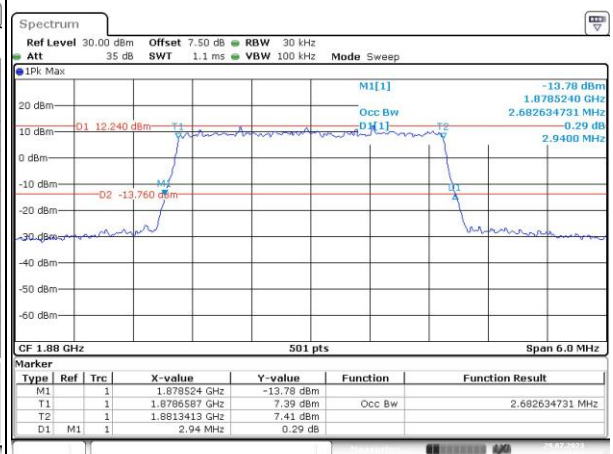
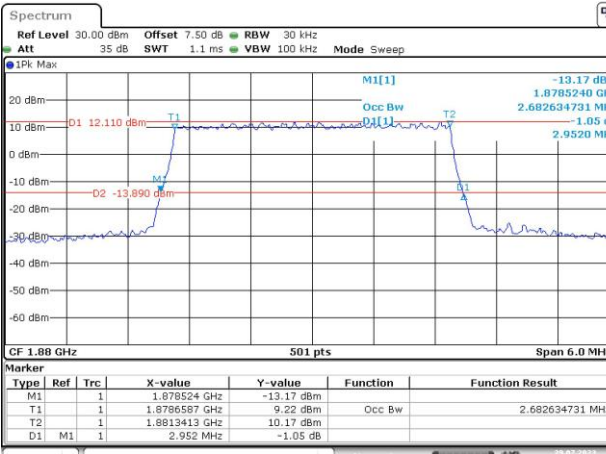
3MHz Bandwidth QPSK

3MHz Bandwidth 16QAM

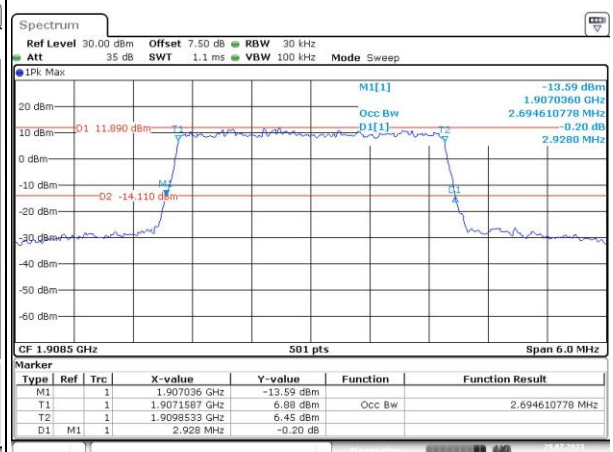
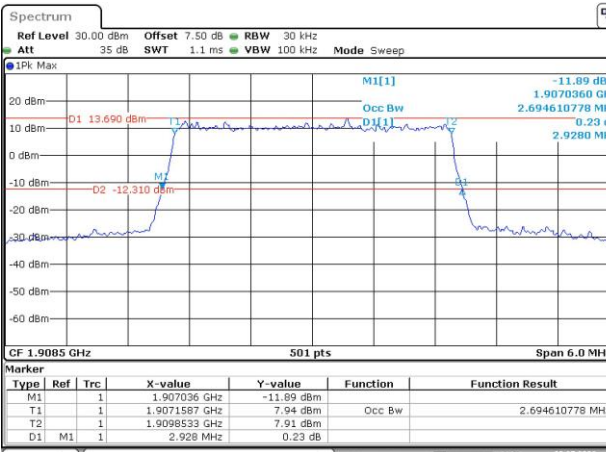
Lowest



Middle



Highest





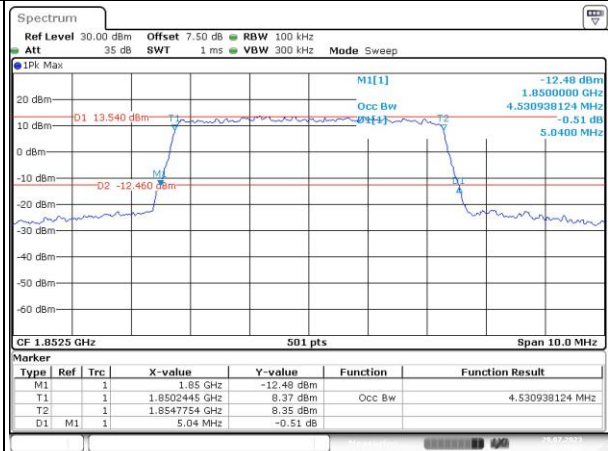
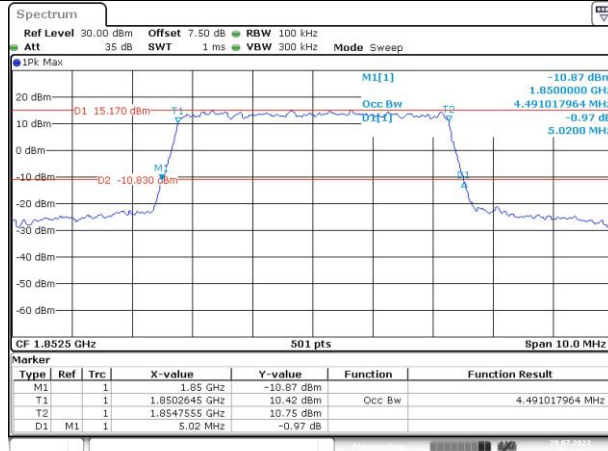
### Occupied Bandwidth

Channel

5MHz Bandwidth QPSK

5MHz Bandwidth 16QAM

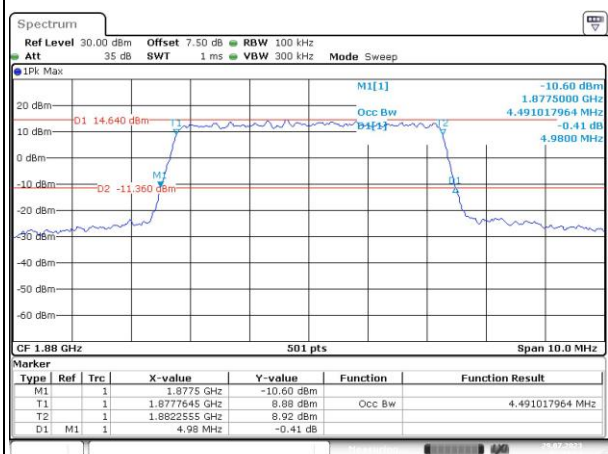
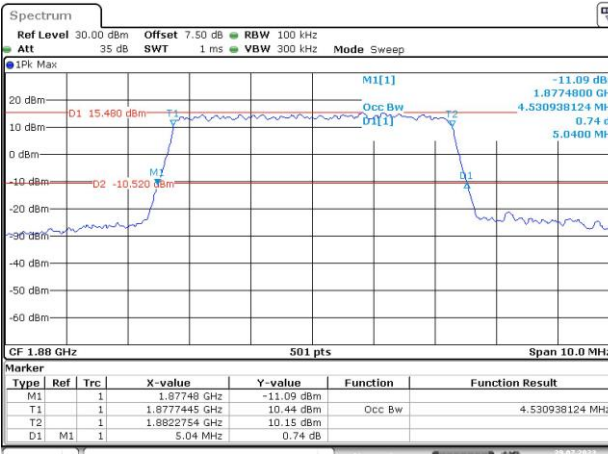
Lowest



Date: 29\_JUL\_2023 02:53:31

Date: 29\_JUL\_2023 02:53:59

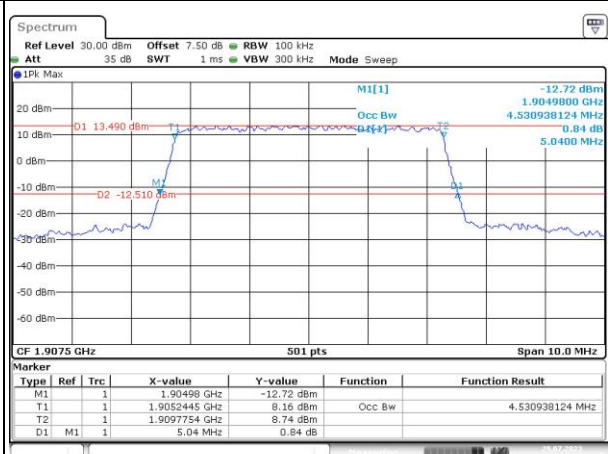
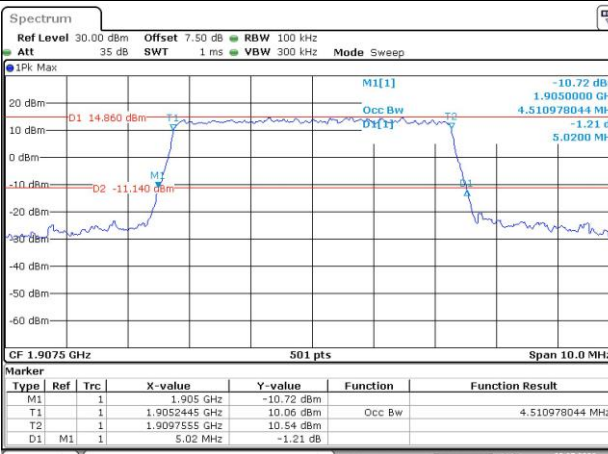
Middle



Date: 29\_JUL\_2023 02:54:27

Date: 29\_JUL\_2023 02:54:54

Highest

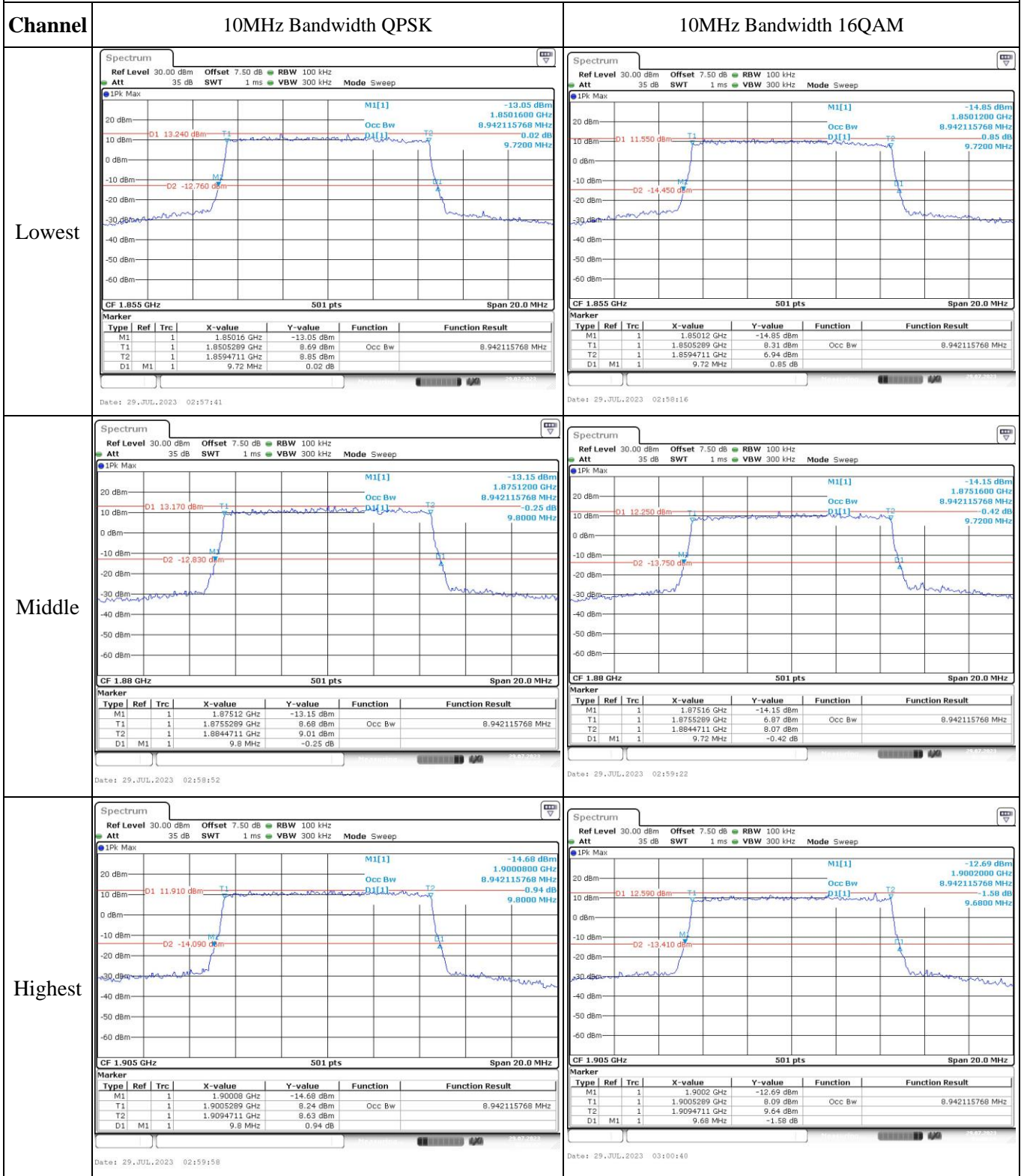


Date: 29\_JUL\_2023 02:55:27

Date: 29\_JUL\_2023 02:55:58



### Occupied Bandwidth



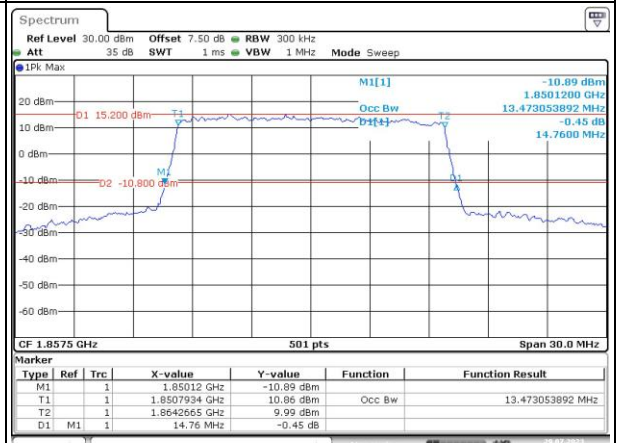
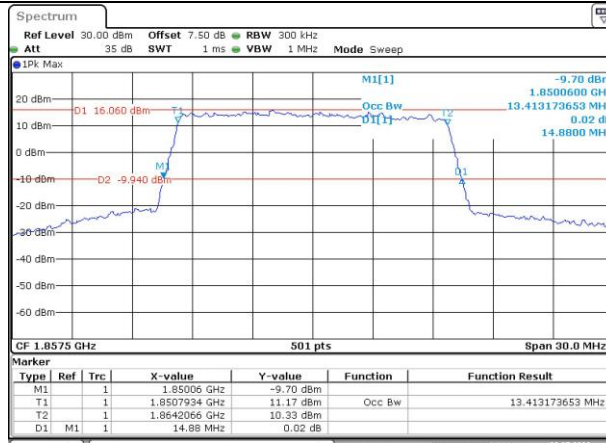
### Occupied Bandwidth

Channel

15MHz Bandwidth QPSK

15MHz Bandwidth 16QAM

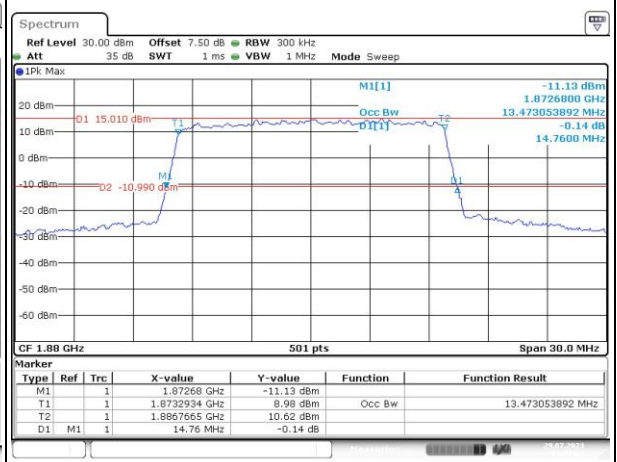
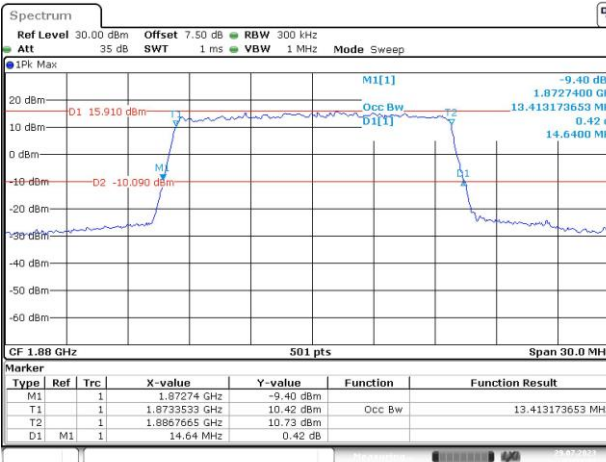
Lowest



Date: 29\_JUL\_2023 03:02:33

Date: 29\_JUL\_2023 03:03:05

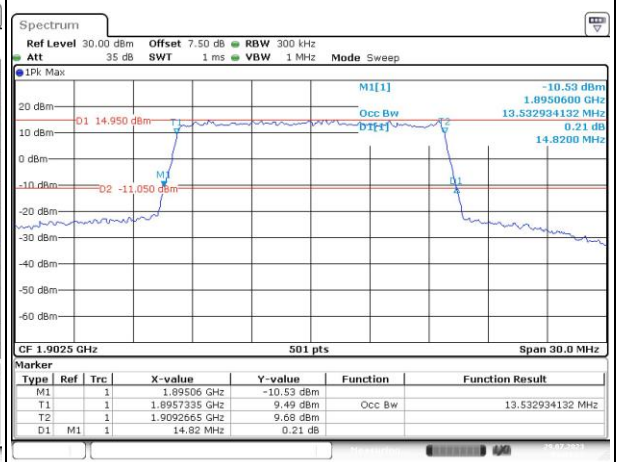
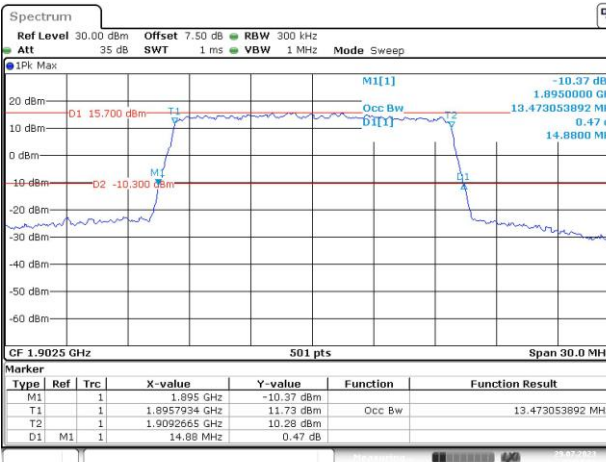
Middle



Date: 29\_JUL\_2023 03:10:31

Date: 29\_JUL\_2023 03:10:40

Highest



Date: 29\_JUL\_2023 03:10:42

Date: 29\_JUL\_2023 03:10:58

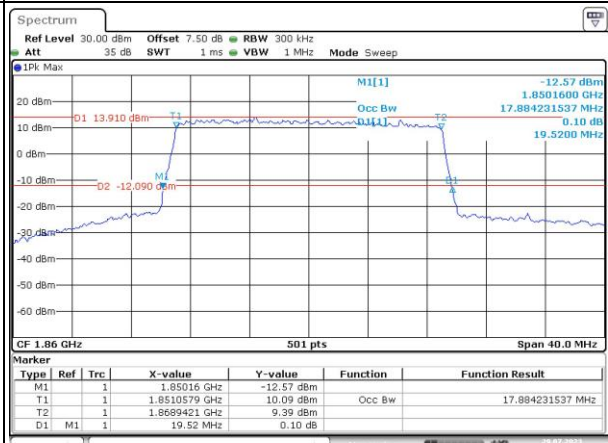
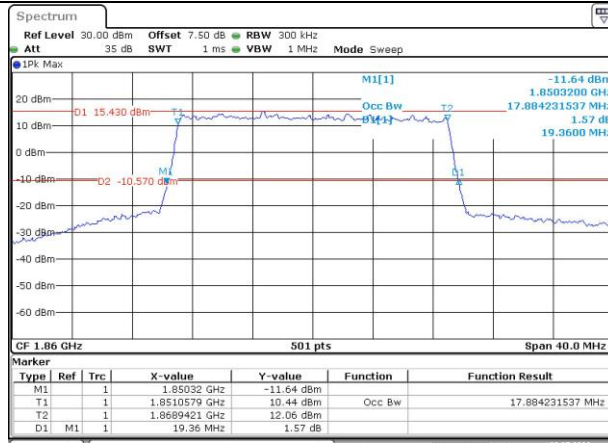
### Occupied Bandwidth

Channel

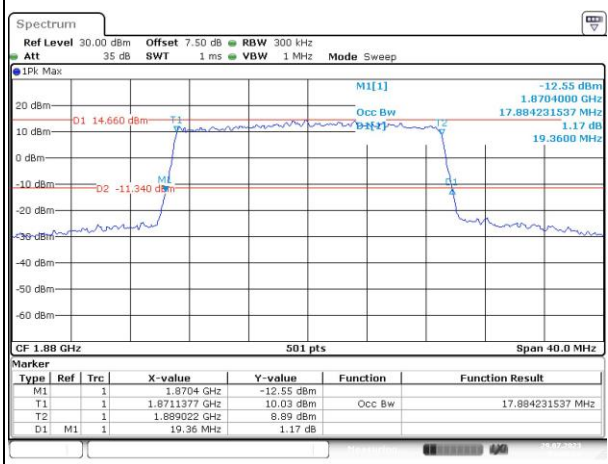
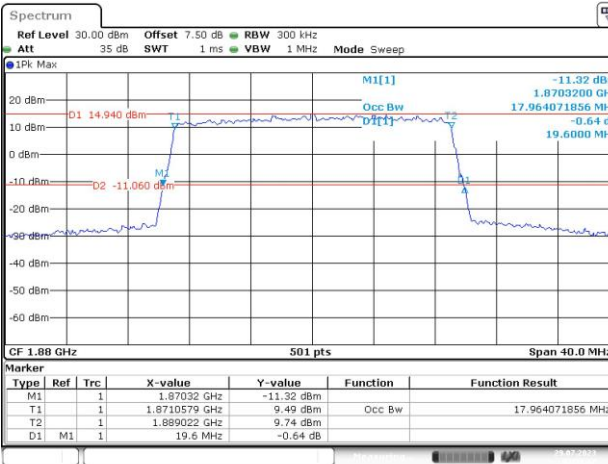
20MHz Bandwidth QPSK

20MHz Bandwidth 16QAM

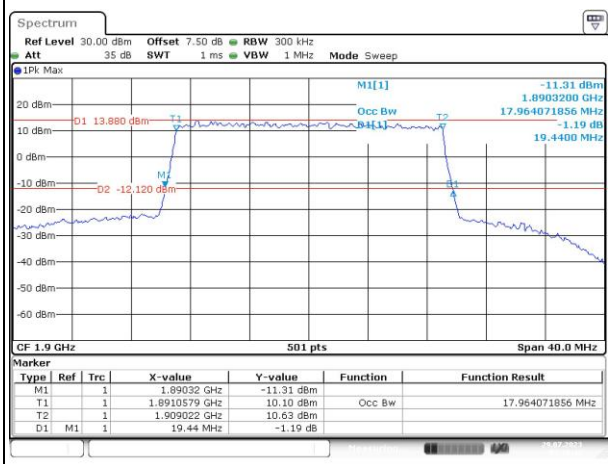
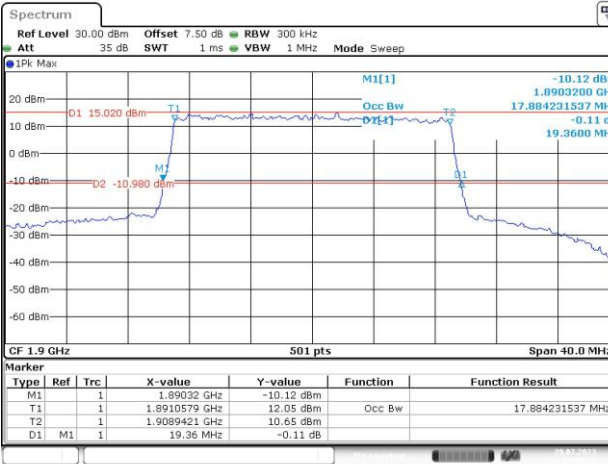
Lowest



Middle



Highest

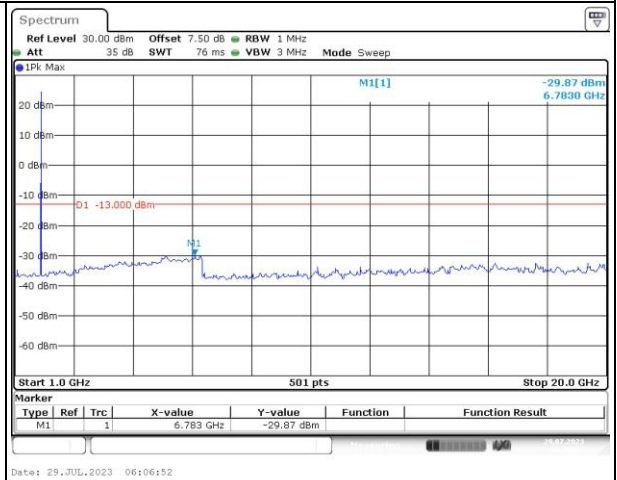
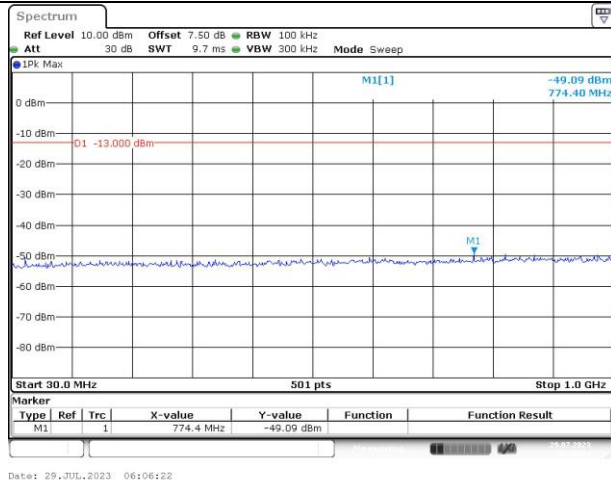


### Spurious Emissions at Antenna Terminal

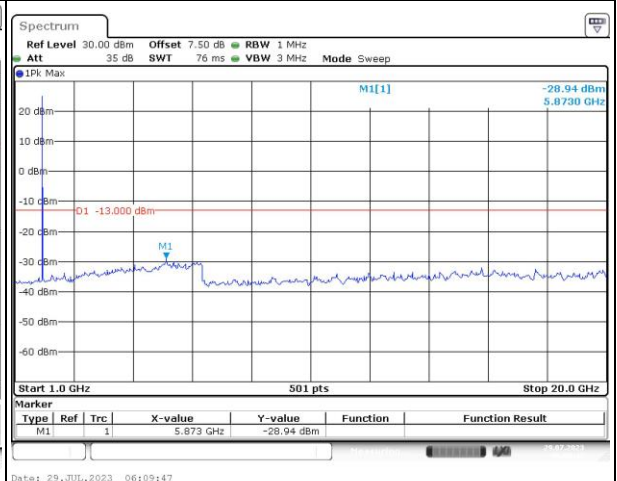
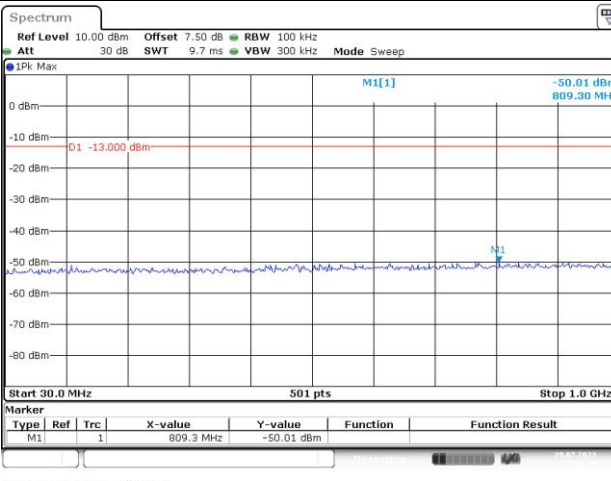
Channel

1.4MHz Bandwidth QPSK

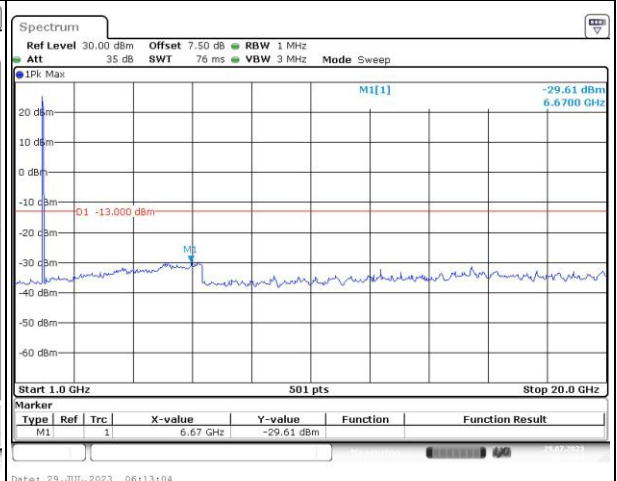
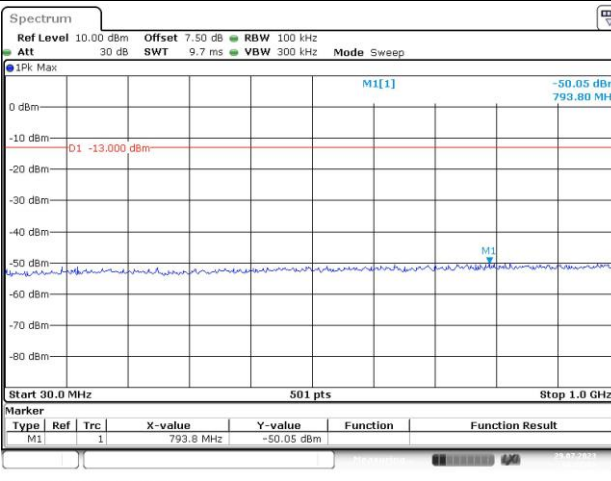
Lowest



Middle



Highest



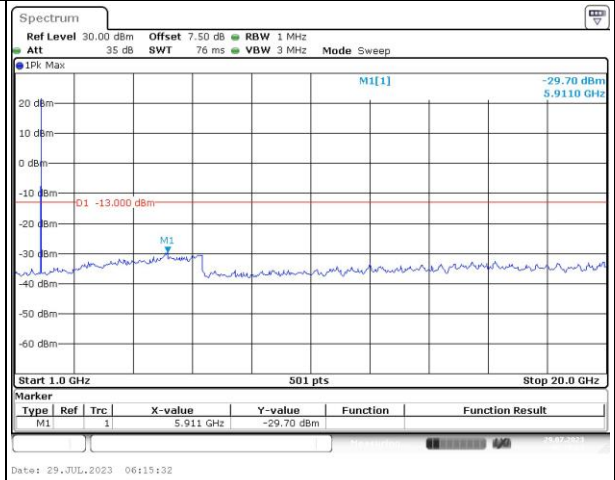
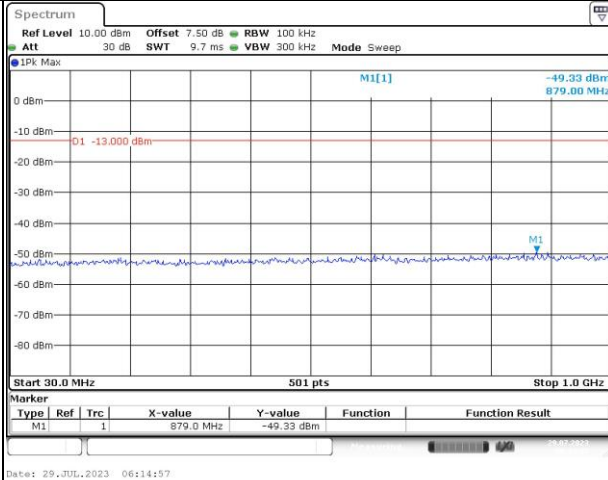


### Spurious Emissions at Antenna Terminal

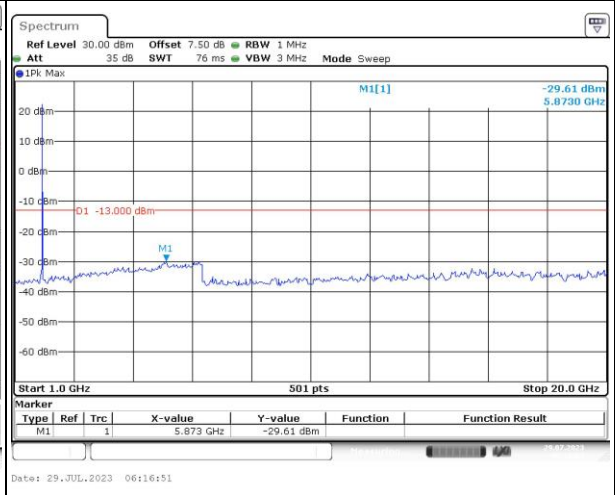
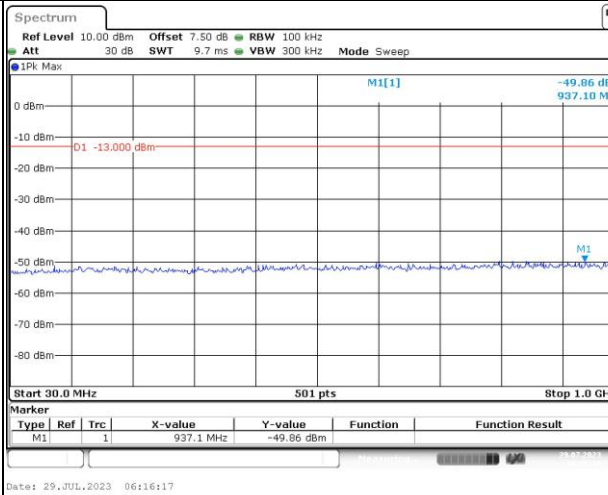
Channel

3MHz Bandwidth QPSK

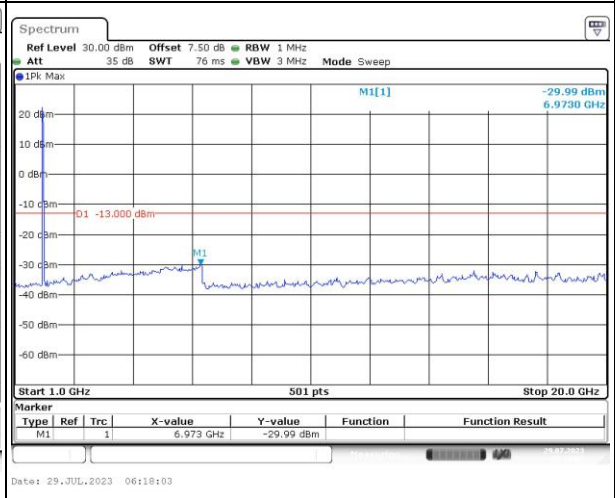
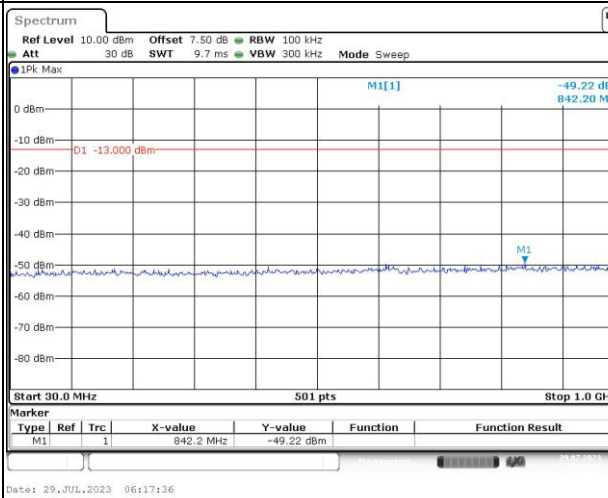
Lowest



Middle



Highest

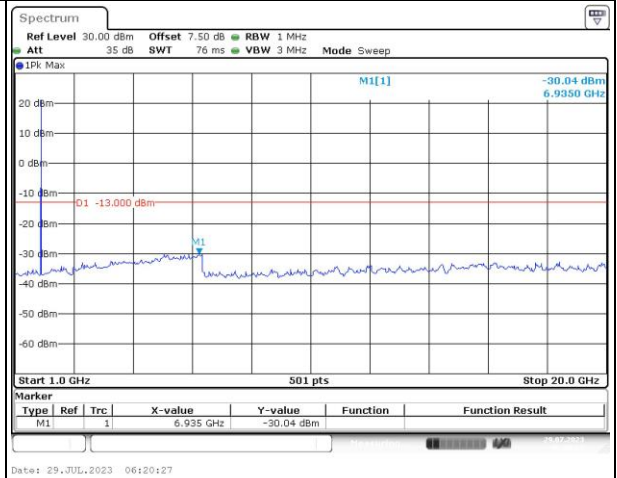
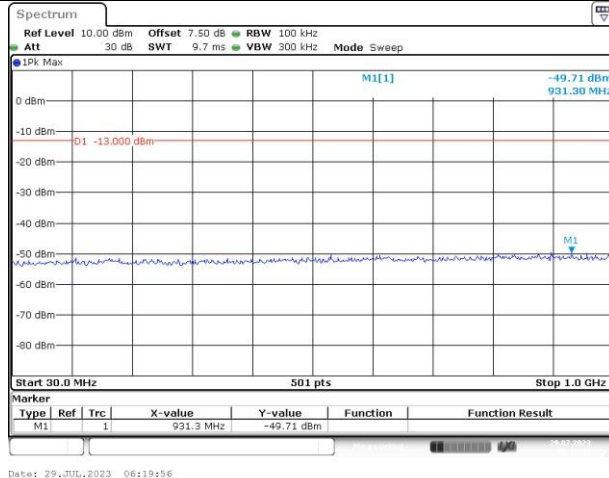


### Spurious Emissions at Antenna Terminal

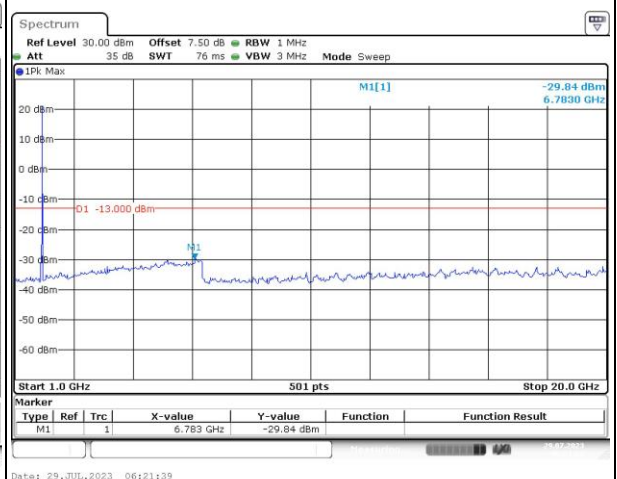
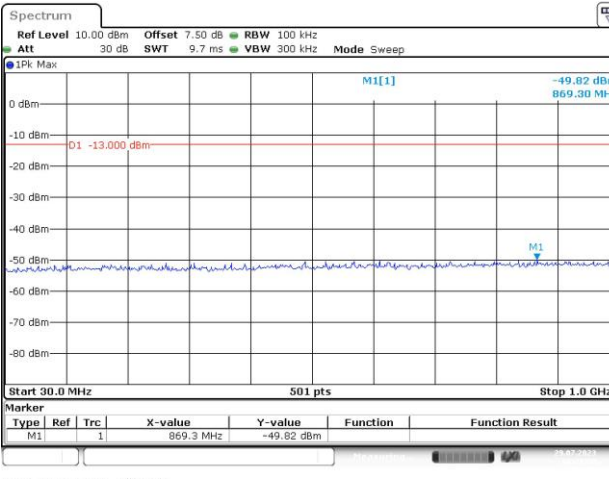
Channel

5MHz Bandwidth QPSK

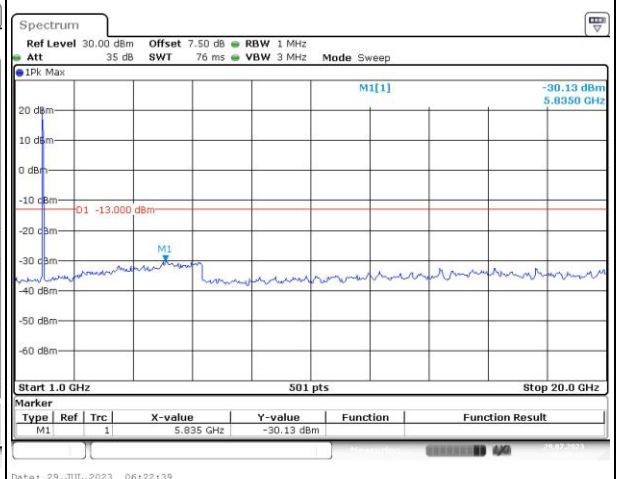
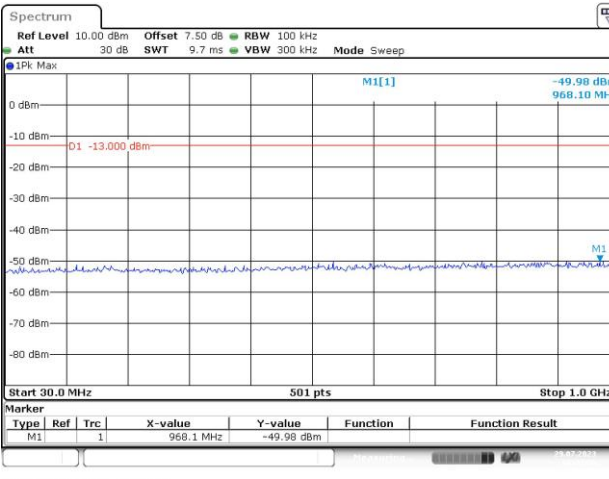
Lowest



Middle



Highest

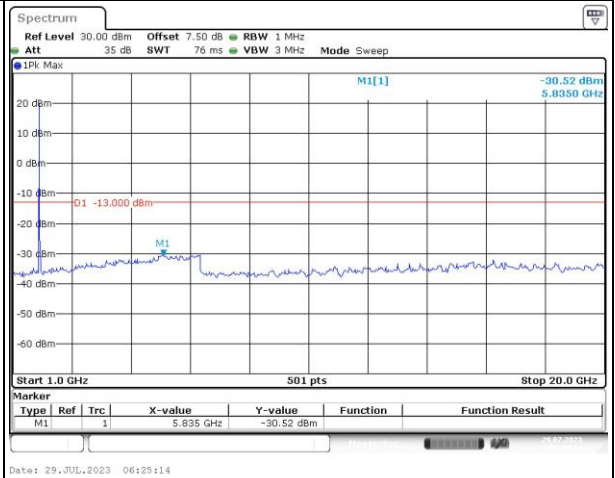
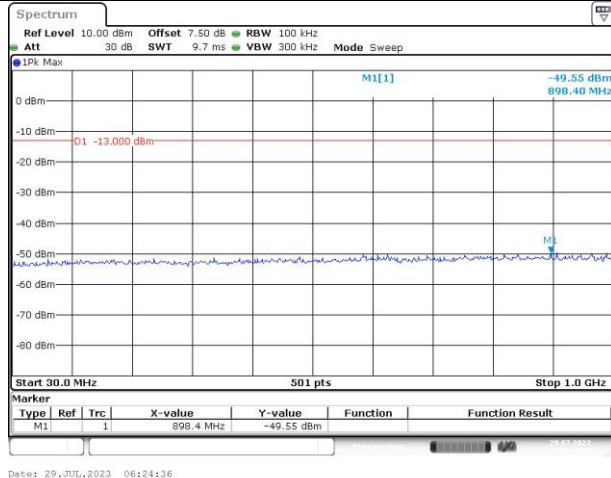


### Spurious Emissions at Antenna Terminal

Channel

10MHz Bandwidth QPSK

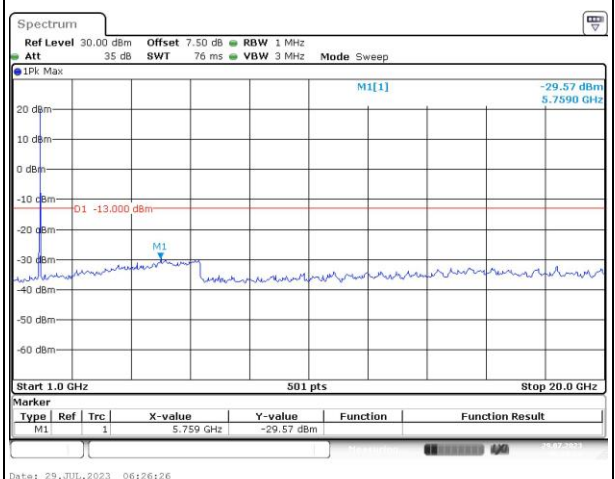
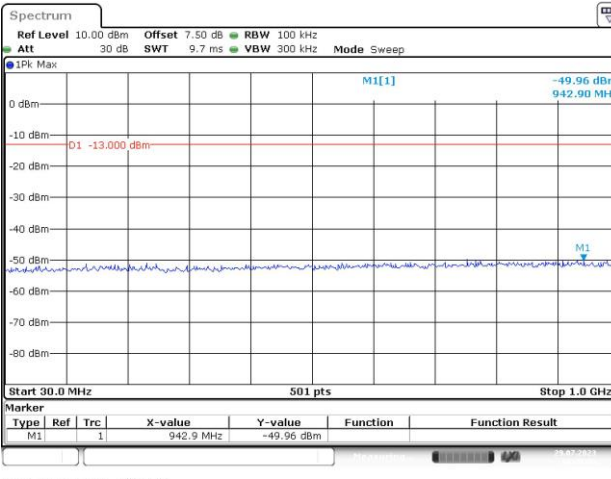
Lowest



Date: 29\_JUL\_2023 06:12:16

Date: 29\_JUL\_2023 06:12:14

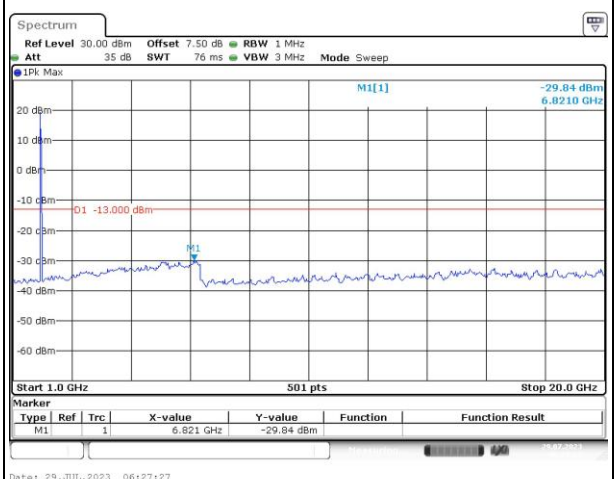
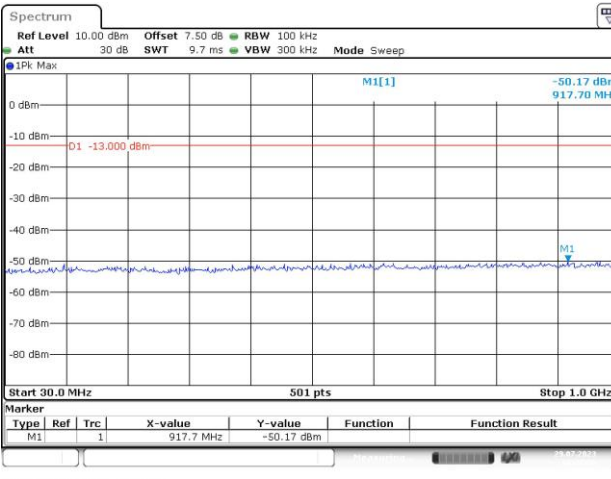
Middle



Date: 29\_JUL\_2023 06:12:18

Date: 29\_JUL\_2023 06:12:16

Highest



Date: 29\_JUL\_2023 06:12:01

Date: 29\_JUL\_2023 06:12:27

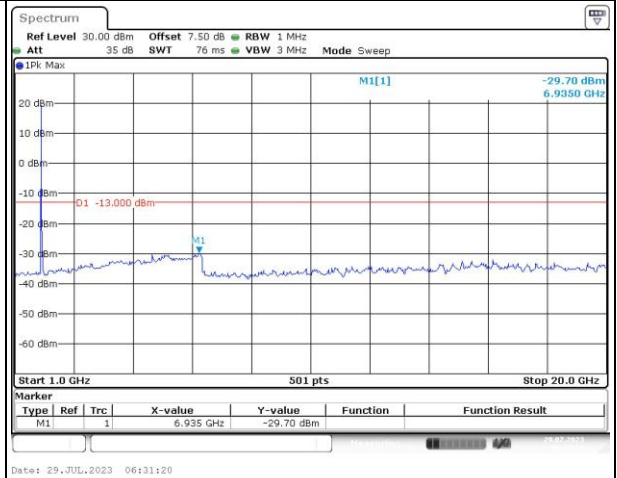
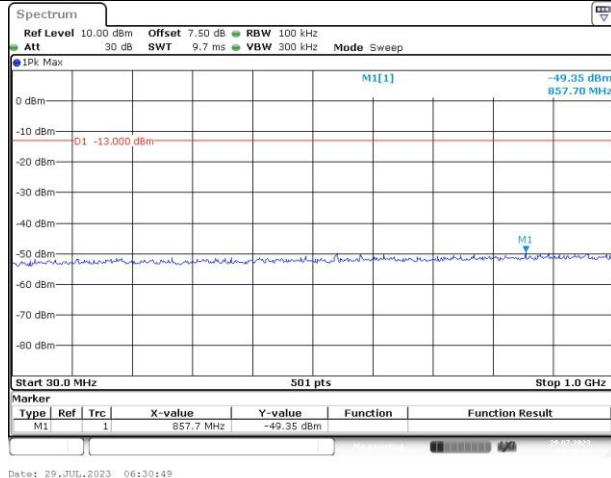


### Spurious Emissions at Antenna Terminal

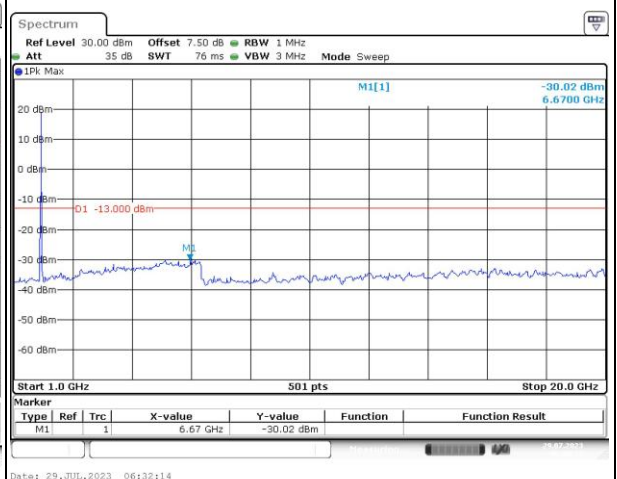
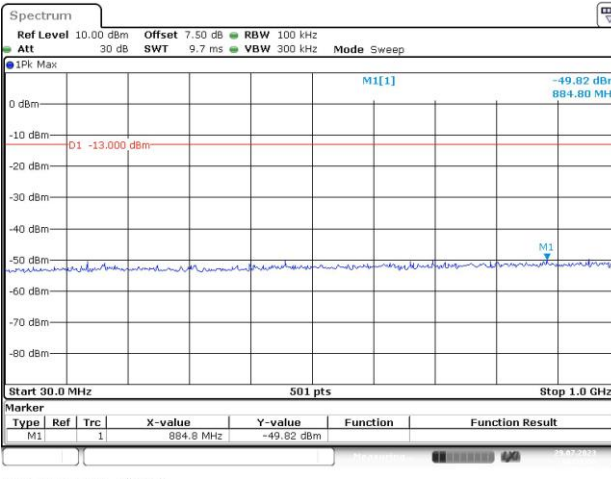
Channel

15MHz Bandwidth QPSK

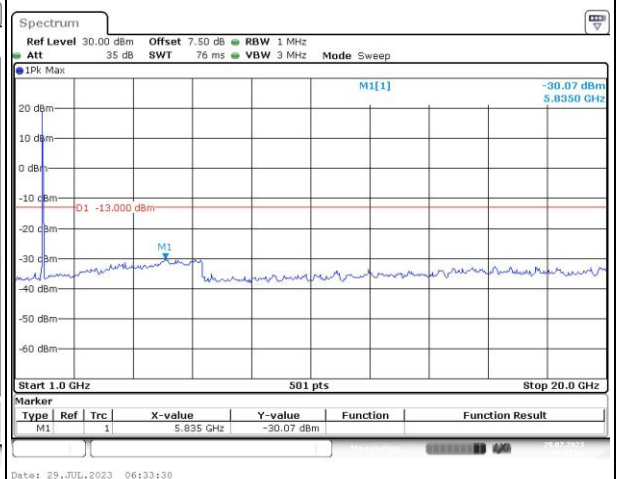
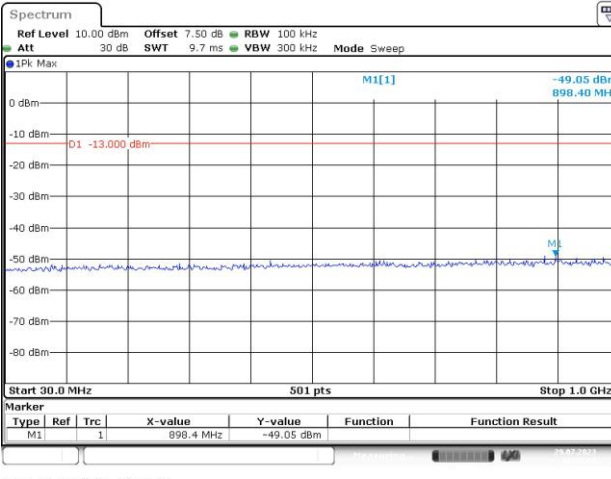
Lowest



Middle



Highest

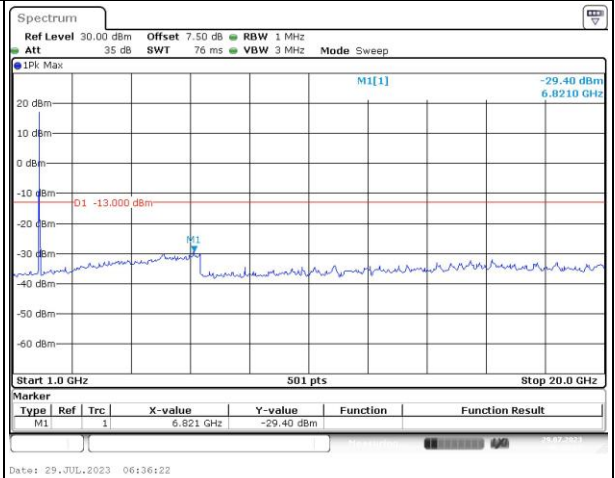
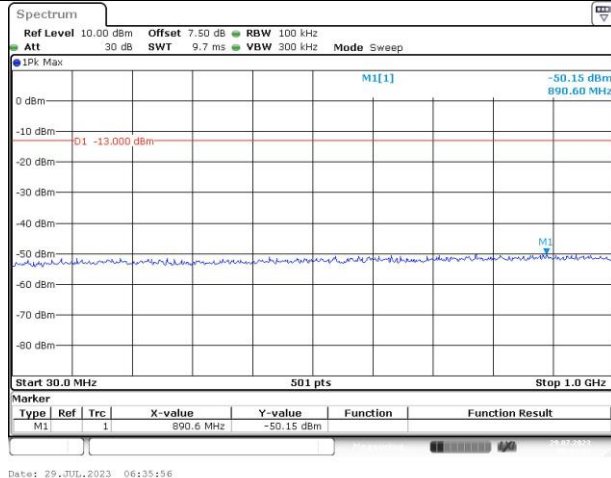


### Spurious Emissions at Antenna Terminal

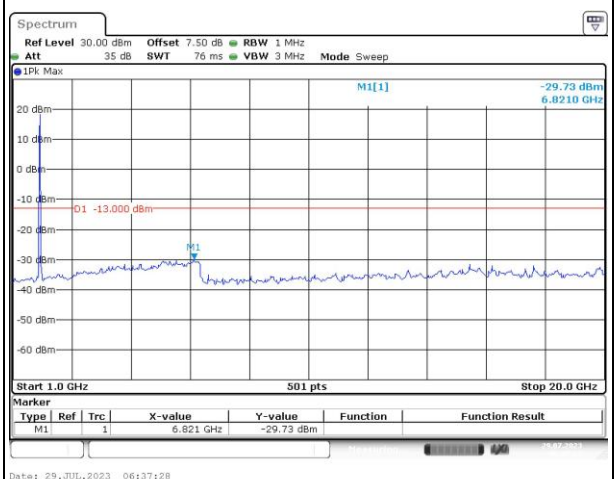
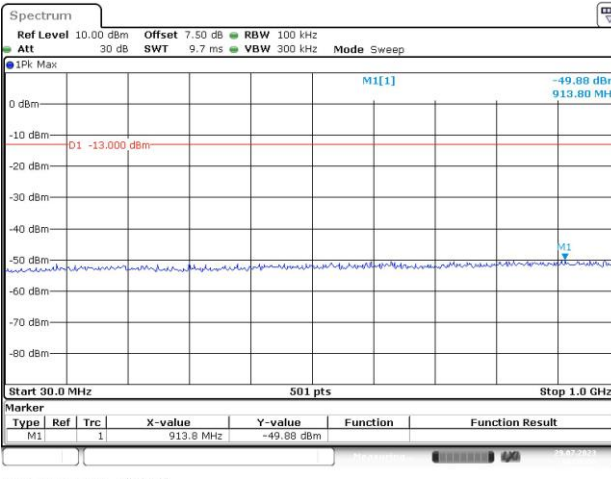
Channel

20MHz Bandwidth QPSK

Lowest



Middle



Highest

