

Out of band emission, Band Edge

Mode	Lowest	Highest
R99		
HSUPA		
HSDPA		

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

Serial Number:	22HX	Test Date:	2023/3/8~2023/3/20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jou Zhou	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	23.4~25.1	Relative Humidity: (%)	43~47	ATM Pressure: (kPa)	100.6~102
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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	2022/7/15	2023/7/14
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
Weinschel	Power Splitter	1515	RA914	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	149218	2022/7/15	2023/7/14
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2022/4/6	2023/4/5
UNI-T	Multimeter	UT39A+	C210582554	2022/9/29	2023/9/28
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	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 Subtest 1	21.89	22.07	21.93	23.04	38.45
HSDPA Subtest 1	21.67	21.99	22.01	22.98	38.45
HSDPA Subtest 2	21.65	21.76	21.31	22.73	38.45
HSDPA Subtest 3	21.52	21.79	21.61	22.76	38.45
HSDPA Subtest 4	21.48	22.01	21.52	22.98	38.45
HSUPA Subtest 1	22.01	21.17	21.57	22.98	38.45
HSUPA Subtest 2	21.85	21.39	21.42	22.82	38.45
HSUPA Subtest 3	21.66	21.57	21.04	22.63	38.45
HSUPA Subtest 4	21.45	21.87	21.86	22.84	38.45
HSUPA Subtest 5	21.24	21.34	21.8	22.77	38.45
DC-HSDPA Subtest 1	21.81	21.96	21.07	22.93	38.45
DC-HSDPA Subtest 2	21.87	21.8	21.56	22.84	38.45
DC-HSDPA Subtest 3	21.74	21.86	21.52	22.83	38.45
DC-HSDPA Subtest 4	21.48	21.97	21.13	22.94	38.45
HSPA+ Subtest 1	21.2	21.18	21.49	22.46	38.45

Note:

ERP= Conducted Power(dBm) - Lc(dB) + G<sub>T</sub>(dBd)G<sub>T</sub>(dBd)=G<sub>T</sub>(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	2.99	2.96	3.45	13
HSDPA	6.46	6.03	4.9	13
HSUPA	5.39	5.59	5.65	13
<b>Result:</b>				<b>Pass</b>

<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	4.197	4.168	4.182	5.34	4.761	4.747
HSDPA	4.197	4.211	4.255	5.152	5.21	6.049
HSUPA	4.226	4.197	4.197	5.499	5.094	5.036

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

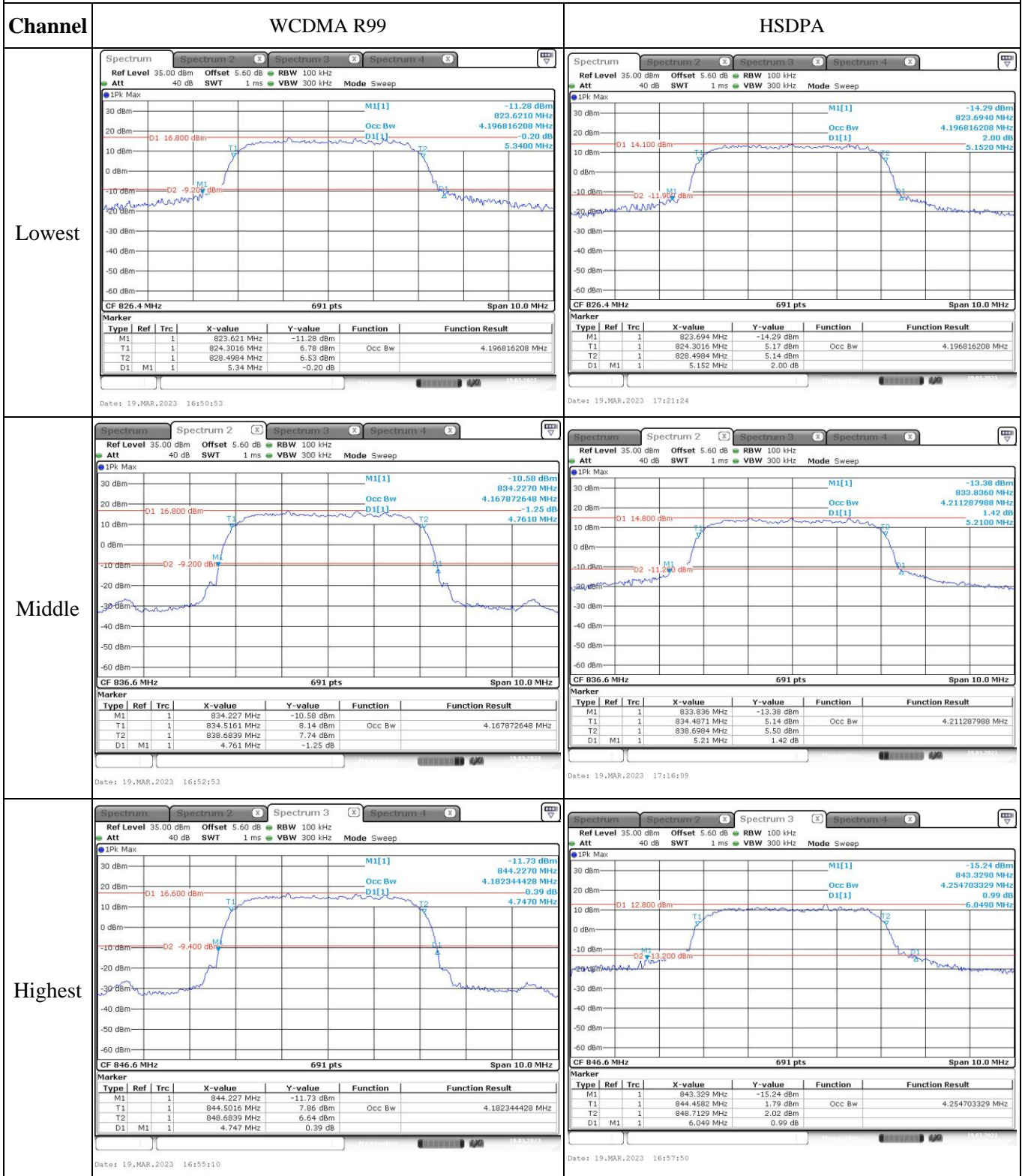
<b>FCC §2.1051, §22.917(a):Spurious Emissions at Antenna Terminal</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Spurious Emissions at Antenna Terminal.</b>

<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	3.7	-29	-0.035	2.5
	-20	3.7	21	0.025	2.5
	-10	3.7	10	0.012	2.5
	0	3.7	15	0.018	2.5
	10	3.7	21	0.025	2.5
	20	3.7	27	0.032	2.5
	30	3.7	22	0.026	2.5
	40	3.7	15	0.018	2.5
	50	3.7	19	0.023	2.5
Frequency Stability vs. Voltage	20	3.5	20	0.024	2.5
	20	4.2	27	0.032	2.5
<b>Result:</b>				<b>Pass</b>	

**Test Plots**(Note: The 5.6dB is the Insertion loss of the RF cable, Power Splitter and DC Block, which was offset into the Spectrum Analyzer):

**Occupied Bandwidth**

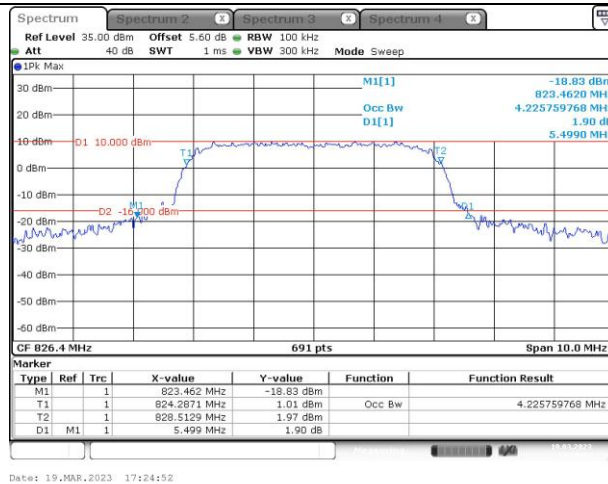


### Occupied Bandwidth

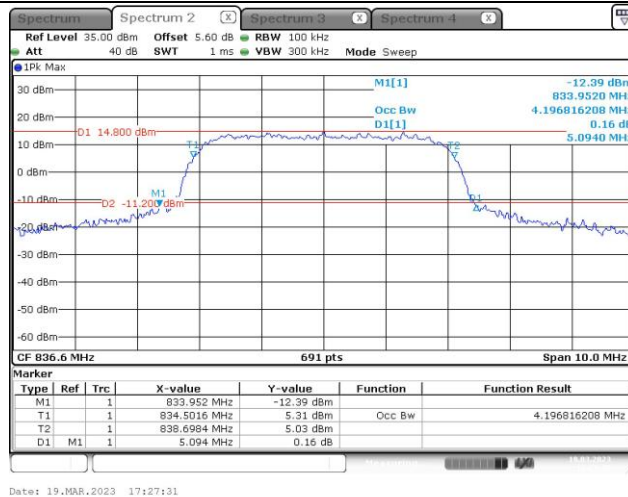
Channel

HSUPA

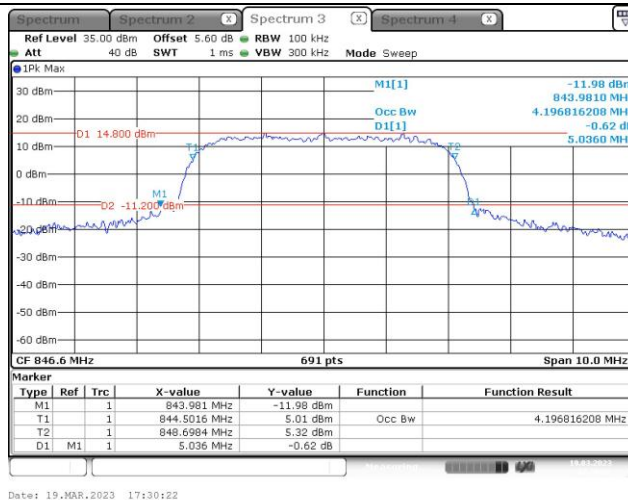
Lowest



Middle



Highest

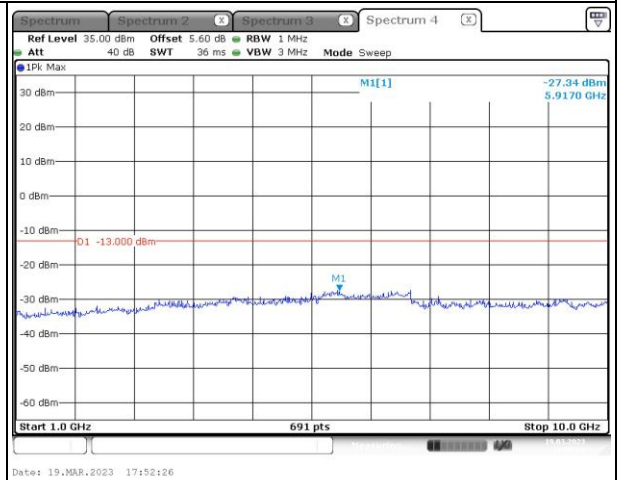
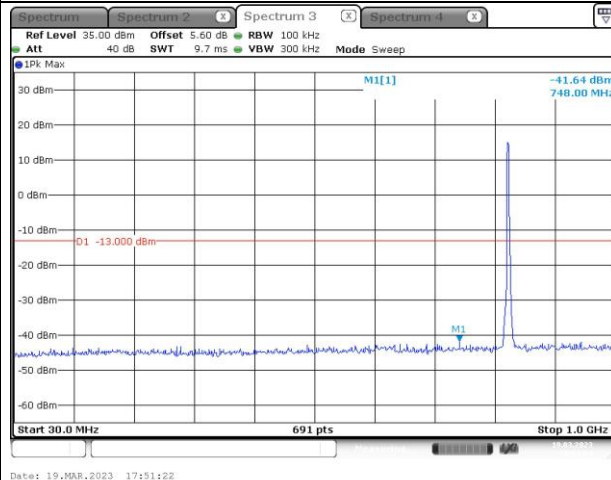


### Spurious Emissions at Antenna Terminal

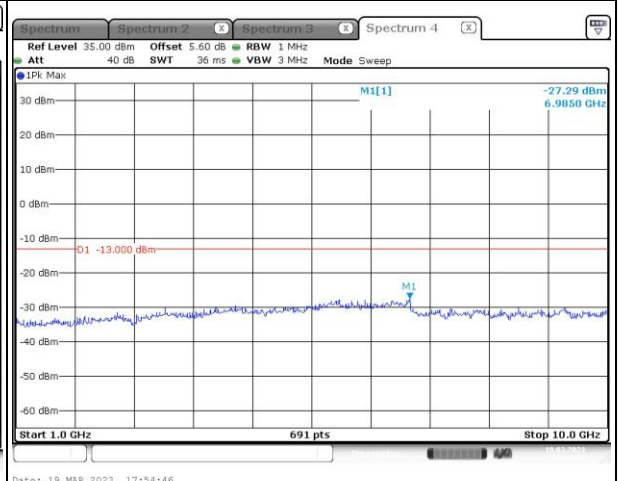
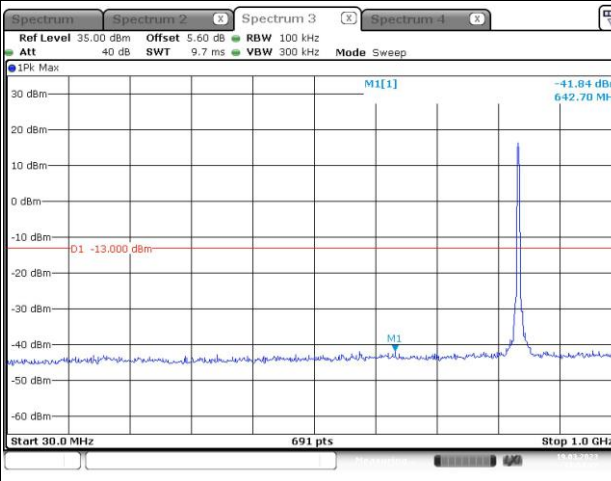
Channel

WCDMA R99

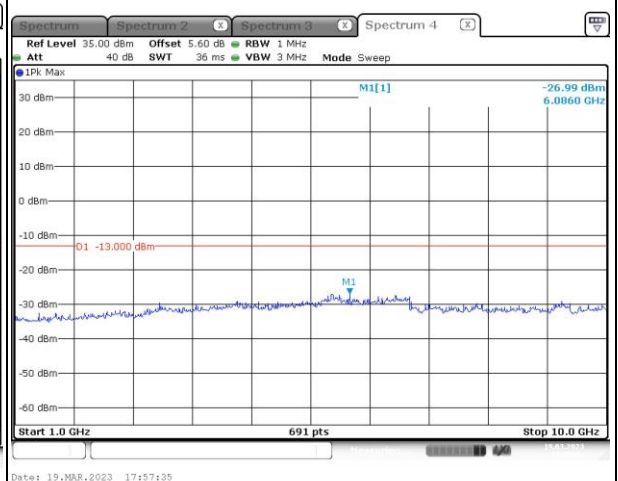
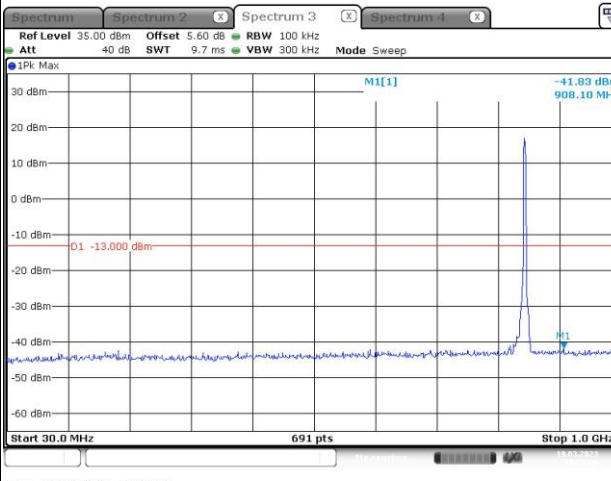
Lowest



Middle



Highest



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:	22HX	Test Date:	2023/3/8~2023/3/20
Test Site:	RF	Test Mode:	Transmitting
Tester:	Jou Zhou	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	23.4~25.1	Relative Humidity: (%)	43~47	ATM Pressure: (kPa)	100.6~102
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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	211001	Each time	N/A
YINSAIGE	Coaxial Cable	SS402	SJ0100004	Each time	N/A
Mini-Circuits	DC Block	BLK-18-S+	1554404	Each time	N/A
eastsheep	Coaxial Attenuator	2W-SMA- JK-18G	21060301	Each time	N/A
Weinschel	Power splitter	1515	RA915	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	2022-09-29	2023-09-28
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	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	21.21	20.74	20.53	24.63	33
	RB1#3	21.17	20.74	20.53		
	RB1#5	21.13	20.74	20.53		
	RB3#0	21.18	20.92	20.63		
	RB3#3	21.21	20.86	20.65		
	RB6#0	20.12	19.88	19.56		
1.4MHz 16QAM	RB1#0	20.26	20.31	19.3	23.74	33
	RB1#3	20.29	20.32	19.35		
	RB1#5	20.26	20.24	19.39		
	RB3#0	20.06	19.79	19.62		
	RB3#3	20.11	19.77	19.57		
	RB6#0	19.2	19.06	18.94		
3MHz QPSK	RB1#0	21.14	20.81	20.46	24.57	33
	RB1#8	21.1	20.78	20.46		
	RB1#14	21.15	20.72	20.41		
	RB6#0	20.18	19.84	19.55		
	RB6#9	20.2	19.72	19.49		
	RB15#0	20.18	19.8	19.58		
3MHz 16QAM	RB1#0	20.88	19.64	19.97	24.37	33
	RB1#8	20.95	19.57	19.87		
	RB1#14	20.9	19.63	19.84		
	RB6#0	19.24	18.92	18.55		
	RB6#9	19.34	18.91	18.62		
	RB15#0	19.23	18.97	18.81		
5MHz QPSK	RB1#0	21.23	20.81	20.56	24.7	33
	RB1#13	21.28	20.8	20.47		
	RB1#24	21.25	20.75	20.47		
	RB15#0	20.19	19.84	19.57		
	RB15#10	20.19	19.8	19.64		
	RB25#0	20.2	19.81	19.47		
5MHz 16QAM	RB1#0	20.32	19.55	18.85	23.74	33
	RB1#13	20.32	19.5	18.8		
	RB1#24	20.31	19.55	18.83		
	RB15#0	19.15	19.02	18.65		
	RB15#10	19.1	18.94	18.86		
	RB25#0	19.21	18.83	18.74		
10MHz QPSK	RB1#0	21.18	20.83	20.56	24.6	33
	RB1#25	21.16	20.81	20.52		
	RB1#49	21.17	20.73	20.46		

	RB25#0	20.15	19.94	19.56		
	RB25#25	20.19	19.78	19.61		
	RB50#0	20.22	19.87	19.53		
10MHz 16QAM	RB1#0	20.31	19.37	19.78	24.34	33
	RB1#25	20.91	19.39	19.76		
	RB1#49	20.92	19.23	19.76		
	RB25#0	19.19	19.02	18.65		
	RB25#25	19.19	18.95	18.63		
	RB50#0	19.3	18.86	18.7		
15MHz QPSK	RB1#0	21.18	20.91	20.47	24.6	33
	RB1#38	21.17	20.85	20.53		
	RB1#74	21.06	20.79	20.52		
	RB36#0	20.13	19.85	19.69		
	RB36#39	20.1	19.83	19.66		
	RB75#0	20.1	19.83	19.68		
15MHz 16QAM	RB1#0	20.92	20.3	19.83	24.35	33
	RB1#38	20.93	20.26	19.79		
	RB1#74	20.85	20.23	19.78		
	RB36#0	19.25	18.99	18.75		
	RB36#39	19.22	18.91	18.75		
	RB75#0	19.25	18.91	18.76		
20MHz QPSK	RB1#0	21.3	20.94	20.69	24.72	33
	RB1#50	21.15	20.86	20.71		
	RB1#99	21.18	20.78	20.69		
	RB50#0	20.1	19.88	19.6		
	RB50#50	20.08	19.69	19.61		
	RB100#0	20.07	19.88	19.68		
20MHz 16QAM	RB1#0	20.21	20.64	19.78	24.06	33
	RB1#50	20.11	20.55	19.72		
	RB1#99	20.14	20.41	19.77		
	RB50#0	19.28	19.12	18.94		
	RB50#50	19.13	19.02	18.69		
	RB100#0	19.14	18.99	18.65		

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	4.26	4.67	4.84	13
	RB100#0	3.91	4.2	4	13
20MHz 16QAM	RB1#0	5.39	5.62	5.59	13
	RB100#0	5.59	5.8	5.68	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	1.102	1.102	1.102	1.26	1.254	1.266
1.4MHz 16QAM	1.096	1.102	1.108	1.254	1.26	1.278
3MHz QPSK	2.695	2.695	2.695	3	3.012	2.988
3MHz 16QAM	2.683	2.683	2.695	3	3.024	3.012
5MHz QPSK	4.511	4.491	4.511	5.02	5	5
5MHz 16QAM	4.531	4.551	4.511	5.02	5.04	5
10MHz QPSK	8.982	8.942	8.942	9.8	9.8	9.8
10MHz 16QAM	8.982	8.942	8.942	9.84	9.84	9.8
15MHz QPSK	13.473	13.533	13.533	15.06	15.12	15.06
15MHz 16QAM	13.533	13.533	13.533	15.18	15.06	15
20MHz QPSK	17.964	18.044	17.884	19.6	19.92	19.52
20MHz 16QAM	17.964	17.964	17.964	19.84	19.76	19.76

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>

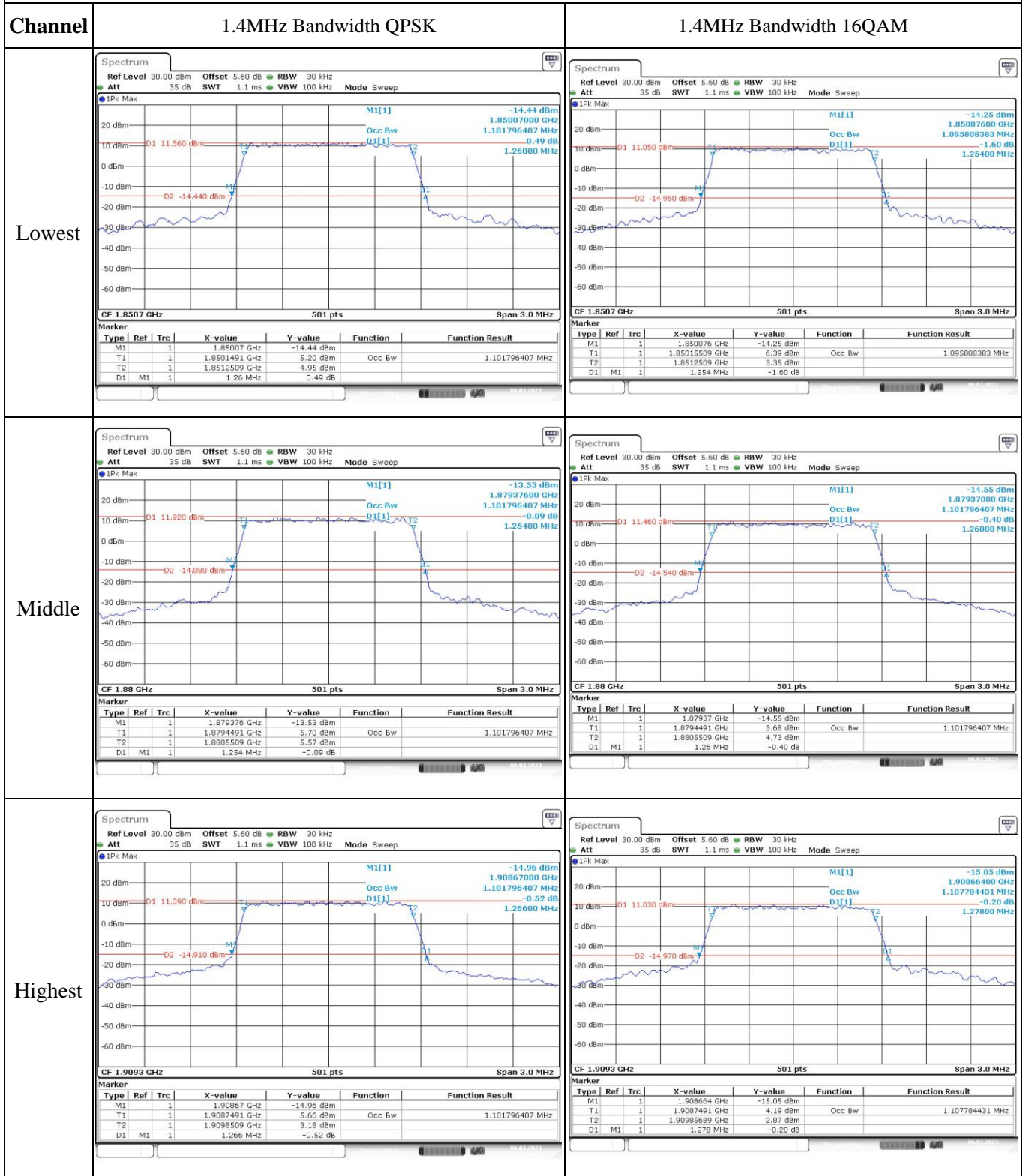
<b>FCC §2.1051, § 24.238 (a):Out of band emission, Band Edge</b>	
<b>Result:</b>	<b>Pass, Please refer to the test plots of Out of band emission, Band Edge.</b>

<b>FCC §2.1055, §24.235: Frequency Stability</b>						
Test Mode:	20 MHz 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	3.7	1851.059	1850.000	1908.925	1910.000
	-20	3.7	1851.083	1850.000	1908.969	1910.000
	-10	3.7	1851.032	1850.000	1908.910	1910.000
	0	3.7	1851.001	1850.000	1908.912	1910.000
	10	3.7	1851.056	1850.000	1908.987	1910.000
	20	3.7	1851.058	1850.000	1908.942	1910.000
	30	3.7	1851.001	1850.000	1908.949	1910.000
	40	3.7	1851.083	1850.000	1908.912	1910.000
	50	3.7	1851.018	1850.000	1908.940	1910.000
Frequency Stability vs. Voltage	20	3.5	1851.003	1850.000	1908.999	1910.000
	20	4.2	1851.050	1850.000	1908.965	1910.000
					<b>Result:</b>	<b>Pass</b>

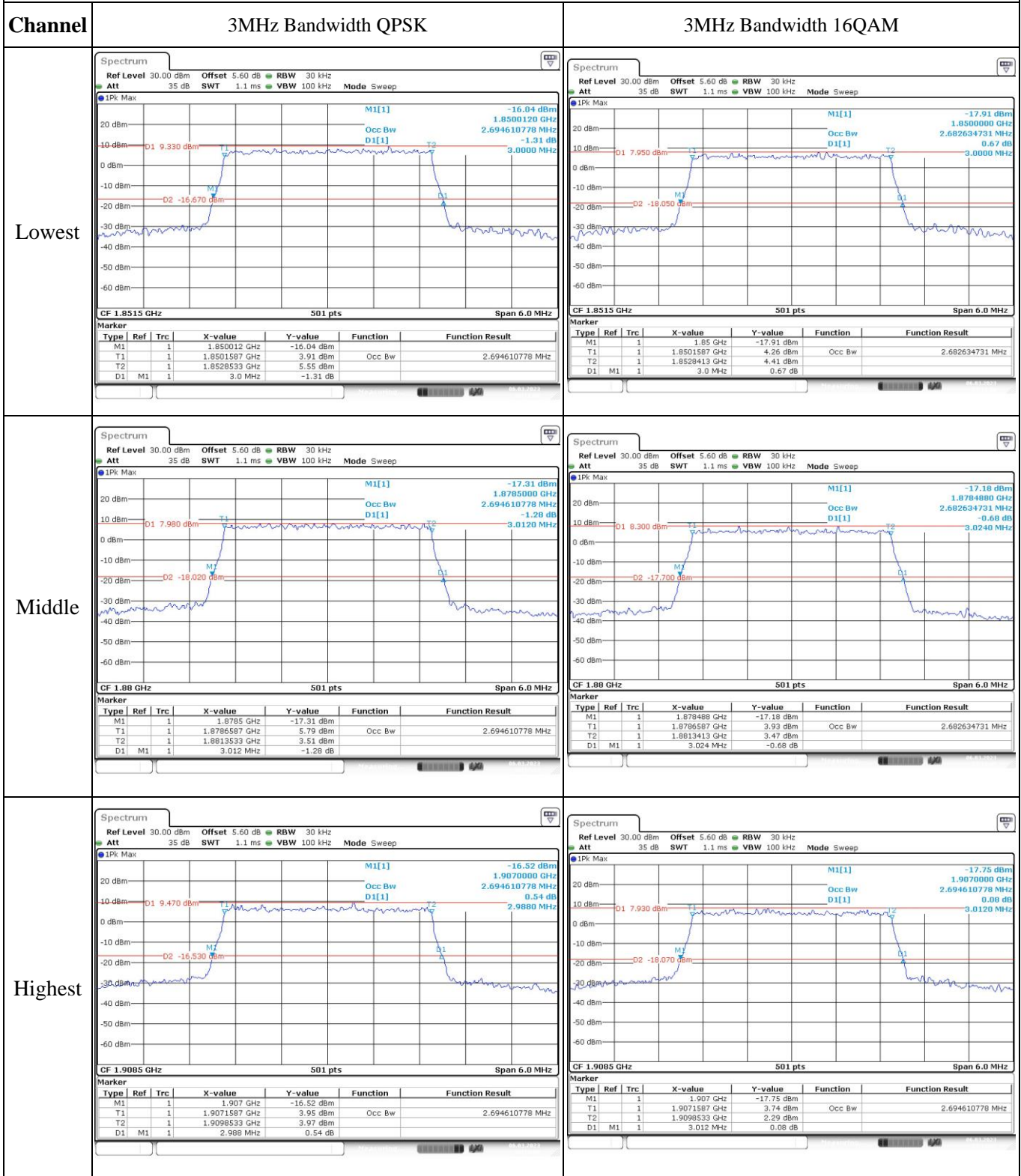
Test Mode:	20 MHz 16QAM	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V <sub>DC</sub> )	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	3.7	1851.006	1850.000	1909.091	1910.000
	-20	3.7	1851.053	1850.000	1909.081	1910.000
	-10	3.7	1851.083	1850.000	1909.084	1910.000
	0	3.7	1851.013	1850.000	1909.038	1910.000
	10	3.7	1851.023	1850.000	1909.018	1910.000
	20	3.7	1851.058	1850.000	1909.022	1910.000
	30	3.7	1851.063	1850.000	1909.016	1910.000
	40	3.7	1851.046	1850.000	1909.047	1910.000
	50	3.7	1851.079	1850.000	1909.097	1910.000
Frequency Stability vs. Voltage	20	3.5	1851.055	1850.000	1909.038	1910.000
	20	4.2	1851.073	1850.000	1909.052	1910.000
					<b>Result:</b>	<b>Pass</b>

**Test Plots**(Note: The 5.6dB is the Insertion loss of the RF cable, Power Splitter and DC Block, which was offset into the Spectrum Analyzer):

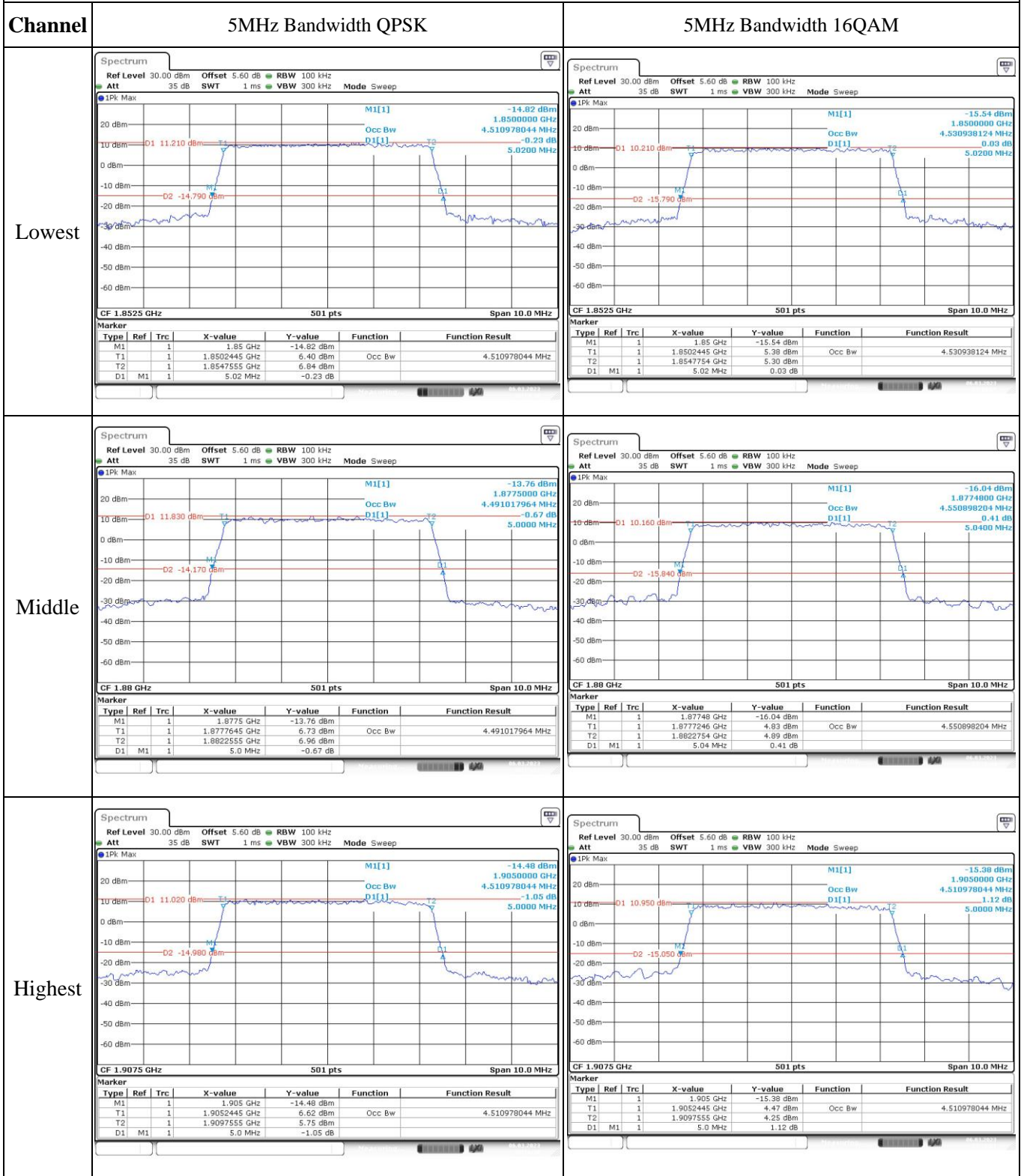
**Occupied Bandwidth**



### Occupied Bandwidth

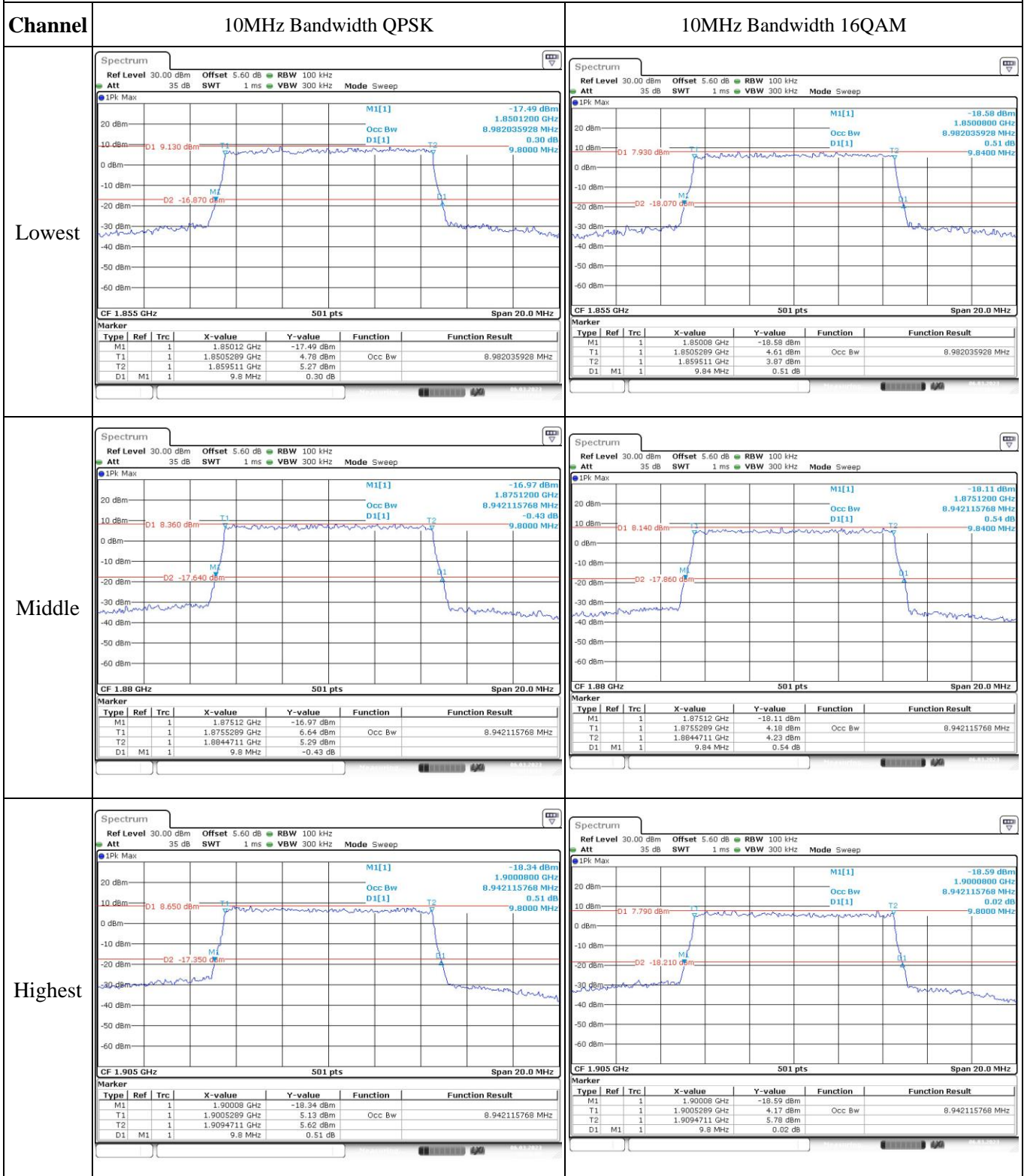


### Occupied Bandwidth





### Occupied Bandwidth



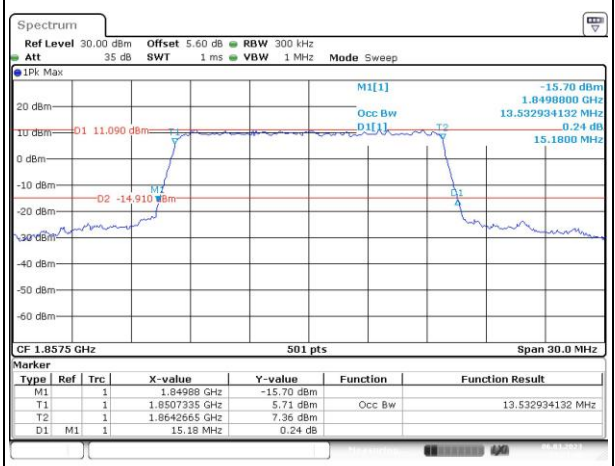
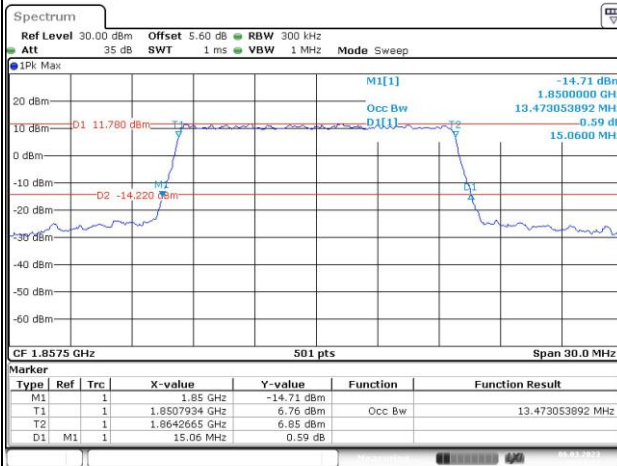
### Occupied Bandwidth

Channel

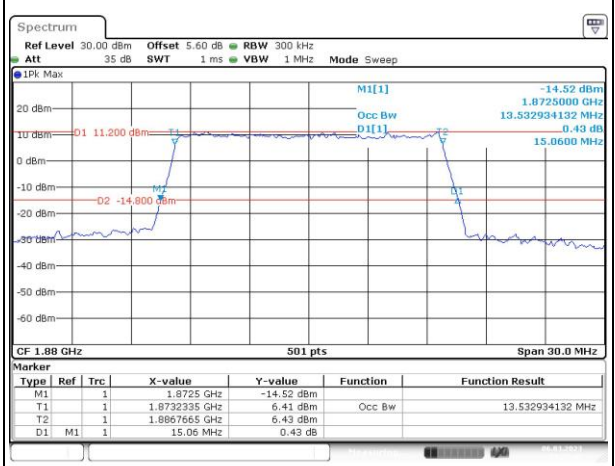
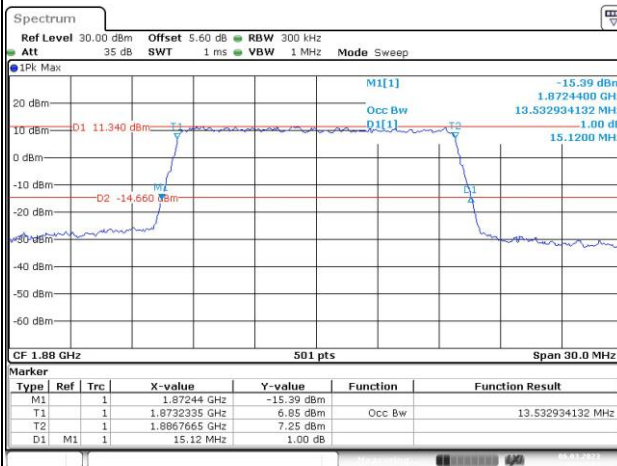
15MHz Bandwidth QPSK

15MHz Bandwidth 16QAM

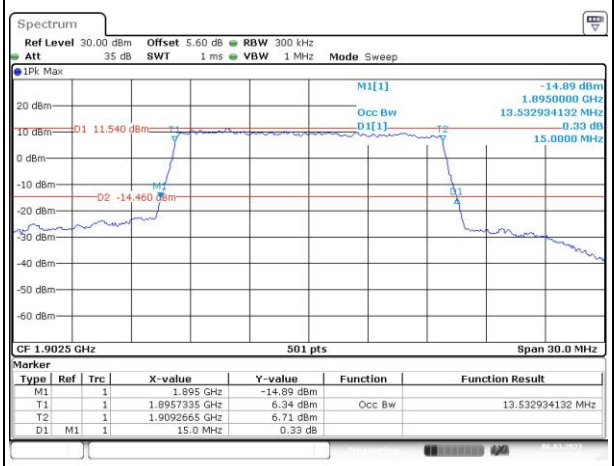
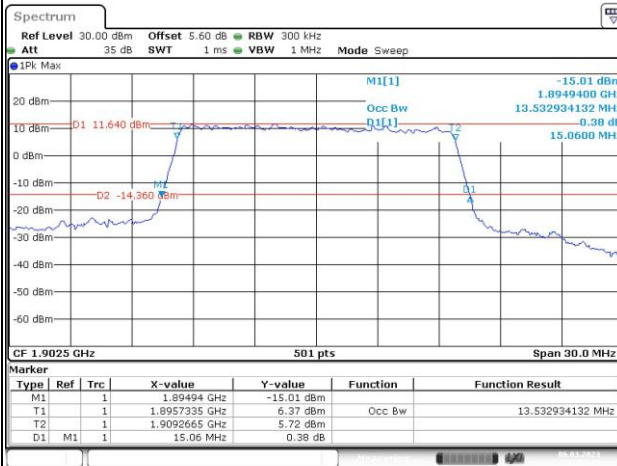
Lowest



Middle



Highest



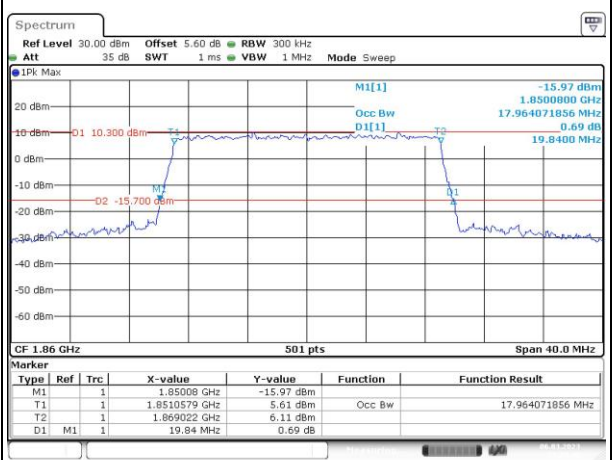
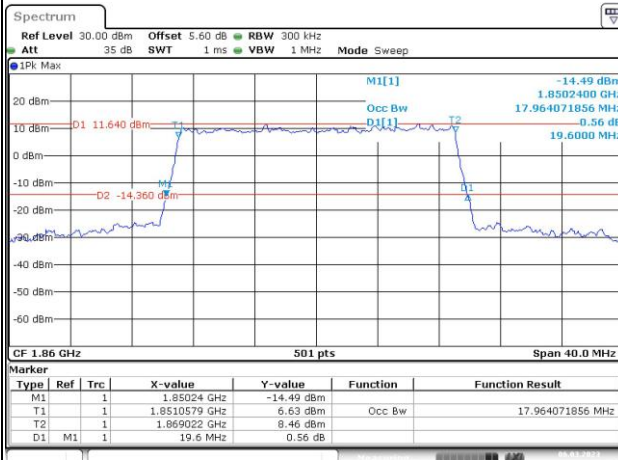
### Occupied Bandwidth

Channel

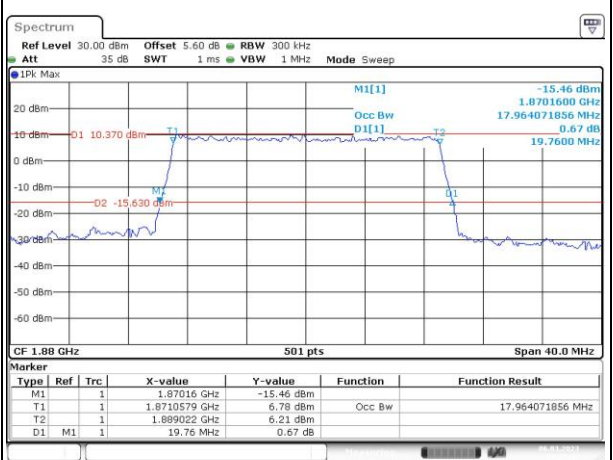
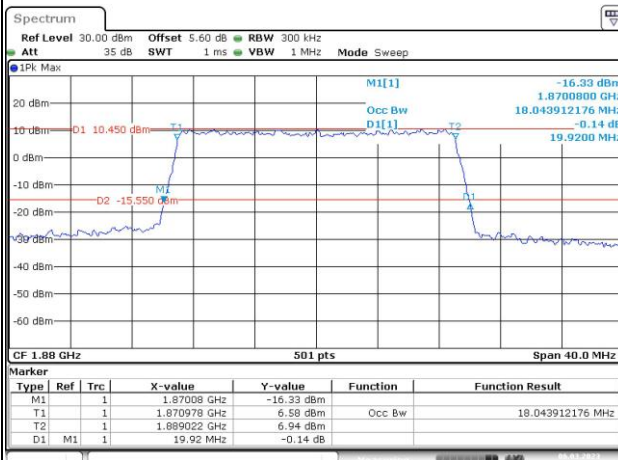
20MHz Bandwidth QPSK

20MHz Bandwidth 16QAM

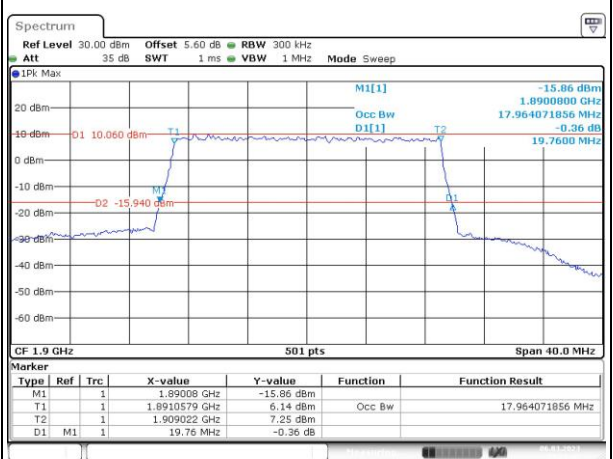
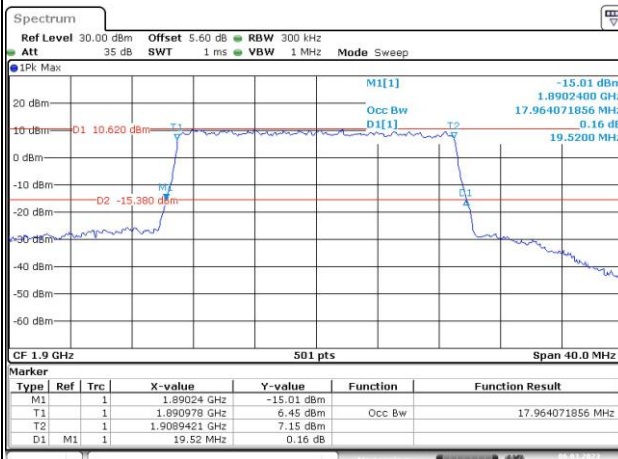
Lowest



Middle



Highest

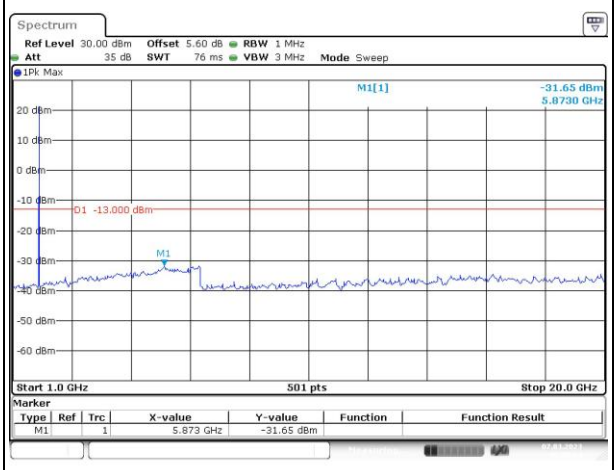
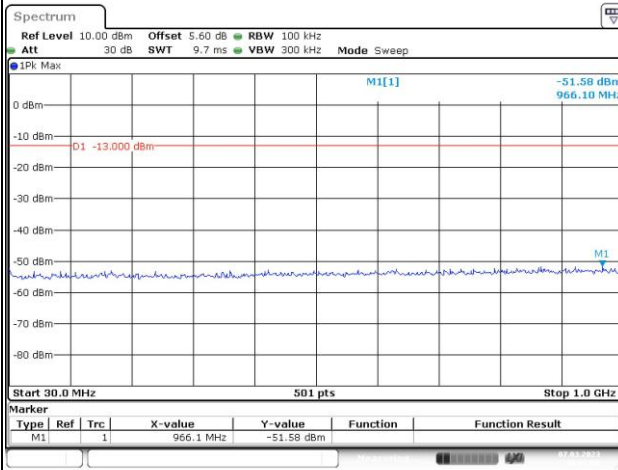


### Spurious Emissions at Antenna Terminal

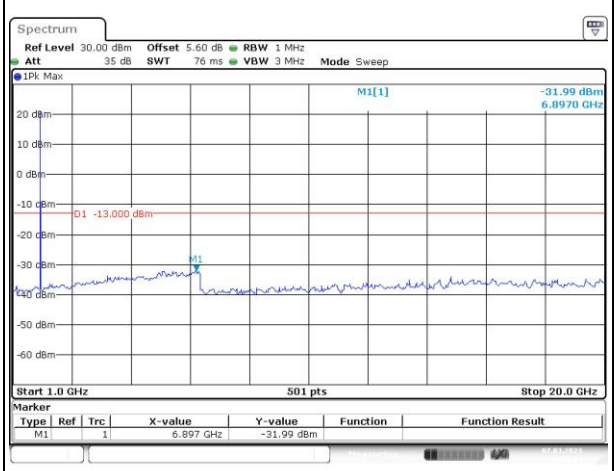
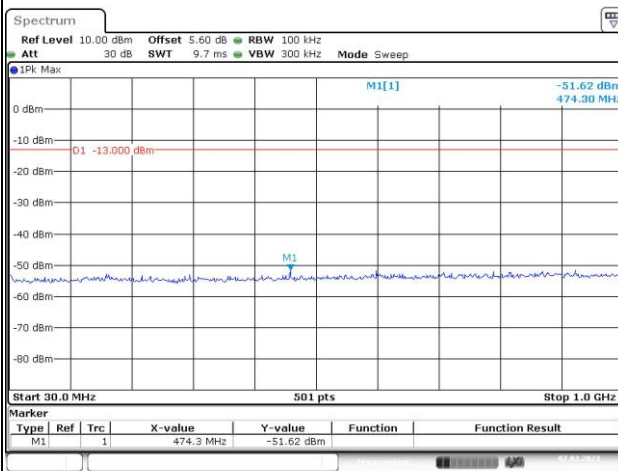
Channel

1.4MHz Bandwidth QPSK

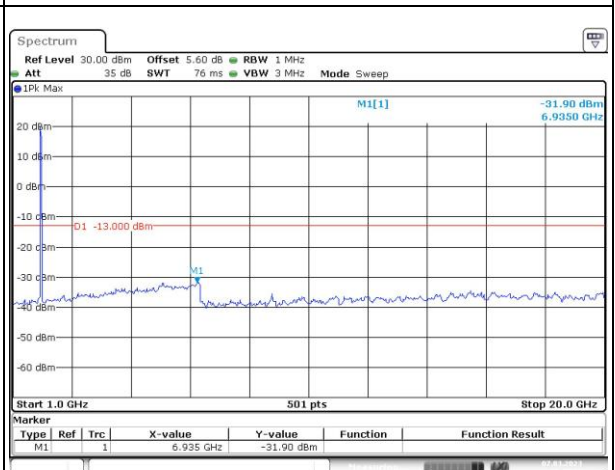
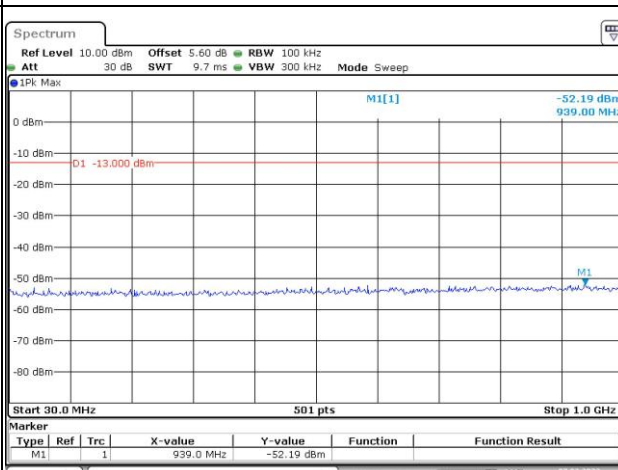
Lowest



Middle



Highest

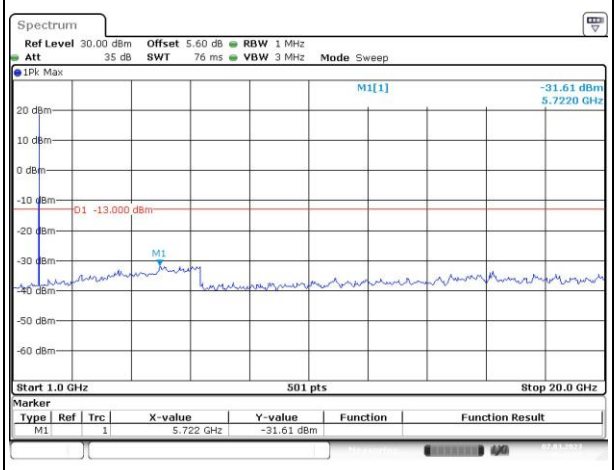
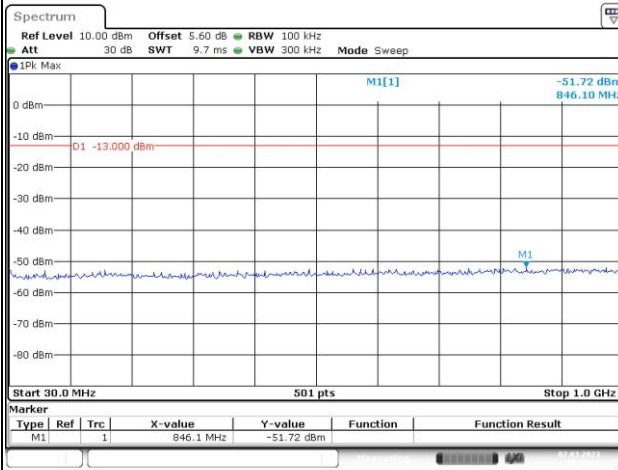


### Spurious Emissions at Antenna Terminal

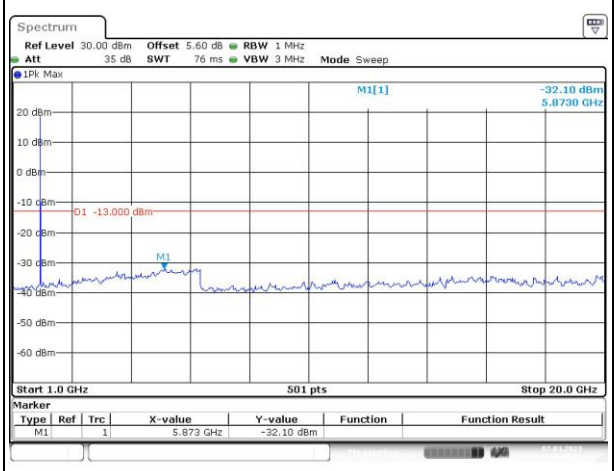
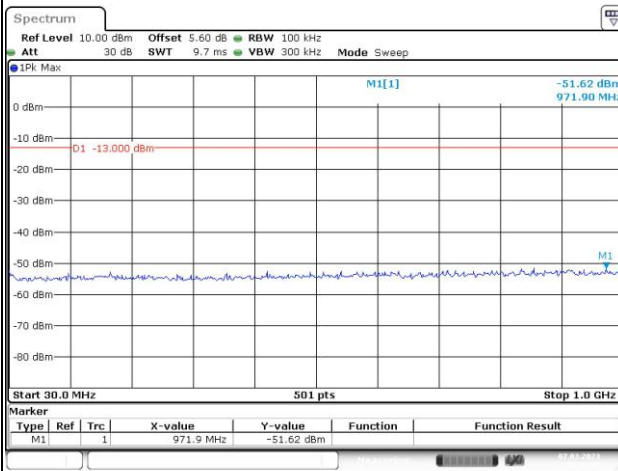
Channel

3MHz Bandwidth QPSK

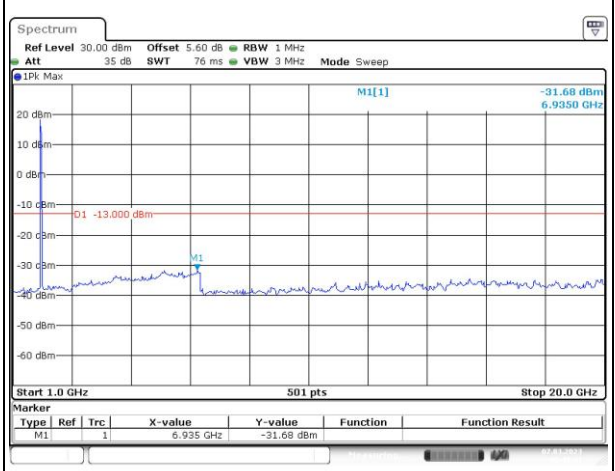
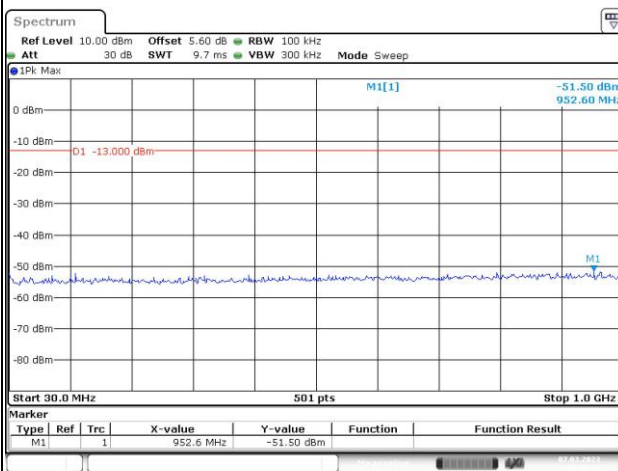
Lowest



Middle



Highest

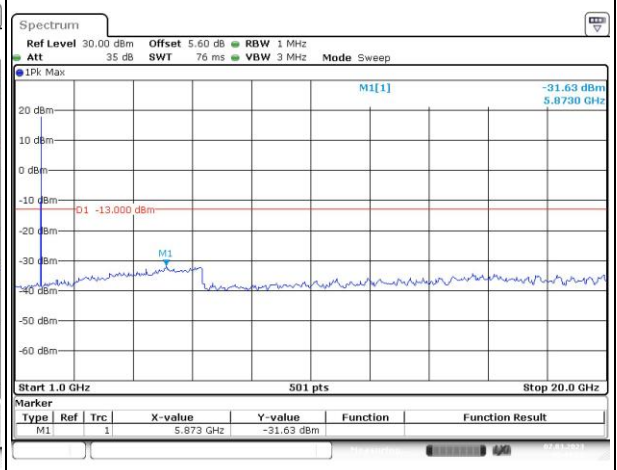
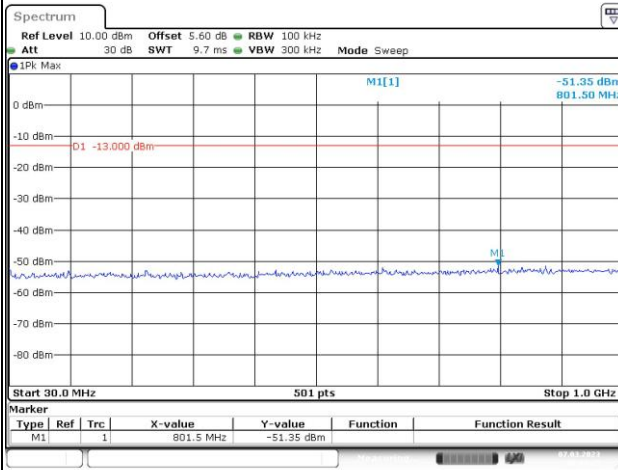


### Spurious Emissions at Antenna Terminal

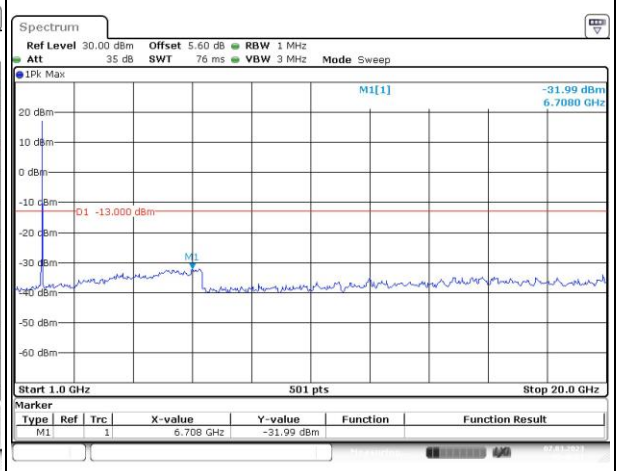
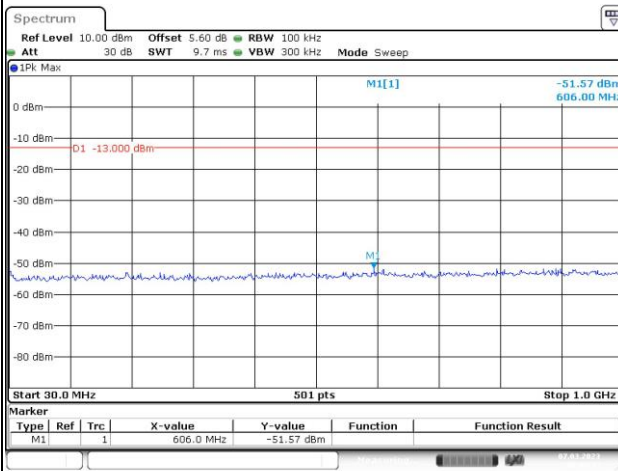
Channel

5MHz Bandwidth QPSK

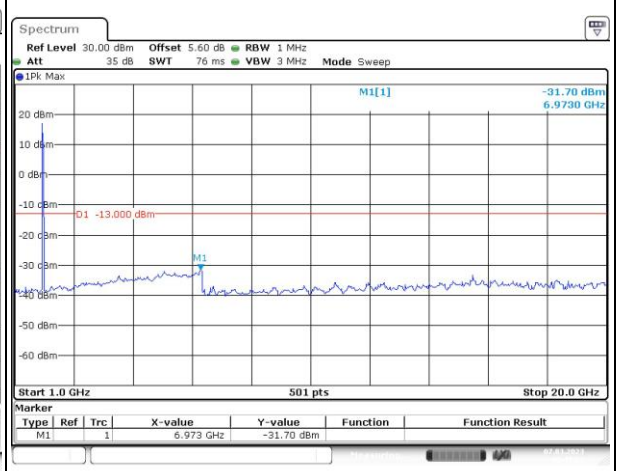
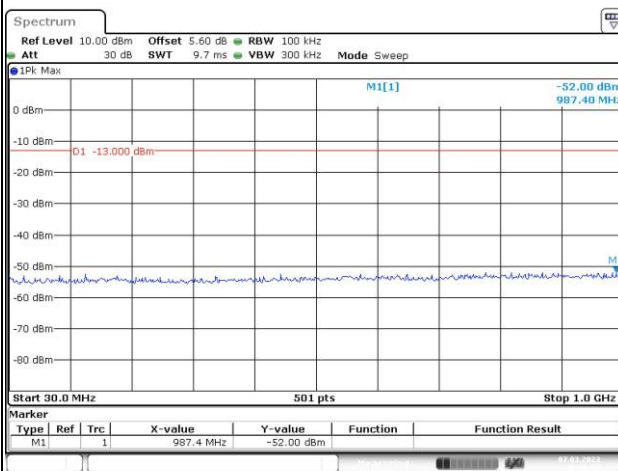
Lowest



Middle



Highest

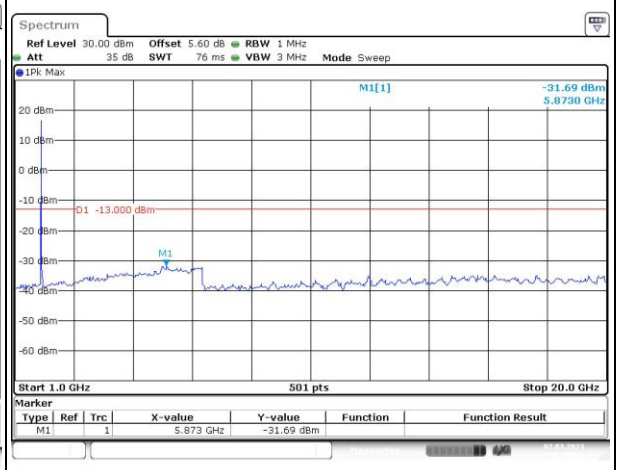
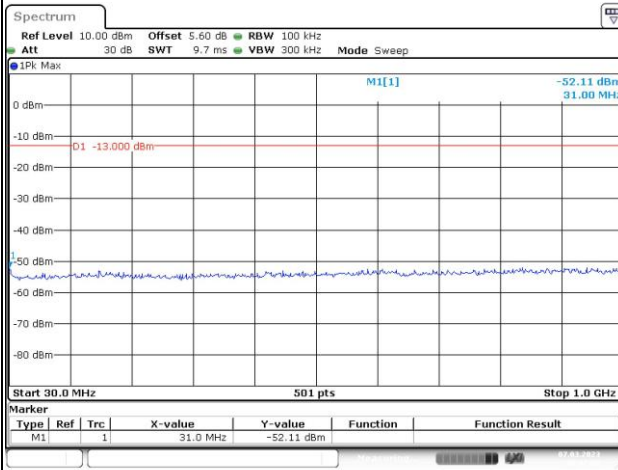


### Spurious Emissions at Antenna Terminal

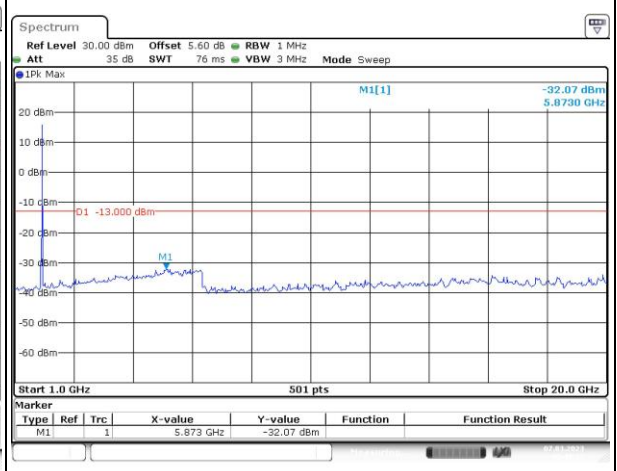
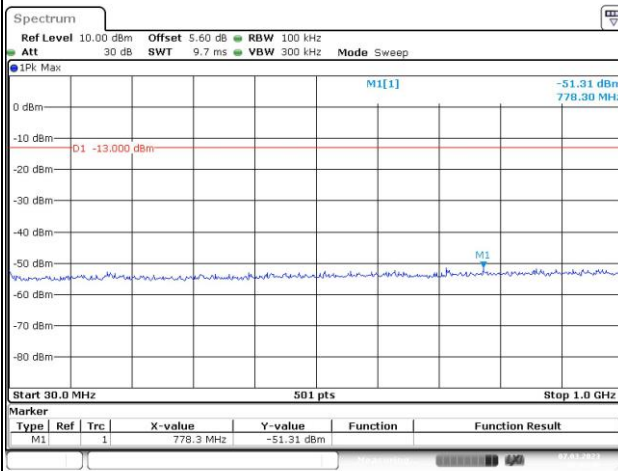
Channel

10MHz Bandwidth QPSK

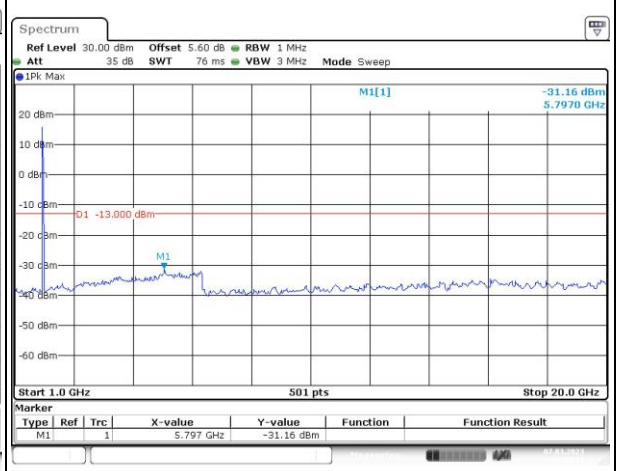
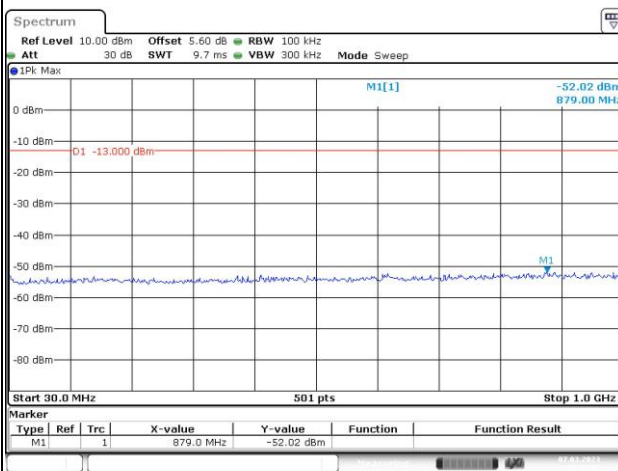
Lowest



Middle



Highest

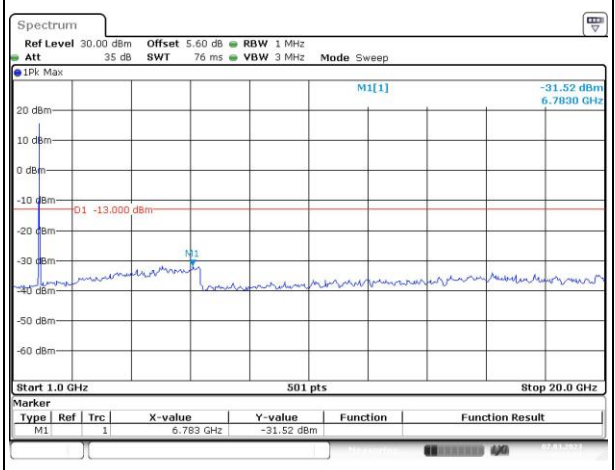
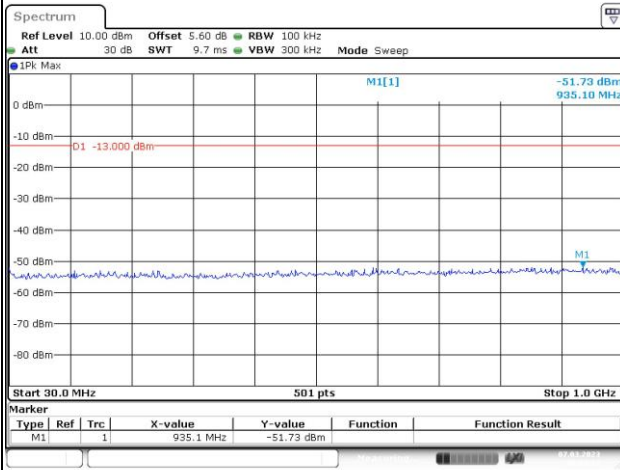


### Spurious Emissions at Antenna Terminal

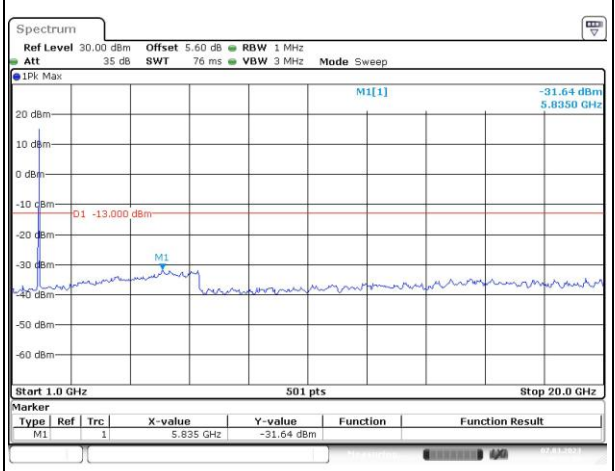
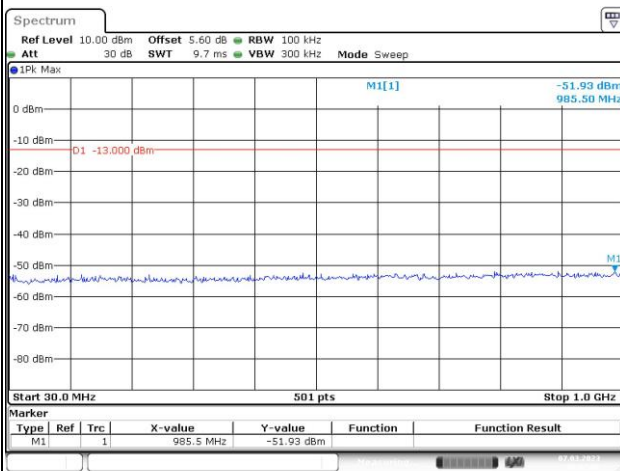
Channel

15MHz Bandwidth QPSK

Lowest



Middle



Highest

