

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:	1ZO9	Test Date:	2023/2/8~2023/2/21
Test Site:	RF	Test Mode:	Transmitting
Tester:	George Chen	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	21.1~24.2	Relative Humidity: (%)	39~53	ATM Pressure: (kPa)	101.2~102.1
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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	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	2022/04/06	2023/04/05
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2022/09/29	2023/09/28
UNI-T	Multimeter	UT39A+	C210582554	2022/9/29	2023/9/28

\* 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	21.95	22.21	22.58	21.57	38.45
HSDPA Subtest 1	21.91	21.72	21.93	20.92	38.45
HSDPA Subtest 2	21.85	22.24	22.46	21.45	38.45
HSDPA Subtest 3	21.6	21.59	21.96	20.95	38.45
HSDPA Subtest 4	21.54	21.74	21.62	20.73	38.45
HSUPA Subtest 1	22.01	22.21	22.52	21.51	38.45
HSUPA Subtest 2	21.83	21.8	22.4	21.39	38.45
HSUPA Subtest 3	21.55	21.49	21.93	20.92	38.45
HSUPA Subtest 4	21.53	21.57	22.16	21.15	38.45
HSUPA Subtest 5	21.43	21.85	21.85	20.84	38.45
DC-HSDPA Subtest 1	22.12	22.4	22.34	21.39	38.45
DC-HSDPA Subtest 2	21.73	21.85	22.49	21.48	38.45
DC-HSDPA Subtest 3	21.57	21.79	21.59	20.78	38.45
DC-HSDPA Subtest 4	21.41	21.7	21.44	20.69	38.45
HSPA+ Subtest 1	21.15	21.66	21.85	20.84	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	3.25	3.07	3.16	13
HSDPA	4.75	5.04	5.36	13
HSUPA	5.97	5.48	6.2	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	4.124	4.124	4.124	4.732	4.747	4.718
HSDPA	4.197	4.197	4.182	4.933	6.006	4.745
HSUPA	4.197	4.211	4.124	5.789	5.644	4.761

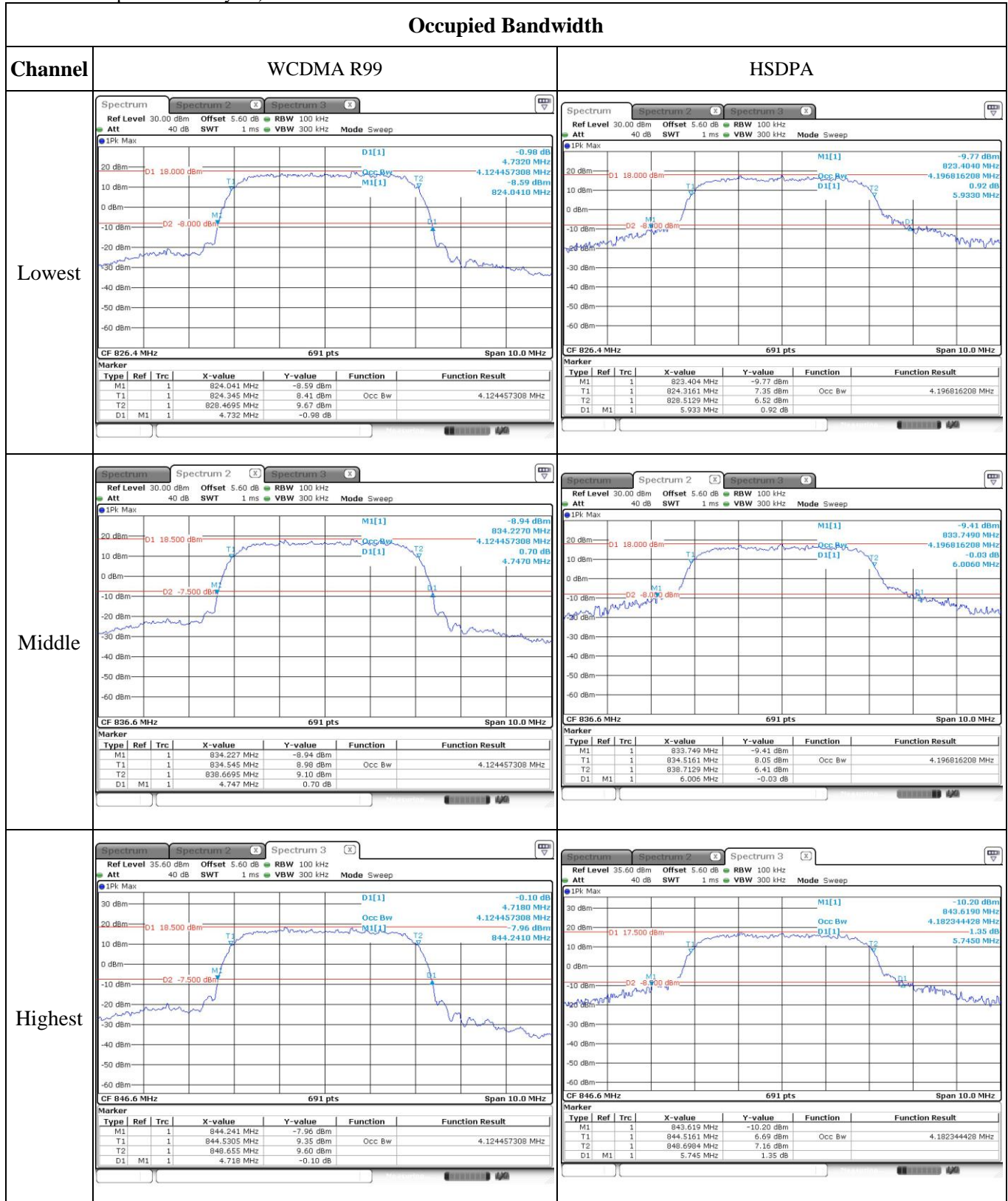
Note: The test plots please refer to the Plots of Occupied Bandwidth

<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>AC</sub> )	Frequency Error		Limit
			(Hz)	(ppm)	(ppm)
Frequency Stability vs. Temperature	-30	24	-2.86	-0.003	2.5
	-20	24	5.12	0.006	2.5
	-10	24	-7.54	-0.009	2.5
	0	24	6.69	0.008	2.5
	10	24	-9.3	-0.011	2.5
	20	24	-7.91	-0.009	2.5
	30	24	8.99	0.011	2.5
	40	24	8.43	0.010	2.5
Frequency Stability vs. Voltage	20	15	9.66	0.012	2.5
	20	30	-6.08	-0.007	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):

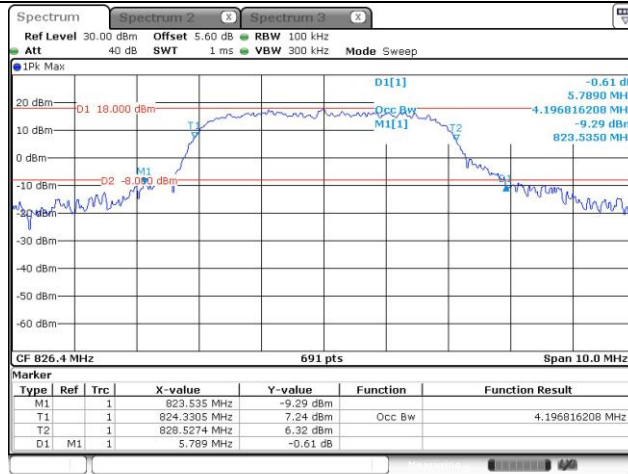


### Occupied Bandwidth

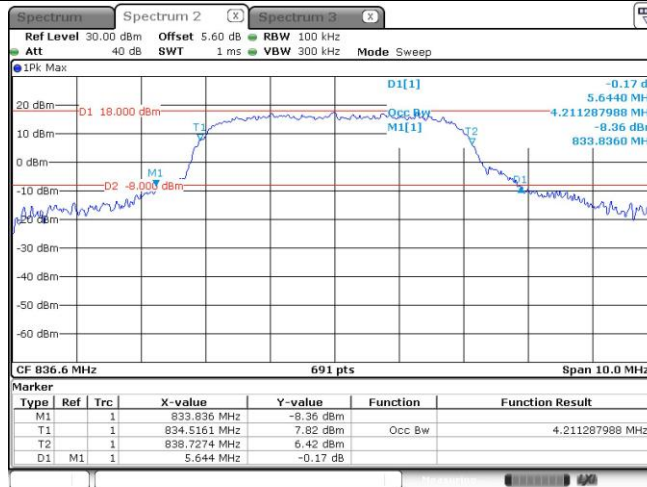
Channel

HSUPA

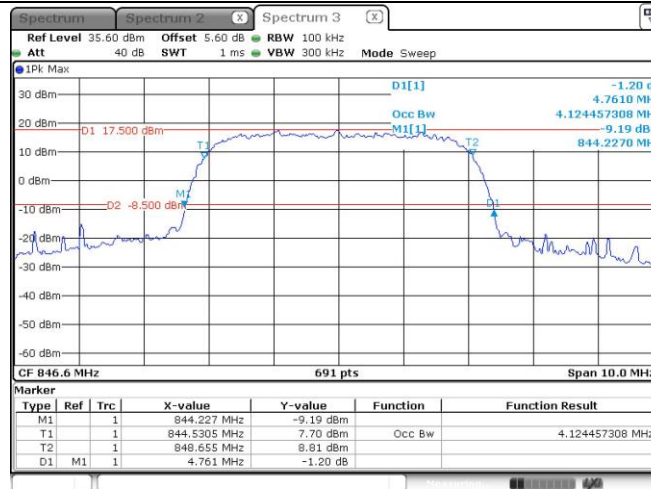
Lowest



Middle



Highest





### Spurious Emissions at Antenna Terminal

Channel	WCDMA R99	
Lowest	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 100 kHz Att 40 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>1Pk Max M1[1] -40.91 dBm 874.40 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p>	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 1 MHz Att 40 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>1Pk Max M1[1] -26.98 dBm 6.9720 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</p>
Middle	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 100 kHz Att 40 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>1Pk Max M1[1] -40.80 dBm 851.90 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p>	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 1 MHz Att 40 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>1Pk Max M1[1] -26.75 dBm 5.8000 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</p>
Highest	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 100 kHz Att 40 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>1Pk Max M1[1] -41.05 dBm 835.10 MHz</p> <p>D1 -13.000 dBm</p> <p>Start 30.0 MHz 691 pts Stop 1.0 GHz</p>	<p>Ref Level 35.60 dBm Offset 5.60 dB RBW 1 MHz Att 40 dB SWT 36 ms VBW 3 MHz Mode Sweep</p> <p>1Pk Max M1[1] -27.12 dBm 5.8000 GHz</p> <p>D1 -13.000 dBm</p> <p>Start 1.0 GHz 691 pts Stop 10.0 GHz</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:	1ZO9	Test Date:	2023/2/8~2023/2/21
Test Site:	RF	Test Mode:	Transmitting
Tester:	George Chen	Test Result:	Pass

**Environmental Conditions:**

Temperature: (°C)	21.1~24.2	Relative Humidity: (%)	39~53	ATM Pressure: (kPa)	101.2~102.1
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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	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	2022/04/06	2023/04/05
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30174	2022/09/29	2023/09/28
UNI-T	Multimeter	UT39A+	C210582554	2022/9/29	2023/9/28

\* 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	23.43	22.97	23.23	25.69	33
	RB1#3	23.44	23.09	23.16		
	RB1#5	23.29	23	23.09		
	RB3#0	23.4	23.05	23.08		
	RB3#3	23.49	23.37	23.02		
	RB6#0	22.42	22.12	22.09		
1.4MHz 16QAM	RB1#0	22.55	21.98	22.14	25.14	33
	RB1#3	22.94	22.1	22.13		
	RB1#5	22.76	22.16	22.07		
	RB3#0	22.52	22.19	22.21		
	RB3#3	22.65	22.12	22.22		
	RB6#0	21.51	21.12	21.23		
3MHz QPSK	RB1#0	23.45	22.92	23.01	25.69	33
	RB1#8	23.41	22.86	22.87		
	RB1#14	23.49	23.33	22.71		
	RB6#0	22.05	22.08	22.05		
	RB6#9	22.07	22.08	21.84		
	RB15#0	22.03	21.92	22.01		
3MHz 16QAM	RB1#0	22.2	21.71	22.34	24.72	33
	RB1#8	22.46	21.44	22.22		
	RB1#14	22.52	21.53	22.14		
	RB6#0	21.19	20.82	20.96		
	RB6#9	21.36	20.91	21.04		
	RB15#0	21.35	21.1	20.99		
5MHz QPSK	RB1#0	23.26	22.93	22.98	25.62	33
	RB1#13	23.18	22.92	23.11		
	RB1#24	23.42	23.17	22.89		
	RB15#0	22.46	22.08	22		
	RB15#10	22.37	22.11	21.93		
	RB25#0	22.27	22.11	22.19		
5MHz 16QAM	RB1#0	21.79	21.51	22.22	24.46	33
	RB1#13	21.8	21.33	22.26		
	RB1#24	21.9	21.59	22.1		
	RB15#0	21.11	21.25	21.04		
	RB15#10	21.04	21.33	21		
	RB25#0	21.05	21.32	21		
10MHz QPSK	RB1#0	23.53	23.1	23.13	25.73	33

	RB1#25	23.52	23.14	22.94		
	RB1#49	23.09	23.16	21.76		
	RB25#0	22.17	22.01	21.93		
	RB25#25	22.19	22.08	21.89		
	RB50#0	22.13	22.06	21.91		
10MHz 16QAM	RB1#0	21.75	22.25	22.48	24.79	33
	RB1#25	21.79	22.5	22.59		
	RB1#49	21.57	22.24	20.89		
	RB25#0	21.27	20.96	21.15		
	RB25#25	21.2	21.05	21.19		
	RB50#0	21.2	20.91	20.81		
15MHz QPSK	RB1#0	23.08	23.1	22.9	25.52	33
	RB1#38	22.96	22.93	22.71		
	RB1#74	22.95	23.32	21.43		
	RB36#0	22.13	21.79	21.72		
	RB36#39	21.99	21.81	21.84		
	RB75#0	22.08	21.77	21.77		
15MHz 16QAM	RB1#0	21.89	22.21	22.27	24.47	33
	RB1#38	21.82	22.1	22.24		
	RB1#74	21.32	22.24	20.59		
	RB36#0	21.13	20.69	20.91		
	RB36#39	20.71	20.7	20.82		
	RB75#0	21.01	20.79	20.83		
20MHz QPSK	RB1#0	23.26	22.83	22.81	25.75	33
	RB1#50	23.55	23	22.49		
	RB1#99	22.79	22.95	21.15		
	RB50#0	21.98	21.82	21.77		
	RB50#50	21.81	21.78	21.78		
	RB100#0	21.88	21.82	21.77		
20MHz 16QAM	RB1#0	21.92	22.35	22.06	25.17	33
	RB1#50	21.73	22.97	22.07		
	RB1#99	21.66	22.78	20.47		
	RB50#0	20.99	20.49	20.65		
	RB50#50	20.76	20.66	20.66		
	RB100#0	20.87	20.53	20.76		

Note: EIRP=Conducted Power(dBm) - Lc(dB) + Gr(dBi)

**Result:**

**Pass**

<b>Peak-to-average Ratio(PAR)</b>					
Test Bandwidth & Modulation	Resource Block & RB offset	Peak-to-average Ratio(dB)			Limit (dB)
		Lowest Channel	Middle Channel	Highest Channel	
20MHz QPSK	RB1#0	4.75	4.93	4.55	13
	RB100#0	3.97	4.03	3.94	13
20MHz 16QAM	RB1#0	5.54	5.86	5.48	13
	RB100#0	5.86	5.83	5.8	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	1.108	1.108	1.302	1.32	1.302
1.4MHz 16QAM	1.102	1.096	1.102	1.32	1.296	1.32
3MHz QPSK	2.695	2.683	2.695	2.94	2.964	2.94
3MHz 16QAM	2.683	2.683	2.695	2.964	2.94	2.964
5MHz QPSK	4.511	4.491	4.531	5	5.02	5.04
5MHz 16QAM	4.531	4.531	4.511	5.06	5.08	5.02
10MHz QPSK	8.942	8.942	8.942	9.72	9.84	9.68
10MHz 16QAM	8.942	8.902	8.942	9.72	9.64	9.64
15MHz QPSK	13.473	13.473	13.353	14.82	14.94	14.7
15MHz 16QAM	13.473	13.473	13.473	14.76	14.82	14.7
20MHz QPSK	17.804	17.964	17.804	19.28	19.6	19.28
20MHz 16QAM	17.884	17.964	17.884	19.44	19.36	19.36
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>

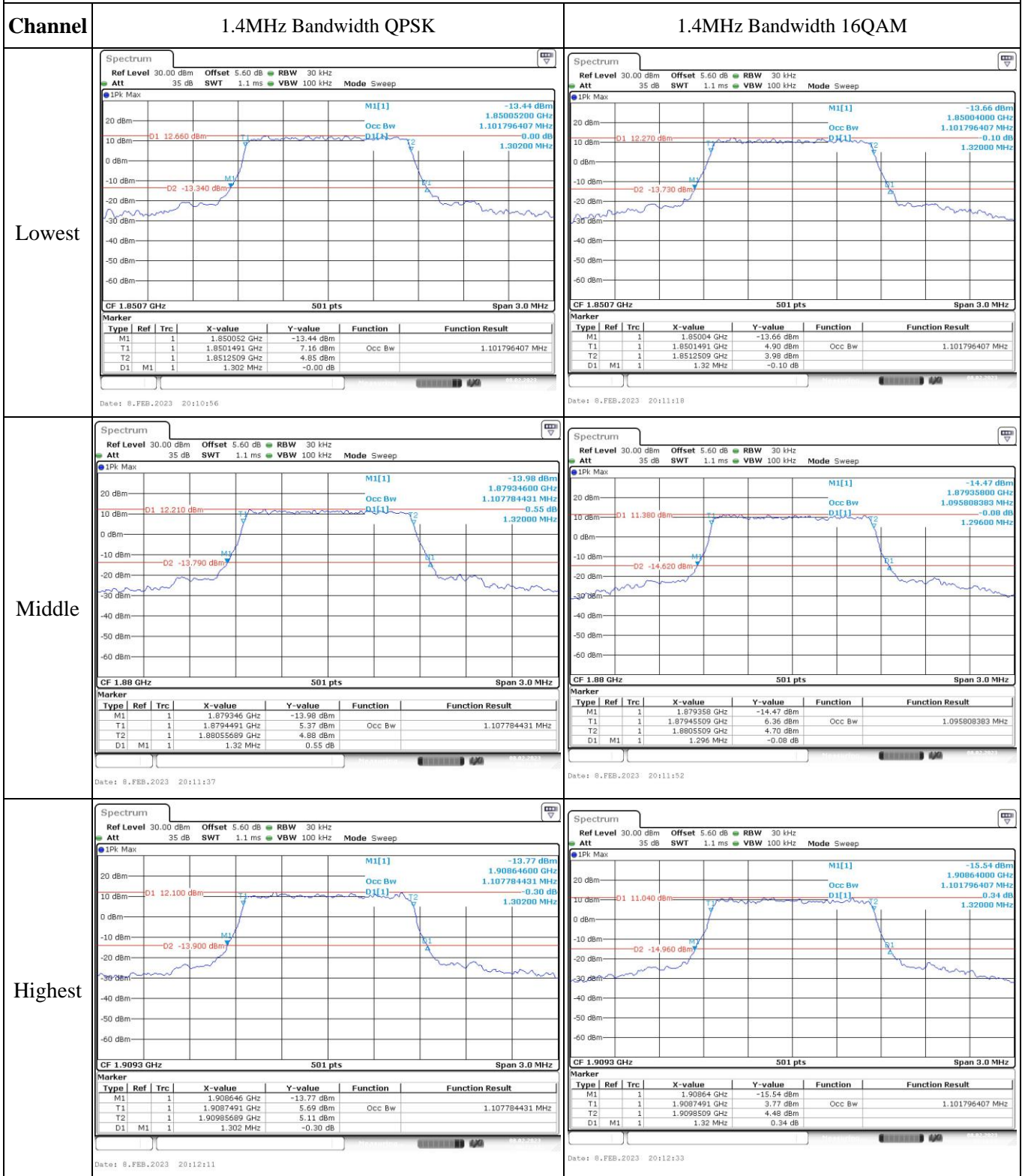
**FCC §2.1055, §24.235: Frequency Stability**

Test Mode:	20M QPSK	Test Channel: Lowest for Lower Edge,Highest for Upper Edge				
Test Item	Temperature (°C)	Voltage (V <sub>AC</sub> )	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	24	1851.091	1850.000	1908.808	1910.000
	-20	24	1851.060	1850.000	1908.868	1910.000
	-10	24	1851.158	1850.000	1908.894	1910.000
	0	24	1851.127	1850.000	1908.889	1910.000
	10	24	1851.146	1850.000	1908.842	1910.000
	20	24	1851.138	1850.000	1908.862	1910.000
	30	24	1851.114	1850.000	1908.841	1910.000
	40	24	1851.082	1850.000	1908.824	1910.000
	50	24	1851.140	1850.000	1908.876	1910.000
Frequency Stability vs. Voltage	20	15	1851.102	1850.000	1908.803	1910.000
	20	30	1851.107	1850.000	1908.809	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>AC</sub> )	Lower Edge (MHz)		Upper Edge (MHz)	
			Result	Limit	Result	Limit
Frequency Stability vs. Temperature	-30	24	1851.055	1850.000	1908.923	1910.000
	-20	24	1851.009	1850.000	1908.924	1910.000
	-10	24	1851.093	1850.000	1908.974	1910.000
	0	24	1851.020	1850.000	1908.918	1910.000
	10	24	1851.059	1850.000	1908.963	1910.000
	20	24	1851.058	1850.000	1908.942	1910.000
	30	24	1851.014	1850.000	1908.963	1910.000
	40	24	1851.027	1850.000	1908.915	1910.000
	50	24	1851.010	1850.000	1908.916	1910.000
Frequency Stability vs. Voltage	20	15	1851.067	1850.000	1908.909	1910.000
	20	30	1851.044	1850.000	1908.991	1910.000
					<b>Result:</b>	<b>Pass</b>

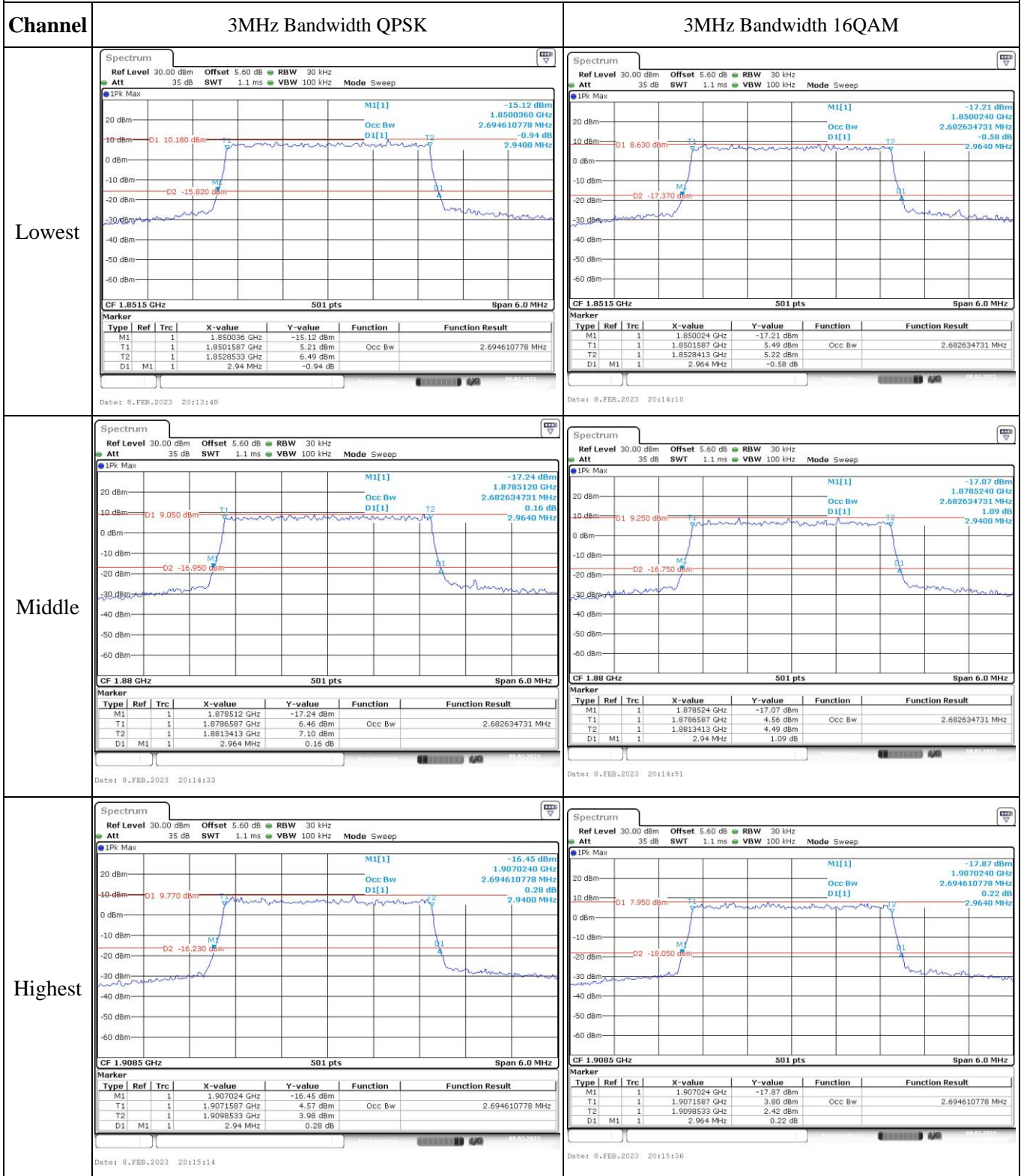
**Test Plots**(Note: The 5.6dB is the Insertion loss of the RF cable, Power Splitter and DC Block, which was offset into the Spectrum Analyzer):

**Occupied Bandwidth**





### Occupied Bandwidth



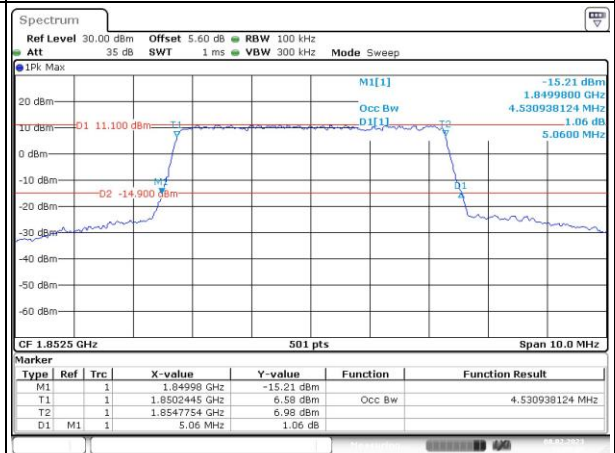
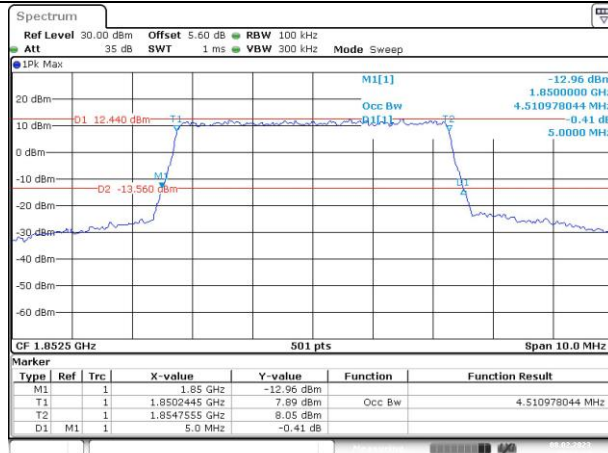
### Occupied Bandwidth

Channel

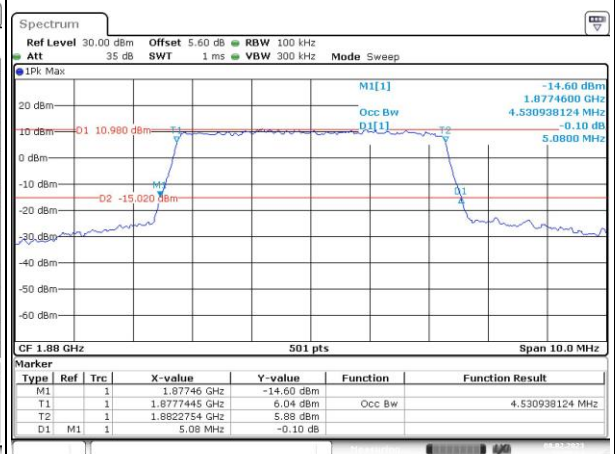
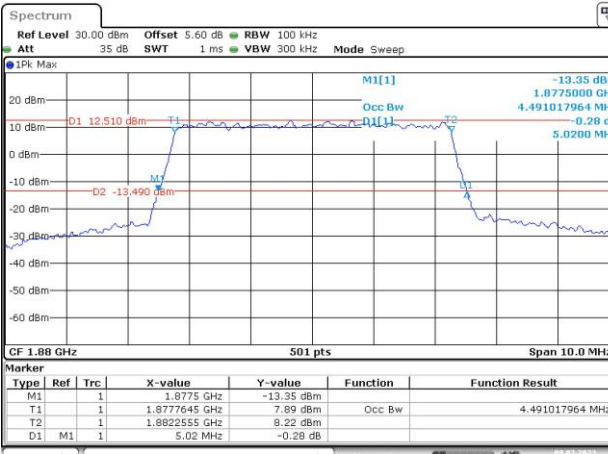
5MHz Bandwidth QPSK

5MHz Bandwidth 16QAM

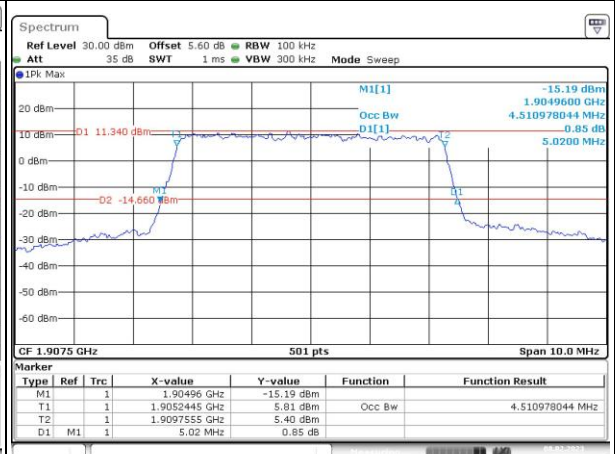
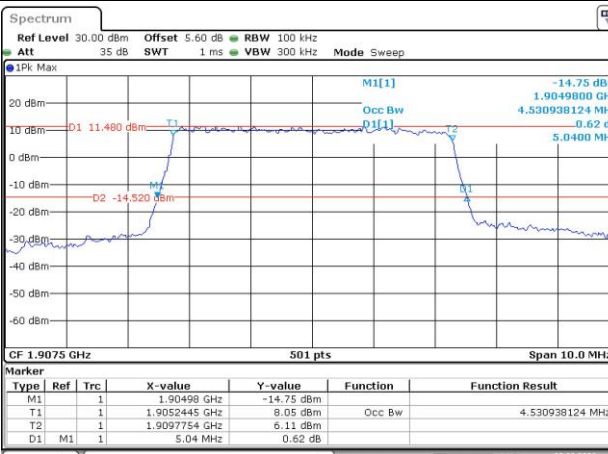
Lowest



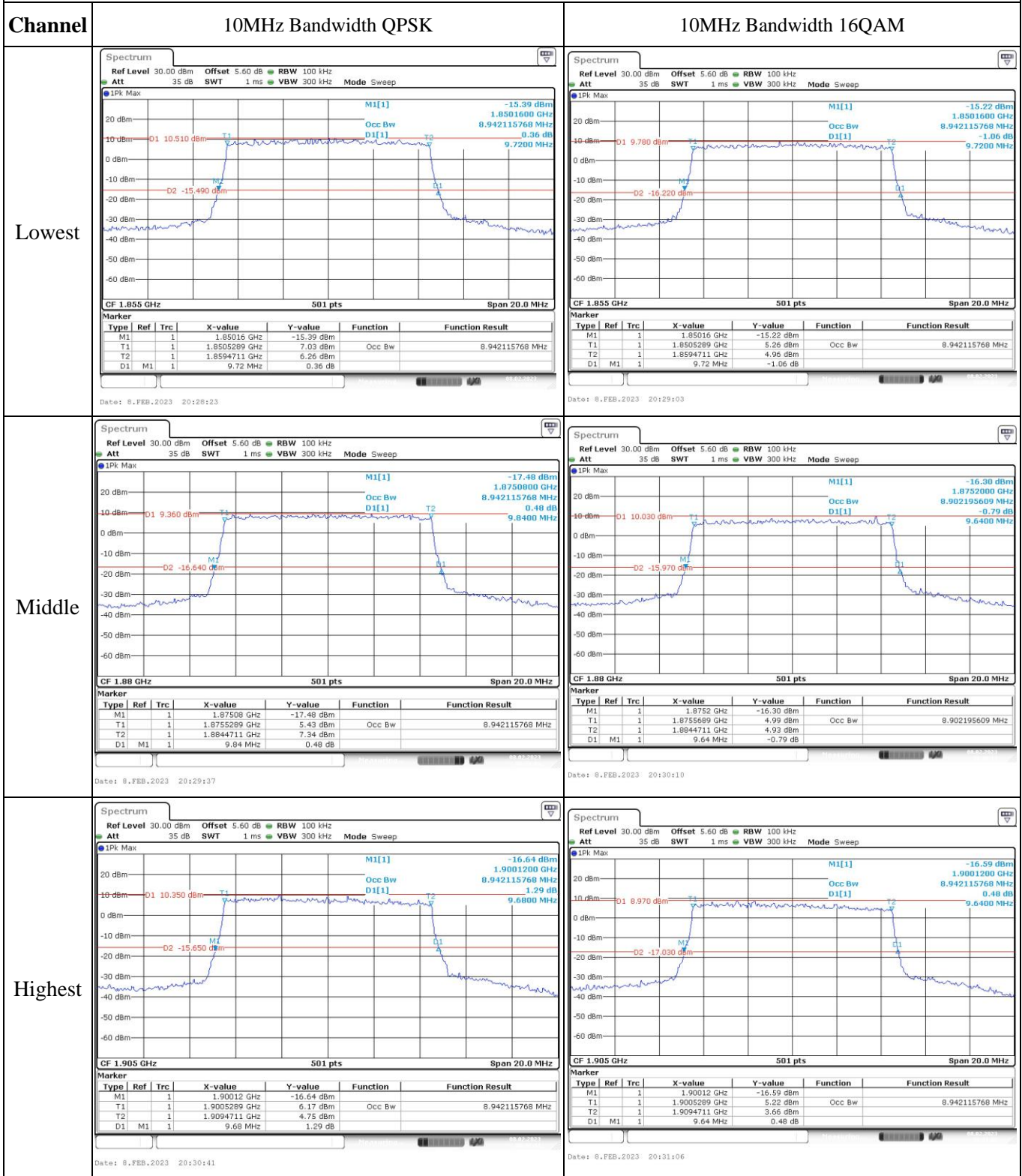
Middle



Highest



### Occupied Bandwidth





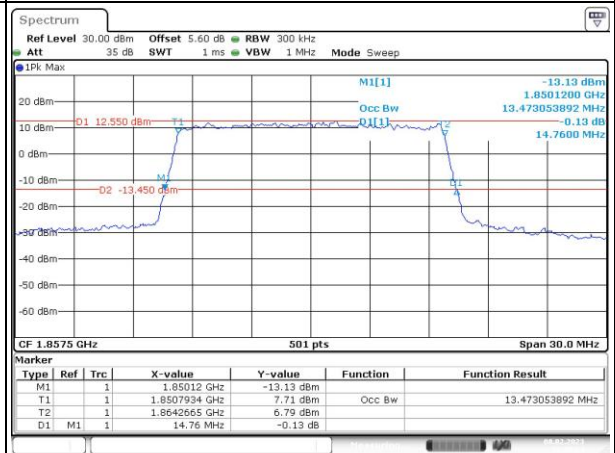
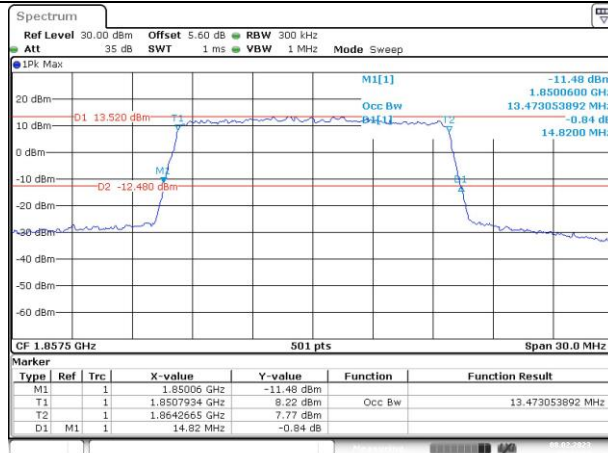
### Occupied Bandwidth

Channel

15MHz Bandwidth QPSK

15MHz Bandwidth 16QAM

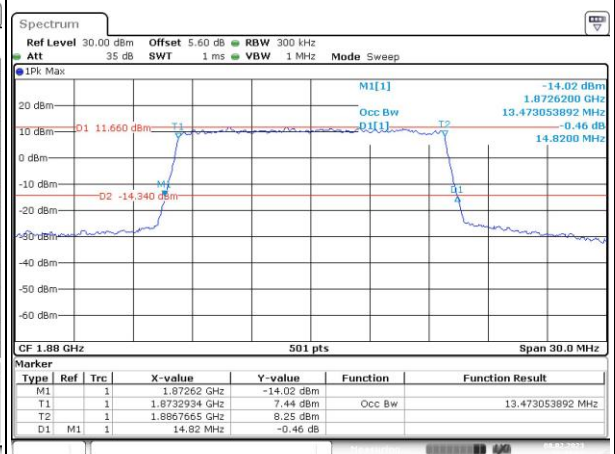
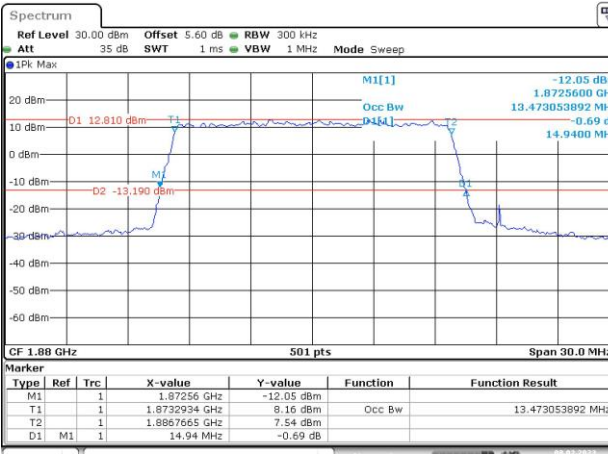
Lowest



Date: 8.FEB.2023 20:32:23

Date: 8.FEB.2023 20:32:14

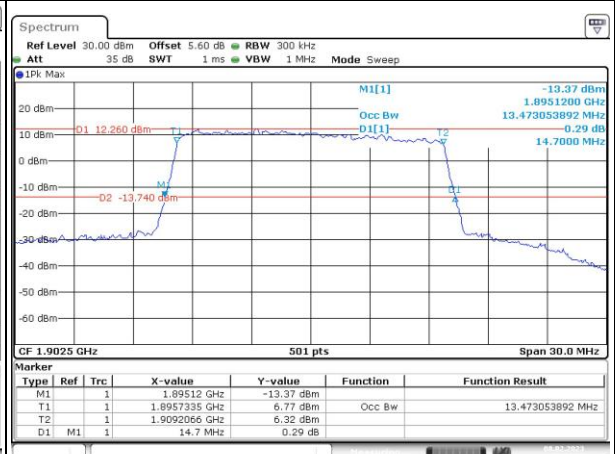
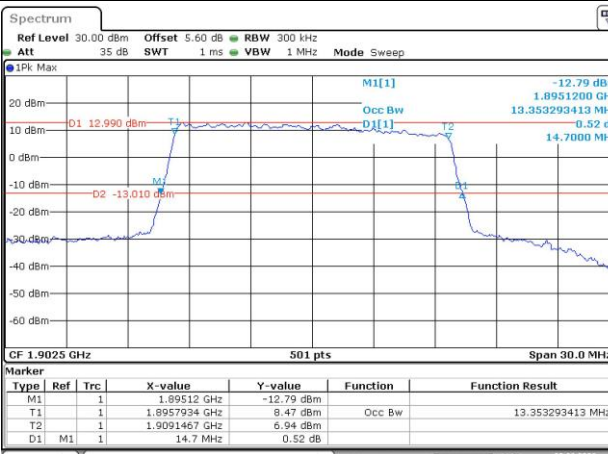
Middle



Date: 8.FEB.2023 20:33:22

Date: 8.FEB.2023 20:33:17

Highest



Date: 8.FEB.2023 20:34:29

Date: 8.FEB.2023 20:34:12

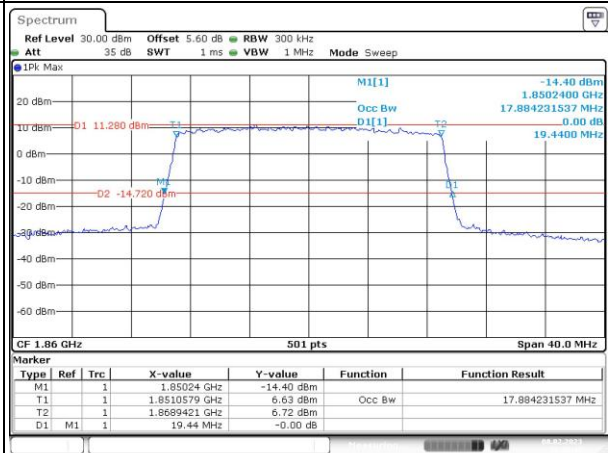
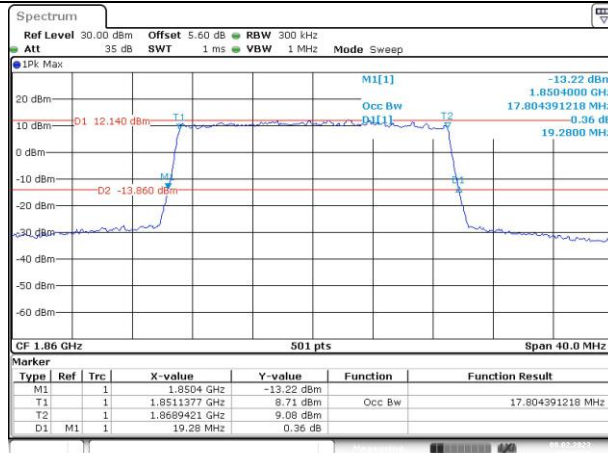
### Occupied Bandwidth

Channel

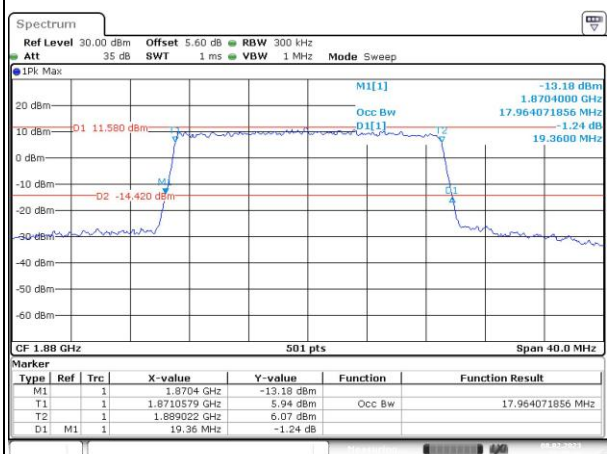
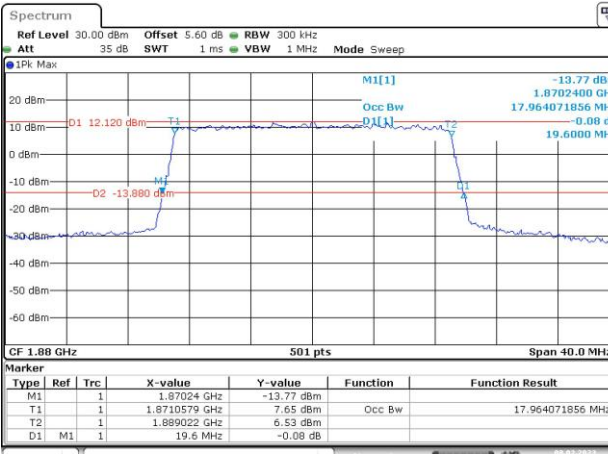
20MHz Bandwidth QPSK

20MHz Bandwidth 16QAM

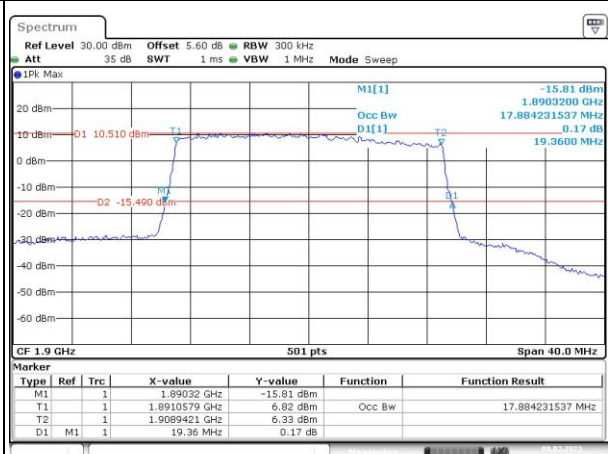
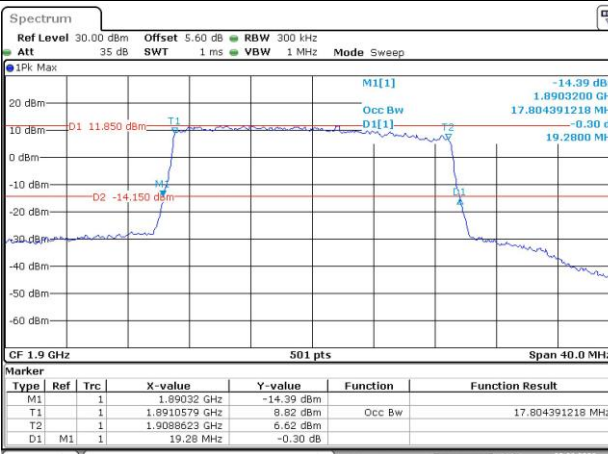
Lowest



Middle



Highest

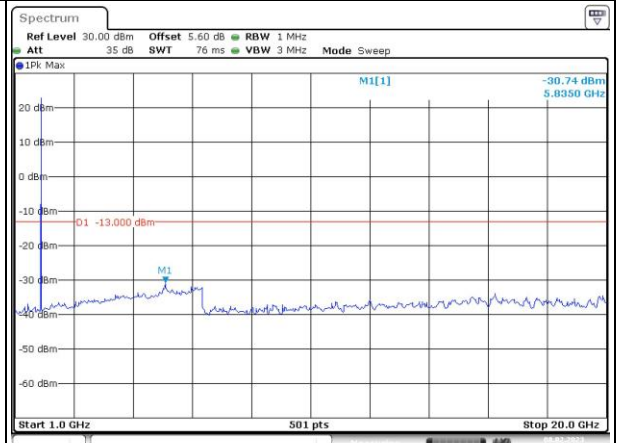
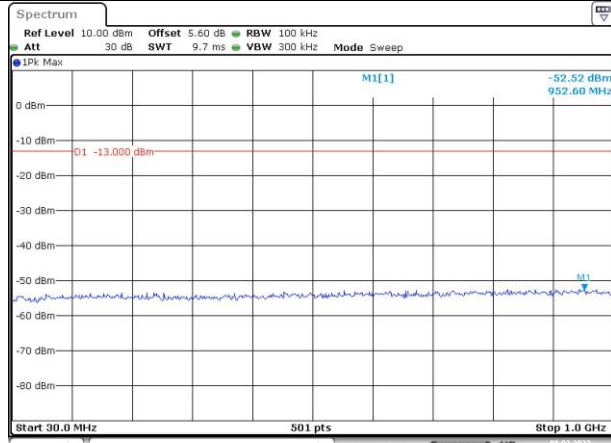


Spurious Emissions at Antenna Terminal

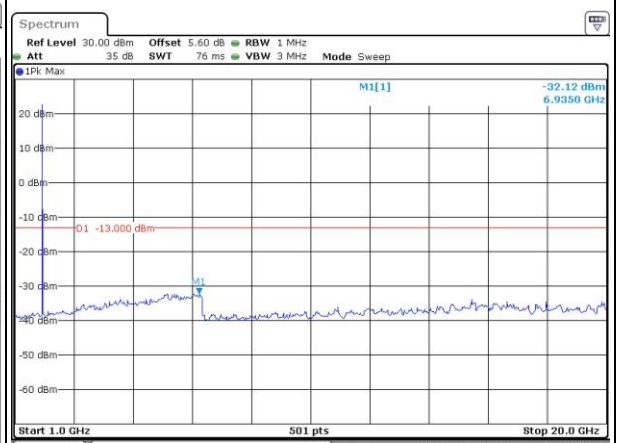
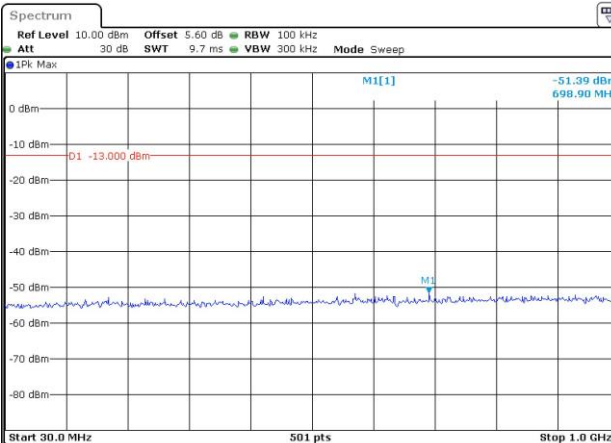
Channel

1.4MHz Bandwidth QPSK

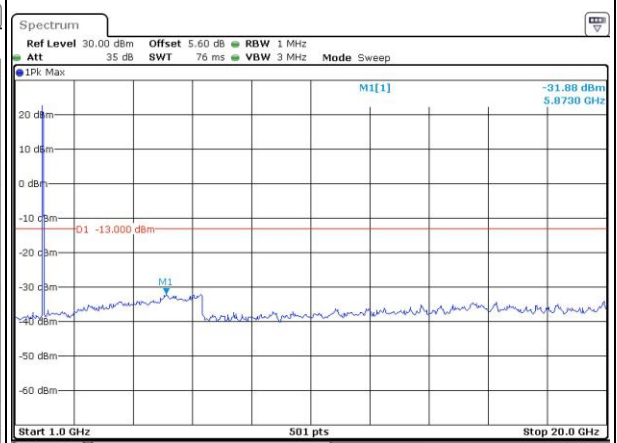
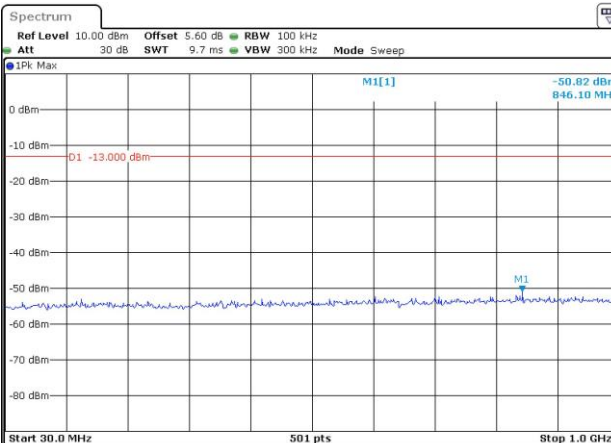
Lowest



Middle



Highest



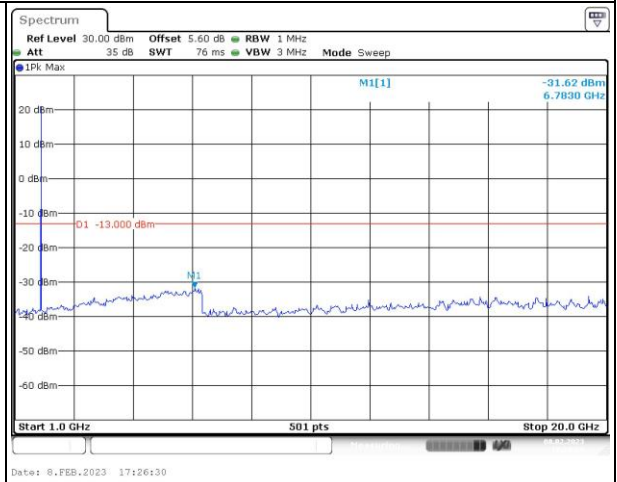
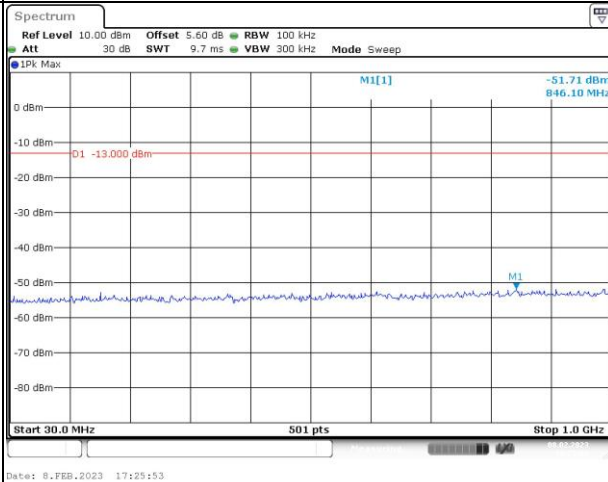


### Spurious Emissions at Antenna Terminal

Channel

3MHz Bandwidth QPSK

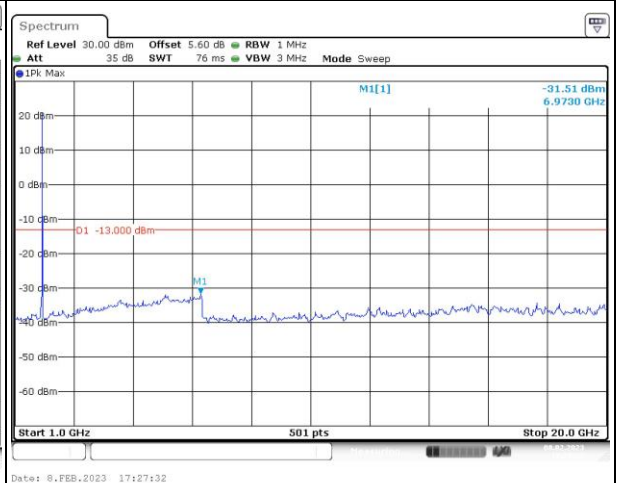
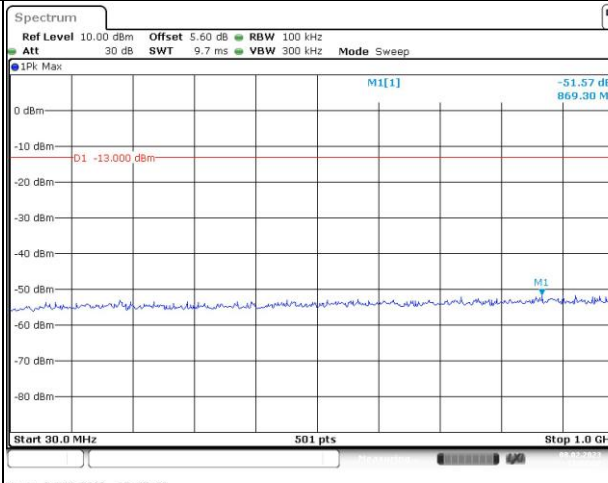
Lowest



Date: 8.FEB.2023 17:29:53

Date: 8.FEB.2023 17:26:30

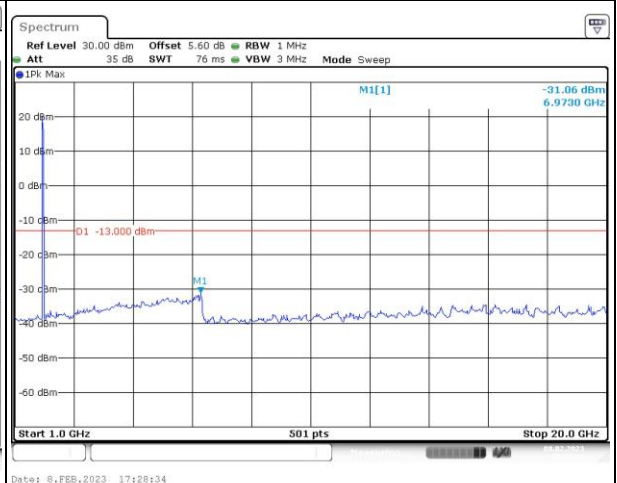
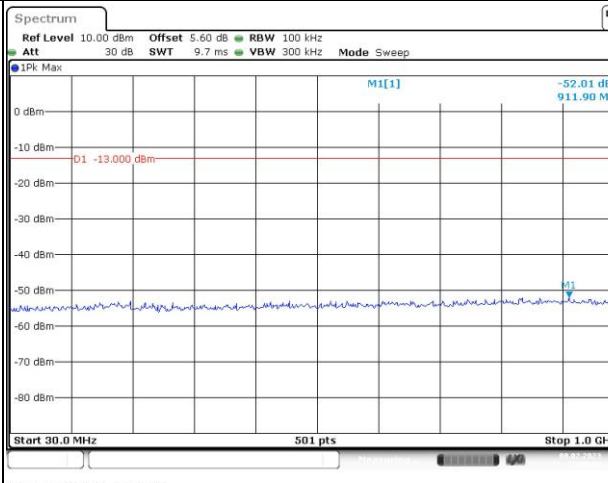
Middle



Date: 8.FEB.2023 17:27:03

Date: 8.FEB.2023 17:27:32

Highest



Date: 8.FEB.2023 17:28:05

Date: 8.FEB.2023 17:28:34

### Spurious Emissions at Antenna Terminal

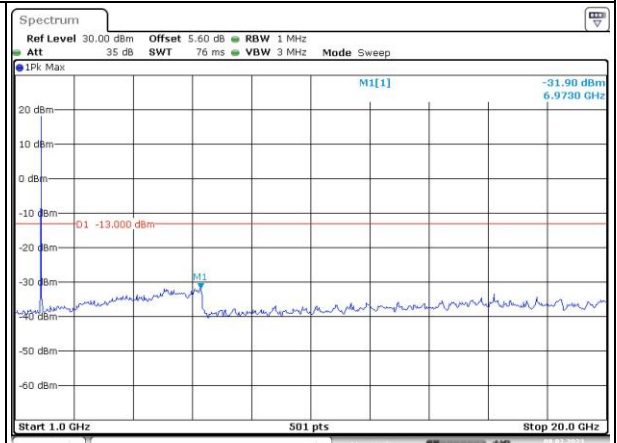
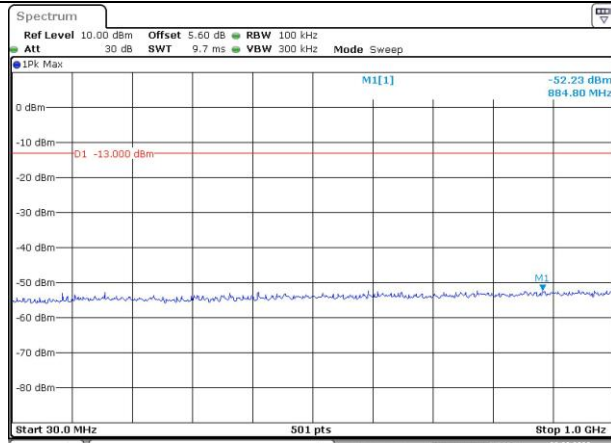
Channel	5MHz Bandwidth QPSK	
Lowest	<p>Ref Level 10.00 dBm Offset 5.60 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPK Max MI[1] -51.93 dBm 927.40 MHz</p> <p>Start 30.0 MHz 501 pts Stop 1.0 GHz</p> <p>Date: 8.FEB.2023 17:47:49</p>	<p>Ref Level 30.00 dBm Offset 5.60 dB RBW 1 MHz Att 35 dB SWT 76 ms VBW 3 MHz Mode Sweep</p> <p>IPK Max MI[1] -31.95 dBm 5.7970 GHz</p> <p>Start 1.0 GHz 501 pts Stop 20.0 GHz</p> <p>Date: 8.FEB.2023 17:48:22</p>
	<p>Ref Level 10.00 dBm Offset 5.60 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPK Max MI[1] -51.90 dBm 869.30 MHz</p> <p>Start 30.0 MHz 501 pts Stop 1.0 GHz</p> <p>Date: 8.FEB.2023 17:48:55</p>	<p>Ref Level 30.00 dBm Offset 5.60 dB RBW 1 MHz Att 35 dB SWT 76 ms VBW 3 MHz Mode Sweep</p> <p>IPK Max MI[1] -31.99 dBm 6.9350 GHz</p> <p>Start 1.0 GHz 501 pts Stop 20.0 GHz</p> <p>Date: 8.FEB.2023 17:49:20</p>
Highest	<p>Ref Level 10.00 dBm Offset 5.60 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep</p> <p>IPK Max MI[1] -51.36 dBm 824.80 MHz</p> <p>Start 30.0 MHz 501 pts Stop 1.0 GHz</p> <p>Date: 8.FEB.2023 17:50:04</p>	<p>Ref Level 30.00 dBm Offset 5.60 dB RBW 1 MHz Att 35 dB SWT 76 ms VBW 3 MHz Mode Sweep</p> <p>IPK Max MI[1] -31.48 dBm 5.7590 GHz</p> <p>Start 1.0 GHz 501 pts Stop 20.0 GHz</p> <p>Date: 8.FEB.2023 17:50:30</p>

### Spurious Emissions at Antenna Terminal

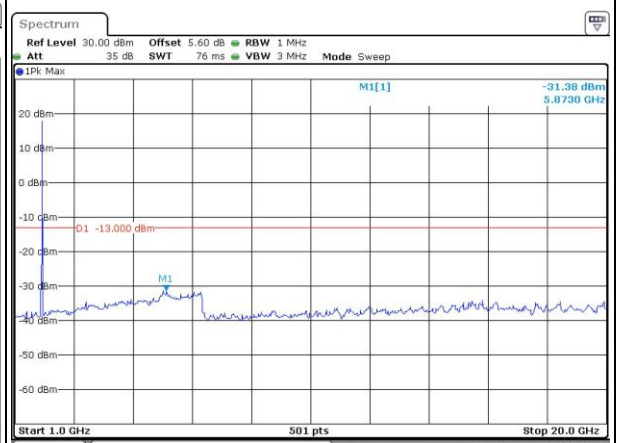
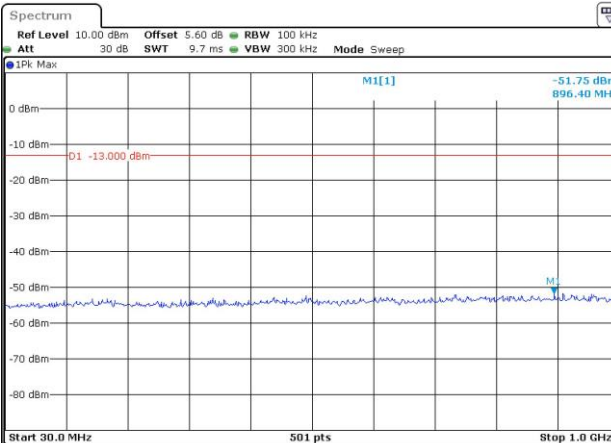
Channel

10MHz Bandwidth QPSK

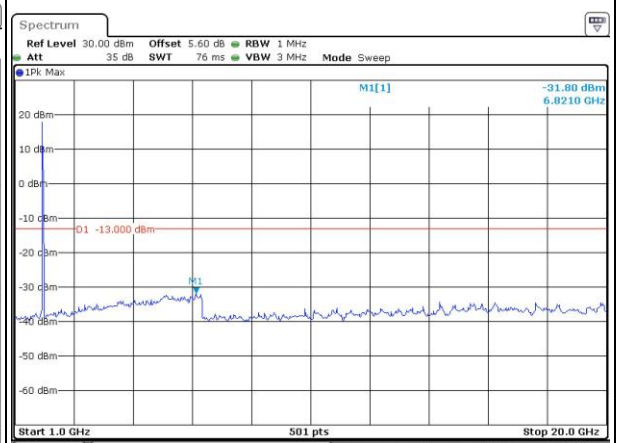
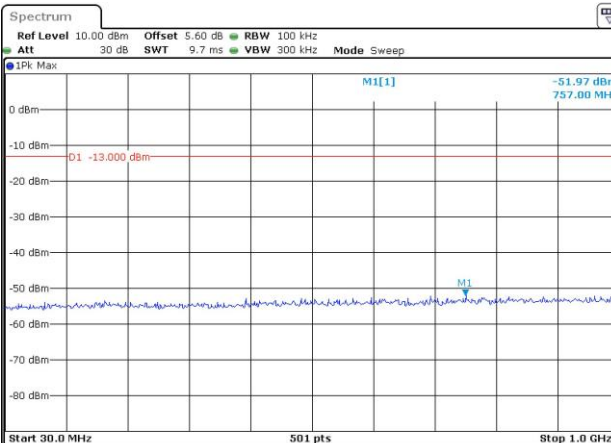
Lowest



Middle



Highest

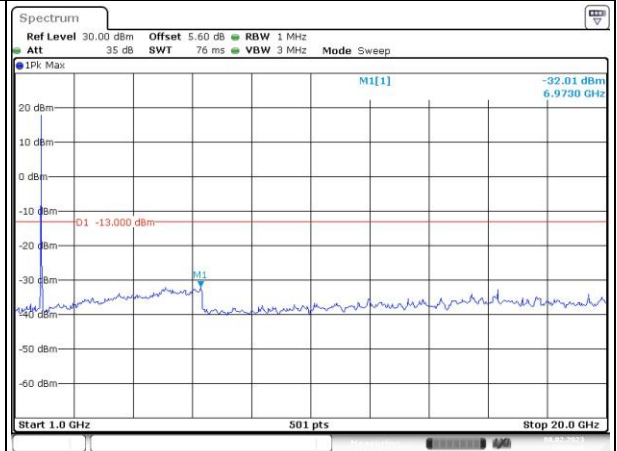
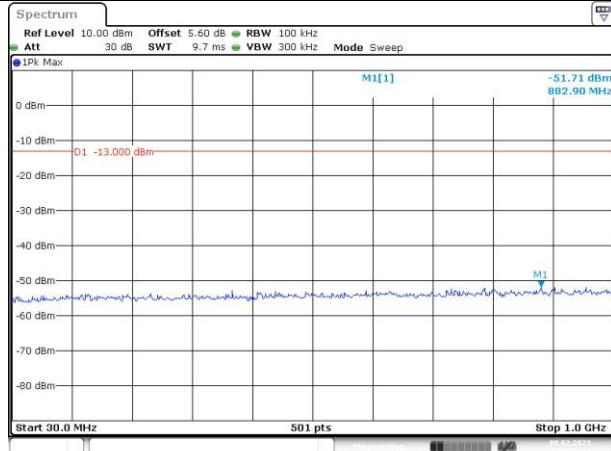


### Spurious Emissions at Antenna Terminal

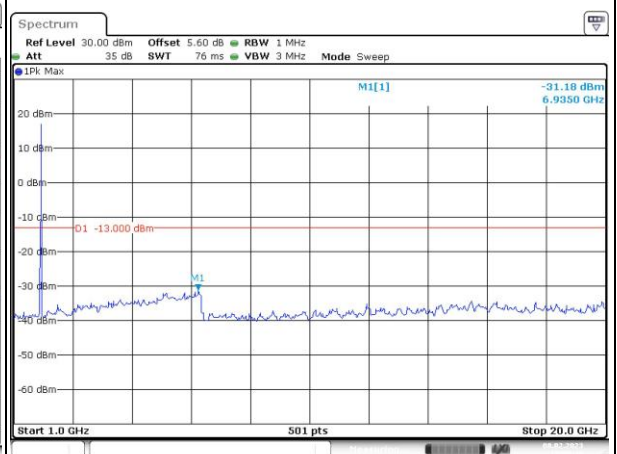
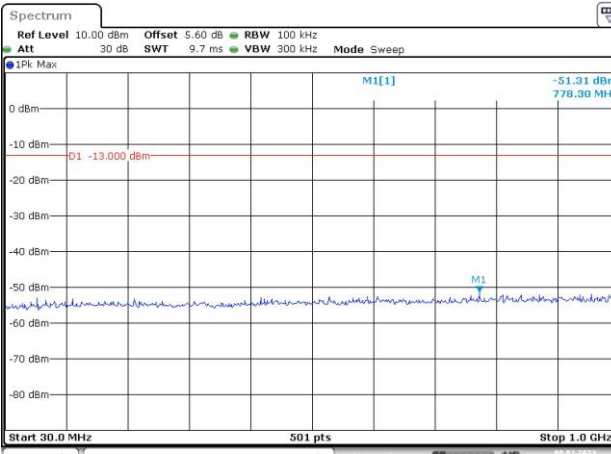
Channel

15MHz Bandwidth QPSK

Lowest



Middle



Highest

