

Occupied Bandwidth

Channel	15MHz Bandwidth QPSK	15MHz Bandwidth 16QAM
Lowest		
Middle		
Highest		

Occupied Bandwidth

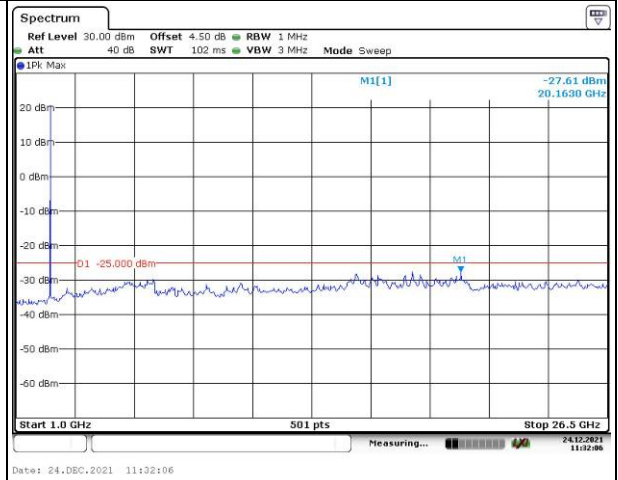
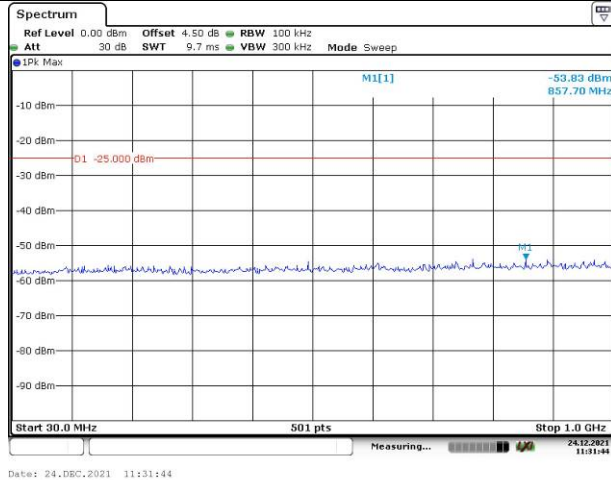
Channel	20MHz Bandwidth QPSK	20MHz Bandwidth 16QAM
Lowest		
Middle		
Highest		

Spurious Emissions at Antenna Terminal

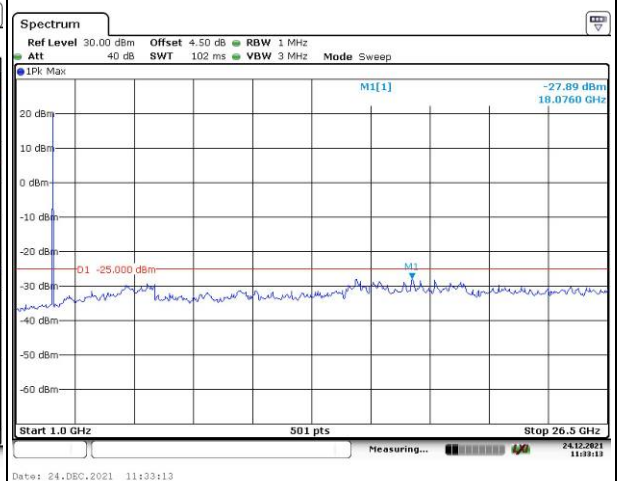
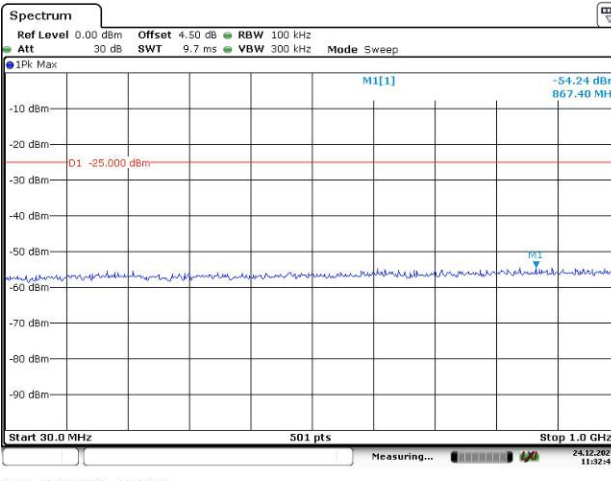
Channel

5MHz Bandwidth QPSK

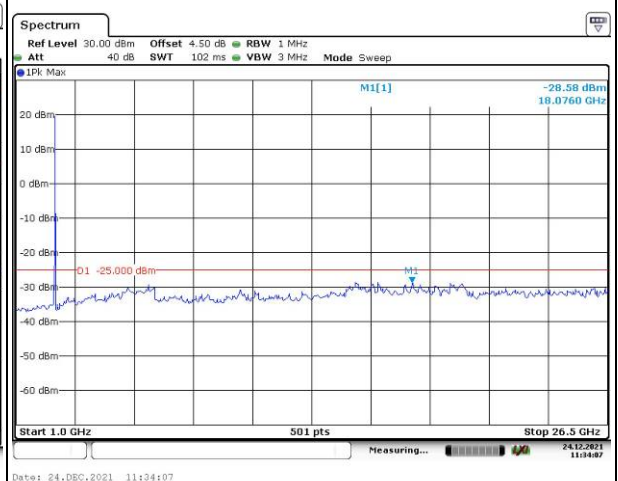
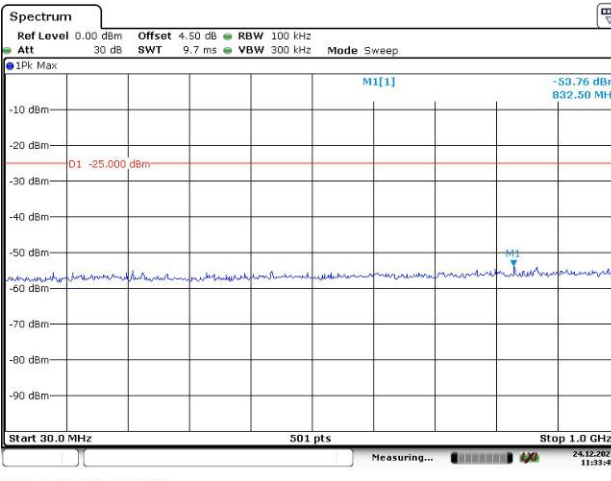
Lowest



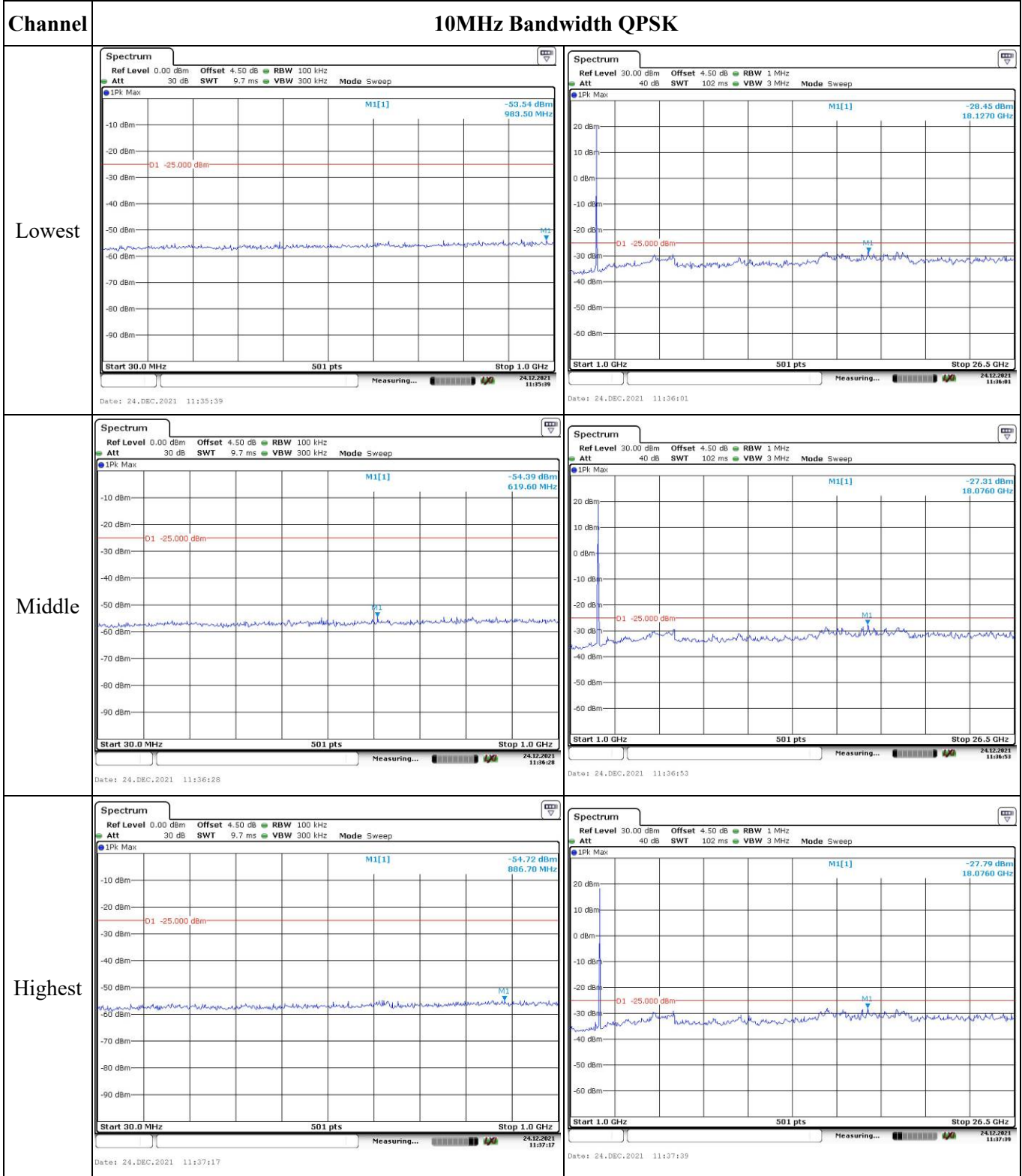
Middle



Highest



Spurious Emissions at Antenna Terminal

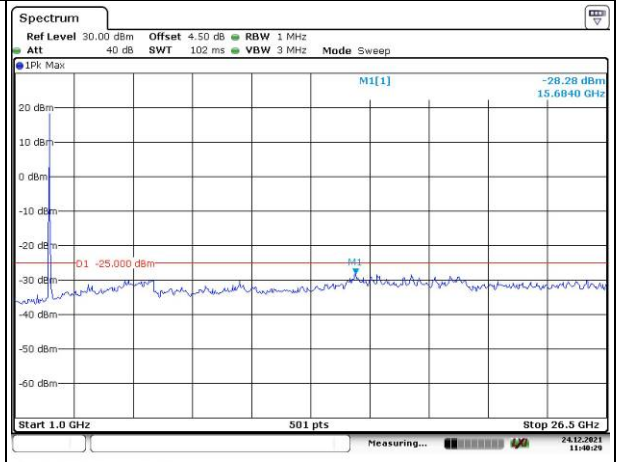
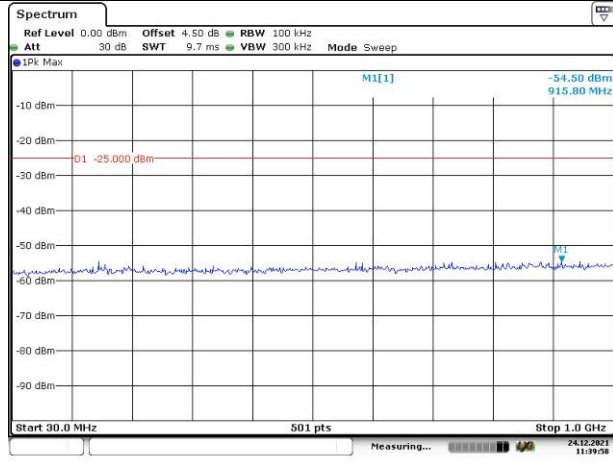


Spurious Emissions at Antenna Terminal

Channel

15MHz Bandwidth QPSK

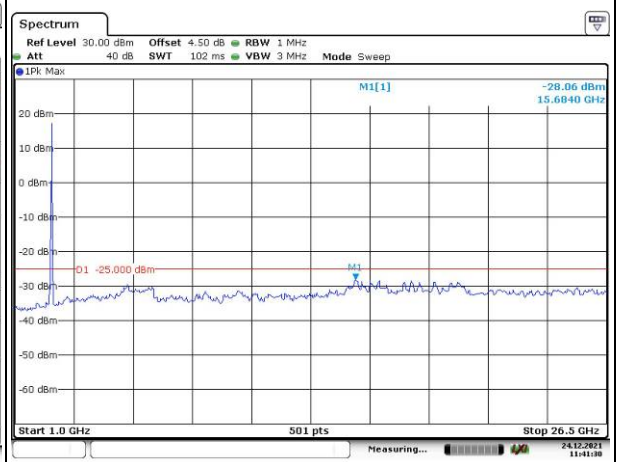
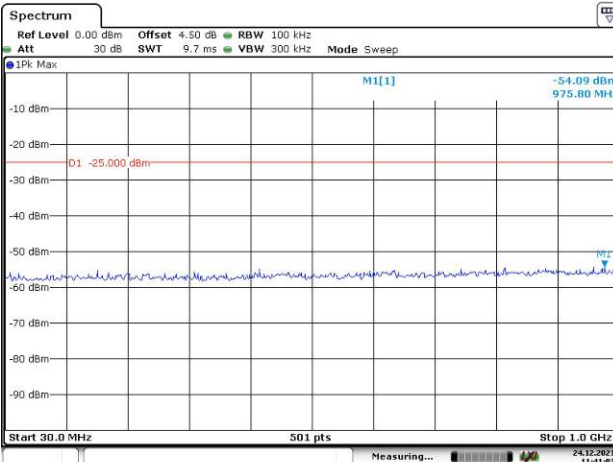
Lowest



Date: 24.DEC.2021 11:39:58

Date: 24.DEC.2021 11:40:30

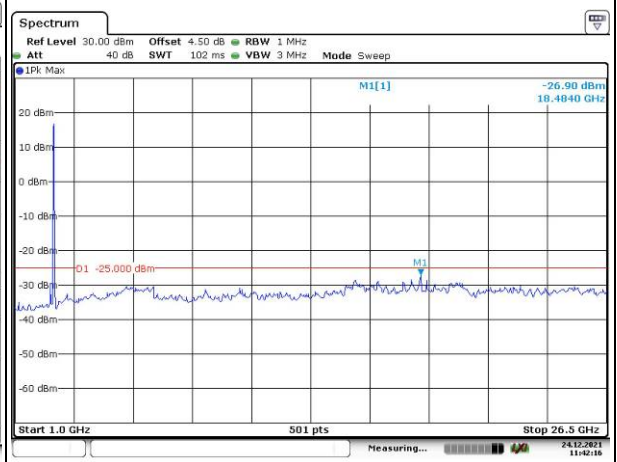
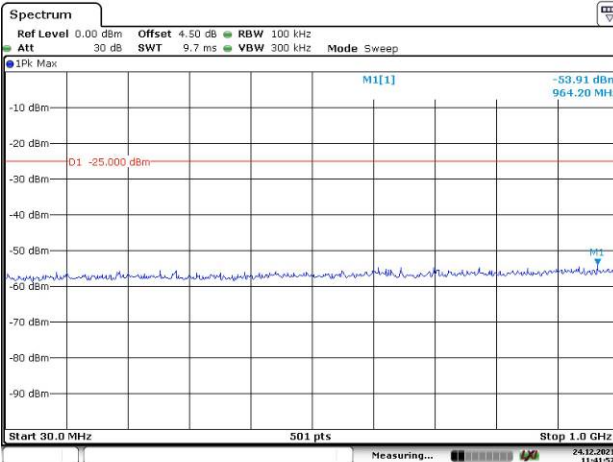
Middle



Date: 24.DEC.2021 11:41:02

Date: 24.DEC.2021 11:41:31

Highest



Date: 24.DEC.2021 11:41:57

Date: 24.DEC.2021 11:42:16

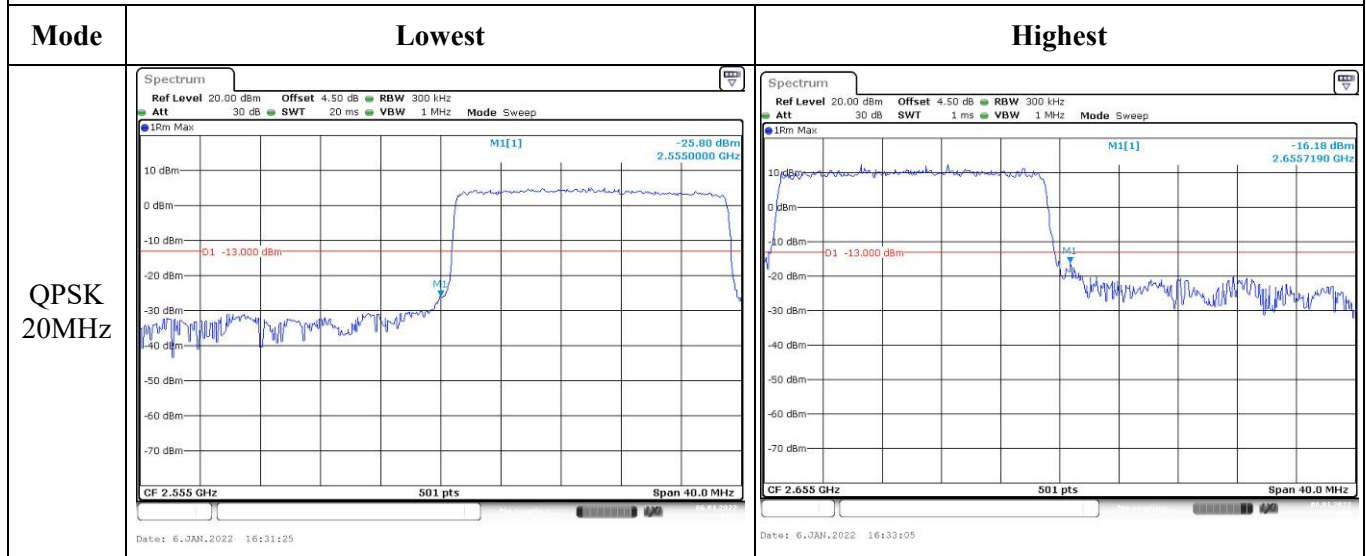
Spurious Emissions at Antenna Terminal

Channel	20MHz Bandwidth QPSK	
Lowest	<p>Spectrum Ref Level 0.00 dBm Offset 4.50 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep IPk Max M1[1] -54.70 dBm 704.70 MHz -01 -25.000 dBm Start 30.0 MHz 501 pts Stop 1.0 GHz Measuring... 24.12.2021 11:42:50 Date: 24.DEC.2021 11:42:50</p>	<p>Spectrum Ref Level 30.00 dBm Offset 4.50 dB RBW 1 MHz Att 40 dB SWT 102 ms VBW 3 MHz Mode Sweep IPk Max M1[1] -28.23 dBm 15.6330 GHz -01 -25.000 dBm Start 1.0 GHz 501 pts Stop 26.5 GHz Measuring... 24.12.2021 11:43:15 Date: 24.DEC.2021 11:43:16</p>
Middle	<p>Spectrum Ref Level 0.00 dBm Offset 4.50 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep IPk Max M1[1] -54.23 dBm 920.90 MHz -01 -25.000 dBm Start 30.0 MHz 501 pts Stop 1.0 GHz Measuring... 24.12.2021 11:43:48 Date: 24.DEC.2021 11:43:48</p>	<p>Spectrum Ref Level 30.00 dBm Offset 4.50 dB RBW 1 MHz Att 40 dB SWT 102 ms VBW 3 MHz Mode Sweep IPk Max M1[1] -28.33 dBm 18.4330 GHz -01 -25.000 dBm Start 1.0 GHz 501 pts Stop 26.5 GHz Measuring... 24.12.2021 11:44:10 Date: 24.DEC.2021 11:44:10</p>
Highest	<p>Spectrum Ref Level 0.00 dBm Offset 4.50 dB RBW 100 kHz Att 30 dB SWT 9.7 ms VBW 300 kHz Mode Sweep IPk Max M1[1] -54.33 dBm 940.90 MHz -01 -25.000 dBm Start 30.0 MHz 501 pts Stop 1.0 GHz Measuring... 24.12.2021 11:44:36 Date: 24.DEC.2021 11:44:36</p>	<p>Spectrum Ref Level 30.00 dBm Offset 4.50 dB RBW 1 MHz Att 40 dB SWT 102 ms VBW 3 MHz Mode Sweep IPk Max M1[1] -27.72 dBm 18.0760 GHz -01 -25.000 dBm Start 1.0 GHz 501 pts Stop 26.5 GHz Measuring... 24.12.2021 11:44:58 Date: 24.DEC.2021 11:44:58</p>

Out of band emission, Band Edge

Mode	Lowest	Highest
QPSK 5MHz		
QPSK 10MHz		
QPSK 15MHz		

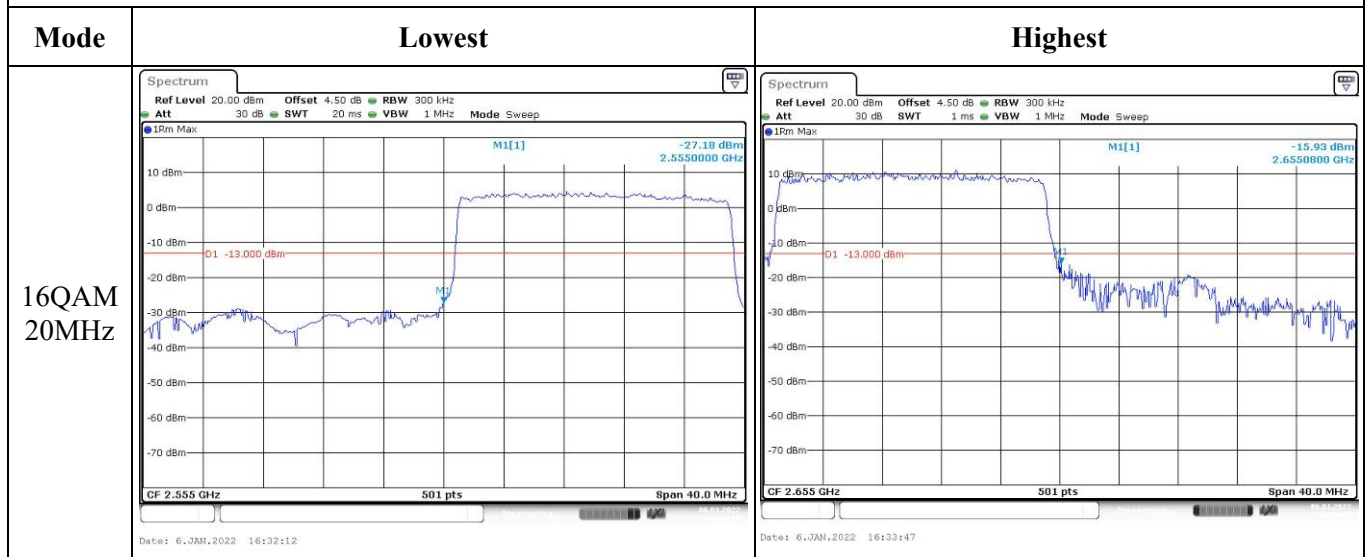
Out of band emission, Band Edge



Out of band emission, Band Edge

Mode	Lowest	Highest
16QAM 5MHz		
16QAM 10MHz		
16QAM 15MHz		

Out of band emission, Band Edge



4.4 Spurious Emissions

Serial Number:	CR21110071-RF-S1	Test Date:	2021-12-14~2021-12-16
Test Site:	966-2, 966-1	Test Mode:	Transmitting
Tester:	Great Qiao, Carl Liang	Test Result:	Pass

Environmental Conditions:

Temperature: (°C)	20.1~21.5	Relative Humidity: (%)	49~53	ATM Pressure: (kPa)	101.1~101.5
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Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
ETS-Lindgren	Horn Antenna	3115	9912-5985	2020-10-13	2023-10-12
R&S	Spectrum Analyzer	FSV40	101591	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	UFA210A-1-1200-70U300	217423-008	2021-08-08	2022-08-07
MICRO-COAX	Coaxial Cable	UFA210A-1-2362-300300	235780-001	2021-08-08	2022-08-07
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2021-11-10	2022-11-09
AH	Double Ridge Guide Horn Antenna	SAS-571	1396	2021-10-18	2023-10-17
MICRO-COAX	Coaxial Cable	UFA210B-0-0720-300300	99G1448	2021-07-25	2022-07-24
Agilent	Signal Generator	E8247C	MY43321352	2021-04-25	2022-04-24
PASTERNAK	Horn Antenna	PE9852/2F-20	112002	2021-02-05	2024-02-04
PASTERNAK	Horn Antenna	PE9852/2F-20	112001	2021-02-05	2024-02-04
AH	Preamplifier	PAM-1840VH	190	2021-11-19	2022-11-18
PASTERNAK	Horn Antenna	PE9850/2F-20	072001	2021-02-05	2024-02-04
PASTERNAK	Horn Antenna	PE9850/2F-20	072002	2021-02-05	2024-02-04
MICRO-COAX	Coaxial Cable	UFB142A-1-2362-200200	235772-001	2021-08-08	2022-08-07
Sunol Sciences	Antenna	JB6	A082520-5	2020-10-19	2023-10-18
R&S	EMI Test Receiver	ESR3	102724	2021-07-22	2022-07-21
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0470-02	2021-07-18	2022-07-17
TIMES MICROWAVE	Coaxial Cable	LMR-600-UltraFlex	C-0780-01	2021-07-18	2022-07-17

Sonoma	Amplifier	310N	186165	2021-07-18	2022-07-17
EMCO	Adjustable Dipole Antenna	3121C	9109-756	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 Data:

Please refer to the below table and plots.

Note: The device can be mounted in multiple orientations, test was performed with X,Y, Z Axis, the worst orientation was photographed and it`s data was recorded.

Test Data:**Cellular Band (PART 22H)**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band 5 Frequency:826.4 MHz								
1652.80	H	44.64	-59.69	8.68	0.81	-51.82	-13.00	38.82
1652.80	V	40.24	-64.17	8.68	0.81	-56.30	-13.00	43.30
2479.20	H	34.60	-66.16	9.39	1.01	-57.78	-13.00	44.78
2479.20	V	35.10	-65.63	9.39	1.01	-57.25	-13.00	44.25
3305.60	H	34.42	-62.31	10.32	1.15	-53.14	-13.00	40.14
3305.60	V	35.54	-60.96	10.32	1.15	-51.79	-13.00	38.79
330.00	H	31.76	-47.18	0.00	0.34	-47.52	-13.00	34.52
89.00	V	26.31	-51.39	0.00	0.18	-51.57	-13.00	38.57
WCDMA Band 5 Frequency:836.6MHz								
1673.20	H	42.33	-61.98	8.71	0.85	-54.12	-13.00	41.12
1673.20	V	43.83	-60.58	8.71	0.85	-52.72	-13.00	39.72
2509.80	H	33.08	-67.53	9.42	1.01	-59.12	-13.00	46.12
2509.80	V	35.69	-64.93	9.42	1.01	-56.52	-13.00	43.52
3346.40	H	34.97	-62.20	10.34	1.16	-53.02	-13.00	40.02
3346.40	V	34.72	-62.31	10.34	1.16	-53.13	-13.00	40.13
330.00	H	31.51	-47.43	0.00	0.34	-47.77	-13.00	34.77
210.00	V	26.49	-51.91	0.00	0.26	-52.17	-13.00	39.17
WCDMA Band 5 Frequency:846.6MHz								
1693.20	H	38.60	-65.70	8.73	0.89	-57.86	-13.00	44.86
1693.20	V	39.95	-64.47	8.73	0.89	-56.63	-13.00	43.63
2539.80	H	37.51	-62.87	9.46	1.01	-54.42	-13.00	41.42
2539.80	V	40.99	-59.35	9.46	1.01	-50.90	-13.00	37.90
3386.40	H	35.32	-62.27	10.35	1.18	-53.10	-13.00	40.10
3386.40	V	35.56	-61.98	10.35	1.18	-52.81	-13.00	39.81
330.00	H	31.58	-47.36	0.00	0.34	-47.70	-13.00	34.70
210.00	V	26.88	-51.52	0.00	0.26	-51.78	-13.00	38.78

LTE Band 5(30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 824.7 MHz								
1649.40	H	52.32	-52.01	8.68	0.80	-44.13	-13.00	31.13
1649.40	V	50.08	-54.33	8.68	0.80	-46.45	-13.00	33.45
2474.10	H	43.56	-57.22	9.38	1.00	-48.84	-13.00	35.84
2474.10	V	41.73	-59.00	9.38	1.00	-50.62	-13.00	37.62
3298.80	H	40.27	-56.41	10.32	1.15	-47.24	-13.00	34.24
3298.80	V	45.86	-50.58	10.32	1.15	-41.41	-13.00	28.41
330.00	H	31.57	-47.37	0.00	0.34	-47.71	-13.00	34.71
210.00	V	26.53	-51.87	0.00	0.26	-52.13	-13.00	39.13
QPSK, Frequency: 836.5 MHz								
1673.00	H	53.19	-51.12	8.71	0.85	-43.26	-13.00	30.26
1673.00	V	50.45	-53.96	8.71	0.85	-46.10	-13.00	33.10
2509.50	H	42.61	-58.00	9.42	1.01	-49.59	-13.00	36.59
2509.50	V	41.12	-59.50	9.42	1.01	-51.09	-13.00	38.09
3346.00	H	39.12	-58.04	10.34	1.16	-48.86	-13.00	35.86
3346.00	V	46.24	-50.78	10.34	1.16	-41.60	-13.00	28.60
330.00	H	34.46	-44.48	0.00	0.34	-44.82	-13.00	31.82
210.00	V	26.85	-51.55	0.00	0.26	-51.81	-13.00	38.81
QPSK, Frequency: 848.3 MHz								
1696.60	H	52.95	-51.34	8.74	0.89	-43.49	-13.00	30.49
1696.60	V	50.67	-53.75	8.74	0.89	-45.90	-13.00	32.90
2544.90	H	43.81	-56.53	9.47	1.01	-48.07	-13.00	35.07
2544.90	V	42.57	-57.73	9.47	1.01	-49.27	-13.00	36.27
3393.20	H	40.80	-56.87	10.36	1.19	-47.70	-13.00	34.70
3393.20	V	45.25	-52.38	10.36	1.19	-43.21	-13.00	30.21
330.00	H	30.75	-48.19	0.00	0.34	-48.53	-13.00	35.53
210.00	V	26.35	-52.05	0.00	0.26	-52.31	-13.00	39.31

LTE Band 41(30MHz-26.5GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 2557.5 MHz								
4997.00	H	42.50	-50.44	11.20	1.48	-40.72	-25.00	15.72
4997.00	V	40.17	-52.63	11.20	1.48	-42.91	-25.00	17.91
7495.50	H	34.82	-54.97	10.90	1.94	-46.01	-25.00	21.01
7495.50	V	35.63	-54.66	10.90	1.94	-45.70	-25.00	20.70
330.00	H	30.59	-48.35	0.00	0.34	-48.69	-25.00	23.69
210.00	V	26.89	-51.51	0.00	0.26	-51.77	-25.00	26.77
QPSK, Frequency: 2605 MHz								
5186.00	H	43.30	-50.73	11.31	1.44	-40.86	-25.00	15.86
5186.00	V	40.32	-53.57	11.31	1.44	-43.70	-25.00	18.70
7779.00	H	34.53	-54.96	10.84	1.99	-46.11	-25.00	21.11
7779.00	V	35.13	-54.81	10.84	1.99	-45.96	-25.00	20.96
330.00	H	31.47	-47.47	0.00	0.34	-47.81	-25.00	22.81
210.00	V	26.51	-51.89	0.00	0.26	-52.15	-25.00	27.15
QPSK, Frequency: 2652.5 MHz								
5375.00	H	45.87	-47.64	11.43	1.49	-37.70	-25.00	12.70
5375.00	V	43.04	-50.46	11.43	1.49	-40.52	-25.00	15.52
8062.50	H	35.27	-52.95	10.81	2.12	-44.26	-25.00	19.26
8062.50	V	35.94	-52.78	10.81	2.12	-44.09	-25.00	19.09
330.00	H	31.56	-47.38	0.00	0.34	-47.72	-25.00	22.72
210.00	V	25.78	-52.62	0.00	0.26	-52.88	-25.00	27.88

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

5. RF EXPOSURE EVALUATION

5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

5.1.1 Applicable Standard

FCC §1.1310 & §2.1091

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

5.1.2 Procedure

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.1.3 Calculated Result

Operation Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
WCDMA B5	824-849	3.06	2.02	23	199.53	20	0.0802	0.549
LTE B5	824-849	3.06	2.02	24	251.19	20	0.1009	0.549
LTE B41	2555-2655	3.06	2.02	22	158.49	20	0.0637	1.0

Result: The device meet FCC MPE at 20 cm distance.

******* END OF REPORT *******