



**SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch**

EMC-ARF-05 Rev 1.1

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# Appendix -

## Test Data and Result for report

### GZCR250300027204

(For FirstNet Band UL)



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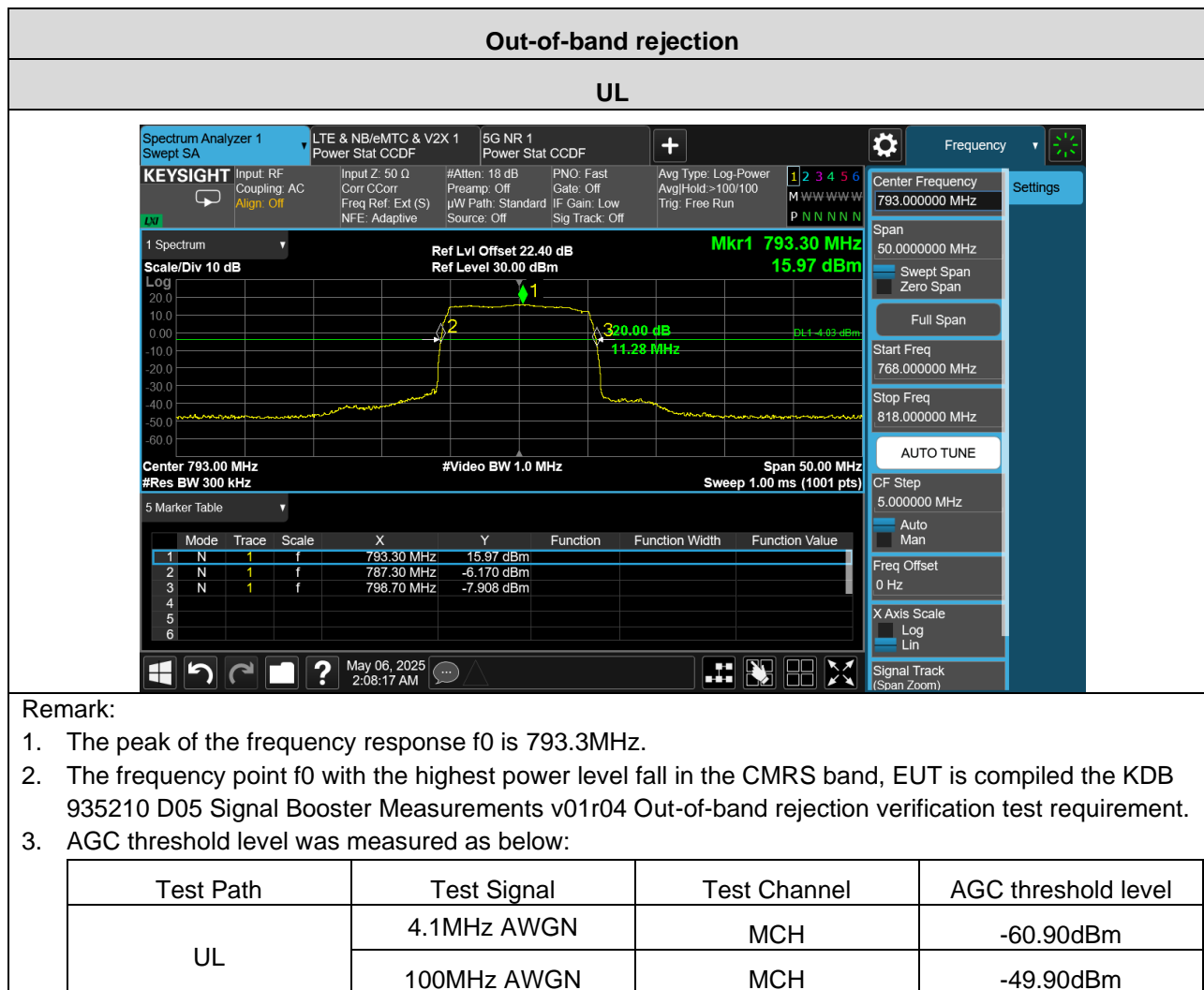
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### 1 Out-of-band rejection



## 2 Input versus Output comparison

Occupied Bandwidth				
Test Path	Test Signal	Test Channel	Signal Level	Verdict
UL	4.1MHz AWGN	MCH	Pre-AGC	PASS
			3dB above AGC	PASS
	100MHz AWGN	MCH	Pre-AGC	PASS*
			3dB above AGC	PASS*
Remark: 1. * The band supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal. 2. Compare the spectral plot of the input signal to the output signal affirm that they are similar (in passband and roll off characteristic features and relative spectral locations). The test result complies with the requirement.				

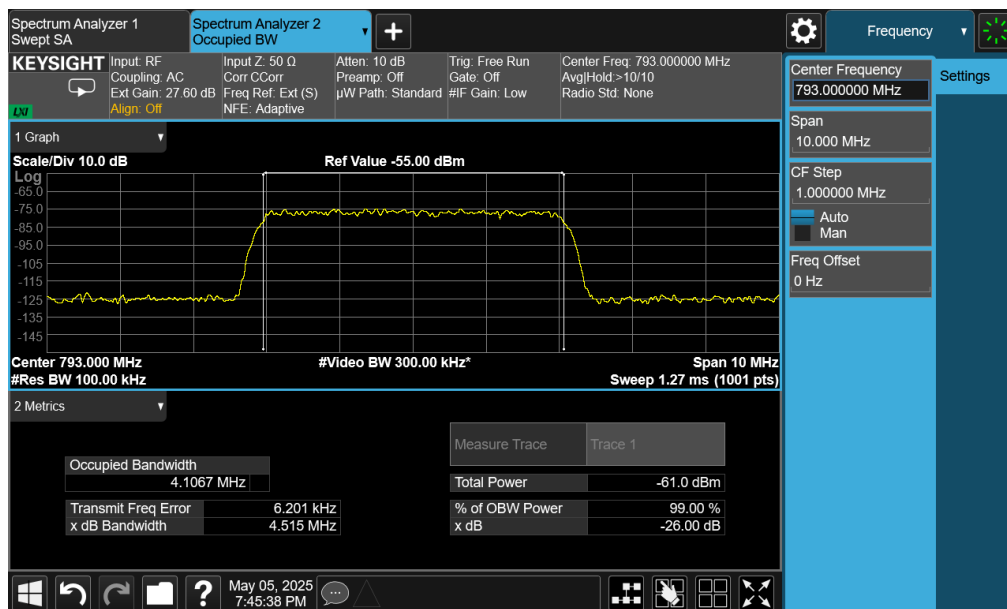


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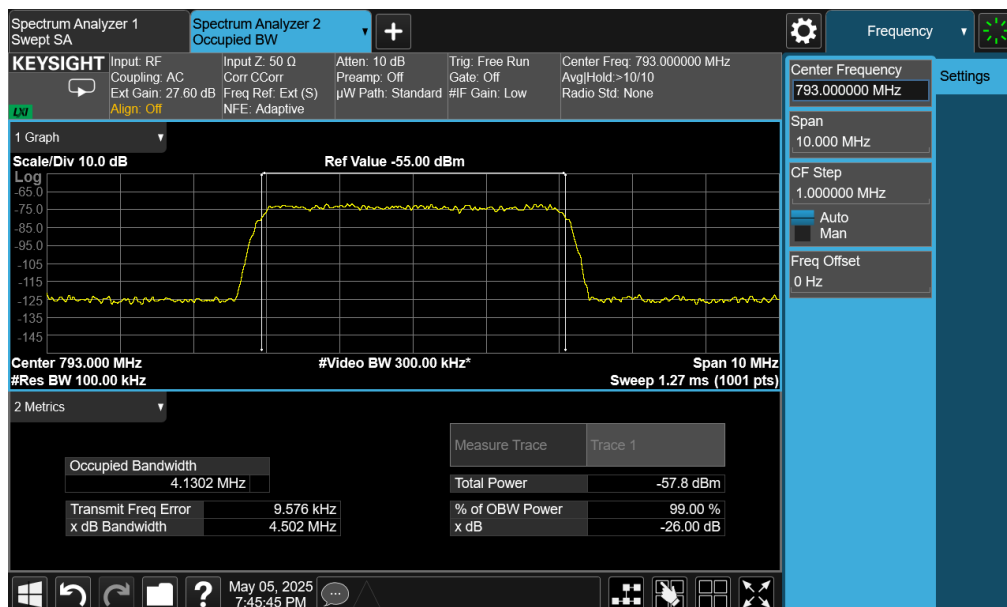
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### 99% OBW

#### UL\_4.1MHz AWGN\_MCH\_Input\_Pre-AGC



#### UL\_4.1MHz AWGN\_MCH\_Input\_3dB above AGC



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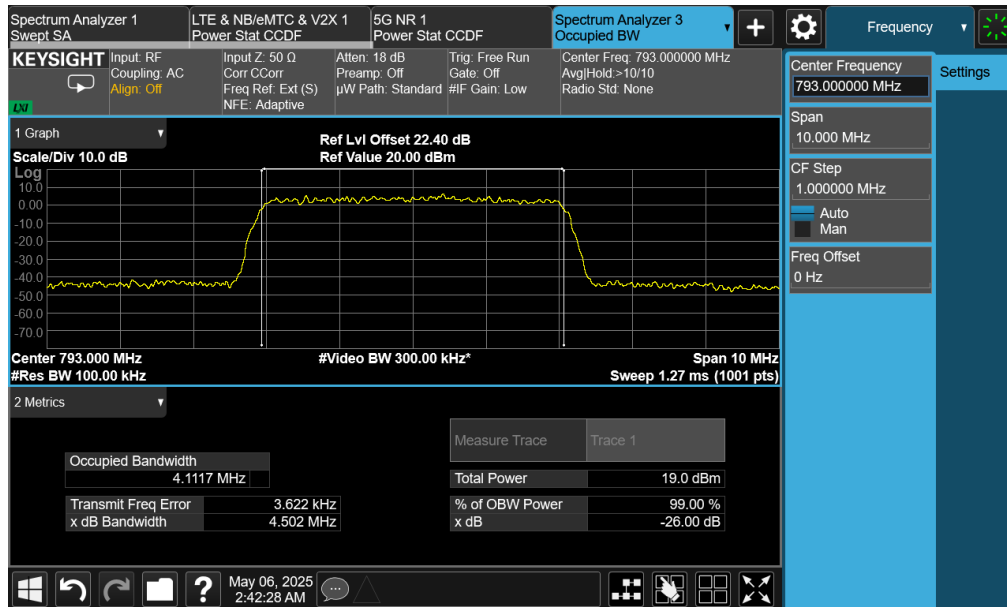
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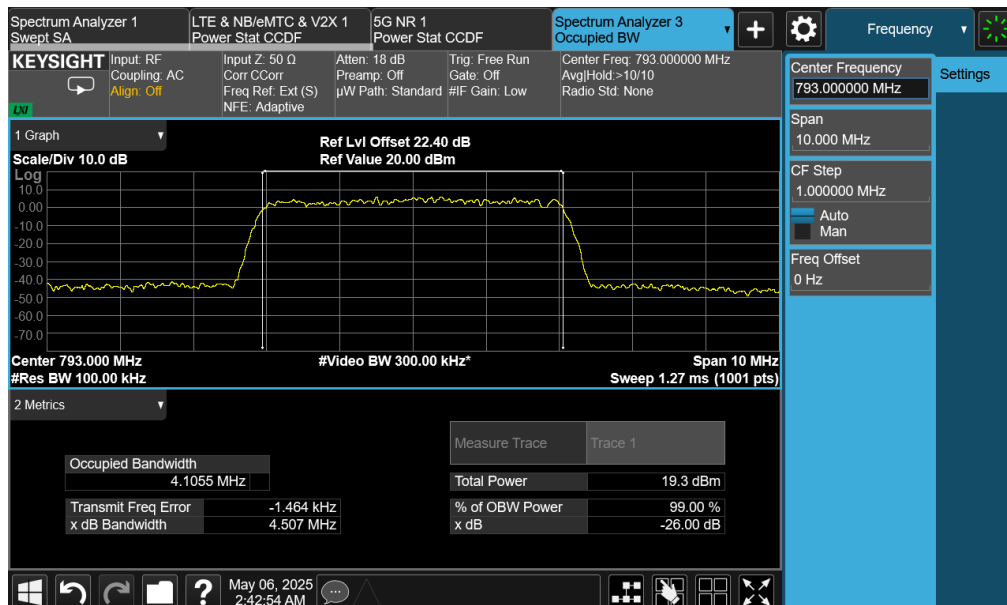
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### 99% OBW

#### UL\_4.1MHz AWGN\_MCH\_Output\_Pre-AGC

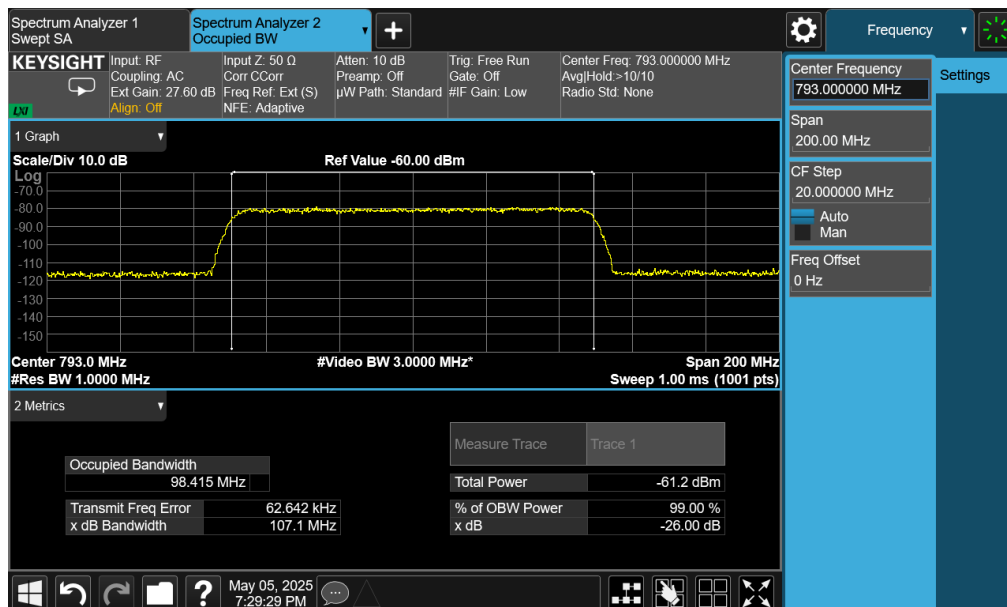


#### UL\_4.1MHz AWGN\_MCH\_Output\_3dB above AGC

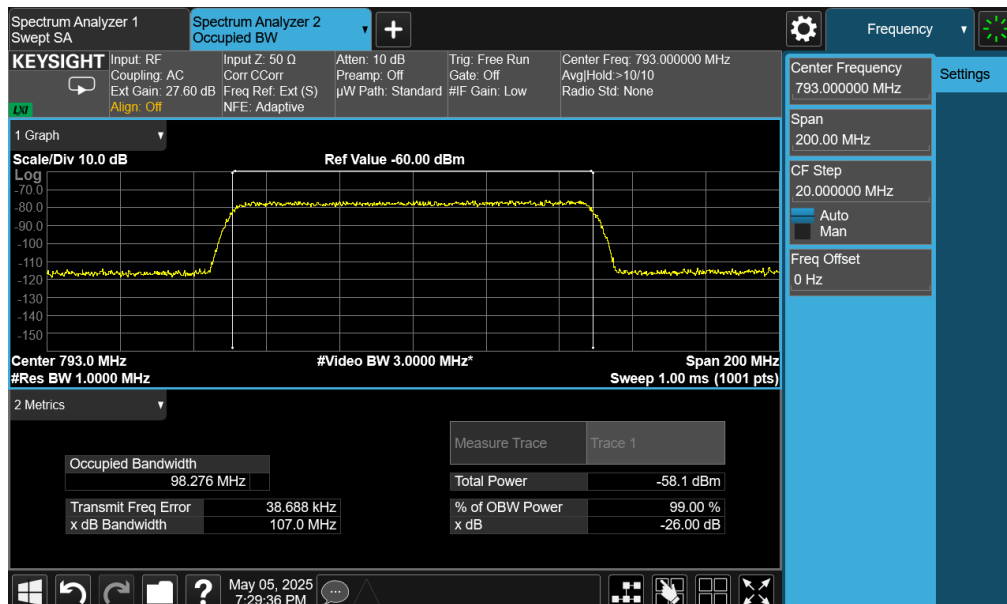


### 99% OBW

### UL\_100MHz AWGN\_MCH\_Input\_Pre-AGC



### UL\_100MHz AWGN\_MCH\_Input\_3dB above AGC



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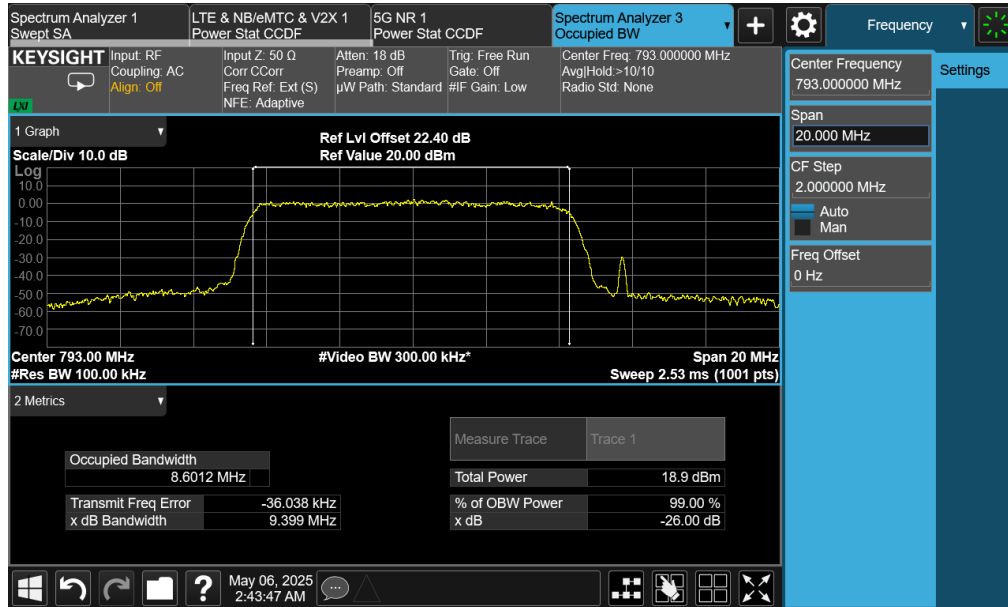
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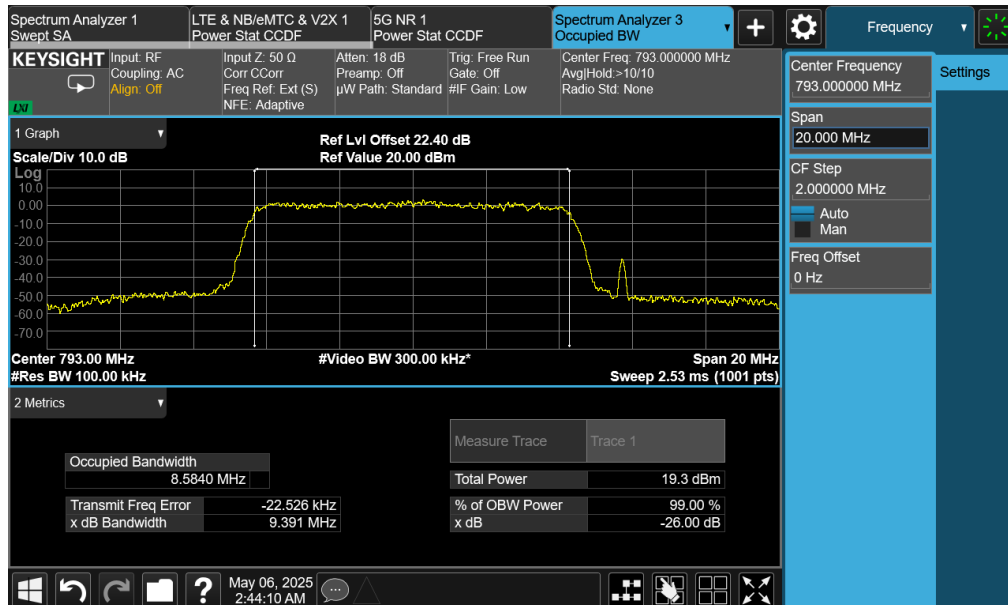
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### 99% OBW

#### UL\_100MHz AWGN\_MCH\_Output\_Pre-AGC



#### UL\_100MHz AWGN\_MCH\_Output\_3dB above AGC



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### 3 Emission Mask

Emission Masks					
Test path	Test signal	Test channel	Signal level	Emission mask	Verdict
UL	4.1MHz AWGN	MCH	Pre-AGC	Mask B	PASS
			3dB above AGC		PASS
	100MHz AWGN	MCH	Pre-AGC	Mask B	PASS*
			3dB above AGC		PASS*
Remark: * The band supports maximum channel BW is 10MHz for NR, so the output signal OBW was less than the input when 100MHz AWGN was as stimulus signal.					



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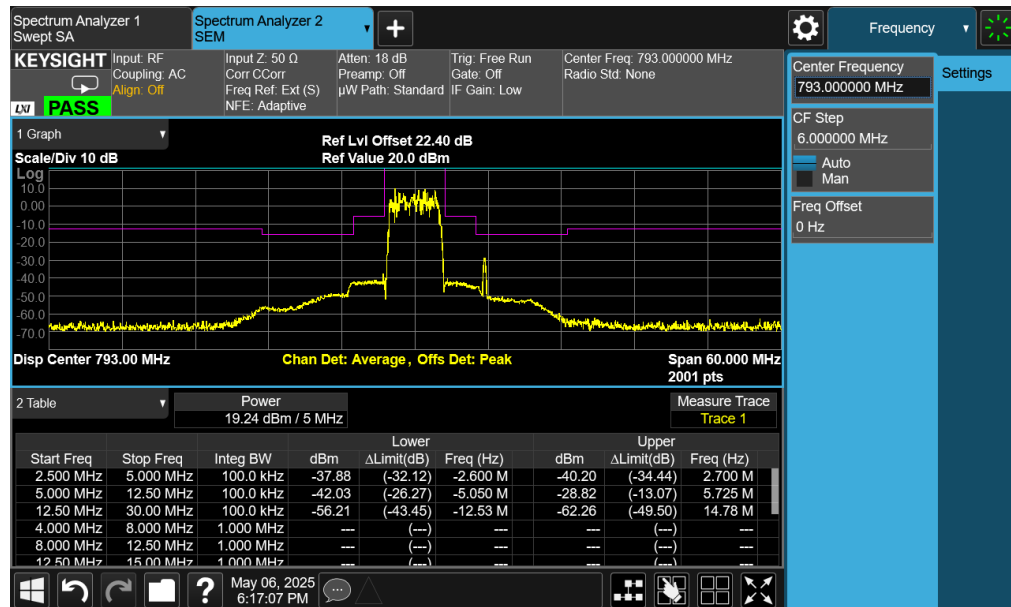
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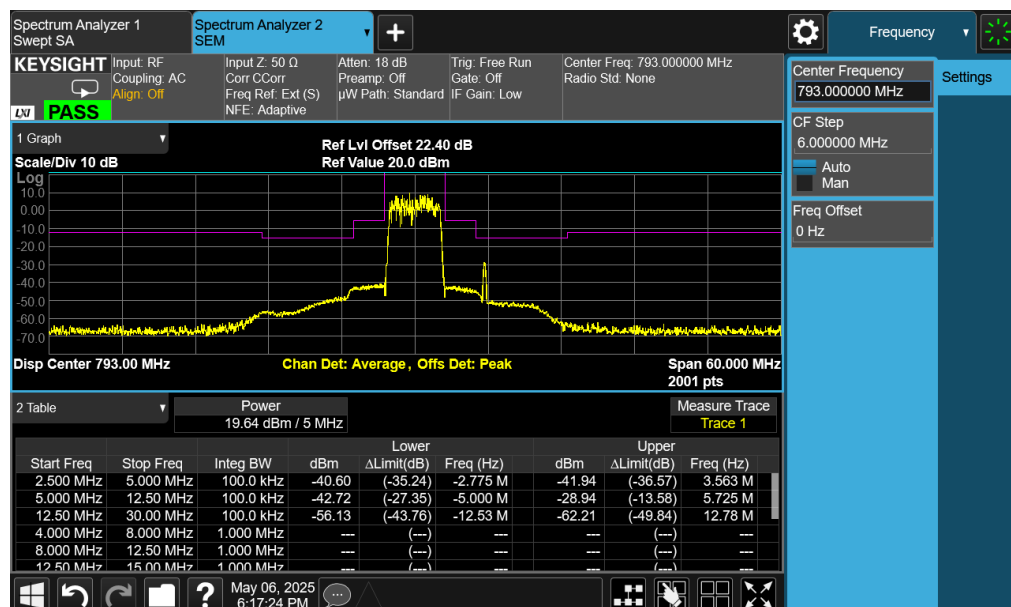
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### Emission Mask B

#### UL\_4.1MHz AWGN\_MCH\_Output\_Pre-AGC

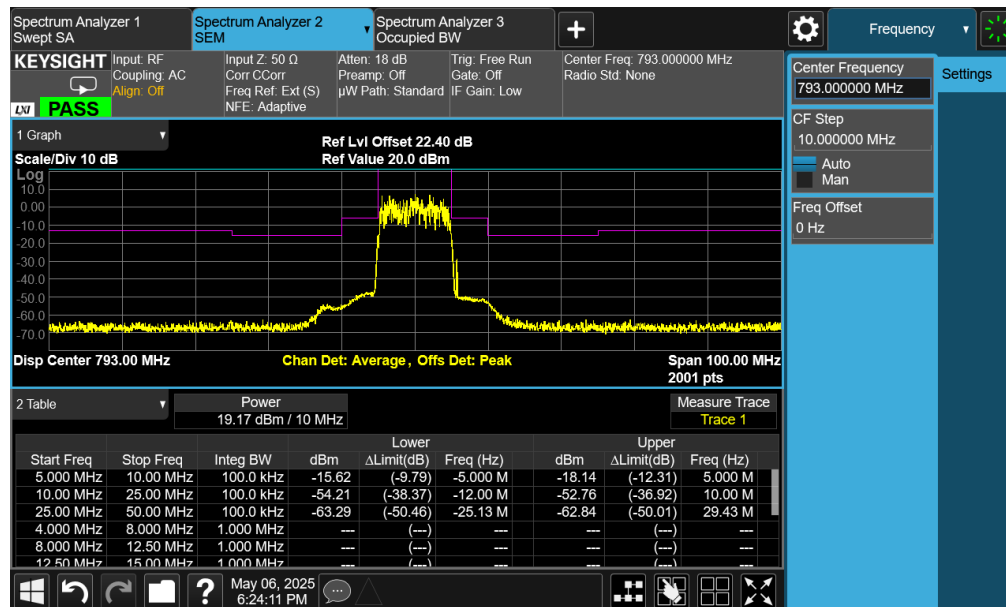


#### UL\_4.1MHz AWGN\_MCH\_Output\_3dB above AGC

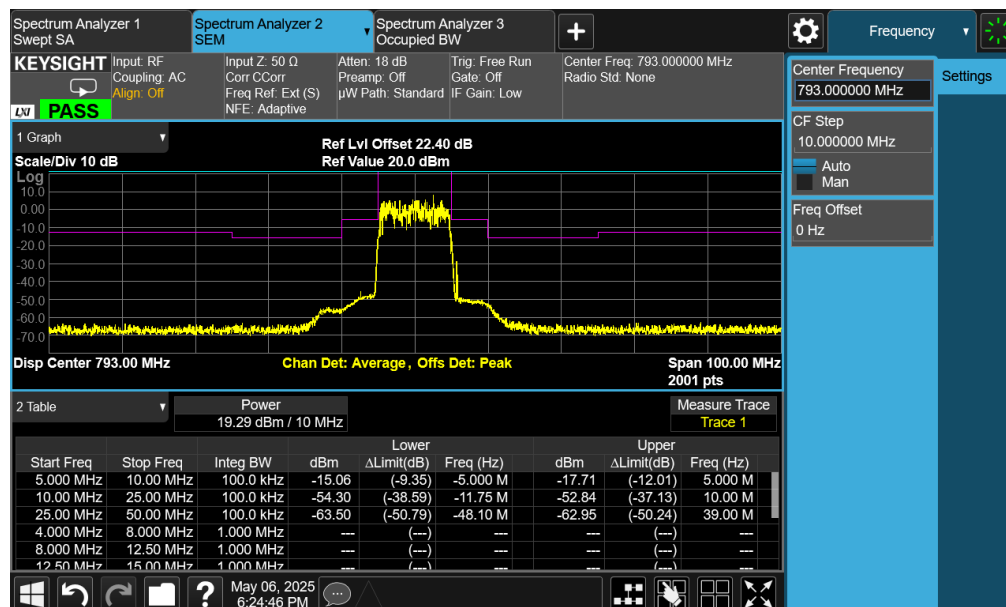


### Emission Mask B

#### UL\_100MHz AWGN\_MCH\_Output\_Pre-AGC



#### UL\_100MHz AWGN\_MCH\_Output\_3dB above AGC



## 4 Input/output power and amplifier/booster gain

Mean output power and gain								
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Input power (dBm)	Output Power (dBm)	ERP (dBm)	ERP (W)	Gain (dB)
UL	793.3	4.1MHz AWGN	Pre-AGC	-61	19.11	30.96	1.25	80.11
			3dB above AGC	-58	19.39	31.24	1.34	/
		100MHz AWGN	Pre-AGC	-50	18.96	30.81	1.21	68.96
			3dB above AGC	-47	19.22	31.07	1.28	/
Remark: 1. f0 is from Out-of-band Rejection test in the report. 2. ERP= output power (dBm)+ antenna gain (dBi)- 2.15, the antenna gain is 14dBi declared by the manufacturer.								

Mean output power							
Test Path	Test Freq. f0 (MHz)	Test Signal	Signal Level	Output Power (dBm/MHz)	ERP (dBm/MHz)	ERP (W/MHz)	Verdict
UL	793.3	4.1MHz AWGN	Pre-AGC	12.99	24.84	0.31	PASS
			3dB above AGC	13.27	25.12	0.33	PASS
		100MHz AWGN	Pre-AGC	9.28	21.13	0.13	PASS
			3dB above AGC	9.54	21.39	0.14	PASS
Remark: 1. f0 is from Out-of-band Rejection test in the report. 2. ERP= output power (dBm)+ antenna gain (dBi)- 2.15, the antenna gain is 14dBi declared by the manufacturer. 3. The output power is limited to an EIRP of 1000W/MHz.							



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### 5 Noise Figure

Noise Figure			
Test Path	Maximum Noise Figure (dB)	Limit (dB)	Verdict
UL	6.91	≤9	PASS



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## 6 Intermodulation emissions

Intermodulation emissions					
Test Path	Test Freq. f0 (MHz)	CW signals spacing (kHz)	Signal Level	Worst conducted test level (dBm)	
				/300Hz	/10kHz
UL	793.3	6.25	Pre-AGC	-25.81	-10.58
			3dB above AGC	-25.06	-9.83
		12.5	Pre-AGC	-26.81	-11.58
			3dB above AGC	-26.09	-10.86
		25	Pre-AGC	-29.34	-14.11
			3dB above AGC	-28.81	-13.58

### Remark:

- f0 is from Out-of-band Rejection test in the report.
- The level in 10kHz measurement bandwidth= the level in 300Hz measurement bandwidth+ 10lg(10000/300).
- ERP= output power (dBm)+ antenna gain (dBi)- 2.15, the maximum antenna gain is 14dBi declared by the manufacturer.
- The maximum ERP of intermodulation product is -9.83dBm/10kHz+ 14- 2.15= 2.02dBm/10kHz, which exceeded the limit -30dBm/10kHz, the applicant must use good engineering practice to eliminate the intermodulation products interference.

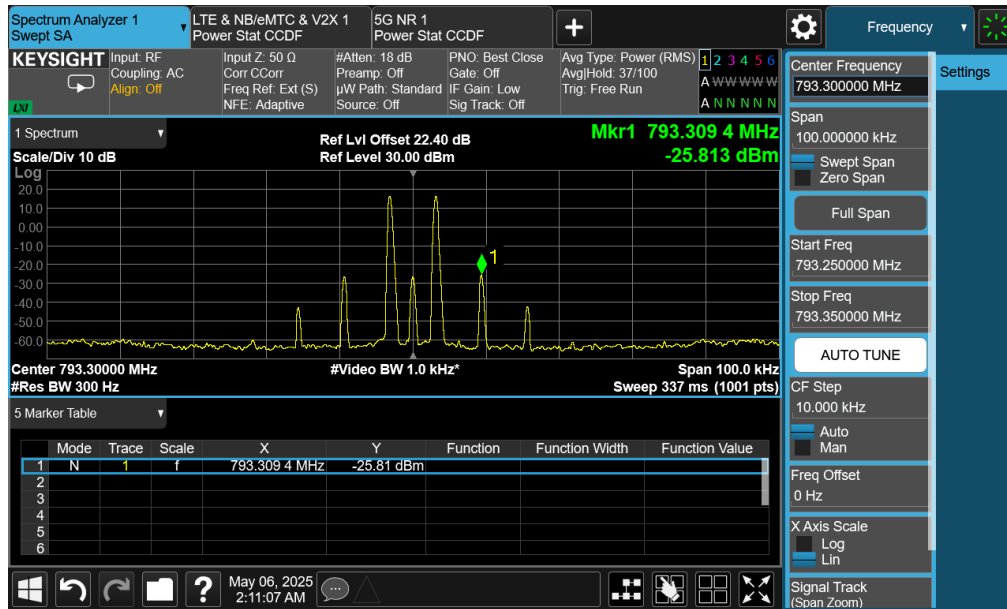


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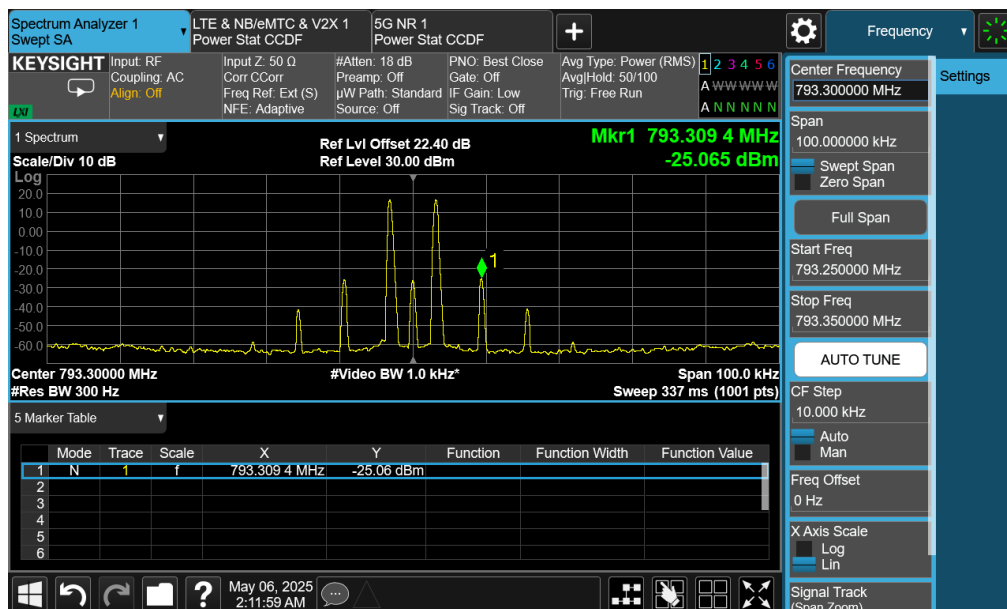
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### Intermodulation emissions

#### UL\_6.25kHz spacing\_Pre-AGC



#### UL\_6.25kHz spacing\_3dB above AGC

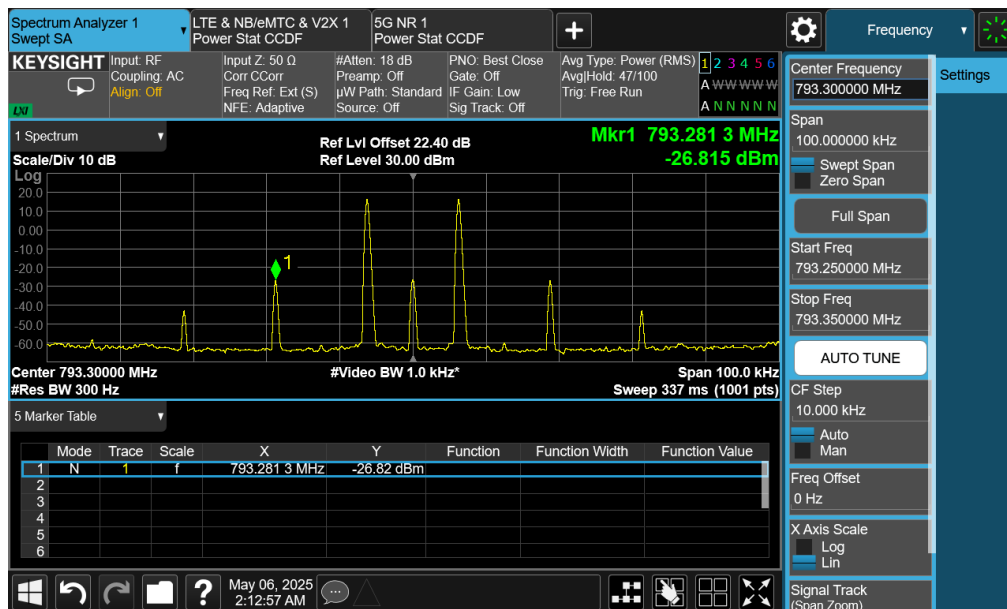


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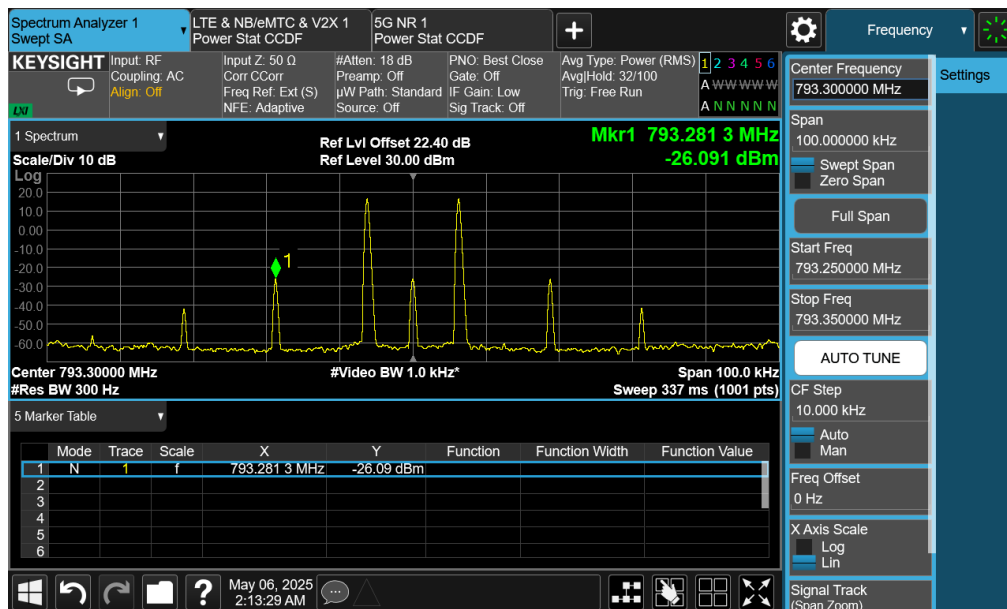
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### Intermodulation emissions

#### UL\_12.5kHz spacing\_Pre-AGC



#### UL\_12.5kHz spacing\_3dB above AGC



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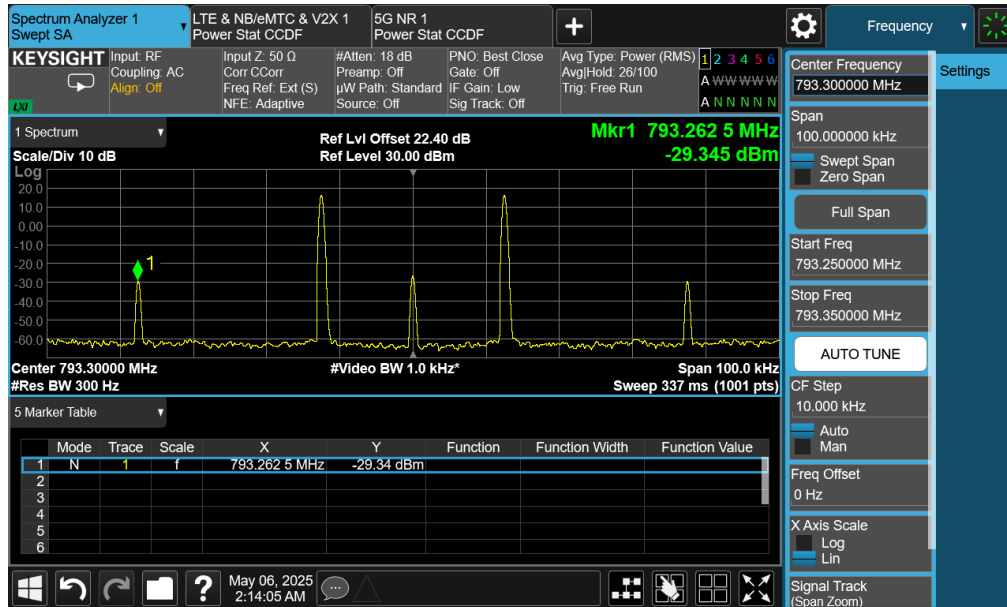
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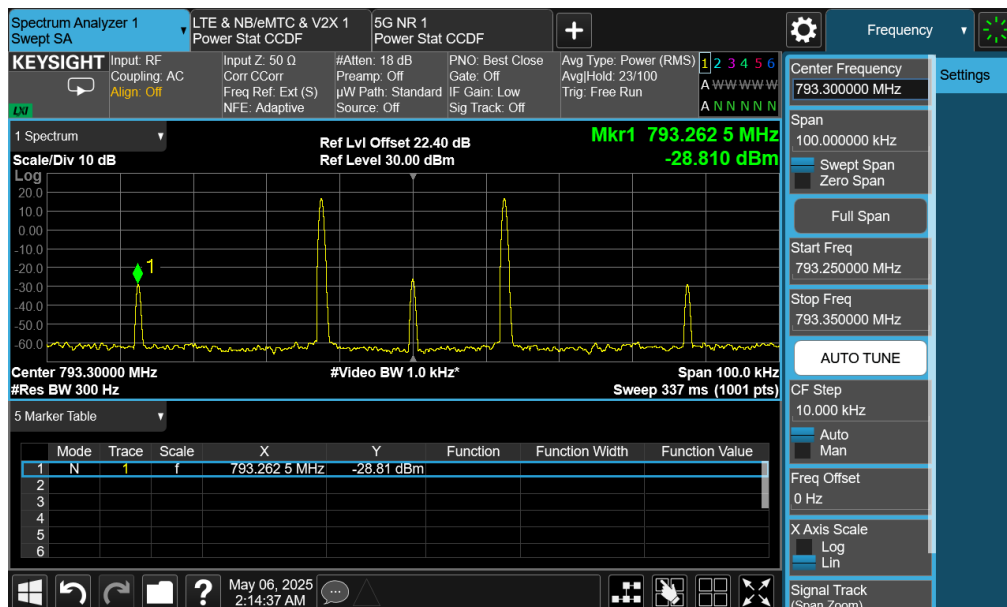
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### Intermodulation emissions

#### UL\_25kHz spacing\_Pre-AGC



#### UL\_25kHz spacing\_3dB above AGC



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## 7 Conducted Spurious emissions

Conducted Spurious emissions						
Test path	Test signal	Test channel	Frequency range (MHz)	Worst test level (dBm)	Limit (dBm)	Verdict
UL	4.1MHz AWGN	LCH	0.09-788	-34.55	≤-13	PASS
			769-775	-62.89	≤-46	PASS
		HCH	798-1000	-28.35	≤-13	PASS
			1000-7980	-37.32	≤-13	PASS
			799-805	-54.04	≤-46	PASS
Remark: 1. On all frequencies between 769-775MHz and 799-805MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations, here P= 19dBm= 0.08W Limit= 19dBm- [76 + 10 log10 (0.08W)]dB= -46dBm 2. All modes (LCH/MCH/HCH, with 4.1MHz AWGN signal/ with 100MHz AWGN signal) had been tested, only show the worst-case in this report. 3. The spurious emissions 9kHz to 30MHz were very low and not displayed test plots in this report.						

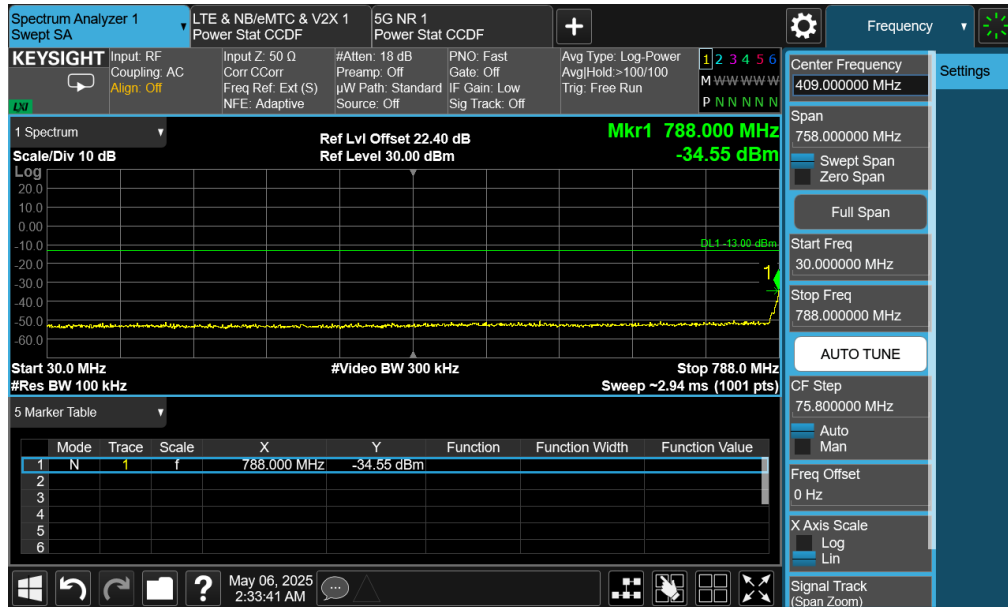


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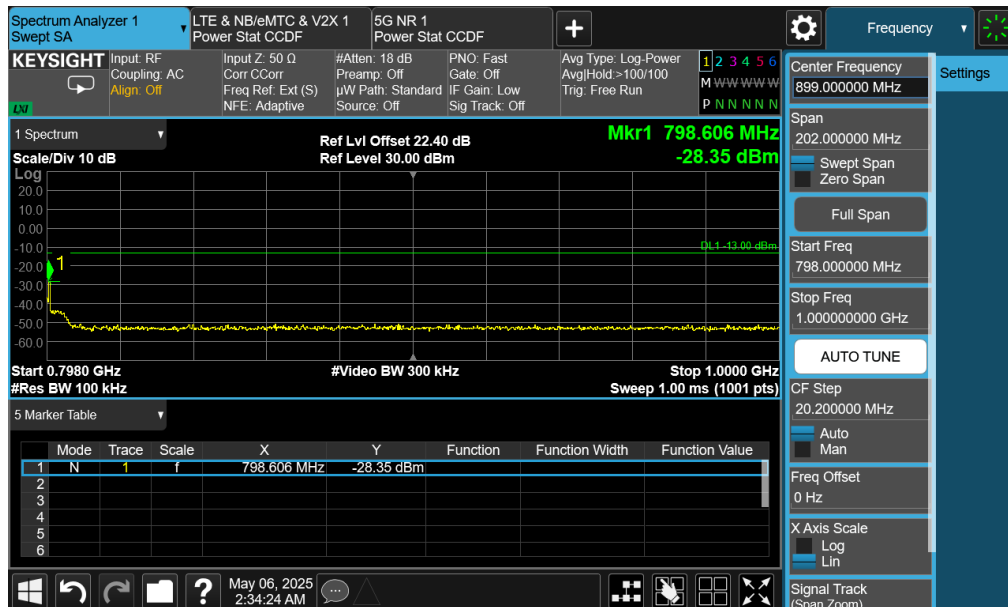
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### Conducted spurious emissions

#### UL\_4.1MHz AWGN\_LCH\_Pre-AGC



#### UL\_4.1MHz AWGN\_HCH\_Pre-AGC



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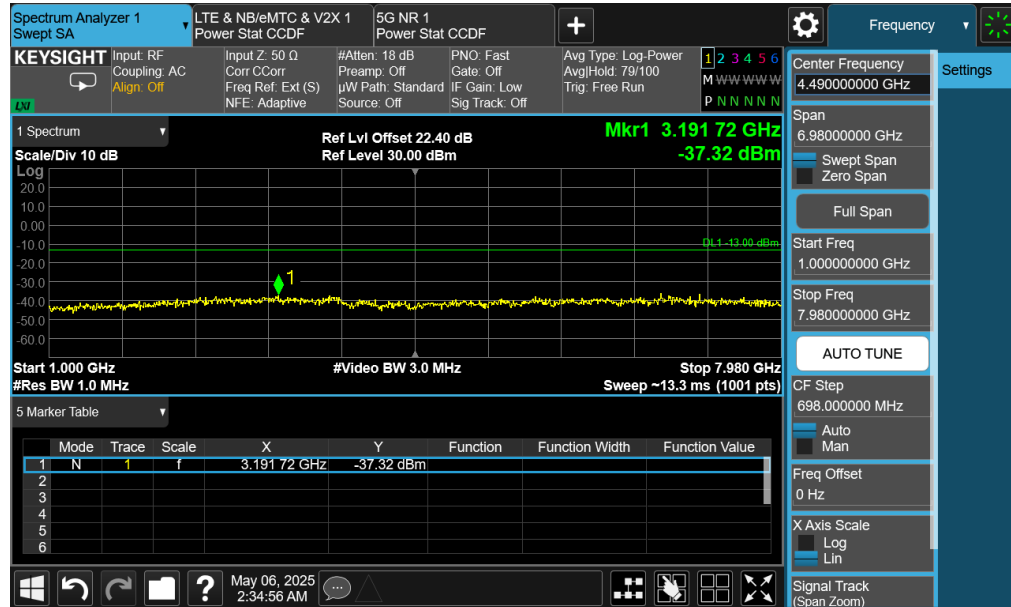
SGS-CSTC Standards Technical Services Co., Ltd.  
Guangzhou Branch Testing & Calibration Laboratory

No. 198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663  
中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663

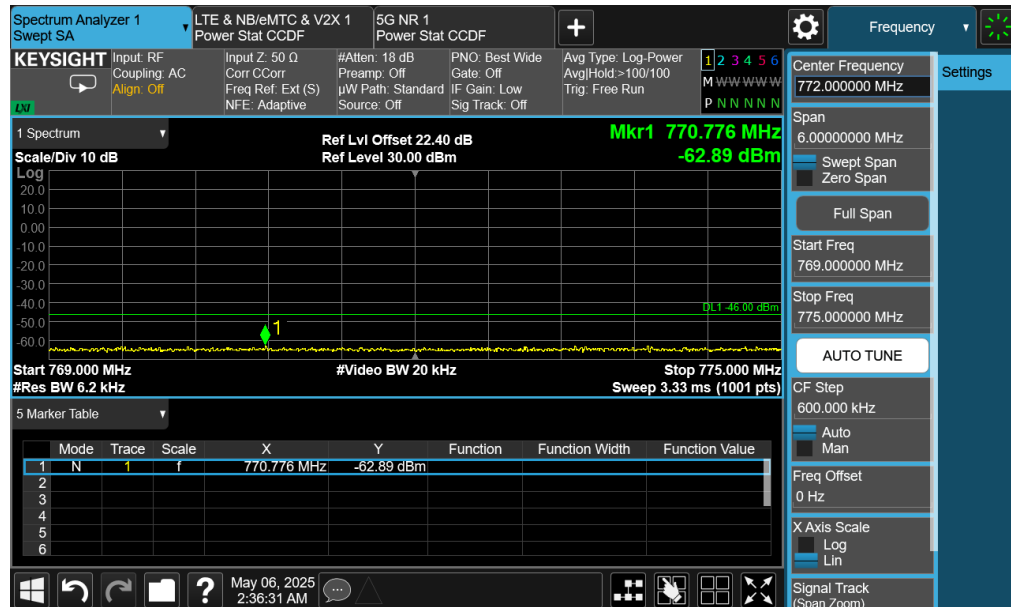
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t (86-20) 82155555 sgs.china@sgs.com

### Conducted spurious emissions

#### UL\_4.1MHz AWGN\_HCH\_Pre-AGC

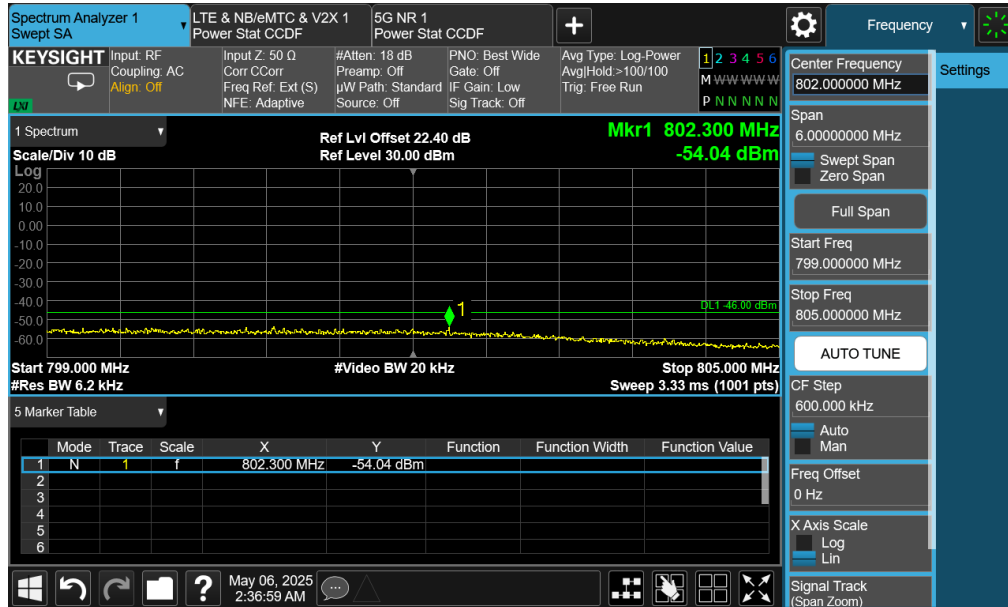


#### UL\_4.1MHz AWGN\_LCH\_Pre-AGC



### Conducted spurious emissions

#### UL\_4.1MHz AWGN\_HCH\_Pre-AGC



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## 8 Noise

Noise within the passband		
Test path	Frequency range (MHz)	Worst conducted test level (dBm)
UL	788-798	-21.00
Noise outside of the passband		
Test path	Frequency range (MHz)	Worst conducted test level (dBm)
UL	0.009-787	-52.12
	799-7980	-29.18
Remark: 1. ERP= conducted test level (dBm)+ antenna gain (dBi)- 2.15dB, the maximum antenna gain is 14dBi declared by the manufacturer. 2. The ERP of worst noise within the passband is -21.00/10kHz+ 14dBi- 2.15dB= -9.15dBm, the applicant must use good engineering practice to make sure that the ERP of noise outside the passband should not exceed -43dBm in 10kHz measurement bandwidth. 3. The ERP of worst noise outside of the passband is -29.18/10kHz+ 14dBi- 2.15dB= -17.33dBm, the applicant must use good engineering practice to make sure that the ERP of noise outside the passband should not exceed -70dBm in 10kHz measurement bandwidth.		

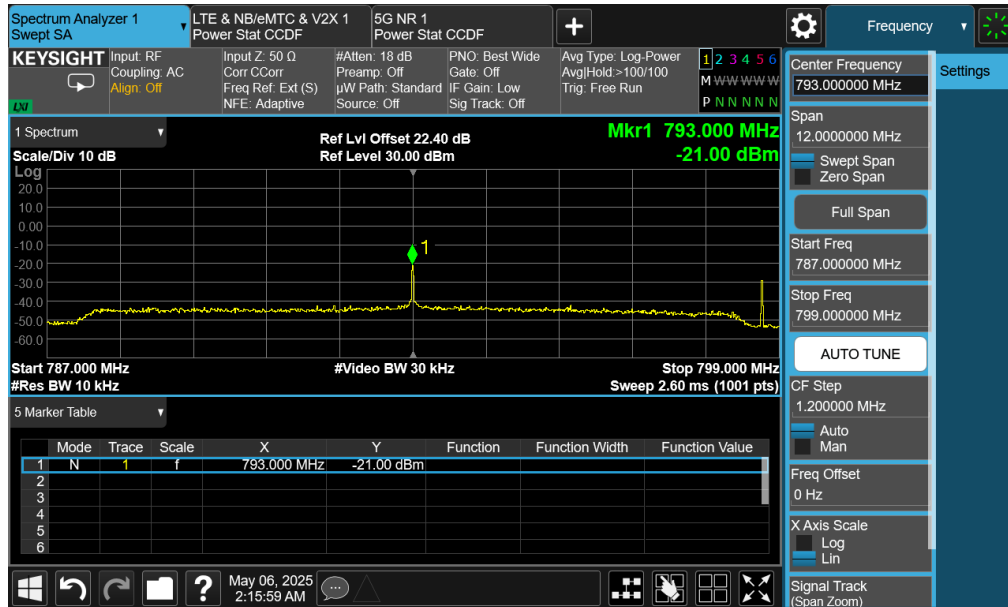


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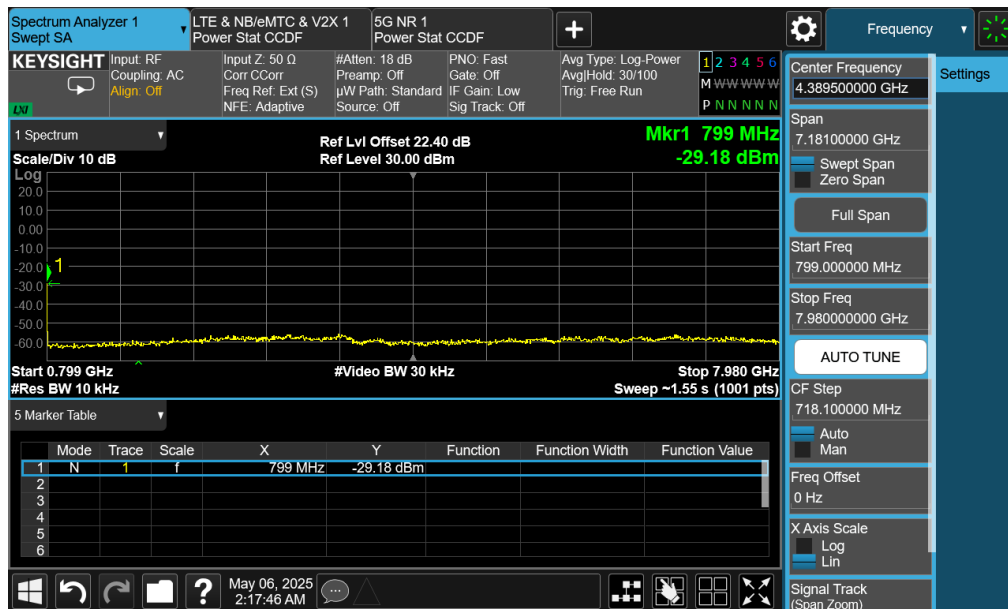
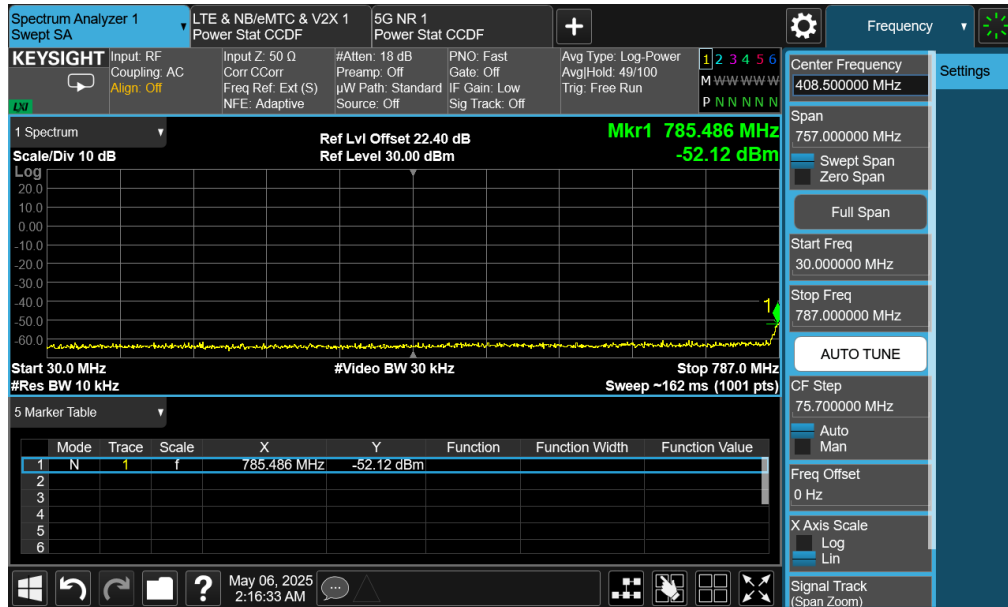
### Noise\_Within the passband

#### UL



### Noise\_Out of the passband

#### UL



## 9 Frequency Stability

Frequency stability vs voltage							
Test path	Test Channel	Test Signal	Temperature	Voltage	Freq. error (Hz)	Tolerance (ppm)	Verdict
UL	MCH	4.1MHz AWGN	TN	VL	6.2	0.00782	PASS
			TN	VH	6.2	0.00782	PASS
		100MHz AWGN	TN	VL	6.8	0.00858	PASS
			TN	VH	6.8	0.00858	PASS

Frequency stability vs temperature							
Test Path	Test Channel	Test Signal	Voltage	Temperature (°C)	Freq. error (Hz)	Tolerance (ppm)	Verdict
UL	MCH	4.1MHz AWGN	VN	+50	5.6	0.00706	PASS
			VN	+40	4.6	0.00580	PASS
			VN	+30	4.1	0.00517	PASS
			VN	+20	6.5	0.00820	PASS
			VN	+10	4.4	0.00555	PASS
			VN	0	7.4	0.00933	PASS
			VN	-10	7.8	0.00984	PASS
			VN	-20	5.4	0.00681	PASS
			VN	-30	7.5	0.00946	PASS
	MCH	100MHz AWGN	VN	+50	6.5	0.00820	PASS
			VN	+40	7.4	0.00933	PASS
			VN	+30	7.0	0.00883	PASS
			VN	+20	7.8	0.00984	PASS
			VN	+10	7.4	0.00933	PASS
			VN	0	6.4	0.00807	PASS
			VN	-10	7.9	0.00996	PASS
			VN	-20	5.1	0.00643	PASS
			VN	-30	7.4	0.00933	PASS



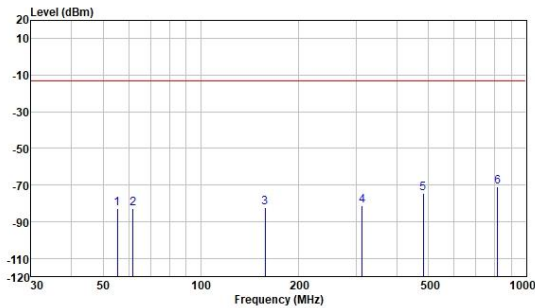
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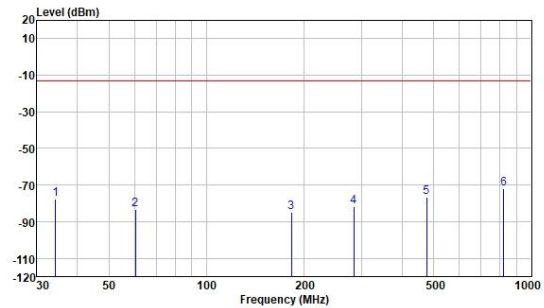
### 10 Radiated Spurious emissions

#### Radiated Spurious emissions

##### UL\_4.1MHz AWGN\_MCH\_30MHz-1GHz

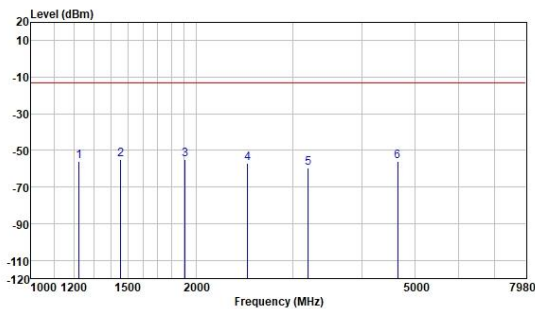


	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	55.22	-78.63	-4.12	-82.75	-13.00	-69.75	VERTICAL
2	61.78	-79.67	-2.89	-82.56	-13.00	-69.56	VERTICAL
3	157.56	-78.46	-3.94	-82.40	-13.00	-69.40	VERTICAL
4	313.28	-78.54	-2.60	-81.14	-13.00	-68.14	VERTICAL
5	482.22	-76.50	1.94	-74.56	-13.00	-61.56	VERTICAL
6	815.97	-78.59	7.57	-71.02	-13.00	-58.02	VERTICAL

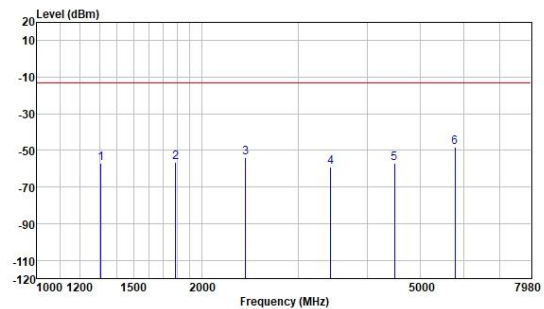


	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	34.28	-80.70	2.93	-77.77	-13.00	-64.77	HORIZONTAL
2	60.28	-80.83	-2.57	-83.40	-13.00	-70.40	HORIZONTAL
3	182.56	-78.63	-6.07	-84.70	-13.00	-71.70	HORIZONTAL
4	283.98	-79.45	-2.52	-81.97	-13.00	-68.97	HORIZONTAL
5	475.50	-76.78	0.34	-76.44	-13.00	-63.44	HORIZONTAL
6	821.71	-79.12	7.05	-72.07	-13.00	-59.07	HORIZONTAL

##### UL\_4.1MHz AWGN\_MCH\_above 1GHz



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1222.69	-59.48	3.51	-55.97	-13.00	-42.97	VERTICAL
2	1457.10	-60.97	5.84	-55.13	-13.00	-42.13	VERTICAL
3	1907.79	-61.82	6.98	-54.84	-13.00	-41.84	VERTICAL
4	2481.91	-65.35	8.30	-57.05	-13.00	-44.05	VERTICAL
5	3201.30	-62.33	2.62	-59.71	-13.00	-46.71	VERTICAL
6	4654.62	-63.54	7.34	-56.20	-13.00	-43.20	VERTICAL



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1309.31	-61.16	3.95	-57.21	-13.00	-44.21	HORIZONTAL
2	1789.22	-62.35	5.71	-56.64	-13.00	-43.64	HORIZONTAL
3	2403.54	-63.30	9.50	-53.80	-13.00	-40.80	HORIZONTAL
4	3435.42	-61.73	2.56	-59.17	-13.00	-46.17	HORIZONTAL
5	4488.42	-62.56	5.64	-56.92	-13.00	-43.92	HORIZONTAL
6	5789.40	-63.42	15.33	-48.09	-13.00	-35.09	HORIZONTAL



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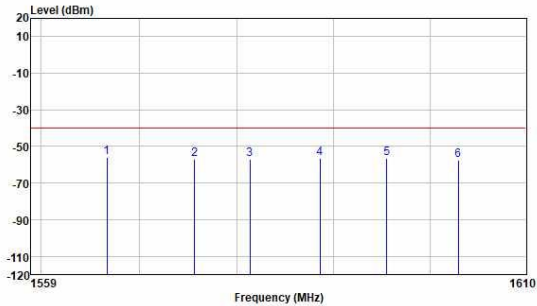
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中国·广东·广州高新技术产业开发区科学城科珠路198号 邮编: 510663

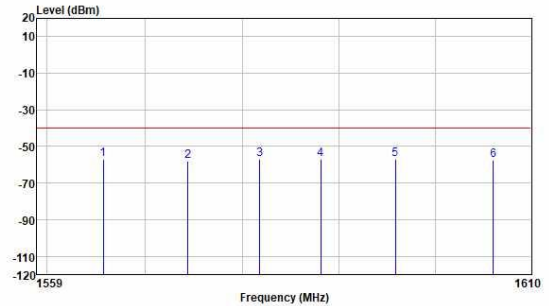
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t (86-20) 82155555 sgs.china@sgs.com

## Radiated Spurious emissions

## UL\_4.1MHz AWGN\_MCH\_1559MHz-1610MHz



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1566.70	-61.42	5.51	-55.91	-40.00	-15.91	VERTICAL
2	1575.65	-62.48	5.31	-57.17	-40.00	-17.17	VERTICAL
3	1581.34	-61.90	5.13	-56.77	-40.00	-16.77	VERTICAL
4	1588.58	-61.60	5.04	-56.56	-40.00	-16.56	VERTICAL
5	1595.45	-61.10	4.89	-56.21	-40.00	-16.21	VERTICAL
6	1602.92	-62.20	4.82	-57.38	-40.00	-17.38	VERTICAL



	Freq	Read Level	Correction Factor	Level	Limit Line	Over Limit	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	1565.74	-62.27	5.07	-57.20	-40.00	-17.20	HORIZONTAL
2	1574.38	-63.12	5.12	-58.00	-40.00	-18.00	HORIZONTAL
3	1581.80	-62.16	5.17	-56.99	-40.00	-16.99	HORIZONTAL
4	1588.07	-62.14	5.19	-56.95	-40.00	-16.95	HORIZONTAL
5	1595.81	-61.99	5.22	-56.77	-40.00	-16.77	HORIZONTAL
6	1606.01	-62.65	5.28	-57.37	-40.00	-17.37	HORIZONTAL

## Remark:

Pre-test was performed for all modes (LCH/MCH/HCH, with 4.1MHz AWGN signals/ with 100MHz AWGN signals), the test result always keeps more than 20dB margin, the spurious emissions 9kHz to 30MHz were very low and not displayed in this report. Therefore, only show the worst-case in this report.

--End of Appendix--



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