

Appendix for LTE B13 test report

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Appendix A: Effective (Isotropic) Radiated Power Output Data

Test Result:

Band	Bandwidth	Modulation	Channel	RB Configuration	Conducted Power[dBm]	ERP (dBm)	Limit (dBm)	Verdict
Band13	5MHz	QPSK	23205	1RB#0	24.54	22.61	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#12	24.70	22.77	34.77	PASS
Band13	5MHz	QPSK	23205	1RB#24	24.84	22.91	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#0	23.45	21.52	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#6	23.63	21.7	34.77	PASS
Band13	5MHz	QPSK	23205	12RB#11	23.61	21.68	34.77	PASS
Band13	5MHz	QPSK	23205	25RB#0	23.52	21.59	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#0	24.68	22.75	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#12	24.82	22.89	34.77	PASS
Band13	5MHz	QPSK	23230	1RB#24	24.67	22.74	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#0	23.63	21.7	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#6	23.58	21.65	34.77	PASS
Band13	5MHz	QPSK	23230	12RB#11	23.65	21.72	34.77	PASS
Band13	5MHz	QPSK	23230	25RB#0	23.71	21.78	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#0	24.72	22.79	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#12	24.77	22.84	34.77	PASS
Band13	5MHz	QPSK	23255	1RB#24	24.48	22.55	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#0	23.46	21.53	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#6	23.62	21.69	34.77	PASS
Band13	5MHz	QPSK	23255	12RB#11	23.47	21.54	34.77	PASS
Band13	5MHz	QPSK	23255	25RB#0	23.45	21.52	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#0	23.50	21.57	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#12	23.40	21.47	34.77	PASS
Band13	5MHz	16QAM	23205	1RB#24	23.38	21.45	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#0	22.58	20.65	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#6	22.58	20.65	34.77	PASS
Band13	5MHz	16QAM	23205	12RB#11	22.49	20.56	34.77	PASS
Band13	5MHz	16QAM	23205	25RB#0	22.70	20.77	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#0	23.07	21.14	34.77	PASS
Band13	5MHz	16QAM	23230	1RB#12	23.63	21.7	34.77	PASS

Band13	5MHz	16QAM	23230	1RB#24	23.37	21.44	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#0	22.75	20.82	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#6	22.71	20.78	34.77	PASS
Band13	5MHz	16QAM	23230	12RB#11	22.61	20.68	34.77	PASS
Band13	5MHz	16QAM	23230	25RB#0	22.87	20.94	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#0	23.72	21.79	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#12	23.63	21.7	34.77	PASS
Band13	5MHz	16QAM	23255	1RB#24	23.10	21.17	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#0	22.51	20.58	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#6	22.65	20.72	34.77	PASS
Band13	5MHz	16QAM	23255	12RB#11	22.41	20.48	34.77	PASS
Band13	5MHz	16QAM	23255	25RB#0	22.58	20.65	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#0	24.64	22.71	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#25	24.90	22.97	34.77	PASS
Band13	10MHz	QPSK	23230	1RB#49	24.64	22.71	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#0	23.60	21.67	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#13	23.55	21.62	34.77	PASS
Band13	10MHz	QPSK	23230	25RB#25	23.49	21.56	34.77	PASS
Band13	10MHz	QPSK	23230	50RB#0	23.60	21.67	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#0	23.28	21.35	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#24	23.65	21.72	34.77	PASS
Band13	10MHz	16QAM	23230	1RB#49	23.43	21.5	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#0	22.70	20.77	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#13	22.72	20.79	34.77	PASS
Band13	10MHz	16QAM	23230	25RB#25	22.65	20.72	34.77	PASS
Band13	10MHz	16QAM	23230	50RB#0	22.65	20.72	34.77	PASS

Note1:

a, For getting the ERP (Efficient Radiated Power) or EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

c, Antenna gain of LTE Band 13 is 0.22dBi.



Note2: SET Span=1.5*OBW

SET RBW=1%of the OBW, not to exceed 1MHz

SET VBW>= 3*RBW

SET Sweep time=auto-couple.

Detector:RMS

Appendix B: Peak-to-Average Ratio

Test Result:

Worst Case data as follows:

Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dB)	Limit(dB)	Verdict
Band13	5MHz	QPSK	23205	25RB#0	4.27	13	PASS
Band13	5MHz	QPSK	23230	25RB#0	4.29	13	PASS
Band13	5MHz	QPSK	23255	25RB#0	4.34	13	PASS
Band13	5MHz	16QAM	23205	25RB#0	5.0	13	PASS
Band13	5MHz	16QAM	23230	25RB#0	4.97	13	PASS
Band13	5MHz	16QAM	23255	25RB#0	5.15	13	PASS
Band13	10MHz	QPSK	23230	50RB#0	4.27	13	PASS
Band13	10MHz	16QAM	23230	50RB#0	5.02	13	PASS

Appendix C: Modulation Characteristics

Test Result:

Worst Case data as follows:

Band	Bandwidth	Modulation	Channel	RB Configuration	Result	Verdict
Band13	5MHz	QPSK	23205	25RB#0	PASS	PASS
Band13	5MHz	QPSK	23230	25RB#0	PASS	PASS
Band13	5MHz	QPSK	23255	25RB#0	PASS	PASS
Band13	5MHz	16QAM	23205	25RB#0	PASS	PASS
Band13	5MHz	16QAM	23230	25RB#0	PASS	PASS
Band13	5MHz	16QAM	23255	25RB#0	PASS	PASS
Band13	10MHz	QPSK	23230	50RB#0	PASS	PASS
Band13	10MHz	16QAM	23230	50RB#0	PASS	PASS

Appendix D: Bandwidth

Test Result:

Band	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band13	5MHz	QPSK	23205	25RB#0	4.5086	5.019	PASS
Band13	5MHz	QPSK	23230	25RB#0	4.5070	4.893	PASS
Band13	5MHz	QPSK	23255	25RB#0	4.5059	4.995	PASS
Band13	5MHz	16QAM	23205	25RB#0	4.4931	5.023	PASS
Band13	5MHz	16QAM	23230	25RB#0	4.5024	4.999	PASS
Band13	5MHz	16QAM	23255	25RB#0	4.4948	4.981	PASS
Band13	10MHz	QPSK	23230	50RB#0	8.9432	9.831	PASS
Band13	10MHz	16QAM	23230	50RB#0	8.9511	9.853	PASS

Test Graphs

Band13-5MHz-QPSK-23205-25RB#0



Band13-5MHz-QPSK-23230-25RB#0



Band13-5MHz-QPSK-23255-25RB#0



Band13-5MHz-16QAM-23205-25RB#0



Band13-5MHz-16QAM-23230-25RB#0



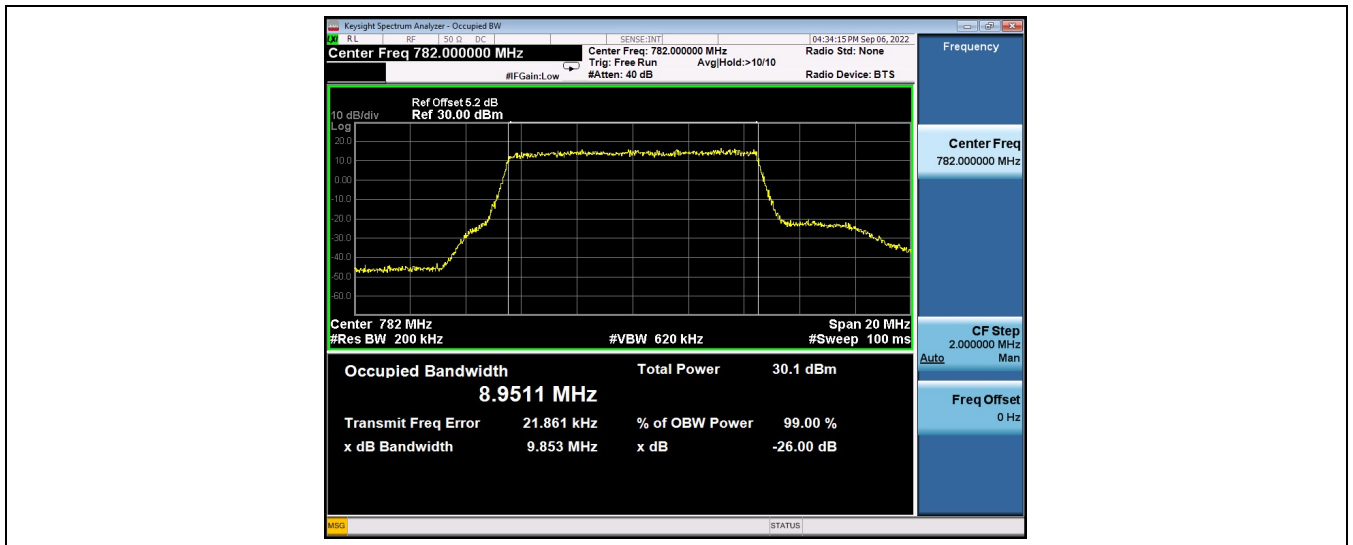
Band13-5MHz-16QAM-23255-25RB#0



Band13-10MHz-QPSK-23230-50RB#0



Band13-10MHz-16QAM-23230-50RB#0



Appendix E: Band Edge Compliance

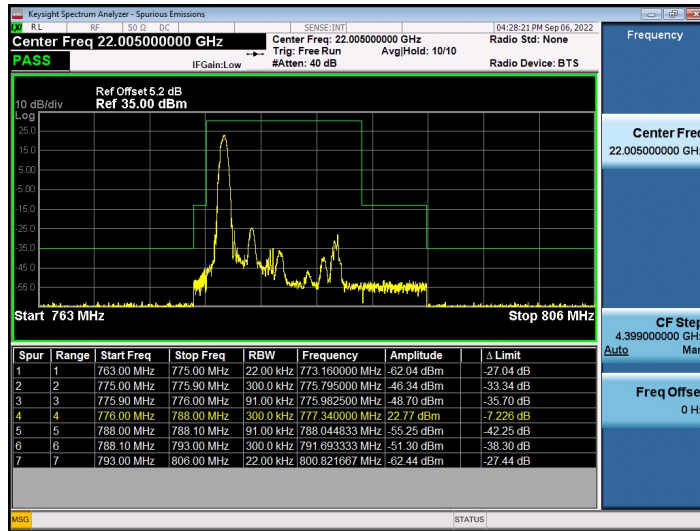
Test Result:

Worst Case data as follows:

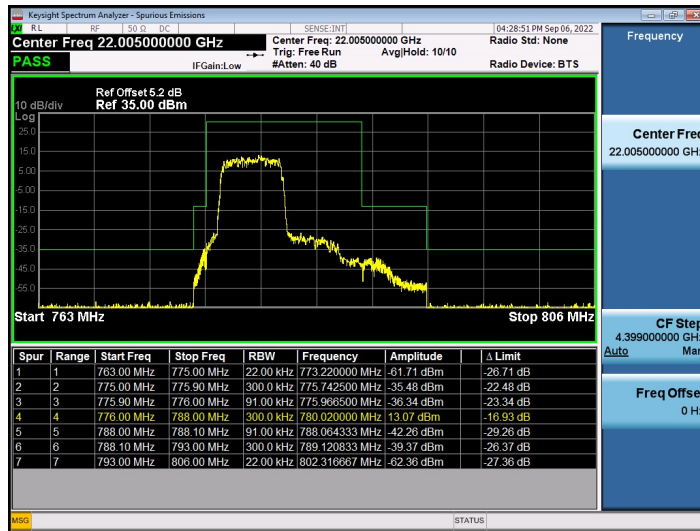
Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dBm)	Verdict
Band13	5MHz	QPSK	23205	1RB#0	Reference test Graphs	PASS
Band13	5MHz	QPSK	23205	25RB#0	Reference test Graphs	PASS
Band13	5MHz	QPSK	23255	1RB#24	Reference test Graphs	PASS
Band13	5MHz	QPSK	23255	25RB#0	Reference test Graphs	PASS
Band13	10MHz	QPSK	23230	1RB#49	Reference test Graphs	PASS
Band13	10MHz	QPSK	23230	50RB#0	Reference test Graphs	PASS

Test Graphs

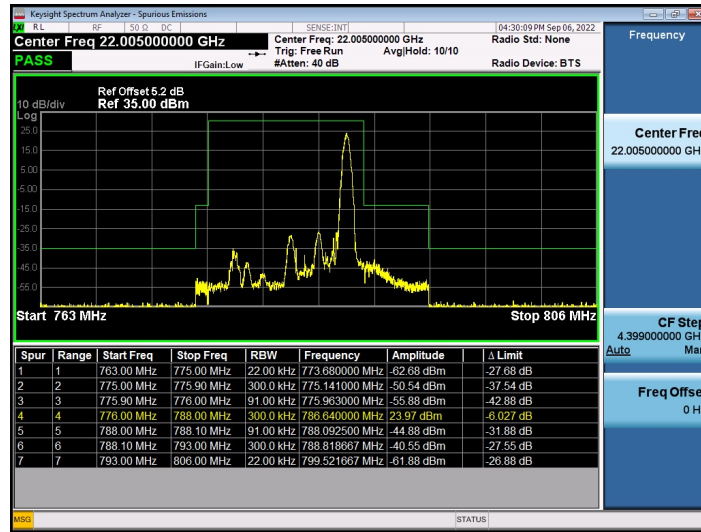
Band13-5MHz-QPSK-23205-1RB#0



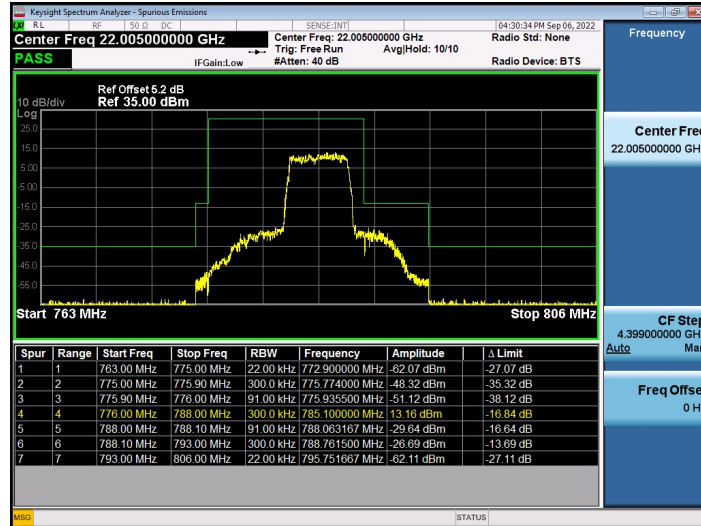
Band13-5MHz-QPSK-23205-25RB#0



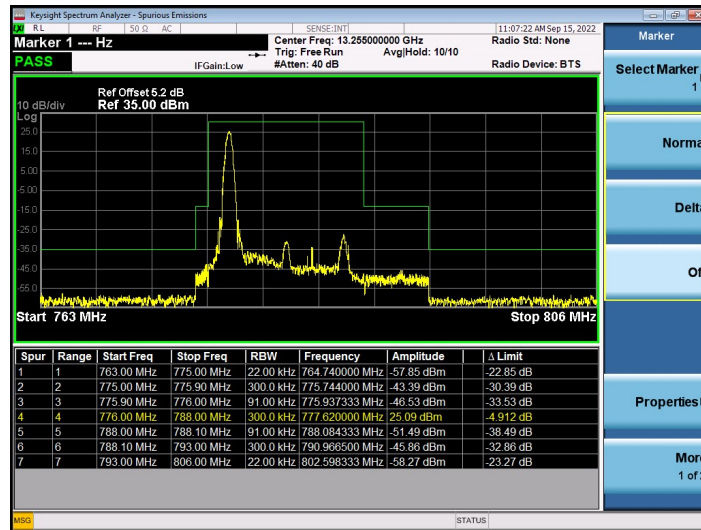
Band13-5MHz-QPSK-23255-1RB#24



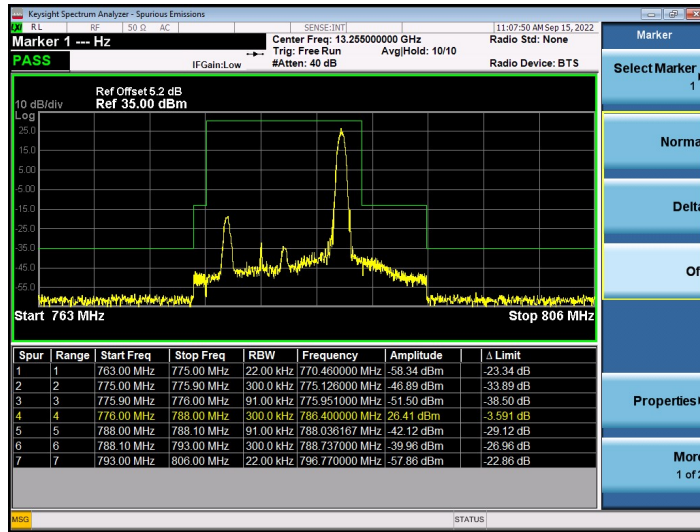
Band13-5MHz-QPSK-232255-25RB#0



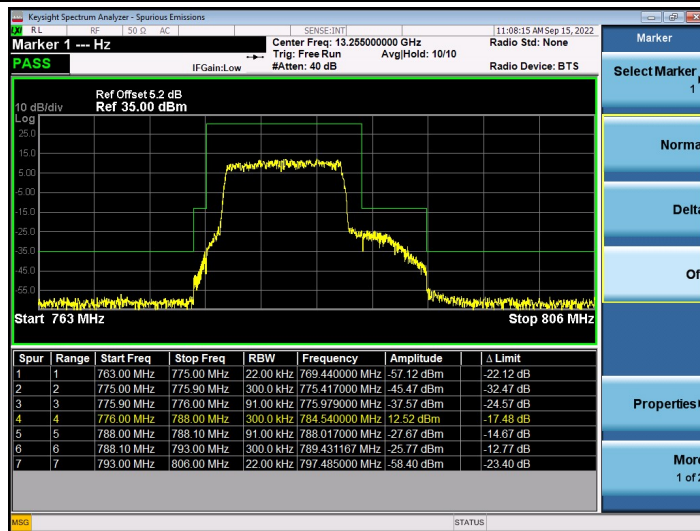
Band13-10MHz-QPSK-232301RB#0



Band13-10MHz-QPSK-23230-1RB#49



Band13-10MHz-QPSK-23230-50RB#0



Appendix E: Spurious Emission at Antenna Terminals

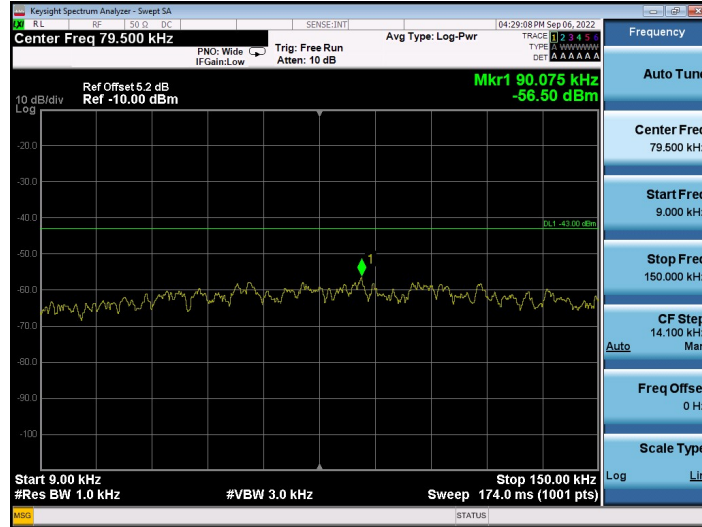
Test Result:

Worst Case data as follows:

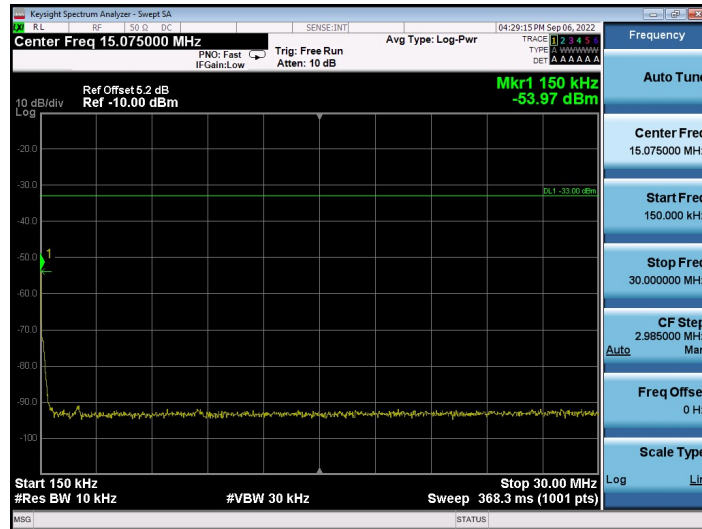
Band	Bandwidth	Modulation	Channel	RB Configuration	Frequency Range	Result (dBm)	Verdict
Band13	5MHz	QPSK	23230	1RB#0	Range1: 9KHz~150KHz	-56.50	PASS
Band13	5MHz	QPSK	23230	1RB#0	Range2: 150KHz~30MHz	-53.97	PASS
Band13	5MHz	QPSK	23230	1RB#0	Range3: 30MHz~7.82GHz	-39.00	PASS
Band13	10MHz	QPSK	23230	1RB#0	Range1: 9KHz~150KHz	-56.24	PASS
Band13	10MHz	QPSK	23230	1RB#0	Range2: 150KHz~30MHz	-54.41	PASS
Band13	10MHz	QPSK	23230	1RB#0	Range3: 30MHz~7.82GHz	-37.63	PASS

Test Graphs

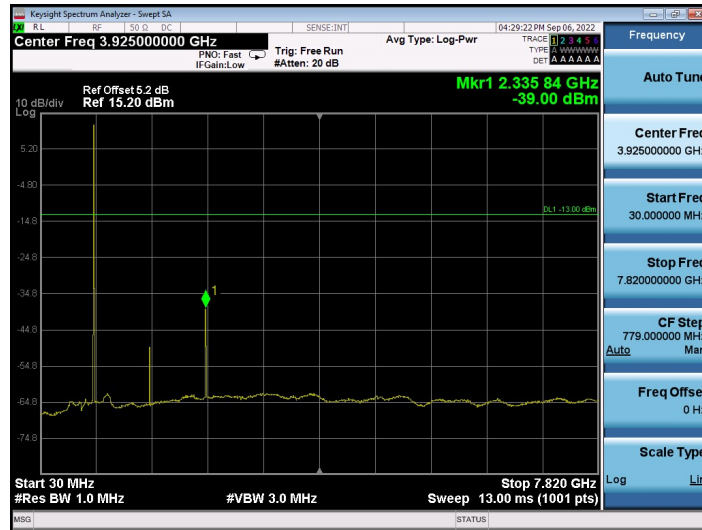
Band13-5MHz-QPSK-23230-1RB#0-Range1: 9KHz~150KHz



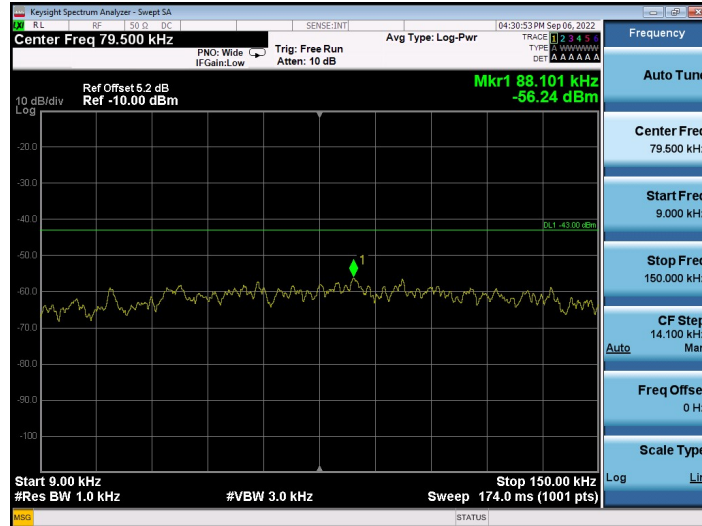
Band13-5MHz-QPSK-23230-1RB#0-Range2: 150KHz~30MHz



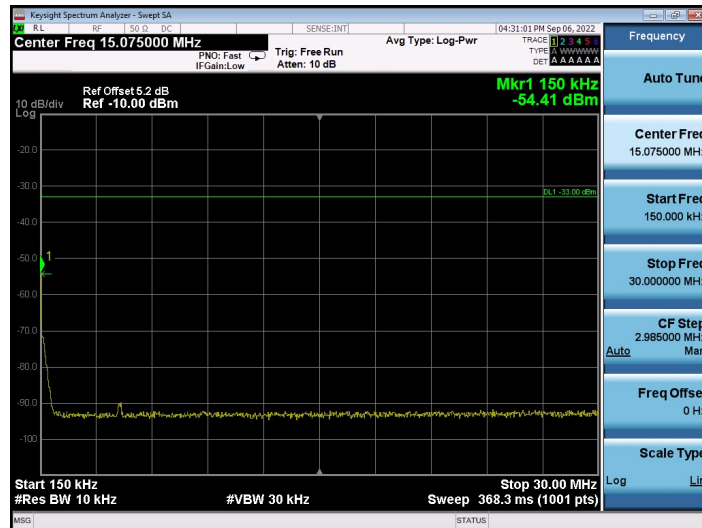
Band13-5MHz-QPSK-23230-1RB#0-Range3:30MHz~7.82GHz



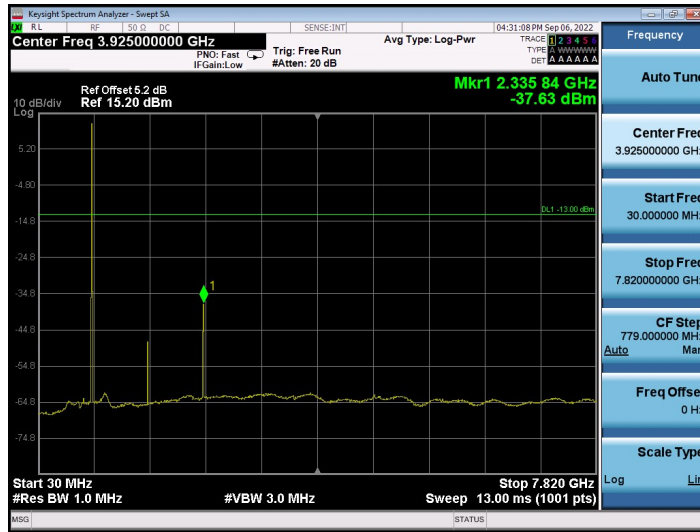
Band13-10MHz-QPSK-23230-1RB#0-Range1: 9KHz~150KHz



Band13-10MHz-QPSK-23230-1RB#0-Range2: 150KHz~30MHz



Band13-10MHz-QPSK-23230-1RB#0-Range3: 30MHz~7.82GHz



Appendix G: Field Strength of Spurious Radiation

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter up to 1GHz and 1.5 meter above 1GHz in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. The emissions were very low against the limit in the frequency range 9kHz to 30MHz and 18 GHz ~ 20 GHz.

Note: We tested all modes, but the data presented below is the worst case.

9kHz~150kHz, VBW = 200Hz, VBW = 600Hz, Detector: PK

150kHz~30MHz, VBW = 9kHz, VBW = 30kHz, Detector: PK

30MHz~1GHz, RBW = 100kHz, VBW = 300kHz. Detector: RMS

Above 1GHz, RBW = 1MHz, VBW = 3MHz. Detector: RMS

Test Plots

Test Band = BAND13

Worst Test Bandwidth = 5MHz-Middle channel(30MHz~1GHz)

Worst Test Bandwidth = 1.4MHz, 5MHz, 10MHz, -Middle channel(1GHz~8GHz)

Note:

1. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.
2. The EUT is tested radiation emission at each test mode in three axes. The worst emissions are reported in all test mode and channels.
3. Measurement = Reading + Correct Factor
Over = Measurement – Limit.

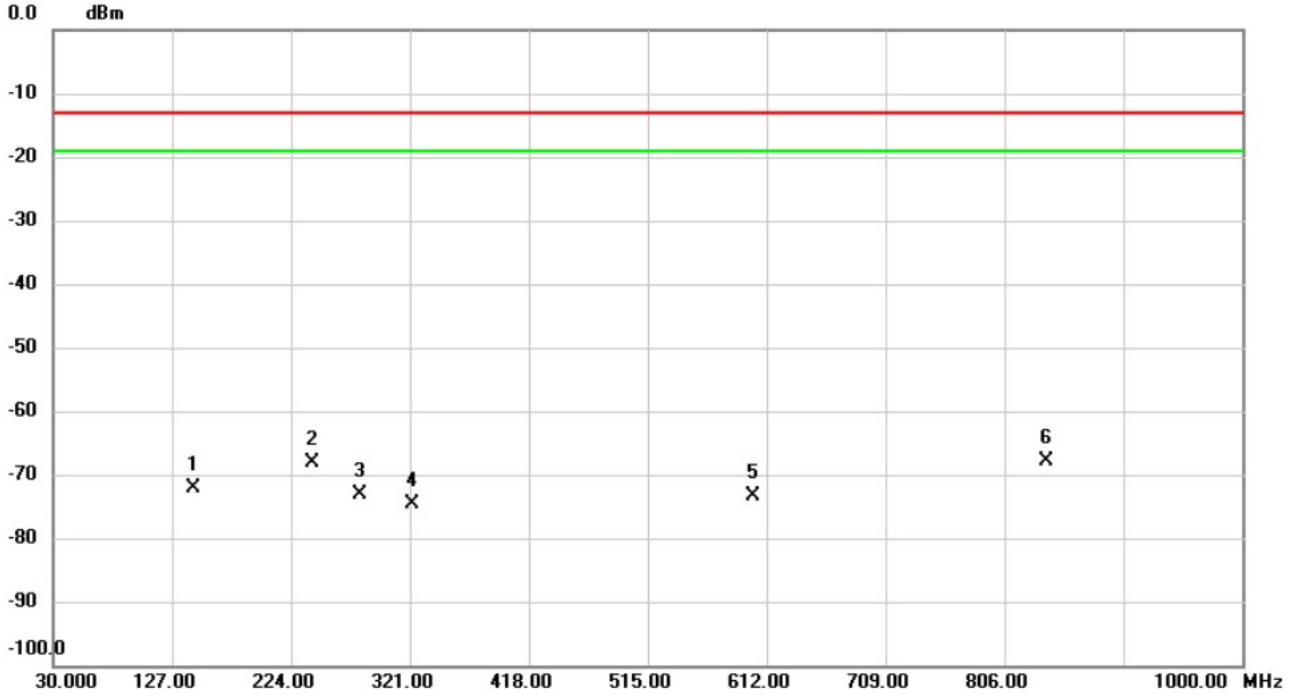
Middle channel Horizontal
Below 1G
BW_5MHz
Radiated Emission Measurement

File :FCCP_BELOW1G

Data :#12

Date: 2022/9/13

Time: 11:39:11



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector
1		144.4600	-66.82	-5.41	-72.23	-13.00	-59.23	RMS
2		241.4600	-64.22	-3.91	-68.13	-13.00	-55.13	RMS
3		280.2600	-70.04	-3.06	-73.10	-13.00	-60.10	RMS
4		322.9400	-71.82	-2.81	-74.63	-13.00	-61.63	RMS
5		600.3600	-75.39	1.95	-73.44	-13.00	-60.44	RMS
6	*	839.9500	-72.16	4.22	-67.94	-13.00	-54.94	RMS

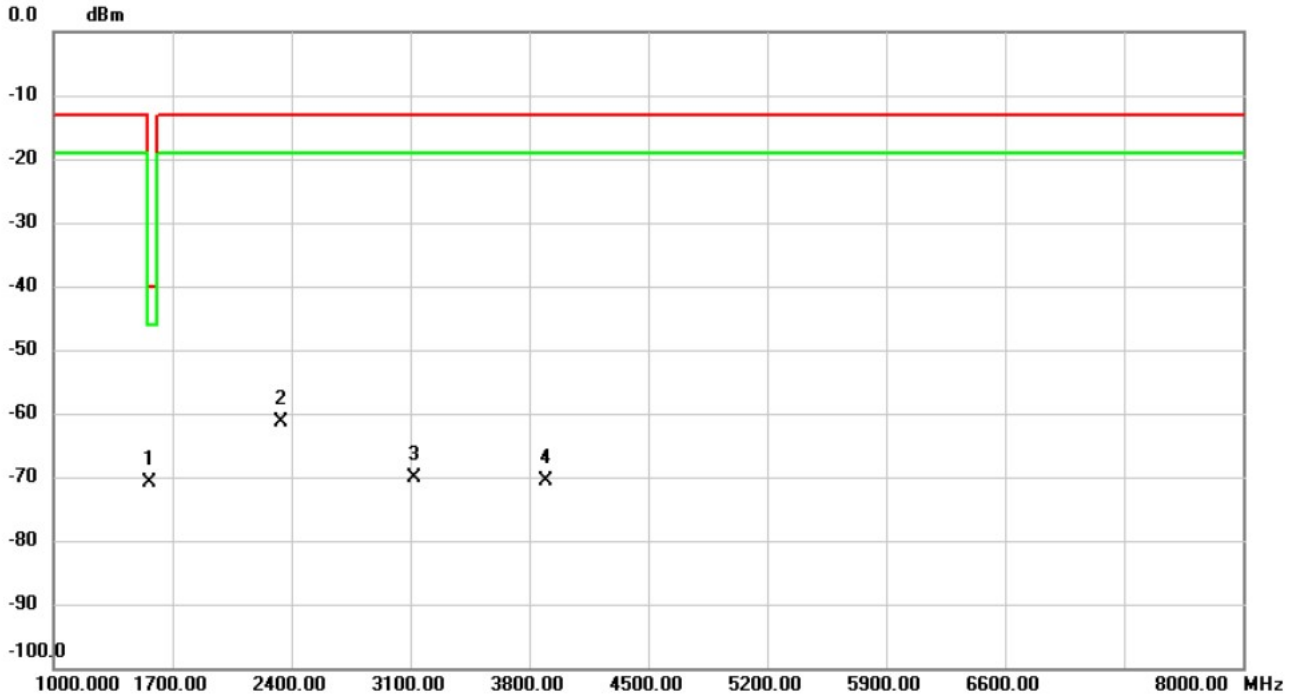
Above IG
BW_5MHz
Radiated Emission Measurement

File :FCCP_ABOVE1G

Data :#20

Date: 2022/9/7

Time: 13:32:00



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector
1	*	1560.000	-58.03	-12.81	-70.84	-40.00	-30.84	RMS
2		2337.000	-51.62	-9.68	-61.30	-13.00	-48.30	RMS
3		3121.000	-61.76	-8.30	-70.06	-13.00	-57.06	RMS
4		3898.750	-63.99	-6.61	-70.60	-13.00	-57.60	RMS

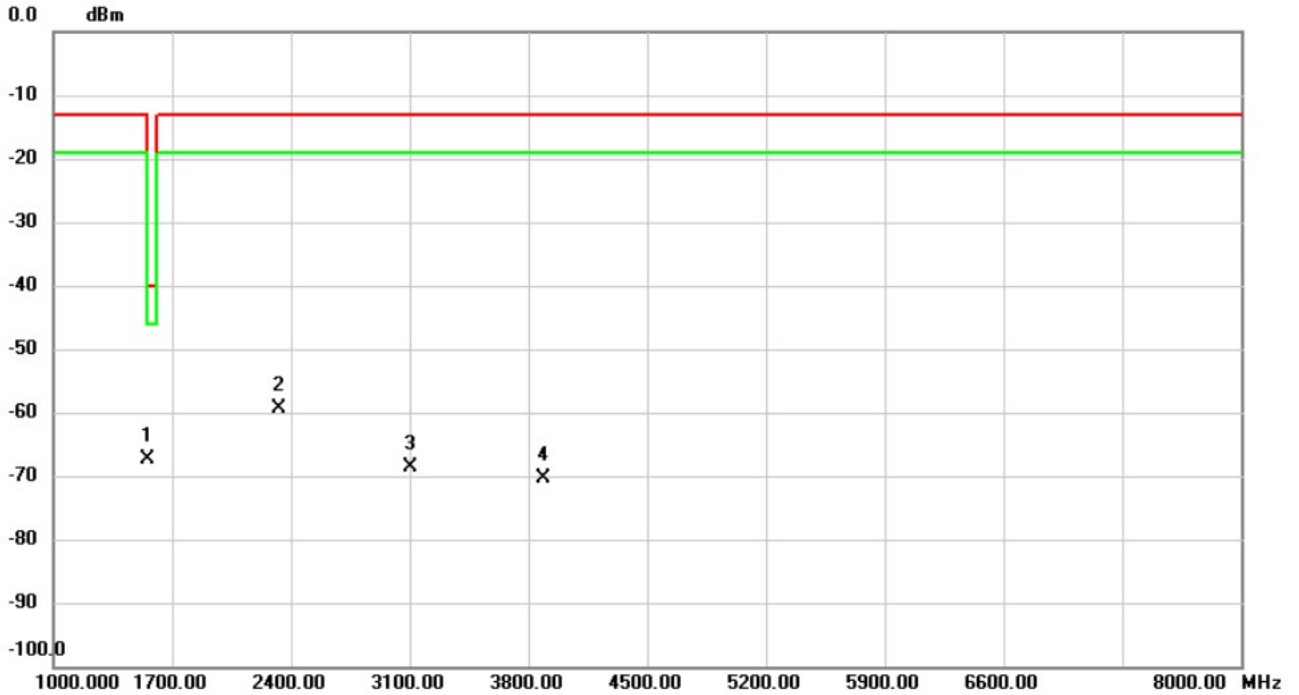
**BW_10MHz
Radiated Emission Measurement**

File :FCCP_ABOVE1G

Data :#22

Date: 2022/9/7

Time: 13:35:30



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector
1		1553.000	-54.68	-12.78	-67.46	-13.00	-54.46	RMS
2	*	2330.000	-49.62	-9.64	-59.26	-13.00	-46.26	RMS
3		3107.000	-60.36	-8.37	-68.73	-13.00	-55.73	RMS
4		3887.500	-63.69	-6.63	-70.32	-13.00	-57.32	RMS

Middle channel Vertical
Below 1G
BW_5MHz

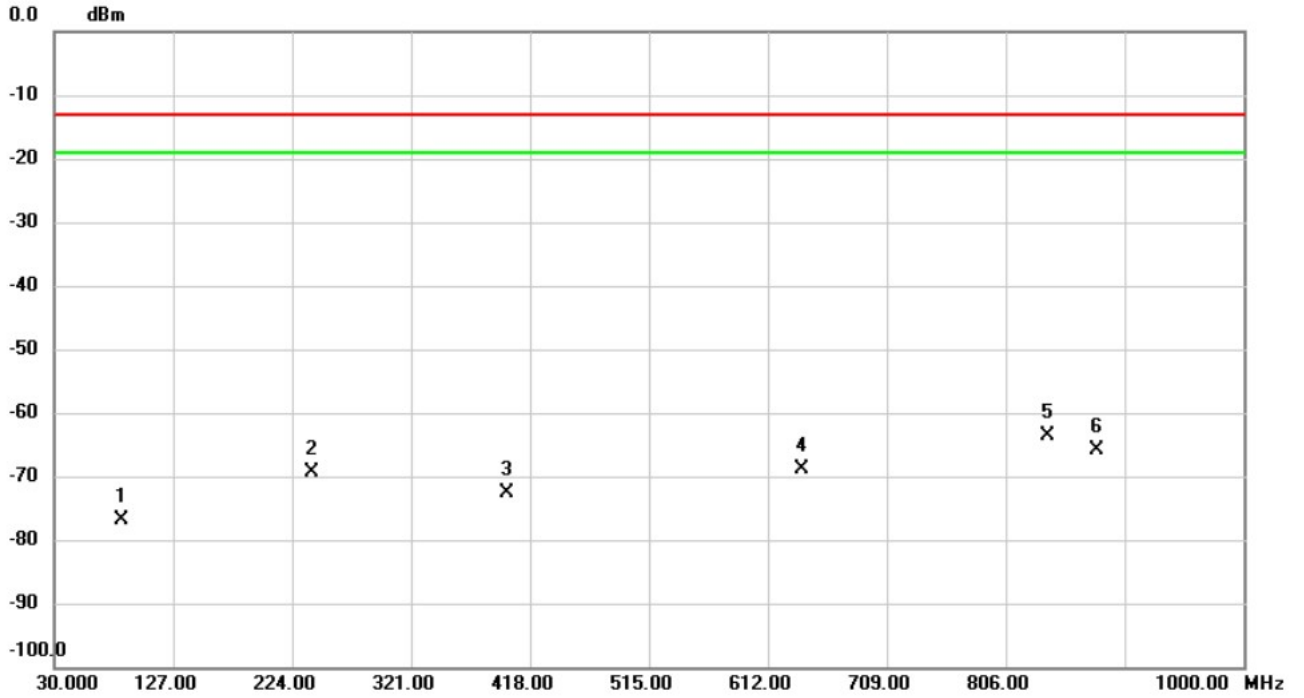
Radiated Emission Measurement

File :FCCP_BELOW1G

Data :#11

Date: 2022/9/13

Time: 11:37:38



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector
1		84.3200	-70.67	-6.25	-76.92	-13.00	-63.92	RMS
2		239.5200	-63.87	-5.49	-69.36	-13.00	-56.36	RMS
3		399.5700	-71.10	-1.55	-72.65	-13.00	-59.65	RMS
4		640.1300	-70.84	1.95	-68.89	-13.00	-55.89	RMS
5	*	839.9500	-67.25	3.60	-63.65	-13.00	-50.65	RMS
6		879.7200	-69.75	3.99	-65.76	-13.00	-52.76	RMS

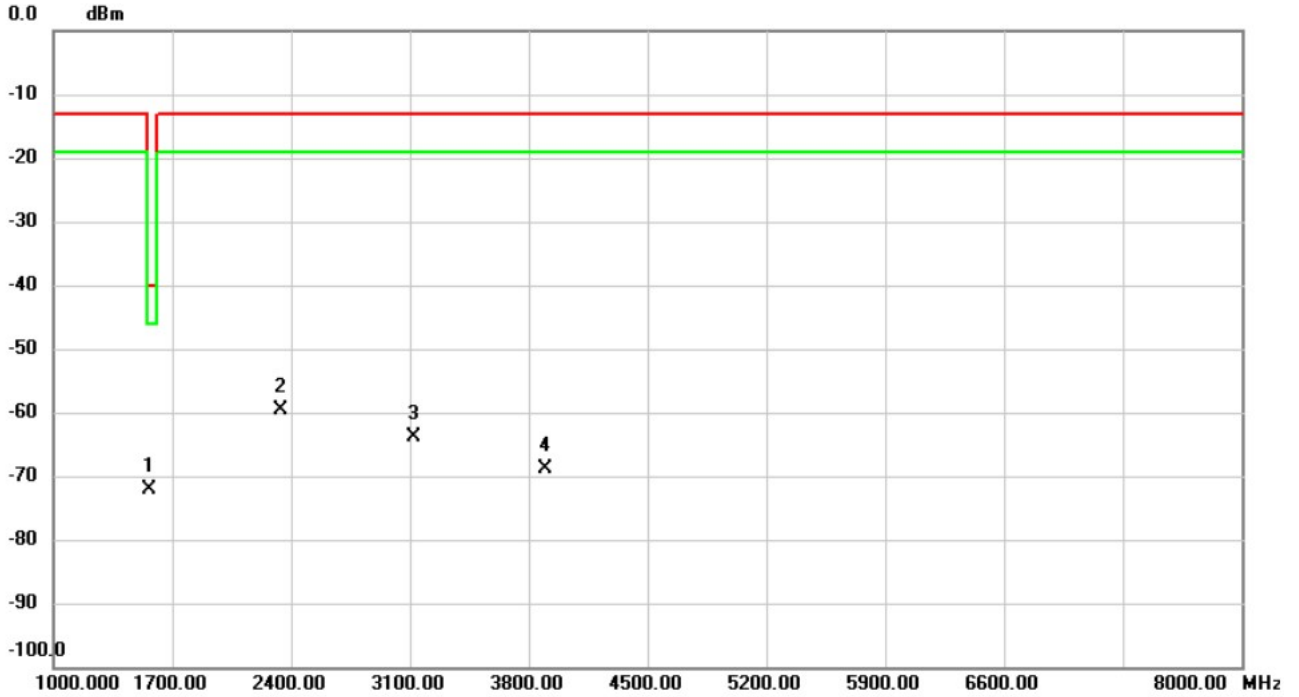
**Above IG
BW_5MHz
Radiated Emission Measurement**

File :FCCP_ABOVE1G

Data :#19

Date: 2022/9/7

Time: 13:30:20



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBm	dB	dBm	dBm	dB	Detector
1	*	1560.000	-59.47	-12.63	-72.10	-40.00	-32.10	RMS
2		2337.000	-49.78	-9.80	-59.58	-13.00	-46.58	RMS
3		3121.000	-55.54	-8.31	-63.85	-13.00	-50.85	RMS
4		3898.000	-62.21	-6.57	-68.78	-13.00	-55.78	RMS

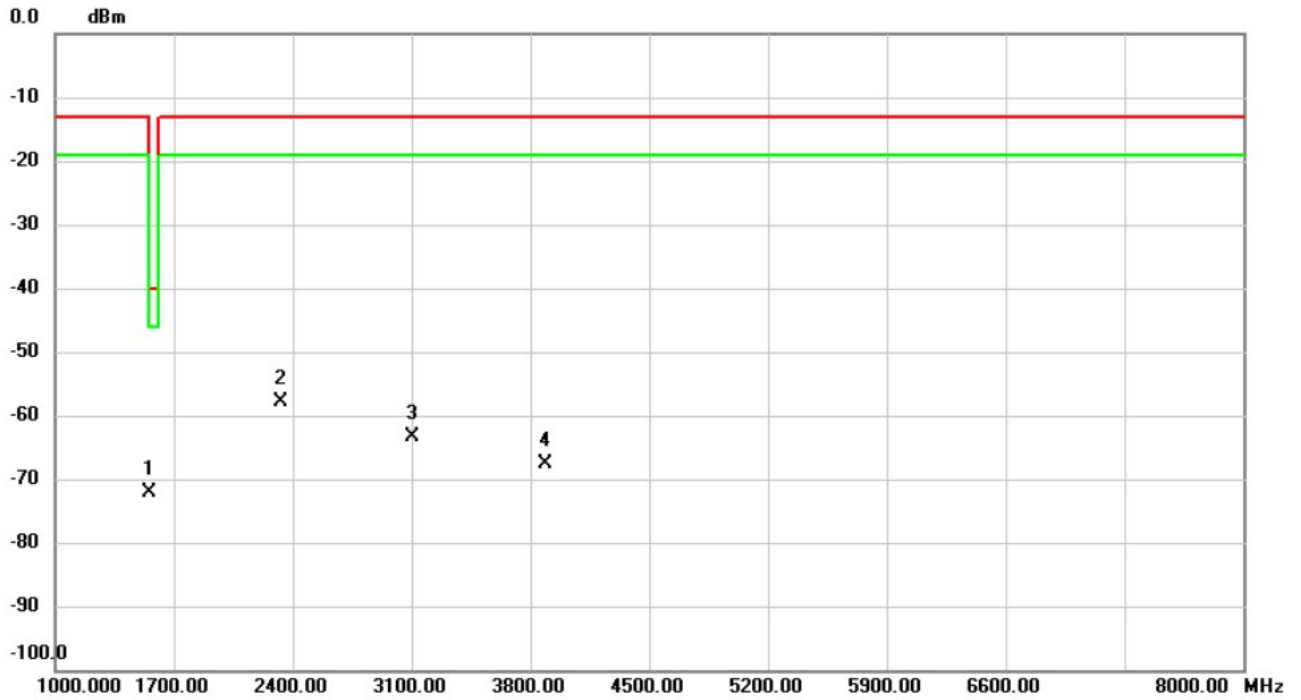
**BW_10MHz
Radiated Emission Measurement**

File :FCCP_ABOVE1G

Data :#21

Date: 2022/9/7

Time: 13:34:02



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector
1		1553.000	-59.50	-12.56	-72.06	-13.00	-59.06	RMS
2	*	2330.000	-48.18	-9.77	-57.95	-13.00	-44.95	RMS
3		3107.000	-54.94	-8.39	-63.33	-13.00	-50.33	RMS
4		3891.000	-61.10	-6.61	-67.71	-13.00	-54.71	RMS

Appendix F: Frequency Stability

Test Result:

Frequency Error vs. Voltage:

Worst Case data as follows:

Voltage										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band13	5MHz	QPSK	23230	1RB#0	VH	NT	6.76	0.00864450	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	VN	NT	7.35	0.00939898	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	VL	NT	4.84	0.00618926	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	VH	NT	7.10	0.00907928	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	VN	NT	5.32	0.00680307	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	VL	NT	8.34	0.01066496	±2.5	PASS

Frequency Error vs. Temperature:
Worst Case data as follows:

Temperature										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band13	5MHz	QPSK	23230	1RB#0	NV	-40	8.88	0.01135550	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	-30	6.08	0.00777494	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	-20	6.40	0.00818414	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	-10	6.15	0.00786445	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	0	6.40	0.00818414	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	10	5.24	0.00670077	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	20	4.10	0.00524297	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	30	4.69	0.00599744	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	40	6.19	0.00791560	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	50	6.48	0.00828645	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	60	5.60	0.00716113	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	70	4.25	0.00543478	±2.5	PASS
Band13	5MHz	QPSK	23230	1RB#0	NV	80	6.86	0.00877238	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	-40	7.57	0.00968031	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	-30	7.40	0.00946292	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	-20	4.91	0.00627877	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	-10	7.67	0.00980818	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	0	7.17	0.00916880	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	10	8.49	0.01085678	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	20	6.08	0.00777494	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	30	5.02	0.00641944	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	40	5.46	0.00698210	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	50	5.76	0.00736573	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	60	8.09	0.01034527	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	70	8.38	0.01071611	±2.5	PASS
Band13	10MHz	QPSK	23230	1RB#0	NV	80	5.10	0.00652174	±2.5	PASS

END