

Appendix A: Test Results of FHSS

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Appendix A.1: 20dB Bandwidth

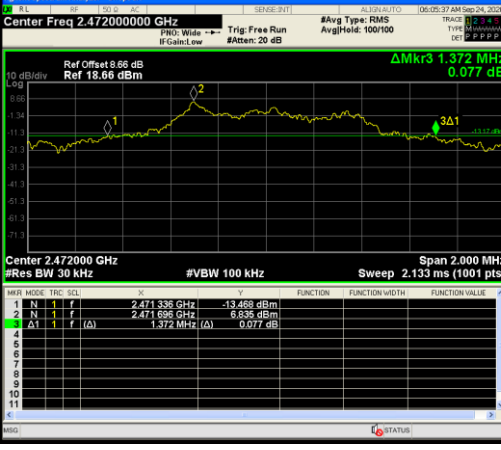
Channel Number	Frequency (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Verdict
0	2406	1.418	-	Pass
15	2440	1.378	-	Pass
30	2472	1.372	-	Pass



Frequency (MHz)	Power (dBm)	Bandwidth (MHz)	Delta (dB)
2406.340	-13.112		
2406.714	7.430		
1.418		0.247	

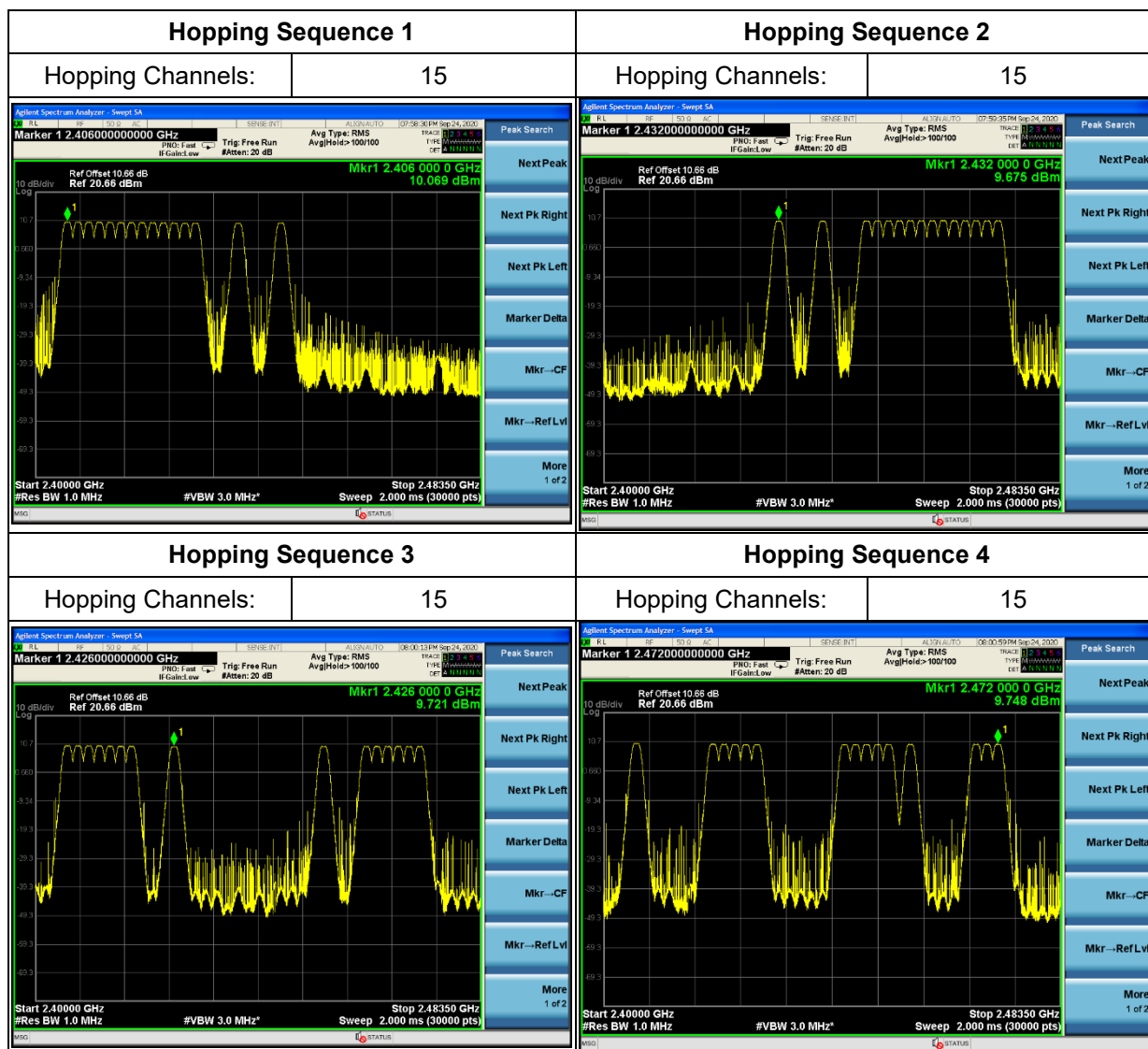


Frequency (MHz)	Power (dBm)	Bandwidth (MHz)	Delta (dB)
2439.338	-13.677		
2439.712	6.409		
1.378		-0.233	



Frequency (MHz)	Power (dBm)	Bandwidth (MHz)	Delta (dB)
2471.338	-13.468		
2471.698	6.835		
1.372		0.077	

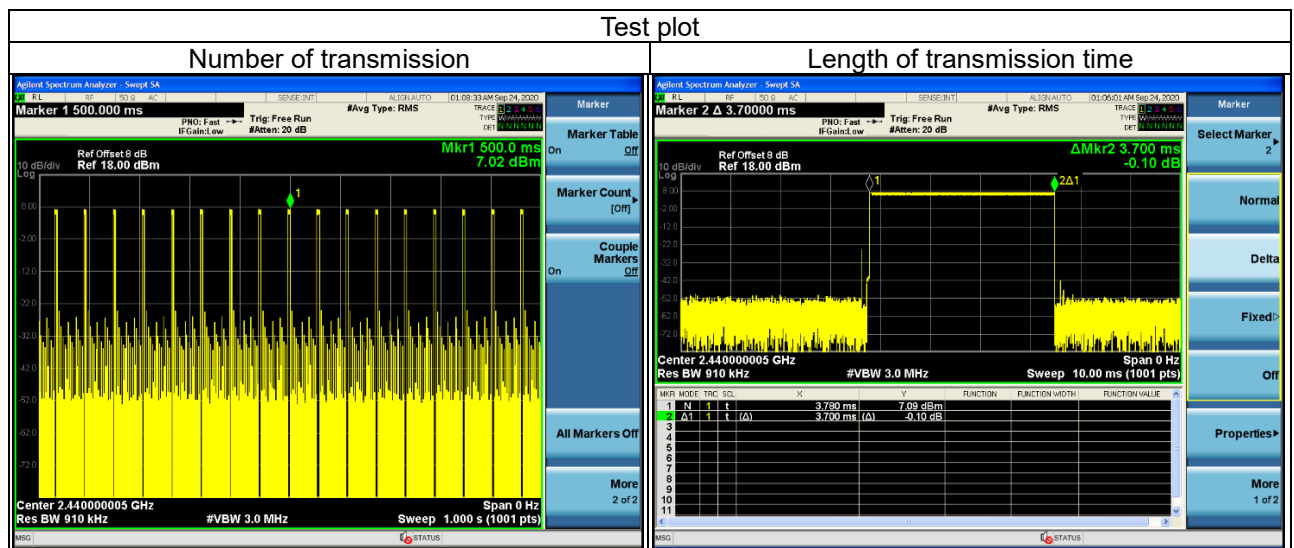
Appendix A.2: Test Results of Number of Hopping Frequency



Appendix A.3: Time of Occupancy

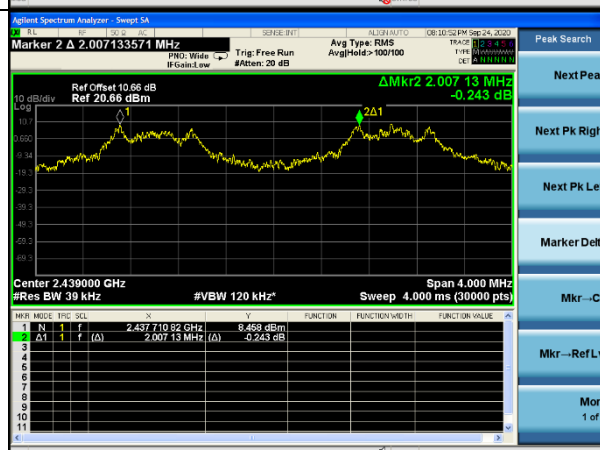
Number of Hopping Channel	Number of transmission in a period (channel number*0.015 sec)				Length of transmission time (ms)	Result (ms)	Limit (ms)	Verdict
	Period (Sec)	Sweep time (Sec)	Number in a sweep	Number in a period				
15	6	1	17	102	3.70	377.40	400	Pass

Test plot



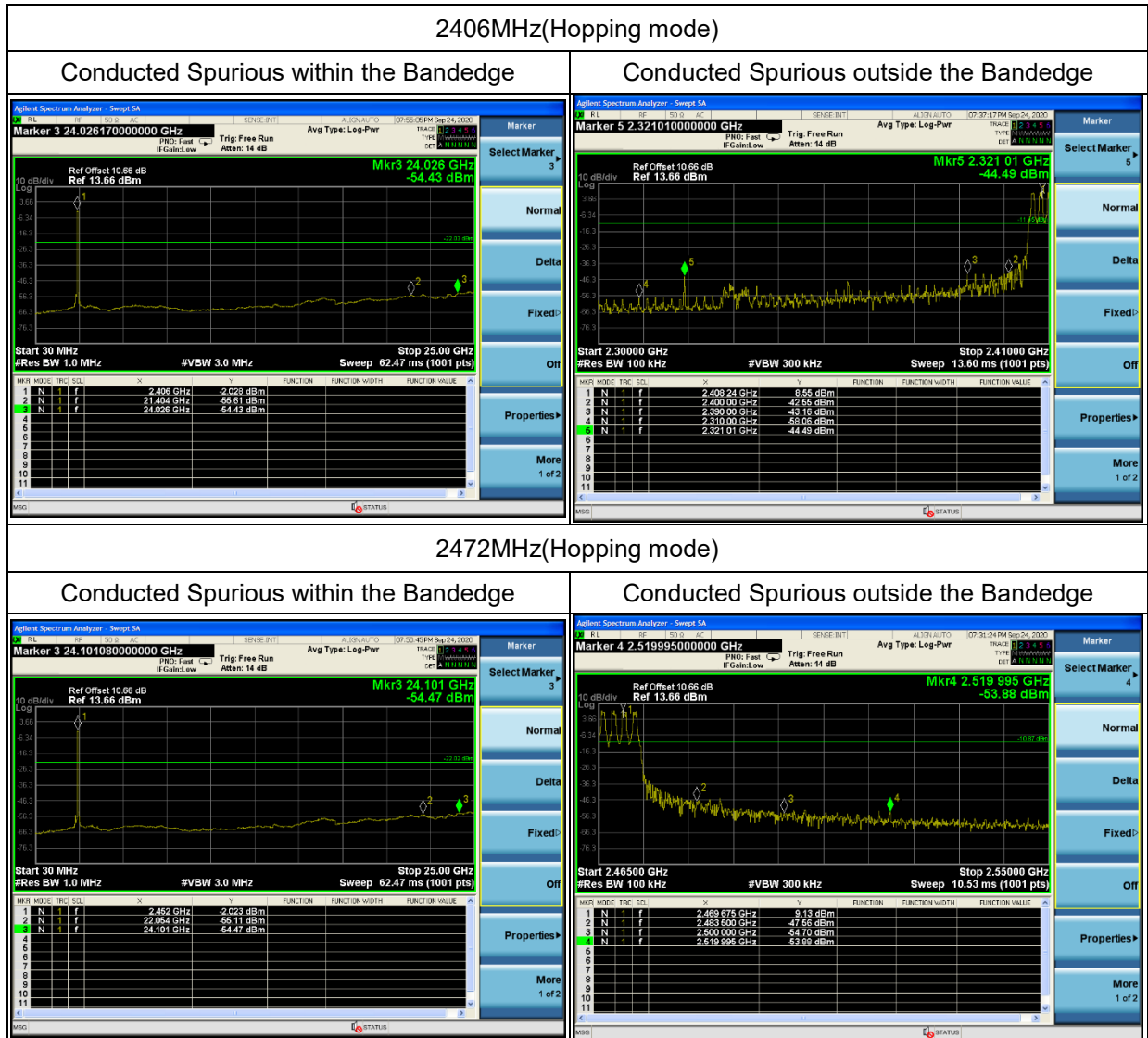
Appendix A.4: Carrier Frequency Separation

Channel Number	Frequency (MHz)	Channel Separation (MHz)	Minimum Limit (MHz)	Verdict
0	2406	1.927	1.418	Pass
15	2440	2.007	1.378	Pass
30	2472	2.002	1.372	Pass



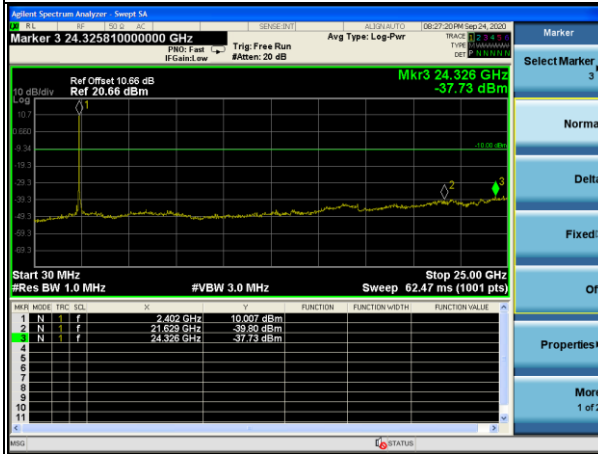
Appendix A.5: Conducted Spurious Emissions Measured in 100 kHz Bandwidth

Only the high and low channels which produce the worst results listed



2406MHz (Disable Hopping mode)

Conducted Spurious within the Bandedge

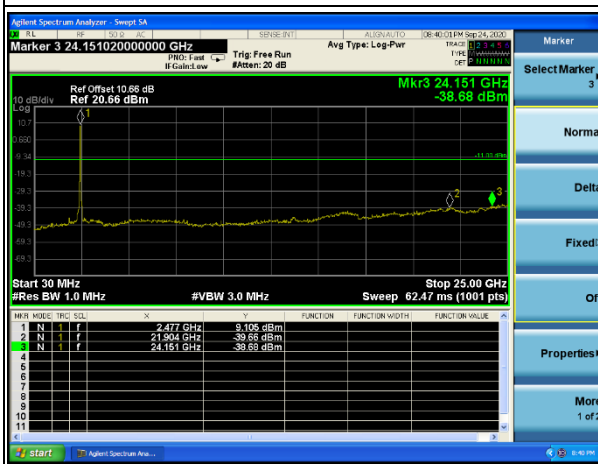


Conducted Spurious outside the Bandedge

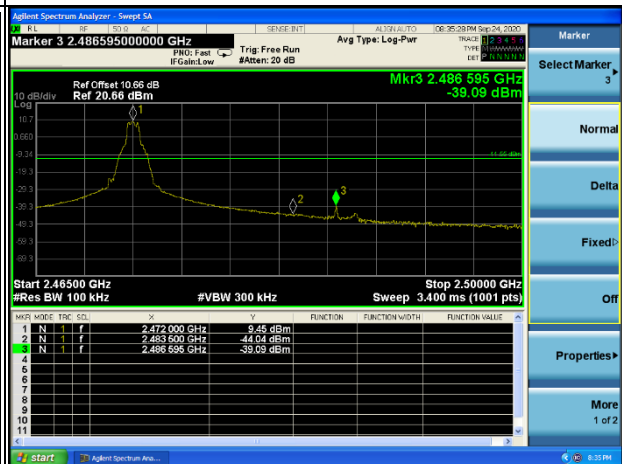


2472MHz (Disable Hopping mode)

Conducted Spurious within the Bandedge



Conducted Spurious outside the Bandedge



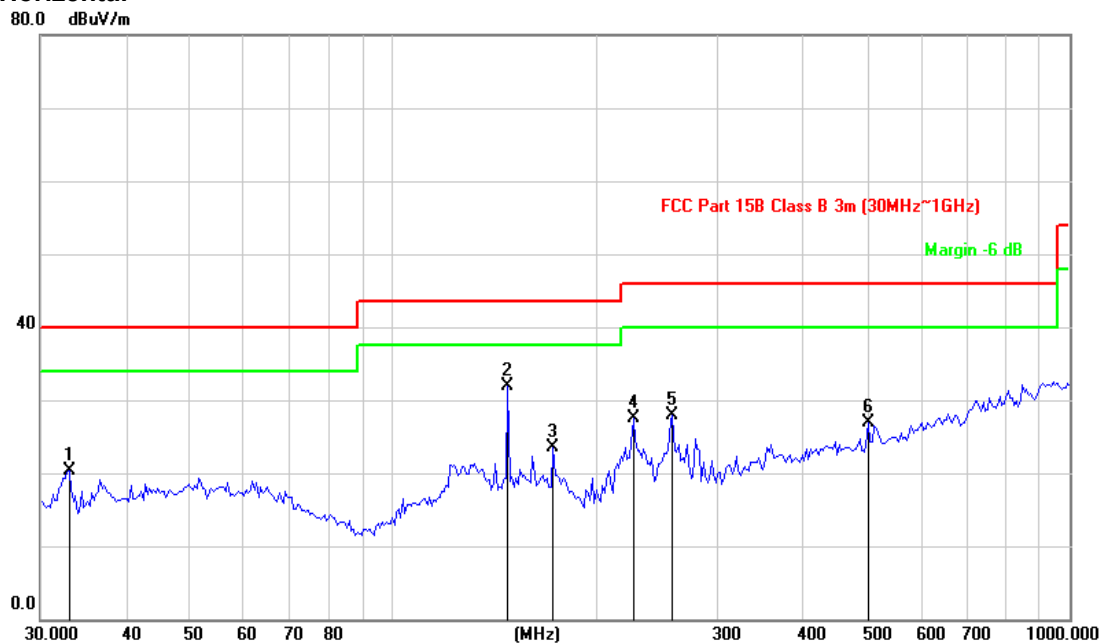
Appendix A.6: Test Results of Radiated Spurious Emissions

9kHz ~ 30MHz

Note: The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

30MHz - 1GHz

GFSK_Horizontal

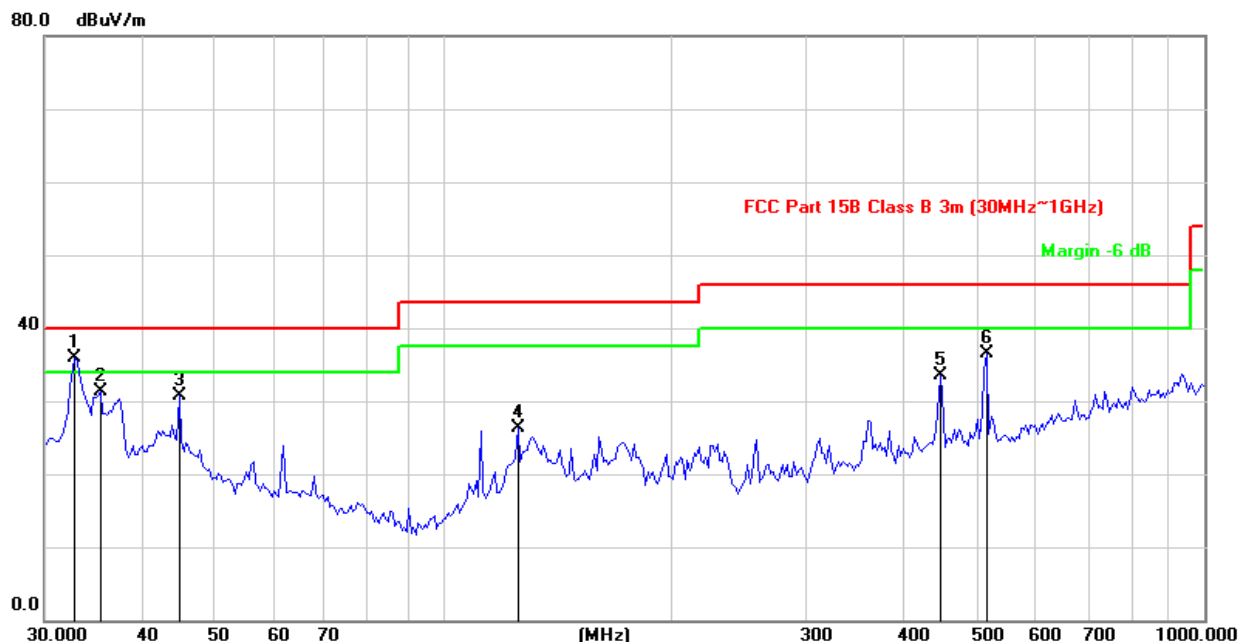


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	33.0950	37.37	-17.11	20.26	40.00	-19.74	200	103
2	147.4036	45.76	-13.88	31.88	43.50	-11.62	200	220
3	171.9946	36.73	-13.21	23.52	43.50	-19.98	100	136
4	226.0994	42.85	-15.31	27.54	46.00	-18.46	100	354
5	258.3264	42.63	-14.66	27.97	46.00	-18.03	300	310
6	502.9395	34.43	-7.50	26.93	46.00	-19.07	200	98

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

GFSK_Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	32.8637	53.08	-17.16	35.92	40.00	-4.08	100	102
2	35.4993	47.92	-16.54	31.38	40.00	-8.62	200	220
3	45.0583	45.29	-14.56	30.73	40.00	-9.27	200	302
4	125.4457	40.84	-14.60	26.24	43.50	-17.26	300	175
5	449.5558	41.91	-8.38	33.53	46.00	-12.47	100	116
6	517.2480	43.22	-6.75	36.47	46.00	-9.53	100	245

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

Above 1GHz - 18GHz

GFSK_Horizontal_Low Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	4812.000	41.52	5.45	46.97	74.00	-27.03	peak	213	237
2	4812.000	18.67	5.45	24.12	54.00	-29.88	AVG	213	237
3	7218.000	32.63	11.79	44.42	74.00	-29.58	peak	176	194
4	7218.000	9.78	11.79	21.57	54.00	-32.43	AVG	176	194

GFSK_Vertical_Low Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	4812.000	42.68	5.45	48.13	74.00	-25.87	peak	304	207
2	4812.000	19.83	5.45	25.28	54.00	-28.72	AVG	304	207
3	7218.000	35.10	11.79	46.89	74.00	-27.11	peak	271	186
4	7218.000	12.25	11.79	24.04	54.00	-29.96	AVG	271	186

GFSK_Horizontal_Middle Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	2440.000	103.19	-0.64	102.55			peak	250	169
2 *	2440.000	80.34	-0.64	79.70			AVG	250	169
3	4880.000	41.95	6.24	48.19	74.00	-25.81	peak	214	140
4	4880.000	19.10	6.24	25.34	54.00	-28.66	AVG	214	140
5	7320.000	33.96	12.13	46.09	74.00	-27.91	peak	185	195
6	7320.000	11.11	12.13	23.24	54.00	-30.76	AVG	185	195

GFSK_Vertical_Middle Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	2440.000	99.94	-0.64	99.30			peak	160	244
2 *	2440.000	77.09	-0.64	76.45			AVG	160	244
3	4880.000	44.68	6.24	50.92	74.00	-23.08	peak	214	203
4	4880.000	21.83	6.24	28.07	54.00	-25.93	AVG	214	203
5	7320.000	32.92	12.13	45.05	74.00	-28.95	peak	185	163
6	7320.000	10.07	12.13	22.20	54.00	-31.80	AVG	185	163

GFSK_Horizontal_High Channel

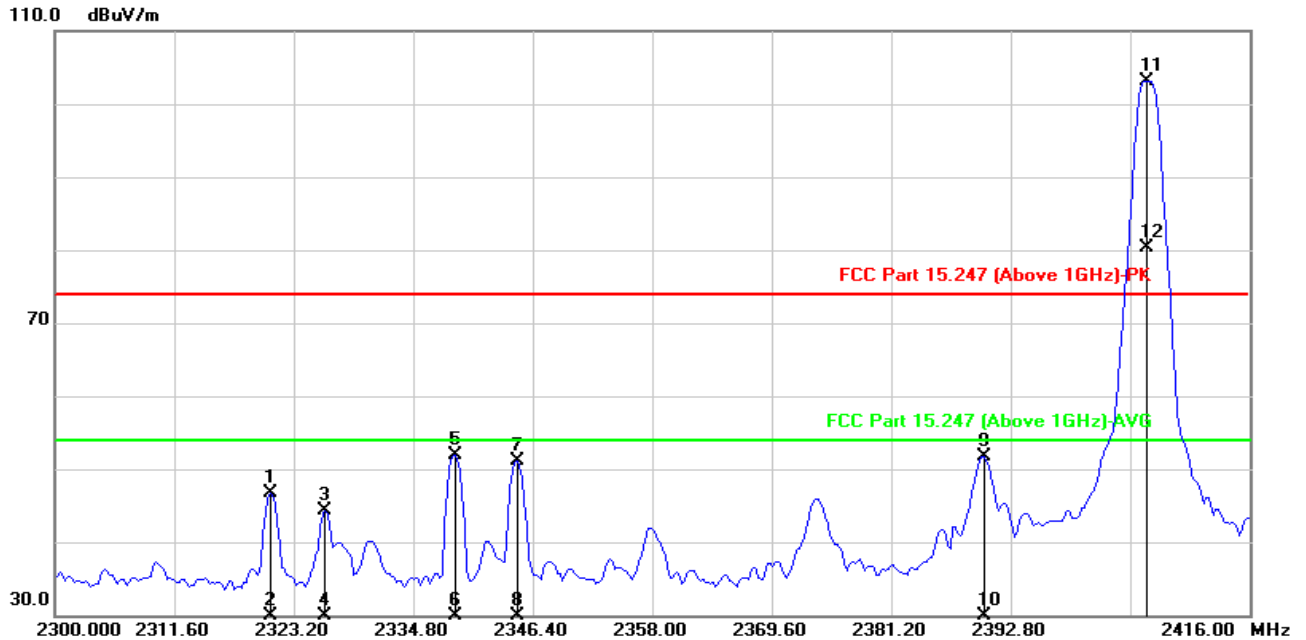
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	4944.000	43.27	6.19	49.46	74.00	-24.54	peak	135	101
2	4944.000	20.42	6.19	26.61	54.00	-27.39	AVG	135	101
3	7416.000	34.11	12.46	46.57	74.00	-27.43	peak	176	195
4	7416.000	11.26	12.46	23.72	54.00	-30.28	AVG	176	195

GFSK_Vertical_High Channel

No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	4944.000	44.71	6.19	50.90	74.00	-23.10	peak	275	194
2	4944.000	21.86	6.19	28.05	54.00	-25.95	AVG	275	194
3	7416.000	33.74	12.46	46.20	74.00	-27.80	peak	231	207
4	7416.000	10.86	12.46	23.32	54.00	-30.68	AVG	231	207

Appendix A.7: Test Results of Radiated Emissions in Restricted Bands

GFSK_Horizontal_Low Channel

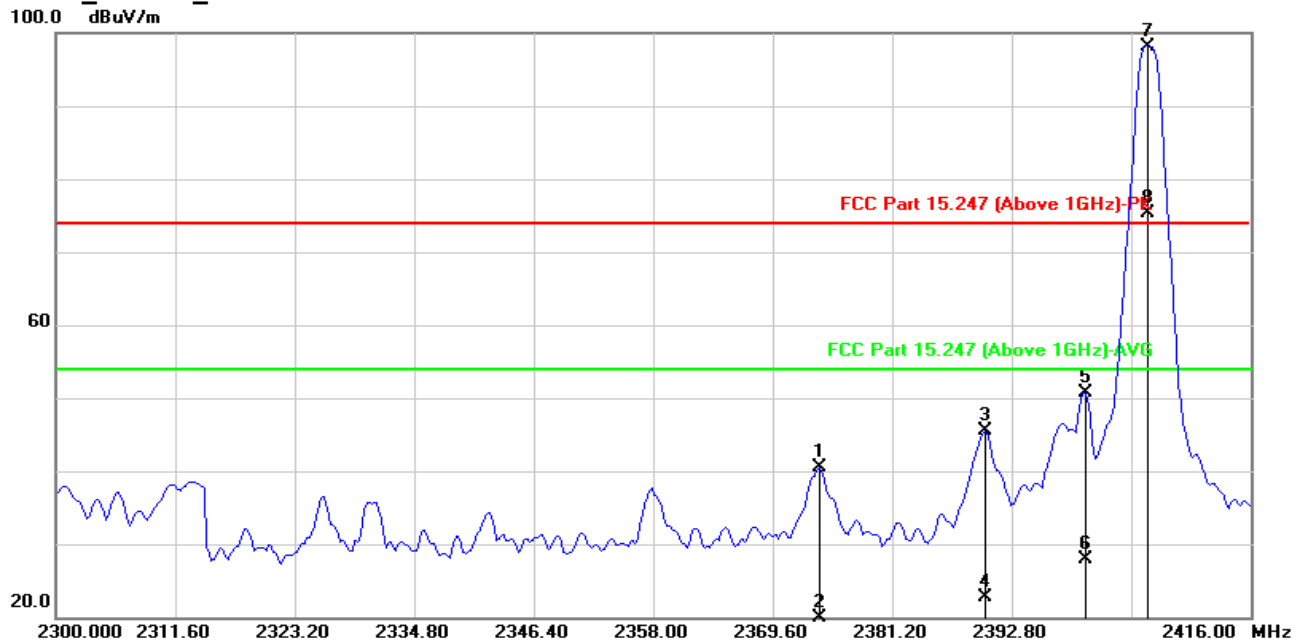


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	2320.922	47.58	-0.97	46.61	74.00	-27.39	peak	355	30
2	2320.922	24.73	-0.97	23.76	54.00	-30.24	AVG	355	30
3	2326.269	45.20	-0.96	44.24	74.00	-29.76	peak	355	30
4	2326.269	22.35	-0.96	21.39	54.00	-32.61	AVG	355	30
5	2338.822	52.92	-0.92	52.00	74.00	-22.00	peak	355	30
6	2338.822	30.07	-0.92	29.15	54.00	-24.85	AVG	355	30
7	2344.866	52.03	-0.91	51.12	74.00	-22.88	peak	355	30
8	2344.866	29.18	-0.91	28.27	54.00	-25.73	AVG	355	30
9	2390.196	52.45	-0.77	51.68	74.00	-22.32	peak	355	30
10	2390.196	29.60	-0.77	28.83	54.00	-25.17	AVG	355	30
11*	2406.000	103.81	-0.73	103.08	/	/	peak	355	30
12*	2406.000	80.96	-0.73	80.23	/	/	AVG	355	30

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

GFSK_Vertical_Low Channel

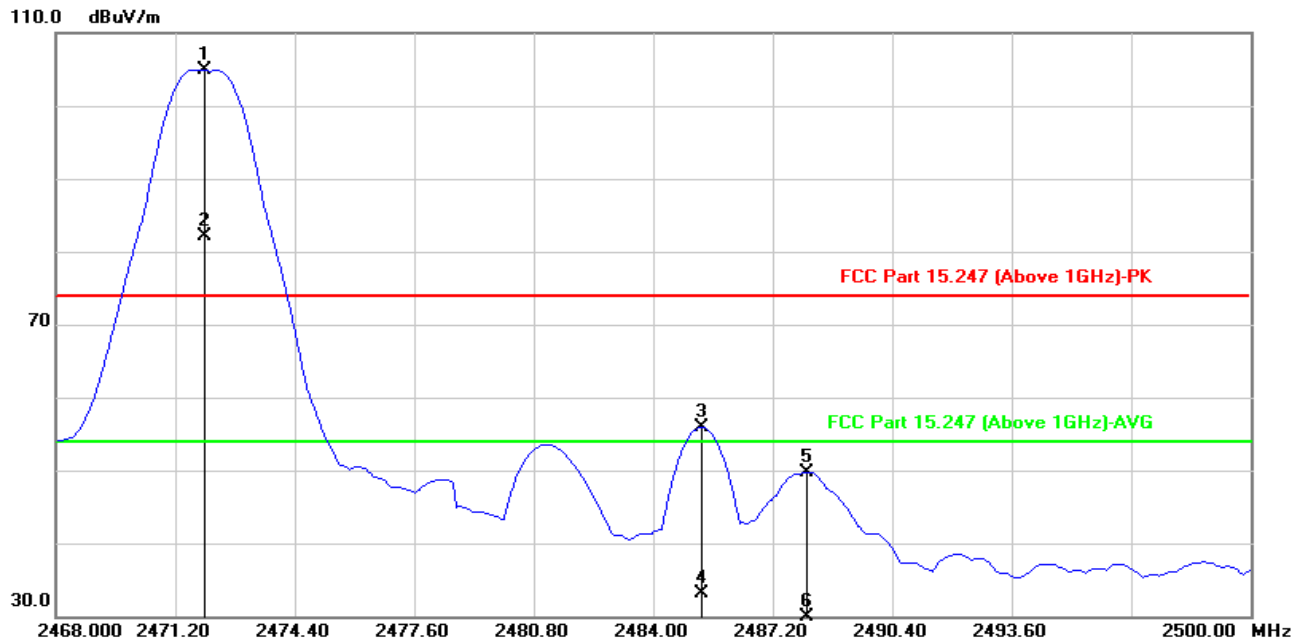


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1	2374.156	41.30	-0.82	40.48	74.00	-33.52	peak	130	232
2	2374.156	18.45	-0.82	17.63	54.00	-36.37	AVG	130	232
3	2390.196	46.24	-0.77	45.47	74.00	-28.53	peak	130	232
4	2390.196	23.39	-0.77	22.62	54.00	-31.38	AVG	130	232
5	2399.960	51.48	-0.75	50.73	74.00	-23.27	peak	130	232
6	2399.960	28.63	-0.75	27.88	54.00	-26.12	AVG	130	232
7	2406.000	98.82	-0.73	98.09	/	/	peak	130	232
8	2406.000	75.97	-0.73	75.24	/	/	AVG	130	232

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

GFSK_Horizontal_High Channel

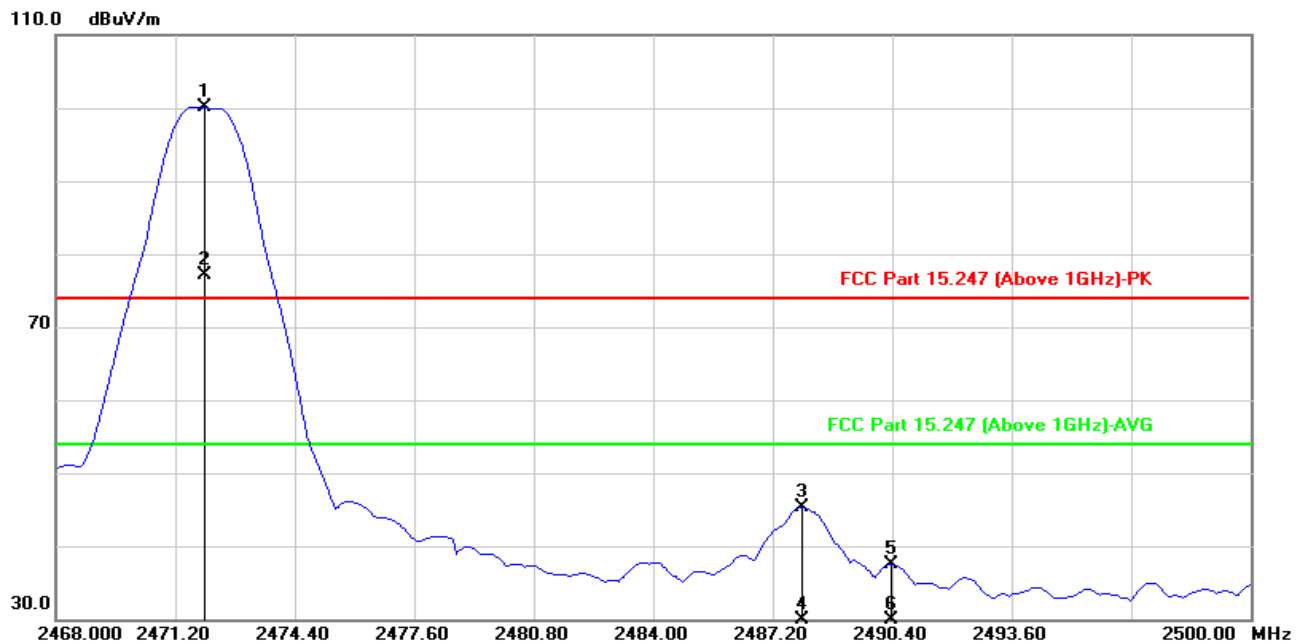


No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	2472.000	105.43	-0.55	104.88	/	/	peak	378	29
2 *	2472.000	82.58	-0.55	82.03	/	/	AVG	378	29
3	2485.315	56.42	-0.50	55.92	74.00	-18.08	peak	378	29
4	2485.315	33.57	-0.50	33.07	54.00	-20.93	AVG	378	29
5	2488.136	50.26	-0.51	49.75	74.00	-24.25	peak	378	29
6	2488.136	27.41	-0.51	26.90	54.00	-27.10	AVG	378	29

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

GFSK_Veritical_High Channel



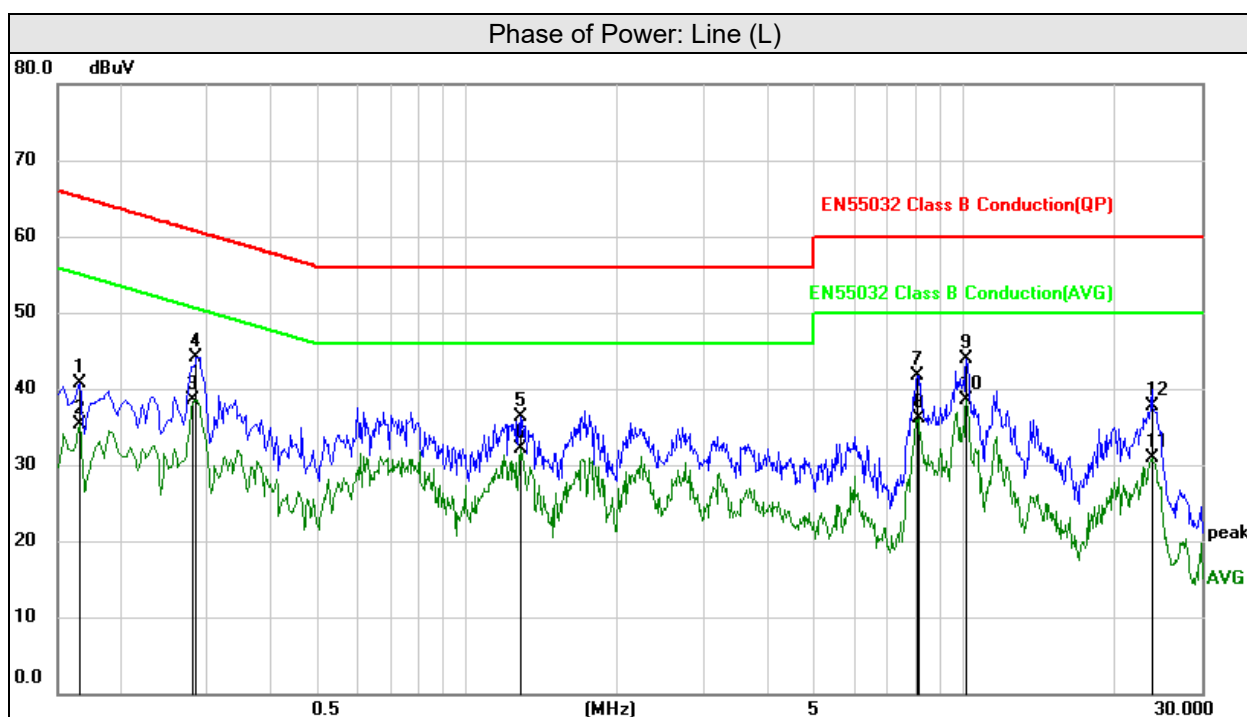
No.	Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Height (cm)	Table Angle (Degree)
1 *	2472.000	100.59	-0.55	100.04	/	/	peak	378	72
2 *	2472.000	77.74	-0.55	77.19	/	/	AVG	378	72
3	2488.008	45.82	-0.51	45.31	74.00	-28.69	peak	378	72
4	2488.008	22.97	-0.51	22.46	54.00	-31.54	AVG	378	72
5	2490.381	37.95	-0.49	37.46	74.00	-36.54	peak	378	72
6	2490.381	15.10	-0.49	14.61	54.00	-39.39	AVG	378	72

Remarks:

1. Emission Level (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier gain (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. * means the operation frequency.

Appendix A.8: Test Results of Conducted Emission on AC Mains

Test mode	Normal mode (Optical input to TX and RX receiver playing)		
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Band Width	Quasi-Peak (QP) / CISPR Average (AV), 9kHz

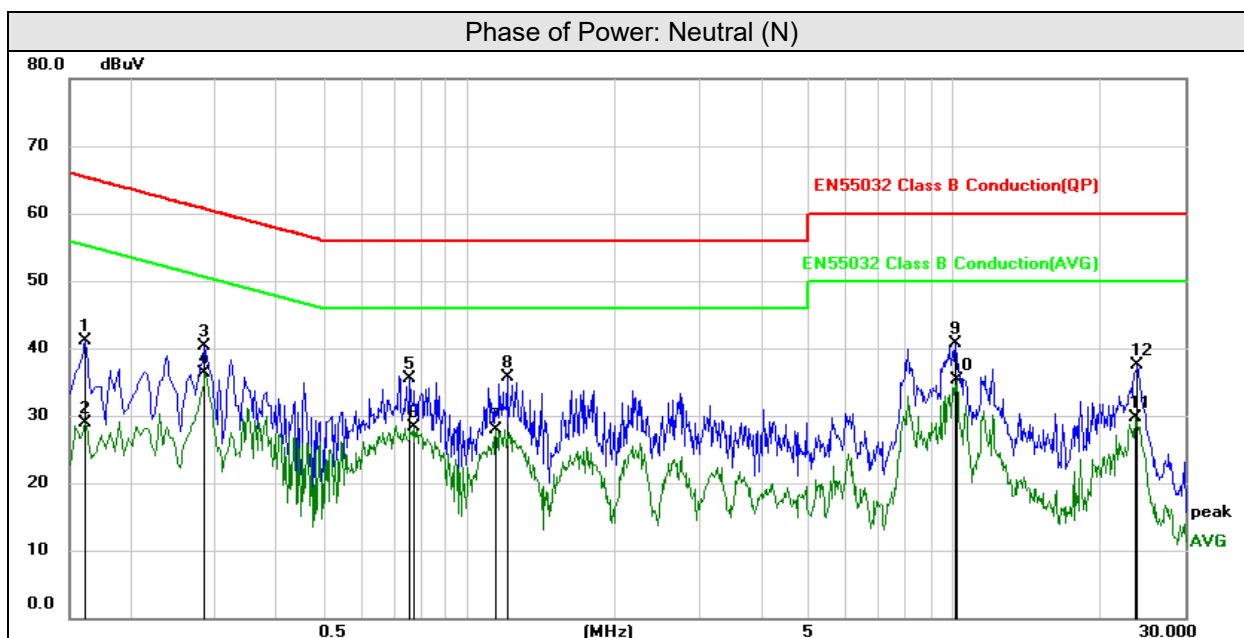


No.	Frequency	Reading	Correction Factor	Emissions Level	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	Detector
1	0.1660	30.97	9.70	40.67	65.16	-24.49	QP
2	0.1660	25.66	9.70	35.36	55.16	-19.80	AVG
3	0.2819	28.77	9.70	38.47	50.76	-12.29	QP
4	0.2860	34.36	9.70	44.06	60.64	-16.58	AVG
5	1.2780	26.75	9.64	36.39	56.00	-19.61	QP
6	1.2780	22.55	9.64	32.19	46.00	-13.81	AVG
7	8.0460	31.96	9.75	41.71	60.00	-18.29	QP
8	8.0820	26.37	9.75	36.12	50.00	-13.88	AVG
9	10.0780	34.15	9.84	43.99	60.00	-16.01	QP
10	10.0780	28.70	9.84	38.54	50.00	-11.46	AVG
11	23.8500	20.30	10.66	30.96	50.00	-19.04	QP
12	23.9619	26.98	10.67	37.65	60.00	-22.35	AVG

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

Test mode	Normal mode (Optical input to TX and RX receiver playing)		
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Band Width	Quasi-Peak (QP) / CISPR Average (AV), 9kHz



No.	Frequency (MHz)	Reading (dBuV)	Correction Factor dB	Emissions Level (dBuV)	Limit (dBuV)	Margin (dB)	Remark Detector
1	0.1620	31.33	9.70	41.03	65.36	-24.33	QP
2	0.1620	19.21	9.70	28.91	55.36	-26.45	AVG
3	0.2860	30.64	9.70	40.34	60.64	-20.30	QP
4	0.2860	26.55	9.70	36.25	50.64	-14.39	AVG
5	0.7580	25.80	9.68	35.48	56.00	-20.52	QP
6	0.7700	18.70	9.68	28.38	46.00	-17.62	AVG
7	1.1380	18.29	9.63	27.92	46.00	-18.08	QP
8	1.1980	26.10	9.63	35.73	56.00	-20.27	AVG
9	10.1220	30.94	9.84	40.78	60.00	-19.22	QP
10	10.1580	25.45	9.86	35.31	50.00	-14.69	AVG
11	23.7340	19.04	10.66	29.70	50.00	-20.30	QP
12	23.9420	26.74	10.67	37.41	60.00	-22.59	AVG

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value