



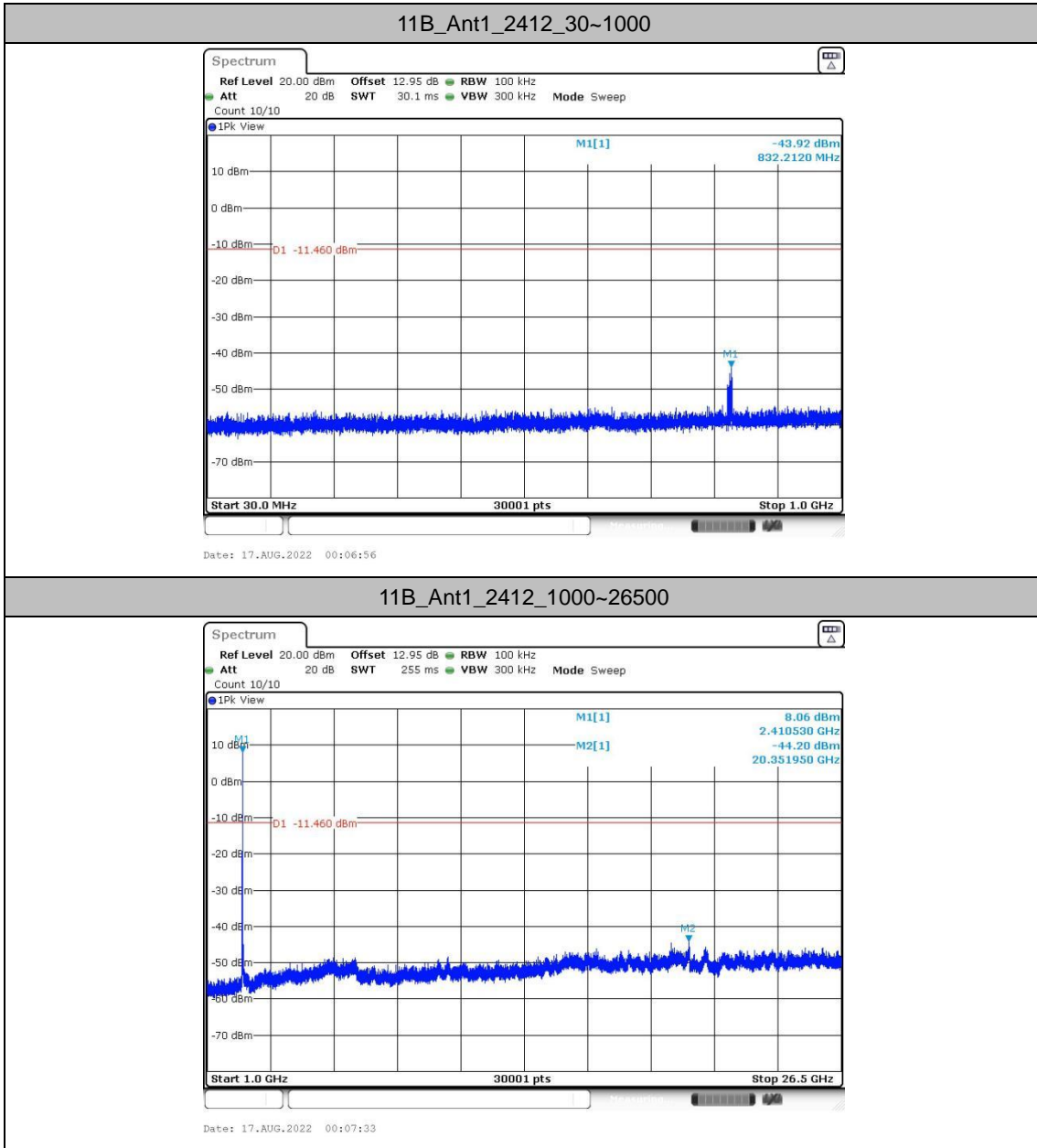
Conducted Spurious Emission

Test Result

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	30~1000	8.54	-43.92	≤-11.46	PASS
			1000~26500	8.54	-44.2	≤-11.46	PASS
		2437	30~1000	9.02	-39.95	≤-10.98	PASS
			1000~26500	9.02	-45.97	≤-10.98	PASS
		2462	30~1000	8.70	-43.16	≤-11.3	PASS
			1000~26500	8.70	-44.59	≤-11.3	PASS
11G	Ant1	2412	30~1000	4.84	-50.49	≤-15.16	PASS
			1000~26500	4.84	-45.37	≤-15.16	PASS
		2437	30~1000	4.63	-54.52	≤-15.37	PASS
			1000~26500	4.63	-45.53	≤-15.37	PASS
		2462	30~1000	4.77	-37.44	≤-15.23	PASS
			1000~26500	4.77	-45.53	≤-15.23	PASS
11N20SISO	Ant1	2412	30~1000	4.07	-50.68	≤-15.93	PASS
			1000~26500	4.07	-45.39	≤-15.93	PASS
		2437	30~1000	4.20	-50.36	≤-15.8	PASS
			1000~26500	4.20	-44.04	≤-15.8	PASS
		2462	30~1000	4.37	-52.98	≤-15.63	PASS
			1000~26500	4.37	-44.92	≤-15.63	PASS
11N40SISO	Ant1	2422	30~1000	1.26	-44.55	≤-18.74	PASS
			1000~26500	1.26	-44.13	≤-18.74	PASS
		2437	30~1000	1.36	-45.5	≤-18.64	PASS
			1000~26500	1.36	-45.32	≤-18.64	PASS
		2452	30~1000	2.19	-46.78	≤-17.81	PASS
			1000~26500	2.19	-44.72	≤-17.81	PASS

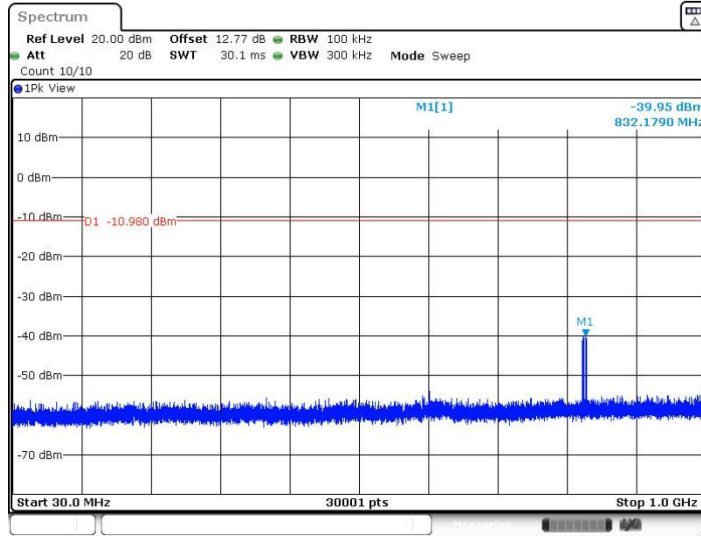


Test Graphs



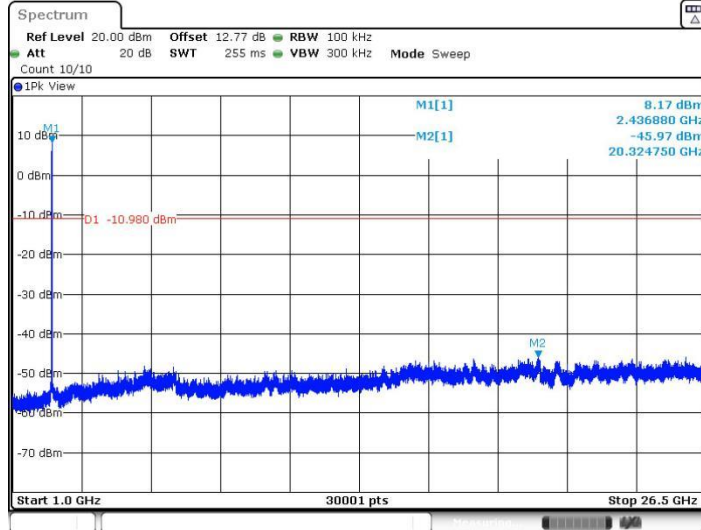


11B_Ant1_2437_30~1000



Date: 17.AUG.2022 00:08:39

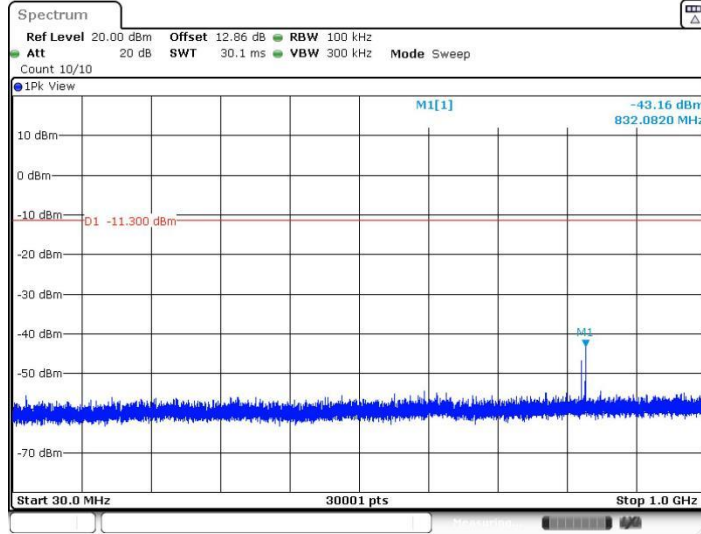
11B_Ant1_2437_1000~26500



Date: 17.AUG.2022 00:09:16

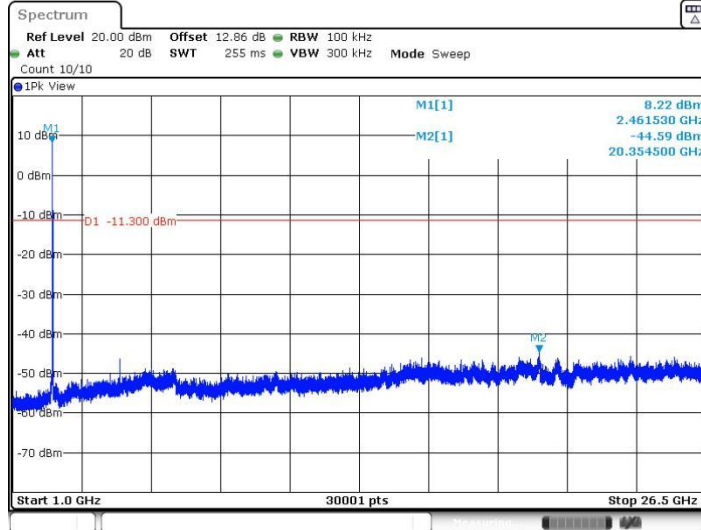


11B_Ant1_2462_30~1000



Date: 17.AUG.2022 00:10:37

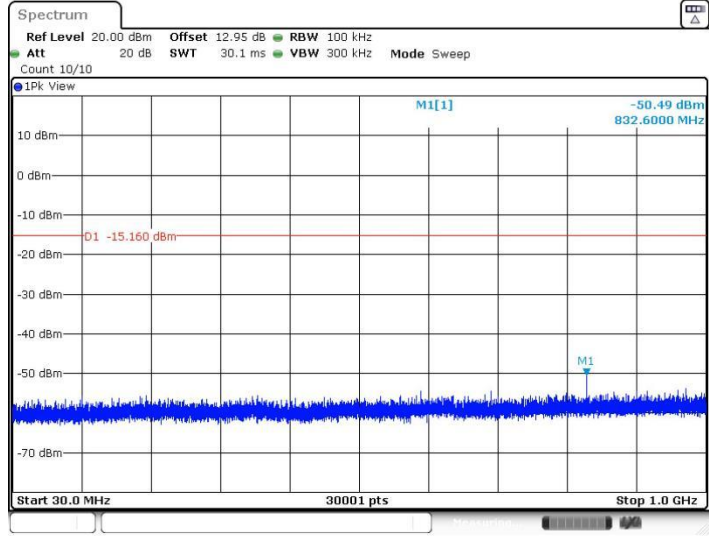
11B_Ant1_2462_1000~26500



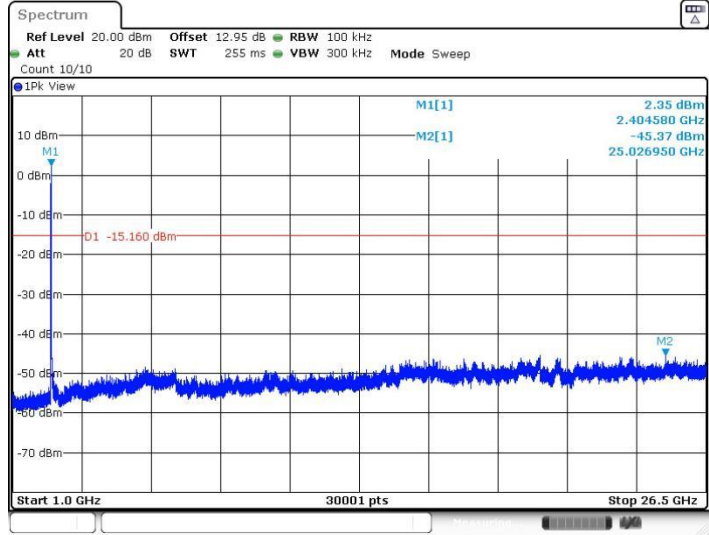
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11G_Ant1_2412_30~1000

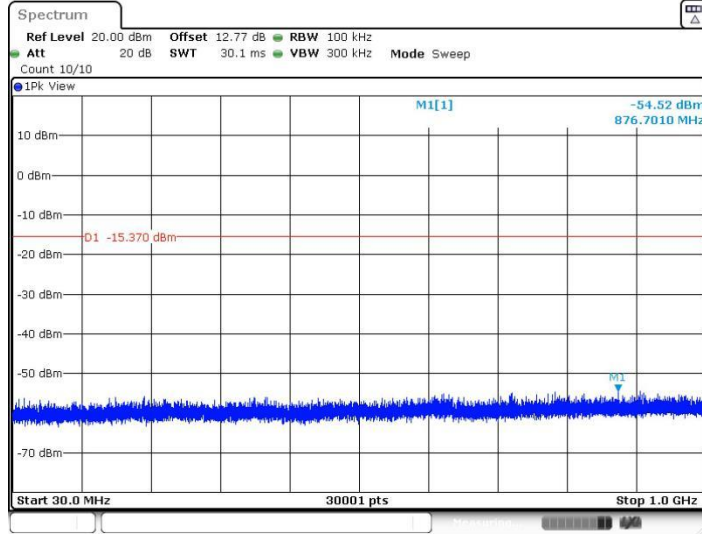


11G_Ant1_2412_1000~26500



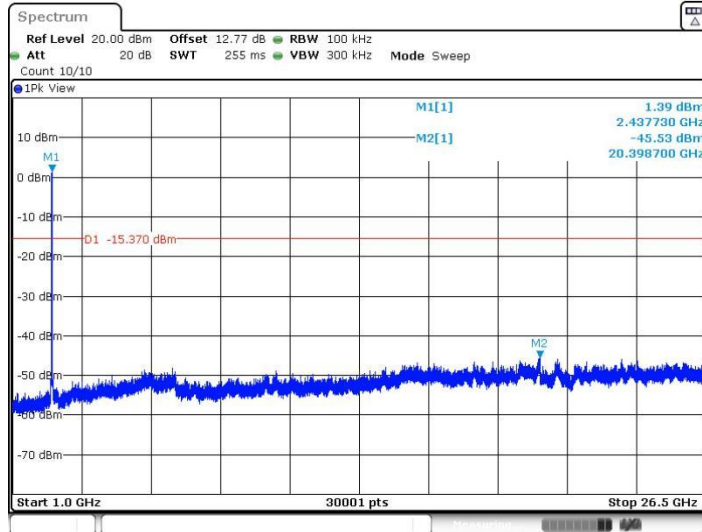


11G_Ant1_2437_30~1000



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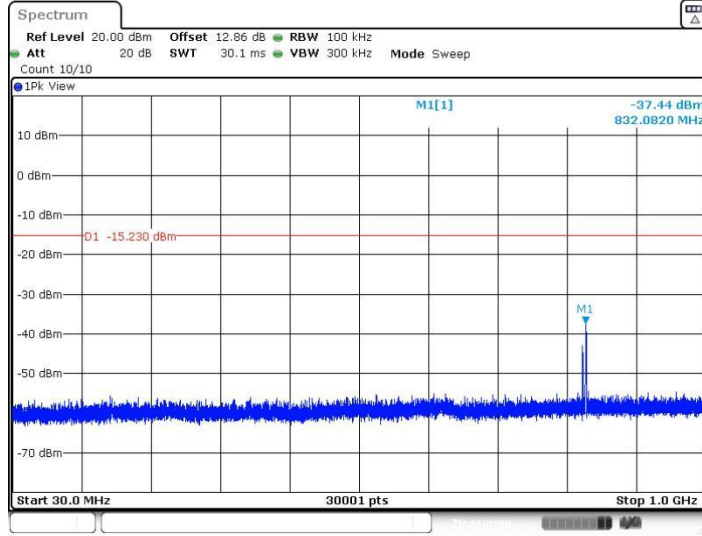
11G_Ant1_2437_1000~26500



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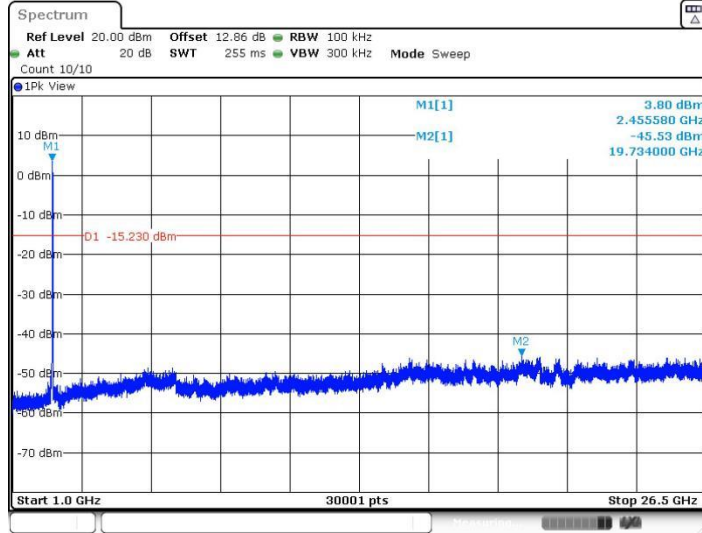


11G_Ant1_2462_30~1000



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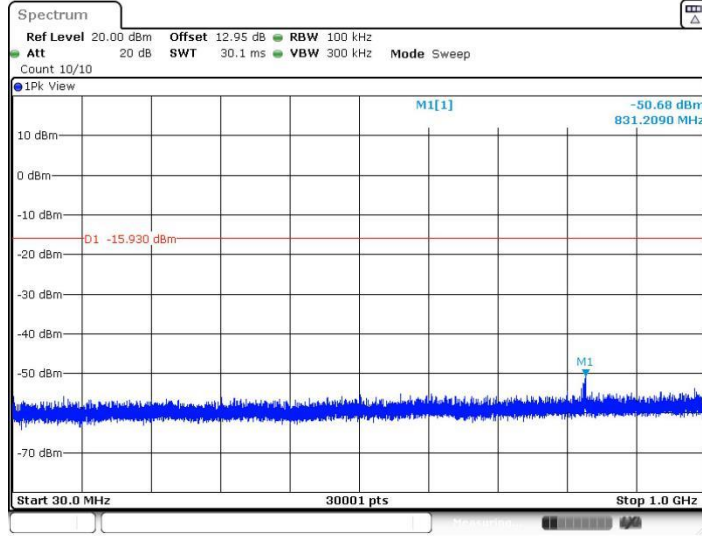
11G_Ant1_2462_1000~26500



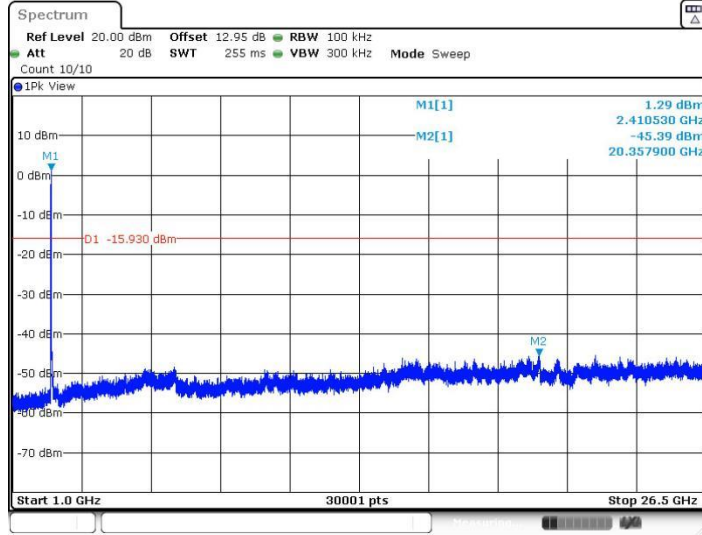
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11N20SISO_Ant1_2412_30~1000

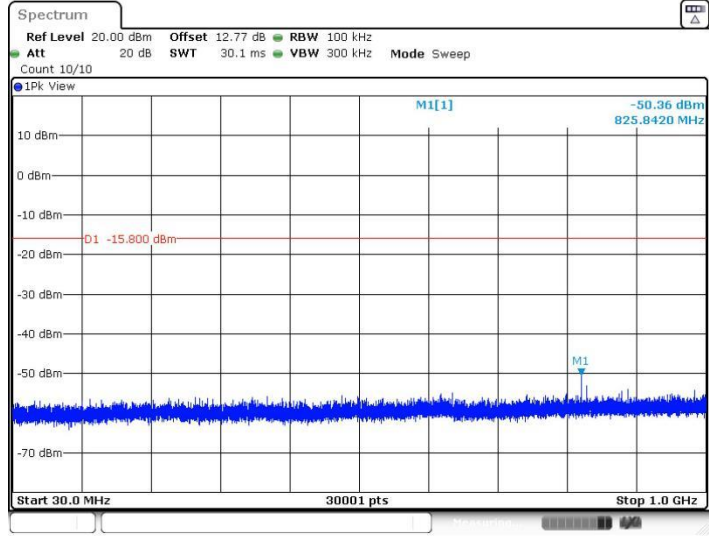


11N20SISO_Ant1_2412_1000~26500

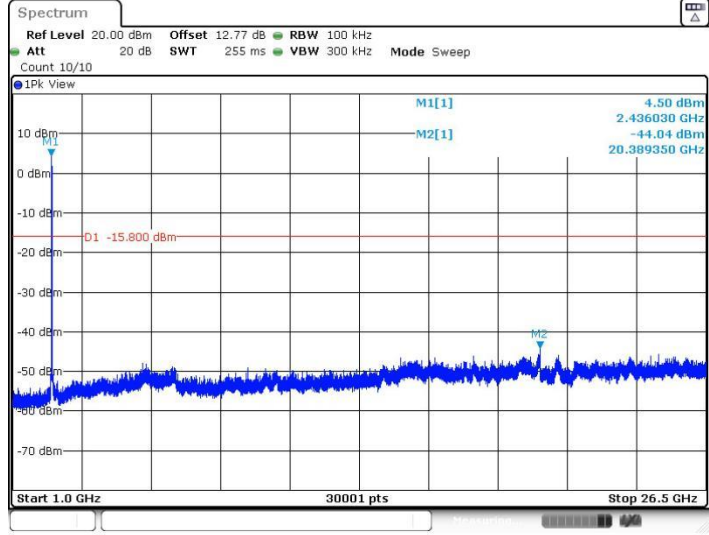




11N20SISO_Ant1_2437_30~1000

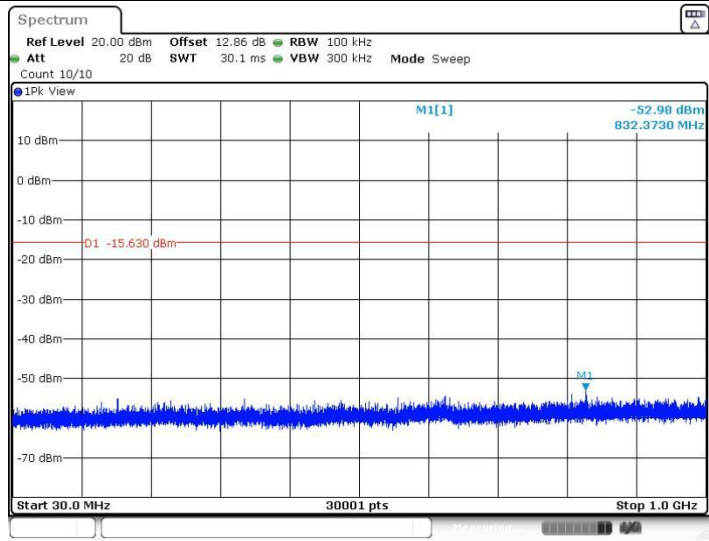


11N20SISO_Ant1_2437_1000~26500

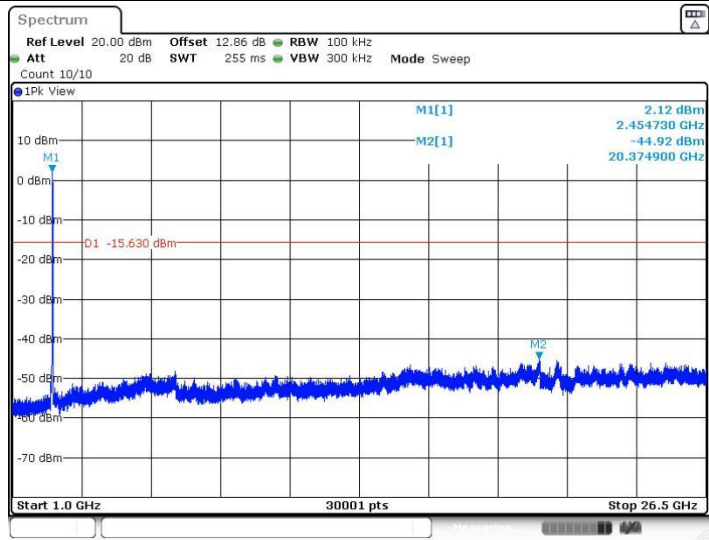




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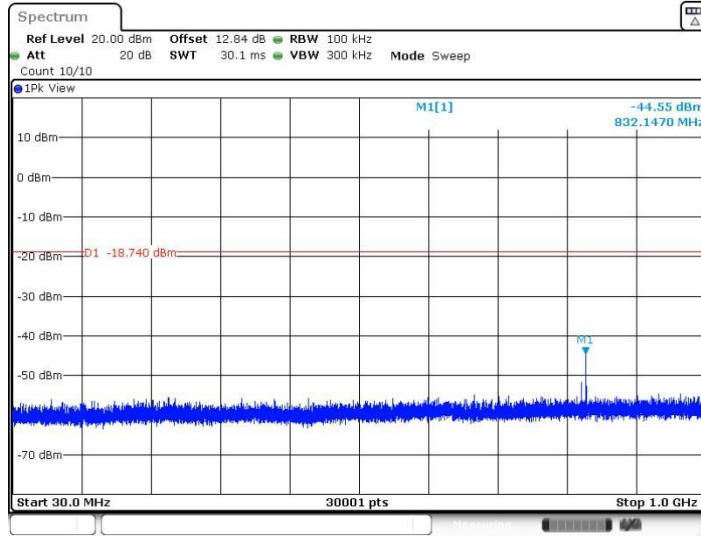


11N20SISO_Ant1_2462_1000~26500



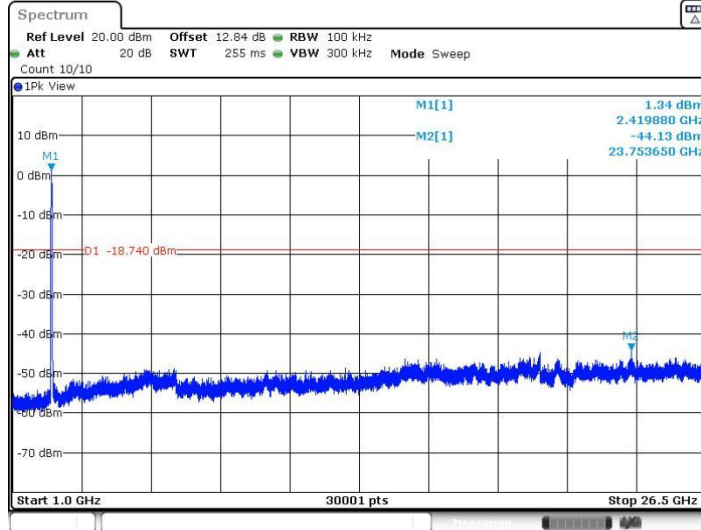


11N40SISO_Ant1_2422_30~1000



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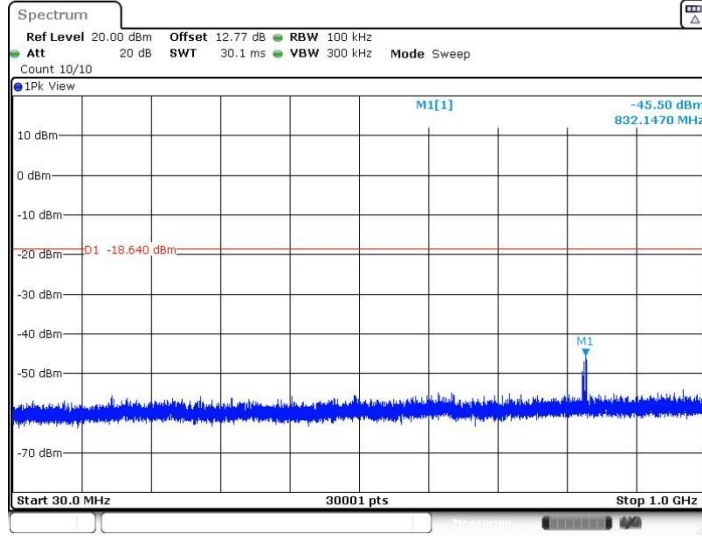
11N40SISO_Ant1_2422_1000~26500



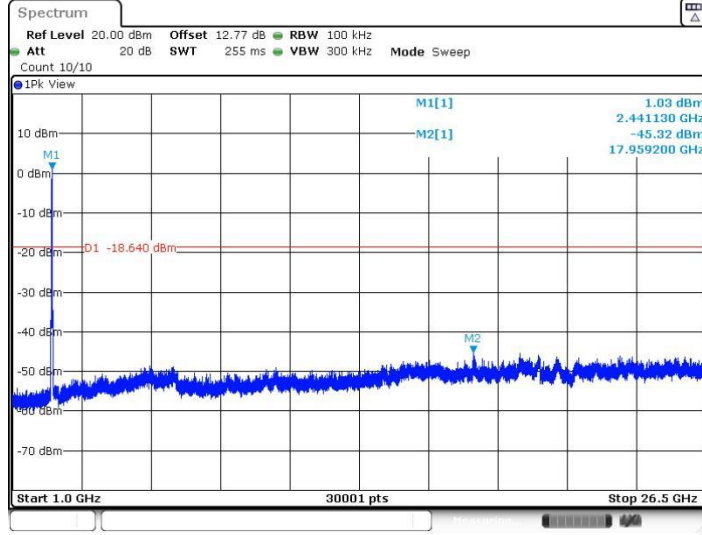
Date: 17.AUG.2022 00:26:29



11N40SISO_Ant1_2437_30~1000

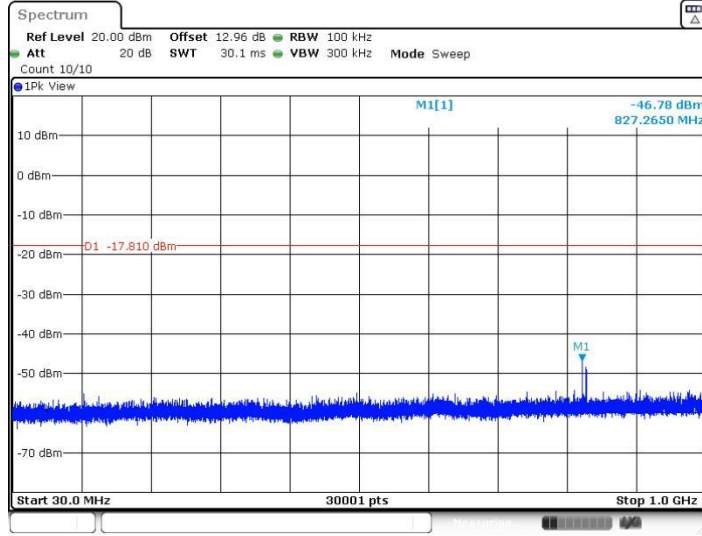


11N40SISO_Ant1_2437_1000~26500

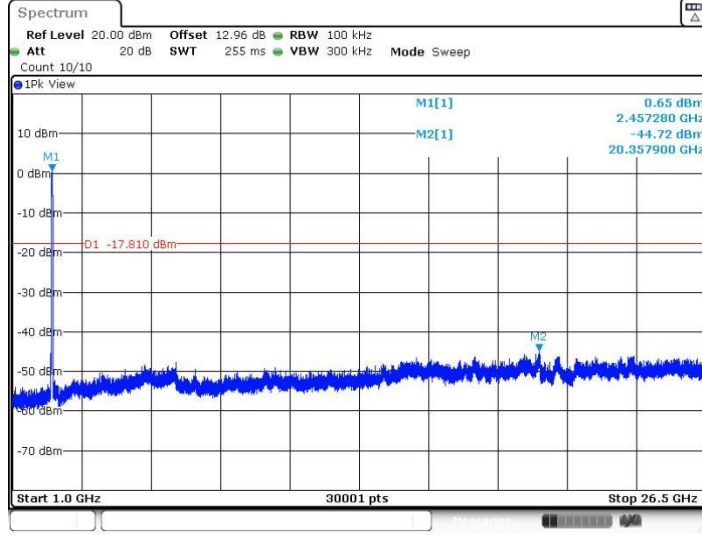




11N40SISO_Ant1_2452_30~1000



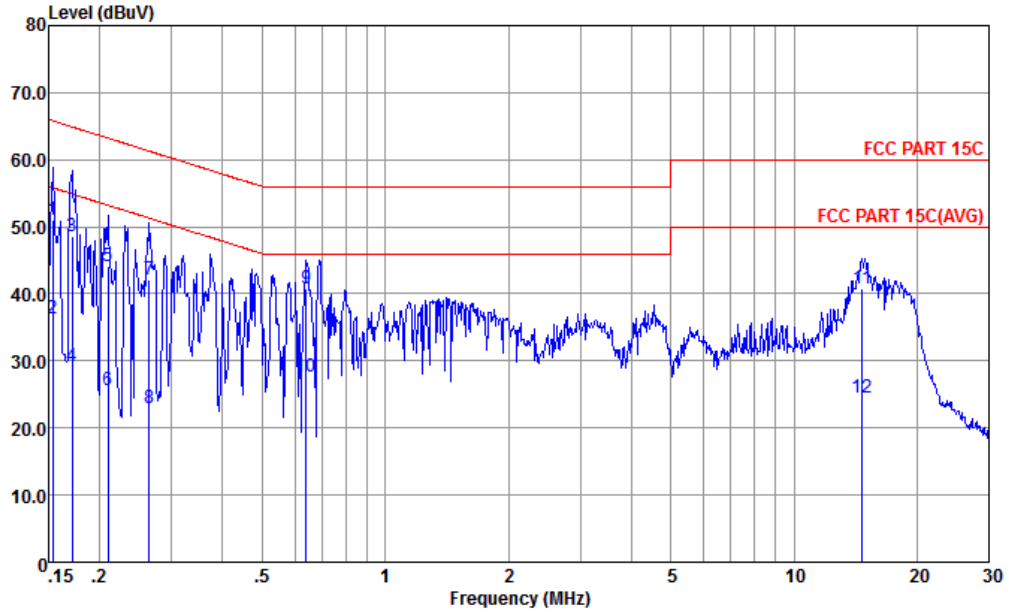
11N40SISO_Ant1_2452_1000~26500





Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

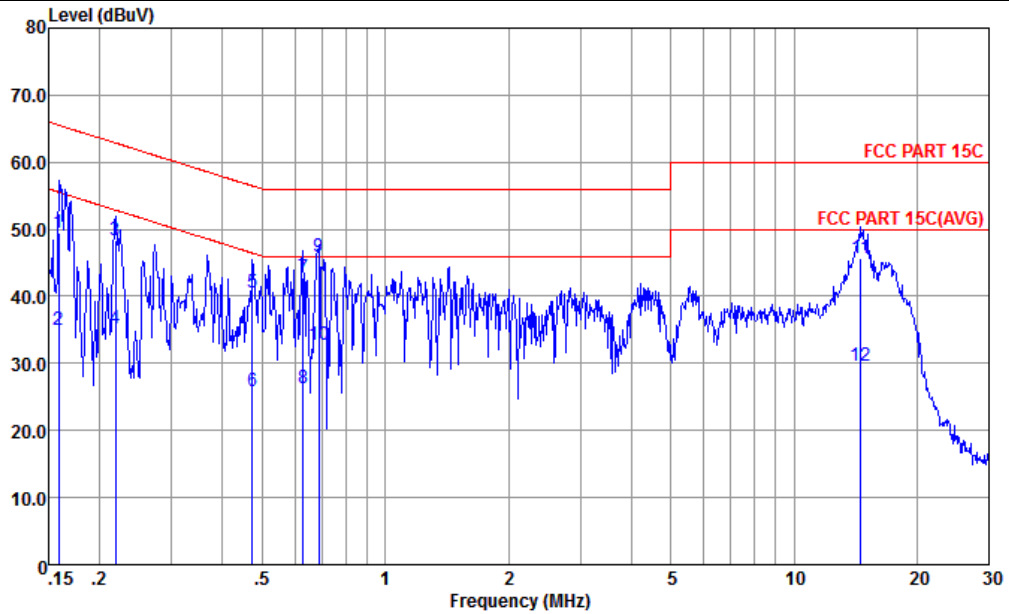


Site : CO01-KS
 Condition : FCC PART 15C LISN-060105-L LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1 *	0.153	50.99	-14.83	65.82	40.50	0.02	10.47	QP
2	0.153	36.39	-19.43	55.82	25.90	0.02	10.47	Average
3	0.171	48.66	-16.24	64.90	38.20	0.03	10.43	QP
4	0.171	29.26	-25.64	54.90	18.80	0.03	10.43	Average
5	0.209	44.20	-19.03	63.23	33.80	0.04	10.36	QP
6	0.209	25.60	-27.63	53.23	15.20	0.04	10.36	Average
7	0.264	42.19	-19.10	61.29	31.81	0.06	10.32	QP
8	0.264	22.89	-28.40	51.29	12.51	0.06	10.32	Average
9	0.641	40.84	-15.16	56.00	30.49	0.11	10.24	QP
10	0.641	27.54	-18.46	46.00	17.19	0.11	10.24	Average
11	14.672	40.89	-19.11	60.00	30.20	0.30	10.39	QP
12	14.672	24.49	-25.51	50.00	13.80	0.30	10.39	Average



Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
 Condition : FCC PART 15C LISN-060105-N NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.159	49.36	-16.16	65.52	38.79	0.11	10.46	QP
2	0.159	35.06	-20.46	55.52	24.49	0.11	10.46	Average
3	0.219	48.25	-14.63	62.88	37.80	0.10	10.35	QP
4	0.219	35.25	-17.63	52.88	24.80	0.10	10.35	Average
5	0.474	40.55	-15.90	56.45	30.20	0.11	10.24	QP
6	0.474	25.95	-20.50	46.45	15.60	0.11	10.24	Average
7	0.630	42.85	-13.15	56.00	32.50	0.11	10.24	QP
8	0.630	26.25	-19.75	46.00	15.90	0.11	10.24	Average
9 *	0.686	45.85	-10.15	56.00	35.50	0.11	10.24	QP
10	0.686	32.65	-13.35	46.00	22.30	0.11	10.24	Average
11	14.594	45.60	-14.40	60.00	34.91	0.30	10.39	QP
12	14.594	29.60	-20.40	50.00	18.91	0.30	10.39	Average

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.56	54.42	-19.58	74	47.25	30.94	7.13	30.9	164	320	P	H
		2389.95	42.84	-11.16	54	35.65	30.94	7.13	30.88	164	320	A	H
	*	2414	102.37	-	-	95.09	31	7.16	30.88	164	320	P	H
	*	2414	99.81	-	-	92.53	31	7.16	30.88	164	320	A	H
		2361.48	53.26	-20.74	74	46.27	30.83	7.08	30.92	377	41	P	V
		2389.82	42.47	-11.53	54	35.28	30.94	7.13	30.88	377	41	A	V
	*	2414	99.56	-	-	92.28	31	7.16	30.88	377	41	P	V
	*	2414	97.33	-	-	90.05	31	7.16	30.88	377	41	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b		4824	53.44	-20.56	74	73.45	34.57	10.85	65.43	100	109	P	H
CH 01		4824	50.59	-3.41	54	70.6	34.57	10.85	65.43	100	109	A	H
2412MHz		4824	48.65	-25.35	74	68.66	34.57	10.85	65.43	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test data for 802.11n HT20 CH 11 2462MHz and a Remark section.



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for 802.11n HT20 and CH 11 at 4924 and 7386 MHz, and a Remark section.



**2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 09 2452MHz		2372.14	53.96	-20.04	74	48.03	32.23	6.58	32.88	217	29	P	H
		2388.13	43.85	-10.15	54	37.82	32.3	6.61	32.88	217	29	A	H
	*	2466	101.01	-	-	94.65	32.37	6.7	32.71	217	29	P	H
	*	2466	93.65	-	-	87.29	32.37	6.7	32.71	217	29	A	H
		2486.32	65.56	-8.44	74	59.04	32.43	6.73	32.64	217	29	P	H
		2488	49.94	-4.06	54	43.33	32.5	6.75	32.64	217	29	A	H
		2387.22	53.43	-20.57	74	47.4	32.3	6.61	32.88	306	246	P	V
		2388.39	43.81	-10.19	54	37.78	32.3	6.61	32.88	306	246	A	V
	*	2468	99.34	-	-	92.91	32.37	6.7	32.64	306	246	P	V
	*	2466	92.04	-	-	85.68	32.37	6.7	32.71	306	246	A	V
		2486.38	63.08	-10.92	74	56.56	32.43	6.73	32.64	306	246	P	V
		2489.56	47.63	-6.37	54	41.02	32.5	6.75	32.64	306	246	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include 802.11n HT40 CH 09 2452MHz and a Remark section.



Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		31.94	24.85	-15.15	40	30.65	24.39	0.52	30.71	-	-	P	H
		77.53	22.95	-17.05	40	38.44	14.12	1.14	30.75	-	-	P	H
		90.14	22.03	-21.47	43.5	36.59	14.84	1.32	30.72	-	-	P	H
		266.68	17.19	-28.81	46	26.35	19.42	2.38	30.96	-	-	P	H
		412.18	20.62	-25.38	46	26.83	22.14	2.96	31.31	-	-	P	H
		569.32	24.5	-21.5	46	27.5	25.52	3.47	31.99	-	-	P	H
		32.91	23.55	-16.45	40	30.02	23.71	0.54	30.72	-	-	P	V
		127	14.67	-28.83	43.5	26.26	17.55	1.63	30.77	-	-	P	V
		258.92	16.44	-29.56	46	25.48	19.56	2.34	30.94	-	-	P	V
		386.96	19.68	-26.32	46	26.46	21.55	2.87	31.2	-	-	P	V
		542.16	23.2	-22.8	46	26.76	24.94	3.39	31.89	-	-	P	V
	751.68	24.47	-21.53	46	25.49	27.48	3.99	32.49	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

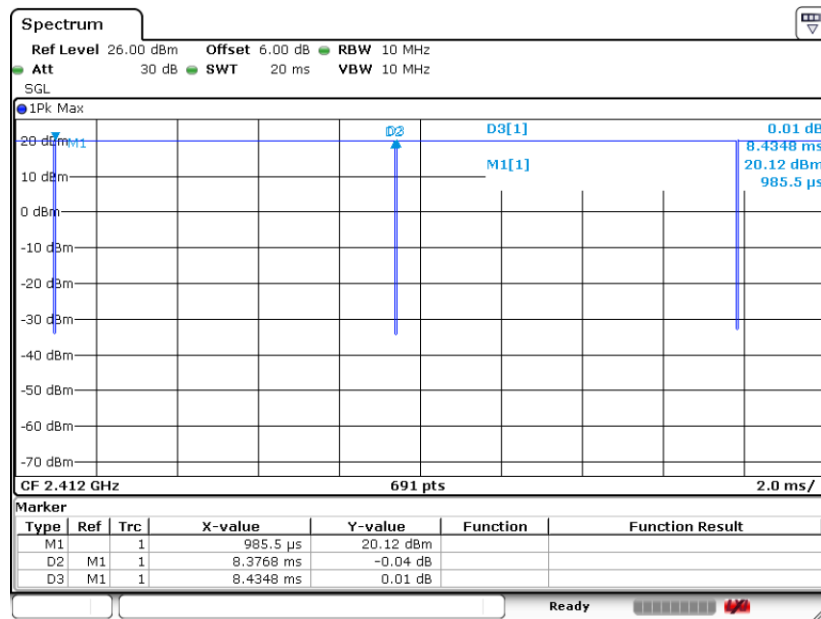
Both peak and average measured complies with the limit line, so test result is “PASS”.



Appendix D. Duty Cycle Plots

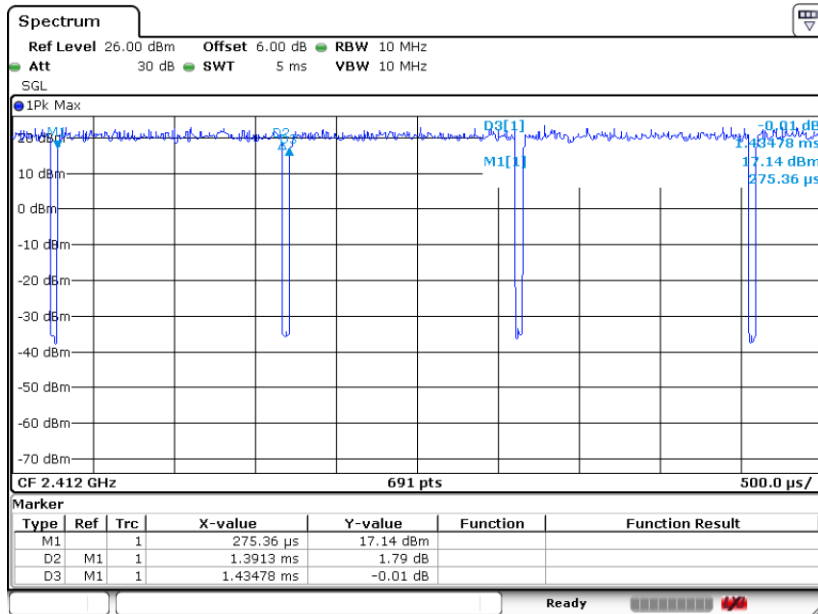
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	99.31	-	-	10Hz
802.11g	96.98	1.391	0.719	0.75kHz
802.11n HT20	96.24	1.297	0.771	0.82kHz
802.11n HT40	93.71	0.648	1.544	1.6kHz

802.11b

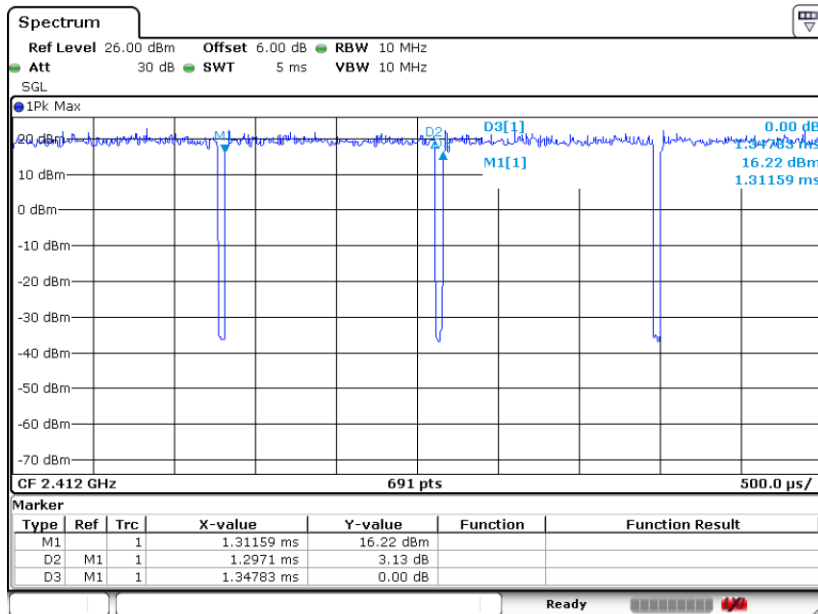




802.11g



802.11n HT20





802.11n HT40

