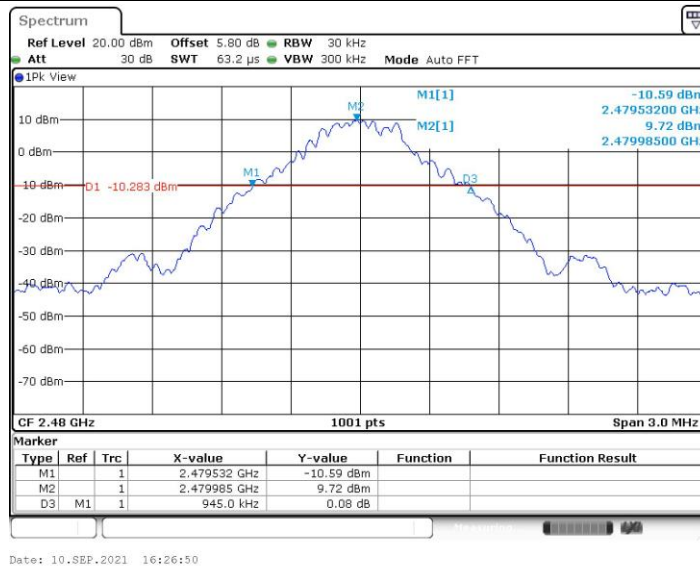




DH5_Ant1_2480



2DH1_Ant1_2402





2DH1_Ant1_2441



2DH1_Ant1_2480

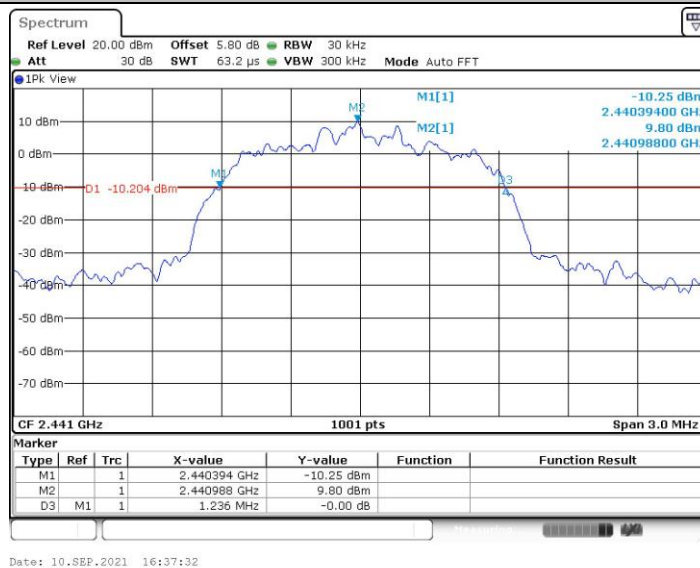


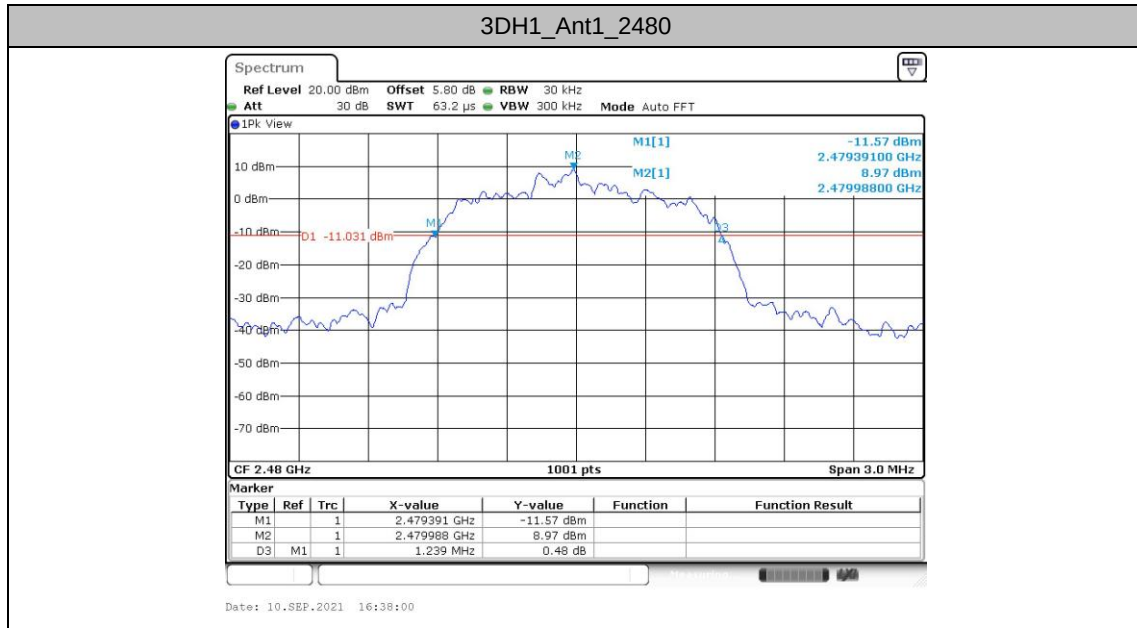


3DH1_Ant1_2402



3DH1_Ant1_2441







Occupied Channel Bandwidth

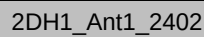
Test Result

TestMode	Antenna	Frequency [MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.83	2401.583	2402.414	---	---
		2441	0.83	2440.580	2441.411	---	---
		2480	0.83	2479.577	2480.408	---	---
2DH1	Ant1	2402	1.166	2401.410	2402.575	---	---
		2441	1.163	2440.410	2441.572	---	---
		2480	1.166	2479.407	2480.572	---	---
3DH1	Ant1	2402	1.151	2401.437	2402.587	---	---
		2441	1.148	2440.437	2441.584	---	---
		2480	1.151	2479.434	2480.584	---	---



Test Graphs







2DH1_Ant1_2441



2DH1_Ant1_2480



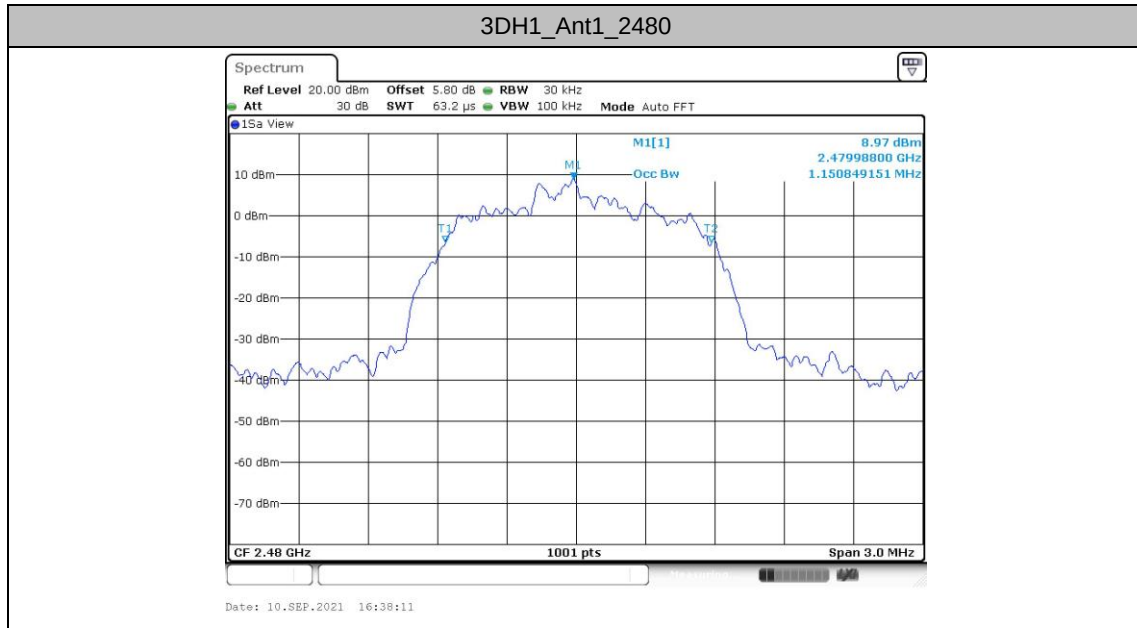


3DH1_Ant1_2402



3DH1_Ant1_2441







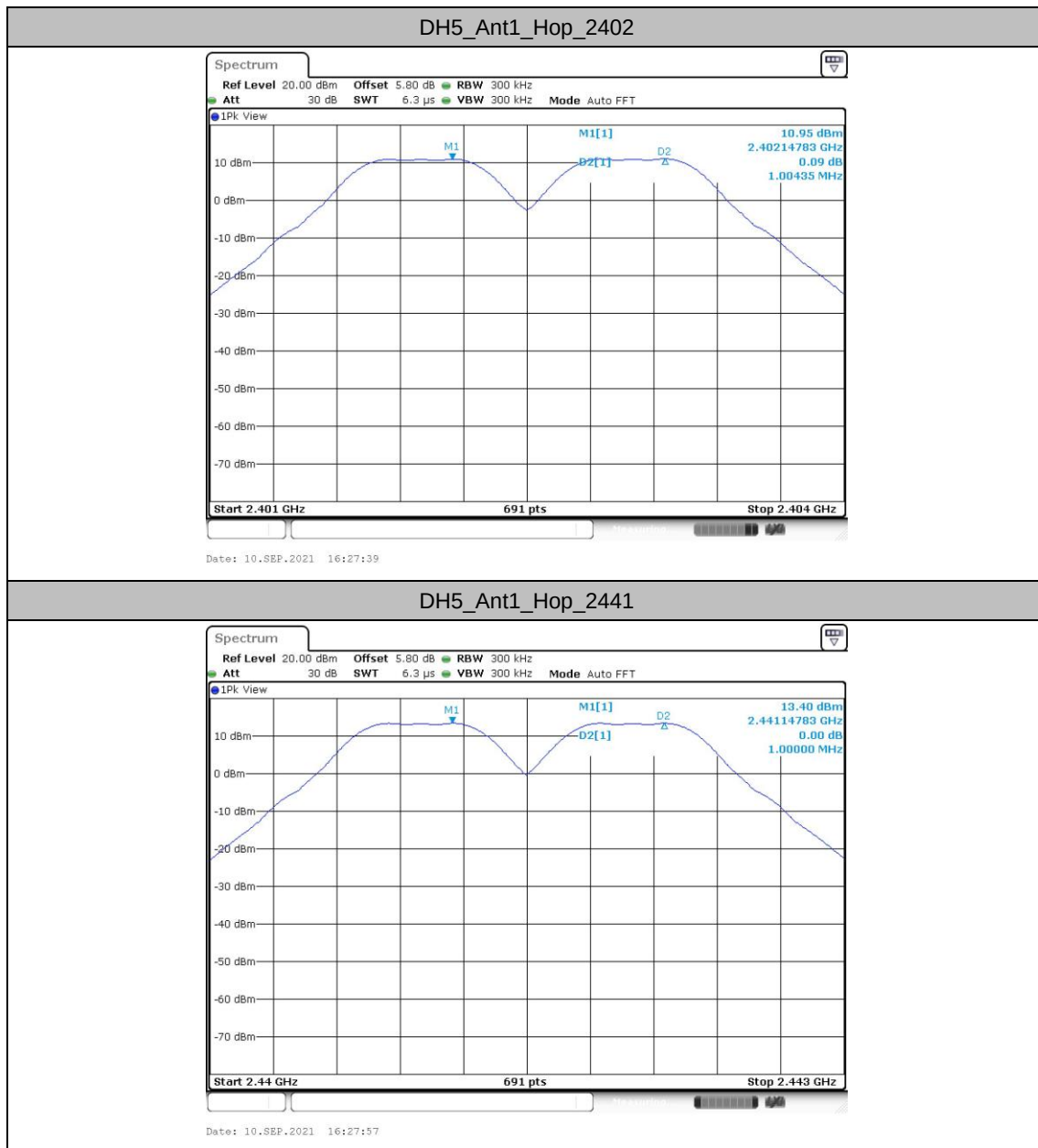
Carrier frequency separation

Test Result

TestMode	Antenna	Frequency [MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop_2402	1.004	≥ 0.632	PASS
		Hop_2441	1	≥ 0.632	PASS
		Hop_2480	1.004	≥ 0.630	PASS
2DH1	Ant1	Hop_2402	0.917	≥ 0.860	PASS
		Hop_2441	1.052	≥ 0.862	PASS
		Hop_2480	1.157	≥ 0.862	PASS
3DH1	Ant1	Hop_2402	0.93	≥ 0.824	PASS
		Hop_2441	0.996	≥ 0.824	PASS
		Hop_2480	1.004	≥ 0.826	PASS

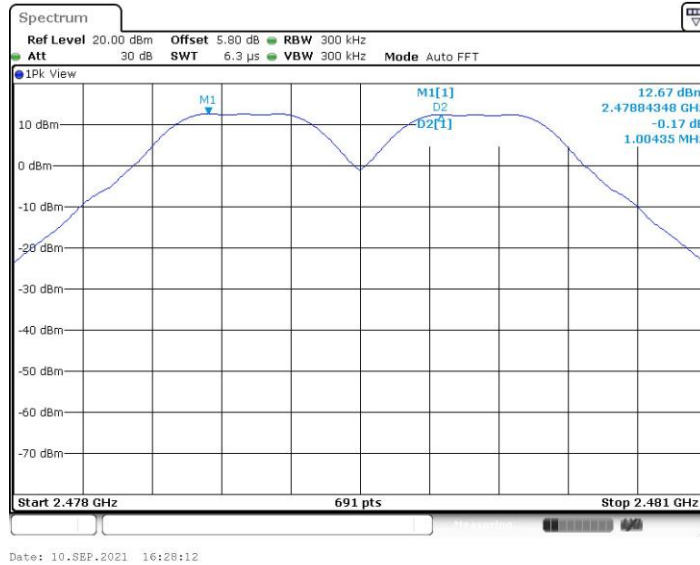


Test Graphs





DH5_Ant1_Hop_2480

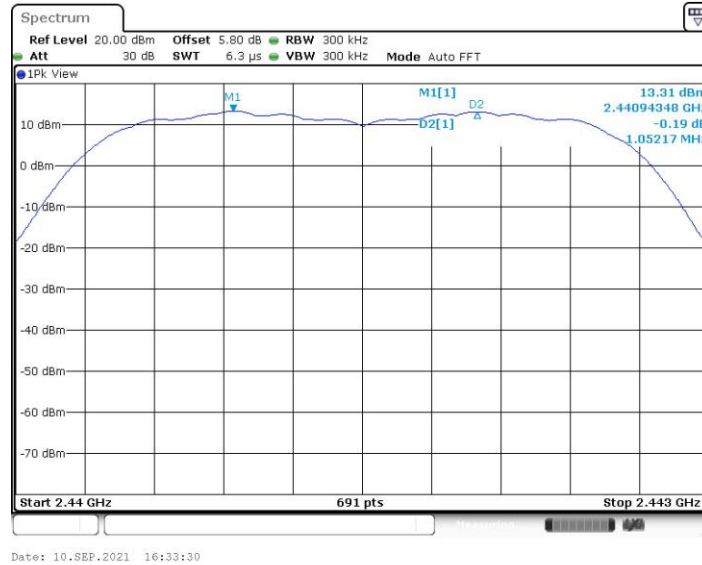


2DH1_Ant1_Hop_2402





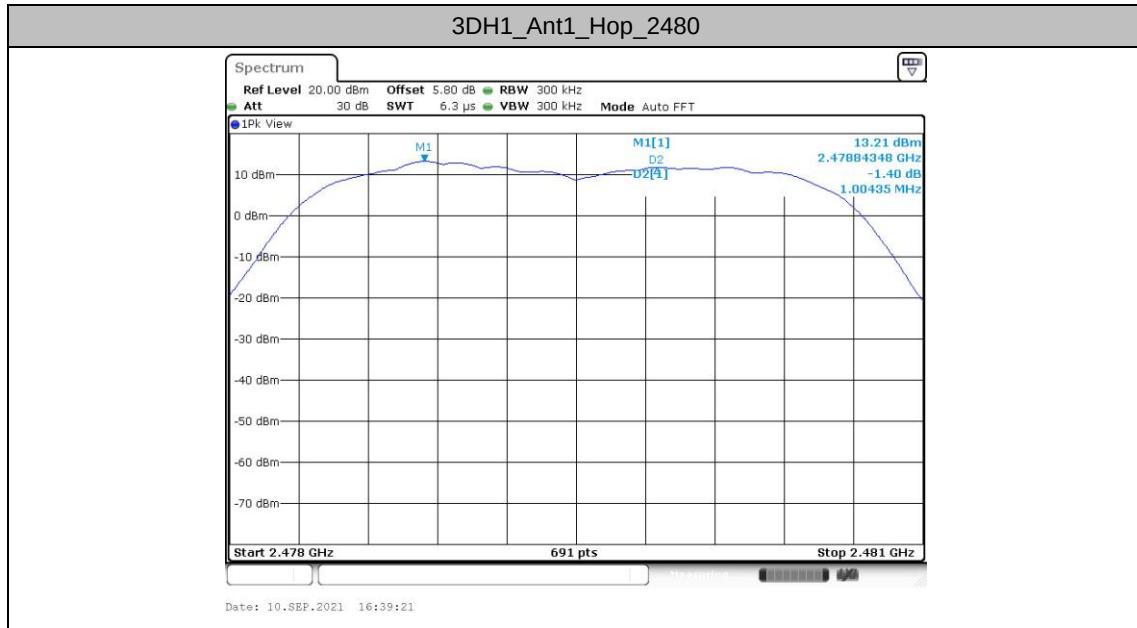
2DH1_Ant1_Hop_2441



2DH1_Ant1_Hop_2480







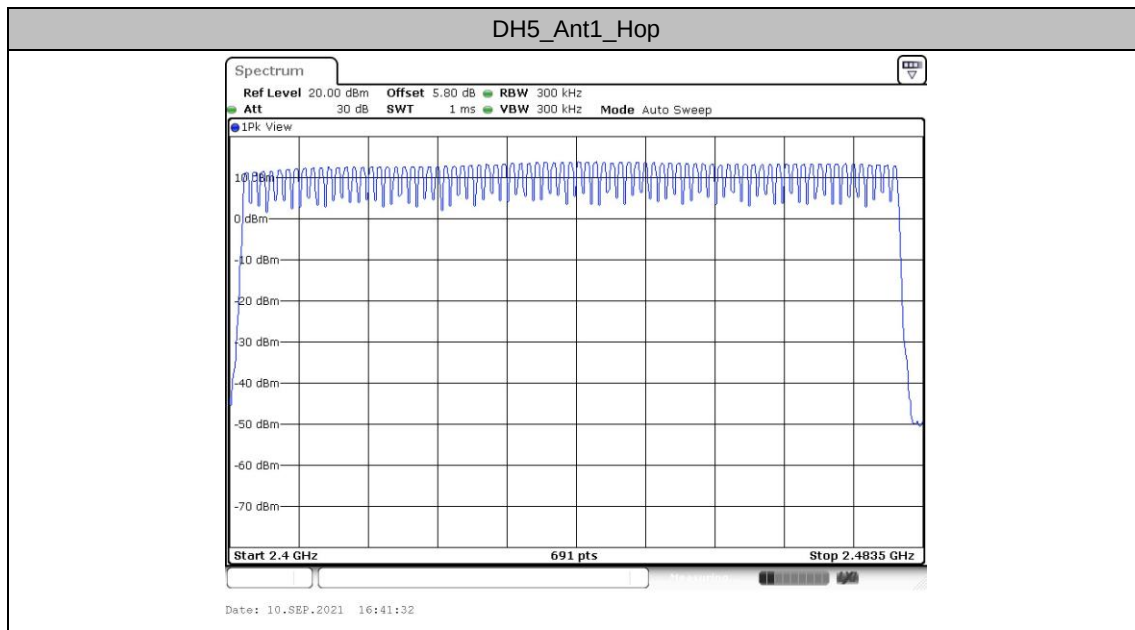


Number of hopping Frequency [MHz]s

Test Result

TestMode	Antenna	Frequency [MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS

Test Graphs



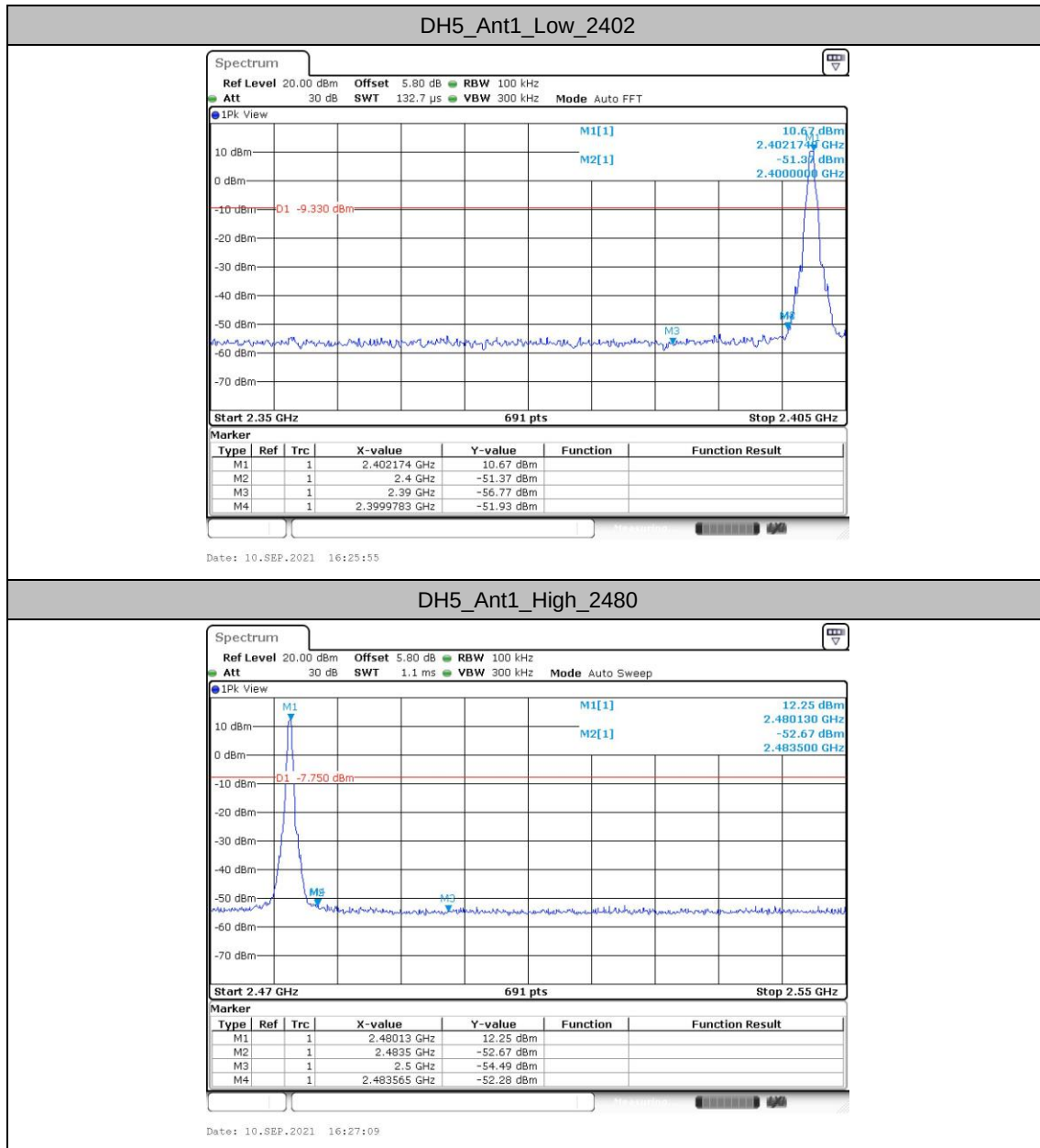
Band edge measurements

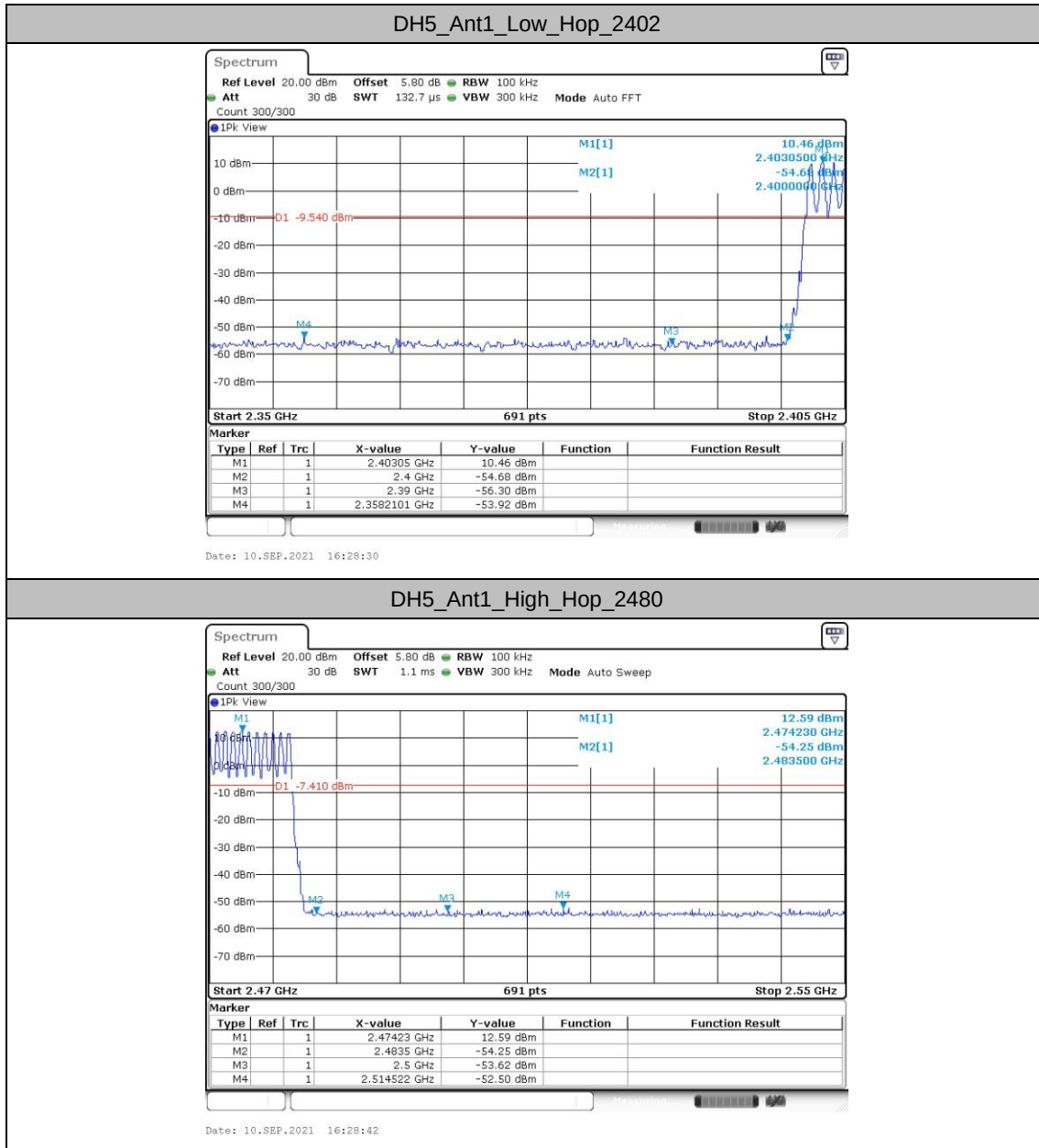
Test Result

TestMode	Antenna	ChName	Frequency [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	10.67	-51.93	≤-9.33	PASS
		High	2480	12.25	-52.28	≤-7.75	PASS
		Low	Hop_2402	10.46	-53.92	≤-9.54	PASS
		High	Hop_2480	12.59	-52.5	≤-7.41	PASS
2DH1	Ant1	Low	2402	9.66	-50.71	≤-10.34	PASS
		High	2480	11.40	-52.27	≤-8.6	PASS
		Low	Hop_2402	9.50	-53.86	≤-10.5	PASS
		High	Hop_2480	11.66	-52.21	≤-8.34	PASS
3DH1	Ant1	Low	2402	9.80	-50	≤-10.2	PASS
		High	2480	11.55	-51.94	≤-8.45	PASS
		Low	Hop_2402	7.70	-52.83	≤-12.3	PASS
		High	Hop_2480	12.00	-52.3	≤-8	PASS



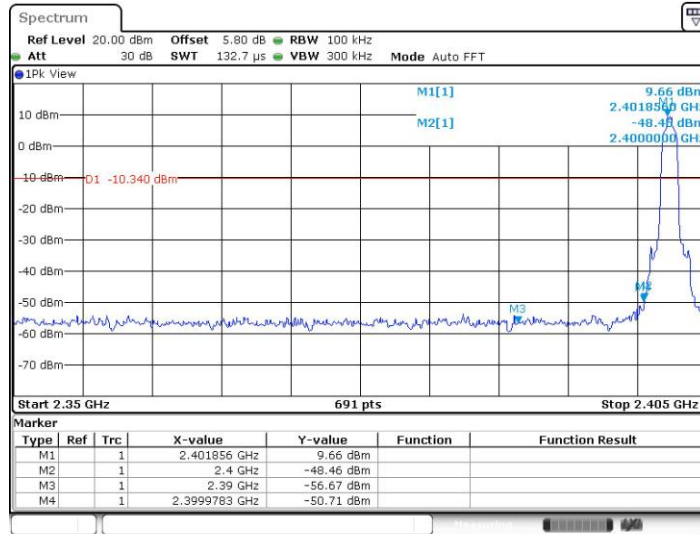
Test Graphs



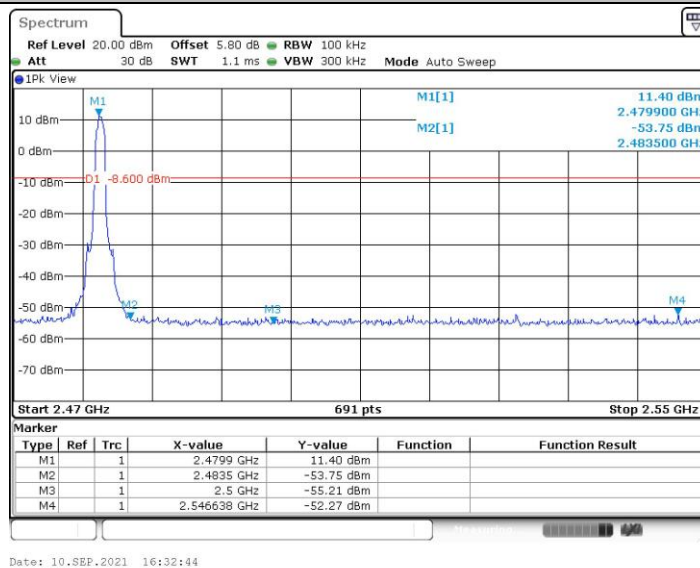




2DH1_Ant1_Low_2402

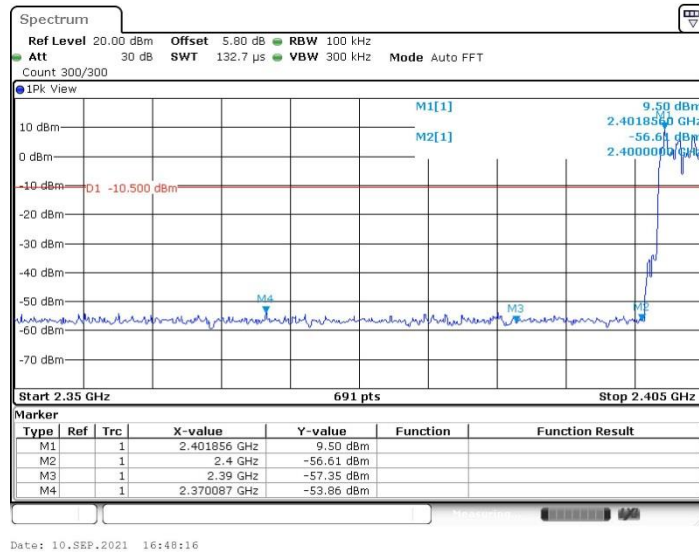


2DH1_Ant1_High_2480

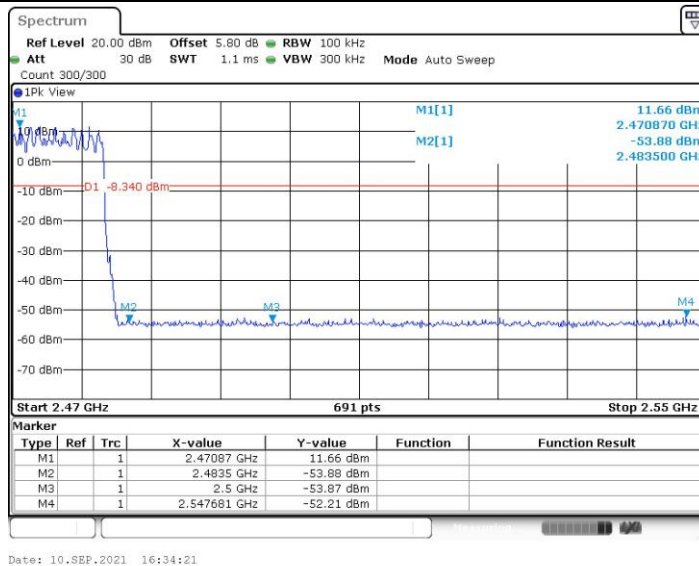




2DH1_Ant1_Low_Hop_2402

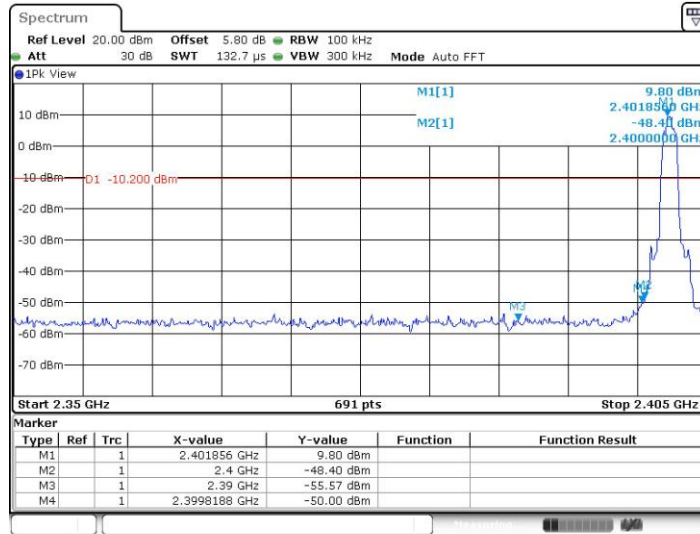


2DH1_Ant1_High_Hop_2480

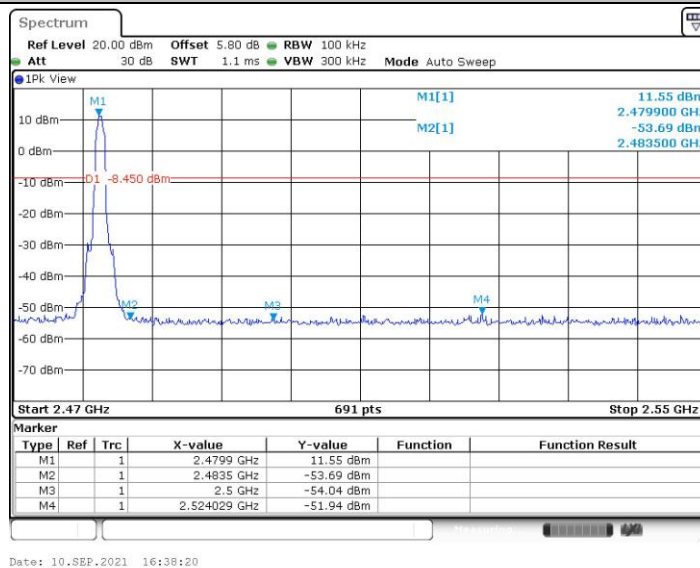


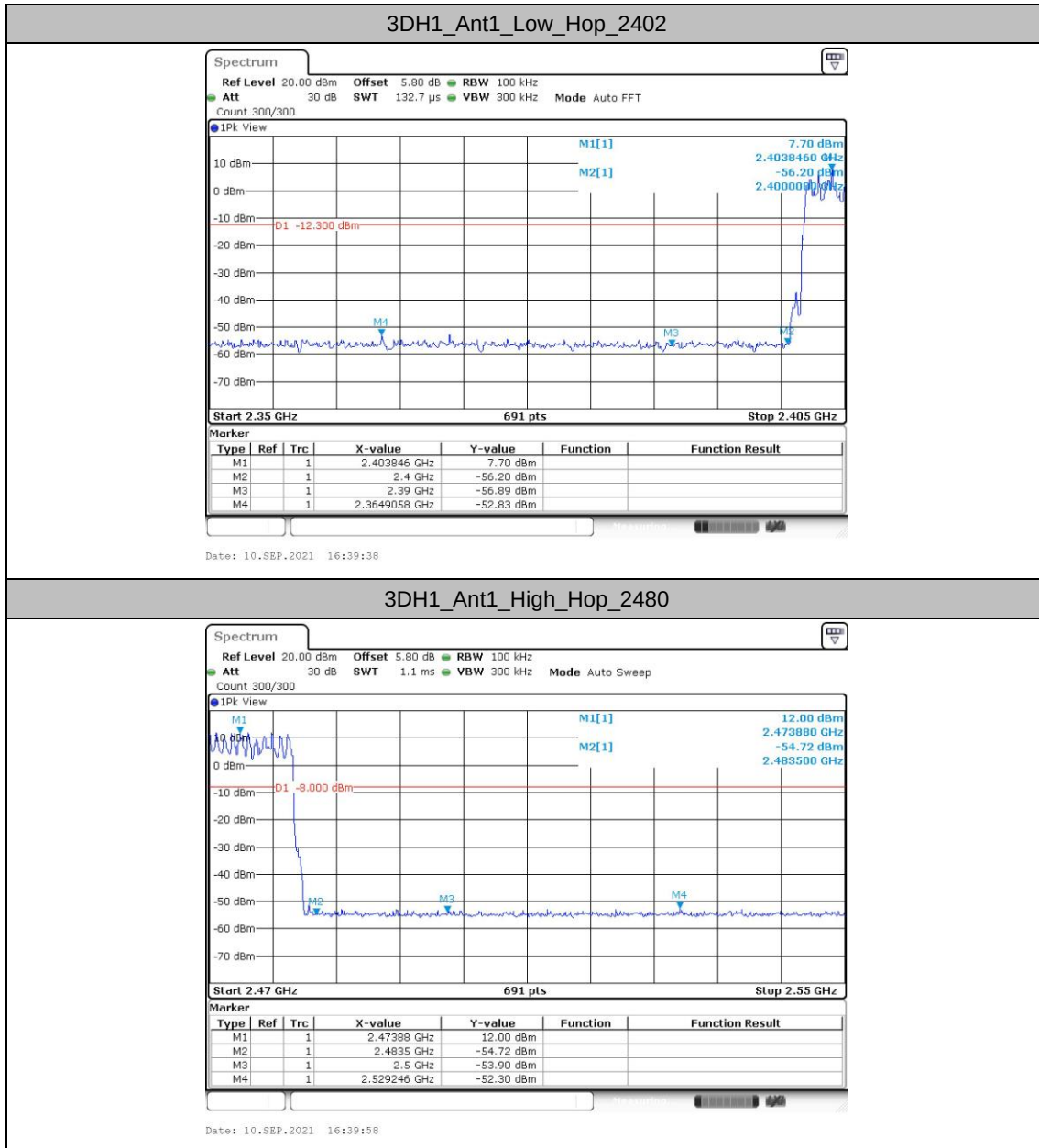


3DH1_Ant1_Low_2402



3DH1_Ant1_High_2480







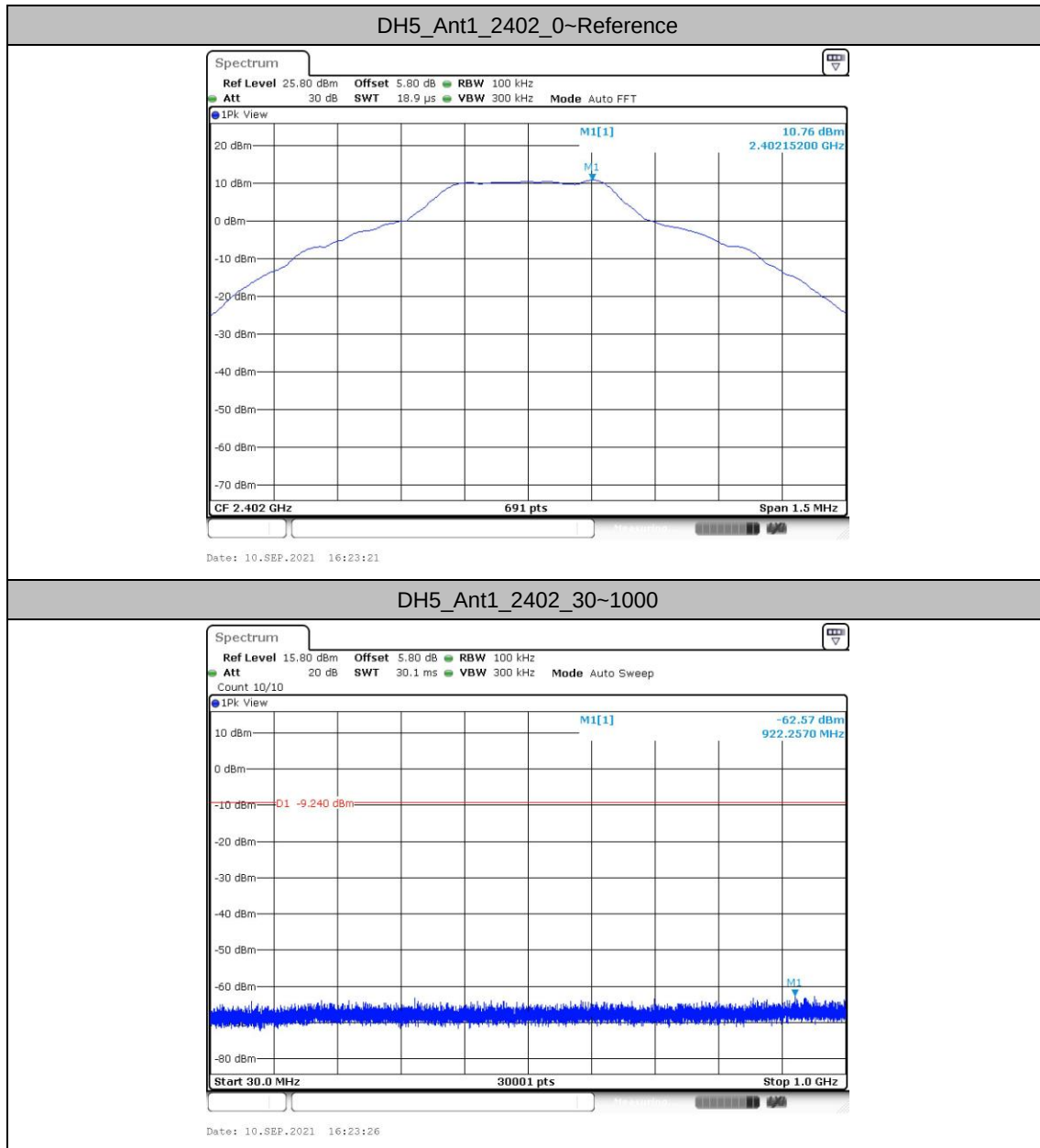
Conducted Spurious Emission

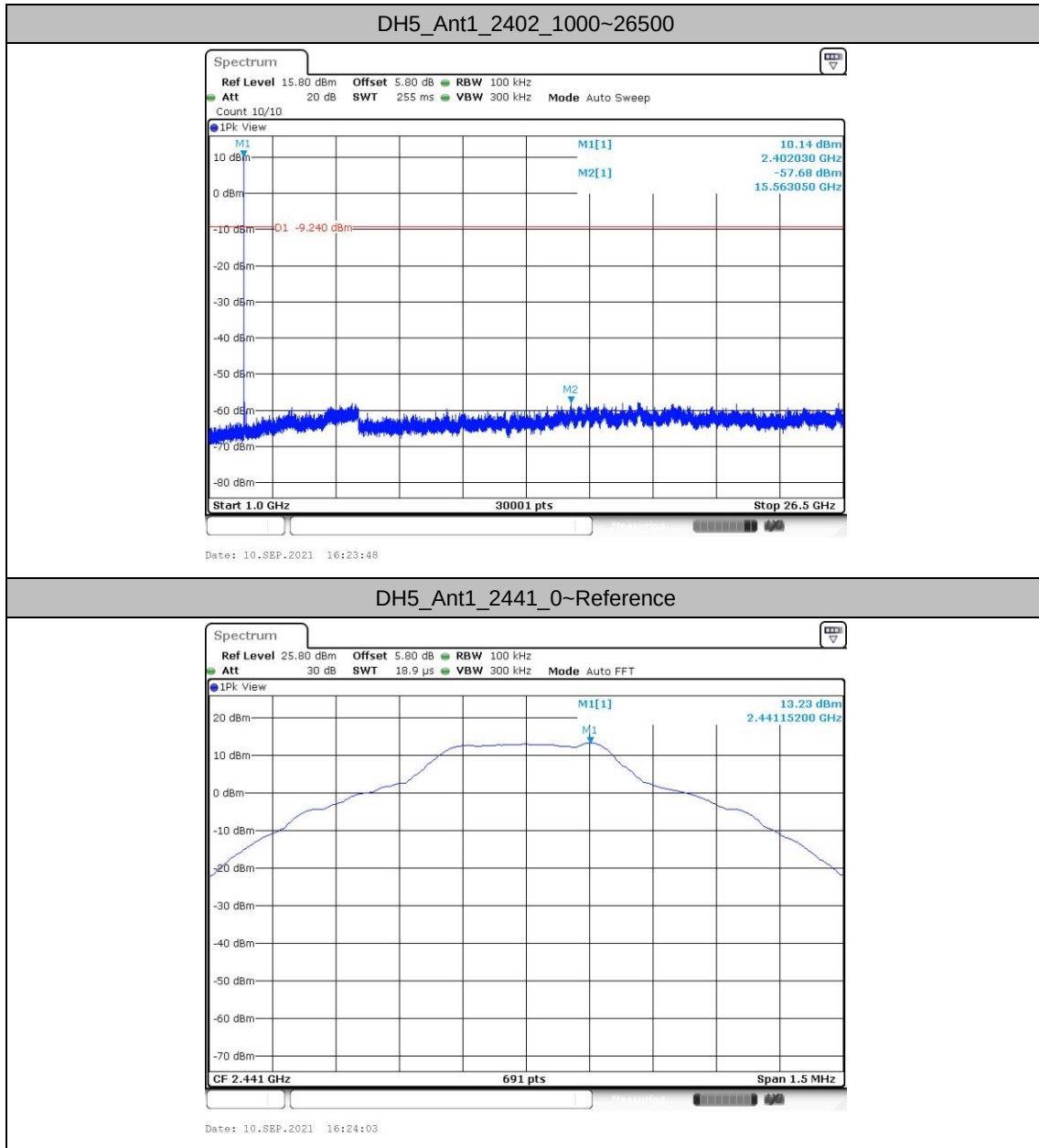
Test Result

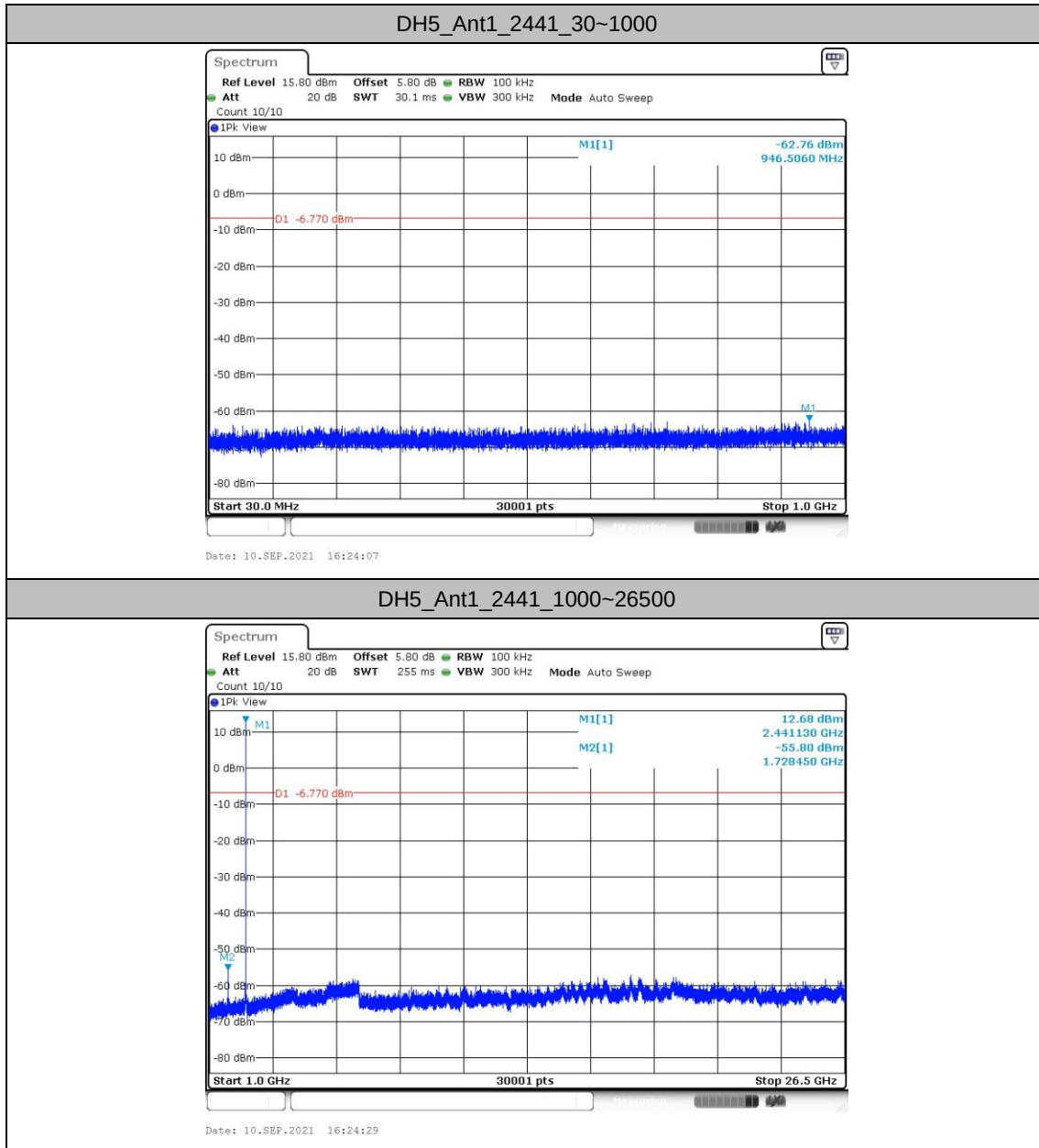
TestMode	Antenna	Frequency [MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	10.76	10.76	---	---
			30~1000	10.76	-62.57	≤-9.24	PASS
			1000~26500	10.76	-57.68	≤-9.24	PASS
		2441	Reference	13.23	13.23	---	---
			30~1000	13.23	-62.76	≤-6.77	PASS
			1000~26500	13.23	-55.8	≤-6.77	PASS
		2480	Reference	12.33	12.33	---	---
			30~1000	12.33	-62.18	≤-7.67	PASS
			1000~26500	12.33	-57.25	≤-7.67	PASS
2DH1	Ant1	2402	Reference	9.65	9.65	---	---
			30~1000	9.65	-61.8	≤-10.35	PASS
			1000~26500	9.65	-57.3	≤-10.35	PASS
		2441	Reference	12.25	12.25	---	---
			30~1000	12.25	-62.37	≤-7.75	PASS
			1000~26500	12.25	-57.24	≤-7.75	PASS
		2480	Reference	11.48	11.48	---	---
			30~1000	11.48	-62.06	≤-8.52	PASS
			1000~26500	11.48	-56.55	≤-8.52	PASS
3DH1	Ant1	2402	Reference	9.87	9.87	---	---
			30~1000	9.87	-61.82	≤-10.13	PASS
			1000~26500	9.87	-57.05	≤-10.13	PASS
		2441	Reference	12.46	12.46	---	---
			30~1000	12.46	-62.82	≤-7.54	PASS
			1000~26500	12.46	-56.71	≤-7.54	PASS
		2480	Reference	11.70	11.70	---	---
			30~1000	11.70	-62.47	≤-8.3	PASS
			1000~26500	11.70	-56.3	≤-8.3	PASS

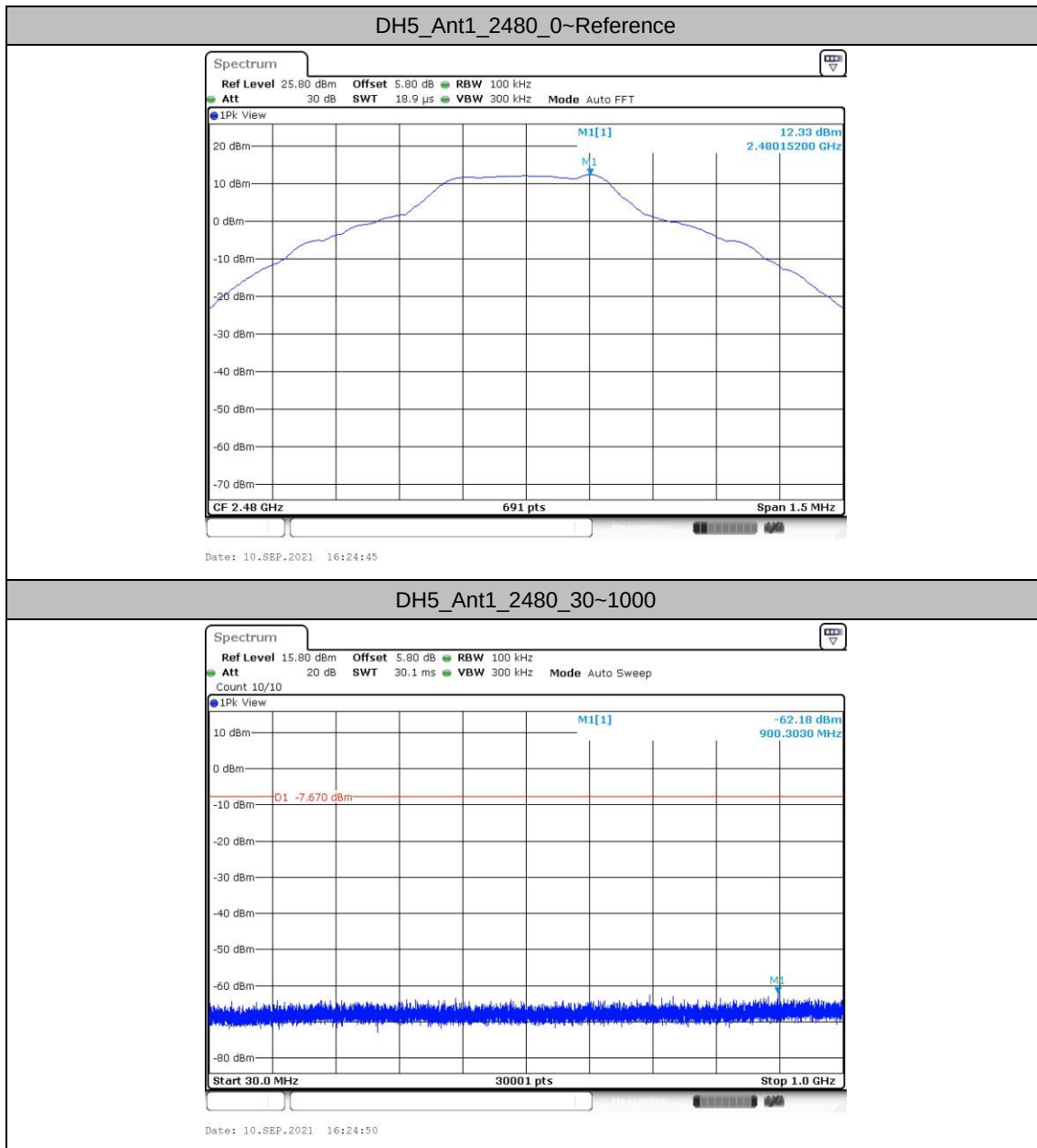


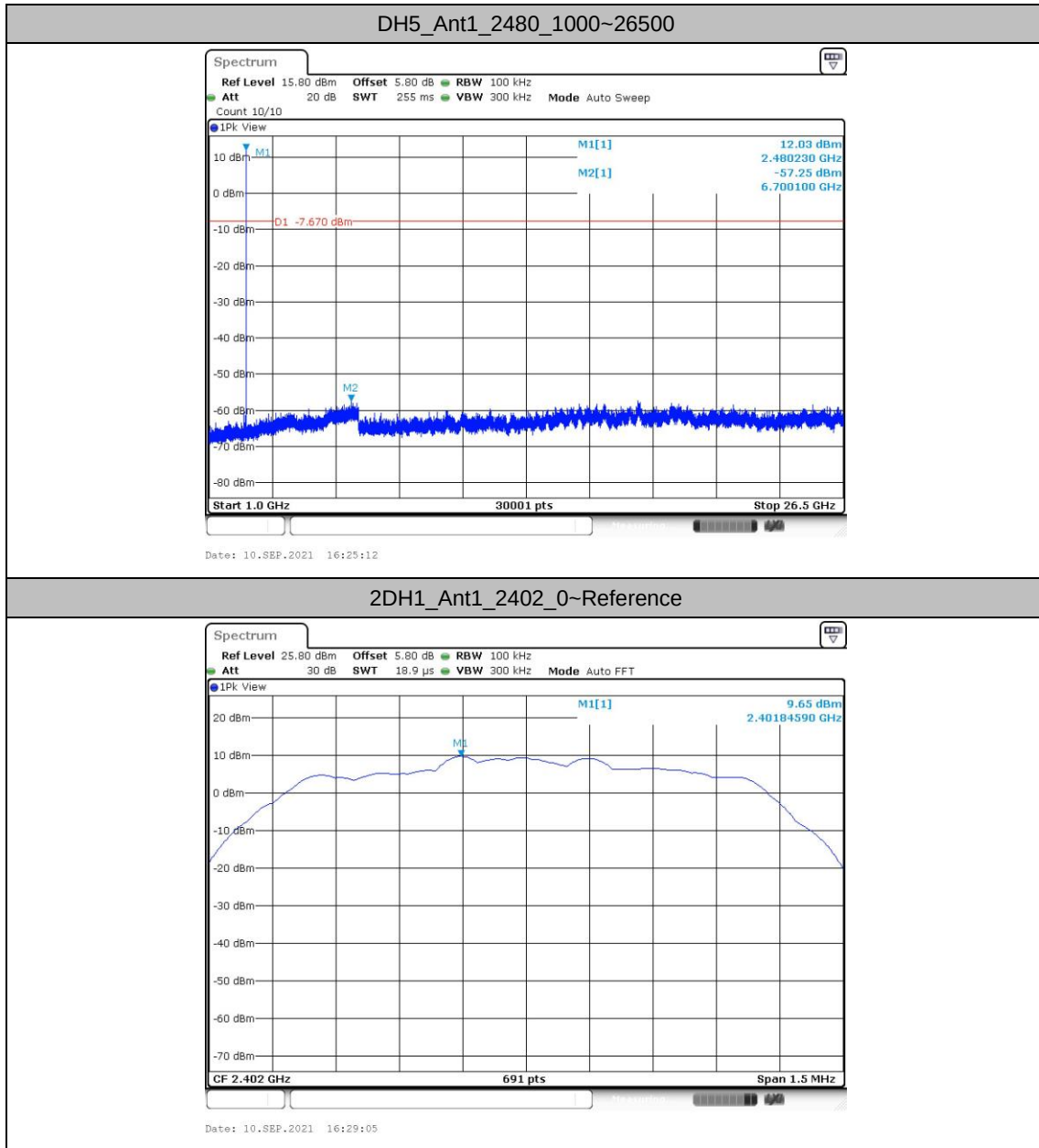
Test Graphs

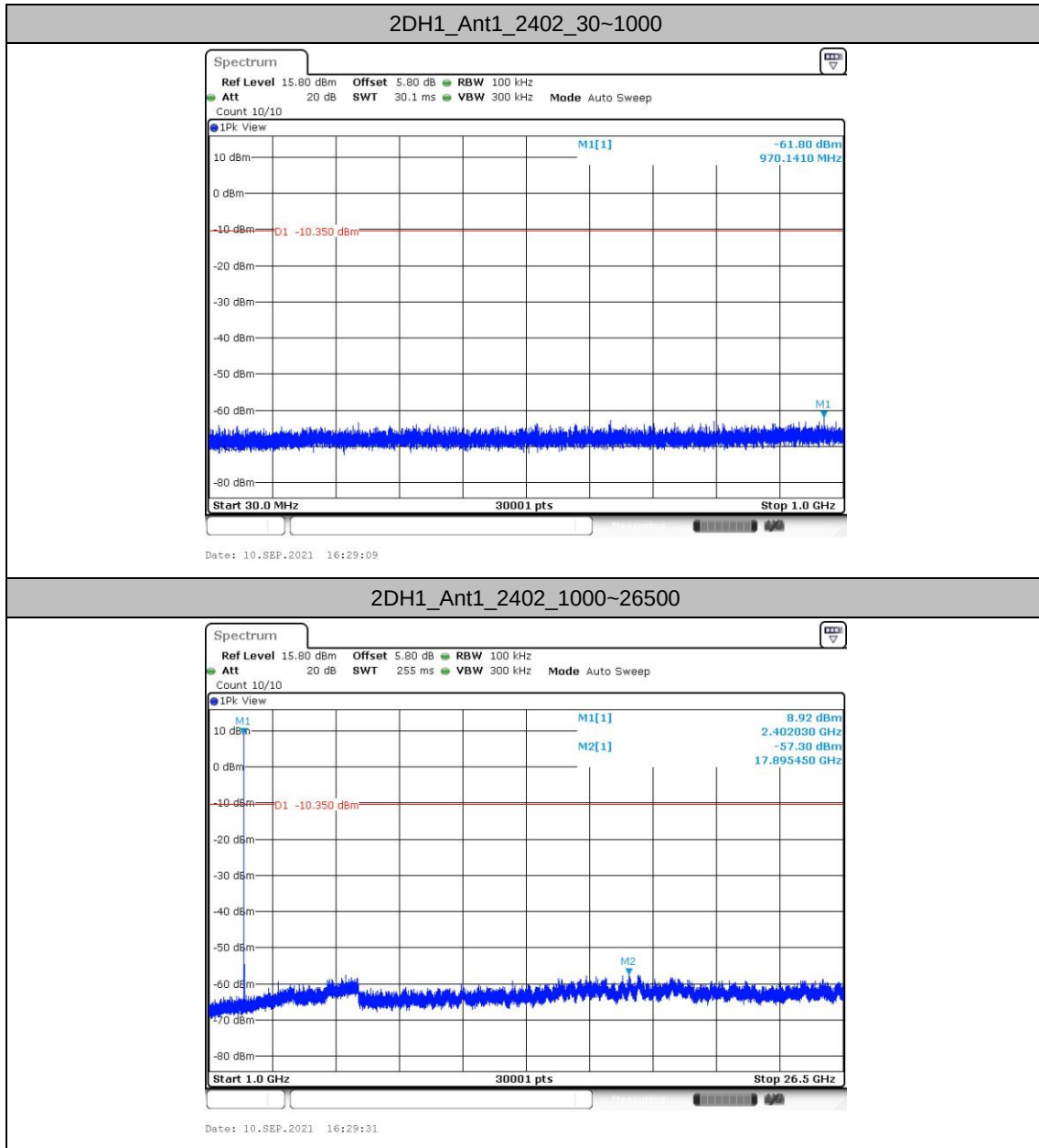


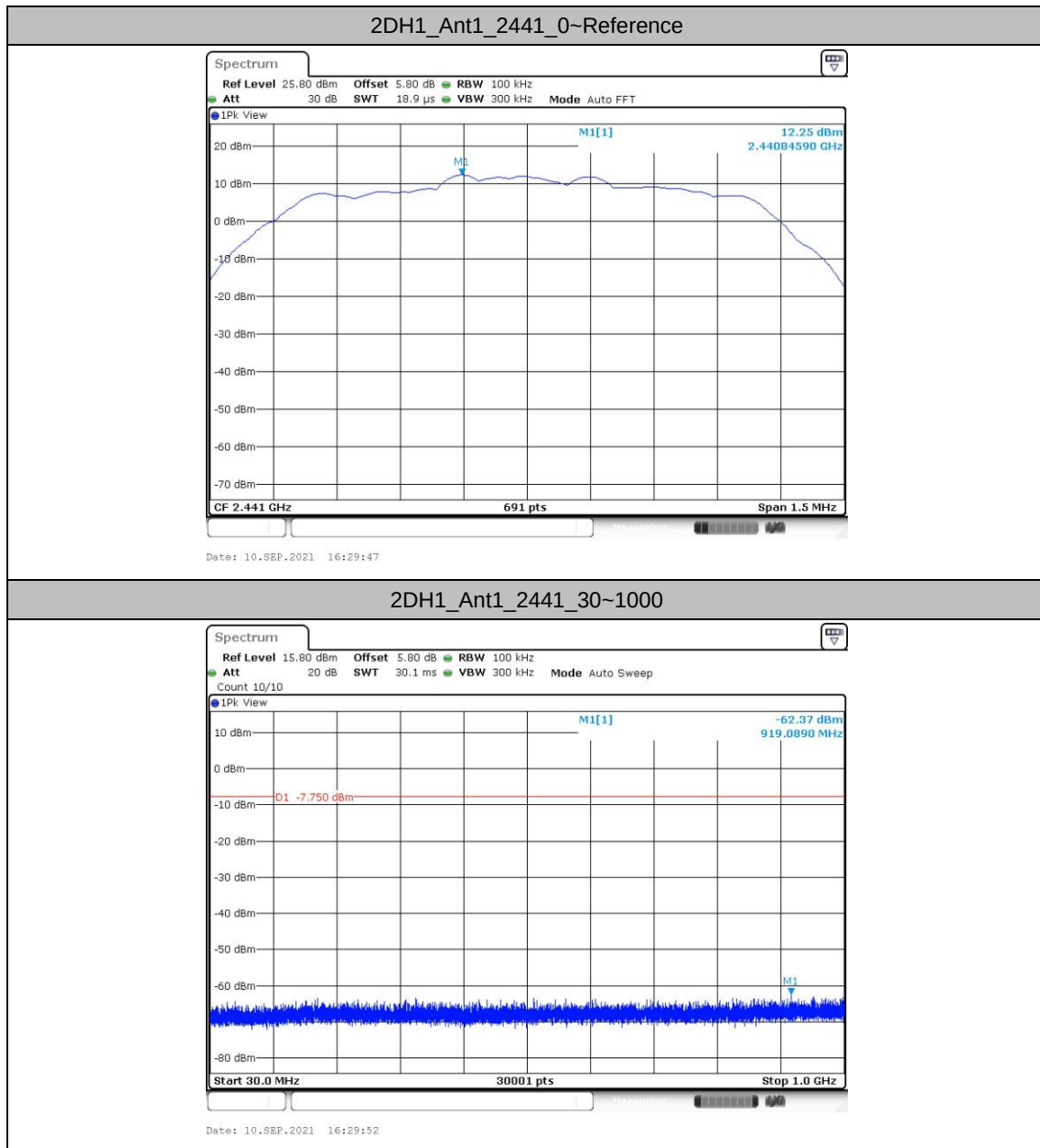


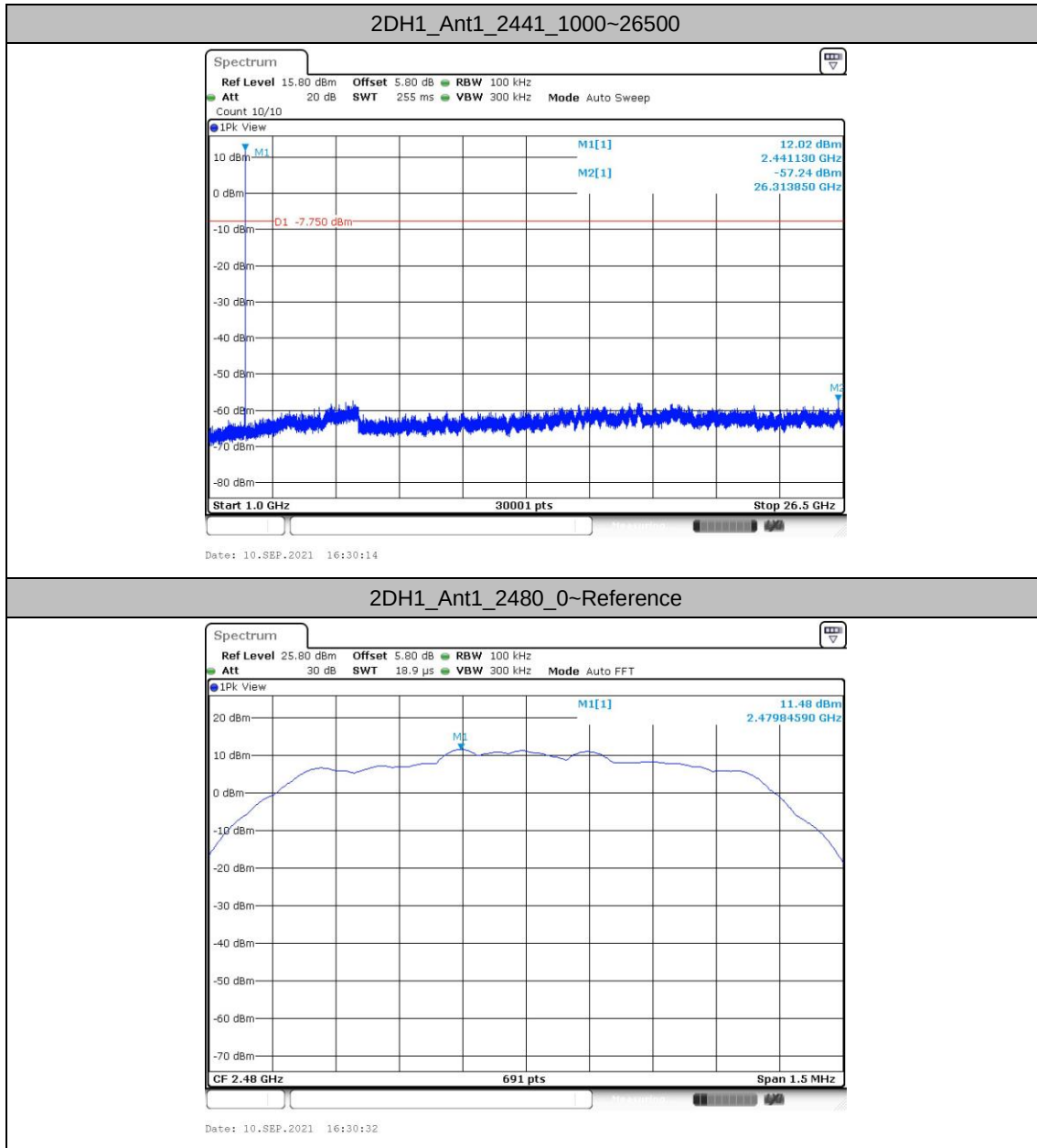


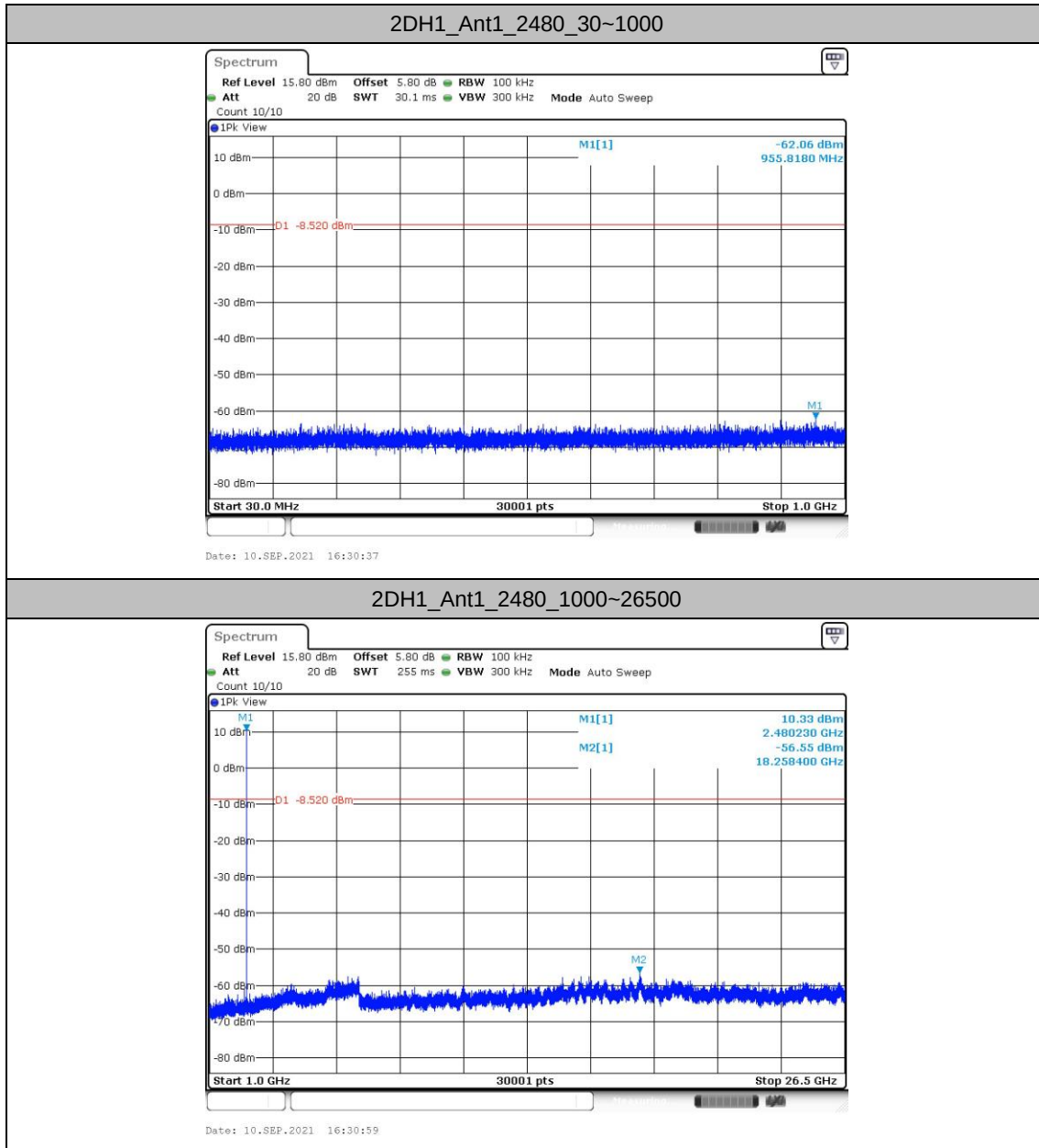


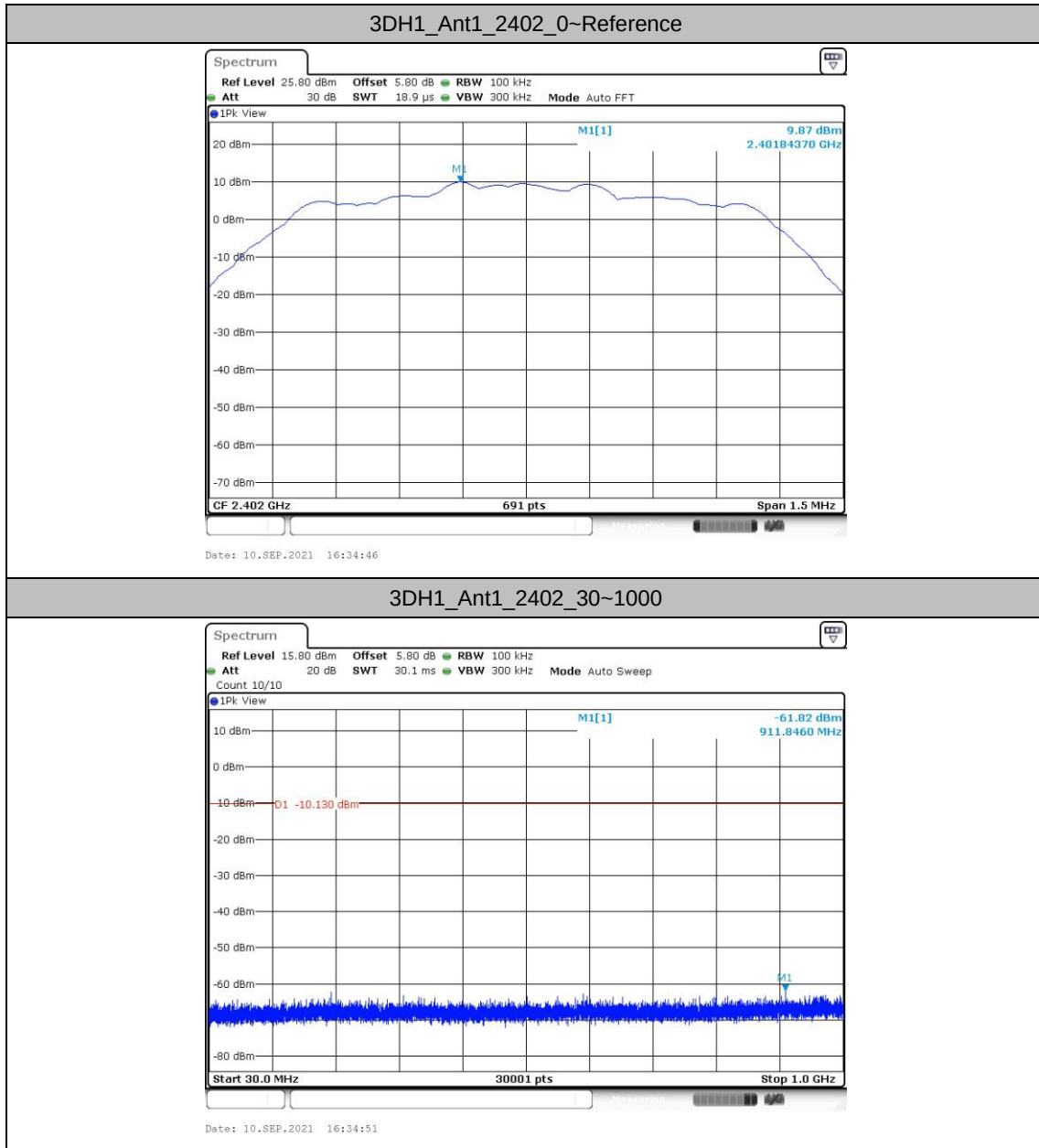


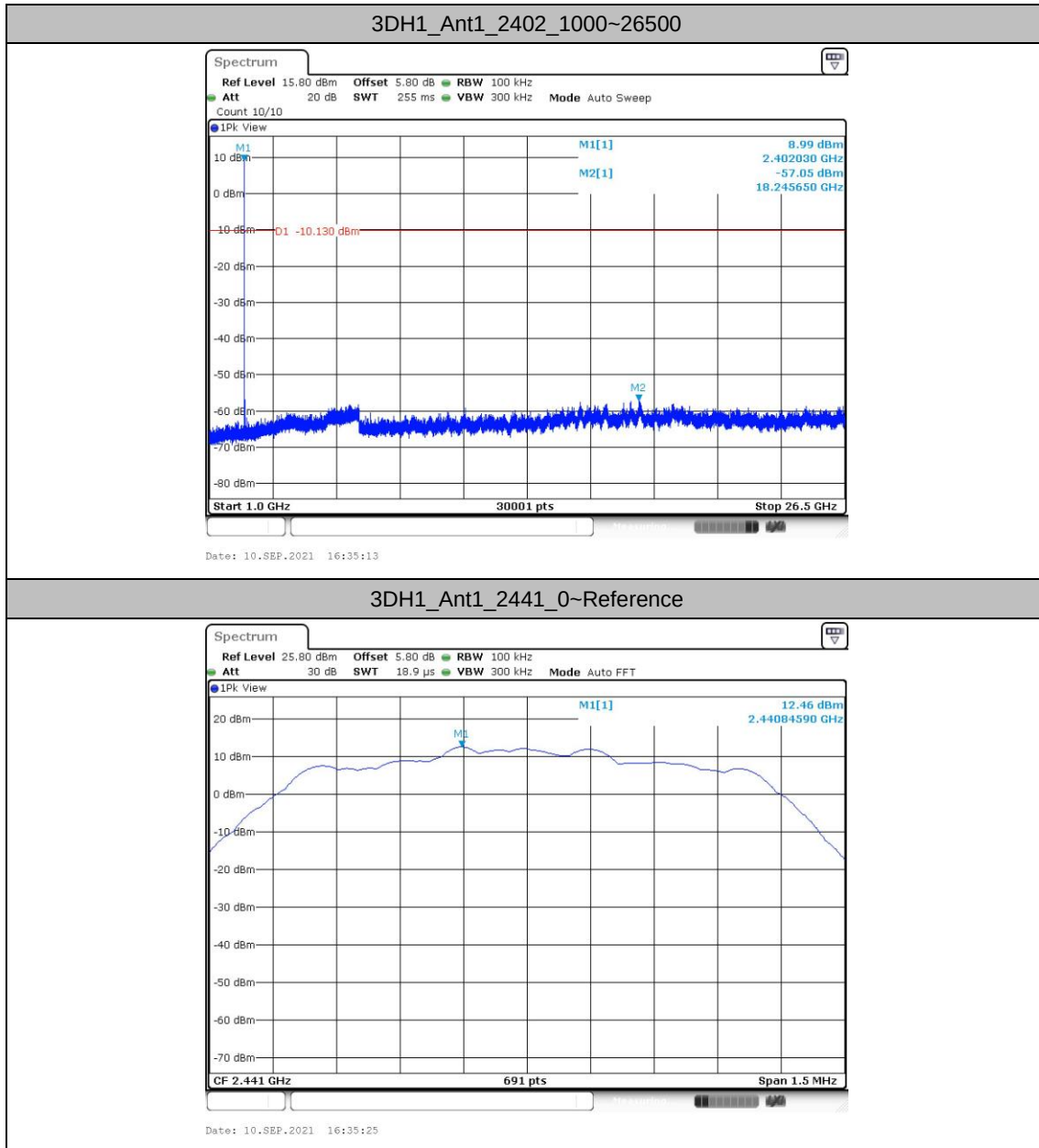


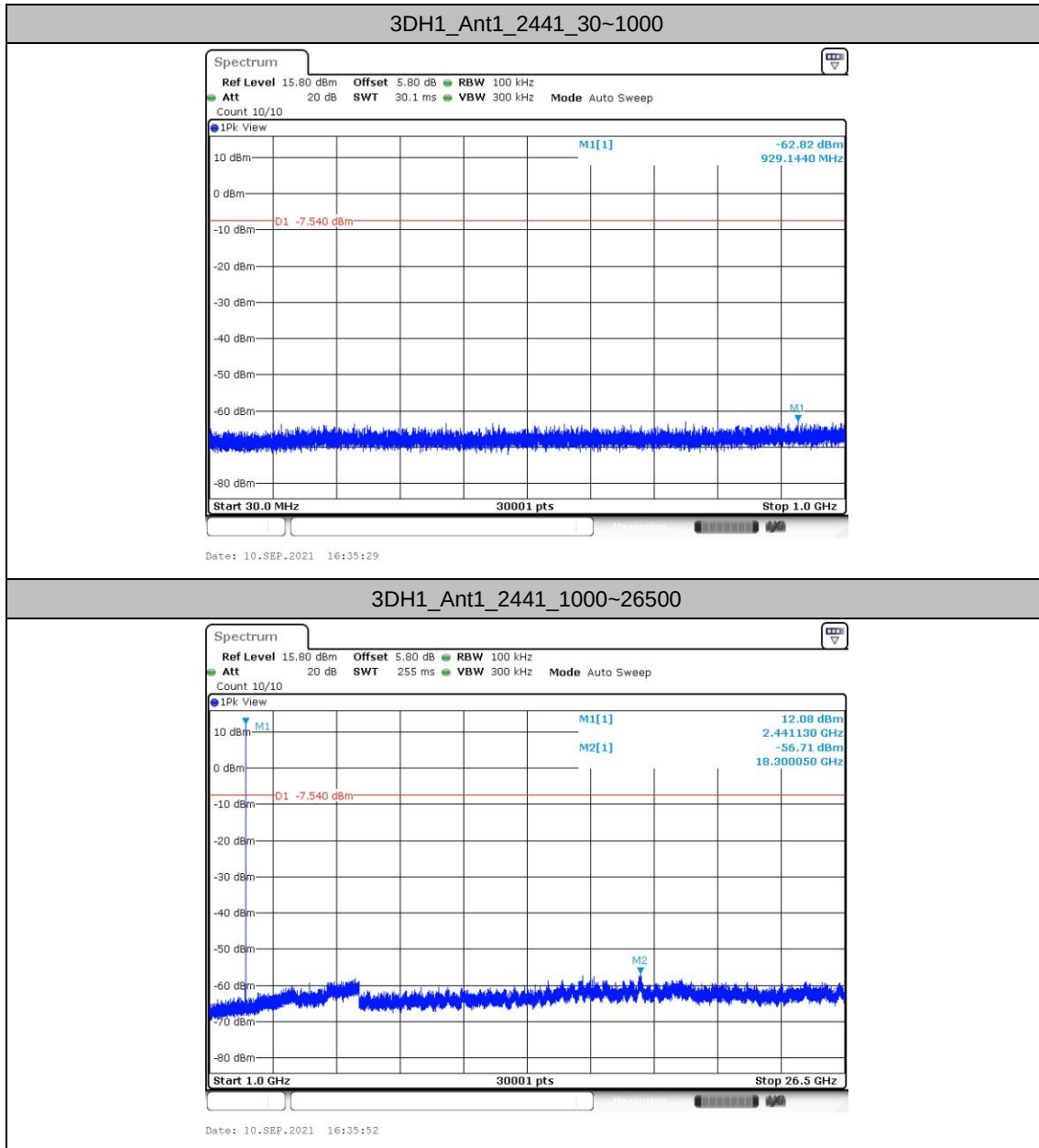


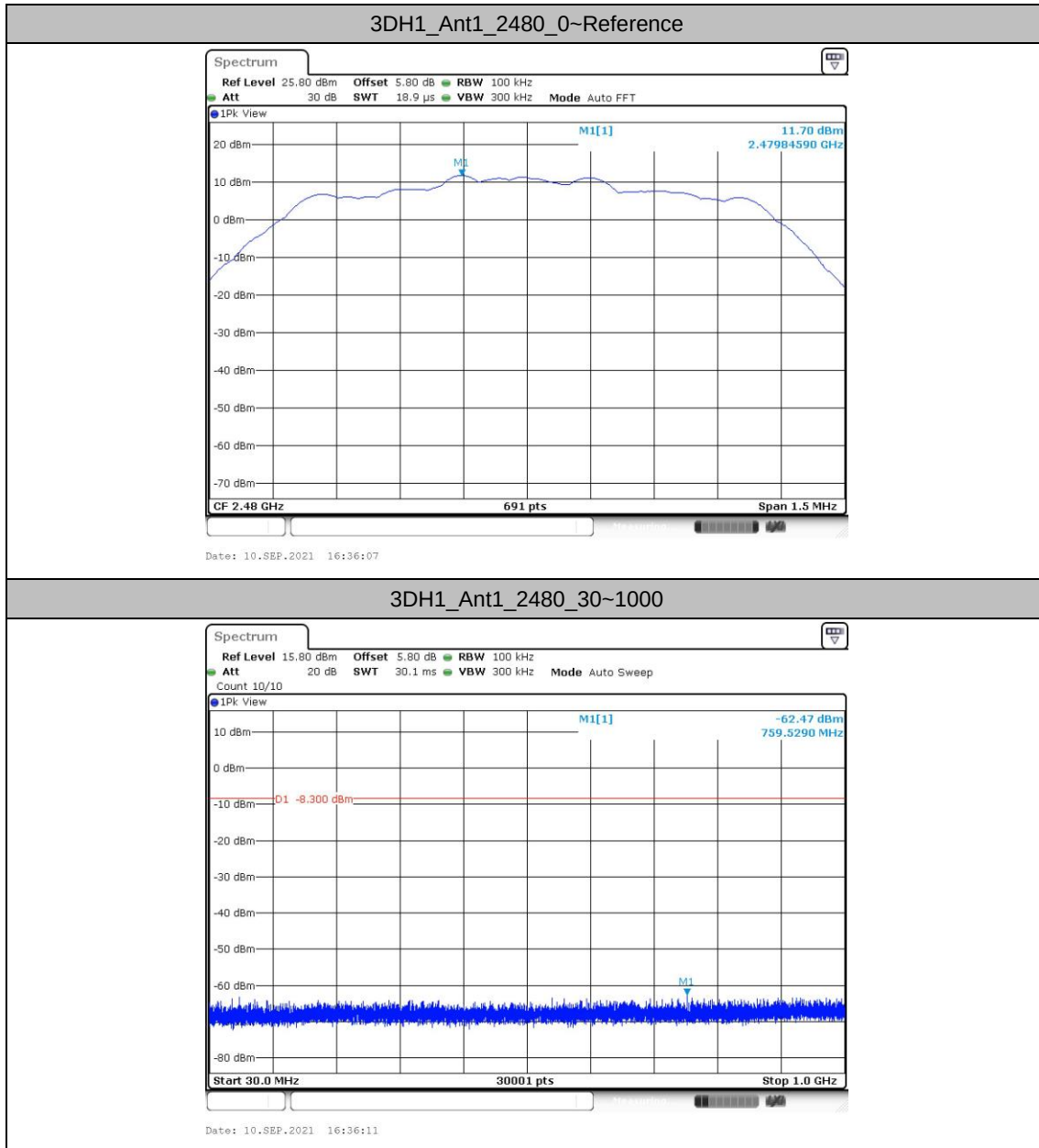


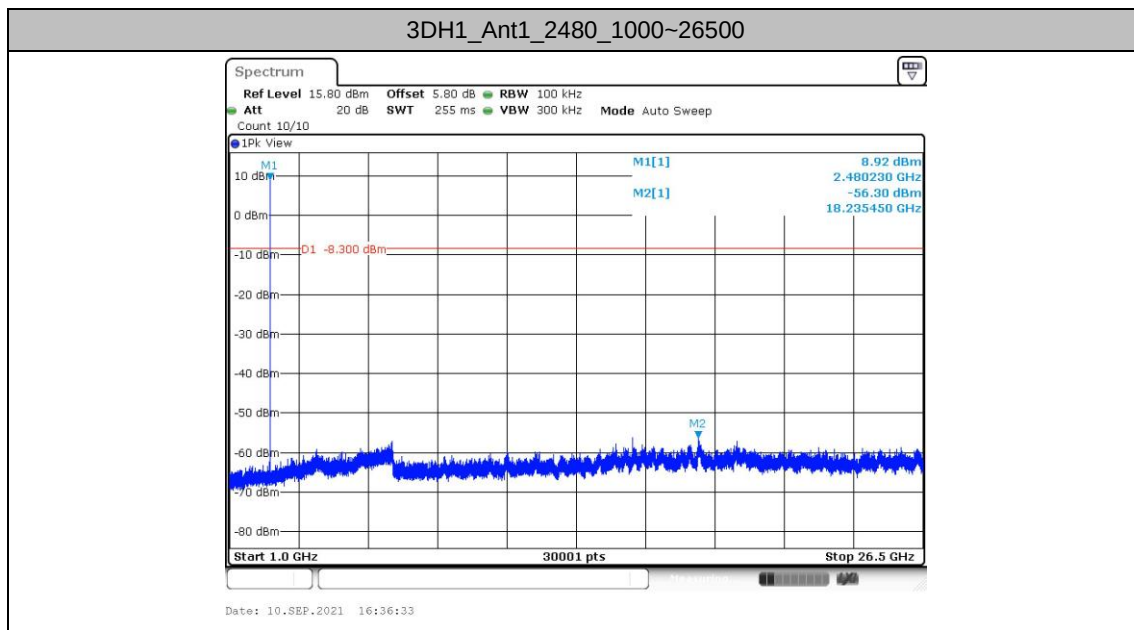












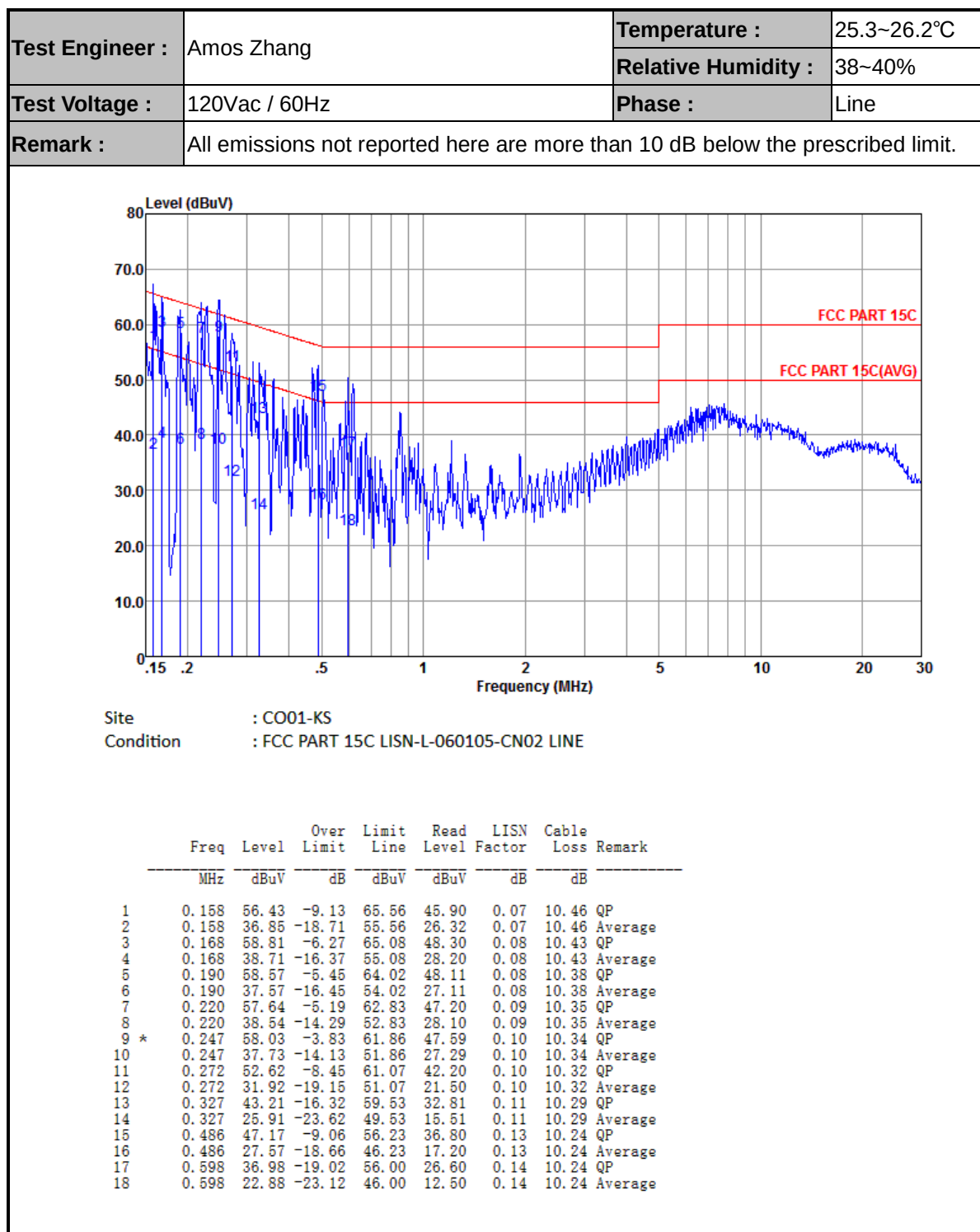
Dwell Time of each Frequency Measurement

Test Result

Package Mode	Average Hopping Channel	Package Transfer Time (msec)	Dwell Time	Limits	Pass
			(sec)	(sec)	
Normal	106.67	2.9	0.31	0.4	Pass
AFH	53.34	2.9	0.15	0.4	Pass

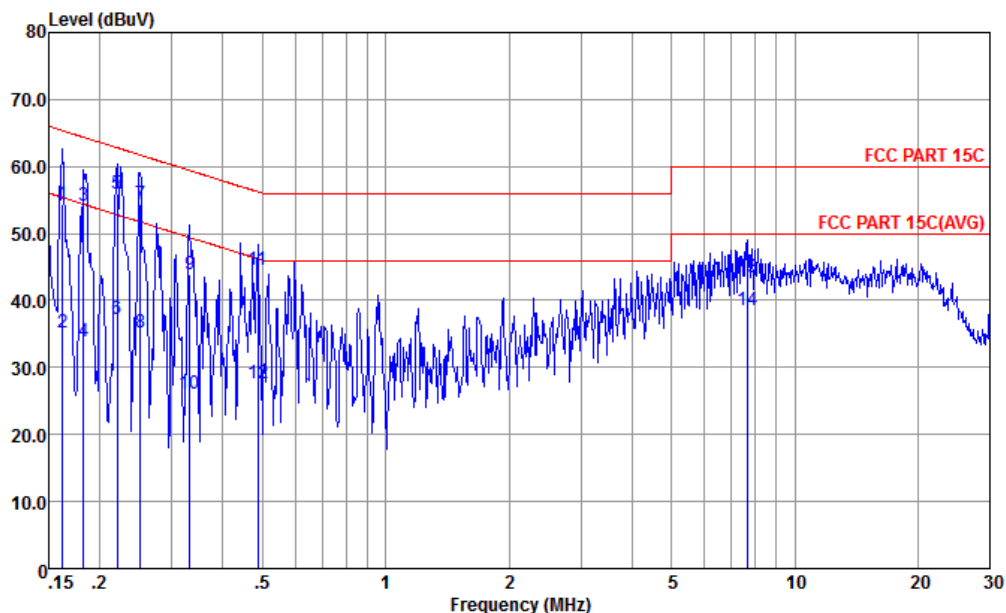


Appendix B. AC Conducted Emission Test Results





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



Site : CO01-KS
Condition : FCC PART 15C LISN-N-060105-CN02 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.162	54.40	-10.94	65.34	43.80	0.15	10.45	QP
2	0.162	35.10	-20.24	55.34	24.50	0.15	10.45	Average
3	0.182	54.16	-10.21	64.37	43.60	0.16	10.40	QP
4	0.182	33.86	-20.51	54.37	23.30	0.16	10.40	Average
5 *	0.221	56.02	-6.77	62.79	45.50	0.17	10.35	QP
6	0.221	37.12	-15.67	52.79	26.60	0.17	10.35	Average
7	0.251	54.32	-7.41	61.73	43.81	0.18	10.33	QP
8	0.251	35.32	-16.41	51.73	24.81	0.18	10.33	Average
9	0.332	43.99	-15.41	59.40	33.50	0.20	10.29	QP
10	0.332	25.99	-23.41	49.40	15.50	0.20	10.29	Average
11	0.486	44.67	-11.56	56.23	34.20	0.23	10.24	QP
12	0.486	27.67	-18.56	46.23	17.20	0.23	10.24	Average
13	7.646	43.55	-16.45	60.00	32.21	1.03	10.31	QP
14	7.646	38.45	-11.55	50.00	27.11	1.03	10.31	Average

Note:

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



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT ANT 1	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2376.43	53.42	-20.58	74	49.98	30.48	7.69	34.73	124	308	P	H
		2376.43	28.63	-25.37	54	-	-	-	-	-	-	A	H
	*	2402	100.1	-	-	96.59	30.5	7.72	34.71	124	308	P	H
	*	2402	75.31	-	-	-	-	-	-	-	-	A	H
		2374.87	53.04	-20.96	74	49.6	30.48	7.69	34.73	395	56	P	V
		2374.87	28.25	-25.75	54	-	-	-	-	-	-	A	V
	*	2402	98.3	-	-	94.79	30.5	7.72	34.71	395	56	P	V
	*	2402	73.51	-	-	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		2487.4	53.3	-20.7	74	49.21	30.86	7.86	34.63	316	309	P	H
		2487.4	28.51	-25.49	54	-	-	-	-	-	-	A	H
	*	2480	97.68	-	-	93.59	30.86	7.86	34.63	316	309	P	H
	*	2480	72.89	-	-	-	-	-	-	-	-	A	H
		2485.48	53.42	-20.58	74	49.33	30.86	7.86	34.63	333	34	P	V
		2485.48	28.63	-25.37	54	-	-	-	-	-	-	A	V
	*	2480	94.39	-	-	90.3	30.86	7.86	34.63	333	34	P	V
	*	2480	69.6	-	-	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT 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)
BT CH 00 2402MHz		4806	40.95	-33.05	74	55.23	34.58	11.18	60.04	300	0	P	H
		4806	39.98	-34.02	74	54.26	34.58	11.18	60.04	100	360	P	V
BT CH 39 2441MHz		4884	40.07	-33.93	74	54.13	34.69	11.28	60.03	300	0	P	H
		7320	43.92	-30.08	74	54.04	36.67	13.73	60.52	300	0	P	H
		4884	40.76	-33.24	74	54.82	34.69	11.28	60.03	100	360	P	V
		7320	44.17	-29.83	74	54.29	36.67	13.73	60.52	100	360	P	V
BT CH 78 2480MHz		4962	42.31	-31.69	74	56.11	34.82	11.39	60.01	300	0	P	H
		7440	42.95	-31.05	74	53.02	36.62	13.85	60.54	300	0	P	H
		4962	41.22	-32.78	74	55.02	34.82	11.39	60.01	100	360	P	V
		7440	43.73	-30.27	74	53.8	36.62	13.85	60.54	100	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

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
ANT 2				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2358.75	52.08	-21.92	74	48.72	30.46	7.66	34.76	301	52	P	H
		2358.75	27.29	-26.71	54	-	-	-	-	-	-	A	H
	*	2402	96.65	-	-	93.14	30.5	7.72	34.71	301	52	P	H
	*	2402	71.86	-	-	-	-	-	-	-	-	A	H
		2364.6	53.37	-20.63	74	49.98	30.46	7.66	34.73	240	346	P	V
		2364.6	28.58	-25.42	54	-	-	-	-	-	-	A	V
	*	2402	94.82	-	-	91.31	30.5	7.72	34.71	240	346	P	V
	*	2402	70.03	-	-	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		2490.94	52.84	-21.16	74	48.62	30.93	7.89	34.6	319	50	P	H
		2490.94	28.05	-25.95	54	-	-	-	-	-	-	A	H
	*	2480	96.85	-	-	92.76	30.86	7.86	34.63	319	50	P	H
	*	2480	72.06	-	-	-	-	-	-	-	-	A	H
		2484.34	53.47	-20.53	74	49.38	30.86	7.86	34.63	202	6	P	V
		2484.34	28.68	-25.32	54	-	-	-	-	-	-	A	V
	*	2480	94.9	-	-	90.81	30.86	7.86	34.63	202	6	P	V
	*	2480	70.11	-	-	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT ANT 2	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)
BT CH 00 2402MHz		4806	41.19	-32.81	74	55.47	34.58	11.18	60.04	300	0	P	H
		4806	40.16	-33.84	74	54.44	34.58	11.18	60.04	100	360	P	V
BT CH 39 2441MHz		4884	41.84	-32.16	74	55.9	34.69	11.28	60.03	300	0	P	H
		7320	43.56	-30.44	74	53.68	36.67	13.73	60.52	300	0	P	H
		4884	41.04	-32.96	74	55.1	34.69	11.28	60.03	100	360	P	V
		7320	44.32	-29.68	74	54.44	36.67	13.73	60.52	100	360	P	V
BT CH 78 2480MHz		4962	43.85	-30.15	74	57.65	34.82	11.39	60.01	300	0	P	H
		7440	43.79	-30.21	74	53.86	36.62	13.85	60.54	300	0	P	H
		4962	45.74	-28.26	74	59.54	34.82	11.39	60.01	100	360	P	V
		7440	44.18	-29.82	74	54.25	36.62	13.85	60.54	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		30	22.54	-17.46	40	29.03	25.5	0.71	32.7	100	0	P	H
		43.58	21.64	-18.36	40	35.7	17.82	1	32.88	-	-	P	H
		142.52	18.56	-24.94	43.5	31.98	17.59	1.81	32.82	-	-	P	H
		210.42	20.59	-22.91	43.5	34.52	16.96	2.21	33.1	-	-	P	H
		330.7	23.61	-22.39	46	32.8	20.94	2.77	32.9	-	-	P	H
		448.07	23.88	-22.12	46	29.78	23.57	3.23	32.7	-	-	P	H
		43.58	33.6	-6.4	40	47.66	17.82	1	32.88	100	360	P	V
		54.25	25.24	-14.76	40	42.94	14.36	1.1	33.16	-	-	P	V
		176.47	22	-21.5	43.5	36.08	16.86	2.02	32.96	-	-	P	V
		401.51	22.46	-23.54	46	29.47	22.73	3.06	32.8	-	-	P	V
		681.84	26.54	-19.46	46	29.54	25.77	3.99	32.76	-	-	P	V
		885.54	28.57	-17.43	46	29.21	27.34	4.55	32.53	-	-	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	P eak or A verage
H/V	H orizontal or V ertical



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

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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)

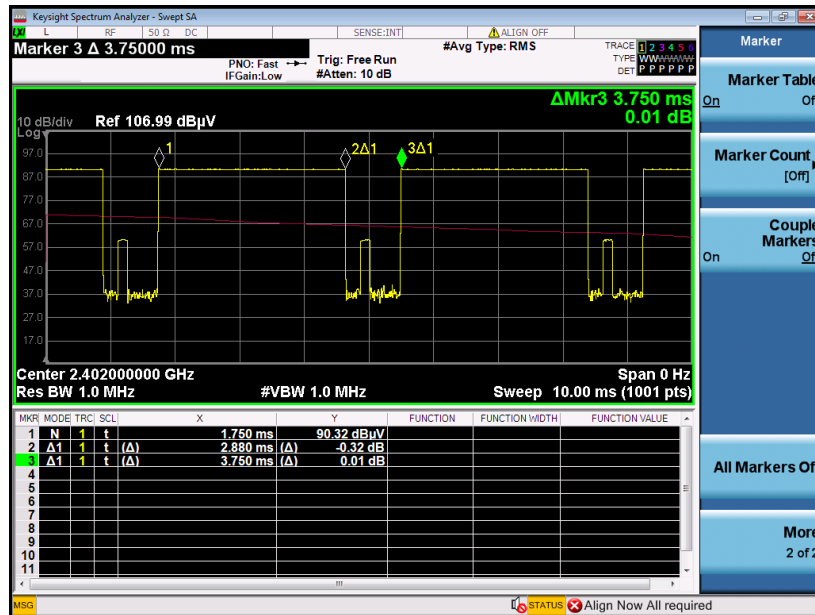
= -10.46(dB)

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

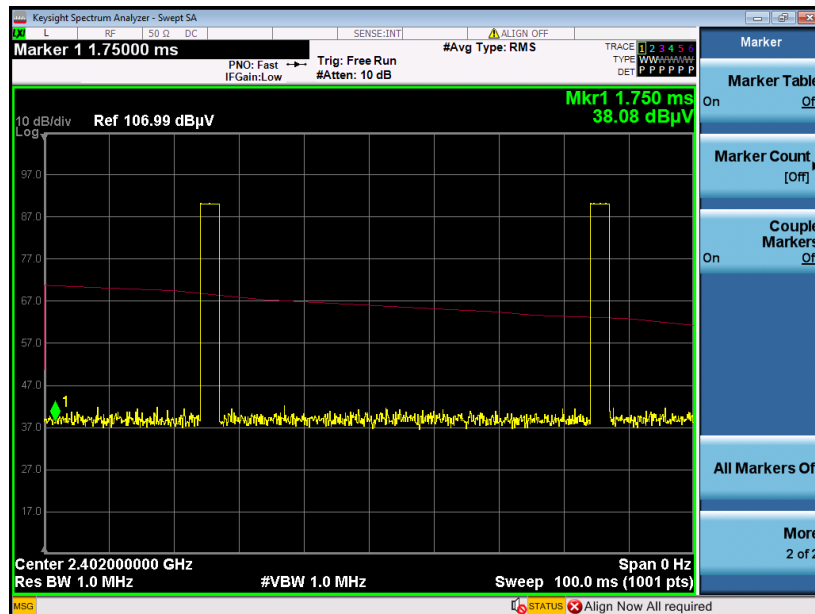
Appendix D. Duty Cycle Plots

For Ant.1:

3DH5 on time (One Pulse) Plot on Channel 00



3DH5 on time (Count Pulses) Plot on Channel 00

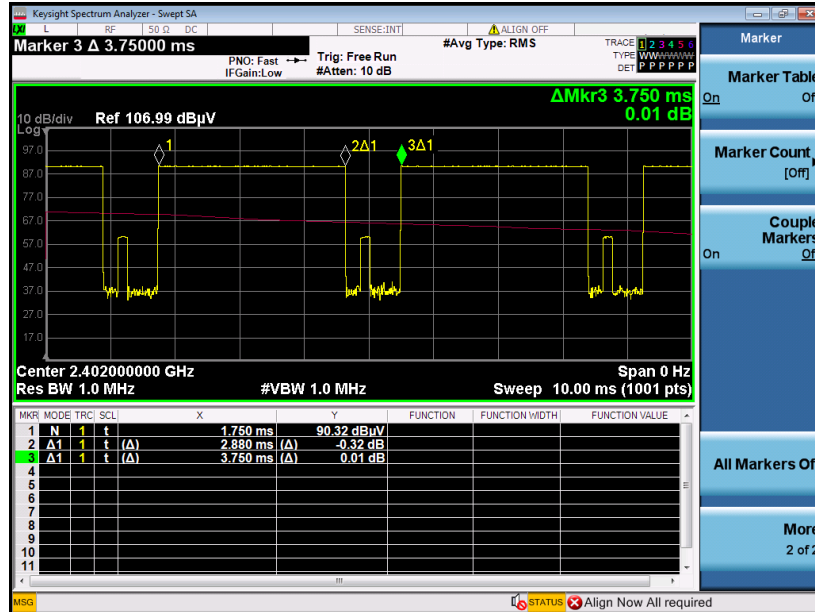


Note:

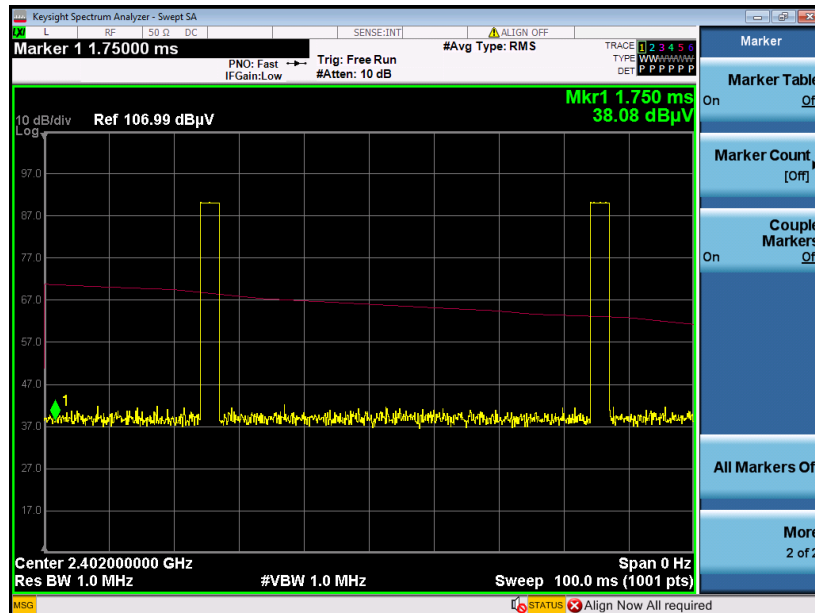
1. Worst case Duty cycle = on time/100 milliseconds = $2 * 2.88 / 100 = 5.76 \%$
2. Worst case Duty cycle correction factor = $20 * \log(\text{Duty cycle}) = -24.79 \text{ dB}$
3. 3DH5 has the highest duty cycle worst case and is reported.

For Ant.2:

3DH5 on time (One Pulse) Plot on Channel 00



3DH5 on time (Count Pulses) Plot on Channel 00



Note:

1. Worst case Duty cycle = on time/100 milliseconds = $2 * 2.88 / 100 = 5.76 \%$
2. Worst case Duty cycle correction factor = $20 * \log(\text{Duty cycle}) = -24.79 \text{ dB}$
3. 3DH5 has the highest duty cycle worst case and is reported.