

APPENDIX 2: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

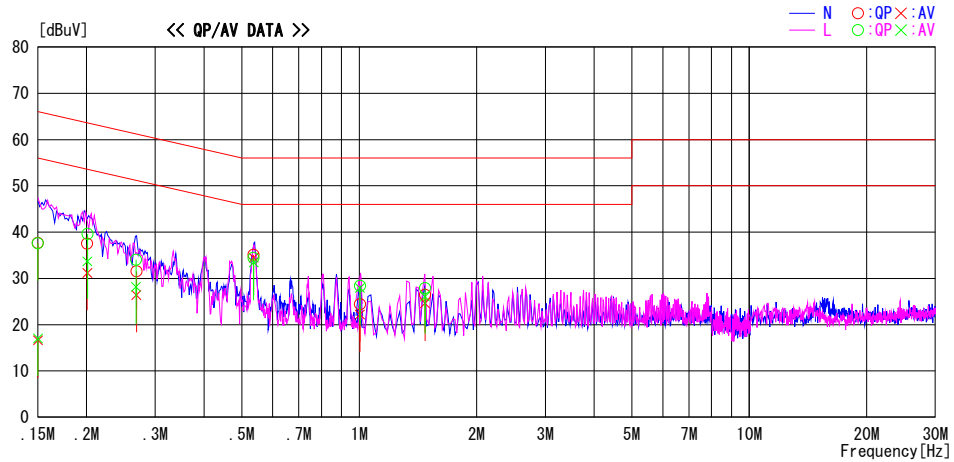
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2011/07/06

Report No. : 311E0027-H0-01

Temp./Humi. : 25deg. C / 61% RH
 Engineer : Yutaka Yoshida

Mode / Remarks : Tx 11a 5240MHz 6Mbps

LIMIT : FCC15.207 QP
 FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	24.6	3.5	13.1	37.7	16.6	66.0	56.0	28.3	39.4	N	
0.20087	24.2	17.9	13.3	37.5	31.2	63.6	53.6	26.1	22.4	N	
0.26844	18.2	13.1	13.3	31.5	26.4	61.2	51.2	29.7	24.8	N	
0.53620	21.8	21.2	13.3	35.1	34.5	56.0	46.0	20.9	11.5	N	
1.00468	11.1	8.9	13.3	24.4	22.2	56.0	46.0	31.6	23.8	N	
1.47416	13.0	11.2	13.4	26.4	24.6	56.0	46.0	29.6	21.4	N	
0.15000	24.5	3.9	13.1	37.6	17.0	66.0	56.0	28.4	39.0	L	
0.20102	26.3	20.4	13.3	39.6	33.7	63.6	53.6	24.0	19.9	L	
0.26788	20.7	14.9	13.3	34.0	28.2	61.2	51.2	27.2	23.0	L	
0.53586	21.1	20.1	13.3	34.4	33.4	56.0	46.0	21.6	12.6	L	
1.00480	15.1	14.6	13.3	28.4	27.9	56.0	46.0	27.6	18.1	L	
1.47386	14.5	12.7	13.4	27.9	26.1	56.0	46.0	28.1	19.9	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT [dBuV] = READING [dBuV] + C. F [dB] (LISN LOSS + CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

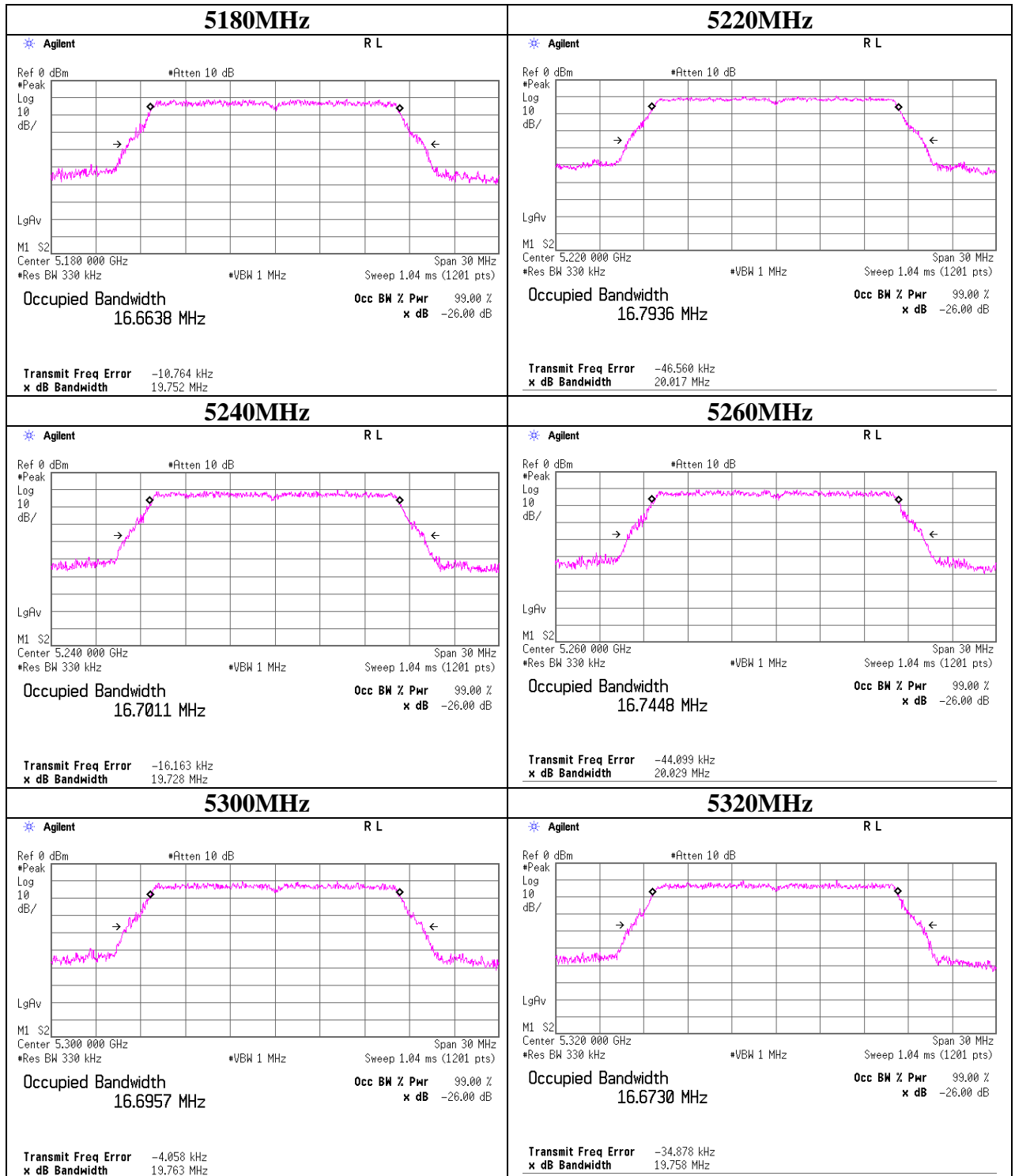
26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.11 Measurement room
Report No. 31IE0027-HO-01
Date 06/24/2011
Temperature/ Humidity 25deg. C / 57 % RH
Engineer Yutaka Yoshida
Mode 11a Tx

Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	19.752	16.6638	-
5220	20.017	16.7936	-
5240	19.728	16.7011	-
5260	20.029	16.7448	-
5300	19.763	16.6957	-
5320	19.758	16.6730	-

26dB Emission Bandwidth and 99% Occupied Bandwidth

11a



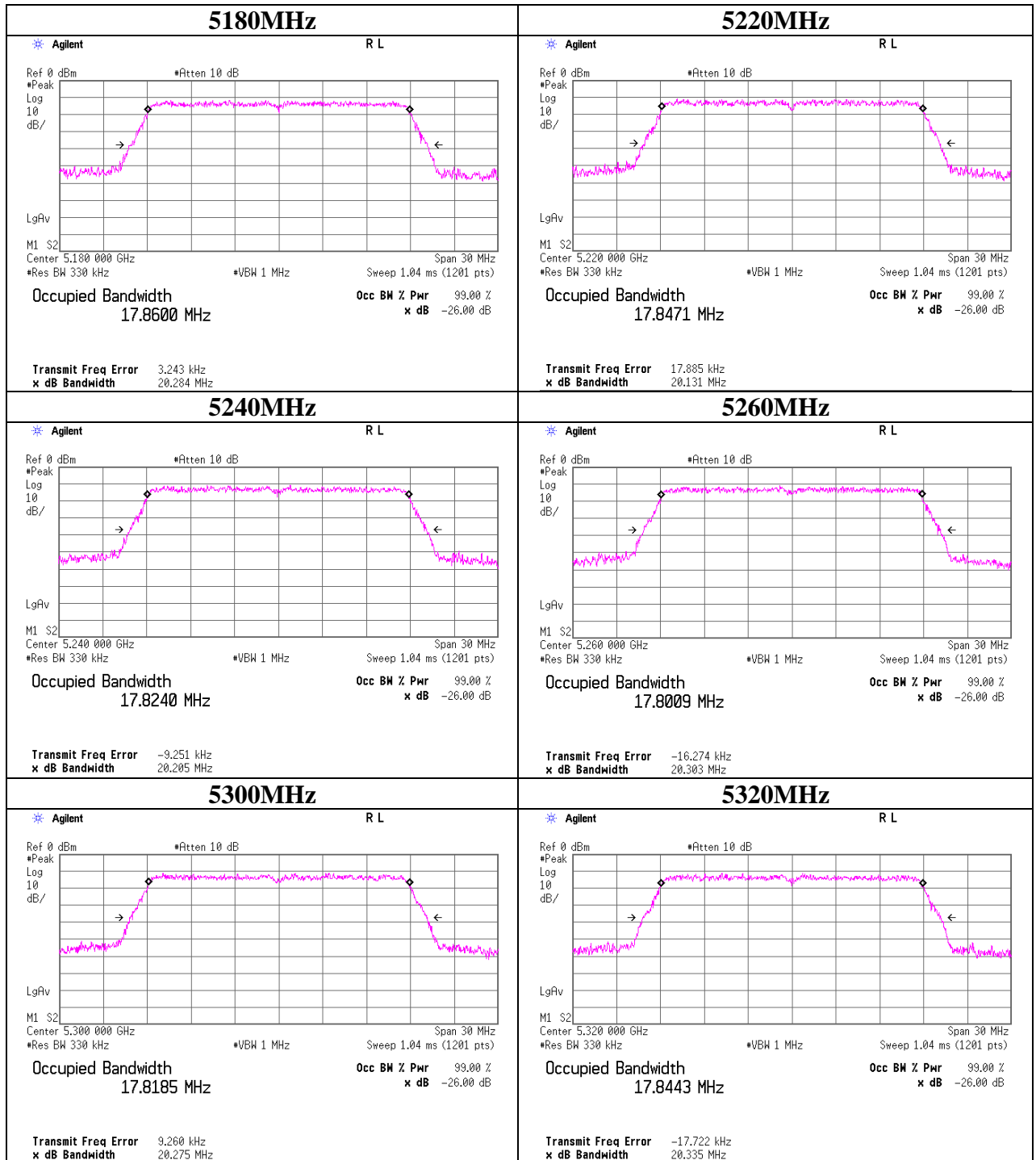
26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.11 Measurement room
Report No. 31IE0027-HO-01
Date 06/24/2011
Temperature/ Humidity 25deg. C / 57% RH
Engineer Yutaka Yoshida
Mode 11n-20 Tx

Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	20.284	17.8600	-
5220	20.131	17.8471	-
5240	20.205	17.8240	-
5260	20.303	17.8009	-
5300	20.275	17.8185	-
5320	20.335	17.8443	-

26dB Emission Bandwidth and 99% Occupied Bandwidth

11n-20



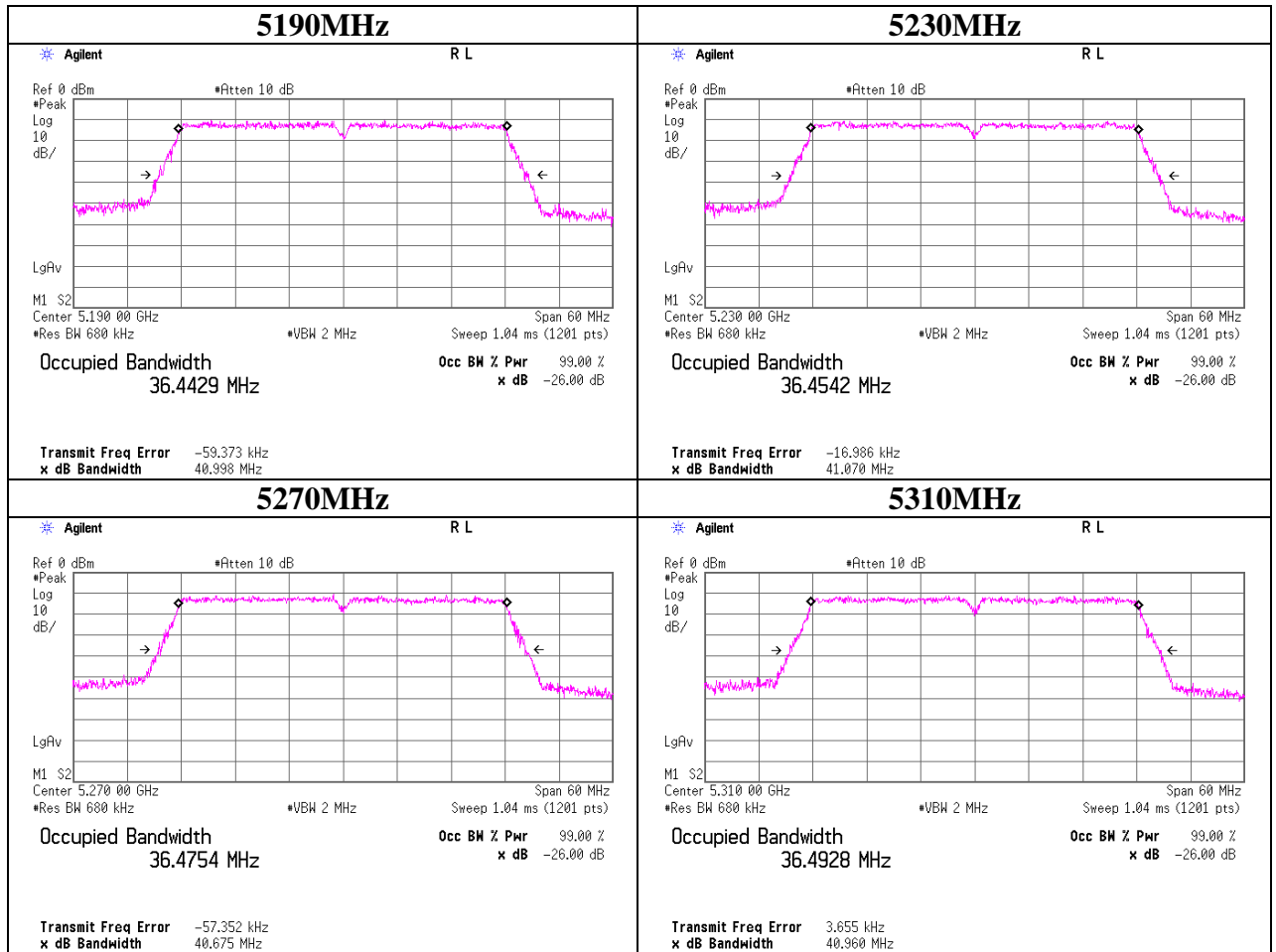
26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.11 Measurement room
Report No. 31IE0027-HO-01
Date 06/29/2011
Temperature/ Humidity 28deg. C / 32% RH
Engineer Yutaka Yoshida
Mode 11n-40 Tx

Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5190	40.998	36.4429	-
5230	41.070	36.4542	-
5270	40.675	36.4754	-
5310	40.960	36.4928	-

26dB Emission Bandwidth and 99% Occupied Bandwidth

11n-40



Maximum Peak Output Power

Test place : Head Office EMC Lab. No. 11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/24/2011
Temperature/ Humidity : 25deg. C / 57% RH
Engineer : Yutaka Yoshida
Mode : 11a Tx

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	-1.66	1.48	10.00	-0.43	9.82	9.39	16.95	-	7.13	-
5220.0	-1.15	1.48	10.00	-0.43	10.33	9.90	16.98	-	6.65	-
5240.0	-1.29	1.48	10.00	-0.43	10.19	9.76	16.95	-	6.76	-
5260.0	-1.38	1.48	10.01	-0.43	10.11	9.68	23.97	-	13.86	-
5300.0	-1.76	1.48	10.01	-0.43	9.73	9.30	23.95	-	14.22	-
5320.0	-2.11	1.48	10.01	-0.43	9.38	8.95	23.95	-	14.57	-

Result(Cond.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

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Head Office EMC Lab.

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Maximum Peak Output Power

Test place : Head Office EMC Lab. No. 11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/24/2011
Temperature/ Humidity : 25deg. C / 57% RH
Engineer : Yutaka Yoshida
Mode : 11n-20 Tx

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5180.0	-1.47	1.48	10.00	-0.43	10.01	9.58	16.98	-	6.97	-
5220.0	-1.30	1.48	10.00	-0.43	10.18	9.75	16.98	-	6.80	-
5240.0	-1.71	1.48	10.00	-0.43	9.77	9.34	16.98	-	7.21	-
5260.0	-1.63	1.48	10.01	-0.43	9.86	9.43	23.97	-	14.11	-
5300.0	-1.78	1.48	10.01	-0.43	9.71	9.28	23.97	-	14.26	-
5320.0	-2.06	1.48	10.01	-0.43	9.43	9.00	23.97	-	14.54	-

Result(Cond.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

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Maximum Peak Output Power

Test place : Head Office EMC Lab. No. 11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/29/2011
Temperature/ Humidity : 28deg. C / 32% RH
Engineer : Yutaka Yoshida
Mode : 11n-40 Tx

Freq. [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.) [dBm]	Result (e.i.r.p.) [dBm]	Limit (Cond.) [dBm]	Limit (e.i.r.p.) [dBm]	Margin (Cond.) [dB]	Margin (e.i.r.p.) [dB]
5190.0	-1.85	1.48	10.00	-0.43	9.63	9.20	16.98	-	7.35	-
5230.0	-1.77	1.48	10.00	-0.43	9.71	9.28	16.98	-	7.27	-
5270.0	-1.96	1.48	10.01	-0.43	9.53	9.10	23.97	-	14.44	-
5310.0	-2.36	1.48	10.01	-0.43	9.13	8.70	23.97	-	14.84	-

Result(Cond.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten.Loss + Antenna Gain

15.407(a)(1) Limit(Cond.) = 16.98dBm(50mW) or 4 + 10log(26dB BW) dBm

15.407(a)(2) Limit(Cond.) = 23.97dBm(250mW) or 11 + 10log(26dB BW) dBm

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Peak Power Spectral Density

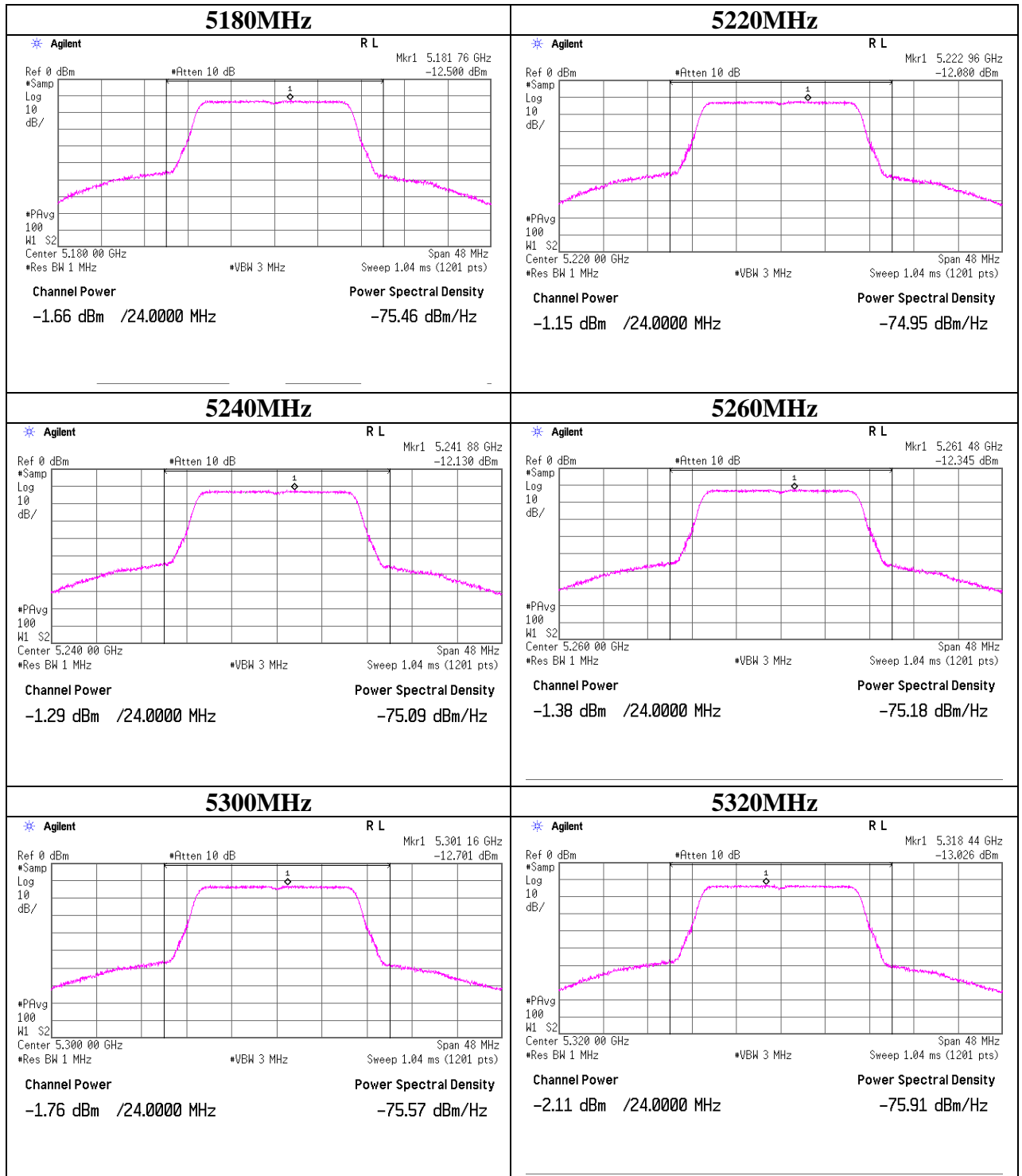
Test place : Head Office EMC Lab. No.11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/24/2011
Temperature/ Humidity : 25deg. C / 57% RH
Engineer : Yutaka Yoshida
Mode : 11a Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	ENBW [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
5180.0	-12.50	1.48	10.00	0.20	-1.22	4.00	5.22
5220.0	-12.08	1.48	10.00	0.20	-0.80	4.00	4.80
5240.0	-12.13	1.48	10.00	0.20	-0.85	4.00	4.85
5260.0	-12.35	1.48	10.01	0.20	-1.06	11.00	12.06
5300.0	-12.70	1.48	10.01	0.20	-1.41	11.00	12.41
5320.0	-13.03	1.48	10.01	0.20	-1.74	11.00	12.74

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator - ENBW
*ENBW: Equivalent Noise Band Width

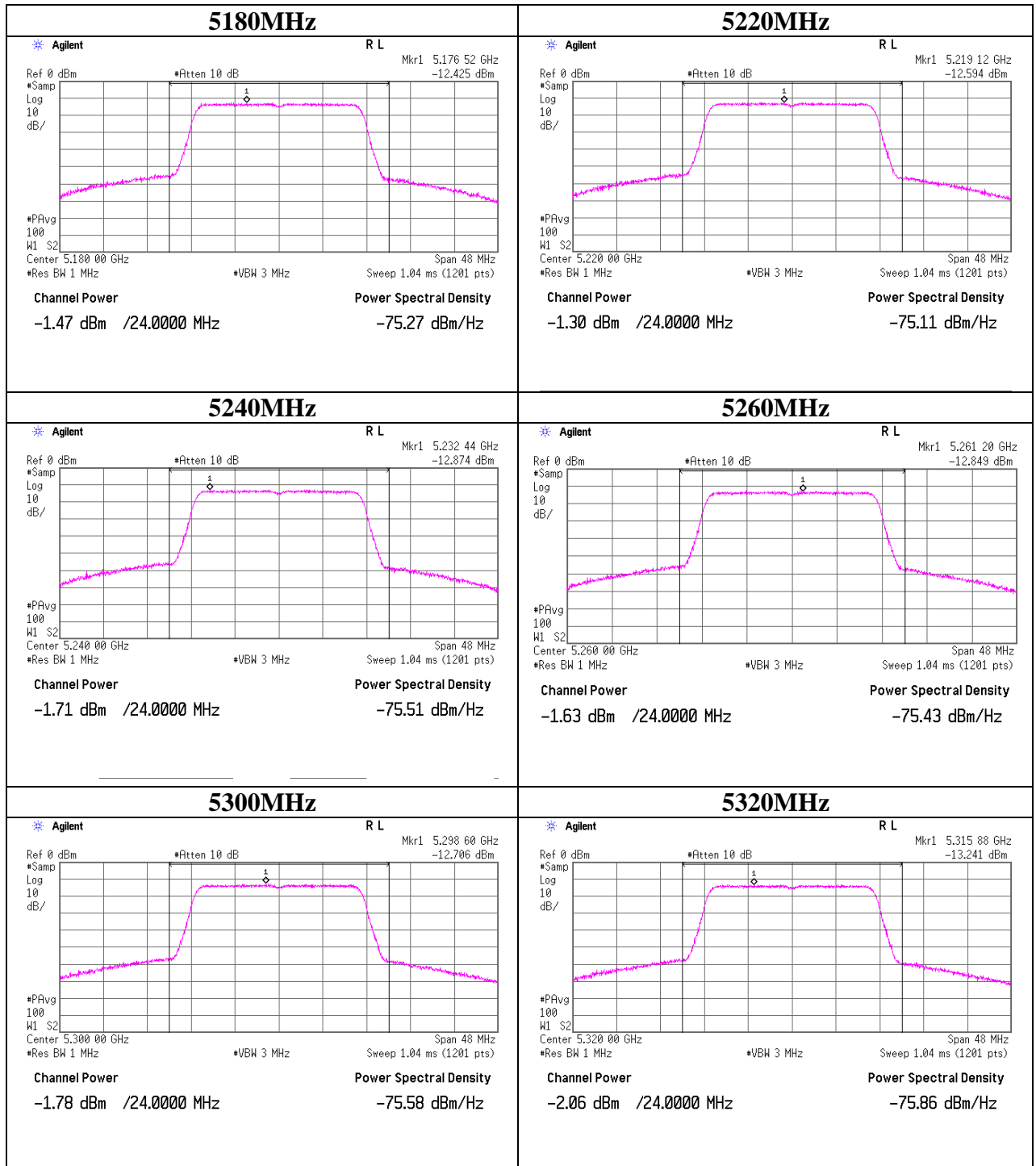
Maximum Peak Output Power & Peak Power Spectral Density

11a



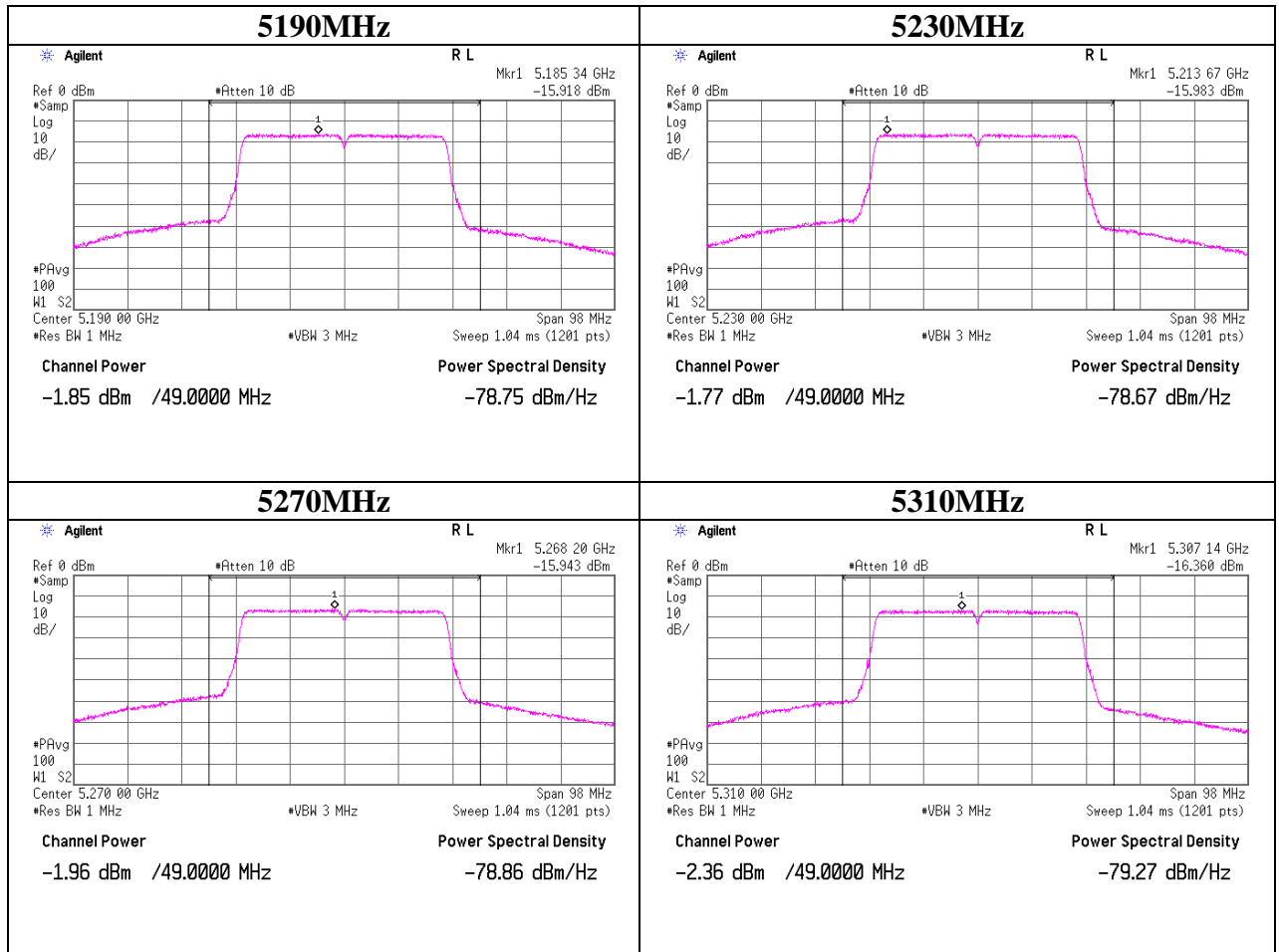
Maximum Peak Output Power & Peak Power Spectral Density

11n-20



Maximum Peak Output Power & Peak Power Spectral Density

11n-40



Maximum Peak Output Power
(Reference data)

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 31IE0027-HO-01
Date 06/24/2011
Temperature/ Humidity 25deg. C / 57% RH
Engineer Yutaka Yoshida
Mode 11a Tx

5240MHz

Data Rate [Mbps]	Reading [dBm]	Remark
6	-1.29	*
9	-1.52	
12	-1.48	
18	-1.49	
24	-1.54	
36	-1.51	
48	-1.55	
54	-1.54	

* Worst Rate

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power
(Reference data)

Test place : Head Office EMC Lab. No.11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/24/2011
Temperature/ Humidity : 25deg. C / 57% RH
Engineer : Yutaka Yoshida
Mode : 11n-20 Tx

5240MHz

MCS Number	Reading [dBm]	Remark
0	-1.48	*
1	-1.75	
2	-1.92	
3	-1.77	
4	-1.73	
5	-1.82	
6	-1.67	
7	-1.78	

* Worst MCS

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power
(Reference data)

Test place : Head Office EMC Lab. No. 11 Measurement Room
Report No. : 31IE0027-HO-01
Date : 06/29/2011
Temperature/ Humidity : 28deg. C / 32% RH
Engineer : Yutaka Yoshida
Mode : 11n-40 Tx

5270MHz

MCS Number	Reading [dBm]	Remark
0	-1.96	*
1	-2.04	
2	-2.26	
3	-2.19	
4	-2.11	
5	-2.18	
6	-2.14	
7	-2.08	

* Worst MCS

All comparison were carried out on same frequency and measurement factors.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
Report No. 31IE0027-HO-01
Date 06/30/2011 07/01/2011
Temperature/ Humidity 20deg C / 65% RH 20deg C / 66% RH
Engineer Takayuki Shimada Takayuki Shimada
(1-10GHz) (10-40GHz)
Mode 11a Tx 5180MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5150.000	PK	41.1	31.8	4.0	31.3	45.6	73.9	28.3	Bandedge	
Hori	6906.842	PK	51.5	35.0	4.7	31.4	59.8	68.2	8.4	Outside	*1)
Hori	10360.000	PK	49.5	39.1	-2.2	31.6	54.8	68.2	13.4	Outside	*1)
Hori	15540.000	PK	43.9	39.0	-0.4	30.6	51.9	73.9	22.0	Inside	NS
Hori	5150.000	AV	29.1	31.8	4.0	31.3	33.6	53.9	20.3	Bandedge	
Hori	15540.000	AV	31.6	39.0	-0.4	30.6	39.6	53.9	14.3	Inside	NS
Vert	5150.000	PK	42.5	31.8	4.0	31.3	47.0	73.9	26.9	Bandedge	
Vert	6906.842	PK	52.4	35.0	4.7	31.4	60.7	68.2	7.5	Outside	*1)
Vert	10360.000	PK	47.9	39.1	-2.2	31.6	53.2	68.2	15.0	Outside	*1)
Vert	15540.000	PK	43.8	39.0	-0.4	30.6	51.8	73.9	22.1	Inside	NS
Vert	5150.000	AV	30.4	31.8	4.0	31.3	34.9	53.9	19.0	Bandedge	
Vert	15540.000	AV	31.6	39.0	-0.4	30.6	39.6	53.9	14.3	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

*NS: No signal detected

*1) The test was performed with severer PK detection for average limit.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
Report No. 31IE0027-HO-01
Date 06/30/2011 07/01/2011 07/05/2011
Temperature/ Humidity 20deg C / 65% RH 20deg C / 66% RH 26deg C / 56% RH
Engineer Takayuki Shimada Takayuki Shimada Yutaka Yoshida
(1-10GHz) (10-40GHz) (30-1000MHz)
Mode 11a Tx 5240MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	41.564	QP	28.6	15.0	7.3	32.2	18.7	40.0	21.3	Outside	
Hori	48.000	QP	25.6	12.4	7.4	32.2	13.2	40.0	26.8	Outside	
Hori	100.200	QP	27.4	10.1	8.1	32.1	13.5	43.5	30.0	Outside	
Hori	143.992	QP	32.7	14.6	8.6	32.1	23.8	43.5	19.7	Outside	
Hori	207.812	QP	26.3	16.8	9.2	32.0	20.3	43.5	23.2	Outside	
Hori	290.937	QP	28.5	19.1	9.8	32.0	25.4	46.0	20.6	Outside	
Hori	332.506	QP	33.3	16.0	10.1	32.0	27.4	46.0	18.6	Inside	
Hori	374.063	QP	37.6	16.9	10.4	32.0	32.9	46.0	13.1	Outside	
Hori	457.499	QP	32.4	17.8	10.9	32.0	29.1	46.0	16.9	Outside	
Hori	479.973	QP	29.9	18.0	11.1	32.0	27.0	46.0	19.0	Outside	
Hori	6986.735	PK	51.7	35.2	4.7	31.5	60.1	68.2	8.1	Outside	*1)
Hori	10480.000	PK	48.5	39.2	-2.2	31.5	54.0	68.2	14.2	Outside	*1)
Hori	15720.000	PK	44.4	38.5	-0.5	30.7	51.7	73.9	22.2	Inside	NS
Hori	15720.000	AV	31.8	38.5	-0.5	30.7	39.1	53.9	14.8	Inside	NS
Vert	41.564	QP	44.2	15.0	7.3	32.2	34.3	40.0	5.7	Outside	
Vert	48.000	QP	40.9	12.4	7.4	32.2	28.5	40.0	11.5	Outside	
Vert	100.200	QP	42.5	10.1	8.1	32.1	28.6	43.5	14.9	Outside	
Vert	143.992	QP	40.3	14.6	8.6	32.1	31.4	43.5	12.1	Outside	
Vert	207.812	QP	38.8	16.8	9.2	32.0	32.8	43.5	10.7	Outside	
Vert	290.937	QP	37.5	19.1	9.8	32.0	34.4	46.0	11.6	Outside	
Vert	332.506	QP	35.4	16.0	10.1	32.0	29.5	46.0	16.5	Inside	
Vert	374.063	QP	37.0	16.9	10.4	32.0	32.3	46.0	13.7	Outside	
Vert	457.499	QP	33.7	17.8	10.9	32.0	30.4	46.0	15.6	Outside	
Vert	479.973	QP	31.1	18.0	11.1	32.0	28.2	46.0	17.8	Outside	
Vert	6986.735	PK	53.3	35.2	4.7	31.5	61.7	68.2	6.5	Outside	*1)
Vert	10480.000	PK	46.9	39.2	-2.2	31.5	52.4	68.2	15.8	Outside	*1)
Vert	15720.000	PK	44.4	38.5	-0.5	30.7	51.7	73.9	22.2	Inside	NS
Vert	15720.000	AV	31.8	38.5	-0.5	30.7	39.1	53.9	14.8	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)= 9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

*NS: No signal detected

*1) The test was performed with severer PK detection for average limit.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
Report No. 31IE0027-HO-01
Date 06/30/2011 07/01/2011
Temperature/ Humidity 20deg C / 65% RH 20deg C / 66% RH
Engineer Takayuki Shimada Takayuki Shimada
(1-10GHz) (10-40GHz)
Mode 11a Tx 5320MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5350.000	PK	41.3	31.8	4.0	31.3	45.8	73.9	28.1	Bandedge	*1)
Hori	7093.473	PK	50.6	35.4	4.7	31.5	59.2	68.2	9.0	Outside	
Hori	10640.000	PK	47.4	39.4	-2.1	31.5	53.2	73.9	20.7	Inside	NS
Hori	15960.000	PK	44.2	37.9	-0.6	30.8	50.7	73.9	23.2	Inside	
Hori	5350.000	AV	29.4	31.8	4.0	31.3	33.9	53.9	20.0	Bandedge	
Hori	10640.000	AV	34.5	39.4	-2.1	31.5	40.3	53.9	13.6	Inside	
Hori	15960.000	AV	31.6	37.9	-0.6	30.8	38.1	53.9	15.8	Inside	NS
Vert	5350.000	PK	42.1	31.8	4.0	31.3	46.6	73.9	27.3	Bandedge	*1)
Vert	7093.473	PK	53.0	35.4	4.7	31.5	61.6	68.2	6.6	Outside	
Vert	10640.000	PK	44.6	39.4	-2.1	31.5	50.4	73.9	23.5	Inside	NS
Vert	15960.000	PK	44.1	37.9	-0.6	30.8	50.6	73.9	23.3	Inside	
Vert	5350.000	AV	29.6	31.8	4.0	31.3	34.1	53.9	19.8	Bandedge	
Vert	10640.000	AV	32.2	39.4	-2.1	31.5	38.0	53.9	15.9	Inside	
Vert	15960.000	AV	31.6	37.9	-0.6	30.8	38.1	53.9	15.8	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

*NS: No signal detected

*1) The test was performed with severer PK detection for average limit.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
 Report No. : 31IE0027-HO-01
 Date : 06/30/2011 07/01/2011
 Temperature/ Humidity : 20deg C / 65% RH 20deg C / 66% RH
 Engineer : Takayuki Shimada Takayuki Shimada
 (1-10GHz) (10-40GHz)
 Mode : 11n-20 Tx 5180MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5150.000	PK	41.2	31.8	4.0	31.3	45.7	73.9	28.2	Bandedge	
Hori	6906.842	PK	51.6	35.0	4.7	31.4	59.9	68.2	8.3	Outside	*1)
Hori	10360.000	PK	49.7	39.1	-2.2	31.6	55.0	68.2	13.2	Outside	*1)
Hori	15540.000	PK	43.9	39.0	-0.4	30.6	51.9	73.9	22.0	Inside	NS
Hori	5150.000	AV	29.2	31.8	4.0	31.3	33.7	53.9	20.2	Bandedge	
Hori	15540.000	AV	31.6	39.0	-0.4	30.6	39.6	53.9	14.3	Inside	NS
Vert	5150.000	PK	43.2	31.8	4.0	31.3	47.7	73.9	26.2	Bandedge	
Vert	6906.842	PK	52.6	35.0	4.7	31.4	60.9	68.2	7.3	Outside	*1)
Vert	10360.000	PK	47.9	39.1	-2.2	31.6	53.2	68.2	15.0	Outside	*1)
Vert	15540.000	PK	43.9	39.0	-0.4	30.6	51.9	73.9	22.0	Inside	NS
Vert	5150.000	AV	30.5	31.8	4.0	31.3	35.0	53.9	18.9	Bandedge	
Vert	15540.000	AV	31.6	39.0	-0.4	30.6	39.6	53.9	14.3	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

*NS: No signal detected

*1) The test was performed with severer PK detection for average limit.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
Report No. 31IE0027-HO-01
Date 06/30/2011 07/01/2011
Temperature/ Humidity 20deg C / 65% RH 20deg C / 66% RH
Engineer Takayuki Shimada Takayuki Shimada
(1-10GHz) (10-40GHz)
Mode 11n-20 Tx 5240MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	6986.735	PK	51.9	35.2	4.7	31.5	60.3	68.2	7.9	Outside	*1)
Hori	10480.000	PK	49.2	39.2	-2.2	31.5	54.7	68.2	13.5	Outside	*1)
Hori	15720.000	PK	44.5	38.5	-0.5	30.7	51.8	73.9	22.1	Inside	NS
Hori	15720.000	AV	31.8	38.5	-0.5	30.7	39.1	53.9	14.8	Inside	NS
Vert	6986.735	PK	52.8	35.2	4.7	31.5	61.2	68.2	7.0	Outside	*1)
Vert	10480.000	PK	47.2	39.2	-2.2	31.5	52.7	68.2	15.5	Outside	*1)
Vert	15720.000	PK	44.4	38.5	-0.5	30.7	51.7	73.9	22.2	Inside	NS
Vert	15720.000	AV	31.8	38.5	-0.5	30.7	39.1	53.9	14.8	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)=9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

*NS: No signal detected

*1) The test was performed with severer PK detection for average limit.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 and No.2 Anechoic Chamber
Report No. 31IE0027-HO-01
Date 06/30/2011 07/01/2011
Temperature/ Humidity 20deg C / 65% RH 20deg C / 66% RH
Engineer Takayuki Shimada Takayuki Shimada
(1-10GHz) (10-40GHz)
Mode 11n-20 Tx 5320MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5350.000	PK	41.6	31.8	4.0	31.3	46.1	73.9	27.8	Bandedge	*1)
Hori	7093.473	PK	50.4	35.4	4.7	31.5	59.0	68.2	9.2	Outside	
Hori	10640.000	PK	47.6	39.4	-2.1	31.5	53.4	73.9	20.5	Inside	NS
Hori	15960.000	PK	44.2	37.9	-0.6	30.8	50.7	73.9	23.2	Inside	
Hori	5350.000	AV	29.4	31.8	4.0	31.3	33.9	53.9	20.0	Bandedge	
Hori	10640.000	AV	34.2	39.4	-2.1	31.5	40.0	53.9	13.9	Inside	
Hori	15960.000	AV	31.6	37.9	-0.6	30.8	38.1	53.9	15.8	Inside	NS
Vert	5350.000	PK	41.9	31.8	4.0	31.3	46.4	73.9	27.5	Bandedge	*1)
Vert	7093.473	PK	53.0	35.4	4.7	31.5	61.6	68.2	6.6	Outside	
Vert	10640.000	PK	44.6	39.4	-2.1	31.5	50.4	73.9	23.5	Inside	NS
Vert	15960.000	PK	44.0	37.9	-0.6	30.8	50.5	73.9	23.4	Inside	
Vert	5350.000	AV	29.7	31.8	4.0	31.3	34.2	53.9	19.7	Bandedge	
Vert	10640.000	AV	32.0	39.4	-2.1	31.5	37.8	53.9	16.1	Inside	
Vert	15960.000	AV	31.6	37.9	-0.6	30.8	38.1	53.9	15.8	Inside	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

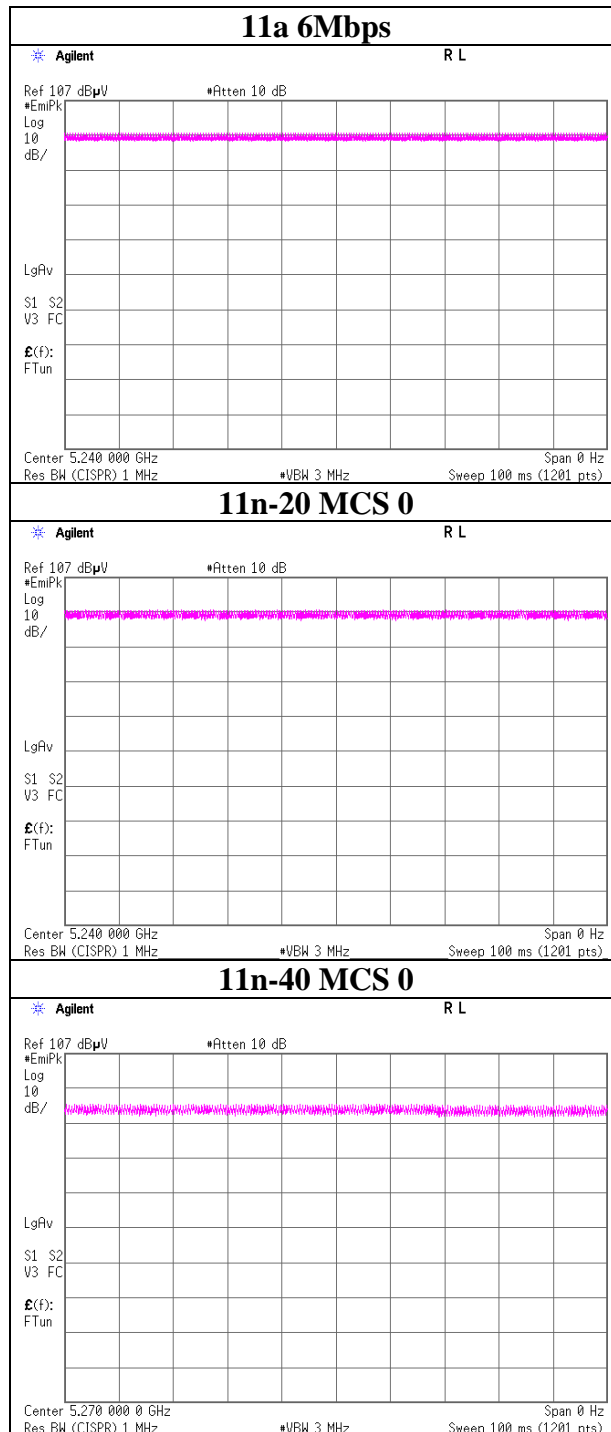
*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)= 9.5dB$
26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

*NS: No signal detected

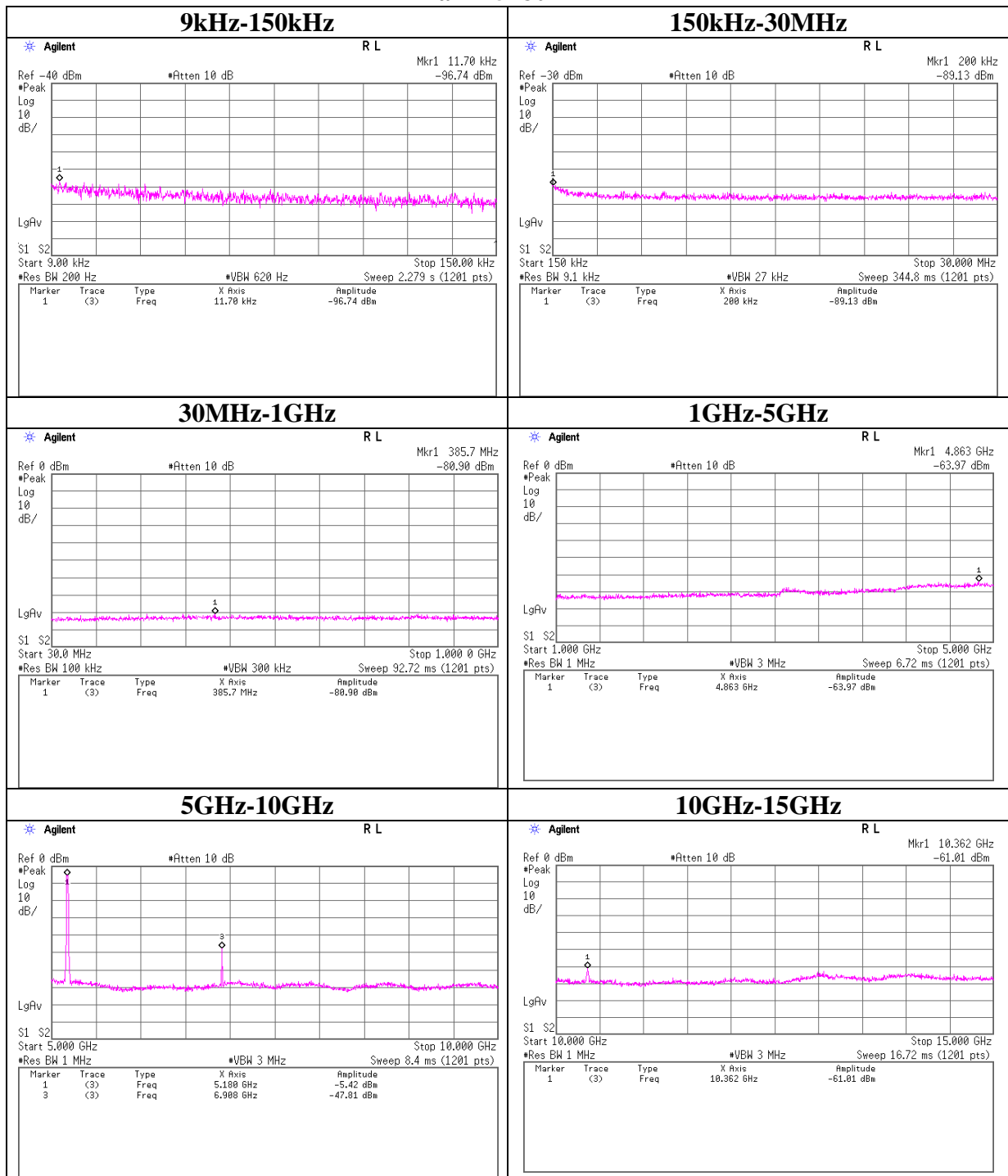
*1) The test was performed with severer PK detection for average limit.

The tested burst timing



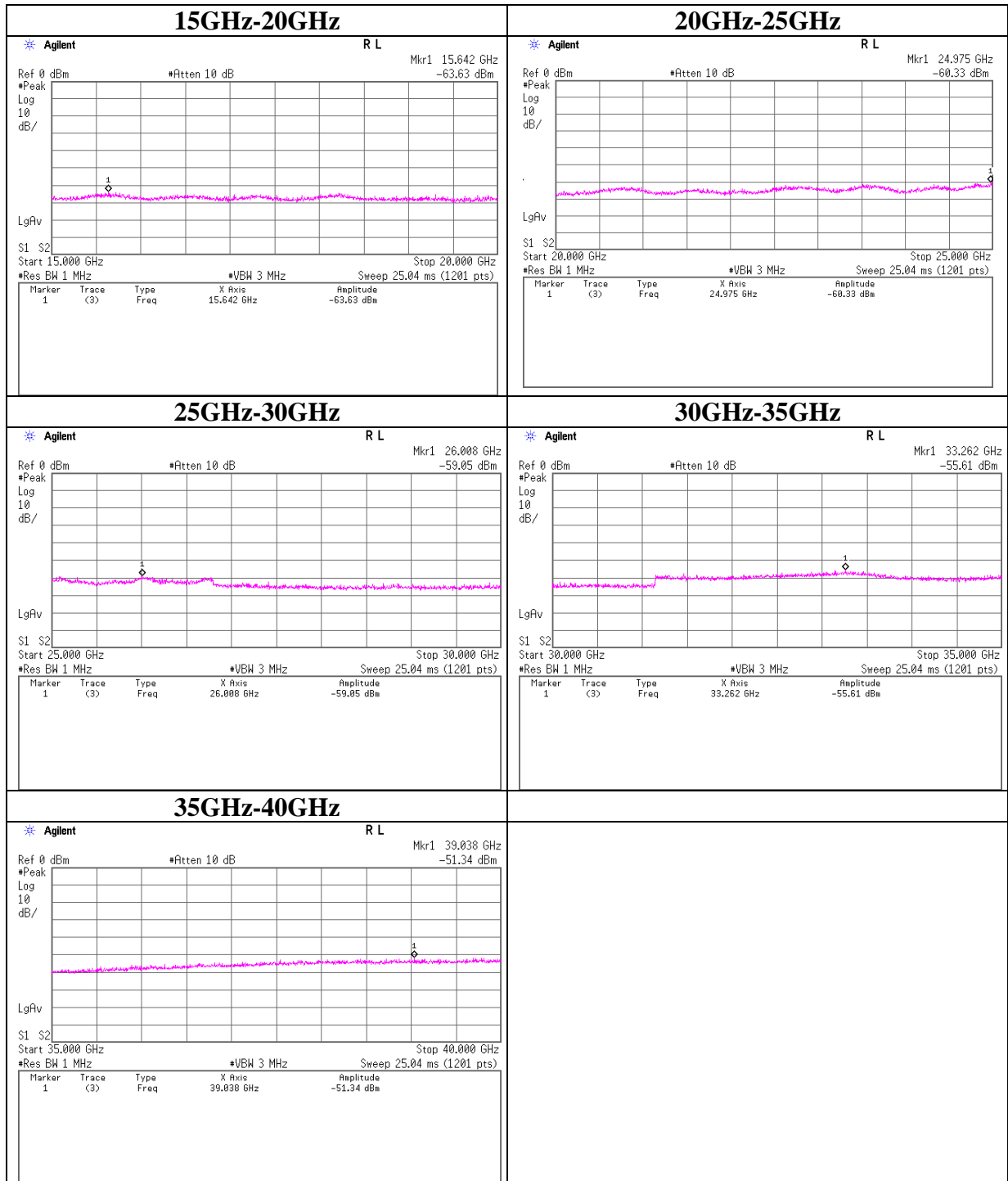
Conducted Spurious Emission

11a Tx 5180MHz



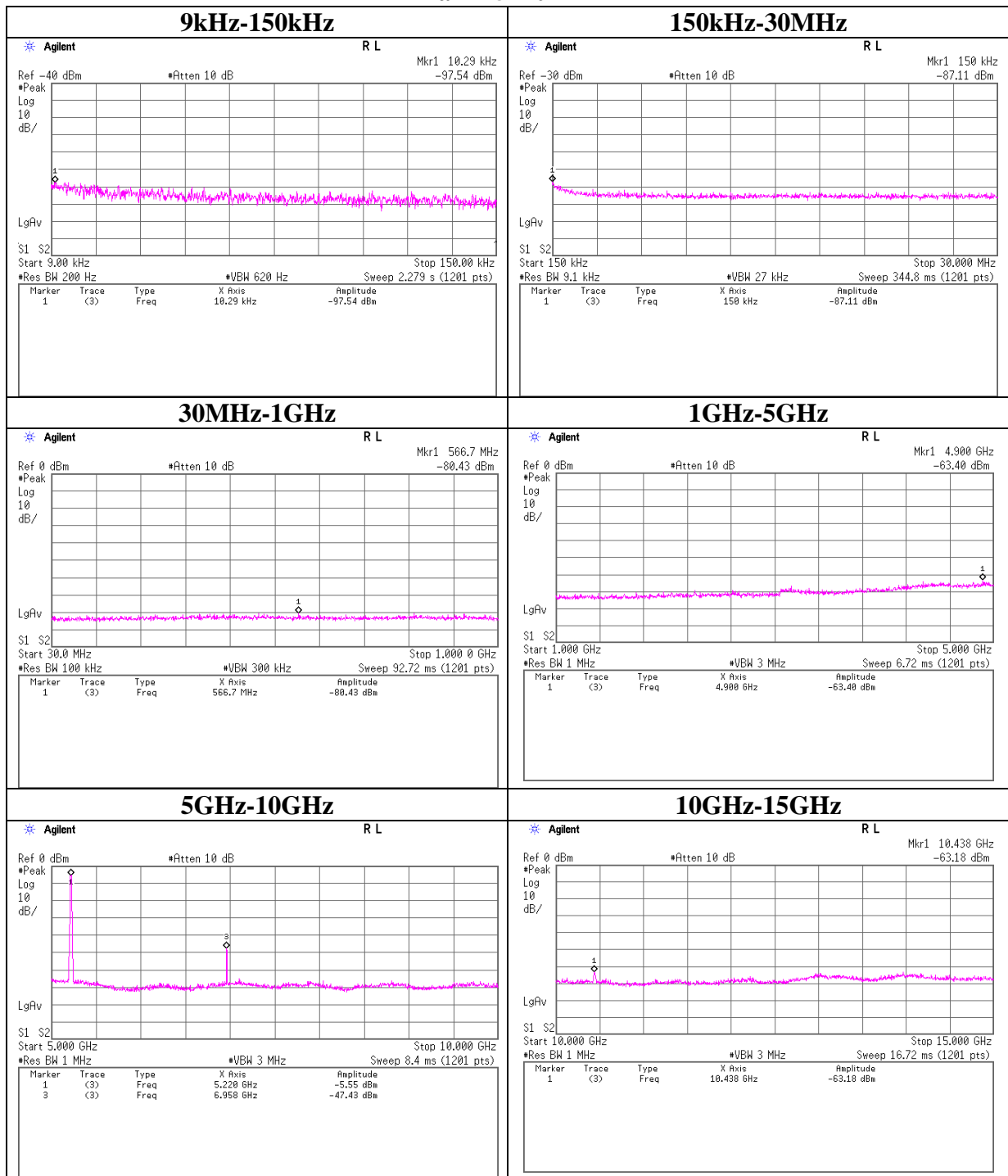
Conducted Spurious Emission

11a Tx 5180MHz



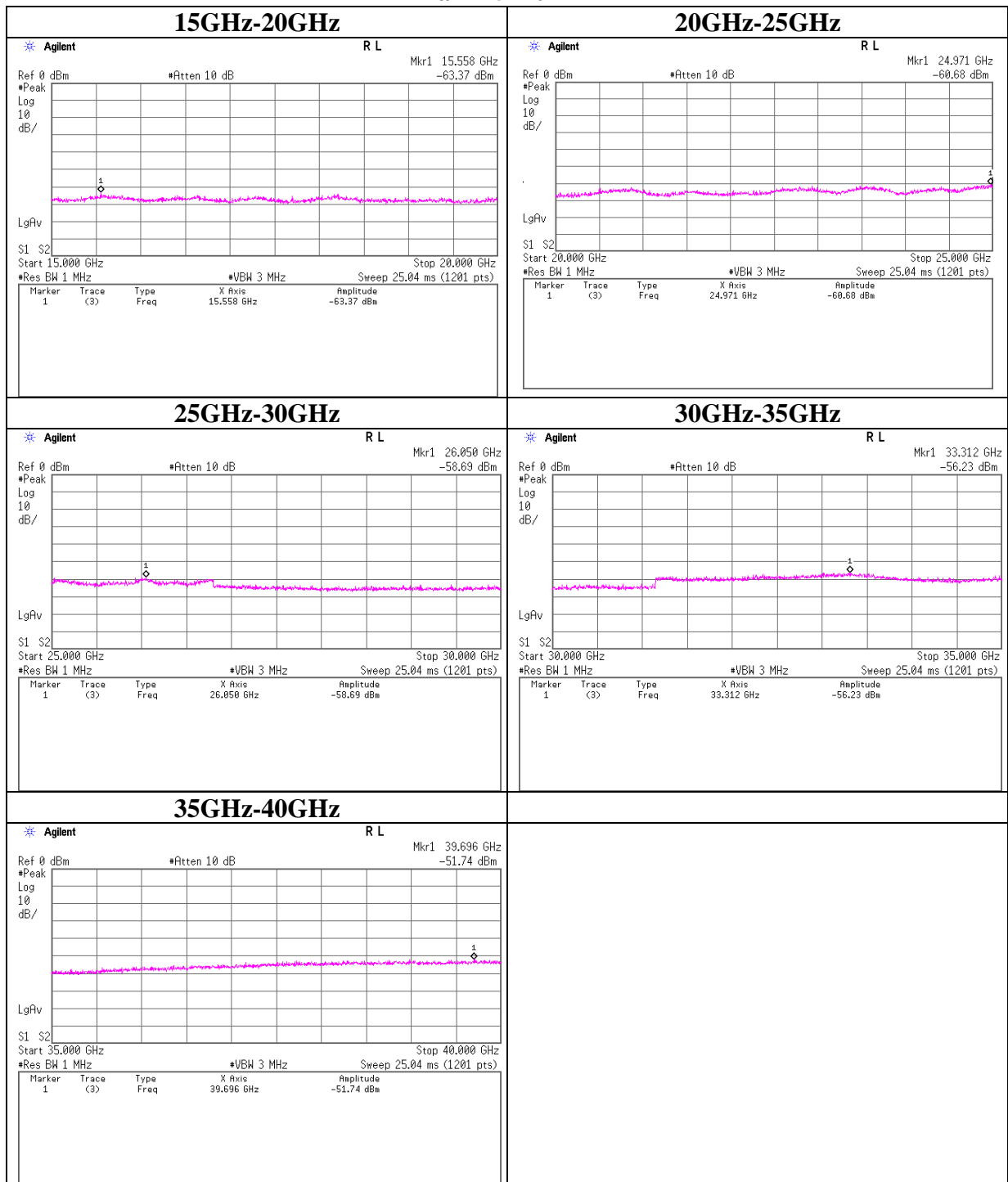
Conducted Spurious Emission

11a Tx 5220MHz



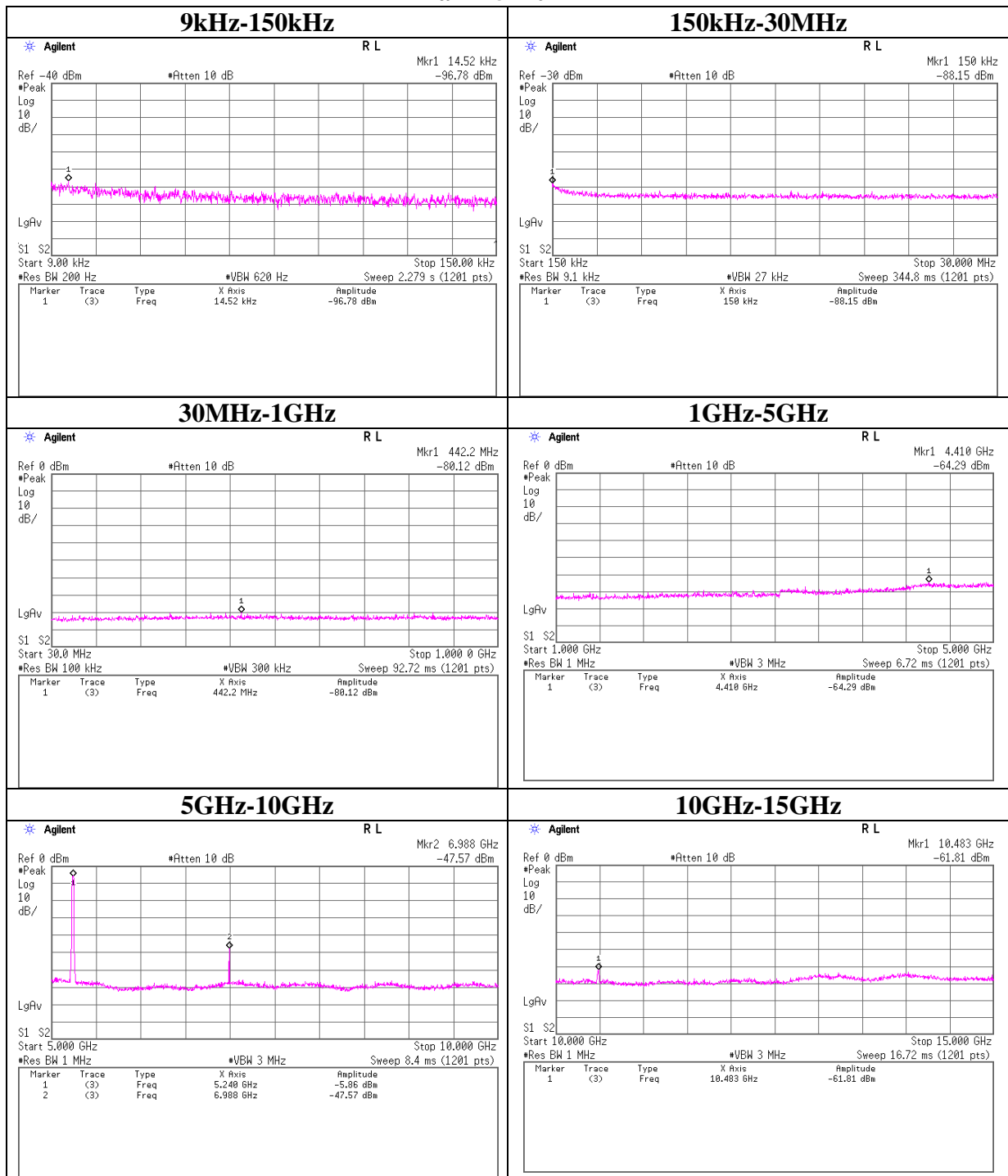
Conducted Spurious Emission

11a Tx 5220MHz



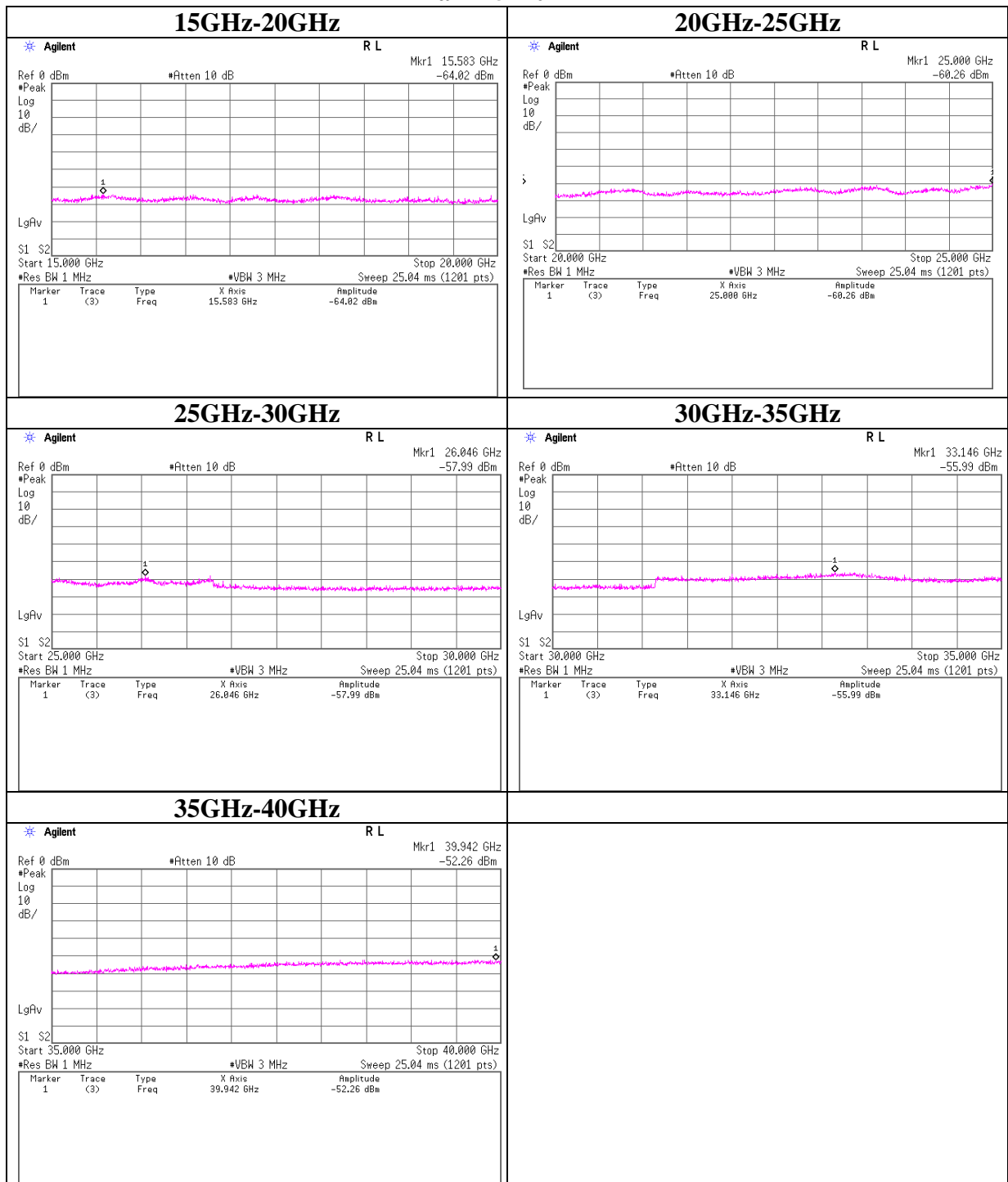
Conducted Spurious Emission

11a Tx 5240MHz



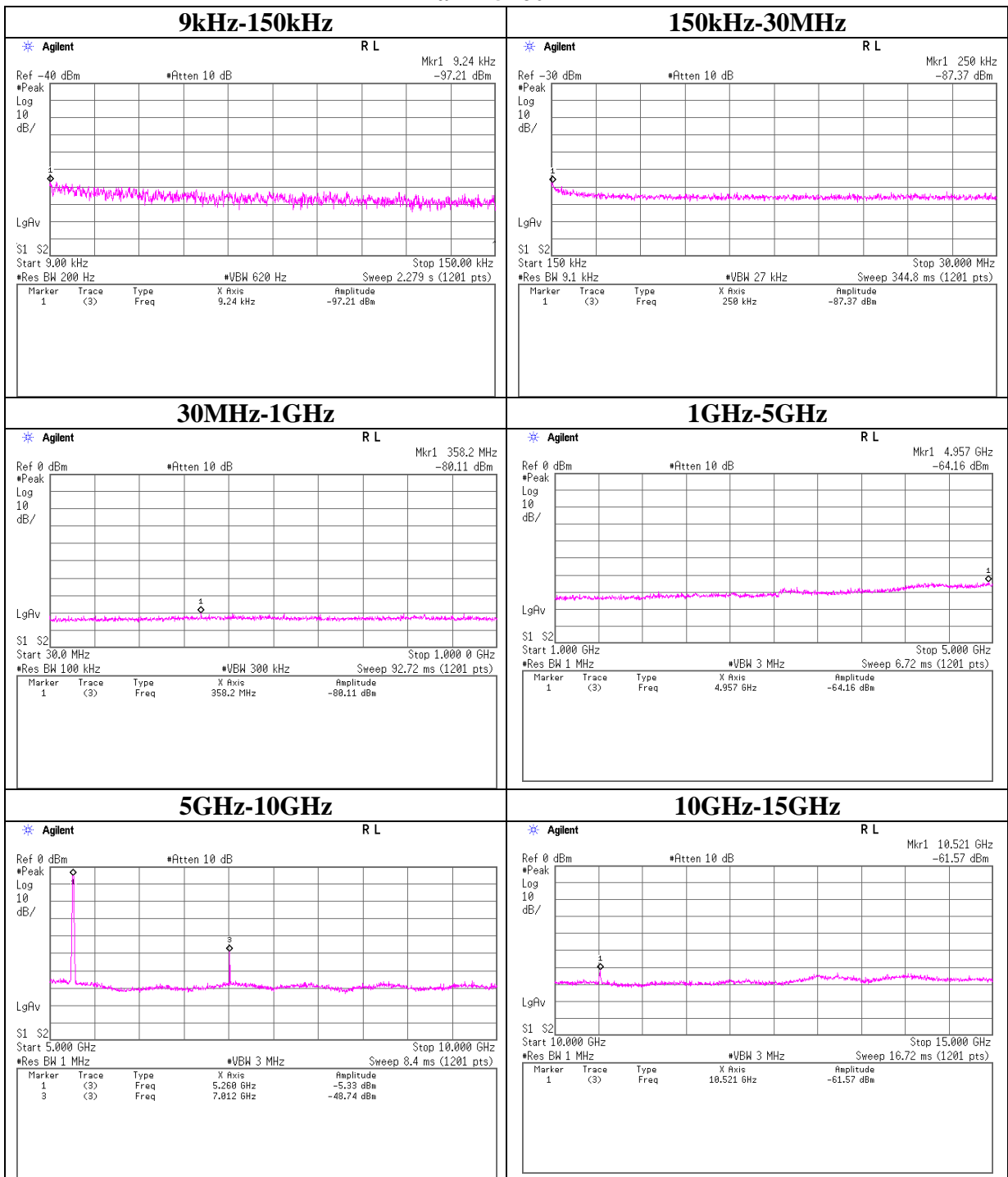
Conducted Spurious Emission

11a Tx 5240MHz



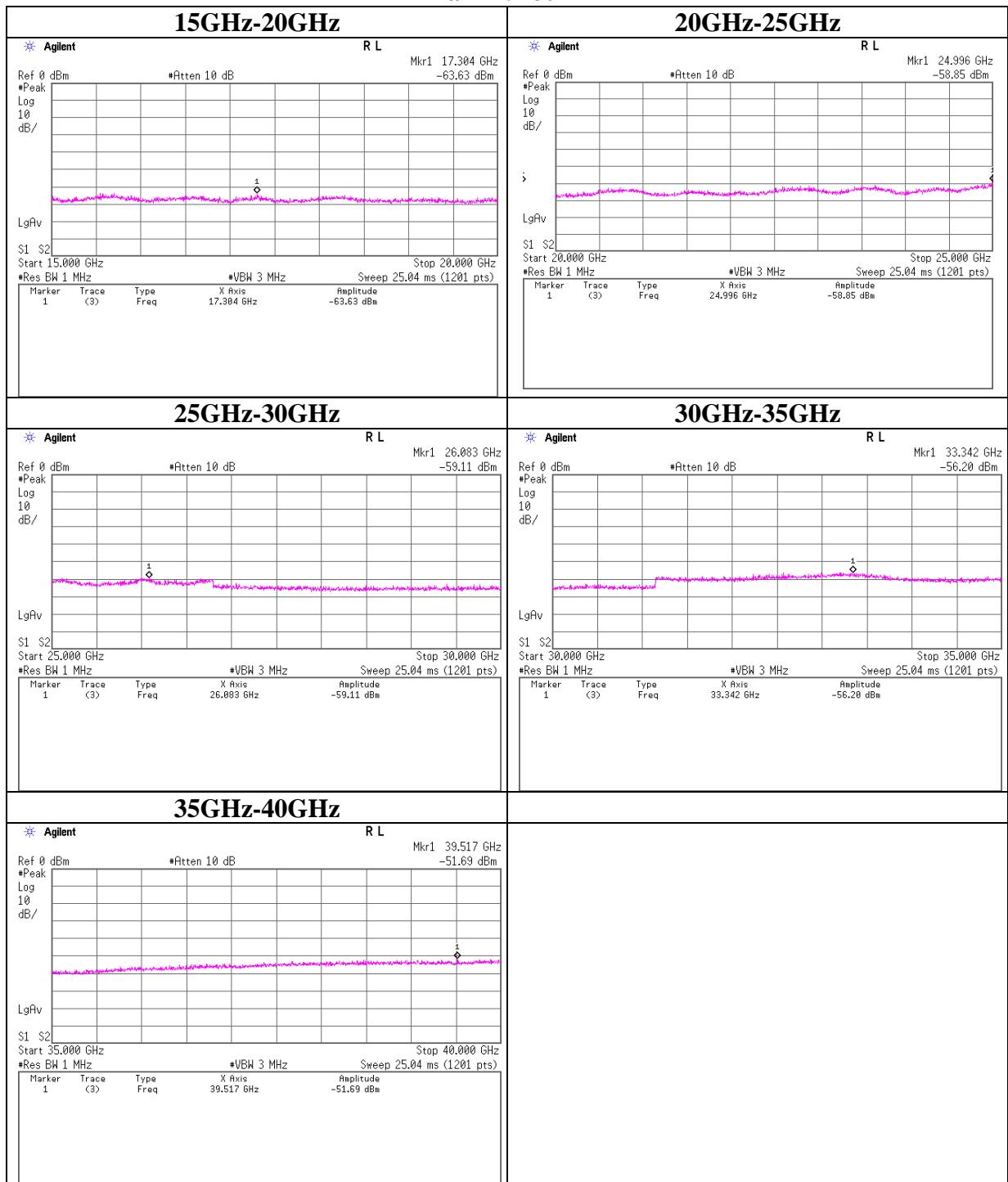
Conducted Spurious Emission

11a Tx 5260MHz



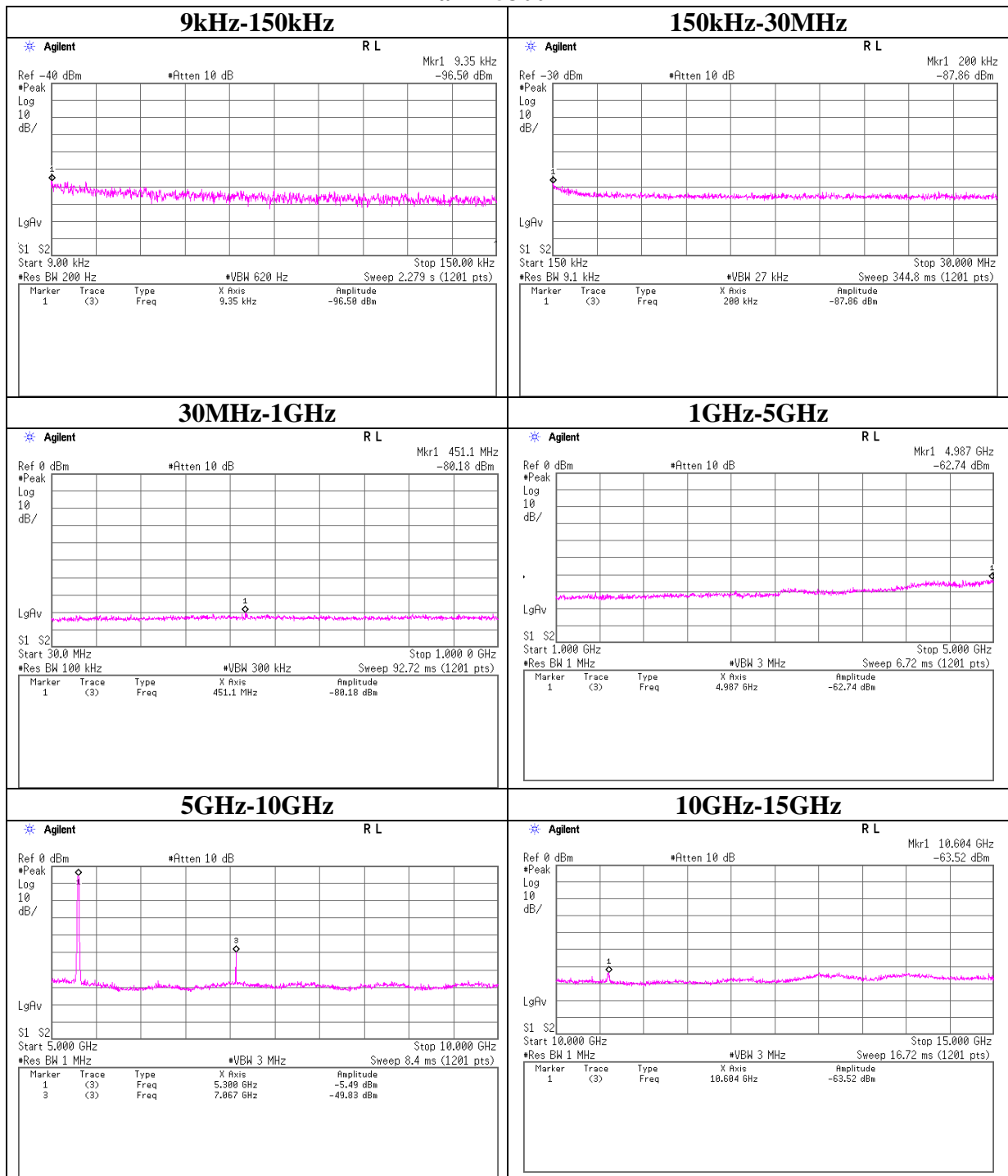
Conducted Spurious Emission

11a Tx 5260Mz



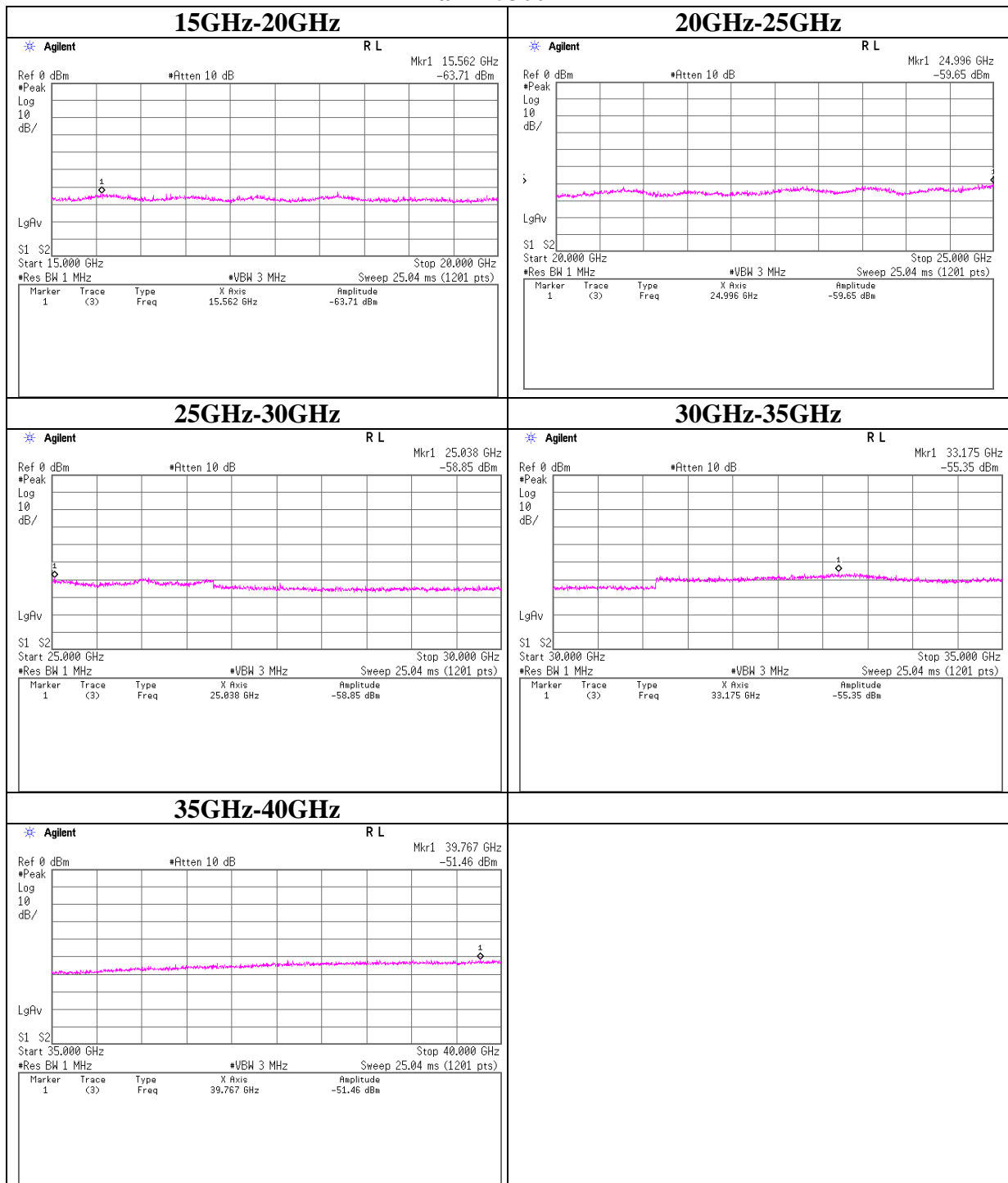
Conducted Spurious Emission

11a Tx 5300MHz



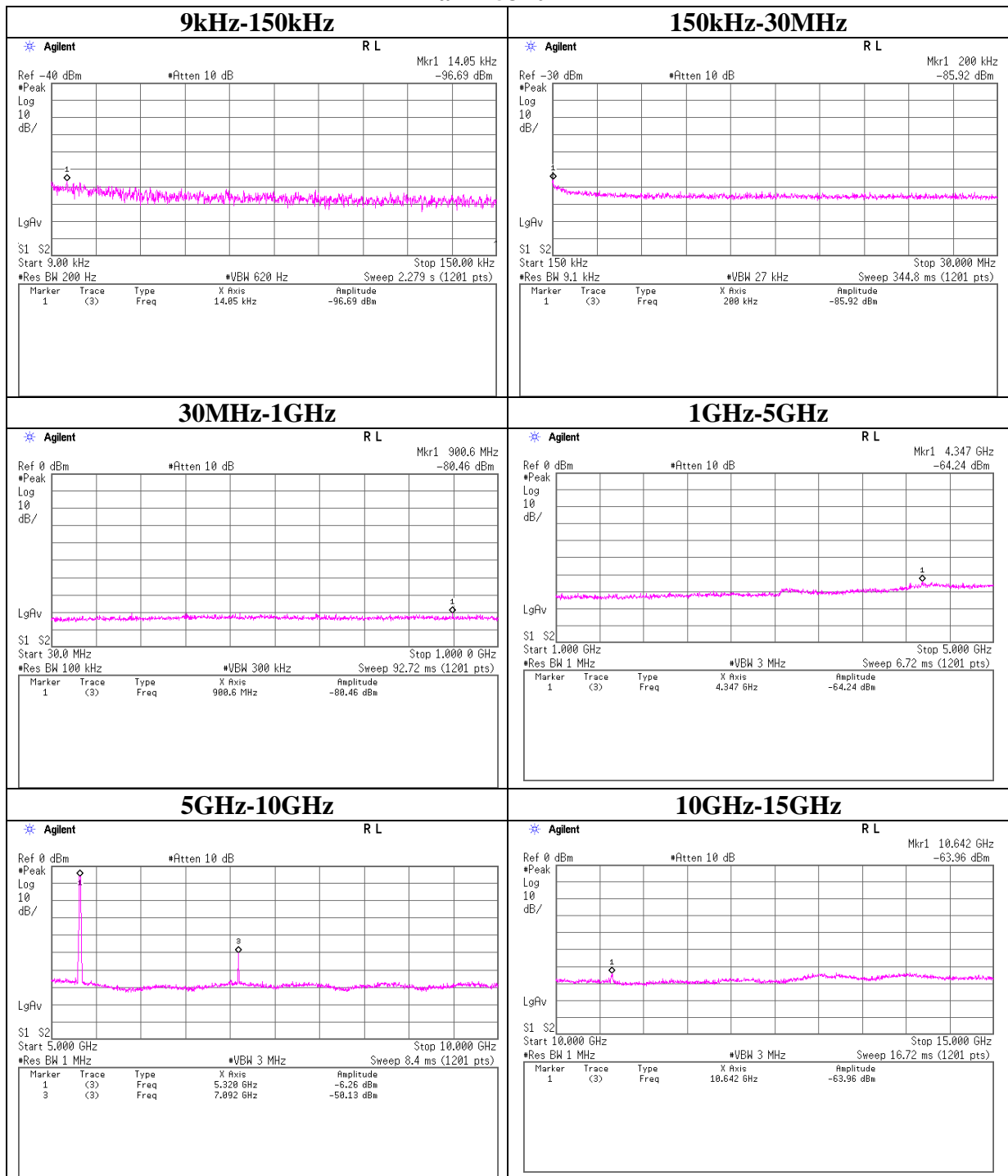
Conducted Spurious Emission

11a Tx 5300MHz



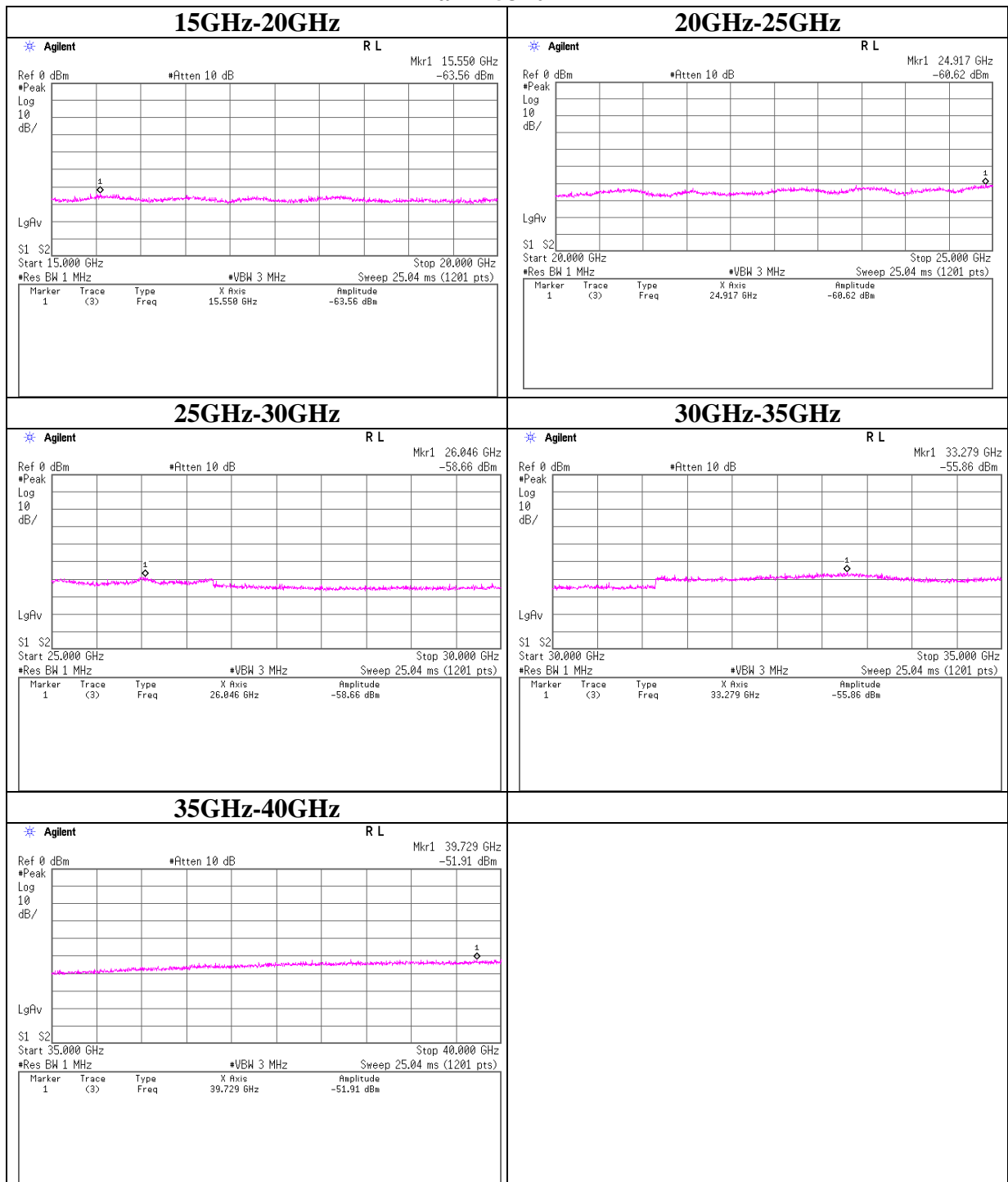
Conducted Spurious Emission

11a Tx 5320MHz



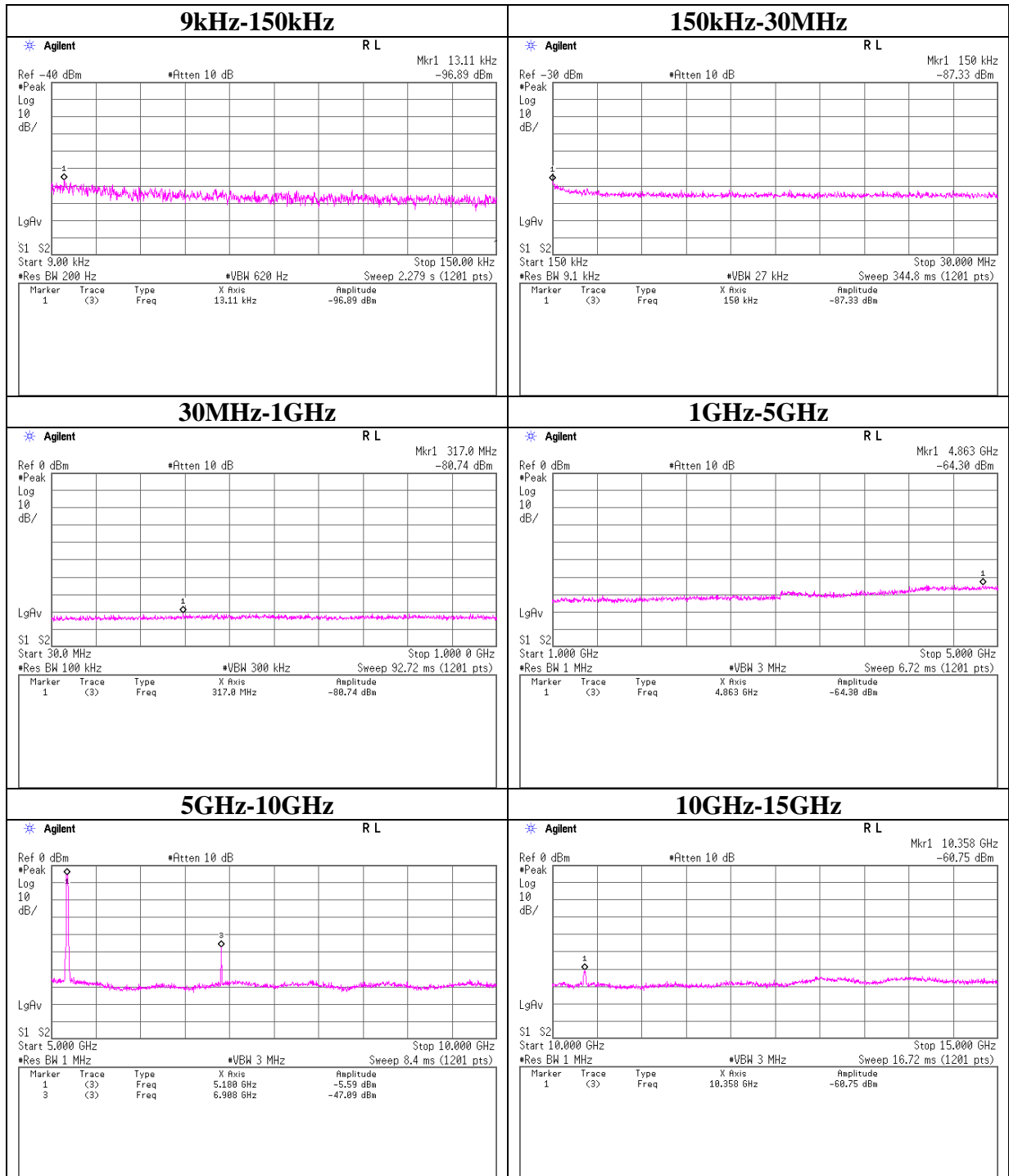
Conducted Spurious Emission

11a Tx 5320MHz



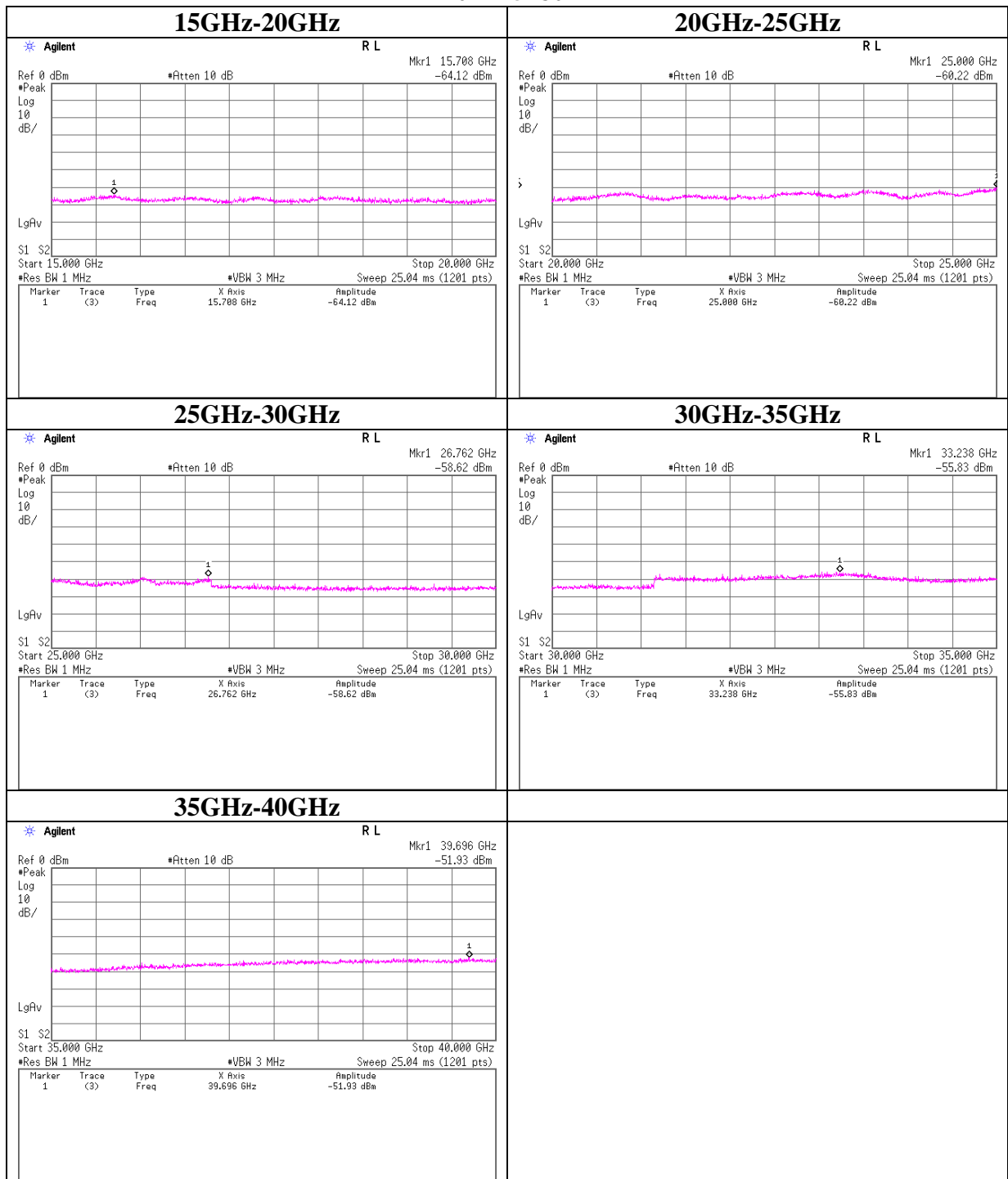
Conducted Spurious Emission

11n-20 Tx 5180MHz



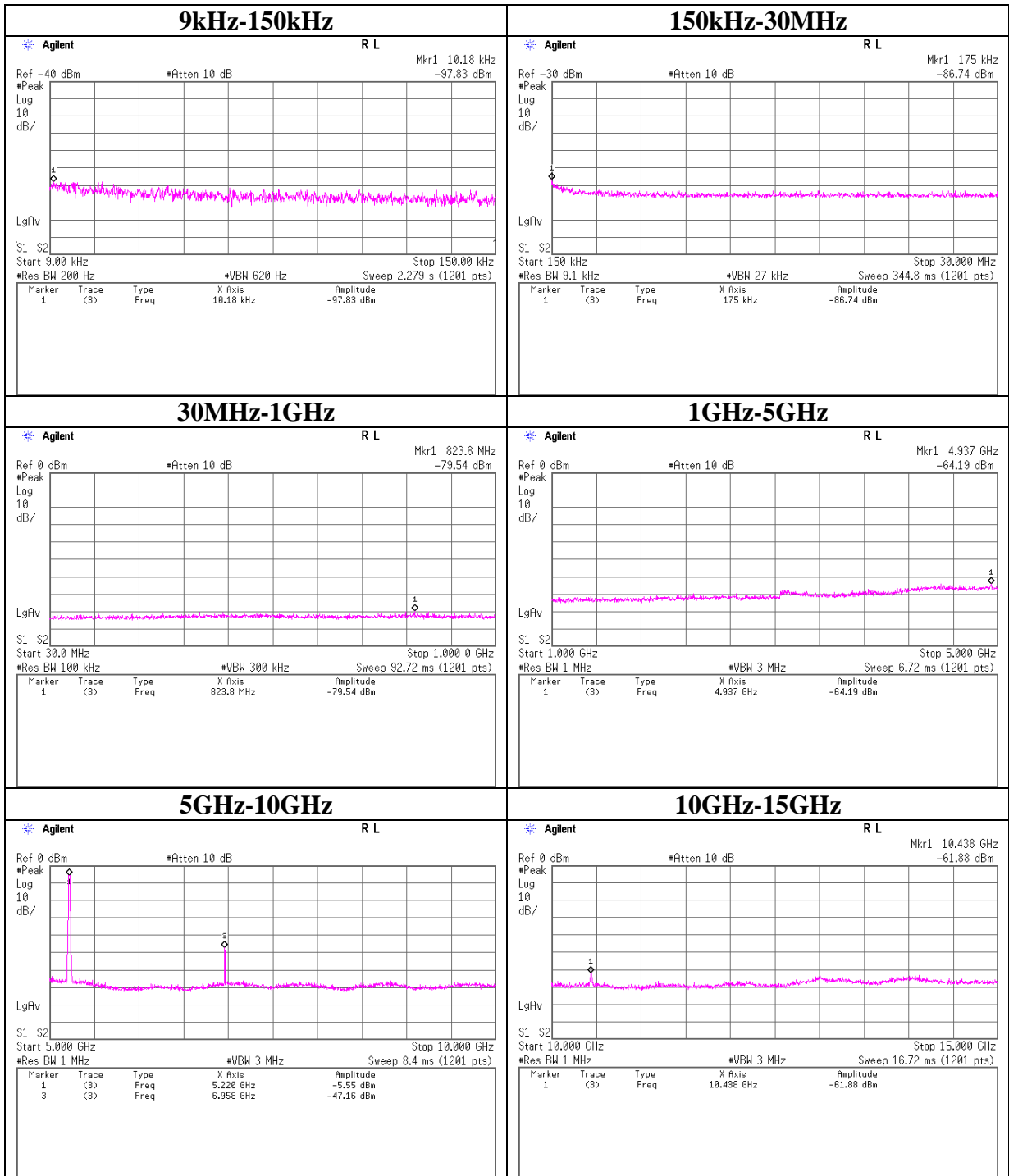
Conducted Spurious Emission

11n-20 Tx 5180MHz



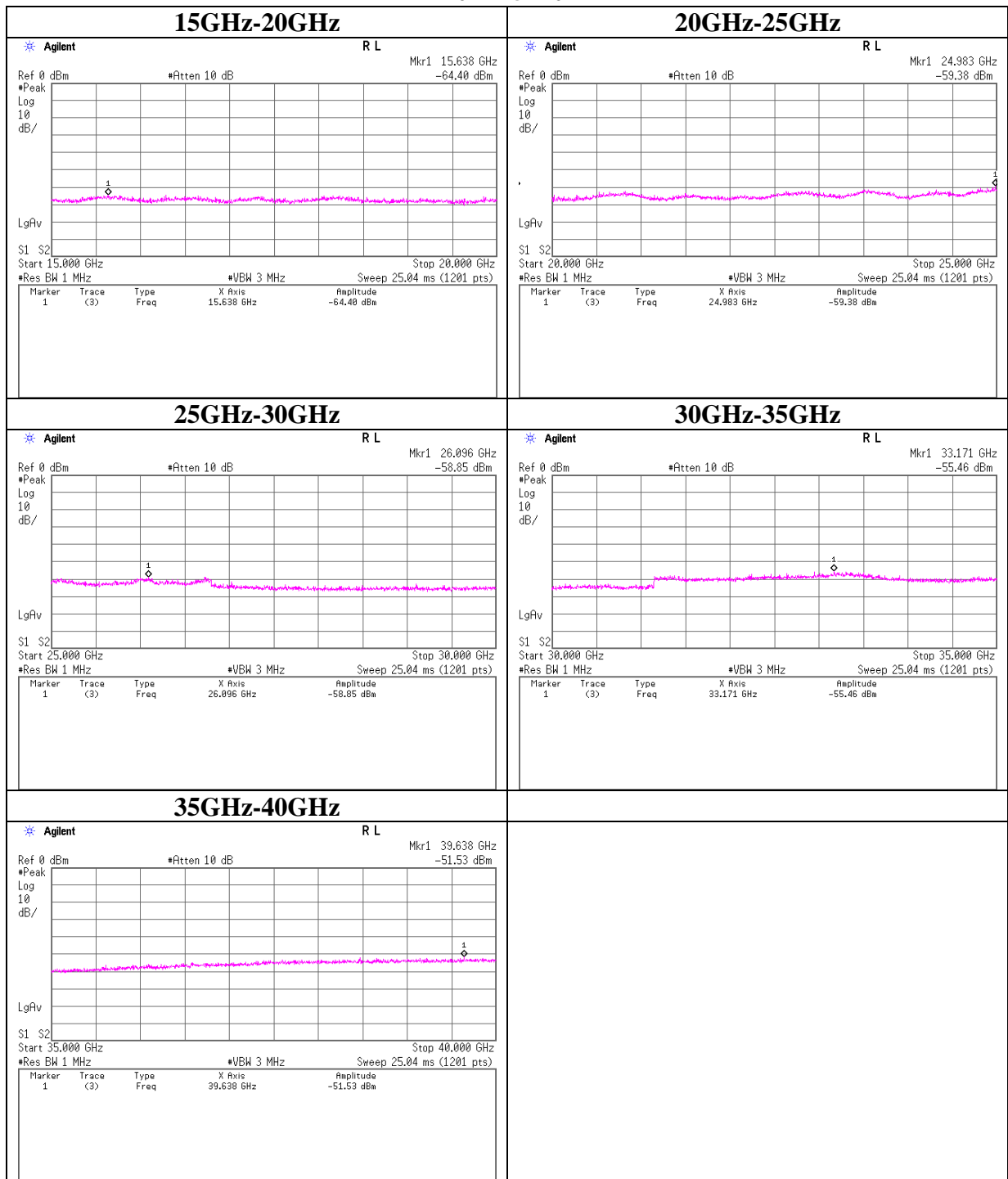
Conducted Spurious Emission

11n-20 Tx 5220MHz



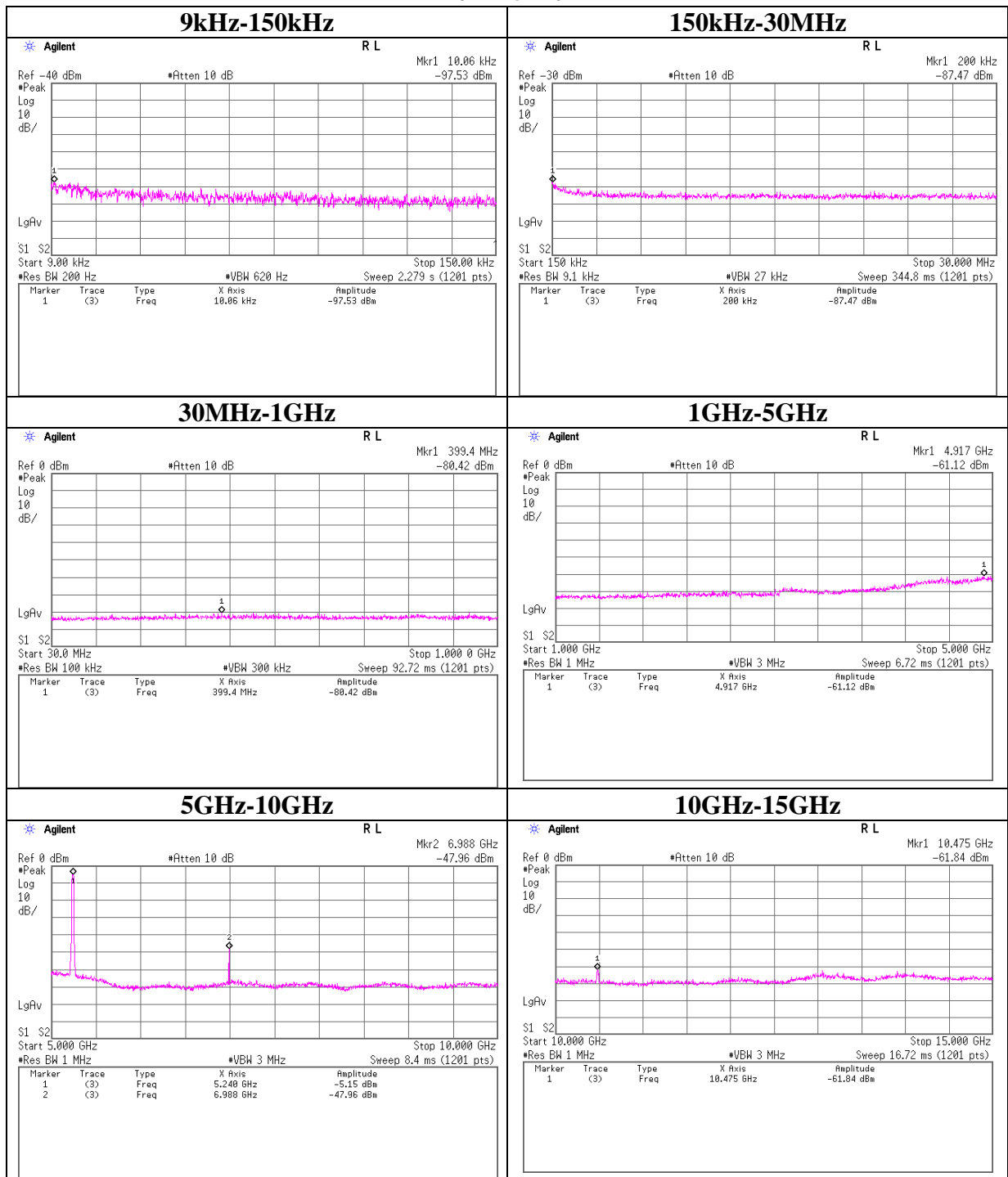
Conducted Spurious Emission

11n-20 Tx 5220MHz



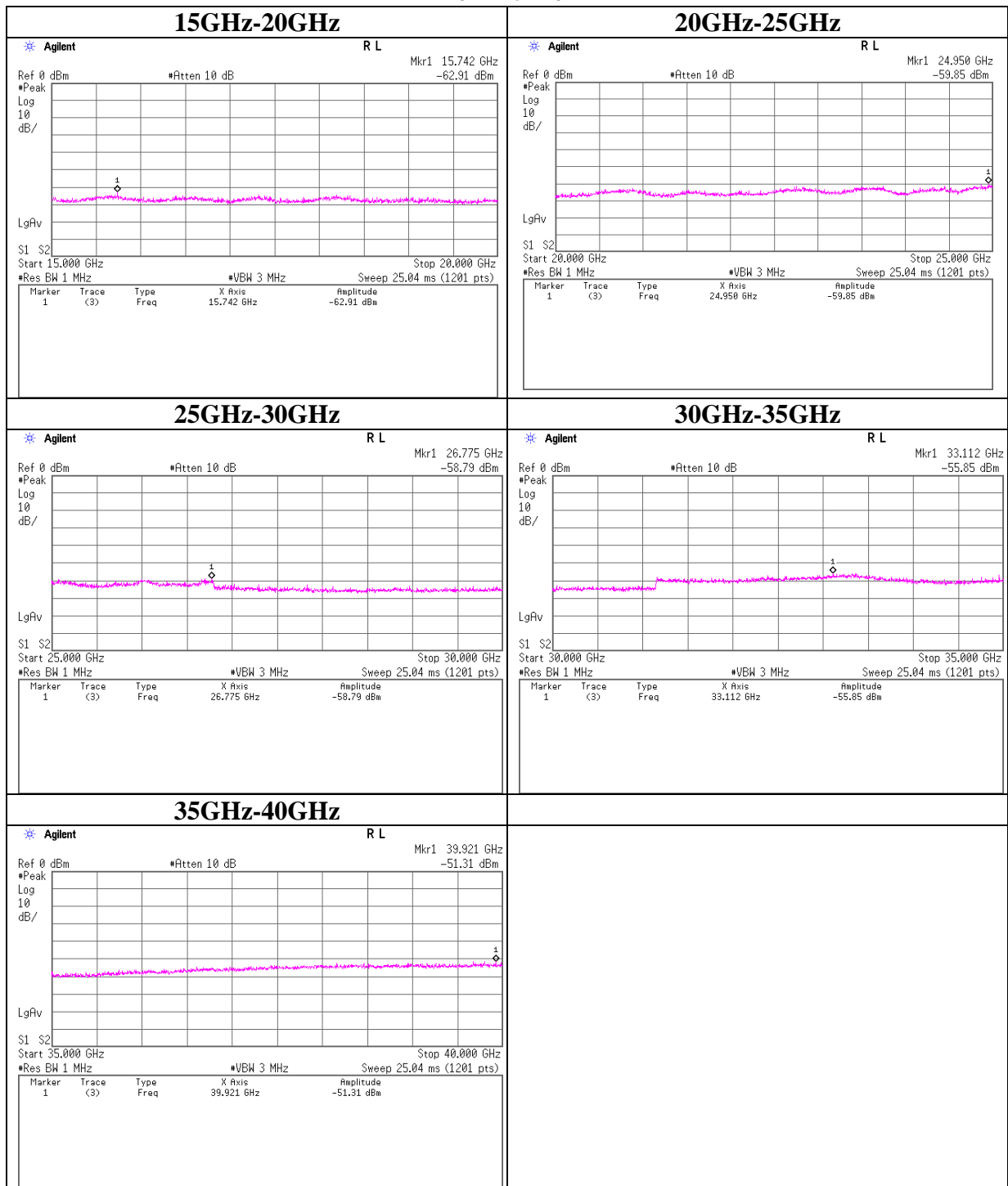
Conducted Spurious Emission

11n-20 Tx 5240MHz



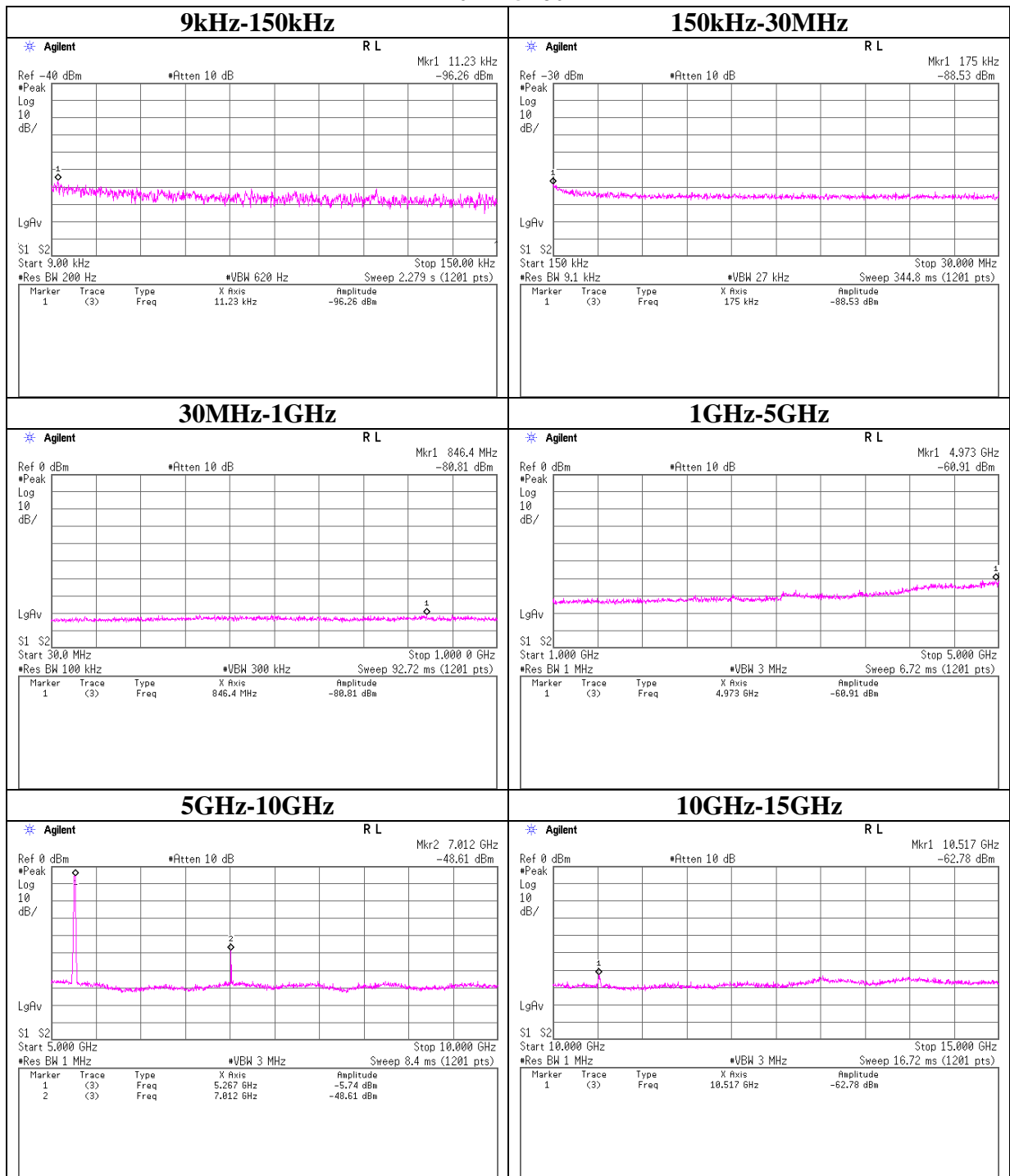
Conducted Spurious Emission

11n-20 Tx 5240MHz



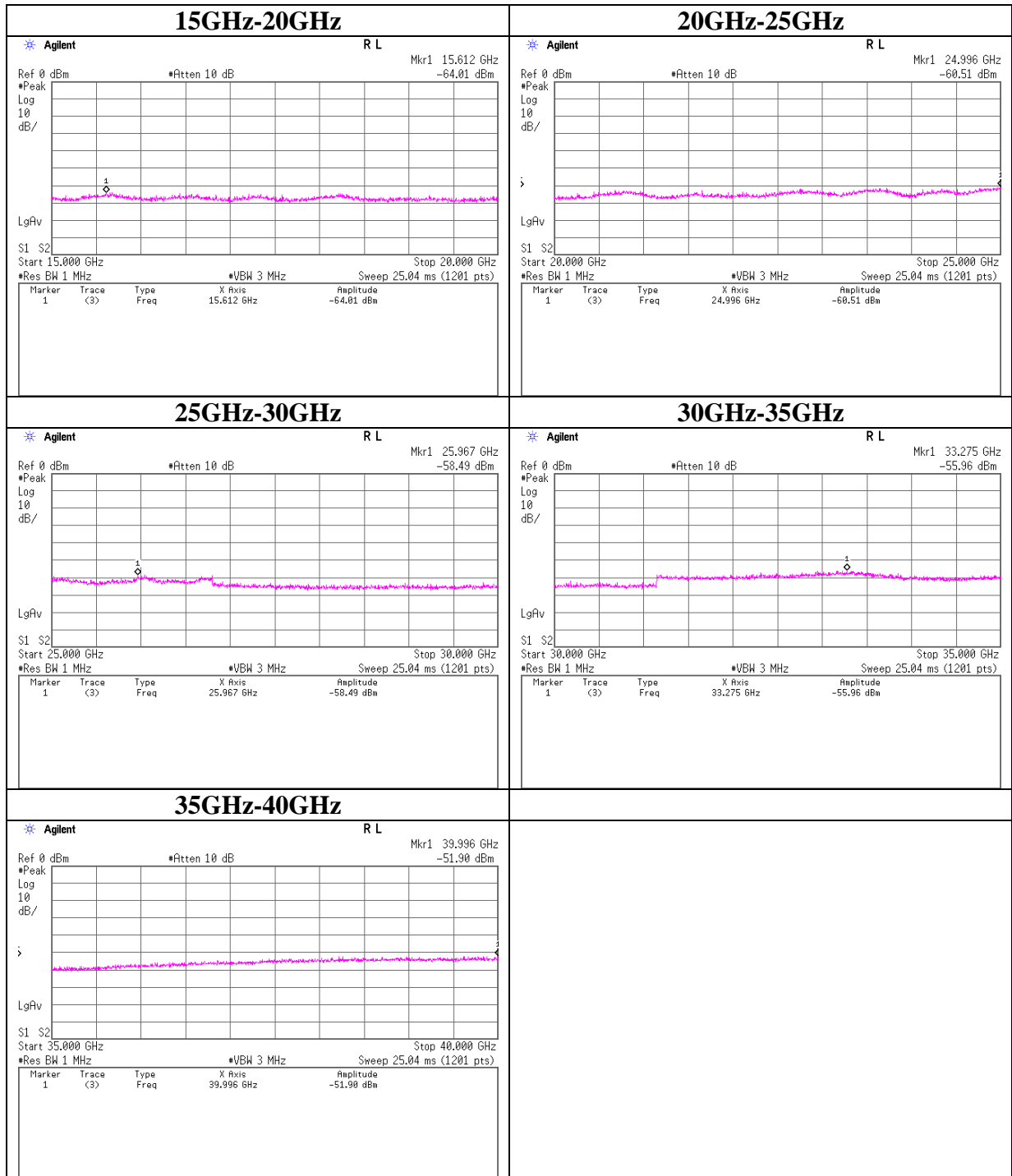
Conducted Spurious Emission

11n-20 Tx 5260MHz



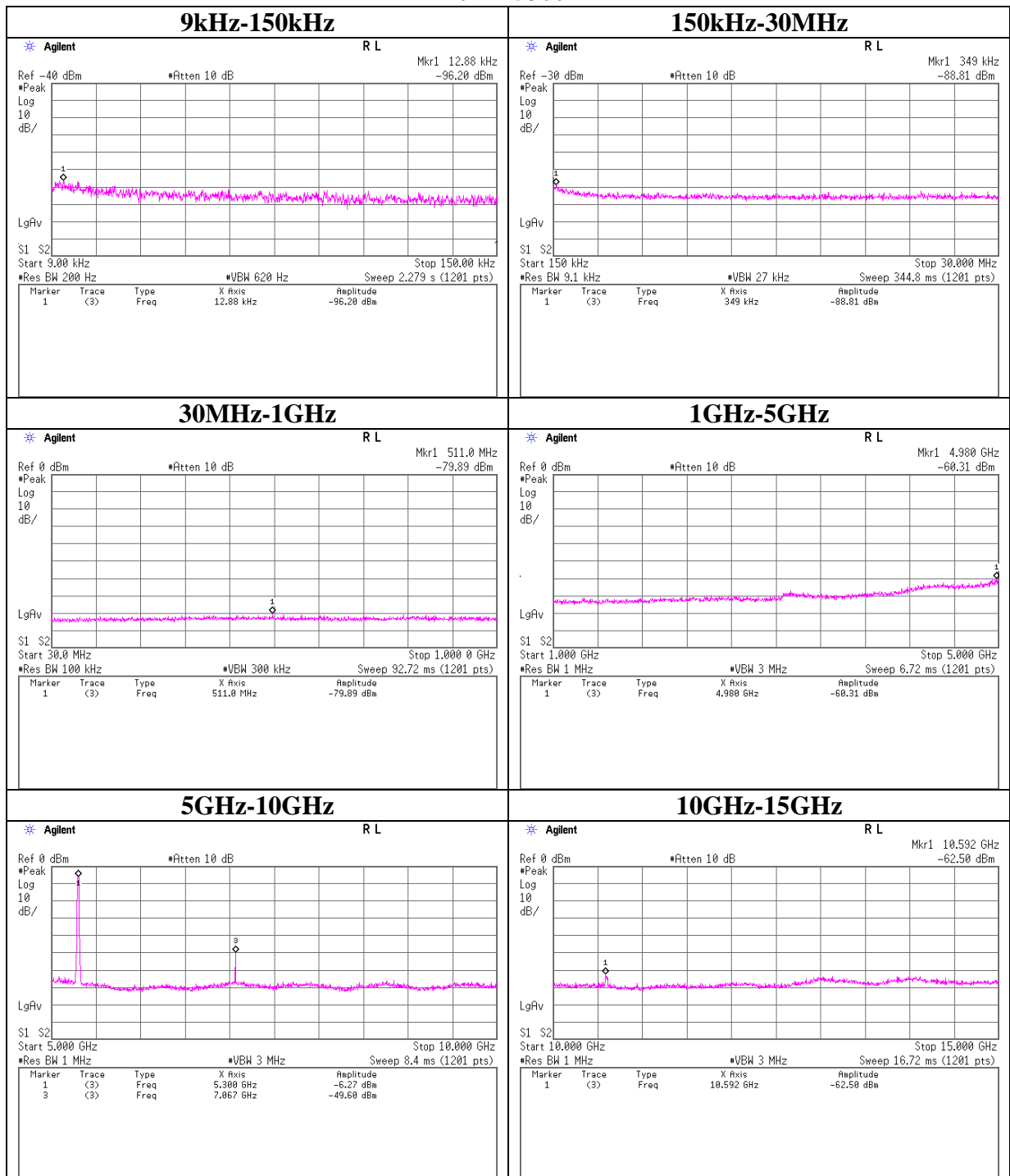
Conducted Spurious Emission

11n-20 Tx 5260MHz



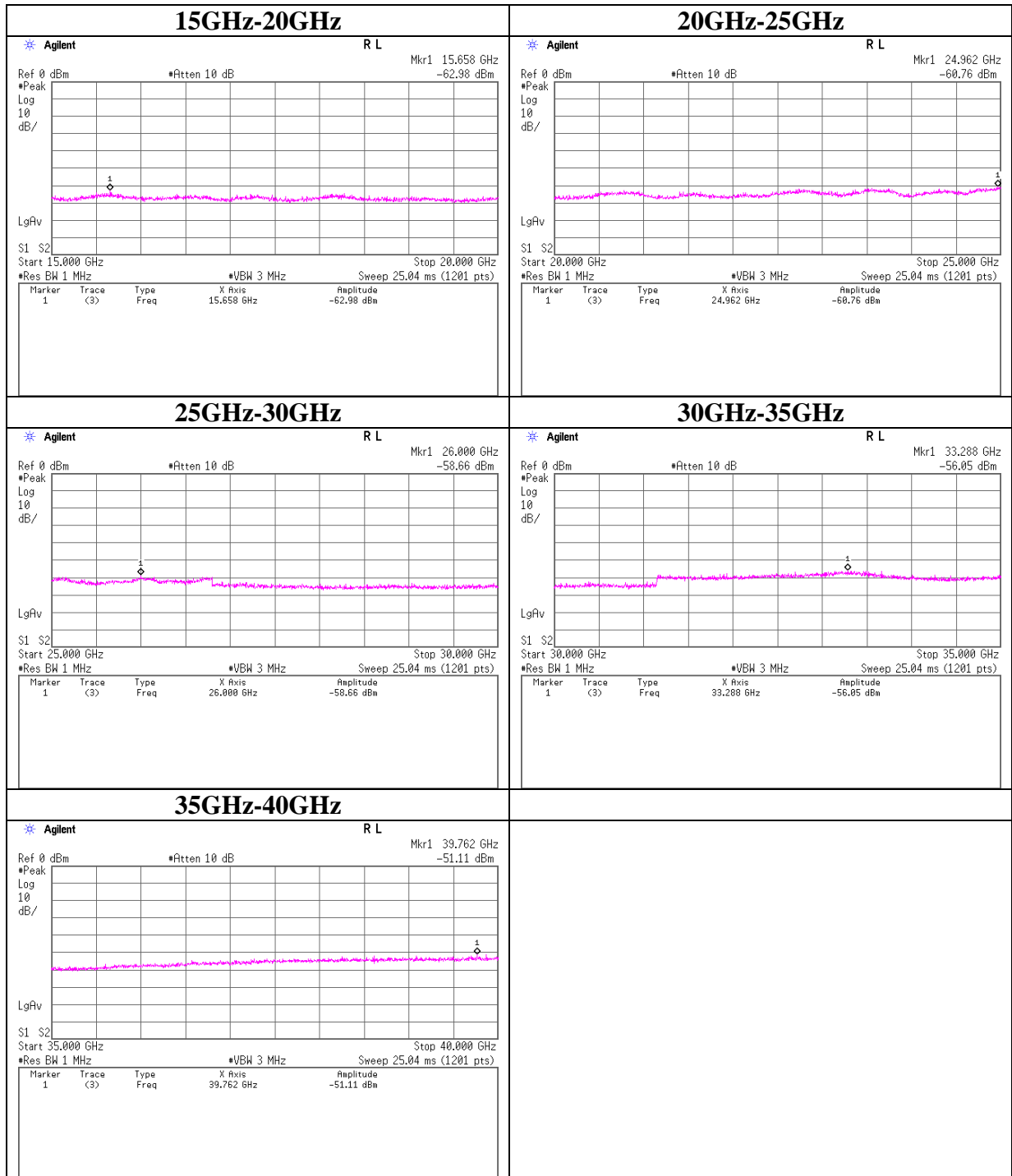
Conducted Spurious Emission

11n-20 Tx 5300MHz



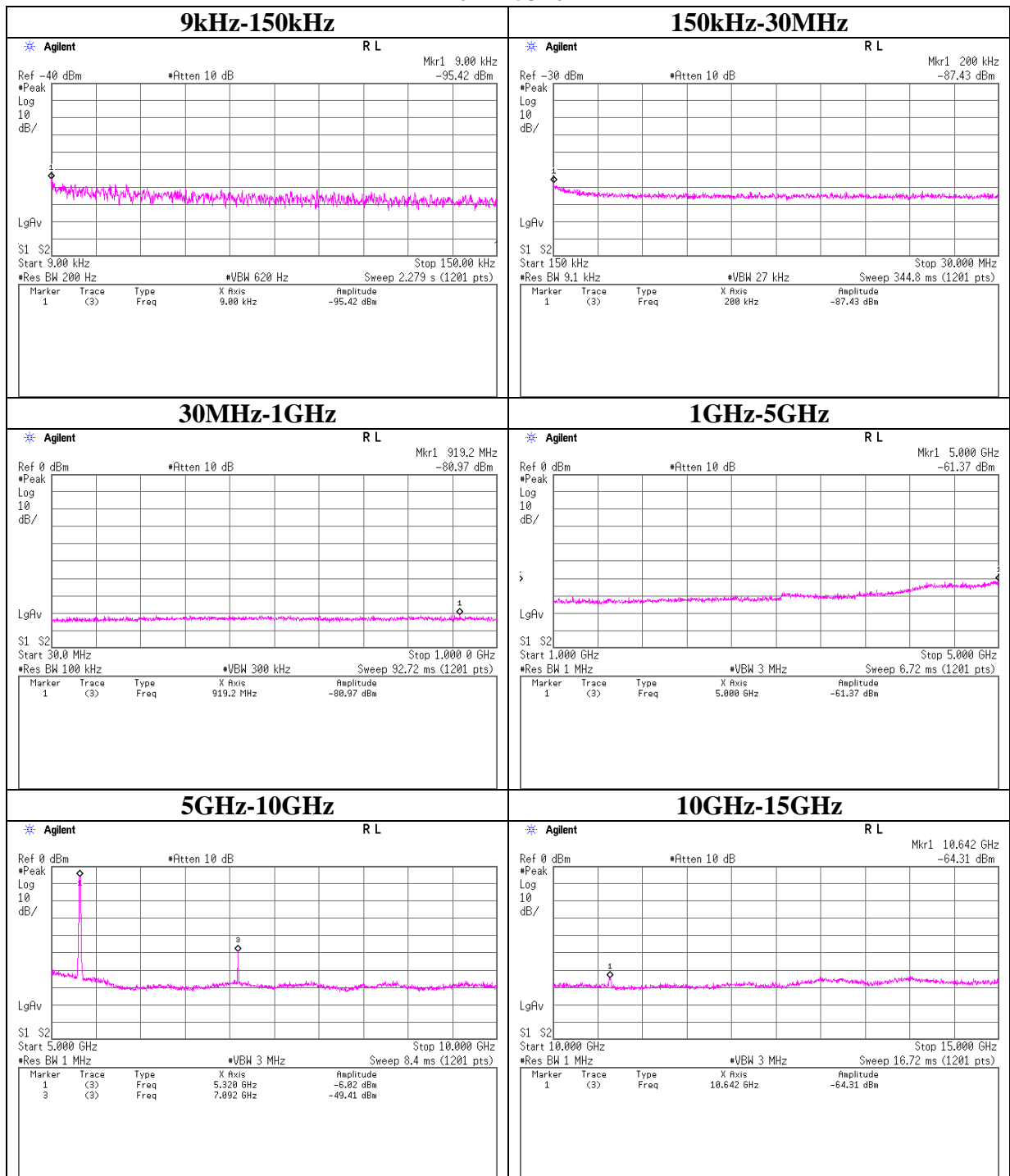
Conducted Spurious Emission

11n-20 Tx 5300MHz



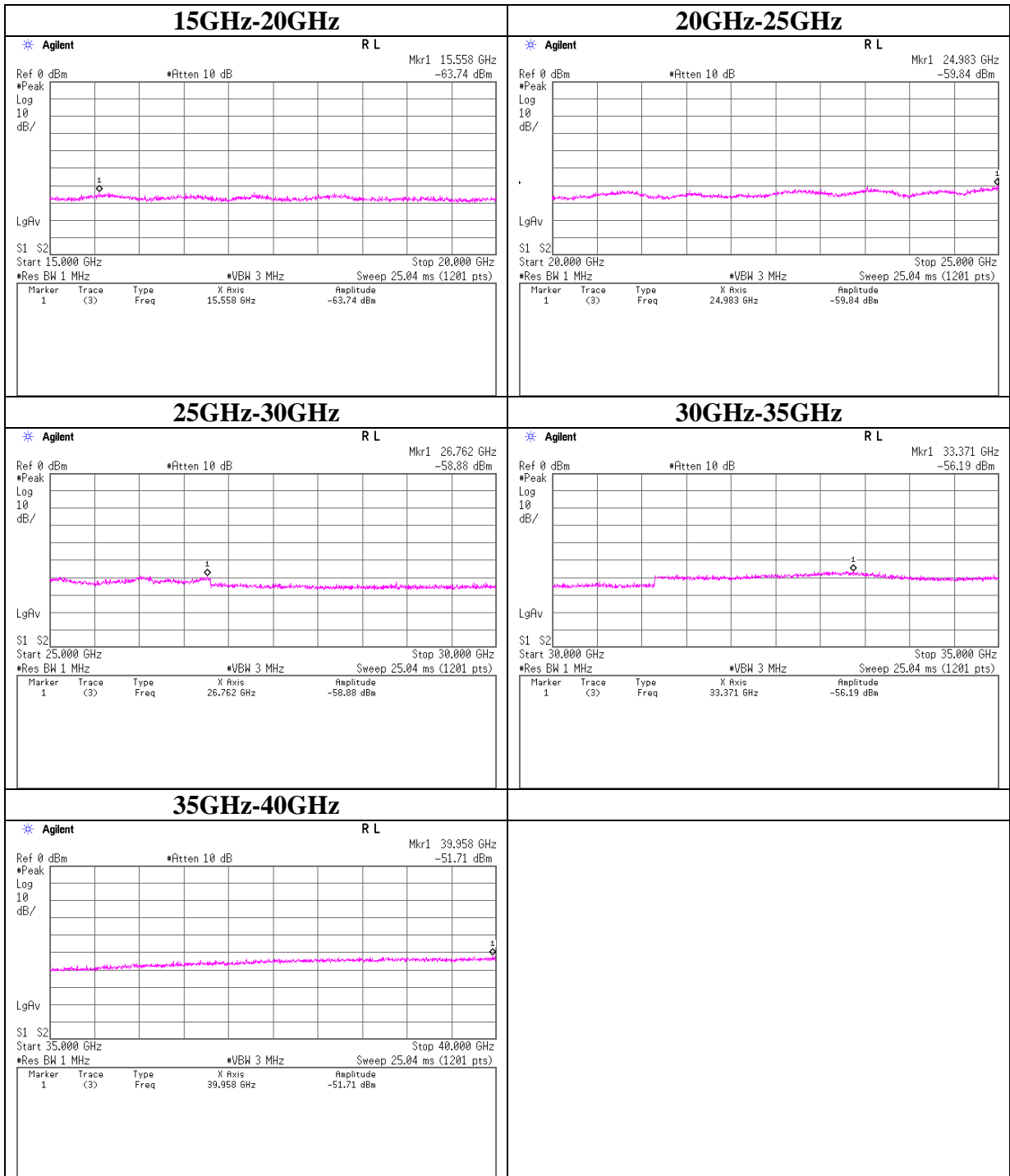
Conducted Spurious Emission

11n-20 Tx 5320MHz



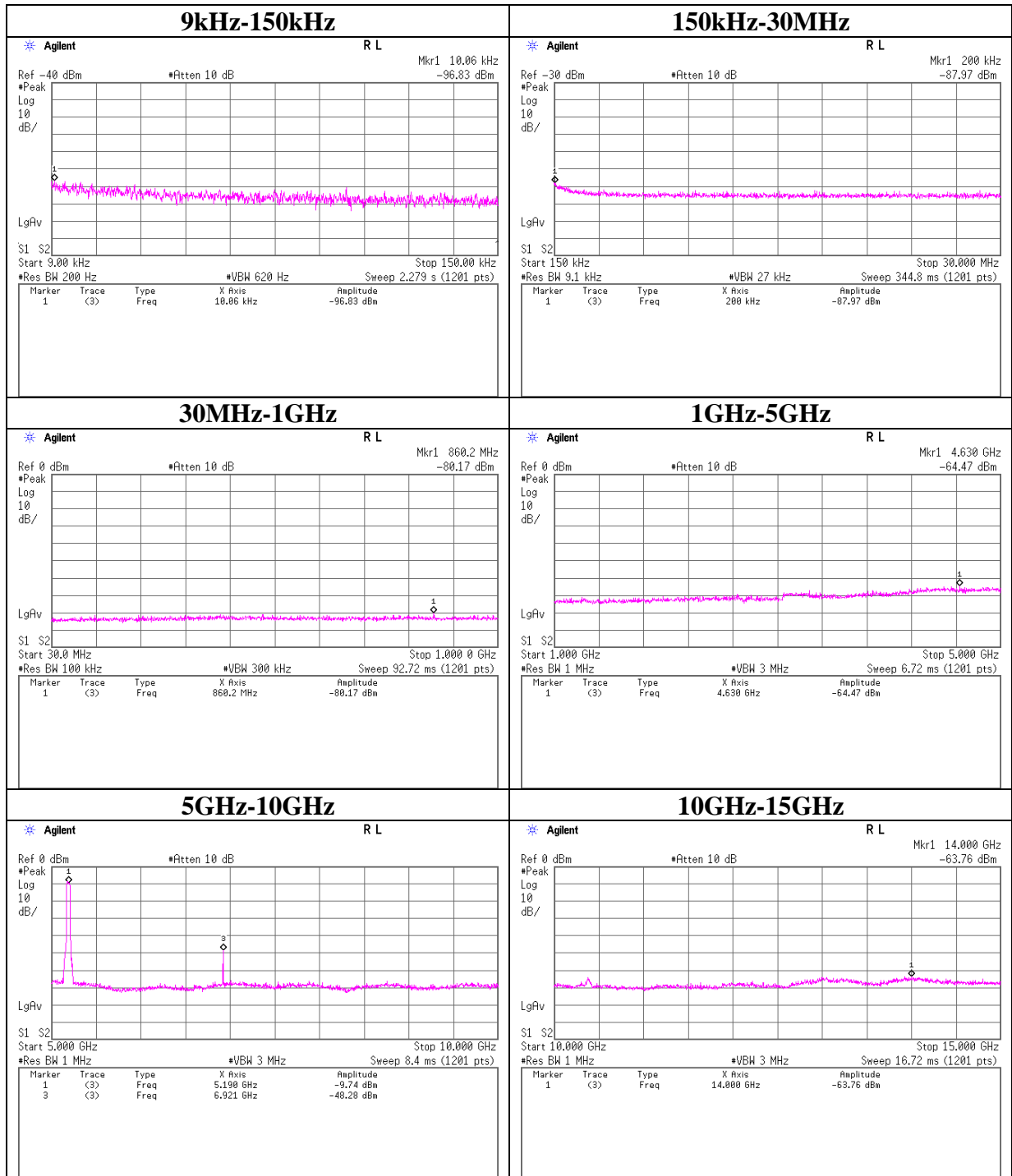
Conducted Spurious Emission

11n-20 Tx 5320MHz



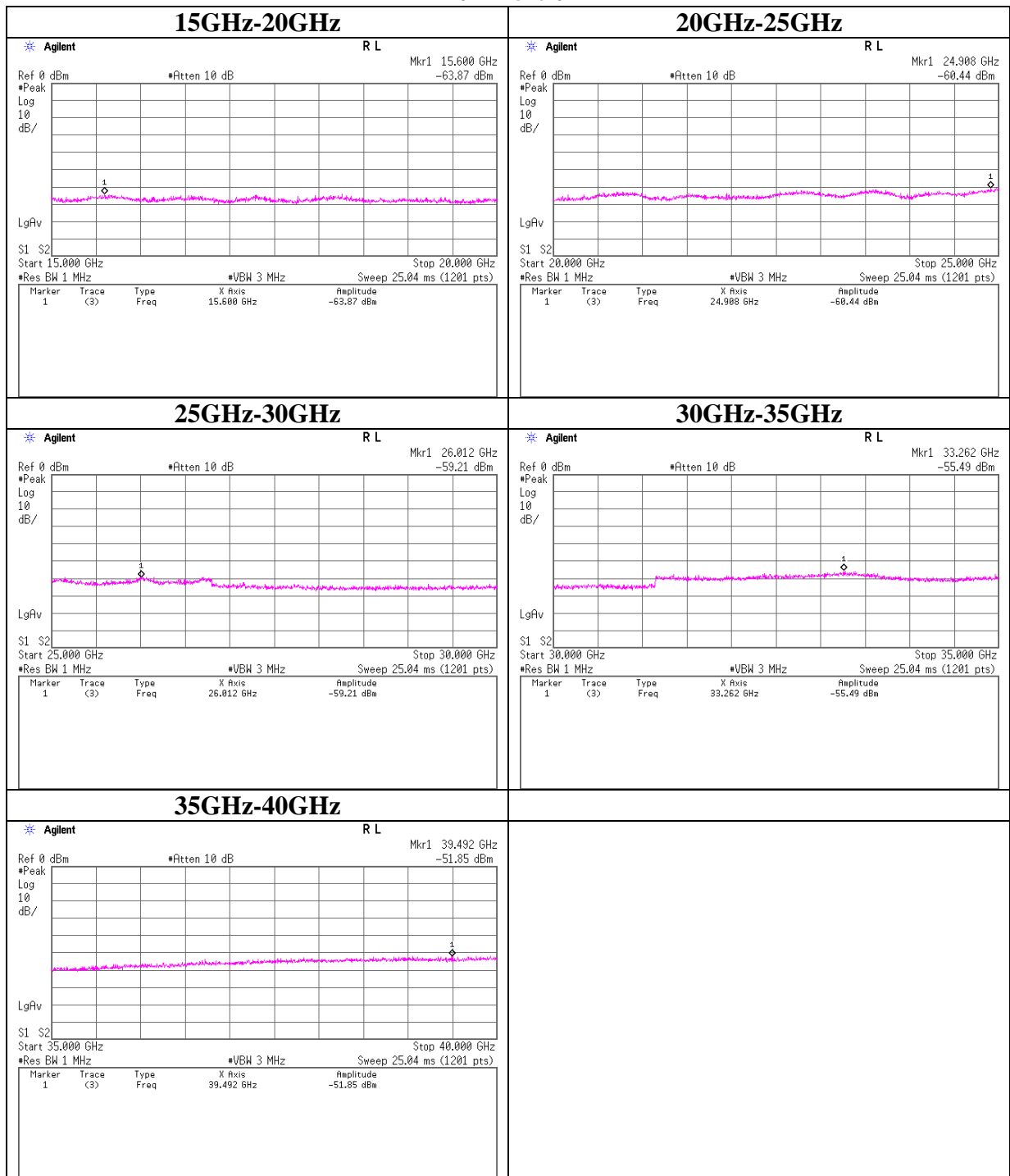
Conducted Spurious Emission

11n-40 Tx 5190MHz



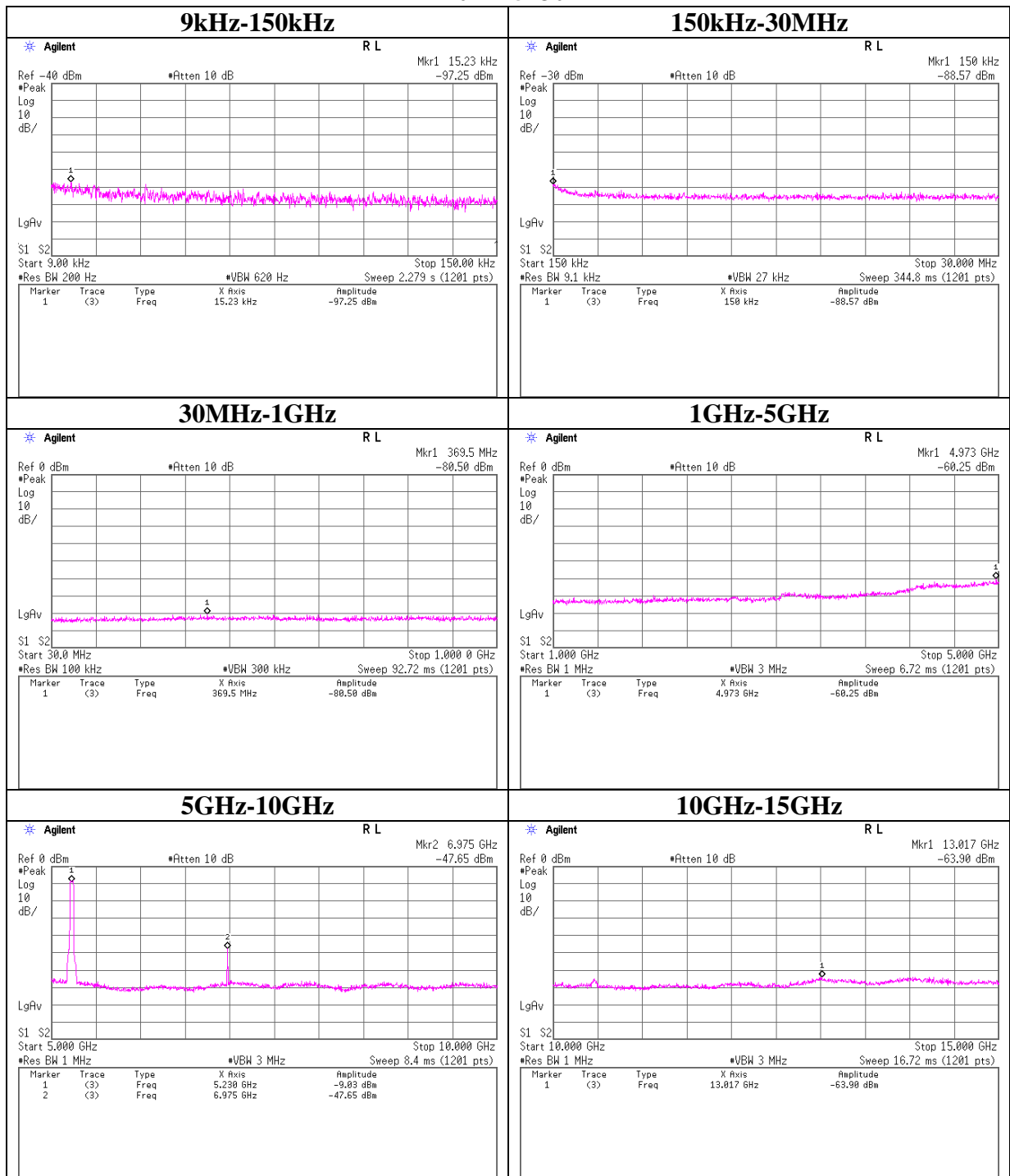
Conducted Spurious Emission

11n-40 Tx 5190MHz



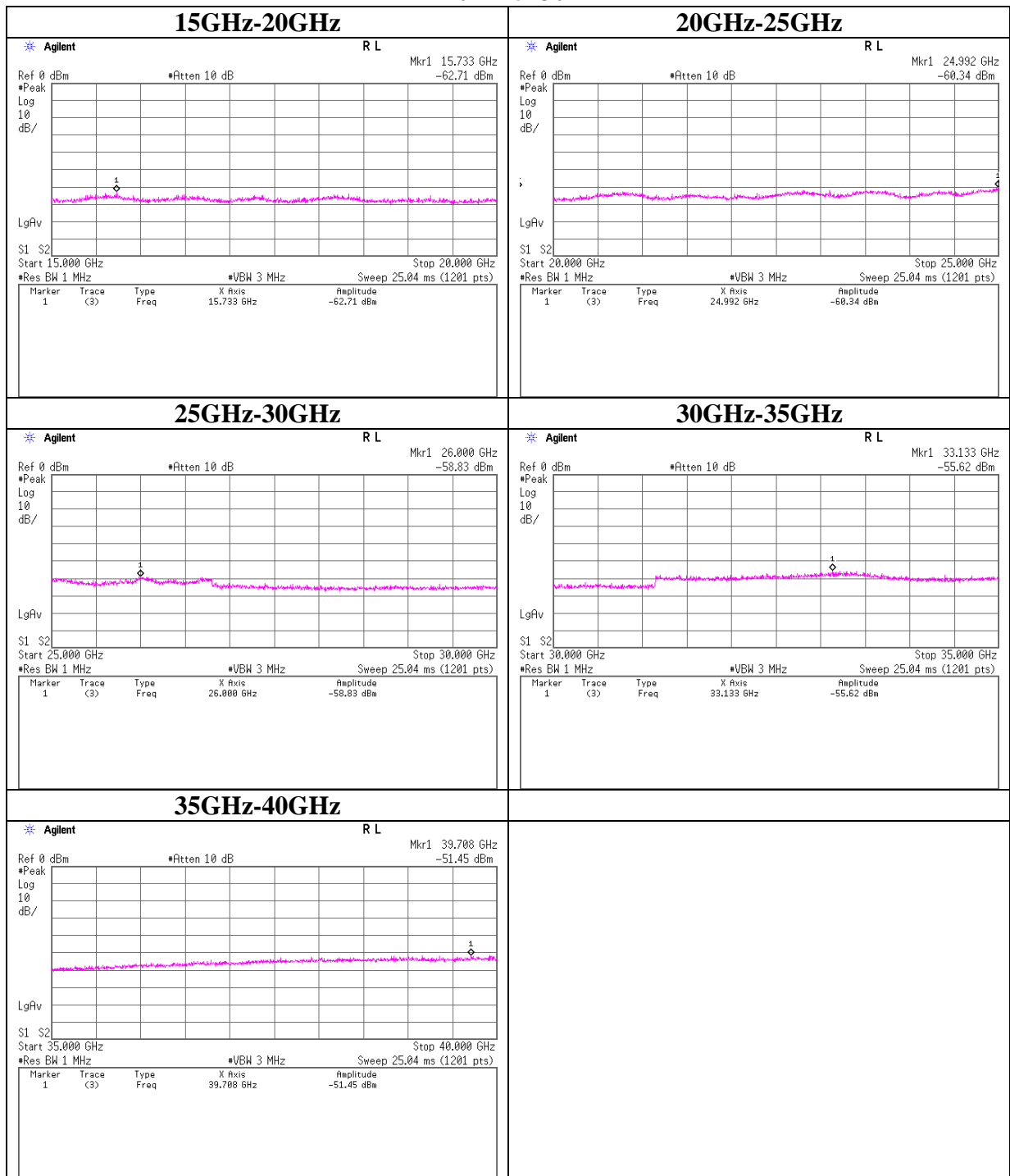
Conducted Spurious Emission

11n-40 Tx 5230MHz



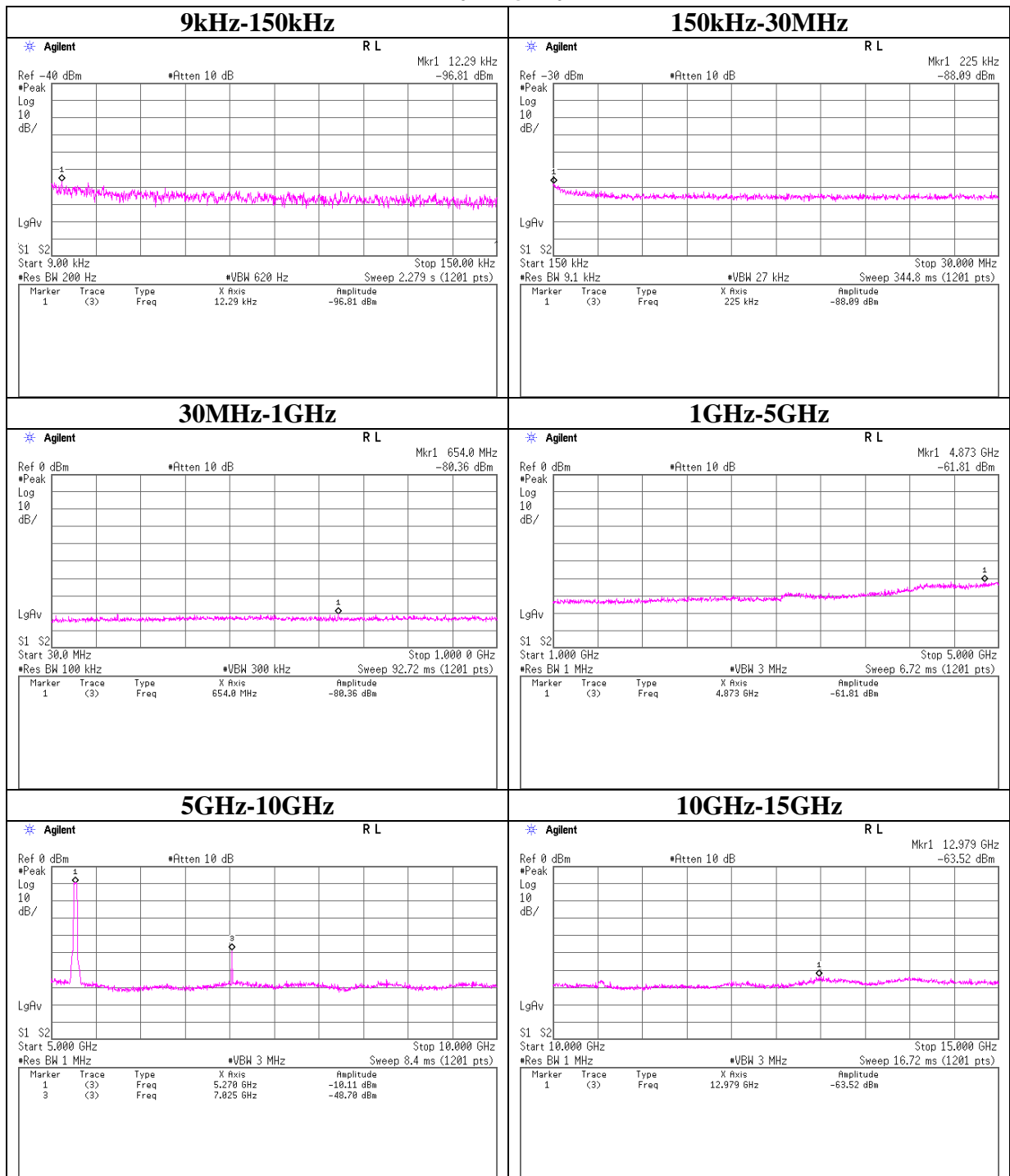
Conducted Spurious Emission

11n-40 Tx 5230MHz



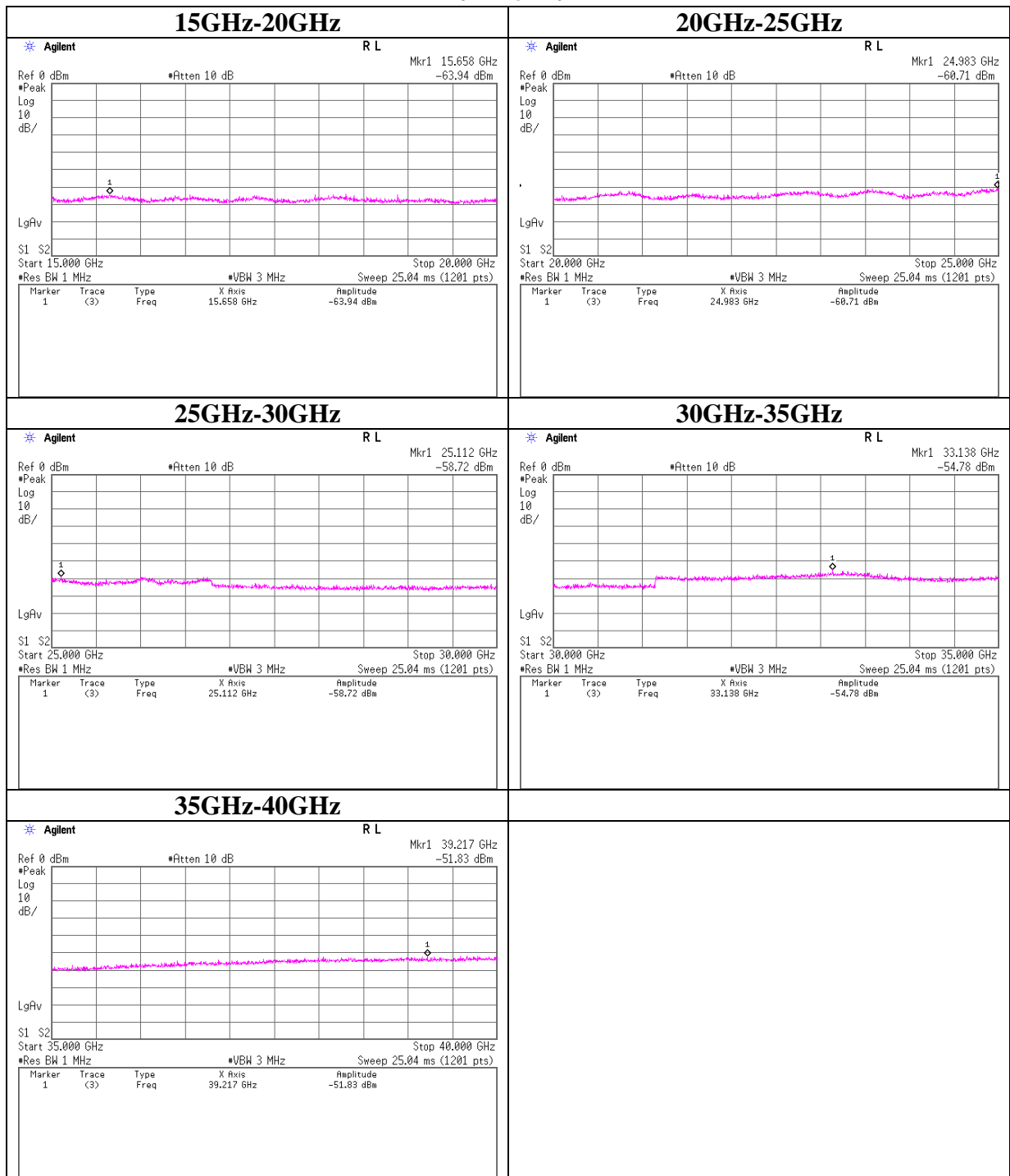
Conducted Spurious Emission

11n-40 Tx 5270MHz



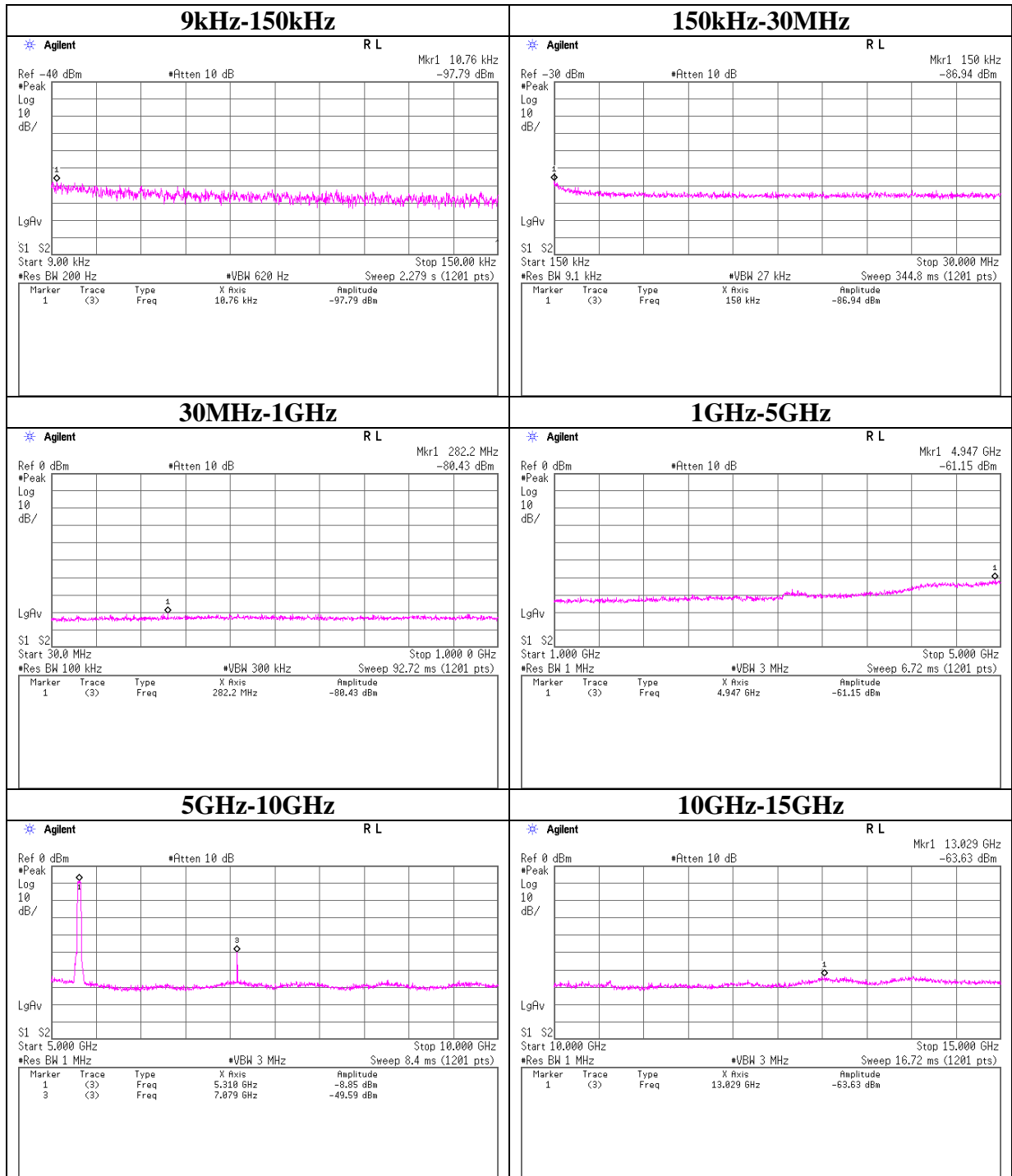
Conducted Spurious Emission

11n-40 Tx 5270MHz



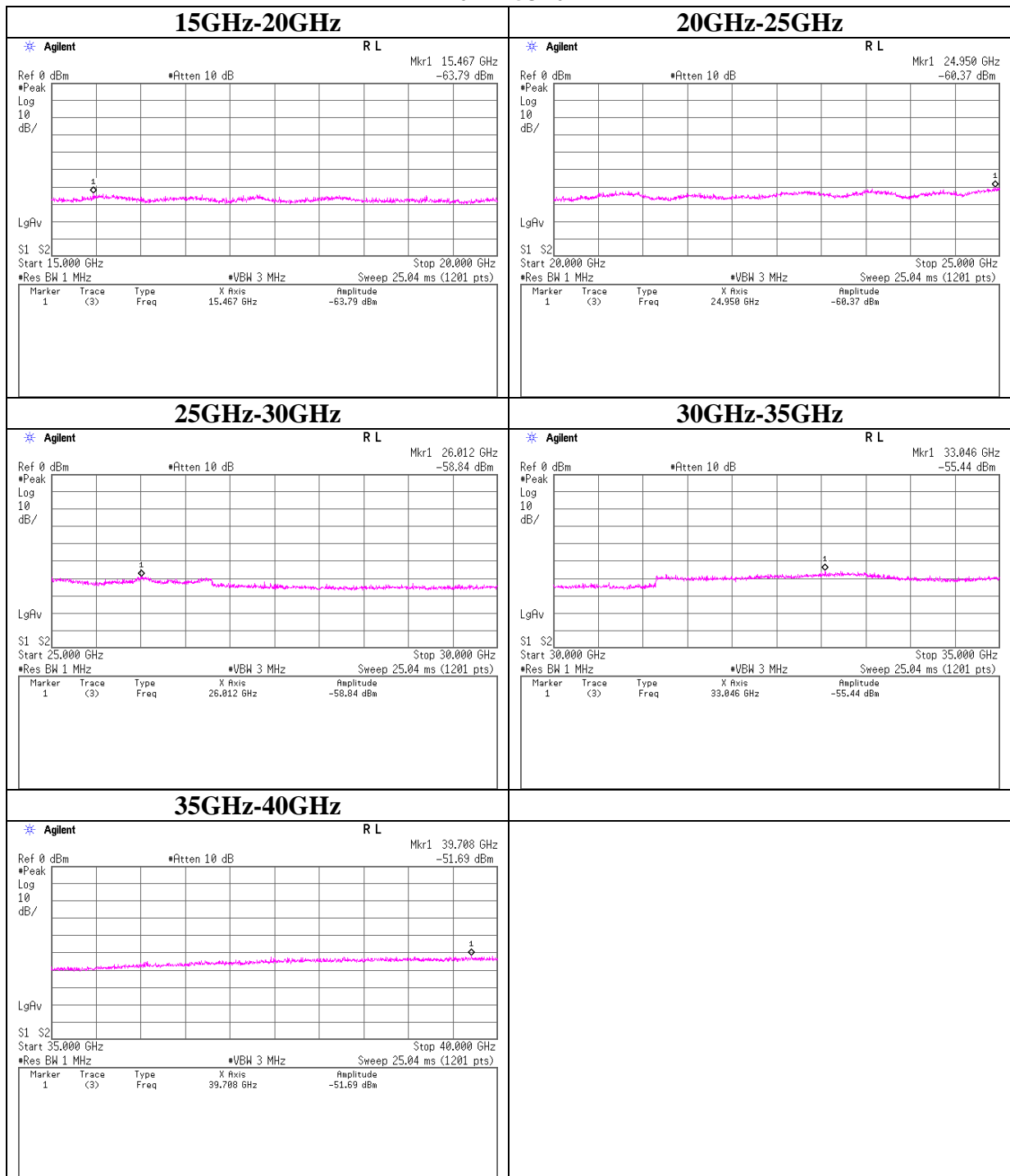
Conducted Spurious Emission

11n-40 Tx 5310MHz



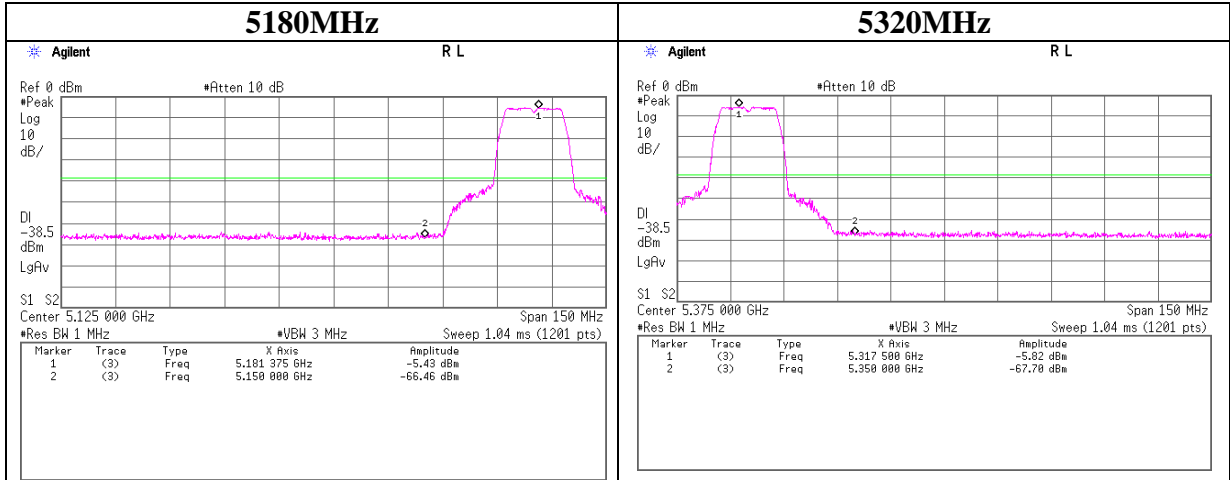
Conducted Spurious Emission

11n-40 Tx 5310MHz

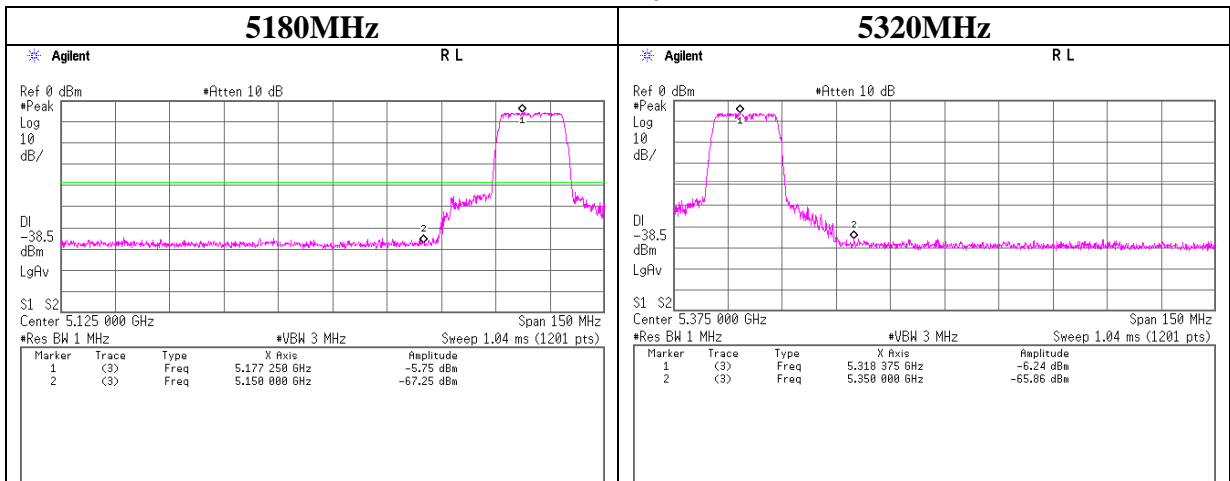


Conducted emission Band Edge compliance

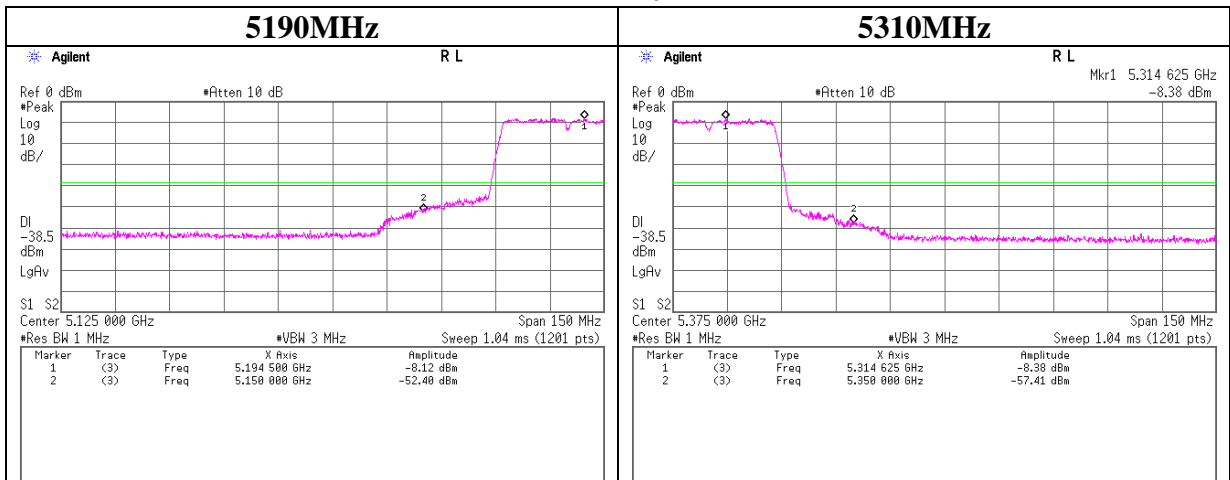
11a



11n-20



11n-40



Peak Excursion Ratio

Test place Head Office EMC Lab. No.11 Measurement room
Report No. 31IE0027-HO-01
Date 06/24/2011 06/29/2011
Temperature/ Humidity 25deg. C / 57% RH 28deg. C / 32% RH
Engineer Yutaka Yoshida Yutaka Yoshida
Mode 11a Tx / 11n-20 Tx / 11n-40 Tx

11a

Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
5180	7.94	13.00
5220	7.83	13.00
5240	8.49	13.00
5260	8.74	13.00
5300	7.87	13.00
5320	8.25	13.00

11n-20

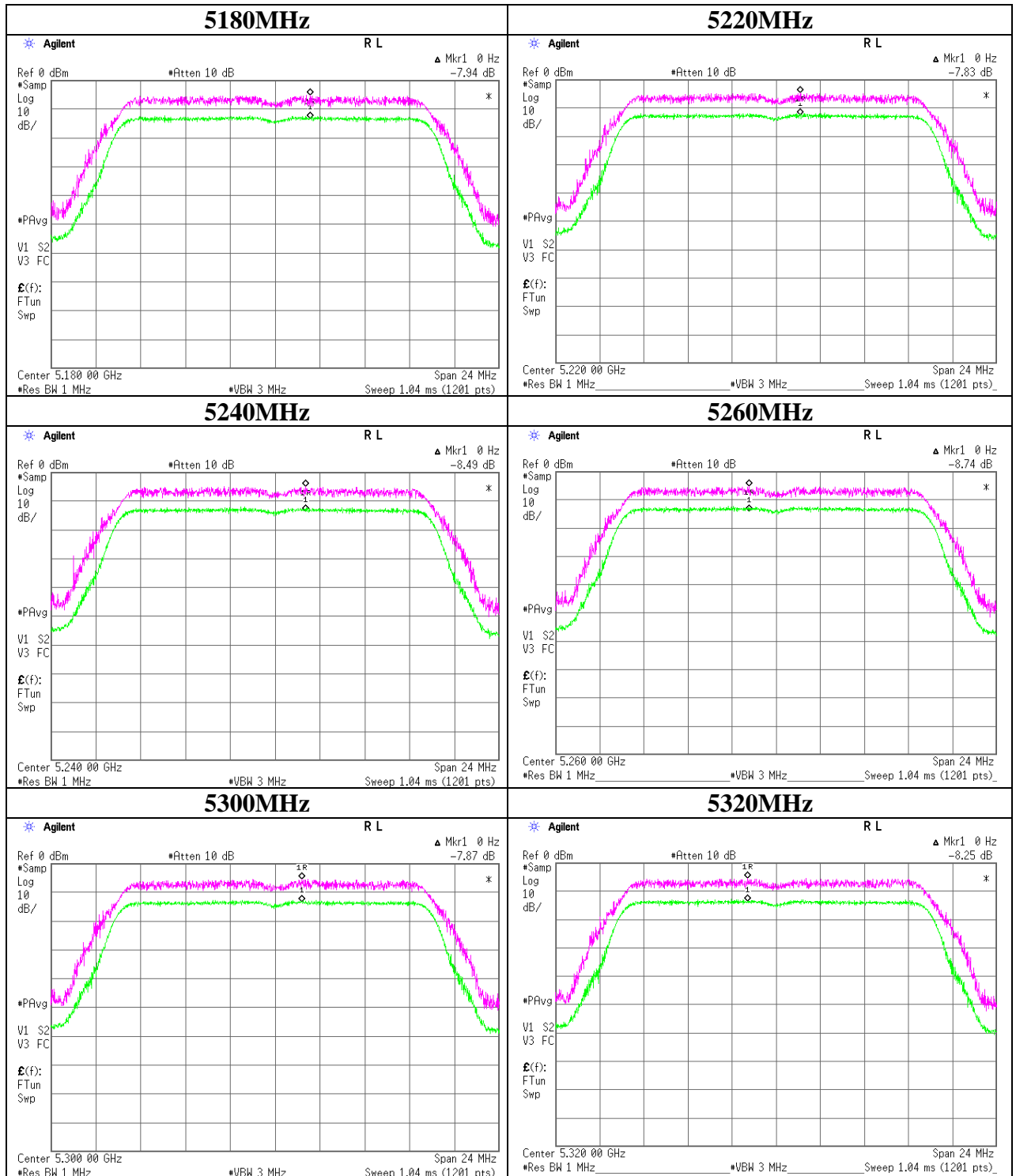
Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
5180	8.10	13.00
5220	8.38	13.00
5240	8.30	13.00
5260	8.15	13.00
5300	8.22	13.00
5320	8.40	13.00

11n-40

Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
5190	9.32	13.00
5230	9.84	13.00
5270	11.63	13.00
5310	10.04	13.00

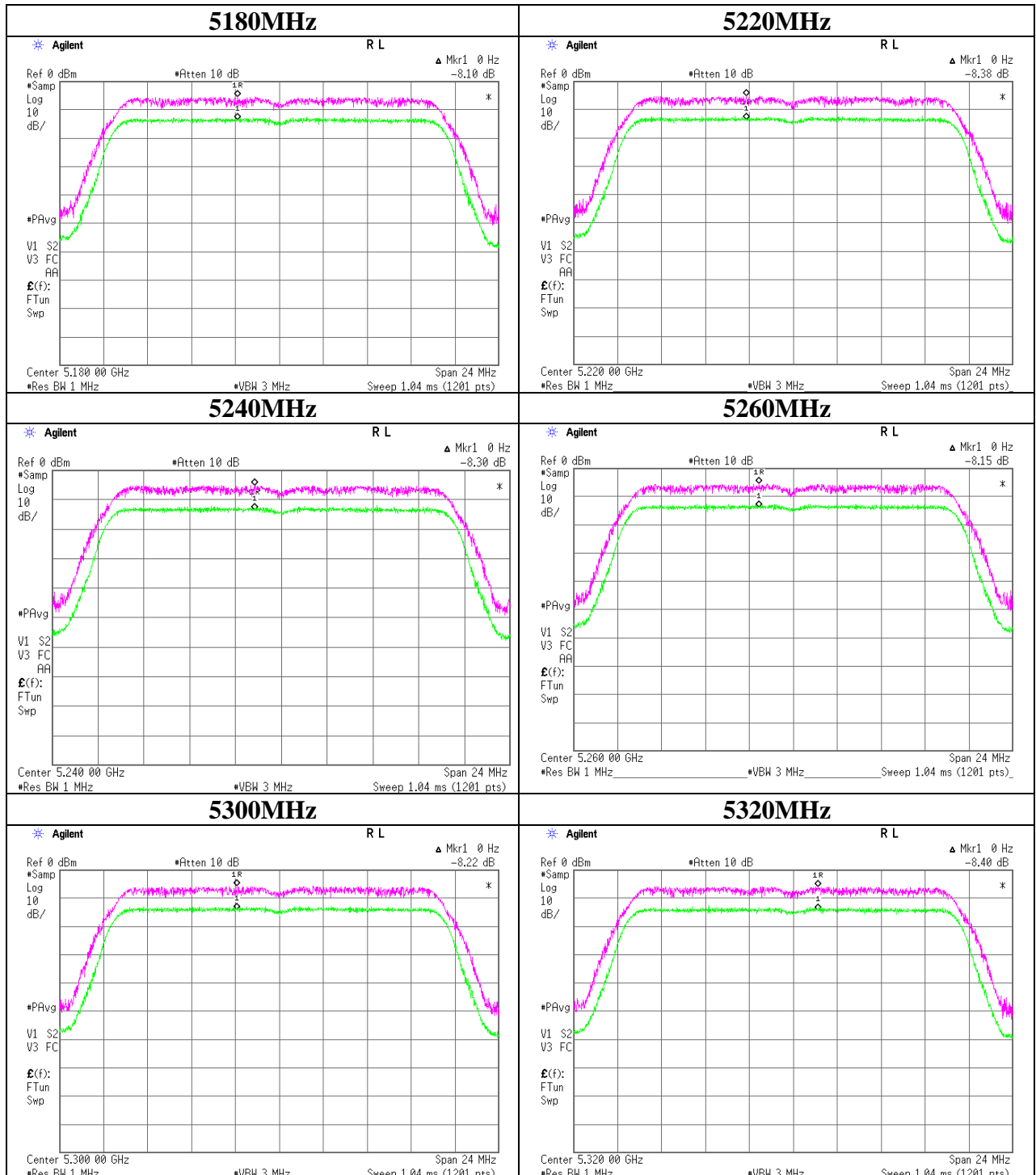
Peak Excursion Ratio

11a



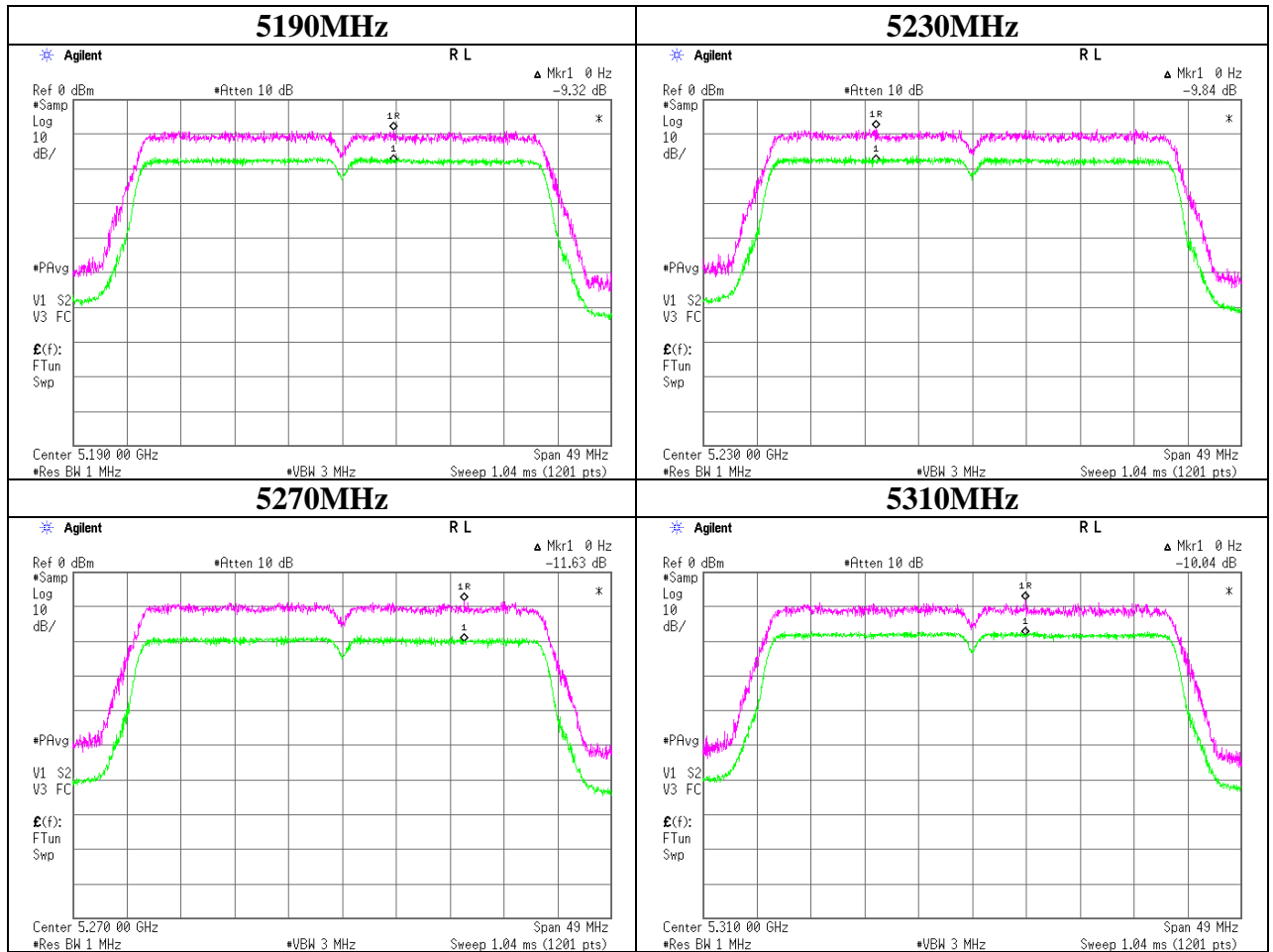
Peak Excursion Ratio

11n-20



Peak Excursion Ratio

11n-40



APPENDIX 3: Test instruments

EMI test equipment [1/2]

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2010/08/20 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2010/08/20 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2011/03/14 * 12
MCC-46	Microwave Cable	Murata	MXGS83RK3000	-	AT	2010/07/26 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2011/02/23 * 12
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	AT	2011/04/15 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2011/03/14 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2011/06/23 * 12
MCC-45	Microwave Cable	Murata	MXGS83RK3000	-	AT	2010/07/26 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2011/02/23 * 12
MAT-21	Attenuator(20dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	AT	2011/01/06 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2010/12/13 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT/RE	2011/04/08 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2010/09/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2011/02/23 * 12
MJM-05	Measure	PROMART	SEN1955	-	RE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2011/01/16 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2010/09/30 * 12
MCC-18	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	148048-143(1m) / 292410(5m)	RE	2010/09/30 * 12
MHF-16	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	RE	2010/09/21 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2010/12/02 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2011/01/16 * 12
MHA-04	Horn Antenna 26.5-40GHz	EMCO	3160-10	1140	RE	2010/09/25 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2011/03/02 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2011/02/22 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2011/02/23 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE/CE	
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2010/08/23 * 12

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EMI test equipment [2/2]

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2010/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2010/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2010/07/06 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2010/11/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2011/03/04 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2011/02/22 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D- 2W(10m)/SFM141(3m)/suciform141- PE(1m)/421- 010(1.5m)/RFM- E321(Switcher)	-/00640	CE	2010/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2010/11/18 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

**Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test**