

APPENDIX 2: Data of EMI test

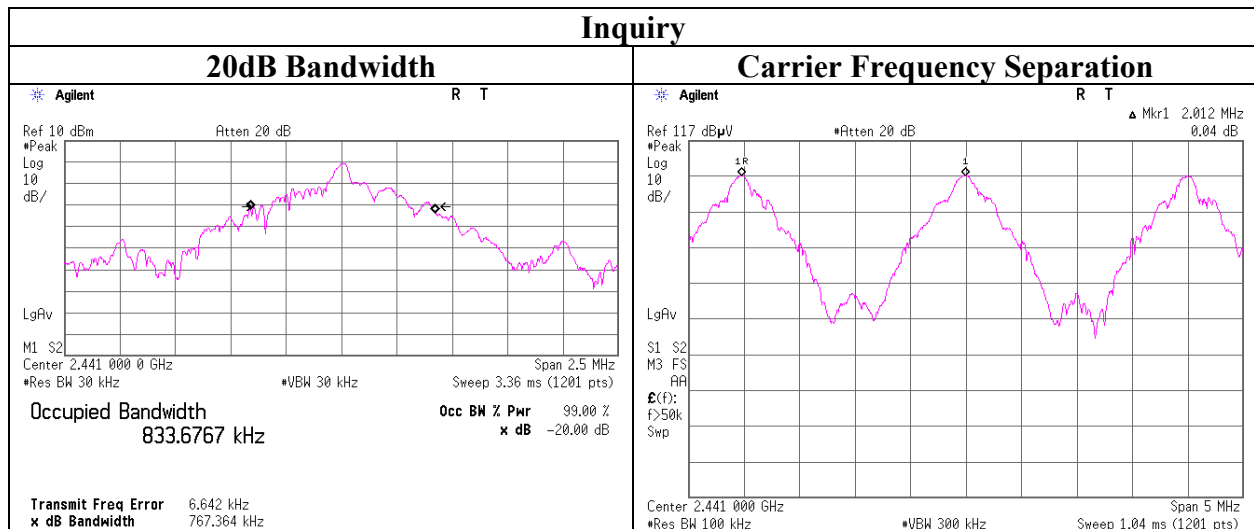
20dB Bandwidth and Carrier Frequency Separation

Test place Head Office EMC Lab. No.6 and 7 Measurement Room
Report No. 29LE0057-HO-01
Date 08/27/2009 09/01/2009
Temperature/ Humidity 26 deg.C./ 56% 23 deg.C./ 56%
Engineer Satofumi Matsuyama Satofumi Matsuyama
Mode Tx (Hopping on/off) DH5/3DH5/Inquiry

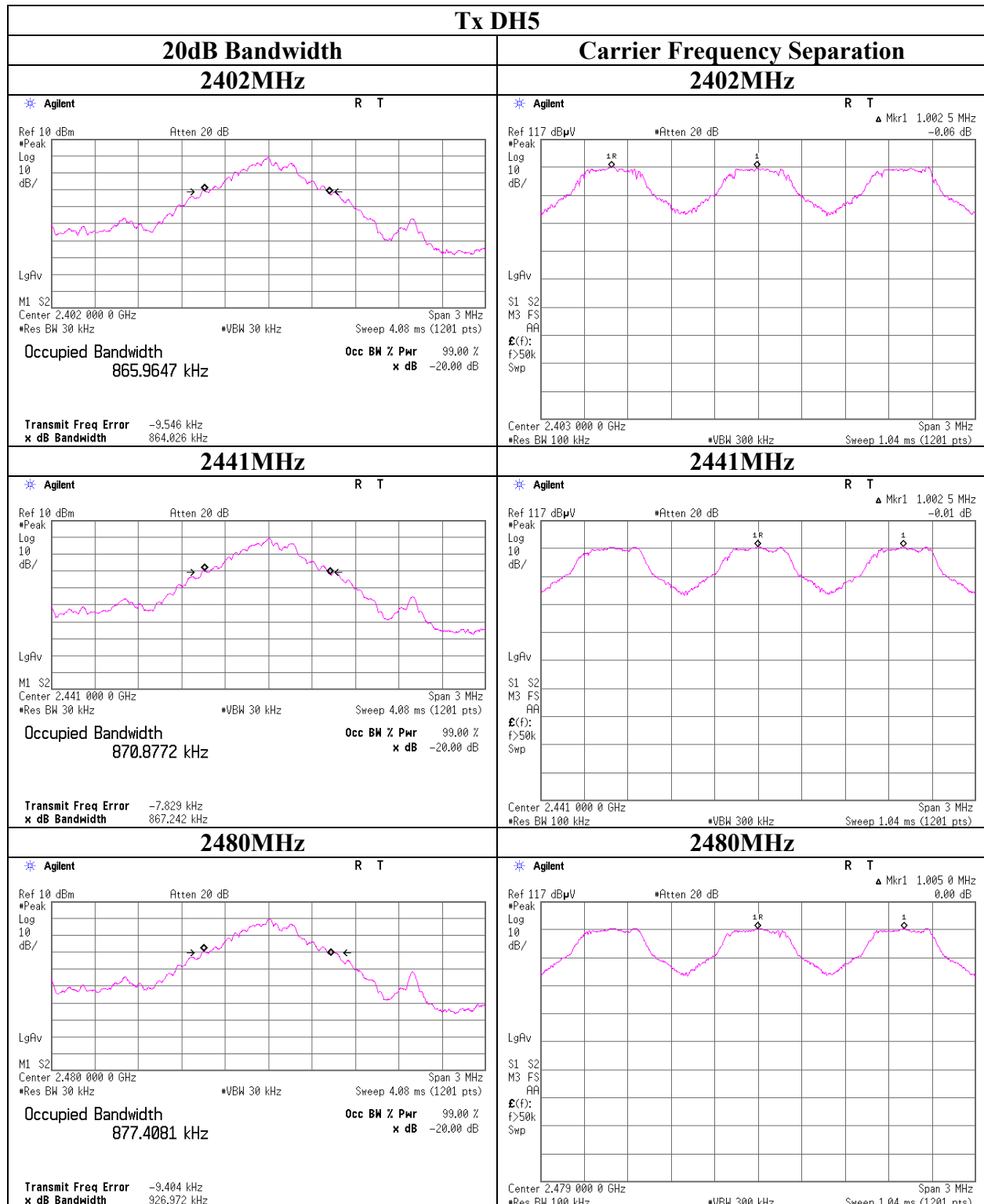
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.864	1.003	≥ 0.576
DH5	2441.0	0.867	1.003	≥ 0.578
DH5	2480.0	0.927	1.005	≥ 0.618
3DH5	2402.0	1.219	1.005	≥ 0.813
3DH5	2441.0	1.218	1.000	≥ 0.812
3DH5	2480.0	1.223	1.005	≥ 0.815
Inquiry	2441.0	0.767	2.012	≥ 0.512

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

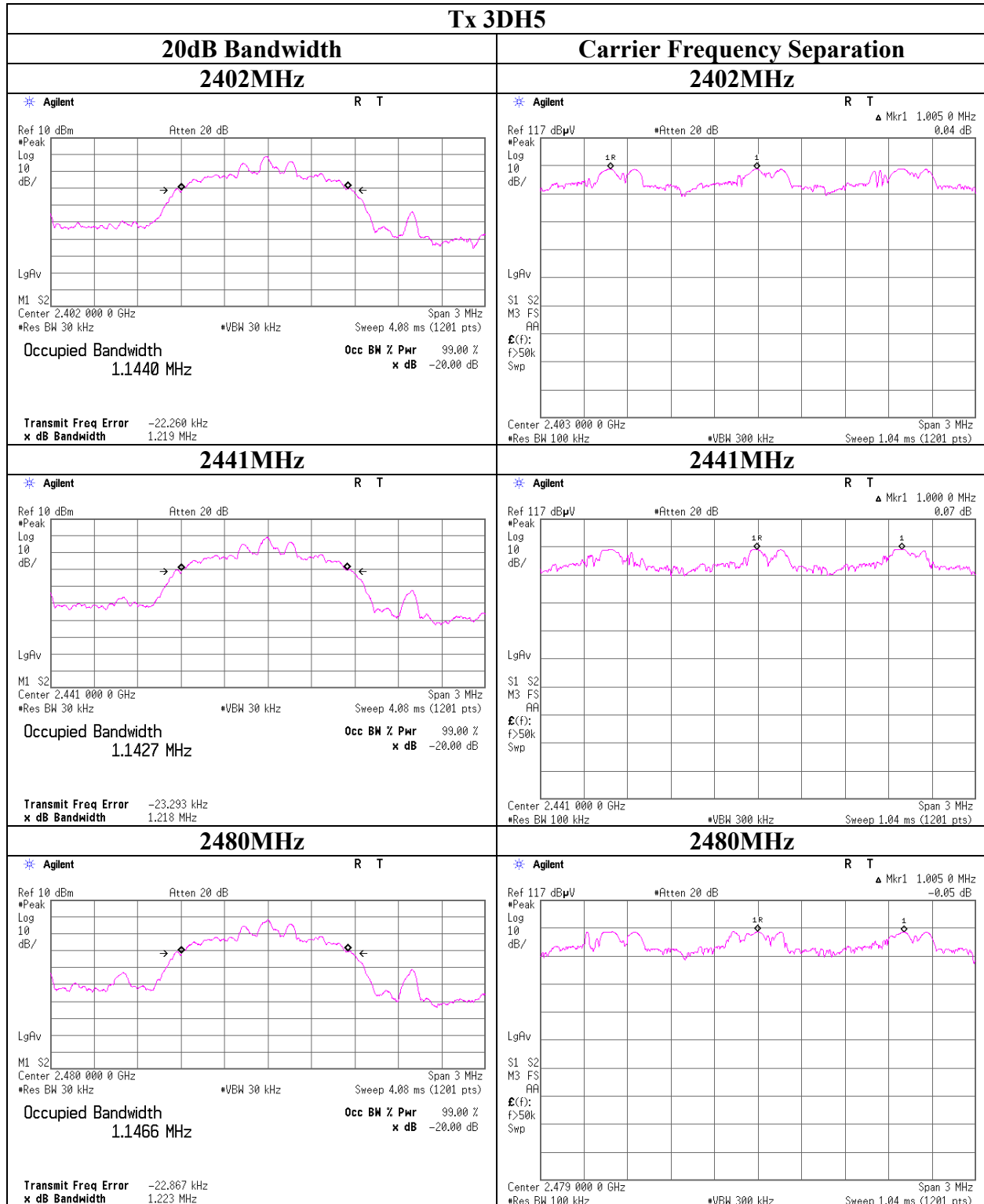
No limit applies to 20dB Bandwidth.



20dB Bandwidth and Carrier Frequency Separation



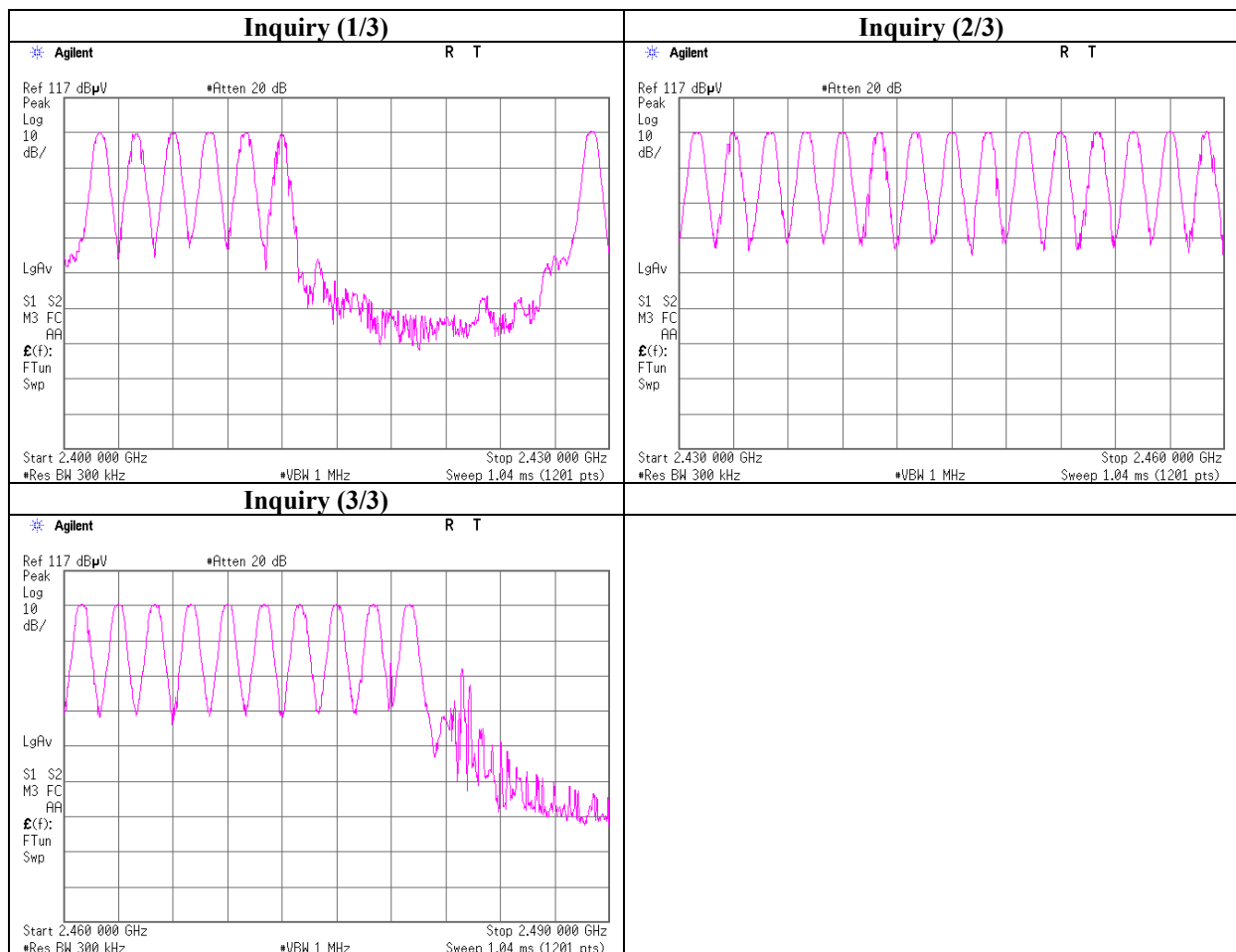
20dB Bandwidth and Carrier Frequency Separation



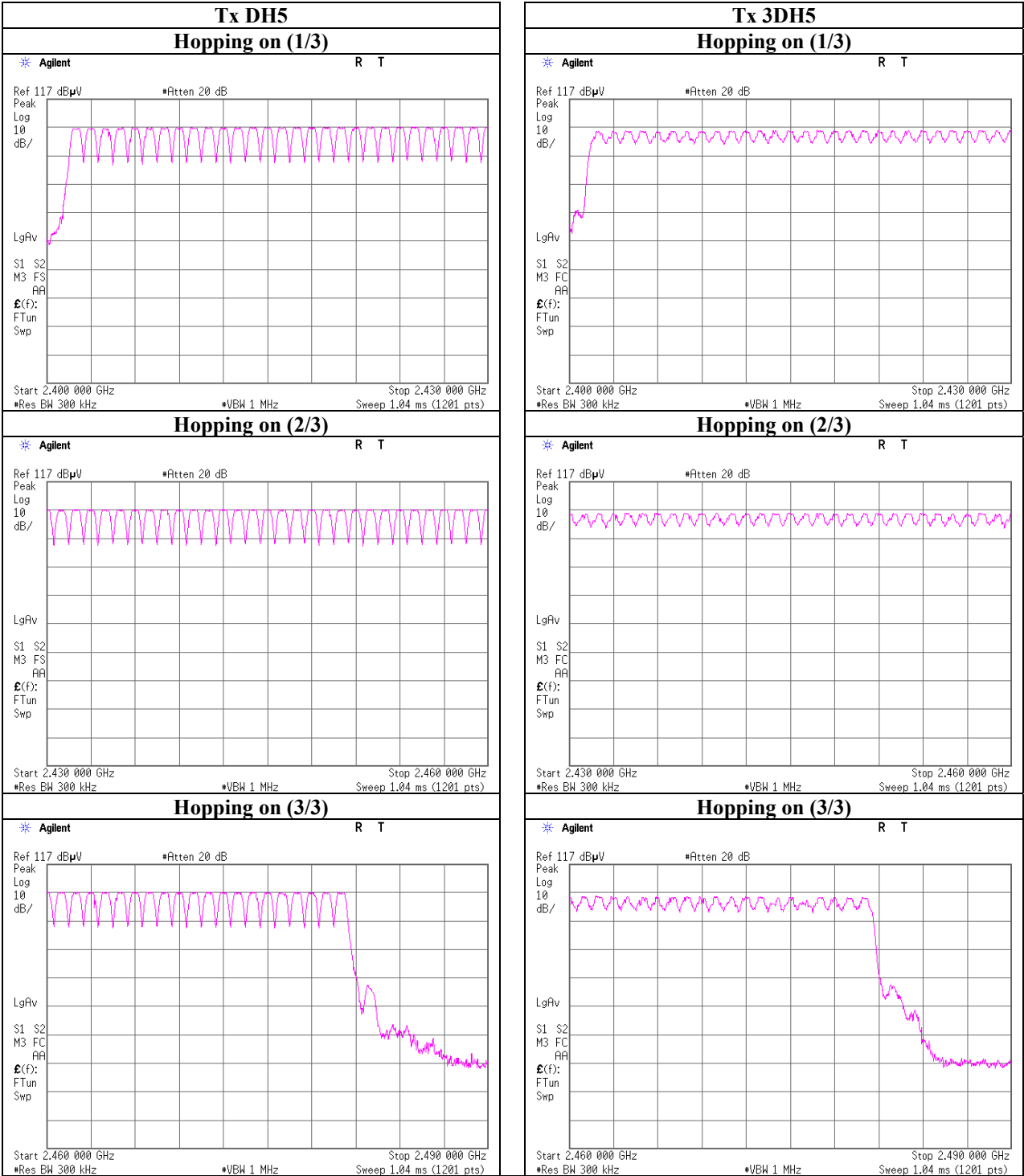
Number of Hopping Frequency

Test place	Head Office EMC Lab. No.7 Measurement Room
Report No.	29LE0057-HO-01
Date	09/01/2009
Temperature/ Humidity	23 deg.C./ 56%
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

Mode	Number of channel [times]	Limit [times]
DH5	79	>= 15
3DH5	79	>= 15
Inquiry	32	>= 15



Number of Hopping Frequency



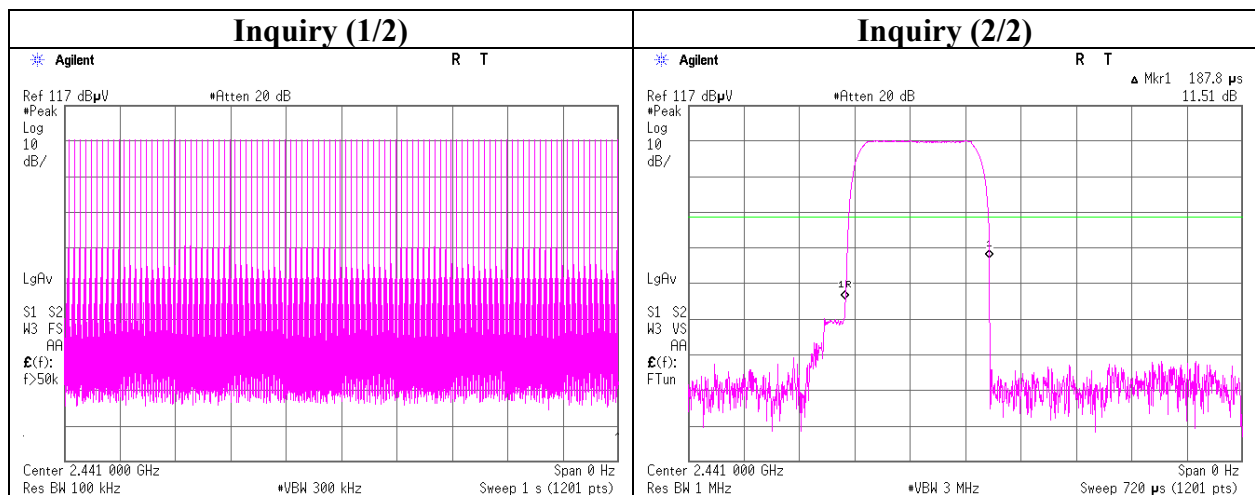
Dwell time

Test place	Head Office EMC Lab. No.7 Measurement Room
Report No.	29LE0057-HO-01
Date	09/01/2009
Temperature/ Humidity	23 deg.C./ 56%
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on) DH1, DH3, DH5/ 3DH1, 3DH3, 3DH5/Inquiry

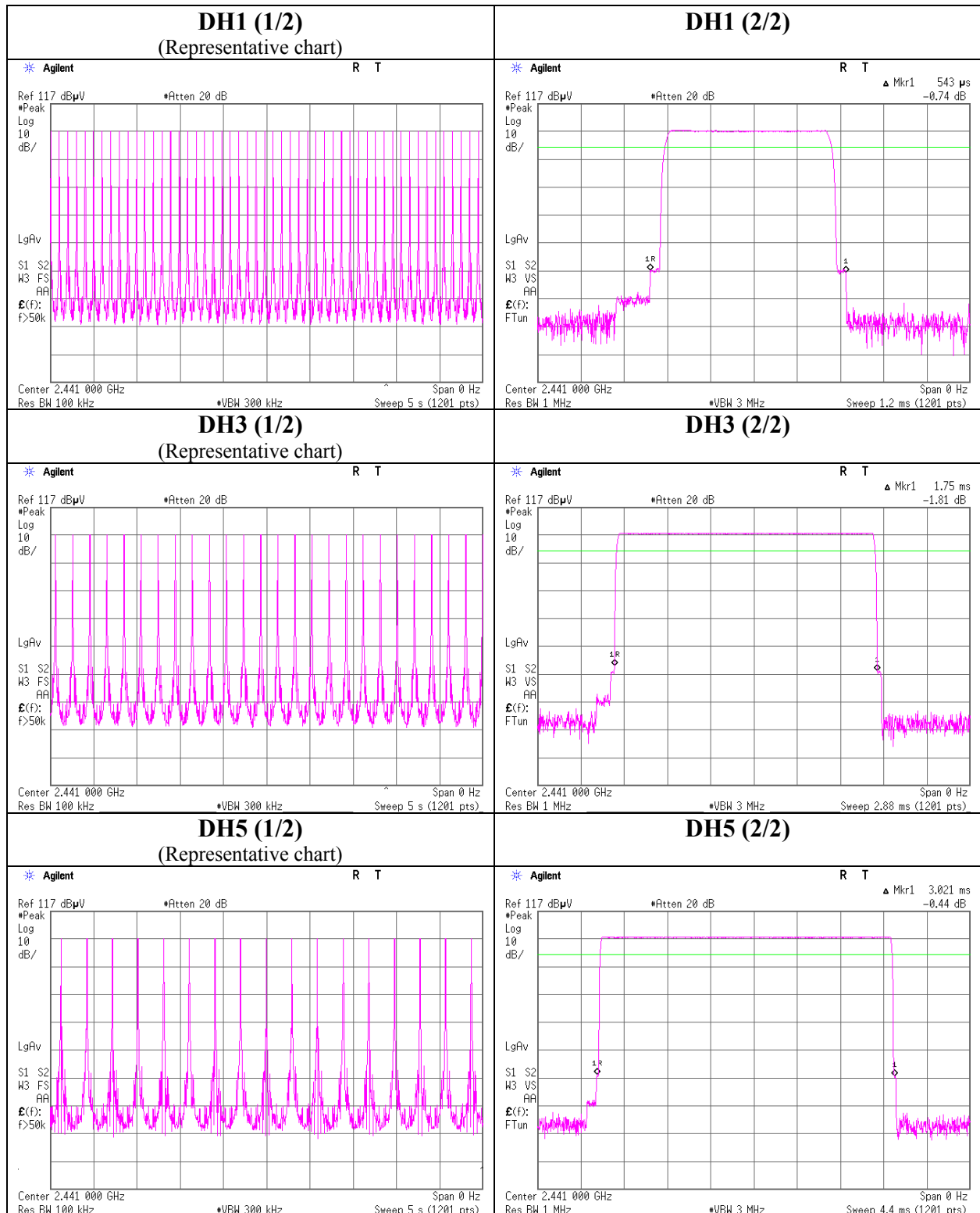
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period				Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	51.0 times	/	5 sec. x	31.6 sec. = 323 times	0.543	175	400
DH3	25.0 times	/	5 sec. x	31.6 sec. = 158 times	1.750	277	400
DH5	17.0 times	/	5 sec. x	31.6 sec. = 108 times	3.021	326	400
3DH1	51.0 times	/	5 sec. x	31.6 sec. = 323 times	0.542	175	400
3DH3	26.0 times	/	5 sec. x	31.6 sec. = 165 times	1.747	288	400
3DH5	17.0 times	/	5 sec. x	31.6 sec. = 108 times	2.993	323	400
Inquiry	100.0 times	/	1 sec. x	12.8 sec. = 1280 times	0.188	241	400

Sample Calculation

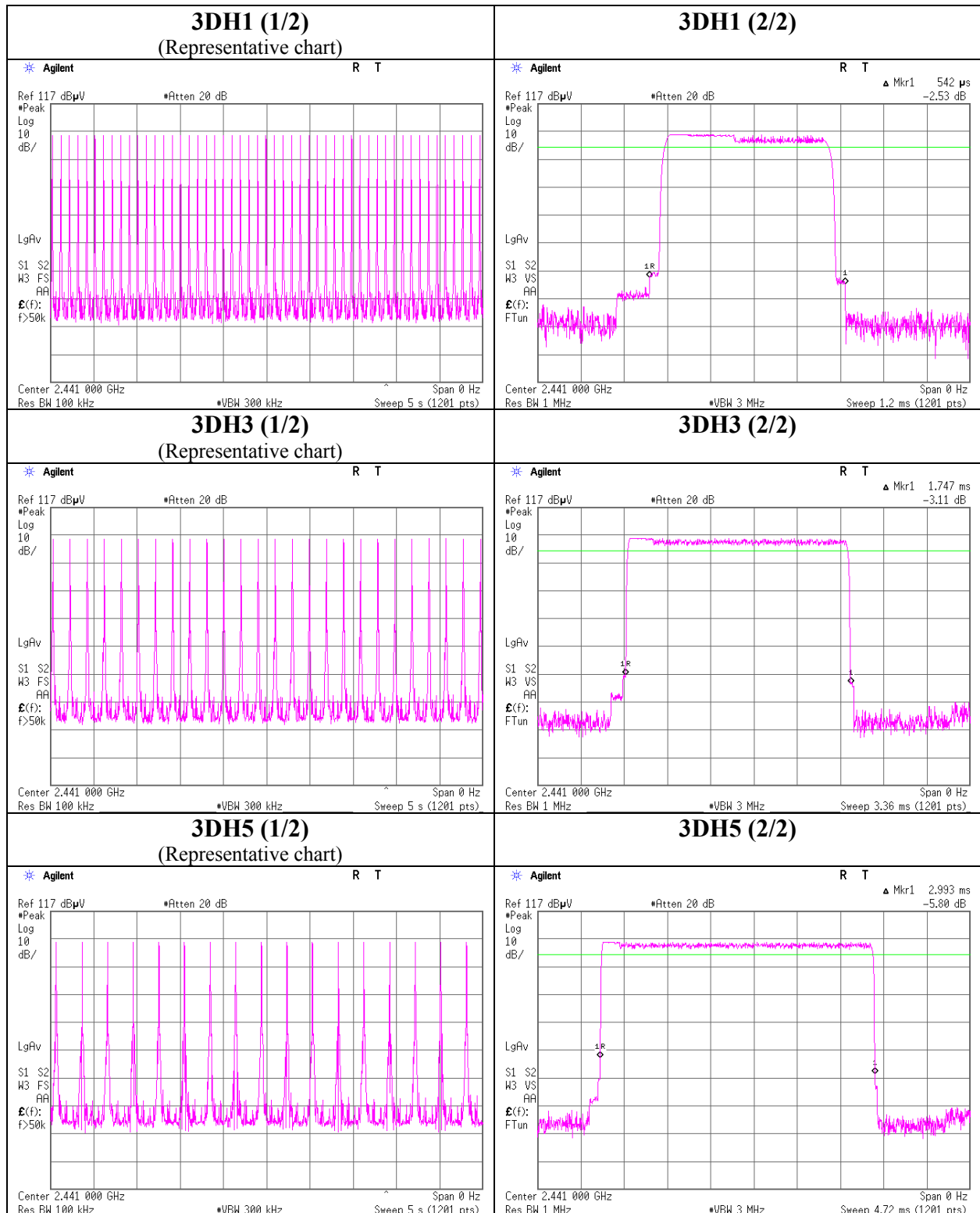
Result = Number of transmission x Length of transmission time



Dwell time



Dwell time



Maximum Peak Output Power

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 29LE0057-HO-01
Date 08/27/2009
Temperature/ Humidity 26 deg.C./ 56%
Engineer Satofumi Matsuyama
Mode Tx (Hopping off) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-0.35	1.33	10.02	11.00	12.59	20.97	125	9.97
DH5	2441.0	0.05	1.34	10.02	11.41	13.84	20.97	125	9.56
DH5	2480.0	0.03	1.35	10.02	11.40	13.80	20.97	125	9.57
3DH5	2402.0	-1.56	1.33	10.02	9.79	9.53	20.97	125	11.18
3DH5	2441.0	-1.39	1.34	10.02	9.97	9.93	20.97	125	11.00
3DH5	2480.0	-1.77	1.35	10.02	9.60	9.12	20.97	125	11.37
Inquiry	2441.0	-0.23	1.34	10.02	11.13	12.97	20.97	125	9.84

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	29LE0057-HO-01	
Date	08/30/2009	08/28/2009
Temperature/ Humidity	25 deg.C./ 65%	24 deg.C./ 59%
Engineer	Takumi Shimada	Hiroyuki Furutaka
	(30-1000MHz)	(1-26.5GHz)
Mode	Tx, DH5 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.018	QP	34.5	13.2	8.5	32.1	24.1	43.5	19.4	
Hori	224.614	QP	39.4	17.0	9.3	31.9	33.8	46.0	12.2	
Hori	249.578	QP	36.5	17.6	9.5	31.9	31.7	46.0	14.3	
Hori	311.962	QP	37.7	16.5	10.0	31.9	32.3	46.0	13.7	
Hori	324.431	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Hori	336.914	QP	39.4	16.9	10.2	32.0	34.5	46.0	11.5	
Hori	1602.025	PK	55.2	25.4	2.4	33.7	49.3	73.9	24.6	
Hori	2390.000	PK	48.1	26.7	2.8	32.7	44.9	73.9	29.0	
Hori	2400.000	PK	69.3	26.7	2.8	32.7	66.1	73.9	7.8	
Hori	4804.000	PK	53.1	30.8	5.3	31.9	57.3	73.9	16.6	
Hori	7206.000	PK	41.1	35.9	5.6	32.6	50.0	73.9	23.9	
Hori	9608.000	PK	41.8	37.9	6.7	33.4	53.0	73.9	20.9	
Hori	24020.000	PK	44.1	38.1	-1.1	32.5	48.6	73.9	25.3	
Hori	1602.025	AV	53.0	25.4	2.4	33.7	47.1	53.9	6.8	See 20dB Date Sheet
Hori	2390.000	AV	38.4	26.7	2.8	32.7	35.2	53.9	18.7	
Hori	2400.000	AV	63.7	26.7	2.8	32.7	60.5	-	-	
Hori	4804.000	AV	45.9	30.8	5.3	31.9	50.1	53.9	3.8	
Hori	7206.000	AV	29.4	35.9	5.6	32.6	38.3	53.9	15.6	
Hori	9608.000	AV	29.8	37.9	6.7	33.4	41.0	53.9	12.9	
Hori	24020.000	AV	31.3	38.1	-1.1	32.5	35.8	53.9	18.1	
Vert	128.025	QP	38.8	13.2	8.5	32.1	28.4	43.5	15.1	
Vert	224.606	QP	37.9	17.0	9.3	31.9	32.3	46.0	13.7	
Vert	249.581	QP	32.2	17.6	9.5	31.9	27.4	46.0	18.6	
Vert	311.983	QP	40.3	16.5	10.0	31.9	34.9	46.0	11.1	
Vert	324.439	QP	40.9	16.7	10.1	31.9	35.8	46.0	10.2	
Vert	336.923	QP	40.5	16.9	10.2	32.0	35.6	46.0	10.4	
Vert	1602.027	PK	56.0	25.4	2.4	33.7	50.1	73.9	23.8	
Vert	2390.000	PK	44.7	26.7	2.8	32.7	41.5	73.9	32.4	
Vert	2400.000	PK	66.2	26.7	2.8	32.7	63.0	73.9	10.9	
Vert	4804.000	PK	47.4	30.8	5.3	31.9	51.6	73.9	22.3	
Vert	7206.000	PK	42.2	35.9	5.6	32.6	51.1	73.9	22.8	
Vert	9608.000	PK	41.4	37.9	6.7	33.4	52.6	73.9	21.3	
Vert	24020.000	PK	44.3	38.1	-1.1	32.5	48.8	73.9	25.1	
Vert	1602.027	AV	54.7	25.4	2.4	33.7	48.8	53.9	5.1	See 20dB Date Sheet
Vert	2390.000	AV	35.2	26.7	2.8	32.7	32.0	53.9	21.9	
Vert	2400.000	AV	61.6	26.7	2.8	32.7	58.4	-	-	
Vert	4804.000	AV	37.1	30.8	5.3	31.9	41.3	53.9	12.6	
Vert	7206.000	AV	29.4	35.9	5.6	32.6	38.3	53.9	15.6	
Vert	9608.000	AV	29.4	37.9	6.7	33.4	40.6	53.9	13.3	
Vert	24020.000	AV	31.5	38.1	-1.1	32.5	36.0	53.9	17.9	

*Other frequency noises omitted in this report were not seen or had 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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	29LE0057-HO-01	
Date	08/30/2009	08/28/2009
Temperature/ Humidity	25 deg.C./ 65%	24 deg.C./ 59%
Engineer	Takumi Shimada	Hiroyuki Furutaka
	(30-1000MHz)	(1-26.5GHz)
Mode	Tx, DH5 2402MHz	

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2402.000	PK	104.6	26.7	2.8	32.7	101.4	-	-	Carrier
Hori	2400.000	PK	68.0	26.7	2.8	32.7	64.8	81.4	16.6	
Veri	2402.000	PK	102.7	26.7	2.8	32.7	99.5	-	-	Carrier
Veri	2400.000	PK	65.6	26.7	2.8	32.7	62.4	79.5	17.1	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	29LE0057-HO-01	
Date	08/30/2009	08/28/2009
Temperature/ Humidity	25 deg.C./ 65%	24 deg.C./ 59%
Engineer	Takumi Shimada	Hiroyuki Furutaka
	(30-1000MHz)	(1-26.5GHz)
Mode	Tx, DH5 2441MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.014	QP	34.2	13.2	8.5	32.1	23.8	43.5	19.7	
Hori	224.603	QP	39.6	17.0	9.3	31.9	34.0	46.0	12.0	
Hori	249.581	QP	36.6	17.6	9.5	31.9	31.8	46.0	14.2	
Hori	311.976	QP	36.4	16.5	10.0	31.9	31.0	46.0	15.0	
Hori	324.447	QP	39.8	16.7	10.1	31.9	34.7	46.0	11.3	
Hori	336.912	QP	39.1	16.9	10.2	32.0	34.2	46.0	11.8	
Hori	1627.977	PK	56.1	25.5	2.4	33.7	50.3	73.9	23.6	
Hori	4882.000	PK	49.5	31.1	5.3	31.9	54.0	73.9	19.9	
Hori	7323.000	PK	41.5	36.1	5.6	32.6	50.6	73.9	23.3	
Hori	9764.000	PK	42.1	38.1	6.9	33.4	53.7	73.9	20.2	
Hori	24410.000	PK	43.7	38.3	-1.1	32.3	48.6	73.9	25.3	
Hori	1627.977	AV	53.9	25.5	2.4	33.7	48.1	53.9	5.8	
Hori	4882.000	AV	38.4	31.1	5.3	31.9	42.9	53.9	11.0	
Hori	7323.000	AV	29.1	36.1	5.6	32.6	38.2	53.9	15.7	
Hori	9764.000	AV	29.0	38.1	6.9	33.4	40.6	53.9	13.3	
Hori	24410.000	AV	31.0	38.3	-1.1	32.3	35.9	53.9	18.0	
Vert	128.028	QP	38.4	13.2	8.5	32.1	28.0	43.5	15.5	
Vert	224.611	QP	38.1	17.0	9.3	31.9	32.5	46.0	13.5	
Vert	249.584	QP	32.8	17.6	9.5	31.9	28.0	46.0	18.0	
Vert	311.981	QP	40.0	16.5	10.0	31.9	34.6	46.0	11.4	
Vert	324.442	QP	40.4	16.7	10.1	31.9	35.3	46.0	10.7	
Vert	336.918	QP	40.6	16.9	10.2	32.0	35.7	46.0	10.3	
Vert	1628.000	PK	55.0	25.5	2.4	33.7	49.2	73.9	24.7	
Vert	4882.000	PK	45.5	31.1	5.3	31.9	50.0	73.9	23.9	
Vert	7323.000	PK	41.5	36.1	5.6	32.6	50.6	73.9	23.3	
Vert	9764.000	PK	41.8	38.1	6.9	33.4	53.4	73.9	20.5	
Vert	24410.000	PK	44.1	38.3	-1.1	32.3	49.0	73.9	24.9	
Vert	1628.000	AV	53.1	25.5	2.4	33.7	47.3	53.9	6.6	
Vert	4882.000	AV	34.7	31.1	5.3	31.9	39.2	53.9	14.7	
Vert	7323.000	AV	29.2	36.1	5.6	32.6	38.3	53.9	15.6	
Vert	9764.000	AV	29.0	38.1	6.9	33.4	40.6	53.9	13.3	
Vert	24410.000	AV	30.9	38.3	-1.1	32.3	35.8	53.9	18.1	

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 had 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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	29LE0057-HO-01	
Date	08/30/2009	08/28/2009
Temperature/ Humidity	25 deg.C./ 65%	24 deg.C./ 59%
Engineer	Takumi Shimada	Hiroyuki Furutaka
	(30-1000MHz)	(1-26.5GHz)
Mode	Tx, DH5 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.021	QP	34.3	13.2	8.5	32.1	23.9	43.5	19.6	
Hori	224.615	QP	39.4	17.0	9.3	31.9	33.8	46.0	12.2	
Hori	249.572	QP	36.2	17.6	9.5	31.9	31.4	46.0	14.6	
Hori	311.980	QP	36.9	16.5	10.0	31.9	31.5	46.0	14.5	
Hori	324.431	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Hori	336.911	QP	38.8	16.9	10.2	32.0	33.9	46.0	12.1	
Hori	1654.060	PK	56.5	25.5	2.4	33.6	50.8	73.9	23.1	
Hori	2483.500	PK	62.5	26.9	2.8	32.7	59.5	73.9	14.4	
Hori	4960.000	PK	46.8	31.3	5.3	31.9	51.5	73.9	22.4	
Hori	7440.000	PK	41.6	36.3	5.7	32.7	50.9	73.9	23.0	
Hori	9920.000	PK	41.9	38.3	7.0	33.5	53.7	73.9	20.2	
Hori	24800.000	PK	46.1	38.4	-1.0	32.2	51.3	73.9	22.6	
Hori	1654.060	AV	54.7	25.5	2.4	33.6	49.0	53.9	4.9	
Hori	2483.500	AV	52.7	26.9	2.8	32.7	49.7	53.9	4.2	
Hori	4960.000	AV	38.6	31.3	5.3	31.9	43.3	53.9	10.6	
Hori	7440.000	AV	29.2	36.3	5.7	32.7	38.5	53.9	15.4	
Hori	9920.000	AV	29.1	38.3	7.0	33.5	40.9	53.9	13.0	
Hori	24800.000	AV	33.0	38.4	-1.0	32.2	38.2	53.9	15.7	
Vert	128.022	QP	39.8	13.2	8.5	32.1	29.4	43.5	14.1	
Vert	224.610	QP	38.7	17.0	9.3	31.9	33.1	46.0	12.9	
Vert	249.582	QP	32.1	17.6	9.5	31.9	27.3	46.0	18.7	
Vert	311.983	QP	40.1	16.5	10.0	31.9	34.7	46.0	11.3	
Vert	324.442	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Vert	336.916	QP	40.8	16.9	10.2	32.0	35.9	46.0	10.1	
Vert	1654.007	PK	54.9	25.5	2.4	33.6	49.2	73.9	24.7	
Vert	2483.500	PK	60.9	26.9	2.8	32.7	57.9	73.9	16.0	
Vert	2483.500	PK	60.9	26.9	2.8	32.7	57.9	73.9	16.0	
Vert	4960.000	PK	45.2	31.3	5.3	31.9	49.9	73.9	24.0	
Vert	7440.000	PK	41.5	36.3	5.7	32.7	50.8	73.9	23.1	
Vert	9920.000	PK	41.3	38.3	7.0	33.5	53.1	73.9	20.8	
Vert	24800.000	PK	46.5	38.4	-1.0	32.2	51.7	73.9	22.2	
Vert	1654.007	AV	52.6	25.5	2.4	33.6	46.9	53.9	7.0	
Vert	2483.500	AV	50.8	26.9	2.8	32.7	47.8	53.9	6.1	
Vert	4960.000	AV	37.9	31.3	5.3	31.9	42.6	53.9	11.3	
Vert	7440.000	AV	29.2	36.3	5.7	32.7	38.5	53.9	15.4	
Vert	9920.000	AV	28.9	38.3	7.0	33.5	40.7	53.9	13.2	
Vert	24800.000	AV	32.9	38.4	-1.0	32.2	38.1	53.9	15.8	

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 had 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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 29LE0057-HO-01
Date 08/30/2009 08/28/2009
Temperature/ Humidity 25 deg.C./ 65% 24 deg.C./ 59%
Engineer Takumi Shimada Hiroyuki Furutaka
(30-1000MHz) (1-26.5GHz)
Mode Tx, 3DH5 2402MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.009	QP	35.1	13.2	8.5	32.1	24.7	43.5	18.8	
Hori	224.611	QP	39.1	17.0	9.3	31.9	33.5	46.0	12.5	
Hori	249.570	QP	36.3	17.6	9.5	31.9	31.5	46.0	14.5	
Hori	311.955	QP	37.0	16.5	10.0	31.9	31.6	46.0	14.4	
Hori	324.434	QP	40.1	16.7	10.1	31.9	35.0	46.0	11.0	
Hori	336.909	QP	41.8	16.9	10.2	32.0	36.9	46.0	9.1	
Hori	1601.923	PK	55.9	25.4	2.4	33.7	50.0	73.9	23.9	
Hori	2390.000	PK	47.6	26.7	2.8	32.7	44.4	73.9	29.5	
Hori	2400.000	PK	72.1	26.7	2.8	32.7	68.9	73.9	5.0	
Hori	4804.000	PK	51.4	30.8	5.3	31.9	55.6	73.9	18.3	
Hori	7206.000	PK	40.9	35.9	5.6	32.6	49.8	73.9	24.1	
Hori	9608.000	PK	41.9	37.9	6.7	33.4	53.1	73.9	20.8	
Hori	24020.000	PK	45.2	38.1	-1.1	32.5	49.7	73.9	24.2	
Hori	1601.923	AV	53.6	25.4	2.4	33.7	47.7	53.9	6.2	See 20dBc Data Sheet
Hori	2390.000	AV	36.4	26.7	2.8	32.7	33.2	53.9	20.7	
Hori	2400.000	AV	61.6	26.7	2.8	32.7	58.4	-	-	
Hori	4804.000	AV	38.9	30.8	5.3	31.9	43.1	53.9	10.8	
Hori	7206.000	AV	29.5	35.9	5.6	32.6	38.4	53.9	15.5	
Hori	9608.000	AV	29.5	37.9	6.7	33.4	40.7	53.9	13.2	
Hori	24020.000	AV	31.5	38.1	-1.1	32.5	36.0	53.9	17.9	
Vert	128.007	QP	39.7	13.2	8.5	32.1	29.3	43.5	14.2	
Vert	224.600	QP	38.0	17.0	9.3	31.9	32.4	46.0	13.6	
Vert	249.573	QP	32.4	17.6	9.5	31.9	27.6	46.0	18.4	
Vert	311.956	QP	39.3	16.5	10.0	31.9	33.9	46.0	12.1	
Vert	324.424	QP	40.0	16.7	10.1	31.9	34.9	46.0	11.1	
Vert	336.903	QP	40.3	16.9	10.2	32.0	35.4	46.0	10.6	
Vert	1602.077	PK	55.1	25.4	2.4	33.7	49.2	73.9	24.7	
Vert	2390.000	PK	46.3	26.7	2.8	32.7	43.1	73.9	30.8	
Vert	2400.000	PK	69.4	26.7	2.8	32.7	66.2	73.9	7.7	
Vert	4804.000	PK	45.4	30.8	5.3	31.9	49.6	73.9	24.3	
Vert	7206.000	PK	42.4	35.9	5.6	32.6	51.3	73.9	22.6	
Vert	9608.000	PK	41.2	37.9	6.7	33.4	52.4	73.9	21.5	
Vert	24020.000	PK	44.8	38.1	-1.1	32.5	49.3	73.9	24.6	
Vert	1602.077	AV	53.0	25.4	2.4	33.7	47.1	53.9	6.8	See 20dBc Data Sheet
Vert	2390.000	AV	35.4	26.7	2.8	32.7	32.2	53.9	21.7	
Vert	2400.000	AV	60.2	26.7	2.8	32.7	57.0	-	-	
Vert	4804.000	AV	32.1	30.8	5.3	31.9	36.3	53.9	17.6	
Vert	7206.000	AV	29.5	35.9	5.6	32.6	38.4	53.9	15.5	
Vert	9608.000	AV	29.7	37.9	6.7	33.4	40.9	53.9	13.0	
Vert	24020.000	AV	31.6	38.1	-1.1	32.5	36.1	53.9	17.8	

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 had 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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 29LE0057-HO-01
Date 08/30/2009 08/28/2009
Temperature/ Humidity 25 deg.C./ 65% 24 deg.C./ 59%
Engineer Takumi Shimada Hiroyuki Furutaka
(30-1000MHz) (1-26.5GHz)
Mode Tx, 3DH5 2402MHz

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2402.000	PK	103.5	26.7	2.8	32.7	100.3	-	-	Carrier
Hori	2400.000	PK	70.8	26.7	2.8	32.7	67.6	80.3	12.7	
Vert	2402.000	PK	102.0	26.7	2.8	32.7	98.8	-	-	Carrier
Vert	2400.000	PK	69.4	26.7	2.8	32.7	66.2	78.8	12.6	

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 29LE0057-HO-01
Date 08/30/2009 08/28/2009
Temperature/ Humidity 25 deg.C./ 65% 24 deg.C./ 59%
Engineer Takumi Shimada Hiroyuki Furutaka
(30-1000MHz) (1-26.5GHz)
Mode Tx, 3DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.007	QP	35.0	13.2	8.5	32.1	24.6	43.5	18.9	
Hori	224.613	QP	39.0	17.0	9.3	31.9	33.4	46.0	12.6	
Hori	249.571	QP	36.5	17.6	9.5	31.9	31.7	46.0	14.3	
Hori	311.954	QP	36.7	16.5	10.0	31.9	31.3	46.0	14.7	
Hori	324.433	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Hori	336.906	QP	40.9	16.9	10.2	32.0	36.0	46.0	10.0	
Hori	1627.890	PK	56.1	25.5	2.4	33.7	50.3	73.9	23.6	
Hori	4882.000	PK	50.4	31.1	5.3	31.9	54.9	73.9	19.0	
Hori	7323.000	PK	42.9	36.1	5.6	32.6	52.0	73.9	21.9	
Hori	9764.000	PK	42.6	38.1	6.9	33.4	54.2	73.9	19.7	
Hori	24410.000	PK	43.9	38.3	-1.1	32.3	48.8	73.9	25.1	
Hori	1627.890	AV	54.0	25.5	2.4	33.7	48.2	53.9	5.7	
Hori	4882.000	AV	32.7	31.1	5.3	31.9	37.2	53.9	16.7	
Hori	7323.000	AV	29.5	36.1	5.6	32.6	38.6	53.9	15.3	
Hori	9764.000	AV	29.2	38.1	6.9	33.4	40.8	53.9	13.1	
Hori	24410.000	AV	30.8	38.3	-1.1	32.3	35.7	53.9	18.2	
Vert	128.005	QP	39.8	13.2	8.5	32.1	29.4	43.5	14.1	
Vert	224.609	QP	37.8	17.0	9.3	31.9	32.2	46.0	13.8	
Vert	249.573	QP	33.2	17.6	9.5	31.9	28.4	46.0	17.6	
Vert	311.954	QP	39.2	16.5	10.0	31.9	33.8	46.0	12.2	
Vert	324.437	QP	40.0	16.7	10.1	31.9	34.9	46.0	11.1	
Vert	336.902	QP	40.2	16.9	10.2	32.0	35.3	46.0	10.7	
Vert	1627.960	PK	55.9	25.5	2.4	33.7	50.1	73.9	23.8	
Vert	4882.000	PK	44.4	31.1	5.3	31.9	48.9	73.9	25.0	
Vert	7323.000	PK	41.7	36.1	5.6	32.6	50.8	73.9	23.1	
Vert	9764.000	PK	41.7	38.1	6.9	33.4	53.3	73.9	20.6	
Vert	24410.000	PK	44.6	38.3	-1.1	32.3	49.5	73.9	24.4	
Vert	1627.960	AV	53.6	25.5	2.4	33.7	47.8	53.9	6.1	
Vert	4882.000	AV	29.2	31.1	5.3	31.9	33.7	53.9	20.2	
Vert	7323.000	AV	29.3	36.1	5.6	32.6	38.4	53.9	15.5	
Vert	9764.000	AV	29.0	38.1	6.9	33.4	40.6	53.9	13.3	
Vert	24410.000	AV	30.9	38.3	-1.1	32.3	35.8	53.9	18.1	

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 had 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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 29LE0057-HO-01
Date 08/30/2009 08/28/2009
Temperature/ Humidity 25 deg.C./ 65% 24 deg.C./ 59%
Engineer Takumi Shimada Hiroyuki Furutaka
(30-1000MHz) (1-26.5GHz)
Mode Tx, 3DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	128.010	QP	34.7	13.2	8.5	32.1	24.3	43.5	19.2	
Hori	224.605	QP	38.8	17.0	9.3	31.9	33.2	46.0	12.8	
Hori	249.578	QP	36.6	17.6	9.5	31.9	31.8	46.0	14.2	
Hori	311.961	QP	36.3	16.5	10.0	31.9	30.9	46.0	15.1	
Hori	324.436	QP	40.5	16.7	10.1	31.9	35.4	46.0	10.6	
Hori	336.917	QP	40.8	16.9	10.2	32.0	35.9	46.0	10.1	
Hori	1654.057	PK	56.5	25.5	2.4	33.6	50.8	73.9	23.1	
Hori	2483.500	PK	64.9	26.9	2.8	32.7	61.9	73.9	12.0	
Hori	4960.000	PK	45.6	31.3	5.3	31.9	50.3	73.9	23.6	
Hori	7440.000	PK	40.8	36.3	5.7	32.7	50.1	73.9	23.8	
Hori	9920.000	PK	41.9	38.3	7.0	33.5	53.7	73.9	20.2	
Hori	24800.000	PK	46.8	38.4	-1.0	32.2	52.0	73.9	21.9	
Hori	1654.057	AV	53.8	25.5	2.4	33.6	48.1	53.9	5.8	
Hori	2483.500	AV	54.8	26.9	2.8	32.7	51.8	53.9	2.1	
Hori	4960.000	AV	30.6	31.3	5.3	31.9	35.3	53.9	18.6	
Hori	7440.000	AV	30.0	36.3	5.7	32.7	39.3	53.9	14.6	
Hori	9920.000	AV	28.9	38.3	7.0	33.5	40.7	53.9	13.2	
Hori	24800.000	AV	33.0	38.4	-1.0	32.2	38.2	53.9	15.7	
Vert	128.007	QP	39.9	13.2	8.5	32.1	29.5	43.5	14.0	
Vert	224.607	QP	37.6	17.0	9.3	31.9	32.0	46.0	14.0	
Vert	249.577	QP	33.7	17.6	9.5	31.9	28.9	46.0	17.1	
Vert	311.958	QP	39.2	16.5	10.0	31.9	33.8	46.0	12.2	
Vert	324.431	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Vert	336.913	QP	40.1	16.9	10.2	32.0	35.2	46.0	10.8	
Vert	1654.003	PK	54.7	25.5	2.4	33.6	49.0	73.9	24.9	
Vert	2483.500	PK	63.6	26.9	2.8	32.7	60.6	73.9	13.3	
Vert	4960.000	PK	40.9	31.3	5.3	31.9	45.6	73.9	28.3	
Vert	7440.000	PK	41.4	36.3	5.7	32.7	50.7	73.9	23.2	
Vert	9920.000	PK	41.2	38.3	7.0	33.5	53.0	73.9	20.9	
Vert	24800.000	PK	47.4	38.4	-1.0	32.2	52.6	73.9	21.3	
Vert	1654.003	AV	52.9	25.5	2.4	33.6	47.2	53.9	6.7	
Vert	2483.500	AV	52.9	26.9	2.8	32.7	49.9	53.9	4.0	
Vert	4960.000	AV	29.0	31.3	5.3	31.9	33.7	53.9	20.2	
Vert	7440.000	AV	29.1	36.3	5.7	32.7	38.4	53.9	15.5	
Vert	9920.000	AV	28.9	38.3	7.0	33.5	40.7	53.9	13.2	
Vert	24800.000	AV	32.9	38.4	-1.0	32.2	38.1	53.9	15.8	

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 had enough margin (more than 20dB).

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. 29LE0057-HO-01
Date 08/30/2009 08/28/2009
Temperature/ Humidity 25 deg.C./ 65% 24 deg.C./ 59%
Engineer Takumi Shimada Hiroyuki Furutaka
(30-1000MHz) (1-10GHz)
Mode Rx 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	119.910	QP	37.4	12.8	8.4	32.1	26.5	43.5	17.0	
Hori	224.595	QP	39.5	17.0	9.3	31.9	33.9	46.0	12.1	
Hori	249.545	QP	37.3	17.6	9.5	31.9	32.5	46.0	13.5	
Hori	311.935	QP	37.7	16.5	10.0	31.9	32.3	46.0	13.7	
Hori	324.415	QP	40.5	16.7	10.1	31.9	35.4	46.0	10.6	
Hori	336.900	QP	42.2	16.9	10.2	32.0	37.3	46.0	8.7	
Hori	1626.442	PK	53.3	25.5	2.4	33.7	47.5	73.9	26.4	
Hori	2439.613	PK	48.3	26.8	2.8	32.7	45.2	73.9	28.7	
Hori	4882.000	PK	40.1	31.1	3.9	31.9	43.2	73.9	30.7	
Hori	7323.000	PK	41.9	36.1	4.2	32.6	49.6	73.9	24.3	
Hori	1626.442	AV	50.7	25.5	2.4	33.7	44.9	53.9	9.0	
Hori	2439.613	AV	44.1	26.8	2.8	32.7	41.0	53.9	12.9	
Hori	4882.000	AV	27.2	31.1	3.9	31.9	30.3	53.9	23.6	
Hori	7323.000	AV	29.0	36.1	4.2	32.6	36.7	53.9	17.2	
Vert	119.928	QP	40.2	12.8	8.4	32.1	29.3	43.5	14.2	
Vert	224.587	QP	38.2	17.0	9.3	31.9	32.6	46.0	13.4	
Vert	249.559	QP	32.4	17.6	9.5	31.9	27.6	46.0	18.4	
Vert	311.935	QP	39.5	16.5	10.0	31.9	34.1	46.0	11.9	
Vert	324.418	QP	40.2	16.7	10.1	31.9	35.1	46.0	10.9	
Vert	336.890	QP	40.5	16.9	10.2	32.0	35.6	46.0	10.4	
Vert	1626.303	PK	52.1	25.5	2.4	33.7	46.3	73.9	27.6	
Vert	2439.500	PK	45.9	26.8	2.8	32.7	42.8	73.9	31.1	
Vert	4882.000	PK	39.8	31.1	3.9	31.9	42.9	73.9	31.0	
Vert	7323.000	PK	41.5	36.1	4.2	32.6	49.2	73.9	24.7	
Vert	1626.303	AV	49.1	25.5	2.4	33.7	43.3	53.9	10.6	
Vert	2439.500	AV	38.7	26.8	2.8	32.7	35.6	53.9	18.3	
Vert	4882.000	AV	27.2	31.1	3.9	31.9	30.3	53.9	23.6	
Vert	7323.000	AV	29.0	36.1	4.2	32.6	36.7	53.9	17.2	

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

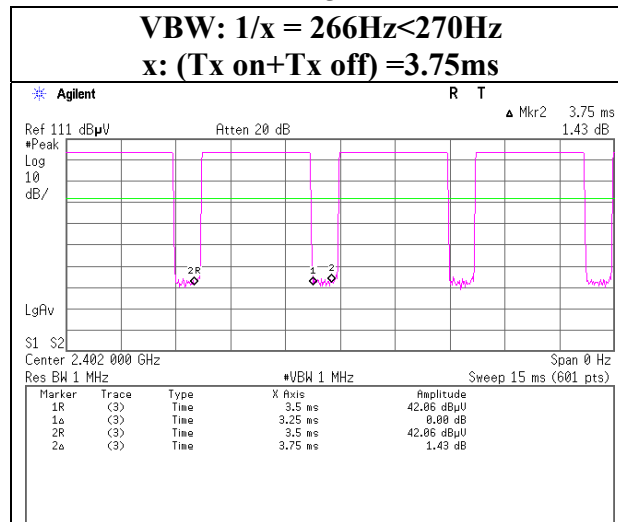
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

VBW (AV) Calculation

DH5

VBW: 1/x = 266Hz<270Hz

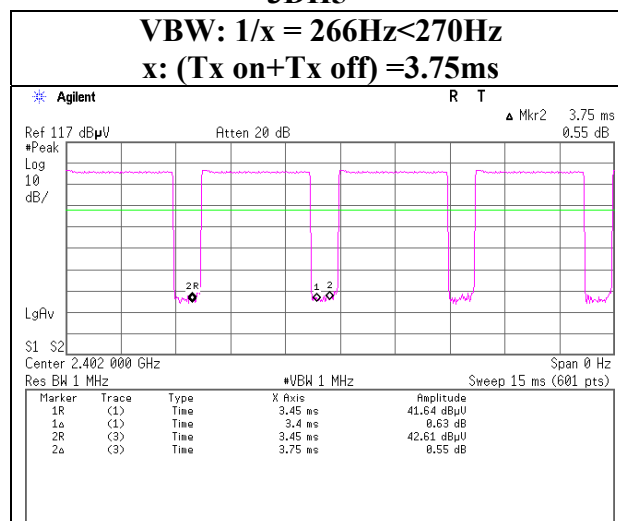
x: (T_{x on}+T_{x off})=3.75ms



3DH5

VBW: 1/x = 266Hz<270Hz

x: (T_{x on}+T_{x off}) =3.75ms



UL Japan, Inc.

Head Office EMC Lab.

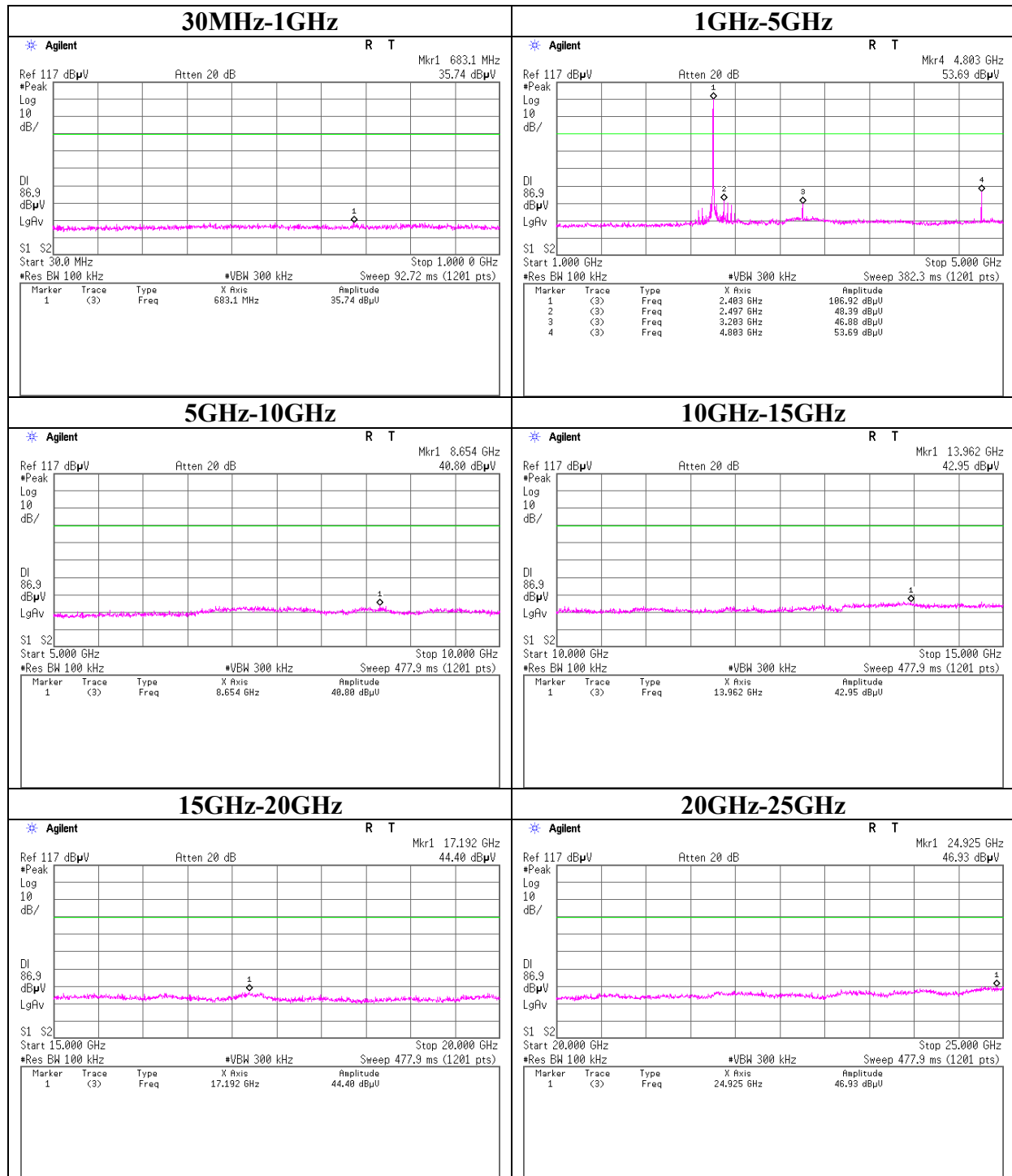
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

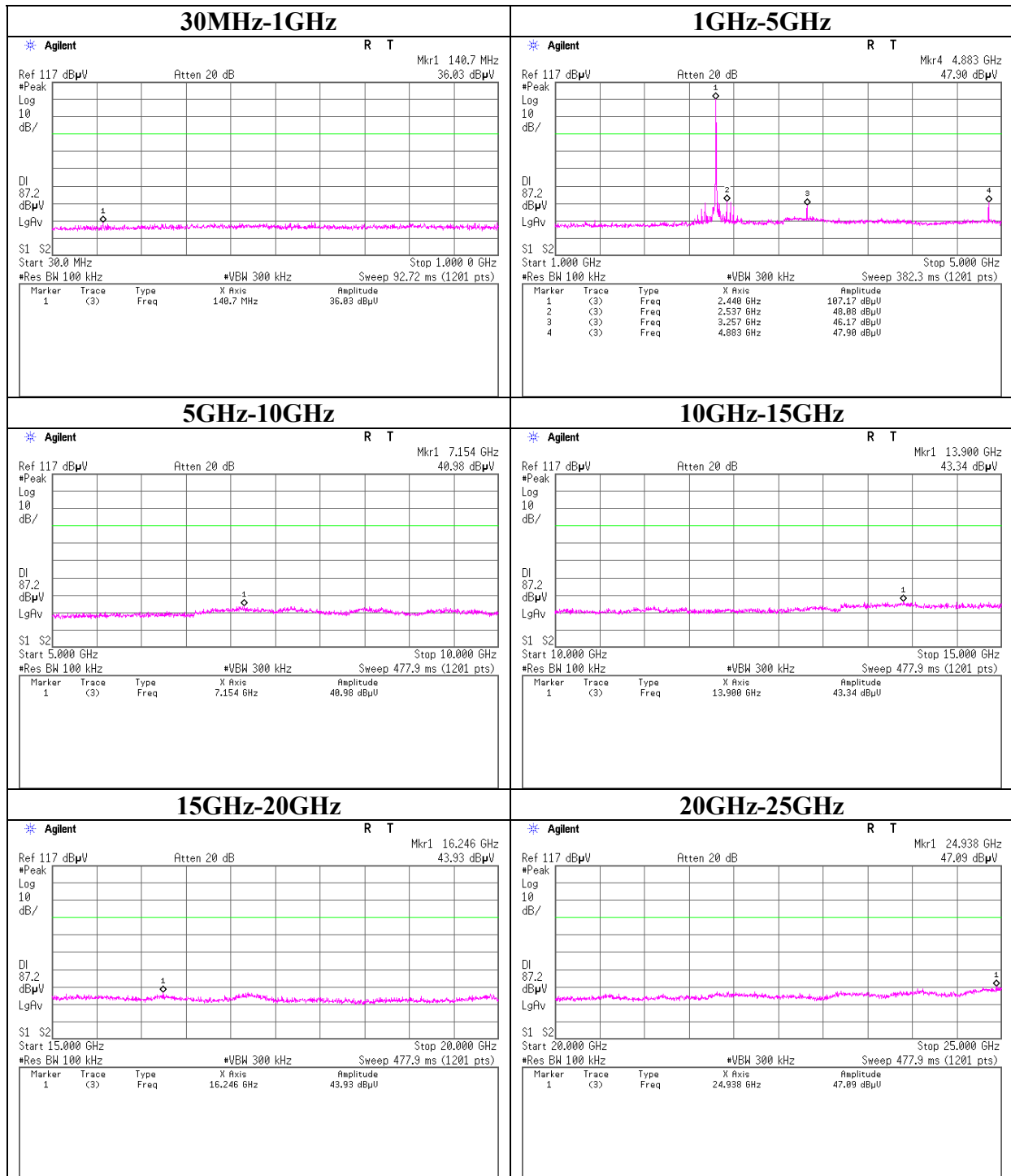
Conducted Spurious Emission

Tx DH5 2402MHz



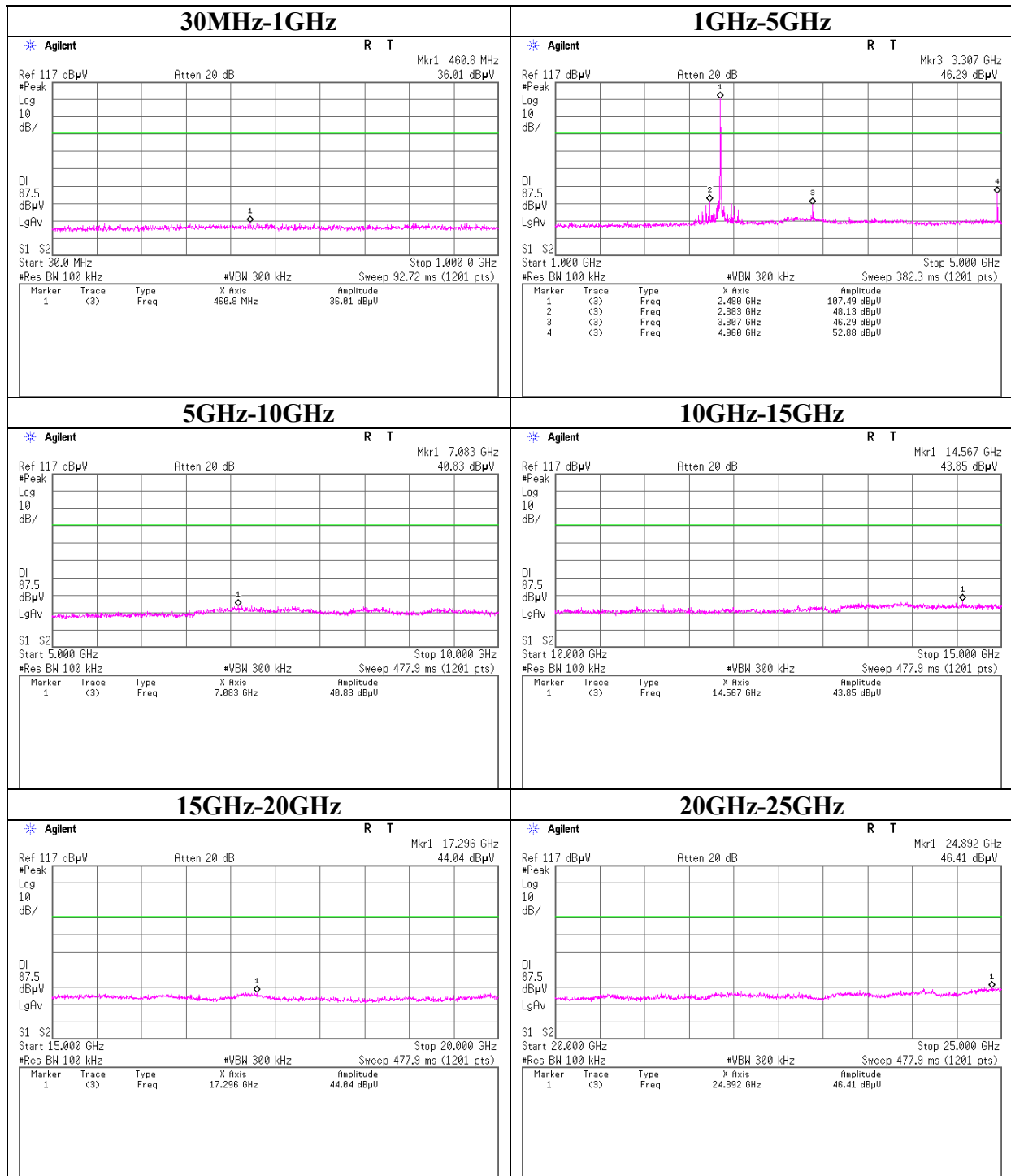
Conducted Spurious Emission

Tx DH5 2441MHz



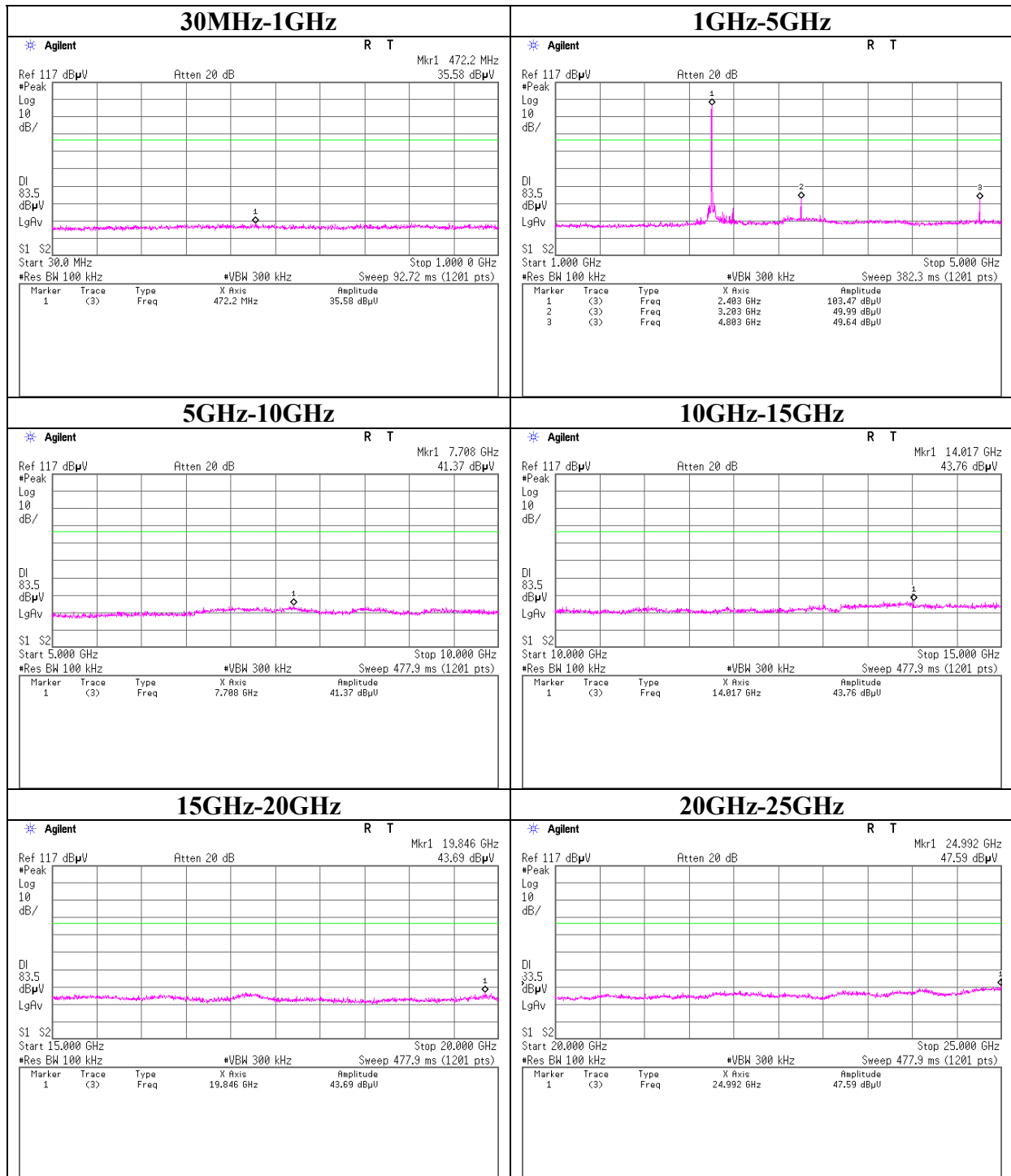
Conducted Spurious Emission

Tx DH5 2480MHz



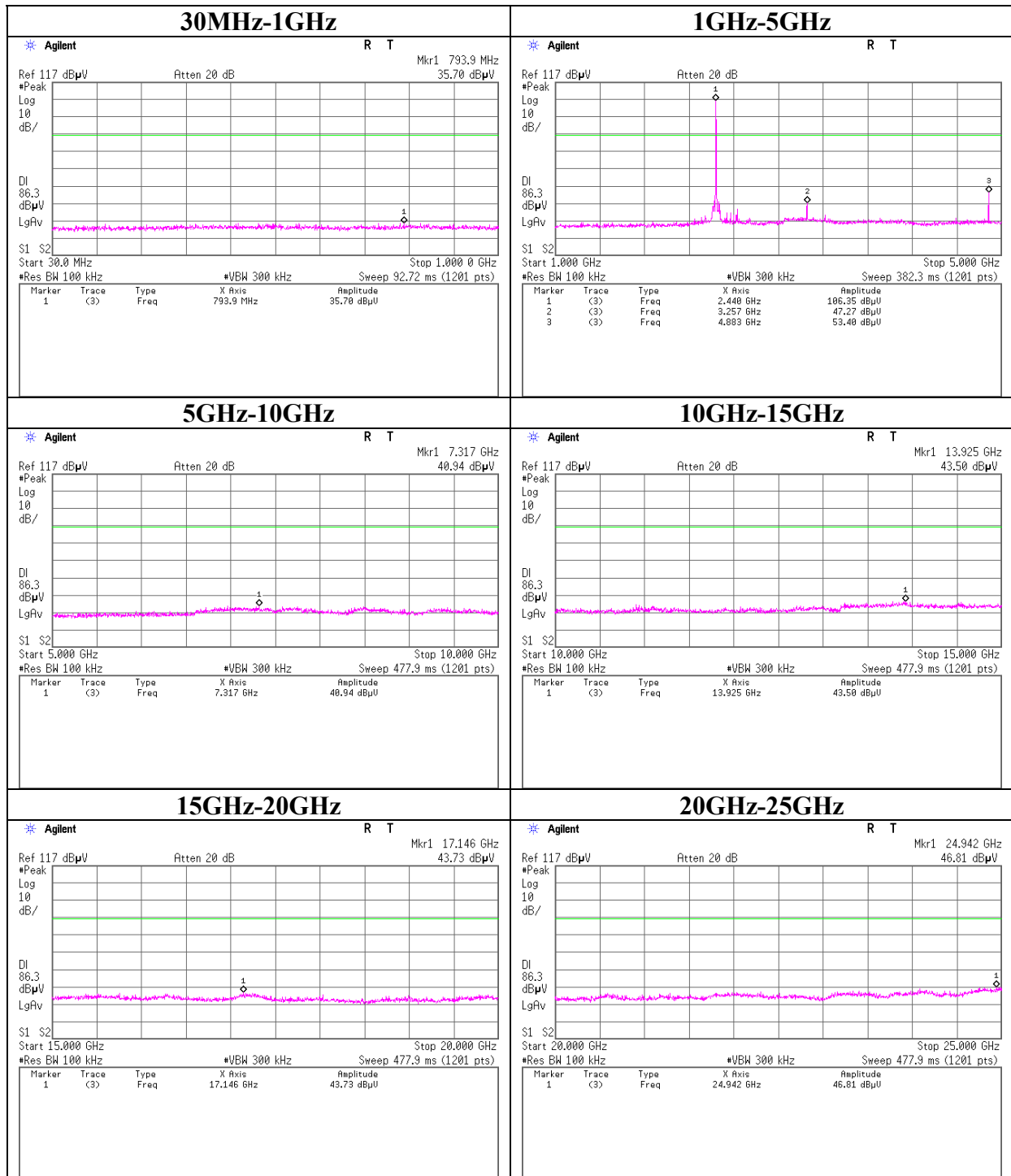
Conducted Spurious Emission

Tx 3DH5 2402MHz



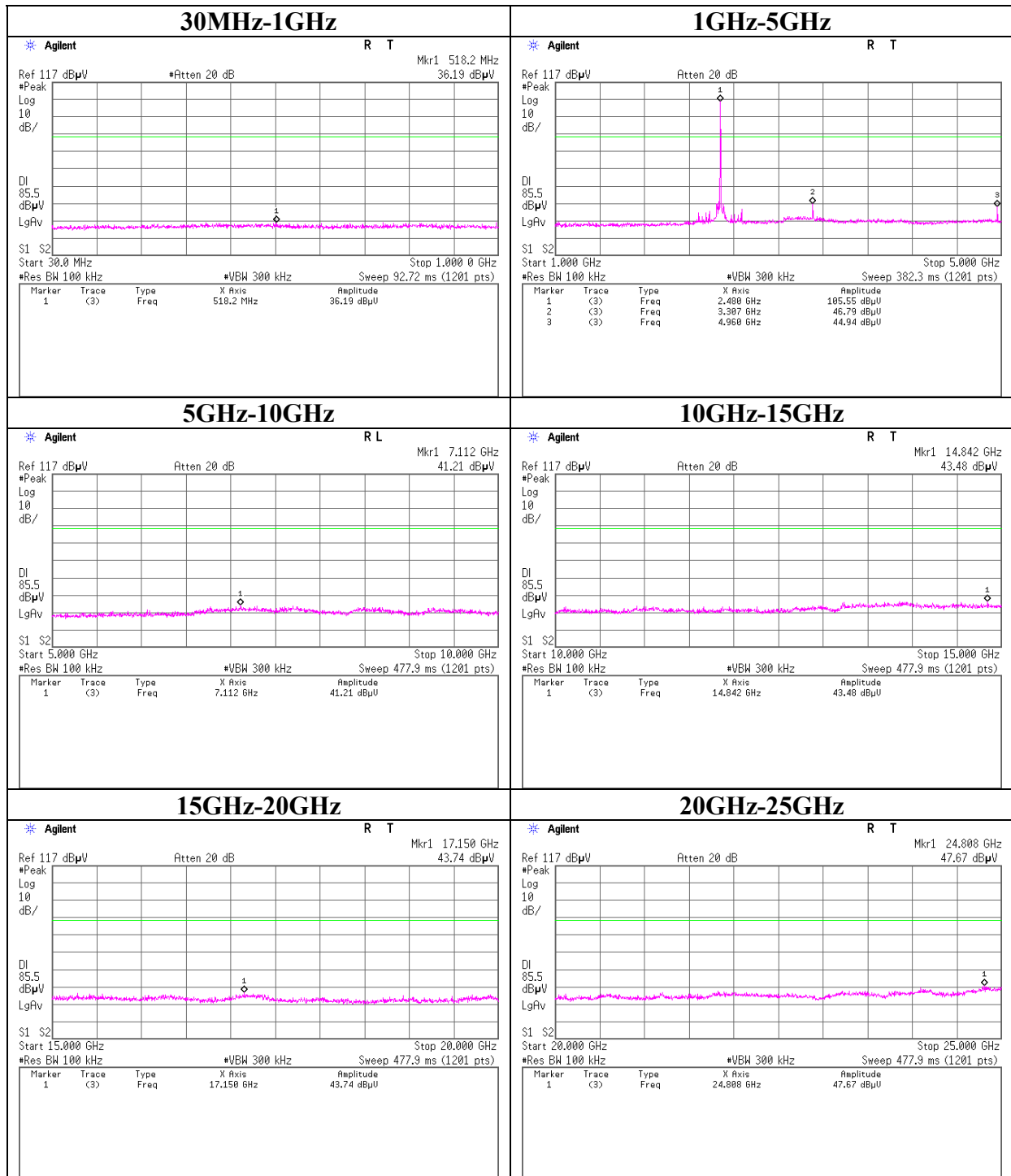
Conducted Spurious Emission

Tx 3DH5 2441MHz



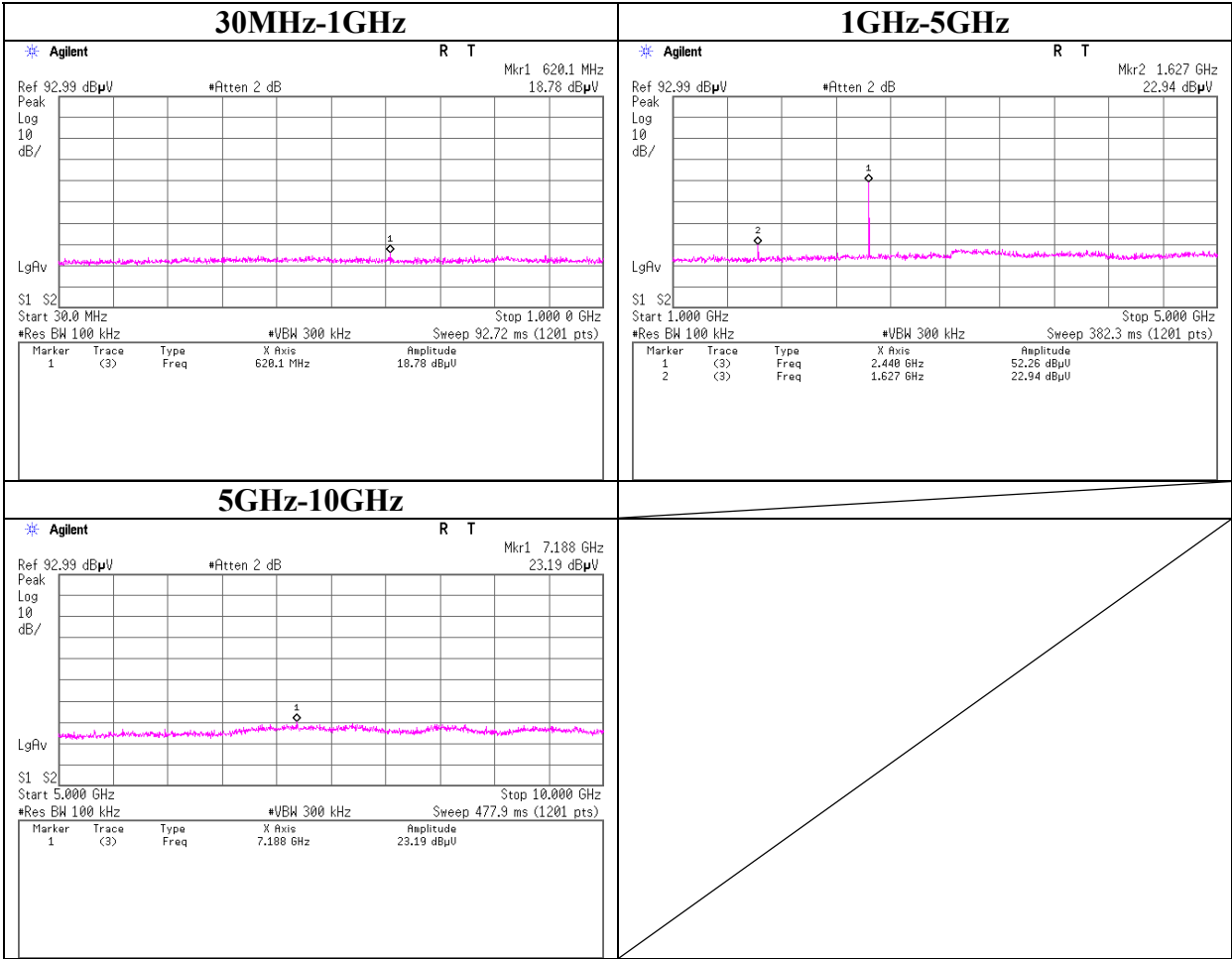
Conducted Spurious Emission

Tx 3DH5 2480MHz



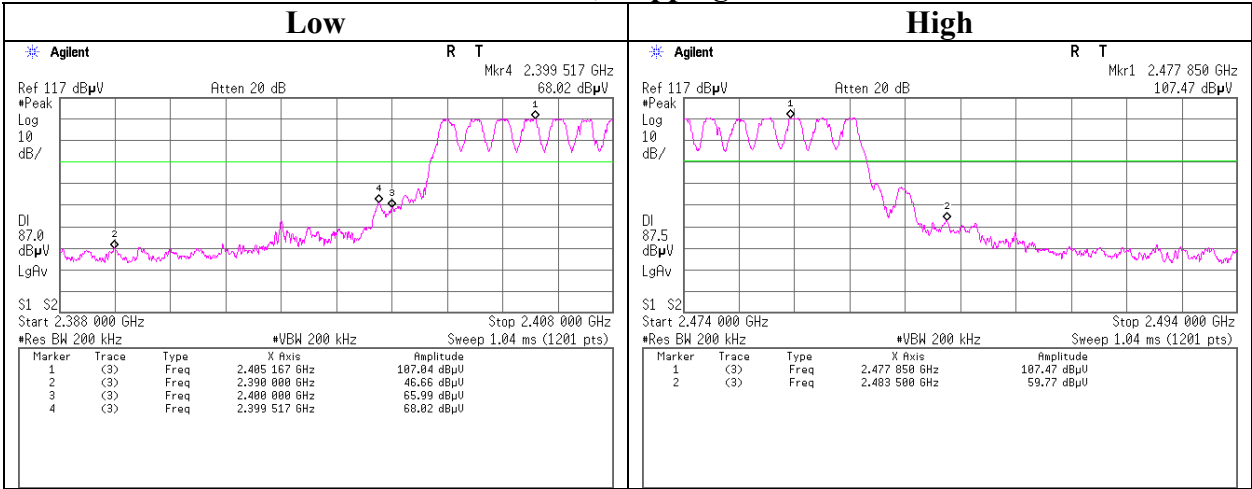
Conducted Spurious Emission

Rx 2441MHz

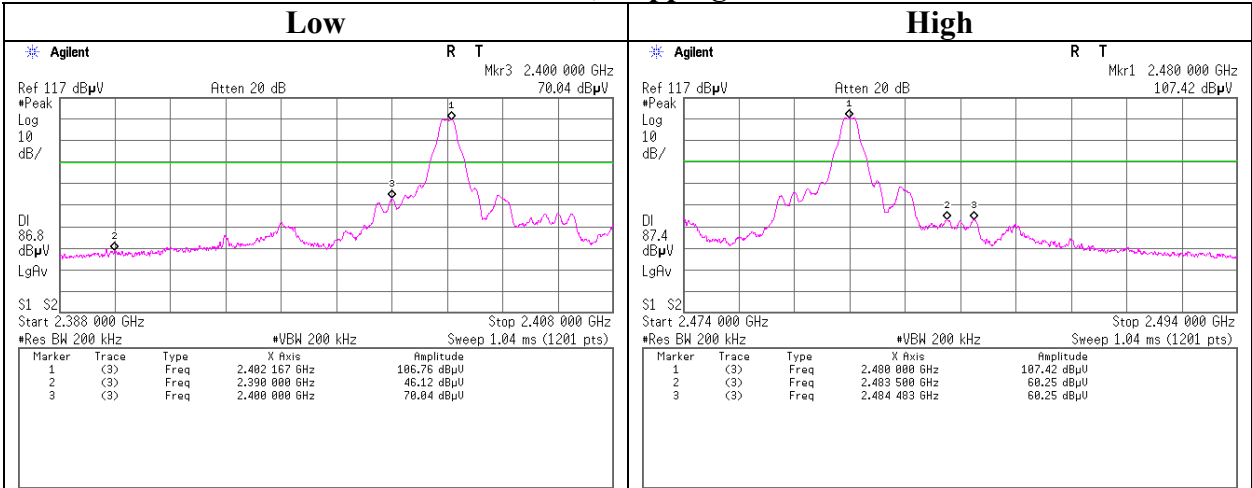


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

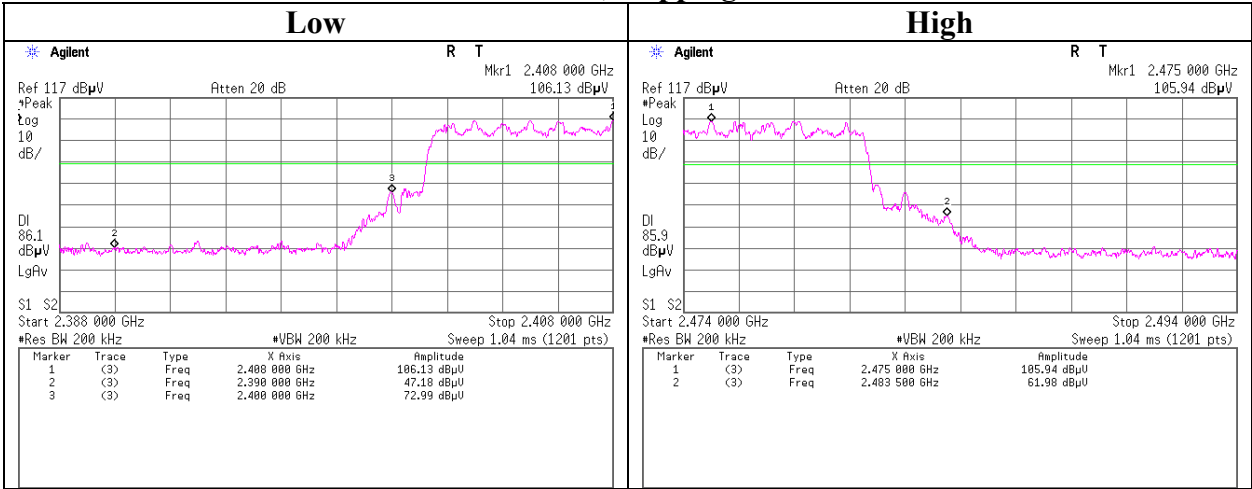


Tx DH5, Hopping off

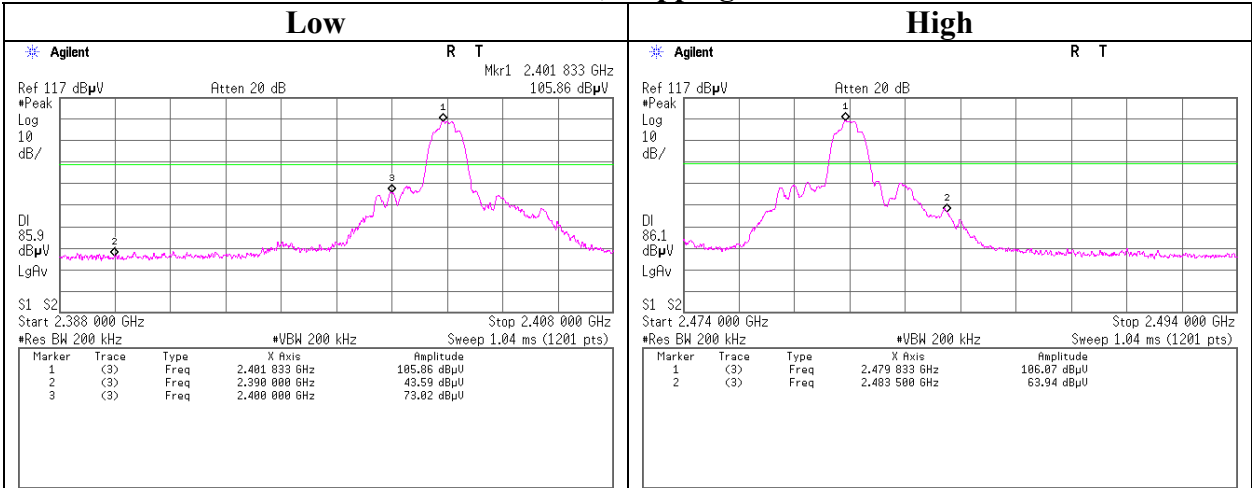


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



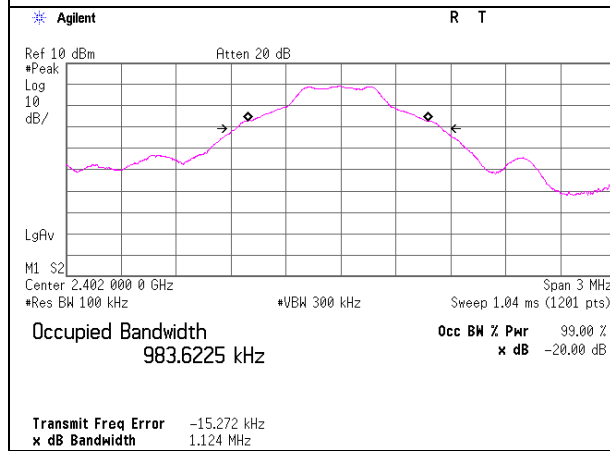
Tx 3DH5, Hopping off



99%Occupied Bandwidth

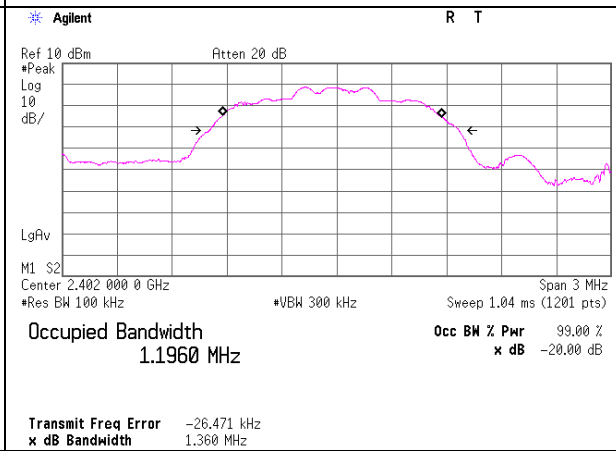
Tx DH5, Hopping off

2402MHz

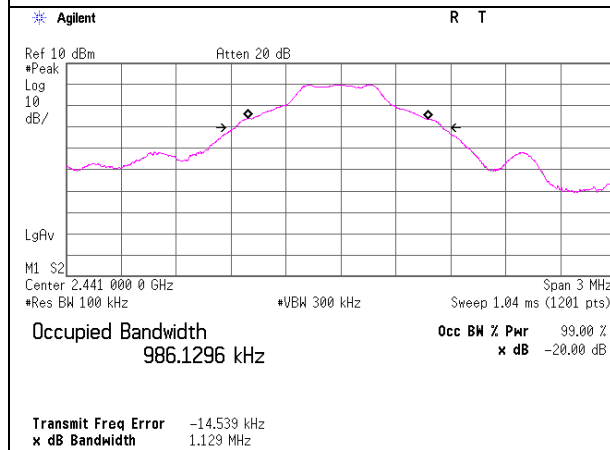


Tx 3DH5, Hopping off

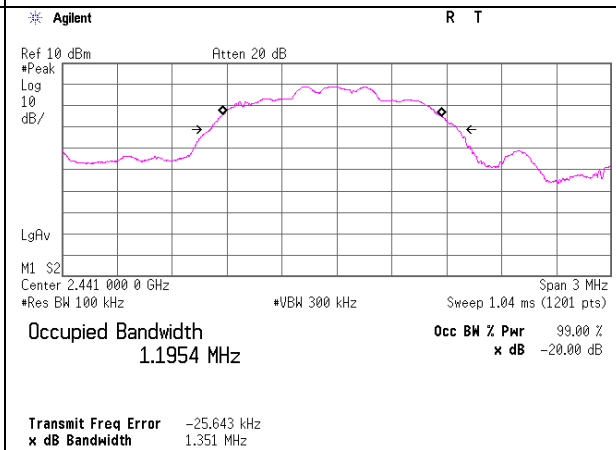
2402MHz



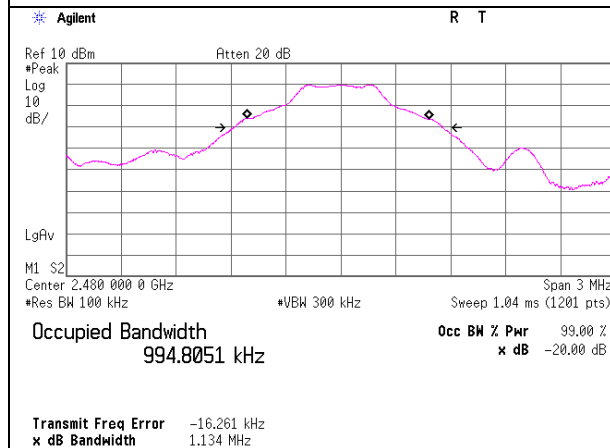
2441MHz



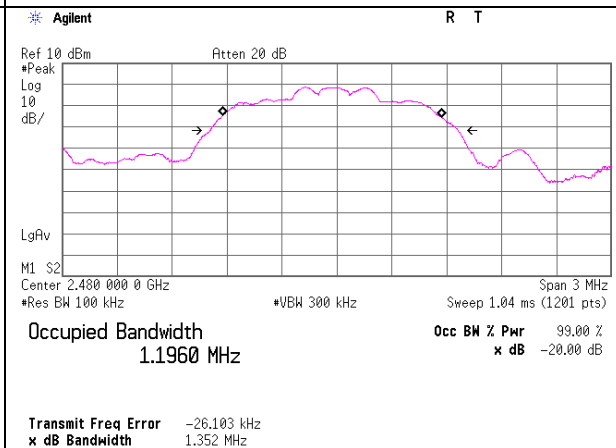
2441MHz



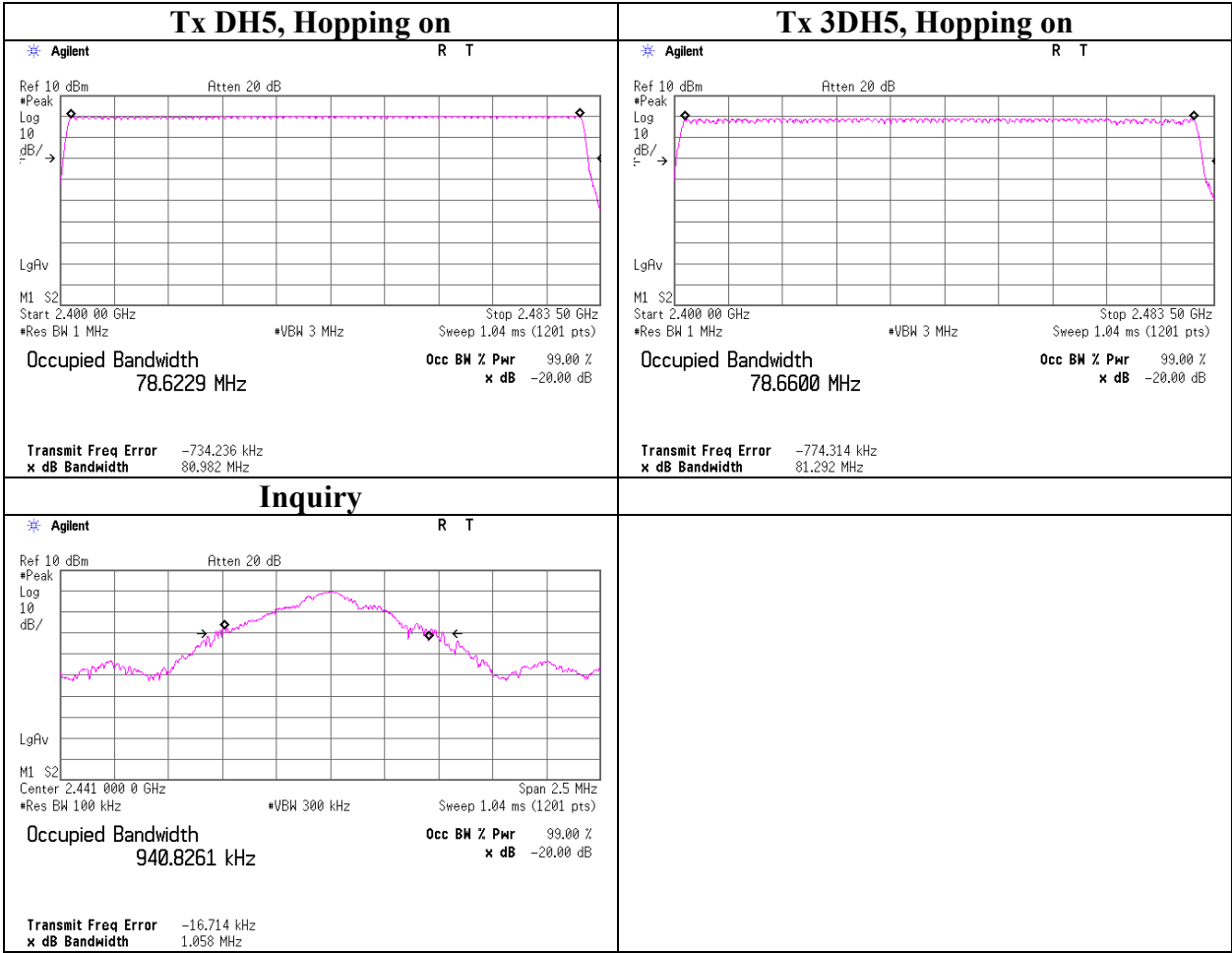
2480MHz



2480MHz



99% Occupied Bandwidth



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2009/02/25 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2008/09/24 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2008/09/24 * 12
MCC-67	Microwave Cable 1G-40GHz	Schner	SUCOFLEX102	28635/2	AT	2009/04/24 * 12
MAT-22	Attenuator(10dB) DC-18GHz	Orient Microwave	BX10-0476-00	-	AT	2009/03/24 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-180	-	AT	2009/02/04 * 12
MCC-115	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	290211/4	AT	2009/08/27 * 12
MAT-24	Attenuator(10dB) (above1GHz)	Agilent	8493C	71389	AT	2009/06/11 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2009/02/04 * 12
MAEC-04	Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2009/02/03 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2009/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2009/06/29 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2008/11/07 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2009/08/10 * 12
MCC-57	Microwave Cable 1G-26.5GHz 6m	Suhner	SUCOFLEX104	246769(1m) / 292411(5m)	RE	2008/11/05 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2009/03/19 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2009/06/18 * 12
MHF-20	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCC	607	RE	2008/12/12 * 12
MCC-79	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278923/4	RE	2008/12/17 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2008/10/03 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2009/01/10 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2009/01/10 * 12
MCC-50	Coaxial cable	UL Japan	-	-	RE	2009/03/18 * 12
MAT-31	Attenuator(6dB)	TME	UFA-01	-	RE	2009/03/03 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2009/03/18 * 12

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

All equipment is calibrated with traceable calibrations. Each calibration 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: RE: Radiated Emission

AT: Antenna Terminal Conducted test

UL Japan, Inc.

Head Office EMC Lab.

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