

APPENDIX 2: Data of EMI test

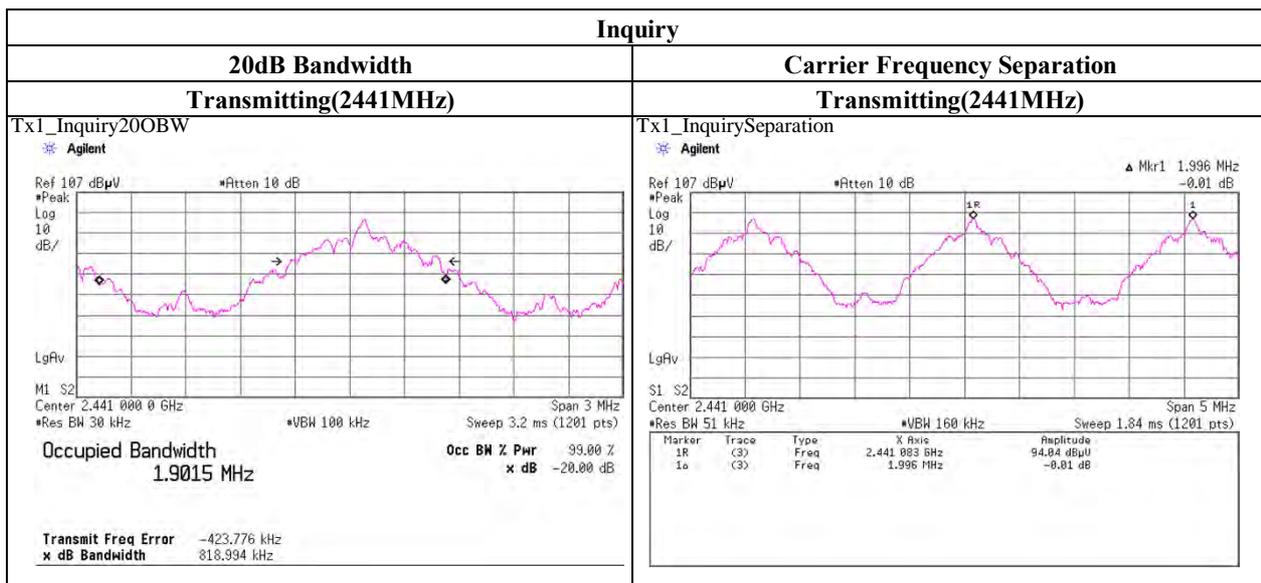
20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 12, 2011
 Temperature / Humidity 26deg.C. , 36%RH
 Engineer Hikaru Shirasawa
 Mode Tx, Bluetooth, BDR, PRBS9 , Inquiry

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.933	1.003	>= 0.622
DH5	2441.0	0.928	1.008	>= 0.619
DH5	2480.0	0.932	1.020	>= 0.621
Inquiry	2441.0	0.819	1.996	>= 0.546

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

No limit applies to 20dB Bandwidth.

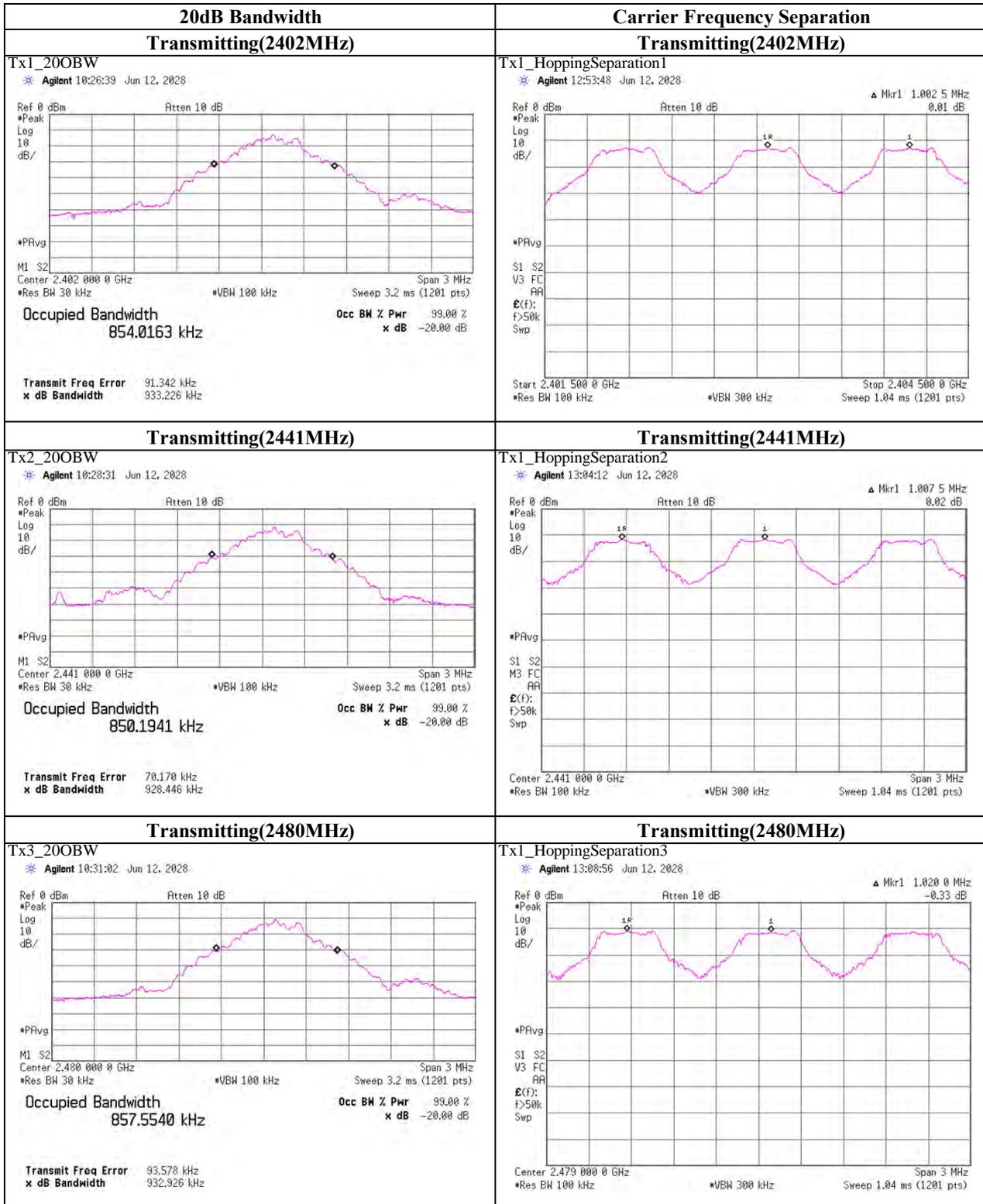


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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR (Worst: DH5)



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 12, 2011
 Temperature / Humidity 26deg.C. , 36%RH
 Engineer Hikaru Shirasawa
 Mode Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.270	1.000	>= 0.847
3-DH5	2441.0	1.261	1.000	>= 0.841
3-DH5	2480.0	1.274	1.000	>= 0.849

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

No limit applies to 20dB Bandwidth.

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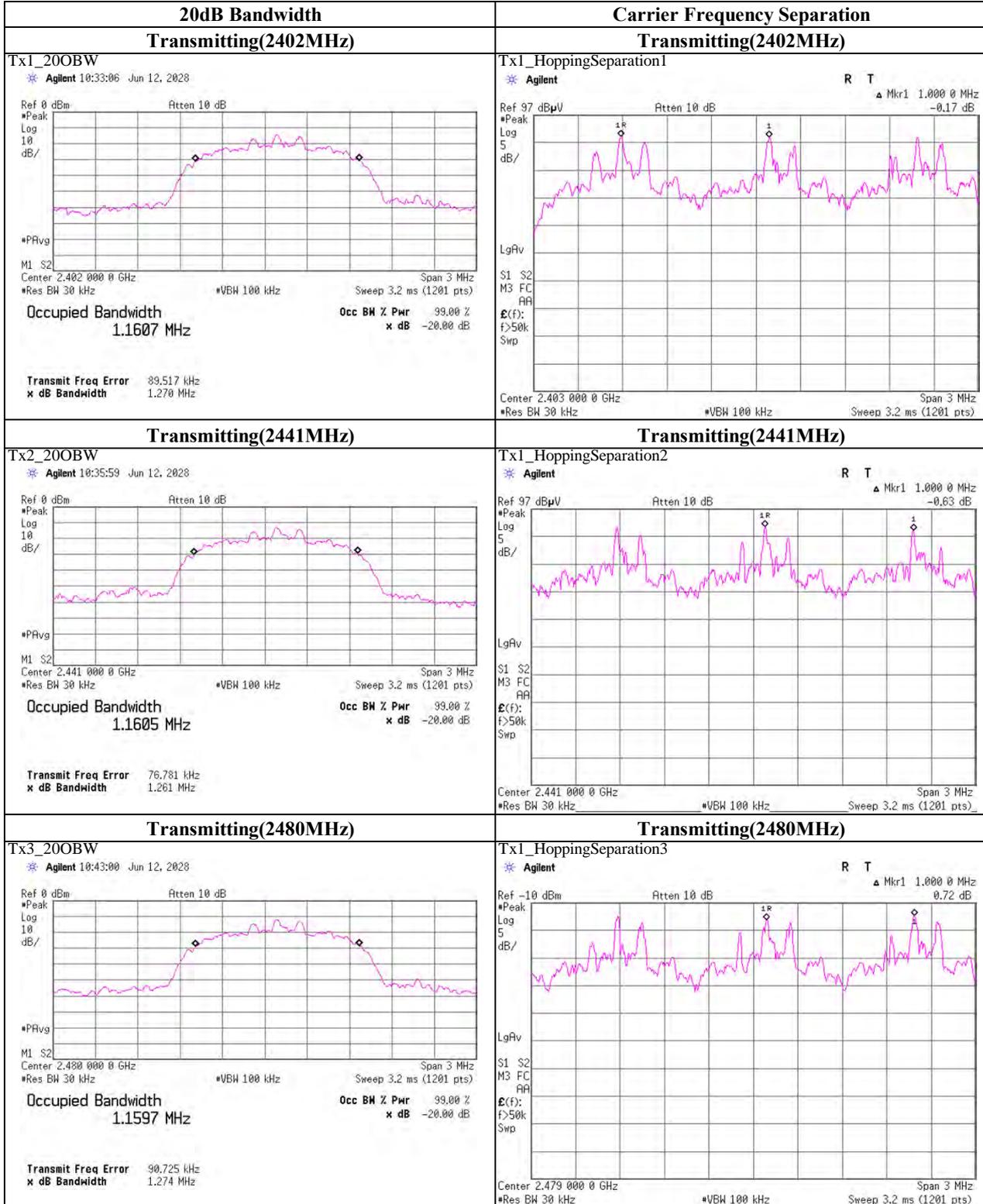
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR (Worst: DH5), PRBS9, worst antenna port A



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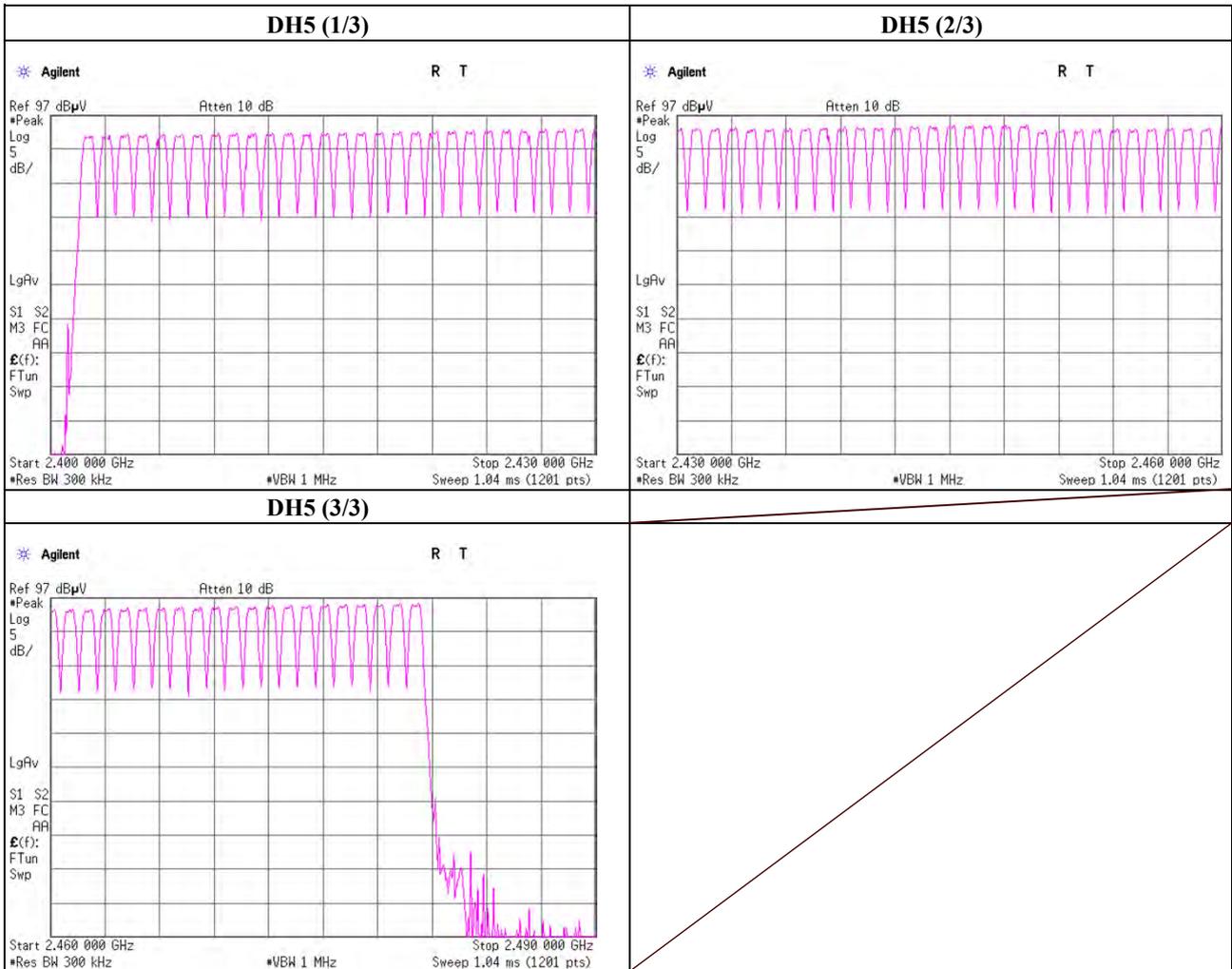
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2011/4/14	
Temperature / Humidity	25deg.C , 46%RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Number of Channel [times]	Limit [times]
DH5	79	>= 15

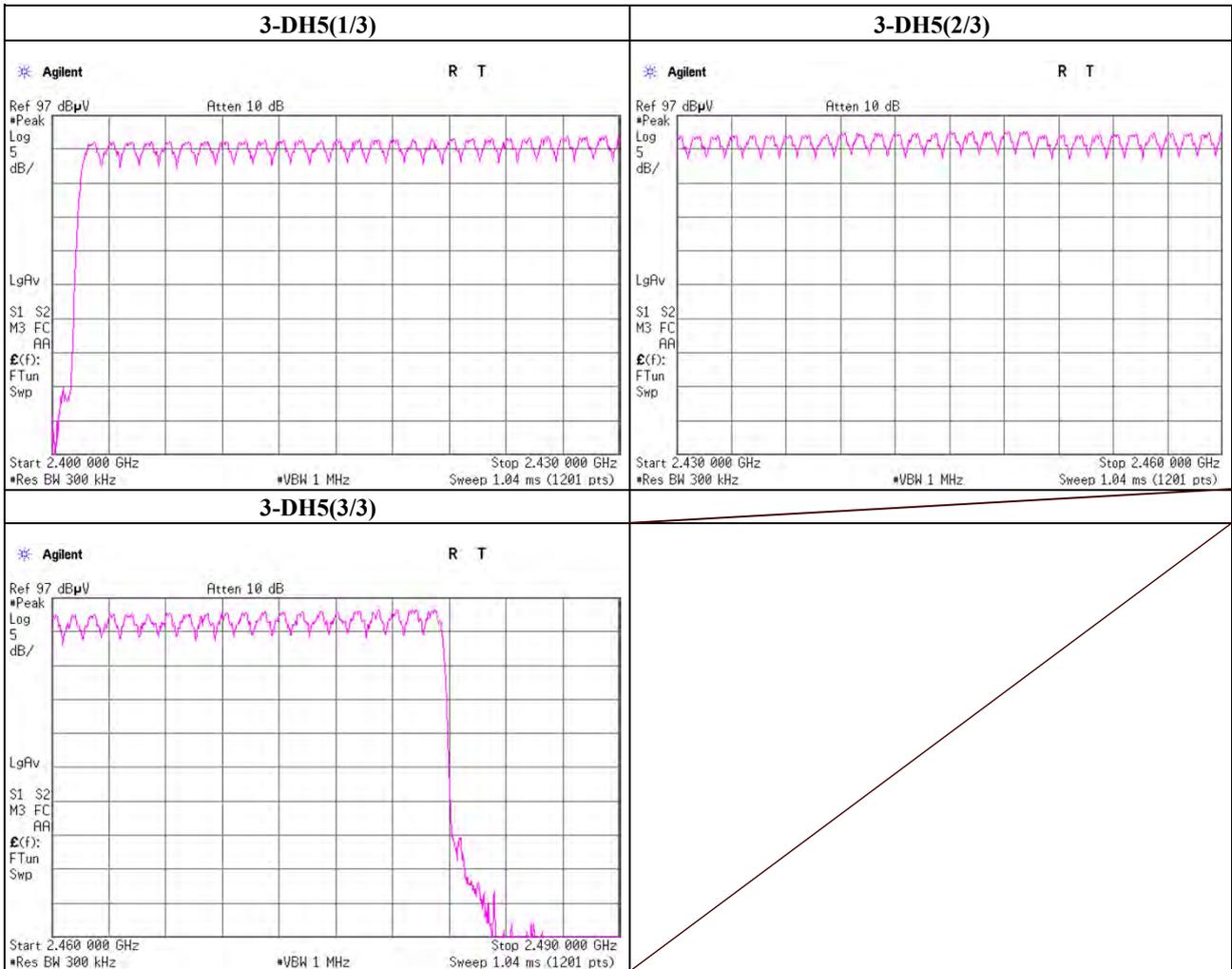


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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2011/4/14	
Temperature / Humidity	25deg.C , 45%RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, EDR, PRBS9	

Mode	Number of Channel [times]	Limit [times]
3-DH5	79	>= 15

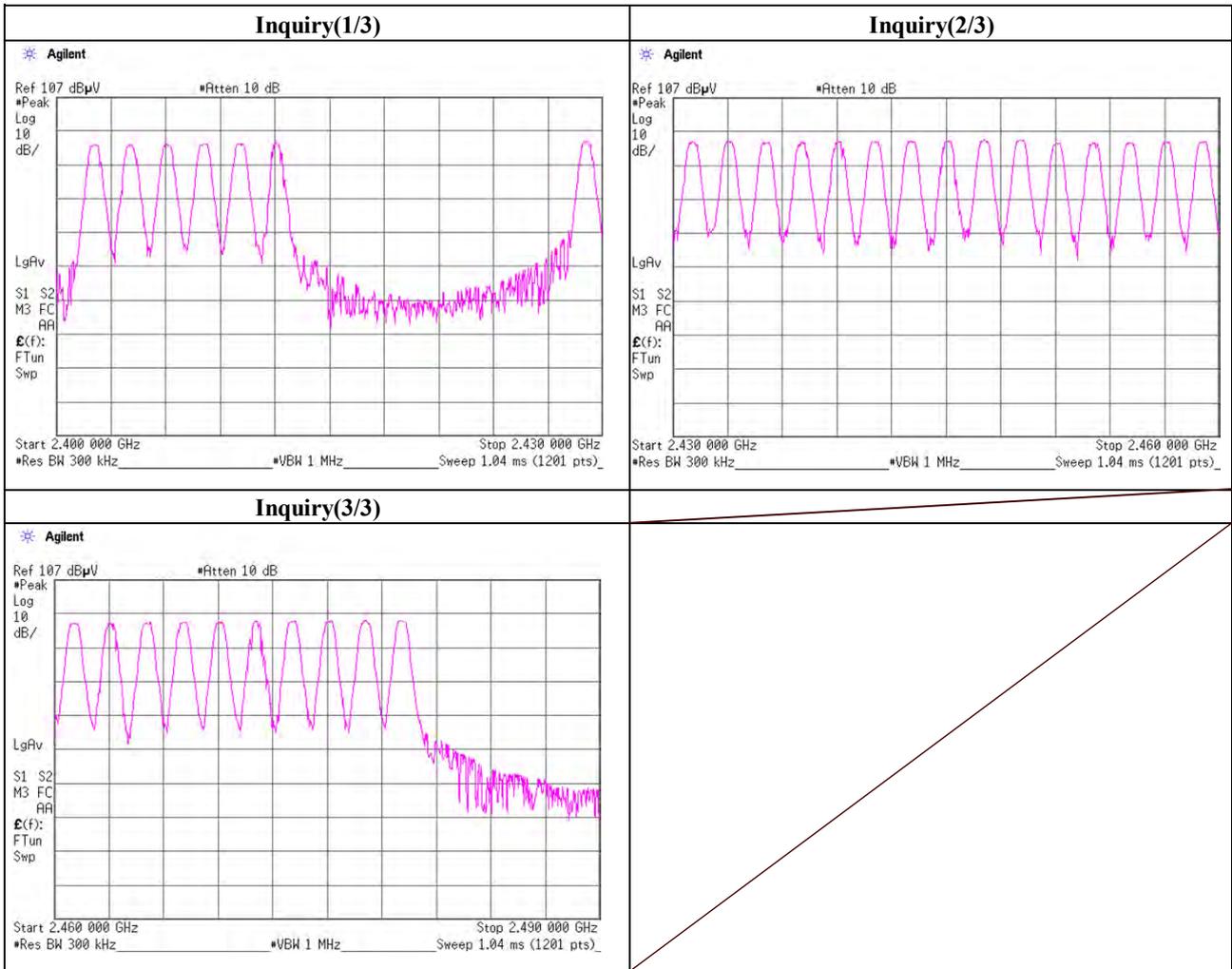


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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	April 19, 2011	
Temperature / Humidity	23deg.C , 43%RH	
Engineer	Makoto Hosaka	
Mode	Inquiry	

Mode	Number of Channel [times]	Limit [times]
Inquiry	32	>= 15



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date 2011/4/14
 Temperature / Humidity 25deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, BDR, PRBS9

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	/	5.0 sec.	x 31.6 sec. = 323 times	0.415	134	400
DH3	17.0	/	5.0 sec.	x 31.6 sec. = 108 times	1.669	180	400
DH5	11.0	/	5.0 sec.	x 31.6 sec. = 70 times	2.923	205	400
Inquiry	100.0	/	1.0 sec.	x 12.8 sec. = 1280 times	0.116	149	400

Sample Calculation

Result = Number of transmission x Length of transmittion time

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Shonan EMC Lab.

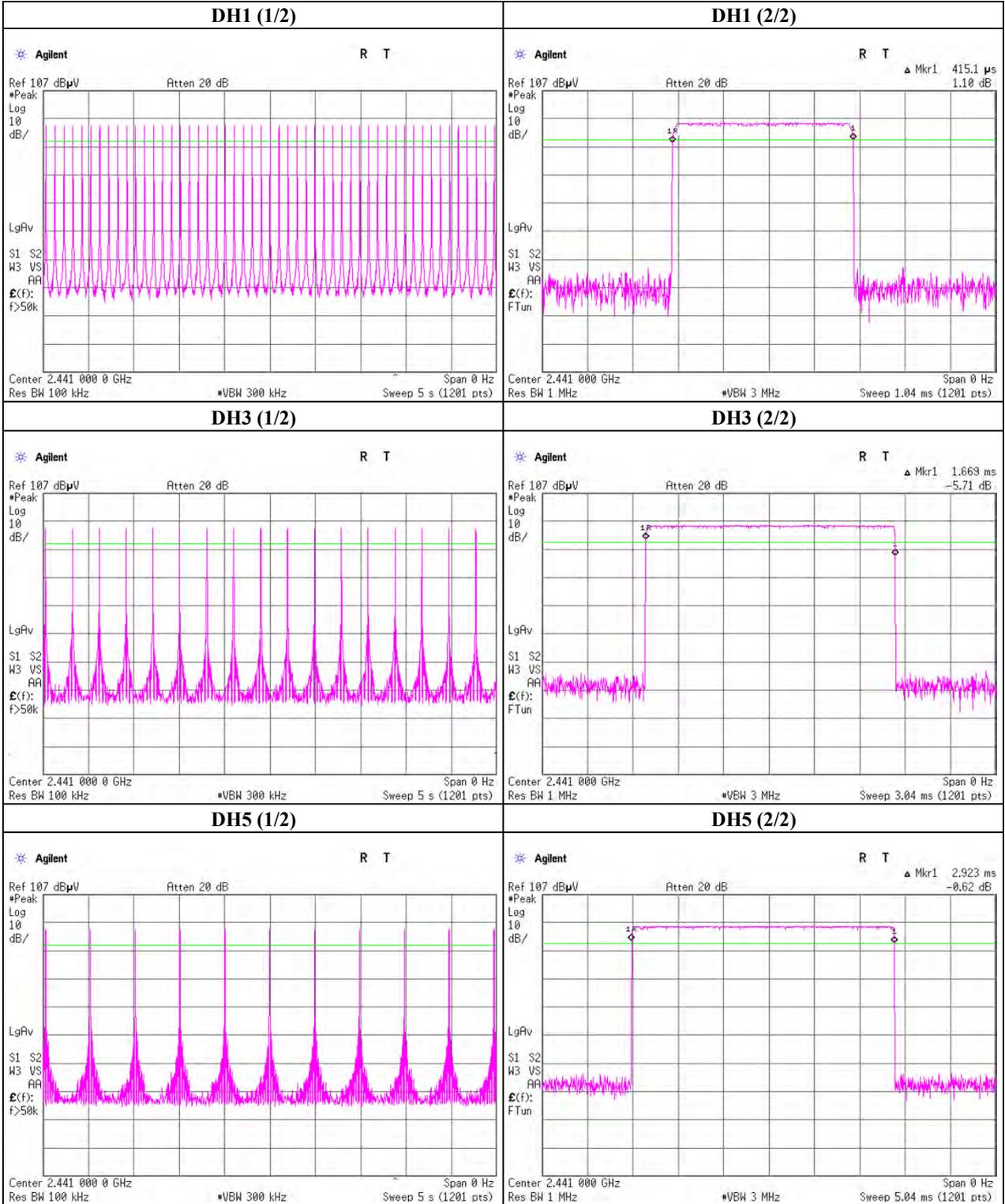
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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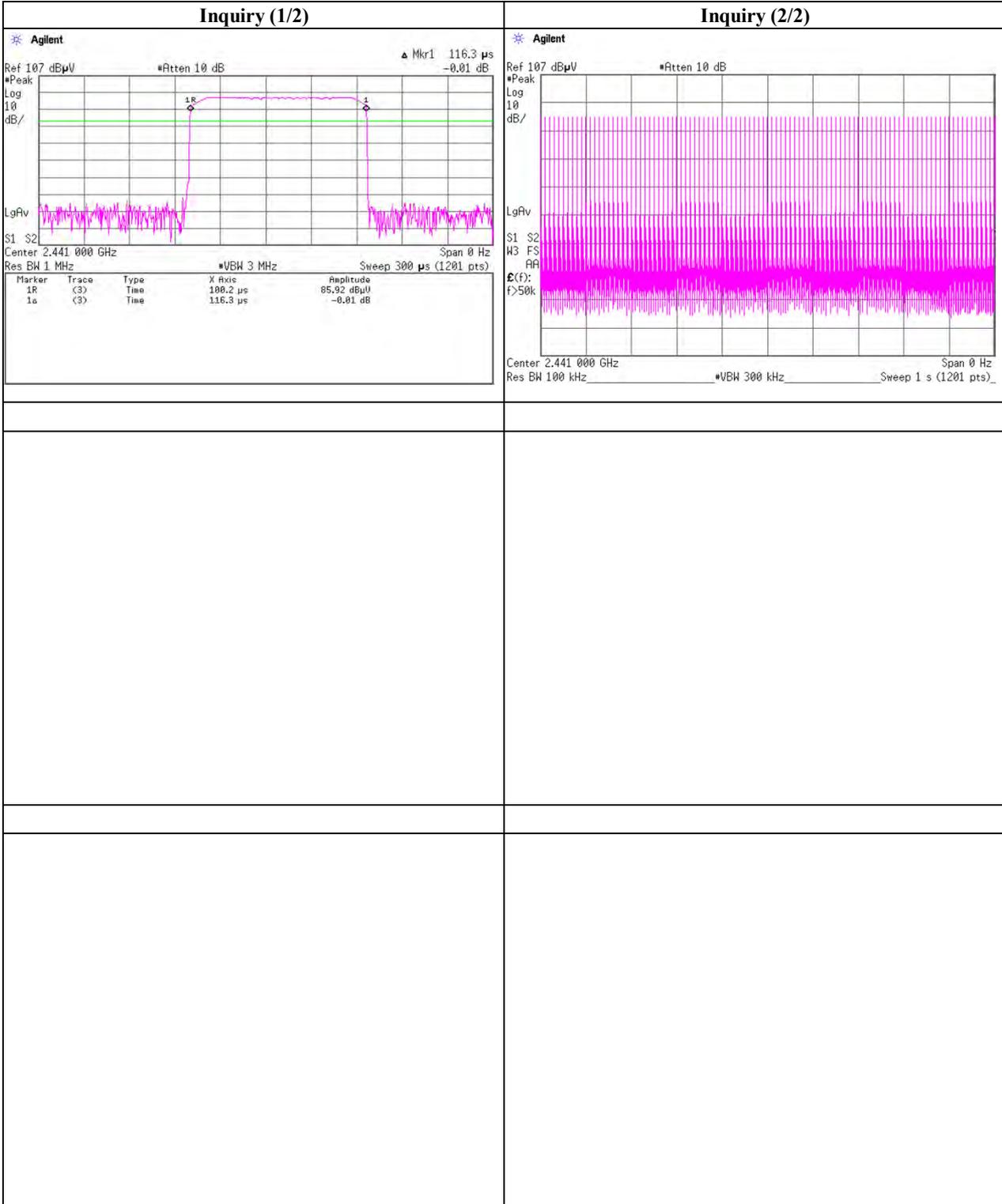
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Dwell time



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date 2011/4/14
 Temperature / Humidity 25deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, EDR, PRBS9

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]
3-DH1	51.0	/	5.0 sec.	x 31.6 sec. = 323 times	0.420	136	400
3-DH3	13.0	/	5.0 sec.	x 31.6 sec. = 83 times	1.672	139	400
3-DH5	6.0	/	5.0 sec.	x 31.6 sec. = 38 times	2.927	111	400

Sample Calculation

Result = Number of transmission x Length of transimtion time

UL Japan, Inc.

Shonan EMC Lab.

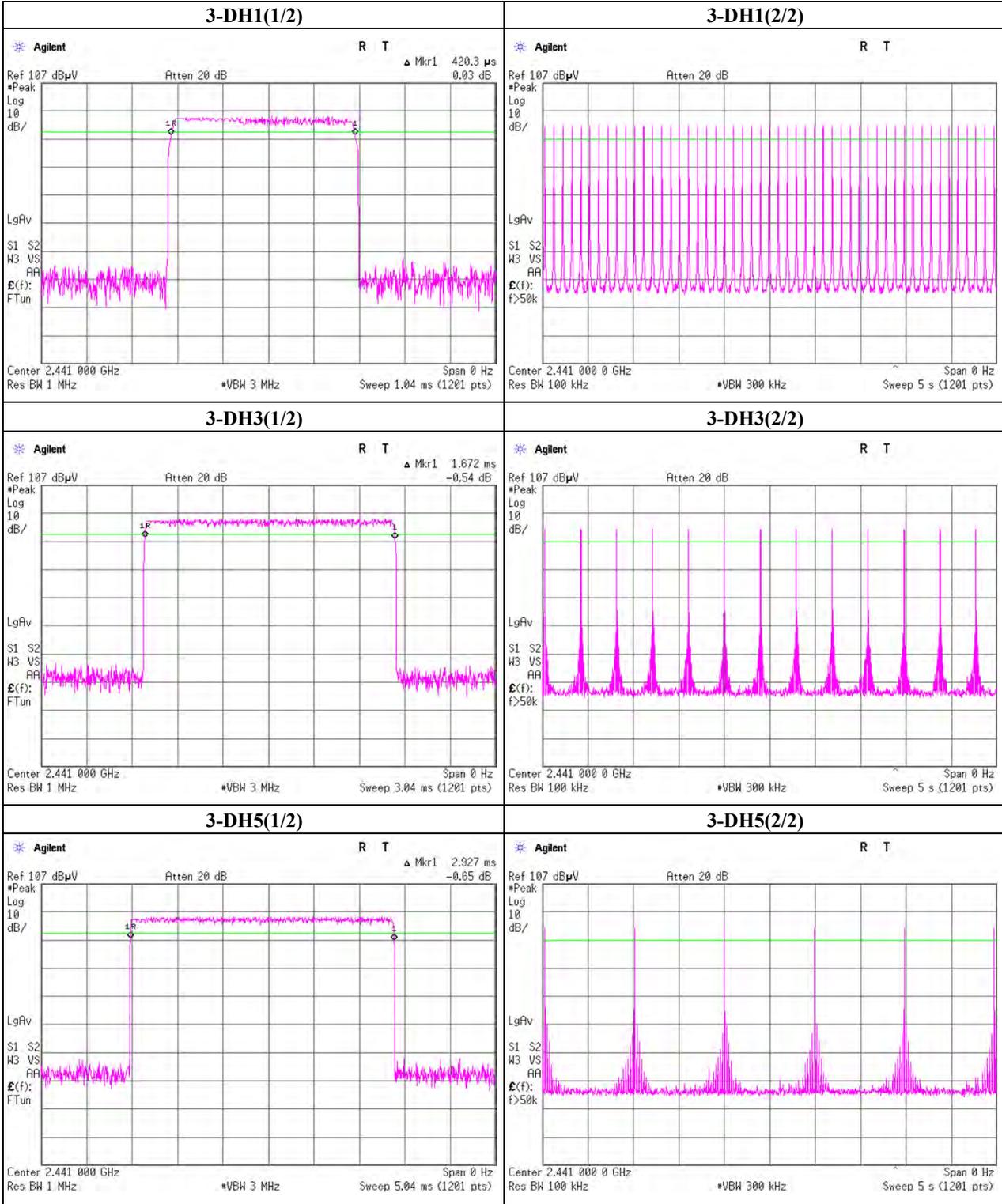
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Dwell time

Tx, Bluetooth, EDR, PRBS9



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Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date 2011/4/14
Temperature / Humidity 25deg.C , 46%RH
Engineer Akio Hayashi
Mode Tx, Bluetooth

	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-12.32	1.25	9.57	-1.50	0.71	20.97	125	22.46
DH5	2441.0	-11.27	1.26	9.57	-0.44	0.90	20.97	125	21.40
DH5	2480.0	-10.47	1.27	9.57	0.37	1.09	20.97	125	20.59
2-DH5	2402.0	-12.72	1.25	9.57	-1.90	0.65	20.97	125	22.86
2-DH5	2441.0	-11.49	1.26	9.57	-0.66	0.86	20.97	125	21.62
2-DH5	2480.0	-10.68	1.27	9.57	0.16	1.04	20.97	125	20.80
3-DH5	2402.0	-12.35	1.25	9.57	-1.53	0.70	20.97	125	22.49
3-DH5	2441.0	-11.07	1.26	9.57	-0.24	0.95	20.97	125	21.20
3-DH5	2480.0	-10.27	1.27	9.57	0.57	1.14	20.97	125	20.39

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer) + Atten. Loss

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test Site	No.1 Semi Anechoic Chamber	, No.3 Semi Anechoic Chamber
Date	April 18, 2011	, April 21, 2011
Temperature / Humidity	22deg.C. , 44%RH	, 22deg.C.
Engineer	Hikaru Shirasawa	, Fumiaki Matsuo
Mode	Tx, 2402 MHz	
	Tx, Bluetooth, BDR, PRBS9	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	109.132	QP	22.8	11.9	8.0	31.8	10.9	43.5	32.6	205	354	
Hori.	222.143	QP	30.6	17.2	9.0	31.7	25.1	46.0	20.9	144	113	
Hori.	226.006	QP	30.5	17.2	9.0	31.7	25.0	46.0	21.0	152	353	
Hori.	2390.000	PK	57.5	27.5	13.3	40.8	57.5	73.9	16.4	120	101	
Hori.	4804.000	PK	54.3	31.5	5.6	40.6	50.8	73.9	23.1	100	160	
Hori.	7206.000	PK	49.3	36.4	6.8	39.6	52.9	73.9	21.0	100	33	
Hori.	9608.000	PK	48.0	37.9	8.0	37.9	56.0	73.9	17.9	100	160	
Hori.	12010.000	PK	47.5	39.4	9.2	39.5	56.6	73.9	17.3	100	250	
Hori.	2390.000	AV	35.2	27.5	13.3	40.8	35.2	53.9	18.7	120	101	VBW:200Hz
Hori.	4804.000	AV	46.2	31.5	5.6	40.6	42.7	53.9	11.2	100	160	VBW:200Hz
Hori.	7206.000	AV	34.6	36.4	6.8	39.6	38.2	53.9	15.7	100	33	VBW:10Hz
Hori.	9608.000	AV	33.7	37.9	8.0	37.9	41.7	53.9	12.2	100	160	VBW:10Hz
Hori.	12010.000	AV	33.3	39.4	9.2	39.5	42.4	53.9	11.5	100	250	VBW:10Hz
Vert.	136.714	QP	22.0	14.3	8.2	31.8	12.7	43.5	30.8	100	139	
Vert.	163.595	QP	22.0	15.5	8.5	31.8	14.2	43.5	29.3	100	345	
Vert.	855.053	QP	21.8	21.5	9.6	31.6	21.3	46.0	24.7	100	355	
Vert.	2390.000	PK	57.5	27.5	13.3	40.8	57.5	73.9	16.4	100	115	
Vert.	4804.000	PK	56.0	31.5	5.6	40.6	52.5	73.9	21.4	110	123	
Vert.	7206.000	PK	49.0	36.4	6.8	39.6	52.6	73.9	21.3	100	41	
Vert.	9608.000	PK	48.3	37.9	8.0	37.9	56.3	73.9	17.6	100	99	
Vert.	12010.000	PK	47.2	39.4	9.2	39.5	56.3	73.9	17.6	100	240	
Vert.	2390.000	AV	35.0	27.5	13.3	40.8	35.0	53.9	18.9	100	115	VBW:200Hz
Vert.	4804.000	AV	49.3	31.5	5.6	40.6	45.8	53.9	8.1	110	123	VBW:200Hz
Vert.	7206.000	AV	34.6	36.4	6.8	39.6	38.2	53.9	15.7	100	41	VBW:10Hz
Vert.	9608.000	AV	33.7	37.9	8.0	37.9	41.7	53.9	12.2	100	99	VBW:10Hz
Vert.	12010.000	AV	33.1	39.4	9.2	39.5	42.2	53.9	11.7	100	240	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	94.3	27.5	13.3	40.8	94.3	-	-	Carrier
Hori.	2400.000	PK	53.0	27.5	13.3	40.8	53.0	74.3	21.3	
Vert.	2402.000	PK	95.5	27.5	13.3	40.8	95.5	-	-	Carrier
Vert.	2400.000	PK	54.5	27.5	13.3	40.8	54.5	75.5	21.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test Site	No.1 Semi Anechoic Chamber	, No.3Semi Anechoic Chamber
Date	April 18, 2011	, April 21, 2011
Temperature / Humidity	22deg.C. , 44%RH	, 22deg.C.
Engineer	Hikaru Shirasawa	, Fumiaki Matsuo
Mode	Tx, 2441 MHz	
	Tx, Bluetooth, BDR, PRBS9	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	222.540	QP	30.0	17.2	9.0	31.7	24.5	46.0	21.5	150	356	
Hori.	226.005	QP	31.0	17.2	9.0	31.7	25.5	46.0	20.5	143	350	
Hori.	4882.000	PK	55.0	31.7	5.7	40.5	51.9	73.9	22.0	100	190	
Hori.	7323.000	PK	49.0	36.7	6.9	39.6	53.0	73.9	20.9	100	116	
Hori.	9764.000	PK	48.5	38.2	8.0	37.9	56.8	73.9	17.1	100	55	
Hori.	12205.000	PK	47.1	39.2	9.2	39.2	56.3	73.9	17.6	115	99	
Hori.	4882.000	AV	41.0	31.7	5.7	40.5	51.9	73.9	22.0	100	190	VBW:200Hz
Hori.	7323.000	AV	34.2	36.7	6.9	39.6	53.0	73.9	20.9	100	116	VBW:10Hz
Hori.	9764.000	AV	33.8	38.2	8.0	37.9	56.8	73.9	17.1	100	55	VBW:10Hz
Hori.	12205.000	AV	33.0	39.2	9.2	39.2	56.3	73.9	17.6	115	99	VBW:10Hz
Vert.	4882.000	PK	54.5	31.7	5.7	40.5	51.4	73.9	22.5	100	111	
Vert.	7323.000	PK	48.3	36.7	6.9	39.6	52.3	73.9	21.6	121	110	
Vert.	9764.000	PK	48.5	38.2	8.0	37.9	56.8	73.9	17.1	110	123	
Vert.	12205.000	PK	47.5	39.2	9.2	39.2	56.7	73.9	17.2	117	98	
Vert.	4882.000	AV	42.5	31.7	5.7	40.5	51.4	73.9	22.5	100	111	VBW:200Hz
Vert.	7323.000	AV	34.2	36.7	6.9	39.6	52.3	73.9	21.6	121	110	VBW:10Hz
Vert.	9764.000	AV	33.9	38.2	8.0	37.9	56.8	73.9	17.1	110	123	VBW:10Hz
Vert.	12205.000	AV	33.1	39.2	9.2	39.2	56.7	73.9	17.2	117	98	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.		
Test Site	No.1 Semi Anechoic Chamber	,	No.3 Semi Anechoic Chamber
Date	April 18, 2011	,	April 21, 2011
Temperature / Humidity	22deg.C. , 44%RH	,	22deg.C.
Engineer	Hikaru Shirasawa	,	Fumiaki Matsuo
Mode	Tx, 2480 MHz		
	Tx, Bluetooth, BDR, PRBS9		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	222.142	QP	31.1	17.2	9.0	31.7	25.6	46.0	20.4	158	90	
Hori.	227.945	QP	28.8	17.3	9.0	31.7	23.4	46.0	22.6	146	0	
Hori.	2483.500	PK	66.0	27.6	13.3	40.7	66.2	73.9	7.7	100	180	
Hori.	4960.000	PK	51.7	31.9	5.7	40.3	49.0	73.9	24.9	100	111	
Hori.	7440.000	PK	49.3	36.9	6.9	39.6	53.5	73.9	20.4	100	115	
Hori.	9920.000	PK	48.3	38.4	8.1	37.9	56.9	73.9	17.0	112	110	
Hori.	12400.000	PK	47.5	39.1	9.3	38.9	57.0	73.9	16.9	100	58	
Hori.	2483.500	AV	46.9	27.6	13.3	40.7	47.1	53.9	6.8	100	180	VBW:200Hz
Hori.	4960.000	AV	37.8	31.9	5.7	40.3	35.1	53.9	18.8	100	111	VBW:200Hz
Hori.	7440.000	AV	34.3	36.9	6.9	39.6	38.5	53.9	15.4	100	115	VBW:10Hz
Hori.	9920.000	AV	34.3	38.4	8.1	37.9	42.9	53.9	11.0	112	110	VBW:10Hz
Hori.	12400.000	AV	33.0	39.1	9.3	38.9	42.5	53.9	11.4	100	58	VBW:10Hz
Vert.	2483.500	PK	66.1	27.6	13.3	40.7	66.3	73.9	7.6	110	115	
Vert.	4960.000	PK	54.3	31.9	5.7	40.3	51.6	73.9	22.3	108	99	
Vert.	7440.000	PK	48.6	36.9	6.9	39.6	52.8	73.9	21.1	101	101	
Vert.	9920.000	PK	48.0	38.4	8.1	37.9	56.6	73.9	17.3	100	160	
Vert.	12400.000	PK	47.1	39.1	9.3	38.9	56.6	73.9	17.3	100	123	
Vert.	2483.500	AV	47.0	27.6	13.3	40.7	47.2	53.9	6.7	110	115	VBW:200Hz
Vert.	4960.000	AV	40.2	31.9	5.7	40.3	37.5	53.9	16.4	108	99	VBW:200Hz
Vert.	7440.000	AV	34.3	36.9	6.9	39.6	38.5	53.9	15.4	101	101	VBW:10Hz
Vert.	9920.000	AV	34.0	38.4	8.1	37.9	42.6	53.9	11.3	100	160	VBW:10Hz
Vert.	12400.000	AV	33.0	39.1	9.3	38.9	42.5	53.9	11.4	100	123	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test Site	No.1 Semi Anechoic Chamber	, No.3 Semi Anechoic Chamber
Date	April 18, 2011	, April 21, 2011
Temperature / Humidity	22deg.C. , 44%RH	, 22deg.C.
Engineer	Hikaru Shirasawa	, Fumiaki Matsuo
Mode	Tx, 2402 MHz	
	Tx, Bluetooth, EDR, PRBS9	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	226.039	QP	30.0	17.2	9.0	31.7	24.5	46.0	21.5	154	0	
Hori.	227.543	QP	29.7	17.2	9.0	31.7	24.2	46.0	21.8	152	96	
Hori.	2390.000	PK	57.3	27.5	13.3	40.8	57.3	73.9	16.6	117	98	
Hori.	4804.000	PK	54.2	31.5	5.6	40.6	50.7	73.9	23.2	100	160	
Hori.	7206.000	PK	49.1	36.4	6.8	39.6	52.7	73.9	21.2	100	33	
Hori.	9608.000	PK	47.9	37.9	8.0	37.9	55.9	73.9	18.0	100	160	
Hori.	12010.000	PK	47.4	39.4	9.2	39.5	56.5	73.9	17.4	100	250	
Hori.	2390.000	AV	35.5	27.5	13.3	40.8	35.5	53.9	18.4	117	98	VBW:100Hz
Hori.	4804.000	AV	46.0	31.5	5.6	40.6	42.5	53.9	11.4	100	160	VBW:100Hz
Hori.	7206.000	AV	34.5	36.4	6.8	39.6	38.1	53.9	15.8	100	33	VBW:10Hz
Hori.	9608.000	AV	33.7	37.9	8.0	37.9	41.7	53.9	12.2	100	160	VBW:10Hz
Hori.	12010.000	AV	33.3	39.4	9.2	39.5	42.4	53.9	11.5	100	250	VBW:10Hz
Vert.	2390.000	PK	57.4	27.5	13.3	40.8	57.4	73.9	16.5	100	116	
Vert.	4804.000	PK	55.6	31.5	5.6	40.6	52.1	73.9	21.8	109	123	
Vert.	7206.000	PK	49.0	36.4	6.8	39.6	52.6	73.9	21.3	100	41	
Vert.	9608.000	PK	48.3	37.9	8.0	37.9	56.3	73.9	17.6	100	101	
Vert.	12010.000	PK	47.1	39.4	9.2	39.5	56.2	73.9	17.7	100	238	
Vert.	2390.000	AV	35.2	27.5	13.3	40.8	35.2	53.9	18.7	100	116	VBW:100Hz
Vert.	4804.000	AV	49.1	31.5	5.6	40.6	45.6	53.9	8.3	109	123	VBW:100Hz
Vert.	7206.000	AV	34.6	36.4	6.8	39.6	38.2	53.9	15.7	100	41	VBW:10Hz
Vert.	9608.000	AV	33.6	37.9	8.0	37.9	41.6	53.9	12.3	100	101	VBW:10Hz
Vert.	12010.000	AV	33.1	39.4	9.2	39.5	42.2	53.9	11.7	100	238	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	94.0	27.5	13.3	40.8	94.0	-	-	Carrier
Hori.		PK	52.8	27.5	13.3	40.8	52.8	74.0	21.2	
Vert.	2402.000	PK	95.3	27.5	13.3	40.8	95.3	-	-	Carrier
Vert.		PK	54.4	27.5	13.3	40.8	54.4	75.3	20.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab.
 Test Site No.1 Semi Anechoic Chamber , No.3Semi Anechoic Chamber
 Date April 18, 2011 , April 21, 2011
 Temperature / Humidity 22deg.C. , 44%RH , 22deg.C.
 Engineer Hikaru Shirasawa , Fumiaki Matsuo
 Mode Tx, 2441 MHz
 Tx, Bluetooth, EDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	222.078	QP	30.3	17.2	9.0	31.7	24.8	46.0	21.2	155	89	
Hori.	227.492	QP	28.3	17.2	9.0	31.7	22.8	46.0	23.2	159	87	
Hori.	4882.000	PK	54.9	31.7	5.7	40.5	51.8	73.9	22.1	100	187	
Hori.	7323.000	PK	48.6	36.7	6.9	39.6	52.6	73.9	21.3	100	115	
Hori.	9764.000	PK	48.7	38.2	8.0	37.9	57.0	73.9	16.9	100	58	
Hori.	12205.000	PK	47.1	39.2	9.2	39.2	56.3	73.9	17.6	108	99	
Hori.	4882.000	AV	41.1	31.7	5.7	40.5	38.0	53.9	15.9	100	187	VBW:100Hz
Hori.	7323.000	AV	34.1	36.7	6.9	39.6	38.1	53.9	15.8	100	115	VBW:10Hz
Hori.	9764.000	AV	34.0	38.2	8.0	37.9	42.3	53.9	11.6	100	58	VBW:10Hz
Hori.	12205.000	AV	33.0	39.2	9.2	39.2	42.2	53.9	11.7	108	99	VBW:10Hz
Vert.	4882.000	PK	54.4	31.7	5.7	40.5	51.3	73.9	22.6	100	111	
Vert.	7323.000	PK	48.2	36.7	6.9	39.6	52.2	73.9	21.7	112	110	
Vert.	9764.000	PK	48.5	38.2	8.0	37.9	56.8	73.9	17.1	110	118	
Vert.	12205.000	PK	47.4	39.2	9.2	39.2	56.6	73.9	17.3	117	101	
Vert.	4882.000	AV	42.3	31.7	5.7	40.5	39.2	53.9	14.7	100	111	VBW:100Hz
Vert.	7323.000	AV	34.2	36.7	6.9	39.6	38.2	53.9	15.7	112	110	VBW:10Hz
Vert.	9764.000	AV	33.9	38.2	8.0	37.9	42.2	53.9	11.7	110	118	VBW:10Hz
Vert.	12205.000	AV	33.0	39.2	9.2	39.2	42.2	53.9	11.7	117	101	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test Site	No.1 Semi Anechoic Chamber	, No.3 Semi Anechoic Chamber
Date	April 18, 2011	, April 21, 2011
Temperature / Humidity	22deg.C. , 44%RH	, 22deg.C.
Engineer	Hikaru Shirasawa	, Fumiaki Matsuo
Mode	Tx, 2480 MHz	
	Tx, Bluetooth, EDR, PRBS9	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	222.234	QP	31.1	17.2	9.0	31.7	25.6	46.0	20.4	148	355	
Hori.	226.036	QP	29.0	17.2	9.0	31.7	23.5	46.0	22.5	155	1	
Hori.	2483.500	PK	65.8	27.6	13.3	40.7	66.0	73.9	7.9	106	177	
Hori.	4960.000	PK	51.7	31.9	5.7	40.3	49.0	73.9	24.9	100	110	
Hori.	7440.000	PK	49.2	36.9	6.9	39.6	53.4	73.9	20.5	100	115	
Hori.	9920.000	PK	48.3	38.4	8.1	37.9	56.9	73.9	17.0	105	108	
Hori.	12400.000	PK	47.5	39.1	9.3	38.9	57.0	73.9	16.9	100	58	
Hori.	2483.500	AV	47.0	27.6	13.3	40.7	47.2	53.9	6.7	106	177	VBW:100Hz
Hori.	4960.000	AV	37.8	31.9	5.7	40.3	35.1	53.9	18.8	100	110	VBW:100Hz
Hori.	7440.000	AV	34.3	36.9	6.9	39.6	38.5	53.9	15.4	100	115	VBW:10Hz
Hori.	9920.000	AV	34.3	38.4	8.1	37.9	42.9	53.9	11.0	105	108	VBW:10Hz
Hori.	12400.000	AV	33.0	39.1	9.3	38.9	42.5	53.9	11.4	100	58	VBW:10Hz
Vert.	2483.500	PK	66.1	27.6	13.3	40.7	66.3	73.9	7.6	103	115	
Vert.	4960.000	PK	54.2	31.9	5.7	40.3	51.5	73.9	22.4	106	99	
Vert.	7440.000	PK	48.6	36.9	6.9	39.6	52.8	73.9	21.1	101	98	
Vert.	9920.000	PK	47.9	38.4	8.1	37.9	56.5	73.9	17.4	100	154	
Vert.	12400.000	PK	47.0	39.1	9.3	38.9	56.5	73.9	17.4	100	136	
Vert.	2483.500	AV	47.1	27.6	13.3	40.7	47.3	53.9	6.6	103	115	VBW:100Hz
Vert.	4960.000	AV	40.2	31.9	5.7	40.3	37.5	53.9	16.4	106	99	VBW:100Hz
Vert.	7440.000	AV	34.2	36.9	6.9	39.6	38.4	53.9	15.5	101	98	VBW:10Hz
Vert.	9920.000	AV	34.0	38.4	8.1	37.9	42.6	53.9	11.3	100	154	VBW:10Hz
Vert.	12400.000	AV	33.1	39.1	9.3	38.9	42.6	53.9	11.3	100	136	VBW:10Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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

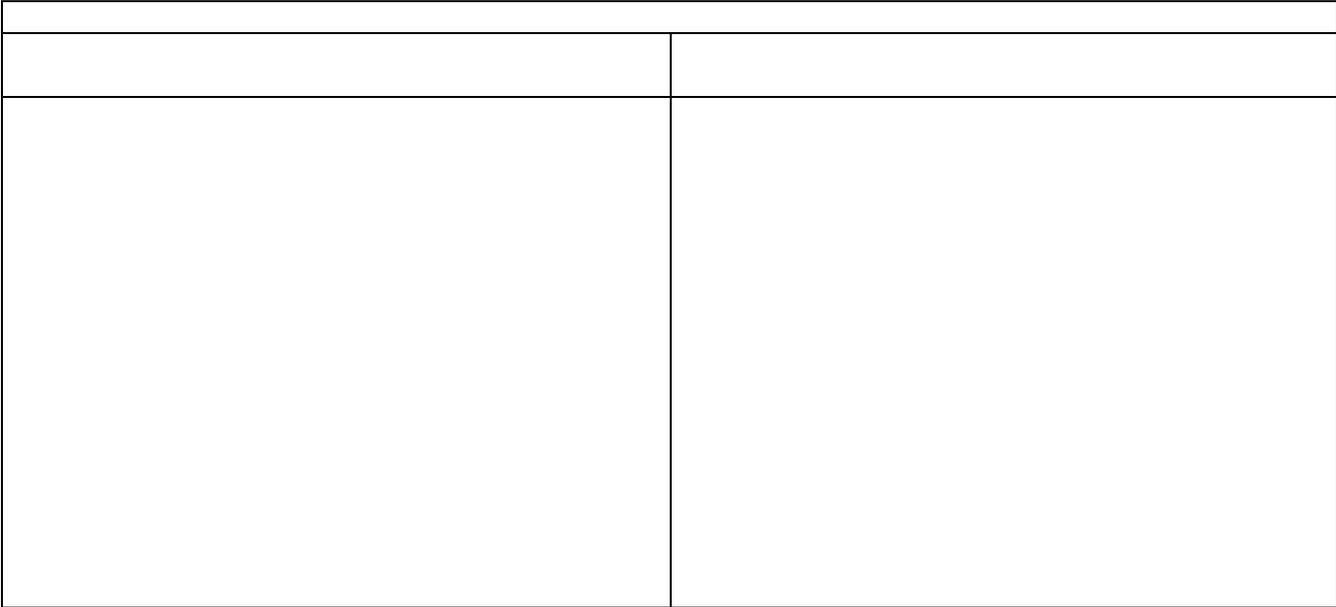
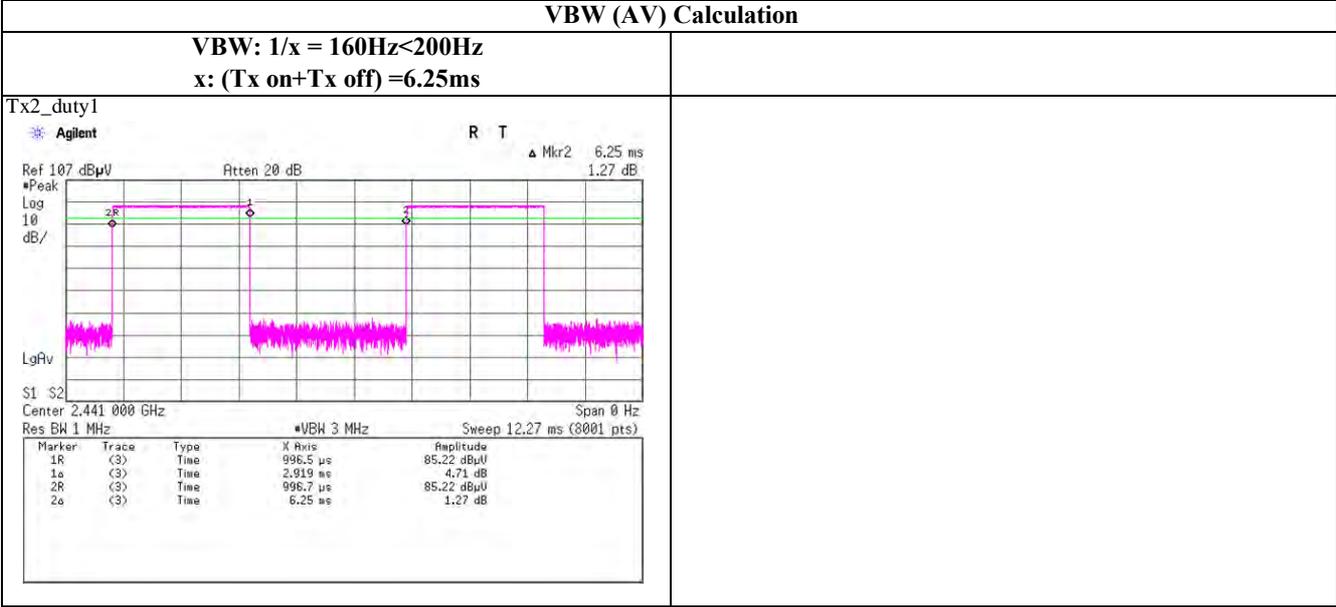
*Above 5th harmonics were not seen.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Spurious emission (Radiated)

Tx, Bluetooth, BDR, PRBS9

VBW (AV) Calculation



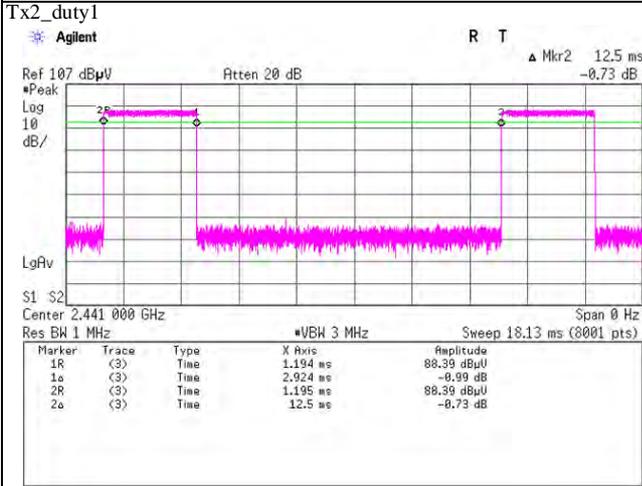
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 Facsimile : +81 463 50 6401

Spurious emission (Radiated)

Tx, Bluetooth, EDR, PRBS9

VBW (AV) Calculation

**VBW: $1/x = 80\text{Hz} < 100\text{Hz}$
 $x: (\text{Tx on} + \text{Tx off}) = 12.5\text{ms}$**



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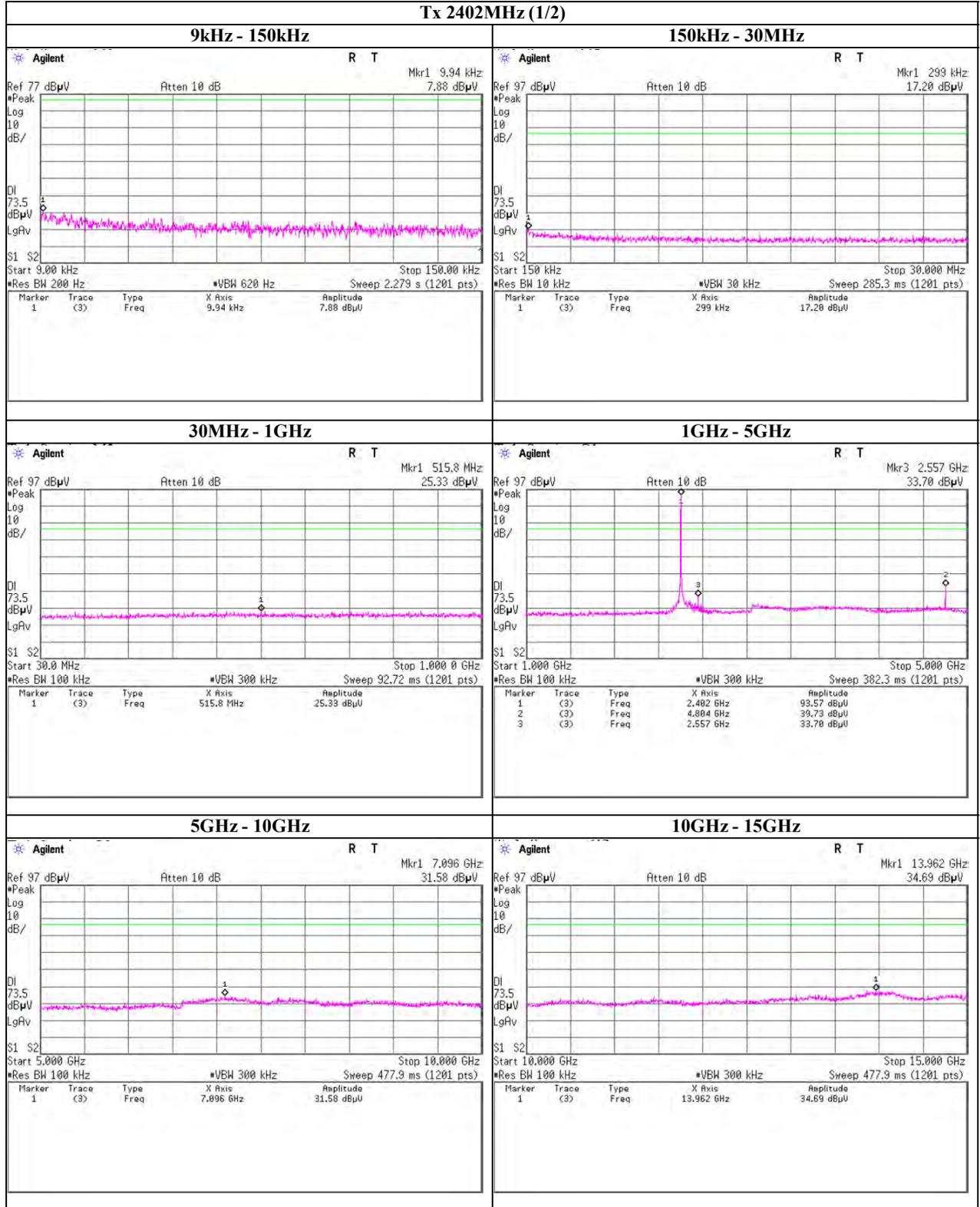
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2402MHz (1/2)



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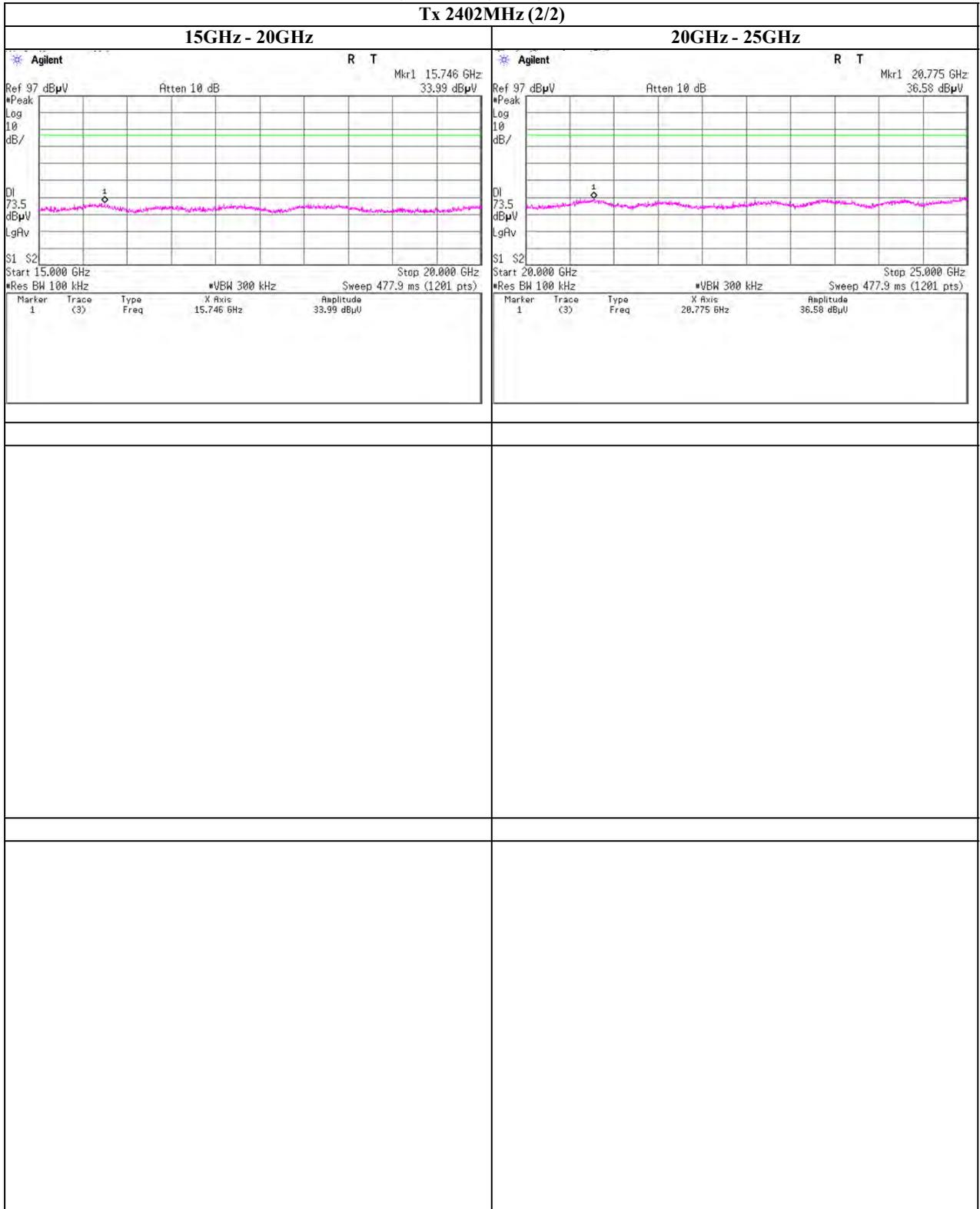
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2402MHz (2/2)



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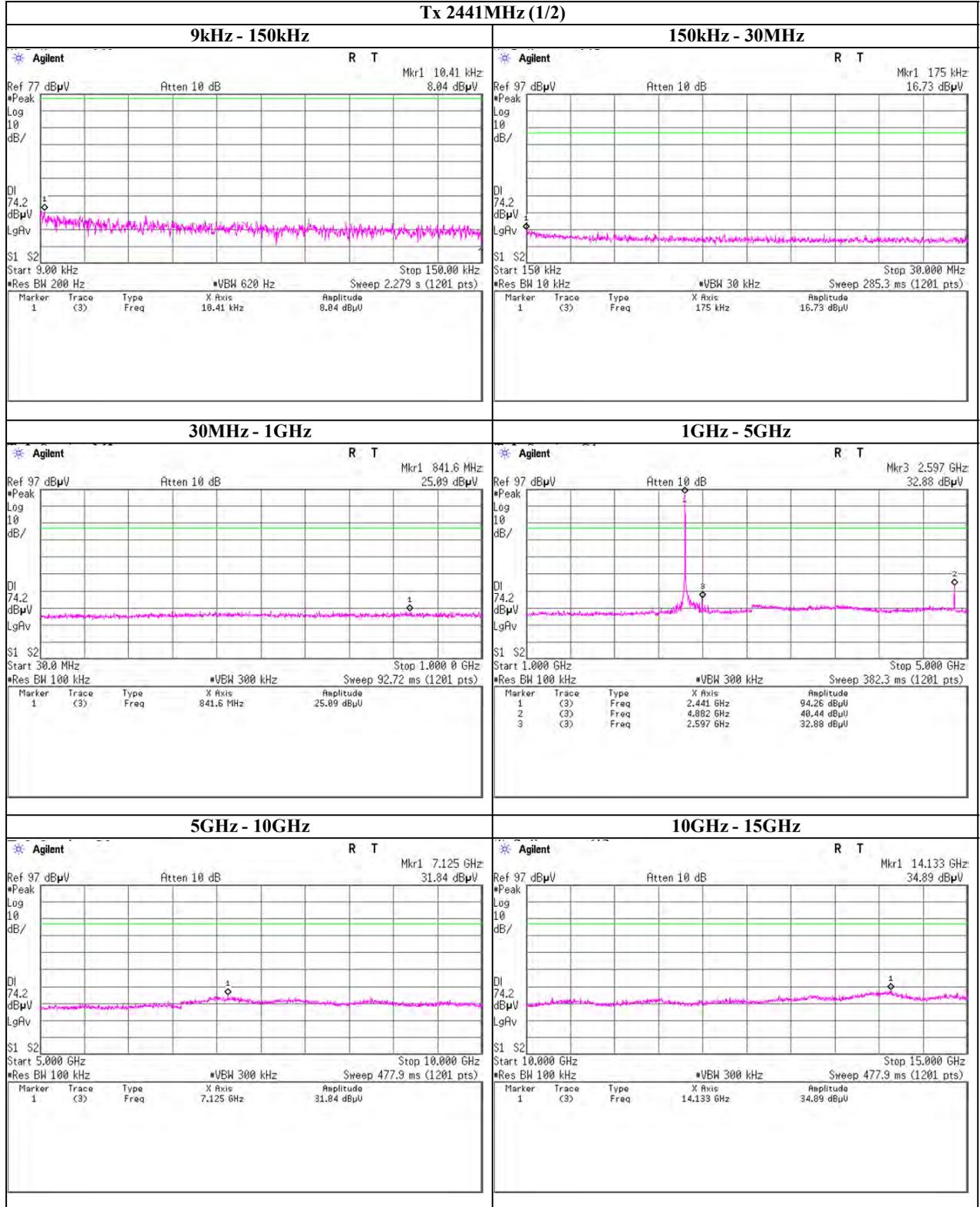
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2441MHz (1/2)



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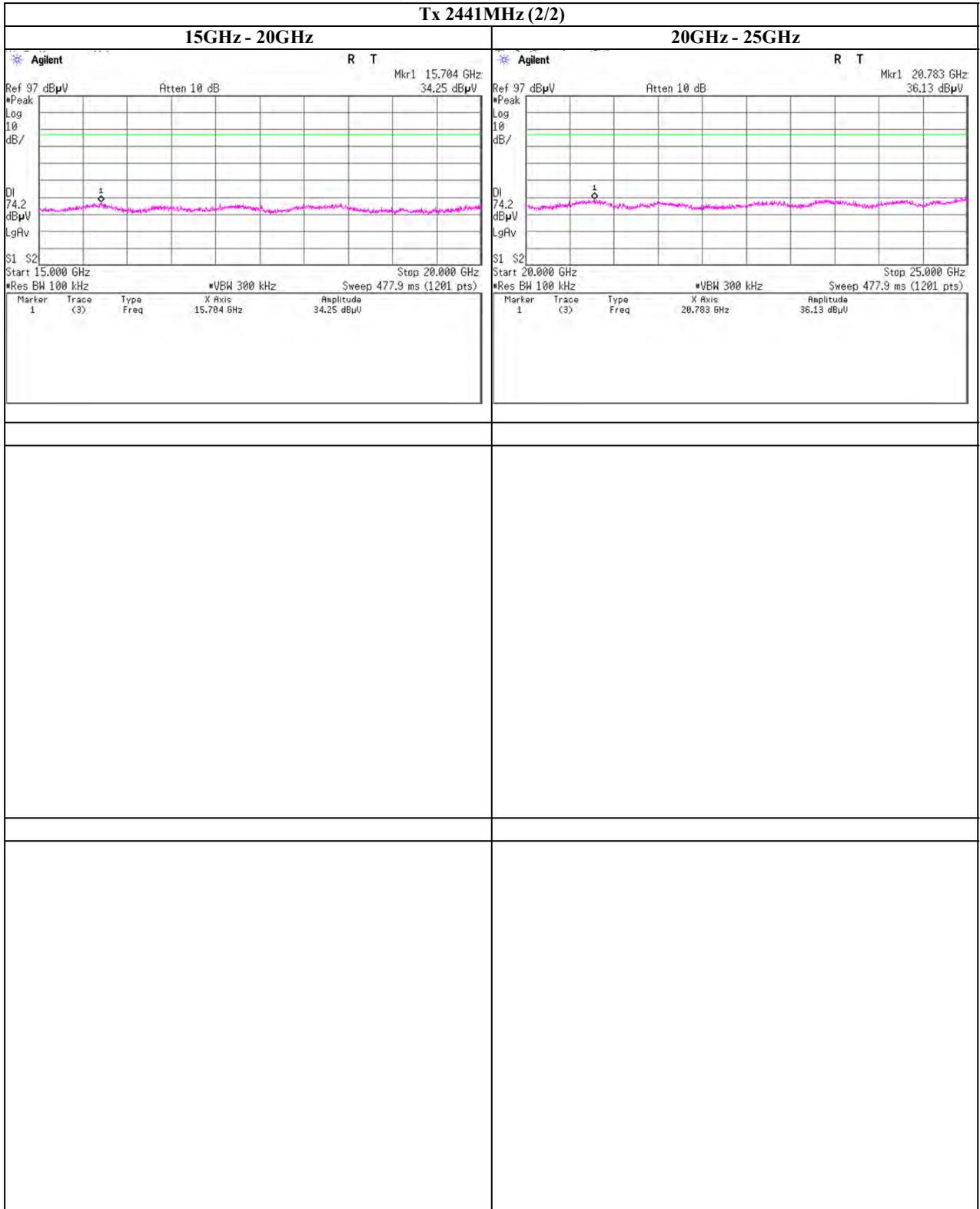
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2441MHz (2/2)



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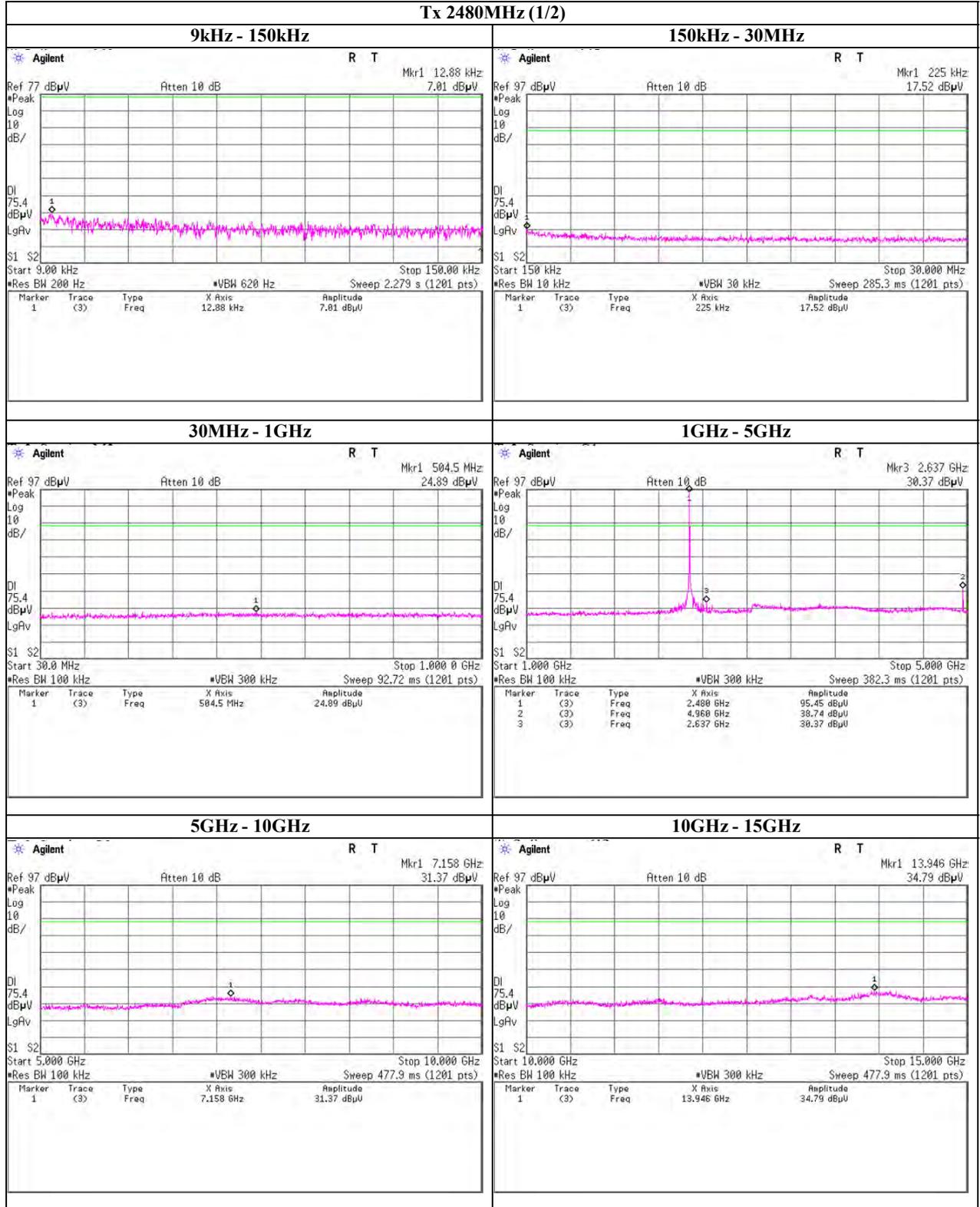
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2480MHz (1/2)



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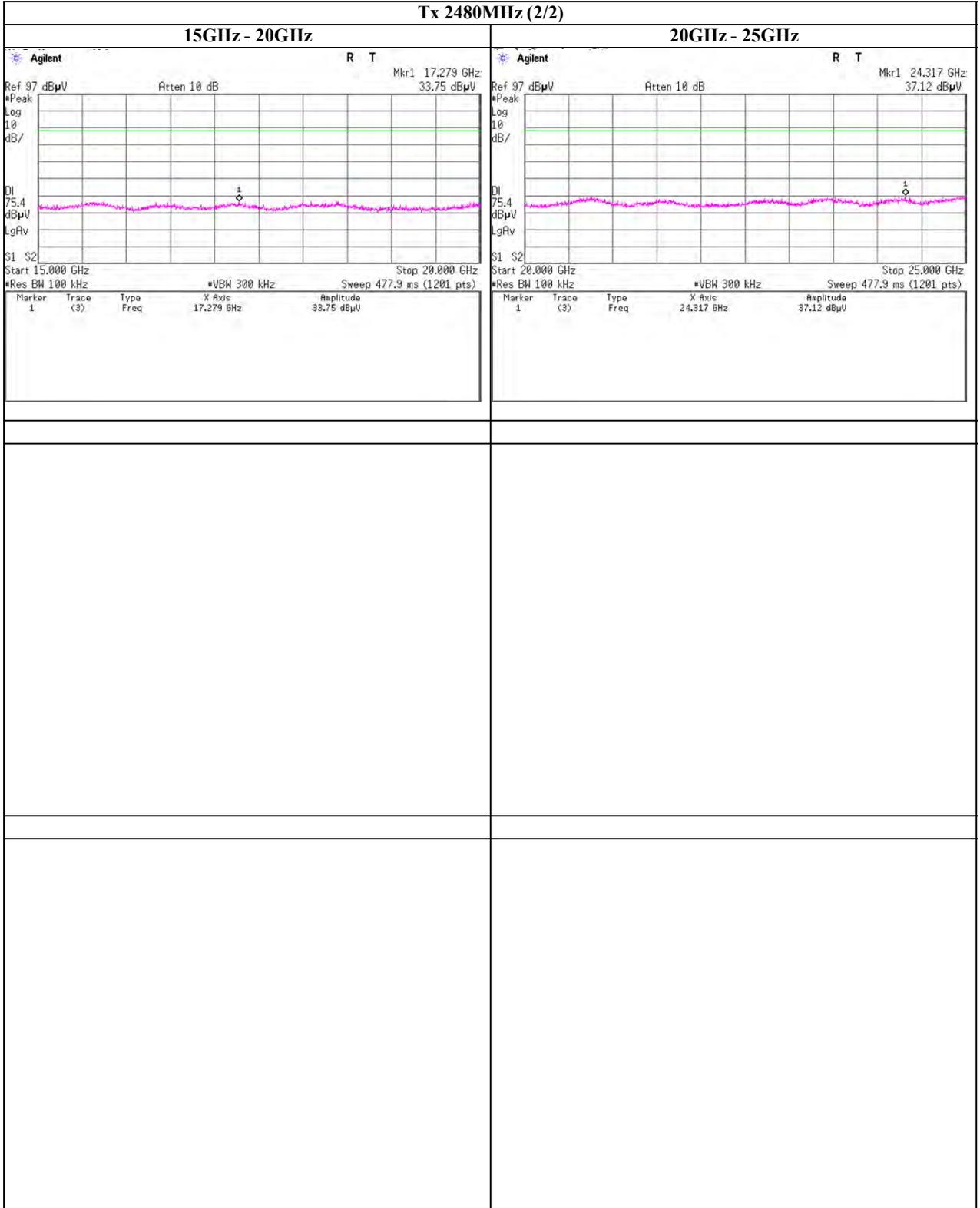
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2480MHz (2/2)



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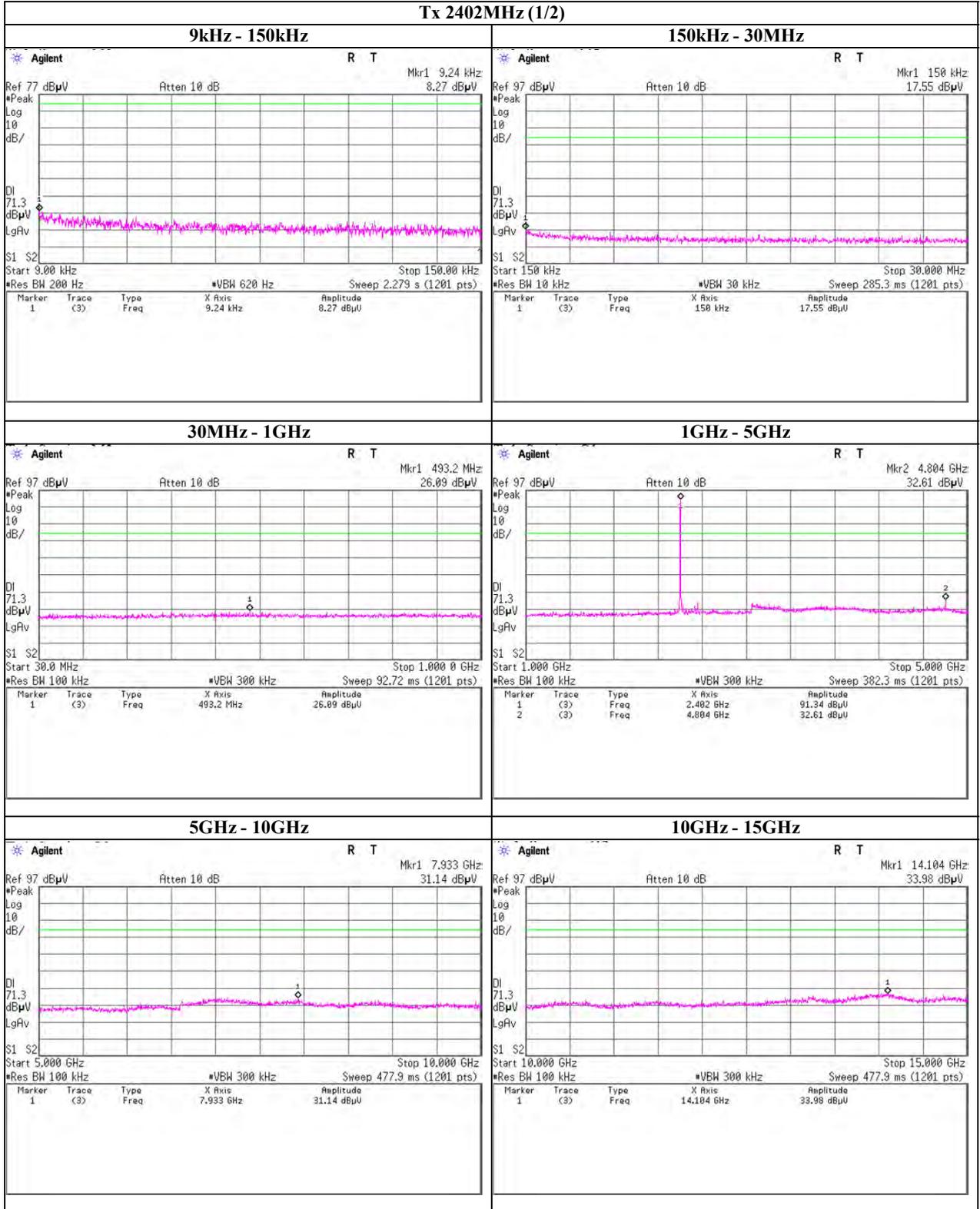
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2402MHz (1/2)



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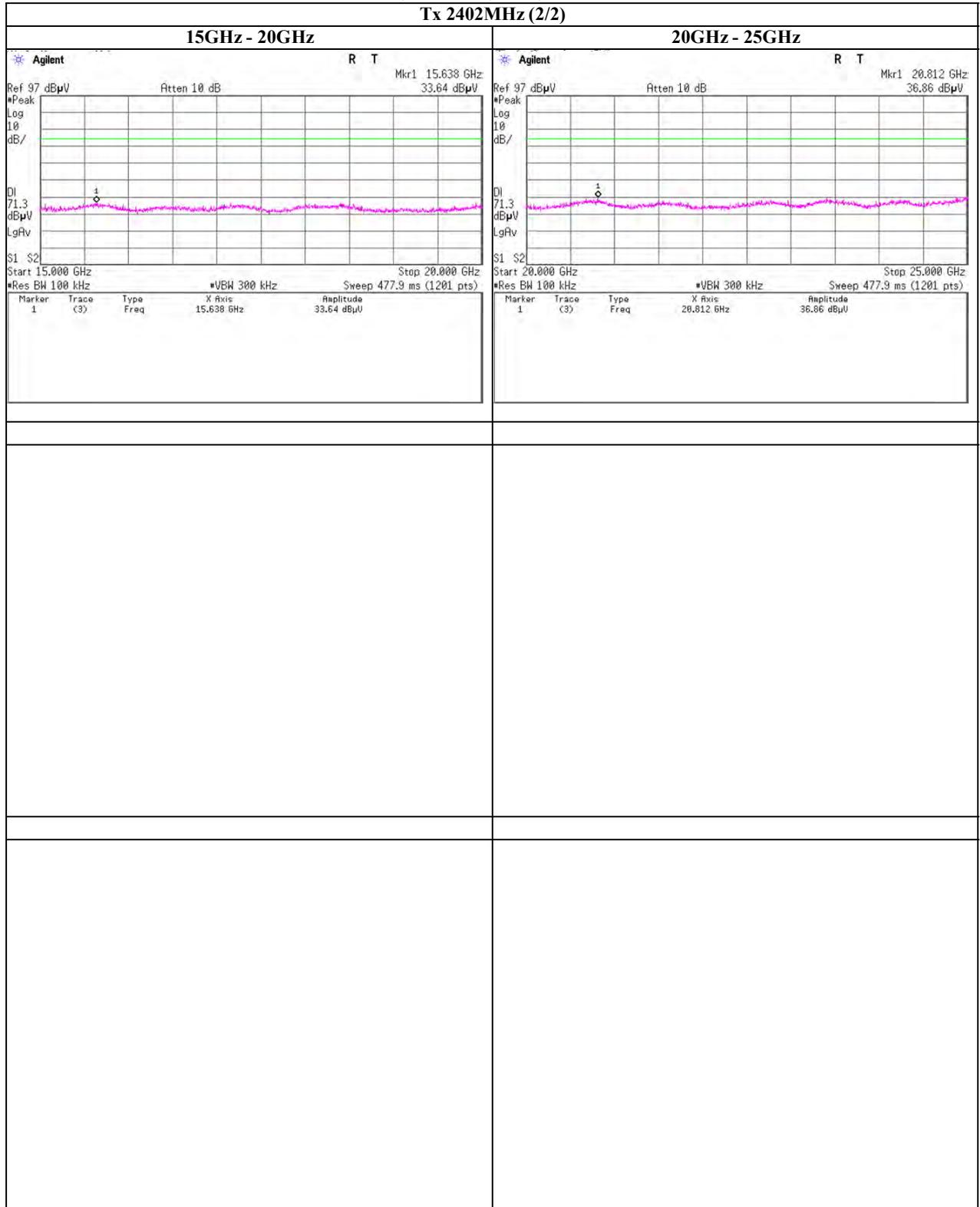
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2402MHz (2/2)



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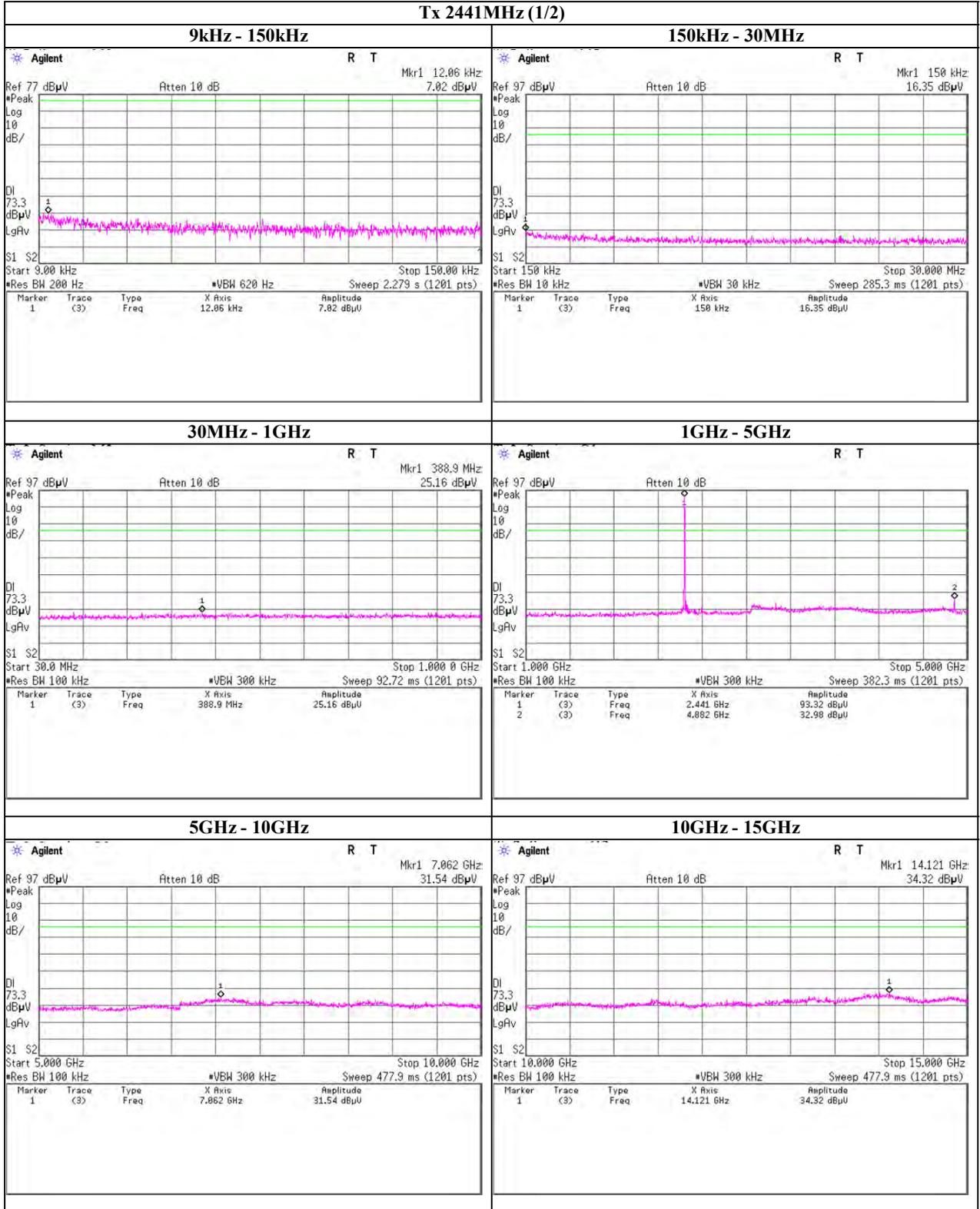
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2441MHz (1/2)



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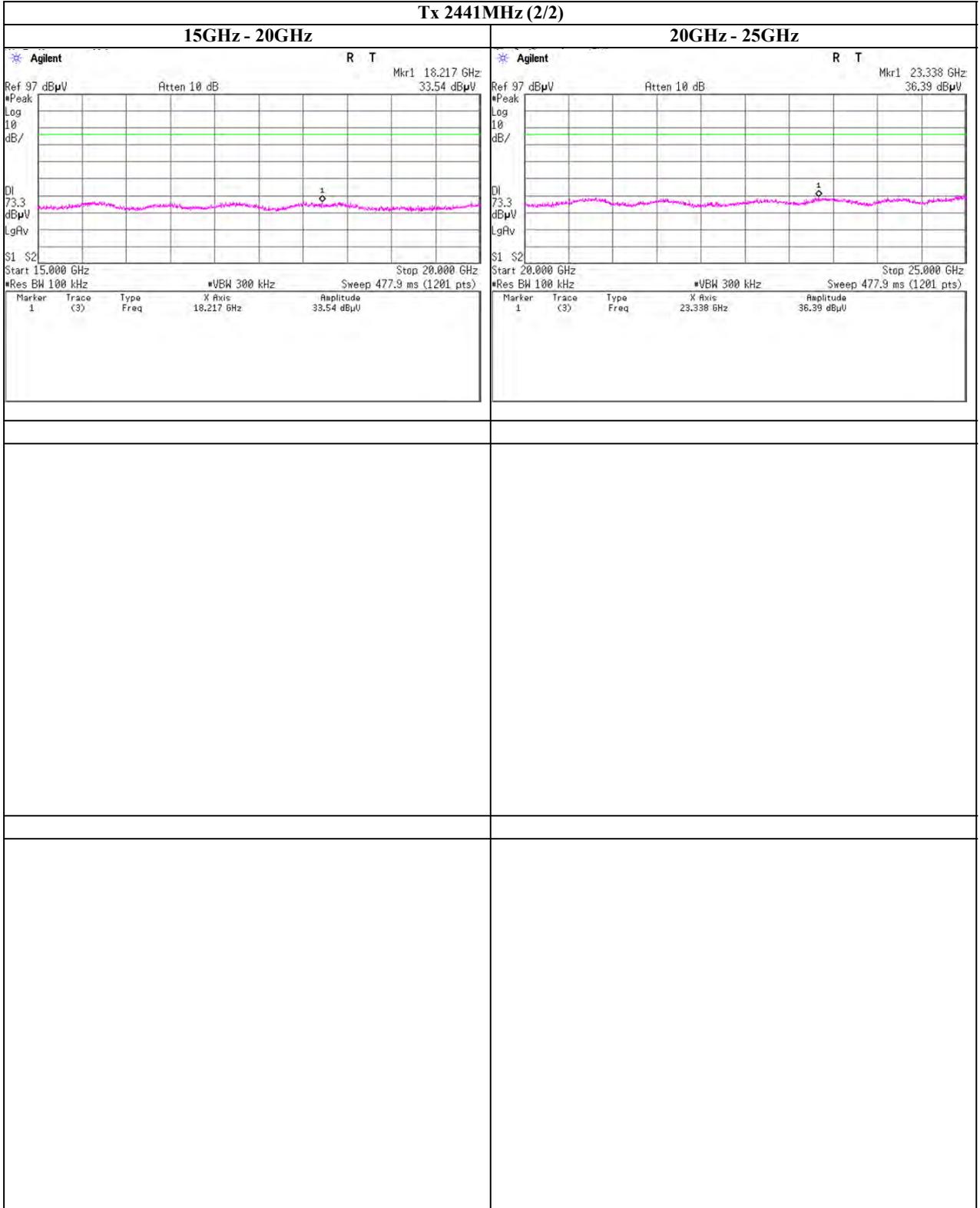
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2441MHz (2/2)



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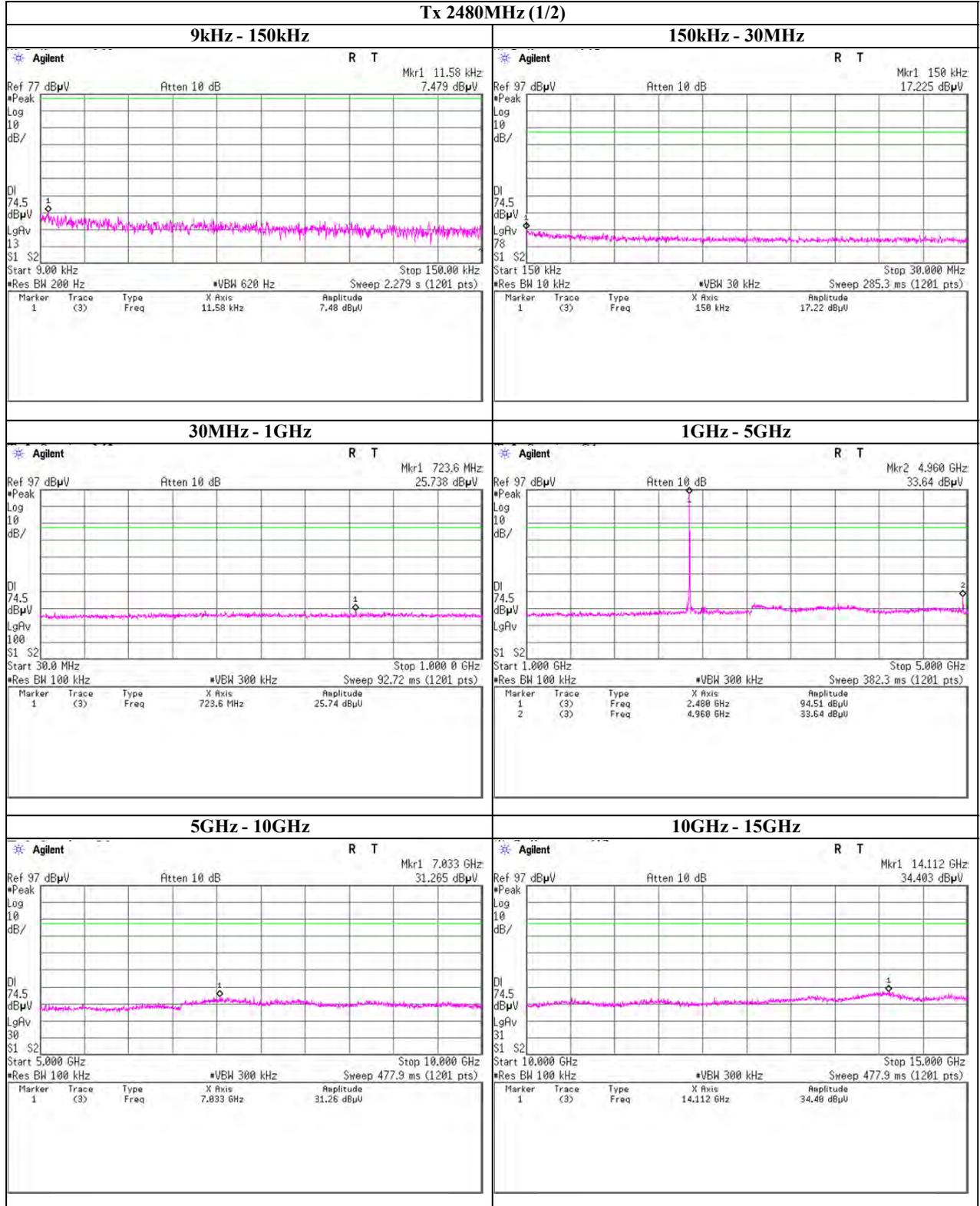
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2480MHz (1/2)



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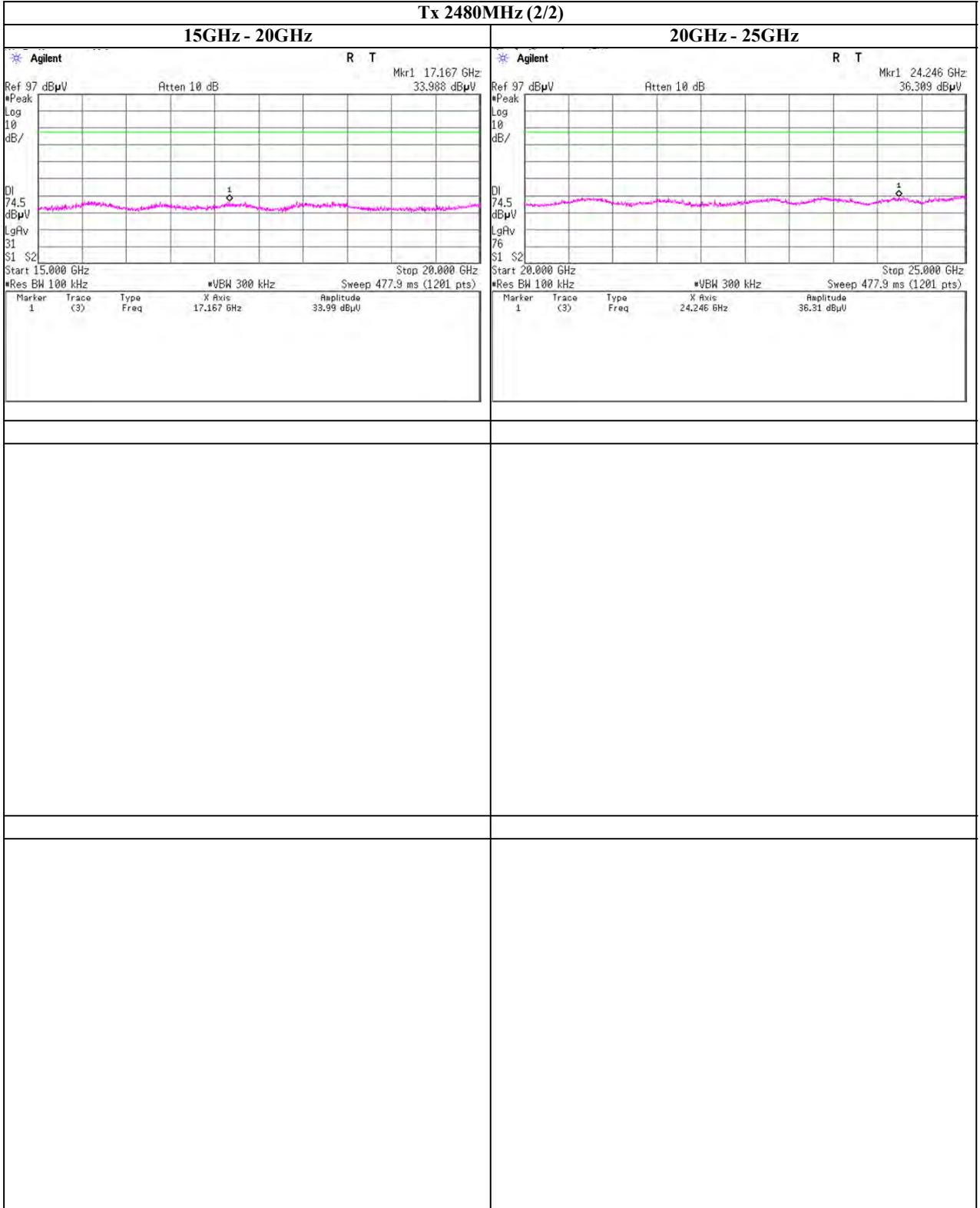
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2480MHz (2/2)



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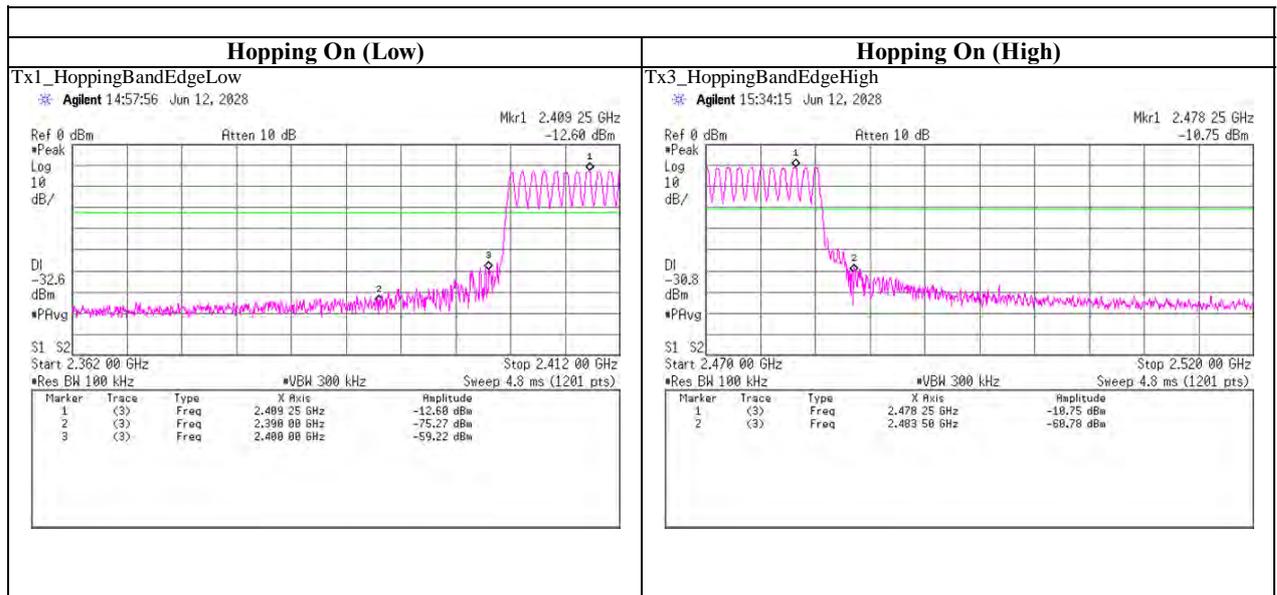
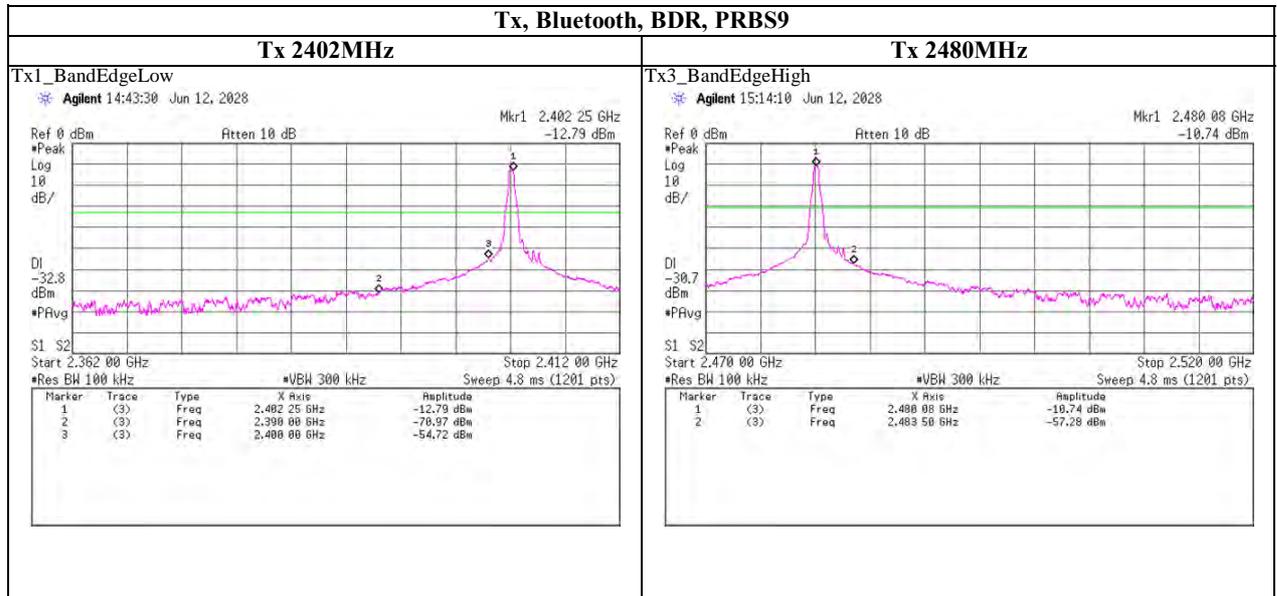
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Spurious emission (Conducted)

Band Edge compliance



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Shonan EMC Lab.

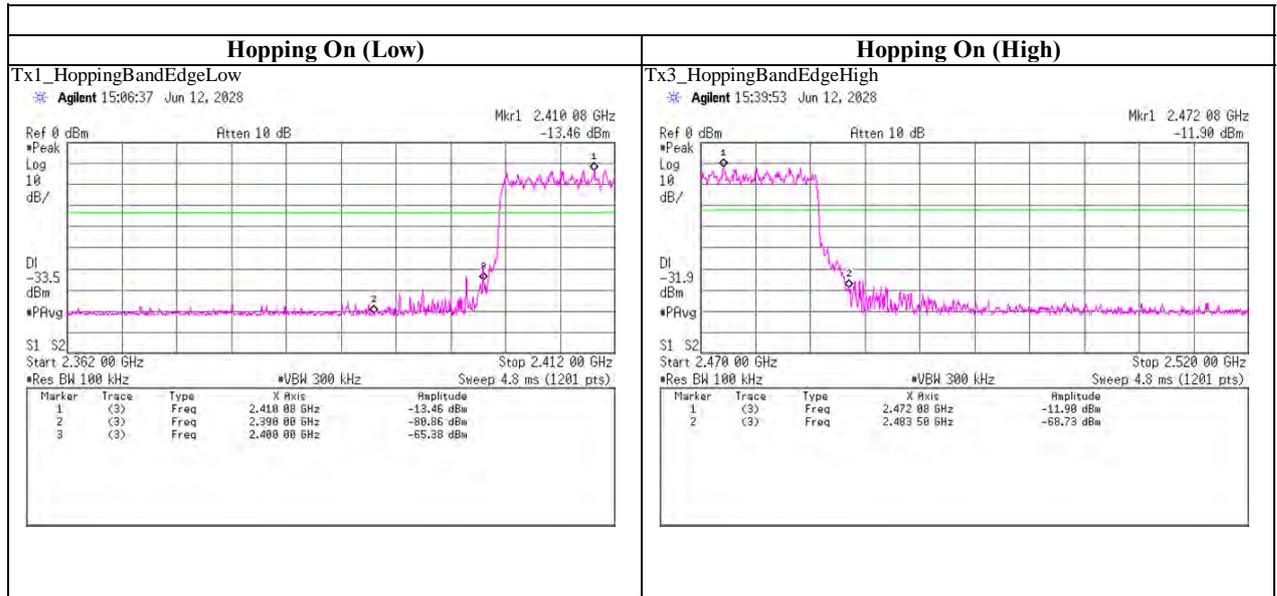
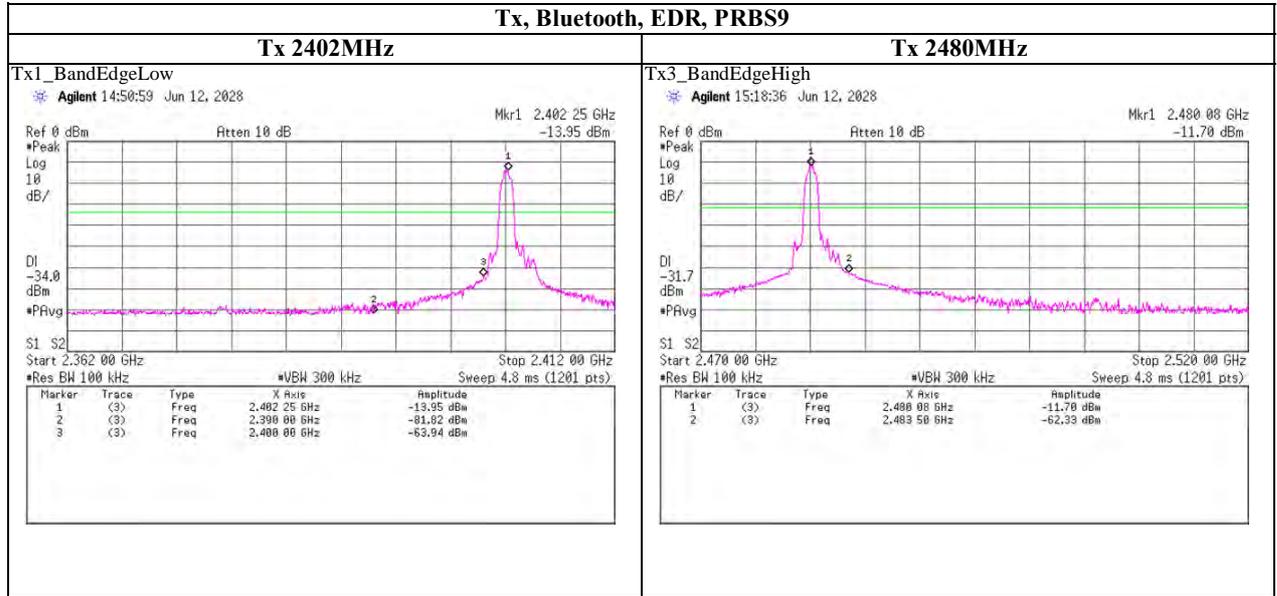
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Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Band Edge compliance



UL Japan, Inc.

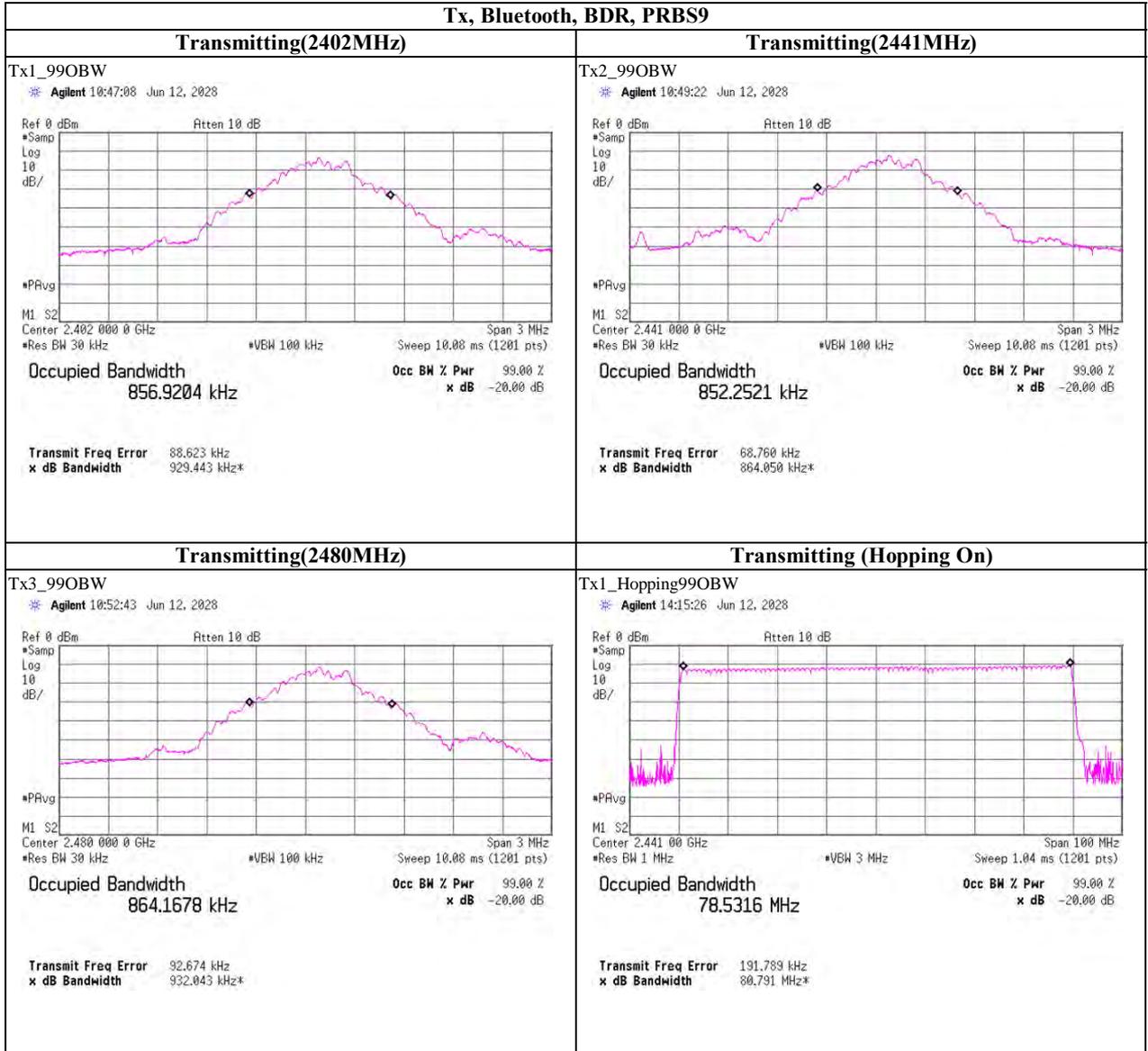
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99% Occupied Bandwidth



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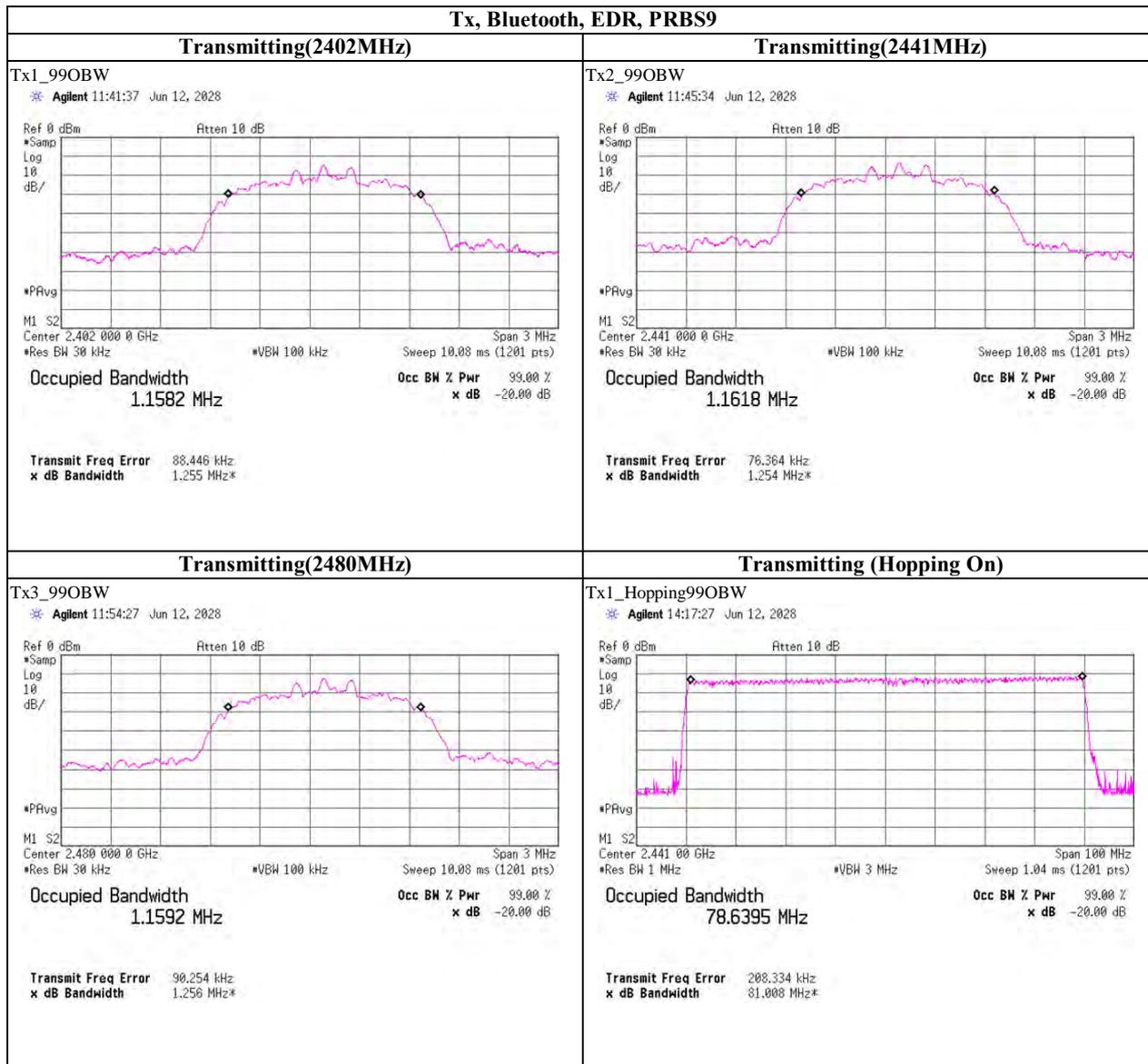
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99% Occupied Bandwidth



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**APPENDIX 3
Test Instruments**

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2011/02/02 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2011/03/23 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2010/11/24 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2011/03/02 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2010/11/16 * 12
KPM-08	Power meter	Anritsu	ML2495A	6K00003356	AT	2010/09/22 * 12
KPSS-04	Power sensor	Anritsu	MA2411B	012088	AT	2010/09/22 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,LMF)	-	RE	-
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2011/02/17 * 12
SAT6-01	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SAT3-04	Attenuator	JFW	50HF-003N	-	RE	2011/02/17 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2010/10/11 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2010/04/02 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2010/04/02 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0888	RE	2010/10/11 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2011/02/23 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2010/10/29 * 12
SJM-12	Measure	PROMART	SEN1935	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2010/09/11 * 12
SAEC-03	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2010/09/13 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2011/03/07 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2010/04/16 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2010/05/27 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2011/03/16 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2011/03/16 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/03/23 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2010/08/17 * 12
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	RE	2010/12/15 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2010/12/15 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with traceable calibrations . Each calibration is traceable to the national or international standards .

Test Item :

- RE: Radiated emission ,
- AT: Antenna terminal disturbance voltage