



RADIO TEST REPORT

Test Report No. : 32DE0235-HO-C

Applicant : SAMSUNG ELECTRONICS CO., LTD.
Type of Equipment : GSM/GPRS 1900 Phone with 802.11abgn, BT3.0 (EDR)
Model No. : SHW-M410K
FCC ID : A3LSHWM410K
Test regulation : FCC Part 15 Subpart E: 2011
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: November 21 to 25 2011

Representative test engineer:

Katsunori Okai
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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SECTION 1: Customer information

Company Name : SAMSUNG ELECTRONICS CO., LTD.
Address : 416, MAETAN 3-DONG, YEONGTONG-GU SUWON-CITY,
GYEONGGI-DO 443-742, SOUTH KOREA

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : GSM/GPRS 1900 Phone with 802.11abgn, BT3.0 (EDR)
Model No. : SHW-M410K
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC3.7V
Receipt Date of Sample : November 21, 2011
Modification of EUT : No Modification by the test lab

2.2 Product Description

Radio Specification

Bluetooth

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Bandwidth & Channel spacing	1MHz & 1MHz
Antenna Gain	-11.5dBi

WLAN (IEEE802.11a/b/g/n-20)

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	5180-5240MHz 5260-5320MHz 5500-5640MHz 5745-5825MHz
Type of Modulation	DSSS, OFDM	OFDM
Bandwidth & Channel spacing	20MHz & 5MHz	20MHz & 20MHz
Antenna Gain	2.4G: -11.5dBi	5G: -11.5dBi

*EUT cannot operate in the frequency range from 5660 to 5700MHz

GSM

Equipment Type	Transceiver
Frequency of Operation	[Up Link] PCS: 1850 – 1910MHz [Down Link] PCS: 1930 – 1990MHz
Type of Modulation	GMSK
Antenna Gain	-3.93dBi

[Additional model]

EUT (SHW-M410K) has a variant model: SHW-M410S.

Difference between two models is only software version name to identify each model.

Basic		Additional	
Model	SHW-M410K	Model	SHW-M410S
HW version	REV 0.7	HW version	REV 0.7
SW version	M410K.002	SW version	M410S.000

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E: 2011, final revised on July 8, 2011 and effective August 8, 2011

Title : FCC 47CFR Part15 Radio Frequency Device Subpart E
Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC :ANSI C63.4:2003	FCC: 15.407(b)(6) / 15.207	QP 11.8dB, 21.36118MHz, L AV 11.4dB, 0.29775MHz, N	Complied	-
	IC: RSS-Gen 7.2.4	IC: RSS-Gen 7.2.4			
26dB Emission Bandwidth	FCC :ANSI C63.4:2003 FCC Public Notice DA 02-2138A1	FCC : 15.407(a)(1)(2)(3)	See data	N/A	Conducted
	IC: -	IC: -			
Maximum Peak Output Power	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1	FCC : 15.407(a)(1)(2)(3)		Complied	Conducted
	IC: -	IC: RSS-210 A9.2(1)(2)(3)			
Peak Power Spectral Density	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1	FCC : 15.407(a)(1)(2)(3)		Complied	Conducted
	IC: -	IC: RSS-210 A9.2(1)(2)(3)			
Peak Excursion Ratio	FCC :ANSI C63.4:2003, FCC Public Notice DA 02-2138A1	FCC : 15.407(a)(6)	Complied	Conducted	
	IC: -	IC: -			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.4:2003	FCC : 15.407(b), 15.205 and 15.209	6.9dB 31440MHz, AV, Vertical/ Horizontal	Complied	Conducted / Radiated
	IC: -	IC: RSS-210 A.9.2(1)(2)(3)			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. For DFS tests, please see the test report number 32DE0235-HO-D issued by UL Japan, Inc.					

* These tests were also referred to FCC Public Notice DA 02-2138A1 "Measurement Procedure Updated for Peak Transmit Power in the Unlicensed National Information Infrastructure (U-NII) Bands.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Band Width	RSS-Gen 4.6.1	RSS-210 A9.2 (1)(2)(3)	N/A	N/A	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)

The data listed in this test report has enough margin, more than the site margin.

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3.5 Test Location

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11a (11a)	54Mbps, PN9
IEEE 802.11n SISO 20MHz BW (11n-20)	MCS 7, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low channel).	

Power of the EUT was set by the software as follow:

Software name & version: HW Rev 0.7, SW: M410K.002

[Power Setting]

11a: 12dBm

11n-20(5GHz): 11dBm

*The above setting of the software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.

*Details of Operating mode(s)

Test Item	Operating Mode	Tested Frequency		
		Low Band	Middle Band	Additional Band
Conducted emission	11a Tx*1)	5180MHz	-	-
26dB Emission Bandwidth, 99% Occupied Bandwidth, Maximum Peak Output Power Peak Power Spectral Density, Spurious Emission (Band Edge compliance)	11a Tx 11n-20 Tx	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz	5500MHz 5580MHz 5640MHz
Spurious Emission (Conducted)	11a Tx *2)	5180MHz 5220MHz 5240MHz	5260MHz 5300MHz 5320MHz	5500MHz 5580MHz 5640MHz
Spurious Emission(Radiated)	11a Tx *2)	5180MHz 5240MHz	5320MHz	5500MHz 5580MHz 5640MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test and the noise levels at the mode/tested frequencies were equivalent to those of other modes/tested frequencies. *2) Since 11a and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.				

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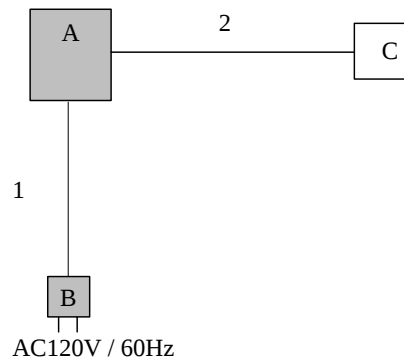
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4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	GSM/GPRS 1900 Phone with 802.11abgn, BT3.0 (EDR)	SHW-M410K	FI-294-E *1) FI-294-C *2)	SAMSUNG	EUT
B	AC Adapter	ETA0U10KBK	DK2B729TS/7-E	SAMSUNG	EUT
C	Ear phone	-	-	SAMSUNG	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission and Radiated Emission tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Ear phone Cable	1.2	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure

EUT was placed on a urethane platform / a wooden table of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector	: QP and AV
Measurement range	: 0.15-30MHz
Test data	: APPENDIX
Test result	: Pass

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SECTION 6: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Below 1GHz

The result also satisfied with the general limits specified in section 15.209(a).

Above 1GHz

Inside of restricted bands(Section 15.205): Apply to limit in the Section 15.209(a).

Outside of the restricted bands: Peak detector apply to limit 68.2dBuV/m(−27dBm e.i.r.p. ^{*})
in the Section 15.407(b)(1)(2)(3).

Restricted bandedge:

Apply to limit in the Section 15.209(a).

Since this limit is severer than the limit of the inside of restricted bands.

*Electric Field Strength to e.i.r.p. Conversion

$$E = \frac{1000000\sqrt{30P}}{3} \text{ (uV/m)} \quad : P \text{ is the e.i.r.p. (Watts)}$$

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Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	Below 1GHz	Above 1GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	PK	AV
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz*1)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz), 0.5m *3) (above 26.5GHz)	

*1) As both cycle and Off duration were short enough, 10Hz video bandwidth was used. (See Appendix)

*2) Distance Factor: $20 \times \log (3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

*3) Distance Factor: $20 \times \log (3.0\text{m}/0.5\text{m}) = 15.6\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-40GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port with Spectrum Analyzer.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
26dB Bandwidth	30MHz	Close to 1% of EBW	Greater than RBW	Auto	Peak	Max Hold	Spectrum Analyzer *1)
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	Close to 1% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer *1)
Maximum Peak Output Power	52MHz	1MHz	3MHz	Auto	Sample Power Averaging (100 times)	Clear Write	Spectrum Analyzer method 1
Peak Power Spectral Density	52MHz	1MHz	3MHz	Auto	Sample Power Averaging (100 times)	Clear Write	Spectrum Analyzer method 2
Peak Excursion Ratio	26MHz	1MHz	3MHz	Auto	Peak Sample Power Averaging (100 times)	Max Hold Clear Write	Spectrum Analyzer method 1
Conducted Spurious Emission *2)	9kHz to 150kHz 150kHz to 30MHz 30MHz to 1GHz 1GHz to 40GHz (Less or equal to 5GHz)	200Hz 9.1kHz 100kHz 1MHz	620Hz 27kHz 300kHz 3MHz	Auto	Peak	Max Hold	Spectrum Analyzer
*1) The measurement was performed with Max Hold since the duty cycle was not 100%. *2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart..							

*EBW: Enough width to display Bandwidth

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

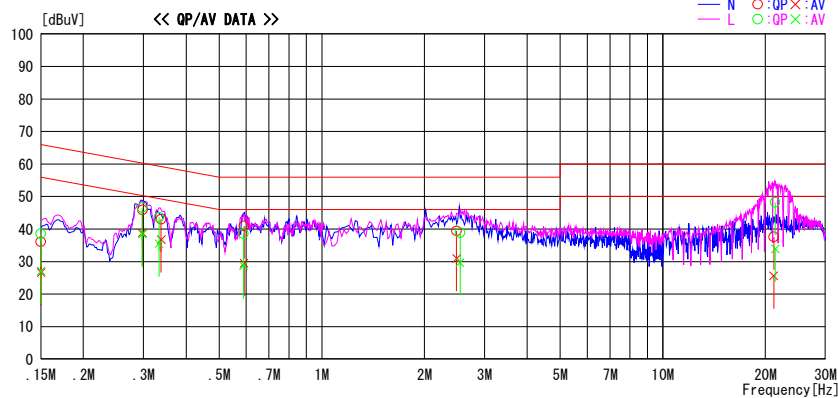
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/11/25

Report No. : 32DE0235-H0
Temp./Humi. : 22deg. C / 30% RH
Engineer : Katsunori Okai

Mode / Remarks : Tx WLAN 11a 5180MHz

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	22.7	13.2	13.4	36.1	26.6	66.0	56.0	29.9	29.4	N	
0.29775	32.5	25.5	13.4	45.9	38.9	60.3	50.3	14.4	11.4	N	
0.33796	29.6	23.3	13.4	43.0	36.7	59.3	49.3	16.3	12.6	N	
0.59110	27.5	16.1	13.4	40.9	29.5	56.0	46.0	15.1	16.5	N	
2.48525	25.6	17.2	13.8	39.4	31.0	56.0	46.0	16.6	15.0	N	
21.16028	20.5	8.5	17.1	37.6	25.6	60.0	50.0	22.4	24.4	N	
0.15000	25.2	13.7	13.4	38.6	27.1	66.0	56.0	27.4	28.9	L	
0.29747	33.2	25.0	13.4	46.6	38.4	60.3	50.3	13.7	11.9	L	
0.33307	30.2	22.1	13.4	43.6	35.5	59.4	49.4	15.8	13.9	L	
0.58936	25.2	15.3	13.4	38.6	28.7	56.0	46.0	17.4	17.3	L	
2.54316	25.1	15.9	13.8	38.9	29.7	56.0	46.0	17.1	16.3	L	
21.36118	31.1	16.8	17.1	48.2	33.9	60.0	50.0	11.8	16.1	L	

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

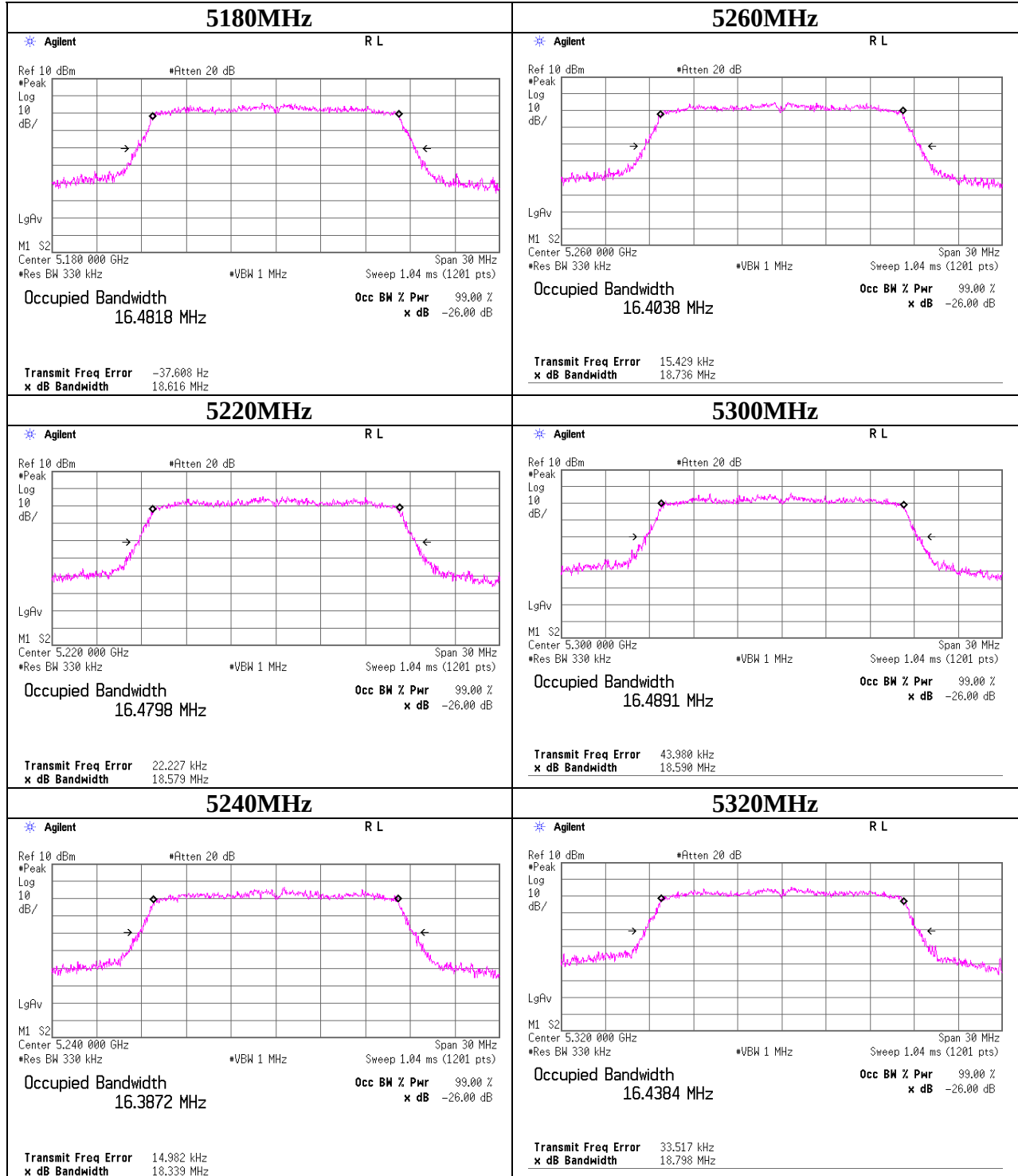
26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32DE0235-HO
Date 11/25/2011
Temperature/ Humidity 24 deg. C / 41% RH
Engineer Tomohisa Nakagawa
Mode 11a Tx

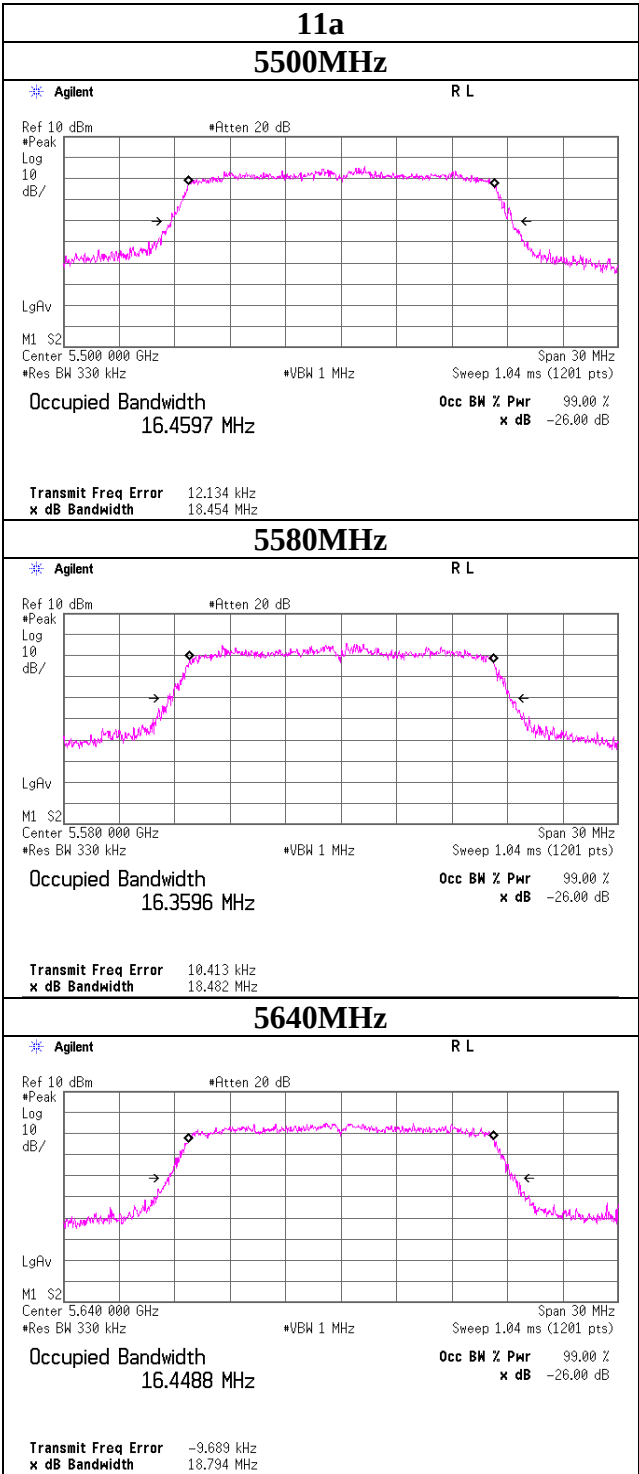
Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	18.616	16.482	-
5220	18.579	16.480	-
5240	18.339	16.387	-
5260	18.736	16.404	-
5300	18.590	16.489	-
5320	18.798	16.438	-
5500	18.454	16.460	-
5580	18.482	16.360	-
5640	18.794	16.449	-

26dB Emission Bandwidth and 99% Occupied Bandwidth

11a



26dB Emission Bandwidth and 99% Occupied Bandwidth



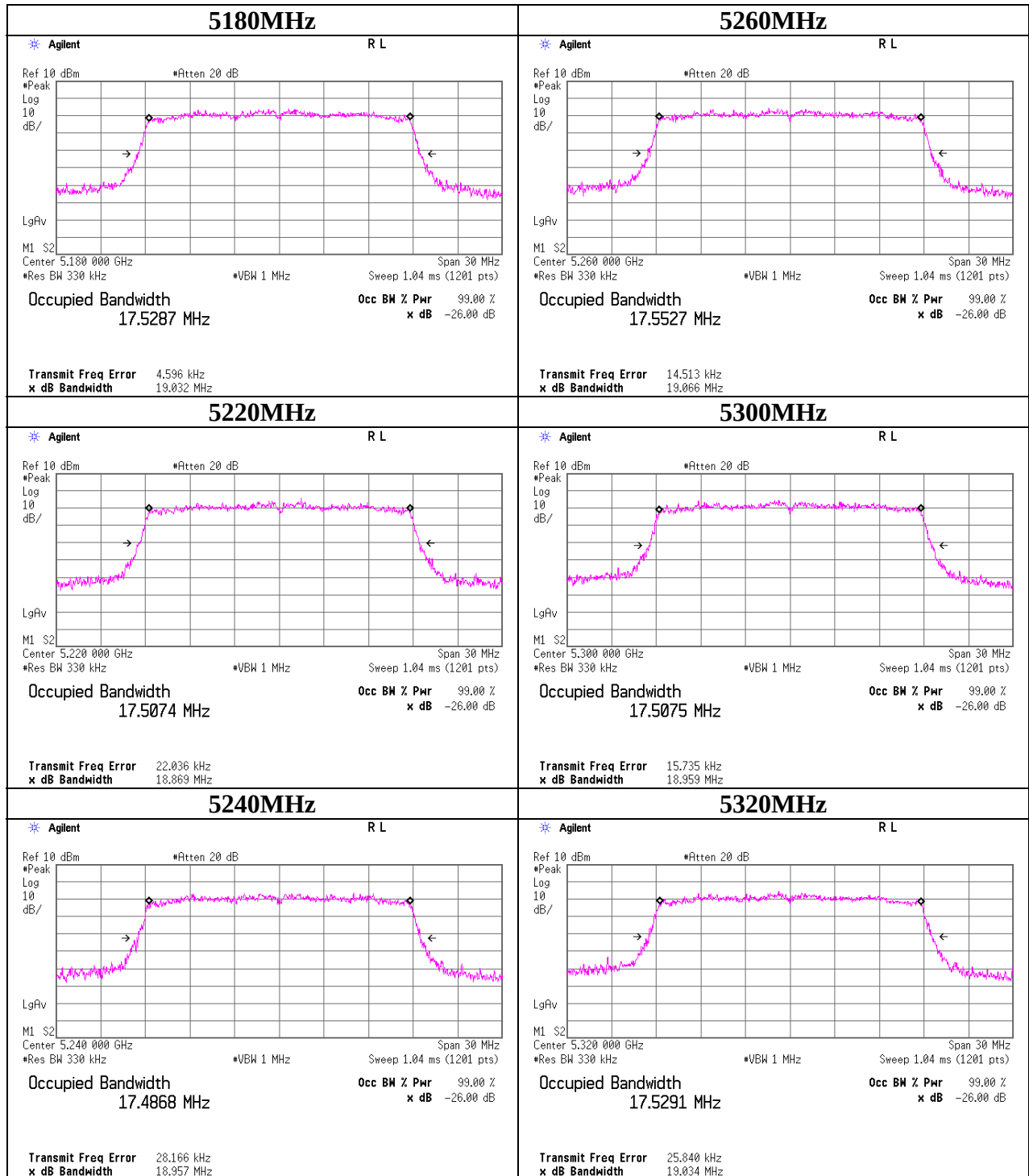
26dB Emission Bandwidth and 99% Occupied Bandwidth

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32DE0235-HO
Date 11/25/2011
Temperature/ Humidity 24 deg. C / 41% RH
Engineer Tomohisa Nakagawa
Mode 11n-20 Tx

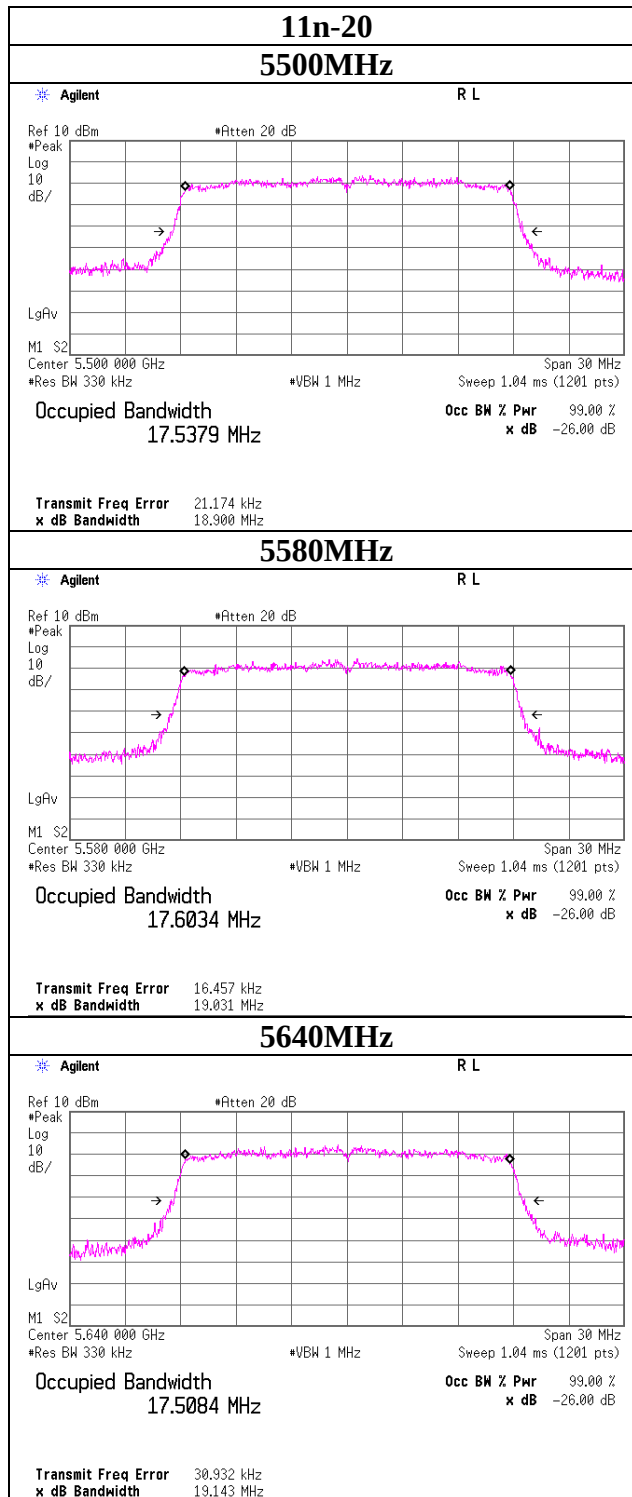
Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	19.032	17.529	-
5220	18.869	17.507	-
5240	18.957	17.487	-
5260	19.066	17.553	-
5300	18.959	17.508	-
5320	19.034	17.529	-
5500	18.900	17.538	-
5580	19.031	17.603	-
5640	19.143	17.508	-

26dB Emission Bandwidth and 99% Occupied Bandwidth

11n-20



26dB Emission Bandwidth and 99% Occupied Bandwidth



Maximum Peak Output Power

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32DE0235-HO
Date 11/25/2011
Temperature/ Humidity 24 deg. C / 41% RH
Engineer Tomohisa Nakagawa
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	3.15	0.00	10.03	-11.50	13.18	1.68	16.69	-	3.51	-
5220.0	2.69	0.00	10.03	-11.50	12.72	1.22	16.69	-	3.97	-
5240.0	2.83	0.00	10.03	-11.50	12.86	1.36	16.63	-	3.77	-
5260.0	2.67	0.00	10.03	-11.50	12.70	1.20	23.72	-	11.02	-
5300.0	2.86	0.00	10.03	-11.50	12.89	1.39	23.69	-	10.80	-
5320.0	2.82	0.00	10.03	-11.50	12.85	1.35	23.74	-	10.89	-
5500.0	2.17	0.00	10.03	-11.50	12.20	0.70	23.66	-	11.46	-
5580.0	2.67	0.00	10.03	-11.50	12.70	1.20	23.66	-	10.96	-
5640.0	2.83	0.00	10.03	-11.50	12.86	1.36	23.74	-	10.88	-

Result(Cond.) = Reading + Cable Loss + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss + 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

ON time was only measured using Gate function.

Maximum Peak Output Power

Test place : Head Office EMC Lab. No.6 Measurement Room
Report No. : 32DE0235-HO
Date : 11/25/2011
Temperature/ Humidity : 24 deg. C / 41% RH
Engineer : Tomohisa Nakagawa
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	1.79	0.00	10.03	-11.50	11.82	0.32	16.79	-	4.97	-
5220.0	1.66	0.00	10.03	-11.50	11.69	0.19	16.75	-	5.06	-
5240.0	1.97	0.00	10.03	-11.50	12.00	0.50	16.77	-	4.77	-
5260.0	1.87	0.00	10.03	-11.50	11.90	0.40	23.80	-	11.90	-
5300.0	2.08	0.00	10.03	-11.50	12.11	0.61	23.77	-	11.66	-
5320.0	1.68	0.00	10.03	-11.50	11.71	0.21	23.79	-	12.08	-
5500.0	1.46	0.00	10.03	-11.50	11.49	-0.01	23.76	-	12.27	-
5580.0	1.71	0.00	10.03	-11.50	11.74	0.24	23.79	-	12.05	-
5640.0	1.63	0.00	10.03	-11.50	11.66	0.16	23.82	-	12.16	-

Result(Cond.) = Reading + Cable Loss + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss + 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

ON time was only measured using Gate function.

Maximum Average Output Power (Reference data for SAR testing)

IEEE802.11a 5180-5320MHz band 6Mbps

Ch	Freq.	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm] AVG	[mW] AVG
36	5180	0.52	1.85	10.03	12.40	17.38
40	5200	0.56	1.85	10.03	12.44	17.54
44	5220	0.59	1.86	10.03	12.48	17.70
48	5240	0.66	1.86	10.03	12.55	17.99
52	5260	0.66	1.87	10.03	12.56	18.03
56	5280	0.51	1.87	10.03	12.41	17.42
60	5300	0.46	1.87	10.03	12.36	17.22
64	5320	0.44	1.88	10.03	12.35	17.18

Sample Calculation: Result = Reading + Cable Loss + Attenuator

IEEE802.11n-20 5180-5320MHz band MCS0

Ch	Freq.	P/M Reading [dBm]	Cable Loss	Atten.	Result	
					[dBm]	[mW]
	[MHz]	AVG	[dB]	[dB]	AVG	AVG
36	5180	-0.71	1.85	10.03	11.17	13.09
40	5200	-0.77	1.85	10.03	11.11	12.91
44	5220	-0.66	1.86	10.03	11.23	13.27
48	5240	-0.59	1.86	10.03	11.30	13.49
52	5260	-0.64	1.87	10.03	11.26	13.37
56	5280	-0.60	1.87	10.03	11.30	13.49
60	5300	-0.77	1.87	10.03	11.13	12.97
64	5320	-0.76	1.88	10.03	11.15	13.03

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11a 5500-5700MHz band] 6Mbps

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm] AVG	[mW] AVG
100	5500	0.28	1.91	10.02	12.21	16.63
104	5520	0.34	1.92	10.02	12.28	16.90
108	5540	0.28	1.92	10.02	12.22	16.67
112	5560	0.42	1.92	10.03	12.37	17.26
116	5580	0.37	1.93	10.03	12.33	17.10
120	5600	0.24	1.93	10.03	12.20	16.60
124	5620	0.31	1.94	10.03	12.28	16.90
128	5640	0.39	1.94	10.03	12.36	17.22
132	5660	Operation is impossible.				
136	5680					
140	5700					

Sample Calculation: Result = Reading + Cable Loss + Attenuator

[IEEE802.11n-20 5500-5700MHz band] MCS0

Ch	Freq. [MHz]	P/M Reading [dBm] AVG	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm] AVG	[mW] AVG
100	5500	-0.82	1.91	10.02	11.11	12.91
104	5520	-0.84	1.92	10.02	11.10	12.88
108	5540	-0.82	1.92	10.02	11.12	12.94
112	5560	-0.87	1.92	10.03	11.08	12.82
116	5580	-0.85	1.93	10.03	11.11	12.91
120	5600	-0.81	1.93	10.03	11.15	13.03
124	5620	-0.76	1.94	10.03	11.21	13.21
128	5640	-0.77	1.94	10.03	11.20	13.18
132	5660	Operation is impossible.				
136	5680					
140	5700					

Sample Calculation: Result = Reading + Cable Loss + Attenuator

Peak Power Spectral Density

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32DE0235-HO
Date 11/25/2011
Temperature/ Humidity 24 deg. C / 41% RH
Engineer Tomohisa Nakagawa
Mode 11a, 11n-20 Tx

11a

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
5180.0	-6.89	0.00	10.03	3.14	4.00	0.86
5220.0	-7.50	0.00	10.03	2.53	4.00	1.47
5240.0	-7.27	0.00	10.03	2.76	4.00	1.24
5260.0	-7.26	0.00	10.03	2.77	11.00	8.23
5300.0	-7.01	0.00	10.03	3.02	11.00	7.98
5320.0	-7.22	0.00	10.03	2.81	11.00	8.19
5500.0	-7.89	0.00	10.03	2.14	11.00	8.86
5580.0	-7.28	0.00	10.03	2.75	11.00	8.25
5640.0	-6.69	0.00	10.03	3.34	11.00	7.66

Result = Reading + Cable Loss + Attenuator

11n-20

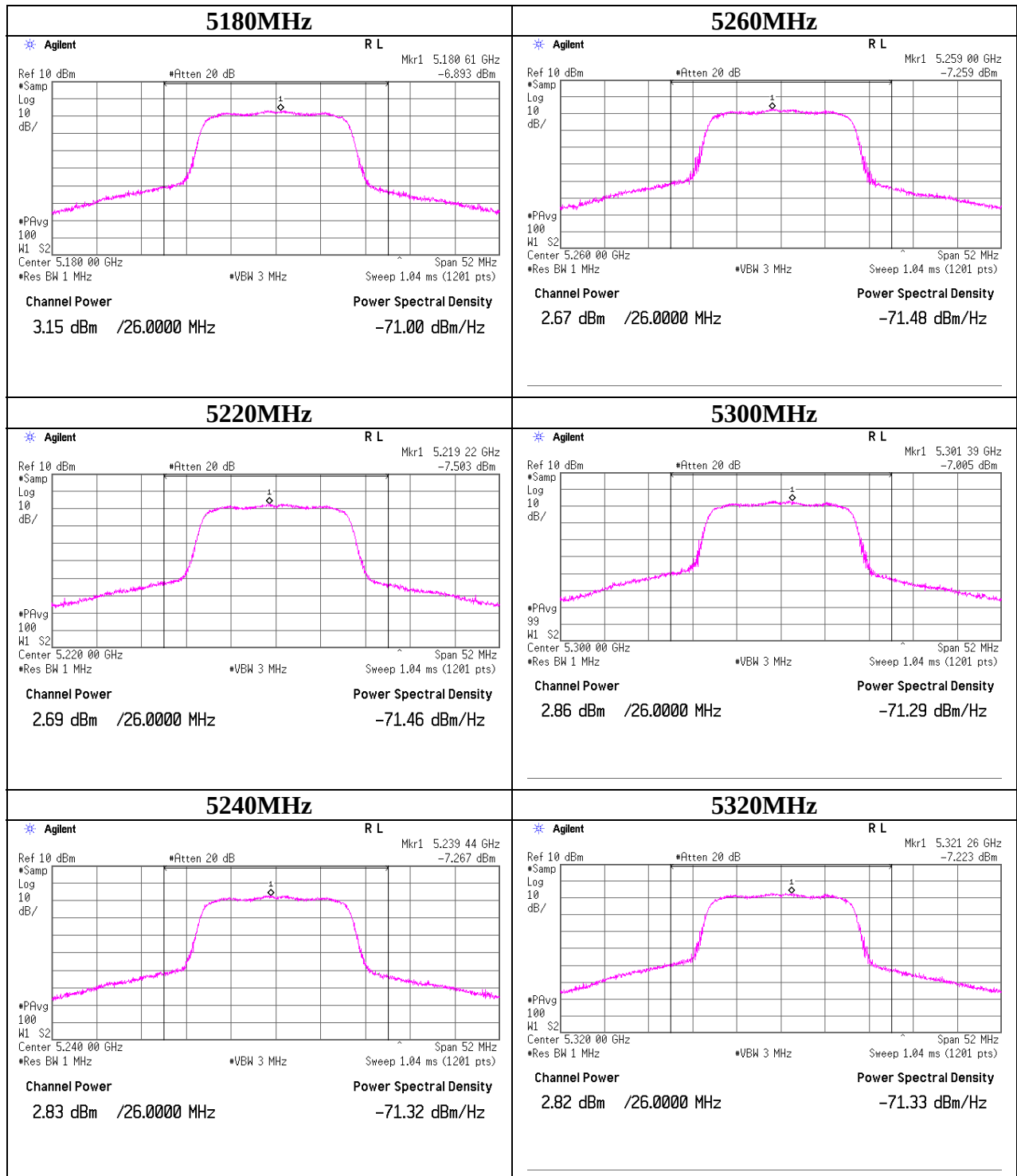
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
5180.0	-8.38	0.00	10.03	1.65	4.00	2.35
5220.0	-8.78	0.00	10.03	1.25	4.00	2.75
5240.0	-7.88	0.00	10.03	2.16	4.00	1.85
5260.0	-8.36	0.00	10.03	1.67	11.00	9.33
5300.0	-8.01	0.00	10.03	2.02	11.00	8.98
5320.0	-8.68	0.00	10.03	1.35	11.00	9.65
5500.0	-8.39	0.00	10.03	1.64	11.00	9.36
5580.0	-8.40	0.00	10.03	1.63	11.00	9.37
5640.0	-8.33	0.00	10.03	1.70	11.00	9.30

Result = Reading + Cable Loss + Attenuator

ON time was only measured using Gate function.

Maximum Peak Output Power & Peak Power Spectral Density

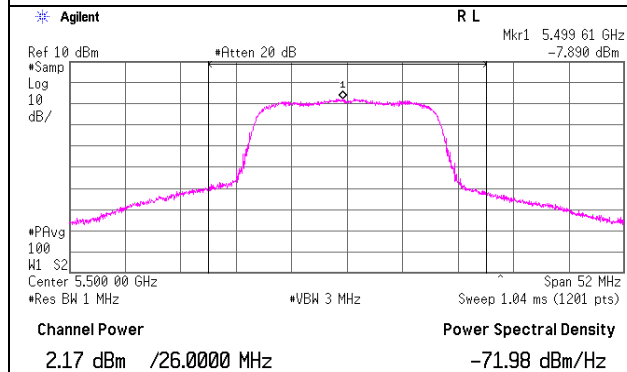
11a



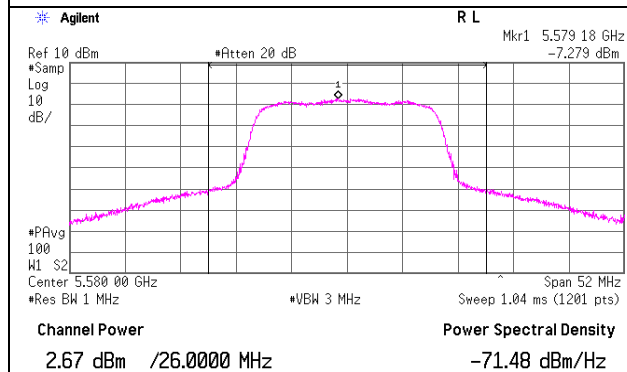
Maximum Peak Output Power & Peak Power Spectral Density

11a

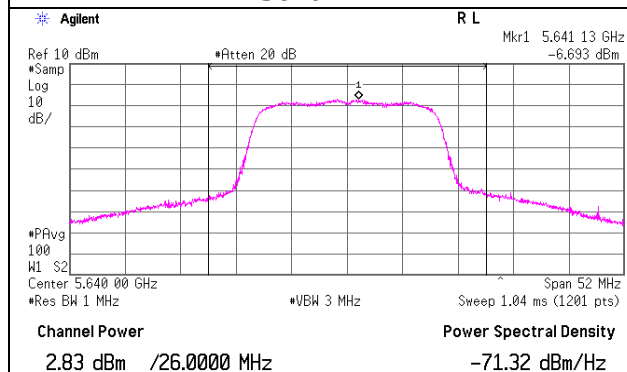
5500MHz



5580MHz

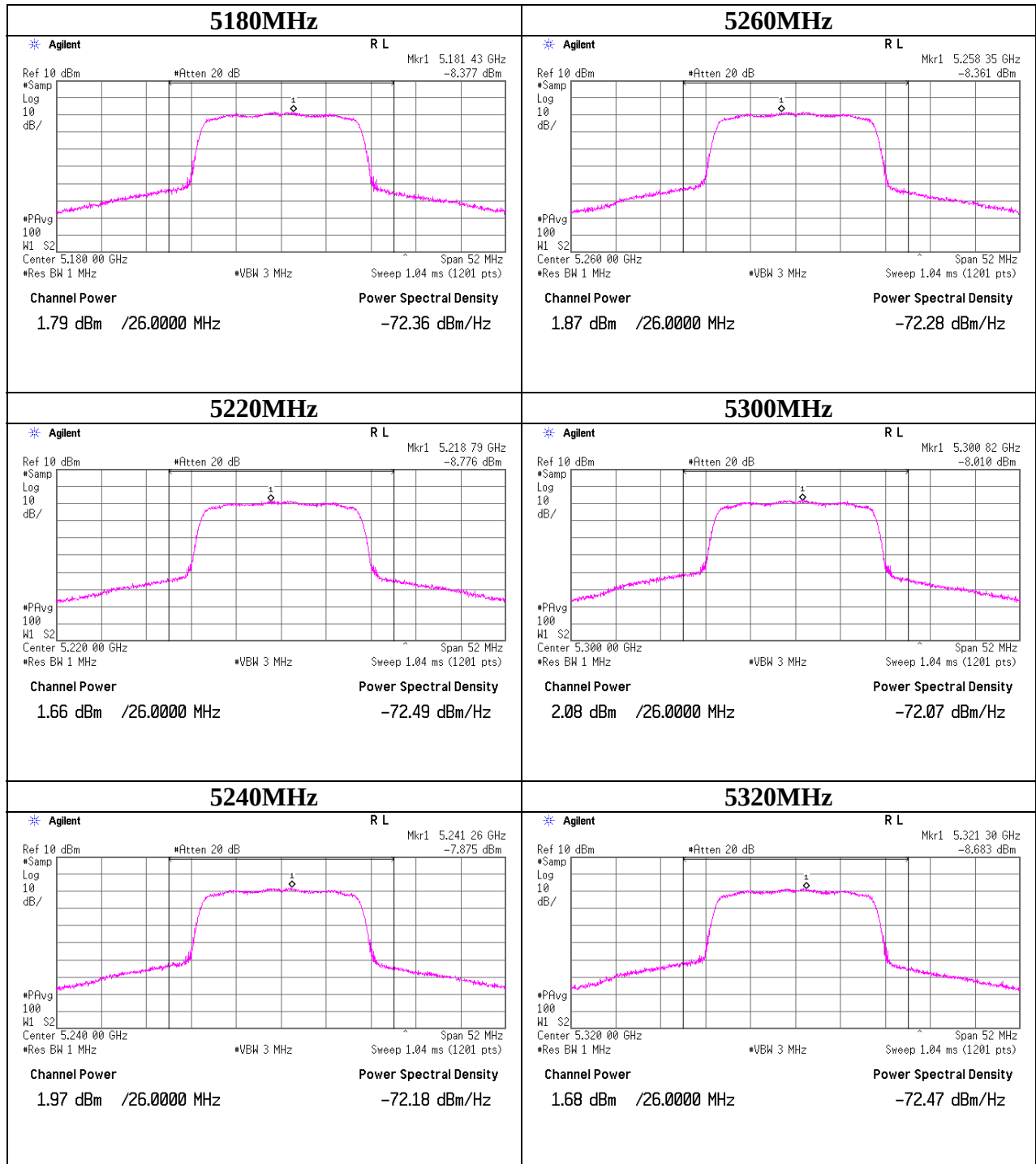


5640MHz



Maximum Peak Output Power & Peak Power Spectral Density

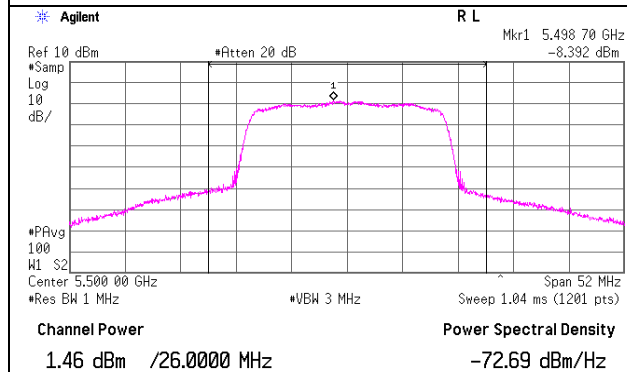
11n-20



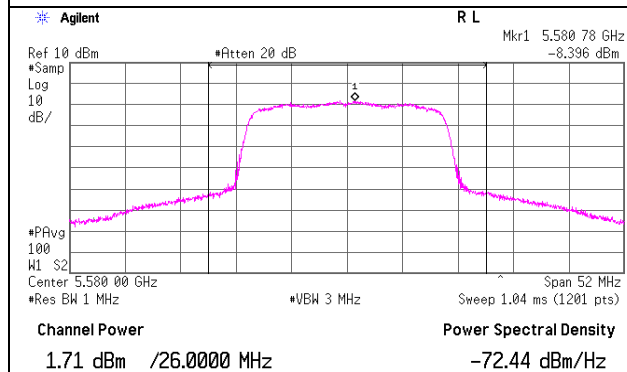
Maximum Peak Output Power & Peak Power Spectral Density

11n-20

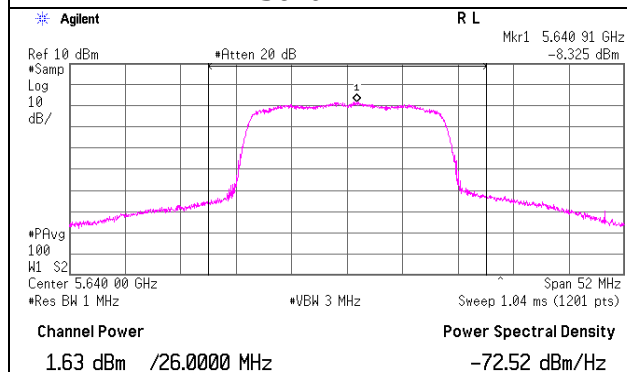
5500MHz



5580MHz



5640MHz



Maximum Peak Output Power
(Reference data)

Test place Head Office EMC Lab. No.6 shielded room
Report No. 32DE0235-HO
Date 11/23/2011
Temperature/ Humidity 22deg. C / 42% RH
Engineer Tomohisa Nakagawa
Mode 11a, 11n-20 Tx

5180MHz
11a

Data Rate [Mbps]	Reading [dBm]	Remark
6	4.41	
9	4.41	
12	4.71	
18	4.78	
24	5.07	
36	5.12	
48	5.17	
54	5.20	*

5180MHz
11n-20

MCS Number	Reading [dBm]	Remark
0	4.63	
1	4.70	
2	4.73	
3	4.77	
4	4.79	
5	4.82	
6	4.88	
7	5.08	*

* Worst Rate

All comparison were carried out on same frequency and measurement factors.
ON time was only measured using Gate function.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011, 11/25/2011
Temperature/ Humidity 22deg. C / 42% RH 23 deg.C / 35% RH
Engineer Katsunori Okai Satofumi Matsuyama
(1-18GHz) (Below1GHz, 18-40GHz)
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
Hori	30.000	QP	22.7	18.0	6.7	28.5	18.9	40.0	21.1	Outside
Hori	44.703	QP	22.8	12.8	6.9	28.6	13.9	40.0	26.1	Outside
Hori	85.743	QP	36.1	7.0	7.3	28.4	22.0	40.0	18.0	Outside
Hori	90.115	QP	31.0	7.6	7.4	28.4	17.6	43.5	25.9	Outside
Hori	126.142	QP	22.2	13.2	7.7	28.2	14.9	43.5	28.6	Inside
Hori	819.972	QP	21.6	22.1	11.0	28.0	26.7	46.0	19.3	Outside
Hori	5150.000	PK	49.1	31.8	3.3	31.9	52.3	73.9	21.6	Bandedge
Hori	6906.700	PK	45.5	35.0	3.9	32.3	52.1	68.2	16.1	Outside
Hori	10360.000	PK	42.5	39.1	-2.8	32.9	45.9	68.2	22.3	Outside
Hori	15540.000	PK	44.7	39.0	-1.4	32.8	49.5	73.9	24.4	Inside
Hori	20720.000	PK	46.3	40.3	-2.3	30.5	53.8	73.9	20.1	Inside
Hori	31080.000	PK	36.4	43.5	0.2	24.9	55.2	68.2	13.0	Outside
Hori	5150.000	AV	29.7	31.8	3.3	31.9	32.9	53.9	21.0	Bandedge
Hori	6906.700	AV	39.9	35.0	3.9	32.3	46.5	68.2	21.7	Outside
Hori	10360.000	AV	30.2	39.1	-2.8	32.9	33.6	68.2	34.6	Outside
Hori	15540.000	AV	30.7	39.0	-1.4	32.8	35.5	53.9	18.4	Inside
Hori	20720.000	AV	33.4	40.3	-2.3	30.5	40.9	53.9	13.0	Inside
Hori	31080.000	AV	24.1	43.5	0.2	24.9	42.9	68.2	25.3	Outside
Vert	30.040	QP	29.6	18.0	6.7	28.5	25.8	40.0	14.2	Outside
Vert	43.072	QP	28.7	13.3	6.9	28.6	20.3	40.0	19.7	Outside
Vert	79.644	QP	33.0	6.2	7.3	28.5	18.0	40.0	22.0	Outside
Vert	85.444	QP	34.0	7.0	7.3	28.4	19.9	40.0	20.1	Outside
Vert	126.868	QP	29.2	13.2	7.7	28.2	21.9	43.5	21.6	Inside
Vert	819.926	QP	21.6	22.1	11.0	28.0	26.7	46.0	19.3	Outside
Vert	5150.000	PK	48.6	31.8	3.3	31.9	51.8	73.9	22.1	Bandedge
Vert	6906.703	PK	42.5	35.0	3.9	32.3	49.1	68.2	19.1	Outside
Vert	10360.000	PK	42.8	39.1	-2.8	32.9	46.2	68.2	22.0	Outside
Vert	15540.000	PK	44.3	39.0	-1.4	32.8	49.1	73.9	24.8	Inside
Vert	20720.000	PK	46.7	40.3	-2.3	30.5	54.2	73.9	19.7	Inside
Vert	31080.000	PK	37.5	43.5	0.2	24.9	56.3	68.2	11.9	Outside
Vert	5150.000	AV	29.3	31.8	3.3	31.9	32.5	53.9	21.4	Bandedge
Vert	6906.703	AV	35.9	35.0	3.9	32.3	42.5	68.2	25.7	Outside
Vert	10360.000	AV	30.2	39.1	-2.8	32.9	33.6	68.2	34.6	Outside
Vert	15540.000	AV	30.7	39.0	-1.4	32.8	35.5	53.9	18.4	Inside
Vert	20720.000	AV	33.4	40.3	-2.3	30.5	40.9	53.9	13.0	Inside
Vert	31080.000	AV	24.1	43.5	0.2	24.9	42.9	68.2	25.3	Outside

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).

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Anechoic Chamber	
Report No.	32DE0235-HO	
Date	11/24/2011,	11/25/2011
Temperature/ Humidity	22deg. C / 42% RH	23 deg.C / 35% RH
Engineer	Katsunori Okai	Satofumi Matsuyama
	(1-18GHz)	(18-40GHz)
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
Hori	6986.750	PK	45.1	35.2	3.9	32.3	51.9	68.2	16.3	Outside
Hori	10480.000	PK	41.5	39.2	-2.8	32.9	45.0	68.2	23.2	Outside
Hori	15720.000	PK	43.3	38.5	-1.5	32.7	47.6	73.9	26.3	Inside
Hori	20960.000	PK	47.2	40.3	-2.3	30.5	54.7	73.9	19.2	Inside
Hori	31440.000	PK	38.7	43.6	0.3	25.1	57.5	73.9	16.4	Inside
Hori	6986.750	AV	40.2	35.2	3.9	32.3	47.0	68.2	21.2	Outside
Hori	10480.000	AV	29.4	39.2	-2.8	32.9	32.9	68.2	35.3	Outside
Hori	15720.000	AV	30.7	38.5	-1.5	32.7	35.0	53.9	18.9	Inside
Hori	20960.000	AV	34.5	40.3	-2.3	30.5	42.0	53.9	11.9	Inside
Hori	31440.000	AV	28.2	43.6	0.3	25.1	47.0	53.9	6.9	Inside
Vert	6986.755	PK	42.6	35.2	3.9	32.3	49.4	68.2	18.8	Outside
Vert	10480.000	PK	41.7	39.2	-2.8	32.9	45.2	68.2	23.0	Outside
Vert	15720.000	PK	43.1	38.5	-1.5	32.7	47.4	73.9	26.5	Inside
Vert	20960.000	PK	46.5	40.3	-2.3	30.5	54.0	73.9	19.9	Inside
Vert	31440.000	PK	38.7	43.6	0.3	25.1	57.5	73.9	16.4	Inside
Vert	6986.755	AV	36.5	35.2	3.9	32.3	43.3	68.2	24.9	Outside
Vert	10480.000	AV	29.4	39.2	-2.8	32.9	32.9	68.2	35.3	Outside
Vert	15720.000	AV	30.7	38.5	-1.5	32.7	35.0	53.9	18.9	Inside
Vert	20960.000	AV	34.5	40.3	-2.3	30.5	42.0	53.9	11.9	Inside
Vert	31440.000	AV	28.2	43.6	0.3	25.1	47.0	53.9	6.9	Inside

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011, 11/25/2011
Temperature/ Humidity 22deg. C / 42% RH 23 deg.C / 35% RH
Engineer Katsunori Okai Satofumi Matsuyama
(1-18GHz) (18-40GHz)
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
Hori	5350.000	PK	51.0	31.8	3.4	31.9	54.3	73.9	19.6	Bandedge
Hori	5479.933	PK	46.4	31.8	3.5	32.0	49.7	68.2	18.5	Outside
Hori	7093.383	PK	45.2	35.4	4.0	32.3	52.3	68.2	15.9	Outside
Hori	10640.000	PK	41.3	39.4	-2.7	32.9	45.1	73.9	28.8	Inside
Hori	15960.000	PK	42.7	37.9	-1.6	32.7	46.3	73.9	27.6	Inside
Hori	21280.000	PK	45.3	40.3	-2.2	30.6	52.8	73.9	21.1	Inside
Hori	26600.000	PK	37.2	44.2	-1.0	24.6	55.8	68.2	12.4	Outside
Hori	5350.000	AV	29.4	31.8	3.4	31.9	32.7	53.9	21.2	Bandedge
Hori	5479.933	AV	33.1	31.8	3.5	32.0	36.4	68.2	31.8	Outside
Hori	7093.383	AV	39.7	35.4	4.0	32.3	46.8	68.2	21.4	Outside
Hori	10640.000	AV	32.0	39.4	-2.7	32.9	35.8	53.9	18.1	Inside
Hori	15960.000	AV	31.0	37.9	-1.6	32.7	34.6	53.9	19.3	Inside
Hori	21280.000	AV	33.0	40.3	-2.2	30.6	40.5	53.9	13.4	Inside
Hori	26600.000	AV	25.3	44.2	-1.0	24.6	43.9	68.2	24.3	Outside
Vert	5350.000	PK	50.1	31.8	3.4	31.9	53.4	73.9	20.5	Bandedge
Vert	5480.122	PK	44.3	31.8	3.5	32.0	47.6	68.2	20.6	Outside
Vert	7093.383	PK	43.6	35.4	4.0	32.3	50.7	68.2	17.5	Outside
Vert	10640.000	PK	47.9	39.4	-2.7	32.9	51.7	73.9	22.2	Inside
Vert	15960.000	PK	43.0	37.9	-1.6	32.7	46.6	73.9	27.3	Inside
Vert	21280.000	PK	44.7	40.3	-2.2	30.6	52.2	73.9	21.7	Inside
Vert	26600.000	PK	37.3	44.2	-1.0	24.6	55.9	68.2	12.3	Outside
Vert	5350.000	AV	29.4	31.8	3.4	31.9	32.7	53.9	21.2	Bandedge
Vert	5480.122	AV	31.2	31.8	3.5	32.0	34.5	68.2	33.7	Outside
Vert	7093.383	AV	35.9	35.4	4.0	32.3	43.0	68.2	25.2	Outside
Vert	10640.000	AV	35.5	39.4	-2.7	32.9	39.3	53.9	14.6	Inside
Vert	15960.000	AV	31.0	37.9	-1.6	32.7	34.6	53.9	19.3	Inside
Vert	21280.000	AV	33.0	40.3	-2.2	30.6	40.5	53.9	13.4	Inside
Vert	26600.000	AV	25.3	44.2	-1.0	24.6	43.9	68.2	24.3	Outside

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011, 11/25/2011
Temperature/ Humidity 22deg. C / 42% RH 23 deg.C / 35% RH
Engineer Katsunori Okai Satofumi Matsuyama
(1-18GHz) (18-40GHz)
Mode 11a Tx 5500MHz

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
Hori	5460.000	PK	46.4	31.8	3.5	32.0	49.7	73.9	24.2	Inside
Hori	5470.000	PK	50.6	31.8	3.5	32.0	53.9	68.2	14.3	Outside
Hori	7333.411	PK	46.2	35.7	4.1	32.4	53.6	73.9	20.3	Inside
Hori	11000.000	PK	42.3	39.7	-2.6	32.9	46.5	73.9	27.4	Inside
Hori	16500.000	PK	44.2	38.8	-1.4	32.6	49.0	68.2	19.2	Outside
Hori	22000.000	PK	44.6	40.5	-2.1	30.9	52.1	68.2	16.1	Outside
Hori	27500.000	PK	34.9	43.3	-0.8	24.9	52.5	68.2	15.7	Outside
Hori	5460.000	AV	29.1	31.8	3.5	32.0	32.4	53.9	21.5	Inside
Hori	5470.000	AV	30.0	31.8	3.5	32.0	33.3	68.2	34.9	Outside
Hori	7333.411	AV	39.5	35.7	4.1	32.4	46.9	53.9	7.0	Inside
Hori	11000.000	AV	30.2	39.7	-2.6	32.9	34.4	53.9	19.5	Inside
Hori	16500.000	AV	31.2	38.8	-1.4	32.6	36.0	68.2	32.2	Outside
Hori	22000.000	AV	32.7	40.5	-2.1	30.9	40.2	68.2	28.0	Outside
Hori	27500.000	AV	23.9	43.3	-0.8	24.9	41.5	68.2	26.7	Outside
Vert	5460.000	PK	41.5	31.8	3.5	32.0	44.8	73.9	29.1	Inside
Vert	5470.000	PK	46.8	31.8	3.5	32.0	50.1	68.2	18.1	Outside
Vert	7333.407	PK	44.2	35.7	4.1	32.4	51.6	73.9	22.3	Inside
Vert	11000.000	PK	41.5	39.7	-2.6	32.9	45.7	73.9	28.2	Inside
Vert	16500.000	PK	43.3	38.8	-1.4	32.6	48.1	68.2	20.1	Outside
Vert	22000.000	PK	44.6	40.5	-2.1	30.9	52.1	68.2	16.1	Outside
Vert	27500.000	PK	35.1	43.3	-0.8	24.9	52.7	68.2	15.5	Outside
Vert	5460.000	AV	28.5	31.8	3.5	32.0	31.8	53.9	22.1	Inside
Vert	5470.000	AV	29.2	31.8	3.5	32.0	32.5	68.2	35.7	Outside
Vert	7333.407	AV	36.1	35.7	4.1	32.4	43.5	53.9	10.4	Inside
Vert	11000.000	AV	29.9	39.7	-2.6	32.9	34.1	53.9	19.8	Inside
Vert	16500.000	AV	31.2	38.8	-1.4	32.6	36.0	68.2	32.2	Outside
Vert	22000.000	AV	32.7	40.5	-2.1	30.9	40.2	68.2	28.0	Outside
Vert	27500.000	AV	23.9	43.3	-0.8	24.9	41.5	68.2	26.7	Outside

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011, 11/25/2011
Temperature/ Humidity 22deg. C / 42% RH 23 deg.C / 35% RH
Engineer Katsunori Okai Satofumi Matsuyama
(1-18GHz) (18-40GHz)
Mode 11a Tx 5580MHz

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
Hori	5740.016	PK	47.2	32.2	3.5	32.0	50.9	68.2	17.3	Outside
Hori	7440.158	PK	43.5	35.8	4.1	32.4	51.0	73.9	22.9	Inside
Hori	11160.000	PK	42.8	39.5	-2.6	32.9	46.8	73.9	27.1	Inside
Hori	16740.000	PK	44.2	39.3	-1.4	32.6	49.5	68.2	18.7	Outside
Hori	22320.000	PK	45.4	40.6	-2.0	30.8	53.2	73.9	20.7	Inside
Hori	27900.000	PK	34.9	43.3	-0.7	25.0	52.5	68.2	15.7	Outside
Hori	5740.016	AV	34.2	32.2	3.5	32.0	37.9	68.2	30.3	Outside
Hori	7440.158	AV	35.6	35.8	4.1	32.4	43.1	53.9	10.8	Inside
Hori	11160.000	AV	29.9	39.5	-2.6	32.9	33.9	53.9	20.0	Inside
Hori	16740.000	AV	31.3	39.3	-1.4	32.6	36.6	68.2	31.6	Outside
Hori	22320.000	AV	33.2	40.6	-2.0	30.8	41.0	53.9	12.9	Inside
Hori	27900.000	AV	24.7	43.3	-0.7	25.0	42.3	68.2	25.9	Outside
Vert	5740.011	PK	42.8	32.2	3.5	32.0	46.5	68.2	21.7	Outside
Vert	7440.025	PK	42.2	35.8	4.1	32.4	49.7	73.9	24.2	Inside
Vert	11160.000	PK	43.2	39.5	-2.6	32.9	47.2	73.9	26.7	Inside
Vert	16740.000	PK	44.3	39.3	-1.4	32.6	49.6	68.2	18.6	Outside
Vert	22320.000	PK	45.1	40.6	-2.0	30.8	52.9	73.9	21.0	Inside
Vert	27900.000	PK	35.6	43.3	-0.7	25.0	53.2	68.2	15.0	Outside
Vert	5740.011	AV	31.5	32.2	3.5	32.0	35.2	68.2	33.0	Outside
Vert	7440.025	AV	33.2	35.8	4.1	32.4	40.7	53.9	13.2	Inside
Vert	11160.000	AV	29.9	39.5	-2.6	32.9	33.9	53.9	20.0	Inside
Vert	16740.000	AV	31.3	39.3	-1.4	32.6	36.6	68.2	31.6	Outside
Vert	22320.000	AV	33.2	40.6	-2.0	30.8	41.0	53.9	12.9	Inside
Vert	27900.000	AV	24.7	43.3	-0.7	25.0	42.3	68.2	25.9	Outside

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011, 11/25/2011
Temperature/ Humidity 22deg. C / 42% RH 23 deg.C / 35% RH
Engineer Katsunori Okai Satofumi Matsuyama
(1-18GHz) (18-40GHz)
Mode 11a Tx 5640MHz

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
Hori	5725.000	PK	41.9	32.2	3.5	32.0	45.6	68.2	22.6	Outside
Hori	5795.655	PK	45.5	32.3	3.6	32.0	49.4	68.2	18.8	Outside
Hori	7520.027	PK	43.2	35.9	4.1	32.5	50.7	73.9	23.2	Inside
Hori	11280.000	PK	41.7	39.4	-2.5	32.9	45.7	73.9	28.2	Inside
Hori	16920.000	PK	43.9	39.7	-1.4	32.5	49.7	68.2	18.5	Outside
Hori	22560.000	PK	46.4	40.7	-1.9	30.7	54.5	73.9	19.4	Inside
Hori	28200.000	PK	36.3	43.4	-0.6	24.9	54.2	68.2	14.0	Outside
Hori	5725.000	AV	28.9	32.2	3.5	32.0	32.6	68.2	35.6	Outside
Hori	5795.655	AV	34.0	32.3	3.6	32.0	37.9	68.2	30.3	Outside
Hori	7520.027	AV	35.1	35.9	4.1	32.5	42.6	53.9	11.3	Inside
Hori	11280.000	AV	29.8	39.4	-2.5	32.9	33.8	53.9	20.1	Inside
Hori	16920.000	AV	31.3	39.7	-1.4	32.5	37.1	68.2	31.1	Outside
Hori	22560.000	AV	34.0	40.7	-1.9	30.7	42.1	53.9	11.8	Inside
Hori	28200.000	AV	24.2	43.4	-0.6	24.9	42.1	68.2	26.1	Outside
Vert	5725.000	PK	40.9	32.2	3.5	32.0	44.6	68.2	23.6	Outside
Vert	5795.678	PK	42.0	32.3	3.6	32.0	45.9	68.2	22.3	Outside
Vert	7520.027	PK	42.2	35.9	4.1	32.5	49.7	73.9	24.2	Inside
Vert	11280.000	PK	42.2	39.4	-2.5	32.9	46.2	73.9	27.7	Inside
Vert	16920.000	PK	43.5	39.7	-1.4	32.5	49.3	68.2	18.9	Outside
Vert	22560.000	PK	45.3	40.7	-1.9	30.7	53.4	73.9	20.5	Inside
Vert	28200.000	PK	37.4	43.4	-0.6	24.9	55.3	68.2	12.9	Outside
Vert	5725.000	AV	28.5	32.2	3.5	32.0	32.2	68.2	36.0	Outside
Vert	5795.678	AV	32.4	32.3	3.6	32.0	36.3	68.2	31.9	Outside
Vert	7520.027	AV	33.9	35.9	4.1	32.5	41.4	53.9	12.5	Inside
Vert	11280.000	AV	29.8	39.4	-2.5	32.9	33.8	53.9	20.1	Inside
Vert	16920.000	AV	31.3	39.7	-1.4	32.5	37.1	68.2	31.1	Outside
Vert	22560.000	AV	34.0	40.7	-1.9	30.7	42.1	53.9	11.8	Inside
Vert	28200.000	AV	24.2	43.4	-0.6	24.9	42.1	68.2	26.1	Outside

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011,
Temperature/ Humidity 22deg. C / 42% RH
Engineer Katsunori Okai
(1-18GHz)
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	48.9	31.8	3.3	31.9	52.1	73.9	21.8	Bandedge	
Hori	5150.000	AV	29.2	31.8	3.3	31.9	32.4	53.9	21.5	Bandedge	
Vert	5150.000	PK	47.8	31.8	3.3	31.9	51.0	73.9	22.9	Bandedge	
Vert	5150.000	AV	29.0	31.8	3.3	31.9	32.2	53.9	21.7	Bandedge	

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011,
Temperature/ Humidity 22deg. C / 42% RH
Engineer Katsunori Okai
(1-18GHz)
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	50.2	31.8	3.4	31.9	53.5	73.9	20.4	Bandedge	
Hori	5480.013	PK	47.2	31.8	3.5	32.0	50.5	68.2	17.7	Outside	
Hori	5350.000	AV	29.3	31.8	3.4	31.9	32.6	53.9	21.3	Bandedge	
Hori	5480.013	AV	33.3	31.8	3.5	32.0	36.6	68.2	31.6	Outside	
Vert	5350.000	PK	48.5	31.8	3.4	31.9	51.8	73.9	22.1	Bandedge	
Vert	5480.011	PK	41.5	31.8	3.5	32.0	44.8	68.2	23.4	Outside	
Vert	5350.000	AV	28.8	31.8	3.4	31.9	32.1	53.9	21.8	Bandedge	
Vert	5480.011	AV	30.3	31.8	3.5	32.0	33.6	68.2	34.6	Outside	

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011,
Temperature/ Humidity 22deg. C / 42% RH
Engineer Katsunori Okai
(1-18GHz)
Mode 11n-20 Tx 5500MHz

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	5460.000	PK	45.1	31.8	3.5	32.0	48.4	73.9	25.5	Inside	
Hori	5470.000	PK	50.3	31.8	3.5	32.0	53.6	68.2	14.6	Outside	
Hori	5460.000	AV	28.7	31.8	3.5	32.0	32.0	53.9	21.9	Inside	
Hori	5470.000	AV	29.4	31.8	3.5	32.0	32.7	68.2	35.5	Outside	
Vert	5460.000	PK	42.5	31.8	3.5	32.0	45.8	73.9	28.1	Inside	
Vert	5470.000	PK	48.4	31.8	3.5	32.0	51.7	68.2	16.5	Outside	
Vert	5460.000	AV	28.3	31.8	3.5	32.0	31.6	53.9	22.3	Inside	
Vert	5470.000	AV	28.8	31.8	3.5	32.0	32.1	68.2	36.1	Outside	

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).

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Anechoic Chamber
Report No. 32DE0235-HO
Date 11/24/2011,
Temperature/ Humidity 22deg. C / 42% RH
Engineer Katsunori Okai
(1-18GHz)
Mode 11n-20 Tx 5640MHz

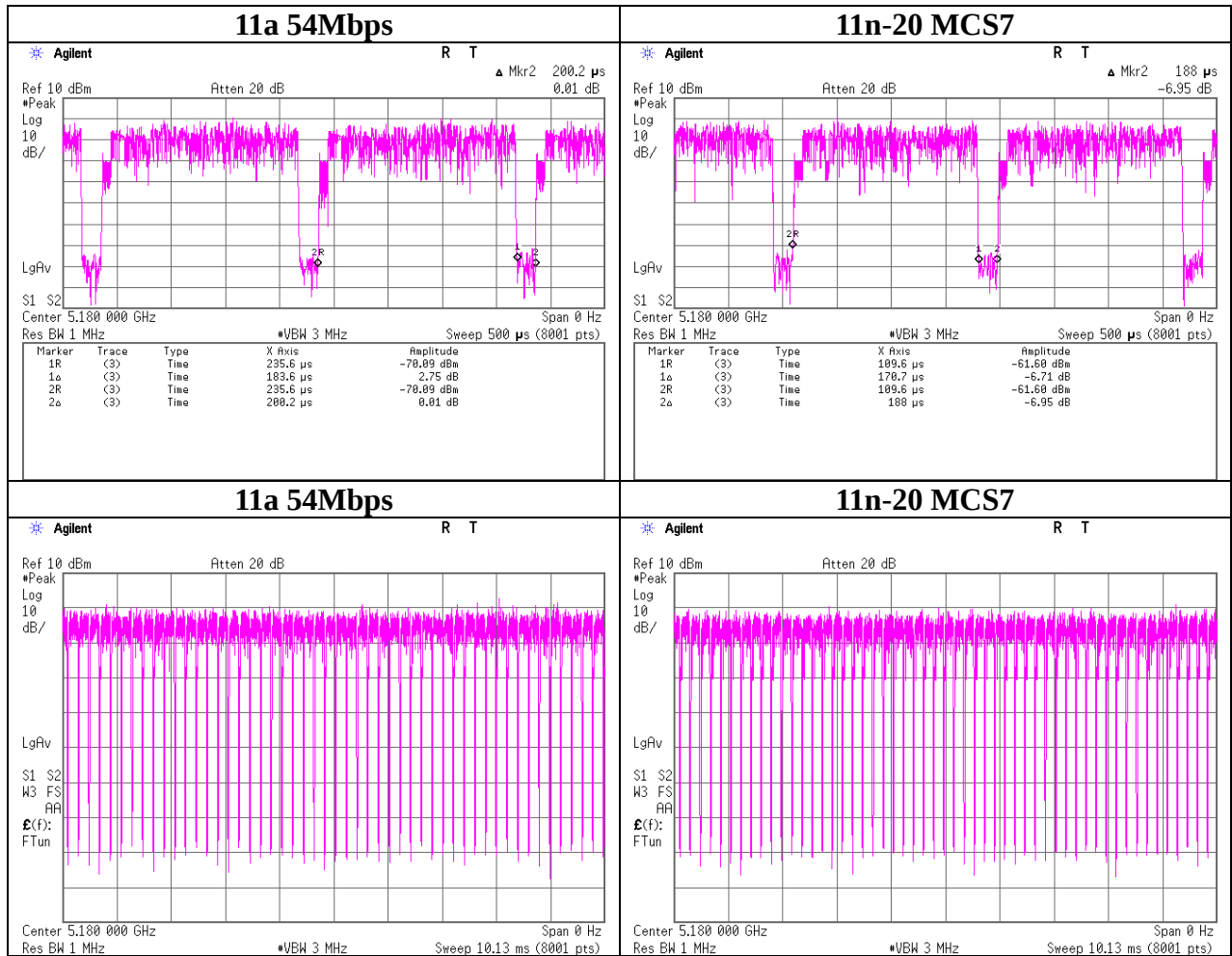
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Inside or Outside of Restricted Bands	Remark
Hori	5725.000	PK	40.6	32.2	3.5	32.0	44.3	68.2	23.9	Outside	
Hori	5790.609	PK	44.7	32.3	3.6	32.0	48.6	68.2	19.6	Outside	
Hori	5725.000	AV	28.7	32.2	3.5	32.0	32.4	68.2	35.8	Outside	
Hori	5790.609	AV	33.3	32.3	3.6	32.0	37.2	68.2	31.0	Outside	
Vert	5725.000	PK	40.2	32.2	3.5	32.0	43.9	68.2	24.3	Outside	
Vert	5793.587	PK	40.1	32.3	3.6	32.0	44.0	68.2	24.2	Outside	
Vert	5725.000	AV	26.8	32.2	3.5	32.0	30.5	68.2	37.7	Outside	
Vert	5793.587	AV	28.1	32.3	3.6	32.0	32.0	68.2	36.2	Outside	

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).

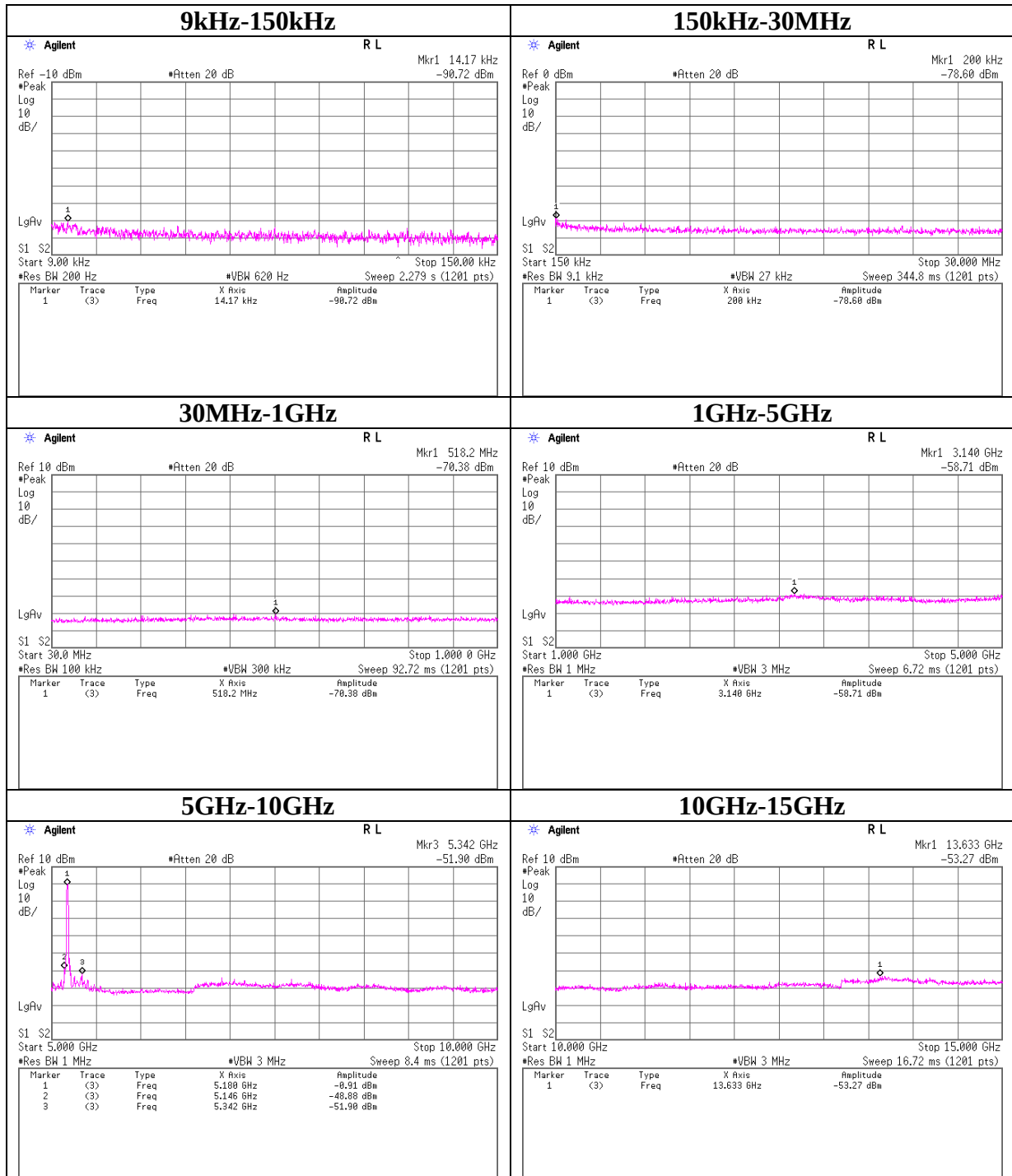
Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
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VBW (AV) Calculation



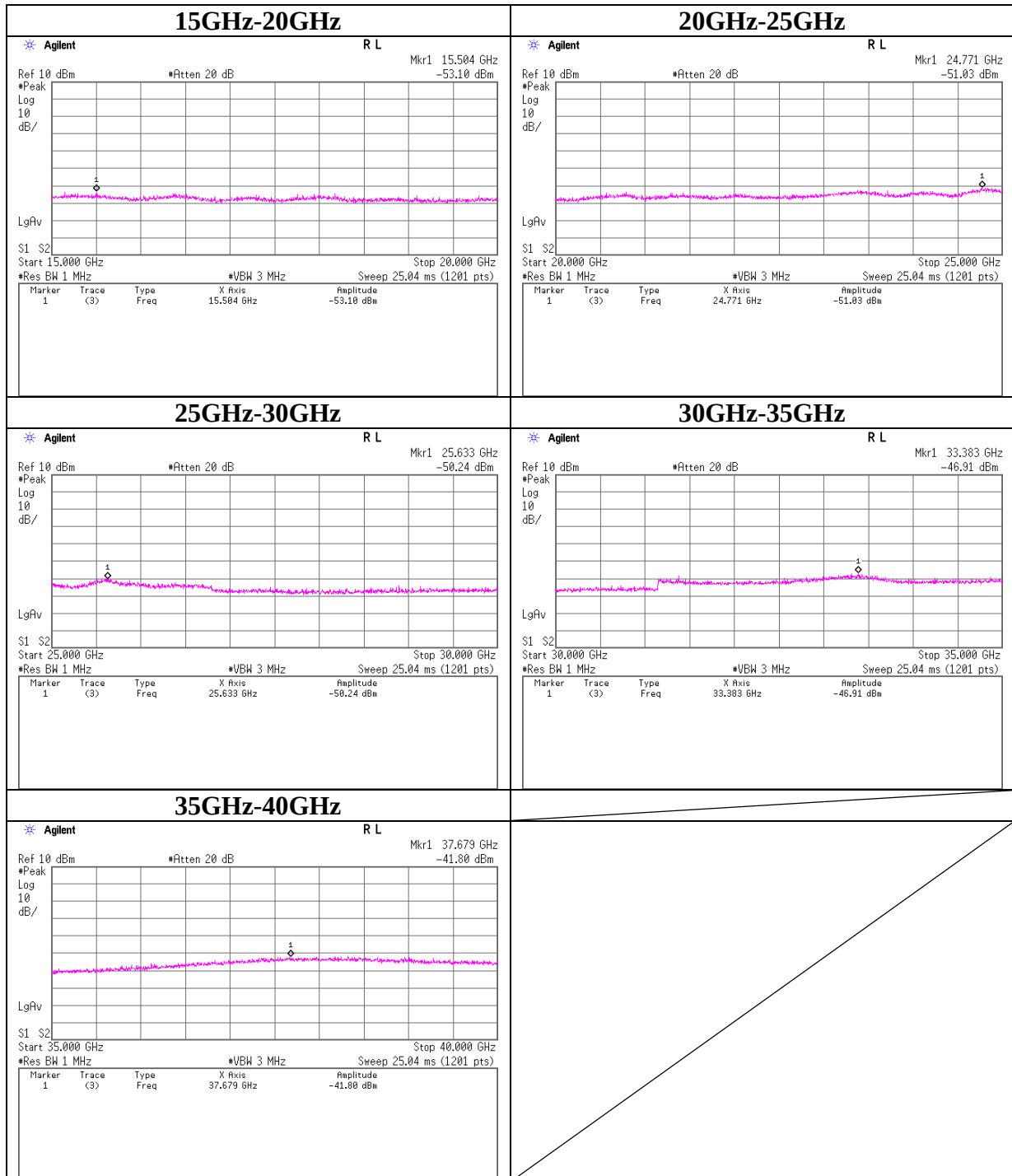
Conducted Spurious Emission

11a Tx 5180MHz



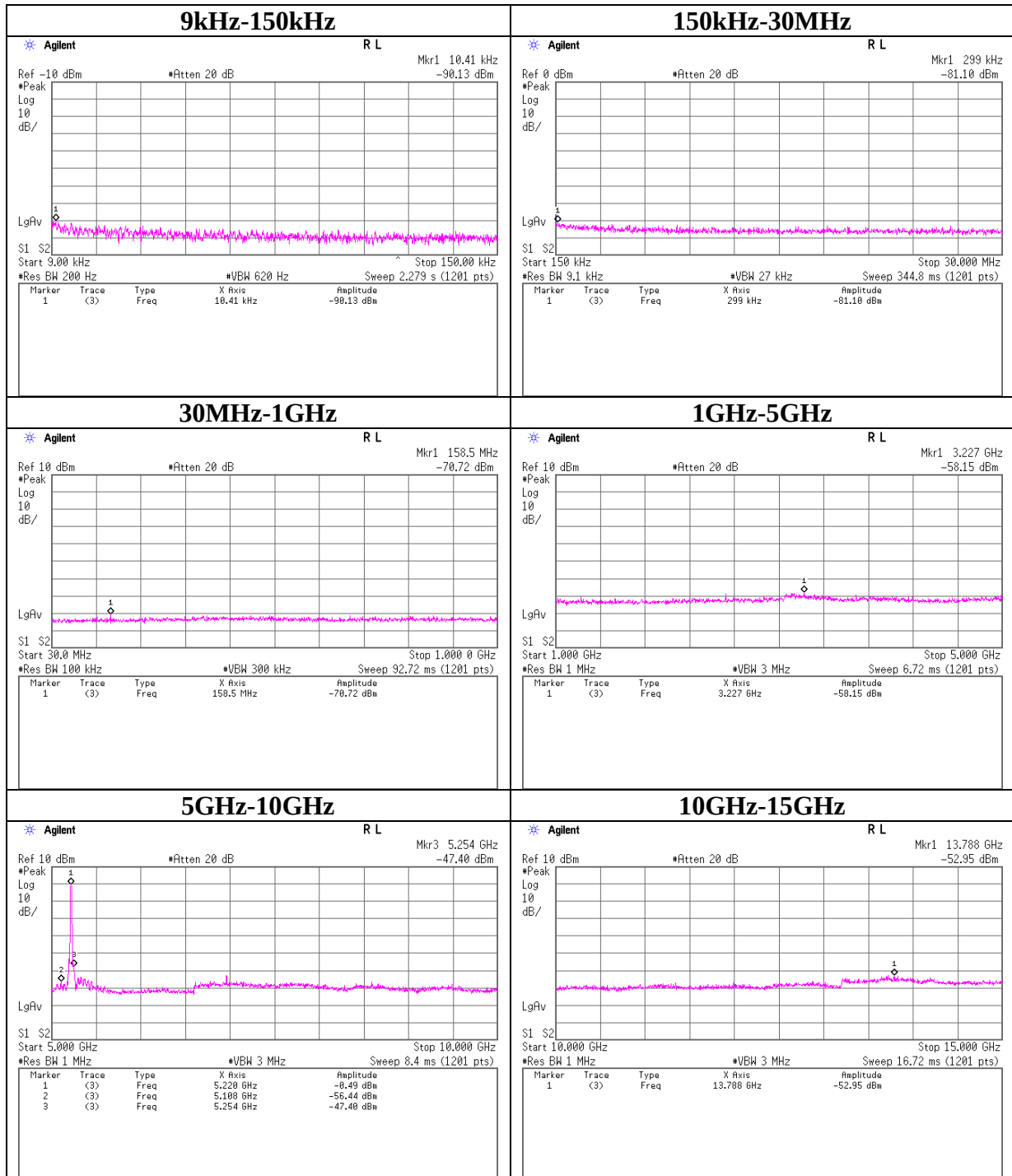
Conducted Spurious Emission

11a Tx 5180MHz



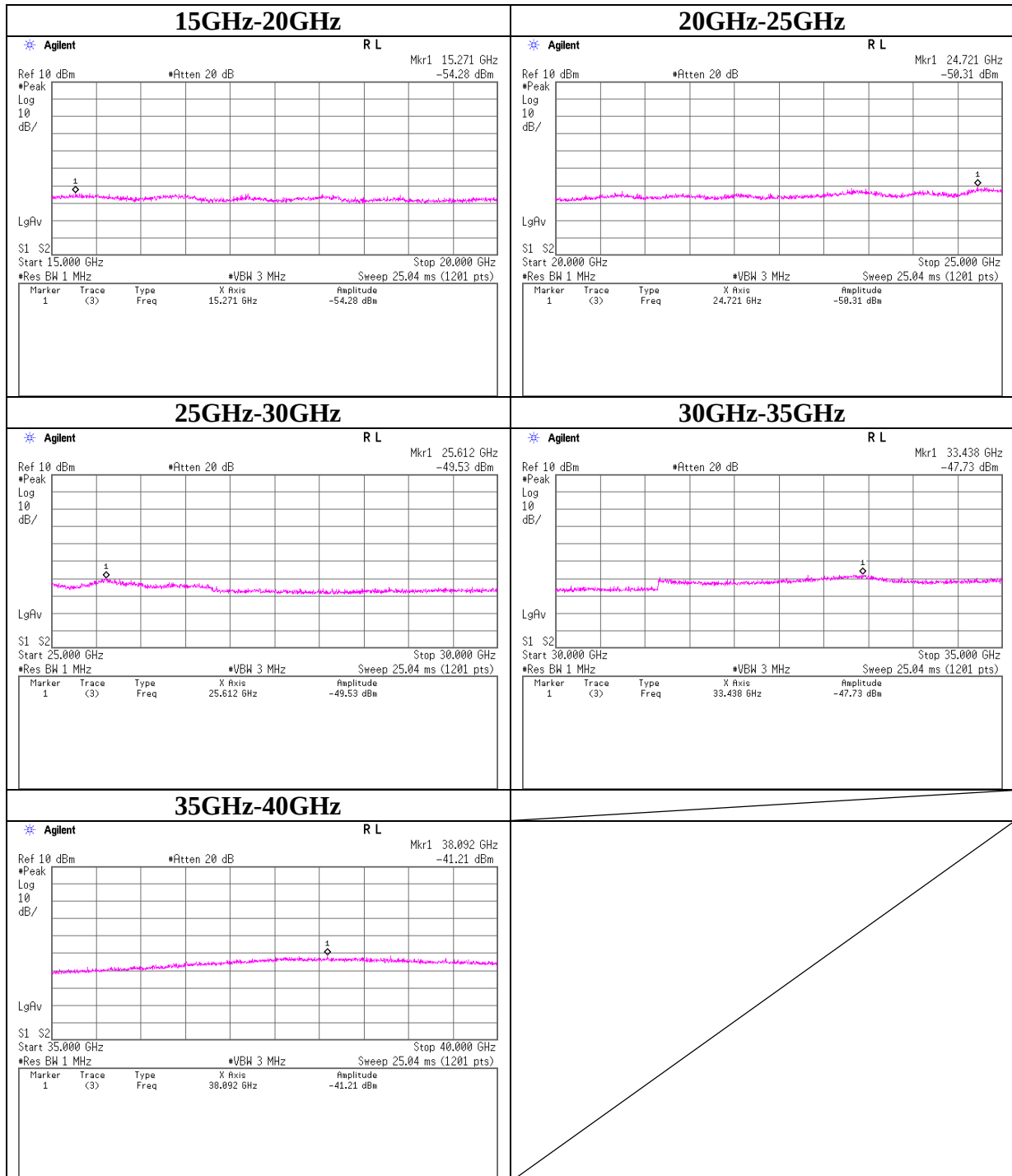
Conducted Spurious Emission

11a Tx 5220MHz



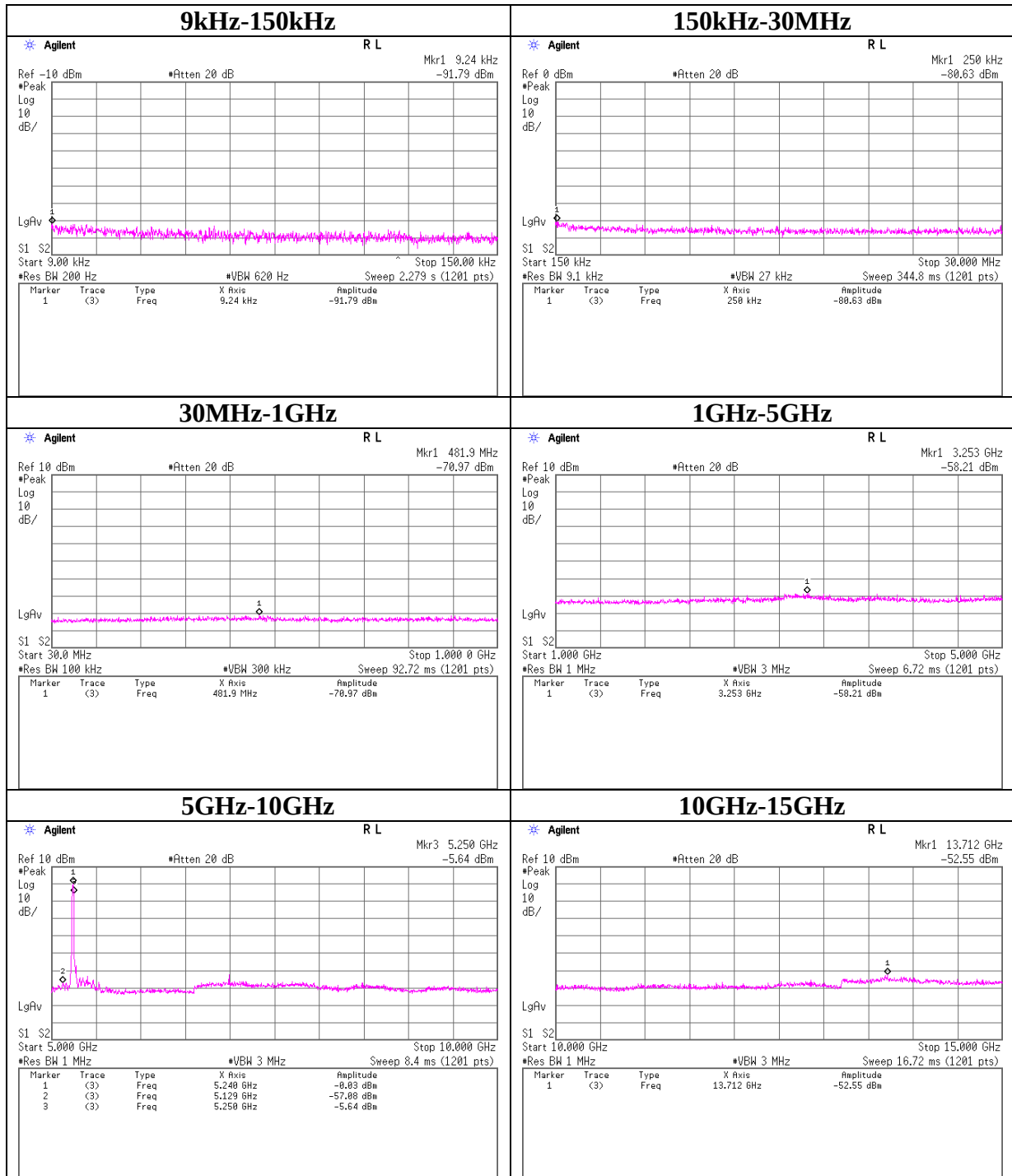
Conducted Spurious Emission

11a Tx 5220MHz



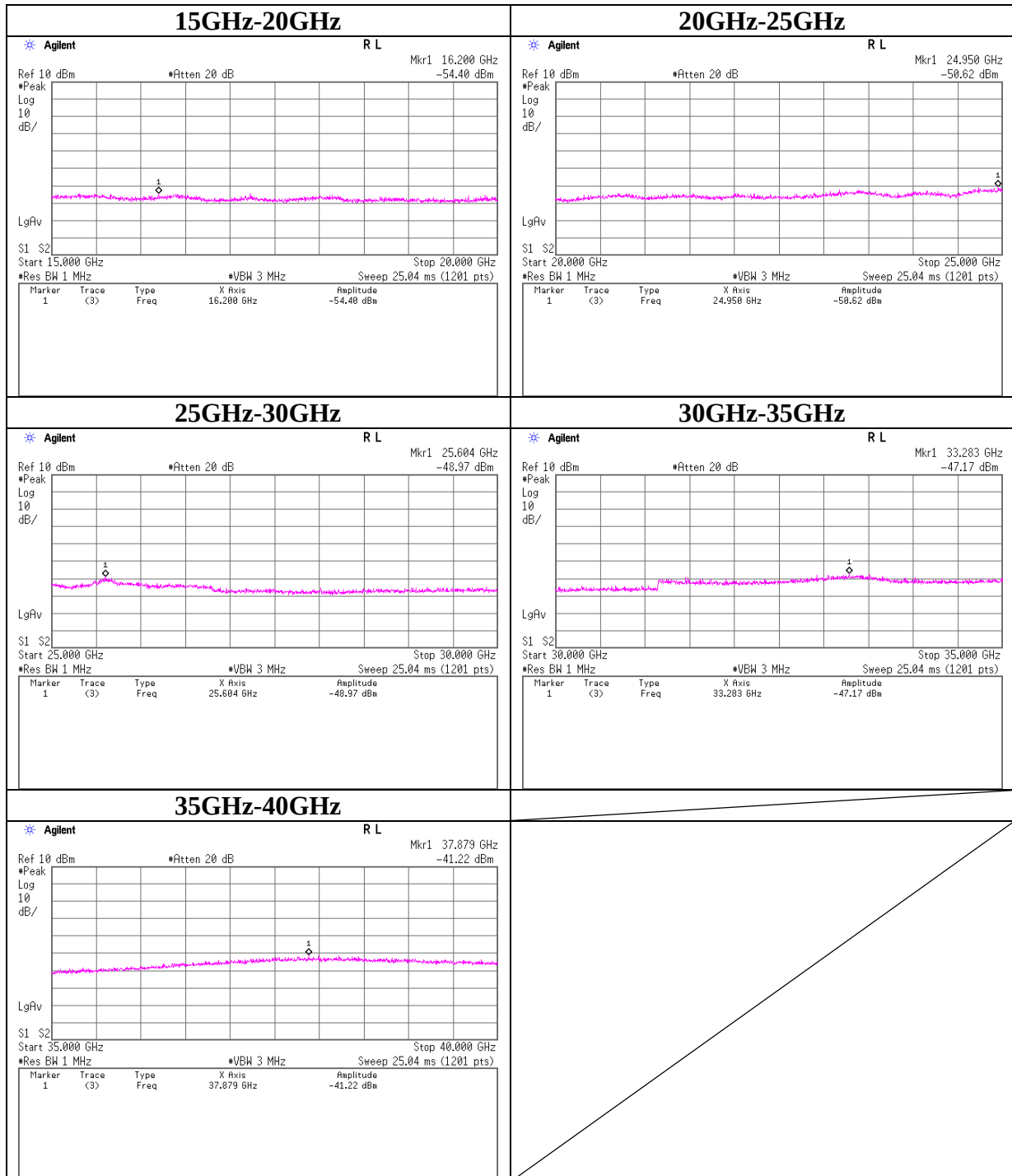
Conducted Spurious Emission

11a Tx 5240MHz



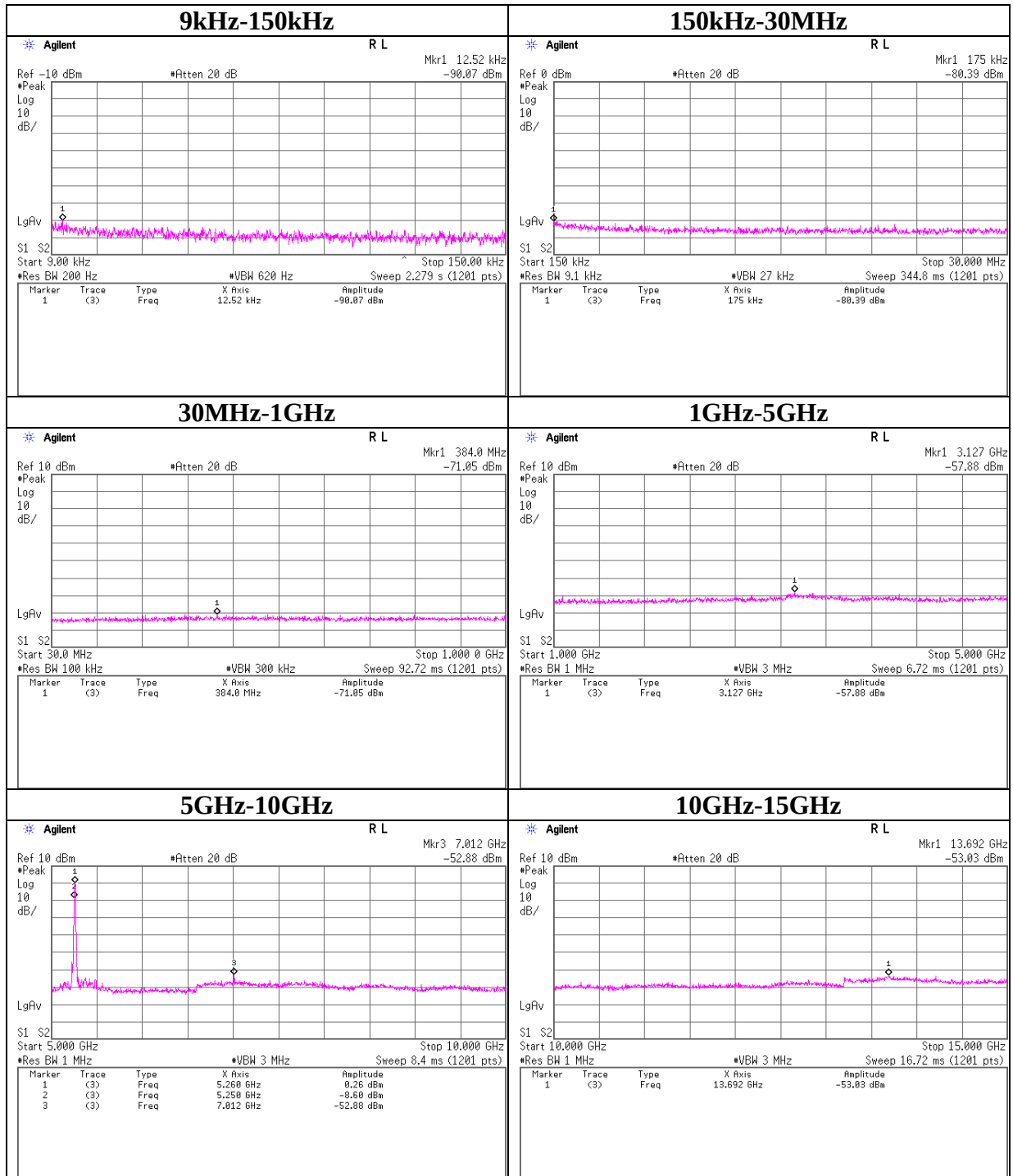
Conducted Spurious Emission

11a Tx 5240MHz



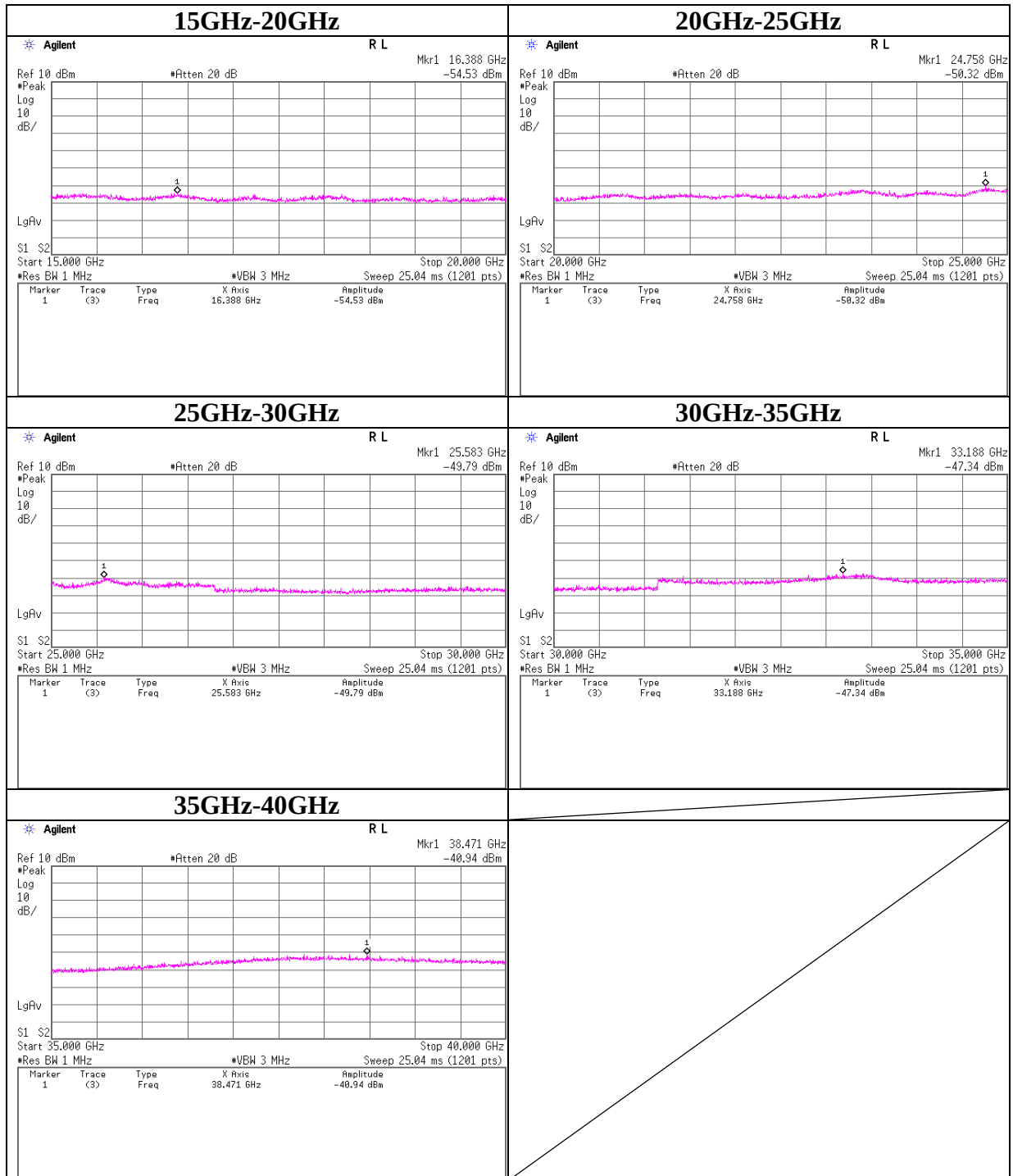
Conducted Spurious Emission

11a Tx 5260MHz



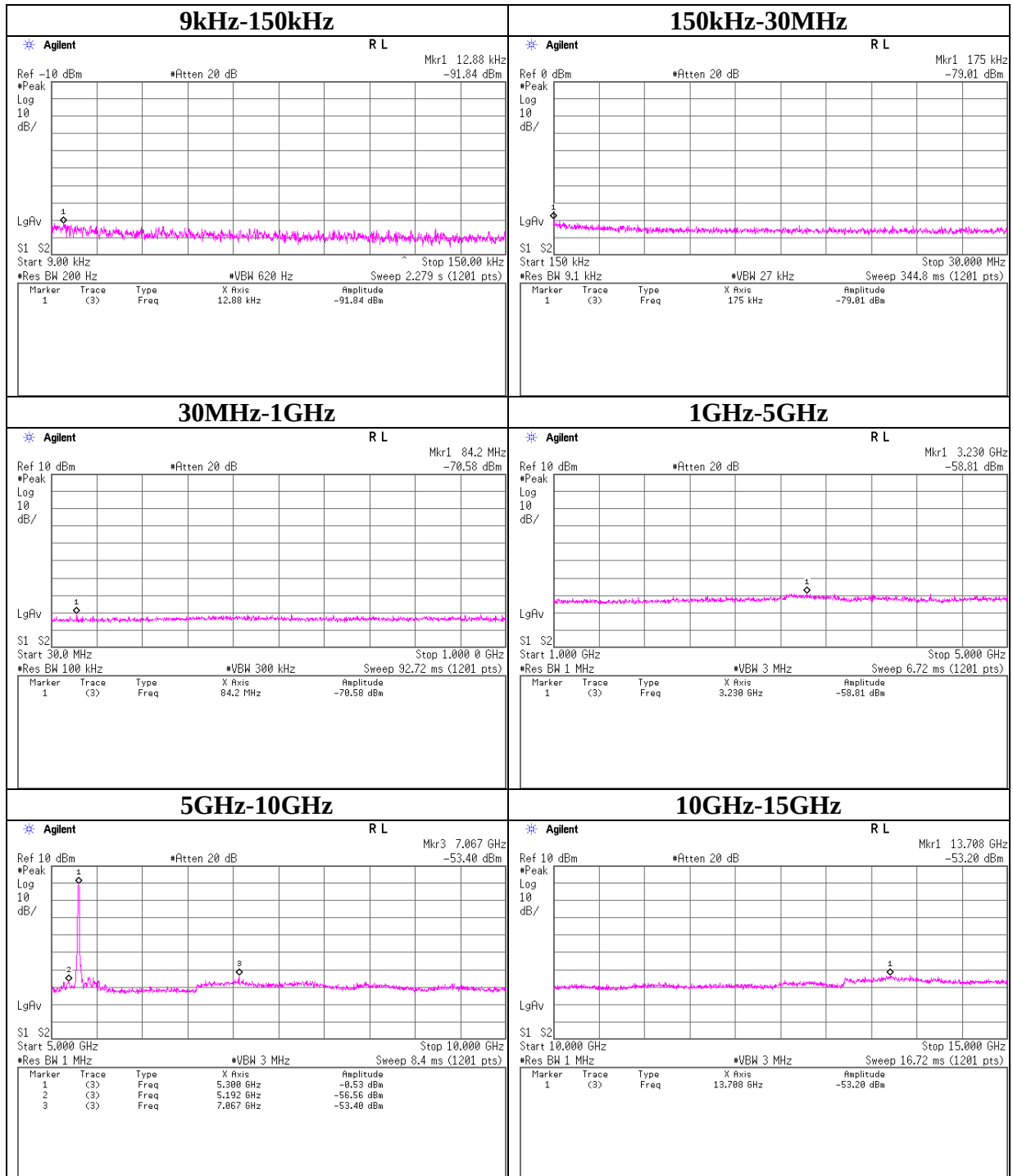
Conducted Spurious Emission

11a Tx 5260MHz



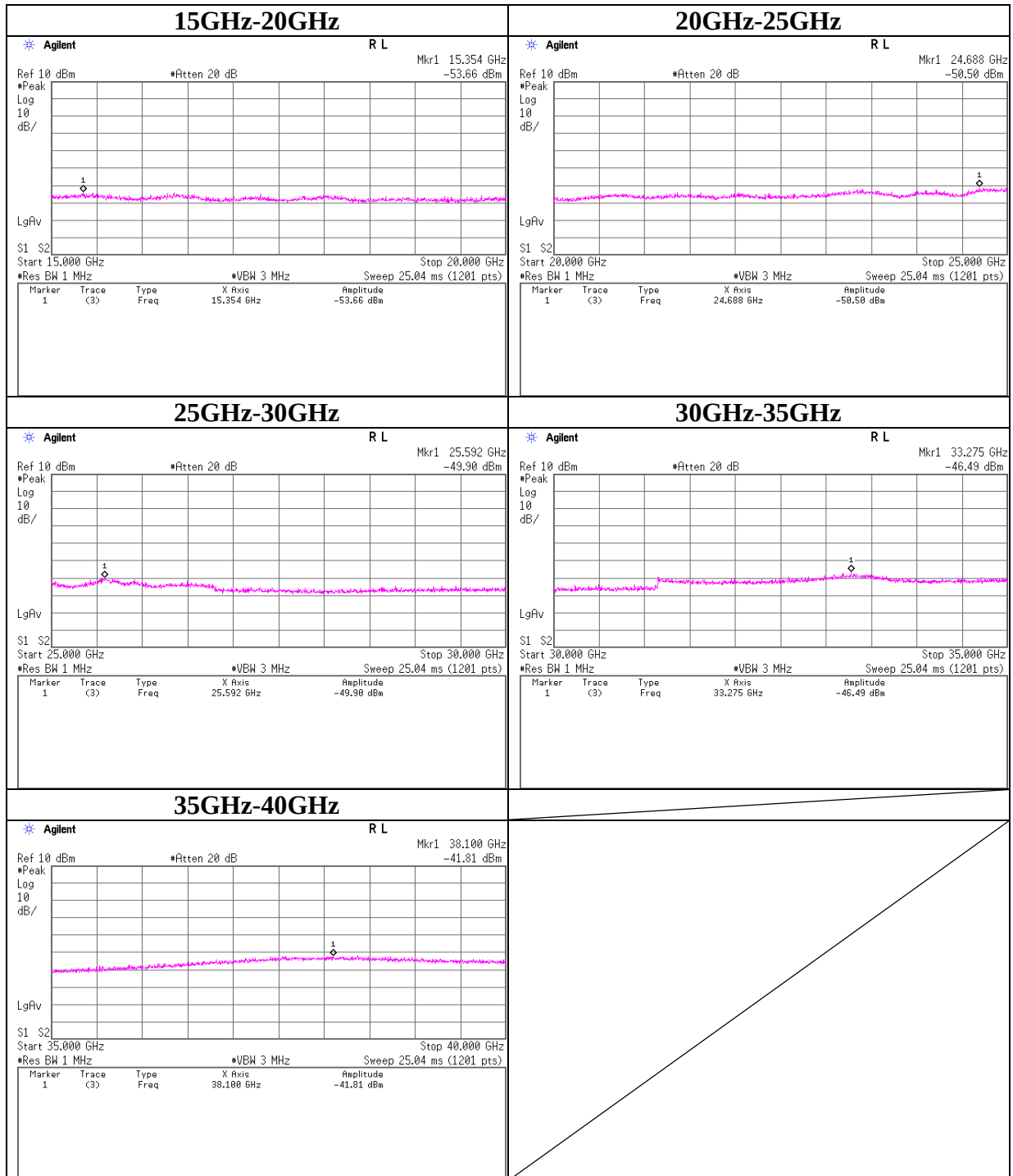
Conducted Spurious Emission

11a Tx 5300MHz



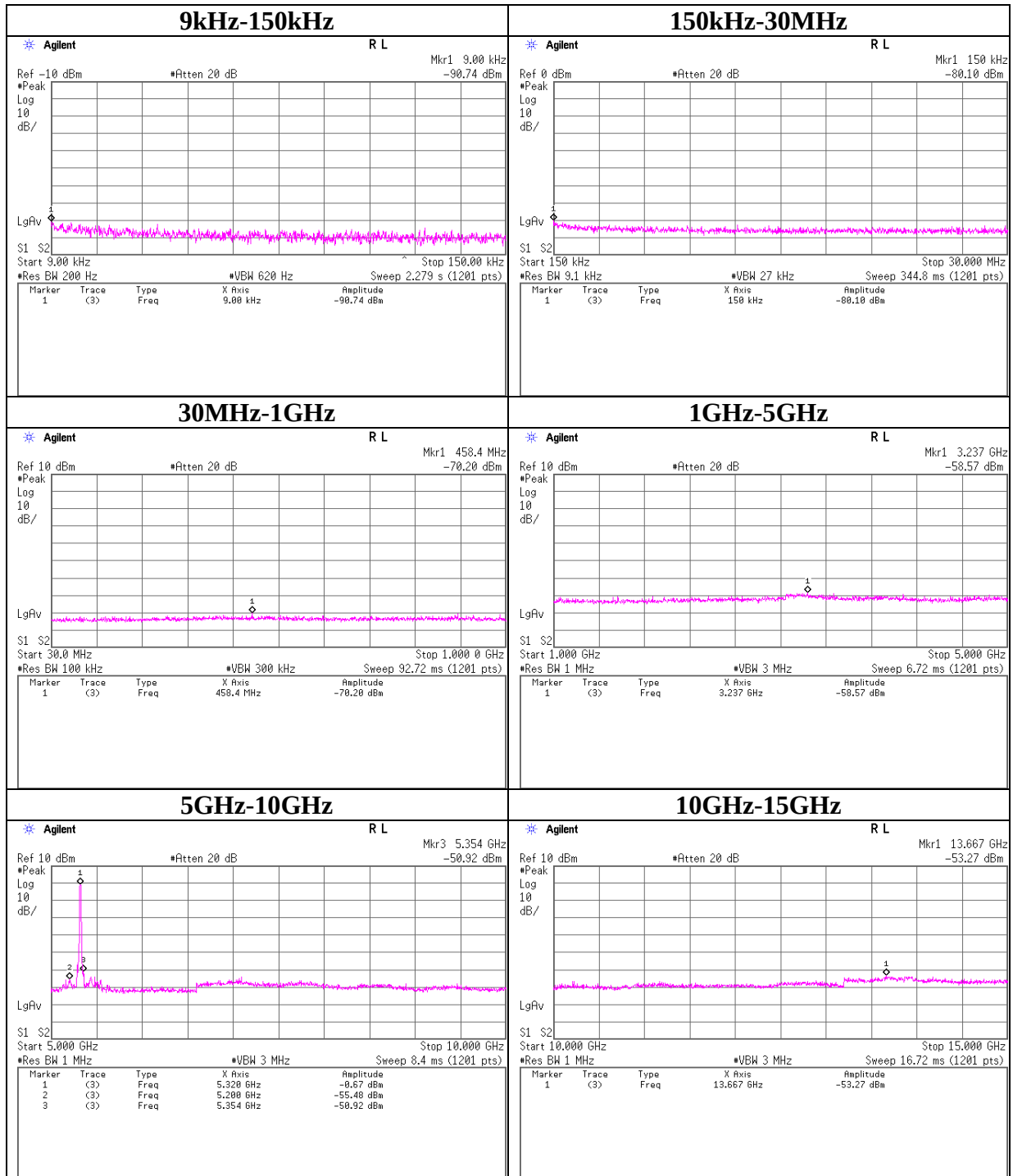
Conducted Spurious Emission

11a Tx 5300MHz



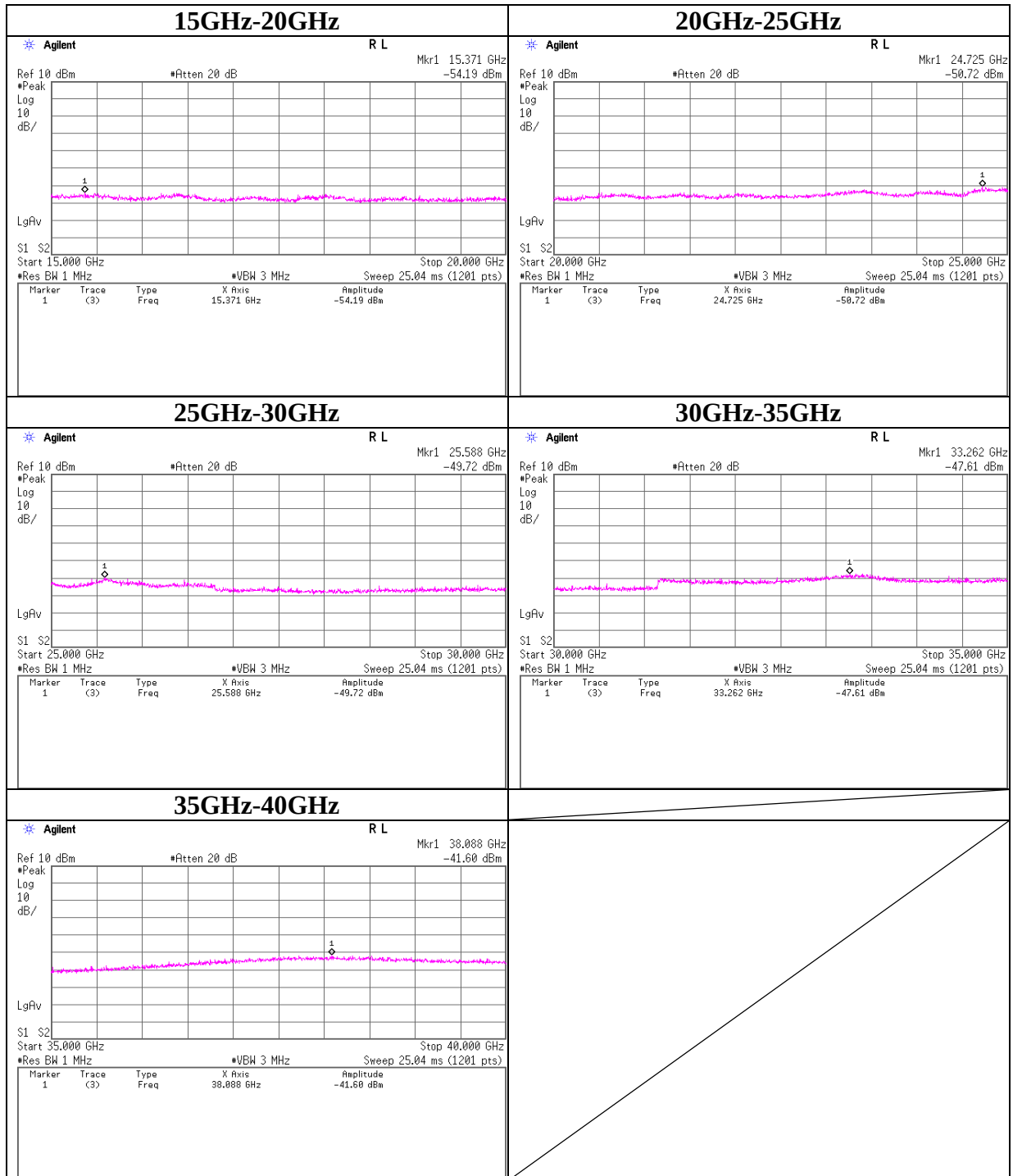
Conducted Spurious Emission

11a Tx 5320MHz



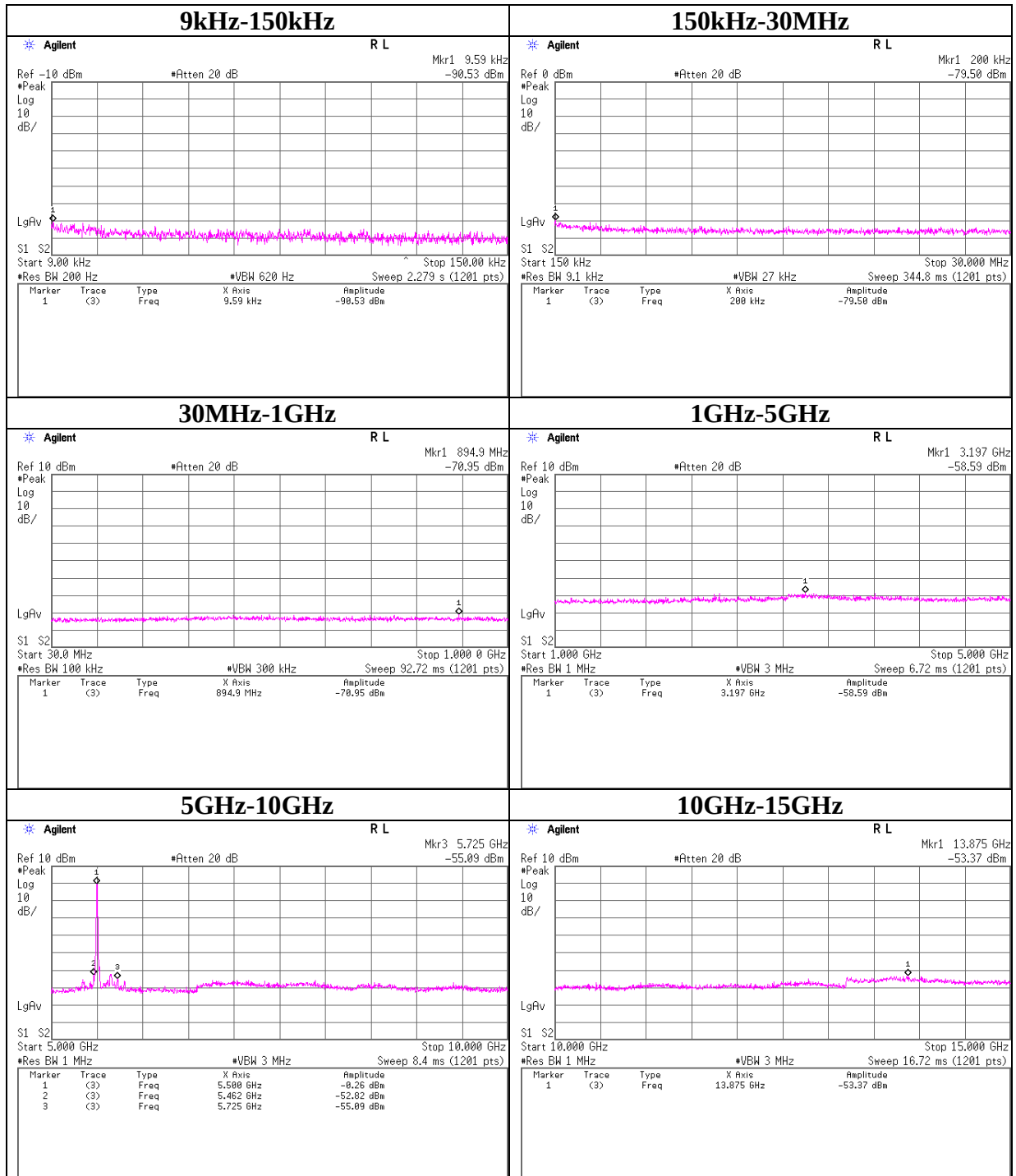
Conducted Spurious Emission

11a Tx 5320MHz



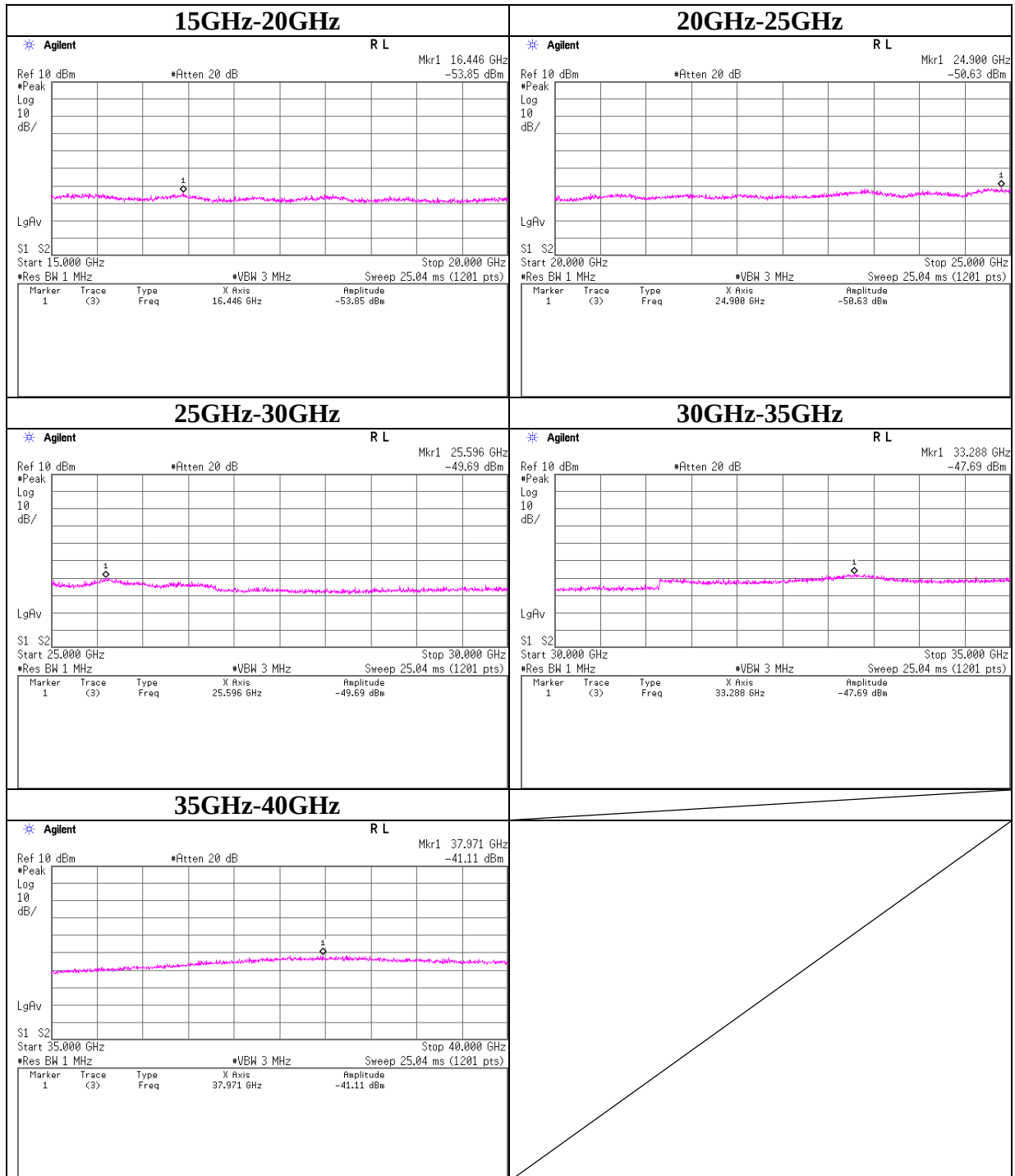
Conducted Spurious Emission

11a Tx 5500MHz



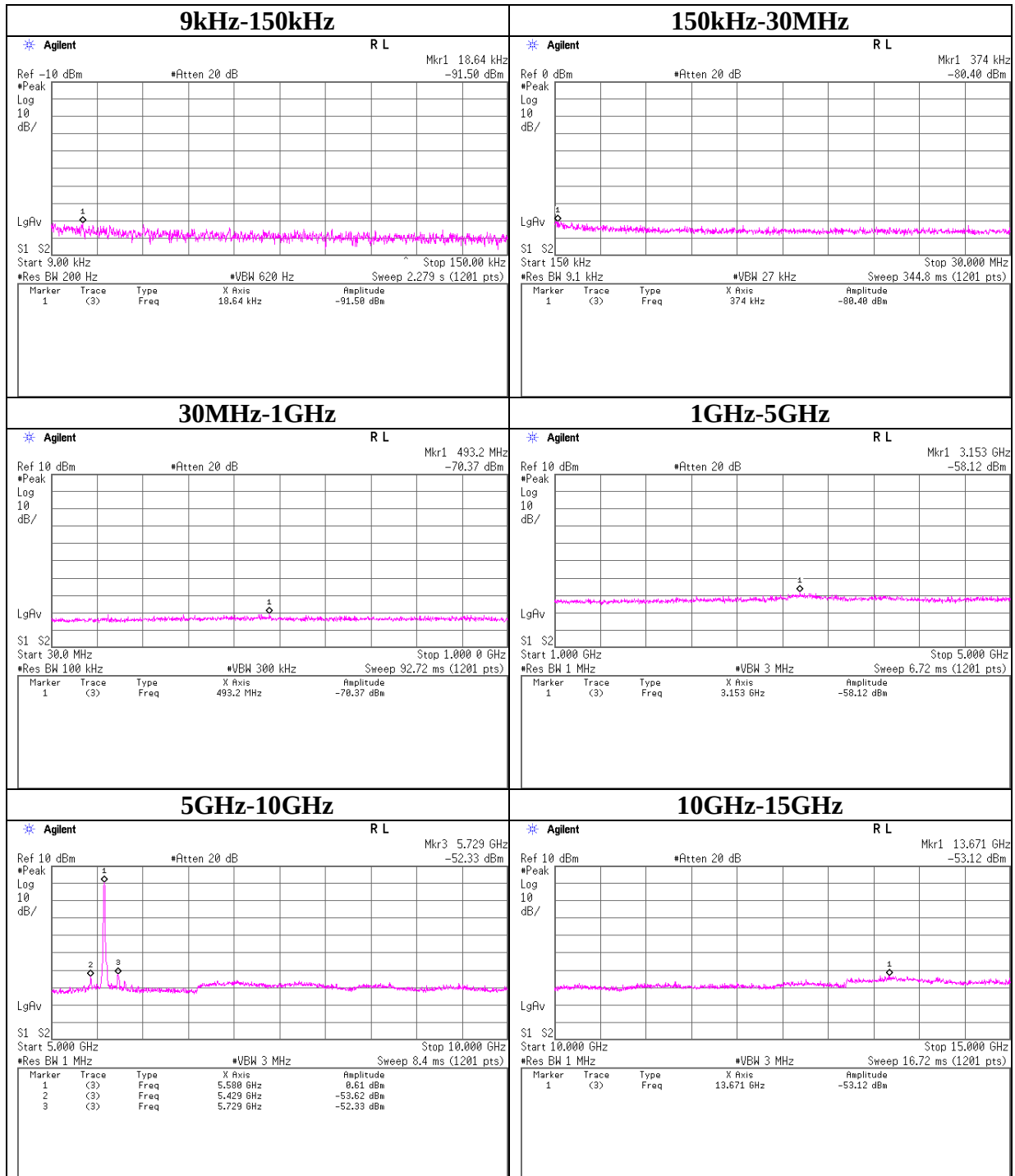
Conducted Spurious Emission

11a Tx 5500MHz



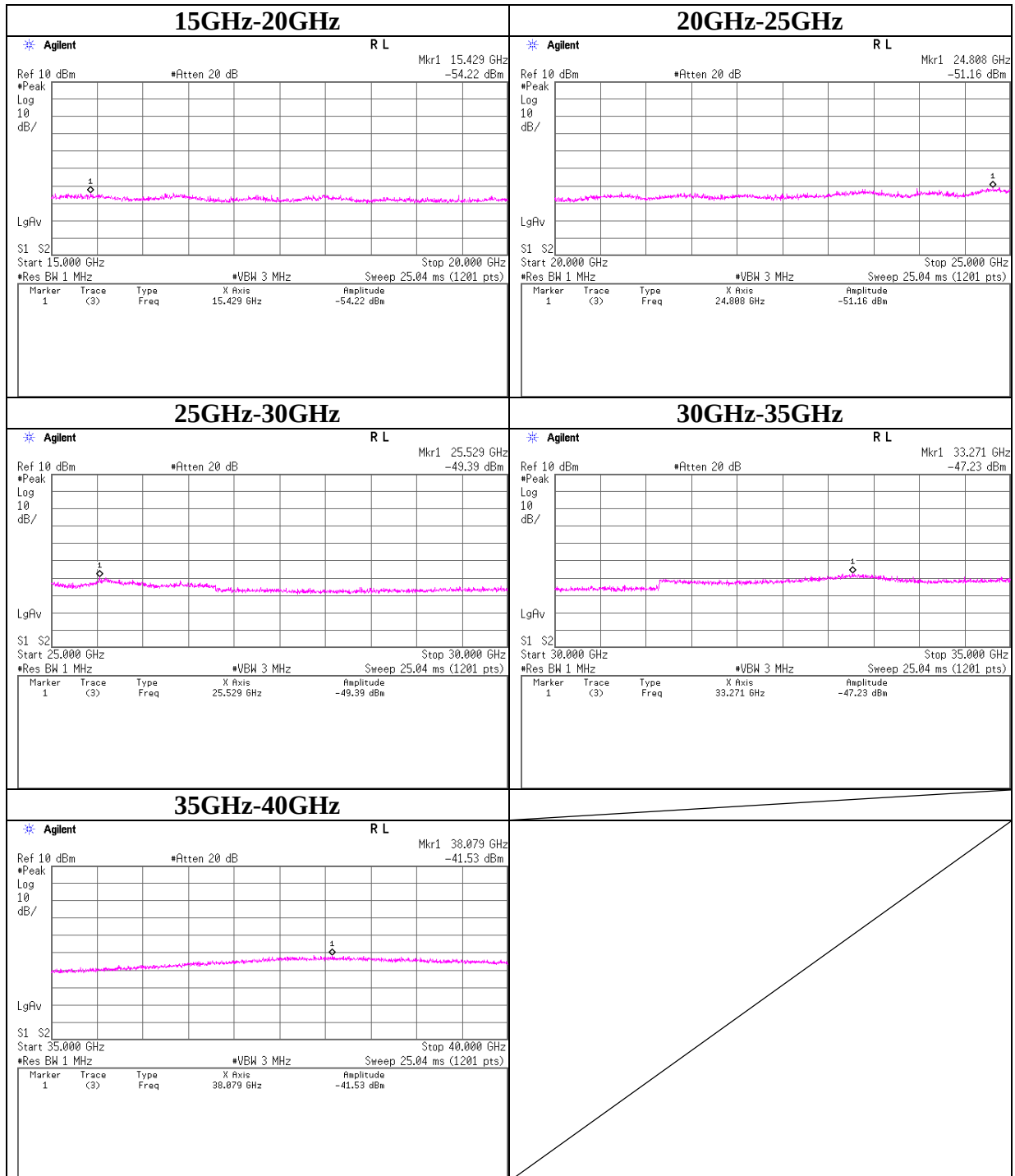
Conducted Spurious Emission

11a Tx 5580MHz



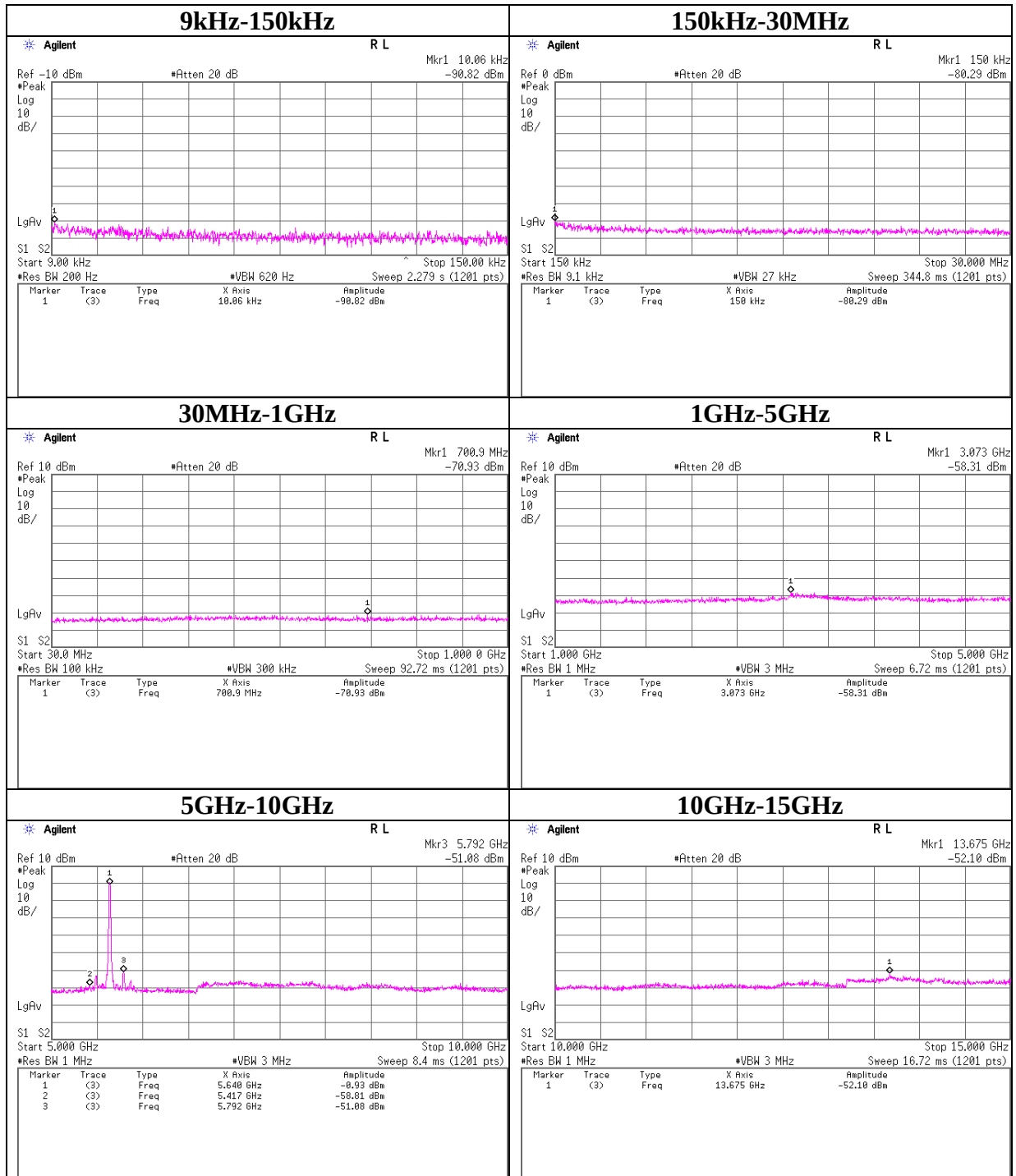
Conducted Spurious Emission

11a Tx 5580MHz



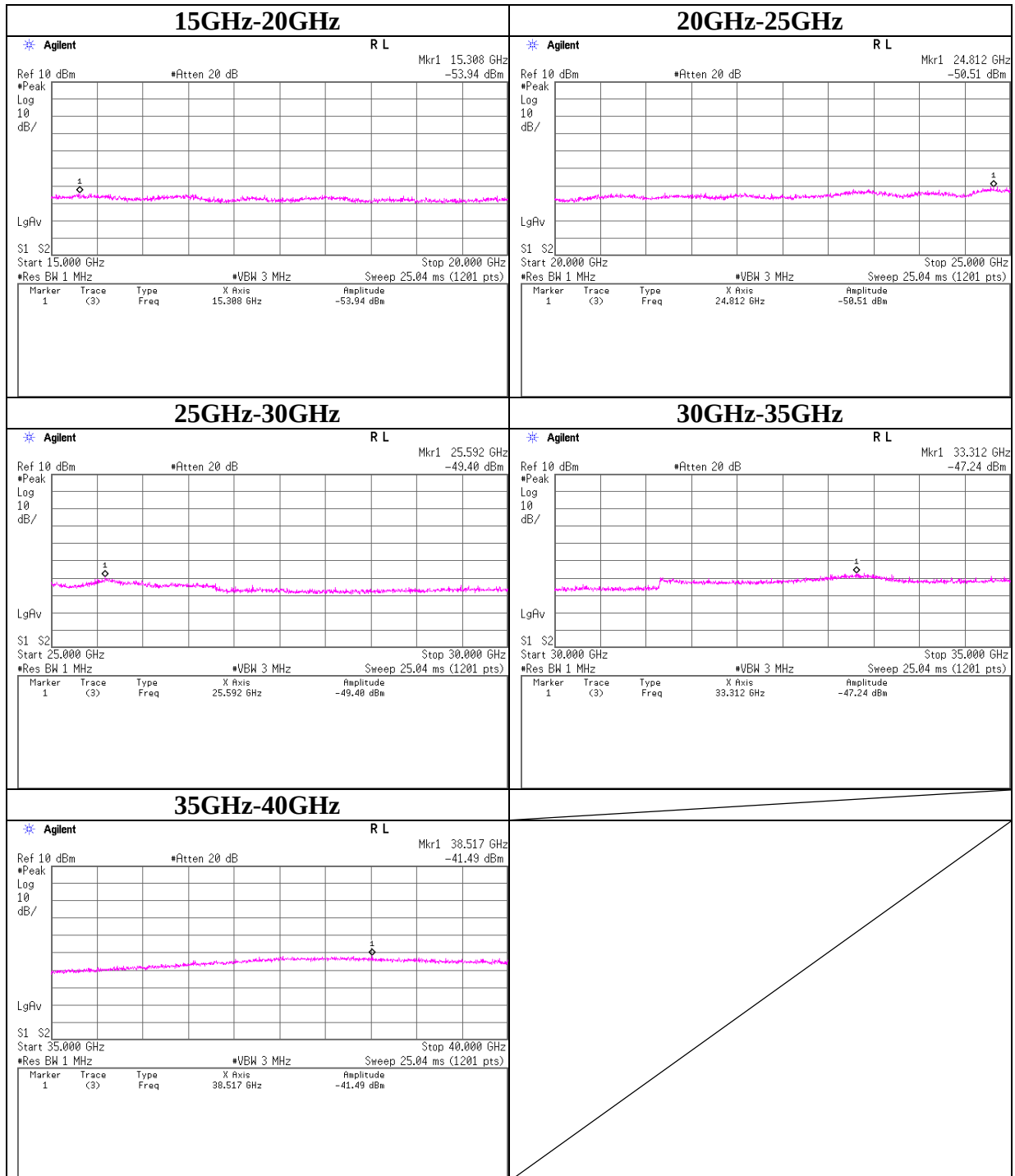
Conducted Spurious Emission

11a Tx 5640MHz



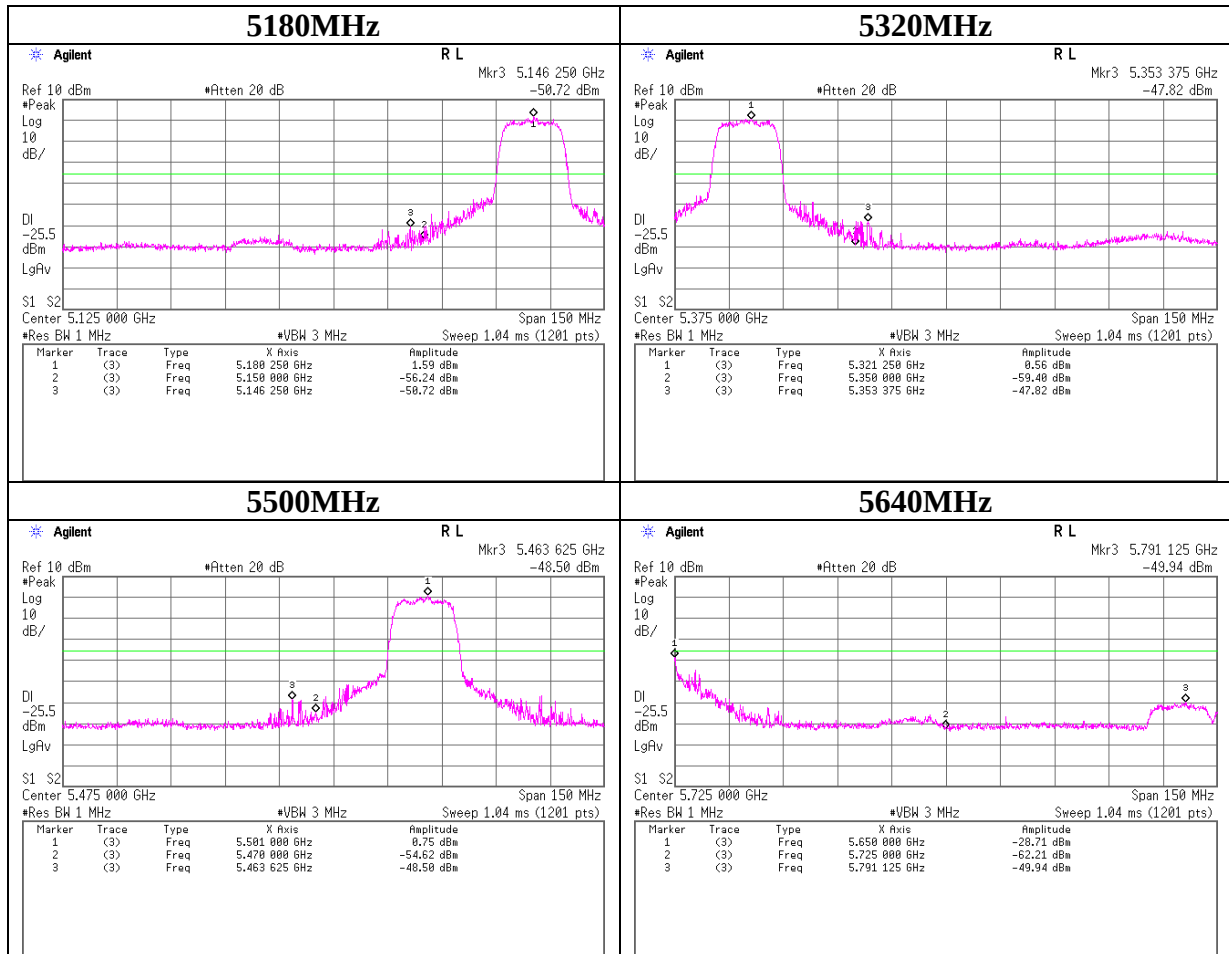
Conducted Spurious Emission

11a Tx 5640MHz



Conducted emission Band Edge compliance

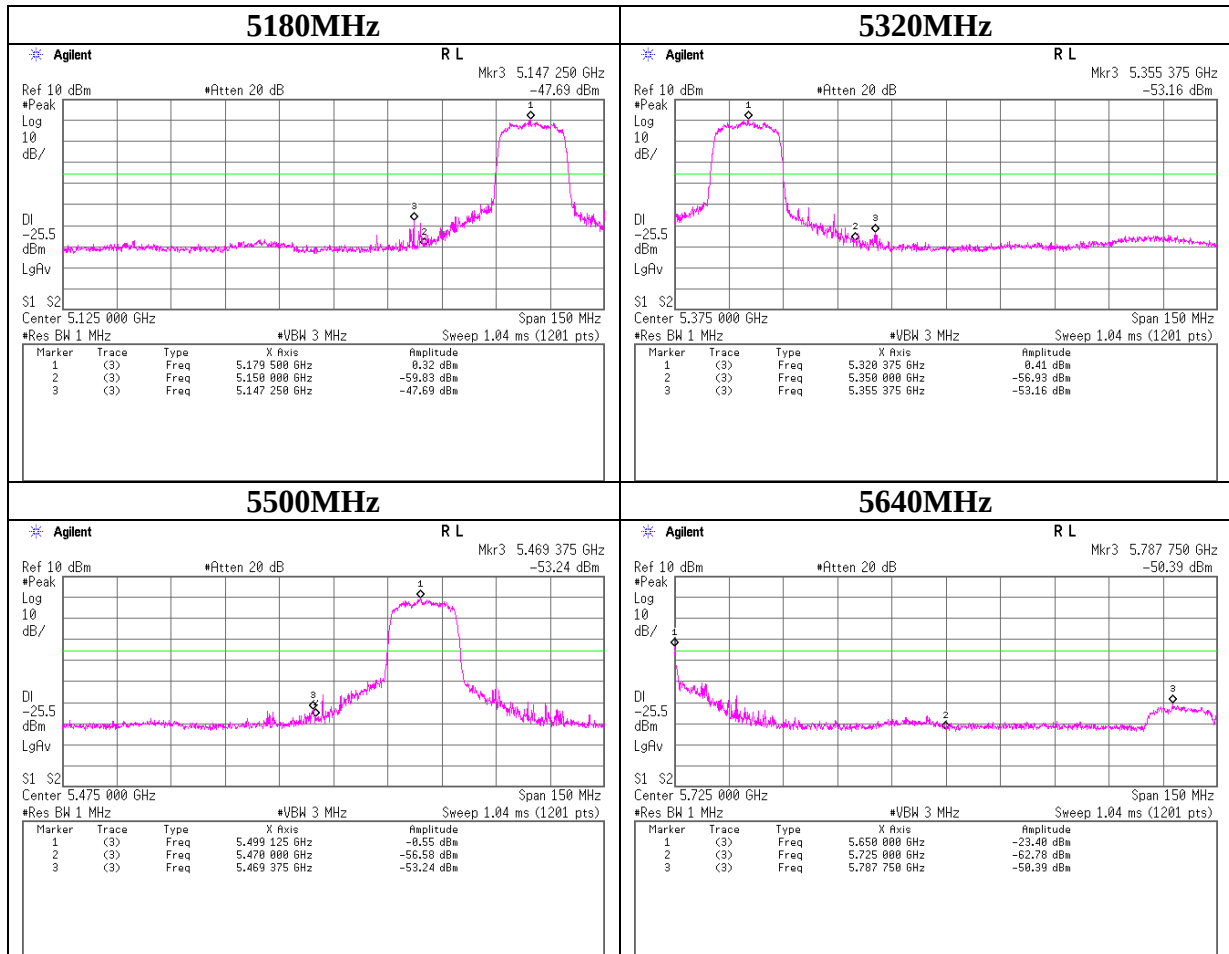
11a



Limit line = -27dBm – Ant Gain – Cable loss – Att. loss

Conducted emission Band Edge compliance

11n-20



Limit line = -27dBm – Ant Gain – Cable loss – Att. loss

Peak Excursion Ratio

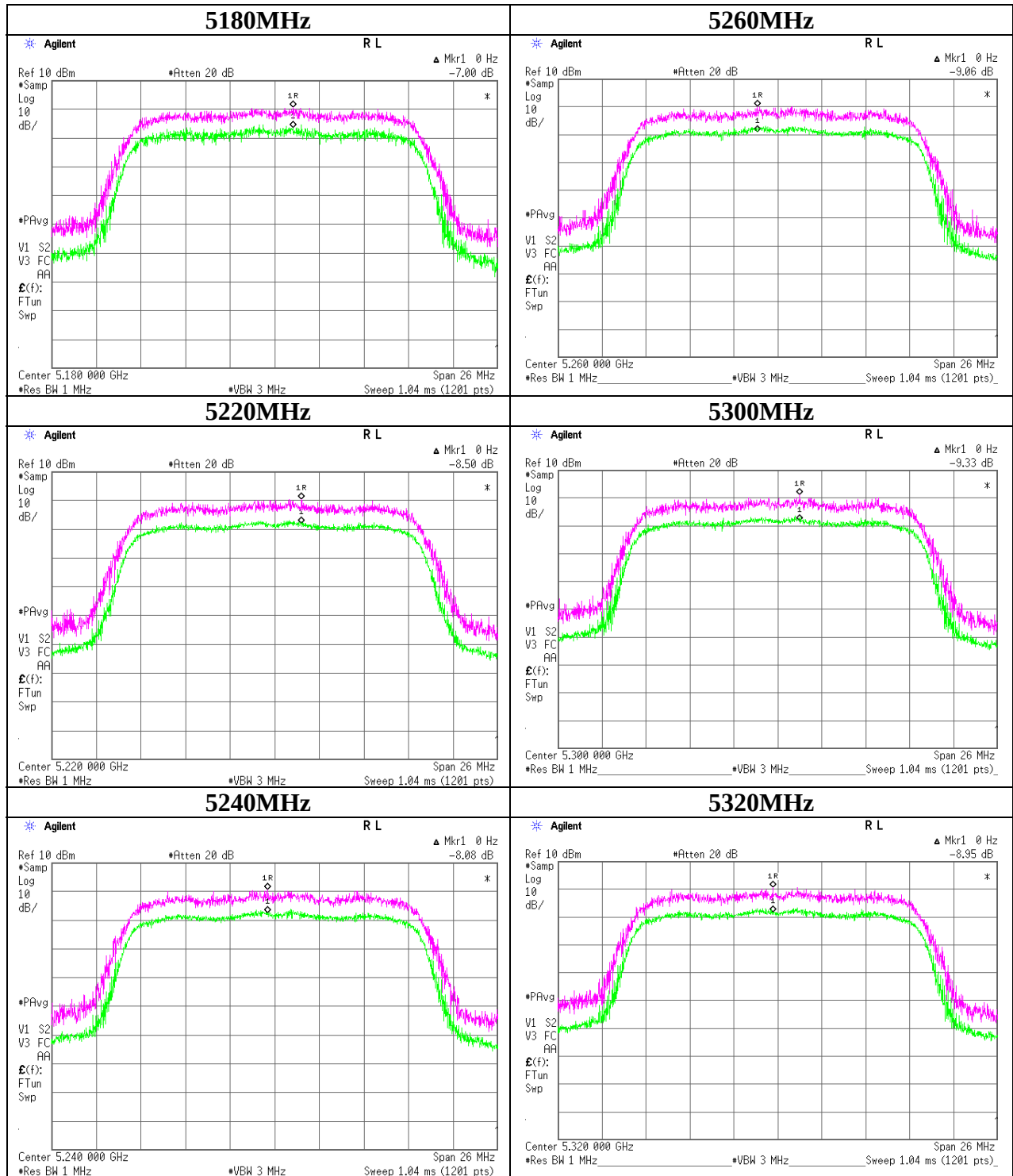
Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32DE0235-HO
Date 11/25/2011
Temperature/ Humidity 24 deg. C / 41% RH
Engineer Tomohisa Nakagawa
Mode 11a, 11n-20 Tx

11a		
Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
5180	7.00	13.00
5220	8.50	13.00
5240	8.08	13.00
5260	9.06	13.00
5300	9.33	13.00
5320	8.95	13.00
5500	9.25	13.00
5580	8.26	13.00
5640	10.79	13.00

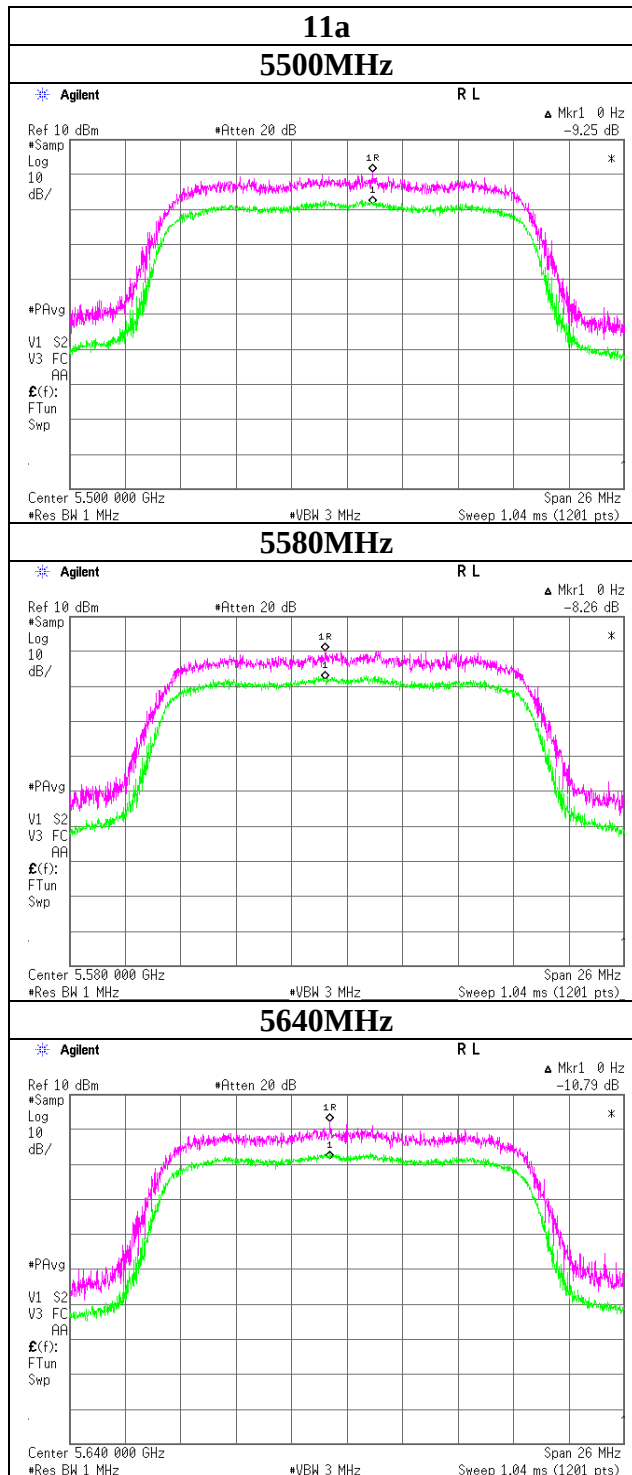
11n-20		
Frequency [MHz]	Peak Power Excursion [dB]	Limit [dB]
5180	9.50	13.00
5220	8.53	13.00
5240	9.31	13.00
5260	9.38	13.00
5300	8.93	13.00
5320	9.07	13.00
5500	9.62	13.00
5580	7.87	13.00
5640	10.20	13.00

Peak Excursion Ratio

11a

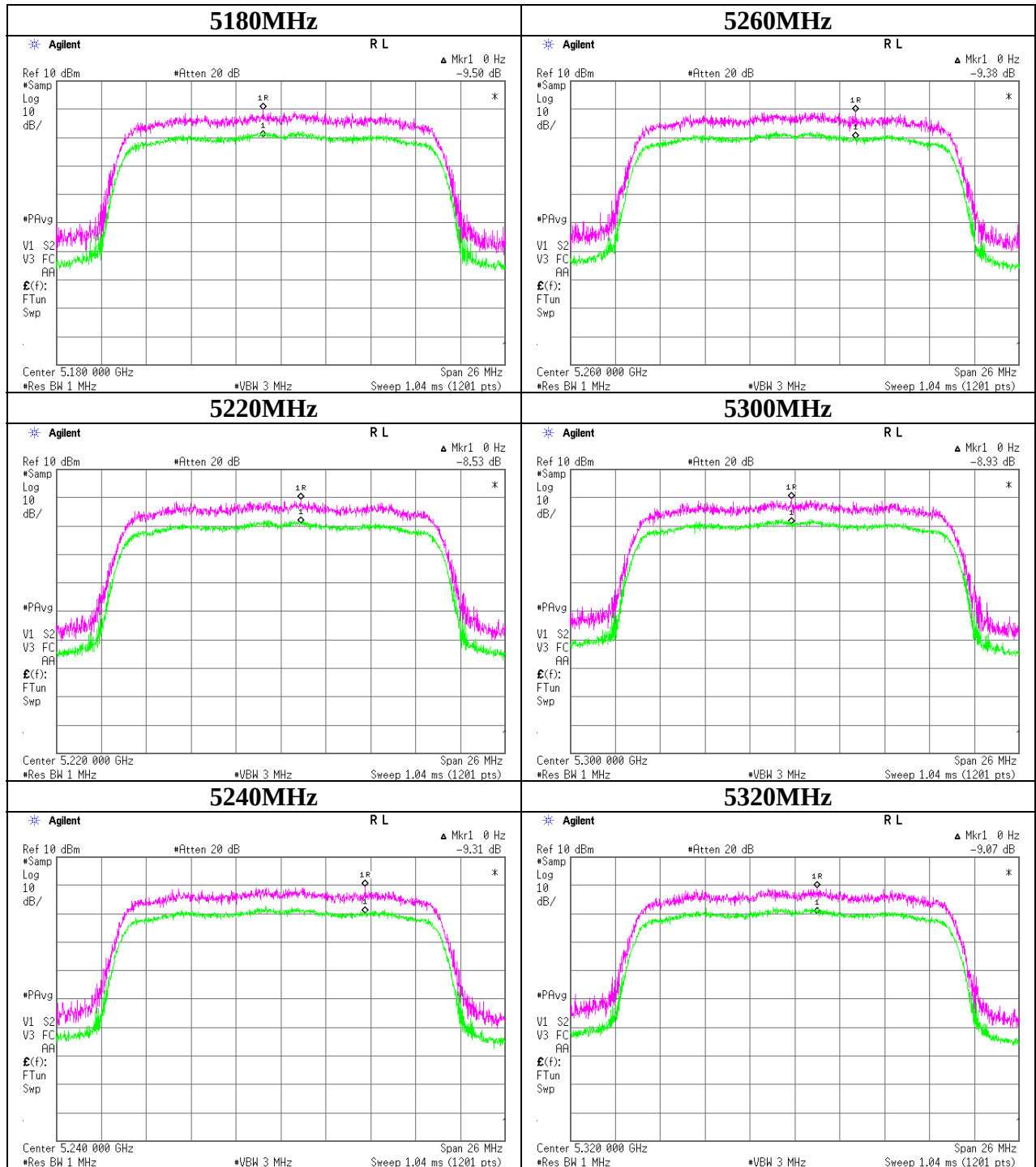


Peak Excursion Ratio

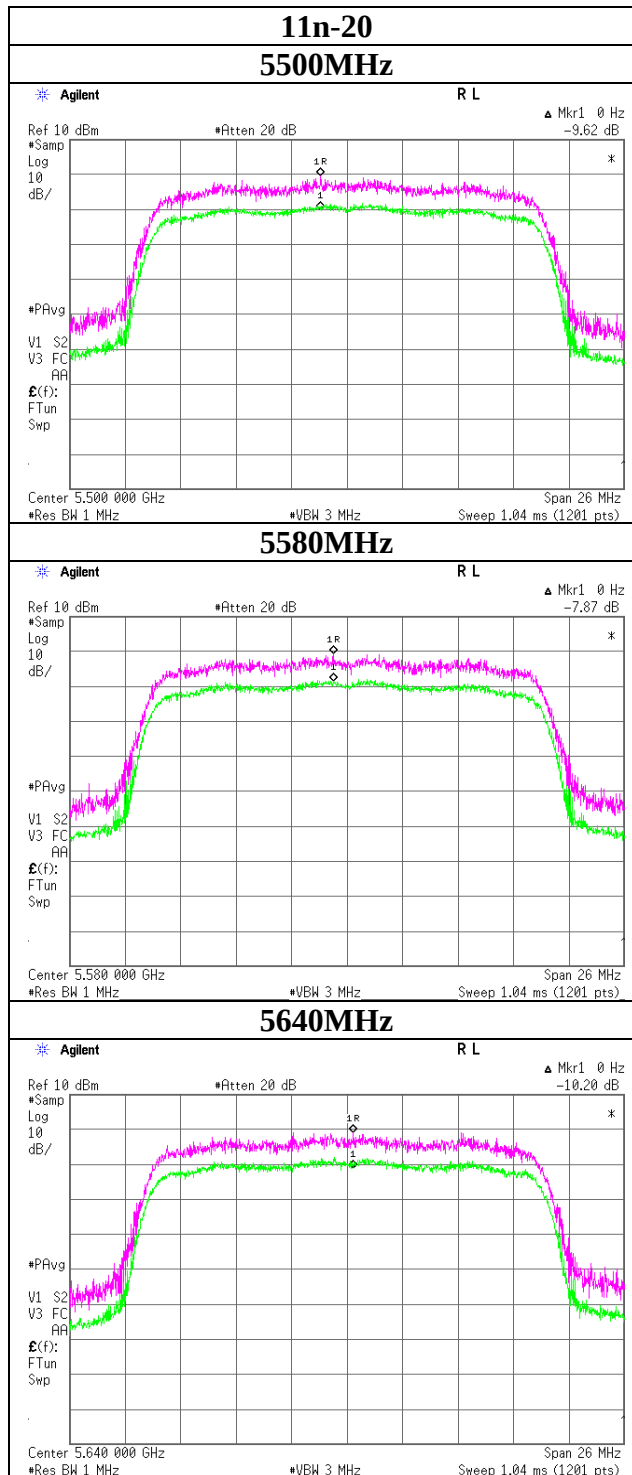


Peak Excursion Ratio

11n-20



Peak Excursion Ratio



APPENDIX 2: Test instruments

EMI test equipment (1 of 2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2011/02/23 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	US44302652	RE	2011/06/30 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2011/01/16 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2010/12/03 * 12
MHF-16	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	RE	2011/09/08 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2011/02/23 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2011/02/15 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2011/08/09 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2011/03/14 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2011/04/08 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2011/04/15 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2011/02/18 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2011/09/21 * 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	2011/10/22 * 12
MCC-55	Microwave Cable	Suhner	SUCOFLEX101	2874(1m) / 2877(5m)	RE	2011/03/03 * 12
MPA-03	Microwave System Power Amplifier	Agilent	83050A	3950M00205	RE	2011/06/15 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2011/03/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	CE	2011/02/23 * 12
MJM-07	Measure	PROMART	SEN1955	-	CE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2011/11/23 * 12

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Facsimile : +81 596 24 8124

EMI test equipment (2 of 2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	CE	2011/10/19 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2011/02/20 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D- 2W(10m)/SFM14 1(5m)/421- 010(1m)/sucofor m141- PE(1m)/RFM- E121(Switcher)	-/04178	CE	2011/07/04 * 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**