



RADIO TEST REPORT

Test Report No. : 10348320H-F-R1

Applicant : Sony Computer Entertainment Inc.
Type of Equipment : PlayStation® TV
Model No. : VTE-1001
FCC ID : AK8VTE1001F1
Test regulation : FCC Part 15 Subpart C: 2014
*Bluetooth part
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 the 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.
6. This report is a revised version of 10348320H-F. 10348320H-F is replaced with this report.

Date of test: August 29 to September 5, 2013

Representative test engineer:

T. Shimada

Takumi Shimada
Engineer
Consumer Technology Division

Approved by:

M. Nishiyama

Masanori Nishiyama
Manager
Consumer Technology Division



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.
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<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10348320H-F

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SECTION 1: Customer information

Company Name	Sony Computer Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-3-6748-6333
Facsimile Number	+81-3-6748-6383
Contact Person	Kiyoto Sasaki

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

2.1 Identification of E.U.T.

Type of Equipment	PlayStation® TV
Model No	VTE-1001
Serial No	8200094 for Antenna Terminal Conducted test 8200109 for Conducted Emission and Radiated Emission tests
Country of Manufacture	China
Receipt Date of Sample	August 27, 2013
Condition of EUT	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	No modification by the test lab.

2.2 Product Description

VTE-1001 is the PlayStation® TV.

WLAN antenna and Bluetooth antenna transmit simultaneously, but there is no correlation between WLAN and Bluetooth antennas.

Product Specification

Maximum clock frequency in the system	444MHz
Operating Temperature	5-35 deg. C
Power Supply	DC5.0V
Size	105.0 x 65.0 x 13.6 mm
Weight	Approx. 110g

Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20MHz & 5MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC1.8V/DC3.1V
Antenna Type	Chip Multilayer Antenna
Antenna Gain	-0.33dBi

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Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	1MHz & 1MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC1.8V
Antenna Type	Chip Multilayer Antenna
Antenna Gain	-0.56dBi (peak)

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2014, final revised on May 1, 2014 and effective June 2, 2014

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

- * The revision on May 1, 2014 does not affect the test specification applied to the EUT.
- * The EUT complies with FCC Part 15 Subpart B: 2014, final revised on May 1, 2014 and effective June 2, 2014.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4	FCC: Section 15.207 IC: RSS-Gen 7.2.4	QP 15.3dB, 2.24193MHz, L AV 10.1dB 2.24193MHz, L 2.24096MHz, L 2.34340MHz, L	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (a)		-	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-210 A8.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-210 A8.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.8	FCC: Section15.247(a)(b)(1) IC: RSS-210 A8.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.9	FCC: Section15.247(d) IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3	3.8dB 370.896MHz, QP, Hori.	Complied	Conducted/ Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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FCC 15.31 (e)

This EUT provides stable voltage(DC1.8V/3.1V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	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	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

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

Power meter (+dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

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	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Conducted Emission test

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

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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	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	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	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	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	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	4.0 x 4.5 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 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 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.

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

4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PN9
Inquiry

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
20dB Bandwidth Maximum Peak Output Power	Tx (Hopping off) DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5 Inquiry	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5 Inquiry	-
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2441MHz 2480MHz
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *EUT has the power settings by the software as follows; Power settings: 0dBm Software: Marvell 8787 Labtool Ver.14.0.11.p74 *This setting of 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.		

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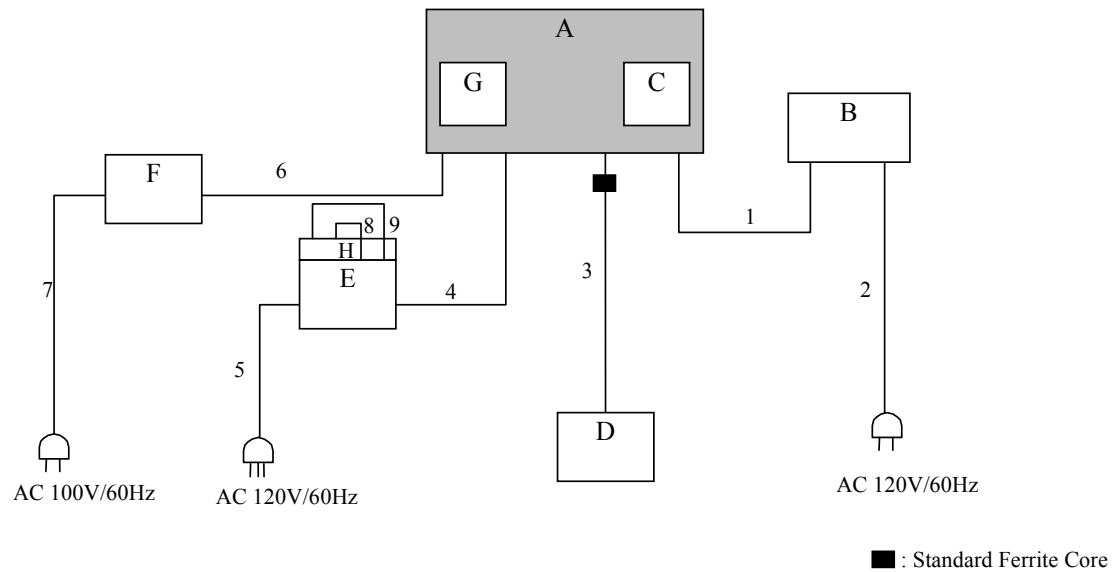
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4.2 Configuration and peripherals



* 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	Remark
A	PlayStation® TV	VTE-1001	8200094: AT 8200109: CE/RE	Sony Computer Entertainment Inc.	EUT
B	AC Adaptor	ACC-219	13046000362A	Sony Computer Entertainment Inc.	-
C	Memory Card	PCH-Z041	-	Sony Computer Entertainment Inc.	-
D	Wireless Controller (DS3)	CECHZC2U	PDC0000000094	Sony Computer Entertainment Inc.	-
E	Monitor	U2413f	CN-0M0Y5W-72872-31 S-A6LL	DELL	-
F	LAN Hub	FX-051S	07FA03634C	PLANEX COMMUNICATIONS INC.	-
G	Vita Card	-	VCDMA1294DB00A 1JS	Sony Computer Entertainment Inc.	-
H	Speaker	AX510	CN-0C730C-71623-348 -3855	DELL	-

AT: Antenna Terminal Conducted tests

CE/RE: Conducted Emission and Radiated Spurious Emission test

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List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.5	Shielded	Shielded	-
2	AC Cable	1.0	Unshielded	Unshielded	-
3	USB Cable	1.5	Shielded	Shielded	-
4	HDMI Cable	2.0	Shielded	Shielded	-
5	AC Cable	1.8	Unshielded	Unshielded	-
6	LAN Cable	1.0	Unshielded	Unshielded	-
7	AC Cable	1.8	Unshielded	Unshielded	-
8	DC Cable	0.3	Unshielded	Unshielded	-
9	Audio Cable	1.5	Shielded	Shielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, 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 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 .

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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

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SECTION 6: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.5m 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 performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

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

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.

Test Antennas are used as below;

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

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5 (IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz),		3m (below 10GHz), 1m*2) (above 10GHz),

*1) Although 00-705 accepts VBW=10Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.”

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

- 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-25GHz
Test data	: APPENDIX
Test result	: Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3MHz	30kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	5MHz or 3MHz	100kHz or 30kHz	300kHz or 100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	1MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Max Hold	Spectrum Analyzer
Conducted Spurious Emission *2)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	10MHz	100kHz	300kHz	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.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

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

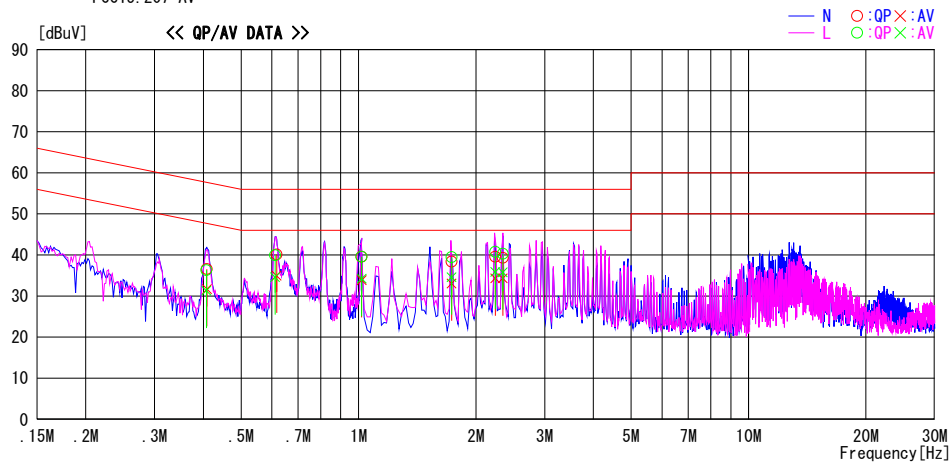
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2013/09/05

Report No. : 10348320H

Temp./Humi. : 24deg. C / 58% RH
Engineer : Takumi Shimada

Mode / Remarks : BT DH5 2441MHz

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]		
0.40883	23.3	18.4	13.3	36.6	31.7	57.7	47.7	21.1	16.0	N	
0.61684	26.8	21.7	13.3	40.1	35.0	56.0	46.0	15.9	11.0	N	
1.01875	26.3	20.6	13.3	39.6	33.9	56.0	46.0	16.4	12.1	N	
1.73262	24.9	19.6	13.5	38.4	33.1	56.0	46.0	17.6	12.9	N	
2.24112	26.1	20.8	13.5	39.6	34.3	56.0	46.0	16.4	11.7	N	
2.34366	25.8	20.8	13.5	39.3	34.3	56.0	46.0	16.7	11.7	N	
0.40722	23.0	18.0	13.3	36.3	31.3	57.7	47.7	21.4	16.4	L	
0.61152	26.6	21.3	13.3	39.9	34.6	56.0	46.0	16.1	11.4	L	
1.01874	26.3	20.9	13.3	39.6	34.2	56.0	46.0	16.4	11.8	L	
1.73158	26.0	21.1	13.5	39.5	34.6	56.0	46.0	16.5	11.4	L	
2.24193	27.2	22.4	13.5	40.7	35.9	56.0	46.0	15.3	10.1	L	
2.34327	26.8	22.3	13.5	40.3	35.8	56.0	46.0	15.7	10.2	L	

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

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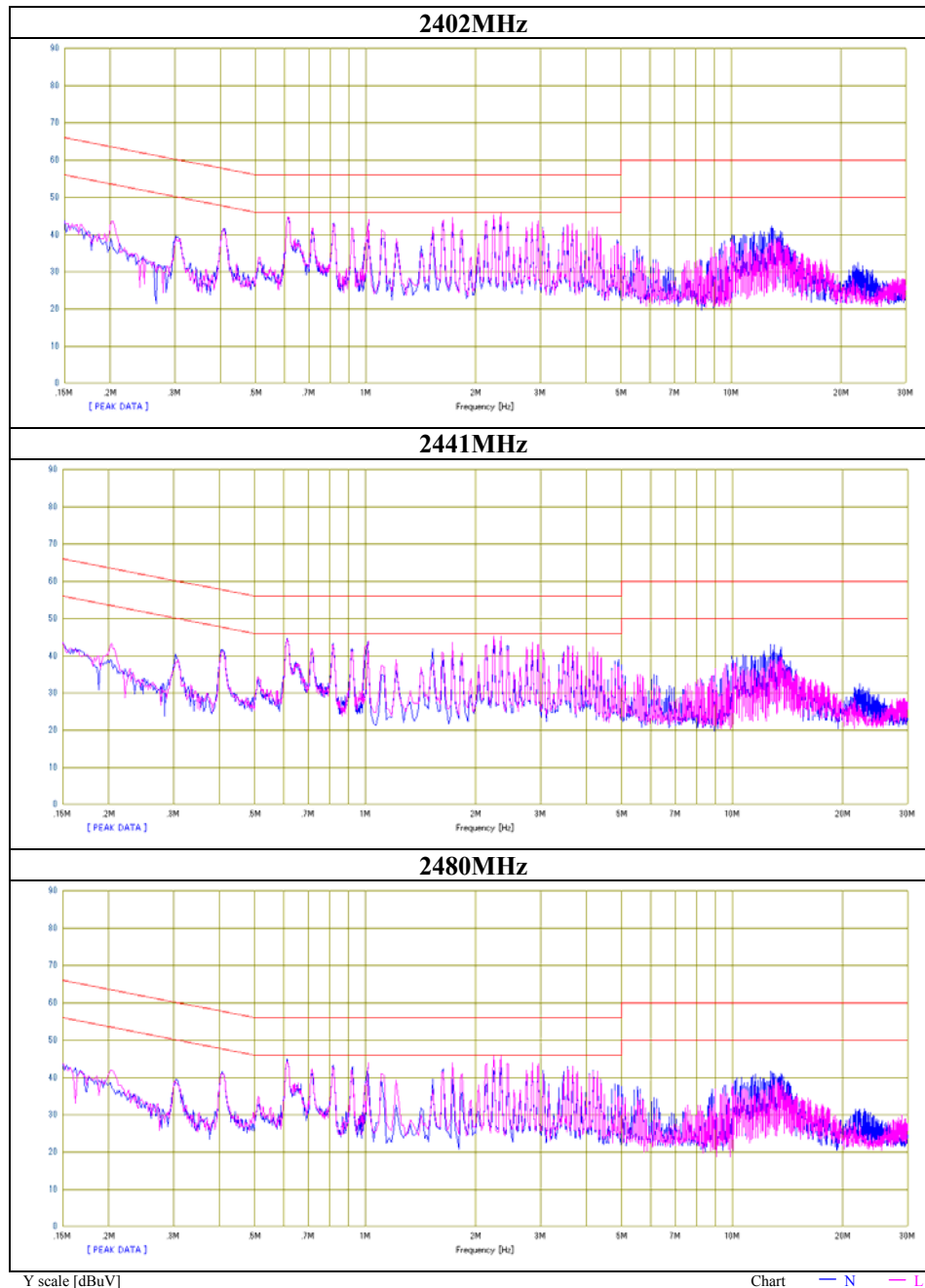
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Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10348320H
Date	09/04/2013
Temperature/ Humidity	24 deg.C/ 58% RH
Engineer	Takumi Shimada
Mode	Tx DH5



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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

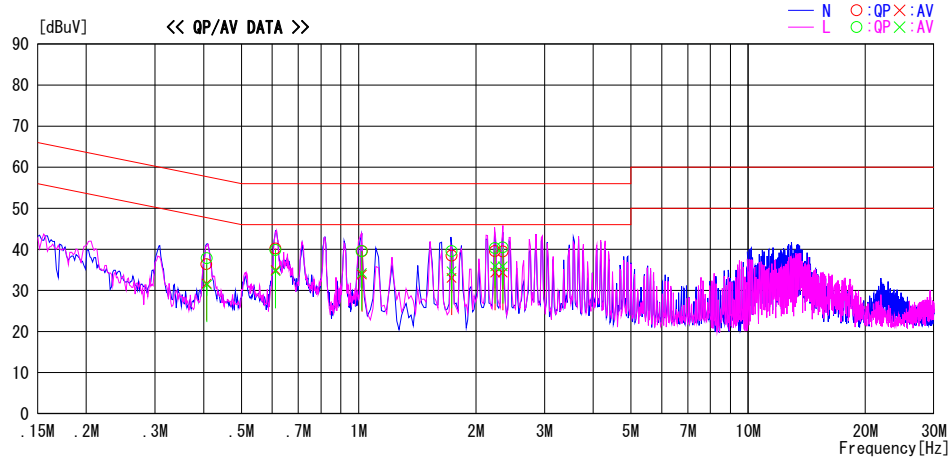
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date: 2013/09/05

Report No. : 10348320H

Temp./Humi. : 24deg. C / 58% RH
Engineer : Takumi Shimada

Mode / Remarks : BT 3DH5 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

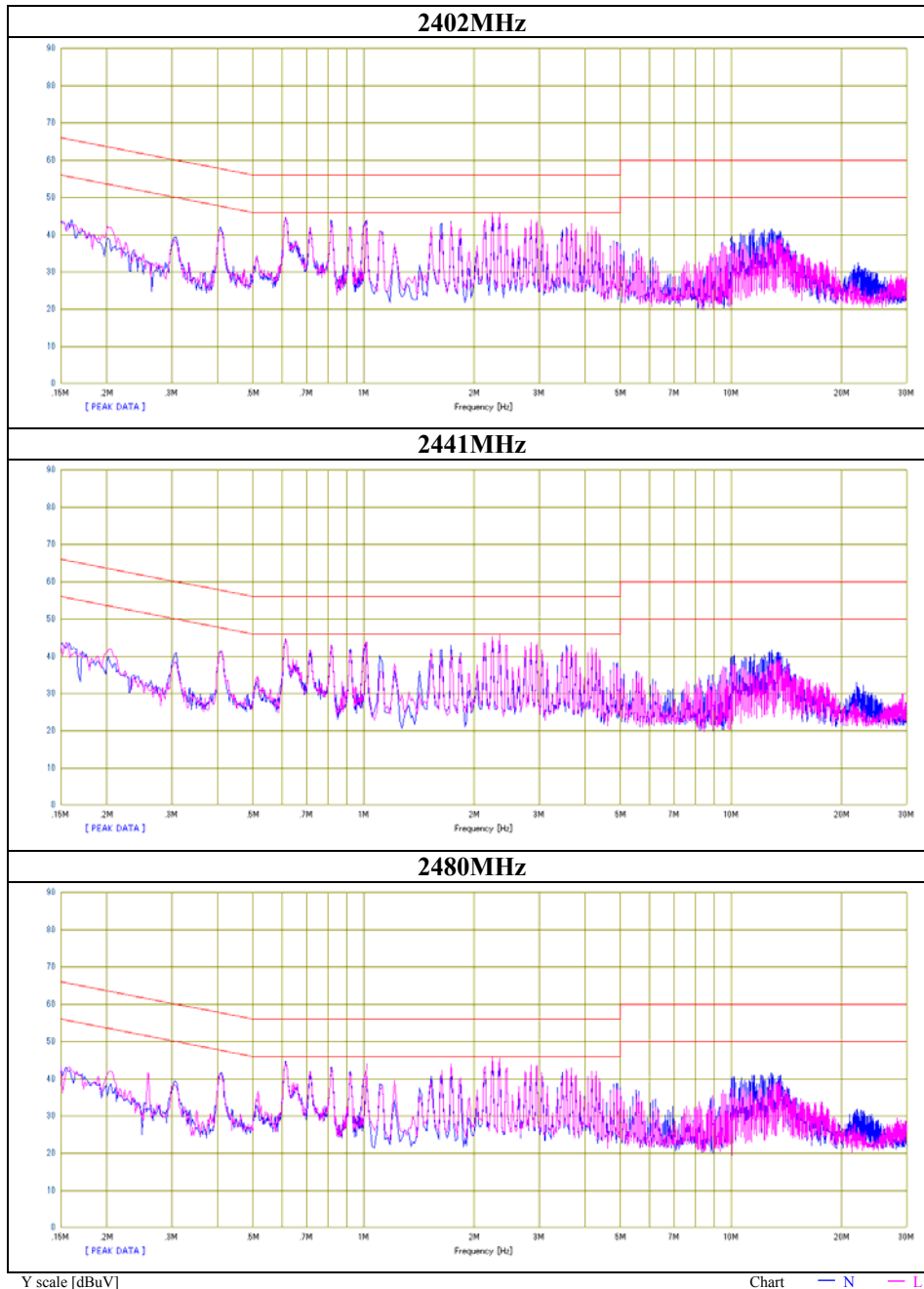


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.40674	23.1	18.4	13.3	36.4	31.7	57.7	47.7	21.3	16.0	N	
0.61199	26.9	21.7	13.3	40.2	35.0	56.0	46.0	15.8	11.0	N	
1.01933	26.3	20.6	13.3	39.6	33.9	56.0	46.0	16.4	12.1	N	
1.73221	25.0	19.6	13.5	38.5	33.1	56.0	46.0	17.5	12.9	N	
2.24088	26.1	20.8	13.5	39.6	34.3	56.0	46.0	16.4	11.7	N	
2.34351	26.0	20.8	13.5	39.5	34.3	56.0	46.0	16.5	11.7	N	
0.40793	24.5	18.1	13.3	37.8	31.4	57.7	47.7	19.9	16.3	L	
0.61208	26.5	21.4	13.3	39.8	34.7	56.0	46.0	16.2	11.3	L	
1.01926	26.3	20.9	13.3	39.6	34.2	56.0	46.0	16.4	11.8	L	
1.73262	26.1	21.2	13.5	39.6	34.7	56.0	46.0	16.4	11.3	L	
2.24096	26.8	22.4	13.5	40.3	35.9	56.0	46.0	15.7	10.1	L	
2.34340	27.0	22.4	13.5	40.5	35.9	56.0	46.0	15.5	10.1	L	

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

Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10348320H
Date	09/04/2013
Temperature/ Humidity	24 deg.C/ 58% RH
Engineer	Takumi Shimada
Mode	Tx 3DH5



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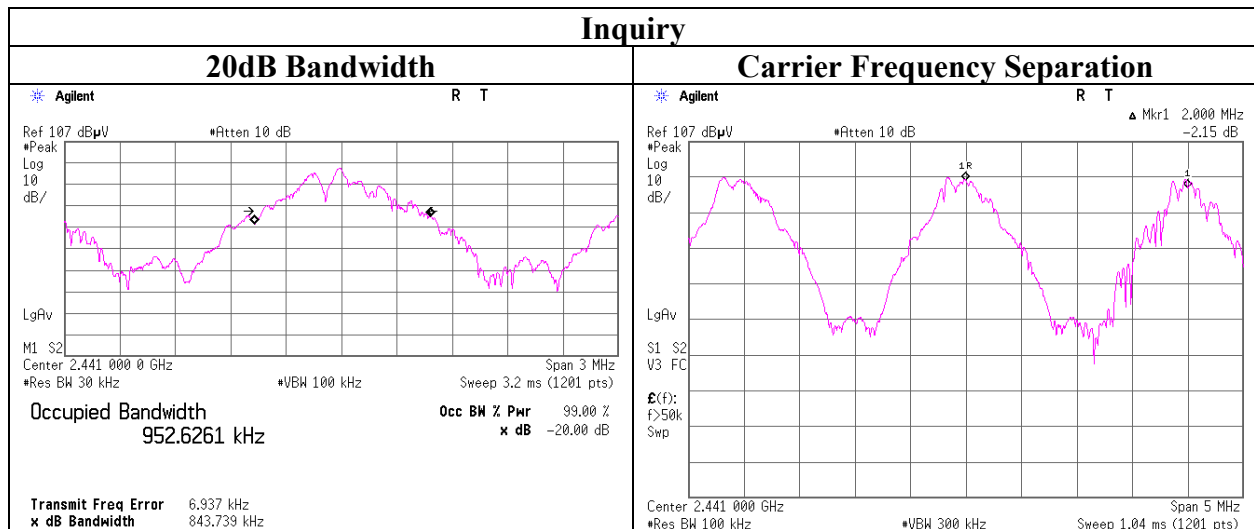
20dB Bandwidth and Carrier Frequency Separation

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/05/2013
Temperature/ Humidity : 23 deg. C / 68% RH
Engineer : Takumi Shimada
Mode : Tx (Hopping on) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.953	1.000	≥ 0.636
DH5	2441.0	0.951	1.000	≥ 0.634
DH5	2480.0	0.954	1.000	≥ 0.636
3DH5	2402.0	1.302	1.000	≥ 0.868
3DH5	2441.0	1.303	1.000	≥ 0.869
3DH5	2480.0	1.307	1.000	≥ 0.871
Inquiry	2441.0	0.844	2.000	≥ 0.562

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

No limit applies to 20dB Bandwidth.



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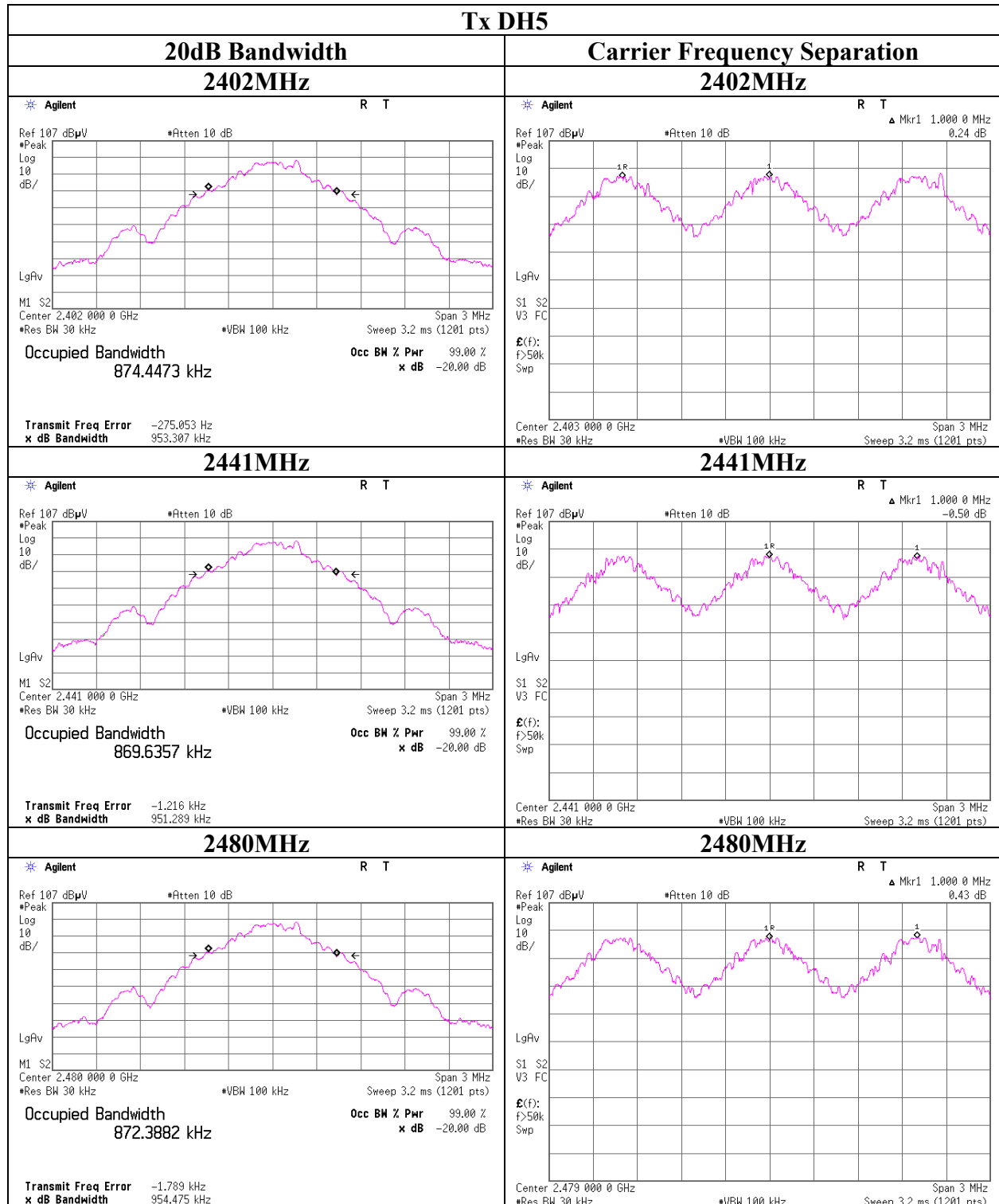
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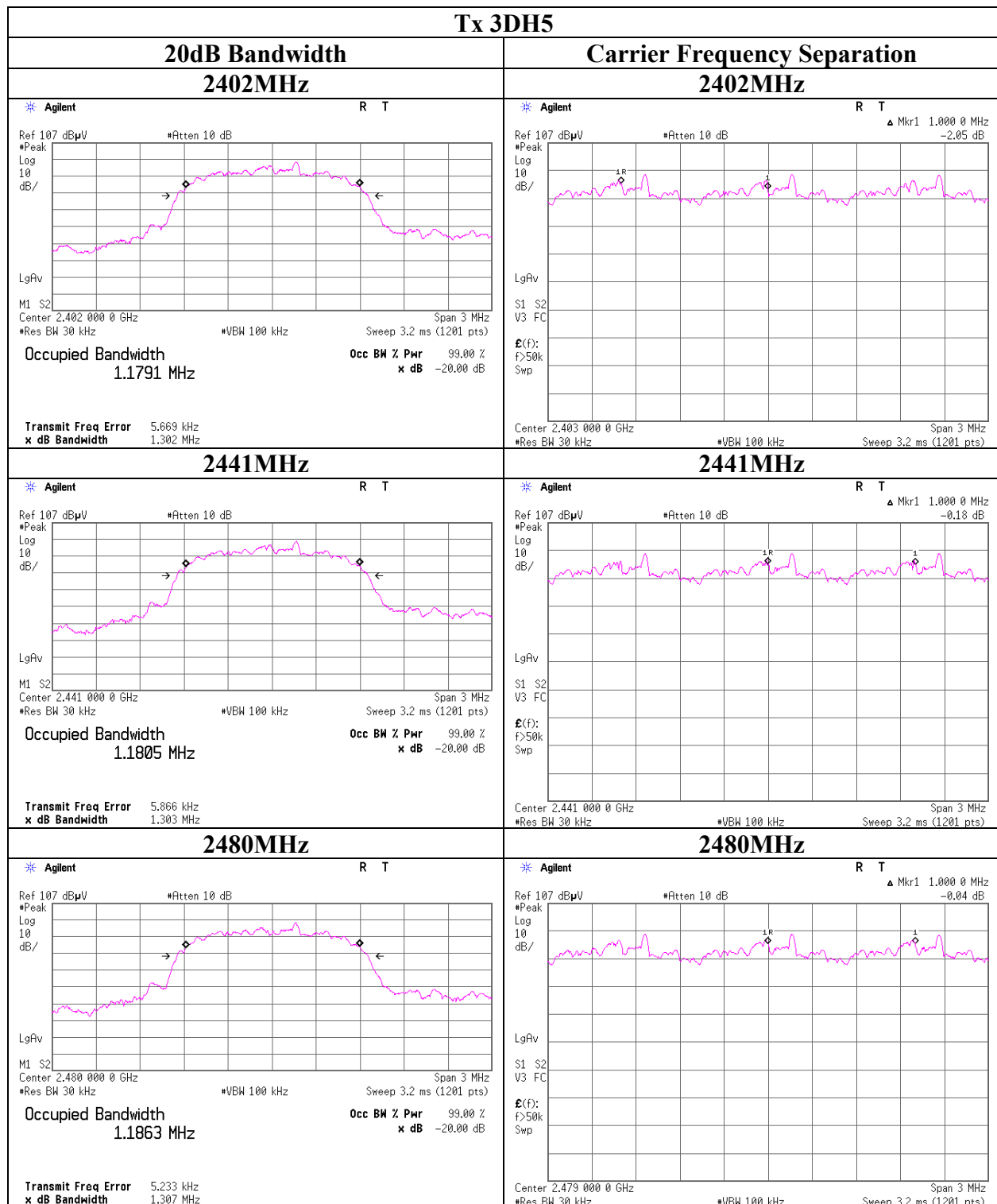
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20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation



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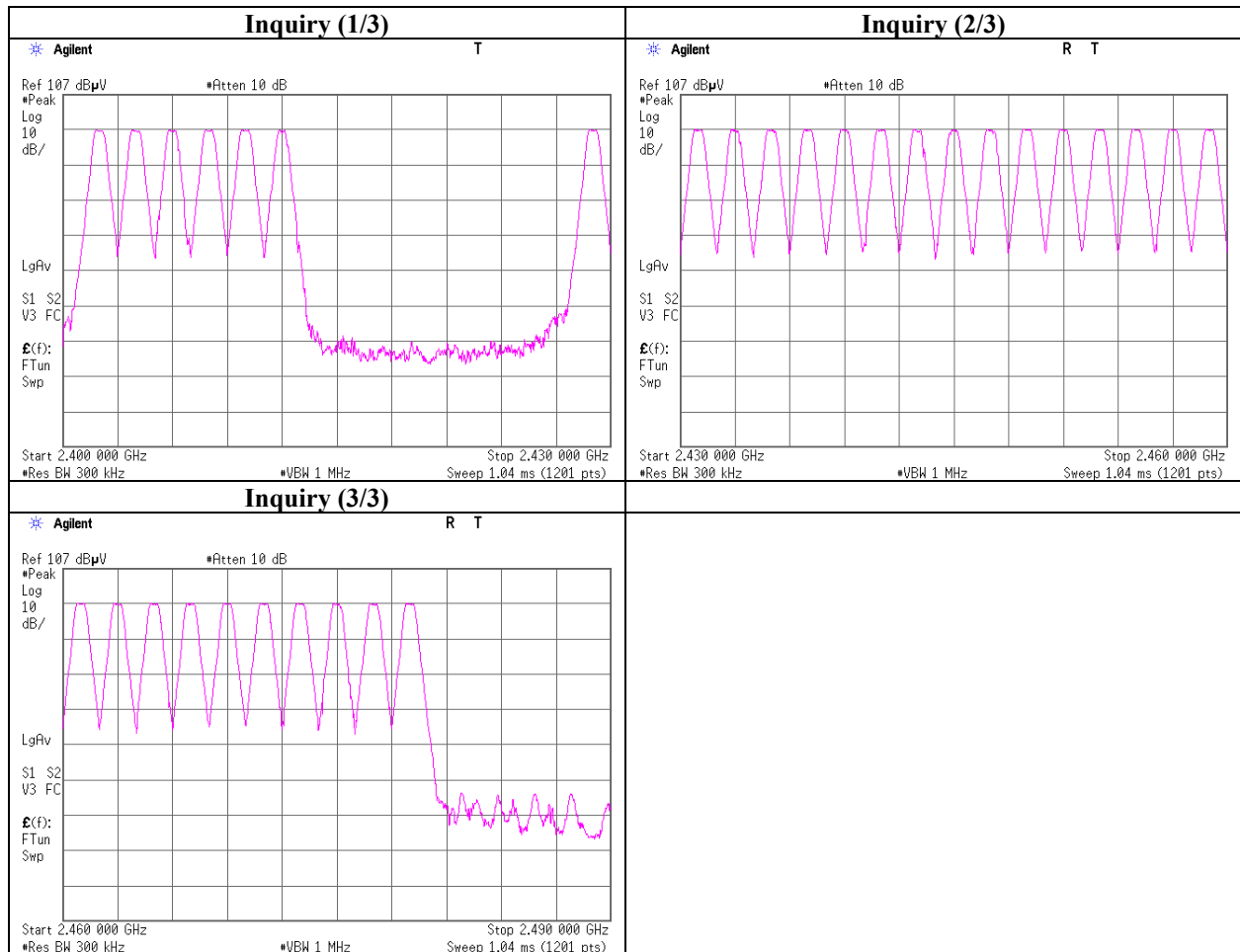
Facsimile : +81 596 24 8124

Number of Hopping Frequency

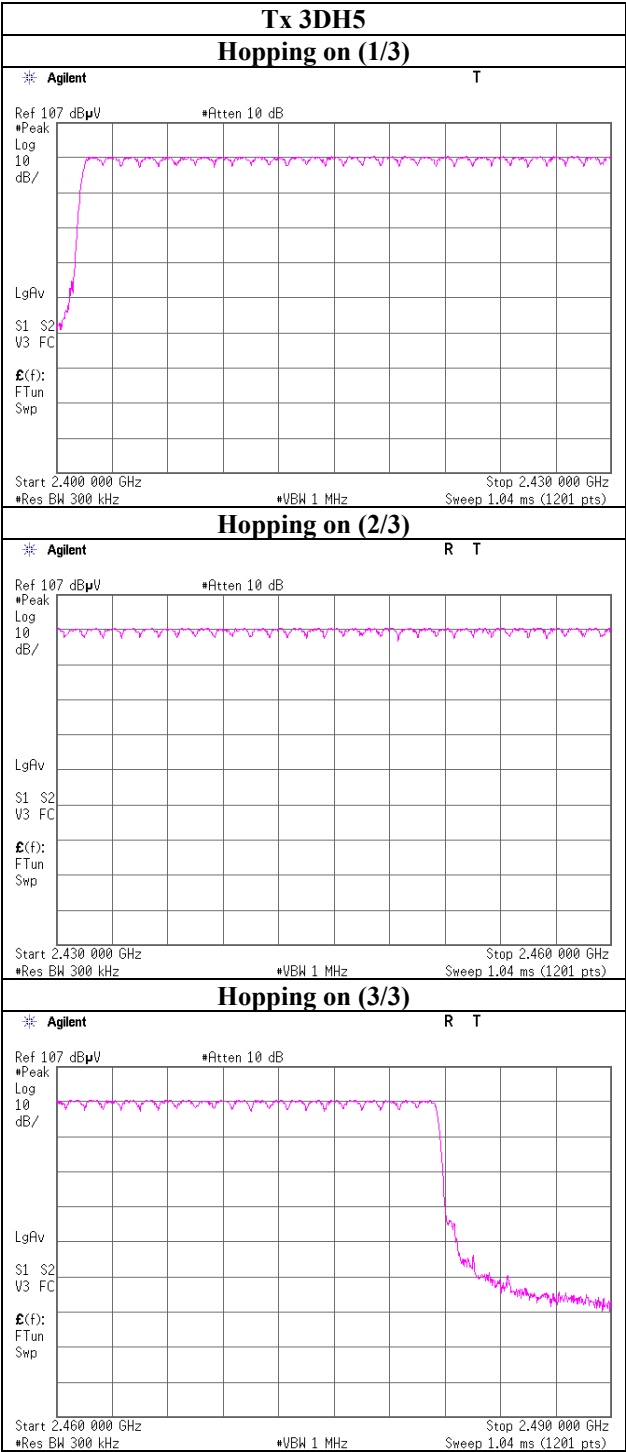
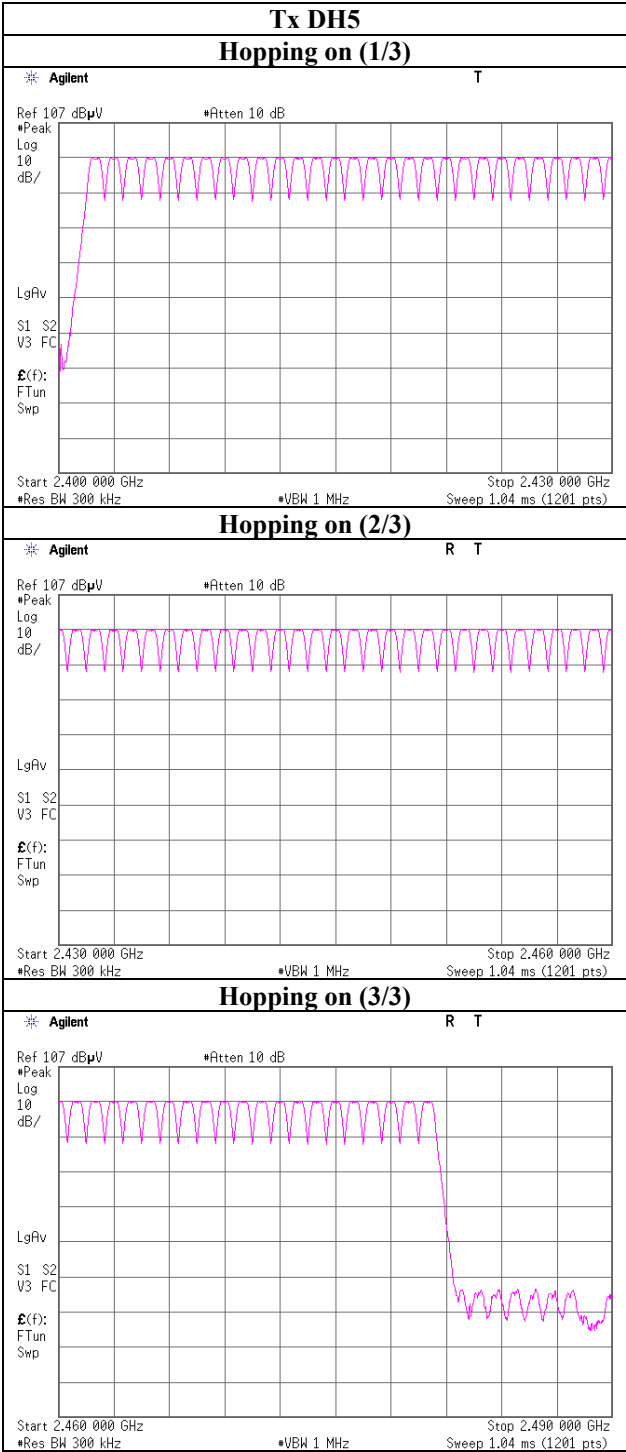
Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10348320H
Date	09/05/2013
Temperature/ Humidity	23 deg. C / 68% RH
Engineer	Takumi Shimada
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

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

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.



Number of Hopping Frequency



Dwell time

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/05/2013
Temperature/ Humidity : 23 deg. C / 68% RH
Engineer : Takumi Shimada
Mode : Tx (Hopping on) DH5/3DH5/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	48.4 times / 5 sec. x 31.6 sec. = 306 times	0.400	123	400
DH3	24.4 times / 5 sec. x 31.6 sec. = 155 times	1.662	258	400
DH5	19.4 times / 5 sec. x 31.6 sec. = 123 times	2.911	358	400
3DH1	48.6 times / 5 sec. x 31.6 sec. = 308 times	0.399	123	400
3DH3	25.2 times / 5 sec. x 31.6 sec. = 160 times	1.662	266	400
3DH5	15.6 times / 5 sec. x 31.6 sec. = 99 times	2.906	288	400
Inquiry	100.0 times / 1 sec. x 12.8 sec. = 1280 times	0.101	130	400

Sample Calculation

Result = Number of transmission x Length of transmission time

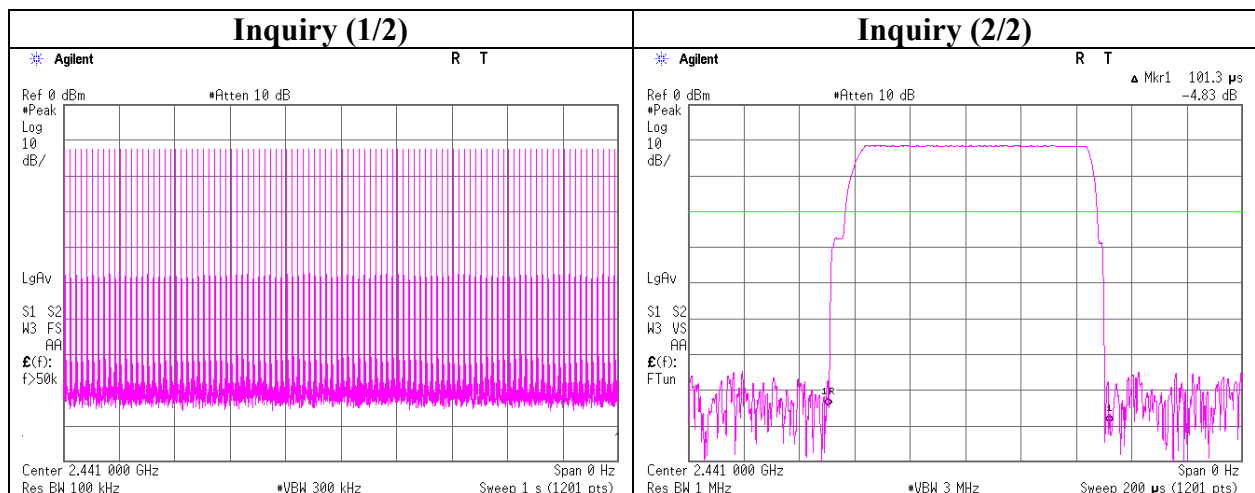
*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	47	49	50	48	48	48.4
DH3	25	24	24	24	25	24.4
DH5	17	23	18	22	17	19.4
3DH1	50	48	48	48	49	48.6
3DH3	22	20	24	31	29	25.2
3DH5	18	13	12	13	22	15.6

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless of packet size. This is confirmed in the test report for $N=79$.



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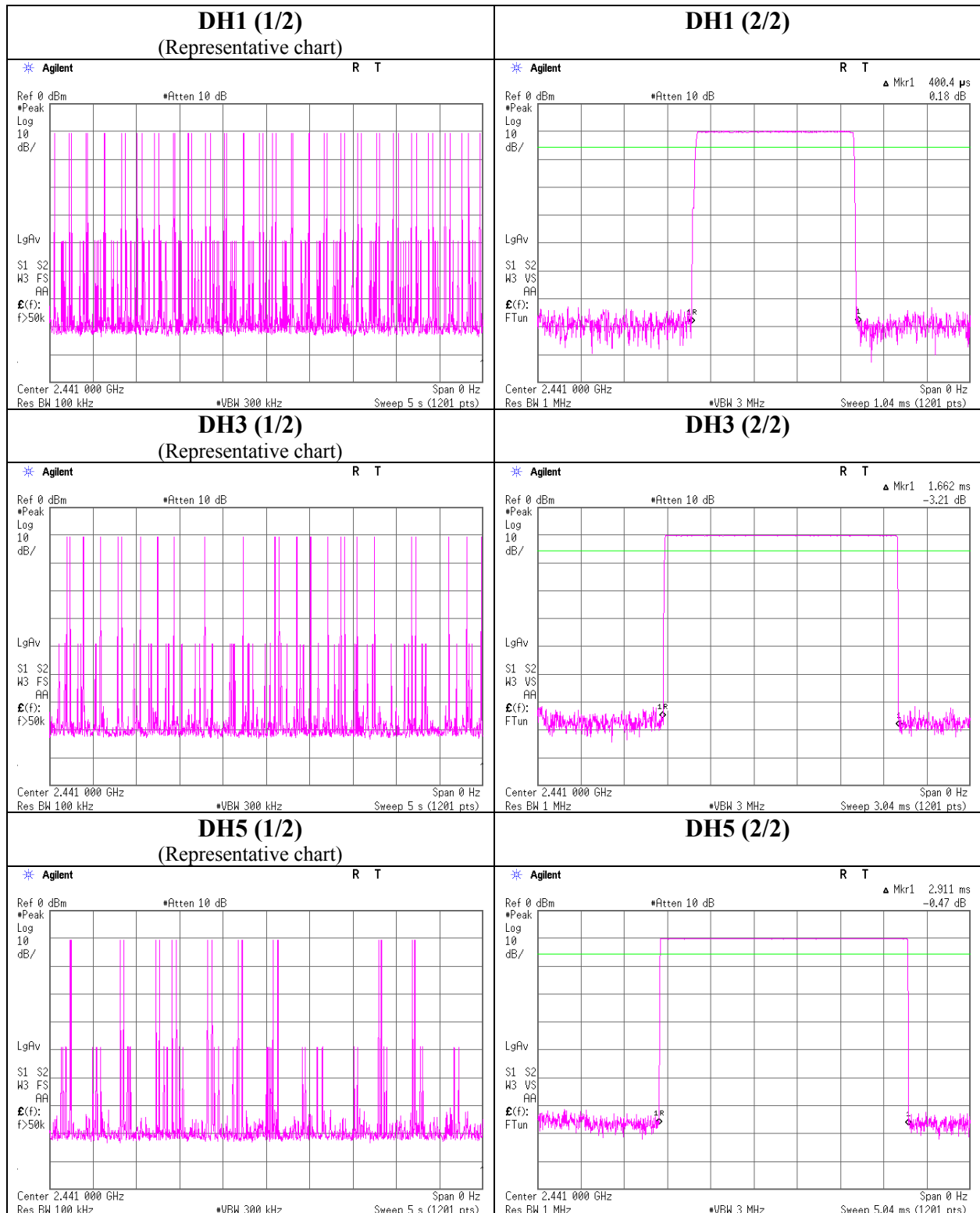
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Dwell time



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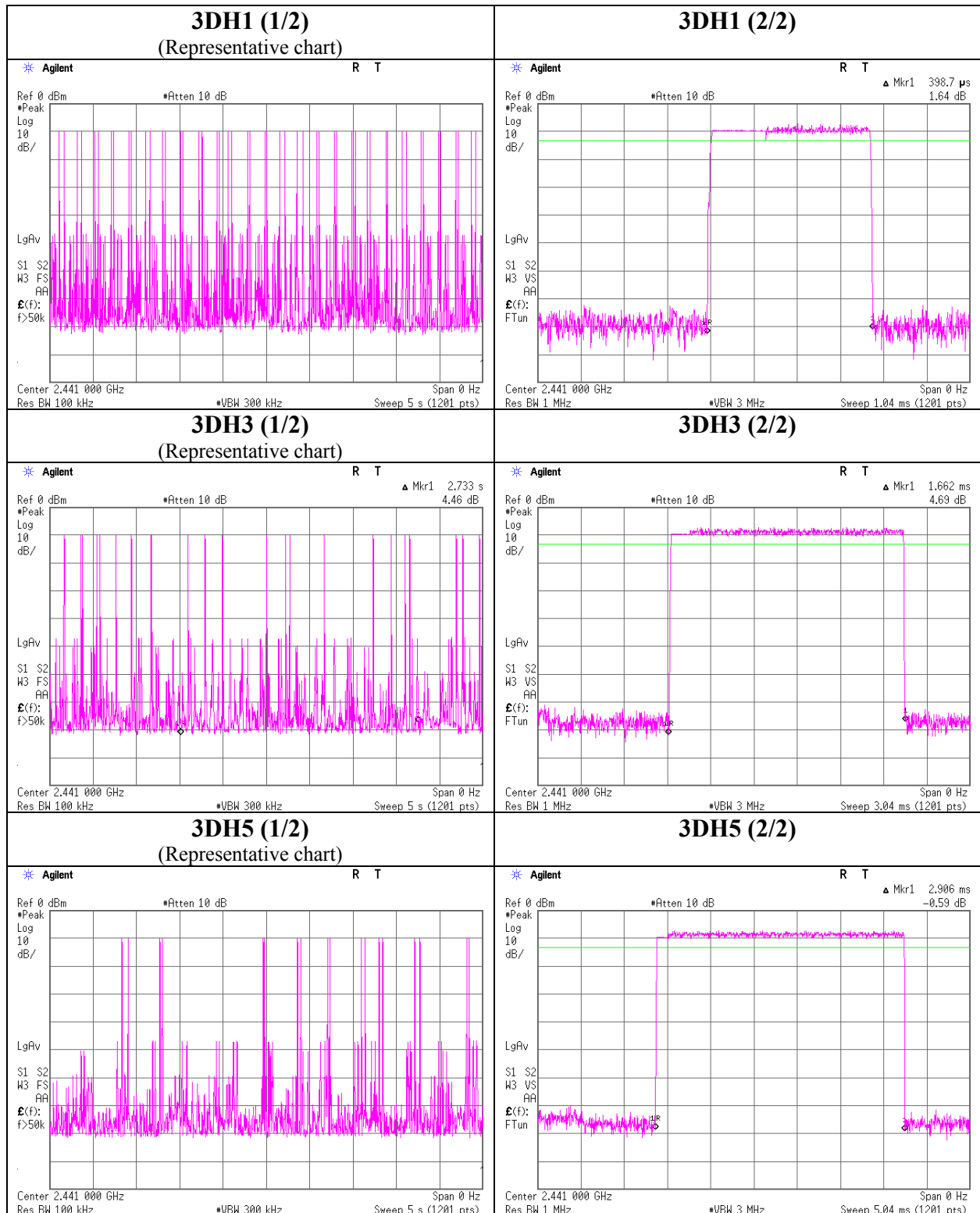
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Dwell time



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Maximum Peak Output Power

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10348320H
Date : 08/29/2013
Temperature/ Humidity : 23 deg.C / 68% RH
Engineer : Takumi Shimada
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	-9.18	0.50	9.97	1.29	1.35	20.96	125	19.67
DH5	2441.0	-8.99	0.50	9.97	1.48	1.41	20.96	125	19.48
DH5	2480.0	-9.01	0.50	9.97	1.46	1.40	20.96	125	19.50
3DH5	2402.0	-6.11	0.50	9.97	4.36	2.73	20.96	125	16.60
3DH5	2441.0	-5.82	0.50	9.97	4.65	2.92	20.96	125	16.31
3DH5	2480.0	-5.78	0.50	9.97	4.69	2.94	20.96	125	16.27
Inquiry	2441.0	-10.40	0.50	9.97	0.07	1.02	20.96	125	20.89

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied)+ Attenuator

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

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Average Output Power
(Reference data for SAR testing)

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 10348320H
Date : 08/29/2013
Temperature/ Humidity : 23 deg.C/ 68% RH
Engineer : Takumi Shimada
Mode : Tx (Hopping off) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
DH5	2402.0	-10.43	0.50	9.97	0.04	1.01
DH5	2441.0	-10.30	0.50	9.97	0.17	1.04
DH5	2480.0	-10.33	0.50	9.97	0.14	1.03
3DH5	2402.0	-10.26	0.50	9.97	0.21	1.05
3DH5	2441.0	-10.06	0.50	9.97	0.41	1.10
3DH5	2480.0	-10.01	0.50	9.97	0.46	1.11
Inquiry	2441.0	-19.15	0.50	9.97	-8.68	0.14

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013
Temperature/ Humidity : 23 deg. C / 69% RH
Engineer : Takumi Shimada
(1-26.5GHz)
Mode : Tx, DH5 2402MHz

20dBc Data Sheet

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	97.9	28.4	3.2	32.4	97.1	-	-	Carrier
Hori	2400.000	PK	37.3	28.4	3.2	32.4	36.5	77.1	40.6	
Vert	2402.000	PK	98.6	28.4	3.2	32.4	97.8	-	-	Carrier
Vert	2400.000	PK	37.8	28.4	3.2	32.4	37.0	77.8	40.8	

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4804.000	AV	29.3	32.2	5.4	31.6	-16.7	18.6	53.9	35.3	
Hori	7206.000	AV	45.3	36.7	6.6	32.7	-16.7	39.2	53.9	14.7	
Hori	9608.000	AV	30.3	38.9	7.3	33.3	-16.7	26.5	53.9	27.4	
Hori	12010.000	AV	37.0	39.9	-1.5	33.4	-16.7	25.3	53.9	28.6	
Vert	4804.000	AV	29.4	32.2	5.4	31.6	-16.7	18.7	53.9	35.2	
Vert	7206.000	AV	43.8	36.7	6.6	32.7	-16.7	37.7	53.9	16.2	
Vert	9608.000	AV	30.4	38.9	7.3	33.3	-16.7	26.6	53.9	27.3	
Vert	12010.000	AV	34.3	39.9	-1.5	33.4	-16.7	22.6	53.9	31.3	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013 09/04/2013
Temperature/ Humidity : 23 deg. C / 69% RH 24 deg. C / 58% RH
Engineer : Takumi Shimada Takumi Shimada
Mode : (1-26.5GHz) (30-1000MHz)
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	31.435	QP	25.4	17.5	7.0	32.2	17.7	40.0	22.3	
Hori	125.000	QP	39.2	13.4	8.3	32.1	28.8	43.5	14.7	
Hori	250.000	QP	35.6	17.3	9.5	32.1	30.3	46.0	15.7	
Hori	296.723	QP	33.3	19.8	9.8	32.0	30.9	46.0	15.1	
Hori	370.893	QP	46.8	16.6	10.4	32.0	41.8	46.0	4.2	
Hori	445.042	QP	38.3	17.7	10.8	32.0	34.8	46.0	11.2	
Hori	500.000	QP	36.7	18.1	11.2	32.0	34.0	46.0	12.0	
Hori	2360.000	PK	48.2	28.2	3.2	32.4	47.2	73.9	26.7	
Hori	2527.000	PK	48.8	28.8	3.3	32.3	48.6	73.9	25.3	
Hori	4882.000	PK	42.7	32.5	5.4	31.6	49.0	73.9	24.9	
Hori	7323.000	PK	51.8	36.6	6.6	32.7	62.3	73.9	11.6	
Hori	9764.000	PK	42.8	38.6	7.3	33.4	55.3	73.9	18.7	
Hori	12205.000	PK	49.5	40.0	-1.4	33.3	54.8	73.9	19.1	
Hori	2360.000	AV	35.1	28.2	3.2	32.4	34.1	53.9	19.8	
Hori	2527.000	AV	35.1	28.8	3.3	32.3	34.9	53.9	19.0	
Vert	31.435	QP	38.3	17.5	7.0	32.2	30.6	40.0	9.4	
Vert	125.000	QP	45.3	13.4	8.3	32.1	34.9	43.5	8.6	
Vert	250.000	QP	37.5	17.3	9.5	32.1	32.2	46.0	13.8	
Vert	296.723	QP	32.1	19.8	9.8	32.0	29.7	46.0	16.3	
Vert	370.893	QP	41.4	16.6	10.4	32.0	36.4	46.0	9.6	
Vert	445.042	QP	32.2	17.7	10.8	32.0	28.7	46.0	17.3	
Vert	500.000	QP	31.0	18.1	11.2	32.0	28.3	46.0	17.7	
Vert	2360.000	PK	49.8	28.2	3.2	32.4	48.8	73.9	25.1	
Vert	2527.000	PK	48.7	28.8	3.3	32.3	48.5	73.9	25.5	
Vert	4882.000	PK	41.7	32.5	5.4	31.6	48.0	73.9	25.9	
Vert	7323.000	PK	56.6	36.6	6.6	32.7	67.1	73.9	6.8	
Vert	9764.000	PK	44.7	38.6	7.3	33.4	57.2	73.9	16.7	
Vert	12205.000	PK	50.1	40.0	-1.4	33.3	55.4	73.9	18.5	
Vert	2360.000	AV	36.1	28.2	3.2	32.4	35.1	53.9	18.8	
Vert	2527.000	AV	35.7	28.8	3.3	32.3	35.5	53.9	18.4	

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4882.000	AV	30.7	32.5	5.4	31.6	-16.7	20.3	53.9	33.6	
Hori	7323.000	AV	44.6	36.6	6.6	32.7	-16.7	38.4	53.9	15.5	
Hori	9764.000	AV	30.4	38.6	7.3	33.4	-16.7	26.2	53.9	27.7	
Hori	12205.000	AV	37.4	40.0	-1.4	33.3	-16.7	26.0	53.9	27.9	
Vert	4882.000	AV	30.0	32.5	5.4	31.6	-16.7	19.6	53.9	34.3	
Vert	7323.000	AV	50.1	36.6	6.6	32.7	-16.7	43.9	53.9	10.0	
Vert	9764.000	AV	30.3	38.6	7.3	33.4	-16.7	26.1	53.9	27.8	
Vert	12205.000	AV	38.8	40.0	-1.4	33.3	-16.7	27.4	53.9	26.5	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013 09/04/2013
Temperature/ Humidity : 23 deg. C / 69% RH 24 deg. C / 58% RH
Engineer : Takumi Shimada Takumi Shimada
(1-26.5GHz) (30-1000MHz)
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	31.434	QP	25.6	17.5	7.0	32.2	17.9	40.0	22.1	
Hori	125.000	QP	39.3	13.4	8.3	32.1	28.9	43.5	14.6	
Hori	250.000	QP	35.4	17.3	9.5	32.1	30.1	46.0	15.9	
Hori	296.725	QP	33.0	19.8	9.8	32.0	30.6	46.0	15.4	
Hori	370.892	QP	46.5	16.6	10.4	32.0	41.5	46.0	4.5	
Hori	445.041	QP	38.1	17.7	10.8	32.0	34.6	46.0	11.4	
Hori	500.000	QP	36.9	18.1	11.2	32.0	34.2	46.0	11.8	
Hori	2393.000	PK	48.8	28.3	3.2	32.4	47.9	73.9	26.0	
Hori	2483.500	PK	44.3	28.7	3.3	32.4	43.9	73.9	30.0	
Hori	2567.000	PK	48.3	28.8	3.3	32.3	48.1	73.9	25.8	
Hori	4960.000	PK	43.7	32.7	5.5	31.6	50.3	73.9	23.6	
Hori	7440.000	PK	51.9	36.5	6.7	32.8	62.3	73.9	11.6	
Hori	9920.000	PK	42.9	38.3	7.4	33.5	55.1	73.9	18.9	
Hori	12400.000	PK	49.0	40.1	-1.3	33.2	54.6	73.9	19.3	
Hori	2393.000	AV	35.5	28.3	3.2	32.4	34.6	53.9	19.3	
Hori	2483.500	AV	32.7	28.7	3.3	32.4	32.3	53.9	21.6	
Hori	2567.000	AV	34.2	28.8	3.3	32.3	34.0	53.9	19.9	
Vert	31.434	QP	38.4	17.5	7.0	32.2	30.7	40.0	9.3	
Vert	125.000	QP	45.1	13.4	8.3	32.1	34.7	43.5	8.8	
Vert	250.000	QP	37.1	17.3	9.5	32.1	31.8	46.0	14.2	
Vert	296.725	QP	31.9	19.8	9.8	32.0	29.5	46.0	16.5	
Vert	370.892	QP	41.6	16.6	10.4	32.0	36.6	46.0	9.4	
Vert	445.041	QP	32.5	17.7	10.8	32.0	29.0	46.0	17.0	
Vert	500.000	QP	30.8	18.1	11.2	32.0	28.1	46.0	17.9	
Vert	2393.000	PK	49.3	28.3	3.2	32.4	48.4	73.9	25.5	
Vert	2483.500	PK	45.5	28.7	3.3	32.4	45.1	73.9	28.8	
Vert	2567.000	PK	47.3	28.8	3.3	32.3	47.1	73.9	26.8	
Vert	4960.000	PK	42.9	32.7	5.5	31.6	49.5	73.9	24.4	
Vert	7440.000	PK	55.6	36.5	6.7	32.8	66.0	73.9	7.9	
Vert	9920.000	PK	43.2	38.3	7.4	33.5	55.4	73.9	18.5	
Vert	12400.000	PK	52.8	40.1	-1.3	33.2	58.4	73.9	15.5	
Vert	2393.000	AV	35.2	28.3	3.2	32.4	34.3	53.9	19.6	
Vert	2483.500	AV	32.3	28.7	3.3	32.4	31.9	53.9	22.0	
Vert	2567.000	AV	33.9	28.8	3.3	32.3	33.7	53.9	20.2	

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).

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

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

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4960.000	AV	32.0	32.7	5.5	31.6	-16.7	21.9	53.9	32.0	
Hori	7440.000	AV	45.0	36.5	6.7	32.8	-16.7	38.7	53.9	15.2	
Hori	9920.000	AV	30.7	38.3	7.4	33.5	-16.7	26.2	53.9	27.7	
Hori	12400.000	AV	38.2	40.1	-1.3	33.2	-16.7	27.1	53.9	26.8	
Vert	4960.000	AV	31.3	32.7	5.5	31.6	-16.7	21.2	53.9	32.7	
Vert	7440.000	AV	49.3	36.5	6.7	32.8	-16.7	43.0	53.9	10.9	
Vert	9920.000	AV	31.3	38.3	7.4	33.5	-16.7	26.8	53.9	27.1	
Vert	12400.000	AV	41.1	40.1	-1.3	33.2	-16.7	30.0	53.9	23.9	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*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

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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Telephone : +81 596 24 8999

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013 09/04/2013
Temperature/ Humidity : 23 deg. C / 69% RH 24 deg. C / 58% RH
Engineer : Takumi Shimada Takumi Shimada
(1-26.5GHz) (30-1000MHz)
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	31.435	QP	25.4	17.5	7.0	32.2	17.7	40.0	22.3	
Hori	125.000	QP	39.2	13.4	8.3	32.1	28.8	43.5	14.7	
Hori	250.000	QP	35.3	17.3	9.5	32.1	30.0	46.0	16.0	
Hori	296.725	QP	33.1	19.8	9.8	32.0	30.7	46.0	15.3	
Hori	370.892	QP	46.3	16.6	10.4	32.0	41.3	46.0	4.7	
Hori	445.041	QP	38.0	17.7	10.8	32.0	34.5	46.0	11.5	
Hori	500.000	QP	37.0	18.1	11.2	32.0	34.3	46.0	11.7	
Hori	2323.000	PK	45.8	28.1	3.2	32.5	44.6	73.9	29.4	
Hori	2390.000	PK	47.0	28.3	3.2	32.4	46.1	73.9	27.8	
Hori	2484.000	PK	43.2	28.7	3.3	32.4	42.8	73.9	31.1	
Hori	4804.000	PK	43.5	32.2	5.4	31.6	49.5	73.9	24.4	
Hori	7206.000	PK	54.2	36.7	6.6	32.7	64.8	73.9	9.1	
Hori	9608.000	PK	48.7	38.9	7.3	33.3	61.6	73.9	12.3	
Hori	12010.000	PK	53.2	39.9	-1.5	33.4	58.2	73.9	15.7	
Hori	2323.000	AV	30.7	28.1	3.2	32.5	29.5	53.9	24.4	
Hori	2390.000	AV	31.0	28.3	3.2	32.4	30.1	53.9	23.8	
Hori	2484.000	AV	30.2	28.7	3.3	32.4	29.8	53.9	24.1	
Vert	31.435	QP	38.6	17.5	7.0	32.2	30.9	40.0	9.1	
Vert	125.000	QP	44.9	13.4	8.3	32.1	34.5	43.5	9.0	
Vert	250.000	QP	37.3	17.3	9.5	32.1	32.0	46.0	14.0	
Vert	296.725	QP	32.2	19.8	9.8	32.0	29.8	46.0	16.2	
Vert	370.892	QP	41.6	16.6	10.4	32.0	36.6	46.0	9.4	
Vert	445.041	QP	32.3	17.7	10.8	32.0	28.8	46.0	17.2	
Vert	500.000	QP	30.7	18.1	11.2	32.0	28.0	46.0	18.0	
Vert	2323.000	PK	42.3	28.1	3.2	32.5	41.1	73.9	32.8	
Vert	2390.000	PK	46.1	28.3	3.2	32.4	45.2	73.9	28.7	
Vert	2484.000	PK	43.7	28.7	3.3	32.4	43.3	73.9	30.6	
Vert	4804.000	PK	42.4	32.2	5.4	31.6	48.4	73.9	25.5	
Vert	7206.000	PK	58.4	36.7	6.6	32.7	69.0	73.9	4.9	
Vert	9608.000	PK	52.6	38.9	7.3	33.3	65.5	73.9	8.4	
Vert	12010.000	PK	51.8	39.9	-1.5	33.4	56.8	73.9	17.1	
Vert	2323.000	AV	30.4	28.1	3.2	32.5	29.2	53.9	24.7	
Vert	2390.000	AV	30.6	28.3	3.2	32.4	29.7	53.9	24.2	
Vert	2484.000	AV	30.3	28.7	3.3	32.4	29.9	53.9	24.0	

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
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013
Temperature/ Humidity : 23 deg. C / 69% RH
Engineer : Takumi Shimada
(1-26.5GHz)
Mode : Tx, 3DH5 2402MHz

20dBc Data Sheet

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	98.8	28.4	3.2	32.4	98.0	-	-	Carrier
Hori	2400.000	PK	46.4	28.4	3.2	32.4	45.6	78.0	32.4	
Vert	2402.000	PK	96.8	28.4	3.2	32.4	96.0	-	-	Carrier
Vert	2400.000	PK	44.8	28.4	3.2	32.4	44.0	76.0	32.0	

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4804.000	AV	31.0	32.2	5.4	31.6	-16.8	20.3	53.9	33.7	
Hori	7206.000	AV	46.1	36.7	6.6	32.7	-16.8	40.0	53.9	14.0	
Hori	9608.000	AV	38.5	38.9	7.3	33.3	-16.8	34.7	53.9	19.3	
Hori	12010.000	AV	42.2	39.9	-1.5	33.4	-16.8	30.5	53.9	23.5	
Vert	4804.000	AV	31.2	32.2	5.4	31.6	-16.8	20.5	53.9	33.5	
Vert	7206.000	AV	50.1	36.7	6.6	32.7	-16.8	44.0	53.9	10.0	
Vert	9608.000	AV	42.4	38.9	7.3	33.3	-16.8	38.6	53.9	15.4	
Vert	12010.000	AV	40.7	39.9	-1.5	33.4	-16.8	29.0	53.9	25.0	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013 09/04/2013
Temperature/ Humidity : 23 deg. C / 69% RH 24 deg. C / 58% RH
Engineer : Takumi Shimada Takumi Shimada
(1-26.5GHz) (30-1000MHz)
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	31.433	QP	25.5	17.5	7.0	32.2	17.8	40.0	22.2	
Hori	125.000	QP	39.4	13.4	8.3	32.1	29.0	43.5	14.5	
Hori	250.000	QP	35.1	17.3	9.5	32.1	29.8	46.0	16.2	
Hori	296.723	QP	33.3	19.8	9.8	32.0	30.9	46.0	15.1	
Hori	370.891	QP	46.4	16.6	10.4	32.0	41.4	46.0	4.6	
Hori	445.042	QP	37.9	17.7	10.8	32.0	34.4	46.0	11.6	
Hori	500.000	QP	37.1	18.1	11.2	32.0	34.4	46.0	11.6	
Hori	2360.000	PK	44.8	28.2	3.2	32.4	43.8	73.9	30.1	
Hori	2523.000	PK	47.0	28.7	3.3	32.3	46.7	73.9	27.2	
Hori	4882.000	PK	44.0	32.5	5.4	31.6	50.3	73.9	23.6	
Hori	7323.000	PK	54.6	36.6	6.6	32.7	65.1	73.9	8.8	
Hori	9764.000	PK	45.1	38.6	7.3	33.4	57.6	73.9	16.3	
Hori	12205.000	PK	52.7	40.0	-1.4	33.3	58.0	73.9	15.9	
Hori	2360.000	AV	30.9	28.2	3.2	32.4	29.9	53.9	24.0	
Hori	2523.000	AV	30.6	28.7	3.3	32.3	30.3	53.9	23.6	
Vert	31.433	QP	38.4	17.5	7.0	32.2	30.7	40.0	9.3	
Vert	125.000	QP	45.2	13.4	8.3	32.1	34.8	43.5	8.7	
Vert	250.000	QP	37.6	17.3	9.5	32.1	32.3	46.0	13.7	
Vert	296.723	QP	32.1	19.8	9.8	32.0	29.7	46.0	16.3	
Vert	370.891	QP	41.4	16.6	10.4	32.0	36.4	46.0	9.6	
Vert	445.042	QP	32.2	17.7	10.8	32.0	28.7	46.0	17.3	
Vert	500.000	QP	30.7	18.1	11.2	32.0	28.0	46.0	18.0	
Vert	2360.000	PK	44.7	28.2	3.2	32.4	43.7	73.9	30.2	
Vert	2523.000	PK	46.1	28.7	3.3	32.3	45.8	73.9	28.1	
Vert	4882.000	PK	43.5	32.5	5.4	31.6	49.8	73.9	24.1	
Vert	7323.000	PK	59.2	36.6	6.6	32.7	69.7	73.9	4.2	
Vert	9764.000	PK	48.9	38.6	7.3	33.4	61.4	73.9	12.5	
Vert	12205.000	PK	53.8	40.0	-1.4	33.3	59.1	73.9	14.8	
Vert	2360.000	AV	30.5	28.2	3.2	32.4	29.5	53.9	24.5	
Vert	2523.000	AV	30.5	28.7	3.3	32.3	30.2	53.9	23.7	

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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4882.000	AV	32.4	32.5	5.4	31.6	-16.8	22.0	53.9	32.0	
Hori	7323.000	AV	45.6	36.6	6.6	32.7	-16.8	39.4	53.9	14.6	
Hori	9764.000	AV	33.3	38.6	7.3	33.4	-16.8	29.1	53.9	24.9	
Hori	12205.000	AV	42.0	40.0	-1.4	33.3	-16.8	30.6	53.9	23.4	
Vert	4882.000	AV	31.8	32.5	5.4	31.6	-16.8	21.4	53.9	32.6	
Vert	7323.000	AV	50.5	36.6	6.6	32.7	-16.8	44.3	53.9	9.7	
Vert	9764.000	AV	38.1	38.6	7.3	33.4	-16.8	33.9	53.9	20.1	
Vert	12205.000	AV	42.9	40.0	-1.4	33.3	-16.8	31.5	53.9	22.5	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 and 4 Semi Anechoic Chamber
Report No. : 10348320H
Date : 09/03/2013 09/04/2013
Temperature/ Humidity : 23 deg. C / 69% RH 24 deg. C / 58% RH
Engineer : Takumi Shimada Takumi Shimada
(1-26.5GHz) (30-1000MHz)
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	31.432	QP	25.2	17.5	7.0	32.2	17.5	40.0	22.5	
Hori	125.000	QP	39.2	13.4	8.3	32.1	28.8	43.5	14.7	
Hori	250.000	QP	35.3	17.3	9.5	32.1	30.0	46.0	16.0	
Hori	296.724	QP	33.4	19.8	9.8	32.0	31.0	46.0	15.0	
Hori	370.893	QP	46.2	16.6	10.4	32.0	41.2	46.0	4.8	
Hori	445.041	QP	38.0	17.7	10.8	32.0	34.5	46.0	11.5	
Hori	500.000	QP	37.4	18.1	11.2	32.0	34.7	46.0	11.3	
Hori	2393.000	PK	46.0	28.3	3.2	32.4	45.1	73.9	28.8	
Hori	2483.500	PK	54.1	28.7	3.3	32.4	53.7	73.9	20.2	
Hori	2567.000	PK	46.2	28.8	3.3	32.3	46.0	73.9	27.9	
Hori	4960.000	PK	44.4	32.7	5.5	31.6	51.0	73.9	22.9	
Hori	7440.000	PK	53.3	36.5	6.7	32.8	63.7	73.9	10.2	
Hori	9920.000	PK	43.2	38.3	7.4	33.5	55.4	73.9	18.6	
Hori	12400.000	PK	52.6	40.1	-1.3	33.2	58.2	73.9	15.7	
Hori	2393.000	AV	30.5	28.3	3.2	32.4	29.6	53.9	24.3	
Hori	2483.500	AV	36.0	28.7	3.3	32.4	35.6	53.9	18.3	
Hori	2567.000	AV	30.5	28.8	3.3	32.3	30.3	53.9	23.6	
Vert	31.432	QP	38.3	17.5	7.0	32.2	30.6	40.0	9.4	
Vert	125.000	QP	45.1	13.4	8.3	32.1	34.7	43.5	8.8	
Vert	250.000	QP	37.4	17.3	9.5	32.1	32.1	46.0	13.9	
Vert	296.724	QP	32.3	19.8	9.8	32.0	29.9	46.0	16.1	
Vert	370.893	QP	41.5	16.6	10.4	32.0	36.5	46.0	9.5	
Vert	445.041	QP	32.5	17.7	10.8	32.0	29.0	46.0	17.0	
Vert	500.000	QP	30.4	18.1	11.2	32.0	27.7	46.0	18.3	
Vert	2393.000	PK	47.4	28.3	3.2	32.4	46.5	73.9	27.5	
Vert	2483.500	PK	54.7	28.7	3.3	32.4	54.3	73.9	19.7	
Vert	2567.000	PK	45.4	28.8	3.3	32.3	45.2	73.9	28.7	
Vert	4960.000	PK	43.1	32.7	5.5	31.6	49.7	73.9	24.2	
Vert	7440.000	PK	58.6	36.5	6.7	32.8	69.0	73.9	5.0	
Vert	9920.000	PK	45.4	38.3	7.4	33.5	57.6	73.9	16.3	
Vert	12400.000	PK	55.2	40.1	-1.3	33.2	60.8	73.9	13.1	
Vert	2393.000	AV	30.9	28.3	3.2	32.4	30.0	53.9	23.9	
Vert	2483.500	AV	36.5	28.7	3.3	32.4	36.1	53.9	17.8	
Vert	2567.000	AV	30.5	28.8	3.3	32.3	30.3	53.9	23.6	

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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4960.000	AV	34.4	32.7	5.5	31.6	-16.8	24.3	53.9	29.7	
Hori	7440.000	AV	44.5	36.5	6.7	32.8	-16.8	38.2	53.9	15.8	
Hori	9920.000	AV	31.4	38.3	7.4	33.5	-16.8	26.9	53.9	27.1	
Hori	12400.000	AV	42.1	40.1	-1.3	33.2	-16.8	31.0	53.9	23.0	
Vert	4960.000	AV	32.2	32.7	5.5	31.6	-16.8	22.1	53.9	31.9	
Vert	7440.000	AV	50.0	36.5	6.7	32.8	-16.8	43.7	53.9	10.3	
Vert	9920.000	AV	34.2	38.3	7.4	33.5	-16.8	29.7	53.9	24.3	
Vert	12400.000	AV	44.5	40.1	-1.3	33.2	-16.8	33.4	53.9	20.6	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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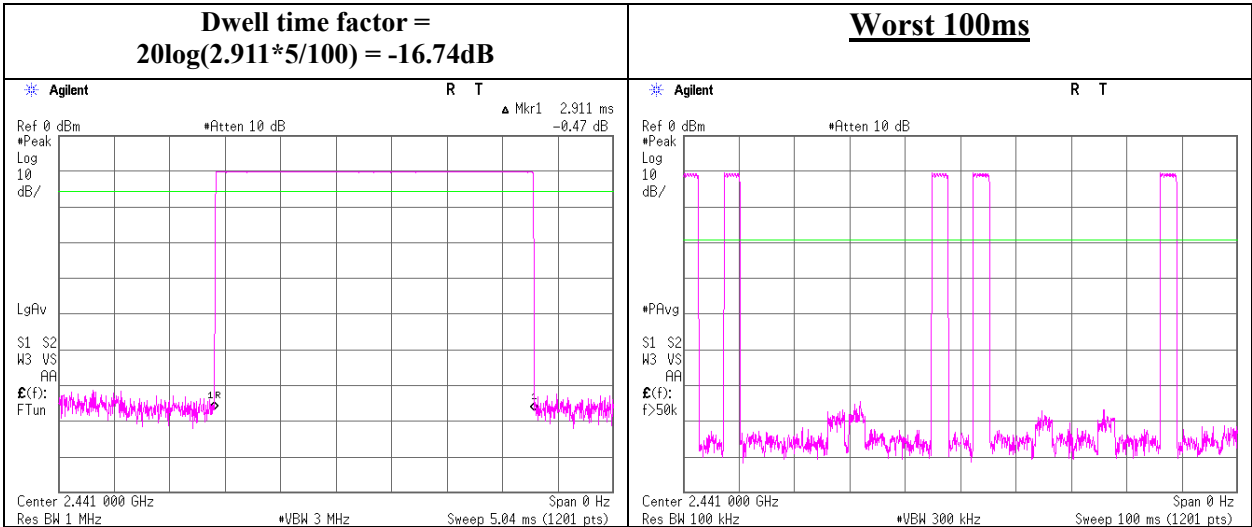
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

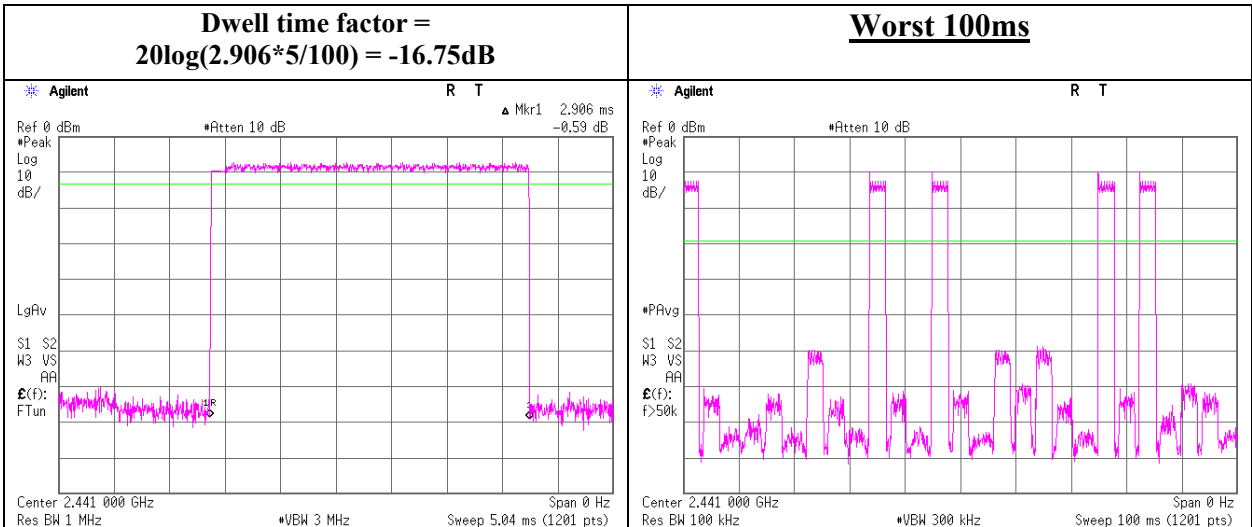
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Dwell time factor

DH5

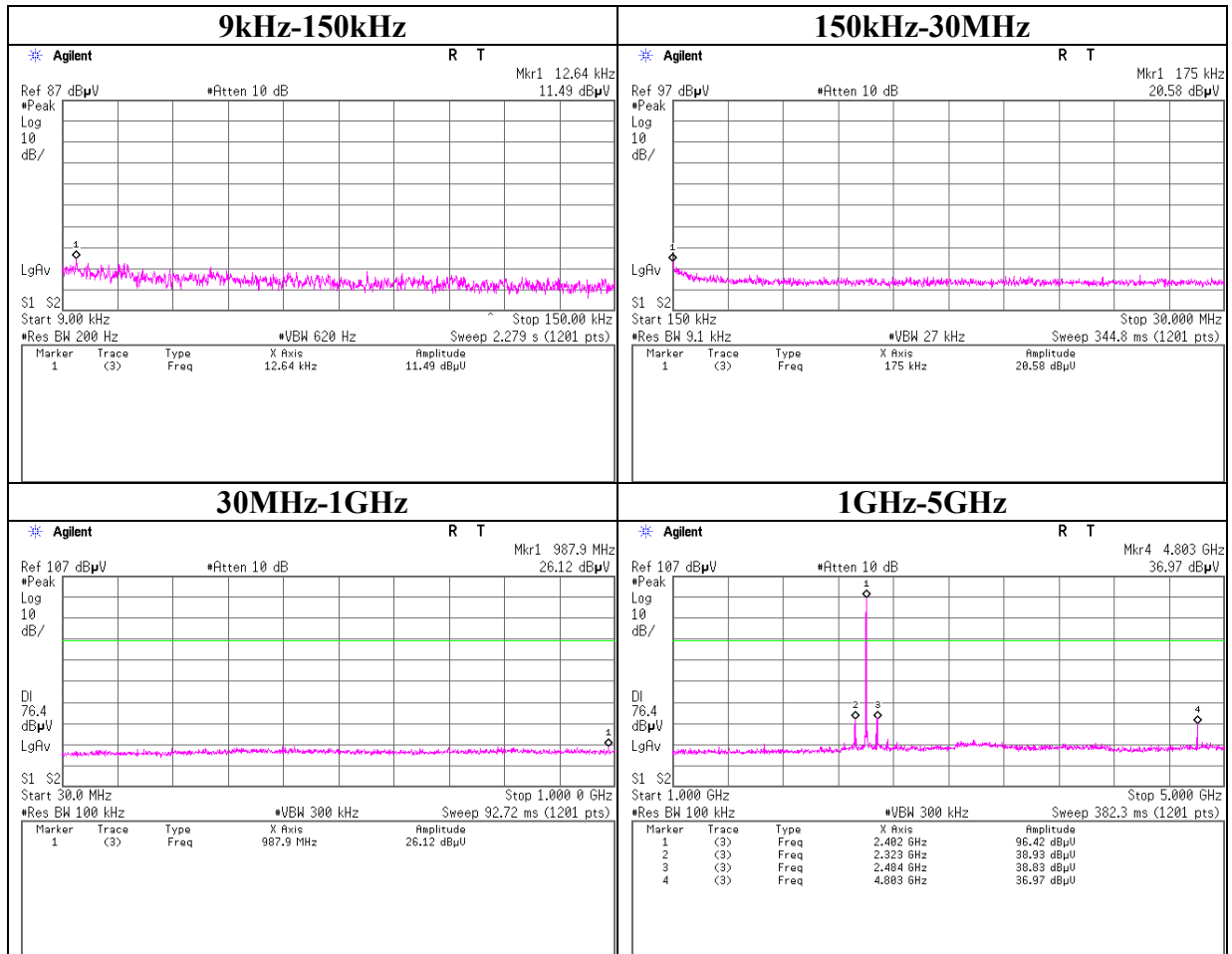


3DH5



Conducted Spurious Emission

Tx DH5 2402MHz



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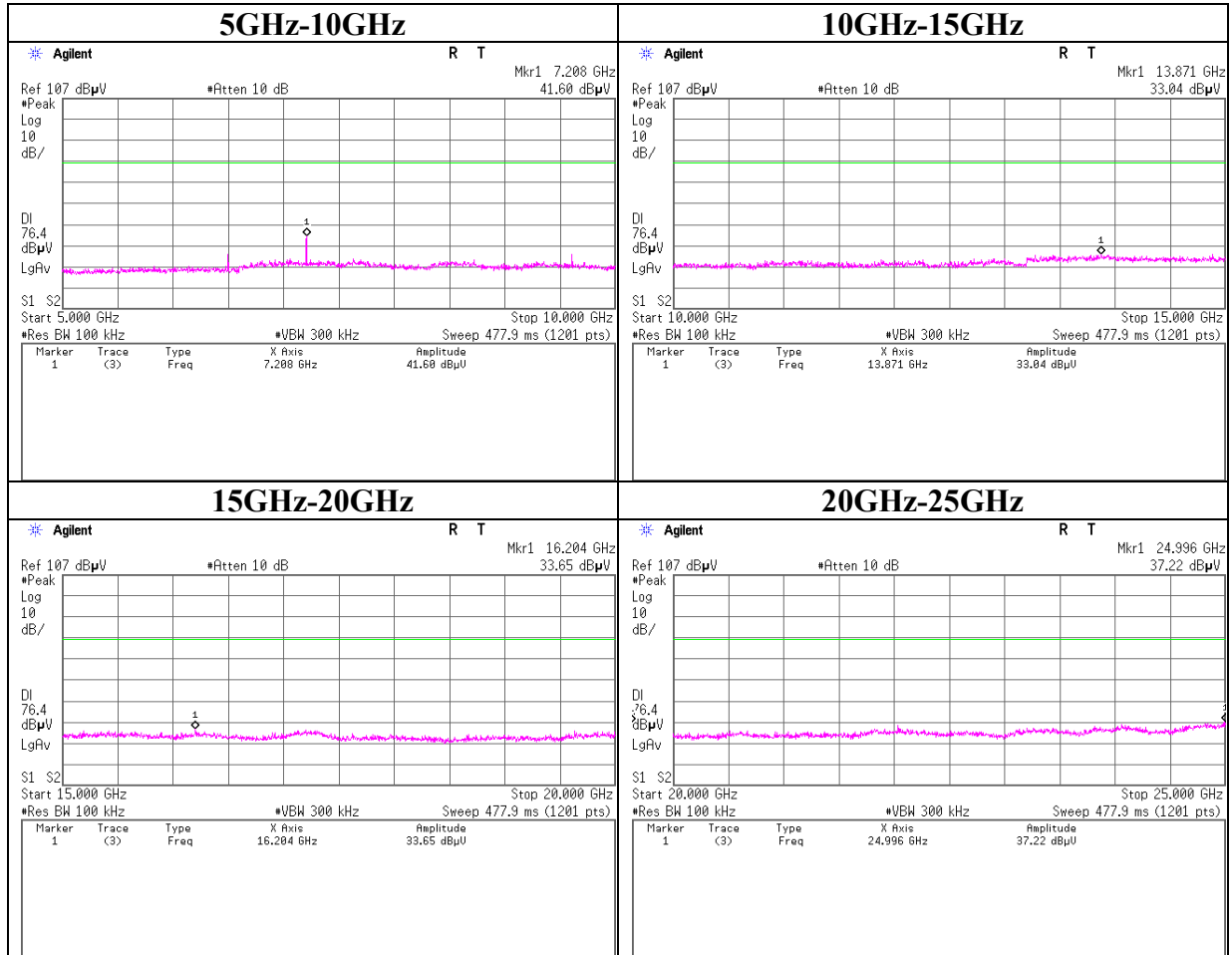
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Facsimile : +81 596 24 8124

Conducted Spurious Emission

Tx DH5 2402MHz



UL Japan, Inc.

Ise EMC Lab.

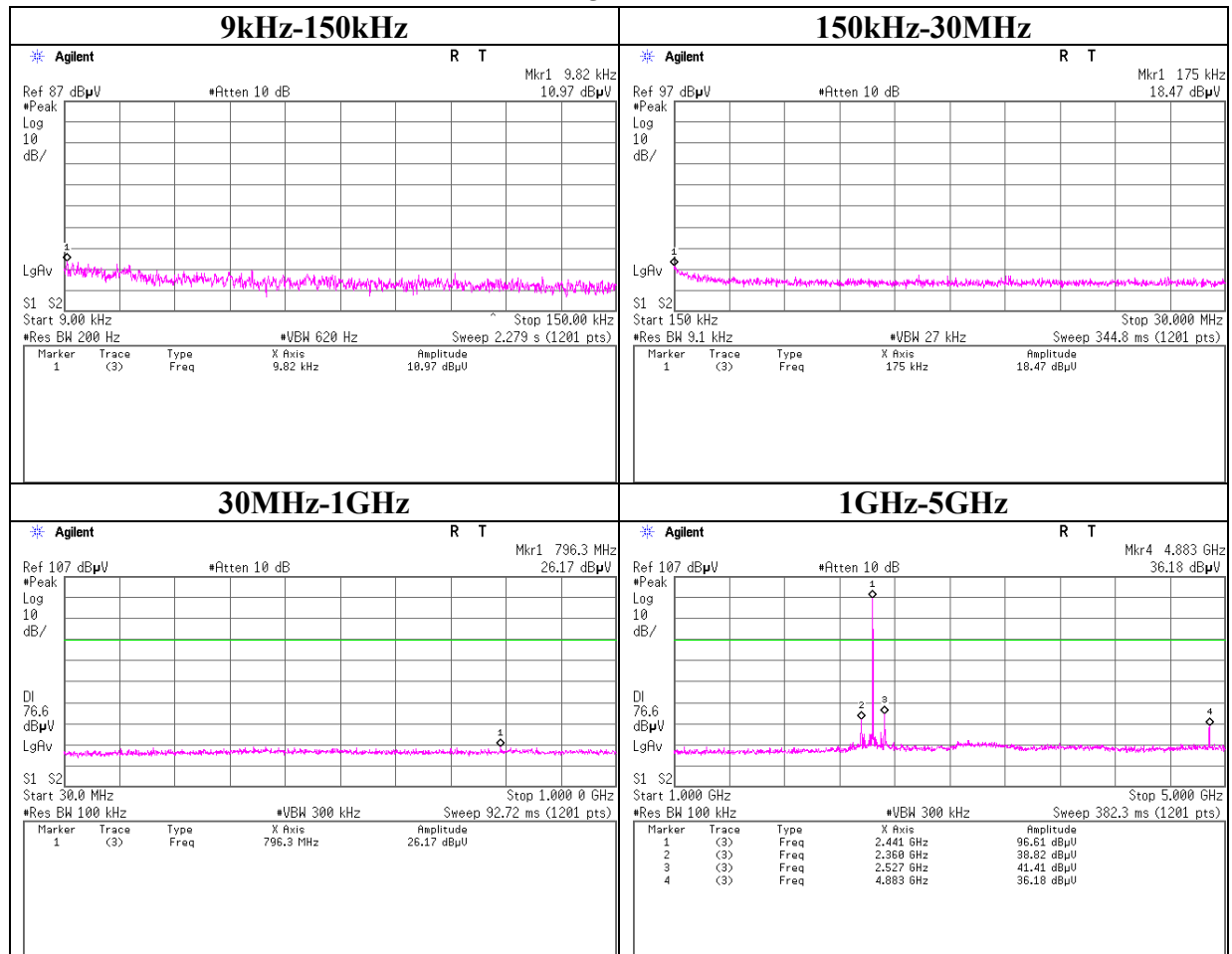
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Facsimile : +81 596 24 8124

Conducted Spurious Emission

Tx DH5 2441MHz



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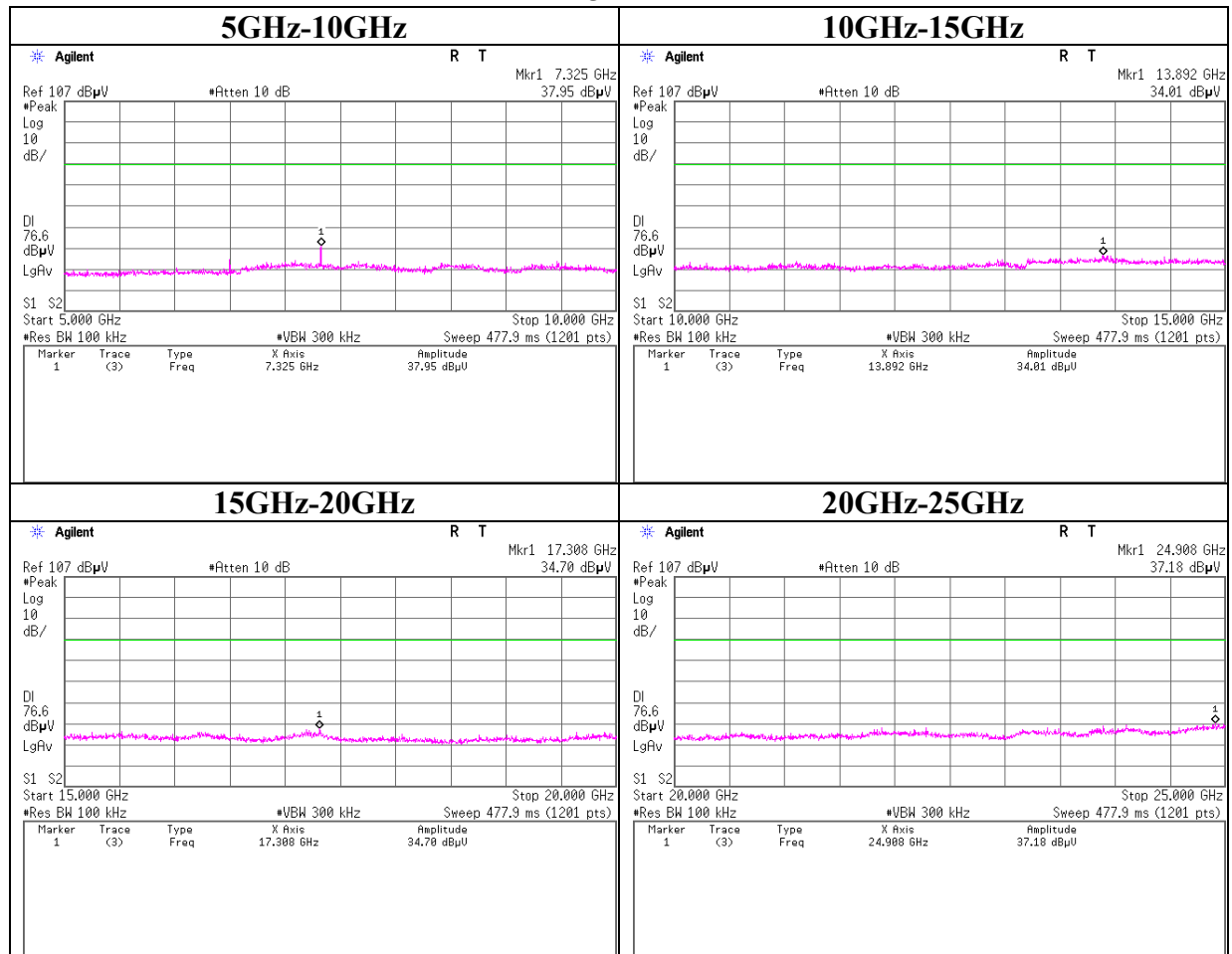
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Tx DH5 2441MHz



UL Japan, Inc.

Ise EMC Lab.

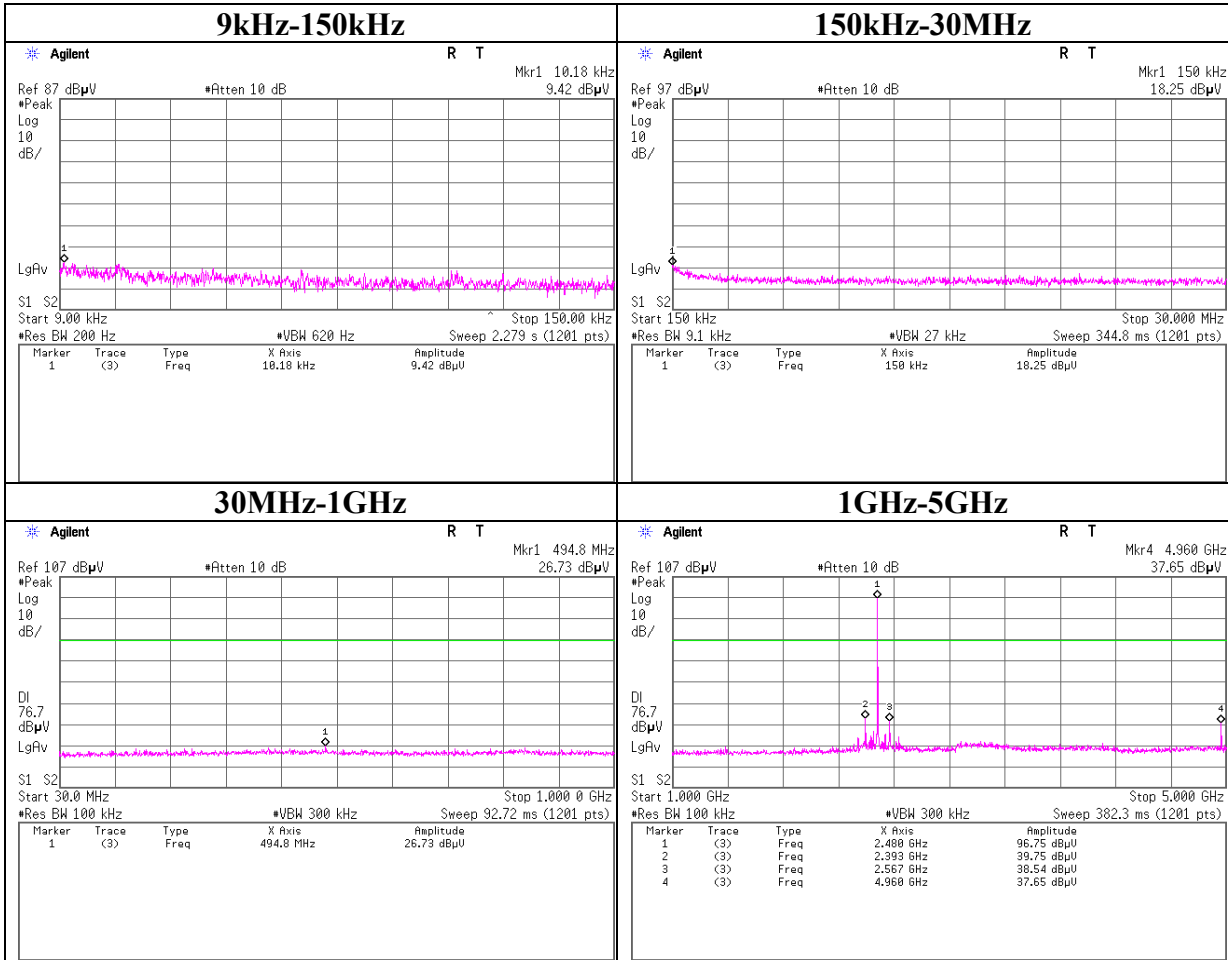
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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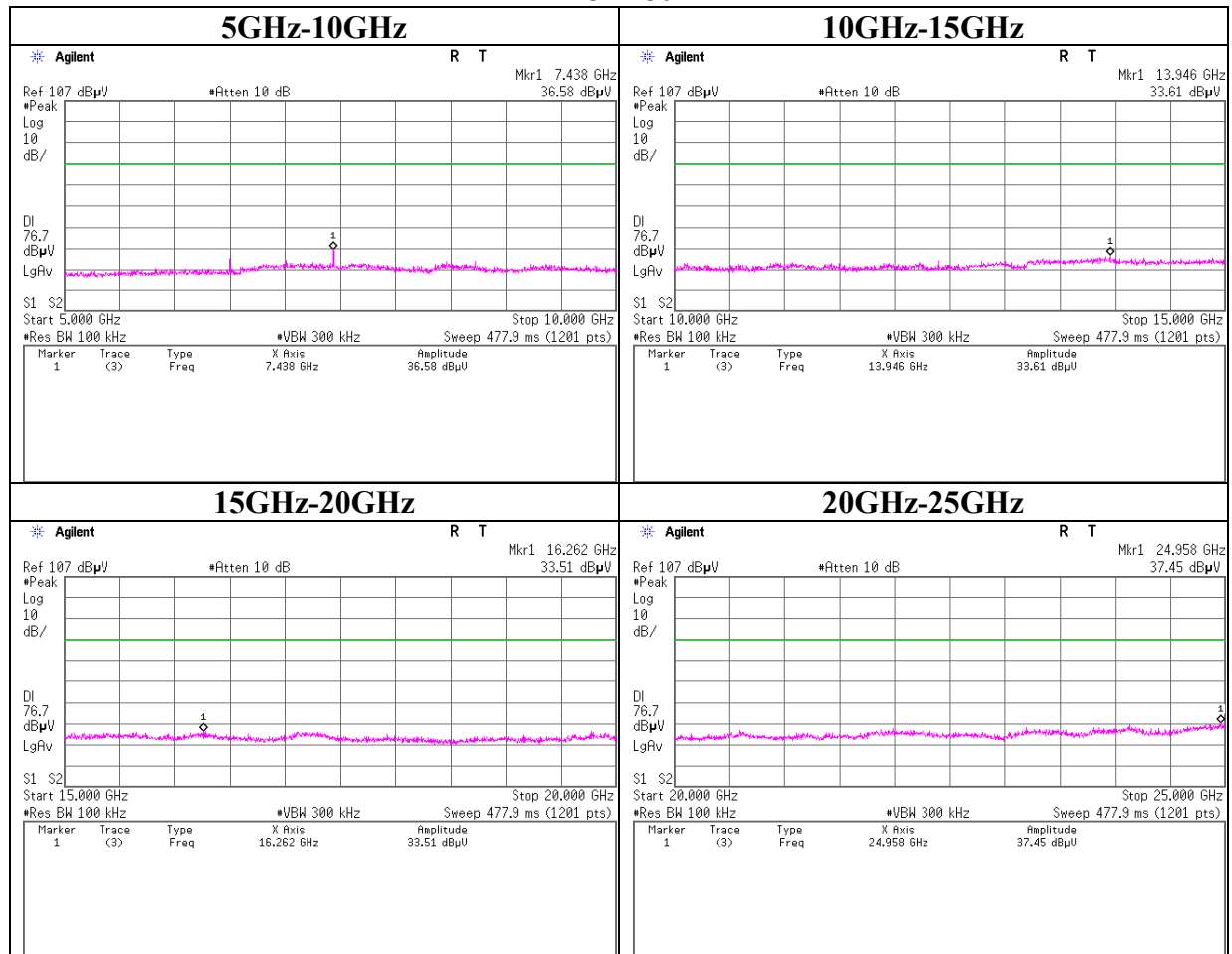
Conducted Spurious Emission

Tx DH5 2480MHz



Conducted Spurious Emission

Tx DH5 2480MHz



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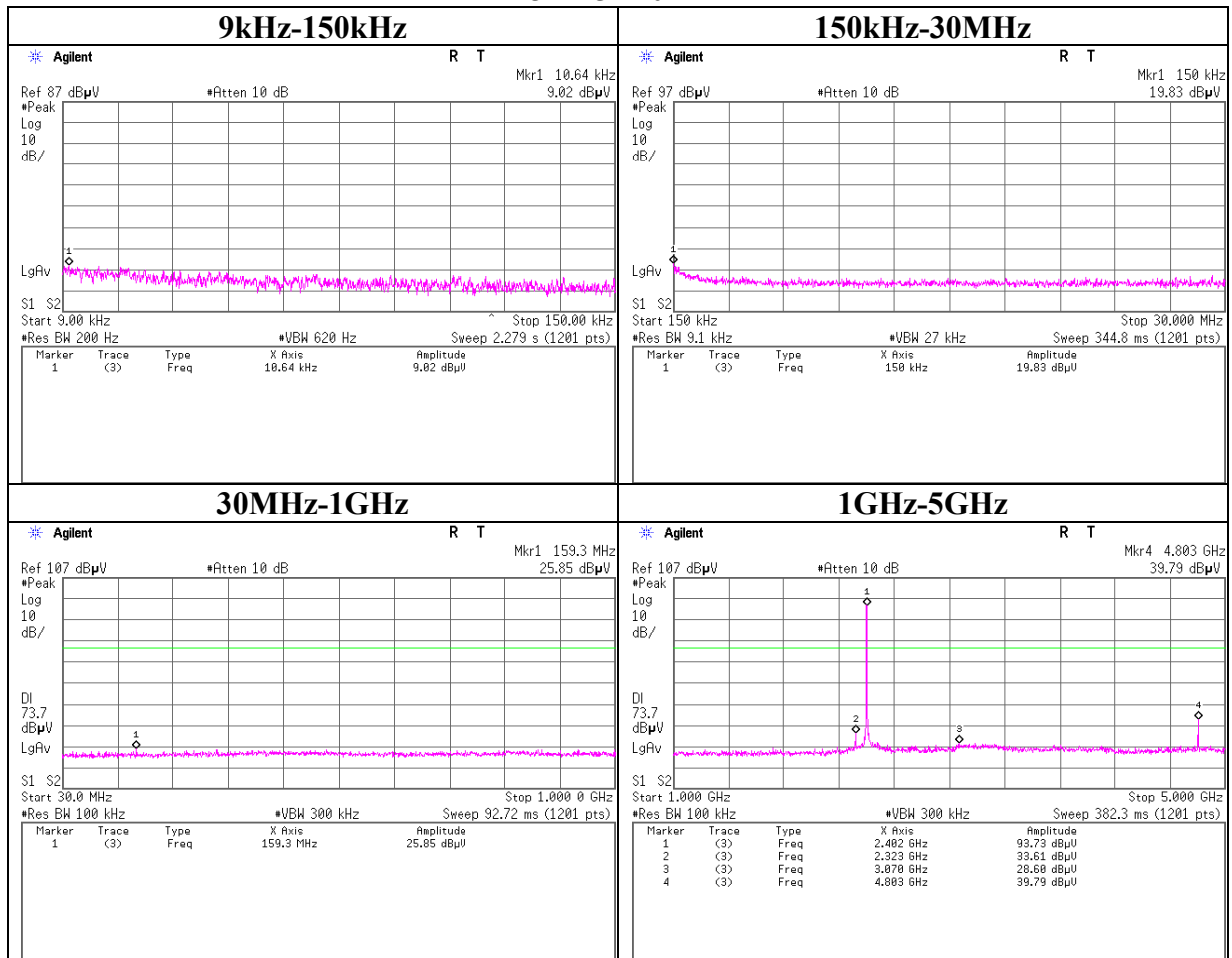
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Conducted Spurious Emission

Tx 3DH5 2402MHz



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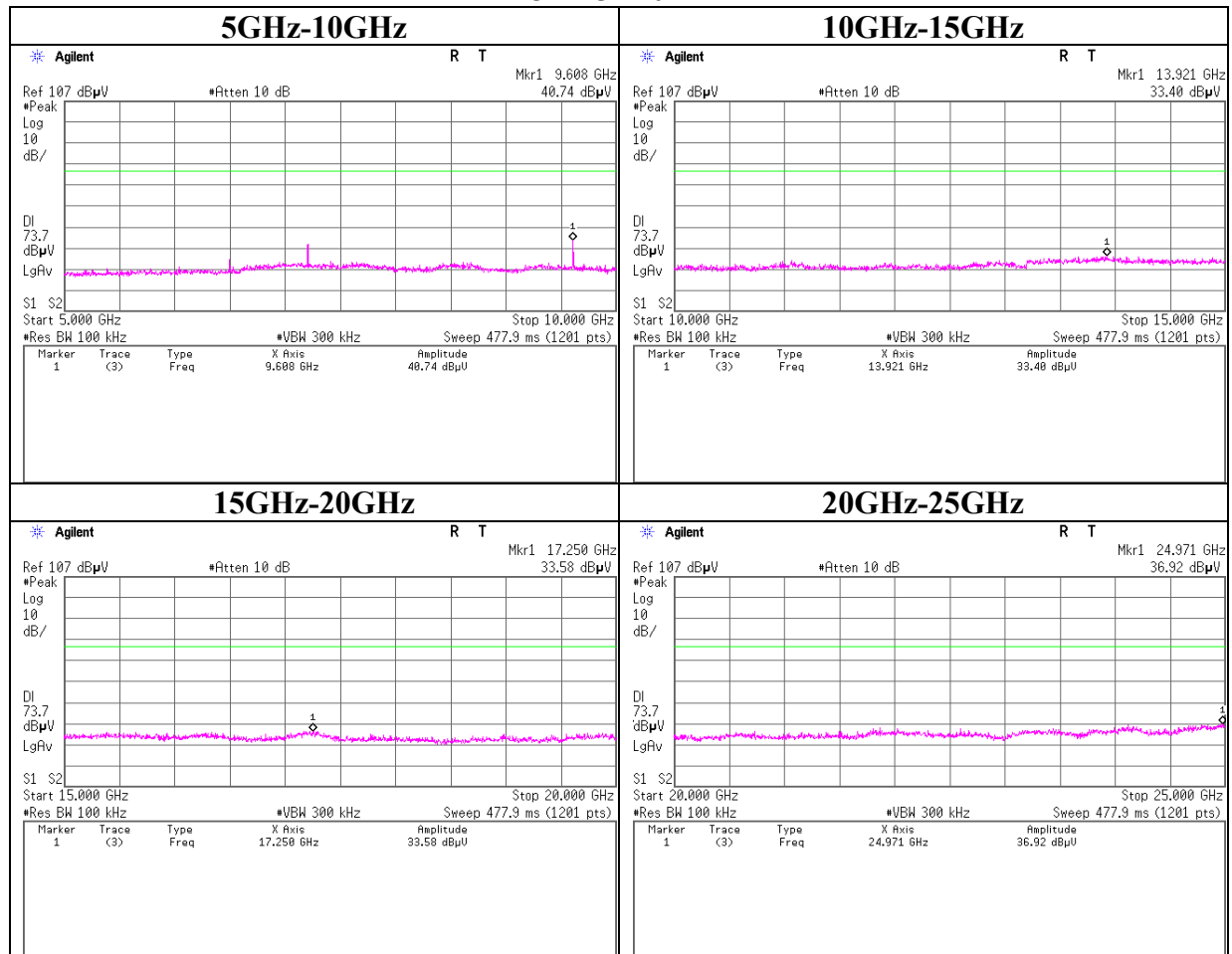
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Conducted Spurious Emission

Tx 3DH5 2402MHz



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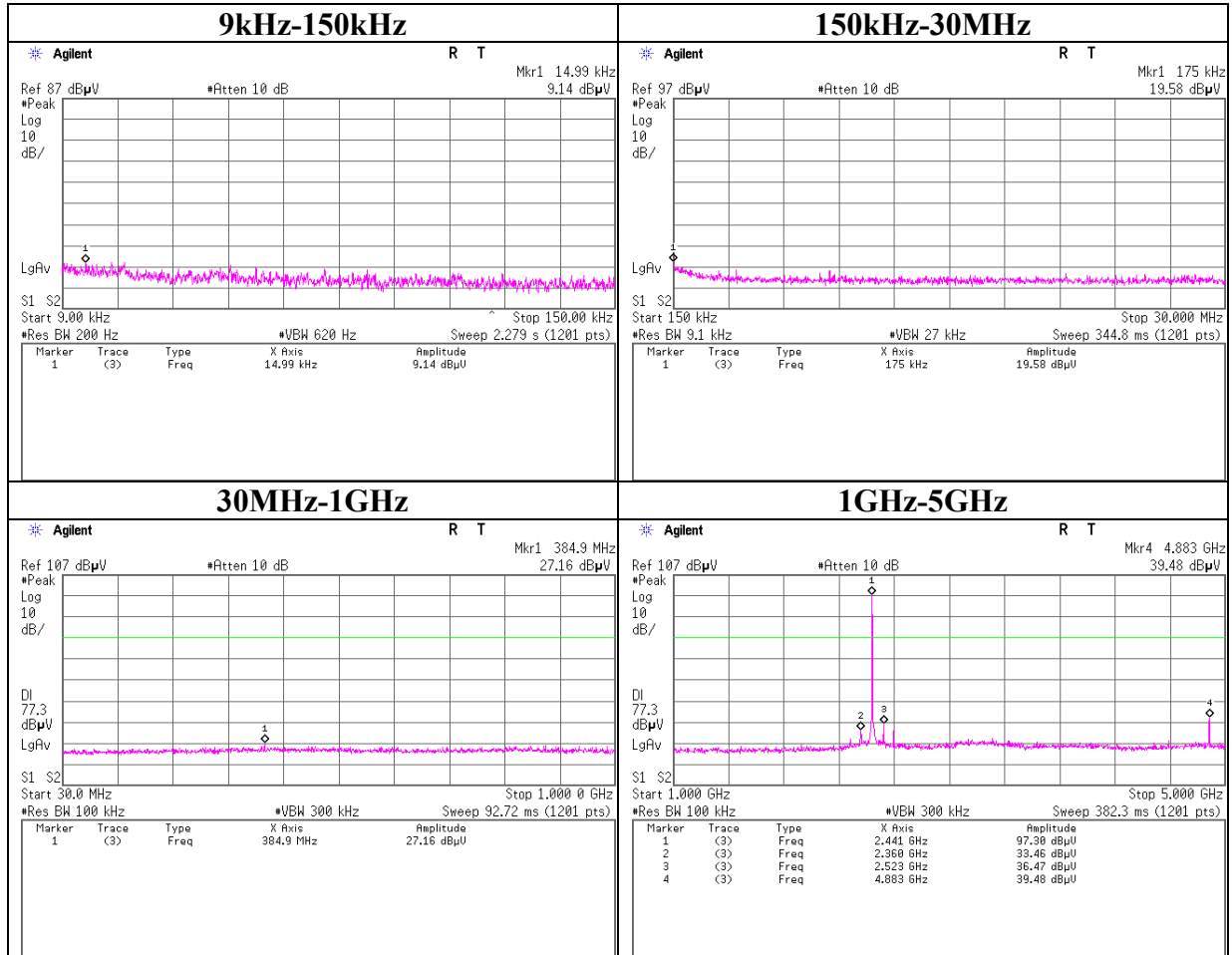
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Conducted Spurious Emission

Tx 3DH5 2441MHz



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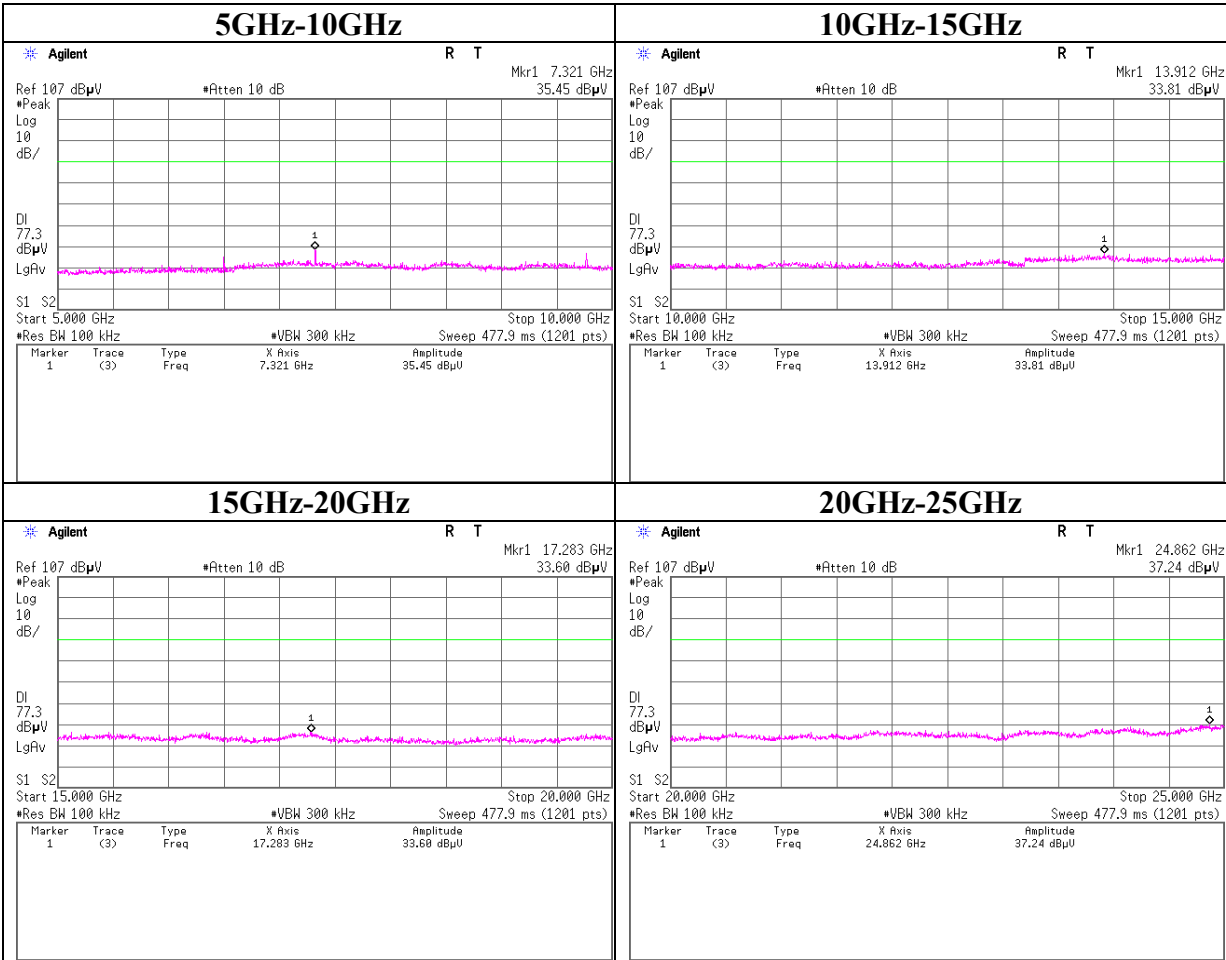
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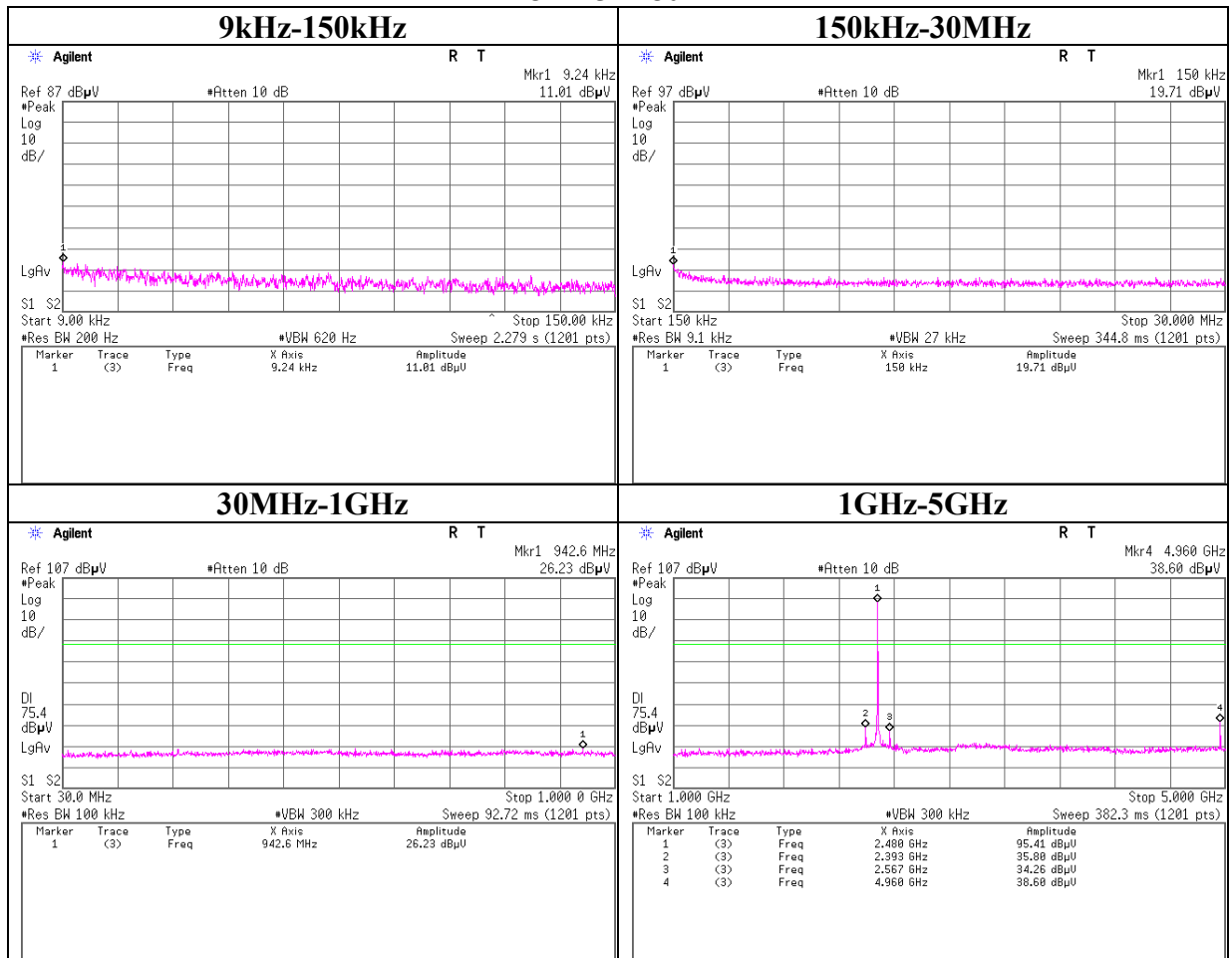
Conducted Spurious Emission

Tx 3DH5 2441MHz



Conducted Spurious Emission

Tx 3DH5 2480MHz



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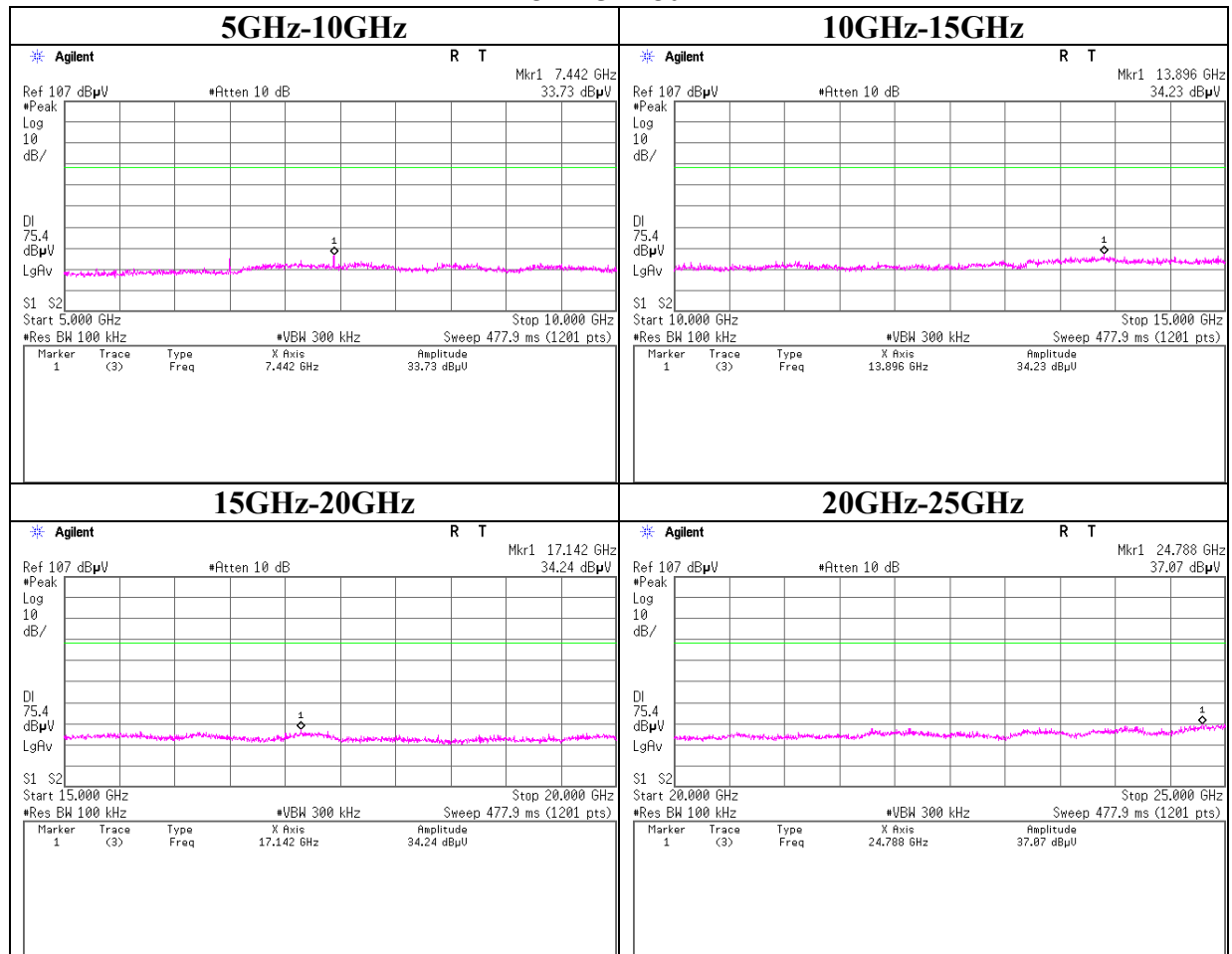
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Conducted Spurious Emission

Tx 3DH5 2480MHz



UL Japan, Inc.

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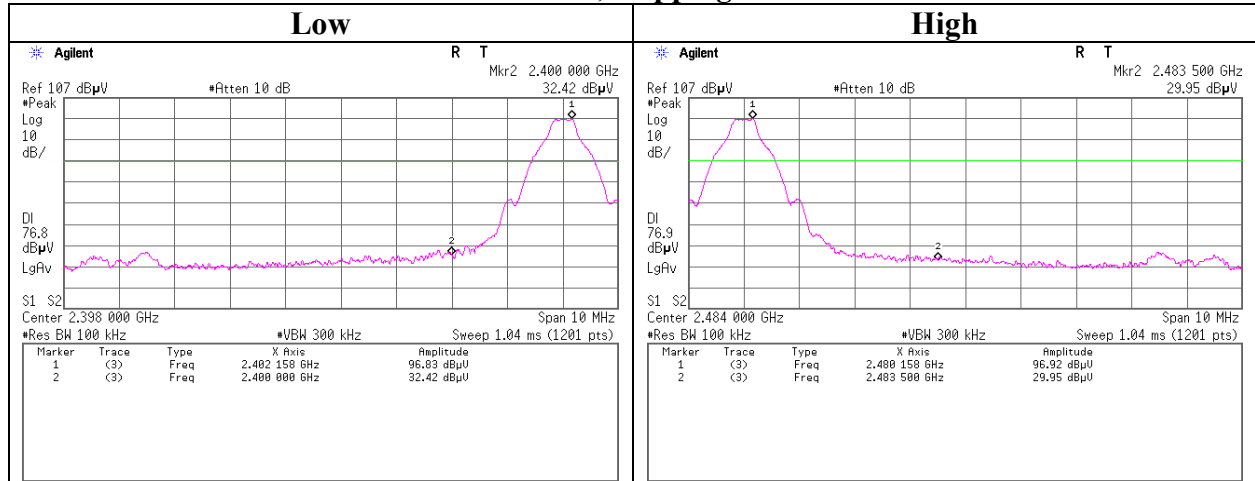
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

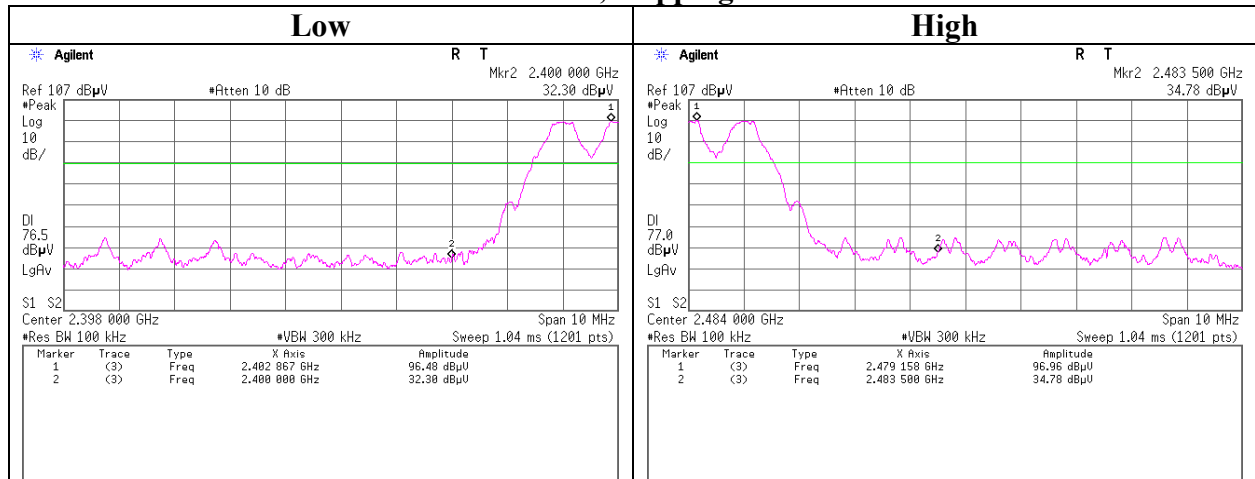
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Conducted Emission Band Edge compliance

Tx DH5, Hopping off



Tx DH5, Hopping on



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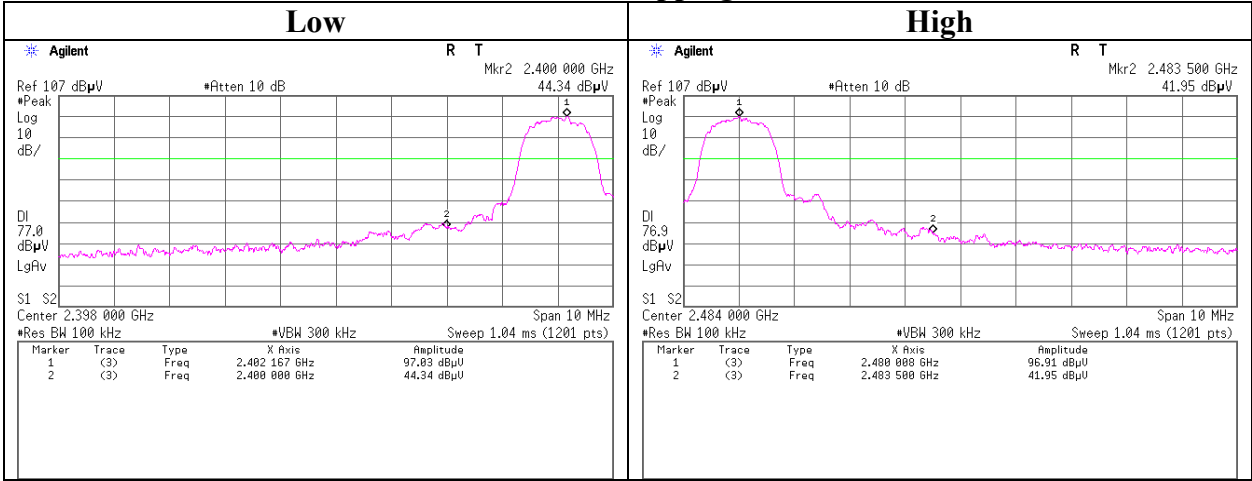
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Telephone : +81 596 24 8999

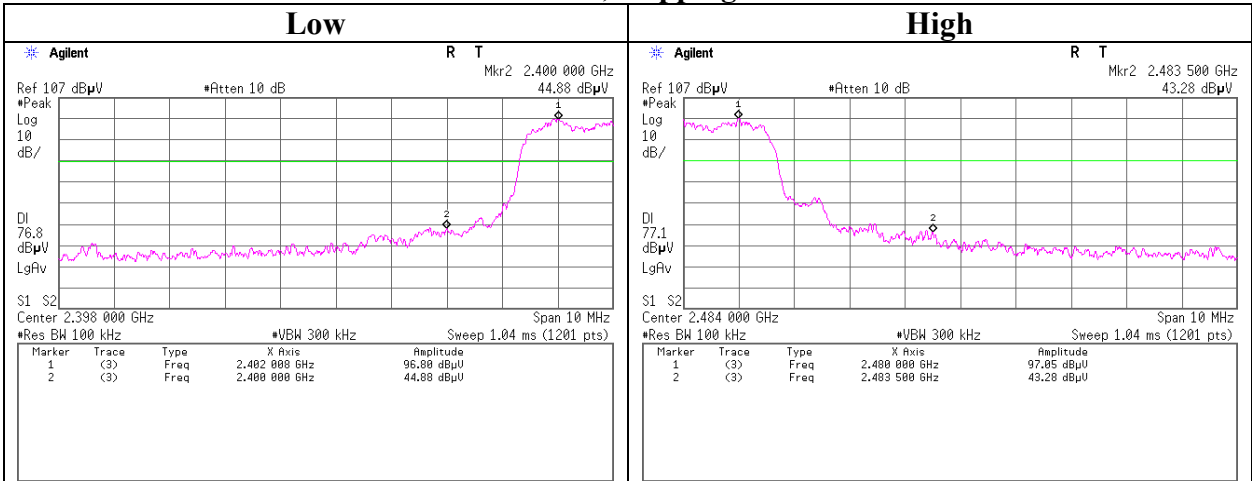
Facsimile : +81 596 24 8124

Conducted Emission Band Edge compliance

Tx 3DH5, Hopping off



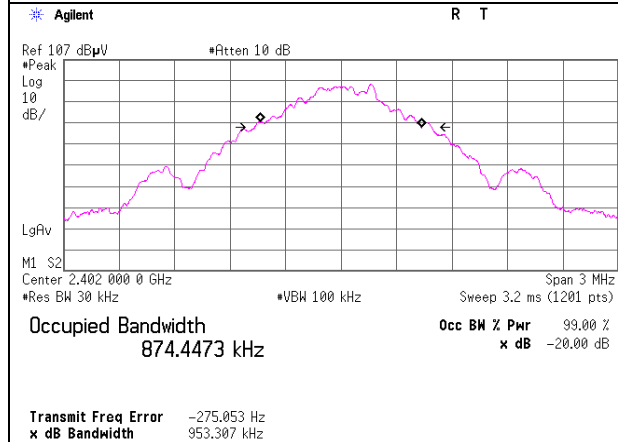
Tx 3DH5, Hopping on



99%Occupied Bandwidth

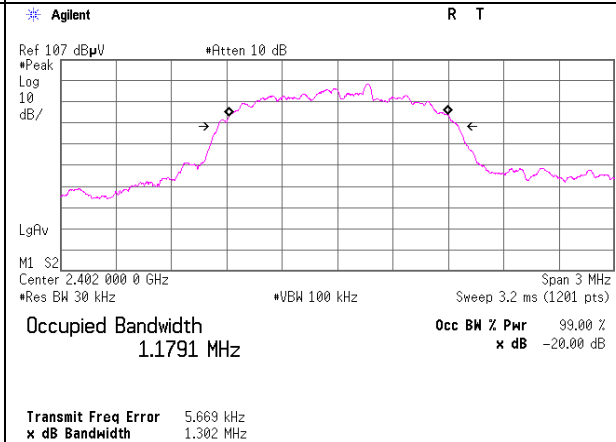
Tx DH5, Hopping off

2402MHz

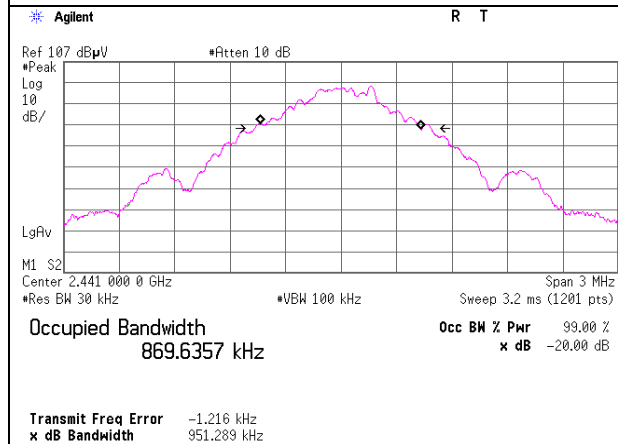


Tx 3DH5, Hopping off

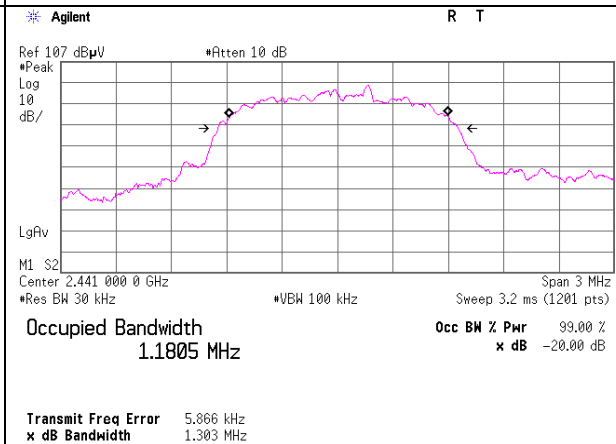
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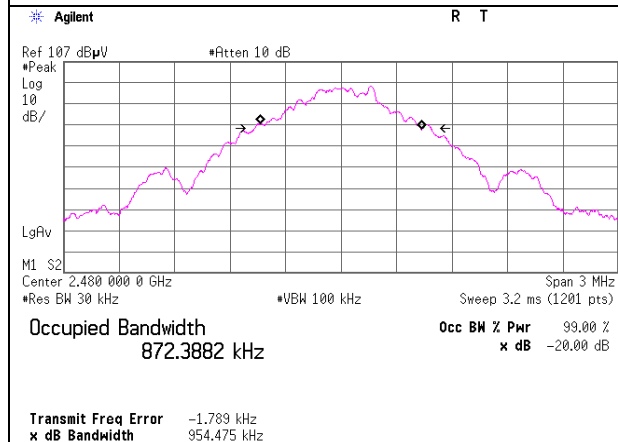
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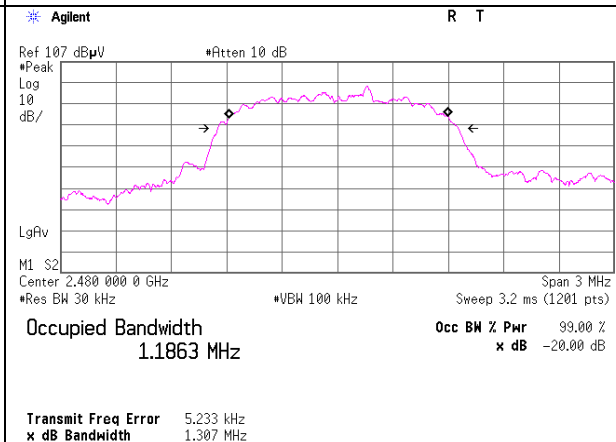
2441MHz



2480MHz



2480MHz



UL Japan, Inc.

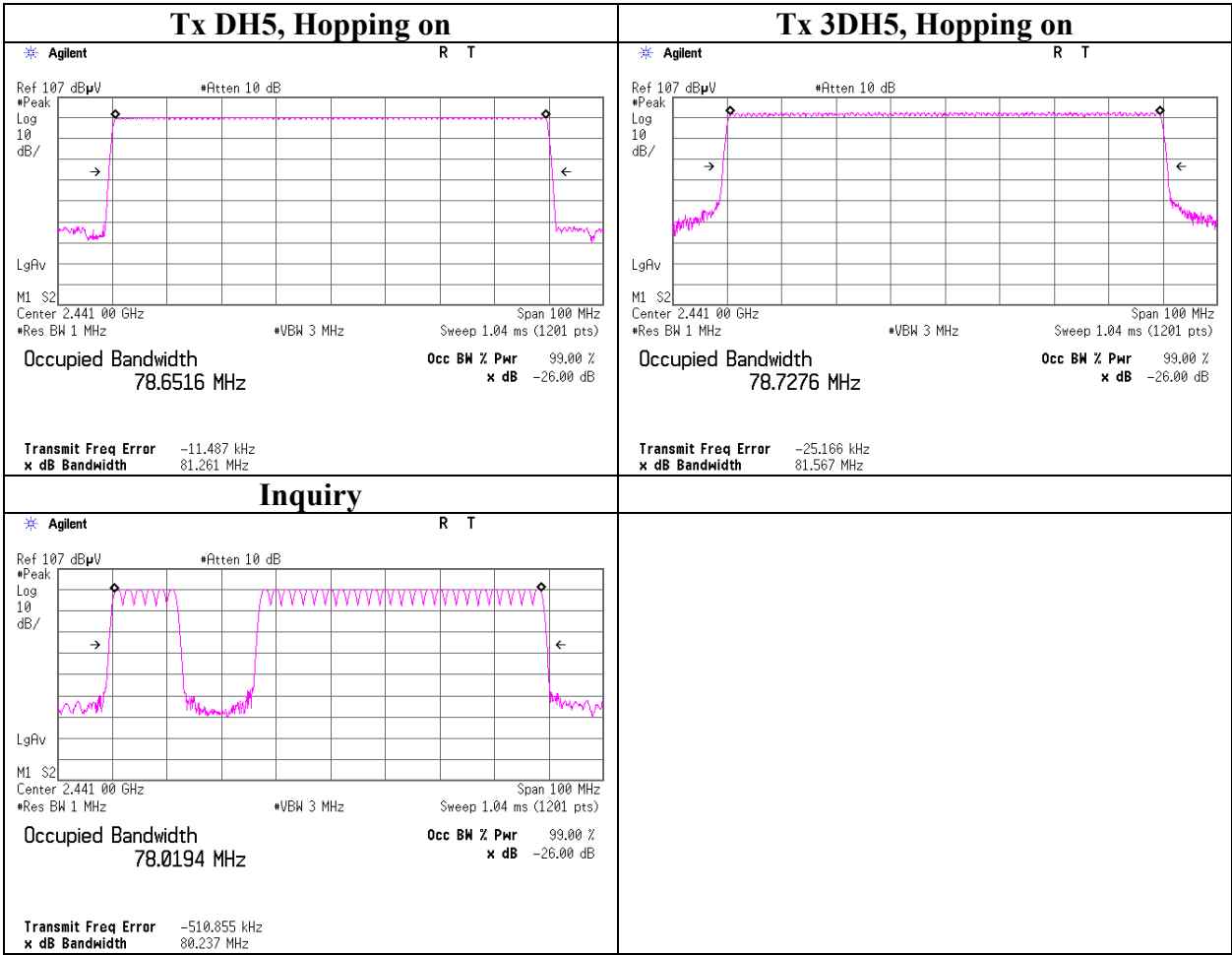
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99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2013/06/05 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2013/06/12 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2013/06/12 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	AT	2013/02/26 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2013/02/22 * 12
MAT-25	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71642	AT	2013/06/20 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2013/08/19 * 12
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2013/02/28 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2013/02/26 * 12
MJM-09	Measure	KDS	E19-55	-	RE	-
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2013/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1204S062(5m)	RE	2013/05/28 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2013/03/19 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2013/06/30 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2013/09/01 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2013/02/28 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2013/02/26 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2012/11/20 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2013/08/20 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2012/10/08 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2012/10/08 * 12

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EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MCC-51	Coaxial cable	UL Japan	-	-	RE	2013/07/23 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2013/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2013/03/12 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2013/01/07 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2013/01/07 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2013/01/21 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D- 2W(10m)/SFM14 1(3m)/sucoform1 41-PE(1m)/421- 010(1.5m)/RFM- E321(Switcher)	-/00640	CE	2013/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2013/01/22 * 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

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