



RADIO TEST REPORT

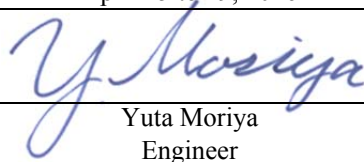
Test Report No. : 11249046H-A

Applicant : Sony Interactive Entertainment Inc.
Type of Equipment : Wireless Adaptor
Model No. : CUH-ZWA1U
FCC ID : AK8CUHZWA1
Test regulation : FCC Part 15 Subpart C: 2015
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.
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6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

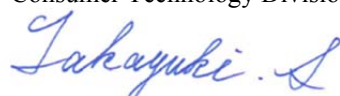
Date of test: April 15 to 19, 2016

Representative test engineer:


Yuta Moriya
Engineer

Consumer Technology Division

Approved by:


Takayuki Shimada
Engineer

Consumer Technology Division



NVLAP LAB CODE: 200572-0

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*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
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UL Japan, Inc.

Ise EMC Lab.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11249046H-A

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SECTION 1: Customer information

Company Name	Sony Interactive 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	Wireless Adaptor
Model No	CUH-ZWA1U
Serial No	Refer to Clause 4.2
Country of Manufacture	China
Receipt Date of Sample	April 15, 2016
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

CUH-ZWA1U is the Wireless Adaptor.

Product Specification

Clock frequency in the system (radio part)	24 MHz, 26 MHz, 64 MHz, 96 MHz, 384 MHz
Operating Temperature	+5 to +35 deg. C
Power Supply	5 ± 0.25 V
Size	18 mm x 9 mm x 75mm

Radio Specification

Bluetooth (BDR/EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	79MHz & 1MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 1.2 V / DC 3.2 V
Antenna Type	Monopole
Antenna Gain	4.5 dBi (Max)

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
 *Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

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 EUT complies with FCC Part 15 Subpart B: 2015, final revised on November 23, 2015

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	QP 15.7 dB, 0.19420 MHz, N AV 13.5 dB, 0.39200 MHz, L	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (2)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (1)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	15.5 dB 168.000 MHz, QP, Vert.	Complied	Conducted/ Radiated (above 30 MHz) *1)

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

*1) Radiated test was selected over 30 MHz based on section 15.247(d).

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 1.2 V / DC 3.2 V) 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.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	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 $k = 2$.
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Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	

Frequency range	Conducted emission using AMN(LISN) (+dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

Test distance	Radiated emission (+dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+dB)		(10 m*)(+dB)	
	30 – 200 MHz	200 – 1000MHz	30 – 200 MHz	200 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(+dB)		(1 m*)(+dB)	(0.5 m*)(+dB)	(10 m*)(+dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

*Measurement distance

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 test report has enough margin, more than the site margin.

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3.5 Test Location

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Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

3.6 Test data, 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: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5, 3DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5, 2DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz
*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) *2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative. * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all test items based on Bluetooth Core specification. *The power value of the EUT was set for testing as follows (setting value might be different from product specification value); Power settings: 4 dBm Software: BtUART V2.1.6 *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.		

4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform / a wooden table of nominal size, 1.0 m by 1.5 m, raised 0.8m above the conducting ground plane.

The rear of tabletop was located 40 cm 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 80 cm from any other grounded conducting surface. EUT was located 80 cm 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 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm 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 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

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

The height of the measuring antenna varied between 1 and 4 m 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	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	4.5 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz)		4.5 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz)

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

*2) Distance Factor: $20 \times \log(4.5 \text{ m}/3.0 \text{ m}) = 3.52 \text{ dB}$

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

- 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	: 30 M - 26.5 GHz
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	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	300 kHz	1 MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *2)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	9.1 kHz	27 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) Peak hold was applied as Worst-case measurement.

*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. (9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz)

*3) Reference data

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

Test data : APPENDIX
Test result : Pass

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

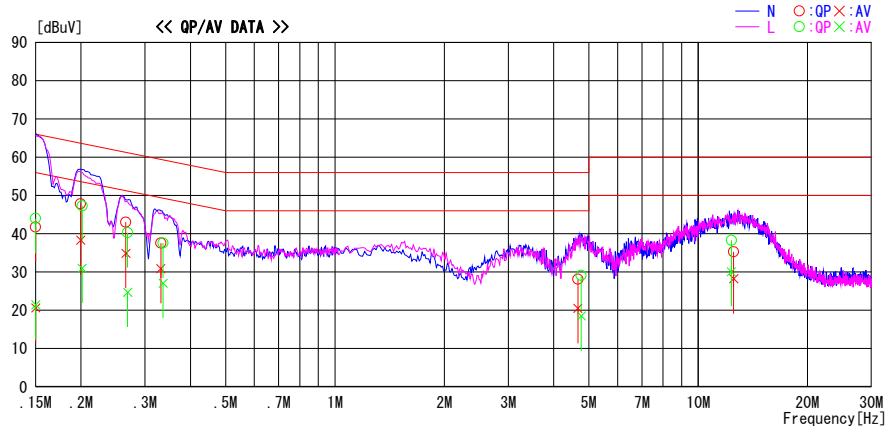
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/04/18

Report No. : 11249046H

Temp./Humi. : 22deg. C / 45% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	28.5	7.4	13.2	41.7	20.6	66.0	56.0	24.3	35.4	N	
0.19950	34.6	25.1	13.2	47.8	38.3	63.6	53.6	15.8	15.3	N	
0.26580	29.8	21.7	13.2	43.0	34.9	61.2	51.2	18.2	16.3	N	
0.33160	24.3	17.6	13.3	37.6	30.9	59.4	49.4	21.8	18.5	N	
4.66400	14.5	6.9	13.6	28.1	20.5	56.0	46.0	27.9	25.5	N	
12.51700	21.1	14.0	14.2	35.3	28.2	60.0	50.0	24.7	21.8	N	
0.15000	30.8	8.2	13.2	44.0	21.4	66.0	56.0	22.0	34.6	L	
0.20150	34.1	17.8	13.2	47.3	31.0	63.5	53.5	16.2	22.5	L	
0.26880	27.1	11.5	13.2	40.3	24.7	61.2	51.2	20.9	26.5	L	
0.33640	24.3	13.8	13.3	37.6	27.1	59.3	49.3	21.7	22.2	L	
4.76600	15.5	4.9	13.6	29.1	18.5	56.0	46.0	26.9	27.5	L	
12.34100	24.1	15.9	14.2	38.3	30.1	60.0	50.0	21.7	19.9	L	

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

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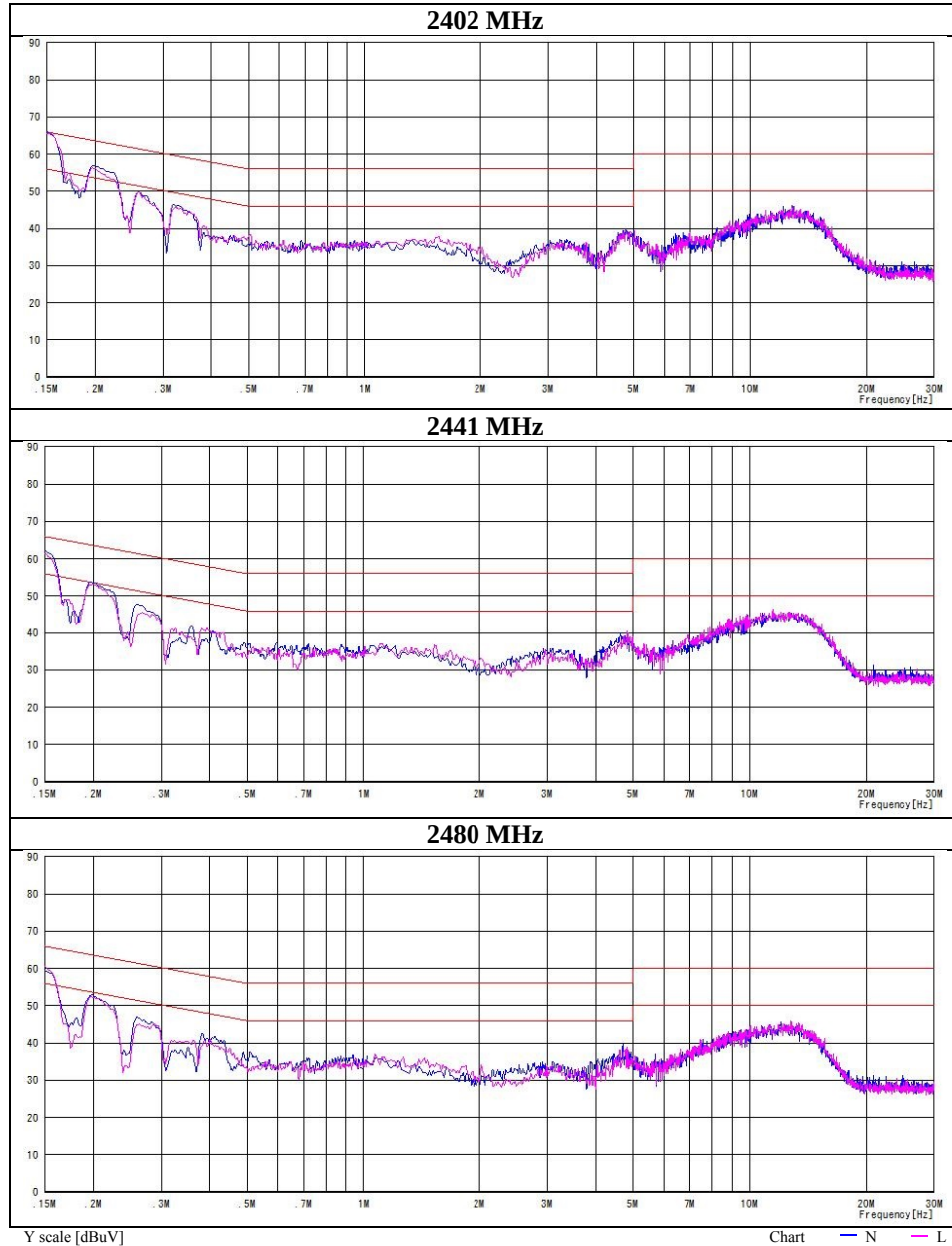
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Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 18, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, DH5



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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

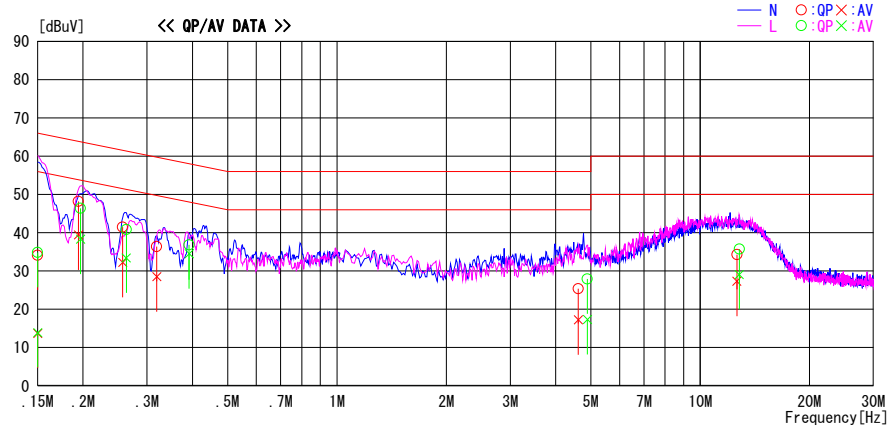
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/04/18

Report No : 11249046H

Temp./Humi. : 22deg. C / 45% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 3DH5 2402MHz

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	20.9	0.5	13.2	34.1	13.7	66.0	56.0	31.9	42.3	N	
0.19420	35.0	26.2	13.2	48.2	39.4	63.9	53.9	15.7	14.5	N	
0.25710	28.3	19.0	13.2	41.5	32.2	61.5	51.5	20.0	19.3	N	
0.31925	23.1	15.2	13.3	36.4	28.5	59.7	49.7	23.3	21.2	N	
4.61700	11.8	3.6	13.6	25.4	17.2	56.0	46.0	30.6	28.8	N	
12.62000	20.1	13.1	14.2	34.3	27.3	60.0	50.0	25.7	22.7	N	
0.15000	21.6	0.7	13.2	34.8	13.9	66.0	56.0	31.2	42.1	L	
0.19690	33.2	25.1	13.2	46.4	38.3	63.7	53.7	17.3	15.4	L	
0.26310	27.6	20.2	13.2	40.8	33.4	61.3	51.3	20.5	17.9	L	
0.39200	23.5	21.2	13.3	36.8	34.5	58.0	48.0	21.2	13.5	L	
4.89080	14.3	3.7	13.6	27.9	17.3	56.0	46.0	28.1	28.7	L	
12.82200	21.5	14.9	14.2	35.7	29.1	60.0	50.0	24.3	20.9	L	

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

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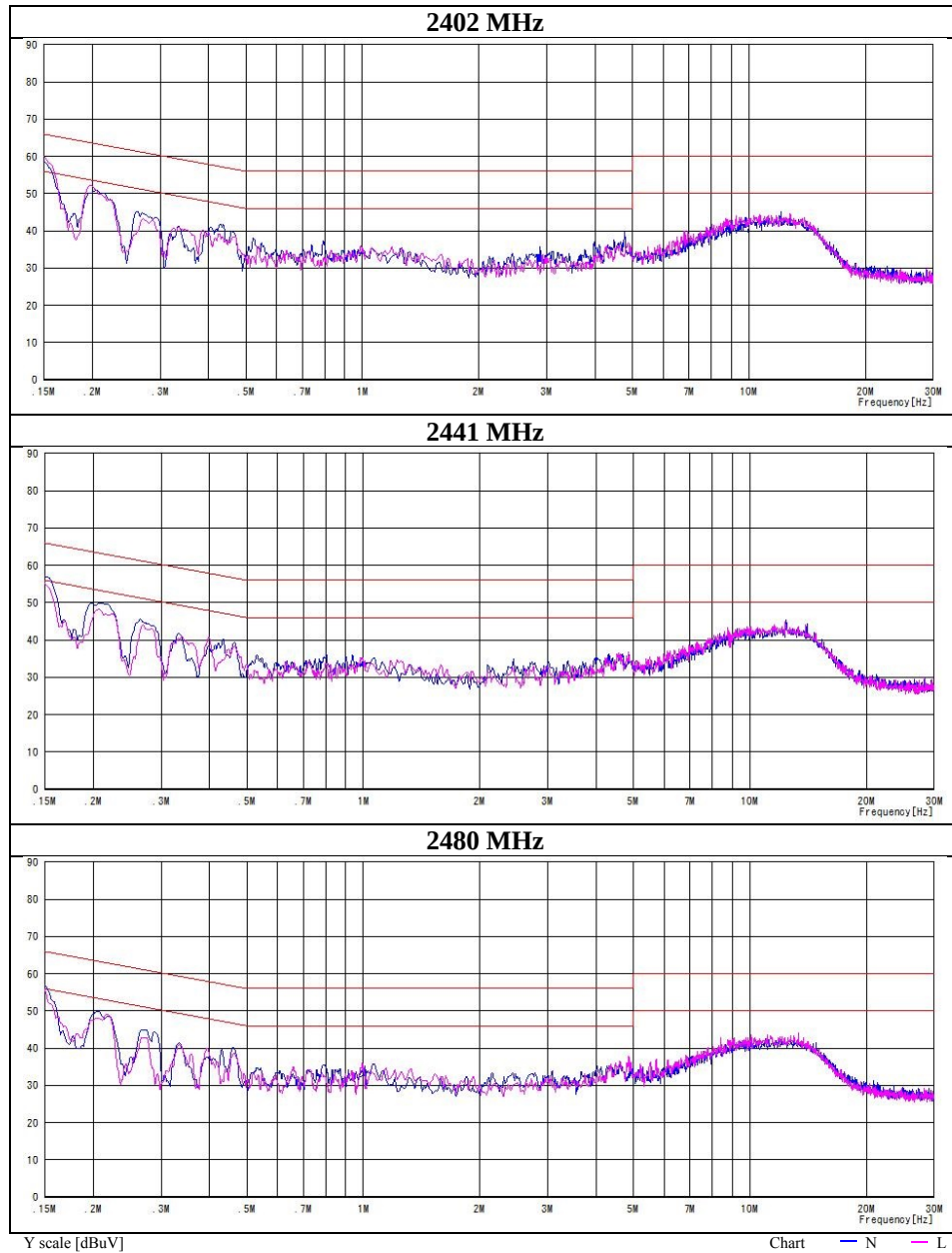
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 18, 2016
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, 3DH5



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20dB Bandwidth and Carrier Frequency Separation

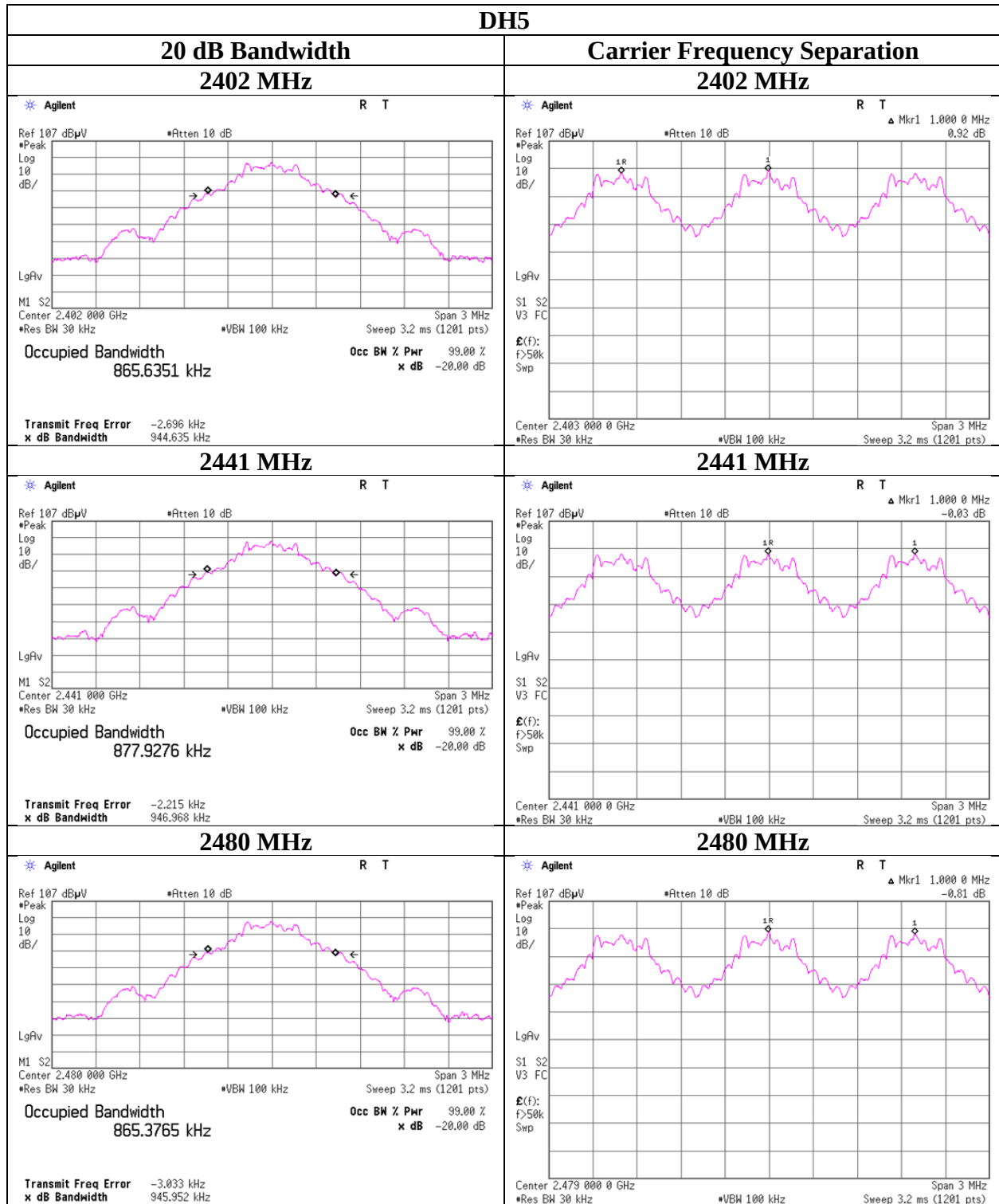
Test place : Ise EMC Lab. No.3 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35 % RH
Engineer : Shinichi Miyazono
Mode : Tx, Hopping On/Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.945	1.000	≥ 0.630
DH5	2441.0	0.947	1.000	≥ 0.631
DH5	2480.0	0.946	1.000	≥ 0.631
3DH5	2402.0	1.297	1.000	≥ 0.865
3DH5	2441.0	1.299	1.000	≥ 0.866
3DH5	2480.0	1.297	1.000	≥ 0.865

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

No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation



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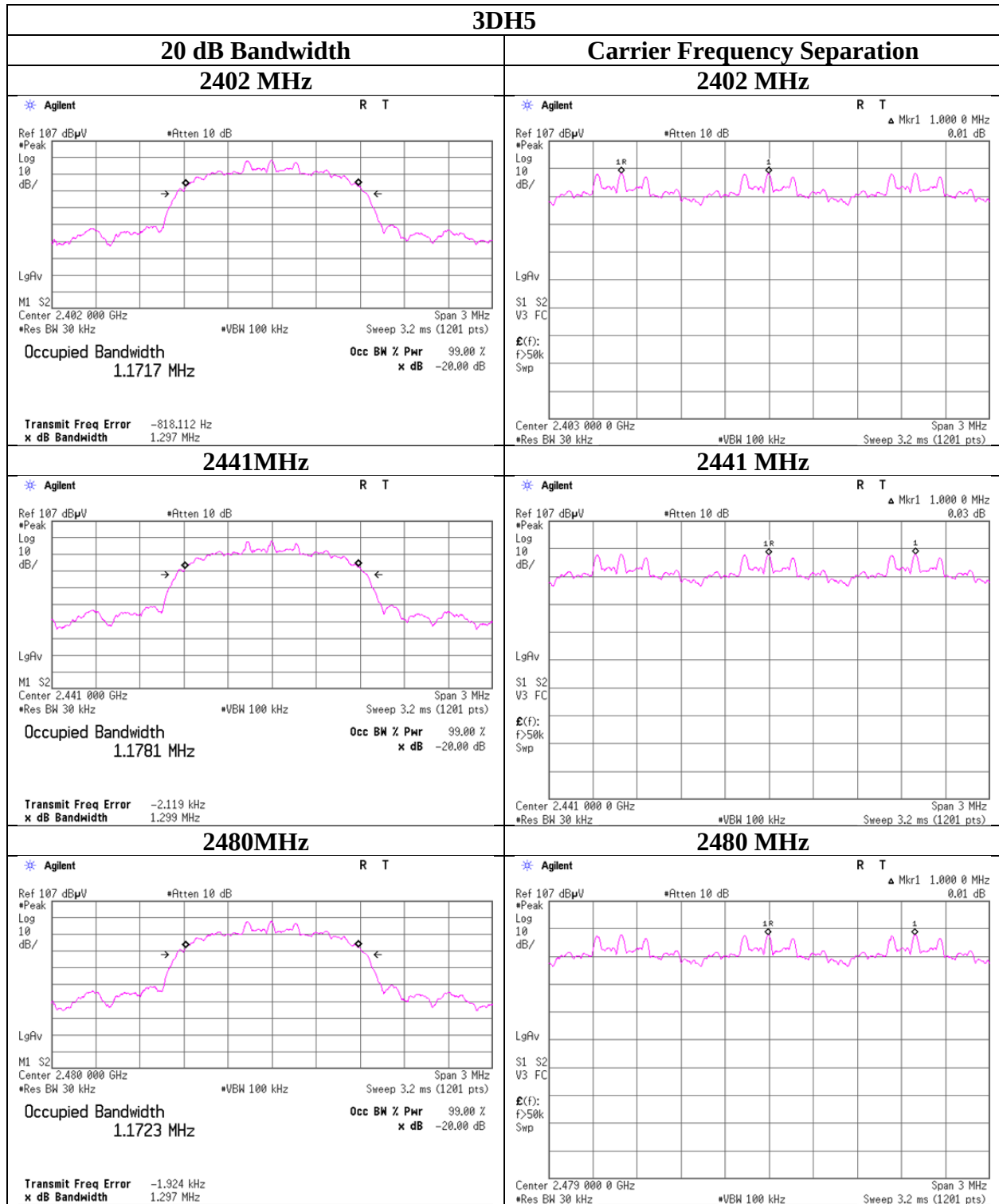
Ise EMC Lab.

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Facsimile : +81 596 24 8124

20dB Bandwidth and Carrier Frequency Separation



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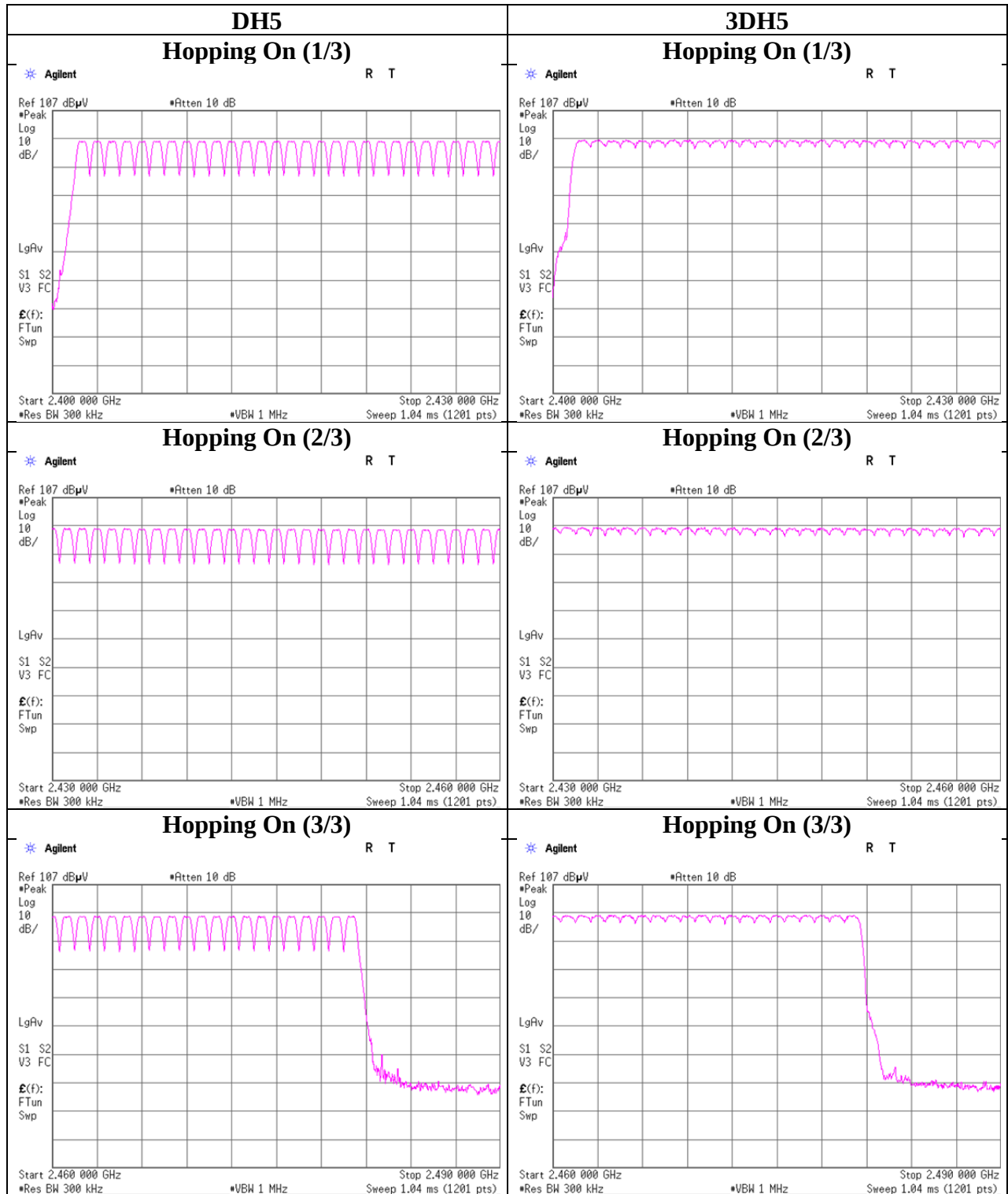
Number of Hopping Frequency

Test place Ise EMC Lab. No.4 Measurement Room
Report No. 11249046H
Date April 19, 2016
Temperature / Humidity 22 deg. C / 35% RH
Engineer Shinichi Miyazono
Mode Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	≥ 15
3DH5	79	≥ 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



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Ise EMC Lab.

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Telephone : +81 596 24 8999

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Dwell time

Test place Ise EMC Lab. No.4 Measurement Room
Report No. 11249046H
Date April 19, 2016
Temperature / Humidity 22 deg. C / 35 % RH
Engineer Shinichi Miyazono
Mode Tx, Hopping On

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 [msec]	Result [msec]	Limit [msec]
DH1	50.0 times	/	5 sec.	x	31.6 sec. =	316 times	400
DH3	25.4 times	/	5 sec.	x	31.6 sec. =	161 times	400
DH5	17.4 times	/	5 sec.	x	31.6 sec. =	110 times	400
3DH1	51.4 times	/	5 sec.	x	31.6 sec. =	325 times	400
3DH3	26.0 times	/	5 sec.	x	31.6 sec. =	165 times	400
3DH5	20.2 times	/	5 sec.	x	31.6 sec. =	128 times	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

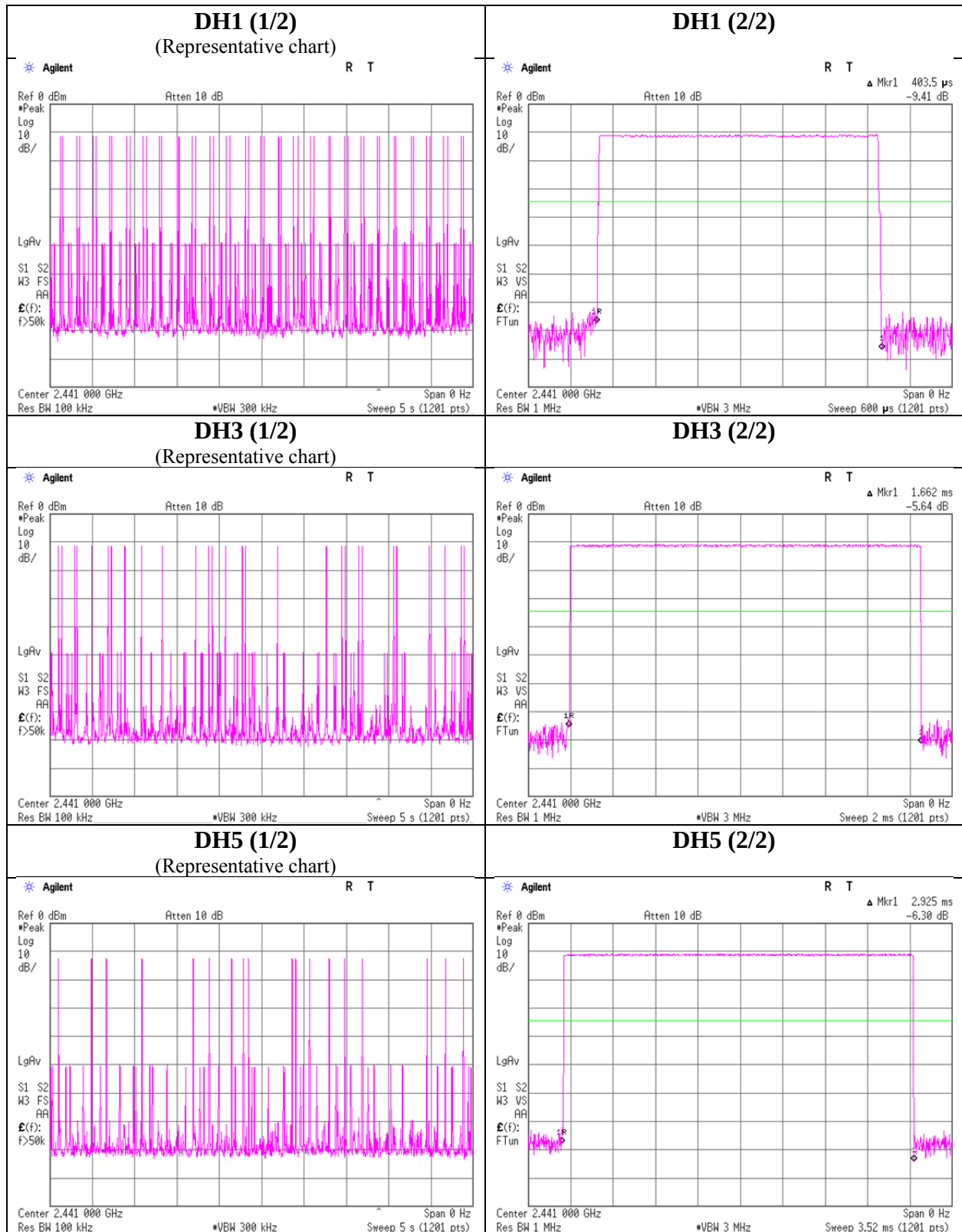
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	49	52	50	49	50
DH3	25	28	27	23	24	25.4
DH5	18	20	18	15	16	17.4
3DH1	51	52	51	51	52	51.4
3DH3	26	24	29	23	28	26
3DH5	18	18	24	22	19	20.2

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 $N = 79$.

Dwell time



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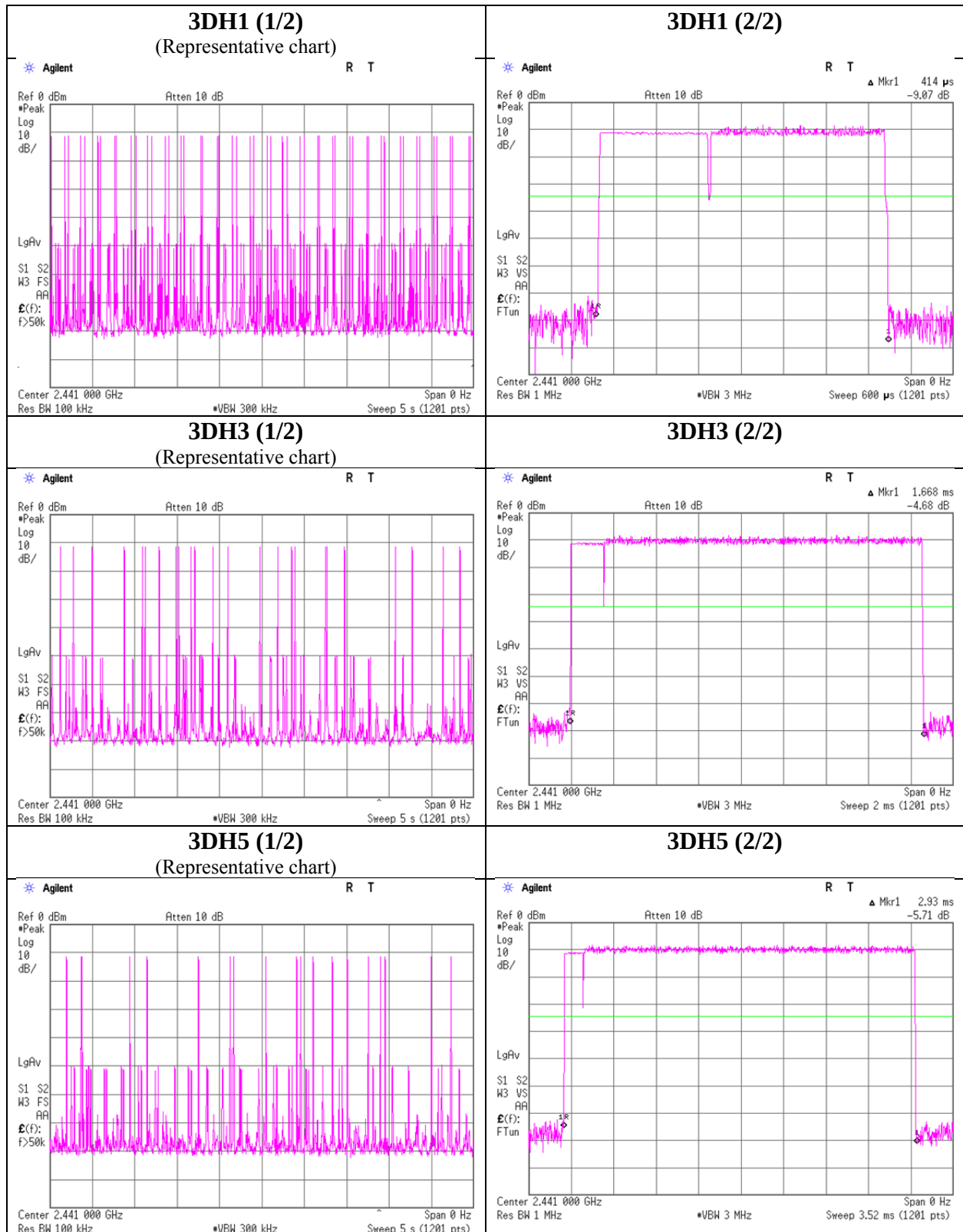
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Dwell time



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Maximum Peak Output Power

Test place : Ise EMC Lab. No.4 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35% RH
Engineer : Shinichi Miyazono
Mode : Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	0.37	0.80	0.00	1.17	1.31	20.96	125	19.79
DH5	2441.0	0.20	0.80	0.00	1.00	1.26	20.96	125	19.96
DH5	2480.0	0.13	0.80	0.00	0.93	1.24	20.96	125	20.03
2DH5	2402.0	2.83	0.80	0.00	3.63	2.31	20.96	125	17.33
2DH5	2441.0	2.68	0.80	0.00	3.48	2.23	20.96	125	17.48
2DH5	2480.0	2.62	0.80	0.00	3.42	2.20	20.96	125	17.54
3DH5	2402.0	3.26	0.80	0.00	4.06	2.55	20.96	125	16.90
3DH5	2441.0	3.10	0.80	0.00	3.90	2.45	20.96	125	17.06
3DH5	2480.0	3.08	0.80	0.00	3.88	2.44	20.96	125	17.08

Sample Calculation:

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

*The equipment and cables were not used for factor 0 dB of the data sheets.

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.

Average Output Power
(Reference data for RF Exposure / SAR testing)

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	11249046H
Date	April 19, 2016
Temperature / Humidity	22 deg. C / 35% RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)	
					[dBm]	[mW]
DH5	2402.0	-1.13	0.80	0.00	-0.33	0.93
DH5	2441.0	-1.34	0.80	0.00	-0.54	0.88
DH5	2480.0	-1.39	0.80	0.00	-0.59	0.87
2DH5	2402.0	-0.86	0.80	0.00	-0.06	0.99
2DH5	2441.0	-1.14	0.80	0.00	-0.34	0.92
2DH5	2480.0	-1.16	0.80	0.00	-0.36	0.92
3DH5	2402.0	-0.84	0.80	0.00	-0.04	0.99
3DH5	2441.0	-1.09	0.80	0.00	-0.29	0.94
3DH5	2480.0	-1.11	0.80	0.00	-0.31	0.93

Sample Calculation:

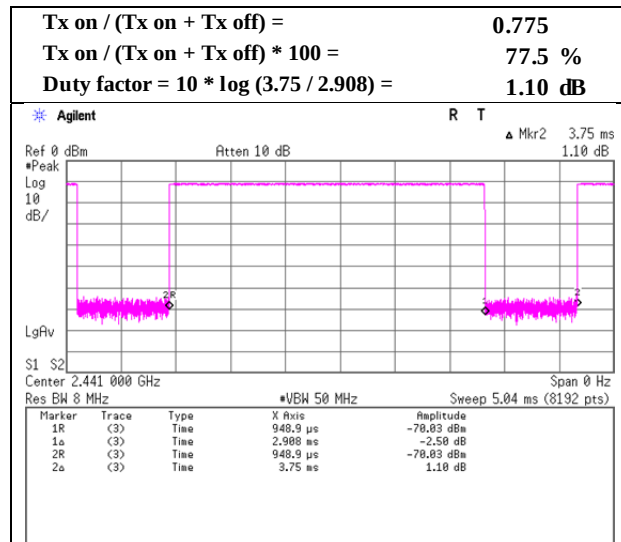
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

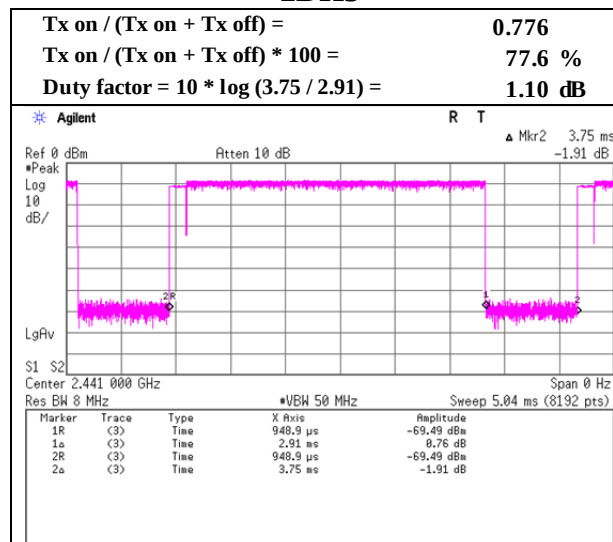
Burst Rate Confirmation

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	11249046H
Date	April 19, 2016
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off

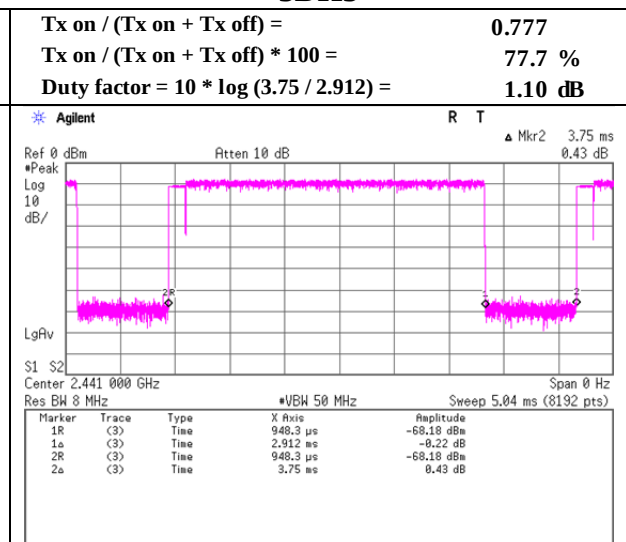
DH5



2DH5



3DH5



Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Tomoki Matsui Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.924	QP	22.4	15.3	7.1	32.2	12.6	40.0	27.4	
Hori	120.100	QP	30.5	12.4	8.3	32.2	19.0	43.5	24.5	
Hori	168.000	QP	27.8	15.7	8.7	32.1	20.1	43.5	23.4	
Hori	216.000	QP	30.1	11.8	9.2	32.0	19.1	43.5	24.4	
Hori	408.001	QP	31.9	15.8	10.6	31.9	26.4	46.0	19.6	
Hori	799.800	QP	22.6	20.8	12.9	31.5	24.8	46.0	21.2	
Hori	2390.000	PK	43.6	26.9	6.8	32.7	44.6	73.9	29.3	
Hori	4804.000	PK	40.1	31.8	9.0	31.8	49.1	73.9	24.8	Floor Noise
Hori	7206.000	PK	42.3	36.0	10.2	32.6	55.9	73.9	18.0	Floor Noise
Hori	9608.000	PK	42.6	38.2	11.0	33.2	58.6	73.9	15.3	Floor Noise
Hori	2390.000	AV	30.5	26.9	6.8	32.7	31.5	53.9	22.4	
Hori	4804.000	AV	27.1	31.8	9.0	31.8	36.1	53.9	17.8	Floor Noise
Hori	7206.000	AV	28.5	36.0	10.2	32.6	42.1	53.9	11.8	Floor Noise
Hori	9608.000	AV	29.2	38.2	11.0	33.2	45.2	53.9	8.7	Floor Noise
Vert	35.924	QP	31.4	15.3	7.1	32.2	21.6	40.0	18.4	
Vert	120.100	QP	37.1	12.4	8.3	32.2	25.6	43.5	17.9	
Vert	168.000	QP	35.4	15.7	8.7	32.1	27.7	43.5	15.8	
Vert	216.000	QP	35.9	11.8	9.2	32.0	24.9	43.5	18.6	
Vert	407.990	QP	26.8	15.8	10.6	31.9	21.3	46.0	24.7	
Vert	799.800	QP	26.6	20.8	12.9	31.5	28.8	46.0	17.2	
Vert	2390.000	PK	43.9	26.9	6.8	32.7	44.9	73.9	29.0	
Vert	4804.000	PK	40.0	31.8	9.0	31.8	49.0	73.9	24.9	Floor Noise
Vert	7206.000	PK	42.1	36.0	10.2	32.6	55.7	73.9	18.2	Floor Noise
Vert	9608.000	PK	42.8	38.2	11.0	33.2	58.8	73.9	15.1	Floor Noise
Vert	2390.000	AV	30.5	26.9	6.8	32.7	31.5	53.9	22.4	
Vert	4804.000	AV	26.8	31.8	9.0	31.8	35.8	53.9	18.1	Floor Noise
Vert	7206.000	AV	28.5	36.0	10.2	32.6	42.1	53.9	11.8	Floor Noise
Vert	9608.000	AV	29.2	38.2	11.0	33.2	45.2	53.9	8.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.52 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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	94.5	26.9	6.8	32.7	95.5	-	-	Carrier
Hori	2400.000	PK	38.2	26.9	6.8	32.7	39.2	75.5	36.3	
Vert	2402.000	PK	94.3	26.9	6.8	32.7	95.3	-	-	Carrier
Vert	2400.000	PK	38.4	26.9	6.8	32.7	39.4	75.3	35.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

***These results have sufficient margin without taking account Dwell time factor.**

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Ise EMC Lab.

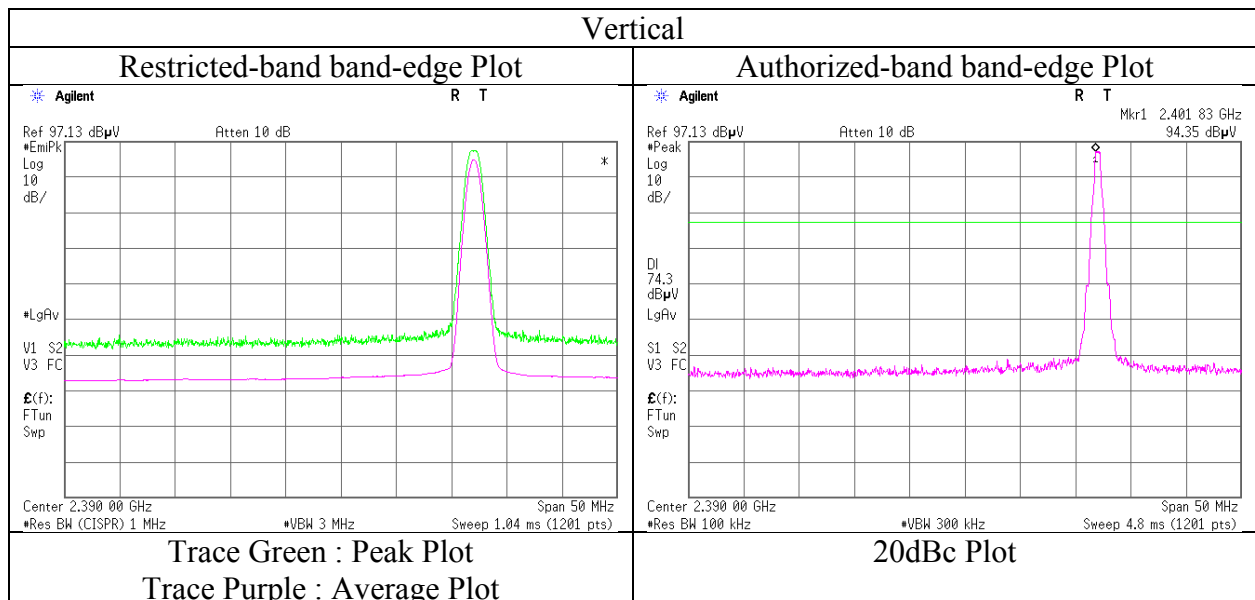
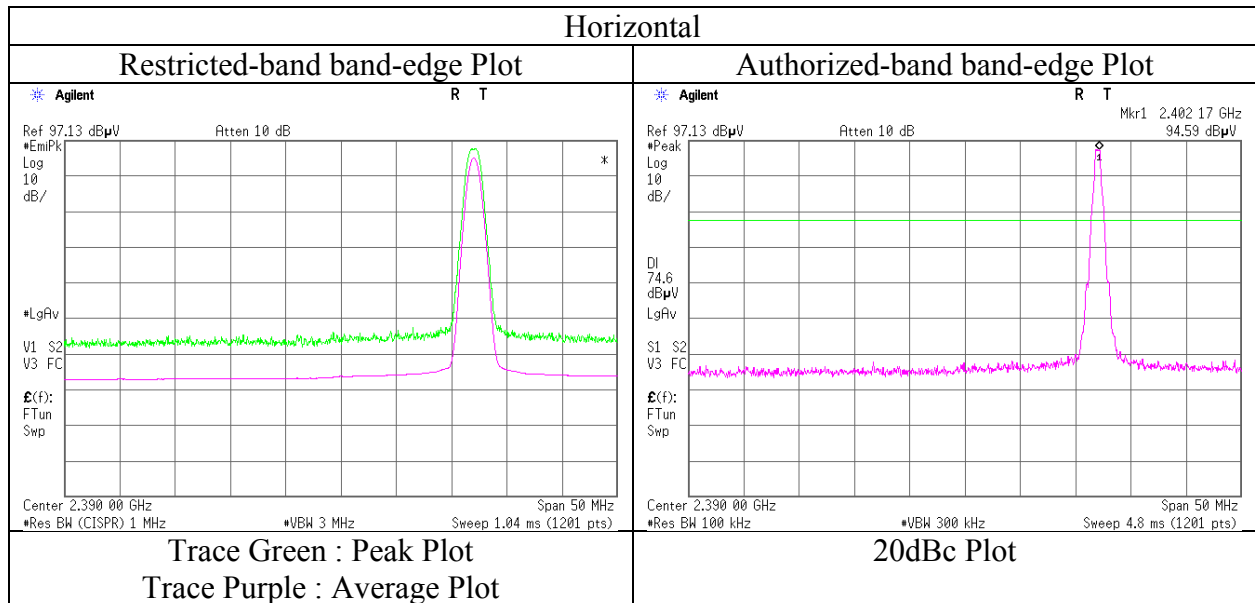
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 15, 2016
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Tomoki Matsui
	(1-10GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



* Final result of restricted band edge was shown in tabular data.

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Ise EMC Lab.

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Yuta Moriya Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.925	QP	22.5	15.3	7.1	32.2	12.7	40.0	27.3	
Hori	120.100	QP	30.3	12.4	8.3	32.2	18.8	43.5	24.7	
Hori	168.000	QP	27.3	15.7	8.7	32.1	19.6	43.5	23.9	
Hori	216.000	QP	30.2	11.8	9.2	32.0	19.2	43.5	24.3	
Hori	407.990	QP	31.4	15.8	10.6	31.9	25.9	46.0	20.1	
Hori	799.800	QP	22.5	20.8	12.9	31.5	24.7	46.0	21.3	
Hori	4882.000	PK	39.3	31.9	9.0	31.7	48.5	73.9	25.4	Floor Noise
Hori	7323.000	PK	40.2	36.0	10.3	32.6	53.9	73.9	20.0	Floor Noise
Hori	9764.000	PK	41.5	38.2	11.0	33.3	57.4	73.9	16.5	Floor Noise
Hori	4882.000	AV	27.6	31.9	9.0	31.7	36.8	53.9	17.1	Floor Noise
Hori	7323.000	AV	28.4	36.0	10.3	32.6	42.1	53.9	11.8	Floor Noise
Hori	9764.000	AV	29.1	38.2	11.0	33.3	45.0	53.9	8.9	Floor Noise
Vert	35.925	QP	31.5	15.3	7.1	32.2	21.7	40.0	18.3	
Vert	120.100	QP	37.2	12.4	8.3	32.2	25.7	43.5	17.8	
Vert	168.000	QP	35.5	15.7	8.7	32.1	27.8	43.5	15.7	
Vert	216.000	QP	35.9	11.8	9.2	32.0	24.9	43.5	18.6	
Vert	407.990	QP	26.6	15.8	10.6	31.9	21.1	46.0	24.9	
Vert	799.800	QP	26.7	20.8	12.9	31.5	28.9	46.0	17.1	
Vert	4882.000	PK	39.9	31.9	9.0	31.7	49.1	73.9	24.8	Floor Noise
Vert	7323.000	PK	40.9	36.0	10.3	32.6	54.6	73.9	19.3	Floor Noise
Vert	9764.000	PK	41.6	38.2	11.0	33.3	57.5	73.9	16.4	Floor Noise
Vert	4882.000	AV	27.6	31.9	9.0	31.7	36.8	53.9	17.1	Floor Noise
Vert	7323.000	AV	28.2	36.0	10.3	32.6	41.9	53.9	12.0	Floor Noise
Vert	9764.000	AV	29.0	38.2	11.0	33.3	44.9	53.9	9.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.52\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Yuta Moriya Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.653	QP	22.4	15.4	7.1	32.2	12.7	40.0	27.3	
Hori	120.100	QP	30.2	12.4	8.3	32.2	18.7	43.5	24.8	
Hori	168.000	QP	27.5	15.7	8.7	32.1	19.8	43.5	23.7	
Hori	216.000	QP	30.3	11.8	9.2	32.0	19.3	43.5	24.2	
Hori	407.988	QP	31.7	15.8	10.6	31.9	26.2	46.0	19.8	
Hori	799.966	QP	22.5	20.8	12.9	31.5	24.7	46.0	21.3	
Hori	2483.500	PK	49.2	26.9	6.8	32.6	50.3	73.9	23.6	
Hori	4960.000	PK	39.4	32.1	8.9	31.7	48.7	73.9	25.2	Floor Noise
Hori	7440.000	PK	40.3	36.0	10.2	32.7	53.8	73.9	20.1	Floor Noise
Hori	9920.000	PK	41.3	38.2	11.1	33.4	57.2	73.9	16.7	Floor Noise
Hori	2483.500	AV	32.3	26.9	6.8	32.6	33.4	53.9	20.5	
Hori	4960.000	AV	27.5	32.1	8.9	31.7	36.8	53.9	17.1	Floor Noise
Hori	7440.000	AV	28.5	36.0	10.2	32.7	42.0	53.9	11.9	Floor Noise
Hori	9920.000	AV	29.2	38.2	11.1	33.4	45.1	53.9	8.8	Floor Noise
Vert	35.653	QP	31.7	15.4	7.1	32.2	22.0	40.0	18.0	
Vert	120.100	QP	36.7	12.4	8.3	32.2	25.2	43.5	18.3	
Vert	168.000	QP	35.7	15.7	8.7	32.1	28.0	43.5	15.5	
Vert	216.000	QP	36.0	11.8	9.2	32.0	25.0	43.5	18.5	
Vert	407.988	QP	26.7	15.8	10.6	31.9	21.2	46.0	24.8	
Vert	799.966	QP	26.7	20.8	12.9	31.5	28.9	46.0	17.1	
Vert	2483.500	PK	44.6	26.9	6.8	32.6	45.7	73.9	28.2	
Vert	4960.000	PK	39.8	32.1	8.9	31.7	49.1	73.9	24.8	Floor Noise
Vert	7440.000	PK	40.8	36.0	10.2	32.7	54.3	73.9	19.6	Floor Noise
Vert	9920.000	PK	41.2	38.2	11.1	33.4	57.1	73.9	16.8	Floor Noise
Vert	2483.500	AV	31.9	26.9	6.8	32.6	33.0	53.9	21.0	
Vert	4960.000	AV	27.7	32.1	8.9	31.7	37.0	53.9	16.9	Floor Noise
Vert	7440.000	AV	28.3	36.0	10.2	32.7	41.8	53.9	12.1	Floor Noise
Vert	9920.000	AV	29.1	38.2	11.1	33.4	45.0	53.9	8.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

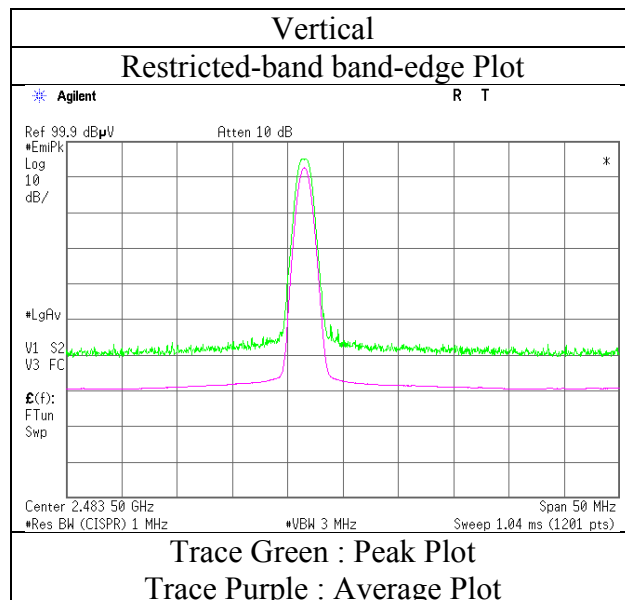
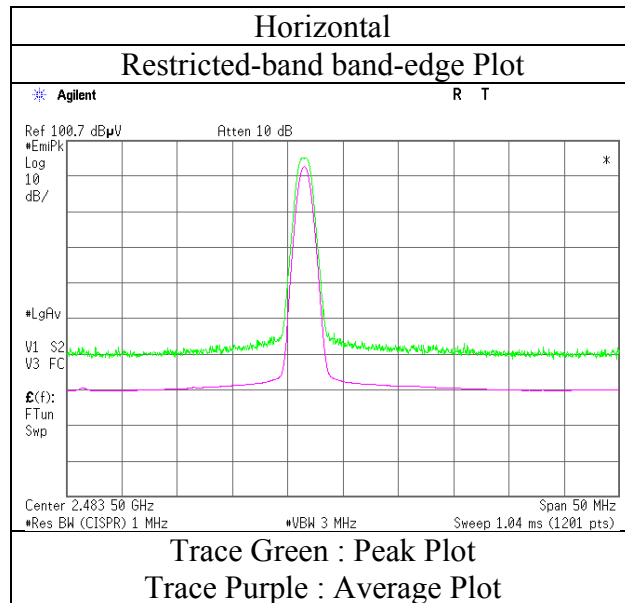
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.52\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 15, 2016
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Yuta Moriya (1-10GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Yuta Moriya Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.933	QP	22.5	15.3	7.1	32.2	12.7	40.0	27.3	
Hori	120.100	QP	30.6	12.4	8.3	32.2	19.1	43.5	24.4	
Hori	168.000	QP	27.9	15.7	8.7	32.1	20.2	43.5	23.3	
Hori	216.000	QP	30.2	11.8	9.2	32.0	19.2	43.5	24.3	
Hori	408.022	QP	32.0	15.8	10.6	31.9	26.5	46.0	19.5	
Hori	799.772	QP	22.7	20.8	12.9	31.5	24.9	46.0	21.1	
Hori	2390.000	PK	42.4	26.9	6.8	32.7	43.4	73.9	30.5	
Hori	4804.000	PK	38.9	31.8	9.0	31.8	47.9	73.9	26.0	Floor Noise
Hori	7206.000	PK	40.9	36.0	10.2	32.6	54.5	73.9	19.4	Floor Noise
Hori	9608.000	PK	41.0	38.2	11.0	33.2	57.0	73.9	16.9	Floor Noise
Hori	2390.000	AV	29.6	26.9	6.8	32.7	30.6	53.9	23.3	
Hori	4804.000	AV	27.5	31.8	9.0	31.8	36.5	53.9	17.4	Floor Noise
Hori	7206.000	AV	28.3	36.0	10.2	32.6	41.9	53.9	12.0	Floor Noise
Hori	9608.000	AV	29.3	38.2	11.0	33.2	45.3	53.9	8.6	Floor Noise
Vert	35.933	QP	33.2	15.3	7.1	32.2	23.4	40.0	16.6	
Vert	120.100	QP	37.2	12.4	8.3	32.2	25.7	43.5	17.8	
Vert	168.000	QP	35.1	15.7	8.7	32.1	27.4	43.5	16.1	
Vert	216.000	QP	36.1	11.8	9.2	32.0	25.1	43.5	18.4	
Vert	408.022	QP	26.7	15.8	10.6	31.9	21.2	46.0	24.8	
Vert	799.772	QP	26.7	20.8	12.9	31.5	28.9	46.0	17.1	
Vert	2390.000	PK	42.0	26.9	6.8	32.7	43.0	73.9	30.9	
Vert	4804.000	PK	39.3	31.8	9.0	31.8	48.3	73.9	25.6	Floor Noise
Vert	7206.000	PK	40.7	36.0	10.2	32.6	54.3	73.9	19.6	Floor Noise
Vert	9608.000	PK	41.0	38.2	11.0	33.2	57.0	73.9	16.9	Floor Noise
Vert	2390.000	AV	29.9	26.9	6.8	32.7	30.9	53.9	23.0	
Vert	4804.000	AV	27.3	31.8	9.0	31.8	36.3	53.9	17.6	Floor Noise
Vert	7206.000	AV	28.4	36.0	10.2	32.6	42.0	53.9	11.9	Floor Noise
Vert	9608.000	AV	29.3	38.2	11.0	33.2	45.3	53.9	8.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.52\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

20dBc Data Sheet

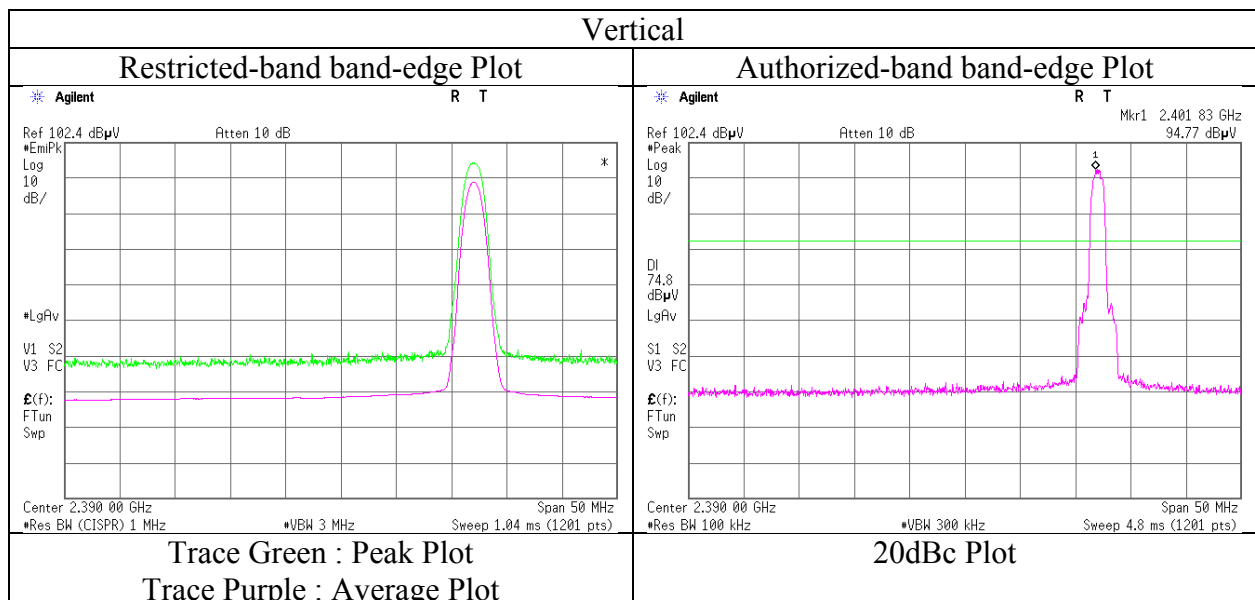
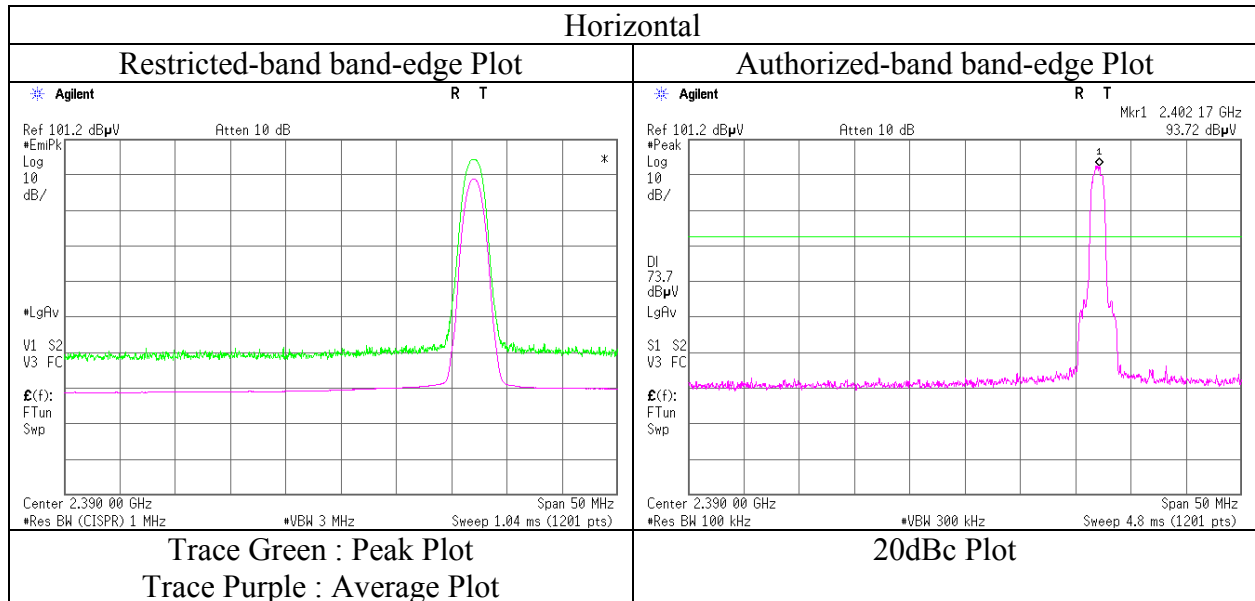
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	93.7	26.9	6.8	32.7	94.7	-	-	Carrier
Hori	2400.000	PK	37.5	26.9	6.8	32.7	38.5	74.7	36.2	
Vert	2402.000	PK	94.8	26.9	6.8	32.7	95.8	-	-	Carrier
Vert	2400.000	PK	37.9	26.9	6.8	32.7	38.9	75.8	36.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 15, 2016
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Yuta Moriya (1-10GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



* Final result of restricted band edge was shown in tabular data.

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Yuta Moriya Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.884	QP	22.5	15.4	7.1	32.2	12.8	40.0	27.2	
Hori	120.102	QP	30.5	12.4	8.3	32.2	19.0	43.5	24.5	
Hori	168.000	QP	27.6	15.7	8.7	32.1	19.9	43.5	23.6	
Hori	216.000	QP	30.3	11.8	9.2	32.0	19.3	43.5	24.2	
Hori	408.022	QP	32.3	15.8	10.6	31.9	26.8	46.0	19.2	
Hori	799.893	QP	22.4	20.8	12.9	31.5	24.6	46.0	21.4	
Hori	4882.000	PK	39.6	31.9	9.0	31.7	48.8	73.9	25.1	Floor Noise
Hori	7323.000	PK	40.8	36.0	10.3	32.6	54.5	73.9	19.4	Floor Noise
Hori	9764.000	PK	41.1	38.2	11.0	33.3	57.0	73.9	16.9	Floor Noise
Hori	4882.000	AV	27.5	31.9	9.0	31.7	36.7	53.9	17.2	Floor Noise
Hori	7323.000	AV	28.5	36.0	10.3	32.6	42.2	53.9	11.7	Floor Noise
Hori	9764.000	AV	29.2	38.2	11.0	33.3	45.1	53.9	8.8	Floor Noise
Vert	35.884	QP	32.8	15.4	7.1	32.2	23.1	40.0	16.9	
Vert	120.102	QP	37.3	12.4	8.3	32.2	25.8	43.5	17.7	
Vert	168.000	QP	34.8	15.7	8.7	32.1	27.1	43.5	16.4	
Vert	216.000	QP	36.4	11.8	9.2	32.0	25.4	43.5	18.1	
Vert	408.022	QP	26.5	15.8	10.6	31.9	21.0	46.0	25.0	
Vert	799.893	QP	26.2	20.8	12.9	31.5	28.4	46.0	17.6	
Vert	4882.000	PK	39.6	31.9	9.0	31.7	48.8	73.9	25.1	Floor Noise
Vert	7323.000	PK	40.9	36.0	10.3	32.6	54.6	73.9	19.3	Floor Noise
Vert	9764.000	PK	41.1	38.2	11.0	33.3	57.0	73.9	16.9	Floor Noise
Vert	4882.000	AV	27.6	31.9	9.0	31.7	36.8	53.9	17.1	Floor Noise
Vert	7323.000	AV	28.6	36.0	10.3	32.6	42.3	53.9	11.6	Floor Noise
Vert	9764.000	AV	29.1	38.2	11.0	33.3	45.0	53.9	8.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.52\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Test place : Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11249046H
Date : April 15, 2016 April 18, 2016
Temperature / Humidity : 21 deg. C / 40 % RH 20 deg. C / 55 % RH
Engineer : Yuta Moriya Yuta Moriya
(1-10GHz) (Above 10GHz and Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.894	QP	22.5	15.4	7.1	32.2	12.8	40.0	27.2	
Hori	120.102	QP	30.6	12.4	8.3	32.2	19.1	43.5	24.4	
Hori	168.000	QP	27.5	15.7	8.7	32.1	19.8	43.5	23.7	
Hori	216.000	QP	30.1	11.8	9.2	32.0	19.1	43.5	24.4	
Hori	408.011	QP	32.5	15.8	10.6	31.9	27.0	46.0	19.0	
Hori	799.897	QP	22.7	20.8	12.9	31.5	24.9	46.0	21.1	
Hori	2483.500	PK	44.6	26.9	6.8	32.6	45.7	73.9	28.3	
Hori	4960.000	PK	39.5	32.1	8.9	31.7	48.8	73.9	25.1	Floor Noise
Hori	7440.000	PK	40.3	36.0	10.2	32.7	53.8	73.9	20.1	Floor Noise
Hori	9920.000	PK	41.2	38.2	11.1	33.4	57.1	73.9	16.8	Floor Noise
Hori	2483.500	AV	32.1	26.9	6.8	32.6	33.2	53.9	20.7	
Hori	4960.000	AV	27.6	32.1	8.9	31.7	36.9	53.9	17.0	Floor Noise
Hori	7440.000	AV	28.6	36.0	10.2	32.7	42.1	53.9	11.8	Floor Noise
Hori	9920.000	AV	29.1	38.2	11.1	33.4	45.0	53.9	8.9	Floor Noise
Vert	35.894	QP	32.7	15.4	7.1	32.2	23.0	40.0	17.0	
Vert	120.102	QP	37.2	12.4	8.3	32.2	25.7	43.5	17.8	
Vert	168.000	QP	34.3	15.7	8.7	32.1	26.6	43.5	16.9	
Vert	216.000	QP	36.1	11.8	9.2	32.0	25.1	43.5	18.4	
Vert	408.011	QP	26.7	15.8	10.6	31.9	21.2	46.0	24.8	
Vert	799.897	QP	26.6	20.8	12.9	31.5	28.8	46.0	17.2	
Vert	2483.500	PK	44.8	26.9	6.8	32.6	45.9	73.9	28.0	
Vert	4960.000	PK	39.9	32.1	8.9	31.7	49.2	73.9	24.7	Floor Noise
Vert	7440.000	PK	41.0	36.0	10.2	32.7	54.5	73.9	19.4	Floor Noise
Vert	9920.000	PK	41.2	38.2	11.1	33.4	57.1	73.9	16.8	Floor Noise
Vert	2483.500	AV	32.0	26.9	6.8	32.6	33.1	53.9	20.8	
Vert	4960.000	AV	27.7	32.1	8.9	31.7	37.0	53.9	16.9	Floor Noise
Vert	7440.000	AV	28.4	36.0	10.2	32.7	41.9	53.9	12.0	Floor Noise
Vert	9920.000	AV	29.1	38.2	11.1	33.4	45.0	53.9	8.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

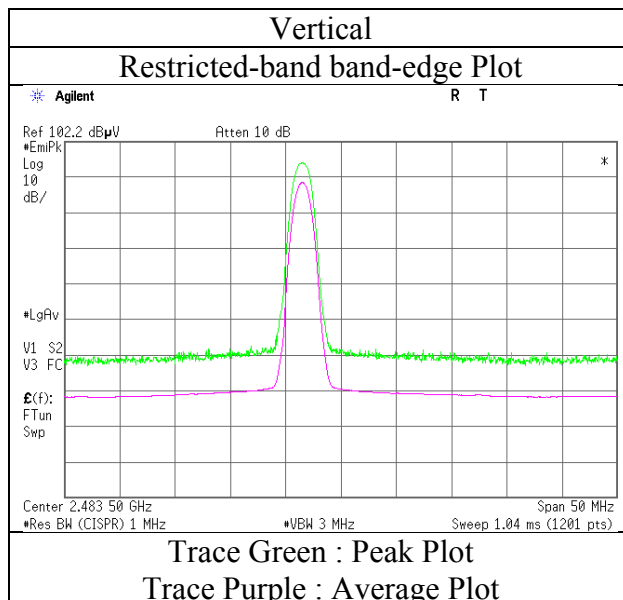
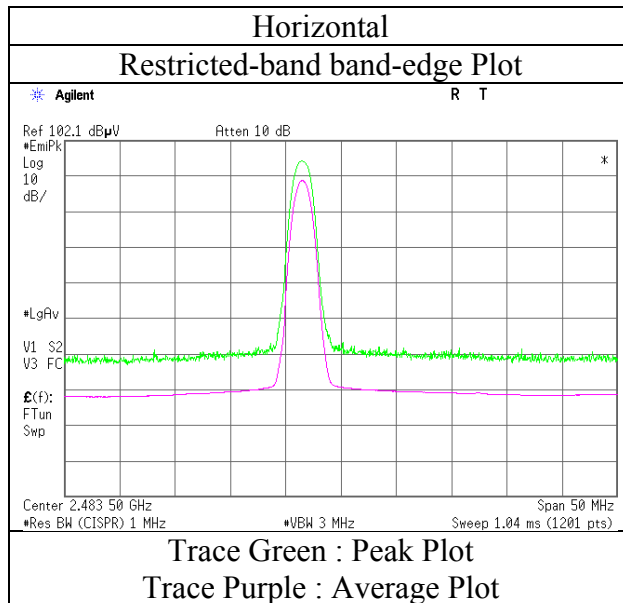
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.52\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission (Reference Plot for band-edge)

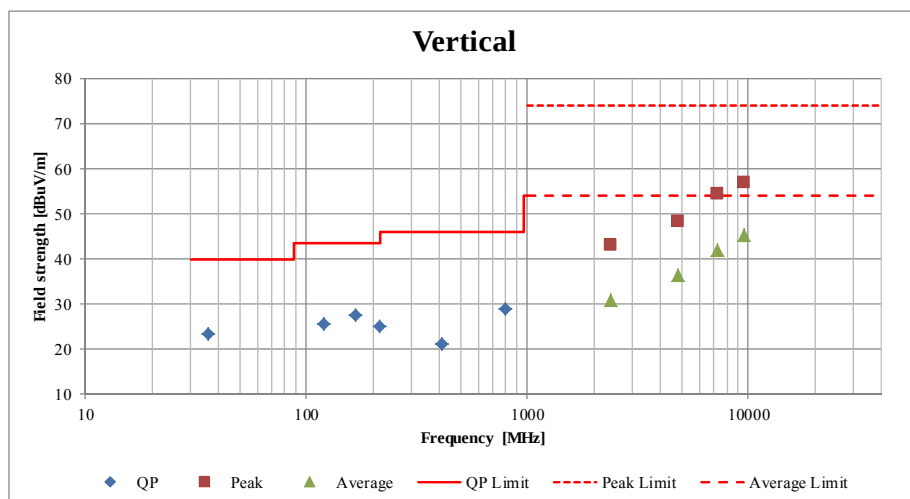
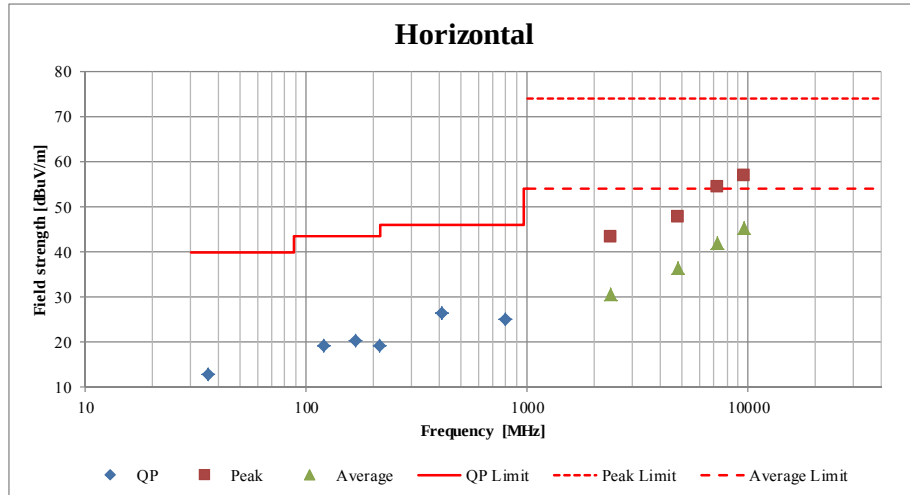
Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11249046H
Date	April 15, 2016
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Yuta Moriya (1-10GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission **(Plot data, Worst case)**

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11249046H		
Date	April 15, 2016	April 18, 2016	
Temperature / Humidity	21 deg. C / 40 % RH	20 deg. C / 55 % RH	
Engineer	Yuta Moriya	Yuta Moriya	
	(1-10GHz)	(Above 10GHz and Below 1GHz)	
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

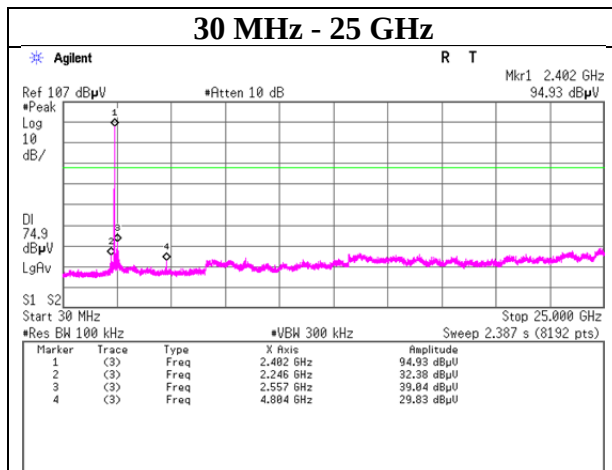
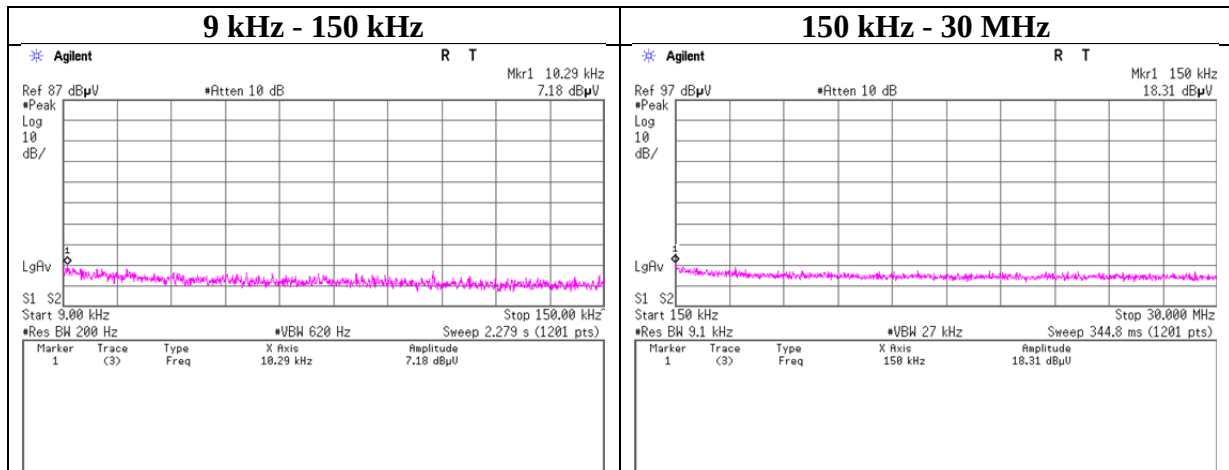


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	11249046H
Date	April 19, 2016
Temperature / Humidity	22 deg. C / 35% RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, DH5

2402 MHz



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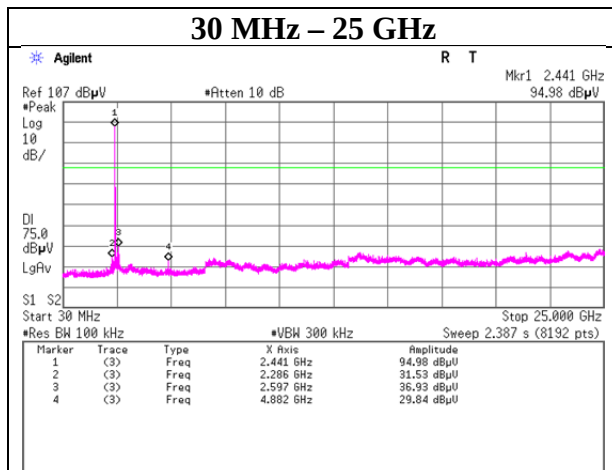
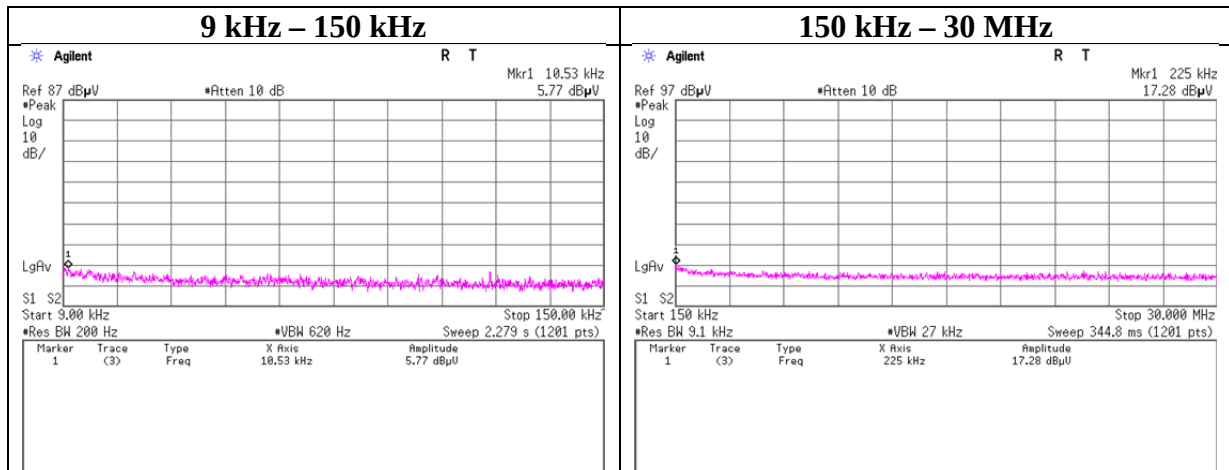
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35% RH
Engineer : Shinichi Miyazono
Mode : Tx, Hopping Off, DH5

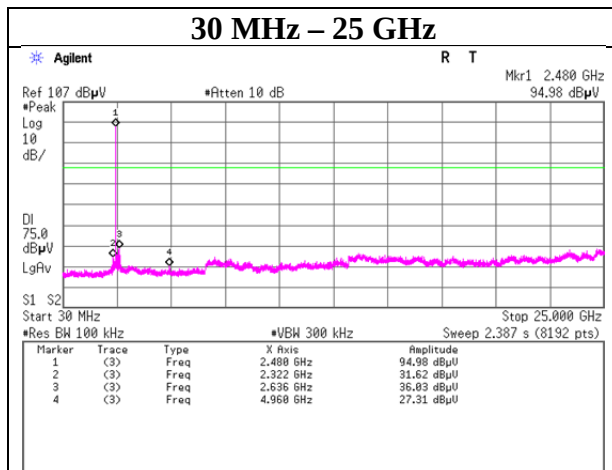
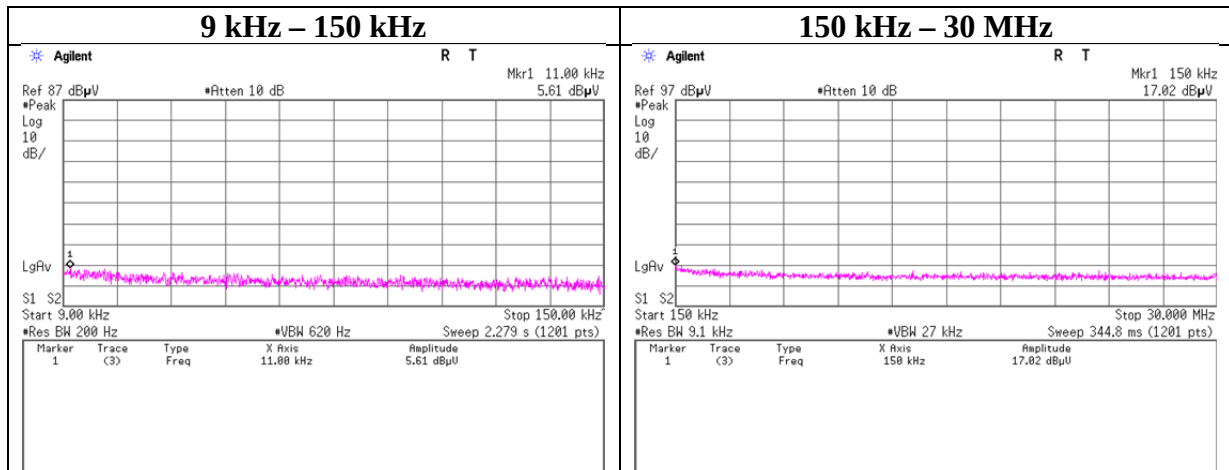
2441 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35% RH
Engineer : Shinichi Miyazono
Mode : Tx, Hopping Off, DH5

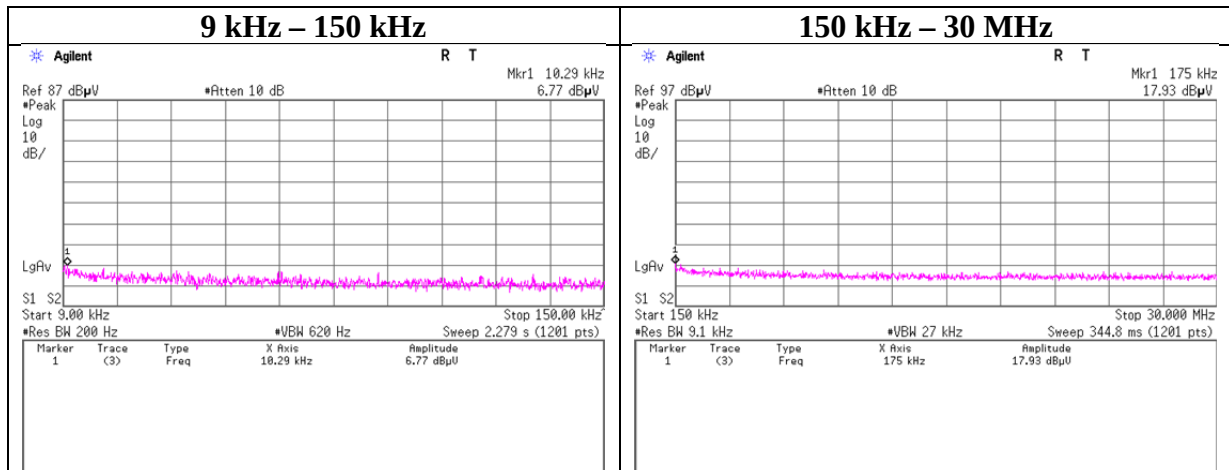
2480 MHz



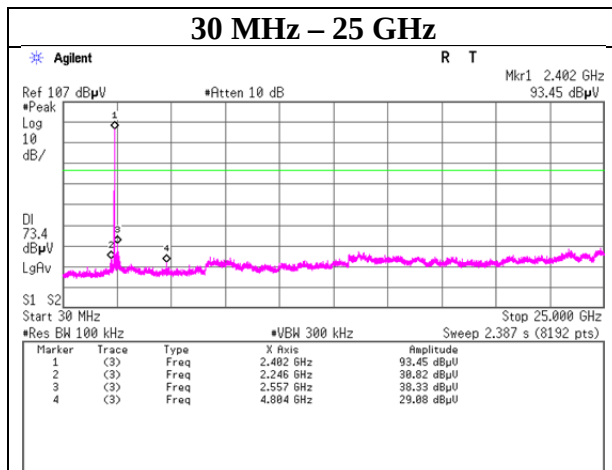
Conducted Spurious Emission

Test place Ise EMC Lab. No.4 Measurement Room
Report No. 11249046H
Date April 19, 2016
Temperature / Humidity 22 deg. C / 35% RH
Engineer Shinichi Miyazono
Mode Tx, Hopping Off, 3DH5

2402 MHz



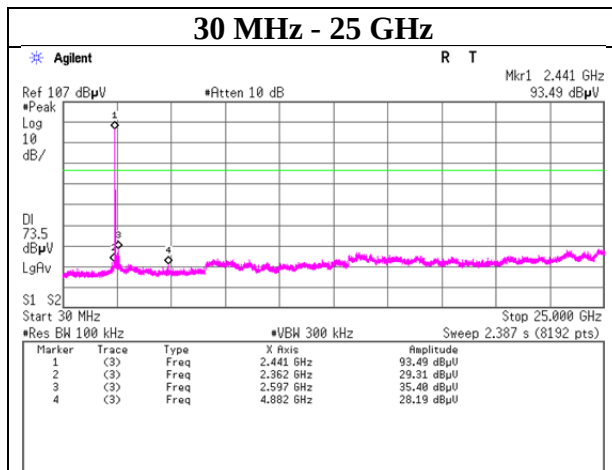
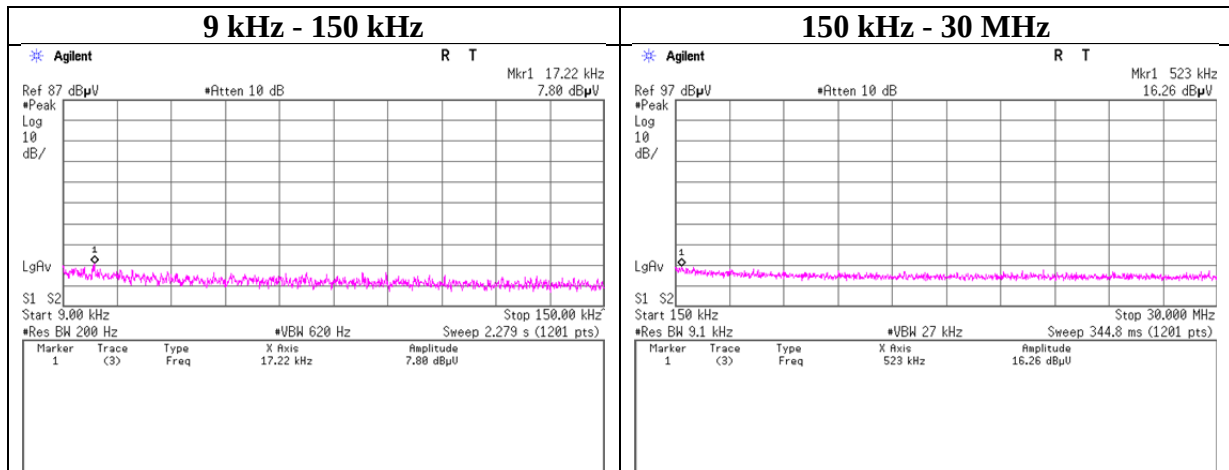
30 MHz – 25 GHz



Conducted Spurious Emission

Test place Ise EMC Lab. No.4 Measurement Room
Report No. 11249046H
Date April 19, 2016
Temperature / Humidity 22 deg. C / 35% RH
Engineer Shinichi Miyazono
Mode Tx, Hopping Off, 3DH5

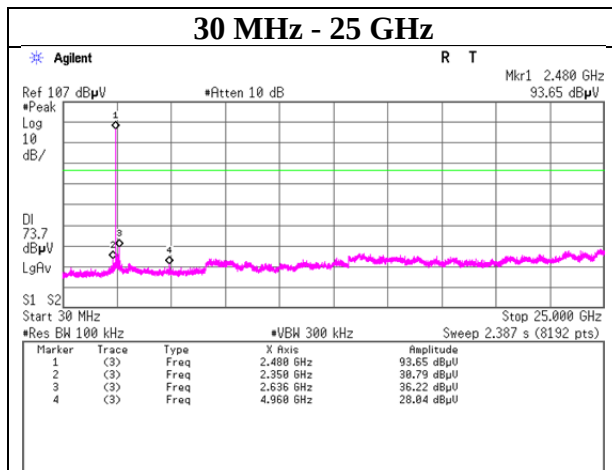
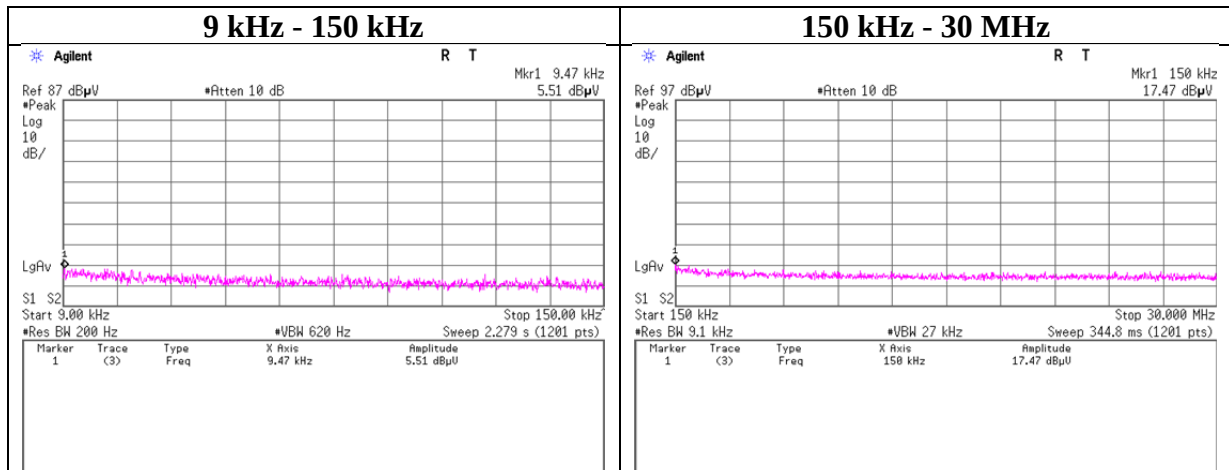
2441 MHz



Conducted Spurious Emission

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	11249046H
Date	April 19, 2016
Temperature / Humidity	22 deg. C / 35% RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, 3DH5

2480 MHz



UL Japan, Inc.

Ise EMC Lab.

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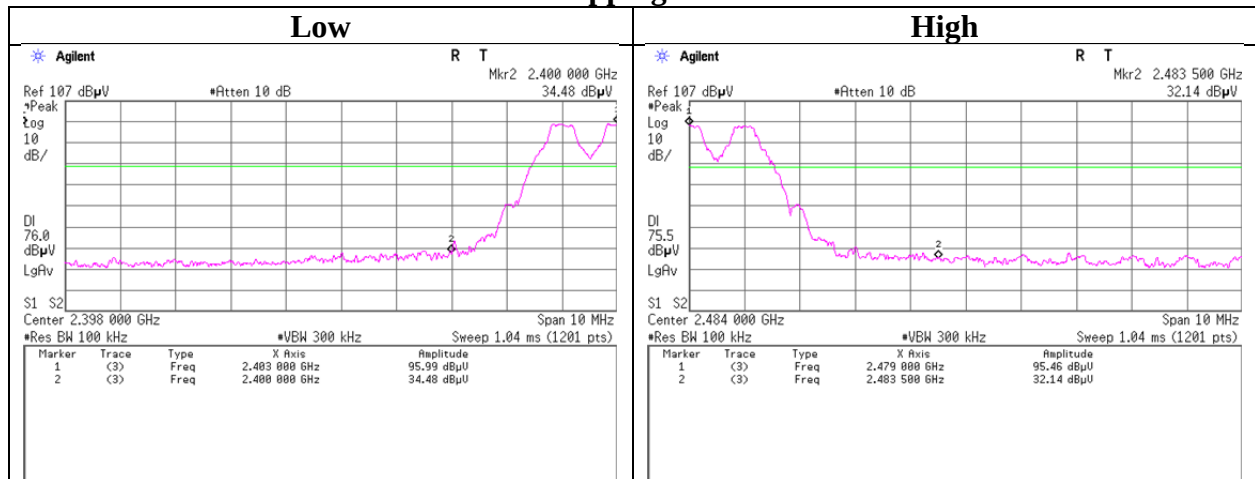
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

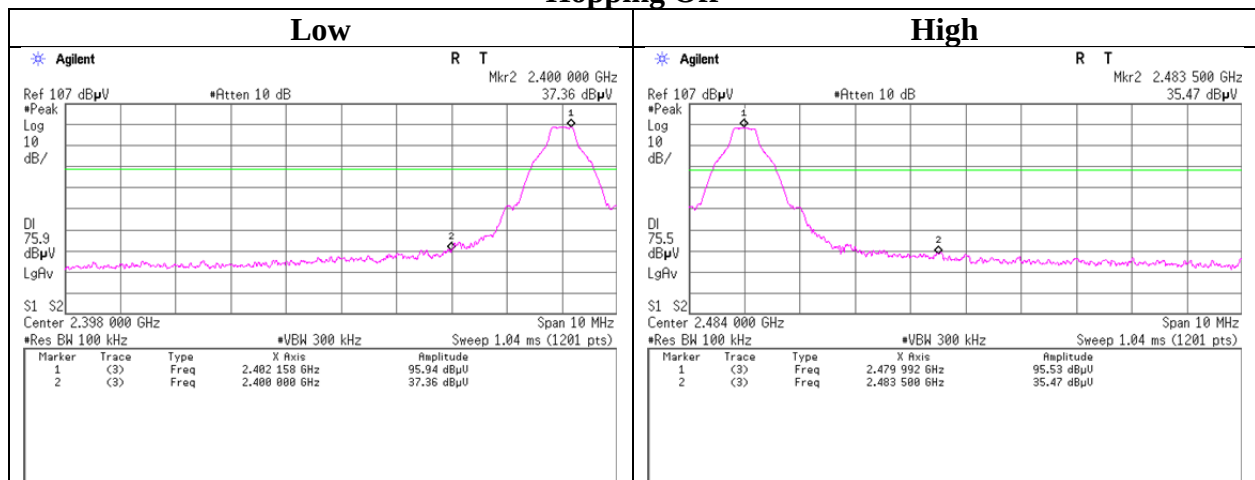
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.4 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35% RH
Engineer : Shinichi Miyazono
Mode : Tx DH5

Hopping On



Hopping Off



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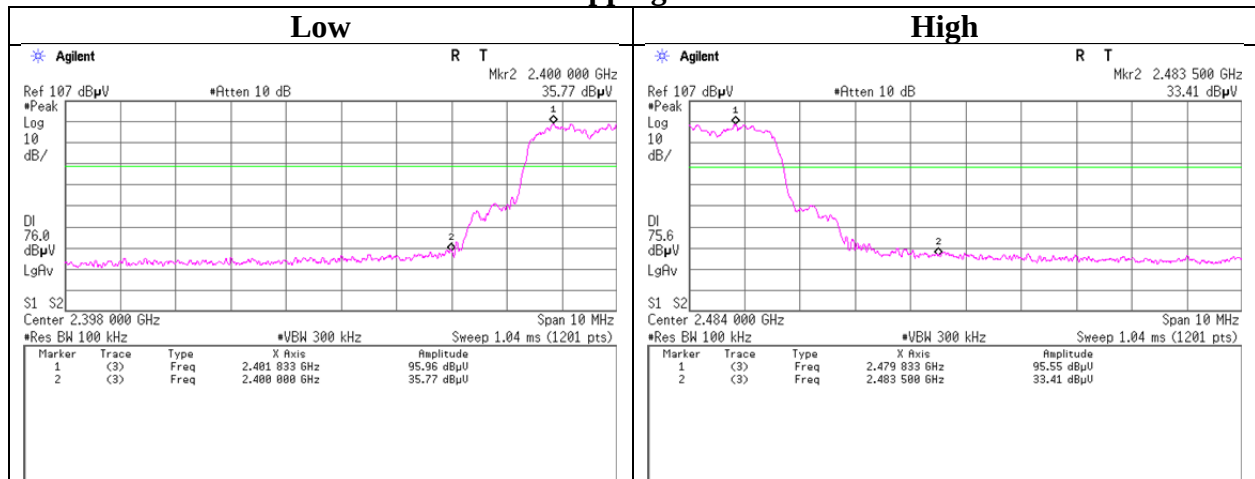
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

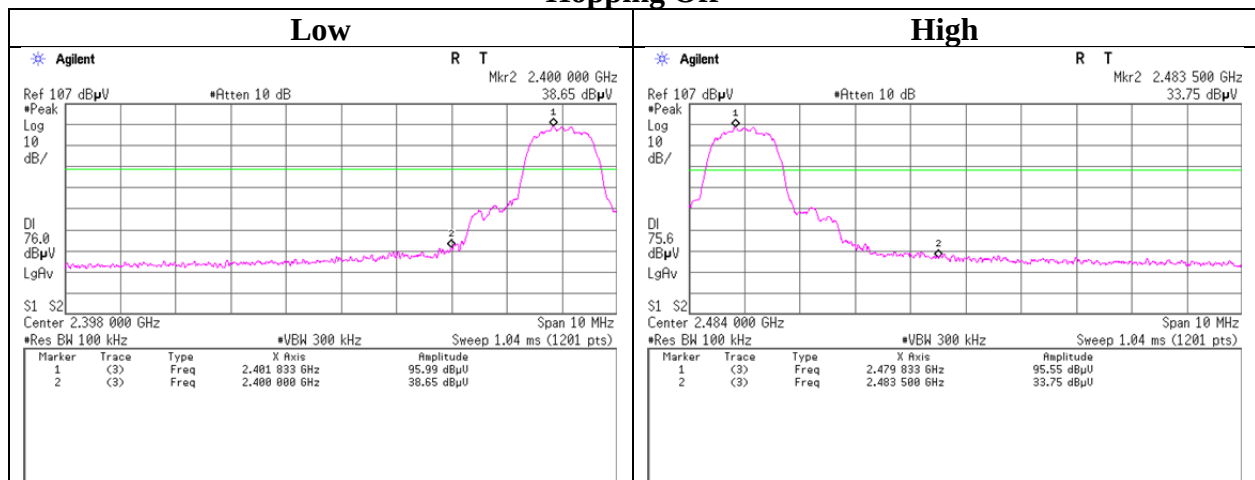
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.4 Measurement Room
Report No. : 11249046H
Date : April 19, 2016
Temperature / Humidity : 22 deg. C / 35% RH
Engineer : Shinichi Miyazono
Mode : Tx 3DH5

Hopping On



Hopping Off



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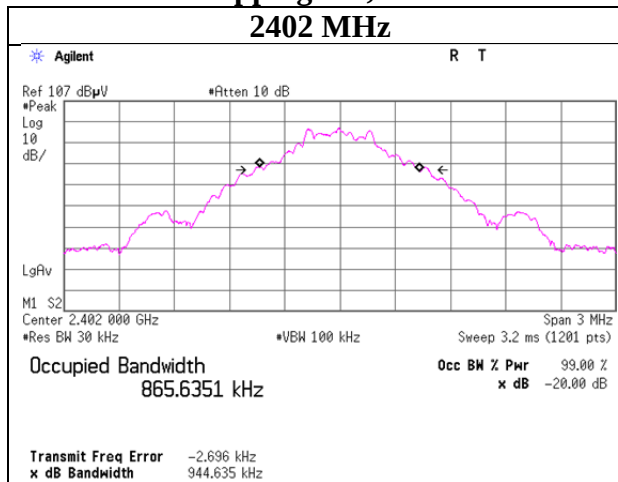
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

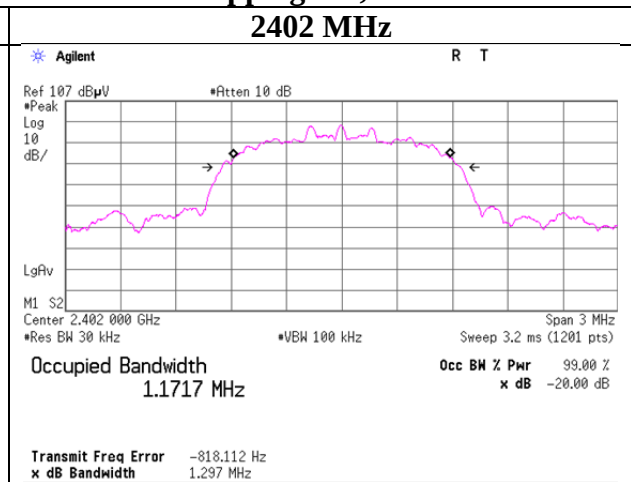
99%Occupied Bandwidth

Test place Ise EMC Lab. No.4 Measurement Room
Report No. 11249046H
Date April 19, 2016
Temperature / Humidity 22 deg. C / 35% RH
Engineer Shinichi Miyazono
Mode Tx Hopping Off

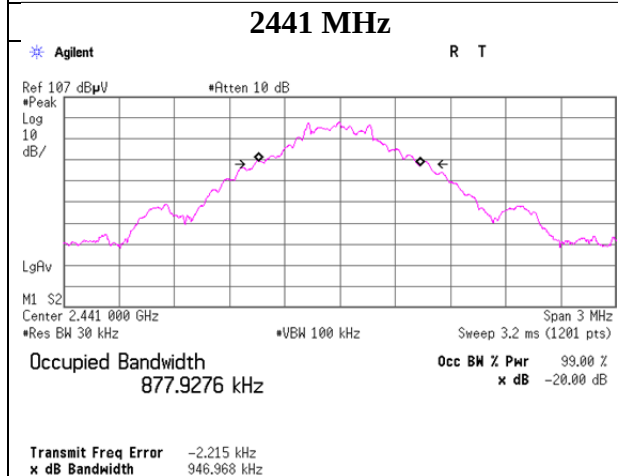
Hopping Off, DH5



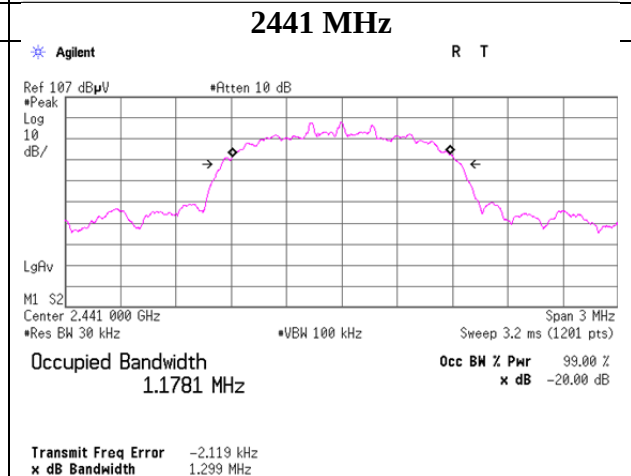
Hopping Off, 3DH5



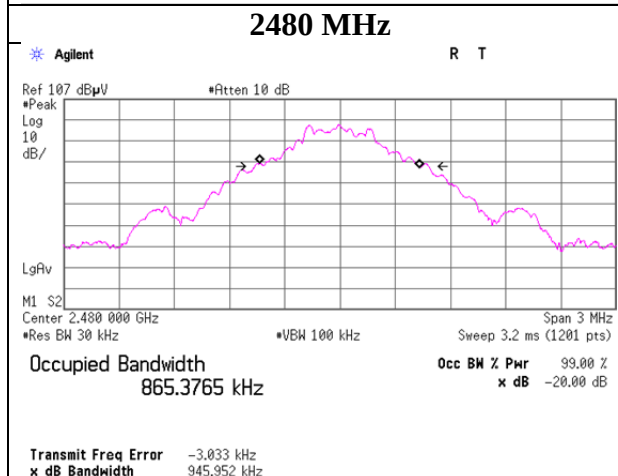
2441 MHz



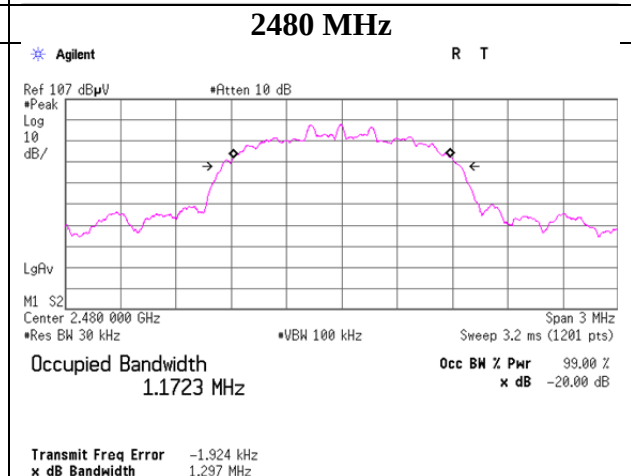
2441 MHz



2480 MHz



2480 MHz



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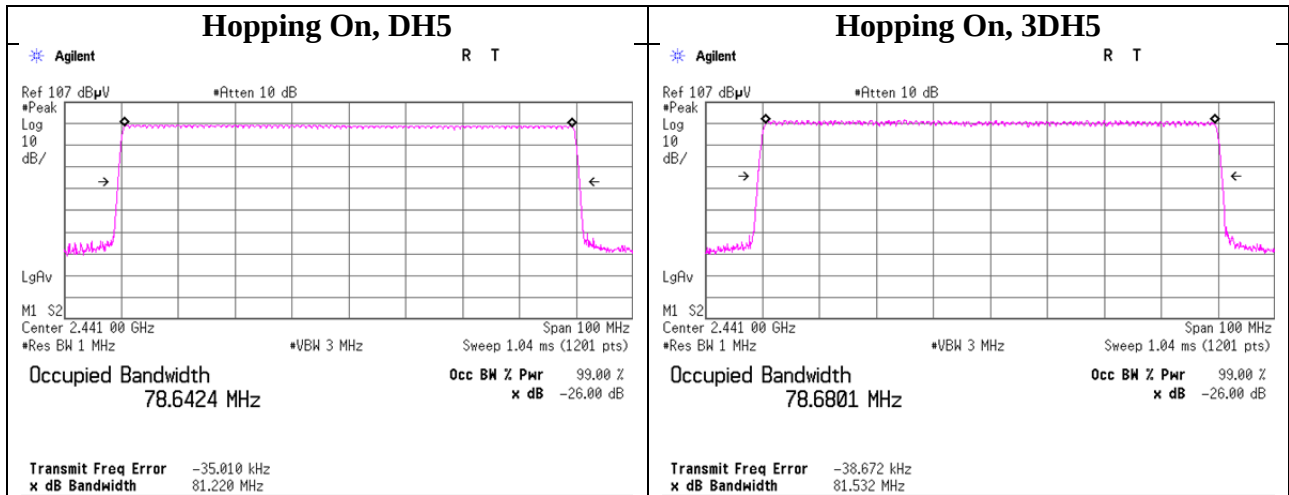
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99% Occupied Bandwidth

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	11249046H
Date	April 19, 2016
Temperature / Humidity	22 deg. C / 35% RH
Engineer	Shinichi Miyazono
Mode	Tx Hopping On



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE/CE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/CE/AT	2016/02/24 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2016/03/24 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE/CE	2016/01/13 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2015/09/16 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2015/05/19 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2015/09/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2015/10/11 * 12
MLA-22	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2016/01/30 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2016/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2015/07/10 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2016/01/12 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2015/07/02 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MOS-29	Thermo-Hygrometer	Custom	CTH-201	2901	AT	2016/01/21 * 12
MAT-92	Attenuator	Weinschel Associates	WA56-10	56100308	AT	2015/06/01 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2015/10/08 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2015/11/11 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2015/11/11 * 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 test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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