RADIO TEST REPORT

Test Report No. : 11047825H-B-R1

Applicant	:	**KEYENCE CORPORATION**
Type of Equipment	:	**Handheld Code Reader**
Model No.	:	**HR-100B**
FCC ID	:	**RF41399A**
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)
7. This report is a revised version of 11047825H-B. 11047825H-B is replaced with this report.

Date of test: November 12 and 13, 2015

Representative test engineer:
T. Shimada
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
Takayuki Shimada
Engineer
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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REVISION HISTORY

Original Test Report No.: 11047825H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11047825H-B	December 15, 2015	-	-
1	11047825H-B-R1	December 22, 2015	P.10, 11	Correction of Configuration and peripherals

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SECTION 1: Customer information

Company Name	:	KEYENCE CORPORATION
Address	:	1-3-14, Higashinakajima Higashiyodogawa-ku, Osaka 533-8555 Japan
Telephone Number	:	+81-6-6379-1197
Facsimile Number	:	+81-6-6325-6818
Contact Person	:	Kazuhiko Morishita

*Remarks:
KEYENCE CORPORATION designates METRO (SUZHOU) TECHNOLOGIES CO LTD as manufacturer of the product (Handheld Code Reader).

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

2.1 Identification of E.U.T.

Type of Equipment	:	Handheld Code Reader
Model No.	:	HR-100B
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	3.75 V (Battery Pack)
Receipt Date of Sample	:	November 12, 2015
Country of Mass-production	:	China
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

Model: HR-100B (referred to as the EUT in this report) is a Handheld Code Reader.

Variant Model

This HR-100B has a Variant Model.
The diffrences between HR-100B and HR-101B are as follows.

Reading specifications		HR-100B	HR-101B
Minimum resolution	2D code	0.169 mm	0.127 mm
	Barcode	0.127 mm	0.076 mm
Reading distance (Typical examples)	2D code	15 mm to 180 mm (Cell size: 0.254 mm)	0 mm to 114 mm (Cell size: 0.254 mm)
	Barcode	25 mm to 115 mm (Narrow bar width 0.127 mm)	0 mm to 96 mm (Narrow bar width 0.127 mm)
Focal distance		100 mm	50 mm
Field of view in focal distance		106 mm × 80 mm	64 mm × 49 mm

General Specification

Clock frequency(ies) in the system	:	Crystal: 26 MHz CPU: 400 MHz Memory : 133 MHz Y2 : 26 MHz Y3 : 24 MHz USB : 12 MHz Power supplies : 1.6 MHz Y1 : 32.768 KHz

Radio Specification

[Bluetooth (Ver. 2.1 without EDR function)]

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 3.3 V
Antenna type	:	MULTILAYER CHIP ANTENNA
Antenna Gain	:	2 dBi (Peak)

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4-2009 7. AC powerline conducted emission measurements **IC:** RSS-Gen 8.8	**FCC:** Section 15.207 **IC:** RSS-Gen 8.8	**QP** 13.7 dB, 0.64690 MHz, L **AV** 9.9 dB, 0.64690 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	1.8 dB 4882.000 MHz, AV, Horizontal.	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: 2009 is also referred.

FCC Part 15.31 (e)

This EUT provides stable voltage(DC3.3 V) constantly to RF Module 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 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 $k = 2$.

Ise EMC Lab.

Test site (semi anechoic chamber)	Conducted emission Uncertainty (+/-)			
	No. 1	No. 2	No. 3	No. 4
150 kHz - 30 MHz	3.5 dB	3.5 dB	3.4 dB	3.5 dB

Test site (semi anechoic chamber)	Radiated emission Uncertainty (+/-)						
	Measurement distance: 3 m				1 m		0.5 m
	9 kHz - 30 MHz	30 MHz - 300 MHz	300 MHz - 1 GHz	1 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz
No. 1	4.3 dB	5.1 dB	6.2 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No. 2	4.2 dB	5.1 dB	6.2 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No. 3	4.4 dB	5.1 dB	6.3 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No. 4	4.7 dB	5.3 dB	6.3 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

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	2.6 dB

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.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

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	-	-

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz

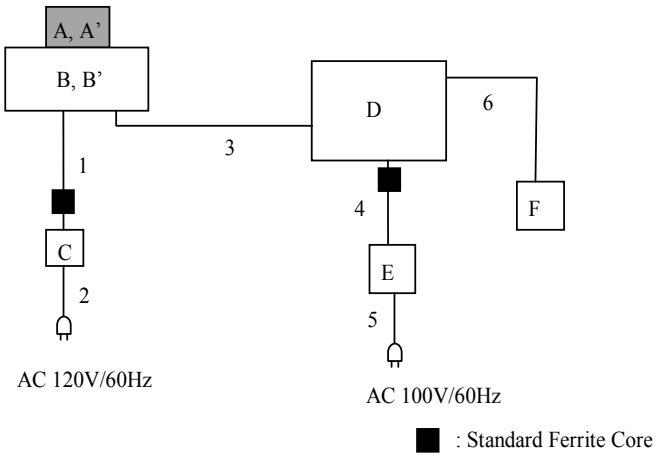
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
* It is considered 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.

*EUT has the power settings by the software as follows;
Power settings: same as production model
Software: Software: BJ000244BBA.Nov.8.2015

*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

Conducted emission test and Radiated emission test (Below 1 GHz)



Radiated emission test (Above 1 GHz)

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Handheld Code Reader	HR-100B	15209B0720	METRO (SUZHOU) TECHNOLOGIES CO LTD	EUT
A'	Handheld Code Reader	HR-100B	S41	METRO (SUZHOU) TECHNOLOGIES CO LTD	EUT *1)
B	Communication Unit	HR-UC1	15239B4C16	METRO (SUZHOU) TECHNOLOGIES CO LTD	-
B'	Communication Unit	HR-UC1	15236132E0D	METRO (SUZHOU) TECHNOLOGIES CO LTD	-
C	AC adapter	OP-88046	001	KEYENCE	-
D	Laptop PC	FMVNAGHM	R2X00554	FUJITSU	-
E	AC adapter	ADP-65JH ABZ	CP500581-01	FUJITSU	-
F	Mouse	M-MTURBK/RS	18015353C	ELECOM	-

*1) Used for Antenna Terminal conducted test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.6	Unshielded	Unshielded	-
2	AC Cable	2.0	Unshielded	Unshielded	-
3	RS-232C Cable	1.5	Shielded	Shielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-
5	AC Cable	1.0	Unshielded	Unshielded	-
6	Mouse Cable	1.5	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform 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

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.
The height of the measuring antenna varied between 1 m 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 300 MHz	300 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	3 m (below 10 GHz), 1 m*2) (above 10 GHz)		3 m (below 10 GHz), 1 m*2) (above 10 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 x log (3.0 m / 1.0 m) = 9.5 dB

The carrier level and noise levels were confirmed at each position of X, Y and Z axes and with Cradle 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

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

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

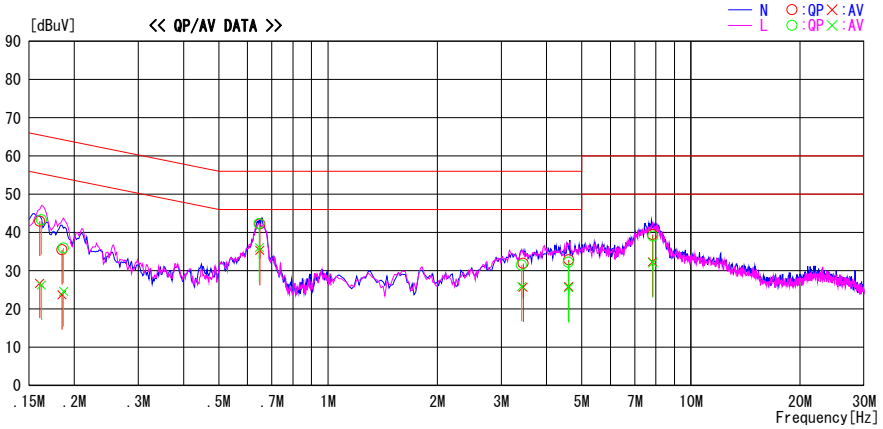
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/11/13

Report No. : 11047825H

Temp./Humi. : 22deg. C / 56% RH
Engineer : Koji Yamamoto

Mode / Remarks : DH5 2402MHz

LIMIT : FCC15.107(a) QP ClassB
FCC15.107(a) AV ClassB



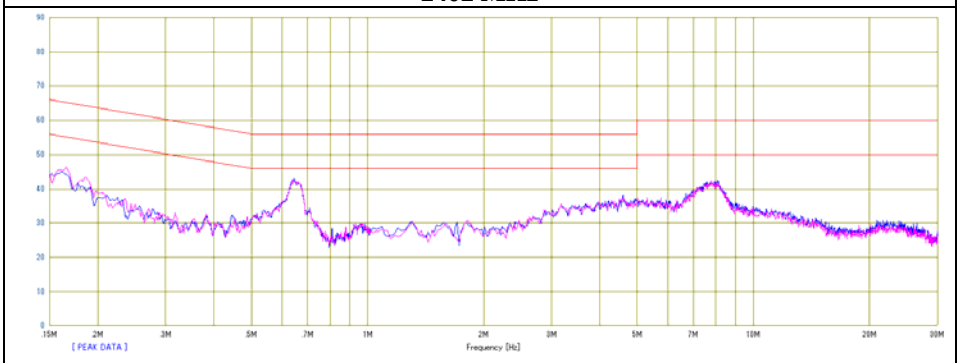
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16046	29.5	13.3	13.4	42.9	26.7	65.4	55.4	22.5	28.7	N	
0.18487	22.1	10.3	13.4	35.5	23.7	64.3	54.3	28.8	30.6	N	
0.64864	28.8	21.9	13.4	42.2	35.3	56.0	46.0	13.8	10.7	N	
3.44812	18.2	12.0	13.7	31.9	25.7	56.0	46.0	24.1	20.3	N	
4.60345	19.1	12.2	13.7	32.8	25.9	56.0	46.0	23.2	20.1	N	
7.83252	25.5	18.3	14.0	39.5	32.3	60.0	50.0	20.5	17.7	N	
0.16220	29.9	12.8	13.4	43.3	26.2	65.4	55.4	22.1	29.2	L	
0.18661	22.5	11.2	13.4	35.9	24.6	64.2	54.2	28.3	29.6	L	
0.64690	28.9	22.7	13.4	42.3	36.1	56.0	46.0	13.7	9.9	L	
3.41563	17.8	12.2	13.7	31.5	25.9	56.0	46.0	24.5	20.1	L	
4.60018	18.5	11.9	13.7	32.2	25.6	56.0	46.0	23.8	20.4	L	
7.85070	25.0	18.1	14.0	39.0	32.1	60.0	50.0	21.0	17.9	L	

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

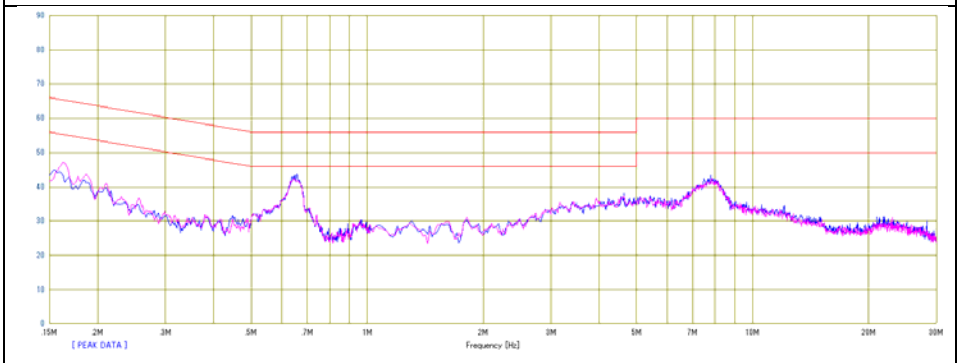
Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11047825H
Date	November 12, 2015
Temperature / Humidity	22 deg. C / 56 % RH
Engineer	Koji Yamamoto
Mode	Tx, Hopping Off, DH5

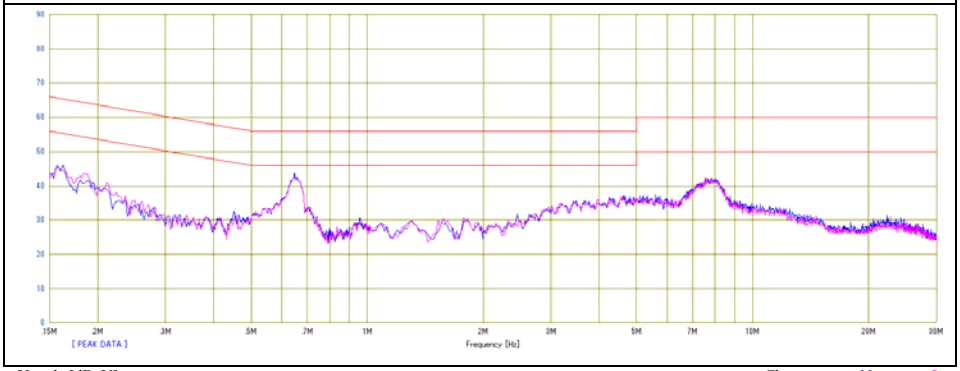
2402 MHz



2441 MHz



2480 MHz



Y scale [dBuV] Chart — N — L

20dB Bandwidth and Carrier Frequency Separation

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.926	1.000	>= 0.617
DH5	2441.0	0.935	1.000	>= 0.623
DH5	2480.0	0.923	1.000	>= 0.615

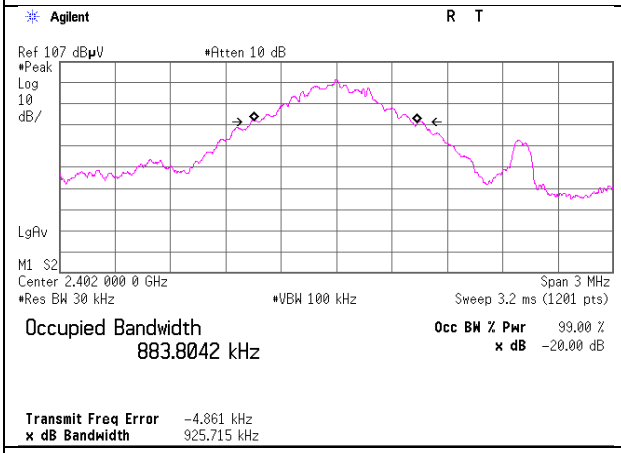
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation

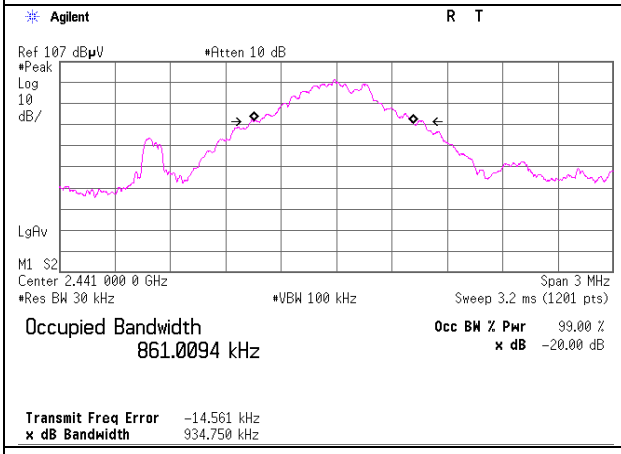
Tx DH5

20dB Bandwidth

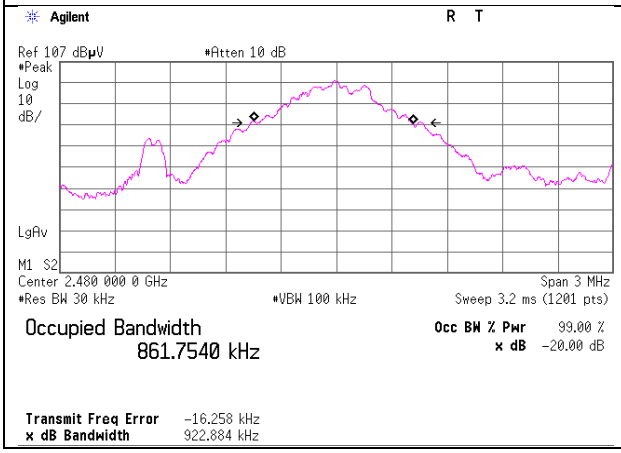
2402MHz



2441MHz

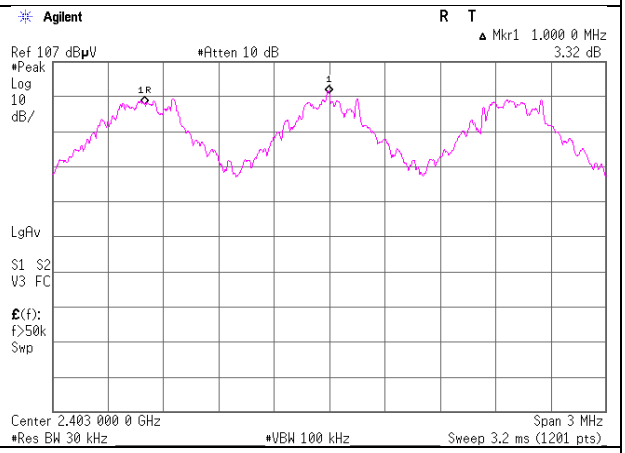


2480MHz

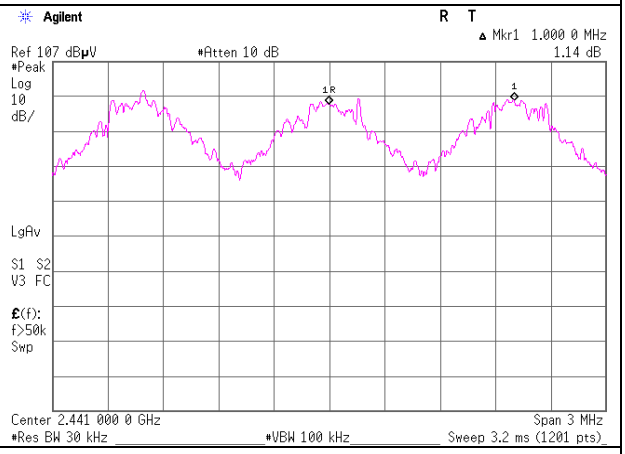


Carrier Frequency Separation

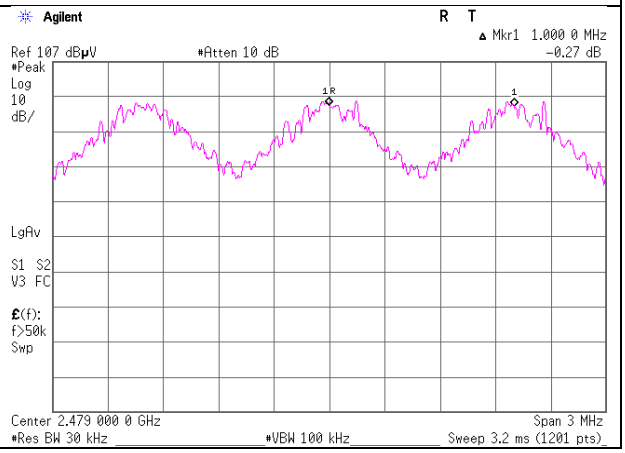
2402MHz



2441MHz



2480MHz



Number of Hopping Frequency

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping On

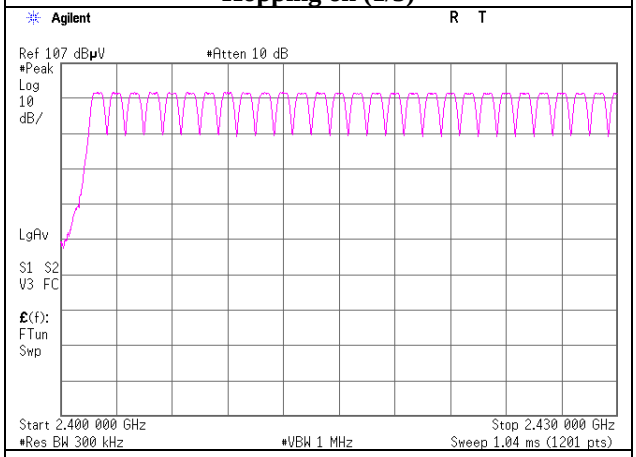
Mode	Number of channel [channels]	Limit [channels]
DH5	79	>= 15

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.

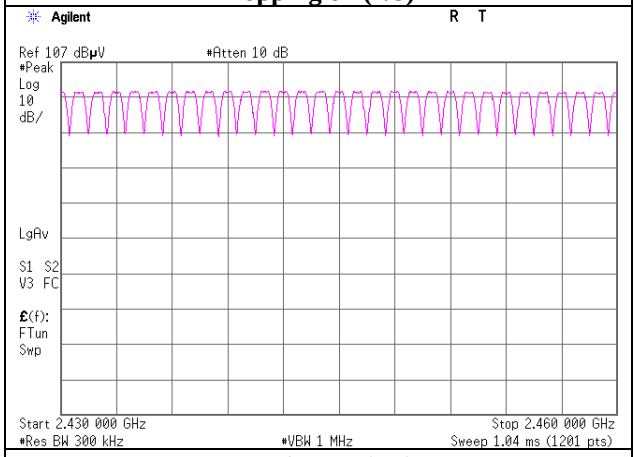
Number of Hopping Frequency

DH5

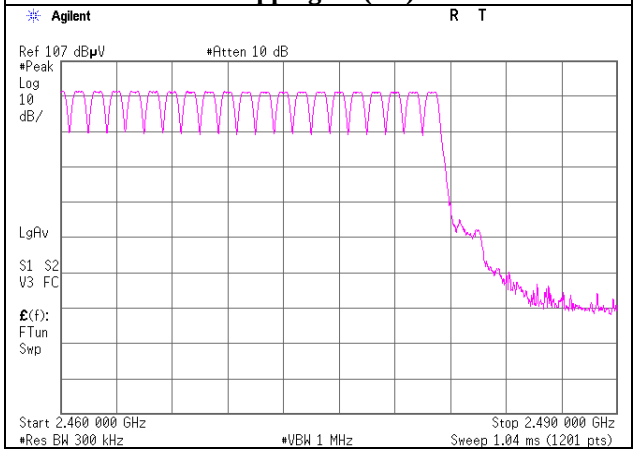
Hopping on (1/3)



Hopping on (2/3)



Hopping on (3/3)



Dwell time

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping On

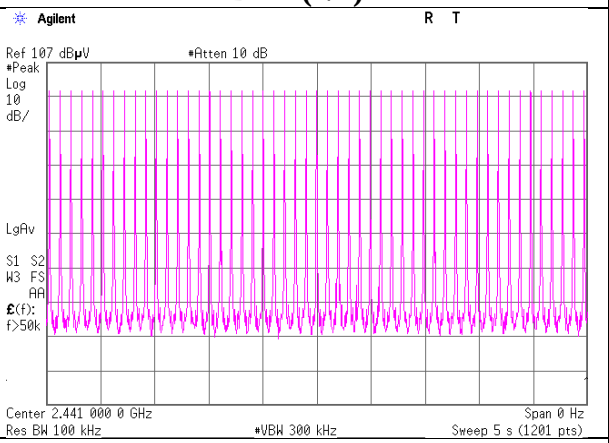
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period					Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	51.0 times	/	5 sec.	x	31.6 sec. = 323 times	0.511	165	400
DH3	26.0 times	/	5 sec.	x	31.6 sec. = 165 times	1.789	295	400
DH5	17.0 times	/	5 sec.	x	31.6 sec. = 108 times	3.037	328	400

Sample Calculation
Result = Number of transmission x Length of transmission

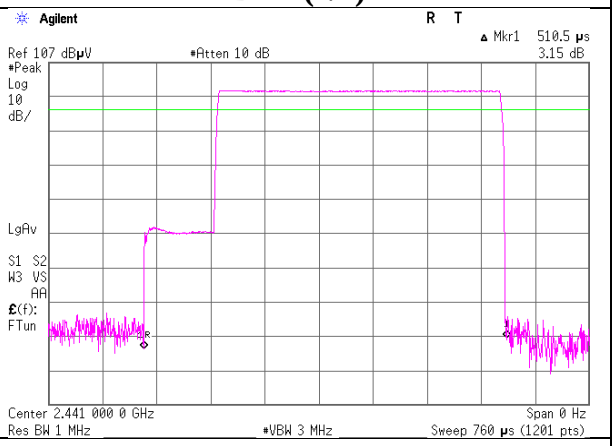
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless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

Dwell time

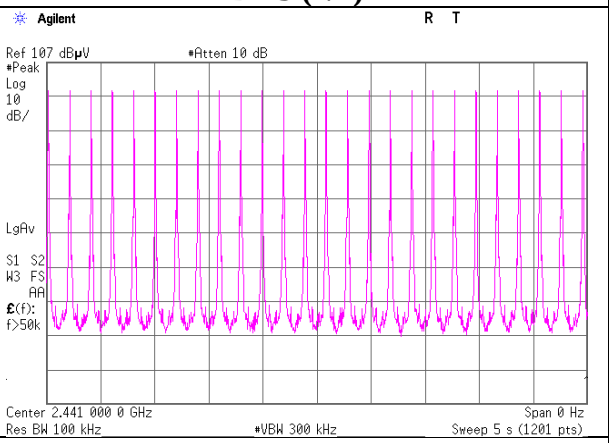
DH1 (1/2)



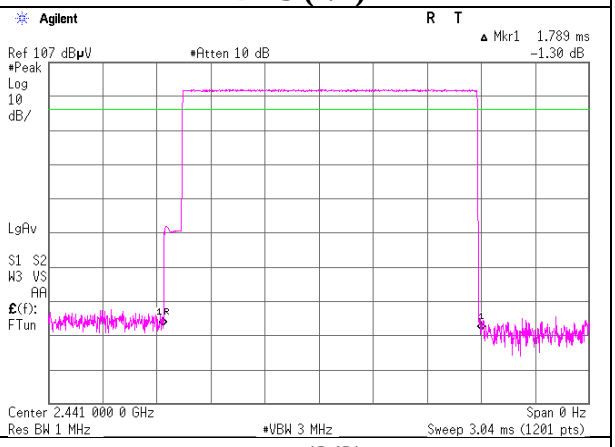
DH1 (2/2)



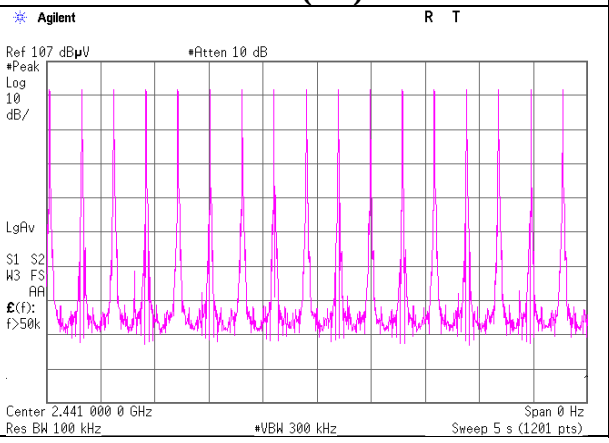
DH3 (1/2)



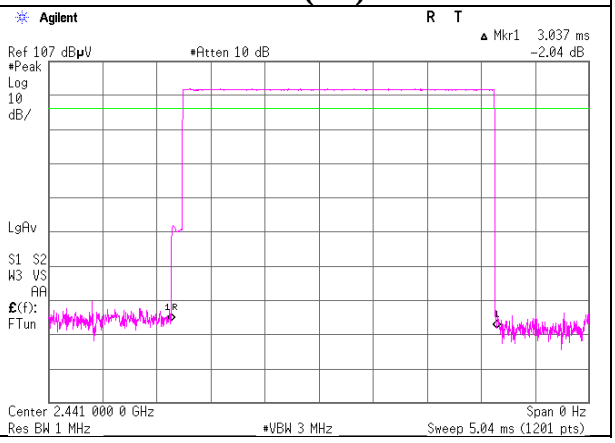
DH3 (2/2)



DH5 (1/2)



DH5 (2/2)



Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-7.93	1.37	0.00	-6.56	0.22	20.96	125	27.52
DH5	2441.0	-7.90	1.37	0.00	-6.53	0.22	20.96	125	27.49
DH5	2480.0	-8.25	1.38	0.00	-6.87	0.21	20.96	125	27.83

Sample Calculation:
Result = Reading + Cable Loss + 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.
However, the limit level 125mW of AFH mode was used for the test.

Average Output Power
(Reference data)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
DH5	2402.0	-9.62	1.37	0.00	-8.25	0.15
DH5	2441.0	-9.58	1.37	0.00	-8.21	0.15
DH5	2480.0	-9.89	1.38	0.00	-8.51	0.14

Sample Calculation:
Result (Frame power) = Reading + Cable Loss + Attenuator Loss

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11047825H	
Date	November 12, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 51 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(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	166.424	QP	38.3	15.7	8.8	31.9	30.9	43.5	12.6	
Hori	192.270	QP	34.7	16.3	9.0	31.8	28.2	43.5	15.3	
Hori	214.771	QP	38.8	16.7	9.2	31.8	32.9	43.5	10.6	
Hori	329.316	QP	39.2	17.5	10.1	31.8	35.0	46.0	11.0	
Hori	357.949	QP	36.3	17.8	10.3	31.8	32.6	46.0	13.4	
Hori	532.001	QP	43.1	19.6	11.4	32.0	42.1	46.0	3.9	
Hori	2390.000	PK	41.8	27.9	3.3	32.1	40.9	73.9	33.0	
Hori	4804.000	PK	51.2	32.8	5.6	31.3	58.3	73.9	15.6	
Hori	7206.000	PK	42.6	36.8	6.6	32.6	53.4	73.9	20.5	Floor Noise
Hori	9608.000	PK	42.4	38.1	7.6	32.6	55.5	73.9	18.4	Floor Noise
Hori	2390.000	AV	29.6	27.9	3.3	32.1	28.7	53.9	25.2	
Hori	4804.000	AV	43.7	32.8	5.6	31.3	50.8	53.9	3.1	
Hori	7206.000	AV	30.0	36.8	6.6	32.6	40.8	53.9	13.1	Floor Noise
Hori	9608.000	AV	29.9	38.1	7.6	32.6	43.0	53.9	10.9	Floor Noise
Vert	144.046	QP	35.4	14.6	8.6	32.0	26.6	43.5	16.9	
Vert	166.425	QP	42.6	15.7	8.8	31.9	35.2	43.5	8.3	
Vert	214.772	QP	37.0	16.7	9.2	31.8	31.1	43.5	12.4	
Vert	501.134	QP	36.9	19.4	11.2	32.0	35.5	46.0	10.5	
Vert	532.002	QP	40.0	19.6	11.4	32.0	39.0	46.0	7.0	
Vert	558.404	QP	35.0	19.8	11.5	32.0	34.3	46.0	11.7	
Vert	2390.000	PK	41.6	27.9	3.3	32.1	40.7	73.9	33.2	
Vert	4804.000	PK	48.8	32.8	5.6	31.3	55.9	73.9	18.0	
Vert	7206.000	PK	42.4	36.8	6.6	32.6	53.2	73.9	20.8	Floor Noise
Vert	9608.000	PK	42.5	38.1	7.6	32.6	55.6	73.9	18.3	Floor Noise
Vert	2390.000	AV	29.6	27.9	3.3	32.1	28.7	53.9	25.2	
Vert	4804.000	AV	40.2	32.8	5.6	31.3	47.3	53.9	6.6	
Vert	7206.000	AV	29.7	36.8	6.6	32.6	40.5	53.9	13.4	Floor Noise
Vert	9608.000	AV	29.8	38.1	7.6	32.6	42.9	53.9	11.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB

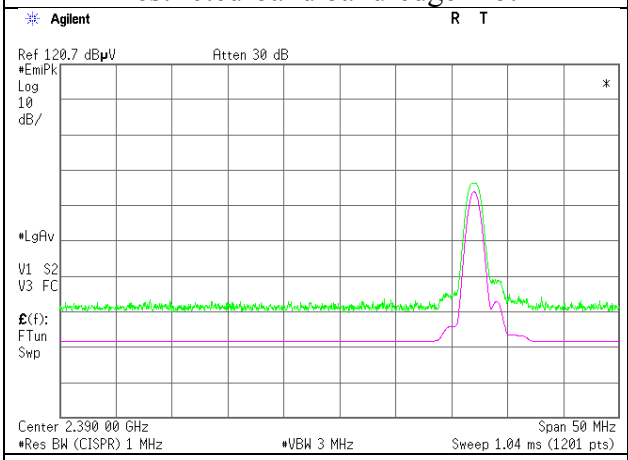
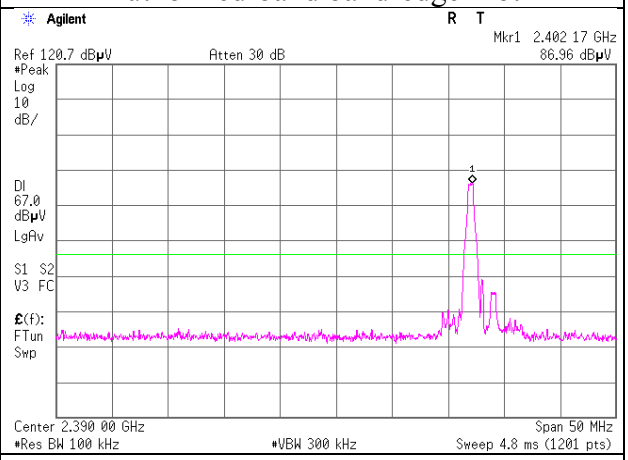
20dBc Data Sheet

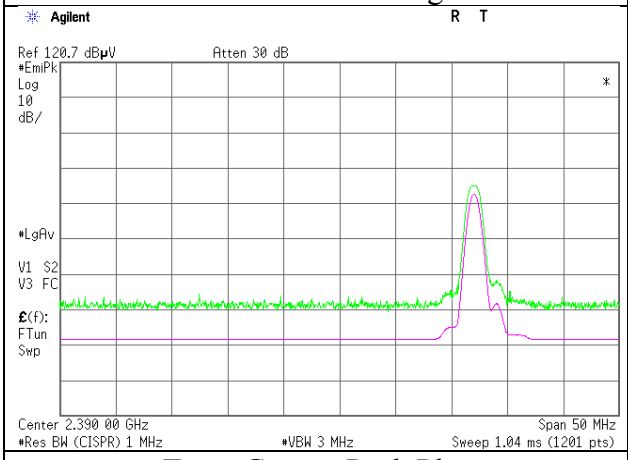
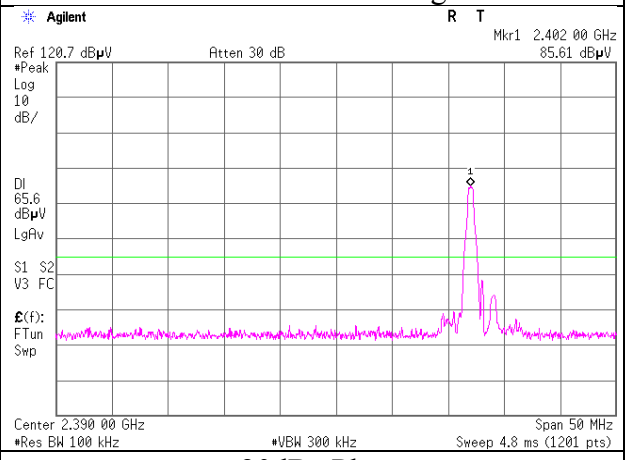
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	87.0	28.0	3.3	32.1	86.2	-	-	Carrier
Hori	2400.000	PK	50.7	28.0	3.3	32.1	49.9	66.2	16.3	
Vert	2402.000	PK	85.6	28.0	3.3	32.1	84.8	-	-	Carrier
Vert	2400.000	PK	50.6	28.0	3.3	32.1	49.8	64.8	15.0	

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11047825H
Date	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Yuta Moriya
	(1-10GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11047825H	
Date	November 12, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 51 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(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	166.424	QP	37.3	15.7	8.8	31.9	29.9	43.5	13.6	
Hori	192.270	QP	34.9	16.3	9.0	31.8	28.4	43.5	15.1	
Hori	214.771	QP	37.6	16.7	9.2	31.8	31.7	43.5	11.8	
Hori	329.316	QP	39.9	17.5	10.1	31.8	35.7	46.0	10.3	
Hori	357.949	QP	35.8	17.8	10.3	31.8	32.1	46.0	13.9	
Hori	532.001	QP	42.8	19.6	11.4	32.0	41.8	46.0	4.2	
Hori	4882.000	PK	50.6	33.1	5.6	31.3	58.0	73.9	15.9	
Hori	7323.000	PK	42.1	36.8	6.7	32.6	53.0	73.9	20.9	Floor Noise
Hori	9764.000	PK	42.2	38.2	7.6	32.7	55.3	73.9	18.6	Floor Noise
Hori	4882.000	AV	44.7	33.1	5.6	31.3	52.1	53.9	1.8	
Hori	7323.000	AV	30.3	36.8	6.7	32.6	41.2	53.9	12.7	Floor Noise
Hori	9764.000	AV	30.0	38.2	7.6	32.7	43.1	53.9	10.8	Floor Noise
Vert	144.046	QP	35.2	14.6	8.6	32.0	26.4	43.5	17.1	
Vert	166.424	QP	41.5	15.7	8.8	31.9	34.1	43.5	9.4	
Vert	214.772	QP	37.3	16.7	9.2	31.8	31.4	43.5	12.1	
Vert	501.134	QP	37.1	19.4	11.2	32.0	35.7	46.0	10.3	
Vert	532.002	QP	39.6	19.6	11.4	32.0	38.6	46.0	7.4	
Vert	558.404	QP	35.2	19.8	11.5	32.0	34.5	46.0	11.5	
Vert	4882.000	PK	48.7	33.1	5.6	31.3	56.1	73.9	17.8	
Vert	7323.000	PK	42.2	36.8	6.7	32.6	53.1	73.9	20.8	Floor Noise
Vert	9764.000	PK	42.3	38.2	7.6	32.7	55.4	73.9	18.5	Floor Noise
Vert	4882.000	AV	42.8	33.1	5.6	31.3	50.2	53.9	3.7	
Vert	7323.000	AV	29.9	36.8	6.7	32.6	40.8	53.9	13.1	Floor Noise
Vert	9764.000	AV	29.9	38.2	7.6	32.7	43.0	53.9	10.9	Floor Noise

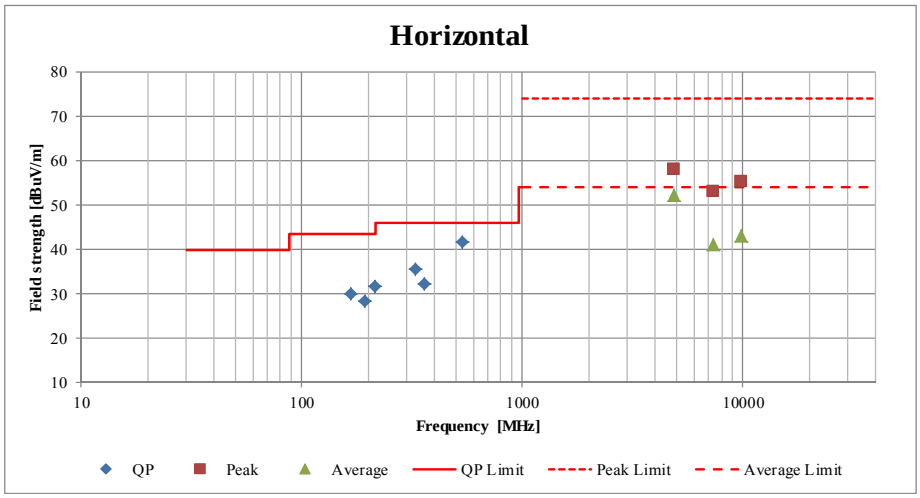
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

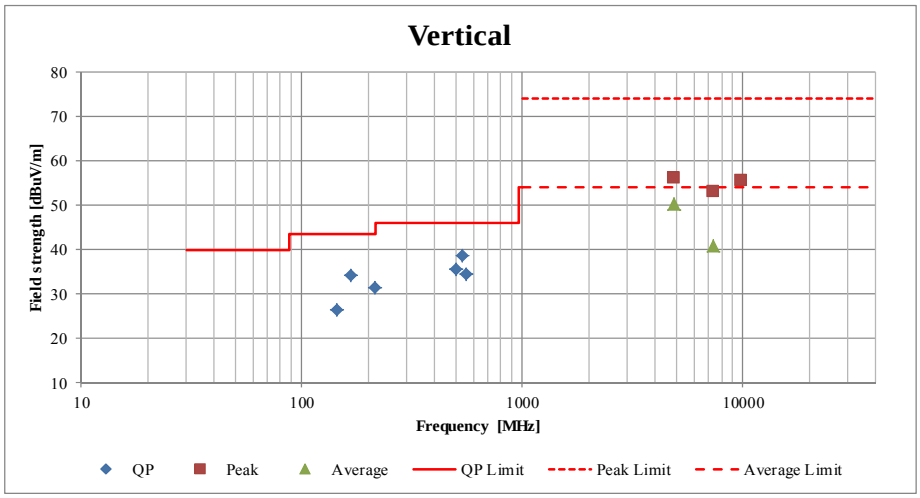
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11047825H	
Date	November 12, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 51 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(1-10GHz)	(Above 10GHz and Below 1GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz	





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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11047825H	
Date	November 12, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH	22 deg. C / 51 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(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	166.424	QP	37.2	15.7	8.8	31.9	29.8	43.5	13.7	
Hori	192.270	QP	35.3	16.3	9.0	31.8	28.8	43.5	14.7	
Hori	214.772	QP	37.8	16.7	9.2	31.8	31.9	43.5	11.6	
Hori	329.316	QP	39.5	17.5	10.1	31.8	35.3	46.0	10.7	
Hori	357.949	QP	35.9	17.8	10.3	31.8	32.2	46.0	13.8	
Hori	532.001	QP	43.3	19.6	11.4	32.0	42.3	46.0	3.7	
Hori	2483.500	PK	47.0	28.1	3.3	32.1	46.3	73.9	27.6	
Hori	4960.000	PK	49.6	33.4	5.6	31.2	57.4	73.9	16.5	
Hori	7440.000	PK	42.6	36.8	6.7	32.7	53.4	73.9	20.6	Floor Noise
Hori	9920.000	PK	42.3	38.3	7.7	32.8	55.5	73.9	18.4	Floor Noise
Hori	2483.500	AV	34.5	28.1	3.3	32.1	33.8	53.9	20.1	
Hori	4960.000	AV	42.4	33.4	5.6	31.2	50.2	53.9	3.7	
Hori	7440.000	AV	30.1	36.8	6.7	32.7	40.9	53.9	13.0	Floor Noise
Hori	9920.000	AV	30.0	38.3	7.7	32.8	43.2	53.9	10.7	Floor Noise
Vert	144.046	QP	35.5	14.6	8.6	32.0	26.7	43.5	16.8	
Vert	166.424	QP	40.8	15.7	8.8	31.9	33.4	43.5	10.1	
Vert	214.772	QP	37.1	16.7	9.2	31.8	31.2	43.5	12.3	
Vert	501.134	QP	37.6	19.4	11.2	32.0	36.2	46.0	9.8	
Vert	532.002	QP	40.1	19.6	11.4	32.0	39.1	46.0	6.9	
Vert	558.404	QP	36.3	19.8	11.5	32.0	35.6	46.0	10.4	
Vert	2483.500	PK	44.7	28.1	3.3	32.1	44.0	73.9	29.9	
Vert	4960.000	PK	47.9	33.4	5.6	31.2	55.7	73.9	18.2	
Vert	7440.000	PK	42.3	36.8	6.7	32.7	53.1	73.9	20.8	Floor Noise
Vert	9920.000	PK	42.0	38.3	7.7	32.8	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	32.5	28.1	3.3	32.1	31.8	53.9	22.1	
Vert	4960.000	AV	40.5	33.4	5.6	31.2	48.3	53.9	5.6	
Vert	7440.000	AV	29.8	36.8	6.7	32.7	40.6	53.9	13.3	Floor Noise
Vert	9920.000	AV	29.9	38.3	7.7	32.8	43.1	53.9	10.8	Floor Noise

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

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

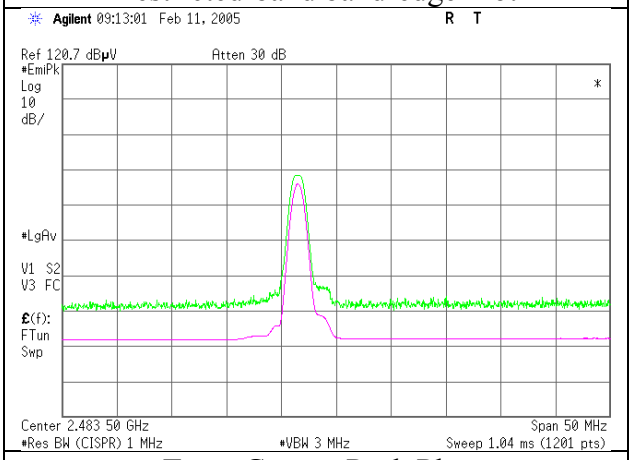
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1. 0 m) = 9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11047825H
Date	November 12, 2015
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Yuta Moriya
	(1-10GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz

Horizontal

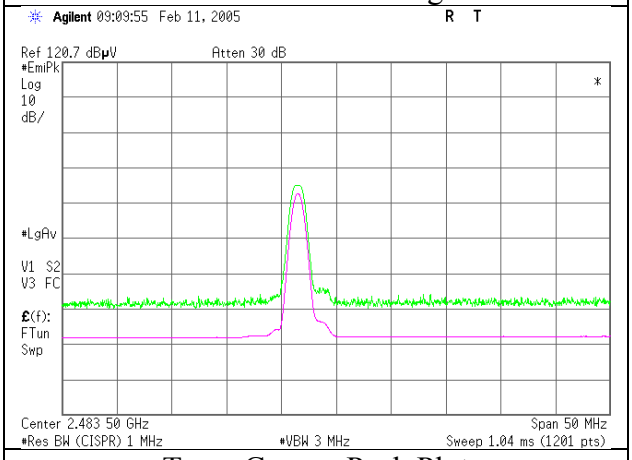
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

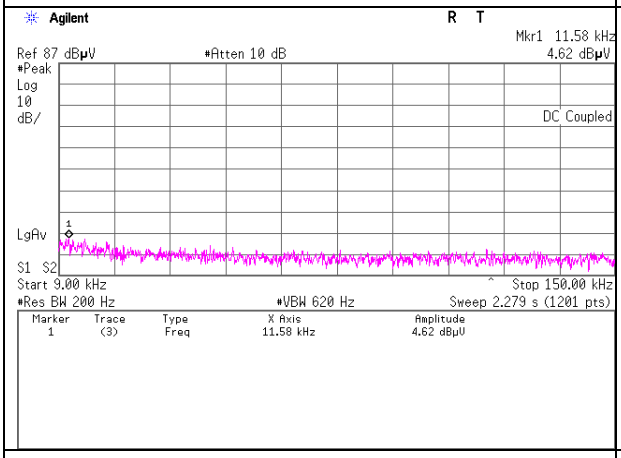
UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Conducted Spurious Emission

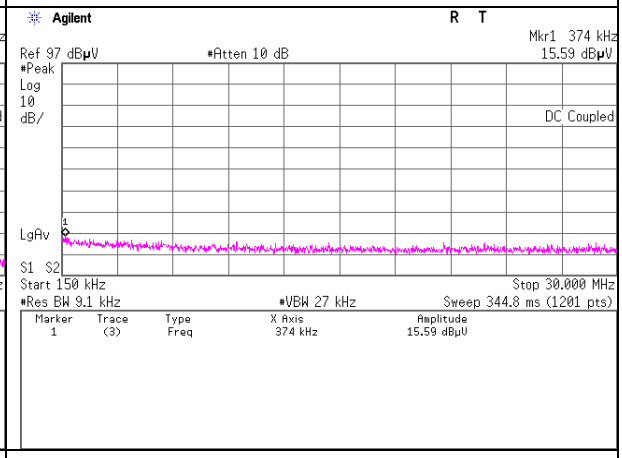
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2402 MHz

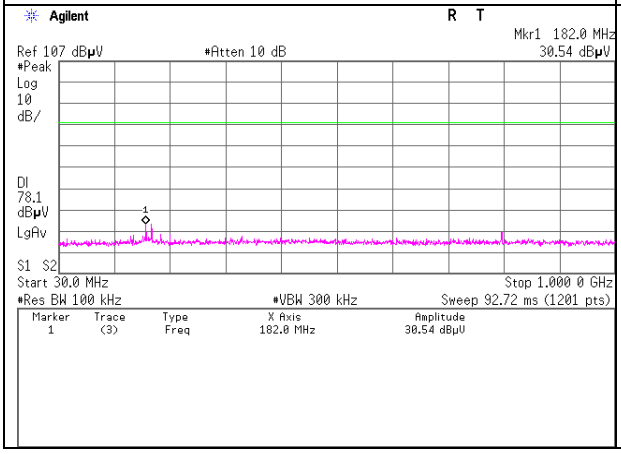
9kHz-150kHz



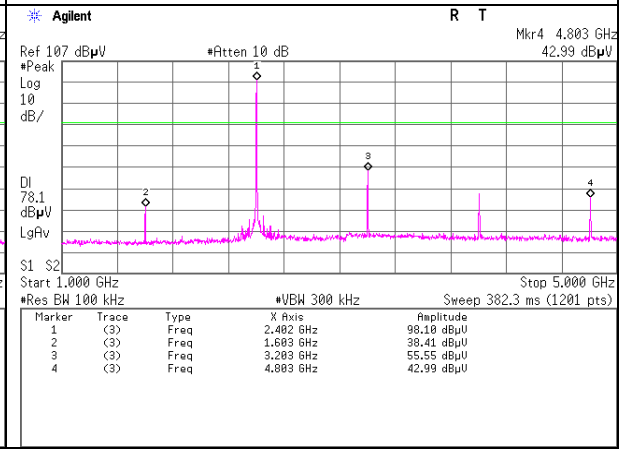
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz

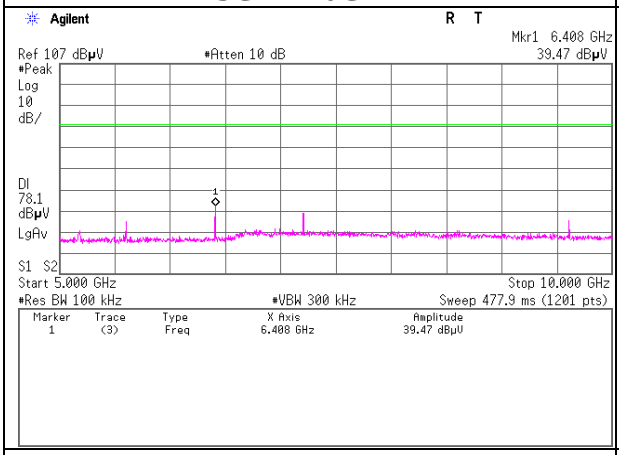


Conducted Spurious Emission

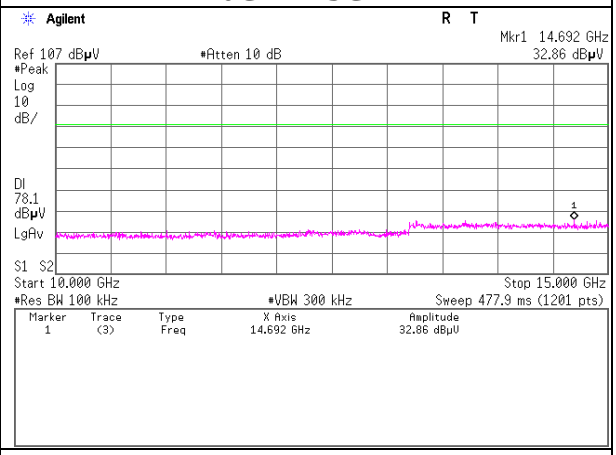
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2402 MHz

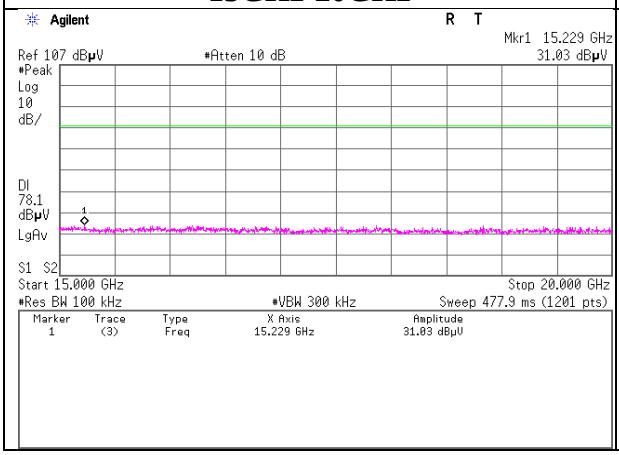
5GHz-10GHz



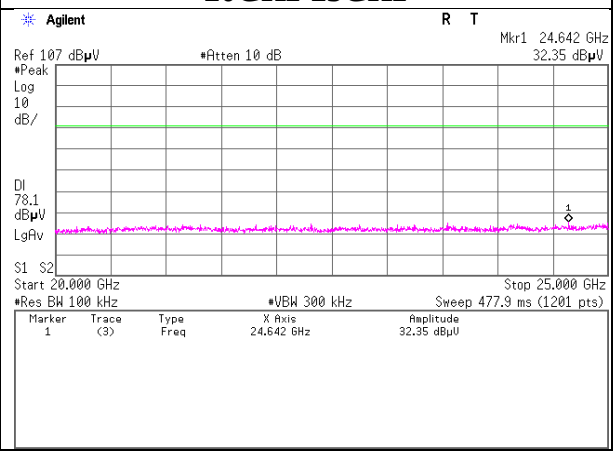
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

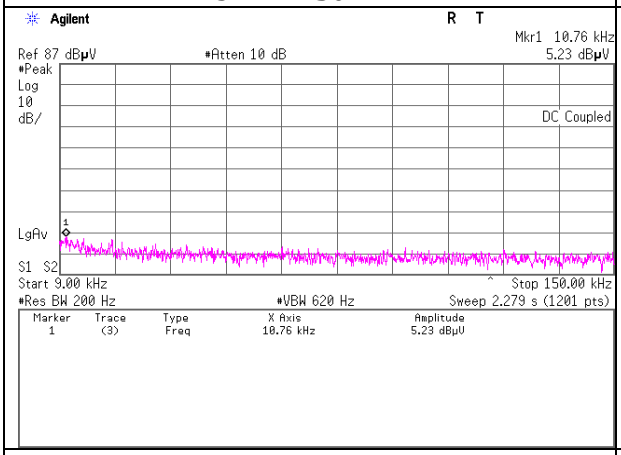


Conducted Spurious Emission

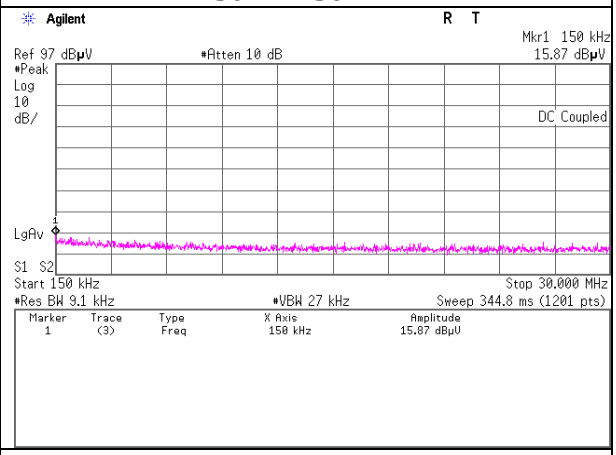
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2441 MHz

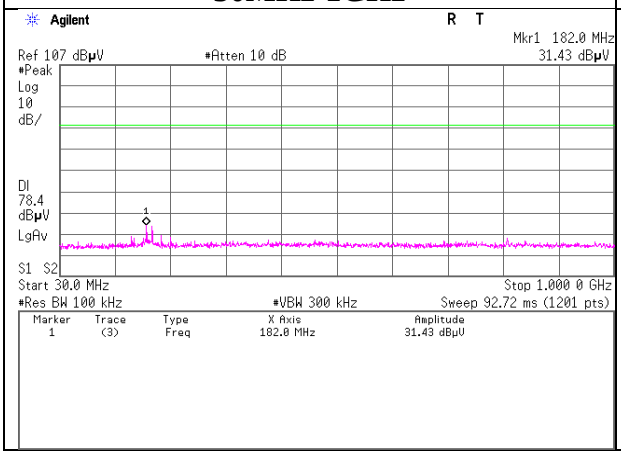
9kHz-150kHz



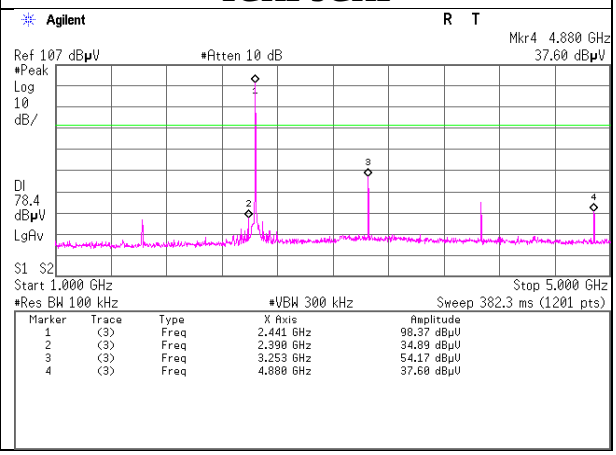
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz

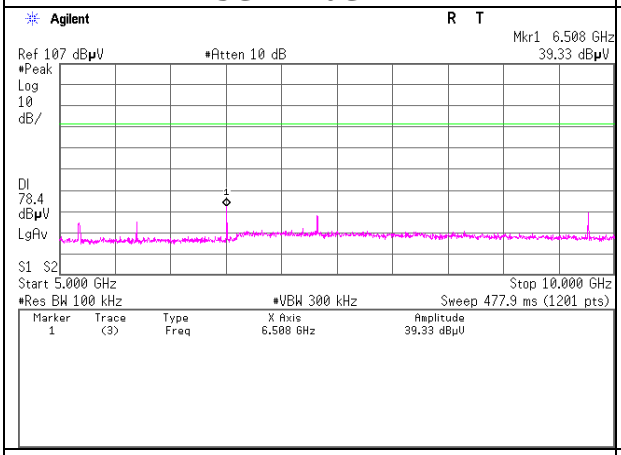


Conducted Spurious Emission

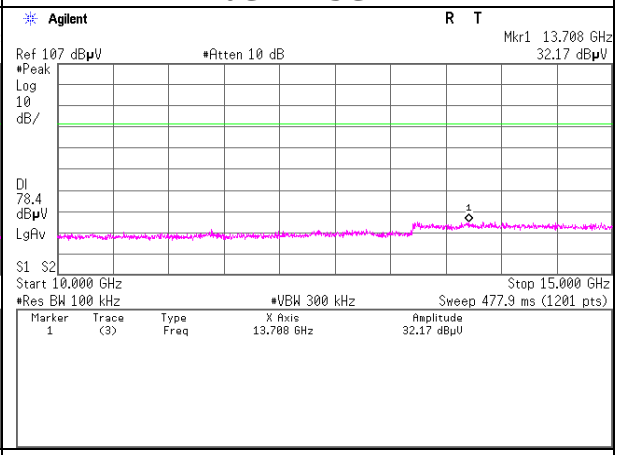
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2441 MHz

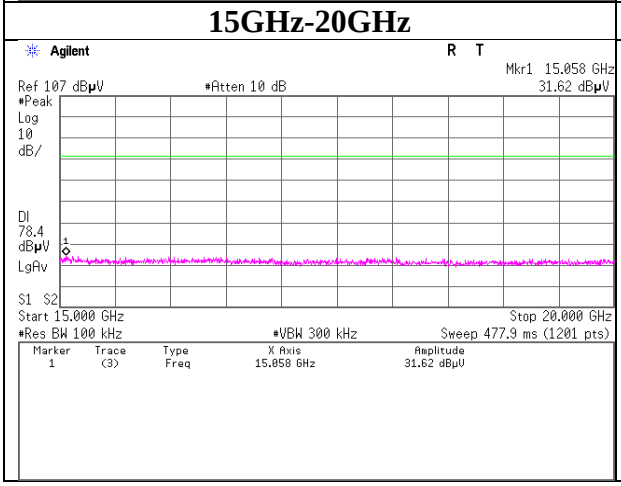
5GHz-10GHz



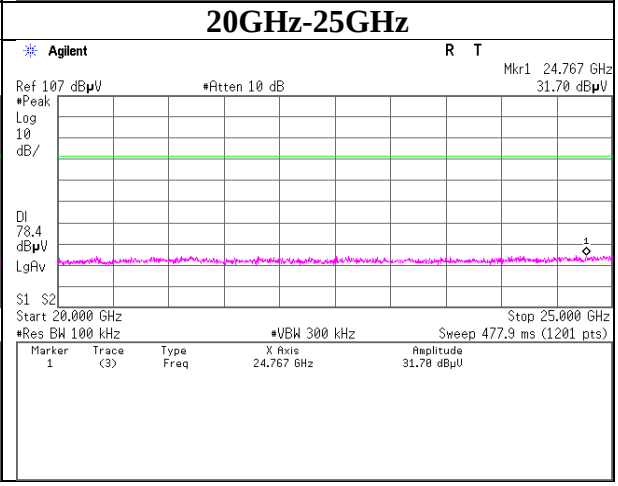
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

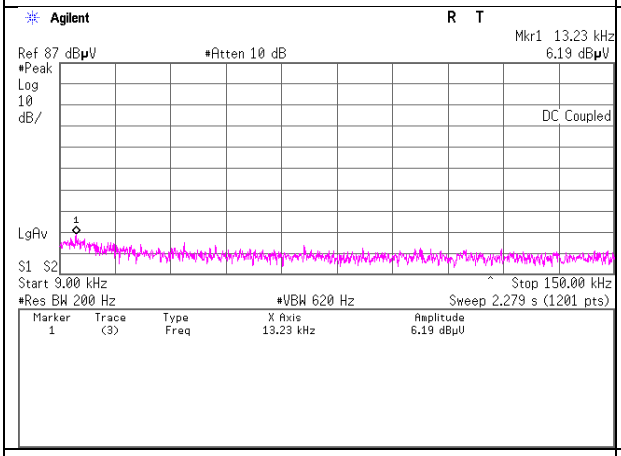


Conducted Spurious Emission

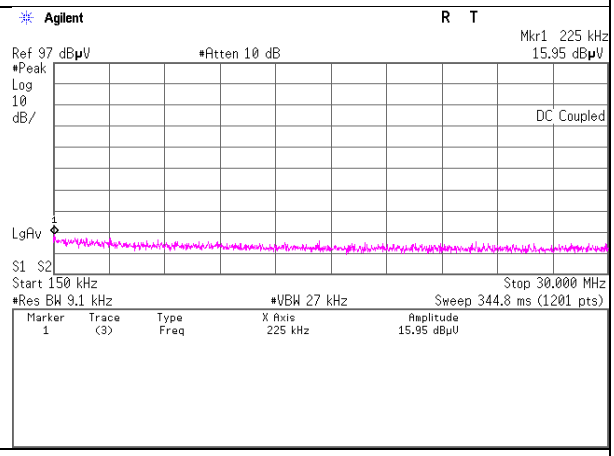
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2480 MHz

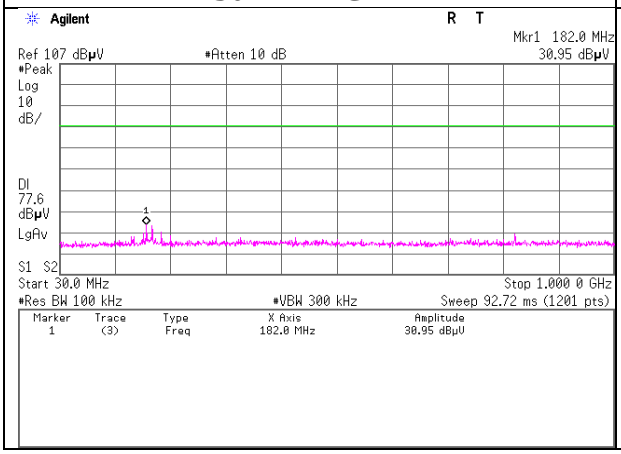
9kHz-150kHz



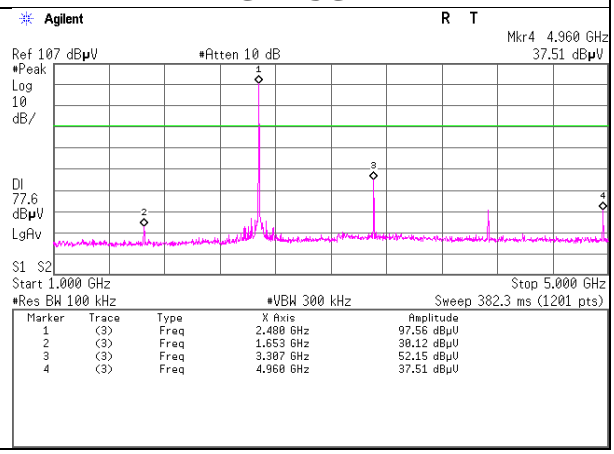
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz

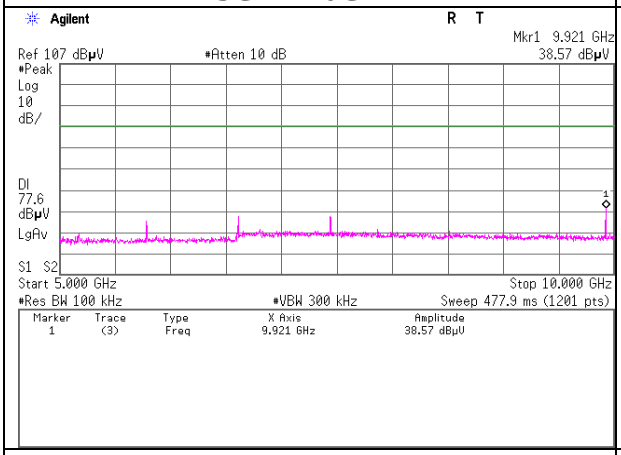


Conducted Spurious Emission

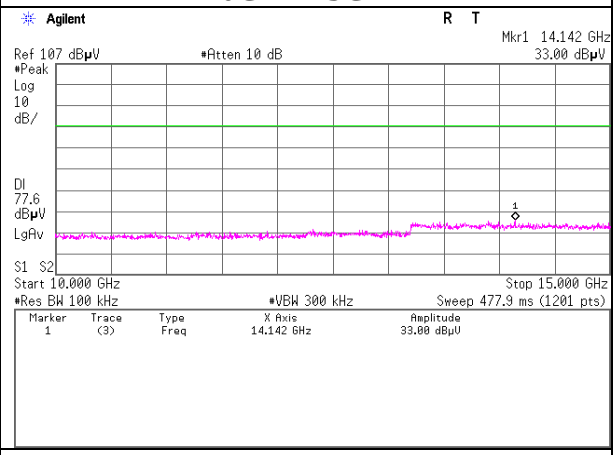
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx, Hopping Off, DH5

2480 MHz

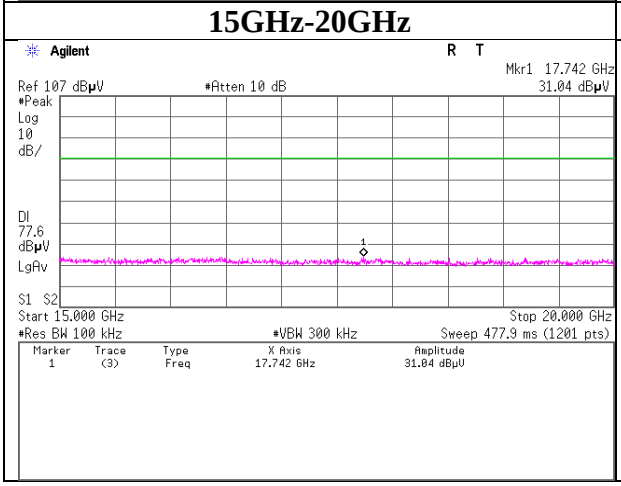
5GHz-10GHz



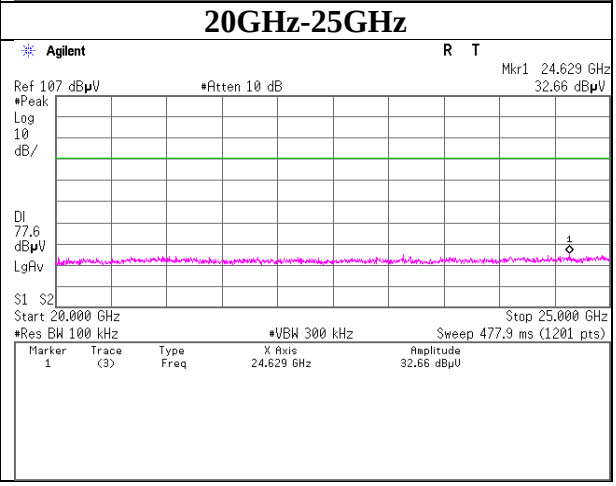
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

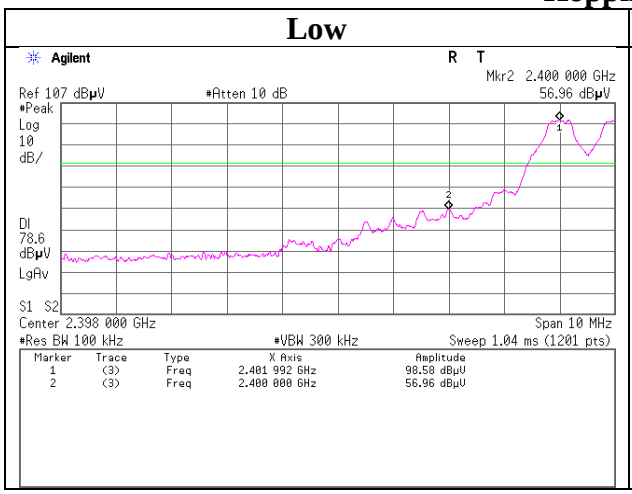


Conducted Emission Band Edge compliance

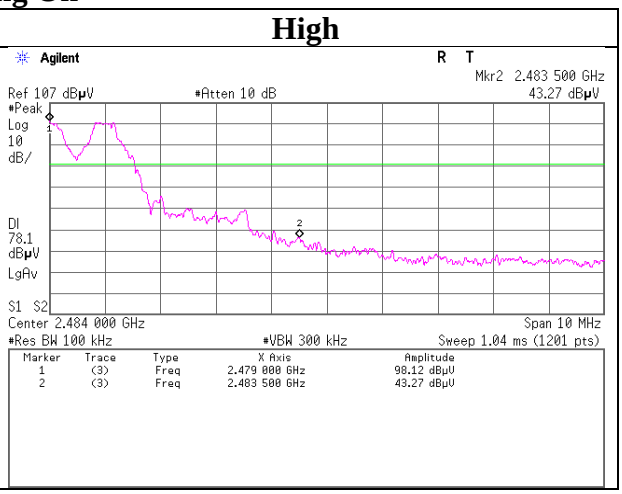
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx DH5

Hopping On

Low

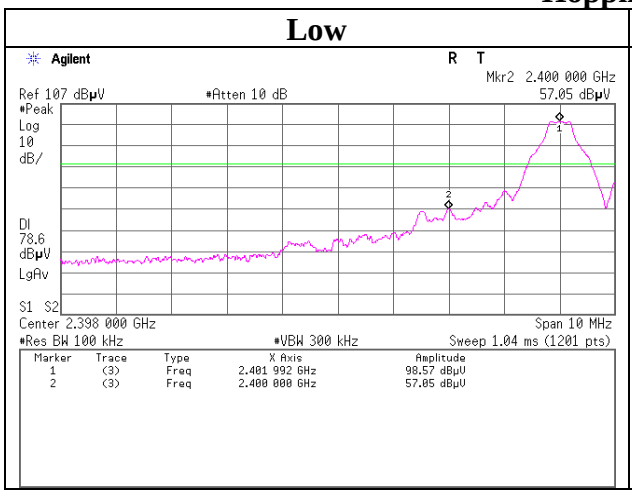


High

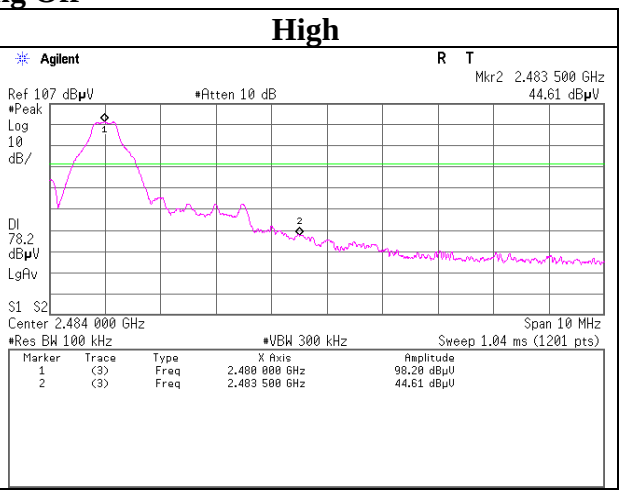


Hopping Off

Low



High

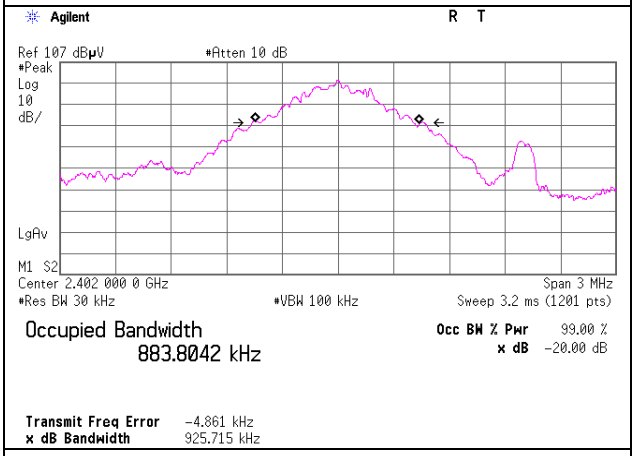


99%Occupied Bandwidth

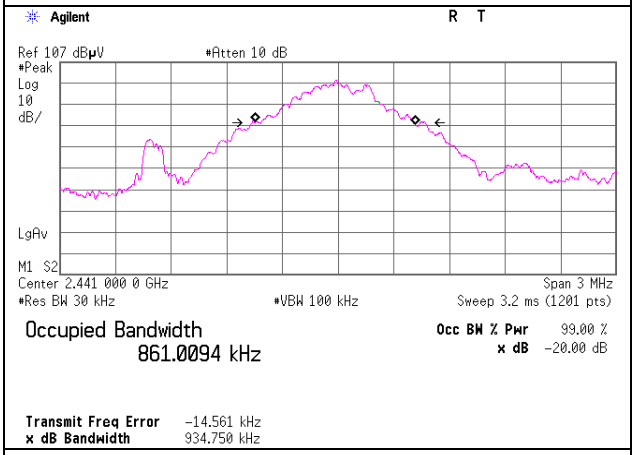
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx Hopping Off

Hopping Off, DH5

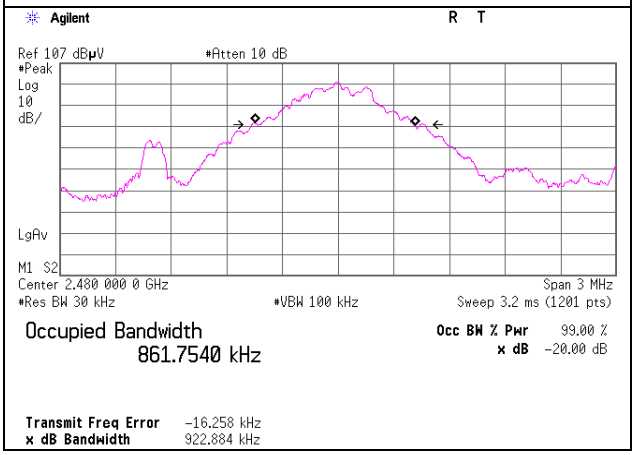
2402MHz



2441MHz



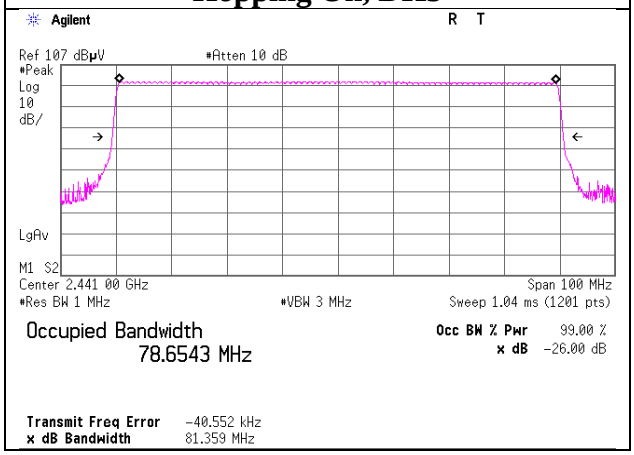
2480MHz



99% Occupied Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11047825H
Date	November 13, 2015
Temperature / Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx Hopping On

Hopping On, DH5



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2015/01/13 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2015/06/02 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17*12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE/CE	2015/01/16 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE/CE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2015/11/02 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2015/11/03 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2015/07/10 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(AE)	2015/07/10 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2015/01/19 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2015/07/02 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2015/10/07 * 12
MCC-171	Microwave Cable	Junkosha	MWX221	1409S494	AT	2015/03/04 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2015/10/19 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2015/10/19 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2014/12/22 * 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 test**
RE: Radiated Emission test
AT: Antenna Terminal Conducted test