RADIO TEST REPORT

Test Report No. : 11390244S-E

Applicant	:	**Sony Corporation**
Type of Equipment	:	**Bluetooth Audio System**
Model No.	:	**MEX-N5200BT**
FCC ID	:	**AK8MEXN5200BT**
Test regulation	:	**FCC Part 15 Subpart C: 2016**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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: August 15 to September 8, 2016

Representative test engineer:
Kazutaka Takeyama
Engineer
Consumer Technology Division

Approved by:
Akio Hayashi
Leader
Consumer Technology Division

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☒ There is no testing item of "Non-accreditation".

RTL02610

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REVISION HISTORY

Original Test Report No.: 11390244S-E

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11390244S-E	October 18, 2016	-	-

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SECTION 1: Customer information

Company Name	:	Sony Technology (Thailand) Co., Ltd.
Address	:	700/402 Moo 7, Amata Nakorn Industrial Estate, Don Hua Roh, Muang Chonburi, Chonburi 20000, Thailand
Telephone Number	:	+66 38 214900 17 Ext : 1937
Contact Person	:	Sira Sotthiphinyo

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

2.1 Identification of E.U.T.

Type of Equipment	:	Bluetooth Audio System
Model No.	:	MEX-N5200BT
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	July 20, 2016
Country of Mass-production	:	Thailand
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: MEX-N5200BT (referred to as the EUT in this report) is a Bluetooth Audio System.

General Specification

Clock frequency(ies) in the system	:	12 MHz, 9.25 MHz, 16.934 MHz, 32.768 kHz, 26.000 MHz

Radio Specification (Bluetooth)

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 3.3 V
Antenna type	:	Top-GND-coupled loop
Antenna Gain	:	-2.68 dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC part 15 final revised on April 6, 2016.
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 has been tested for compliance with FCC Part 15 Subpart B. Refer to the test report 11390244S-G.

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	-	-	N/A *1)
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)		-	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	7.5 dB 12400.00 MHz, AV, Vertical Tx 2480 MHz, 3DH5	Complied	Conducted/ Radiated (above 30 MHz) *2)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT has no AC mains.
*2) 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)

The equipment provides the wireless transmitter with stable power supply (DC 3.3 V). Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the 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.

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

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

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber
SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

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

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

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)

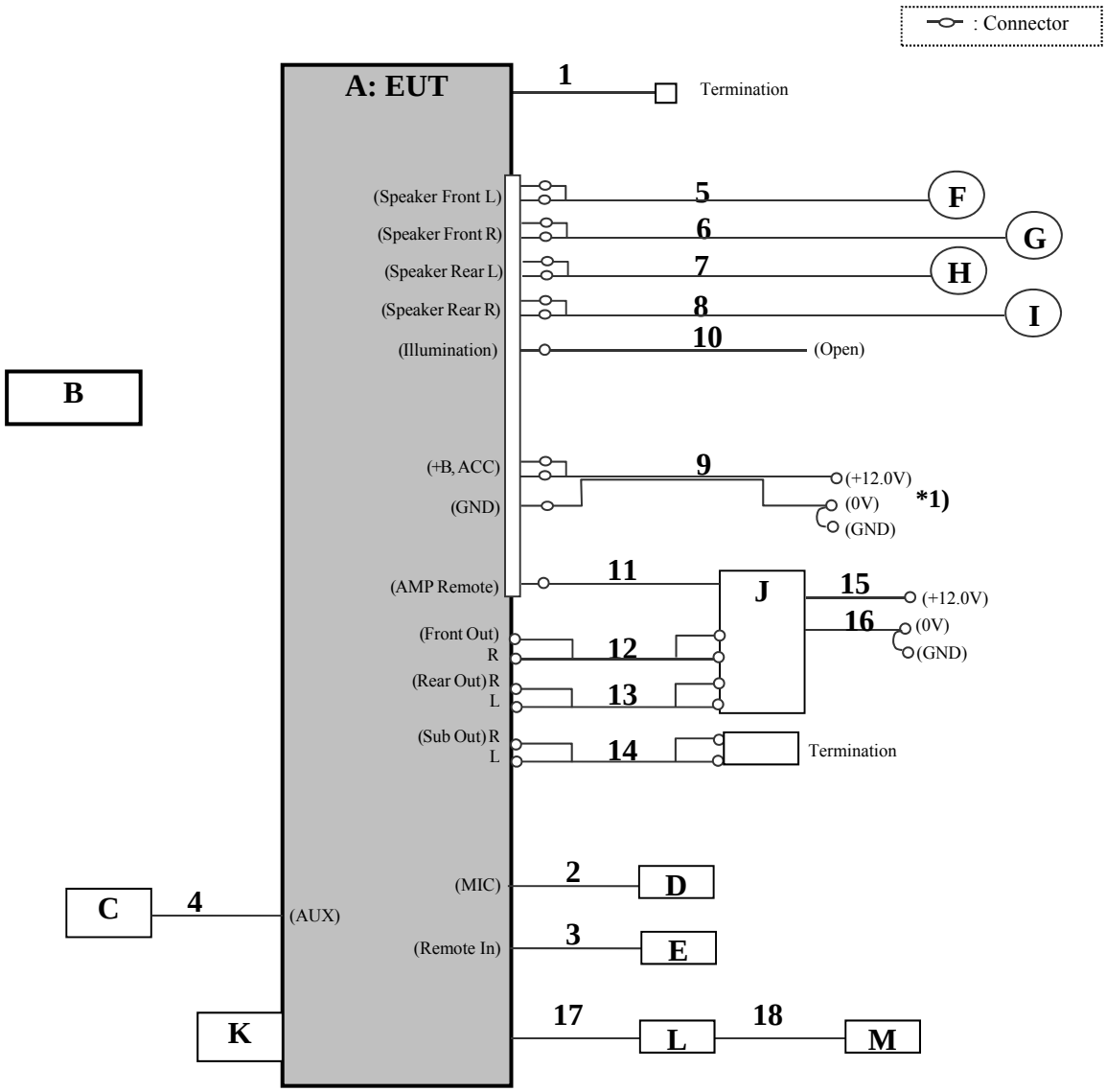
Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
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 the test items based on Bluetooth Core specification.
*EUT has the power settings by the software as follows;
Power settings: BDR: Ext.=23, Int.=39
EDR: Ext.=73, Int.=48
Software: CSR BlueSuite BlueTest 3 Version 2.5.0.93
*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



* 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	Bluetooth Audio System	MEX-N5200BT	57 *2) 56 *3)	Sony	EUT
B	Remote Commander	RM-X231	-	Sony	-
C	Digital Media Player	NW-A829	5017289	Sony	-
D	MIC	-	-	Sony	-
E	Wired Remote Controller	RM-X2S	-	Sony	-
F	Speaker 1	IS-10	-	Sony	-
G	Speaker 2	IS-10	-	Sony	-
H	Speaker 3	XS-GTF1625R	-	Sony	-
I	Speaker 4	XS-GTF1625R	-	Sony	-
J	Stereo Power Amplifier	XM-4S-020	S0C5	Sony	-
K	USB Memory	SDK-USM4GL(B)	10615MEDB	Sony	-
L	Sirius XM connect	SXV100	S0C17	Sony	-
M	Sirius XM antenna	XVANT1	1046	Sony	-

*1) DC power supply (Model No.: PAN35-10A) was used for DC 12 V input.
*2) Used for Antenna Terminal conducted test
*3) Used for Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield- Cable	Shield- Connector	Remarks
1	FM antenna	1.1	Shielded	Shielded	-
2	MIC	3.0	Shielded	Shielded	-
3	REMOTE IN	2.0	Shielded	Shielded	-
4	Audio	2.0	Shielded	Shielded	-
5	Speaker (1)	0.15+2.1	Unshielded	Unshielded	-
6	Speaker (2)	0.15+2.1	Unshielded	Unshielded	-
7	Speaker (3)	0.15+2.1	Unshielded	Unshielded	-
8	Speaker (4)	0.15+2.1	Unshielded	Unshielded	-
9	DC Power	0.15+2.1	Unshielded	Unshielded	-
10	Illumination	0.15+1.5	Unshielded	Unshielded	-
11	AMP Remote	0.15+1.4	Unshielded	Unshielded	-
12	RCA (Front Audio Out)	5.0	Shielded	Shielded	-
13	RCA (Rear Audio Out)	5.0	Shielded	Shielded	-
14	RCA (Sub Audio Out)	3.0	Shielded	Shielded	-
15	DC Power (+)	1.3	Unshielded	Unshielded	-
16	DC Power (-)	1.3	Unshielded	Unshielded	-
17	Signal	1.55	Shielded	Shielded	-
18	Sirius XM antenna	6.9	Shielded	Shielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]
EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
[For above 1 GHz]
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 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	3.885 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.885 m *2) (1 GHz – 13 GHz), 1 m *3) (13 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 x log (3.885 m/3.0 m) = 2.24 dB
*2) Distance Factor: 20 x log (1.0 m/3.0 m) = -9.54 dB

The carrier level and noise levels were confirmed at angle of 0 deg. to 45 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.)

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

Measurement range : 30 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: 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 *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 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) The measurement was performed with Max Hold since the duty cycle was not 100 %.
*2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 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

20dB Bandwidth and Carrier Frequency Separation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.960	1.000	>= 0.640
DH5	2441.0	0.982	1.000	>= 0.654
DH5	2480.0	1.019	1.000	>= 0.679
3DH5	2402.0	1.289	1.000	>= 0.860
3DH5	2441.0	1.284	1.000	>= 0.856
3DH5	2480.0	1.283	1.000	>= 0.855

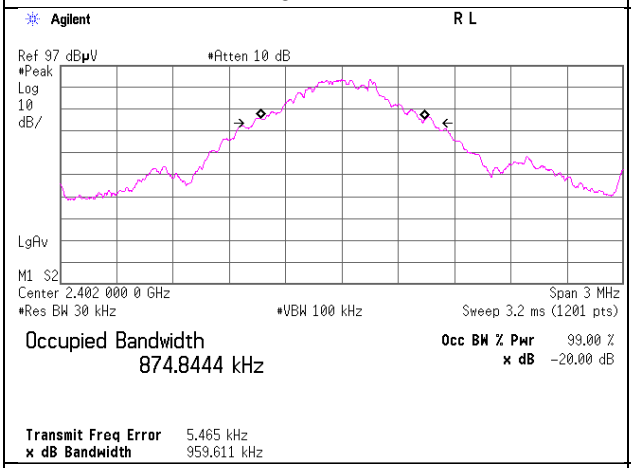
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation

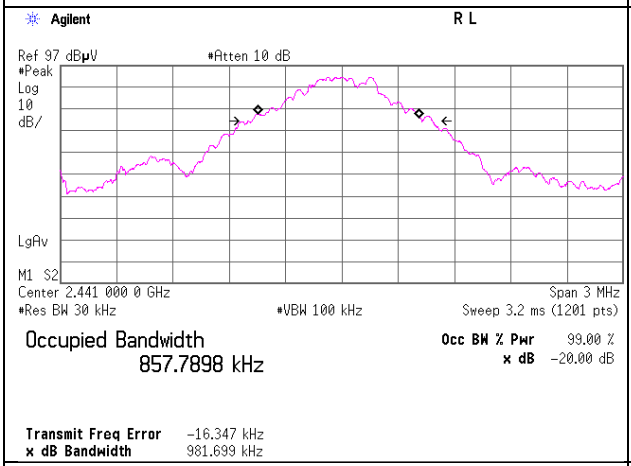
DH5

20 dB Bandwidth

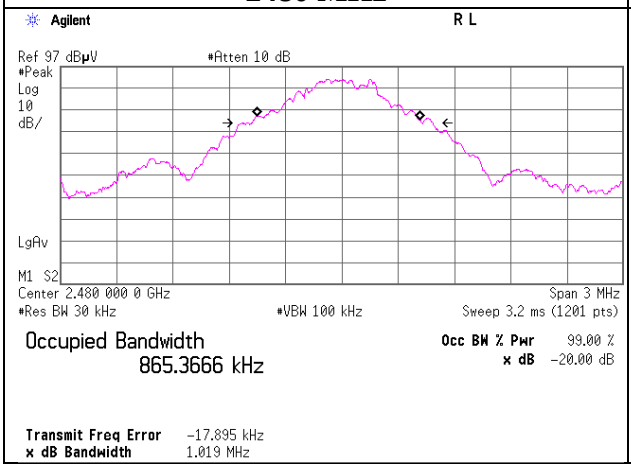
2402 MHz



2441 MHz

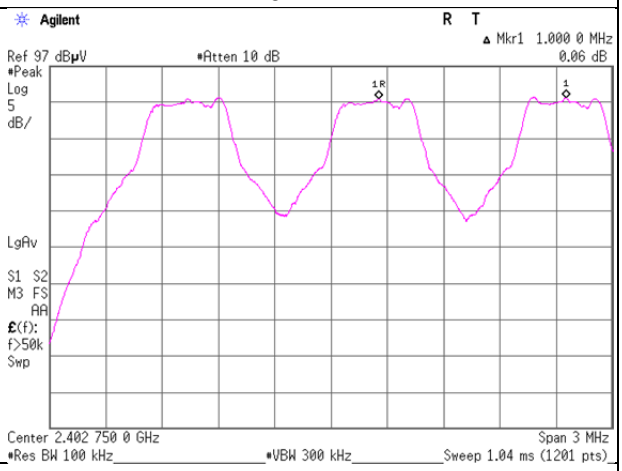


2480 MHz



Carrier Frequency Separation

2402 MHz



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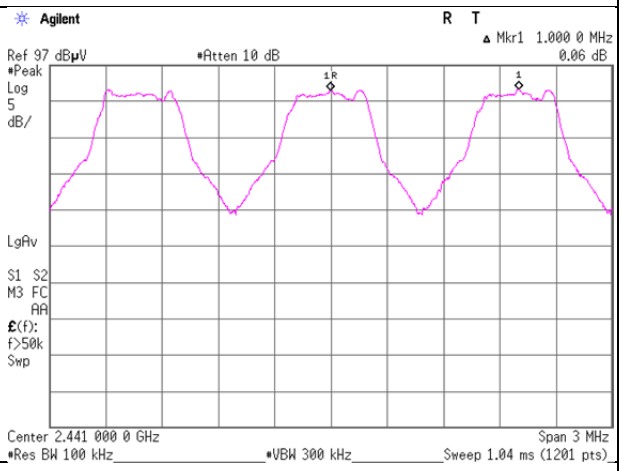
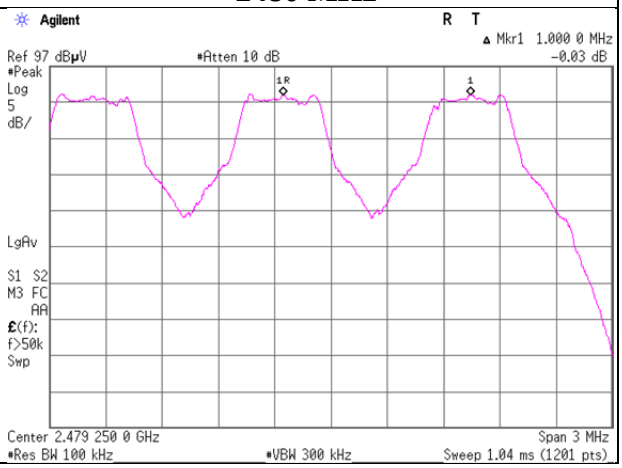


2480 MHz

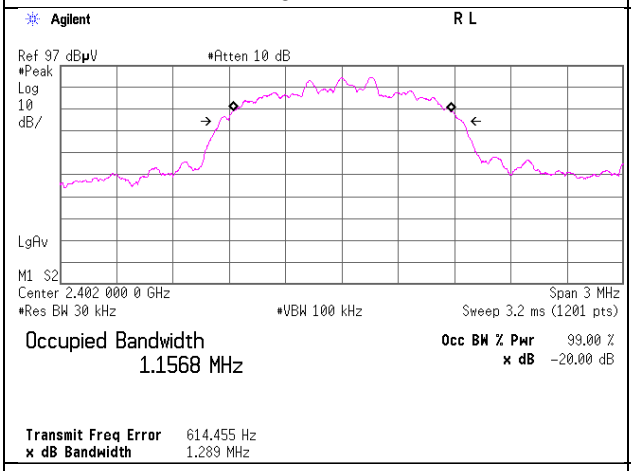


20dB Bandwidth and Carrier Frequency Separation

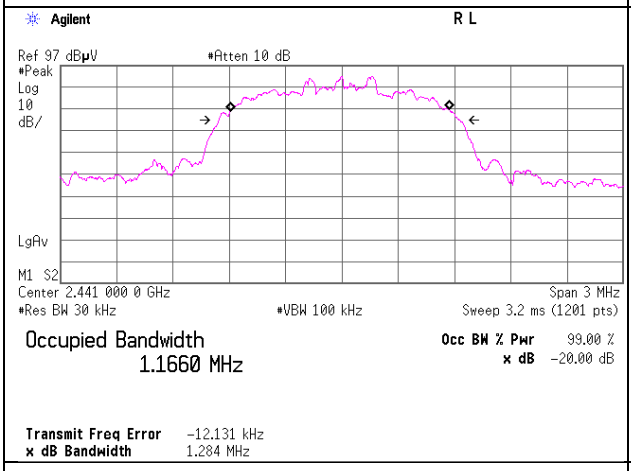
3DH5

20 dB Bandwidth

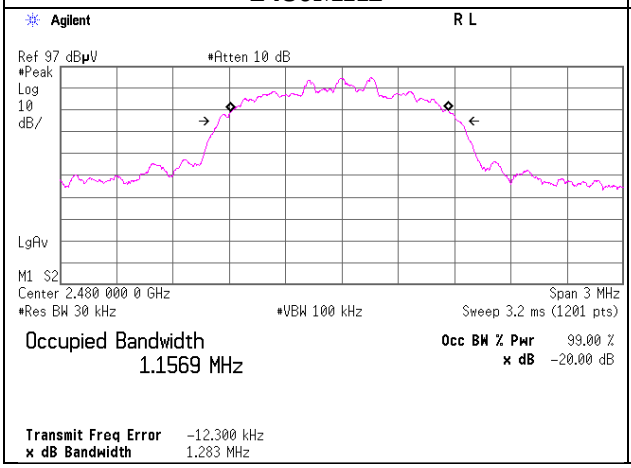
2402 MHz



2441MHz

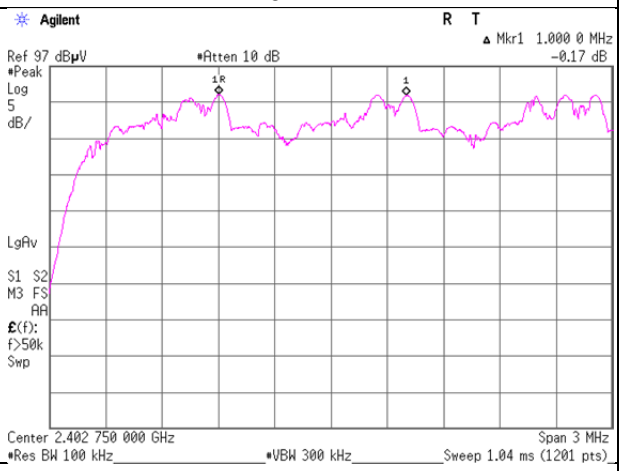


2480MHz

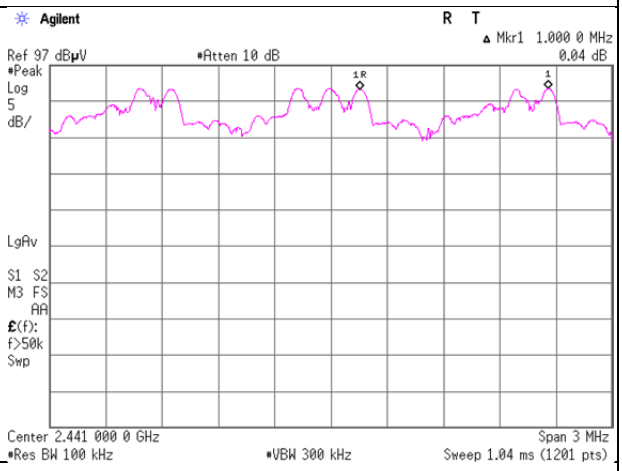


Carrier Frequency Separation

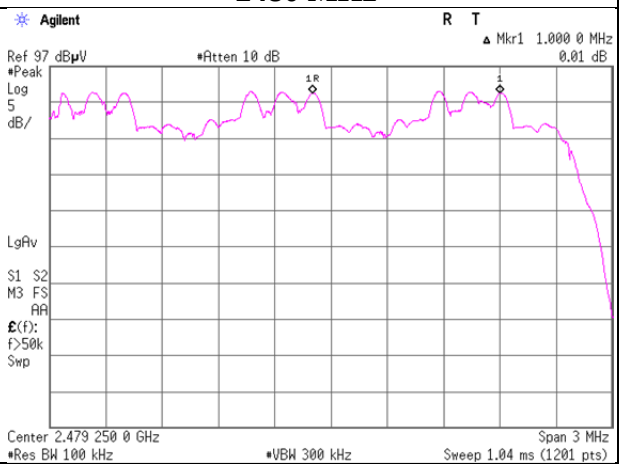
2402 MHz



2441 MHz



2480 MHz



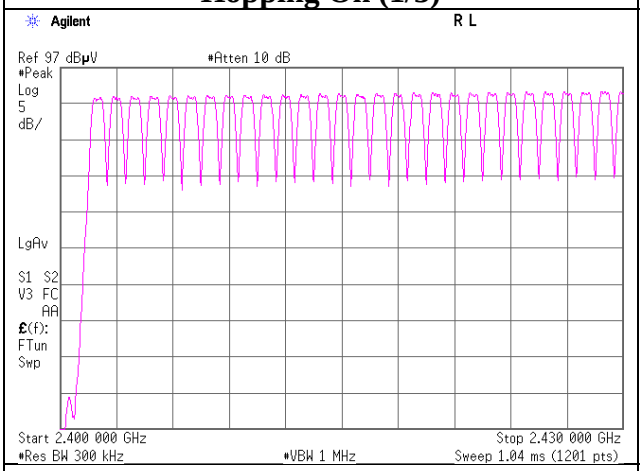
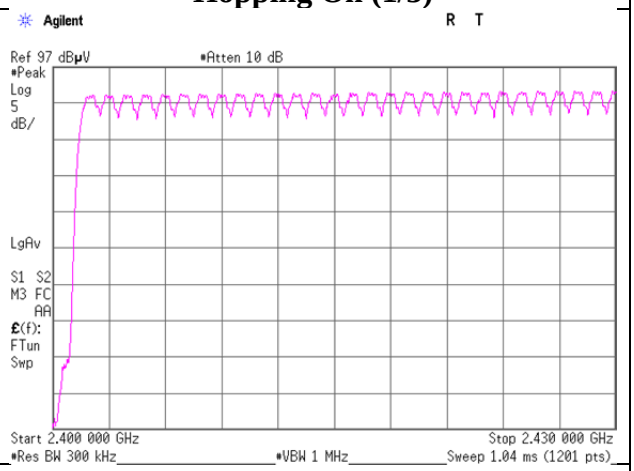
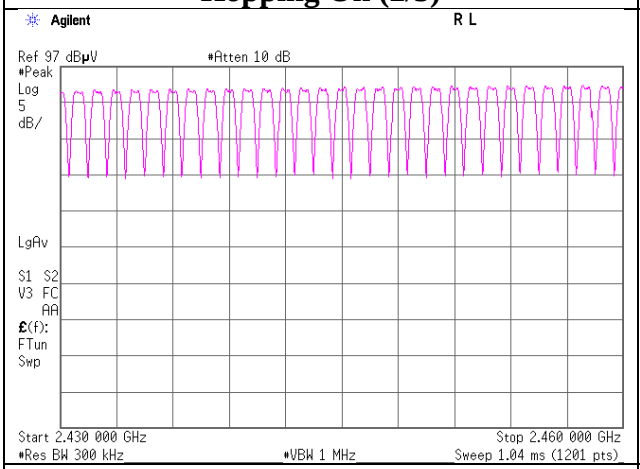
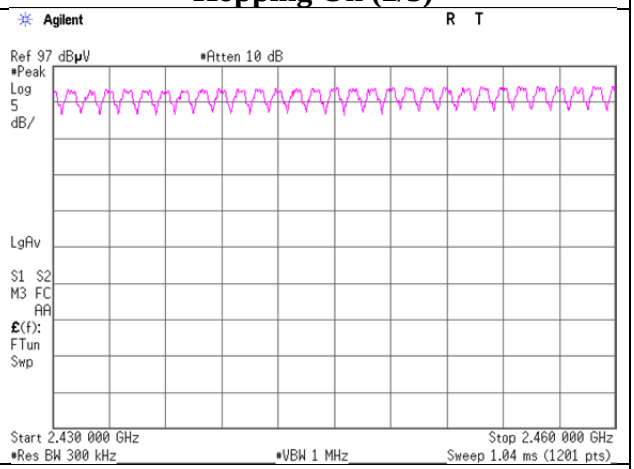
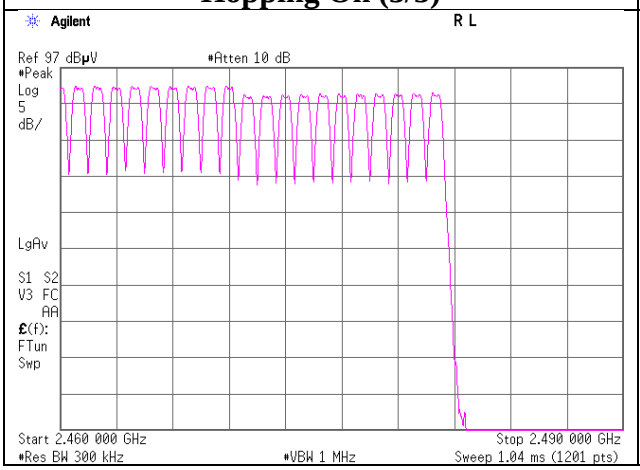
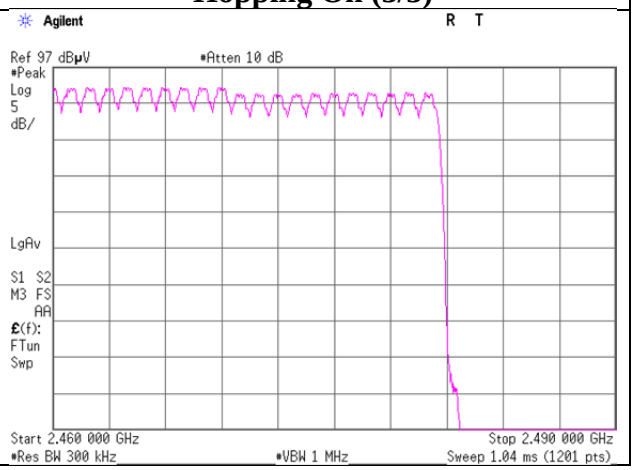
Number of Hopping Frequency

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
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

DH5	3DH5
Hopping On (1/3)	**Hopping On (1/3)**
	
Hopping On (2/3)	**Hopping On (2/3)**
	
Hopping On (3/3)	**Hopping On (3/3)**
	

Dwell time

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
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	0.413	133	400
DH3	26.0 times / 5 sec. x 31.6 sec. = 165 times	1.671	276	400
DH5	17.0 times / 5 sec. x 31.6 sec. = 108 times	2.921	315	400
3DH1	51.0 times / 5 sec. x 31.6 sec. = 323 times	0.431	139	400
3DH3	26.0 times / 5 sec. x 31.6 sec. = 165 times	1.684	278	400
3DH5	17.0 times / 5 sec. x 31.6 sec. = 108 times	2.941	318	400

Sample Calculation
Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

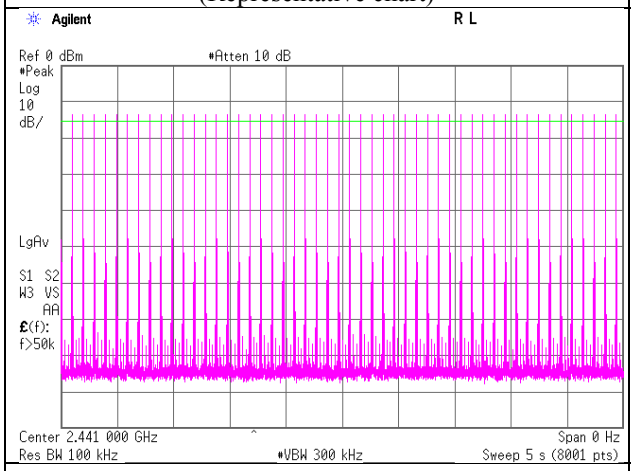
Mode	Sampling [times] 1	2	3	4	5	Average [times]
DH1	51	51	51	51	51	51
DH3	26	26	26	26	26	26
DH5	17	17	17	17	17	17
3DH1	51	51	51	51	51	51
3DH3	26	26	26	26	26	26
3DH5	17	17	17	17	17	17

Sample Calculation
Average = Summation (Sampling 1 to 5) / 5

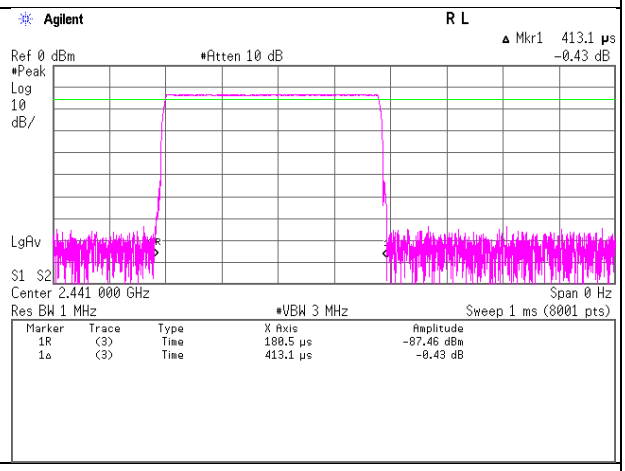
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless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

Dwell time

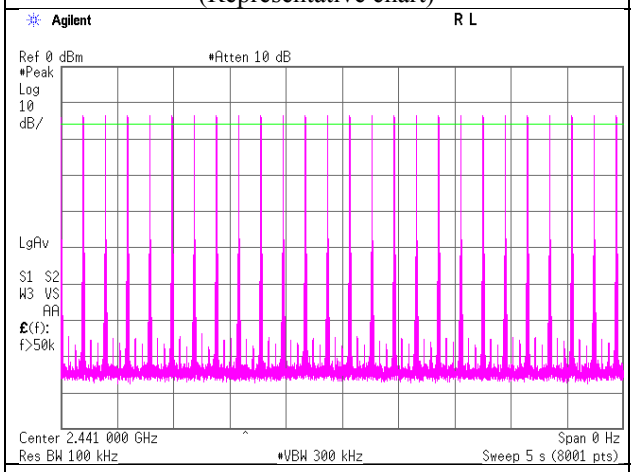
DH1 (1/2)
(Representative chart)



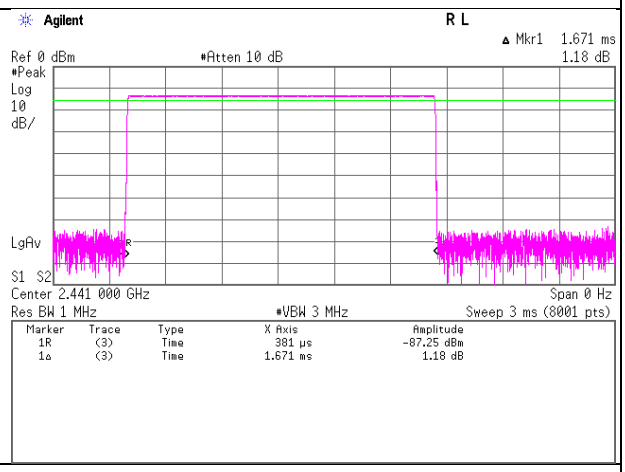
DH1 (2/2)



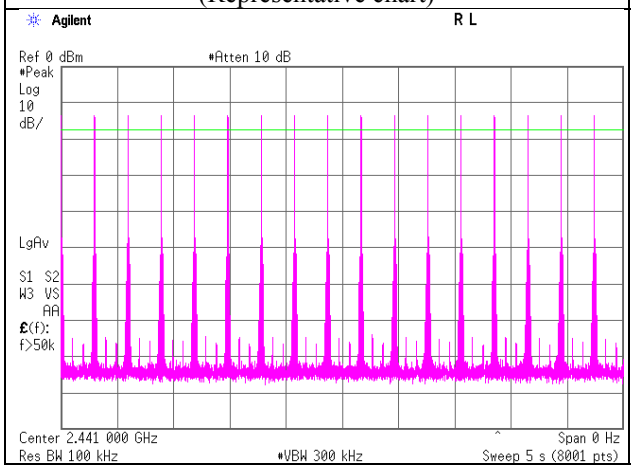
DH3 (1/2)
(Representative chart)



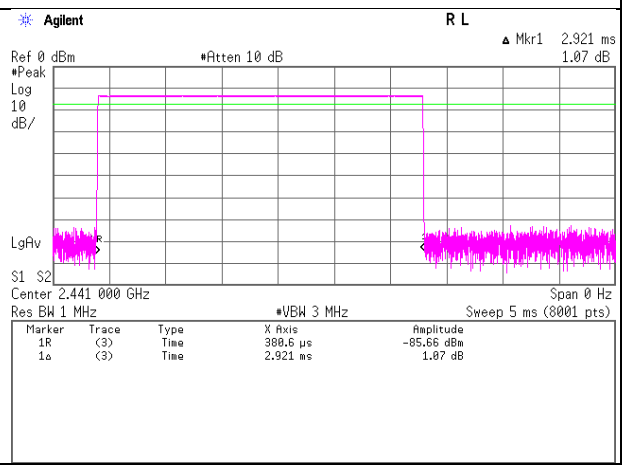
DH3 (2/2)



DH5 (1/2)
(Representative chart)

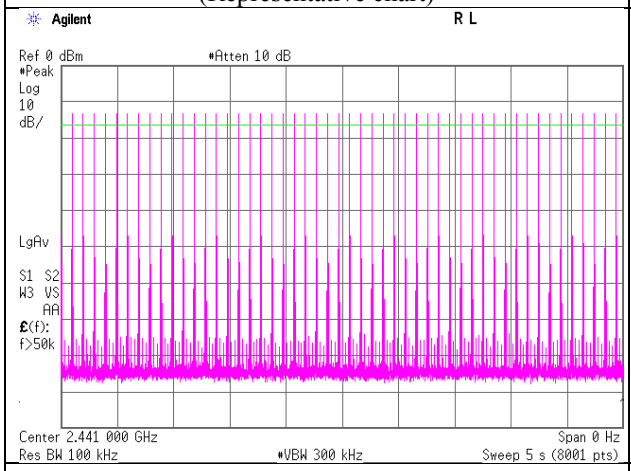


DH5 (2/2)

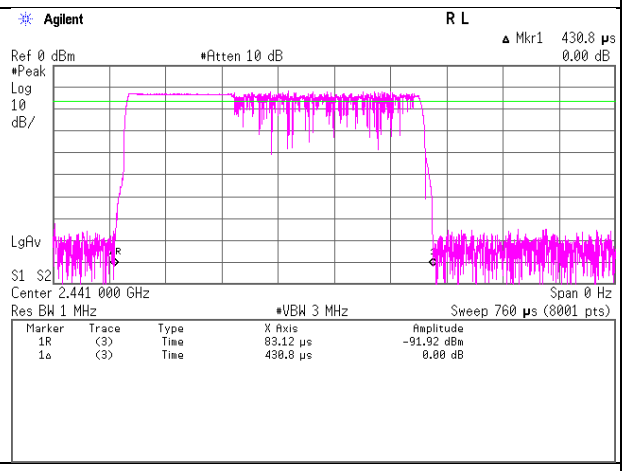


Dwell time

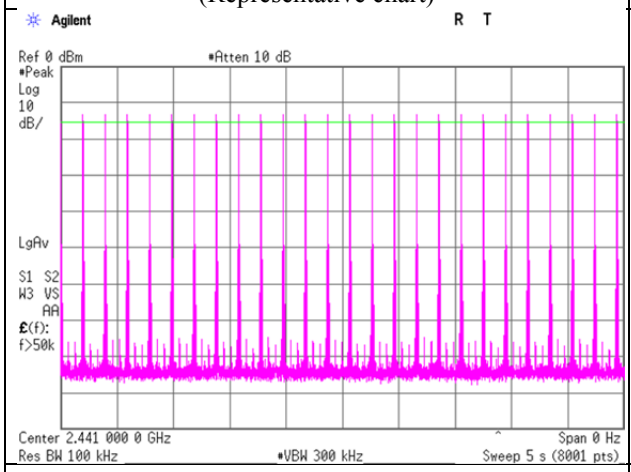
3DH1 (1/2)
(Representative chart)



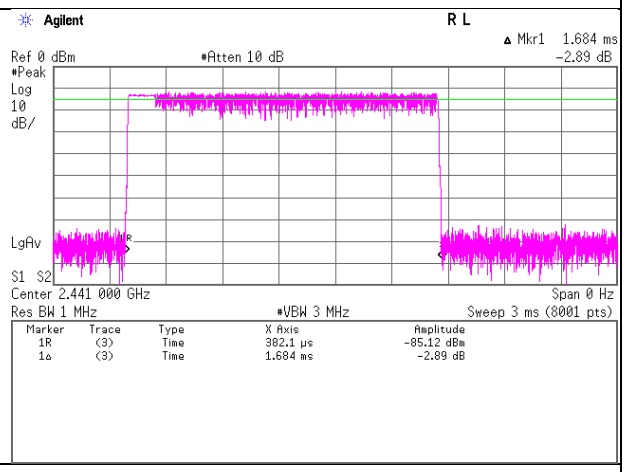
3DH1 (2/2)



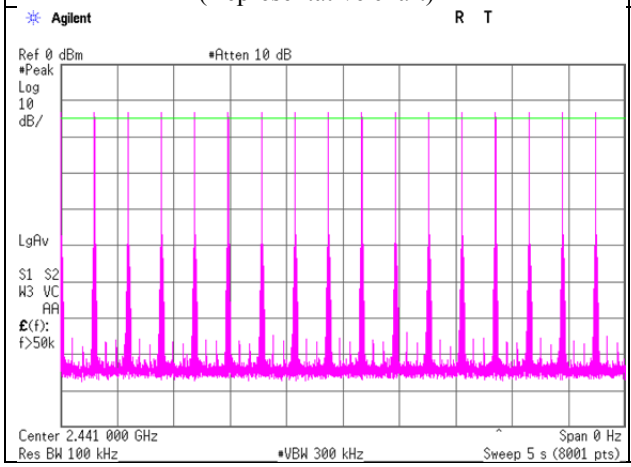
3DH3 (1/2)
(Representative chart)



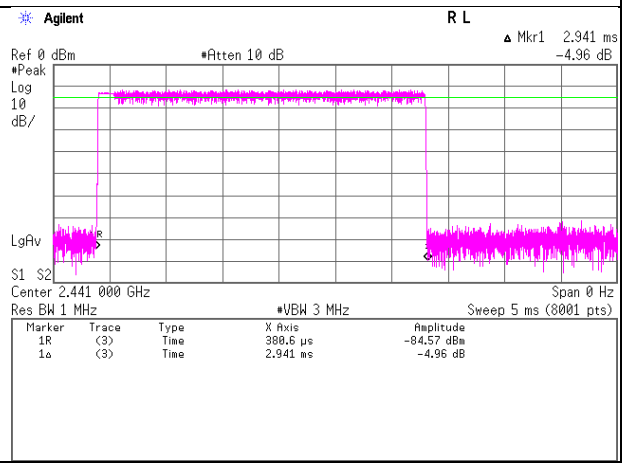
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
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	-14.06	2.17	9.92	-1.97	0.64	20.96	125	22.93
DH5	2441.0	-13.09	2.18	9.92	-0.99	0.80	20.96	125	21.95
DH5	2480.0	-13.58	2.20	9.92	-1.46	0.71	20.96	125	22.42
2DH5	2402.0	-13.27	2.17	9.92	-1.18	0.76	20.96	125	22.14
2DH5	2441.0	-12.51	2.18	9.92	-0.41	0.91	20.96	125	21.37
2DH5	2480.0	-12.92	2.20	9.92	-0.80	0.83	20.96	125	21.76
3DH5	2402.0	-13.12	2.17	9.92	-1.03	0.79	20.96	125	21.99
3DH5	2441.0	-12.27	2.18	9.92	-0.17	0.96	20.96	125	21.13
3DH5	2480.0	-12.64	2.20	9.92	-0.52	0.89	20.96	125	21.48

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)

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
DH5	2402.0	-15.64	2.17	9.92	-3.55	0.44	1.09	-2.46	0.57
DH5	2441.0	-14.56	2.18	9.92	-2.46	0.57	1.09	-1.37	0.73
DH5	2480.0	-15.10	2.20	9.92	-2.98	0.50	1.09	-1.89	0.65
2DH5	2402.0	-16.21	2.17	9.92	-4.12	0.39	1.07	-3.05	0.50
2DH5	2441.0	-15.41	2.18	9.92	-3.31	0.47	1.07	-2.24	0.60
2DH5	2480.0	-15.84	2.20	9.92	-3.72	0.42	1.07	-2.65	0.54
3DH5	2402.0	-16.18	2.17	9.92	-4.09	0.39	1.07	-3.02	0.50
3DH5	2441.0	-15.41	2.18	9.92	-3.31	0.47	1.07	-2.24	0.60
3DH5	2480.0	-15.83	2.20	9.92	-3.71	0.43	1.07	-2.64	0.54

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

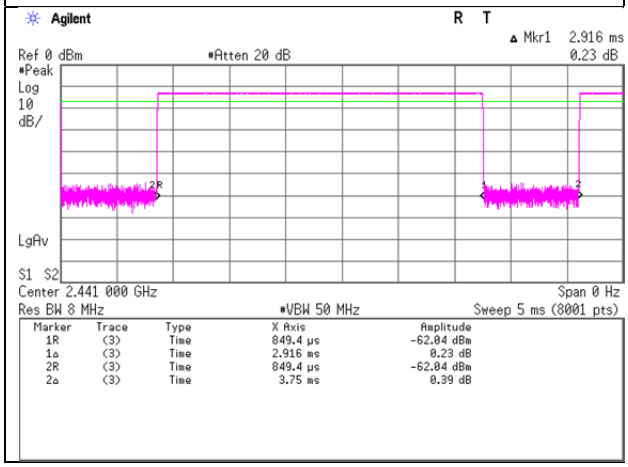
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst Rate Confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

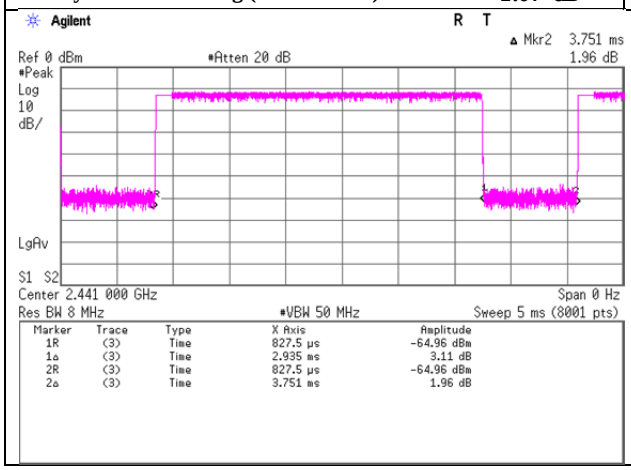
DH5

Tx on / (Tx on + Tx off) =	**0.778**
Tx on / (Tx on + Tx off) * 100 =	**77.8 %**
Duty factor = 10 * log (3.75 / 2.916) =	**1.09 dB**



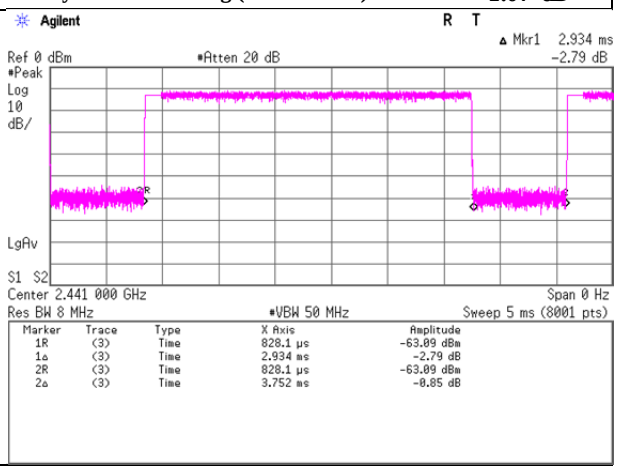
2DH5

Tx on / (Tx on + Tx off) =	**0.782**
Tx on / (Tx on + Tx off) * 100 =	**78.2 %**
Duty factor = 10 * log (3.751 / 2.935) =	**1.07 dB**



3DH5

Tx on / (Tx on + Tx off) =	**0.782**
Tx on / (Tx on + Tx off) * 100 =	**78.2 %**
Duty factor = 10 * log (3.752 / 2.934) =	**1.07 dB**



Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	70.509	QP	31.60	6.21	7.33	31.88	0.00	13.26	40.00	26.7	300	204	
Hori.	151.298	QP	41.30	14.72	8.61	31.81	0.00	32.82	43.50	10.6	300	358	
Hori.	170.344	QP	38.80	15.49	8.73	31.79	0.00	31.23	43.50	12.2	187	-1	
Hori.	210.101	QP	24.00	16.67	9.05	31.75	0.00	17.97	43.50	25.5	151	283	
Hori.	281.911	QP	23.50	18.78	9.63	31.68	0.00	20.23	46.00	25.7	150	19	
Hori.	959.999	QP	30.00	22.49	10.10	30.42	0.00	32.17	46.00	13.8	100	218	
Hori.	2390.000	PK	42.50	27.71	13.70	37.06	2.24	49.09	73.90	24.8	144	307	
Hori.	4804.000	PK	44.00	31.43	5.92	37.12	2.24	46.47	73.90	27.4	100	0	
Hori.	7206.000	PK	45.70	36.90	7.23	37.84	2.24	54.23	73.90	19.6	100	0	
Hori.	9608.000	PK	45.00	37.94	7.85	39.13	2.24	53.90	73.90	20.0	100	0	
Hori.	12010.000	PK	44.18	39.75	9.40	39.38	2.24	56.19	73.90	17.7	100	0	
Hori.	2390.000	AV	30.80	27.71	13.70	37.06	2.24	37.39	53.90	16.5	144	307	
Hori.	4804.000	AV	33.00	31.43	5.92	37.12	2.24	35.47	53.90	18.4	100	0	
Hori.	7206.000	AV	33.30	36.90	7.23	37.84	2.24	41.83	53.90	12.0	100	0	
Hori.	9608.000	AV	33.50	37.94	7.85	39.13	2.24	42.40	53.90	11.5	100	0	
Hori.	12010.000	AV	34.00	39.75	9.40	39.38	2.24	46.01	53.90	**7.8**	100	0	
Vert.	40.259	QP	37.50	14.33	7.03	31.90	0.00	26.96	40.00	13.0	100	90	
Vert.	153.862	QP	40.30	14.81	8.65	31.81	0.00	31.95	43.50	11.5	100	31	
Vert.	170.881	QP	34.40	15.51	8.73	31.79	0.00	26.85	43.50	16.6	100	97	
Vert.	861.440	QP	23.00	21.63	9.64	31.02	0.00	23.25	46.00	22.7	100	92	
Vert.	2390.000	PK	43.00	27.71	13.70	37.06	2.24	49.59	73.90	24.3	150	30	
Vert.	4804.000	PK	45.00	31.43	5.92	37.12	2.24	47.47	73.90	26.4	100	351	
Vert.	7206.000	PK	45.00	36.90	7.23	37.84	2.24	53.53	73.90	20.3	100	0	
Vert.	9608.000	PK	44.80	37.94	7.85	39.13	2.24	53.70	73.90	20.2	100	0	
Vert.	12010.000	PK	43.90	39.75	9.40	39.38	2.24	55.91	73.90	17.9	100	0	
Vert.	2390.000	AV	31.00	27.71	13.70	37.06	2.24	37.59	53.90	16.3	150	30	
Vert.	4804.000	AV	35.30	31.43	5.92	37.12	2.24	37.77	53.90	16.1	100	351	
Vert.	7206.000	AV	33.30	36.90	7.23	37.84	2.24	41.83	53.90	12.0	100	0	
Vert.	9608.000	AV	33.60	37.94	7.85	39.13	2.24	42.50	53.90	11.4	100	0	
Vert.	12010.000	AV	33.90	39.75	9.40	39.38	2.24	45.91	53.90	7.9	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	78.00	27.72	13.71	37.05	2.24	84.62	-	-	Carrier
Hori.	2400.000	PK	30.10	27.72	13.71	37.05	2.24	36.72	64.62	27.9	
Vert.	2402.000	PK	80.30	27.72	13.71	37.05	2.24	86.92	-	-	Carrier
Vert.	2400.000	PK	33.20	27.72	13.71	37.05	2.24	39.82	66.92	27.1	

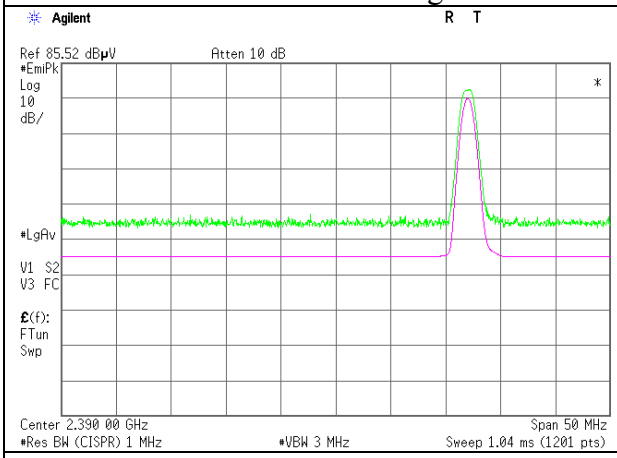
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz	

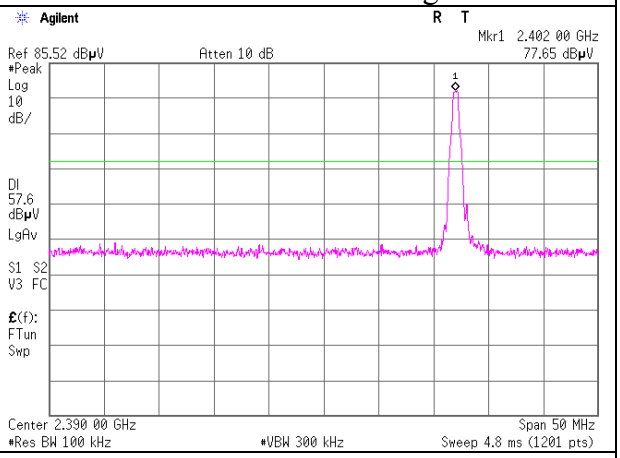
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

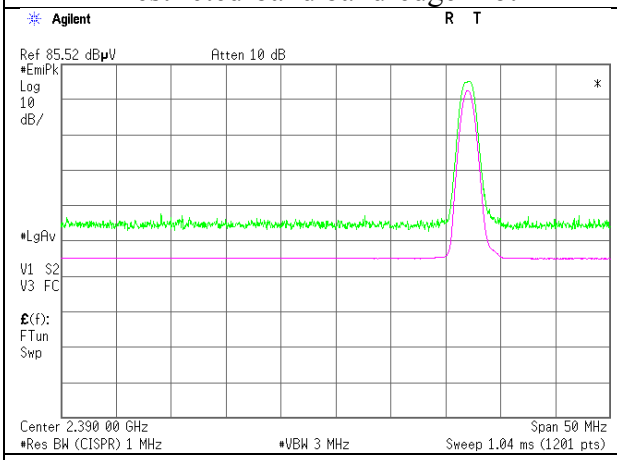
Authorized-band band-edge Plot



20dBc Plot

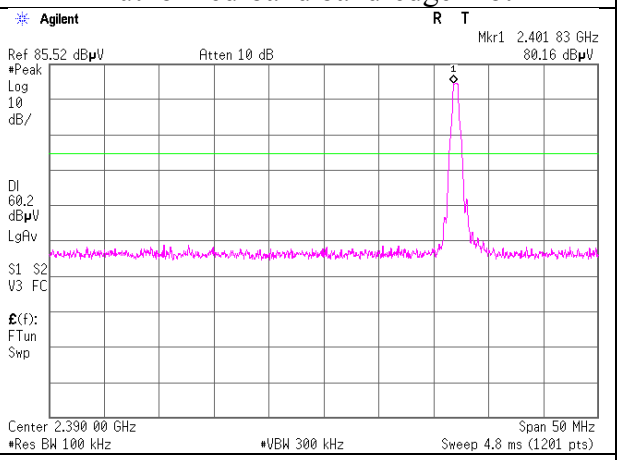
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	63.214	QP	34.00	7.30	6.98	31.89	0.00	16.39	40.00	23.6	300	198	
Hori.	151.332	QP	40.60	14.73	8.61	31.81	0.00	32.13	43.50	11.3	227	350	
Hori.	170.365	QP	37.40	15.49	8.73	31.79	0.00	29.83	43.50	13.6	193	347	
Hori.	198.870	QP	33.00	16.36	8.79	31.76	0.00	26.39	43.50	17.1	152	107	
Hori.	389.591	QP	23.50	16.00	7.16	31.63	0.00	15.03	46.00	30.9	100	78	
Hori.	960.035	QP	30.00	22.49	10.10	30.42	0.00	32.17	53.90	21.7	100	221	
Hori.	4882.000	PK	43.70	31.72	5.97	37.16	2.24	46.47	73.90	27.4	100	12	
Hori.	7323.000	PK	44.80	36.89	7.32	37.92	2.24	53.33	73.90	20.5	100	0	
Hori.	9764.000	PK	44.00	38.01	7.98	39.20	2.24	53.03	73.90	20.8	100	0	
Hori.	12205.000	PK	44.80	39.70	9.41	39.39	2.24	56.76	73.90	17.1	100	0	
Hori.	4882.000	AV	33.70	31.72	5.97	37.16	2.24	36.47	53.90	17.4	100	12	
Hori.	7323.000	AV	32.30	36.89	7.32	37.92	2.24	40.83	53.90	13.0	100	0	
Hori.	9764.000	AV	32.90	38.01	7.98	39.20	2.24	41.93	53.90	11.9	100	0	
Hori.	12205.000	AV	33.50	39.70	9.41	39.39	2.24	45.46	53.90	8.4	100	0	
Vert.	39.523	QP	36.00	14.59	7.02	31.91	0.00	25.70	40.00	14.3	100	282	
Vert.	153.876	QP	40.40	14.81	8.65	31.81	0.00	32.05	43.50	11.4	100	26	
Vert.	861.357	QP	22.87	21.62	9.64	31.02	0.00	23.11	46.00	22.8	100	82	
Vert.	4882.000	PK	45.30	31.72	5.97	37.16	2.24	48.07	73.90	25.8	100	353	
Vert.	7323.000	PK	43.30	36.89	7.32	37.92	2.24	51.83	73.90	22.0	100	0	
Vert.	9764.000	PK	44.00	38.01	7.98	39.20	2.24	53.03	73.90	20.8	100	0	
Vert.	12205.000	PK	44.40	39.70	9.41	39.39	2.24	56.36	73.90	17.5	100	0	
Vert.	4882.000	AV	34.60	31.72	5.97	37.16	2.24	37.37	53.90	16.5	100	353	
Vert.	7323.000	AV	32.20	36.89	7.32	37.92	2.24	40.73	53.90	13.1	100	0	
Vert.	9764.000	AV	33.00	38.01	7.98	39.20	2.24	42.03	53.90	11.8	100	0	
Vert.	12205.000	AV	33.70	39.70	9.41	39.39	2.24	45.66	53.90	**8.2**	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	151.857	QP	40.40	14.74	8.62	31.81	0.00	31.95	43.50	11.5	300	345	
Hori.	170.891	QP	37.60	15.51	8.73	31.79	0.00	30.05	43.50	13.4	190	1	
Hori.	221.973	QP	24.60	17.00	9.15	31.73	0.00	19.02	46.00	26.9	200	85	
Hori.	245.999	QP	28.20	17.67	9.35	31.70	0.00	23.52	46.00	22.4	200	72	
Hori.	315.555	QP	37.00	13.97	6.67	31.66	0.00	25.98	46.00	20.0	149	97	
Hori.	959.999	QP	29.80	22.49	10.10	30.42	0.00	31.97	46.00	14.0	100	221	
Hori.	2483.500	PK	42.35	27.82	13.79	37.01	2.24	49.19	73.90	24.7	100	308	
Hori.	4960.000	PK	45.00	32.02	6.02	37.19	2.24	48.09	73.90	25.8	100	33	
Hori.	7440.000	PK	45.40	36.89	7.39	37.99	2.24	53.93	73.90	19.9	100	0	
Hori.	9920.000	PK	45.00	38.07	8.13	39.26	2.24	54.18	73.90	19.7	100	0	
Hori.	12400.000	PK	44.80	39.65	9.42	39.40	2.24	56.71	73.90	17.1	100	0	
Hori.	2483.500	AV	31.80	27.82	13.79	37.01	2.24	38.64	53.90	15.2	100	308	
Hori.	4960.000	AV	32.20	32.02	6.02	37.19	2.24	35.29	53.90	18.6	100	33	
Hori.	7440.000	AV	32.10	36.89	7.39	37.99	2.24	40.63	53.90	13.2	100	0	
Hori.	9920.000	AV	33.10	38.07	8.13	39.26	2.24	42.28	53.90	11.6	100	0	
Hori.	12400.000	AV	33.90	39.65	9.42	39.40	2.24	45.81	53.90	**8.0**	100	0	
Vert.	30.315	QP	32.00	17.09	6.80	31.91	0.00	23.98	40.00	16.0	100	100	
Vert.	39.671	QP	36.00	14.54	7.02	31.91	0.00	25.65	40.00	14.3	100	3	
Vert.	153.388	QP	41.00	14.80	8.63	31.81	0.00	32.62	43.50	10.8	100	25	
Vert.	847.419	QP	22.80	21.47	9.57	31.09	0.00	22.75	46.00	23.2	100	353	
Vert.	2483.500	PK	41.70	27.82	13.79	37.01	2.24	48.54	73.90	25.3	130	16	
Vert.	4960.000	PK	44.70	32.02	6.02	37.19	2.24	47.79	73.90	26.1	100	354	
Vert.	7440.000	PK	44.80	36.89	7.39	37.99	2.24	53.33	73.90	20.5	100	0	
Vert.	9920.000	PK	45.00	38.07	8.13	39.26	2.24	54.18	73.90	19.7	100	0	
Vert.	12400.000	PK	43.54	39.65	9.42	39.40	2.24	55.45	73.90	18.4	100	0	
Vert.	2483.500	AV	32.00	27.82	13.79	37.01	2.24	38.84	53.90	15.0	130	16	
Vert.	4960.000	AV	33.00	32.02	6.02	37.19	2.24	36.09	53.90	17.8	100	354	
Vert.	7440.000	AV	32.00	36.89	7.39	37.99	2.24	40.53	53.90	13.3	100	0	
Vert.	9920.000	AV	33.20	38.07	8.13	39.26	2.24	42.38	53.90	11.5	100	0	
Vert.	12400.000	AV	33.80	39.65	9.42	39.40	2.24	45.71	53.90	8.1	100	0	

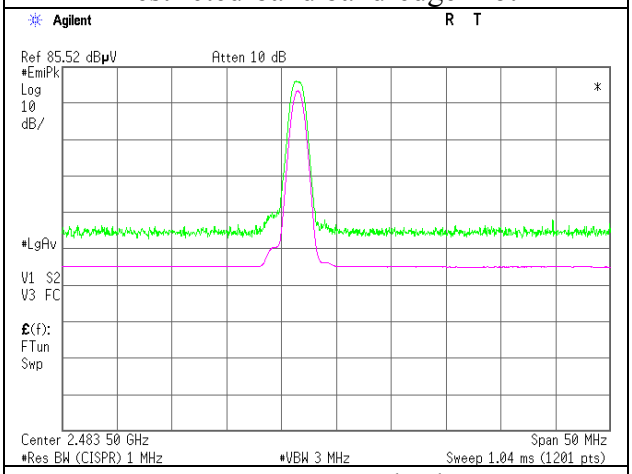
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz	

Horizontal

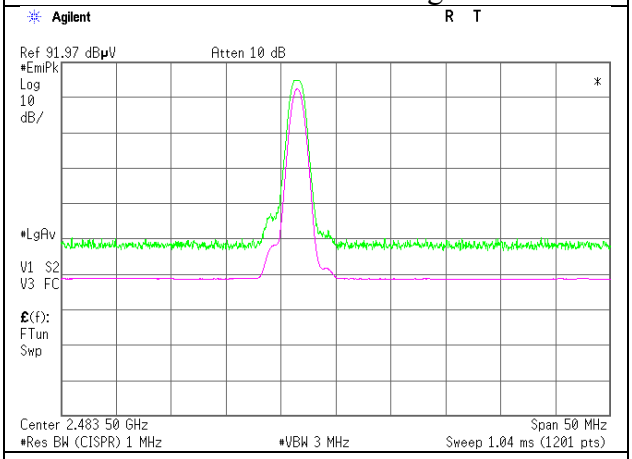
Restricted-band band-edge Plot



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.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	63.604	QP	32.90	7.23	6.98	31.89	0.00	15.22	40.00	24.7	300	193	
Hori.	153.354	QP	40.70	14.79	8.63	31.81	0.00	32.31	43.50	11.1	211	351	
Hori.	170.374	QP	37.50	15.49	8.73	31.79	0.00	29.93	43.50	13.5	193	343	
Hori.	198.865	QP	33.00	16.36	8.79	31.76	0.00	26.39	43.50	17.1	150	92	
Hori.	312.084	QP	35.60	13.87	6.65	31.66	0.00	24.46	46.00	21.5	122	88	
Hori.	960.000	QP	30.20	22.49	10.10	30.42	0.00	32.37	46.00	13.6	100	222	
Hori.	2390.000	PK	43.90	27.71	13.70	37.06	2.24	50.49	73.90	23.4	100	316	
Hori.	4804.000	PK	43.50	31.43	5.92	37.12	2.24	45.97	73.90	27.9	100	0	
Hori.	7206.000	PK	44.40	36.90	7.23	37.84	2.24	52.93	73.90	20.9	100	0	
Hori.	9608.000	PK	43.70	37.94	7.85	39.13	2.24	52.60	73.90	21.3	100	0	
Hori.	12010.000	PK	44.00	39.75	9.40	39.38	2.24	56.01	73.90	17.8	100	0	
Hori.	2390.000	AV	31.60	27.71	13.70	37.06	2.24	38.19	53.90	15.7	100	316	
Hori.	4804.000	AV	31.70	31.43	5.92	37.12	2.24	34.17	53.90	19.7	100	0	
Hori.	7206.000	AV	32.60	36.90	7.23	37.84	2.24	41.13	53.90	12.7	100	0	
Hori.	9608.000	AV	33.10	37.94	7.85	39.13	2.24	42.00	53.90	11.9	100	0	
Hori.	12010.000	AV	33.50	39.75	9.40	39.38	2.24	45.51	53.90	8.3	100	0	
Vert.	30.462	QP	32.00	17.06	6.80	31.91	0.00	23.95	40.00	16.0	100	101	
Vert.	39.534	QP	34.30	14.58	7.02	31.91	0.00	23.99	40.00	16.0	100	63	
Vert.	153.385	QP	40.40	14.80	8.63	31.81	0.00	32.02	43.50	11.4	100	49	
Vert.	908.993	QP	22.87	22.12	9.87	30.80	0.00	24.06	46.00	21.9	100	34	
Vert.	2390.000	PK	43.60	27.71	13.70	37.06	2.24	50.19	73.90	23.7	100	30	
Vert.	4804.000	PK	44.30	31.43	5.92	37.12	2.24	46.77	73.90	27.1	100	355	
Vert.	7206.000	PK	43.00	36.90	7.23	37.84	2.24	51.53	73.90	22.3	100	0	
Vert.	9608.000	PK	43.60	37.94	7.85	39.13	2.24	52.50	73.90	21.4	100	0	
Vert.	12010.000	PK	44.60	39.75	9.40	39.38	2.24	56.61	73.90	17.2	100	0	
Vert.	2390.000	AV	30.50	27.71	13.70	37.06	2.24	37.09	53.90	16.8	100	30	
Vert.	4804.000	AV	31.00	31.43	5.92	37.12	2.24	33.47	53.90	20.4	100	355	
Vert.	7206.000	AV	32.00	36.90	7.23	37.84	2.24	40.53	53.90	13.3	100	0	
Vert.	9608.000	AV	32.50	37.94	7.85	39.13	2.24	41.40	53.90	12.5	100	0	
Vert.	12010.000	AV	33.70	39.75	9.40	39.38	2.24	45.71	53.90	**8.1**	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	76.60	27.72	13.71	37.05	2.24	83.22	-	-	Carrier
Hori.	2400.000	PK	30.60	27.72	13.71	37.05	2.24	37.22	63.22	26.0	
Vert.	2402.000	PK	81.70	27.72	13.71	37.05	2.24	88.32	-	-	Carrier
Vert.	2400.000	PK	34.40	27.72	13.71	37.05	2.24	41.02	68.32	27.3	

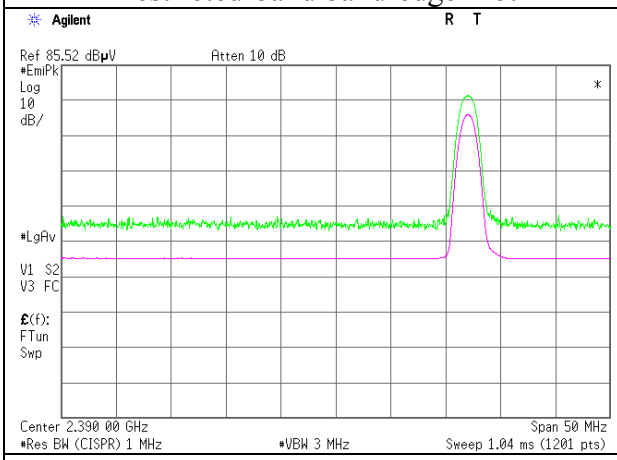
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz	

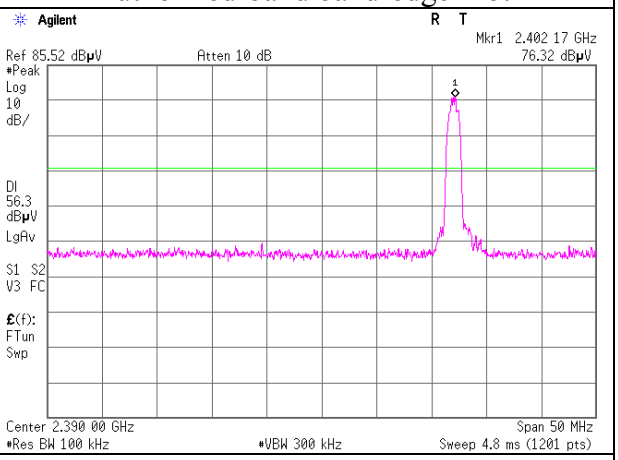
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

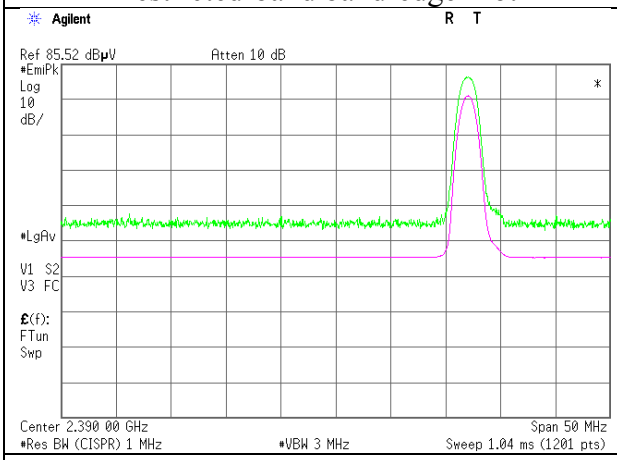
Authorized-band band-edge Plot



20dBc Plot

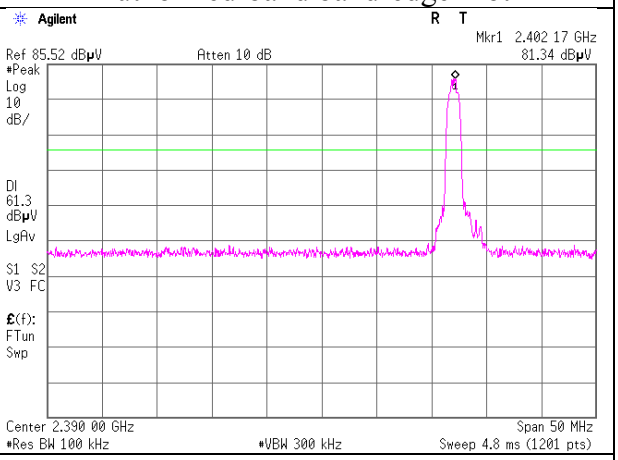
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	63.000	QP	33.30	7.33	6.99	31.89	0.00	15.73	40.00	24.2	300	192	
Hori.	67.726	QP	32.00	6.57	7.14	31.88	0.00	13.83	40.00	26.1	300	196	
Hori.	151.859	QP	40.80	14.74	8.62	31.81	0.00	32.35	43.50	11.1	200	340	
Hori.	169.897	QP	36.90	15.47	8.73	31.79	0.00	29.31	43.50	14.1	200	323	
Hori.	315.587	QP	37.70	13.97	6.67	31.66	0.00	26.68	46.00	19.3	150	93	
Hori.	329.330	QP	30.00	14.35	6.77	31.65	0.00	19.47	46.00	26.5	100	90	
Hori.	960.083	QP	30.00	22.49	10.10	30.42	0.00	32.17	53.90	21.7	100	205	
Hori.	4882.000	PK	43.50	31.72	5.97	37.16	2.24	46.27	73.90	27.6	100	0	
Hori.	7323.000	PK	44.80	36.89	7.32	37.92	2.24	53.33	73.90	20.5	100	0	
Hori.	9764.000	PK	46.00	38.01	7.98	39.20	2.24	55.03	73.90	18.8	100	0	
Hori.	12205.000	PK	45.90	39.70	9.41	39.39	2.24	57.86	73.90	16.0	100	0	
Hori.	4882.000	AV	31.80	31.72	5.97	37.16	2.24	34.57	53.90	19.3	100	0	
Hori.	7323.000	AV	33.50	36.89	7.32	37.92	2.24	42.03	53.90	11.8	100	0	
Hori.	9764.000	AV	34.88	38.01	7.98	39.20	2.24	43.91	53.90	9.9	100	0	
Hori.	12205.000	AV	33.90	39.70	9.41	39.39	2.24	45.86	53.90	**8.0**	100	0	
Vert.	30.126	QP	30.70	17.13	6.79	31.91	0.00	22.71	40.00	17.2	100	44	
Vert.	39.521	QP	36.00	14.59	7.02	31.91	0.00	25.70	40.00	14.3	100	298	
Vert.	153.390	QP	40.00	14.80	8.63	31.81	0.00	31.62	43.50	11.8	100	34	
Vert.	912.552	QP	23.00	22.14	9.89	30.77	0.00	24.26	46.00	21.7	100	70	
Vert.	4882.000	PK	42.00	31.72	5.97	37.16	2.24	44.77	73.90	29.1	100	0	
Vert.	7323.000	PK	45.00	36.89	7.32	37.92	2.24	53.53	73.90	20.3	100	0	
Vert.	9764.000	PK	44.70	38.01	7.98	39.20	2.24	53.73	73.90	20.1	100	0	
Vert.	12205.000	PK	46.00	39.70	9.41	39.39	2.24	57.96	73.90	15.9	100	0	
Vert.	4882.000	AV	31.50	31.72	5.97	37.16	2.24	34.27	53.90	19.6	100	0	
Vert.	7323.000	AV	33.60	36.89	7.32	37.92	2.24	42.13	53.90	11.7	100	0	
Vert.	9764.000	AV	34.50	38.01	7.98	39.20	2.24	43.53	53.90	10.3	100	0	
Vert.	12205.000	AV	33.80	39.70	9.41	39.39	2.24	45.76	53.90	8.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	35.670	QP	27.30	15.87	6.93	31.91	0.00	18.19	40.00	21.8	300	117	
Hori.	152.377	QP	40.00	14.76	8.62	31.81	0.00	31.57	43.50	11.9	300	358	
Hori.	170.370	QP	37.90	15.49	8.73	31.79	0.00	30.33	43.50	13.1	190	355	
Hori.	377.699	QP	24.00	15.68	7.09	31.63	0.00	15.14	46.00	30.8	100	258	
Hori.	960.000	QP	30.20	22.49	10.10	30.42	0.00	32.37	46.00	13.6	100	213	
Hori.	2483.500	PK	42.50	27.82	13.79	37.01	2.24	49.34	73.90	24.5	100	309	
Hori.	4960.000	PK	43.00	32.02	6.02	37.19	2.24	46.09	73.90	27.8	100	0	
Hori.	7440.000	PK	45.00	36.89	7.39	37.99	2.24	53.53	73.90	20.3	100	0	
Hori.	9920.000	PK	45.50	38.07	8.13	39.26	2.24	54.68	73.90	19.2	100	0	
Hori.	12400.000	PK	44.90	39.65	9.42	39.40	2.24	56.81	73.90	17.0	100	0	
Hori.	2483.500	AV	31.90	27.82	13.79	37.01	2.24	38.74	53.90	15.1	100	309	
Hori.	4960.000	AV	32.10	32.02	6.02	37.19	2.24	35.19	53.90	18.7	100	0	
Hori.	7440.000	AV	33.50	36.89	7.39	37.99	2.24	42.03	53.90	11.8	100	0	
Hori.	9920.000	AV	34.10	38.07	8.13	39.26	2.24	43.28	53.90	10.6	100	0	
Hori.	12400.000	AV	33.60	39.65	9.42	39.40	2.24	45.51	53.90	8.3	100	0	
Vert.	30.428	QP	31.00	17.07	6.80	31.91	0.00	22.96	40.00	17.0	100	22	
Vert.	39.531	QP	35.80	14.59	7.02	31.91	0.00	25.50	40.00	14.5	100	3	
Vert.	43.257	QP	32.30	13.23	7.12	31.90	0.00	20.75	40.00	19.2	100	355	
Vert.	153.397	QP	40.60	14.80	8.63	31.81	0.00	32.22	43.50	11.2	100	48	
Vert.	783.076	QP	23.00	20.84	9.27	31.40	0.00	21.71	46.00	24.2	100	1	
Vert.	2483.500	PK	42.40	27.82	13.79	37.01	2.24	49.24	73.90	24.6	120	21	
Vert.	4960.000	PK	43.90	32.02	6.02	37.19	2.24	46.99	73.90	26.9	100	0	
Vert.	7440.000	PK	44.00	36.89	7.39	37.99	2.24	52.53	73.90	21.3	100	0	
Vert.	9920.000	PK	44.70	38.07	8.13	39.26	2.24	53.88	73.90	20.0	100	0	
Vert.	12400.000	PK	44.90	39.65	9.42	39.40	2.24	56.81	73.90	17.0	100	0	
Vert.	2483.500	AV	31.80	27.82	13.79	37.01	2.24	38.64	53.90	15.2	120	21	
Vert.	4960.000	AV	32.50	32.02	6.02	37.19	2.24	35.59	53.90	18.3	100	0	
Vert.	7440.000	AV	33.30	36.89	7.39	37.99	2.24	41.83	53.90	12.0	100	0	
Vert.	9920.000	AV	34.20	38.07	8.13	39.26	2.24	43.38	53.90	10.5	100	0	
Vert.	12400.000	AV	34.40	39.65	9.42	39.40	2.24	46.31	53.90	**7.5**	100	0	

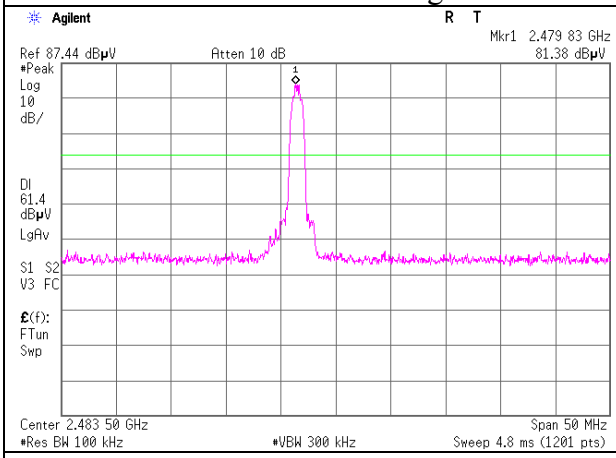
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.885 m / 3.0 m) = 2.24 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz	

Horizontal

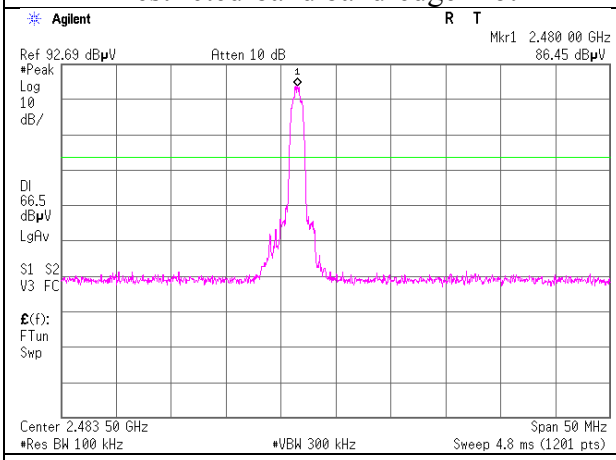
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

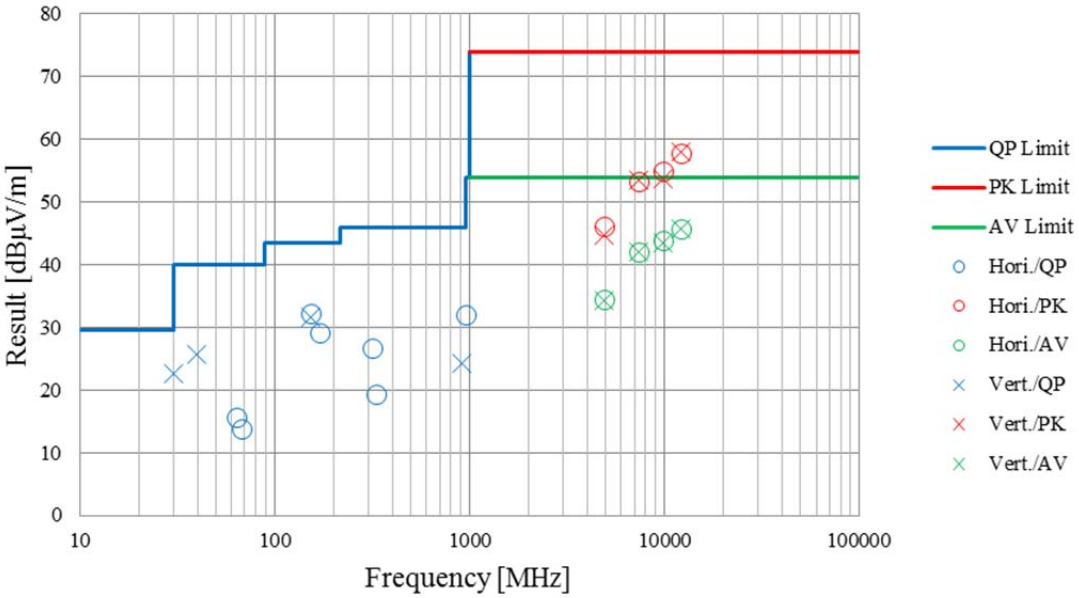


Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	11390244S-E	
Date	August 15, 2016	August 16, 2016
Temperature / Humidity	24 deg. C / 50 % RH	23 deg. C / 63 % RH
Engineer	Kazutaka Takeyama (1G-26.5GHz)	Kazutaka Takeyama (30M-1GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz	



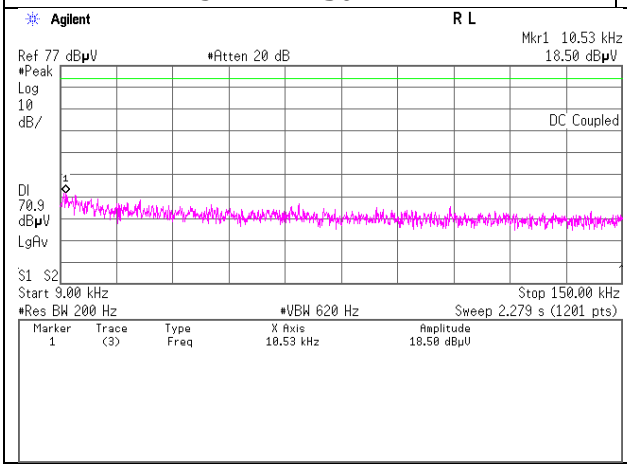
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

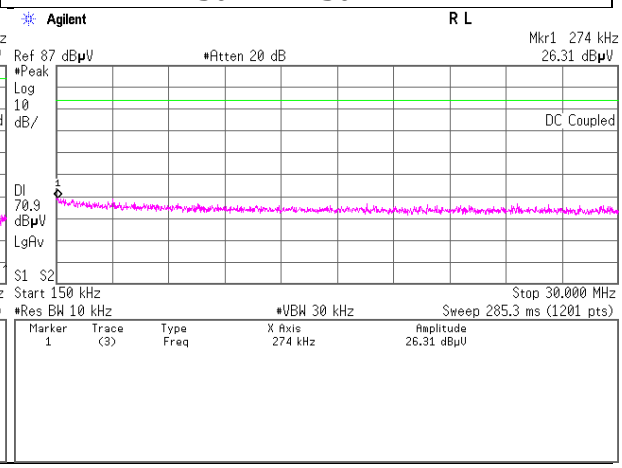
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5

2402 MHz

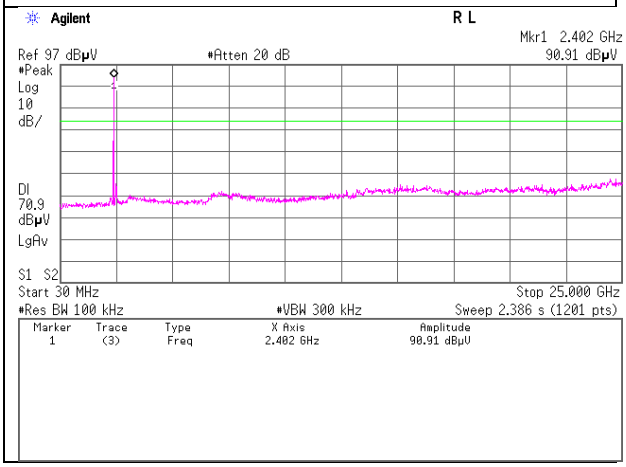
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

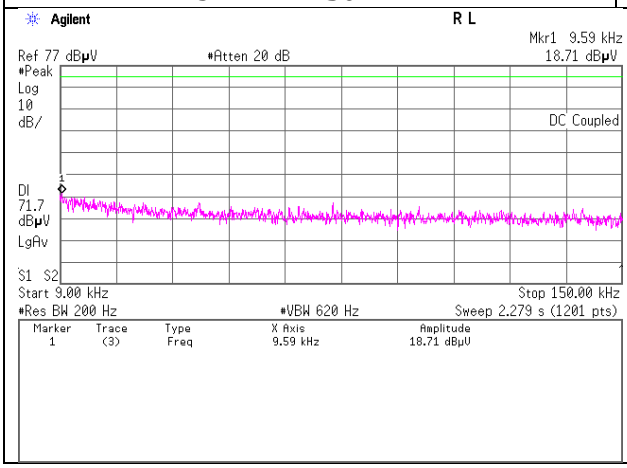


Conducted Spurious Emission

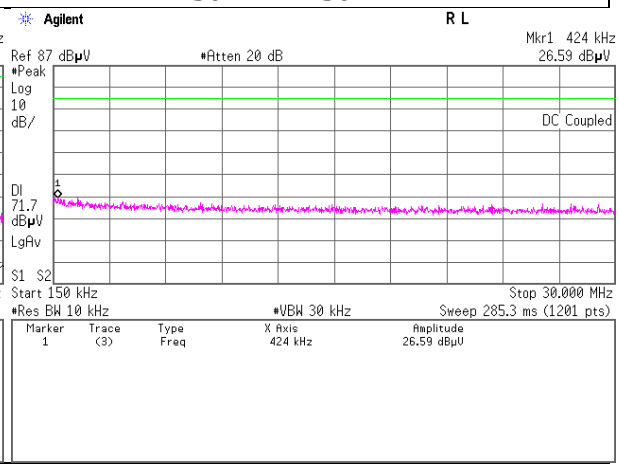
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5

2441 MHz

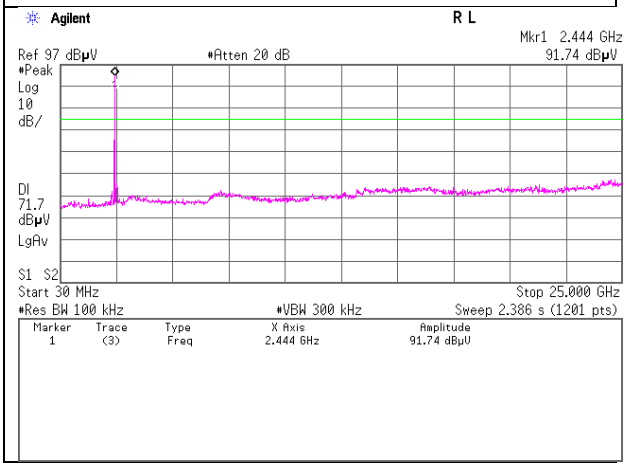
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

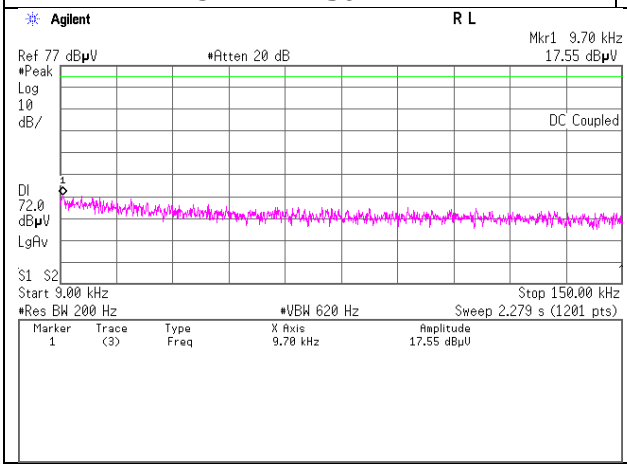


Conducted Spurious Emission

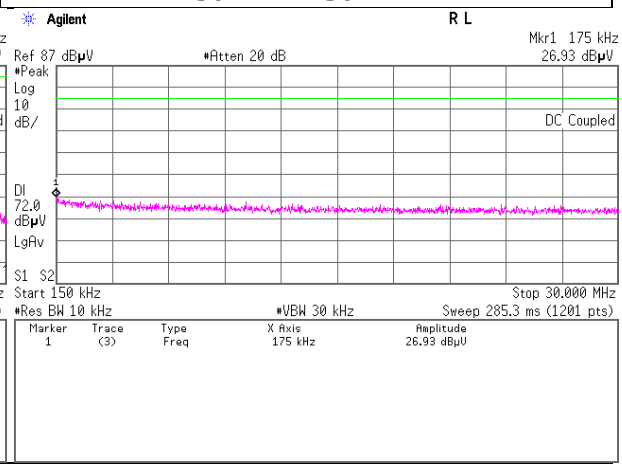
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, DH5

2480 MHz

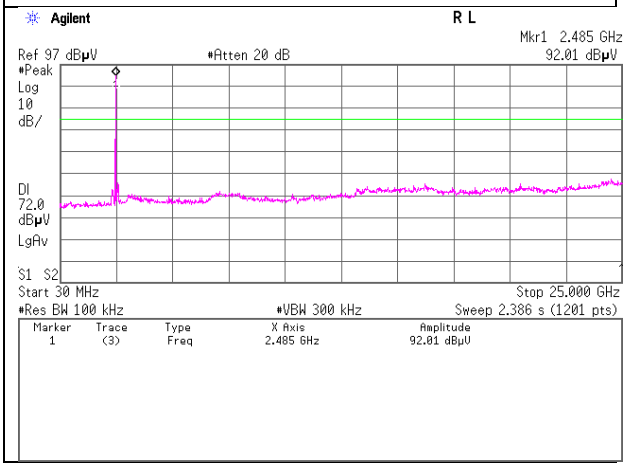
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

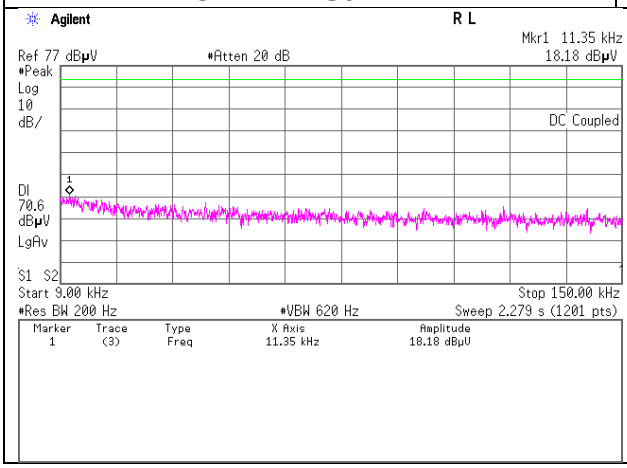


Conducted Spurious Emission

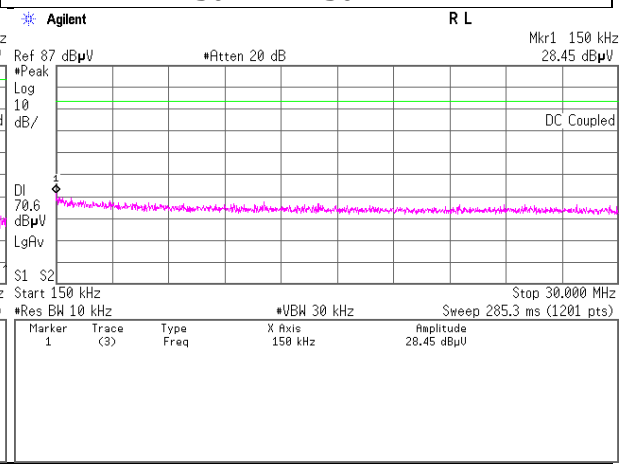
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On, 3DH5

2402 MHz

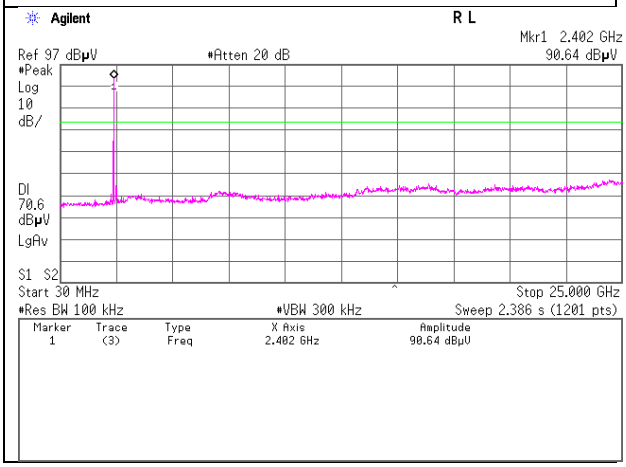
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

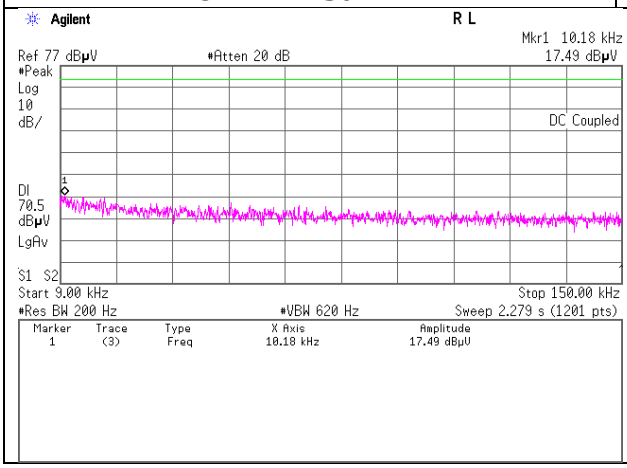


Conducted Spurious Emission

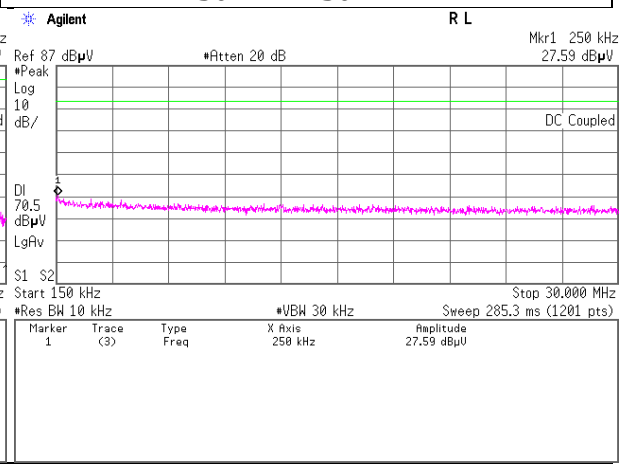
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, 3DH5

2441 MHz

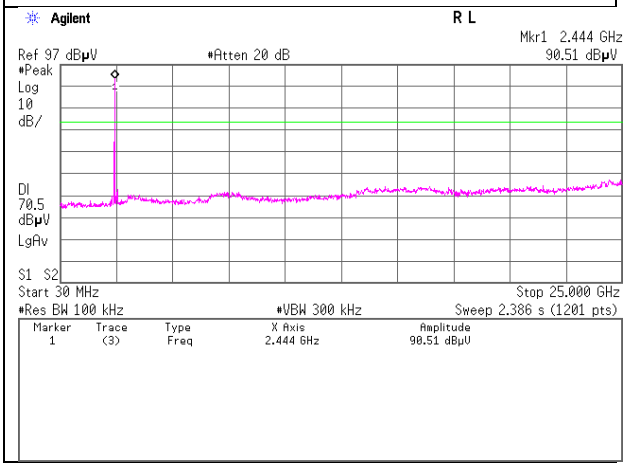
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

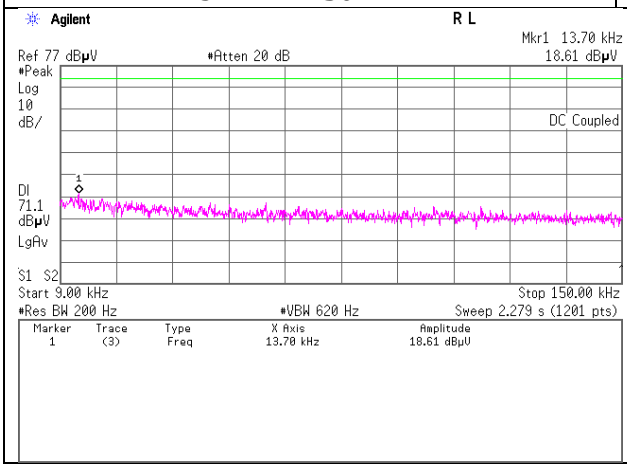


Conducted Spurious Emission

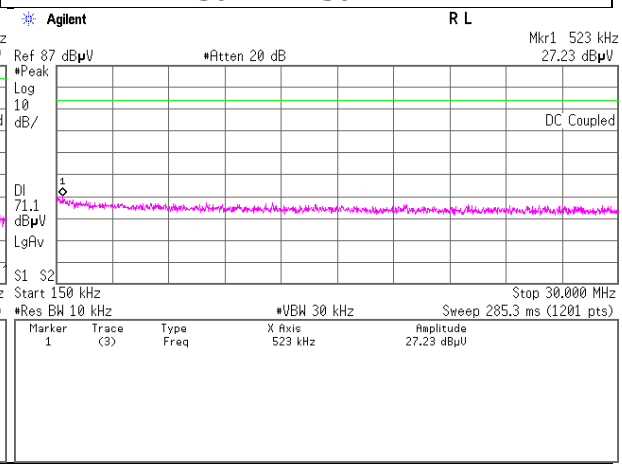
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off, 3DH5

2480 MHz

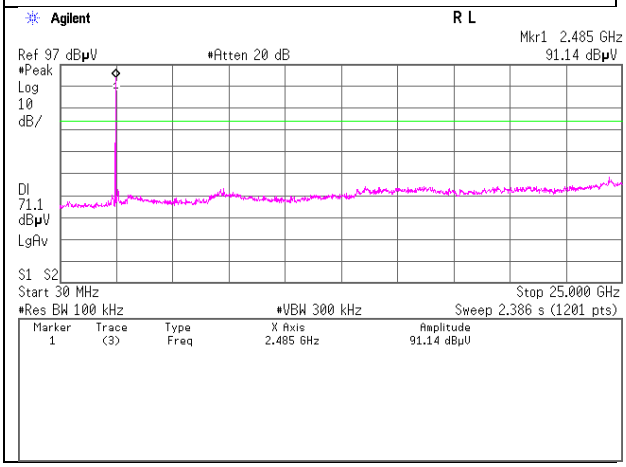
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

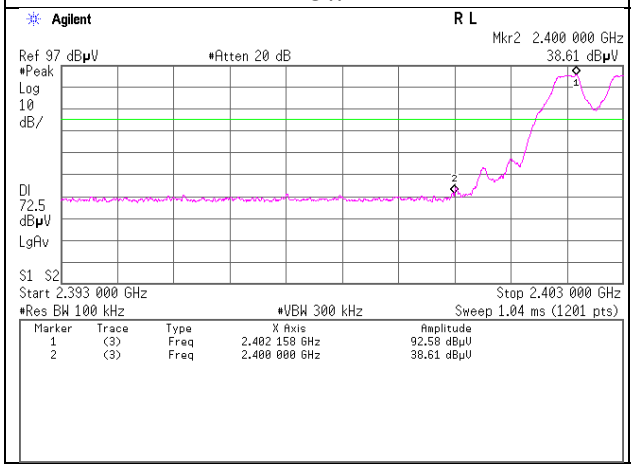


Conducted Emission Band Edge compliance

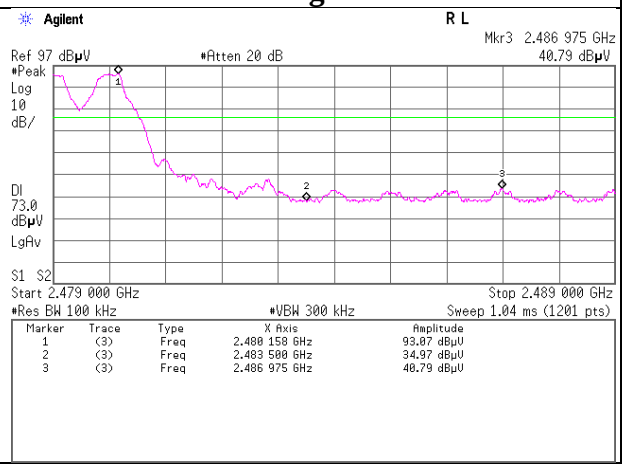
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx DH5

Hopping On

Low

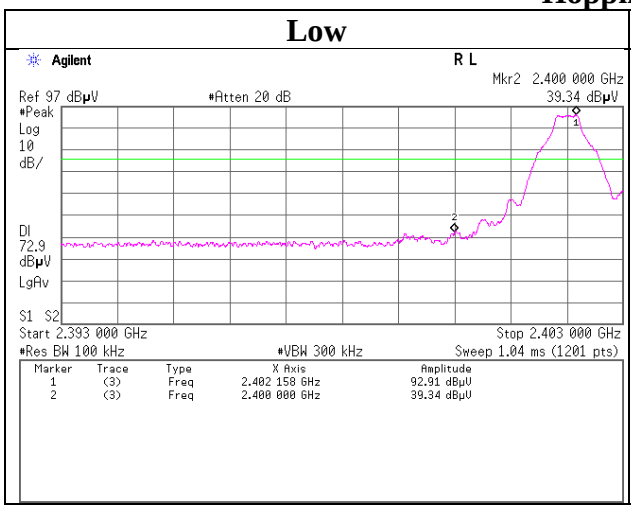


High

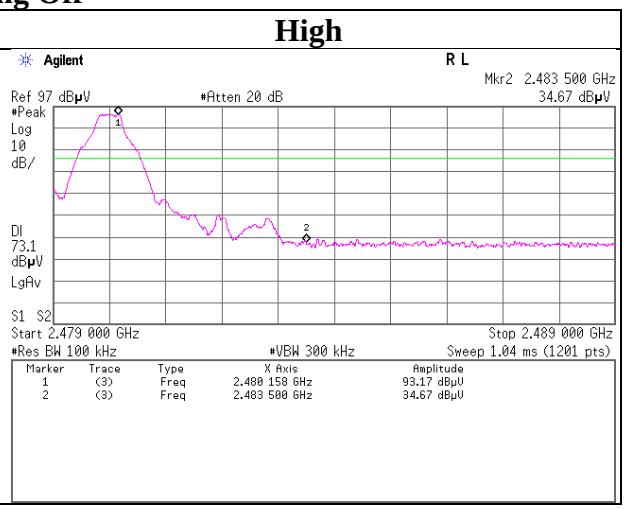


Hopping Off

Low



High

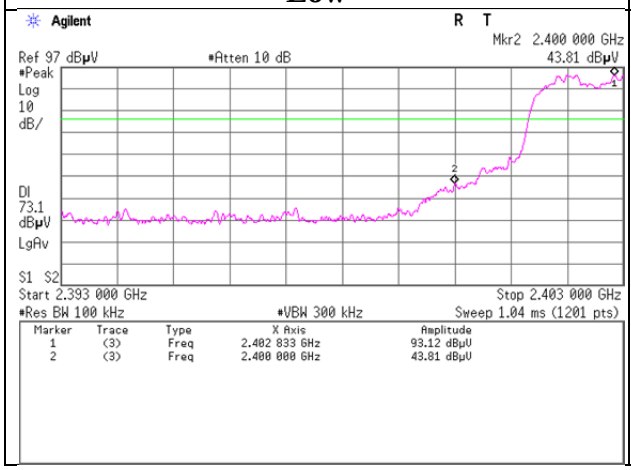


Conducted Emission Band Edge compliance

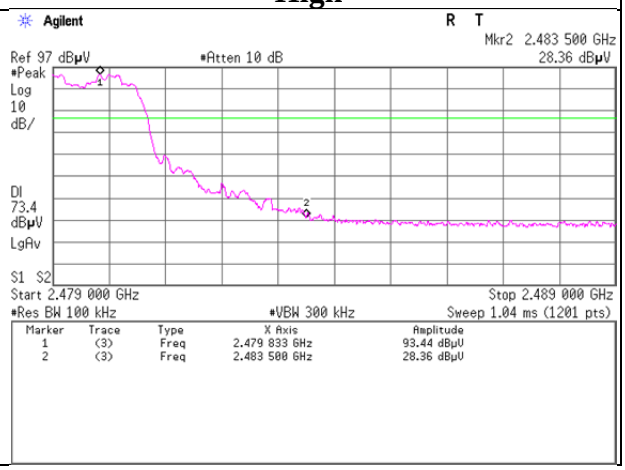
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 3DH5

Hopping On

Low

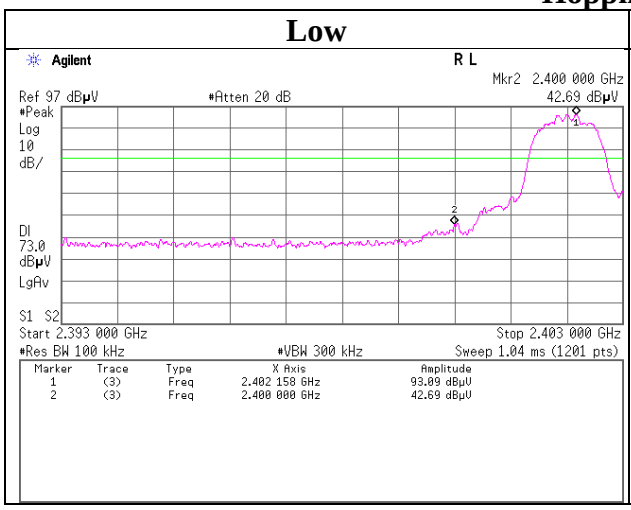


High

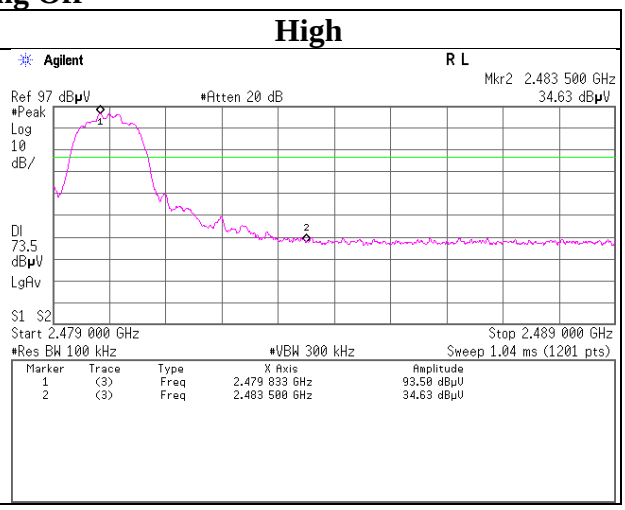


Hopping Off

Low



High

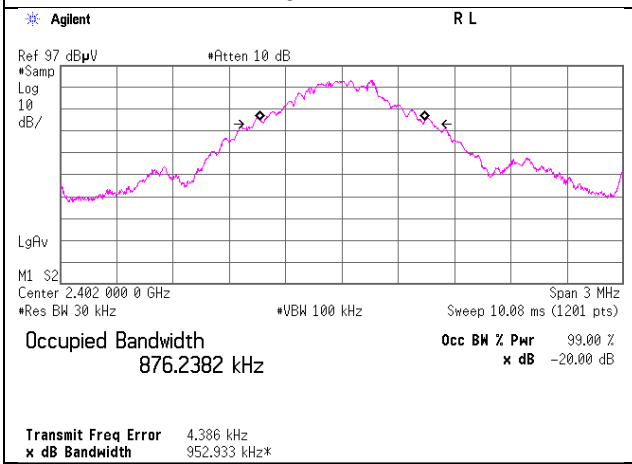


99%Occupied Bandwidth

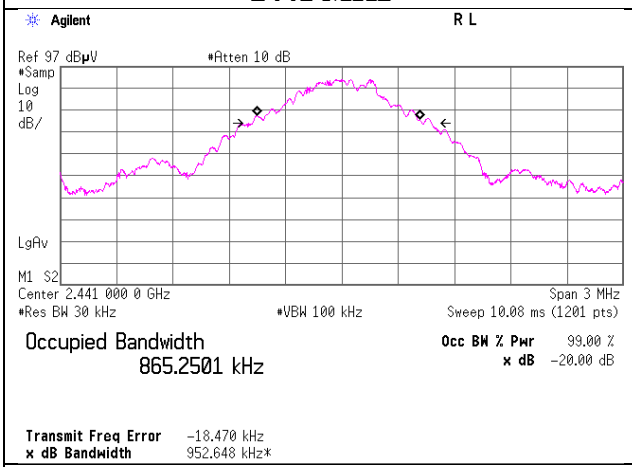
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx Hopping Off

Hopping Off, DH5

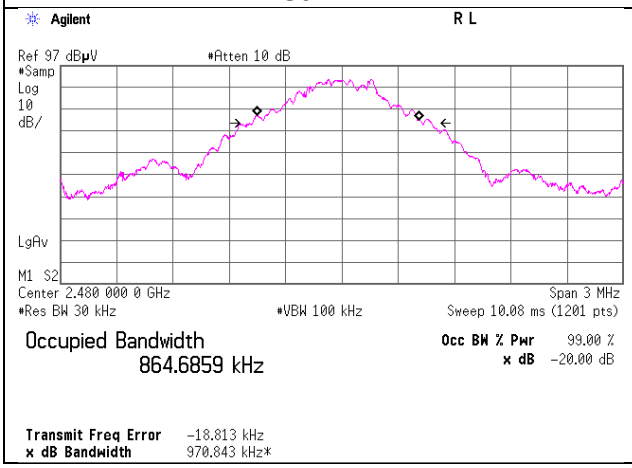
2402 MHz



2441 MHz

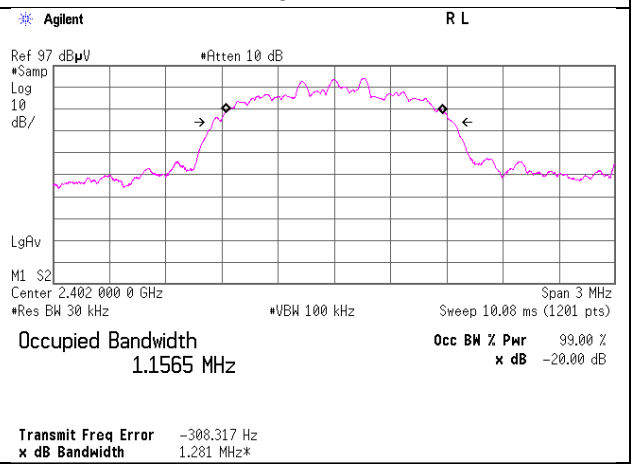


2480 MHz

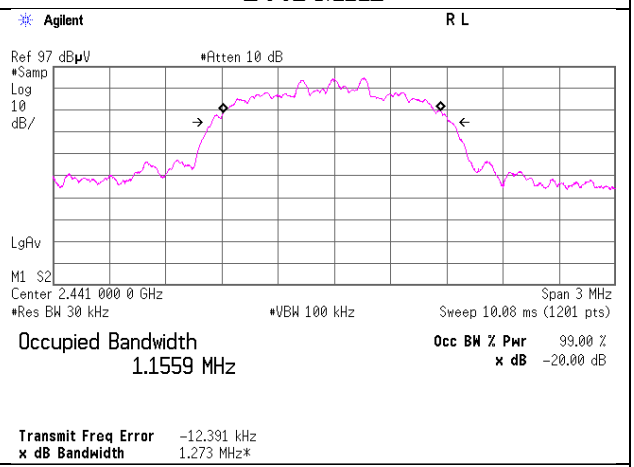


Hopping Off, 3DH5

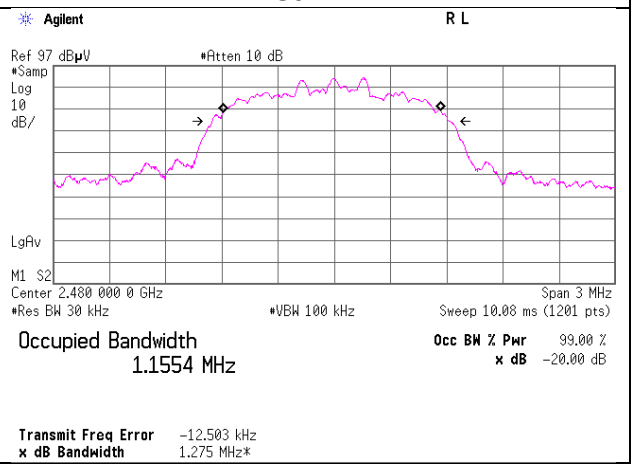
2402 MHz



2441 MHz



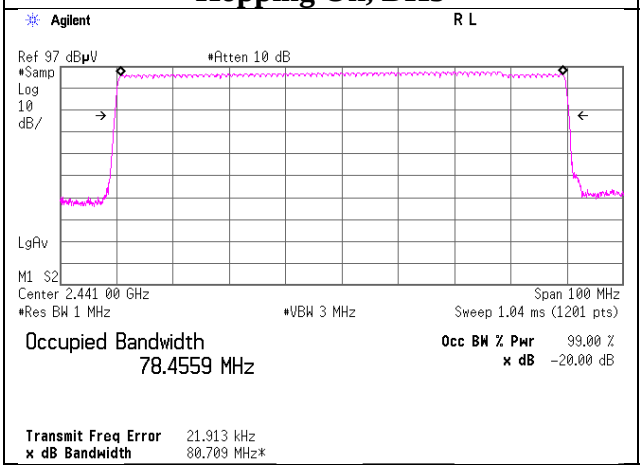
2480 MHz



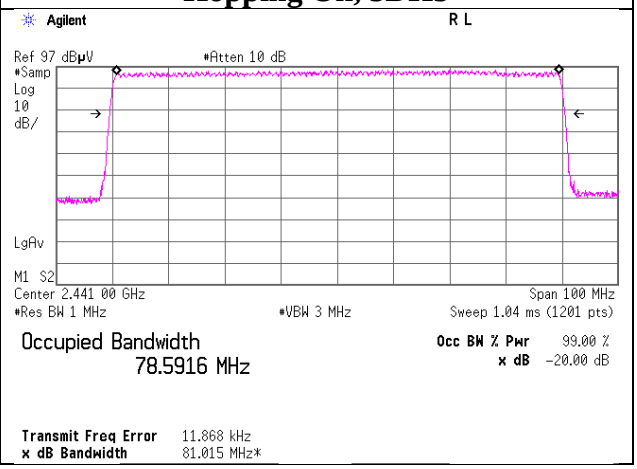
99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11390244S-E
Date	September 8, 2016
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Yosuke Ishikawa
Mode	Tx Hopping On

Hopping On, DH5



Hopping On, 3DH5



*Refer to 20dB Bandwidth for 99% Bandwidth inquiry mode.

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2016/03/23 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2016/04/18 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2016/04/01 * 12
SPSS-01	Power Sensor	Anritsu	MA2444D	0738366	AT	2016/04/01 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	AT	2015/11/18 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2016/02/19 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2016/02/25 * 12
KAT3-10	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2016/07/26 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2015/11/02 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2016/04/22 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2016/04/22 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2015/11/03 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2015/10/22 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2016/09/28 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2016/07/13 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2016/03/22 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2016/02/10 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2016/05/24 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2016/05/11 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2016/08/09 * 12
SAEC-02(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	RE	2016/07/22 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/03/28 * 12
SAT10-08	Attenuator	Weinschel	W54-10	-	RE	
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2016/04/18 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	RE	2016/04/18 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2016/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2016/03/23 * 12
SAJ-02	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S002	RE	Pre Check

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: **RE: Radiated Emission test**
AT: Antenna Terminal Conducted test