RADIO TEST REPORT

Test Report No. : 12685233S-A-R1

Applicant	:	**JVC KENWOOD Corporation**
Type of Equipment	:	**GPS NAVIGATION SYSTEM**
Model No.	:	**DNX5190DABS**
Test standard	:	**EN 300 328 V2.1.1**
Test Result	:	**Complied (Refer to Section 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
7. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12685233S-A. 12685233S-A is replaced with this report.

Date of test: January 8 and 9, 2019

Representative test engineer:
Y. Ishikawa
Yosuke Ishikawa
Engineer
Consumer Technology Division

Approved by :
H. Shirasawa
Hikaru Shirasawa
Engineer
Consumer Technology Division

RTL02610

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

REVISION HISTORY

Original Test Report No.: 12685233S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12685233S-A	February 14, 2019	-	-
1	12685233S-A-R1	March 8, 2019	9, 10	Correction of “Configuration and peripherals”, “Description of EUT and Support equipment” and “List of cables used” in section 4.2

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SECTION 1: Customer information

Company Name	:	JVC KENWOOD Corporation
Address	:	2967-3, Ishikawa-machi, Hachioji, Tokyo 192-8525 Japan
Telephone Number	:	+81-42-646-5525
Facsimile Number	:	+81-42-646-1440
Contact Person	:	Seigo Tsutsumi

The information provided from the customer is as follows:
- Applicant, Type of Equipment, Model No. on the cover page and other relevant pages
- Section 1: Customer information
- Section 2: Equipment under test (E.U.T.)
- Section 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the above information in Section 2 and 4.

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

2.1 Identification of E.U.T.

Type of Equipment	:	GPS NAVIGATION SYSTEM
Model No.	:	DNX5190DABS
Serial No.	:	Refer to Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample (Information from test lab.)	:	January 7, 2019
Country of Mass-production	:	Indonesia
Condition of EUT	:	Production 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: DNX5190DABS (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

Clock frequency(ies) in the system : 6.2208 GHz (Maximum)

Similar Model

Model Name	Difference
DNX5190DABS	Base
DNX7190DABS	Slide Panel
DDX819WBTS	None Navigation function, Wide Panel
DMX8019S	None Navigation function, None DVD function

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Antenna type	:	Chip Antenna
Antenna Gain	:	-2.3 dBi
Clock frequency (Maximum)	:	37.4 MHz
Power Supply (radio art input)		DC 3.6 V/ 3.3 V/1.8 V

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Radio : EN 300 328 V2.1.1

Title : Wideband transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using wide band modulation techniques;
Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Purpose of test Compliance with the harmonized RE directive 2014/53/EU.

3.2 Procedures and results

No.	Item	Test Procedure	Limit	Remarks	Worst margin	Exclusions	Results
1	RF output power	Clause 5.4.2	Clause 4.3.1.2	Conducted	-	N/A	Complied a)
2	Duty cycle, Tx-sequence, Tx-gap	Clause 5.4.2	Clause 4.3.1.3	Conducted	-	N/A	N/A*1)
3	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	Clause 5.4.4	Clause 4.3.1.4	Conducted	-	N/A	Complied b)
4	Hopping Frequency Separation	Clause 5.4.5	Clause 4.3.1.5	Conducted	-	N/A	Complied c)
5	Medium Utilization (MU) factor	Clause 5.4.2	Clause 4.3.1.6	Conducted	-	N/A	N/A*1)
6	Adaptivity (Adaptive Frequency Hopping)	Clause 5.4.6	Clause 4.3.1.7	Conducted	-	N/A	N/A*2)
7	Occupied Channel Bandwidth	Clause 5.4.7	Clause 4.3.1.8	Conducted	-	N/A	Complied d)
8	Transmitter unwanted emissions in the out-of-band domain	Clause 5.4.8	Clause 4.3.1.9	Conducted	-	N/A	Complied e)
9	Transmitter unwanted emissions in the spurious domain	Clause 5.4.9	Clause 4.3.1.10	Radiated	12.1 dB 500.785 MHz Vertical Tx DH5 2480 MHz	N/A	Complied f)
10	Receiver Spurious emissions	Clause 5.4.10	Clause 4.3.1.11	Radiated	10.2 dB 501.055 MHz Vertical Rx 2480 MHz	N/A	Complied g)
11	Transmitter unwanted emissions in the spurious domain	Clause 5.4.9	Clause 4.3.1.10	Conducted	-	N/A	N/A*3)
12	Receiver Spurious emissions	Clause 5.4.10	Clause 4.3.1.11	Conducted	-	N/A	N/A*3)
13	Receiver Blocking	Clause 5.4.11	Clause 4.3.1.12	Conducted	-	N/A	Complied h)
14	Geo-location capability	-	Clause 4.3.1.13	-	-	N/A	N/A*4)

Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420. *1) The test is not applicable since the EUT is an adaptive equipment and does not operate in a non-adaptive mode. *2) The test is not applicable since the RF output power of the EUT is less than 10 dBm (e.i.r.p.). *3) The EUT does not have antenna connector. *4) The EUT does not have Geo-location capability. a) Refer to APPENDIX 1 (data of RF Output Power) b) Refer to APPENDIX 1 (data of Accumulated Transmit Time, Frequency Occupation and Hopping Sequence) c) Refer to APPENDIX 1 (data of Hopping Frequency Separation) d) Refer to APPENDIX 1 (data of Occupied Channel Bandwidth) e) Refer to APPENDIX 1 (data of Transmitter unwanted emissions in the out-of-band domain) f) Refer to APPENDIX 1 (data of Transmitter unwanted emissions in the spurious domain (Radiated)) g) Refer to APPENDIX 1 (data of Receiver spurious emissions (Radiated)) h) Refer to APPENDIX 1 (data of Receiver Blocking)
Symbols: Complied — The data of this test item has enough margin, more than the measurement uncertainty. Complied# — The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

3.3 Additions or deviations to standards

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

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

Shonan EMC Lab.

Substitution measurement (EUT height: 1.5 m, Distance: 3 m)	
Frequency range	Uncertainty (+/-)
30 MHz - 200 MHz	4.8 dB
200 MHz - 1000 MHz	3.6 dB
1 GHz - 12.75 GHz	4.4 dB

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.48 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Average Detector)_SPM-08, 09, 10, 11	1.27 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Conducted emissions Measurement (below 1 GHz)	1.8 dB
Conducted emissions Power Density Measurement (1 GHz-3 GHz)	1.7 dB
Conducted emissions Measurement (3 GHz-18 GHz)	2.5 dB
Conducted emissions Measurement (18 GHz-26.5 GHz)	2.5 dB
Frequency Measurement (Spectrum Analyzer)	2.1 x 10^-7
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %
Temperature	0.95 deg.C.
Voltage	0.24 %
Humidity	3.4 %
Receiver Blocking (Wanted RF Level)_SWT-02	2.82 dB
Receiver Blocking (Blocking Signal Level)_SWT-02	2.20 dB
Receiver Blocking (Wanted RF Level)_SSG-12	2.73 dB
Receiver Blocking (Blocking Signal Level)_SSG-12	2.21 dB
Receiver Blocking (Wanted RF Level)_SBT-01	2.80 dB
Receiver Blocking (Blocking Signal Level)_SBT-01	2.14 dB
Receiver Blocking (Blocking Signal Level)_without tester	1.79 dB

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)

Details of Operating Mode(s)

Test item	Operating mode	Tested frequency
RF output power	Transmitting (Tx) Hopping On, Payload: PRBS9 - DH5 - 2DH5 - 3DH5	-
Transmitter unwanted emissions in the out-of-band domain	Transmitting (Tx) Hopping On, Payload: PRBS9 - DH5 - 3DH5	-
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	Transmitting (Tx) Hopping On, Payload: PRBS9 - DH5 - 3DH5	2402 MHz, 2480 MHz
Hopping Frequency Separation	Transmitting (Tx) Hopping On, Payload: PRBS9 - DH5 - 3DH5	2440 MHz, 2441 MHz
Occupied channel bandwidth Transmitter unwanted emissions in the spurious domain (Radiated)	Transmitting (Tx) Hopping Off , Payload: PRBS9 - DH5 - 3DH5	2402 MHz, 2480 MHz
Receiver spurious emissions (Radiated)	Receiving (Rx)	2402 MHz, 2480 MHz
Receiver Blocking *1)	Communication mode (Device Under Test mode) - DH1	Hopping

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (other than Receiver Blocking).
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3Mb/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: Fixed
- Software: SoC : 0.0.3209.4000
  Syscom : 1.0.0209.3100
  Panel : 1.0.0159.3700

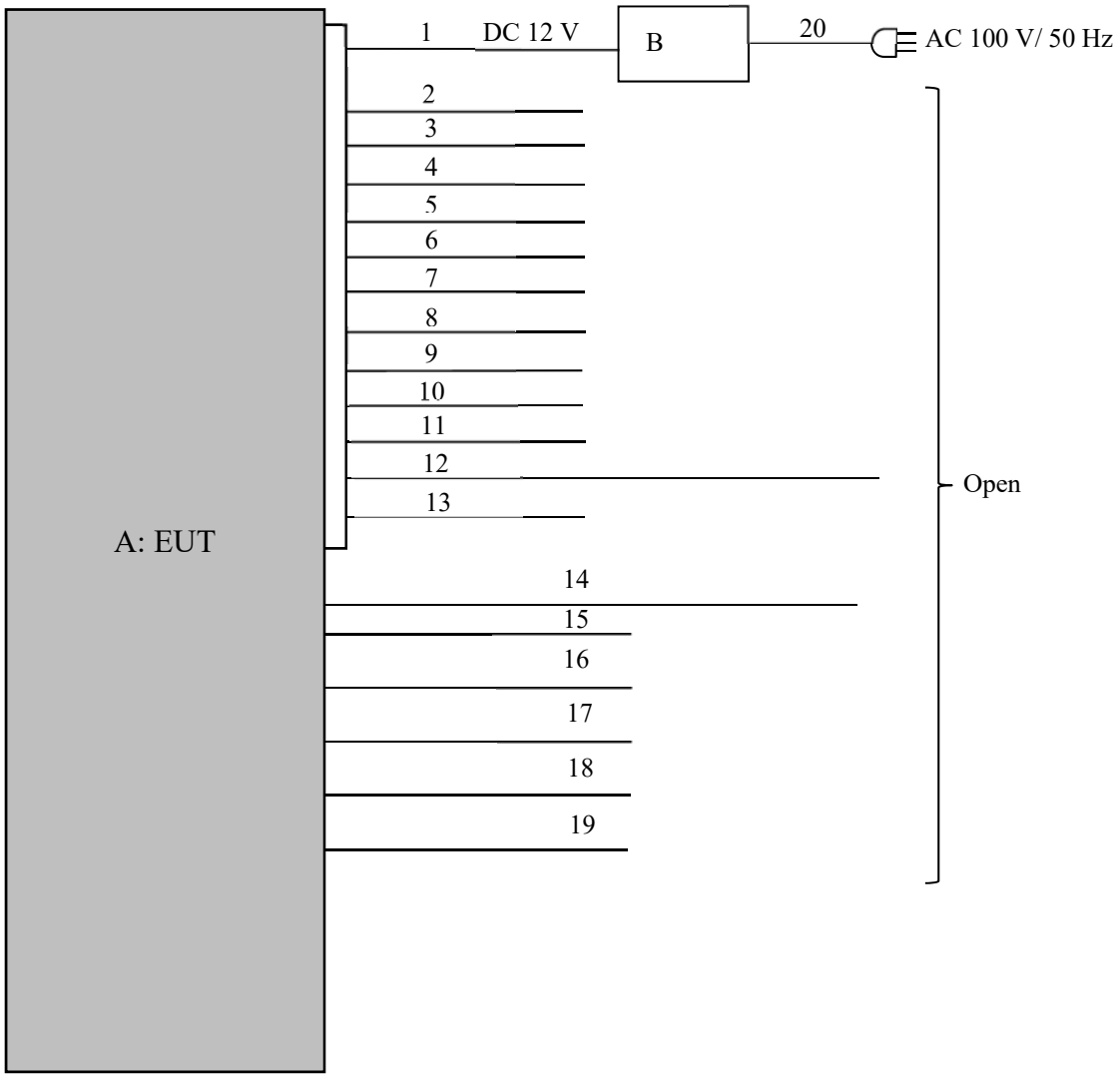
This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*1) The test was performed with the above modes, which had the lowest data rate.

Extreme test condition	
Temperature	-10 deg. C to +60 deg. C : operating temperature range of EUT
Voltage	Vnom: DC 12 V *

*The RF module is constantly provided with the stable voltage regardless of input voltage, so the testing was performed with DC 12 V only.

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	GPS NAVIGATION SYSTEM	DNX5190DABS	PE-X0001 *1) PE-X0010 *2)	JVC KENWOOD Corporation	EUT
B	DC Power Supply	PAN35-10A	DE001677	Kikusui	-

*1) Used for Antenna terminal conducted test.
*2) Used for Radiated Emission test.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC (ACC, B+, GND)	2.0	Unshielded	Unshielded	-
2	Speaker	0.15	Unshielded	Unshielded	-
3	Speaker	0.15	Unshielded	Unshielded	-
4	Speaker	0.15	Unshielded	Unshielded	-
5	Speaker	0.15	Unshielded	Unshielded	-
6	ANT. CONT	0.15	Unshielded	Unshielded	-
7	P. CONT	0.15	Unshielded	Unshielded	-
8	ILLUMI	0.15	Unshielded	Unshielded	-
9	REMOTE CONT	0.15	Unshielded	Unshielded	-
10	CAM +	0.15	Unshielded	Unshielded	-
11	CAM -	0.15	Unshielded	Unshielded	-
12	REVERSE	2.0	Unshielded	Unshielded	-
13	MUTE	0.15	Unshielded	Unshielded	-
14	PRK SW	2.0	Unshielded	Unshielded	-
15	REAR VIEW CAMERA	0.2	Shielded	Shielded	-
16	VIDEO OUT	0.2	Shielded	Shielded	-
17	FM/AM Antenna	0.15	Shielded	Shielded	-
18	USB	0.2	Shielded	Shielded	-
19	USB	0.2	Shielded	Shielded	-
20	AC	1.8	Unshielded	Unshielded	-

SECTION 5: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Instrument used	Remark
RF Output Power	Power Meter	Normal and Extreme conditions
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	Spectrum Analyzer	Normal condition - Sweep points: 8000 For spectrum analyzer not supporting 30000 of sweep points, so sweep time and sweep points were set to calculated value to be the same as 30000 points. - Sweep time: 12.27ms (Approximation value) Sweep time = Dwell time(1 hop) x Minimum number of hopping frequency(N=15) / 30000points x 8000points - Sweep points: 8000 x 4 segmented frequency band For spectrum analyzer not supporting 30000 of sweep points, so sweep time and sweep points were set to calculated value to be the same as 30000 points.
Hopping Frequency Separation	Spectrum Analyzer	Normal condition Test method: Option 2
Occupied Channel Bandwidth	Spectrum Analyzer	Normal condition
Transmitter unwanted emissions in the out-of band domain	Spectrum Analyzer	Normal conditions - Detector mode: RMS - Trace: Max Hold - Band power was used on behalf of the time domain power function. - Filter mode: Gaussian Filter Since the data in this test report has enough margin
Receiver Blocking	Bluetooth Tester	Normal condition

The test results are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0.0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

SECTION 6: Transmitter unwanted emissions in the spurious domain and Receiver spurious emissions (Radiated)

Test Procedure

1) 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 intensity has been measured in semi anechoic chamber at a distance of 3 m.
The measuring antenna height was varied between 1 m to 4 m and the turn table 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.

2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1).
The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna.
The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 m to 4 m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Below 1 GHz:
Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna except for the Half wave dipole Antenna for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.
Above 1 GHz:
Equivalent isotropic radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the signal generator and the substitution antenna from the output power of the signal generator recorded in 2).
For the usage of the antenna (horn antenna) for the substitution antenna, the equivalent isotropic radiated power was calculated by compensating the finite substitution antenna.

Pre-check scan and Measured setting (PK)

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	Peak, RBW: 100 kHz / VBW: 300 kHz	Peak, RBW: 1 MHz / VBW: 3 MHz
Trace mode	Max hold	Max hold

Measured setting (RMS)

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	RMS, RBW: 100 kHz / VBW: 300 kHz	RMS, RBW: 1 MHz / VBW: 3 MHz
Span	Zero	
Sweep mode	Single Sweep	
Sweep time	Tx: more than 120 % of the duration of the longest burst detected during the measurement of the RF Output Power Rx: 30ms	
Sweep points	Tx: Sweep time [μs] / (1 μs) with a maximum of 30 000 Rx: equal or more than 30 000	

- The carrier level and noise levels were confirmed at each position of 0 deg. and 30 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

	Frequency / Test / Antenna	Below 1 GHz	Above 1 GHz
Transmitting	Horizontal	30 deg.	30 deg.
	Vertical	30 deg.	30 deg.
Receiving	Horizontal	30 deg.	30 deg.
	Vertical	30 deg.	30 deg.

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

RF Output Power

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On

DH5

Test Condition		P/M (AV)	Cable	Atten.	Antenna	Result	Limit	Margin
Temp.	Volt.	Reading [dBm]	Loss [dB]	Loss [dB]	Gain [dBi]	[dBm]	[dBm]	[dB]
nom	nom	-12.07	1.77	9.69	-2.30	-2.91	20.00	22.91
min	nom	-11.11	1.77	9.69	-2.30	-1.95	20.00	21.95
max	nom	-10.81	1.77	9.69	-2.30	-1.65	20.00	21.65

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

2DH5

Test Condition		P/M (AV)	Cable	Atten.	Antenna	Result	Limit	Margin
Temp.	Volt.	Reading [dBm]	Loss [dB]	Loss [dB]	Gain [dBi]	[dBm]	[dBm]	[dB]
nom	nom	-12.49	1.77	9.69	-2.30	-3.33	20.00	23.33
min	nom	-11.66	1.77	9.69	-2.30	-2.50	20.00	22.50
max	nom	-11.46	1.77	9.69	-2.30	-2.30	20.00	22.30

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

3DH5

Test Condition		P/M (AV)	Cable	Atten.	Antenna	Result	Limit	Margin
Temp.	Volt.	Reading [dBm]	Loss [dB]	Loss [dB]	Gain [dBi]	[dBm]	[dBm]	[dB]
nom	nom	-12.42	1.77	9.69	-2.30	-3.26	20.00	23.26
min	nom	-11.63	1.77	9.69	-2.30	-2.47	20.00	22.47
max	nom	-11.44	1.77	9.69	-2.30	-2.28	20.00	22.28

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

Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On, DH5

Dwell Time

Channel Frequency [MHz]	One dwell time [ms]	Number of hopping in 6s [times]	Number of hopping in 31.6s [times]	Maximum accumulated dwell time [ms]	Limit [ms]
2402	2.894	22.6	119.0	344.5	<=400
2480	2.896	20.8	109.5	317.2	<=400

Number of hopping in 6s [times] = Average data of 5 tests. (Average [times])
Number of hopping in 31.6s [times] = Number of hopping in 6s [times] / 6s * 31.6s
Maximum accumulated dwell time [ms] = One dwell time [ms] * Number of hopping in 31.6s [times]
*31.6 [s] = 400 [ms] (for adaptive equipment) x 79 (Number of hopping frequency)

*Average data of 5 tests. (except Inquiry)

Channel Frequency [MHz]	Sampling [times]					Average [times]
	1	2	3	4	5	
2402	22	26	19	24	22	22.6
2480	21	23	18	18	24	20.8

Minimum Frequency Occupation Time

Channel Frequency [MHz]	Number of transmission in One dwell time x Number of Hopping x 4 = Period [msec]				Minimum Frequency Occupation Time [times]	[ms]	Limit (One dwell time) [ms]
2402	2.894	x 79	x 4 =	914.567	2	5.788	>=2.894
2480	2.896	x 79	x 4 =	915.041	2	5.791	>=2.896

Minimum Frequency Occupation Time [ms] = One dwell time[ms] * Minimum Frequency Occupation Time [times]

Hopping Sequence

Mode	Number of Channel [times]	Limit [times]
DH5	79	>=15

Lowest -20dB Point [MHz]	Highest -20dB Point [MHz]	Hopping Frequency Range [MHz]	Used Range [%]	Limit [%]
2401.504	2480.492	78.988	94.6	70

Hopping frequency range [MHz] = Highest -20dB point [MHz] - Lowest -20dB point [MHz]
Used Range [%] = Hopping Frequency Range [MHz] / ISM Bandwidth (83.5MHz)

Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On, 3DH5

Dwell Time

Channel Frequency [MHz]	One dwell time [ms]	Number of hopping in 6s [times]	Number of hopping in 31.6s [times]	Maximum accumulated dwell time [ms]	Limit [ms]
2402	3.029	21.0	110.6	335.0	<=400
2480	3.031	21.8	114.8	348.0	<=400

Number of hopping in 6s [times] = Average data of 5 tests. (Average [times])
Number of hopping in 31.6s [times] = Number of hopping in 6s [times] / 6s * 31.6s
Maximum accumulated dwell time [ms] = One dwell time [ms] * Number of hopping in 31.6s [times]
*31.6 [s] = 400 [ms] (for adaptive equipment) x 79 (Number of hopping frequency)

*Average data of 5 tests. (except Inquiry)

Channel Frequency [MHz]	Sampling [times]					Average [times]
	1	2	3	4	5	
2402	23	21	23	19	19	21
2480	22	21	25	23	18	21.8

Minimum Frequency Occupation Time

Channel Frequency [MHz]	Number of transmission in One dwell time x Number of Hopping x 4 = Period [msec]				Minimum Frequency Occupation Time [times]	[ms]	Limit (One dwell time) [ms]
2402	3.029	x 79	x 4 =	957.227	2	6.058	>=3.029
2480	3.031	x 79	x 4 =	957.701	2	6.061	>=3.031

Minimum Frequency Occupation Time [ms] = One dwell time[ms] * Minimum Frequency Occupation Time [times]

Hopping Sequence

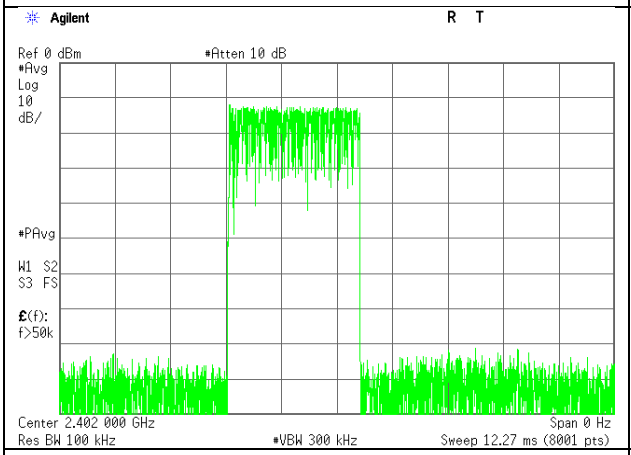
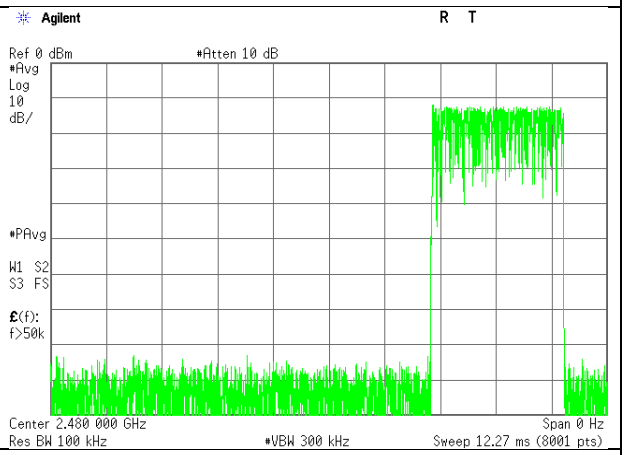
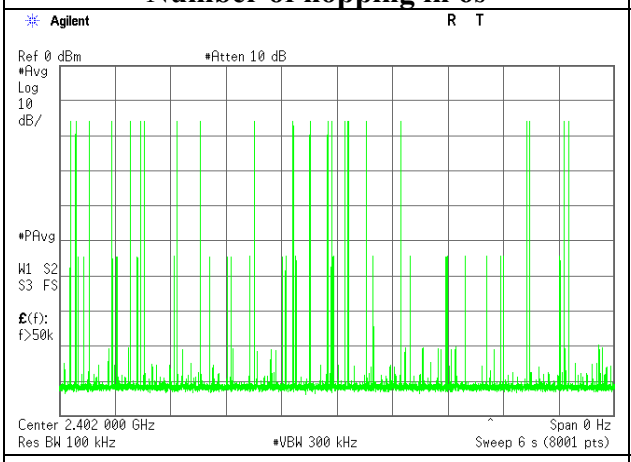
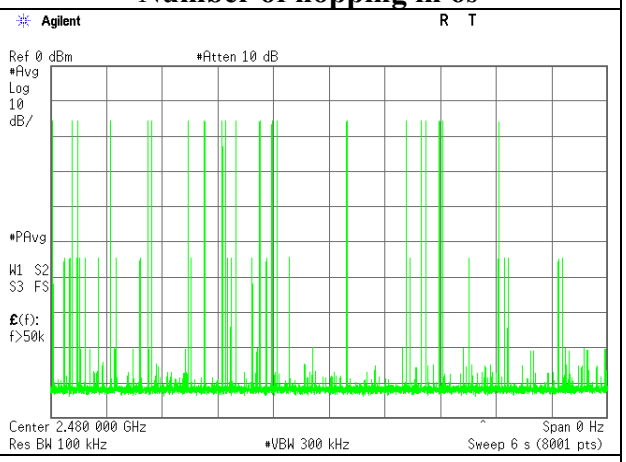
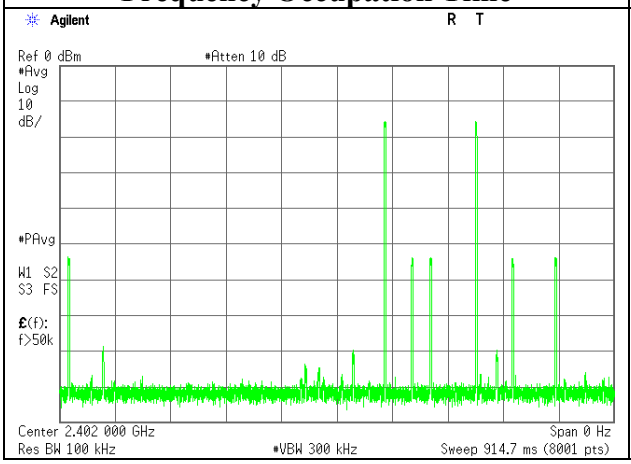
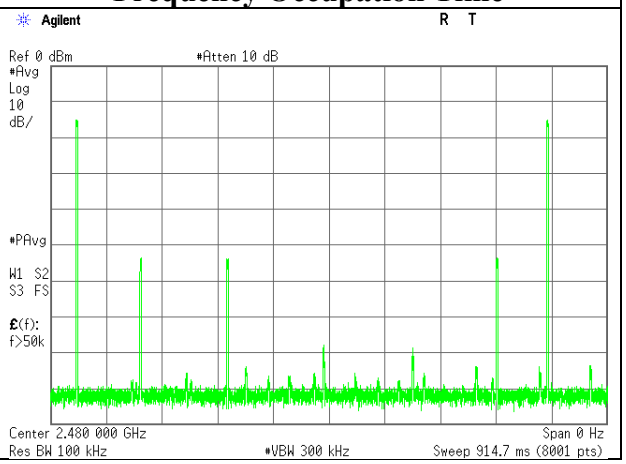
Mode	Number of Channel [times]	Limit [times]
3DH5	79	>=15

Lowest -20dB Point [MHz]	Highest -20dB Point [MHz]	Hopping Frequency Range [MHz]	Used Range [%]	Limit [%]
2401.286	2480.687	79.401	95.1	70

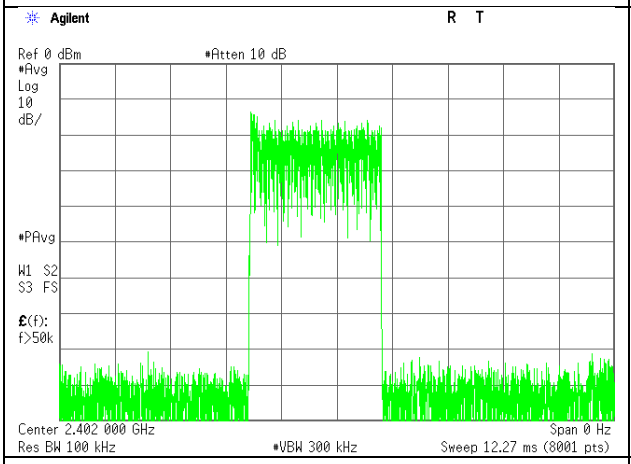
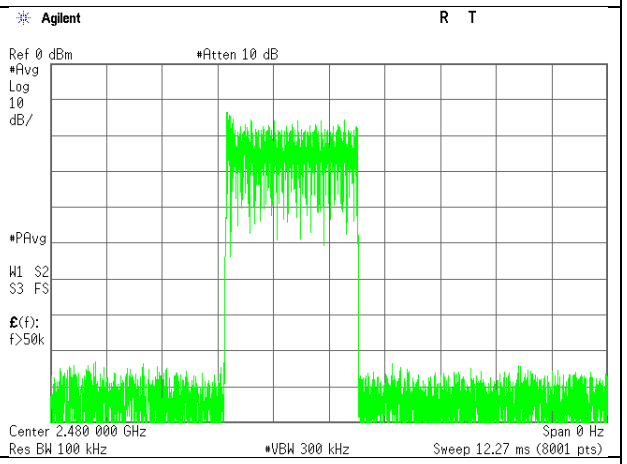
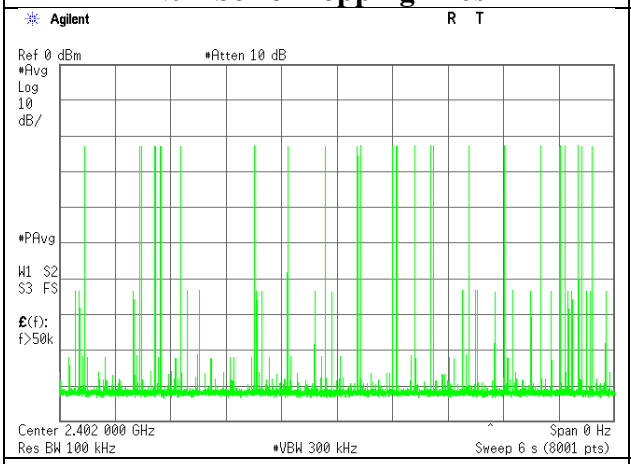
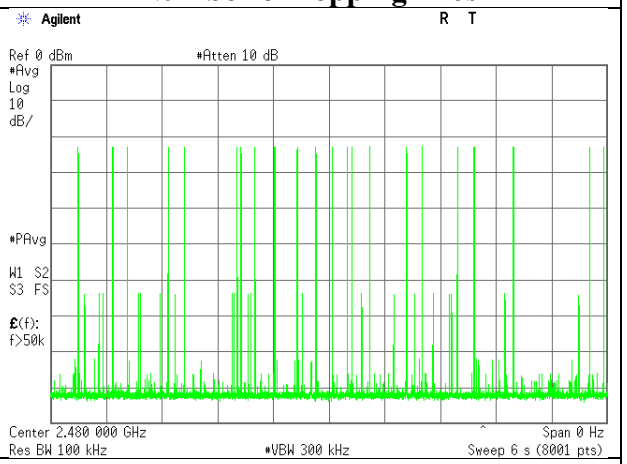
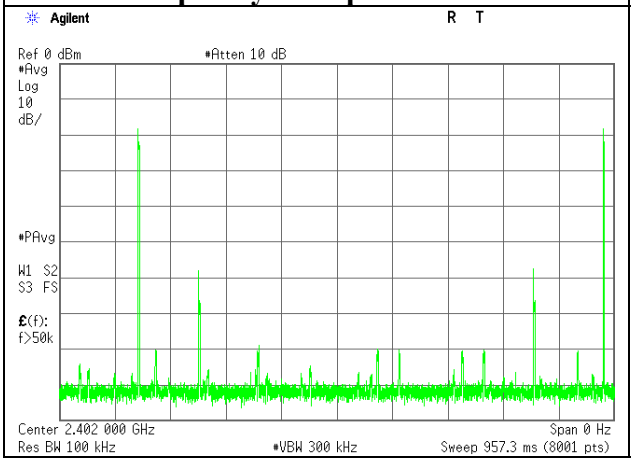
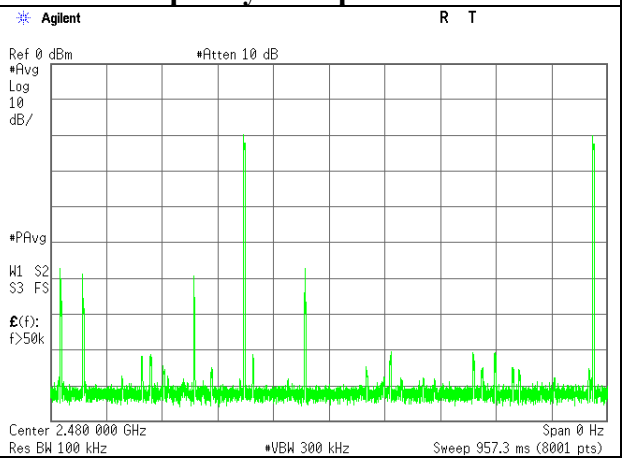
Hopping frequency range [MHz] = Highest -20dB point [MHz] - Lowest -20dB point [MHz]
Used Range [%] = Hopping Frequency Range [MHz] / ISM Bandwidth (83.5MHz)

Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

DH5

2402 MHz	2480 MHz
One Dwell Time	**One Dwell Time**
	
Number of hopping in 6s	**Number of hopping in 6s**
	
Frequency Occupation Time	**Frequency Occupation Time**
	

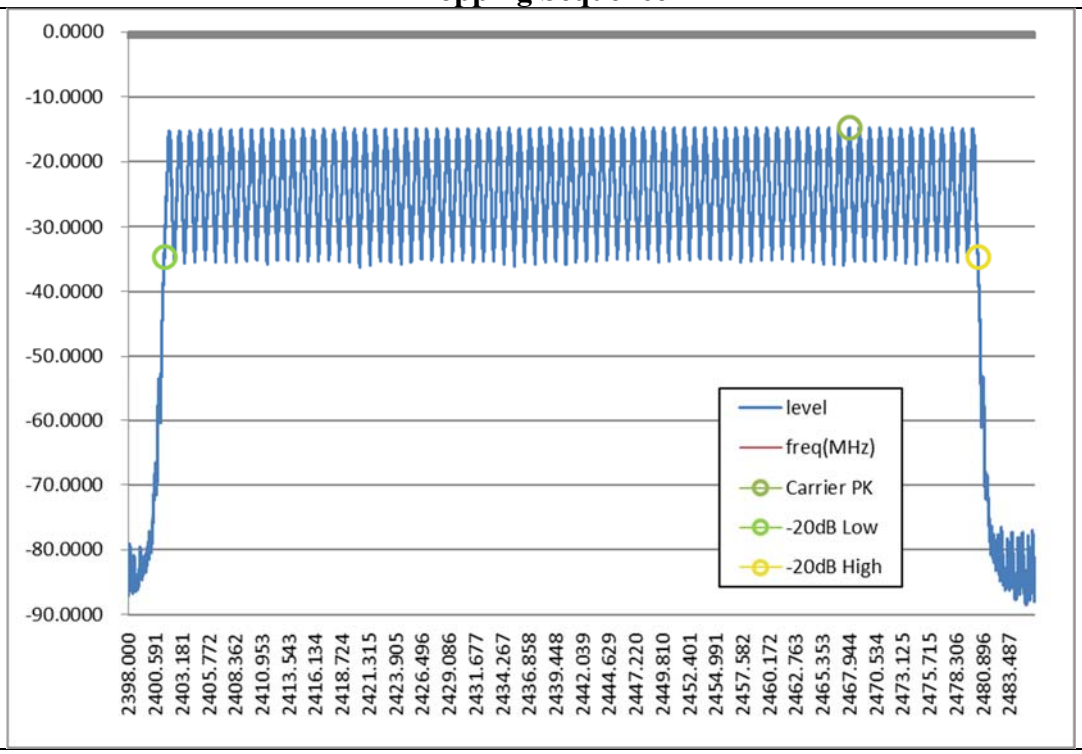
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

3DH5	
2402 MHz	**2480 MHz**
One Dwell Time	**One Dwell Time**
	
Number of hopping in 6s	**Number of hopping in 6s**
	
Frequency Occupation Time	**Frequency Occupation Time**
	

Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

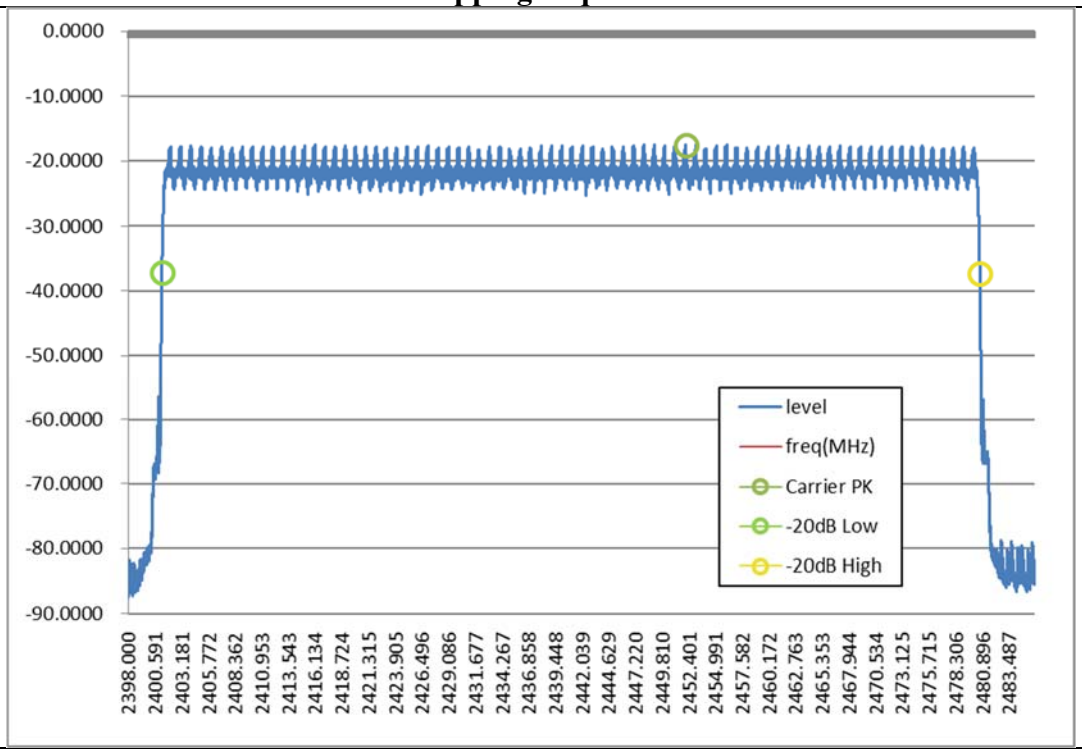
DH5

Hopping Sequence



3DH5

Hopping Sequence

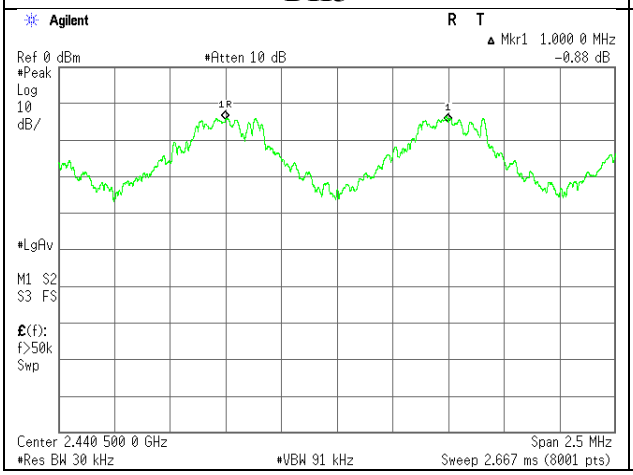


Hopping Frequency Separation

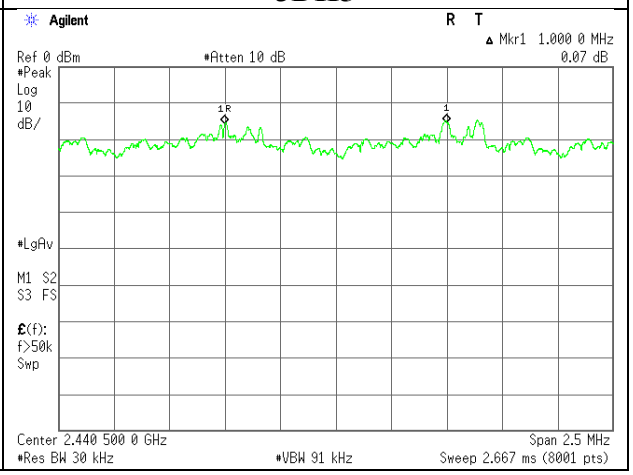
Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On

Mode	Two Adjacent Hopping Frequencies [MHz]	Result [kHz]	Limit [kHz]
DH5	2440 / 2441	1000	> 100
3DH5	2440 / 2441	1000	> 100

DH5



3DH5



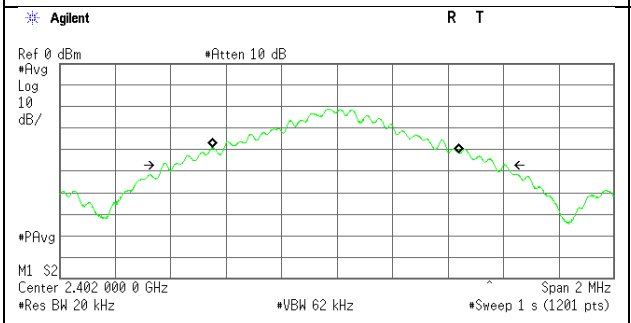
Occupied Channel Bandwidth

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping Off

Mode	Frequency [MHz]	Bandwidth [MHz]	Result [MHz]	Limit [MHz]
DH5	2402	0.8912	2401.5544	> 2400
	2480	0.8917	2480.4459	< 2483.5
3DH5	2402	1.2267	2401.3867	> 2400
	2480	1.2269	2480.6135	< 2483.5

DH5

2402 MHz

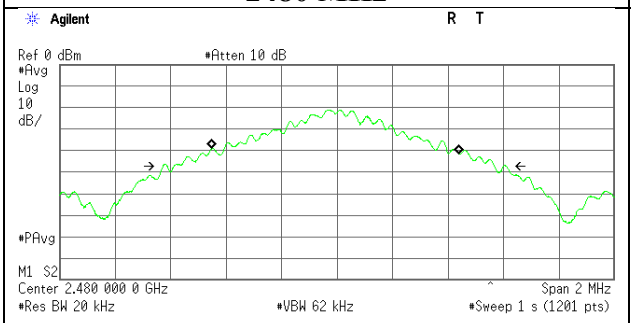


Occupied Bandwidth
891.2292 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -5.409 kHz
x dB Bandwidth 1.236 MHz*

2480 MHz



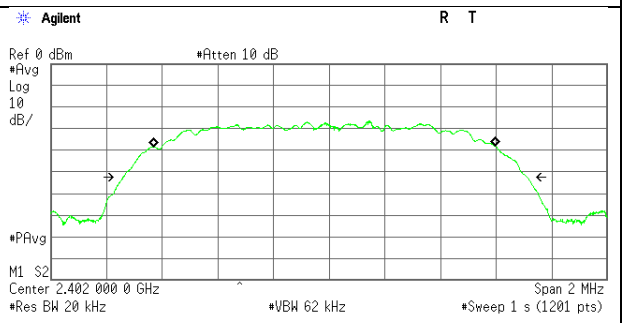
Occupied Bandwidth
891.7005 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -5.225 kHz
x dB Bandwidth 1.236 MHz*

3DH5

2402 MHz

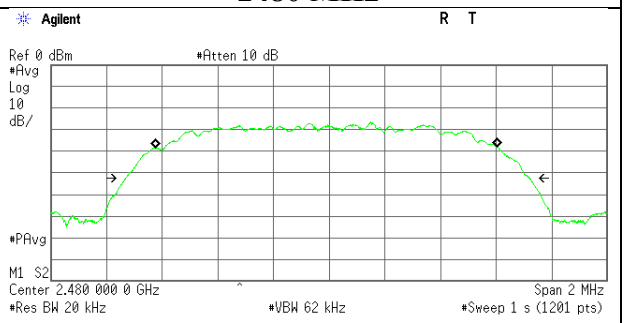


Occupied Bandwidth
1.2267 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -18.956 kHz
x dB Bandwidth 1.452 MHz*

2480 MHz



Occupied Bandwidth
1.2269 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -10.699 kHz
x dB Bandwidth 1.451 MHz*

Transmitter unwanted emissions in the out-of-band domain

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 8, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Yosuke Ishikawa
Mode	Tx, Hopping On

DH5

Frequency [MHz]	S/A (AV) Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Remarks
2398.5	-70.65	1.77	9.69	-2.30	-61.49	-20.00	41.49	Lowest ch 2400 MHz - 2 BW
2399.5	-66.88	1.77	9.69	-2.30	-57.72	-10.00	47.72	Lowest ch 2400 MHz - BW
2484.0	-70.89	1.79	9.70	-2.30	-61.70	-10.00	51.70	Highest ch 2483.5 MHz + BW
2485.0	-71.60	1.79	9.70	-2.30	-62.41	-20.00	42.41	Highest ch 2483.5 MHz + 2 BW

3DH5

Frequency [MHz]	S/A (AV) Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Remarks
2398.3	-71.59	1.77	9.69	-2.30	-62.43	-20.00	42.43	Lowest ch 2400 MHz - 2 BW
2399.5	-67.17	1.77	9.69	-2.30	-58.01	-10.00	48.01	Lowest ch 2400 MHz - BW
2484.0	-72.03	1.79	9.70	-2.30	-62.84	-10.00	52.84	Highest ch 2483.5 MHz + BW
2485.2	-73.10	1.79	9.70	-2.30	-63.91	-20.00	43.91	Highest ch 2483.5 MHz + 2 BW

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

*Above test result was maximum value on each 1 BW.

Transmitter unwanted emissions in the spurious domain (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	21 deg. C / 22 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1 GHz)	Shiro Kobayashi (Above 1 GHz)
Mode	Tx DH5 2402 MHz	

(Below 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	102.704	30.37	-71.33	-10.62	1.67	-85.77	-54.00	31.7	Hori.	185	239	Dipol	RMS
2	500.661	34.36	-57.10	2.15	14.09	-71.19	-54.00	17.1	Hori.	100	254	Dipol	RMS
3	101.671	33.17	-63.25	-10.76	1.66	-77.82	-54.00	23.8	Vert.	100	359	Dipol	RMS
4	500.645	35.74	-53.25	2.15	14.09	-67.34	-54.00	13.3	Vert.	139	113	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	3606.239	38.19	-71.42	12.66	7.24	-66.00	-30.00	36.0	Hori.	115	190	Horn	RMS
2	4804.000	35.02	-83.92	12.28	8.37	-80.01	-30.00	50.0	Hori.	150	0	Horn	RMS
3	3282.370	39.33	-70.83	12.45	6.89	-65.27	-30.00	35.2	Vert.	156	133	Horn	RMS
4	4804.000	35.03	-82.80	12.28	8.37	-78.89	-30.00	48.8	Vert.	150	0	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Transmitter unwanted emissions in the spurious domain (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	21 deg. C / 22 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1GHz)	Shiro Kobayashi (Above 1GHz)
Mode	Tx DH5 2480 MHz	

(Below 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	104.301	33.32	-68.38	-10.40	1.69	-82.62	-54.00	28.6	Hori.	194	62	Dipol	RMS
2	500.885	35.72	-55.74	2.15	14.09	-69.83	-54.00	15.8	Hori.	100	255	Dipol	RMS
3	104.293	34.81	-62.10	-10.40	1.69	-76.34	-54.00	22.3	Vert.	100	357	Dipol	RMS
4	500.785	36.95	-52.04	2.15	14.09	-66.13	-54.00	12.1	Vert.	147	71	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	EIRP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	3534.714	40.01	-67.63	12.80	7.17	-62.00	-30.00	32.0	Hori.	139	147	Horn	RMS
2	4960.000	35.18	-86.57	12.39	8.50	-82.68	-30.00	52.6	Hori.	150	0	Horn	RMS
3	3282.306	40.36	-68.16	12.45	6.89	-62.60	-30.00	32.6	Vert.	145	144	Horn	RMS
4	4960.000	35.21	-84.22	12.39	8.50	-80.33	-30.00	50.3	Vert.	150	0	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Transmitter unwanted emissions in the spurious domain (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	21 deg. C / 22 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1GHz)	Shiro Kobayashi (Above 1GHz)
Mode	Tx 3DH5 2402 MHz	

(Below 1 GHz)

No.	Freq.	Reading <PK>	SG Level	TX Ant.Gain	TX Loss	ERP Result	ERP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	103.036	34.72	-66.98	-10.57	1.67	-81.37	-54.00	27.3	Hori.	165	62	Dipol	RMS
2	500.868	35.79	-55.67	2.15	14.09	-69.76	-54.00	15.7	Hori.	195	234	Dipol	RMS
3	103.698	34.27	-62.64	-10.48	1.68	-76.95	-54.00	22.9	Vert.	103	357	Dipol	RMS
4	500.771	35.33	-53.66	2.15	14.09	-67.75	-54.00	13.7	Vert.	141	112	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading <PK>	SG Level	TX Ant.Gain	TX Loss	EIRP Result	EIRP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	3482.104	36.75	-72.86	12.93	7.12	-67.05	-30.00	37.0	Hori.	165	122	Horn	RMS
2	4804.000	35.01	-83.93	12.28	8.37	-80.02	-30.00	50.0	Hori.	150	0	Horn	RMS
3	3270.051	42.31	-67.85	12.36	6.87	-62.36	-30.00	32.3	Vert.	120	188	Horn	RMS
4	4804.000	35.00	-82.83	12.28	8.37	-78.92	-30.00	48.9	Vert.	150	0	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Transmitter unwanted emissions in the spurious domain (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	21 deg. C / 22 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1 GHz)	Shiro Kobayashi (Above 1 GHz)
Mode	Tx 3DH5 2480 MHz	

(Below 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	103.328	34.87	-66.83	-10.53	1.68	-81.19	-54.00	27.1	Hori.	150	53	Dipol	RMS
2	500.821	34.53	-56.93	2.15	14.09	-71.02	-54.00	17.0	Hori.	182	244	Dipol	RMS
3	104.197	34.23	-62.68	-10.41	1.68	-76.92	-54.00	22.9	Vert.	100	329	Dipol	RMS
4	500.664	35.72	-53.27	2.15	14.09	-67.36	-54.00	13.3	Vert.	137	113	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	EIRP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	3610.897	37.87	-69.77	12.66	7.24	-64.35	-30.00	34.3	Hori.	164	172	Horn	RMS
2	4960.000	35.22	-86.53	12.39	8.50	-82.64	-30.00	52.6	Hori.	150	0	Horn	RMS
3	3296.192	40.75	-67.77	12.55	6.90	-62.12	-30.00	32.1	Vert.	151	177	Horn	RMS
4	4960.000	35.19	-84.24	12.39	8.50	-80.35	-30.00	50.3	Vert.	150	0	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Receiver spurious emissions (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	22 deg. C / 21 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1 GHz)	Shiro Kobayashi (Above 1 GHz)
Mode	Rx 2402 MHz	

(Below 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	215.997	43.32	-55.02	2.15	12.53	-67.55	-57.00	10.5	Hori.	100	204	Dipol	RMS
2	319.404	40.91	-56.71	2.15	13.03	-69.74	-57.00	12.7	Hori.	100	337	Dipol	RMS
3	501.103	35.14	-56.32	2.15	14.09	-70.41	-57.00	13.4	Hori.	105	56	Dipol	RMS
4	107.734	33.54	-63.37	-9.93	1.71	-77.16	-57.00	20.1	Vert.	100	138	Dipol	RMS
5	319.485	39.17	-55.89	2.15	13.03	-68.92	-57.00	11.9	Vert.	127	344	Dipol	RMS
6	500.925	36.50	-53.48	2.15	14.09	-67.57	-57.00	10.5	Vert.	141	113	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
		<PK>				Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	1012.470	42.32	-69.31	5.65	3.77	-67.43	-47.00	20.4	Hori.	149	62	Horn	RMS
2	2799.082	39.73	-70.09	10.80	6.33	-65.62	-47.00	18.6	Hori.	155	22	Horn	RMS
3	3173.344	35.62	-81.09	11.67	6.76	-76.18	-47.00	29.1	Hori.	213	141	Horn	RMS
4	3308.772	39.28	-71.10	12.63	6.92	-65.39	-47.00	18.3	Hori.	173	81	Horn	RMS
5	3826.248	40.34	-66.32	12.88	7.43	-60.87	-47.00	13.8	Hori.	125	156	Horn	RMS
6	1012.480	43.34	-69.85	5.65	3.77	-67.97	-47.00	20.9	Vert.	134	328	Horn	RMS
7	2798.995	40.40	-68.85	10.80	6.33	-64.38	-47.00	17.3	Vert.	129	200	Horn	RMS
8	3173.318	36.03	-76.91	11.67	6.76	-72.00	-47.00	25.0	Vert.	129	218	Horn	RMS
9	3309.031	44.98	-64.03	12.64	6.92	-58.31	-47.00	11.3	Vert.	151	155	Horn	RMS
10	3826.900	40.69	-66.67	12.88	7.43	-61.22	-47.00	14.2	Vert.	165	186	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Receiver spurious emissions (Radiated)

Report No.	12685233S-A-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	January 9, 2019	January 8, 2019
Temperature / Humidity	22 deg. C / 21 % RH	21 deg. C / 21 % RH
Engineer	Shiro Kobayashi (Below 1 GHz)	Shiro Kobayashi (Above 1 GHz)
Mode	Rx 2480 MHz	

(Below 1 GHz)

No.	Freq.	Reading <PK>	SG Level	TX Ant.Gain	TX Loss	ERP Result	ERP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	215.994	41.33	-55.01	2.15	12.53	-67.54	-57.00	10.5	Hori.	100	207	Dipol	RMS
2	319.484	40.29	-57.33	2.15	13.03	-70.36	-57.00	13.3	Hori.	167	122	Dipol	RMS
3	500.918	35.09	-56.37	2.15	14.09	-70.46	-57.00	13.4	Hori.	100	64	Dipol	RMS
4	81.908	32.26	-66.29	-18.14	1.47	-88.05	-57.00	31.0	Vert.	253	104	Dipol	RMS
5	107.216	32.64	-64.27	-10.00	1.71	-78.13	-57.00	21.1	Vert.	146	94	Dipol	RMS
6	319.488	38.88	-56.49	2.15	13.03	-69.52	-57.00	12.5	Vert.	125	320	Dipol	RMS
7	501.055	35.81	-53.18	2.15	14.09	-67.27	-57.00	10.2	Vert.	149	88	Dipol	RMS
8	742.525	30.95	-53.17	2.15	15.18	-68.35	-57.00	11.3	Vert.	100	9	Dipol	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable + ATT) [dB] - 2.15 [dB]
Tx Ant: 120MHz turned Dipole(30 MHz-120 MHz), Dipole(120 MHz-1 GHz) / Rx-Ant: Biconical(25 MHz-200 MHz), Logperiodic(200 MHz-1 GHz)

(Above 1 GHz)

No.	Freq.	Reading <PK>	SG Level	TX Ant.Gain	TX Loss	EIRP Result	EIRP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	1012.379	41.06	-70.57	5.65	3.77	-68.69	-47.00	21.6	Hori.	108	154	Horn	RMS
2	2798.956	39.40	-70.42	10.80	6.33	-65.95	-47.00	18.9	Hori.	141	22	Horn	RMS
3	3173.340	36.11	-77.87	11.67	6.76	-72.96	-47.00	25.9	Hori.	132	140	Horn	RMS
4	3397.549	40.17	-69.22	13.03	7.02	-63.21	-47.00	16.2	Hori.	150	248	Horn	RMS
5	3827.340	39.78	-66.88	12.88	7.43	-61.43	-47.00	14.4	Hori.	162	145	Horn	RMS
6	1012.537	45.41	-67.78	5.65	3.77	-65.90	-47.00	18.9	Vert.	115	37	Horn	RMS
7	2799.002	42.15	-67.10	10.80	6.33	-62.63	-47.00	15.6	Vert.	144	296	Horn	RMS
8	3173.336	36.29	-76.75	11.67	6.76	-71.84	-47.00	24.8	Vert.	124	248	Horn	RMS
9	3328.012	42.69	-66.32	12.75	6.94	-60.51	-47.00	13.5	Vert.	162	154	Horn	RMS
10	3827.214	42.10	-65.26	12.88	7.43	-59.81	-47.00	12.8	Vert.	157	184	Horn	RMS

Calculation:Result [dBm] = SG level [dB] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Receiver Blocking

Report No.	12685233S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 9, 2019
Temperature / Humidity	22 deg. C / 25 % RH
Engineer	Yosuke Ishikawa
Mode	Communication mode (Hopping)

Wanted signal mean power from companion device (dBm)	Measured Receiver Sensitivity (dBm)
	DH1
Pmin	-97.14
Pmin + 6 dB	-91.14

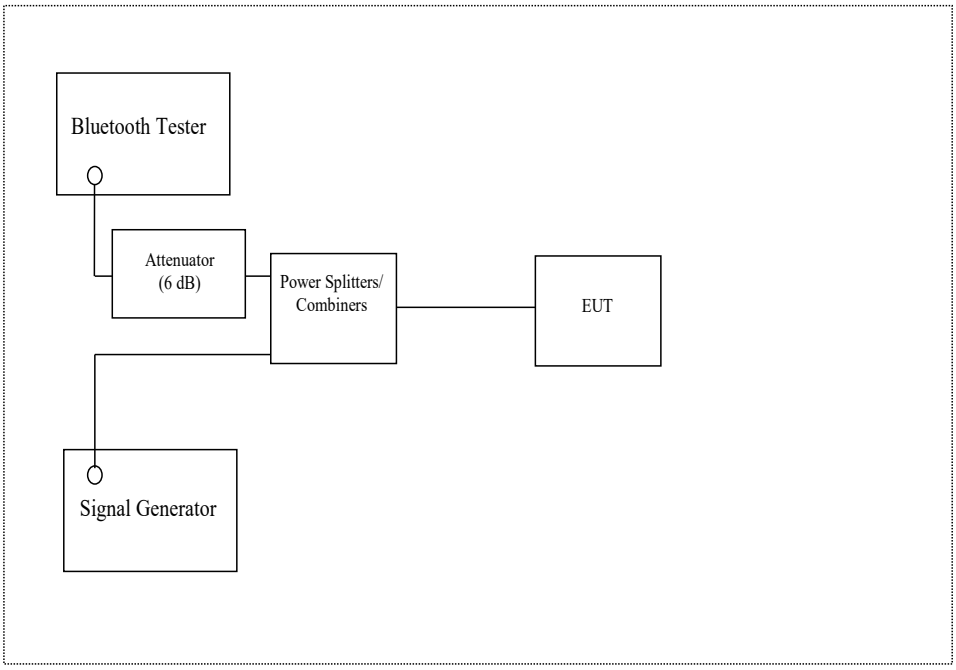
Receiver Category 2 equipment

Operating mode	Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) *1)	Result PER (%)	Limit PER (%)
DH1	P_{min} + 6 dB	2380	-57	0.08	≦10
		2503.5		0.08	
	P_{min} + 6 dB	2300	-47	3.17	
		2583.5		2.28	

*Pmin is the minimum level of wanted signal (in dBm) required to meet the minimum performance criterion a PER less than or equal to 10 % in the absence of any blocking signal.

*1) Blocking signal power was adjusted by assumed antenna gain 0.0 dBi since it was more severe condition.

CONDUCTED METHODS SYSTEM BLOCK DIAGRAM of Receiver Blocking



APPENDIX 2: Test instruments

Test Instruments (1 / 2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SAT10-09	AT	145132	Attenuator	Weinschel Corp.	54A-10	W5692	2018/11/25	2019/11/30	12
SCC-G12	AT	145040	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	2018/3/19	2019/3/31	12
SCH-01	AT	145200	Temperature and Humidity Chamber	ESPEC	PL-1KT	14020837	2018/4/11	2019/4/30	12
SPM-08	AT	146268	Power Meter	DARE!! Instruments	RPR3006W	15I00041SNO73	2018/8/3	2019/8/31	12
SSA-02	AT	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31	12
KTS-07	AT,RB	145111	Digital Tester	SANWA	PC500	7019232	2018/10/17	2019/10/31	12
SOS-09	AT,RB	146318	Humidity Indicator	A&D	AD-5681	4061484	2018/12/5	2019/12/31	12
SAT6-09	RB	145047	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	2018/4/4	2019/4/30	12
SBT-01	RB	158576	Wireless Connectivity Tester	Rohde & Schwarz	CMW270	101015	2018/5/29	2019/5/31	12
SCC-G37	RB	151614	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q035	2018/12/25	2019/12/31	12
SCC-G38	RB	151615	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q036	2018/12/25	2019/12/31	12
SCC-G39	RB	151616	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q037	2018/12/25	2019/12/31	12
SPSC-08	RB	146277	Power Splitters/Combiners	Mini-Circuits	ZFSC-2-10G+	-	2018/7/30	2019/7/31	12
SSG-12	RB	146257	Signal Generator	Rohde & Schwarz	SMBV100A	262152	2018/7/31	2019/7/31	12
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)		-	-	-
KHA-02	RE	144941	Horn Antenna	Schwarzbeck	BBHA9120D	230	2018/7/13	2019/7/31	12
KJM-02	RE	146432	Measure	TAJIMA	GL19-55	-	-	-	-
SAEC-03(NSA)	RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2018/6/2	2019/6/30	12
SAF-03	RE	145126	Pre Amplifier	SONOMA	310N	290213	2018/2/16	2019/2/28	12
SAF-04	RE	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2018/6/26	2019/6/30	12
SAT10-06	RE	145137	Attenuator	AGILENT	8493C-010	74865	2018/11/25	2019/11/30	12
SAT6-13	RE	167094	Attenuator	JFW	50HF-006N		2018/2/9	2019/2/28	12
SBA-03	RE	145023	Biconical Antenna	Schwarzbeck	BBA9106	91032666	2018/6/17	2019/6/30	12

Test Instruments (2 / 2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	RE	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-271(RF Selector)	2018/4/9	2019/4/30	12
SCC-G42	RE	151618	Coaxial Cable	Junkosha	J12J103275-00	FEB-28-17-017	2018/3/19	2019/3/31	12
SCC-G43	RE	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2018/7/10	2019/7/31	12
SCC-G44	RE	168300	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800070/4A	2018/3/28	2019/3/31	12
SCC-04	RE	145032	Coaxial Cable	FUJIKURA	5D2W	-	2018/9/14	2019/9/30	12
SDA-07	RE	145463	Dipole Antenna	Schwarzbeck	VHAP	1177	2018/8/27	2019/8/31	12
SDA-08	RE	145464	Dipole Antenna	Schwarzbeck	UHAP	1158	2018/8/27	2019/8/31	12
SFL-18	RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2018/4/20	2019/4/30	12
SHA-03	RE	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2018/7/23	2019/7/31	12
SLA-07	RE	145529	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	2018/6/17	2019/6/30	12
SOS-05	RE	146293	Humidity Indicator	A&D	AD-5681	4062518	2018/10/25	2019/10/31	12
SSG-02	RE	146226	Signal Generator	AGILENT	E8257D-540	MY48051404	2018/3/8	2019/3/31	12
STR-08	RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2018/11/28	2019/11/30	12
STS-03	RE	146210	Digital Hitester	HIOKI	3805-50	80997823	2018/10/16	2019/10/31	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

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:

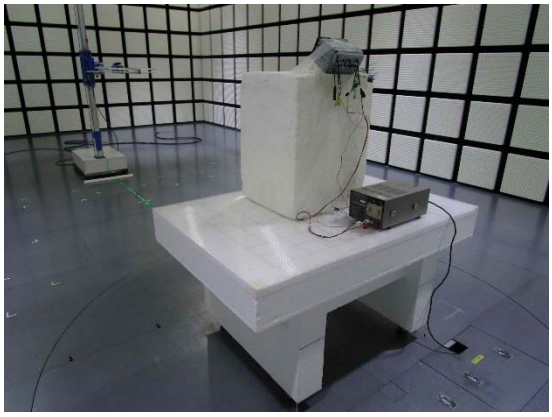
AT: Antenna Terminal Conducted test
RE: Radiated emission test
RB: Receiver blocking test

APPENDIX 3: Photographs of test setup

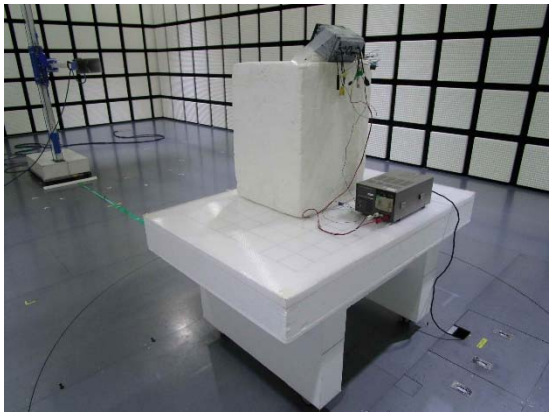
Radiated emission

Front

Below 1 GHz



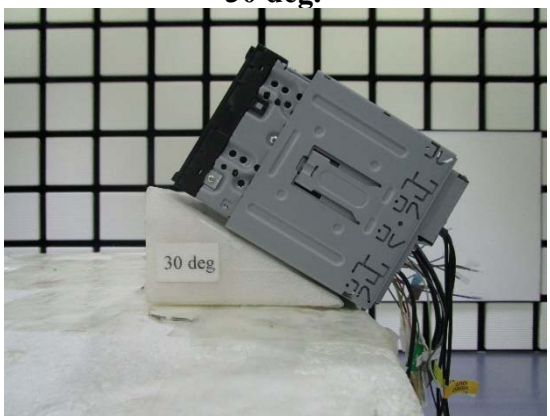
Above 1 GHz



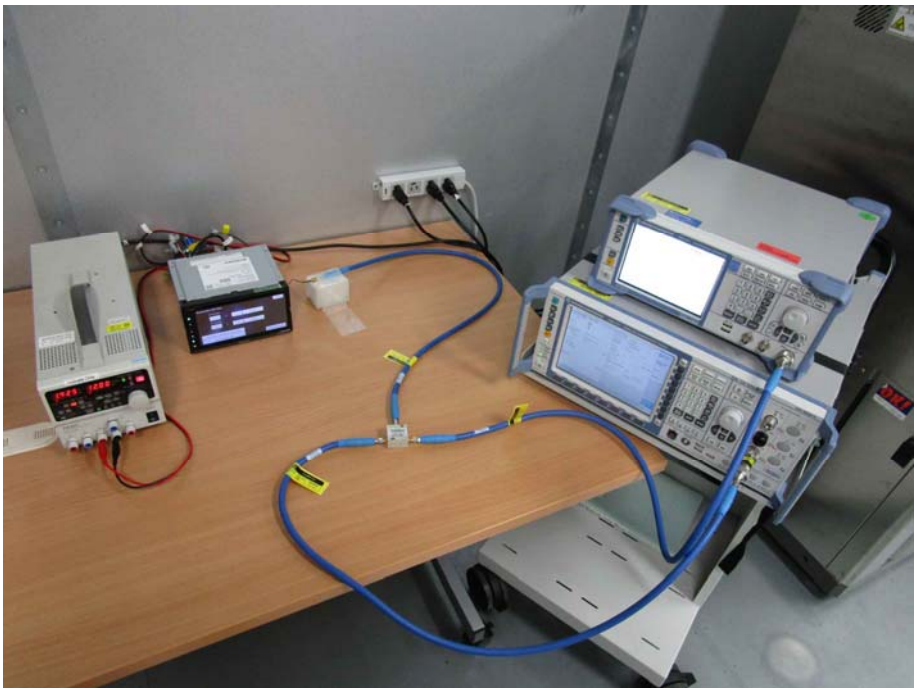
Worst Case Position

0 deg.

30 deg.



Receiver Blocking



End of Report