



RADIO TEST REPORT

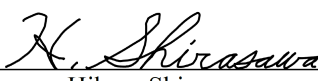
Test Report No. : 12456503S-A-R3

Applicant : Alpine Electronics Inc.
Type of Equipment : Car Navigation
Model No. : 19AVN/DA
FCC ID : A269ZUA159
Test regulation : FCC Part 15 Subpart C: 2018
Test Result : Complied (Refer to Section 3.2)

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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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 12456503S-A-R2. 12456503S-A-R2 is replaced with this report.

Date of test: October 4 to November 29, 2018

Representative test engineer: 
Shiro Kobayashi
Engineer
Consumer Technology Division

Approved by: 
Hikaru Shirasawa
Engineer
Consumer Technology Division



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

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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Original Test Report No.: 12456503S-A

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SECTION 1: Customer information

Company Name	:	Alpine Electronics Inc.
Address	:	20-1 Yoshima Industrial Park, Iwaki, Fukushima, 970-1192 Japan
Telephone Number	:	+81-246-36-4111
Facsimile Number	:	+81-246-36-6492
Contact Person	:	Mitsuru Yoshida

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	:	Car Navigation
Model No.	:	19AVN/DA
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	October 1, 2018
Country of Mass-production	:	Thailand
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: 19AVN/DA (referred to as the EUT in this report) is a Car Navigation.

Radio Specification

Bluetooth

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna type	:	Internal Pattern Antenna
Antenna Gain	:	- 9.0 dBi
Clock frequency	:	CPU: 26 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

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

* Also the EUT complies with FCC Part 15 Subpart B.

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	N/A	*1)
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 *3) IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (b)	See data.	Complied a)	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 *3) IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		Complied a)	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 *3) IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied a)	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 *3) IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied a)	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 *3) IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (b)		Complied a)	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 *3) IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	4.6 dB 270.002 MHz, QP, Hori., Tx, DH5 2402 MHz 270.002 MHz, QP, Hori., Tx, DH5 2441 MHz	Complied# b)	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 does not have AC power ports.

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

*3) Since measurement was performed before issue of KDB 558074 v05r01, we referred to DA 00-705 and KDB 558074 v05 which had been accepted provisionally.

a) Refer to Appendix 2 (data of Antenna Terminal Conducted)

b) Refer to Appendix 2 (data of Radiated emission)

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.

* 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. 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 of Section 15.203.

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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	IC: -	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

There is no applicable rule of uncertainty in this applied standard. 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 $k=2$.

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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.9 dB	4.8 dB	4.9 dB	-	-
	200 MHz-1 GHz	6.1 dB	6.1 dB	6.1 dB	-	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-
Radiated emission (Measurement distance: 1 m)	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 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	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.04 dB
Spurious emission (Conducted) below 1GHz	1.8 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.5 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.7 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

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
FCC Test Firm Registration Number: 839876

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	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
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: Fixed Software: BSDT Engine Version 2.0.0.10 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

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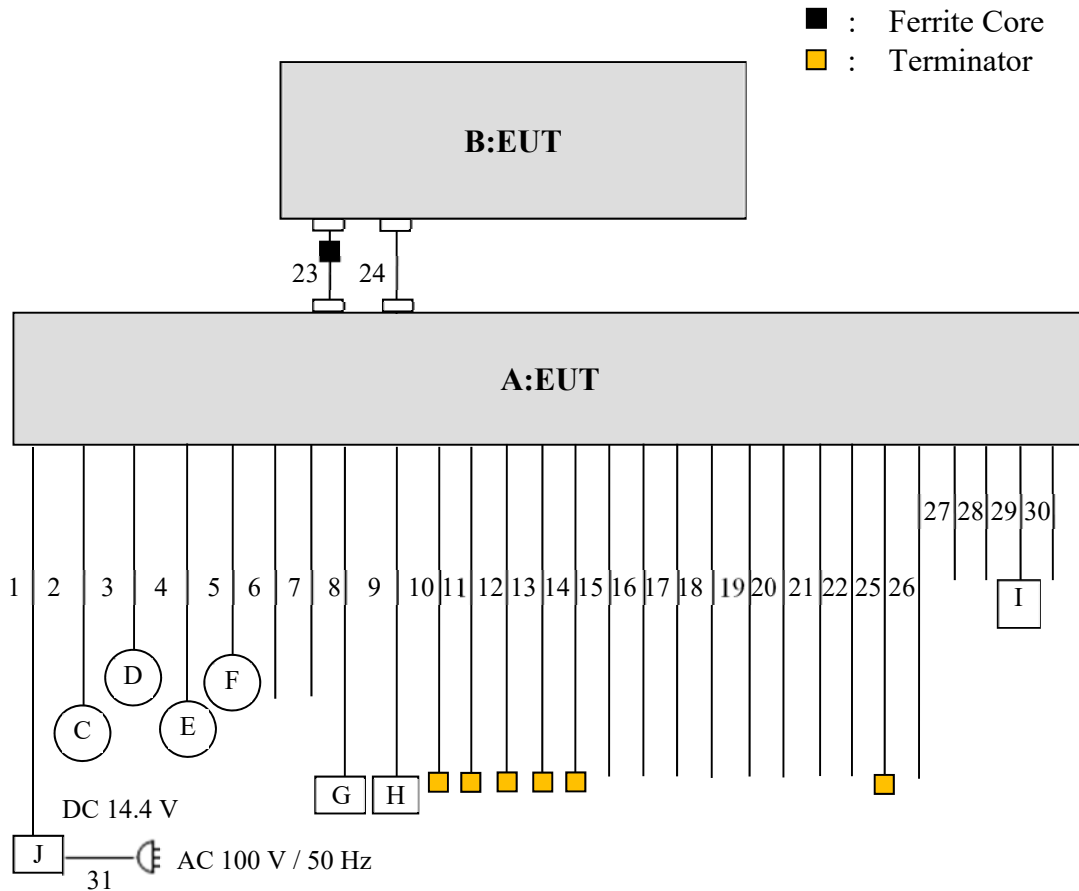
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

4.2 Configuration and peripherals



- * Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* The testing was performed with DC 14.4 V according to the customer's request.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Navigation	19AVN/DA	0004 *1) 0005 *2)	Alpine Electronics, Inc.	EUT
B	Display	i209	B80411959B	Alpine Electronics, Inc.	EUT
C	Speaker	LV-002	-	L&V	-
D	Speaker	LV-002	-	L&V	-
E	Speaker	LV-002	-	L&V	-
F	Speaker	LV-002	-	L&V	-
G	USB Memory	LSM-4GU	-	SONY	-
H	GPS Antenna	-	-	Alpine Electronics, Inc.	-
I	Controller	-	-	Alpine Electronics, Inc.	-
J	DC Power Supply	PAN60-10A	NL002383	Kikusui Corp.	-

*1) Used for Antenna Terminal conducted test

*2) Used for Radiated Emission test

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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC	0.3 + 1.8	Unshielded	Unshielded	-
2	Speaker Front Right	2.0 + 3.0	Unshielded	Unshielded	-
3	Speaker Front Left	2.0 + 3.0	Unshielded	Unshielded	-
4	Speaker Rear Right	2.0 + 3.0	Unshielded	Unshielded	-
5	Speaker Rear Left	2.0 + 3.0	Unshielded	Unshielded	-
6	HDMI IN	3.0	Shielded	Shielded	-
7	HDMI OUT	3.0	Shielded	Shielded	-
8	USB	0.3 + 2.0	Shielded	Shielded	-
9	GPS Antenna	3.0	Shielded	Shielded	-
10	FM/AM Antenna	0.15 + 3.0	Shielded	Shielded	-
11	SXM Antenna	0.15 + 0.6	Shielded	Shielded	-
12	RCA(Front out)	0.3 + 2.0	Shielded	Shielded	-
13	RCA(Rear out)	0.3 + 2.0	Shielded	Shielded	-
14	RCA(SUBW)	0.3 + 2.0	Shielded	Shielded	-
15	DVD REMOTE	0.3 + 1.0	Unshielded	Unshielded	-
16	DVD STATUS IN	0.3 + 1.0	Unshielded	Unshielded	-
17	REMOTE IN	0.3 + 1.0	Unshielded	Unshielded	-
18	REMOTE OUT	0.3 + 1.0	Unshielded	Unshielded	-
19	MON REMOTE	0.3 + 1.0	Unshielded	Unshielded	-
20	REMO	2.0	Unshielded	Unshielded	-
21	REVERSE	2.0	Unshielded	Unshielded	-
22	PARKING BRAKE	2.0	Unshielded	Unshielded	-
23	Display	0.3	Shielded	Shielded	-
24	Signal	0.3	Unshielded	Unshielded	-
25	AUX INPUT	0.15 + 2.0	Unshielded	Unshielded	-
26	SPEED SENSOR	2.0	Unshielded	Unshielded	-
27	CAMERA	0.15	Unshielded	Unshielded	-
28	CONNECT2 I/F	0.15	Unshielded	Unshielded	-
29	Signal	0.15	Unshielded	Unshielded	-
30	Signal	0.15	Unshielded	Unshielded	-
31	AC	1.8	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

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

[For above 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 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

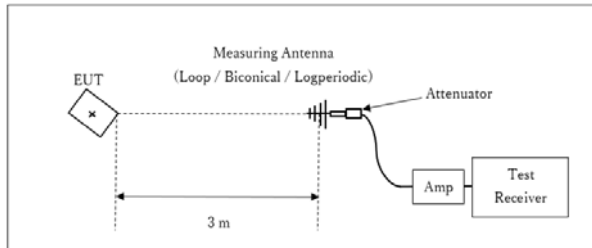
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

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

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

Figure 2: Test Setup

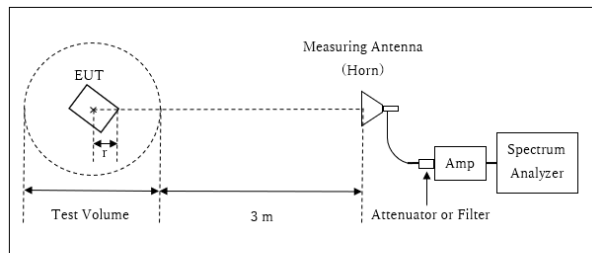
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor: $20 \times \log (3.74 \text{ m} / 3.0 \text{ m}) = 1.92 \text{ dB}$

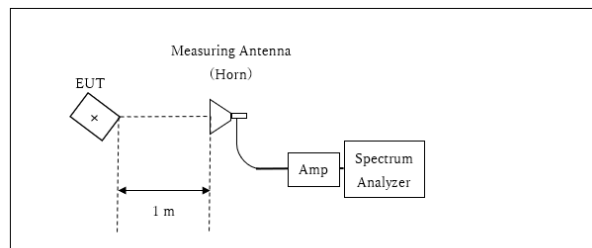
* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.74 \text{ m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.26 \text{ m}$

13 GHz - 26.5 GHz



x : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

*Test Distance: 1 m

- The carrier level and noise levels were confirmed at angle of 0 to 30 deg. Based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Frequency	30 MHz - 1000 MHz	1 GHz - 13 GHz	13 GHz - 26.5 GHz
Worst angle	0 deg.	30 deg.	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	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 160 MHz 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 *3)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 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 %. Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) 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)

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

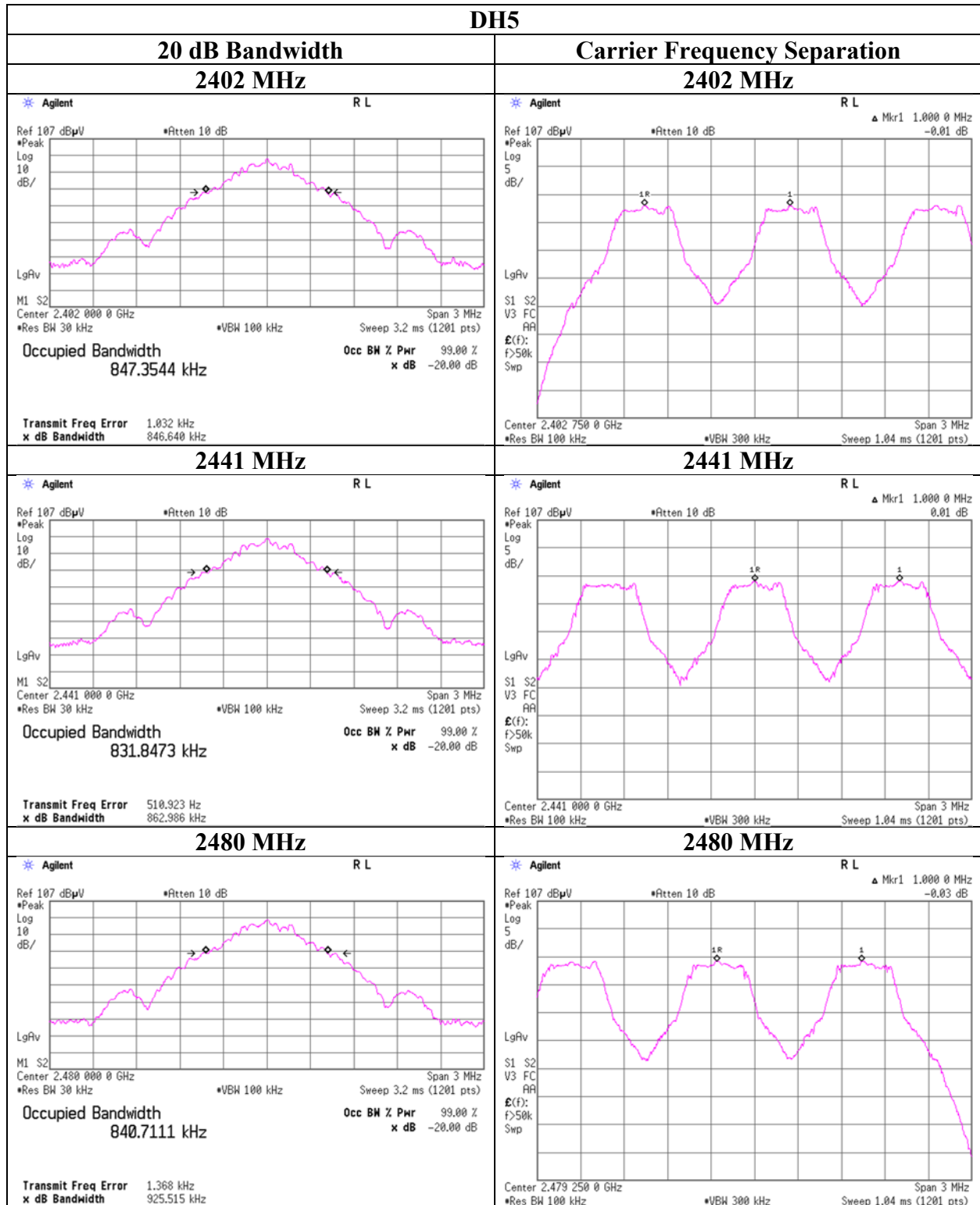
20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 4, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off,

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.847	847.354	1.000	≥ 0.564
DH5	2441.0	0.863	831.847	1.000	≥ 0.575
DH5	2480.0	0.926	840.711	1.000	≥ 0.617
DH5	Hopping On	-	78569.8	-	-
3DH5	2402.0	1.306	1194.7	1.000	≥ 0.871
3DH5	2441.0	1.283	1189.5	1.000	≥ 0.855
3DH5	2480.0	1.287	1193.0	1.000	≥ 0.858
3DH5	Hopping On	-	78660.6	-	-

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

No limit applies to 20dB Bandwidth.



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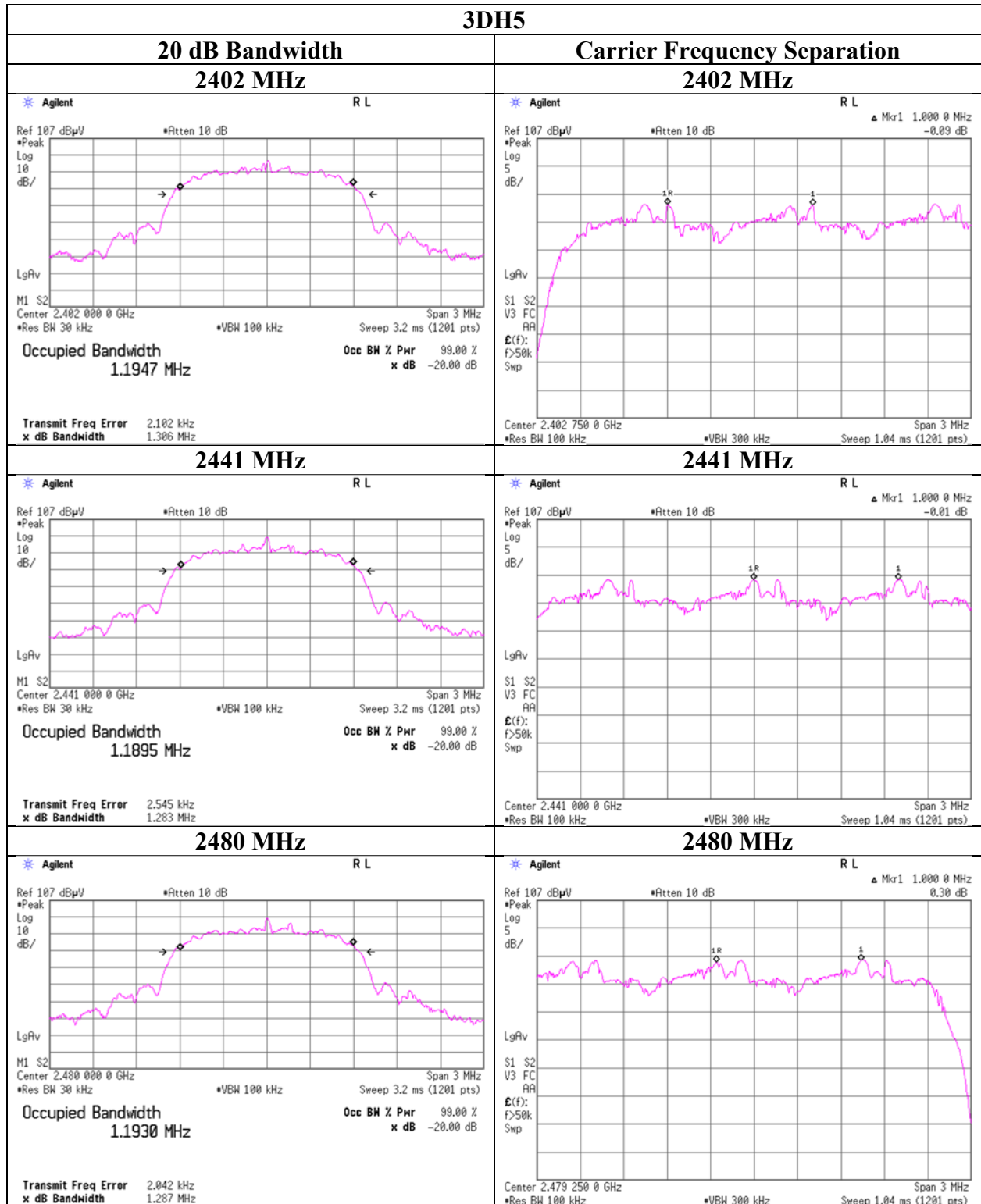
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20 dB Bandwidth and Carrier Frequency Separation



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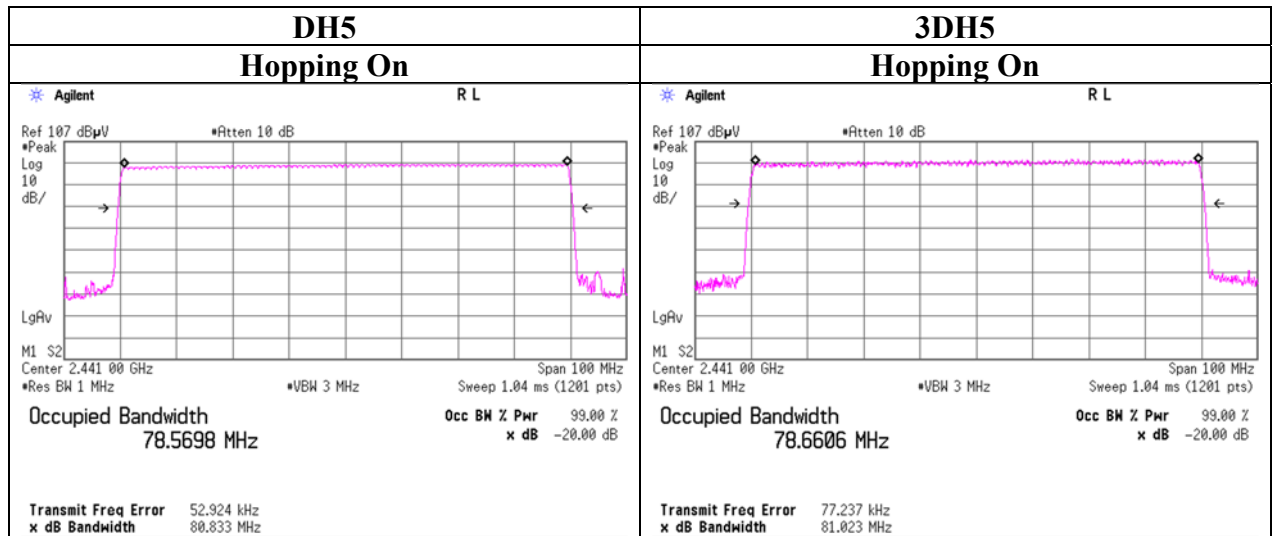
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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

99 % Occupied Bandwidth



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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

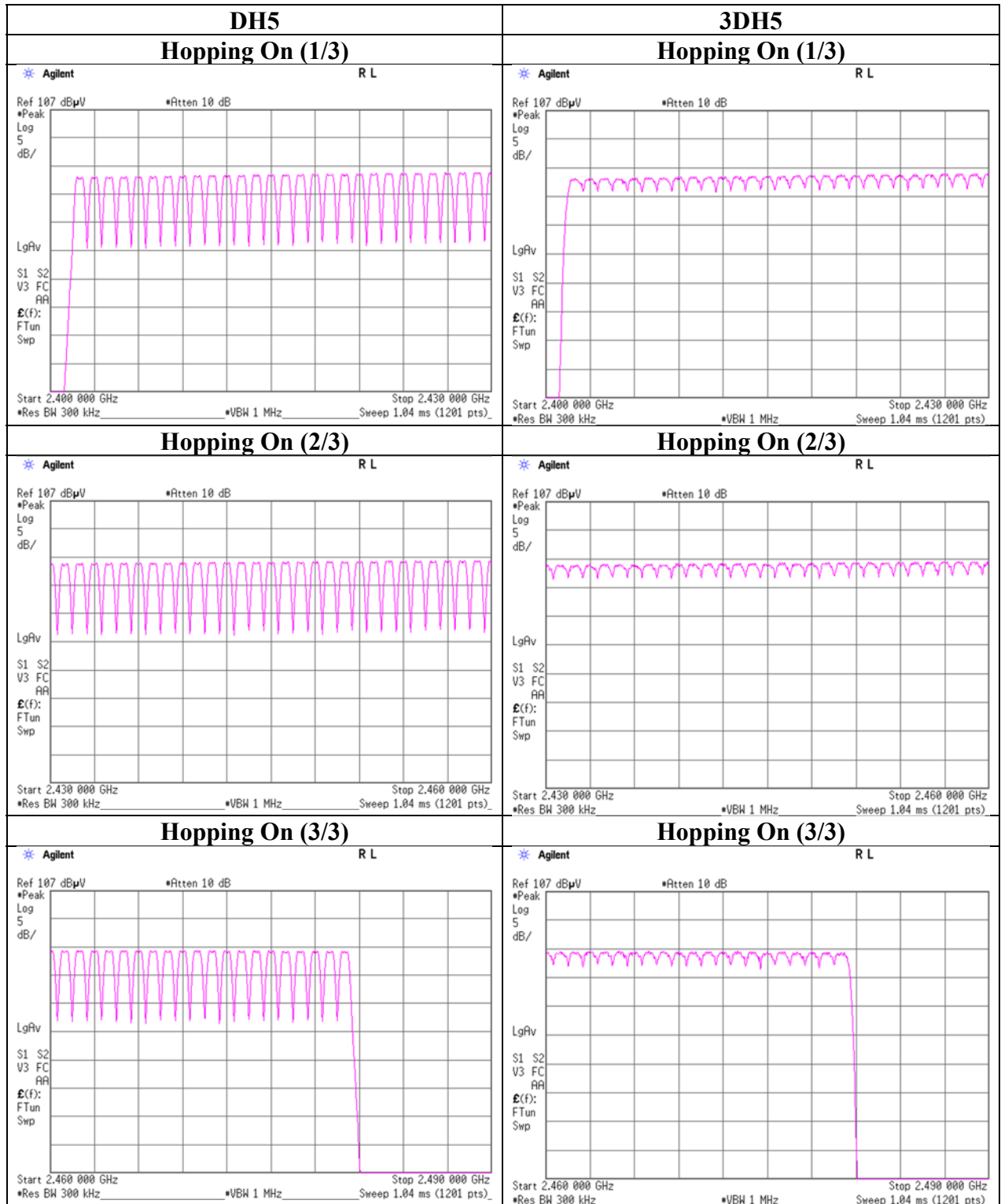
Number of Hopping Frequency

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 4, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping On

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

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

Number of Hopping Frequency



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Dwell time

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 4, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period			Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	50.2 times /	5 sec. x	31.6 sec. =	0.423	135	400
DH3	26.0 times /	5 sec. x	31.6 sec. =	1.678	277	400
DH5	17.6 times /	5 sec. x	31.6 sec. =	2.929	328	400
3DH1	48.4 times /	5 sec. x	31.6 sec. =	0.421	129	400
3DH3	26.2 times /	5 sec. x	31.6 sec. =	1.674	278	400
3DH5	18.4 times /	5 sec. x	31.6 sec. =	2.924	342	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

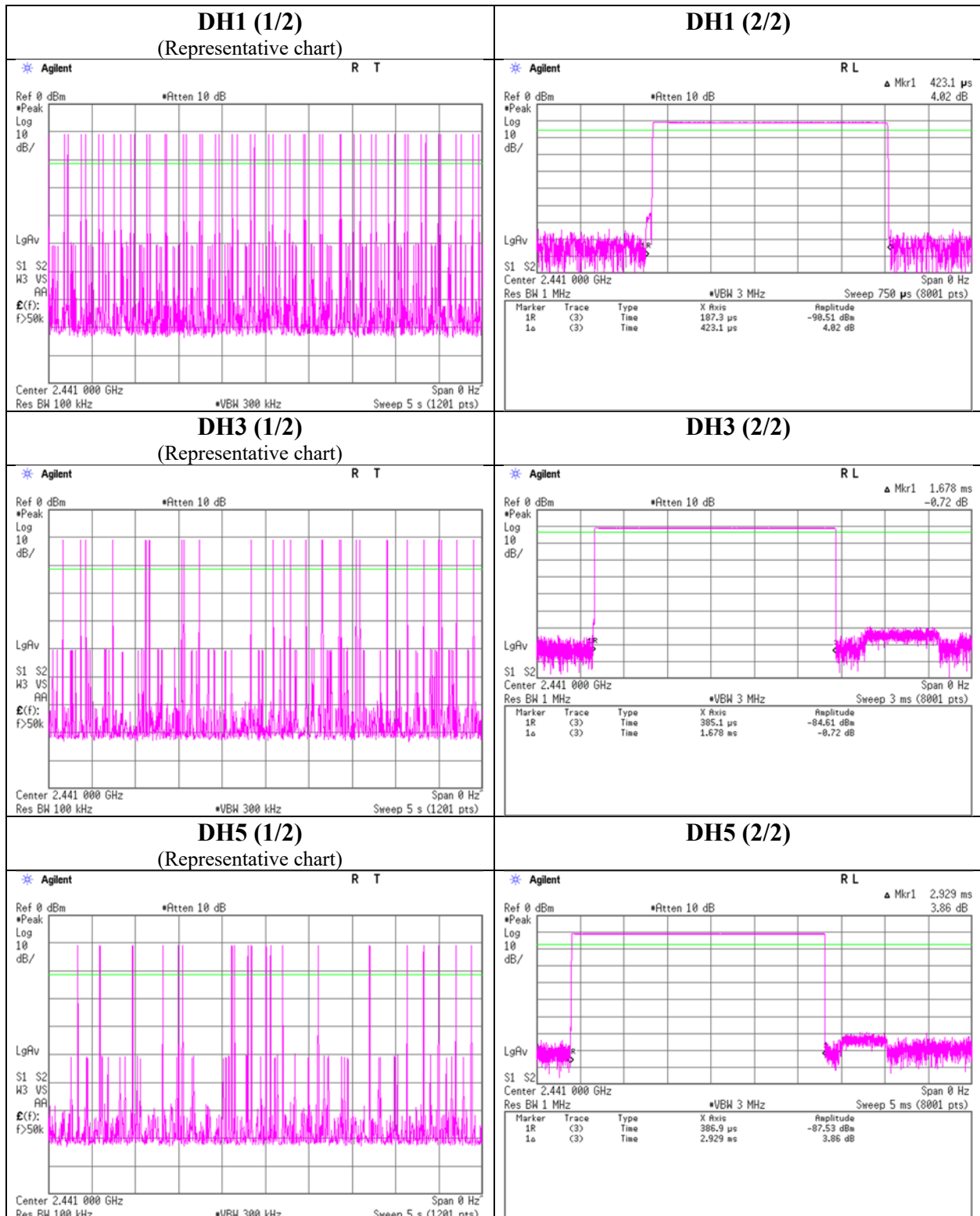
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	50	49	51	51	50.2
DH3	26	24	28	25	27	26.0
DH5	20	17	17	19	15	17.6
3DH1	48	49	48	49	48	48.4
3DH3	27	26	27	26	25	26.2
3DH5	21	17	19	18	17	18.4

Sample Calculation

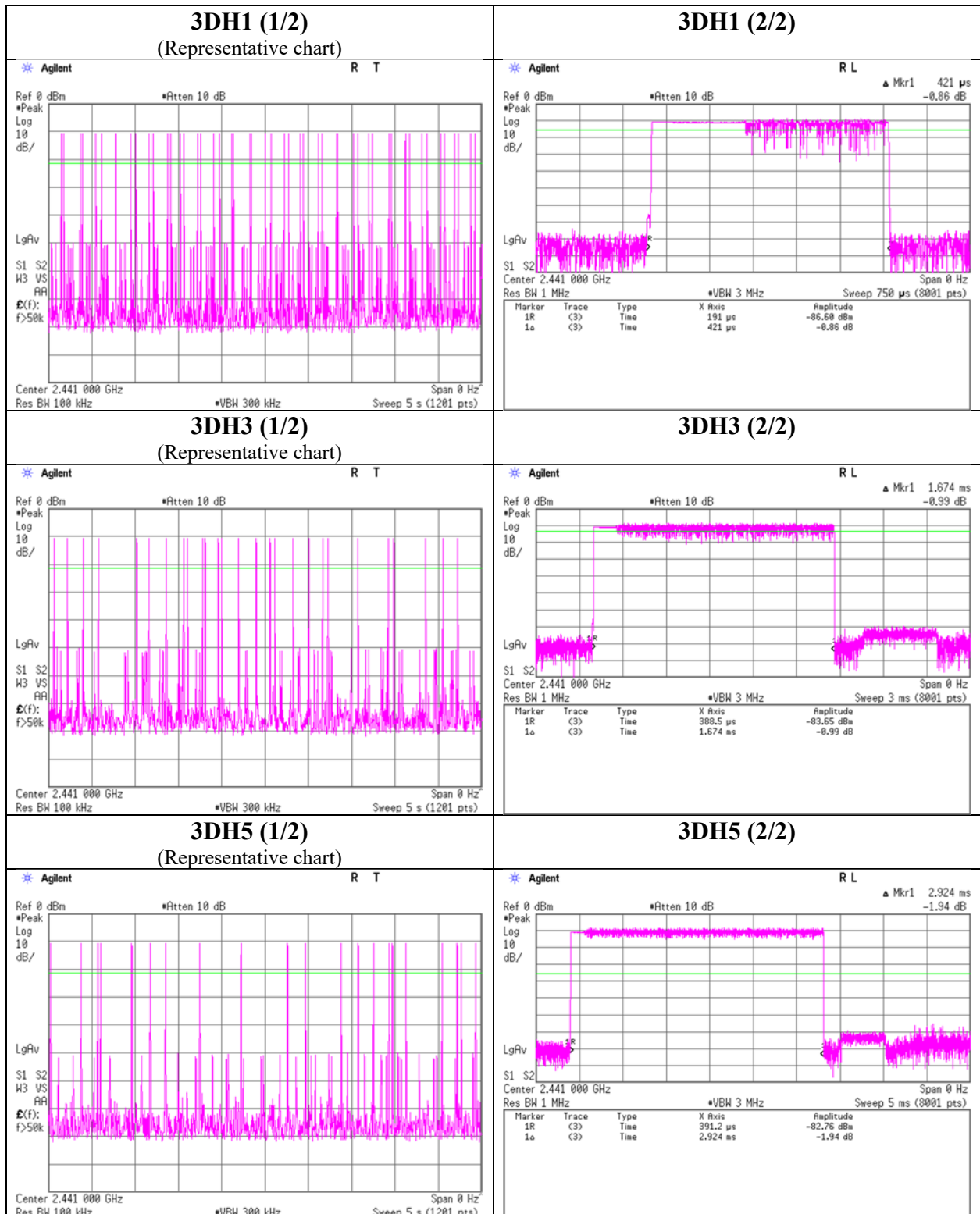
Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



Dwell time



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Facsimile : +81 463 50 6401

Maximum Peak Output Power

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 4, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247								
					Result		Limit		Margin	Antenna Gain	Result		Limit		Margin			
					[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBi]	[dBm]	[mW]		[dBm]	[mW]	[dB]
DH5	2402.0	-11.80	1.84	9.86	-0.10	0.98	20.96	125	21.06	-9.00	-9.10	0.12	36.02	4000	45.12			
DH5	2441.0	-10.74	1.86	9.86	0.98	1.25	20.96	125	19.98	-9.00	-8.02	0.16	36.02	4000	44.04			
DH5	2480.0	-10.63	1.87	9.85	1.09	1.29	20.96	125	19.87	-9.00	-7.91	0.16	36.02	4000	43.93			
2DH5	2402.0	-9.52	1.84	9.86	2.18	1.65	20.96	125	18.78	-9.00	-6.82	0.21	36.02	4000	42.84			
2DH5	2441.0	-8.51	1.86	9.86	3.21	2.09	20.96	125	17.75	-9.00	-5.79	0.26	36.02	4000	41.81			
2DH5	2480.0	-8.38	1.87	9.85	3.34	2.16	20.96	125	17.62	-9.00	-5.66	0.27	36.02	4000	41.68			
3DH5	2402.0	-8.97	1.84	9.86	2.73	1.87	20.96	125	18.23	-9.00	-6.27	0.24	36.02	4000	42.29			
3DH5	2441.0	-8.04	1.86	9.86	3.68	2.33	20.96	125	17.28	-9.00	-5.32	0.29	36.02	4000	41.34			
3DH5	2480.0	-7.87	1.87	9.85	3.85	2.43	20.96	125	17.11	-9.00	-5.15	0.31	36.02	4000	41.17			

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

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

However, the limit level 125mW of AFH mode was used for the test.

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Average Output Power (Reference data for RF Exposure)

Report No.	12456503S-A-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 4, 2018
Temperature / Humidity	26 deg. C / 43 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-13.36	1.84	9.86	-1.66	0.68	1.08	-0.58	0.87
DH5	2441.0	-12.27	1.86	9.86	-0.55	0.88	1.08	0.53	1.13
DH5	2480.0	-12.13	1.87	9.85	-0.41	0.91	1.08	0.67	1.17
2DH5	2402.0	-13.43	1.84	9.86	-1.73	0.67	1.07	-0.66	0.86
2DH5	2441.0	-12.36	1.86	9.86	-0.64	0.86	1.07	0.43	1.10
2DH5	2480.0	-12.22	1.87	9.85	-0.50	0.89	1.07	0.57	1.14
3DH5	2402.0	-13.43	1.84	9.86	-1.73	0.67	1.08	-0.65	0.86
3DH5	2441.0	-12.36	1.86	9.86	-0.64	0.86	1.08	0.44	1.11
3DH5	2480.0	-12.23	1.87	9.85	-0.51	0.89	1.08	0.57	1.14

Sample Calculation:

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

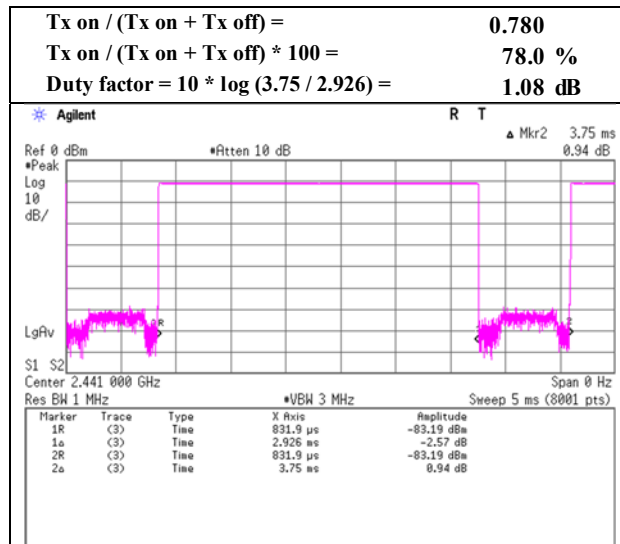
Result (Burst power average) = Time average + Duty factor

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

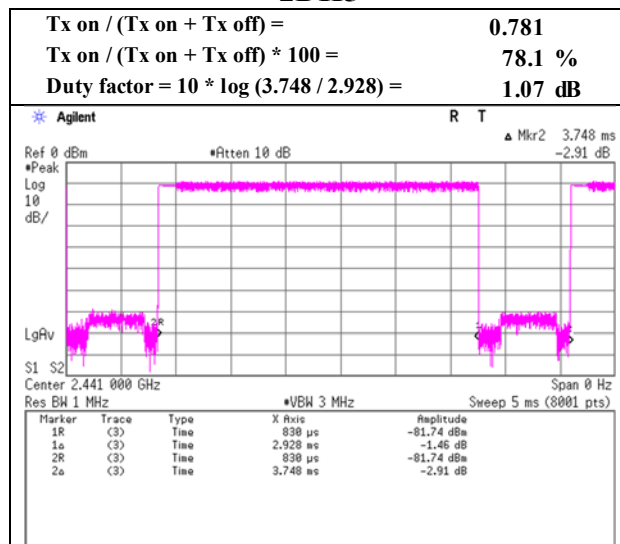
Burst Rate Confirmation

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off

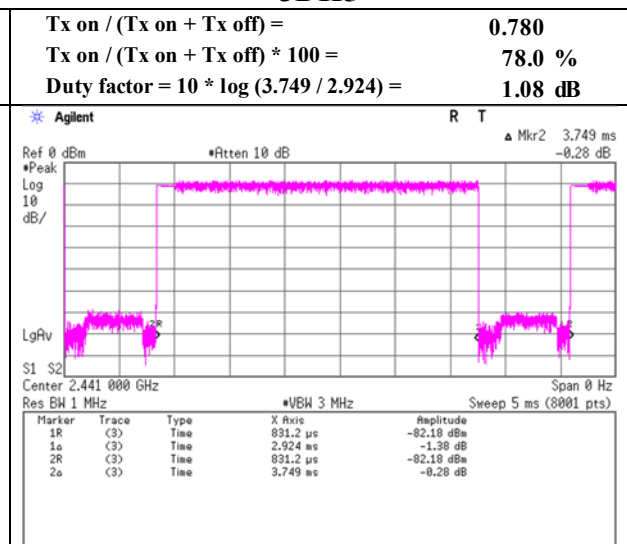
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No.	12456503S-A-R3	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.3
Date	November 28, 2018	November 29, 2018
Temperature / Humidity	22 deg. C / 44 % RH	24 deg. C / 35 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi
	(1 GHz -13 GHz)	(30 MHz -1 GHz, 13 GHz – 26.5 GHz)
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.	108.899	QP	49.96	11.78	7.26	32.15	0.00	36.85	43.50	6.6	293	167	
Hori.	112.220	QP	47.89	12.20	7.23	32.15	0.00	35.17	43.50	8.3	296	266	
Hori.	187.088	QP	41.32	16.16	7.84	32.09	0.00	33.23	43.50	10.2	187	151	
Hori.	191.820	QP	44.57	16.32	7.84	32.08	0.00	36.65	43.50	6.8	177	319	
Hori.	194.300	QP	44.18	16.46	7.85	32.08	0.00	36.41	43.50	7.0	176	318	
Hori.	199.212	QP	43.96	16.56	7.88	32.07	0.00	36.33	43.50	7.1	161	312	
Hori.	216.000	QP	50.42	11.13	8.15	32.05	0.00	37.65	43.50	5.8	162	135	
Hori.	270.002	QP	52.01	12.84	8.51	32.01	0.00	41.35	46.00	4.6	132	306	
Hori.	297.002	QP	47.96	13.65	8.69	32.01	0.00	38.29	46.00	7.7	119	303	
Hori.	351.002	QP	46.39	15.12	9.03	31.95	0.00	38.59	46.00	7.4	100	148	
Hori.	524.009	QP	37.39	17.67	9.72	31.98	0.00	32.80	46.00	13.2	227	348	
Hori.	2390.000	PK	44.94	27.89	14.62	39.46	1.92	49.91	73.90	23.9	210	67	
Hori.	3154.650	PK	53.89	28.84	6.37	39.32	1.92	51.70	73.90	22.2	103	206	
Hori.	4804.000	PK	43.78	31.35	7.10	39.50	1.92	44.65	73.90	29.2	141	54	
Hori.	7206.000	PK	46.79	36.78	8.96	39.29	1.92	55.16	73.90	18.7	186	41	
Hori.	9608.000	PK	45.04	38.10	10.46	39.52	1.92	56.00	73.90	17.9	150	0	
Hori.	2390.000	AV	33.60	27.89	14.62	39.46	1.92	38.57	53.90	15.3	210	67	
Hori.	3154.650	AV	51.00	28.84	6.37	39.32	1.92	48.81	53.90	5.0	103	206	
Hori.	4804.000	AV	33.55	31.35	7.10	39.50	1.92	34.42	53.90	19.4	141	54	
Hori.	7206.000	AV	35.88	36.78	8.96	39.29	1.92	44.25	53.90	9.6	186	41	
Hori.	9608.000	AV	34.38	38.10	10.46	39.52	1.92	45.34	53.90	8.5	150	0	
Vert.	54.462	QP	46.39	9.69	6.74	32.19	0.00	30.63	40.00	9.3	100	131	
Vert.	112.220	QP	46.85	12.20	7.23	32.15	0.00	34.13	43.50	9.3	100	277	
Vert.	216.000	QP	49.82	11.13	8.15	32.05	0.00	37.05	43.50	6.4	100	45	
Vert.	2295.024	PK	47.91	28.19	14.52	39.46	1.92	53.08	73.90	20.8	146	227	
Vert.	2390.000	PK	44.81	27.89	14.62	39.46	1.92	49.78	73.90	24.1	175	69	
Vert.	3154.650	PK	54.06	28.84	6.37	39.32	1.92	51.87	73.90	22.0	104	158	
Vert.	4804.000	PK	43.84	31.35	7.10	39.50	1.92	44.71	73.90	29.1	118	163	
Vert.	7206.000	PK	47.54	36.78	8.96	39.29	1.92	55.91	73.90	17.9	162	164	
Vert.	9608.000	PK	44.62	38.10	10.46	39.52	1.92	55.58	73.90	18.3	150	0	
Vert.	2295.024	AV	38.82	28.19	14.52	39.46	1.92	43.99	53.90	9.9	146	227	
Vert.	2390.000	AV	33.25	27.89	14.62	39.46	1.92	38.22	53.90	15.6	175	69	
Vert.	3154.650	AV	51.36	28.84	6.37	39.32	1.92	49.17	53.90	4.7	104	158	
Vert.	4804.000	AV	33.67	31.35	7.10	39.50	1.92	34.54	53.90	19.3	118	163	
Vert.	7206.000	AV	38.82	36.78	8.96	39.29	1.92	47.19	53.90	6.7	162	164	
Vert.	9608.000	AV	34.37	38.10	10.46	39.52	1.92	45.33	53.90	8.5	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.74 m / 3.0 m) = 1.92 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	84.32	27.88	14.63	39.46	1.92	89.29	-	-	Carrier
Hori.	2400.000	PK	36.33	27.89	14.63	39.46	1.92	41.31	69.29	27.9	
Vert.	2402.000	PK	83.25	27.88	14.63	39.46	1.92	88.22	-	-	Carrier
Vert.	2400.000	PK	36.02	27.89	14.63	39.46	1.92	41.00	68.22	27.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.74 m / 3.0 m) = 1.92 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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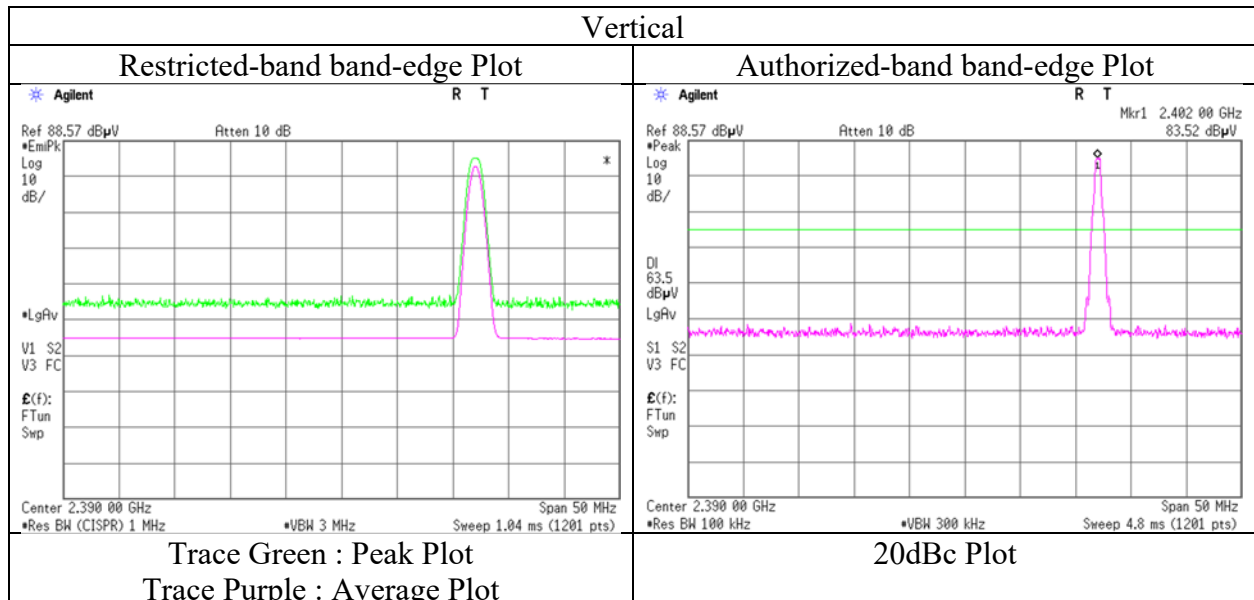
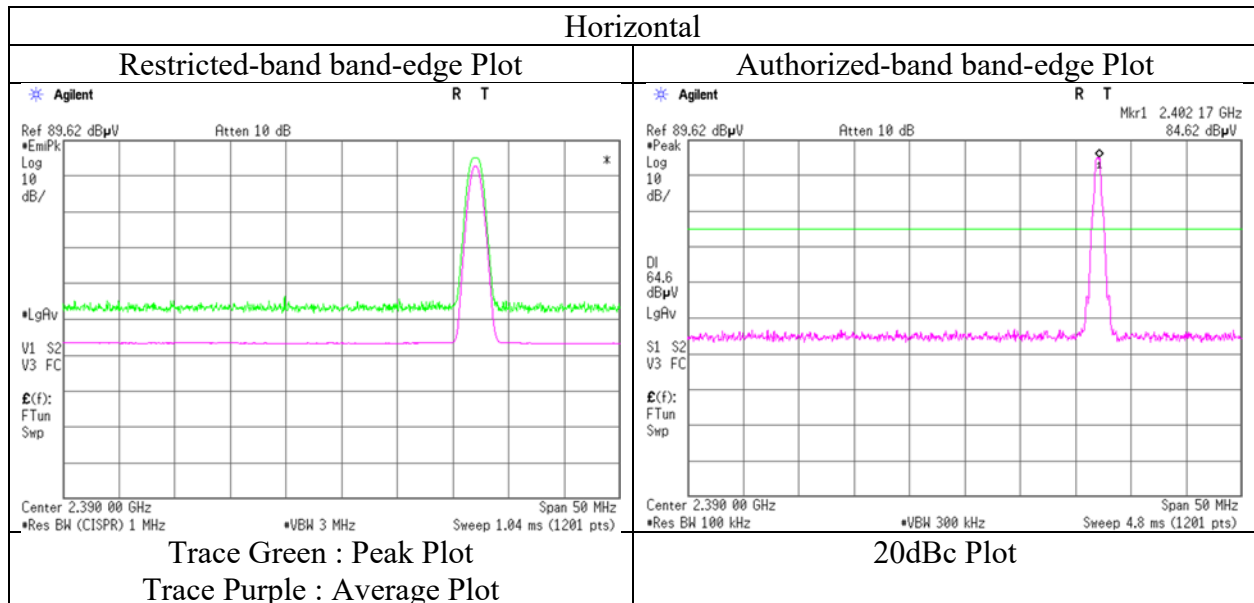
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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12456503S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	November 28, 2018
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Shiro Kobayashi (1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.
It is confirmed there is no emission in the range of 2310 MHz to 2390 MHz.

Radiated Spurious Emission

Report No.	12456503S-A-R3	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.3
Date	November 28, 2018	November 29, 2018
Temperature / Humidity	22 deg. C / 44 % RH	24 deg. C / 35 % RH
Engineer	Shiro Kobayashi	Shiro Kobayashi
	(1 GHz -13 GHz)	(30 MHz -1 GHz, 13 GHz – 26.5 GHz)
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.	108.898	QP	48.73	11.79	7.26	32.15	0.00	35.63	43.50	7.8	293	162	
Hori.	112.216	QP	47.19	12.20	7.23	32.15	0.00	34.47	43.50	9.0	300	247	
Hori.	186.871	QP	39.42	16.15	7.84	32.09	0.00	31.32	43.50	12.1	100	187	
Hori.	191.806	QP	44.76	16.31	7.84	32.08	0.00	36.83	43.50	6.6	182	314	
Hori.	194.290	QP	44.28	16.43	7.85	32.08	0.00	36.48	43.50	7.0	170	317	
Hori.	196.778	QP	44.18	16.49	7.87	32.08	0.00	36.46	43.50	7.0	174	317	
Hori.	216.000	QP	50.07	11.13	8.15	32.05	0.00	37.30	43.50	6.2	158	240	
Hori.	270.002	QP	52.01	12.81	8.51	32.01	0.00	41.32	46.00	4.6	128	305	
Hori.	297.002	QP	48.39	13.65	8.69	32.01	0.00	38.72	46.00	7.2	133	305	
Hori.	351.003	QP	46.85	15.15	9.13	31.96	0.00	39.17	46.00	6.8	100	150	
Hori.	3154.700	PK	53.88	28.84	6.37	39.32	1.92	51.69	73.90	22.2	102	188	
Hori.	4882.000	PK	44.39	31.19	7.15	39.50	1.92	45.15	73.90	28.7	140	50	
Hori.	7323.000	PK	46.21	36.71	9.00	39.35	1.92	54.49	73.90	19.4	178	221	
Hori.	9764.000	PK	44.36	38.61	10.39	39.41	1.92	55.87	73.90	18.0	150	0	
Hori.	3154.700	AV	51.20	28.84	6.37	39.32	1.92	49.01	53.90	4.8	102	188	
Hori.	4882.000	AV	33.48	31.19	7.15	39.50	1.92	34.24	53.90	19.6	140	50	
Hori.	7323.000	AV	36.21	36.71	9.00	39.35	1.92	44.49	53.90	9.4	178	221	
Hori.	9764.000	AV	33.25	38.61	10.39	39.41	1.92	44.76	53.90	9.1	150	0	
Vert.	54.462	QP	46.06	9.69	6.74	32.19	0.00	30.30	40.00	9.7	100	95	
Vert.	112.220	QP	45.33	12.21	7.23	32.15	0.00	32.62	43.50	10.8	288	261	
Vert.	186.929	QP	39.93	16.15	7.84	32.09	0.00	31.83	43.50	11.6	141	153	
Vert.	216.000	QP	50.47	11.13	8.15	32.05	0.00	37.70	43.50	5.8	100	185	
Vert.	2295.027	PK	47.61	28.19	14.52	39.46	1.92	52.78	73.90	21.1	148	226	
Vert.	3154.700	PK	53.99	28.84	6.37	39.32	1.92	51.80	73.90	22.1	105	159	
Vert.	4882.000	PK	43.92	31.19	7.15	39.50	1.92	44.68	73.90	29.2	121	180	
Vert.	7323.000	PK	47.86	36.71	9.00	39.35	1.92	56.14	73.90	17.7	165	170	
Vert.	9764.000	PK	44.51	38.61	10.39	39.41	1.92	56.02	73.90	17.8	150	0	
Vert.	2295.027	AV	37.84	28.19	14.52	39.46	1.92	43.01	53.90	10.8	148	226	
Vert.	3154.700	AV	51.35	28.84	6.37	39.32	1.92	49.16	53.90	4.7	105	159	
Vert.	4882.000	AV	33.49	31.19	7.15	39.50	1.92	34.25	53.90	19.6	121	180	
Vert.	7323.000	AV	38.50	36.71	9.00	39.35	1.92	46.78	53.90	7.1	165	170	
Vert.	9764.000	AV	32.78	38.61	10.39	39.41	1.92	44.29	53.90	9.6	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.74 \text{ m} / 3.0 \text{ m}) = 1.92 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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

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

Radiated Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.1 No.3
Date November 28, 2018 November 29, 2018
Temperature / Humidity 22 deg. C / 44 % RH 24 deg. C / 35 % RH
Engineer Shiro Kobayashi Shiro Kobayashi
(1 GHz -13 GHz) (30 MHz -1 GHz, 13 GHz – 26.5 GHz)
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.	108.904	QP	49.15	11.78	7.26	32.15	0.00	36.04	43.50	7.4	301	163	
Hori.	112.226	QP	47.54	12.20	7.23	32.15	0.00	34.82	43.50	8.6	291	256	
Hori.	186.943	QP	43.85	16.15	7.84	32.09	0.00	35.75	43.50	7.7	184	314	
Hori.	191.878	QP	44.97	16.33	7.84	32.08	0.00	37.06	43.50	6.4	169	323	
Hori.	196.782	QP	44.18	16.50	7.87	32.08	0.00	36.47	43.50	7.0	165	316	
Hori.	199.249	QP	44.00	16.55	7.87	32.07	0.00	36.35	43.50	7.1	167	314	
Hori.	216.000	QP	50.00	11.13	8.15	32.05	0.00	37.23	43.50	6.2	151	134	
Hori.	270.002	QP	51.79	12.84	8.51	32.01	0.00	41.13	46.00	4.8	122	305	
Hori.	297.002	QP	48.16	13.65	8.69	32.01	0.00	38.49	46.00	7.5	112	302	
Hori.	351.002	QP	46.05	15.12	9.03	31.95	0.00	38.25	46.00	7.7	100	152	
Hori.	2483.500	PK	44.88	27.64	14.72	39.46	1.92	49.70	73.90	24.2	224	135	
Hori.	3154.661	PK	53.74	28.84	6.37	39.32	1.92	51.55	73.90	22.3	105	204	
Hori.	4960.000	PK	44.36	31.40	7.20	39.50	1.92	45.38	73.90	28.5	141	61	
Hori.	7440.000	PK	47.32	36.84	9.06	39.42	1.92	55.72	73.90	18.1	190	218	
Hori.	9920.000	PK	44.01	38.77	10.33	39.30	1.92	55.73	73.90	18.1	150	0	
Hori.	2483.500	AV	33.31	27.64	14.72	39.46	1.92	38.13	53.90	15.7	224	135	
Hori.	3154.661	AV	50.81	28.84	6.37	39.32	1.92	48.62	53.90	5.2	105	204	
Hori.	4960.000	AV	33.46	31.40	7.20	39.50	1.92	34.48	53.90	19.4	141	61	
Hori.	7440.000	AV	37.25	36.84	9.06	39.42	1.92	45.65	53.90	8.2	190	218	
Hori.	9920.000	AV	32.49	38.77	10.33	39.30	1.92	44.21	53.90	9.6	150	0	
Vert.	54.472	QP	45.77	9.69	6.74	32.19	0.00	30.01	40.00	9.9	100	189	
Vert.	112.223	QP	45.88	12.21	7.23	32.15	0.00	33.17	43.50	10.3	100	291	
Vert.	191.836	QP	40.38	16.32	7.84	32.08	0.00	32.46	43.50	11.0	100	200	
Vert.	216.000	QP	48.40	11.13	8.15	32.05	0.00	35.63	43.50	7.8	100	359	
Vert.	2295.027	PK	48.90	28.19	14.52	39.46	1.92	54.07	73.90	19.8	153	226	
Vert.	2483.500	PK	44.61	27.64	14.72	39.46	1.92	49.43	73.90	24.4	173	173	
Vert.	3154.661	PK	53.59	28.84	6.37	39.32	1.92	51.40	73.90	22.5	106	159	
Vert.	4960.000	PK	44.40	31.40	7.20	39.50	1.92	45.42	73.90	28.4	127	248	
Vert.	7440.000	PK	46.95	36.84	9.06	39.42	1.92	55.35	73.90	18.5	171	172	
Vert.	9920.000	PK	43.42	38.77	10.33	39.30	1.92	55.14	73.90	18.7	150	0	
Vert.	2295.027	AV	37.90	28.19	14.52	39.46	1.92	43.07	53.90	10.8	153	226	
Vert.	2483.500	AV	33.04	27.64	14.72	39.46	1.92	37.86	53.90	16.0	173	173	
Vert.	3154.661	AV	50.71	28.84	6.37	39.32	1.92	48.52	53.90	5.3	106	159	
Vert.	4960.000	AV	33.01	31.40	7.20	39.50	1.92	34.03	53.90	19.8	127	248	
Vert.	7440.000	AV	37.54	36.84	9.06	39.42	1.92	45.94	53.90	7.9	171	172	
Vert.	9920.000	AV	32.49	38.77	10.33	39.30	1.92	44.21	53.90	9.6	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.74 m / 3.0 m) = 1.92 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.

UL Japan, Inc.

Shonan EMC Lab.

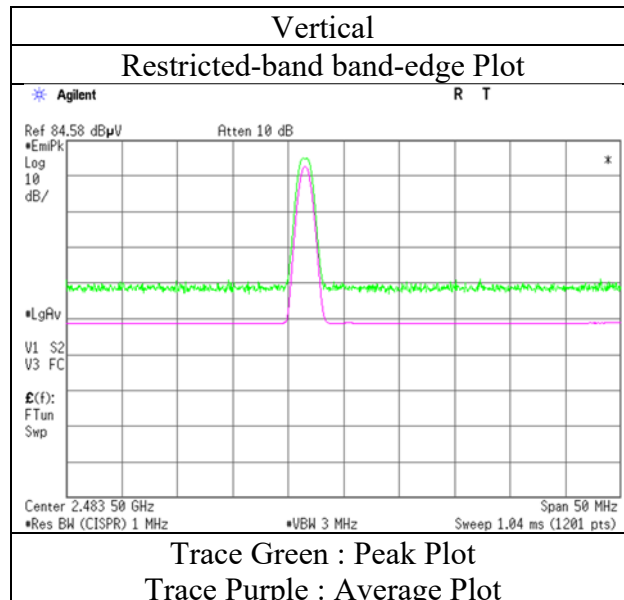
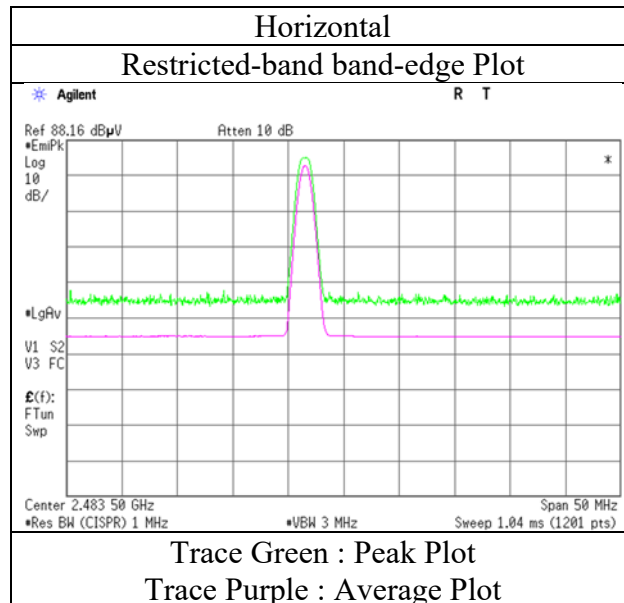
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12456503S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	November 28, 2018
Temperature / Humidity	22 deg. C / 44 % RH
Engineer	Shiro Kobayashi (1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date November 29, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Shiro Kobayashi
(30 MHz -26.5 GHz)
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.	108.893	QP	49.16	11.78	7.26	32.15	0.00	36.05	43.50	7.4	298	171	
Hori.	112.211	QP	44.77	12.21	7.23	32.15	0.00	32.06	43.50	11.4	300	234	
Hori.	194.270	QP	45.04	16.46	7.85	32.08	0.00	37.27	43.50	6.2	170	313	
Hori.	196.740	QP	44.68	16.49	7.87	32.08	0.00	36.96	43.50	6.5	170	316	
Hori.	199.210	QP	44.21	16.56	7.88	32.07	0.00	36.58	43.50	6.9	166	318	
Hori.	216.000	QP	49.80	11.13	8.15	32.05	0.00	37.03	43.50	6.4	149	239	
Hori.	270.002	QP	49.86	12.81	8.51	32.01	0.00	39.17	46.00	6.8	126	239	
Hori.	297.002	QP	46.69	13.65	8.69	32.01	0.00	37.02	46.00	8.9	123	306	
Hori.	351.002	QP	43.93	15.12	9.03	31.95	0.00	36.13	46.00	9.8	124	352	
Hori.	486.003	QP	37.86	17.46	9.57	31.96	0.00	32.93	46.00	13.0	100	328	
Hori.	523.983	QP	38.87	17.67	9.72	31.98	0.00	34.28	46.00	11.7	100	3	
Hori.	2390.000	PK	45.03	27.86	14.26	39.46	1.92	49.61	73.90	24.2	165	60	
Hori.	3154.639	PK	53.96	28.82	5.87	39.32	1.92	51.25	73.90	22.6	159	204	
Hori.	4804.000	PK	45.49	31.43	6.45	39.50	1.92	45.79	73.90	28.1	158	48	
Hori.	7206.000	PK	45.79	36.79	8.39	39.29	1.92	53.60	73.90	20.3	140	138	
Hori.	9608.000	PK	44.33	38.51	9.31	39.52	1.92	54.55	73.90	19.3	140	138	
Hori.	2390.000	AV	33.54	27.86	14.26	39.46	1.92	38.12	53.90	15.7	165	60	
Hori.	3154.639	AV	50.76	28.82	5.87	39.32	1.92	48.05	53.90	5.8	159	204	
Hori.	4804.000	AV	33.71	31.43	6.45	39.50	1.92	34.01	53.90	19.8	158	48	
Hori.	7206.000	AV	35.46	36.79	8.39	39.29	1.92	43.27	53.90	10.6	140	138	
Hori.	9608.000	AV	34.18	38.51	9.31	39.52	1.92	44.40	53.90	9.5	140	138	
Vert.	54.470	QP	45.18	9.69	6.74	32.19	0.00	29.42	40.00	10.5	100	164	
Vert.	112.228	QP	43.16	12.21	7.23	32.15	0.00	30.45	43.50	13.0	292	255	
Vert.	191.823	QP	38.72	16.32	7.84	32.08	0.00	30.80	43.50	12.7	100	358	
Vert.	216.000	QP	48.13	11.13	8.15	32.05	0.00	35.36	43.50	8.1	100	211	
Vert.	2295.019	PK	46.00	28.20	14.16	39.46	1.92	50.82	73.90	23.0	136	216	
Vert.	2390.000	PK	44.50	27.86	14.26	39.46	1.92	49.08	73.90	24.8	237	224	
Vert.	3154.639	PK	54.42	28.82	5.87	39.32	1.92	51.71	73.90	22.1	177	168	
Vert.	4804.000	PK	45.50	31.43	6.45	39.50	1.92	45.80	73.90	28.1	178	90	
Vert.	7206.000	PK	47.41	36.79	8.39	39.29	1.92	55.22	73.90	18.6	174	162	
Vert.	9608.000	PK	44.54	38.51	9.31	39.52	1.92	54.76	73.90	19.1	150	0	
Vert.	2295.019	AV	33.61	28.20	14.16	39.46	1.92	38.43	53.90	15.4	136	216	
Vert.	2390.000	AV	33.57	27.86	14.26	39.46	1.92	38.15	53.90	15.7	237	224	
Vert.	3154.639	AV	51.44	28.82	5.87	39.32	1.92	48.73	53.90	5.1	177	168	
Vert.	4804.000	AV	34.06	31.43	6.45	39.50	1.92	34.36	53.90	19.5	178	90	
Vert.	7206.000	AV	37.30	36.79	8.39	39.29	1.92	45.11	53.90	8.7	174	162	
Vert.	9608.000	AV	34.25	38.51	9.31	39.52	1.92	44.47	53.90	9.4	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.74 \text{ m} / 3.0 \text{ m}) = 1.92 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

* 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	84.49	27.86	14.27	39.46	1.92	89.08	-	-	Carrier
Hori.	2400.000	PK	37.49	27.86	14.27	39.46	1.92	42.08	69.08	27.0	
Vert.	2402.000	PK	81.47	27.86	14.27	39.46	1.92	86.06	-	-	Carrier
Vert.	2400.000	PK	36.55	27.86	14.27	39.46	1.92	41.14	66.06	24.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.74 \text{ m} / 3.0 \text{ m}) = 1.92 \text{ dB}$

13 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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Shonan EMC Lab.

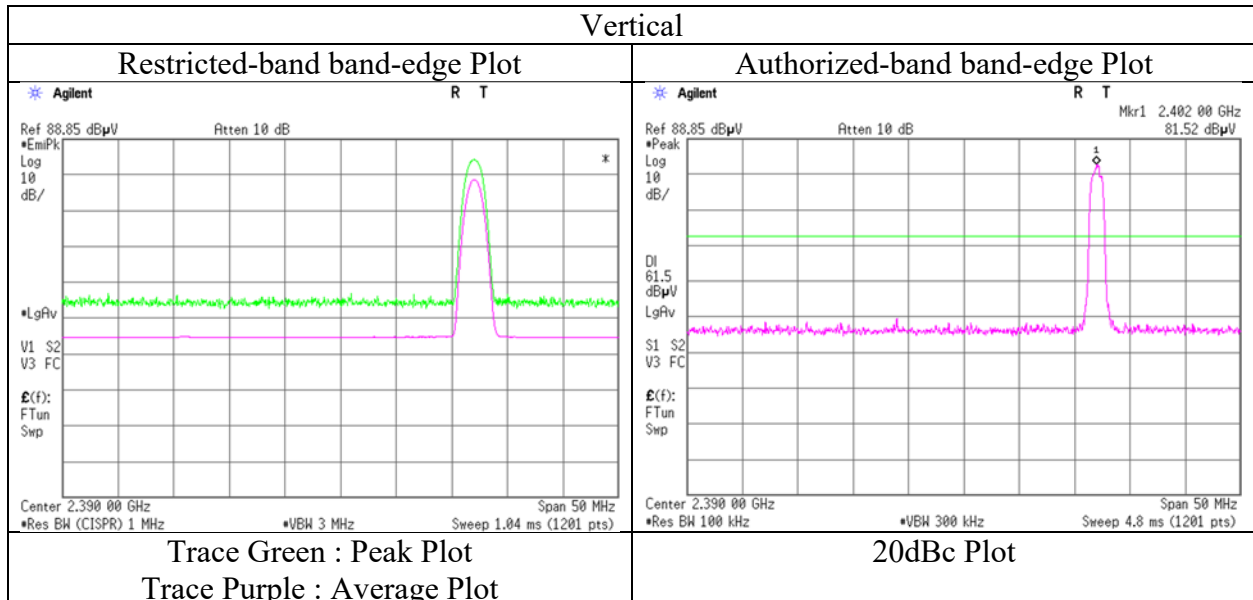
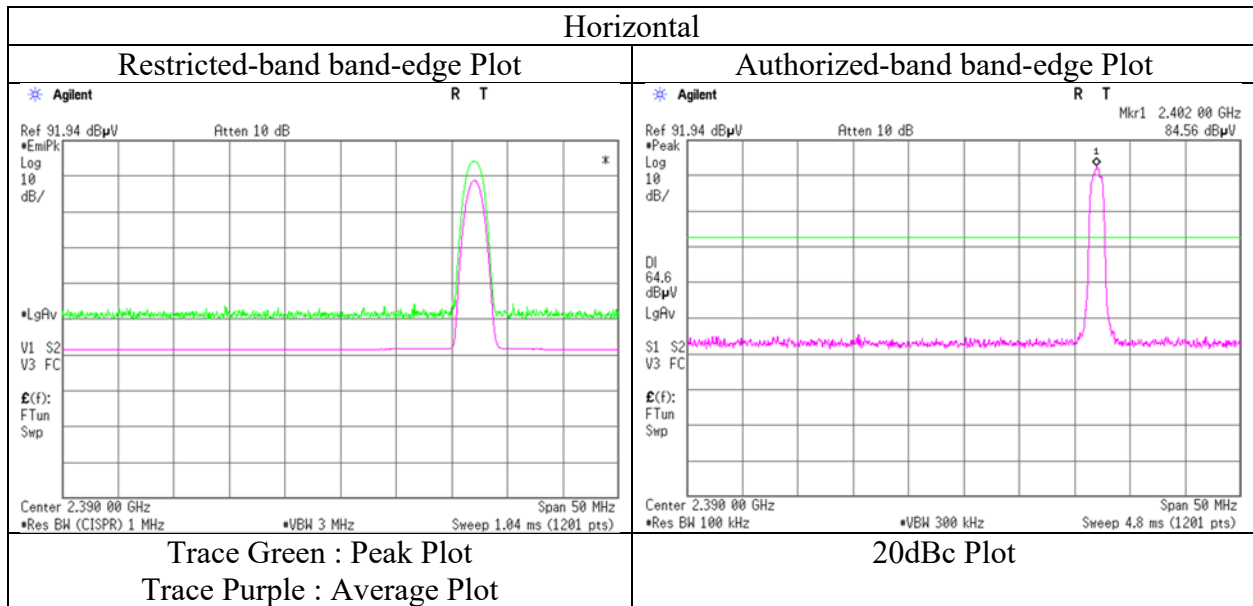
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12456503S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 29, 2018
Temperature / Humidity	24 deg. C / 35 % RH
Engineer	Shiro Kobayashi
	(30 MHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.
It is confirmed there is no emission in the range of 2310 MHz to 2390 MHz.

Radiated Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date November 29, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Shiro Kobayashi
(30 MHz -26.5 GHz)
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.	108.908	QP	48.86	11.78	7.26	32.15	0.00	35.75	43.50	7.7	299	163	
Hori.	112.215	QP	44.80	12.20	7.23	32.15	0.00	32.08	43.50	11.4	293	259	
Hori.	186.956	QP	44.27	16.16	7.84	32.09	0.00	36.18	43.50	7.3	178	316	
Hori.	191.848	QP	45.93	16.34	7.84	32.08	0.00	38.03	43.50	5.4	169	319	
Hori.	196.800	QP	44.81	16.50	7.87	32.08	0.00	37.10	43.50	6.4	173	311	
Hori.	199.265	QP	44.44	16.55	7.87	32.07	0.00	36.79	43.50	6.7	163	312	
Hori.	216.000	QP	49.71	11.13	8.15	32.05	0.00	36.94	43.50	6.5	151	238	
Hori.	270.002	QP	49.69	12.84	8.51	32.01	0.00	39.03	46.00	6.9	133	236	
Hori.	297.002	QP	46.26	13.65	8.69	32.01	0.00	36.59	46.00	9.4	126	305	
Hori.	351.003	QP	43.93	15.12	9.03	31.95	0.00	36.13	46.00	9.8	100	47	
Hori.	524.009	QP	38.48	17.67	9.72	31.98	0.00	33.89	46.00	12.1	100	5	
Hori.	3154.675	PK	53.63	28.82	5.87	39.32	1.92	50.92	73.90	22.9	160	204	
Hori.	4882.000	PK	45.11	31.37	6.46	39.50	1.92	45.36	73.90	28.5	167	46	
Hori.	7323.000	PK	45.94	37.01	8.38	39.35	1.92	53.90	73.90	20.0	152	140	
Hori.	9764.000	PK	44.35	38.92	9.23	39.41	1.92	55.01	73.90	18.8	150	0	
Hori.	3154.675	AV	50.69	28.82	5.87	39.32	1.92	47.98	53.90	5.9	160	204	
Hori.	4882.000	AV	33.41	31.37	6.46	39.50	1.92	33.66	53.90	20.2	167	46	
Hori.	7323.000	AV	35.61	37.01	8.38	39.35	1.92	43.57	53.90	10.3	152	140	
Hori.	9764.000	AV	33.24	38.92	9.23	39.41	1.92	43.90	53.90	10.0	150	0	
Vert.	54.435	QP	45.52	9.70	6.74	32.19	0.00	29.77	40.00	10.2	100	256	
Vert.	112.250	QP	42.82	12.21	7.23	32.15	0.00	30.11	43.50	13.3	100	246	
Vert.	186.956	QP	40.36	16.15	7.84	32.09	0.00	32.26	43.50	11.2	100	186	
Vert.	216.000	QP	47.67	11.13	8.15	32.05	0.00	34.90	43.50	8.6	100	185	
Vert.	2295.002	PK	45.57	28.20	14.16	39.46	1.92	50.39	73.90	23.5	142	217	
Vert.	3154.675	PK	54.86	28.82	5.87	39.32	1.92	52.15	73.90	21.7	160	166	
Vert.	4882.000	PK	46.52	31.37	6.46	39.50	1.92	46.77	73.90	27.1	180	91	
Vert.	7323.000	PK	48.24	37.01	8.38	39.35	1.92	56.20	73.90	17.7	182	158	
Vert.	9764.000	PK	44.09	38.92	9.23	39.41	1.92	54.75	73.90	19.1	150	0	
Vert.	2295.002	AV	35.08	28.20	14.16	39.46	1.92	39.90	53.90	14.0	142	217	
Vert.	3154.675	AV	51.51	28.82	5.87	39.32	1.92	48.80	53.90	5.1	160	166	
Vert.	4882.000	AV	33.92	31.37	6.46	39.50	1.92	34.17	53.90	19.7	180	91	
Vert.	7323.000	AV	37.16	37.01	8.38	39.35	1.92	45.12	53.90	8.7	182	158	
Vert.	9764.000	AV	33.24	38.92	9.23	39.41	1.92	43.90	53.90	10.0	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.74\text{ m} / 3.0\text{ m}) = 1.92\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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

Radiated Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date November 29, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Shiro Kobayashi
(30 MHz -26.5 GHz)
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.	108.905	QP	49.03	11.76	7.26	32.15	0.00	35.90	43.50	7.6	290	168	
Hori.	112.214	QP	44.05	12.20	7.23	32.15	0.00	31.33	43.50	12.1	155	269	
Hori.	186.947	QP	44.37	16.18	7.84	32.09	0.00	36.30	43.50	7.2	169	317	
Hori.	191.872	QP	46.15	16.33	7.84	32.08	0.00	38.24	43.50	5.2	168	316	
Hori.	194.328	QP	45.07	16.45	7.85	32.08	0.00	37.29	43.50	6.2	171	318	
Hori.	199.256	QP	44.36	16.56	7.88	32.07	0.00	36.73	43.50	6.7	169	312	
Hori.	216.000	QP	49.93	11.13	8.15	32.05	0.00	37.16	43.50	6.3	152	239	
Hori.	270.002	QP	49.86	12.84	8.51	32.01	0.00	39.20	46.00	6.8	122	235	
Hori.	297.002	QP	46.38	13.65	8.69	32.01	0.00	36.71	46.00	9.2	111	304	
Hori.	351.003	QP	44.21	15.12	9.03	31.95	0.00	36.41	46.00	9.5	100	53	
Hori.	524.018	QP	38.25	17.67	9.72	31.98	0.00	33.66	46.00	12.3	100	5	
Hori.	2483.500	PK	44.85	27.65	14.35	39.46	2.10	49.49	73.90	24.4	127	56	
Hori.	3154.657	PK	52.90	28.82	5.87	39.32	2.10	50.37	73.90	23.5	165	198	
Hori.	4960.000	PK	44.66	31.54	6.46	39.50	2.10	45.26	73.90	28.6	127	48	
Hori.	7440.000	PK	45.28	37.10	8.37	39.42	2.10	53.43	73.90	20.4	126	165	
Hori.	9920.000	PK	42.72	38.97	9.17	39.30	2.10	53.66	73.90	20.2	150	0	
Hori.	2483.500	AV	33.69	27.65	14.35	39.46	2.10	38.33	53.90	15.5	127	56	
Hori.	3154.657	AV	50.27	28.82	5.87	39.32	2.10	47.74	53.90	6.1	165	198	
Hori.	4960.000	AV	33.95	31.54	6.46	39.50	2.10	34.55	53.90	19.3	127	48	
Hori.	7440.000	AV	34.34	37.10	8.37	39.42	2.10	42.49	53.90	11.4	126	165	
Hori.	9920.000	AV	30.92	38.97	9.17	39.30	2.10	41.86	53.90	12.0	150	0	
Vert.	54.449	QP	46.06	9.74	6.74	32.19	0.00	30.35	40.00	9.6	100	194	
Vert.	194.328	QP	40.61	16.45	7.85	32.08	0.00	32.83	43.50	10.6	100	185	
Vert.	216.000	QP	48.12	11.13	8.15	32.05	0.00	35.35	43.50	8.1	100	197	
Vert.	2295.051	PK	45.79	28.20	14.16	39.46	2.10	50.79	73.90	23.1	139	219	
Vert.	2483.500	PK	45.14	27.65	14.35	39.46	2.10	49.78	73.90	24.1	281	227	
Vert.	3154.657	PK	53.86	28.82	5.87	39.32	2.10	51.33	73.90	22.5	173	166	
Vert.	4960.000	PK	45.31	31.54	6.46	39.50	2.10	45.91	73.90	27.9	171	89	
Vert.	7440.000	PK	45.72	37.10	8.37	39.42	2.10	53.87	73.90	20.0	199	182	
Vert.	9920.000	PK	43.28	38.97	9.17	39.30	2.10	54.22	73.90	19.6	150	0	
Vert.	2295.051	AV	33.42	28.20	14.16	39.46	2.10	38.42	53.90	15.4	139	219	
Vert.	2483.500	AV	33.28	27.65	14.35	39.46	2.10	37.92	53.90	15.9	281	227	
Vert.	3154.657	AV	51.18	28.82	5.87	39.32	2.10	48.65	53.90	5.2	173	166	
Vert.	4960.000	AV	33.02	31.54	6.46	39.50	2.10	33.62	53.90	20.2	171	89	
Vert.	7440.000	AV	35.79	37.10	8.37	39.42	2.10	43.94	53.90	9.9	199	182	
Vert.	9920.000	AV	31.69	38.97	9.17	39.30	2.10	42.63	53.90	11.2	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.74 m / 3.0 m) = 1.92 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.

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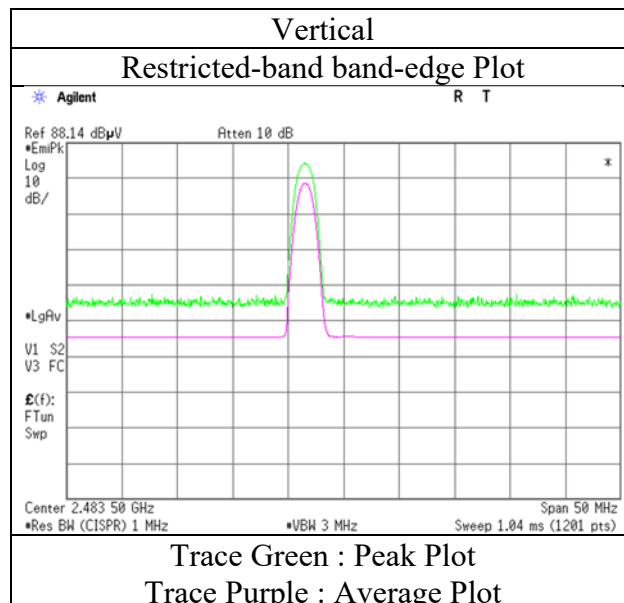
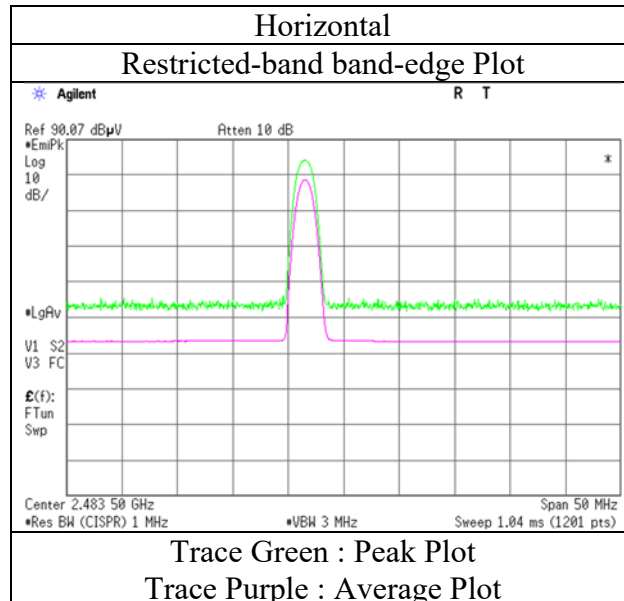
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Radiated Spurious Emission (Reference Plot for band-edge)

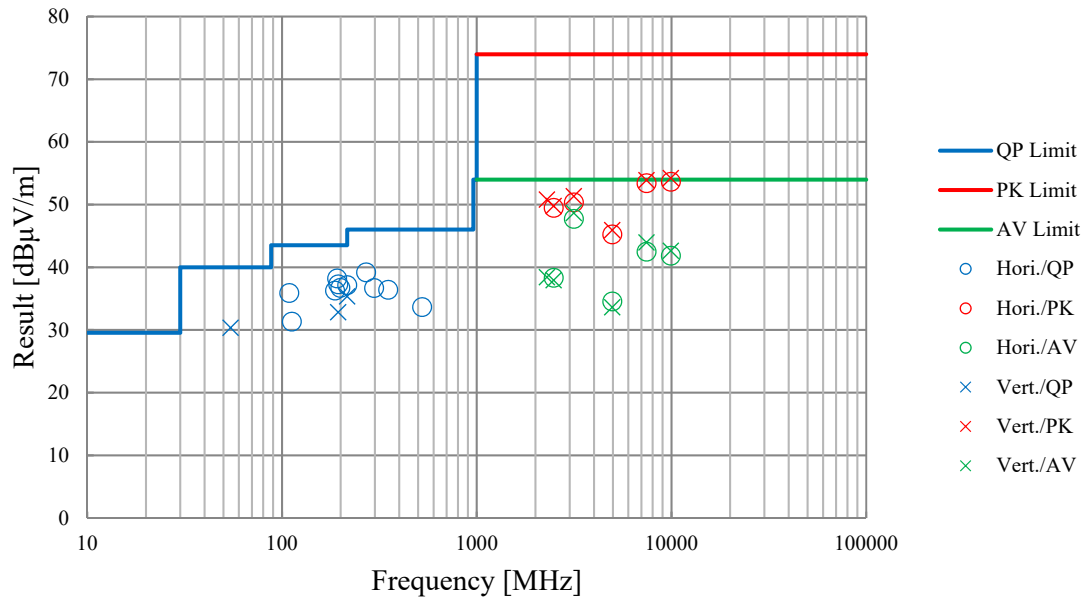
Report No.	12456503S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 29, 2018
Temperature / Humidity	24 deg. C / 35 % RH
Engineer	Shiro Kobayashi
	(30 MHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

Report No. 12456503S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date November 29, 2018
Temperature / Humidity 24 deg. C / 35 % RH
Engineer Shiro Kobayashi
(30 MHz ~26.5 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz

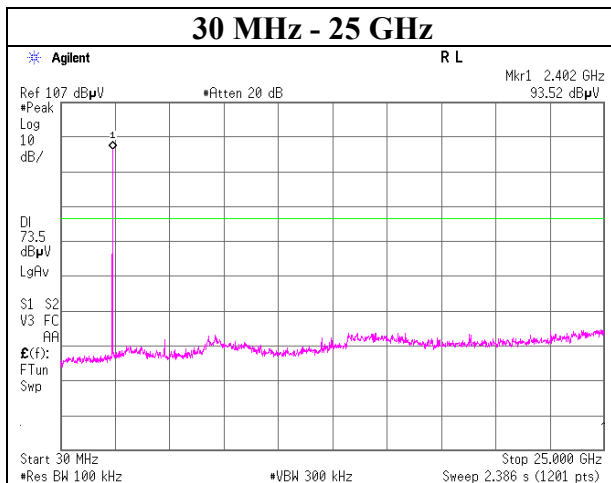
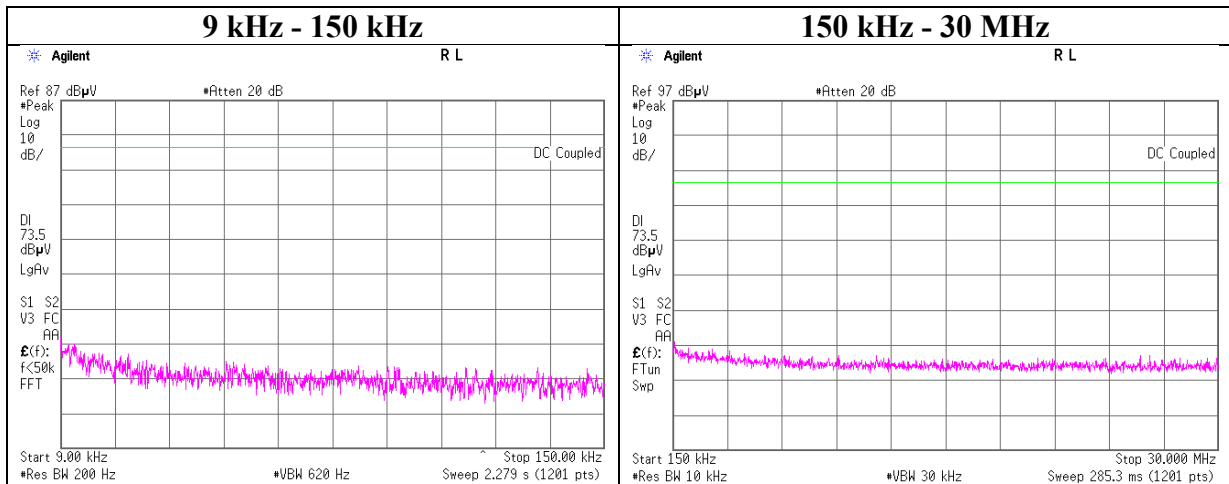


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, DH5

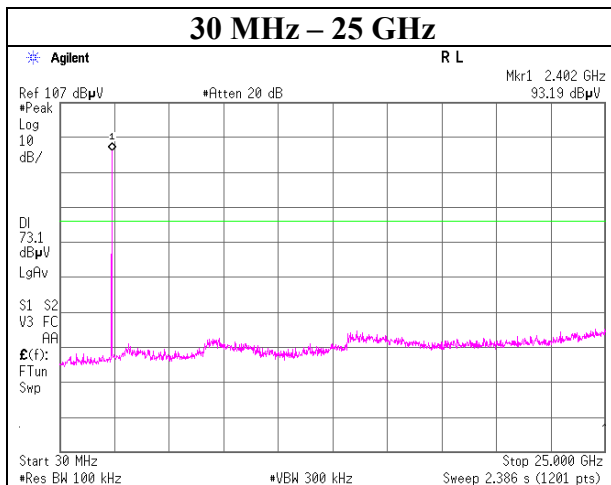
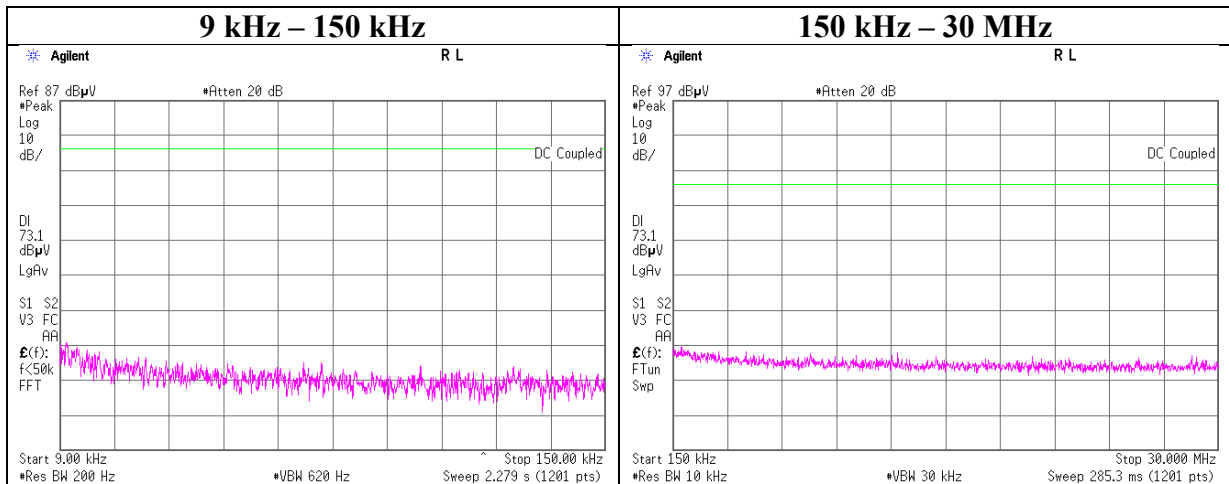
2402 MHz



Conducted Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room /
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5

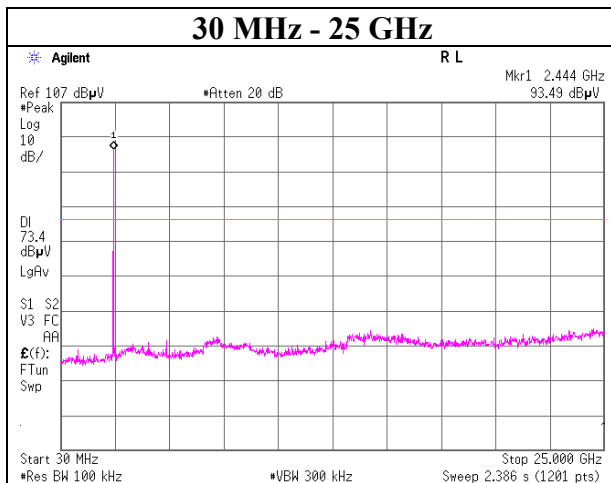
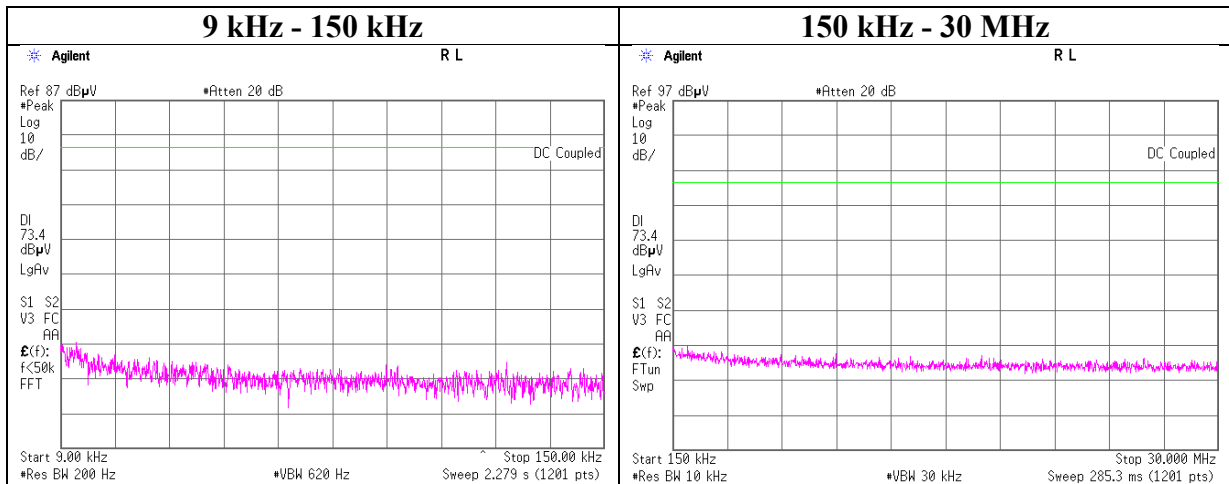
2402 MHz



Conducted Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5

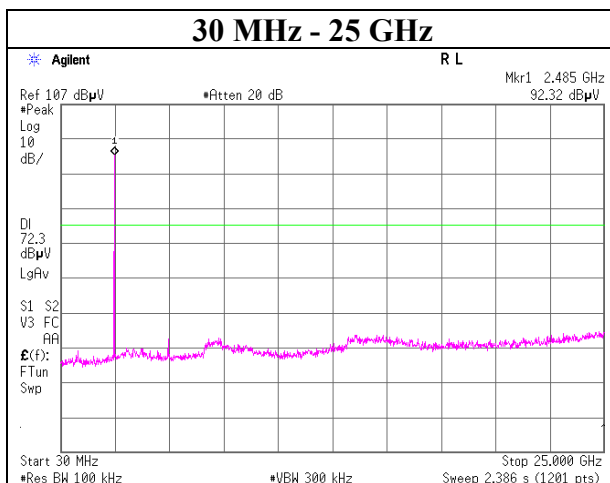
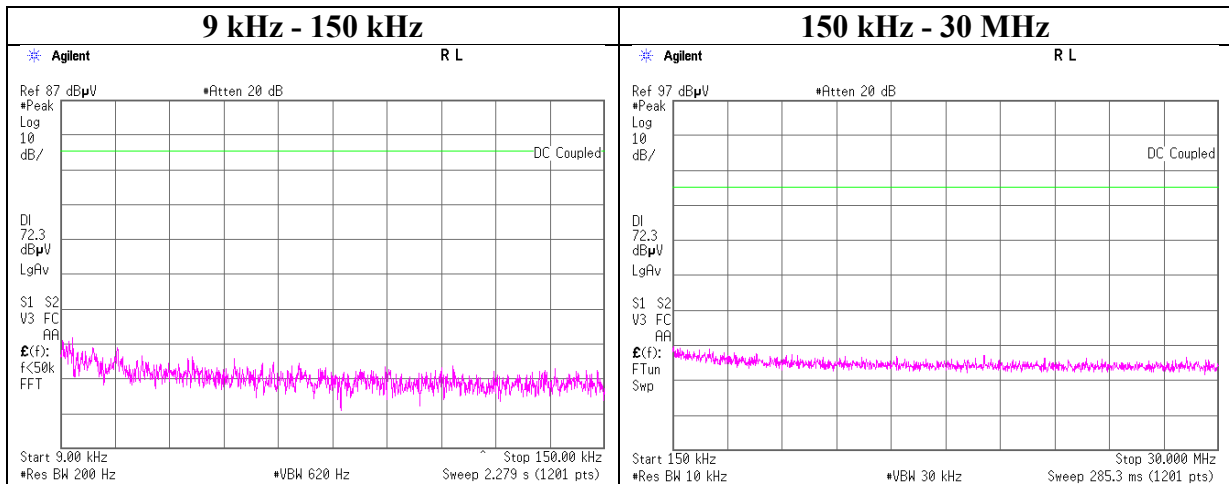
2441 MHz



Conducted Spurious Emission

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx, Hopping Off, 3DH5

2480 MHz



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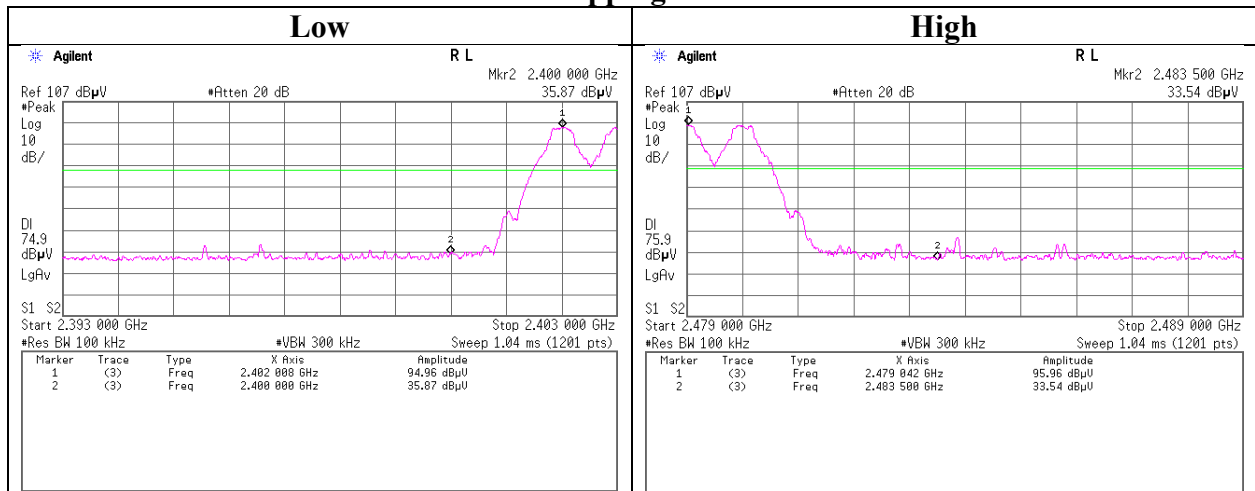
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

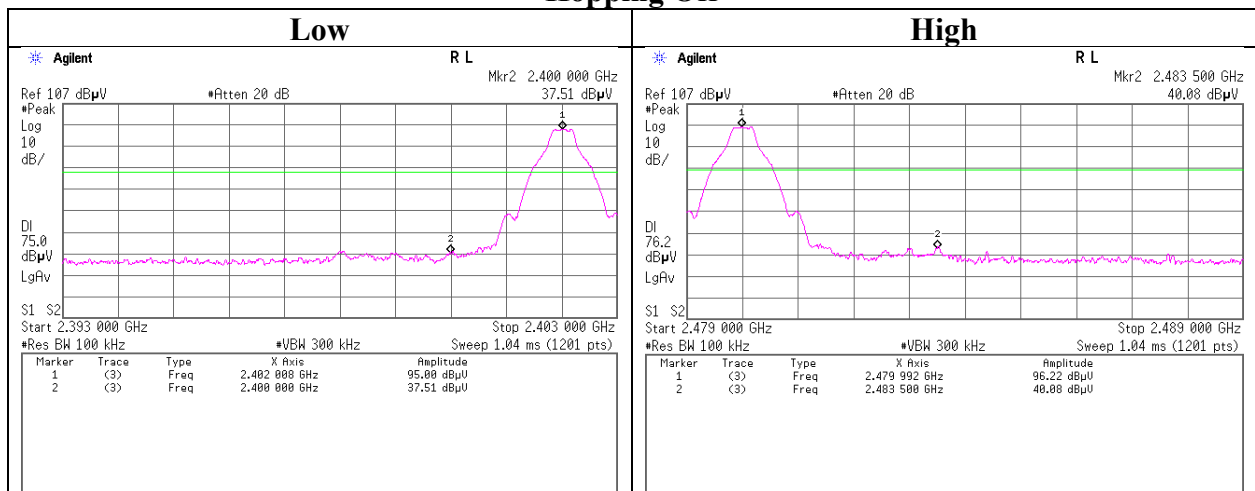
Conducted Emission Band Edge compliance

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx DH5

Hopping On



Hopping Off



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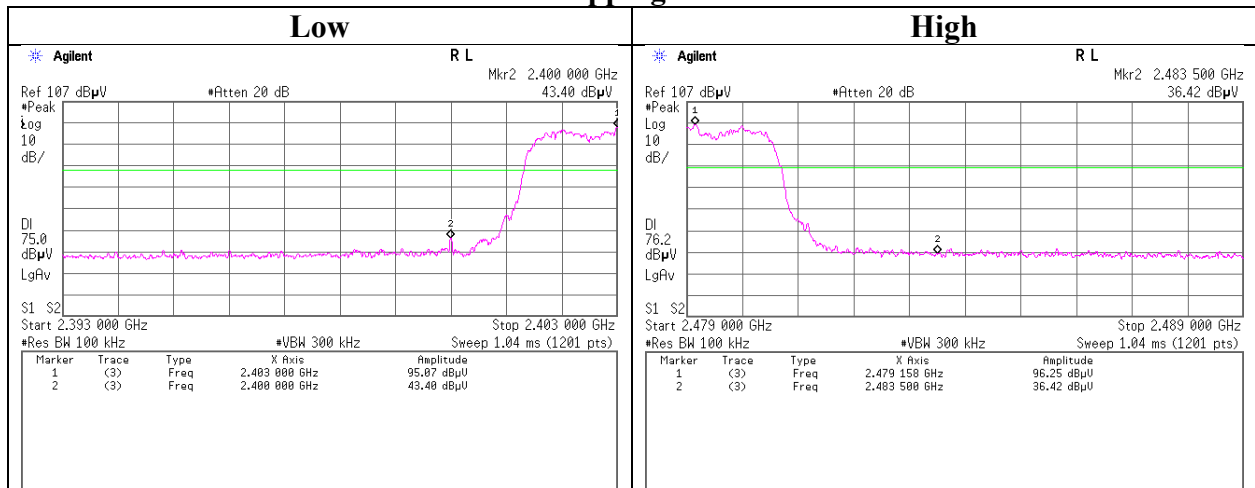
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

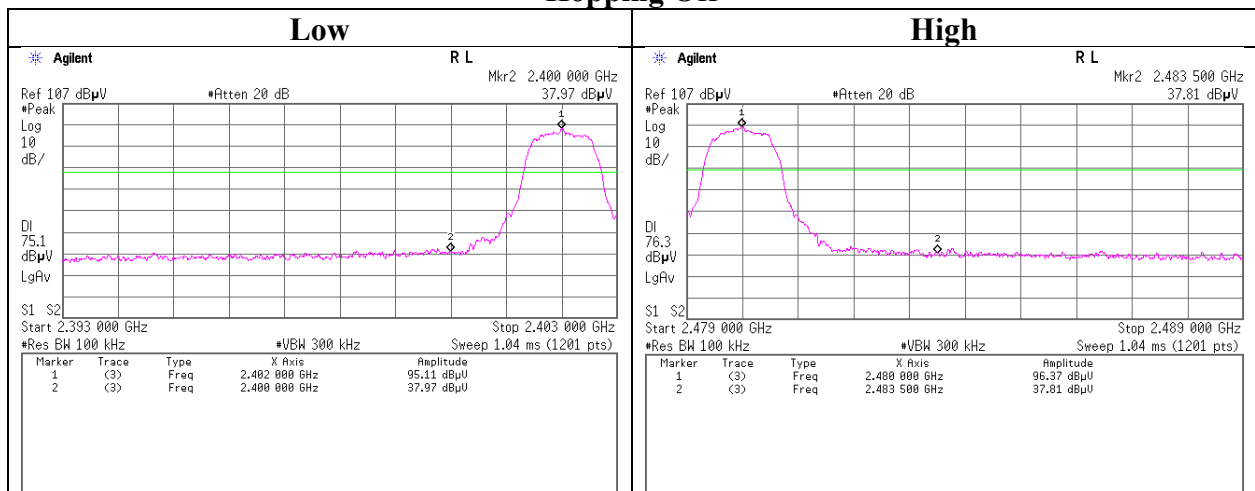
Conducted Emission Band Edge compliance

Report No. 12456503S-A-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 5, 2018
Temperature / Humidity 26 deg. C / 43 % RH
Engineer Makoto Hosaka
Mode Tx 3DH5

Hopping On



Hopping Off



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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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)
KTS-06	AT	145110	Digital Tester	SANWA	PC500	7019240	2018/3/5	2019/3/31	12
SAT10-12	AT	151609	Attenuator	Weinschel Corp.	54A-10	81601	2018/3/22	2019/3/31	12
SCC-G32	AT	145183	Coaxial Cable	Junkosha	MWX241-02000KMSK MS	OCT-09-13-005	2018/11/25	2019/11/30	12
SOS-09	AT	146318	Humidity Indicator	A&D	AD-5681	4061484	2017/12/21	2018/12/31	12
SPM-07	AT	146247	Power Meter	AGILENT	8990B	MY5100272	2018/7/13	2019/7/31	12
SPSS-04	AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2018/7/13	2019/7/31	12
SRENT-15	AT	160899	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46185516	2017/12/26	2018/12/31	12
COTS-SEMI-1	RE	144865	EMI Software	TSJ	TEPTO-DV(RE,CE,R FL,MF)	-	-	-	-
KJM-02	RE	146432	Measure	TAJIMA	GL19-55	-	-	-	-
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
SAEC-01(SVSWR)	RE	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2018/7/19	2019/7/31	12
SAEC-03(NSA)	RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2018/6/2	2019/6/30	12
SAEC-03(SVSWR)	RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2018/7/17	2019/7/31	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
SAF-06	RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2018/9/14	2019/9/30	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2018/3/27	2019/3/31	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
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	RE	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/TOYO	8D2W/12DSF A/141PE/141PE/141PE/141P	-/0901-271(RF Selector)	2018/4/9	2019/4/30	12
SCC-G05	RE	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2018/1/29	2019/1/31	12
SCC-G06	RE	145173	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	2018/6/1	2019/6/30	12
SCC-G22	RE	145180	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	2018/5/11	2019/5/31	12
SCC-G23	RE	145168	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	2018/5/11	2019/5/31	12
SCC-G33	RE	145184	Coaxial Cable	Junkosha	MWX241-01000KMSK MS	-	2018/4/20	2019/4/30	12
SCC-G40	RE	166491	Coaxial Cable	Junkosha	MWX221-01000NFSN MS/B	1612S005	2018/1/29	2019/1/31	12

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Test Instruments [2/2]

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSN MS/B	1612S006	2018/1/29	2019/1/31	12
SCC-G45	RE	168301	Coaxial Cable	HUBER+SUNER	SUCOFLEX 102 E	800137/2E A	2018/3/28	2019/3/31	12
SFL-02	RE	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2018/11/16	2019/11/30	12
SHA-01	RE	145383	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	2018/7/23	2019/7/31	12
SHA-03	RE	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2018/7/23	2019/7/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	Sep-60	LM3640	2018/7/23	2019/7/31	12
SLA-07	RE	145529	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	2018/6/17	2019/6/30	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-05	RE	146293	Humidity Indicator	A&D	AD-5681	4062518	2018/10/25	2019/10/31	12
SSA-02	RE	145800	Spectrum Analyzer	AGILENT	E4448A	MY48250106	2018/3/5	2019/3/31	12
STR-01	RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2018/4/13	2019/4/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2018/10/16	2019/10/31	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: RE: Radiated Emission test
AT: Antenna Terminal Conducted test