



RADIO TEST REPORT

Test Report No. : 11334871S-K

Applicant : Nintendo Co., Ltd.
Type of Equipment : EDEV
Model No. : HAT-002
(for Bluetooth part)
FCC ID : BKEHAT002
Test regulation : FCC Part 15 Subpart C: 2016
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: October 17 to November 11, 2016

Representative test engineer:

K. Takayama

Kazutaka Takeyama

Engineer

Consumer Technology Division

Approved by:

A. Hayashi

Akio Hayashi

Leader

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".

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

13-EM-F0429

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SECTION 1: Customer information

Company Name : Nintendo Co., Ltd.
Address : 11-1 Hokotate-cho, Kamitoba, Minami-ku, Kyoto 601-8501, Japan
Telephone Number : +81-75-662-9600
Facsimile Number : +81-75-662-9624
Contact Person : Kazuya Kuramoto

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

2.1 Identification of E.U.T.

Type of Equipment : EDEV
Model No. : HAT-002
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.7 V (battery),
AC Adapter input: AC 100 – 240 V, 50 / 60 Hz, 1 A,
AC Adapter output: DC 5 V – DC 15 V, 2.6 A
Receipt Date of Sample : September 3, 2016
Country of Mass-production : China
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: HAT-002 (referred to as the EUT in this report) is an EDEV.

The EUT is intended to be used for software development or events.

General Specification

Clock frequency(ies) in the system : 37.4 MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : Wireless LAN part: 2412 MHz - 2472 MHz,
W52: 5180 MHz - 5240 MHz,
W53: 5260 MHz - 5320 MHz,
Bluetooth part: 2402 MHz - 2480 MHz
Modulation : Wireless LAN part:
2.4 GHz bands: DBPSK, DQPSK, CCK, OFDM
5 GHz bands: OFDM
Bluetooth part:
BDR (Basic Data Rate): GFSK
EDR (Enhanced Data Rate): $\pi/4$ -DQPSK, 8DPSK
LE (Low Energy mode): GFSK
Antenna type : PCB Antenna (Dipole)
Antenna connector : (Ant: 0): MHF 4L, (Ant: 1): MHF II
Antenna Gain : 2.4 GHz band:
-0.70 dBi max (ANT0: Wireless LAN & Bluetooth), -8.38 dBi max (ANT1: Wireless LAN)
5 GHz band:
+3.31 dBi max (ANT0: Wireless LAN), -0.96 dBi max (ANT1: Wireless LAN)
Operation temperature : +5 deg.C to +35 deg.C

Remarks: This Wireless Module consists of 1 chip each of 5 GHz band and 2.4 GHz band.

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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

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on November 14, 2016 and effective December 14, 2016
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* The revision on November 14, 2016, does not affect the test specification applied to the EUT.

** The EUT has been tested for compliance with FCC Part 15 Subpart B / ICES-003 Issue 6: 2016.

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	9.2 dB, AV, (0.47180 MHz, N Tx 2480 MHz, 3-DH5)	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (2)	See data.	Complied	Conducted
20 dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (1)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(1),(b)(1) IC: RSS-247 5.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10		7.5 dB (215.989 MHz, QP, Hori. Tx 2402 MHz, DH5)	Complied
99 % Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	Complied	Conducted

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

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

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

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V) constantly to RF Part regardless of input voltage. 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 EUT complies with the requirement.

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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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

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

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k = 2$.
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Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

Conducted Emission test

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

Radiated emission test

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

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

3.5 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	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

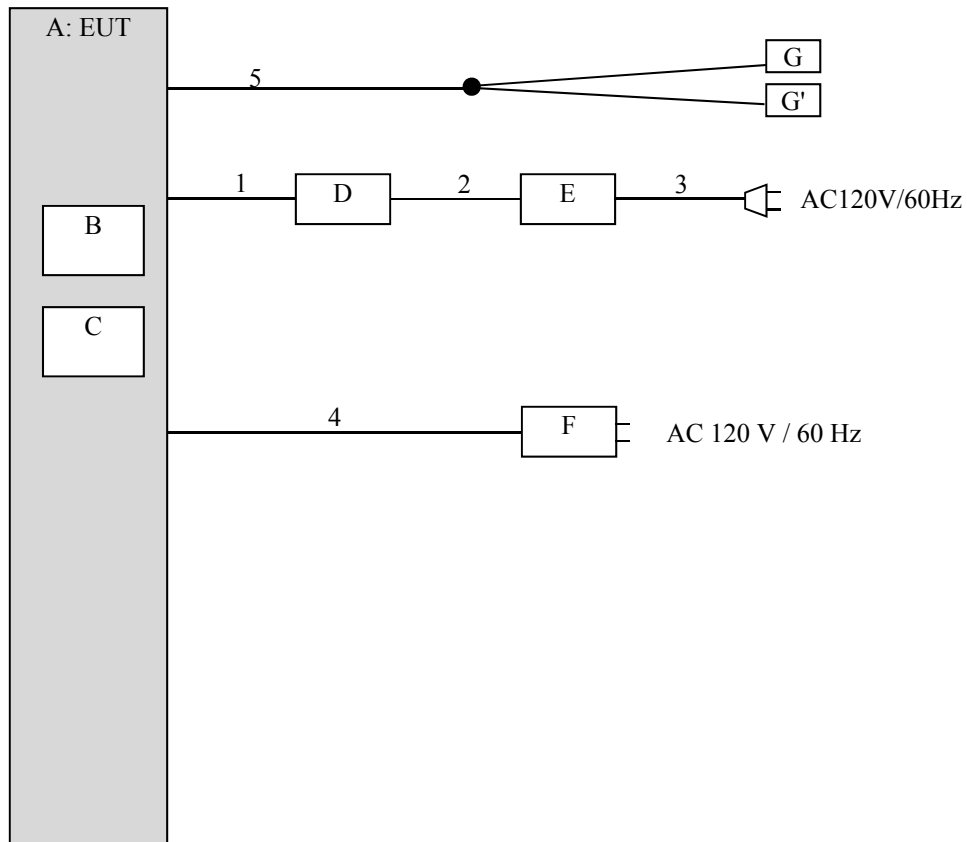
4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20 dB 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
<p>*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)</p> <p>* 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.</p> <p>* 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.</p> <p>*EUT has the power settings by the software as follows; Power settings: Fixed Software: cmd.exe, Ver. 6.3.9600.17415, Bluetool.exe, Ver.1.9.3.0</p> <p>*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.</p>		

4.2 Configuration and peripherals



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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	EDEV	HAT-002	XAW0150000359 *1) XAW0150000723 *2)	Nintendo	EUT
B	Game Card	HAC-008	001	Nintendo	-
C	Micro SD Memory	RP-SMEB08GJK	UJ3AA005855	Panasonic	-
D	Laptop PC	HP EliteBook 820G1	JPA416GD4K	hp	-
E	AC Adapter	HSTNN-LA35	WCWVT0A1R5SORI	hp	-
F	AC Adapter	HAC-002	-	Nintendo	-
G, G'	Headphone	-	-	Nintendo	-

*1) Used for Antenna Terminal conducted test (Type A).

*2) Used for Conducted Emission test and Radiated Emission test (Type B).

* The EUT for final test was selected based on following preliminary test.

- Radiated Emission: Comparison of Type A and Type B on Band Edges, Harmonics and Spurious emission.
- Conducted Emission: Comparison of Type A and Type B on representative mode.
- Antenna Terminal Conducted test: Comparison of Type A and Type B on Output Power

Accessory and model differences

The difference between Type A and Type B is as following table.

The two crystals are compatible and are electrically identical having same radio parameters.

Parts	Manufacturer	
	Type A	Type B
Crystal (X501)	TXC	DAISHINKU

So, for the all tests, the EUT was selected worse type by preliminary tests.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB	1.8	Shielded	Shielded	-
2	DC	1.8	Unshielded	Unshielded	-
3	AC	0.9	Unshielded	Unshielded	-
4	USB	1.8	Shielded	Shielded	-
5	Headphone	0.5 + 0.3	Unshielded	Unshielded	-

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

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Facsimile : +81 463 50 6401

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via AC adapter in a Shielded room.

The EUT via AC adapter was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector : QP and CISPR AV
Measurement range : 0.15 MHz - 30 MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3.9 m*2) (1 GHz – 13 GHz), 1 m (13 GHz – 26 GHz)		3.9 m*2) (1 GHz – 13 GHz), 1 m (13 GHz – 26 GHz)

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

*2) Distance Factor: $20 \times \log(3.9 \text{ m}/3.0 \text{ m}) = 2.28 \text{ dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (Below 1 GHz)	Spurious (1 GHz – 2.8 GHz)	Spurious (2.8 GHz - 13 GHz)	Spurious (Above 13 GHz)
Horizontal	X	X	X	X	X
Vertical	Y	X	Y	Y	X

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

Measurement range : 30 MHz - 26 GHz
Test data : APPENDIX
Test result : Pass

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

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20 dB 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	Sample	Max Hold *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	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 *2)	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 %. *2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz) *3) Reference data							

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

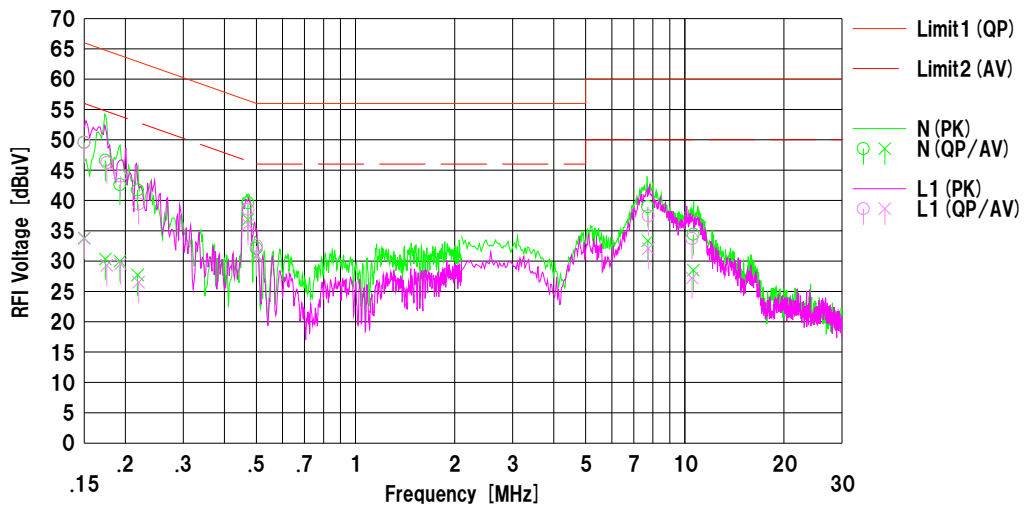
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Date : 2016/11/10

Mode : Tx DH5 2480 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 20 deg.C / 30 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Kazutaka Takeyama

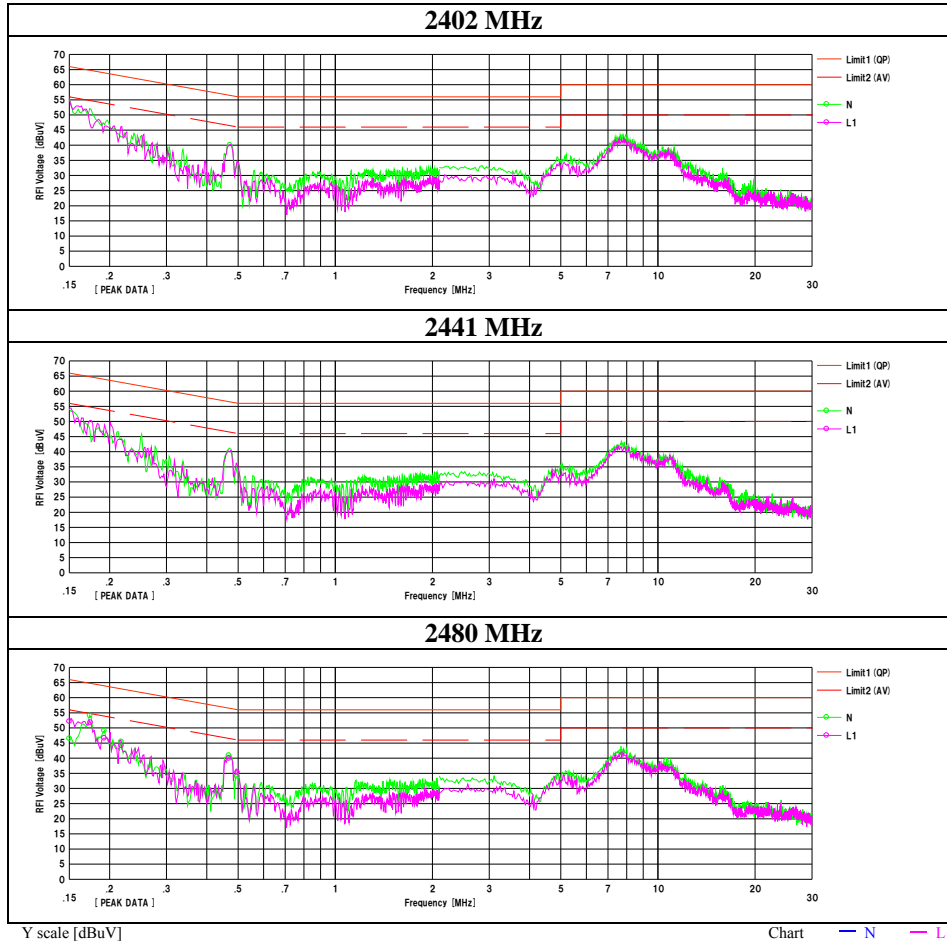


No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	37.10	21.30	12.51	49.61	33.81	66.00	56.00	16.3	22.1	N	
2	0.17392	34.10	17.80	12.52	46.62	30.32	64.77	54.77	18.1	24.4	N	
3	0.19260	30.10	17.50	12.51	42.61	30.01	63.92	53.92	21.3	23.9	N	
4	0.21792	29.20	15.20	12.52	41.72	27.72	62.90	52.90	21.1	25.1	N	
5	0.47120	27.10	24.30	12.54	39.64	36.84	56.49	46.49	16.8	9.6	N	
6	0.50012	19.60	18.30	12.54	32.14	30.84	56.00	46.00	23.8	15.1	N	
7	7.71800	25.60	20.00	13.37	38.97	33.37	60.00	50.00	21.0	16.6	N	
8	10.60931	20.70	14.80	13.72	34.42	28.52	60.00	50.00	25.5	21.4	N	
9	0.15000	37.00	21.20	12.51	49.51	33.71	66.00	56.00	16.4	22.2	L1	
10	0.17564	33.70	16.80	12.52	46.22	29.32	64.69	54.69	18.4	25.3	L1	
11	0.19340	31.50	17.00	12.51	44.01	29.51	63.89	53.89	19.8	24.3	L1	
12	0.21940	26.90	14.00	12.52	39.42	26.52	62.84	52.84	23.4	26.3	L1	
13	0.47160	26.00	23.50	12.54	38.54	36.04	56.49	46.49	17.9	10.4	L1	
14	0.50050	20.00	18.50	12.54	32.54	31.04	56.00	46.00	23.4	14.9	L1	
15	7.74770	24.10	18.70	13.37	37.47	32.07	60.00	50.00	22.5	17.9	L1	
16	10.51660	20.00	13.50	13.71	33.71	27.21	60.00	50.00	26.2	22.7	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-02

Conducted Emission

Test place	Shonan EMC Lab. No.3 Shielded Room
Report No.	11334871S-K
Date	November 10, 2016
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Kazutaka Takeyama
Mode	Tx, Hopping Off, DH5



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

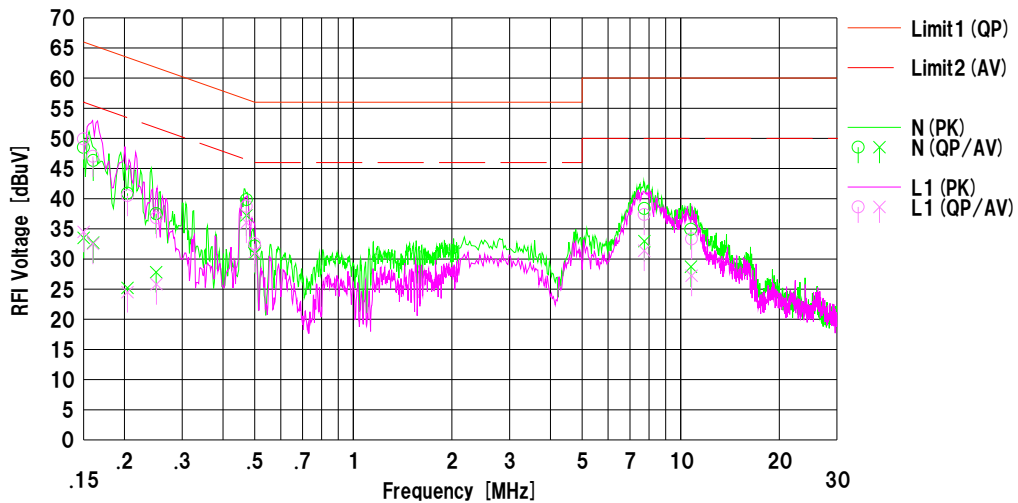
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2016/11/10

Mode : Tx 3-DH5 2480 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 20 deg.C / 30 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Kazutaka Takeyama

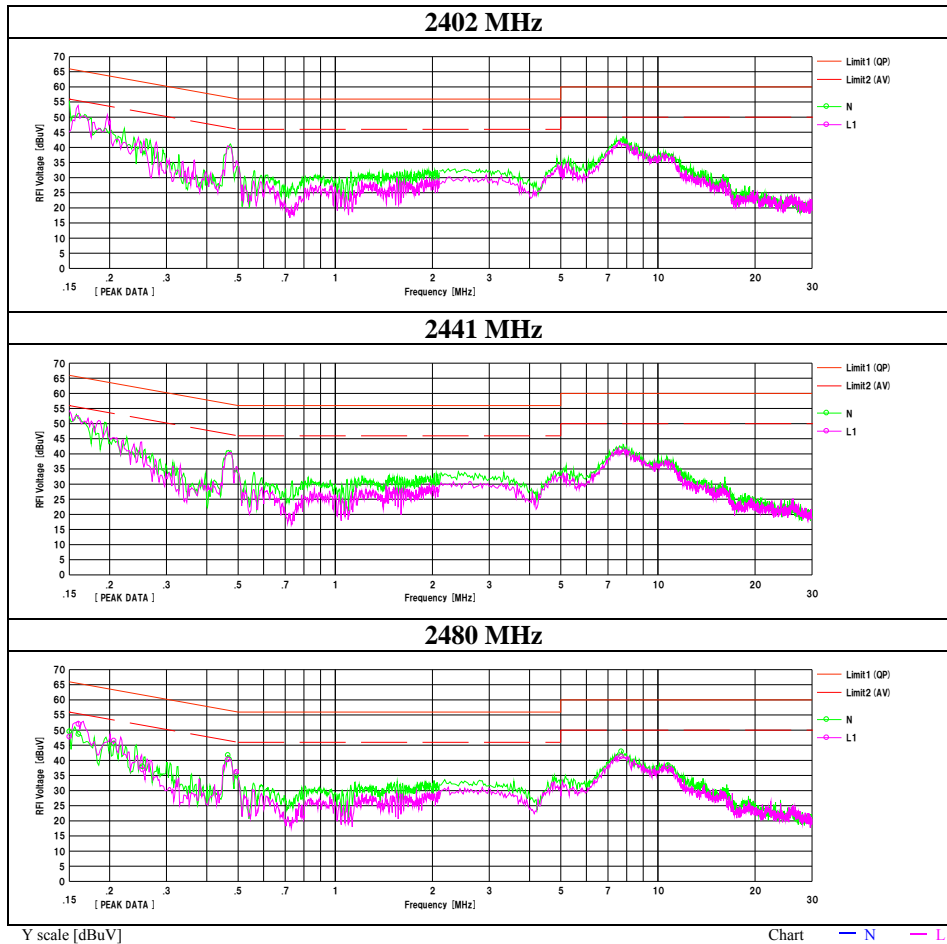


No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	36.00	21.00	12.51	48.51	33.51	66.00	56.00	17.4	22.4	N	
2	0.16055	33.80	20.20	12.52	46.32	32.72	65.44	55.44	19.1	22.7	N	
3	0.20440	28.40	12.70	12.51	40.91	25.21	63.43	53.43	22.5	28.2	N	
4	0.24990	25.00	15.30	12.53	37.53	27.83	61.76	51.76	24.2	23.9	N	
5	0.47180	27.30	24.70	12.54	39.84	37.24	56.48	46.48	16.6	9.2	N	
6	0.50010	19.60	18.40	12.54	32.14	30.94	56.00	46.00	23.8	15.0	N	
7	7.74100	25.00	19.60	13.37	38.37	32.97	60.00	50.00	21.6	17.0	N	
8	10.74813	21.20	15.00	13.73	34.93	28.73	60.00	50.00	25.0	21.2	N	
9	0.15000	37.40	22.00	12.51	49.91	34.51	66.00	56.00	16.0	21.4	L1	
10	0.16020	34.50	20.00	12.52	47.02	32.52	65.45	55.45	18.4	22.9	L1	
11	0.20430	28.00	12.00	12.51	40.51	24.51	63.43	53.43	22.9	28.9	L1	
12	0.25030	24.30	13.30	12.53	36.83	25.83	61.75	51.75	24.9	25.9	L1	
13	0.47130	26.20	23.50	12.54	38.74	36.04	56.49	46.49	17.7	10.4	L1	
14	0.49980	20.00	18.60	12.54	32.54	31.14	56.00	46.00	23.4	14.8	L1	
15	7.73561	24.00	18.00	13.37	37.37	31.37	60.00	50.00	22.6	18.6	L1	
16	10.79600	19.60	13.50	13.73	33.33	27.23	60.00	50.00	26.6	22.7	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-02

Conducted Emission

Test place	Shonan EMC Lab. No.3 Shielded Room
Report No.	11334871S-K
Date	November 10, 2016
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Kazutaka Takeyama
Mode	Tx, Hopping Off, 3DH5



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20 dB Bandwidth and Carrier Frequency Separation

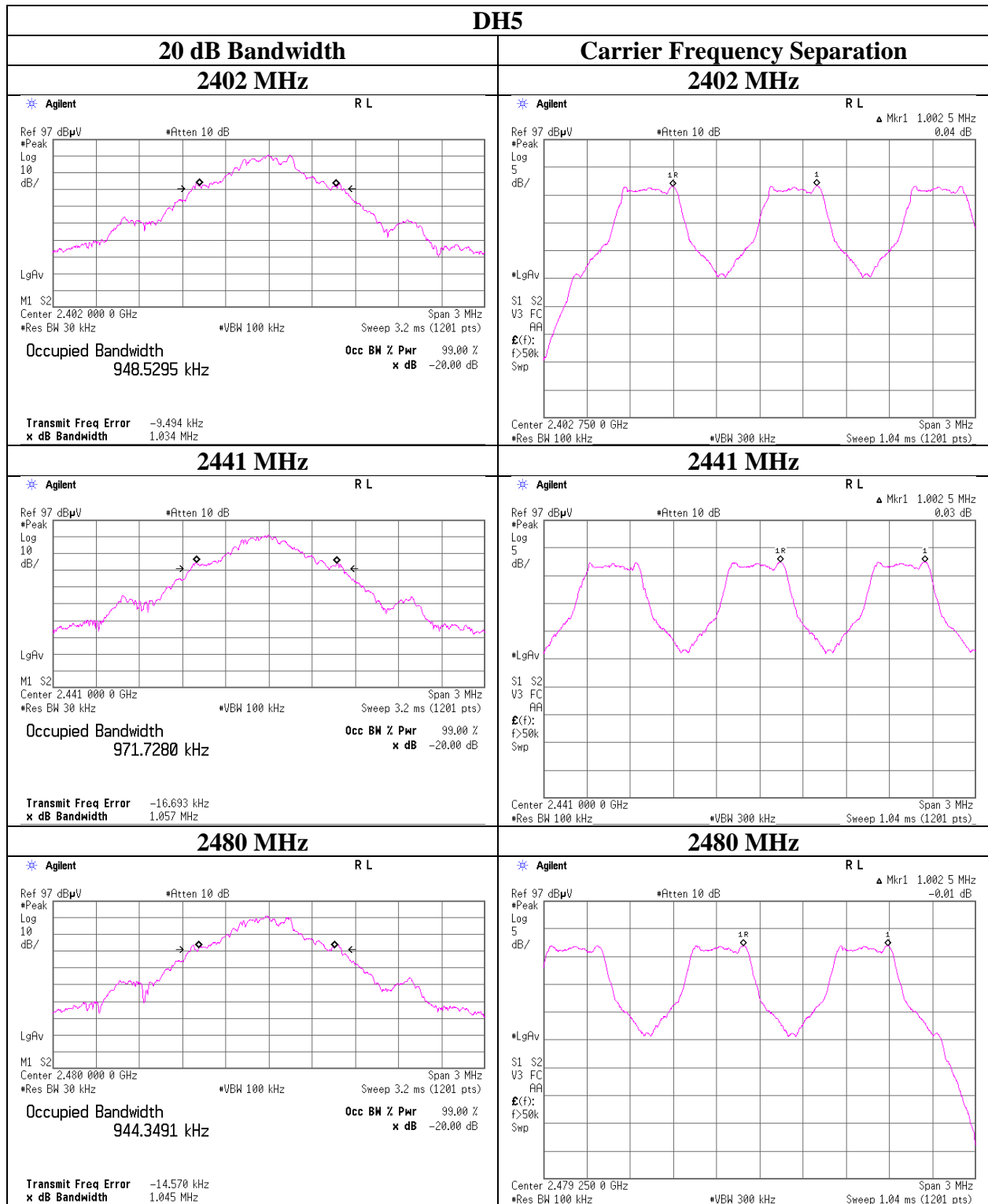
Test place Shonan EMC Lab. No.1 Measurement Room
Report No. 11334871S-K
Date November 11, 2016
Temperature / Humidity 25 deg. C / 33 % RH
Engineer Hikaru Shirasawa
Mode Tx, Hopping Off, On

Mode	Freq. [MHz]	20 dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	1.034	1.003	≥ 0.689
DH5	2441.0	1.057	1.003	≥ 0.704
DH5	2480.0	1.045	1.003	≥ 0.697
3DH5	2402.0	1.311	1.003	≥ 0.874
3DH5	2441.0	1.314	1.003	≥ 0.876
3DH5	2480.0	1.315	1.003	≥ 0.877

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

No limit applies to 20 dB Bandwidth.

20 dB Bandwidth and Carrier Frequency Separation



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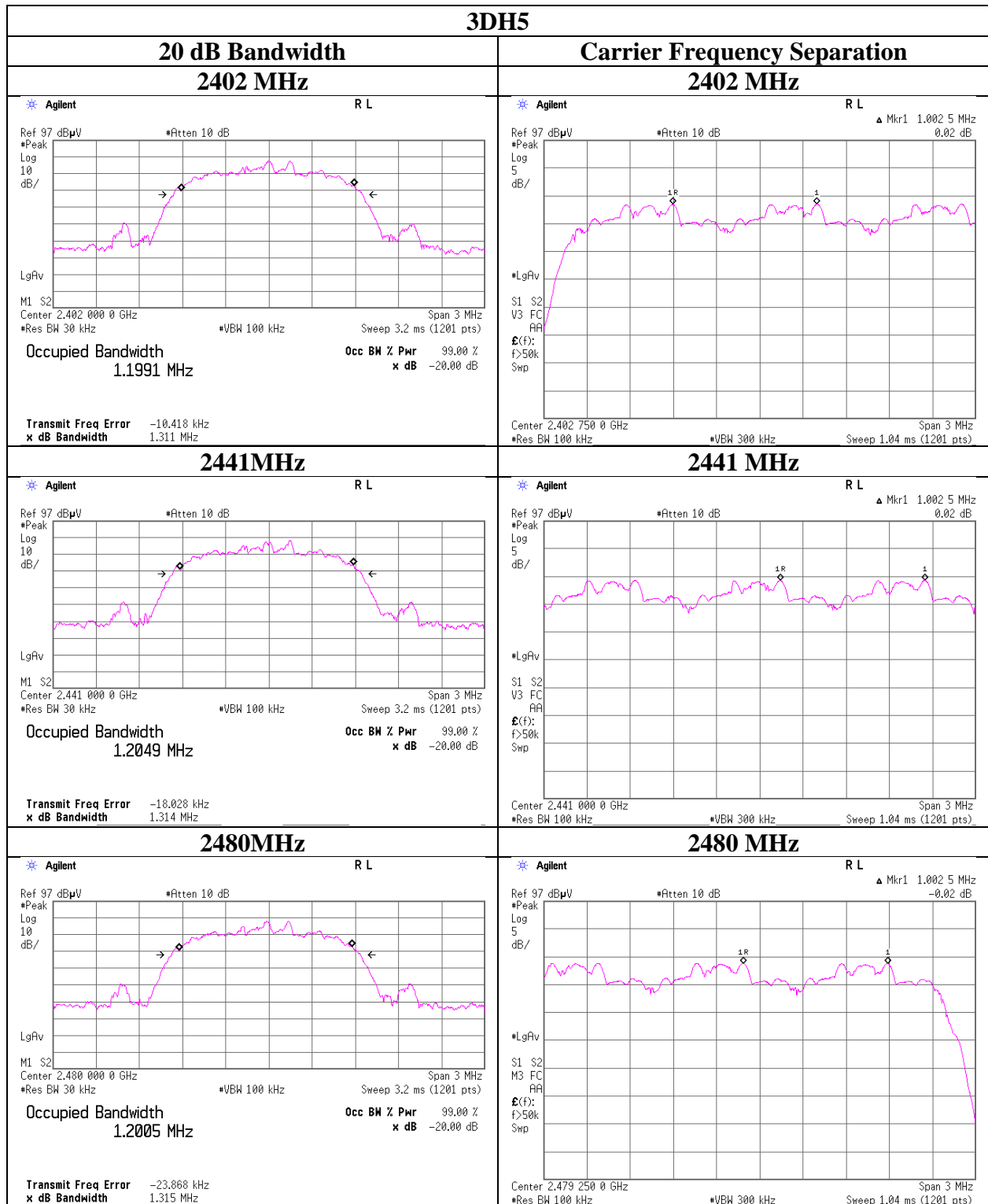
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Facsimile : +81 463 50 6401

20 dB Bandwidth and Carrier Frequency Separation



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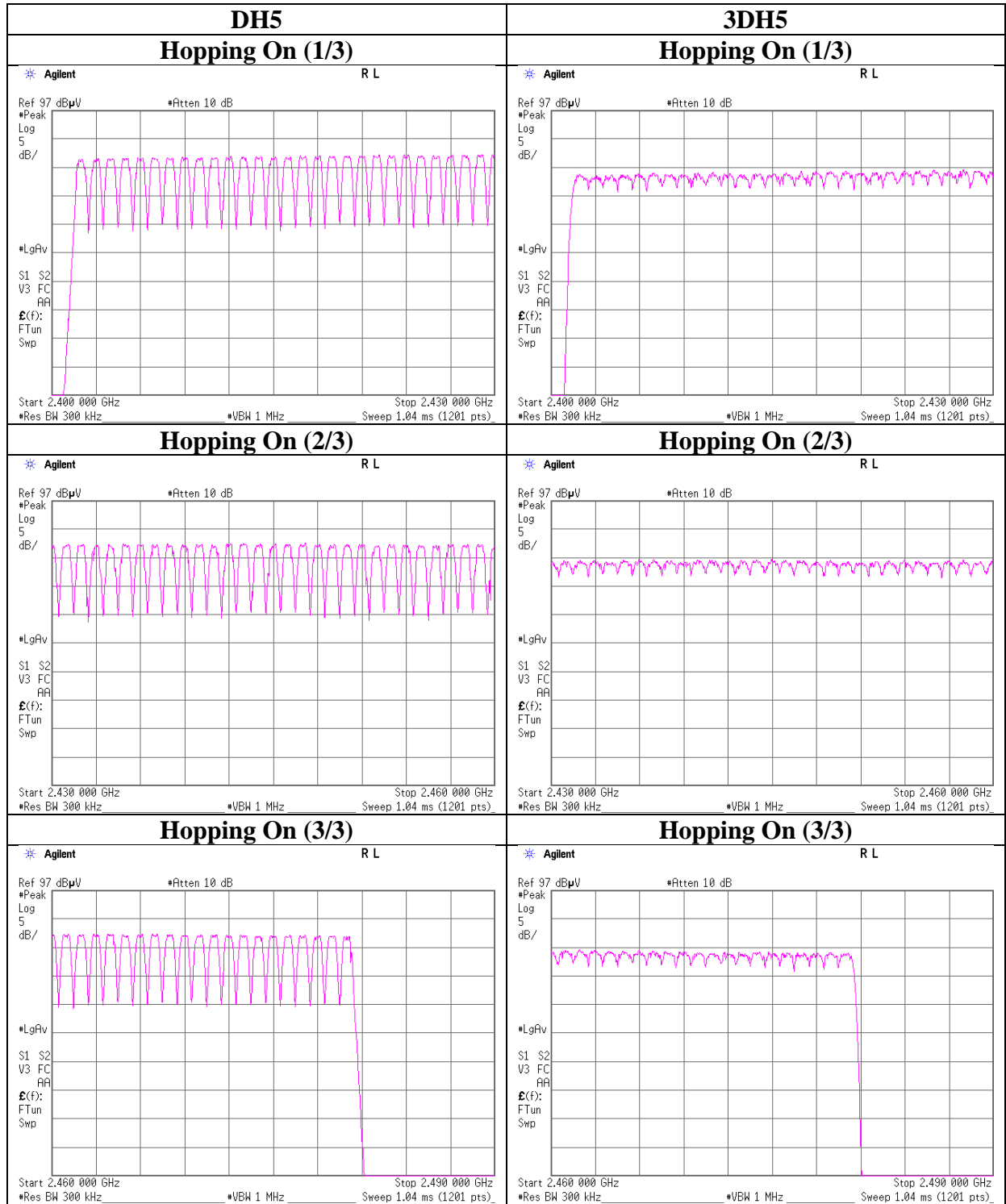
Number of Hopping Frequency

Test place Shonan EMC Lab. No.1 Measurement Room
Report No. 11334871S-K
Date November 11, 2016
Temperature / Humidity 25 deg. C / 33 % RH
Engineer Hikaru Shirasawa
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



Dwell time

Test place : Shonan EMC Lab. No.1 Measurement Room
Report No. : 11334871S-K
Date : November 11, 2016
Temperature / Humidity : 25 deg. C / 33 % RH
Engineer : Hikaru Shirasawa
Mode : Tx, Hopping On

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) s period		Length of transmission [ms]	Result [ms]	Limit [ms]
DH1	49.4 times / 5 s x	31.6 s = 313 times	0.421	132	400
DH3	24.4 times / 5 s x	31.6 s = 155 times	1.678	260	400
DH5	18.4 times / 5 s x	31.6 s = 117 times	2.926	342	400
3DH1	50.4 times / 5 s x	31.6 s = 319 times	0.427	136	400
3DH3	28.0 times / 5 s x	31.6 s = 177 times	1.679	297	400
3DH5	19.2 times / 5 s x	31.6 s = 122 times	2.932	358	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

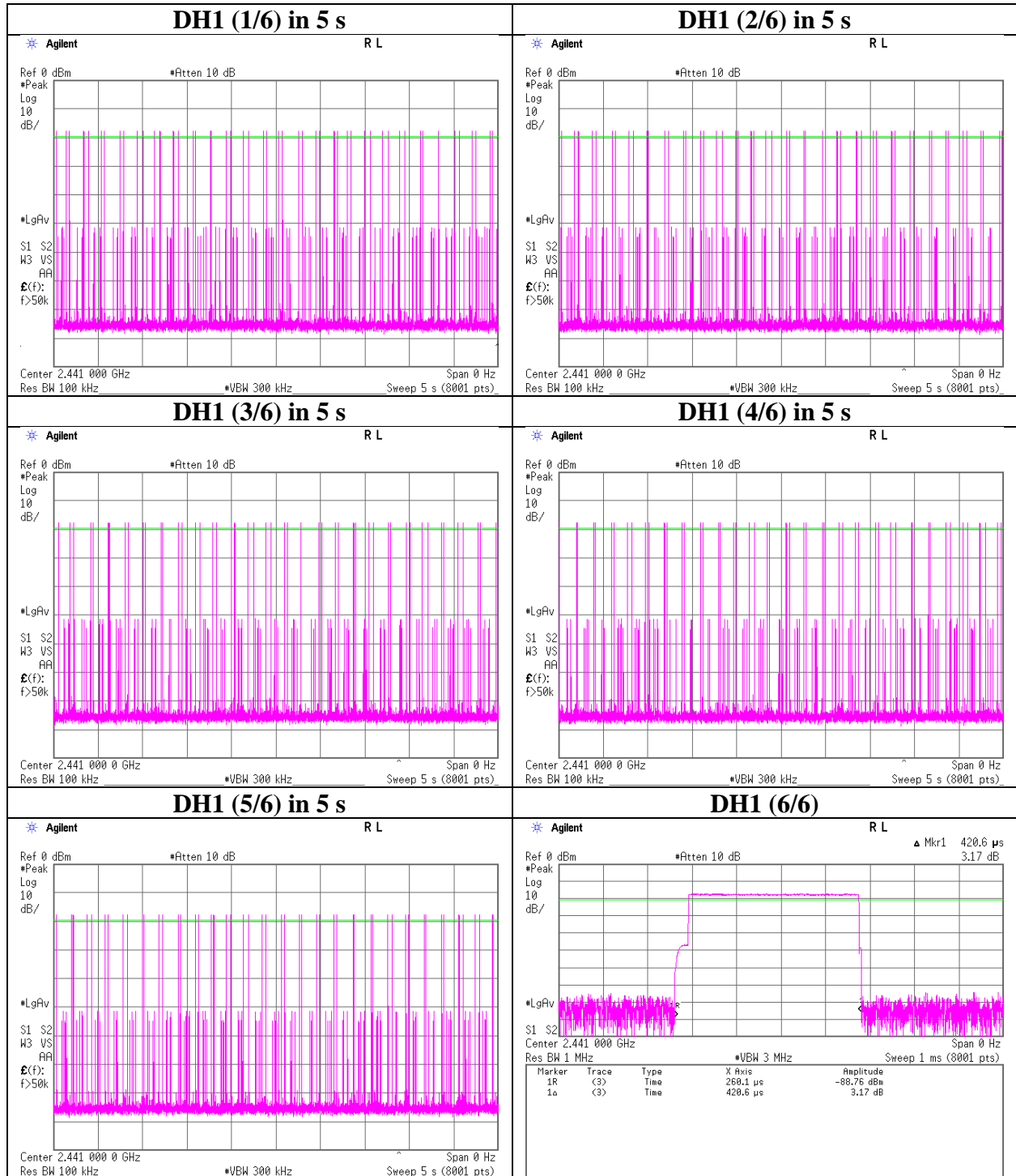
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	49	51	49	49	49	49.4
DH3	23	25	19	27	28	24.4
DH5	22	18	16	17	19	18.4
3DH1	50	51	51	50	50	50.4
3DH3	30	29	27	27	27	28.0
3DH5	19	20	24	12	21	19.2

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

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

Dwell time



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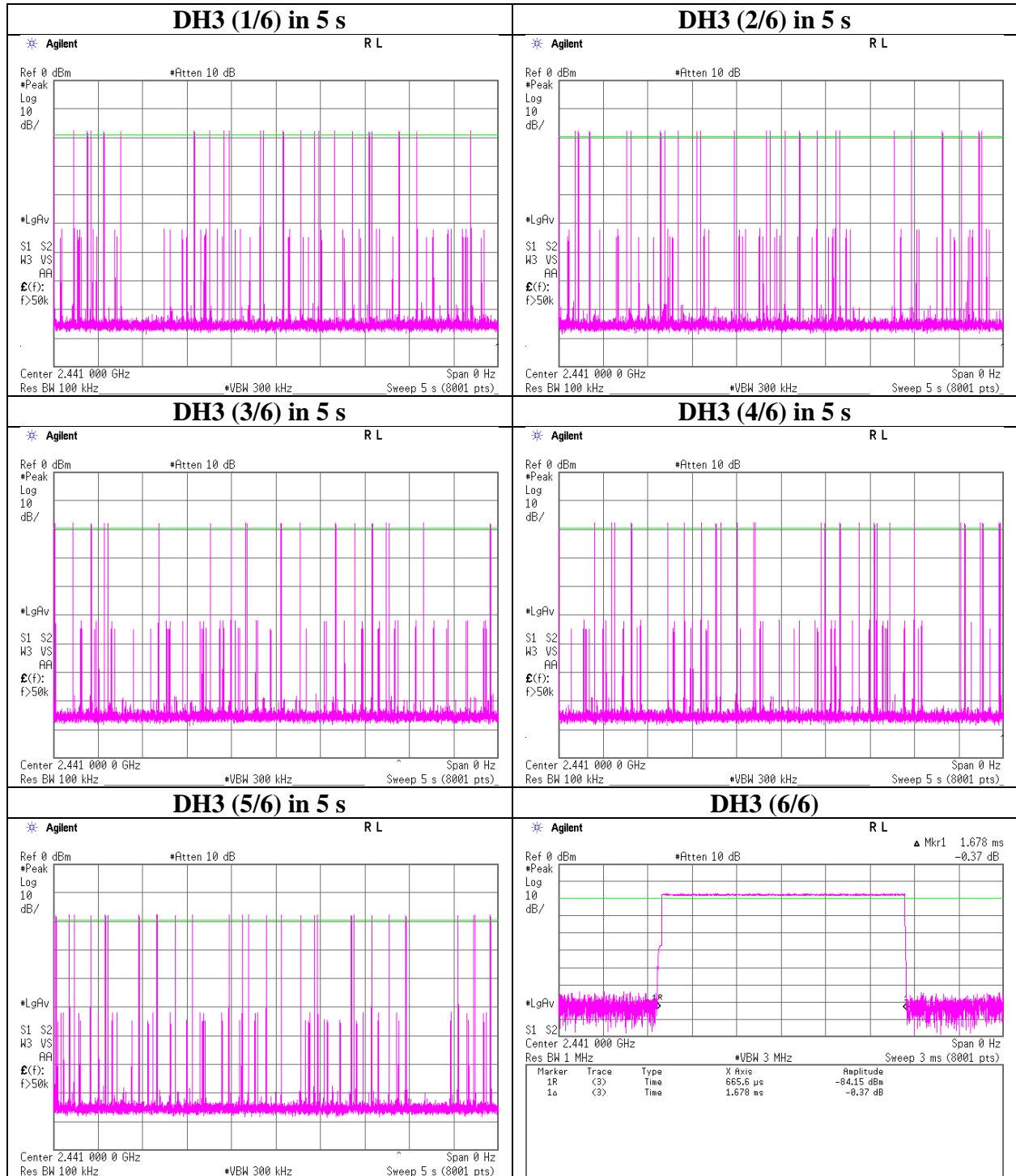
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Facsimile : +81 463 50 6401

Dwell time



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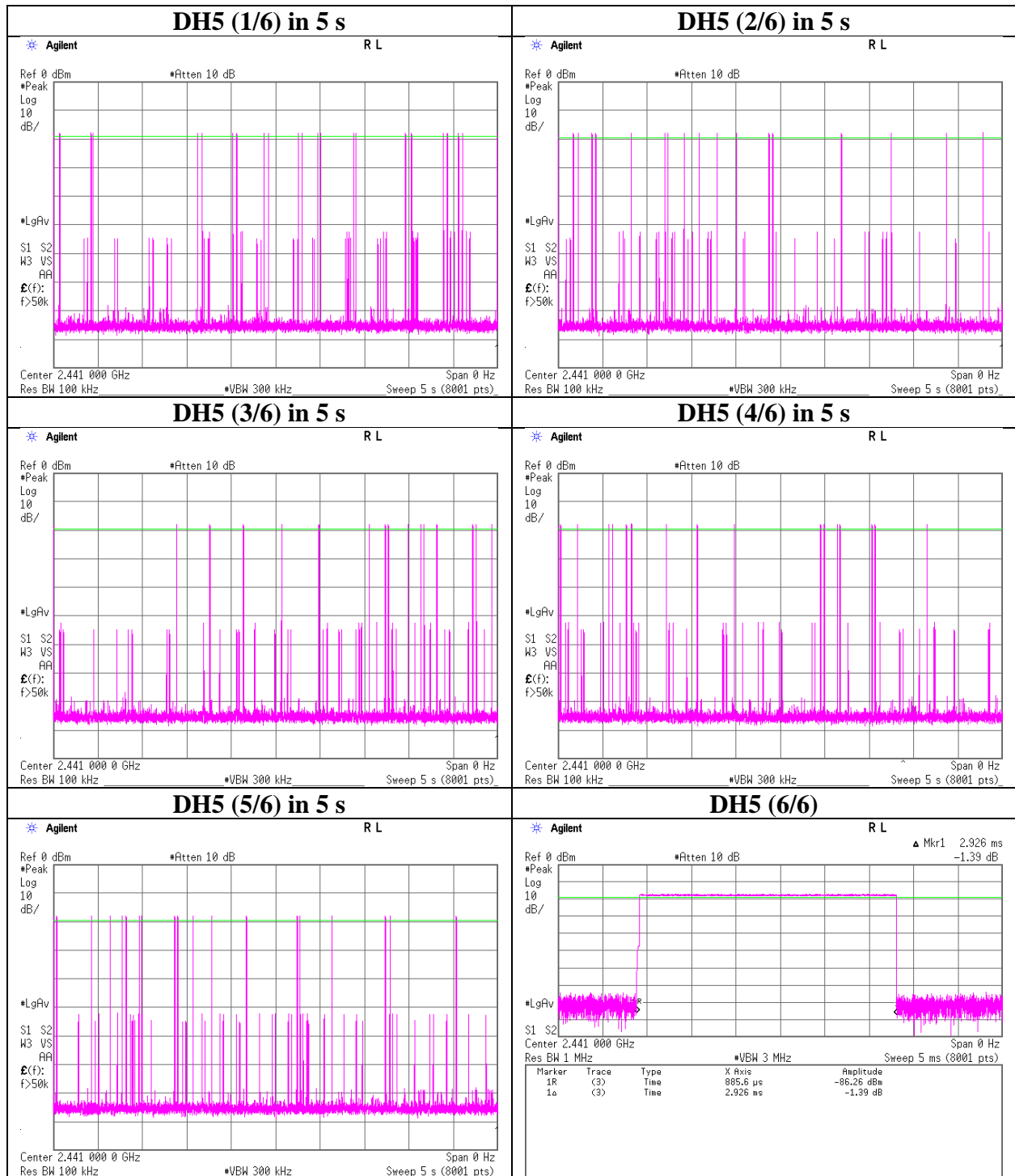
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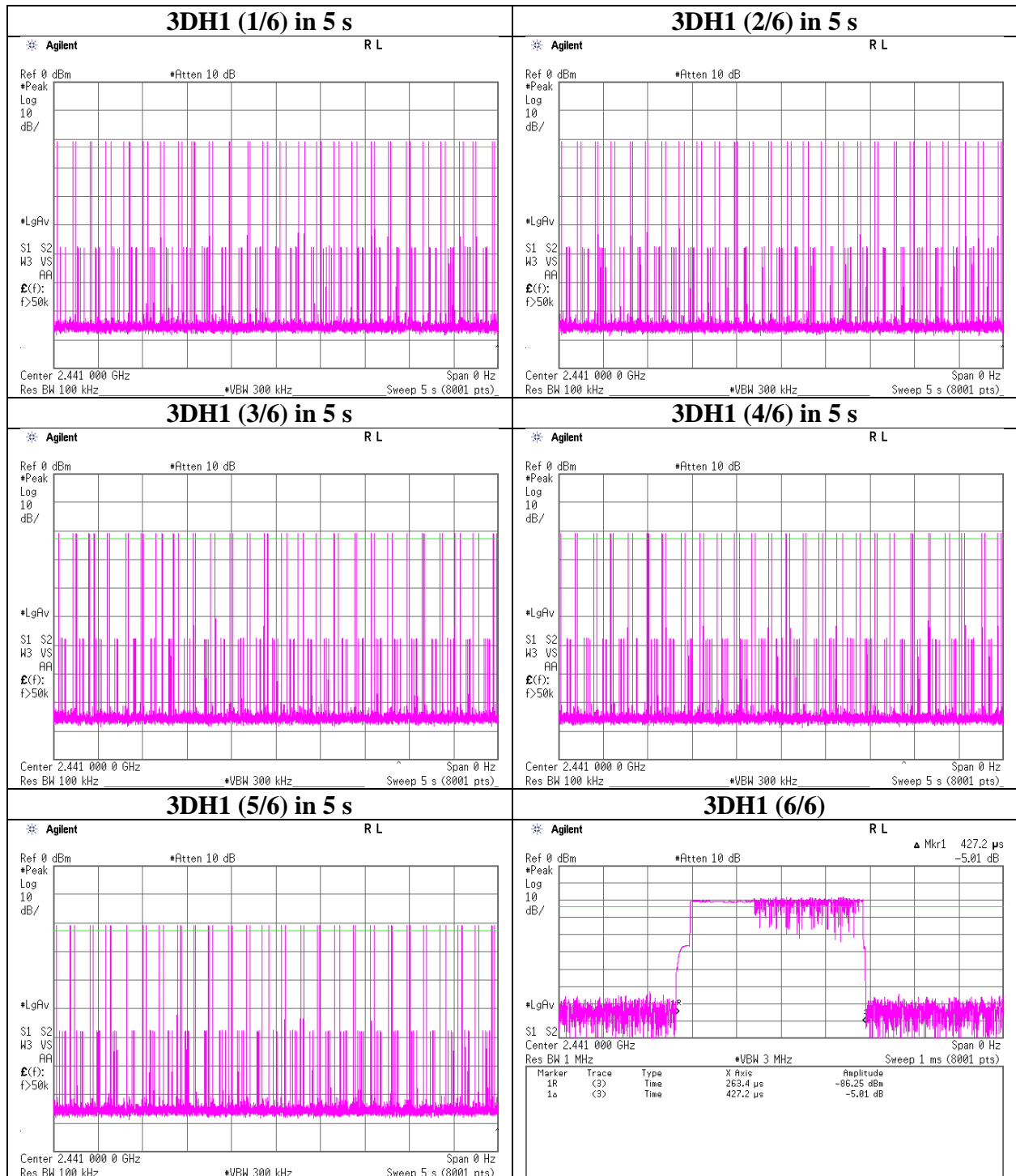
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Dwell time



Dwell time



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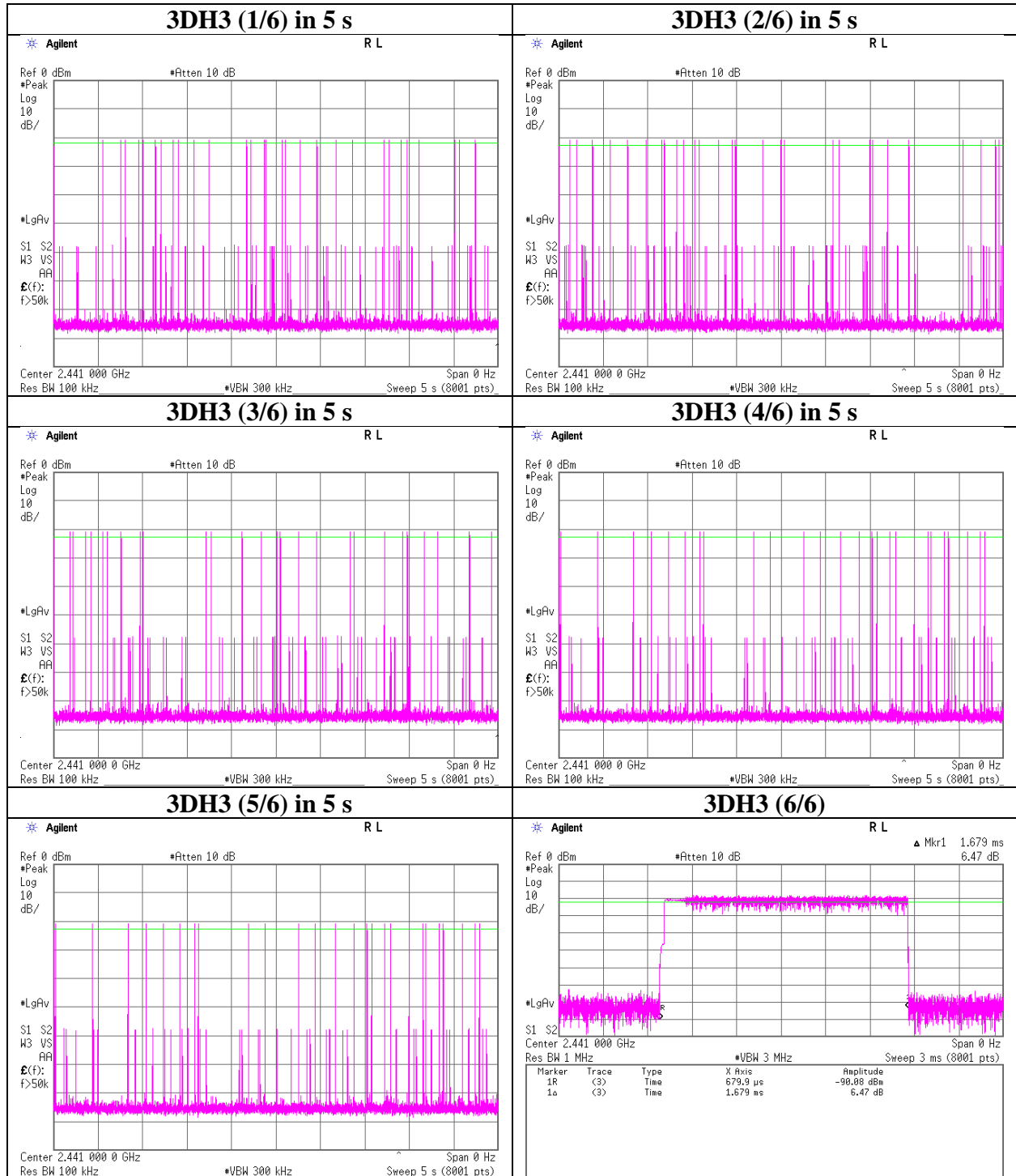
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Dwell time



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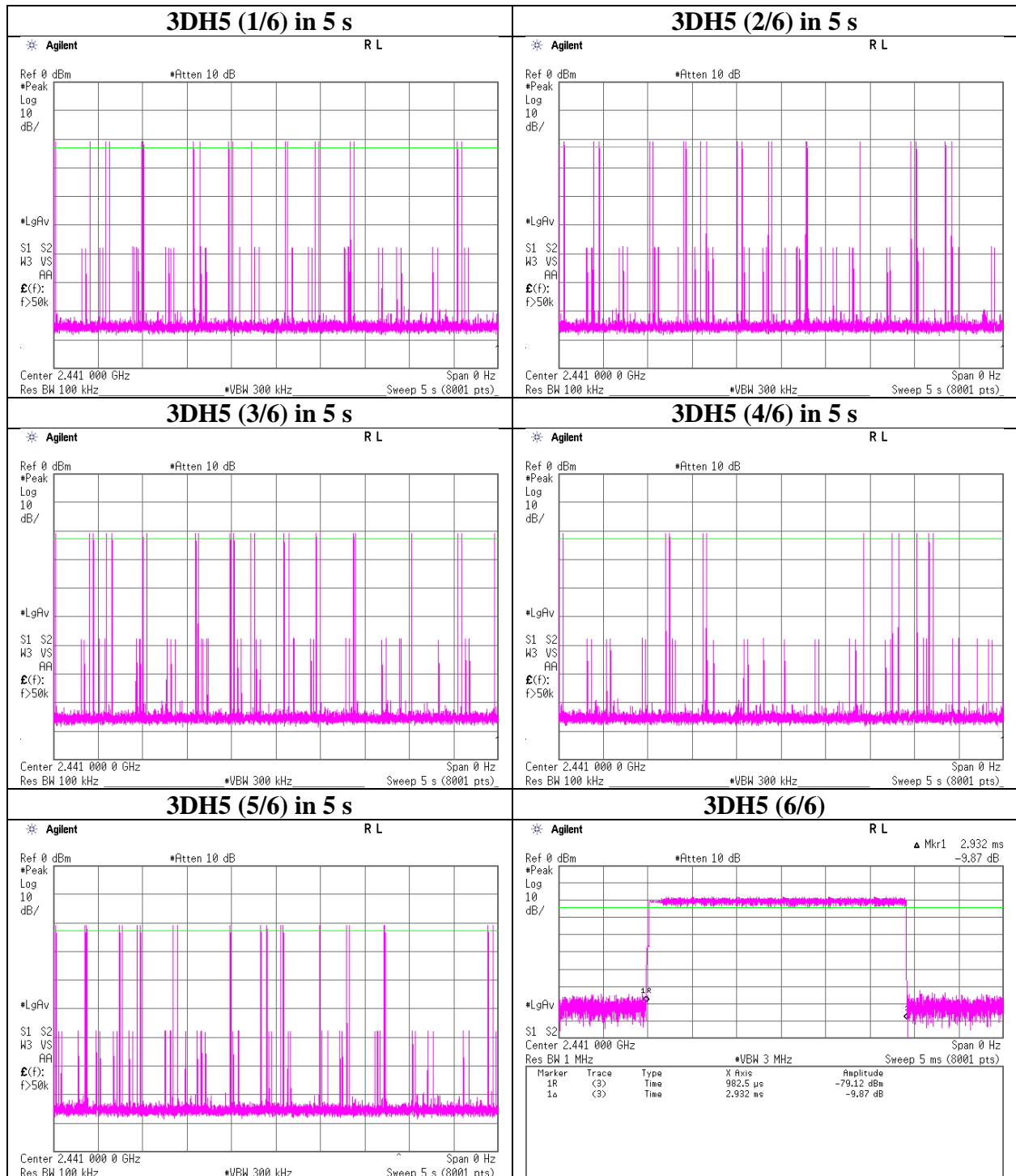
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Dwell time



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-9.37	2.11	9.67	2.41	1.74	20.96	125	18.55
DH5	2441.0	-8.97	2.11	9.67	2.81	1.91	20.96	125	18.15
DH5	2480.0	-9.25	2.12	9.67	2.54	1.79	20.96	125	18.42
2DH5	2402.0	-6.56	2.11	9.67	5.22	3.33	20.96	125	15.74
2DH5	2441.0	-6.45	2.11	9.67	5.33	3.41	20.96	125	15.63
2DH5	2480.0	-6.39	2.12	9.67	5.40	3.47	20.96	125	15.56
3DH5	2402.0	-6.31	2.11	9.67	5.47	3.52	20.96	125	15.49
3DH5	2441.0	-6.18	2.11	9.67	5.60	3.63	20.96	125	15.36
3DH5	2480.0	-6.11	2.12	9.67	5.68	3.70	20.96	125	15.28

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

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

As this device had AFH mode and frequency separation could not meet the requirement of over 20 dB BW without 2/3 relaxation, 125 mW power limit was applied to it.

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

Test place Shonan EMC Lab. No.1 Measurement Room
Report No. 11334871S-K
Date November 11, 2016
Temperature / Humidity 25 deg. C / 33 % RH
Engineer Hikaru Shirasawa
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	-10.90	2.11	9.67	0.88	1.22	1.08	1.96	1.57
DH5	2441.0	-10.46	2.11	9.67	1.32	1.36	1.08	2.40	1.74
DH5	2480.0	-10.73	2.12	9.67	1.06	1.28	1.08	2.14	1.64
2DH5	2402.0	-10.64	2.11	9.67	1.14	1.30	1.07	2.21	1.66
2DH5	2441.0	-10.47	2.11	9.67	1.31	1.35	1.07	2.38	1.73
2DH5	2480.0	-10.45	2.12	9.67	1.34	1.36	1.07	2.41	1.74
3DH5	2402.0	-10.65	2.11	9.67	1.13	1.30	1.07	2.20	1.66
3DH5	2441.0	-10.50	2.11	9.67	1.28	1.34	1.07	2.35	1.72
3DH5	2480.0	-10.44	2.12	9.67	1.35	1.36	1.07	2.42	1.75

Sample Calculation:

Result (Time average) = Reading + Cable Loss + Attenuator Loss

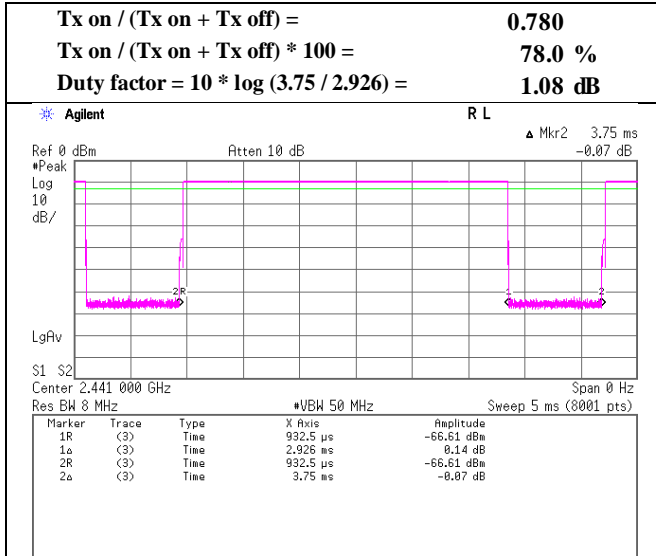
Result (Burst power average) = Time average power + Duty factor

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

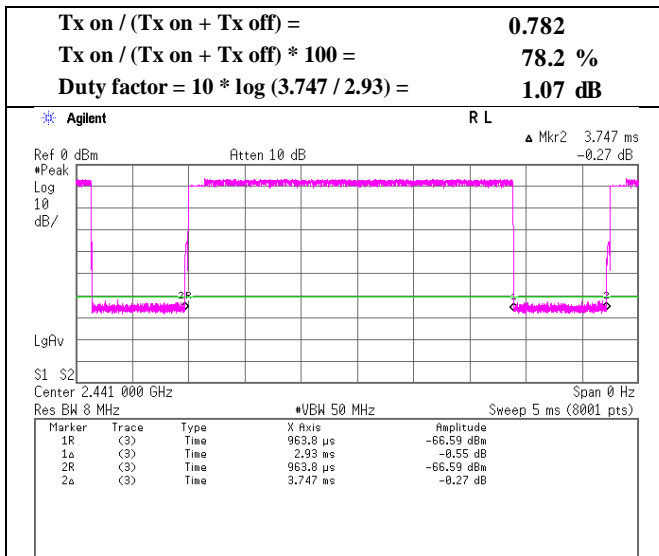
Burst Rate Confirmation

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off

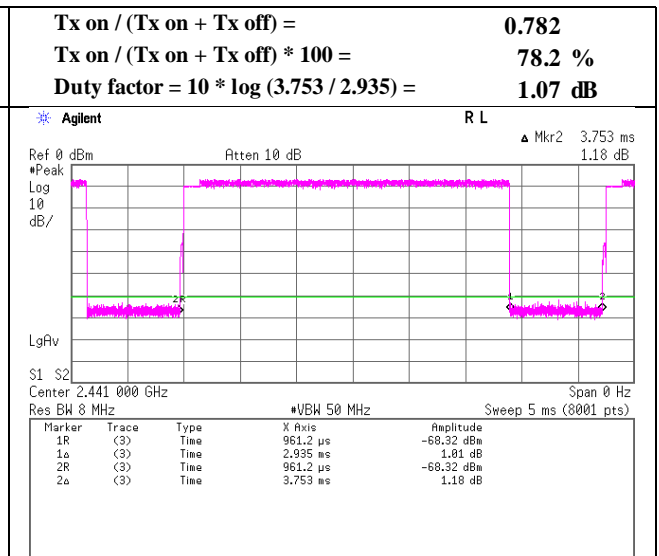
DH5



2DH5



3DH5



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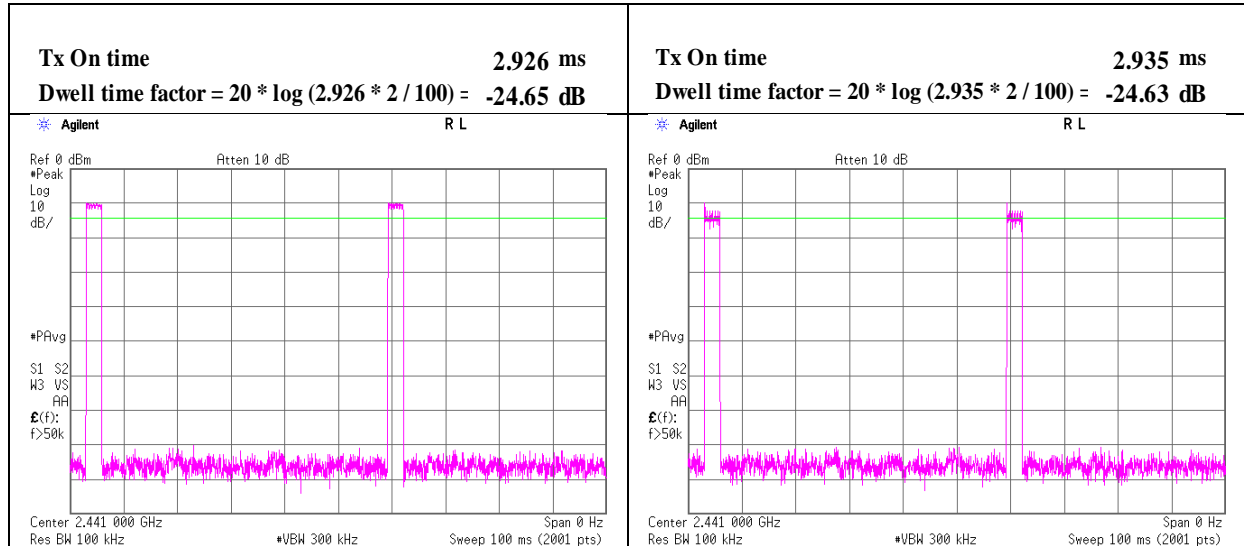
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Dwell time factor

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping On

DH5

3DH5



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Shonan EMC Lab.

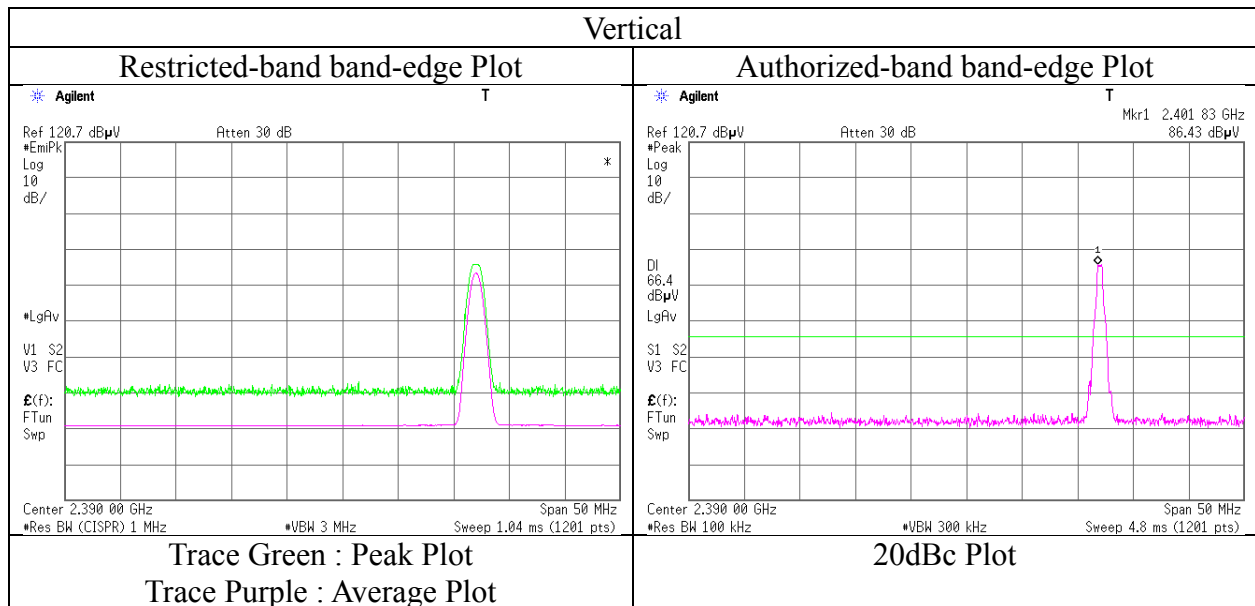
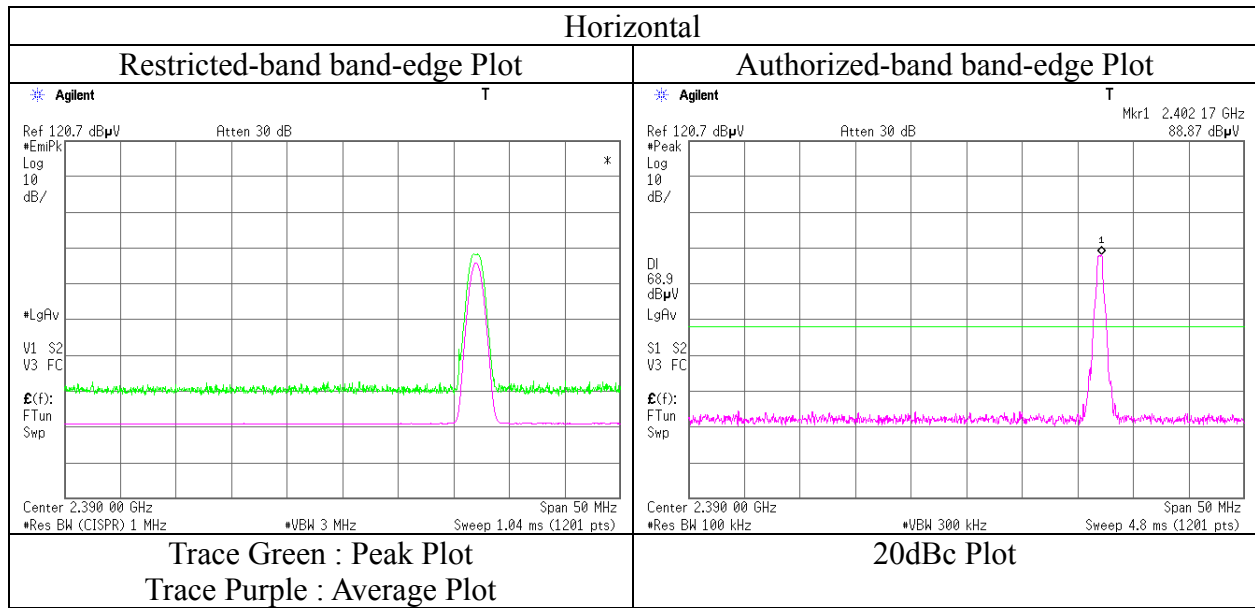
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Report No. : 11334871S-K
 Date : October 17, 2016
 Temperature / Humidity : 24 deg.C / 45 %RH
 Engineer : Hikaru Shirasawa
 Mode : Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11334871S-K
Date : October 17, 2016 November 8, 2016 November 9, 2016 November 6, 2016
Temperature / Humidity : 24 deg.C / 45 %RH 24 deg.C / 30 %RH 22 deg.C / 36 %RH 20 deg.C / 42 %RH
Engineer : Hikaru Shirasawa Shinichi Takano Hikaru Shirasawa Kazutaka Takeyama
(1 GHz - 2.8 GHz) (2.8 GHz - 13 GHz), (18 GHz - 26 GHz) (30 MHz - 1000 MHz)
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.	168.010	QP	40.00	15.72	8.92	31.77	0.00	32.87	43.50	10.6	152	254	
Hori.	191.992	QP	39.00	16.39	8.94	31.76	0.00	32.57	43.50	10.9	147	275	
Hori.	215.987	QP	49.90	11.65	5.90	31.75	0.00	35.70	43.50	7.8	150	177	
Hori.	231.301	QP	45.60	11.62	6.03	31.74	0.00	31.51	46.00	14.4	150	162	
Hori.	240.000	QP	49.00	11.61	6.10	31.74	0.00	34.97	46.00	11.0	150	295	
Hori.	384.678	QP	39.40	15.33	7.16	31.80	0.00	30.09	46.00	15.9	100	290	
Hori.	2483.500	PK	45.83	27.79	13.91	36.85	2.28	52.96	73.97	21.0	140	129	
Hori.	3306.638	PK	48.41	28.63	5.53	36.80	2.28	48.05	73.90	25.8	117	217	
Hori.	4960.000	PK	55.25	31.45	6.06	37.19	2.28	57.85	73.90	16.0	171	347	
Hori.	7440.000	PK	44.12	37.11	7.63	37.99	2.28	53.15	73.90	20.7	150	0	
Hori.	9920.000	PK	44.40	38.87	8.57	39.26	2.28	54.86	73.90	19.0	150	0	
Hori.	12400.000	PK	45.12	39.32	10.10	39.40	2.28	57.42	73.90	16.4	150	0	
Hori.	2483.500	AV	33.15	27.79	13.91	36.85	2.28	40.28	53.97	13.6	140	129	
Hori.	3306.638	AV	40.75	28.63	5.53	36.80	2.28	40.39	53.90	13.5	117	217	
Vert.	37.651	QP	33.30	15.26	7.19	31.83	0.00	23.92	40.00	16.0	100	282	
Vert.	96.016	QP	46.30	9.34	8.28	31.80	0.00	32.12	43.50	11.3	100	293	
Vert.	144.088	QP	36.60	14.64	8.66	31.78	0.00	28.12	43.50	15.3	100	302	
Vert.	168.014	QP	39.50	15.72	8.92	31.77	0.00	32.37	43.50	11.1	100	215	
Vert.	215.996	QP	48.20	11.65	5.90	31.75	0.00	34.00	43.50	9.5	100	223	
Vert.	252.204	QP	46.60	11.67	6.21	31.73	0.00	32.75	46.00	13.2	100	251	
Vert.	799.758	QP	34.70	20.77	9.30	31.88	0.00	32.89	46.00	13.1	100	127	
Vert.	2483.500	PK	45.91	27.79	13.91	36.85	2.28	53.04	73.97	20.9	154	260	
Vert.	3306.408	PK	48.05	28.63	5.53	36.80	2.28	47.69	73.90	26.2	159	224	
Vert.	4960.000	PK	55.07	31.45	6.06	37.19	2.28	57.67	73.90	16.2	255	23	
Vert.	7440.000	PK	44.25	37.11	7.63	37.99	2.28	53.28	73.90	20.6	150	0	
Vert.	9920.000	PK	44.79	38.87	8.57	39.26	2.28	55.25	73.90	18.6	150	0	
Vert.	12400.000	PK	44.59	39.32	10.10	39.40	2.28	56.89	73.90	17.0	150	0	
Vert.	2483.500	AV	31.57	27.79	13.91	36.85	2.28	38.70	53.97	15.2	154	260	
Vert.	3306.408	AV	39.72	28.63	5.53	36.80	2.28	39.36	53.90	14.5	159	224	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4960.000	AV	50.31	31.45	6.06	37.19	-24.65	2.28	28.26	53.90	25.6	
Hori.	7440.000	AV	32.44	37.11	7.63	37.99	-24.65	2.28	16.82	53.90	37.1	
Hori.	9920.000	AV	33.41	38.87	8.57	39.26	-24.65	2.28	19.22	53.90	34.7	
Hori.	12400.000	AV	33.56	39.32	10.10	39.40	-24.65	2.28	21.21	53.90	32.7	
Vert.	4960.000	AV	50.13	31.45	6.06	37.19	-24.65	2.28	28.08	53.90	25.8	
Vert.	7440.000	AV	32.26	37.11	7.63	37.99	-24.65	2.28	16.64	53.90	37.3	
Vert.	9920.000	AV	33.30	38.87	8.57	39.26	-24.65	2.28	19.11	53.90	34.8	
Vert.	12400.000	AV	33.54	39.32	10.10	39.40	-24.65	2.28	21.19	53.90	32.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Dwell(time)factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB
Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

UL Japan, Inc.

Shonan EMC Lab.

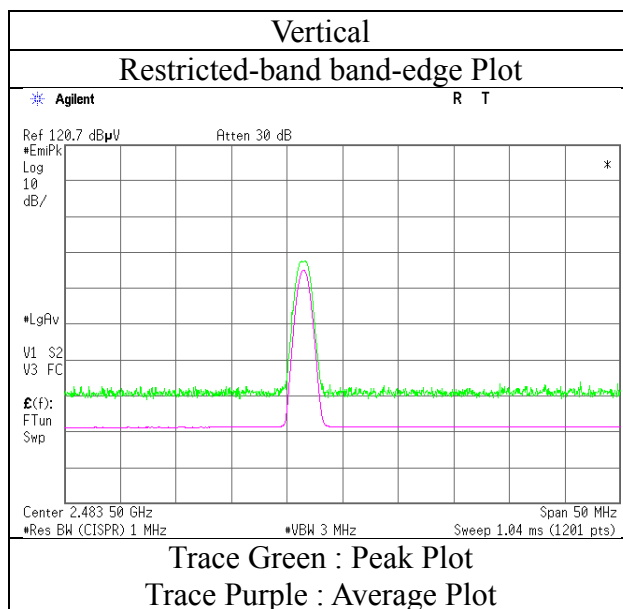
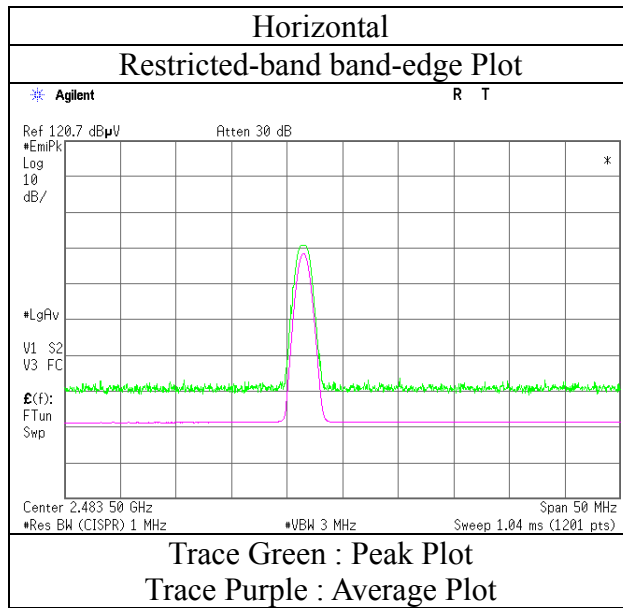
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Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

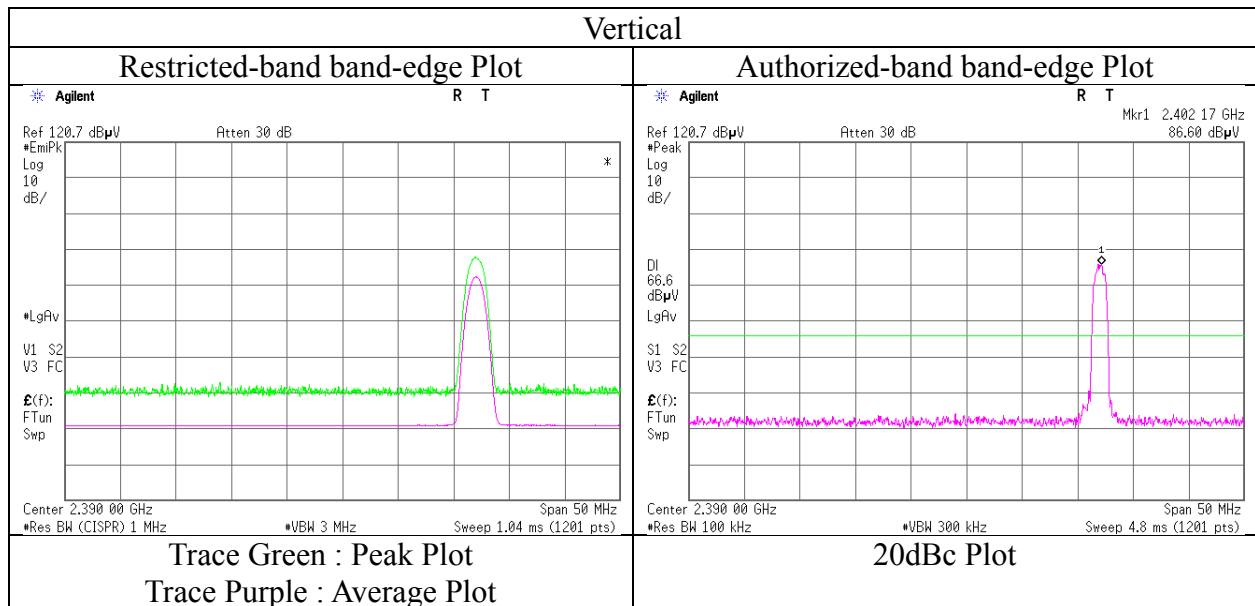
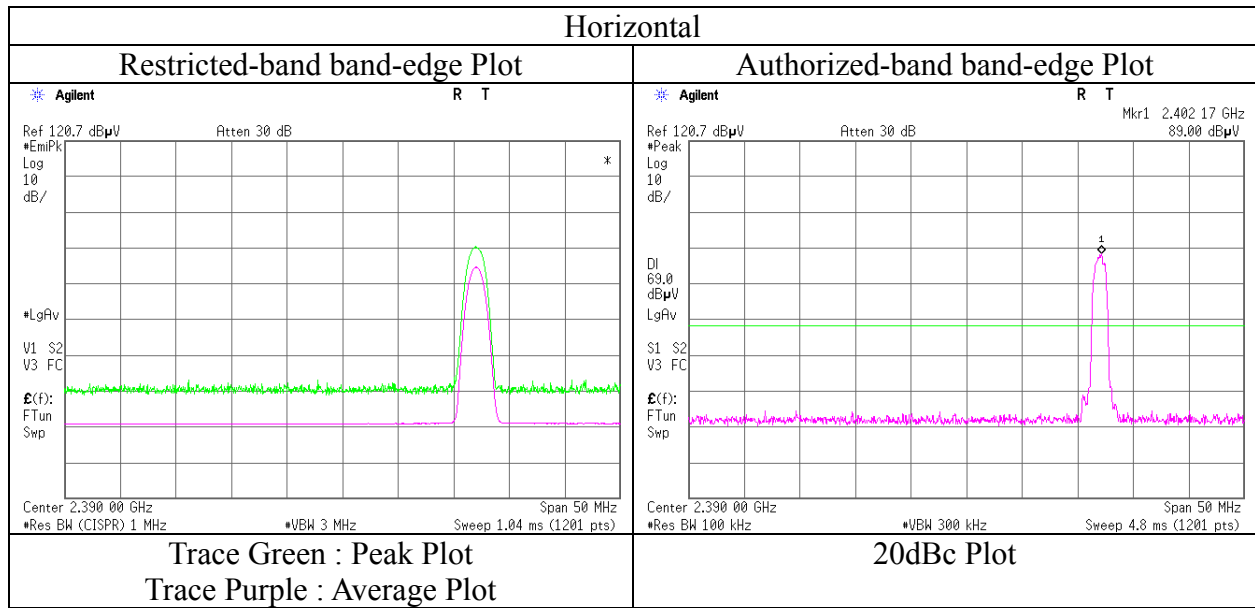
Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11334871S-K
Date : October 17, 2016
Temperature / Humidity : 24 deg.C / 45 %RH
Engineer : Hikaru Shirasawa
Mode : Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11334871S-K
Date	October 17, 2016
Temperature / Humidity	24 deg.C / 45 %RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11334871S-K
Date : October 17, 2016 November 8, 2016 November 9, 2016 November 6, 2016
Temperature / Humidity : 24 deg.C / 45 %RH 24 deg.C / 30 %RH 22 deg.C / 36 %RH 20 deg.C / 42 %RH
Engineer : Hikaru Shirasawa Shinichi Takano Hikaru Shirasawa Kazutaka Takeyama
(1 GHz - 2.8 GHz) (2.8 GHz - 13 GHz), (18 GHz - 26 GHz) (30 MHz - 1000 MHz)
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.	168.035	QP	39.00	15.73	8.92	31.77	0.00	31.88	43.50	11.6	150	257	
Hori.	192.009	QP	38.50	16.39	8.94	31.76	0.00	32.07	43.50	11.4	150	279	
Hori.	215.999	QP	49.90	11.65	5.90	31.75	0.00	35.70	43.50	7.8	150	179	
Hori.	240.008	QP	48.20	11.61	6.10	31.74	0.00	34.17	46.00	11.8	151	279	
Hori.	384.360	QP	39.70	15.32	7.16	31.80	0.00	30.38	46.00	15.6	100	278	
Hori.	3254.639	PK	46.93	28.59	5.52	36.81	2.28	46.51	73.90	27.3	123	213	
Hori.	4882.000	PK	62.31	31.29	6.04	37.16	2.28	64.76	73.90	9.1	106	342	
Hori.	7323.000	PK	44.42	36.77	7.59	37.92	2.28	53.14	73.90	20.7	150	0	
Hori.	9764.000	PK	44.53	38.75	8.49	39.20	2.28	54.85	73.90	19.0	150	0	
Hori.	12205.000	PK	44.92	39.30	9.97	39.39	2.28	57.08	73.90	16.8	150	0	
Hori.	3254.639	AV	39.93	28.59	5.52	36.81	2.28	39.51	53.90	14.3	123	213	
Vert.	37.582	QP	33.70	15.29	7.19	31.83	0.00	24.35	40.00	15.6	100	270	
Vert.	96.015	QP	46.60	9.33	8.28	31.80	0.00	32.41	43.50	11.0	100	286	
Vert.	168.011	QP	39.60	15.72	8.92	31.77	0.00	32.47	43.50	11.0	100	286	
Vert.	252.205	QP	46.80	11.67	6.21	31.73	0.00	32.95	46.00	13.0	100	234	
Vert.	799.763	QP	34.80	20.77	9.30	31.88	0.00	32.99	46.00	13.0	100	135	
Vert.	3254.653	PK	47.51	28.59	5.52	36.81	2.28	47.09	73.90	26.8	148	272	
Vert.	4882.000	PK	60.68	31.29	6.04	37.16	2.28	63.13	73.90	10.7	154	18	
Vert.	7323.000	PK	43.89	36.77	7.59	37.92	2.28	52.61	73.90	21.2	150	0	
Vert.	9764.000	PK	45.50	38.75	8.49	39.20	2.28	55.82	73.90	18.0	150	0	
Vert.	12205.000	PK	45.94	39.30	9.97	39.39	2.28	58.10	73.90	15.8	150	0	
Vert.	3254.653	AV	39.99	28.59	5.52	36.81	2.28	39.57	53.90	14.3	148	272	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	AV	54.23	31.29	6.04	37.16	-24.63	2.28	32.05	53.90	21.9	
Hori.	7323.000	AV	32.32	36.77	7.59	37.92	-24.63	2.28	16.41	53.90	37.5	
Hori.	9764.000	AV	33.58	38.75	8.49	39.20	-24.63	2.28	19.27	53.90	34.6	
Hori.	12205.000	AV	33.57	39.30	9.97	39.39	-24.63	2.28	21.10	53.90	32.8	
Vert.	4882.000	AV	52.92	31.29	6.04	37.16	-24.63	2.28	30.74	53.90	23.2	
Vert.	7323.000	AV	32.32	36.77	7.59	37.92	-24.63	2.28	16.41	53.90	37.5	
Vert.	9764.000	AV	33.67	38.75	8.49	39.20	-24.63	2.28	19.36	53.90	34.5	
Vert.	12205.000	AV	33.63	39.30	9.97	39.39	-24.63	2.28	21.16	53.90	32.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Dwell(time)factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB
Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11334871S-K
Date : October 17, 2016 November 8, 2016 November 9, 2016 November 6, 2016
Temperature / Humidity : 24 deg.C / 45 %RH 24 deg.C / 30 %RH 22 deg.C / 36 %RH 20 deg.C / 42 %RH
Engineer : Hikaru Shirasawa Shinichi Takano Hikaru Shirasawa Kazutaka Takeyama
(1 GHz - 2.8 GHz) (2.8 GHz - 13 GHz), (18 GHz - 26 GHz) (30 MHz - 1000 MHz)
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.	168.003	QP	40.10	15.72	8.92	31.77	0.00	32.97	43.50	10.5	165	263	
Hori.	192.012	QP	39.30	16.39	8.94	31.76	0.00	32.87	43.50	10.6	165	268	
Hori.	215.998	QP	49.90	11.65	5.90	31.75	0.00	35.70	43.50	7.8	148	167	
Hori.	240.284	QP	48.20	11.61	6.11	31.74	0.00	34.18	46.00	11.8	151	278	
Hori.	384.054	QP	39.70	15.31	7.16	31.80	0.00	30.37	46.00	15.6	100	286	
Hori.	2483.500	PK	45.22	27.79	13.91	36.85	2.28	52.35	73.97	21.6	140	127	
Hori.	3306.656	PK	47.60	28.63	5.53	36.80	2.28	47.24	73.90	26.6	117	219	
Hori.	4960.000	PK	56.90	31.45	6.06	37.19	2.28	59.50	73.90	14.4	173	347	
Hori.	7440.000	PK	44.23	37.11	7.63	37.99	2.28	53.26	73.90	20.6	100	0	
Hori.	9920.000	PK	44.58	38.87	8.57	39.26	2.28	55.04	73.90	18.8	100	0	
Hori.	12400.000	PK	45.70	39.32	10.10	39.40	2.28	58.00	73.90	15.9	100	0	
Hori.	2483.500	AV	33.16	27.79	13.91	36.85	2.28	40.29	53.97	13.6	140	127	
Hori.	3306.656	AV	40.68	28.63	5.53	36.80	2.28	40.32	53.90	13.5	117	219	
Vert.	37.538	QP	33.80	15.30	7.19	31.83	0.00	24.46	40.00	15.5	100	271	
Vert.	96.047	QP	46.40	9.34	8.28	31.80	0.00	32.22	43.50	11.2	100	287	
Vert.	144.108	QP	36.20	14.64	8.66	31.78	0.00	27.72	43.50	15.7	100	299	
Vert.	168.002	QP	39.50	15.72	8.92	31.77	0.00	32.37	43.50	11.1	100	203	
Vert.	252.211	QP	48.20	11.67	6.21	31.73	0.00	34.35	46.00	11.6	100	236	
Vert.	799.765	QP	35.10	20.77	9.30	31.88	0.00	33.29	46.00	12.7	100	118	
Vert.	2483.500	PK	45.42	27.79	13.91	36.85	2.28	52.55	73.97	21.4	167	257	
Vert.	3306.397	PK	46.19	28.63	5.53	36.80	2.28	45.83	73.90	28.0	159	226	
Vert.	4960.000	PK	55.90	31.45	6.06	37.19	2.28	58.50	73.90	15.4	155	32	
Vert.	7440.000	PK	44.74	37.11	7.63	37.99	2.28	53.77	73.90	20.1	150	0	
Vert.	9920.000	PK	44.99	38.87	8.57	39.26	2.28	55.45	73.90	18.4	150	0	
Vert.	12400.000	PK	45.14	39.32	10.10	39.40	2.28	57.44	73.90	16.4	150	0	
Vert.	2483.500	AV	33.03	27.79	13.91	36.85	2.28	40.16	53.97	13.8	167	257	
Vert.	3306.397	AV	38.79	28.63	5.53	36.80	2.28	38.43	53.90	15.4	159	226	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB

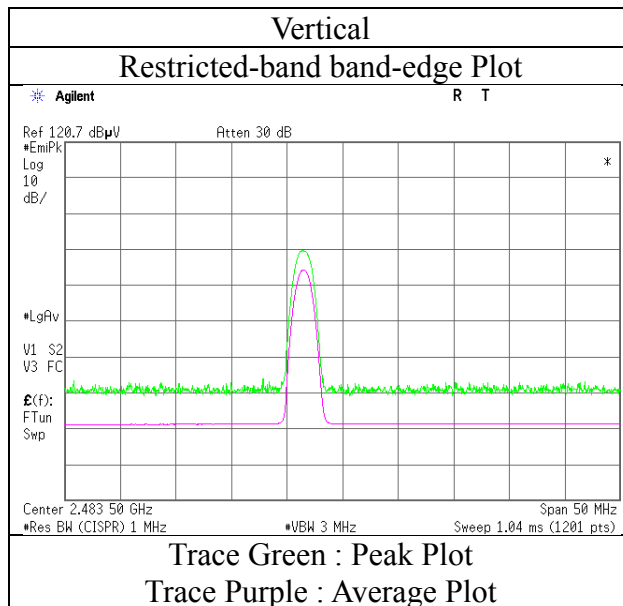
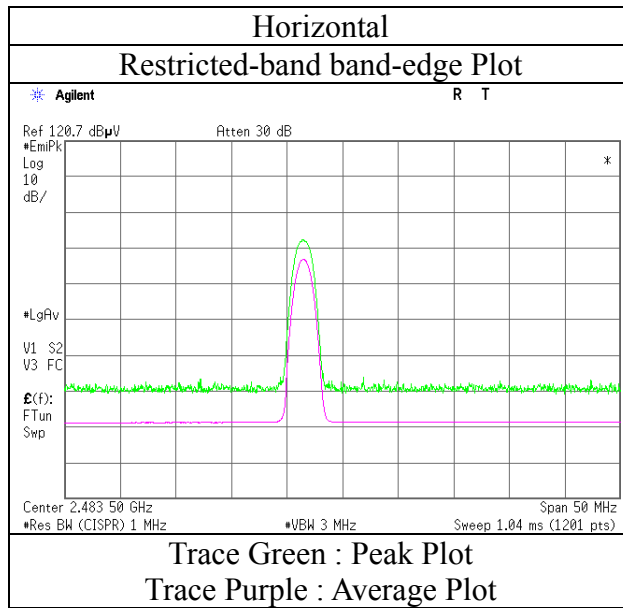
Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4960.000	AV	48.70	31.45	6.06	37.19	-24.63	2.28	26.68	53.90	27.1	
Hori.	7440.000	AV	32.40	37.11	7.63	37.99	-24.63	2.28	16.81	53.90	37.0	
Hori.	9920.000	AV	33.43	38.87	8.57	39.26	-24.63	2.28	19.27	53.90	34.5	
Hori.	12400.000	AV	33.59	39.32	10.10	39.40	-24.63	2.28	21.27	53.90	32.5	
Vert.	4960.000	AV	47.69	31.45	6.06	37.19	-24.63	2.28	25.67	53.90	28.1	
Vert.	7440.000	AV	32.41	37.11	7.63	37.99	-24.63	2.28	16.82	53.90	37.0	
Vert.	9920.000	AV	33.46	38.87	8.57	39.26	-24.63	2.28	19.30	53.90	34.5	
Vert.	12400.000	AV	33.57	39.32	10.10	39.40	-24.63	2.28	21.25	53.90	32.6	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Dwell(time)factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.90 m / 3.0 m) = 2.28 dB
Dwell (time) factor refer to "Dwell time factor Calculation chart" sheet.

Radiated Spurious Emission (Reference Plot for band-edge)

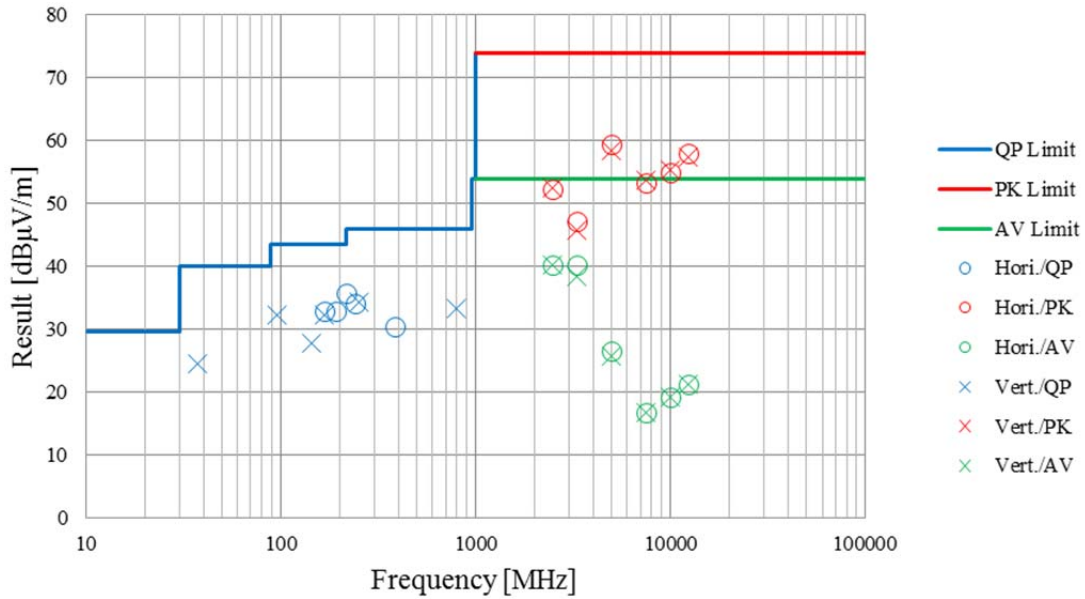
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11334871S-K
Date	October 17, 2016
Temperature / Humidity	24 deg.C / 45 %RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber			
Report No.	11334871S-K			
Date	October 17, 2016	November 8, 2016	November 9, 2016	November 6, 2016
Temperature / Humidity	24 deg.C / 45 %RH	24 deg.C / 30 %RH	22 deg.C / 36 %RH	20 deg.C / 42 %RH
Engineer	Hikaru Shirasawa (1 GHz -2.8 GHz)	Shinichi Takano (2.8 GHz – 13 GHz), (13 GHz – 18 GHz)	Hikaru Shirasawa (18 GHz – 26 GHz)	Kazutaka Takeyama (30 MHz – 1000 MHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz			

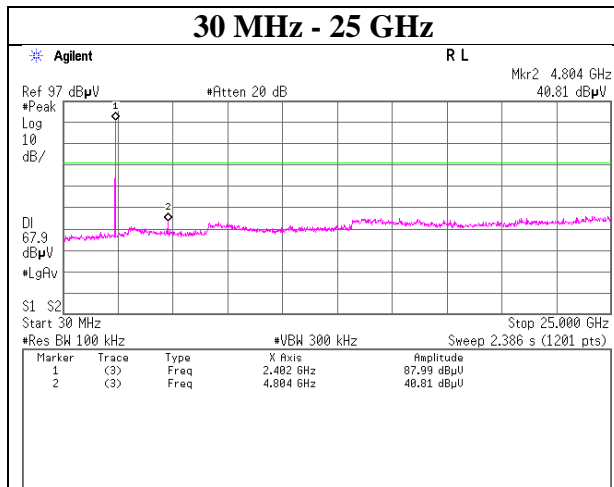
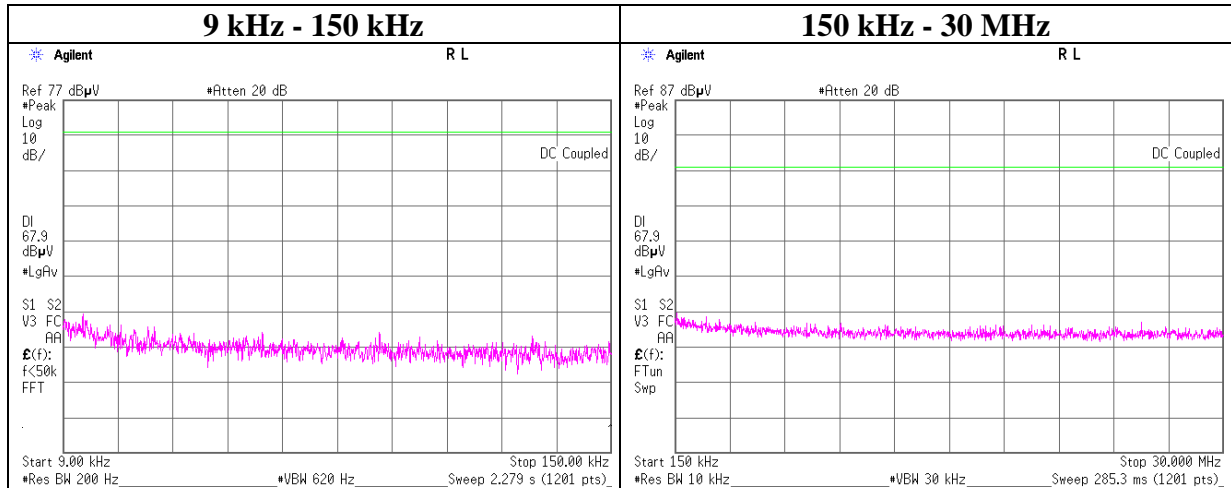


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, DH5

2402 MHz



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Shonan EMC Lab.

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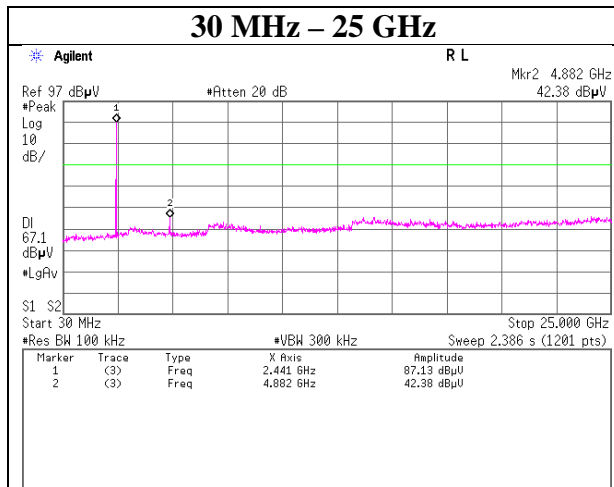
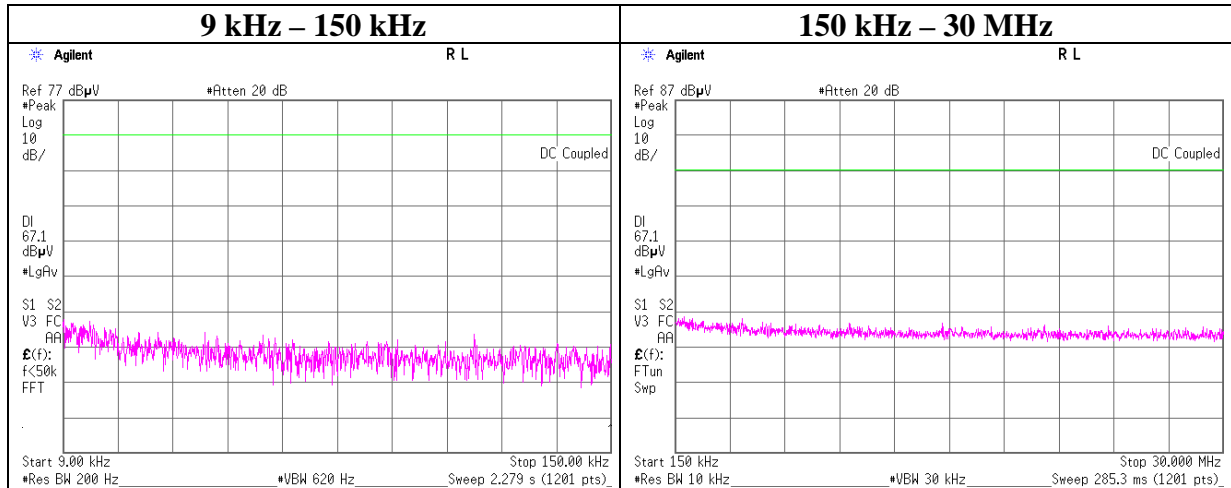
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Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, DH5

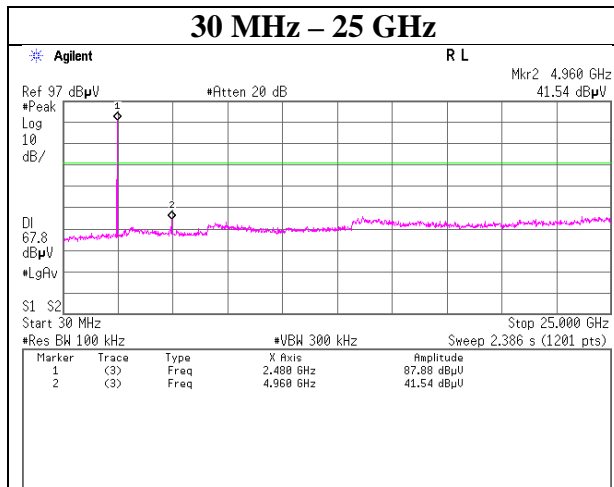
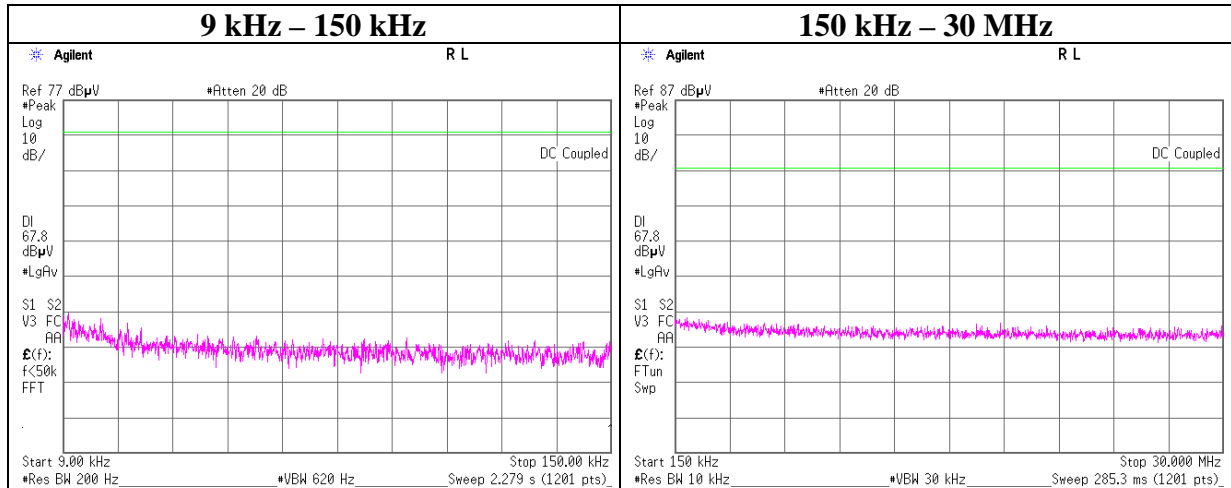
2441 MHz



Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, DH5

2480 MHz



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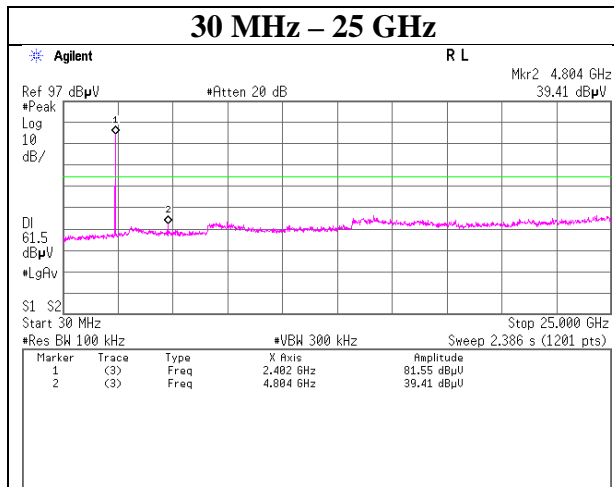
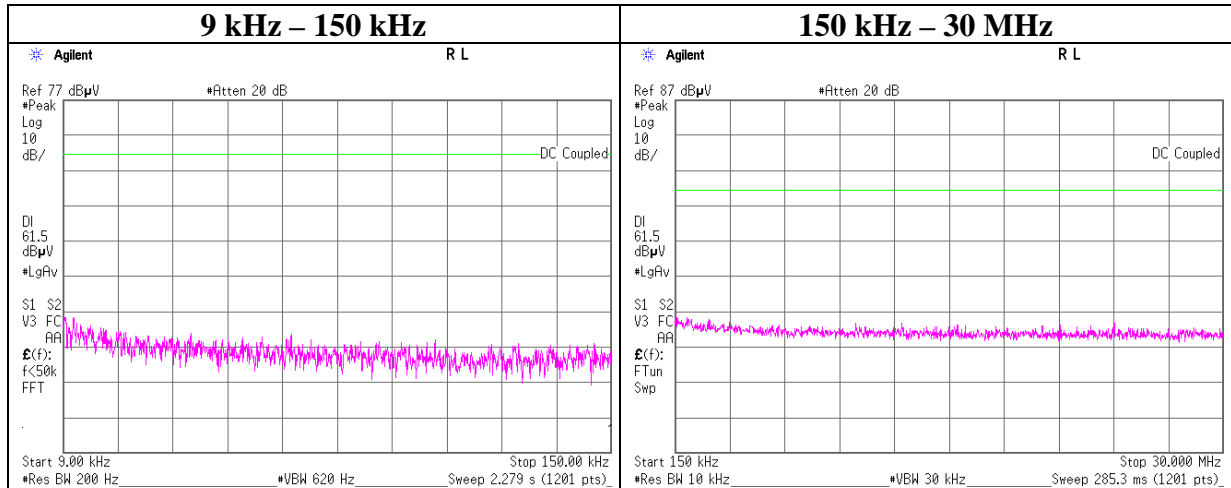
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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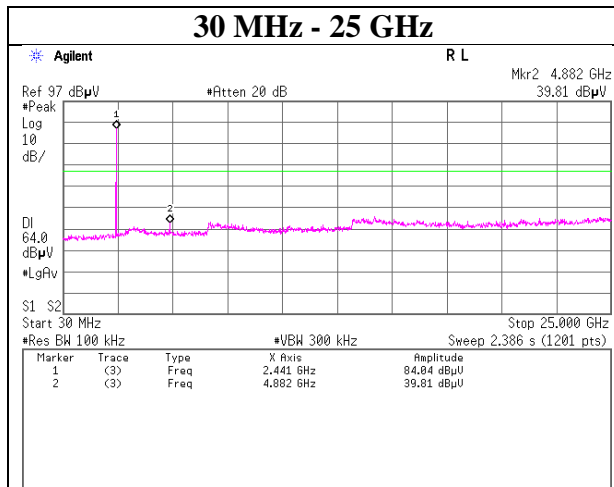
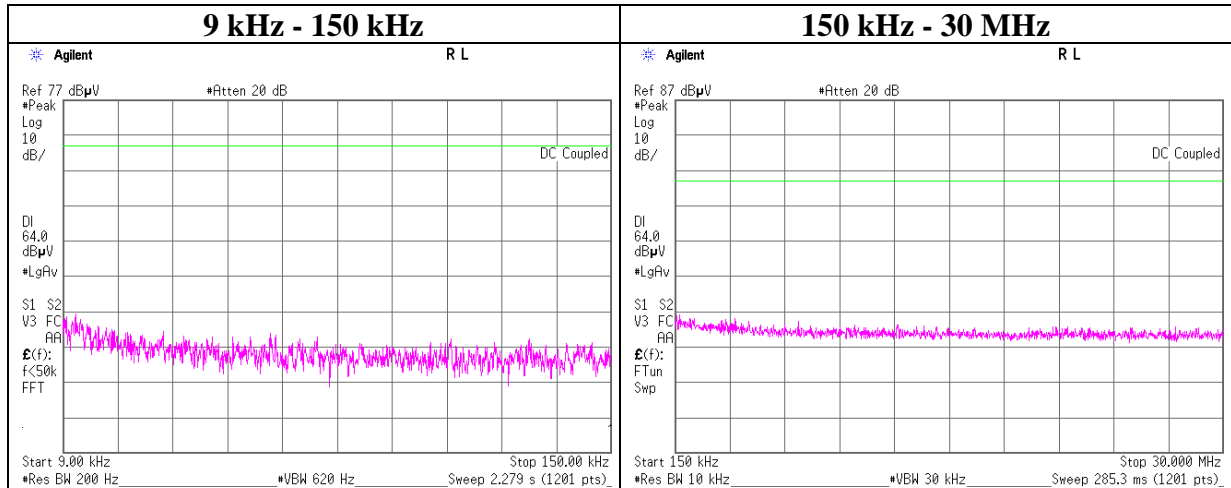
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, 3DH5

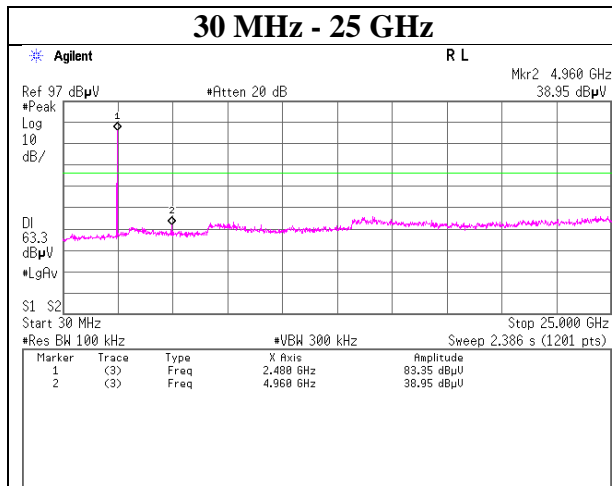
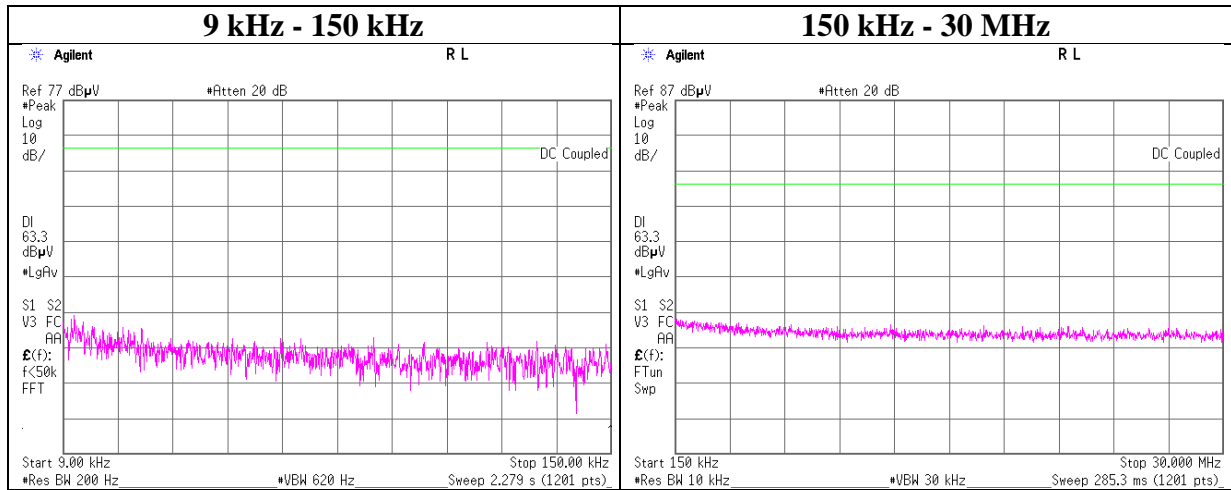
2441 MHz



Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off, 3DH5

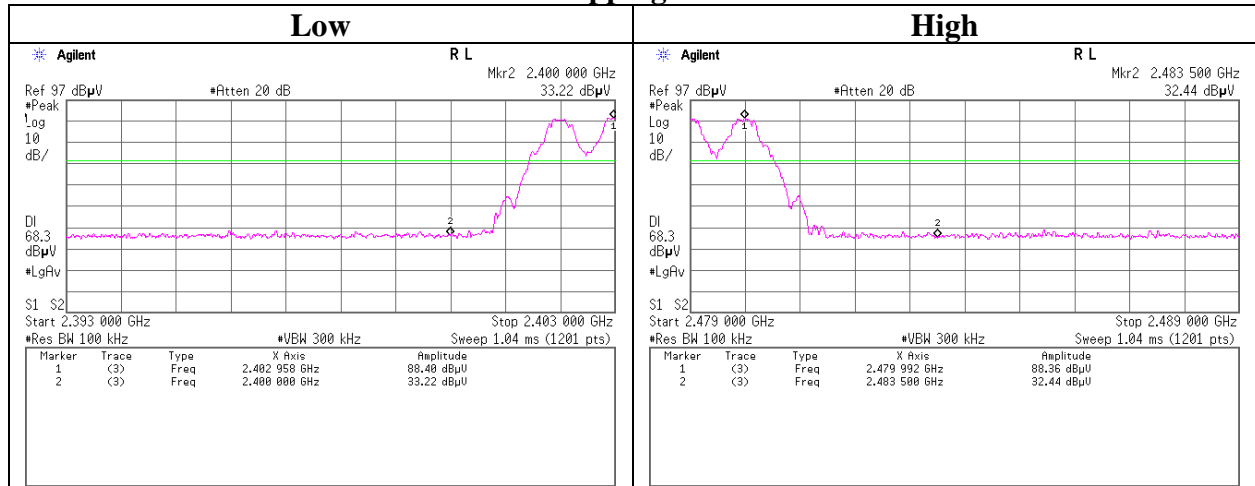
2480 MHz



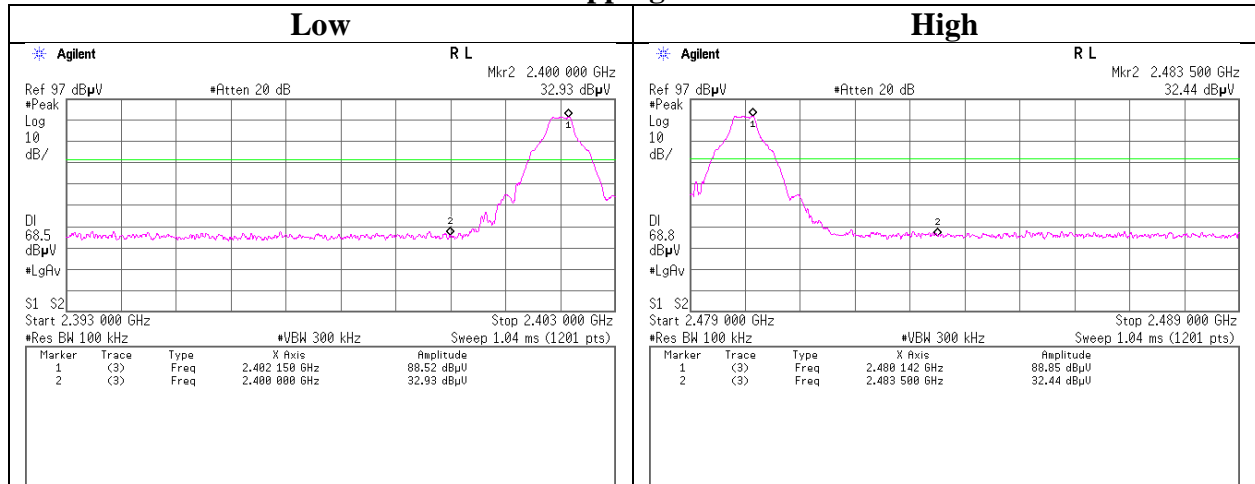
Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping On, Off, DH5

Hopping On



Hopping Off



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Shonan EMC Lab.

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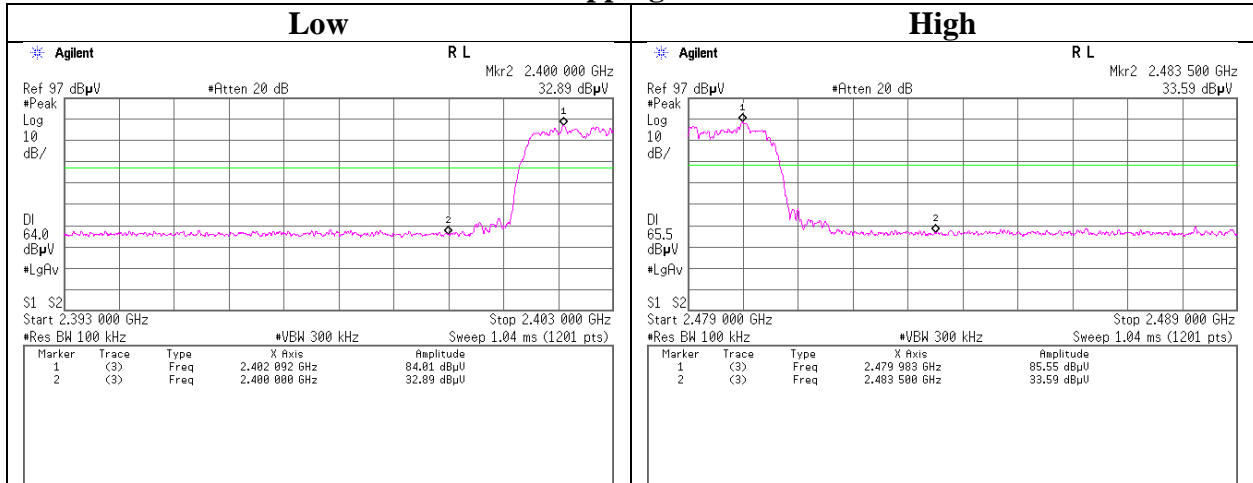
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

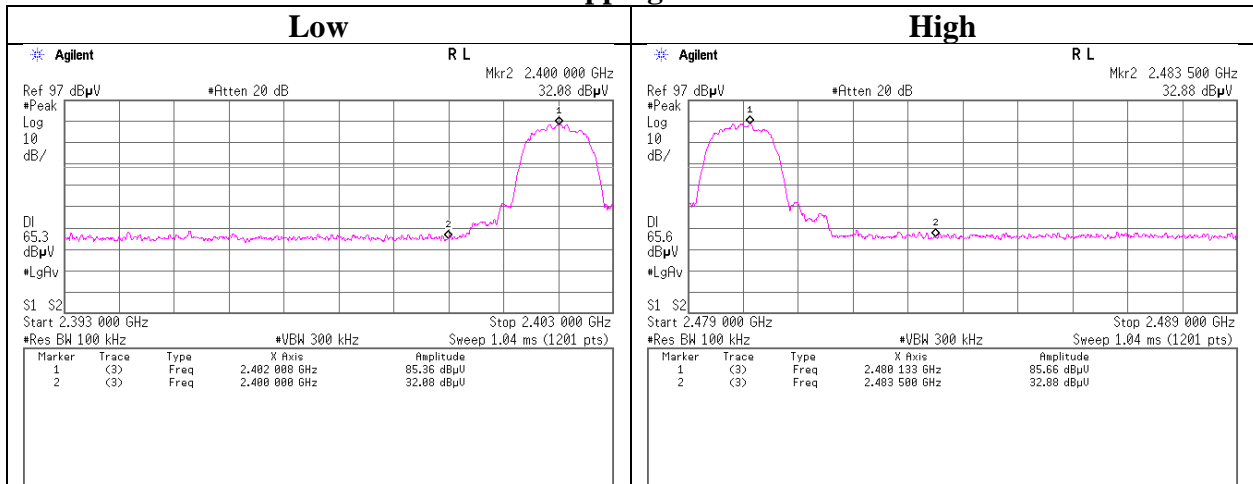
Conducted Emission Band Edge compliance

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping On, Off, 3DH5

Hopping On



Hopping Off



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Shonan EMC Lab.

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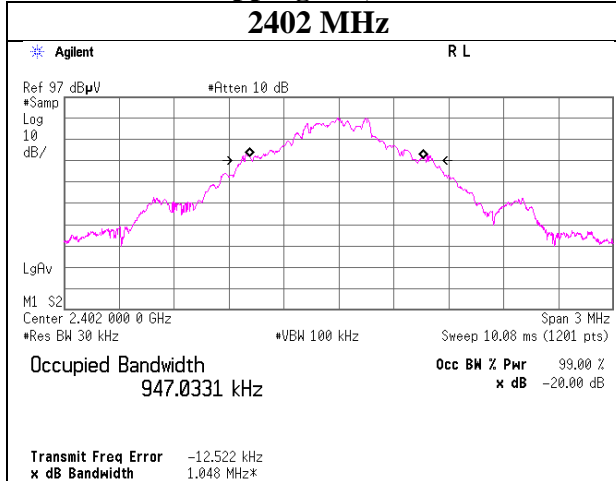
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

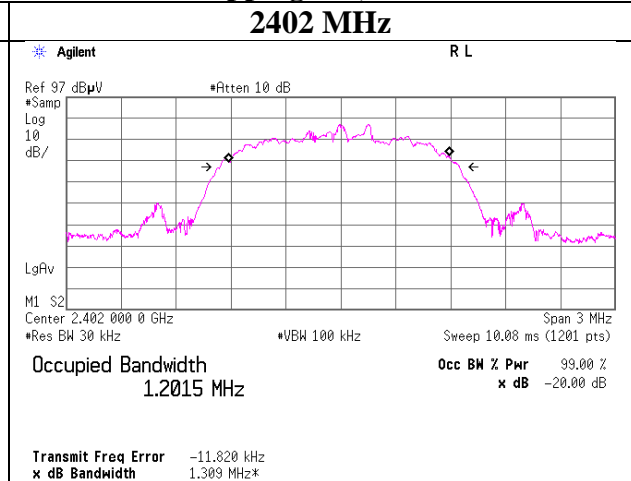
99 %Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping Off

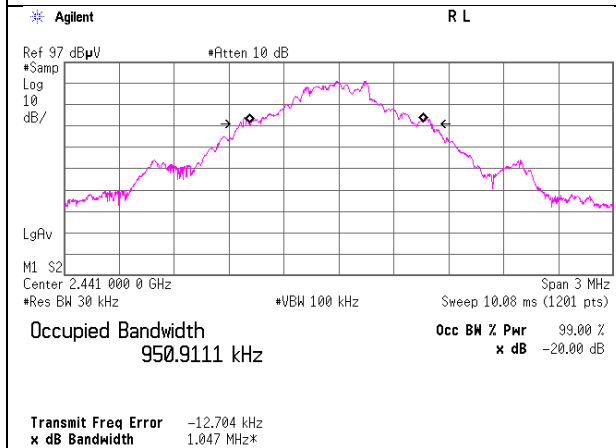
Hopping Off, DH5 2402 MHz



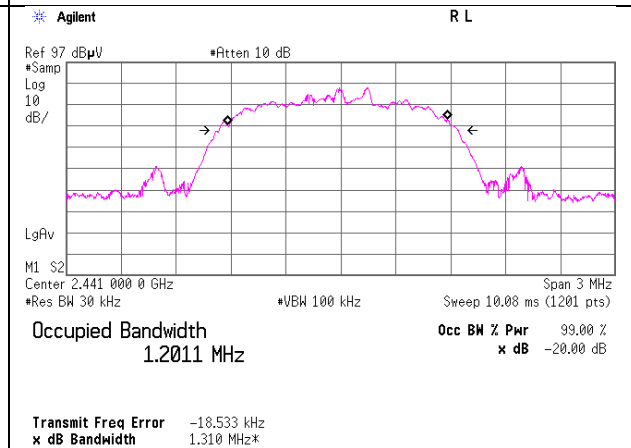
Hopping Off, 3DH5 2402 MHz



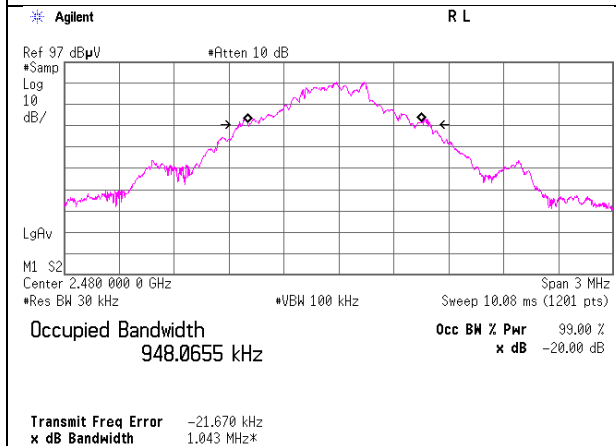
2441 MHz



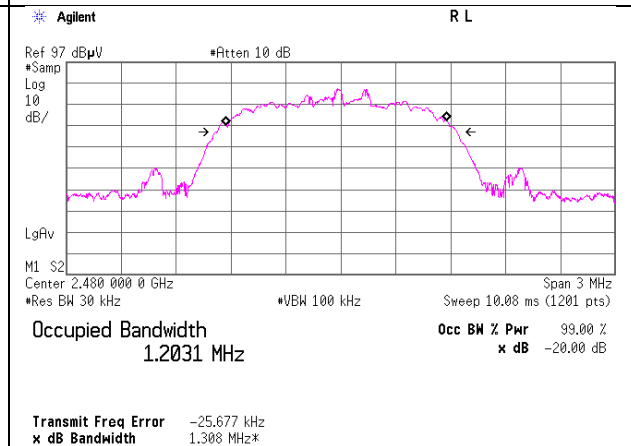
2441 MHz



2480 MHz



2480 MHz



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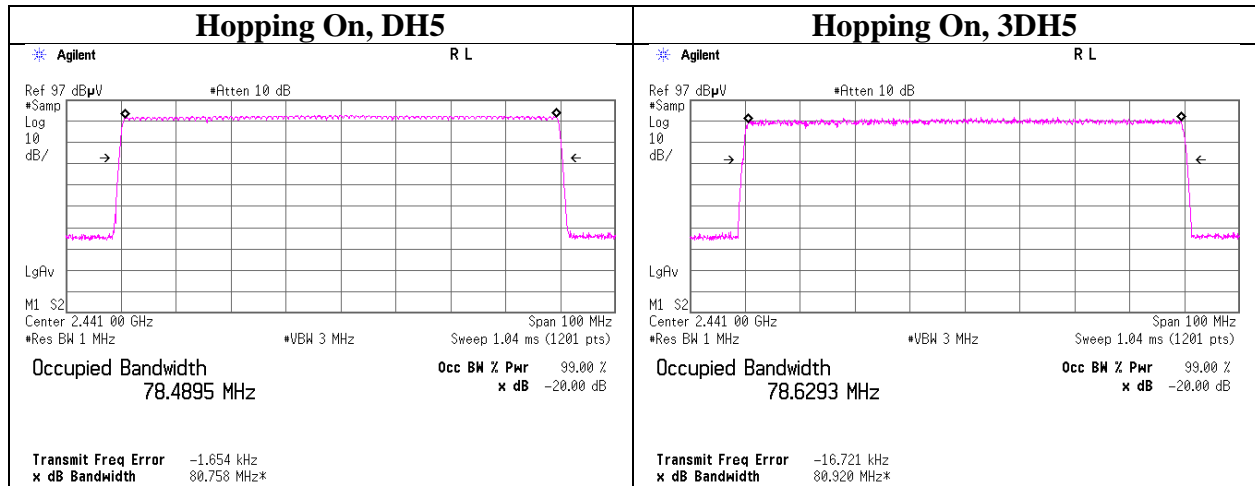
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	11334871S-K
Date	November 11, 2016
Temperature / Humidity	25 deg. C / 33 % RH
Engineer	Hikaru Shirasawa
Mode	Tx, Hopping On



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APPENDIX 2: Test instruments

Test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KAF-02	Pre Amplifier	Hewlett Packard	8449B	3008A01268	RE	2016/04/22 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2016/06/23 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2016/05/11 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2016/08/22 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	RE	2016/02/08 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2016/07/25 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF I,MF)	-	RE,CE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2016/03/22 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE,AT	2015/11/04 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2015/11/16 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2016/02/19 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2015/12/18 * 12
SAT3-09	Attenuator	JFW	50HF-003N	-	RE	2016/08/04 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2016/10/15 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2016/04/22 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2016/04/22 * 12
SLA-05	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	RE	2016/01/30 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2016/10/12 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2015/11/06 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2016/07/14 * 12
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2016/10/17 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2016/02/10 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	RE	2016/10/24 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2016/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2016/03/23 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMS	-	RE	2016/04/18 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

Tested date:
- Conducted emission test : November 10, 2016
- Radiated emissions test : October 17 to November 9, 2016
- Antenna Terminal Conducted test : November 11, 2016

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

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Test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12
SRENT-05	Spectrum Analyzer	KEYSIGHT	E4440A	MY46187752	AT	2016/11/04 * 12
SCC-G31	Coaxial Cable	Junkosha	MWX241-01000KMS KMS	OCT-08-13-046	AT	2016/04/18 * 12
STM-G5	Terminator	Weinschel	M1459A	U6594	AT	2016/07/27 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2015/12/07 * 12
KTS-08	Digital Tester	SANWA	PC500	7019224	AT	2016/03/15 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	CE	2016/10/17 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	CE	2016/03/28 * 12
SCC-C9/C10/SRS E-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS490 6	-/0901-271(RF Selector)	CE	2016/04/22 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE(AE)	2016/02/09 * 12
SAT3-07	Attenuator	JFW	50HF-003N	-	CE	2016/09/23 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2015/12/07 * 12
STM-05	Terminator	TME	CT-01 BP	-	CE	2015/12/18 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE(EUT)	2016/02/08 * 12
SJM-02	Measure	KOMELON	KMC-36	-	CE	-

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

Tested date:
- Conducted emission test : November 10, 2016
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