



RADIO TEST REPORT

Test Report No. : 11822950S-A

Applicant : Sony Corporation
Type of Equipment : IC Recorder
Model No. : ICD-TX800
FCC ID : AK8ICDTX800
Test regulation : FCC Part 15 Subpart C: 2017
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: June 22 to 25, 2017

Representative test engineer:


Kazutaka Takeyama
Engineer
Consumer Technology Division

Approved by:


Toyokazu Imamura
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".

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11822950S-A

[illegible]

CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Conducted Emission.....	9
SECTION 6: Radiated Spurious Emission	10
SECTION 7: Antenna Terminal Conducted Tests.....	11
APPENDIX 1: Test data	12
Conducted Emission	12
20dB Bandwidth and Carrier Frequency Separation.....	16
Number of Hopping Frequency	19
Dwell time.....	21
Maximum Peak Output Power	24
Average Output Power	25
Radiated Spurious Emission	27
Conducted Spurious Emission	38
Conducted Emission Band Edge compliance	44
99%Occupied Bandwidth	46
APPENDIX 2: Test instruments	48
APPENDIX 3: Photographs of test setup	49
Conducted Emission	49
Radiated Spurious Emission	50
Worst Case Position	51

SECTION 1: Customer information

Company Name	:	Sony Corporation
Brand Name	:	SONY
Address	:	1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan

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

2.1 Identification of E.U.T.

Type of Equipment	:	IC Recorder
Model No.	:	ICD-TX800
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.7 V (rechargeable battery) DC 5 V (USB)
Receipt Date of Sample	:	June 12, 2017
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: ICD-TX800 (referred to as the EUT in this report) is an IC Recorder.

General Specification

Clock frequency(ies) in the system	:	32.768 kHz (RTC), 24 MHz (CPU), 26 MHz (Bluetooth)
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, π /4DQPSK, 8DPSK (Classic Bluetooth), GFSK (Bluetooth Low Energy)
Power Supply (radio part input)	:	DC 1.8 V
Antenna type	:	Chip
Antenna Gain	:	-1.5 dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
 FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

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 June 14, 2017, does not affect the test specification applied to the EUT.

The EUT has been tested for compliance 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	13.6 dB, 0.18500 MHz, L1 QP, Tx 2402 MHz, DH5	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		-	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (b)		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	8.5 dB 9608.000 MHz, AV, Horizontal, Tx 2402 MHz DH5	Complied	Conducted/ Radiated (above 30 MHz) *1)

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 1.8 V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203

It is impossible for end users to replace the antenna, because it is mounted inside of the EUT. Therefore the equipment complies with the requirement.

3.3 Addition to standard

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

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

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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	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 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 %

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.

3.5 Test Location

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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.

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SECTION 4: Operation of E.U.T. during testing

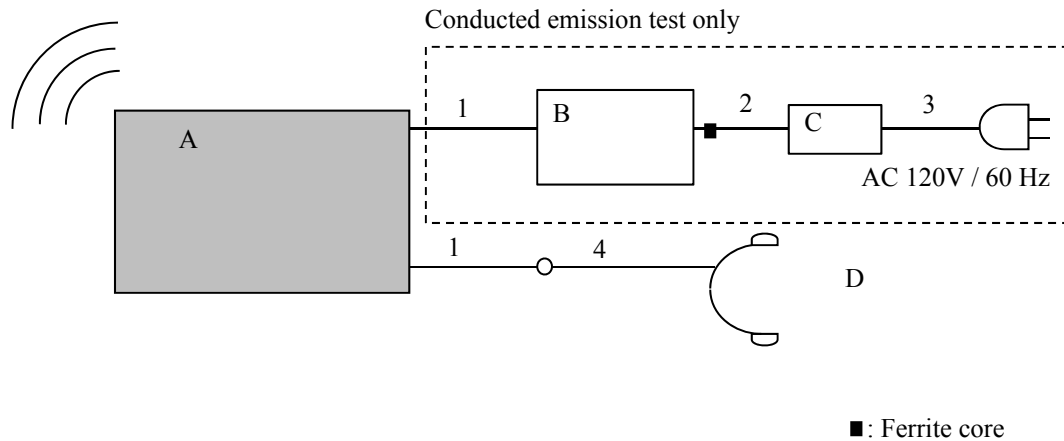
4.1 Operating Mode(s)

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
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 test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; - Power settings: Fixed - Software: N/A *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	IC Recorder	ICD-TX800	235 *1) 238 *2)	Sony Corporation	EUT
B	Laptop Computer	7666-77J	LV-B8PZ8 08/05	Lenovo	-
C	AC Adaptor	92P1213	11S92P1213Z1ZDDZ92C2B0	Lenovo	-
D	Headphones	MDR-E804Y	-	Sony Corporation	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB	0.5	Shielded	Shielded	-
2	DC power	1.8	Unshielded	Unshielded	-
3	AC power	1.0	Unshielded	Unshielded	-
4	Headphone	1.1	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded room. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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

SECTION 6: Radiated Spurious Emission

Test Procedure

[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 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

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

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

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

Test Antennas are used as below;

Frequency	30 MHz to 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	3.99 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz),		3.99 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz),

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

*2) Distance Factor: $20 \times \log (3.99 \text{ m}/3.0 \text{ m}) = 2.48 \text{ dB}$

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

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	Frequency			
	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 18 GHz	18 GHz - 26.5 GHz
Horizontal	X	Y	Y	Z
Vertical	X	Z	Z	X

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

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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

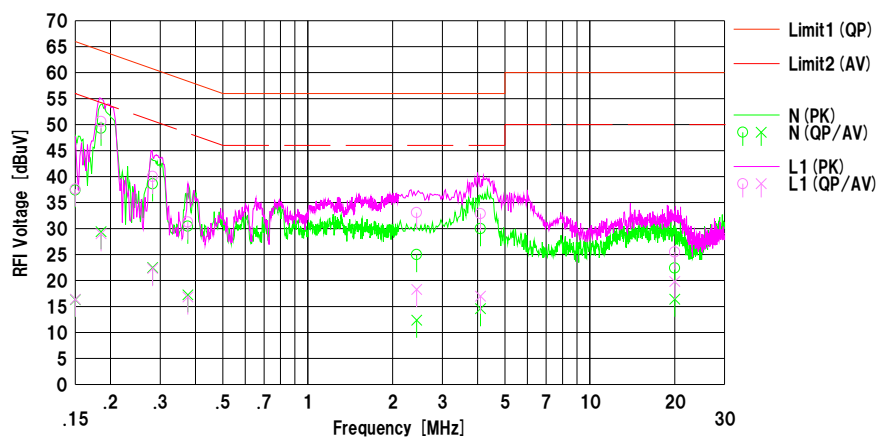
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2017/06/25

Mode : BT Tx DH5 2402MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 25 deg.C. / 55 %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
		<OP> [dBuV]	<AV> [dBuV]		<OP> [dBuV]	<AV> [dBuV]	<OP> [dBuV]	<AV> [dBuV]	<OP> [dBuV]	<AV> [dBuV]		
1	0.15000	25.00	3.90	12.41	37.41	16.31	66.00	56.00	28.5	39.6	N	
2	0.18500	36.90	17.00	12.41	49.31	29.41	64.26	54.26	14.9	24.8	N	
3	0.28200	26.20	10.10	12.43	38.63	22.53	60.76	50.76	22.1	28.2	N	
4	0.37600	18.00	4.80	12.46	30.46	17.26	58.37	48.37	27.9	31.1	N	
5	2.43300	12.40	-0.20	12.59	24.99	12.39	56.00	46.00	31.0	33.6	N	
6	4.09600	17.30	1.90	12.69	29.99	14.59	56.00	46.00	26.0	31.4	N	
7	19.99700	9.00	3.00	13.41	22.41	16.41	60.00	50.00	37.5	33.5	N	
8	0.15000	25.20	4.00	12.41	37.61	16.41	66.00	56.00	28.3	39.5	L1	
9	0.18500	38.20	16.60	12.41	50.61	29.01	64.26	54.26	13.6	25.2	L1	
10	0.28200	27.60	9.90	12.43	40.03	22.33	60.76	50.76	20.7	28.4	L1	
11	0.37600	18.80	4.40	12.46	31.26	16.86	58.37	48.37	27.1	31.5	L1	
12	2.43300	20.50	5.70	12.59	33.09	18.29	56.00	46.00	22.9	27.7	L1	
13	4.09600	20.20	4.30	12.69	32.89	16.99	56.00	46.00	23.1	29.0	L1	
14	19.99723	12.10	6.40	13.41	25.51	19.81	60.00	50.00	34.4	30.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-01

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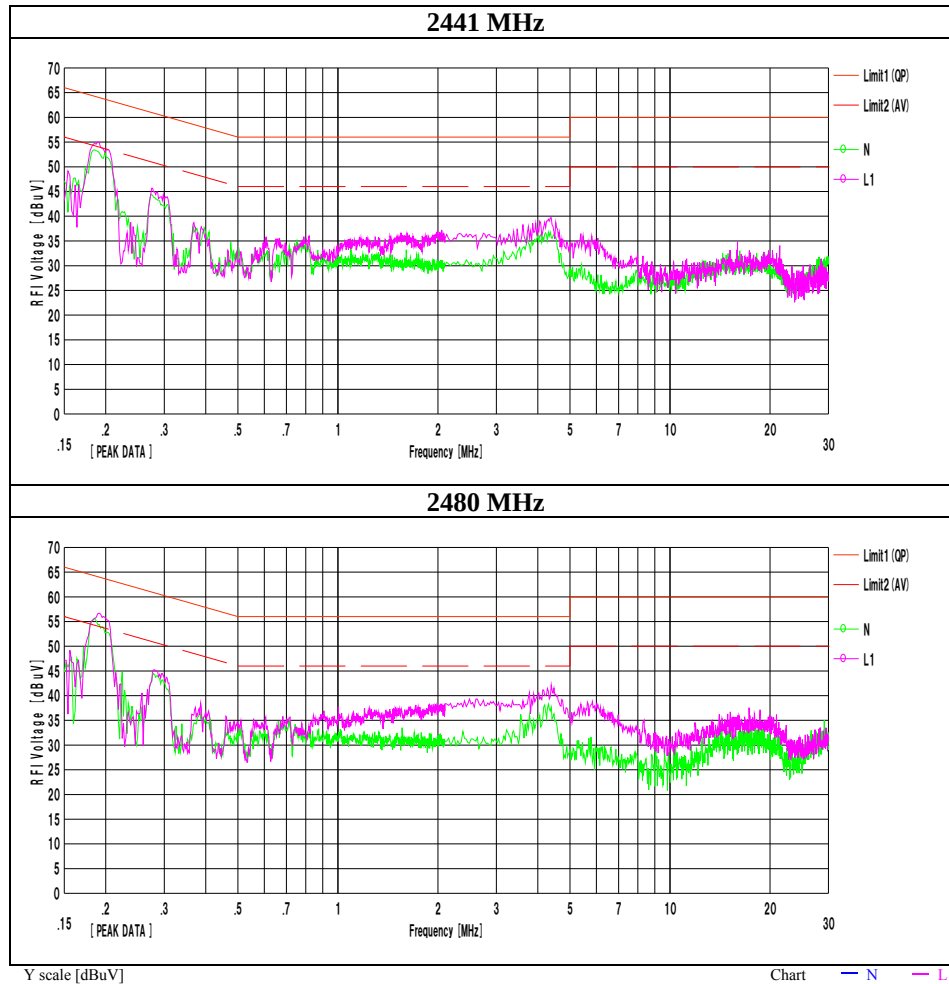
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Conducted Emission

Test place	Shonan EMC Lab. No.1 Shielded room
Report No.	11822950S-A
Date	June 25, 2017
Temperature / Humidity	22 deg. C / 55 % RH
Engineer	Kazutaka Takeyama
Mode	Tx, Hopping Off, DH5



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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2017/06/25

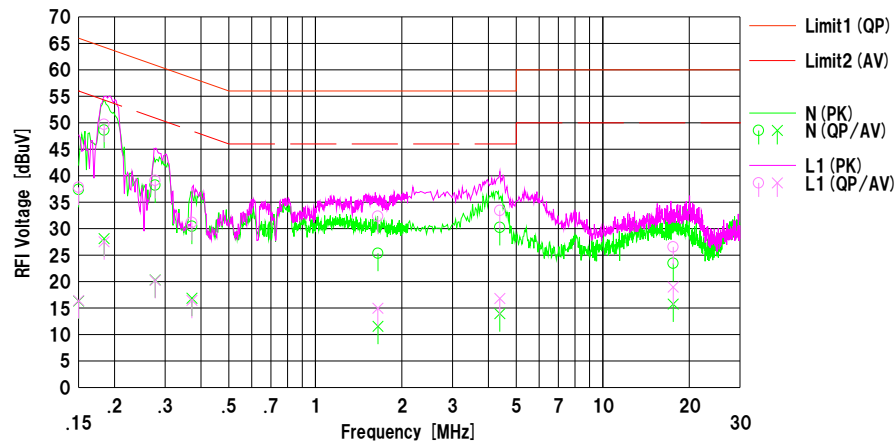
Mode : BT Tx 3DH5 2402MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 25 deg.C. / 55 %RH

Remarks : -

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

Engineer : Kazutaka Takeyama

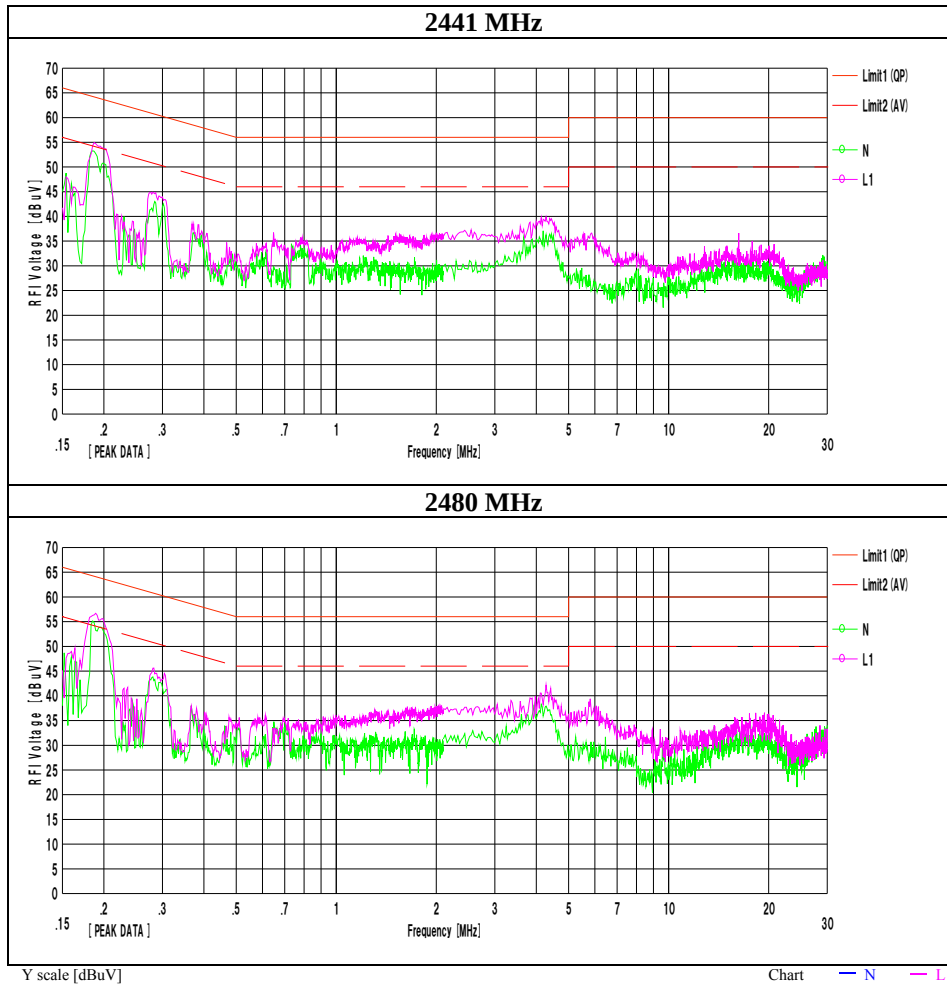


No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	25.00	3.90	12.41	37.41	16.31	66.00	56.00	28.5	39.6	N	
2	0.18400	36.20	15.70	12.41	48.61	28.11	64.30	54.30	15.6	26.1	N	
3	0.27700	25.80	7.90	12.42	38.22	20.32	60.91	50.91	22.6	30.5	N	
4	0.37200	18.00	4.40	12.45	30.45	16.85	58.46	48.46	28.0	31.6	N	
5	1.65047	12.80	-1.00	12.55	25.35	11.55	56.00	46.00	30.6	34.4	N	
6	4.38100	17.50	1.20	12.72	30.22	13.92	56.00	46.00	25.7	32.0	N	
7	17.58200	10.10	2.40	13.35	23.45	15.75	60.00	50.00	36.5	34.2	N	
8	0.15000	25.40	4.00	12.41	37.81	16.41	66.00	56.00	28.1	39.5	L1	
9	0.18400	37.30	15.10	12.41	49.71	27.51	64.30	54.30	14.5	26.7	L1	
10	0.27700	26.70	7.80	12.42	39.12	20.22	60.91	50.91	21.7	30.6	L1	
11	0.37200	18.70	4.00	12.45	31.15	16.45	58.46	48.46	27.3	32.0	L1	
12	1.65000	19.80	2.40	12.55	32.35	14.95	56.00	46.00	23.6	31.0	L1	
13	4.38100	20.70	4.10	12.72	33.42	16.82	56.00	46.00	22.5	29.1	L1	
14	17.58200	13.20	5.60	13.35	26.55	18.95	60.00	50.00	33.4	31.0	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-01

Conducted Emission

Test place	Shonan EMC Lab. No.1 Shielded room
Report No.	11822950S-A
Date	June 25, 2017
Temperature / Humidity	22 deg. C / 55 % RH
Engineer	Kazutaka Takeyama
Mode	Tx, Hopping Off, 3DH5



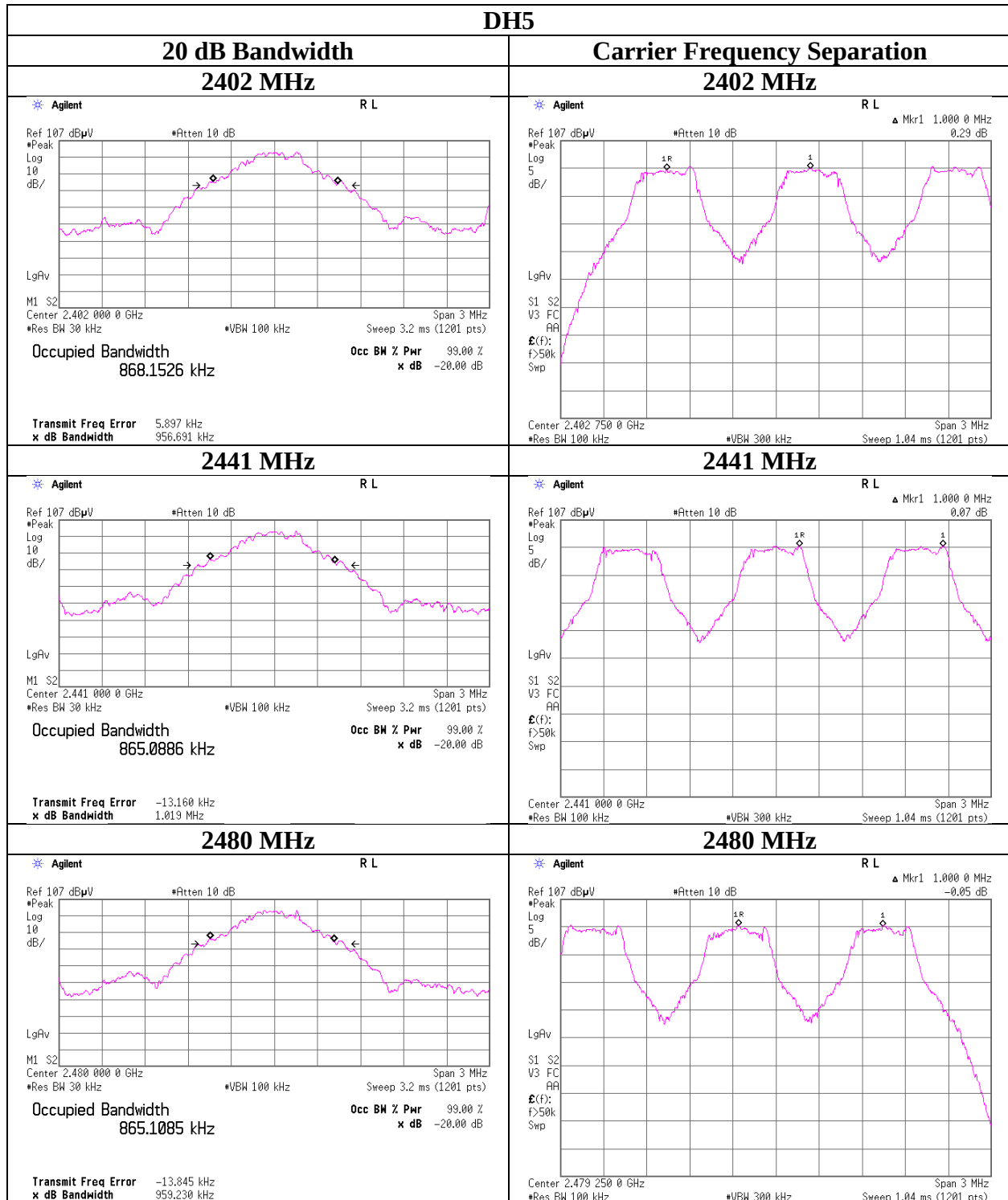
20dB Bandwidth and Carrier Frequency Separation

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11822950S-A
Date June 23, 2017
Temperature / Humidity 25 deg. C / 52 % RH
Engineer Hiroyuki Morikawa
Mode Tx, Hopping On

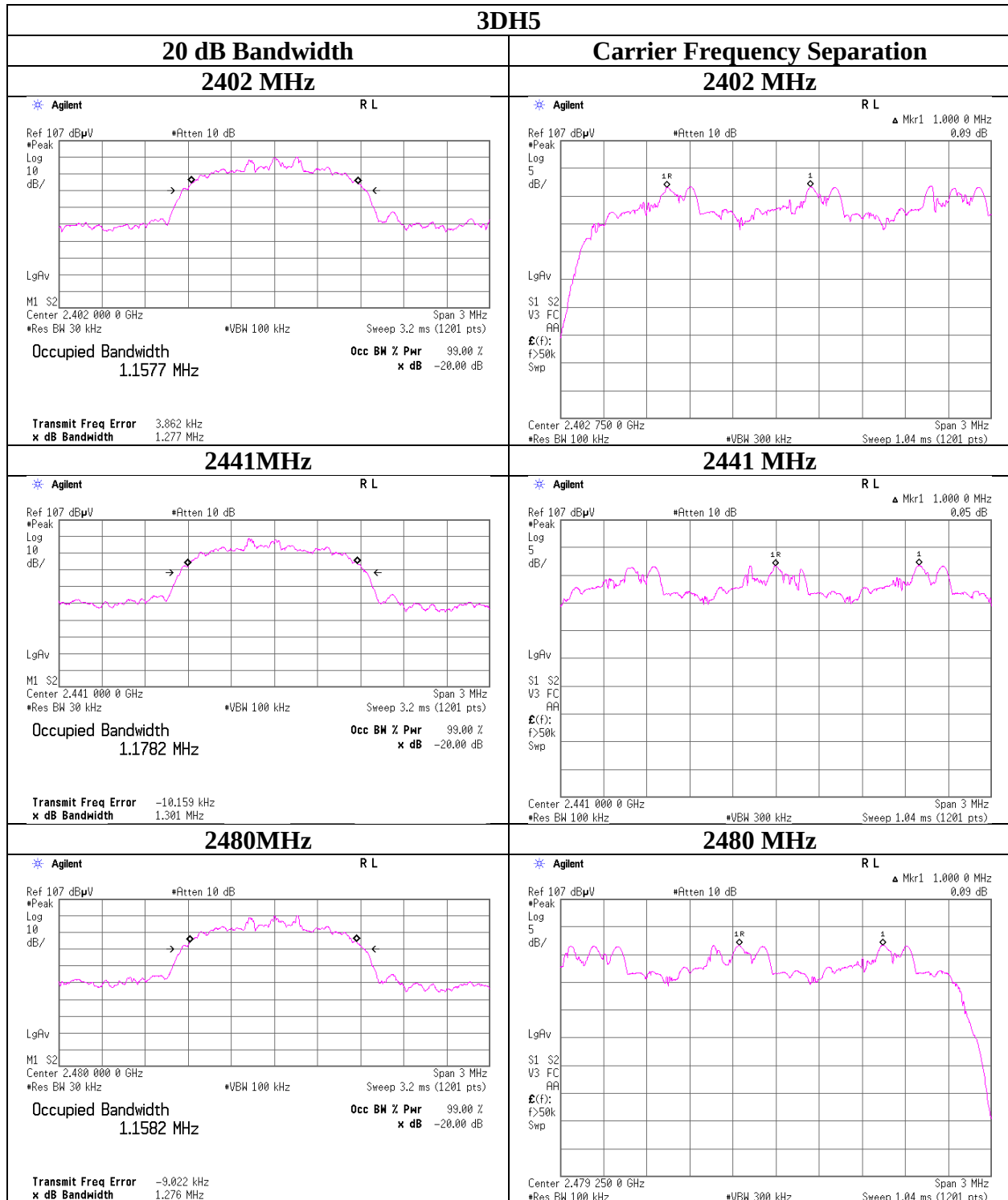
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.957	1.000	≥ 0.638
DH5	2441.0	1.019	1.000	≥ 0.679
DH5	2480.0	0.959	1.000	≥ 0.639
3DH5	2402.0	1.277	1.000	≥ 0.851
3DH5	2441.0	1.301	1.000	≥ 0.867
3DH5	2480.0	1.276	1.000	≥ 0.851

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

20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation



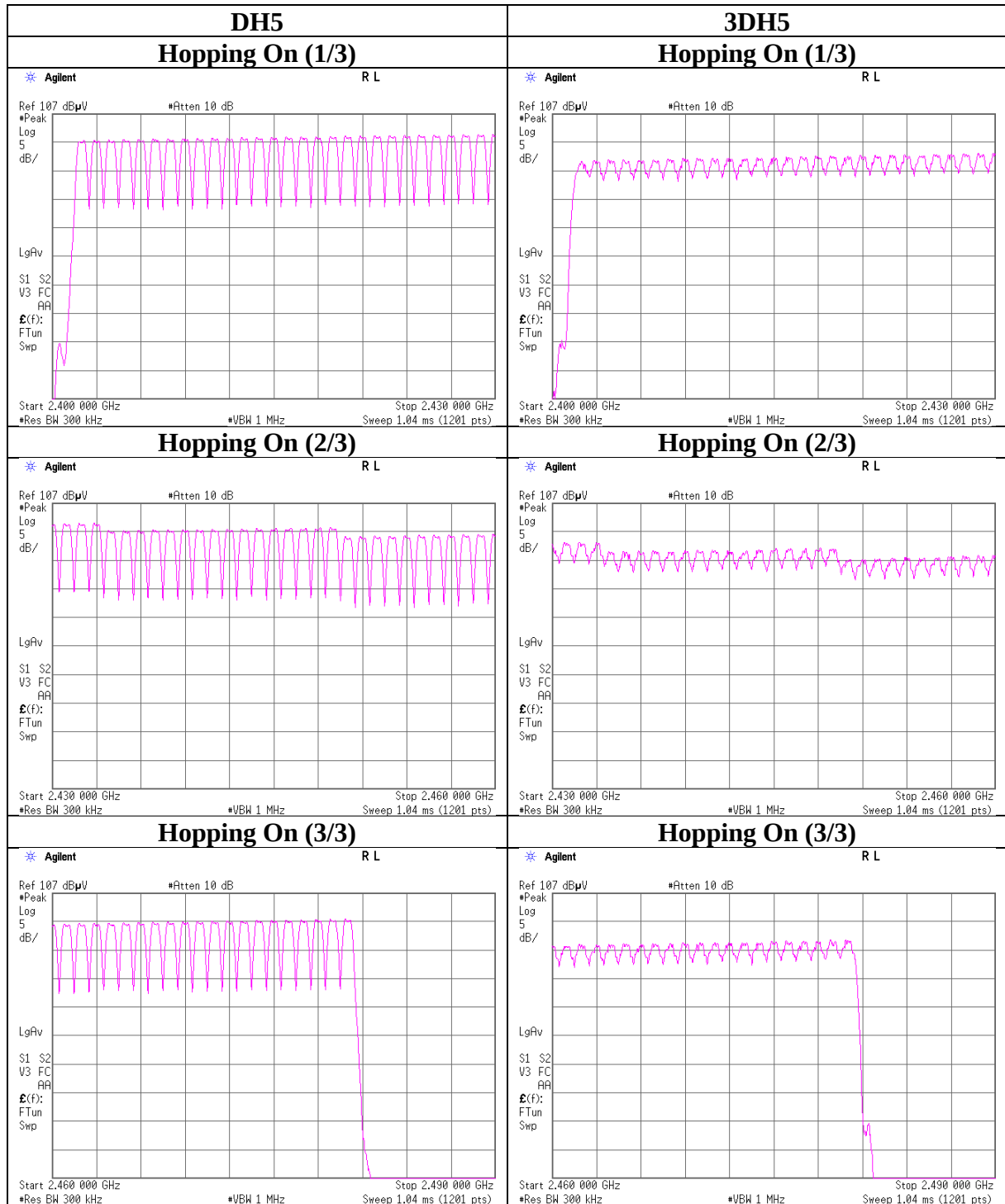
Number of Hopping Frequency

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11822950S-A
Date June 23, 2017
Temperature / Humidity 25 deg. C / 52 % RH
Engineer Hiroyuki Morikawa
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.5 Shielded Room
Report No. 11822950S-A
Date June 23, 2017
Temperature / Humidity 25 deg. C / 52 % RH
Engineer Hiroyuki Morikawa
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	50.0 times	/	5 sec.	x 31.6 sec. =	316 times	0.410	400
DH3	26.0 times	/	5 sec.	x 31.6 sec. =	165 times	1.668	400
DH5	17.0 times	/	5 sec.	x 31.6 sec. =	108 times	2.915	400
3DH1	50.0 times	/	5 sec.	x 31.6 sec. =	316 times	0.422	400
3DH3	26.0 times	/	5 sec.	x 31.6 sec. =	165 times	1.676	400
3DH5	17.0 times	/	5 sec.	x 31.6 sec. =	108 times	2.920	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

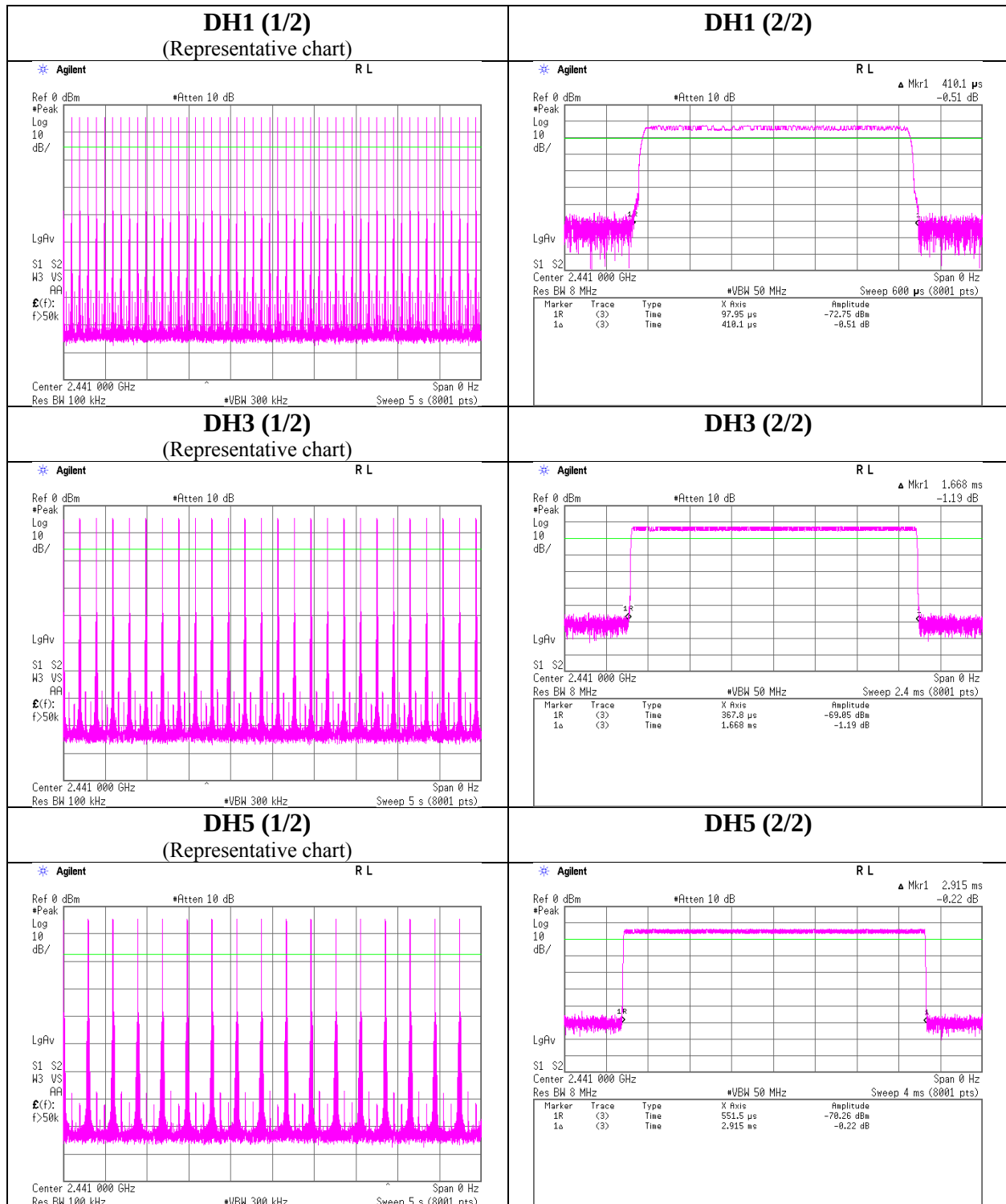
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	50	50	50	50	50
DH3	26	26	26	26	26	26
DH5	17	17	17	17	17	17
3DH1	50	50	50	50	50	50
3DH3	26	26	26	26	26	26
3DH5	17	17	17	17	17	17

Sample Calculation

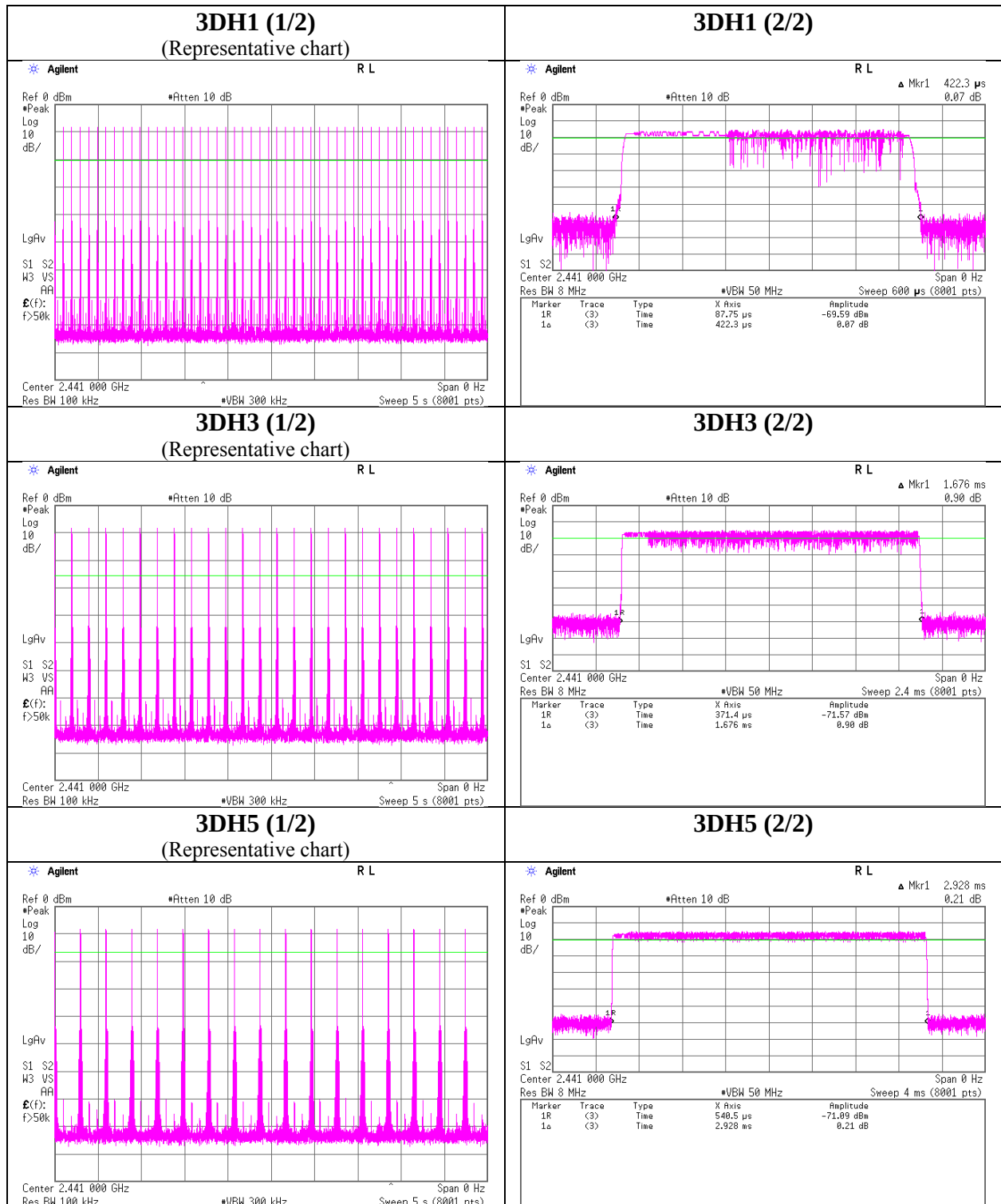
Average = Summation (Sampling 1 to 5) / 5

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, 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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Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-A
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx, Hopping On

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-4.31	1.00	9.96	6.65	4.62	20.96	125	14.31
DH5	2441.0	-4.16	1.00	9.97	6.81	4.80	20.96	125	14.15
DH5	2480.0	-4.26	1.01	9.97	6.72	4.70	20.96	125	14.24
2DH5	2402.0	-6.46	1.00	9.96	4.50	2.82	20.96	125	16.46
2DH5	2441.0	-6.24	1.00	9.97	4.73	2.97	20.96	125	16.23
2DH5	2480.0	-6.33	1.01	9.97	4.65	2.92	20.96	125	16.31
3DH5	2402.0	-5.99	1.00	9.96	4.97	3.14	20.96	125	15.99
3DH5	2441.0	-5.73	1.00	9.97	5.24	3.34	20.96	125	15.72
3DH5	2480.0	-5.93	1.01	9.97	5.05	3.20	20.96	125	15.91

Sample Calculation:

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

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

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

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

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Average Output Power (Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-A
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx, Hopping On

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	-5.91	1.00	9.96	5.05	3.20	1.10	6.15	4.12
DH5	2441.0	-5.78	1.00	9.97	5.19	3.30	1.10	6.29	4.25
DH5	2480.0	-5.83	1.01	9.97	5.15	3.27	1.10	6.25	4.21
2DH5	2402.0	-10.76	1.00	9.96	0.20	1.05	1.07	1.27	1.34
2DH5	2441.0	-10.66	1.00	9.97	0.31	1.07	1.07	1.38	1.37
2DH5	2480.0	-10.70	1.01	9.97	0.28	1.07	1.07	1.35	1.36
3DH5	2402.0	-10.74	1.00	9.96	0.22	1.05	1.08	1.30	1.35
3DH5	2441.0	-10.63	1.00	9.97	0.34	1.08	1.08	1.42	1.39
3DH5	2480.0	-10.69	1.01	9.97	0.29	1.07	1.08	1.37	1.37

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.

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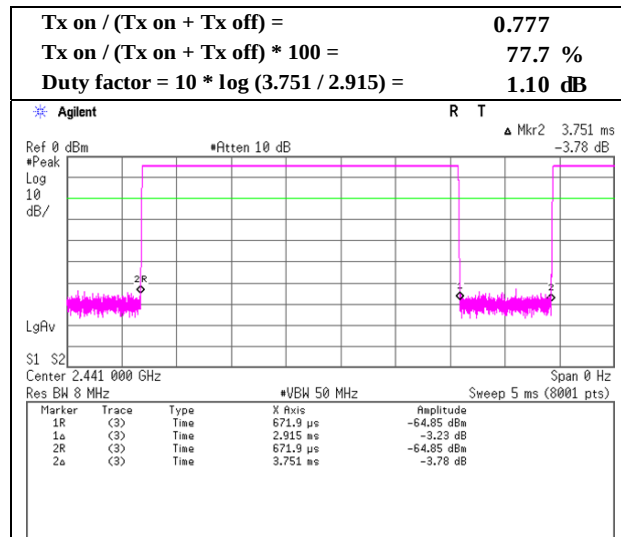
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

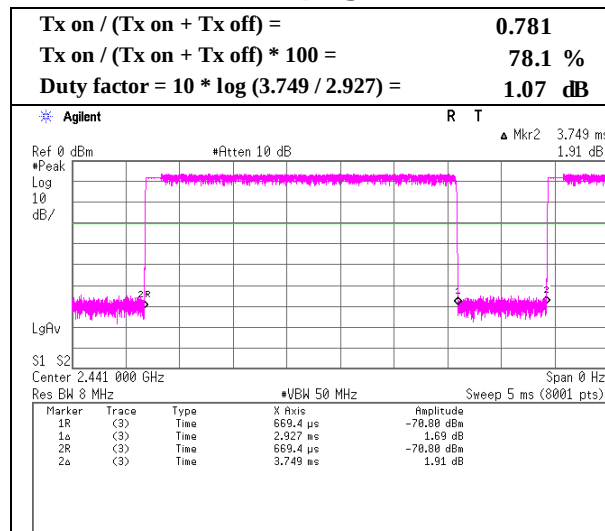
Burst Rate Confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping On

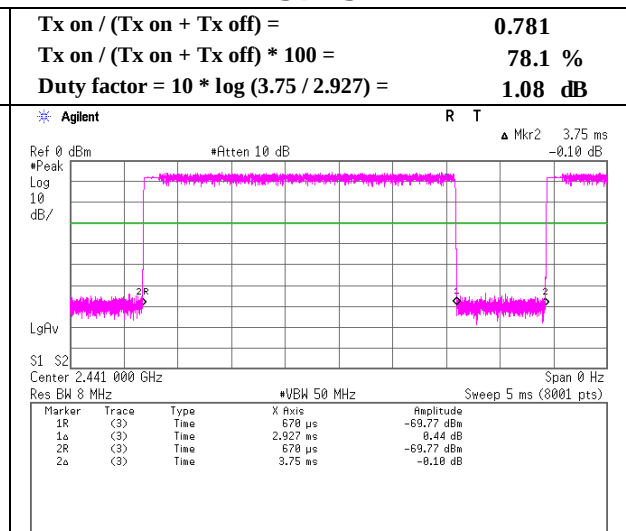
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	42.373	QP	23.30	13.34	6.86	32.12	0.00	11.38	40.00	28.6	300	357	
Hori.	148.679	QP	22.80	14.77	7.91	32.03	0.00	13.45	43.50	30.0	300	25	
Hori.	388.802	QP	22.50	15.37	9.16	31.86	0.00	15.17	46.00	30.8	150	301	
Hori.	678.390	QP	22.80	19.44	10.31	31.79	0.00	20.76	46.00	25.2	150	11	
Hori.	2390.000	PK	47.50	27.41	14.02	40.85	2.48	50.56	73.90	23.3	133	2	
Hori.	4804.000	PK	51.60	31.13	6.41	41.86	2.48	49.76	73.90	24.1	300	273	
Hori.	7206.000	PK	48.10	36.44	8.09	41.18	2.48	53.93	73.90	19.9	100	0	
Hori.	9608.000	PK	47.20	38.63	9.30	40.59	2.48	57.02	73.90	16.8	100	0	
Hori.	19220.000	PK	49.85	40.44	8.30	45.06	-9.54	43.99	73.90	29.9	126	292	
Hori.	2390.000	AV	35.10	27.41	14.02	40.85	2.48	38.16	53.90	15.7	133	2	
Hori.	4804.000	AV	44.00	31.13	6.41	41.86	2.48	42.16	53.90	11.7	300	273	
Hori.	7206.000	AV	36.70	36.44	8.09	41.18	2.48	42.53	53.90	11.3	100	0	
Hori.	9608.000	AV	35.50	38.63	9.30	40.59	2.48	45.32	53.90	8.5	100	0	
Hori.	19220.000	AV	44.61	40.44	8.30	45.06	-9.54	38.75	53.90	15.1	126	292	
Vert.	136.588	QP	23.00	14.05	7.68	32.04	0.00	12.69	43.50	30.8	100	1	
Vert.	800.009	QP	22.70	20.57	10.71	31.46	0.00	22.52	46.00	23.4	100	291	
Vert.	936.858	QP	20.80	22.05	11.16	30.59	0.00	23.42	46.00	22.5	100	356	
Vert.	2390.000	PK	46.70	27.41	14.02	40.85	2.48	49.76	73.90	24.1	144	3	
Vert.	4804.000	PK	52.70	31.13	6.41	41.86	2.48	50.86	73.90	23.0	123	253	
Vert.	7206.000	PK	47.00	36.44	8.09	41.18	2.48	52.83	73.90	21.0	100	0	
Vert.	9608.000	PK	47.30	38.63	9.30	40.59	2.48	57.12	73.90	16.7	100	0	
Vert.	19220.000	PK	50.13	40.44	8.30	45.06	-9.54	44.27	73.90	29.6	174	6	
Vert.	2390.000	AV	35.00	27.41	14.02	40.85	2.48	38.06	53.90	15.8	144	3	
Vert.	4804.000	AV	44.40	31.13	6.41	41.86	2.48	42.56	53.90	11.3	123	253	
Vert.	7206.000	AV	34.50	36.44	8.09	41.18	2.48	40.33	53.90	13.5	100	0	
Vert.	9608.000	AV	34.30	38.63	9.30	40.59	2.48	44.12	53.90	9.7	100	0	
Vert.	19220.000	AV	44.34	40.44	8.30	45.06	-9.54	38.48	53.90	15.4	174	6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48dB

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	99.00	27.46	14.03	40.84	2.48	102.13	-	-	Carrre
Hori.	2400.000	PK	54.00	27.45	14.03	40.84	2.48	57.12	82.13	25.0	
Hori.	2532.060	PK	42.60	27.90	14.15	40.84	2.48	46.29	82.13	35.8	
Hori.	2558.000	PK	46.19	27.93	14.19	40.87	2.48	49.92	82.13	32.2	
Hori.	2584.000	PK	45.22	27.96	14.21	40.90	2.48	48.97	82.13	33.2	
Vert.	2402.000	PK	97.70	27.46	14.03	40.84	2.48	100.83	-	-	Carrre
Vert.	2400.000	PK	53.70	27.45	14.03	40.84	2.48	56.82	80.83	24.0	
Vert.	2558.000	PK	46.65	27.93	14.19	40.87	2.48	50.38	80.83	30.5	
Vert.	2584.000	PK	43.50	27.96	14.21	40.90	2.48	47.25	80.83	33.6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48dB

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

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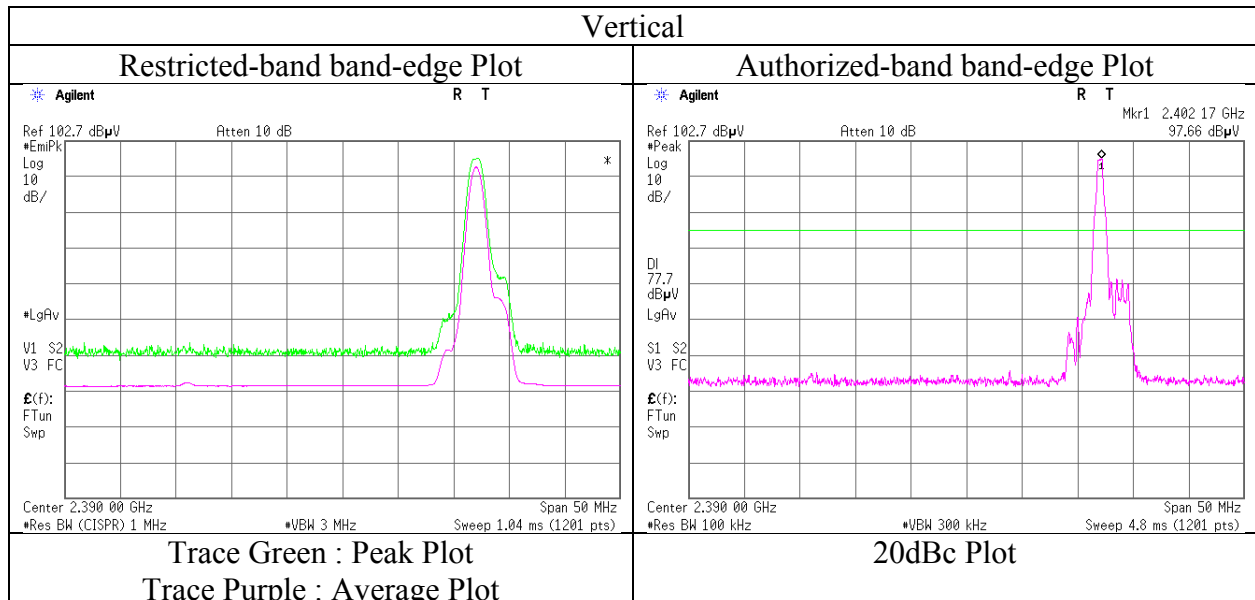
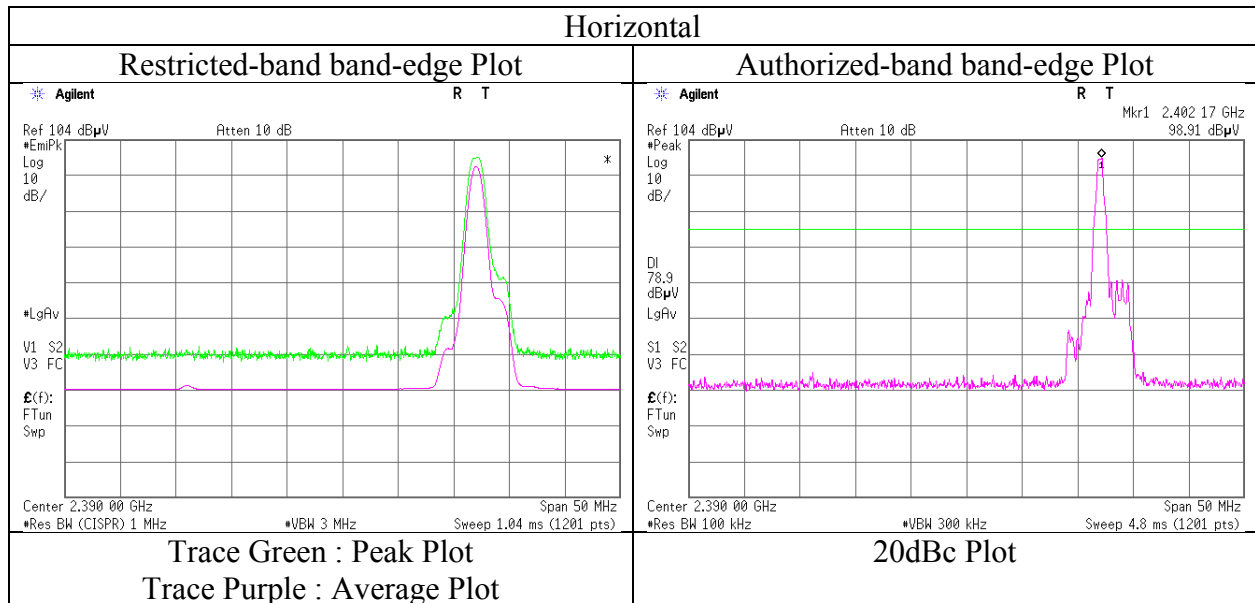
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11822950S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	181.679	QP	23.00	16.28	7.97	32.01	0.00	15.24	43.50	28.2	150	212	
Hori.	444.828	QP	22.80	16.53	9.41	31.85	0.00	16.89	46.00	29.1	150	90	
Hori.	713.564	QP	22.50	19.71	10.43	31.72	0.00	20.92	46.00	25.0	100	341	
Hori.	4882.000	PK	51.30	31.29	6.47	41.76	2.48	49.78	73.90	24.1	256	331	
Hori.	7323.000	PK	45.00	36.77	8.25	41.27	2.48	51.23	73.90	22.6	100	0	
Hori.	9764.000	PK	43.00	38.75	9.40	40.62	2.48	53.01	73.90	20.8	100	0	
Hori.	19524.000	PK	49.46	40.34	8.39	45.01	-9.54	43.64	73.90	30.2	130	295	
Hori.	4882.000	AV	42.30	31.29	6.47	41.76	2.48	40.78	53.90	13.1	256	331	
Hori.	7323.000	AV	36.10	36.77	8.25	41.27	2.48	42.33	53.90	11.5	100	0	
Hori.	9764.000	AV	34.40	38.75	9.40	40.62	2.48	44.41	53.90	9.4	100	0	
Hori.	19524.000	AV	43.80	40.34	8.39	45.01	-9.54	37.98	53.90	15.9	130	295	
Vert.	129.943	QP	23.00	13.57	7.55	32.05	0.00	12.07	43.50	31.4	100	107	
Vert.	160.222	QP	22.90	15.40	8.02	32.02	0.00	14.30	43.50	29.2	100	244	
Vert.	794.567	QP	22.80	20.52	10.69	31.48	0.00	22.53	46.00	23.4	100	355	
Vert.	922.477	QP	22.50	22.01	11.12	30.72	0.00	24.91	46.00	21.0	100	200	
Vert.	4882.000	PK	53.90	31.29	6.47	41.76	2.48	52.38	73.90	21.5	200	258	
Vert.	7323.000	PK	45.00	36.77	8.25	41.27	2.48	51.23	73.90	22.6	100	0	
Vert.	9764.000	PK	44.40	38.75	9.40	40.62	2.48	54.41	73.90	19.4	100	0	
Vert.	19524.000	PK	50.83	40.34	8.39	45.01	-9.54	45.01	73.90	28.8	178	6	
Vert.	4882.000	AV	44.70	31.29	6.47	41.76	2.48	43.18	53.90	10.7	200	258	
Vert.	7323.000	AV	35.00	36.77	8.25	41.27	2.48	41.23	53.90	12.6	100	0	
Vert.	9764.000	AV	34.00	38.75	9.40	40.62	2.48	44.01	53.90	9.8	100	0	
Vert.	19524.000	AV	44.36	40.34	8.39	45.01	-9.54	38.54	53.90	15.3	178	6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48dB

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.	2441.000	PK	97.40	27.62	14.08	40.83	2.48	100.75	-	-	Carrier
Hori.	2571.000	PK	43.63	27.94	14.20	40.89	2.48	47.36	80.75	33.4	
Hori.	2597.000	PK	45.12	27.97	14.22	40.92	2.48	48.87	80.75	31.9	
Vert.	2441.000	PK	97.60	27.62	14.08	40.83	2.48	100.95	-	-	Carrier
Vert.	2571.000	PK	42.72	27.94	14.20	40.89	2.48	46.45	80.95	34.5	
Vert.	2597.000	PK	44.75	27.97	14.22	40.92	2.48	48.50	80.95	32.5	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48dB

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

UL Japan, Inc.

Shonan EMC Lab.

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

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Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	107.023	QP	23.10	10.98	7.43	32.07	0.00	9.44	43.50	34.0	200	1	
Hori.	352.530	QP	22.50	14.56	9.00	31.84	0.00	14.22	46.00	31.7	150	325	
Hori.	415.244	QP	22.60	15.93	9.28	31.86	0.00	15.95	46.00	30.0	150	115	
Hori.	2483.500	PK	50.00	27.79	14.12	40.81	2.48	53.58	73.90	20.3	325	1	
Hori.	4960.000	PK	49.30	31.45	6.52	41.65	2.48	48.10	73.90	25.8	256	333	
Hori.	7440.000	PK	46.60	37.11	8.40	41.36	2.48	53.23	73.90	20.6	100	0	
Hori.	9920.000	PK	45.70	38.87	9.49	40.66	2.48	55.88	73.90	18.0	100	0	
Hori.	19836.000	PK	49.31	40.24	8.45	45.11	-9.54	43.35	73.90	30.5	132	292	
Hori.	2483.500	AV	35.50	27.79	14.12	40.81	2.48	39.08	53.90	14.8	325	1	
Hori.	4960.000	AV	40.60	31.45	6.52	41.65	2.48	39.40	53.90	14.5	256	333	
Hori.	7440.000	AV	36.30	37.11	8.40	41.36	2.48	42.93	53.90	10.9	100	0	
Hori.	9920.000	AV	34.30	38.87	9.49	40.66	2.48	44.48	53.90	9.4	100	0	
Hori.	19836.000	AV	43.12	40.24	8.45	45.11	-9.54	37.16	53.90	16.7	132	292	
Vert.	178.083	QP	23.00	16.19	7.98	32.01	0.00	15.16	43.50	28.3	100	141	
Vert.	563.373	QP	22.70	18.47	9.88	31.87	0.00	19.18	46.00	26.8	100	48	
Vert.	821.485	QP	22.80	20.87	10.78	31.36	0.00	23.09	46.00	22.9	100	15	
Vert.	985.530	QP	22.40	22.19	11.31	30.20	0.00	25.70	53.90	28.2	100	309	
Vert.	2483.500	PK	50.50	27.79	14.12	40.81	2.48	54.08	73.90	19.8	155	10	
Vert.	4960.000	PK	53.30	31.45	6.52	41.65	2.48	52.10	73.90	21.8	163	262	
Vert.	7440.000	PK	46.30	37.11	8.40	41.36	2.48	52.93	73.90	20.9	100	0	
Vert.	9920.000	PK	45.00	38.87	9.49	40.66	2.48	55.18	73.90	18.7	100	0	
Vert.	19836.000	PK	49.14	40.24	8.45	45.11	-9.54	43.18	73.90	30.7	179	5	
Vert.	2483.500	AV	35.80	27.79	14.12	40.81	2.48	39.38	53.90	14.5	155	10	
Vert.	4960.000	AV	43.80	31.45	6.52	41.65	2.48	42.60	53.90	11.3	163	262	
Vert.	7440.000	AV	36.00	37.11	8.40	41.36	2.48	42.63	53.90	11.2	100	0	
Vert.	9920.000	AV	34.50	38.87	9.49	40.66	2.48	44.68	53.90	9.2	100	0	
Vert.	19836.000	AV	42.65	40.24	8.45	45.11	-9.54	36.69	53.90	17.2	179	5	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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.	2480.000	PK	95.80	27.78	14.12	40.81	2.48	99.37	-	-	Carrier
Hori.	2636.000	PK	41.08	28.02	14.26	40.97	2.48	44.87	79.37	34.5	
Vert.	2480.000	PK	95.60	27.78	14.12	40.81	2.48	99.17	-	-	Carrier
Vert.	2636.000	PK	41.14	28.02	14.26	40.97	2.48	44.93	79.17	34.2	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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

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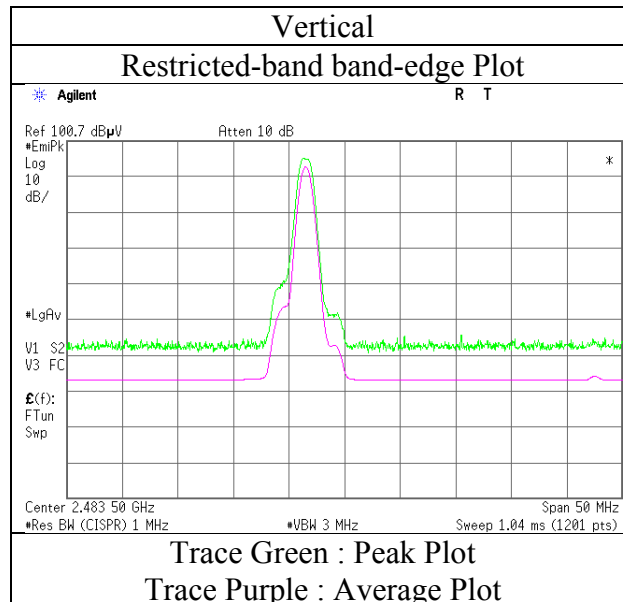
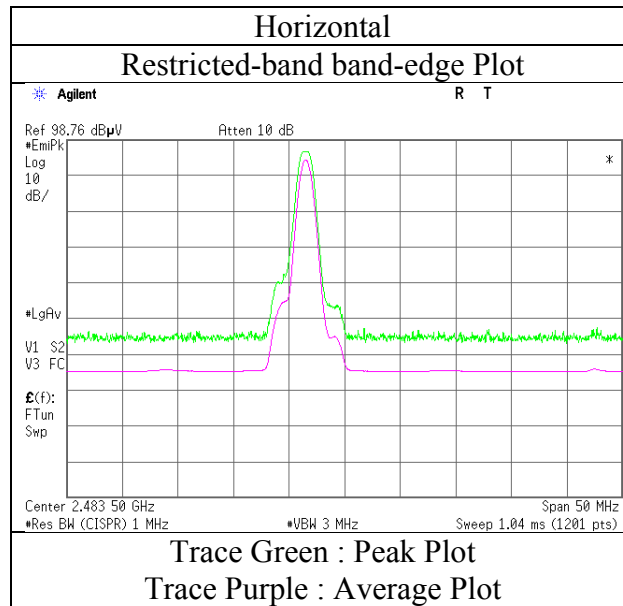
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11822950S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	129.977	QP	23.00	13.57	7.55	32.05	0.00	12.07	43.50	31.4	300	127	
Hori.	178.413	QP	23.10	16.21	7.98	32.01	0.00	15.28	43.50	28.2	300	67	
Hori.	894.398	QP	22.60	21.87	11.03	30.96	0.00	24.54	46.00	21.4	150	336	
Hori.	2390.000	PK	45.00	27.41	14.02	40.85	2.48	48.06	73.90	25.8	127	357	
Hori.	4804.000	PK	50.80	31.13	6.41	41.86	2.48	48.96	73.90	24.9	302	283	
Hori.	7206.000	PK	49.00	36.44	8.09	41.18	2.48	54.83	73.90	19.0	100	0	
Hori.	9608.000	PK	48.10	38.63	9.30	40.59	2.48	57.92	73.90	15.9	100	0	
Hori.	19220.000	PK	49.66	40.44	8.30	45.06	-9.54	43.80	73.90	30.1	128	291	
Hori.	2390.000	AV	33.90	27.41	14.02	40.85	2.48	36.96	53.90	16.9	127	357	
Hori.	4804.000	AV	38.60	31.13	6.41	41.86	2.48	36.76	53.90	17.1	302	283	
Hori.	7206.000	AV	36.30	36.44	8.09	41.18	2.48	42.13	53.90	11.7	100	0	
Hori.	9608.000	AV	34.90	38.63	9.30	40.59	2.48	44.72	53.90	9.1	100	0	
Hori.	19220.000	AV	44.11	40.44	8.30	45.06	-9.54	38.25	53.90	15.6	128	291	
Vert.	35.103	QP	23.60	15.89	6.73	32.13	0.00	14.09	40.00	25.9	100	358	
Vert.	455.038	QP	22.90	16.73	9.46	31.85	0.00	17.24	46.00	28.7	100	201	
Vert.	723.833	QP	22.60	19.82	10.46	31.70	0.00	21.18	46.00	24.8	100	89	
Vert.	943.846	QP	22.70	22.07	11.18	30.53	0.00	25.42	46.00	20.5	100	356	
Vert.	2390.000	PK	45.30	27.41	14.02	40.85	2.48	48.36	73.90	25.5	144	345	
Vert.	4804.000	PK	51.08	31.13	6.41	41.86	2.48	49.24	73.90	24.6	120	270	
Vert.	7206.000	PK	46.20	36.44	8.09	41.18	2.48	52.03	73.90	21.8	100	0	
Vert.	9608.000	PK	46.00	38.63	9.30	40.59	2.48	55.82	73.90	18.0	100	0	
Vert.	19220.000	PK	50.21	40.44	8.30	45.06	-9.54	44.35	73.90	29.5	181	9	
Vert.	2390.000	AV	34.30	27.41	14.02	40.85	2.48	37.36	53.90	16.5	144	345	
Vert.	4804.000	AV	39.30	31.13	6.41	41.86	2.48	37.46	53.90	16.4	120	270	
Vert.	7206.000	AV	34.20	36.44	8.09	41.18	2.48	40.03	53.90	13.8	100	0	
Vert.	9608.000	AV	34.30	38.63	9.30	40.59	2.48	44.12	53.90	9.7	100	0	
Vert.	19220.000	AV	44.22	40.44	8.30	45.06	-9.54	38.36	53.90	15.5	181	9	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 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	95.80	27.46	14.03	40.84	2.48	98.93	-	-	Carrier
Hori.	2400.000	PK	47.70	27.45	14.03	40.84	2.48	50.82	78.93	28.1	
Hori.	2558.000	PK	44.54	27.93	14.19	40.87	2.48	48.27	78.93	30.7	
Hori.	2584.000	PK	42.97	27.96	14.21	40.90	2.48	46.72	78.93	32.2	
Vert.	2402.000	PK	95.50	27.46	14.03	40.84	2.48	98.63	-	-	Carrier
Vert.	2400.000	PK	48.40	27.45	14.03	40.84	2.48	51.52	78.63	27.1	
Vert.	2558.000	PK	45.02	27.93	14.19	40.87	2.48	48.75	78.63	29.9	
Vert.	2584.000	PK	41.96	27.96	14.21	40.90	2.48	45.71	78.63	32.9	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

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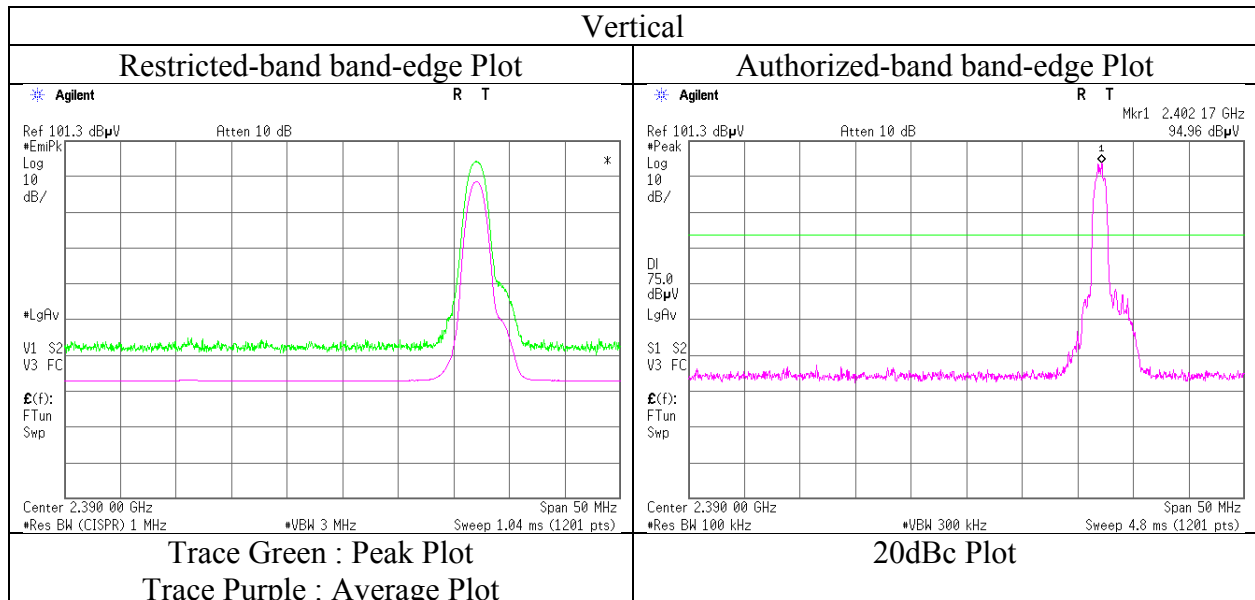
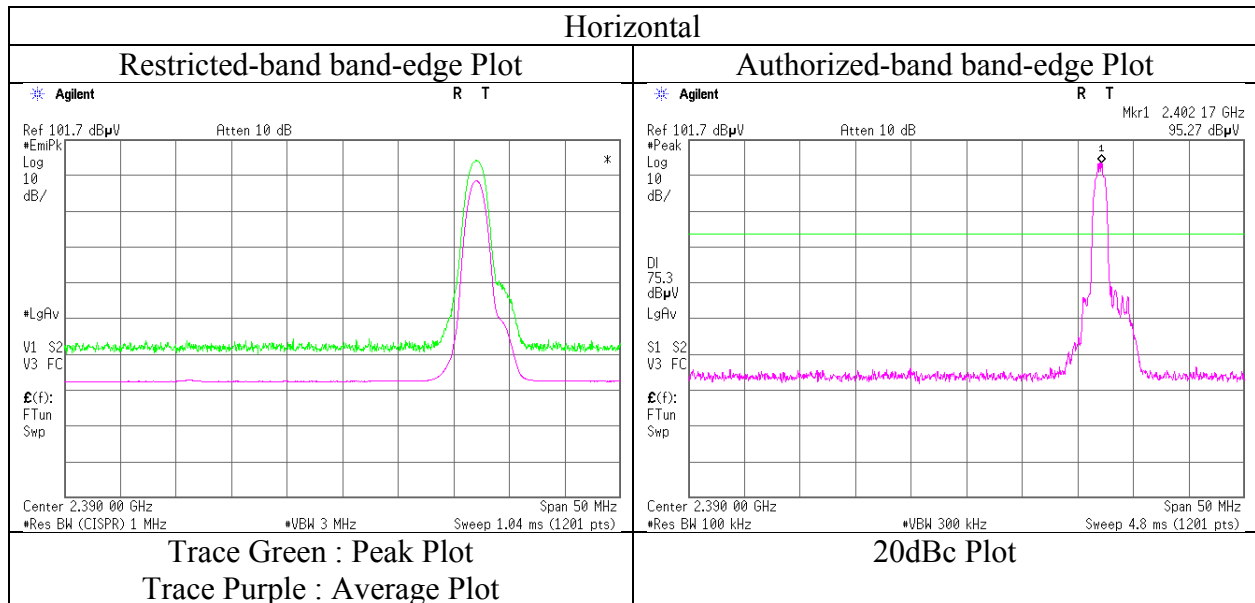
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11822950S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	178.065	QP	23.00	16.19	7.98	32.01	0.00	15.16	43.50	28.3	200	37	
Hori.	593.615	QP	23.00	18.87	10.00	31.83	0.00	20.04	46.00	25.9	150	40	
Hori.	733.399	QP	22.80	19.91	10.49	31.69	0.00	21.51	46.00	24.4	150	74	
Hori.	948.042	QP	22.70	22.08	11.19	30.49	0.00	25.48	46.00	20.5	150	347	
Hori.	4882.000	PK	50.70	31.29	6.47	41.76	2.48	49.18	73.90	24.7	253	323	
Hori.	7323.000	PK	45.40	36.77	8.25	41.27	2.48	51.63	73.90	22.2	100	0	
Hori.	9764.000	PK	43.30	38.75	9.40	40.62	2.48	53.31	73.90	20.5	100	0	
Hori.	19524.000	PK	51.87	40.34	8.39	45.01	-9.54	46.05	73.90	27.8	128	282	
Hori.	4882.000	AV	38.00	31.29	6.47	41.76	2.48	36.48	53.90	17.4	253	323	
Hori.	7323.000	AV	35.80	36.77	8.25	41.27	2.48	42.03	53.90	11.8	100	0	
Hori.	9764.000	AV	34.00	38.75	9.40	40.62	2.48	44.01	53.90	9.8	100	0	
Hori.	19524.000	AV	46.30	40.34	8.39	45.01	-9.54	40.48	53.90	13.4	128	282	
Vert.	104.970	QP	22.90	10.69	7.45	32.08	0.00	8.96	43.50	34.5	100	228	
Vert.	444.047	QP	22.70	16.51	9.40	31.85	0.00	16.76	46.00	29.2	100	195	
Vert.	586.512	QP	22.90	18.77	9.97	31.84	0.00	19.80	46.00	26.2	100	358	
Vert.	650.398	QP	22.90	19.27	10.20	31.85	0.00	20.52	46.00	25.4	100	5	
Vert.	4882.000	PK	51.60	31.29	6.47	41.76	2.48	50.08	73.90	23.8	201	259	
Vert.	7323.000	PK	45.30	36.77	8.25	41.27	2.48	51.53	73.90	22.3	100	0	
Vert.	9764.000	PK	44.20	38.75	9.40	40.62	2.48	54.21	73.90	19.6	100	0	
Vert.	19524.000	PK	51.14	40.34	8.39	45.01	-9.54	45.32	73.90	28.5	179	7	
Vert.	4882.000	AV	40.30	31.29	6.47	41.76	2.48	38.78	53.90	15.1	201	259	
Vert.	7323.000	AV	34.80	36.77	8.25	41.27	2.48	41.03	53.90	12.8	100	0	
Vert.	9764.000	AV	34.10	38.75	9.40	40.62	2.48	44.11	53.90	9.7	100	0	
Vert.	19524.000	AV	45.08	40.34	8.39	45.01	-9.54	39.26	53.90	14.6	179	7	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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.	2441.000	PK	93.40	27.62	14.08	40.83	2.48	96.75	-	-	Carrier
Hori.	2597.000	PK	42.29	27.97	14.22	40.92	2.48	46.04	76.75	30.7	
Vert.	2441.000	PK	94.00	27.62	14.08	40.83	2.48	97.35	-	-	Carrier
Vert.	2597.000	PK	43.57	27.97	14.22	40.92	2.48	47.32	77.35	30.0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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

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Radiated Spurious Emission

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 1 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.	32.380	QP	23.50	16.82	6.86	31.90	0.00	15.28	40.00	24.7	150	133	
Hori.	151.550	QP	23.00	14.91	8.69	31.80	0.00	14.80	43.50	28.7	300	355	
Hori.	229.678	QP	22.80	11.58	6.08	31.72	0.00	8.74	46.00	37.2	100	2	
Hori.	863.240	QP	22.80	21.78	9.66	31.03	0.00	23.21	46.00	22.7	150	120	
Hori.	2483.500	PK	48.20	27.79	14.12	40.81	2.48	51.78	73.90	22.1	320	0	
Hori.	4960.000	PK	49.90	31.45	6.52	41.65	2.48	48.70	73.90	25.2	253	303	
Hori.	7440.000	PK	46.50	37.11	8.40	41.36	2.48	53.13	73.90	20.7	100	0	
Hori.	9920.000	PK	45.50	38.87	9.49	40.66	2.48	55.68	73.90	18.2	100	0	
Hori.	19836.000	PK	49.31	40.24	8.45	45.11	-9.54	43.35	73.90	30.5	128	288	
Hori.	2483.500	AV	35.70	27.79	14.12	40.81	2.48	39.28	53.90	14.6	320	0	
Hori.	4960.000	AV	35.40	31.45	6.52	41.65	2.48	34.20	53.90	19.7	253	303	
Hori.	7440.000	AV	36.20	37.11	8.40	41.36	2.48	42.83	53.90	11.0	100	0	
Hori.	9920.000	AV	34.40	38.87	9.49	40.66	2.48	44.58	53.90	9.3	100	0	
Hori.	19836.000	AV	43.51	40.24	8.45	45.11	-9.54	37.55	53.90	16.3	128	288	
Vert.	180.126	QP	22.90	16.14	8.81	31.78	0.00	16.07	43.50	27.4	100	234	
Vert.	303.193	QP	23.00	13.47	6.65	31.68	0.00	11.44	46.00	34.5	100	65	
Vert.	944.793	QP	22.60	22.48	10.06	30.50	0.00	24.64	46.00	21.3	100	352	
Vert.	2483.500	PK	49.50	27.79	14.12	40.81	2.48	53.08	73.90	20.8	143	353	
Vert.	4960.000	PK	51.00	31.45	6.52	41.65	2.48	49.80	73.90	24.1	121	265	
Vert.	7440.000	PK	46.30	37.11	8.40	41.36	2.48	52.93	73.90	20.9	100	0	
Vert.	9920.000	PK	45.10	38.87	9.49	40.66	2.48	55.28	73.90	18.6	100	0	
Vert.	19836.000	PK	50.18	40.24	8.45	45.11	-9.54	44.22	73.90	29.6	176	3	
Vert.	2483.500	AV	34.70	27.79	14.12	40.81	2.48	38.28	53.90	15.6	143	353	
Vert.	4960.000	AV	39.00	31.45	6.52	41.65	2.48	37.80	53.90	16.1	121	265	
Vert.	7440.000	AV	36.10	37.11	8.40	41.36	2.48	42.73	53.90	11.1	100	0	
Vert.	9920.000	AV	34.40	38.87	9.49	40.66	2.48	44.58	53.90	9.3	100	0	
Vert.	19836.000	AV	42.39	40.24	8.45	45.11	-9.54	36.43	53.90	17.4	176	3	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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.	2480.000	PK	92.80	27.78	14.12	40.81	2.48	96.37	-	-	Carrier
Hori.	2636.000	PK	41.05	28.02	14.26	40.97	2.48	44.84	76.37	31.5	
Vert.	2480.000	PK	93.20	27.78	14.12	40.81	2.48	96.77	-	-	Carrier
Vert.	2636.000	PK	40.92	28.02	14.26	40.97	2.48	44.71	76.77	32.1	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.99\text{ m} / 3.0\text{ m}) = 2.48\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

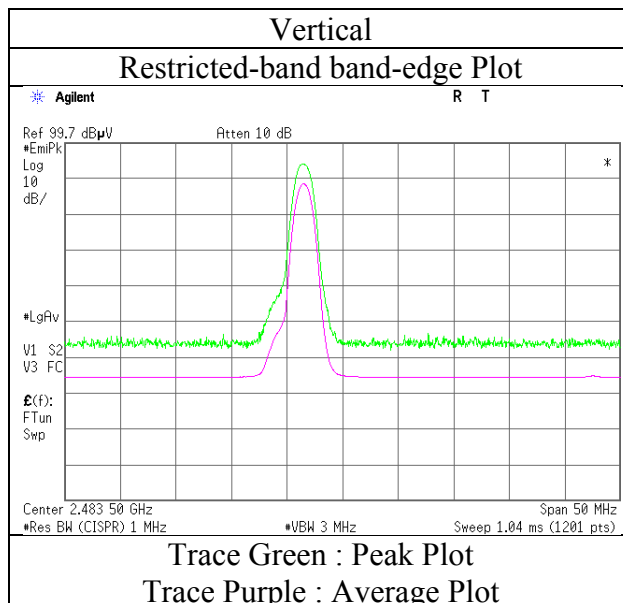
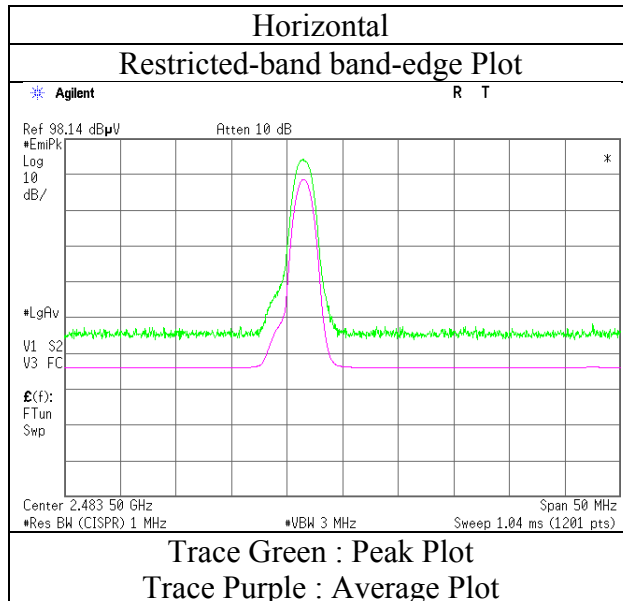
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

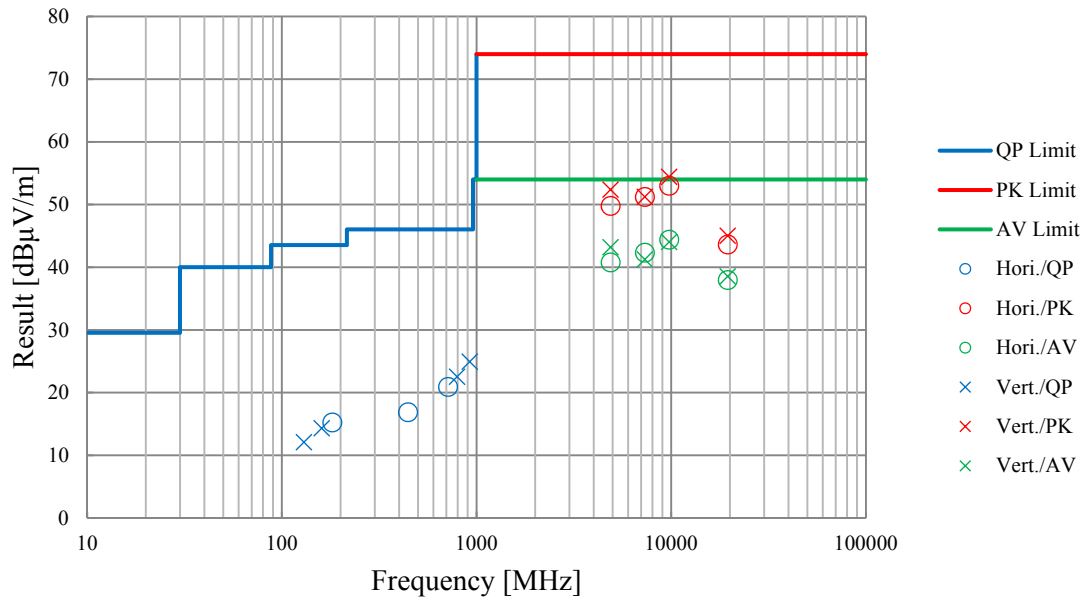
Report No.	11822950S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Report No. 11822950S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3
Date June 22, 2017 June 23, 2017
Temperature / Humidity 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz - 1 GHz)
Mode Tx, Hopping Off, DH5 2441 MHz

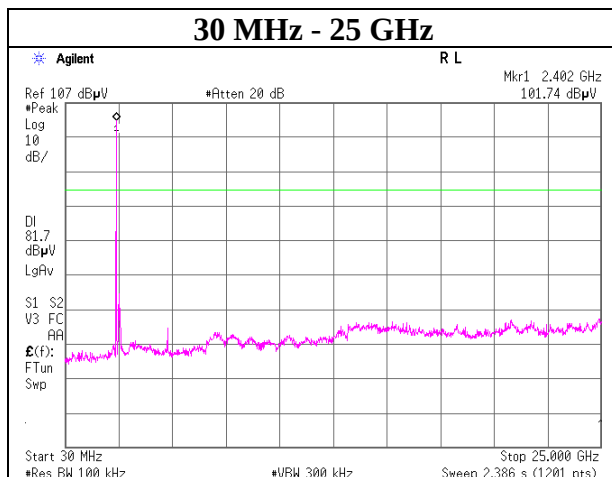
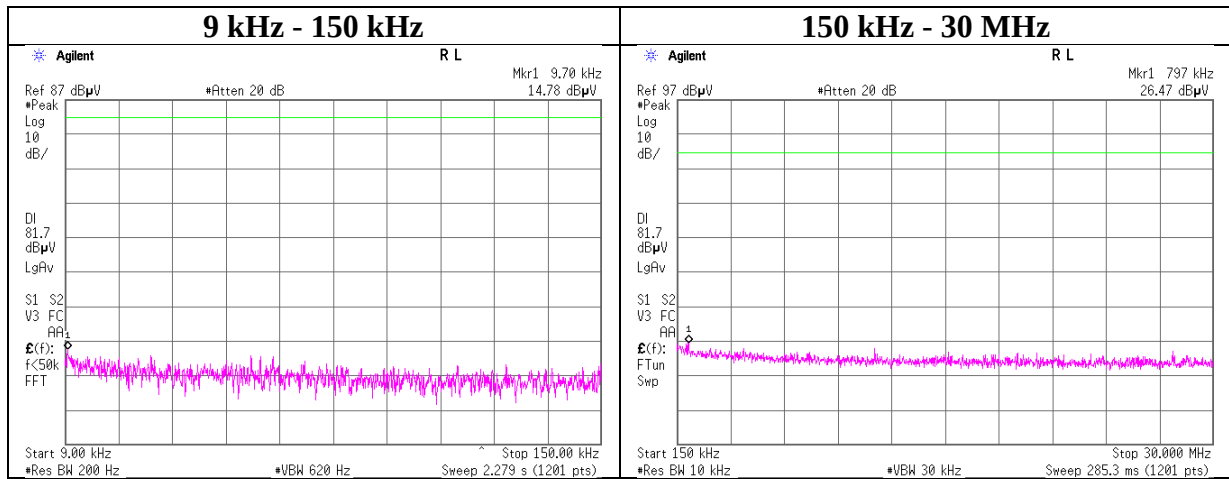


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, DH5

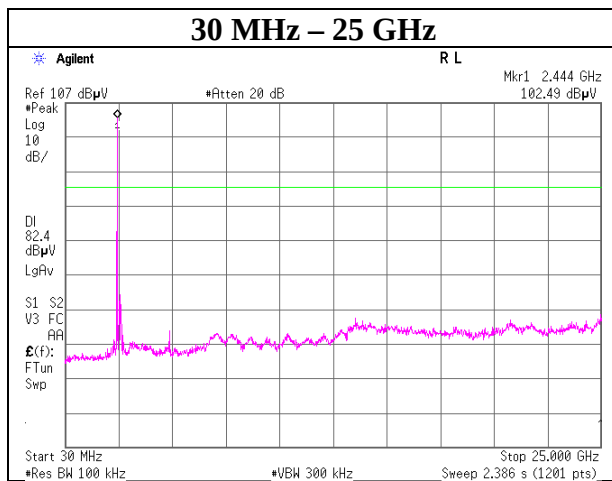
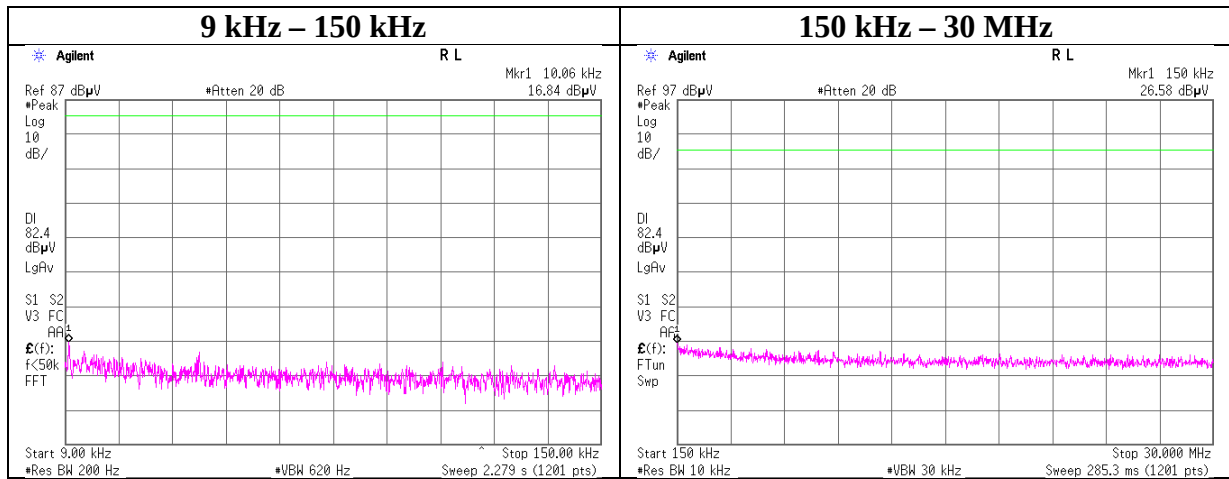
2402 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, DH5

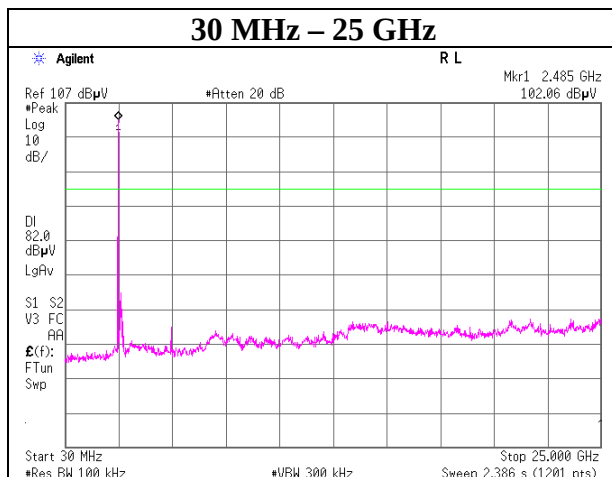
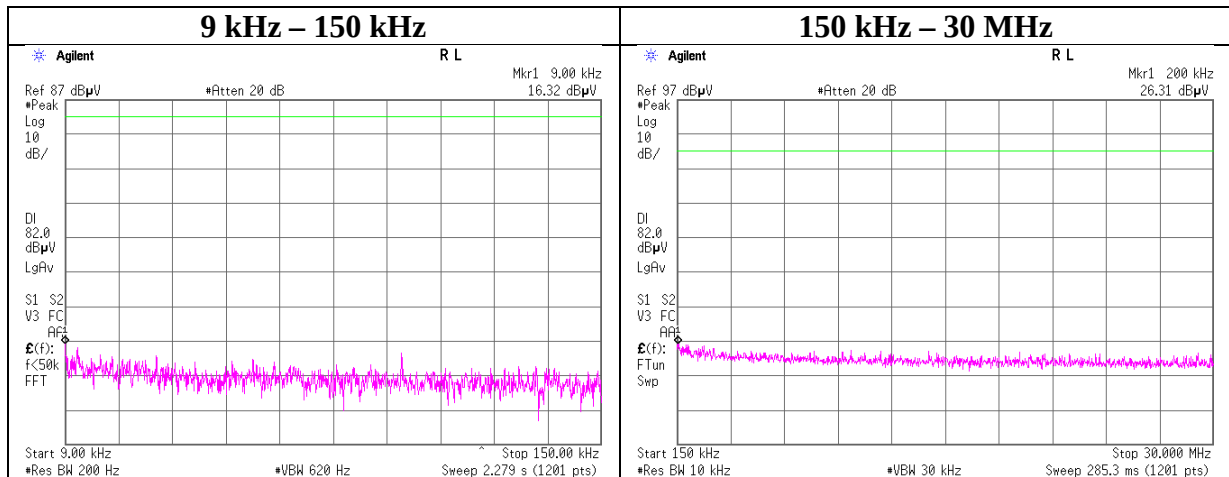
2441 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, DH5

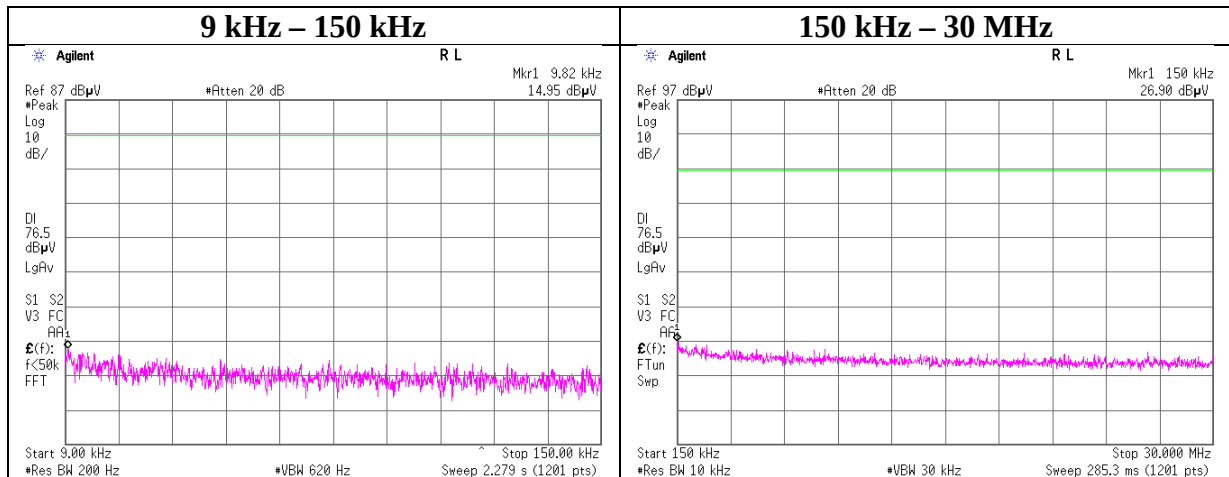
2480 MHz



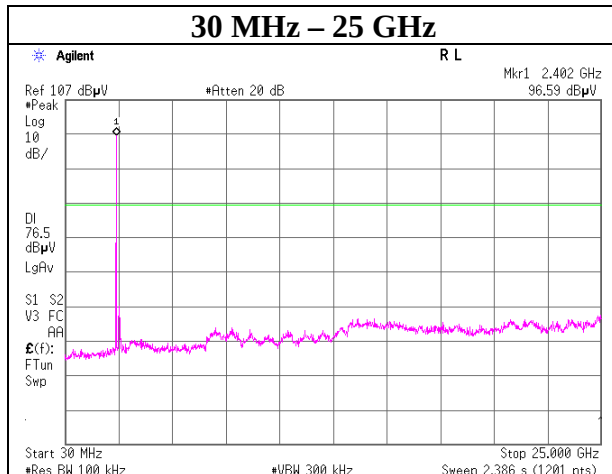
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, 3DH5

2402 MHz



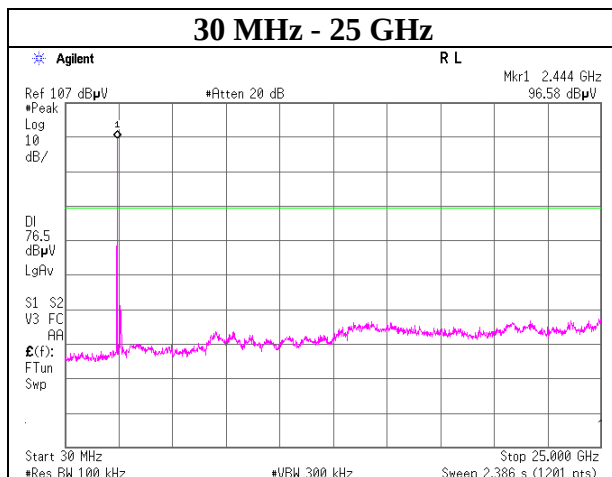
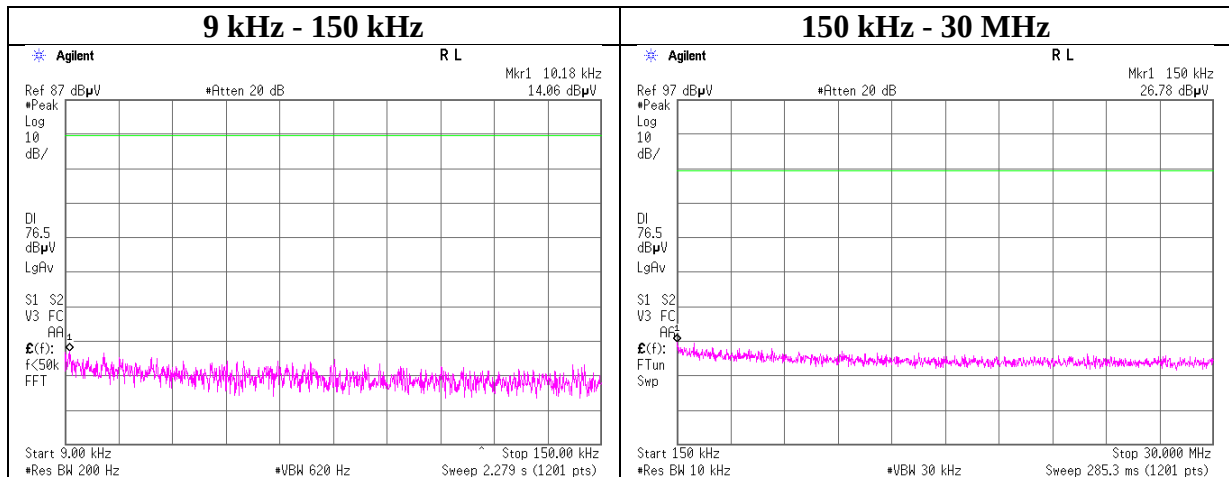
30 MHz – 25 GHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, 3DH5

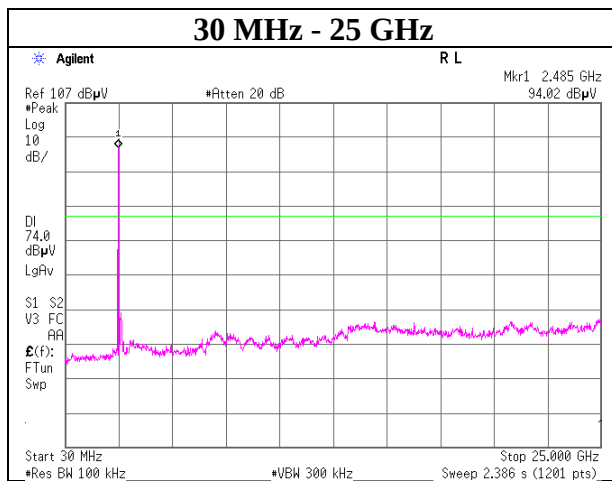
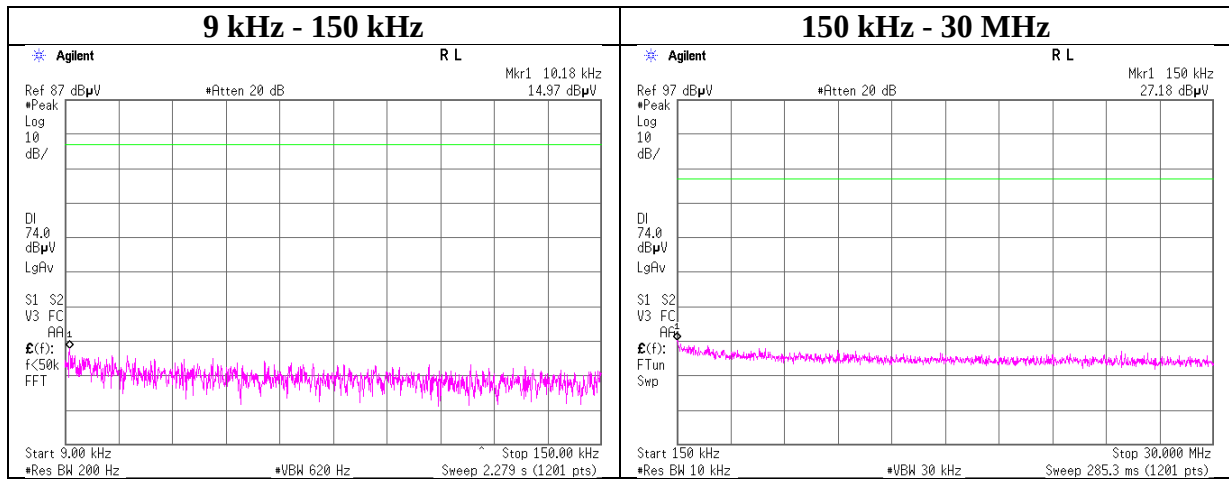
2441 MHz



Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx, Hopping Off, 3DH5

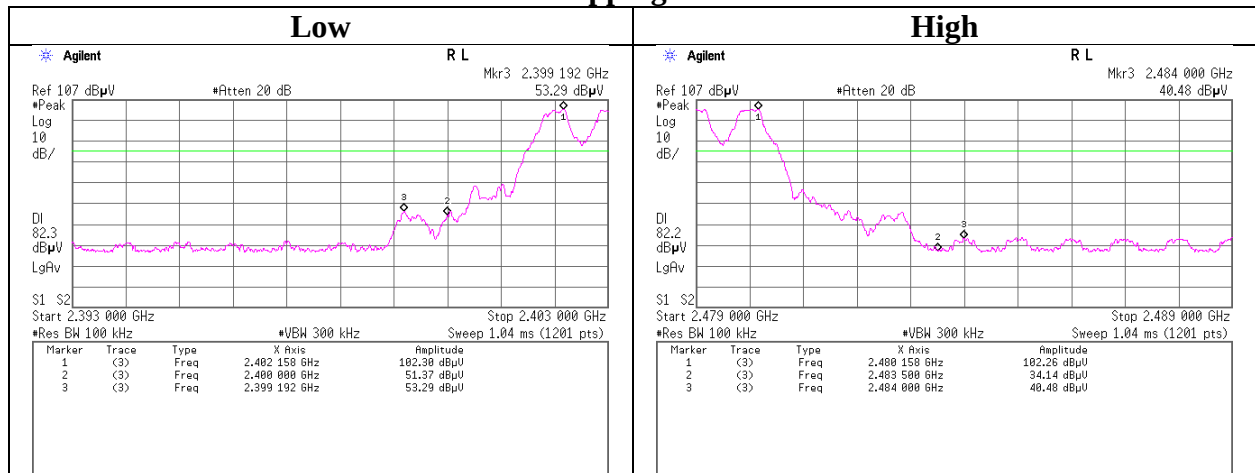
2480 MHz



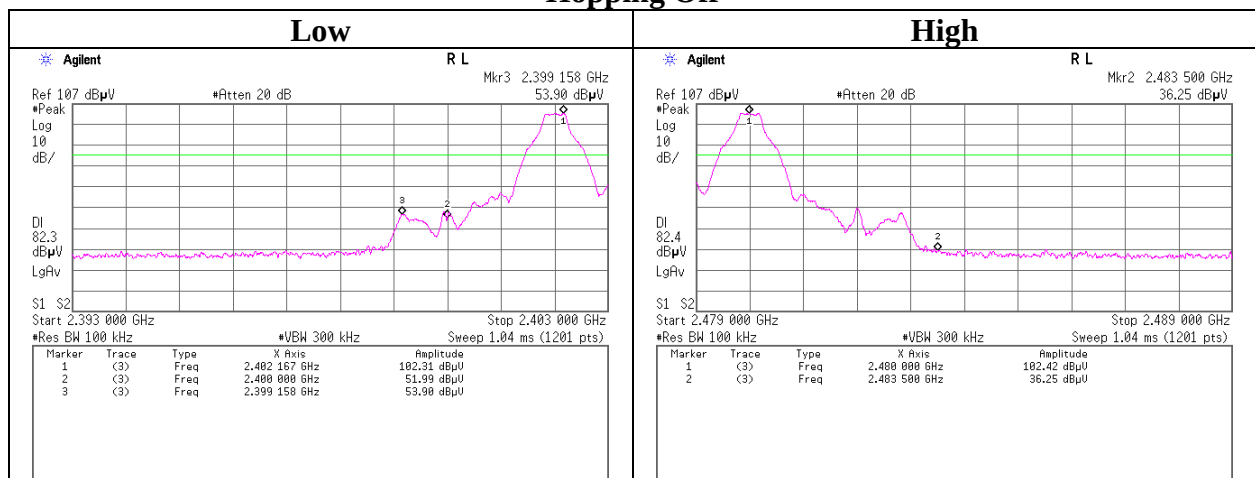
Conducted Emission Band Edge compliance

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx DH5

Hopping On



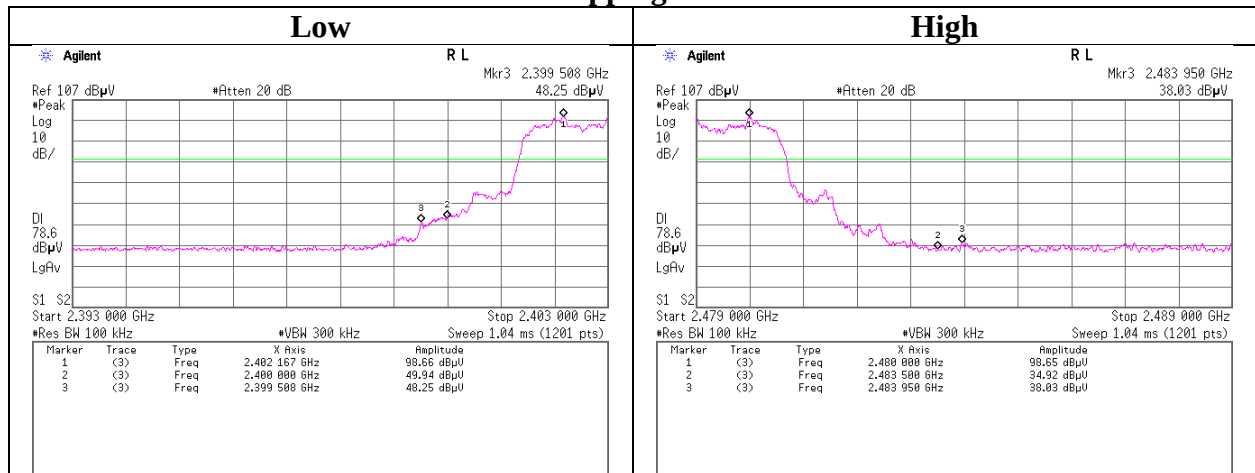
Hopping Off



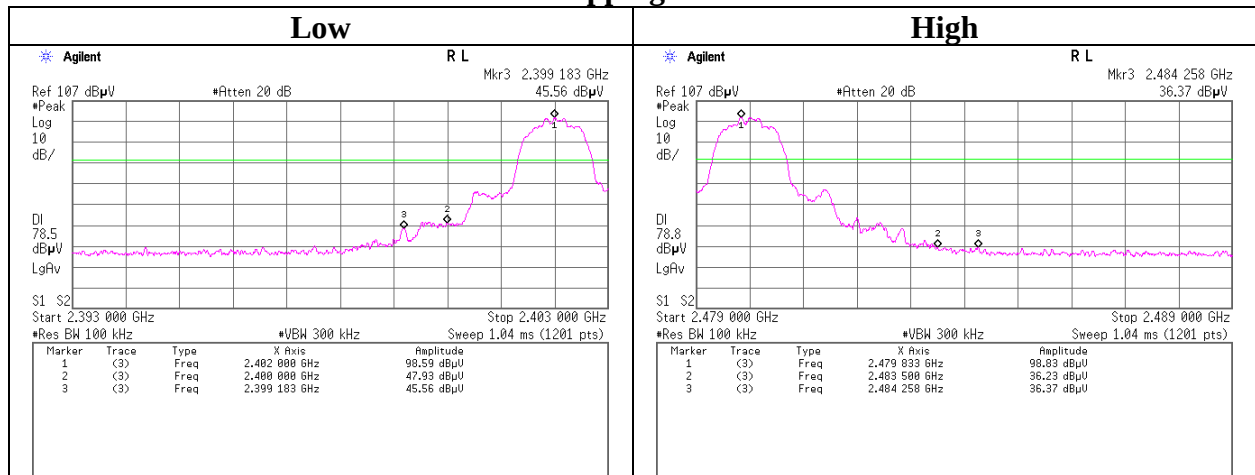
Conducted Emission Band Edge compliance

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11822950S-A
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx 3DH5

Hopping On



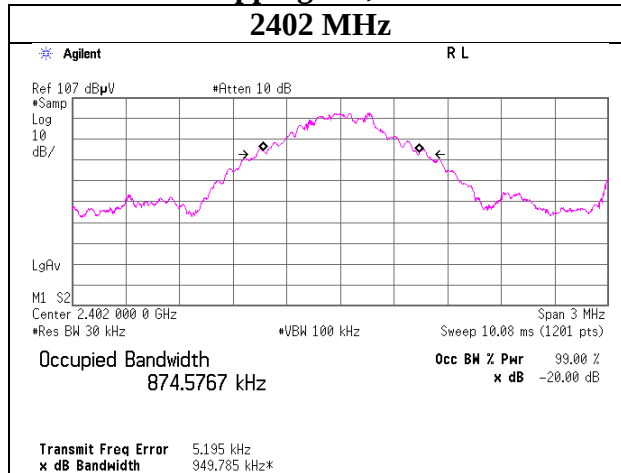
Hopping Off



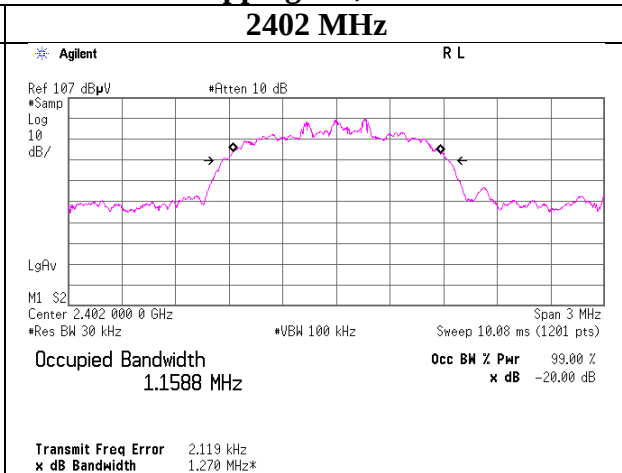
99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-A
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx, Hopping Off

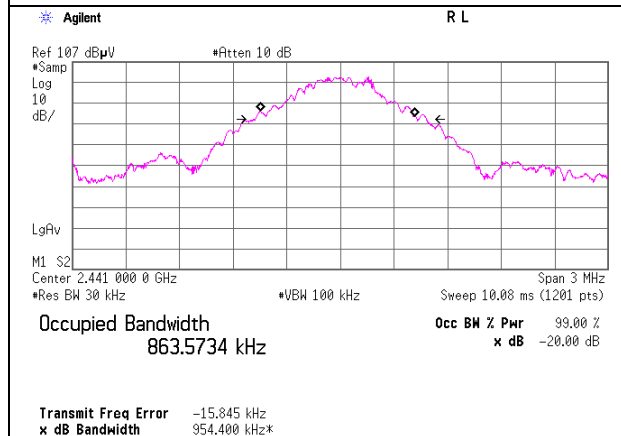
Hopping Off, DH5



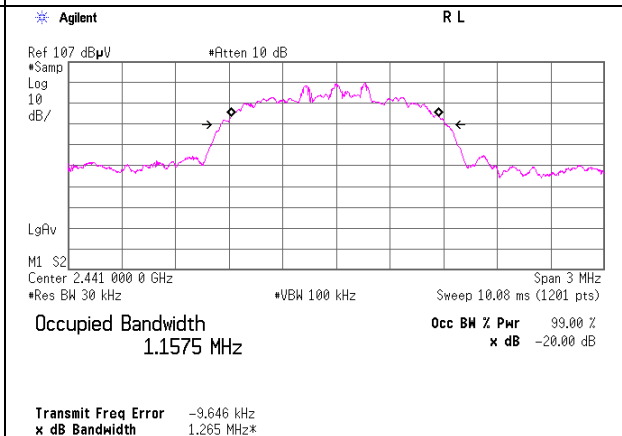
Hopping Off, 3DH5



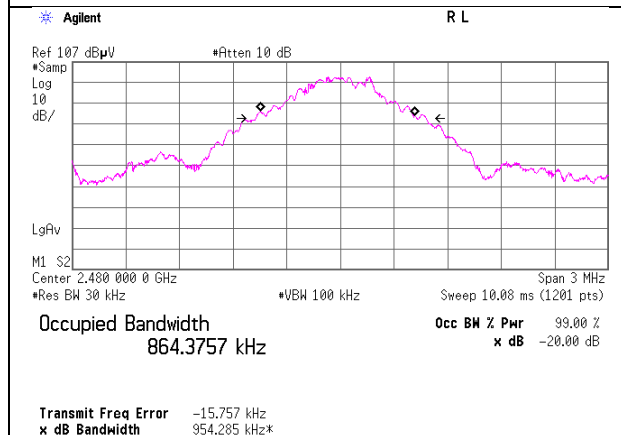
2441 MHz



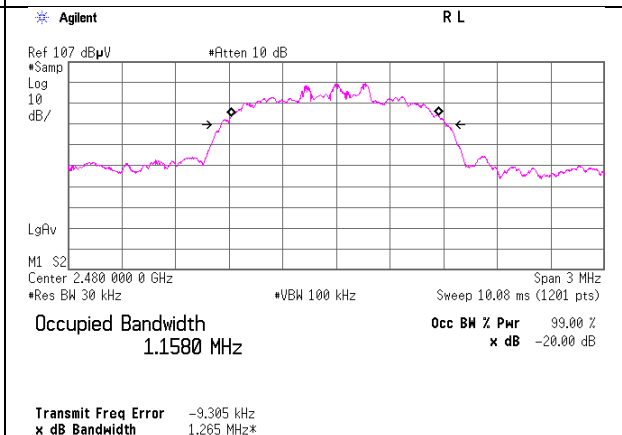
2441 MHz



2480 MHz



2480 MHz



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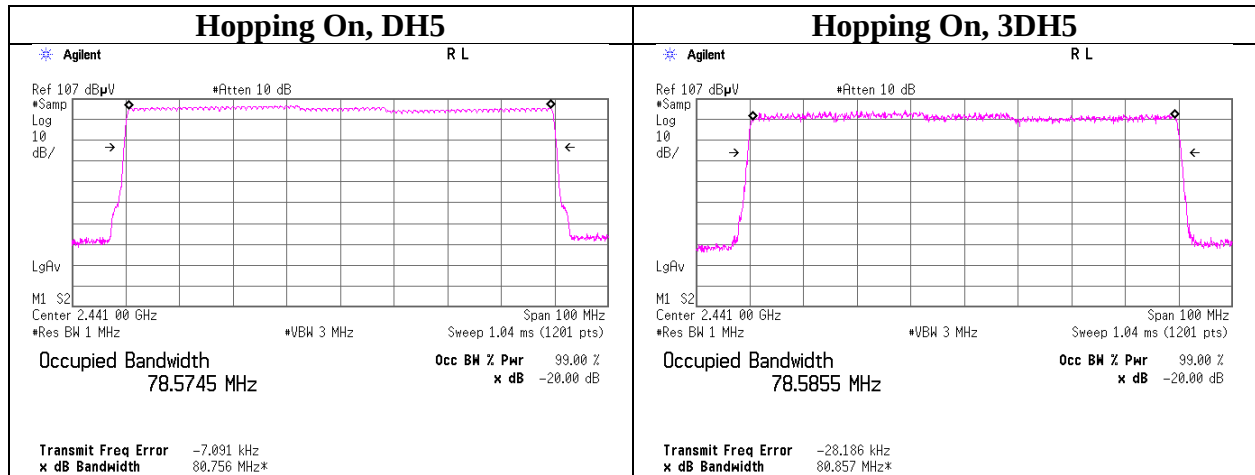
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99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-A
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx, Hopping On



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2017/01/08 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 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
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE,CE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2016/10/17 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000NF SNMS/B	1612S005	RE	2017/01/08 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SCC-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-003	RE	2017/04/20 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000K MSKMS	-	RE	2017/04/20 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2016/11/07 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2016/07/25 * 12
SCC-A12/A13/ SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS 4906	-/0901-269(RF Selector)	CE	2017/04/07 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2017/02/10 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2016/08/04 * 12
SOS-15	Humidity Indicator	A&D	AD-5681	7478311	CE	2017/02/21 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	CE	2017/04/12 * 12
KJM-09	Measure	KOMELON	KMC-36	-	CE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	CE	2016/10/17 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/04/17 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 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