



RADIO TEST REPORT

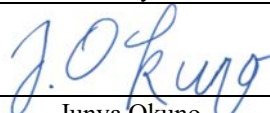
Test Report No. : 13367627H-A-R1

Applicant : DENSO CORPORATION
Type of EUT : Cockpit Control Unit (CCU)
Model Number of EUT : DNNS117
FCC ID : HYQDNNS117
Test regulation : FCC Part 15 Subpart C: 2020
*WLAN Part
Test Result : Complied (Refer to SECTION 3.2)

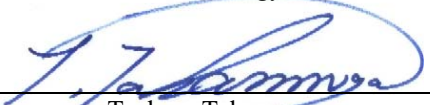
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13367626H-A. 13367627H-A is replaced with this report.

Date of test: June 5 to July 22, 2020

Representative test engineer:


Junya Okuno
Engineer
Consumer Technology Division

Approved by:


Tsubasa Takayama
Leader
Consumer Technology Division



CERTIFICATE 5107.02

- ☐ 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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REVISION HISTORY

Original Test Report No.: 13367627H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13367627H-A	September 9, 2020	-	-
1	13367627H-A-R1	October 20, 2020	P.7	Correction of Test Specification
1	13367627H-A-R1	October 20, 2020	P.13	Addition of Remarks for Cable No.2

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		
LIMS	Laboratory Information Management System		

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SECTION 1: Customer information

Company Name	:	DENSO CORPORATION
Address	:	1-1 Showa-cho, Kariya-shi, Aichi ken, 448-8661 Japan
Telephone Number	:	+81-566-20-3304
Facsimile Number	:	+81-566-25-4920
Contact Person	:	Naoto Makino

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing

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

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	Cockpit Control Unit (CCU)
Model Number	:	DNNS117
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 13.2 V
Receipt Date	:	May 26, 2020
Country of Mass-production	:	Japan
Condition	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: DNNS117 (referred to as the EUT in this report) is a Cockpit Control Unit (CCU).

Radio Specification

Clock frequency (Maximum) : 40 MHz

[AM/FM (incl.RBDS)/XM Radio]

	AM	FM (incl. RBDS)	XM
Equipment type	Receiver		
Frequency of operation	530 kHz to 1710 kHz	87.75 MHz to 107.9 MHz	2333.465 MHz to 2344.045 MHz
Antenna connector type	GT13		

[WLAN (IEEE802.11b/g/n-20) / Bluetooth (Ver4.2 BR/EDR)]

	IEEE802.11b	IEEE802.11g/n (20 M band)	Bluetooth
Equipment type	Transceiver		
Frequency of operation	2412 MHz to 2462 MHz	2412 MHz to 2462 MHz	2402 MHz to 2480 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Channel spacing	5MHz		1 MHz
Antenna type	ASSEMBLY Bluetooth/WiFi Antenna		
Antenna Connector type	MHF PLUG		
Antenna Gain	-4.15 dBi		1.35 dBi

* This test report applied to WLAN (IEEE802.11b/g/n-20).

* WLAN and Bluetooth do not transmit simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 26, 2020 and effective July 27, 2020

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,
and 5725-5850 MHz

* The revision does not affect the test result conducted before its effective date.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	N/A	N/A	*1)
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(a)(2) ISED: RSS-247 5.2(a)	See data.	Complied a)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ISED: RSS-247 5.4(d)		Complied b)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(e) ISED: RSS-247 5.2(b)		Complied c)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.1 dB 200.00 MHz, QP, Vert.	Complied# d), e)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

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

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)

b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)

c) Refer to APPENDIX 1 (data of Power Density)

d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)

e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

FCC Part 15.31 (e)

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage.

Instead of a new battery, DC power supply was used for the test.

That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the vehicle. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)					

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

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

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Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.4 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.6 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.8 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
0.5 m	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

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3.5 Test Location

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*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

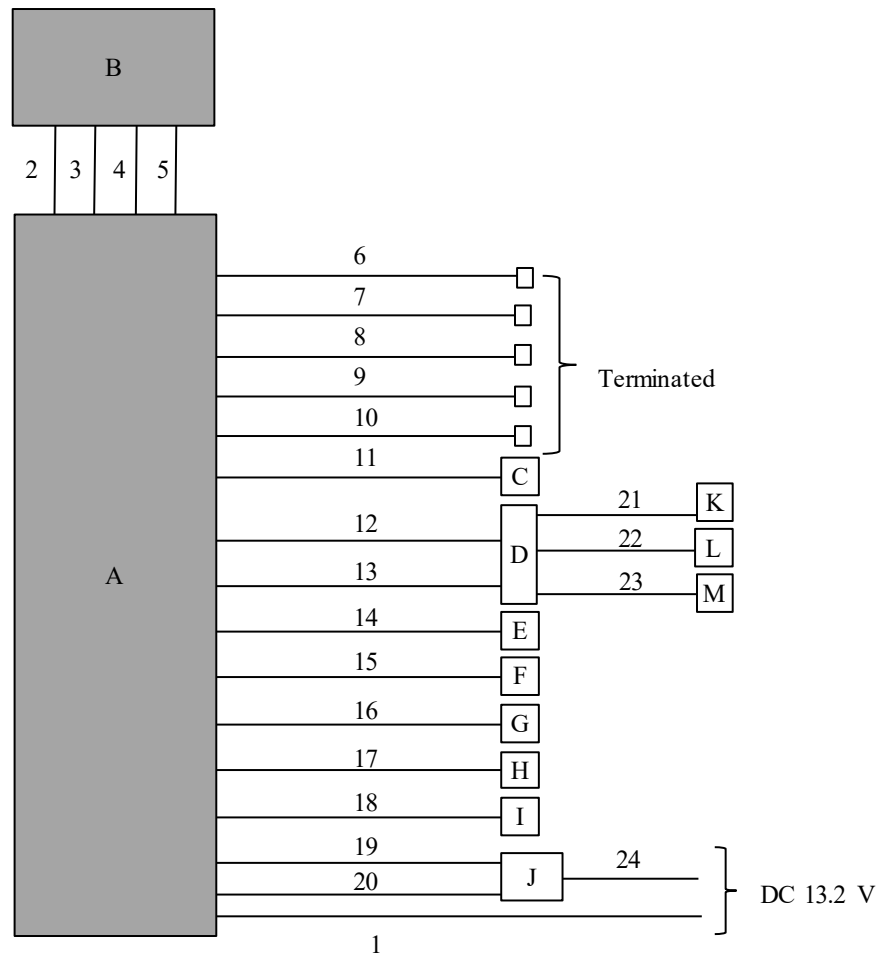
Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 0, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)	
*Power of the EUT was set by the software as follows; Power settings: 11b/g/n 9 dBm Software: MSoC ver : F21SHM003-006 (Date: June 4, 2020, Storage location: EUT memory)	
*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	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Spurious Emission (Radiated)	11b Tx	2412 MHz
	11g Tx	2437 MHz
		2462 MHz
	11n-20 Tx	2412 MHz
		2462 MHz
Spurious Emission (Conducted)	11g Tx	2462 MHz
6dB Bandwidth	11b Tx	2412 MHz
Maximum Peak Output Power	11g Tx	2437 MHz
Power Density	11n-20 Tx	2462 MHz
99% Occupied Bandwidth		

4.2 Configuration and peripherals

Radiated Spurious Emission



* 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	Cockpit Control Unit	DNNS117	RF6-US-K3-High-014	DENSO CORPORATION	EUT
B	Center Information Display	DNNS092	SD-EU-HM-RHD-058	DENSO CORPORATION	EUT
C	GPS Antenna	86277AL150	8980044	-	-
D	AUX-Box	86257FL001	20FHI-AUX-09	-	-
E	Speaker	-	-	-	-
F	Speaker	-	-	-	-
G	Speaker	-	-	-	-
H	Speaker	-	-	-	-
I	CAN Terminated	-	-	-	-
J	Meter	85002AN01A	TN257550-6760	DENSO CORPORATION	-
K	iPod touch	A1367	C3RJ4SLADT75	Apple	-
L	NFC Card Reader	ACR1251	RR395-0056500	Advanced Card Systems Ltd.	-
M	USB Memory	USM4GR B	17116 DGGNN	SONY	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	WLAN Cable	0.2	Shielded	Shielded	-
3	BT Cable	0.2	Shielded	Shielded	-
4	LVDS Cable	0.2	Shielded	Shielded	-
5	DC Cable	0.2	Unshielded	Unshielded	-
6	AM/FM Antenna Cable	1.4	Shielded	Shielded	-
7	XM Antenna Cable	1.4	Shielded	Shielded	-
8	USB Cable	1.5	Shielded	Shielded	-
9	USB Cable	1.5	Shielded	Shielded	-
10	Signal Cable	1.7	Unshielded	Unshielded	-
11	GNSS Antenna Cable	1.3	Shielded	Shielded	-
12	USB Cable	0.4	Shielded	Shielded	-
13	Signal Cable	1.7	Unshielded	Unshielded	-
14	Speaker Cable	0.3	Unshielded	Unshielded	-
15	Speaker Cable	1.5	Unshielded	Unshielded	-
16	Speaker Cable	1.5	Unshielded	Unshielded	-
17	Speaker Cable	1.9	Unshielded	Unshielded	-
18	Signal Cable	1.7	Unshielded	Unshielded	-
19	Signal Cable	1.7	Unshielded	Unshielded	-
20	Meter Cable	1.7	Shielded	Shielded	-
21	Audio Cable	1.5	Shielded	Shielded	-
22	USB Cable	1.0	Shielded	Shielded	-
23	USB Cable	2.0	Shielded	Shielded	-
24	DC Cable	3.0	Unshielded	Unshielded	-

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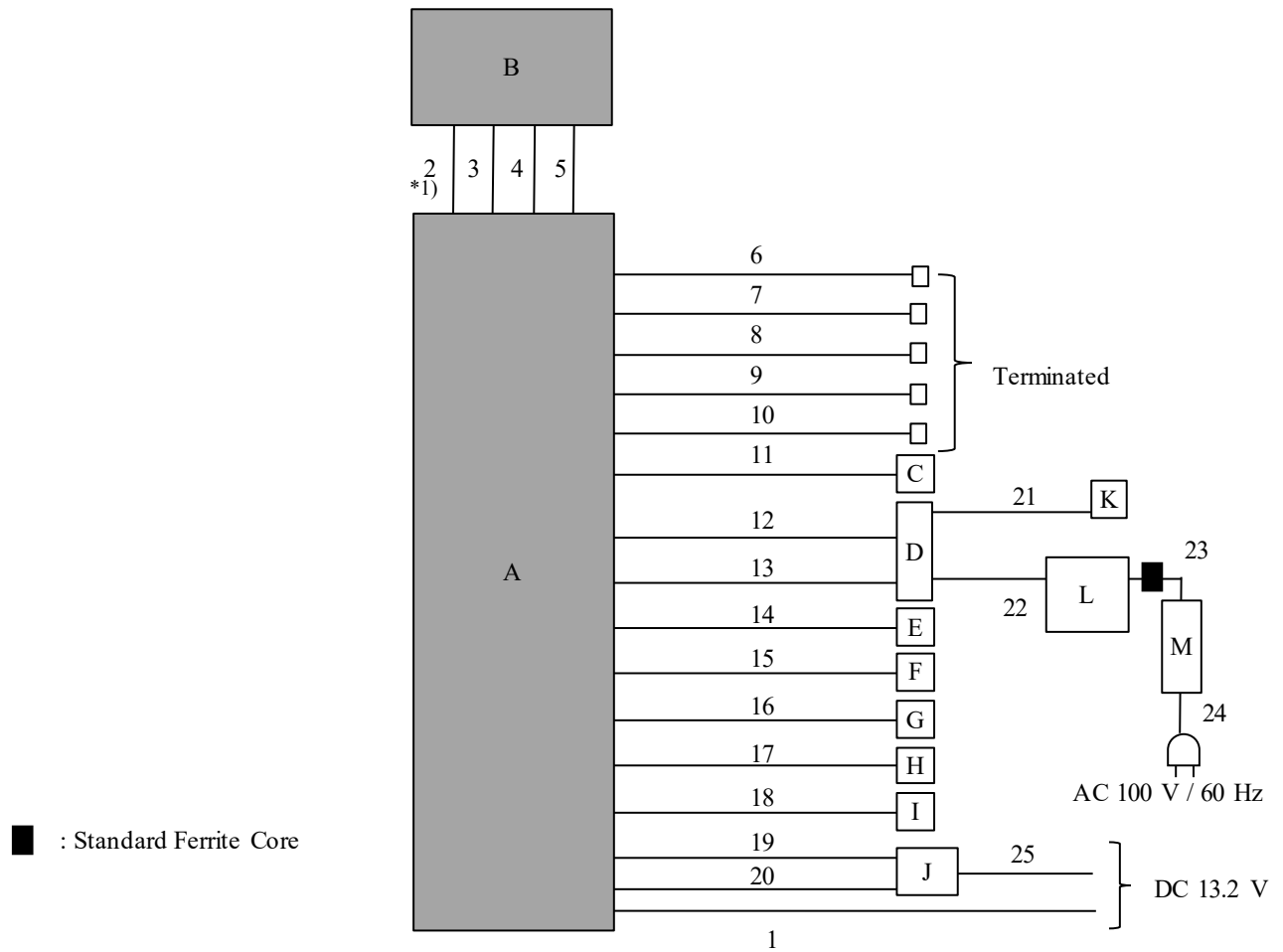
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Antenna Terminal Conducted Tests



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

*1) The test was performed with cables 2 connected to the measurement equipment rather than to the EUT.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Cockpit Control Unit	DNNS117	RF6-US-K3-High-014	DENSO CORPORATION	EUT
B	Center Information Display	DNNS092	SD-EU-HM-RHD-058	DENSO CORPORATION	EUT
C	GPS Antenna	86277AL150	8980044	-	-
D	AUX-Box	86257FL001	20FHI-AUX-09	-	-
E	Speaker	-	-	-	-
F	Speaker	-	-	-	-
G	Speaker	-	-	-	-
H	Speaker	-	-	-	-
I	CAN Terminated	-	-	-	-
J	Meter	85002AN01A	TN257550-6760	DENSO CORPORATION	-
K	NFC Card Reader	ACR1251	RR395-0056500	Advanced Card Systems Ltd.	-
L	Laptop PC	CF-N8HWCDDPS	0BKSA08704	Panasonic	-
M	AC Adapter	CF-AA6372B	6372BM40990732B	Panasonic	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-
2	WLAN Cable	0.2	Shielded	Shielded	-
3	BT Cable	0.2	Shielded	Shielded	-
4	LVDS Cable	0.2	Shielded	Shielded	-
5	DC Cable	0.2	Unshielded	Unshielded	-
6	AM/FM Antenna Cable	1.4	Shielded	Shielded	-
7	XM Antenna Cable	1.4	Shielded	Shielded	-
8	USB Cable	1.5	Shielded	Shielded	-
9	USB Cable	1.5	Shielded	Shielded	-
10	Signal Cable	1.7	Unshielded	Unshielded	-
11	GNSS Antenna Cable	1.3	Shielded	Shielded	-
12	USB Cable	0.4	Shielded	Shielded	-
13	Signal Cable	1.7	Unshielded	Unshielded	-
14	Speaker Cable	0.3	Unshielded	Unshielded	-
15	Speaker Cable	1.5	Unshielded	Unshielded	-
16	Speaker Cable	1.5	Unshielded	Unshielded	-
17	Speaker Cable	1.9	Unshielded	Unshielded	-
18	Signal Cable	1.7	Unshielded	Unshielded	-
19	Signal Cable	1.7	Unshielded	Unshielded	-
20	Meter Cable	1.7	Shielded	Shielded	-
21	USB Cable	1.0	Shielded	Shielded	-
22	USB + LAN Cable	2.2	USB: Shielded LAN: Unshielded	USB: Shielded LAN: Unshielded	-
23	DC Cable	1.0	Unshielded	Unshielded	-
24	AC Cable	1.0	Unshielded	Unshielded	-
25	DC Cable	3.0	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]

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 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.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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 *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

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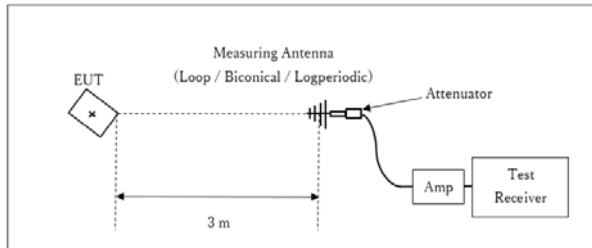
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Figure 2: Test Setup

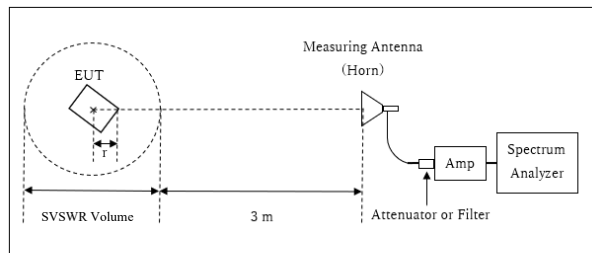
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

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

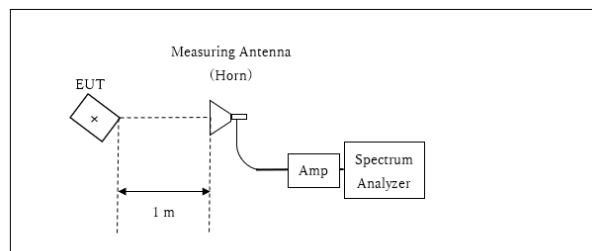
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m

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

r = 0.10 m

10 GHz - 26.5 GHz



x : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

*Test Distance: 1 m

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

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 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4), *5)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".

*4) It was confirmed that the noise was low enough in the radiated emissions.

(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).

*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

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

Test data : APPENDIX

Test result : Pass

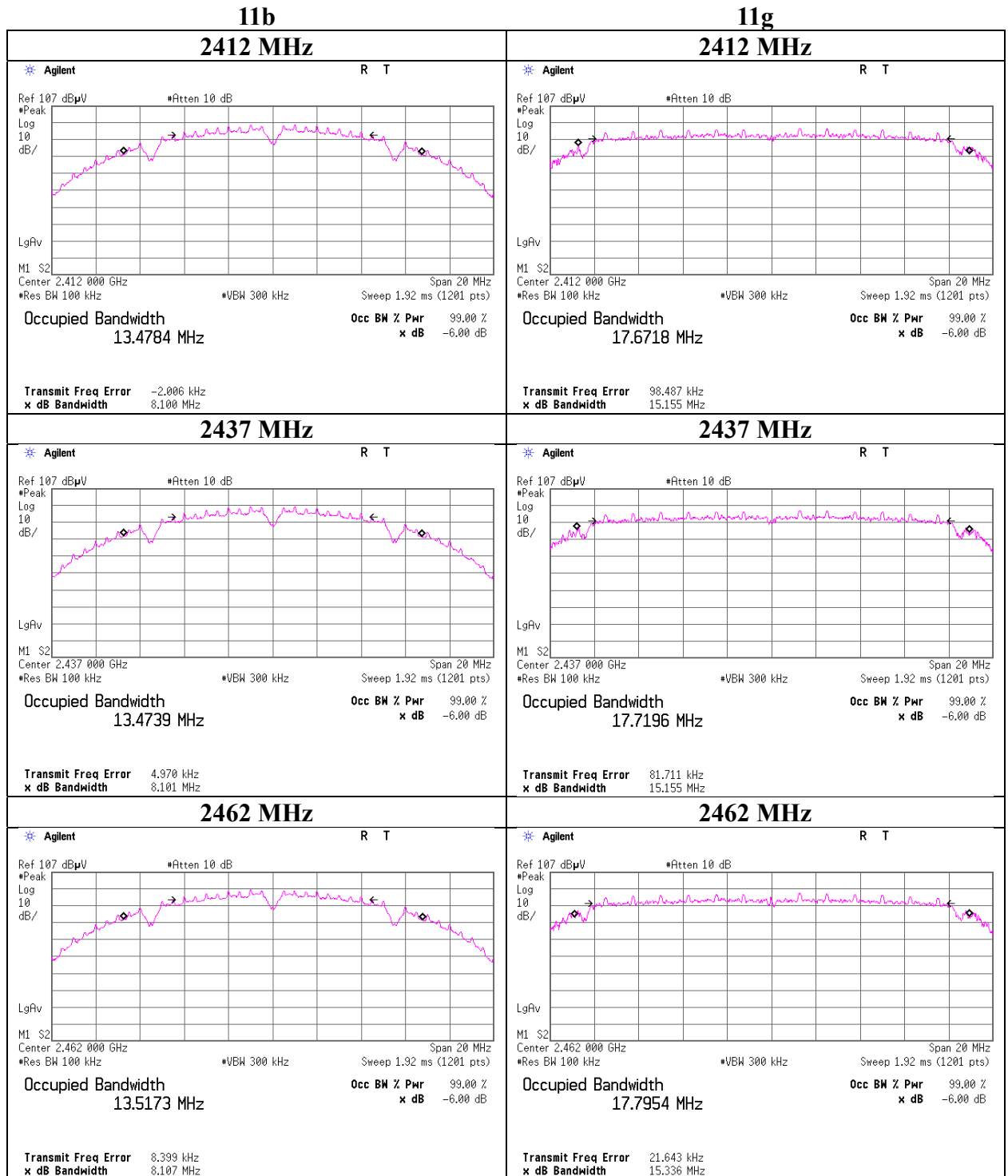
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No. 13367627H
Test place Ise EMC Lab. No.6 Shielded Room
Date July 22, 2020
Temperature / Humidity 24 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
11b	2412	13439.7	8.100	> 0.5000
	2437	13454.3	8.101	> 0.5000
	2462	13461.2	8.107	> 0.5000
11g	2412	18497.2	15.155	> 0.5000
	2437	18772.0	15.155	> 0.5000
	2462	18736.6	15.336	> 0.5000
11n-20	2412	19389.0	15.156	> 0.5000
	2437	19347.4	15.158	> 0.5000
	2462	19360.2	15.156	> 0.5000

6dB Bandwidth



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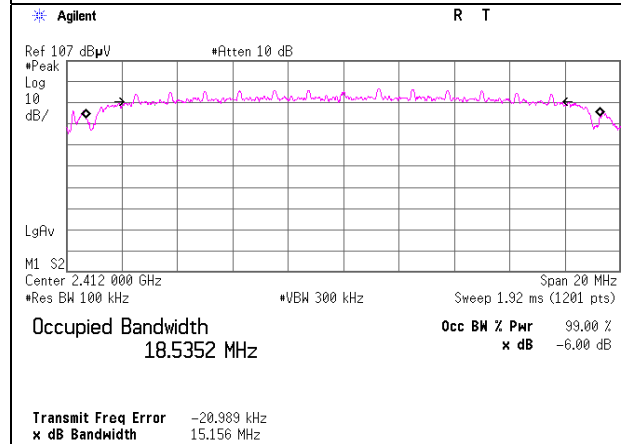
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

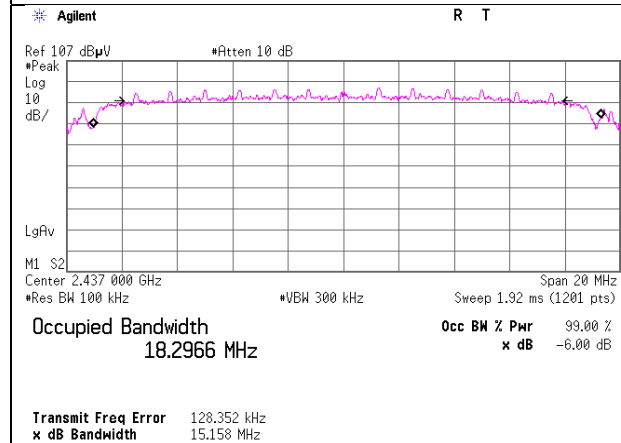
6dB Bandwidth

11n-20

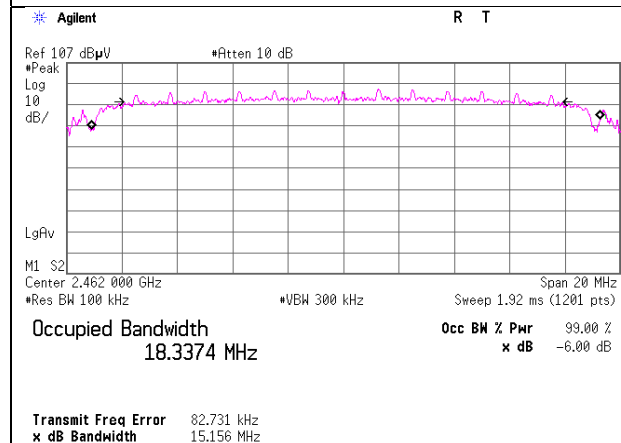
2412 MHz



2437 MHz



2462 MHz



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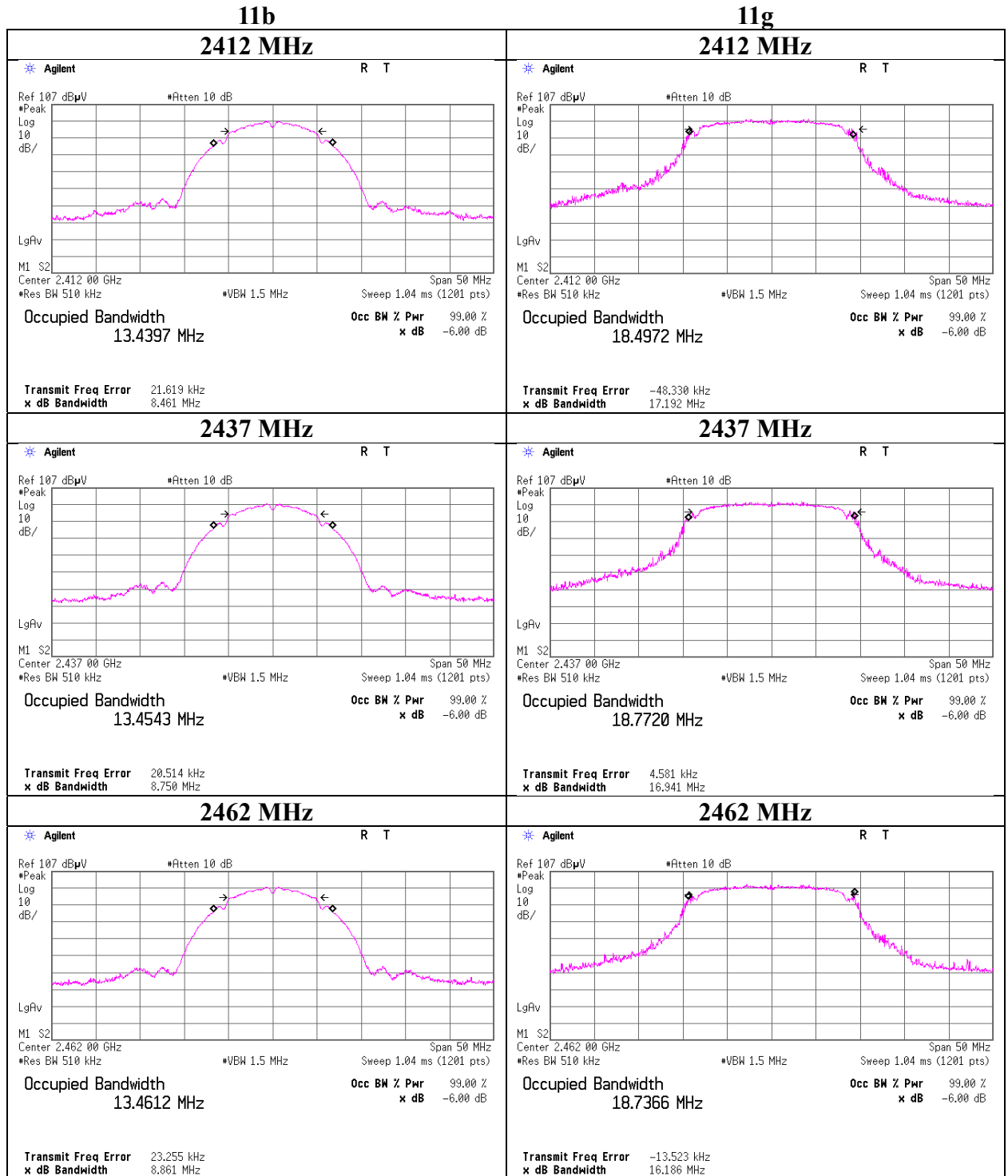
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99%Occupied Bandwidth



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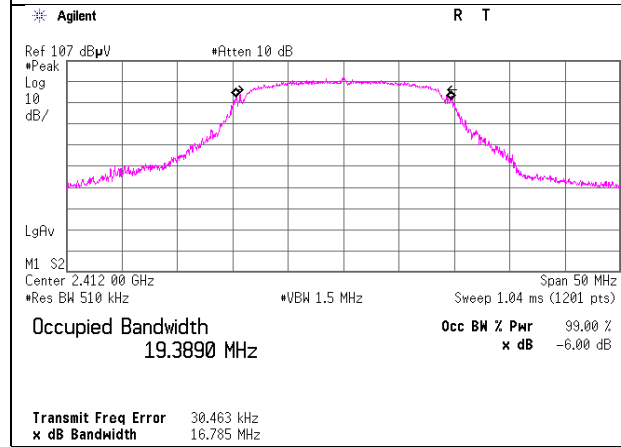
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Facsimile : +81 596 24 8124

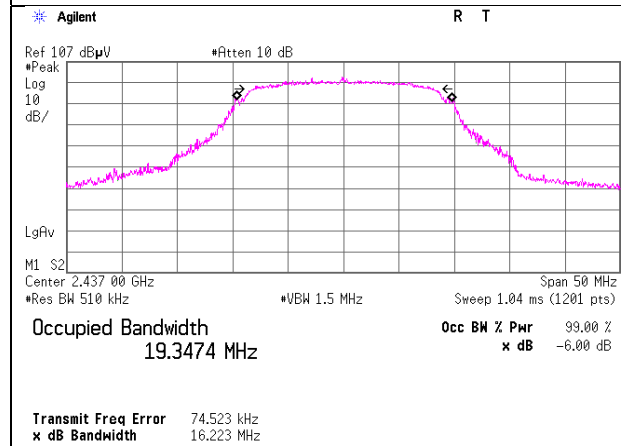
99% Occupied Bandwidth

11n-20

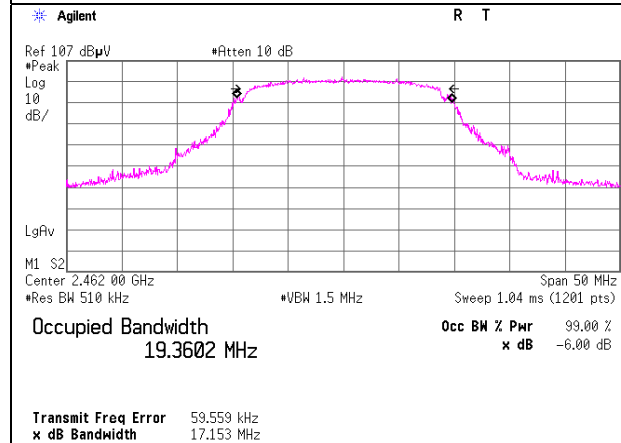
2412 MHz



2437 MHz



2462 MHz



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Maximum Peak Output Power

Report No. 13367627H
Test place Ise EMC Lab. No.3 Measurement Room No.6 Shielded Room
Date June 17, 2020 July 22, 2020
Temperature / Humidity 26 deg. C / 45 % RH 24 deg. C / 50 % RH
Engineer Junya Okuno Junya Okuno
Mode Tx

11b				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	1.17	0.48	10.10	11.75	14.96	30.00	1000	18.25	-4.15	7.60	5.75	36.02	4000	28.42
2437	1.40	0.39	10.10	11.89	15.45	30.00	1000	18.11	-4.15	7.74	5.94	36.02	4000	28.28
2462	1.55	0.43	10.10	12.08	16.14	30.00	1000	17.92	-4.15	7.93	6.21	36.02	4000	28.09

Sample Calculation:

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

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

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

11g				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	7.35	0.48	10.10	17.93	62.07	30.00	1000	12.07	-4.15	13.78	23.87	36.02	4000	22.24
2437	7.60	0.39	10.10	18.09	64.39	30.00	1000	11.91	-4.15	13.94	24.76	36.02	4000	22.08
2462	8.02	0.43	10.10	18.55	71.58	30.00	1000	11.45	-4.15	14.40	27.53	36.02	4000	21.62

Sample Calculation:

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

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

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

11n20				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	7.38	0.48	10.01	17.87	61.22	30.00	1000	12.13	-4.15	13.72	23.55	36.02	4000	22.30
2437	7.69	0.39	10.01	18.09	64.39	30.00	1000	11.91	-4.15	13.94	24.76	36.02	4000	22.08
2462	7.85	0.43	10.01	18.29	67.42	30.00	1000	11.71	-4.15	14.14	25.93	36.02	4000	21.88

Sample Calculation:

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

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

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

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Maximum Peak Output Power
Worst Rate Check

Report No. 13367627H
Test place Ise EMC Lab. No.7 shielded Room
Date July 15, 2020
Temperature / Humidity 23 deg. C / 54 % RH
Engineer Yuichiro Yamazaki
Mode Tx

11b 2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-0.27	*
2	-0.44	
5.5	-0.45	
11	-0.36	

11g 2412 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	6.03	*
9	5.99	
12	5.82	
18	5.76	
24	5.77	
36	5.56	
48	5.51	
54	5.30	

11n-20 2412 MHz

MCS Number	Reading	Remark
	[dBm]	
0	5.93	*
1	5.38	
2	5.33	
3	5.29	
4	5.23	
5	5.61	
6	5.26	
7	5.70	

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Average Output Power
(Reference data for RF Exposure)

Report No. 13367627H
Test place Ise EMC Lab. No.6 Shielded Room
Date July 22, 2020
Temperature / Humidity 24 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-1.92	0.48	10.10	8.66	7.35	0.13	8.79	7.57
2437	-1.58	0.39	10.10	8.91	7.78	0.13	9.04	8.02
2462	-1.44	0.43	10.10	9.09	8.11	0.13	9.22	8.36

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.52	0.48	10.10	8.06	6.40	0.79	8.85	7.67
2437	-2.10	0.39	10.10	8.39	6.90	0.79	9.18	8.28
2462	-1.86	0.43	10.10	8.67	7.36	0.79	9.46	8.83

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.50	0.48	10.10	8.08	6.43	0.76	8.84	7.66
2437	-2.20	0.39	10.10	8.29	6.75	0.76	9.05	8.04
2462	-1.93	0.43	10.10	8.60	7.24	0.76	9.36	8.63

Sample Calculation:

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

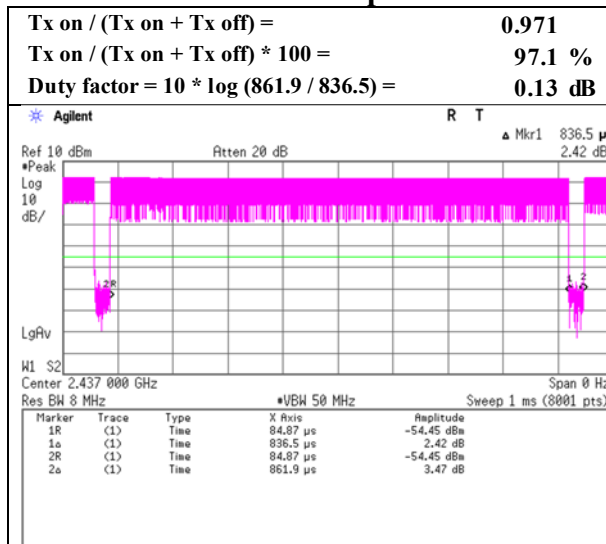
Result (Burst power average) = Time average + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

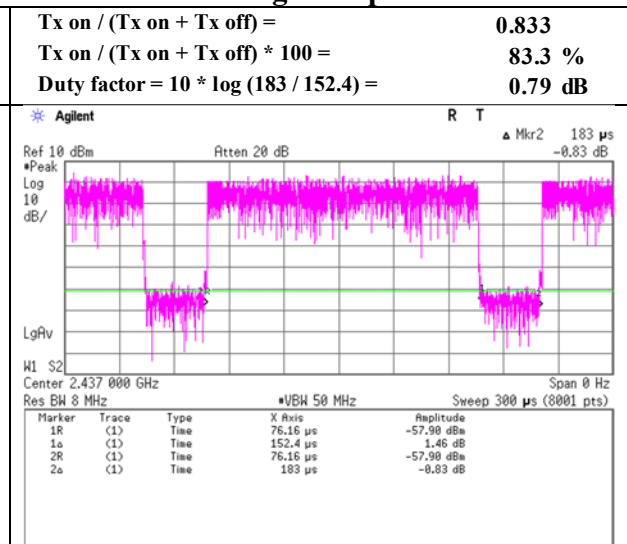
Burst rate confirmation

Report No.	13367627H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	July 17, 2020
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Junya Okuno
Mode	Tx

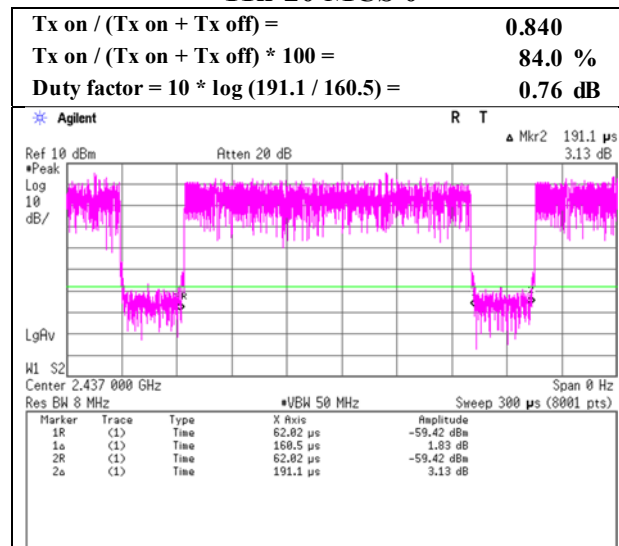
11b 1 Mbps



11g 6 Mbps



11n-20 MCS 0



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

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Radiated Spurious Emission

Report No. 13367627H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date July 17, 2020 July 19, 2020
Temperature / Humidity 23 deg. C / 56 % RH 23 deg. C / 70 % RH
Engineer Junya Okuno Junya Okuno
(1 GHz -10 GHz) (10 GHz -26.5 GHz)
Mode Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2370.733	PK	43.4	27.7	5.4	32.7	-	43.8	73.9	30.1	
Hori.	2390.000	PK	43.1	27.7	5.4	32.7	-	43.4	73.9	30.5	
Hori.	4824.000	PK	43.5	31.6	7.5	31.7	-	51.0	73.9	23.0	
Hori.	7236.000	PK	42.8	36.0	8.9	32.6	-	55.1	73.9	18.8	Floor noise
Hori.	9648.000	PK	44.2	38.6	9.4	33.3	-	58.8	73.9	15.1	Floor noise
Hori.	2370.733	AV	35.0	27.7	5.4	32.7	0.1	35.5	53.9	18.4	*2)
Hori.	2390.000	AV	34.5	27.7	5.4	32.7	0.1	35.0	53.9	19.0	*1)
Hori.	4824.000	AV	36.1	31.6	7.5	31.7	0.1	43.7	53.9	10.2	
Hori.	7236.000	AV	32.0	36.0	8.9	32.6	-	44.3	53.9	9.6	Floor noise
Hori.	9648.000	AV	32.6	38.6	9.4	33.3	-	47.2	53.9	6.7	Floor noise
Vert.	2370.733	PK	43.5	27.7	5.4	32.7	-	43.8	73.9	30.1	
Vert.	2390.000	PK	42.9	27.7	5.4	32.7	-	43.3	73.9	30.6	
Vert.	4824.000	PK	41.6	31.6	7.5	31.7	-	49.0	73.9	24.9	
Vert.	7236.000	PK	43.0	36.0	8.9	32.6	-	55.3	73.9	18.6	Floor noise
Vert.	9648.000	PK	44.4	38.6	9.4	33.3	-	59.1	73.9	14.8	Floor noise
Vert.	2370.733	AV	35.9	27.7	5.4	32.7	0.1	36.4	53.9	17.5	*2)
Vert.	2390.000	AV	35.4	27.7	5.4	32.7	0.1	35.8	53.9	18.1	*1)
Vert.	4824.000	AV	35.2	31.6	7.5	31.7	0.1	42.8	53.9	11.1	
Vert.	7236.000	AV	32.0	36.0	8.9	32.6	-	44.3	53.9	9.6	Floor noise
Vert.	9648.000	AV	32.7	38.6	9.4	33.3	-	47.3	53.9	6.6	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

*2) Noise synchronized with duty of carrier frequency.

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	Factor [dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.000	PK	85.8	27.6	5.4	32.7	86.1	-	-	Carrier
Hori.	2400.000	PK	39.7	27.7	5.4	32.7	40.1	66.1	26.1	
Vert.	2412.000	PK	87.1	27.6	5.4	32.7	87.4	-	-	Carrier
Vert.	2400.000	PK	41.0	27.7	5.4	32.7	41.3	67.4	26.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB

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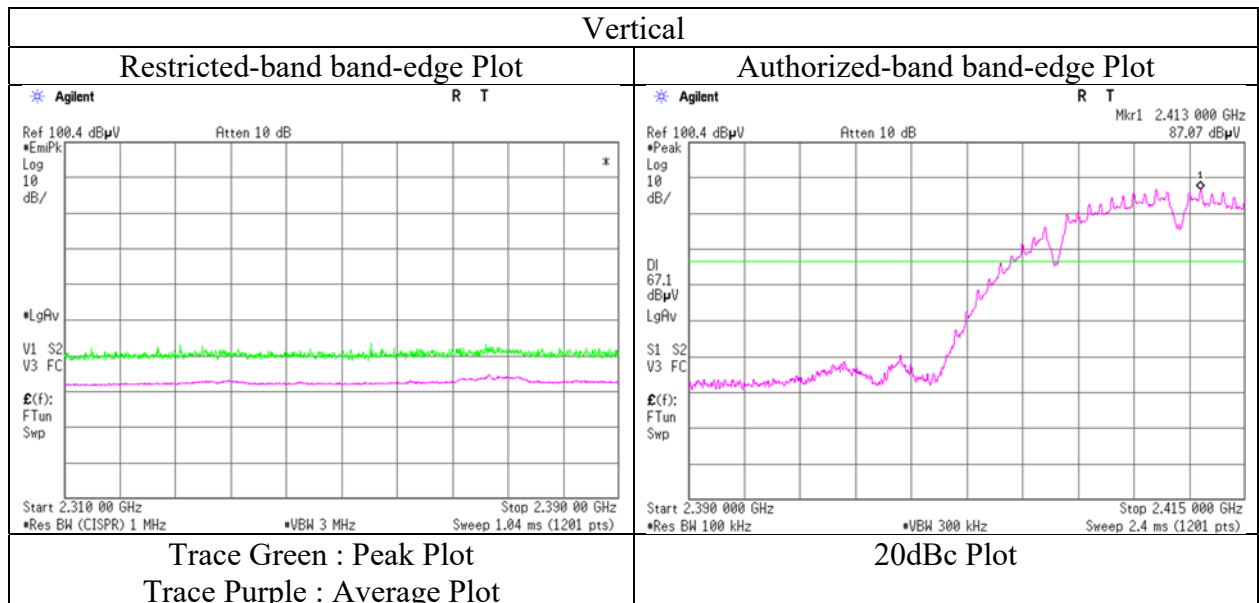
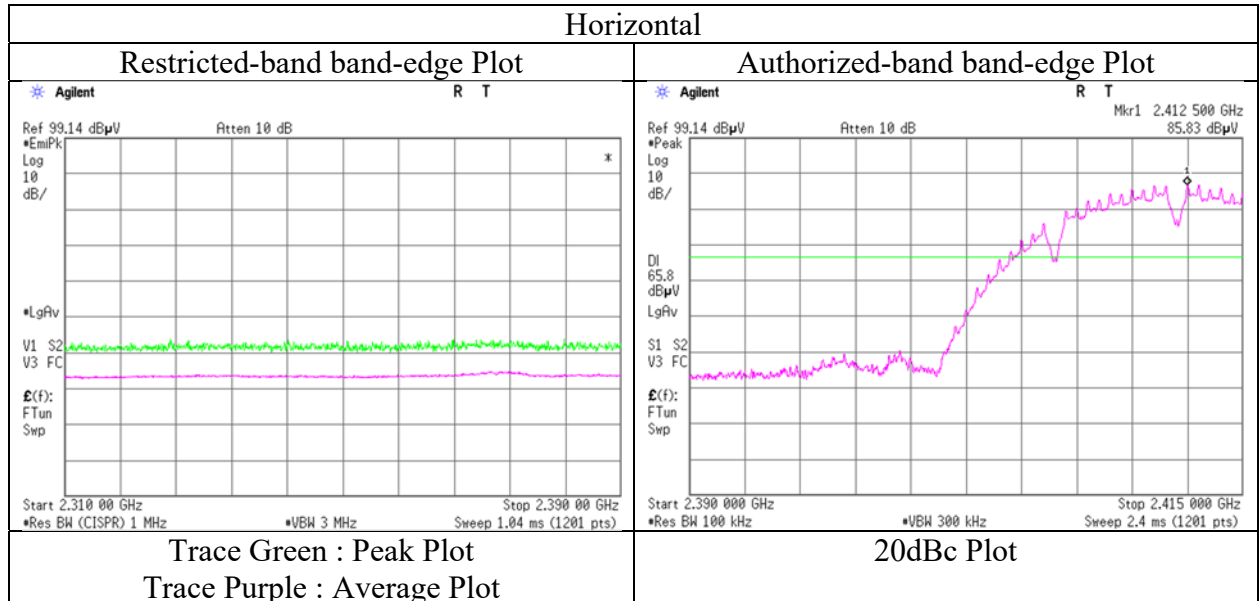
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

(Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11b 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

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Radiated Spurious Emission

Report No.	13367627H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	July 17, 2020	July 19, 2020
Temperature / Humidity	23 deg. C / 56 % RH	23 deg. C / 70 % RH
Engineer	Junya Okuno	Junya Okuno
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx 11b 2437 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	PK	42.1	31.6	7.5	31.6	-	49.5	73.9	24.4	
Hori.	7311.000	PK	42.0	36.2	8.9	32.6	-	54.4	73.9	19.5	Floor noise
Hori.	9748.000	PK	43.5	38.8	9.4	33.4	-	58.3	73.9	15.7	Floor noise
Hori.	4874.000	AV	35.2	31.6	7.5	31.6	0.1	42.8	53.9	11.2	
Hori.	7311.000	AV	33.3	36.2	8.9	32.6	-	45.7	53.9	8.2	Floor noise
Hori.	9748.000	AV	32.5	38.8	9.4	33.4	-	47.3	53.9	6.6	Floor noise
Vert.	4874.000	PK	42.2	31.6	7.5	31.6	-	49.7	73.9	24.3	
Vert.	7311.000	PK	42.0	36.2	8.9	32.6	-	54.4	73.9	19.5	Floor noise
Vert.	9748.000	PK	43.6	38.8	9.4	33.4	-	58.4	73.9	15.6	Floor noise
Vert.	4874.000	AV	35.8	31.6	7.5	31.6	0.1	43.4	53.9	10.5	
Vert.	7311.000	AV	33.4	36.2	8.9	32.6	-	45.8	53.9	8.1	Floor noise
Vert.	9748.000	AV	32.5	38.8	9.4	33.4	-	47.3	53.9	6.6	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Report No.	13367627H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	July 17, 2020	July 19, 2020
Temperature / Humidity	23 deg. C / 56 % RH	23 deg. C / 70 % RH
Engineer	Junya Okuno	Junya Okuno
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)
Mode	Tx 11b 2462 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	42.1	27.5	5.4	32.7	-	42.3	73.9	31.6	
Hori.	4924.000	PK	40.3	31.5	5.2	31.6	-	45.4	73.9	28.5	
Hori.	7386.000	PK	41.8	36.3	6.1	32.7	-	51.5	73.9	22.4	Floor noise
Hori.	2483.500	AV	34.5	27.5	5.4	32.7	0.1	34.8	53.9	19.1	*1)
Hori.	4924.000	AV	34.6	31.5	5.2	31.6	0.1	39.9	53.9	14.0	
Hori.	7386.000	AV	35.0	36.3	6.1	32.7	-	44.7	53.9	9.2	Floor noise
Vert.	2483.500	PK	42.7	27.5	5.4	32.7	-	42.9	73.9	31.0	
Vert.	4924.000	PK	41.7	31.5	5.2	31.6	-	46.8	73.9	27.1	
Vert.	7386.000	PK	41.8	36.3	6.1	32.7	-	51.6	73.9	22.3	Floor noise
Vert.	2483.500	AV	34.0	27.5	5.4	32.7	0.1	34.3	53.9	19.6	*1)
Vert.	4924.000	AV	34.8	31.5	5.2	31.6	0.1	40.0	53.9	13.9	
Vert.	7386.000	AV	33.9	36.3	6.1	32.7	-	43.7	53.9	10.3	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	89.2	27.5	5.4	32.7	89.4	-	-	Carrier
Hori.	9848.000	PK	32.8	39.0	8.9	33.4	47.2	69.4	22.2	
Vert.	2462.000	PK	87.2	27.5	5.4	32.7	87.4	-	-	Carrier
Vert.	9848.000	PK	32.0	39.0	8.9	33.4	46.4	67.4	21.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

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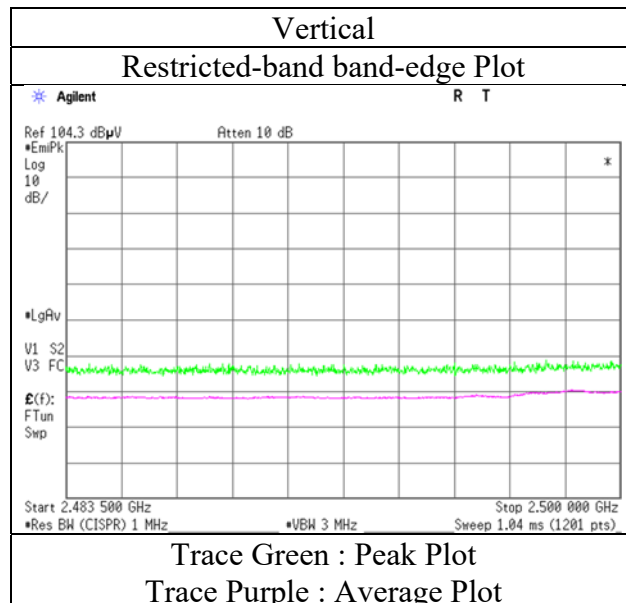
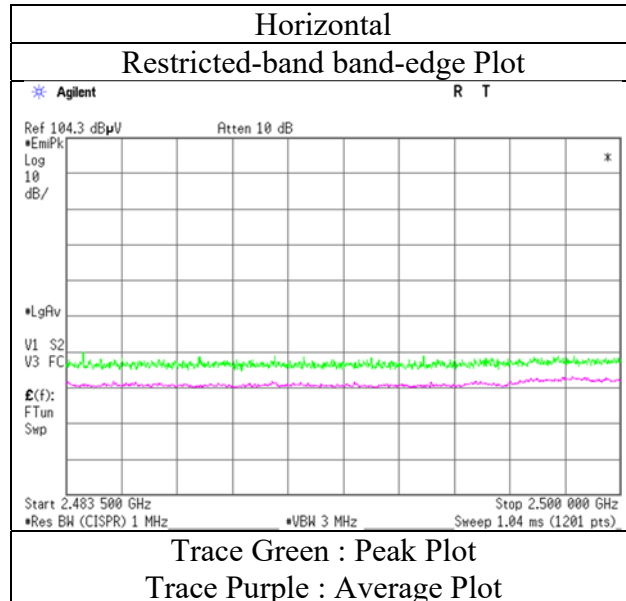
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

(Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11b 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

UL Japan, Inc.

Ise EMC Lab.

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Telephone : +81 596 24 8999

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Radiated Spurious Emission

Report No. 13367627H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date July 17, 2020 July 19, 2020
Temperature / Humidity 23 deg. C / 56 % RH 23 deg. C / 70 % RH
Engineer Junya Okuno Junya Okuno
(1 GHz -10 GHz) (10 GHz -26.5 GHz)
Mode Tx 11g 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	47.9	27.7	5.4	32.7	-	48.2	73.9	25.7	
Hori.	4824.000	PK	41.1	31.6	7.5	31.7	-	48.5	73.9	25.4	Floor noise
Hori.	7236.000	PK	42.4	36.0	8.9	32.6	-	54.7	73.9	19.2	Floor noise
Hori.	2390.000	AV	36.1	27.7	5.4	32.7	0.8	37.3	53.9	16.7	*1)
Hori.	4824.000	AV	32.9	31.6	7.5	31.7	-	40.3	53.9	13.6	Floor noise
Hori.	7236.000	AV	32.2	36.0	8.9	32.6	-	44.5	53.9	9.4	Floor noise
Vert.	2390.000	PK	49.2	27.7	5.4	32.7	-	49.6	73.9	24.4	
Vert.	4824.000	PK	41.1	31.6	7.5	31.7	-	48.5	73.9	25.4	Floor noise
Vert.	7236.000	PK	42.3	36.0	8.9	32.6	-	54.6	73.9	19.3	Floor noise
Vert.	2390.000	AV	38.0	27.7	5.4	32.7	0.8	39.1	53.9	14.8	*1)
Vert.	4824.000	AV	32.9	31.6	7.5	31.7	-	40.4	53.9	13.5	Floor noise
Vert.	7236.000	AV	32.1	36.0	8.9	32.6	-	44.4	53.9	9.5	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	83.3	27.6	5.4	32.7	83.6	-	-	Carrier
Hori.	2400.000	PK	50.5	27.7	5.4	32.7	50.9	63.6	12.7	
Hori.	9648.000	PK	40.9	38.6	9.4	33.3	55.5	63.6	8.0	
Vert.	2412.000	PK	87.2	27.6	5.4	32.7	87.4	-	-	Carrier
Vert.	2400.000	PK	53.3	27.7	5.4	32.7	53.6	67.4	13.9	
Vert.	9648.000	PK	42.9	38.6	9.4	33.3	57.6	67.4	9.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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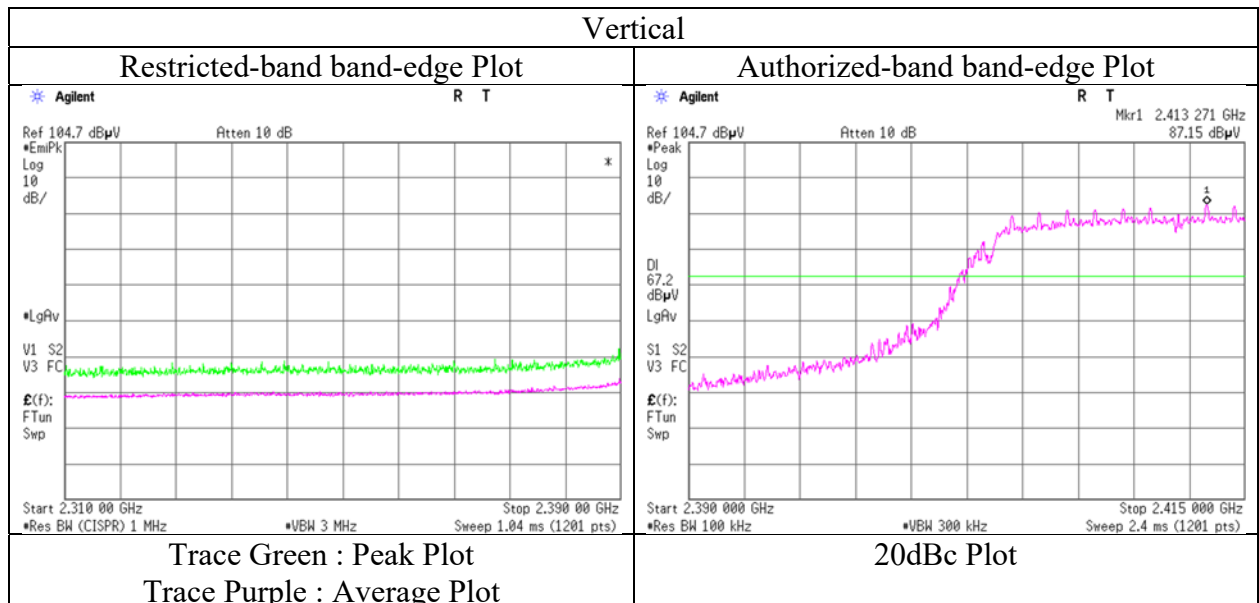
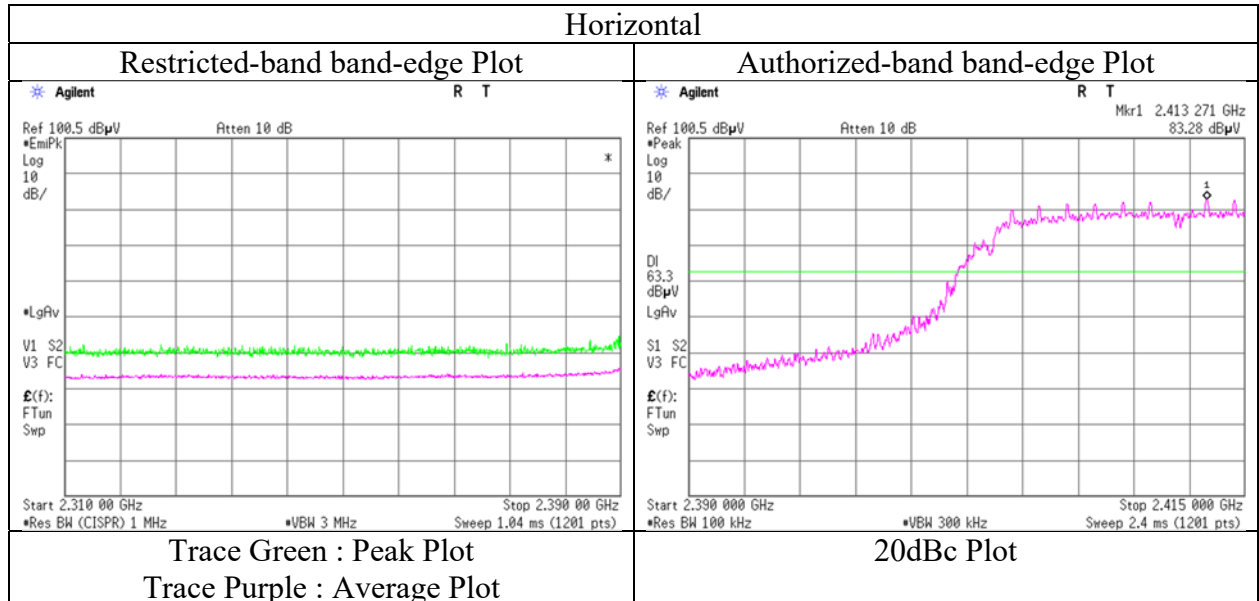
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

(Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11g 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

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Ise EMC Lab.

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Telephone : +81 596 24 8999

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Radiated Spurious Emission

Report No. 13367627H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date July 17, 2020 No.3
Temperature / Humidity 23 deg. C / 56 % RH July 19, 2020
Engineer Junya Okuno 23 deg. C / 70 % RH
(1 GHz -10 GHz) Junya Okuno
(10 GHz -26.5 GHz)
Mode Tx 11g 2437 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	PK	40.8	31.6	7.5	31.6	-	48.2	73.9	25.7	Floor noise
Hori.	7311.000	PK	42.0	36.2	8.9	32.6	-	54.4	73.9	19.5	Floor noise
Hori.	4874.000	AV	33.0	31.6	7.5	31.6	-	40.4	53.9	13.5	Floor noise
Hori.	7311.000	AV	33.3	36.2	8.9	32.6	-	45.8	53.9	8.2	Floor noise
Vert.	4874.000	PK	40.8	31.6	7.5	31.6	-	48.2	73.9	25.7	Floor noise
Vert.	7311.000	PK	42.1	36.2	8.9	32.6	-	54.5	73.9	19.4	Floor noise
Vert.	4874.000	AV	33.0	31.6	7.5	31.6	-	40.4	53.9	13.5	Floor noise
Vert.	7311.000	AV	33.4	36.2	8.9	32.6	-	45.8	53.9	8.1	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2437.000	PK	85.1	27.6	5.4	32.7	85.3	-	-	Carrier
Hori.	9748.000	PK	35.6	38.8	9.4	33.4	50.4	65.3	15.0	
Vert.	2437.000	PK	87.1	27.6	5.4	32.7	87.4	-	-	Carrier
Vert.	9748.000	PK	39.5	38.8	9.4	33.4	54.3	67.4	13.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

Radiated Spurious Emission

Report No. 13367627H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date July 17, 2020 July 19, 2020
Temperature / Humidity 23 deg. C / 56 % RH 23 deg. C / 70 % RH
Engineer Junya Okuno Junya Okuno
(1 GHz -10 GHz) (10 GHz -26.5 GHz)
(Below 1 GHz)
Mode Tx 11g 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	176.000	QP	41.0	16.1	8.8	29.7	-	36.1	43.5	7.4	
Hori.	184.000	QP	37.7	16.1	8.8	29.7	-	33.0	43.5	10.5	
Hori.	192.000	QP	42.0	16.4	8.9	29.6	-	37.7	43.5	5.8	
Hori.	200.000	QP	48.0	11.4	9.0	29.6	-	38.8	43.5	4.7	
Hori.	208.000	QP	45.0	11.1	9.0	29.5	-	35.6	43.5	7.9	
Hori.	216.000	QP	42.9	11.0	9.1	29.5	-	33.5	43.5	10.0	
Hori.	2483.500	PK	47.0	27.5	5.4	32.7	-	47.2	73.9	26.7	
Hori.	4924.000	PK	41.2	31.5	7.5	31.6	-	48.5	73.9	25.4	Floor noise
Hori.	7386.000	PK	42.4	36.3	8.9	32.7	-	54.9	73.9	19.0	Floor noise
Hori.	2483.500	AV	36.4	27.5	5.4	32.7	0.8	37.3	53.9	16.6	*1)
Hori.	4924.000	AV	32.7	31.5	7.5	31.6	-	40.1	53.9	13.8	Floor noise
Hori.	7386.000	AV	32.0	36.3	8.9	32.7	-	44.5	53.9	9.4	Floor noise
Vert.	176.000	QP	42.7	16.1	8.8	29.7	-	37.8	43.5	5.7	
Vert.	184.000	QP	42.1	16.1	8.8	29.7	-	37.4	43.5	6.1	
Vert.	192.000	QP	42.3	16.4	8.9	29.6	-	38.0	43.5	5.5	
Vert.	200.000	QP	49.6	11.4	9.0	29.6	-	40.4	43.5	3.1	
Vert.	208.000	QP	44.9	11.1	9.0	29.5	-	35.5	43.5	8.0	
Vert.	216.000	QP	45.5	11.0	9.1	29.5	-	36.1	43.5	7.4	
Vert.	2483.500	PK	46.9	27.5	5.4	32.7	-	47.1	73.9	26.8	
Vert.	4924.000	PK	41.1	31.5	7.5	31.6	-	48.5	73.9	25.4	Floor noise
Vert.	7386.000	PK	42.3	36.3	8.9	32.7	-	54.8	73.9	19.1	Floor noise
Vert.	2483.500	AV	35.8	27.5	5.4	32.7	0.8	36.8	53.9	17.1	*1)
Vert.	4924.000	AV	32.7	31.5	7.5	31.6	-	40.1	53.9	13.8	Floor noise
Vert.	7386.000	AV	32.0	36.3	8.9	32.7	-	44.5	53.9	9.4	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2462.000	PK	85.9	27.5	5.4	32.7	86.1	-	-	Carrier
Hori.	9848.000	PK	36.5	39.0	9.4	33.4	51.5	66.1	14.7	
Vert.	2462.000	PK	87.4	27.5	5.4	32.7	87.6	-	-	Carrier
Vert.	9848.000	PK	41.1	39.0	9.4	33.4	56.0	67.6	11.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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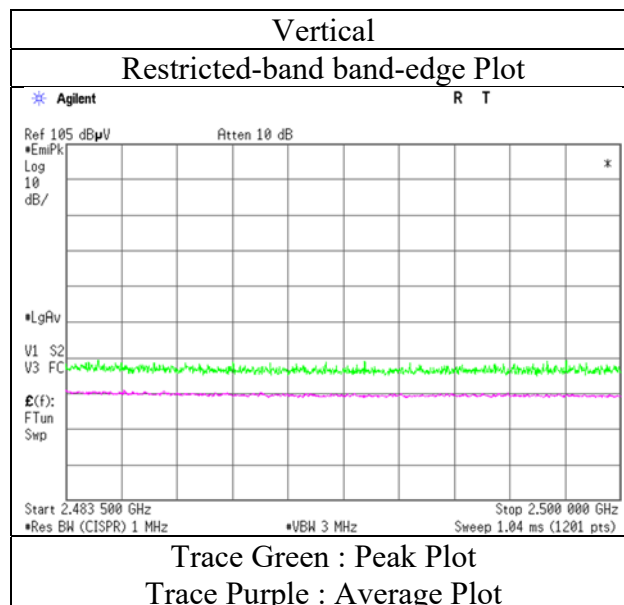
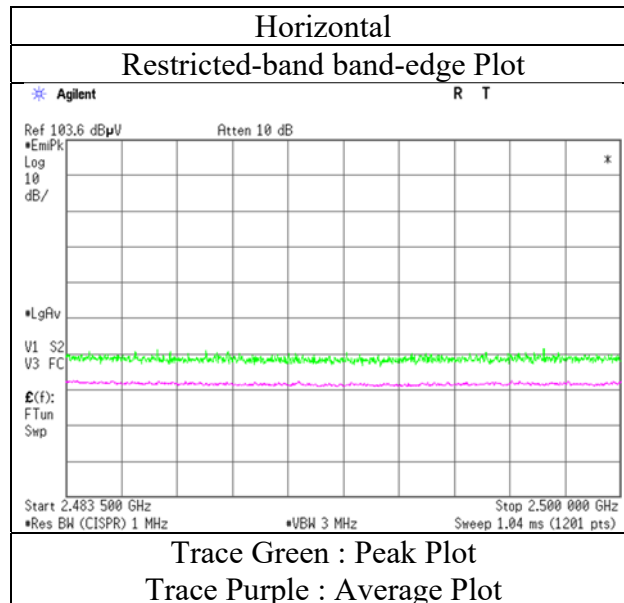
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

(Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11g 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Radiated Spurious Emission

Report No. 13367627H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date July 17, 2020
Temperature / Humidity 23 deg. C / 56 % RH
Engineer Junya Okuno
(1 GHz -10 GHz)
Mode Tx 11n-20 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	46.8	27.7	5.4	32.7	-	47.1	73.9	26.8	
Hori.	2390.000	AV	36.7	27.7	5.4	32.7	0.8	37.8	53.9	16.1	*1)
Vert.	2390.000	PK	48.7	27.7	5.4	32.7	-	49.0	73.9	24.9	
Vert.	2390.000	AV	37.9	27.7	5.4	32.7	0.8	39.0	53.9	14.9	*1)

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

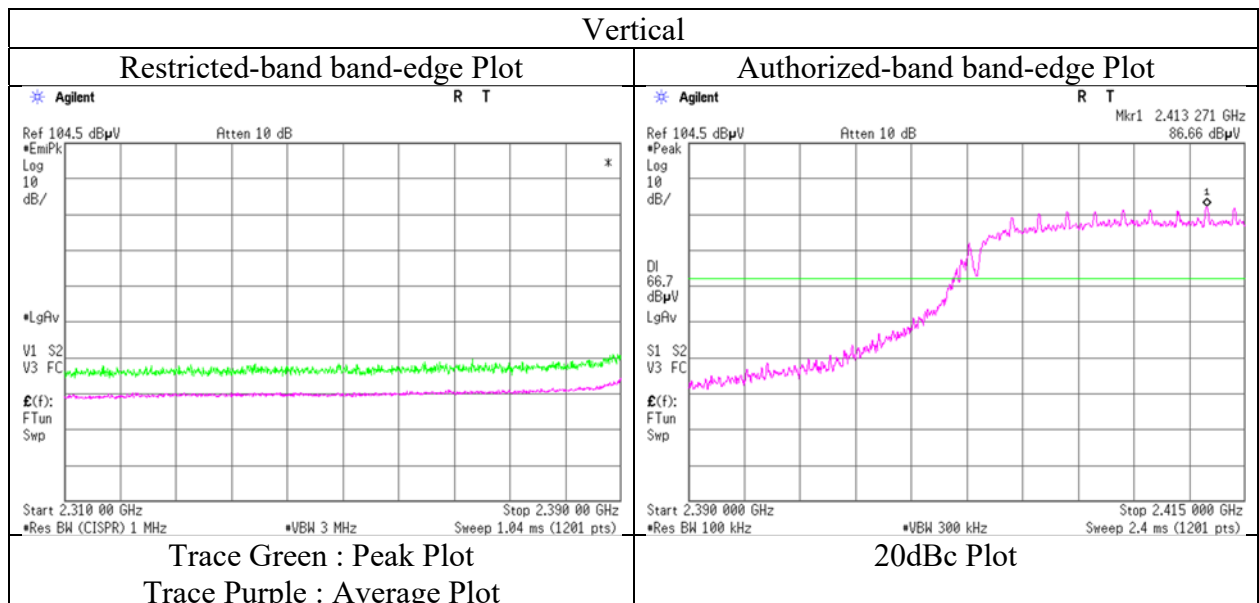
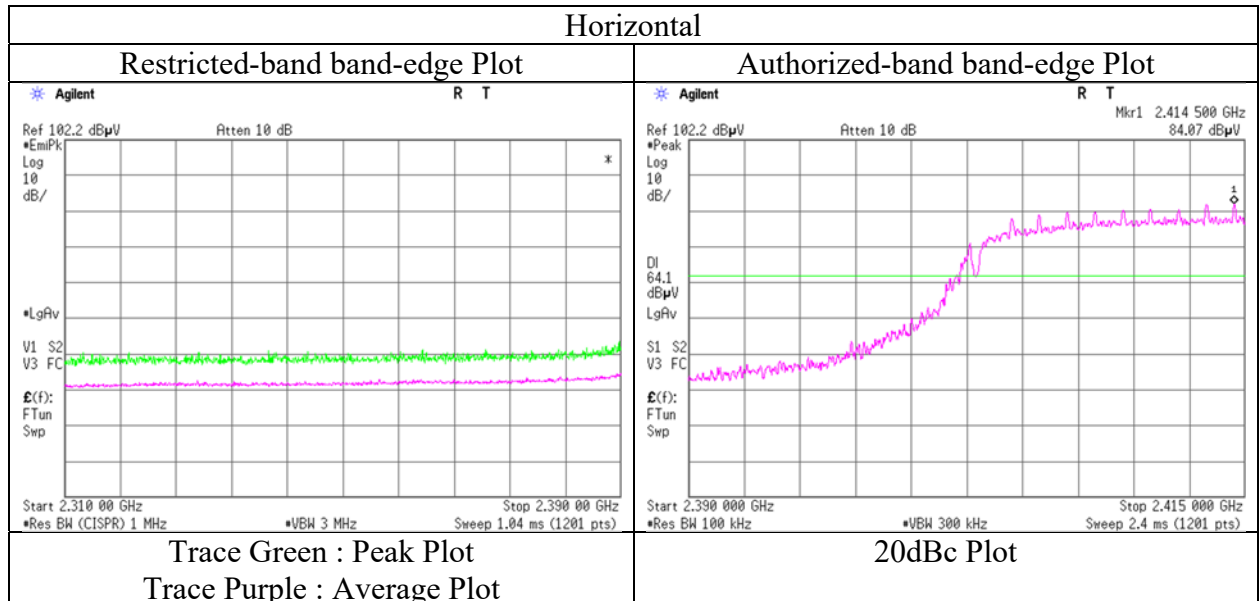
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.1	27.6	5.4	32.7	84.4	-	-	Carrier
Hori.	2400.000	PK	51.7	27.7	5.4	32.7	52.0	64.4	12.4	
Vert.	2412.000	PK	86.7	27.6	5.4	32.7	87.0	-	-	Carrier
Vert.	2400.000	PK	55.2	27.7	5.4	32.7	55.5	67.0	11.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11n-20 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Radiated Spurious Emission

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11n-20 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	49.4	27.5	5.4	32.7	-	49.5	73.9	24.4	
Hori.	2483.500	AV	34.1	27.5	5.4	32.7	0.8	35.0	53.9	18.9	
Vert.	2483.500	PK	48.1	27.5	5.4	32.7	-	48.3	73.9	25.6	
Vert.	2483.500	AV	31.7	27.5	5.4	32.7	0.8	32.6	53.9	21.3	

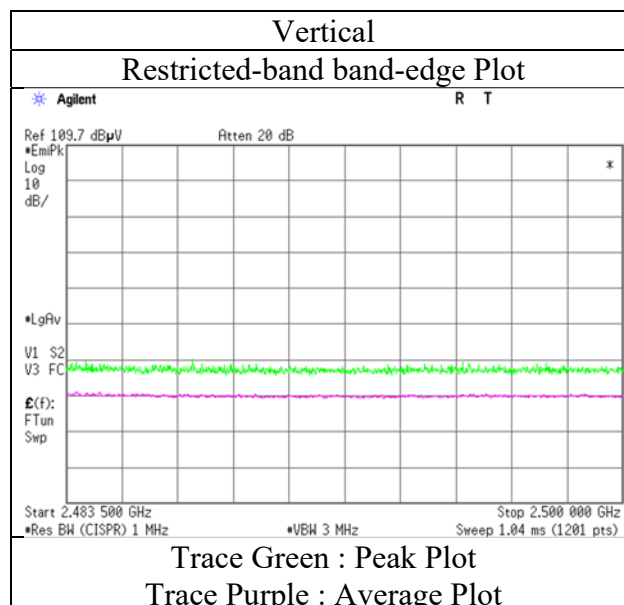
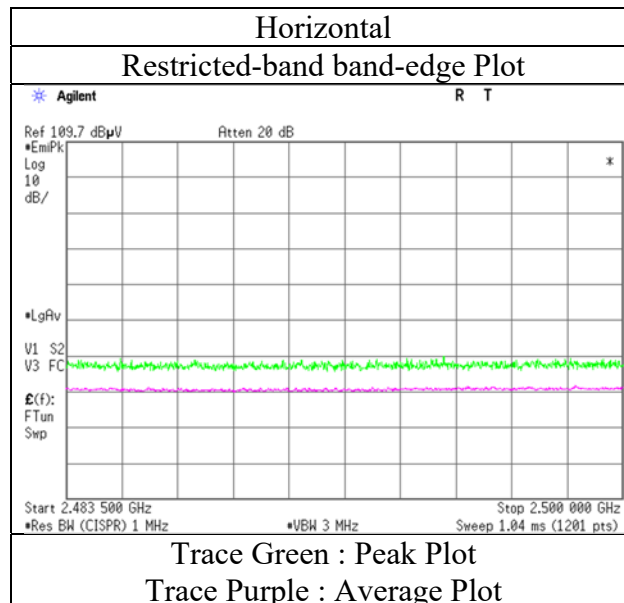
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	13367627H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	July 17, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Junya Okuno
	(1 GHz -10 GHz)
Mode	Tx 11n-20 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

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

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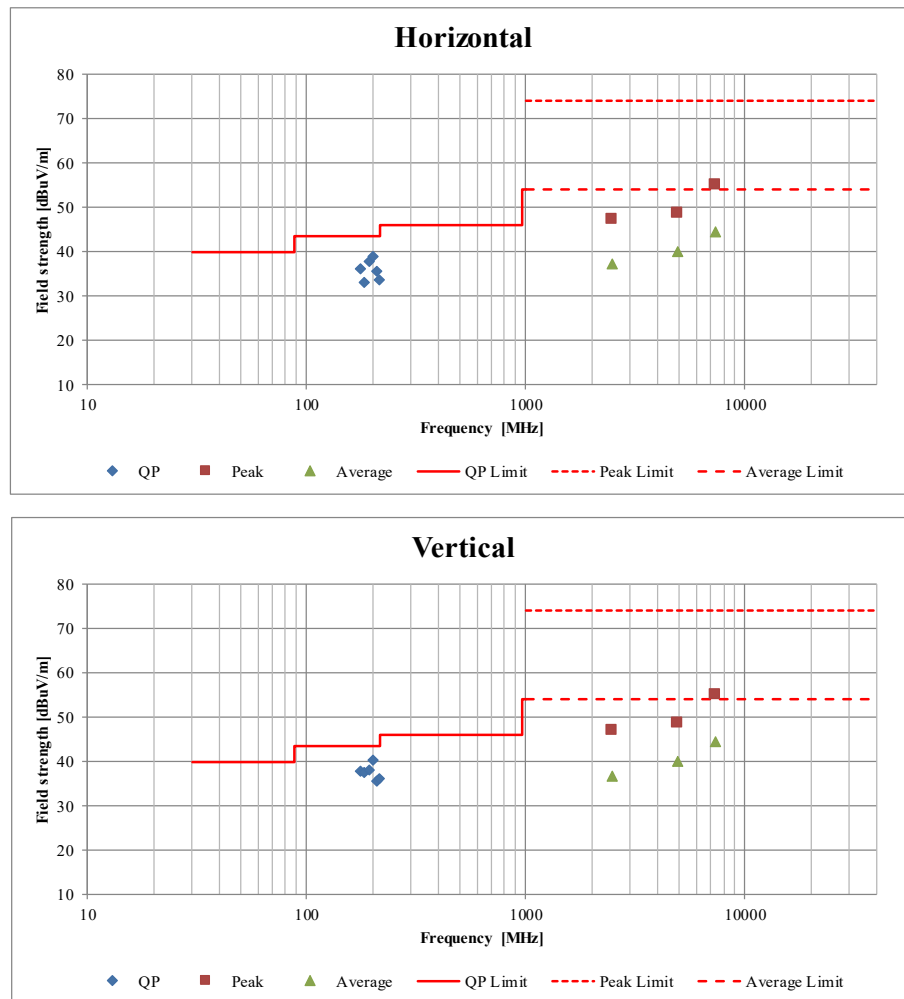
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Radiated Spurious Emission **(Plot data, Worst case)**

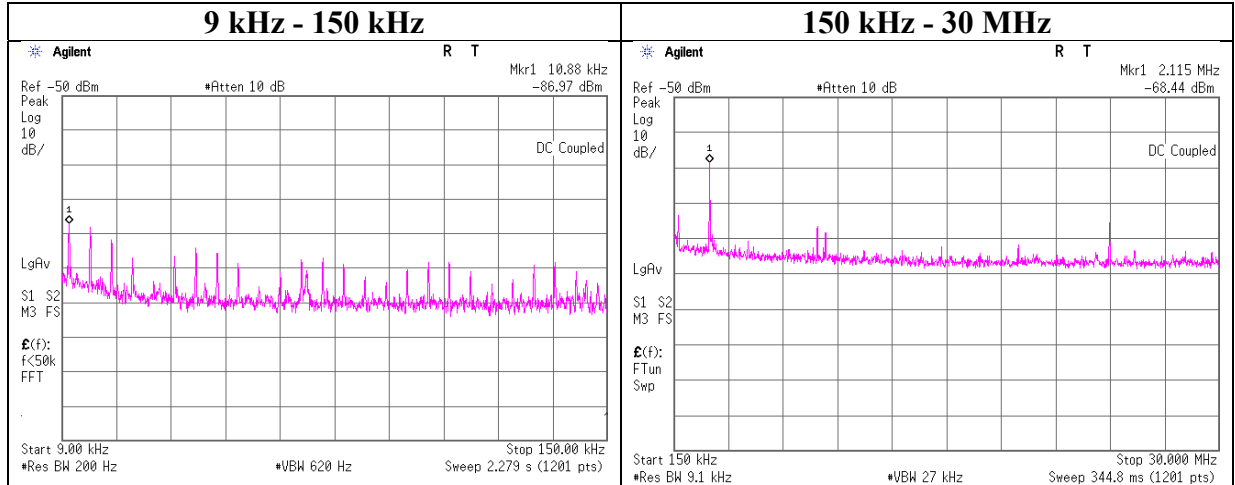
Report No.	13367627H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	July 17, 2020	July 19, 2020
Temperature / Humidity	23 deg. C / 56 % RH	23 deg. C / 70 % RH
Engineer	Junya Okuno (1 GHz -10 GHz)	Junya Okuno (10 GHz -26.5 GHz) (Below 1 GHz)
Mode	Tx 11g 2462 MHz	



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

Conducted Spurious Emission

Report No.	13367627H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	July 22, 2020
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Junya Okuno
Mode	Tx 11g 2462 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.88	-87.0	0.43	10.1	2.0	1	-74.4	300	6.0	-13.2	46.8	60.0	
2115.00	-68.4	0.45	10.1	2.0	1	-55.9	30	6.0	25.4	29.5	4.1	

$E [dBuV/m] = EIRP [dBm] - 20 \log (Distance [m]) + Ground\ bounce [dB] + 104.8 [dBuV/m]$

$EIRP [dBm] = Reading [dBm] + Cable\ loss [dB] + Attenuator\ Loss [dB] + Antenna\ gain [dBi] + 10 * \log (N)$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

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Power Density

Report No. 13367627H
Test place Ise EMC Lab. No.6 Shielded Room
Date July 22, 2020
Temperature / Humidity 24 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-18.36	1.81	10.10	-6.45	8.00	14.45
2437.00	-17.94	1.73	10.10	-6.11	8.00	14.11
2462.00	-18.03	1.78	10.10	-6.15	8.00	14.15

11g

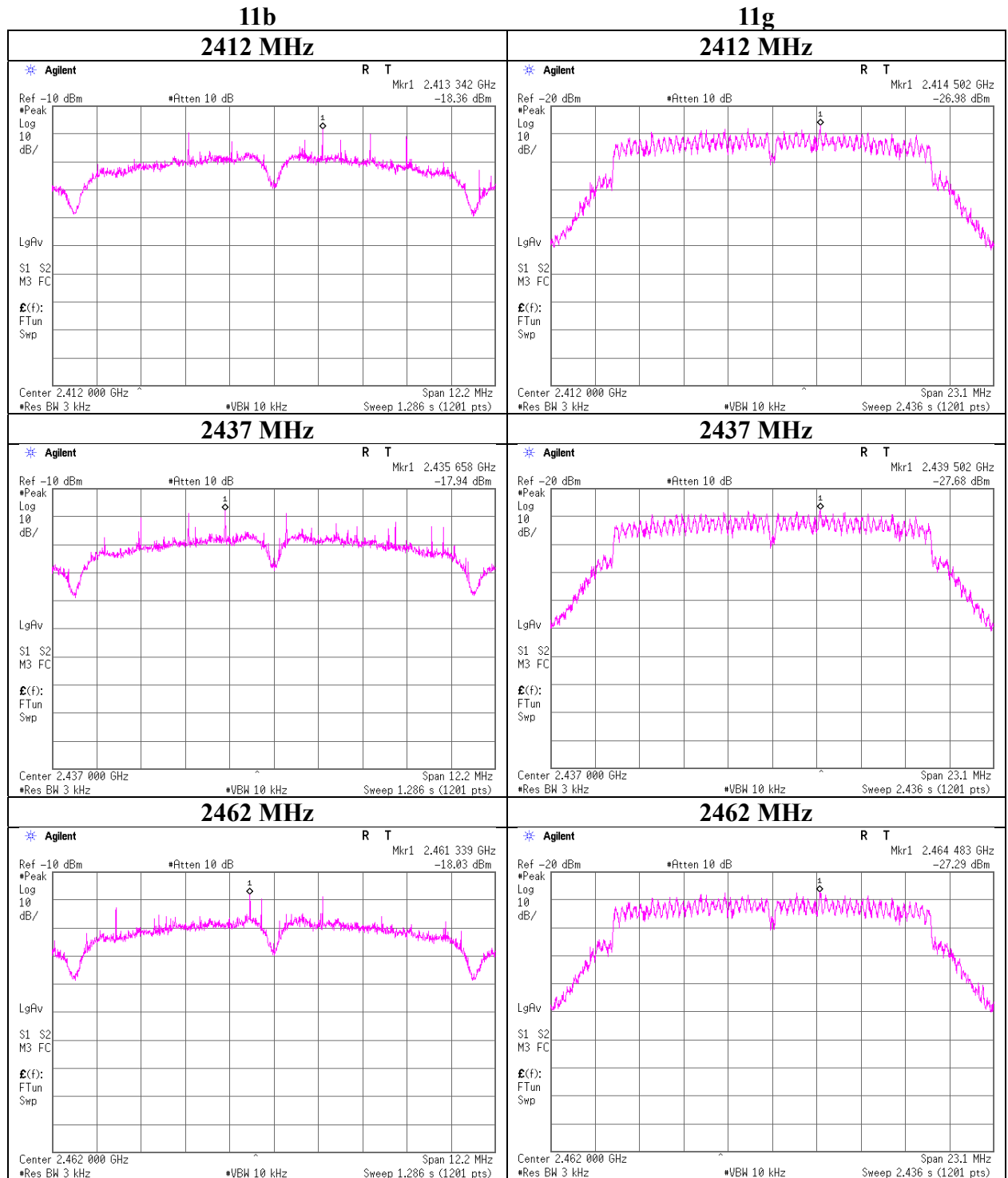
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-26.98	1.81	10.10	-15.07	8.00	23.07
2437.00	-27.68	1.73	10.10	-15.85	8.00	23.85
2462.00	-27.29	1.78	10.10	-15.41	8.00	23.41

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.

Power Density



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Power Density

Report No. 13367627H
Test place Ise EMC Lab. No.6 Shielded Room
Date July 22, 2020 July 22, 2020
Temperature / Humidity 24 deg. C / 50 % RH 24 deg. C / 50 % RH
Engineer Junya Okuno Junya Okuno
Mode Tx

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-26.36	1.81	10.10	-14.45	8.00	22.45
2437.00	-25.96	1.73	10.10	-14.13	8.00	22.13
2462.00	-27.40	1.78	10.10	-15.52	8.00	23.52

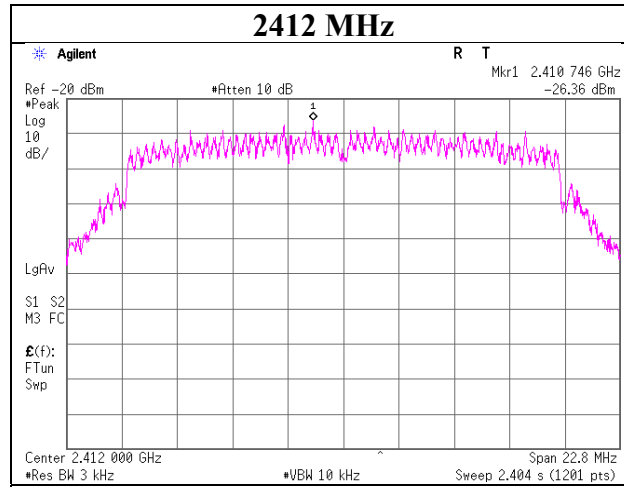
Sample Calculation:

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

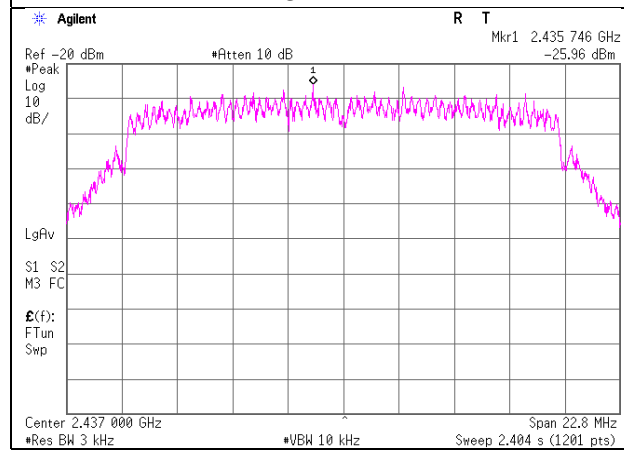
Power Density

11n-20

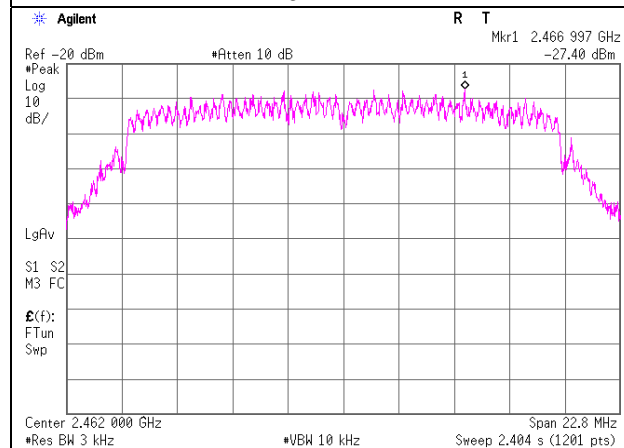
2412 MHz



2437 MHz



2462 MHz



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APPENDIX 2: Test instruments

Test equipment-1/2

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0005	01/07/2020	12
AT	MMM-12	141547	DIGITAL HiTESTER	Hioki	3805	60500120	02/03/2020	12
AT	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	08/07/2019	12
AT	MAT-57	141333	Attenuator(10dB)	Suhner	6810.19.A	-	12/09/2019	12
AT	MOS-34	141572	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	3401	01/07/2020	12
AT	MMM-16	141360	DIGITAL HiTESTER	Hioki	3805	70900532	01/06/2020	12
AT	MPM-13	141810	Power Meter	ANRITSU	ML2495A	824014	10/09/2019	12
AT	MPSE-18	141832	Power sensor	ANRITSU	MA2411B	738174	10/09/2019	12
AT	MCC-144	141414	Microwave Cable	Junkosha	MWX221	1207S407	08/06/2019	12
AT	MAT-22	141269	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	03/24/2020	12
AT	MOS-24	90289	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0005	01/07/2020	12
AT	MJM-24	142225	Measure	ASKUL	-	-	-	-
AT	MSA-14	141901	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250080	10/06/2019	12
AT	MPM-08	141805	Power Meter	ANRITSU	ML2495A	6K00003338	10/03/2019	12
AT	MPSE-11	141840	Power sensor	ANRITSU	MA2411B	11737	10/03/2019	12
AT	MCC-64	141327	Coaxial Cable	UL Japan	-	-	02/04/2020	12
AT	MCC-66	141328	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	04/02/2020	12
AT	MAT-26	141244	Attenuator(10dB)	Weinschel - API Technologies Corp	WA8-10-34	A198	02/19/2020	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	258	09/26/2019	12
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MRENT-130	141855	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187750	11/19/2019	12

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Test equipment-2/2

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MAEC-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2020	24
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/07/2020	12
RE	MMM-08	141532	DIGITAL HiTESTER	Hioki	3805	51201197	01/06/2020	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	-	-
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess - Elektronik	BBHA9170	BBHA9170306	05/21/2020	12
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/08/2019	24
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/02/2020	12
RE	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/24/2020	12
RE	MHF-25	141232	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	09/11/2019	12
RE	MSA-04	141885	Spectrum Analyzer	Keysight Technologies Inc	E4448A	US44300523	11/21/2019	12
RE	MAT-95	142314	Attenuator	Pasternack	PE7390-6	D/C 1504	06/17/2020	12
RE	MBA-03	141424	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	1915	08/24/2019	12
RE	MCC-51	141323	Coaxial cable	UL Japan	-	-	07/06/2020	12
RE	MLA-22	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-191	08/24/2019	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/10/2020	12
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	08/02/2019	12

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

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

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

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

Test item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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