



RADIO TEST REPORT

Test Report No. : 11157080H-A-R1

Applicant : CASIO COMPUTER CO., LTD.
Type of Equipment : Digital Camera
Model No. : EX-FR200CA
FCC ID : BBQEXFR200CA
Test regulation : FCC Part 15 Subpart C: 2015
(WLAN, Bluetooth (Low Energy) parts)
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. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11157080H-A. 11157080H-A is replaced with this report.

Date of test: March 1 to April 28, 2016

Representative test engineer:

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Approved by:

Takayuki Shimada

Takayuki Shimada
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
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13-EM-F0429

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SECTION 1: Customer information

Company Name	:	CASIO COMPUTER CO., LTD.
Address	:	2-1, Sakaecho 3-chome, Hamura-shi, Tokyo 205-8555, Japan
Telephone Number	:	+81-42-579-7282
Facsimile Number	:	+81-42-579-7702
Contact Person	:	Hiroaki Suzuki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Camera
Model No.	:	EX-FR200CA
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	Li-ion Battery(NP-170) DC 3.7V, 950mAh, 3.6Wh
Receipt Date of Sample	:	February 27, 2016
Country of Mass-production	:	Indonesia
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: EX-FR200CA (referred to as the EUT in this report) is a Digital Camera.

General Specification

Clock frequency(ies) in the system	:	48 MHz and 32.768 kHz for main system 37.4 MHz for WLAN and Bluetooth Low Energy module 26 MHz for Bluetooth classic module (Bluetooth 2.1+EDR(for IC241 of CP-1 circuit board))
Operating temperature	:	-5 deg. C to +40 deg. C

Radio Specification

<WLAN + Bluetooth Low Energy module>

WLAN (IEEE802.11b/g/n-20)

Equipment Type	Transceiver
Frequency of Operation	2412 MHz - 2462 MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20 MHz & 5 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 1.2 V / DC 3.3 V
Antenna Type	Monopole Pattern Antenna
Antenna Gain	-3.3dBi

Bluetooth (Ver. 4.1 Low Energy)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Type of Modulation	GFSK
Bandwidth & Channel spacing	2 MHz & 2 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 1.2 V / DC 3.3 V
Antenna Type	Monopole Pattern Antenna
Antenna Gain	-3.3dBi

<Bluetooth classic module>

Bluetooth (Ver. 2.1 + EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	1 MHz & 1 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 1.2 V / DC 3.3 V
Antenna Type	Monopole Pattern Antenna
Antenna Gain	+0.6dBi

*This test report applies for WLAN and Bluetooth Low Energy parts.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
 *Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

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 EUT complies with FCC Part 15 Subpart B: 2015, final revised on November 23, 2015.

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	QP 21.8 dB, 0.15000 MHz, N AV 30.3 dB, 0.45266 MHz, N	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(4)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.0 dB 2390.00 MHz, AV, Horizontal	Complied	Conducted (below 30 MHz)/ 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) and KDB 558074 D01 DTS Meas Guidance v03r04 12.2.7.

* 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 1.2 V / 3.3 V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

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

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

3.4 Uncertainty

EMI

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 Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	

Frequency range	Conducted emission using AMN(LISN) (+dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

Test distance	Radiated emission (+dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+dB)		(10 m*)(+dB)	
	30 – 200 MHz	200 – 1000MHz	30 – 200 MHz	200 – 1000MHz
Horizontal	4.9 dB	5.2 dB	4.9 dB	5.0 dB
Vertical	4.6 dB	5.9 dB	5.0 dB	5.0 dB

Radiated emission				
(3 m*)(+dB)		(1 m*)(+dB)	(0.5 m*)(+dB)	(10 m*)(+dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.0 dB	5.2 dB	5.1 dB	5.0 dB	5.2 dB

*Measurement distance

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 report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

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Test site	IC Registration Number	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	2973C-1	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	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	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	2973C-4	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.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	N/A	-	-
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 m x 2.0m 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 E.U.T. during testing

4.1 Operating Mode(s)

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

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n SISO 20MHz BW (11n-20)	MCS 3, PN9
Bluetooth(BT) Low Energy (LE)	Maximum Packet Size, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Low Channel)	
*The power value of the EUT was set for testing as follows (setting value might be different from product specification value); Power settings: WLAN: 11b/g/n-20: 9dBm BT LE: 5.5dBm Software: WLAN: C597A wireless test firmware Ver.0226 BT LE: C597A wireless test firmware Ver.0226 *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)

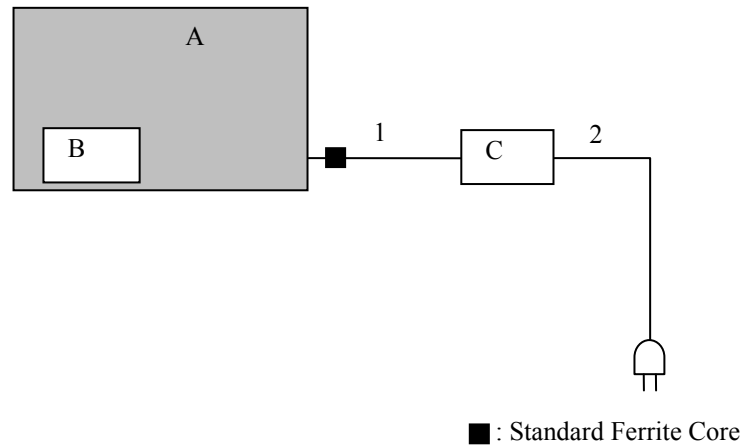
Test Item	Operating Mode	Tested frequency
Conducted Emission *1)	11n-20 Tx	2412MHz
	BT LE Tx	2402MHz
		2440MHz
		2480MHz
Spurious Emission above 1GHz (Radiated)	11b Tx	2412MHz
	11n-20 Tx *2)	2437MHz
		2462MHz
	BT LE Tx	2402MHz
		2440MHz
		2480MHz
Band edge of Spurious Emission above 1GHz (Radiated)	11b Tx	2412MHz
	11n-20 Tx *3)	2462MHz
6dB Bandwidth 99% Occupied Bandwidth	11b Tx	2412MHz
	11g Tx	2437MHz
	11n-20 Tx	2462MHz
	BT LE Tx	2402MHz
		2440MHz
		2480MHz
Maximum Peak Output Power, Power Density	11b Tx	2412MHz
	11g Tx	2437MHz
	11n-20 Tx	2462MHz
	BT LE Tx	2402MHz
		2440MHz
		2480MHz
Spurious Emission (Conducted)	11n-20 Tx *1)	2412MHz
	BT LE Tx	2402MHz
		2440MHz
		2480MHz

*1) The operating mode and tested frequency were tested as a representative, because it had the highest power at antenna terminal test.

*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power

*3) Only band edge test was tested on this mode, because the 11n-20 Tx mode had the higher power at antenna terminal test.

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

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Camera	EX-FR200CA	P115011000197 *1) P115011000200 *2)	CASIO COMPUTER CO., LTD.	EUT
B	Micro SD	SD-C01G	-	Toshiba	-
C	AC Adaptor	AD-C53U	130816	CASIO	-

*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 Cable	0.8	Shielded	Shielded	-
2	AC Cable	1.5	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 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 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

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

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r04".

[For below 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

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

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

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

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

Test Antennas are used as below;

Frequency	30 MHz to 300 MHz	300 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 *3)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces If duty cycle was less than 98%, a duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	4.5 m *1) (1 GHz – 10GHz), 1.0 m *2) (10 GHz – 26.5 GHz)		4.5 m *1) (1 GHz – 10GHz), 1.0 m *2) (10 GHz – 26.5 GHz)

*1) Distance Factor: $20 \times \log(4.5 \text{ m} / 3.0 \text{ m}) = 3.5 \text{ dB}$

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

*3) Average Power Measurement was performed based on 6. 0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r05"

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- 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.

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

Measurement range	: 30 M - 26.5 GHz
Test data	: APPENDIX
Test result	: Pass

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
6dB Bandwidth	20 MHz, 2 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)	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 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".

*4) 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 low enough as shown in the chart.

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

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

Test data : APPENDIX

Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

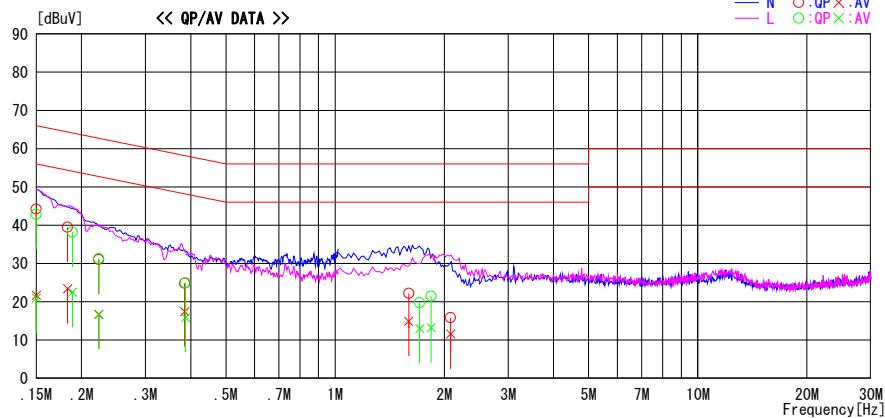
UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2016/04/28

Report No. : 11157080H

Temp./Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : 11n20 2412MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	30.8	8.3	13.4	44.2	21.7	66.0	56.0	21.8	34.3	N	
0.18304	26.1	10.0	13.4	39.5	23.4	64.3	54.3	24.8	30.9	N	
0.22288	17.6	3.3	13.4	31.0	16.7	62.7	52.7	31.7	36.0	N	
0.38499	11.4	4.0	13.4	24.8	17.4	58.2	48.2	33.4	30.8	N	
1.59605	8.7	1.4	13.5	22.2	14.9	56.0	46.0	33.8	31.1	N	
2.08160	2.3	-1.9	13.5	15.8	11.6	56.0	46.0	40.2	34.4	N	
0.15000	29.4	7.6	13.4	42.8	21.0	66.0	56.0	23.2	35.0	L	
0.18883	24.8	9.1	13.4	38.2	22.5	64.1	54.1	25.9	31.6	L	
0.22315	17.9	3.3	13.4	31.3	16.7	62.7	52.7	31.4	36.0	L	
0.38674	11.5	2.5	13.4	24.9	15.9	58.1	48.1	33.2	32.2	L	
1.71036	6.2	-0.5	13.5	19.7	13.0	56.0	46.0	36.3	33.0	L	
1.84110	8.0	-0.3	13.5	21.5	13.2	56.0	46.0	34.5	32.8	L	

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

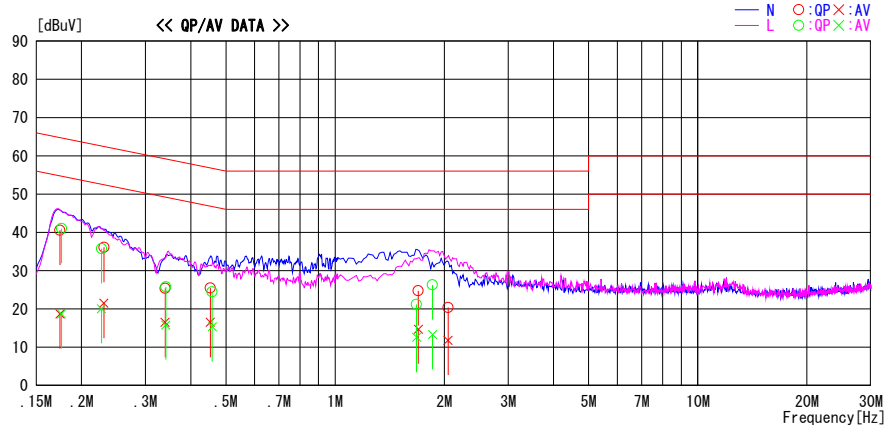
UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2016/04/28

Report No. : 11157080H

Temp./Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : BLE 2480MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

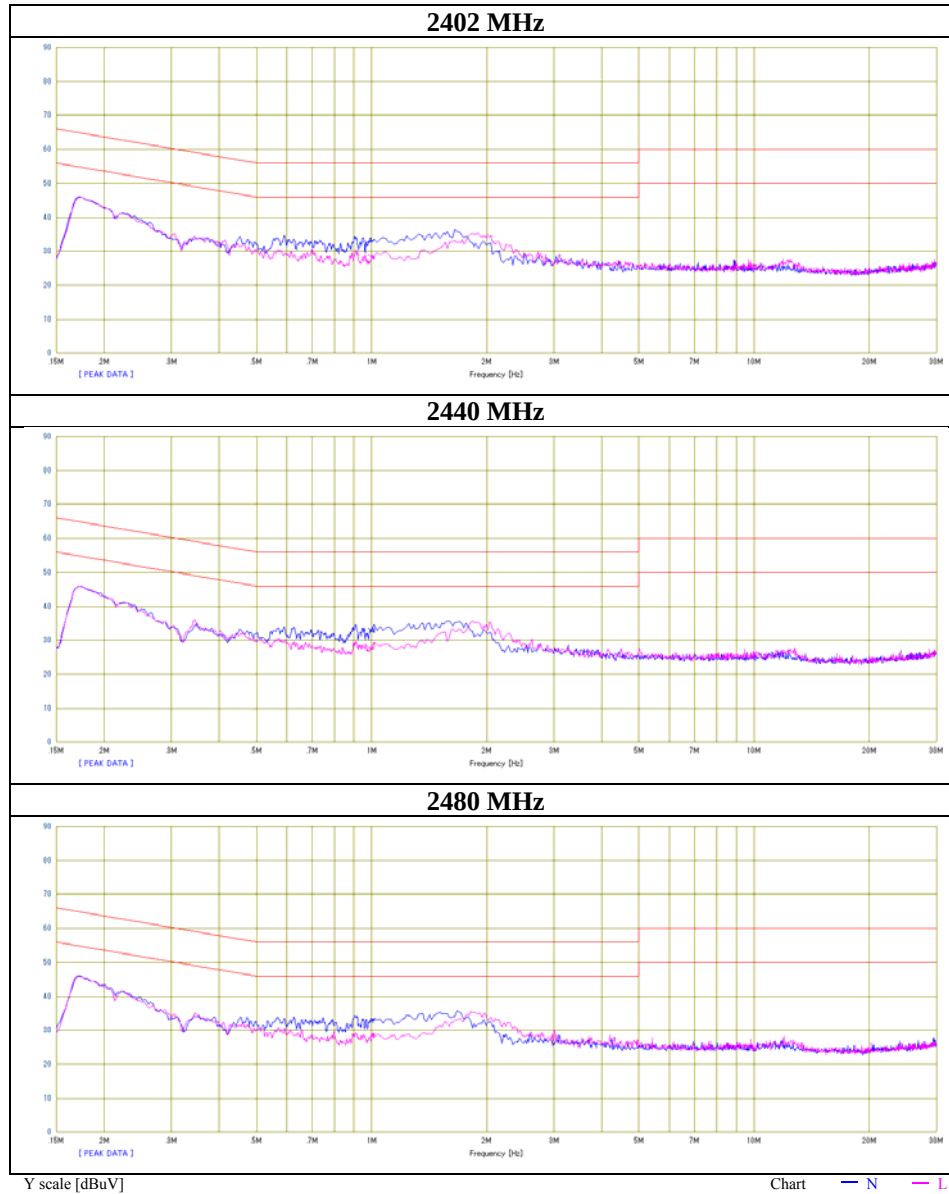


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.17426	27.2	5.3	13.4	40.6	18.7	64.8	54.8	24.2	36.1	N	
0.23048	22.7	8.1	13.4	36.1	21.5	62.4	52.4	26.3	30.9	N	
0.33972	12.0	3.1	13.4	25.4	16.5	59.2	49.2	33.8	32.7	N	
0.45266	12.1	3.1	13.4	25.5	16.5	56.8	46.8	31.3	30.3	N	
1.69581	11.2	1.2	13.5	24.7	14.7	56.0	46.0	31.3	31.3	N	
2.04854	6.9	-1.7	13.5	20.4	11.8	56.0	46.0	35.6	34.2	N	
0.17599	27.6	5.3	13.4	41.0	18.7	64.7	54.7	23.7	36.0	L	
0.22704	22.3	6.7	13.4	35.7	20.1	62.6	52.6	26.9	32.5	L	
0.34132	12.3	2.4	13.4	25.7	15.8	59.2	49.2	33.5	33.4	L	
0.45815	11.1	1.9	13.4	24.5	15.3	56.7	46.7	32.2	31.4	L	
1.67825	7.7	-0.9	13.5	21.2	12.6	56.0	46.0	34.8	33.4	L	
1.85605	12.8	-0.2	13.5	26.3	13.3	56.0	46.0	29.7	32.7	L	

CHART : WITH FACTOR. Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTN + CABLE)
Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	April 28, 2016
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE



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Ise EMC Lab.

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6dB Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	7.566	> 500
	2437	6.659	> 500
	2462	8.023	> 500
11g	2412	15.101	> 500
	2437	15.080	> 500
	2462	15.087	> 500
11n-20	2412	15.092	> 500
	2437	15.062	> 500
	2462	15.091	> 500
BT LE	2402	0.710	> 500
	2440	0.711	> 500
	2480	0.715	> 500

6dB Bandwidth

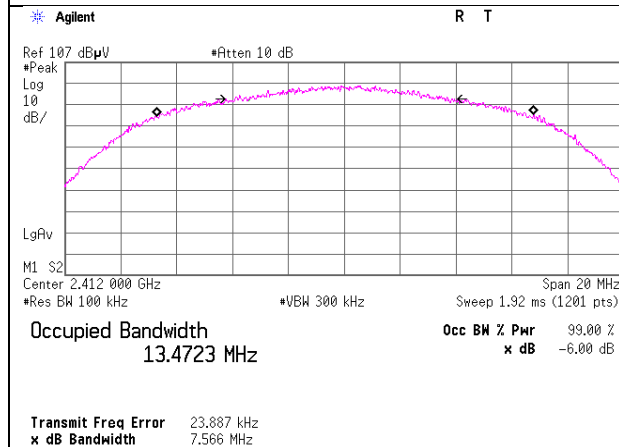
Test place
Report No.

Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.11 Measurement Room
11157080H
March 1, 2016
23 deg. C / 42 % RH
Shinichi Miyazono
Tx

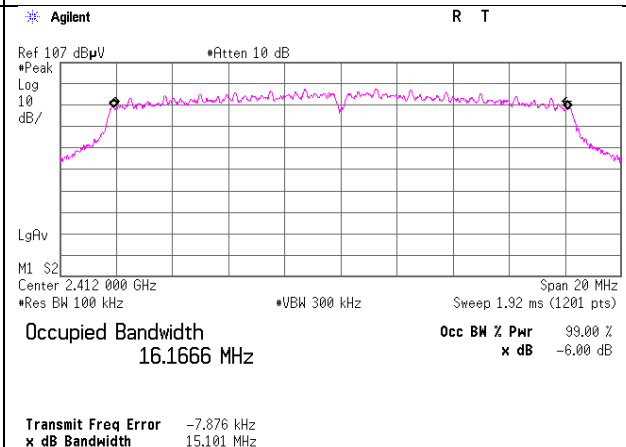
11b

2412 MHz

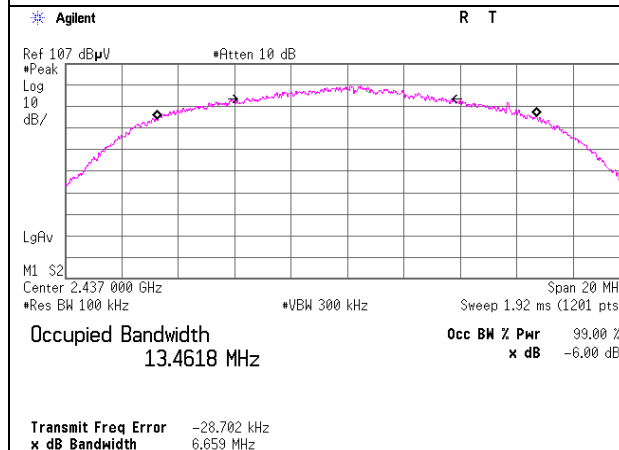


11g

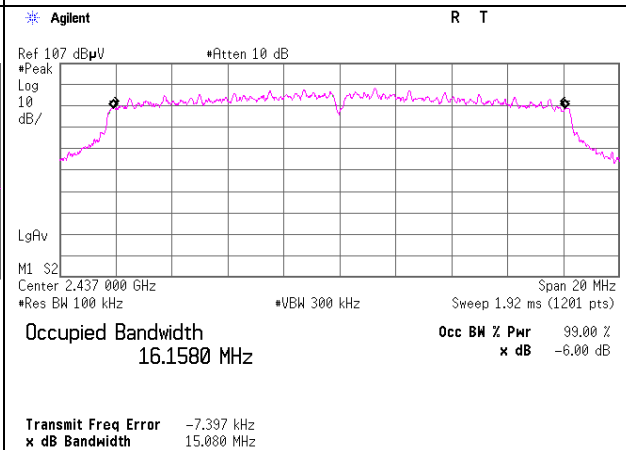
2412 MHz



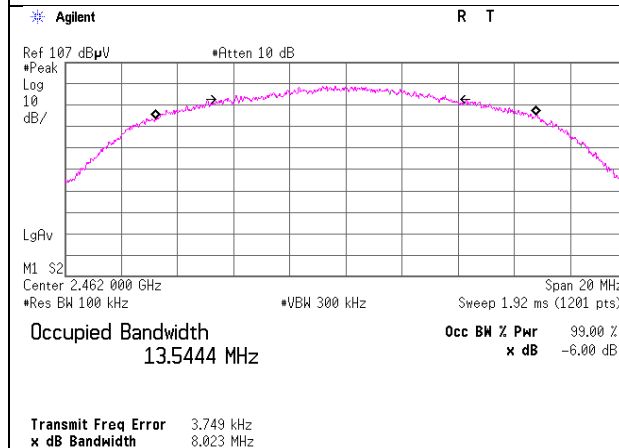
2437 MHz



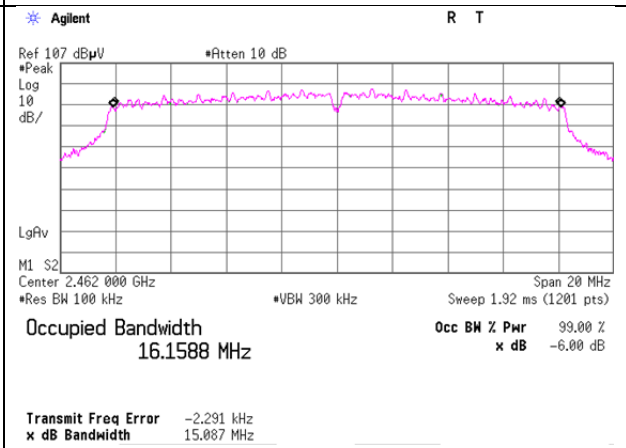
2437 MHz



2462 MHz



2462 MHz



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Ise EMC Lab.

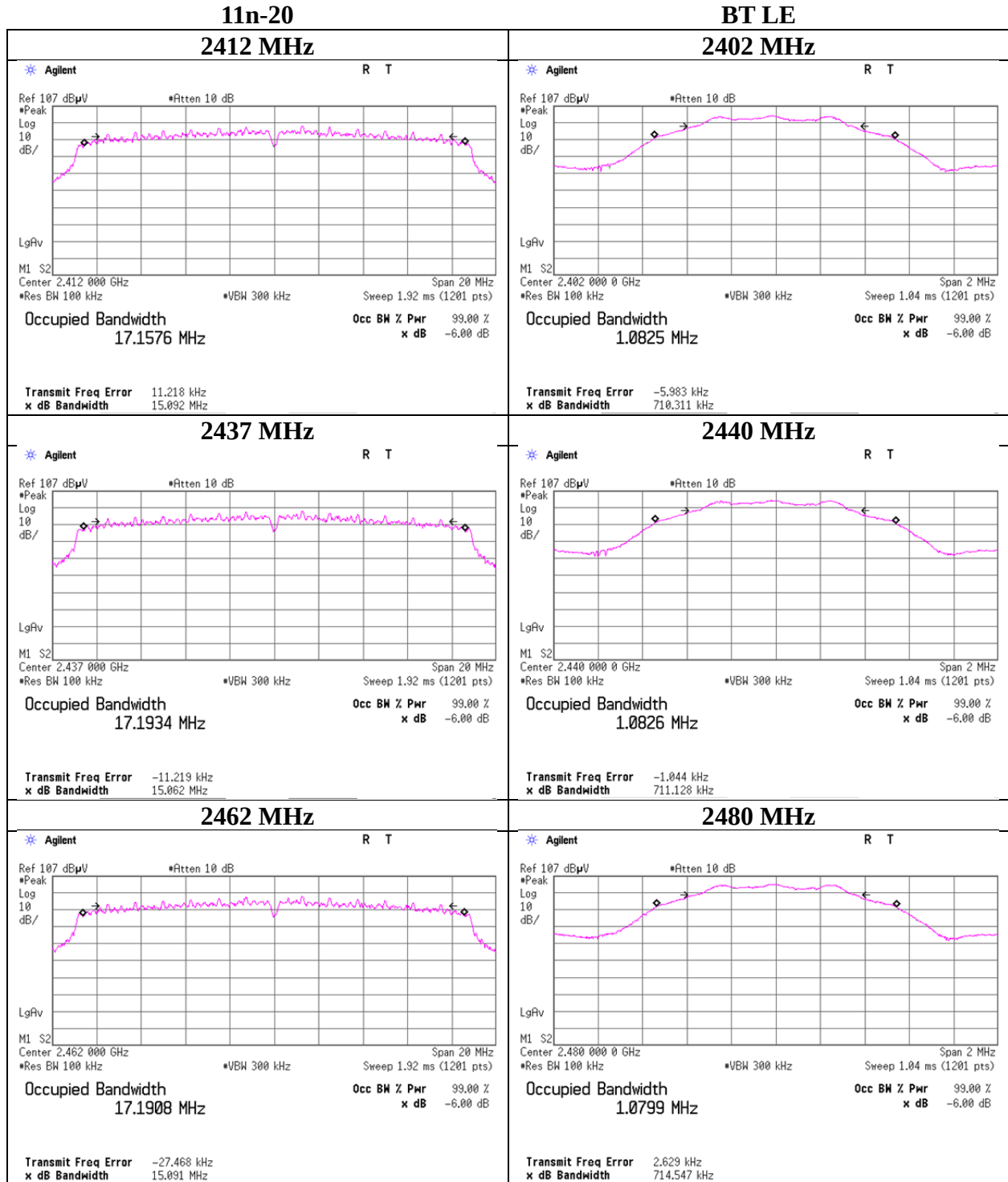
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124

6dB Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx



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Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	21 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11b

11b 11Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	0.39	2.56	10.02	12.97	19.82	30.00	1000	17.03
2437	0.30	2.57	10.02	12.89	19.45	30.00	1000	17.11
2462	0.21	2.57	10.02	12.80	19.05	30.00	1000	17.20

Sample Calculation:

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	0.17	
2	-0.07	
5.5	-0.17	
11	0.30	*

*: Worst Rate

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

Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11g

11g 24Mbps		Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
Freq. [MHz]	Reading [dBm]			[dBm]	[mW]	[dBm]	[mW]	
2412	6.68	2.56	10.02	19.26	84.33	30.00	1000	10.74
2437	6.66	2.57	10.02	19.25	84.14	30.00	1000	10.75
2462	6.51	2.57	10.02	19.10	81.28	30.00	1000	10.90

Sample Calculation:

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

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	6.46	
9	6.55	
12	6.61	
18	6.70	
24	6.73	*
36	6.47	
48	6.66	
54	6.60	

*: Worst Rate

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

Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-20

11n-20 mcs3

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.75	2.56	10.02	19.33	85.70	30.00	1000	10.67
2437	6.72	2.57	10.02	19.31	85.31	30.00	1000	10.69
2462	6.54	2.57	10.02	19.13	81.85	30.00	1000	10.87

Sample Calculation:

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

2437 MHz

MCS Number	Reading [dBm]	Remark
0	6.63	
1	6.65	
2	6.57	
3	6.72	*
4	6.43	
5	6.60	
6	6.39	
7	6.62	

*: Worst Rate

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

Maximum Peak Output Power

Test place Ise EMC Lab. No.11 Measurement Room
Report No. 11157080H
Date March 1, 2016
Temperature / Humidity 23 deg. C / 42 % RH
Engineer Shinichi Miyazono
Mode Tx BT LE

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-5.71	2.56	10.02	6.87	4.86	30.00	1000	23.13
2440	-5.29	2.57	10.02	7.30	5.37	30.00	1000	22.70
2480	-4.75	2.58	10.02	7.85	6.10	30.00	1000	22.15

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

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

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.83	2.56	10.02	9.75	9.44	0.04	9.79	9.53
2437	-2.93	2.57	10.02	9.66	9.25	0.04	9.70	9.33
2462	-3.11	2.57	10.02	9.48	8.87	0.04	9.52	8.95

11g 6 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.75	2.56	10.02	9.83	9.62	0.28	10.11	10.26
2437	-2.84	2.57	10.02	9.75	9.44	0.28	10.03	10.07
2462	-2.92	2.57	10.02	9.67	9.27	0.28	9.95	9.89

11n-20 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.01	2.56	10.02	9.57	9.06	0.30	9.87	9.71
2437	-3.08	2.57	10.02	9.51	8.93	0.30	9.81	9.57
2462	-3.16	2.57	10.02	9.43	8.77	0.30	9.73	9.40

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

The test was performed with condition that obtained the maximum frame power in pre-check.

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

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11157080H
Date : March 1, 2016
Temperature / Humidity : 23 deg. C / 42 % RH
Engineer : Shinichi Miyazono
Mode : Tx

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-7.60	2.56	10.02	4.98	3.15	1.79	6.77	4.75
2440	-7.23	2.57	10.02	5.36	3.44	1.79	7.15	5.19
2480	-6.57	2.58	10.02	6.03	4.01	1.79	7.82	6.05

Sample Calculation:

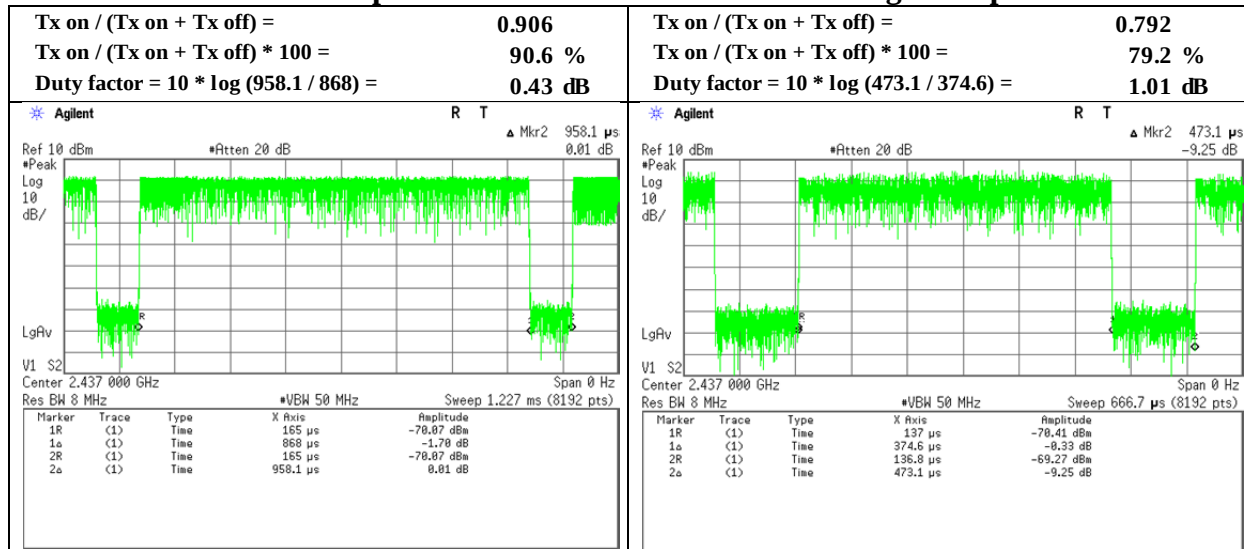
Result (Frame power) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Result (Burst power) = Frame power + Duty factor

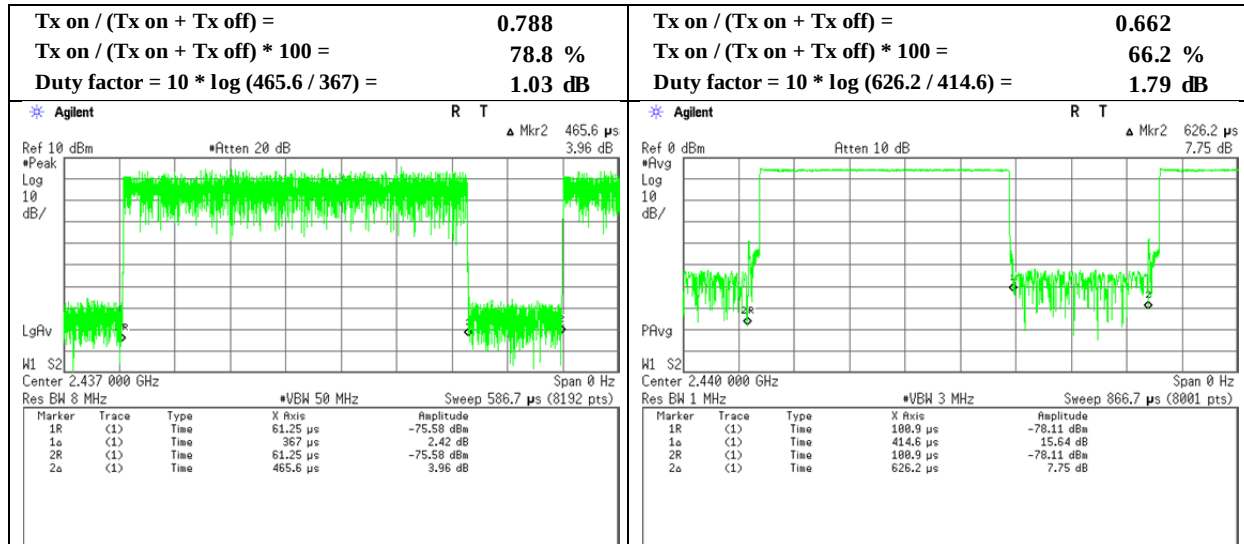
Burst rate confirmation

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11157080H
Date : March 1, 2016
Temperature / Humidity : 21 deg. C / 42 % RH
Engineer : Shinichi Miyazono
Mode : Tx

11b 11Mbps



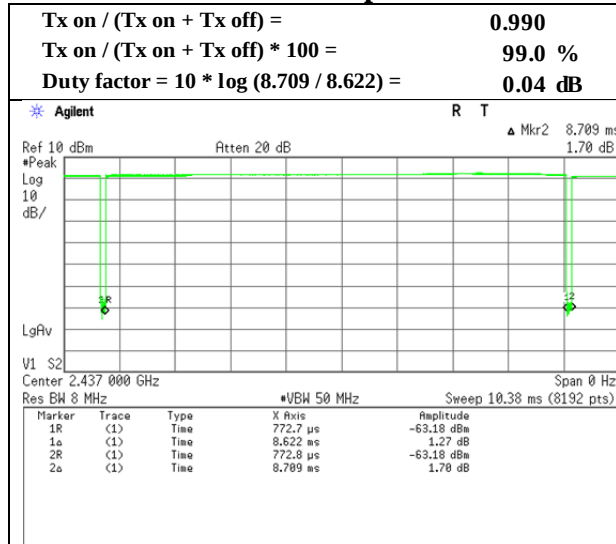
11n-20 MCS 3



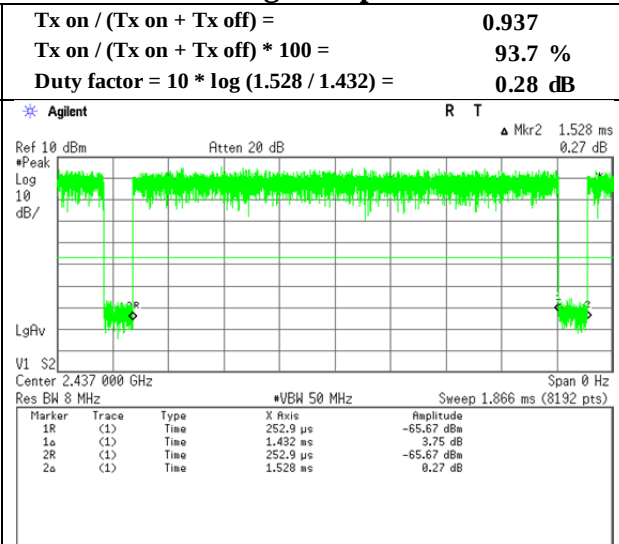
Burst rate confirmation (Reference data for Average power)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	21 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx

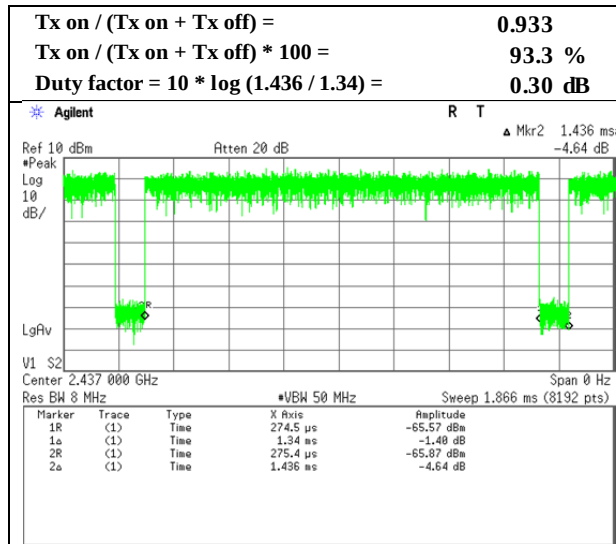
11b 1Mbps



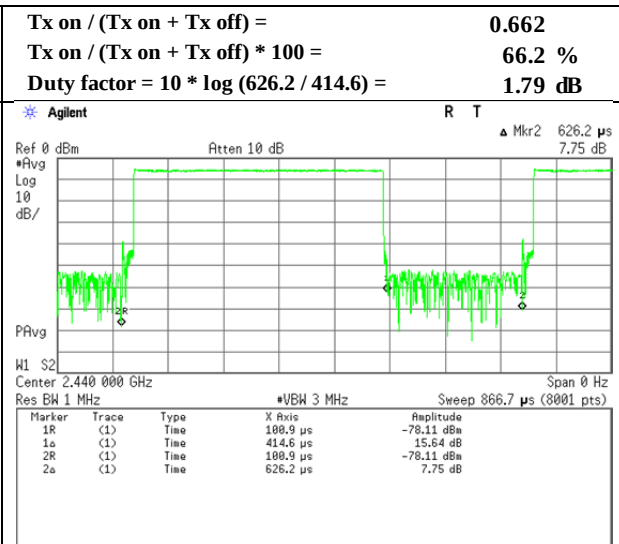
11g 6 Mbps



11n-20 MCS 0



BT LE



Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama
	(1-10GHz)	(Above 10GHz)
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	2390.000	PK	44.9	27.9	6.8	32.1	-	47.5	73.9	26.4	
Hori	3617.992	PK	45.5	29.1	7.7	31.6	-	50.7	73.9	23.2	
Hori	4824.000	PK	40.3	32.9	9.2	31.3	-	51.1	73.9	22.8	Floor Noise
Hori	7236.000	PK	41.1	36.8	10.4	32.6	-	55.7	73.9	18.2	Floor Noise
Hori	2390.000	AV	35.6	27.9	6.8	32.1	0.4	38.6	53.9	15.3	*1)
Hori	3617.992	AV	38.0	29.1	7.7	31.6	-	43.2	53.9	10.7	
Hori	4824.000	AV	28.8	32.9	9.2	31.3	-	39.6	53.9	14.3	Floor Noise
Hori	7236.000	AV	30.1	36.8	10.4	32.6	-	44.7	53.9	9.2	Floor Noise
Vert	2390.000	PK	43.0	27.9	6.8	32.1	-	45.6	73.9	28.3	
Vert	3617.992	PK	45.5	29.1	7.7	31.6	-	50.7	73.9	23.2	
Vert	4824.000	PK	42.2	32.9	9.2	31.3	-	53.0	73.9	20.9	Floor Noise
Vert	7236.000	PK	43.6	36.8	10.4	32.6	-	58.2	73.9	15.7	Floor Noise
Vert	2390.000	AV	34.8	27.9	6.8	32.1	0.4	37.8	53.9	16.1	*1)
Vert	3617.992	AV	40.4	29.1	7.7	31.6	-	45.6	53.9	8.3	
Vert	4824.000	AV	29.7	32.9	9.2	31.3	-	40.5	53.9	13.4	Floor Noise
Vert	7236.000	AV	30.7	36.8	10.4	32.6	-	45.3	53.9	8.6	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 (4.5 m / 3.0 m) = 3.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

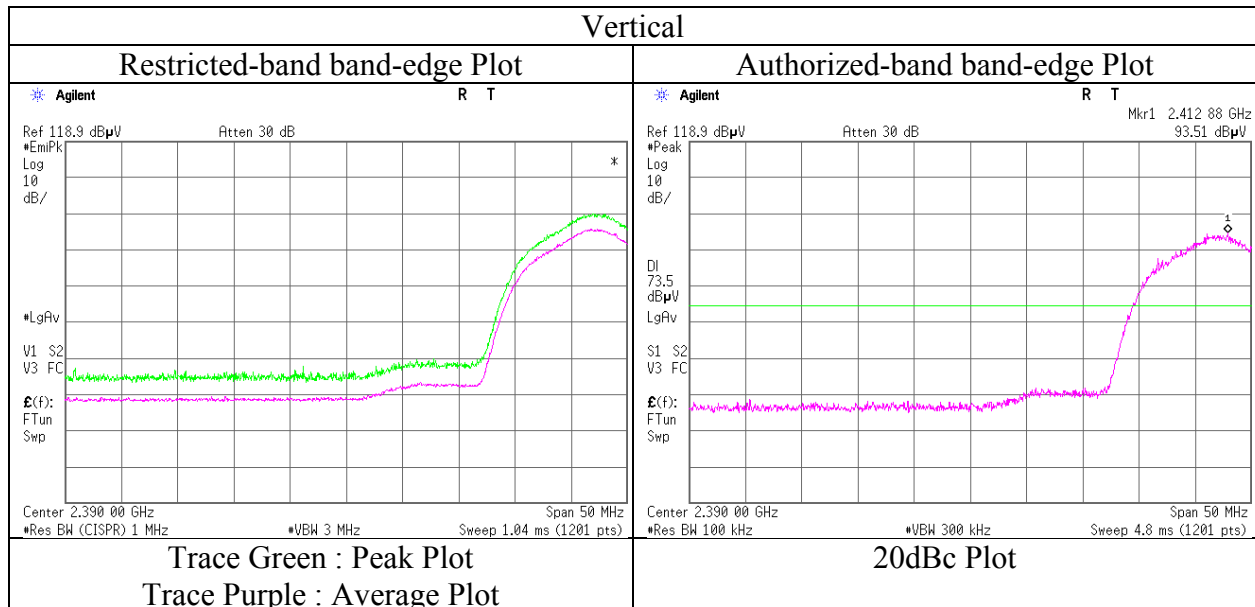
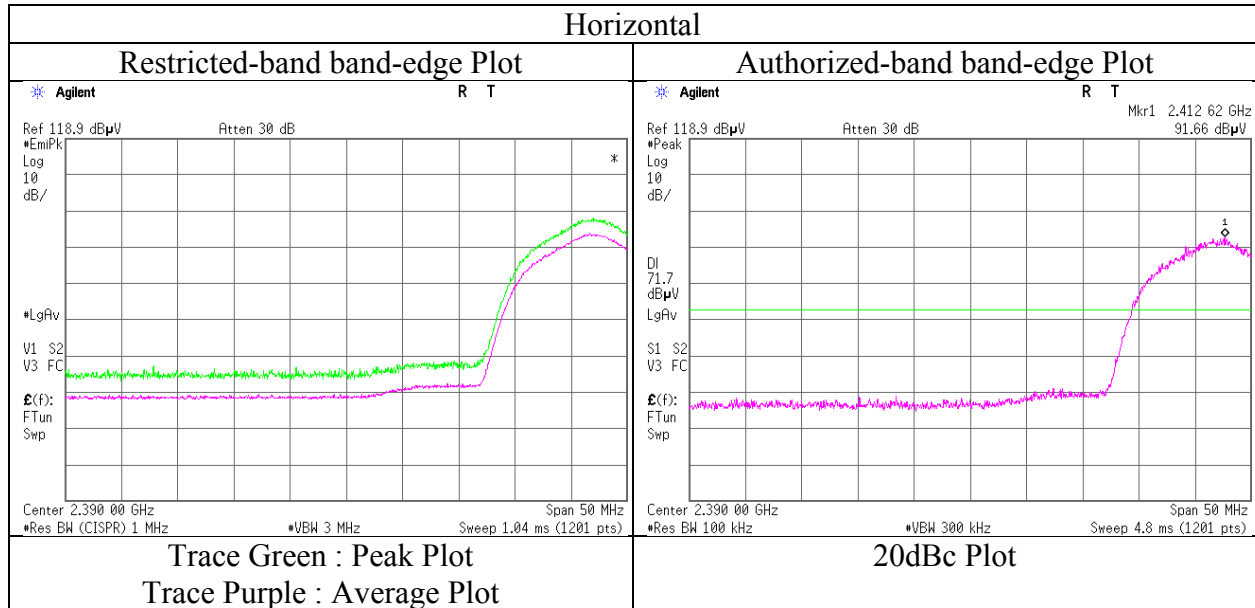
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	91.7	28.0	6.8	32.1	94.4	-	-	Carrier
Hori	2400.000	PK	48.5	28.0	6.8	32.1	51.2	74.4	23.2	
Hori	9648.000	PK	39.7	38.1	11.2	32.6	56.4	74.4	18.0	
Vert	2412.000	PK	93.5	28.0	6.8	32.1	96.2	-	-	Carrier
Vert	2400.000	PK	47.0	28.0	6.8	32.1	49.7	76.2	26.5	
Vert	9648.000	PK	40.1	38.1	11.2	32.6	56.8	76.2	19.4	

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH
Engineer	Tomoki Matsui
	(1-10GHz)
Mode	Tx 11b 2412 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama
	(1-10GHz)	(Above 10GHz)
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	3655.488	PK	45.9	29.2	7.7	31.6	-	51.2	73.9	22.7	
Hori	4874.000	PK	39.6	33.1	9.2	31.3	-	50.6	73.9	23.3	Floor Noise
Hori	7311.000	PK	41.2	36.8	10.4	32.6	-	55.8	73.9	18.1	Floor Noise
Hori	3655.488	AV	40.3	29.2	7.7	31.6	-	45.6	53.9	8.3	
Hori	4874.000	AV	31.4	33.1	9.2	31.3	-	42.4	53.9	11.5	Floor Noise
Hori	7311.000	AV	31.9	36.8	10.4	32.6	-	46.5	53.9	7.4	Floor Noise
Vert	3655.488	PK	46.0	29.2	7.7	31.6	-	51.3	73.9	22.6	
Vert	4874.000	PK	40.2	33.1	9.2	31.3	-	51.2	73.9	22.7	Floor Noise
Vert	7311.000	PK	40.9	36.8	10.4	32.6	-	55.5	73.9	18.4	Floor Noise
Vert	3655.488	AV	41.3	29.2	7.7	31.6	-	46.6	53.9	7.3	
Vert	4874.000	AV	31.8	33.1	9.2	31.3	-	42.8	53.9	11.1	Floor Noise
Vert	7311.000	AV	32.3	36.8	10.4	32.6	-	46.9	53.9	7.0	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 20log (4.5 m / 3.0 m) = 3.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 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	93.9	28.0	6.9	32.1	96.7	-	-	Carrier
Hori	9748.000	PK	39.1	38.2	11.2	32.7	55.8	76.7	20.9	
Vert	2437.000	PK	92.4	28.0	6.9	32.1	95.2	-	-	Carrier
Vert	9748.000	PK	41.0	38.2	11.2	32.7	57.7	75.2	17.5	

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama
	(1-10GHz)	(Above 10GHz)
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	43.4	28.1	6.9	32.1	-	46.3	73.9	27.6	
Hori	3693.000	PK	45.1	29.3	7.7	31.6	-	50.5	73.9	23.4	
Hori	4924.000	PK	39.3	33.3	9.3	31.3	-	50.6	73.9	23.3	Floor Noise
Hori	7386.000	PK	40.9	36.8	10.4	32.6	-	55.5	73.9	18.4	Floor Noise
Hori	2483.500	AV	34.7	28.1	6.9	32.1	0.4	38.0	53.9	15.9	*1)
Hori	3693.000	AV	39.9	29.3	7.7	31.6	-	45.3	53.9	8.6	
Hori	4924.000	AV	28.7	33.3	9.3	31.3	-	40.0	53.9	13.9	Floor Noise
Hori	7386.000	AV	30.0	36.8	10.4	32.6	-	44.6	53.9	9.3	Floor Noise
Vert	2483.500	PK	43.1	28.1	6.9	32.1	-	46.0	73.9	27.9	
Vert	3693.000	PK	45.9	29.3	7.7	31.6	-	51.3	73.9	22.6	
Vert	4924.000	PK	39.6	33.3	9.3	31.3	-	50.9	73.9	23.0	Floor Noise
Vert	7386.000	PK	41.2	36.8	10.4	32.6	-	55.8	73.9	18.1	Floor Noise
Vert	2483.500	AV	34.2	28.1	6.9	32.1	0.4	37.5	53.9	16.4	*1)
Vert	3693.000	AV	41.0	29.3	7.7	31.6	-	46.4	53.9	7.5	
Vert	4924.000	AV	29.0	33.3	9.3	31.3	-	40.3	53.9	13.6	Floor Noise
Vert	7386.000	AV	29.8	36.8	10.4	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 20log (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

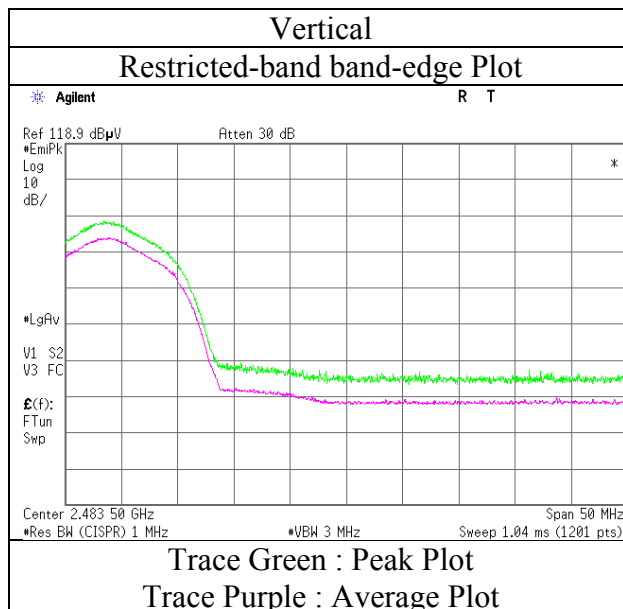
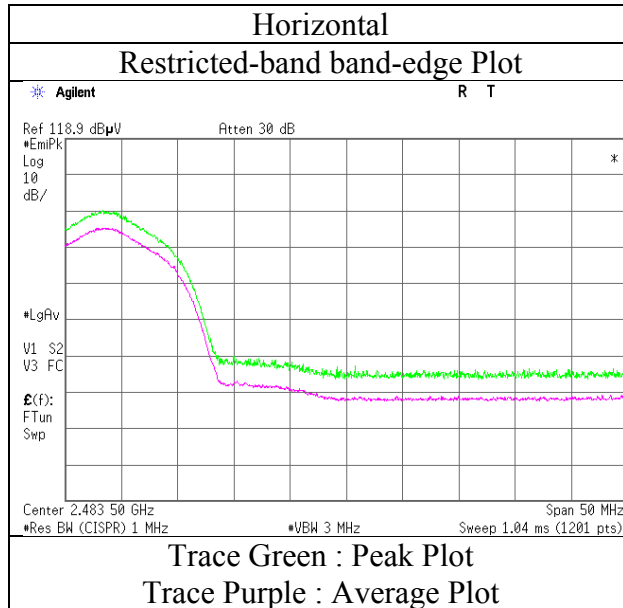
20dBc Data Sheet

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	93.4	28.0	6.9	32.1	96.2	-	-	Carrier
Hori	9848.000	PK	40.0	38.2	11.2	32.7	56.7	76.2	19.5	
Vert	2462.000	PK	92.1	28.0	6.9	32.1	94.9	-	-	Carrier
Vert	9848.000	PK	38.7	38.2	11.2	32.7	55.4	74.9	19.5	

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH
Engineer	Tomoki Matsui
	(1-10GHz)
Mode	Tx 11b 2462 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11157080H		
Date	March 7, 2016	March 7, 2016	April 28, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama	Takafumi Noguchi
	(1-10GHz)	(Above 10GHz)	(Below 1GHz)
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	149.397	QP	32.5	14.9	8.6	32.0	-	24.0	43.5	19.5	
Hori	248.996	QP	39.4	12.3	9.5	31.9	-	29.3	46.0	16.7	
Hori	335.783	QP	36.3	14.3	10.2	31.9	-	28.9	46.0	17.1	
Hori	348.595	QP	43.3	14.6	10.3	31.9	-	36.3	46.0	9.7	
Hori	512.992	QP	32.2	17.8	11.3	32.2	-	29.1	46.0	16.9	
Hori	547.791	QP	36.4	18.3	11.5	32.2	-	34.0	46.0	12.0	
Hori	647.391	QP	35.0	19.4	12.0	32.2	-	34.2	46.0	11.8	
Hori	746.989	QP	37.6	20.3	12.5	31.9	-	38.5	46.0	7.5	
Hori	2390.000	PK	60.6	27.9	6.8	32.1	-	63.2	73.9	10.7	
Hori	3617.992	PK	43.9	29.1	7.7	31.6	-	49.1	73.9	24.8	
Hori	4824.000	PK	41.2	32.9	9.2	31.3	-	52.0	73.9	21.9	Floor Noise
Hori	7236.000	PK	40.6	36.8	10.4	32.6	-	55.2	73.9	18.7	Floor Noise
Hori	2390.000	AV	47.3	27.9	6.8	32.1	1.0	50.9	53.9	3.0	
Hori	3617.992	AV	37.4	29.1	7.7	31.6	-	42.6	53.9	11.3	
Hori	4824.000	AV	30.2	32.9	9.2	31.3	-	41.0	53.9	12.9	Floor Noise
Hori	7236.000	AV	30.2	36.8	10.4	32.6	-	44.8	53.9	9.1	Floor Noise
Vert	149.397	QP	39.1	14.9	8.6	32.0	-	30.6	43.5	12.9	
Vert	248.996	QP	39.4	12.3	9.5	31.9	-	29.3	46.0	16.7	
Vert	335.783	QP	38.7	14.3	10.2	31.9	-	31.3	46.0	14.7	
Vert	348.595	QP	42.4	14.6	10.3	31.9	-	35.4	46.0	10.6	
Vert	512.992	QP	37.2	17.8	11.3	32.2	-	34.1	46.0	11.9	
Vert	547.791	QP	36.6	18.3	11.5	32.2	-	34.2	46.0	11.8	
Vert	647.391	QP	37.0	19.4	12.0	32.2	-	36.2	46.0	9.8	
Vert	746.989	QP	35.9	20.3	12.5	31.9	-	36.8	46.0	9.2	
Vert	2390.000	PK	58.6	27.9	6.8	32.1	-	61.2	73.9	12.7	*1)
Vert	3617.992	PK	44.9	29.1	7.7	31.6	-	50.1	73.9	23.8	
Vert	4824.000	PK	40.9	32.9	9.2	31.3	-	51.7	73.9	22.2	Floor Noise
Vert	7236.000	PK	41.6	36.8	10.4	32.6	-	56.2	73.9	17.7	Floor Noise
Vert	2390.000	AV	44.6	27.9	6.8	32.1	1.0	48.2	53.9	5.7	*1)
Vert	3617.992	AV	38.5	29.1	7.7	31.6	-	43.7	53.9	10.2	
Vert	4824.000	AV	29.2	32.9	9.2	31.3	-	40.0	53.9	13.9	Floor Noise
Vert	7236.000	AV	30.5	36.8	10.4	32.6	-	45.1	53.9	8.8	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 (4.5 m / 3.0 m) = 3.5 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	2412.000	PK	91.0	28.0	6.8	32.1	93.7	-	-	Carrier
Hori	2400.000	PK	56.0	28.0	6.8	32.1	58.7	73.7	15.0	
Hori	9648.000	PK	39.2	38.1	11.2	32.6	55.9	73.7	17.8	
Vert	2412.000	PK	90.1	28.0	6.8	32.1	92.8	-	-	Carrier
Vert	2400.000	PK	56.0	28.0	6.8	32.1	58.7	72.8	14.1	
Vert	9648.000	PK	37.8	38.1	11.2	32.6	54.5	72.8	18.3	

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

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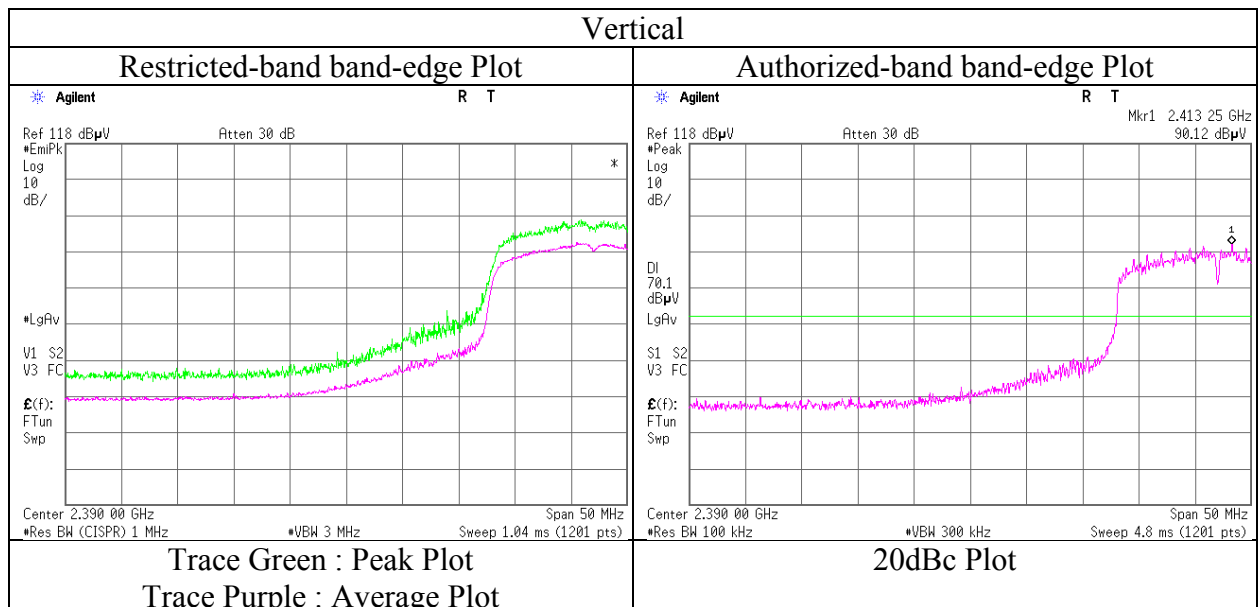
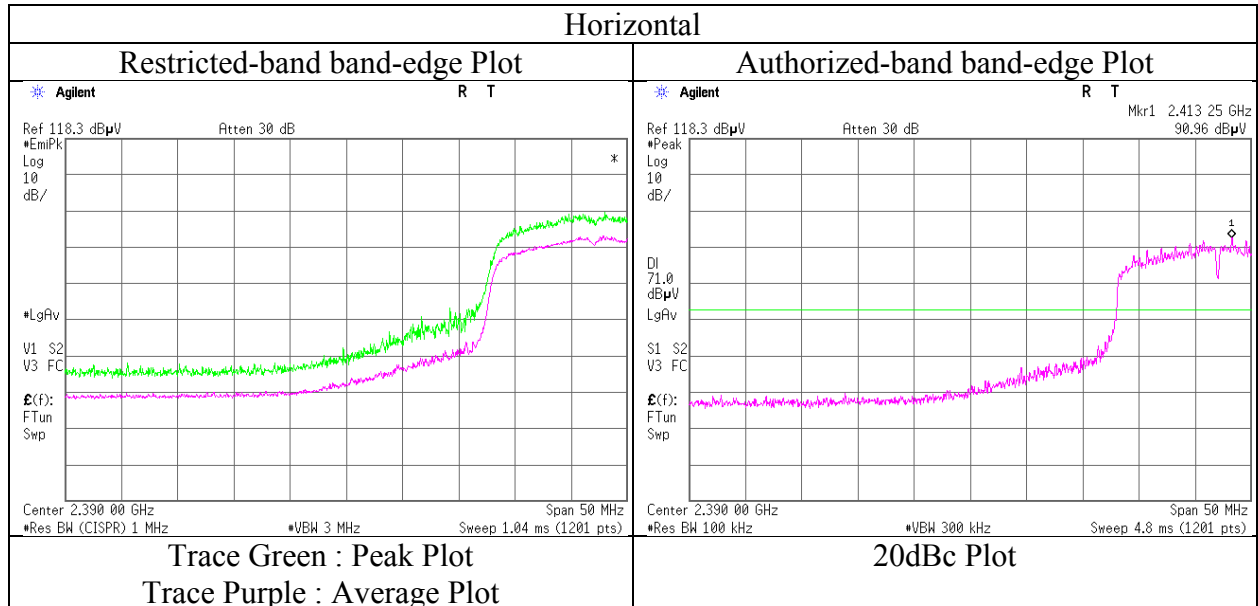
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

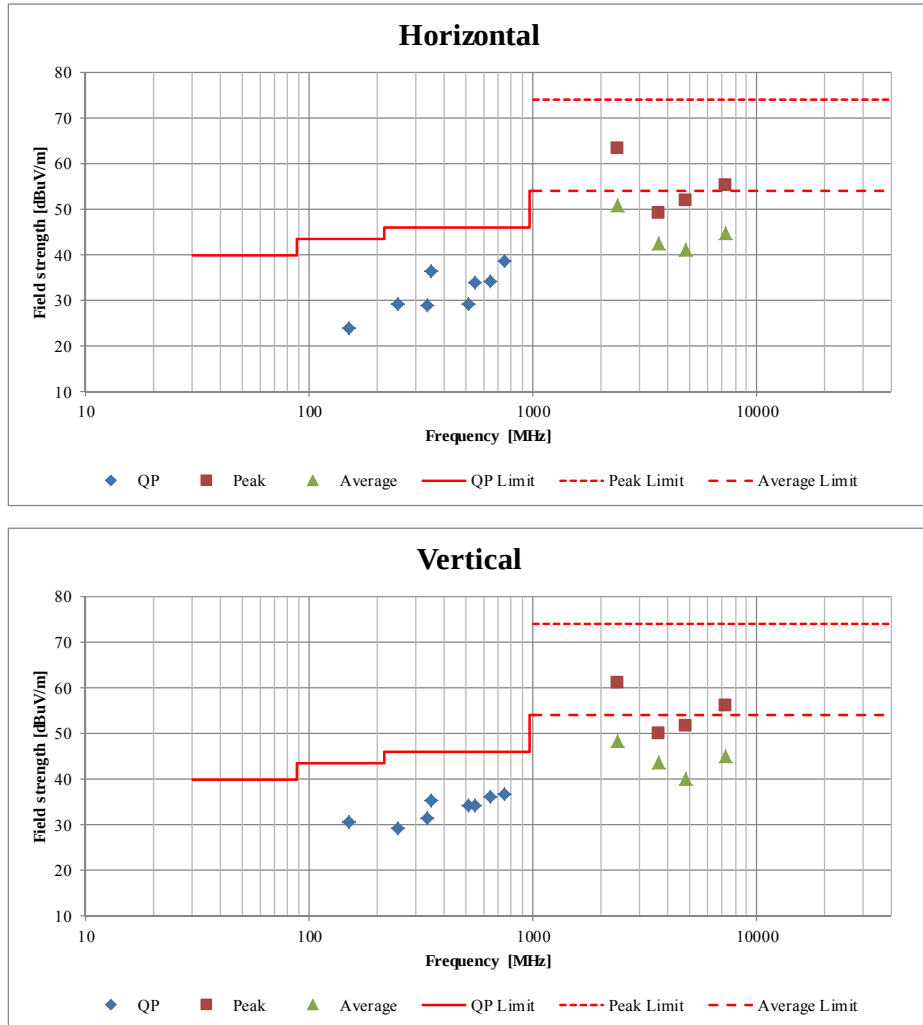
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH
Engineer	Tomoki Matsui
	(1-10GHz)
Mode	Tx 11n-20 2412 MHz



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

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

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11157080H		
Date	March 7, 2016	March 7, 2016	April 28, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Tomoki Matsui (1-10GHz)	Satofumi Matsuyama (Above 10GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx 11n-20 2412 MHz		



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

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Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama
	(1-10GHz)	(Above 10GHz)
Mode	Tx 11n-20 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	3655.488	PK	45.0	29.2	7.7	31.6	-	50.3	73.9	23.6	
Hori	4874.000	PK	39.3	33.1	9.2	31.3	-	50.3	73.9	23.6	Floor Noise
Hori	7311.000	PK	40.6	36.8	10.4	32.6	-	55.2	73.9	18.7	Floor Noise
Hori	3655.488	AV	39.3	29.2	7.7	31.6	-	44.6	53.9	9.3	
Hori	4874.000	AV	31.1	33.1	9.2	31.3	-	42.1	53.9	11.8	Floor Noise
Hori	7311.000	AV	32.3	36.8	10.4	32.6	-	46.9	53.9	7.0	Floor Noise
Vert	3655.488	PK	46.0	29.2	7.7	31.6	-	51.3	73.9	22.6	
Vert	4874.000	PK	39.4	33.1	9.2	31.3	-	50.4	73.9	23.5	Floor Noise
Vert	7311.000	PK	40.6	36.8	10.4	32.6	-	55.2	73.9	18.7	Floor Noise
Vert	3655.488	AV	41.2	29.2	7.7	31.6	-	46.5	53.9	7.4	
Vert	4874.000	AV	31.4	33.1	9.2	31.3	-	42.4	53.9	11.5	Floor Noise
Vert	7311.000	AV	32.0	36.8	10.4	32.6	-	46.6	53.9	7.3	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 20log (4.5 m / 3.0 m) = 3.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 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	90.3	28.0	6.9	32.1	93.1	-	-	Carrier
Hori	9748.000	PK	38.0	38.2	11.2	32.7	54.7	73.1	18.4	
Vert	2437.000	PK	90.6	28.0	6.9	32.1	93.4	-	-	Carrier
Vert	9748.000	PK	38.0	38.2	11.2	32.7	54.7	73.4	18.7	

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH
Engineer	Tomoki Matsui	Satofumi Matsuyama
	(1-10GHz)	(Above 10GHz)
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	61.4	28.1	6.9	32.1	-	64.3	73.9	9.6	
Hori	3693.000	PK	45.3	29.3	7.7	31.6	-	50.7	73.9	23.2	
Hori	4924.000	PK	38.6	33.3	9.3	31.3	-	49.9	73.9	24.0	
Hori	7386.000	PK	39.8	36.8	10.4	32.6	-	54.4	73.9	19.5	
Hori	2483.500	AV	45.6	28.1	6.9	32.1	1.0	49.5	53.9	4.4	*1)
Hori	3693.000	AV	39.8	29.3	7.7	31.6	-	45.2	53.9	8.7	
Hori	4924.000	AV	28.2	33.3	9.3	31.3	-	39.5	53.9	14.4	Floor Noise
Hori	7386.000	AV	29.4	36.8	10.4	32.6	-	44.0	53.9	9.9	Floor Noise
Vert	2483.500	PK	60.6	28.1	6.9	32.1	-	63.5	73.9	10.4	
Vert	3693.000	PK	46.5	29.3	7.7	31.6	-	51.9	73.9	22.0	
Vert	4924.000	PK	39.3	33.3	9.3	31.3	-	50.6	73.9	23.3	Floor Noise
Vert	7386.000	PK	40.6	36.8	10.4	32.6	-	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	44.4	28.1	6.9	32.1	1.0	48.3	53.9	5.6	*1)
Vert	3693.000	AV	41.4	29.3	7.7	31.6	-	46.8	53.9	7.1	
Vert	4924.000	AV	30.7	33.3	9.3	31.3	-	42.0	53.9	11.9	Floor Noise
Vert	7386.000	AV	32.0	36.8	10.4	32.6	-	46.6	53.9	7.3	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 (4.5 m / 3.0 m) = 3.5 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	91.5	28.0	6.9	32.1	94.3	-	-	Carrier
Hori	9848.000	PK	39.6	38.2	11.2	32.7	56.3	74.3	18.0	
Vert	2462.000	PK	89.9	28.0	6.9	32.1	92.7	-	-	Carrier
Vert	9848.000	PK	39.3	38.2	11.2	32.7	56.0	72.7	16.7	

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

UL Japan, Inc.

Ise EMC Lab.

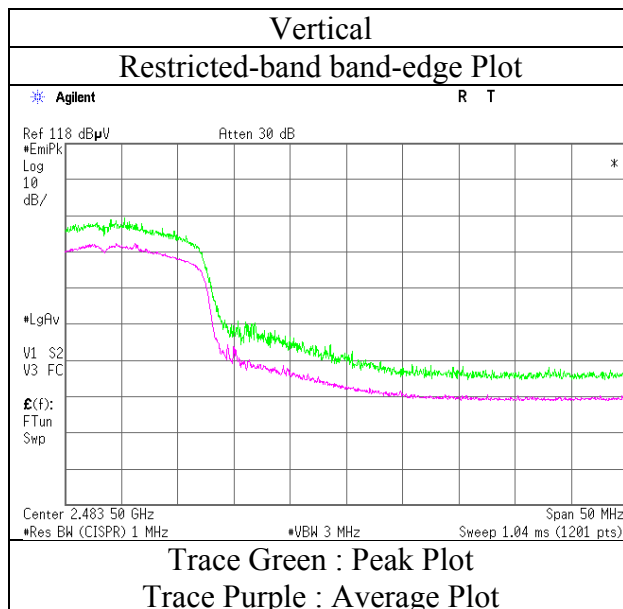
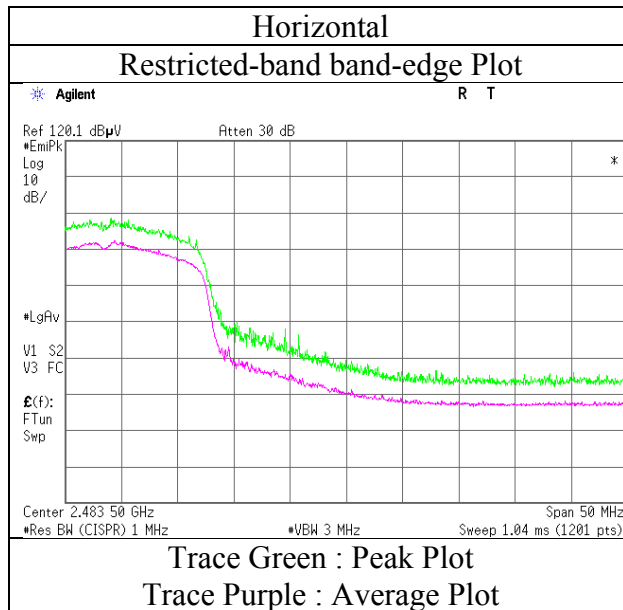
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission **(Reference Plot for band-edge)**

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11157080H
Date : March 7, 2016
Temperature / Humidity : 20 deg. C / 59 % RH
Engineer : Tomoki Matsui
(1-10GHz)
Mode : Tx 11n-20 2462 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11157080H		
Date	March 7, 2016	March 7, 2016	April 28, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Tomoki Matsui (1-10GHz)	Satofumi Matsuyama (Above 10GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx BT LE 2402 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	215.996	QP	29.4	11.5	9.2	31.9	-	18.2	43.5	25.3	
Hori	265.596	QP	30.0	12.7	9.6	31.9	-	20.4	46.0	25.6	
Hori	287.996	QP	31.1	13.2	9.8	31.8	-	22.3	46.0	23.7	
Hori	335.783	QP	36.1	14.3	10.2	31.9	-	28.7	46.0	17.3	
Hori	512.992	QP	32.1	17.8	11.3	32.2	-	29.0	46.0	17.0	
Hori	769.489	QP	29.7	20.5	12.7	31.8	-	31.1	46.0	14.9	
Hori	2390.000	PK	42.3	27.9	6.8	32.1	-	44.9	73.9	29.0	
Hori	4804.000	PK	39.5	32.8	9.2	31.3	-	50.2	73.9	23.7	Floor Noise
Hori	7206.000	PK	40.9	36.8	10.4	32.6	-	55.5	73.9	18.4	Floor Noise
Hori	9608.000	PK	42.1	38.1	11.1	32.6	-	58.7	73.9	15.2	Floor Noise
Hori	2390.000	AV	33.6	27.9	6.8	32.1	1.8	38.0	53.9	15.9	*1)
Hori	4804.000	AV	29.3	32.8	9.2	31.3	-	40.0	53.9	13.9	Floor Noise
Hori	7206.000	AV	30.6	36.8	10.4	32.6	-	45.2	53.9	8.7	Floor Noise
Hori	9608.000	AV	31.0	38.1	11.1	32.6	-	47.6	53.9	6.3	Floor Noise
Vert	215.996	QP	29.4	11.5	9.2	31.9	-	18.2	43.5	25.3	
Vert	265.596	QP	26.0	12.7	9.6	31.9	-	16.4	46.0	29.6	
Vert	287.996	QP	27.0	13.2	9.8	31.8	-	18.2	46.0	27.8	
Vert	335.783	QP	38.6	14.3	10.2	31.9	-	31.2	46.0	14.8	
Vert	512.992	QP	37.1	17.8	11.3	32.2	-	34.0	46.0	12.0	
Vert	769.489	QP	30.8	20.5	12.7	31.8	-	32.2	46.0	13.8	
Vert	2390.000	PK	42.1	27.9	6.8	32.1	-	44.7	73.9	29.2	
Vert	4804.000	PK	39.8	32.8	9.2	31.3	-	50.5	73.9	23.4	Floor Noise
Vert	7206.000	PK	41.3	36.8	10.4	32.6	-	55.9	73.9	18.0	Floor Noise
Vert	9608.000	PK	41.1	38.1	11.1	32.6	-	57.7	73.9	16.2	Floor Noise
Vert	2390.000	AV	33.4	27.9	6.8	32.1	1.8	37.8	53.9	16.1	*1)
Vert	4804.000	AV	28.9	32.8	9.2	31.3	-	39.6	53.9	14.3	Floor Noise
Vert	7206.000	AV	30.5	36.8	10.4	32.6	-	45.1	53.9	8.8	Floor Noise
Vert	9608.000	AV	31.0	38.1	11.1	32.6	-	47.6	53.9	6.3	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 (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

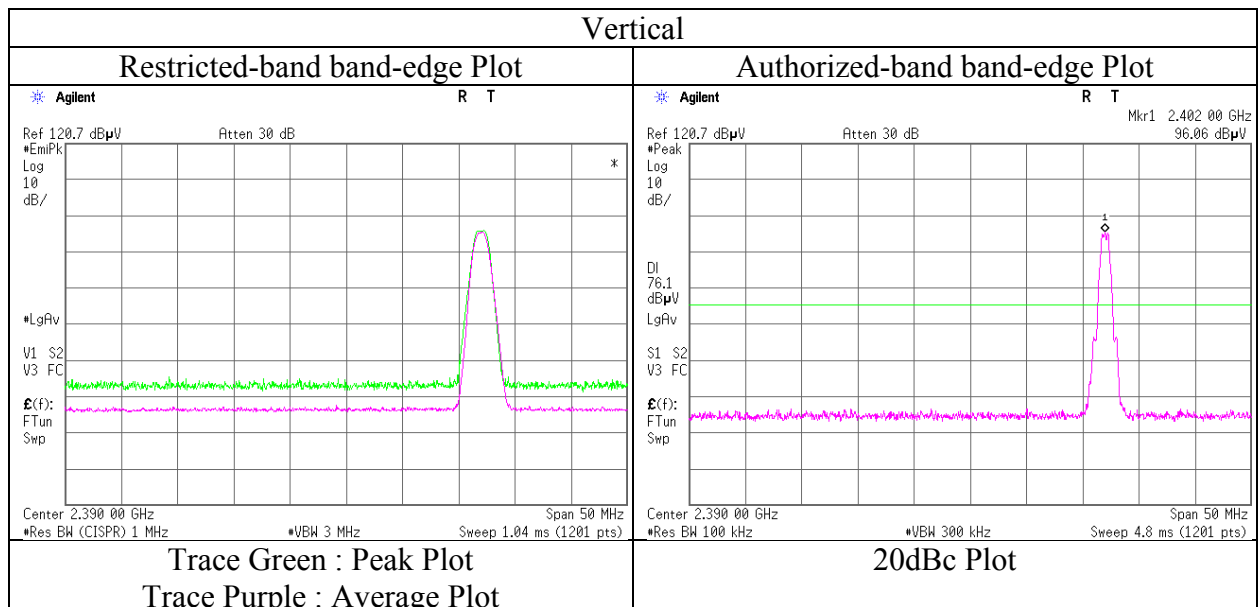
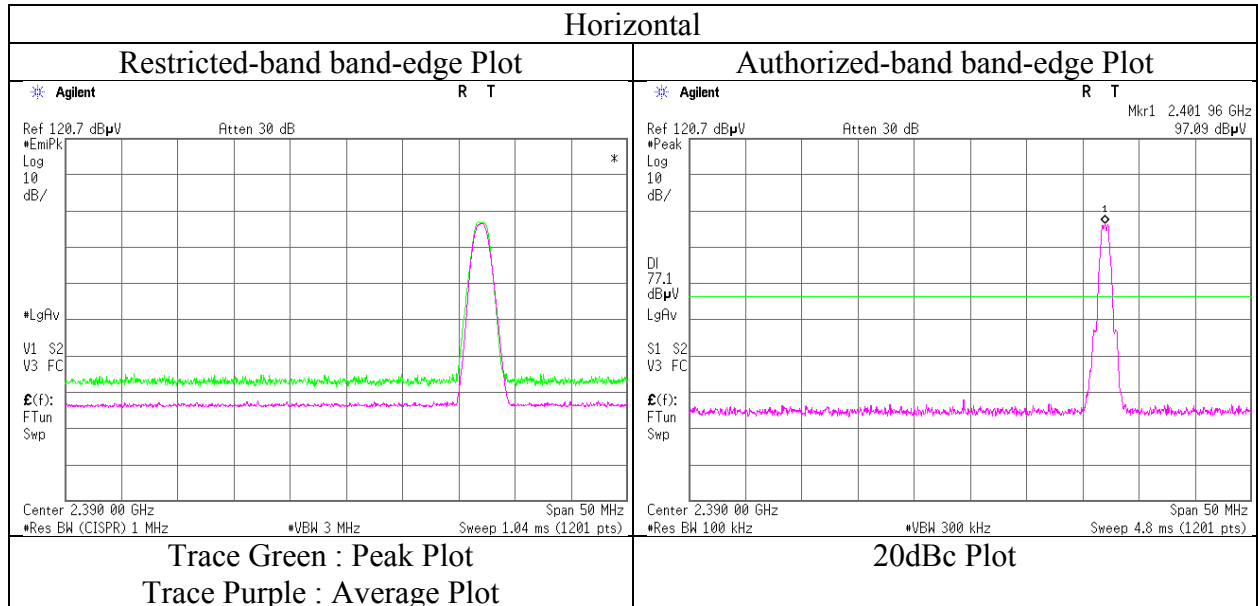
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	97.1	28.0	6.8	32.1	99.8	-	-	Carrier
Hori	2400.000	PK	40.7	28.0	6.8	32.1	43.4	79.8	36.4	
Vert	2402.000	PK	96.1	28.0	6.8	32.1	98.8	-	-	Carrier
Vert	2400.000	PK	39.8	28.0	6.8	32.1	42.5	78.8	36.3	

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	March 7, 2016
Temperature / Humidity	20 deg. C / 59 % RH
Engineer	Tomoki Matsui
	(1-10GHz)
Mode	Tx BT LE 2402 MHz



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

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Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11157080H		
Date	March 7, 2016	March 7, 2016	April 28, 2016
Temperature / Humidity	20 deg. C / 59 % RH	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Tomoki Matsui (1-10GHz)	Satofumi Matsuyama (Above 10GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx BT LE 2440 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	215.996	QP	29.6	11.5	9.2	31.9	-	18.4	43.5	25.1	
Hori	265.596	QP	30.0	12.7	9.6	31.9	-	20.4	46.0	25.6	
Hori	287.996	QP	31.0	13.2	9.8	31.8	-	22.2	46.0	23.8	
Hori	335.783	QP	36.1	14.3	10.2	31.9	-	28.7	46.0	17.3	
Hori	512.992	QP	32.0	17.8	11.3	32.2	-	28.9	46.0	17.1	
Hori	769.489	QP	29.9	20.5	12.7	31.8	-	31.3	46.0	14.7	
Hori	4880.000	PK	39.2	33.1	9.3	31.3	-	50.3	73.9	23.6	Floor Noise
Hori	7320.000	PK	40.5	36.8	10.4	32.6	-	55.1	73.9	18.8	Floor Noise
Hori	9760.000	PK	41.5	38.2	11.2	32.7	-	58.2	73.9	15.7	Floor Noise
Hori	4880.000	AV	31.9	33.1	9.3	31.3	-	43.0	53.9	10.9	Floor Noise
Hori	7320.000	AV	32.7	36.8	10.4	32.6	-	47.3	53.9	6.6	Floor Noise
Hori	9760.000	AV	32.0	38.2	9.7	32.7	-	47.2	53.9	6.7	Floor Noise
Vert	215.996	QP	29.6	11.5	9.2	31.9	-	18.4	43.5	25.1	
Vert	265.596	QP	27.0	12.7	9.6	31.9	-	17.4	46.0	28.6	
Vert	287.996	QP	27.2	13.2	9.8	31.8	-	18.4	46.0	27.6	
Vert	335.783	QP	38.0	14.3	10.2	31.9	-	30.6	46.0	15.4	
Vert	512.992	QP	37.1	17.8	11.3	32.2	-	34.0	46.0	12.0	
Vert	769.489	QP	31.0	20.5	12.7	31.8	-	32.4	46.0	13.6	
Vert	4880.000	PK	39.4	33.1	9.3	31.3	-	50.5	73.9	23.4	Floor Noise
Vert	7320.000	PK	40.2	36.8	10.4	32.6	-	54.8	73.9	19.1	Floor Noise
Vert	9760.000	PK	41.2	38.2	11.2	32.7	-	57.9	73.9	16.0	Floor Noise
Vert	4880.000	AV	31.3	33.1	9.3	31.3	-	42.4	53.9	11.5	Floor Noise
Vert	7320.000	AV	32.4	36.8	10.4	32.6	-	47.0	53.9	6.9	Floor Noise
Vert	9760.000	AV	32.0	38.2	9.7	32.7	-	47.2	53.9	6.7	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 20log (4.5 m / 3.0 m) = 3.5 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	April 28, 2016
Temperature / Humidity	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx BT LE 2480 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	215.996	QP	29.4	11.5	9.2	31.9	-	18.2	43.5	25.3	
Hori	265.596	QP	34.0	12.7	9.6	31.9	-	24.4	46.0	21.6	
Hori	287.996	QP	33.0	13.2	9.8	31.8	-	24.2	46.0	21.8	
Hori	335.783	QP	36.1	14.3	10.2	31.9	-	28.7	46.0	17.3	
Hori	512.992	QP	32.0	17.8	11.3	32.2	-	28.9	46.0	17.1	
Hori	769.489	QP	29.8	20.5	12.7	31.8	-	31.2	46.0	14.8	
Hori	2483.500	PK	50.9	28.1	6.9	32.1	-	53.8	73.9	20.1	
Hori	4960.000	PK	39.2	33.4	8.2	31.2	-	49.6	73.9	24.3	Floor Noise
Hori	7440.000	PK	40.7	36.8	9.1	32.7	-	53.9	73.9	20.0	Floor Noise
Hori	9920.000	PK	41.6	38.3	9.6	32.8	-	56.7	73.9	17.2	Floor Noise
Hori	2483.500	AV	37.6	28.1	6.9	32.1	1.8	42.3	53.9	11.6	*1)
Hori	4960.000	AV	30.6	33.4	8.2	31.2	-	41.0	53.9	12.9	Floor Noise
Hori	7440.000	AV	31.7	36.8	9.1	32.7	-	44.9	53.9	9.0	Floor Noise
Hori	9920.000	AV	33.1	38.3	9.6	32.8	-	48.2	53.9	5.7	Floor Noise
Vert	215.996	QP	29.6	11.5	9.2	31.9	-	18.4	43.5	25.1	
Vert	265.596	QP	29.0	12.7	9.6	31.9	-	19.4	46.0	26.6	
Vert	287.996	QP	28.0	13.2	9.8	31.8	-	19.2	46.0	26.8	
Vert	335.783	QP	38.0	14.3	10.2	31.9	-	30.6	46.0	15.4	
Vert	512.992	QP	37.1	17.8	11.3	32.2	-	34.0	46.0	12.0	
Vert	769.489	QP	30.9	20.5	12.7	31.8	-	32.3	46.0	13.7	
Vert	2483.500	PK	49.4	28.1	6.9	32.1	-	52.3	73.9	21.6	
Vert	4960.000	PK	39.4	33.4	8.2	31.2	-	49.8	73.9	24.1	Floor Noise
Vert	7440.000	PK	40.1	36.8	9.1	32.7	-	53.3	73.9	20.6	Floor Noise
Vert	9920.000	PK	42.0	38.3	9.6	32.8	-	57.1	73.9	16.8	Floor Noise
Vert	2483.500	AV	35.7	28.1	6.9	32.1	1.8	40.4	53.9	13.5	*1)
Vert	4960.000	AV	30.6	33.4	8.2	31.2	-	41.0	53.9	12.9	Floor Noise
Vert	7440.000	AV	31.7	36.8	9.1	32.7	-	44.9	53.9	9.0	Floor Noise
Vert	9920.000	AV	33.1	38.3	9.6	32.8	-	48.2	53.9	5.7	Floor Noise

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

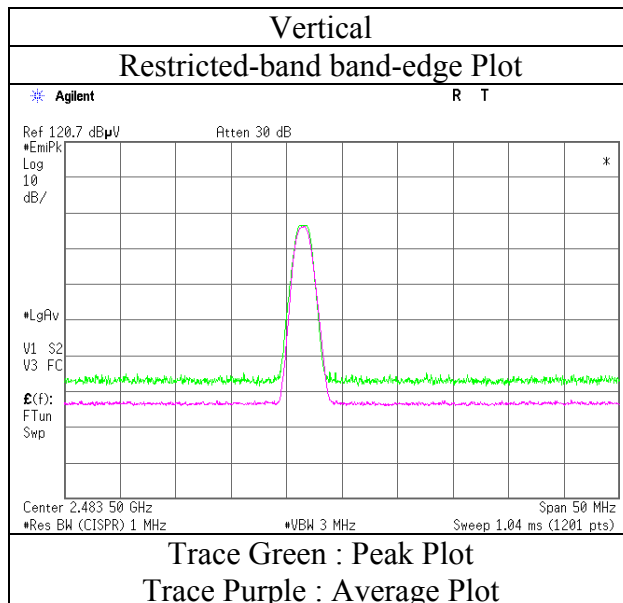
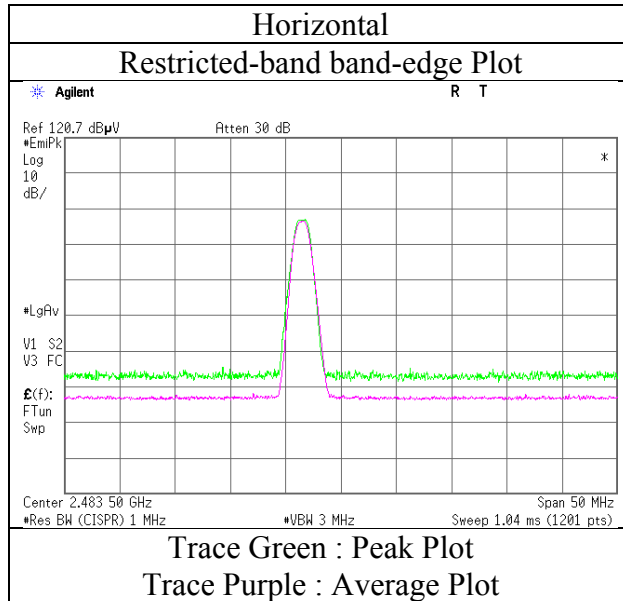
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$
 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)

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11157080H
Date	March 7, 2016
Temperature / Humidity	23 deg. C / 57 % RH
Engineer	Satofumi Matsuyama (1-10GHz)
Mode	Tx BT LE 2480 MHz



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

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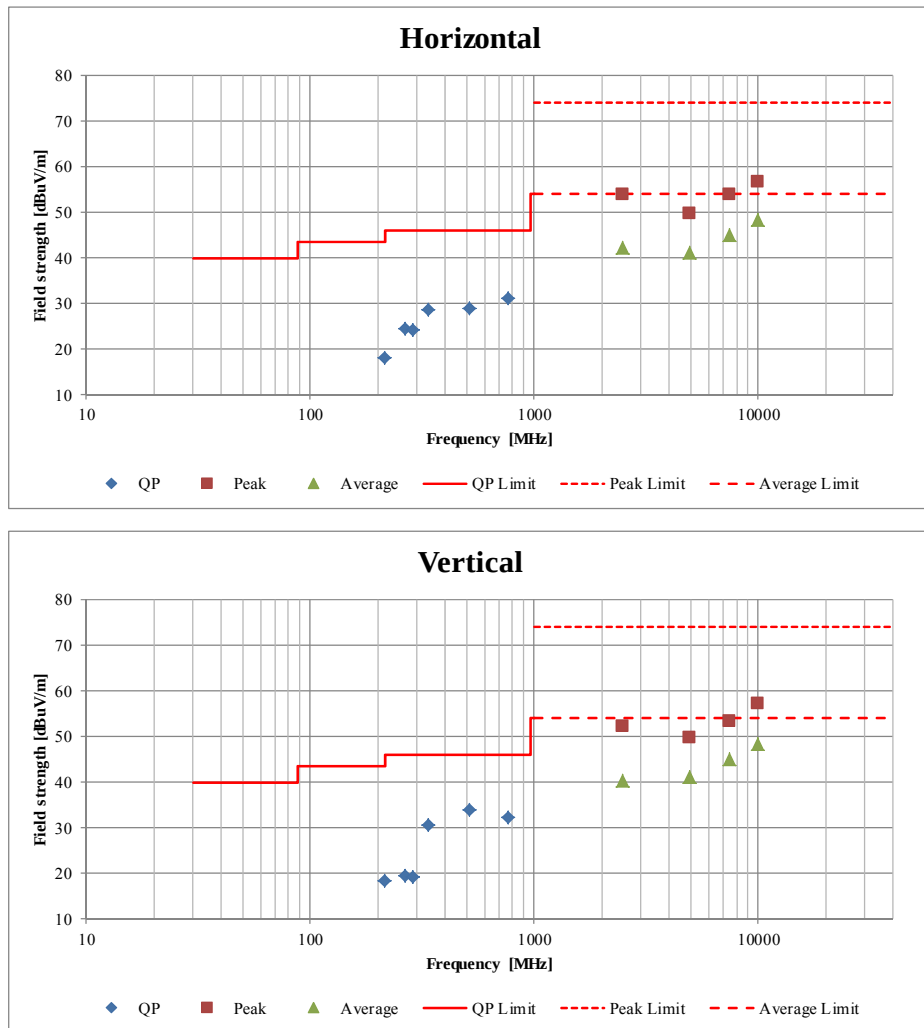
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Radiated Spurious Emission **(Plot data, Worst case)**

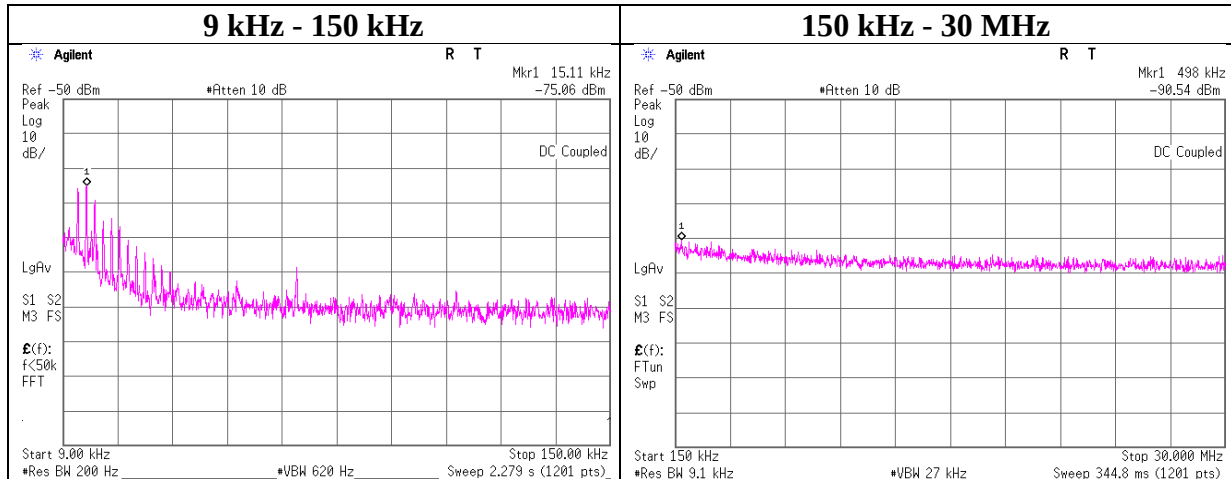
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11157080H	
Date	March 7, 2016	April 28, 2016
Temperature / Humidity	23 deg. C / 57 % RH	24 deg. C / 60 % RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Takafumi Noguchi (Below 1GHz)
Mode	Tx BT LE 2480 MHz	



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

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-20 2412 MHz



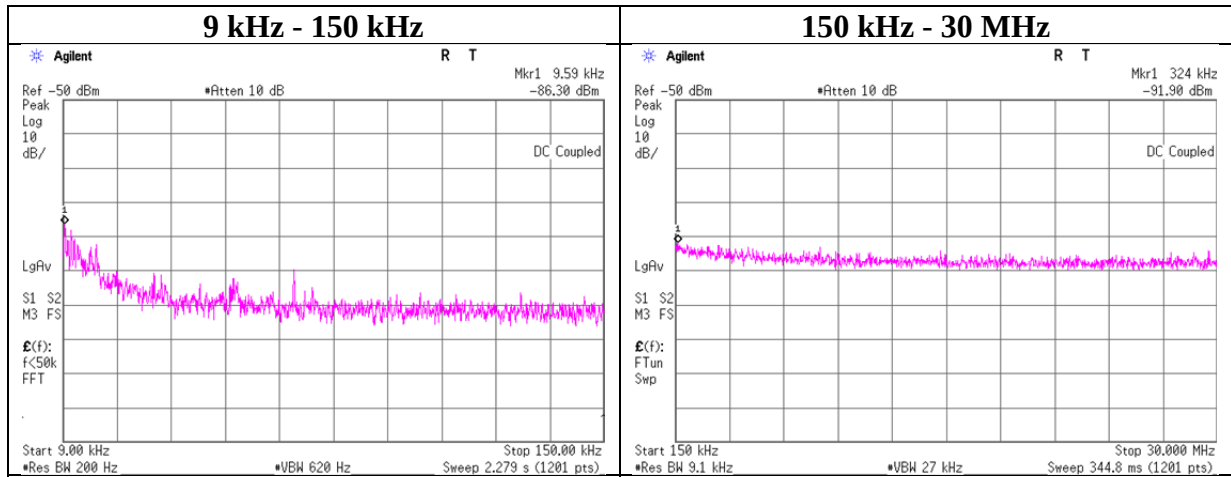
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
15.11	-75.1	1.20	9.8	2.0	1	-62.0	300	6.0	-0.8	44.0	44.8	
498.00	-90.5	1.21	9.9	2.0	1	-77.4	30	6.0	3.8	33.6	29.8	

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx BT LE 2402MHz



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain	N (Number of Output)	EIRP	Distance	Ground bounce	E (field strength)	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]		[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
9.59	-86.3	1.20	9.8	2.0	1	-73.3	300	6.0	-12.0	47.9	59.9	
324.00	-91.9	1.21	9.9	2.0	1	-78.8	300	6.0	-17.6	17.3	34.9	

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$

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Ise EMC Lab.

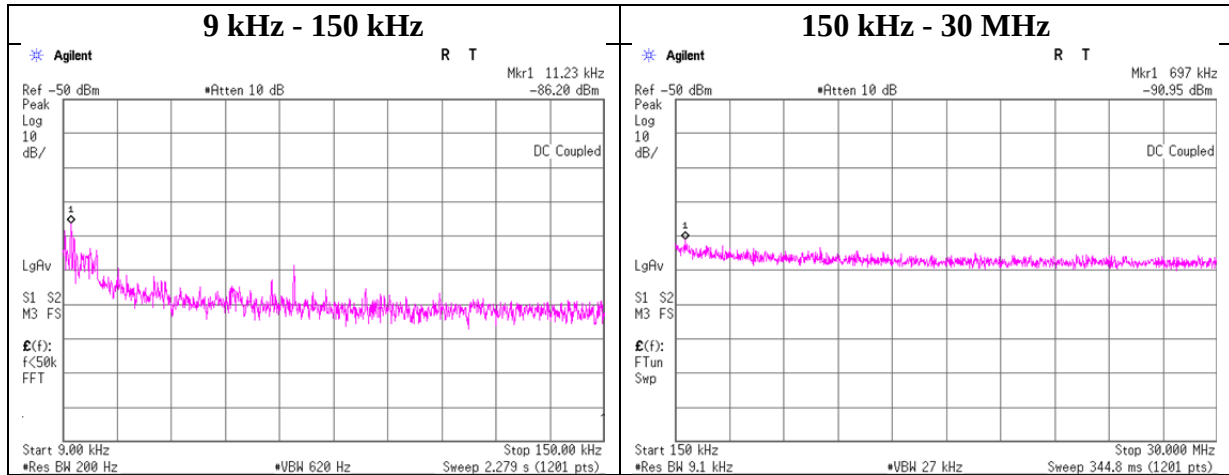
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Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx BT LE 2440MHz



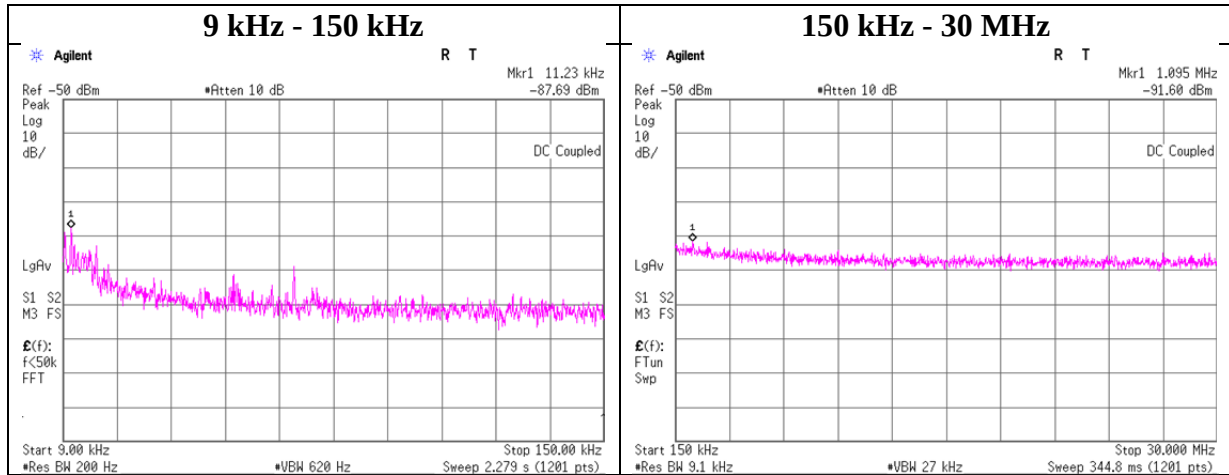
Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.23	-86.2	1.20	9.8	2.0	1	-73.2	300	6.0	-11.9	46.5	58.4	
697.00	-91.0	1.21	9.9	2.0	1	-77.8	30	6.0	3.4	30.7	27.3	

$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx BT LE 2480MHz



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
11.23	-87.7	1.20	9.8	2.0	1	-74.7	300	6.0	-13.4	46.5	59.9	
1095.00	-91.6	1.21	9.9	2.0	1	-78.5	30	6.0	2.8	26.8	24.0	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

EIRP = Reading + Cable Loss + Attenuator Loss + Antenna Gain + 10 * log (N)

Power Density

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-25.54	2.56	10.02	-12.96	8.00	20.96
2437.00	-25.13	2.57	10.02	-12.54	8.00	20.54
2462.00	-25.84	2.57	10.02	-13.25	8.00	21.25

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-26.55	2.56	10.02	-13.97	8.00	21.97
2437.00	-25.59	2.57	10.02	-13.00	8.00	21.00
2462.00	-26.53	2.57	10.02	-13.94	8.00	21.94

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-27.08	2.56	10.02	-14.50	8.00	22.50
2437.00	-27.35	2.57	10.02	-14.76	8.00	22.76
2462.00	-27.35	2.57	10.02	-14.76	8.00	22.76

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-19.36	2.56	10.02	-6.78	8.00	14.78
2440.00	-18.96	2.57	10.02	-6.37	8.00	14.37
2480.00	-18.30	2.58	10.02	-5.70	8.00	13.70

Sample Calculation:

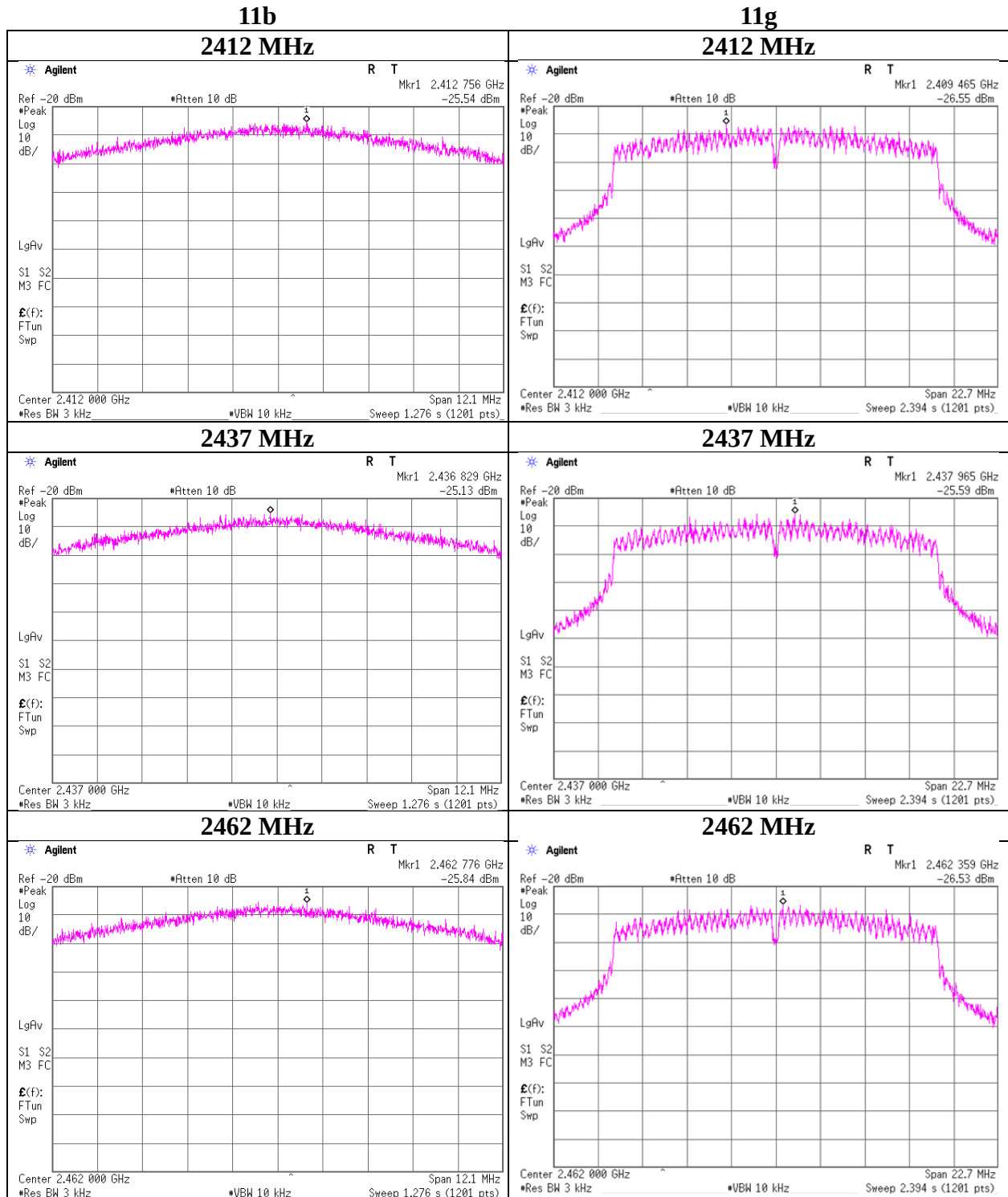
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

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

Power Density

Test place
Report No.
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab. No.11 Measurement Room
11157080H
March 1, 2016
23 deg. C / 42 % RH
Shinichi Miyazono
Tx



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Ise EMC Lab.

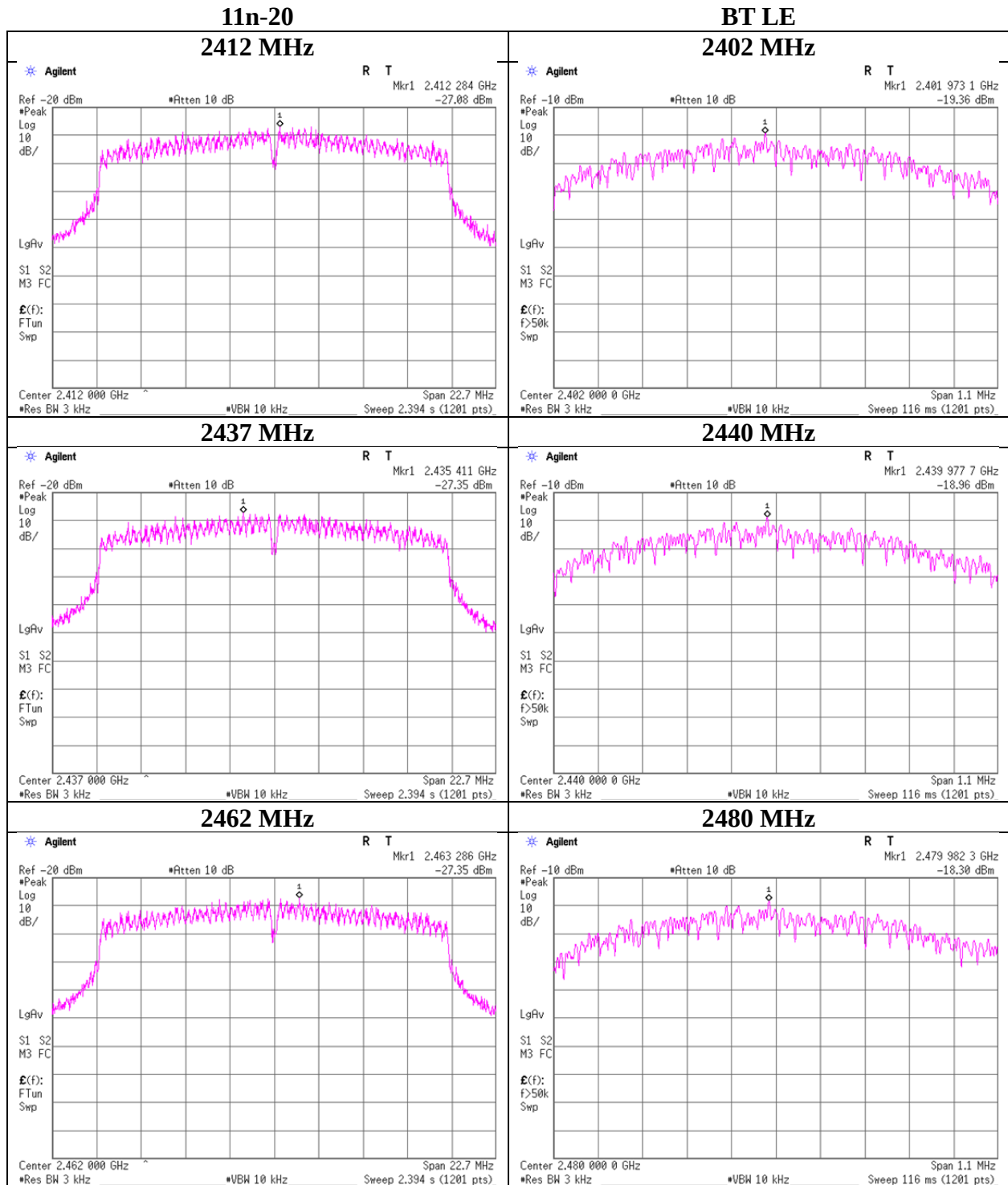
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124

Power Density

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11157080H
Date : March 1, 2016
Temperature / Humidity : 23 deg. C / 42 % RH
Engineer : Shinichi Miyazono
Mode : Tx



UL Japan, Inc.

Ise EMC Lab.

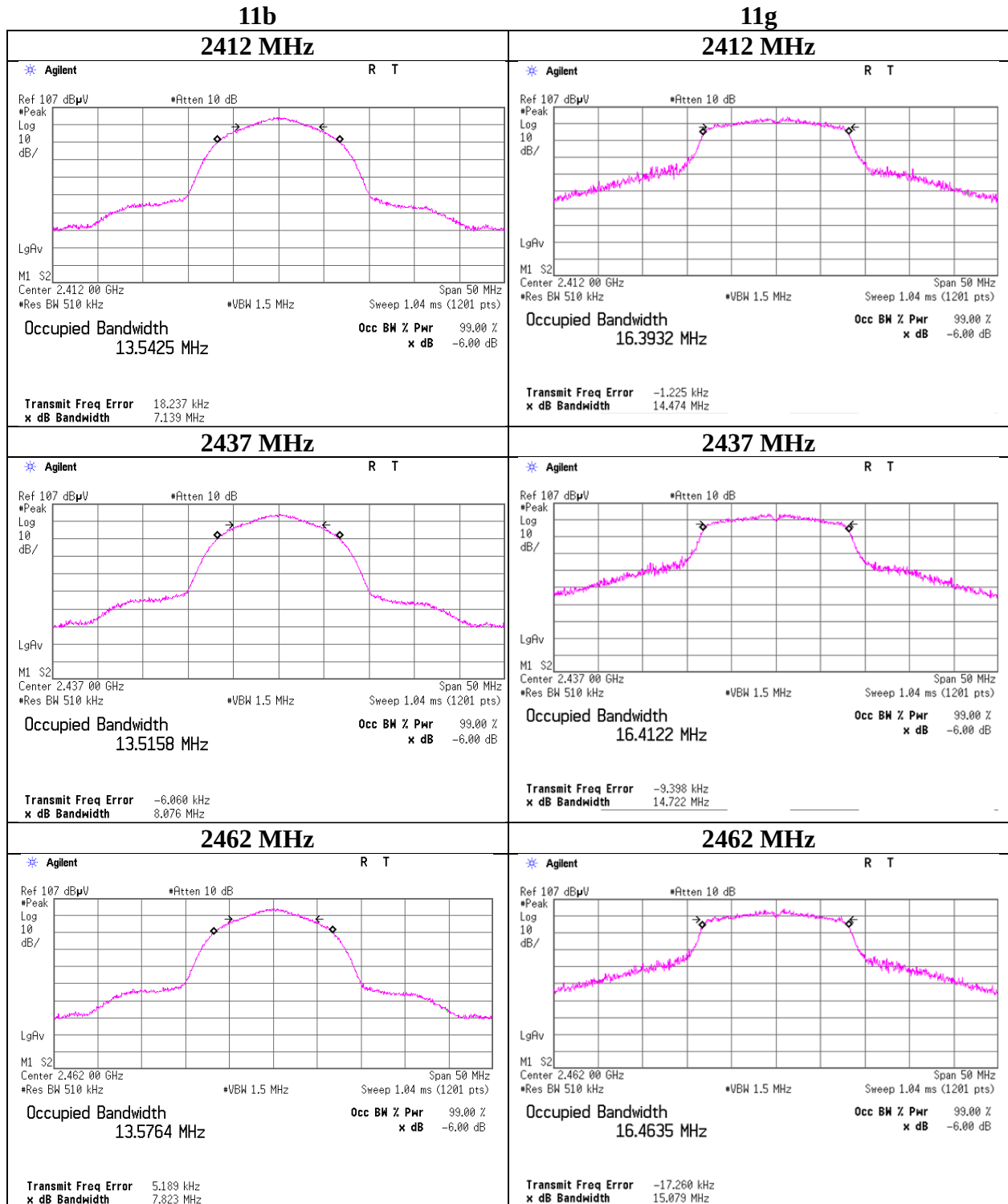
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99%Occupied Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx



UL Japan, Inc.

Ise EMC Lab.

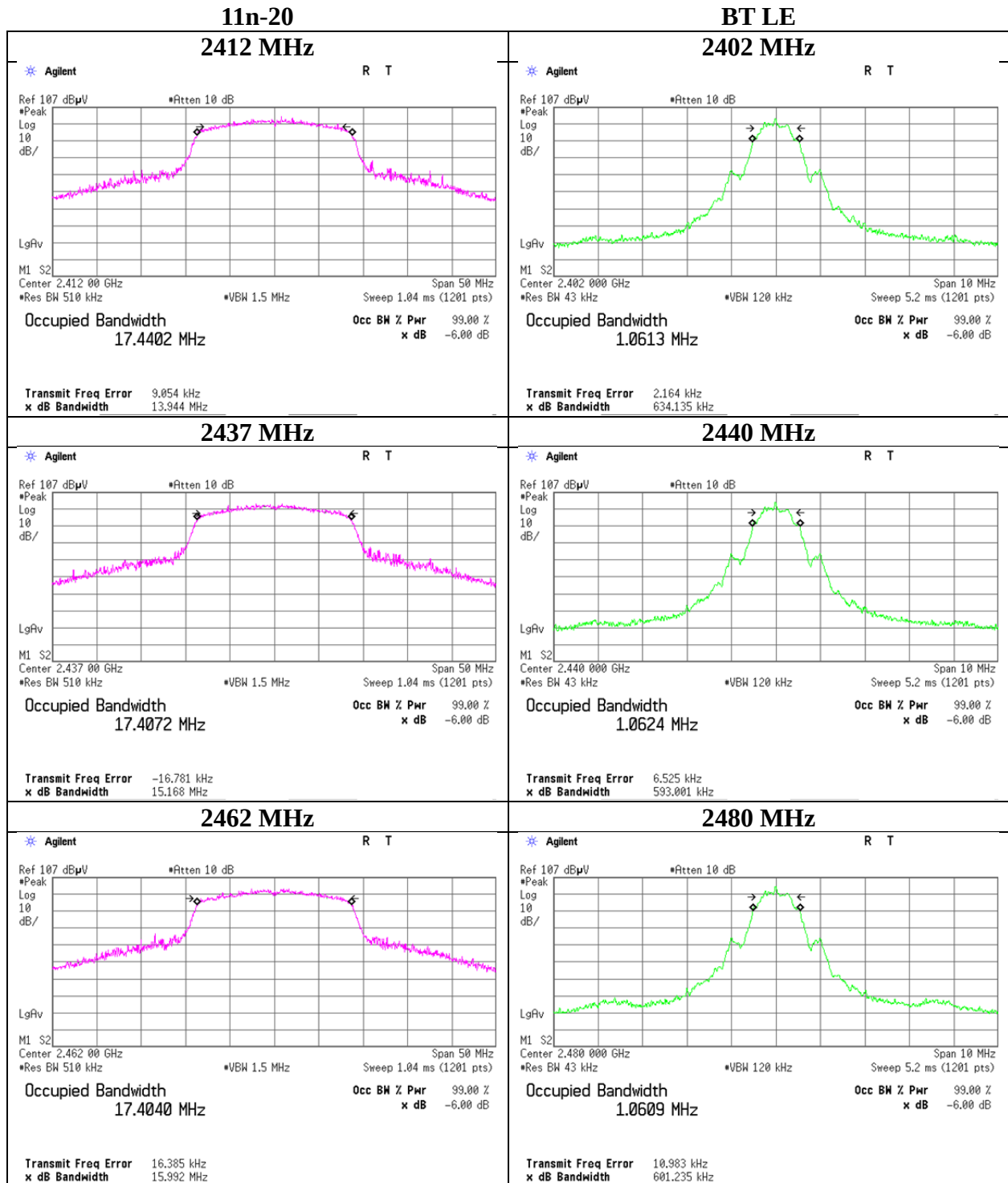
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99% Occupied Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11157080H
Date	March 1, 2016
Temperature / Humidity	23 deg. C / 42 % RH
Engineer	Shinichi Miyazono
Mode	Tx



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APPENDIX 2: Test instruments

Test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2015/10/02 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE/CE	-
MMM-10	DIGITAL HiTESTER	Hioki	3805	51201148	RE/CE	2016/01/18 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2016/01/21 * 12
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE/CE	2016/01/29 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2015/11/02 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2015/05/15 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	2	RE	2015/09/17 * 12
MLA-23	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2016/01/30 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	650	RE	2015/10/01 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12 *1)
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ sucoform141-PE(1m)/ RFM-E121(Switcher)	-/04178	CE	2015/07/02 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE	2015/07/10 * 12

*1) This test equipment was used for the tests before the expiration date of the calibration.

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Test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2015/12/08 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2015/10/08 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/18 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2015/10/08 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2015/10/07 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2015/10/08 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2015/11/10 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	AT	2015/12/07 * 12
MMM-17	DIGITAL HiTESTER	Hioki	3805	070900530	AT	2016/01/13 * 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