



RADIO TEST REPORT

Test Report No. : 10749723H-B

Applicant : OMRON Automotive Electronics Co. Ltd.
Type of Equipment : Remote engine starter (FOB)
Model No. : GHR-M010
FCC ID : OUCGHR-M010
Test regulation : FCC Part 15 Subpart C: 2015
(Remote control engine starter function)
Test Result : Complied

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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)

Date of test: April 17 and 18, 2015

Representative test engineer:

T. Noguchi

Takafumi Noguchi
Engineer
Consumer Technology Division

Approved by:

M. Imura

Motoya Imura
Engineer
Consumer Technology Division



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Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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Telephone : +81 596 24 8999

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SECTION 1: Customer information

Company Name : OMRON Automotive Electronics Co. Ltd.
Address : 6368 NENJOZAKA OKUSA KOMAKI AICHI, 485-0802 JAPAN
Telephone Number : +81-568-78-6159
Facsimile Number : +81-568-78-7659
Contact Person : Masashi Matsuda

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

2.1 Identification of E.U.T.

Type of Equipment : Remote engine starter (FOB)
Model No. : GHR-M010
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.0 V (CR2032 x 2)
Receipt Date of Sample : April 15, 2015
Country of Mass-production : Japan
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 No: GHR-M010 (referred to as the EUT in this report) is the Remote engine starter (FOB).

[Keyless function]

General Specification

Clock frequencies in the system : 18.610 MHz

Radio Specification

Radio Type : Transmitter
Frequency of Operation : 315 MHz
Modulation : FSK
Operating voltage (inner) : DC 3.0 V
Antenna type : PWB Pattern Antenna
Antenna Gain : -23 dBi

Radio Type : Receiver
Frequency of Operation : 125 kHz

*The test of receiver part was performed separately from this test report, and the conformability is confirmed.

[Remote engine start function]

General Specification

Clock frequencies in the system : 30.000 MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 915.4 MHz to 925.0 MHz
Modulation : FHSS, FSK
Operating voltage (inner) : DC 3.0 V
Antenna type : Chip Antenna
Antenna Gain : -2.0 dBi
Number of channel : 25
Channel spacing : 400 kHz

*This report applies with for Remote engine start function.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on January 21, 2015

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2009 7. AC powerline conducted emission measurements IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	N/A	N/A *1)	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (a)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(i) IC: RSS-210 A8.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(i) IC: RSS-210 A8.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(b)(2) IC: RSS-210 A8.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-210 A8.5 RSS-Gen 8.9 RSS-Gen 8.10	2.0 dB 6407.800 MHz, AV, Vertical	Complied	Conducted/ Radiated

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.

* In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.

FCC Part 15.31 (e)

The test was performed with the New Battery (DC 3.0 V) during the tests. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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.

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9 kHz -30 MHz	30 MHz -300 MHz	300 MHz -1 GHz	1 GHz -10 GHz	10 GHz -18 GHz	18 GHz -26.5 GHz	26.5 GHz -40 GHz
No.1	4.3 dB	5.5 dB	6.3 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No.2	4.2 dB	5.4 dB	6.3 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No.3	4.4 dB	5.4 dB	6.4 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No.4	4.7 dB	5.6 dB	6.4 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1 GHz	Above 1 GHz
0.7 dB	1.5 dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1 GHz	1 GHz-3 GHz	3 GHz-18 GHz	18 GHz - 26.5 GHz	26.5 GHz- 40 GHz	
1.5 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Radiated emission test (3m)

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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.

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

4.1 Operating Mode(s)

Mode	Tested Frequency
Transmitting mode (Tx mode)	915.4MHz 920.2MHz 925.0MHz
*Power of the EUT was set by the software as follows; Power settings: +10dBm Software: 20150409_ACAS_FHSS_FOB_denpaB_new *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

4.2 Configuration and peripherals

A

* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Remote engine starter (FOB)	GHR-M010	FH03	OMRON Automotive Electronics Co. Ltd.	EUT

SECTION 5: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

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

The height of the measuring antenna varied between 1 and 4m 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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

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

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

- 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 : 30M-10GHz

Test data : APPENDIX

Test result : Pass

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	1MHz	10kHz	30kHz	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 *3)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	1.25MHz	15kHz	51kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	12MHz	120kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	300kHz	1MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *2)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	10MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

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

*2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

*3) Reference data

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

Test data : APPENDIX
Test result : Pass

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Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

APPENDIX 1: Test data

20dB Bandwidth and Carrier Frequency Separation

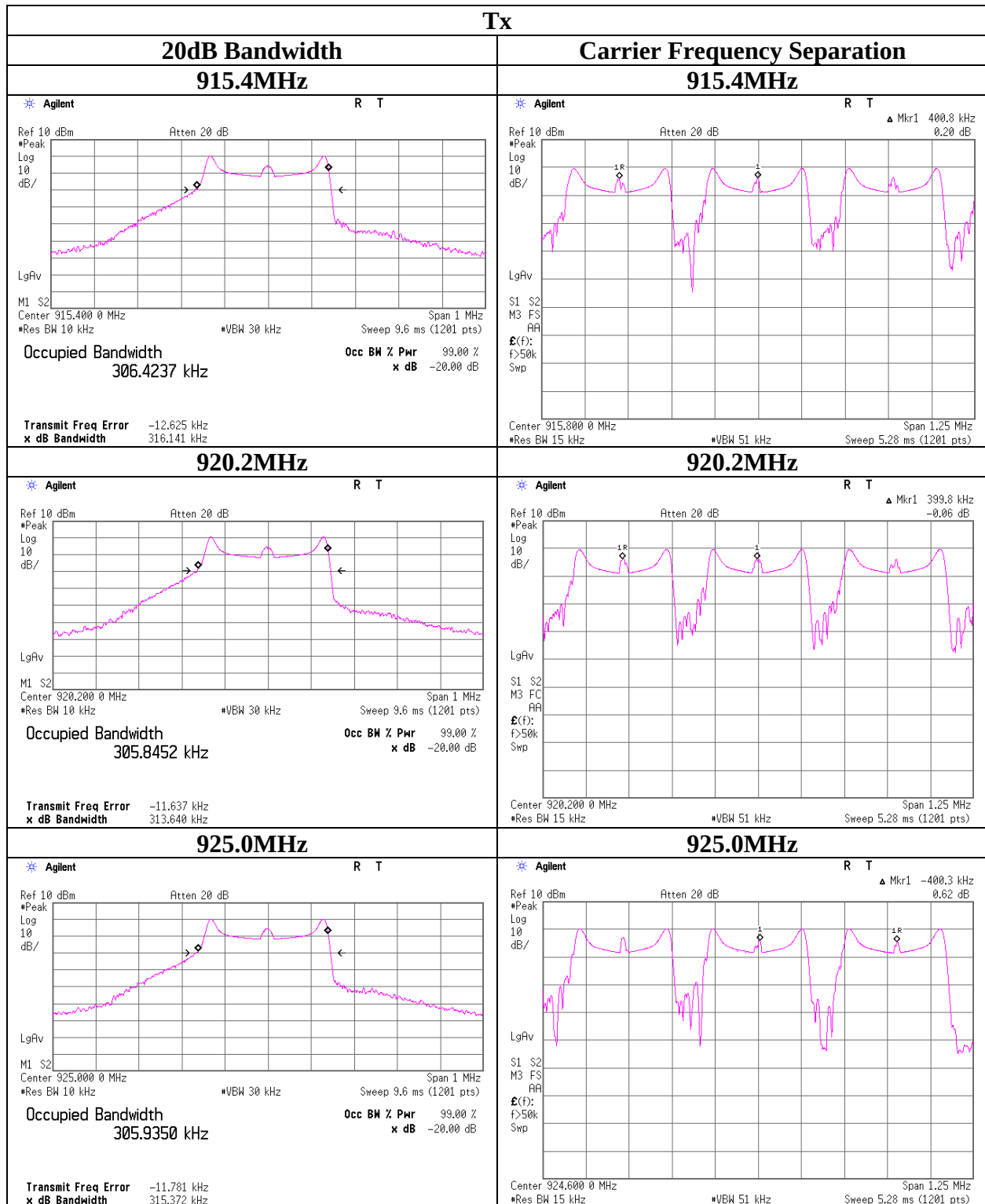
Test place Ise EMC Lab. No.3 Measurement Room
Report No. 10749723H
Date 04/17/2015
Temperature/ Humidity 23deg. C / 42% RH
Engineer Takafumi Noguchi
Mode Tx (Hopping off/on)

Freq. [MHz]	20dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]
915.4	0.316	<=0.5
920.2	0.314	<=0.5
925.0	0.315	<=0.5

Freq. [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
915.4	0.401	>= 0.316
920.2	0.400	>= 0.314
925.0	0.400	>= 0.315

Limit: 20dB Bandwidth or 25kHz (whichever is greater).

20dB Bandwidth and Carrier Frequency Separation



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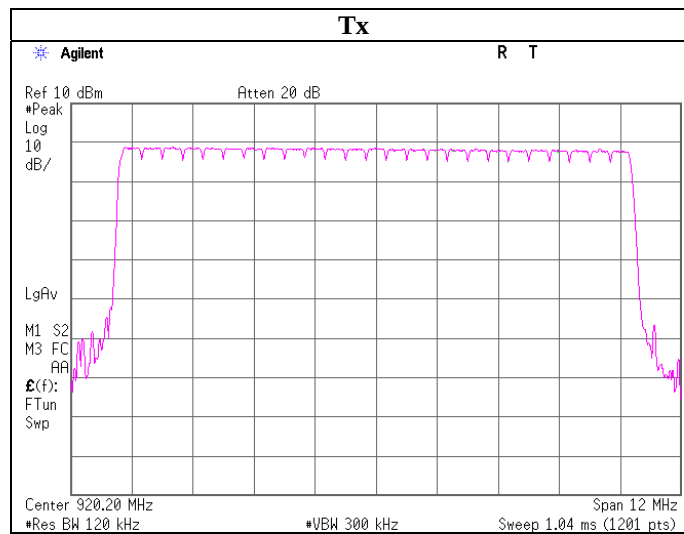
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Number of Hopping Frequency

Test place Ise EMC Lab. No.3 Measurement Room
Report No. 10749723H
Date 04/17/2015
Temperature/ Humidity 23deg. C / 42% RH
Engineer Takafumi Noguchi
Mode Tx (Hopping on)

Mode	Number of channel [times]	Limit [times]
Tx	25	>= 25



Dwell time

Test place

Report No.

Date

Temperature/ Humidity

Engineer

Mode

Ise EMC Lab. No.3 Measurement Room

10749723H

04/17/2015

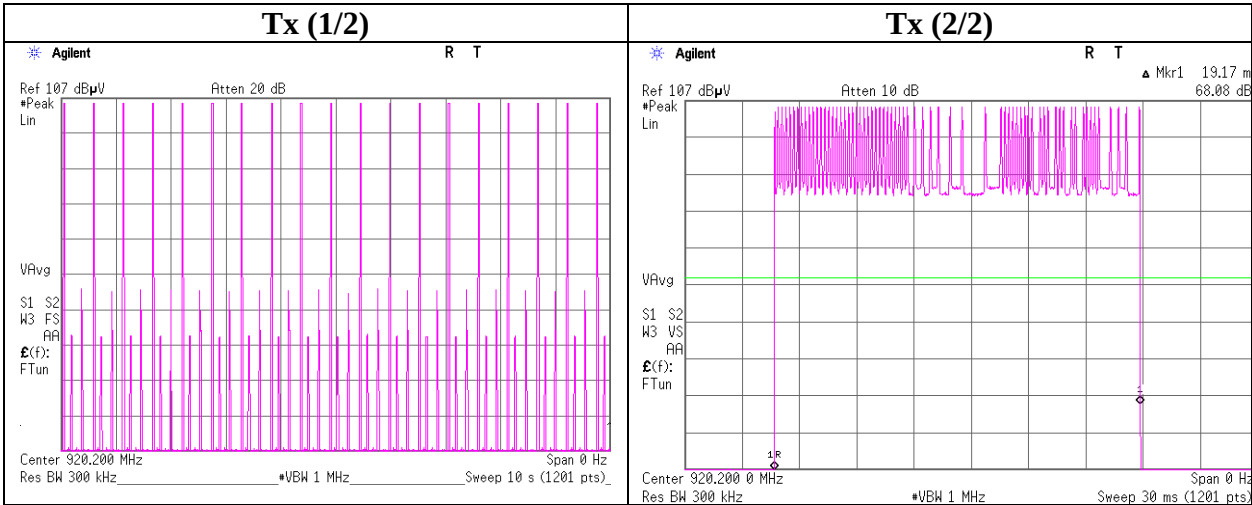
23deg. C / 42% RH

Takafumi Noguchi

Tx (Hopping on)

Mode	Number of transmission in 10sec [times]	Length of transmission time [msec]	Result [msec]	Limit [msec]
Tx	19	19.2	364.2	400

Result [ms] = Number of transmission in 10sec [times] * Length of transmission time [msec]



Maximum Peak Output Power

Test place Ise EMC Lab. No.3 Measurement Room
Report No. 10749723H
Date 04/17/2015
Temperature/ Humidity 23deg. C / 42% RH
Engineer Takafumi Noguchi
Mode Tx (Hopping off)

[PK]

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
915.4	-0.13	0.25	9.90	10.02	10.05	23.97	250	13.95
920.2	0.06	0.25	9.90	10.21	10.50	23.97	250	13.76
925.0	-0.07	0.25	9.90	10.08	10.19	23.97	250	13.89

Sample Calculation:

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

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Average Output Power
(Reference data for SAR testing)

Test place	Ise EMC Lab. No.3 Measurement Room
Report No.	10749723H
Date	04/17/2015
Temperature/ Humidity	23deg. C / 42% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)

[AV]

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
				[dBm]	[mW]
915.4	-0.67	0.25	9.90	9.48	8.87
920.2	-0.45	0.25	9.90	9.70	9.33
925.0	-0.60	0.25	9.90	9.55	9.02

Sample Calculation:

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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 915.4 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.021	QP	22.1	15.0	7.1	32.3	11.9	40.0	28.1	
Hori	72.300	QP	22.3	6.3	7.7	32.1	4.2	40.0	35.8	
Hori	140.250	QP	21.7	14.4	8.5	32.2	12.4	43.5	31.1	
Hori	270.299	QP	21.7	18.3	9.6	32.0	17.6	46.0	28.4	
Hori	509.998	QP	21.7	18.3	11.2	32.1	19.1	46.0	26.9	
Hori	961.506	QP	20.8	23.1	13.5	30.7	26.7	53.9	27.2	
Hori	1830.800	PK	51.1	28.4	3.7	35.2	48.0	73.9	25.9	
Hori	2746.200	PK	48.0	29.5	4.0	34.8	46.7	73.9	27.2	
Hori	3661.600	PK	48.9	30.3	4.6	34.2	49.6	73.9	24.3	
Hori	4577.000	PK	53.3	32.2	5.1	34.1	56.5	73.9	17.4	
Hori	5492.400	PK	56.7	32.8	5.6	33.9	61.2	73.9	12.7	
Hori	6407.800	PK	59.5	35.2	6.2	34.0	66.9	73.9	7.0	
Hori	7323.200	PK	46.1	36.8	6.5	34.1	55.3	73.9	18.6	
Hori	8238.600	PK	43.6	36.6	6.7	34.4	52.5	73.9	21.4	Floor Noise
Hori	9154.000	PK	43.5	38.0	7.4	34.6	54.3	73.9	19.6	Floor Noise
Hori	1830.800	AV	45.1	28.4	3.7	35.2	42.0	53.9	11.9	
Hori	2746.200	AV	38.9	29.5	4.0	34.8	37.6	53.9	16.3	
Hori	3661.600	AV	39.3	30.3	4.6	34.2	40.0	53.9	13.9	
Hori	4577.000	AV	41.3	32.2	5.1	34.1	44.5	53.9	9.4	
Hori	5492.400	AV	41.9	32.8	5.6	33.9	46.4	53.9	7.5	
Hori	6407.800	AV	42.9	35.2	6.2	34.0	50.3	53.9	3.6	
Hori	7323.200	AV	33.2	36.8	6.5	34.1	42.4	53.9	11.5	
Hori	8238.600	AV	30.2	36.6	6.7	34.4	39.1	53.9	14.8	Floor Noise
Hori	9154.000	AV	30.5	38.0	7.4	34.6	41.3	53.9	12.6	Floor Noise
Vert	38.021	QP	22.0	15.0	7.1	32.3	11.8	40.0	28.2	
Vert	72.300	QP	22.1	6.3	7.7	32.1	4.0	40.0	36.0	
Vert	140.250	QP	21.8	14.4	8.5	32.2	12.5	43.5	31.0	
Vert	270.299	QP	21.8	18.3	9.6	32.0	17.7	46.0	28.3	
Vert	509.998	QP	21.6	18.3	11.2	32.1	19.0	46.0	27.0	
Vert	961.506	QP	20.9	23.1	13.5	30.7	26.8	53.9	27.1	
Vert	1830.800	PK	46.3	28.4	3.7	35.2	43.2	73.9	30.7	
Vert	2746.200	PK	47.0	29.5	4.0	34.8	45.7	73.9	28.2	
Vert	3661.600	PK	49.1	30.3	4.6	34.2	49.8	73.9	24.1	
Vert	4577.000	PK	51.7	32.2	5.1	34.1	54.9	73.9	19.0	
Vert	5492.400	PK	55.8	32.8	5.6	33.9	60.3	73.9	13.6	
Vert	6407.800	PK	61.7	35.2	6.2	34.0	69.1	73.9	4.8	
Vert	7323.200	PK	42.8	36.8	6.5	34.1	52.0	73.9	21.9	
Vert	8238.600	PK	43.9	36.6	6.7	34.4	52.8	73.9	21.1	Floor Noise
Vert	9154.000	PK	43.6	38.0	7.4	34.6	54.4	73.9	19.5	Floor Noise
Vert	1830.800	AV	37.1	28.4	3.7	35.2	34.0	53.9	19.9	
Vert	2746.200	AV	36.0	29.5	4.0	34.8	34.7	53.9	19.2	
Vert	3661.600	AV	38.3	30.3	4.6	34.2	39.0	53.9	14.9	
Vert	4577.000	AV	39.8	32.2	5.1	34.1	43.0	53.9	10.9	
Vert	5492.400	AV	38.4	32.8	5.6	33.9	42.9	53.9	11.0	
Vert	6407.800	AV	44.5	35.2	6.2	34.0	51.9	53.9	2.0	
Vert	7323.200	AV	31.5	36.8	6.5	34.1	40.7	53.9	13.2	
Vert	8238.600	AV	30.3	36.6	6.7	34.4	39.2	53.9	14.7	Floor Noise
Vert	9154.000	AV	30.5	38.0	7.4	34.6	41.3	53.9	12.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 915.4 MHz	

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	915.400	PK	100.3	22.6	13.3	30.9	105.3	-	-	Carrier
Hori	902.000	PK	29.4	22.5	13.2	31.0	34.1	85.3	51.2	
Vert	915.400	PK	99.3	22.6	13.3	30.9	104.3	-	-	Carrier
Vert	902.000	PK	28.0	22.5	13.2	31.0	32.7	84.3	51.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 920.2 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.022	QP	22.1	15.0	7.1	32.3	11.9	40.0	28.1	
Hori	72.301	QP	22.2	6.3	7.7	32.1	4.1	40.0	35.9	
Hori	140.256	QP	21.7	14.4	8.5	32.2	12.4	43.5	31.1	
Hori	270.288	QP	21.8	18.3	9.6	32.0	17.7	46.0	28.3	
Hori	509.997	QP	21.7	18.3	11.2	32.1	19.1	46.0	26.9	
Hori	961.507	QP	20.8	23.1	13.5	30.7	26.7	53.9	27.2	
Hori	1840.400	PK	53.6	28.5	3.7	35.2	50.6	73.9	23.3	
Hori	2760.600	PK	47.0	29.5	4.0	34.8	45.7	73.9	28.2	
Hori	3680.800	PK	52.0	30.3	4.6	34.1	52.8	73.9	21.1	
Hori	4601.000	PK	52.7	32.2	5.1	34.1	55.9	73.9	18.0	
Hori	5521.200	PK	60.8	32.9	5.7	33.9	65.5	73.9	8.4	
Hori	6441.400	PK	60.5	35.3	6.2	34.0	68.0	73.9	5.9	
Hori	7361.600	PK	48.9	36.8	6.5	34.1	58.1	73.9	15.8	
Hori	8281.800	PK	43.2	36.6	6.7	34.4	52.1	73.9	21.8	Floor Noise
Hori	9202.000	PK	43.3	38.1	7.4	34.6	54.2	73.9	19.7	Floor Noise
Hori	1840.400	AV	48.6	28.5	3.7	35.2	45.6	53.9	8.3	
Hori	2760.600	AV	36.4	29.5	4.0	34.8	35.1	53.9	18.8	
Hori	3680.800	AV	42.6	30.3	4.6	34.1	43.4	53.9	10.5	
Hori	4601.000	AV	41.2	32.2	5.1	34.1	44.4	53.9	9.5	
Hori	5521.200	AV	45.6	32.9	5.7	33.9	50.3	53.9	3.6	
Hori	6441.400	AV	43.9	35.3	6.2	34.0	51.4	53.9	2.5	
Hori	7361.600	AV	35.3	36.8	6.5	34.1	44.5	53.9	9.4	
Hori	8281.800	AV	30.5	36.6	6.7	34.4	39.4	53.9	14.5	Floor Noise
Hori	9202.000	AV	30.4	38.1	7.4	34.6	41.3	53.9	12.6	Floor Noise
Vert	38.022	QP	22.1	15.0	7.1	32.3	11.9	40.0	28.1	
Vert	72.301	QP	22.2	6.3	7.7	32.1	4.1	40.0	35.9	
Vert	140.256	QP	21.7	14.4	8.5	32.2	12.4	43.5	31.1	
Vert	270.288	QP	21.7	18.3	9.6	32.0	17.6	46.0	28.4	
Vert	509.997	QP	21.6	18.3	11.2	32.1	19.0	46.0	27.0	
Vert	961.507	QP	20.8	23.1	13.5	30.7	26.7	53.9	27.2	
Vert	1840.400	PK	48.2	28.5	3.7	35.2	45.2	73.9	28.7	
Vert	2760.600	PK	45.2	29.5	4.0	34.8	43.9	73.9	30.0	
Vert	3680.800	PK	52.5	30.3	4.6	34.1	53.3	73.9	20.6	
Vert	4601.000	PK	51.3	32.2	5.1	34.1	54.5	73.9	19.4	
Vert	5521.200	PK	59.2	32.9	5.7	33.9	63.9	73.9	10.0	
Vert	6441.400	PK	61.2	35.3	6.2	34.0	68.7	73.9	5.2	
Vert	7361.600	PK	45.1	36.8	6.5	34.1	54.3	73.9	19.6	
Vert	8281.800	PK	43.8	36.6	6.7	34.4	52.7	73.9	21.2	Floor Noise
Vert	9202.000	PK	44.5	38.1	7.4	34.6	55.4	73.9	18.5	Floor Noise
Vert	1840.400	AV	39.8	28.5	3.7	35.2	36.8	53.9	17.1	
Vert	2760.600	AV	34.7	29.5	4.0	34.8	33.4	53.9	20.5	
Vert	3680.800	AV	43.3	30.3	4.6	34.1	44.1	53.9	9.8	
Vert	4601.000	AV	39.0	32.2	5.1	34.1	42.2	53.9	11.7	
Vert	5521.200	AV	44.0	32.9	5.7	33.9	48.7	53.9	5.2	
Vert	6441.400	AV	44.3	35.3	6.2	34.0	51.8	53.9	2.1	
Vert	7361.600	AV	32.6	36.8	6.5	34.1	41.8	53.9	12.1	
Vert	8281.800	AV	30.6	36.6	6.7	34.4	39.5	53.9	14.4	Floor Noise
Vert	9202.000	AV	30.5	38.1	7.4	34.6	41.4	53.9	12.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 925.0 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.023	QP	22.2	15.0	7.1	32.3	12.0	40.0	28.0	
Hori	72.303	QP	22.3	6.3	7.7	32.1	4.2	40.0	35.8	
Hori	140.244	QP	21.6	14.4	8.5	32.2	12.3	43.5	31.2	
Hori	270.245	QP	21.7	18.3	9.6	32.0	17.6	46.0	28.4	
Hori	509.997	QP	21.6	18.3	11.2	32.1	19.0	46.0	27.0	
Hori	961.511	QP	20.8	23.1	13.5	30.7	26.7	53.9	27.2	
Hori	1850.000	PK	49.4	28.5	3.7	35.2	46.4	73.9	27.5	
Hori	2775.000	PK	49.5	29.5	4.0	34.8	48.2	73.9	25.7	
Hori	3700.000	PK	52.1	30.4	4.6	34.1	53.0	73.9	20.9	
Hori	4625.000	PK	54.8	32.3	5.2	34.1	58.2	73.9	15.7	
Hori	5550.000	PK	60.1	32.9	5.7	33.9	64.8	73.9	9.1	
Hori	6475.000	PK	59.2	35.4	6.2	34.0	66.8	73.9	7.1	
Hori	7400.000	PK	46.2	36.8	6.5	34.2	55.3	73.9	18.6	
Hori	8325.000	PK	42.5	36.5	6.8	34.5	51.3	73.9	22.6	Floor Noise
Hori	9250.000	PK	43.6	38.3	7.4	34.6	54.7	73.9	19.2	Floor Noise
Hori	1850.000	AV	41.6	28.5	3.7	35.2	38.6	53.9	15.3	
Hori	2775.000	AV	40.5	29.5	4.0	34.8	39.2	53.9	14.7	
Hori	3700.000	AV	42.7	30.4	4.6	34.1	43.6	53.9	10.3	
Hori	4625.000	AV	43.1	32.3	5.2	34.1	46.5	53.9	7.4	
Hori	5550.000	AV	44.6	32.9	5.7	33.9	49.3	53.9	4.6	
Hori	6475.000	AV	43.1	35.4	6.2	34.0	50.7	53.9	3.2	
Hori	7400.000	AV	31.9	36.8	6.5	34.2	41.0	53.9	12.9	
Hori	8325.000	AV	30.3	36.5	6.8	34.5	39.1	53.9	14.8	Floor Noise
Hori	9250.000	AV	30.5	38.3	7.4	34.6	41.6	53.9	12.3	Floor Noise
Vert	38.023	QP	22.1	15.0	7.1	32.3	11.9	40.0	28.1	
Vert	72.303	QP	22.3	6.3	7.7	32.1	4.2	40.0	35.8	
Vert	140.244	QP	21.6	14.4	8.5	32.2	12.3	43.5	31.2	
Vert	270.245	QP	21.8	18.3	9.6	32.0	17.7	46.0	28.3	
Vert	509.997	QP	21.7	18.3	11.2	32.1	19.1	46.0	26.9	
Vert	961.511	QP	20.9	23.1	13.5	30.7	26.8	53.9	27.1	
Vert	1850.000	PK	45.1	28.5	3.7	35.2	42.1	73.9	31.8	
Vert	2775.000	PK	47.5	29.5	4.0	34.8	46.2	73.9	27.7	
Vert	3700.000	PK	52.5	30.4	4.6	34.1	53.4	73.9	20.5	
Vert	4625.000	PK	52.9	32.3	5.2	34.1	56.3	73.9	17.6	
Vert	5550.000	PK	57.4	32.9	5.7	33.9	62.1	73.9	11.8	
Vert	6475.000	PK	59.3	35.4	6.2	34.0	66.9	73.9	7.0	
Vert	7400.000	PK	43.0	36.8	6.5	34.2	52.1	73.9	21.8	
Vert	8325.000	PK	42.9	36.5	6.8	34.5	51.7	73.9	22.2	Floor Noise
Vert	9250.000	PK	43.3	38.3	7.4	34.6	54.4	73.9	19.5	Floor Noise
Vert	1850.000	AV	33.1	28.5	3.7	35.2	30.1	53.9	23.8	
Vert	2775.000	AV	37.9	29.5	4.0	34.8	36.6	53.9	17.3	
Vert	3700.000	AV	43.5	30.4	4.6	34.1	44.4	53.9	9.5	
Vert	4625.000	AV	41.1	32.3	5.2	34.1	44.5	53.9	9.4	
Vert	5550.000	AV	42.4	32.9	5.7	33.9	47.1	53.9	6.8	
Vert	6475.000	AV	43.4	35.4	6.2	34.0	51.0	53.9	2.9	
Vert	7400.000	AV	30.3	36.8	6.5	34.2	39.4	53.9	14.5	
Vert	8325.000	AV	30.2	36.5	6.8	34.5	39.0	53.9	14.9	Floor Noise
Vert	9250.000	AV	30.6	38.3	7.4	34.6	41.7	53.9	12.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya	Koji Yamamoto
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 925.0 MHz	

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	925.000	PK	99.7	22.7	13.3	30.9	104.8	-	-	Carrier
Hori	928.000	PK	39.1	22.8	13.4	30.9	44.4	84.8	40.4	
Vert	925.000	PK	98.1	22.7	13.3	30.9	103.2	-	-	Carrier
Vert	928.000	PK	37.7	22.8	13.4	30.9	43.0	83.2	40.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

VBW (AV) Calculation

Test place

Report No.

Date

Temperature/ Humidity

Engineer

Mode

Ise EMC Lab. No.3 Semi Anechoic Chamber

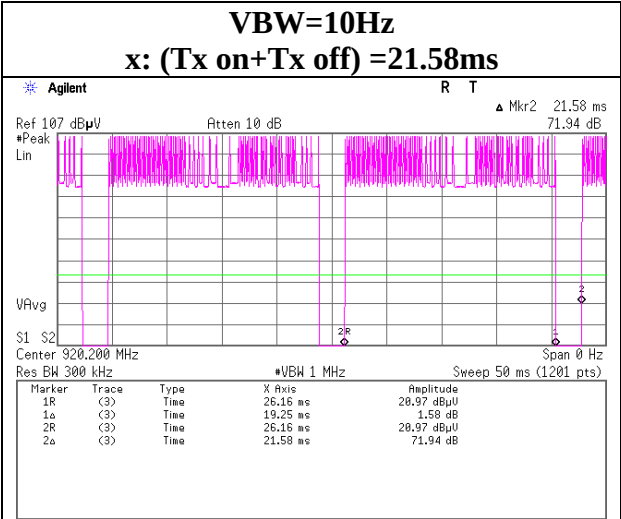
10749723H

04/17/2015

26deg. C / 32% RH

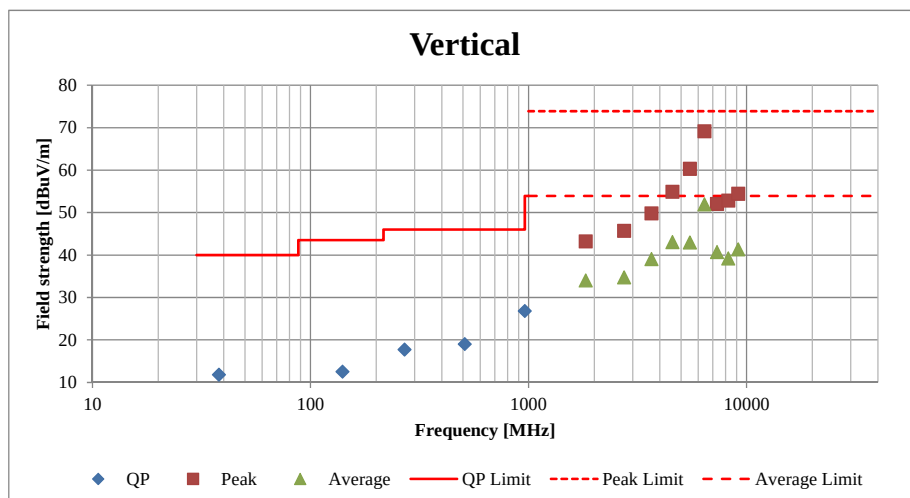
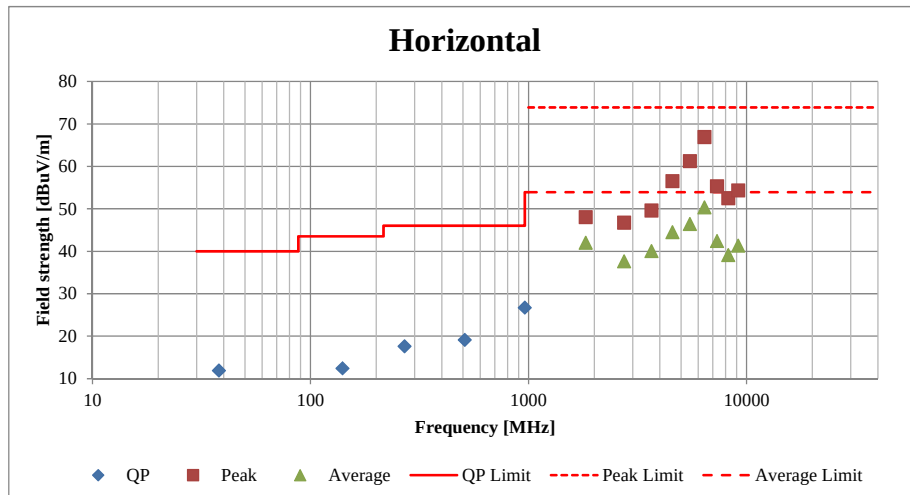
Yuta Moriya

Tx, 920.2MHz



Radiated Spurious Emission
(Plot data, Worst case)

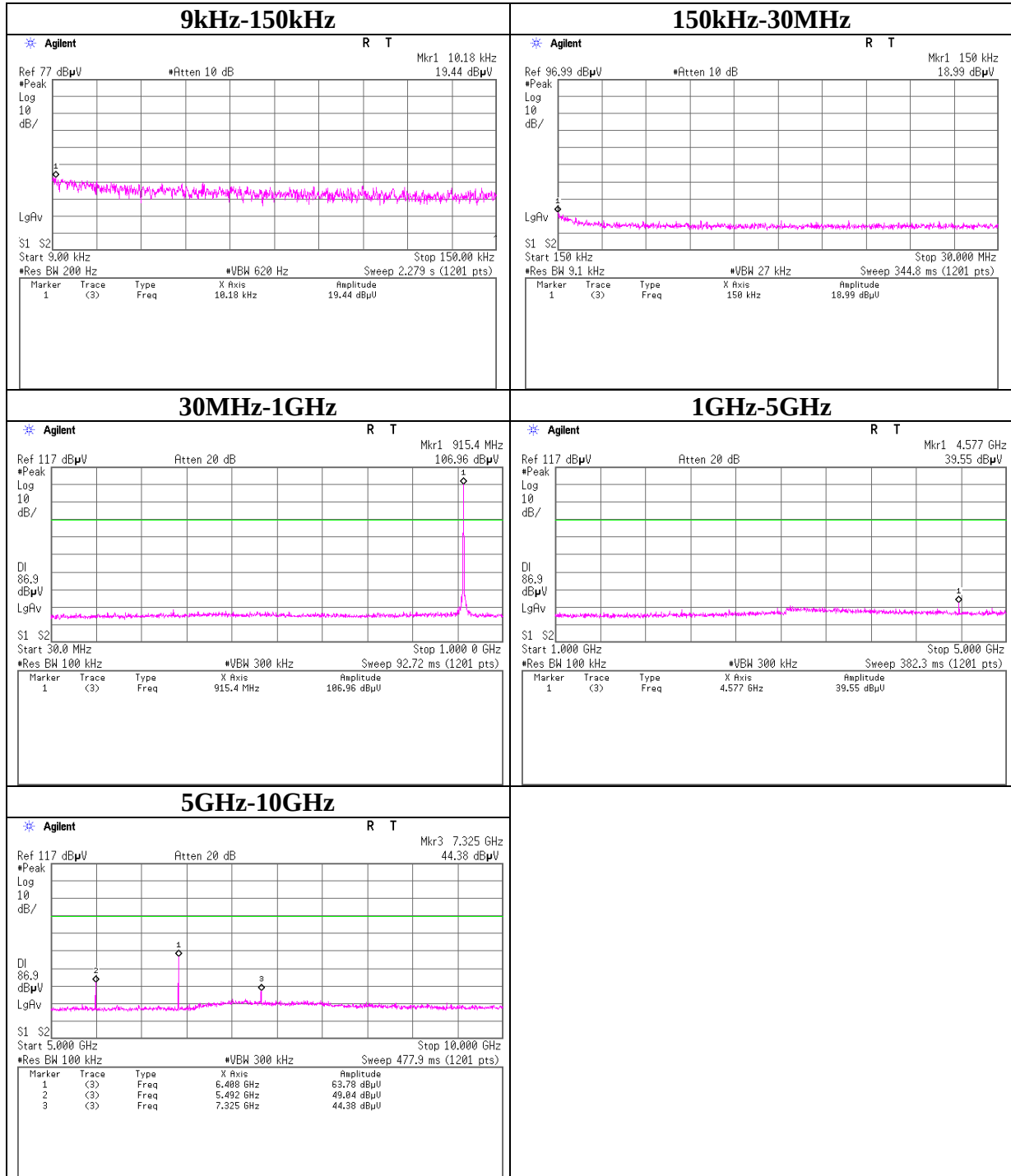
Test place	Ise EMC Lab.	No.2
Semi Anechoic Chamber	No.3	
Report No.	10749723H	
Date	04/17/2015	04/18/2015
Temperature/ Humidity	26 deg. C / 32 % RH	21 deg. C / 40 % RH
Engineer	Yuta Moriya (Below 1GHz)	Koji Yamamoto (Above 1GHz)
Mode	Tx, 915.4 MHz	



Conducted Spurious Emission

Test place : Ise EMC Lab. No.3 Measurement Room
Report No. : 10749723H
Date : 04/17/2015
Temperature/ Humidity : 23deg. C / 42% RH
Engineer : Takafumi Noguchi
Mode : Tx (Hopping off)

Tx 915.4MHz



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Ise EMC Lab.

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

Telephone : +81 596 24 8999

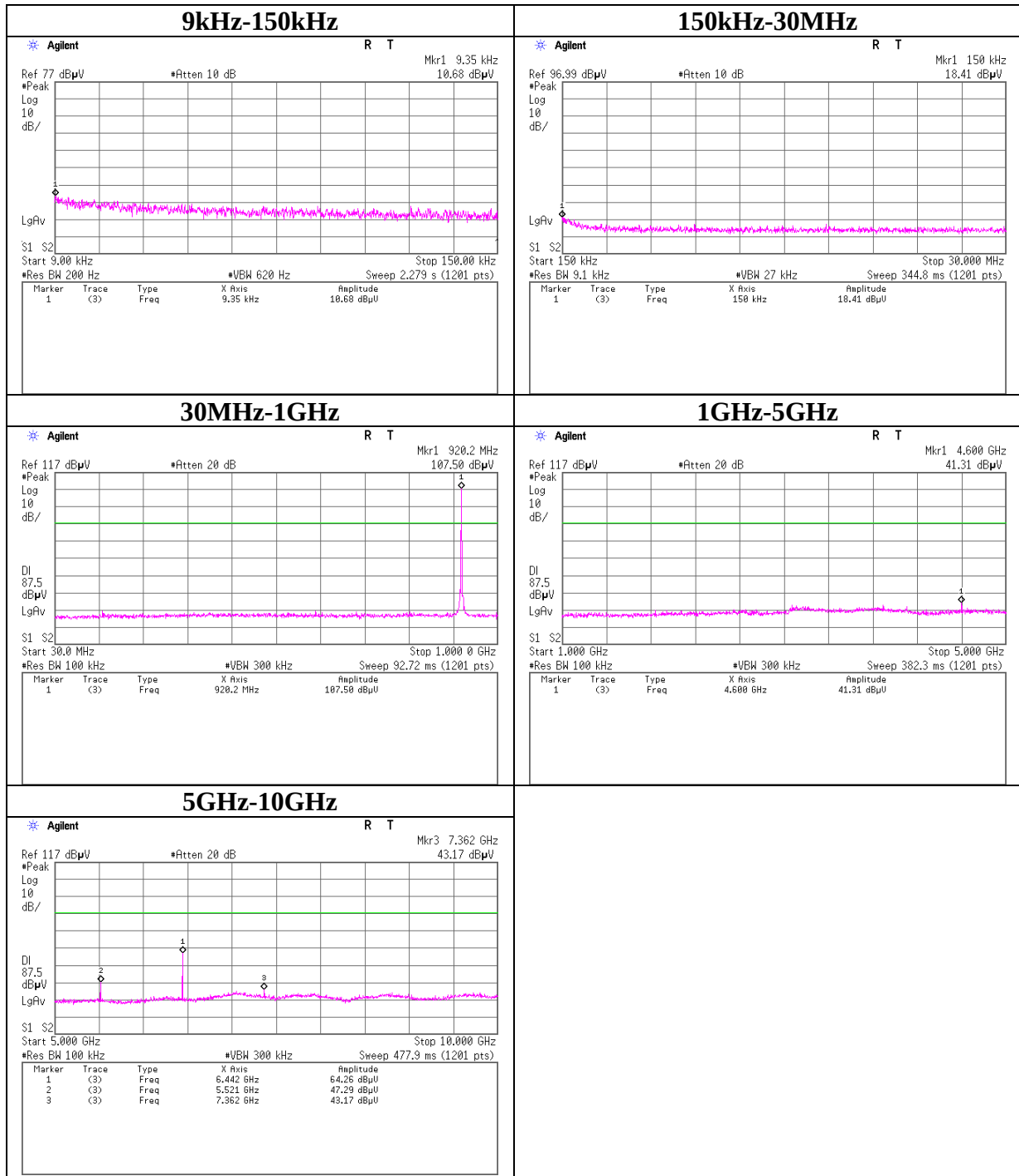
Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place
Report No.
Date
Temperature/ Humidity
Engineer
Mode

Ise EMC Lab. No.3 Measurement Room
10749723H
04/17/2015
23deg. C / 42% RH
Takafumi Noguchi
Tx (Hopping off)

Tx 920.2MHz



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Telephone : +81 596 24 8999

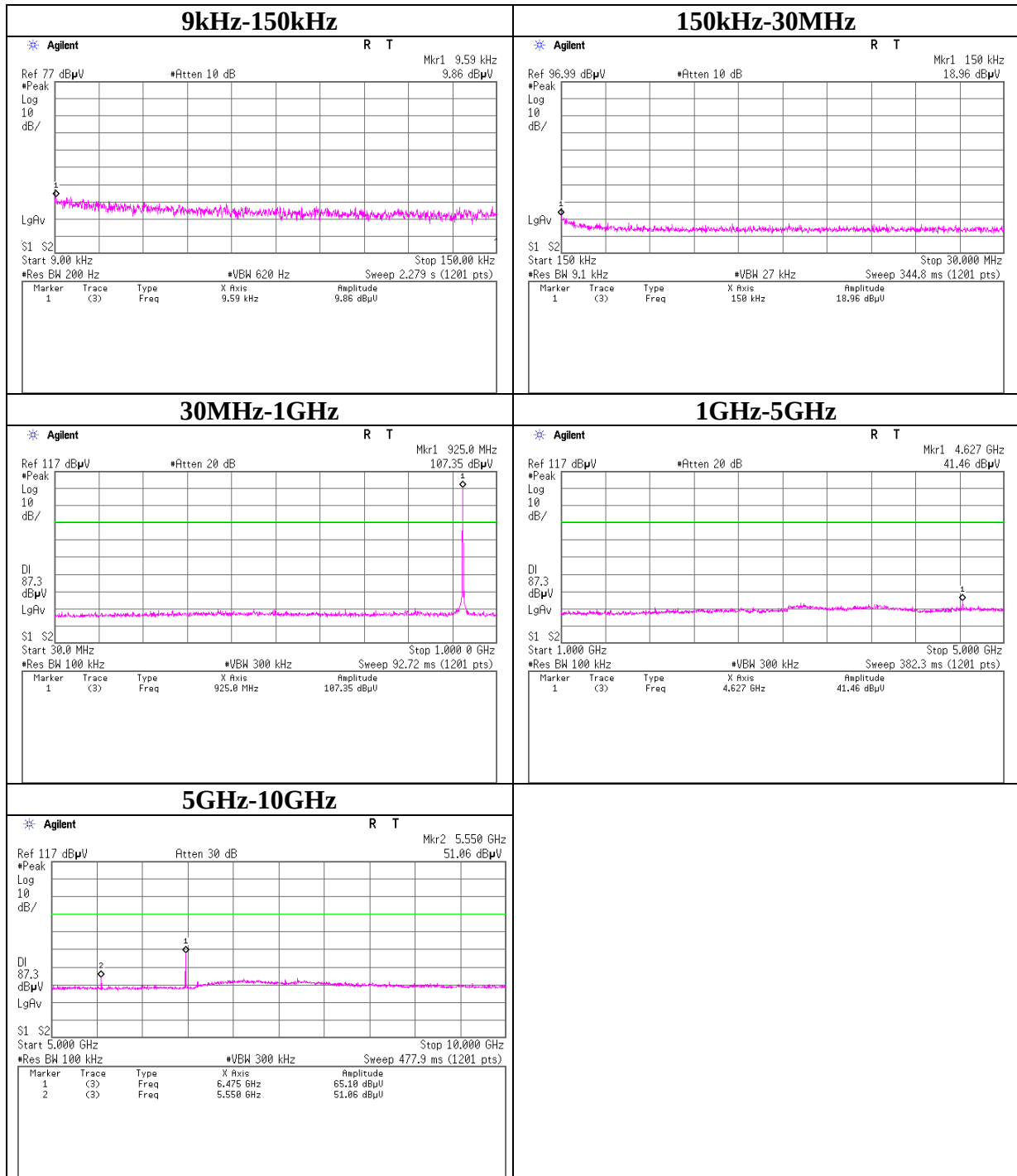
Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place
Report No.
Date
Temperature/ Humidity
Engineer
Mode

Ise EMC Lab. No.3 Measurement Room
10749723H
04/17/2015
23deg. C / 42% RH
Takafumi Noguchi
Tx (Hopping off)

Tx 925.0MHz



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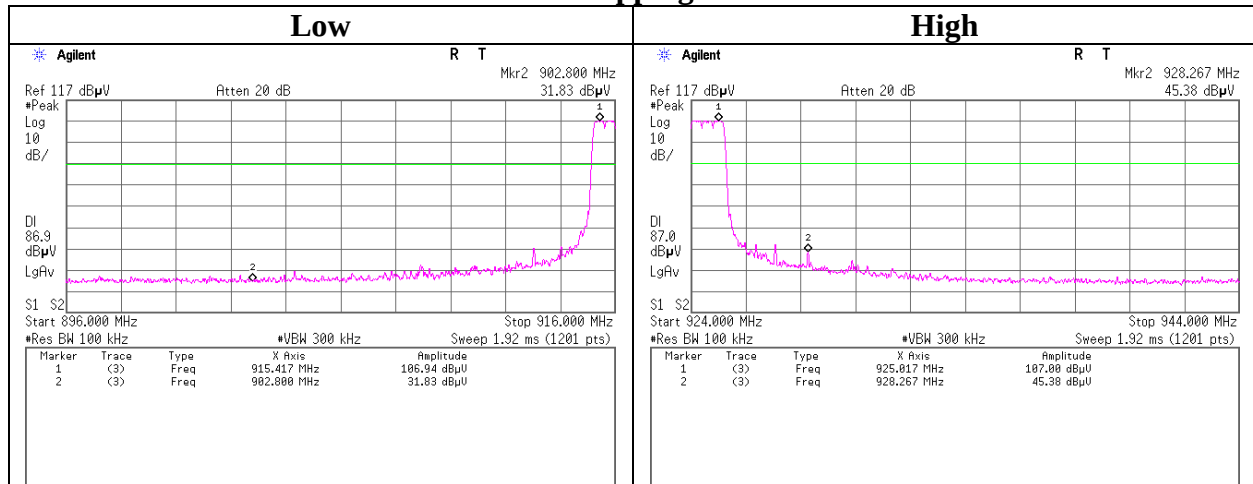
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

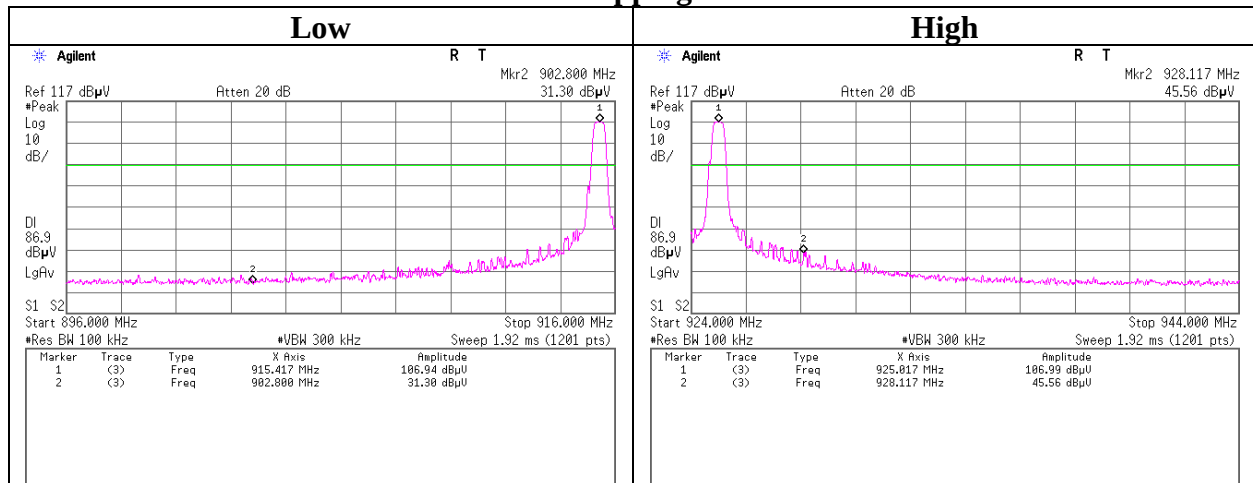
Conducted Emission Band Edge compliance

Test place Ise EMC Lab. No.3 Measurement Room
Report No. 10749723H
Date 04/17/2015
Temperature/ Humidity 23deg. C / 42% RH
Engineer Takafumi Noguchi
Mode Tx (Hopping on/off)

Tx Hopping on



Tx Hopping off



UL Japan, Inc.

Ise EMC Lab.

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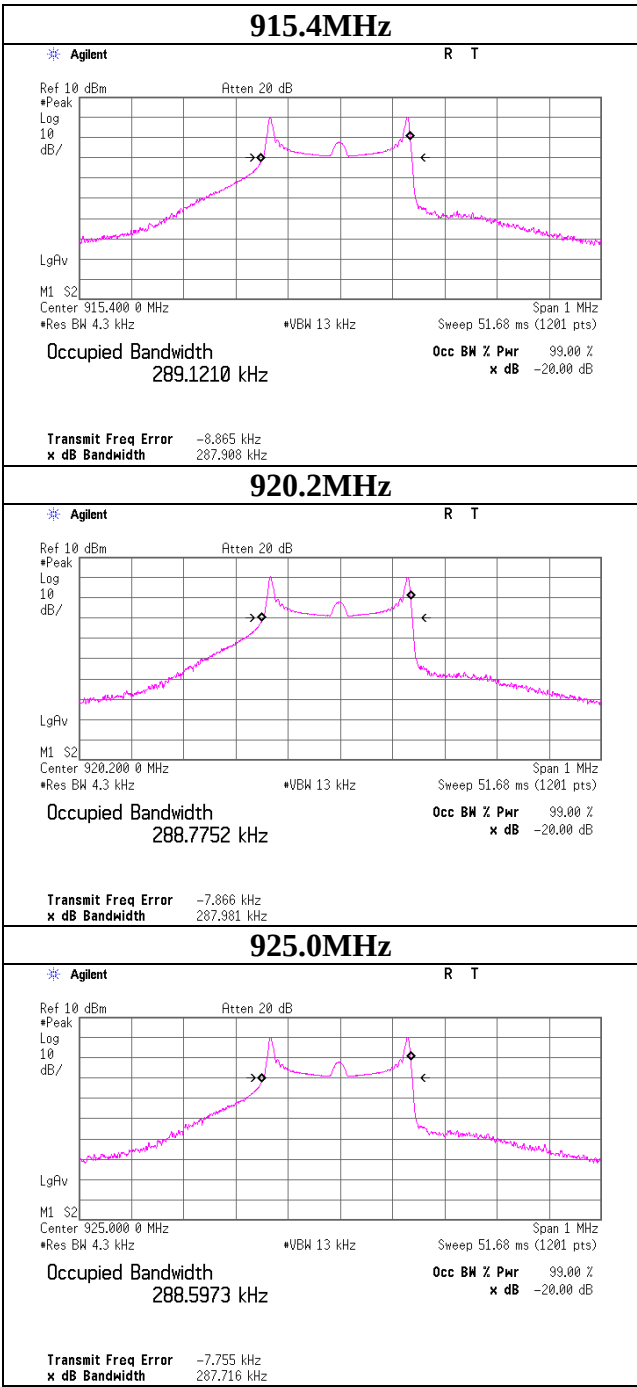
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99%Occupied Bandwidth

Test place
Report No.
Date
Temperature/ Humidity
Engineer
Mode

Ise EMC Lab. No.3 Measurement Room
10749723H
04/17/2015
23deg. C / 42% RH
Takafumi Noguchi
Tx (Hopping off)



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-12	Thermo-Hygrometer	Custom	CTH-180	1201	AT	2015/01/13 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2014/11/12 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	RE	2014/11/19 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2014/06/16 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2014/06/16 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/19 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-116	Spectrum Analyzer	Agilent	E4440A	MY46187620	RE	2015/03/09 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2014/08/19 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2014/10/18 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2014/10/18 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2014/07/14 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2015/04/08 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2015/03/10 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2014/06/25 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2014/10/17 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2015/02/05 * 12
MCC-166	Microwave Cable	Junkosha	MWX221	1303S120(1m) / 1311S167(5m)	RE	2014/09/24 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2015/01/28 * 12
MHF-27	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	RE	2015/01/23 * 12
MCC-176	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S303	RE	2015/03/27 * 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:

RE: Radiated Emission test

AT: Antenna Terminal Conducted test

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