



RADIO TEST REPORT

Test Report No. : 10818685H-A-R1

Applicant : TOKAI RIKA CO., LTD.
Type of Equipment : Handy Controller
Model No. : WT42A
FCC ID : MOZWT42A
Test regulation : FCC Part 15 Subpart C: 2015
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.
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6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 10818685H-A. 10818685H-A is replaced with this report.

Date of test: June 8 and 19, 2015

Representative test engineer:

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Consumer Technology Division

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Engineer

Consumer Technology Division



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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10818685H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10818685H-A	July 24, 2015	-	-
1	10818685H-A-R1	August 3, 2015	P.5	Correction of power supply of FCC Part 15.31 (e) in Clause 3.2.
1	10818685H-A-R1	August 3, 2015	P.8	Correction of Configuration and peripherals

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SECTION 1: Customer information

Company Name : TOKAI RIKA CO., LTD
Address : 3-260 Toyota, Oguchi-cho, Niwa-gun, Aichi-ken, 480-0195 Japan
Telephone Number : +81-587-95-0093
Facsimile Number : +81-587-95-5471
Contact Person : Hiroki Unno

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

2.1 Identification of E.U.T.

Type of Equipment : HANDY CONTROLLER
Model No. : WT42A
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 4 to 6 V (CR2032 x 2)
Receipt Date of Sample : June 11, 2015
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: WT42A (referred to as the EUT in this report) is the Handy Controller.

General Specification

Clock frequencies in the system : RF-IC : 26 MHz
Control :4.9152 MHz / 32.768 kHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 913.16 MHz to 920.84 MHz
Modulation : FHSS
Operating voltage (inner) : DC 3.0 V
Antenna type : Helical Antenna
Antenna Gain : -2.0 dBi
Number of channel : 25
Channel spacing : 320 kHz

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on June 12, 2015 and effective July 13, 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

* The revision on June 12, 2015 does not affect the test specification applied to the EUT.

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-247 5.1 (2)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) ----- IC: RSS-247 5.1 (1)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-247 5.1 (4)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-247 5.1 (4)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(b)(1) ----- IC: RSS-247 5.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) ----- IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10		3.0 dB 3652.640 MHz, AV, Vertical	Complied

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 6.0 V (DC 3.0 V x 2)) 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.

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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 $k = 2$.

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

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	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 7.7	7.0 x 6.0	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room
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
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	-	8.0 x 4.6 x 2.8	2.4 x 2.4	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-

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

3.6 Test data, Test instruments, and Test set up

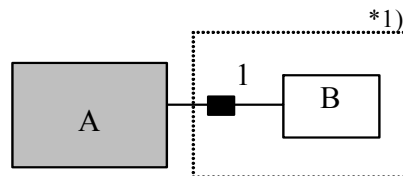
Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Tested Frequency
Transmitting mode (Tx mode)	913.16 MHz 917.00 MHz 920.84 MHz
<p>*Power of the EUT was set by the software as follows; Power settings: 19.5dBm Software: continuous emission test: NA_RMT(test) hopping emission test: NA_RMT(Hoptest) communication operation test: NARMTR303</p> <p>*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.</p>	

4.2 Configuration and peripherals



*1) The items in the square were used just for testing.
(Those aren't installed in the end product.)

■: Ferrite Core
(2turn /attached 0.01m from EUT / TR-9-5-8-F NITTO SUPPLY)

* Test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Handy Controller	WT42A	No.812	TOKAI RIKA CO., LTD	EUT
B	Battery Pack	-	-	-	

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.1	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

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.

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

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

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

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

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

Test Antennas are used as below;

Frequency	Below 30 MHz	30 MHz to 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

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

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

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

*1) Although DA 00-705 accepts VBW = 10 Hz 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 : 30 MHz - 10 GHz
Test data : APPENDIX
Test result : Pass

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SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

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

*1) 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.

*3) Reference data

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

20dB Bandwidth and Carrier Frequency Separation

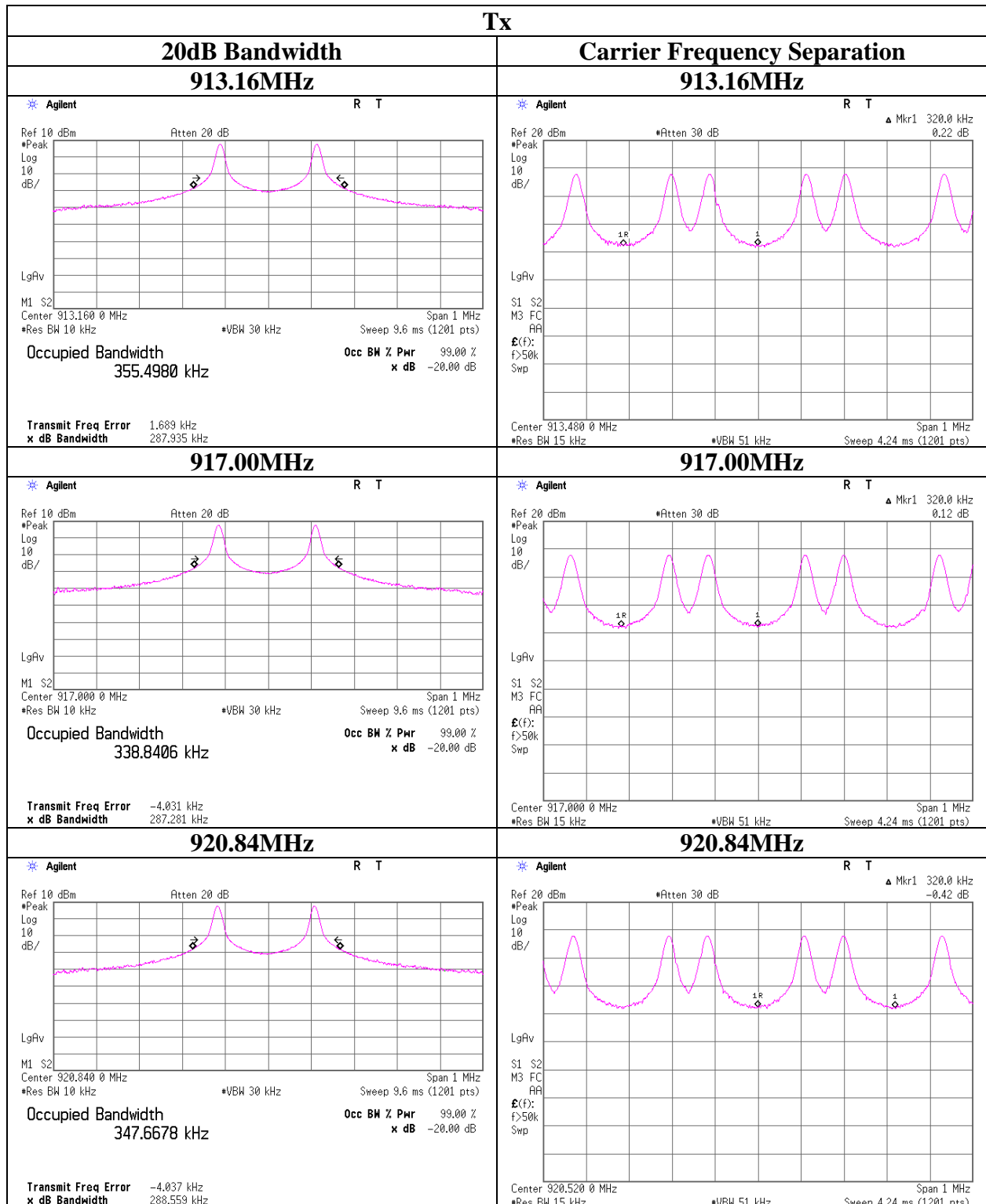
Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10818685H
Date 06/19/2015
Temperature/ Humidity 22deg. C / 58% RH
Engineer Takafumi Noguchi
Mode Tx (Hopping off/on)

Freq. [MHz]	20dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]
913.16	0.288	≤ 0.5
917.00	0.287	≤ 0.5
920.84	0.289	≤ 0.5

Freq. [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
913.16	0.320	≥ 0.288
917.00	0.320	≥ 0.287
920.84	0.320	≥ 0.289

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

20dB Bandwidth and Carrier Frequency Separation



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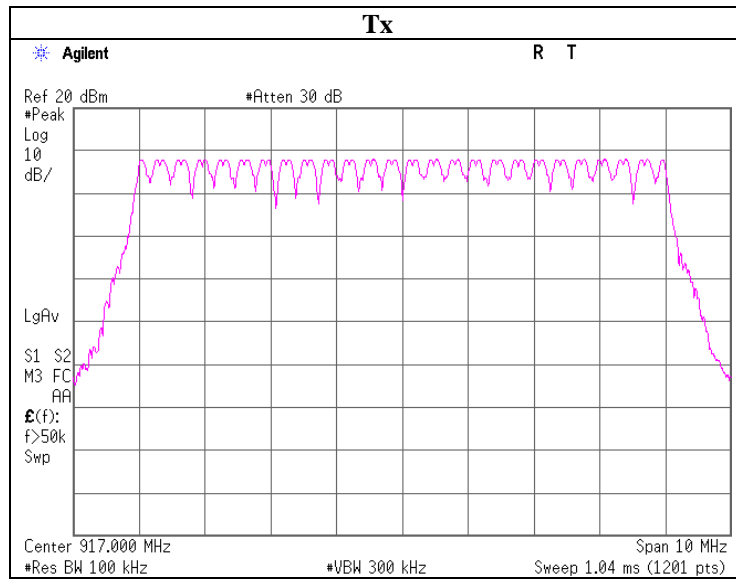
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Number of Hopping Frequency

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping on)

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

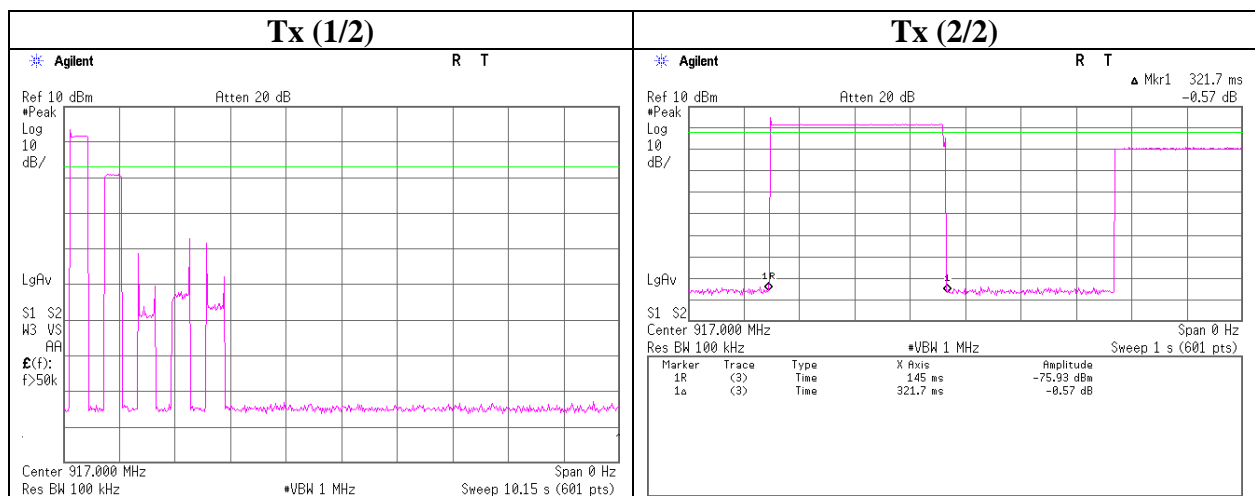


Dwell time

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping on)

Mode	Number of transmission in 10sec [times]	Length of transmission time [msec]	Result [msec]	Limit [msec]
Tx	1	321.7	321.7	400

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



Maximum Peak Output Power

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10818685H
Date 06/19/2015
Temperature/ Humidity 22deg. C / 58% 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]	
913.16	7.46	0.55	9.90	17.91	61.80	23.97	250	6.06
917.00	7.48	0.55	9.90	17.93	62.09	23.97	250	6.04
920.84	7.49	0.55	9.90	17.94	62.23	23.97	250	6.03

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

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Average Output Power
(Reference data for SAR testing)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)

[AV]

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Duty 10log [dB]	Result	
					[dBm]	[mW]
913.16	7.44	0.55	9.90	-5.16	12.73	18.75
917.00	7.46	0.55	9.90	-5.16	12.75	18.84
920.84	7.46	0.55	9.90	-5.16	12.75	18.84

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Total On time = 318*9 = 2862 mS

One sequence time = On time *9 + Hopping interval*8 + Device Operation time *1) + User Operation time *1)
= 318*9 + 310*8 + 3334 + 731
= 9407 mS

*1):Refer to Theory of Operation-Hopping Sequence

Duty Factor = 10log(Total On time / One sequence time)
= 10log(2862 / 9407) = -5.16

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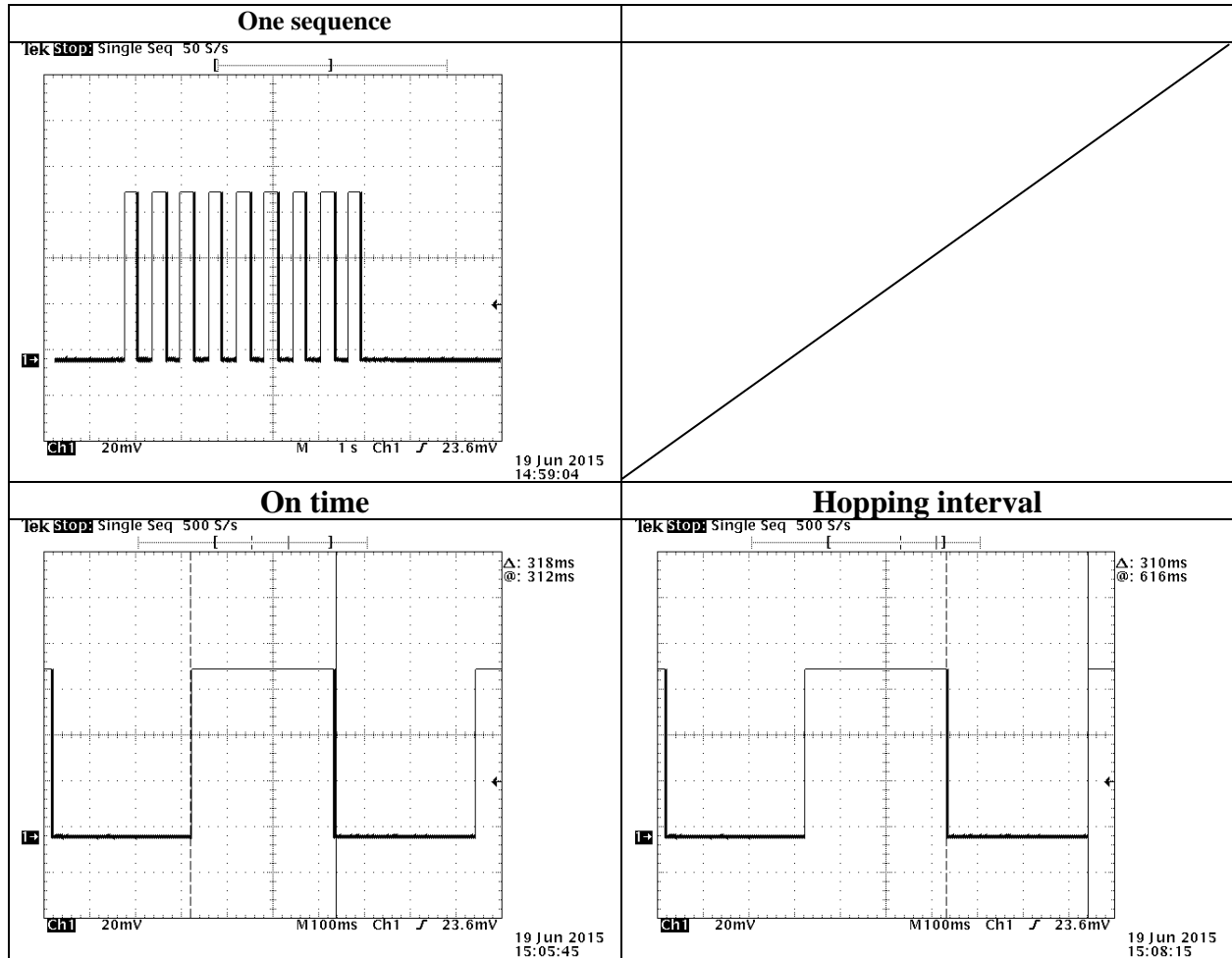
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Hopping time



Test equipment: MDT-03 MDO-04

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Radiated Spurious Emission

Test place	Ise EMC Lab. No4 Semi Anechoic Chamber
Report No.	10818685H
Date	06/08/2015 06/08/2015
Temperature/ Humidity	22deg. C / 60% RH 23deg. C / 63% RH
Engineer	Masatoshi Nishiguchi Satofumi Matsuyama
	(Below 1GHz) (Above 1GHz)
Mode	Tx, 913.16 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	35.952	QP	22.4	15.6	7.2	32.1	13.1	40.0	26.9	
Hori	50.561	QP	22.5	10.4	7.5	32.0	8.4	40.0	31.6	
Hori	119.279	QP	21.9	12.6	8.4	32.0	10.9	43.5	32.6	
Hori	165.270	QP	21.8	15.7	8.8	31.9	14.4	43.5	29.1	
Hori	744.693	QP	21.7	22.7	12.5	31.9	25.0	46.0	21.0	
Hori	991.592	QP	20.8	26.7	13.7	30.8	30.4	53.9	23.5	
Hori	2739.480	PK	49.7	28.0	3.4	32.2	48.9	73.9	25.0	
Hori	3652.640	PK	53.5	29.5	3.8	31.9	54.9	73.9	19.0	
Hori	4565.800	PK	44.9	30.7	4.3	31.7	48.2	73.9	25.7	
Hori	7305.280	PK	44.7	37.0	5.3	32.8	54.2	73.9	19.7	
Hori	8218.440	PK	41.9	37.5	5.5	33.2	51.7	73.9	22.2	
Hori	9131.600	PK	41.8	38.1	6.0	33.0	52.9	73.9	21.0	
Hori	2739.480	AV	43.2	28.0	3.4	32.2	42.4	53.9	11.5	
Hori	3652.640	AV	46.3	29.5	3.8	31.9	47.7	53.9	6.2	
Hori	4565.800	AV	34.1	30.7	4.3	31.7	37.4	53.9	16.5	
Hori	7305.280	AV	34.4	37.0	5.3	32.8	43.9	53.9	10.0	
Hori	8218.440	AV	31.0	37.5	5.5	33.2	40.8	53.9	13.1	
Hori	9131.600	AV	30.9	38.1	6.0	33.0	42.0	53.9	11.9	
Vert	35.952	QP	22.0	15.6	7.2	32.1	12.7	40.0	27.3	
Vert	50.561	QP	21.8	10.4	7.5	32.0	7.7	40.0	32.3	
Vert	119.279	QP	21.8	12.6	8.4	32.0	10.8	43.5	32.7	
Vert	165.270	QP	21.8	15.7	8.8	31.9	14.4	43.5	29.1	
Vert	744.693	QP	21.7	22.7	12.5	31.9	25.0	46.0	21.0	
Vert	991.592	QP	20.9	26.7	13.7	30.8	30.5	53.9	23.4	
Vert	2739.480	PK	47.6	28.0	3.4	32.2	46.8	73.9	27.1	
Vert	3652.640	PK	55.8	29.5	3.8	31.9	57.2	73.9	16.7	
Vert	4565.800	PK	47.2	30.7	4.3	31.7	50.5	73.9	23.4	
Vert	7305.280	PK	45.4	37.0	5.3	32.8	54.9	73.9	19.0	
Vert	8218.440	PK	41.0	37.5	5.5	33.2	50.8	73.9	23.1	
Vert	9131.600	PK	41.8	38.1	6.0	33.0	52.9	73.9	21.0	
Vert	2739.480	AV	40.9	28.0	3.4	32.2	40.1	53.9	13.8	
Vert	3652.640	AV	49.5	29.5	3.8	31.9	50.9	53.9	3.0	
Vert	4565.800	AV	38.4	30.7	4.3	31.7	41.7	53.9	12.2	
Vert	7305.280	AV	35.7	37.0	5.3	32.8	45.2	53.9	8.7	
Vert	8218.440	AV	30.8	37.5	5.5	33.2	40.6	53.9	13.3	
Vert	9131.600	AV	30.8	38.1	6.0	33.0	41.9	53.9	12.0	

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).

Radiated Spurious Emission

Test place Ise EMC Lab.No. 4 Semi Anechoic Chamber
Report No. 10818685H
Date 06/08/2015 06/08/2015
Temperature/ Humidity 22deg. C / 60% RH 23deg. C / 63% RH
Engineer Masatoshi Nishiguchi Satofumi Matsuyama
(Below 1GHz) (Above 1GHz)
Mode Tx, 913.16 MHz

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	913.160	PK	101.6	24.8	13.4	27.2	112.6	-	-	Carrier
Hori	902.000	PK	33.8	24.5	13.3	31.1	40.5	92.6	52.1	
Hori	1826.320	PK	69.4	26.3	3.2	32.8	66.1	92.6	26.5	
Hori	5478.960	PK	50.4	32.4	4.7	31.7	55.8	92.6	36.8	
Hori	6392.120	PK	43.2	34.8	5.0	32.1	50.9	92.6	41.7	
Vert	913.160	PK	102.7	24.8	13.4	27.2	113.7	-	-	Carrier
Vert	902.000	PK	33.9	24.5	13.3	31.1	40.6	93.7	53.1	
Vert	1826.320	PK	61.6	26.3	3.2	32.8	58.3	93.7	35.4	
Vert	5478.960	PK	53.5	32.4	4.7	31.7	58.9	93.7	34.8	
Vert	6392.120	PK	39.5	34.8	5.0	32.1	47.2	93.7	46.5	

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

Radiated Spurious Emission

Test place Ise EMC Lab.No. 4 Semi Anechoic Chamber
Report No. 10818685H
Date 06/08/2015 06/08/2015
Temperature/ Humidity 22deg. C / 60% RH 23deg. C / 63% RH
Engineer Masatoshi Nishiguchi Satofumi Matsuyama
 (Below 1GHz) (Above 1GHz)
Mode Tx, 917.00 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	32.705	QP	22.0	16.5	7.1	32.1	13.5	40.0	26.5	
Hori	54.890	QP	22.0	9.0	7.5	32.0	6.5	40.0	33.5	
Hori	122.525	QP	21.7	12.9	8.4	32.0	11.0	43.5	32.5	
Hori	165.270	QP	21.6	15.7	8.8	31.9	14.2	43.5	29.3	
Hori	744.693	QP	21.5	22.7	12.5	31.9	24.8	46.0	21.2	
Hori	977.563	QP	20.8	26.3	13.7	30.8	30.0	53.9	23.9	
Hori	2751.000	PK	50.0	28.0	3.4	32.2	49.2	73.9	24.7	
Hori	3668.000	PK	53.3	29.5	3.9	31.9	54.8	73.9	19.1	
Hori	4585.000	PK	45.2	30.7	4.3	31.7	48.5	73.9	25.4	
Hori	7336.000	PK	44.9	37.0	5.3	32.8	54.4	73.9	19.5	
Hori	8253.000	PK	42.3	37.5	5.5	33.2	52.1	73.9	21.8	
Hori	9170.000	PK	42.2	38.2	6.0	33.0	53.4	73.9	20.5	
Hori	2751.000	AV	43.7	28.0	3.4	32.2	42.9	53.9	11.0	
Hori	3668.000	AV	46.5	29.5	3.9	31.9	48.0	53.9	5.9	
Hori	4585.000	AV	35.9	30.7	4.3	31.7	39.2	53.9	14.7	
Hori	7336.000	AV	32.9	37.0	5.3	32.8	42.4	53.9	11.5	
Hori	8253.000	AV	30.7	37.5	5.5	33.2	40.5	53.9	13.4	
Hori	9170.000	AV	31.0	38.2	6.0	33.0	42.2	53.9	11.7	
Vert	32.705	QP	22.1	16.5	7.1	32.1	13.6	40.0	26.4	
Vert	54.890	QP	22.0	9.0	7.5	32.0	6.5	40.0	33.5	
Vert	122.525	QP	21.7	12.9	8.4	32.0	11.0	43.5	32.5	
Vert	165.270	QP	21.6	15.7	8.8	31.9	14.2	43.5	29.3	
Vert	744.693	QP	21.4	22.7	12.5	31.9	24.7	46.0	21.3	
Vert	977.563	QP	20.8	26.3	13.7	30.8	30.0	53.9	23.9	
Vert	2751.000	PK	48.1	28.0	3.4	32.2	47.3	73.9	26.6	
Vert	3668.000	PK	55.5	29.5	3.9	31.9	57.0	73.9	16.9	
Vert	4585.000	PK	48.4	30.7	4.3	31.7	51.7	73.9	22.2	
Vert	7336.000	PK	44.8	37.0	5.3	32.8	54.3	73.9	19.6	
Vert	8253.000	PK	41.3	37.5	5.5	33.2	51.1	73.9	22.8	
Vert	9170.000	PK	41.1	38.2	6.0	33.0	52.3	73.9	21.6	
Vert	2751.000	AV	41.1	28.0	3.4	32.2	40.3	53.9	13.6	
Vert	3668.000	AV	49.3	29.5	3.9	31.9	50.8	53.9	3.1	
Vert	4585.000	AV	39.7	30.7	4.3	31.7	43.0	53.9	10.9	
Vert	7336.000	AV	35.0	37.0	5.3	32.8	44.5	53.9	9.4	
Vert	8253.000	AV	30.7	37.5	5.5	33.2	40.5	53.9	13.4	
Vert	9170.000	AV	31.0	38.2	6.0	33.0	42.2	53.9	11.7	

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).

Radiated Spurious Emission

Test place Ise EMC Lab.No. 4 Semi Anechoic Chamber
Report No. 10818685H
Date 06/08/2015 06/08/2015
Temperature/ Humidity 22deg. C / 60% RH 23deg. C / 63% RH
Engineer Masatoshi Nishiguchi Satofumi Matsuyama
(Below 1GHz) (Above 1GHz)
Mode Tx, 917.00 MHz

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	917.000	PK	101.9	24.9	13.4	27.2	113.0	-	-	Carrier
Hori	928.000	PK	39.1	22.8	13.4	30.9	44.4	93.0	48.6	
Hori	1834.000	PK	56.4	26.4	3.2	32.8	53.2	93.0	39.8	
Hori	5502.000	PK	50.2	32.4	4.7	31.7	55.6	93.0	37.4	
Hori	6419.000	PK	41.8	34.9	5.0	32.1	49.6	93.0	43.4	
Vert	917.000	PK	102.0	24.9	13.4	27.2	113.1	-	-	Carrier
Vert	928.000	PK	37.7	22.8	13.4	30.9	43.0	93.1	50.1	
Vert	1834.000	PK	62.2	26.4	3.2	32.8	59.0	93.1	34.1	
Vert	5502.000	PK	53.6	32.4	4.7	31.7	59.0	93.1	34.1	
Vert	6419.000	PK	39.2	34.9	5.0	32.1	47.0	93.1	46.1	

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

Radiated Spurious Emission

Test place Ise EMC Lab.No. 4 Semi Anechoic Chamber
Report No. 10818685H
Date 06/08/2015 06/08/2015
Temperature/ Humidity 22deg. C / 60% RH 23deg. C / 63% RH
Engineer Masatoshi Nishiguchi Satofumi Matsuyama
(Below 1GHz) (Above 1GHz)
Mode Tx, 920.84 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	32.705	QP	21.9	16.5	7.1	32.1	13.4	40.0	26.6	
Hori	54.890	QP	22.1	9.0	7.5	32.0	6.6	40.0	33.4	
Hori	119.279	QP	21.9	12.6	8.4	32.0	10.9	43.5	32.6	
Hori	165.270	QP	22.0	15.7	8.8	31.9	14.6	43.5	28.9	
Hori	744.693	QP	21.8	22.7	12.5	31.9	25.1	46.0	20.9	
Hori	991.592	QP	21.7	26.7	13.7	30.8	31.3	53.9	22.6	
Hori	2762.520	PK	52.5	28.0	3.4	32.2	51.7	73.9	22.2	
Hori	3683.360	PK	53.8	29.5	3.9	31.9	55.3	73.9	18.6	
Hori	4604.200	PK	45.3	30.8	4.3	31.7	48.7	73.9	25.2	
Hori	7366.720	PK	44.5	37.1	5.3	32.9	54.0	73.9	19.9	
Hori	8287.560	PK	40.3	37.5	5.5	33.2	50.1	73.9	23.8	
Hori	9208.400	PK	41.4	38.3	6.0	33.0	52.7	73.9	21.2	Floor noise
Hori	2762.520	AV	47.5	28.0	3.4	32.2	46.7	53.9	7.2	
Hori	3683.360	AV	47.3	29.5	3.9	31.9	48.8	53.9	5.1	
Hori	4604.200	AV	35.8	30.8	4.3	31.7	39.2	53.9	14.7	
Hori	7366.720	AV	34.4	37.1	5.3	32.9	43.9	53.9	10.0	
Hori	8287.560	AV	30.3	37.5	5.5	33.2	40.1	53.9	13.8	
Hori	9208.400	AV	31.1	38.3	6.0	33.0	42.4	53.9	11.5	Floor noise
Vert	32.705	QP	22.0	16.5	7.1	32.1	13.5	40.0	26.5	
Vert	54.890	QP	22.0	9.0	7.5	32.0	6.5	40.0	33.5	
Vert	119.279	QP	21.8	12.6	8.4	32.0	10.8	43.5	32.7	
Vert	165.270	QP	22.2	15.7	8.8	31.9	14.8	43.5	28.7	
Vert	744.693	QP	21.8	22.7	12.5	31.9	25.1	46.0	20.9	
Vert	991.592	QP	22.0	26.7	13.7	30.8	31.6	53.9	22.3	
Vert	2762.520	PK	47.7	28.0	3.4	32.2	46.9	73.9	27.0	
Vert	3683.360	PK	55.2	29.5	3.9	31.9	56.7	73.9	17.2	
Vert	4604.200	PK	46.9	30.8	4.3	31.7	50.3	73.9	23.6	
Vert	7366.720	PK	45.4	37.1	5.3	32.9	54.9	73.9	19.0	
Vert	8287.560	PK	41.0	37.5	5.5	33.2	50.8	73.9	23.1	
Vert	9208.400	PK	41.1	38.3	6.0	33.0	52.4	73.9	21.5	Floor noise
Vert	2762.520	AV	40.4	28.0	3.4	32.2	39.6	53.9	14.3	
Vert	3683.360	AV	48.9	29.5	3.9	31.9	50.4	53.9	3.5	
Vert	4604.200	AV	37.4	30.8	4.3	31.7	40.8	53.9	13.1	
Vert	7366.720	AV	34.8	37.1	5.3	32.9	44.3	53.9	9.6	
Vert	8287.560	AV	30.3	37.5	5.5	33.2	40.1	53.9	13.8	
Vert	9208.400	AV	31.1	38.3	6.0	33.0	42.4	53.9	11.5	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.

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Telephone : +81 596 24 8999

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Radiated Spurious Emission

Test place Ise EMC Lab.No. 4 Semi Anechoic Chamber
Report No. 10818685H
Date 06/08/2015 06/08/2015
Temperature/ Humidity 22deg. C / 60% RH 23deg. C / 63% RH
Engineer Masatoshi Nishiguchi Satofumi Matsuyama
(Below 1GHz) (Above 1GHz)
Mode Tx, 920.84 MHz

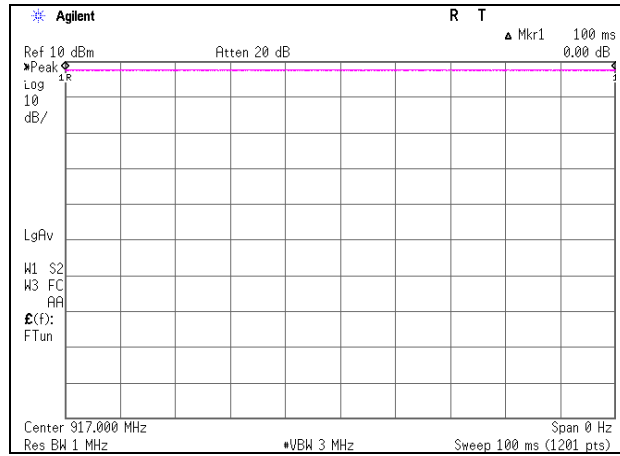
20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	920.840	PK	103.6	25.0	13.4	27.2	114.8	-	-	Carrier
Hori	928.000	PK	42.3	25.2	13.4	31.0	49.9	94.8	44.9	
Hori	1841.680	PK	60.6	26.4	3.2	32.8	57.4	94.8	37.4	
Hori	5525.040	PK	49.6	32.5	4.7	31.7	55.1	94.8	39.7	
Hori	6445.880	PK	42.8	35.0	5.0	32.2	50.6	94.8	44.2	
Vert	920.840	PK	102.7	25.0	13.4	27.2	113.9	-	-	Carrier
Vert	928.000	PK	43.3	25.2	13.4	31.0	50.9	93.9	43.0	
Vert	1841.680	PK	54.9	26.4	3.2	32.8	51.7	93.9	42.2	
Vert	5525.040	PK	52.7	32.5	4.7	31.7	58.2	93.9	35.7	
Vert	6445.880	PK	38.1	35.0	5.0	32.2	45.9	93.9	48.0	

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

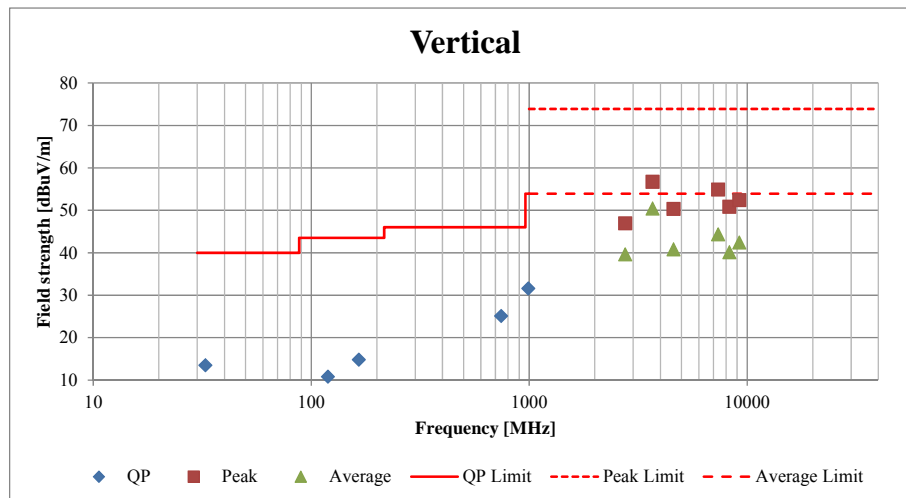
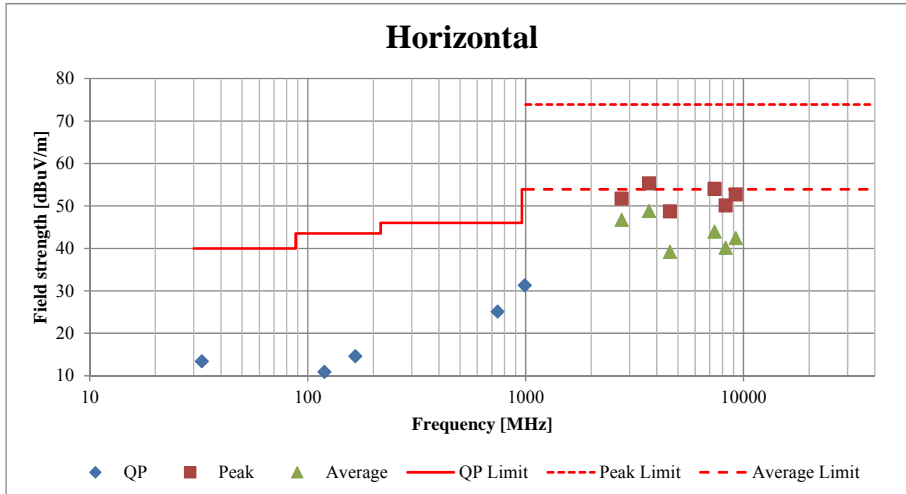
VBW (AV) Calculation

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 10818685H
Date 06/19/2015
Temperature/ Humidity 22deg. C / 58% RH
Engineer Takafumi Noguchi
Mode Tx, 917.00 MHz



Radiated Spurious Emission
(Plot data, Worst case)

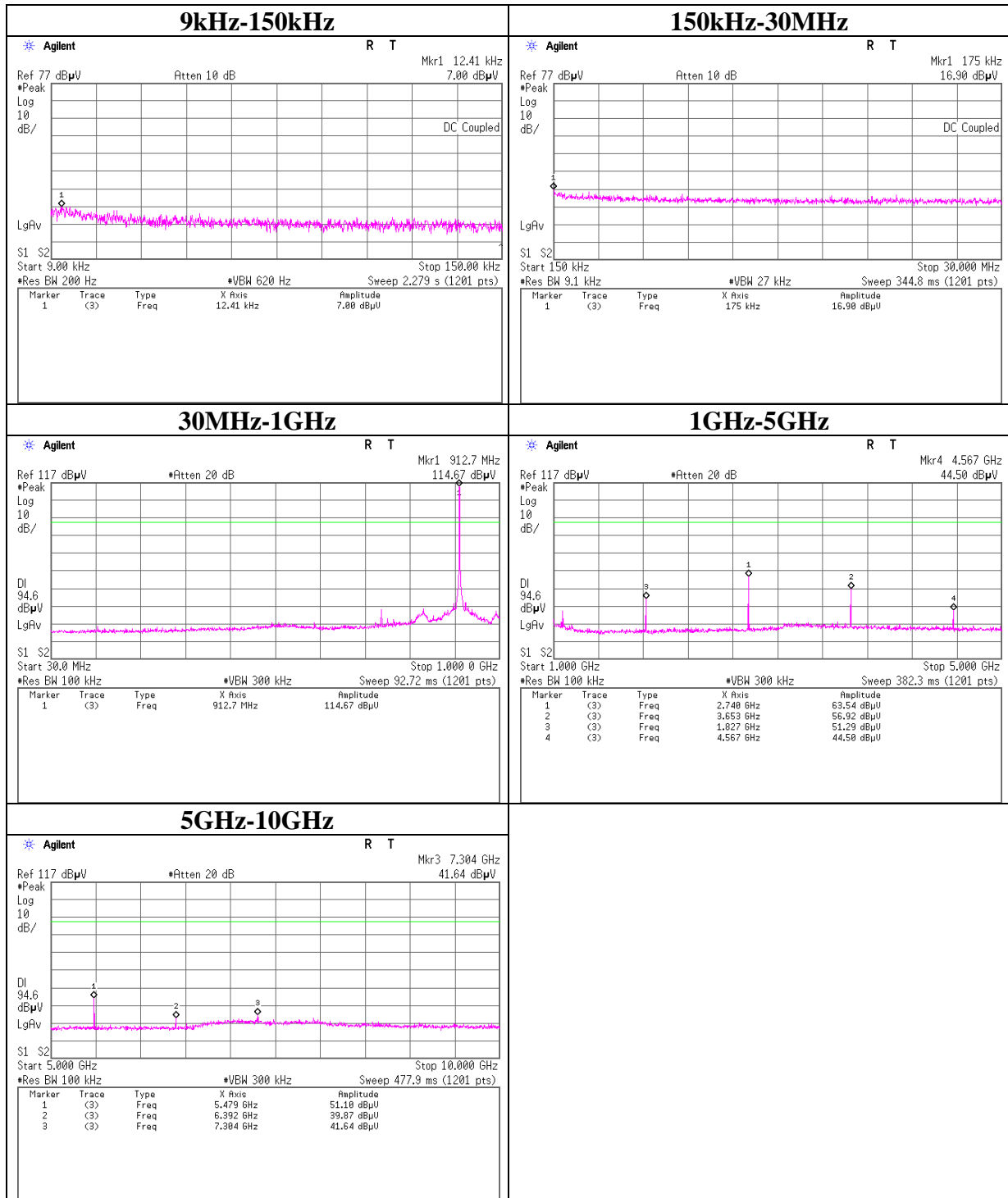
Test place	Ise EMC Lab.No. 4 Semi Anechoic Chamber	
Report No.	10818685H	
Date	06/08/2015	06/08/2015
Temperature/ Humidity	22deg. C / 60% RH	23deg. C / 63% RH
Engineer	Masatoshi Nishiguchi	Satofumi Matsuyama
	(Below 1GHz)	(Above 1GHz)
Mode	Tx, 920.84 MHz	



Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)

Tx 913.16MHz



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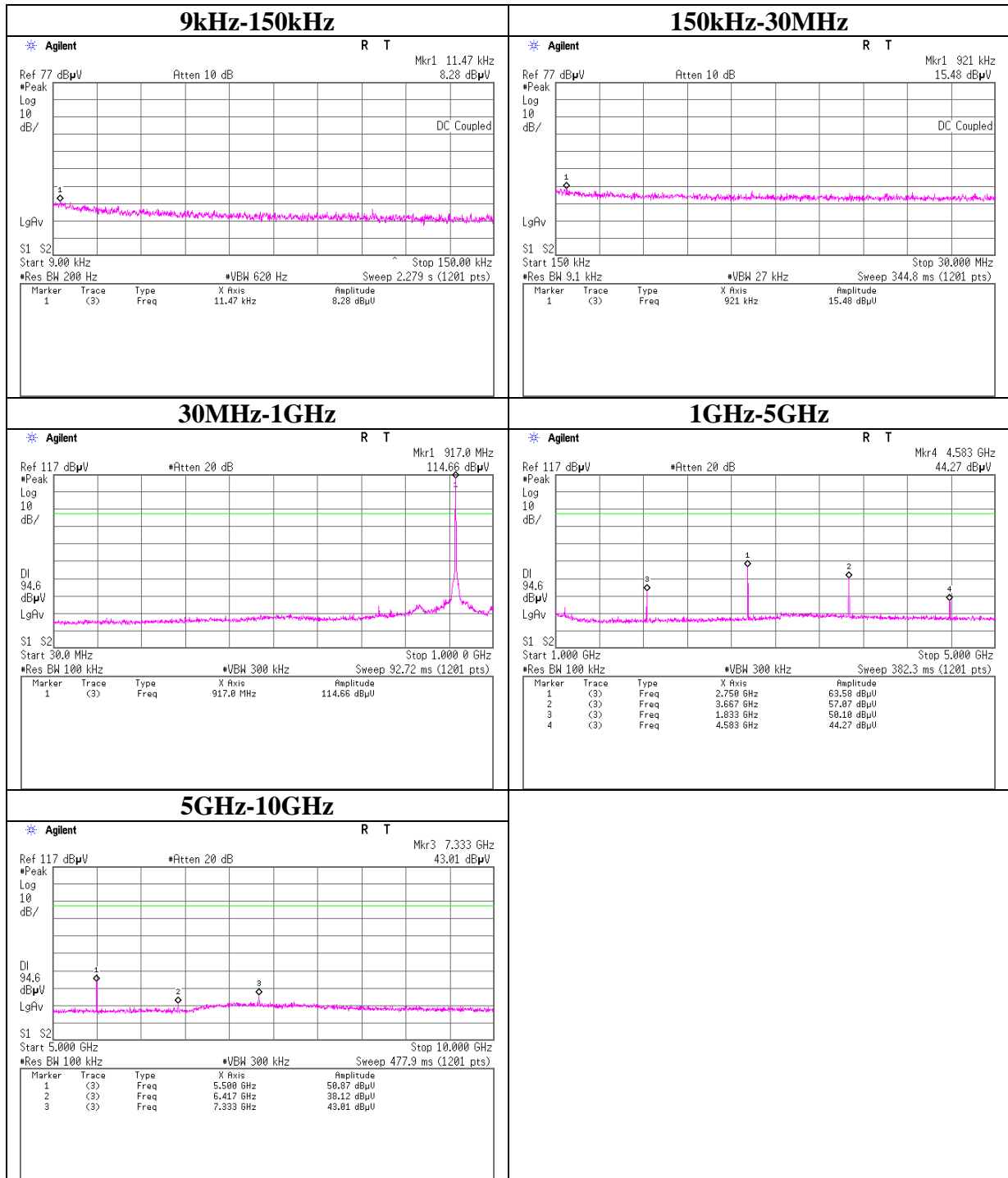
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)

Tx 917.00MHz



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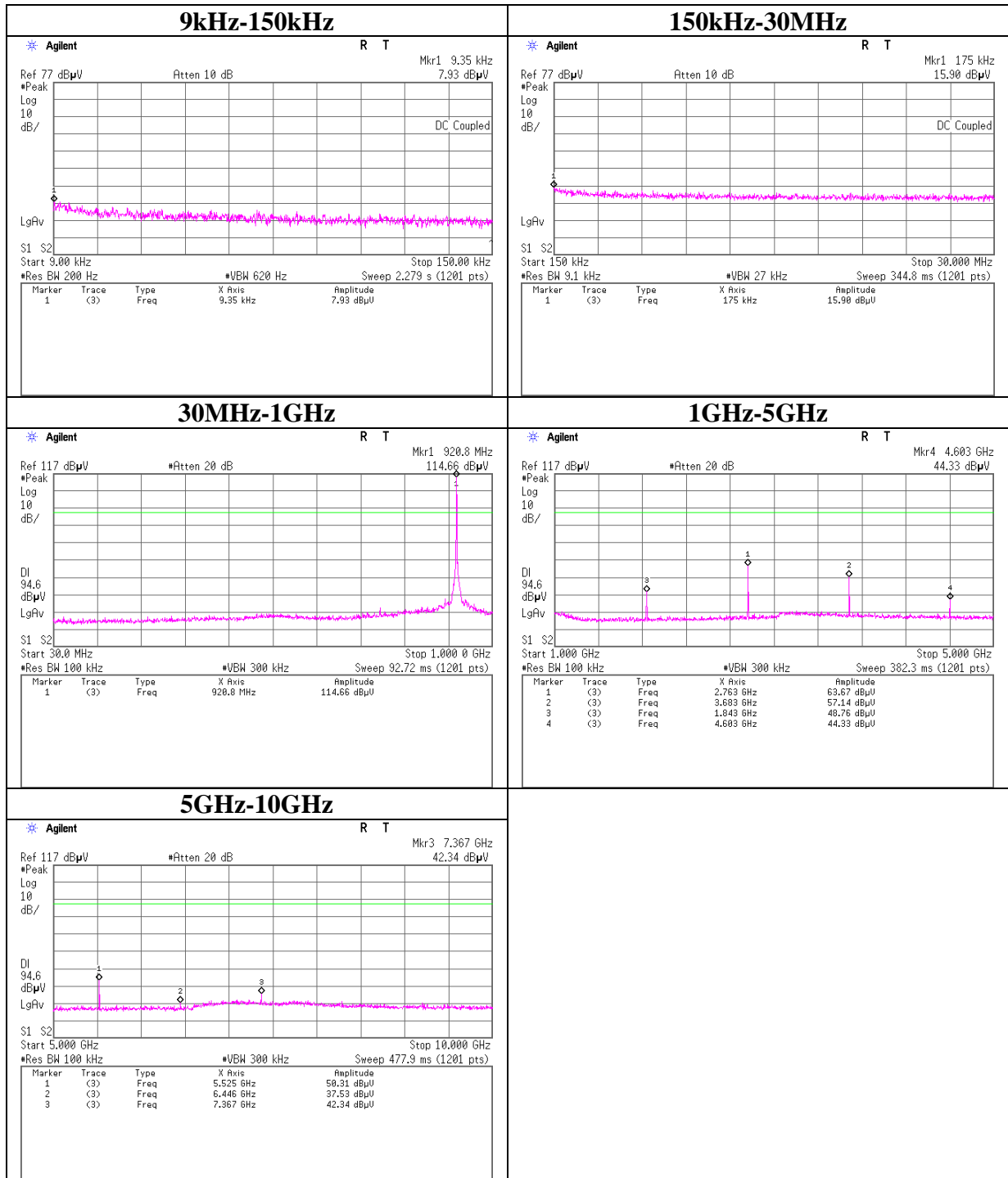
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)

Tx 920.84MHz



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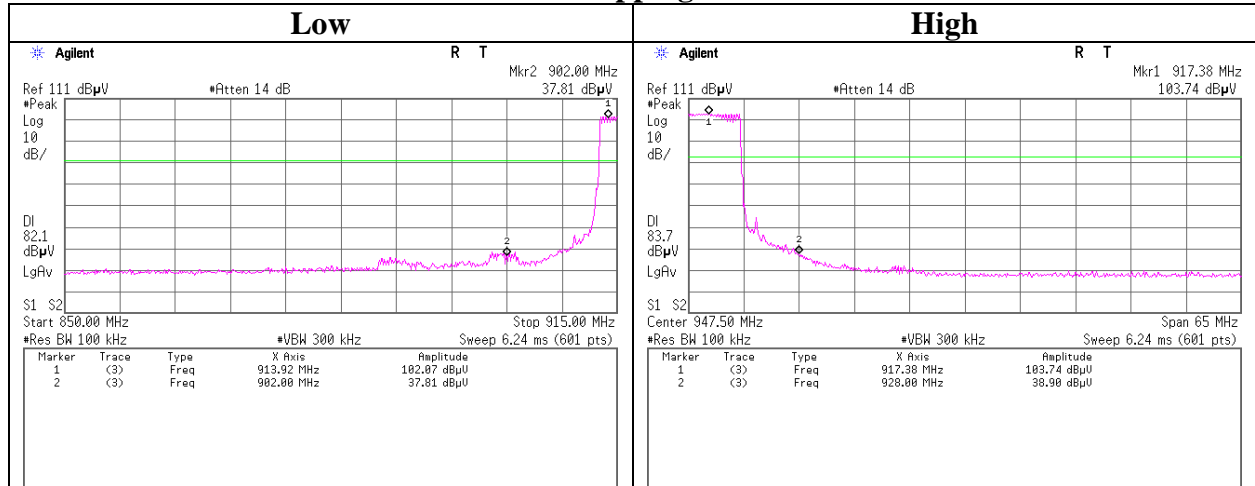
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

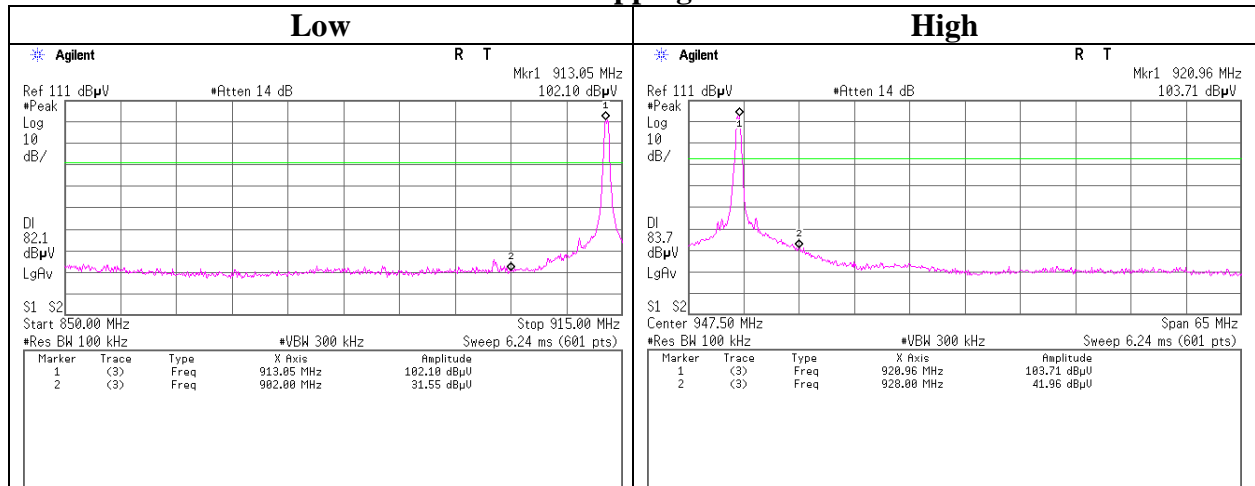
Radiated Emission Band Edge compliance

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/24/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping on/off)

Tx Hopping on



Tx Hopping off



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Ise EMC Lab.

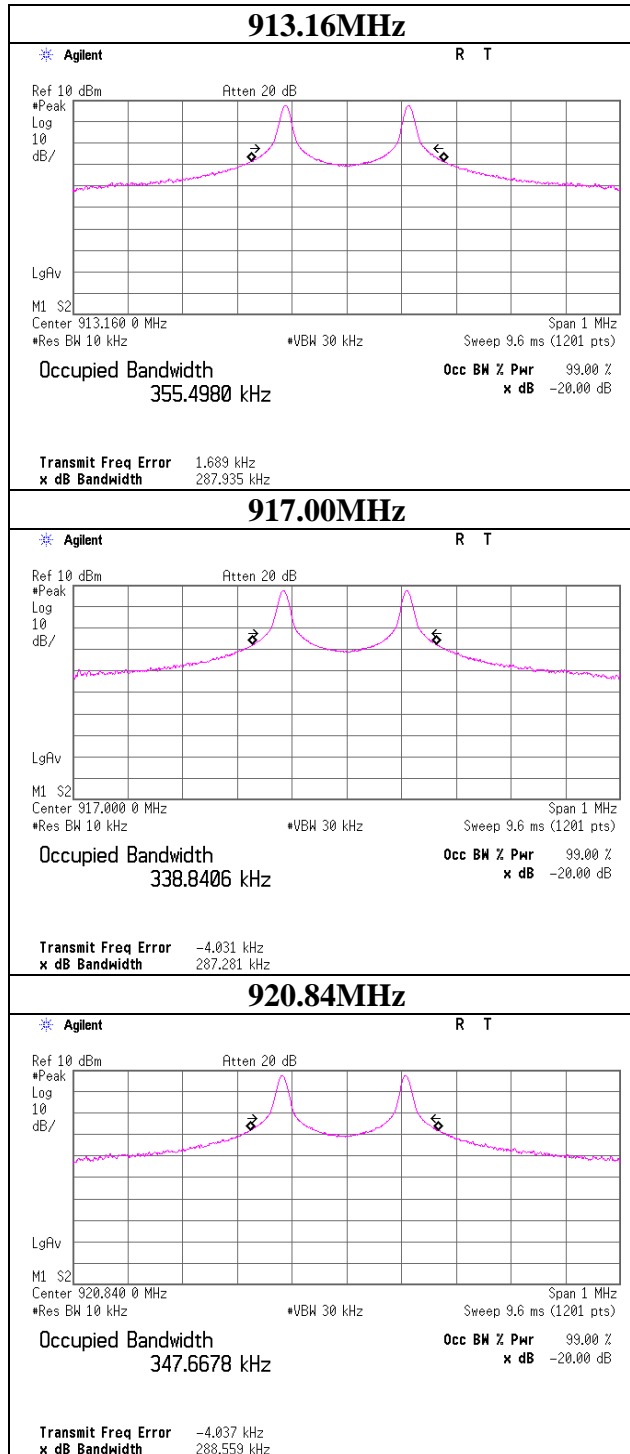
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10818685H
Date	06/19/2015
Temperature/ Humidity	22deg. C / 58% RH
Engineer	Takafumi Noguchi
Mode	Tx (Hopping off)



UL Japan, Inc.

Ise EMC Lab.

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APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/26 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/AT	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2014/06/02 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/AT	2015/05/18 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2015/03/12 * 12
MHF-27	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	RE	2015/01/23 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2014/10/06 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2014/10/06 * 12
MCC-45	Microwave Cable	Murata	MXGS83RK3000	-	AT	2014/07/31 * 12
MAT-17	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	AT	2015/01/19 * 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.

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