



RADIO TEST REPORT

Test Report No. : 10334913S

Applicant : Sony Engineering Corporation
Type of Equipment : RF Transmitter
Model No. : FFS-T1
FCC ID : 2AADJFFS-T
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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Date of test: May 23 to 29, 2014

Representative test engineer:

Kenichi Adachi
Engineer
Consumer Technology Division

Approved by:

Toyokazu Imamura
Leader
Consumer Technology Division



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☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10334913S

[illegible]

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SECTION 1: Customer information

Company Name : Sony Engineering Corporation
Address : 3-3-1 Tsujido-Shinmachi Fujisawa-shi, Kanagawa, 251-0042 Japan
Telephone Number : +81-466-38-3428
Facsimile Number : +81-466-38-3771
Contact Person : Masayuki Okada

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

2.1 Identification of E.U.T.

Type of Equipment : RF Transmitter
Model No. : FFS-T1
Serial No. : Refer to 4.2 of this report.
Rating : DC5V
Receipt Date of Sample : May 16 and 23, 2014
Country of Mass-production : Japan
Condition of EUT : Engineering 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: FFS-T1 (referred to as the EUT in this report) is an RF Transmitter.

Clock frequency(ies) in the system : 30MHz (RFIC), 25MHz (MCU), 32.768kHz (MCU)

Radio specification:

Equipment type : Transmitter
Frequency of operation : 922.4-926.4MHz
Type of modulation : GFSK
Antenna type : Whip
Antenna connector type : SMA plug (Reverse polarity)
Antenna gain : 2 dBi
Operation temperature range : +5 to +35 deg.C.
ITU code : F1D

FCC 15.31 (e)

The stable voltage of DC3.3V is provided constantly to RF transmitter regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203

The EUT has a unique coupling/antenna connector. Therefore, the equipment complies with the antenna requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014, final revised on May 1, 2014 and effective June 2, 2014
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.249 Operation within the bands 902-928MHz, 2400-2483.5MHz, 5725-5875MHz, and 24.0-24.25GHz

* The revision on May 1, 2014 does not affect the test specification applied to the EUT.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	12.6dB Freq.: 0.19550MHz Detector: Quasi-Peak Phase: L1 Mode: Tx 922.4MHz	Complied
20dB bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.215	Conducted	N/A	-	Complied
Electric field strength of fundamental emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.249 (a)(e), 15.209	Radiated	N/A	2.9dB Freq.: 926.363MHz Detector: Quasi-Peak Polarization: Horizontal & Vertical	Complied
Electric field strength of spurious emission	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.205 (a)(b), 15.209, 15.249 (a)(d)(e)	Radiated	N/A	4.9dB Freq.: 50.002MHz Detector: Quasi-Peak Polarization: Vertical Mode: Tx 922.4MHz	Complied
Frequency tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.249 (b)	-	N/A *1)	N/A	N/A

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

*1) The test is not applicable since this EUT does not operate in the 24.05-24.25GHz band.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	-	Conducted	-	Complied

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

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

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3.4 Uncertainty

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

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-18GHz	4.9 dB	4.9 dB	4.9 dB
	18GHz-26.5GHz	5.1 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

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

Antenna port conducted test

Bandwidth measurement uncertainty for this test was: (±) 5.4%

3.5 Test location

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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input checked="" type="checkbox"/> No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input type="checkbox"/> No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

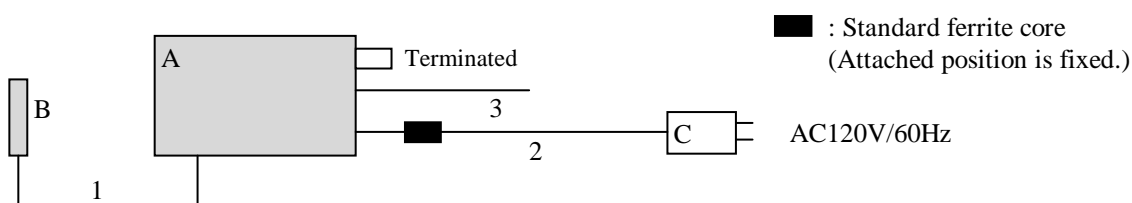
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
All items	Transmitting	922.4MHz, 924.4MHz, 926.4MHz

Software: NODE1_v0058

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RF transmitter	FFS-T1	No.0021	Sony Engineering	EUT
B	Antenna	MEGHX-467XSAXX-920	-	MAP ELECTRONICS	EUT
C	AC Adaptor	SU10-102	08459031 1329	Sinpro Electronics	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Coaxial	3.0	Shielded	Shielded	-
2	DC	0.8	Unshielded	Unshielded	-
3	Canon	3.0	Shielded	Shielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of peripheral was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment. Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT within a Shielded room. The EUT was connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection has been performed. The measurements had been performed with a quasi-peak detector and if required, a CISPR average detector. The conducted emission measurements were made with the following detection of the test receiver.

Detection Type : Quasi-Peak/ CISPR Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

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SECTION 6: Radiated emission

6.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

6.2 Test configuration

For 9kHz to 30MHz and 30 to 1000MHz, EUT was placed on a platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

For 1-25GHz, EUT was placed on a polystyrene platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane.

The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop.

Photographs of the set up are shown in APPENDIX 3.

6.3 Test conditions

Frequency range : 9kHz to 10GHz
EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m.

<9kHz to 30MHz>

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0deg.to 360deg.) and horizontal polarization.

* FCC 15.31 (f)(2) (9kHz-30MHz)

9kHz – 490kHz [Limit at 3m]= [Limit at 300m]-40log (3[m]/300[m])

490kHz – 30MHz [Limit at 3m]= [Limit at 30m]-40log (3[m]/30[m])

<30MHz to 10GHz>

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection of the test receiver and spectrum analyzer.

	9kHz to 90kHz & 110kHz to 150kHz	90kHz to 110kHz	150kHz to 490kHz	490kHz to 30MHz	30MHz to 1GHz	1GHz to 10GHz	
Detector type	PK/AV	QP	PK/AV	QP	QP	PK	AV *1)
IF Bandwidth	200Hz	200Hz	10kHz	9kHz	120kHz	RBW: 1MHz /VBW: 3MHz	RBW:1MHz /VBW:10Hz

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

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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.

Combinations of the worst case

	Antenna polarization	Frequency	Carrier	Spurious		
				9kHz-30MHz	30-1000MHz	1-10GHz
Transmitter	Horizontal		Z	X	Z	Z
	Vertical		Z	X	Z	Y
Antenna	Horizontal		X	X	X	X
	Vertical		Y	X	Y	Y

Figure 1. Direction of the Loop Antenna

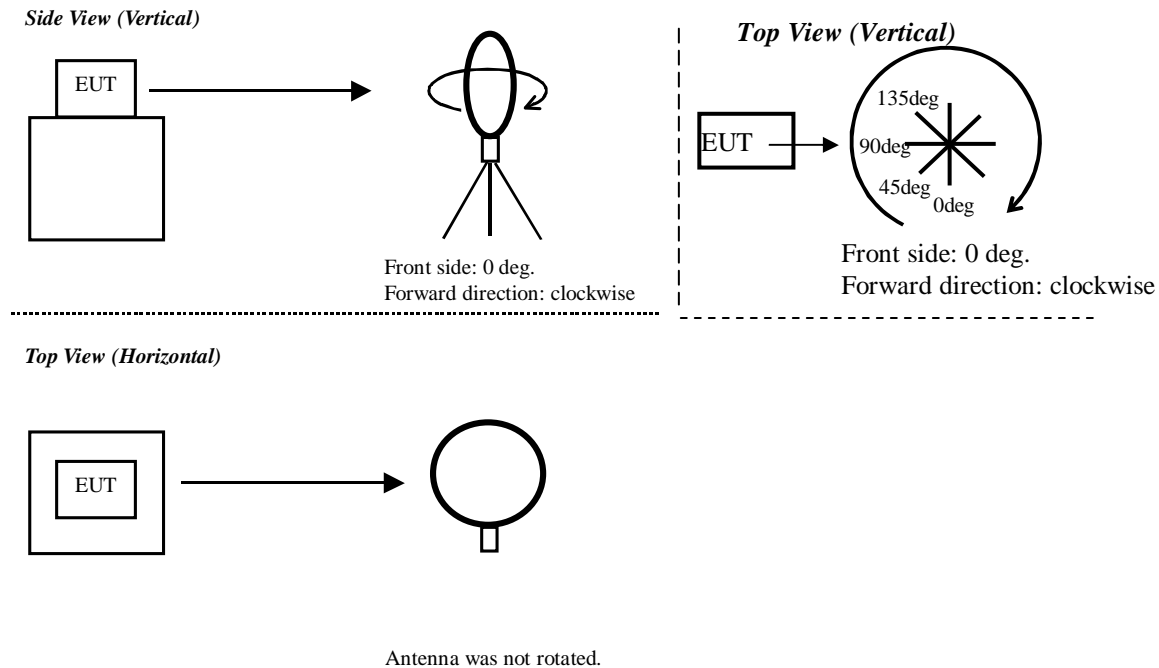
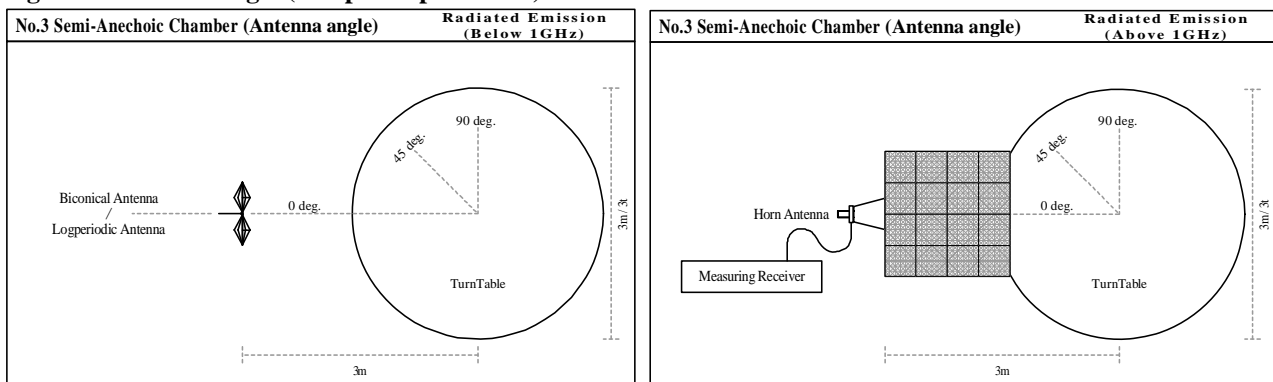


Figure 2. Antenna angle (except Loop antenna)



6.5 Results

Summary of the test results : Pass
* No noise was detected below 30MHz.

Refer to APPENDIX 1

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SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Results

Summary of the test results : Pass
Refer to APPENDIX 1

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Contents of APPENDIXES

APPENDIX 1: Test data

Conducted emission
20dB bandwidth
Radiated emission
99% Occupied bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of the worst position

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DATA OF CONDUCTED EMISSION TEST

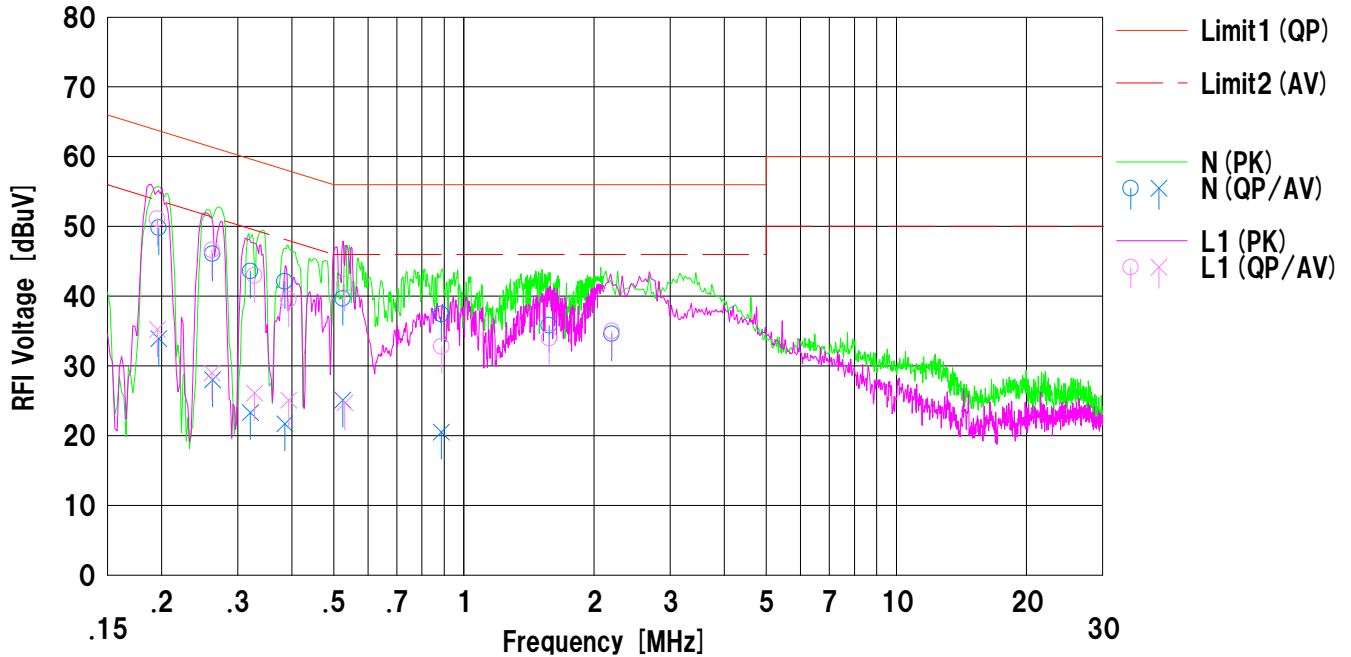
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2014/05/28

Company : Sony Engineering Corporation
 Kind of EUT : RF Transmitter
 Model No. : FFS-T1
 Serial No. : 0021
 Remarks : -

Mode : Transmitting 922.4MHz
 Order No. : 10334913S
 Power : AC 120V / 60Hz
 Temp./Humi. : 26deg.C / 44%RH

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

Engineer : Tatsuya Arai



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.19700	37.1	21.2	12.7	49.8	33.9	63.7	53.7	13.9	19.8	N	
2	0.26200	33.4	15.3	12.7	46.1	28.0	61.3	51.3	15.2	23.3	N	
3	0.32100	30.9	10.6	12.7	43.6	23.3	59.6	49.6	16.0	26.3	N	
4	0.38550	29.4	9.0	12.7	42.1	21.7	58.1	48.1	16.0	26.4	N	
5	0.52500	27.0	12.4	12.7	39.7	25.1	56.0	46.0	16.3	20.9	N	
6	0.88700	24.7	7.8	12.7	37.4	20.5	56.0	46.0	18.6	25.5	N	
7	1.57400	23.0	---	12.8	35.8	---	56.0	46.0	20.2	---	N	
8	2.19800	21.8	---	12.8	34.6	---	56.0	46.0	21.4	---	N	
9	0.19550	38.4	22.5	12.7	51.1	35.2	63.7	53.7	12.6	18.5	L1	
10	0.26150	33.9	16.3	12.7	46.6	29.0	61.3	51.3	14.7	22.3	L1	
11	0.32800	30.3	13.4	12.7	43.0	26.1	59.5	49.5	16.5	23.4	L1	
12	0.39350	26.8	12.4	12.7	39.5	25.1	57.9	47.9	18.4	22.8	L1	
13	0.53050	29.0	12.0	12.7	41.7	24.7	56.0	46.0	14.3	21.3	L1	
14	0.88750	20.1	---	12.7	32.8	---	56.0	46.0	23.2	---	L1	
15	1.57600	21.2	---	12.8	34.0	---	56.0	46.0	22.0	---	L1	
16	2.20000	22.2	---	12.8	35.0	---	56.0	46.0	21.0	---	L1	

DATA OF CONDUCTED EMISSION TEST

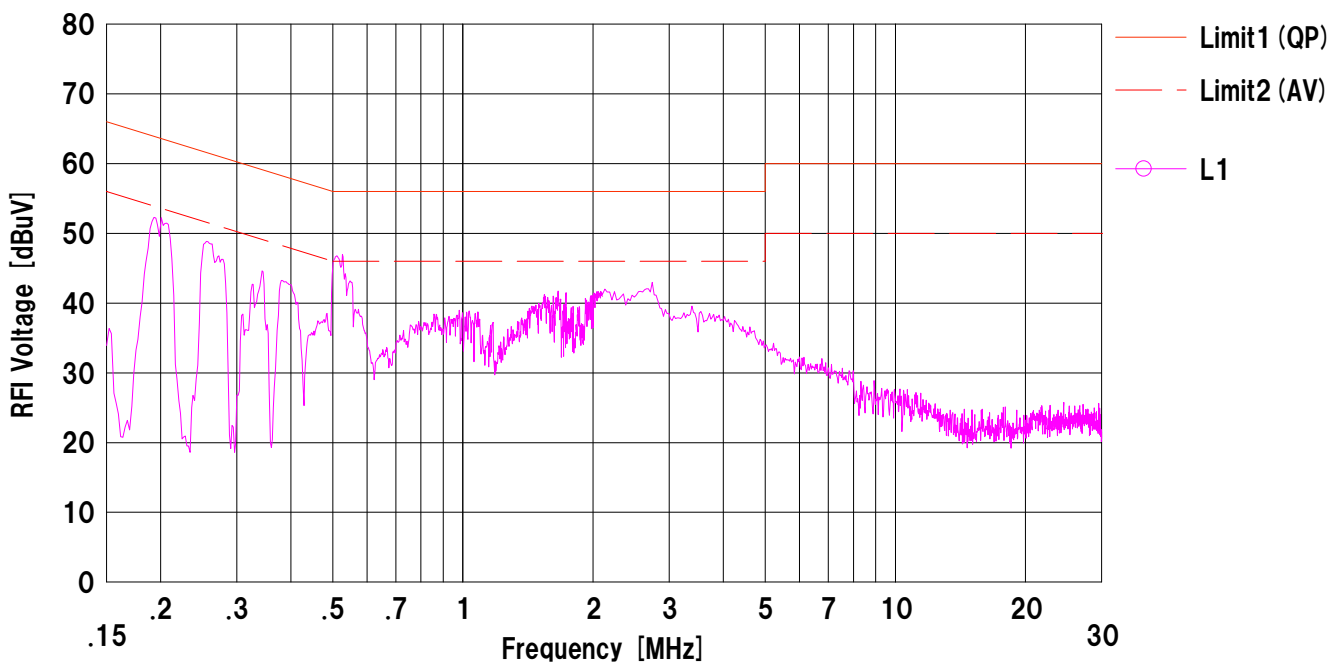
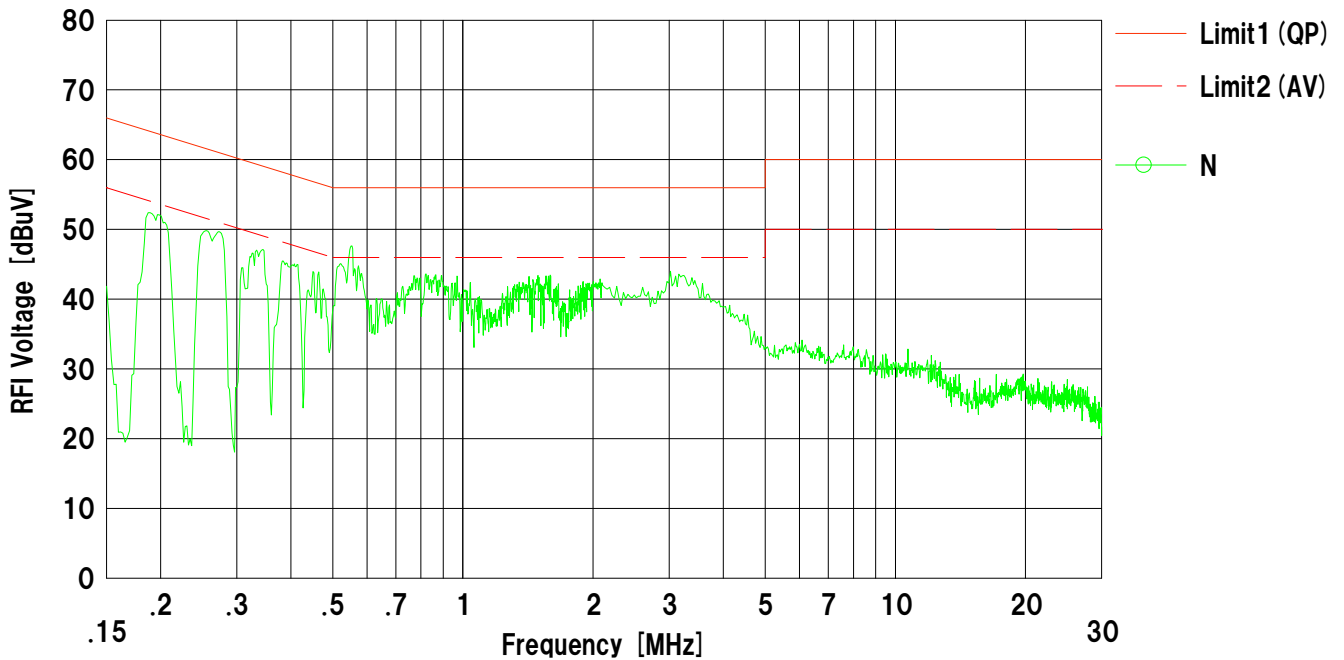
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2014/05/29

Company : Sony Engineering Corporation
Kind of EUT : RF Transmitter
Model No. : FFS-T1
Serial No. : 0021
Remarks : -

Mode : Transmitting 924.4MHz
Order No. : 10334913S
Power : AC 120V / 60Hz
Temp./Humi. : 26deg.C / 44%RH

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

Engineer : Tatsuya Arai



DATA OF CONDUCTED EMISSION TEST

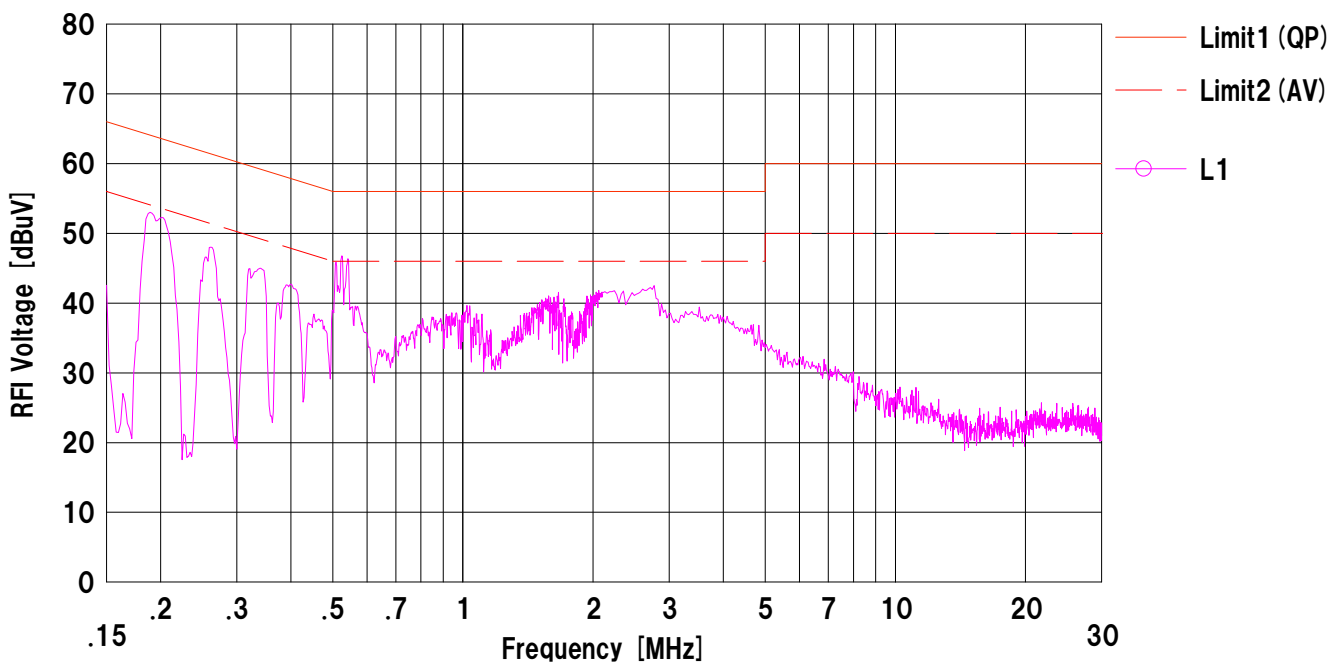
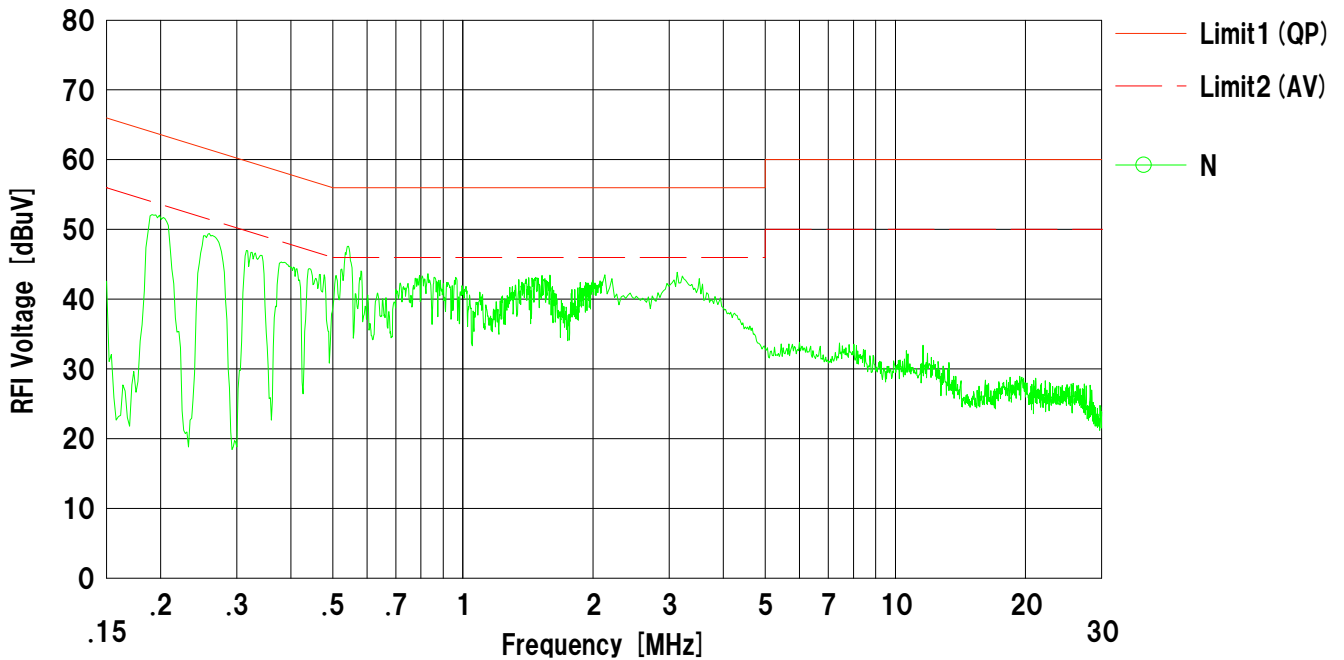
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2014/05/29

Company : Sony Engineering Corporation
Kind of EUT : RF Transmitter
Model No. : FFS-T1
Serial No. : 0021
Remarks : -

Mode : Transmitting 926.4MHz
Order No. : 10334913S
Power : AC 120V / 60Hz
Temp./Humi. : 26deg.C / 44%RH

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

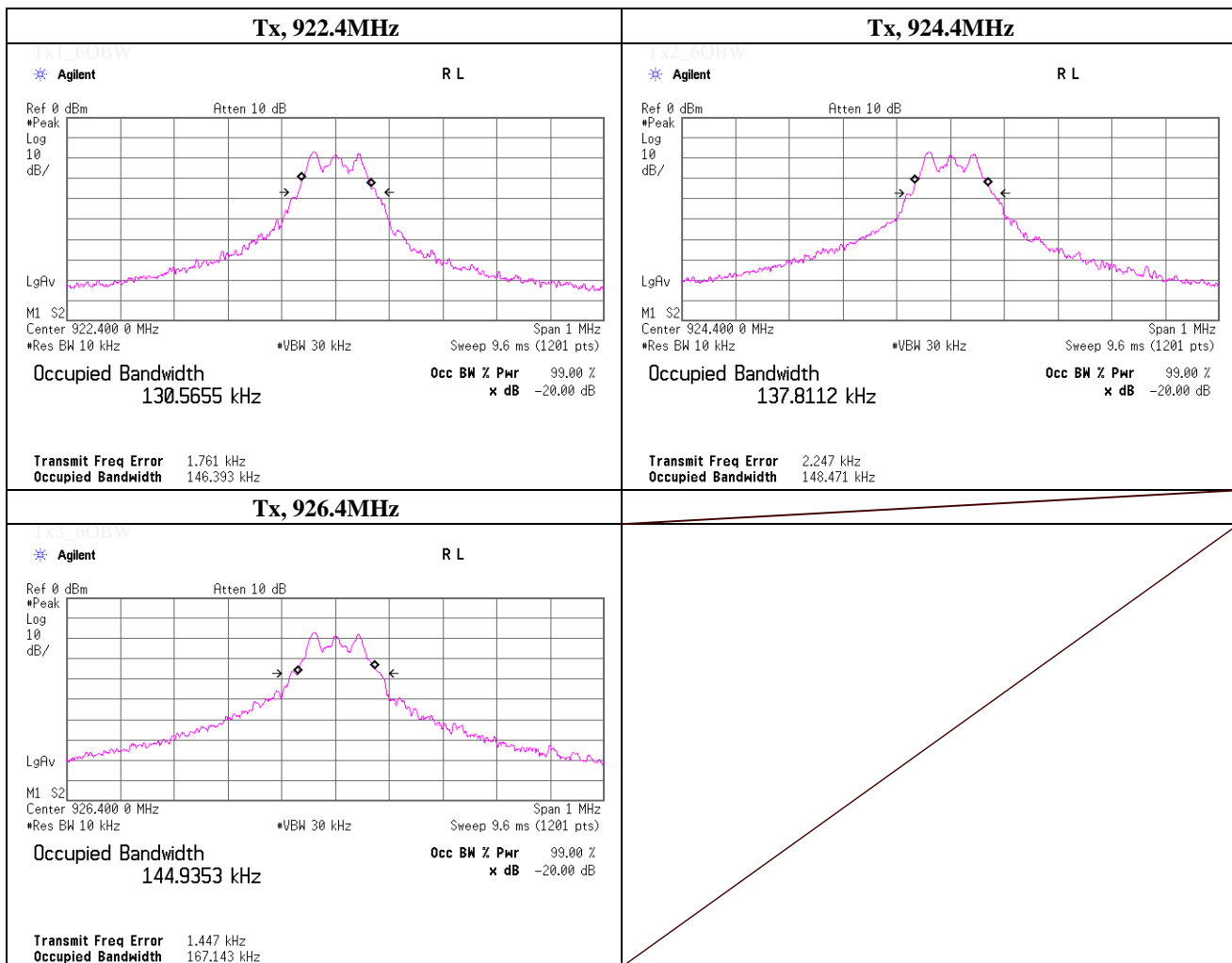
Engineer : Tatsuya Arai



20dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	May 28, 2014	
Temperature / Humidity	26deg.C , 44%RH	
Engineer	Tatsuya Arai	
Mode	Tx,	

Freq. [MHz]	20dB Bandwidth [MHz]
922.4000	0.146
924.4000	0.148
926.4000	0.167



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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date May 23, 2014
 Temperature / Humidity 26deg.C , 44%RH
 Engineer Kenichi Adachi
 Mode Tx, 922.4 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	49.999	QP	33.2	10.8	6.8	32.2	18.6	40.0	21.4	400	148	
Hori.	54.904	QP	29.5	9.5	6.7	32.2	13.5	40.0	26.5	400	311	
Hori.	149.999	QP	39.8	14.6	7.7	32.1	30.0	43.5	13.5	121	126	
Hori.	209.998	QP	38.4	16.6	7.9	32.1	30.8	43.5	12.7	157	251	
Hori.	300.000	QP	45.9	13.8	8.4	32.0	36.1	46.0	9.9	106	285	
Hori.	359.999	QP	42.2	15.3	8.7	32.0	34.2	46.0	11.8	132	173	
Hori.	902.000	QP	21.7	21.6	10.6	31.0	22.9	46.0	23.1	153	99	(noise floor level)
Hori.	922.361	QP	79.2	21.8	20.8	30.9	90.9	93.9	3.0	153	99	carrier
Hori.	928.000	QP	21.7	21.8	10.7	30.8	23.4	46.0	22.6	153	99	(noise floor level)
Hori.	1844.718	PK	45.4	26.3	4.5	38.7	37.5	73.9	36.4	100	221	
Hori.	2767.079	PK	42.2	27.6	5.8	38.1	37.5	73.9	36.4	100	0	
Hori.	3689.438	PK	45.0	28.2	6.4	37.9	41.7	73.9	32.2	100	169	
Hori.	4611.796	PK	46.7	29.9	6.9	37.2	46.3	73.9	27.6	100	244	
Hori.	5534.156	PK	43.2	32.3	7.5	37.2	45.8	73.9	28.1	100	234	
Hori.	9224.000	PK	42.9	38.1	9.5	37.6	52.9	73.9	21.0	100	0	
Hori.	1844.718	AV	34.7	26.3	4.5	38.7	26.8	53.9	27.1	100	221	(VBW10Hz)
Hori.	2767.079	AV	31.2	27.6	5.8	38.1	26.5	53.9	27.4	100	0	(VBW10Hz)
Hori.	3689.438	AV	33.9	28.2	6.4	37.9	30.6	53.9	23.3	100	169	(VBW10Hz)
Hori.	4611.796	AV	36.1	29.9	6.9	37.2	35.7	53.9	18.2	100	244	(VBW10Hz)
Hori.	5534.156	AV	31.6	32.3	7.5	37.2	34.2	53.9	19.7	100	234	(VBW10Hz)
Hori.	9224.000	AV	31.1	38.1	9.5	37.6	41.1	53.9	12.8	100	0	(VBW10Hz)
Vert.	44.884	QP	39.6	12.8	6.7	32.2	26.9	40.0	13.1	100	189	
Vert.	50.002	QP	49.8	10.7	6.8	32.2	35.1	40.0	4.9	100	191	
Vert.	149.999	QP	32.9	14.6	7.7	32.1	23.1	43.5	20.4	100	44	
Vert.	209.999	QP	36.3	16.6	7.9	32.1	28.7	43.5	14.8	100	52	
Vert.	300.000	QP	40.0	13.8	8.4	32.0	30.2	46.0	15.8	166	46	
Vert.	359.999	QP	39.5	15.3	8.7	32.0	31.5	46.0	14.5	174	89	
Vert.	902.000	QP	21.7	21.6	10.6	31.0	22.9	46.0	23.1	104	168	(noise floor level)
Vert.	922.361	QP	79.0	21.8	20.8	30.9	90.7	93.9	3.2	104	168	carrier
Vert.	928.000	QP	21.7	21.8	10.7	30.8	23.4	46.0	22.6	104	168	(noise floor level)
Vert.	1844.718	PK	45.2	26.3	4.5	38.7	37.3	73.9	36.6	100	87	
Vert.	2767.079	PK	42.2	27.6	5.8	38.1	37.5	73.9	36.4	100	0	
Vert.	3689.438	PK	44.7	28.2	6.4	37.9	41.4	73.9	32.5	100	174	
Vert.	4611.796	PK	43.8	29.9	6.9	37.2	43.4	73.9	30.5	100	178	
Vert.	5534.156	PK	43.1	32.3	7.5	37.2	45.7	73.9	28.2	100	189	
Vert.	9224.000	PK	43.0	38.1	9.5	37.6	53.0	73.9	20.9	100	0	
Vert.	1844.718	AV	34.1	26.3	4.5	38.7	26.2	53.9	27.7	100	87	(VBW10Hz)
Vert.	2767.079	AV	31.3	27.6	5.8	38.1	26.6	53.9	27.3	100	0	(VBW10Hz)
Vert.	3689.438	AV	33.4	28.2	6.4	37.9	30.1	53.9	23.8	100	174	(VBW10Hz)
Vert.	4611.796	AV	33.1	29.9	6.9	37.2	32.7	53.9	21.2	100	178	(VBW10Hz)
Vert.	5534.156	AV	31.5	32.3	7.5	37.2	34.1	53.9	19.8	100	189	(VBW10Hz)
Vert.	9224.000	AV	31.2	38.1	9.5	37.6	41.2	53.9	12.7	100	0	(VBW10Hz)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amplifier)

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date May 23, 2014
 Temperature / Humidity 26deg.C , 44% RH
 Engineer Kenichi Adachi
 Mode Tx, 924.4 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	49.999	QP	32.5	10.8	6.8	32.2	17.9	40.0	22.1	400	146	
Hori.	55.720	QP	27.5	9.2	6.6	32.2	11.1	40.0	28.9	400	143	
Hori.	149.999	QP	29.3	14.6	7.7	32.1	19.5	43.5	24.0	124	127	
Hori.	189.195	QP	23.9	16.2	7.7	32.1	15.7	43.5	27.8	138	132	
Hori.	209.999	QP	38.1	16.6	7.9	32.1	30.5	43.5	13.0	153	248	
Hori.	300.000	QP	41.7	13.8	8.4	32.0	31.9	46.0	14.1	100	168	
Hori.	359.999	QP	45.8	15.3	8.7	32.0	37.8	46.0	8.2	100	278	
Hori.	902.000	QP	21.6	21.6	20.7	31.0	32.9	46.0	13.1	159	81	(noise floor level)
Hori.	924.362	QP	78.9	21.8	20.8	30.8	90.7	93.9	3.2	159	81	carrier
Hori.	928.000	QP	21.6	21.8	20.8	30.8	33.4	46.0	12.6	159	81	(noise floor level)
Hori.	1848.719	PK	46.1	26.3	4.5	38.7	38.2	73.9	35.7	100	208	
Hori.	2773.080	PK	42.5	27.6	5.8	38.1	37.8	73.9	36.1	100	0	
Hori.	3697.437	PK	44.8	28.2	6.4	37.9	41.5	73.9	32.4	100	167	
Hori.	4621.797	PK	46.8	30.0	6.9	37.2	46.5	73.9	27.4	100	243	
Hori.	5546.150	PK	43.0	32.3	7.6	37.2	45.7	73.9	28.2	100	238	
Hori.	9244.000	PK	43.2	38.1	9.5	37.6	53.2	73.9	20.7	100	0	
Hori.	1848.719	AV	36.0	26.3	4.5	38.7	28.1	53.9	25.8	100	208	(VBW10Hz)
Hori.	2773.080	AV	31.5	27.6	5.8	38.1	26.8	53.9	27.1	100	0	(VBW10Hz)
Hori.	3697.437	AV	33.7	28.2	6.4	37.9	30.4	53.9	23.5	100	167	(VBW10Hz)
Hori.	4621.797	AV	36.0	30.0	6.9	37.2	35.7	53.9	18.2	100	243	(VBW10Hz)
Hori.	5546.150	AV	31.5	32.3	7.6	37.2	34.2	53.9	19.7	100	238	(VBW10Hz)
Hori.	9244.000	AV	31.3	38.1	9.5	37.6	41.3	53.9	12.6	100	0	(VBW10Hz)
Vert.	44.882	QP	38.9	12.8	6.7	32.2	26.2	40.0	13.8	100	186	
Vert.	49.999	QP	43.3	10.8	6.8	32.2	28.7	40.0	11.3	100	256	
Vert.	149.999	QP	29.3	14.6	7.7	32.1	19.5	43.5	24.0	100	101	
Vert.	209.999	QP	38.0	16.6	7.9	32.1	30.4	43.5	13.1	100	51	
Vert.	300.000	QP	39.3	13.8	8.4	32.0	29.5	46.0	16.5	159	91	
Vert.	359.999	QP	41.2	15.3	8.7	32.0	33.2	46.0	12.8	148	187	
Vert.	902.000	QP	21.6	21.6	20.7	31.0	32.9	46.0	13.1	100	169	(noise floor level)
Vert.	924.362	QP	79.0	21.8	20.8	30.8	90.8	93.9	3.1	100	169	carrier
Vert.	928.000	QP	21.6	21.8	20.8	30.8	33.4	46.0	12.6	100	169	(noise floor level)
Vert.	1848.719	PK	45.0	26.3	4.5	38.7	37.1	73.9	36.8	100	78	
Vert.	2773.080	PK	42.3	27.6	5.8	38.1	37.6	73.9	36.3	100	0	
Vert.	3697.437	PK	44.5	28.2	6.4	37.9	41.2	73.9	32.7	100	182	
Vert.	4621.797	PK	44.0	30.0	6.9	37.2	43.7	73.9	30.2	100	178	
Vert.	5546.150	PK	43.2	32.3	7.6	37.2	45.9	73.9	28.0	100	173	
Vert.	9244.000	PK	43.1	38.1	9.5	37.6	53.1	73.9	20.8	100	0	
Vert.	1848.719	AV	34.2	26.3	4.5	38.7	26.3	53.9	27.6	100	78	(VBW10Hz)
Vert.	2773.080	AV	31.4	27.6	5.8	38.1	26.7	53.9	27.2	100	0	(VBW10Hz)
Vert.	3697.437	AV	33.6	28.2	6.4	37.9	30.3	53.9	23.6	100	182	(VBW10Hz)
Vert.	4621.797	AV	33.4	30.0	6.9	37.2	33.1	53.9	20.8	100	178	(VBW10Hz)
Vert.	5546.150	AV	31.6	32.3	7.6	37.2	34.3	53.9	19.6	100	173	(VBW10Hz)
Vert.	9244.000	AV	31.2	38.1	9.5	37.6	41.2	53.9	12.7	100	0	(VBW10Hz)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amplifier)

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date May 23, 2014
 Temperature / Humidity 26deg.C , 44%RH
 Engineer Kenichi Adachi
 Mode Tx, 926.4 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	50.002	QP	32.7	10.7	6.8	32.2	18.0	40.0	22.0	400	134	
Hori.	149.999	QP	29.1	14.6	7.7	32.1	19.3	43.5	24.2	126	123	
Hori.	197.464	QP	23.7	16.4	7.8	32.1	15.8	43.5	27.7	142	121	
Hori.	209.999	QP	43.3	16.6	7.9	32.1	35.7	43.5	7.8	153	129	
Hori.	300.001	QP	41.9	13.8	8.4	32.0	32.1	46.0	13.9	100	172	
Hori.	359.999	QP	45.6	15.3	8.7	32.0	37.6	46.0	8.4	100	271	
Hori.	902.000	QP	21.5	21.6	20.7	31.0	32.8	46.0	13.2	161	85	(noise floor level)
Hori.	926.363	QP	79.2	21.8	20.8	30.8	91.0	93.9	2.9	161	85	carrier
Hori.	928.000	QP	21.6	21.8	20.8	30.8	33.4	46.0	12.6	161	85	(noise floor level)
Hori.	1852.718	PK	46.6	26.3	4.6	38.7	38.8	73.9	35.1	100	211	
Hori.	2779.078	PK	42.6	27.6	5.8	38.1	37.9	73.9	36.0	100	0	
Hori.	3705.438	PK	45.1	28.3	6.4	37.9	41.9	73.9	32.0	100	154	
Hori.	4631.798	PK	45.0	30.0	6.9	37.2	44.7	73.9	29.2	100	161	
Hori.	5558.158	PK	43.1	32.3	7.6	37.3	45.7	73.9	28.2	100	168	
Hori.	9264.000	PK	42.9	38.1	9.5	37.6	52.9	73.9	21.0	100	0	
Hori.	1852.718	AV	36.3	26.3	4.6	38.7	28.5	53.9	25.4	100	211	(VBW10Hz)
Hori.	2779.078	AV	31.6	27.6	5.8	38.1	26.9	53.9	27.0	100	0	(VBW10Hz)
Hori.	3705.438	AV	34.4	28.3	6.4	37.9	31.2	53.9	22.7	100	154	(VBW10Hz)
Hori.	4631.798	AV	34.1	30.0	6.9	37.2	33.8	53.9	20.1	100	161	(VBW10Hz)
Hori.	5558.158	AV	31.4	32.3	7.6	37.3	34.0	53.9	19.9	100	168	(VBW10Hz)
Hori.	9264.000	AV	31.1	38.1	9.5	37.6	41.1	53.9	12.8	100	0	(VBW10Hz)
Vert.	44.643	QP	39.8	12.8	6.7	32.2	27.1	40.0	12.9	100	183	
Vert.	50.002	QP	43.4	10.7	6.8	32.2	28.7	40.0	11.3	100	267	
Vert.	149.999	QP	29.2	14.6	7.7	32.1	19.4	43.5	24.1	100	98	
Vert.	187.609	QP	25.0	16.2	7.7	32.1	16.8	43.5	26.7	100	97	
Vert.	209.999	QP	40.2	16.6	7.9	32.1	32.6	43.5	10.9	100	52	
Vert.	300.001	QP	39.4	13.8	8.4	32.0	29.6	46.0	16.4	157	89	
Vert.	359.999	QP	41.8	15.3	8.7	32.0	33.8	46.0	12.2	135	189	
Vert.	902.000	QP	21.5	21.6	20.7	31.0	32.8	46.0	13.2	100	163	(noise floor level)
Vert.	926.363	QP	79.2	21.8	20.8	30.8	91.0	93.9	2.9	100	163	carrier
Vert.	928.000	QP	21.6	21.8	20.8	30.8	33.4	46.0	12.6	100	163	(noise floor level)
Vert.	1852.718	PK	45.8	26.3	4.6	38.7	38.0	73.9	35.9	100	76	
Vert.	2779.078	PK	42.5	27.6	5.8	38.1	37.8	73.9	36.1	100	0	
Vert.	3705.438	PK	44.4	28.3	6.4	37.9	41.2	73.9	32.7	100	176	
Vert.	4631.798	PK	44.5	30.0	6.9	37.2	44.2	73.9	29.7	100	182	
Vert.	5558.158	PK	43.0	32.3	7.6	37.3	45.6	73.9	28.3	100	179	
Vert.	9264.000	PK	43.0	38.1	9.5	37.6	53.0	73.9	20.9	100	0	
Vert.	1852.718	AV	35.0	26.3	4.6	38.7	27.2	53.9	26.7	100	76	(VBW10Hz)
Vert.	2779.078	AV	31.5	27.6	5.8	38.1	26.8	53.9	27.1	100	0	(VBW10Hz)
Vert.	3705.438	AV	33.8	28.3	6.4	37.9	30.6	53.9	23.3	100	176	(VBW10Hz)
Vert.	4631.798	AV	33.5	30.0	6.9	37.2	33.2	53.9	20.7	100	182	(VBW10Hz)
Vert.	5558.158	AV	31.4	32.3	7.6	37.3	34.0	53.9	19.9	100	179	(VBW10Hz)
Vert.	9264.000	AV	31.2	38.1	9.5	37.6	41.2	53.9	12.7	100	0	(VBW10Hz)

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amplifier)

UL Japan, Inc.

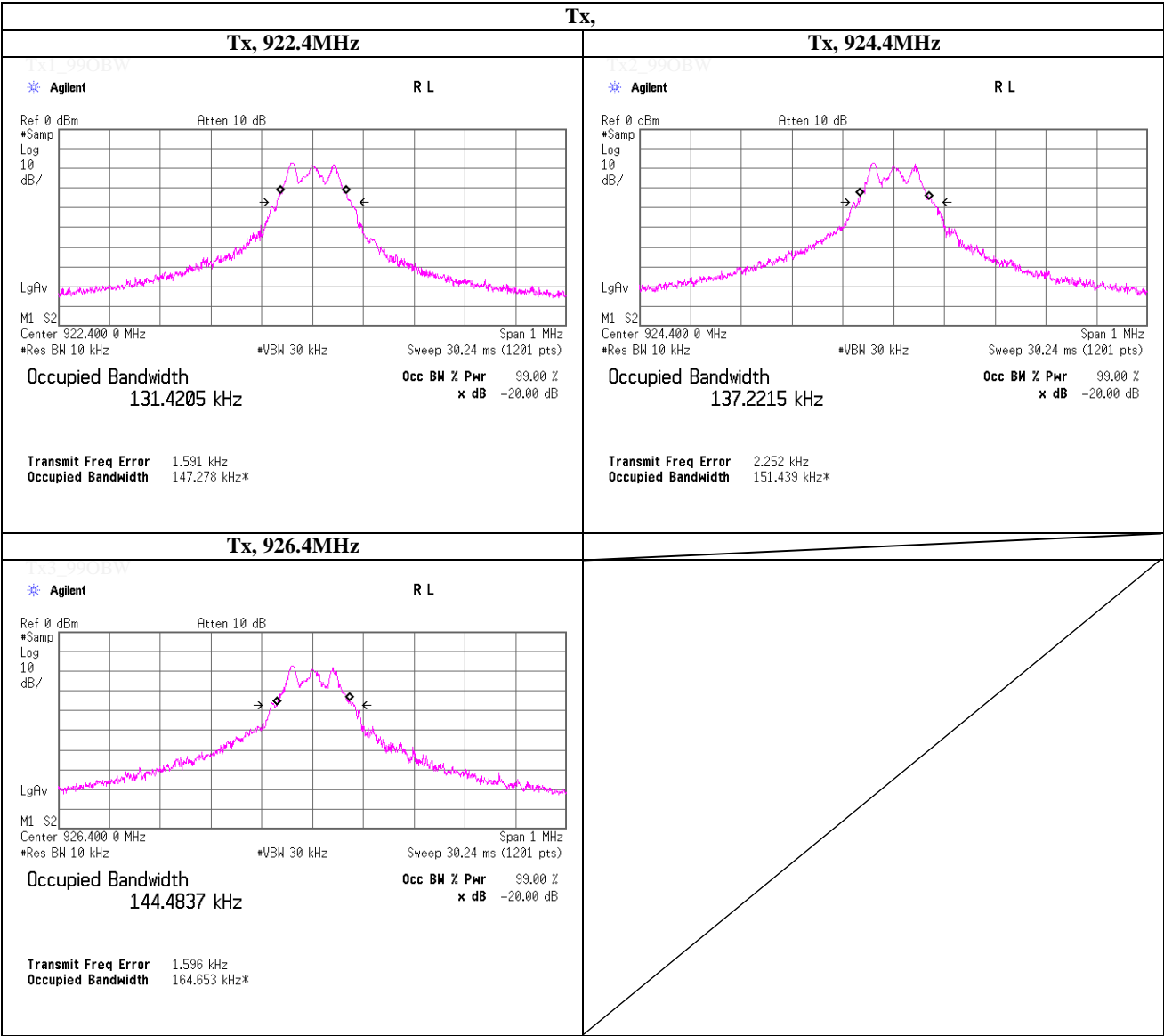
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99% Occupied Bandwidth



APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2013/10/26 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2013/10/26 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SAT10-01	Attenuator	JFW	50HF-010N	-	RE	2014/02/17 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE/CE	2014/03/04 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/02/21 * 12
SJM-15	Measure	ASKUL	-	-	RE/CE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE/CE	-
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2013/08/19 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2014/04/22 * 12
SFL-01	Highpass Filter	MICRO-TRONICS	HPM50115	001	RE	2013/11/22 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2013/11/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE/AT	2014/05/15 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2014/03/04 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2013/11/08 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2014/04/25 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2014/03/05 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE/AT	2014/03/07 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2014/03/17 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	AT	2013/11/22 * 12

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

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

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

Test Item :

CE: Conducted emission,

RE: Radiated emission,

AT: Antenna terminal conducted tests ,