



EMI TEST REPORT

Test Report No. : 11034766H-B

Applicant : Sharp Corporation, Consumer Electronics Company,
Communication Systems Division

Type of Equipment : Smart Phone

Model No. : HR229

FCC ID : APYHRO00229

Test standard : FCC Part 15 Subpart B 2015 Class B

Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers EMC technical requirements. It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)

Date of test: November 10, 2015

**Representative
test engineer:**

Yuta Moriya
Engineer
Consumer Technology Division

Approved by :

Takahiro Hatakeda
Leader
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

UL Japan, Inc.

Ise EMC Lab.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11034766H-B

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SECTION 1: Customer information

Company Name : Sharp Corporation, Consumer Electronics Company, Communication Systems Division
Address : 2-13-1 Iida Hachihonmatsu Higashi Hiroshima-City, Hiroshima, 739-0192 Japan
Telephone Number : +81-82-420-1552
Facsimile Number : +81-82-420-1555
Contact Person : Hiroyuki Uwatoko

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

2.1 Identification of E.U.T.

Type of Equipment : Smart Phone
Model No. : HR229
Serial No. : Refer to Section 4, Clause 4.2
Receipt Date of Sample : November 9, 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

Feature of EUT : HR229 is AXGP/WiMax2+, Penta-band LTE(Band 1 / 3 / 5 / 8 / 26), Tri-band WCDMA(FDD I / V / VIII) & Quad-band GSM(850 / 900 / 1800 / 1900) Multi-mode Smart Phone.
The EUT has the function that NFC, Bluetooth and Wireless-LAN technology interface for establishing contact and transmitting data with certain device.
Clock frequencies in the system : CPU: 1.824 GHz (max)
Source oscillation: 19.2 MHz, 27.12 MHz(NFC), 48.0 MHz(WLAN/BT), 32.0 MHz(DTV)

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification: Test specification: FCC Part 15 Subpart B: 2015, final revised on September 8, 2015

Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Class B	N/A	[QP] 14.0 dB 0.17180 MHz, L [AV] 12.4 dB 0.17180 MHz, L	Complied
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	Class B	N/A	5.6 dB 31.953 MHz, Horizontal, QP	Complied

*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.

3.3 Addition to standard

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)	Conducted emission (+dB)
	150 kHz - 30 MHz
No.1	3.5 dB
No.2	3.5 dB
No.3	3.4 dB
No.4	3.5 dB

Test room (semi- anechoic chamber)	Radiated emission						
	(3 m*) (+dB)				(1 m*) (+dB)		(0.5 m*) (+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	5.1 dB	6.2 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No.2	4.2 dB	5.1 dB	6.2 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No.3	4.4 dB	5.1 dB	6.3 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No.4	4.7 dB	5.3 dB	6.3 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

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

Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test (3 m)

The data listed in this test report has enough margin, more than the site margin.

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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	-	8.8 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

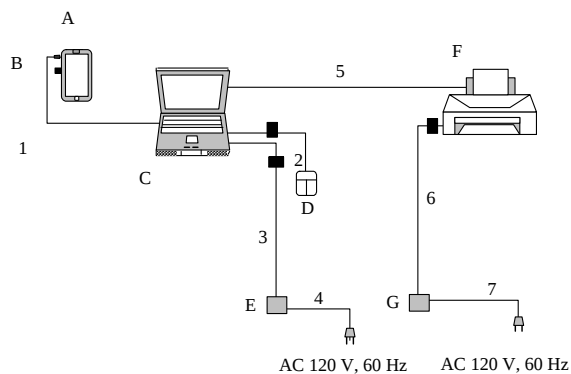
Refer to APPENDIX.

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

4.1 Operating modes

The mode(s) : 1) USB Data Com Mode
The USB data is communicated between EUT and Personal computer (Pair of EUT).
2) Standby Mode
Standby state for USB communication.

4.2 Configuration and peripherals



■ : Ferrite core which has been standard on support equipment.

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Smart Phone	HR229	004401/11/564608/1	Sharp Corporation	EUT
B	microSD Memory Card	SD-MD008GA	None	TOSHIBA	-
C	Personal Computer	PP11L	CN-0D4571-48643-58P-1053	Dell	-
D	Mouse	M-UAG120	LZ733B70EVV	TOSHIBA	-
E	AC Adaptor(PC)	LA65NS1-00	CN-0YD637-71615-64Q-2243	Dell	-
F	Printer	895Cxi	SG8BA1W18J	Hewlett Packard	-
G	AC Adapter(Printer)	C4557-60004	C8L01B	Hewlett Packard	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Data Cable	0.95	Shielded	Shielded	-
2	Mouse Cable	0.72	Unshielded	Unshielded	-
3	AC Adaptor Cable (PC)	1.76	Unshielded	Unshielded	-
4	AC Power Cable (PC)	1.20	Unshielded	Unshielded	-
5	Parallel Cable	1.65	Shielded	Shielded	-
6	AC Adapter Cable (printer)	2.00	Unshielded	Unshielded	-
7	AC Power Cable (printer)	1.75	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

5.1 Operating environment

Test place	: No.1 semi anechoic chamber
Temperature	: See data
Humidity	: See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT and its peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from the LISN/AMN and excess AC cable was bundled in center. I/O cables that were connected to the other peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN/AMN to the input power source. All unused 50 ohm connectors of the LISN/AMN were resistivity terminated in 50 ohm when not connected to the measuring equipment. Photographs of the set up are shown in Appendix 3.

Frequency range	: 0.15 MHz - 30 MHz
EUT position	: Table top
EUT operation mode	: See Clause 4.1

5.3 Test procedure

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT within a semi anechoic chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains network (AMN). An overview sweep with peak detection has been performed. The measurements have been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type	: Quasi-Peak and CISPR AV
IF Bandwidth	: 9 kHz

5.4 Test result

Summary of the test results: Pass

Date: November 10, 2015

Test engineer: Yuta Moriya

UL Japan, Inc.

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SECTION 6: Radiated Emission

6.1 Operating environment

Test place : No.1 semi anechoic chamber
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The EUT was set on the center the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 30 MHz - 300 MHz (Biconical antenna) / 300 MHz - 1000 MHz (Logperiodic antenna)
: 1000 MHz - 10000 MHz (Horn antenna)
Test distance : 3 m
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

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

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver

The radiated emission measurements were made with the following detector function of the Test Receiver

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Test Receiver	Test Receiver
IF Bandwidth	QP: BW 120 kHz	PK: BW 1 MHz, CISPR AV: BW 1 MHz

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.

6.5 Test result

Summary of the test results: Pass

Date: November 10, 2015

Test engineer: Yuta Moriya

UL Japan, Inc.

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Radiated Emission (Below 1GHz)

DATA OF RADIATED EMISSION TEST

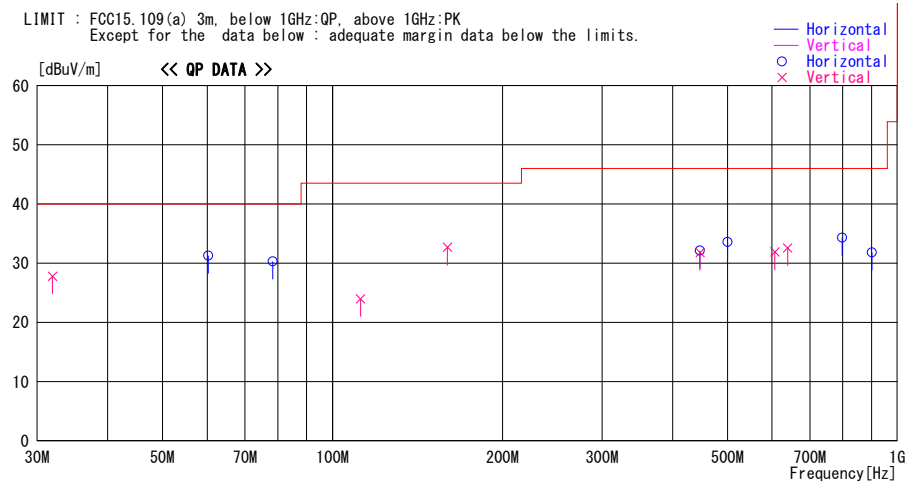
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/11/10

Report No. : 11034766H

Temp./Humi. : 22deg. C / 69% RH
Engineer : Yuta Moriya

Mode / Remarks : USB Data Com Mode Worst-Axis (Hori Y Vert Y)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
31.955	42.5	QP	16.7	-31.4	27.8	123	100	Vert.	40.0	12.2	
60.323	55.0	QP	7.3	-31.0	31.3	226	336	Hori.	40.0	8.7	
78.425	54.3	QP	6.7	-30.7	30.3	287	237	Hori.	40.0	9.7	
112.135	42.6	QP	11.6	-30.2	24.0	205	100	Vert.	43.5	19.5	
159.772	46.9	QP	15.4	-29.6	32.7	161	100	Vert.	43.5	10.8	
447.353	40.9	QP	17.8	-26.9	31.8	333	152	Vert.	46.0	14.2	
447.358	41.2	QP	17.8	-26.9	32.1	211	100	Hori.	46.0	13.9	
500.396	41.8	QP	18.0	-26.2	33.6	0	205	Hori.	46.0	12.4	
607.125	37.9	QP	19.5	-25.5	31.9	169	100	Vert.	46.0	14.1	
639.078	38.1	QP	19.9	-25.4	32.6	170	100	Vert.	46.0	13.4	
798.001	37.0	QP	21.7	-24.4	34.3	209	171	Hori.	46.0	11.7	
900.726	33.6	QP	22.1	-23.9	31.8	292	181	Hori.	46.0	14.2	

CHART:WITH FACTOR ANT TYPE:-30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE)+ ATTEN - GAIN (AMP)

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission (Below 1GHz)

DATA OF RADIATED EMISSION TEST

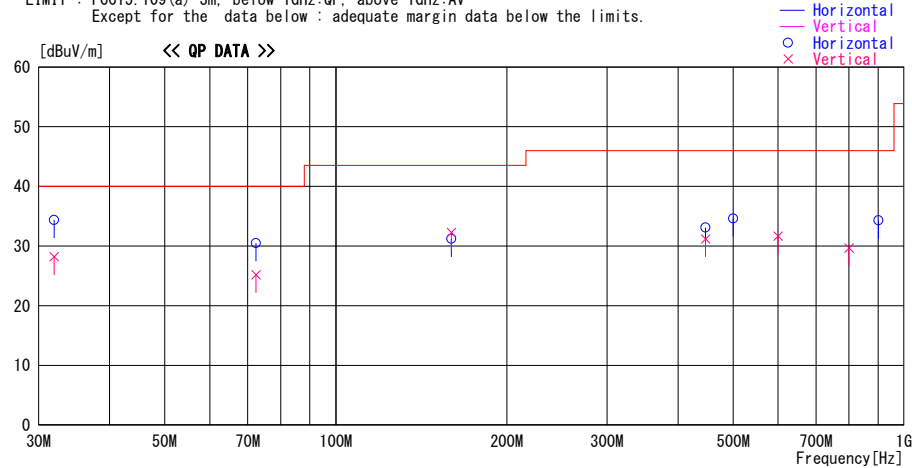
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/11/10

Report No. : 11034766H

Temp./Humi. : 22deg. C / 69% RH
Engineer : Yuta Moriya

Mode / Remarks : Standby Mode Worst-Axis (Hori Y Vert Y)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
31.953	49.1	QP	16.7	-31.4	34.4	209	400	Hori.	40.0	5.6	
31.952	42.9	QP	16.7	-31.4	28.2	162	100	Vert.	40.0	11.8	
72.388	55.0	QP	6.3	-30.8	30.5	292	180	Hori.	40.0	9.5	
72.390	49.7	QP	6.3	-30.8	25.2	256	100	Vert.	40.0	14.8	
159.770	45.4	QP	15.4	-29.6	31.2	138	100	Hori.	43.5	12.3	
159.771	46.5	QP	15.4	-29.6	32.3	157	100	Vert.	43.5	11.2	
447.354	40.3	QP	17.8	-26.9	31.2	35	130	Vert.	46.0	14.8	
447.358	42.2	QP	17.8	-26.9	33.1	208	100	Hori.	46.0	12.9	
500.381	42.8	QP	18.0	-26.2	34.6	238	100	Hori.	46.0	11.4	
599.994	37.8	QP	19.5	-25.6	31.7	312	100	Vert.	46.0	14.3	
800.000	32.4	QP	21.7	-24.4	29.7	250	122	Vert.	46.0	16.3	
900.685	36.1	QP	22.1	-23.9	34.3	318	105	Hori.	46.0	11.7	

CHART:WITH FACTOR ANT TYPE:-30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE)+ ATTN - GAIN (AMP)

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission (Above 1GHz)

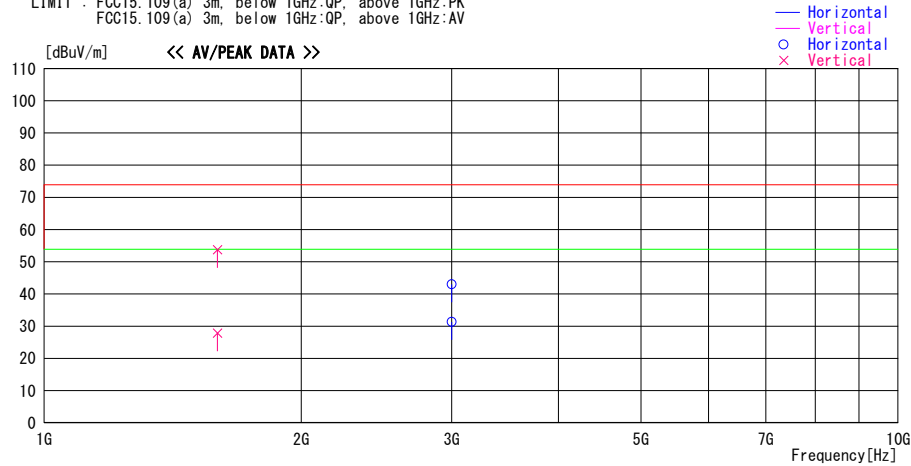
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/11/10

Report No. : 11034766H
Temp./Humi. : 22deg. C / 69% RH
Engineer : Yuta Moriya

Mode / Remarks : USB Data Com Mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Loss& Gain [dB]					[dBuV/m]	[dB]	
1595.184	62.2	PK	25.6	-34.1	53.7	185	100	Vert.	73.9	20.2	
1595.184	36.3	AV	25.6	-34.1	27.8	185	100	Vert.	53.9	26.1	
3001.995	48.1	PK	28.3	-33.4	43.0	345	100	Hori.	73.9	30.9	
3001.995	36.5	AV	28.3	-33.4	31.4	345	100	Hori.	53.9	22.5	

CHART:WITH FACTOR ANT TYPE: ~30MHz:LOOP, 30~300MHz:BICONICAL, 300MHz~1000MHz:LOGPERIODIC, 1000MHz~:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN(CABLE - GAIN(AMP))

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission (Above 1GHz)

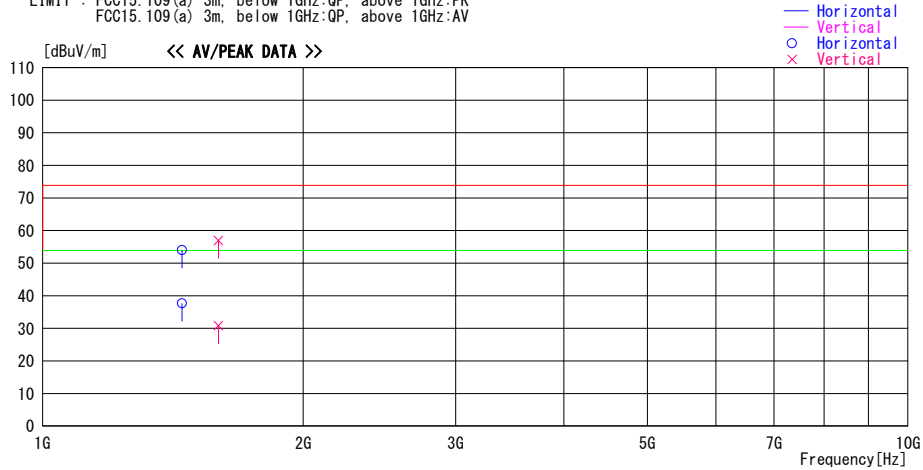
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/11/10

Report No. : 11034766H
Temp./Humi. : 22deg. C / 69% RH
Engineer : Yuta Moriya

Mode / Remarks : Standby Mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
1449.513	63.1	PK	25.2	-34.3	54.0	191	175	Hori.	73.9	19.9	
1449.513	46.8	AV	25.2	-34.3	37.7	191	175	Hori.	53.9	16.2	
1596.073	39.3	AV	25.6	-34.1	30.8	232	121	Vert.	53.9	23.1	
1596.073	65.5	PK	25.6	-34.1	57.0	232	121	Vert.	73.9	16.9	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION : RESULT = READING + ANT FACTOR + LOSS & GAIN(CABLE - GAIN(AMP))

*The limit is rounded down to one decimal place.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

APPENDIX 2: Test instruments

EMI Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE/CE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE/CE	2015/01/13 * 12
MJM-21	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE/CE	2015/06/08 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2015/11/02 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2015/11/03 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2015/11/10 * 12
MCC-02	Coaxial Cable	Suhner/storm/Agilent/T SJ	-	-	RE	2015/09/29 * 12
MPA-19	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	RE	2015/02/03 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	RE/CE	2015/08/19 * 12
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2015/05/18 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2015/02/04 * 12
MCC-165	Microwave Cable	Junkosha	MWX221	1203S213(1m) / 1311S166(5m)	RE	2014/11/11 * 12
MLS-25	LISN(AMN)	Schwarzbeck	NSLK8127	8127-731	CE(EUT)	2015/07/17 * 12
MLS-26	LISN(AMN)	Schwarzbeck	NSLK8127	8127-732	CE(AE)	2015/07/17 * 12
MTA-28	Terminator	TME	CT-01	-	CE	2014/11/26 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	CE	2015/09/29 * 12
MAT-64	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12

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

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

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

Test Item:

CE: Conducted Emissions

RE: Radiated Emissions

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