



# RADIO TEST REPORT

## Test Report No.: 11823786S-A-R1

**Applicant** : SEGA Interactive Co., Ltd.  
**Type of Equipment** : NFC RW LED BD EXP  
**Model No.** : 837-20002  
**FCC ID** : FJ8IDZ170620  
**Test regulation** : FCC Part15 Subpart C: 2017  
**Test result** : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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 11823786S-A.

**Date of test:** June 20 and 21, 2017

**Representative test engineer:**

Hiroyuki Morikawa

Engineer

Consumer Technology Division

**Approved by :**

Akira Sato

Engineer

Consumer Technology Division



The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".

RTL02610

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**UL Japan, Inc.**

**Shonan EMC Lab.**

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13-EM-F0429

## REVISION HISTORY

## Original Test Report No.: 11823786S-A

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## **SECTION 1: Customer information**

Company Name : SEGA Interactive Co., Ltd.  
Address : 1-2-12, Haneda, Ohta-ku, Tokyo, 144-8531 Japan  
Telephone Number : +81-045-444-7571  
Facsimile Number : +81-045-444-7970  
Contact Person : Takashi Homma

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

### **2.1 Identification of E.U.T.**

Type of Equipment : NFC RW LED BD EXP  
Model No. : 837-20002  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 5 V  
Receipt Date of Sample : June 19, 2017  
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: 837-20002 (referred to as the EUT in this report) is a NFC RW LED BD EXP.

Series name: 837-20002XXXXXX

X is replaced with alphanumeric, symbol or blank in accordance with the firmware.  
The firmware does not affect the radio specification.

### **General Specification**

Clock frequency(ies) in the system : 27.12 MHz:Crystal / 12 MHz:Ceralock / 48 MHz:CPU / 1 MHz:SPI

### **Radio Specification**

#### **NFC**

Radio Type : Transceiver  
Frequency of Operation : 13.56 MHz  
Modulation : ASK  
Antenna type : Loop

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test specification**

Test specification : FCC Part 15 Subpart C  
 FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

\*The revision on June 14, 2017, does not affect the test specification applied to the EUT.

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators  
 Section 15.207 Conducted limits  
 Section 15.209 Radiated emission limits, general requirements  
 Section 15.215 Additional provisions to the general radiated emission limitations.  
 Section 15.225 Operation within the bands 13.110 - 14.010 MHz.

### **3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.10:2013 6 Standard test methods <IC>RSS-Gen 8.8	FCC 15.207 <IC> RSS-Gen 8.8	-	N/A	7.2 dB (0.81939 MHz, AV, L1)	Complied
Electric field strength of Fundamental emission	ANSI C63.10:2013 6 Standard test methods <IC>RSS-Gen 6.4, 6.12	FCC 15.225 (a) <IC> RSS-210 B.6	Radiated	N/A	52.5 dB (Vertical)	Complied
Electric field strength of Spurious emission (within the 13.110-14.010 MHz band)	ANSI C63.10:2013 6 Standard test methods <IC>RSS-Gen 6.4, 6.13	FCC 15.225 (b)(c) <IC> RSS-210 B.6	Radiated	N/A	33.1 dB (13.567 MHz, Vertical)	Complied
Electric field strength of Spurious emission (outside of the 13.110-14.010 MHz band)	ANSI C63.10:2013 6 Standard test methods <IC>RSS-Gen 6.4, 6.13	FCC 15.209 FCC 15.225 (d) <IC> RSS-210 B.6	Radiated	N/A	3.8 dB (149.160 MHz, Horizontal)	Complied
20 dB bandwidth	ANSI C63.10:2013 6 Standard test methods <IC> -	FCC 15.215 (c) <IC> -	Radiated	N/A	-	-
Frequency tolerance	ANSI C63.10:2013 6 Standard test methods <IC> RSS-Gen 6.11, 8.11	FCC 15.225 (e) <IC> RSS-210 B.6	Radiated	N/A	-	Complied

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

### **FCC Part 15.31 (e)**

The RF Module has its own regulator.

The RF Module is constantly provided voltage (DC 3.3 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

### **FCC Part 15.203 Antenna requirement**

The antenna is not removable from 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	Remarks	Worst Margin	Results
Occupied Bandwidth (99 %)	ANSI C63.10:2013 6.Standard test methods RSS-Gen 6.6	RSS-Gen 4.6.1	Conducted	-	-
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.

### 3.4 Uncertainty

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

Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 dB	-	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector) _SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector) _SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector) _SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector) _SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

#### Conducted emission test

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

#### Radiated emission test

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

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### 3.5 Test location

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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
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

### 3.6 Test setup, Data of EMI & Test instruments

Refer to APPENDIX.

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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 except for Frequency Tolerance	Transmitting	13.56 MHz
Frequency Tolerance	Transmitting (Unmodulated)	13.56 MHz

Software : NFC\_RW\_LED\_BD\_0x92\_EXP\_Noise Ver.0x92

Power setting: Fixed

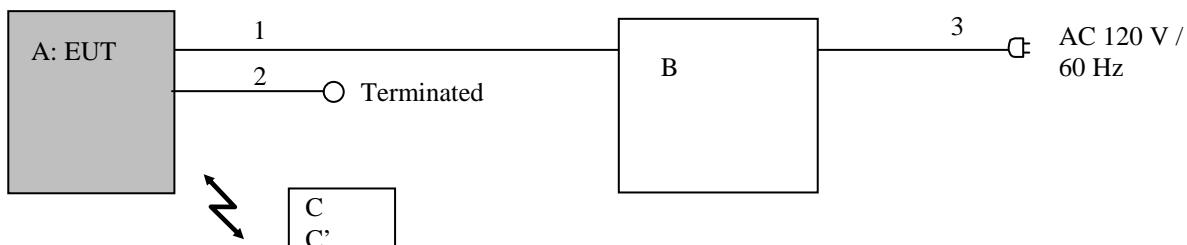
The carrier level and noise levels were confirmed with and without Tag, and the test was made with the condition that has the maximum noise.

Combinations of the worst case:

Radiated emission (Carrier)	Radiated emission (Below 30 MHz)	Radiated emission (Above 30 MHz)
Without Tag (FeliCa)	Without Tag (FeliCa)	With Tag (FeliCa)

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

### 4.2 Configuration and peripherals



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

#### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	NFC RW LED BD EXP	837-20002	001 *1) 002 *2) 003 *3)	SEGA Interactive Co., Ltd.	EUT
B	Power Source BOX	PS	002	SEGA Interactive Co., Ltd.	-
C	FeliCa Card	-	-	-	-
C'	Mifare Card	-	-	-	-

\*1) for Radiated emission tests (Below 30MHz)

\*2) for all tests except for \*1) and \*3)

\*3) for Conducted emission tests (Antenna terminal terminated)

#### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.7	Unshielded	Unshielded	-
2	Signal	0.6	Unshielded	Unshielded	-
3	AC	2.3	Unshielded	Unshielded	-

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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, 1.0 m by 2.0 m, raised 0.8 m 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 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and was 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 LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the 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 to the input power source. All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm 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 MHz - 30 MHz  
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, an average detector. The conducted emission measurements were made with the following detection of the test receiver.

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

### **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**

EUT was placed on a platform of normal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. Photographs of the set up are shown in Appendix 3.

### **6.3 Test procedure**

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

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788. These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

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

Frequency: From 9 kHz to 30 MHz at distance 3 m (Refer to Figure 2)

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: 0 deg., 45 deg., 90 deg. and 135 deg.) and horizontal polarization. Drawing of the antenna direction is shown in Figure 1.

Frequency: From 30 MHz to 1 GHz at distance 3 m (Refer to Figure 2).

The measuring antenna height was 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.

Measurements were performed with QP, PK, and AV detector.

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

	9 kHz to 90 kHz & 110 kHz to 150 kHz	90 kHz to 110 kHz	150 kHz to 490 kHz	490 kHz to 30 MHz	30 MHz to 1 GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200 Hz	200 Hz	10 kHz	9 kHz	120 kHz
Distance factor *1)	-80 dB	-80 dB	-80 dB	-40 dB	-
Measuring antenna	Loop antenna				Biconical (30 MHz - 199.99 MHz) Logperiodic (200 MHz - 1 GHz)

\*1) FCC 15.31 (f)(2) (9kHz-30MHz)

Distance Factor:  $40 \times \log (3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

Distance Factor:  $40 \times \log (3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

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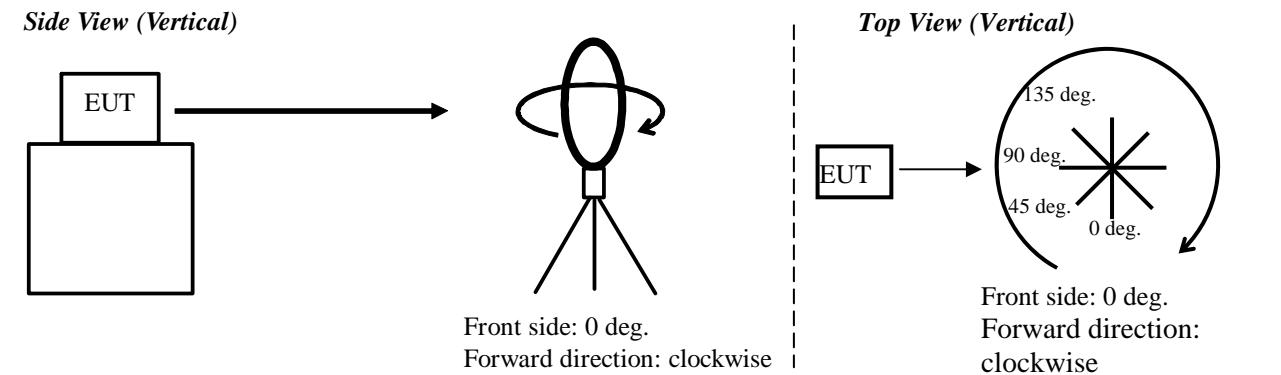
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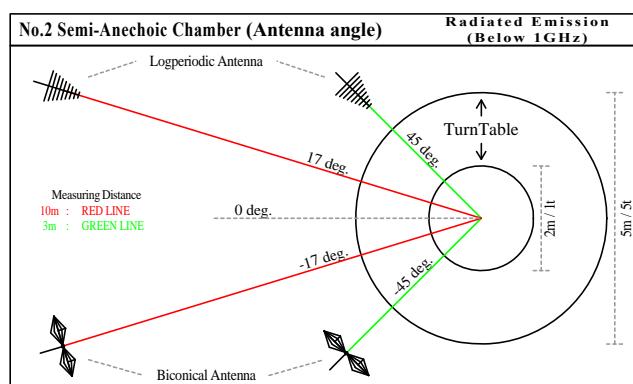
Facsimile : +81 463 50 6401

Figure 1. Direction of the Loop Antenna



Antenna was not rotated.

Figure 2. Antenna angle



#### 6.4 Results

Summary of the test results : Pass

Refer to APPENDIX 1

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

### **Test procedure**

The test was measured with a spectrum analyzer using a test fixture.

### **Results**

Summary of the test results: Pass  
Refer to APPENDIX 1

## **SECTION 8: Frequency Tolerance**

### **Test procedure**

The test was measured with a frequency counter using a test fixture.

The temperature test was started after the temperature stabilization time of 30 minutes.

The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

### **Results**

Summary of the test results: Pass  
Refer to APPENDIX 1

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# DATA OF CONDUCTED EMISSION TEST

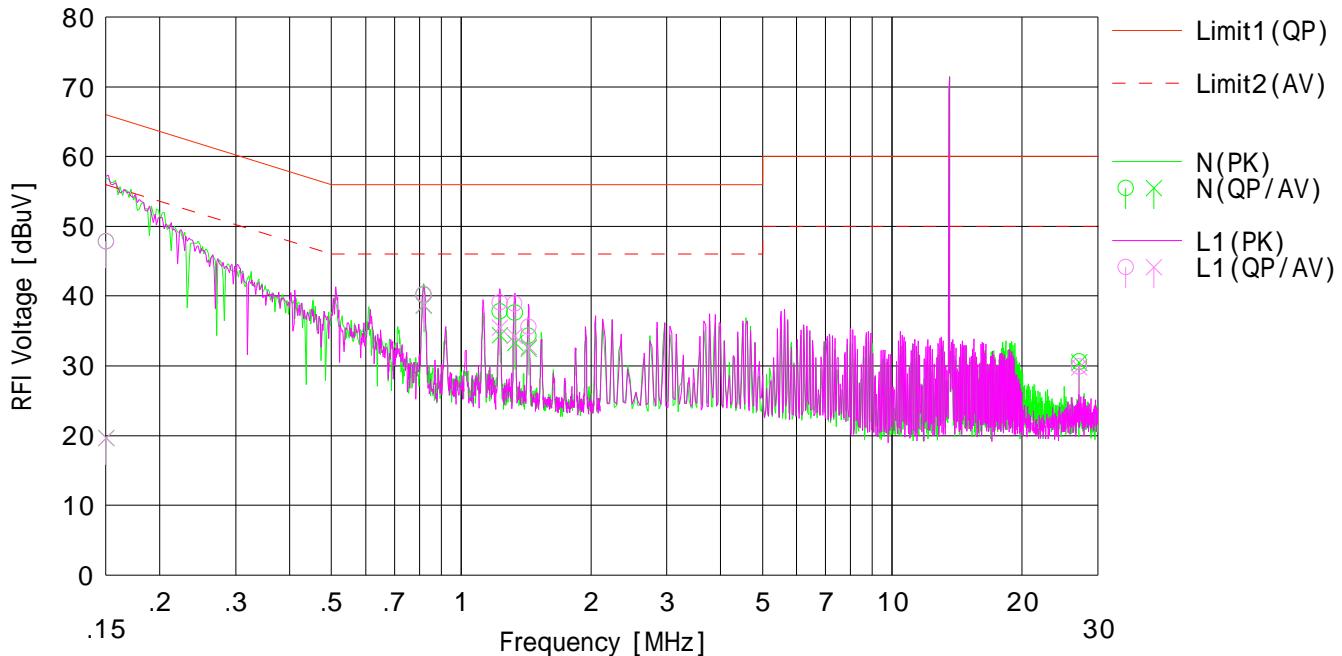
UL Japan,Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2017/06/20

Company : SEGA Interactive Co., Ltd.  
Kind of EUT : NFC RW LED BD EXP  
Model No. : 837-20002  
Serial No. : 002  
Remarks : FeliCa

Mode : Transmitting with Card  
Report No. : 11823786S  
Power : DC 5 V  
Temp./Humi. : 24 deg.C. / 56 %RH

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

Engineer : Hiroyuki Morikawa



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	0.15000	35.10	6.90	12.76	47.86	19.66	66.00	56.00	18.1	36.3	N	
2	0.81922	27.30	25.80	12.86	40.16	38.66	56.00	46.00	15.8	7.3	N	
3	1.23121	24.90	21.50	12.87	37.77	34.37	56.00	46.00	18.2	11.6	N	
4	1.33415	24.70	20.40	12.89	37.59	33.29	56.00	46.00	18.4	12.7	N	
5	1.43645	21.40	19.60	12.90	34.30	32.50	56.00	46.00	21.7	13.5	N	
6	27.12000	16.40	16.30	14.16	30.56	30.46	60.00	50.00	29.4	19.5	N	
7	0.15000	35.10	6.90	12.76	47.86	19.66	66.00	56.00	18.1	36.3	L1	
8	0.81939	27.40	25.90	12.86	40.26	38.76	56.00	46.00	15.7	7.2	L1	
9	1.22919	26.20	22.60	12.87	39.07	35.47	56.00	46.00	16.9	10.5	L1	
10	1.33293	26.00	21.40	12.89	38.89	34.29	56.00	46.00	17.1	11.7	L1	
11	1.43541	22.70	19.80	12.90	35.60	32.70	56.00	46.00	20.4	13.3	L1	
12	27.12000	15.70	15.60	14.16	29.86	29.76	60.00	50.00	30.1	20.2	L1	

Calculation:Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN: SLS-05

# DATA OF CONDUCTED EMISSION TEST

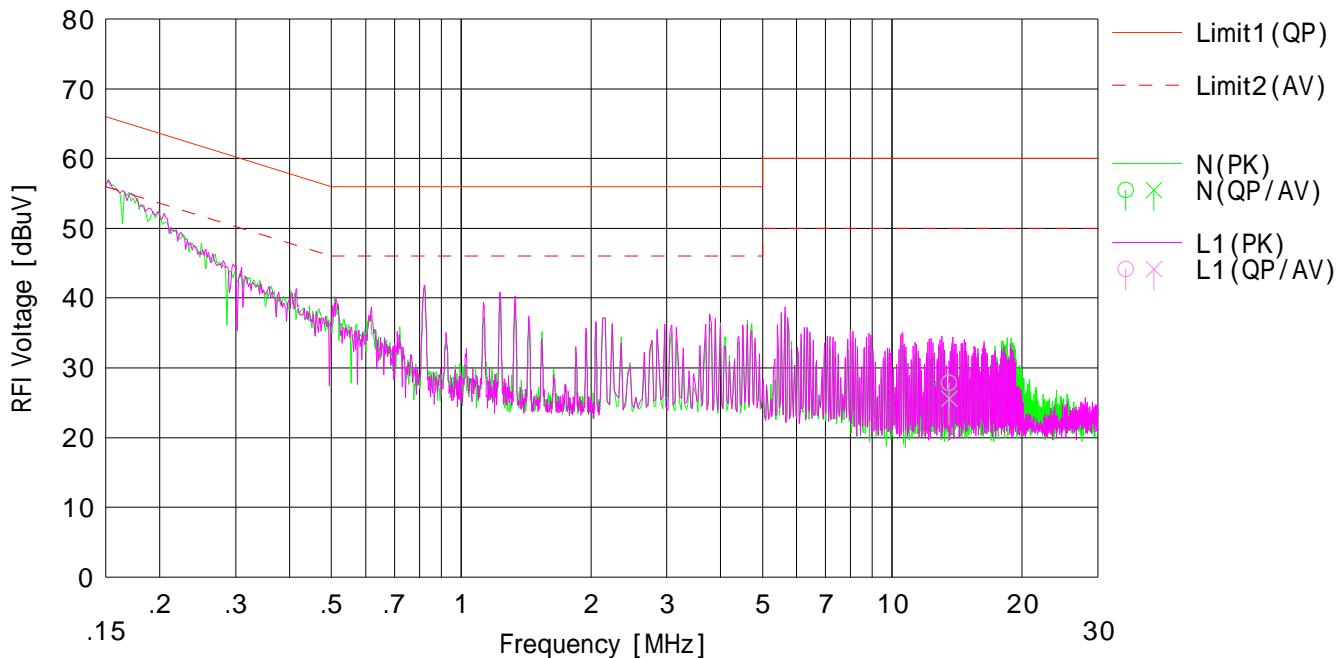
UL Japan,Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2017/06/20

Company : SEGA Interactive Co., Ltd.  
Kind of EUT : NFC RW LED BD EXP  
Model No. : 837-20002  
Serial No. : 003  
Remarks : FeliCa with TAG Antenna Terminated

Mode : Transmitting with Card  
Report No. : 11823786S  
Power : DC 5 V  
Temp./Humi. : 24 deg.C. / 56 %RH

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

Engineer : Hiroyuki Morikawa



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]		
		13.56000	14.20		12.10	13.57	27.77	25.67	60.00	50.00		
1	13.56000	14.20	12.10	13.57	27.77	25.67	60.00	50.00	32.2	24.3	N	
2	13.56000	14.30	12.00	13.57	27.87	25.57	60.00	50.00	32.1	24.4	L1	

Calculation:Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN: SLS-05

## Data of Electric field strength of Fundamental emission and Spurious emission within the band: FCC15.225(a)(b)(c)

UL Japan, Inc.  
Shonan EMC Lab., No.2 Semi Anechoic Chamber

Company:	SEGA Interactive Co., Ltd.	Regulation:	FCC Part15 Subpart C 15.225
Equipment:	NFC RW LED BD EXP	Test Distance:	3m
Model:	837-20002	Date:	June 20, 2017
Sample No.:	001	Temperature:	24 deg C
Power:	DC 5 V	Humidity:	56 %RH
Mode:	Transmitting 13.56 MHz	ENGINEER:	Hiroyuki Morikawa
Remarks:	: FeliCa 212 kbps without TAG (Axis:Hor_Y / Ver_Y), Vertical polarization (antenna angle) of the worst case: 0 deg		

### Fundamental emission

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	68.6	77.8	18.9	6.7	31.9	-40.0	22.2	31.4	83.9	61.7	52.5

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Distance factor:  $40 \times \log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$

Limits (30 m)

• 13.553 MHz to 13.567 MHz : 83.9 dBuV/m (FCC 15.225(a))

### Spurious emission within the band

No.	FREQ [MHz]	Test Receiver Reading		Antenna Factor	Loss [dB]	AMP GAIN [dB]	Distance factor [dB]	RESULT		LIMIT (30m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]					Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.110	30.0	30.0	19.0	6.6	31.9	-40.0	-16.3	-16.3	29.5	45.8	45.8
2	13.410	31.7	36.9	18.9	6.7	31.9	-40.0	-14.7	-9.46	40.5	55.2	50.0
3	13.553	52.7	61.9	18.9	6.7	31.9	-40.0	6.3	15.5	50.4	44.1	34.9
4	13.567	54.6	63.7	18.9	6.7	31.9	-40.0	8.2	17.3	50.4	42.2	33.1
5	13.710	33.2	39.9	18.8	6.7	31.9	-40.0	-13.2	-6.53	40.5	53.7	47.0
6	14.010	30.1	30.1	18.8	6.7	31.9	-40.0	-16.4	-16.39	29.5	45.9	45.9

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]+Distance factor[dB]

Outside filed strength frequencies

- $F_c \pm 7 \text{ kHz}$ : 13.553 MHz to 13.567 MHz
- $F_c \pm 150 \text{ kHz}$ : 13.410 MHz to 13.710 MHz
- $F_c \pm 450 \text{ kHz}$ : 13.110 MHz to 14.010 MHz

$F_c = 13.56 \text{ MHz}$

Limits (30 m)

- 13.410 MHz to 13.553 MHz and 13.567 MHz to 13.710 MHz : 50.4 dBuV/m (FCC 15.225(b))
- 13.110 MHz to 13.410 MHz and 13.710 MHz to 14.010 MHz : 40.5 dBuV/m (FCC 15.225(c))
- Below 13.110 MHz and Above 14.010 MHz : 29.5 dBuV/m (FCC 15.225(d) and FCC 15.209)

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## Radiated Emission

UL Japan, Inc.  
Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: SEGA Interactive Co., Ltd.  
 Equipment: NFC RW LED BD EXP  
 Model: 837-20002  
 Sample No.: 001 (Below 30 MHz), 002 (Above 30 MHz)  
 Power: DC 5 V  
 Mode: Transmitting 13.56 MHz  
 EUT axis: Below 30 MHz (Horizontal Y-axis, Vertical Y-axis), FeliCa, without Tag  
                   Above 30 MHz (Horizontal: X-axis, Vertical: Y-axis), FeliCa, with Tag  
 Remarks:

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	29.7	18.6	7.0	31.9	-40.0	-16.7	29.5	46.2	-	0	* Limit: 30m
Hori.	40.680	QP	30.9	14.2	7.1	31.9	0.0	20.2	40.0	19.8	221	84	
Hori.	94.920	QP	43.9	9.1	8.1	31.9	0.0	29.3	43.5	14.2	195	60	
Hori.	122.040	QP	43.2	13.1	8.0	31.8	0.0	32.5	43.5	11.0	254	53	
Hori.	149.160	QP	48.1	14.8	8.6	31.8	0.0	39.7	43.5	3.8	213	58	
Hori.	176.280	QP	40.8	16.0	8.8	31.8	0.0	33.8	43.5	9.7	181	41	
Hori.	203.400	QP	39.2	11.4	5.9	31.8	0.0	24.7	43.5	18.8	133	309	
Vert.	27.12	QP	29.5	18.6	7.0	31.9	-40.0	-16.9	29.5	46.4	-	0	* Limit: 30m
Vert.	40.680	QP	39.1	14.2	7.1	31.9	0.0	28.4	40.0	11.6	100	191	
Vert.	94.920	QP	46.0	9.1	8.1	31.9	0.0	31.4	43.5	12.1	100	122	
Vert.	122.040	QP	41.4	13.1	8.0	31.8	0.0	30.7	43.5	12.8	100	355	
Vert.	149.160	QP	41.9	14.8	8.6	31.8	0.0	33.5	43.5	10.0	135	175	
Vert.	176.280	QP	36.1	16.0	8.8	31.8	0.0	29.1	43.5	14.4	100	355	
Vert.	203.400	QP	36.7	11.4	5.9	31.8	0.0	22.2	43.5	21.3	135	175	

Result = Reading + Ant Factor + Loss (Cable+ATT+ΔAF(above 30MHz)) - Gain(Amprifier) + Distance factor(below 30MHz)

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

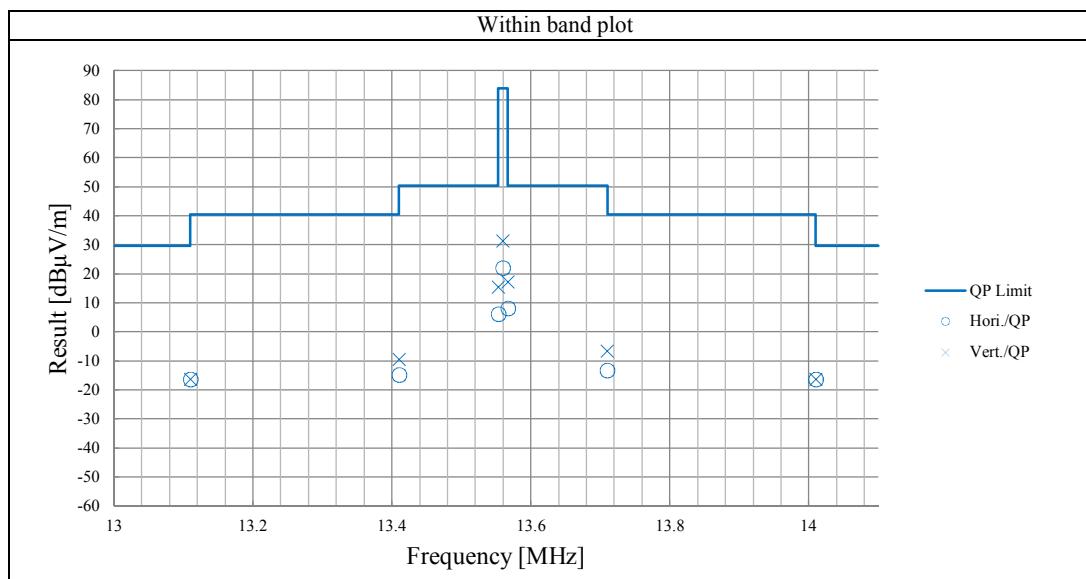
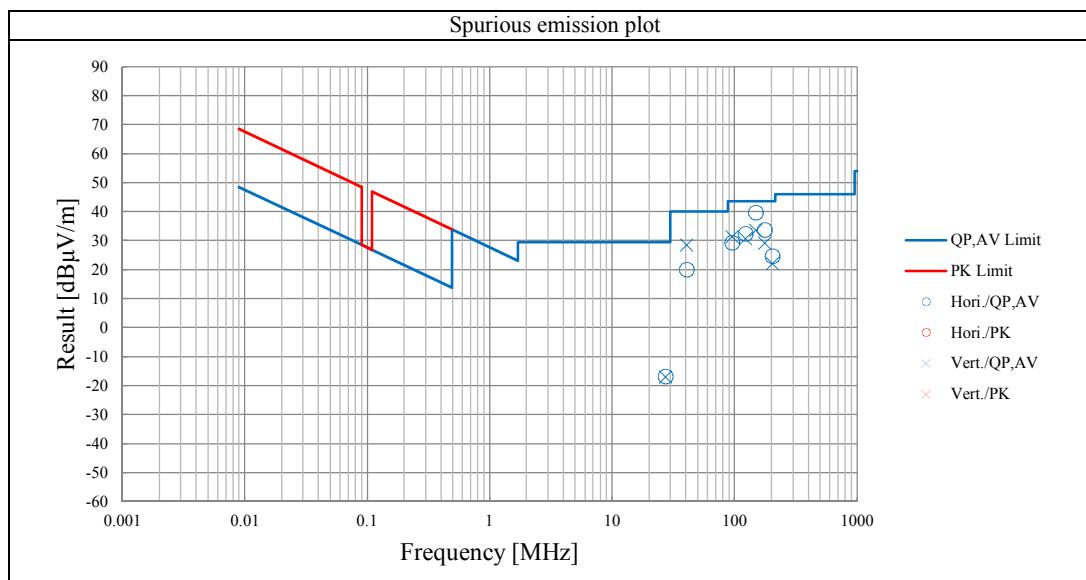
\* Carrier level (Result at 3m): Hor= 62.2dBuV/m, Ver= 71.4 dBuV/m

## Radiated Emission (Worst mode plot)

UL Japan, Inc.  
Shonan EMC Lab. No.2 Semi Anechoic Chamber

Company: SEGA Interactive Co., Ltd  
Equipment: NFC RW LED BD EXP  
Model: 837-20002  
Sample No.: 001 (Below 30 MHz), 002 (Above 30 MHz)  
Power: DC 5 V  
Mode: Transmitting 13.56 MHz  
EUT axis: Below 30 MHz (Horizontal Y-axis, Vertical Y-axis), FeliCa, without Tag  
Above 30 MHz (Horizontal: X-axis, Vertical: Y-axis), FeliCa, with Tag  
Remarks: These plots data contains sufficient number to show the trend of characteristic features for EUT.

Regulation: FCC Part15 Subpart C 15.225  
Test Distance: 3m  
Date: June 20, 2017  
Temperature: 24 deg.C  
Humidity: 56 %RH  
ENGINEER: Hiroyuki Morikawa



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## Data of Frequency Tolerance

UL Japan, Inc.  
Shonan EMC Lab. No.5 Shielded room

Company	SEGA Interactive Co., Ltd.	Regulation	FCC Part15 Subpart C 15.225 (e)
Equipment	NFC RW LED BD EXP	Date	June 21, 2017
Model	837-20002	Temperature	25 deg.C
Serial No.	002	Humidity	43 %RH
Power	DC 5 V	ENGINEER	Yosuke Ishikawa
Mode	Transmitting 13.56 MHz		

### Temperature Variation: -20 deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560155	0.000155	0.00114	0.010
after 2minutes	13.56	13.560182	0.000182	0.00134	0.010
after 5minutes	13.56	13.560183	0.000183	0.00135	0.010
after 10minutes	13.56	13.560183	0.000183	0.00135	0.010

### Temperature Variation: -10 deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560203	0.000203	0.00150	0.010
after 2minutes	13.56	13.560206	0.000206	0.00152	0.010
after 5minutes	13.56	13.560206	0.000206	0.00152	0.010
after 10minutes	13.56	13.560206	0.000206	0.00152	0.010

### Temperature Variation: 0 deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560208	0.000208	0.00153	0.010
after 2minutes	13.56	13.560205	0.000205	0.00151	0.010
after 5minutes	13.56	13.560205	0.000205	0.00151	0.010
after 10minutes	13.56	13.560205	0.000205	0.00151	0.010

### Temperature Variation: 10 deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560200	0.000200	0.00147	0.010
after 2minutes	13.56	13.560187	0.000187	0.00138	0.010
after 5minutes	13.56	13.560187	0.000187	0.00138	0.010
after 10minutes	13.56	13.560187	0.000187	0.00138	0.010

### Temperature Variation: 20 deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560178	0.000178	0.00131	0.010
after 2minutes	13.56	13.560161	0.000161	0.00119	0.010
after 5minutes	13.56	13.560161	0.000161	0.00119	0.010
after 10minutes	13.56	13.560161	0.000161	0.00119	0.010

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## Data of Frequency Tolerance

### **Temperature Variation: 30 deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560151	0.000151	0.00112	0.010
after 2minutes	13.56	13.560133	0.000133	0.00098	0.010
after 5minutes	13.56	13.560132	0.000132	0.00098	0.010
after 10minutes	13.56	13.560132	0.000132	0.00098	0.010

### **Temperature Variation: 40 deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560117	0.000117	0.00087	0.010
after 2minutes	13.56	13.560109	0.000109	0.00080	0.010
after 5minutes	13.56	13.560108	0.000108	0.00080	0.010
after 10minutes	13.56	13.560108	0.000108	0.00080	0.010

### **Temperature Variation: 50 deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560102	0.000102	0.00075	0.010
after 2minutes	13.56	13.560098	0.000098	0.00072	0.010
after 5minutes	13.56	13.560098	0.000098	0.00073	0.010
after 10minutes	13.56	13.560099	0.000099	0.00073	0.010

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## Data of Frequency Tolerance

UL Japan, Inc.  
Shonan EMC Lab. No.5 Shielded room

Company	SEGA Interactive Co., Ltd.	Regulation	FCC Part15 Subpart C 15.225 (e)
Equipment	NFC RW LED BD EXP	Date	June 21, 2017
Model	837-20002	Temperature	25 deg.C
Serial No.	002	Humidity	43 %RH
Power	DC 5 V	ENGINEER	Yosuke Ishikawa
Mode	Transmitting 13.56 MHz		

**Voltage Variation: DC 4.25 V**

**Temperature Variation: 20 deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560176	0.000176	0.00130	0.010
after 2minutes	13.56	13.560166	0.000166	0.00122	0.010
after 5minutes	13.56	13.560166	0.000166	0.00122	0.010
after 10minutes	13.56	13.560166	0.000166	0.00122	0.010

**Voltage Variation: DC 5.75 V**

**Temperature Variation: 20 deg.C**

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.560176	0.000176	0.00130	0.010
after 2minutes	13.56	13.560156	0.000156	0.00115	0.010
after 5minutes	13.56	13.560155	0.000155	0.00115	0.010
after 10minutes	13.56	13.560155	0.000155	0.00115	0.010

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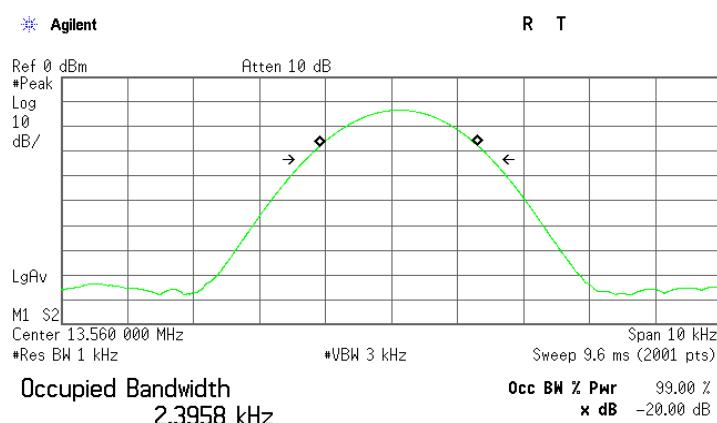
## 20dB bandwidth & 99% Occupied bandwidth: FCC 15.215 / RSS-Gen

Company: SEGA Interactive Co., Ltd.  
 Equipment: NFC RW LED BD EXP  
 Model: 837-20002  
 Sample No.: 002  
 Power: DC 5 V  
 Mode: Transmitting 13.56 MHz  
       : FeliCa 212 kbps without TAG

UL Japan, Inc.  
Shonan EMC Lab. No.5 Shielded Room

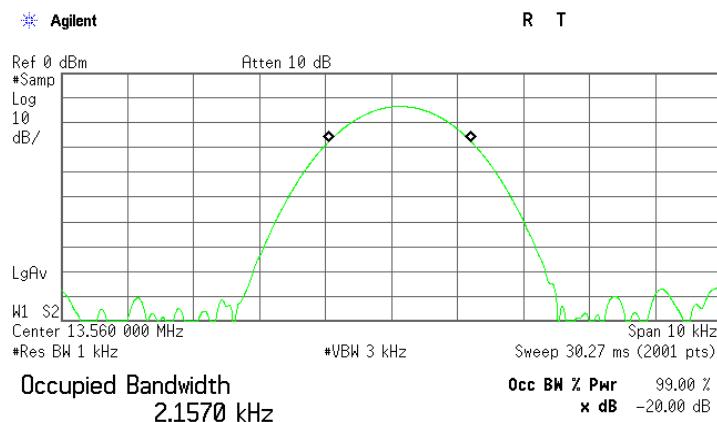
Regulation: FCC Part15 Subpart C 15.215  
 Date: June 21, 2017  
 Temperature: 25 deg.C  
 Humidity: 43 %RH  
 ENGINEER: Yosuke Ishikawa

**20dB Bandwidth:** 2.823 kHz



Transmit Freq Error 111.389 Hz  
 Occupied Bandwidth 2.823 kHz

**99% Occupied Bandwidth:** 2.157 kHz



Transmit Freq Error 128.864 Hz  
 x dB Bandwidth 2.545 kHz\*

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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)
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2017/02/09 * 12
SAT6-02	Attenuator	JFW	50HF-006N	—	RE	2017/02/09 * 12
KAT3-10	Attenuator	JFW IND. INC.	50HF-003N	—	RE	2016/07/26 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2016/11/23 * 12
SCC-B1/B3/B5 /B7/B8/B13/S RSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE /141PE/NS4906	—/0901-270(RF Selector)	RE	2017/04/07 * 12
SCC-B2/B4/B6 /B7/B8/B13/S RSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/14 1PE/141PE/141PE /141PE/NS4906	—/0901-270(RF Selector)	RE	2017/04/07 * 12
SLA-06	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	RE	2017/01/05 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2016/10/12 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE, CE	2016/09/28 * 12
SJM-09	Measure	PROMART	SEN1935	—	RE, CE	—
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2017/06/08 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	—	RE, CE	—
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE, CE	2017/03/08 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2016/10/28 * 12
SAT6-12	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	—	RE	2016/08/04 * 12
SCC-B12/B13/ SRSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/N S4906	—/0901-270(RF Selector)	CE	2017/04/07 * 12
SLS-04	LISN	Rohde & Schwarz	ENV216	100514	CE	2017/02/27 * 12
SAT3-06	Attenuator	JFW	50HF-003N	—	CE	2017/02/09 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2016/12/13 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	TF	2016/09/26 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	TF	Pre Check
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2017/04/17 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	TF	2016/12/13 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	TF	2016/10/17 * 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,  
TF: Test Fixture