

FCC Test Report

Product Name	10.7MHz Communication Unit
Model No.	EFC-SPLC-02S
FCC ID.	2AM4X-EFC-SPLC-02S

Applicant	Panasonic Corporation
Address	1006 Kadoma, Kadoma City, Osaka 571-8506, Japan

Date of Receipt	Jul. 24, 2017
Issued Date	Aug. 02, 2017
Report No.	1770344R-RFUSP20V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Product Name	10.7MHz Communication Unit
Applicant	Panasonic Corporation
Address	1006 Kadoma, Kadoma City, Osaka 571-8506, Japan
Manufacturer	Panasonic Corporation
Model No.	EFC-SPLC-02S
FCC ID.	2AM4X-EFC-SPLC-02S
EUT Rated Voltage	DC 6V (Power by Battery)
EUT Test Voltage	DC 6V (Power by Battery)
Trade Name	Panasonic
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	10.7MHz Communication Unit
Trade Name	Panasonic
Model No.	EFC-SPLC-02S
FCC ID.	2AM4X-EFC-SPLC-02S
Frequency Range	10.7MHz
Type of Modulation	ASK
Type of antenna	Case-attached metal flat type
Number of Channel	1

Frequency of Each Channel:

Channel	Frequency
1	10.7MHz

Note:

1. The EUT is a 10.7MHz Communication Unit with a built-in 10.7MHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.209
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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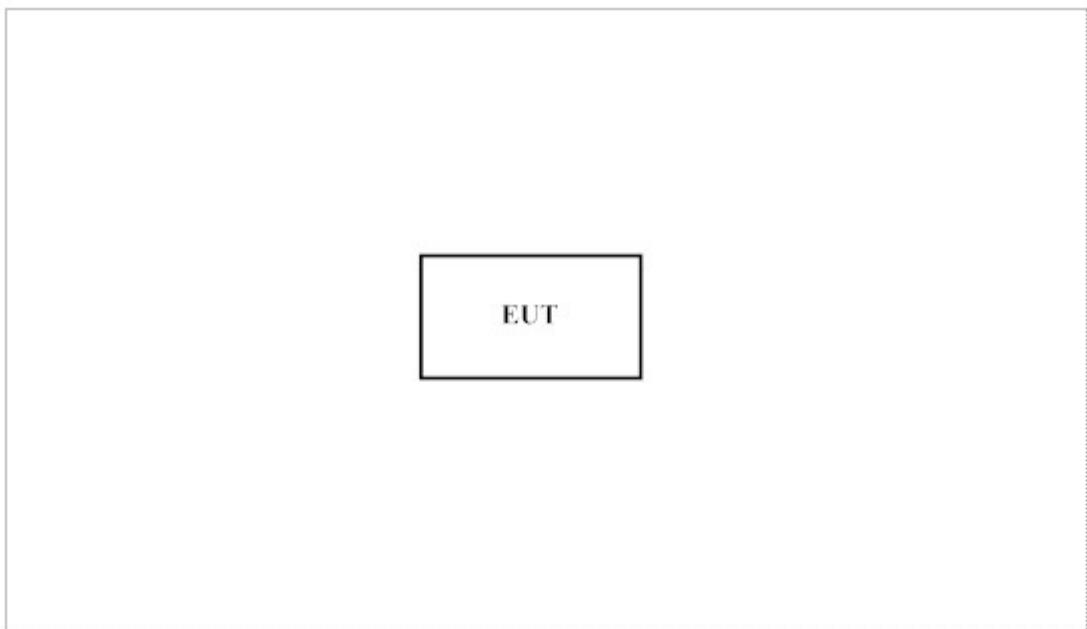
1.3. Test System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
		N/A		

Signal Cable Type	Signal cable Description
	N/A

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Provide power supply and press the button of EUT.
- (3) Start the continuous transmitter.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
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FCC Accreditation Number: TW3023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
X	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
X	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.24	2018.05.23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Radiated measurements /ACB1

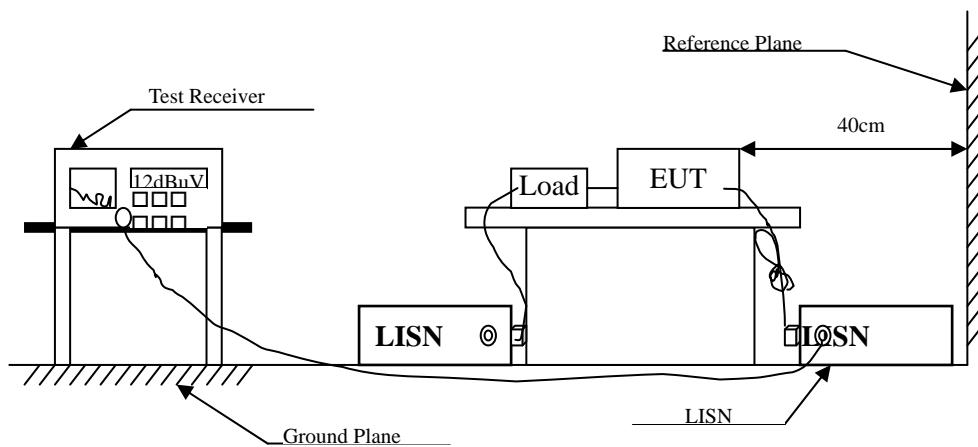
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	TESEQ	HLA6121	37133	2016.03.18	2018.03.17
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.09	2018.02.08
	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.14	2018.05.13
	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.15	2018.05.14
	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.15	2018.05.14
	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

Note:

1. Loop Antenna is calibrated every two year, the other equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 _(註)	56-46 _(註)
0.50-5.0	56	46
5.0 - 30	60	50

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.35 dB

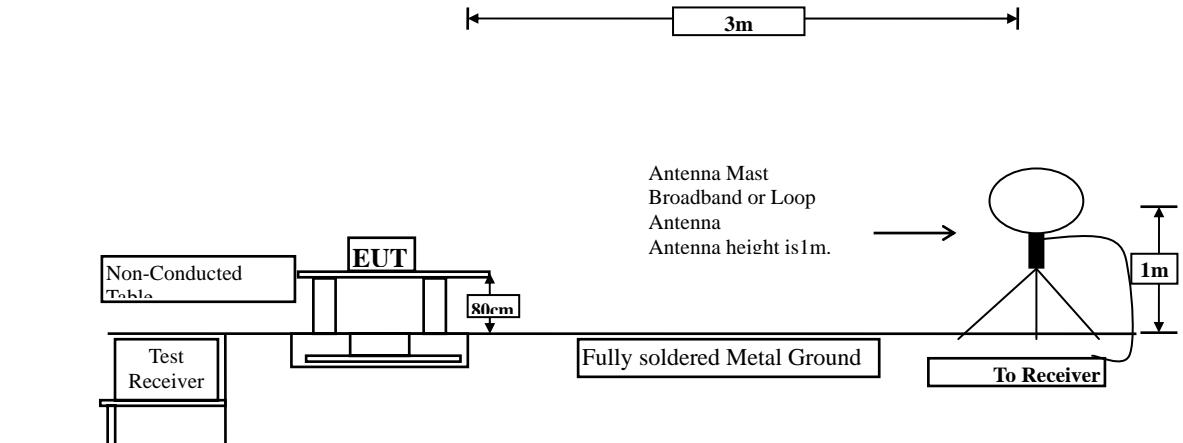
2.5. Test Result of Conducted Emission

Owing to the Battery operation of EUT, this test item is not performed.

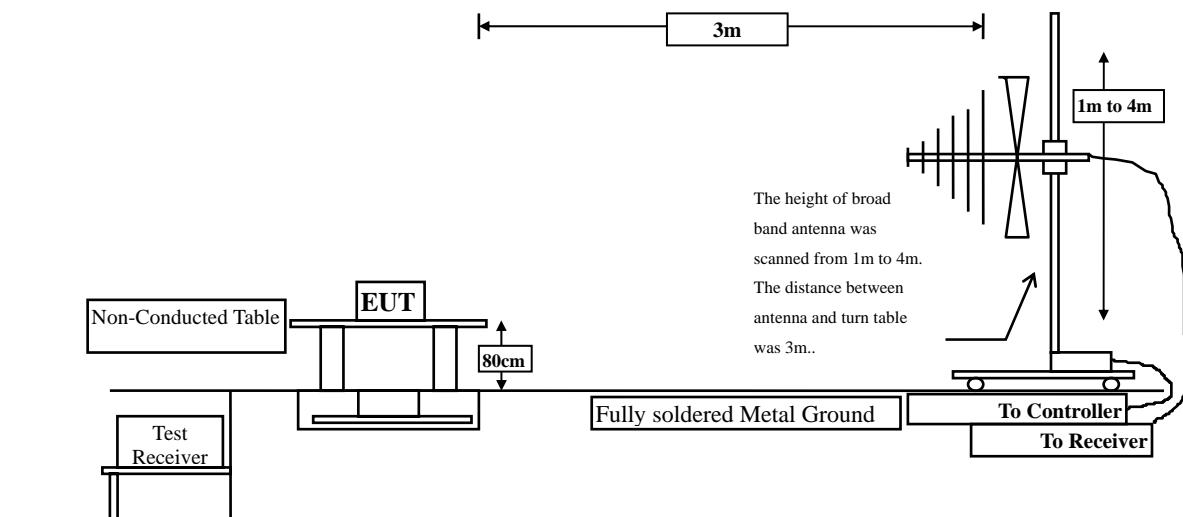
3. Radiated Emission

3.1. Test Setup

Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



3.2. Limits

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks : 1. RF Voltage (dBuV) = $20 \log \text{RF Voltage (uV)}$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.209 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz. Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Uncertainty

Horizontal :

30-300MHz: $\pm 4.08\text{dB}$; 300M-1GHz: $\pm 3.86\text{dB}$.

Vertical :

30-300MHz: $\pm 4.81\text{dB}$; 300M-1GHz: $\pm 3.87\text{dB}$.

3.5. Test Result of Radiated Emission

Product : 10.7MHz Communication Unit
 Test Item : Radiated Emission
 Test date : 2017/08/01
 Test Mode : Mode 1: Transmit

Fundamental

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
X-axis					
Horizontal					
10.700	15.491	5.800	21.291	-48.249	69.540
Vertical					
10.700	15.491	7.600	23.091	-46.449	69.540
Y-axis					
Horizontal					
10.700	15.491	5.900	21.391	-48.149	69.540
Vertical					
10.700	15.491	5.700	21.191	-48.349	69.540
Z-axis					
Horizontal					
10.700	15.491	5.600	21.091	-48.449	69.540
Vertical					
10.700	15.491	5.400	20.891	-48.649	69.540

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. Measurement Level = Reading Level + Correct Factor.

Product : 10.7MHz Communication Unit
 Test Item : Radiated Emission
 Test date : 2017/08/01
 Test Mode : Mode 1: Transmit

9kHz~30MHz

Frequency MHz	Correct Factor	Reading dB	Measurement Level dBuV	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
21.400	4.120	5.300	9.420	-60.120	69.540
Vertical					
21.400	4.120	5.200	9.320	-60.220	69.540

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. “” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : 10.7MHz Communication Unit
 Test Item : General Radiated Emission
 Test date : 2017/07/29
 Test Mode : Mode 1: Transmit

30MHz~1GHz

Frequency MHz	Correct Factor	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
51.087	-11.013	30.952	19.939	-20.061	40.000
153.710	-10.677	30.624	19.947	-23.553	43.500
268.986	-11.099	30.333	19.234	-26.766	46.000
315.252	0.000	20.021	20.021	-25.979	46.000
485.485	-5.798	25.428	19.630	-26.370	46.000
600.025	0.000	19.852	19.852	-26.148	46.000
Vertical					
59.522	-11.878	30.611	18.733	-21.267	40.000
129.812	-12.067	31.735	19.668	-23.832	43.500
184.638	-12.916	32.568	19.651	-23.849	43.500
356.251	-8.800	28.680	19.880	-26.120	46.000
458.251	-6.271	26.304	20.033	-25.967	46.000
850.014	-0.062	19.387	19.326	-26.674	46.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.