

# FCC Test Report

Product Name	10.7MHz Communication Unit
Model No.	EFC-TIDA-T1
FCC ID.	2AM4X-EFC-TIDA-T1

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

Date of Receipt	Mar. 13, 2018
Issued Date	Mar. 23, 2018
Report No.	1830172R-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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# Test Report

Issued Date: Mar. 23, 2018

Report No.: 1830172R-RFUSP20V00



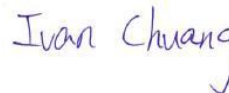
Product Name	10.7MHz Communication Unit
Applicant	Panasonic Corporation
Address	1006 Kadoma, Kadoma City, Osaka 571-8506, Japan
Manufacturer	Panasonic Corporation
Model No.	EFC-TIDA-T1
FCC ID.	2AM4X-EFC-TIDA-T1
EUT Rated Voltage	DC 5V (Power by USB) or DC 3.8V (Power by Battery)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	Panasonic
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



( Senior Adm. Specialist / Joanne Lin )

Tested By :



( Senior Engineer / Ivan Chuang )

Approved By :



( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	10.7MHz Communication Unit
Trade Name	Panasonic
Model No.	EFC-TIDA-T1
FCC ID.	2AM4X-EFC-TIDA-T1
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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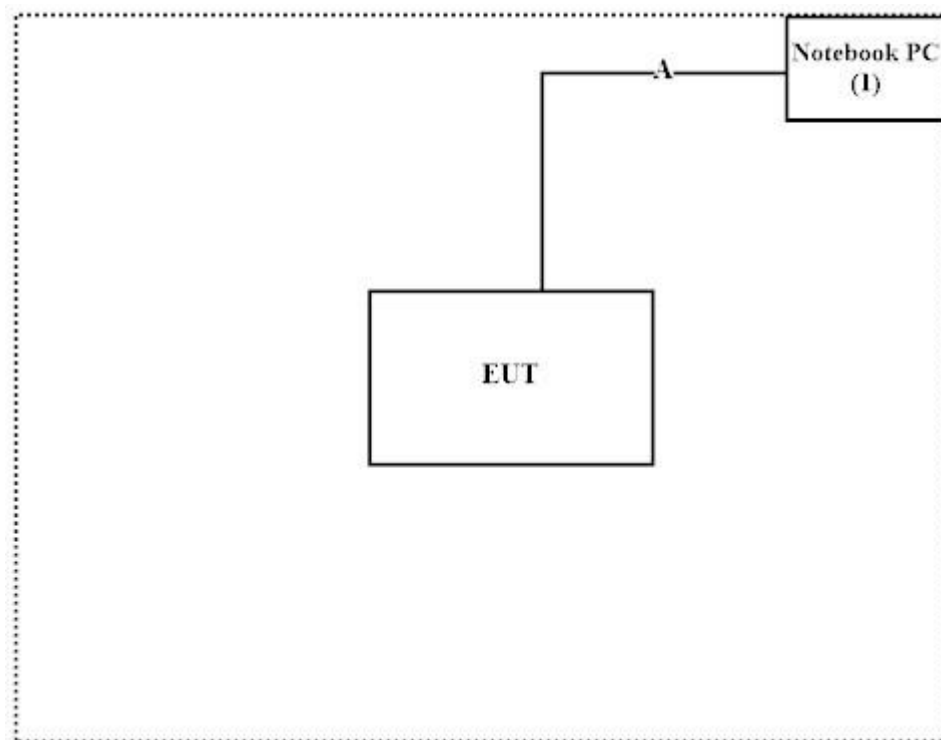
### 1.3. Test System Details

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
(1) Notebook PC	DELL	P62G	CY9FJC2	N/A

Signal Cable Type	Signal cable Description
A USB Cable	Non-Shielded, 0.3m

### 1.4. Configuration of Test System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) 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](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	101601	2018.02.08	2019.02.07
X	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
X	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
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

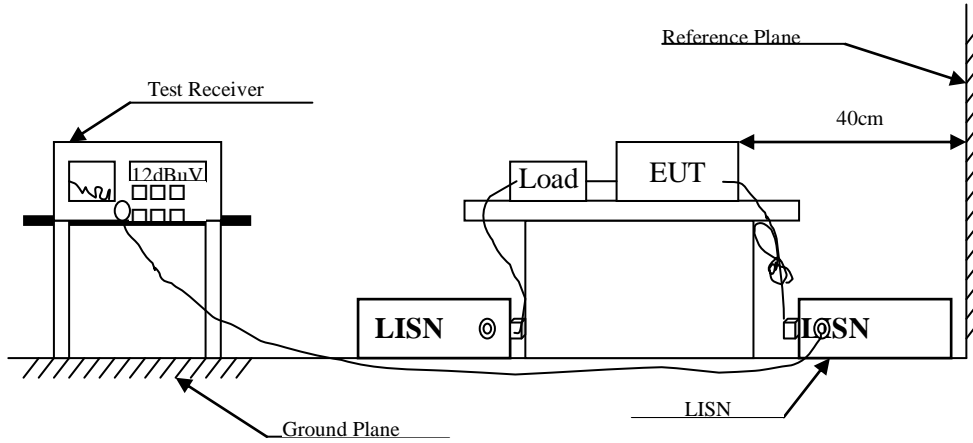
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2017.06.01	2018.05.31
	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
	Filter	MICRO TRONICS	BRM50702	G251	2017.08.30	2018.08.29
	Filter	MICRO TRONICS	BRM50716	G188	2017.08.30	2018.08.29
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

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

## 2. Conducted Emission

### 2.1. Test Setup



### 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB $\mu$ V) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 <sup>(註)</sup>	56-46 <sup>(註)</sup>
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 investigated 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

Product : 10.7MHz Communication Unit  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test date : 2018/03/15  
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V	Margin dB	Limit dB $\mu$ V
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.159	9.631	35.216	44.847	-20.896	65.743
0.300	9.686	32.477	42.163	-19.551	61.714
0.540	9.700	25.801	35.501	-20.499	56.000
2.400	9.764	17.011	26.775	-29.225	56.000
7.800	9.895	17.488	27.383	-32.617	60.000
20.000	10.070	22.937	33.007	-26.993	60.000
<b>Average</b>					
0.159	9.631	8.085	17.716	-38.027	55.743
0.300	9.686	17.018	26.705	-25.009	51.714
0.540	9.700	10.534	20.234	-25.766	46.000
2.400	9.764	5.387	15.151	-30.849	46.000
7.800	9.895	6.703	16.598	-33.402	50.000
20.000	10.070	16.772	26.842	-23.158	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : 10.7MHz Communication Unit  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test date : 2018/03/15  
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V	Margin dB	Limit dB $\mu$ V
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.157	9.618	37.386	47.004	-18.796	65.800
0.310	9.684	30.094	39.778	-21.651	61.429
0.550	9.692	25.898	35.591	-20.409	56.000
2.300	9.762	18.201	27.963	-28.037	56.000
7.800	9.895	16.642	26.537	-33.463	60.000
20.000	10.090	22.940	33.030	-26.970	60.000
<b>Average</b>					
0.157	9.618	8.693	18.311	-37.489	55.800
0.310	9.684	15.345	25.029	-26.400	51.429
0.550	9.692	11.170	20.862	-25.138	46.000
2.300	9.762	5.561	15.323	-30.677	46.000
7.800	9.895	7.007	16.902	-33.098	50.000
20.000	10.090	16.808	26.898	-23.102	50.000

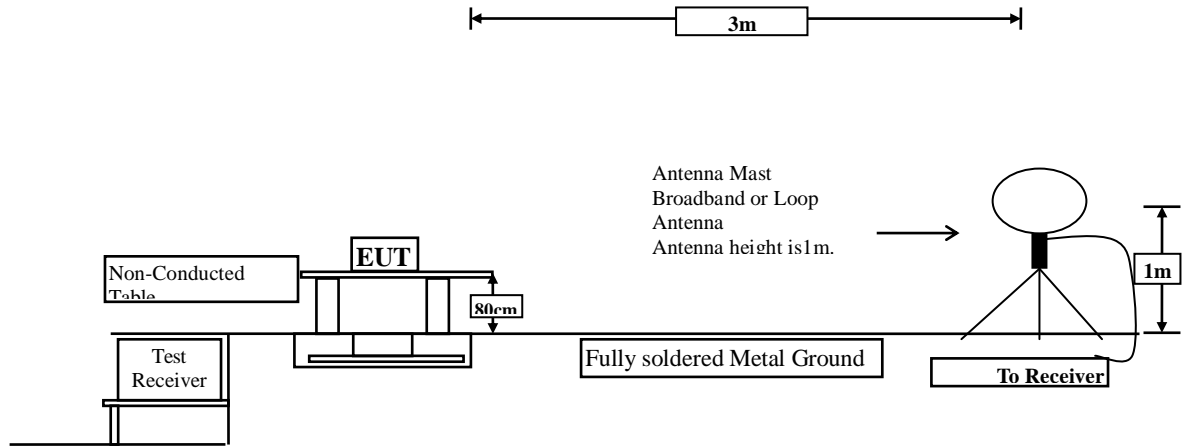
## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

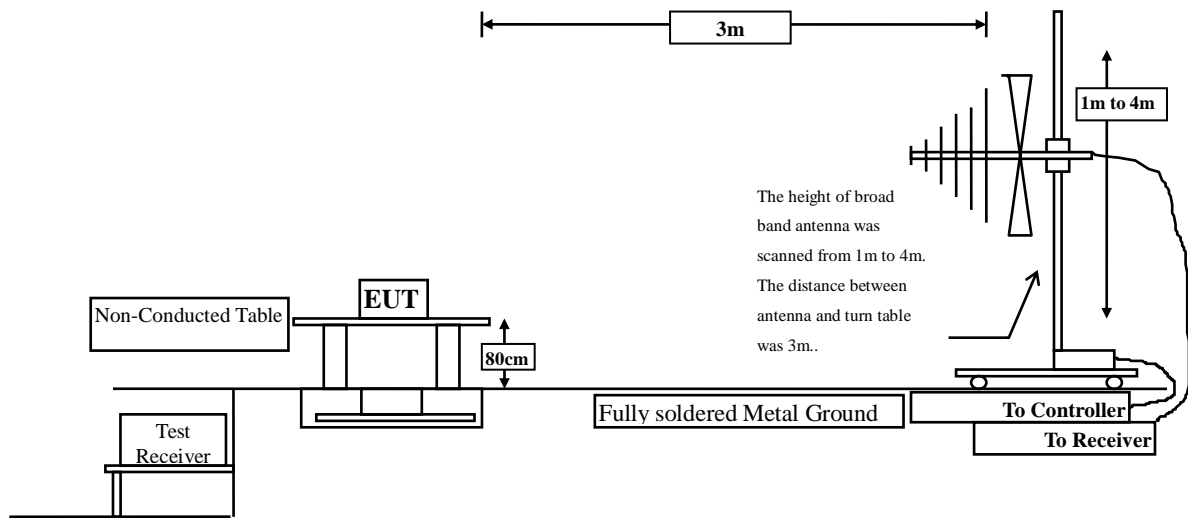
### 3. Radiated Emission

#### 3.1. Test Setup

Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



### 3.2. Limits

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
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 (dB $\mu$ V) = 20 log 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 form 9kHz - 10th Harmonic of fundamental was investigated.

### 3.4. Uncertainty

Horizontal :

30-300MHz:  $\pm 4.08$ dB ; 300M-1GHz:  $\pm 3.86$ dB ◦

Vertical :

30-300MHz:  $\pm 4.81$ dB ; 300M-1GHz:  $\pm 3.87$ dB ◦

### 3.5. Test Result of Radiated Emission

Product : 10.7MHz Communication Unit  
 Test Item : Radiated Emission  
 Test date : 2018/03/16  
 Test Mode : Mode 1: Transmit

#### Fundamental

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Quasi-Peak</b>					
<b>X-axis</b>					
<b>Horizontal</b>					
10.700	20.542	15.020	35.562	-33.978	69.540
<b>Vertical</b>					
10.700	20.542	18.800	39.342	-30.198	69.540
<b>Y-axis</b>					
<b>Horizontal</b>					
10.700	20.542	15.020	35.562	-33.978	69.540
<b>Vertical</b>					
10.700	20.542	19.110	39.652	-29.888	69.540
<b>Z-axis</b>					
<b>Horizontal</b>					
10.700	20.542	13.710	34.252	-35.288	69.540
<b>Vertical</b>					
10.700	20.542	17.950	38.492	-31.048	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 : 2018/03/16  
 Test Mode : Mode 1: Transmit

**9kHz~30MHz**

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Quasi-Peak</b>					
<b>Horizontal</b>					
21.400	20.308	5.360	25.668	-43.872	69.540
<b>Vertical</b>					
21.400	20.308	3.580	23.888	-45.652	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 : 2018/03/16  
 Test Mode : Mode 1: Transmit

**30MHz~1GHz**

Frequency MHz	Correct Factor dB	Reading Level dB $\mu$ V	Measurement Level dB $\mu$ V/m	Margin dB	Limit dB $\mu$ V/m
<b>Quasi-Peak</b>					
<b>Horizontal</b>					
100.290	-15.823	38.983	23.160	-20.340	43.500
117.159	-13.328	36.266	22.938	-20.562	43.500
202.913	-13.362	37.034	23.672	-19.828	43.500
263.362	-11.221	36.941	25.720	-20.280	46.000
309.754	-9.681	38.599	28.918	-17.082	46.000
353.333	-8.662	35.274	26.612	-19.388	46.000
<b>Vertical</b>					
42.652	-10.960	32.273	21.313	-18.687	40.000
143.870	-10.829	30.936	20.107	-23.393	43.500
198.696	-13.469	35.213	21.743	-21.757	43.500
284.449	-10.248	30.155	19.907	-26.093	46.000
325.217	-9.330	29.715	20.385	-25.615	46.000
351.928	-8.702	30.184	21.482	-24.518	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.