

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Fax: +82-31-624-9501

Report No.:
CTK-2017-00551
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1. Client

- Name : RT Tech Co., Ltd.
- Address : 1104, 271, Digital-ro, Guro-gu, Seoul, Republic of KOREA
- Date of Receipt : 2017-02-17



2. Manufacturer

- Name : RT Tech Co., Ltd.
- Address : 1104, 271, Digital-ro, Guro-gu, Seoul, Republic of KOREA

3. Use of Report : For FCC DoC Report

4. Test Sample / Model: Wireless Charging Pad / RT-A300FT

5. Date of Test : 2017-03-21

6. FCC ID : 2ALH5-PRESTO-A300FT

7. Test Standard(method) used : FCC Part 18 Subpart C

8. Testing Environment: refer to 10 pages to 18 pages

9. Test Results : refer to 11 pages to 18 pages

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Approved by
	Park Sangkyun: (Signature) EMC Test Engineer	Lee Eunwon: (Signature) Technical Manager

2017-03-28

Republic of KOREA **CTK Co., Ltd.**



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REPORT REVISION HISTORY

Date	Revision	Page No
2017-03-28	Issued (CTK-2017-00551)	All

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1.0 General Product Description


No.	ITEM		APPLICATION	
1	Test Sample		Wireless Charging Pad	
2	Model		RT-A300FT	
3	Variant Model		-	
4	Dimensions (W x L x H)		266.00 mm × 235.49 mm × 29.00 mm	
5	Mobility		<input checked="" type="checkbox"/> Table-top <input type="checkbox"/> Floor-standing <input type="checkbox"/> Built-in <input type="checkbox"/> Portable	
6	Maximum Clock Frequency		6.78 MHz	
7	Electrical Ratings	EUT	Input:	DC 36 V
			Output:	-
		AC/DC Adapter	Input:	AC 100 V - AC 240 V, 50 Hz / 60 Hz, 1.5 A
			Output:	DC 36 V, 1.25 A
8	Test Voltage / Frequency		Voltage:	AC 120 V
			Frequency:	60 Hz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:



— Ferrite Core

Location	Manufacturer	Part No.	Turn
AC/DC Adapter Cable	TDK	ZCAT3035-1330	3



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1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

Peripheral Devices

Device	Model No.	Serial No.	Manufacturer
Resonance PRU	-	-	RT Tech Co., Ltd.
Resistor jig	-	-	RT Tech Co., Ltd.
AC/DC Adapter	HK-X145-A36	-	HON-KWANG Electric

Cable Description

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	Wireless Communication	Resonance PRU	Wireless Communication	-	-	-
2		DC IN	AC/DC Adapter	-	1.5	U	Y
3	AC/DC Adapter	AC Power	AC Mains	-	-	-	-
4	Resonance PRU	DC Out	Resistor jig	DC IN	0.2	U	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

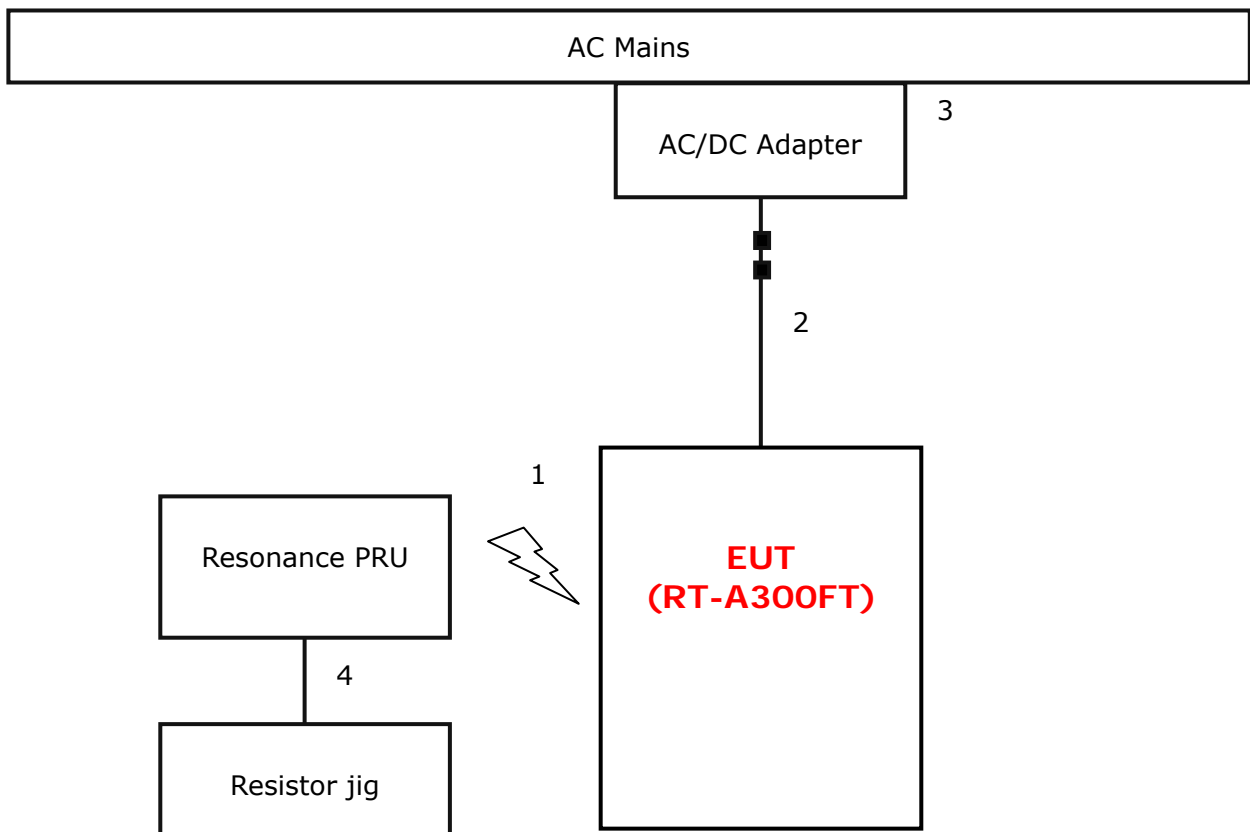
- EMC Test V 1.0
- Display Test Patterns - V1.5
- Ping.exe
- Not applicable

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

Charging Mode

1.6 Configuration





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1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at (Ho-dong) 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.

Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)


Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.




Final radiated emissions test was performed Semi-Anechoic Chamber.

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2014 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

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1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	FCC	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
JAPAN	VCCI	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	MSIP	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	150 kHz to 30 MHz	2.62 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 MHz to 1000 MHz	4.54 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 GHz Above	4.98 dB (C.L.: Approx. 95 %, $k=2$)

2.0 EMC Test Regulations/Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 18 Subpart C <input type="checkbox"/> Class A <input checked="" type="checkbox"/> Class B	Conducted Voltage Emissions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> MET <input type="checkbox"/> NOT MET
	Radiated Electric Field Emissions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> MET <input type="checkbox"/> NOT MET



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3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date
2017-03-21

Test Location
Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2018-02-02	<input type="checkbox"/>
LISN	ENV216	Rohde & Schwarz	101235	2017-05-14	<input type="checkbox"/>
LISN	ENV216	Rohde & Schwarz	101236	2017-05-14	<input type="checkbox"/>
EMI Test Receiver	ESR7	Rohde & Schwarz	101088	2017-05-14	<input type="checkbox"/>
LISN	ENV216	Rohde & Schwarz	101151	2017-11-01	<input type="checkbox"/>
LISN	ESH3-Z5	Rohde & Schwarz	100207	2017-11-01	<input type="checkbox"/>
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2017-10-31	<input checked="" type="checkbox"/>
LISN	ENV216	Rohde & Schwarz	101760	2018-02-03	<input checked="" type="checkbox"/>
LISN	NNLK 8121	SCHWARZBECK	8121-644	2017-05-14	<input type="checkbox"/>
Pulse Limiter	VTSD 9561-F	SCHWARZBECK	9561-F064	2017-05-13	<input type="checkbox"/>
LISN	ENV216	Rohde & Schwarz	101150	2018-02-03	<input type="checkbox"/>

Test Software
ESCI7, ESCI3 : EMC32 Ver. 8.50.0
ESR7 : EMC32 Ver. 8.53.0

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Setting
IF Band Width: 9 kHz

Climate Condition
Temperature: (21 ± 1) °C
Relative Humidity: (39 ± 1) %
Atmospheric Pressure: 99 kPa



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Test Result

The requirements are: MET NOT MET

Test Mode	Frequency (MHz)	Measured Data (dB μ V)	Margin (dB)	Remark
Charging	20.341 500	44.8	5.2	CAverage

The Result is calculated by using the following formula;

* Result = Limit - Margin (Result included the correction factor)

* Correction factor = Cable Loss + Insertion loss of LISN



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Test Data

[Line: L1]

Test

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Test Report

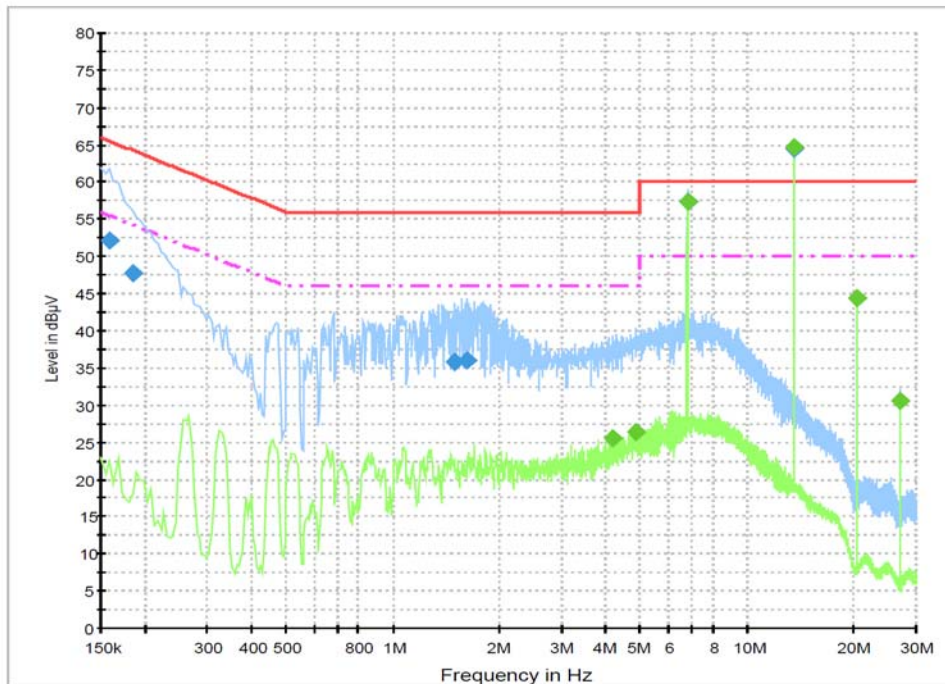
Common Information

Test Model Name: RT-A300FT
Test Mode: Charging Mode
Manufacturer: RT Tech Co., Ltd.
Tester: PARK SANG KYUN

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101760) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 23), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101760)
Correction Table: 3-2 CE Cable Loss
LISN: ENV216 FO(101760)
Correction Table (Line 0): ENV216_FO_N(101760)
Correction Table (Line 1): ENV216_FO_L1(101760)

Class B_L1



3/21/2017

1:48:05



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Test

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Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.159000	52.1	1000.0	9.000	On	L1	9.8	13.4	65.5
0.186000	47.8	1000.0	9.000	On	L1	9.9	16.4	64.2
1.491000	35.8	1000.0	9.000	On	L1	9.7	20.2	56.0
1.626000	36.0	1000.0	9.000	On	L1	9.7	20.0	56.0
6.783000	57.4	1000.0	9.000	On	L1	9.8	2.6	60.0
13.560000	64.6	1000.0	9.000	On	L1	9.9	-4.6	60.0

Final Result 2

Frequency (MHz)	CAverage (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
4.195500	25.6	1000.0	9.000	On	L1	9.8	20.4	46.0
4.834500	26.4	1000.0	9.000	On	L1	9.8	19.6	46.0
6.783000	57.4	1000.0	9.000	On	L1	9.8	-7.4	50.0
13.560000	64.8	1000.0	9.000	On	L1	9.9	-14.8	50.0
20.341500	44.5	1000.0	9.000	On	L1	10.0	5.5	50.0
27.123000	30.5	1000.0	9.000	On	L1	10.0	19.5	50.0

3/21/2017

1:48:05

- => Operating frequency (6.78 MHz)'s emission is excluded from test result.
- => ISM Band frequency (13.56 MHz)'s emission is excluded from test result.



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[Line : Neutral]

Test

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Test Report

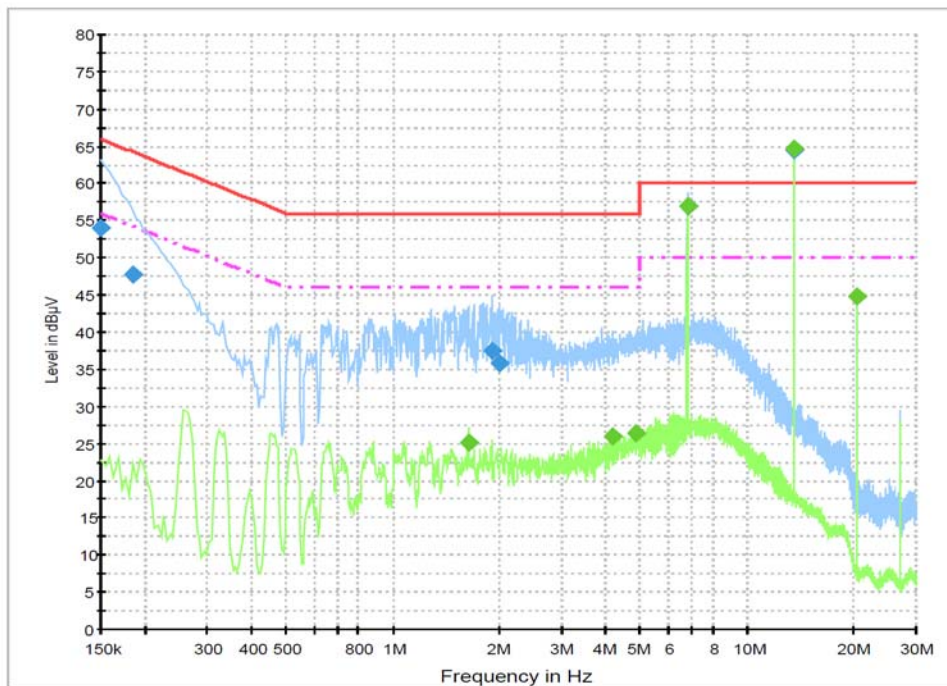
Common Information

Test Model Name: RT-A300FT
Test Mode: Charging Mode
Manufacturer: RT Tech Co., Ltd.
Tester: PARK SANG KYUN

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101760) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 23), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101760)
Correction Table: 3-2 CE Cable Loss
ENV216 FO(101760)
LISN: Correction Table (Line 0): ENV216_FO_N(101760)
Correction Table (Line 1): ENV216_FO_L1(101760)

Class B_N



3/21/2017

1:55:47



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Test

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Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	54.1	1000.0	9.000	On	N	9.8	11.9	66.0
0.186000	47.8	1000.0	9.000	On	N	9.9	16.4	64.2
1.905000	37.4	1000.0	9.000	On	N	9.7	18.6	56.0
1.990500	35.8	1000.0	9.000	On	N	9.7	20.2	56.0
6.783000	57.0	1000.0	9.000	On	N	9.8	3.0	60.0
13.560000	64.4	1000.0	9.000	On	N	10.0	-4.4	60.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.635000	25.1	1000.0	9.000	On	N	9.7	20.9	46.0
4.195500	25.9	1000.0	9.000	On	N	9.8	20.1	46.0
4.830000	26.3	1000.0	9.000	On	N	9.8	19.7	46.0
6.783000	57.0	1000.0	9.000	On	N	9.8	-7.0	50.0
13.560000	64.7	1000.0	9.000	On	N	10.0	-14.7	50.0
20.341500	44.8	1000.0	9.000	On	N	10.1	5.2	50.0

3/21/2017

1:55:47

- => Operating frequency (6.78 MHz)'s emission is excluded from test result.
- => ISM Band frequency (13.56 MHz)'s emission is excluded from test result.



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3.2 Radiated Electric Field Emissions (Below 30 MHz)

Test Date

2017-03-21

Test Location

10 m SAC (test distance : 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2017-11-01	<input checked="" type="checkbox"/>
Active Loop Antenna	FMZB 1513	Schwarzbeck	1513-126	2018-05-25	<input checked="" type="checkbox"/>
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50-2	2017-11-01	<input checked="" type="checkbox"/>

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

9 kHz to 30 MHz

Instrument Setting

IF Band Width: 9 kHz

Climate Condition

Temperature: (22 ± 1) °C

Relative Humidity: (37 ± 1) %

Atmospheric Pressure: 99 kPa

Test Result

The requirements are: MET NOT MET

Test Mode	Frequency (MHz)	Measured Data (dB μ V/m)	Margin (dB)	Remark
Charging	20.344	52.7	15.3	Quasi-peak

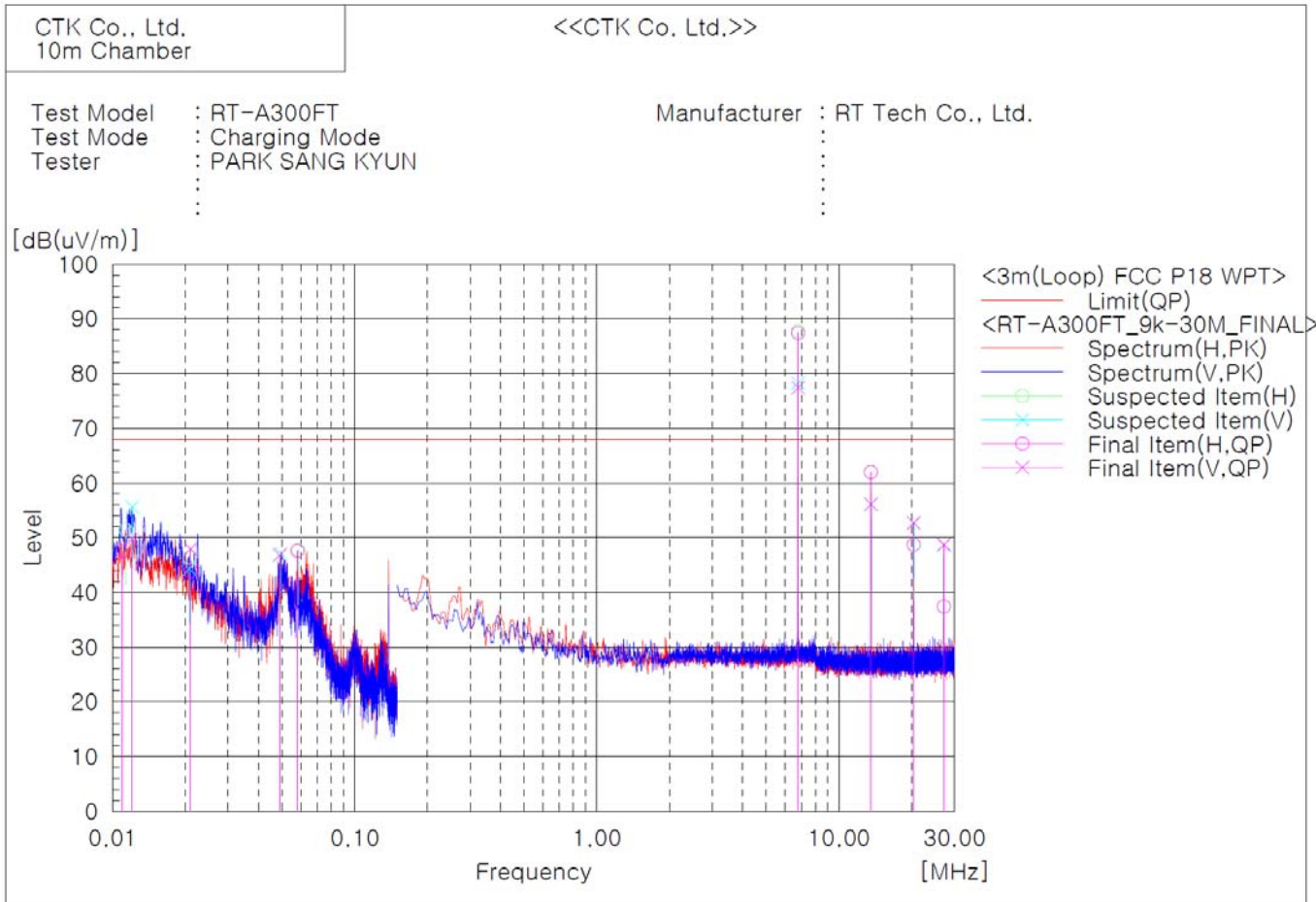
The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator



Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	0.011	H	22.1	25.4	47.5	68.0	20.5	101.0	142.0
2	0.012	V	24.3	25.4	49.7	68.0	18.3	101.0	0.0
3	0.021	H	18.4	25.5	43.9	68.0	24.1	101.0	64.0
4	0.021	V	22.4	25.5	47.9	68.0	20.1	101.0	142.0
5	0.049	V	21.3	25.5	46.8	68.0	21.2	101.0	0.0
6	0.058	H	22.1	25.5	47.6	68.0	20.4	101.0	0.0
7	6.780	H	61.4	26.0	87.4	68.0	-19.4	101.0	43.0
8	6.780	V	51.4	26.0	77.4	68.0	-9.4	101.0	104.0
9	13.560	V	29.6	26.5	56.1	68.0	11.9	101.0	261.0
10	13.564	H	35.5	26.5	62.0	68.0	6.0	101.0	30.0
11	20.344	H	22.1	26.6	48.7	68.0	19.3	101.0	291.0
12	20.344	V	26.1	26.6	52.7	68.0	15.3	101.0	169.0
13	27.123	H	10.7	26.7	37.4	68.0	30.6	101.0	339.0
14	27.123	V	22.0	26.7	48.7	68.0	19.3	101.0	65.0

=> Operating frequency (6.78 MHz)'s emission is excluded from test result.

=> ISM Band frequency (13.56 MHz)'s emission is excluded from test result.



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3.3 Radiated Electric Field Emissions (Above 30 MHz - Below 1 GHz)

Test Date

2017-03-21

Test Location

10 m SAC (test distance : 10 m, 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2017-11-01	<input checked="" type="checkbox"/>
Bilog Antenna	CBL6111C	Schaffner	2551	2017-04-24	<input checked="" type="checkbox"/>
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50-2	2017-11-01	<input checked="" type="checkbox"/>
Amplifier	310	Sonoma Instrument Co.	291721	2018-02-02	<input checked="" type="checkbox"/>

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Setting

IF Band Width: 120 kHz

Climate Condition

Temperature: (22 ± 1) °C

Relative Humidity: (37 ± 1) %

Atmospheric Pressure: 99 kPa

Test Result

The requirements are: MET NOT MET

Test Mode	Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
Charging	162.648	63.6	4.4	Quasi-peak

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator - Amp Gain



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3.4 Radiated Electric Field Emissions (Above 1 GHz)

Test Date
Not Applicable

Test Location
3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2017-10-31	<input type="checkbox"/>
Double Ridged Guide Antenna	3115	ETS-Lindgren	00078895	2017-05-07	<input type="checkbox"/>
Preamplifier	8449B	Agilent Technologies	3008A02011	2017-12-01	<input type="checkbox"/>

Test Software
TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement
1 GHz to 2 GHz

Instrument Setting
IF Band Width: 1 MHz

Climate Condition
Temperature:
Relative Humidity:
Atmospheric Pressure:

Test Result
The requirements are: MET NOT MET

Test Mode	Frequency (MHz)	Measured Data (dB μ V/m)	Margin (dB)	Remark

The Result is calculated by using the following formula;

- * Result = Reading + Correction factor
- * Correction factor = Antenna Factor + Cable Loss- Amp Gain

Test Data
Because the maximum clock frequency is less than 108 MHz, this test is not applicable.

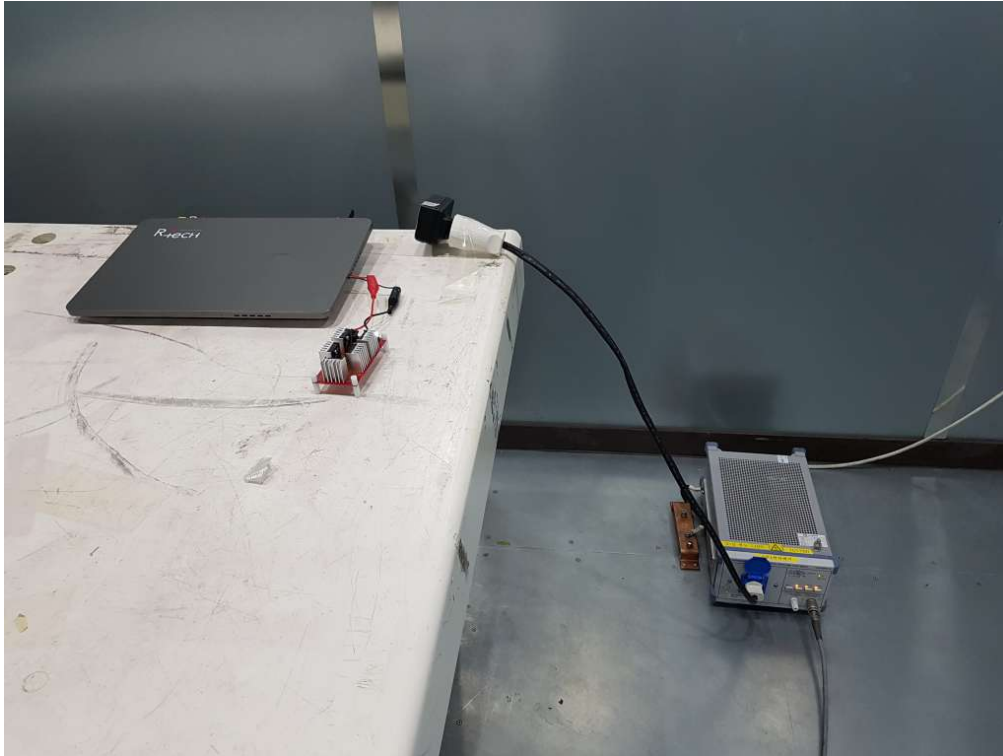


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APPENDIX A - Test Setup Photos and Configuration

Conducted Voltage Emissions of Mains Ports



Radiated Electric Field Emissions (Below 30 MHz)



Radiated Electric Field Emissions (Above 30 MHz - Below 1 GHz)





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Radiated Electric Field Emissions (Above 1 GHz)

Not Applicable



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APPENDIX B – EUT Photographs



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EUT External Photographs





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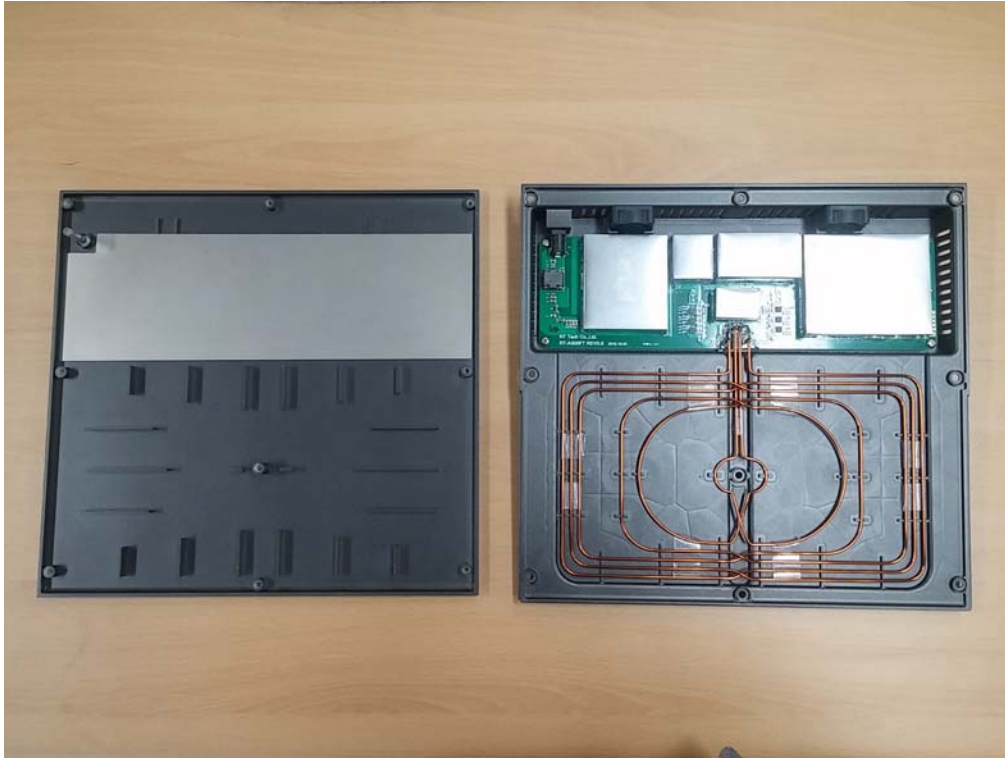




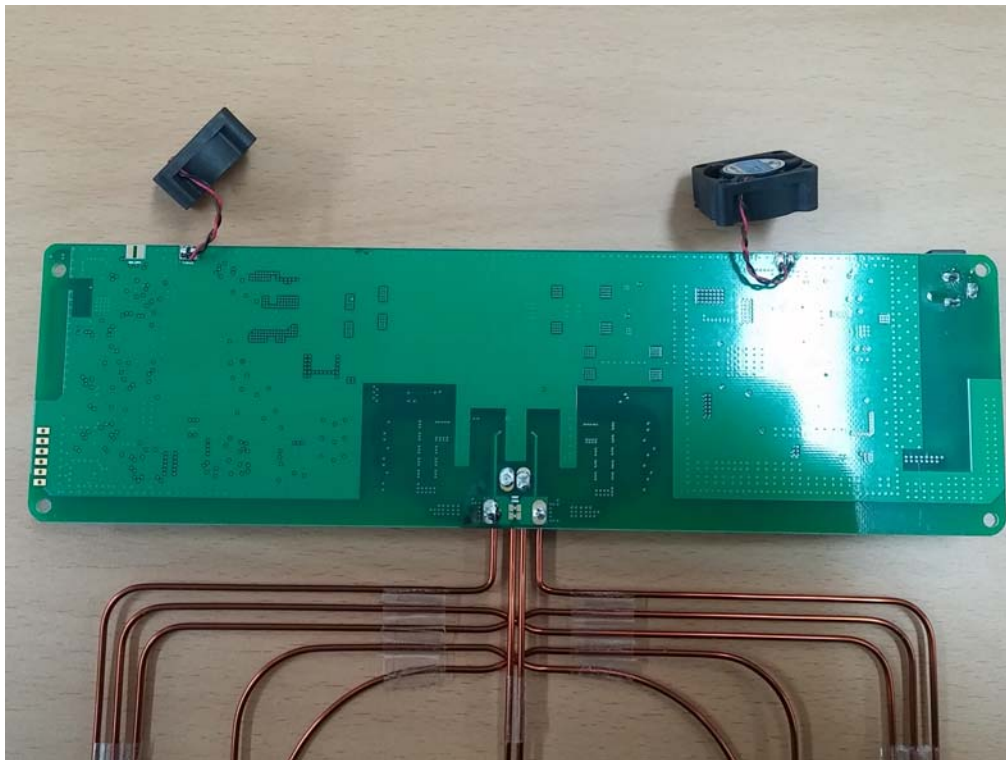
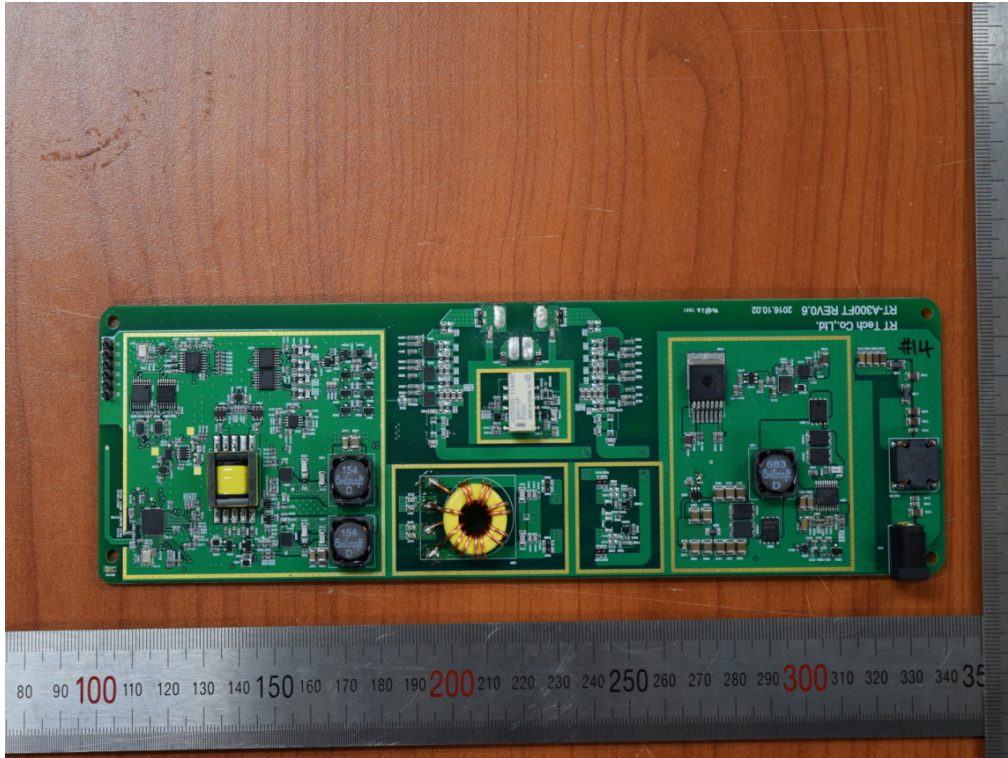
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EUT Internal Photographs



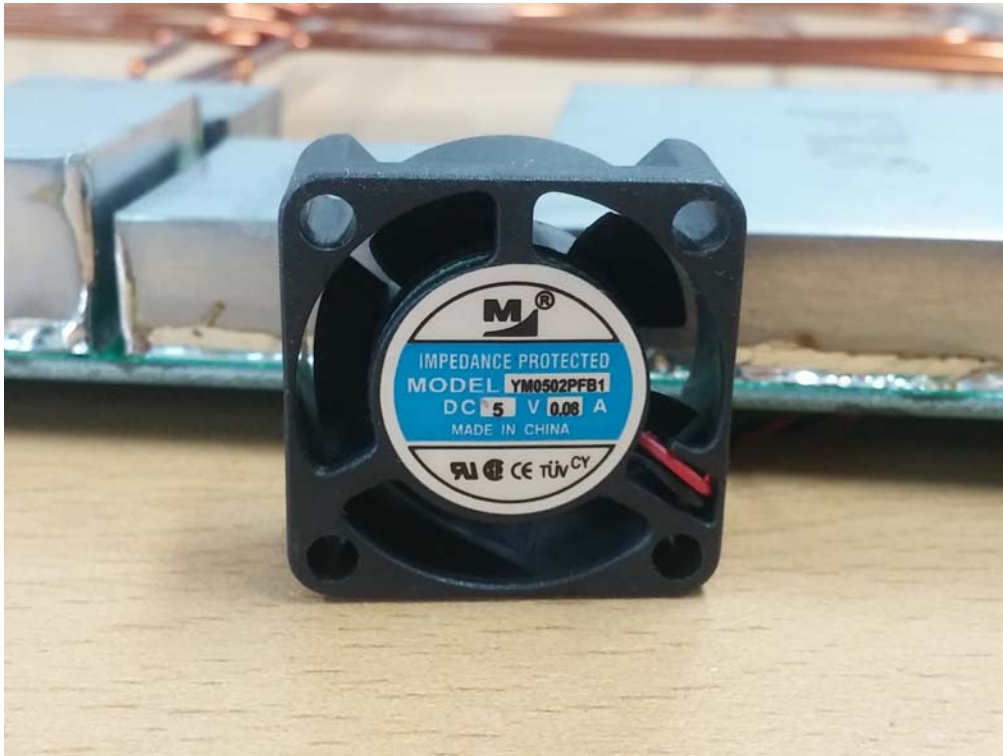
PCB





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AC/DC Adapter





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SET

