

FCC Radio Test Report

FCC ID: Y9E-IAD18007

Original Grant

Report No. : TB-FCC164439

Applicant : IAdea Corporation

Equipment Under Test (EUT)

EUT Name : Smart Signboard
(Tablet without battery)

Model No. : XDS-1588-H/IAD-18007

Serial Model No. : XDS-1588-A/IAD-18008, XDS-158Z-Y/IAD-18007,
XDS-158Z-Y/IAD-18008 (Note: Z is "0~9", and Y is "A~Z",
represents the appearance color or customer models)

Brand Name : IAdea

Receipt Date : 2019-05-27

Test Date : 2019-05-27 to 2019-06-20

Issue Date : 2019-06-26

Standards : FCC Part 15, Subpart C(15.209)

Test Method : ANSI C63.10: 2013

Conclusions : PASS

In the configuration tested, the EUT complied with the standards specified above,

Test/Witness Engineer : Jason xu

Jason Xu

Engineer Supervisor : Ivan Su

Ivan Su

Engineer Manager : Ray Lai

Ray Lai



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in

TB-RF-074-1.0

the report.

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Revision History

Report No.	Version	Description	Issued Date
TB-FCC164439	Rev.01	Initial issue of report	2019-06-26

1. General Information about EUT

1.1 Client Information

Applicant	:	IAdea Corporation
Address	:	3F, No. 21 Lane 168, Xingshan Road, Neihu Dist., Taipei, Taiwan
Manufacturer	:	IAdea Corporation
Address	:	3F, No. 21 Lane 168, Xingshan Road, Neihu Dist., Taipei, Taiwan

1.2 General Description of EUT (Equipment Under Test)

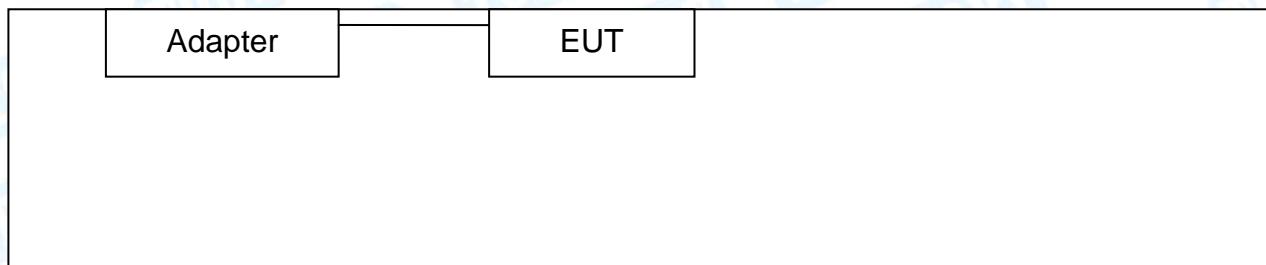
EUT Name	:	Smart Signboard (Tablet without battery)	
Models No.	:	XDS-1588-H/IAD-18007, XDS-1588-A/IAD-18008, XDS-158Z-Y/IAD-18007, XDS-158Z-Y/IAD-18008 (Note: Z is "0~9", and Y is "A~Z", represents the appearance color or customer models)	
Model Difference	:	All these models are the same PCB, layout and electrical circuit, the only different is appearance color or customer models.	
Product Description	Operation Frequency:	RFID:125KHz	
	Modulation Type:	ASK	
	Antenna:	Loop Antenna	
Power Rating	:	AC Adapter(FJ-SW1202000N): Input: AC 100-240V, 50/60Hz, 0.6A Output: DC 12V, 2.0A	
Software Version	:	N/A	
Hardware Version	:	R35	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.3 Block Diagram Showing the Configuration of System Tested

TX Mode



1.4 Description of Support Units

Name	Model	S/N	Manufacturer	Used “ √ ”
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1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Radiated Test	
Final Test Mode	Description
Mode 1	Adapter + TX Mode
For Bandwidth Test	
Final Test Mode	Description
Mode 1	Adapter + TX Mode

Note:

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

TX Mode: Transmitting mode.

- (2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.
- (3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

Test Software Version	N/A
Frequency	125KHz

1.7 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty (U_{Lab})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	± 3.42 dB ± 3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB

1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01. FCC Accredited Test Site Number: 854351.

FCC Accredited Test Site Number: 854351.

IC Registration No.: (11950A-1)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

FCC Part 15 Subpart C(15.209)			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	PASS	N/A
15.207(a)	Conducted Emission	PASS	N/A
15.209(a)(f)	Radiated emissions	PASS	N/A
15.215	Bandwidth	PASS	N/A

Note: N/A is an abbreviation for Not Applicable.

3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Jul. 18, 2018	Jul. 17, 2019
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Jul. 18, 2018	Jul. 17, 2019
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Jul. 18, 2018	Jul. 17, 2019
LISN	Rohde & Schwarz	ENV216	101131	Jul. 18, 2018	Jul. 17, 2019
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 18, 2018	Jul. 17, 2019
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 18, 2018	Jul. 17, 2019
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Jan. 27, 2019	Jan. 26, 2020
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Jan. 27, 2019	Jan. 26, 2020
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.03, 2019	Mar. 02, 2020
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar.03, 2019	Mar. 02, 2020
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 14, 2018	Jul.13, 2019
Pre-amplifier	Sonoma	310N	185903	Mar.04, 2019	Mar. 03, 2020
Pre-amplifier	HP	8449B	3008A00849	Mar.03, 2019	Mar. 02, 2020
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.03, 2019	Mar. 02, 2020
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 18, 2018	Jul. 17, 2019
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 18, 2018	Jul. 17, 2019
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Oct. 15, 2018	Sep. 14, 2019
Vector Signal Generator	Agilent	N5182A	MY50141294	Oct. 15, 2018	Sep. 14, 2019
Analog Signal Generator	Agilent	N5181A	MY50141953	Oct. 15, 2018	Sep. 14, 2019
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Oct. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Oct. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Oct. 15, 2018	Sep. 14, 2019
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Oct. 15, 2018	Sep. 14, 2019

4. Conducted Emission Test

4.1 Test Standard and Limit

4.1.1 Test Standard
FCC Part 15.207

4.1.2 Test Limit

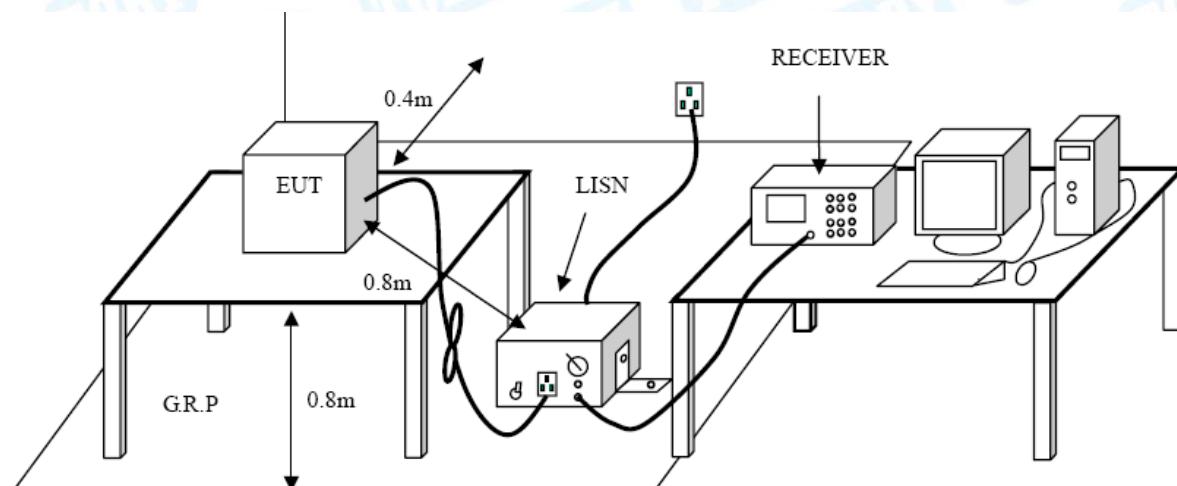
Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2 Test Setup



4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4 EUT Operating Mode

Please refer to the description of test mode.

4.5 Test Data

Please refer to the Attachment A.

5. Radiated Emission Test

5.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.209(a)(f)

5.1.2 Test Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

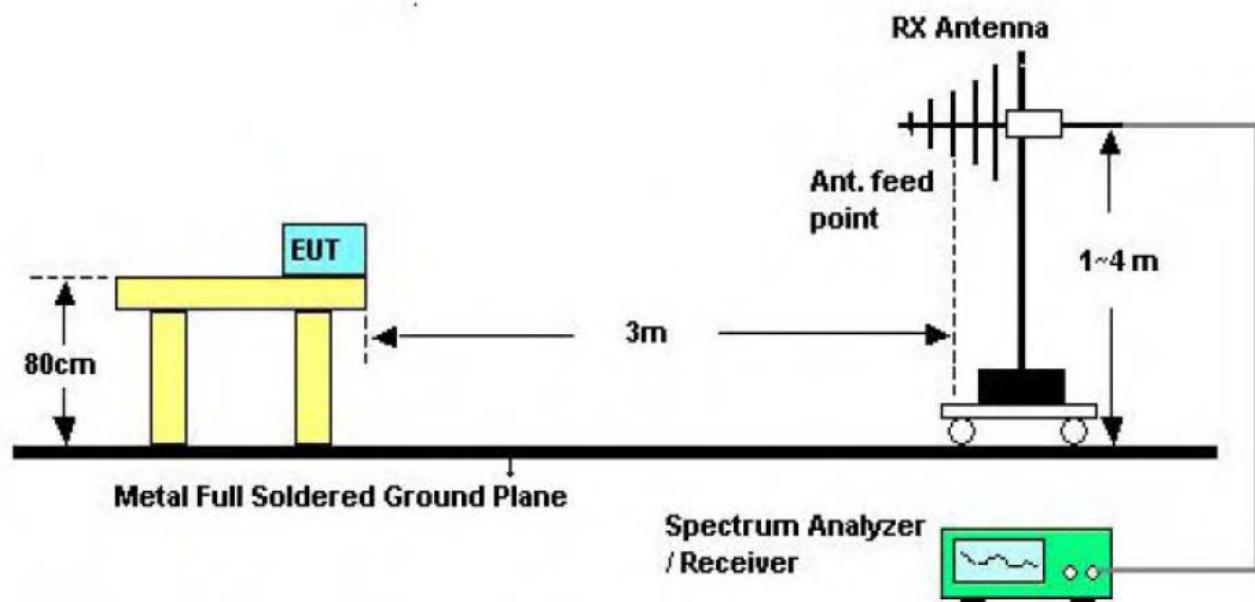
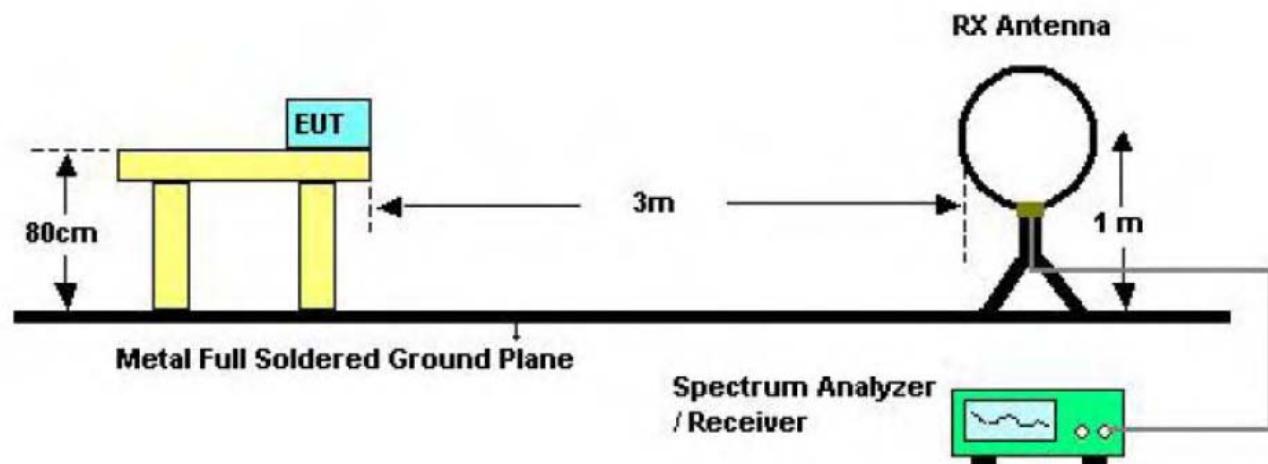
Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance of 3m (dBuV/m)	
	Peak	Average
Above 1000	74	54

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level(dBuV/m)=20log Emission Level(uV/m)

5.2 Test Setup



5.3 Test Procedure

- (1) Measurements at frequency 9KHz~30MHz and Below 1GHz. The EUT was placed on a rotating 0.8m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The table was rotated 360 degrees to determine the position of the highest radiation.
- (2) 9KHz~30MHz the test antenna 1m away from the ground, Both 0° and 90° antenna are set to make measurement.
Below 1GHz the test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Below 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (6) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (7) For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW= 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.
For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW= 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple
- (8) For the actual test configuration, please see the test setup photo.

5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

5.5 Test Data

Please refer to the Attachment B.

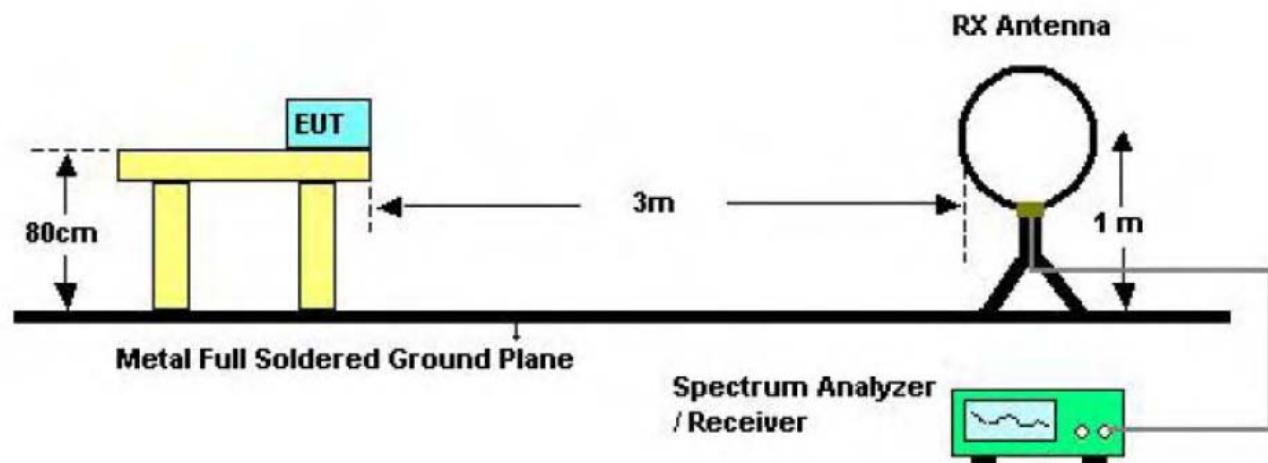
6. Bandwidth Measurement

6.1 Test Standard and Limit

5.1.1 Test Standard

FCC Part 15.215

6.2 Test Setup



6.3 Test Procedure

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions;
2. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
3. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

6.5 Test Data

Please refer to the Attachment C.

7. Antenna Requirement

7.1 Standard Requirement

7.1.1 Standard

FCC Part 15.203

7.1.2 Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

7.2 Antenna Connected Construction

The antenna is Loop Antenna, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

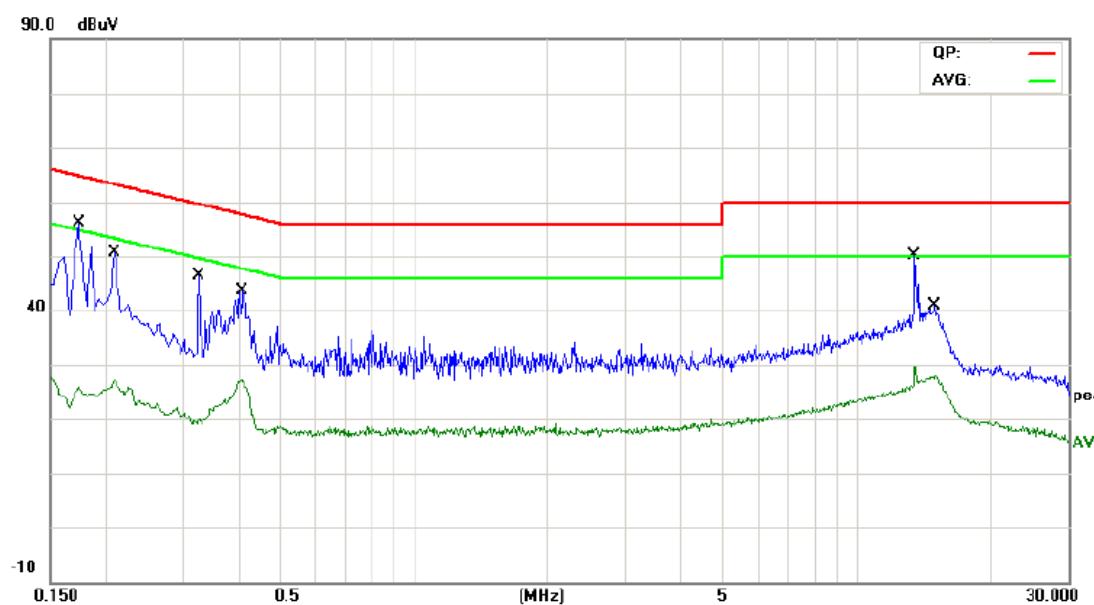
7.3 Result

The EUT antenna is a Loop Antenna. It complies with the standard requirement.

Antenna Type
<input checked="" type="checkbox"/> Permanent attached antenna
<input type="checkbox"/> Unique connector antenna
<input type="checkbox"/> Professional installation antenna

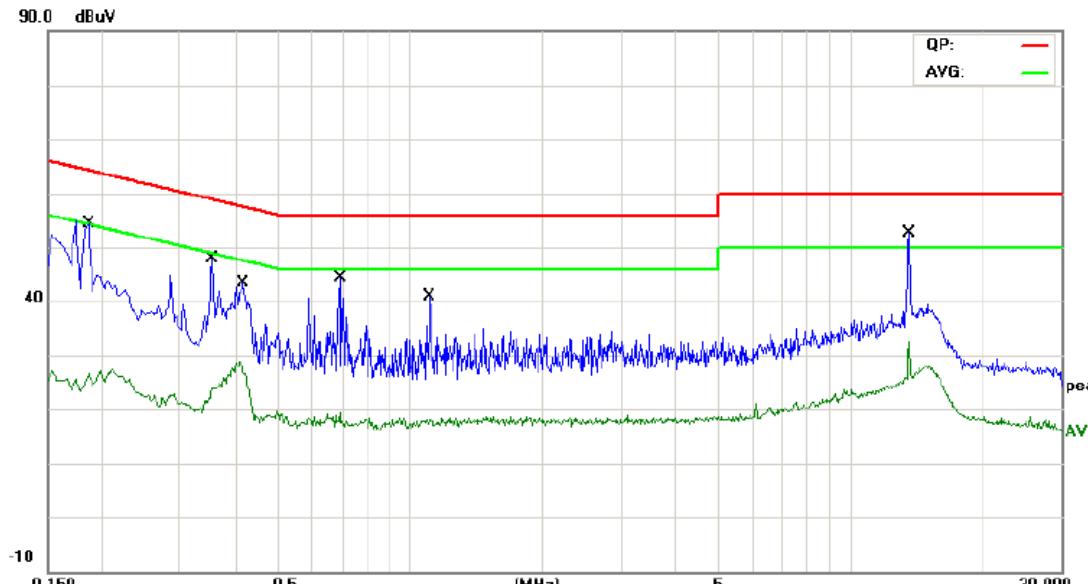
Attachment A-- Conducted Emission Test Data

Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	AC 120V/60Hz		
Terminal:	Line		
Test Mode:	RFID Mode		
Remark:	Only worse case is reported		



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector
			Level	Factor	ment	dBuV	dB	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1740	28.95	9.68	38.63	64.76	-26.13	QP
2		0.1740	13.05	9.68	22.73	54.76	-32.03	AVG
3		0.2100	28.42	9.69	38.11	63.20	-25.09	QP
4		0.2100	15.83	9.69	25.52	53.20	-27.68	AVG
5		0.3260	17.39	9.71	27.10	59.55	-32.45	QP
6		0.3260	8.93	9.71	18.64	49.55	-30.91	AVG
7		0.4100	25.65	9.72	35.37	57.65	-22.28	QP
8	*	0.4100	16.33	9.72	26.05	47.65	-21.60	AVG
9		13.5420	26.74	9.94	36.68	60.00	-23.32	QP
10		13.5420	16.13	9.94	26.07	50.00	-23.93	AVG
11		15.0500	23.51	9.95	33.46	60.00	-26.54	QP
12		15.0500	16.91	9.95	26.86	50.00	-23.14	AVG

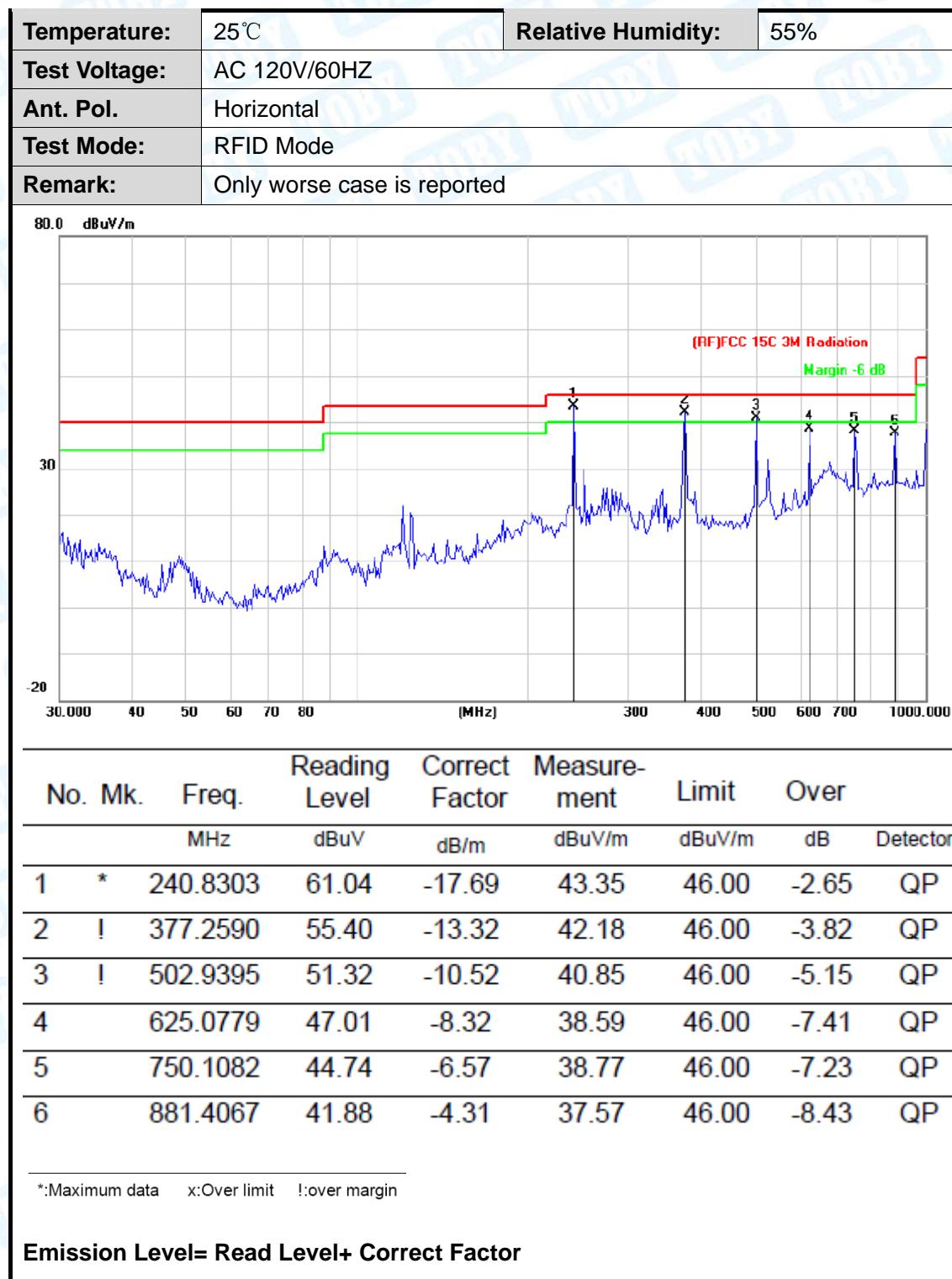
Emission Level= Read Level+ Correct Factor

Temperature:	25 °C	Relative Humidity:	55%					
Test Voltage:	AC 120V/60Hz							
Terminal:	Neutral							
Test Mode:	RFID Mode							
Remark:	Only worse case is reported							
								
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dB		Detector
1		0.1860	28.32	9.68	38.00	64.21	-26.21	QP
2		0.1860	13.58	9.68	23.26	54.21	-30.95	AVG
3		0.3540	22.20	9.71	31.91	58.87	-26.96	QP
4		0.3540	12.68	9.71	22.39	48.87	-26.48	AVG
5		0.4180	25.09	9.72	34.81	57.49	-22.68	QP
6		0.4180	16.99	9.72	26.71	47.49	-20.78	AVG
7		0.6900	13.86	9.74	23.60	56.00	-32.40	QP
8		0.6900	6.93	9.74	16.67	46.00	-29.33	AVG
9		1.1100	14.28	9.76	24.04	56.00	-31.96	QP
10		1.1100	7.74	9.76	17.50	46.00	-28.50	AVG
11	*	13.5699	31.21	9.94	41.15	60.00	-18.85	QP
12		13.5699	18.64	9.94	28.58	50.00	-21.42	AVG

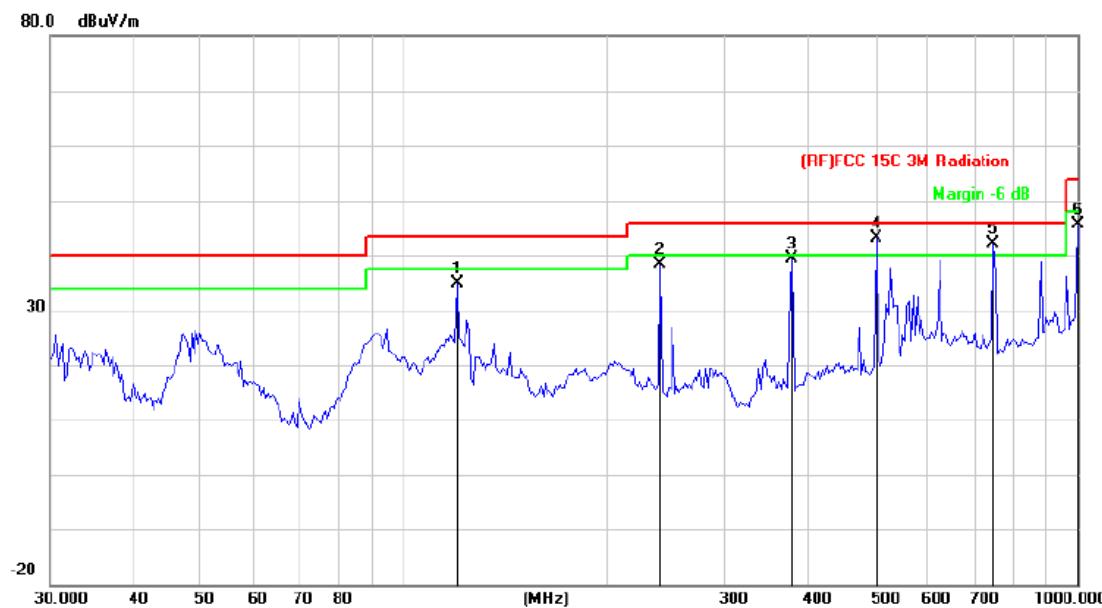
Emission Level= Read Level+ Correct Factor

Attachment B-- Radiated Emission Test Data

30MHz~1GHz



Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Vertical		
Test Mode:	RFID Mode		
Remark:	Only worse case is reported		

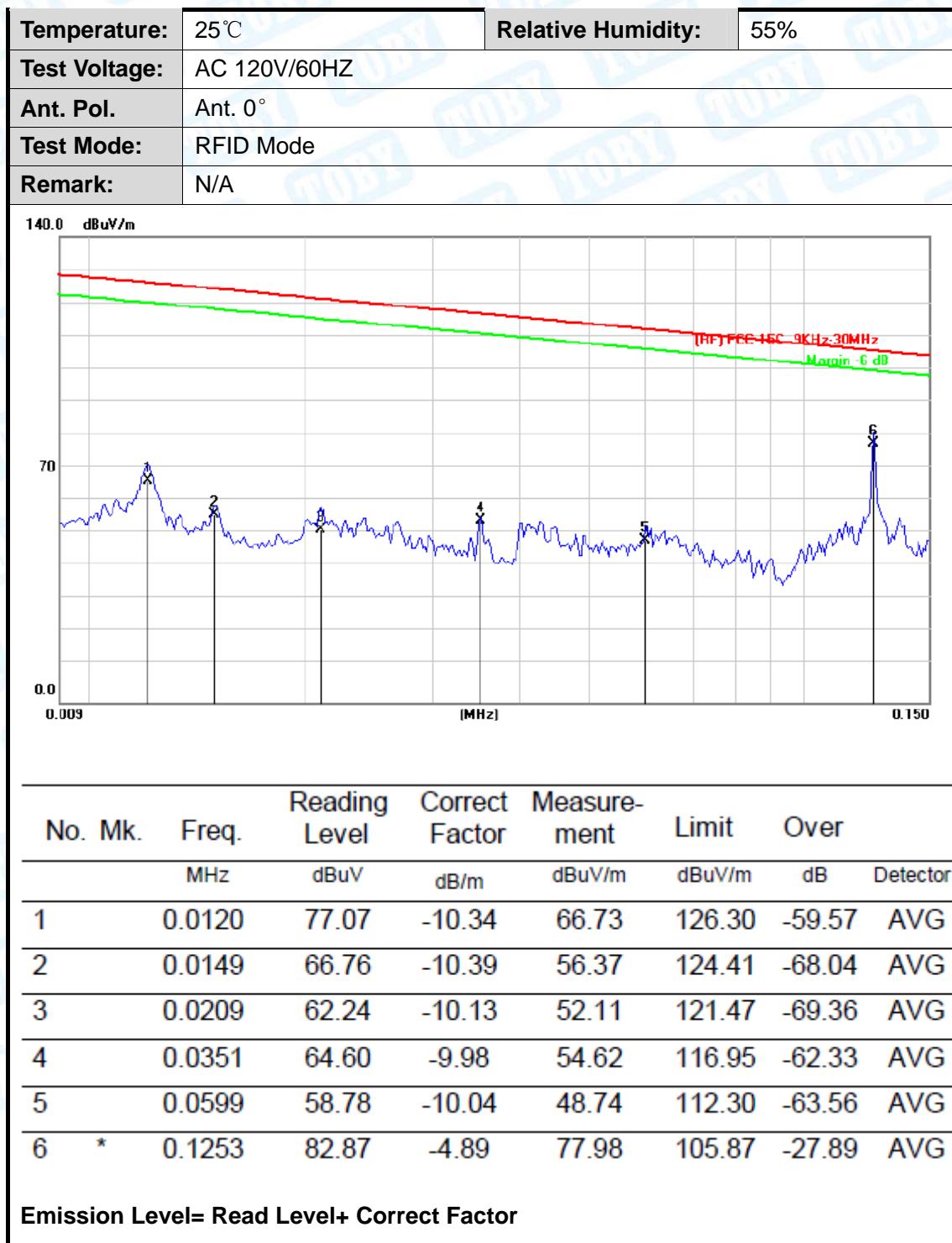


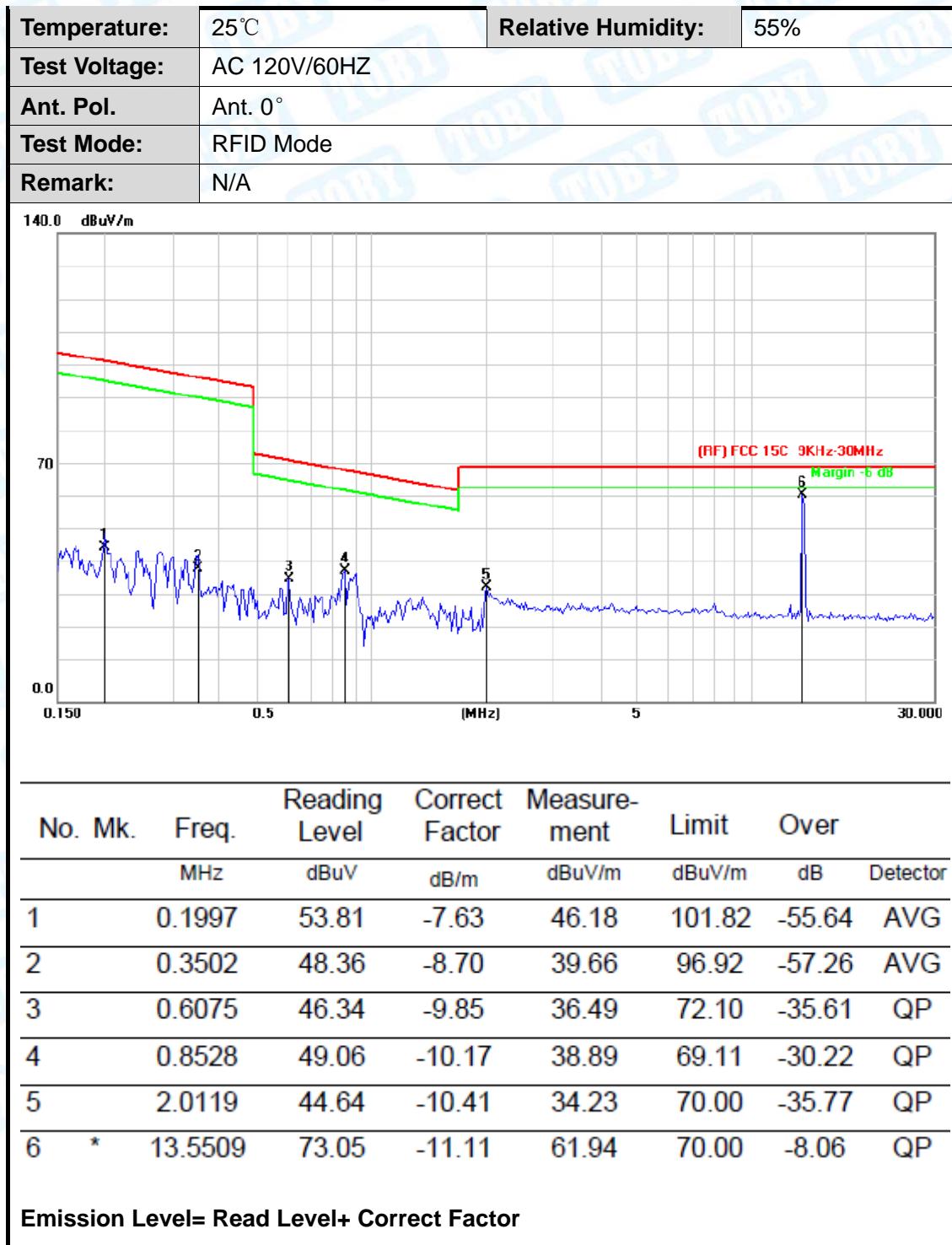
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over
			Level	Factor	ment		
		MHz	dBuV	dB/m	dBuV/m	dB	Detector
1		120.2766	57.10	-22.30	34.80	43.50	-8.70 QP
2		240.8304	56.03	-17.69	38.40	46.00	-7.60 QP
3		377.2591	52.68	-13.32	39.30	46.00	-6.70 QP
4	*	502.9395	53.70	-10.52	43.15	46.00	-2.85 QP
5	!	750.1083	48.59	-6.57	42.12	46.00	-3.88 QP
6		1000.0000	48.73	-3.16	45.77	54.00	-8.23 QP

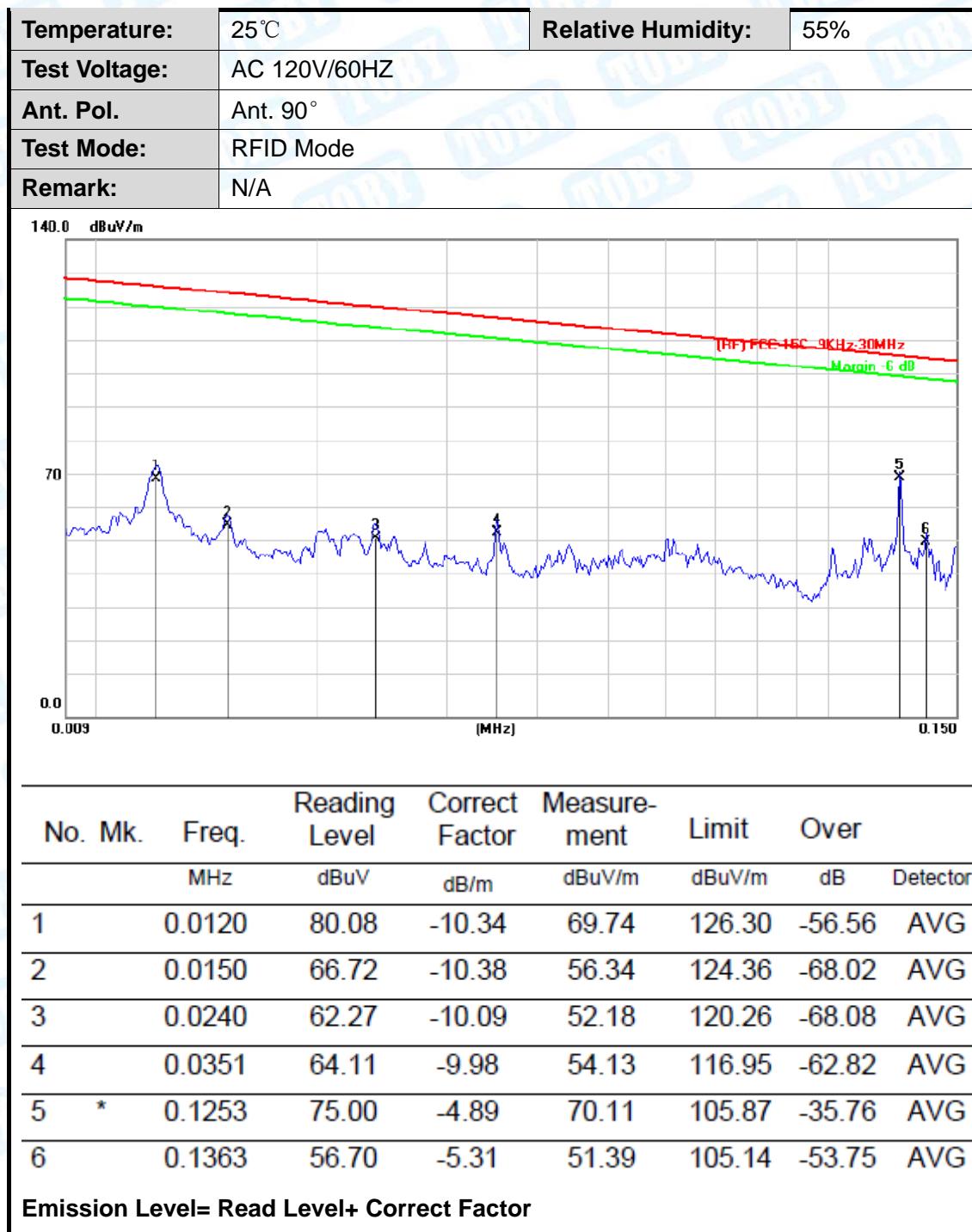
*:Maximum data x:Over limit !:over margin

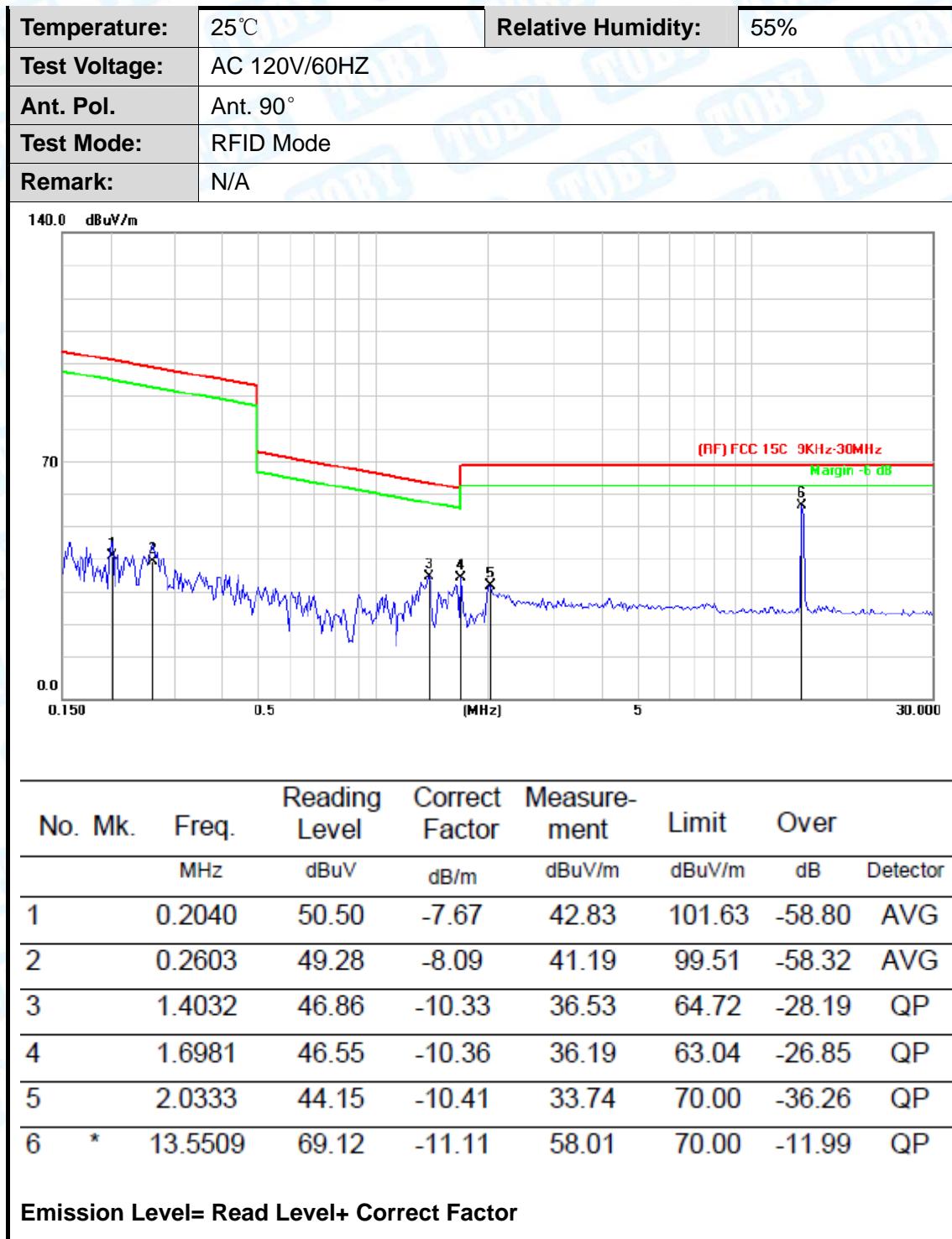
Emission Level= Read Level+ Correct Factor

9KHz-30MHz



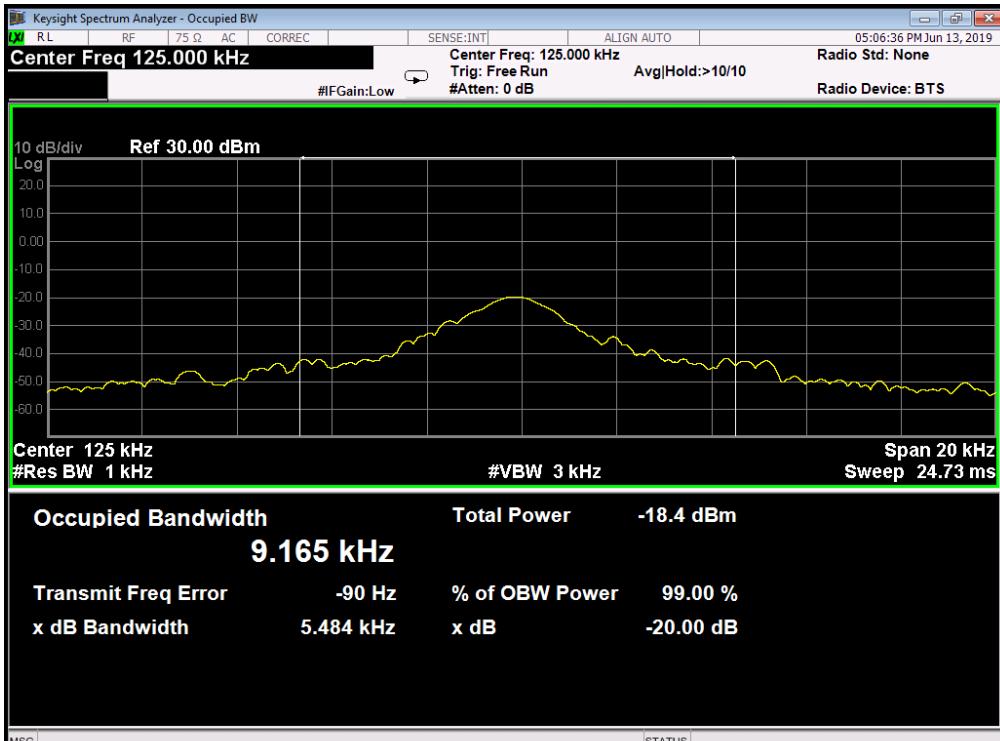






Attachment C-- Bandwidth Measurement Data

Frequency (KHz)	20 dBc Bandwidth (kHz)	99% OBW (kHz)	Result
125	5.484	9.165	PASS



Keysight Spectrum Analyzer - Occupied BW

Center Freq 125.000 kHz

Center Freq: 125.000 kHz

Trig: Free Run

#IFGain:Low

SENSE:INT

ALIGN AUTO

05:06:36 PM Jun 13, 2019

Radio Std: None

#AvgHold:>10/10

#Atten: 0 dB

Radio Device: BTS

10 dB/div

Ref 30.00 dBm

Log

10.00

0.00

-10.00

-20.00

-30.00

-40.00

-50.00

-60.00

Center 125 kHz

#Res BW 1 kHz

#VBW 3 kHz

Span 20 kHz

Sweep 24.73 ms

Occupied Bandwidth

9.165 kHz

Total Power -18.4 dBm

Transmit Freq Error -90 Hz

x dB Bandwidth 5.484 kHz

% of OBW Power 99.00 %

x dB -20.00 dB

MSG

STATUS

-----END OF REPORT-----