

FCC Radio Test Report

FCC ID: Y9E-IAD18006

Original Grant

Report No. : TB-FCC164588
Applicant : IAdea Corporation
Equipment Under Test (EUT)
EUT Name : Smart Signboard
(Tablet without battery)
Model No. : XDS-1088-H/IAD-18006
XDS-1088-A/IAD-18004,XDS-108Z-Y/IAD-18006,
Serial Model No. : XDS-108Z-Y/IAD-18004(Note: Z is "0~9", and Y is "A~Z",
represents the software version or customer's models)
Brand Name : IAdea
Receipt Date : 2019-03-06
Test Date : 2019-03-06 to 2019-06-12
Issue Date : 2019-06-28
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 the report.

Contents

CONTENTS.....	3
1. GENERAL INFORMATION ABOUT EUT	5
1.1 Client Information.....	5
1.2 General Description of EUT (Equipment Under Test)	5
1.3 Block Diagram Showing the Configuration of System Tested.....	6
1.4 Description of Support Units	6
1.5 Description of Test Mode.....	6
1.6 Description of Test Software Setting	7
1.7 Measurement Uncertainty	8
1.8 Test Facility	8
2. TEST SUMMARY.....	9
3. TEST EQUIPMENT.....	10
4. CONDUCTED EMISSION TEST	11
4.1 Test Standard and Limit.....	11
4.2 Test Setup.....	11
4.3 Test Procedure.....	11
4.4 EUT Operating Mode	12
4.5 Test Data.....	12
5. RADIATED EMISSION TEST	13
5.1 Test Standard and Limit.....	13
5.2 Test Setup.....	14
5.3 Test Procedure.....	15
5.4 EUT Operating Condition	15
5.5 Test Data.....	15
6. BANDWIDTH MEASUREMENT.....	16
6.1 Test Standard and Limit.....	16
6.2 Test Setup.....	16
6.3 Test Procedure.....	16
6.4 EUT Operating Condition	16
6.5 Test Data.....	16
7. ANTENNA REQUIREMENT.....	17
7.1 Standard Requirement.....	17
7.2 Antenna Connected Construction	17
7.3 Result.....	17
ATTACHMENT A-- RADIATED EMISSION TEST DATA	20
ATTACHMENT B-- BANDWIDTH MEASUREMENT DATA.....	26

Revision History

Report No.	Version	Description	Issued Date
TB-FCC164588	Rev.01	Initial issue of report	2019-06-28

1. General Information about EUT

1.1 Client Information

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

1.2 General Description of EUT (Equipment Under Test)

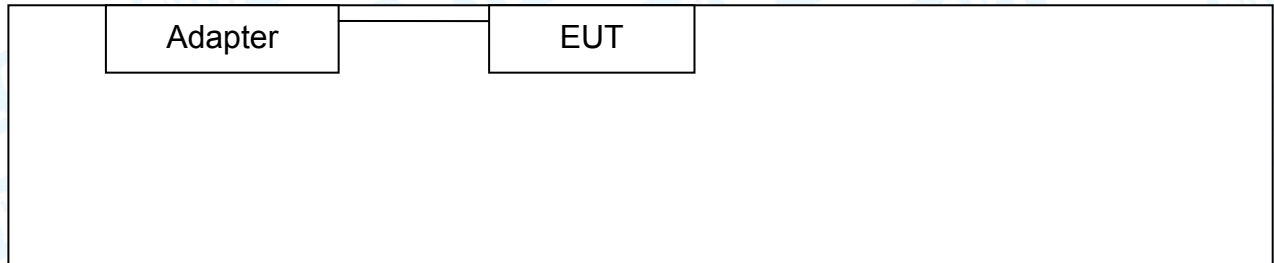
EUT Name	:	Smart Signboard (Tablet without battery)	
Models No.	:	XDS-1088-H/IAD-18006, XDS-1088-A/IAD-18004, XDS-108Z-Y/IAD-18006, XDS-108Z-Y/IAD-18004 (Note: Z is "0~9", and Y is "A~Z", represents the software version or customer's models)	
Model Difference	:	All models are in the same PCB layout interior structure and electrical circuits, Just different on colors, software version or customer's model number.	
Product Description	:	Operation Frequency:	RFID:125KHz
	:	Modulation Type:	ASK
	:	Antenna:	Loop Antenna
Power Rating	:	AC/DC Adapter(FJ-SW1202000N) Input: AC 100~240V, 50/60Hz, 0.6A. Output: DC 12V, 2A.	
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 “√”
---	---	---	---	
---	---	---	---	

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 expanded 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

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

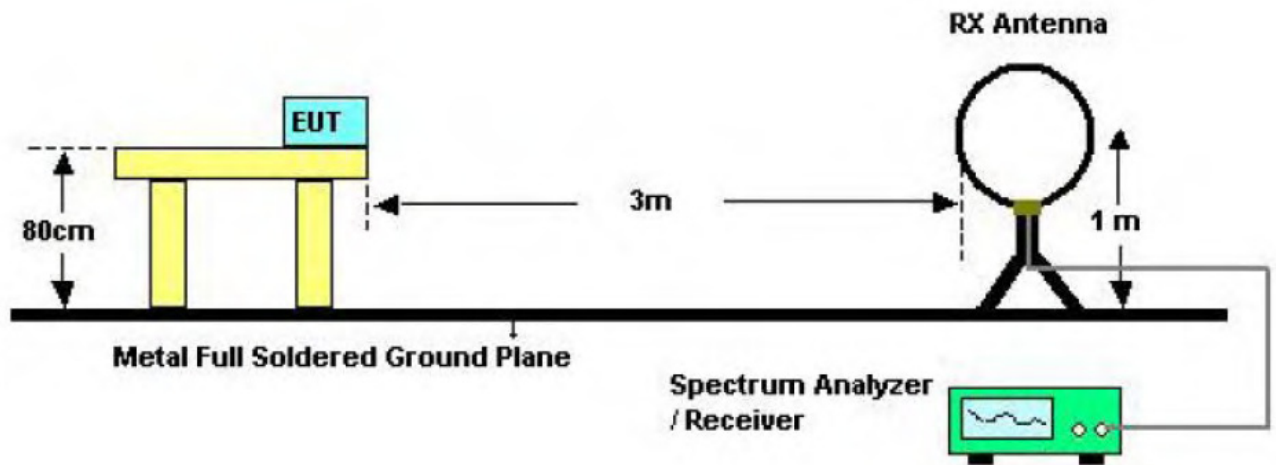
Radiated Emission Limit (Above 1000MHz)

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

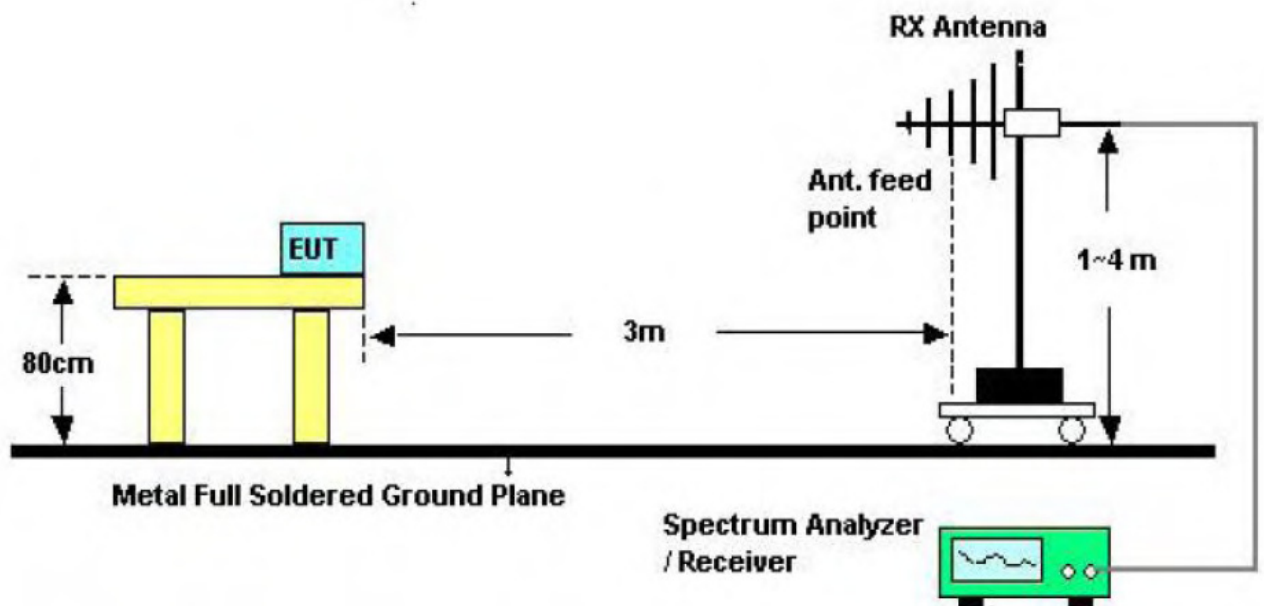
Note:

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

5.2 Test Setup



Below 30MHz Test Setup



Below 1000MHz 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 Bellow 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.

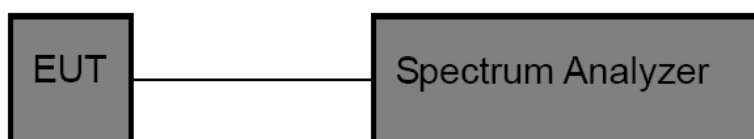
6. Bandwidth Measurement

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 EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Span = set to capture all products of the modulation process, including the emission skirts, RBW =1KHz, VBW = set approximately 3 x RBW, Sweep = auto, Detector = peak, Trace =max hold.
3. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is 20 dB bandwidth of the emission.

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

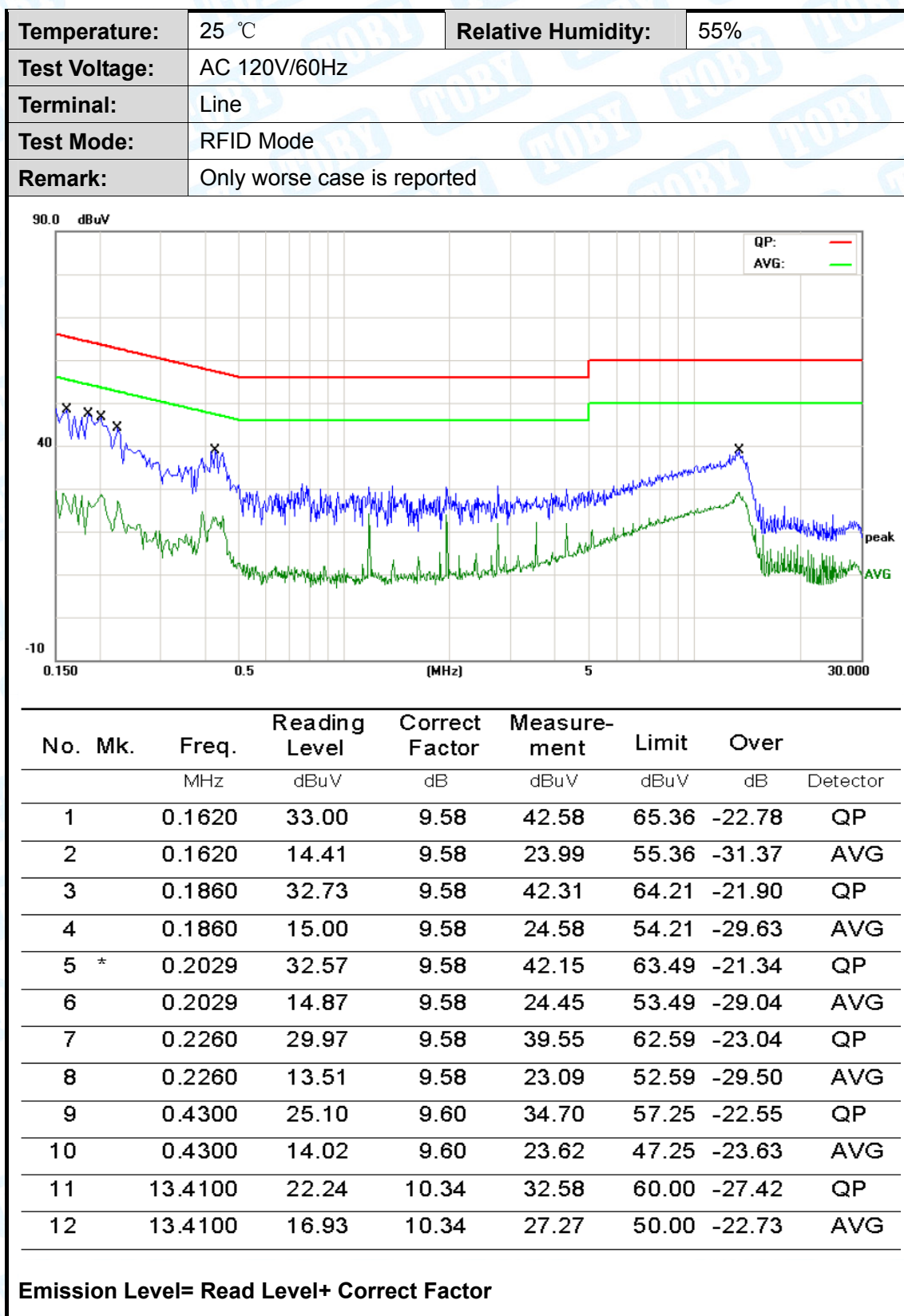
The antenna is Loop Antenna, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

7.3 Result

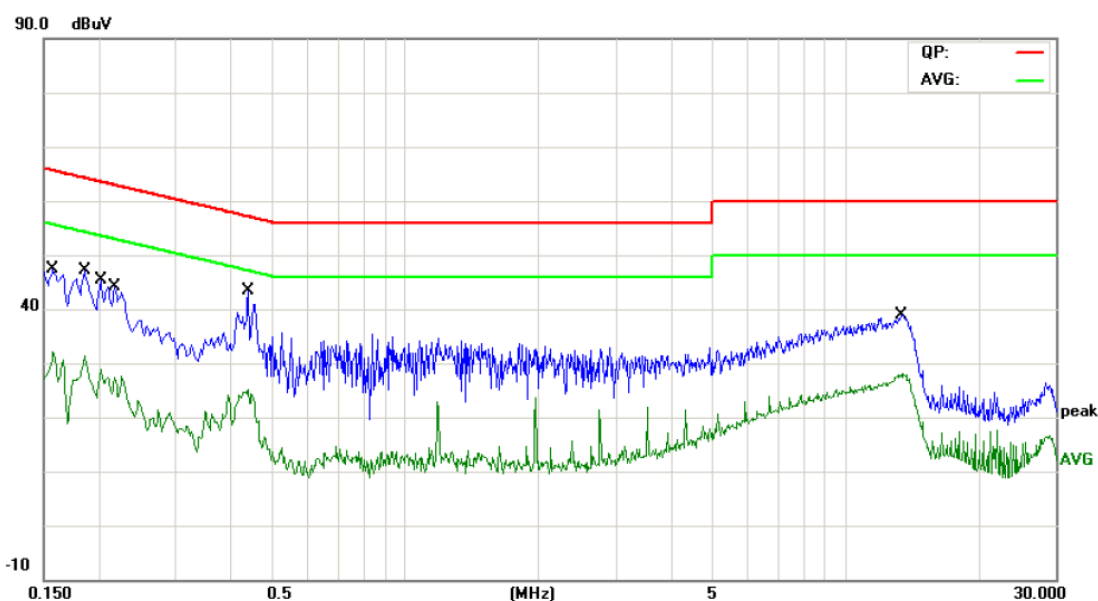
The EUT antenna is a Loop Antenna. It complies with the standard requirement.

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:	Neutral		
Test Mode:	RFID Mode		
Remark:	Only worse case is reported		

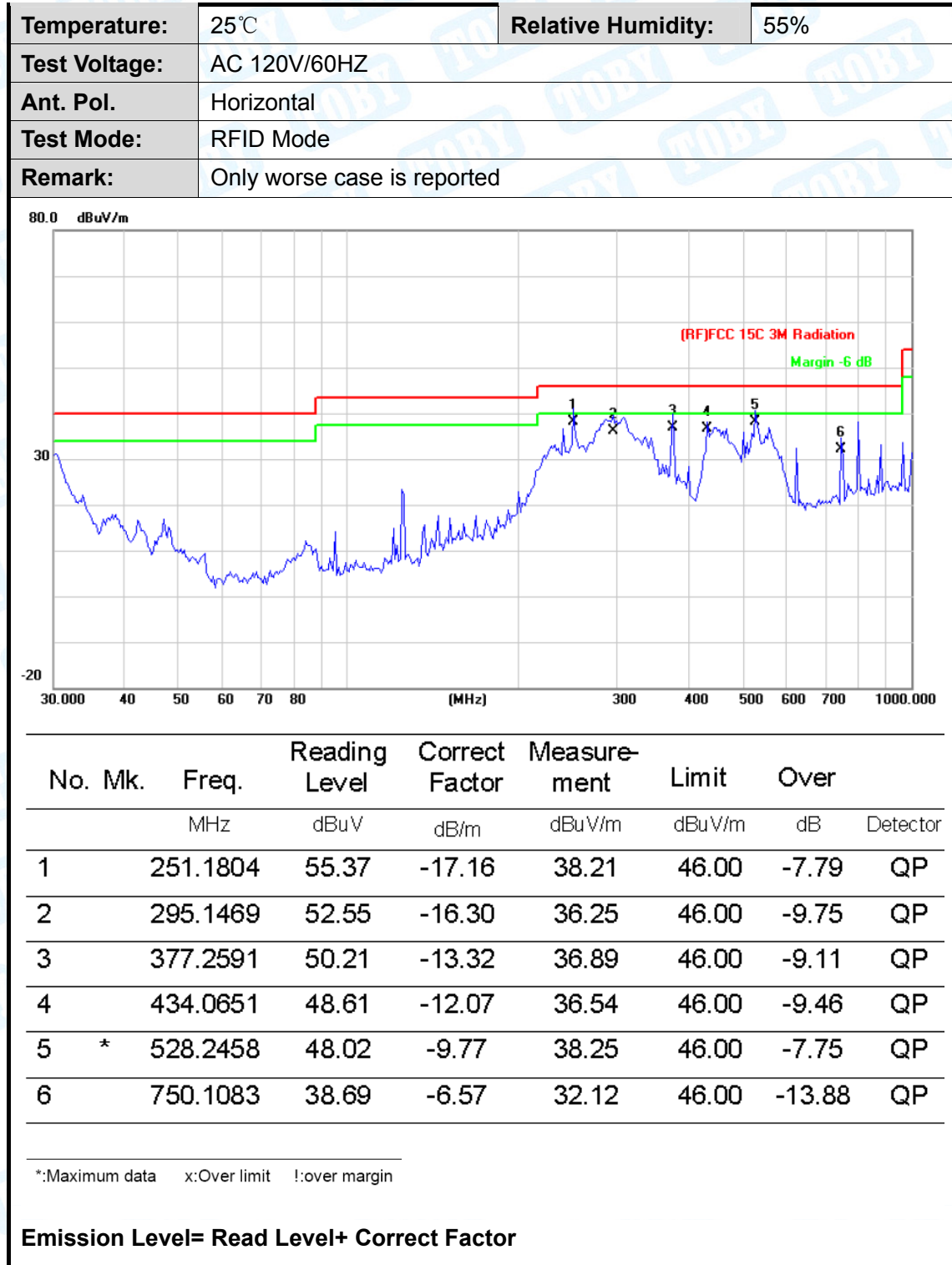


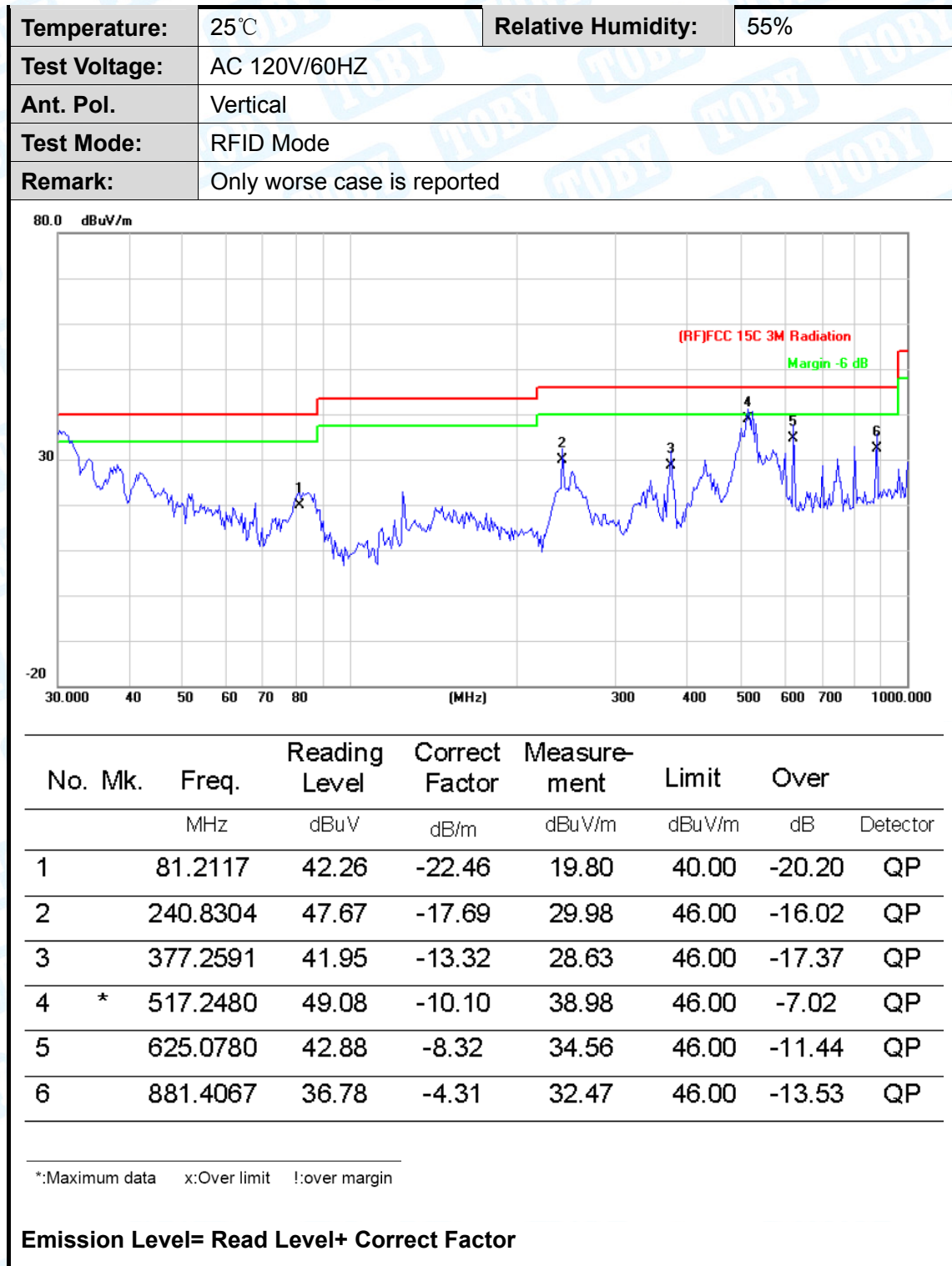
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1580	33.62	9.64	43.26	65.56	-22.30	QP
2		0.1580	16.60	9.64	26.24	55.56	-29.32	AVG
3		0.1860	32.16	9.65	41.81	64.21	-22.40	QP
4		0.1860	16.49	9.65	26.14	54.21	-28.07	AVG
5		0.2020	31.68	9.65	41.33	63.52	-22.19	QP
6		0.2020	16.97	9.65	26.62	53.52	-26.90	AVG
7		0.2180	28.70	9.64	38.34	62.89	-24.55	QP
8		0.2180	13.07	9.64	22.71	52.89	-30.18	AVG
9	*	0.4380	25.51	9.58	35.09	57.10	-22.01	QP
10		0.4380	13.27	9.58	22.85	47.10	-24.25	AVG
11		13.3980	22.75	10.49	33.24	60.00	-26.76	QP
12		13.3980	16.55	10.49	27.04	50.00	-22.96	AVG

Emission Level= Read Level+ Correct Factor

Attachment B-- Radiated Emission Test Data

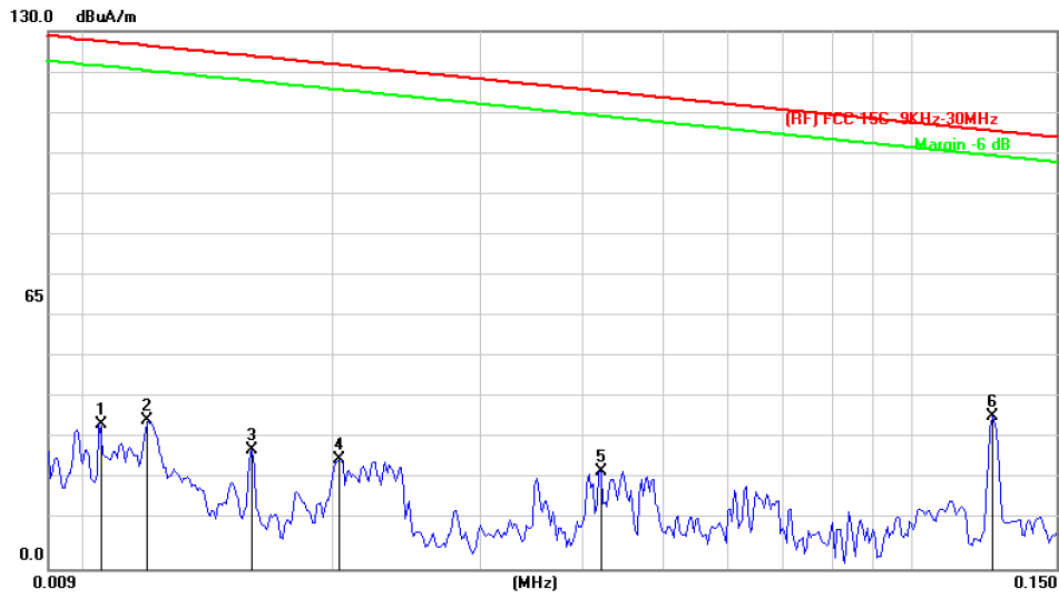
30MHz~1GHz





9KMz-30MHz

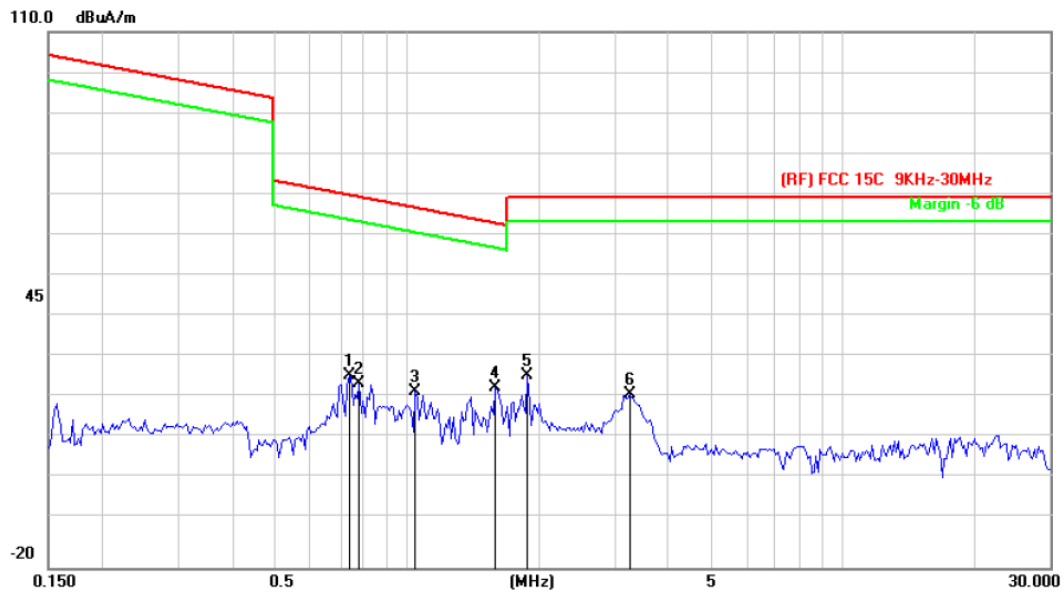
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Ant. 0°		
Test Mode:	RFID Mode		
Remark:	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuA/m	dB	dBuA/m	dBuA/m	dB	Detector
1		0.0104	45.42	-10.45	34.97	127.64	-92.67	QP
2		0.0119	46.18	-10.35	35.83	126.46	-90.63	QP
3		0.0159	38.97	-10.24	28.73	123.93	-95.20	QP
4		0.0202	36.65	-10.15	26.50	121.84	-95.34	QP
5		0.0421	33.52	-10.01	23.51	115.43	-91.92	QP
6	*	0.1253	41.79	-4.89	36.90	105.91	-69.01	QP

Emission Level= Read Level+ Correct Factor

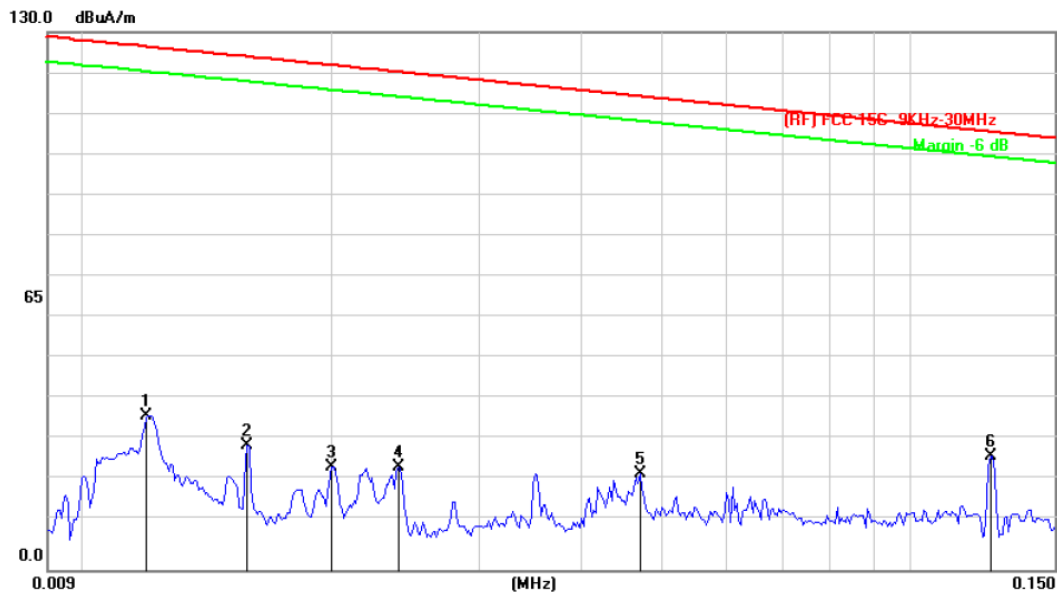
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Ant. 0°		
Test Mode:	RFID Mode		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuA/m	Correct Factor dB	Measure- ment dBuA/m	Limit dBuA/m	Over dB	Detector
1		0.7352	36.81	-10.04	26.77	70.42	-43.65	QP
2		0.7752	34.93	-10.10	24.83	69.95	-45.12	QP
3		1.0430	32.85	-10.26	22.59	67.34	-44.75	QP
4	*	1.5935	34.19	-10.35	23.84	63.60	-39.76	QP
5		1.8879	37.01	-10.39	26.62	70.00	-43.38	QP
6		3.2411	32.73	-10.55	22.18	70.00	-47.82	QP

Emission Level= Read Level+ Correct Factor

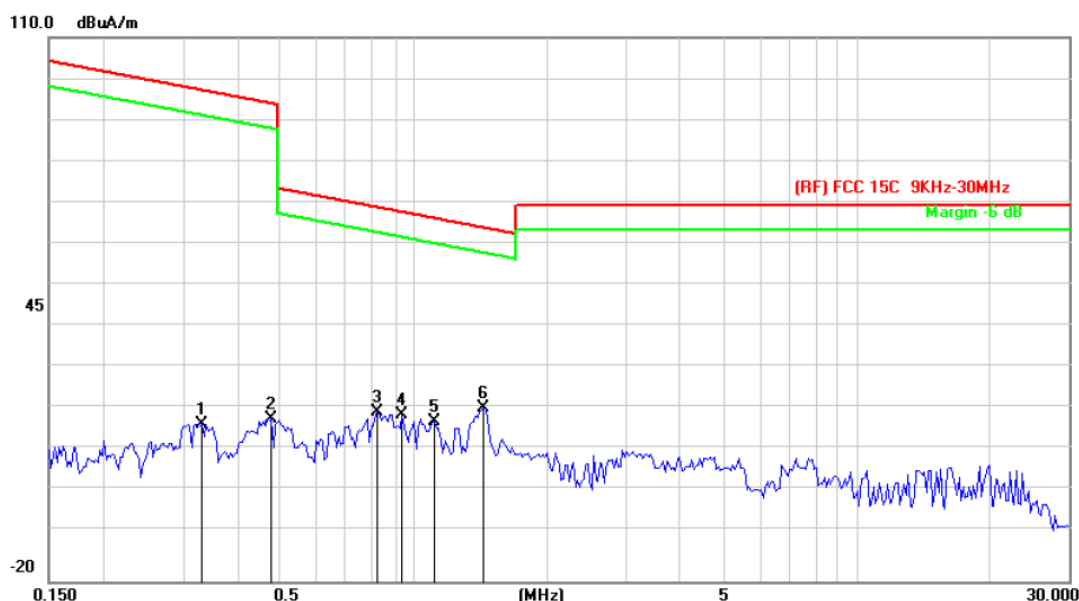
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Ant. 90°		
Test Mode:	RFID Mode		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuA/m	Correct Factor dB	Measure- ment dBuA/m	Limit dBuA/m	Over dB	Detector
1		0.0119	47.54	-10.35	37.19	126.46	-89.27	QP
2		0.0157	40.40	-10.27	30.13	124.04	-93.91	QP
3		0.0199	35.17	-10.15	25.02	121.97	-96.95	QP
4		0.0240	35.08	-10.09	24.99	120.34	-95.35	QP
5		0.0471	33.36	-10.05	23.31	114.45	-91.14	QP
6	*	0.1253	32.41	-4.89	27.52	105.91	-78.39	QP

Emission Level= Read Level+ Correct Factor

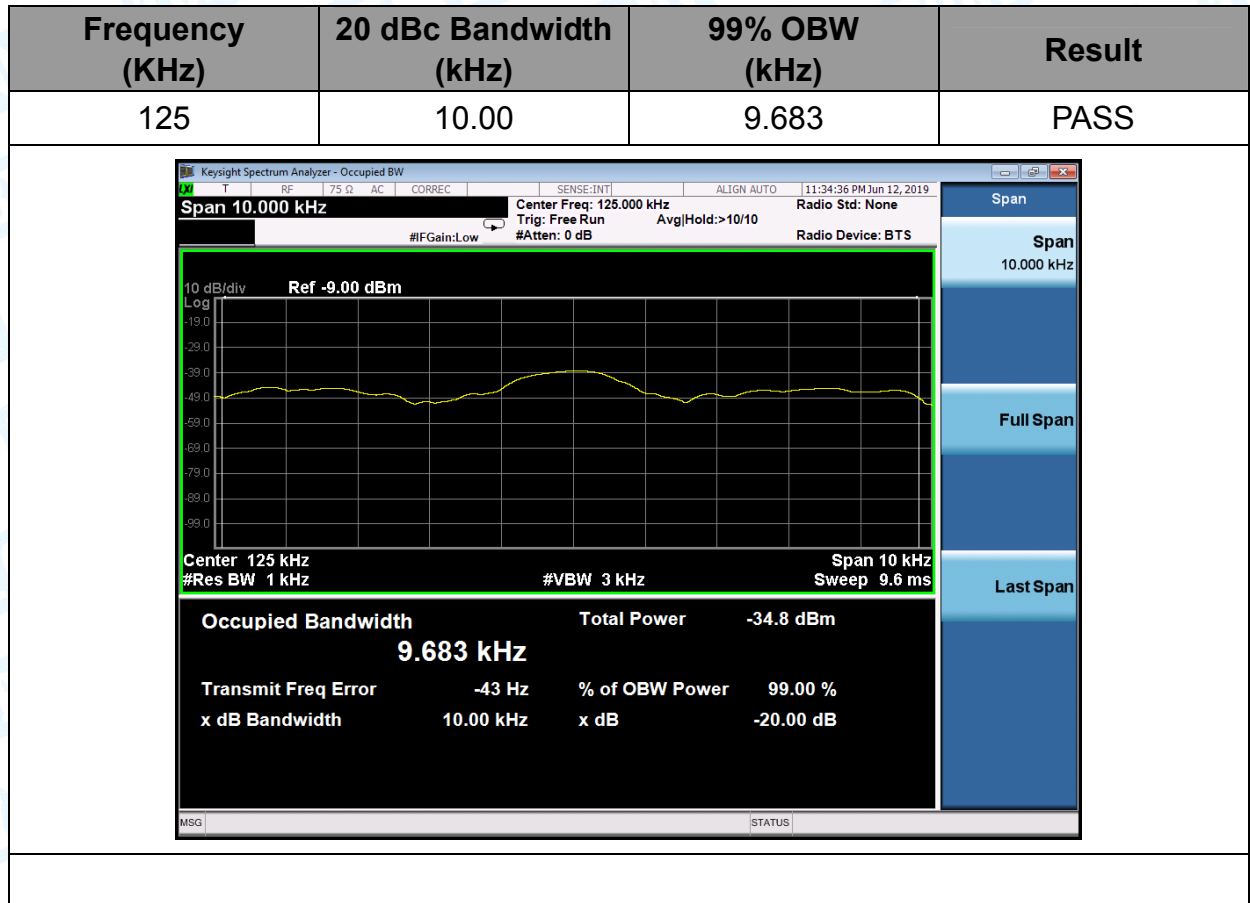
Temperature:	25°C	Relative Humidity:	55%
Test Voltage:	AC 120V/60HZ		
Ant. Pol.	Ant. 90°		
Test Mode:	RFID Mode		
Remark:	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuA/m	Correct Factor dB	Measure- ment dBuA/m	Limit dBuA/m	Over dB	Detector
1		0.3321	26.16	-8.56	17.60	97.40	-79.80	QP
2		0.4761	28.42	-9.53	18.89	94.25	-75.36	QP
3		0.8261	30.56	-10.15	20.41	69.39	-48.98	QP
4		0.9381	29.99	-10.23	19.76	68.27	-48.51	QP
5		1.1114	28.52	-10.27	18.25	66.78	-48.53	QP
6	*	1.4333	31.64	-10.33	21.31	64.53	-43.22	QP

Emission Level= Read Level+ Correct Factor

Attachment C-- Bandwidth Measurement Data



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