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TEST REPORT

Report No.: 16040672HKG-001

ITI Hong Kong Co Ltd

Application
For
Certification
(Original Grant)
(FCC ID: 2AIGJ1201773)

FM Transmitter

Prepared and Checked by:

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Date: May 23, 2016

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GENERAL INFORMATION

Grantee:	ITI Hong Kong Co Ltd
Grantee Address:	Unit 10B, 13/F, Cable TV Tower, 9 Hoi Shing Road, Tsuen Wan, Hong Kong.
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Manufacturer:	Skytech Electronics (Dongguan) Co, Ltd.
Manufacturer Address:	Qiaotou Industrial District, Qiaoli Cun, Changping Town, Dongguang, GuangDong, China.
Brand Name:	radioshack
Model:	1201773
Type of EUT:	FM Transmitter
Description of EUT:	Universal FM Transmitter
Serial Number:	N/A
FCC ID:	2AIGJ1201773
Date of Sample Submitted:	April 13, 2016
Date of Test:	April 13, 2016 to April 26, 2016
Report No.:	16040672HKG-001
Report Date:	May 23, 2016
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Field Strength and Bandwidth Requirement	15.239	Pass
Radiated Emission Radiated Emission on the Bandedge	15.209	Pass
Radiated Emission in Restricted Bands	15.205	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2014 Edition

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Table of Contents

1.0 General Description

1.1 Product Description

The EUT is a Universal FM Transmitter (using in a vehicle) which transmits audio signal from external electronic devices like iPhone or iPad to the car radio. The electronic devices are connected with the EUT by 3.5mm AUX IN plug. The Unit comes with a LCD display to show the frequency & channel being transmitted to the car radio. The Unit is powered by car cigarette 12V socket. It can be operated in 100 different channels in the frequency band 88.1MHz to 107.9MHz with 200kHz channel spacing (88.1, 88.3, 88.7, 88.9, … ,107.9MHz).

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). All radiated measurements were performed in an 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

1.4 Test Facility

The 3m Chamber used to collect the radiated data is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The device was powered by 12V car lead acid battery.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

2.5 Support Equipment List and Description

Smartphone (Provided by Intertek)

3.0 **Emission Results**

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG - AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF

where FS = Field Strength in dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 88.100 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 5.4 dB

Applicant: ITI Hong Kong Co Ltd Date of Test: April 26, 2016
Model: 1201773
Worst-Case Operating Mode: Transmitting (FM)

Table 1
Radiated Emissions
Pursuant to FCC Part 15 Section 15.239 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	88.100	49.6	16	9.0	42.6	48.0	-5.4
V	176.200	27.5	16	19.0	30.5	43.5	-13.0
V	***264.300***	***26.7***	***16***	***21.0***	***31.7***	***46.0***	***-14.3***
H	352.400	24.9	16	24.0	32.9	46.0	-13.1
H	440.500	20.9	16	26.0	30.9	46.0	-15.1
H	528.600	20.5	16	27.0	31.5	46.0	-14.5

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	98.100	44.4	16	12.0	40.4	48.0	-7.6
V	196.200	30.5	16	16.0	30.5	43.5	-13.0
V	294.300	25.6	16	22.0	31.6	46.0	-14.4
H	392.400	23.8	16	25.0	32.8	46.0	-13.2
H	490.500	20.2	16	26.0	30.2	46.0	-15.8
H	588.600	18.3	16	29.0	31.3	46.0	-14.7

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	107.900	42.2	16	14.0	40.2	48.0	-7.8
V	215.800	29.5	16	17.0	30.5	43.5	-13.0
V	***323.700***	***23.6***	***16***	***24.0***	***31.6***	***46.0***	***-14.4***
H	431.600	20.7	16	25.0	29.7	46.0	-16.3
H	539.500	15.8	16	28.0	27.8	46.0	-18.2
H	647.400	17.7	16	29.0	30.7	46.0	-15.3

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

Applicant: ITI Hong Kong Co Ltd Date of Test: April 26, 2016
Model: 1201773
Worst-Case Operating Mode: Transmitting (Other)

Table 2
Radiated Emissions
Pursuant to FCC Part 15 Section 15.209 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	36.354	34.4	16	10.0	28.4	40.0	-11.6
V	48.545	37.5	16	11.0	32.5	40.0	-7.5
V	72.534	42.6	16	7.0	33.6	40.0	-6.4
V	108.456	34.7	16	14.0	32.7	43.5	-10.8
V	136.769	33.9	16	14.0	31.9	43.5	-11.6
H	192.898	30.0	16	16.0	30.0	43.5	-13.5

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

6. Measurement Uncertainty is ±5.3dB at a level of confidence of 95%.

4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

8.0 Miscellaneous Information

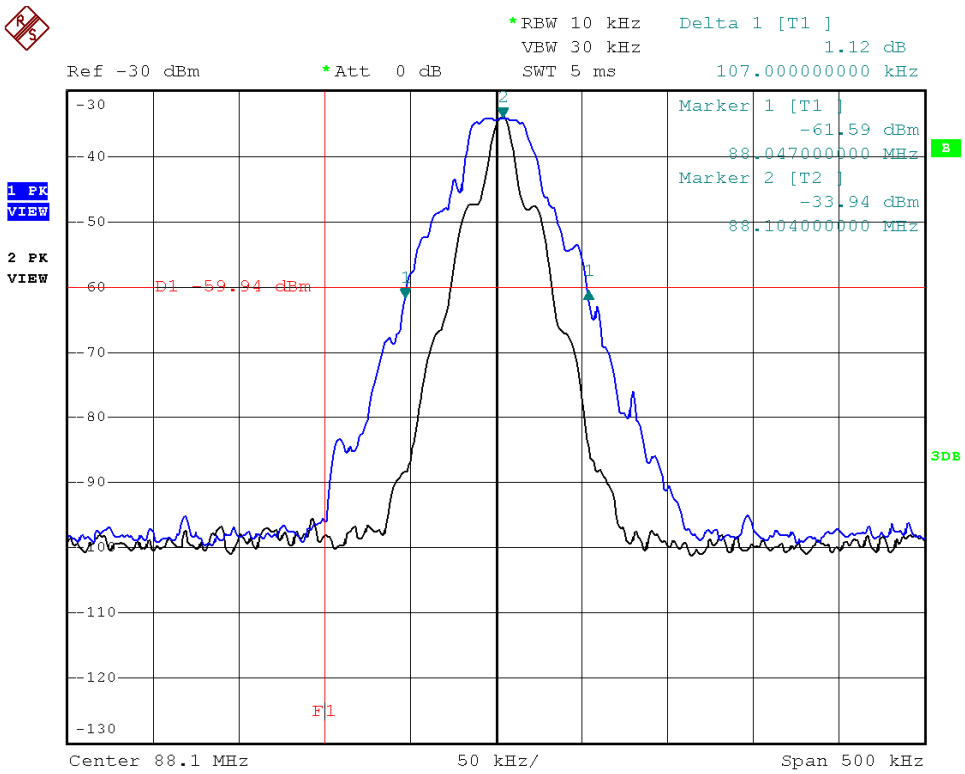
The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor.

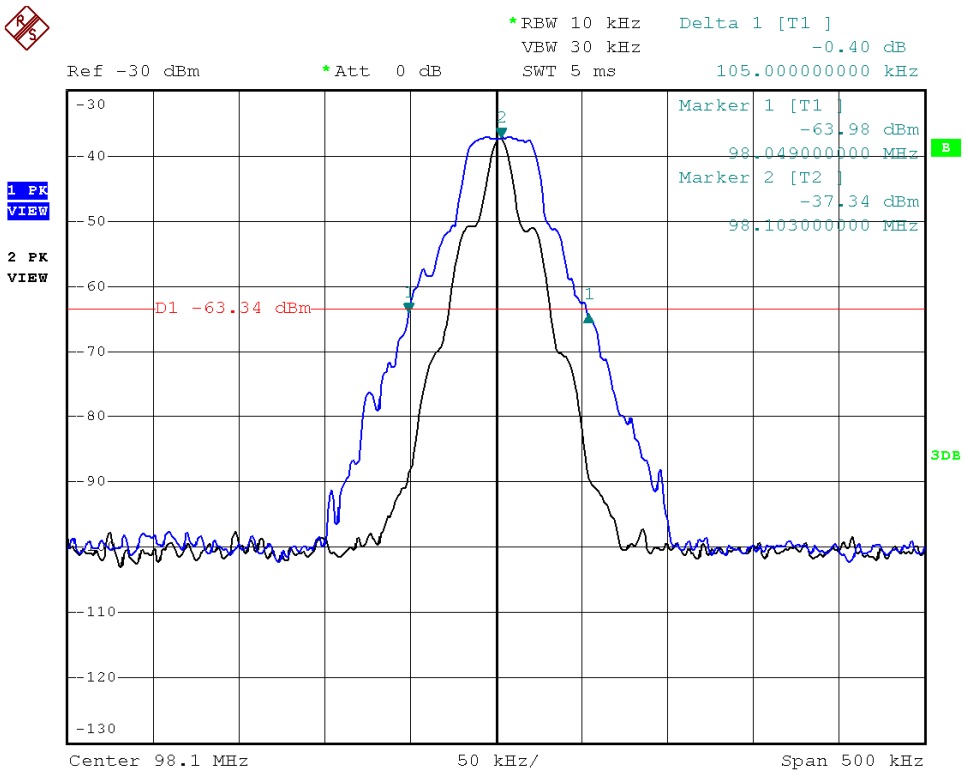
8.1 Measured Bandwidth

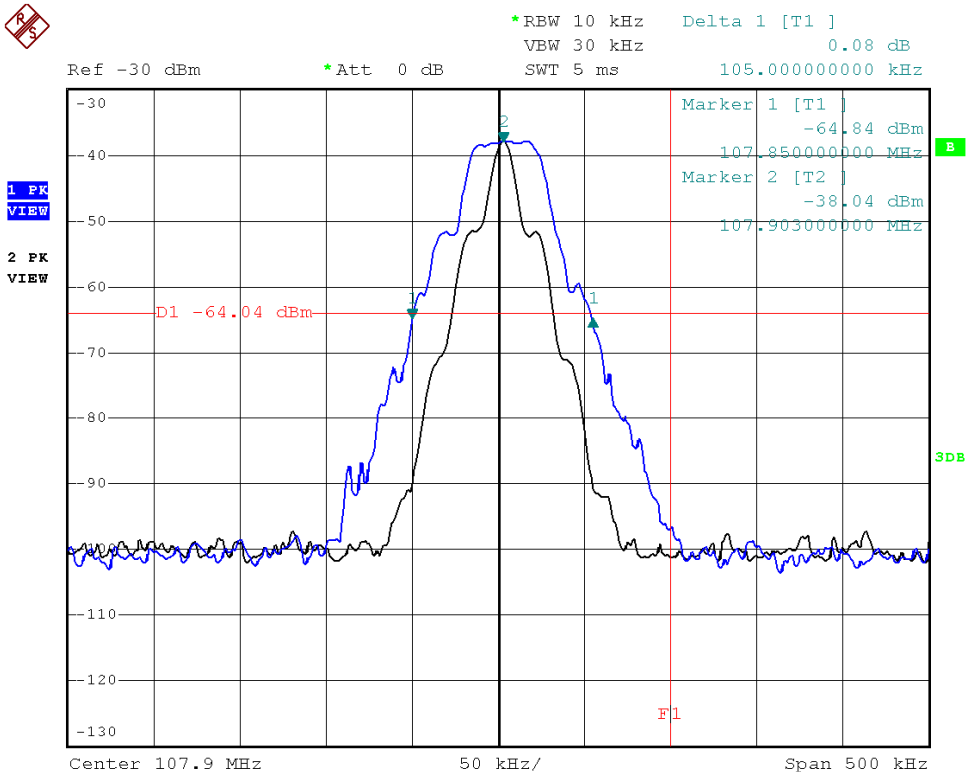
The fundamental emission which is applied iPod Video as audio input source in maximum volume. From the plot, it shows the emission is within 200kHz band.

Measured Bandwidth Results:

Bluetooth	Occupied Bandwidth (kHz)
Low Channel: 88.1MHz	107
Middle Channel: 98.1MHz	105
High Channel: 107.9MHz	105




*RBW 10 kHz
VBW 30 kHz
SWT 5 ms
Delta 1 [T1]
-0.40 dB
105.000000000 kHz
Ref -30 dBm
*Att 0 dB
Marker 1 [T1]
-63.98 dBm
98.049000000 MHz
Marker 2 [T2]
-37.34 dBm
98.103000000 MHz
1 PK VIEW
2 PK VIEW
D1 -63.34 dBm
B
3DB
Center 98.1 MHz
50 kHz/
Span 500 kHz


*RBW 10 kHz
VBW 30 kHz
SWT 5 ms
Delta 1 [T1]
0.08 dB
105.000000000 kHz
Ref -30 dBm
*Att 0 dB
Marker 1 [T1]
-64.84 dBm
107.850000000 MHz
Marker 2 [T2]
-38.04 dBm
107.903000000 MHz
1 PK VIEW
2 PK VIEW
D1 -64.04 dBm
B
3DB
F1
Center 107.9 MHz
50 kHz/
Span 500 kHz

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. Since the transmitter transmits the RF signal continuously.

8.3 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

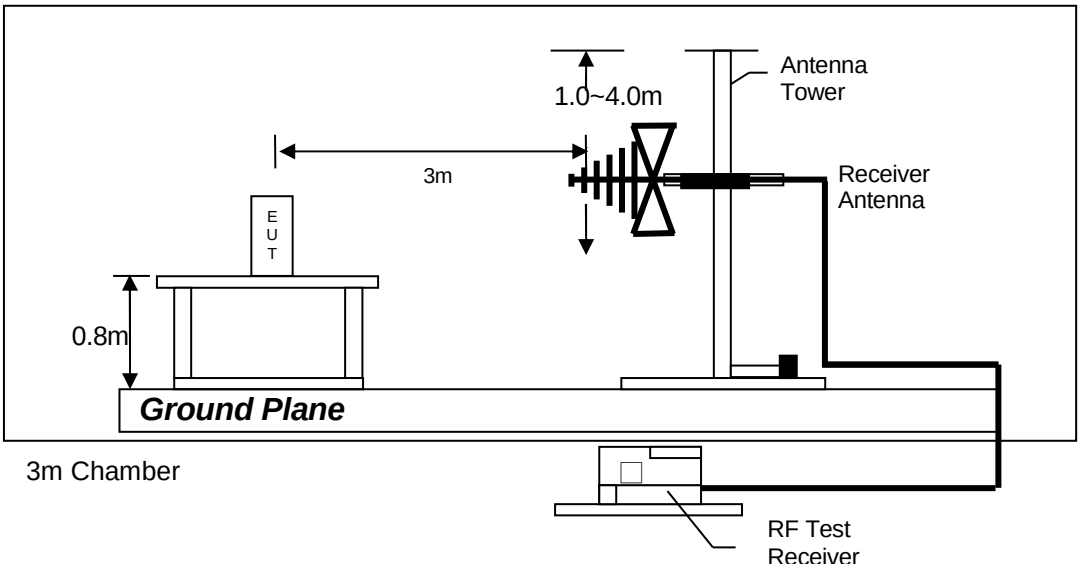
Conducted measurements were made as described in ANSI C63.10 (2013).

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

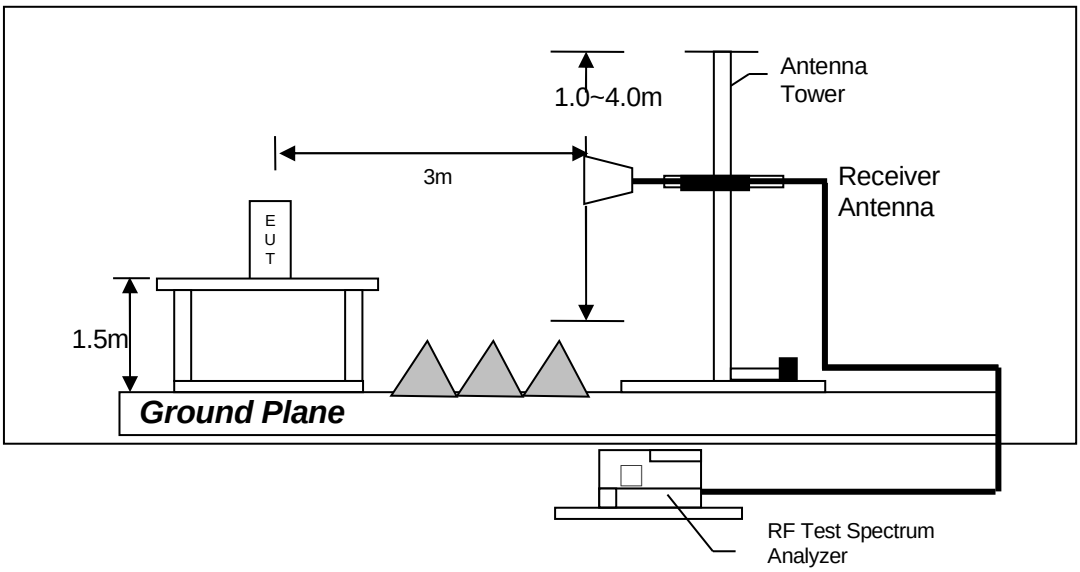
Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.

8.4.1 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

9.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-0571	EW-0447
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	May 13, 2015	Jun. 23, 2015	Mar. 16, 2015
Calibration Due Date	May 13, 2016	Dec. 23, 2016	Sep. 16, 2016

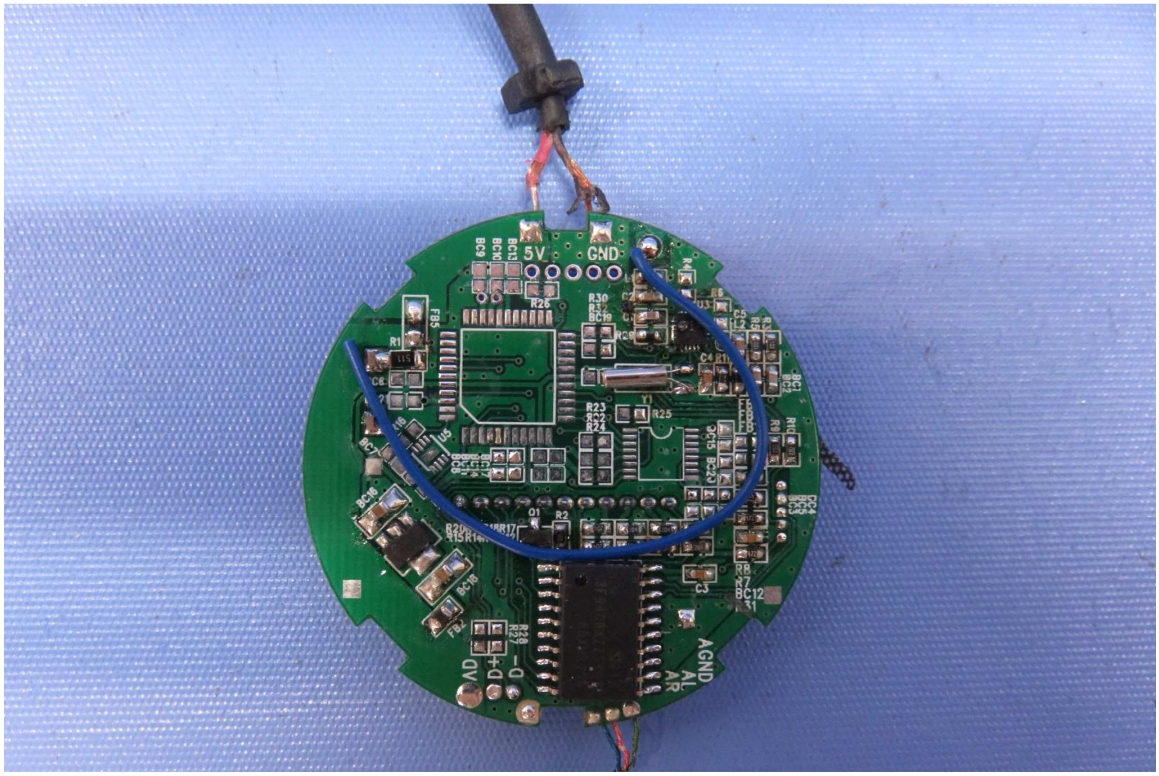
Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-1133
Manufacturer	R&S	EMCO
Model No.	FSP40	3115
Calibration Date	May 27, 2015	Nov. 05, 2015
Calibration Due Date	May 27, 2016	May 05, 2017

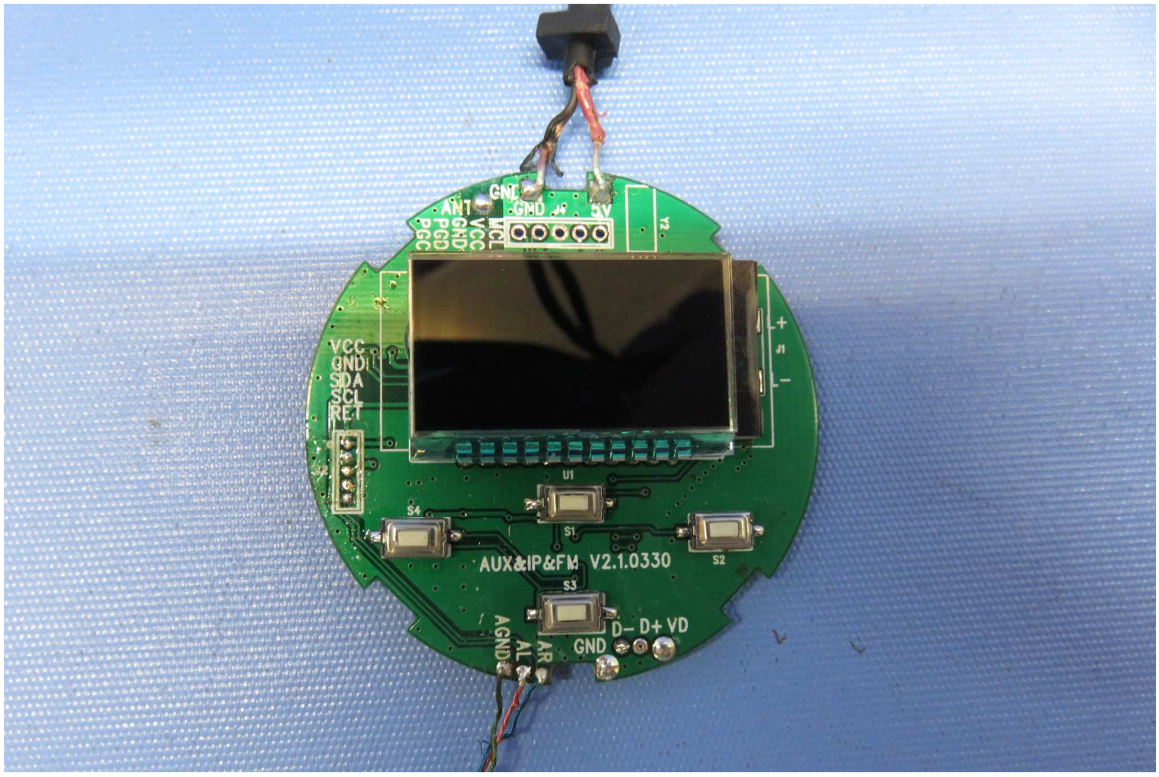
2) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Nov. 27, 2015
Calibration Due Date	Nov. 27, 2016

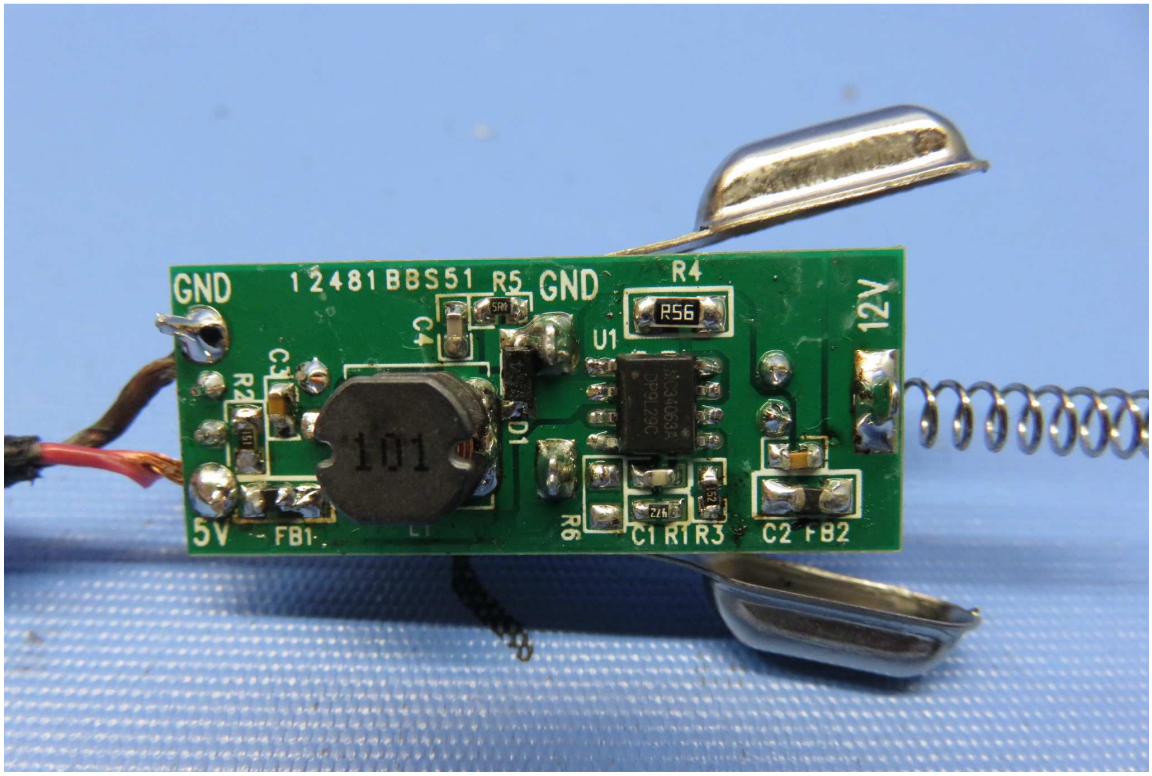
10.0 **EUT Photos**

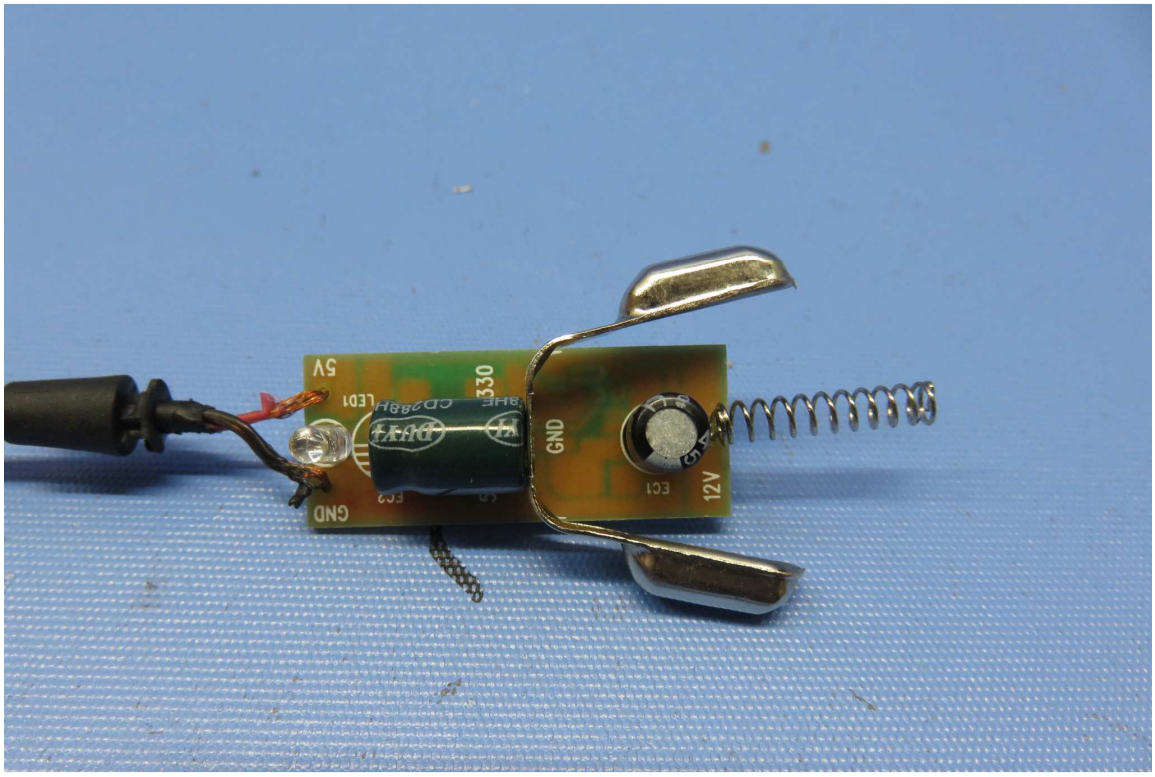
10.0 **EUT Photos (cont.)**





10.0 **EUT Photos (cont.)**





END OF TEST REPORT