

TEST REPORT

Report No.: 18070937HKG-001R2

Scosche Industries, Inc.

Application For Certification
(Original Grant)

FCC ID: IKQFMTD13A

Transmitter

This report supersedes previous report with report number 18070937HKG-001R1 dated September 19, 2018. Please refer HEE-S18-0085 Letter issued on October 09, 2018 for amendment/ supersede notification.

Prepared and Checked by:

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TEST REPORT

GENERAL INFORMATION

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Manufacturer:	Scosche Industries, Inc.
Manufacturer Address:	1550 Pacific Ave, Oxnard, CA 93033 USA.
Brand Name:	Scosche
FCC Model:	FMTD13XXX, FMTD13, FMTD13-SP1, FMTD3X, FMTD3, FMTD3A, FMTD3R
Tested Model:	FMTD13 (worse case data), FMTD3
Type of EUT:	Transmitter
Description of EUT:	In Car Flex-Mount FM Transmitter
Serial Number:	N/A
FCC ID	IKQFMTD13A
Date of Sample Submitted:	July 17, 2018
Date of Test:	July 17, 2018 to July 24, 2018
Report No.:	18070937HKG-001R2
Report Date:	October 09, 2018
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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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, 2016 Edition

- Note:
1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions 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.

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1.0 GENERAL DESCRIPTION

1.1 Product Description

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

The Model(s): FMTD13XXX, FMTD13-SP1, FMTD3X, FMTD3, FMTD3A and FMTD3R are the same as the Model: FMTD13 in hardware aspect (circuit and software design), only PCB layout are different as declared by client.

- FMTD13XXX, FMTD13, FMTD13-SP1 are identical in PCB layout (FMTD13 is selected for test) (worse case result)
- FMTD3X, FMTD3, FMTD3A, FMTD3R are identical in another PCB layout. (FMTD3 is selected for test)

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.

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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 a fully charged 12V Car Lead Acid Battery.

The Model: FMTD3 is the same as the Model: FMTD13 in hardware aspect (circuit and software design), only PCB layout are different. Both FMTD13 and FMTD3 were tested. Only the worse case result are shown in this report (FMTD13).

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

The EUT exercise program (if any) used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

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

1. Smartphone
2. 12V Car Lead Acid Battery with 1m of twisted cable
(Provided by Intertek)

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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 dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

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 dB μ V/m

RR = RA - AG - AV in dB μ V

LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V 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 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V/m}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V/m}$$

$$RR = 18.0 \text{ dB}\mu\text{V}$$

$$LF = 9.0 \text{ dB}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 500.068 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 14.0 dB

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RADIATED EMISSIONS

Model: FMTD13

Date of Test: July 24, 2018

Worst-Case Operating Mode: FM Transmitting

Table 1
Pursuant to FCC Part 15 Section 15.239 Requirement

Lowest Channel

Polarization	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	41.5	16	9.0	34.5	48.0	-13.5
V	176.200	13.4	16	19.0	16.4	43.5	-27.1
V	264.300	13.2	16	21.0	18.2	46.0	-27.8
V	352.400	8.8	16	24.0	16.8	46.0	-29.2
V	440.500	6.8	16	26.0	16.8	46.0	-29.2
V	528.600	8.8	16	27.0	19.8	46.0	-26.2

- 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%.

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Model: FMTD13
Date of Test: July 24, 2018
Worst-Case Operating Mode: FM Transmitting

Table 2
Pursuant to FCC Part 15 Section 15.239 Requirement

Middle Channel

Polarization	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	38.4	16	12.0	34.4	48.0	-13.6
V	196.200	15.1	16	16.0	15.8	43.5	-27.7
V	294.300	12.4	16	22.0	18.4	46.0	-27.6
V	392.400	7.8	16	25.0	16.8	46.0	-29.2
V	490.500	6.5	16	26.0	16.5	46.0	-29.5
V	588.600	6.4	16	29.0	19.4	46.0	-26.6

- 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%.

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Model: FMTD13
Date of Test: July 24, 2018
Worst-Case Operating Mode: FM Transmitting

Table 3
Pursuant to FCC Part 15 Section 15.239 Requirement

Highest Channel

Polarization	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	36.2	16	14.0	34.2	48.0	-13.8
V	215.800	15.4	16	17.0	16.4	43.5	-27.1
V	323.700	10.8	16	24.0	18.8	46.0	-27.2
V	431.600	7.8	16	25.0	16.8	46.0	-29.2
V	539.500	7.5	16	28.0	19.5	46.0	-26.5
V	647.400	5.4	16	29.0	18.4	46.0	-27.6

- 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%.

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Model: FMTD13

Date of Test: July 24, 2018

Worst-Case Operating Mode: FM Transmitter Operating

Table 4
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	166.666	27.0	16	17.0	28.0	43.5	-15.5
V	187.522	25.4	16	16.0	25.4	43.5	-18.1
V	208.342	24.2	16	17.0	25.2	43.5	-18.3
H	229.162	22.5	16	18.0	24.5	46.0	-21.5
H	266.645	20.6	16	21.0	25.6	46.0	-20.4
H	479.180	19.8	16	26.0	29.8	46.0	-16.2
H	500.068	22.0	16	26.0	32.0	46.0	-14.0
H	533.950	20.2	16	27.0	31.2	46.0	-14.8
H	749.982	17.8	16	30.0	31.8	46.0	-14.2

- NOTES:
1. Quasi-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%.

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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 and Canada.

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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 (calculation and timing diagram).

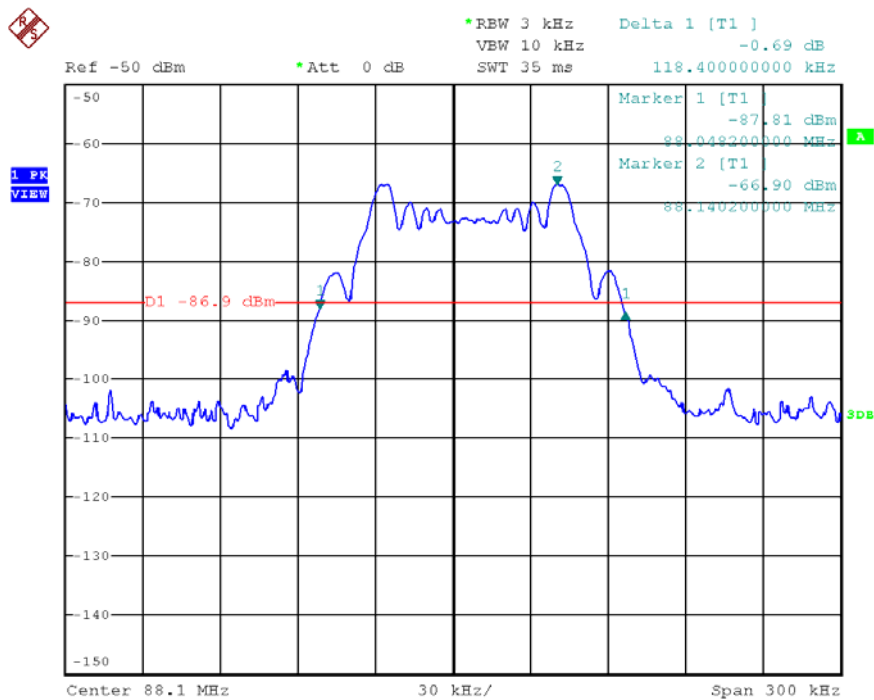
8.1 Measured Bandwidth

For electronic filing, the plot on saved in bw.pdf shows the fundamental emission which is applied iPod Video as audio input source in maximum volume. From the plot, it shows the emission is within the 200 kHz band.

Bandwidth Results:

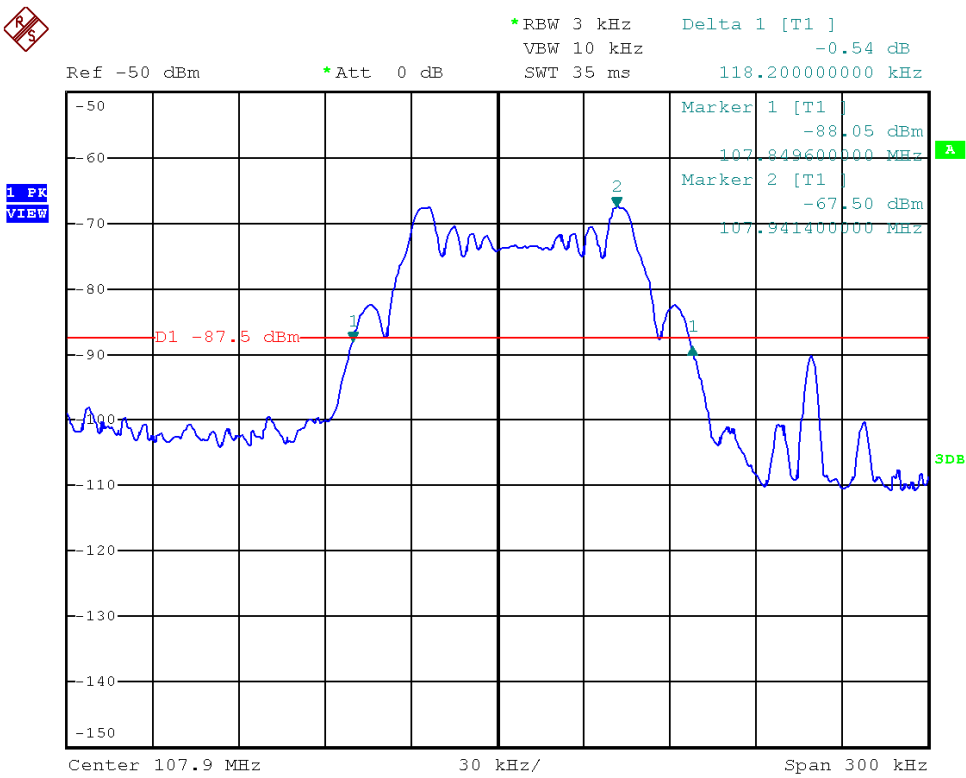
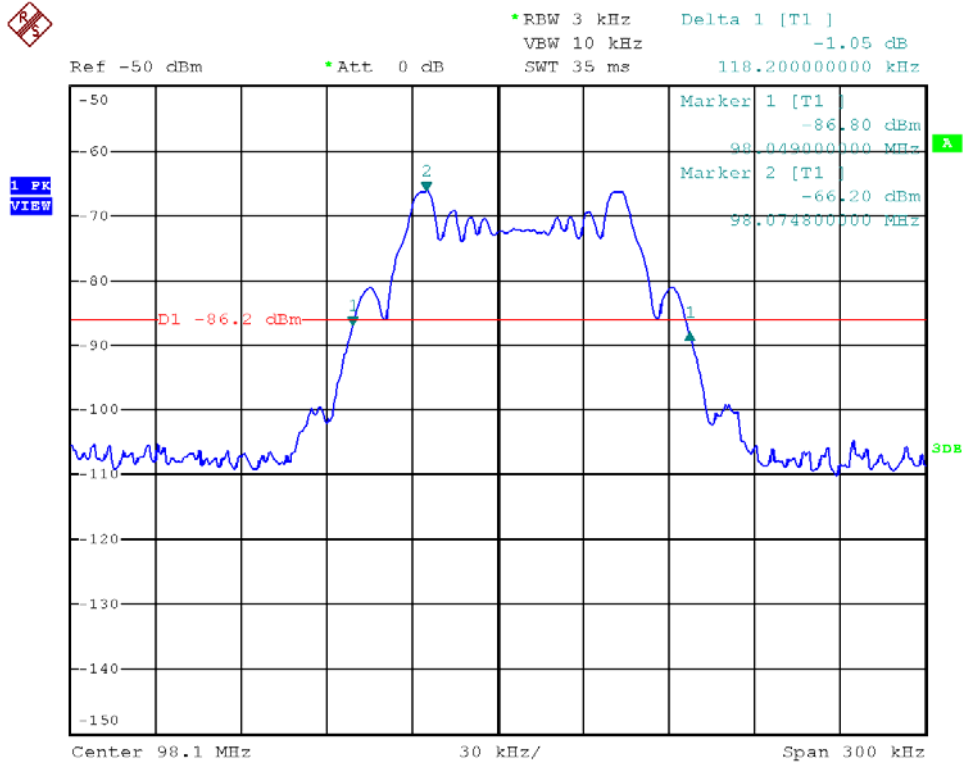
Frequency (MHz)	Measured Bandwidth (kHz)
Low Channel: 88.1	118.4
Middle Channel: 98.1	118.2
High Channel: 107.9	118.2

Bandwidth



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Bandwidth



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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.

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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.

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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).

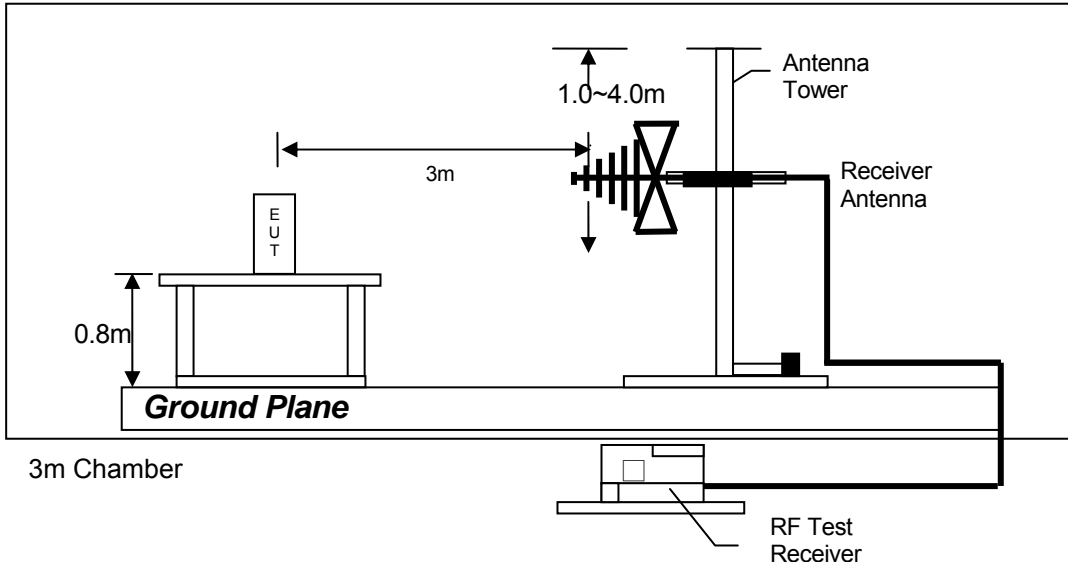
The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion 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 3 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.

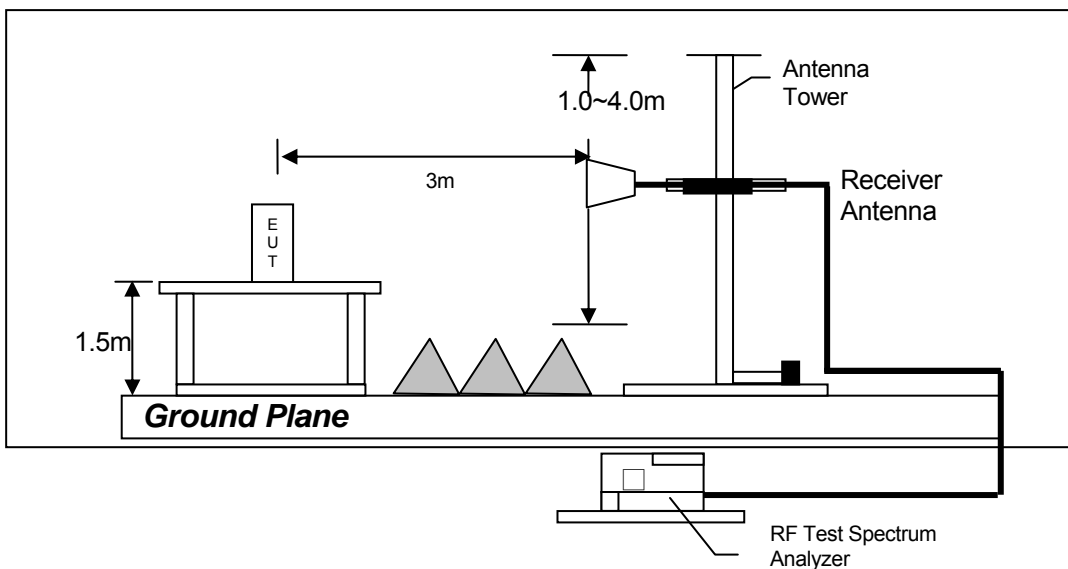
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8.4.1 Radiated Emission Test Setup

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

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9.0 CONFIDENTIALITY REQUEST

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

10.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-3156	EW-0954	EW-0447
Manufacturer	ROHDESCHWARZ	EMCO	EMCO
Model No.	ESR26	3104C	3146
Calibration Date	November 10, 2017	February 27, 2018	January 17, 2018
Calibration Due Date	November 10, 2018	August 27, 2019	July 17, 2019

Equipment	Active Loop H-field (9kHz to 30MHz)	12m Double Shield RF Cable (20MHz to 6GHz)	RF Cable (up to 40GHz)
Registration No.	EW-2313	EW-1852	EW-3155
Manufacturer	ELECTROMETRI	RADIALL	N/A
Model No.	EM-6876	N(m)-RG142 - N(m)	1-40 GHz
Calibration Date	March 08, 2018	January 19, 2018	January 29, 2018
Calibration Due Date	September 08, 2019	January 19, 2019	January 29, 2019

Equipment	Double Ridged Guide Antenna	Pyramidal Horn Antenna	Spectrum Analyzer
Registration No.	EW-1015	EW-0905	EW-2329
Manufacturer	EMCO	EMCO	R&S
Model No.	3115	3160-09	FSP3
Calibration Date	November 17, 2017	August 18, 2017	September 28, 2017
Calibration Due Date	May 17, 2019	February 18, 2019	September 28, 2018

Equipment	Solid State Low Noise Pre-amplifier Assembly (1 - 18)GHz	RF Pre-amplifier (9kHz to 40GHz)
Registration No.	EW-3229	EW-3006
Manufacturer	BONN ELEKTRO	SCHWARZBECK
Model No.	BLMA 0118-5G	BBV 9744
Calibration Date	January 30, 2018	April 26, 2018
Calibration Due Date	January 30, 2019	April 26, 2019

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2) Bandedge/Bandwidth Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	September 28, 2017
Calibration Due Date	September 28, 2018

END OF TEST REPORT