Test report

352148-TRFEMC

Date of issue: June 14, 2018

Applicant:

Somewear Labs

Product:

Portable Hotspot

Models:

Somewear Global Hotspot

Specifications:

- FCC 47 CFR Part 15, Subpart B – Verification
- ICES-003 Issue 6

Lab and test locations

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Andres Martinez, Wireless Engineer
Reviewed by	Chip Fleury, Wireless and Certification Supervisor
Review date	June 13, 2018
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart B – Verification	Title 47: Telecommunication; Part 15—Radio Frequency Devices
ICES-003 Issue 6 April 2017 (NVLAP Accreditation Pending)	Information Technology Equipment (ITE) – Limits and methods of measurement

1.2 Test methods

ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

1.3 Exclusions

None

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full of the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Test report revision history

Table 1.5-1: Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Notes: TRFEMC – Original Report

Section 2 Summary of test results

2.1 Emissions Test results

Table 2.1-1: FCC 47 CFR Part 15, Subpart B and ICES-003 Issue 6 results

Test description	Verdict
FCC 15.109 Radiated disturbance	Pass
FCC 15.107 Conducted disturbance at mains port [1]	Not applicable

Notes: Class B Emissions

[1]Conducted disturbance – As the EUT only charges through battery, Conducted disturbance test isn't applicable.

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	Somewear Labs
Address	1040 Mariposa Street
City	San Francisco
State	CA
Postal/Zip code	94107
Country	U.S.A.

3.2 Manufacturer

Company name	Somewear Labs
Address	1040 Mariposa Street
City	San Francisco
State	CA
Postal/Zip code	94107
Country	U.S.A.

3.3 Sample information

Receipt date	May 17, 2018
Nemko sample ID number	352148

3.4 EUT information

Product name	Somewear Labs
Model	Somewear Global Hotspot
Model variant	N/A
Serial number	Engineering Sample
Power requirements	1000mA Battery and Micro USB.
Description/theory of operation	The Somewear Hotspot is a Bluetooth and satellite transceiver that provides a Bluetooth enabled smartphone constant connectivity even outside cellular coverage. It supports the following functions: Two-way messaging, location sharing, weather updates, S.O.S.
Operational frequencies	Bluetooth: 2402GHz – 2480GHz, Satellite: 1616MHz – 1626.5MHz
Software details	V.1.3.0

3.5 EUT exercise and monitoring details

For FCC-unintentional emissions the EUT was set to Rx mode while in battery mode. EUT has two modules which were set as receiver mode, Satellite - Model:9603N (FCC ID: Q639603, IC: 4629A-9603), BT - Model: BL652-SA (FCC ID: SQGBL652, IC: 3147A-BL652).

3.6 EUT setup details

Table 3.6-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Not Applicable			

Table 3.6-2: EUT interface ports

Description	Qty.
Not Applicable	

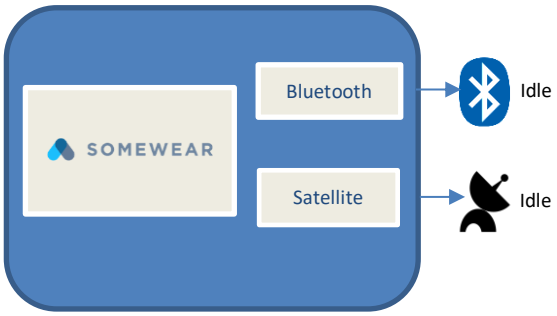
Table 3.6-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
MacBook Pro	Apple	Retina, 13-inch, Early 2015	N/A	N/A

Table 3.6-4: Inter-connection cables

Cable description	From	To	Length (m)

EUT – Idle Mode



Equipment Setup

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

None

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	21.1 °C
Relative humidity	58.7 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Terms and definitions

7.1 Product classifications definitions

7.1.1 Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Class A digital device	A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.
Class B digital device	A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public. Note: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. If a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

7.1.2 ICES-003

Class B ITE	limits of radio noise for ITE for residential operation
Class A ITE	limits of radio noise for ITE for non-residential operation
Conditions	Only ITE intended strictly for non-residential use in commercial, industrial or business environments, and whose design or other characteristics strongly preclude the possibility of its use in a residential environment, shall be permitted to comply with the less stringent Class A limits. All ITE that cannot meet the conditions for Class A operation shall comply with the Class B limits. The ITE shall comply with both the power line – conducted and the radiated emissions limits within the same Class, with no intermixing.

7.2 General definitions

7.2.1 Title 47: Telecommunication – Part 15-Radio Frequency devices, Subpart A – General

Digital device (Previously defined as a computing device)	An unintentional radiator (device or system) that generates and uses timing signals or pulses at a rate in excess of 9,000 pulses (cycles) per second and uses digital techniques; inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses radio frequency energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer. A radio frequency device that is specifically subject to an emanation requirement in any other FCC Rule part or an intentional radiator subject to subpart C of this part that contains a digital device is not subject to the standards for digital devices, provided the digital device is used only to enable operation of the radio frequency device and the digital device does not control additional functions or capabilities. Note: Computer terminals and peripherals that are intended to be connected to a computer are digital devices.

7.2.2 ICES-003

Information technology equipment (ITE)	Information Technology Equipment (ITE) is defined as devices or systems that use digital techniques for purposes such as data processing and computation. ITE is any unintentional radiator (device or system) that generates and/or uses timing signals or pulses having a rate of at least 9 kHz and employs digital techniques for purposes such as computation, display, data processing and storage, and control.

Section 8 Testing data

8.1 Radiated disturbance

8.1.1 References

FCC 15.109 & ANSI C63.4-2014

8.1.2 Test summary

Verdict	Pass		
Test date	June 12, 2018	Temperature	19.9 °C
Test engineer	Andres Martinez, Wireless Engineer	Air pressure	1001 mbar
Test location	10m semi anechoic chamber	Relative humidity	56 %

8.1.3 Notes

None

8.1.4 Setup details

EUT setup configuration	Table top
Test facility	10m Semi Anechoic Chamber(SAC)
Measuring distance	3 m
Antenna height variation	1–4 m
Turn table position	0–360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/spectrum analyzer settings for frequencies below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	– Peak (Preview measurement) – Quasi-peak (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 1000 ms (Quasi-peak final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (Preview measurement) Peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 100 ms (Peak and CAverage final measurement)

8.1.4 Setup details, continued

Table 8.1-1: Radiated disturbance equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1121	1 yr.	4/28/2019
Antenna, Bilog	Schaffner-Chase	CBL6111C	1763	2 yr.	11/28/2018
Antenna, Horn	ETS	3117-PA	E1139	2 yr.	1/25/2020
Antenna, Horn	Sage	SAR-2309-42-S2	E1143	2 yr.	03/05/2020

Notes: None

Table 8.1-2: Radiated disturbance test software details

Manufacturer of Software	Details
R&S	EMC32 V10.00.00

Notes: None

8.1.5 Test data -Radiated disturbance (Idle Mode)

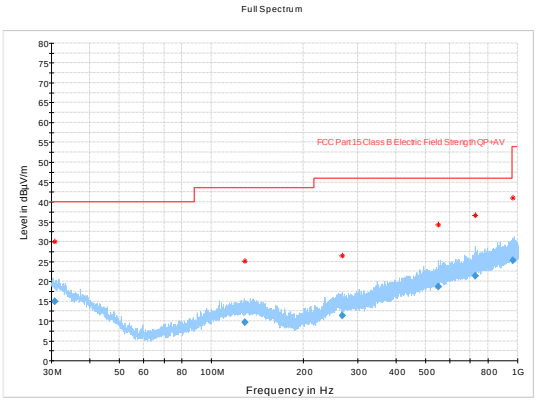


Figure 8.1.1: *Radiated spurious emissions, 30MHz - 1000MHz*

(Battery Mode and Idle Mode)

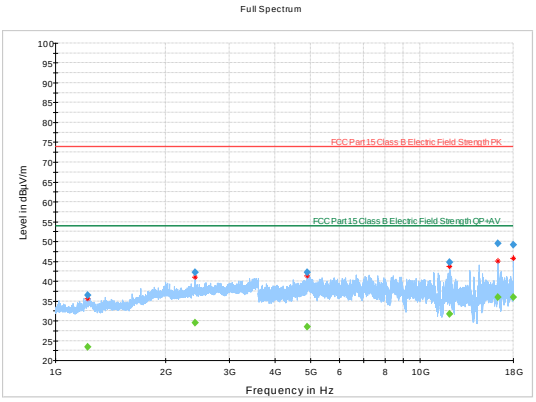


Figure 8.1.2: *Radiated spurious emissions, 1GHz-18GHz*

(Battery Mode Fully Operational)

Note: The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators. No considerable emissions were observed above 18 GHz, the presented data above 15GHz is the test system noise floor.

Table 8.1-3: Radiated field strength measurement results

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.840000	14.86	40.00	25.14	5000.0	120.000	239.3	V	17.0	20.2
128.667000	9.67	43.50	33.83	5000.0	120.000	177.1	V	207.0	13.8
267.099500	11.42	46.00	34.58	5000.0	120.000	355.8	H	355.0	15.6
551.679500	18.56	46.00	27.44	5000.0	120.000	109.4	V	100.0	22.3
727.892000	21.42	46.00	24.58	5000.0	120.000	348.9	V	249.0	25.0
967.412500	25.21	53.90	28.69	5000.0	120.000	402.8	V	280.0	28.6
30.840000	14.86	40.00	25.14	5000.0	120.000	239.3	V	17.0	20.2

Radiated spurious emissions, 30MHz - 1000 MHz

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1224.100000	---	23.37	53.90	30.53	5000.0	1000.000	109.5	V	340.0	-13.6
1224.100000	36.41	---	73.90	37.49	5000.0	1000.000	109.5	V	340.0	-13.6
2410.633333	---	29.48	53.90	24.42	5000.0	1000.000	138.2	V	116.0	-9.7
2410.633333	42.19	---	73.90	31.71	5000.0	1000.000	138.2	V	116.0	-9.7
4910.566667	42.21	---	73.90	31.69	5000.0	1000.000	189.8	H	349.0	-2.3
4910.566667	---	28.55	53.90	25.35	5000.0	1000.000	189.8	H	349.0	-2.3
12050.033333	---	31.75	53.90	22.15	5000.0	1000.000	296.0	V	184.0	4.4
12050.033333	44.69	---	73.90	29.21	5000.0	1000.000	296.0	V	184.0	4.4
16309.766667	---	35.90	53.90	18.00	5000.0	1000.000	132.0	H	101.0	10.5
16309.766667	49.51	---	73.90	24.39	5000.0	1000.000	132.0	H	101.0	10.5
17994.866667	49.19	---	73.90	24.71	5000.0	1000.000	397.1	H	0.0	13.2
17994.866667	---	36.00	53.90	17.90	5000.0	1000.000	397.1	H	0.0	13.2

Radiated spurious emissions, 1GHz-18 GHz

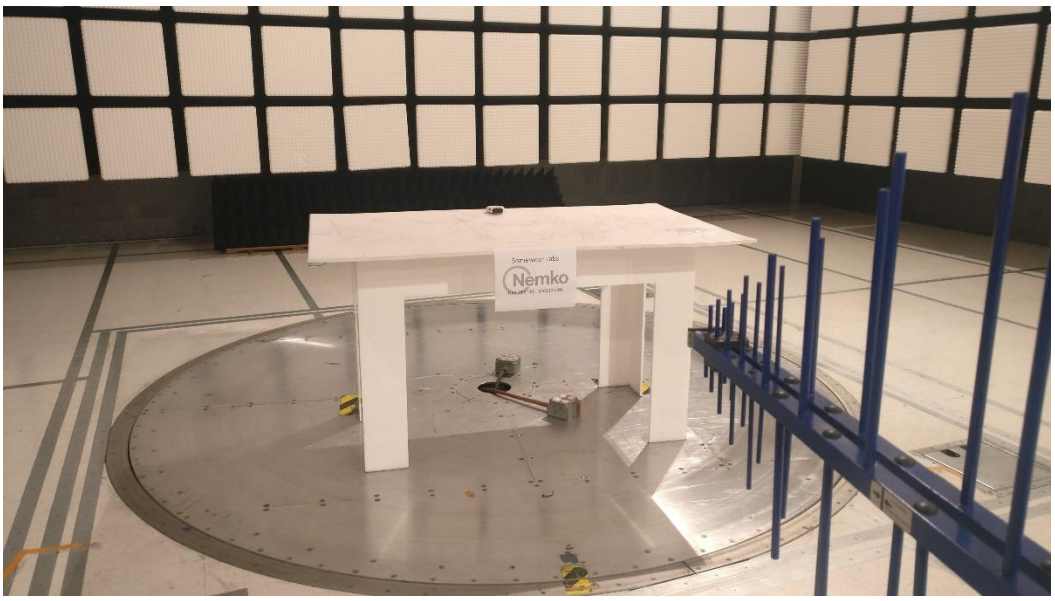
Notes: [1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

[2] Correction factors = antenna factor ACF (dB) + cable loss (dB) − amplifier gain (dB)

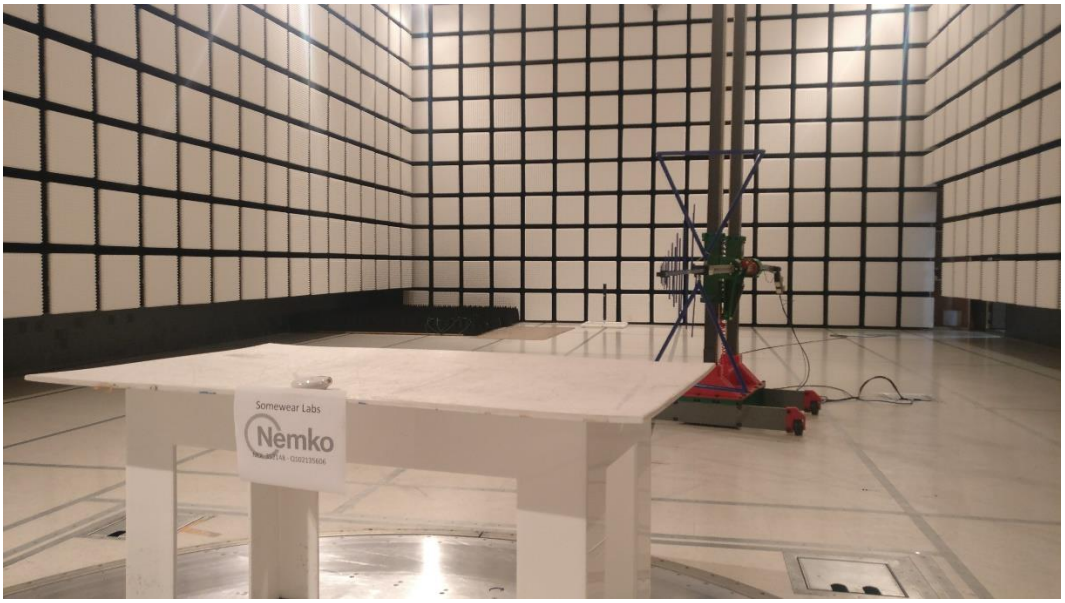
[3] The maximum measured value observed over a period of 15 seconds was recorded.

Sample calculation: 46.02 dBµV/m (field strength) = 44.82 dBµV (receiver reading) + 1.2 dB (Correction factor)

8.1.6 Setup photos



Front Picture - 30MHz-1GHZ



Back Picture - 30MHz-1GHZ

8.2 Conducted disturbance at mains port

8.2.1 References

FCC 15.107 & ANSI C63.4-2014

8.2.2 Test summary

Verdict	Not Applicable		
Test date	N/A	Temperature	19.9 °C
Test engineer	Andres Martinez, Wireless Engineer	Air pressure	1000 mbar
Test location	Table Top	Relative humidity	56

8.2.3 Notes

Not applicable. EUT can only be charge by a Li-Ion battery.

8.2.4 Setup details

Port under test	AC Mains Input
EUT setup configuration	Floor standing
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	– Peak and Average (Preview measurement) – Quasi-peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak and Average preview measurement) – 1000 ms (Quasi-peak final measurement) – 160 ms (CAverage final measurement)

Table 8.2-1: Conducted disturbance at mains port equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESCI 7	E1026	5/23/2017	5/23/2019
Two Line V-Network	Rohde & Schwarz	ENV216	E1019	6/27/2017	6/27/2018

Notes: None

Table 8.2-2: Conducted disturbance at mains port test software details

Manufacturer of Software	Details
Rohde-Schwarz	EMC 32 V10.0

Notes: None

Section 9 EUT photos

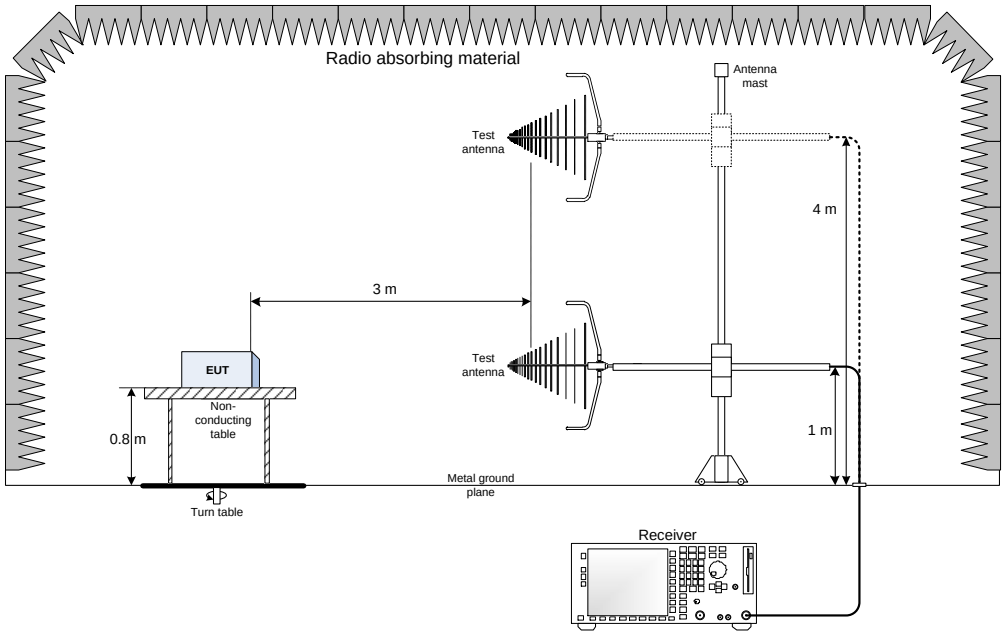
9.1 External photos

Front Image - EUT

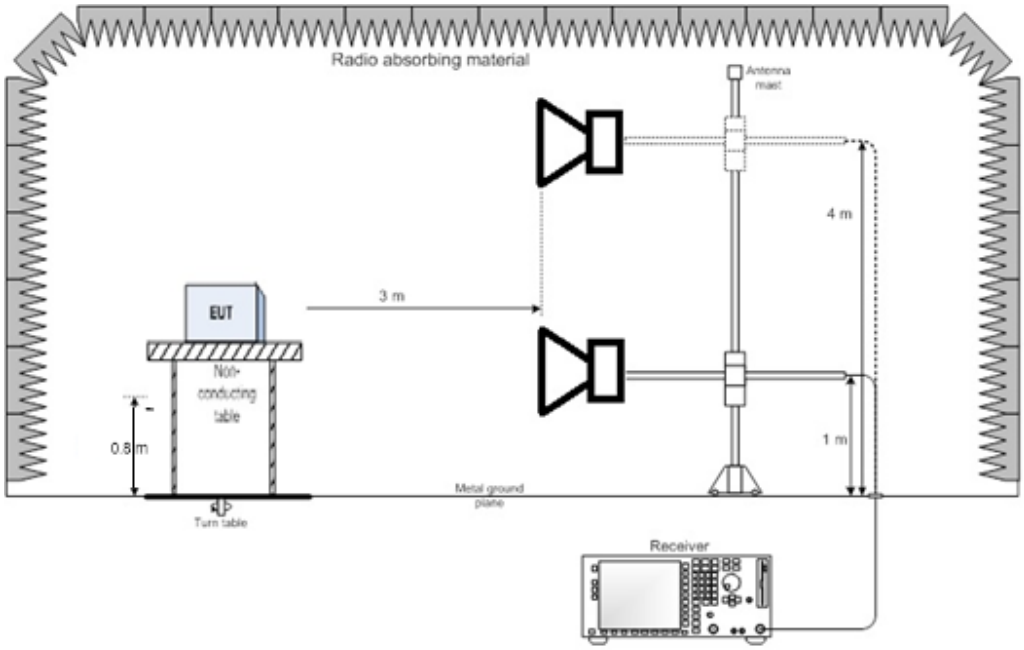
Back Image- EUT

Section 10 Block diagrams of test set-ups

10.1 Radiated emissions set-up



30-1000MHz Setup



Above 1GHz Setup

Thank you for choosing