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Nemko Spa

Via del Carroccio, 4 – I 20853 Biassono (MB)

Report number: 286044-1TRFFCC

Apparatus: EGO PRO SAFETY MOVE SENSOR

Applicant: Advanced Microwave Engineering s.r.l.
Via Lucca, 50 - Firenze, 50142 Italy

FCC ID: UKOPLXSENSSFT

Test specification:

Title 47-Telecommunication

Chapter I - Federal Communications Commission

Subchapter A - General

Part 15 - Radio Frequency Devices

Subpart B - Unintentional Radiators

- **§15.107 – Conducted limits**
- **§15.109 – Radiated emission limits**

Reviewed by:

2015-12-18

Signature

G. Curioni, Wireless/EMC Specialist

Date

Tested by:

2015-12-18

Signature

D. Guarnone, Wireless/EMC Specialist

Date

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 Nemko Spa Via del Carroccio, 4 – I 20853 Biassono (MB)	Section 1: Report summary
	Report Number: 286044-1TRFFCC
	Specification: FCC 15 Subpart B

Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko S.p.A.

Test specification:
FCC Part 15 Subpart B, 15.107,15.109
Unintentional radiators

Compliance status:	Complies
Exclusions:	None
Non-compliances:	None
Report release history:	Original release
Test location:	Nemko Spa Via del Carroccio, 4 – I 20853 Biassono (MB)
Registration number:	(10 m Semi anechoic chamber),481407

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.

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Nemko Spa Via del Carroccio, 4 – I 20853 Biassono (MB)

Section 2: Equipment under test

Report Number: 286044-1TRFFCC

Specification: FCC 15 Subpart B

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

Type of equipment:	Sensor for anticollision system for detecting hazards in real-time
Product marketing name:	EGO PRO SAFETY MOVE SENSOR
Code number:	--
Model number:	EGO PRO SAFETY MOVE SENSOR
Serial number:	--
FCC ID:	UKOPLXSENSST
Date of receipt:	2015-12-03
Label	

2.2 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

Use*	Product Type	Manufacturer	Model	Comments
AE	--	--	--	--

Note: * Use

EUT - Equipment Under Test

AE - Auxiliary/Associated Equipment (Not Subjected to Test)

SIM - Simulator (Not Subjected to Test)

Section 2: Equipment under test, continued

2.3 EUT description

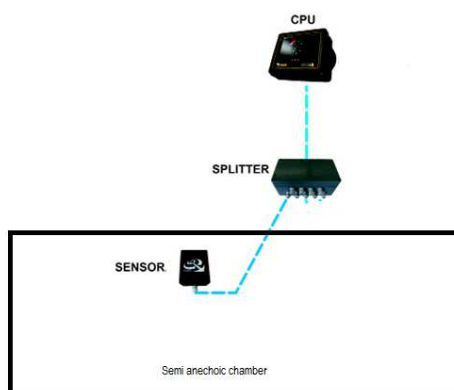
EGO PRO SAFETY MOVE SENSOR for anticollision system for detecting hazards in real-time

2.4 Technical specifications of the EUT

Operating frequency:	433.92 MHz, receiver
Modulation type:	OOK
Occupied bandwidth:	None (receiver)
Emission designator:	NA
Antenna type:	Integral
Power source	12 ÷ 24 Vdc

Section 2: Equipment under test, continued

2.5 EUT setup diagram



2.6 Operation of the EUT during testing

Receiver mode
Class CYY Communications Receiver

2.7 Modifications incorporated in the EUT

none

2.8 Photo EUT



Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	<p>Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa</p> <p>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.</p>
Power supply range:	<p>The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ± 5 %, for which the equipment was designed.</p>

Section 3: Test conditions, continued

3.3 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements" and is documented in the Nemko Spa Technical Procedure WML1002. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device

3.4 Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Spectrum Analyzer 9 KHz ÷ 40 GHz	R&S	FSEK	848255/005	09/2016
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	12/2016
Trilog Broadband Antenna	Schwarzbeck	VULB 9162	9162-025	2018/07
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2016/09
Antenna mast	R&S	HCM	836 529/05	NCR
Controller	R&S	HCC	836 620/7	NCR
EMI receiver 9 kHz ÷ 3 GHz	R&S	ESCI	100888	2016/09
LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041	2016/11
Climatic Chamber	ESPEC	ARS 1100	4100000067	2016/11
Loop antenna	R&S	HFH2-Z2	831247/011	2017/02
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	2016/04
Bilog antenna 1 ÷ 18 GHz	Schwarzbeck	STLP 9148-123	123	09/2018

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
 (*) Equipment supplied by manufacturer's

Section 4: Result summary

4.1 FCC Part 15 Subpart B, 15.107 and 15.109,: Test results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See report summary)

Part	Test description	Required	Result
FCC Part 15 Subpart B requirements			
§15.107(a)	Conducted emissions for class B		NA
§15.109(a)	Radiated emissions for class B		P

Notes: --

Appendix A: Test results

Clause 15.107(a) Conducted limits

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	0
*-Decreases with the logarithm of the frequency.		

Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

--

Test results: NA

Special notes

Port under test: AC mains

Preview measurements:

0.15 MHz to 30 MHz

Receiver settings:

- Peak and average detector
- 9 kHz RBW

Final measurement:

0.15 MHz to 30 MHz

Receiver settings:

- Q-Peak and average detector
- 9 kHz RBW

- Spectral plots have been corrected for transducer factors; cable loss, LISN, and attenuators.
- Emissions detected within 6 dB of limit were re-measured with a quasi peak or average detector for a final measurement.

Clause 15.109(a) Radiated emissions limit

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

In the emission table above, the tighter limit applies at the band edges. Sections 15.33 and 15.35, which specify the frequency range over which radiated emissions, are to be measured and the detector functions and other measurement standards apply.

For CB receivers, the field strength of radiated emissions within the frequency range of 25–30 MHz shall not exceed $40 \mu\text{V/m}$ at a distance of 3 meters. The field strength of radiated emissions above 30 MHz from such devices shall comply with the limits in paragraph (a) of this section.

For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this section.

§ 15.111 Antenna power conduction limits for receivers.

In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nW (-57 dBm)

Test date: 2015-12-18

Test results: Pass

Clause 15.109(a) Radiated emissions limit, continued**Special notes**

- The spectrum was searched from 9 kHz to the 5th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- Only the worst data presented in the test report.

Preview measurements:

30 MHz to 1 GHz

Receiver settings:

- Peak detector, Max hold
- 120 kHz RBW

1 GHz to 10GHz

Spectrum analyzer settings:

- Peak detector, Max hold
- 1 MHz RBW

Final measurement:

30 MHz to 1 GHz

Receiver settings:

- Quasi-Peak detector
- 120 kHz RBW

1 GHz to 10 GHz

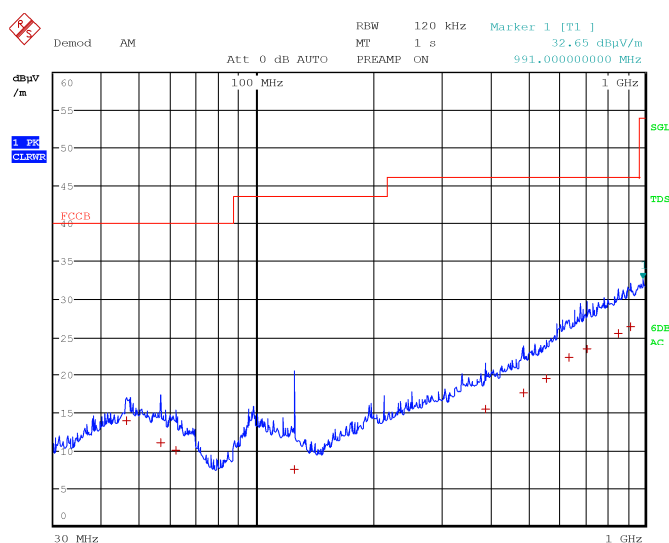
Receiver settings:

- Average and Peak detector
- 1 MHz RBW

Clause 15.109(a) Radiated emissions limit, continued

Test data, continued

Horizontal polarization

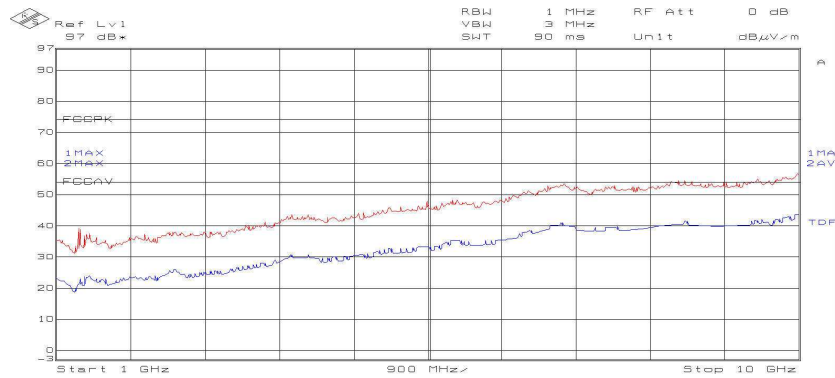


Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
46.3250	13.9	40.0	-26.1	QP
56.6500	11.0	40.0	-29.0	QP
61.8000	10.1	40.0	-29.9	QP
125.0750	7.3	43.5	-36.2	QP
389.5000	15.4	46.0	-30.6	QP
486.0500	17.6	46.0	-28.4	QP
556.1250	19.5	46.0	-26.6	QP
639.4500	22.2	46.0	-23.8	QP
711.7250	23.4	46.0	-22.6	QP
854.5750	25.5	46.0	-20.5	QP
919.7000	26.4	46.0	-19.7	QP

Clause 15.109(a) Radiated emissions limit, continued

Test data, continued

Horizontal polarization



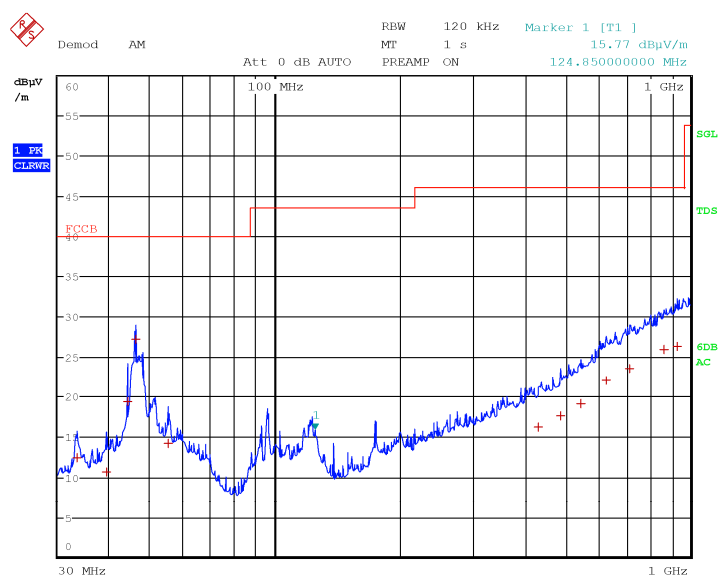
Frequency (MHz)	Pol. V/H	QP field strength (dBμV/m)	Correction (dB)	Peak limit (dBμV/m)	QP margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBμV/m)	Avg limit (dBμV/m)	Avg margin (dB)
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Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

Clause 15.109(a) Radiated emissions limit, continued

Test data, continued

Vertical polarization

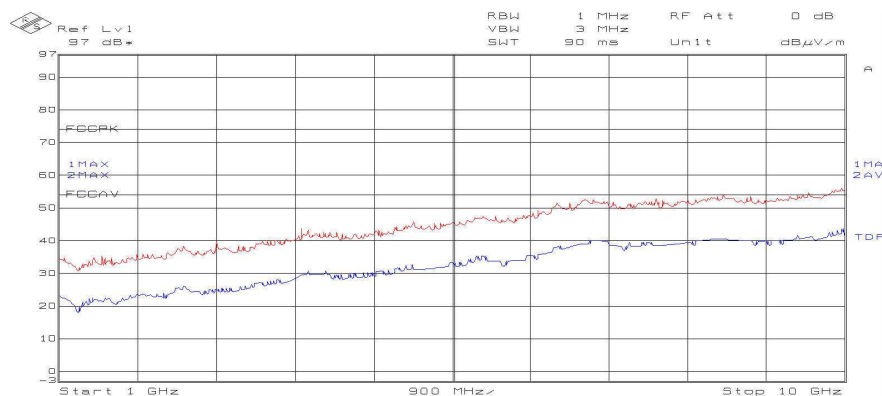


Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
33.4250	12.5	40.0	-27.5	QP
39.2500	10.6	40.0	-29.4	QP
44.2500	19.3	40.0	-20.7	QP
46.1000	27.2	40.0	-12.8	QP
55.3250	14.2	40.0	-25.8	QP
429.4500	16.2	46.0	-29.8	QP
486.1250	17.6	46.0	-28.4	QP
543.9250	19.2	46.0	-26.9	QP
625.7500	22.0	46.0	-24.0	QP
713.5500	23.5	46.0	-22.5	QP
864.7500	25.9	46.0	-20.2	QP
928.8250	26.3	46.0	-19.8	QP

Clause 15.109(a) Radiated emissions limit, continued

Test data, continued

Vertical polarization



Tabular data

Frequency (MHz)	Pol. V/H	QP field strength (dBμV/m)	Correction (dB)	Peak limit (dBμV/m)	QP margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBμV/m)	Avg limit (dBμV/m)	Avg margin (dB)
--	-	-	-	--	--	--	--	--	--

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

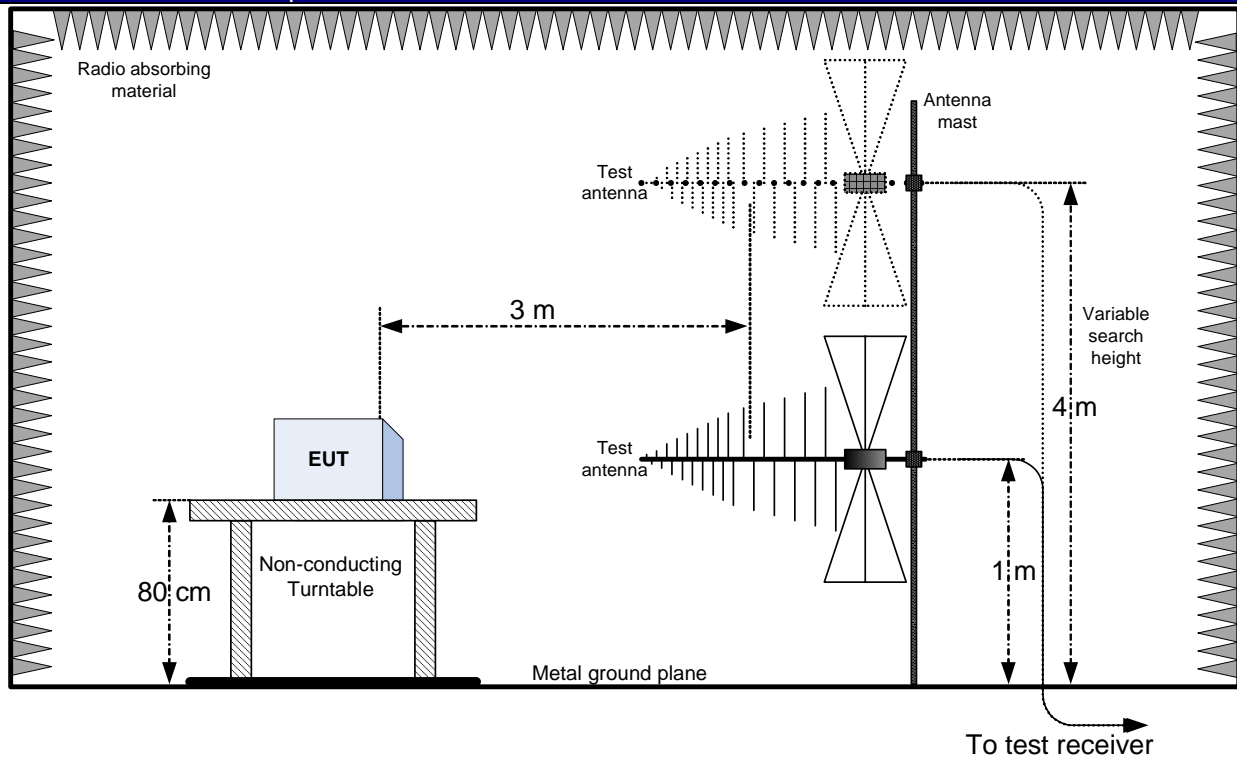
Clause 15. 209 Field Strength, continued

Set up photo

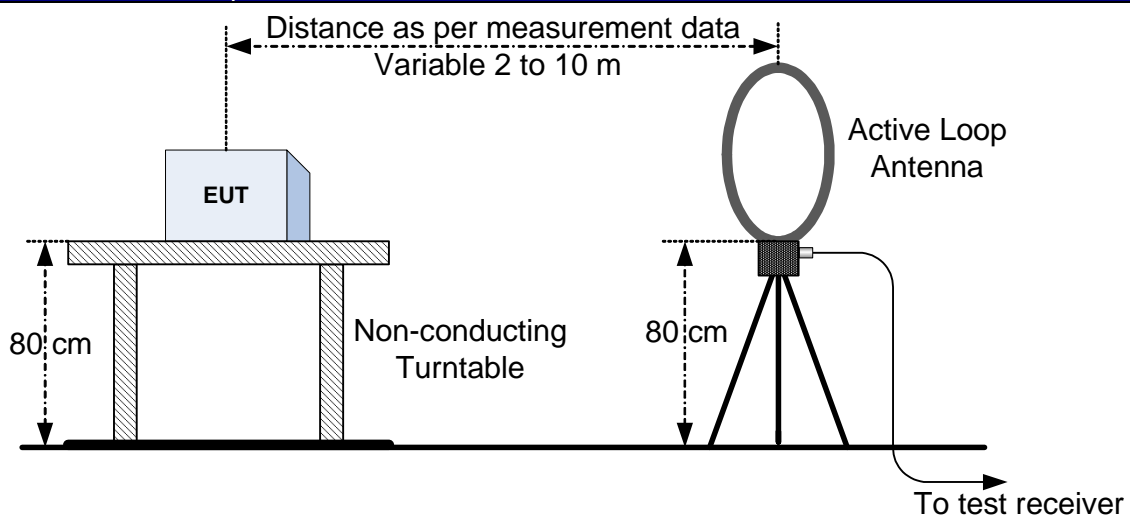


Appendix B: Block diagrams of test set-ups

Radiated emissions set-up above 30 MHz

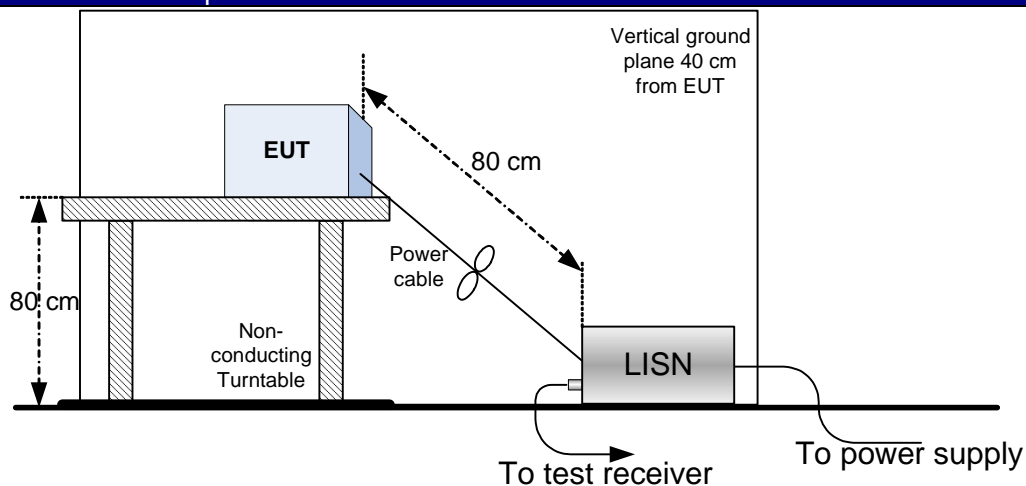


Radiated emissions set-up below 30 MHz



Block diagram, continued

Conducted emissions set-up



Frequency stability set-up

