



TEST REPORT

Test Report No.: 1-5048/12-01-02_B



Testing Laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS) The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

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 Robert-Bosch-Straße 200
 31139 Hildesheim / Germany
 Phone: +49 5121 49-0
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Manufacturer

same as applicant

Test Standard/s

47CFR15	2009-10	Subpart B - Unintentional Radiators
ICES-003, Issue 4	2004-02	Interference-Causing Equipment Standard Digital Apparatus

Test Item

Kind of test item:	Bluetooth Radio Navigation Nissan
Model name:	Nissan LCN2.0A
S/N serial number:	CM1041 C 0002008
HW hardware status:	017
SW software status:	0755
Power Supply:	DC 12 V



This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test performed:

Test Report authorised:

Jens Hennemann
 Testing Manager

Uli Kraus
 Senior Testing Manager

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order: 2012-06-28
Date of receipt of test item: 2012-07-03
Start of test: 2012-07-03
End of test: 2012-07-03
Person(s) present during the test: - / -

3 Test standard/s:

Test Standard	Version	Test Standard Description
47CFR15	2009-10	Subpart B - Unintentional Radiators
ICES-003, Issue 4	2004-02	Interference-Causing Equipment Standard Digital Aparatus

4 Test Environment

Temperature: 20°C – 25°C
Relative humidity content: 30 % - 50 %
Air pressure: 1020 hPa
Power supply: 230 V / 50 Hz

5 Test Laboratories sub-contracted

6 Information about Test Conditions

6.1 Test Item

Kind of test item :	Bluetooth Radio Navigation Nissan		
Type identification :	Nissan LCN2.0A		
Equipment classification:	Equipment for vehicular use		
Environment classification:	Residential, commercial and light industry		
Supply voltage :	DC 12 V		
Ports : (maximum cable lengths declared by manufacturer)	Description	Direction	Length
	DC:	input	> 3 m
	2x antenna port:	input	> 3 m
	2x multi-port-connector:	in- / output	> 3 m
	USB port:	in- / output	> 3 m
Is mounting position / usual operating position defined?		mounted at car dashboard	
Additional information:			
The built in radio parts with the following IC- and FCC-IDs are not part of this test report and already tested. IC: 9595A-LCN20A FCC ID: YBN-LCN20A			

6.2 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	Bluetooth radio navigation	Nissan LCN 2.0A	CM1041 C 0002008	017	0755

*) EUT short description is used to simplify the identification of the EUT in this test report.

6.3 Auxiliary Equipment (AE): Type, S/N etc. and Short Descriptions

AE description*)	Auxiliary equipment	Type	S/N serial number	HW hardware status	SW software status
AE A	termination box with cable harness	unknown	made by customer	unknown	unknown

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

6.4 EUT Set-up(s)

EUT set-up no.)*	Combination of EUT and AE	Remarks
set. 1	EUT A + AE A	AE A was on floor under a metal box

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

6.5 EUT Operating Modes

EUT operating mode no.)*	Description of operating modes	Additional information
op. 1	active	playback mp3-files, navigation system in demo mode, all ports terminated

*) EUT operating mode no. is used to simplify the test report.

7 Summary of Test Results

- No deviations from the technical specifications were ascertained
 There were deviations from the technical specifications ascertained

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 15 B Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 B Class B	passed

7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15– 30 MHz	FCC Part 15 B Class B	NA1

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz

7.2 Measurement and Test Set-up

Note: The test configuration is in accordance with the requirements given in the standards in point 3

7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.

The table below shows the measurement uncertainties for each measurement method. The expanded uncertainty (k=2 or 95%) was calculated with worst case values.

Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Radiated Emission FCC part 15 B, ANSI C63.4	30 MHz – 18 GHz	- / -	± 4.28 dB
Conducted Emission FCC part 15 B, ANSI C63.4	9 kHz – 30 MHz	- / -	± 3.49 dB

8 Detailed test results - Emission

8.1 Electromagnetic Radiated Emissions (Distance 10 m)

8.1.1 Instrumentation for Test (see equipment list)

F 1	F 2	F 4b	F 5	F 6	F 7	F 8	F 28				
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8.1.2 Test Plan

EUT set-up	set. 1		
Operating mode	Application	Limit	Result
op. 1	Enclosure	FCC part 15 B Class B	passed

Remarks: Powered by external power supply (DC 12 V)

8.1.3 Radiated Limits

Frequency- range	FCC part 15 B Class B	FCC part 15 B Class A
30 MHz – 88 MHz	30 dB μ V/m	39,1 dB μ V/m
88 MHz – 216 MHz	33,5 dB μ V/m	43,5 dB μ V/m
216 MHz – 960 MHz	36 dB μ V/m	46,4 dB μ V/m
960 MHz – 1000 MHz	44 dB μ V/m	49,5 dB μ V/m
	* This values are recalculated from the class B limits at 3 m antenna distance in §15.109 (g 2) of the FCC rules	

8.1.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
ESCI 3 Receiver	100083/003	300003312	03/2013	12 month
Trilog Antenna	9163-295	300003787	05/2014	24 month

Remarks:

System check of all relevant devices and the chamber (weekly)

Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

8.1.5 Test Results

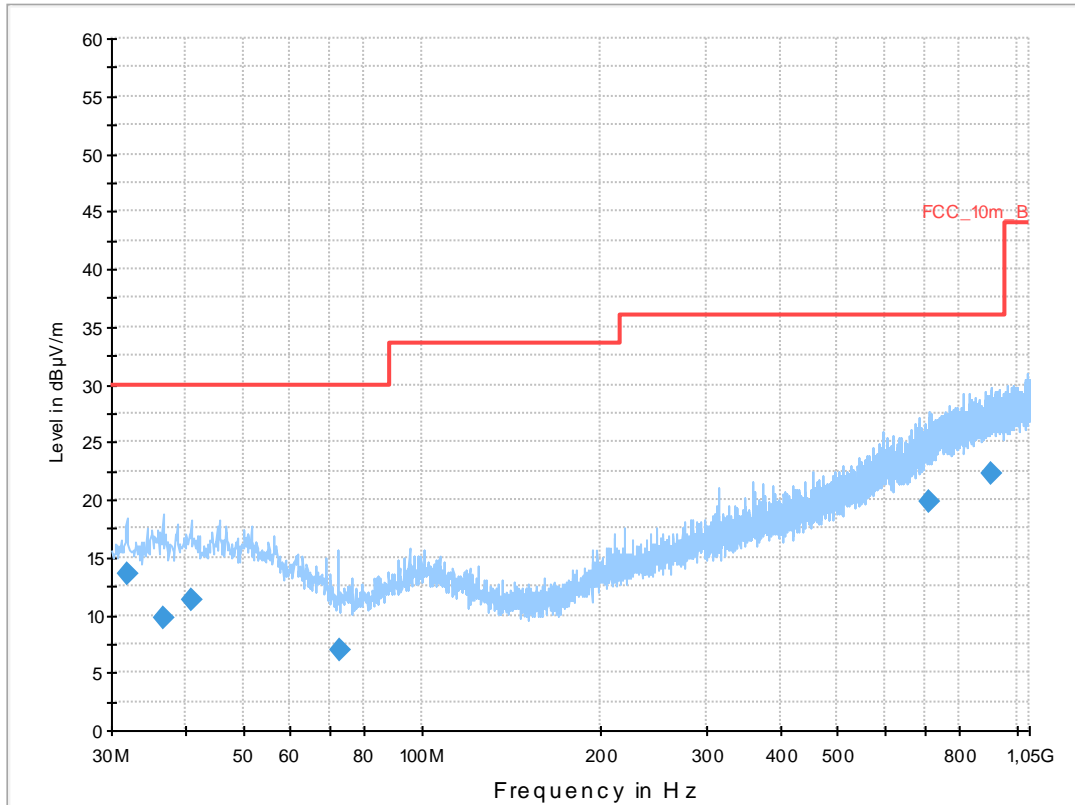
Common Information

EUT: Nissan LCN2.0A
 Serial Number: CM1041 C 0002008
 Test Description: FCC part 15 B class B @ 10m
 Operating Conditions: active (playback mp3-files, navigation active, ports terminated)
 Operator Name: Hennemann
 Comment: DC: 12 V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.891950	13.6	1000.0	120.000	276.0	V	181.0	12.7	16.4	30.0	
36.805050	9.8	1000.0	120.000	233.0	H	127.0	13.2	20.2	30.0	
40.883100	11.3	1000.0	120.000	212.0	V	241.0	13.4	18.7	30.0	
72.639300	6.9	1000.0	120.000	322.0	V	320.0	9.2	23.1	30.0	
714.299850	19.9	1000.0	120.000	321.0	H	194.0	22.8	16.1	36.0	
905.277750	22.2	1000.0	120.000	400.0	H	140.0	25.2	13.8	36.0	

8.1.6 Hardware Set-up

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.42
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table (vertical): Cable_EN_1GHz (1005) Correction Table (horizontal): Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12
Hardware-version:	EMC 32 Version 8.52

8.1.7 Signal strength calculation

Calculation formula:

$$SS = U_R + CL + AF$$

List of abbreviations:

SS	▶	signal strength
U_R	▶	voltage at the receiver
CL	▶	loss of the cable
AF	▶	antenna factor

List with correction factors:

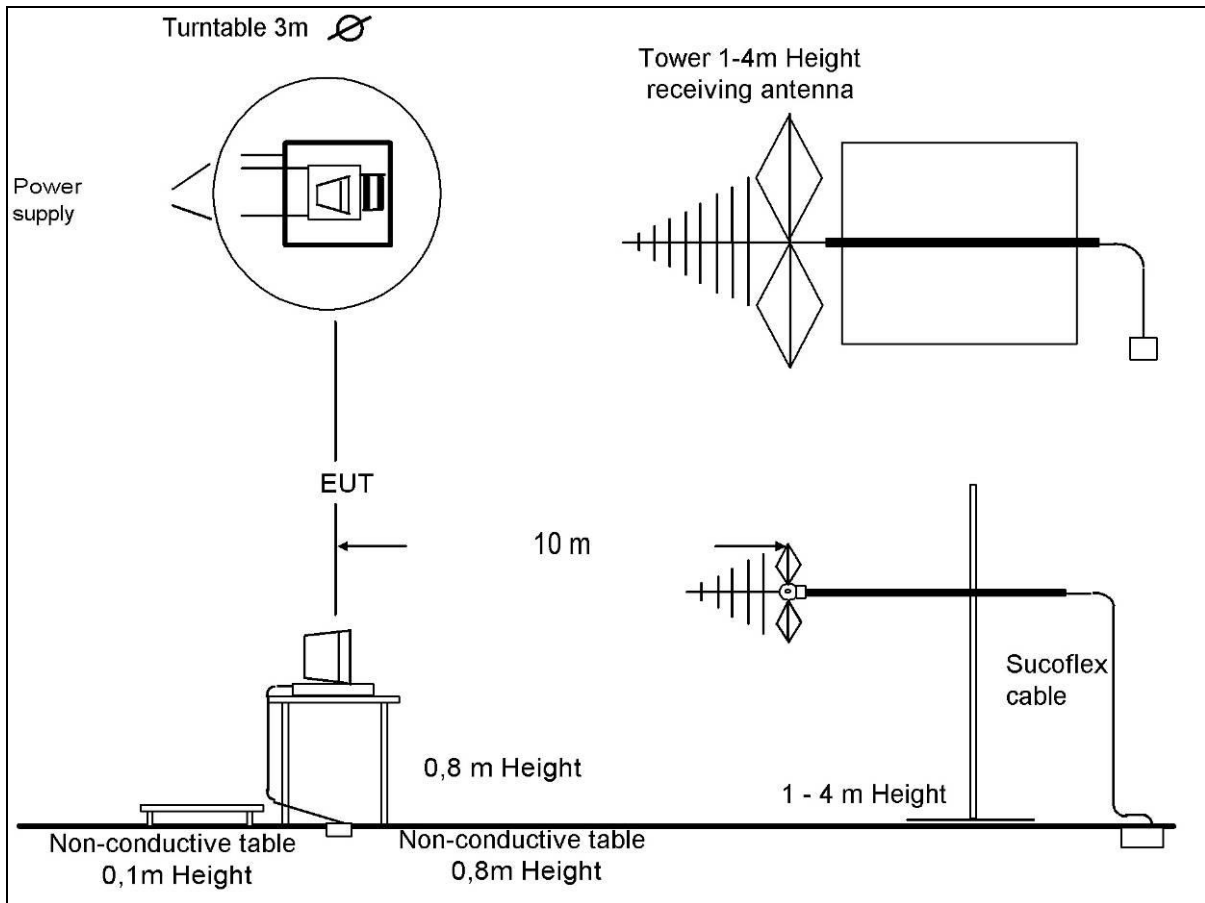
Frequency [MHz]	CL [dB]	AF [dB μ V/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

Example calculation:

For example at 500,000 000 MHz the measured Voltage (U_R) is 12,35 dB μ V/m, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dB μ V/m the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 12,35 \text{ [dB}\mu\text{V/m]} + 1,90 \text{ [dB]} + 16,80 \text{ [dB}\mu\text{V/m]} = \underline{31,05 \text{ [dB}\mu\text{V/m]}} \text{ (35,69 } \mu\text{V/m)}$$

8.1.8 Test Set-up



8.2 Electromagnetic Radiated Emissions (Distance 5 m)

8.2.1 Instrumentation for Test (see equipment list)

F 1	F 6	F 28	F 29	F 30	F 33						
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8.2.2 Test Plan

EUT set-up	set. 1		
Operating mode	Application	Limit	Result
op. 1	Enclosure	47CFR15: (FCC part 15 B) Class B	passed

Remarks:	The measured values are recalculated from 5m to 3m distance Powered by external power supply (DC 12 V)
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8.2.3 Radiated Limits

Frequency- range	47CFR15: (FCC part 15 B) Class B	47CFR15: (FCC part 15 B) Class A *
30 MHz – 88 MHz	40 dB μ V/m	49,1 dB μ V/m
88 MHz – 216 MHz	43,5 dB μ V/m	53,5 dB μ V/m
216 MHz – 960 MHz	46 dB μ V/m	56,4 dB μ V/m
960 MHz – 25000 MHz	54 dB μ V/m	59,5 dB μ V/m
		* This values are recalculated from the class A limits at 10 m antenna distance in §15.109 (g 2) of the FCC rules.

8.2.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
ESU 26	100037	300003555	01/2013	12 month
Horn Antenna	9120B188	300003896	04/2014	24 month

Remarks:

System check of all relevant devices and the chamber (weekly)

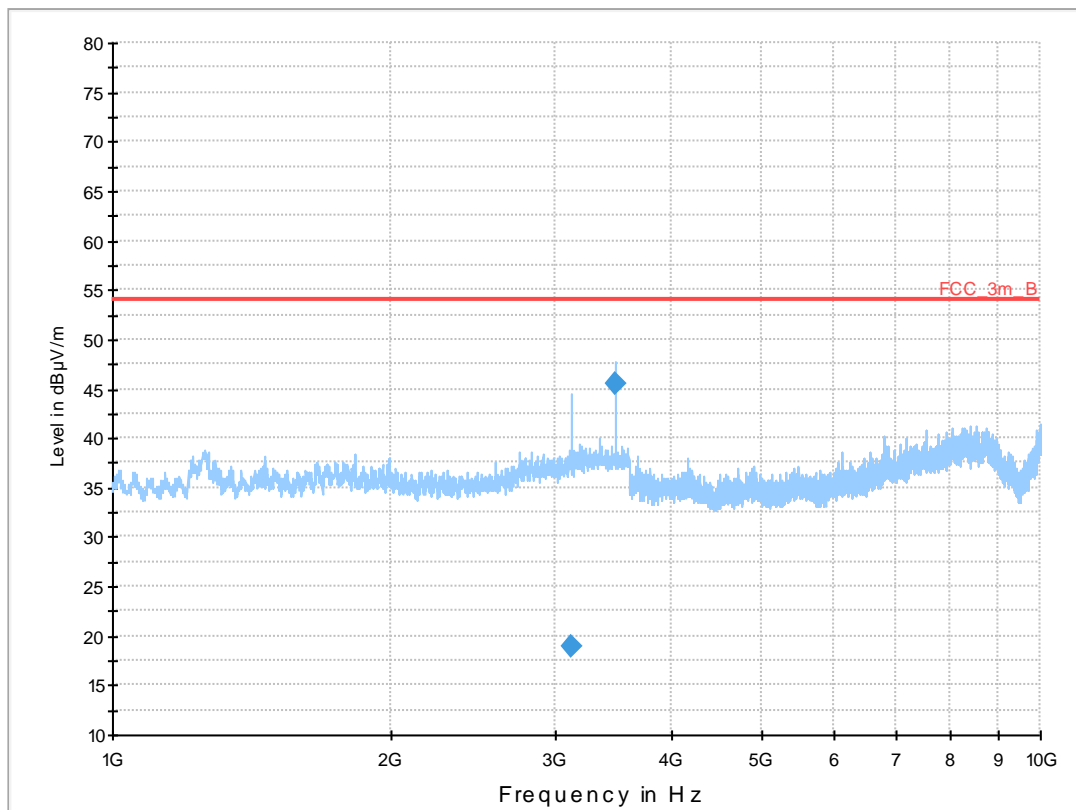
Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

8.2.5 Test Results

Plot 1: 1 GHz to 10 GHz

Common Information

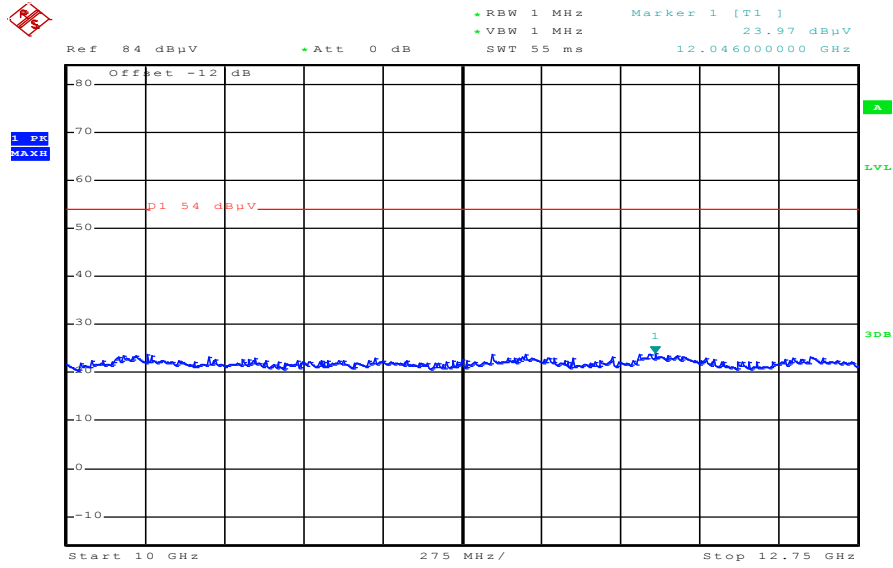
EUT:	Nissan LCN2.0A
Serial Number:	CM1041 C 0002008
Test Description:	FCC part 15 B class B
Operating Conditions:	active (playback mp3-files, navigation active, ports terminated)
Operator Name:	Hennemann
Comment:	DC: 12 V



Final Result 1

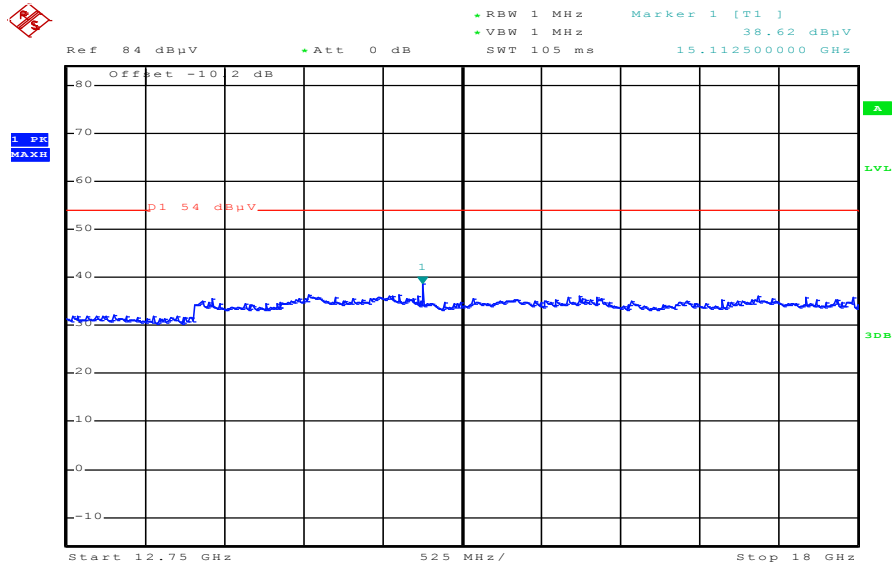
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
3118.198816	18.9	100.0	100.000	100.0	V	229.0	-2.4	35.1	54.0	
3481.595902	45.4	100.0	100.000	100.0	V	332.0	-2.0	8.6	54.0	

Plot 2: 10 GHz to 12.75 GHz



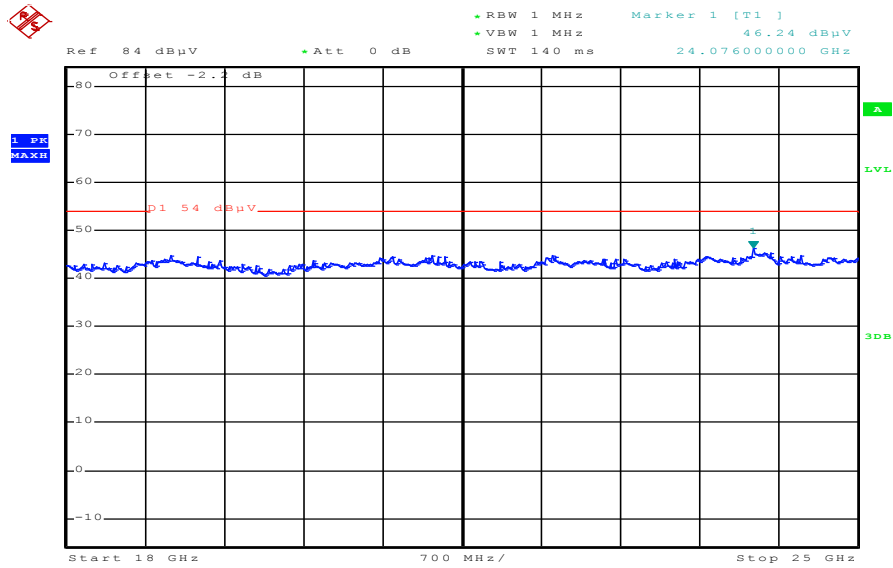
Date: 28.AUG.2012 13:54:35

Plot 3: 12.75 GHz to 18 GHz



Date: 28.AUG.2012 14:00:27

Plot 4: 18 GHz to 25 GHz



Date: 28.AUG.2012 13:58:01

8.2.6 Hardware Set-up

Subrange 1

Frequency Range: 1 GHz – 10 GHz

Receiver: ESU [ESU 26]
@ GPIB0 (ADR 17), SN 100037/026, FW 4.43

Signal Path: 1_6_EN
FW 1.0
Correction Table: 3_5m
Correction Table: LNA_EN (matix)

Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table (vertical): Cable_Horn_EN (1103)
Correction Table (horizontal): Cable_Horn_EN (1103)

Antenna Tower: Generic Tripod [Generic Tripod]
@ GPIB0 (ADR 19), SN ?

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

8.2.7 Signal strength calculation

Calculation formula:

$$SS = U_R + CL + AF + PA + DC$$

List of abbreviations:

SS	▶	signal strength
U_R	▶	voltage at the receiver
CL	▶	loss of the cable and gain of the preamp
AF	▶	antenna factor
DC	▶	distance correction (results measured on 5 m calculated to 3 m)

List with correction factors:

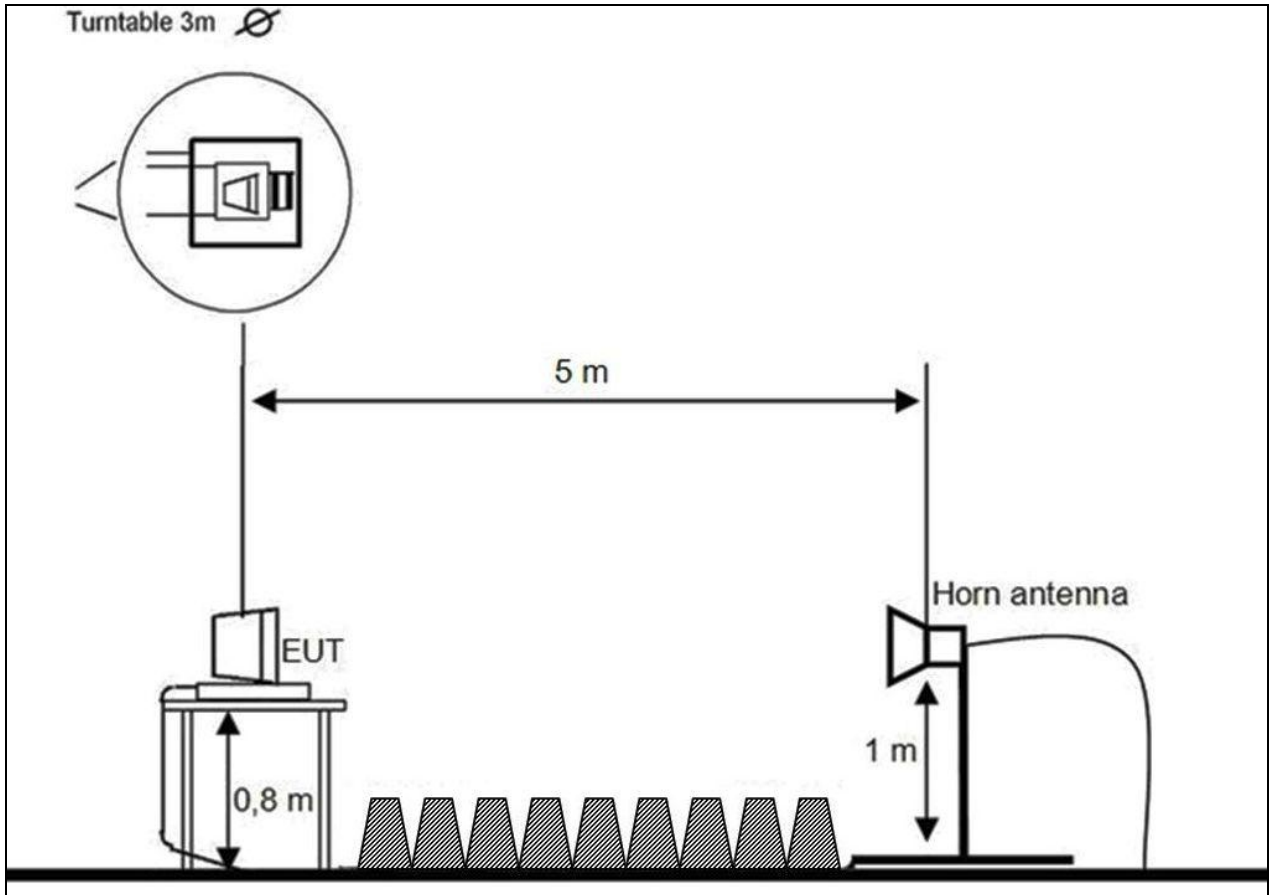
Frequency [GHz]	CL [dB]	AF [dB μ V/m]	DC [dB]
1,000	-35,50	26,20	4,40
1,500	-35,20	26,10	4,40
2,000	-35,10	26,70	4,40
2,500	-35,00	26,50	4,40
3,000	-34,70	27,60	4,40
3,500	-34,80	28,40	4,40
4,000	-35,00	28,60	4,40
4,500	-34,90	28,90	4,40
5,000	-34,80	29,30	4,40
5,500	-34,35	29,80	4,40
6,000	-34,00	30,30	4,40
6,500	-33,50	31,20	4,40
7,000	-33,10	31,20	4,40
7,500	-33,40	31,70	4,40
8,000	-33,80	32,10	4,40
8,500	-33,75	32,30	4,40
9,000	-33,70	31,70	4,40
9,500	-33,50	29,40	4,40
10,000	-33,40	33,00	4,40

Example calculation:

For example at 4,000 000 000 GHz the measured Voltage (U_R) is 46,13 dB μ V/m, the loss of the cable (CL) is -35,00 dB, the antenna factor (AF) is 28,60 dB μ V/m and the distance correction (DC) is 4,40 dB the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 46,13 \text{ [dB}\mu\text{V/m]} + (-35,00) \text{ [dB]} + 28,60 \text{ [dB}\mu\text{V/m]} + 4,4 \text{ [dB]} = \underline{44,13 \text{ [dB}\mu\text{V/m]} (160,88 \mu\text{V/m})}$$

8.2.8 Test Set-up



9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
Radiated emission in chamber F					
F-1	Control Computer	F+W		FW0502032	300003303
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-295	---
F-3a	Amplifier	Veritech Microwave Inc.	0518C-138	- / -	- / -
F-4b	Switch	HP	3488A	- / -	30000368
F-5	EMI Test receiver	R&S	ESCI	100083	300003312
F-6	Turntable Interface-Box	EMCO / ETS- LINDGREN	Model 105637	44583	300003747
F-7	Tower/Turntable Controller	EMCO / ETS- LINDGREN	Model 2090	64672	300003746
F-8	Tower	EMCO / ETS- LINDGREN	Model 2175	64762	300003745
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
Radiated immunity in chamber F					
F-10	Control Computer	F+W		FW0502032	300003303
F-11	Signal Generator	HP	8665A	2833A00112	300001373
F-12	RF-Amplifier	ar	100W1000 M1	12951	300000529
F-13	Directional Coupler	ar	DC 3010	12708	300001428
F-14	Stacked Logper Antenna	Schwarzbeck	STLP9128 E	9128 E 013	300003408
F-15	RF-Amplifier	ar	60S1G3	313649	300003410
F-15b	RF-Amplifier 0.8 – 4 GHz	BONN	BLMA 0840-2000/100D	076820B	300003783
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-17	Horn Antenna	ar	AT 4002	19739	300000633
F-18	Power Meter	R&S	NRV	860327/024	F033
F-19	Power sensor	R&S	URV5-Z2	839080/005	300002844.02
F-20	Power sensor	R&S	URV5-Z2	830755/057	F032
Harmonics and flicker in front of chamber F					
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300000210
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580
Radiated emission in chamber F > 1GHz					
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B	9120B188	300003896
F-30	Amplifier	ProNova	0518C-138	005	F 024
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379
F-32	Horn antenna	Emco	3115	9709-5289	300000213
F-33	Spectrum Analyzer	R&S	ESU26	100037	300003555
F-34	Loop antenna	EMCO	6502	8905-2342	300000256

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	11b	Microwave System Amplifier, 0.5- 26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
2	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000787	ne		
3	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002442	ne		
4	n. a.	Spectrum Analyzer 20 Hz - 30 GHz	FSP30	R&S	100886	300003575	ve		

10 Observations

No observations, exceeding those reported with the single test cases, have been made.

Annex A: Photographs of the test set-up

Photo 1: setup of radiated emission < 1 GHz

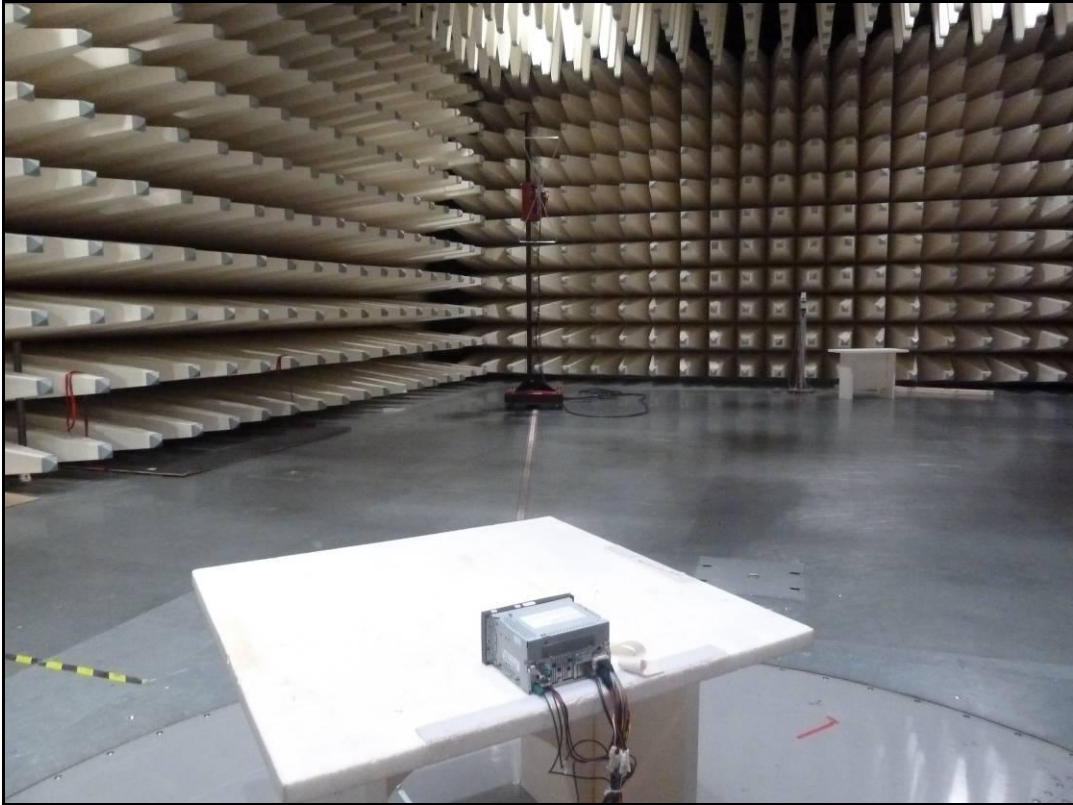


Photo 2: setup of radiated emission 1-10 GHz

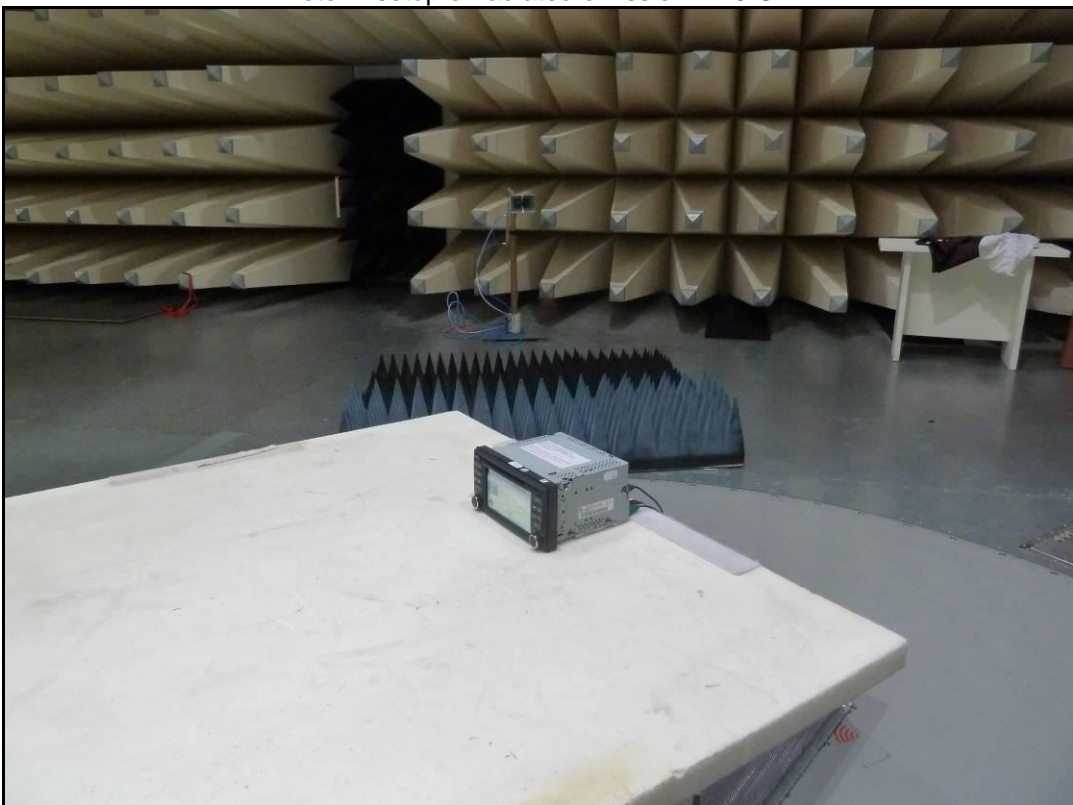
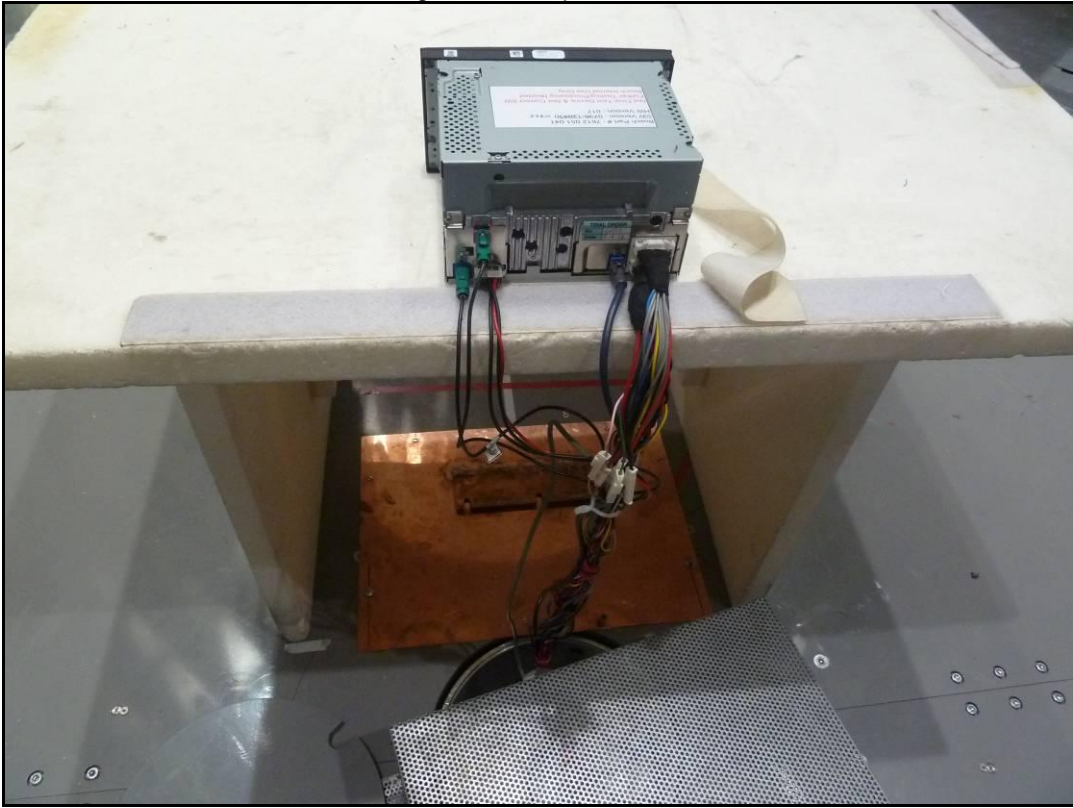


Photo 3: wiring of the setup of radiated emission



Annex B: Photographs of the EUT

Photo 4: front view of the EUT



Photo 5: side view of the EUT



Photo 6: side view of the EUT

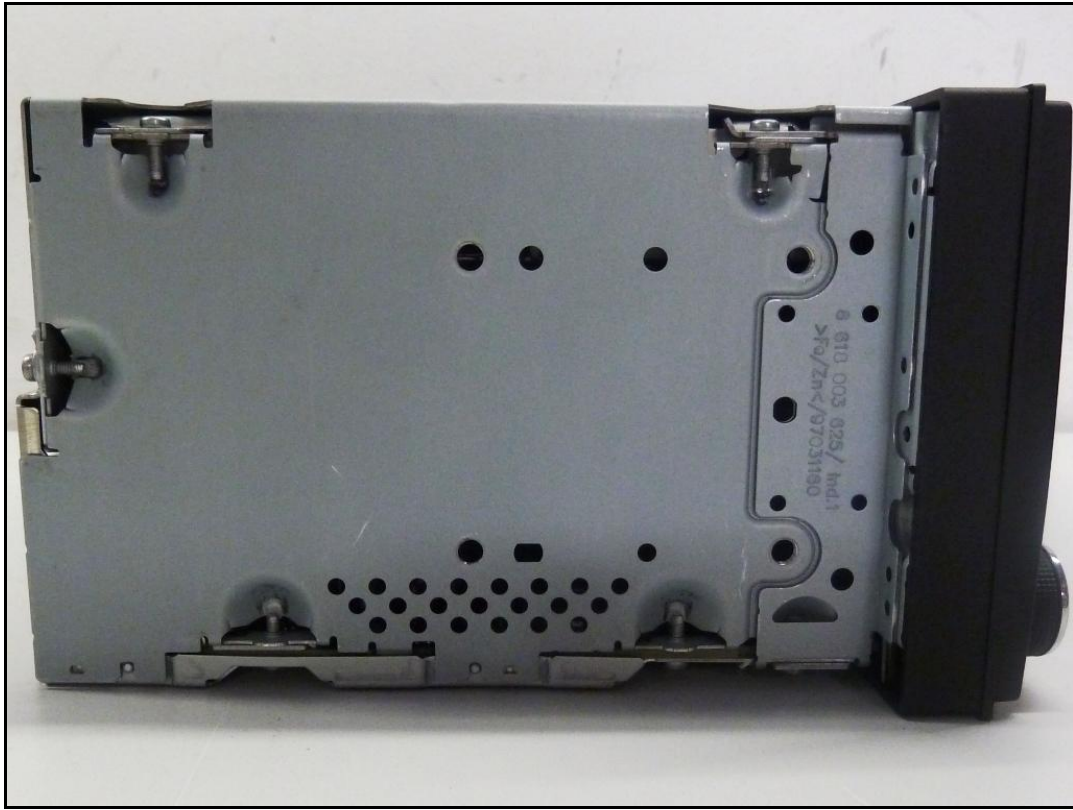


Photo 7: back view of the EUT

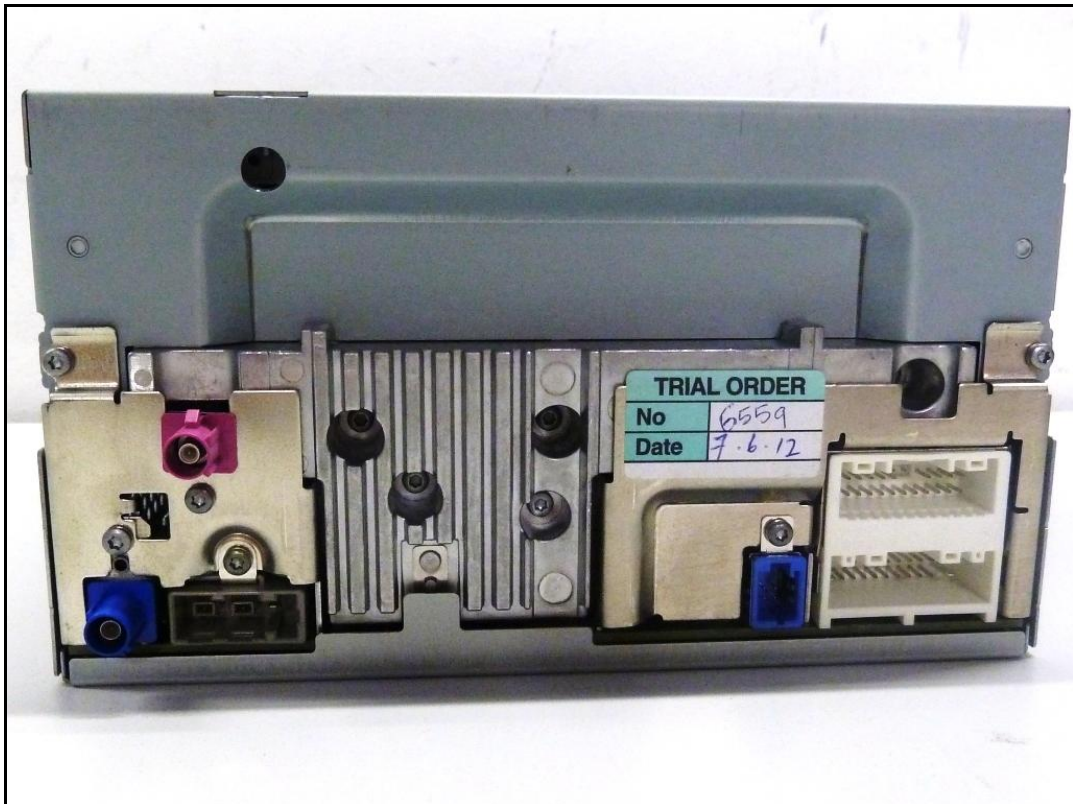


Photo 8: top view of the EUT



Photo 9: bottom view of the EUT

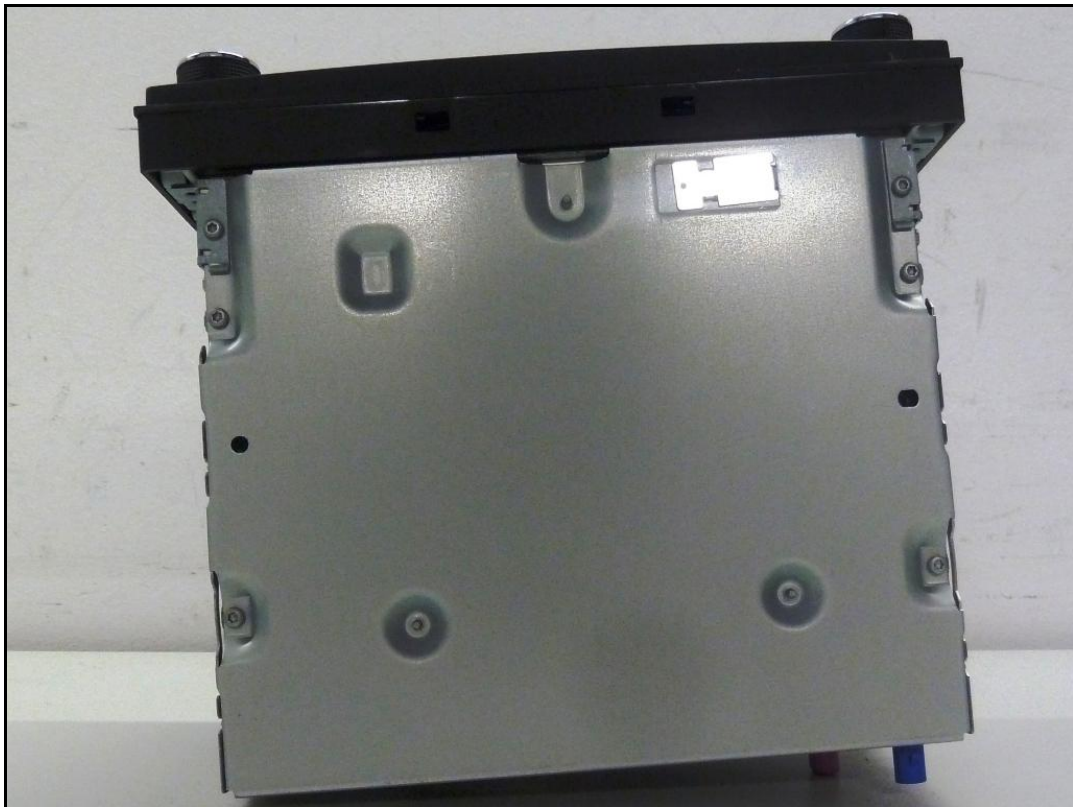


Photo 10: type plate of the EUT

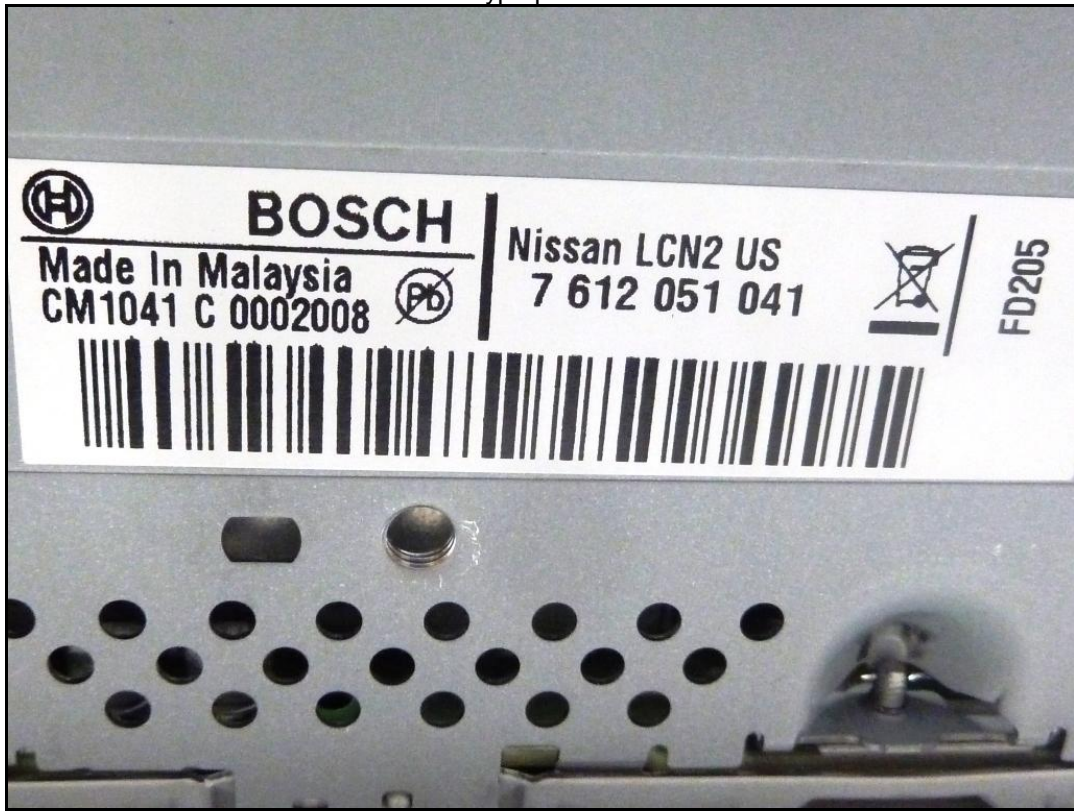
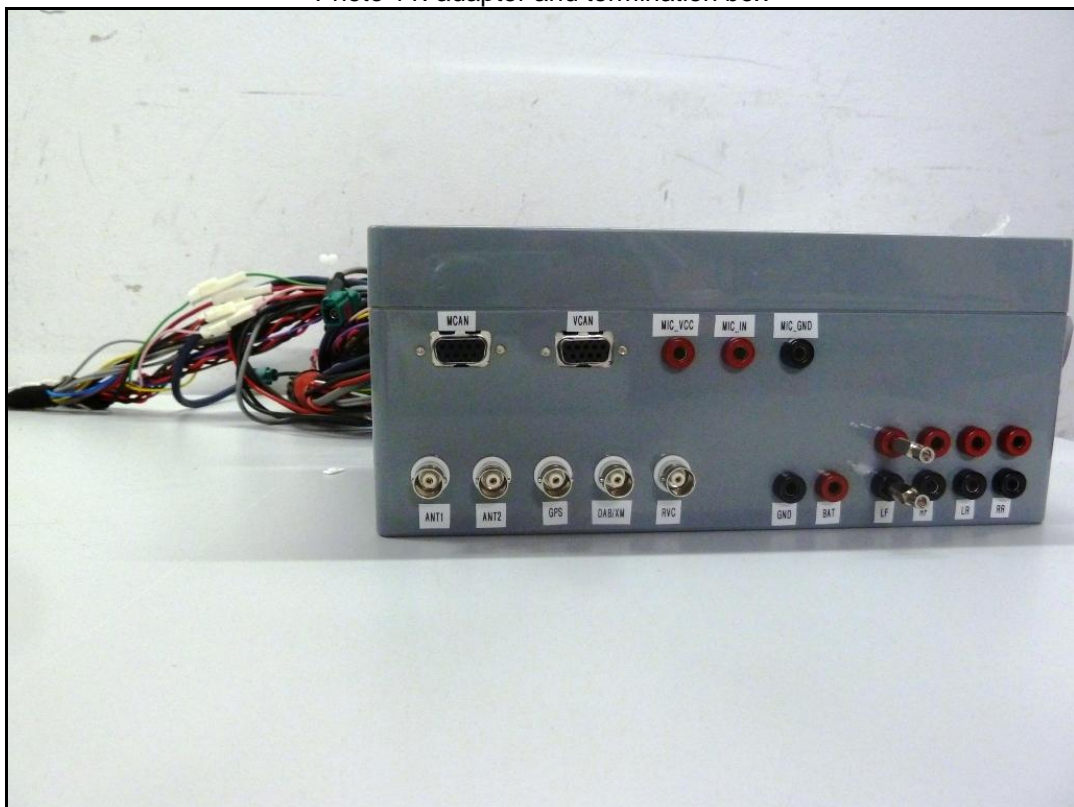


Photo 11: adapter and termination box



Annex C: Document history

Version	Applied changes	Date of release
- / -	Initial release	2012-08-28
A	Editorial change	2012-07-10
B	Spurious up to 25 GHz added	2012-08-28

Annex D: Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software