

TEST REPORT

Test Report No.: 1-3778-01-02/11-A



Testing Laboratory

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Accredited Test Laboratory:

The test laboratory is accredited according to:
DIN EN ISO/IEC 17025
DAkkS registration number: D-PL-12076-01-01

The area of testing is recognized by the FCC and IC.
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001 (FCC)
Accreditation ID: DE 0002 (IC)

Applicant

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Valls (Tarragona)
Spain
Phone: +34-977617625
Contact: Mirko Buesch
e-mail: mbuesch@lear.com

Manufacturer

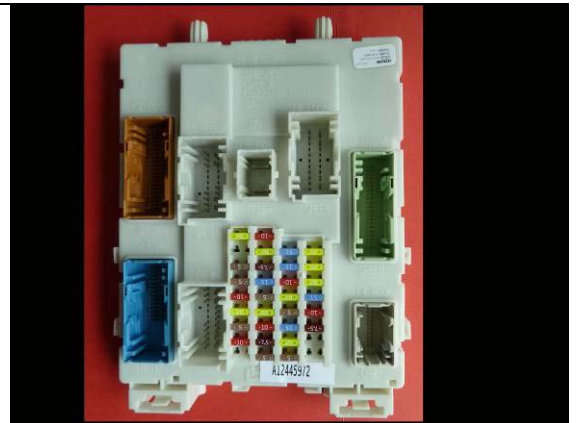
Same as Applicant

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: 315MHz RKE & TPMS Integrated Receiver
Model name: 4410100
FCC ID: TTR4410100
IC: 6276A-4410100
S/N serial number: BV6N-14A073-JG 00MN1
HW hardware status: BV6N-14C245-x
SW software status: BV6N-14094-B
FW Firmware status: BV6N-14C094-BK
Power Supply: 12V DC



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:

Jens Hennemann

Test Report authorised:

Bernd Rebmann



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2 General information

2.1 Notes

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 generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2011-08-04
Date of receipt of test item:	2011-08-03
Start of test:	2011-08-04
End of test:	2011-08-04
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 Apparatus

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 :	315MHz RKE and TPMS Integrated Receiver into an automotive Body Control Module (BCM)		
Type identification :	4410100		
Equipment classification:	Equipment for vehicular use		
Environment classification:	Residential, commercial and light industry		
Supply voltage :	DC 12V		
Ports : (maximum cable lengths declared by manufacturer)	Description	Direction	Length
	C1 - ENGINE	In / output	> 3m
	C2 - FLOOR	In / output	> 3m
	C3 - IP	In / output	> 3m
	C4 - ROOF	In / output	> 3m
	C5 - POWER	Input	> 3m
	C6 - ENGINE	In / output	> 3m
	C7 - FLOOR	In / output	> 3m
	C8 - IP	In / output	> 3m
Is mounting position / usual operating position defined?			No
Additional information:			
the radio part is not part of this test report and already tested;			

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	4410100	BV6N-14A073-JG	BV6N-14A073-JG 00MN1	BV6N-14C245	BV6N-14C094B

*) 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	customer control box	Ford C1 MCA	unknown	unknown	unknown
AE B	DC Power Supply	HP 6032A	2920A04466	- / -	- / -

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

6.4 EUT Set-up

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A + AE A + AE B	AE A powered by 12V DC

*) 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	connectors C1,C3,C5,C6 connected to customer control box; C2,C4,C7,C8 not connected

*) 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 Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 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 Class B	NA2

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.

Measurement uncertainty calculations are on file and available from the test laboratory upon request.

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					
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8.1.2 Test Plan

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

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

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	03/2012	12 month
Trilog Antenna	9163-295	300003787	04/2012	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

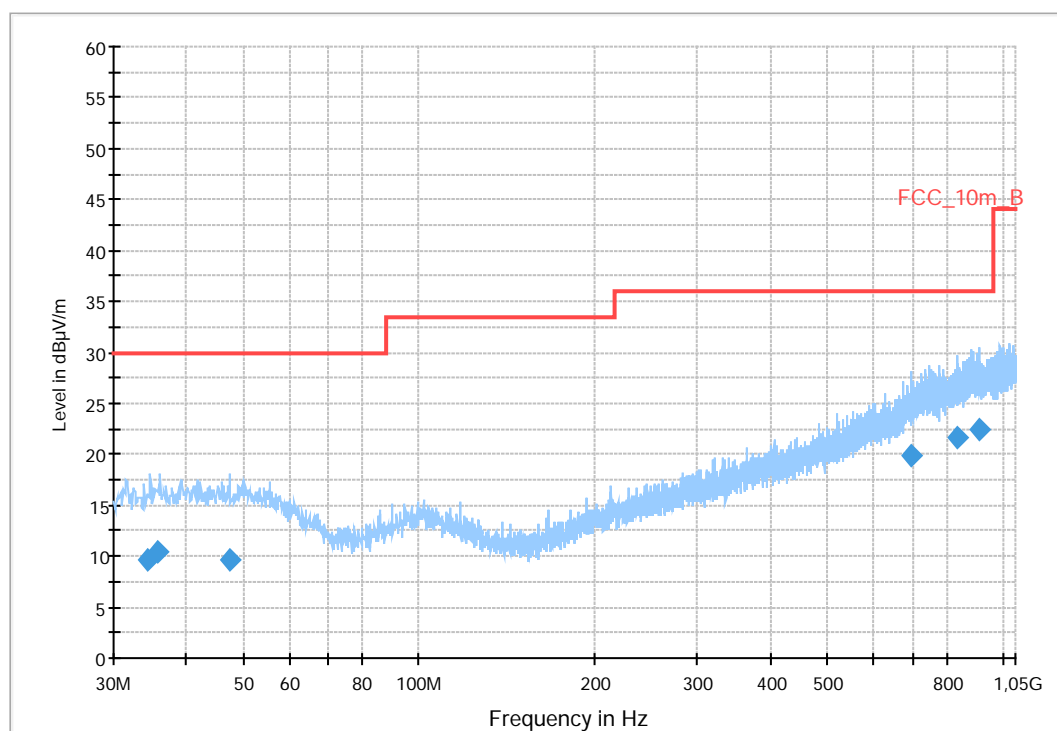
Common Information

EUT: 4410100
 Serial Number: BV6N-14A073-JG 00MN1
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: active
 Operator Name: Hennemann
 Comment: DC 12V

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m
Subrange **Step Size** **Detectors** **IF BW** **Meas. Time** **Preamp**
 30 MHz - 2 GHz 60 kHz QPK 120 kHz 1 s 20 dB

FCC_10m(B)



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
34.442100	9.7	1000.0	120.000	116.0	V	57.0	13.0	20.3	30.0	
35.806200	10.4	1000.0	120.000	202.0	V	317.0	13.1	19.6	30.0	
47.438100	9.6	1000.0	120.000	400.0	V	7.0	13.3	20.4	30.0	
697.836150	19.9	1000.0	120.000	202.0	H	186.0	22.4	16.1	36.0	
832.670250	21.7	1000.0	120.000	202.0	V	16.0	24.3	14.3	36.0	
911.158350	22.5	1000.0	120.000	168.0	V	140.0	25.2	13.5	36.0	

8.1.6 Hardware Set-up

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

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

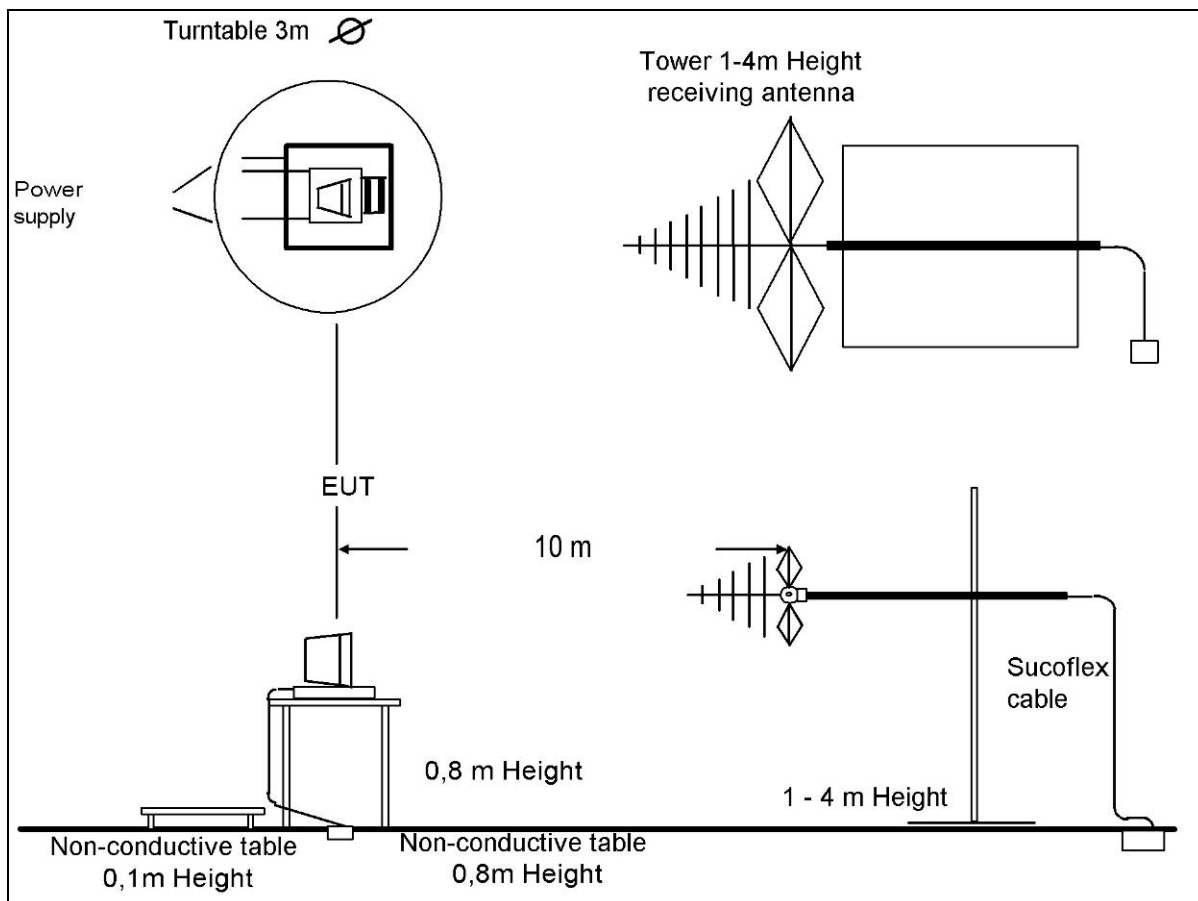
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table (vertical): Cable EN 1GHz (1005)
Correction Table (horizontal): Cable EN 1GHz (1005)

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

EMC 32 Version 8.10.00

8.1.7 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 29	F 30	F 33							
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8.2.2 Test Plan

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

Remarks:	The measured values are recalculated from 5m to 3m distance Powered by external power supply (12V DC)
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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
1000 MHz – 6000 MHz	54 dB μ V/m	59,5 dB μ V/m

8.2.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
ESU 26	100037	300003555	01/2012	12 month
Horn Antenna	9120B188	300003896	04/2012	24 month

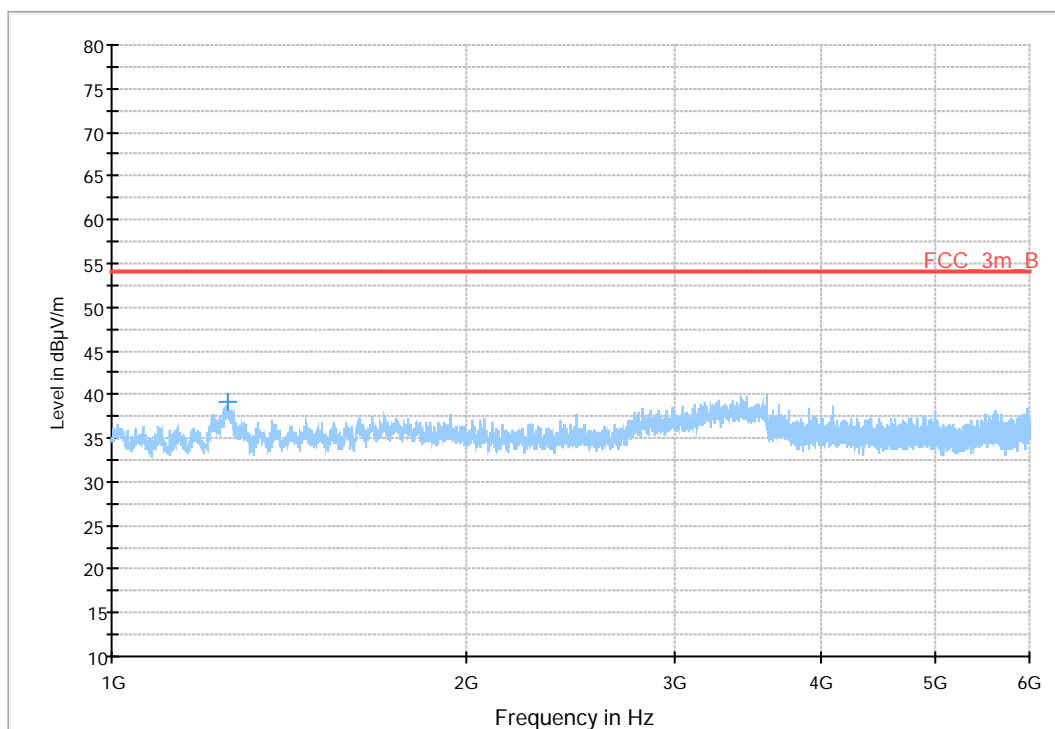
Remarks:
System check of all relevant devices and the chamber (weekly)
Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

8.2.5 Test Results

Common Information

EUT: 4410100
 Serial Number: BV6N-14A073-JG 00MN1
 Test Description: FCC part 15 B class B
 Operating Conditions: active
 Operator Name: Hennemann
 Comment: DC 12V

FCC_1_10_B_5m



Final Result 2 (max peak)

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth	Corr. (dB)	Comment
1253.907831	39.1	100.0	V	155.0	-2.4	

8.2.6 Hardware Set-up

Hardware Setup: EMI radiated\BBHA_5m - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 10 GHz

Receiver: ESU IESU 261
@ 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)

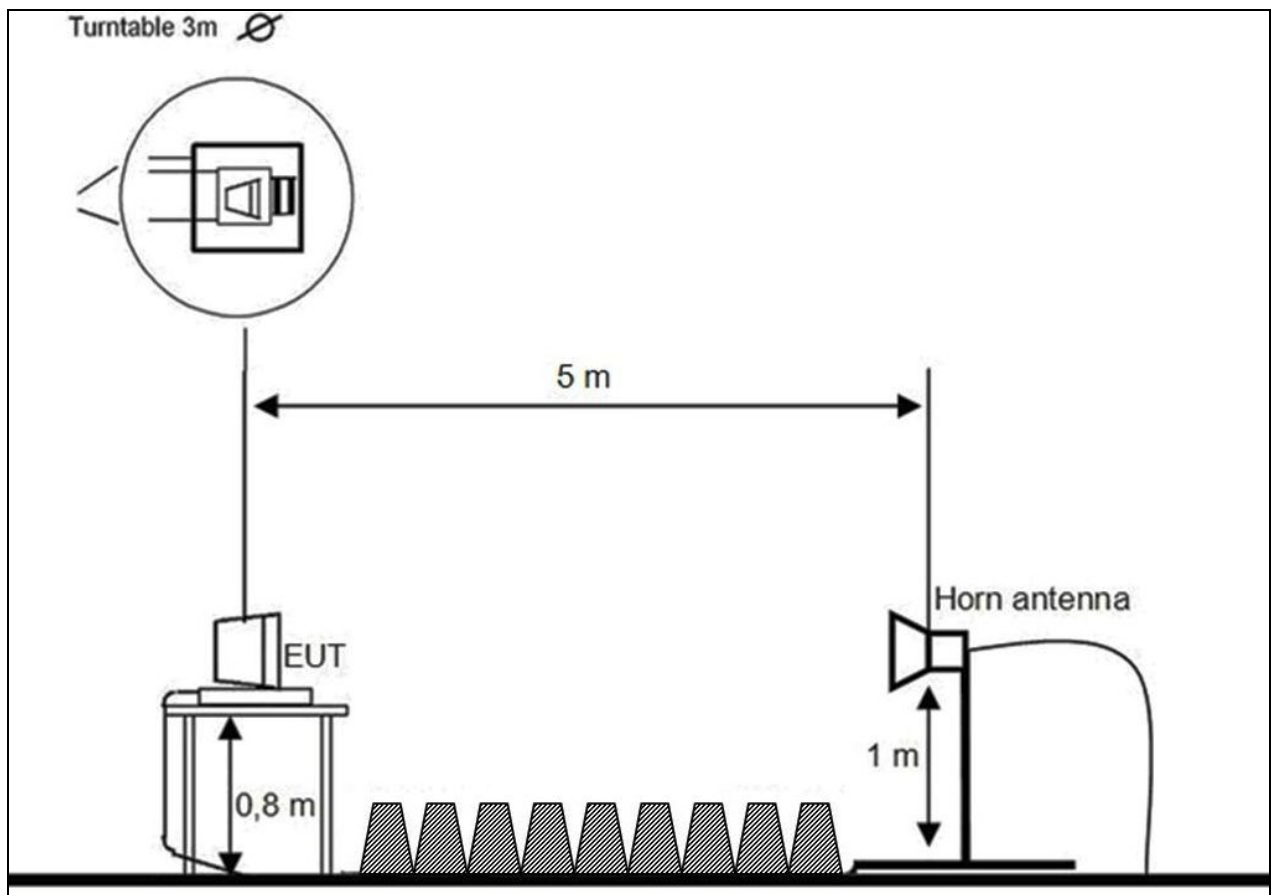
Antenna: BBHA 9120 B
Correction Table (vertical): BBHA9120
Correction Table (horizontal): BBHA9120
Correction Table (vertical): Cable Horn EN (1103)
Correction Table (horizontal): Cable Horn EN (1103)

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

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

EMC 32 Version 8.10.00

8.2.7 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	- / -	300000368
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	R&S	SML 03	102519	300003407
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

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: radiated emission < 1GHz @ 10m

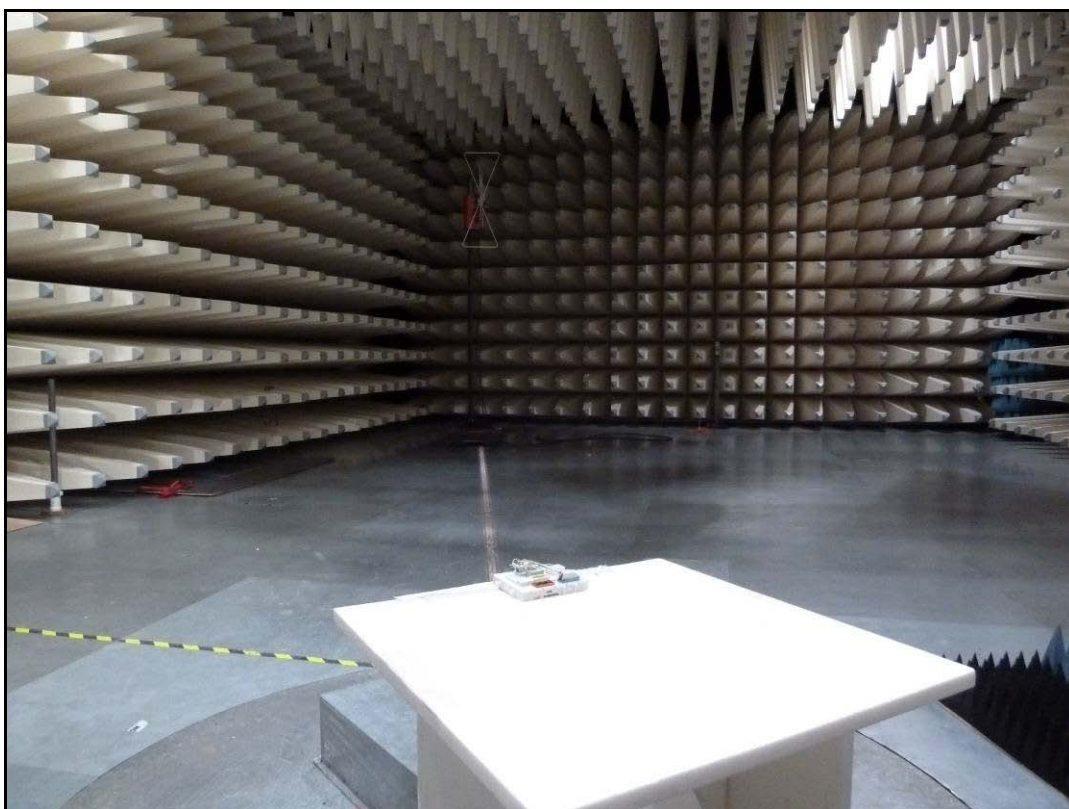


Photo 2: radiated emission < 1GHz @ 10m



Photo 3: radiated emission 1-6 GHz @ 5m



Annex B: Photographs of the EUT

Photo 4: EUT A top view

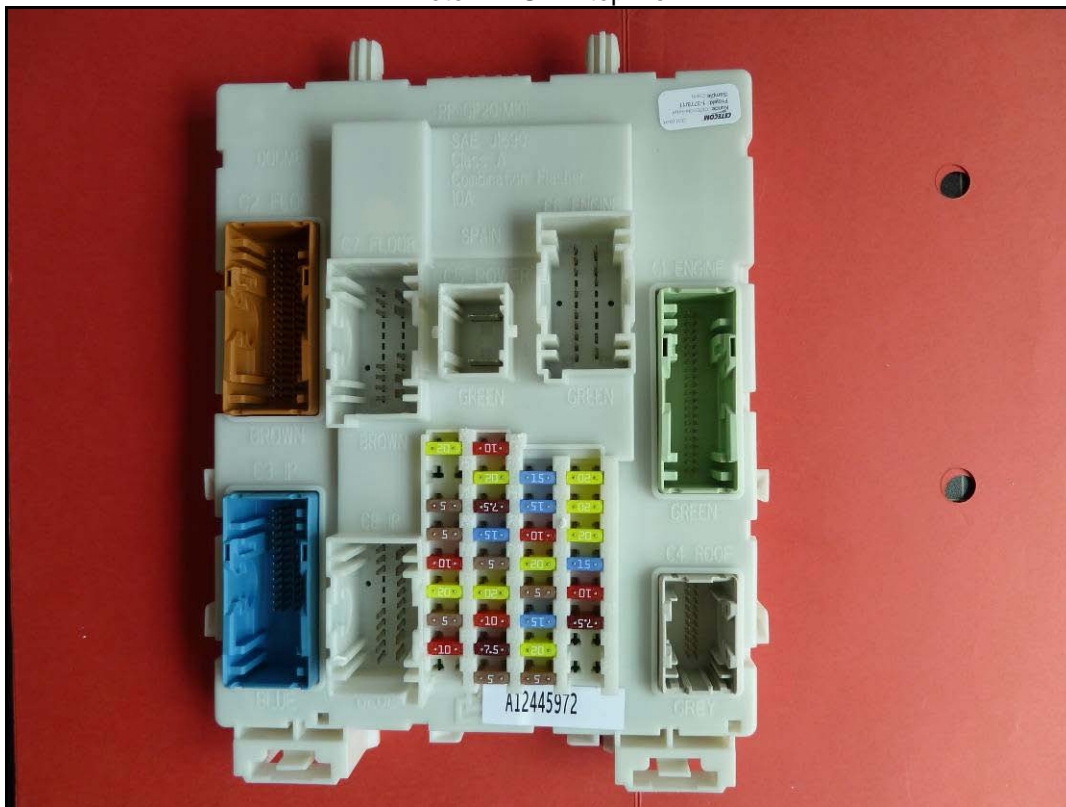


Photo 5: EUT A bottom view



Photo 6: EUT A side view



Photo 7: EUT A side view



Photo 8: EUT A label 1



Photo 9: EUT A label 2

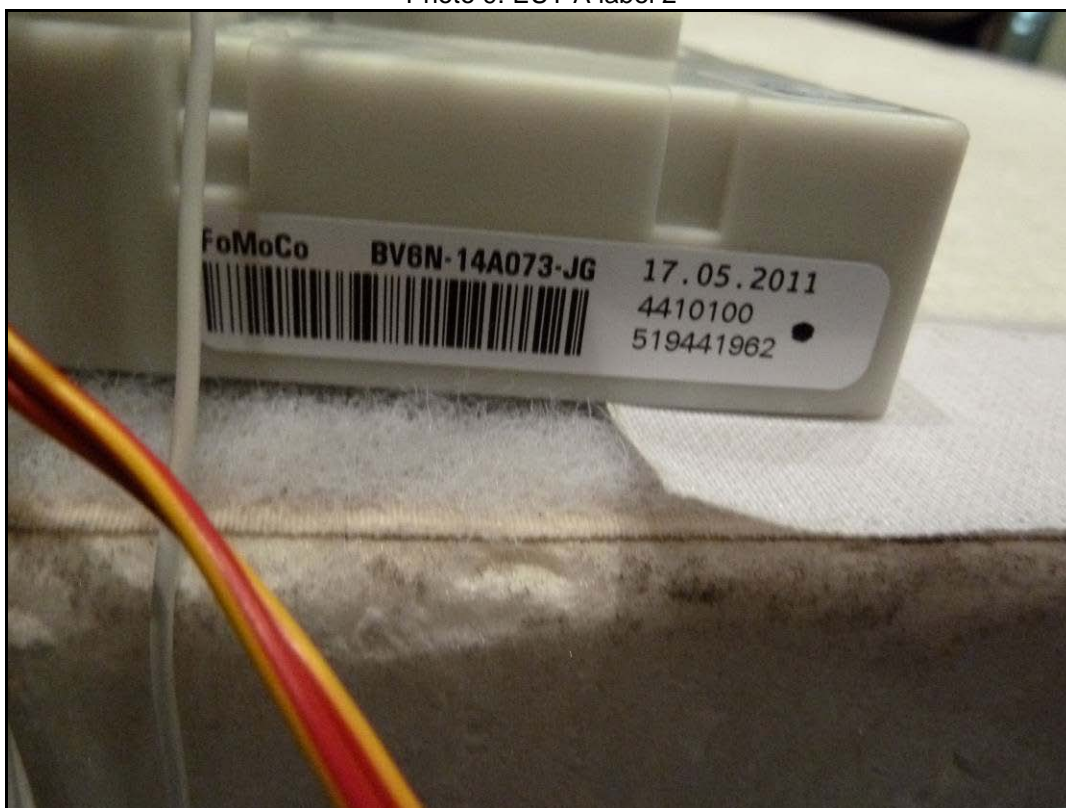


Photo 10: EUT A: pcb top view

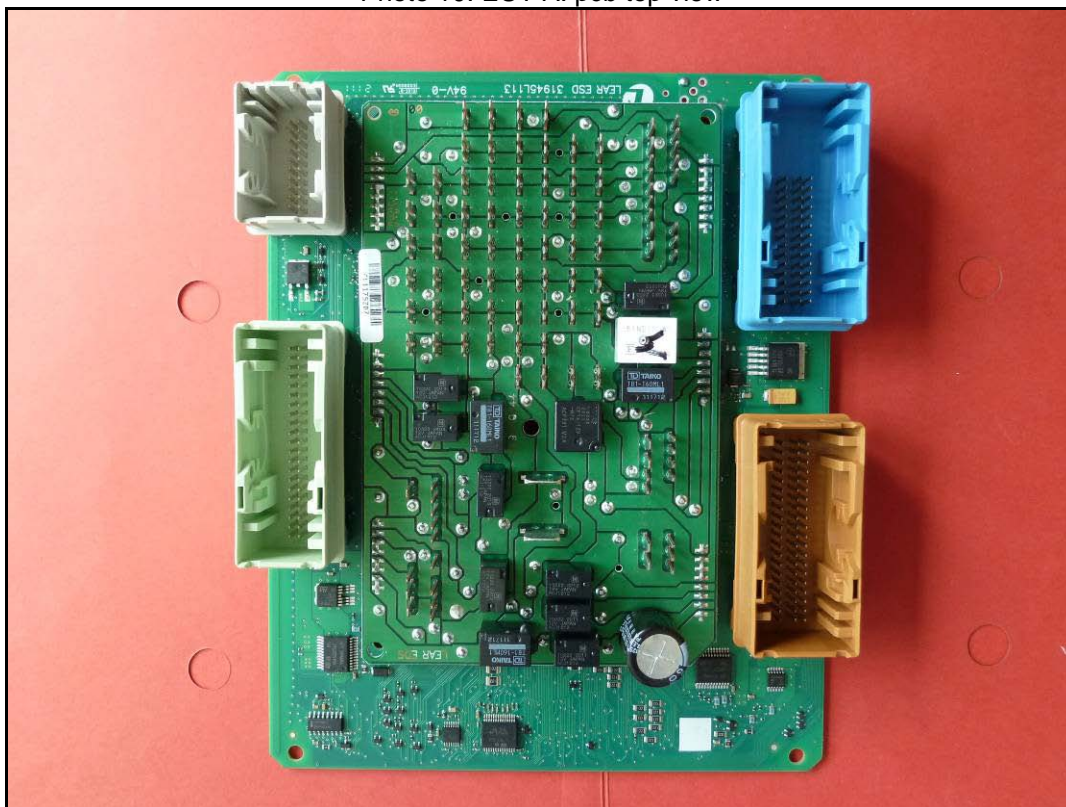
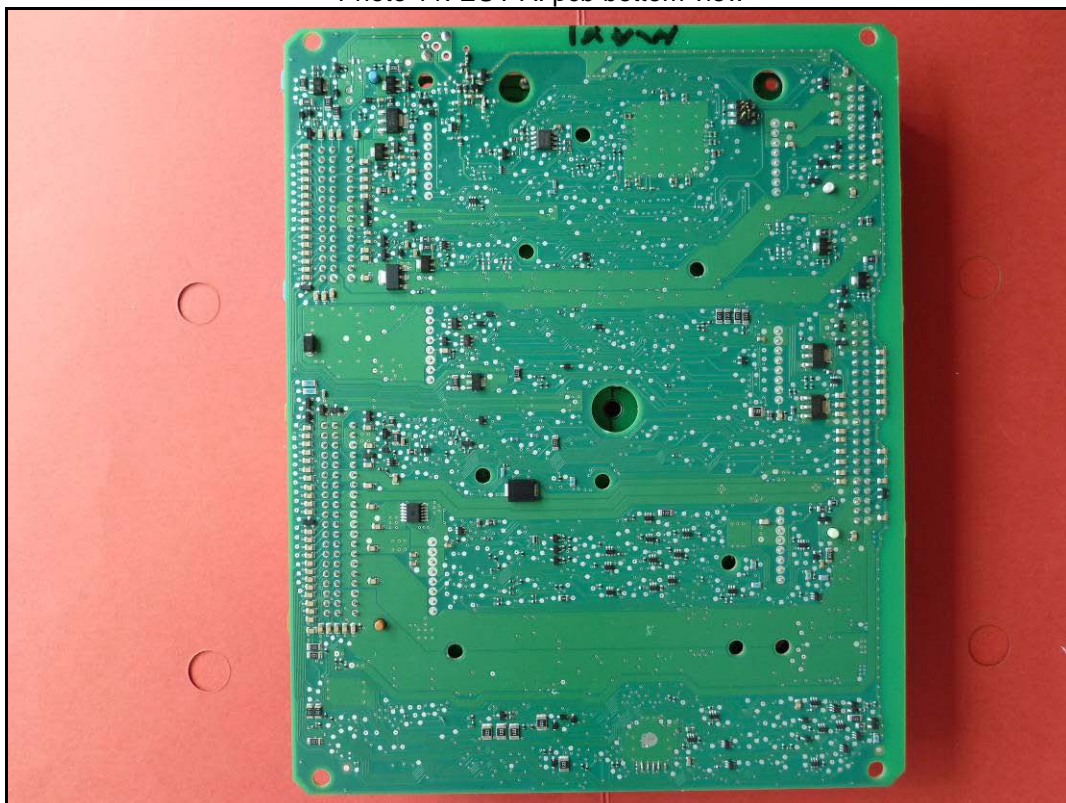


Photo 11: EUT A: pcb bottom view



Annex C: Document history

Version	Applied changes	Date of release
	Initial release	2011-08-04
-A	Change in Model Name	2011-11-15

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