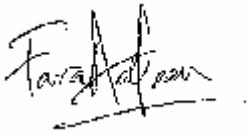
TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Lear Automotive (EEDS Spain)
L322 Immobilizer Module

To: FCC Part 15.209

Test Report Serial No:
RFI/MPTE1/RP71422JD01A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager: 	
Tested By: Fara Razally 	**Checked By: Tony Henriques** 
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To: FCC Part 15.209

Table of Contents

1. Client Information

Company Name:	Lear Automotive (EEDS Spain)
Address:	C/Fusters s.n. 43800 Valls Tarragona Spain
Contact Name:	Albert Escala

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Lear
Model Name or Number:	L322 Immobilizer Module
Serial Number:	2440023882
Country of Manufacture:	Spain
FCC ID Number:	TTRL322
Date of Receipt:	03 October 2005

2.2. Description of EUT

The L322 module (EUT) communicates with the Transponder placed in the Key Fob by means of a Low Frequency Energy Field. Once the key is validated, the EUT grants permission to start the vehicle engine by means of a CAN message.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.4. Additional Information Related to Testing

Power Supply Requirement:	DC Supply of 13.5 V		
Intended Operating Environment:	Automotive		
Equipment Category:	Mobile (Vehicular Use, powered via vehicle regulated supply)		
Type of Unit:	Transceiver		
Interface Ports:	PBT GF30 Interface/Power Port - Unshielded Multicore 1.5m		
Frequency Range:	125 kHz, single channel operation		
Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Single Channel	N/A	0.125
Highest Fundamental Frequency:	125 kHz		

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15 Subpart B: 2004 (Sections 15.209)
Title:	Code of Federal Regulations, Part 15 (47CFR215) Radio Frequency Devices.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

None.

5. Operation of the EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Active mode.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Connected to a transponder test box.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Transmitter Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.209	Enclosure	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations and Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Transmitter Radiated Spurious Emissions: Section 15.209

7.2.1. Electric Field Strength Measurements (Frequency Range: 0.009 to 30 MHz)

7.2.1.1. The EUT was configured for radiated emissions testing as described in Section 9 of this report.

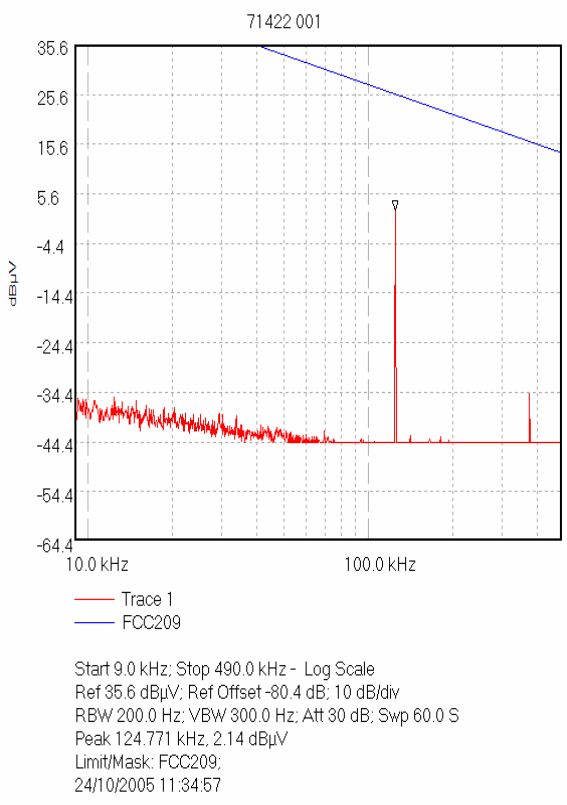
7.2.1.2. Tests were performed to identify the maximum radiated spurious emission levels.

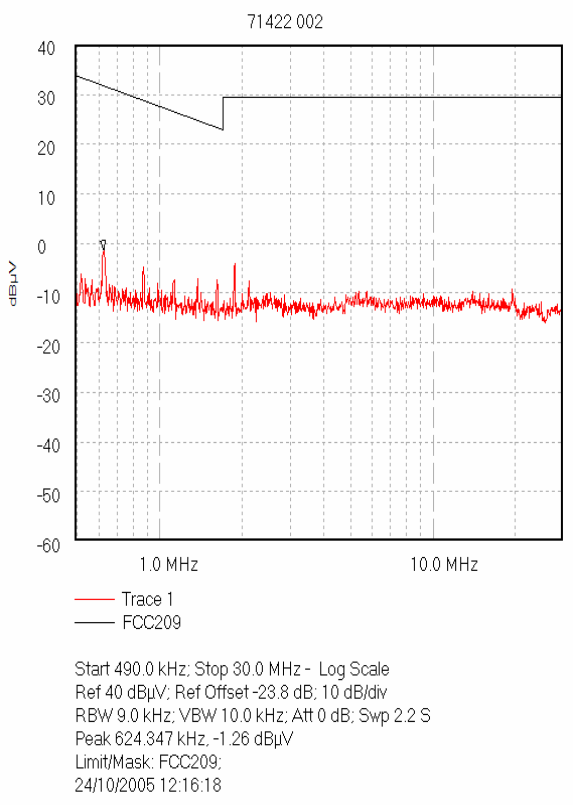
7.2.1.3. Limits below 30 MHz are specified at test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However as specified by section 15.31 (f)(2), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Results:

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Measurement Distance (m)	Margin (dB)	Result
0.125	45°	-23.0	25.7	300	48.7	Complied
0.375	45°	-53.6	16.1	300	69.7	Complied
0.626	45°	-14.5	31.7	30	46.2	Complied
0.875	45°	-17.0	28.8	30	45.8	Complied
1.875	45°	-23.0	29.5	30	31.8	Complied

Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)





Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	+/- 5.26 dB

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

9. Measurement Methods

9.1. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to the upper frequency detailed in Section 15.33(b) were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT, which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Quasi-Peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used. For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 -2003 Clause 5.4.

Below 30 MHz a calibrated loop antenna was used in line with the requirements of ANSI C63.4-2003 Clauses 8.2.1 on a test site compliant with ANSI C63.4 -2003 Clause 5.3.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation (above 30 MHz only). At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

The final field strength was determined as the indicated level in dBμV plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	**Initial Scan (Below 30 MHz)**	**Final Measurements (Below 30 MHz)**
Detector Type:	Peak	Quasi-Peak (CISPR) or Average
Mode:	Max Hold	Not applicable
Bandwidth:	200 Hz or 9 kHz	200 Hz or 9 kHz
Amplitude Range:	60 dB	20 dB
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A007	Loop Antenna	Rohde & Schwarz	HFH2-Z2	880 458/020
G0552	Power Supply	Farnell	AP60-50	000348
M028	Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RU), 860 161/007 (DU)
M088	Test Receiver	Rohde & Schwarz	ESBI	835 387/006 (RU), 835 862/018 (DU)
S212	Site 12	RFI	12	N/A
S201	Site 1	RFI	1	N/A

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawing

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\71422JD01\EMIRAD	Test configuration for measurement of radiated emissions.

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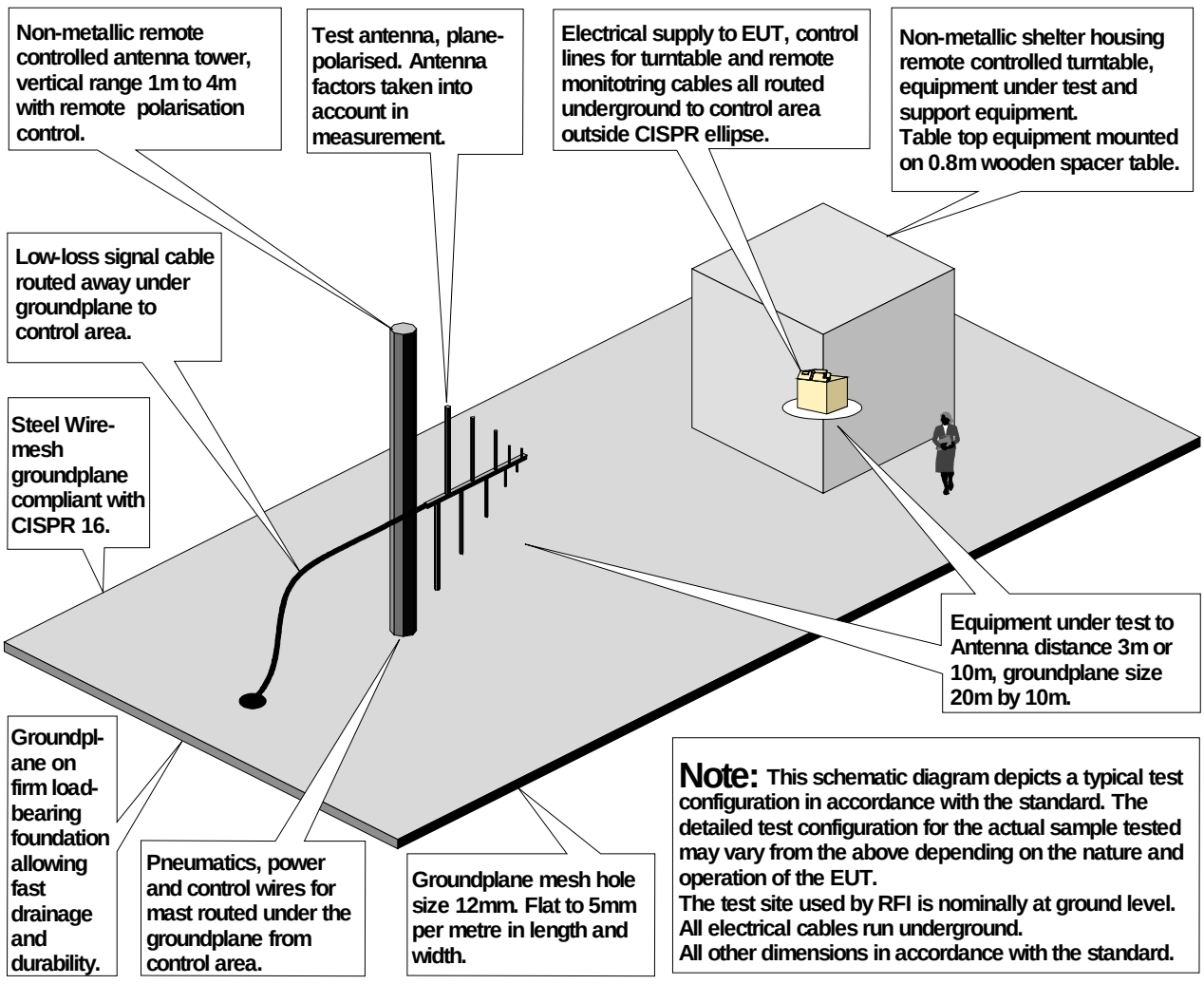

Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m (CISPR ellipse)

Groundplane Earthed

Control room outside CISPR ellipse