TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Lear Corporation
T5 SJB

To: FCC Part 15.209: 2004 Including RSS-Gen Issue 1: 2005 Section 4.4.1

Test Report Serial No:
RFI/MPTE3/RP47648JD01A

Supersedes Test Report Serial No:
RFI/MPTE2/RP47648JD01A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:  **pp**	
Tested By: Fara Razally  **pp**	**Checked By: Tony Henriques** 
Report Copy No: PDF01	
Issue Date: 13 February 2007	**Test Dates: 03 October to 25 October 2005 and 07 August 2006**

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Test of: Lear Corporation
T5 SJB
To: FCC Part 15.209: 2004 Including RSS-Gen Issue 1: 2005 Section 4.4.1

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1. Client Information

Company Name:	Lear Corporation
Address:	Fusters 54 Poligono Industrial P.O BOX 23 43800 VALLS TARRAGONA Spain

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)

Model Name or Number:	T5 SJB
Serial Number:	002015964
Country of Manufacture:	Spain
FCC ID Number:	TTRT5SJB
Date of Receipt:	03 October 2005

2.2. Description of EUT

The equipment under test manages different inputs-analogue sensors, digital switches, etc and controls them through one micro-controller that is reading them permanently. The micro-controller is the core of the system. It is also plugged to different communication buses, where it is included the CAN and the LIN buses. The micro- controller also manages automotive power loads through Smartfet drivers and relay drivers. The SJB also includes an immobiliser system.

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:	C585 propriety connector – shielded 2 core, 2.3m C583 propriety connector – Shielded 2 core, 2.3m C582 propriety connector – Shielded 2 core, 2.3m C584 propriety connector – Shielded 2 core, 2.3m C586 propriety connector – Shielded 2 core, 2.3m C580 propriety connector – Shielded 2 core, 2.3m		
Frequency Range:	125 kHz, single frequency operation		
Channel Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Single Channel	N/A	125 kHz
Highest Fundamental Frequency:	125 kHz		

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop PC
Brand Name:	Compaq
Model Name or Number:	EVO N610C
Serial Number:	7E34K782R0EL
Cable Length and Type:	50 cm Shielded Multicore
Connected to Port:	RS232

Description:	Test Box
Brand Name:	LEAR
Model Name or Number:	T5
Serial Number:	1483
Cable Length and Type:	Shielded 2 core, 2.3m
Connected to Port:	C580-C586

Description:	CAN Bus Extender
Brand Name:	Tesco
Model Name or Number:	OBE 898
Serial Number:	A081
Cable Length and Type:	Fibre Optic, 10 m
Connected to Port:	FO I/P & O/P

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:

The EUT was connected to a microcontroller which was plugged into different communication busses, including the CAN bus, the LIN bus and the immobiliser system.

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
Transmitter 20 dB Bandwidth	RSS-Gen Issue 1: 2005 Section 4.4.1	Antenna	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

FCC Site Registration Number: 90895

IC Site Registration Number: 3485

7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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.

At the request of the client, between the listed test dates given on page 1 of this report, the equipment under test was taken off the premises of RFI Global Services Ltd.

7.2. Transmitter Radiated Spurious Emissions: Section 15.209

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

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

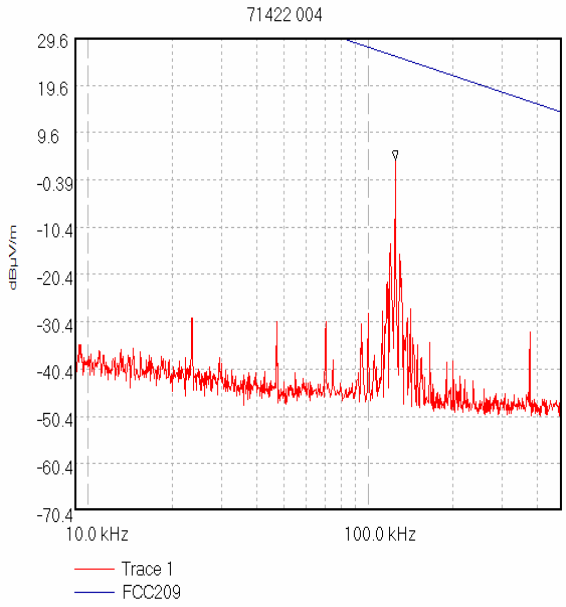
Tests were performed to identify the maximum radiated spurious emission levels.

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).

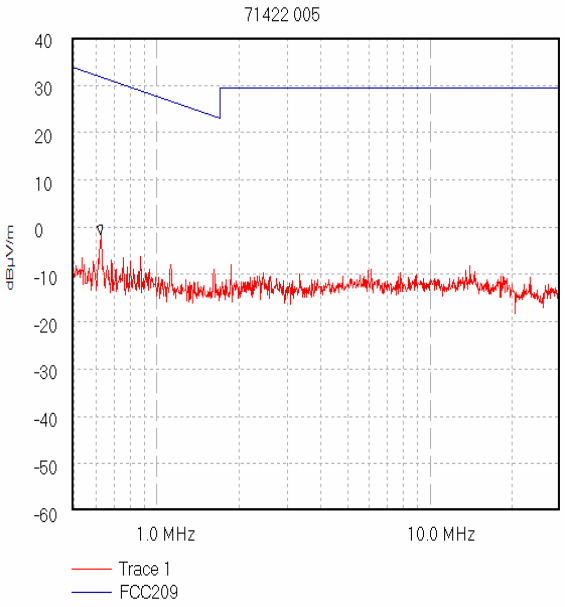
Results:

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Measurement Distance (m)	Margin (dB)	Result
0.024	45°	-46.0	40.2	300	86.2	Complied
0.047	45°	-42.2	34.1	300	76.3	Complied
0.071	45°	-40.4	30.6	300	71.0	Complied
0.100	45°	-43.9	27.6	300	71.5	Complied
0.120	45°	-25.9	26.0	300	51.9	Complied
0.125	45°	-9.2	25.7	300	34.9	Complied
0.375	45°	-39.6	16.1	300	55.7	Complied
0.627	45°	-15.6	31.7	30	47.3	Complied

Transmitter Radiated Spurious Emissions: Section 15.209 (Continued)



Start 9.0 kHz; Stop 490.0 kHz - Log Scale
Ref 29.6 dBµV/m; Ref Offset -80.4 dB; 10 dB/div
RBW 200.0 Hz; VBW 300.0 Hz; Att 30 dB; Swp 68.0 S
Peak 124.771 kHz, 3.78 dBµV/m
Limit/Mask: FCC209;
Transducer Factors: A1037
24/10/2005 13:15:34



Start 490.0 kHz; Stop 30.0 MHz - Log Scale
Ref 40 dBµV/m; Ref Offset -23.8 dB; 10 dB/div
RBW 9.0 kHz; VBW 10.0 kHz; Att 0 dB; Swp 2.2 S
Peak 624.347 kHz, -1.51 dBµV/m
Limit/Mask: FCC209;
Transducer Factors: A1037
24/10/2005 13:28:42

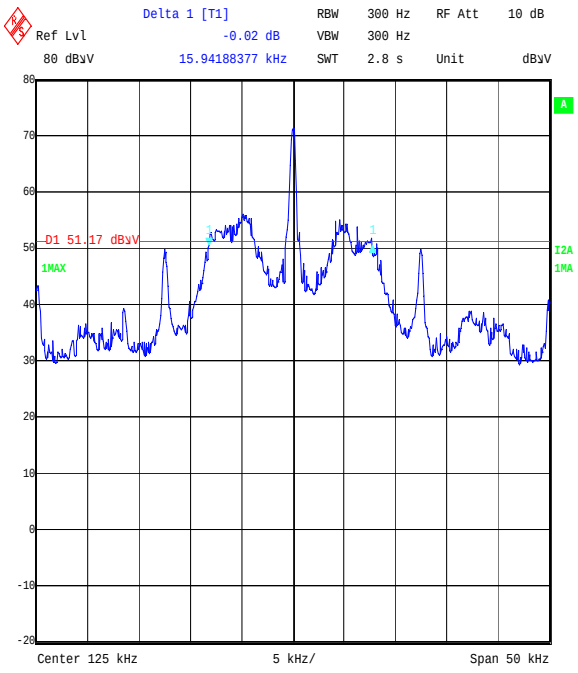
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

7.3.Transmitter 20 dB Bandwidth: RSS-Gen Issue 1:2005 Section 4.4.1

The EUT was configured for 20 dB bandwidth measurements as described in Section 9 of this report.

Tests were performed to identify the 20 dB bandwidth.

Transmitter 20 dB Bandwidth (kHz)
15.942



Title: 3C Test EUT: YQE500160 Industry Canada 20dB Bandwidth
Comment A: 47648JD05 Operating in Tx Mode
Date: 7.AUG.2006 18:52:52

8. Measurement Uncertainty

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.

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

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

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	30 MHz to 1000 MHz	95%	+/- 5.26 dB
20 dB Bandwidth	Not Applicable	95%	± 11.4 ppm

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

9.2. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured for transmitter radiated emissions measurements.

To determine the occupied bandwidth, a resolution bandwidth of 300 Hz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A007	HFH2-Z2 Loop Antenna	Rohde & Schwarz	HFH2-Z2	880 458/020	19 Jan 2005	12
A008	HFH2-Z2 Metal Tripod	Rohde & Schwarz	HFU-Z	None	Not Applicable	-
C363	BNC Cable	Rosenberger	RG142	None	29 Jan 2005	12
C364	BNC Cable	Rosenberger	RG142	None	29 Jan 2005	12
G0552	AP60-50	Farnell	AP60-50	000348	Not Applicable	-
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)	18 Aug 2005	12
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006	29 Jun 2005	12
M1263	ESIB7	Rohde & Schwarz	ESIB7	100265	12 Jan 2006	12
S201	Site 1	RFI	1	-	18 Jul 2006	12
S212	Site 12	RFI	12	-	Not Applicable	-

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

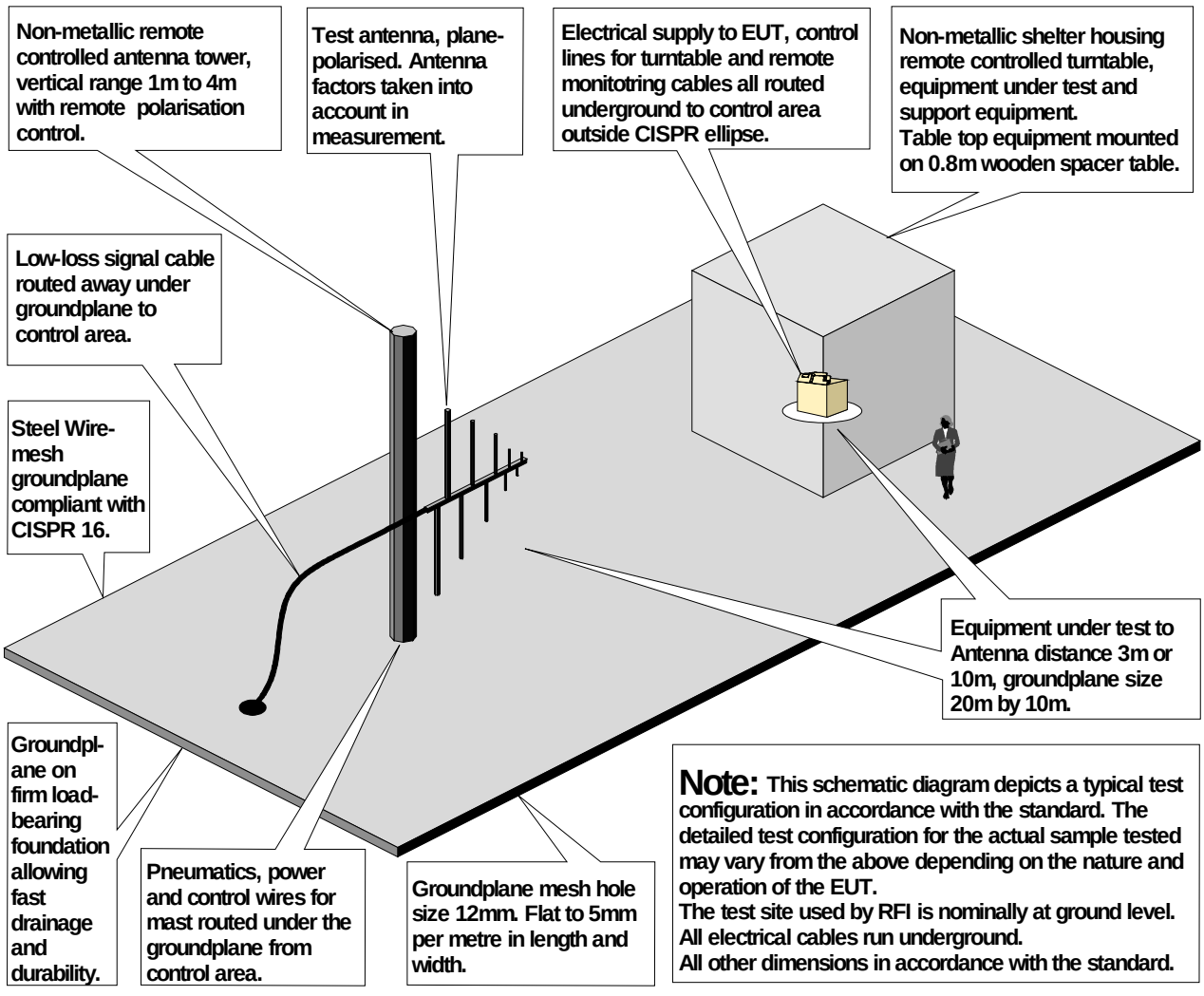
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\47648JD01\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: Lear Corporation
T5 SJB
To: FCC Part 15.209: 2004 Including RSS-Gen Issue 1: 2005 Section 4.4.1

DRG\47648JD01\EMIRAD



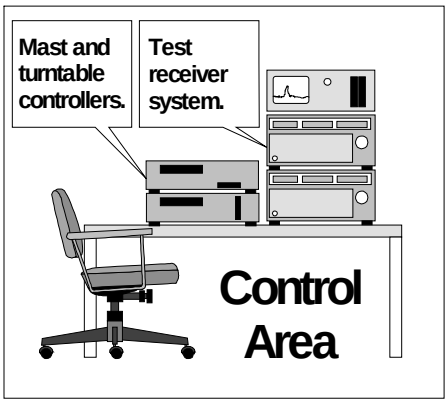
Note: This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical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



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