
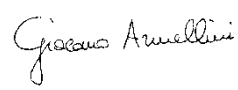
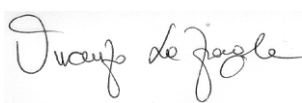


TEST REPORT

APPLICANT:	MAGNETI MARELLI S.P.A. - LIGHTING & BODY ELECTRONIC C/O C.F.R. STRADA TORINO 50 - 10043 ORBASSANO - TO - ITALY Phone : +390119083802	
APPLICANT REFEREE:	Mr. Cardelli	
EUT DESCRIPTION	REMOTE KEYLESS ENTRY	
EUT MODEL	TFR198	
EUT FCC ID	RX2TRF198	
EUT TRADEMARK		
MANUFACTURER	MAGNETI MARELLI S.P.A.	
REFERENCE STANDARDS	47 CFR FCC part 15.231 (b)	
TEST REPORT NUMBER	FCCTR_151581-0	
TEST REPORT ISSUE DATE	22/02/2016	
TESTING LABORATORY	Prima Ricerca & Sviluppo Via Campagna, 92 -22020 Faloppio (Co) – Italy FCC test registration number: 421808	
TESTING LOCATION	As Above	
DATE OF TEST SAMPLE RECEIPT	20/01/16	
NUMBER OF TESTED SAMPLES	1	
DATE OF TEST	20/01/2016	
TESTED BY	Giacomo ARMELLINI Responsabile Laboratorio EMC e RADIO/ EMC and RADIO Laboratory Manager	
APPROVED BY	Vincenzo LA FRAGOLA Direttore generale / Managing director	

The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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1. RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_151581-0	Original release	22/02/2016

2. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

2.1 Identification

Trademark:	
Manufacturer:	MAGNETI MARELLI S.P.A.
Type of Equipment :	REMOTE KEYLESS ENTRY
Model name:	TRF198
FCC ID :	RX2TFR198
Country of manufacturer:	ITALY

2.2 Technical data

Product type:	Radio Equipment
Radio type:	Intentional radiators
Product description / application	The EUT is a remote keyless entry using the 433MHz frequency for remote control of vehicle's door (i.e lock door, unlock door/trunk)
Power supply requirements :	3V (CR2032 type)
Operating Frequency:	433.92MHz
Channel spacing	NA
Number of Channel	1
Modulation Type	ASK
Pulse Train	100ms
Pulse width	95.2ms
Antenna Type	Integral Antenna



2.3 Ports identification

This section contains descriptions of all signal ports and AC/DC power input/output ports, the length and the type of the cable provided by manufacturer needed for the tests. Moreover it is specified if the ports are ever or optionally connected.

Port		Description	Connection
1	Enclosure	Plastic / Metal	Snaps & screw
2	AC Power Supply	Port not present	---
3	DC power supply	Port not present (powered by 3Vdc internal battery)	---
4	Signal lines	Port not present	---
5	Telecomm. Lines	Port not present	---
6	Antenna port	Port not present	---

Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.

2.4 Auxiliary equipment

- None

3. OPERATING TEST MODES AND CONDITIONS

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item "Operating condition of the equipment under test"

Operating condition	Description
#1	Sample 1: Continuous transmission, modulated carrier (see note 1)

Note:

¹ The timing of the continuous transmission and the usual standard operating condition is the same and it is illustrated in Test report 69559-03148 (Edition 3) issued by TÜV SÜD SENTON GmbH on 06/02/2012:

Duty Cycle correction factor = -0.4dB

Special Test Software: Special software and hardware by the Applicant to operate the EUT at channel frequency continuously.

Transmitter Test Antenna: The EUT has been tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment as described with the test results.

4. REFERENCE STANDARD / DOCUMENT FOR PERFORMED TESTS

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2013	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz

5. SUMMARY OF TEST RESULTS

Phenomena	Basic standard	Operating condition	Result
Field Strength of Fundamental and Spurious Emissions	FCC Part 15 § 15.231 (b)	#1	Compliant

Note: Preliminary measurements on all axes have been performed in order to determine the worst case emissions.

6. TEST RESULTS

Field Strength of Fundamental and Spurious Emissions7

**TEST
1.**

FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

REFERENCE DOCUMENT

According to 15.231 (b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	11,250 to 3,750	1125 to 375
174-260	3,750	375
260-470	13,750 to 12,500	1375 to 1,250
Above 470	12,500	1,250

¹Linear interpolations.

TEST SETUP	In according to ref std
TEST LOCATION	Semi Anechoic Chamber
TYPE OF MEASUREMENT	RADIATED
TEST EQUIPMENT	EMI receiver Rohde & Schwarz Mod, ESU 40 Spectrum Analyzer Rohde & Schwarz Mod, FSP40 Chase Antenna Mod, CBL 6111 C Antenna Rohde & Schwarz mod, HL050 High pass filter Wainwright WHNX 1,3/18G-10SS
TEST PERFORMED BY	Giacomo Armellini
TESTING DATE	20/01/2016
UNCERTAINTY OF MEASURE:	Combined uncertainty = $\pm 1,75$ dB Total uncertainty = (k=2) $\pm 3,5$ dB

TEST CONDITIONS:	MEASURED
Ambient temperature : 23°C \pm 5°C	24°C
Ambient humidity : 25 - 75 %rH	45%
Pressure : 85 - 106 kPa (860 mbar - 1060 mbar)	960mbar

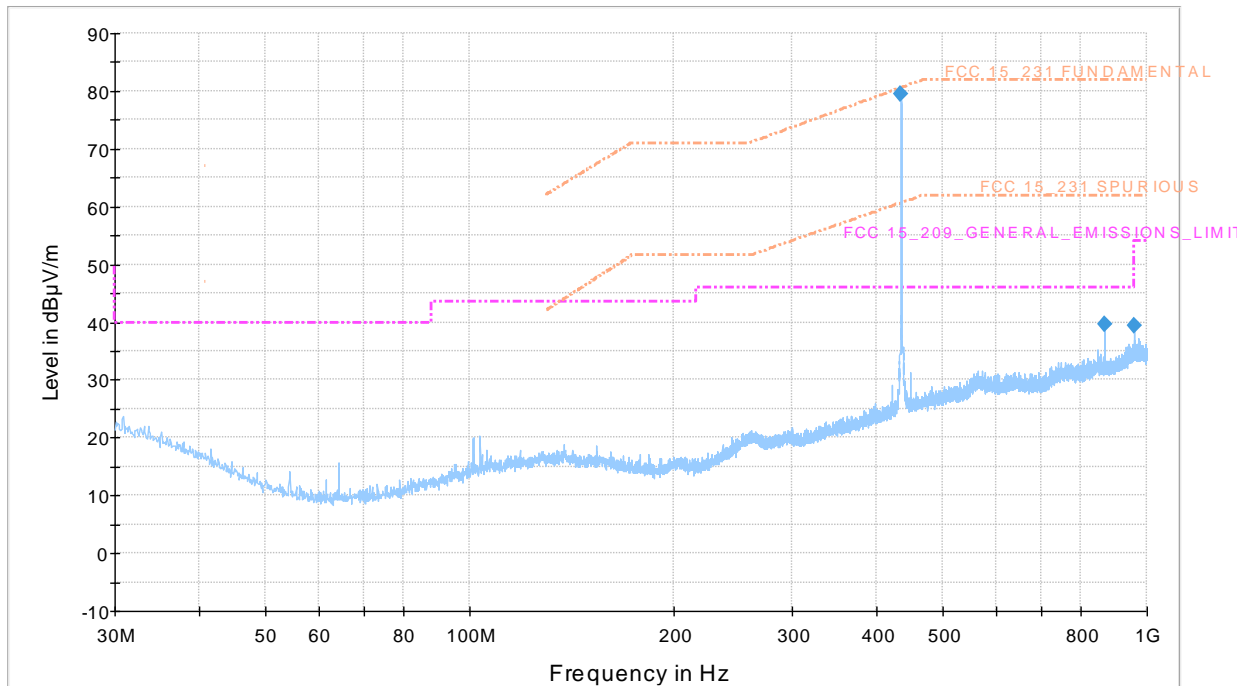
OPERATING CONDITION	#1
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TEST RESULT	COMPLIANT
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RADIATED MEASUREMENT

FREQUENCY RANGE 30MHz – 1GHz

VERTICAL POLARIZATION



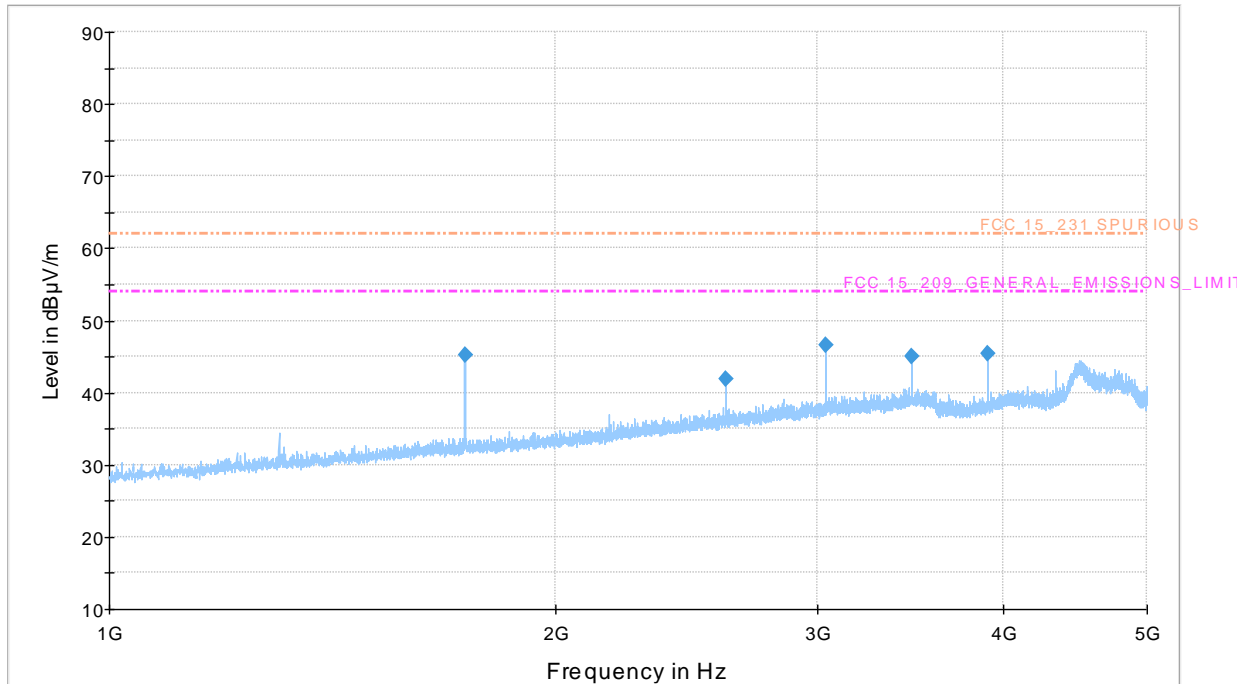
Blue trace Peak detector, Blue Marker Peak detector

Final Result

Frequency (MHz)	Max Peak (dBµV/m)	Duty Cycle correction (dB)	Average (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
433.908000	79.5	-0.4	79.1	100.000	100.00	103.0	V	80.83	1.73
867.886000	39.7	-0.4	39.3	100.000	100.00	103.0	V	60.83	21.53
957.223000	39.3	-0.4	38.9	100.000	100.00	103.0	V	60.83	21.93

FREQUENCY RANGE 1GHz-5GHz

VERTICAL POLARIZATION



Blue trace Peak detector, Blue Marker Peak detector

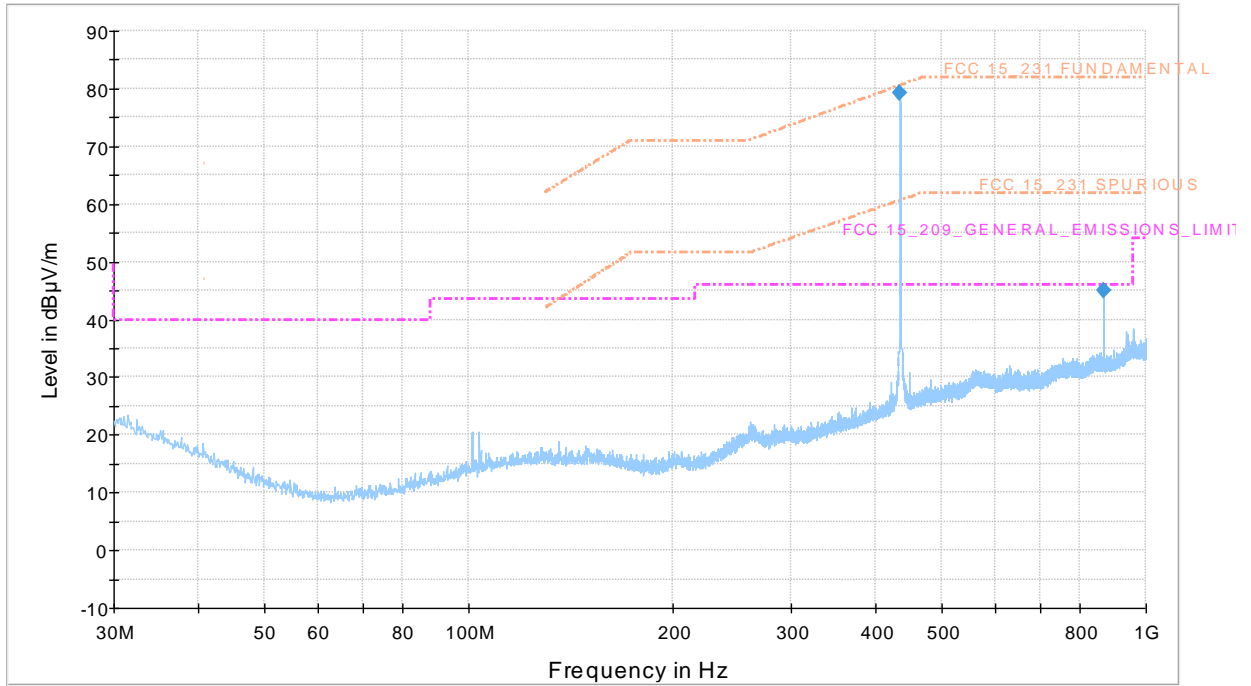
Final Result

Frequency (MHz)	Max Peak (dBµV/m)	Duty Cycle correction (dB)	Average (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
1736.00000	45.1	-0.4	44.7	100.000	103.0	V	180.0	60.83	16.13
2603.20000	41.8	-0.4	41.4	100.000	103.0	V	88.0	60.83	19.43
3037.20000	46.6	-0.4	46.2	100.000	103.0	V	180.0	60.83	14.43
3471.60000	45.0	-0.4	44.6	100.000	103.0	V	180.0	60.83	16.03
3905.60000	45.3	-0.4	44.9	100.000	103.0	V	0.0	60.83	15.73



FREQUENCY RANGE 30MHz – 1GHz

HORIZONTAL POLARIZATION



Blue trace Peak detector, Blue Marker Peak detector

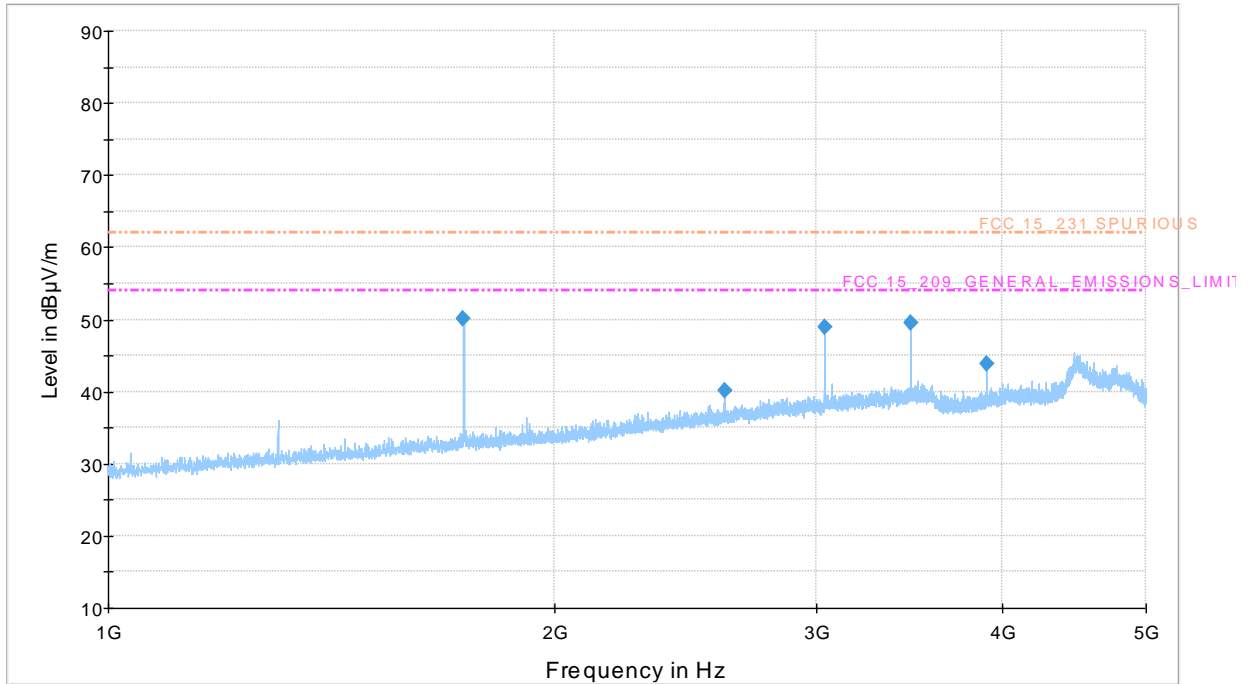
Final Result

Frequency (MHz)	Max Peak (dBµV/m)	Duty Cycle correction (dB)	Average (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
433.908000	79.3	-0.4	78.9	100.000	103.0	H	2.0	80.83	1.93
867.886000	45.1	-0.4	44.7	100.000	103.0	H	2.0	60.83	16.13



FREQUENCY RANGE 1GHz-5GHz

HORIZONTAL POLARIZATION



Blue trace Peak detector, Blue Marker Peak detector

Final Result

Frequency (MHz)	Max Peak (dBµV/m)	Duty Cycle correction (dB)	Average (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBµV/m)	Margin (dB)
1735.60000	50.1	-0.4	49.7	100.000	101.0	H	178.0	60.83	11.13
2603.60000	40.1	-0.4	39.7	100.000	103.0	H	1.0	60.83	21.13
3037.60000	49.0	-0.4	48.6	100.000	103.0	H	1.0	60.83	12.23
3471.20000	49.6	-0.4	49.2	100.000	259.0	H	178.0	60.83	11.63
3905.60000	43.9	-0.4	43.5	100.000	259.0	H	178.0	60.83	17.33

7. LIST OF EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL Nr.	CAL. DUE
EMI TEST RECEIVER 20Hz - 40GHz	Rohde & Schwarz	ESU40	100111	04/03/2016
RF SEMI-ANECHOIC CHAMBER (CSSA)	Siemens	B83117-D6019- T232	003-005- 134/94C	26/01/2016
BILOG ANTENNA	Chase	CBL6111C	2717	05/05/2016
LOG PERIODIC ANTENNA BROAD BAND 1-26,5GHz	Rohde & Schwarz	HL050	100437	01/04/2016
SPECTRUM ANALYZER	Rohde & Schwarz	FSP40	100038	16/01/2017
SYSTEM DC POWER SUPPLY	HP	6623A	3448A04501	10/01/2017
HIGH PASS FILTER	Wainwright	WHNX 1,3/18G- 10SS	1	11/11/2016