

EMC Test report

99512030

based on:
FCC Part 15, Subpart B, section 15.109 (10-01-03 edition)

Receiver
TRW
14RC

Contents

MAIN MODULE.....	3
1 INTRODUCTION	3
2 PRODUCT	4
3 TEST SCHEDULE	4
4 PRODUCT DOCUMENTATION.....	5
5 OBSERVATIONS AND COMMENTS	5
6 SUMMARY.....	5
7 CONCLUSIONS.....	6
TEST RESULTS MODULE	7
1 SUMMARY.....	8
2 EMISSION TESTS.....	9
2.1 Radiated emission	9
USED TEST EQUIPMENT MODULE	13
PHOTOGRAPHS MODULE.....	18
ADDITIONAL INFORMATION MODULE	29

This report comprises of five modules. The total number of pages exclusive of the pages enclosed in the additional information module is: 29

Main module

1 Introduction

This report contains the result of tests performed by:

Telefication bv
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:1999. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie) . The copyright of this test report is owned by Telefication bv and may not be reproduced except in full without the written approval of Telefication bv.

Ordering party:

Company name : TRW Automotive Electronics
Address : Stratford Road Shirley
P.O. Box : B90 4GW
City/town : Solihull
Country : United Kingdom
Date of order : 31 March 2004

2 Product

A sample of the following product was submitted for testing:

Product name	: Receiver
Product category	: Unintentional radiators
Manufacturer	: TRW Automotive Electronics
Trade mark	: TRW
Type designation	: 14RC
FCC ID	: KHH14RC
Hardware version	: Rev. F
Software version	: --
Serial number	: --

Variant:

The 14RC has a variant where some components are not mounted. These components are not involved in the radio frequency part. In this report the normal version is called the High line receiver. The variant is called the Low line receiver.

3 Test schedule

Tests were carried out in accordance with the specification detailed in chapter 6 "Summary" of this report.

Tests were carried out at the following location:

- Telefication, Zevenaar

The sample of the product was received on:

- 2 April 2004

Tests were carried out on the following dates:

- 5 and 6 April 2004

4 Product documentation

For production of this report the following product documentation was used:

Description	Date	Identification
Circuit diagram 14RC TPM High line receiver	23/03/04	59307922 (2 sheets)
Circuit diagram 14RC TPM Low line receiver	23/03/04	59308085 (2 sheets)

5 Observations and comments

This product is a 315 MHz superheterodyne receiver, intended for reception of messages coming from the tire pressure sensors. The receiving antenna is internal.

For testing purpose the applicant provided a generic cable harness and diagnostic test box.

The diagnostic test box was used in order to verify that the receiver was in its operational mode.

6 Summary

The product is intended for use in the following application area:

Automotive

The sample was tested according to the following specification:

FCC Part 15, Subpart B, section 15.109 (10-01-03 edition)

7 Conclusions

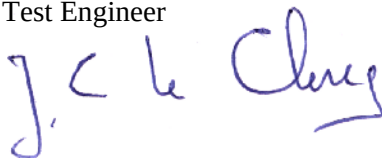
The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 6 of this report.

The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication bv does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

All tests are performed by:

name : ing. J.C. le Clercq

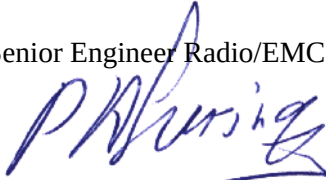
function : Test Engineer

signature : 

Review of test methods and report by:

name : ing. P.A. Suringa

function : Senior Engineer Radio/EMC

signature : 

The above conclusions have been verified by the following signatory:

date : 22 April 2004

name : J.P. van de Poll

function : Co-ordinator Test Group

signature : 

Test results module

1 Summary

According to FCC Part 15; subpart B; sections 15.109 the following tests are performed:

Port	Reference	Phenomena	Result
Enclosure	section 15.109(a)	Radiated Emission	P

Results:

P = Pass
F = Fail

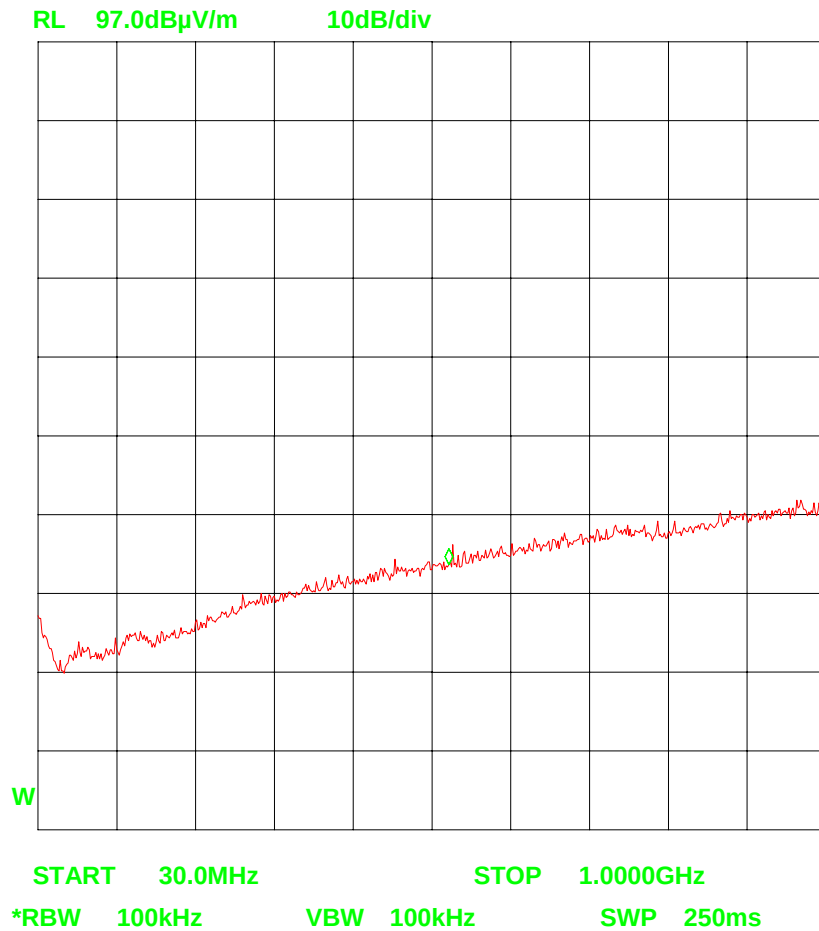
NA = Not Applicable
NP = Not Performed

2 Emission tests

2.1 Radiated emission

Port : Enclosure
Configuration : 315 MHz receiver
Compliance test : Emission measurements at 3 m distance in a Fully Anechoic Chamber (FAC) have been carried out in the frequency ranges 30 MHz to 1000 MHz; and 1 GHz to 2 GHz.

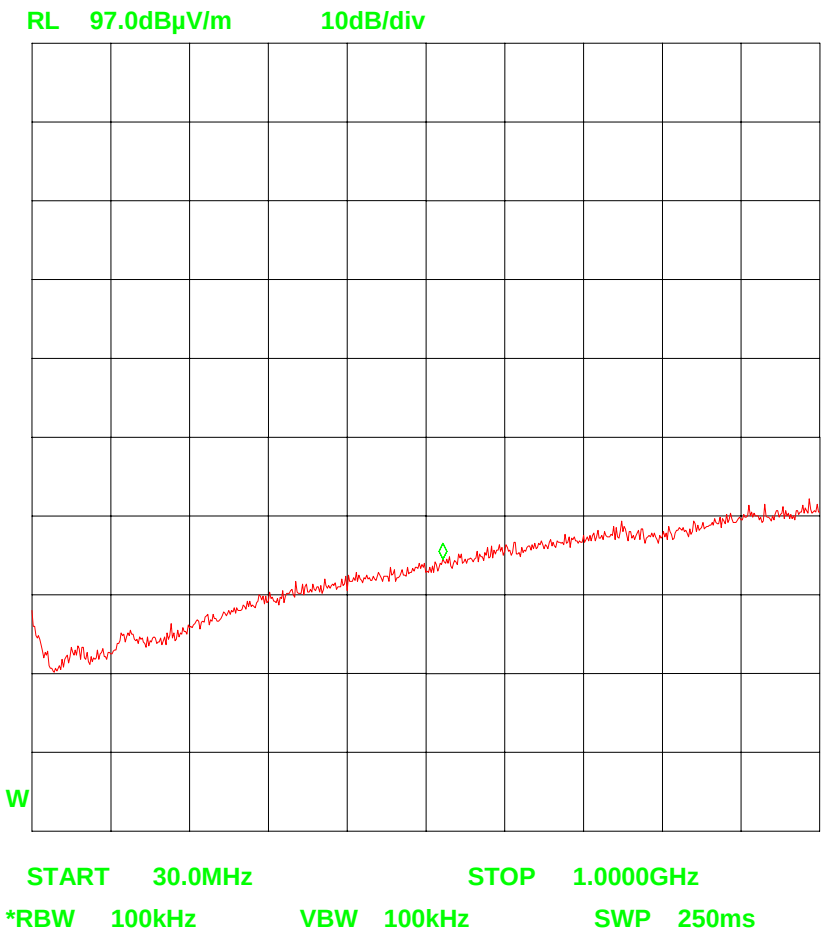
Test results : Graph for vertical polarization (units in dB μ V/m).



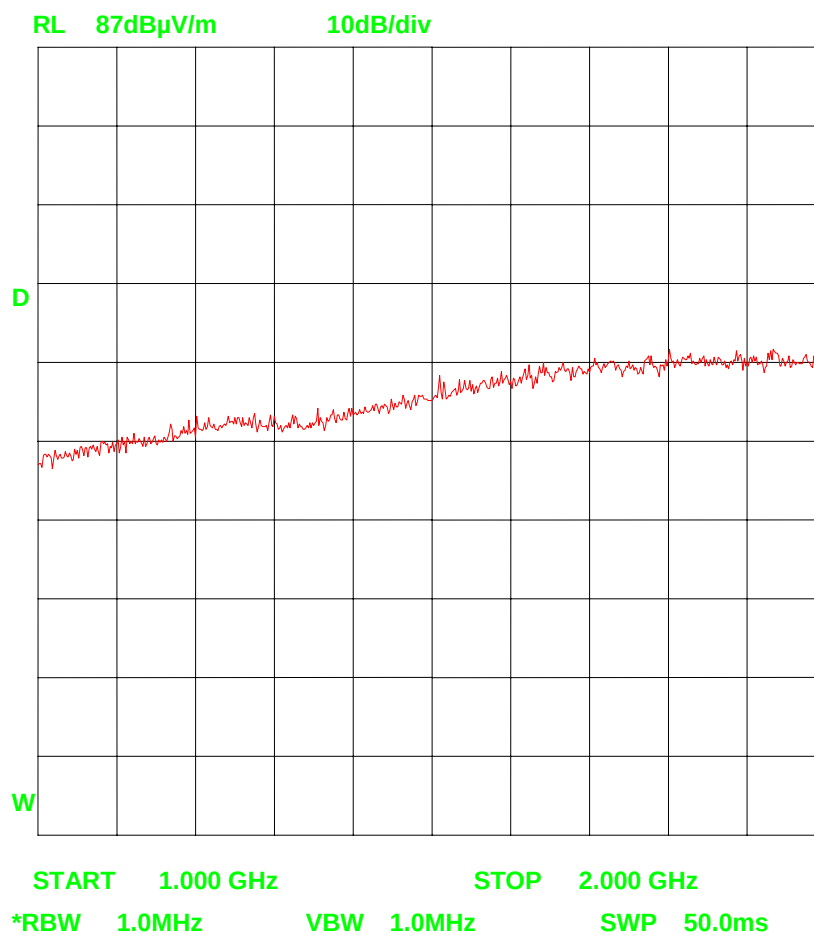
Test results

:

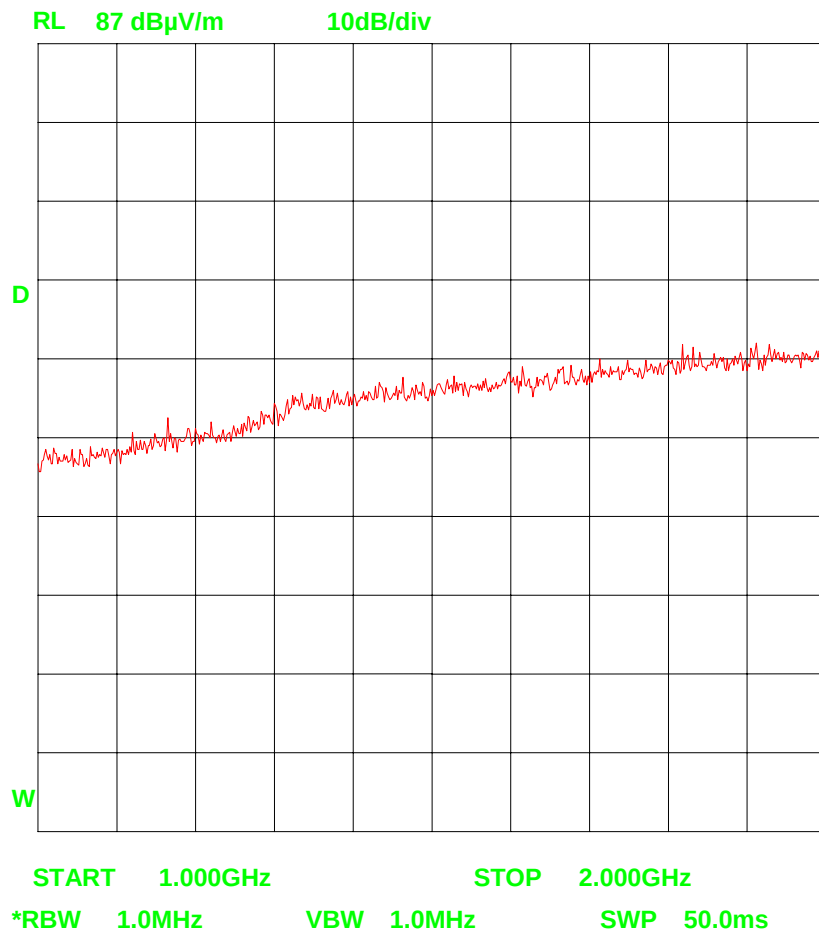
Graph for horizontal polarization (units in dBμV/m)



Test results : Graph for vertical polarization (units in dB μ V/m).



Test results : Graph for horizontal polarization (units in dB μ V/m).



No spurious emissions have been found at 3 meters distance in a Fully Anechoic Chamber.

Measurement equipment : 11, 18, 19, 20, 32, 69, 75, 78.
(The numbers listed refer to the module 'Used test equipment module'.)

Justification : Pre-compliance measurements have been performed in an fully anechoic room. No spurious signals > 30 MHz. were found. Measurements at the Open Area Test Site were judged to be not necessary, as would have been performed at:

TNO Electronic Products & Services (EPS) B.V
Smidshornerweg 18
9822 TL Niekerk
The Netherlands

FCC listed : 90828
Industry Canada : IC3501

Used test equipment module

This module contains the total list of test equipment used.

The following measurement equipment is used at Telefication bv:

Ref	Description	Ident	Manufacturer	Model
1	EFT generator	TE 00760	Keytek	E411
2	EFT/surge coupler	TE 00759	Keytek	E4551
3	Capacitive clamp	TE 00761	Keytek	CCL-4/S
4	Controller (A07)	TE 00023	Keytek	E103
5	ESD simulator	TE 00516	Keytek	MZ-15/EC
6	ESD air discharge tip	TE 00755	Keytek	TPA-2
7	ESD contact discharge tip	TE 00709	Keytek	TPC-2
8	Surge comb. wave generator	TE 00757	Keytek	E501A
9	Surge telecom wave gen.	TE 00022	Keytek	E502A
10	Surge coupler/decoupler	TE 00758	Keytek	E571
11	Logper/bow-tie antenna (Anec)	TE 00700	EMCO	3143
12	Biconical antenna	TE	Schwarzbeck	BBA 9106
13	RF amplifier	TE 00750	Kalmus	737FC
14	RF generator	TE 00474	Adret	7200A
15	Isotropic field sensor	TE 00748	Holaday	HI-4422
16	Fiber optic RS232 interface	--	Holaday	HI-4413G
17	System readout	TE 00749	Holaday	HI-4416
18	Antenna tower	--	HD	AS 620p
19	Turntable	--	HD	DS 412
20	Turntable controller	--	HD	HD 050
21	RF voltmeter	TE 00707	Boonton	9200B
22	40 dB coupler	TE 00752	Kalmus	DC100HHR
23	RF probe (2x)	TE 00753 TE 00754	Boonton	952001B
24	Artificial mains network	TE 00208	R & S	ESH2-Z5

Ref	Description	Ident	Manufacturer	Model
25	Test receiver	TE 00205	R & S	ESH3
26	Pulse limiter	TE 00227	R & S	ESH3-Z2
27	Spectrum analyzer	TE 00094 TE 00095	R & S	FSB Display
28	Test receiver	TE 00091	R & S	ESV(P)
29	Antenna mast	--	EMCO	1070
30	Turn table	--	EMCO	1060-2M
31	Absorbing clamp	TE 00777	R & S	MDS 21
32	Anechoic chamber	--	Euroshield	RFD-F-100
33	Open Area Test Site	--	Telefication	--
34	Power/Arb waveform source	TE 00711	Keytek	EP72
35	Reference impedance	TE 00712	Keytek	ERI-1
36	Power analyzer	TE 00763	Xitron Technologies	2501AH
37	AC power simulator	TE 00762	Kikusui	PCR4000L
38	Signal generator	TE 00413	Marconi	2042
39	RF amplifier	TE 00515	Amplifier Research	25A250A
40	T-network	TE 00026	R & S	ESH3-Z4
41	Mains coupl./dec. network	TE 00766	Telefication	9403S1
42	Power meter	TE 00414	R & S	NRVS
43	Measurement probe	TE 00415	R & S	URV5-Z4
44	Attenuator 6 dB	TE 00514	Narda	766-6
45	Pulse generator	TE 00225	HP	8012 B
46	Coaxial coupl./dec. network	TE 00766	Telefication	CDN-S1
47	Voltage swell/DIP/interrupt source	TE 00710	Keytek	EP62

Ref	Description	Ident	Manufacturer	Model
48	Digital multimeter	TE 00329	Fluke	Fluke 87
49	--	--	--	--
50	EM clamp	TE 00764	Lüthi	EM101
51	Ferrite tube	TE 00765	Lüthi	FTC101
52	Distortion meter	TE 00416	HP	HP 8903 B
53	Artificial Mains Network	TE	Telefication	JOZ191194
54	Attenuator 3 dB, 100 W	TE 00751	Tenuline	8343-030
55	Logperiodic antenna	TE 00744	EMCO	3147
56	Modulation analyzer	TE 00412	R & S	FAM
57	Audio amplifier	TE 00517	Solar Electronics	6552-1A
58	Acoustic Pipe Coupler	TE 00775	Telefication	JOZ110395
59	Antenna	--	Kathrein	K 51164
60	Pulse modulator	TE 00708	Schaffner	CPM9830
61	RF power amplifier	TE 00714	Schaffner	CBA9546
62	Adjustable transformer	--	KSL	RU8
63	100 µF decoupling capacitor	TE 00769	Telefication	JOZ
64	Mains coupling/decoupling Network	TE 00767	Telefication	CDN-M2/M3
65	Coupling/decoupling device for screened cables	TE 00771	MEB	CDN-S25
66	Audio isolation transformer	TE 00772	Solar	6220-2
67	Current probe	TE 00773	Eaton	93686-2
68	Triple loop antenna	TE	Telefication	--
69	Pre-amplifier	TE 00344	R&S	ESV-Z3
70	800 mm strip line	--	Telefication	--
71	Measurement probe	TE 00009	R & S	URV5-Z2

Ref	Description	Ident	Manufacturer	Model
72	Standard gain horn antenna	TE 00602	Scientific Atlanta	12-1.7
73	Frequency doubler	TE 00569	HP	11721A
74	Microwave amplifier	TE 00124	HP	8349A
75	Preamplifier	TE 00092	HP	8449B
76	Spectrum analyzer	TE 00481	HP	8563E
77	Controller (A010)	TE 00713	Keytek	E103
78	Horn antenna	TE 00513	EMCO	3115

Photographs module

Photograph 1: <i>Highline receiver 14RC, top view</i>	19
Photograph 2: <i>Highline receiver 14RC, bottom view</i>	20
Photograph 3: <i>Highline receiver 14RC, PCB top view</i>	21
Photograph 4: <i>Highline receiver 14RC, PCB bottom view</i>	22
Photograph 5: <i>Lowline receiver 14RC, top view</i>	23
Photograph 6: <i>Lowline receiver 14RC, bottom view</i>	24
Photograph 7: <i>Lowline receiver 14RC, PCB top view</i>	25
Photograph 8: <i>Lowline receiver 14RC, PCB bottom view</i>	26
Photograph 9: <i>Test setup radiated emissions</i>	27
Photograph 10: <i>Test setup radiated emissions</i>	28

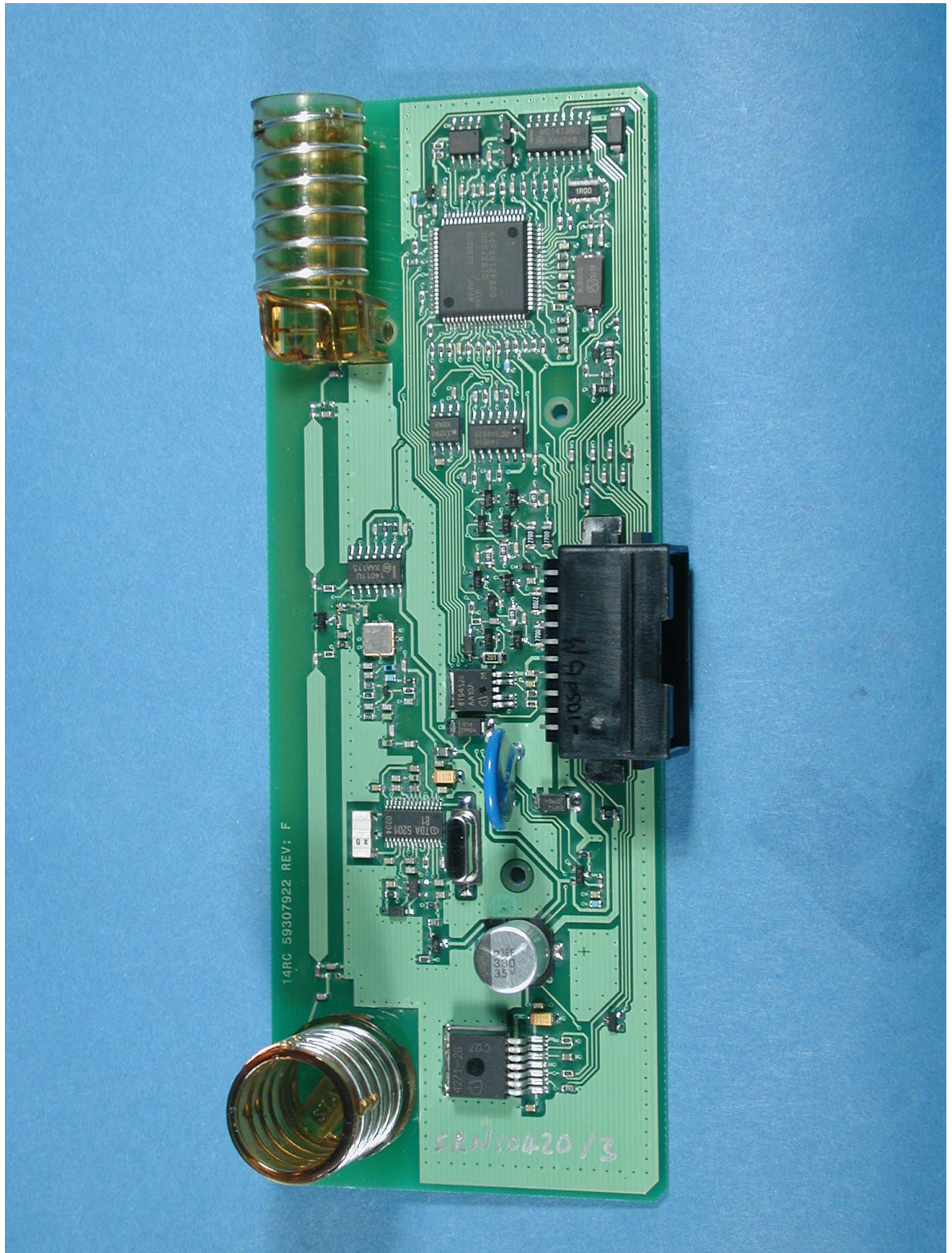
Photograph 1: *Highline receiver 14RC, top view*



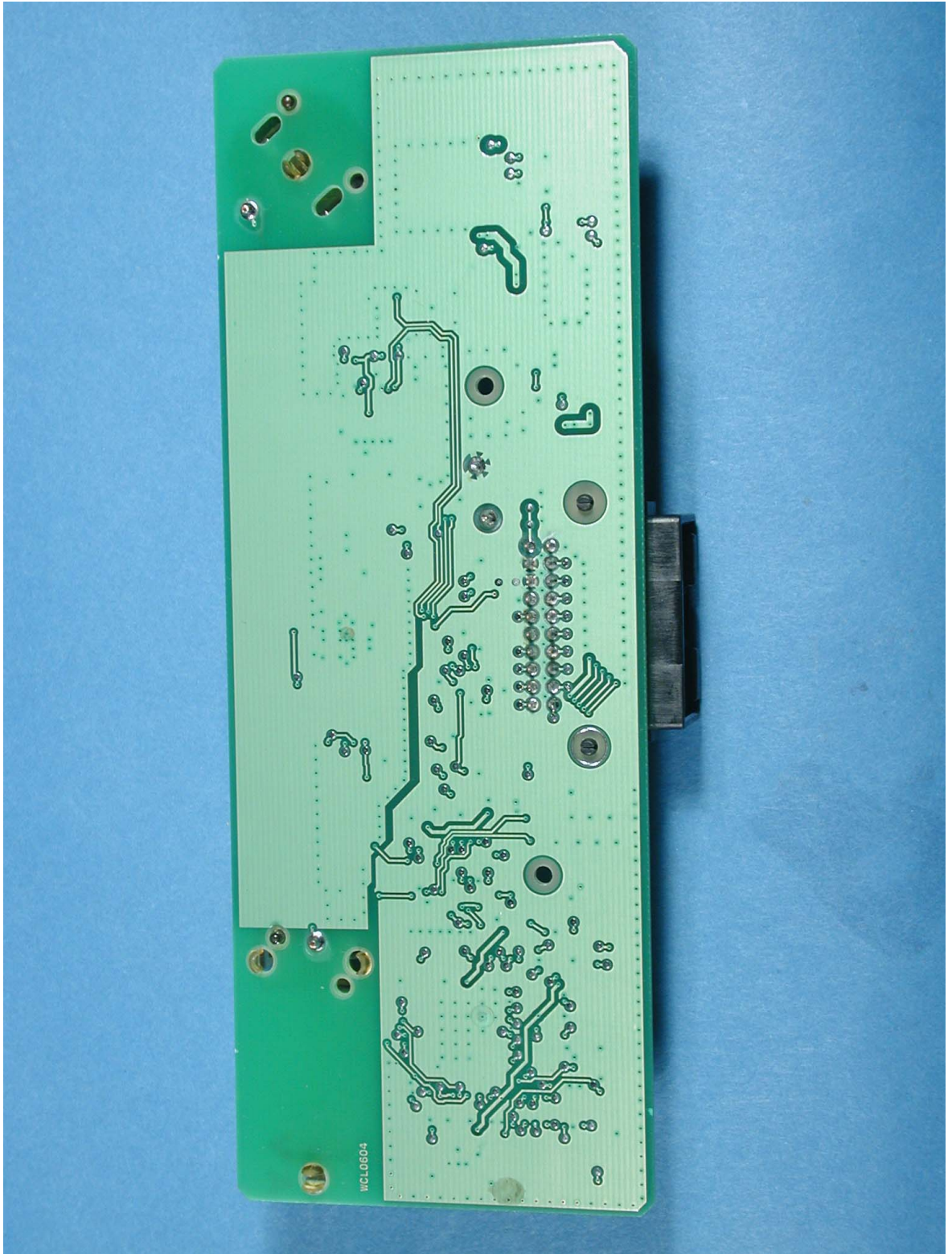
Photograph 2: *Highline receiver 14RC, bottom view*



Photograph 3: *Highline receiver 14RC, PCB top view*



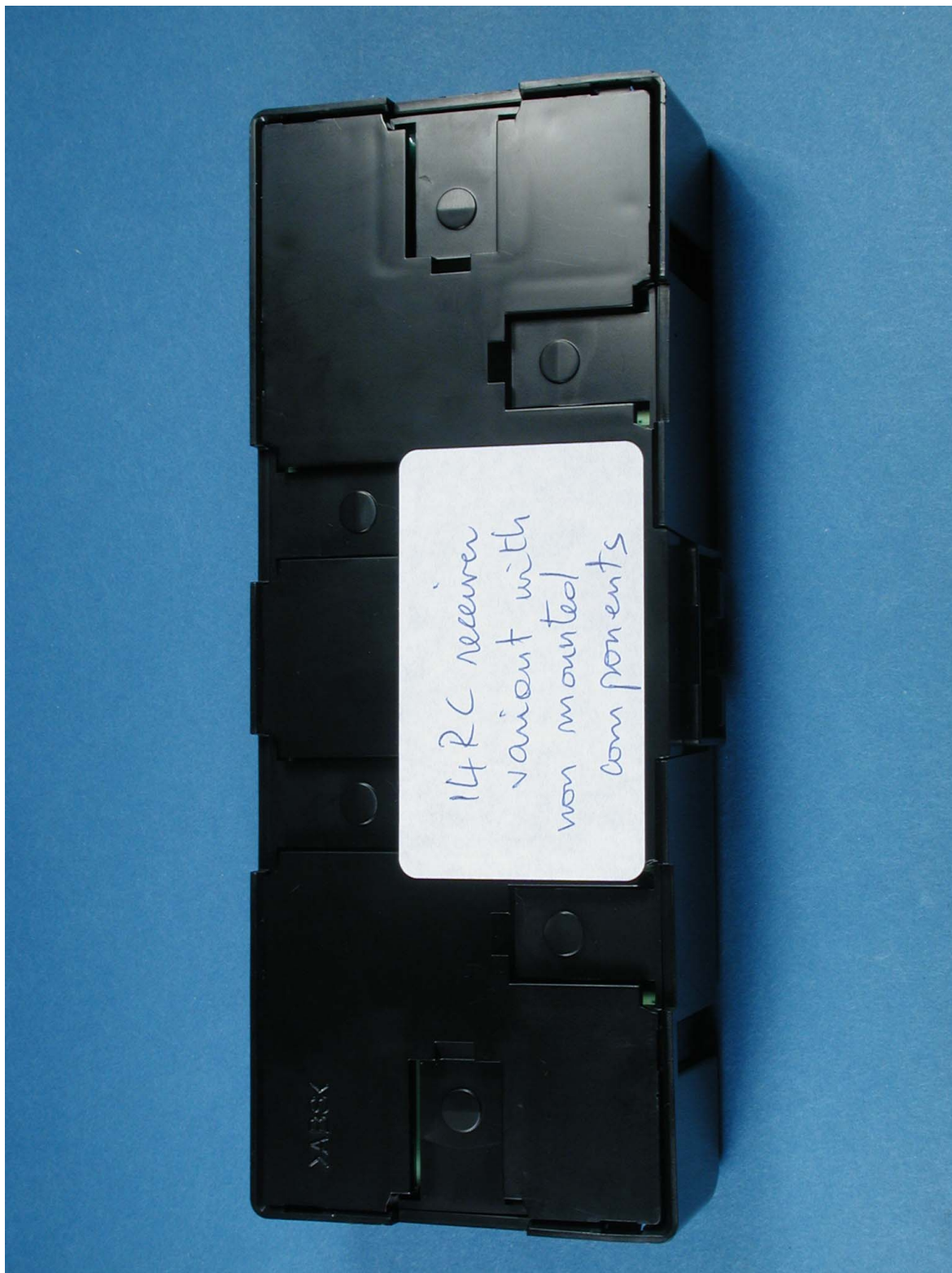
Photograph 4: *Highline receiver 14RC, PCB bottom view*



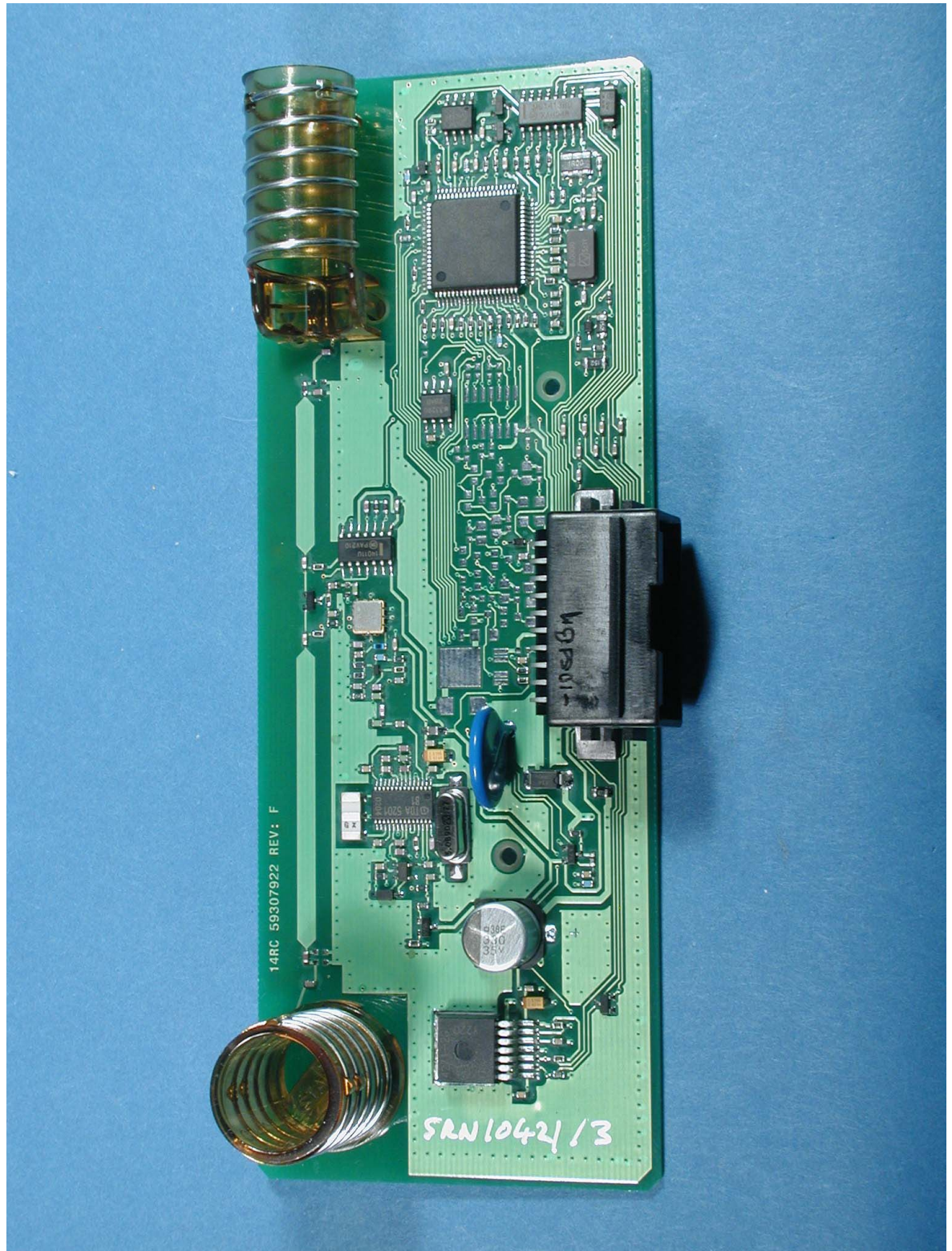
Photograph 5: *Lowline receiver 14RC, top view*



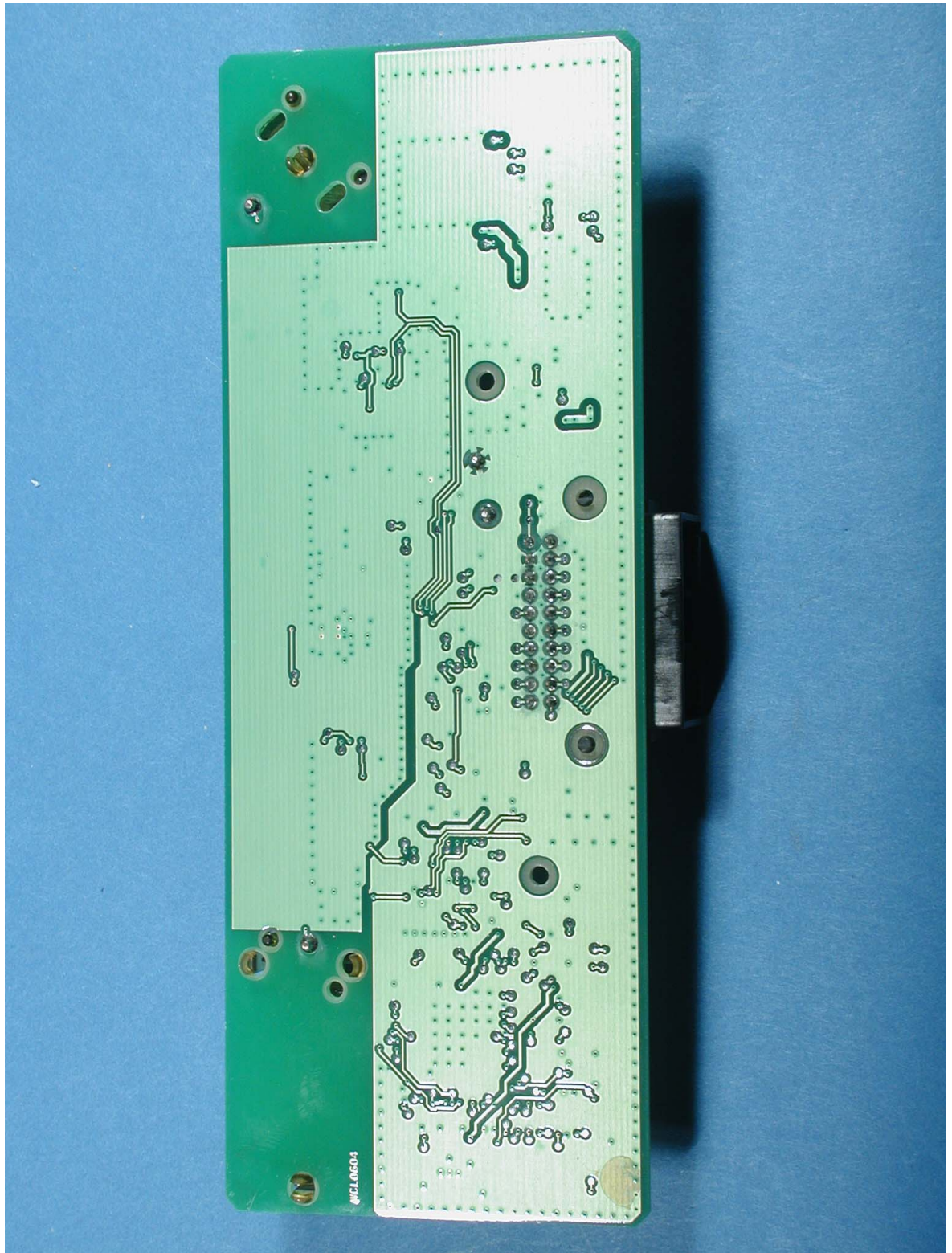
Photograph 6: *Lowline receiver 14RC, bottom view*



Photograph 7: *Lowline receiver 14RC, PCB top view*



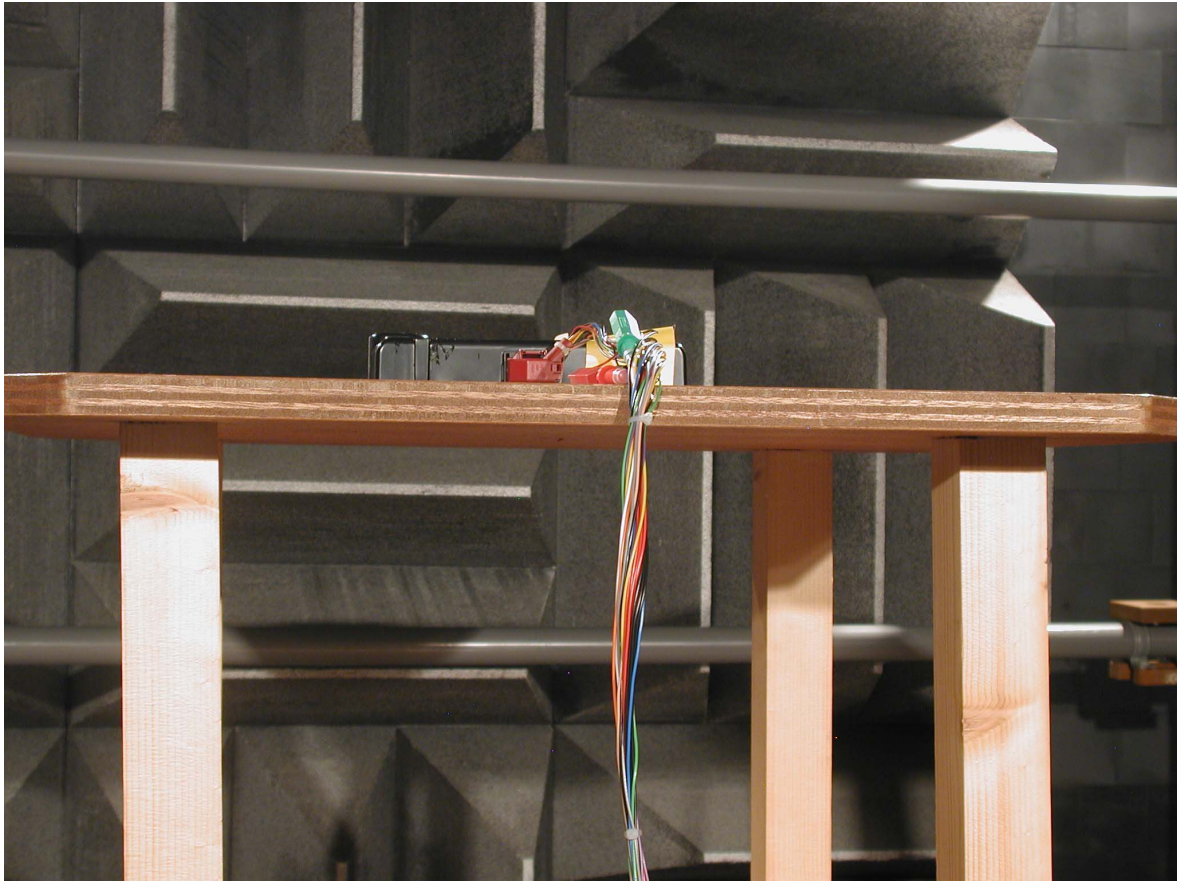
Photograph 8: *Lowline receiver 14RC, PCB bottom view*



Photograph 9: *Test setup radiated emissions*



Photograph 10: *Test setup radiated emissions*



Additional information module

No additional information is enclosed.