

Radio test report

99407821

based on:
FCC part 15; subpart C; section 15.227 (10-1-02
edition)

Wireless mouse
Logitech
M-RAA89

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This report comprises of four modules. The total number of pages exclusive of the pages enclosed in the additional information module is: 28



Main module

1 Introduction

This report contains the result of tests performed by:

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

By order of:

Telefication bv
Edisonstraat 12a
6902 PK Zevenaar
The Netherlands

Ordering party:

Company name	:	Logitech
Address	:	Z.I. Moulin du Choc
Zipcode	:	CH-1122
City/town	:	Romanel/Morges
Country	:	Switzerland
Date of order	:	25 April 2003



2 Product

A sample of the following product was submitted for testing:

Product description	: Wireless mouse
Manufacturer	: Suzhou Logitech Electronic Co. Ltd.
Trade mark	: Logitech
Type designation	: M-RAA89
FCC ID	: DZL211646
Hardware version	: --
Serial number	: PB2-2CH118; PB2-1CH024
Software release	: --

3 Test schedule

Tests were carried out in accordance with the specification detailed in chapter 7 “Summary” of this report.

Tests were carried out at the following location:

- TNO (EPS) B.V., Nieuwerkerk

The sample of the product was received on:

- 8 May 2003

Tests was carried out on the following date(s):

- 5 June 2003

4 Product documentation

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

Description:	Date:	Identification:
Application form I-ETS 300 220	5 May 2003	19 pages annexed to this report
Testing indications for M-RAA89, 4 pgs.	6 May 2003	M-RAA89
User's manual (front & back)	2003	623172-0914.A
Electrical diagram, sheet 2 of 3, Rev. PA3	25 March 2003	M-RAA89 HBR RF
Differences between PA3 & PA4 of M-RAA88 and M-RAA89, 2 sheets	Not dated	--

The fore mentioned documentation will be filed at Telefication for a period of 10 years following the issue of this report.

5 Observations and comments

The equipment under test comes in two versions, a single channel version (27.045 MHz) and a two channels version (27.045 MHz and 27.195 MHz).

This report covers the results of the single channel version.

6 Modifications to the sample

No modifications were made to the sample.

7 Summary

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

INDUCTIVE DATA TRANSMISSION APPLICATION IN THE 27 MHz BAND.

The sample was tested according to the following specification(s):

FCC part 15; subpart C; section 15.227 (10-1-02 edition)

8 Conclusions

The sample of the product showed **NO NON-COMPLIANCES** to the specification stated in chapter 7 of this report.

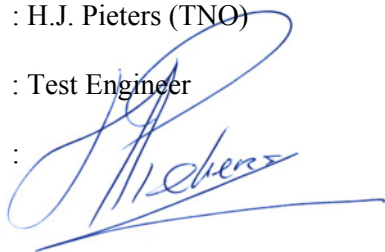
The results of the tests as stated in this report, are exclusively applicable to the product item as identified in this report. Telefication does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

All tests are performed by:

name : H.J. Pieters (TNO)

function : Test Engineer

signature :

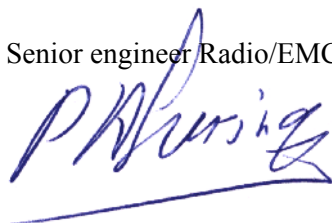


Review of test report by:

name : ing. P.A. Suringa (Telefication)

function : Senior engineer Radio/EMC

signature :



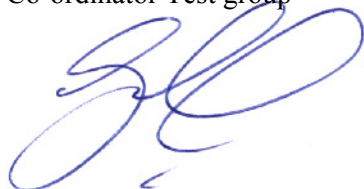
The above conclusions have been verified by the following signatory:

Date : 29 July 2003

name : J.P. van de Poll (Telefication)

function : Co-ordinator Test group

signature :



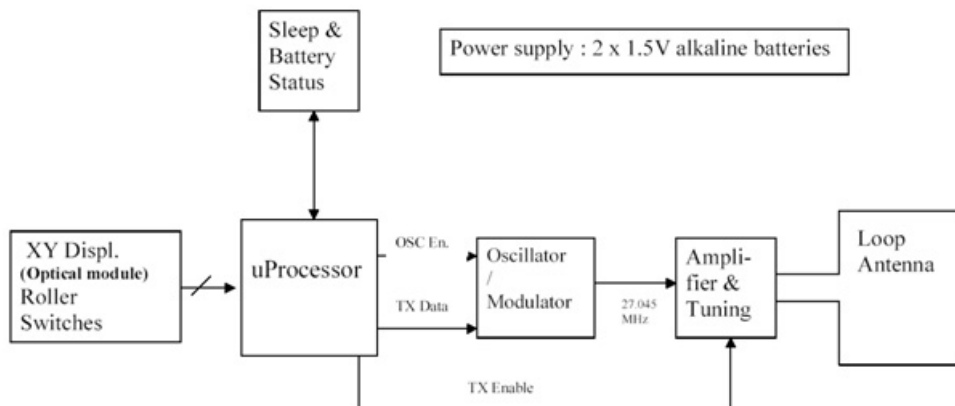
Test results module

1 General information

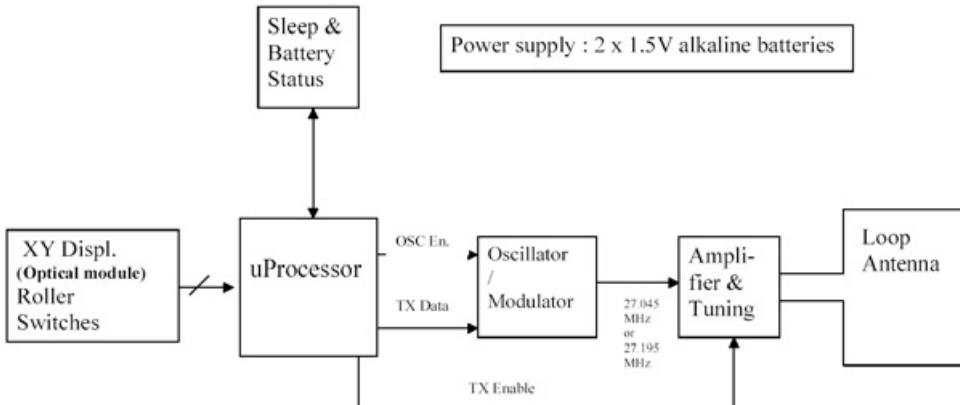
1.1 Equipment information

Rated RF output power	n.a., integral antenna
Rated radiated RF power	200 nW
Operating frequency	27.045 MHz (one channel version) 27.045 MHz & 27.195 MHz (two channel version)
ITU emission class	10K0F1D (one channel version) 10K0F7D (two channel version)
FCC ID	DZL211646

1 channel version block diagram:



2 channel version block diagram:



TNO Electronic Products & Services (EPS) B.V.

Compilation of test results



Applicant : Telefication
 Equipment : Wireless mouse
 Manufacturer : Logitech
 Brand : Logitech
 Model : M-RAA89
 Serial number(s) : PB2-1CH024
 Tested by : H.J. Pieters
 Date : June 05, 2003 corrected version on June 18, 2003
 Test method : FCC part 15; Section 15.227 (radiated emission)

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Date
 June 18, 2003

Project number
 03052801.rev01

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 Conditions, as filed at the
 Chamber of Commerce in
 Groningen, are applicable to all
 orders given to TNO Electronic
 Products & Services (EPS) B.V.

TNO Electronic Products &
 Services (EPS) B.V. is registered
 at the Chamber of Commerce in
 Groningen with no. 27247331.

General

During the tests the wireless mouse, brand Logitech, model M-RAA89, was set up to function in accordance with the manufacturer's instructions.

The emission limit within the operation-band 26.96 – 27.28 MHz is being measured employing an average detector.

The field strength of any emissions which appeared outside this band, is being measured employing a CISPR quasi-peak detector.

EUT position: X orientation

Radiated emissions 9 kHz – 30 MHz:

Radiated emissions (dBµV/m)		
F (MHz)	Bandwidth** (kHz)	Level (dBµV/m) 3 meter
0.009 – 27.04	9	< 10.0
27.04	9	53.8 (Average)
27.04 – 30.0	9	< 10.0
Measurement uncertainty	-2.4 dB / +1.6 dB	

Radiated emissions 30 MHz – 1000 MHz:

Radiated emissions (dBµV/m)			
F (MHz)	Bandwidth** (kHz)	Vert. (dBµV/m) 3 meter	Hor. (dBµV/m) 3 meter
40.57	120	31.3	25.2
54.09	120	26.4	18.4
67.60	120	24.8	17.0
81.15	120	23.6	17.2
202.86	120	20.2	21.1
190.39 – 1000	120	< 15.0	< 15.0
Measurement uncertainty	-2.4 dB / +1.6 dB		



Date
June 5, 2003

Project number
03052801

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EUT position: Y orientation

Radiated emissions 9 kHz – 30 MHz:

Radiated emissions (dB μ V/m)		
F (MHz)	Bandwidth** (kHz)	Level (dB μ V/m) 3 meter
0.009 – 27.04	9	< 10.0
27.04	9	53.6 (Average)
27.04 – 30.0	9	< 10.0
Measurement uncertainty	-2.4 dB / +1.6 dB	

Radiated emissions 30 MHz – 1000 MHz:

Radiated emissions (dB μ V/m)			
F (MHz)	Bandwidth** (kHz)	Vert. (dB μ V/m) 3 meter	Hor. (dB μ V/m) 3 meter
40.57	120	31.2	24.6
54.09	120	26.3	19.9
67.60	120	24.9	17.9
81.15	120	24.0	17.0
202.86	120	18.8	25.9
190.39 – 1000	120	< 15.0	< 15.0
Measurement uncertainty	-2.4 dB / +1.6 dB		



Date
June 5, 2003

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03052801

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EUT position: Z orientation

Radiated emissions 9 kHz – 30 MHz:

Radiated emissions (dB μ V/m)		
F (MHz)	Bandwidth** (kHz)	Level (dB μ V/m) 3 meter
0.009 – 27.04	9	< 10.0
27.04	9	40.0 (Average)
27.04 – 30.0	9	< 10.0
Measurement uncertainty	-2.4 dB / +1.6 dB	

Radiated emissions 30 MHz – 1000 MHz:

Radiated emissions (dB μ V)			
F (MHz)	Bandwidth** (kHz)	Vert. (dB μ V/m) 3 meter	Hor. (dB μ V/m) 3 meter
40.57	120	20.5	23.5
54.09	120	17.5	20.2
67.60	120	14.7	19.1
81.15	120	14.4	14.9
202.86	120	17.9	26.5
190.39 – 1000	120	< 15.0	< 15.0
Measurement uncertainty	-2.4 dB / +1.6 dB		

Limits (at 3 m distance unless stated otherwise):

Frequency (MHz)	μ V/m
0.009 - 0.490	2400/F(kHz) @ 300 m
0.490 – 1.705	24000/F(kHz) @ 30 m
1.705 – 26.96	30 @ 30 m
26.96 – 27.28	10000
27.28 - 30	30 @ 30 m
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Used test equipment module

The following measurement equipment was used:

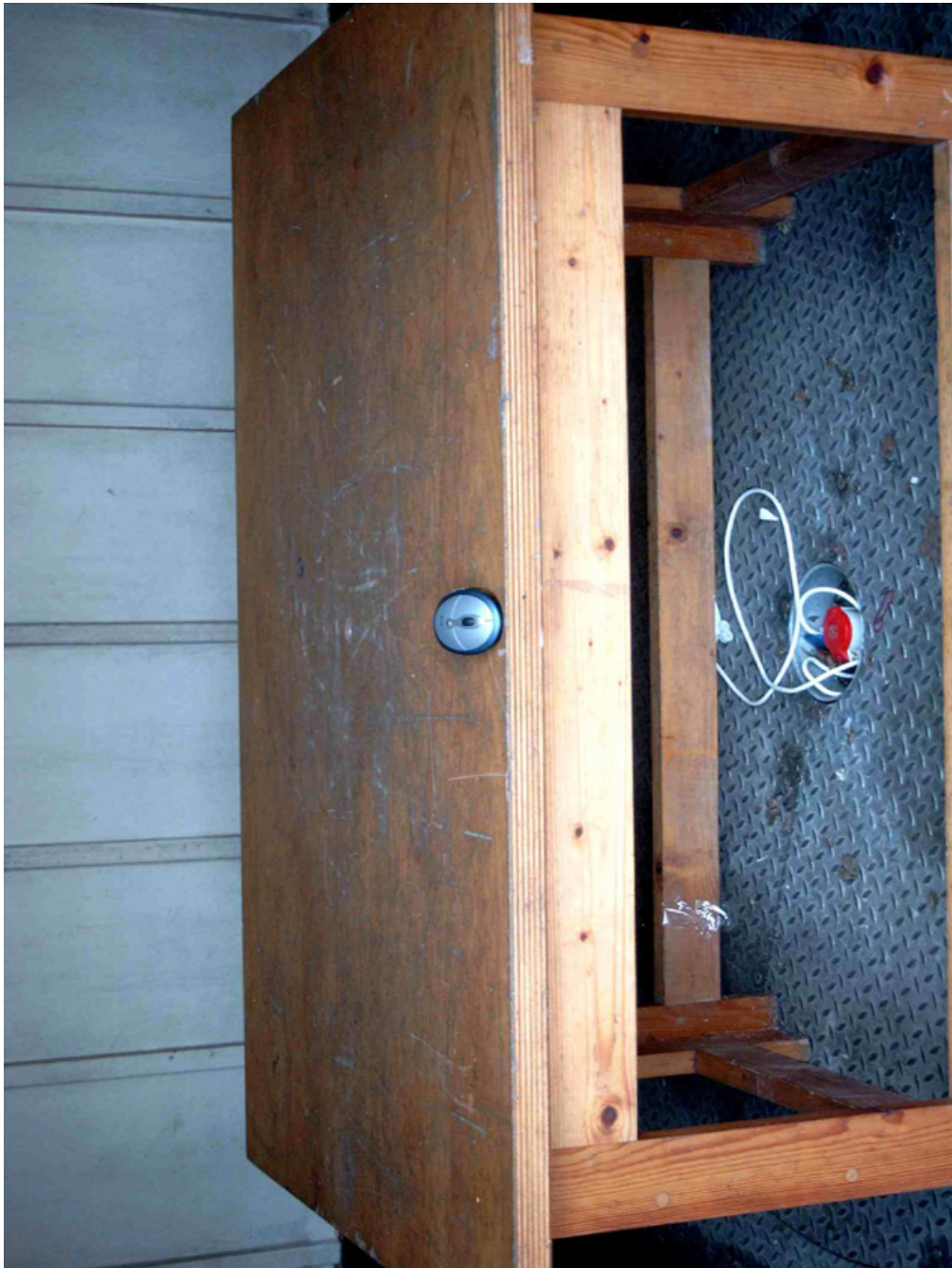
description	ident	manufacturer	model
Plastic measurement room	12636	Polyforce	-
Open Area Test Site	13886	Comtest	-
Antenna mast 4m	14277	Heinrich Deisel	MA240
Controller OATS	14278	Heinrich Deisel	HD100
Biconilog antenna 30MHz – 1000MHz	15633	Chase	CBL6111B
EMI test receiver	15667	Rohde & Schwarz	ESCS 30
Turntable OATS	99108	Heinrich Deisel	HD050

Photographs module

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Photograph 1: *Test setup: EUT on turntable*



Photograph 2: *Test setup: sample front view*



Photograph 3: *Test setup: sample bottom view (horizontal)*



Photograph 4: *Test setup: sample bottom view (vertical)*



Photograph 5: *Top view of 1 CH version*



Photograph 6: *Bottom view of 1 CH version*



Photograph 7: Type designation of 1 CH version



Photograph 8: *Top view of 2 CH version*



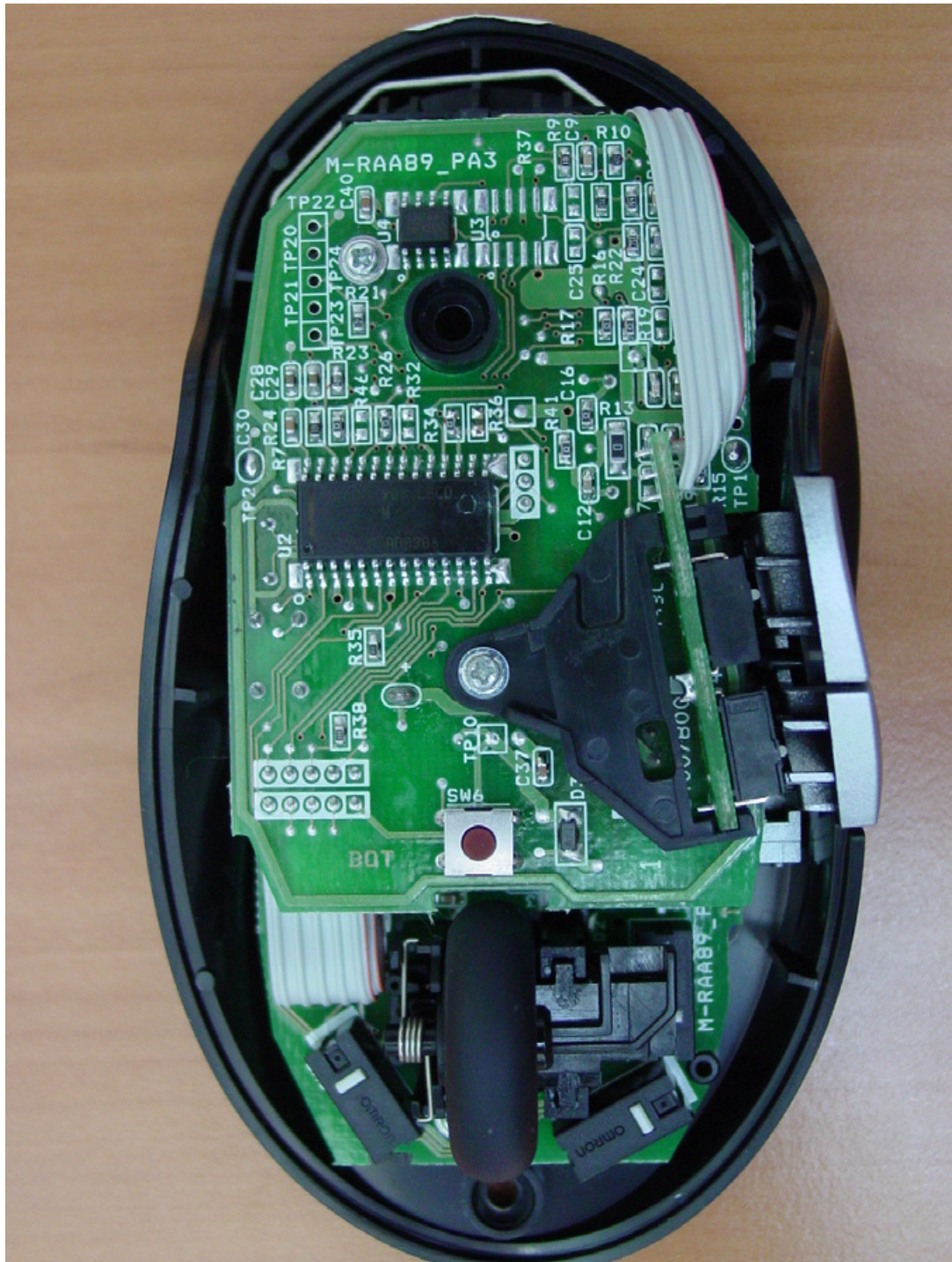
Photograph 9: *Bottom view of 2 CH version*



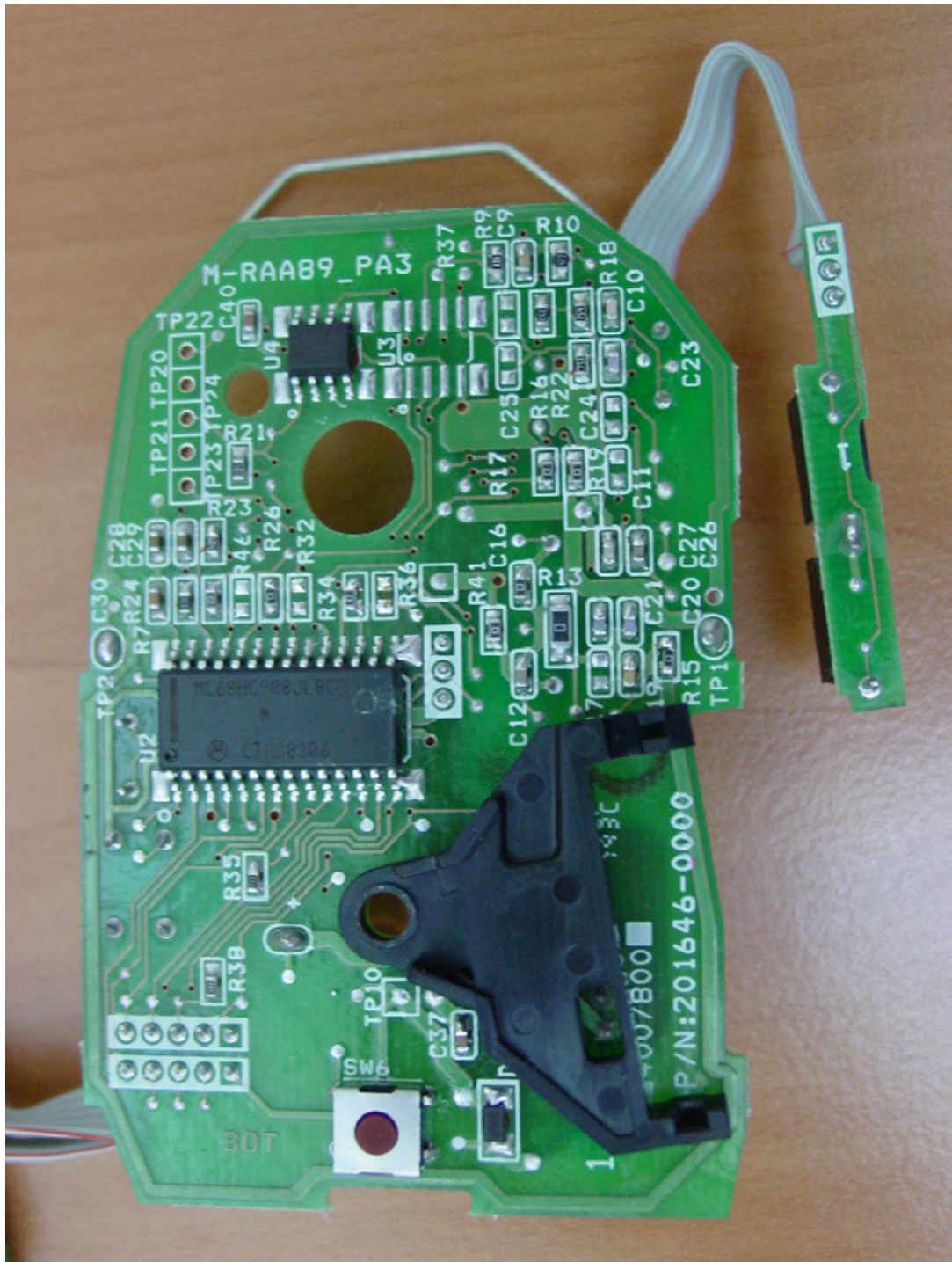
Photograph 10: *Type designation of 2 CH version*



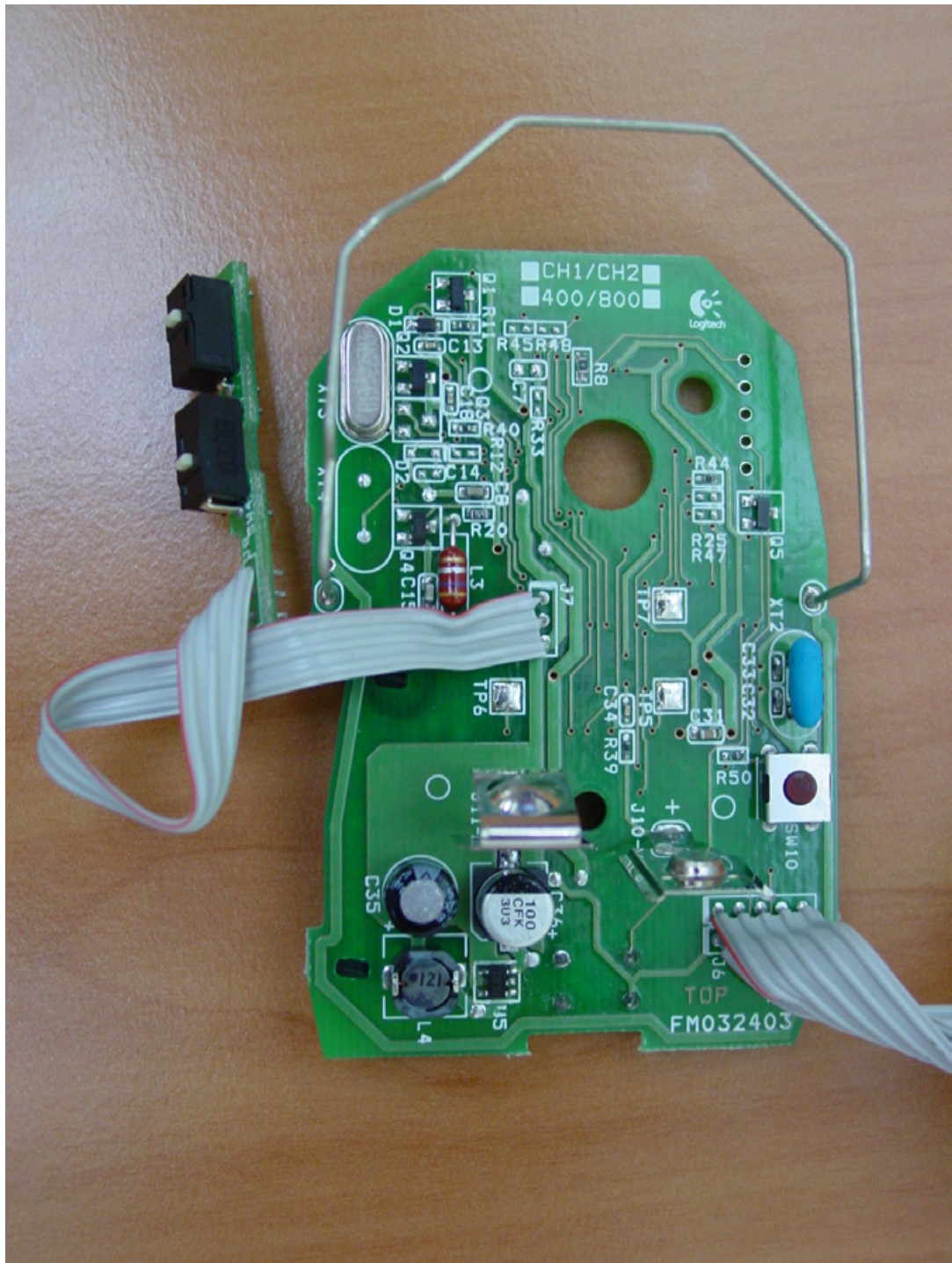
Photograph 11: *1 CH version internal view*



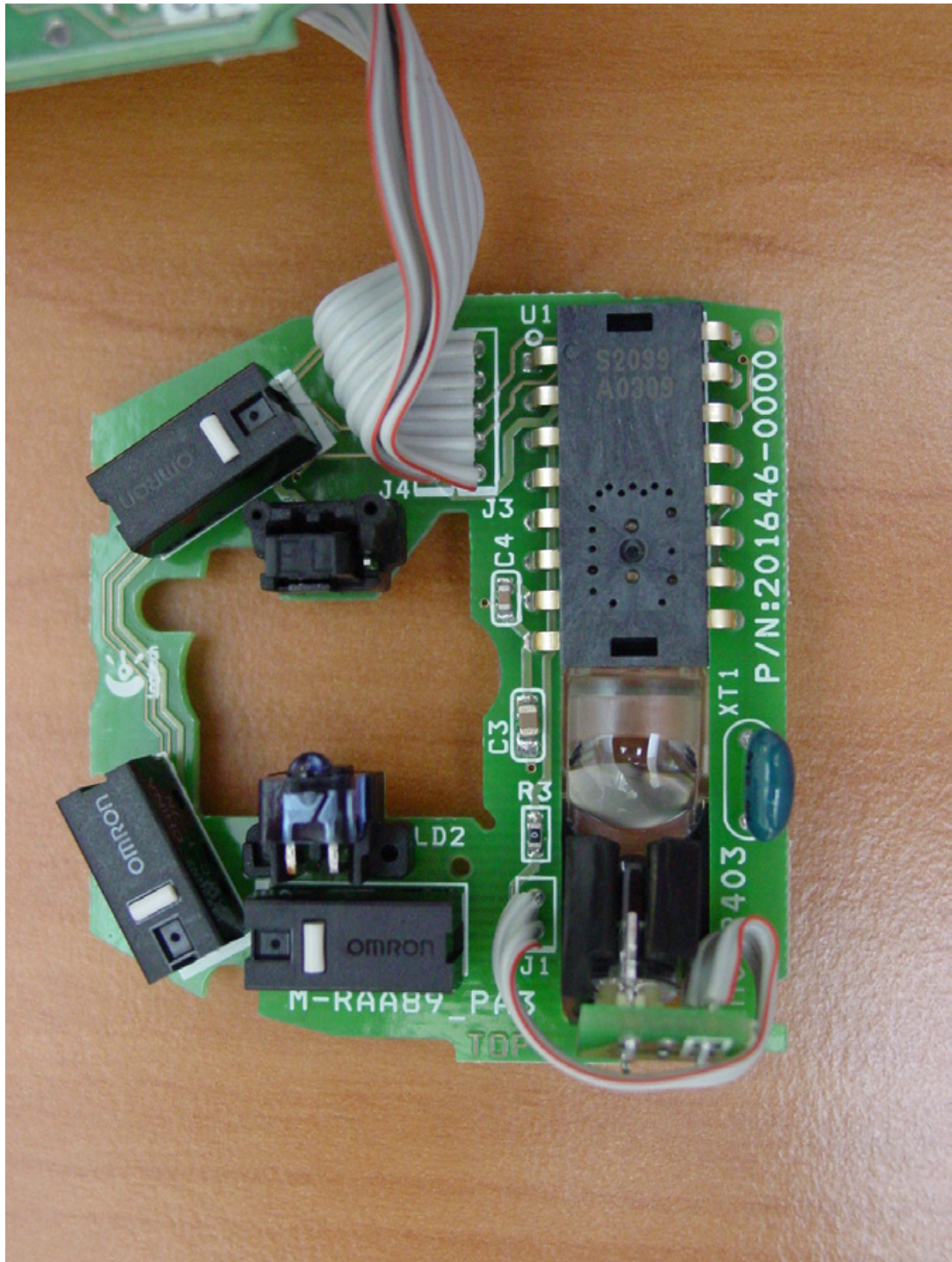
Photograph 12: 1 CH version PCB bottom side view



Photograph 13: *1 CH version PCB top side view*



Photograph 14: 1 CH version sensor board top side view



Photograph 15: 1 CH version sensor board bottom side view

