

Test Report No. 7191017859-EEC11/03
dated 28 Oct 2011



PSB Singapore

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**FORMAL REPORT ON TESTING IN ACCORDANCE WITH
47 CFR FCC Part 15B : 2011 (CLASS B)
OF A
HOME AUTOMATION SYSTEM
[Model : CP9000]**

TEST FACILITY TÜV SÜD PSB Pte Ltd,
Electrical & Electronics Centre (EEC), Product Services,
No. 1 Science Park Drive, Singapore 118221

FCC REG. NO. 99142 (3m and 10m Semi-Anechoic Chamber, Science Park)

IND. CANADA REG. NO. 2932I-1 (3m and 10m Semi-Anechoic Chamber, Science Park)

PREPARED FOR Cytech Technology Pte Ltd
55 Ubi Ave 1 #07-04
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Tel : +65 6846 9701 Fax : +65 6846 9065

QUOTATION NUMBER 219138177

JOB NUMBER 7191017859

TEST PERIOD 13 Oct 2011 – 18 Oct 2011

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Laboratory:
TÜV SÜD PSB Pte. Ltd.
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LA-2007-0380-A
LA-2007-0381-F
LA-2007-0382-B
LA-2007-0383-G
LA-2007-0384-G
LA-2007-0385-E
LA-2007-0386-C
LA-2010-0464-D

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.

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TUV®



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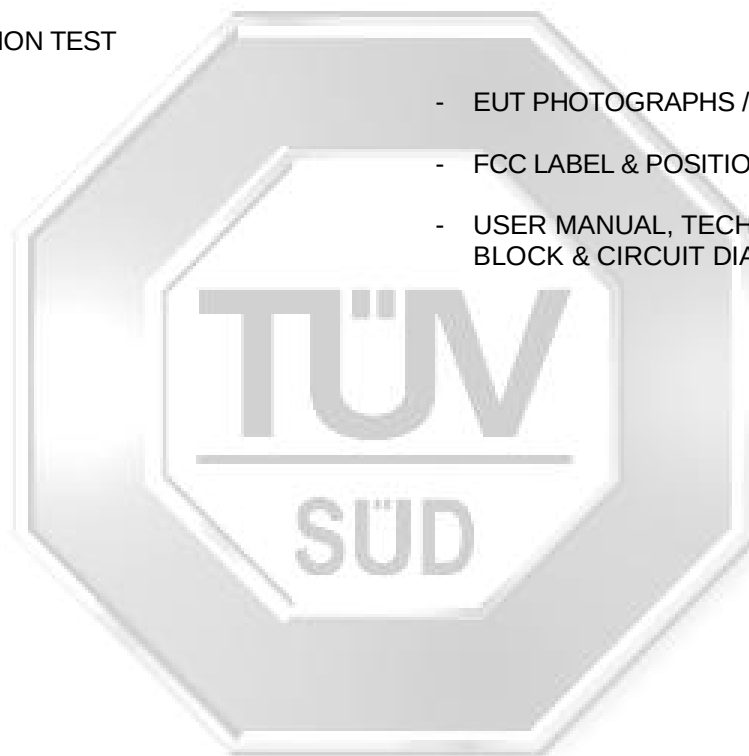
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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

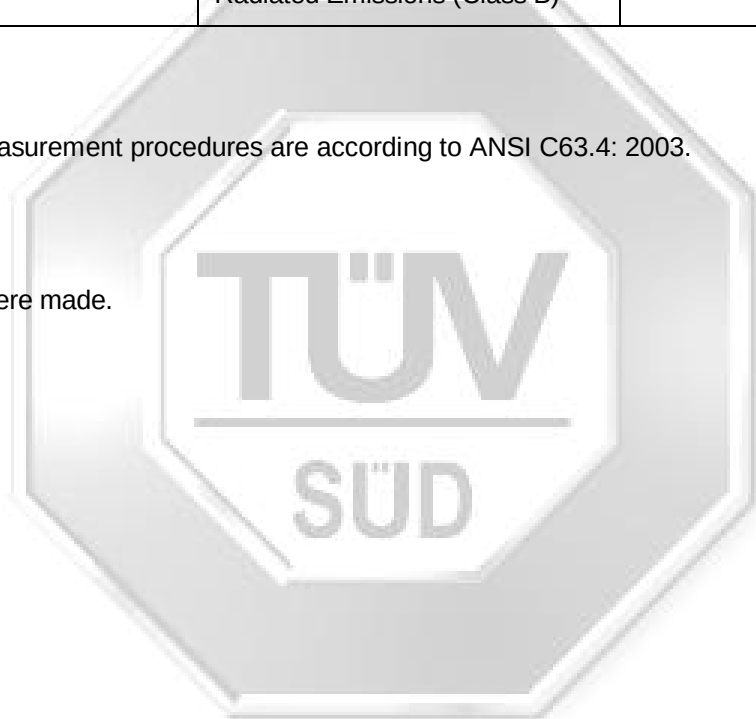
Test Standard	Description	Pass / Fail
47 CFR FCC Part 15B : 2011		
15.107	Conducted Emissions (Class B)	Pass
15.109	Radiated Emissions (Class B)	Pass

Notes

1. All test measurement procedures are according to ANSI C63.4: 2003.

Modifications

No modifications were made.



PRODUCT DESCRIPTION

Description : The Equipment Under Test (EUT) is a **HOME AUTOMATION SYSTEM.**

Manufacturer : Cytech Technology Pte Ltd
55 Ubi Ave 1 #07-04
Singapore 408935

Model Number(s) : CP9000

Serial Number(s) : Nil

Microprocessor(s) : Toshiba TMP91FY42FG

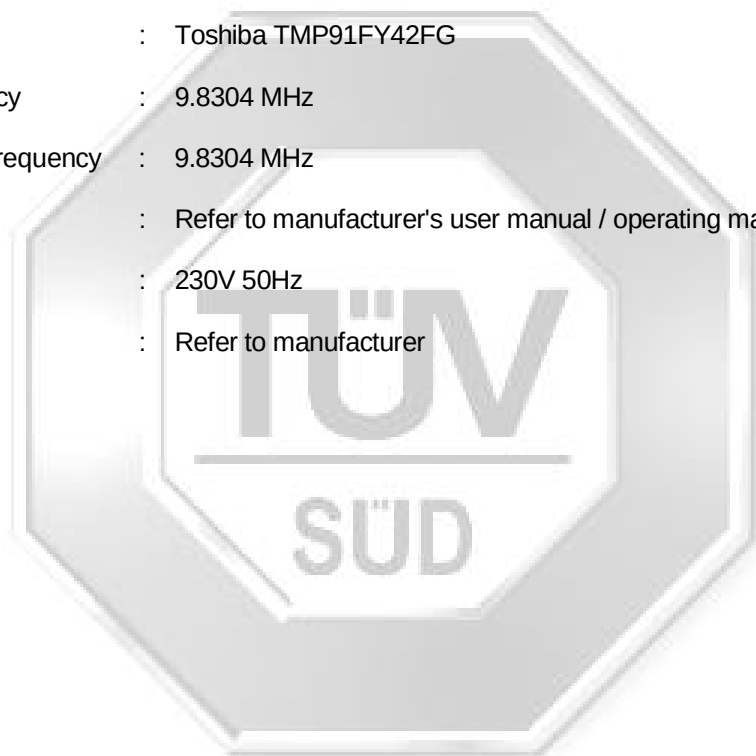
Operating Frequency : 9.8304 MHz

Clock / Oscillator Frequency : 9.8304 MHz

Port / Connectors : Refer to manufacturer's user manual / operating manual.

Rated Input Power : 230V 50Hz

Accessories : Refer to manufacturer





SUPPORTING DESCRIPTION DESCRIPTION

The EUT was tested as a stand-alone unit without any supporting equipment.





EUT OPERATING CONDITIONS

47 CFR FCC Part 15B

1. Conducted Emissions
2. Radiated Emissions

The EUT was exercised in the Security Off (Disarm) mode whereby the control unit will monitor the sensors connected to it continuously.



CONDUCTED EMISSION TEST

47 CFR FCC Part 15.107 Conducted Emission Limits (Class B)

AC Port

Frequency Range (MHz)	Limit Values (dB μ V)	
	Quasi-peak (QP)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreasing linearly with the logarithm of the frequency

47 CFR FCC Part 15.107 Conducted Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI3	ESIB7	100015	05 Jul 2012
Agilent EMC Analyzer-SA7	E7403A	US41160167	27 May 2012
Schaffner LISN – LISN7 (Ref)	NNB42	00008	16 Jun 2012
EMCO LISN (for supporting) – LISN6	3825/2	9309-2127	29 Jul 2012

CONDUCTED EMISSION TEST

AC Port

47 CFR FCC Part 15.107 Conducted Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
2. The power supply for the EUT was fed through a $50\Omega/50\mu\text{H}$ EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another LISN.

47 CFR FCC Part 15.107 Conducted Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
3. High peaks, relative to the limit line, were then selected.
4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.
5. Steps 2 to 4 were then repeated for the LIVE line.

Sample Calculation Example

At 20 MHz

Q-P limit (Class B) = $1000\ \mu\text{V}$ = 60.0 dB μV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB

Q-P reading obtained directly from EMI Receiver = 40.0 dB μV
(Calibrated for system losses)

Therefore, Q-P margin = $40.0 - 60.0 = -20.0$

i.e. 20.0 dB below Q-P limit

CONDUCTED EMISSION TEST



Conducted Emissions Test Setup (Front View)



Conducted Emissions Test Setup (Rear View)

CONDUCTED EMISSION TEST

47 CFR FCC Part 15.107 Conducted Emission Results

Operating Mode	Disarm Mode	Temperature	20°C
Test Input Power	110V 60Hz	Relative Humidity	60%
Line Under Test	AC Mains	Atmospheric Pressure	1030mbar
Class	B	Tested By	Paul Teo

Frequency (MHz)	Q-P Value (dB μ V)	Q-P Margin (dB)	AV Value (dB μ V)	AV Margin (dB)	Line
5.4719	28.2	-31.8	5.5	-44.5	Neutral
6.1830	26.2	-33.8	7.0	-43.0	Neutral
7.5786	20.3	-39.7	-0.1	-50.1	Neutral
11.0485	20.7	-39.3	13.0	-37.0	Live
13.8098	21.6	-38.4	18.6	-31.4	Live
14.7260	23.1	-36.9	21.0	-29.0	Live

Notes

1. All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
150kHz - 30MHz
RBW: 9kHz VBW: 30kHz
4. Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 9kHz – 30MHz is ± 2.2 dB.

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Limits (Class B)

Frequency Range (MHz)	Quasi-Peak Limit Values (dB μ V/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

47 CFR FCC Part 15.109 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012
Schaffner Bilog Antenna –(30MHz-2GHz) BL3 (Ref)	CBL6112B	2549	06 Jan 2012
EMCO Horn Antenna(1GHz-18GHz) – H15 (Ref)	3115	0003-6008	20 May 2012
Teseq Preamplifier (9kHz-1GHz)	LNA6901	72266	23 Jun 2012
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	08 Oct 2012

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

47 CFR FCC Part 15.109 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 5th harmonic of the highest frequency used or generated by the EUT, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz Q-P limit (Class B) = 70.8 μ V/m = 37.0 dB μ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dB μ V/m
(Calibrated level including antenna factors & cable losses)

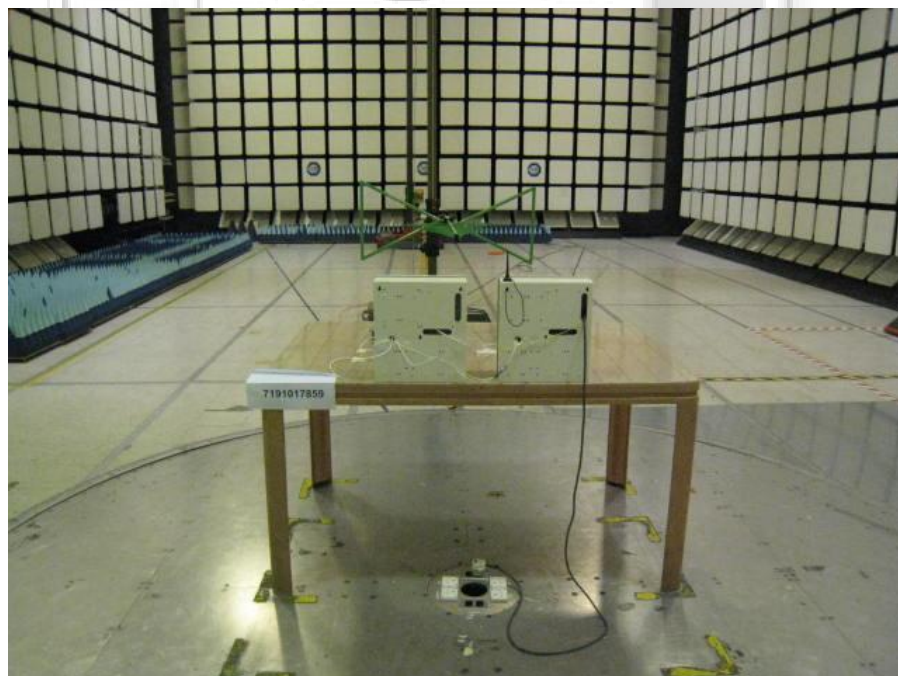
Therefore, Q-P margin = 31.0 - 37.0 = -6.0

i.e. 6 dB below Q-P limit

RADIATED EMISSION TEST



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

RADIATED EMISSION TEST

47 CFR FCC Part 15.109 Radiated Emission Results

Operating Mode	Disarm Mode	Temperature	23°C
Test Input Power	110V 60Hz	Relative Humidity	55%
Test Distance	3m (30MHz – 10GHz)	Atmospheric Pressure	1030mbar
Class	B	Tested By	Zeche Ng Chee Siong

Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBμV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
49.3110	32.7	-7.3	300	100	H
61.4350	20.2	-19.8	16	267	H
81.4050	18.9	-21.1	24	224	V
234.0000	15.1	-30.9	347	316	V
241.8690	14.9	-31.1	290	188	H
400.0690	22.4	-23.6	161	100	V

Emissions above 1GHz-10GHz

Frequency (GHz)	Peak Value (dBμV/m)	Peak Margin (dB)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
8.3894	37.1	-36.9	30.4	-23.6	227	198	H
8.3973	37.3	-36.7	30.7	-23.3	150	171	V
8.8567	37.5	-36.5	30.8	-23.2	129	126	V
9.3489	37.3	-36.7	30.7	-23.3	133	141	V
9.8844	38.5	-35.5	31.8	-22.2	181	100	H
9.9961	38.5	-35.5	32.2	-21.8	300	117	V

Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
 RBW: 120kHz VBW: 1MHz
>1GHz
 RBW: 1MHz VBW: 1MHz
- Radiated Emissions Measurement Uncertainty
 All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25.0GHz is ±4.0dB.



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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011



EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A



ANNEX A
EUT PHOTOGRAPHS / DIAGRAMS

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ANNEX A

EUT PHOTOGRAPHS



Front View



Rear View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



Front View



Rear View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



Front View

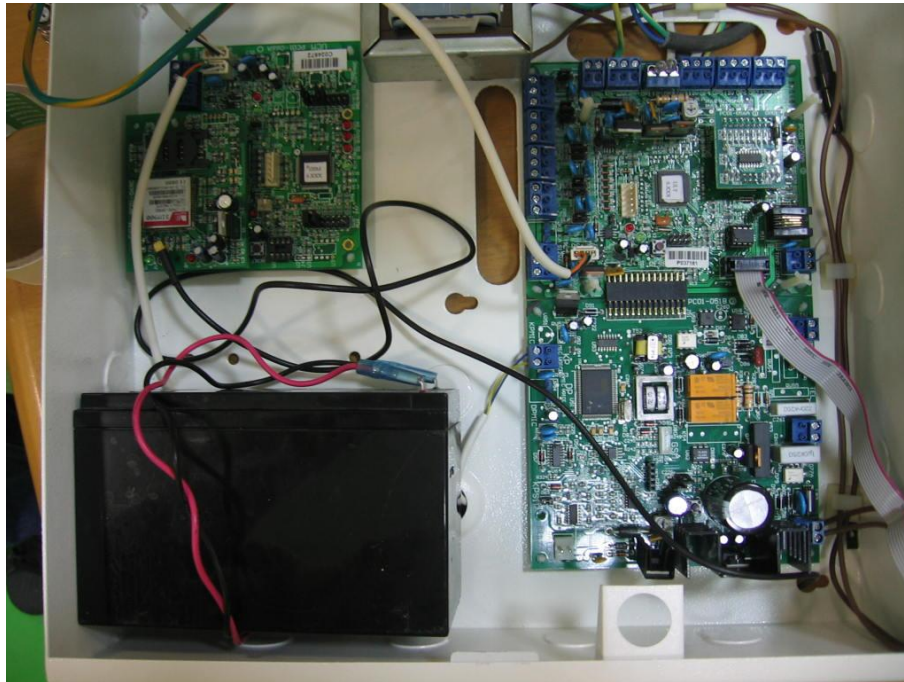


Rear View

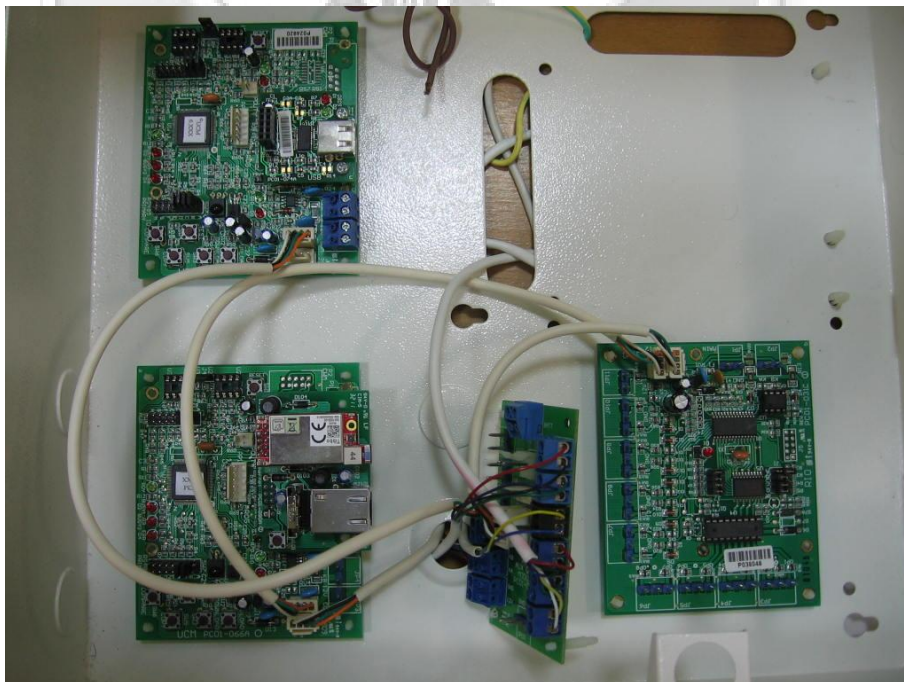
EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



White Box Interior View

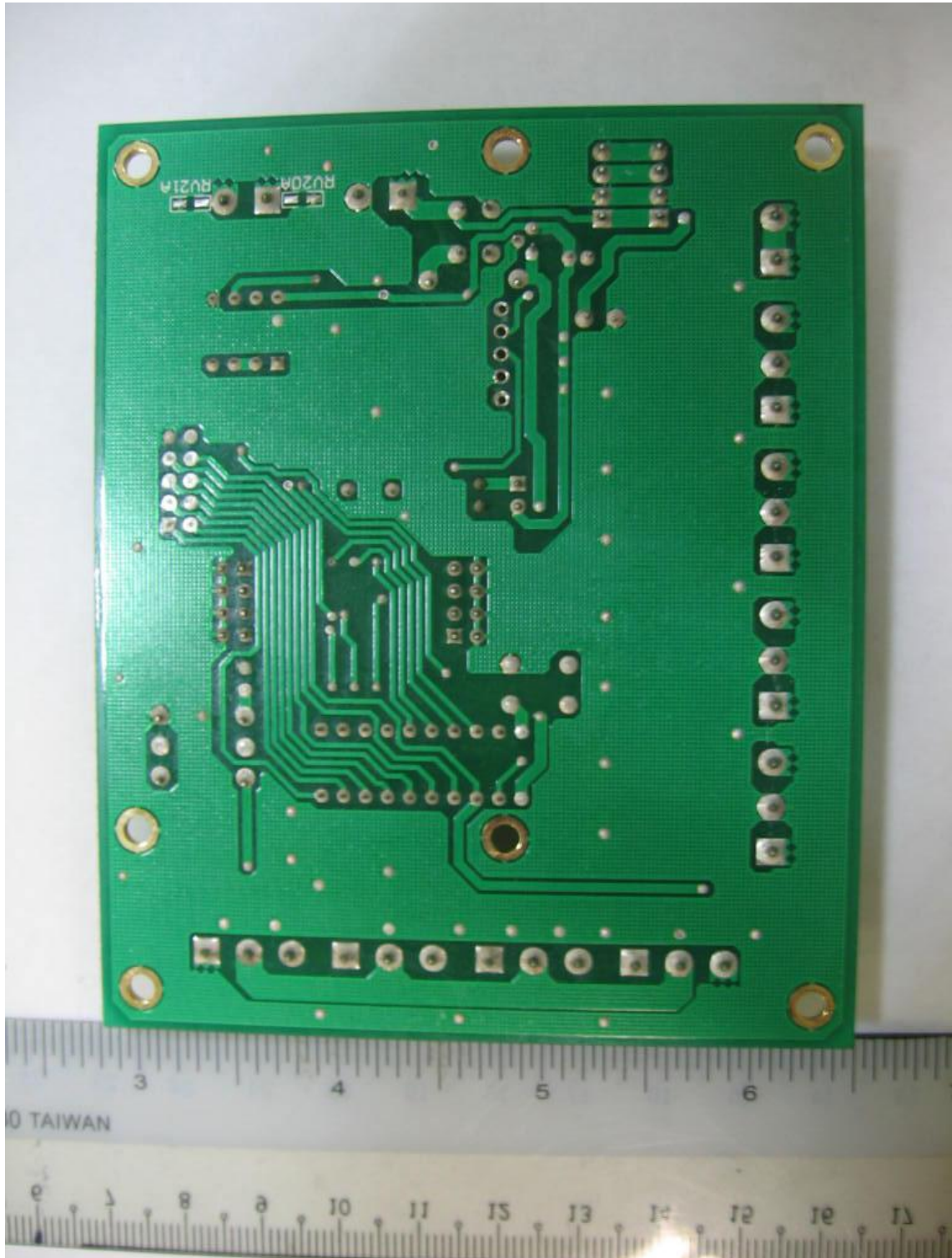


White Box Interior View

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS

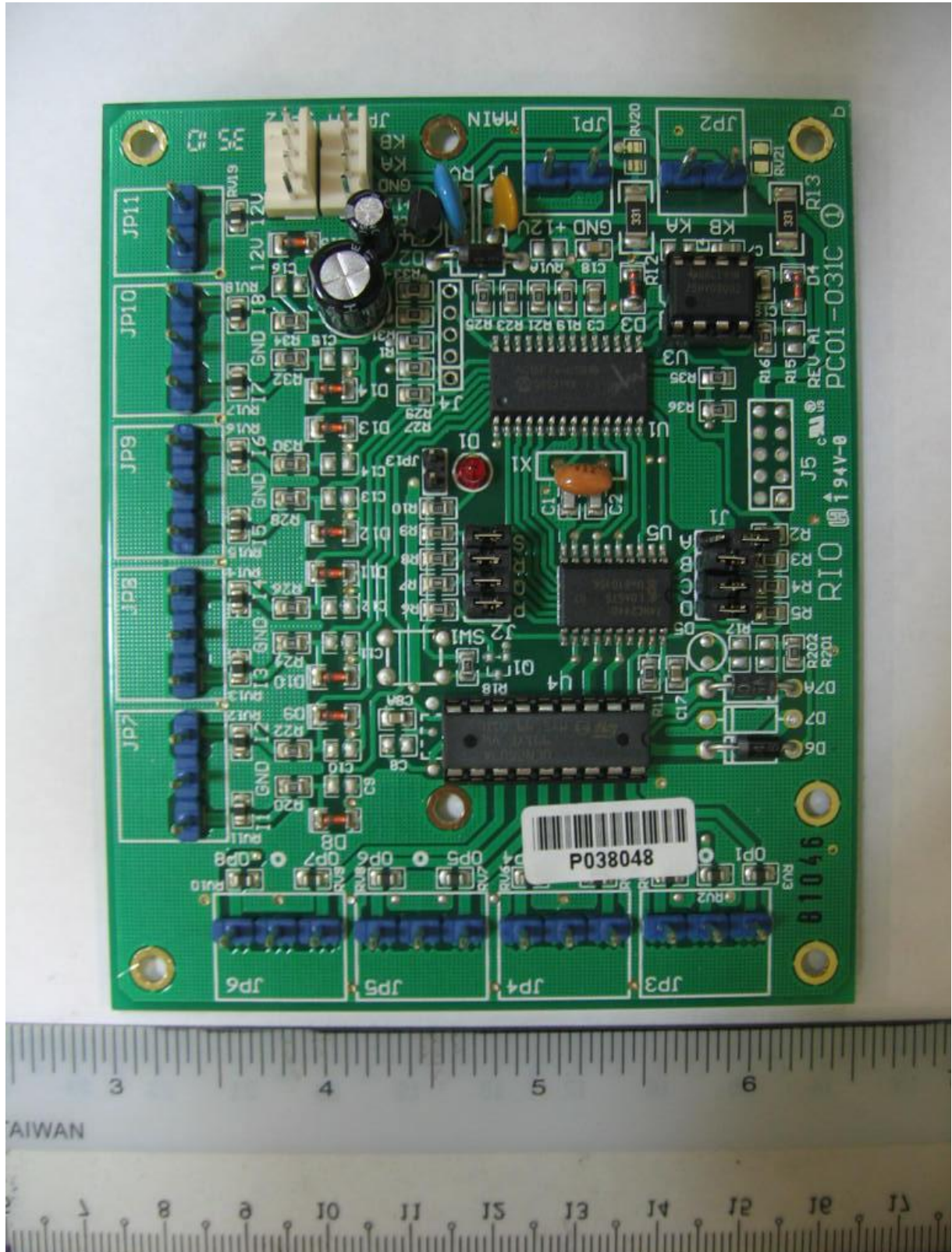


EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS

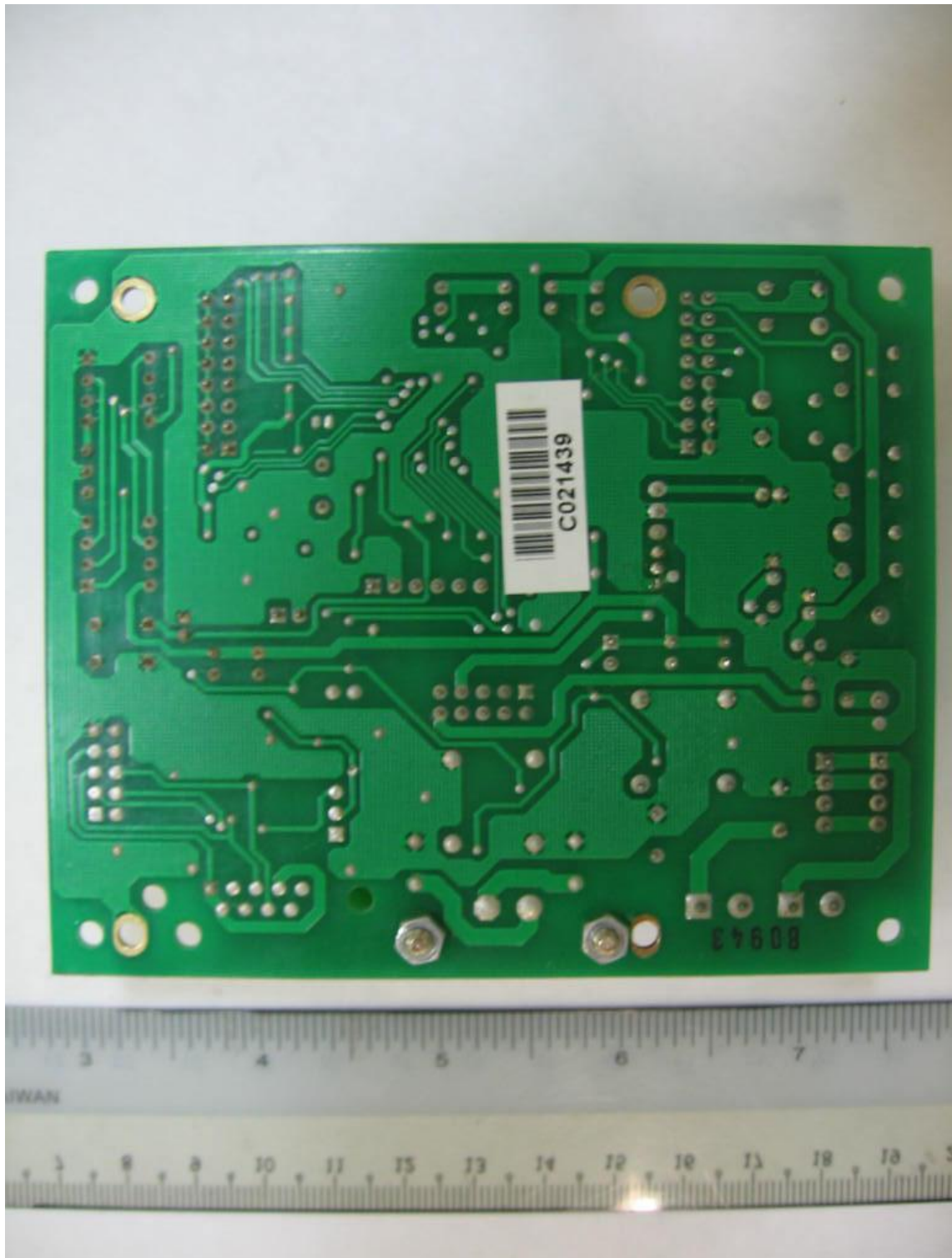


EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



EUT PCB Trace Side

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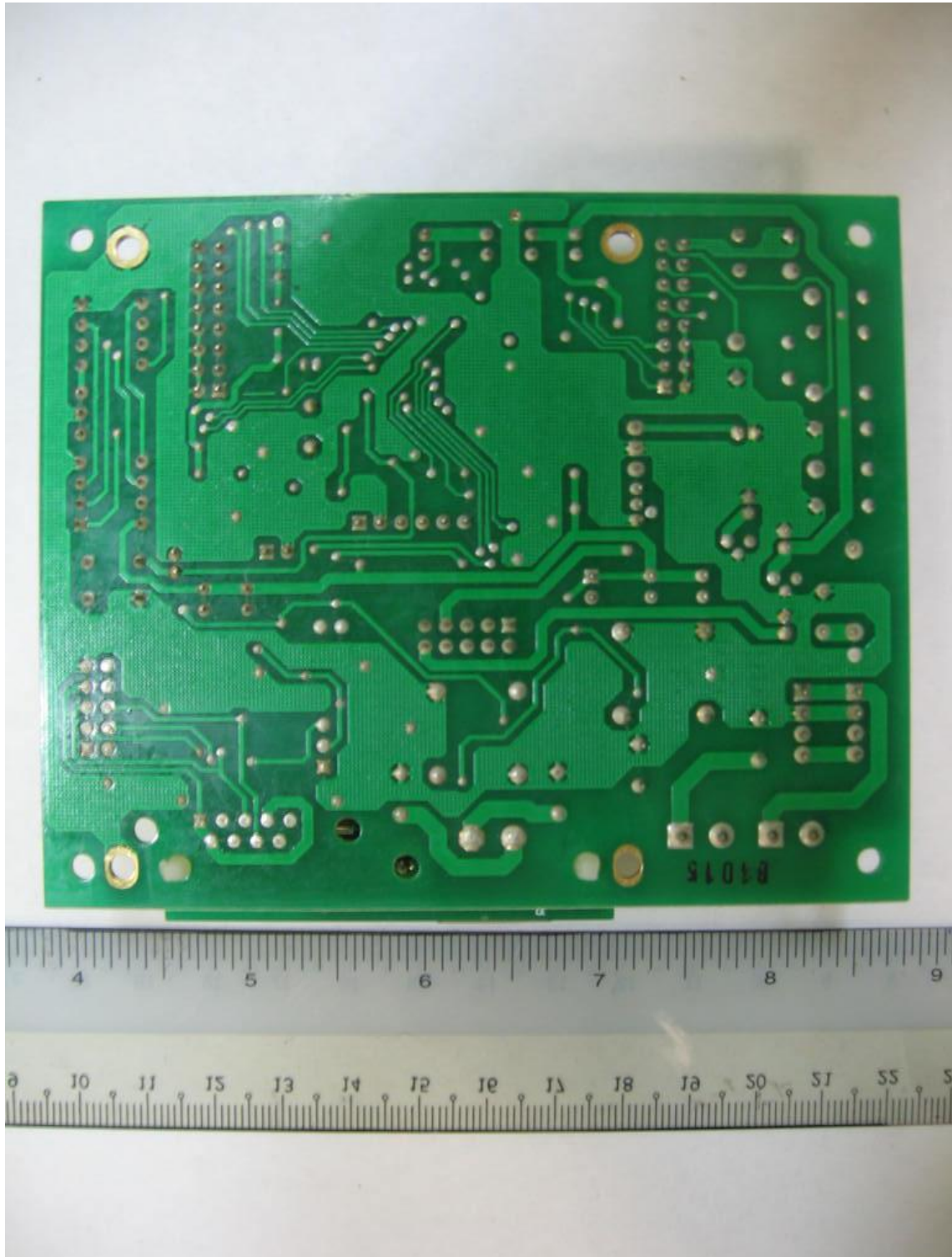


EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

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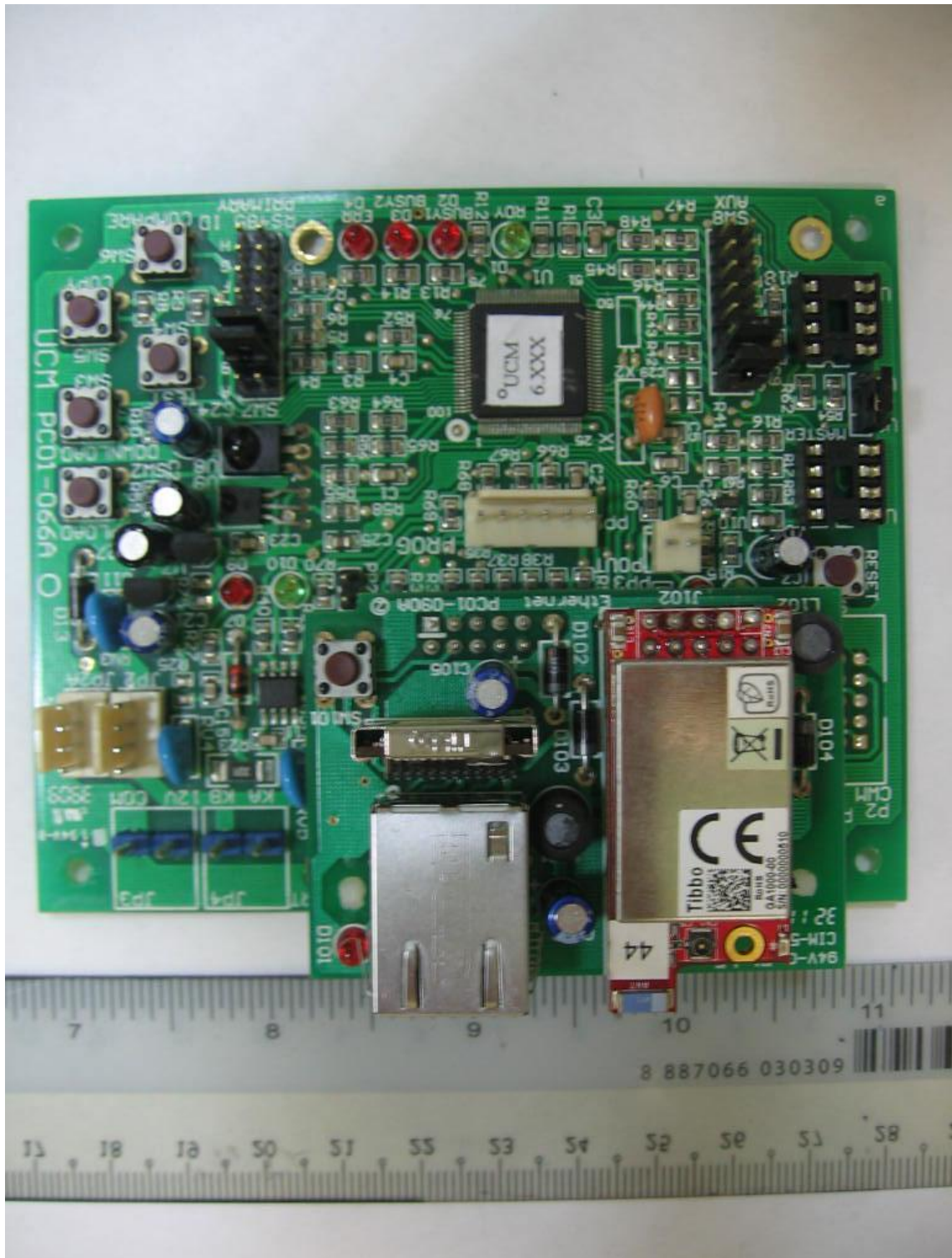


EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

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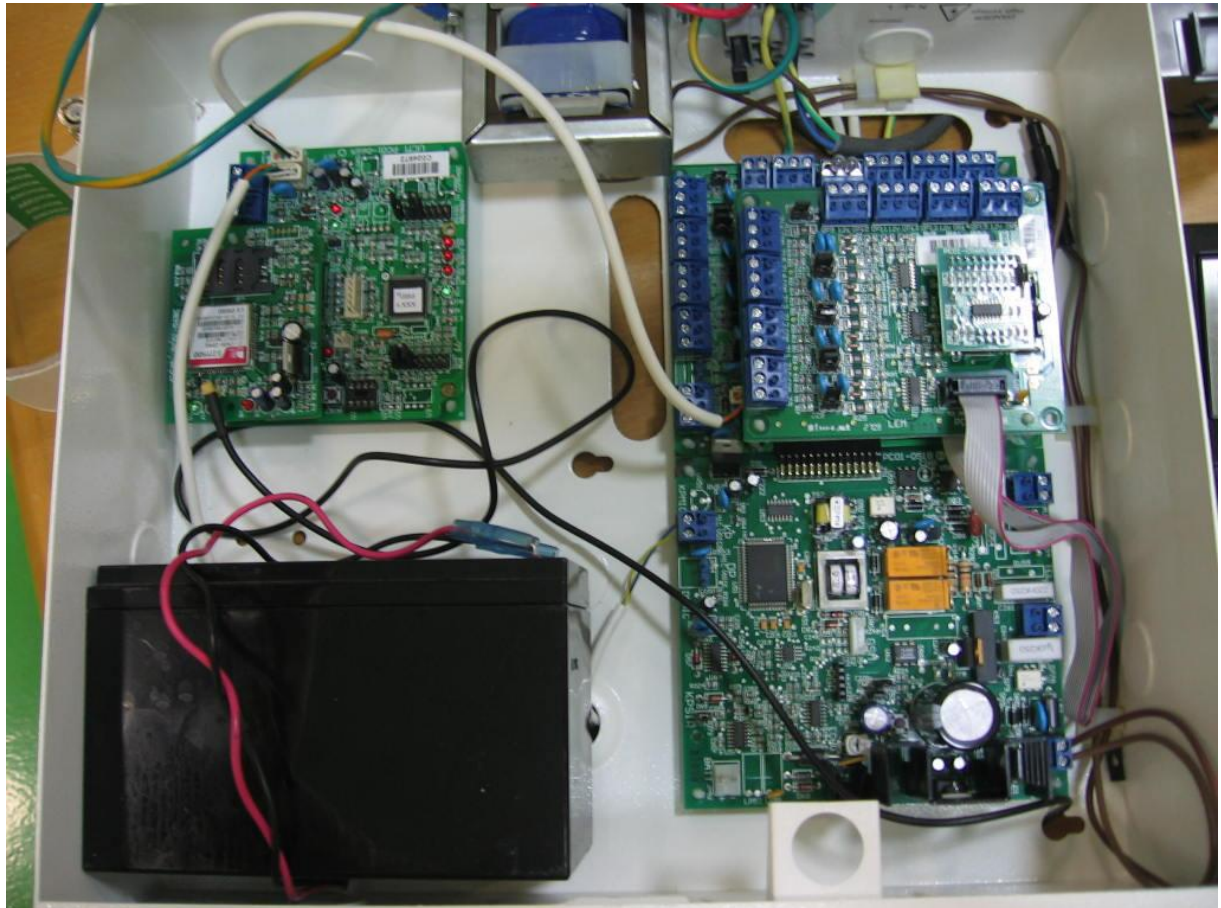


EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

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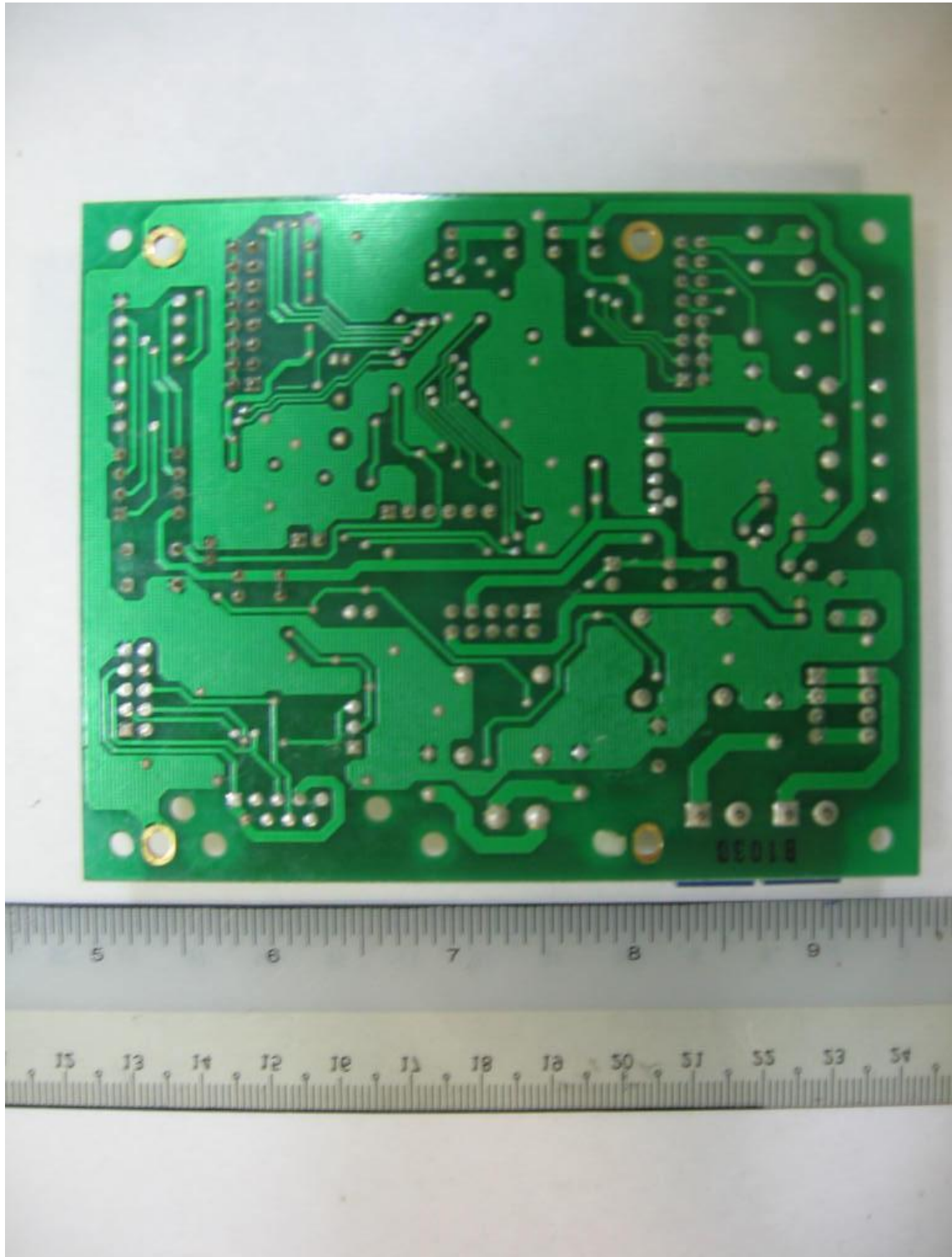


Front View

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ANNEX A

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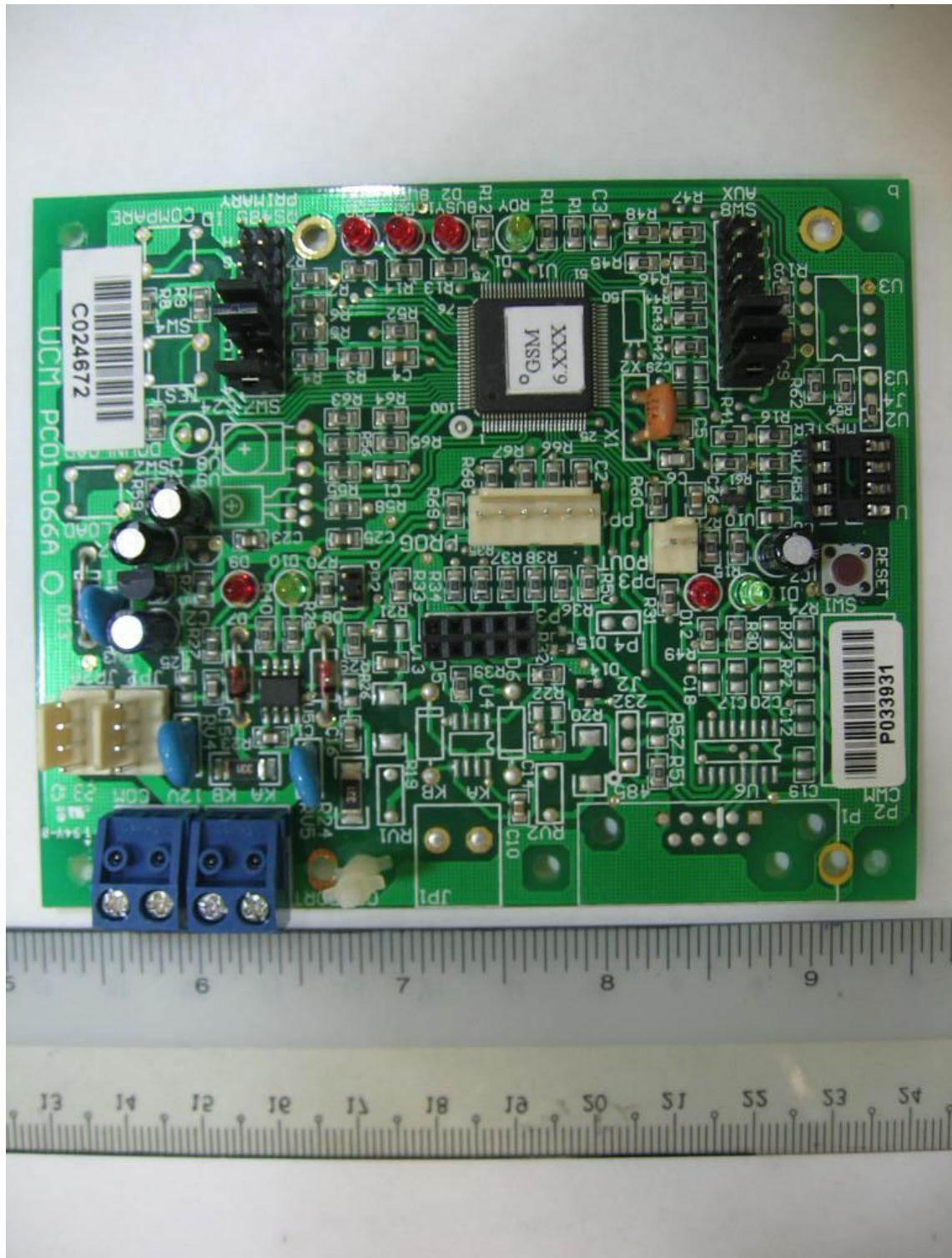


EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

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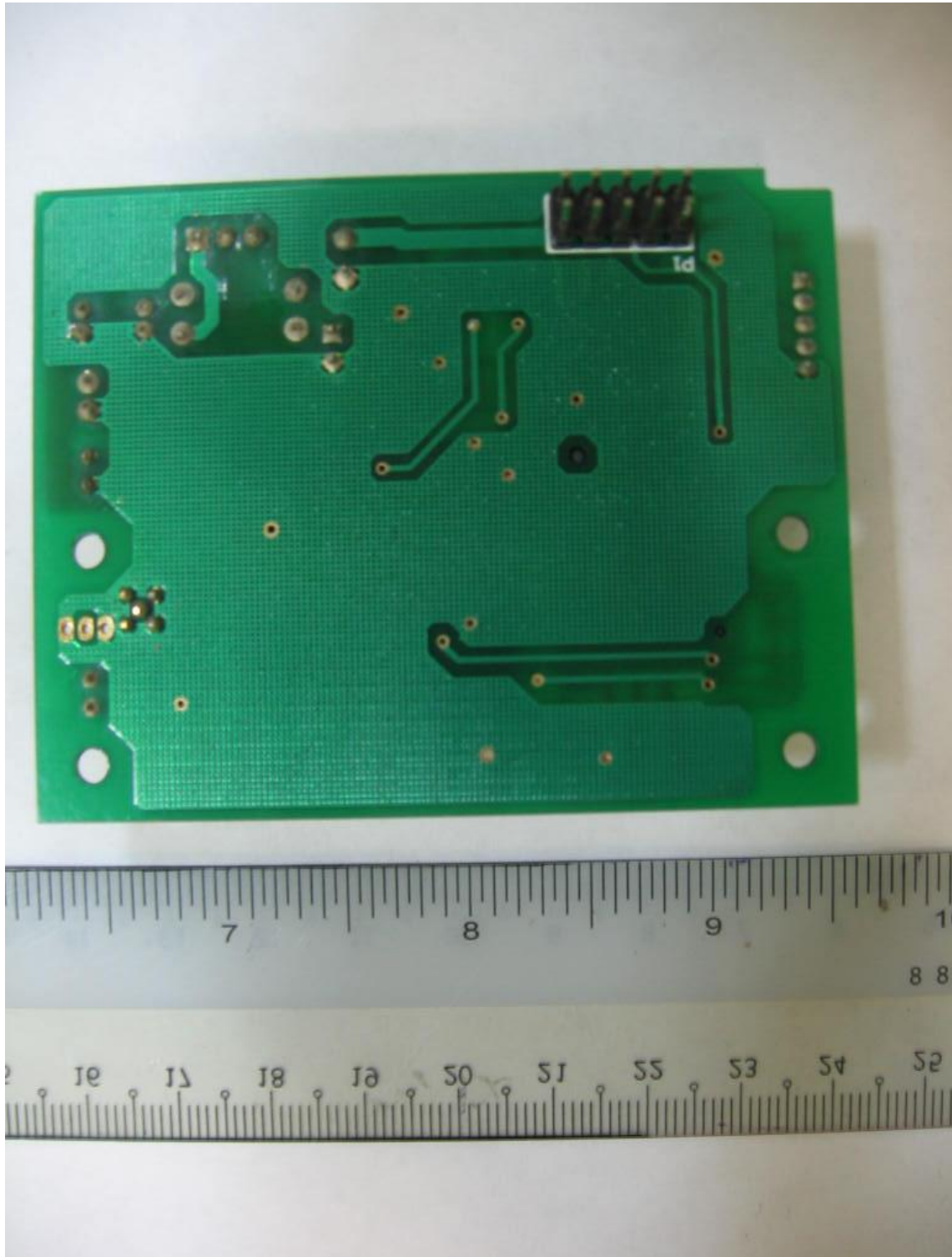


EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

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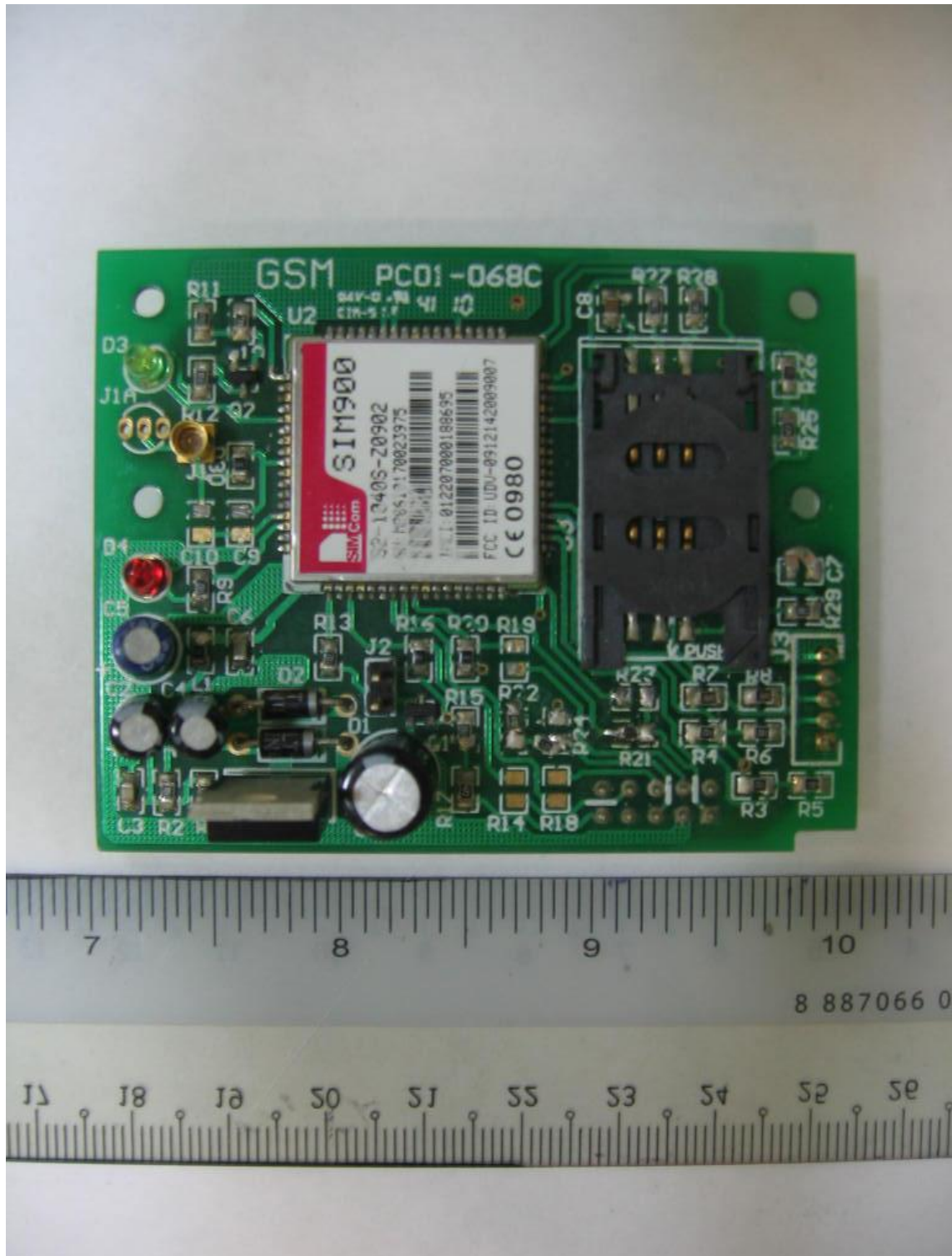


EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

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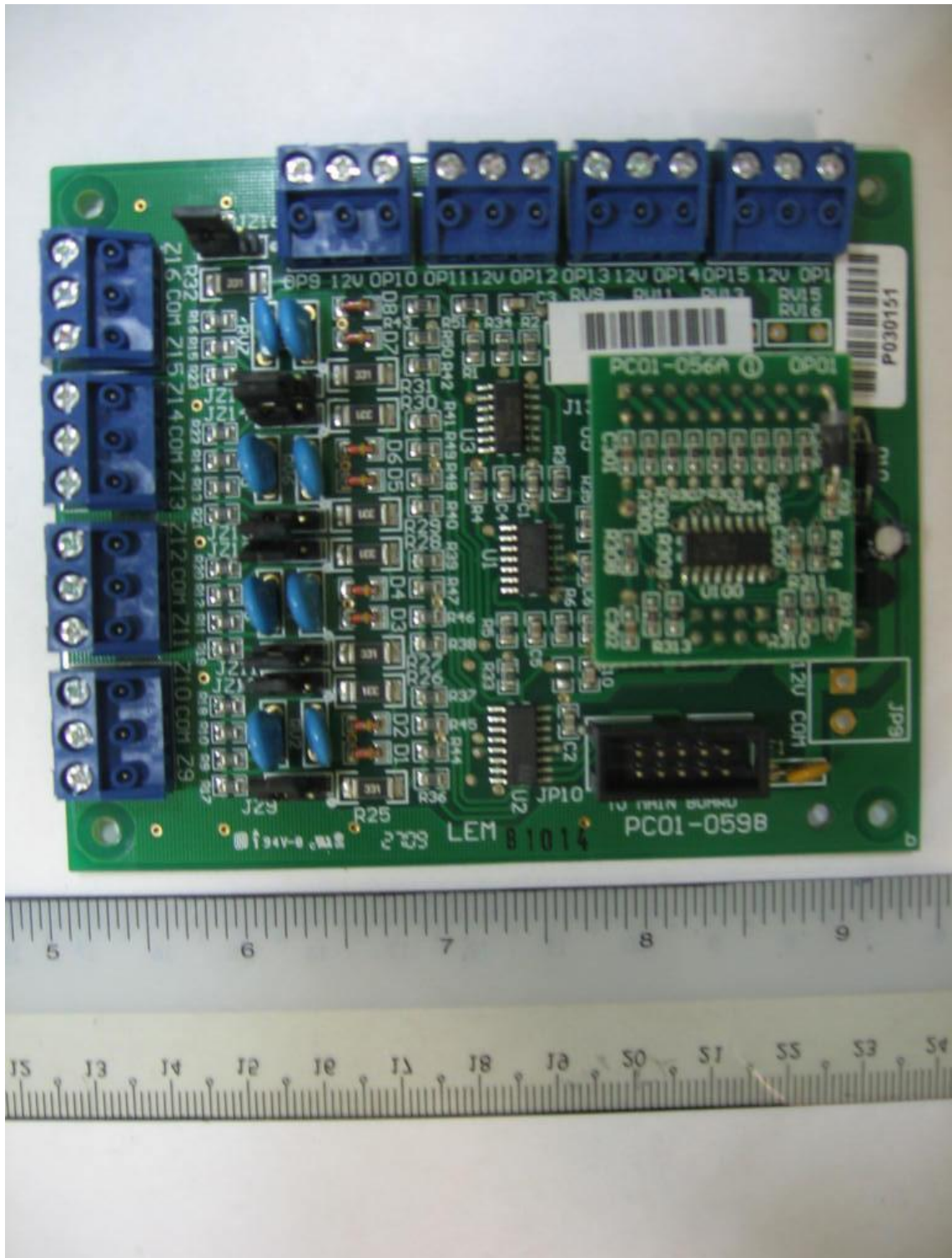


EUT PCB Component Side

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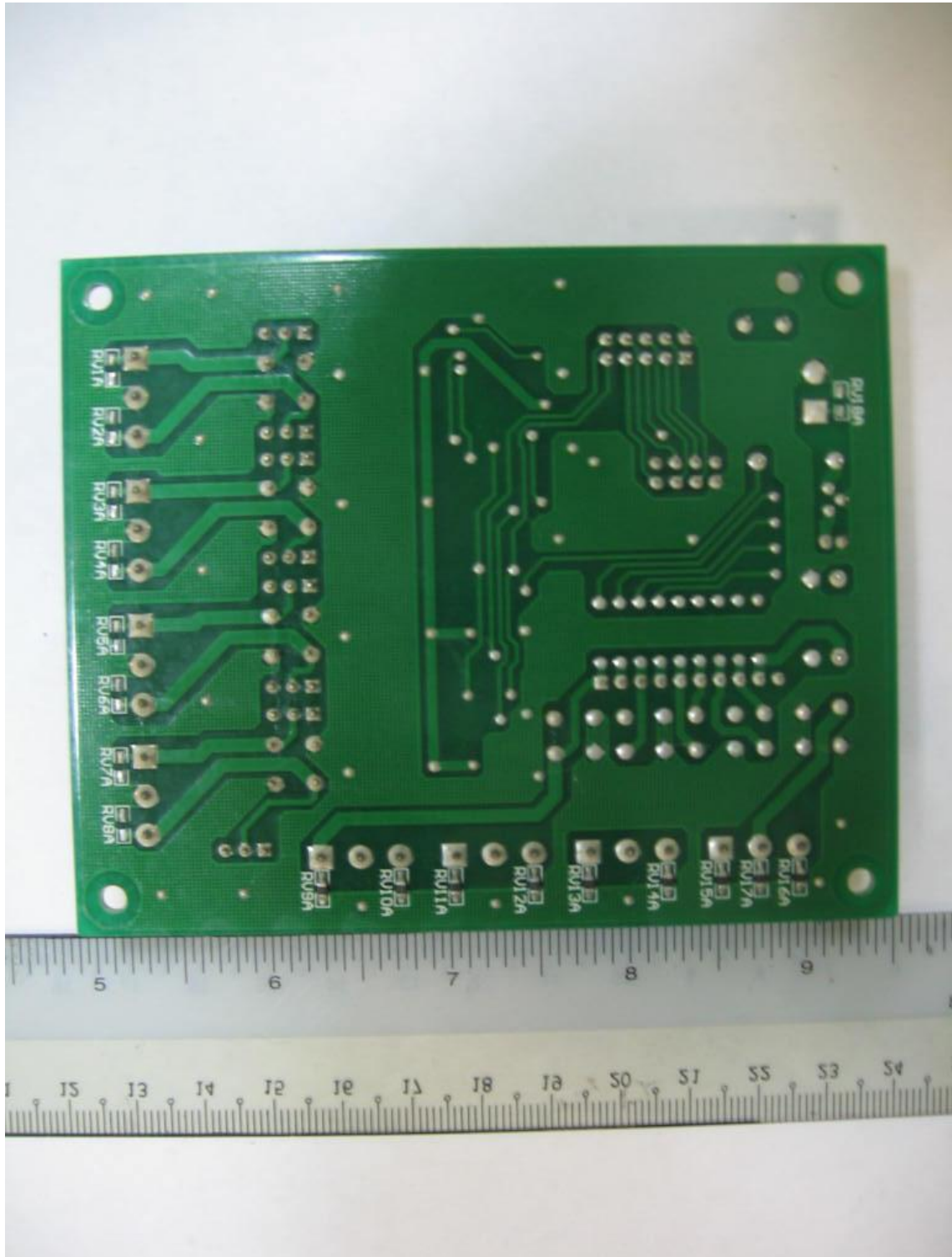


EUT PCB Component Side

EUT PHOTOGRAPHS / DIAGRAMS

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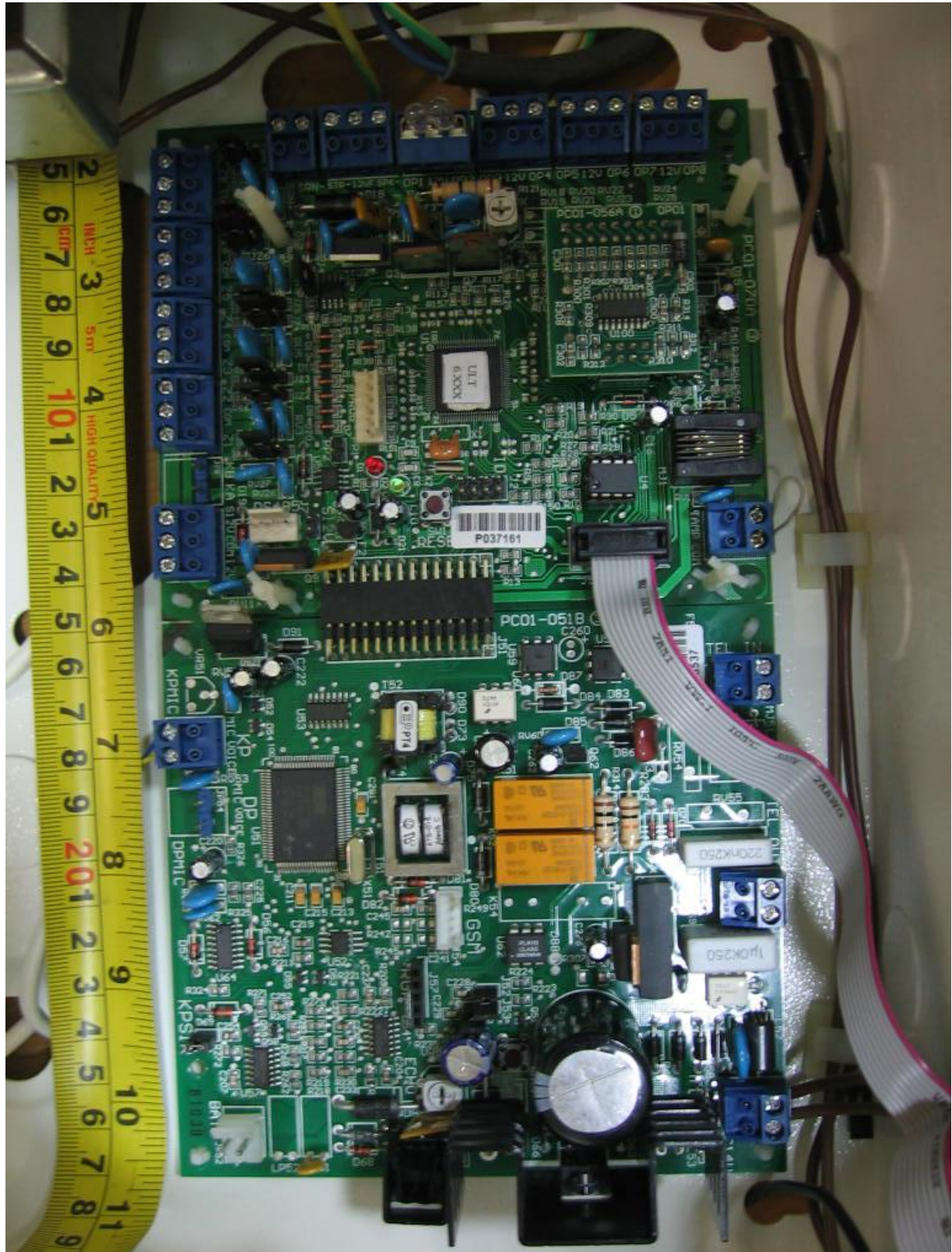


EUT PCB Trace Side

EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



EUT PCB Component Side



FCC LABEL & POSITION

ANNEX B



**USER MANUAL TECHNICAL DESCRIPTION BLOCK
& CIRCUIT DIAGRAM**

ANNEX C

