

Test Report No. 7191017859-EEC11/02
dated 28 Oct 2011

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**FORMAL REPORT ON TESTING IN ACCORDANCE WITH
AS/NZS CISPR 22 : 2009 (CLASS B)
OF A
HOME AUTOMATION SYSTEM
[Model : CP9000]**

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JOB NUMBER 7191017859 & 7191018595

TEST PERIOD 13 Oct 2011 – 18 Oct 2011

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LA-2007-0384-G
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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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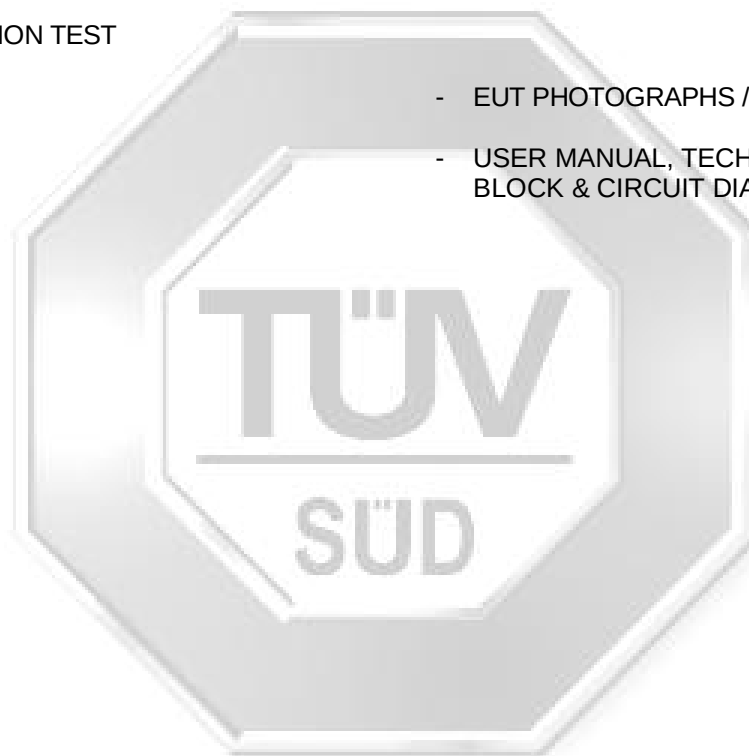
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TEST SUMMARY

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

Test Results Summary

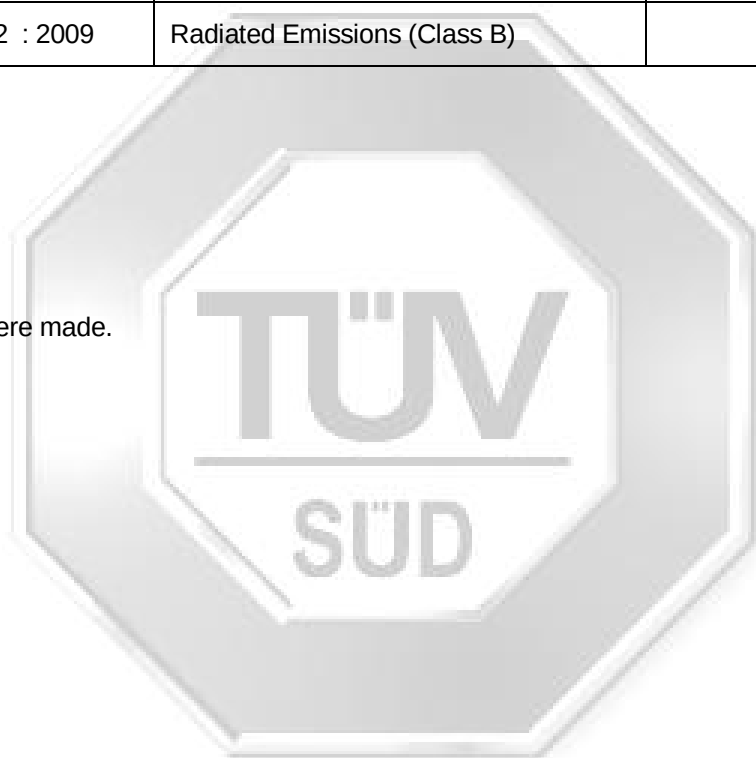
Test Standard	Description	Pass / Fail
AS/NZS CISPR 22 : 2009 Emissions		
AS/NZS CISPR 22 : 2009	Conducted Emissions (Class B)	Pass
AS/NZS CISPR 22 : 2009	Radiated Emissions (Class B)	Pass

Notes

1. Nil.

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

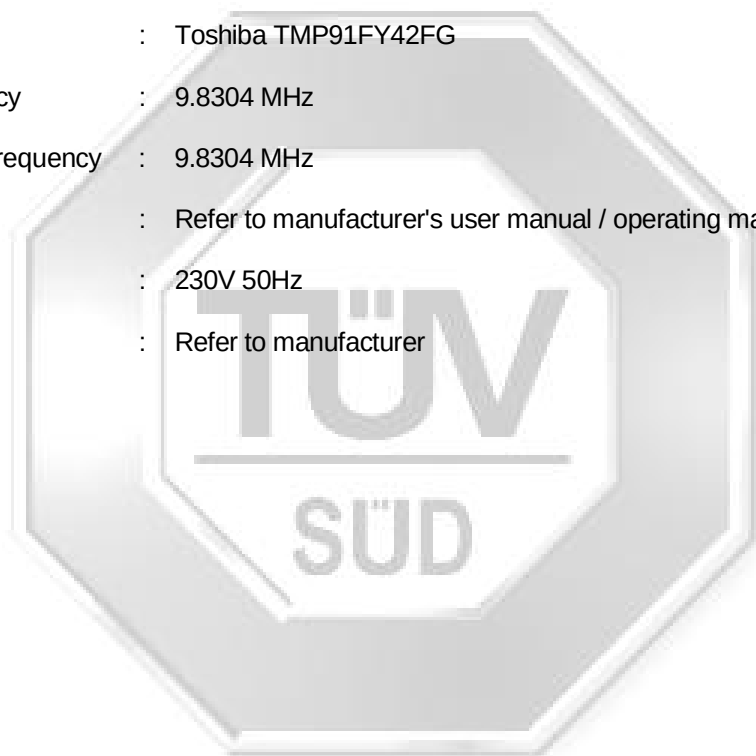
Operating Frequency : 9.8304 MHz

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

AS/NZS CISPR 22
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

AS/NZS CISPR 22 Conducted Emission Limits (Class B)

AC / DC 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

AS/NZS CISPR 22 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 / DC Port

AS/NZS CISPR 22 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.

AS/NZS CISPR 22 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

AS/NZS CISPR 22 Conducted Emission Results

Operating Mode	Disarm Mode	Temperature	20°C
Test Input Power	230V 50Hz	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
0.1561	53.7	-12.0	24.4	-31.3	Neutral
0.1826	52.7	-11.7	22.9	-31.5	Live
0.2639	40.3	-21.0	10.8	-40.5	Neutral
0.2868	41.5	-19.1	10.8	-39.8	Live
0.2948	39.9	-20.5	10.6	-39.8	Live
0.3124	38.5	-21.5	9.5	-40.4	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

AS/NZS CISPR 22 Radiated Emission Limits (Class B)

Frequency Range (MHz)	Quasi-Peak Limit Values (dB μ V/m) @ 10m
30 - 230	30.0
230 - 1000	37.0

Note : At transition frequency, lower limit applies.

Frequency Range (GHz)	Average Limit Values (dB μ V/m) @ 3m	Peak Limit Values (dB μ V/m) @ 3m
1 - 3	50.0	70.0
3 - 6	54.0	74.0

Note : At transition frequency, lower limit applies.

AS/NZS CISPR 22 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

AS/NZS CISPR 22 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.

AS/NZS CISPR 22 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 6GHz, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

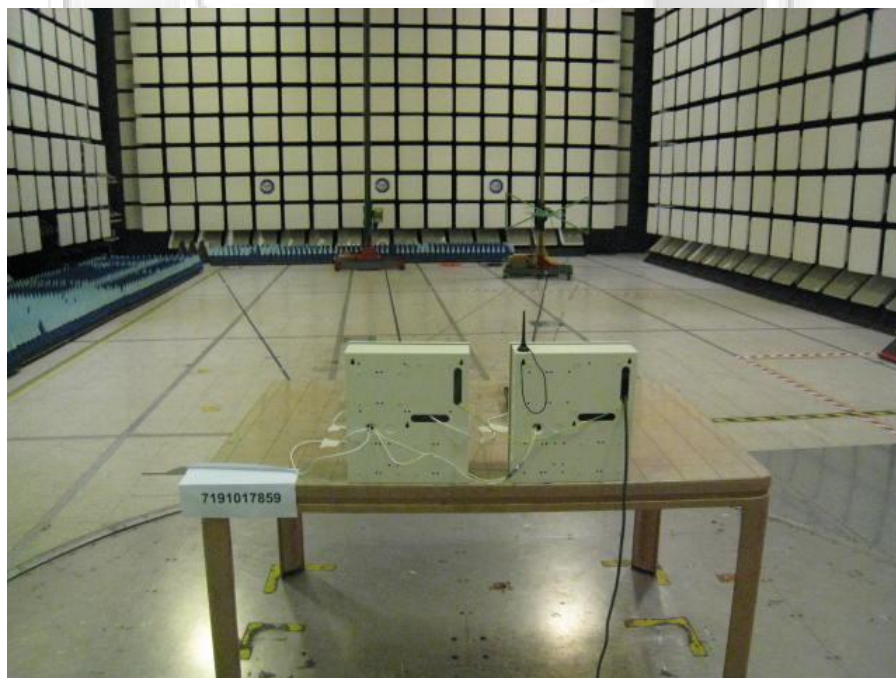
At 300 MHz Q-P limit (Class B) = 70.8 μ V/m = 37.0 dB μ V/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB
Q-P reading obtained directly from EMI Receiver = 31.0 dB μ V/m
(Calibrated level including antenna factors & cable losses)
Therefore, Q-P margin = 31.0 - 37.0 = -6.0 i.e. 6 dB below Q-P limit

RADIATED EMISSION TEST

30MHz – 1GHz Test Setup



Radiated Emissions Test Setup (Front View)



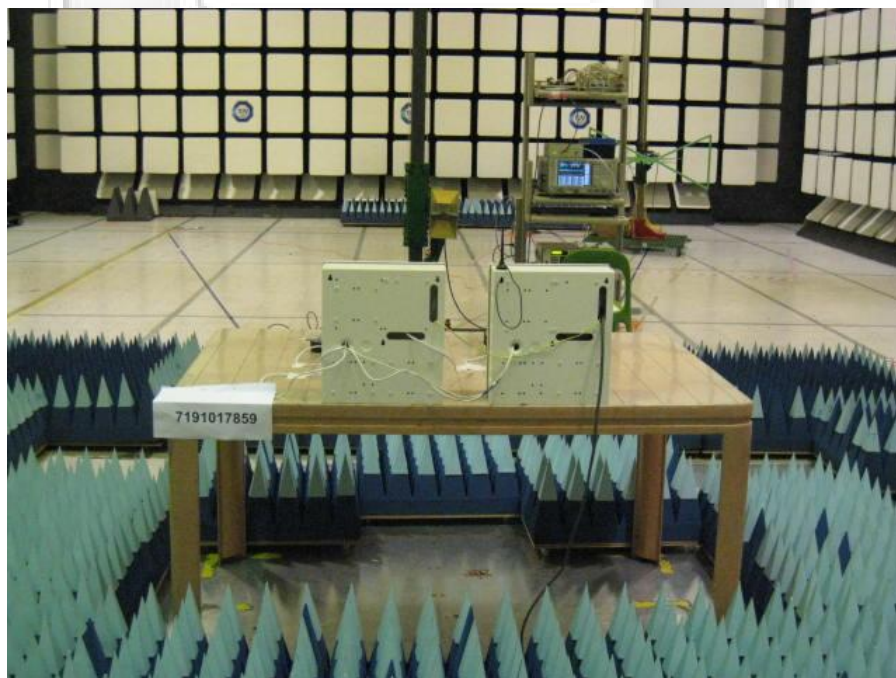
Radiated Emissions Test Setup (Rear View)

RADIATED EMISSION TEST

1GHz – 6GHz Test Setup



Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

RADIATED EMISSION TEST

AS/NZS CISPR 22 Radiated Emission Results

Operating Mode	Disarm Mode	Temperature	23°C
Test Input Power	230V 50Hz	Relative Humidity	55%
Test Distance	10m (30MHz – 1GHz) 3m (>1GHz – 6GHz)	Atmospheric Pressure	1030mbar
Class	B	Tested By	Zechs 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)
31.3190	9.3	-20.7	351	143	V
49.3320	23.6	-6.4	233	100	H
61.4480	15.3	-14.7	164	272	H
97.2230	15.8	-14.2	116	114	V
148.0730	12.4	-17.6	355	100	H
399.9960	23.6	-13.4	40	240	V

Emissions above 1GHz-6GHz

Frequency (GHz)	Peak Value (dBμV/m)	Peak Margin (dBμV/m)	Average Value (dBμV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
4.8771	30.6	-43.4	23.9	-30.1	290	100	V
5.0987	32.8	-41.2	26.2	-27.8	323	170	H
5.1643	32.7	-41.3	25.9	-28.1	164	100	V
5.1930	33.1	-40.9	26.4	-27.6	156	142	H
5.4105	33.1	-40.9	26.4	-27.6	121	146	V
5.5052	33.8	-40.2	27.2	-26.8	160	100	H

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 – 6GHz
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 – 6.0GHz is ± 4.0dB.

Please note that this Report is issued under the following terms :

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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



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



Front View

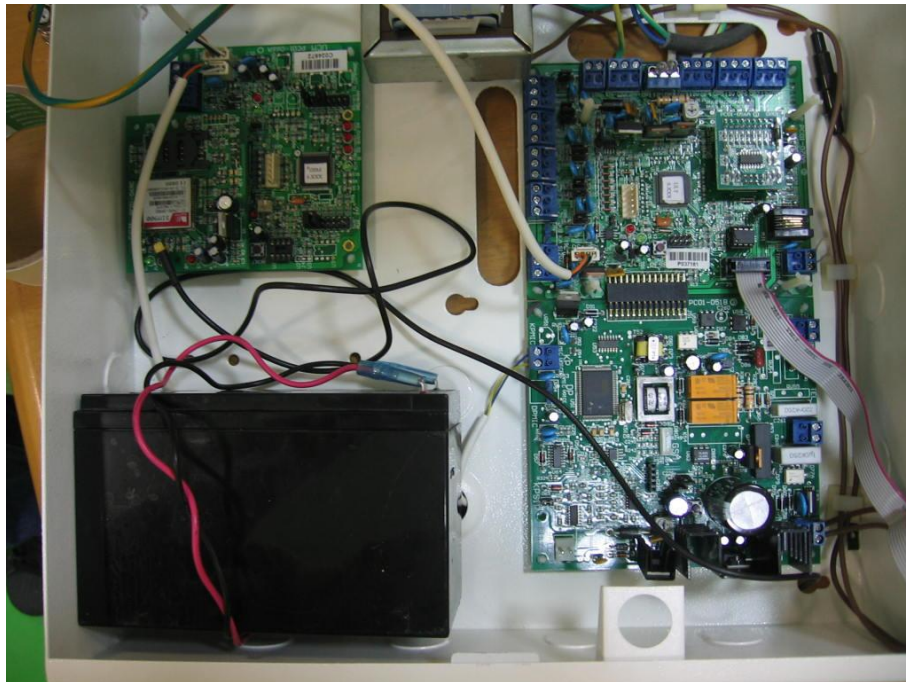


Rear View

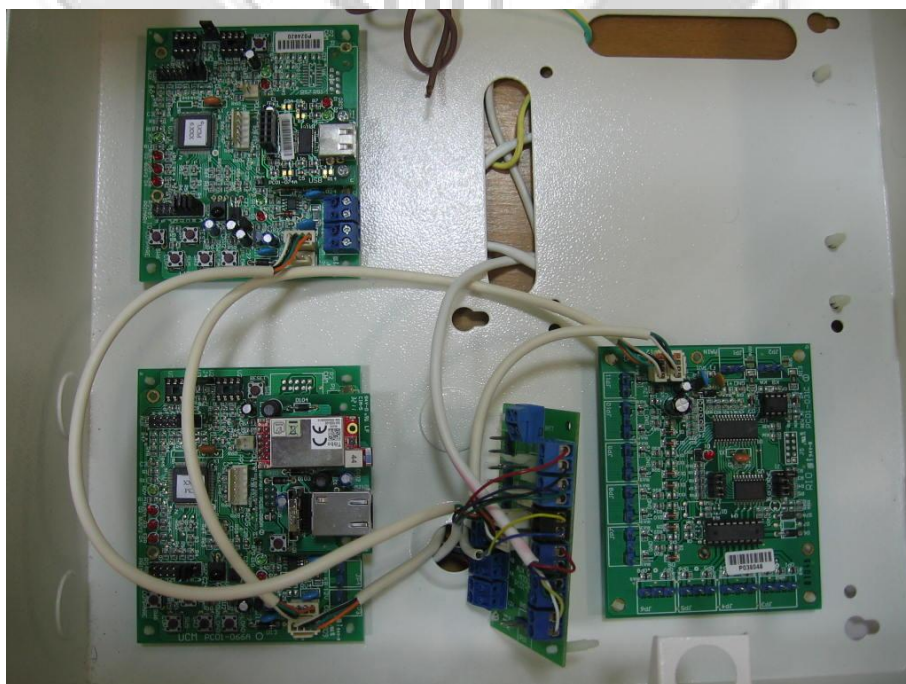
EUT PHOTOGRAPHS / DIAGRAMS

ANNEX A

EUT PHOTOGRAPHS



White Box Interior View



White Box Interior View

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

ANNEX B

