CE

EMC COMPLIANCE TEST REPORT

The Product

Equipment Under Test	:	PLC (Programmable Logic Controller)
Model Number	:	MR5C9-1616T+MPA048-24+MHCM25+MHCM55+ M16X+M16YT+M16YJ+M16YR+M1616XYT+M1616XYJ+M04 ADR+M04AD+M04TCR+M04TC+M04DA+MRE
Product Series	:	M☆◎-□◇+ M☆□◎◇ Symbol's meaning as bellow: ☆: Stands for A,B,S,E,F,P,R,L,HCM,CM,RE,RB,RG,… ◎: Stands for 2 to 3 digit, Ex:3C6、048、TC、AD、ADR、A0、XY… □: Stands for 2 to 4 digit number, Ex:1616、0202、04、25、55、48.. ◇: Stands for T,J,R or blank
Report Number	:	HA229017-SACE
Issue Date	:	30-Jan-2023

is produced by

FATEK AUTOMATION CORPORATION

26 F., No. 29, Sec. 2, Zhongzheng E. Rd., Tamsui Dist., New Taipei City 25170, TAIWAN (R.O.C.)

HongAn TECHNOLOGY CO., LTD.
HongAn TECHNOLOGY EMC Laboratory

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Contents

Release control Record

Report Version	Description	Issued Date
V00	(1) Change IEC 61000-3-2:2018+A1:2020 to IEC 61000-3-2:2019 +A1:2021 (2) Change IEC 61000-3-3:2013+AMD1:2017+AMD2:2021 to IEC 61000-3-3:2013+A1:2019+A2:2021 (3) Change IEC 61000-4-2:2008 to IEC 61000-4-2:2009 (4) Change IEC 61000-4-6:2013 to IEC 61000-4-6:2019 (5) Change IEC 61000-4-8:2009 to IEC 61000-4-8:2010 (6) Chang Series Number M☆◎-□△+MP◇-＊△+M☆□◎△ to M☆◎-□◇+ M☆□◎◇ The original report No. HA229017-CE is replaced by report No. HA229017-SACE.	30-Jan-2023

Verification

Applicant	:	FATEK AUTOMATION CORPORATION
Manufacturer	:	FATEK AUTOMATION CORPORATION
Equipment Under Test	:	PLC (Programmable Logic Controller)
Model Number	:	MR5C9-1616T+MPA048-24+MHCM25+MHCM55+ M16X+M16YT+M16YJ+M16YR+M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+M04TC+M04DA+MRE
Product Series	:	M☆◎-□◇+ M☆□◎◇ Symbol's meaning as bellow: ☆: Stands for A,B,S,E,F,P,R,L,HCM,CM,RE,RB,RG,… ◎: Stands for 2 to 3 digit, Ex:3C6、048、TC、AD、ADR、A0、XY… □: Stands for 2 to 4 digit number, Ex:1616、0202、04、25、55、48.. ◇: Stands for T,J,R or blank
Sample Received Date	:	07-Mar-2022
Test Result	:	Complied
Test Standard	:	

Emission:	**Immunity:**
☒ EN 61131-2:2017	☒ EN 61131-2:2017 Zone B
☒ EN IEC 61000-6-4:2019	☒ IEC 61000-4-2:2009
☒ IEC 61000-3-2:2019+A1:2021	☒ IEC 61000-4-3:2020
☒ IEC 61000-3-3:2013+A1:2019 +A2:2021	☒ IEC 61000-4-4:2012
	☒ IEC 61000-4-5:2014+AMD1:2017
	☒ IEC 61000-4-6:2019
	☒ IEC 61000-4-8:2010
	☒ IEC 61000-4-11:2020

Remark:

This report details the results of the test carried out on one sample. This report shows the EUT is technically compliant with the EN 61131-2:2017 official requirements. This report applies to the above sample only and shall not be reproduced in part without written approval of *HongAn Technology Co., Ltd.*

Documented by: Jody Peng **Date:** 30-Jan-2023

Jody Peng

Tested by: Luke Lu **Date:** 23-Mar-2022

Luke Lu

Approved by: Eason.Hsieh **Date:** 30-Jan-2023

Eason Hsieh

Summary of Test Result – Emission

Emission			
Test Standard	**Test Item**	**Test Result**	**Remark**
EN 61131-2 EN IEC 61000-6-4:2019	Conducted Emission at AC mains port	Pass	Highest Emission L: 0.176MHz, Q.P.61.24dBuV, Margin -17.76 dB A.V.57.24dBuV, Margin -8.76 dB N: 0.171MHz, Q.P.56.96dBuV, Margin -22.04 dB A.V.53.13dBuV, Margin -12.87 dB
EN 61131-2 EN IEC 61000-6-4:2019	Conducted Emission at telecommunications / network port	Pass	Highest Emission 18.328MHz, Q.P.51.21dBuV, Margin -35.79 dB A.V.47.24dBuV, Margin -26.76 dB
EN 61131-2 EN IEC 61000-6-4:2019	Radiated Emission	Pass	Highest Emission H: 124.840MHz, 27.65dBuV, Margin-12.35 dB Antenna Height 379 cm, Turntable Angle 95° V: 130.060MHz, 34.97dBuV, Margin-5.03 dB Antenna Height 110 cm, Turntable Angle 302°
EN 61131-2 EN IEC 61000-6-4:2019	Radiated Emission (1 to 6 GHz)	Pass	Highest Emission H: 3860.000MHz, 46.56dBuV, Margin-13.44 dB V: 3910.000MHz, 46.64dBuV, Margin-13.36 dB
IEC 61000-3-2	Harmonic	Pass	Refer to Page 32
IEC 61000-3-3	Flicker	Pass	Refer to Page 36

Remark:

Since U_{Lab} of our lab is less than U_{CISPR}, no matter if determining compliance with the limits in this standard shall be based on the results of the compliance measurements taking into account the considerations on measurement instrumentation uncertainty or not, any adjustment of the test result is not necessary, which means,

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if measured disturbance level exceeds the disturbance limit.

Summary of Test Result – Immunity

Immunity				
Test Standard	**Test Item**	**Performance Criteria**	**Observed Result Class**	**Test Result**
IEC61000-4-2	Electrostatic Discharge	B	A	Pass
IEC61000-4-3	Radiated Susceptibility	A	A	Pass
IEC61000-4-4	Electrical Fast Transient	B	A	Pass
IEC61000-4-5	Surge	B	A	Pass
IEC61000-4-6	Conducted Susceptibility	A	A	Pass
IEC61000-4-8	Magnetic Field	A	A	Pass
IEC61000-4-11	Voltage Dips and Interruption	Dip 0% B	A	Pass
		Dip 40% C	A	
		Dip 70% C	A	
		Interruptions 0% C	B	
Remark : According to the test standard, the uncertainty related to EMS test instrument calibration and test levels need not be recorded in the test report and shall not be taken into account.				

Measurement Uncertainty

Where relevant, the following measurement uncertainty levels has been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Test Item	Expanded Uncertainty (*U*lab)	Expanded Uncertainty (*U*cispr)
Conducted emission at AC mains power using a V-AMN, 9kHz – 150kHz	±2.75dB	±3.8dB
Conducted emission at AC mains power using a V-AMN, 150kHz – 30MHz	±2.92dB	±3.4dB
Conducted emission at telecommunication port using AAN, 150kHz – 30MHz	±4.62dB	±5.0dB
Radiated emission, 30MHz – 1GHz (Horizontal)	±4.92dB	±6.3dB
Radiated emission, 30MHz – 1GHz (Vertical)	±5.05dB	±6.3dB
Radiated emission, 1GHz – 6GHz	±4.35dB	±5.2dB
Radiated emission, 6GHz – 18GHz	±4.77dB	±5.5dB
Radiated electromagnetic disturbances using a LLAS, 9kHz – 30MHz	±3.27dB	±3.3dB
Disturbance Power, 30MHz – 300MHz	±4.04dB	±4.5dB

This reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of approximately 95%.

1 General Description

1.1 Description of EUT

Equipment Under Test	**:**	PLC (Programmable Logic Controller)
Model Number	**:**	MR5C9-1616T+MPA048-24+MHCM25+MHCM55+ M16X+M16YT+M16YJ+M16YR+M1616XYT+M1616XYJ+M04ADR+M04 AD+M04TCR+M04TC+M04DA+MRE
Product Series	**:**	M☆◎-□△+MP◇-＊△+M☆□◎△
Applicant	**:**	FATEK AUTOMATION CORPORATION
Address of Applicant	**:**	26 F., No. 29, Sec. 2, Zhongzheng E. Rd., Tamsui Dist., New Taipei City 25170, TAIWAN (R.O.C.)
Manufacturer	**:**	FATEK AUTOMATION CORPORATION
Address of Manufacturer	**:**	26 F., No. 29, Sec. 2, Zhongzheng E. Rd., Tamsui Dist., New Taipei City 25170, TAIWAN (R.O.C.)
Power Supply	**:**	AC 100~240V, 1.0A, 50/60Hz
I/O Port	**:**	RJ 45*2,Type C*1,TF*1
Data Cable	**:**	N/A
Description of EUT	**:**	**Dimensions :** 46*9*9cm **Position :** ☒Table-top / ☐Floor-standing **Highest Frequency of the Internal Source :** 600MHz **Intended Function :** The EUT is a PLC (Programmable Logic Controller). **Product Variance :** The manufacturer declares that the series products share the identical circuit design with the main test sample. For marketing reason, there are different series numbers. The main test sample is the most sophisticated product with full functions. The series products have less function than the main test sample. HongAn only takes the responsibility to the main test sample.

1.2 Test Facility

Conducted Emission, Electrostatic Discharge, Electrical Fast Transient, Surge, Voltage Dips and Interruptions Tests are performed at 2F, No.146, Jian Yi Rd., Chung-Ho District, New Taipei City, Taiwan, R.O.C.

Radiated Emission, Harmonic, Flicker, Radiated Susceptibility(Below 3GHz), Conducted Susceptibility, Magnetic Field Tests are performed at No. 15-1, Cweishuh Keng, Cweipin Village, Linkou, New Taipei City, Taiwan, R.O.C.

Radiated Susceptibility(level 10V/m and above 3GHz) Test is performed at Taiwan Testing and Certification Center, Linkou Testing Lab, TAF Registration No:2628, Location: No.34, Lin 5. DingFu, Linkou Dist., New Taipei City, Taiwan, R. O. C.

1.3 Test Instruments

Conducted Emission					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI	100615	30-Jun-2021	29-Jun-2022
LISN	EMCIS	LN2-16	LN04023	30-Jun-2021	29-Jun-2022
LISN	SCHWARZBECK	NSLK 8127	01019	19-Jul-2021	18-Jul-2022
LISN+Adapter	SCHWARZBECK	NSLK 8127	01019	19-Jul-2021	18-Jul-2022
ISN	TESEQ	ISN T800	30838	19-Jul-2021	18-Jul-2022
Cable	HARBOUR	RG 400	1.5m	08-Jul-2021	07-Jul-2022
Software	Audix	e3 (ver 6.101006e)	N/A	N/A	N/A
Software	R&S	Click Rate Analyzer(V2.5.2)	N/A	N/A	N/A
Radiated Emission Test					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESCI7	100931	04-Aug-2021	03-Aug-2022
Spectrum Analyzer	R&S	FSV 40	101296	08-Apr-2021	07-Apr-2022
Preamplifier	SCHAFFNER	CPA 9231A	0405	17-Dec-2021	16-Dec-2022
Preamplifier(1-18 GHz)	EMCI	EMC051845SE	980692	06-Dec-2021	05-Dec-2022
Preamplifier(18~40GHz)	EMCI	EMC184045SE	980699	05-May-2021	04-May-2022
Loop Antenna	EMCO	6502	9202-2717	06-Sep-2021	05-Sep-2022
Bilog	TESEQ	CBL6111D	47016	19-Jul-2021	18-Jul-2022

Antenna(3m)					
Bilog Antenna(10m)	TESEQ	CBL6111D	47016	19-Jul-2021	18-Jul-2022
Horn Antenna	EMCO	3115	9912-5992	24-Feb-2022	23-Feb-2023
Horn Antenna	Com-Power	AH-840	101042	21-May-2021	20-May-2022
Cable	HongAn	8D-FB	HA2-10MSite	20-Aug-2021	19-Aug-2022
RF Cable(1~18GHz)	EMCI	EMC104-SM-NM-1000	191104	05-Dec-2021	04-Dec-2022
RF Cable(1~18GHz)	EMCI	EMC104-SM-NM-8000	191103	09-Dec-2021	08-Dec-2022
RF Cable(18~40GHz)	EMCI	EMC102-KM-KM-1000	200301	28-Apr-2021	27-Apr-2022
RF Cable(18~40GHz)	EMCI	EMC102-KM-KM-8000	200213	28-Apr-2021	27-Apr-2022
Signal Generator	R&S	SMB100A	110549	06-Sep-2021	05-Sep-2022
Software	Audix	e3 (ver 6.101006a)	N/A	N/A	N/A
Harmonic Current Emission					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
Signal conditioning unit	TESEQ	CCN 1000-1	1918A03073	02-Jul-2021	01-Jul-2022
AC Power Source	TESEQ	NSG 1007	1919A00280	02-Jul-2021	01-Jul-2022
Software	TESEQ	CTS4 (Version 4.29.0)	N/A	N/A	N/A
Voltage Fluctuations and Flicker					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
Signal conditioning unit	TESEQ	CCN 1000-1	1918A03073	02-Jul-2021	01-Jul-2022
AC Power Source	TESEQ	NSG 1007	1919A00280	02-Jul-2021	01-Jul-2022
Software	TESEQ	CTS4 (Version 4.29.0)	N/A	N/A	N/A
Electrostatic Discharge immunity test					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
ESD Simulator	NoiseKen	TC-815R	ESS0868491	29-Mar-2021	28-Mar-2022
ESD Simulator	NoiseKen	ESS-2002	ESS0868406	29-Mar-2021	28-Mar-2022
Radiated, radio-frequency, electromagnetic field immunity test					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
Signal Generator	R&S	SMB100A	110549	06-Sep-2021	05-Sep-2022

RF Power Amplifier	ar	150W1000	0343919	N/A	N/A
RF Amplifier	ar	15S1G3	306578	N/A	N/A
Dual Directional Coupler	WERLATONE	C6021-10	108038	N/A	N/A
Directional Coupler	ATM	CHPsc22L-40	Q308504-01	N/A	N/A
Power Sensor	TESEQ	PM6003	074395	03-Aug-2021	02-Aug-2022
Power Sensor	TESEQ	PM6003	074396	03-Aug-2021	02-Aug-2022
Bilog Antenna	TESEQ	CBL6111D	58161	12-Jan-2022	11-Jan-2023
Horn Antenna	EMCO	3115	9912-5992	24-Feb-2022	23-Feb-2023
Broadband Field Meter	Narda	NBM-520	D-0519	16-Oct-2021	15-Oct-2022
Probe	Narda	EF-0691	D-0102	16-Oct-2021	15-Oct-2022
Software	Audix	i2 (Ver:20151112c)	N/A	N/A	N/A
Electrical fast transient/burst immunity test					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
TRANSIENT 2000	EMC PARTNER	TRA2000	449	22-Jul-2021	21-Jul-2022
Software	EMC PARTNER	Ver 3.240	N/A	N/A	N/A
Surge immunity test					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
TRANSIENT 2000	EMC PARTNER	TRA2000	449	22-Jul-2021	21-Jul-2022
Software	EMC PARTNER	Ver 3.240	N/A	N/A	N/A
Immunity to conducted disturbances, induced by radio-frequency fields					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
Signal Generator	R&S	SMB100A	110549	06-Sep-2021	05-Sep-2022
Wide Band Amplifier	ifi	CMX50	D019-0200	N/A	N/A
6dB Attenuator	BIRD	50-A-MFN-06	0048	N/A	N/A
Dual Directional Coupler	WERLATONE	C6021-10	108038	N/A	N/A
Power Sensor	TESEQ	PM6003	074395	03-Aug-2021	02-Aug-2022
Power Sensor	TESEQ	PM6003	074396	03-Aug-2021	03-Aug-2022
CDN	FCC	FCC-801-M3-32 A	2019	27-Jan-2022	26-Jan-2023
CDN	FCC	FCC-801-M3-32 A	20116	27-Jan-2022	26-Jan-2023
Software	Audix	i2 (ver 20151112c)	N/A	N/A	N/A
Power frequency magnetic field immunity test					

Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
EMCPro Plus EMC Test System	ThermoFisher	EMC Pro PLUS	1507189	22-May-2021	21-May-2022
Magnetic Field Immunity Loop	ThermoFisher	F-1000-4-8/9/10 -L-1M	9953	22-May-2021	21-May-2022
Software	KeyTek	CEWare32 (ver 4.1)	N/A	N/A	N/A
Voltage dips, short interruptions and voltage variations immunity tests					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
TRANSIENT 2000	EMC PARTNER	TRA2000	449	22-Jul-2021	21-Jul-2022
Software	EMC PARTNER	Ver 3.240	N/A	N/A	N/A

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.4 Test Methodology

All Emission Tests were performed according to the procedures specified in EN 61131-2:2017.

All Immunity Tests were performed according to the procedures specified in EN 61131-2:2017.

1.5 Auxiliary Equipments

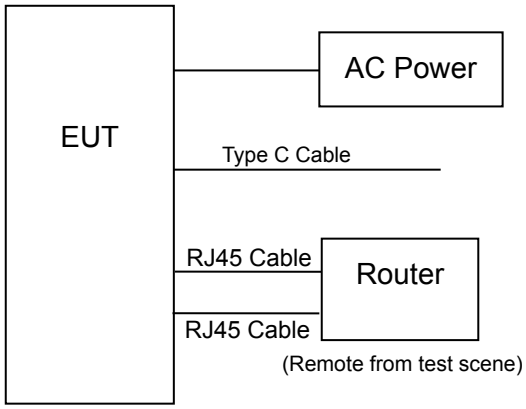
1.5.1 Provided by HongAn Technology Co., Ltd..

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
01.	RJ45 Cable*2	CAT5e	N/A	N/A	Matrix	Non-shielded, Detachable, 2m, Without Core	N/A
02.	TYPE C Cable	TCC	N/A	N/A	Matrix	Shielded, Detachable, 1m, Without Core	N/A
03.	Router	DIR-657	QBEM1BB000300	CE,FCC, R43032	D-LINK	N/A	Adapter: Non-shielded, Un-detachable 1.8m, Without Core

1.5.2 Provided by the Manufacturer

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
01	AC Power Cable	N/A	N/A	N/A	N/A	Non-shielded, Detachable1.2 m,w/o core	N/A

1.6 Block Diagram



1.7 Identifying the Final Test Mode

1. Operation Mode

Note: After pre-test, we identified that the Operation Mode was most likely to cause maximum disturbance and most likely to be susceptible to disturbance. Therefore, the final EMC assessment was performed for the worst case.

1.8 Final Test Mode

Operation Mode

1.9 Condition of Power Supply

AC 230V; 50Hz

1.10 EUT Configuration

1. Setup the EUT as shown in Sec.1.6 Block Diagram
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode shown in Sec. 1.8.

1.11 Immunity Performance Classification

Criterion	Test Description
A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

2 Conducted Emission Test (at Mains Port)

2.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

2.2 Test Configurationand Procedure

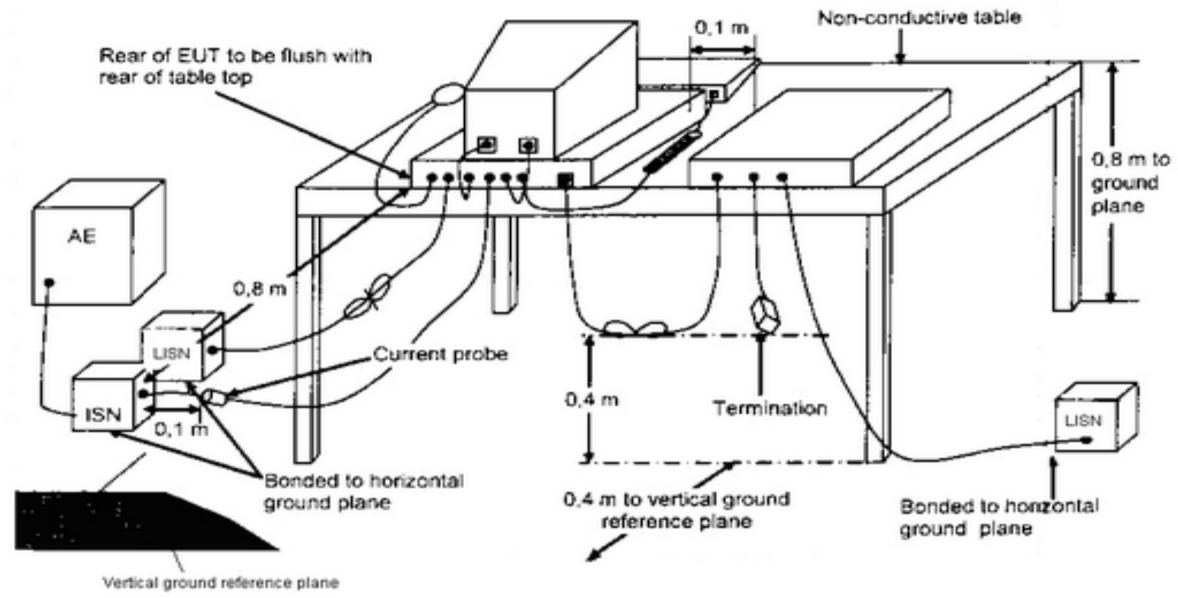


Table-top Equipment

- The EUT was placed on a non-conductive table which was 80 cm above the horizontal coupling plane. The rear of the EUT was 40 cm from the vertical coupling plane.
- The excess interface cables were folded at the cable center into a bundle no longer than 40 cm, so that the bundles were on the table.
- The EUT was connected to the main power through a L.I.S.N. This set up provided 50 ohm / 50 μH coupling impedance for the measuring equipment.
- All auxiliary equipment received power from a second L.I.S.N.
- The conducted emissions were measured between the Line Phase and the PE ground and between the Neutral Phase and the PE ground using an EMI Receiver.
- The values were recorded.

2.3 Conducted Limit

EN IEC 61000-6-4

Low Voltage AC Mains Port		
Frequency (MHz)	Quasi-Peak dB(μV)	Average dB(μV)
0.15 to 0.50	79	66
0.5 to 30	73	60

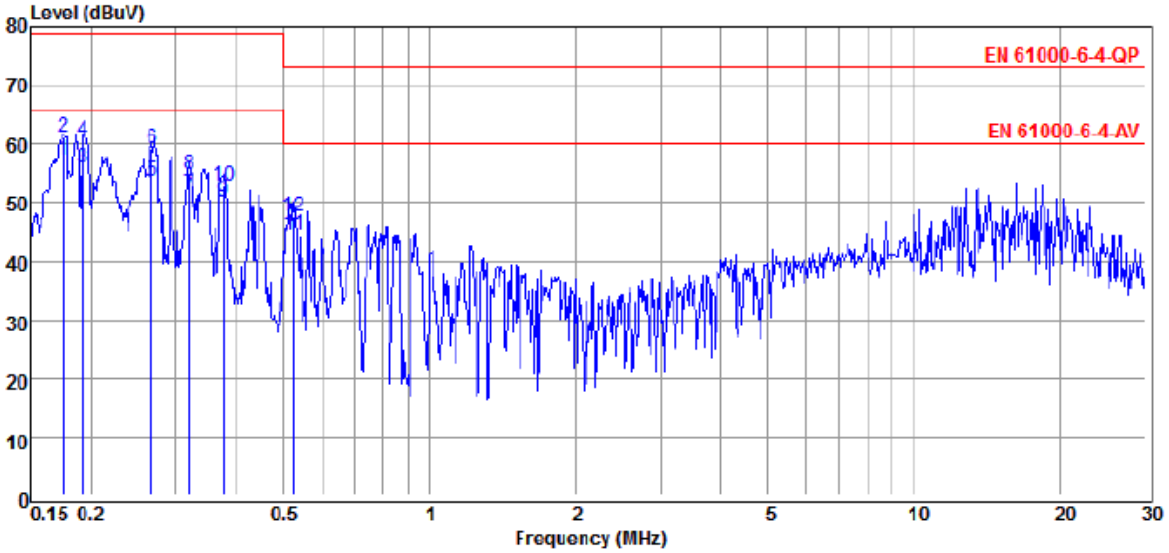
2.4 Test Result

PASS

The final test data are shown on the following page(s).

Conducted Emission Test Data

Test Site	:	HA5	Test Date	:	10-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	24℃
Power Phase	:	LINE	Humidity	:	53%RH
Test voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq MHz	Reading dBµV	C.F dB	Result dBµV	Limit dBµV	Margin dB	Power Line	Remark
1	0.176	57.18	0.06	57.24	66.00	-8.76	LINE	Average
2	0.176	61.18	0.06	61.24	79.00	-17.76	LINE	QP
3	0.192	55.81	0.06	55.87	66.00	-10.13	LINE	Average
4	0.192	60.67	0.06	60.73	79.00	-18.27	LINE	QP
5	0.267	53.58	0.06	53.64	66.00	-12.36	LINE	Average
6	0.267	59.13	0.06	59.19	79.00	-19.81	LINE	QP
7	0.318	51.36	0.06	51.42	66.00	-14.58	LINE	Average
8	0.318	54.88	0.06	54.94	79.00	-24.06	LINE	QP
9	0.375	50.13	0.06	50.19	66.00	-15.81	LINE	Average
10	0.375	52.88	0.06	52.94	79.00	-26.06	LINE	QP
11	0.524	44.59	0.07	44.66	60.00	-15.34	LINE	Average
12	0.524	47.62	0.07	47.69	73.00	-25.31	LINE	QP

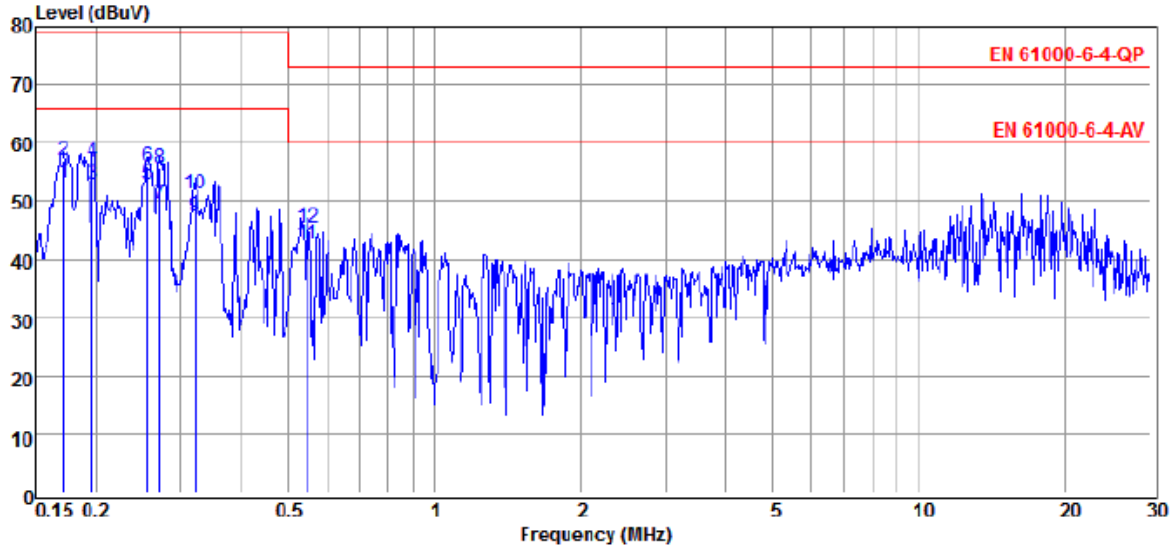
Remark：1. All readings are Quasi-Peak and Average values.

2. Result = Reading + C.F..

3. Margin = Result – Limit.

Conducted Emission Test Data

Test Site	:	HA5	Test Date	:	10-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	24℃
Power Phase	:	NEUTRAL	Humidity	:	53%RH
Test voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq MHz	Reading dBµV	C.F dB	Result dBµV	Limit dBµV	Margin dB	Power Line	Remark
1	0.171	53.07	0.06	53.13	66.00	-12.87	NEUTRAL	Average
2	0.171	56.90	0.06	56.96	79.00	-22.04	NEUTRAL	QP
3	0.197	52.69	0.06	52.75	66.00	-13.25	NEUTRAL	Average
4	0.197	56.59	0.06	56.65	79.00	-22.35	NEUTRAL	QP
5	0.255	52.76	0.06	52.82	66.00	-13.18	NEUTRAL	Average
6	0.255	55.72	0.06	55.78	79.00	-23.22	NEUTRAL	QP
7	0.272	49.57	0.06	49.63	66.00	-16.37	NEUTRAL	Average
8	0.272	55.64	0.06	55.70	79.00	-23.30	NEUTRAL	QP
9	0.320	47.20	0.06	47.26	66.00	-18.74	NEUTRAL	Average
10	0.320	51.15	0.06	51.21	79.00	-27.79	NEUTRAL	QP
11	0.546	42.48	0.07	42.55	60.00	-17.45	NEUTRAL	Average
12	0.546	45.24	0.07	45.31	73.00	-27.69	NEUTRAL	QP

Remark：1. All readings are Quasi-Peak and Average values.

2. Result = Reading + C.F..

3. Margin = Result – Limit.

3 Conducted Emission Test (at Telecommunication Ports)

3.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

3.2 Test Arrangement and Procedure

3.2.1 Measurement arrangement and procedure using an AAN

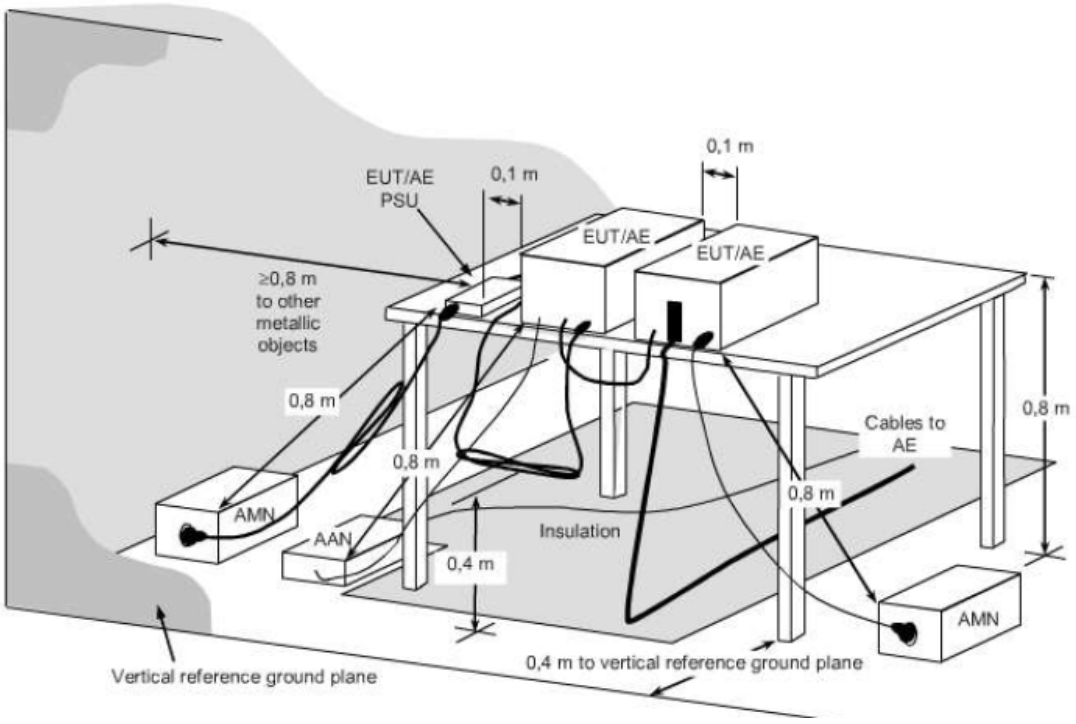


Table-top Equipment

- The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AAN directly to reference ground plane.
- If voltage measurement is used, measure voltage at the measurement port of the AAN, correct the reading by adding the AAN voltage division factor, and compare to the voltage limit.
- If current measurement is used, measure current with the current probe and compare to the current limit. A 50Ω load has to be connect to the measurement port of the AAN during the current measurement.
- It is not necessary to apply the voltage and the current limit if a AAN is used.
- The test results of disturbance at telecommunication port are recorded of six worst margins for quasi-peak(mandatory)[and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

3.3 Conducted Limit

EN IEC 61000-6-4

Telecommunications/network port				
Frequency (MHz)	Voltage Limits dB(μV)		Current Limits dB(μA)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 to 0.50	97 to 87	84 to 74	53 to 43	40 to 30
0.50 to 30	87	74	43	30
The limits decrease linearly with the logarithm of the frequency				

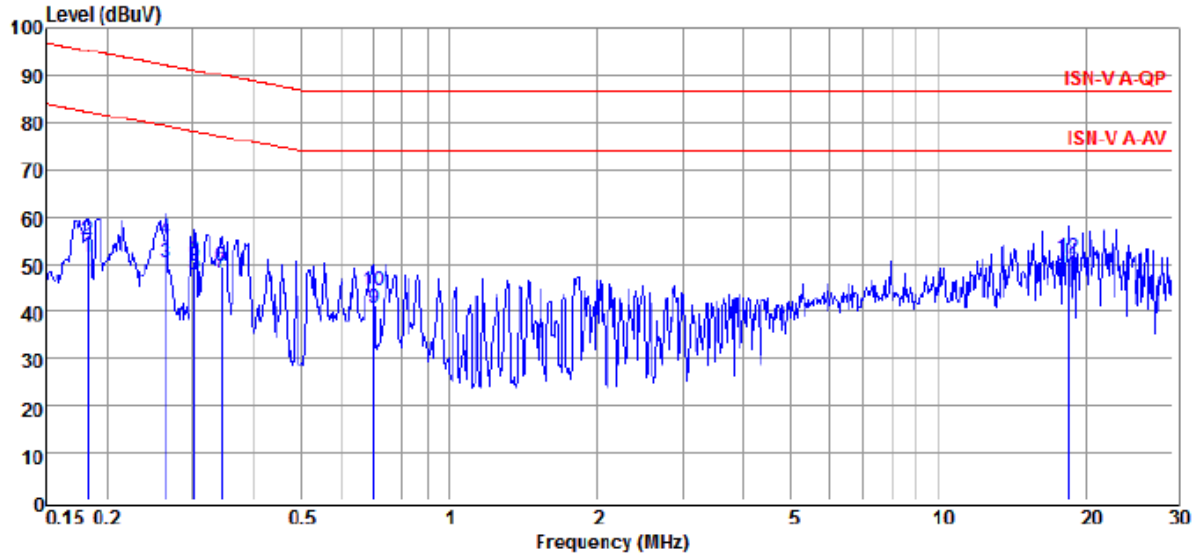
3.4 Test Result

PASS

The final test data are shown on the following page(s).

Conducted Emission Test Data at Telecommunication Ports – Voltage

Test Site	:	HA5	Test Date	:	10-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	24℃
Ethernet Speed	:	100Mbps	Humidity	:	53%RH
Test Voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq MHz	Reading dBµV	C.F dB	Result dBµV	Limit dBµV	Margin dB	Remark
1	0.182	41.65	10.02	51.67	82.37	-30.70	Average
2	0.182	45.09	10.02	55.11	95.37	-40.26	QP
3	0.264	40.12	9.88	50.00	79.29	-29.29	Average
4	0.264	45.49	9.88	55.37	92.29	-36.92	QP
5	0.302	37.99	9.83	47.82	78.19	-30.37	Average
6	0.302	40.79	9.83	50.62	91.19	-40.57	QP
7	0.343	38.18	9.80	47.98	77.13	-29.15	Average
8	0.343	39.68	9.80	49.48	90.13	-40.65	QP
9	0.701	30.95	9.68	40.63	74.00	-33.37	Average
10	0.701	34.45	9.68	44.13	87.00	-42.87	QP
11	18.328	37.64	9.60	47.24	74.00	-26.76	Average
12	18.328	41.61	9.60	51.21	87.00	-35.79	QP

Remark：1. All readings are Quasi-Peak and Average values.
2. Result = Reading + C.F..
3. Margin = Result – Limit.

4 Radiated Emission Test

4.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

4.2 Test Configurationand Procedure

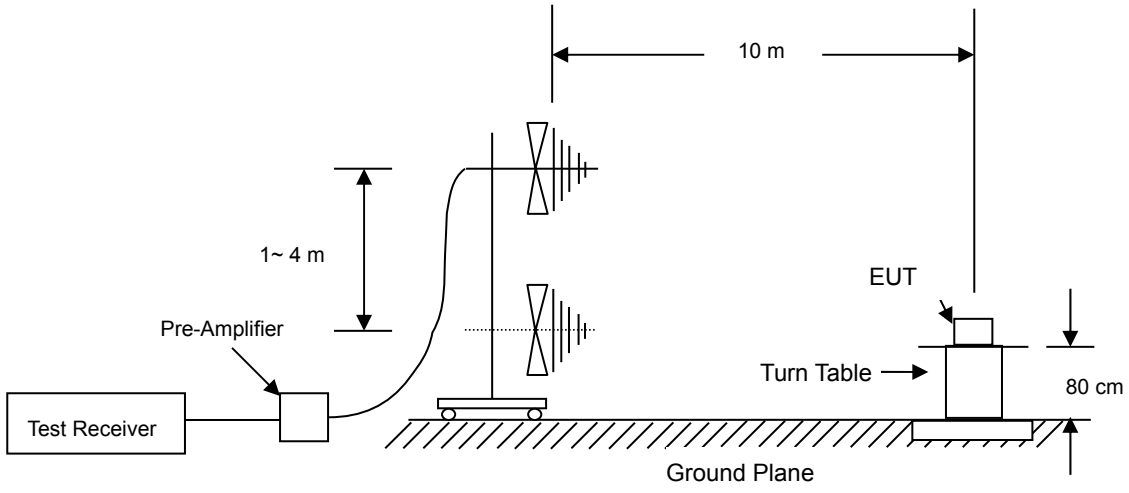


Table-top Equipment

- The EUT was place on a non-conductive turntable which was 80 cm above the horizontal ground plane. The EUT was set 10 m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1 m and 4 m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 4.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

4.3 Radiated Limit

EN IEC 61000-6-4

Enclosure Port	
Frequency (MHz)	Quasi-Peak (dB μ V/m) at 10 m
30 to 230	40.0
230 to 1000	47.0

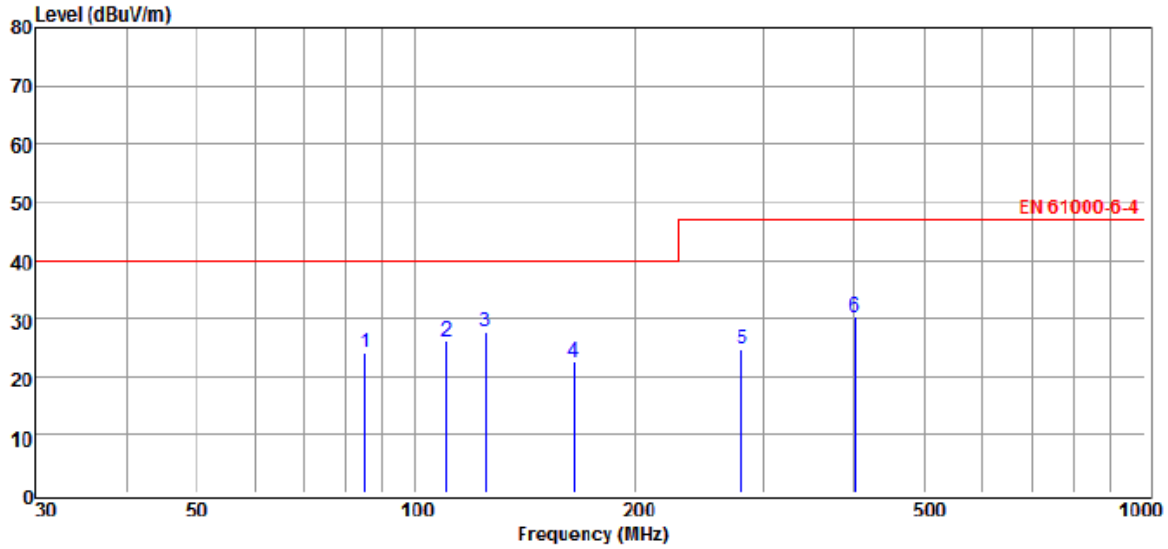
4.4 Test Result

PASS

The final test data are shown on the following page(s).

Radiated Emission Test Data

Test Site	:	HA2 10m	Test Date	:	08-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	22℃
Polarization	:	Horizontal	Humidity	:	53%RH
Test voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Antenna	Remark
	MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	cm	deg	Pol.	
1	84.950	39.43	-15.26	24.17	40.00	-15.83	396	218	HORIZONTAL	QP
2	110.040	38.41	-12.43	25.98	40.00	-14.02	376	188	HORIZONTAL	QP
3	124.840	39.67	-12.02	27.65	40.00	-12.35	379	95	HORIZONTAL	QP
4	164.910	36.02	-13.53	22.49	40.00	-17.51	378	46	HORIZONTAL	QP
5	280.060	34.90	-10.28	24.62	47.00	-22.38	365	137	HORIZONTAL	QP
6	400.670	37.08	-6.90	30.18	47.00	-16.82	341	215	HORIZONTAL	QP

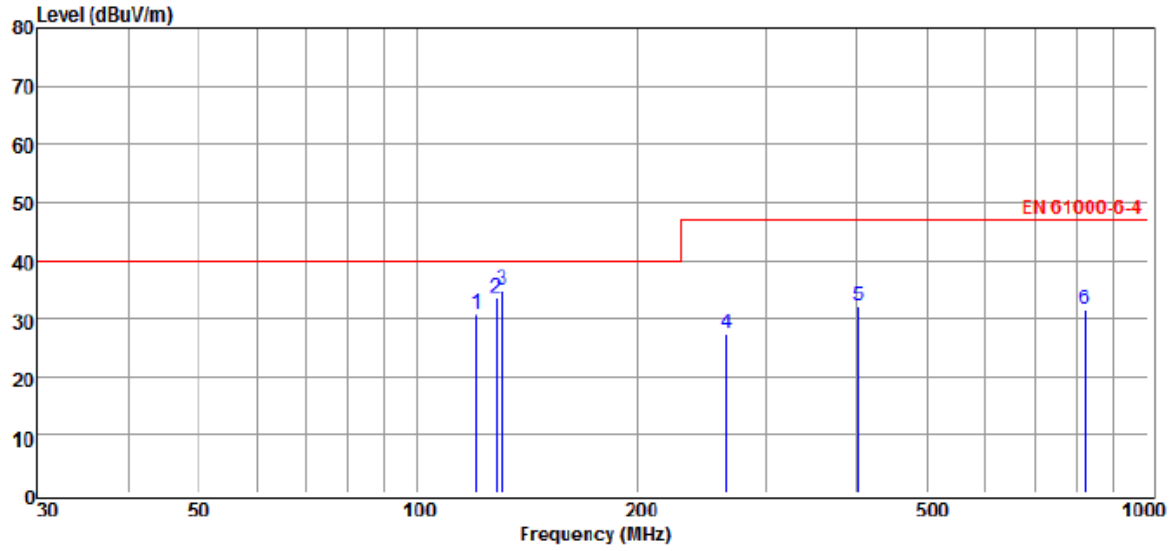
Remark：1. All readings are Quasi-Peak values.

2. Result = Reading + C.F..

3. Margin = Result – Limit.

Radiated Emission Test Data

Test Site	:	HA2 10m	Test Date	:	08-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	22℃
Polarization	:	Vertical	Humidity	:	53%RH
Test Voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Antenna	Remark
	MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	cm	deg	Pol.	
1	119.890	42.90	-12.07	30.83	40.00	-9.17	120	261	VERTICAL	QP
2	127.990	45.49	-11.97	33.52	40.00	-6.48	111	255	VERTICAL	QP
3	130.060	46.92	-11.95	34.97	40.00	-5.03	110	302	VERTICAL	QP
4	264.930	36.19	-8.77	27.42	47.00	-19.58	128	227	VERTICAL	QP
5	401.850	39.06	-6.87	32.19	47.00	-14.81	146	99	VERTICAL	QP
6	820.070	30.67	0.85	31.52	47.00	-15.48	190	126	VERTICAL	QP

Remark：1. All readings are Quasi-Peak values.

2. Result = Reading + C.F..

3. Margin = Result – Limit.

5 Radiated Emission Test – 1 to 6 GHz

5.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

5.2 Test Configuration and Procedure

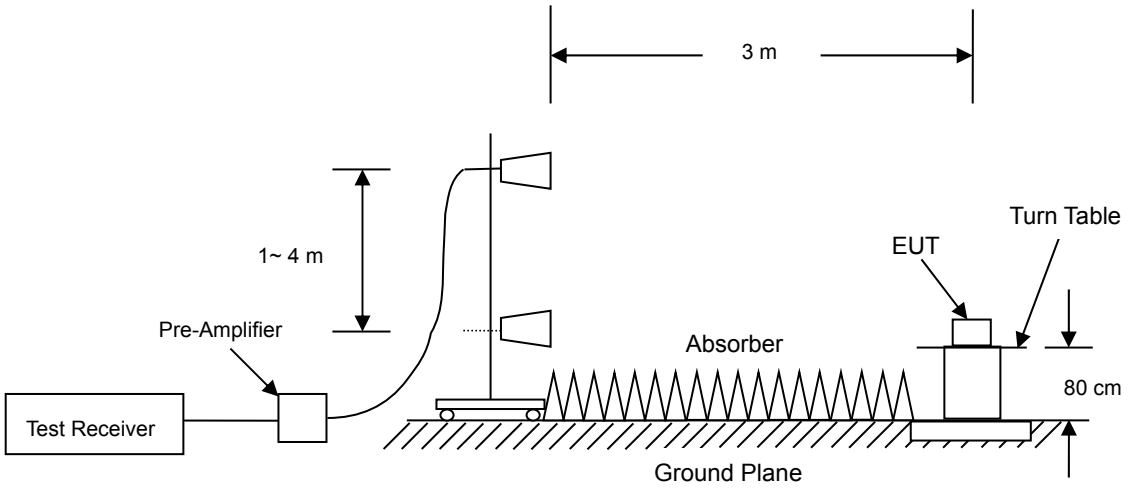


Table-top Equipment

- The EUT was place on a non-conductive turntable which was 80cm above the horizontal ground plane. The EUT was set 3m away from the receiving antenna that was mounted on a non-conductive mast.
- Main cables draped to the ground plane and were routed to the mains power outlet. The mains power outlet was bonded to and did not protrude above the ground plane.
- The antenna was adjusted between 1m and 4m in height above the ground plane and the Antenna-to-EUT azimuth was also varied during the measurements to find the top 6 maximum meter readings within the frequency range limit as indicated in Sec 5.3.
- The radiated emissions were measured when the Antenna-to-EUT polarization was set horizontally and vertically.
- The values were recorded.

5.3 Test Limit

EN IEC 61000-6-4 at a measurement distance of 3m

Frequency GHz	Average limit dB(μV/m)	Peak limit dB(μV/m)
1 to 3	56	76
3 to 6	60	80

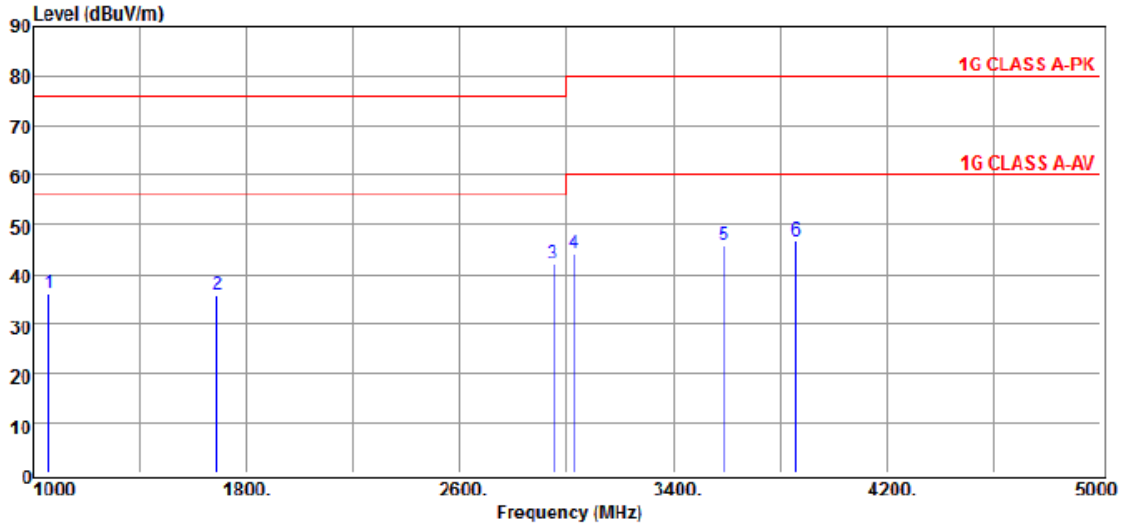
5.4 Test Result

PASS

The final tests data are shown on the following page(s).

Radiated Emission Test Data

Test Site	:	HA2 3m	Test Date	:	08-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	23℃
Polarization	:	Horizontal	Humidity	:	54％RH
Test voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq	Reading	C.F	Result	Limit	Margin	Antenna	Remark
	MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	Pol.	
1	1060.000	57.58	-21.33	36.25	56.00	-19.75	HORIZONTAL	Peak
2	1690.000	54.81	-19.07	35.74	56.00	-20.26	HORIZONTAL	Peak
3	2950.000	55.79	-13.85	41.94	56.00	-14.06	HORIZONTAL	Peak
4	3030.000	57.69	-13.38	44.31	60.00	-15.69	HORIZONTAL	Peak
5	3590.000	57.71	-12.00	45.71	60.00	-14.29	HORIZONTAL	Peak
6	3860.000	57.21	-10.65	46.56	60.00	-13.44	HORIZONTAL	Peak

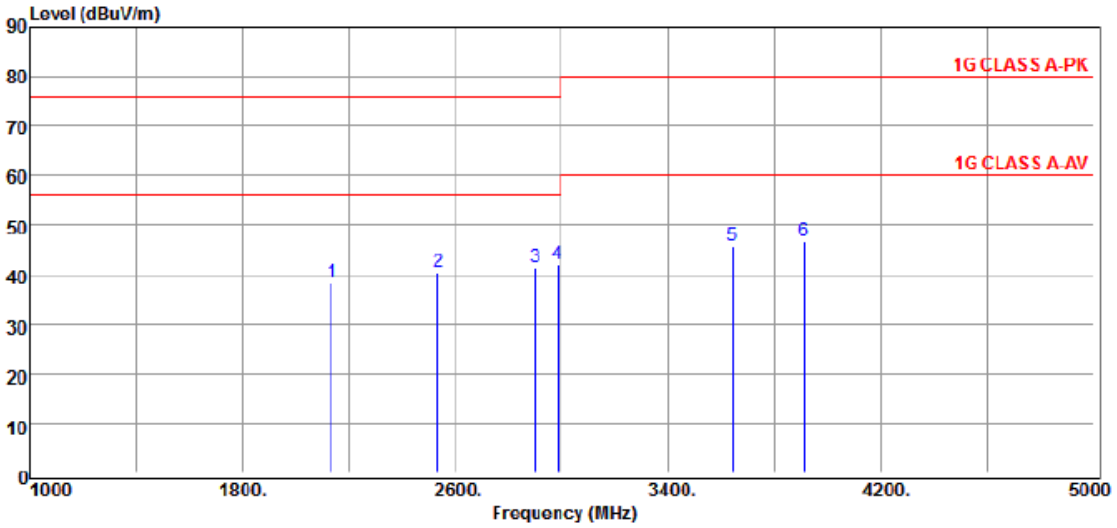
Remark：1. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.

2. Result = Reading + C.F..

3. Margin = Result – Limit.

Radiated Emission Test Data

Test Site	:	HA2 3m	Test Date	:	08-Mar-2022
Model Number	:	MR5C9-1616T+MPA048-24+ MHCM25+MHCM55+M16X+ M16YT+M16YJ+M16YR+ M1616XYT+M1616XYJ+ M04ADR+M04AD+M04TCR+ M04TC+M04DA+MRE	Temperature	:	23℃
Polarization	:	Vertical	Humidity	:	54％RH
Test Voltage	:	230V/50Hz	Test by	:	Luke Lu
Description	:	Operation Mode			



No.	Freq	Reading	C.F	Result	Limit	Margin	Antenna	Remark
	MHz	dBµV	dB/m	dBµV/m	dBµV/m	dB	Pol.	
1	2135.000	55.11	-16.65	38.46	56.00	-17.54	VERTICAL	Peak
2	2535.000	55.84	-15.34	40.50	56.00	-15.50	VERTICAL	Peak
3	2900.000	55.58	-14.19	41.39	56.00	-14.61	VERTICAL	Peak
4	2985.000	55.76	-13.62	42.14	56.00	-13.86	VERTICAL	Peak
5	3645.000	57.45	-11.69	45.76	60.00	-14.24	VERTICAL	Peak
6	3910.000	57.32	-10.68	46.64	60.00	-13.36	VERTICAL	Peak

Remark：1. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.

2. Result = Reading + C.F..

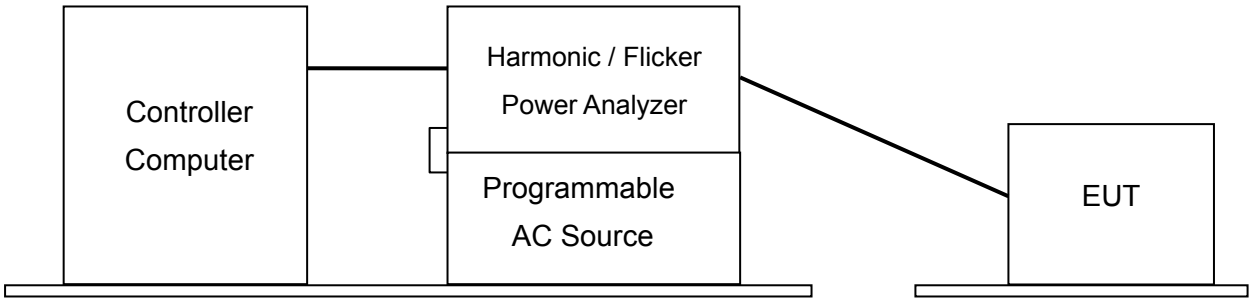
3. Margin = Result – Limit.

6 Harmonic Current Emission Measurement

6.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

6.2 Test Configuration and Procedure



- The EUT was set in series with the Power Analyzer through an Impedance Network for the measurement of harmonic currents.
- The supply voltage and frequency setting on the Programmable AC Source was programmed as the rated voltage and frequency of the EUT.
- Classify the EUT class in accordance with the IEC 61000-3-2 for the purpose of harmonic current limitation. The measurement was automatically performed by test software. The test result was collected and analyzed by the computer.

6.3 EUT Operation Condition

Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA3	08-Mar-2022	25℃	54%RH	1002mbar

6.4 Test Limit

Class A Equipment

Harmonic Order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15 ≤ n ≤ 39	0.15 * 15 / n
Even harmonics	
2	1.08
4	0.43
6	0.30
8 ≤ n ≤ 40	0.23 * 8 / n

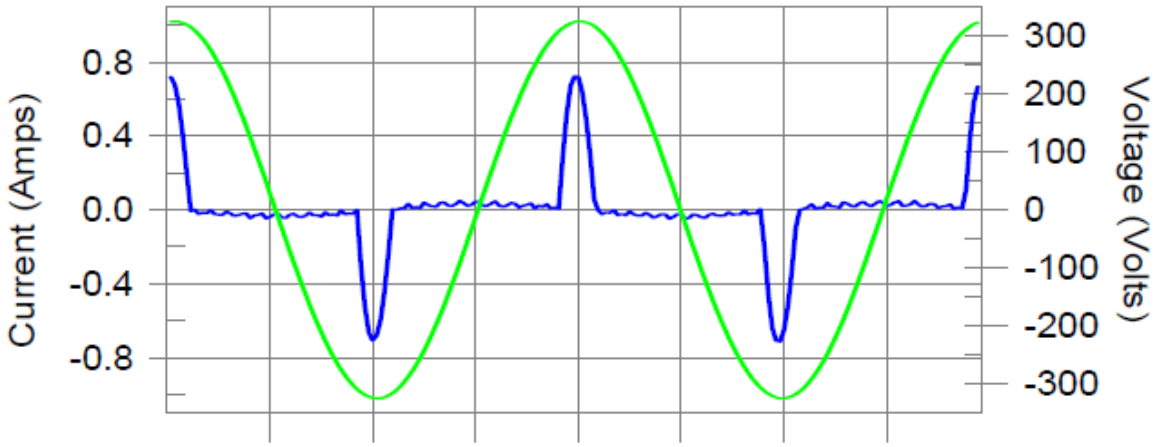
6.5 Test Result

PASS

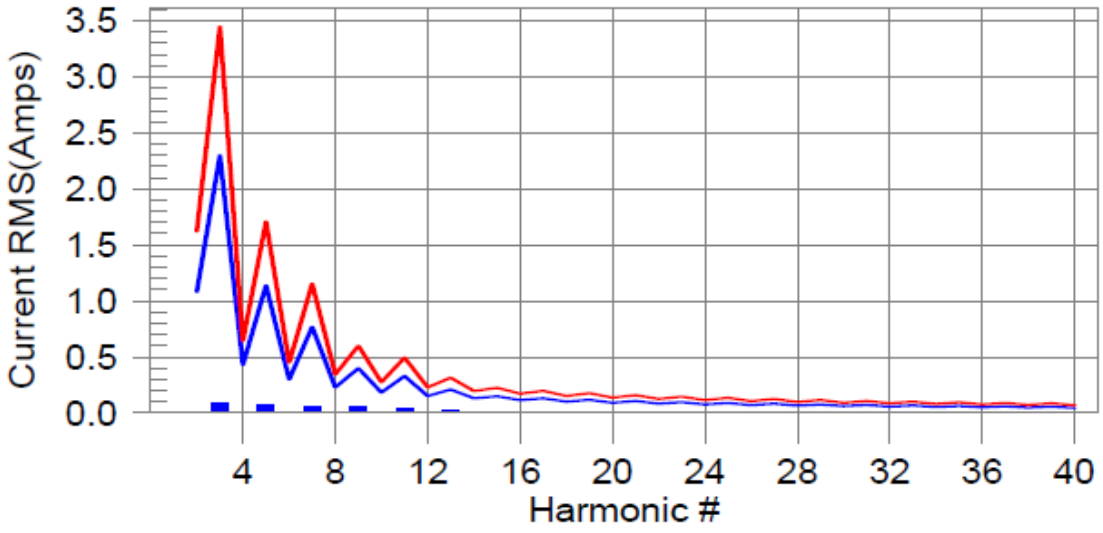
The measured result is shown on the following page(s).

Test Result: Pass **Source qualification: Normal**

Current & voltage waveforms



Harmonics and Class A limit line **European Limits**



Test result: Pass **Worst harmonics H9-8.7% of 150% limit, H9-12.3% of 100% limit**

Test Result: Pass **Source qualification: Normal**
THC(A): 0.144 **I-THD(%): 148.2** **POHC(A): 0.014** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_RMS (Volts):	230.02	Frequency(Hz):	50.00
I_Peak (Amps):	0.737	I_RMS (Amps):	0.203
I_Fund (Amps):	0.097	Crest Factor:	4.174
Power (Watts):	21.4	Power Factor:	0.535

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.002	1.080	N/A	0.002	1.620	N/A	Pass
3	0.082	2.300	3.6	0.088	3.450	2.5	Pass
4	0.002	0.430	N/A	0.002	0.645	N/A	Pass
5	0.074	1.140	6.5	0.078	1.710	4.6	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.062	0.770	8.1	0.066	1.155	5.7	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.049	0.400	12.3	0.052	0.600	8.7	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.035	0.330	10.7	0.038	0.495	7.7	Pass
12	0.000	0.153	N/A	0.001	0.230	N/A	Pass
13	0.023	0.210	10.7	0.025	0.315	7.8	Pass
14	0.000	0.131	N/A	0.001	0.197	N/A	Pass
15	0.012	0.150	7.7	0.013	0.225	5.9	Pass
16	0.001	0.115	N/A	0.001	0.173	N/A	Pass
17	0.004	0.132	N/A	0.005	0.198	N/A	Pass
18	0.001	0.102	N/A	0.001	0.153	N/A	Pass
19	0.004	0.118	N/A	0.007	0.178	N/A	Pass
20	0.001	0.092	N/A	0.001	0.138	N/A	Pass
21	0.007	0.107	6.2	0.008	0.161	5.0	Pass
22	0.000	0.084	N/A	0.001	0.125	N/A	Pass
23	0.007	0.098	7.4	0.008	0.147	5.3	Pass
24	0.000	0.077	N/A	0.001	0.115	N/A	Pass
25	0.006	0.090	6.8	0.007	0.135	5.0	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.004	0.083	N/A	0.005	0.125	N/A	Pass
28	0.000	0.066	N/A	0.001	0.099	N/A	Pass
29	0.002	0.078	N/A	0.003	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.002	0.073	N/A	0.003	0.109	N/A	Pass
32	0.000	0.058	N/A	0.001	0.086	N/A	Pass
33	0.002	0.068	N/A	0.003	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.003	0.064	N/A	0.003	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.003	0.061	N/A	0.003	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.002	0.058	N/A	0.003	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

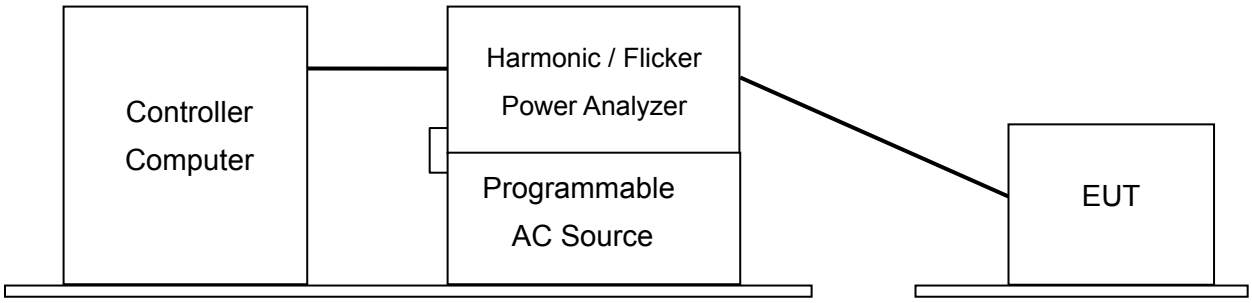
Note: The EUT power level is below 75watts therefore has no defined limits.

7 Voltage Fluctuations and Flicker Measurement

7.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

7.2 Test Configuration and Procedure



- The EUT was set in series with the Power Analyzer through an Impedance Network for the measurement of Flicker Voltage.
- The supply voltage and frequency setting on the Programmable AC Source was programmed as the rated voltage and frequency of the EUT.
- The measurement was automatically performed by test software. The test result was collected and analyzed by the computer.

7.3 EUT Operation Condition

Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA3	08-Mar-2022	25℃	54%RH	1002mbar

7.4 Test Limit

Test Item	Limit	Remark
P_{st}	1.0	P_{st} means short-term flicker indicator. T_p=10 min
P_{lt}	0.65	P_{lt} means long-term flicker indicator. T_p=2 hrs
d_t (%)	3.3	For more than 500ms
d_{max} (%)	4	d_{max} means relative maximum voltage change.
d_c (%)	3.3	d_c means relative steady-state voltage change.

7.5 Test Result

PASS

The measured result is shown on the following page(s).

Test Result: Pass **Status: Test Completed**

Pst and limit line **European Limits**

Plt and limit line

Parameter values recorded during the test:

Vrms at the end of test (Volt):	229.97			
Highest dt (%):		Test limit (%):		
T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.169	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.074	Test limit:	0.650	Pass

8 Electrostatic Discharge Immunity Test

8.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

8.2 Test Configuration and Procedure

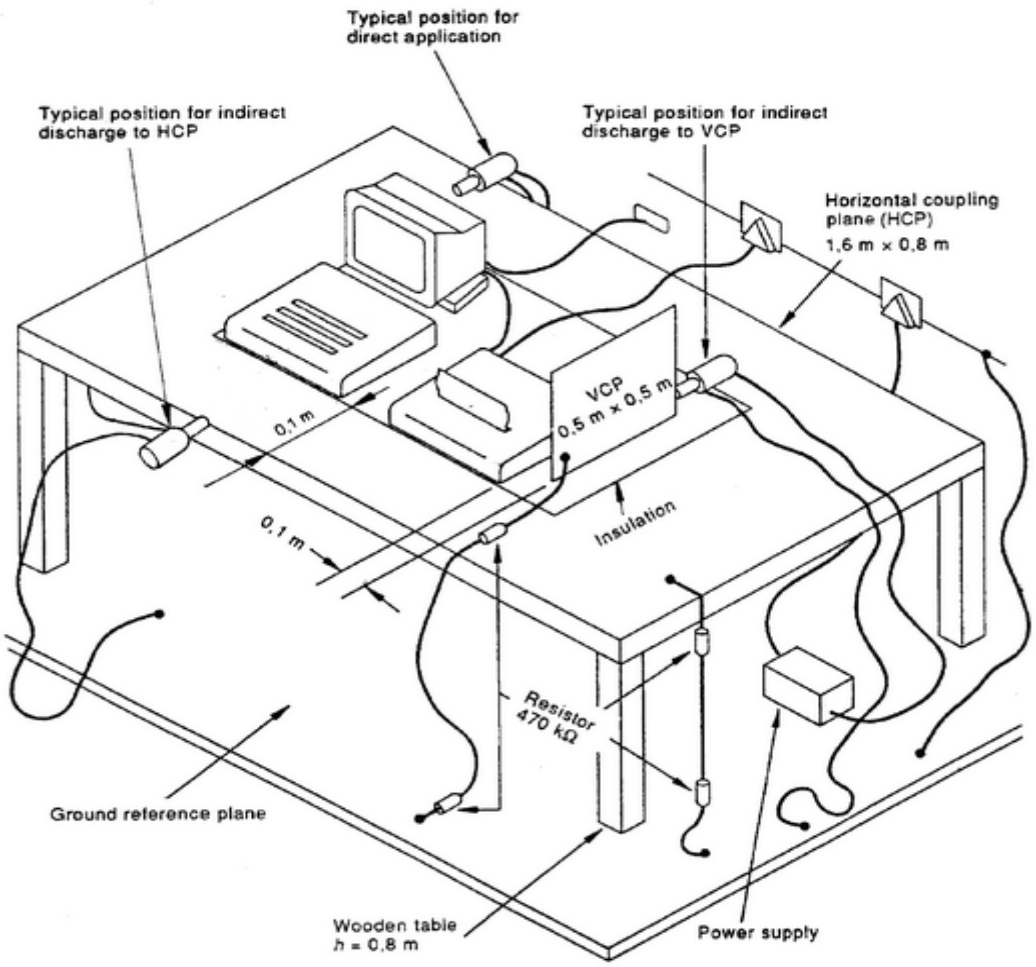


Table-top Equipment

- The EUT was located on a 0.8 m high wooden table standing on the ground reference plane with a 1.6 * 0.8 m horizontal coupling plane on the top. The EUT and cables was isolated from the coupling plane by an insulating support 0.5 mm thick.
- In Contact Discharge, the EUT was exposed to minimum 20 discharges each at negative and positive polarity on the selected test points (the selected test points were marked with red labels on the EUT)
- In Air Discharge, the EUT exposed to minimum of 20 discharges each at negative and positive polarity on the selected test points as well.
- The result was observed and analyzed.

8.3 Test Result

8.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA6	10-Mar-2022	21℃	52%RH	1004mbar

8.3.2 Observation of Direct Discharge

Test Points: 1. Surface of Case 2. Junction of Case. 3. RJ 45Jacks. 4. RS 232 Jack. 5. TFJack. 6. Type C Jack. 7. LED Indicator.

Type of Discharge	Test Specifications				Performance Required by EN61131-2	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
Air Discharge	2,4,8 (kV)	±	1~7	10/ per point	B	A	Pass[1]
Contact Discharge	4 (kV)	±	3~4	10/ per point	B	A	Pass[2]
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of air discharge. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of contact discharge.						
Note	The selected points were marked with labels on the EUT.						

The Performance Requirement Class Criterion is defined in Sec. 1.11.

8.3.3 Observation of Indirect Discharge

Test Points: 1. Front Side. 2. Rear Side. 3. Left Side. 4. Right Side.

Type of Discharge	Test Specifications				Performance Required by EN61131-2	Observed Result	Verdict
	Test Level	Polarity	Test Point	Number of Discharge			
HCP Application	4 (kV)	±	1~4	10/ per point	B	A	Pass[1]
VCP Application	4 (kV)	±	1~4	10/ per point	B	A	Pass[2]
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire time interval of HCP application. 2. No temporary degradation or loss of function has been observed throughout the entire time interval of VCP application.						
Note	The selected points were marked with labels on the EUT.						

The Performance Requirement Class Criterion is defined in Sec. 1.11.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

9 Radio-frequency, Electromagnetic Field Immunity Test

9.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

9.2 Test Configuration and Procedure

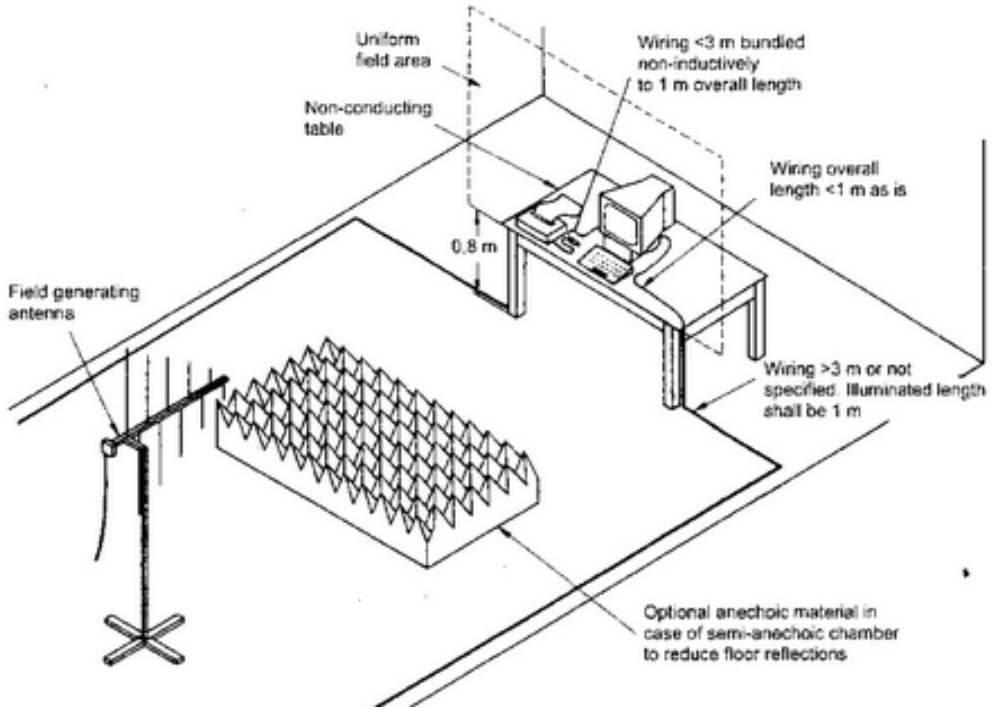


Table-top Equipment

- The field calibration was executed to create a uniform field area (UFA), 3 m away from the antenna, to ensure the validity of the test results.
- The EUT was placed on a non-conductive table 0.8 m high in the UFA.
- The EUT was then connected to power and signal wires according to relevant installation instruction.
- The EUT was positioned so that the four sides of the EUT were exposed to the electromagnetic field in sequence. In each position, the performance of the EUT was investigated and monitored by a CCD camera..

9.3 Test Result

9.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA3	08-Mar-2022	22℃	54%RH	1002mbar

9.3.2 Observation of Direct Discharge

Type of Modulation	Test Specification				Performance Required by EN61131-2	Observed Result	Verdict
	Field Strength	Frequency Range	Modulated	Polarity			
Amplitude Modulation	10V/m	80 to 1000MHz	1kHz, 80% AM, Sine wave	V&H	A	A	Pass[1]
Amplitude Modulation	3V/m	1.4 to 3.0 GHz	1kHz, 80% AM, Sine wave	V&H	A	A	Pass[1]
Remark:	1. No temporary degradation or less of function has been observed throughout the entire time interval of the test.						
Note	The applied 0°, 90°, 180°, 270° relative to the position to the equipment under test.						

The Performance Requirement Class Criterion is defined in Sec. 1.11.

9.3.3 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
Refer to Clause 1.2	09-Mar-2022	23℃	55%RH	1007mbar

9.3.4 Observation of Test

Type of Modulation	Test Specification				Performance Required by EN61131-2	Observed Result	Verdict
	Field Strength	Frequency Range	Modulated	Polarity			
Amplitude Modulation	3V/m	3.0 to 6.0 GHz	1kHz, 80% AM, Sine wave	V&H	A	A	Pass[1,2]
Remark:	1. No temporary degradation or less of function has been observed throughout the entire time interval of the test. 2. The test item was performed at an ISO 17025 accredited facility where this test item is covered under the scope of the facility's ISO 17025 accreditation. Detail of the facility is recorded at clause 1.2 of this report.						
Note	The applied 0°, 90°, 180°, 270° relative to the position to the equipment under test.						

The Performance Requirement Class Criterion is defined in Sec. 1.11.

PASS

The test result shows that the EUT compliant with the test requirement specified in EN EN61131-2.

10 Electrical Fast Transient Test

10.1 Test Instrument

Refer to Sec. 1.3 Test Instruments.

10.2 Test Configuration and Procedure

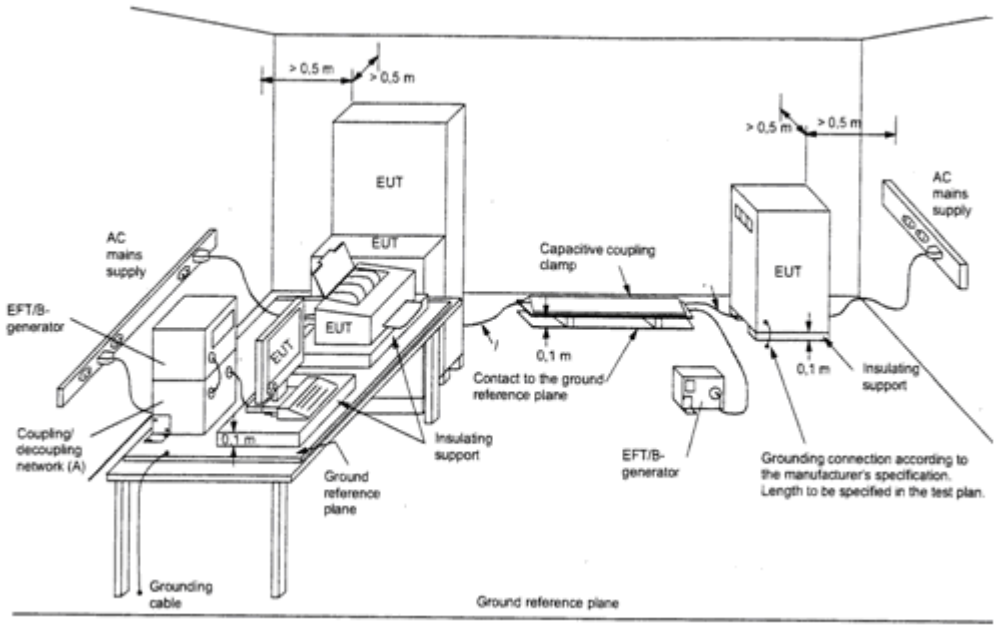


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The distance between the EUT and all other conductive structures, except the ground plane beneath the EUT was more than 0.5 m.
- The length of the signal and power lies between the coupling device and the EUT was 0.5 m.
- All cables to the EUT were placed on the insulation support 0.1 m above the ground reference plane.
- The EUT was connected to the power mains through a coupling device that directly coupled the EFT interference signal. Each of the Line, Neutral and Protective Earth conductors was injected with burst for 1 minute. The test time was broken down into six 10 s bursts separated by a 10 s pause for avoiding synchronization. Both voltage polarities were applied for each test level.
- Operating condition was shown on the monitor and observed.

10.3 Test Result

10.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA6	10-Mar-2022	23℃	51%RH	1004mbar

10.3.2 Observation of AC Power Port

Coupling Selection	Test Specifications				Performance Required by EN61131-2	Observed Result	Verdict
	Voltage (kV)	Test Duration (Sec)	Repetition frequency (kHz)	Tr/ Th (ns)			
L	±1,2	60	100	5/50	B	A	Pass[1]
N	±1,2	60	100	5/50	B	A	Pass[1]
PE	±1,2	60	100	5/50	B	A	Pass[1]
L + N	±1,2	60	100	5/50	B	A	Pass[1]
L + PE	±1,2	60	100	5/50	B	A	Pass[1]
N + PE	±1,2	60	100	5/50	B	A	Pass[1]
L + N +PE	±1,2	60	100	5/50	B	A	Pass[1]
Remark	1. No temporary degradation or loss of function has been observed throughout the entire test.						

The Performance Requirement Class Criterion is defined in Sec. 1.11.

10.3.3 Observation of signal ports (Applicable only to cable length >3m)

There was no signal cable longer than 3 meter; therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

11 Surge Immunity Test

11.1 Test Instrument

Refer to Sec. 1.3 Test Instruments.

11.2 Test Configuration and Procedure

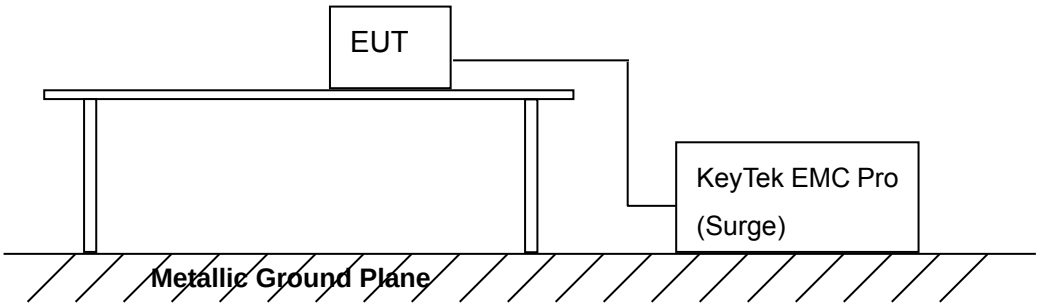


Table-top Equipment

- The EUT was placed on a table of 0.8 m height above the 1 * 1 m metallic ground reference plane, which projected beyond the EUT by at least 0.1 m on all sides.
- The ground plane was connected to the protective earth.
- The length of power cord between the coupling device and the EUT is less than 2 m (provided by the manufacturer).
- The EUT was connected to the power mains through a coupling device that directly couples the Surge interference signal. The surge noise was applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).
- The surges were applied line to line and line(s) to earth. When testing line to earth the test voltage was applied successively between each of the lines and earth. Steps up to the test level specified increased the test voltage. All lower levels including the selected test level were tested. The polarity of each surge level included positive and negative test pulses.
- Operating condition was shown on the monitor and observed.

11.3 Test Result

11.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA6	10-Mar-2022	23℃	53%RH	1004mbar

11.3.2 Observation of AC Power Port

Coupling Selection	Test Specifications			Performance Required by EN61131-2	Observed Result	Verdict
	Voltage (kV)	Min. of Surge at Each Polarity	Repetition Rate (per min)			
L ►N	±0.5,1	5	1	B	A	Pass[1]
L ►PE	±0.5,1,2	5	1	B	A	Pass[1]
N ►PE	±0.5,1,2	5	1	B	A	Pass[1]
Remark	1. No temporary degradation or loss of function has been observed throughout the entire test.					

The Performance Requirement Class Criterion is defined in Sec. 1.11.

11.3.3 Observation of other supply/ signal lines: (Applicable only to ports which according to the manufacturer's specification may exceed 30m)

N/A

PASS

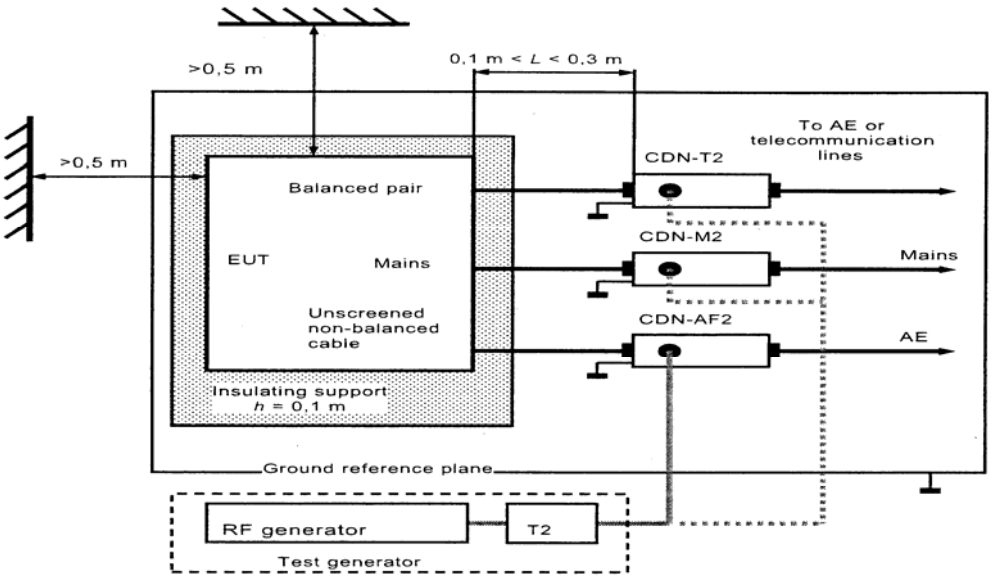
The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

12 Radio-frequency, Conducted Disturbances Immunity Test

12.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

12.2 Test Configuration and Procedure



- The EUT was placed on an insulating support of 0.1 m height above a ground reference plane. All cables exiting the EUT was supported at a height of 30 mm above the ground reference plane.
- The EUT was connected to the power mains through a Coupling and Decoupling Networks (CDN).
- The CDN was located 0.3 m from the EUT as indicated in the diagram above.
- The test was performed with the test generator connected to each of the CDN in turn while the other non-excited RF input ports of the coupling devices were terminated by a 50 Ω terminator.
- The conducted disturbance was applied on the EUT from 150 kHz to 80 MHz using the signal levels established during the setting process. .
- Operating condition was shown on the monitor and observed.

12.3 Test Result

12.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA3	08-Mar-2022	21℃	55%RH	1002mbar

12.3.2 Observation of AC Power Port

Type of Modulation	Test Specifications			Performance Required by EN61131-2	Observed Result	Verdict
	Voltage Level (emf) U_0	Frequency Range	Modulated			
Amplitude Modulation	10V/ 140dBμV	0.15 to 80MHz	1kHz, 80% AM, Sine wave	A	A	Pass[1]
Remark	1. No temporary degradation or loss of function has been observed throughout the entire test.					

The Performance Requirement Class Criterion is defined in Sec. 1.11.

12.3.3 There was no Signal ports cable longer than 3 m, therefore, no test has been required.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

13 Power Frequency Magnetic Field Immunity Test

13.1 Test Instruments

Refer to Sec. 1.3 Test Instruments.

13.2 Test Configuration and Procedure

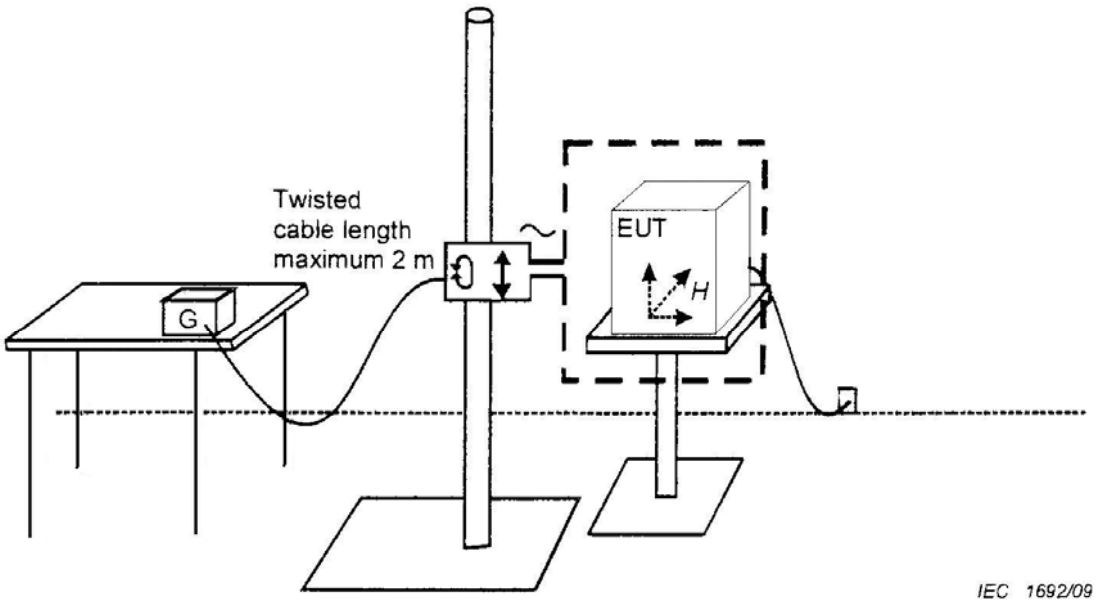


Table-top Equipment

- The EUT was placed on a non-magnetic metal ground plane of 0.25 mm thickness with the interposition of a 0.1 m thickness insulating support. The ground plane was connected to the protected earth.
- The EUT was placed at the center of the 1 * 1 m induction coil with the test generator placed within 3 m distance.
- The test was operated by moving and shifting the induction coil to expose to the test field.
- The operation condition was observed and analyzed.
- The induction coil was then rotated by 90° to expose the EUT to the test field with different orientations and the same procedure.

13.3 Test Result

13.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA3	08-Mar-2022	21℃	52%RH	1002mbar

13.3.2 Observation of Test

Level (A/m)	Frequency (Hz)	Performance Required by EN EN61131-2	Observed Result	Verdict
30	50	A	A	Pass[1]
Remark	1. No temporary degradation or loss of function has been observed throughout the entire test.			

The Performance Requirement Class Criterion is defined in Sec. 1.11.

PASS

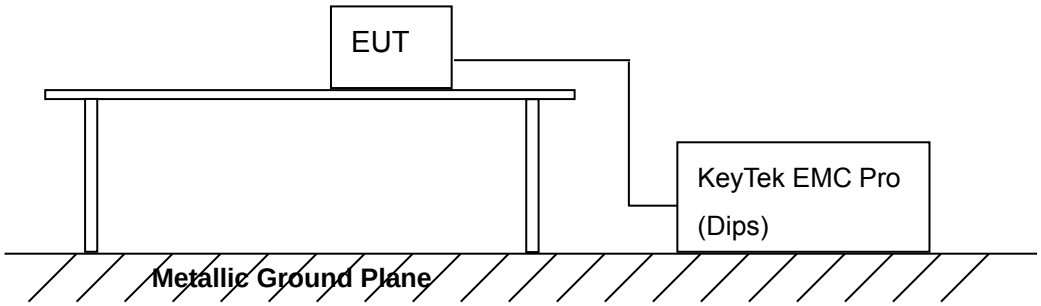
The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

14 Voltage Dips, Short Interruptions Immunity Test

14.1 Test Instrument

Refer to Sec. 1.3 Test Instruments.

14.2 Test Configuration and Procedure



- The EUT was tested with (Ⅰ) 0% voltage dip of supplied voltage with a duration of 20 ms (Ⅱ) 40% voltage dip of supplied voltage with duration 200 ms (Ⅲ) 70% voltage dip of supplied voltage with duration 500 ms (Ⅳ) A 0% voltage interruption of supplied voltage with duration of 5000 ms,
- For each selected combination of test level and duration with a sequence of three dips / interruptions with intervals of 10 s.
- For Voltage Dips, changes in supply voltage occurred at zero crossings of the voltage.
- For Short Interruptions, changes in supply voltage also occurred at zero crossings of the voltage.

14.3 Test Result

14.3.1 Environment Condition

Test Site	Test Date	Temperature	Humidity	Atmospheric Pressure
HA6	10-Mar-2022	23℃	51%RH	1004mbar

14.3.2 Observation of Power Supply Port

Voltage Dips

Voltage Residual (%)	Test Specifications			Performance Required by EN61131-2	Observed Result	Verdict
	Duration Periods	No. of Reductions	Interval between Each Duration (sec.)			
0	0.5	3	≥ 10	A	A	Pass[1]
40	10	3	≥ 10	C	A	Pass[1]
70	25	3	≥ 10	C	A	Pass[1]
Remarks	1. No temporary degradation or loss of function has been observed throughout the entire test.					

The Performance Requirement Class Criterion is defined in Sec. 1.11.

Voltage Interruptions

Voltage Residual (%)	Test Specifications			Performance Required by EN61131-2	Observed Result	Verdict
	Duration Periods	No. of Reductions	Interval between Each Duration (sec.)			
0	250	3	≥ 10	C	B	Pass[1]
Remark	1. When testing Voltage Interruptions with 0% of normal power supply, the EUT shut down automatically. After testing, the EUT recovered its function.					

The Performance Requirement Class Criterion is defined in Sec. 1.11.

PASS

The test result shows that the EUT is in compliance with the test performance criteria specified in EN61131-2.

15 Photographs of Test

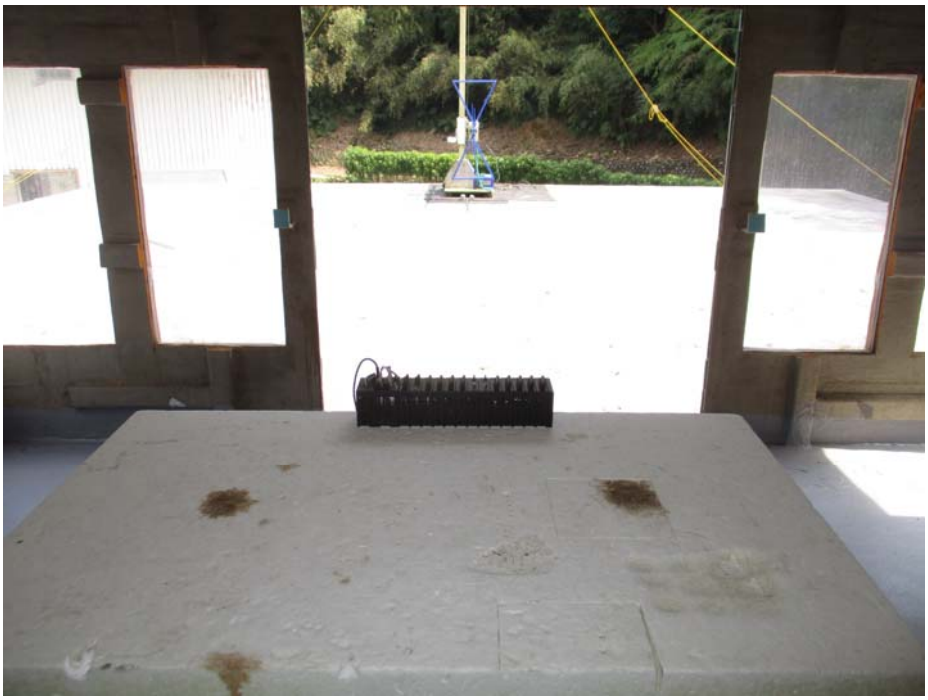
15.1 Power Line Conducted Test

Front View

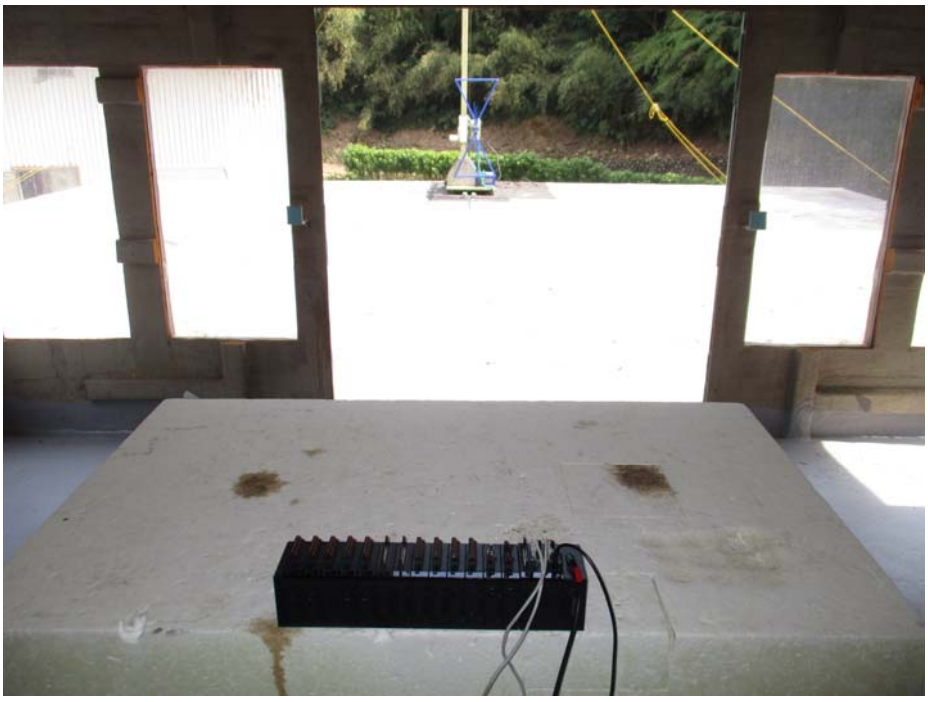
Rear View

15.2 Conducted Emission Test (at Telecommunication Ports)

15.3 Radiated Emission Test

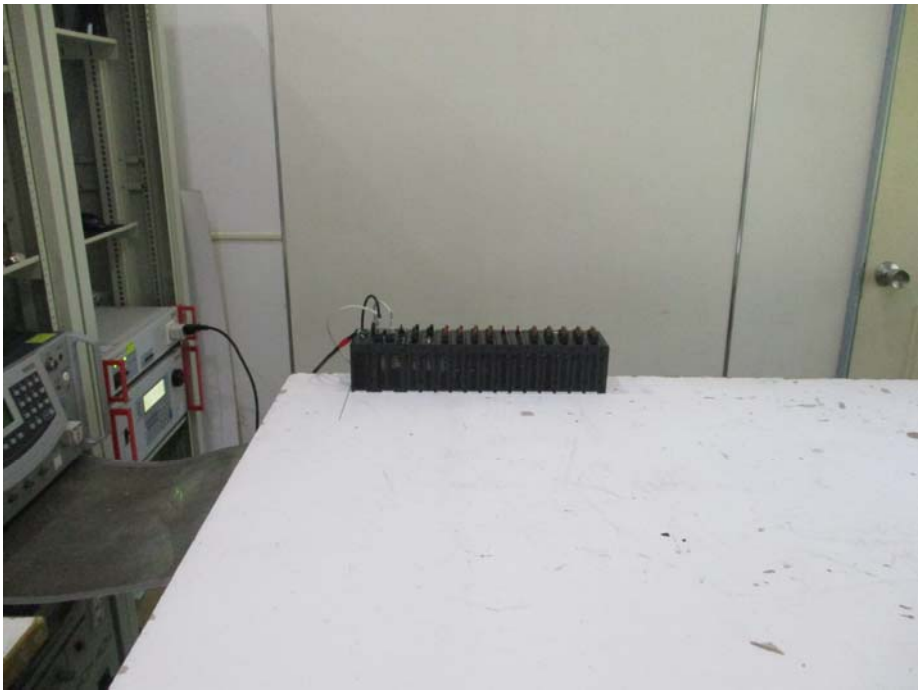


Front View



Rear View

15.4 Harmonic Current & Voltage Fluctuations and Flicker Measurement

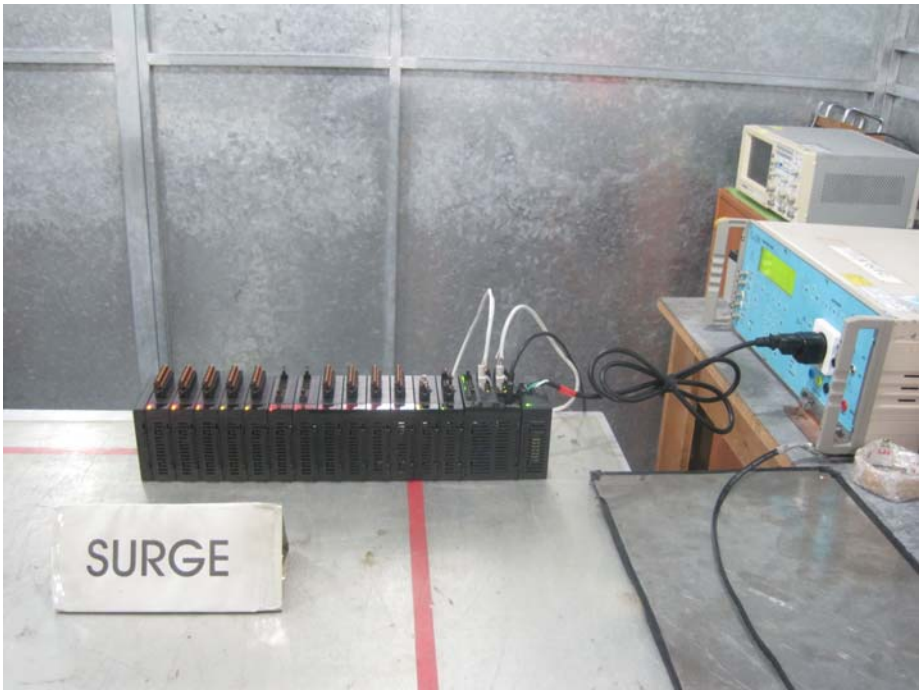


15.5 Electrostatic Discharge Immunity Test

15.6 Radio-frequency, Electromagnetic Field Immunity Test

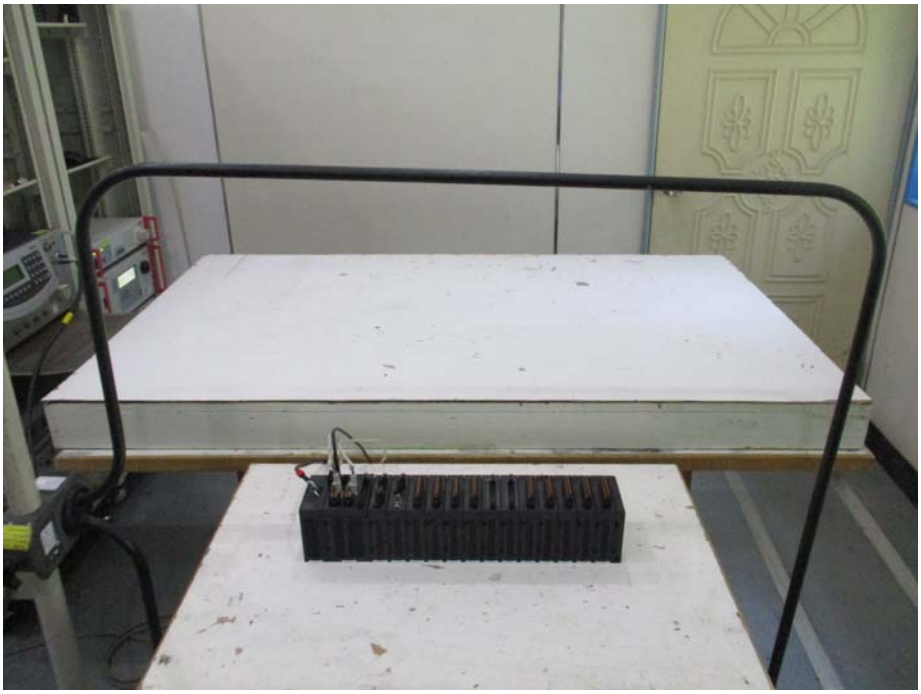
15.7 Electrical Fast Transient / Burst Immunity Test

15.8 Surge Immunity Test

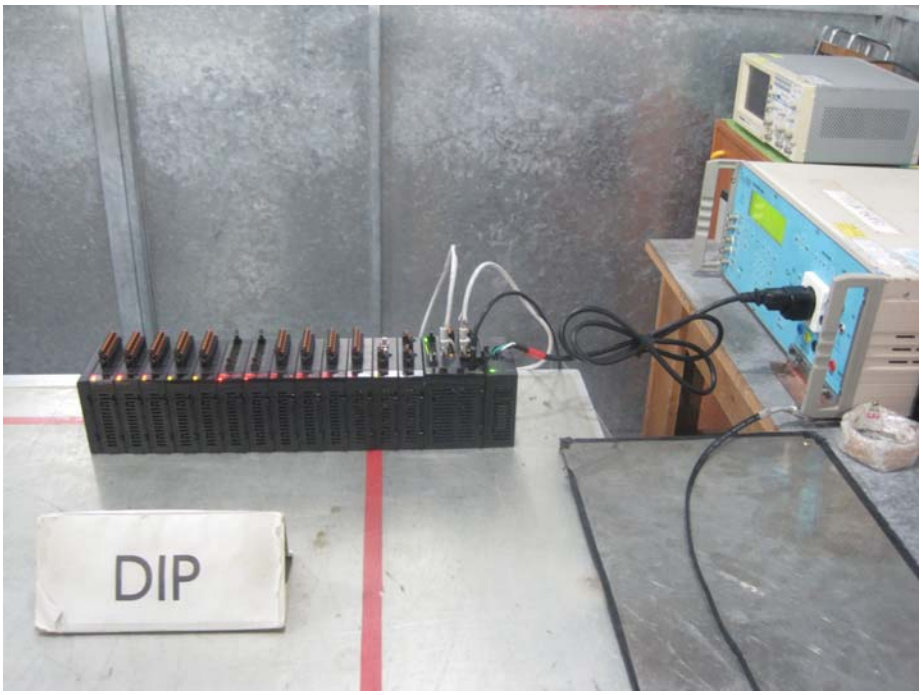


15.9 Radio-frequency, Conducted Disturbances Immunity Test

15.10 Power Frequency Magnetic Field Immunity Test



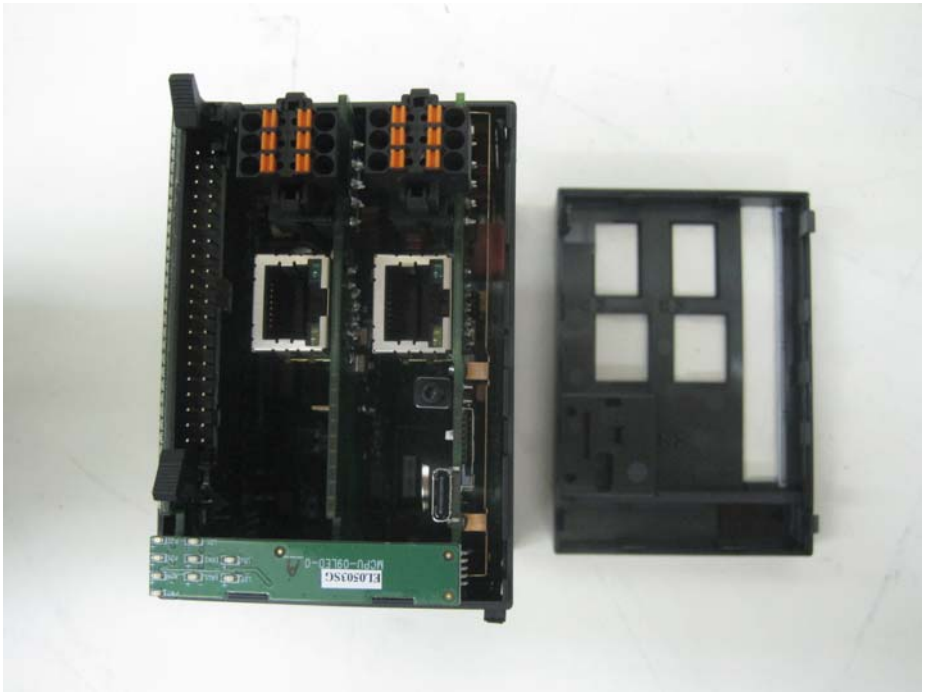
15.11 Voltage Dips, Short Interruptions Immunity Test



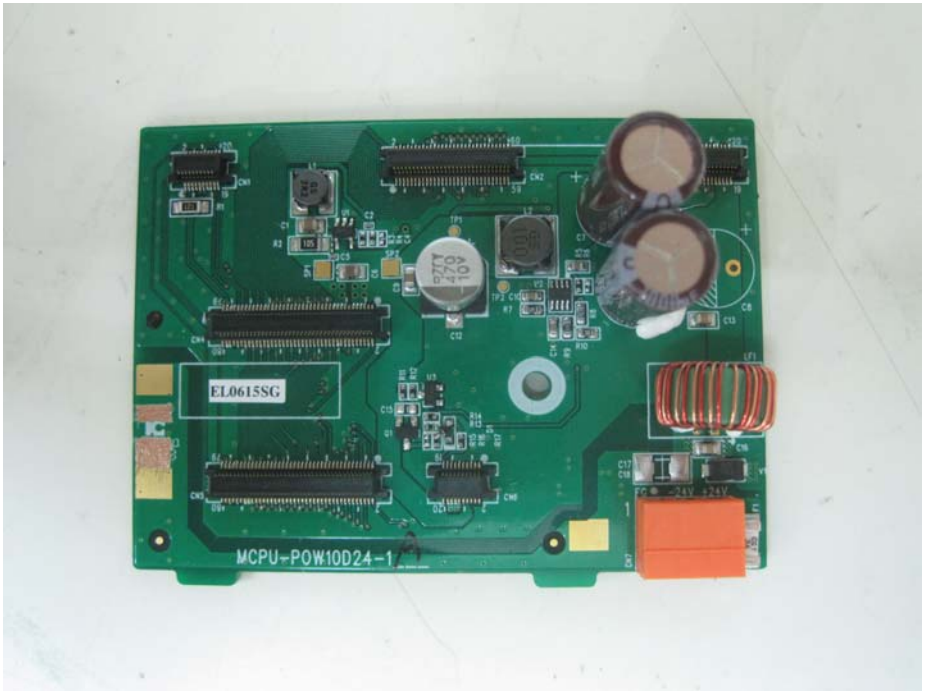
16 Photographs of EUT (Model Number: MR5C9-1616T)

Front View of the EUT

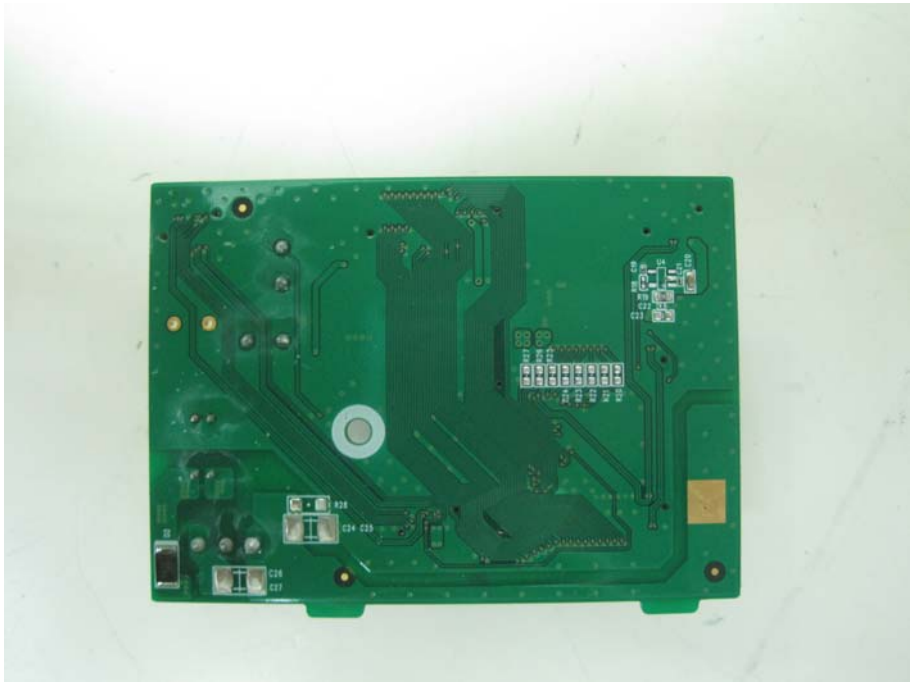
Rear View of the EUT



Inside View of the EUT

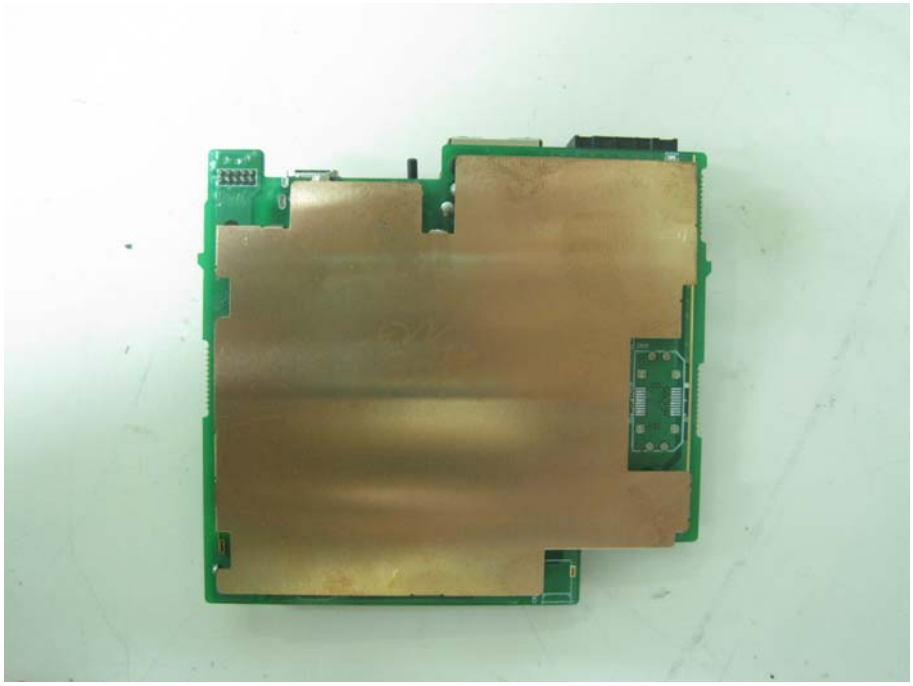


Front View of the PCB 1

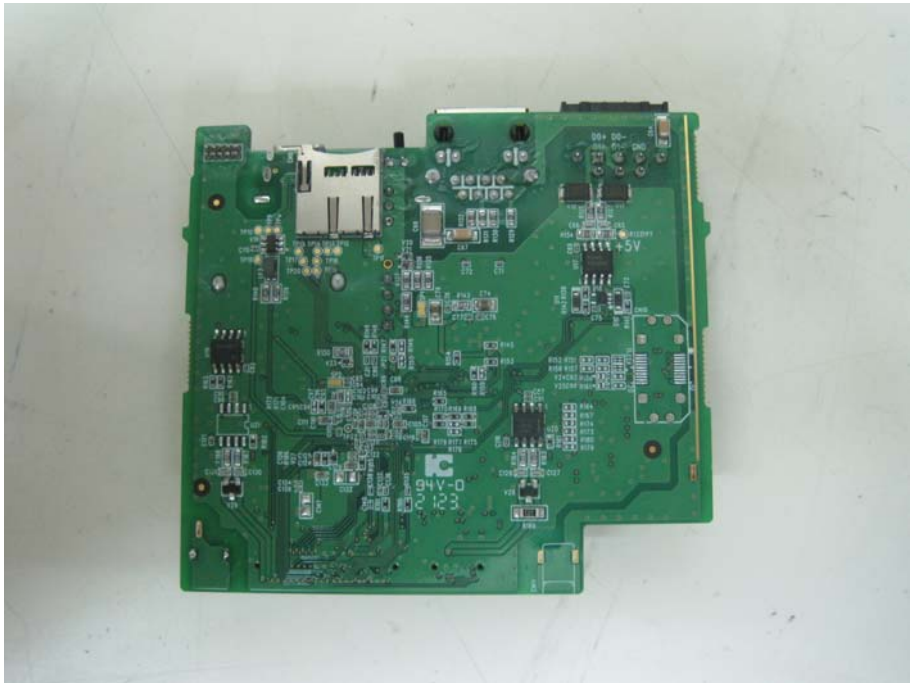


Rear View of the PCB 1

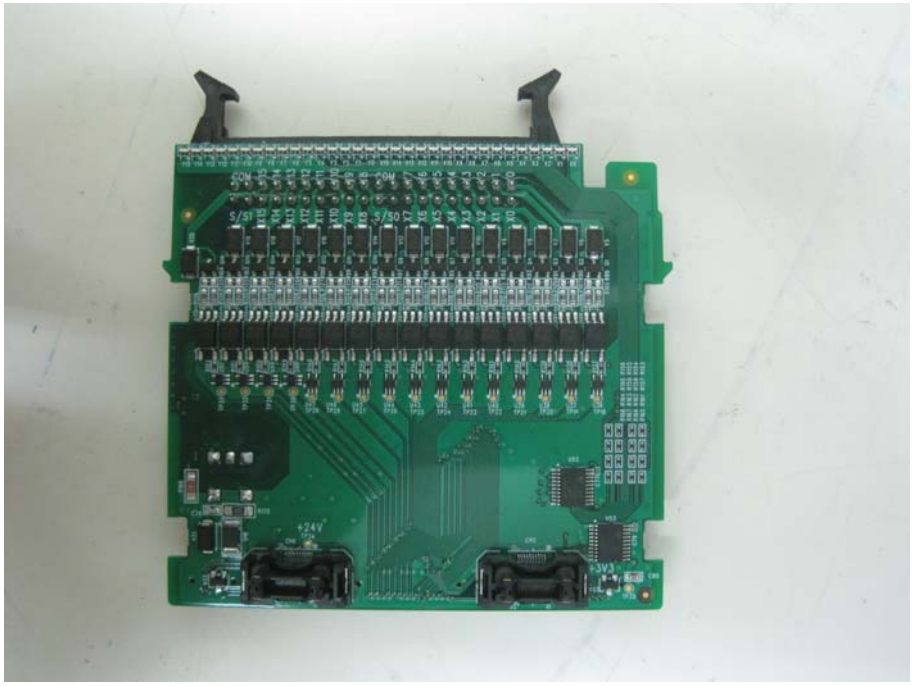
Front View of the PCB 2



Rear View of the PCB 2-1



Rear View of the PCB 2-2



Front View of the PCB 3

Rear View of the PCB 3

Front View of the PCB 4

Rear View of the PCB 4

Front View of the PCB 5

Rear View of the PCB 5

View of the Label

17 Photographs of EUT (Model Number: MPA048-24)

Front View of the EUT

Rear View of the EUT

Inside View of the EUT

Front View of the PCB 1

Rear View of the PCB 1

View of the Label

18 Photographs of EUT (Model Number: MHCM25)

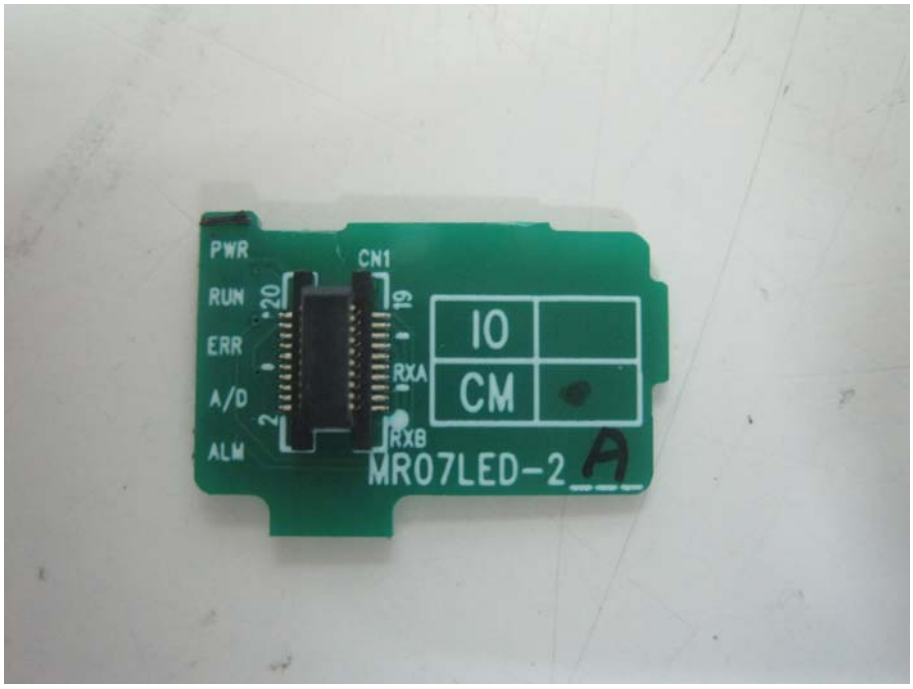
Front View of the EUT

Rear View of the EUT

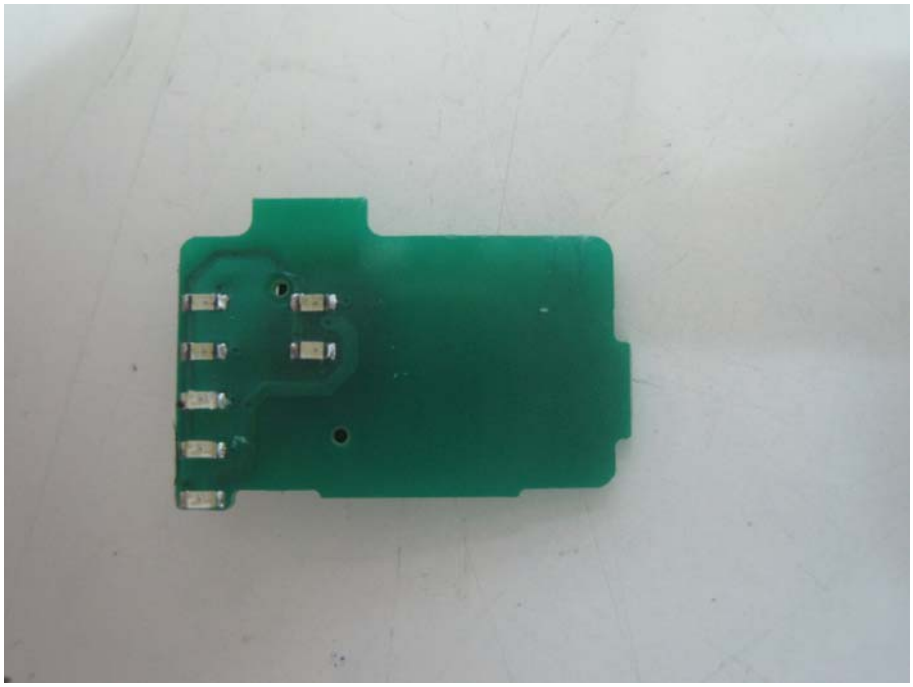
Inside View of the EUT

Front View of the PCB 1

Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

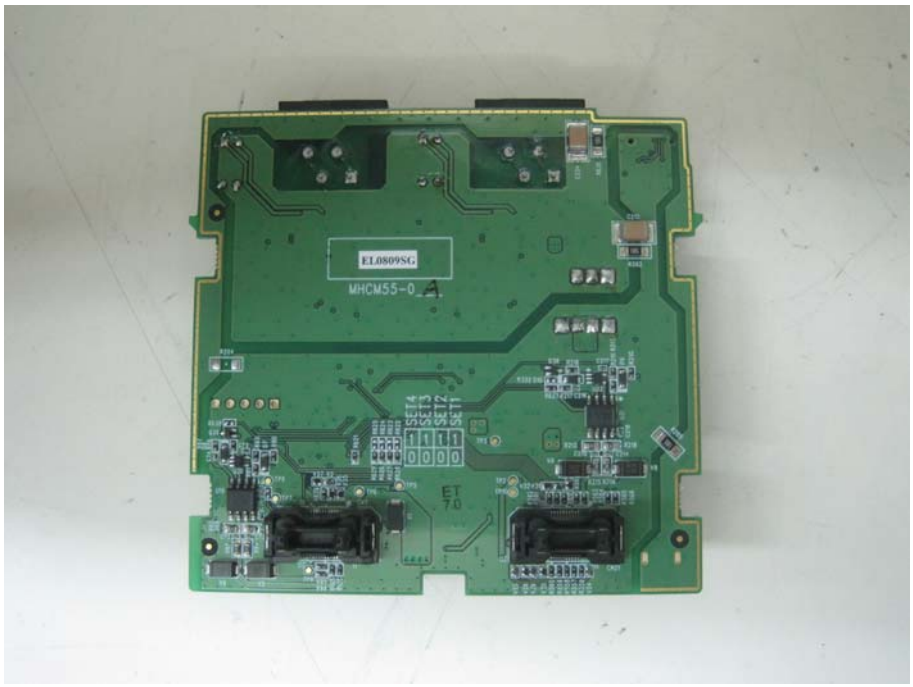
19 Photographs of EUT (Model Number: MHCM55)

Front View of the EUT

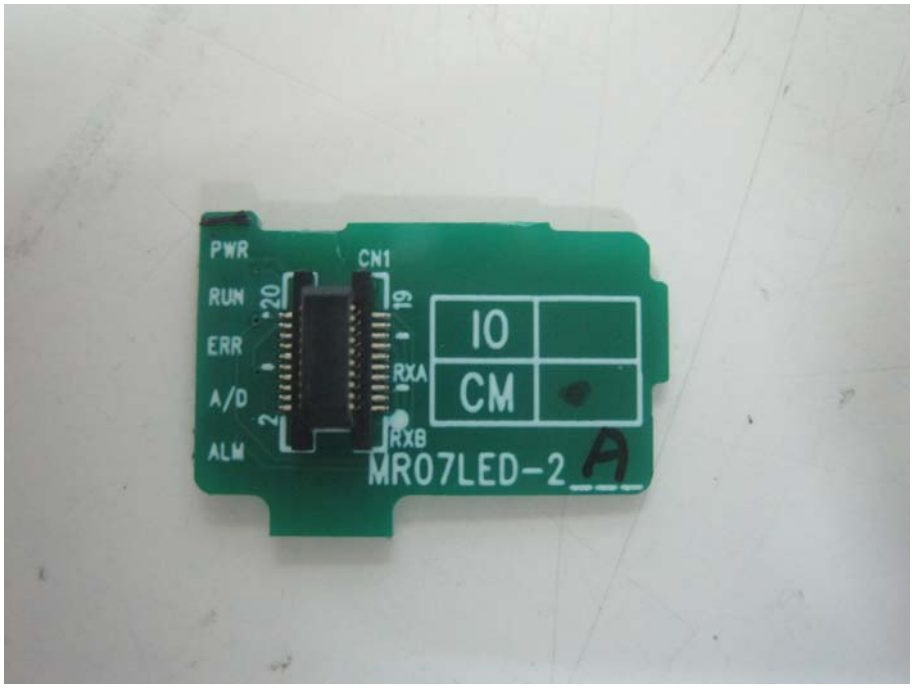
Rear View of the EUT

Inside View of the EUT

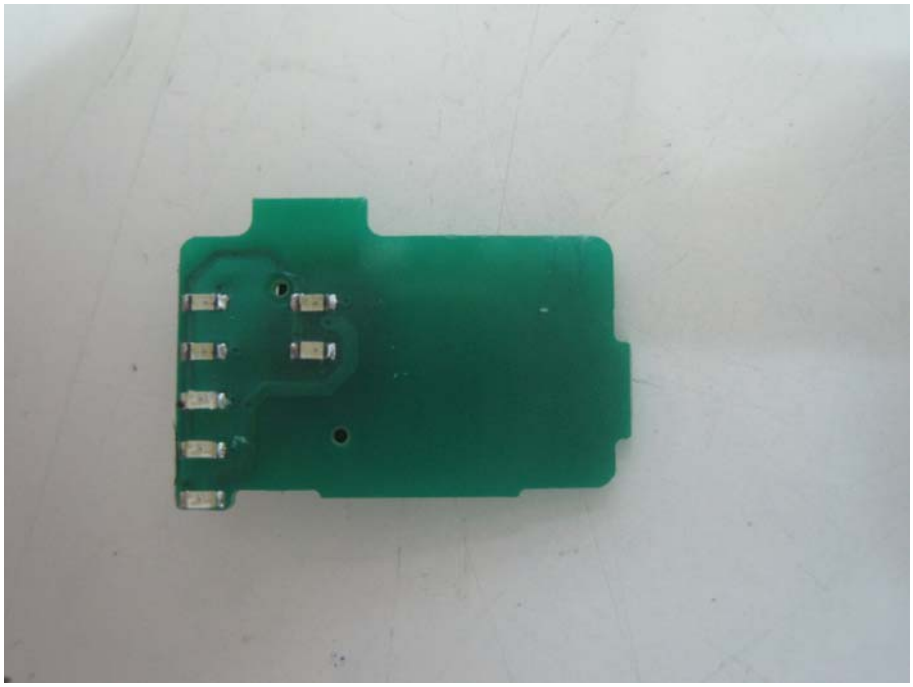
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

20 Photographs of EUT (Model Number: M16X)

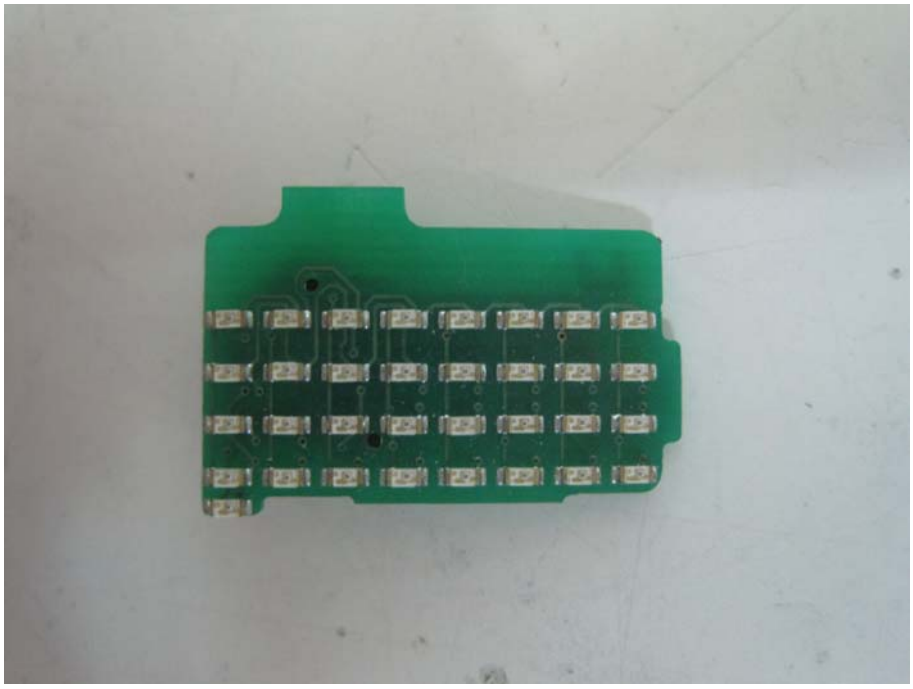
Front View of the EUT

Rear View of the EUT

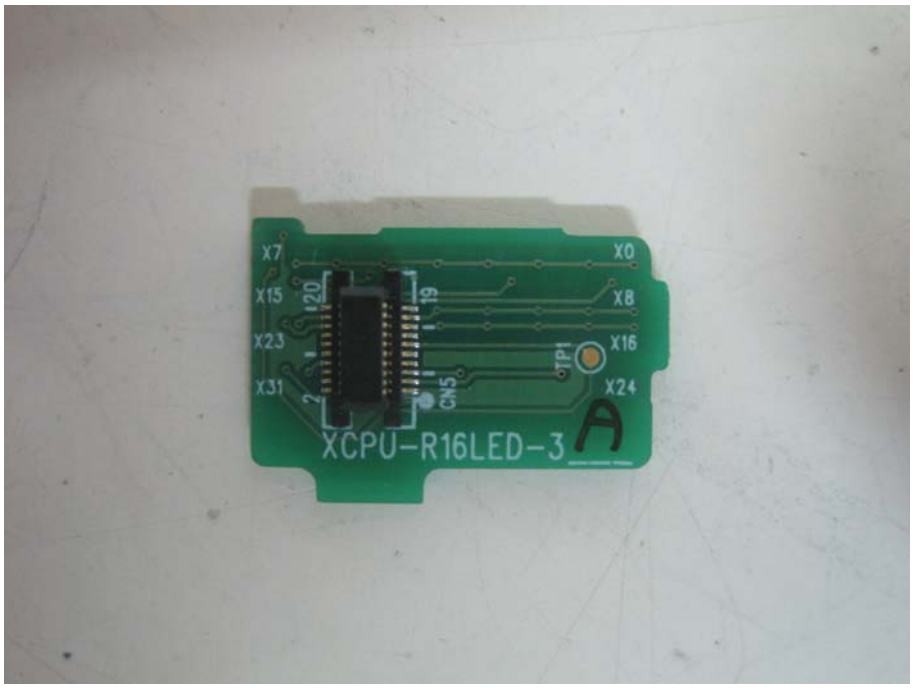
Inside View of the EUT

Front View of the PCB 1

Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

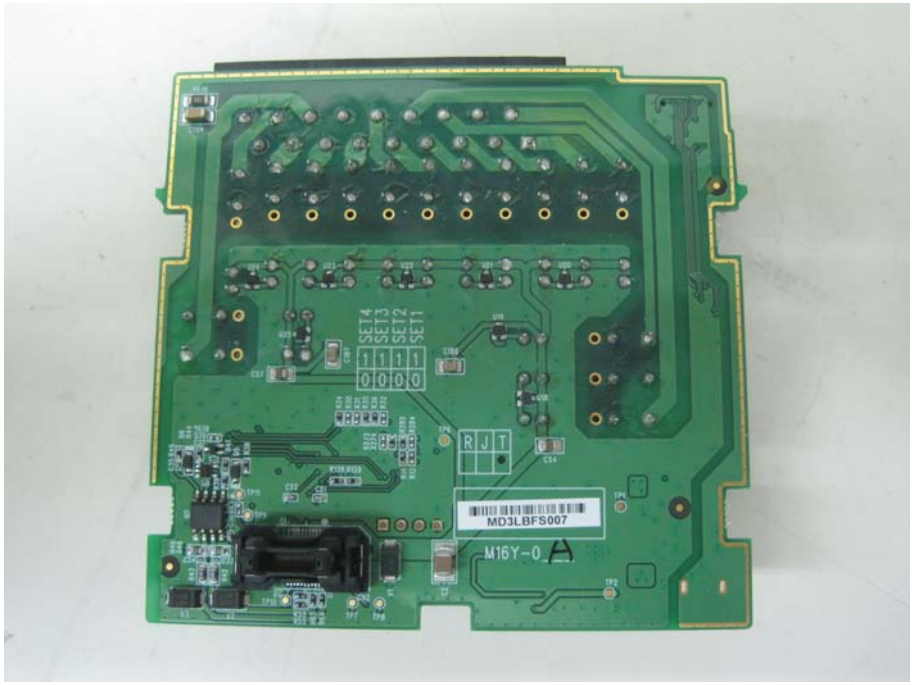
21 Photographs of EUT (Model Number: M16YT)

Front View of the EUT

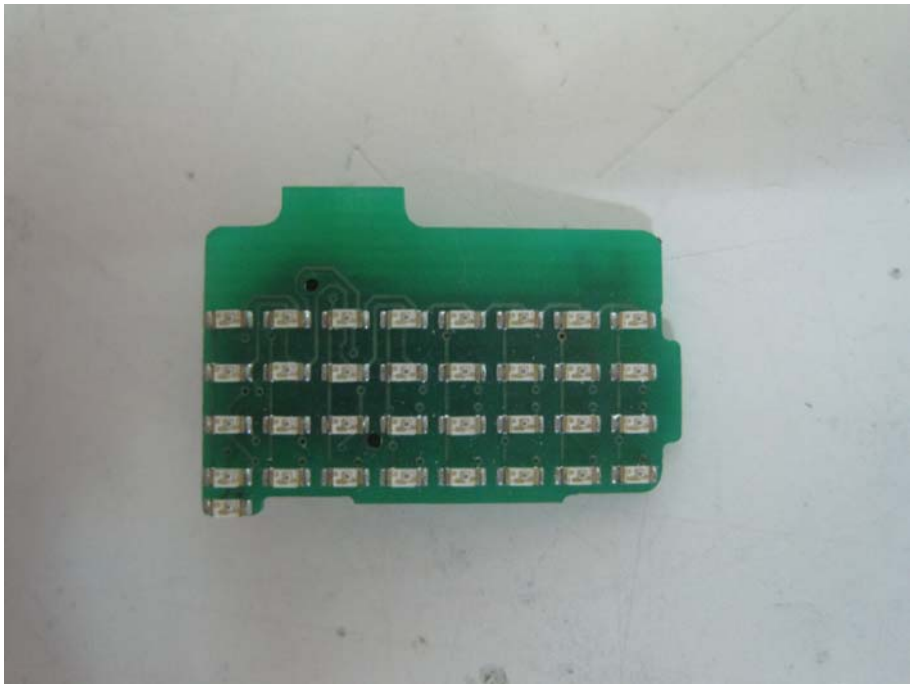
Rear View of the EUT

Inside View of the EUT

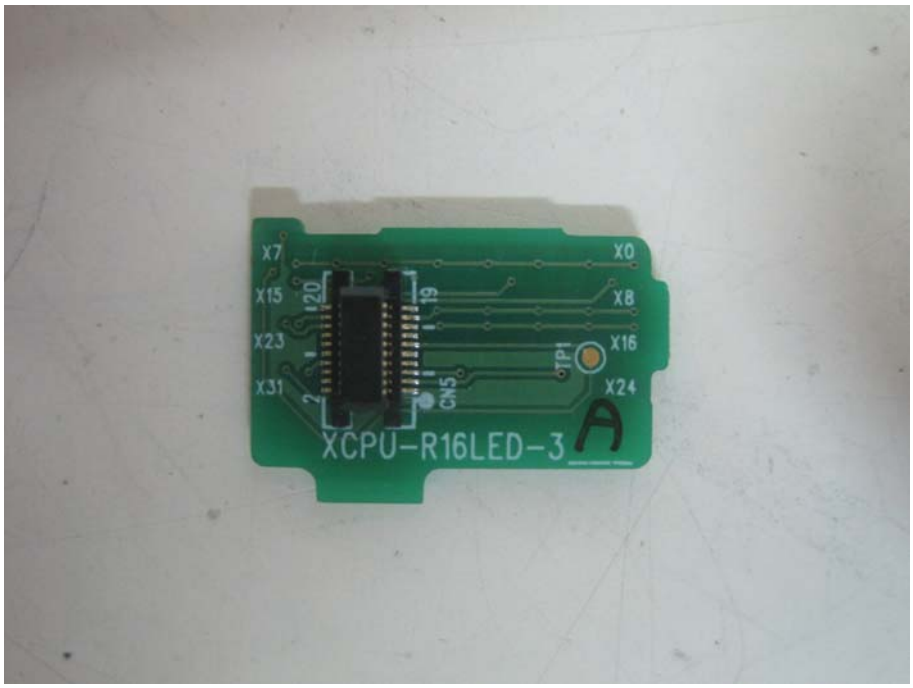
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

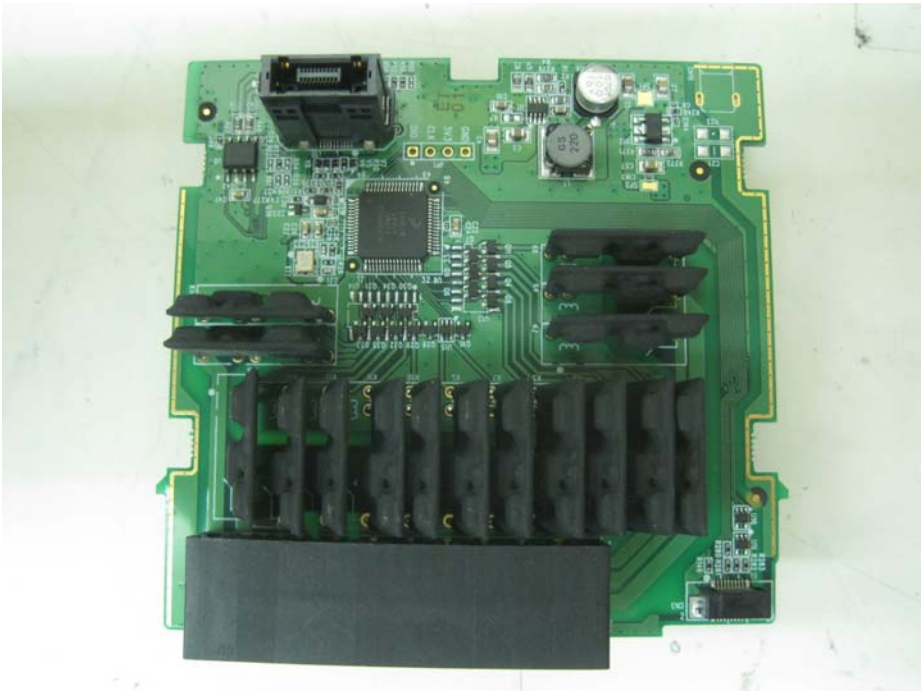
View of the Label

22 Photographs of EUT (Model Number: M16YJ)

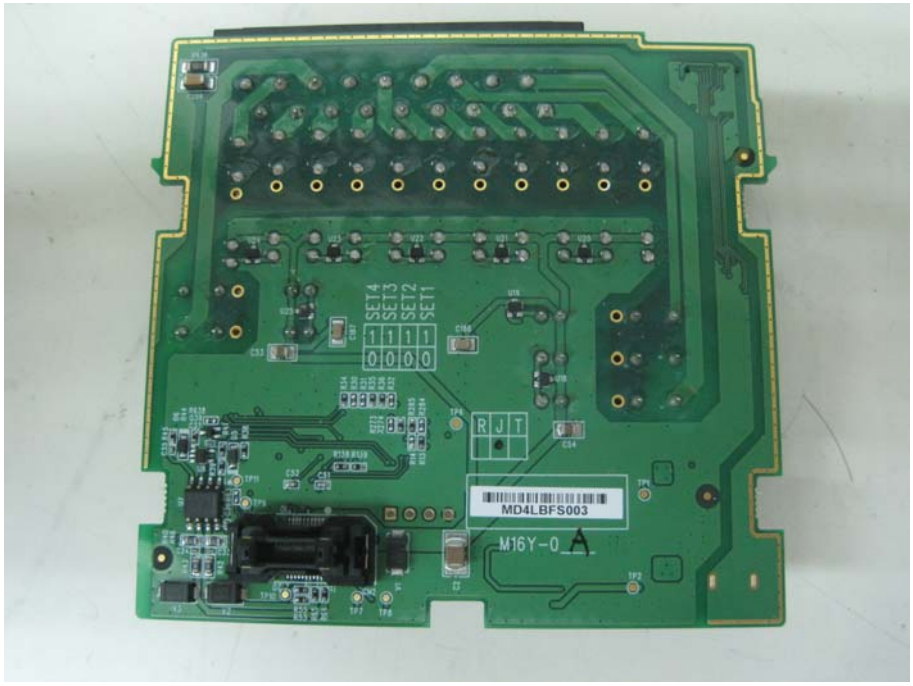
Front View of the EUT

Rear View of the EUT

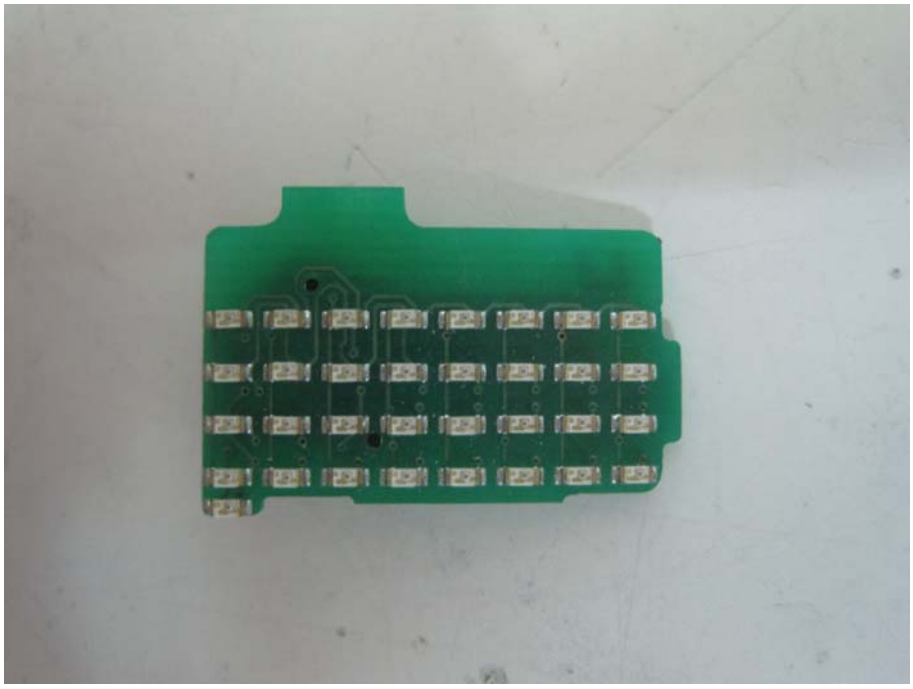
Inside View of the EUT



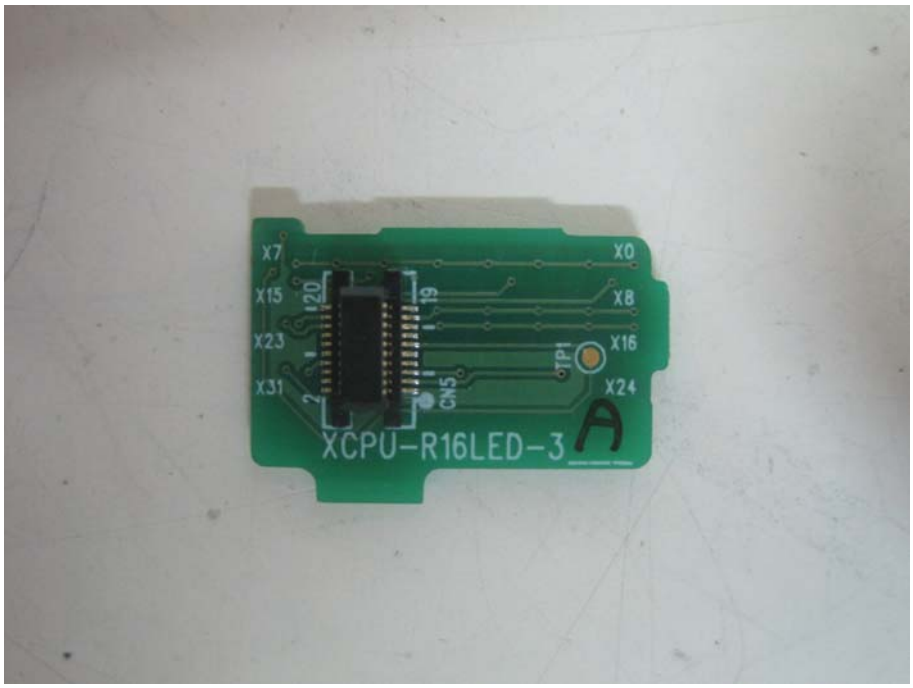
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

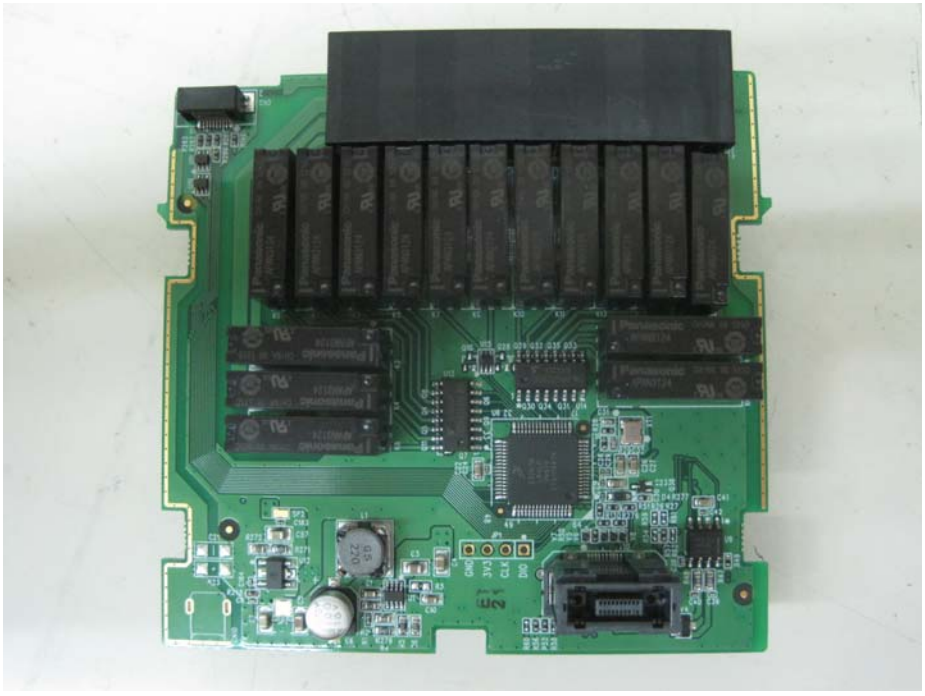
View of the Label

23 Photographs of EUT (Model Number: M16YR)

Front View of the EUT

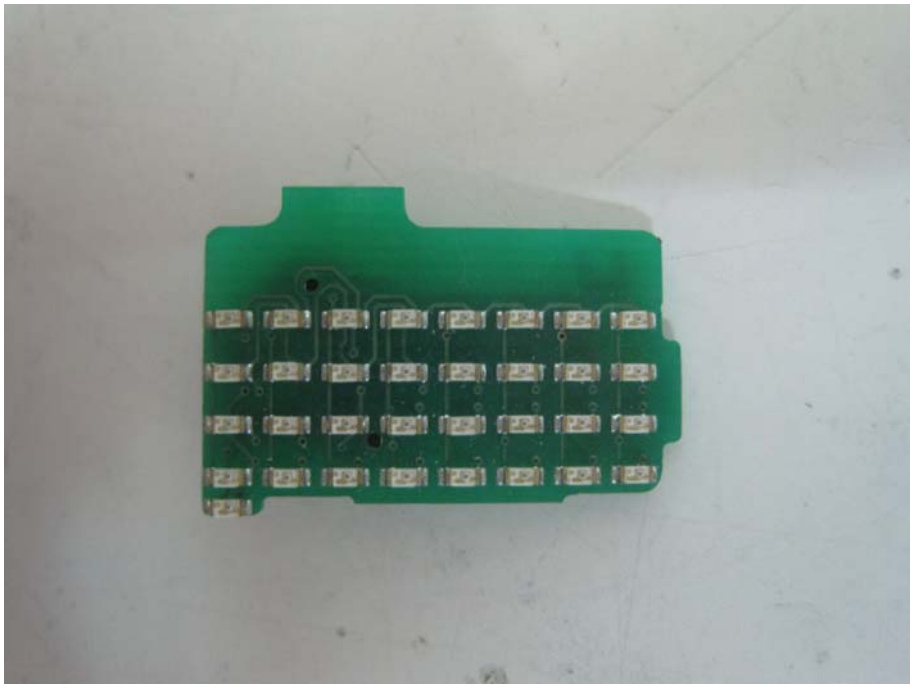
Rear View of the EUT

Inside View of the EUT

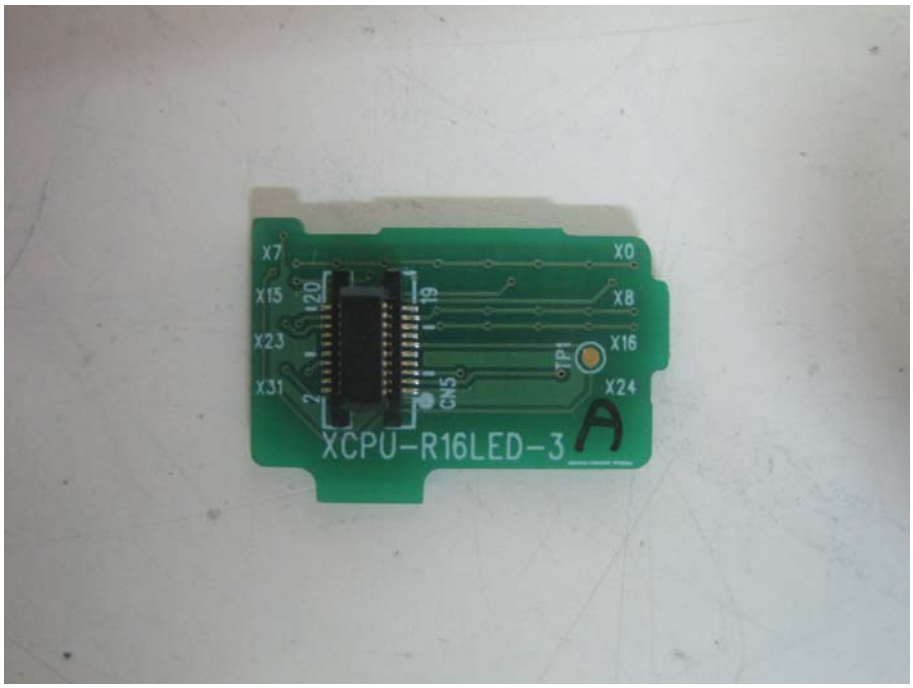


Front View of the PCB 1

Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

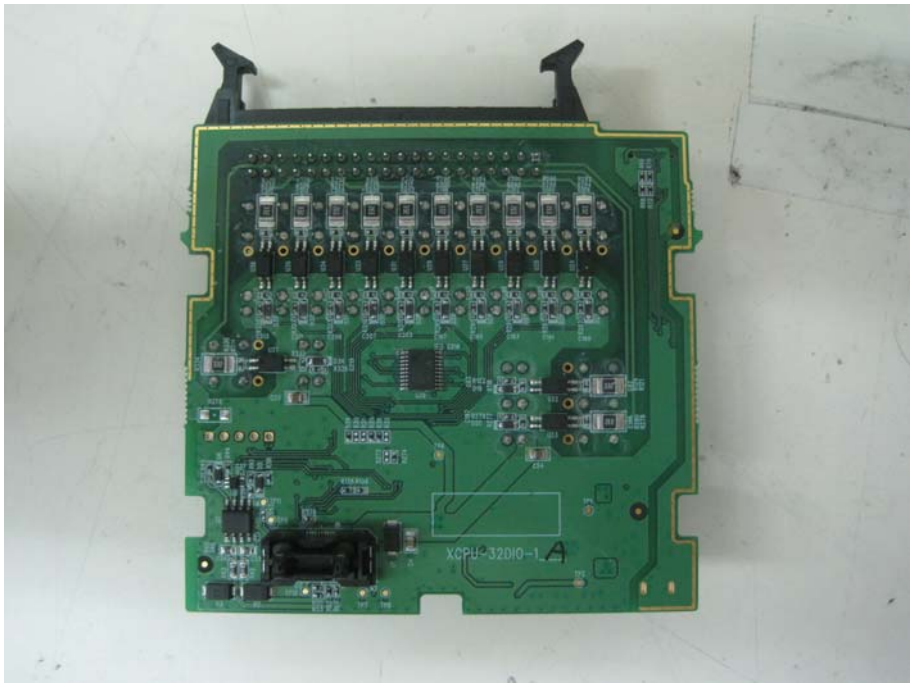
24 Photographs of EUT (Model Number: M1616XYT)

Front View of the EUT

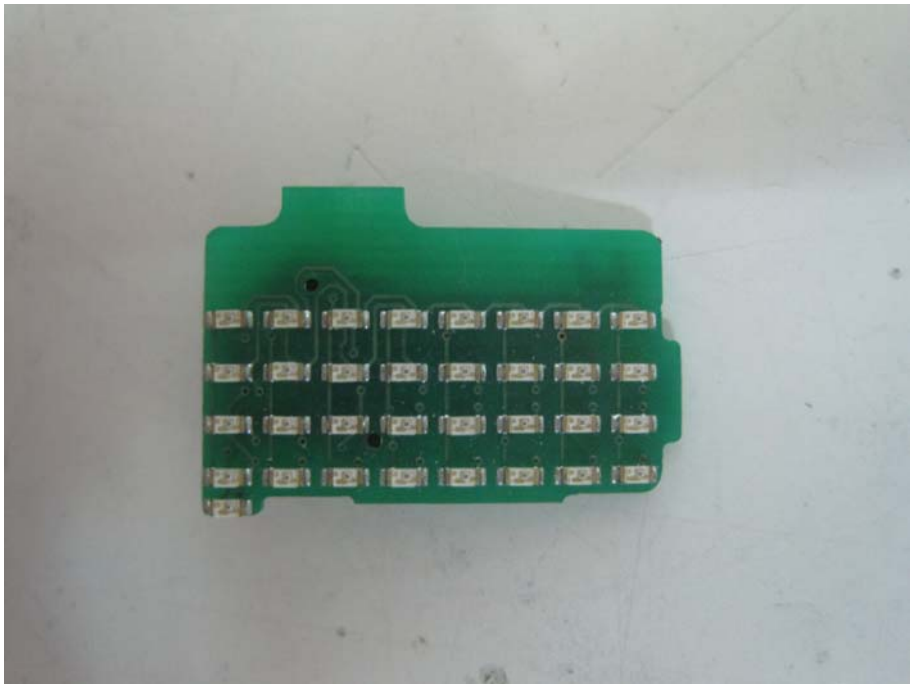
Rear View of the EUT

Inside View of the EUT

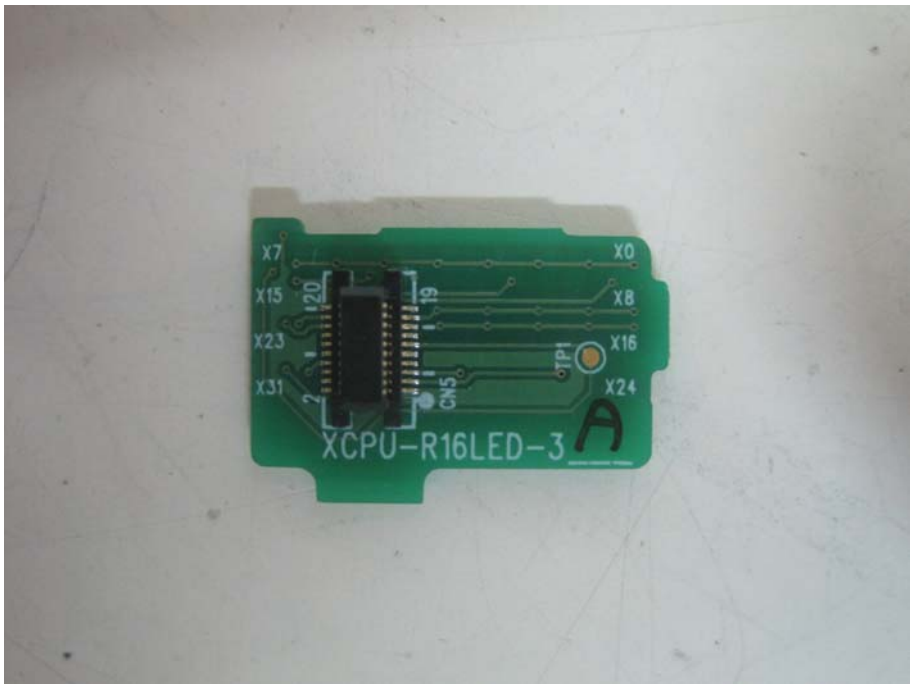
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

25 Photographs of EUT (Model Number: M1616XYJ)

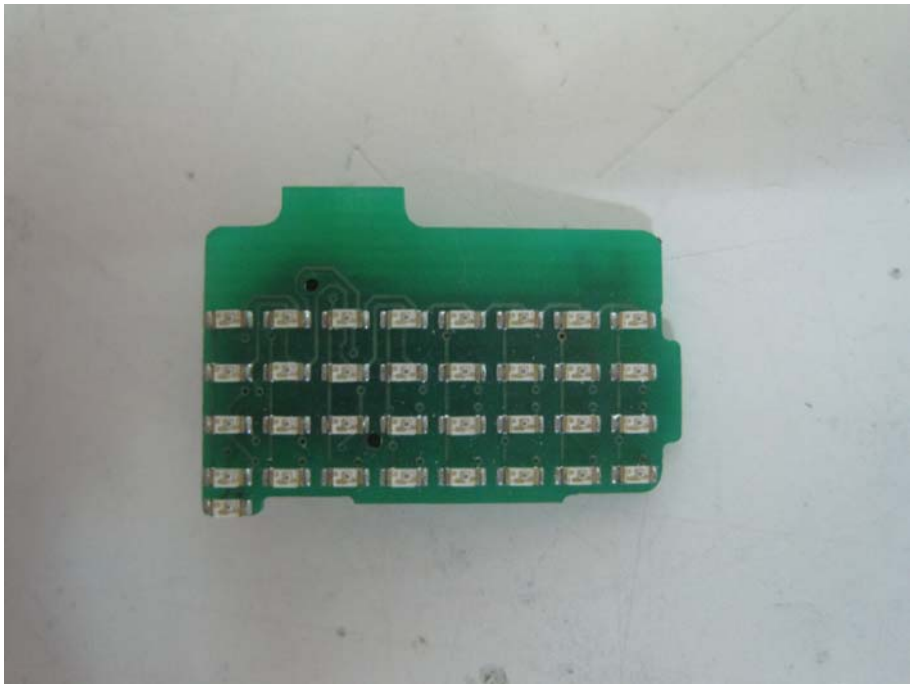
Front View of the EUT

Rear View of the EUT

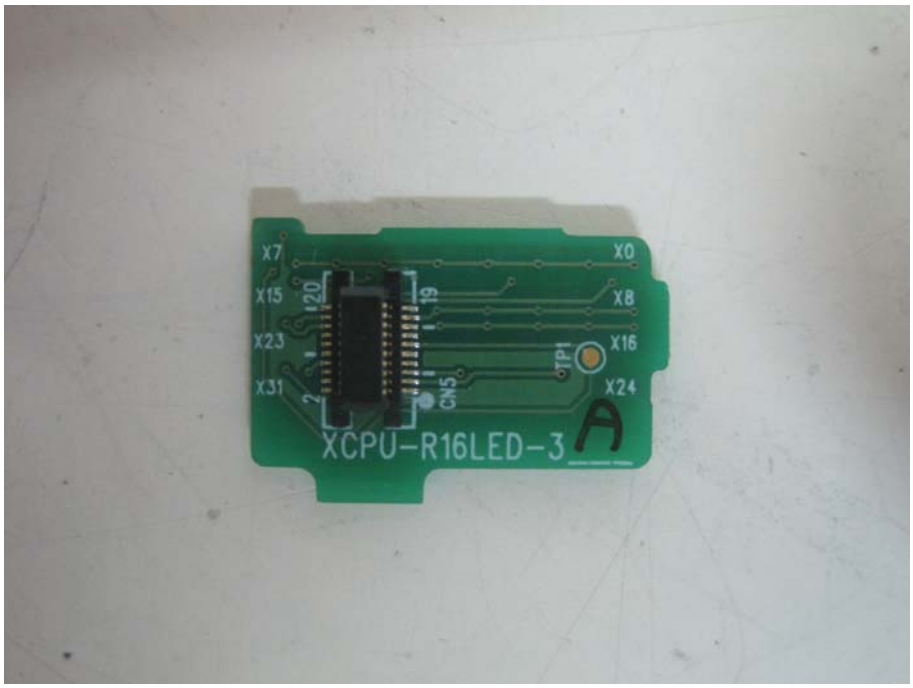
Inside View of the EUT

Front View of the PCB 1

Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

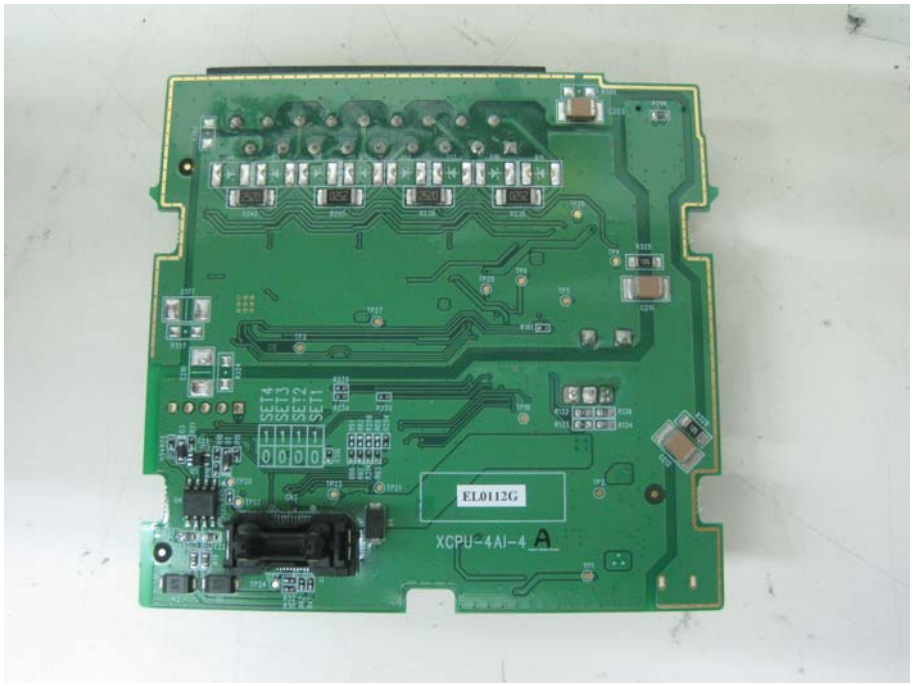
26 Photographs of EUT (Model Number: M04ADR)

Front View of the EUT

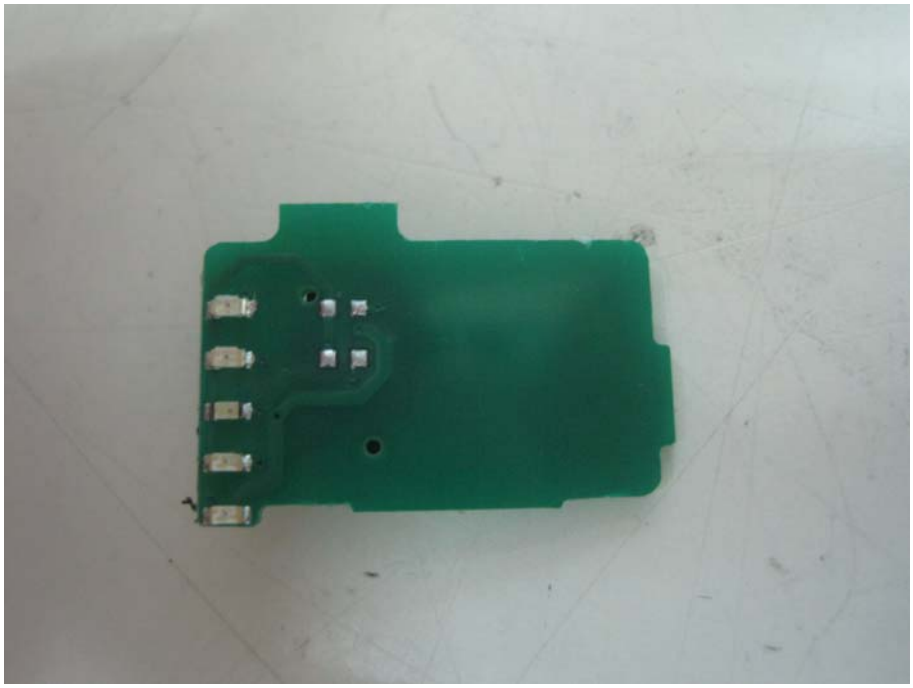
Rear View of the EUT

Inside View of the EUT

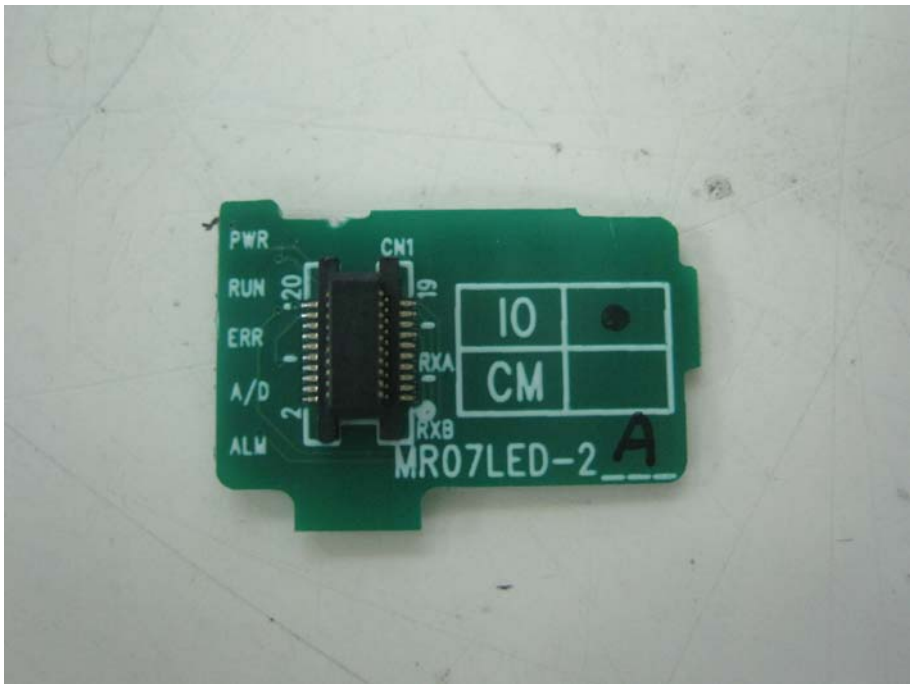
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

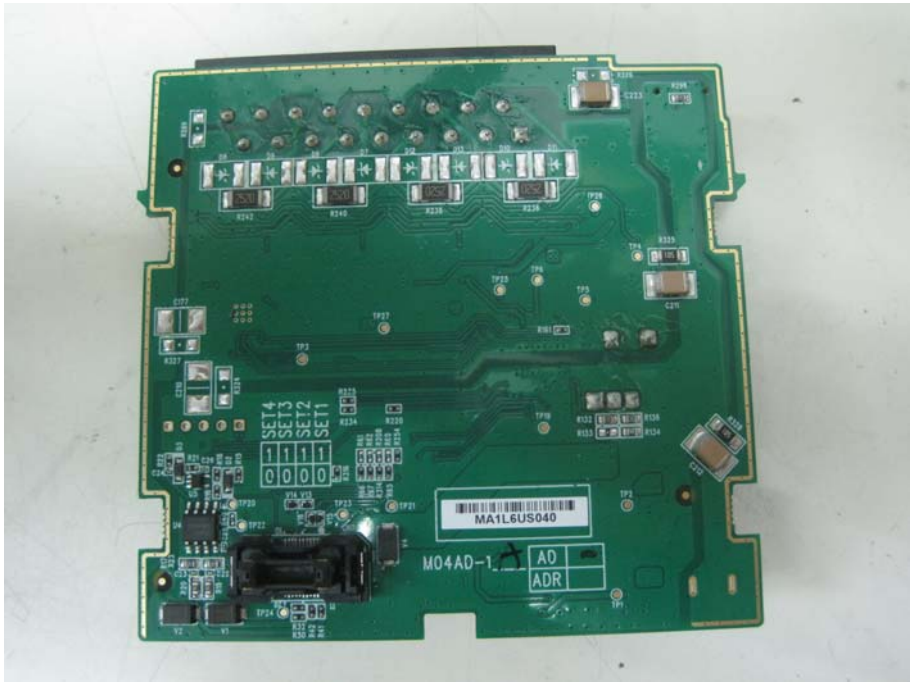
27 Photographs of EUT (Model Number: M04AD)

Front View of the EUT

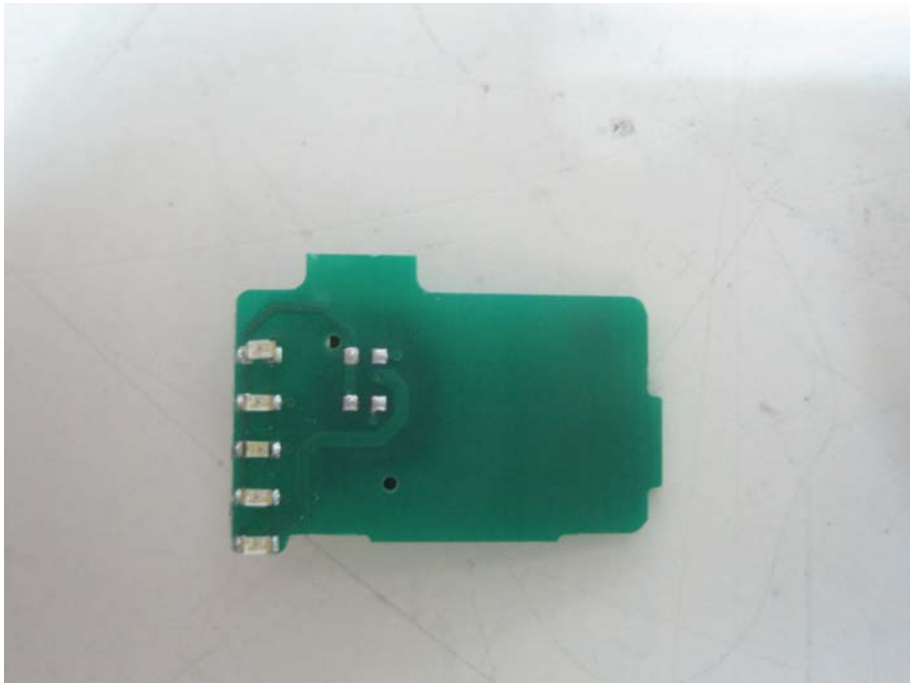
Rear View of the EUT

Inside View of the EUT

Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2

Rear View of the PCB 2

View of the Label

28 Photographs of EUT (Model Number: M04TCR)

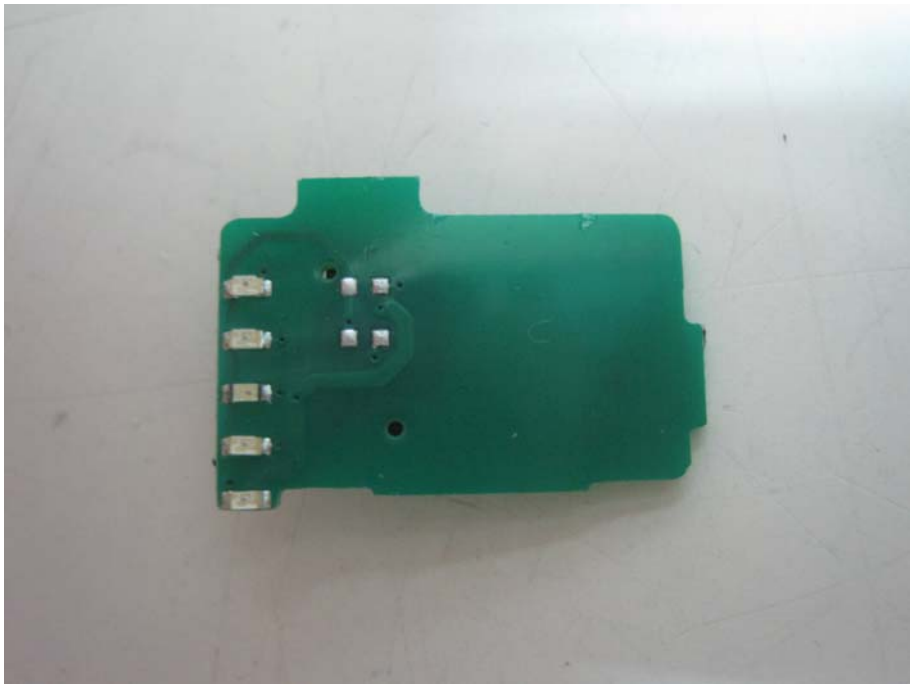
Front View of the EUT

Rear View of the EUT

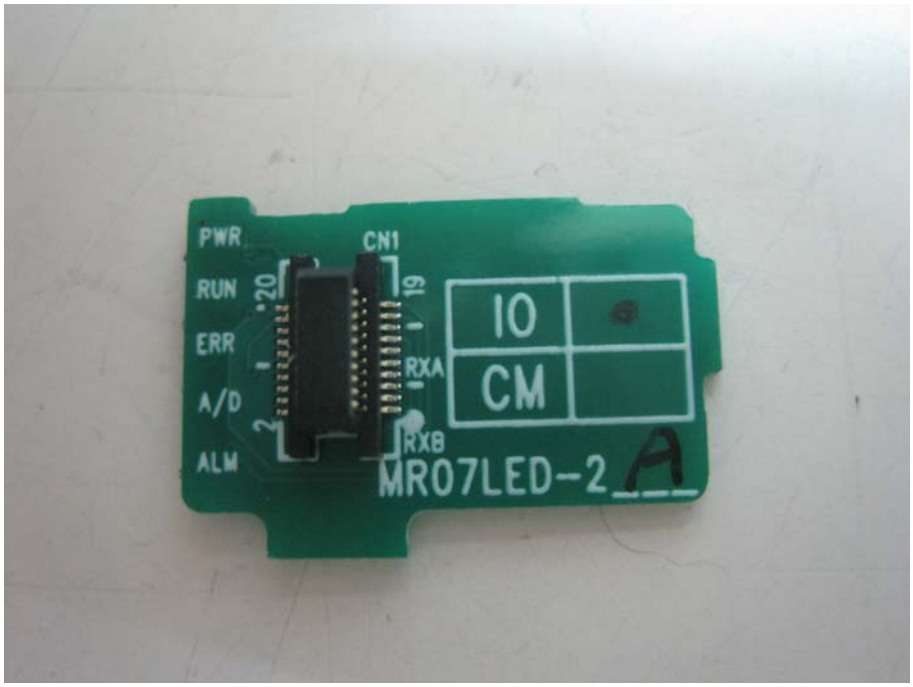
Inside View of the EUT

Front View of the PCB 1

Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

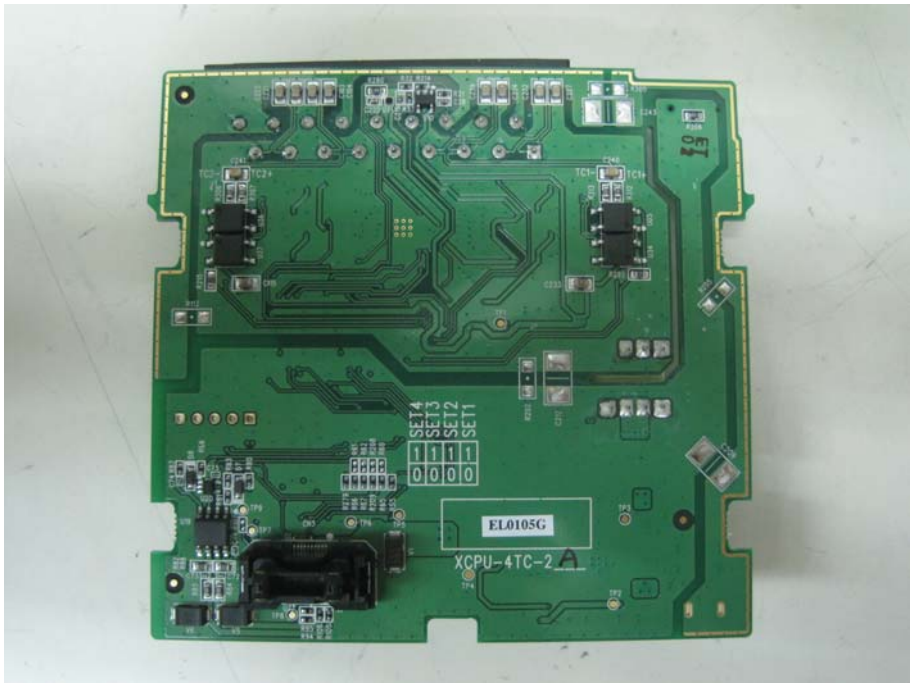
29 Photographs of EUT (Model Number: M04TC)

Front View of the EUT

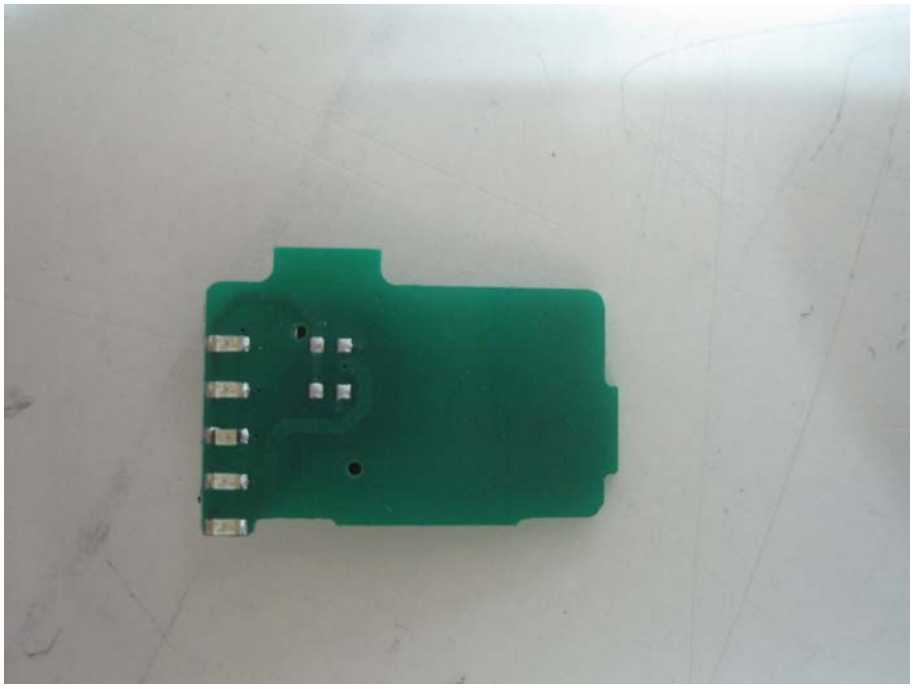
Rear View of the EUT

Inside View of the EUT

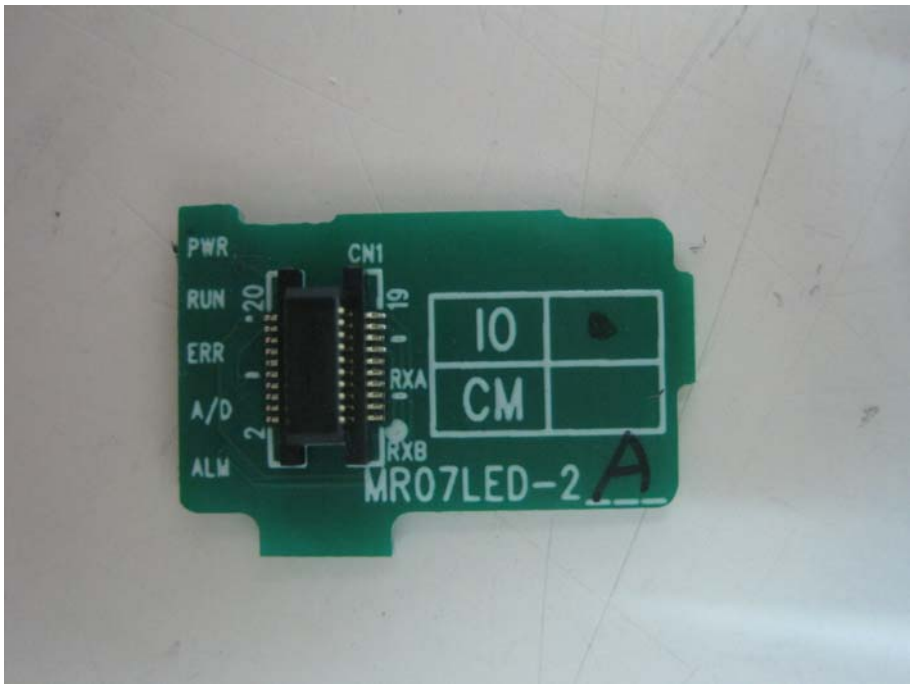
Front View of the PCB 1



Rear View of the PCB 1



Front View of the PCB 2



Rear View of the PCB 2

View of the Label

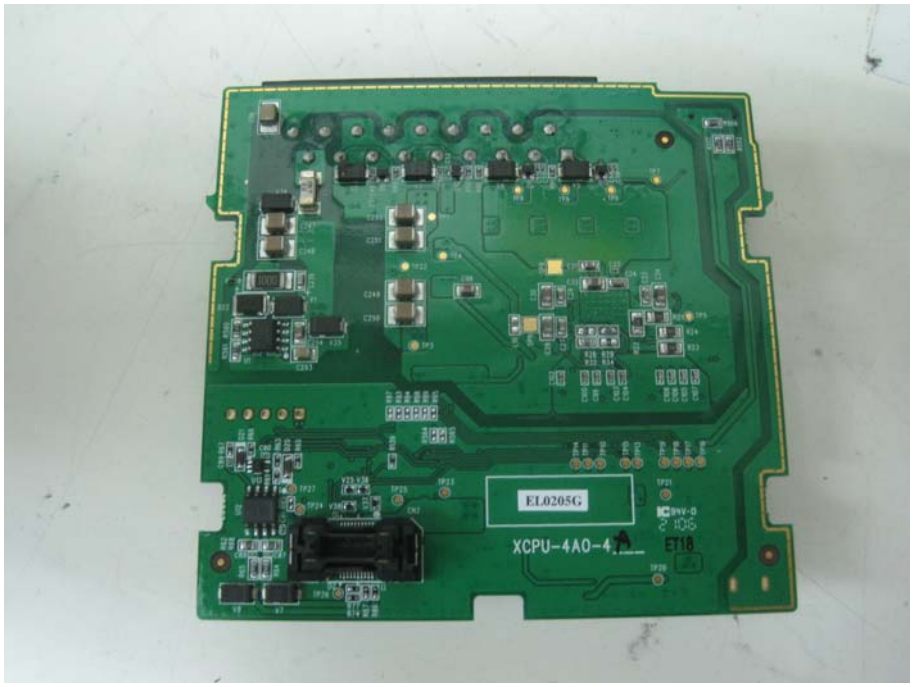
30 Photographs of EUT (Model Number: M04DA)

Front View of the EUT

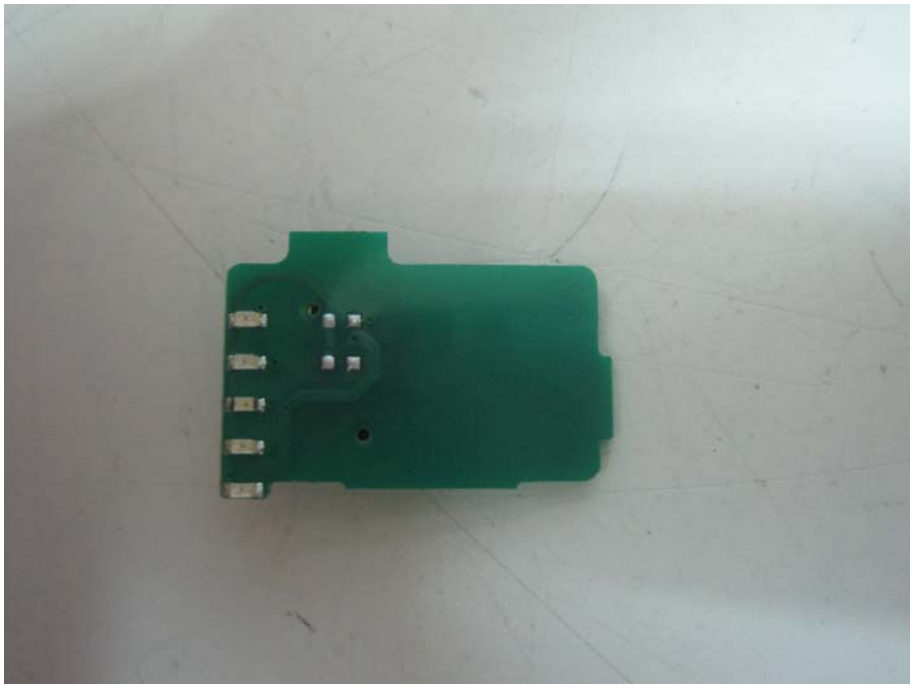
Rear View of the EUT

Inside View of the EUT

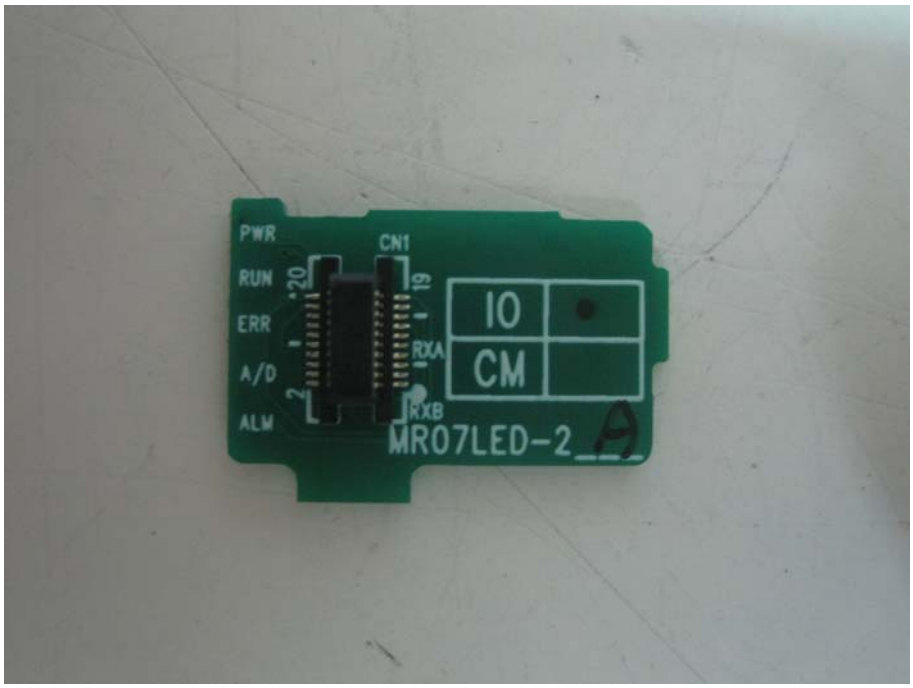
Front View of the PCB 1



Rear View of the PCB 1



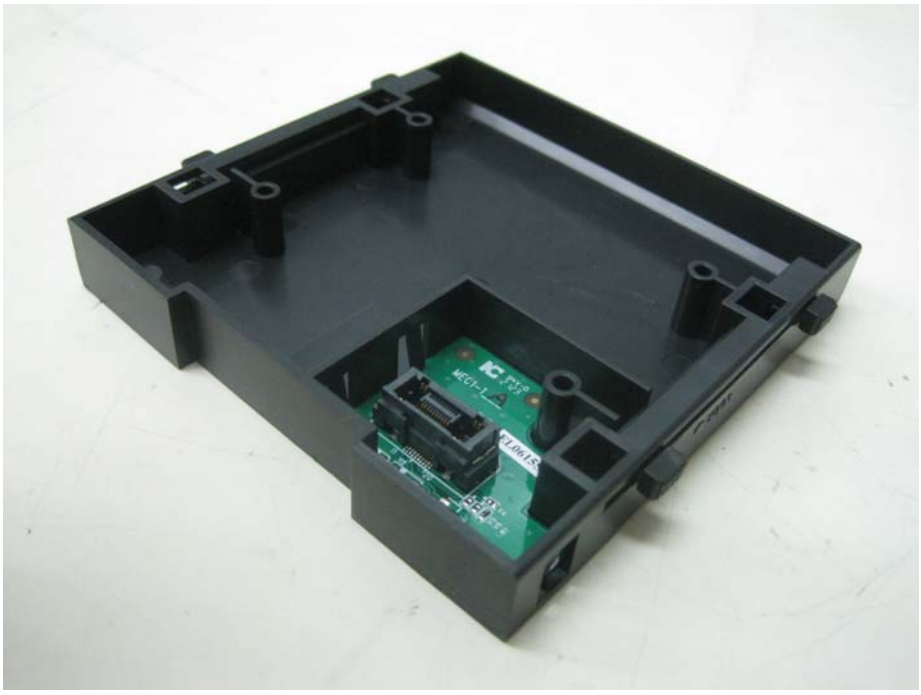
Front View of the PCB 2



Rear View of the PCB 2

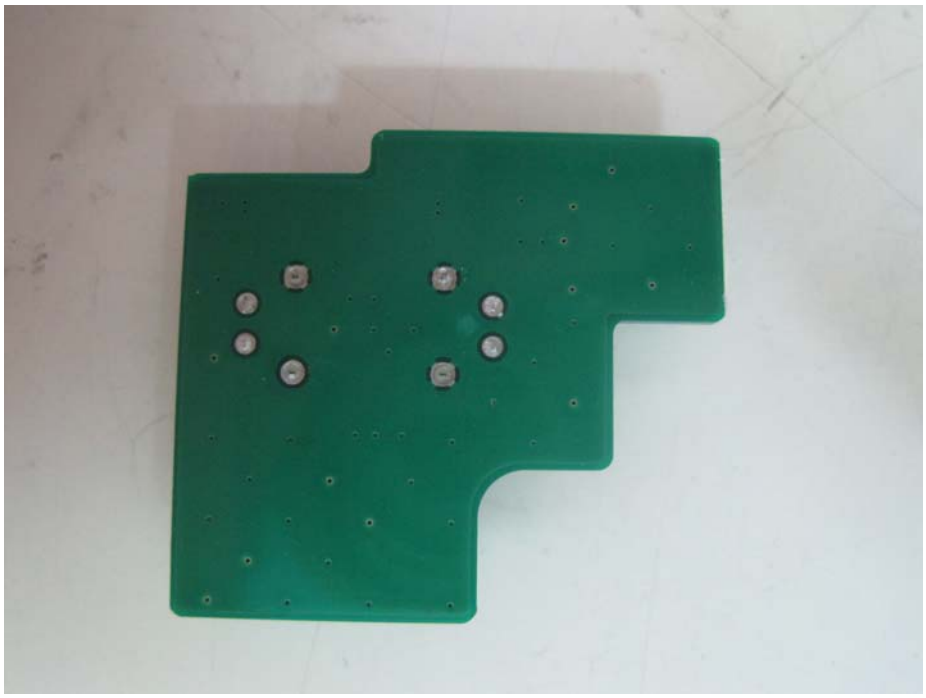
View of the Label

31 Photographs of EUT (Model Number: MRE)



Front View of the EUT

Rear View of the EUT



Front View of the PCB 1

Rear View of the PCB 1

View of the Label

32 Photographs of ESD Test Points

View of ESD Test Points

View of ESD Test Points

View of ESD Test Points

View of ESD Test Points

View of ESD Test Points