

## Test Report

### (TR-1404-017-02)



**Applicant** : Energy Recovery Products (Zhuhai) Co., Ltd  
**Address** : Building F, No. 8, Pingdong Road 2, Nanping Science Park, Zhuhai, Guangdong.  
**Manufacturer** : Energy Recovery Products (Zhuhai) Co., Ltd  
**Address** : Building F, No. 8, Pingdong Road 2, Nanping Science Park, Zhuhai, Guangdong.  
**Product Name** : LED Driver  
**Trademark** : ERP  
**Model(s)** : Hydra series (Model list reference section 2.5)  
**Standard(s)** : ICES-003 Issue5  
**Date of test** : Jul 23, 2014 to Jul 30, 2014  
**Test Result** : Pass  
**Report issued Dated** : Aug 08, 2014

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The results in this report apply only to the sample(s) tested. The production units are required to conform to the initial sample as received when the units are placed in the market.

Responsible : Approved by :  
Engineer

Engineer		Technical	
	Phenix Zhang	manager	Chan King-Chui
Date	: Aug 08, 2014	Date	: Aug 08, 2014

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## 1. Description of the Test Site

### 1.1 Test Site Location:

Laboratory	:	TDK South China EMC Center SAE Technologies Development (Dongguan) Co., Ltd. Changan Branch
Address	:	Zhenan Hi-tech Industrial Park, Dongguan City, Guangdong Province, China
Phone no.	:	(86)-769-8564-4678
Fax no.	:	(86)-769-8564-4499
Email	:	<a href="mailto:emc@cn.tdk.com">emc@cn.tdk.com</a>

### 1.2 Site Registration

VCCI ( November 2011)	:	Reg. No. R-4814, C-3733, G-473, T-1212
FCC site registration (August 2011)	:	Reg. No. 732901
IC registration (December,2013)	:	Reg. No. 7993A-1
EMCC (September 2008)	:	Reg. No. NAR/tl-060330
CNAS (August 2013)	:	Reg. No. L4677
MEE B.V.(June 2012)	:	Reg. No.EMV-07/61-08

### 1.3 Test Scope

EMC testing according to national / international standards

## 2. Description of the Tested Samples

### 2.1 Customer Information

Customer : Energy Recovery Products (Zhuhai) Co., Ltd  
Address : Building F, No. 8, Pingdong Road 2, Nanping Science  
Park, Zhuhai, Guangdong.  
Phone no. : NIL  
Fax no. : NIL

### 2.2 Identification of EUT

Trademark : ERP  
Model(s) No. : EBR020U-0700-30, EBR010U-0200-42  
Serial No. : None

### 2.3 Power Rating

Input : 120Vac, 60 Hz  
Output : Reference model list of section 2.5

### 2.4 Test Standards List

ICES-003 : Issue5

Spectrum Management and Telecommunications Policy  
Interference-Causing Equipment Standard.

## 2.5 Model List

ERP P/N	Input Voltage(V ac)	Frequency(Hz)	Input Current(A)	Max Output Power	Max output regulated current	Min output regulated current	Output Voltage Range (Vdc)	Potting(Y/N)
EBR0PPA-XXXX-30-YYY-ZZ	A	50/60	0.27	21.0	700mA	100mA	20<Vout<30	Y
EBR0PPA-XXXX-30-YYY-ZZ	A	50/60	0.27	15.0	500mA			N
EBR0PPA-XXXX-24-YYY-ZZ	A	50/60	0.27	16.8	700mA	100mA	16<Vout<24	Y
EBR0PPA-XXXX-24-YYY-ZZ	A	50/60	0.27	15.0	625mA			N
EBR0PPA-XXXX-32-YYY-ZZ	A	50/60	0.27	21.0	650mA	100mA	20<Vout<32	Y
EBR0PPA-XXXX-32-YYY-ZZ	A	50/60	0.27	15.0	465mA			N
EBR0PPA-XXXX-36-YYY-ZZ	A	50/60	0.27	21.0	580mA	100mA	24<Vout<36	Y
EBR0PPA-XXXX-36-YYY-ZZ	A	50/60	0.27	15.0	415mA			N
EBR0PPA-XXXX-37-YYY-ZZ	A	50/60	0.27	18.5	500mA	100mA	26<Vout<37	Y
EBR0PPA-XXXX-37-YYY-ZZ	A	50/60	0.27	15.0	405mA			N
EBR0PPA-XXXX-42-YYY-ZZ	A	50/60	0.27	21.0	500mA	80mA	30<Vout<42	Y
EBR0PPA-XXXX-42-YYY-ZZ	A	50/60	0.27	15.0	355mA			N
JWBR010U-XXXX-28-YYY-ZZ	120	50/60	0.27	7.6	300mA	80mA	22<Vout<28	N
EBR010U-XXXX-28-YYY-ZZ	120	50/60	0.27	7.6	300mA	80mA	22<Vout<28	N
EBR0YYU-XXXX-21-YYY-ZZ	120	50/60	0.27	11.1	530mA	100mA	14<Vout<21	N
JWBR0YYU-XXXX-21-YYY-ZZ	120	50/60	0.27	11.1	530mA	100mA	14<Vout<21	N

Notes: 1. PP designate: If 16W<Pout<21W, PP=20, If 11W<Pout<16W, PP=15, If Pout<11W, PP=10

2. If AC input is 120VAC, A=U; If AC input is 120-277VAC, A=W; if AC input is 230VAC, A=E; If AC input is 277VAC, A=V

3. XXXX means regulated output current, which is not greater than max output regulated current within the output voltage range.

For last two model, if 10W<Pout<15W, YY=15, If Pout<10W, YY=10

4. YYY(Y=0~9, A~Z or blank, for marketing purpose only)

5. ZZZ(Z=0~9, A~Z or blank, for marketing purpose only)

### 3. Test Specifications

#### 3.1 Standard(s) Used

TEST ITEM	Standard	Tested
Conducted emission	: ICES-003 Issue5	✓
Radiated emission	: ICES-003 Issue5	✓

#### 3.2 Deviations from the Test Specification

N/A

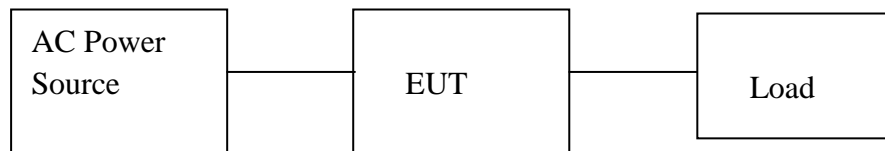
## 4. Test Result

### 4.1 Radiated Emission

#### 4.1.1 Test Summary

Test Room	:	Chamber
Power Source	:	AC 120V / 60Hz
Standards	:	ICES-003 Issue5
EUT Type	:	Table Top
EUT configuration	:	EUT's highest possible emission level

#### 4.1.2 Block diagram of test setup



#### 4.1.3 Measurement method

Radiated emissions from 30 MHz to 1000 MHz were measured according to the methods defines in ICES-005:2007. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

#### 4.1.4. Result

**PASS**

### RADIATED EMISSION

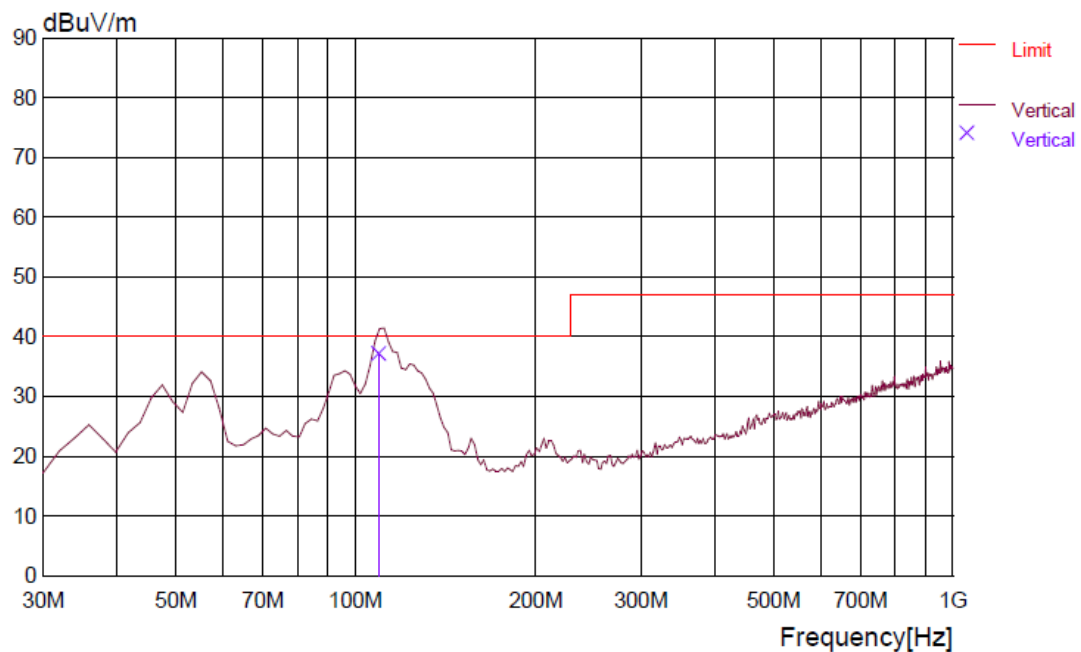
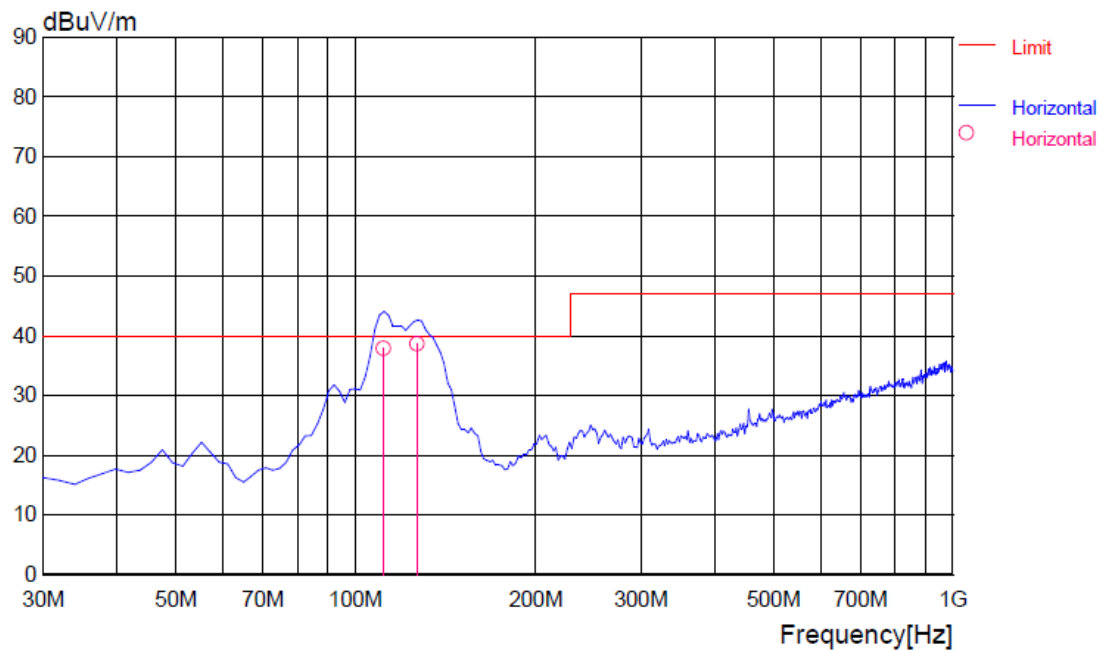
Date : 2014/07/23 11:20:55

Trade Name :  
Model Name : EBR020U-0700-30  
Product Name : LED Driver  
Test Condition : 30V/0.7A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 27/55RH%  
Operator : pang

Memo :

LIMIT : ICES-003



## RADIATED EMISSION

Date : 2014/07/23 11:20:55

Trade Name :  
Model Name : EBR020U-0700-30  
Product Name : LED Driver  
Test Condition : 30V/0.7A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 27/55RH%  
Operator : pang

Memo :

LIMIT : ICES-003

No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE	COMMENT
	[MHz]	QP [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]	
---- Horizontal ----											
1	112.205	52.0	9.8	7.5	31.6	37.7	40.0	2.3	269	294	
2	127.663	51.3	11.2	7.7	31.6	38.6	40.0	1.4	296	155	
---- Vertical ----											
3	110.385	51.6	9.6	7.5	31.6	37.1	40.0	2.9	116	351	

## RADIATED EMISSION

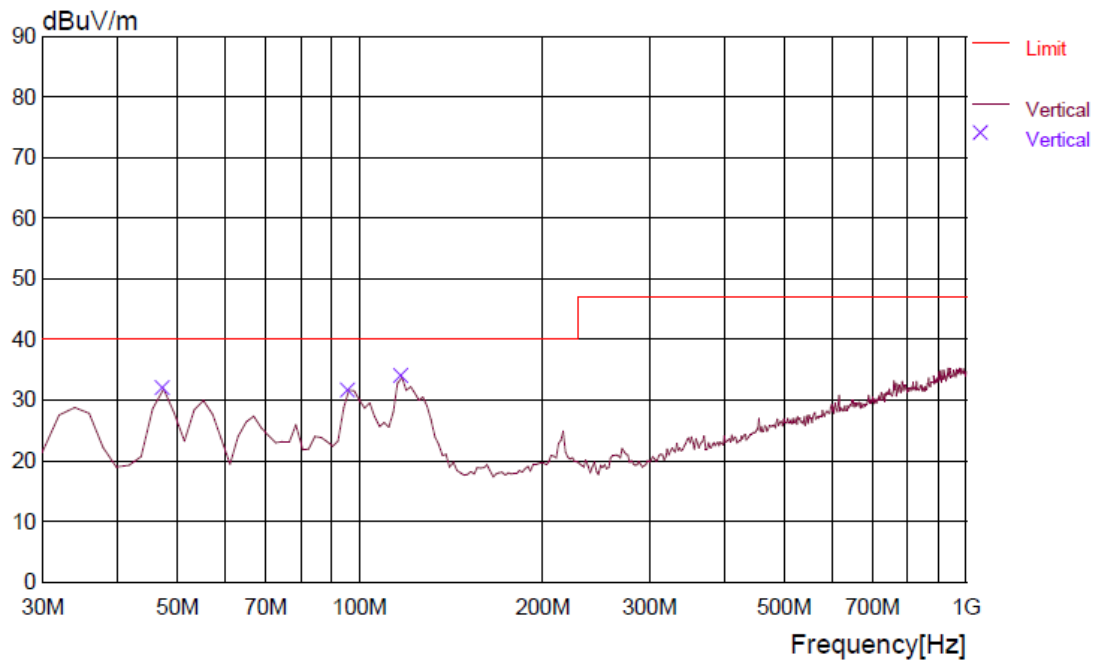
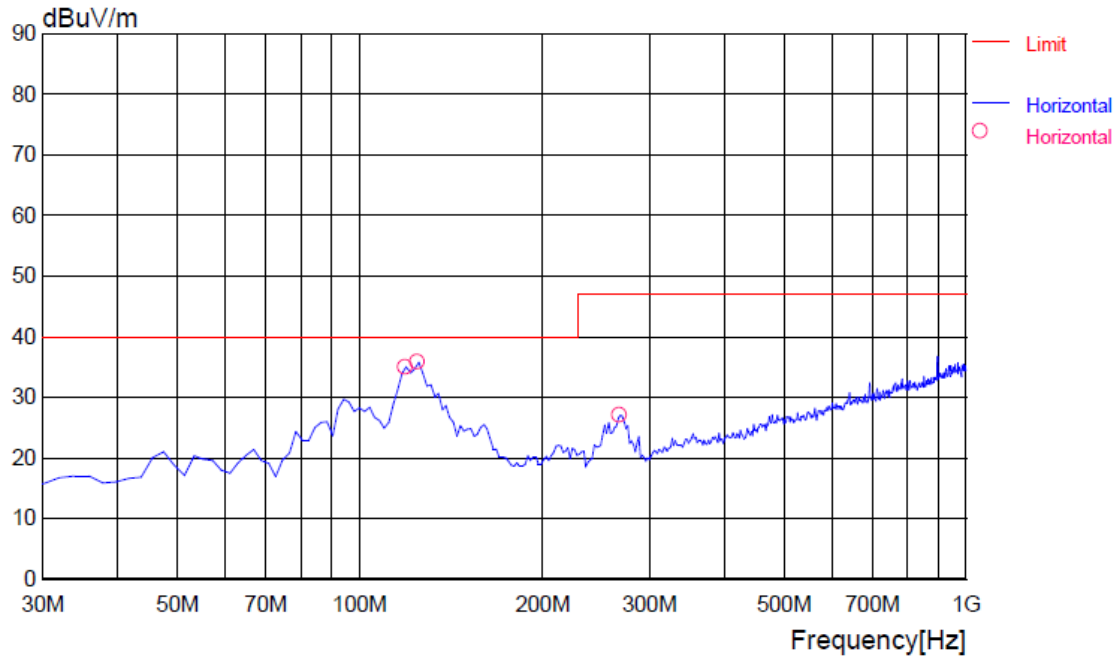
Date : 2014/07/23 11:37:25

Trade Name :  
Model Name : EBR010U-0200-42  
Product Name : LED Driver  
Test Condition : 42V/0.2A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 27/55RH%  
Operator : pang

Memo :

LIMIT : ICES-003



## RADIATED EMISSION

Date : 2014/07/23 11:37:25

Trade Name :  
Model Name : EBR010U-0200-42  
Product Name : LED Driver  
Test Condition : 42V/0.2A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 27/55RH%  
Operator : pang

Memo :

LIMIT : ICES-003

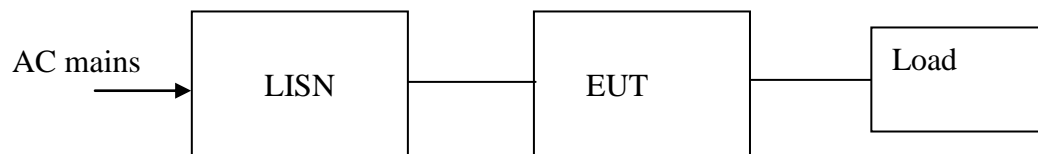
No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE	COMMENT
	[MHz]	PEAK [dBuV]	FACTOR [dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]	
---- Horizontal ----											
1	119.419	48.4	10.6	7.6	31.6	35.0	40	5.0	400	290	
2	125.251	48.5	11.2	7.7	31.6	35.8	40	4.2	300	319	
3	269.099	37.8	12.4	8.4	31.6	27.0	47	20.0	100	0	
---- Vertical ----											
4	47.495	45.6	11.0	6.9	31.6	31.9	40	8.1	100	16	
5	96.092	47.8	8.1	7.4	31.6	31.7	40	8.3	100	132	
6	117.475	47.4	10.4	7.6	31.6	33.8	40	6.2	100	298	

## 4.2 Conducted Emission (mains)

### 4.2.1 Test Summary

Test Room	:	Shielded Room
Power Source	:	AC 120V / 60Hz
Standards:	:	ICES-003 Issue5
EUT Type	:	Table Top
EUT configuration	:	EUT's highest possible emission level

### 4.2.2 Block diagram of test setup



### 4.2.3 Measurement method

The EUT along with its peripherals were placed on a 1.0m (W) x 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4m space from a vertical reference plane. The EUT was connected to power mains through a Artificial Mains Network(AMN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.

The excess power cable between the EUT and the AMN was bundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

#### 4.2.4. Result

**PASS**

### Conducted Emission

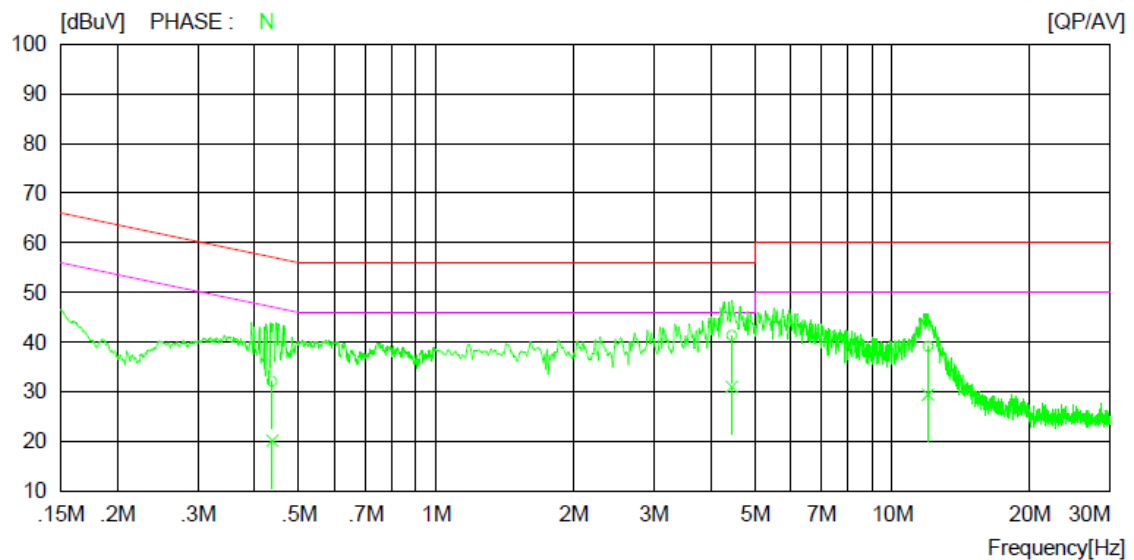
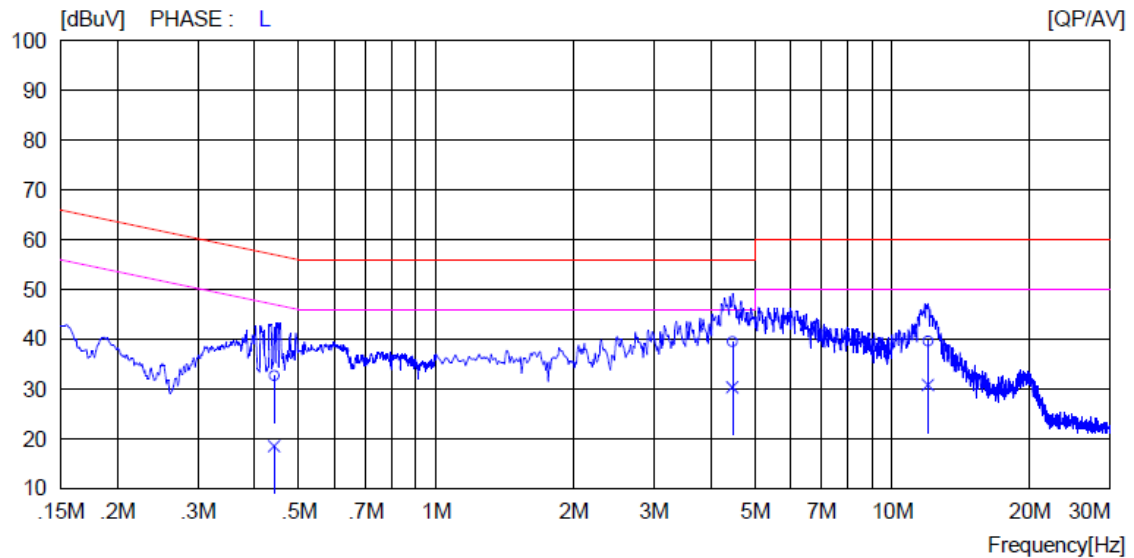
TDK South China EMC Centre  
Date : 2014-07-30 15:02:33

Company Name :  
Model Name : EBR020U-0700-30  
Product Name :  
Test condition : 30Vdc/0.7A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 25deg / 52%RH  
Operator : CAO JIALIANG

Memo :

LIMIT : ICES-003 QP  
ICES-003 AV



## Conducted Emission

TDK South China EMC Centre  
Date : 2014-07-30 15:02:33

Company Name :  
Model Name : EBR020U-0700-30  
Product Name :  
Test condition : 30Vdc/0.7A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 25deg / 52%RH  
Operator : CAO JIALIANG

Memo :

LIMIT : ICES-003 QP  
ICES-003 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.44100	22.7	8.6	10.0	32.7	18.6	57.0	47.0	24.3	28.4	L
2	4.46000	29.5	20.4	10.0	39.5	30.4	56.0	46.0	16.5	15.6	L
3	11.97500	29.9	21.1	9.8	39.7	30.9	60.0	50.0	20.3	19.1	L
4	0.43700	22.1	10.2	10.0	32.1	20.2	57.1	47.1	25.0	26.9	N
5	4.45000	31.3	21.0	10.0	41.3	31.0	56.0	46.0	14.7	15.0	N
6	11.97500	29.3	19.6	9.8	39.1	29.4	60.0	50.0	20.9	20.6	N

## Conducted Emission

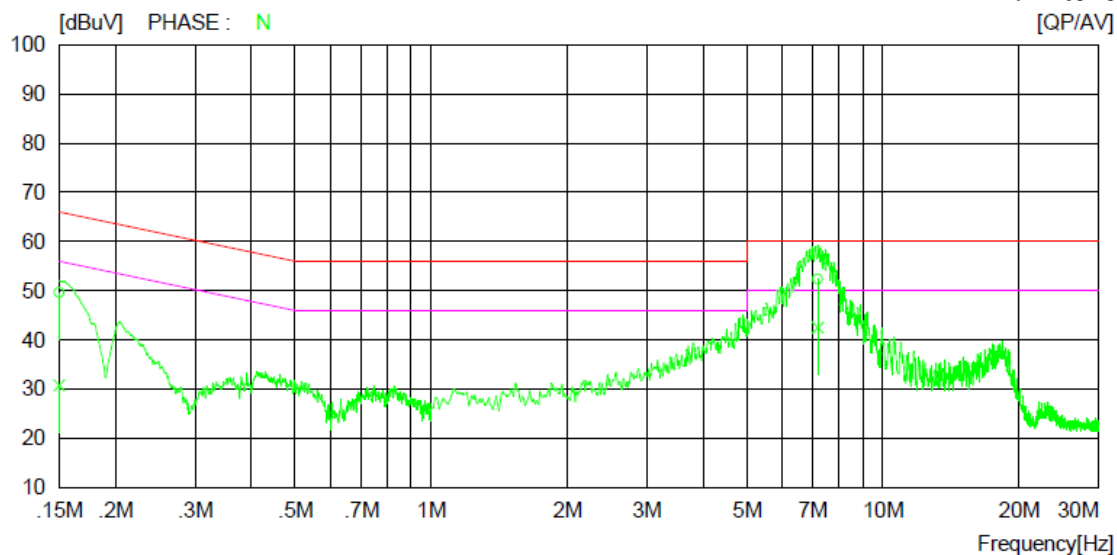
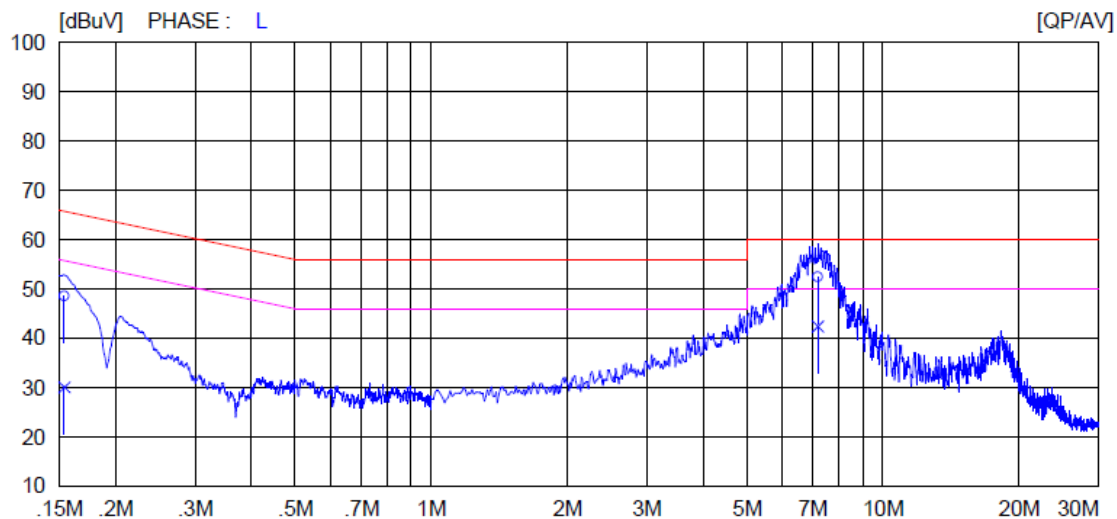
TDK South China EMC Centre  
Date : 2014-07-30 14:53:50

Company Name :  
Model Name : EBR010U-0200-42  
Product Name :  
Test condition : 42Vdc/0.2A

Document No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 25deg / 52%RH  
Operator : CAO JIALIANG

Memo :

LIMIT : ICES-003 QP  
ICES-003 AV



## Conducted Emission

TDK South China EMC Centre  
Date : 2014-07-30 14:53:50Company Name :  
Model Name : EBR010U-0200-42  
Product Name :  
Test condition : 42Vdc/0.2ADocument No. :  
Power Supply : AC 120V/60Hz  
Temp/Humi : 25deg / 52%RH  
Operator : CAO JIALIANG

Memo :

LIMIT : ICES-003 QP  
ICES-003 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15400	38.5	20.0	10.1	48.6	30.1	65.8	55.8	17.2	25.7	L
2	7.17500	42.6	32.6	9.9	52.5	42.5	60.0	50.0	7.5	7.5	L
3	0.15000	39.5	20.7	10.1	49.6	30.8	66.0	56.0	16.4	25.2	N
4	7.17500	42.5	32.6	9.9	52.4	42.5	60.0	50.0	7.6	7.5	N

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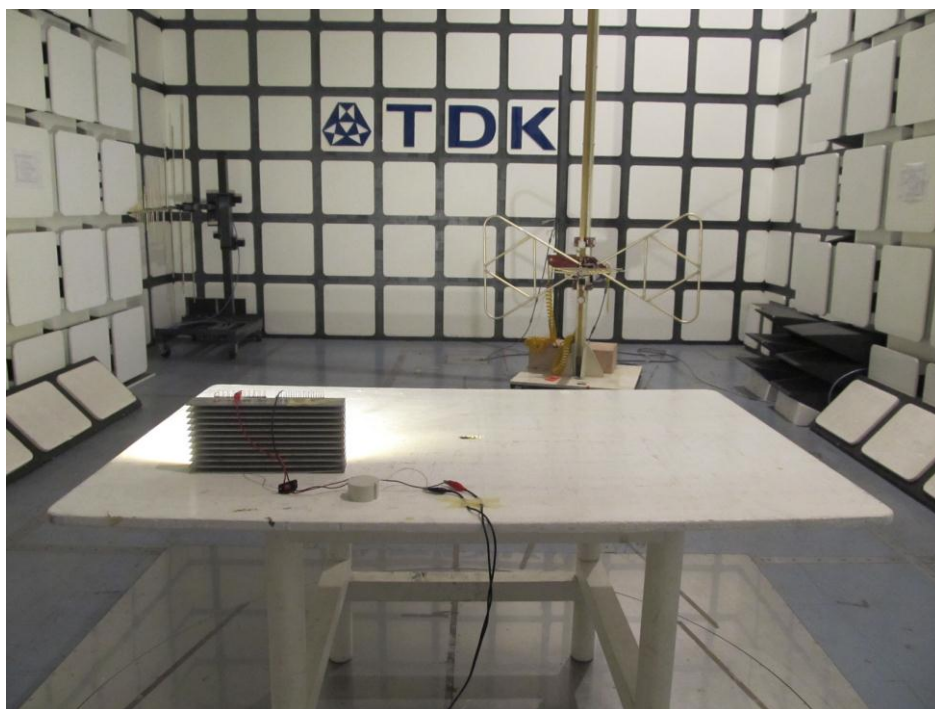
## 5. Test Setup

### 5.1 Ancillary and Accessory Equipment Used

No.	Description	Specification	Quantity
1	Load	42V, 0.2A, 8.4W	1
2	Load	30V, 0.7A, 21W	1

## 5.2 Photographs of the Test Configuration

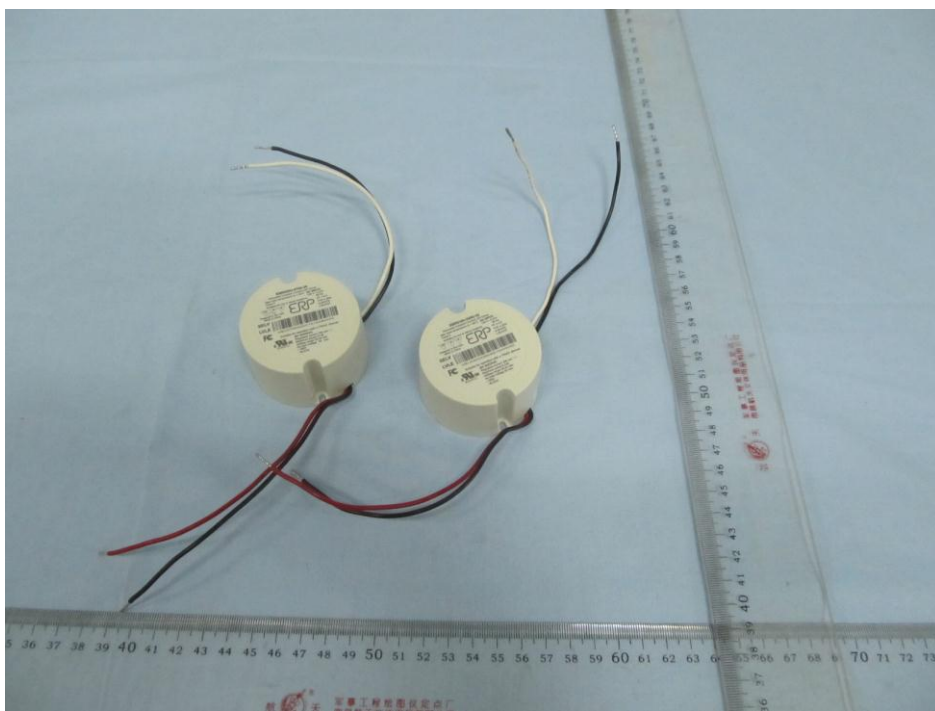
### 5.2.1 Radiated emission



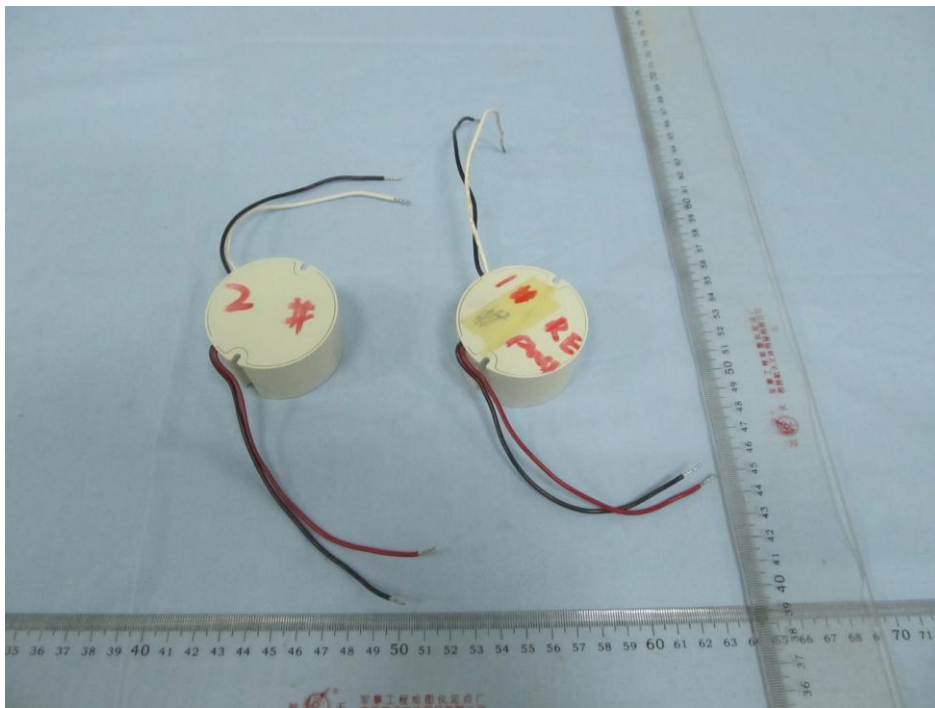
### 5.2.2 Conducted emission



### 5.3 Photographs of the EUT

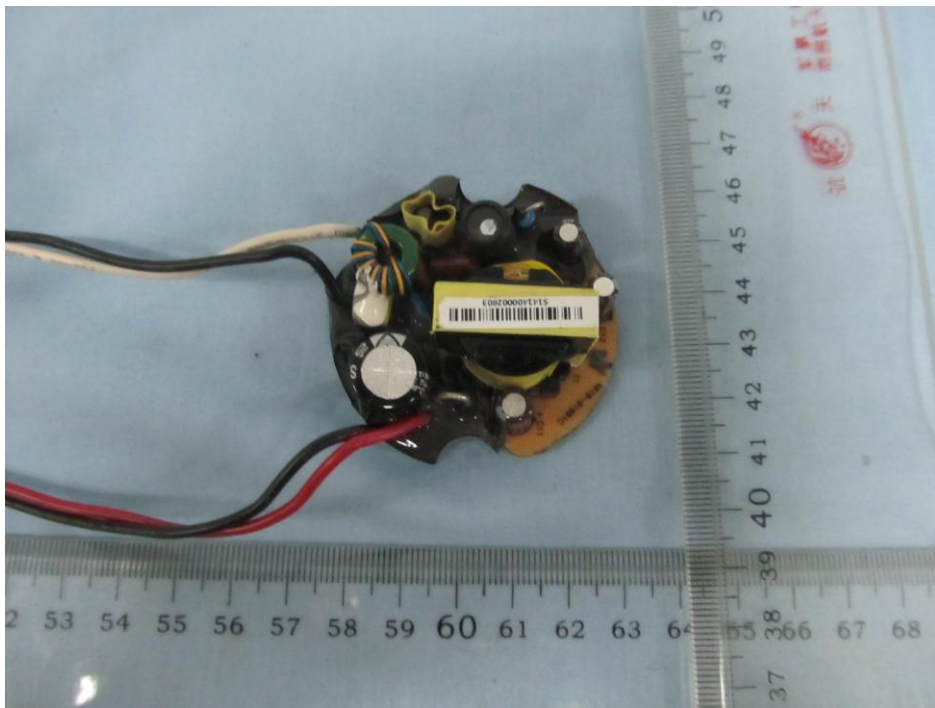


Enclosure of EUT

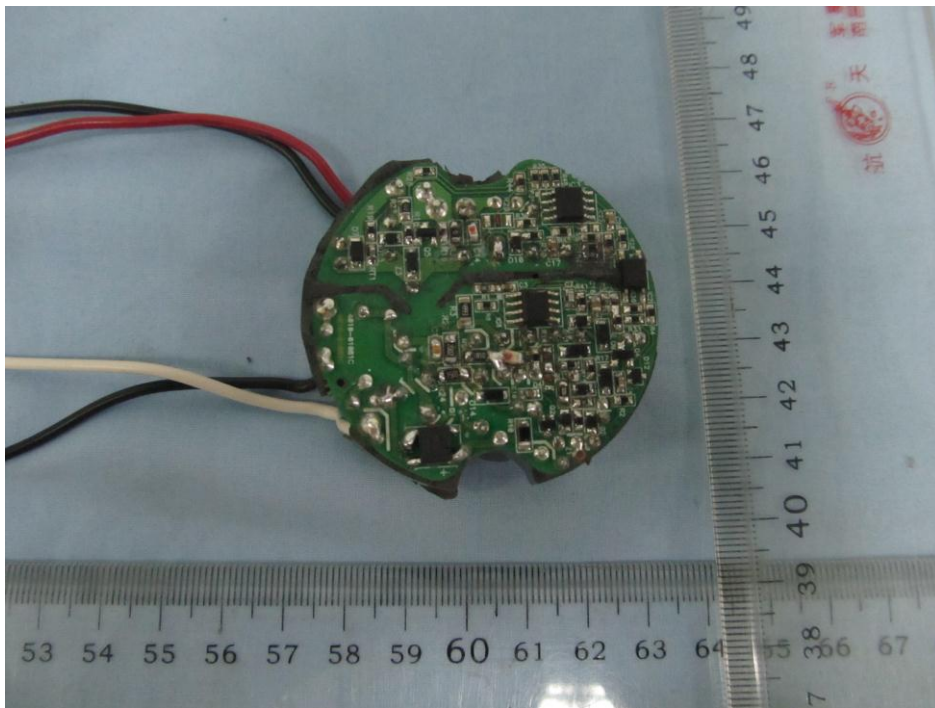


Enclosure of EUT

EBR020W-0700-30:

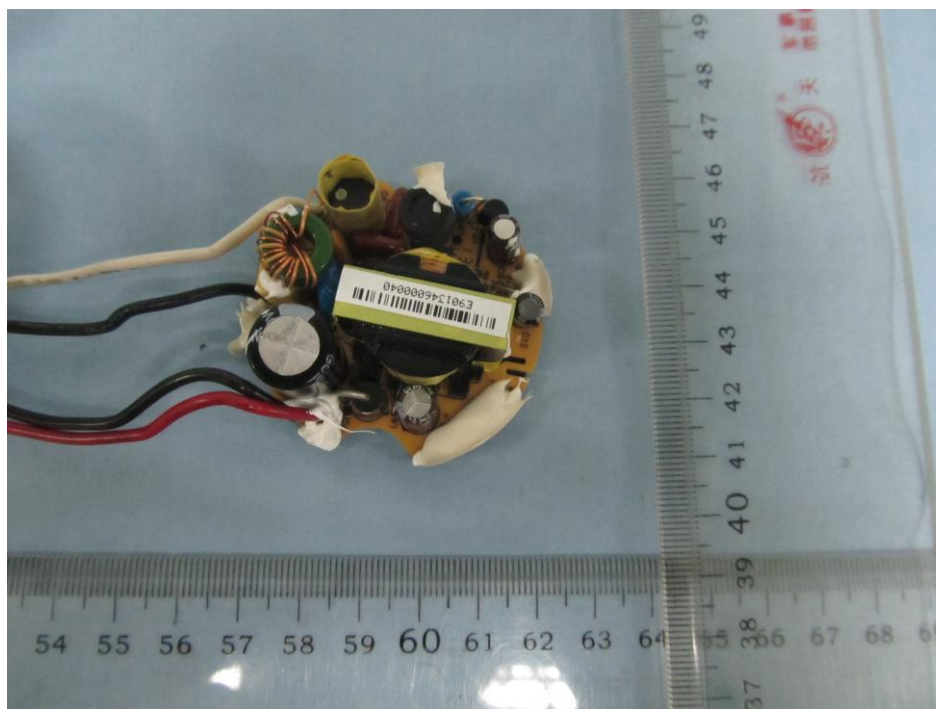


PCB of EUT

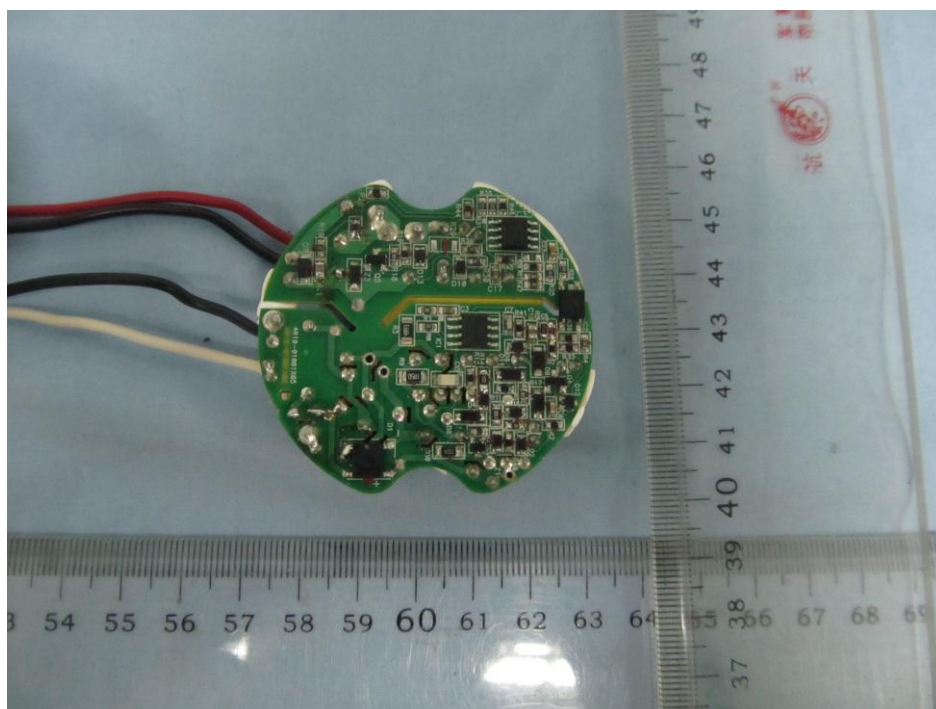


PCB of EUT

EBR010U-0200-42:



PCB of EUT



PCB of EUT

## 6. Equipment List

No.	Equipment	Manufacturer	Model	Serial No.	Due Calibration Date
1	Hybrid Log Periodic Antenna	TDK Co.	HLP-3003C	130174	2015-03-20
2	Attenuator 6 dB	Agilent	8491B	MY39260147	2014-09-16
3	Preamplifier	TDK Sonoma	310	242803	2015-03-23
4	EMI Receiver	Rohde & Schwarz	ESIB26	100234	2015-03-23
5	Power Source	NF	CVCF1	422554	NA
6	Personal Computer	HP	DX2000MT	MXD4250FZ M	NA
7	Art. Mains Network	EMCO	3816/2	00044921	2015-03-23
8	Art. Mains Network	EMCO	3816/2	00044922	2015-03-23
9	Transient Limiter(10 db)	Agilent	11947A	3107A03736	2014-12-09
10	EMI Receiver	Rohde & Schwarz	ESCS30	100350	2015-03-23
11	Spectrum Analyzer	Agilent	E4403B	MY44210199	2015-03-23
12	Personal Computer	HP	DX2000MT	MXD4130B2 N	NA
13	Semi-Anechoic Chamber	TDK Co.	N/A	N/A	2015-07-20
14	Shielded Room	TDK Co.	N/A	N/A	NA

## 7. Test Uncertainty

Test	Confidence Level	CISPR Uncertainty	Our Uncertainty
Radiated emission (3m) 30-1000MHz	95%	5.2dB	4.2dB
Conducted Emission (Mains) 0.15- 30MHz	95%	3.6dB	3.3dB

## 8. Appendix

### 8.1 Confirmation of Compliance within the Limits

#### 8.1.1 Method of calculating measurement result

Radiated Emission

For example:

	Reading	+	Antenna factor	+	Cable loss	-	Gain	=	Result
Example	46.3	+	8.1	+	7.4	-	31.6	=	30.2

Conducted Emission

For example:

	Reading	+	C. FACTOR	=	Result
Example	33.3	+	10.1	=	43.4