CODUCTED AND RADIATED DISTURBANCE EMISSIONS EMC TEST REPORT

for

LED Display

Model:P10

Trade Mark: N/A

Test Report Number: WSCT1508003084E

Issued Date: October 16, 2015

Issued for:

Shenzhen Chip Optech Co.,Ltd.

Tower C,Baoshi Technological Park,Baoshi Road Baoshi Street,Bao'an District,Shenzhen City,P,R.China

Issued by:

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Revision History Of Report

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	WSCT1508003084E	Initial Issue	ALL	Wang Fengbing

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Report No.: WSCT1508003084E Issued: October 16, 2015 Revised: None

1 TEST RESULT CERTIFICATION

Product: LED Display

Model: P10

Trade Mark: N/A

Applicant: **Shenzhen Chip Optech Co.,Ltd.**
Tower C,Baoshi Technological Park,Baoshi Road Baoshi Street,Bao'an District,Shenzhen City,P,R.China

Manufacturer: **Shenzhen Chip Optech Co.,Ltd.**
Tower C,Baoshi Technological Park,Baoshi Road Baoshi Street,Bao'an District,Shenzhen City,P,R.China

Tested Date: August 11, 2015 to September 23, 2015

Test Voltage 240V~ 50Hz

EMISSION				
Standard	**Item**		**Result**	**Remarks**
AS/NZS CISPR 22: 2009+A1(2010)	Conducted (Main Port)		PASS	Meet Class A limit
	Conducted (Telecommunication Port)		PASS	Meet Class A limit
	Radiated	Below 1GHz	PASS	Meet Class A limit
		Above 1GHz	PASS	Meet Class A limit

Note: 1. The test result judgment is decided by the limit of measurement standard
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
None

The above equipment has been tested by World Standardization Certification& Testing CO., LTD and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Abner Li ***Date:*** 2015.10.16
(Abner Li)

Check By: Chen Hui ***Date:*** 2015.10.16
(Chen Hui)

Approved By: Wang Fengbing ***Date:*** 2015.10.16
(Wang Fengbing)

2 EUT DESCRIPTION

Product	LED Display
Trade Mark	N/A
Model	P10
Applicant	Shenzhen Chip Optech Co.,Ltd.
Housing material	Metal
EUT Type	☒Engineering Sample. ☐Product Sample, ☐ Mass Product Sample.
AC Line	N/A
Power Rating	Input: 100-240V～50-60Hz 780W/m^2 max.

I/O PORT

I/O PORT TYPES	Q'TY	TESTED WITH
Ethernet/RJ45	2	☒

Model difference

N/A

World Standardization Certification & Testing
World Standardization PengCheng Commodity Inspection Technology Service (Shenzhen)Co.,Ltd.
World Standardization Certification & Testing (Shenzhen)Co.,Ltd.

3 TEST METHODOLOGY

3.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the thereinafter additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode		Remark:
Conducted Emission	Mode: Communication	Video playing
Radiated Emission	Mode: Communication	Video playing

3.2. EUT SYSTEM OPERATION

1. Set up EUT with the relative support equipments.

2. Make sure the EUT worked normally during the test.

4 SETUP OF EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF SUPPORT UNITS

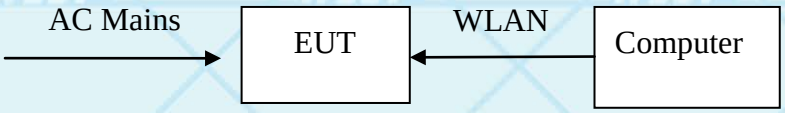
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	PC1	Dx2700	CNG7140T7P	N/A	HP	Unshielded 1.4m	Unshielded 1.6m
	PC2	M490	WB11557766	N/A	Lenovo	Unshielded 1.0m	N/A

Note:

1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2. CONFIGURATION OF SYSTEM UNDER TEST



(EUT: LED Display)

5 FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

Building A, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, P.R.C.

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	**TIMCO (The certificate registration number is Q2012033001)**
Japan	**VCCI (The certificate registration number is C-4128, R-3684)**
Canada	**INDUSTRY CANADA (The certificated registration number is 7700A-1)**
Germany	**TUV (The certificate registration number is UA50138086-0001,UA50138086-0002)**
	EMCC (The certificated registration number is #080380)
	PHOENIX(The certificated registration number is 702777a)
	Eurofins
China	**CNAS (The certificated registration number is L3732)**
Switzerland	**SGS(The certificated registration number is SZE0005409, SZE0005408)**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.wsct-cert.org

5.3. MEASUREMENT UNCERTAINTY

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

Measurement	Frequency		Uncertainty
Conducted emissions	9kHz~30MHz		+/- 3.20dB
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
		1000MHz~1800MHz	+/- 5.01dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB
		1000MHz~1800MHz	+/- 5.01dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 CONDUCTED EMISSION MEASUREMENT

6.1. LIMITS OF CONDUCTED EMISSION MEASUREMENT

(1) Limits of mains terminal disturbance voltage:

FREQUENCY (MHz)	LIMITS(dB μV)	
	Quasi-peak	Average
0.15 - 0.5	79	73
0.5 – 30.	66	60

(2) Limits of conducted common mode disturbance at telecommunication ports:

FREQUENCY (MHz)	Voltage Limits (dB μV)		Current Limits (dB μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 – 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 – 30	87	74	43	30

NOTE:
(1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

6.2. TEST INSTRUMENTS

Conducted Emission Test Site 843				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	100005	2016-08-18
LISN	AFJ	LS16	16010222119	2016-08-18
LISN(EUT)	Mestec	AN3016	04/10040	2016-08-18
ISN	Schwarz beck	NTFM 8158	20101204	2016-08-18

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International System Unit (SI).
2. N.C.R = No Calibration Request.

6.3. TEST PROCEDURES

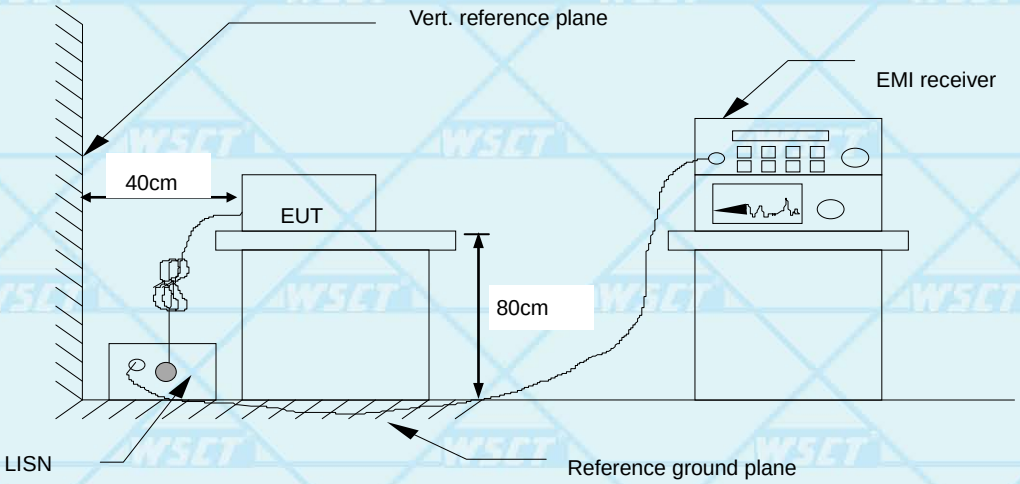
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per AS/NZS CISPR 22 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per AS/NZS CISPR 22.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 9 kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

6.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.5 TEST RESULTS

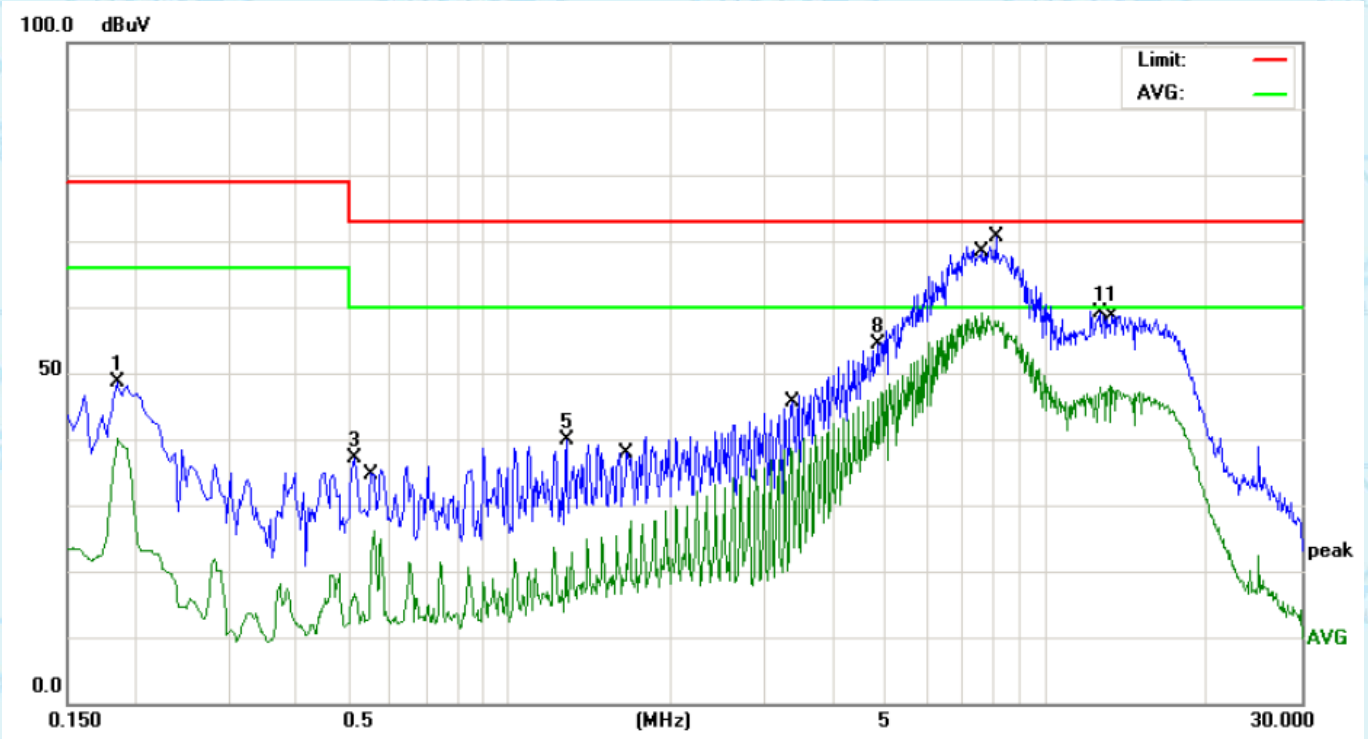
Model No.	P10	**Test Mode**	Video playing
Environmental Conditions	22°C, 57% RH	**6dB Bandwidth**	9 KHz
Detector Function	Peak / Quasi-peak/AV	**Test By**	Abner Li
Test Voltage	240V~ 50Hz		

Note:
1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).
2. "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
3. Freq. = Emission frequency in MHz
Reading level (dBμV) = Receiver reading
Corr. Factor (dB) = Attenuator Factor+ Cable loss
Level (dBμV) = Reading level (dBμV) + Corr. Factor (dB)
Limit (dBμV) = Limit stated in standard
Margin (dB) = Level (dBμV) – Limits (dBμV)
Q.P.=Quasi-Peak

Please refer to following diagram for individual

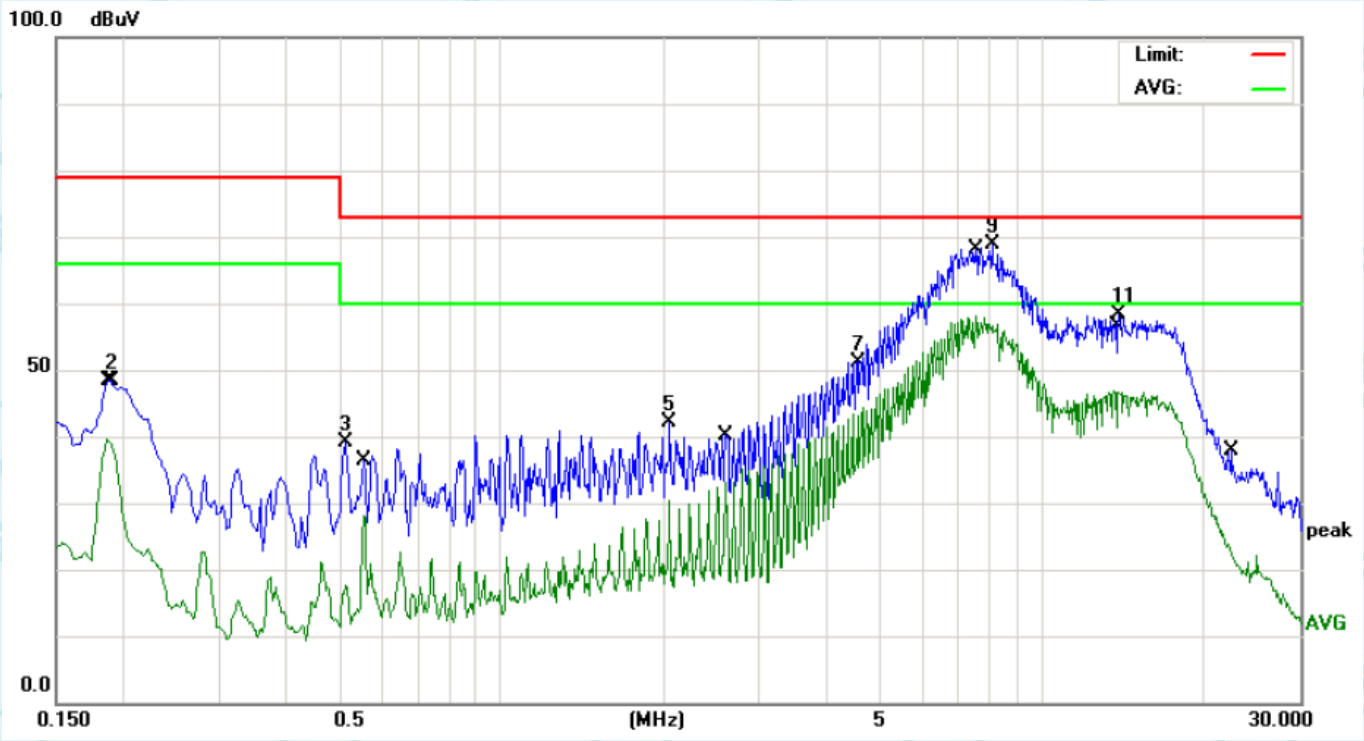
Mains terminal:

Live Line:



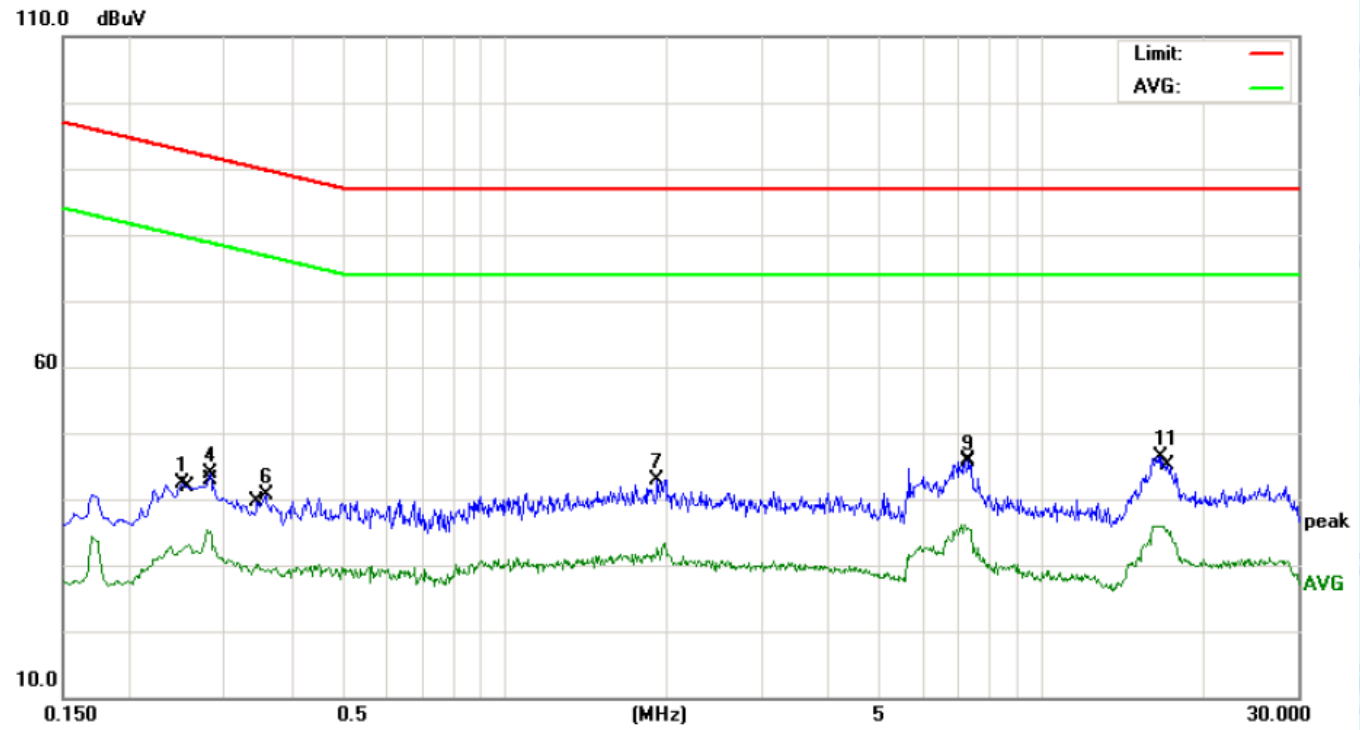
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1860	38.23	10.34	48.57	79.00	-30.43	peak	
2		0.1860	29.81	10.34	40.15	66.00	-25.85	AVG	
3		0.5180	26.67	10.45	37.12	73.00	-35.88	peak	
4		0.5620	15.42	10.59	26.01	60.00	-33.99	AVG	
5		1.2780	29.18	10.74	39.92	73.00	-33.08	peak	
6		1.6820	16.92	10.72	27.64	60.00	-32.36	AVG	
7		3.3620	27.90	10.66	38.56	60.00	-21.44	AVG	
8		4.8580	43.74	10.61	54.35	73.00	-18.65	peak	
9	*	7.5700	48.64	10.50	59.14	60.00	-0.86	AVG	
10		8.0740	50.27	10.48	60.75	73.00	-12.25	QP	
11		12.6220	48.66	10.43	59.09	73.00	-13.91	peak	
12		13.1820	37.77	10.43	48.20	60.00	-11.80	AVG	

Neutral Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1860	29.33	10.34	39.67	66.00	-26.33	AVG	
2		0.1900	38.02	10.33	48.35	79.00	-30.65	peak	
3		0.5140	28.57	10.44	39.01	73.00	-33.99	peak	
4		0.5580	17.48	10.57	28.05	60.00	-31.95	AVG	
5		2.0460	31.39	10.71	42.10	73.00	-30.90	peak	
6		2.6020	22.41	10.69	33.10	60.00	-26.90	AVG	
7		4.5260	40.58	10.62	51.20	73.00	-21.80	peak	
8	*	7.5340	47.63	10.50	58.13	60.00	-1.87	AVG	
9		8.0940	58.52	10.48	69.00	73.00	-4.00	peak	
10		13.5900	36.40	10.44	46.84	60.00	-13.16	AVG	
11		13.8700	47.99	10.44	58.43	73.00	-14.57	peak	
12		22.0780	13.36	10.52	23.88	60.00	-36.12	AVG	

Telecommunication ports:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2500	31.97	10.48	42.45	92.75	-50.30	peak	
2		0.2580	22.52	10.50	33.02	79.49	-46.47	AVG	
3		0.2779	24.84	10.57	35.41	78.88	-43.47	AVG	
4		0.2819	33.26	10.59	43.85	91.76	-47.91	peak	
5		0.3460	19.65	10.58	30.23	77.06	-46.83	AVG	
6		0.3580	30.03	10.56	40.59	89.77	-49.18	peak	
7		1.9220	32.21	10.72	42.93	87.00	-44.07	peak	
8		1.9220	22.02	10.72	32.74	74.00	-41.26	AVG	
9		7.3020	35.24	10.51	45.75	87.00	-41.25	peak	
10		7.3940	24.77	10.50	35.27	74.00	-38.73	AVG	
11		16.7420	35.89	10.47	46.36	87.00	-40.64	peak	
12	*	17.1420	24.96	10.47	35.43	74.00	-38.57	AVG	

7 RADIATED EMISSION MEASUREMENT

7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	dBμV/m (At 3m)
30 ~ 230	50
230 ~ 1000	57

Frequency range (MHz)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)
1000 ~ 3000	56	76
3000 ~ 6000	60	80

NOTE: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBμV/m) = 20 log Emission level (μV/m).

7.2 TEST INSTRUMENTS

Radiated Emission Test Site 966				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESPI	101139	2016-08-18
Spectrum Analyzer	R&S	FSU	200409	2016-08-18
Pre Amplifier	H.P.	HP8447E	2945A02715	2016-08-18
Pre Amplifier	H.P.	PAP-1G18-38	7621	2016-08-18
Bilog Antenna	SUNOL Sciences	JB3	A021907	2016-09-13
HORN ANTENNA	COMPLIANCE ENGINEERING	CE18000	--	2016-09-13
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	2016-09-13
System-Controller	CCS	N/A	N/A	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International System Unit (SI).
2. N.C.R = No Calibration Request.

7.3 TEST PROCEDURES

Procedure of Preliminary Test

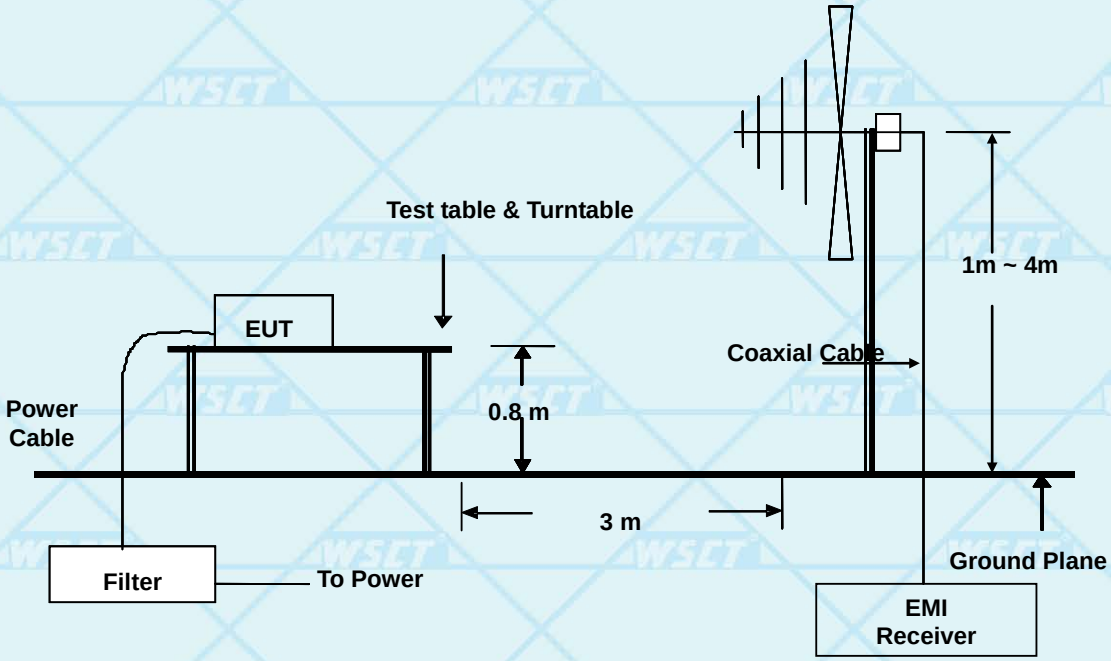
- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per AS/NZS CISPR 22.
- All I/O cables were positioned to simulate typical usage as per AS/NZS CISPR 22.
- Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.
- The antenna was placed at 3 meter away from the EUT as stated in AS/NZS CISPR 22. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 300MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

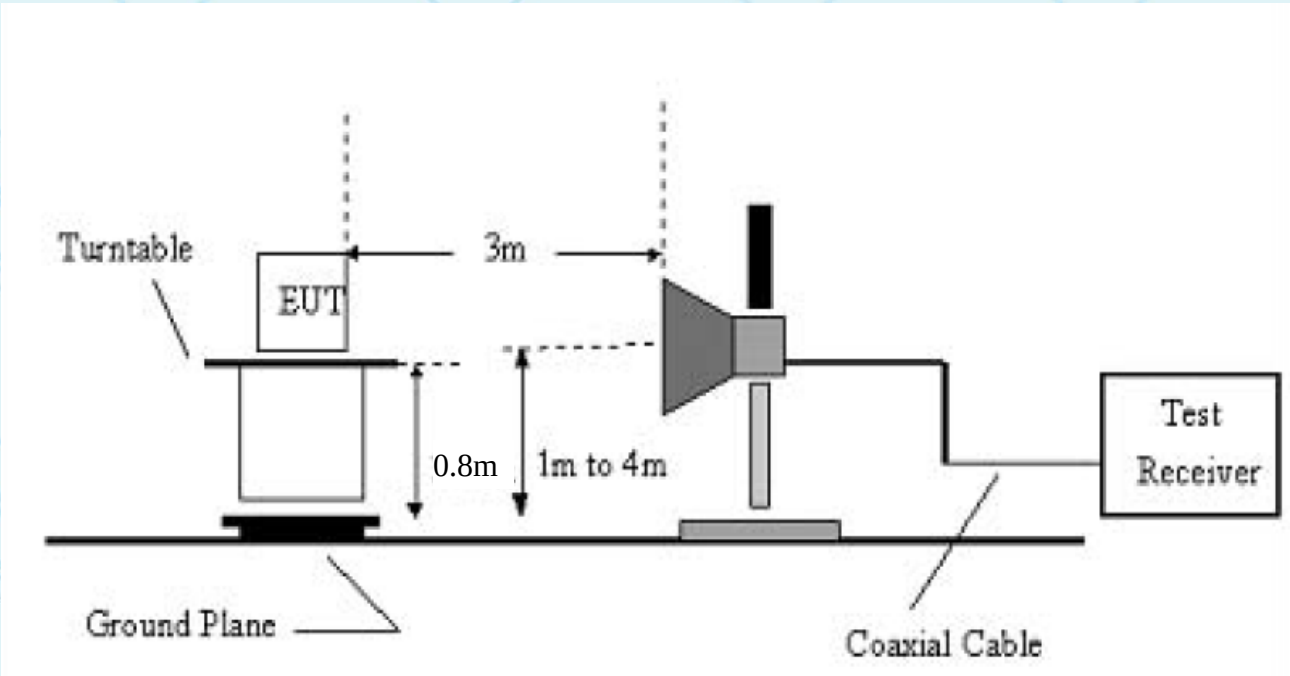
- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 300MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

7.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5TEST RESULTS

Model No.	P10	**Test Mode**	Video playing
Environmental Conditions	22°C,55% RH	**6dB Bandwidth**	120 KHz(30MHz-1GHz) 1MHz(1GHz-6GHz)
Antenna Pole	Vertical / Horizontal	**Antenna Distance**	3m
Detector Function	Peak / Quasi-peak	**Tested by**	Abner Li

Note:

1. Freq. = Emission frequency in MHz
   Reading level (dBμV) = Receiver reading
   Corr. Factor (dB) = Antenna factor + Cable loss
   Measurement (dBuV) = Reading level (dBμV) + Corr. Factor (dB)
   Limit (dBμV) = Limit stated in standard
   Margin (dB) = Measurement (dBμV) – Limits (dBμV)

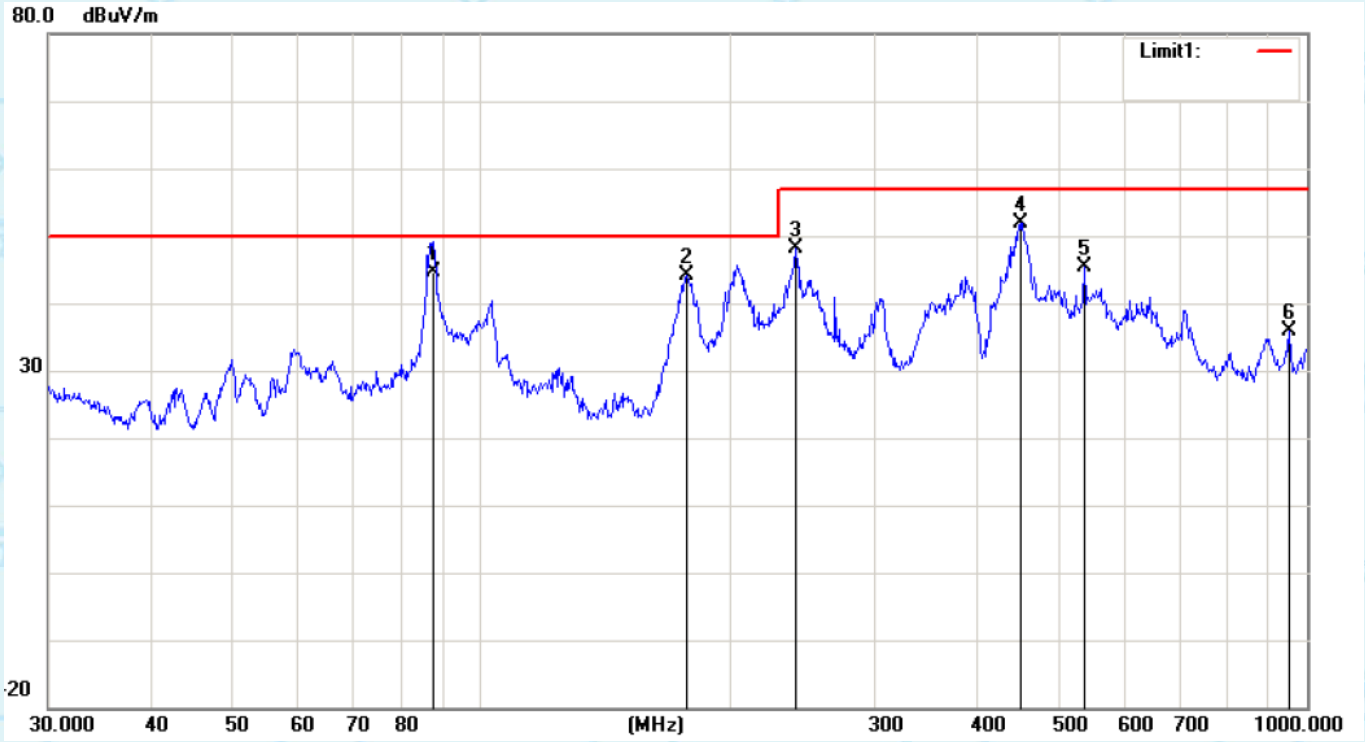
Please refer to following diagram for individual

Below 1G:

Horizontal:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		55.8047	37.11	-9.48	27.63	50.00	-22.37	peak			
2		87.1117	43.34	-7.97	35.37	50.00	-14.63	peak			
3	*	202.8104	51.42	-4.92	46.50	50.00	-3.50	peak			
4		243.3772	54.19	-6.37	47.82	57.00	-9.18	peak			
5		451.1350	52.09	-2.03	50.06	57.00	-6.94	peak			
6		651.9417	42.22	1.69	43.91	57.00	-13.09	peak			

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		87.5648	52.61	-7.97	44.64	50.00	-5.36	QP	100	0	
2		177.5092	49.21	-5.05	44.16	50.00	-5.84	peak			
3		240.8304	54.30	-6.28	48.02	57.00	-8.98	peak			
4	*	449.5558	53.99	-2.07	51.92	57.00	-5.08	peak			
5		537.5891	45.54	-0.20	45.34	57.00	-11.66	peak			
6		952.0937	13.58	22.19	35.77	57.00	-21.23	peak			

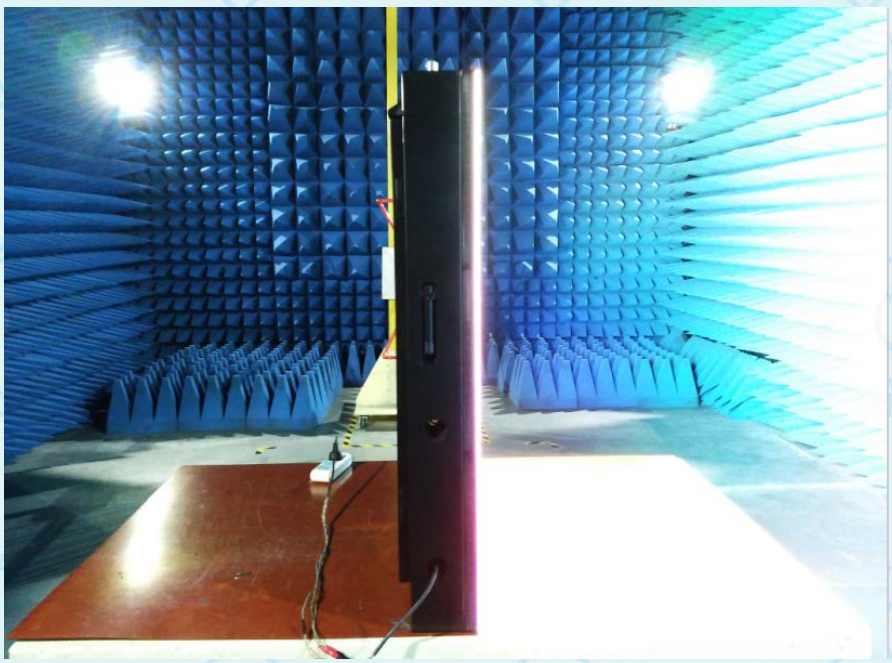
Above 1G:

Ant.Pol.	Frequency	Measurement (dB μ V)		Limit 3m (dB μ V/m)		Margin(dB)	
	MHz	PK	AV	PK	AV	PK	AV
Horizontal	1386.60	70.01	42.70	76	56	-5.99	-13.30
	2007.89	70.19	44.03	76	56	-5.81	-11.97
	4408.28	71.95	53.39	80	60	-8.05	-6.61
Vertical	1756.78	68.71	43.24	76	56	-7.29	-12.76
	2303.38	67.06	43.89	76	56	-8.94	-12.11
	4748.89	74.98	49.14	80	60	-5.02	-10.86

8 PHOTOGRAPHS OF THE TEST CONFIGURATION

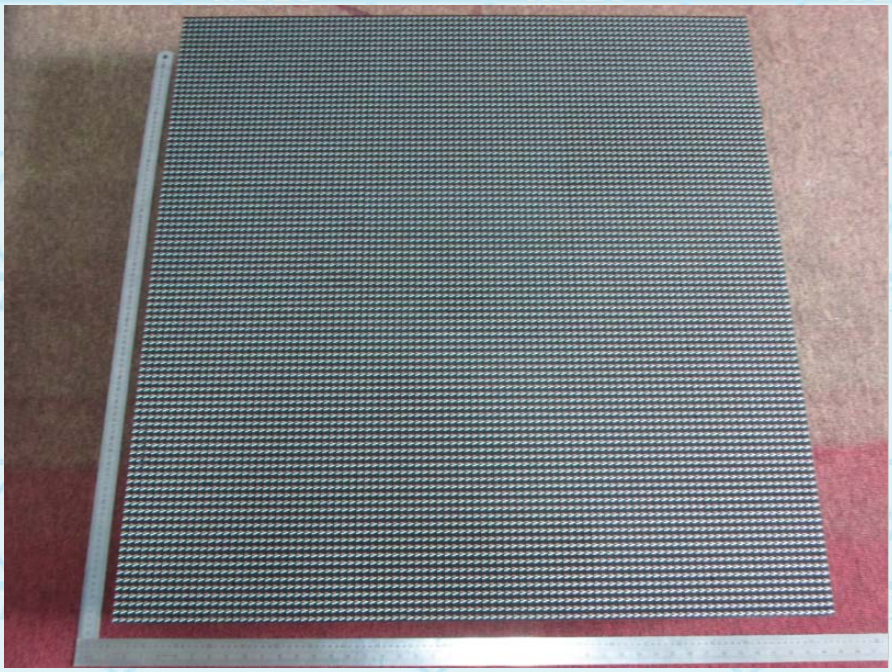
CONDUCTED EMISSION TEST

RADIATED EMISSION TEST



9 PHOTOGRAPHS OF EUT

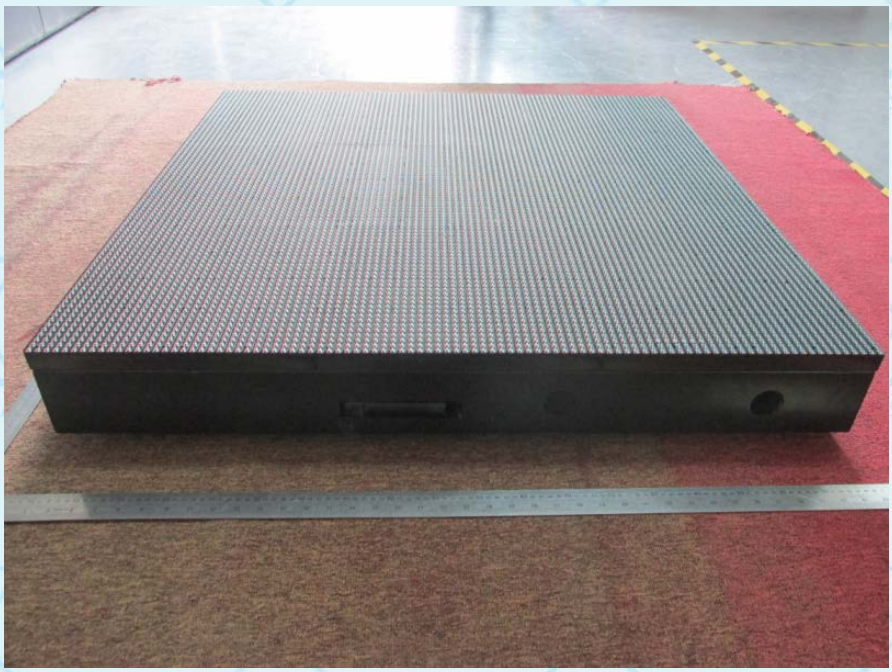
Appearance photograph of EUT



Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT



Appearance photograph of EUT

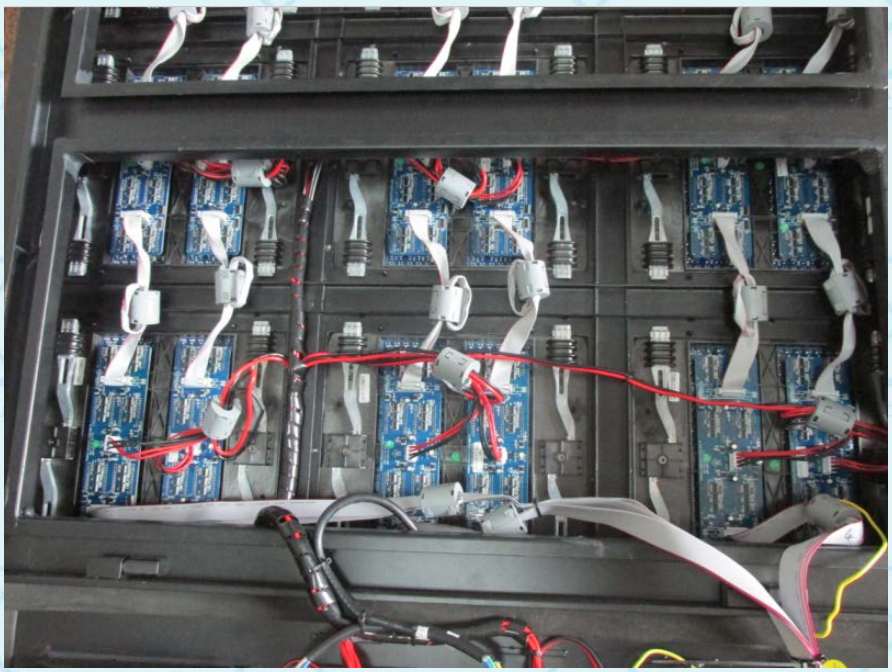
Appearance photograph of EUT

Internal photograph of EUT

Internal photograph of EUT

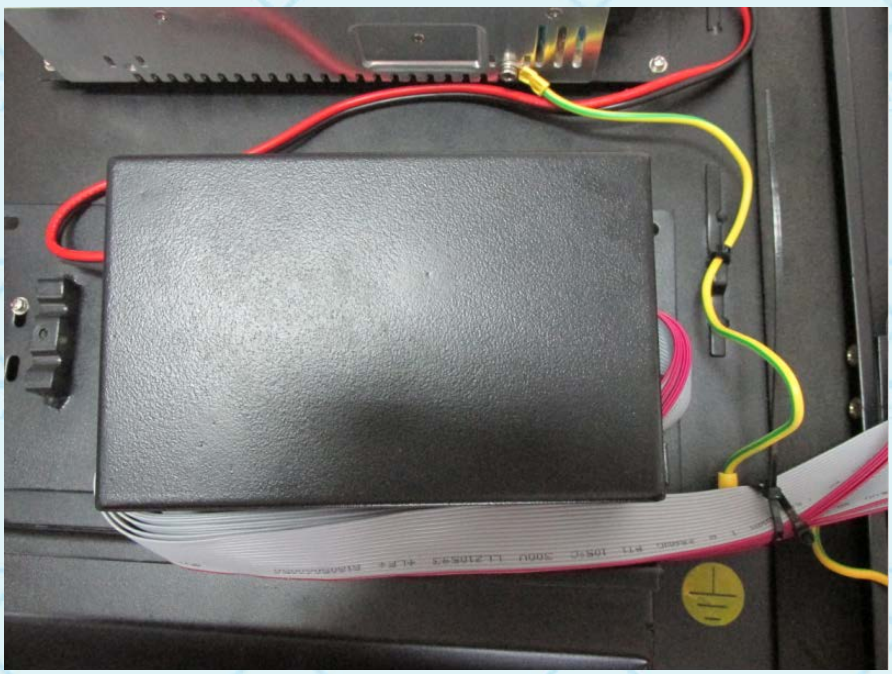
Internal photograph of EUT

Internal photograph of EUT

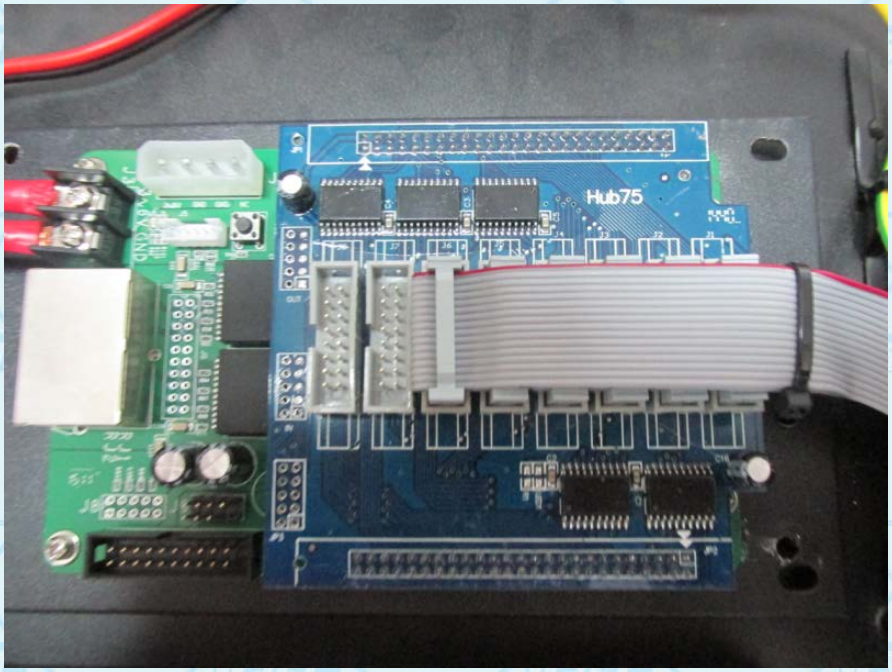


Internal photograph of EUT

Internal photograph of EUT



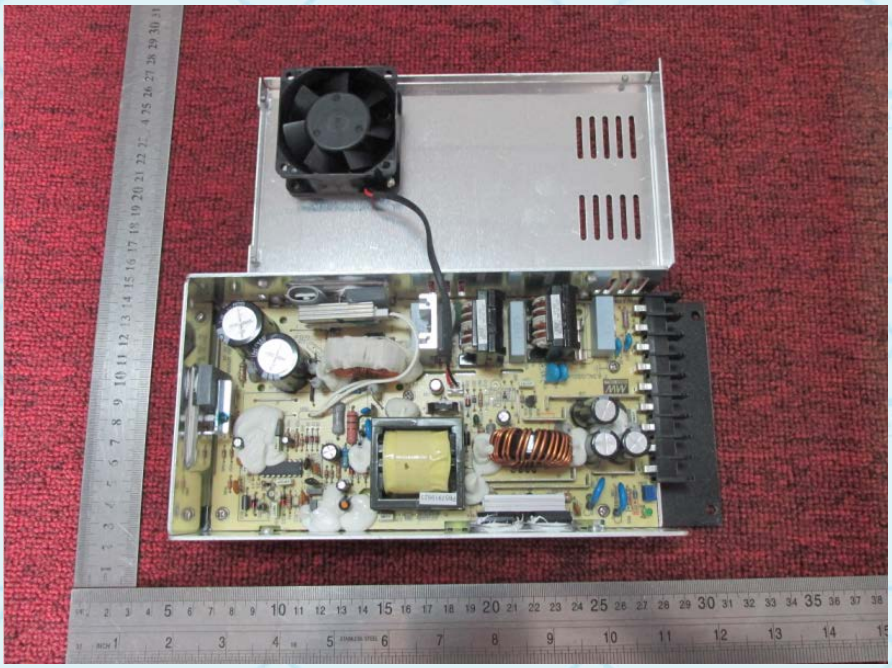
Internal photograph of EUT



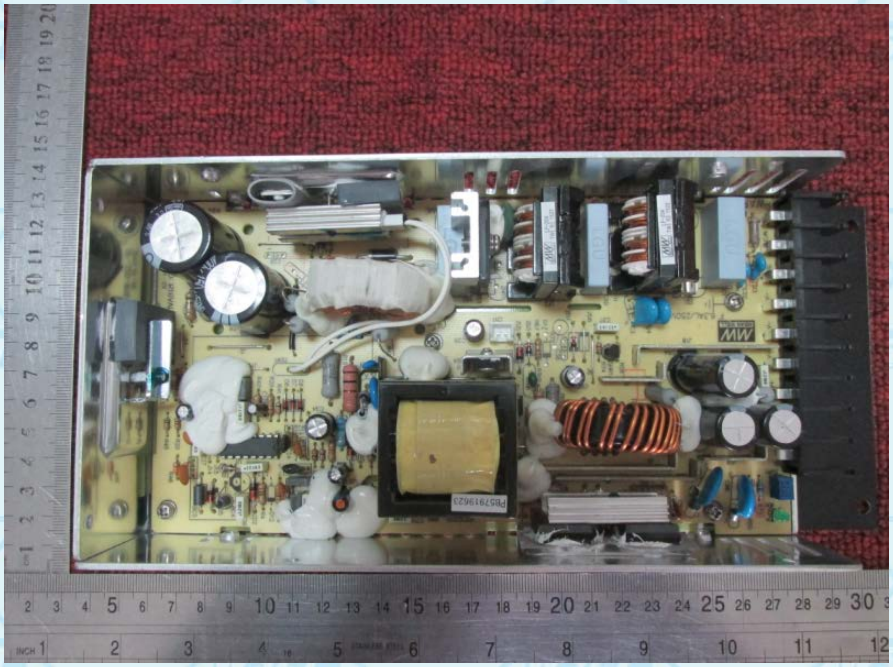
Internal photograph of EUT

Internal photograph of EUT

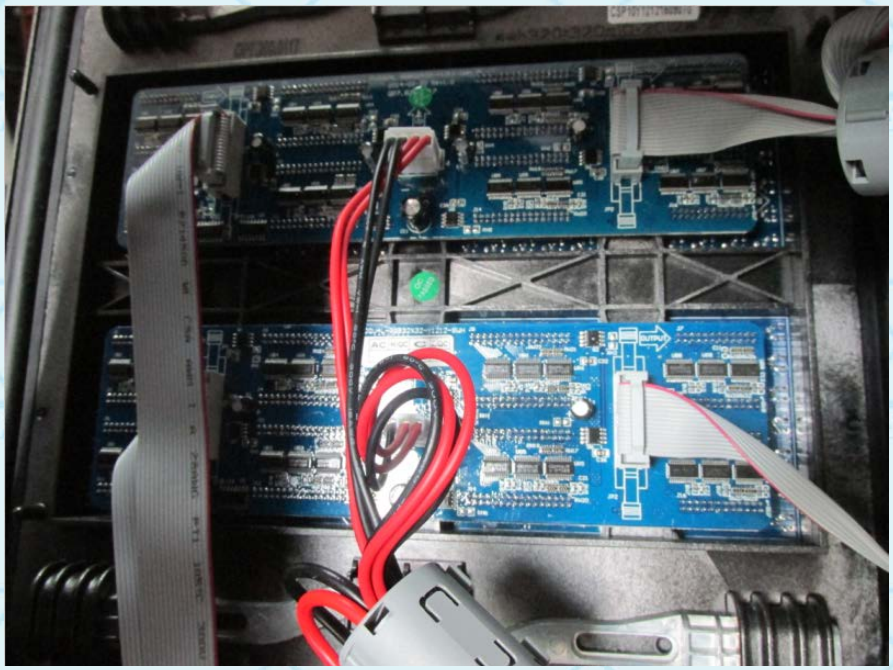
Internal photograph of EUT



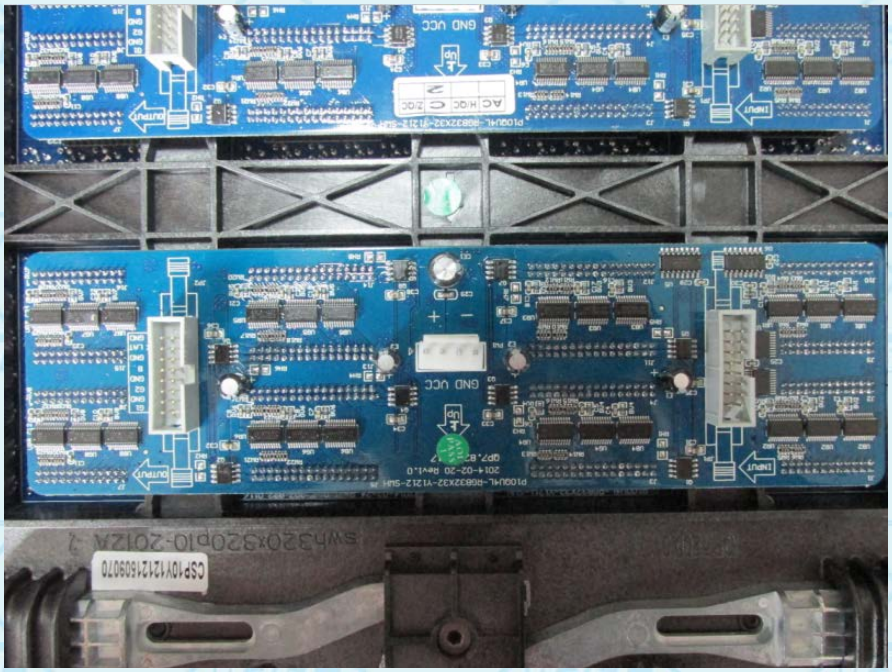
Internal photograph of EUT



Internal photograph of EUT



Internal photograph of EUT



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