

FCC PART 15 SUBPART B MEASUREMENT AND TEST REPORT

For

Fanvil Technology Co . ,Ltd

Level 3,Block A,Gaoxingqi Building,Anhua Industrial Park,Qianjin 1 Road,35th
District,Bao'An,Shenzhen,518101 P.R.China

Model: X3, X3P, X3E, X3EP

October 14, 2015

This Report Concerns: <input type="checkbox"/> Original Report	Equipment Type: X3
Test By:	Xiaona Deng/ <i>Xiaona Deng</i>
Report Number:	HCT15JR-0997E
Test Date:	October 22~November 6, 2014
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Approved By:	Owen Yang/ <i>Owen Yang</i>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Hongcai Testing Technology Co.,Ltd.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: **Fanvil Technology Co . , Ltd**
 Address of applicant: Level 3,Block A, Gaoxinqi Building,Anhua Industrial Park,Qianjin 1 Road,35th District,Bao'An,Shenzhen,518101 P.R. China
 Manufacturer: **Fanvil Technology Co . , Ltd**
 Address of manufacturer: Level 3,Block A, Gaoxinqi Building,Anhua Industrial Park,Qianjin 1 Road,35th District,Bao'An,Shenzhen,518101 P.R. China

General Description of E.U.T

EUT Description: **X3**
 Trade Mark: **Fanvil**
 Model No.: **X3, X3P, X3E, X3EP**
 Test Model No.: **X3P**
 Adapter Power Rating: **Model: F05L5-050060SPAU**
Input: AC 100-240V 50/60Hz 0.2A
Output: DC 5V 600mA
 Power Rating: **Output: DC 5V 600mA**

Remark: * The test data gathered are from the production sample provided by the manufacturer.
 * Supplementary models have the same appearance, but with different ways of power supply.
 * HCT15JR-0997E is produced on the basis of BCT14JR-1475E.

General Description of Test Auxiliary

AUX Description:	Manufacturer	Model No.	Certificate
Laptop	LENOVO	0658	CE,FCC
8-Port 10/100Mbps Desktop Switch with 4-port POE	TP-LINK	TL-SF1008P	CE,FCC

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with FCC Rules and Regulations Part 15 Subpart B

The objective of the manufacturer is to demonstrate compliance with the described above standards.

1.3 Test Summary

For the EUT described above. The standards used were FCC Part 15 Subpart B for Emissions

Table 1 : Tests Carried Out Under FCC Part 15 Subpart B

Standard	Test Items	Status
FCC Part 15 Subpart B	Conduction Emission (0.15MHz to 30MHz)	√
FCC Part 15 Subpart B	Radiation Emission (30MHz to 1GHz)	√

- √ Indicates that the test is applicable
- × Indicates that the test is not applicable

1.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - Registration No.: L3923

Shenzhen Hongcai Testing Technology Co.,Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. The acceptance letter from the CNAS is maintained in our files: Registration: L3923, June 1,2015.

FCC – Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as only used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being ON operation.

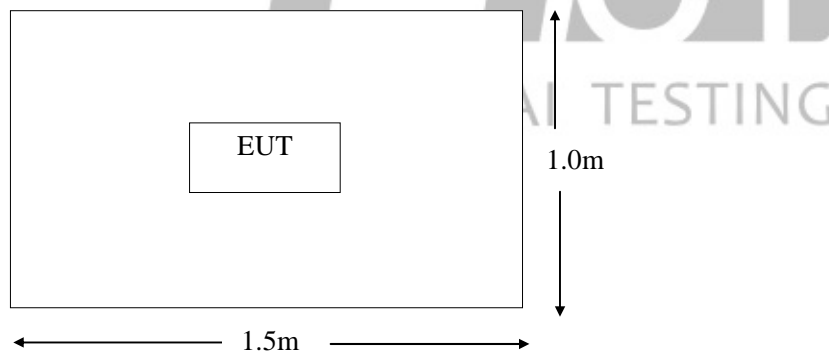
2.3 Special Accessories

As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by **Fanvil Technology Co., Ltd** and its respective support equipment manufacturers.

2.4 Equipment Modifications

The EUT tested was not modified by HCT.

2.5 Configuration of Test System



3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is 3.4 dB.

3.2 Limit of Disturbance Voltage at The Mains Terminals

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup

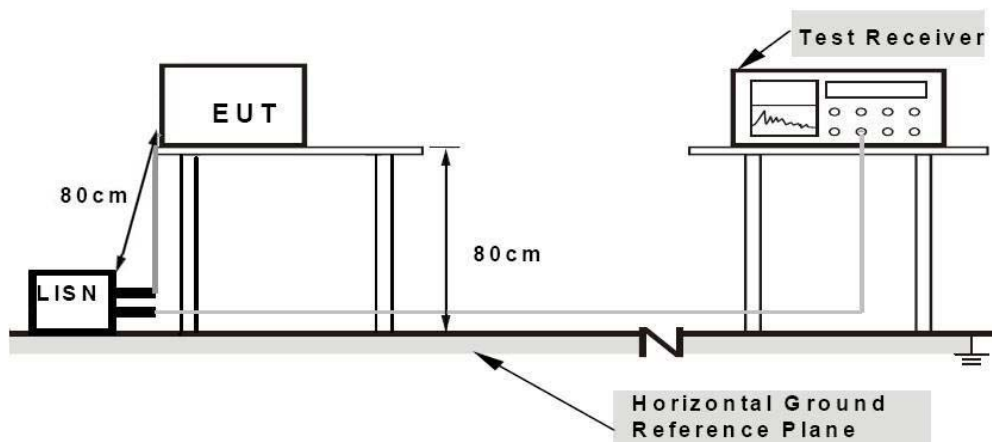
The setup of EUT is according with ANSI C63.4-2009 measurement procedure. The specification used was the FCC Rules and Regulations Part 15 Subpart B limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.



3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....150 KHz to 30 MHz
 Detector.....Peak & Quasi-Peak & Average
 Sweep Speed.....Auto
 IF Band Width.....9 KHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB μ V of specification limits). Quasi-peak readings are distinguished with a "QP". Average readings are distinguished with a "AV".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 B Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (°C)	22~25
Humidity (%RH)	50~55
Barometric Pressure (mbar)	950~1000
EUT	X3
M/N	X3P
Operating Mode	Normal operation

Test data see following pages

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
 (2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

3.8 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last calibration	Due calibration
1	BCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2014-4-24	2015-4-23
2	BCT-EMC020	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	8128247	2014-10-30	2015-10-29
3	BCT-EMC032	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2014-4-24	2015-4-23

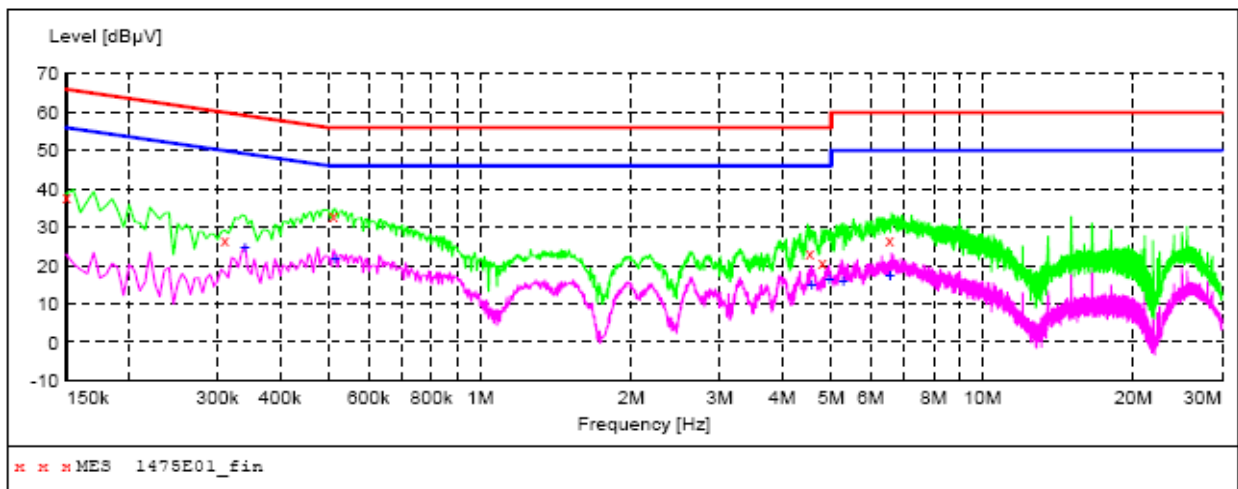
3.9 Test Result

PASS

Conducted Emission Test Data

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Cheng
Test Specification: AC 120V/60Hz for Adapter
Comment: Live Line
Start of Test: Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "1475E01_fin"

11/6/2014 14:04

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	37.90	13.4	66	28.1	QP	L1	GND
0.310000	26.70	10.9	60	33.3	QP	L1	GND
0.510000	32.90	10.5	56	23.1	QP	L1	GND
4.535000	23.10	10.4	56	32.9	QP	L1	GND
4.800000	20.70	10.4	56	35.3	QP	L1	GND
6.540000	26.50	10.5	60	33.5	QP	L1	GND

MEASUREMENT RESULT: "1475E01_fin2"

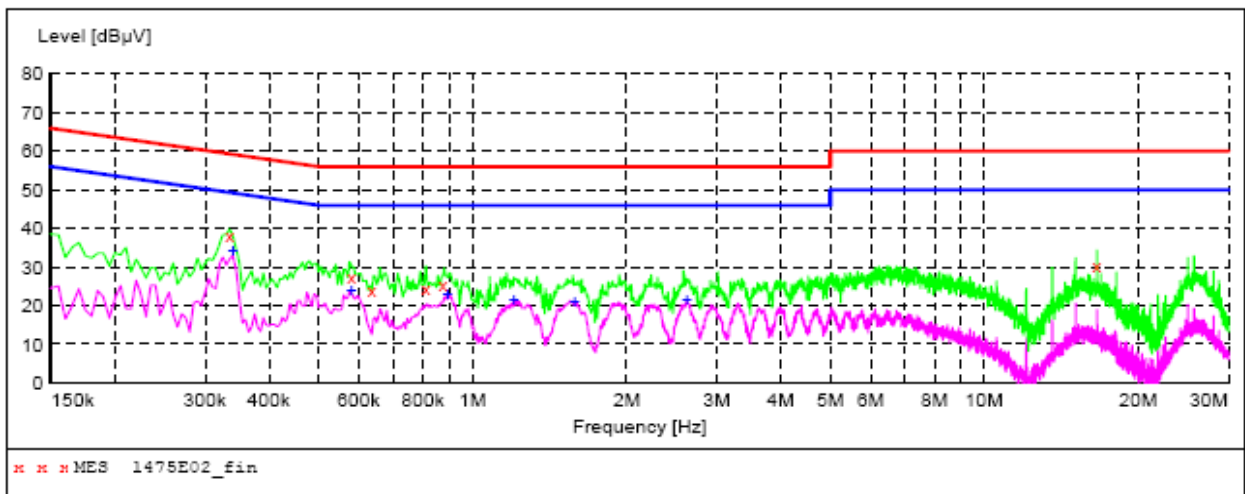
11/6/2014 14:04

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.340000	24.80	10.8	49	24.4	AV	L1	GND
0.515000	21.80	10.5	46	24.2	AV	L1	GND
4.570000	15.00	10.4	46	31.0	AV	L1	GND
4.965000	16.50	10.4	46	29.5	AV	L1	GND
5.290000	15.90	10.4	50	34.1	AV	L1	GND
6.550000	17.70	10.5	50	32.3	AV	L1	GND

Conducted Emission Test Data

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Cheng
Test Specification: AC 120V/60Hz for Adapter
Comment: Neutral Line
Start of Test: Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K-30M) FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "1475E02_fin"

11/6/2014 14:07

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.335000	38.10	10.9	59	21.2	QP	N	GND
0.580000	27.40	10.4	56	28.6	QP	N	GND
0.635000	24.10	10.4	56	31.9	QP	N	GND
0.810000	24.30	10.4	56	31.7	QP	N	GND
0.875000	25.50	10.4	56	30.5	QP	N	GND
16.615000	30.40	10.8	60	29.6	QP	N	GND

MEASUREMENT RESULT: "1475E02_fin2"

11/6/2014 14:07

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.340000	34.40	10.8	49	14.8	AV	N	GND
0.580000	24.00	10.4	46	22.0	AV	N	GND
0.895000	22.90	10.4	46	23.1	AV	N	GND
1.205000	21.70	10.4	46	24.3	AV	N	GND
1.585000	21.20	10.4	46	24.8	AV	N	GND
2.625000	21.50	10.4	46	24.5	AV	N	GND

4 - RADIATED DISTURBANCES

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is 4.0 dB.

4.2 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
960 ~ 1000	3	54

- Note: (1) The tighter limit shall apply at the edge between two frequency bands.
 (2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.3 EUT Setup

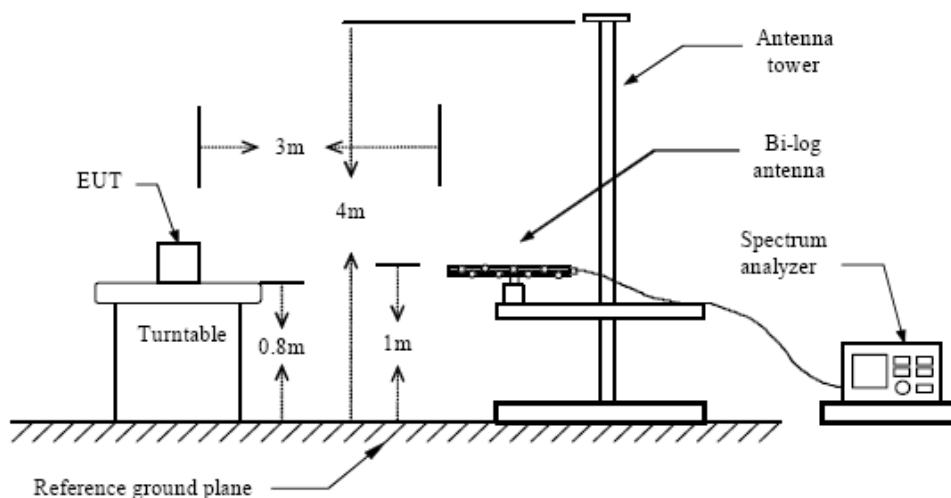
The radiated emission tests were performed in the in the 3-meter anechoic chamber, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC Part 15 Subpart B limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

Block diagram of test setup (In chamber)

Below 1 GHz



4.4 Test Receiver Setup

According to FCC Part 15 rule, the frequency was investigated from 30 to 1000 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak
 IF Band Width.....120KHz
 Frequency Range.....30MHz to 1000MHz
 Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m
 Polarity.....Horizontal and Vertical

4.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dB μ V of specification limits), and are distinguished with a "QP" in the data table.

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Subpart B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corr. Ampl.}$$

4.7 Radiated Emissions Test Result

Temperature (°C)	22~25
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	X3
M/N	X3P
Operating Mode	Normal operation

4.8 Test Equipment List and Details

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last calibration	Due calibration
1	BCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2014-4-24	2015-4-23
2	BCT-EMC002	EMI Test Receiver	R&S	ESPI	100097	2014-10-30	2015-10-29
3	BCT-EMC018	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2014-5-18	2015-5-17

4.9 Test Result

PASS

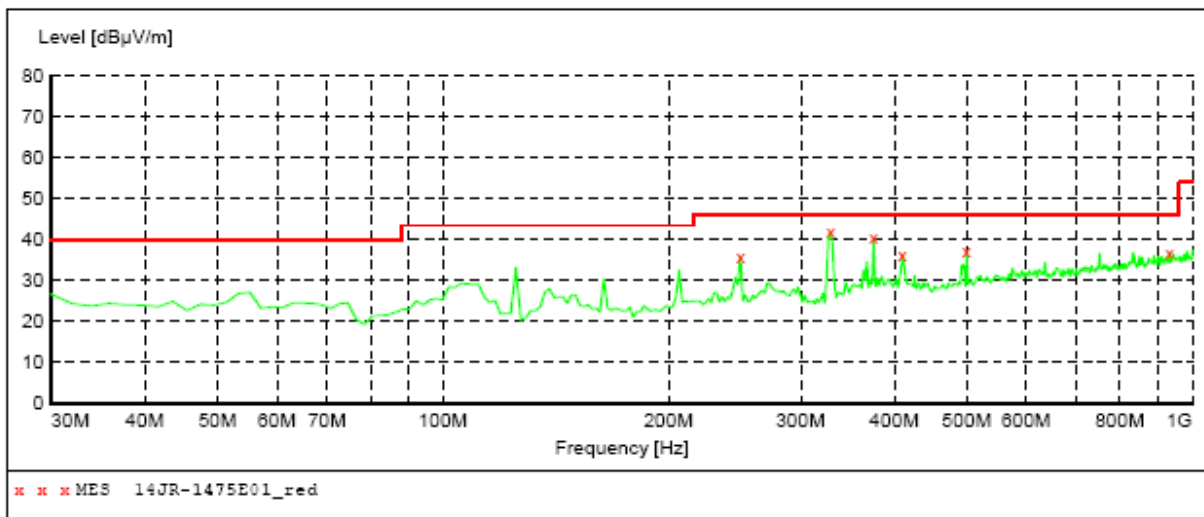


Radiated Emission Test Data of Below 1GHz

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: CHAMBER
Operator: Pan
Test Specification: AC 120V/60Hz for Adapter
Comment: Polarization: Horizontal
Start of Test: Tem:25°C Hum:50%

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency				
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT: "14JR-1475E01_red"

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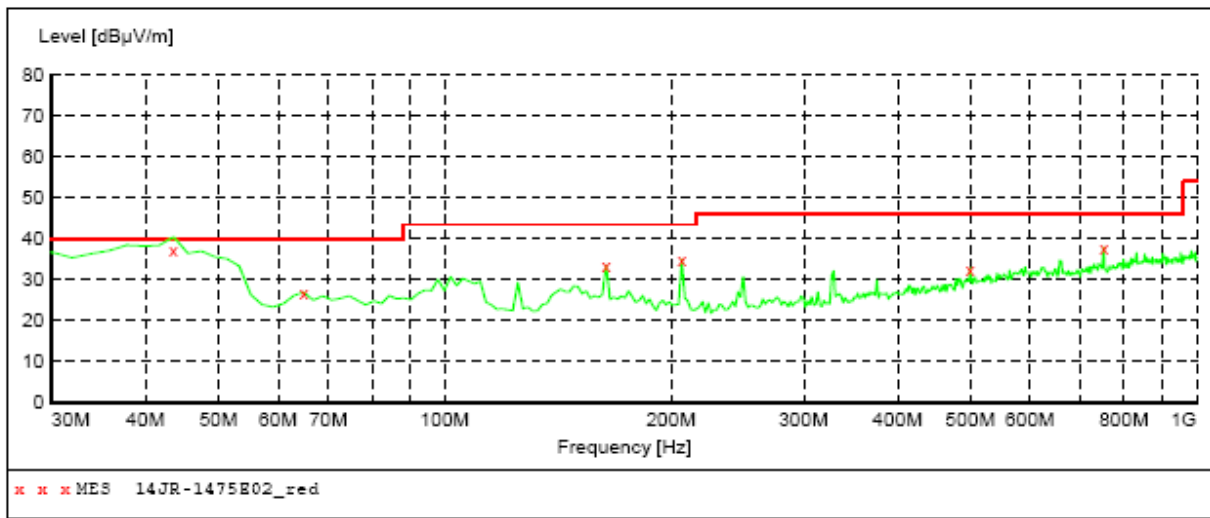
Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
249.220000	36.00	17.2	46.0	10.0	QP	100.0	0.00	HORIZONTAL
328.760000	41.80	19.6	46.0	4.2	QP	100.0	0.00	HORIZONTAL
375.320000	40.40	20.8	46.0	5.6	QP	100.0	0.00	HORIZONTAL
410.240000	36.40	21.7	46.0	9.6	QP	100.0	0.00	HORIZONTAL
499.480000	37.20	23.8	46.0	8.8	QP	100.0	0.00	HORIZONTAL
932.100000	36.90	29.4	46.0	9.1	QP	100.0	0.00	HORIZONTAL

Radiated Emission Test Data of Below 1GHz

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: CHAMBER
Operator: Pan
Test Specification: AC 120V/60Hz for Adapter
Comment: Polarization: Vertical
Start of Test: Tem:25°C Hum:50%

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	MaxPeak	Coupled	100 kHz	VULB9163 NEW
30.0 MHz	1.0 GHz				



MEASUREMENT RESULT: "14JR-1475E02_red"

11/5/2014 16:33

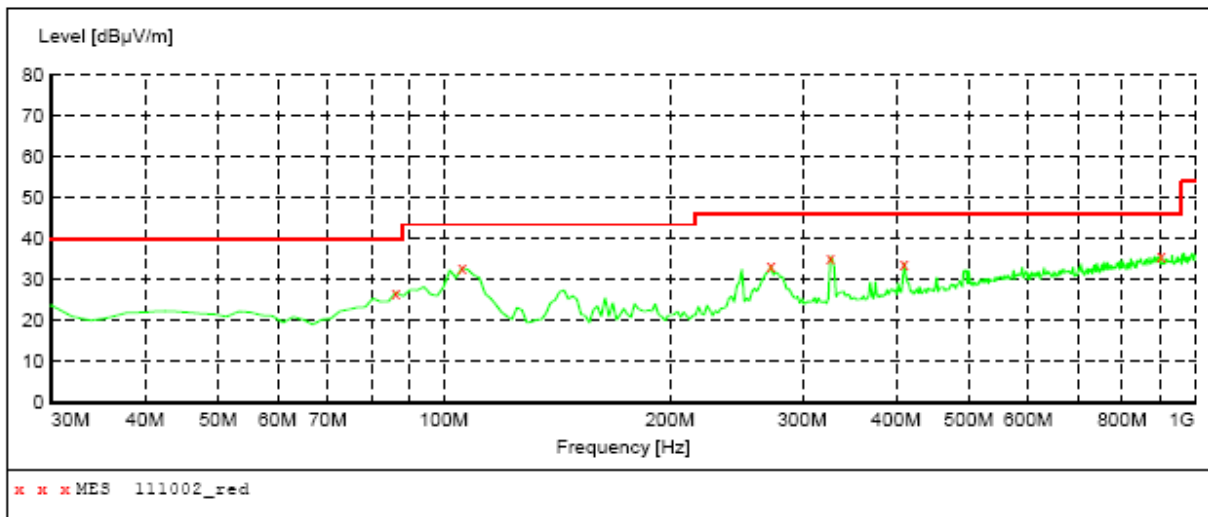
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	37.40	15.9	40.0	2.6	QP	100.0	0.00	VERTICAL
64.920000	26.90	13.5	40.0	13.1	QP	100.0	0.00	VERTICAL
163.860000	33.60	12.9	43.5	9.9	QP	100.0	0.00	VERTICAL
206.540000	35.00	15.0	43.5	8.5	QP	100.0	0.00	VERTICAL
499.480000	32.70	23.8	46.0	13.3	QP	100.0	0.00	VERTICAL
751.680000	37.90	27.3	46.0	8.1	QP	100.0	0.00	VERTICAL

Radiated Emission Test Data of Below 1GHz

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: CHAMBER
Operator: Pan
Test Specification: AC 120V/60Hz for POE
Comment: Polarization: Horizontal
Start of Test: Tem:25°C Hum:50%

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	MaxPeak	Coupled	100 kHz	VULB9163 NEW
30.0 MHz	1.0 GHz				



MEASUREMENT RESULT: "111002_red"

11/10/2014 10:34

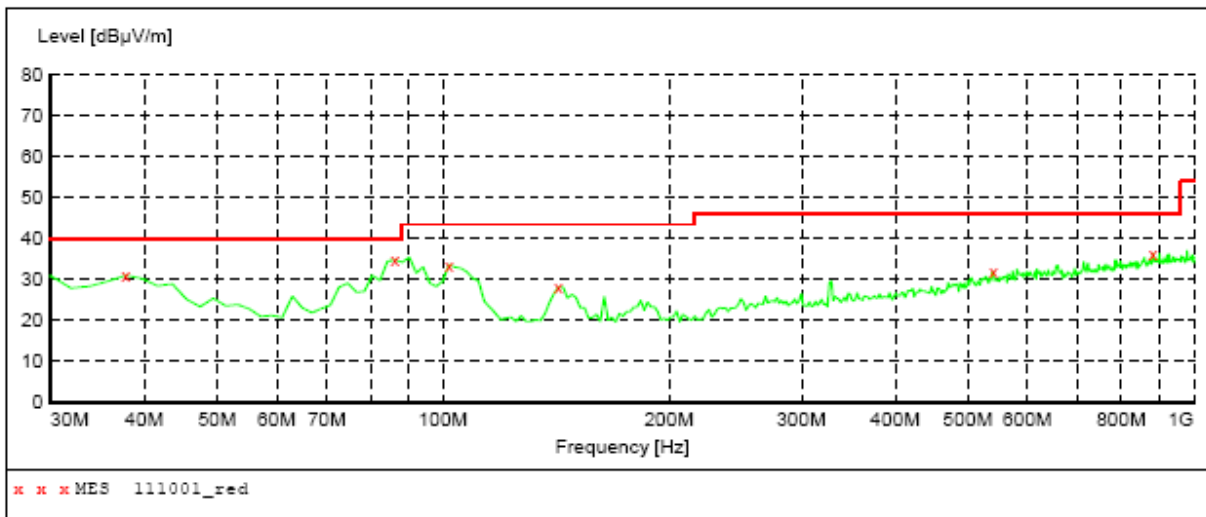
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
86.260000	27.00	14.8	40.0	13.0	QP	100.0	0.00	HORIZONTAL
105.660000	32.90	16.9	43.5	10.6	QP	100.0	0.00	HORIZONTAL
272.500000	33.50	17.9	46.0	12.5	QP	100.0	0.00	HORIZONTAL
326.820000	35.60	19.5	46.0	10.4	QP	100.0	0.00	HORIZONTAL
410.240000	34.00	21.7	46.0	12.0	QP	100.0	0.00	HORIZONTAL
901.060000	35.90	29.2	46.0	10.1	QP	100.0	0.00	HORIZONTAL

Radiated Emission Test Data of Below 1GHz

EUT: X3
M/N: X3P
Operating Condition: Normal operation
Test Site: CHAMBER
Operator: Pan
Test Specification: AC 120V/60Hz for POE
Comment: Polarization: Vertical
Start of Test: Tem:25°C Hum:50%

SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	VULB9163 NEW



MEASUREMENT RESULT: "111001_red"

11/10/2014 10:32

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
37.760000	31.00	15.2	40.0	9.0	QP	100.0	0.00	VERTICAL
86.260000	34.80	14.8	40.0	5.2	QP	100.0	0.00	VERTICAL
101.780000	33.60	17.3	43.5	9.9	QP	100.0	0.00	VERTICAL
142.520000	28.20	12.3	43.5	15.3	QP	100.0	0.00	VERTICAL
540.220000	31.90	24.8	46.0	14.1	QP	100.0	0.00	VERTICAL
881.660000	36.40	29.0	46.0	9.6	QP	100.0	0.00	VERTICAL

APPENDIX A - EUT PHOTOGRAPHS

EUT – Whole View



EUT – Top View



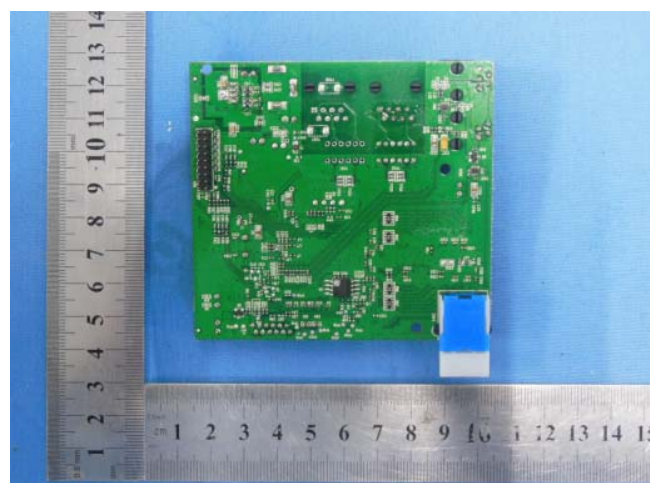
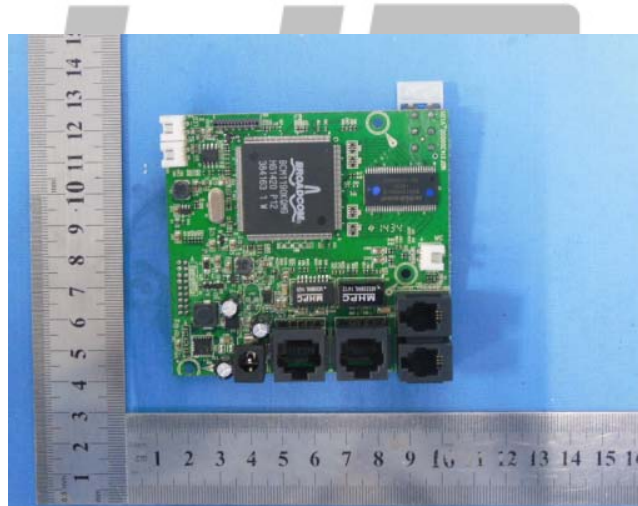
EUT – Bottom View



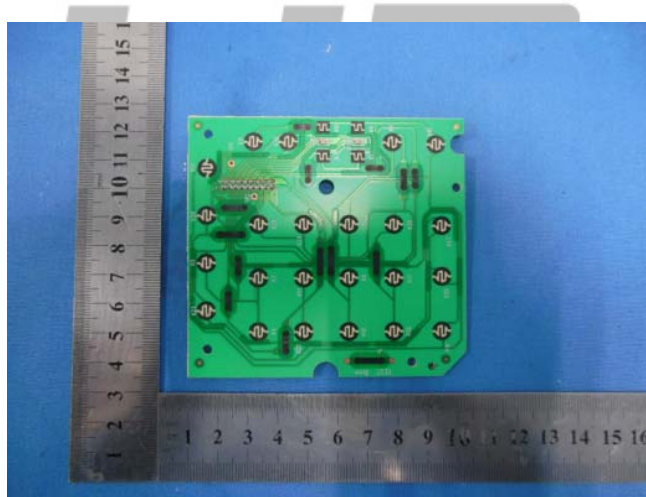
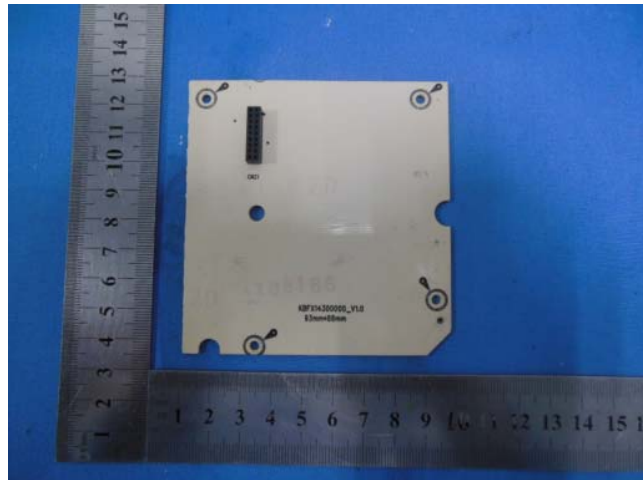
EUT –Open View



EUT –PCB View



EUT –PCB View



EUT –Adapter View



EUT –Adapter View



APPENDIX B - TEST SETUP PHOTOGRAPHS

Conducted Emission



Radiated Emission

