



CE EMC TEST REPORT

REPORT NO.: CE121105D07

MODEL NO.: CC8130-VVTK

RECEIVED: Nov. 5, 2012

TESTED: Nov. 6 ~ Dec. 7, 2012

ISSUED: Dec. 11, 2012

APPLICANT: VIVOTEK INC.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB LOCATION: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City 244, Taiwan (R.O.C.)

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Table of Contents

RELEASE CONTROL RECORD.....	4
1 CERTIFICATION.....	5
2 SUMMARY OF TEST RESULTS.....	6
2.1 MEASUREMENT UNCERTAINTY	7
3 GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT.....	8
3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS	9
3.3 DESCRIPTION OF SUPPORT UNITS.....	10
3.3.1 FOR EMISSION TEST	10
3.3.2 FOR IMMUNITY TEST.....	12
4 EMISSION TEST.....	14
4.1 RADIATED EMISSION MEASUREMENT	14
4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	14
4.1.2 TEST INSTRUMENTS	15
4.1.3 TEST PROCEDURE	16
4.1.4 DEVIATION FROM TEST STANDARD	17
4.1.5 TEST SETUP	18
4.1.6 EUT OPERATING CONDITIONS.....	19
4.3.1 TEST RESULTS.....	20
5 IMMUNITY TEST	24
5.1 GENERAL DESCRIPTION.....	24
5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION	25
5.3 EUT OPERATING CONDITION	26
5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD).....	27
5.4.1 TEST SPECIFICATION	27
5.4.2 TEST INSTRUMENTS	27
5.4.3 TEST PROCEDURE	27
5.4.4 DEVIATION FROM TEST STANDARD	28
5.4.5 TEST SETUP	29
5.4.6 TEST RESULTS.....	30
5.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS).....	31
5.5.1 TEST SPECIFICATION.....	31
5.5.2 TEST INSTRUMENTS	32
5.5.3 TEST PROCEDURE	33
5.5.4 DEVIATION FROM TEST STANDARD	33
5.5.5 TEST SETUP	34
5.5.6 TEST RESULTS.....	35
5.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)	36
5.6.1 TEST SPECIFICATION.....	36
5.6.2 TEST INSTRUMENTS	36
5.6.3 TEST PROCEDURE	36
5.6.4 DEVIATION FROM TEST STANDARD	36
5.6.5 TEST SETUP	37



A D T

5.6.6	TEST RESULTS.....	38
5.7	IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS).....	39
5.7.1	TEST SPECIFICATION.....	39
5.7.2	TEST INSTRUMENTS.....	40
5.7.3	TEST PROCEDURE.....	41
5.7.4	DEVIATION FROM TEST STANDARD.....	41
5.7.5	TEST SETUP.....	42
5.7.6	TEST RESULTS.....	43
5.8	POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST.....	44
5.8.1	TEST SPECIFICATION.....	44
5.8.2	TEST INSTRUMENTS.....	44
5.8.3	TEST PROCEDURE.....	44
5.8.4	DEVIATION FROM TEST STANDARD.....	44
5.8.5	TEST SETUP.....	45
5.8.6	TEST RESULTS.....	46
6	PHOTOGRAPHS OF THE TEST CONFIGURATION.....	47
7	APPENDIX - INFORMATION ON THE TESTING LABORATORIES.....	53



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE121105D07	Original release	Dec. 11, 2012



1 CERTIFICATION

PRODUCT: Indoor Counter Camera

BRADN NAME: VIVOTEK

MODEL NO.: CC8130-VVTK

APPLICANT: VIVOTEK INC.

TEST ITEM: ENGINEERING SAMPLE

TESTED: Nov. 6 ~ Dec. 7, 2012

STANDARDS: EN 55022:2010, Class B

EN 61000-3-2:2006 + A1:2009 +A2:2009(Not Applicable)

EN 61000-3-3:2008(Not Applicable)

CISPR 22:2008, Class B

AS/NZS CISPR 22:2009, Class B

EN 55024:2010

IEC 61000-4-2:2008 ED.2.0

IEC 61000-4-3:2010 ED.3.2

IEC 61000-4-4:2012 ED.3.0

IEC 61000-4-5:2005 ED.2.0(Not Applicable)

IEC 61000-4-6:2008 ED.3.0

IEC 61000-4-8:2009 ED.2.0

IEC 61000-4-11:2004 ED.2.0(Not Applicable)

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Jessica Cheng , DATE: Dec. 11, 2012
(Jessica Cheng/ Specialist)

APPROVED BY : Kenny Meng , DATE: Dec. 11, 2012
(Kenny Meng / Assistant Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55022:2010, Class B CISPR 22:2008, Class B AS/NZS CISPR 22:2009, Class B	Conducted Test	N/A	Refer to item 3.2
	Conducted Test (telecom port)	N/A	Refer to item 3.2
	Radiated Test (30MHz ~ 2GHz)	PASS	Meets Class B Limit Minimum passing margin is -1.21 dB at 77.21 MHz
EN 61000-3-2:2006 +A1:2009 +A2:2009	Harmonic current emissions	N/A	Refer to item 3.2
EN 61000-3-3:2008	Voltage fluctuations & flicker	N/A	Refer to item 3.2

Note: The EUT highest frequency generated **340MHz** and therefore the test frequency range was performed up to 2GHz for radiated emission test.



IMMUNITY (EN 55024:2010)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2008 ED.2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-3:2010 ED.3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-4:2012 ED.3.0	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5:2005 ED.2.0	Surge immunity test	N/A	Refer to item 3.2
IEC 61000-4-6:2008 ED.3.0	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-8:2009 ED.2.0	Power frequency magnetic field immunity test.	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-11:2004 ED.2.0	Voltage dips and short interruptions immunity tests	N/A	Refer to item 3.2

2.1 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:

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Radiated emissions	30MHz ~ 1GHz	3.86 dB
	Above 1GHz	3.36 dB

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.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Indoor Counter Camera
MODEL NO.	CC8130-VVTK
POWER SUPPLY	POE (DC 48V)
DATA CABLE SUPPLIED	N/A

NOTE:

1. The EUT is an Indoor Counter Camera.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of ITE equipment and, according to the specifications of the manufacturers, must comply with the requirements of the following standards:

EN 55022:2010, Class B

CISPR 22:2008, Class B

AS/NZS CISPR 22:2009, Class B

CISPR 24:2010

EN 55024:2010

IEC 61000-4-2:2008 ED.2.0

IEC 61000-4-3:2010 ED.3.2

IEC 61000-4-4:2012 ED.3.0

IEC 61000-4-6:2008 ED.3.0

IEC 61000-4-8:2009 ED.2.0

The EUT has no AC power port and therefore, the item of EN 55022, Conducted emission, was not tested.

The EUT is not direct connection to multi-user telecommunications networks therefore, the item of Conducted emission at telecom port, was not tested

The EUT has no AC power port and therefore the standard, **EN 61000-3-2 & EN 61000-3-3**, was not tested.

The EUT doesn't connect directly to the outdoor cables and the EUT consumes DC power and therefore the standard, **IEC 61000-4-5**, was not tested.

The EUT consumes DC power and therefore, the standard, **IEC 61000-4-11**, was not performed for the test.

Notes: The above IEC basic standards are applied with latest version if customer has no special requirement



3.3 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.

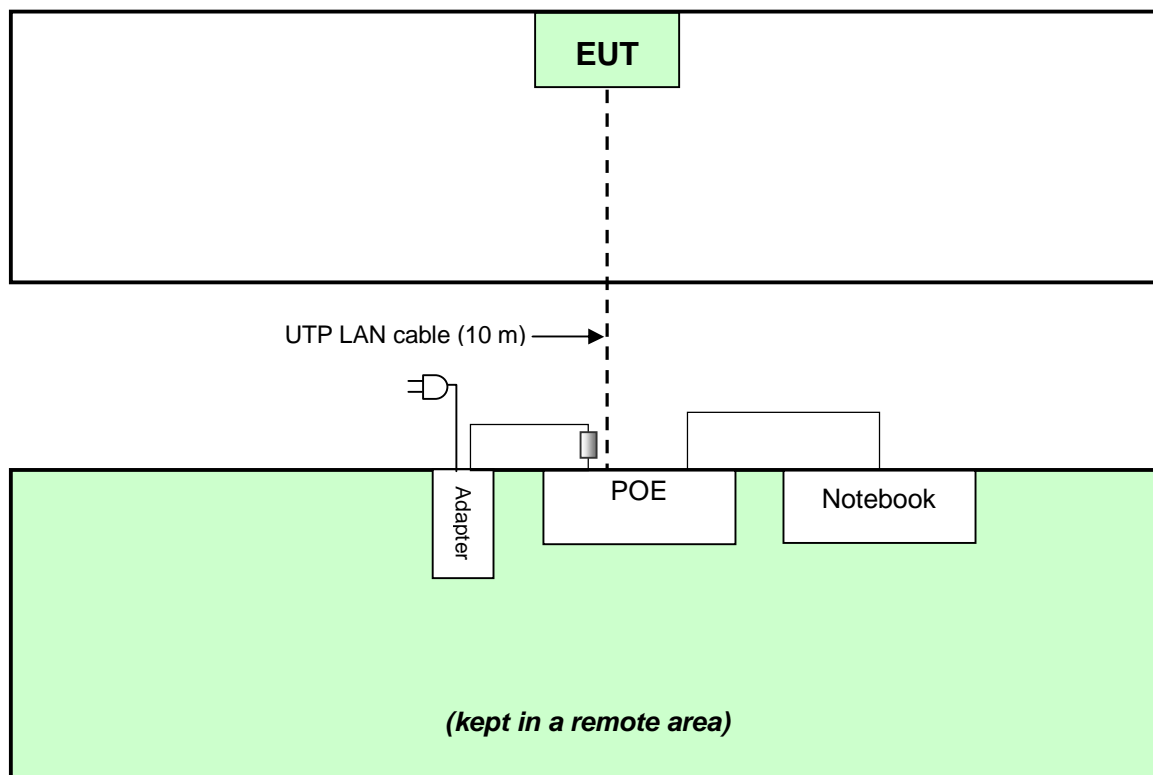
3.3.1 FOR EMISSION TEST

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP04X	1W9ZZ1S	FCC DoC Approved
2	POE	LINKSYS	WAPPOE	N/A	N/A
3	Adapter of POE	LINKSYS	AD 48/04	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m UTP LAN cable.
2	10m UTP LAN cable
3	AC Input: 100-240V, 0.6A, 50-60Hz DC Output: 48V, 0.4A Non-shielded DC (1.8m) with one core. Non-shielded AC 3-pin (1.8m).

NOTE: All power cords of the above support units are non shielded (1.8m).

TEST CONFIGURATION





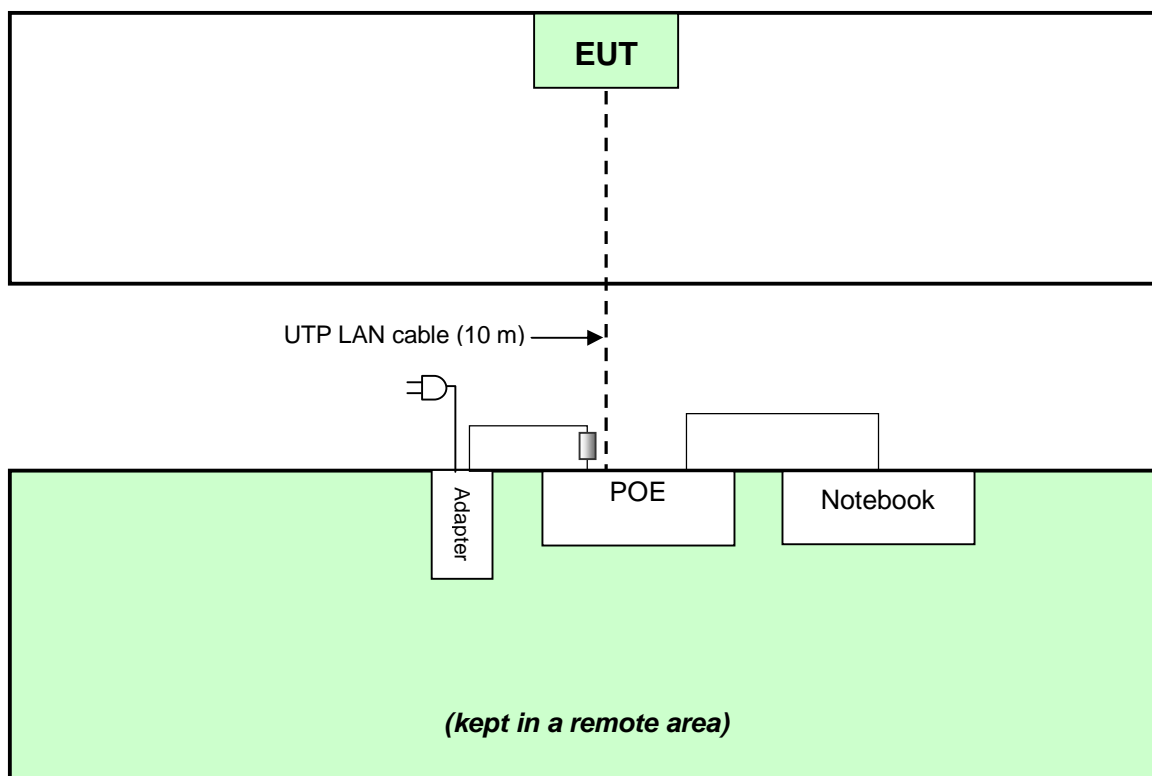
3.3.2 FOR IMMUNITY TEST

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP04X	9LRVR1S	FCC DoC Approved
2	POE	LINKSYS	WAPPOE	N/A	N/A
3	Adapter of POE	LINKSYS	AD 48/04	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m UTP LAN cable.
2	10m UTP LAN cable
3	AC Input: 100-240V, 0.6A, 50-60Hz DC Output: 48V, 0.4A Non-shielded DC (1.8m) with one core. Non-shielded AC 3-pin (1.8m).

NOTE: All power cords of the above support units are non shielded (1.8m).

TEST CONFIGURATION



4 EMISSION TEST

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

TEST STANDARD: EN 55022

FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	40	30
230 – 1000	47	37

FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

- NOTE:** (1) The lower limit shall apply at the transition frequencies.
 (2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
 (3) All emanation 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.

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less



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4.1.2 TEST INSTRUMENTS

Frequency Range 30MHz~1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ TEST RECEIVER	ESCS30	847793/022	May. 28, 2012	May. 27, 2013
CHASE BILOG Antenna	CBL6111C	2765	Apr. 06, 2012	Apr. 05, 2013
CT Turn Table	TT100	CT-0055	NA	NA
CT Tower	AT100	CT-0055	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
ADT RF Switches BOX	EMH-011	08005	Jun. 21, 2012	Jun. 20, 2013
WOKEN RF cable	8D	CABLE-ST6-01	Jun. 21, 2012	Jun. 20, 2013

- NOTE:**
1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Open Site No. 6.
 3. The VCCI Site Registration No. R-728.
 4. The FCC Site Registration No. 90427.
 5. Tested Date: Nov. 6, 2012.

Frequency Range above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum	E4446A	MY51100009	Jun. 26, 2012	Jun. 25, 2013
EMCI Preamplifier	EMC0126545	980076	Mar. 01, 2012	Feb. 28, 2013
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Mar. 02, 2012	Mar. 01, 2013
Schwarzbeck Horn Antenna	BBHA-9170	BBHA9170190	Oct. 04, 2012	Oct. 03, 2013
EMCO Horn Antenna	3115	6714	Oct. 25, 2012	Oct. 24, 2013
Max Full. Turn Table	MF7802	MF780208216	NA	NA
Software	ADT_Radiated_V8. 7.05	NA	NA	NA
SUHNER RF cable	SF106-18	Cable-CH10	Aug. 19, 2012	Aug. 18, 2013

- NOTE:**
1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The 3dB beamwidth of the horn antenna is minimum 30 degree (or w = 1.6m at 3m distance) for 1~6 GHz.
 3. The test was performed in Chamber No. 10.
 4. The Industry Canada Reference No. IC 7450E-11.
 5. The VCCI Site Registration No. G427
 6. The FCC Site Registration No. 367016
 7. Tested Date: Nov. 6, 2012.

4.1.3 TEST PROCEDURE

<Frequency Range 30MHz ~ 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

NOTE: The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

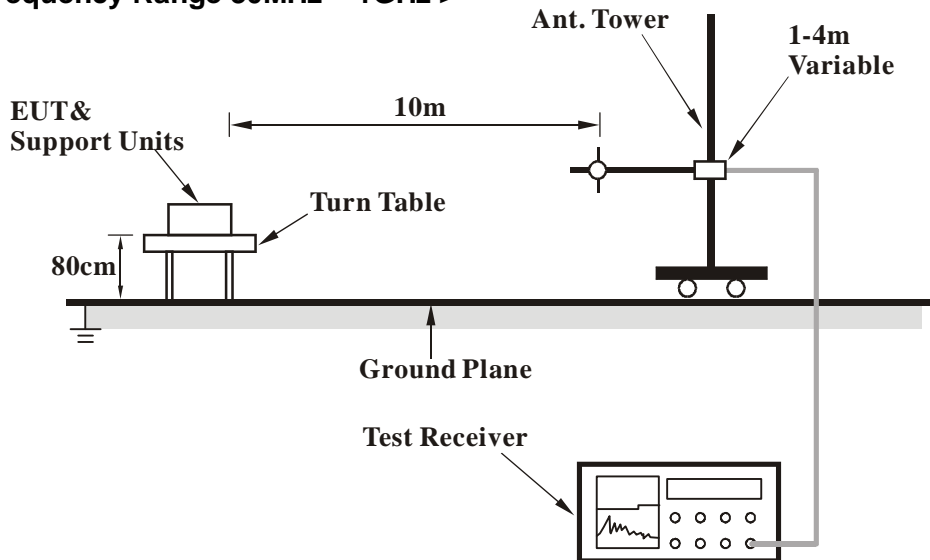
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.

4.1.4 DEVIATION FROM TEST STANDARD

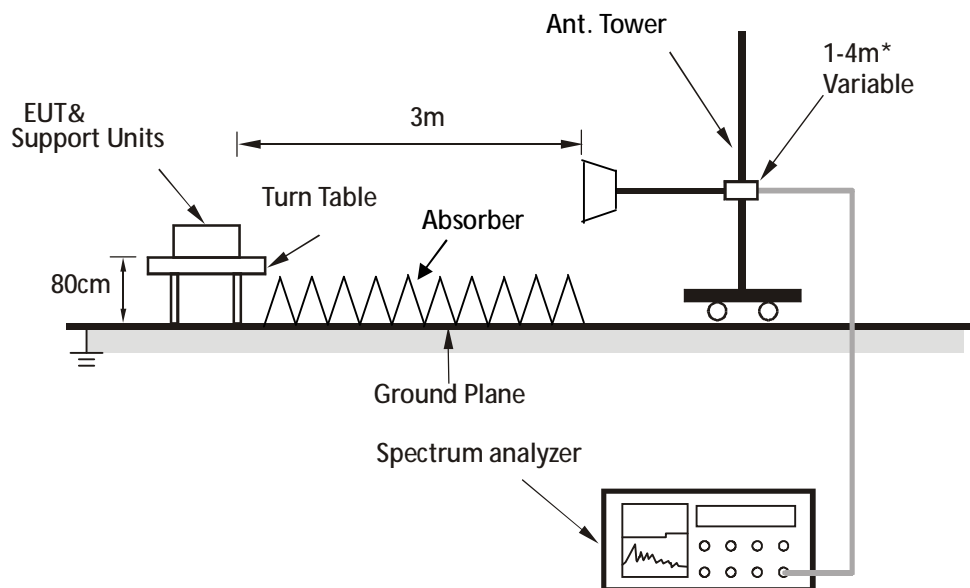
No deviation

4.1.5 TEST SETUP

<Frequency Range 30MHz ~ 1GHz >



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both

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

4.1.6 EUT OPERATING CONDITIONS

- a. Connected the EUT with POE.
- b. Turned on the power of all equipment.
- c. EUT captured video signal.
- d. EUT sent and received messages from/to Server PC (kept in a remote area) via POE by an UTP LAN cable (10 m).
- e. Steps c-e were repeated.



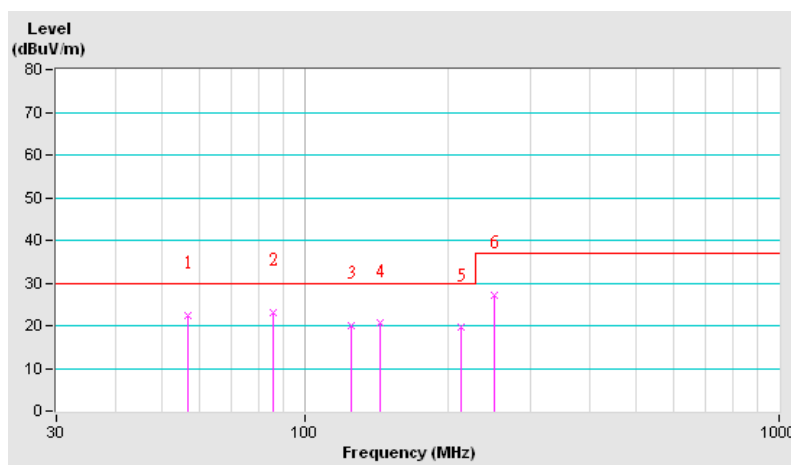
4.3.1 TEST RESULTS

TEST MODE	POE Mode	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	DC 48V	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 64% RH	TESTED BY: Bruce Liao	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	56.83	22.29 QP	30.00	-7.71	4.00 H	83	13.93	8.36
2	86.11	23.22 QP	30.00	-6.78	4.00 H	332	13.42	9.80
3	125.03	20.04 QP	30.00	-9.96	4.00 H	63	6.46	13.58
4	144.72	20.53 QP	30.00	-9.47	4.00 H	76	7.34	13.19
5	213.05	19.56 QP	30.00	-10.44	4.00 H	283	7.15	12.41
6	250.67	27.06 QP	37.00	-9.94	4.00 H	116	11.66	15.40

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





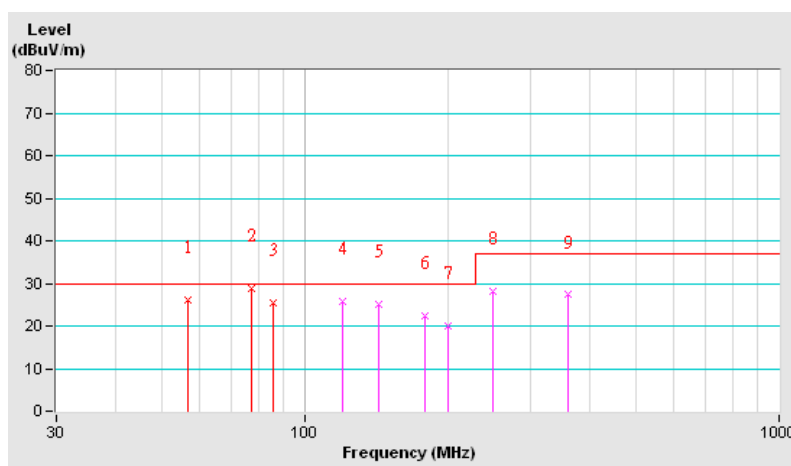
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TEST MODE	POE Mode	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	DC 48V	DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	26deg. C, 64% RH	TESTED BY: Bruce Liao	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	56.72	26.22 QP	30.00	-3.78	1.00 V	356	17.82	8.40
2	77.21	28.79 QP	30.00	-1.21	1.00 V	175	20.24	8.55
3	86.05	25.39 QP	30.00	-4.61	1.00 V	244	15.60	9.79
4	120.12	25.74 QP	30.00	-4.26	1.00 V	69	12.11	13.63
5	143.43	25.18 QP	30.00	-4.82	1.00 V	268	11.93	13.25
6	178.79	22.32 QP	30.00	-7.68	1.00 V	187	11.16	11.16
7	200.21	20.09 QP	30.00	-9.91	1.00 V	69	8.72	11.37
8	250.02	28.26 QP	37.00	-8.74	1.00 V	331	12.87	15.39
9	358.20	27.35 QP	37.00	-9.65	1.00 V	161	8.80	18.55

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





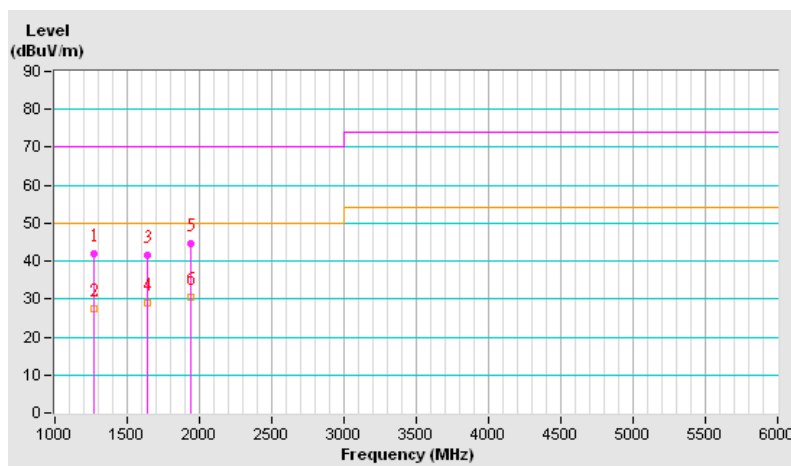
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TEST MODE	POE Mode	FREQUENCY RANGE	1-2GHz
INPUT POWER	DC 48V	DETECTOR FUNCTION & BANDWIDTH	Peak/ Average, 1MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 77% RH	TESTED BY: Nick Hsu	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1266.64	41.82 PK	70.00	-28.18	1.39 H	282	14.61	27.21
2	1266.64	27.54 AV	50.00	-22.46	1.39 H	282	0.33	27.21
3	1643.91	41.57 PK	70.00	-28.43	1.28 H	194	12.74	28.83
4	1643.91	29.02 AV	50.00	-20.98	1.28 H	194	0.19	28.83
5	1944.29	44.63 PK	70.00	-25.37	1.58 H	345	14.21	30.42
6	1944.29	30.54 AV	50.00	-19.46	1.58 H	345	0.12	30.42

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





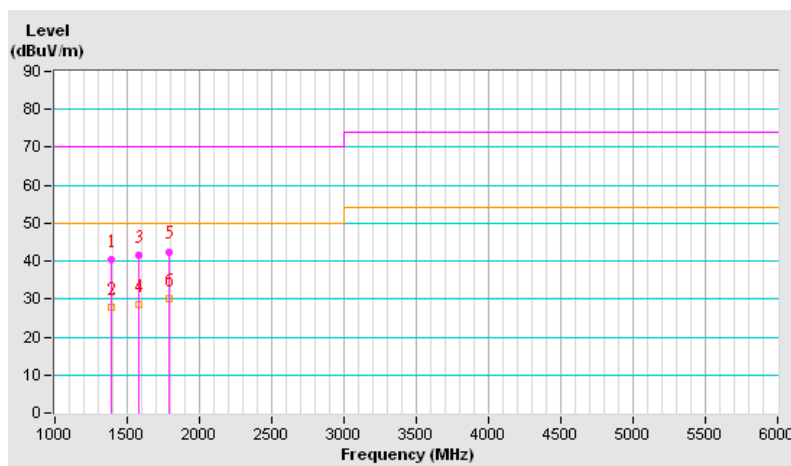
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TEST MODE	POE Mode	FREQUENCY RANGE	1-2GHz
INPUT POWER	DC 48V	DETECTOR FUNCTION & BANDWIDTH	Peak/ Average, 1MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 77% RH	TESTED BY: Nick Hsu	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1386.44	40.25 PK	70.00	-29.75	1.55 V	96	12.58	27.67
2	1386.44	27.96 AV	50.00	-22.04	1.55 V	96	0.29	27.67
3	1580.66	41.69 PK	70.00	-28.31	1.27 V	132	13.18	28.51
4	1580.66	28.64 AV	50.00	-21.36	1.27 V	132	0.13	28.51
5	1786.27	42.51 PK	70.00	-27.49	1.10 V	199	12.91	29.60
6	1786.27	30.01 AV	50.00	-19.99	1.10 V	199	0.41	29.60

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



5 IMMUNITY TEST

5.1 GENERAL DESCRIPTION

Product Standard:	EN 55024:2010	
Basic Standard, specification requirement, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT AC Power line: 1kV, DC Power line: 0.5kV Signal line: 0.5kV Performance Criterion B
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-80 MHz, 3Vrms, 80% AM, 1kHz, Performance Criterion A
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A

5.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

According to Clause 7 of EN 55024 standard, the following describes.

General performance criteria

CRITERION A	The equipment shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the client/customer, when the equipment is used as intended. If the minimum performance level or the permissible performance loss is not specified by the client/customer, then either of these may be derived from the product description and documentation, or from what the user may reasonably expect from the apparatus is used as intended.
CRITERION B	The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the client/customer, when the equipment is used as intended. During the test, degradation of performance is allowed, however, 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 client/customer, then either of these may be derived from the product description and documentation, or from what the user may reasonably expect from the equipment if used as intended.
CRITERION C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Particular performance criteria

The particular performance criteria which are specified in the normative annexes of EN 55024 take precedence over the corresponding parts of the general performance criteria.

Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.



5.3 EUT OPERATING CONDITION

- a. Connected the EUT with POE.
- b. Turned on the power of all equipment.
- c. EUT captured video signal.
- d. EUT sent and received messages from/to Server PC (kept in a remote area) via POE by an UTP LAN cable (10 m).
- e. Steps c-e were repeated.

5.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

5.4.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge : 2, 4, 8kV (Direct) Contact Discharge : 2, 4kV (Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: Min. 20 times at each test point Contact Discharge: Min. 200 times in total
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

5.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
KeyTek, ESD Simulator	MZ-15/EC	0504259	Jul. 05, 2012	Jul. 04, 2013

- NOTE:** 1. The test was performed in ESD Room No. 3.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: Dec. 7, 2012.

5.4.3 TEST PROCEDURE

The discharges shall be applied in two ways:

- a. Contact discharges to the conductive surfaces and coupling planes:
 The EUT shall be exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points. One of the test points shall be subjected to at least 50 indirect discharges to the center of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points are available, then at least 200 indirect discharges shall be applied in the indirect mode. Test shall be performed at a maximum repetition rate of one discharge per second.

- b. Air discharges at slots and apertures and insulating surfaces:
 On those parts of the EUT where it is not possible to perform contact discharge testing, the equipment should be investigated to identify user accessible points where breakdown may occur. Such points are tested using the air discharge method. This investigation should be restricted to those area normally handled by the user. A minimum of 10 single air discharges shall be applied to the selected test point for each such area.

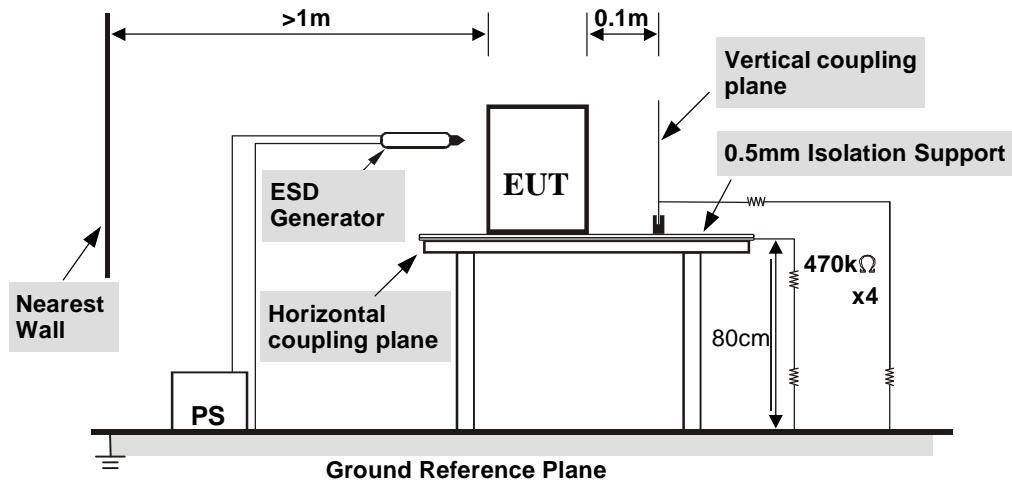
The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the **Horizontal Coupling Plane** at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the **HCP**.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the **Vertical Coupling Plane** in sufficiently different positions that the four faces of the EUT were completely illuminated. The **VCP** (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation

5.4.5 TEST SETUP



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

NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

5.4.6 TEST RESULTS

TEST MODE	POE Mode	INPUT POWER	DC 48V
ENVIRONMENTAL CONDITIONS	25deg. C, 50%RH, 1006hPa	TESTED BY: Ken Chen	

TEST RESULTS OF DIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Contact Discharge	Air Discharge	Performance Criterion
2, 4, 8	+/-	1~ 5	N/A	Note	A

Description of test point: Please refer to ESD test photo for representative mark only.

TEST RESULTS OF INDIRECT APPLICATION					
Discharge Level (kV)	Polarity	Test Point	Horizontal Coupling Plane	Vertical Coupling Plane	Performance Criterion
2, 4	+/-	1 ~ 4	Note	Note	A

Description of test point:

1. Left side
2. Right side
3. Front side
4. Rear side

NOTE: There was no change compared with initial operation during the test.

5.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)

5.5.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Frequency Range:	80 MHz - 1000 MHz
Field Strength:	3 V/m
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5 m
Dwell Time:	3 seconds



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5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Signal Generator	E8257D	MY48050465	Jul. 11, 2012	Jul. 10, 2013
PRANA RF Amplifier	AP32DP280	0811-894	NA	NA
AR RF Amplifier	150W1000M3	306601	NA	NA
AR RF Amplifier	35S4G8AM4	0326094	NA	NA
AR RF Amplifier	100S1G4M3	0329249	NA	NA
AR Controller	SC1000M3	305910	NA	NA
Radisense Electric Field Sensor	CTR1002A	08D00057SN O-07	Nov. 06, 2012	Nov. 05, 2013
BOONTON RF Voltage Meter	4232A	10180	Jun. 14, 2012	Jun. 13, 2013
BOONTON Power Sensor	51011-EMC	34152	Jun. 14, 2012	Jun. 13, 2013
BOONTON Power Sensor	51011-EMC	34153	Jun. 14, 2012	Jun. 13, 2013
AR Log-Periodic Antenna	AT6080	0329465	NA	NA
EMCO BiconiLog Antenna	3141	1001	NA	NA
AR High Gain Antenna	AT4002A	306533	NA	NA
AR High Gain Horn Antenna	AT4010	0329800	NA	NA
CHANCE MOST Full Anechoic Chamber (9x5x3m)	Chance Most	RS-002	Feb. 10, 2012	Feb. 09, 2013
Software	ADT_RS_V7.6	NA	NA	NA

- NOTE:** 1. The test was performed in RS Room No.2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The transmit antenna was located at a distance of 3 meters from the EUT.
4. Tested Date: Dec. 7, 2012.

5.5.3 TEST PROCEDURE

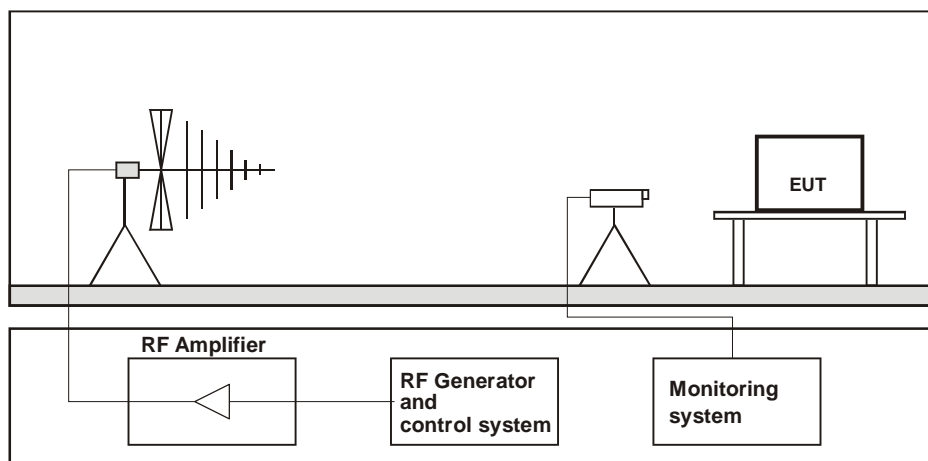
The test procedure was in accordance with IEC 61000-4-3

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- d. The field strength level was 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



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5.5.6 TEST RESULTS

TEST MODE	POE Mode	INPUT POWER	DC 48V
ENVIRONMENTAL CONDITIONS	24deg. C, 68%RH	TESTED BY: Ryan Chen	

Frequency (MHz)	Polarity	Azimuth	Field Strength (V/m)	Observation	Performance Criterion
80 -1000	V & H	0	3	Note	A
	V & H	90	3	Note	A
	V & H	180	3	Note	A
	V & H	270	3	Note	A

NOTE: There was no change compared with the initial operation during the test.



5.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)

5.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Signal Line : 0.5 kV
Polarity:	Positive & Negative
Impulse Frequency:	100 kHz: only for signal lines of xDSL equipment 5 kHz: except for xDSL equipment
Impulse Waveshape:	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	1 min.

5.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Haefely, EFT Generator	PEFT 4010	154954	Apr. 26, 2012	Apr. 25, 2013
Haefely, Capacitive Clamp	IP4A	155173	NA	NA

- NOTE:**
1. The test was performed in EFT Room
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: Dec. 7, 2012.

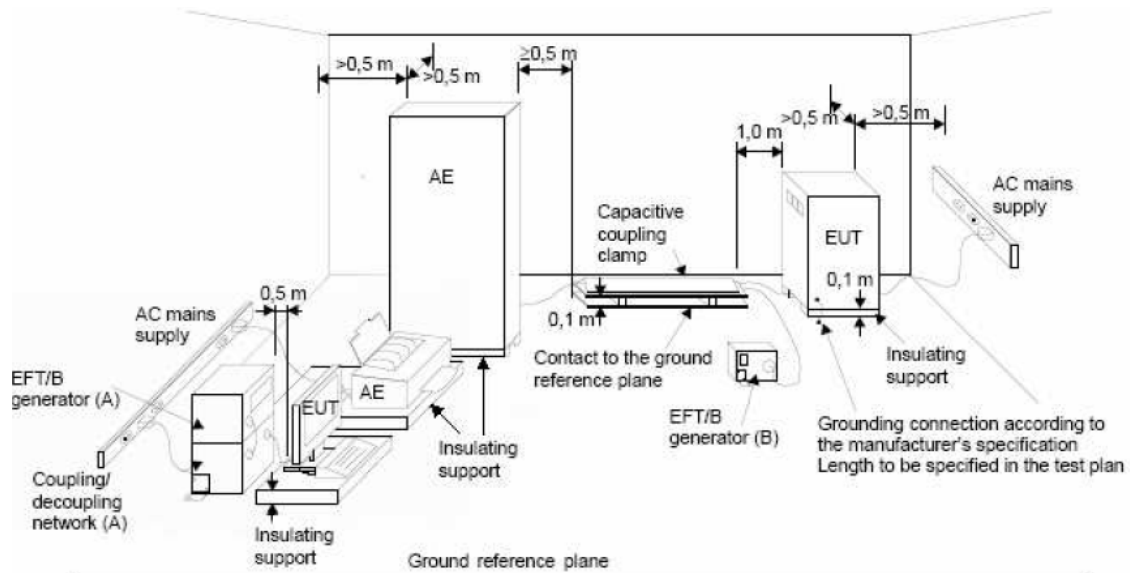
5.6.3 TEST PROCEDURE

- a. Both positive and negative polarity discharges were applied.
- b. The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- c. The duration time of each test sequential was 1 minute.
- d. The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



NOTE:

- (A) location for supply line coupling
- (B) location for signal lines coupling

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



5.6.6 TEST RESULTS

TEST MODE	POE Mode	INPUT POWER	DC 48V
ENVIRONMENTAL CONDITIONS	21deg. C, 68%RH	TESTED BY: Ryan Chen	

Test Point	Polarity	Test Level (kV)	Observation	Performance Criterion
Cat. 5 Line	+/-	0.5	Note	A

NOTE: There was no change compared with the initial operation during the test.

5.7 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)

5.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-6
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 V _{r.m.s.}
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Coupling Device:	CDN-T8



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5.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Signal Generator	SMY01	841104/033	Nov. 20, 2012	Nov. 19, 2013
Digital Sweep Function Generator	8120	984801	NA	NA
AR Power Amplifier	75A250AM1	312196	NA	NA
FCC Coupling Decoupling Network	FCC-801-M3-25 A	48	Aug. 17, 2012	Aug. 16, 2013
FCC Coupling Decoupling Network	FCC-801-M3-25 A	01022	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-M2-16 A	01047	Aug. 17, 2012	Aug. 16, 2013
FISCHER CUSTOM COMMUNICATIONS EM Injection Clamp	FCC-203I	50	NA	NA
FISCHER CUSTOM COMMUNICATIONS Current Injection Clamp	F-120-9A	361	NA	NA
EM TEST Coupling Decoupling Network	CDN M1/32A	306508	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T8	02038	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T4	02031	Feb. 24, 2012	Feb. 23, 2013
FCC Coupling Decoupling Network	FCC-801-T2	02021	Feb. 24, 2012	Feb. 23, 2013
R&S Power Sensor	NRV-Z5	837878/038	Nov. 02, 2012	Nov. 01, 2013
R&S Power Sensor	NRV-Z5	837878/039	Nov. 02, 2012	Nov. 01, 2013
R&S Power Meter	NRVD	837794/040	Nov. 02, 2012	Nov. 01, 2013
Software	ADT_CS_V7.4.2	NA	NA	NA

- NOTE:** 1. The test was performed in CS Room No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Dec. 7, 2012.

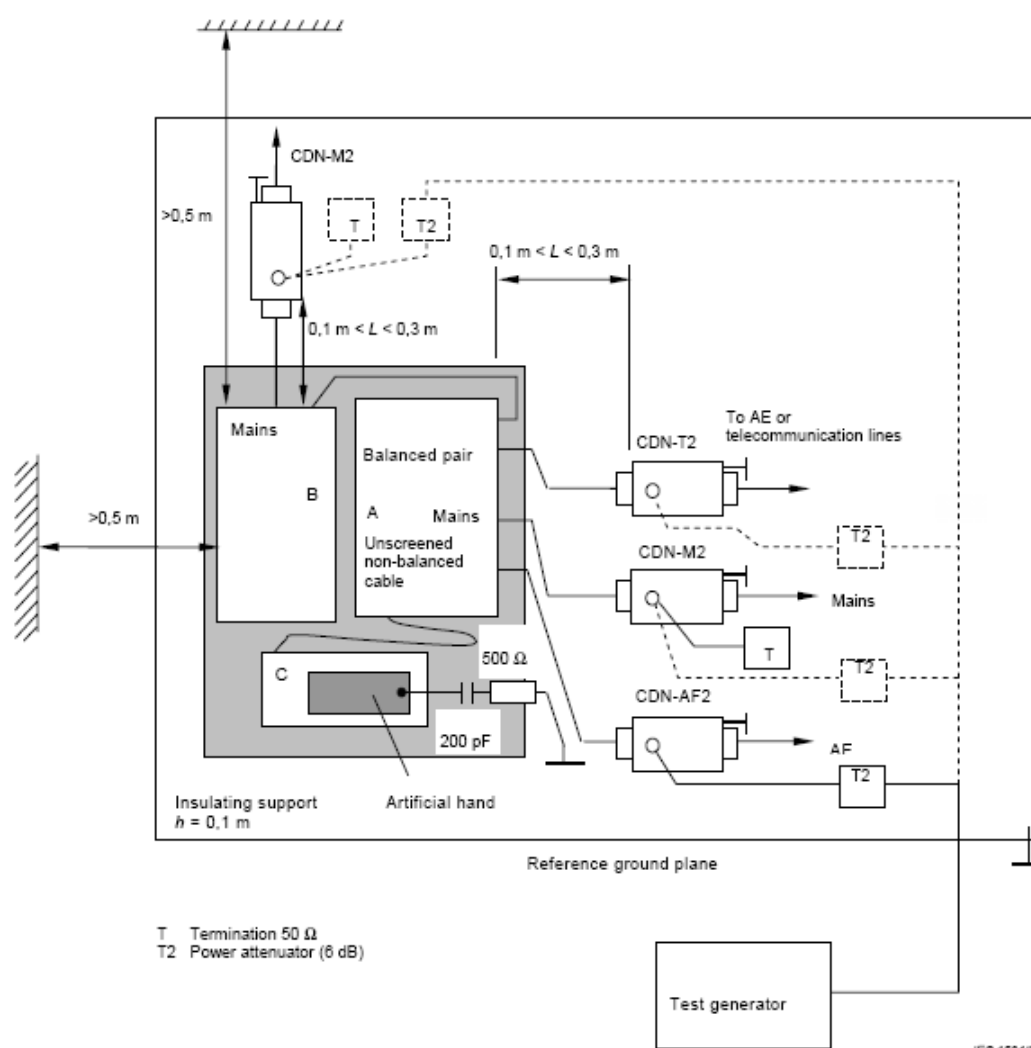
5.7.3 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. One of the CDNs not used for injection was terminated with 50Ω , providing only one return path. All other CDNs were coupled as decoupling networks.
- d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



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

- Note:**
1. The EUT clearance from any metallic obstacles shall be at least 0,5 m.
 2. Interconnecting cables (≤ 1 m) belonging to the EUT shall remain on the insulating support.
 3. The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

5.7.6 TEST RESULTS

TEST MODE	POE Mode	INPUT POWER	DC 48V
ENVIRONMENTAL CONDITIONS	24deg. C, 72%RH	TESTED BY: Ryan Chen	

FREQUENCY (MHz)	FIELD STRENGTH (V_{r.m.s.})	CABLE	INJECTION METHOD	RETURN PATH	OBSERVATION	PERFORMANCE CRITERION
0.15 – 80	3	RJ45	CDN-T8	CDN-M3	Note	A

NOTE: There was no change compared with the initial operation during the test.

5.8 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

5.8.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1 A/m
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1 m x 1 m

5.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HAEFELY Magnetic Field Tester	MAG 100.1	083794-06	NA	NA
COMBINOVA Magnetic Field Meter	MFM10	224	Apr. 12, 2012	Apr. 11, 2013

- NOTE:**
1. The test was performed in EMS Room No. 1.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Tested Date: Dec. 7, 2012.

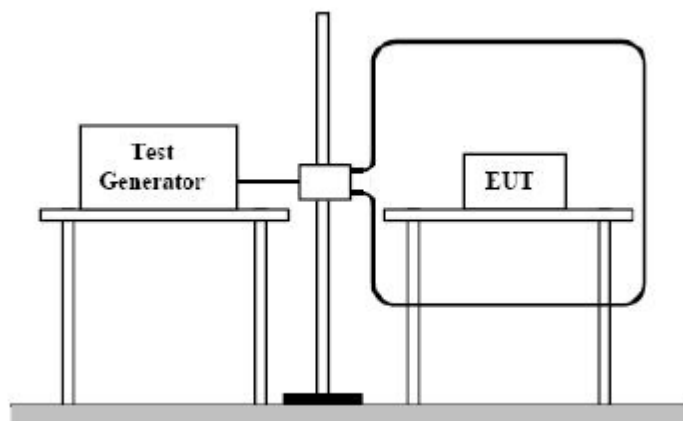
5.8.3 TEST PROCEDURE

- a. The equipment is configured and connected to satisfy its functional requirements.
- b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

5.8.4 DEVIATION FROM TEST STANDARD

No deviation

5.8.5 TEST SETUP



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

NOTE:

TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

5.8.6 TEST RESULTS

TEST MODE	POE Mode	INPUT POWER	DC 48V
ENVIRONMENTAL CONDITIONS	24deg. C, 70%RH	TESTED BY: Ryan Chen	

Direction	Field Strength (A/m)	Observation	Performance Criterion
X - Axis	1	Note	A
Y - Axis	1	Note	A
Z - Axis	1	Note	A

NOTE: There was no change compared with the initial operation during the test.

6 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST <Frequency Range 30MHz ~ 1GHz>



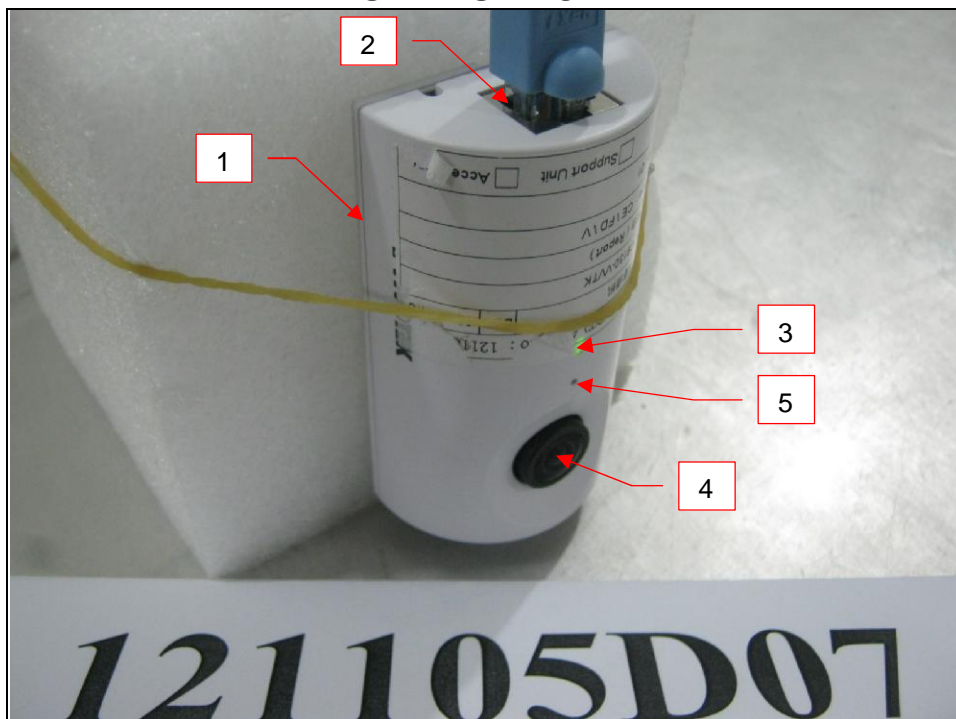
RADIATED EMISSION TEST <Frequency Range above 1GHz>



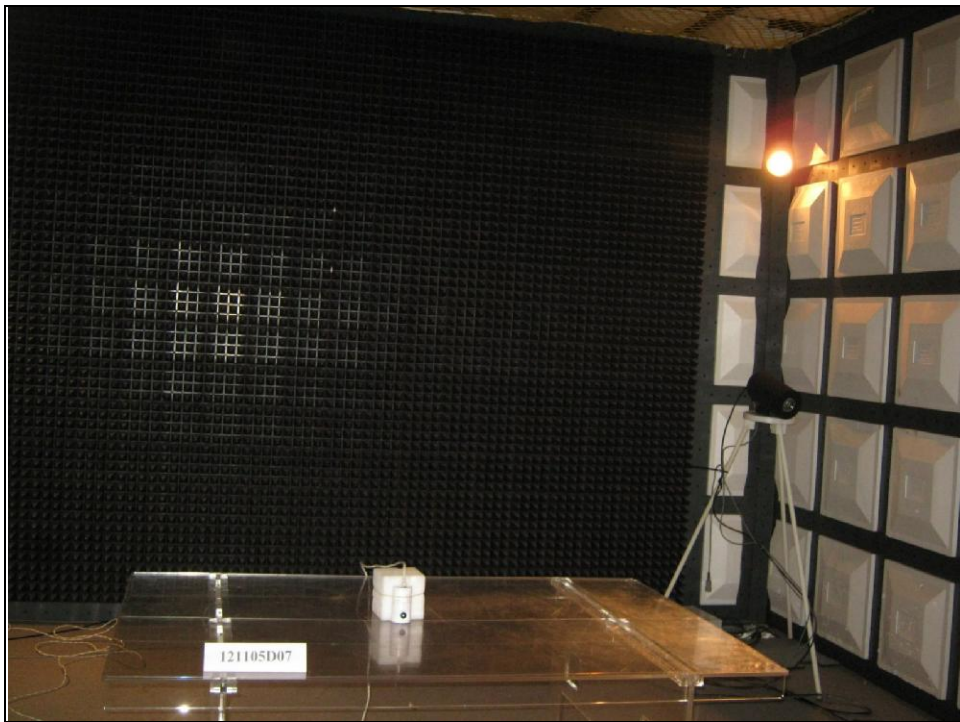
ESD TEST



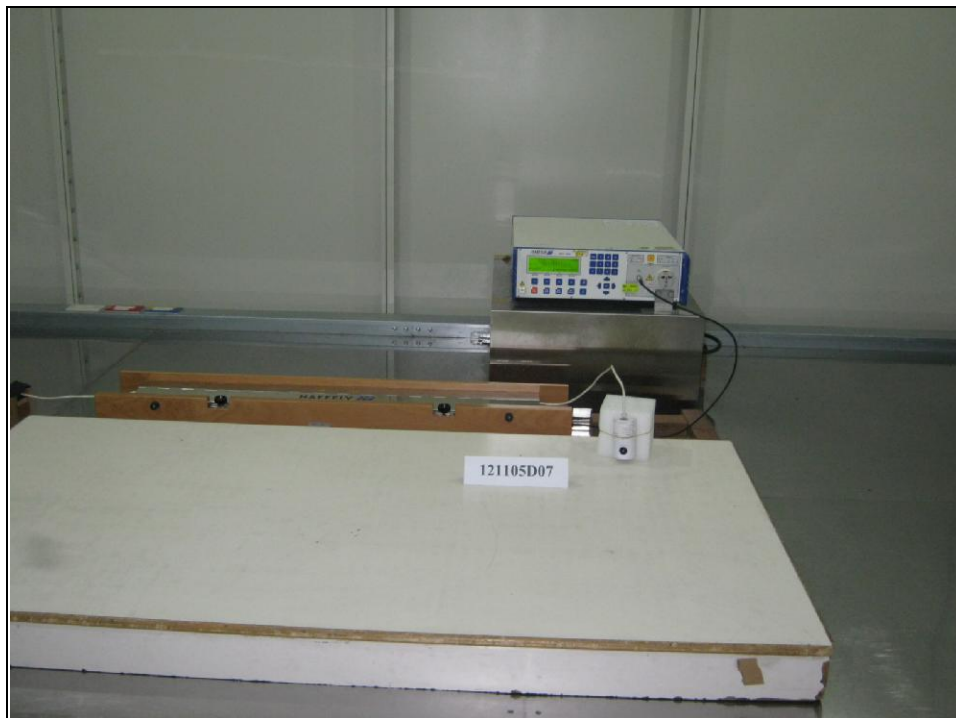
ESD TEST POINT



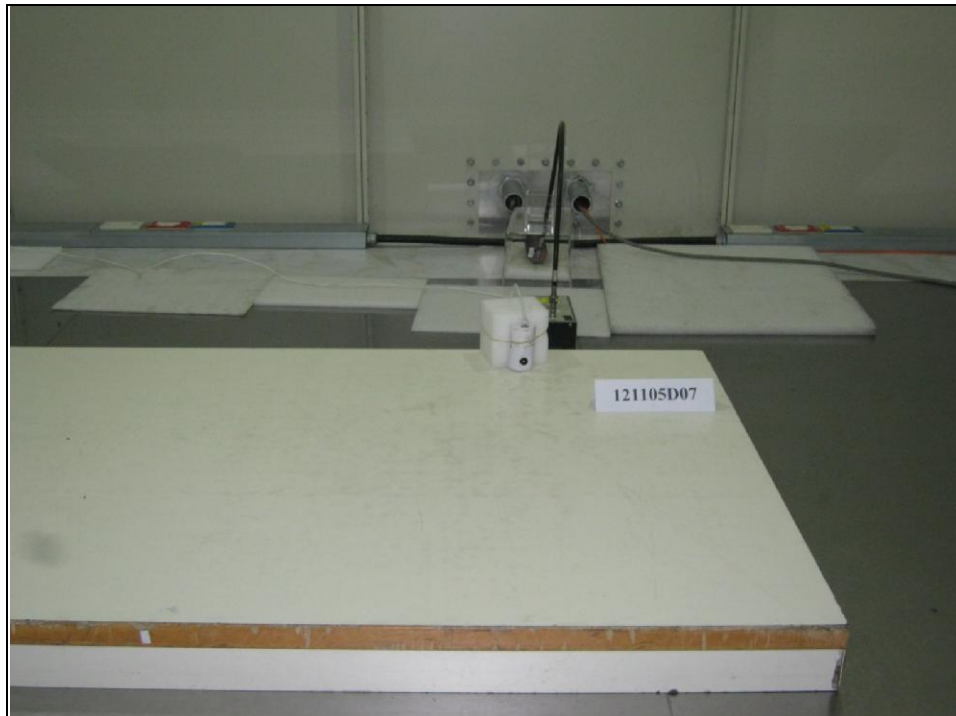
RS TEST



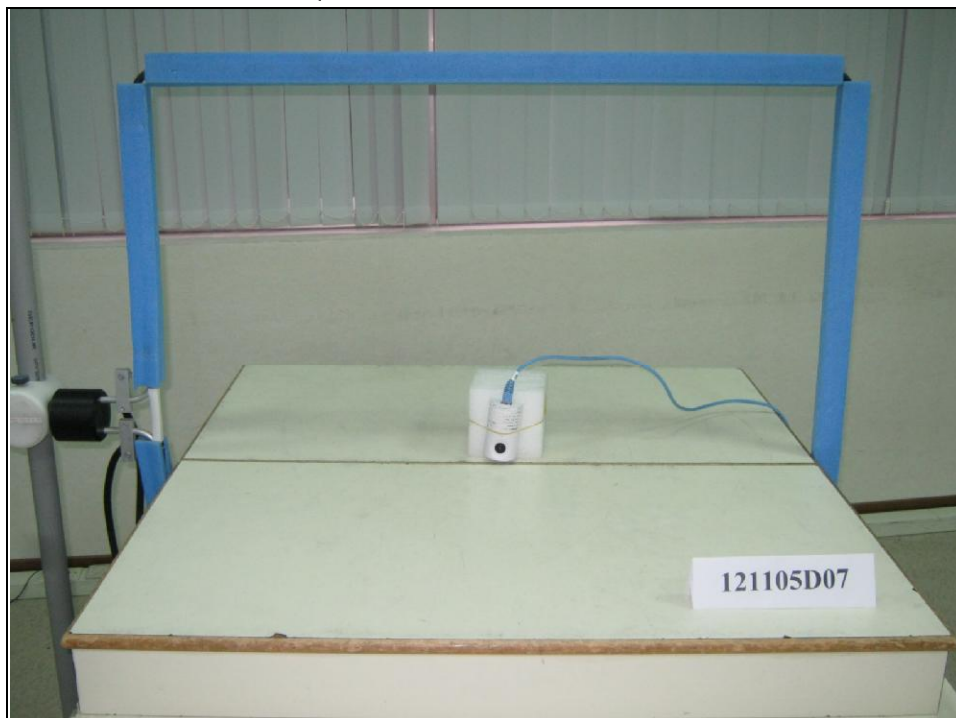
EFT TEST– Cat. 5 Line



CONDUCTED SUSCEPTIBILITY TEST – PCat. 5 Line



POWER-FREQUENCY MAGNETIC FIELDS TEST





7 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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