Shenzhen CTL Electromagnetic Technology Co.,Ltd.
Tel: +86-755-89486194 Fax: +86-755-26636041 Web:www.ctl-lab.com

Test Report

EN 55022 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
EN 55024 Information technology equipment – Immunity characteristics – Limits and methods of measurement

Report Reference No. ..... :	**CTL1404290895-E**	
Compiled by (position+printed name+signature) . :	File administrators Cherry Huang	Cherry Huang
Supervised by (position+printed name+signature) . :	Technique principal Ivan Xie	Ivan Xie
Approved by (position+printed name+signature) . :	Manager Jacky Chen	Jacky chen
Date of issue ..... :	April 29, 2014	
Testing Laboratory Name ..... :	**Shenzhen CTL Electromagnetic Technology Co., Ltd.**	
Address ..... :	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055	
Testing location/ procedure ..... :	Full application of Harmonised standards ☒ Partial application of Harmonised standards ☐ Other standard testing methods ☐	
Applicant's name ..... :	.	
Address ..... :		
Test specification:		
Standard ..... :	**EN 55022: 2010+AC: 2011 EN 55024: 2010** **EN 61000-3-2: 2006+A2:2009 EN 61000-3-3: 2013**	
Non-standard test method..…….. :	/	
Test Report Form No. ..... :	CTLRF10001	
TRF Originator ..... :	Shenzhen CTL Electromagnetic Technology Co., Ltd	
Master TRF ..... :	Dated 2011-01	

Test item description..... :	**Laser pointer pen**
Manufacturer ..... :	.
Model No..... :	BTD406
Listed Models..... :	See next page
Trade Mark..... :	N/A
Ratings..... :	DC 4.5V
Result..... :	**Positive**

EMC -- Test Report

Test Report No. :	CTL1404290895-E	April 29, 2014 Date of issue

Equipment under Test	:	Laser pointer pen
Type / Model	:	BTD406
Listed Models	:	BTB204, BTB001, BTB002, BTB002-1, BTB003, BTB004, BTB005, BTB006, BTB100, BTB101, BTB102, BTB103, BTB104, BTB105, BTB200, BTB201, BTB202, BTB202-1, BTB203, BTB203-1, BTB204, BTB204-1, BTB205, BTB206, BTB206-1, BTB207, BTB208, BTB209, BTB210, BTB211, BTB212, BTB213, BTB214, BTB215, BTB216, BTB217, BTB218, BTB219, BTB220, BTB221, BTB222, BTB223, BTB224, BTB225, BTB226, BTB227, BTB228, BTB229, BTB700, BTB701, BTB800, BTB801, BTB900, BTB901, BTD100, BTD101, BTD102, BTD103, BTD104, BTD105, BTD106, BTD107, BTD108, BTD109, BTD110, BTD111, BTD200, BTD201, BTD202, BTD203, BTD204, BTD205, BTD206, BTD207, BTD208, BTD209, BTD210, BTD211, BTD300, BTD301, BTD302, BTD303, BTD304, BTD305, BTD306, BTD307, BTD308, BTD309, BTD310, BTD311, BTD400, BTD401, BTD402, BTD403, BTD404, BTD405, BTD406, BTD407, BTD408, BTD409, BTD410, BTD411
Applicant	:	YUYAO BETTY ELECTRICAL CO.,LTD.
Address	:	20# Tiantong Rd Hudi Industrial Development Zone, Yuyao, Zhejiang, China
Manufacturer	:	YUYAO BETTY ELECTRICAL CO.,LTD.
Address	:	20# Tiantong Rd Hudi Industrial Development Zone, Yuyao, Zhejiang, China

Test Result according to the standards on page 4:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

EN 55022: 2010+AC: 2011 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
EN 55024: 2010 Information technology equipment – Immunity characteristics – Limits
EN 61000-3-2: 2006+A2:2009 Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN 61000-3-3:2013 Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

2. SUMMARY

2.1. General Remarks:

Date of receipt of test sample : April 25, 2014

Testing commenced on : April 25, 2014

Testing concluded on : April 29, 2014

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage : o 230V / 50 Hz o 115V / 60Hz
o 12 V DC o 24 V DC
n Other (specified in blank below)

DC 4.5V

2.3. Short description of the Equipment under Test (EUT)

The EUT is a Laser pointer pen

Series number: prototype

2.4. EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

The tests are carried out with surge protective devices disconnected.

Test program (customer specific)

Emissions tests…….: According to EN55022, searching for the highest disturbance.
Immunity tests ……..: According to EN55024, searching for the highest susceptivity.
Harmonics current……. : According to EN 61000-3-2, searching for the highest disturbance.
Voltage fluctuation……. : According to EN 61000-3-3, searching for the highest disturbance.

2.5. EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurement:

n- supplied by the manufacturer

o - supplied by the lab

2.6. Performance Criteria

Definition related to the performance level:

☒ based on the used product standard
☐ based on the declaration of the manufacturer, requestor or purchaser

Criterion A:
Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

The apparatus 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 manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion B:
Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus 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 manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

Criterion C:
Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

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.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTL Electromagnetic Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

3.2. Test Facility

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

IC Registration No.: 9618A

The 3m alternate test site of Shenzhen CTL Electromagnetic Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9618A on May, 2011.

FCC-Registration No.: 807767

Shenzhen CTL Electromagnetic 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 807767, June 27, 2011.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	22-25 ° C
Humidity:	40-54 %
Atmospheric pressure:	950-1050mbar

3.4. Test Description

Emission Measurement		
Radiated Emission	EN 55022: 2010+AC: 2011	PASS
Conduction Emission	EN 55022: 2010+AC: 2011	N/A
Harmonic Current	EN 61000-3-2: 2006+A2:2009	N/A
Voltage Fluctuation and Flicker	EN 61000-3-3: 2013	N/A
Immunity Measurement		
Electrostatic Discharge	EN 55024: 2010 IEC 61000-4-2: 2008	PASS
RF Field Strength Susceptibility	EN 55024: 2010 IEC 61000-4-3: 2010	PASS
Electrical Fast Transient/Burst Test	EN 55024: 2010 IEC 61000-4-4: 2012	N/A
Surge Test	EN 55024: 2010 IEC 61000-4-5: 2005	N/A
Conducted Susceptibility Test	EN 55024: 2010 IEC 61000-4-6: 2008	N/A
Power Frequency Magnetic Field Susceptibility Test	EN 55024: 2010 IEC 61000-4-8: 2009	N/A
Voltage Dips and Interruptions Test	EN 55024: 2010 IEC 61000-4-11: 2004	N/A

Remark: The test result PASS and /or FAIL has no relationship with the measurement uncertainty.

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	±4.10dB	(1)
Radiated Emission	1~12.75GHz	±4.32dB	(1)
Conducted Emission	0.15~30MHz	±3.22dB	(1)

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

3.6. Equipments Used during the Test

Conducted Susceptibility（CS）:					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Conducted Disturbances test system	SCHLODER	CDG 6000	N/A	2013/04
2	Amplifier	SCHLODER	4N100W-6DB	N/A	2013/04
3	Dual Directional Coupler	AR	DC2600	302389	2013/04
4	6db Attenuator	EMTEST	ATT6/75	0010230A	2013/04
5	EM CLAMP	LÜTHI	EM101	335625	2013/04
6	CDN	SCHLODER	CDN M2+M3	A2210225/2013	2013/04

Harmonic Current/ Voltage Fluctuation and Flicker					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Purified Power Source	MToni	PHF 5010	N/A	2013/04
2	Harmonic And Flicker Analyzer	Voltech	PM6000	N/A	2013/04

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA-BROADBAND ANTENNA	Sunol Sciences Corp.	JB1 Antenna	A061713	2013/04
2	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESPI	1164.6407.07	2013/04
3	RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	2013/04
4	Controller	EM Electronics	Controller EM 1000	N/A	2013/04
5	EMI TEST SOFTWARE	ROHDE & SCHWARZ	ESK1	N/A	2013/04

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2013/04
2	LISN	ROHDE & SCHWARZ	ENV216	101034	2013/04
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2013/04

RF Field Strength Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	SIGNAL GENERATOR	IFR	2032	203002/100	2013/04
2	AMPLIFIER	AR	150W1000	301584	2013/04
3	DUAL DIRECTIONAL COUPLER	AR	DC6080	301508	2013/04

4	POWER HEAD	AR	PH2000	301193	2013/04
5	POWER METER	AR	PM2002	302799	2013/04

Electrical Fast Transient/Surge/Dips					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Ultra Compact Simulator	HAEFELY	ECOMPACT4	174887	2013/04

Electrostatic Discharge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	SKYLARK	ESD-2000	0220K10251	2013/04

Magnetic Field Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	1166.5950.03	2013/04
2	Triple-Loop Antenna	EVERFINE	LLA-2	1008002	2013/04
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2013/04

Power Frequency Magnetic Field Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	202304/060	2013/04
2	MOTOR DRIVEN VOLTAGE TRANSFORMER	EM TEST	MV2616	302205	2013/04
3	CURRENT TRANSFORMER	EM TEST	MC2630	302389	2013/04
4	MAGNETIC COIL	EM TEST	MS100	0010230A	2013/04

4. TEST CONDITIONS AND RESULTS

4.1. Radiated Emission

For test instruments and accessories used see section 3.6.

4.1.1. Description of the test location

Test location: Shielded room No. 2

4.1.2. Limits of disturbance(EN55022 B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

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

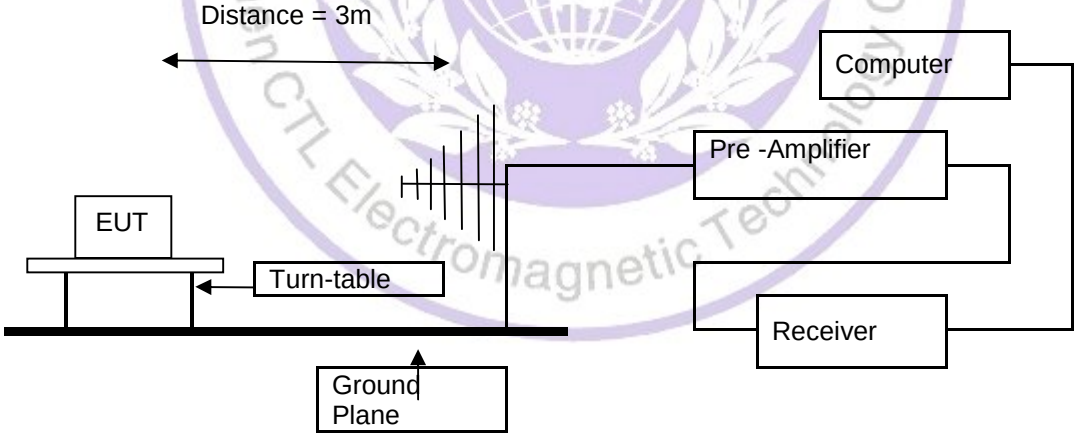
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

4.1.3. Description of the test set-up

4.1.3.1. Operating Condition

The EUT is set to work shall be carried out with full load mode during the test, and the maximum emanating results are recorded.

4.1.3.2. Configuration of test setup



4.1.4. Test result

The requirements are **Fulfilled**

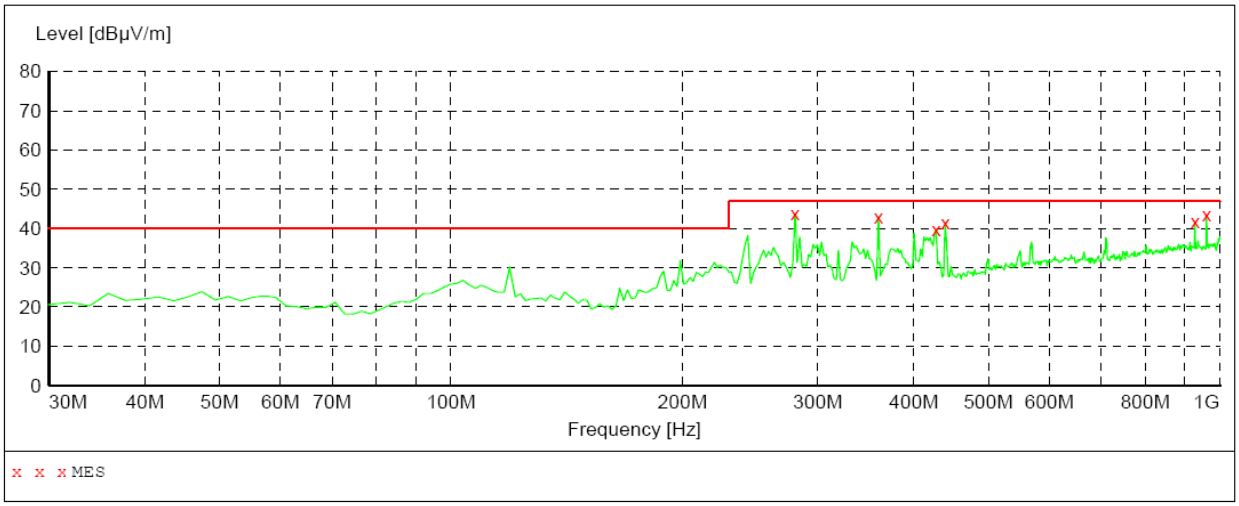
Band Width: 120KHz

Frequency Range: 30MHz to 1000MHz

Remarks: The limits are kept. For detailed results, please see the following page(s).

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

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

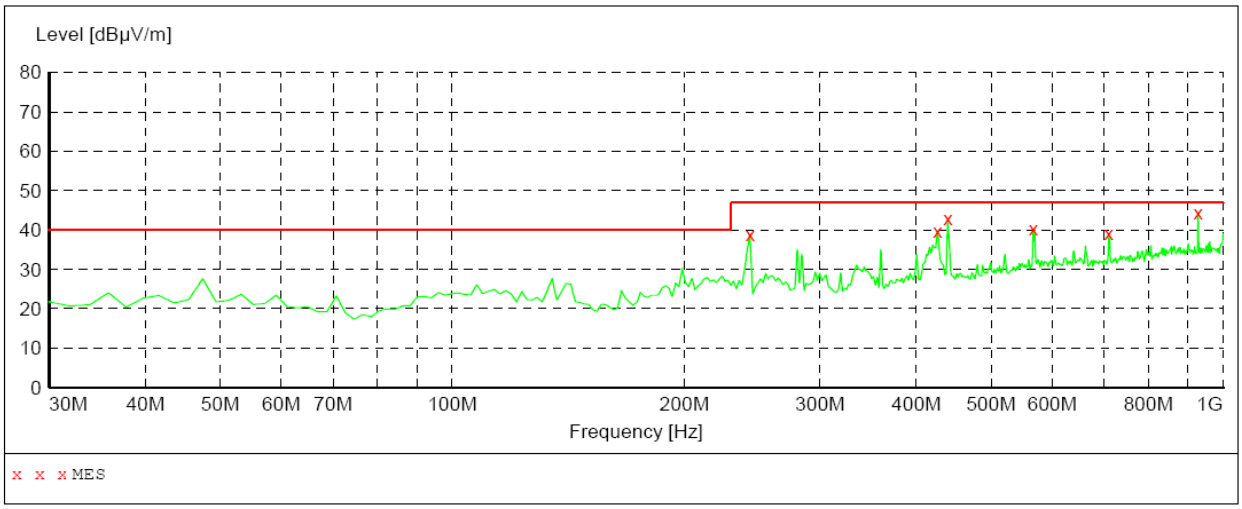


MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
280.260000	43.70	18.2	47.0	3.3	---	100.0	0.00	HORIZONTAL
359.800000	43.00	20.6	47.0	4.0	---	100.0	0.00	HORIZONTAL
427.700000	39.90	22.0	47.0	7.1	---	100.0	0.00	HORIZONTAL
439.340000	41.50	22.1	47.0	5.5	---	100.0	0.00	HORIZONTAL
928.220000	41.70	29.4	47.0	5.3	---	100.0	0.00	HORIZONTAL
961.200000	43.40	29.6	47.0	3.6	---	100.0	0.00	HORIZONTAL

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

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



MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
243.400000	38.90	17.0	47.0	8.1	---	100.0	0.00	VERTICAL
425.760000	39.90	22.0	47.0	7.1	---	100.0	0.00	VERTICAL
439.340000	42.90	22.1	47.0	4.1	---	100.0	0.00	VERTICAL
567.380000	40.20	25.3	47.0	6.8	---	100.0	0.00	VERTICAL
710.940000	39.20	26.7	47.0	7.8	---	100.0	0.00	VERTICAL
928.220000	44.50	29.4	47.0	2.5	---	100.0	0.00	VERTICAL

4.2. Conducted disturbance

The test is not applicable.

4.3. Harmonic current

The test is not applicable.

4.4. Voltage Fluctuation and Flicker

The test is not applicable.

4.5. Electrostatic discharge

For test instruments and accessories used see section 3.6.

4.5.1. Description of the test location and date

Test location: Shielded room No. 3

Date of test: April 28, 2014

Operator: NADA

4.5.2. Severity levels of electrostatic discharge

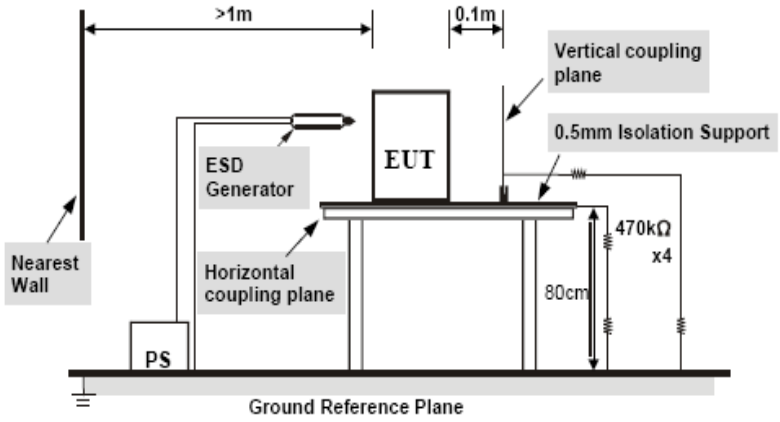
Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

4.5.3. Description of the test set-up

4.5.3.1. Operating Condition

The EUT is set to work shall be carried out with normal working mode during the test, and the maximum emanating results are recorded.

4.5.3.2. Configuration of test setup



4.5.4. Test specification:

Contact discharge voltage:	**n** 2 kV	**n** 4 kV
Air discharge voltage:	**n** 2 kV	**n** 4 kV **n** 8 kV
Number of discharges:	☐ ≥ 10	**n** ≥ 25
Type of discharge:	Direct discharge	**n** Air discharge **n** Contact discharge
	Indirect discharge	**n** Contact discharge
Polarity:	**n** Positive	**n** Negative
Discharge location:	**n** see photo documentation of the test set-up	
	n all external locations accessible by hand	
	n horizontal plate (HCP)	
	n vertical coupling plate (VCP)	

4.5.5. Test result

The requirements are **Fulfilled** Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.6. Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 3.6.

4.6.1. Description of the test location and date

Test location: Shielded room No. 2

Date of test: April 28, 2014

Operator: Bove

4.6.2. Severity levels of radiated, radio-frequency, electromagnetic field

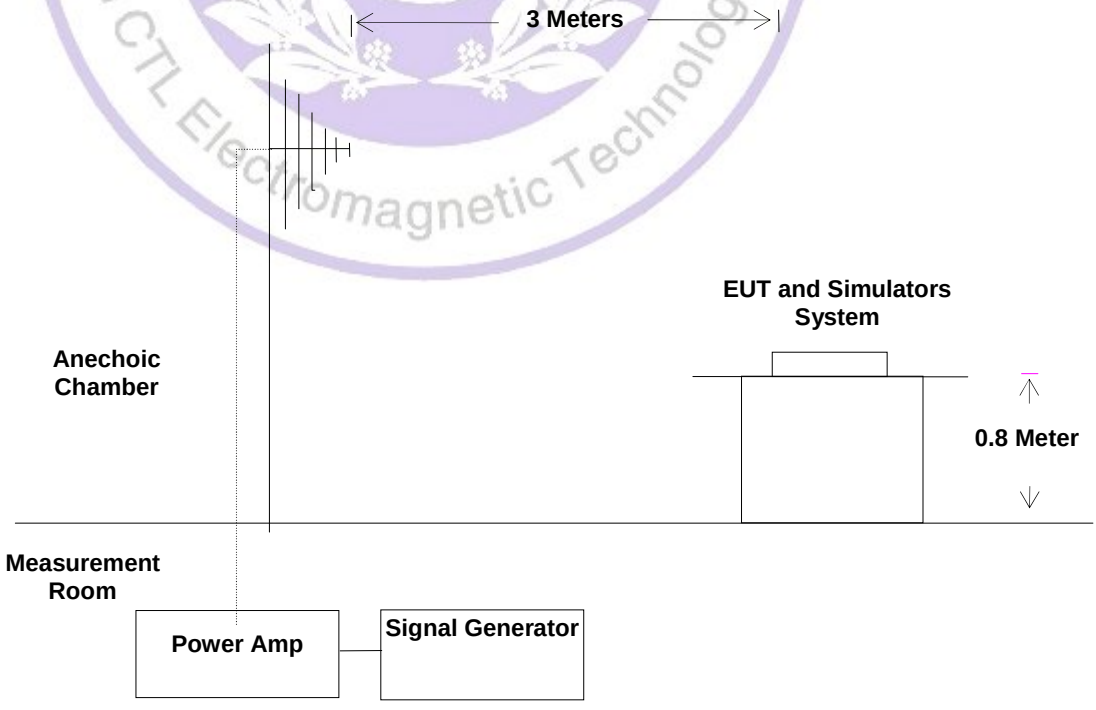
Level	Field Strength (V/m)
1.	1
2.	3
3.	10
X	Special

4.6.3. Description of the test set-up

4.6.3.1. Operating Condition

The EUT is set to work shall be carried out normal working mode during the test, and the maximum emanating results are recorded.

4.6.3.2. Configuration of test setup



4.6.4. Test specification:

Frequency range:	**n** 80 MHz to 1000 MHz
Field strength:	**n** 3 V/m
EUT - antenna separation:	**n** 3 m
Modulation:	**n** AM: 80 % **n** sinusoidal 1000Hz
Frequency step:	**n** 1 % with 3 s dwell time
Antenna polarisation:	**n** horizontal **n** vertical

4.6.5. Test result

The requirements are **Fulfilled** Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

4.7. Electrical fast transients / Burst

The test is not applicable.

4.8. Surge

The test is not applicable.

4.9. Conducted disturbances induced by radio-frequency fields

The test is not applicable.

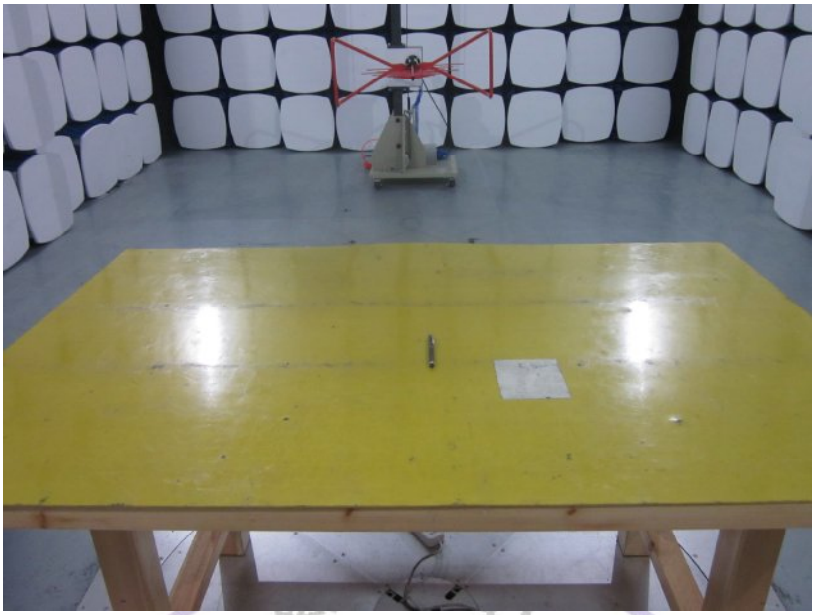
4.10. Magnetic Field Immunity

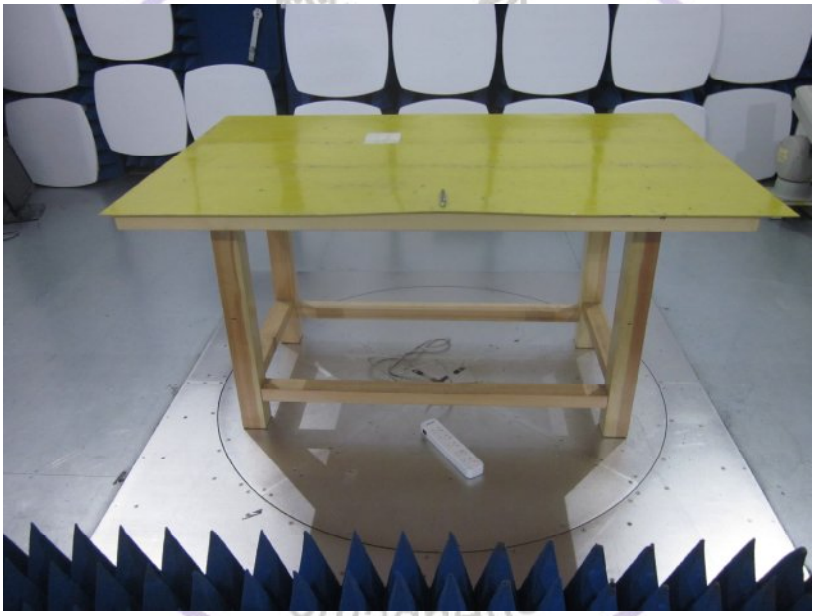
The test is not applicable.

4.11. Voltage Dips and Interruptions

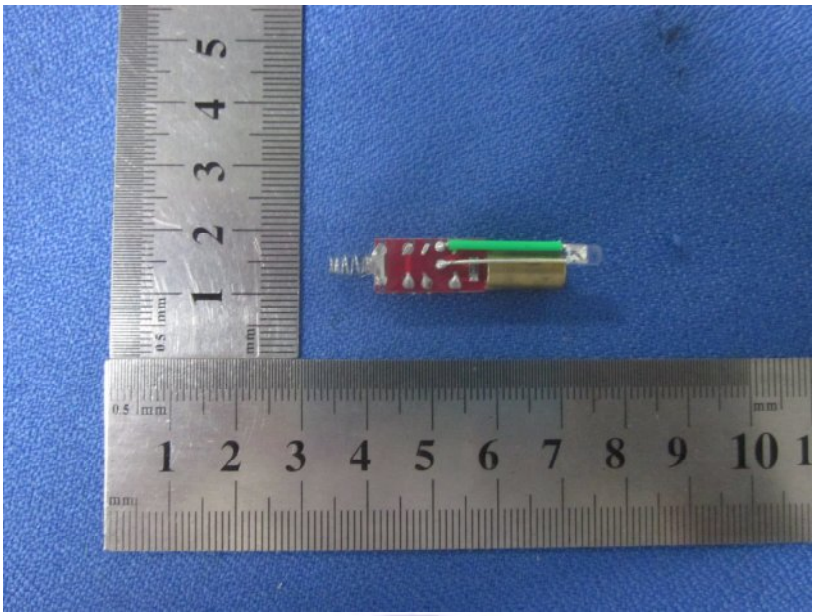
The test is not applicable.

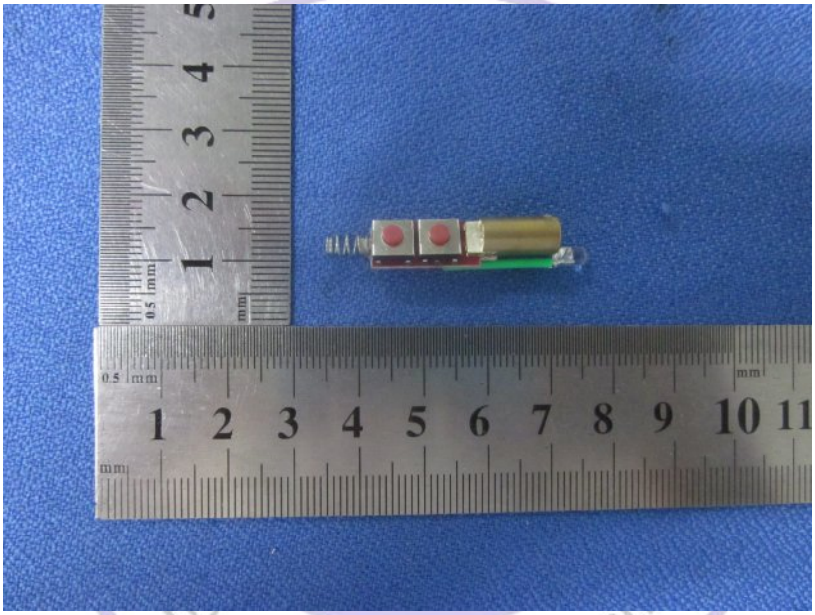
5. Test Setup Photos





6. Photos of the EUT





..... End Of Report.....