




EMC TEST REPORT

| | | | |
|-----------------------|---|---|---|
| Certificate No. | : | IP19082740 | |
| Applicant | : | ASBISC Enterprises PLC | |
| | | | |
| EUT Name | : | Wireless mouse | |
| Model No. | : | CNS-CMSW13XX | |
| Series Model No. | : | CNS-CMSW13BO | |
| Brand Name | : | CANYON | |
| Receipt Date | : | 2019-08-07 | |
| Test Date | : | 2019-08-08 to 2019-08-16 | |
| Issue Date | : | 2019-08-17 | |
| Standards | : | ETSI EN 301 489-1 V2.2.0: 2017 ETSI EN 301 489-3 V2.1.1: 2017 | |
| Conclusions | : | PASS | |
| | | In the configuration tested, the EUT complied with the standards specified above. The EUT technically complies with the RED Directive of 2014/53/EU requirements. | |
| Test/Witness Engineer | : |  |  |
| Approved & Authorized | : |  | |

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information

1.1 Client Information

| | | |
|---------------------|---|--|
| Applicant | : | ASBISC Enterprises PLC |
| Address | : | 43 Kolonakiou street, Diamond Court, 4103, Ayios Athanasios, Limassol, Cyprus |
| Manufacturer | : | DONGGUAN INDENA ELECTRONIC TECHNOLOGY CO.,LTD. |
| Address | : | City NO.6 GAOLI 7 TH ROAD QINGHUTOU COMMUNITY TANGXIA TOWN DONGGUAN,CHINA |

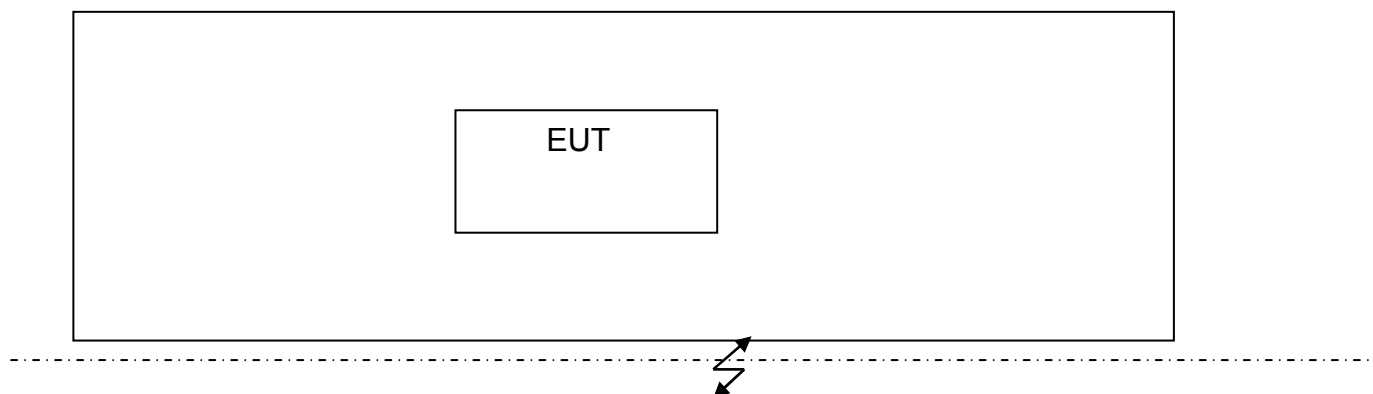
1.2 General Description of EUT (Equipment Under Test)

| | | | |
|-------------------------------|---|--|-----------------|
| EUT Name | : | Wireless mouse | |
| Model No. | : | CNS-CMSW13XX, CNS-CMSW13BO | |
| Model Difference | : | All these models are identical in the same PCB layout and electrical circuit, the only difference is appearance. | |
| Product Description | : | Operation Frequency: | 2405MHz~2472MHz |
| Power Rating | : | DC 3V from battery | |
| Connecting I/O Port(S) | : | Please refer to the User's Manual | |

Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) More information about the RF function, please refer the RF test reports.
- (3) FX : Highest internal frequency.

1.3 Block Diagram Showing the Configuration of System Tested



1.4 Description of Support Units

| Equipment Information | | | | |
|-----------------------|-----------|------------|--------------|----------|
| Name | Model | S/N | Manufacturer | Used “√” |
| Notebook | B470A2450 | VNF3G06957 | Lenovo | √ |

1.5 Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|--------------|-------------|
| Mode 1 | Working |
| Mode 2 | RF Mode |

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

| For EMI Test | |
|-----------------|-------------|
| Final Test Mode | Description |
| Mode 1 | Working |
| Mode 2 | RF Mode |
| For EMS Test | |
| Final Test Mode | Description |
| Mode 1 | Working |
| Mode 2 | RF Mode |

1.6 Test Conditions

For the purpose of the present document, the test conditions of EN 301 489-1[1], clause 4, shall apply as appropriate. Further product related test conditions for digital cellular mobile and portable radio equipment are specified in the present document.

(1) General

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

Whenever the Equipment Under Test (EUT) is provided with a detachable antenna, the EUT shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise.

(2) Arrangements for test signals

The provisions of EN 301 489-1, clause 4.2 shall apply.

a. Arrangements for establishing a communications link

The nominal frequency of the wanted RF input signal (for the receivers) shall be selected by setting the Absolute Radio Frequency Channel Number (ARFCN) to an appropriate number (e.g. in case of GSM 900 MHz this is 60 to 65, and in case of GSM 1 800 MHz this is 690 to 706).

A communication link shall be set up with a suitable base station simulator.

When the EUT is required to be in the transmit/receive mode, the following conditions shall be met:

- the EUT shall be commanded to operate at maximum transmit power;
- the downlink RXQUAL shall be monitored.

b. Arrangements for test signals at the input of transmitters

The provisions of EN 301 489-1, clause 4.2.1 shall apply with the following modifications.

The test system shall command the EUT to disable Discontinuous Transmission (DTX).

A communication link shall be set up between the EUT and the test system.

c. Arrangements for test signals at the output of transmitters

The provisions of EN 301 489-1, clause 4.2.2 shall apply with the following modifications.

Where the equipment incorporates an external 50Ω RF antenna connector that is normally connected via a coaxial cable, then the wanted signal to establish a communication link shall be delivered from that connector by a coaxial cable.

Where the equipment incorporates an external 50Ω RF antenna connector, but this port is not normally connected via a coaxial cable, and where the equipment does not incorporate an external 50Ω RF connector (integral antenna equipment), then the wanted signal, to establish a communication link, shall be delivered from the equipment to an antenna located within the test environment.

d. Gements for test signals at the input of receivers

The provisions of EN 301 489-1, clause 4.2.3 shall apply with the following modifications.

Where the equipment incorporates an external 50ΩRF antenna connector that is normally connected via a coaxial cable, then the wanted signal to establish a communication link shall be delivered to that connector by a coaxial cable.

Where the equipment incorporates an external 50ΩRF antenna connector, but this port is not normally connected via a coaxial cable, and where the equipment does not incorporate an external 50ΩRF connector (integral antenna equipment), then the wanted signal, to establish a communication link, shall be presented to the equipment from an antenna located within the test environment.

The wanted RF input signal level shall be set to 40 dB above the reference sensitivity level.

e. Gements for test signals at the output of receivers

The provisions of EN 301 489-1, clause 4.2.4 shall apply.

f. Idle mode

When the EUT is required to be in the idle mode, the test system shall simulate a Base Station(BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages. Periodic Location Updating shall be disabled.

1.7 Performance Criterion

(1) Final draft EN 301 489-3

According to **Final draft EN 301 489-3** standard, the general performance criteria as following:

- performance criterion A applies for immunity tests with phenomena of a continuous nature;
- performance criterion B applies for immunity tests with phenomena of a transient nature.

NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated in the test procedures for the phenomenon in ETSI EN 301 489-1 [1], clause 9.

Performance Requirements

| Criterion | During test | After test |
|-----------|--|---|
| A | Operate as intended No loss of function No unintentional responses | Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions |
| B | May show loss of function No unintentional responses | Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions |

The Requirement of Performance Criteria

| | | |
|---|--|---|
| 1 | Performance criteria for continuous phenomena applied to transmitters (CT) | Criterion A of the applicable class shall apply |
| 2 | Performance criteria for transient phenomena applied to transmitters (TT) | Criterion B of the applicable class shall apply |
| 3 | Performance criteria for continuous phenomena applied to receivers (CR) | Criterion A of the applicable class shall apply |
| 4 | Performance criteria for transient phenomena applied to transmitters (TR) | Criterion B of the applicable class shall apply |

1.8 Test Facility

The testing report were performed by the Shenzhen iPEN Testing Technology Co., Ltd., in their facilities located at 4/F Building E, Fenghuanggang Second Industrial Zone, Xixiang Street, Baoan District, Shenzhen, China.

2 Test Results Summary

Test procedures according to the technical standards:

| | | | | |
|--|--------------------------------|---|----------|--------|
| Requirement Standard: | | Draft ETSI EN 301 489-1 V2.2.0: 2017 Final draft EN 301 489-3 V2.1.1: 2017 | | |
| EMC Emission | | | | |
| Test Standard | Test Item | Limit | Judgment | Remark |
| EN 55032:2015 | Conducted Emission | Class B | PASS | |
| | Radiated Emission | Class B | PASS | |
| EN61000-3-2:2014 | Harmonic Current Emission | Class A or D NOTE(2) | N/A | |
| EN 6000-3-3:2013 | Voltage Fluctuations& Flicker | | N/A | |
| EMC Immunity | | | | |
| Test Standard | Test Item | Performance Criteria | Judgment | Remark |
| EN 61000-4-2: 2009 | Electrostatic Discharge | B | PASS | |
| EN 61000-4-3: 2006 +A1:2008+A2:2010 | RF electromagnetic field | A | PASS | |
| EN 61000-4-4: 2012 | Fast transients | B | PASS | |
| EN 61000-4-5:2014 +A1:2017 | Surges | B | PASS | |
| EN 61000-4-6: 2014 | Injected Current | A | PASS | |
| EN 61000-4-11:2004 +A1:2017 | Volt. Interruptions Volt. Dips | B /B/ C / C NOTE (3) | PASS | |

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2) The power consumption of EUT is less than 75W and no Limits apply.

(3)Voltage dip: 0% residual0.5 cycle– Performance Criteria B

Voltage dip: 0% residual 1 cycle– Performance Criteria B

Voltage dip: 70% residual 25 cycles – Performance Criteria C

Voltage Interruption: 0% residual votage 250 cycles – Performance Criteria C

3 Conducted Disturbance Test

3.1 Test Standard and Limit

3.1.1 Test Standard

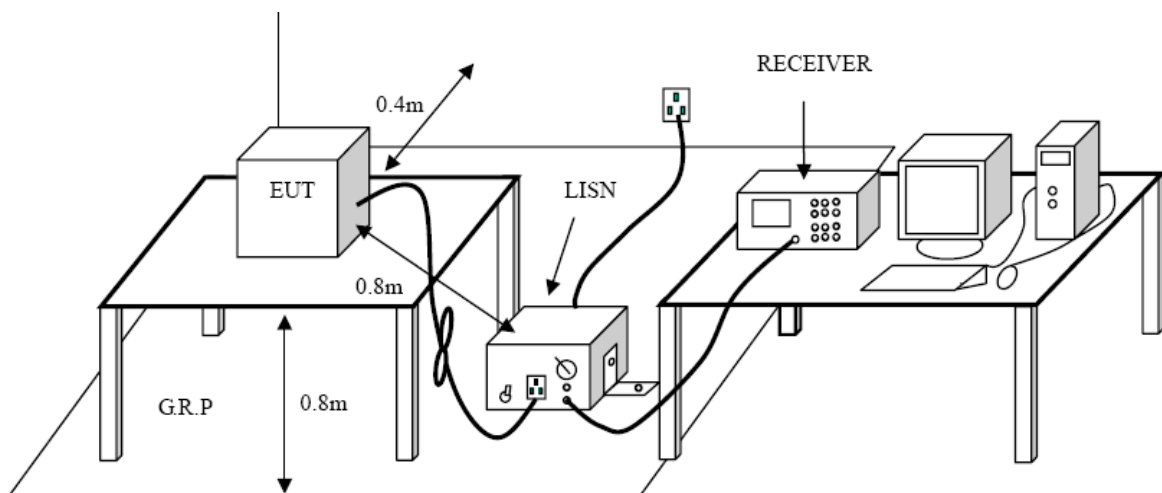
Draft ETSI EN 301 489-1 Clause 8.4
 Final draft EN 301 489-3
 EN55032: 2015 Class B

3.1.2 Test Limit

Conducted Disturbance Test Limit

| Frequency | Maximum RF Line Voltage (Db μ V) | |
|--|--------------------------------------|---------------|
| | Quasi-peak Level | Average Level |
| 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |
| Remark: *Decreasing linearly with logarithm of the frequency | | |

3.2 Test Setup



3.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from the nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

3.4 Test Data

Please refer to the Attachment A.

5 Conducted Emissions(Asymmetric Mode)

5.1 Test Standard and Limit

5.1.1. Test Standard

Draft ETSI EN 301 489-1 Clause 8.4
 Final draft EN 301 489-3
 EN55032: 2015 Class B

5.1.2. Limits

Limits for class A equipment

| Frequency range (MHz) | Voltage Limits dB(μ V) | | Current limits dB(μ A) | |
|--|-----------------------------|---------|-----------------------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 ~ 0.5 | 97 ~ 87 | 84 ~ 74 | 53 ~ 43 | 40 ~ 30 |
| 0.5 ~ 30 | 87 | 74 | 43 | 30 |
| Note: if "150 Ω to50 Ω adaptor" applied, correction factor of 9.5dB should be added to the test data. | | | | |

Limits for class B equipment

| Frequency range (MHz) | Voltage Limits dB(μ V) | | Current limits dB(μ A) | |
|--|-----------------------------|---------|-----------------------------|---------|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 ~ 0.5 | 84 ~ 74 | 74 ~ 64 | 40 ~ 30 | 30 ~ 20 |
| 0.5 ~ 30 | 74 | 64 | 30 | 20 |
| Note: if "150 Ω to50 Ω adaptor" applied, correction factor of 9.5dB should be added to the test data. | | | | |

5.2 Test setup

☒ Coupling device: CVP and Current probe (alternative method 1)

5.3 Test Setup and Test Procedure

Detailed test procedure was following clause C.4.1 of EN 55032.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

| DataPort | Measurementtype | Coupling device | No. of Pairs |
|--------------------|---------------------|---|---------------------|
| BalancedUnscreened | Voltage | AAN | ≤ 4 |
| BalancedUnscreened | Voltage andCurrent | CVP& Current probe | >4 or unable to AAN |
| Screenedor Coaxial | Voltage | AAN | N/A |
| Screenedor Coaxial | Voltage orCurrent | Current probe / “150Ω to50Ω adaptor” / high impedance probe | N/A |
| Unbalancedcables | Voltage and Current | CVP& Current probe | N/A |

5.4 Test Data

This requirement is not applicable.

6 Radiated Disturbance Test

6.1 Test Standard and Limit

6.1.1 Test Standard

Draft ETSI EN 301 489-1 Clause 8.2
 Final draft EN 301 489-3
 EN55032: 2015 Class B

6.1.2 Test Limit

Radiated Disturbance Test Limit

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

Notes:

- (1) The limit for radiated test was performed according to as following: EN55032
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Limits of Radiated Emission Measurement (Above 1000MHz)

| FREQUENCY (MHz) | Class A (dBuV/m) (at 3m) | | Class B (dBuV/m) (at 3m) | |
|-----------------|--------------------------|---------|--------------------------|---------|
| | PEAK | AVERAGE | PEAK | AVERAGE |
| 1000-3000 | 76 | 56 | 70 | 50 |
| 3000-6000 | 80 | 60 | 74 | 54 |

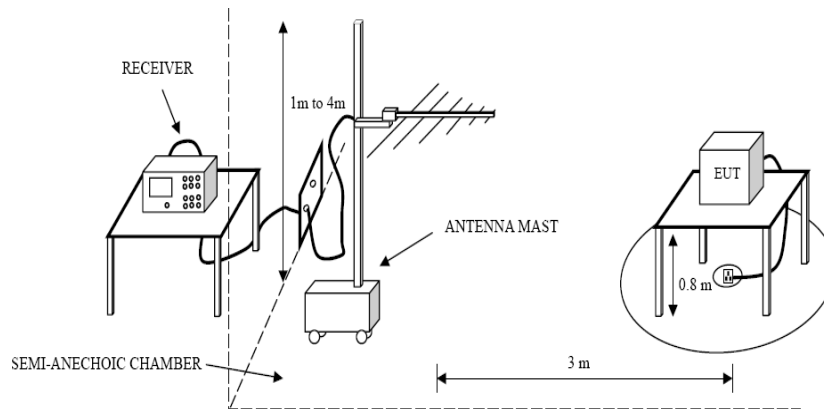
Notes:

- (1) The lower limit applies at the transition frequency.

Frequency Range of Radiated Measurement

| Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz) | Range (MHz) |
|---|--|
| Below 108 | 1000 |
| 108 – 500 | 2000 |
| 500 – 1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 6 GHz, whichever is lower |

6.2 Test Setup



Test Procedure

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

The initial step in collecting radiated emission data is a spectrum QuasiPeak detector mode scanning the measurement frequency range.

If the Peak Mode measure ^{0.8m} e compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

6.3 Test Data

Please refer to the Attachment B.

7 Harmonic Current Emission Test

7.1 Test Standard and Limit

7.1.1 Test Standard

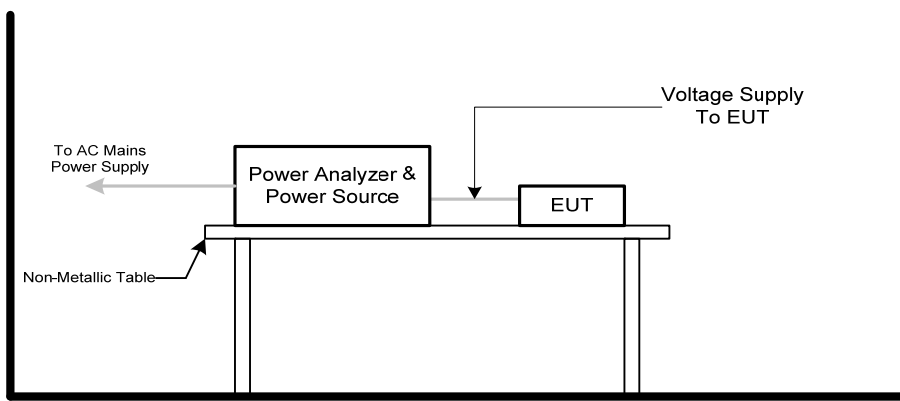
Draft ETSI EN 301 489-1 Clause 8.5
 Final draft EN 301 489-3
 EN 61000-3-2

7.1.2 Limits

| IEC 555-2 | | | | | |
|-------------------------------|------------------|--|--------------------|------------------|--|
| Table- I | | | Table- II | | |
| Equipment Category | Harmonic order n | Max. permissible harmonic current (in Amperes) | Equipment Category | Harmonic order n | Max. permissible harmonic current (in Amperes) |
| NonPortableToolsorTVReceivers | odd harmonics | | TV Receivers | odd harmonics | |
| | 3 | 2.30 | | 3 | 0.8 |
| | 5 | 1.14 | | 5 | 0.65 |
| | 7 | 0.77 | | 7 | 0.45 |
| | 9 | 0.40 | | 9 | 0.30 |
| | 11 | 0.33 | | 11 | 0.17 |
| | 13 | 0.21 | | 13 | 0.12 |
| | 15≤n≤39 | 0.15·15/n | | 15≤n≤39 | 0.10·15/n |
| | even harmonics | | | even harmonics | |
| | 2 | 1.08 | | 2 | 0.30 |
| | 4 | 0.43 | | 4 | 0.15 |
| | 8 | 0.30 | | | |
| | 8≤n≤40 | 0.23·8/n | | DC | 0.05 |

| EN 61000-3-2 | | | | | |
|--------------------|---|--------------------|-----------------------------|---|--------|
| Equipment Category | Max. permissible harmonic current (in Amperes) | Equipment Category | Harmonic order n | Max. permissible harmonic current (in A) (mA/w) | |
| Class A | Same as Limits Specified in Table I But only odd Harmonics required | Class D | 3 | 2.30 | 3.4 |
| | | | 5 | 1.14 | 1.9 |
| | | | 7 | 0.77 | 1.0 |
| | | | 9 | 0.40 | 0.5 |
| | | | 11 | 0.33 | 0.35 |
| | | | 8≤n≤40 | See Tabel I | 3.85/n |
| | | | Only odd harmonics required | | |

7.2 Test Setup



7.3 Test Procedure

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

Class D: Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors and television receivers.

7.4 Test Data

This requirement is not applicable.

8 Voltage Fluctuation and Flicker Test

8.1 Test Standard and Limit

8.1.1 Test Standard

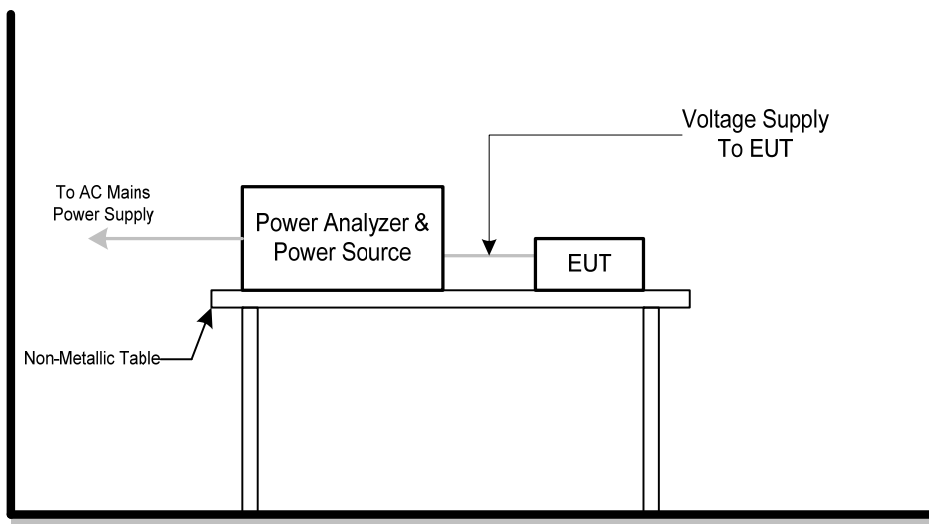
Draft ETSI EN 301 489-1 Clause 8.4
 Final draft EN 301 489-3
 EN 61000-3-3

8.1.2 Limit

Flicker Test Limit

| Tests | Limits | | Descriptions |
|-------|------------------------------|------------------------------|----------------------------------|
| | IEC555-3 | IEC 61000-3-3 | |
| Pst | ≤ 1.0 , $T_p = 10$ min. | ≤ 1.0 , $T_p = 10$ min. | Short Term Flicker Indicator |
| Plt | N/A | ≤ 0.65 , $T_p = 2$ hr. | Long Term Flicker Indicator |
| dc | $\leq 3\%$ | $\leq 3\%$ | Relative Steady-State V-Change |
| dmax | $\leq 4\%$ | $\leq 4\%$ | Maximum Relative V-change |
| d (t) | N/A | $\leq 3\%$ for > 200 ms | Relative V-change characteristic |

8.2 Test Setup



8.3 Test Procedure

8.3.1 Fluctuation and Flickers Test:

Test was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

8.3.2 All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

8.3.3 For the actual test configuration, please refer to the related Item –Block Diagram of system tested.

8.4 Test Data

This requirement is not applicable.

9 Electrostatic Discharge Immunity Test

9.1 Test Requirements

9.1.1 Test Standard

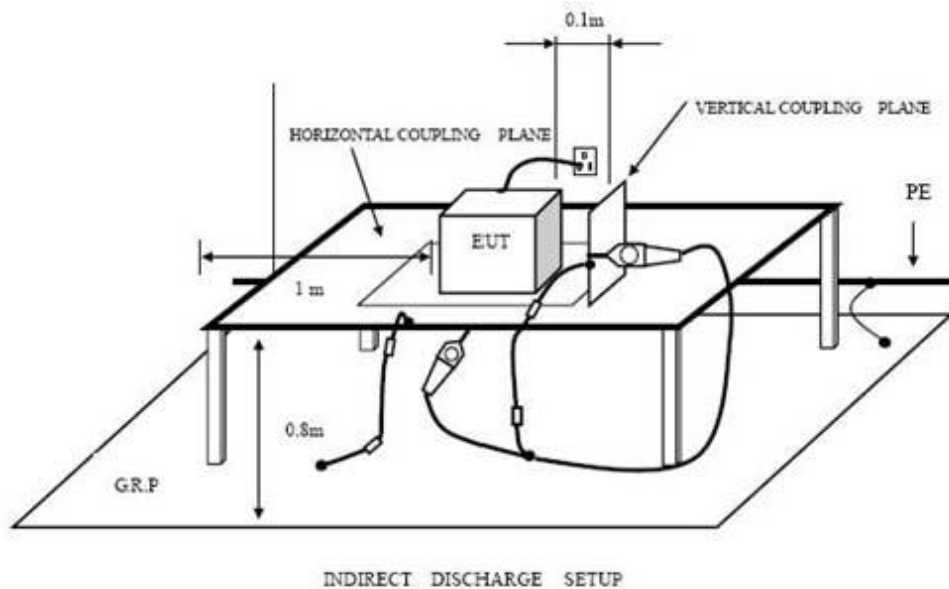
Draft ETSI EN 301 489-1 Clause 9.3
 Final draft EN 301 489-3
 EN 61000-4-2

9.1.2 Test Level

| | |
|-----------------------------|---|
| Discharge Impedance: | 330 ohm/ 150pF |
| Discharge Voltage: | Air Discharge: 2kV/4kV/8kV(Direct) Contact Discharge: 2kV/4kV (Direct /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 |

9.1.3 Performance criterion: B

9.2 Test Setup



9.3 Test Procedure

9.3.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.3.2 Contact Discharge:

All the procedure shall be same as air discharge. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

9.3.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.3.4 Indirect discharge for vertical coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

9.4 Test Data

Please refer to the Attachment C.

10 Radiated Electromagnetic Field Immunity test

10.1 Test Requirements

10.1.1 Test Standard

Draft ETSI EN 301 489-1 Clause 9.2
Final draft EN 301 489-3
EN 61000-4-3

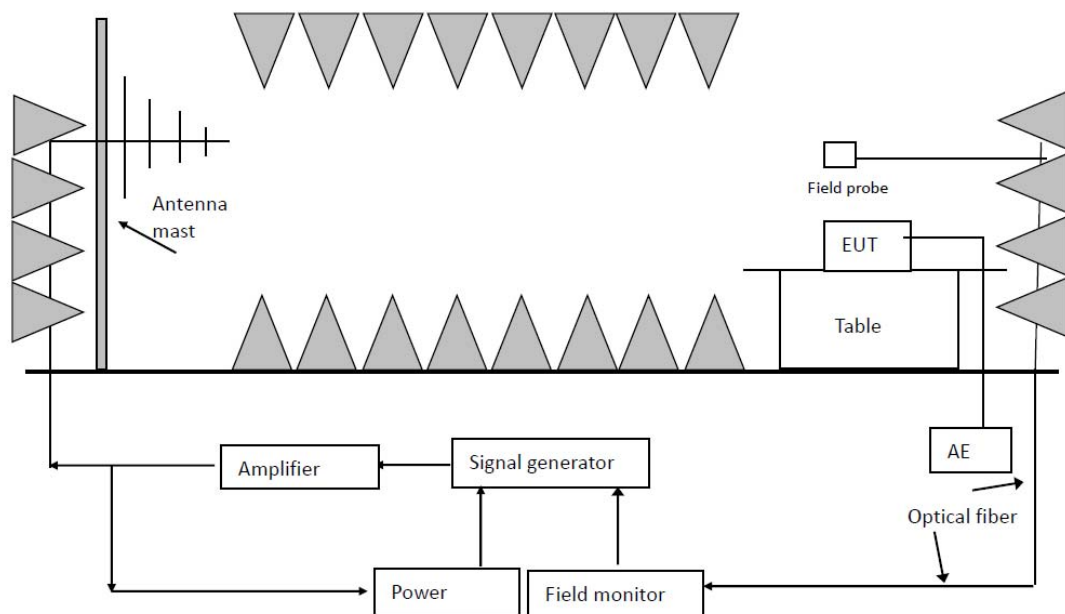
10.1.2 Test Level

Test Level for Radiated Electromagnetic Field Immunity Test

| Port | Test Specification |
|---------------|---------------------------------------|
| EnclosurePort | 80-6000MHz 3 V/m 80 % AM (1kHz) |

10.1.3 Performance criterion: A

10.2 Test Setup



10.3 Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

| Condition of Test | Remark |
|------------------------|-----------------------|
| Fielded Strength | 3V/m |
| Radiated Signal | 80%AM,1kHz Since Wave |
| Scanning Frequency | 80-6000MHz |
| Sweep time of radiated | 0.0015 Decade/s |
| Dwell Time | 3 Sec. |

10.4 Test Data

Please refer to the Attachment D.

11 Electrical Fast Transient/Burst Test

11.1 Test Requirements

11.1.1 Test Standard

Draft ETSI EN 301 489-1 Clause 9.4
 Final draft EN 301 489-3
 EN 61000-4-4

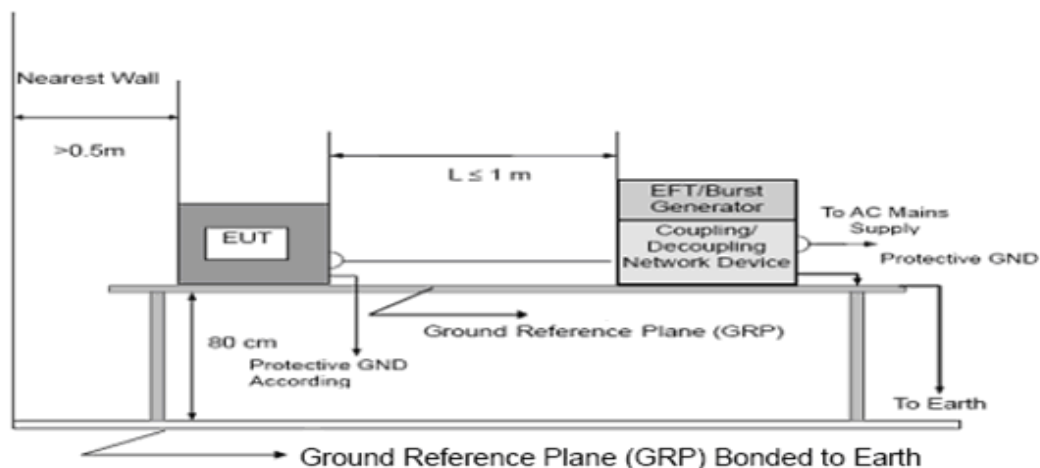
11.1.2 Test Level

Test Level for Electrical Fast Transient Test

| | On Switching Adapter Lines | On I/O (Input/Output) Signal data and control lines |
|----------------------------|-------------------------------|--|
| Test Voltage: | 1 KV | 0.5 KV |
| Polarity: | Positive&Negative | |
| Impulse Wave Shape: | 5/50ns | |
| Burst Duration: | 15ms | |
| Burst Period: | 300ms | |
| Test Duration: | Not less than 1 min | |

11.1.3 Performance criterion: B

11.2 Test Setup



11.3 Test Procedure

11.3.1 For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1minute.

11.3.2 For signal lines and control lines ports:

A coupling clamp is use to couple the EFT interference signal to the signal and control lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.3.3 For DC input and DC output power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to DC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1 minute.

11.4 Test Data

Please refer to the Attachment E.

12 Surge Immunity Test

12.1 Test Requirements

12.1.1 Test Standard

Draft ETSI EN 301 489-1 Clause 9.8
Final draft EN 301 489-3
EN 61000-4-5

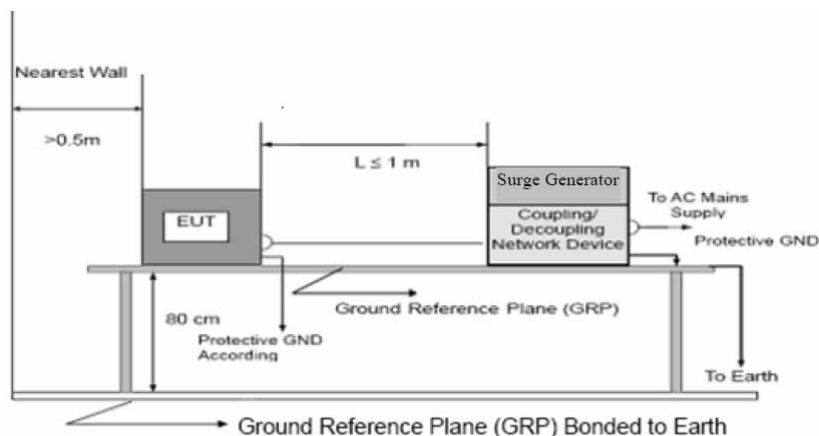
12.1.2 Level

Test Level for Surge Immunity Test

| | |
|-------------------------------|---|
| Basic Standard: | EN 61000-4-5 |
| Wave-Shape: | Combination Wave 1.2/50us Open Circuit Voltage 8/20us Short Circuit Current |
| Test Voltage | Power Line:0.5kV,1kV,2kV |
| Surge Input/Output: | L1-L2,L1-PE,L2-PE |
| Generator Source: | 2 ohm between networks |
| Impedance: | 12ohm between network and ground |
| Polarity: | Positive/Negative |
| Phase Angle: | 0/90/180/270 |
| Pulse Repetition Rate: | 1 time/min.(maximum) |
| Number of Tests: | 5 positive and 5 negative at selected points |

12.1.3 Performance criterion: B

12.2 Test Setup



12.3 Test Procedure

12.3.1 Set up the EUT and test generator.

- 12.3.2 For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge
- 12.3.3 (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 12.3.4 At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 12.3.5 Different phase angles are done individually.
- 12.3.6 Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.4 Test Data

Please refer to the Attachment F.

13 RF Common Mode

13.1 Test Requirements

13.1.1 Test Standard

Draft ETSI EN 301 489-1 Clause 9.5
Final draft EN 301 489-3
EN 61000-4-6

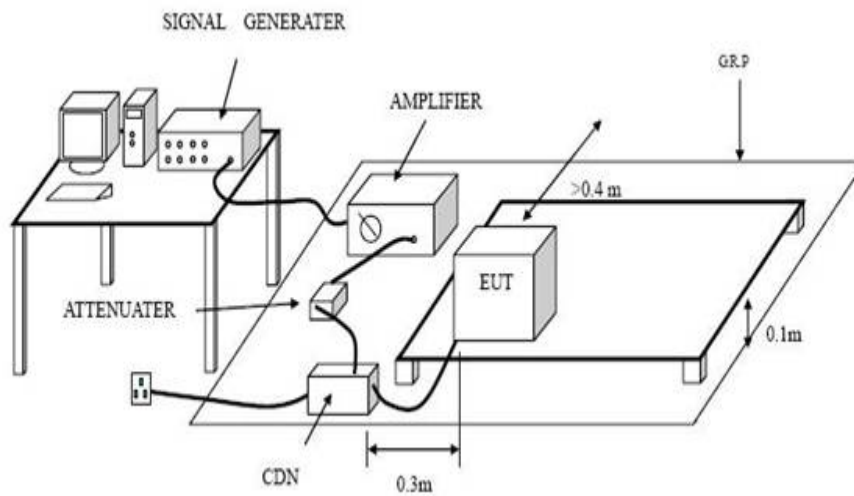
13.1.2 Test Level

Test Level for RF Common Mode

| Port | Test Specification |
|---------------------|---|
| Input AC power port | 0.15MHz~80MHz 3V(r.m.s.) (unmodulated) |

13.1.3 Performance criterion: A

13.2 Test Setup



13.3 Test Procedure

13.3.1 Set up the EUT, CDN and test generators.

13.3.2 Let the EUT work in test mode and test it.

13.3.3 The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

13.3.4 The disturbance signal description below is injected to EUT through CDN.

13.3.5 The EUT operates within its operational mode(s) under intended climatic conditions after power on.

13.3.6 The frequency range is swept from 0.150MHz to 230MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.

13.3.7 The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

13.3.8 Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

13.4 Test Data

Please refer to the Attachment G.

14 Voltage Dips and Interruptions Immunity Test

14.1 Test Requirements

14.1.1 Test Standard

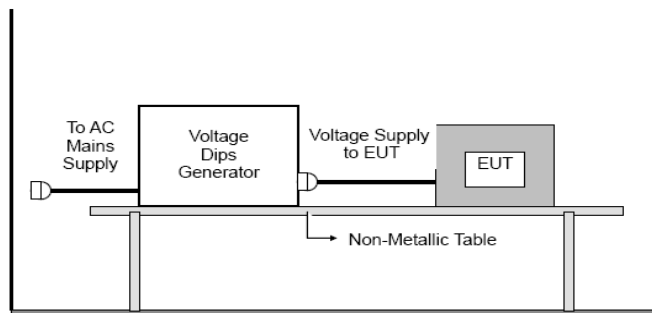
Draft ETSI EN 301 489-1 Clause 9.7
 Final draft EN 301 489-3
 EN 61000-4-11

14.1.2 Level

Test Level for Voltage Dips and Interruptions

| | |
|--------------------------------|--|
| Basic Standard: | EN 61000-4-11 |
| Required Performance: | B(For 100% Voltage Dips) B(For 100% Voltage Dips) C(For 30% Voltage Dips) C(For 100% Voltage Interruptions) |
| Test Duration Time: | Minimum three test events in sequence |
| Interval Between Event: | Minimum ten seconds |
| Phase Angle: | 0°/45°/90°/135°/180°/225°/270°/315°/360° |
| Test Cycle: | 3 times |

14.2 Test Setup



14.3 Test Procedure

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

14.4 Test Data

Please refer to the Attachment H.

15 Photographs - Constructional Details

Photo 1 Appearance of EUT



Photo 2 Appearance of EUT



Photo 3 PCB of EUT

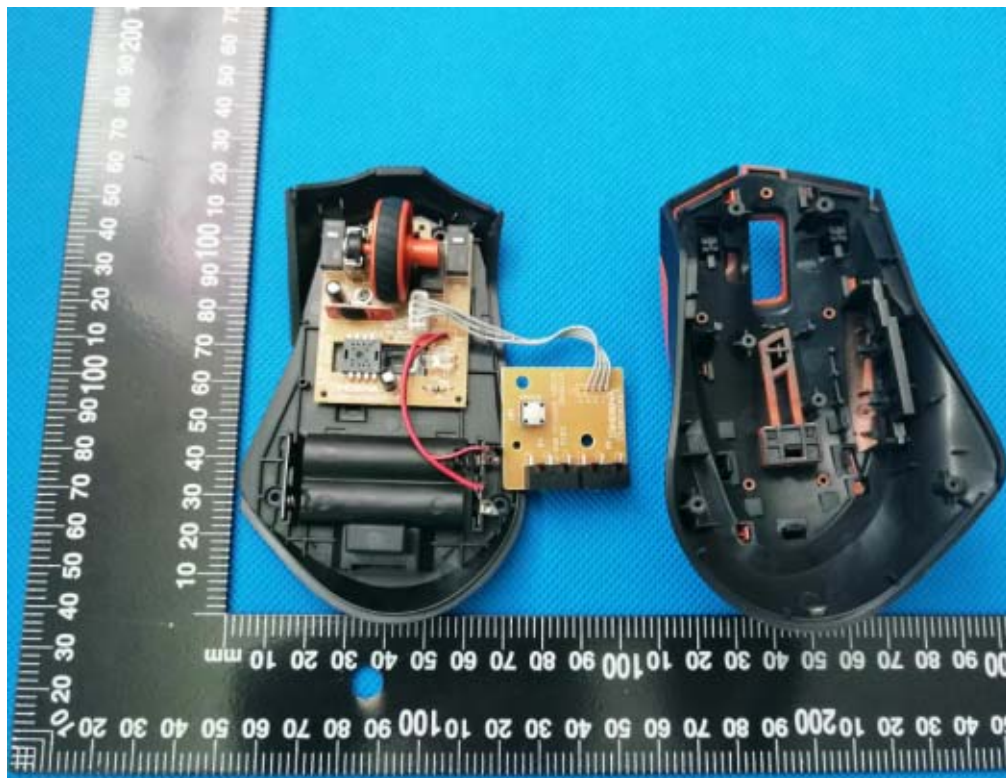
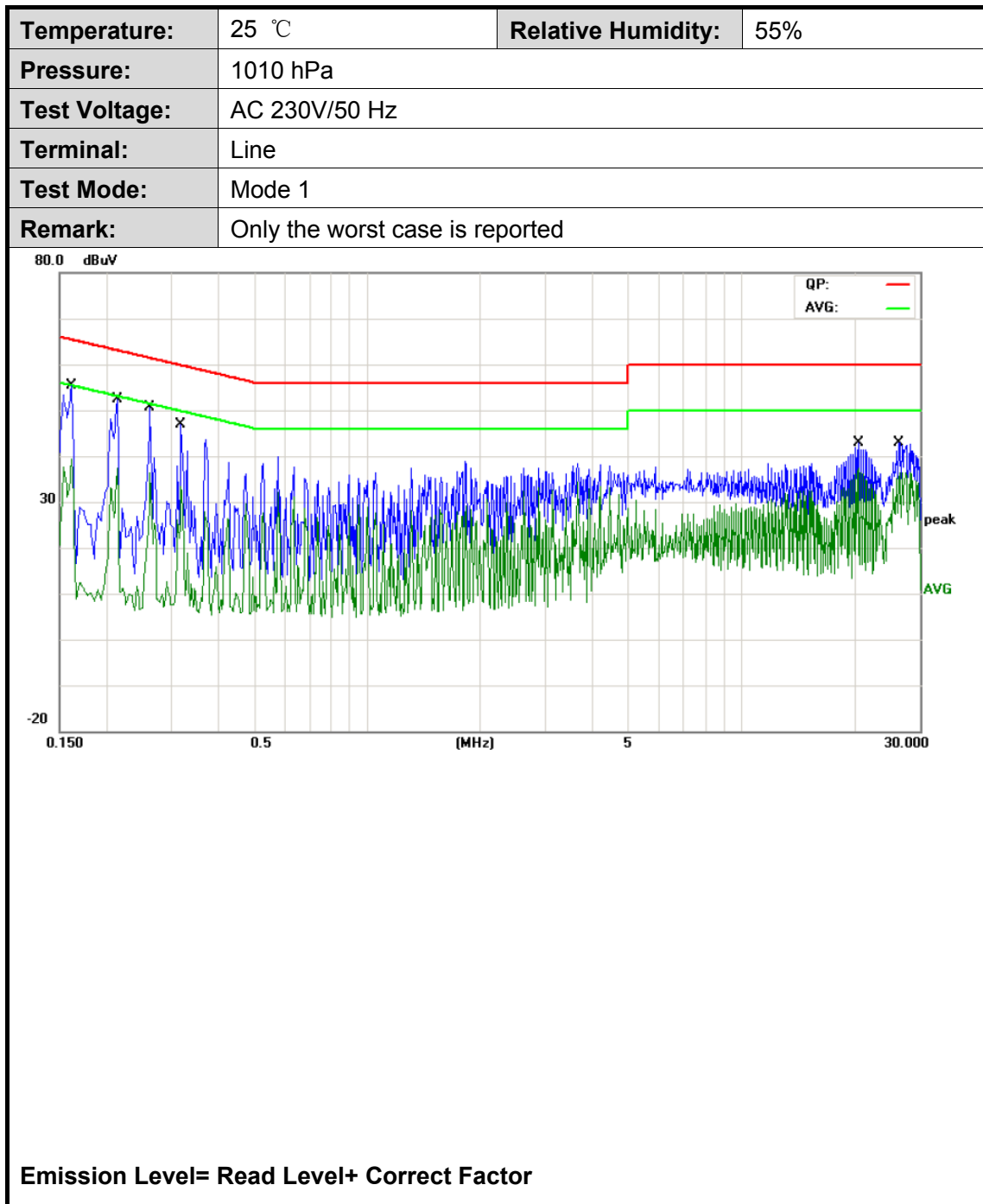
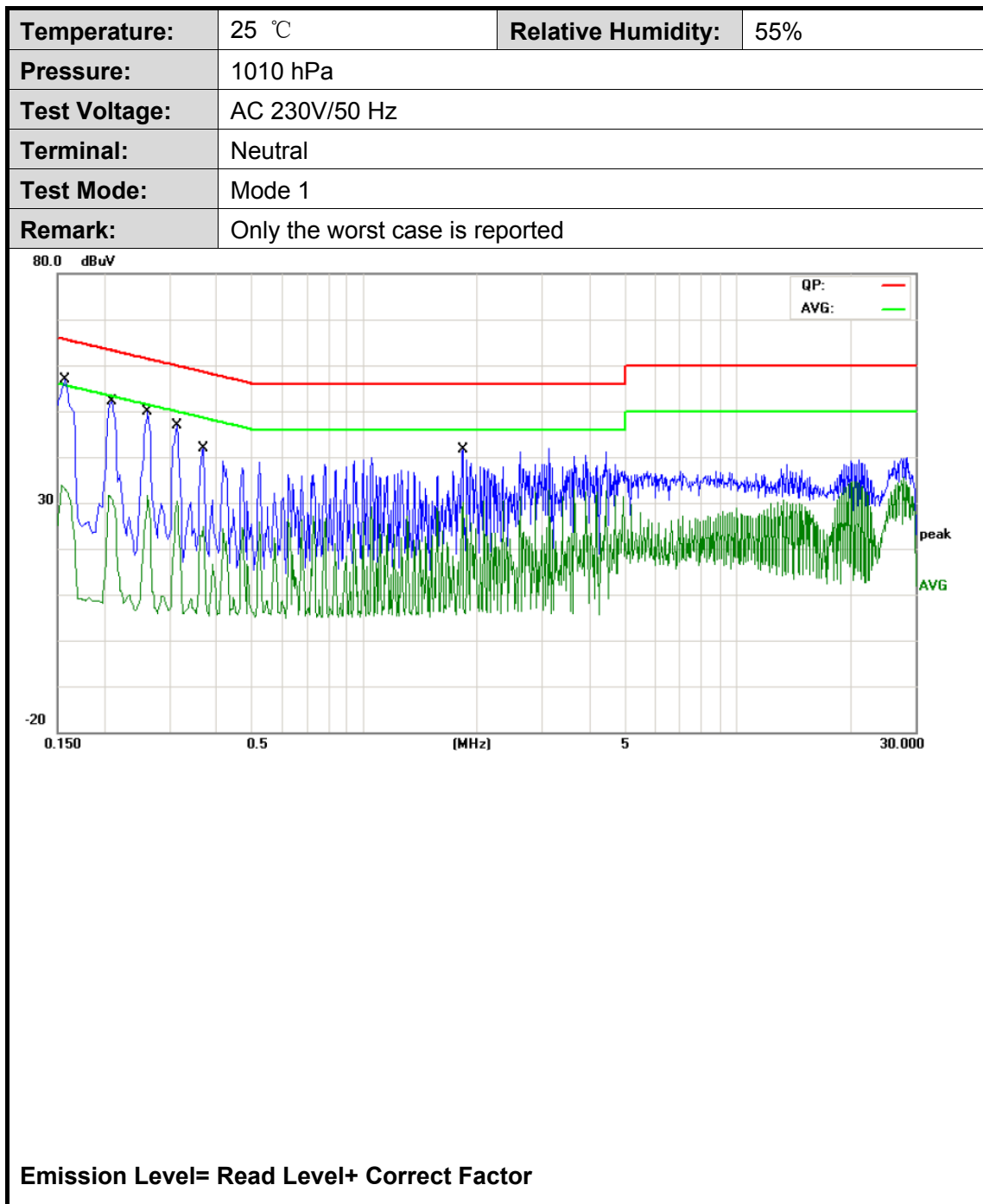


Photo 4 PCB of EUT



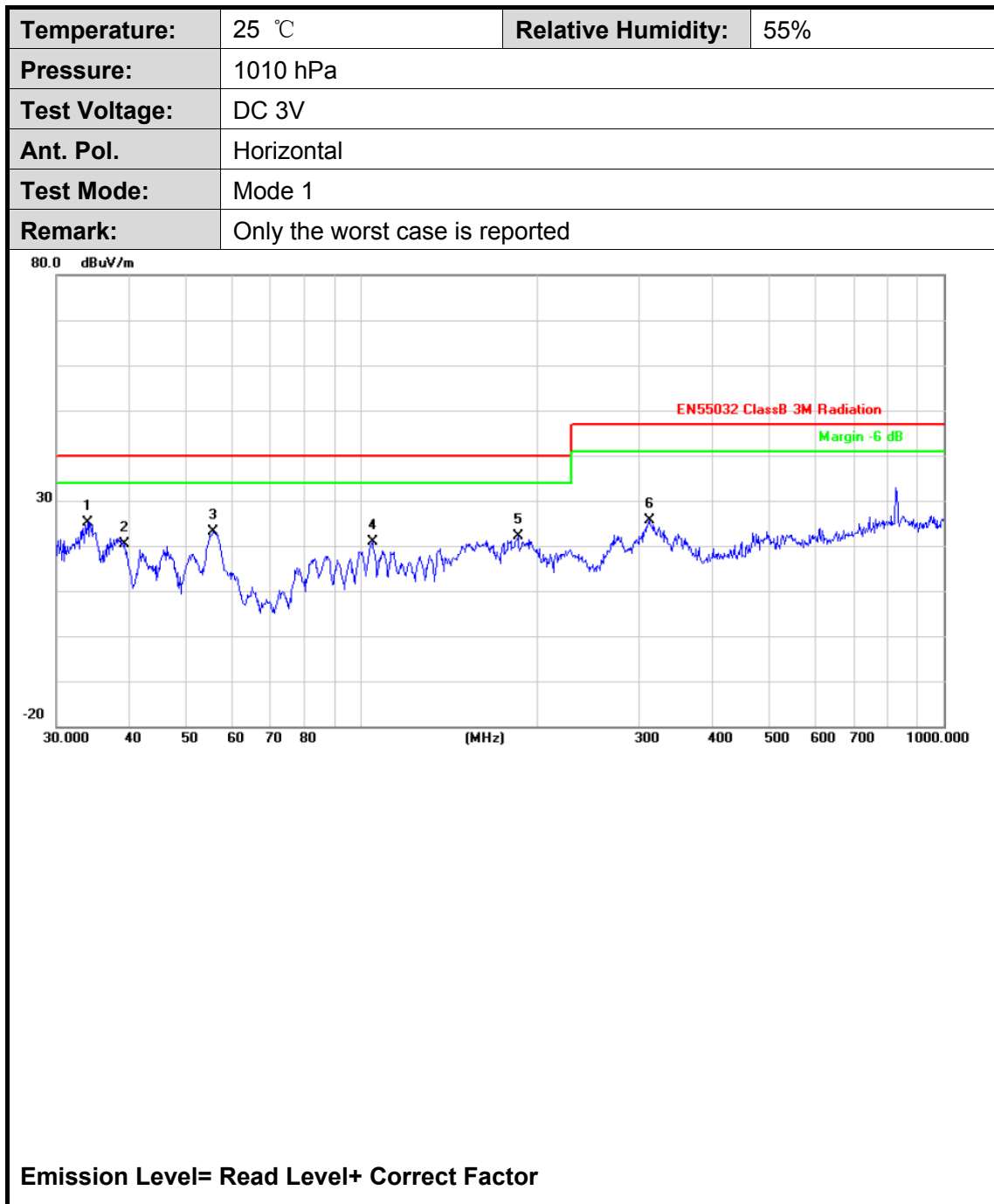
Attachment A--Conducted Emission Data (AC Mains)



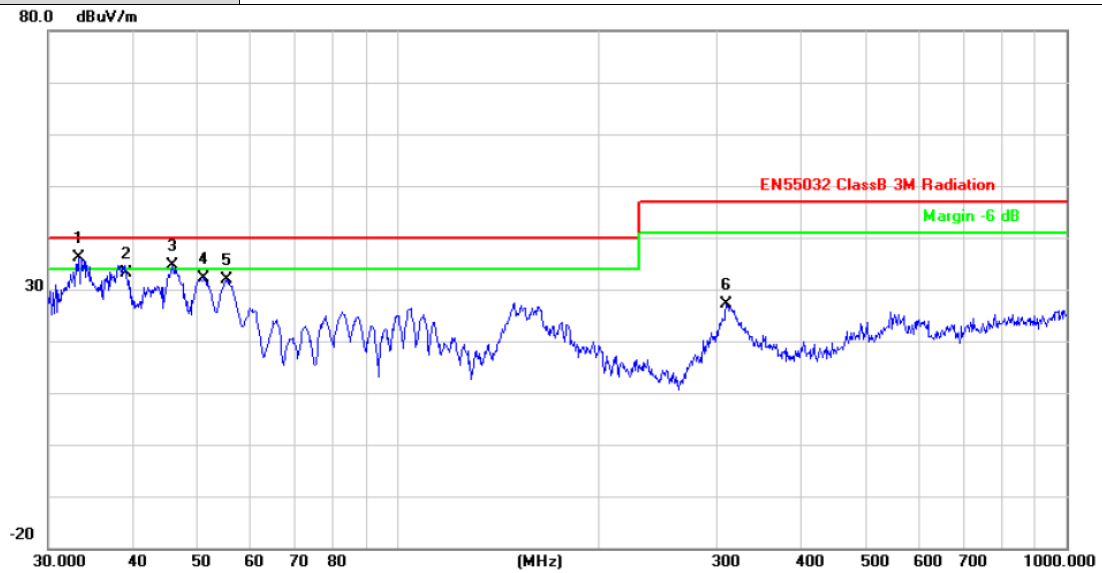


AAttachment B--Radiated EmissionTest Data

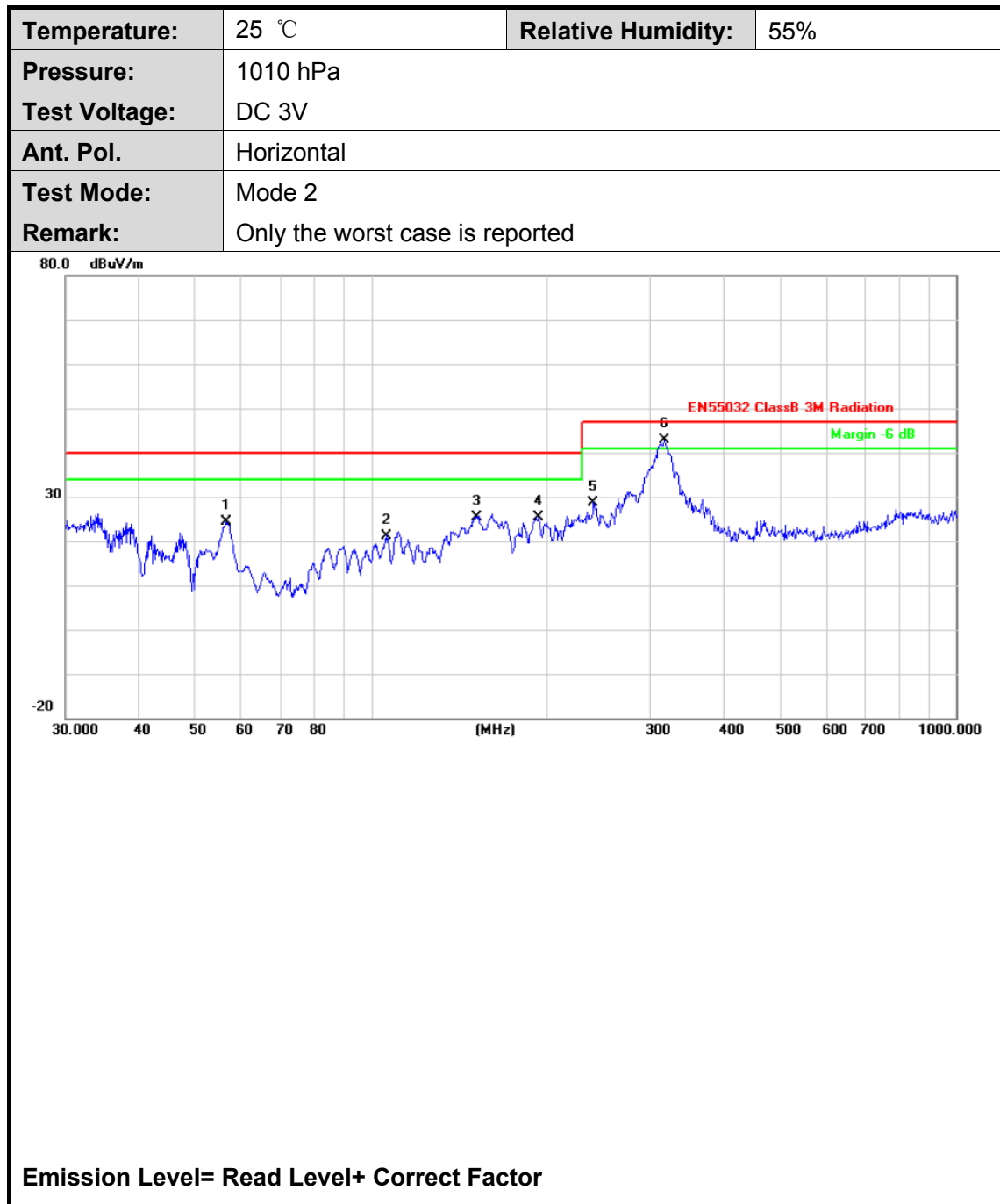
-----Below 1G

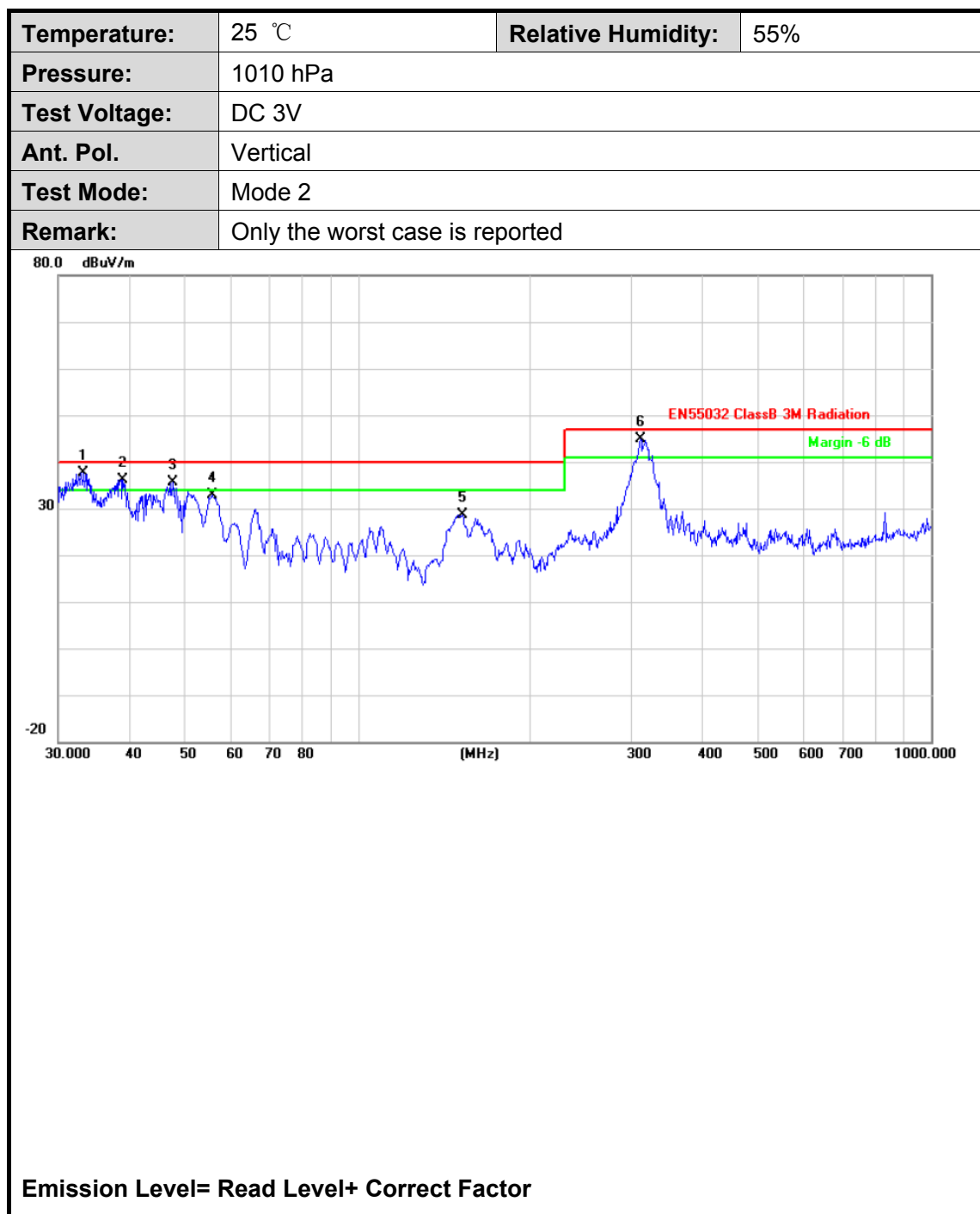


| | | | |
|---------------|---------------------------------|--------------------|-----|
| Temperature: | 25 °C | Relative Humidity: | 55% |
| Pressure: | 1010 hPa | | |
| Test Voltage: | DC 3V | | |
| Ant. Pol. | Vertical | | |
| Test Mode: | Mode 1 | | |
| Remark: | Only the worst case is reported | | |



Emission Level= Read Level+ Correct Factor





Attachment C--Electrostatic Discharge Test Data

| Temperature: | 22℃ | Humidity : | 50% |
|--|----------------------|------------------|----------|
| PowerSupply: | DC 3V | Test Mode : | Mode 1/2 |
| Test Engineer : | Jack | | |
| Air Discharge: ±2kV/±4kV/±8kV Contact Discharge: ±2kV/±4kV For each point positive 10 times and negative 10 times discharge. | | | |
| Location | Test Level (kV) | No. of Discharge | Result |
| A1 | ±2kV ±4kV ±8kV | 20 | A |
| A2 | | 20 | A |
| A3 | | 20 | A |
| C1 | ±2kV ±4kV | 20 | A |
| / | | / | / |
| / | | / | / |
| HCP | ±4kV | 40 | A |
| VCP | ±4kV | 40 | A |
| Note: 1) Criteria A: There was no change operated with initial operating during the test. 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test. 3) Criteria C: The system shut down during the test. | | | |

Attachment D--RF Field Strength Susceptibility Test Data

Temperature : 22°C Humidity : 50%

Powersupply : AC 230V/50Hz Test Mode : Mode 1/2

Required Performance Criteria: A

Modulation: AM 80%

Pulse: 1 kHz

| EUT Position | Actual Performance Criteria | | | | Judgment |
|--------------|---------------------------------|----------|----------------------------------|----------|----------|
| | FrequencyRange 1: 80~1000MHz | | FrequencyRange2: 1000~6000MHz | | |
| | Horizontal | Vertical | Horizontal | Vertical | |
| Front | A | A | A | A | PASS |
| Right | A | A | A | A | PASS |
| Rear | A | A | A | A | PASS |
| Left | A | A | A | A | PASS |

Remark:

- 1) Criteria A: There was no change operated with initial operating during the test.
- 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 3) Criteria C: The system shut down during the test.

Attachment E--Electrical Fast Transient/Burst Test Data

Temperature : 22°C

Humidity : 50%

Powersupply : AC 230V/50Hz

Test Mode : Mode 1/2

Required Performance Criteria: B

Line : ☒ AC MainsCoupling : ☒ DirectLine : ☐ Signal ☐ I/O CableCoupling: ☐ Capacitive

| Line | | Voltage(kV) | Required Performance Criteria | | Actual Performance Criteria | | Judgment |
|-------------|--------|-------------|-------------------------------|-----|-----------------------------|-----|----------|
| | | | (+) | (-) | (+) | (-) | |
| AC LINE | L | 1.0 | B | B | A | A | PASS |
| | N | 1.0 | B | B | A | A | PASS |
| | L-N | 1.0 | B | B | A | A | PASS |
| | L-PE | 1.0 | / | / | / | / | / |
| | N-PE | 1.0 | / | / | / | / | / |
| | L-N-PE | 1.0 | / | / | / | / | / |
| DC LINE | | / | / | / | / | / | / |
| Signal Line | | 0.5 | / | / | / | / | / |

Remark:

- 1) Criteria A: There was no change operated with initial operating during the test.
- 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 3) Criteria C: The system shut down during the test.

Attachment F--Surge Immunity Test Data

Temperature : 22°C

Humidity : 50%

Powersupply : AC 230V/50Hz

Test Mode : Mode 1/2

Required Performance Criteria:B

| Injected Line | Voltage (kV) | Phase | Actual Performance Criteria | | Result | |
|---------------|--------------|-------|-----------------------------|-----|--------|------|
| | | | (+) | (-) | (+) | (-) |
| L, N, L-N | 1.0 | 0° | A | A | PASS | PASS |
| | | 90° | A | A | PASS | PASS |
| | | 180° | A | A | PASS | PASS |
| | | 270° | A | A | PASS | PASS |
| L/N-PE | 2.0 | 0° | / | / | / | / |
| | | 90° | / | / | / | / |
| | | 180° | / | / | / | / |
| | | 270° | / | / | / | / |
| L-N-PE | 2.0 | 0° | / | / | / | / |
| | | 90° | / | / | / | / |
| | | 180° | / | / | / | / |
| | | 270° | / | / | / | / |
| Signal Line | 1.0 | +/- | / | / | / | / |

Remark:

- 1) Criteria A: There was no change operated with initial operating during the test.
- 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 3) Criteria C: The system shut down during the test.

Attachment G--Conducted Immunity Test Data

Temperature : 22°C Humidity : 50%

Powersupply : AC 230V/50Hz Test Mode : Mode 1/2

Required Performance Criteria:A

| FrequencyRange (MHz) | Injected Position | Voltage Level (e.m.f.) | Required Performance Criteria | Actual Performance Criteria | Result |
|-------------------------|----------------------|---|-------------------------------------|-----------------------------------|--------|
| 0.15 ~ 80 | AC Mains | 3V(rms), AM 80% Modulated with 1 kHz | A | A | PASS |
| 0.15 ~ 80 | DC Mains | 3V(rms), AM 80% Modulated with 1 kHz | A | / | / |
| 0.15 ~ 80 | Signal Line | 3V(rms), AM 80% Modulated with 1 kHz | A | / | / |

Remark:

- 1) Criteria A: There was no change operated with initial operating during the test.
- 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test.
- 3) Criteria C: The system shut down during the test.

Attachment H--Voltage Dips and Interruptions Test Data

| | | | | |
|--|--------------|------------------|----------|----------|
| Temperature: | 22℃ | Humidity: | 50 % | |
| Power Supply: | AC 230V/50Hz | Test Mode: | Mode 1/2 | |
| | | | | |
| Required Performance Criteria:B&C | | | | |
| Test Results Description | | | | |
| Voltage Reduction | Cycles | Perform Criteria | Results | Judgment |
| Voltage dip 100% | 0.5 | B | A | PASS |
| Voltage dip 100% | 1 | B | A | PASS |
| Voltage dip 30% | 25 | C | B | PASS |
| Voltage Interruption100% | 250 | C | C | PASS |
| Remark: 1) Criteria A: There was no change operated with initial operating during the test. 2) Criteria B: The EUT function loss during the test, but self-recoverable after the test. 3) Criteria C: The system shut down during the test. | | | | |

END OF REPORT