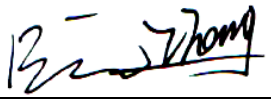
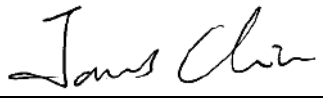
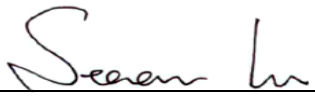
# EMC Test Report

| | | |
|---|---|---|
| **Project No.** | : | 1503C222 |
| **Equipment** | : | Gaming Mouse Mat |
| **Model Name** | : | RZ02-0135 |
| **Applicant** | : | RAZER INC. |
| **Address** | : | 2035 Corte Del Nogal, Suite 101. Carlsbad California 92011. USA |

| | | |
|---|---|---|
| **Date of Receipt** | : | Mar. 26, 2015 |
| **Date of Test** | : | Mar. 26, 2015 ~ Apr. 29, 2015 |
| **Issued Date** | : | May. 04, 2015 |
| **Tested by** | : | BTL Inc. |

**Testing Engineer** : 
(Bill Zhang)

**Technical Manager** : 
(James Chiu)

**Authorized Signatory** : 
(Steven Lu)


**BTL INC.**

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TEL: +86-769-8318-3000 FAX: +86-769-8319-6000


Testing Laboratory
2640

## Declaration

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

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## REPORT ISSUED HISTORY

| Issued No. | Description | Issued Date |
|---|---|---|
| BTL-EMC-1-1503C222 | Original Issue. | May. 04, 2015 |

## 1. CERTIFICATION

| | | |
|---|---|---|
| Equipment | : | Gaming Mouse Mat |
| Brand Name | : | RAZER |
| Model Name | : | RZ02-0135 |
| Applicant | : | RAZER INC. |
| Manufacturer | : | Razer (Asia-Pacific) Pte Ltd. |
| Address | : | 514 Chai Chee Lane #07-01 ~ 06 Singapore 469029 |
| Factory | : | RAZER TECHNOLOGY AND DEVELOPMENT (SHENZHEN) CO., LTD. |
| Address | : | East Wing, 3rd Floor, Block 2, Phase 1 of Vision Shenzhen Business Park Keji South Road, Hi-Tech Industrial Park, Shenzhen 518057, China |
| Date of Test | : | Mar. 26, 2015 ~ Apr. 29, 2015 |
| Test Sample | : | ENGINEERING SAMPLE |
| Standard(s) | : | EN 55022:2010+AC:2011 Class B<br>EN 55024:2010<br>IEC 61000-4-2: 2008<br>IEC 61000-4-3: 2006+A1:2007+A2:2010<br>IEC 61000-4-4: 2012<br>IEC 61000-4-5: 2014<br>IEC 61000-4-6: 2013<br>IEC 61000-4-8: 2009<br>IEC 61000-4-11: 2004 |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-EMC-1-1503C222) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| EMC Emission | | | | |
|---|---|---|---|---|
| Standard(s) | Test Item | Limit | Judgment | Remark |
| EN 55022:2010+AC:2011 | Conducted Emission | Class B | PASS | |
| | Radiated Emission | Class B | PASS | |
| EN 61000-3-2: 2014 | Harmonic Current Emission | Class A | N/A | NOTE (1) |
| EN 61000-3-3:2013 | Voltage Fluctuations & Flicker | ------ | N/A | NOTE (1) |
| **EMC Immunity EN 55024:2010** | | | | |
| Section | Test Item | Criteria | Judgment | Remark |
| IEC 61000-4-2:2008 | Electrostatic Discharge | B | PASS | |
| IEC 61000-4-3: 2006+A1:2007+A2:2010 | RF electromagnetic field | A | PASS | |
| IEC 61000-4-4: 2012 | Fast transients | B | PASS | |
| IEC 61000-4-5:2014 | Surges | B | PASS | |
| IEC 61000-4-6:2013 | Injected Current | A | PASS | |
| IEC 61000-4-8:2009 | Power Frequency Magnetic Field | A | PASS | |
| IEC 61000-4-11:2004 | Volt. Interruptions Volt. Dips | B / C / C NOTE (3) | PASS | |

NOTE:

(1) ” N/A” denotes test is applicable to this device.

(2) If the EUT’s category is Class D and power consumption is less than 75W, there is no limit applied.

(3) Voltage dip: ＞95% reduction – Performance Criteria **B**

Voltage dip: 30% reduction – Performance Criteria **C**

Voltage Interruption: ＞95% reduction – Performance Criteria **C**

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

## 2.2 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.The BTL measurement uncertainty is less than the CISPR 16-4-2 $U_{cispr}$ requirement.

The reported uncertainty of measurement **y** ± **U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately **95**%.

A. Conducted Measurement :

| Test Site | Method | Measurement Frequency Range | U,(dB) | Note |
|---|---|---|---|---|
| DG-C01 | CISPR | 150 kHz ~ 30MHz | 3.4 | |

B. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant. H / V | U,(dB) | Note |
|---|---|---|---|---|---|
| DG-CB08 (10m) | CISPR | 30MHz ~ 200MHz | V | 4.04 | |
| | | 30MHz ~ 200MHz | H | 4.04 | |
| | | 200MHz ~ 1,000MHz | V | 4.08 | |
| | | 200MHz ~ 1,000MHz | H | 4.02 | |

C. Immunity Measurement :

| Test Site | Method | Test item | U | Note |
|---|---|---|---|---|
| SR02 | IEC 61000-4-2 | Voltage (2KV/4KV/6KV/8KV/15KV/25 KV/30 KV) | 1.3% | |
| | | Current | 3% | |
| CB05 | IEC 61000-4-3 | 80MHz~3GHz | 2.875 | |
| SR05 | IEC 61000-4-4 | Impulse Amplitude | 4 % | |
| | | Timing | 3 % | |
| SR05 | IEC 61000-4-5 | Impulse Amplitude | 4 % | |
| | | Timing | 3 % | |
| CB06 | IEC 61000-4-6 | CDN: 150kHz~80MHz | 1.988 dB | |
| | | EM Clamp: 150kHz~80MHz | 1.777 dB | |
| TR06 | IEC 61000-4-8 | Magnetic Field Level | 3 % | |
| SR05 | IEC 61000-4-11 | Impulse Amplitude | 4 % | |
| | | Timing | 3 % | |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Equipment | Gaming Mouse Mat |
| Brand Name | RAZER |
| Model Name | RZ02-0135 |
| Model Difference | N/A |
| Power Source | Supplied from USB port. |
| Power Rating | DC 5V |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. The maximum operating frequency is 48MHz.

## 3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested base 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 | USB |

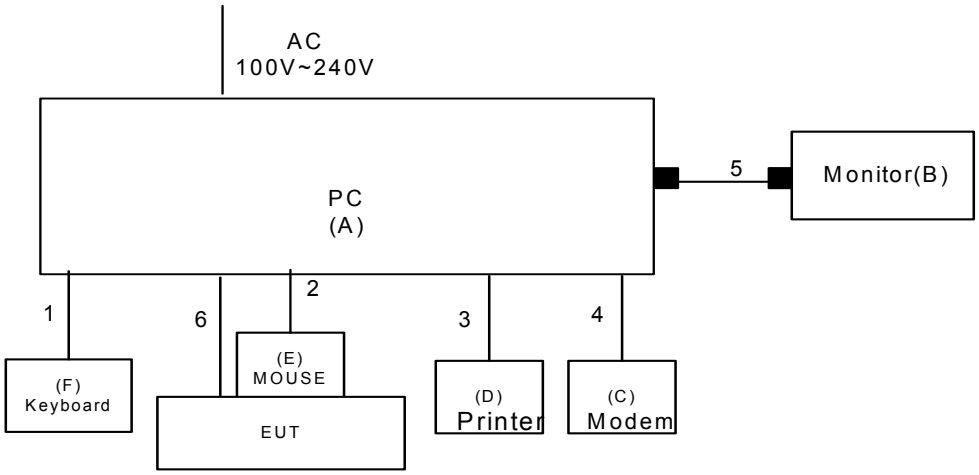
The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

| **For Conducted Test** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | USB |

| **For Radiated Test** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | USB |

| **For EMS Test** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | USB |

### 3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED




■Ferrite core

### 3.4 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.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|---|---|---|---|---|---|---|
| A | PC | Dell 745 | DCSM | DOC | G7K832X | |
| B | Monitor | DELL | E117FPC | DOC | CN-OFJ179-64180-6AG-IWNS | |
| C | Modem | ACEEX | DM-1414V | DOC | 0603002131 | |
| D | Printer | SII | DPU-414 | DOC | 018507 B | |
| E | Mouse | Dell | L100 | DOC | CNORH6596589071T08NE | |
| F | USB Keyboard | Dell | L100 | DOC | CNORH6596589071T08NE | |

| Item | Shielded Type | Ferrite Core | Length | Note |
|---|---|---|---|---|
| 1 | YES | NO | 1.8m | USB Cable |
| 2 | YES | NO | 1.8m | USB Cable |
| 3 | YES | NO | 1.5m | Parallel Cable |
| 4 | YES | NO | 1.5m | RS232 Cable |
| 5 | YES | YES | 1.5m | D-SUB Cable |
| 6 | YES | NO | 2.1m | USB Cable |

Note:

(1) The support equipment was authorized by Declaration of Conformity.
(2) For detachable type I/O cable should be specified the length in m in 『Length』 column.

## 4. EMC EMISSION TEST

### 4.1CONDUCTED EMISSION MEASUREMENT

### 4.1.1 POWER LINE CONDUCTED EMISSION (FREQUENCY RANGE 150KHZ-30MHZ)

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | |
|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

(3) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
Margin Level = Measurement Value – Limit Value

### 4.1.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Artificial-Mains Network | SCHWARZBECK | NSLK 8127 | 8127685 | Dec. 05, 2015 |
| 2 | LISN | R&S | ENV216 | 100526 | Mar. 28, 2016 |
| 3 | Test Cable | N/A | RG400 12m | N/A | Mar. 12, 2016 |
| 4 | EMI Test Receiver | R&S | ESCS30 | 826547/022 | Mar. 28, 2016 |
| 5 | 50Ω Terminator | SHX | TF2-3G-A | 08122901 | Mar. 28, 2016 |
| 6 | Measurement Software | Farad | EZ-EMC Ver.NB-03A1 -01 | N/A | N/A |

Remark: “ N/A” denotes no model name, serial no. and no calibration specified.

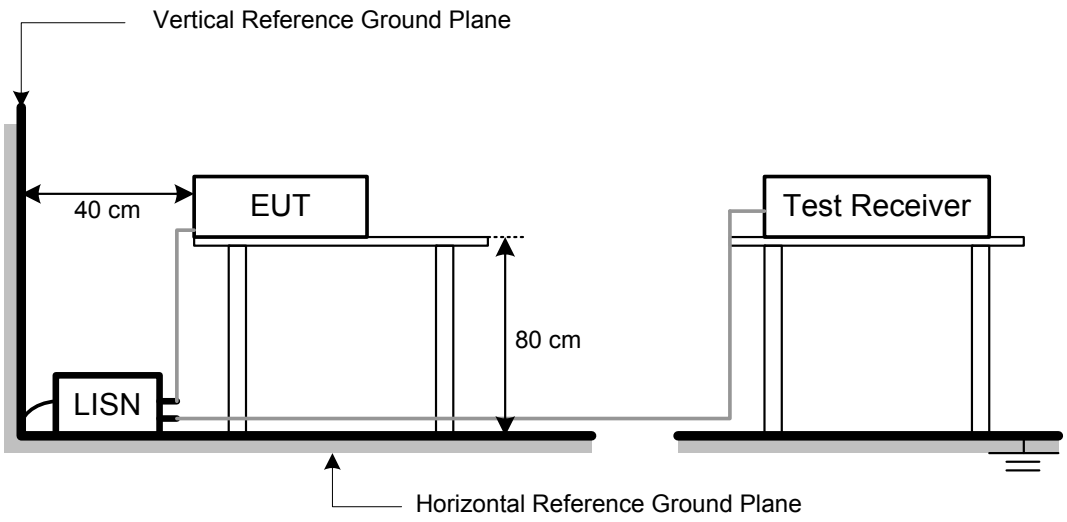
### 4.1.3 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.1.5 TEST SETUP




### 4.1.6 EUT USB CONDITIONS

The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use.

### 4.1.7 TEST RESULTS

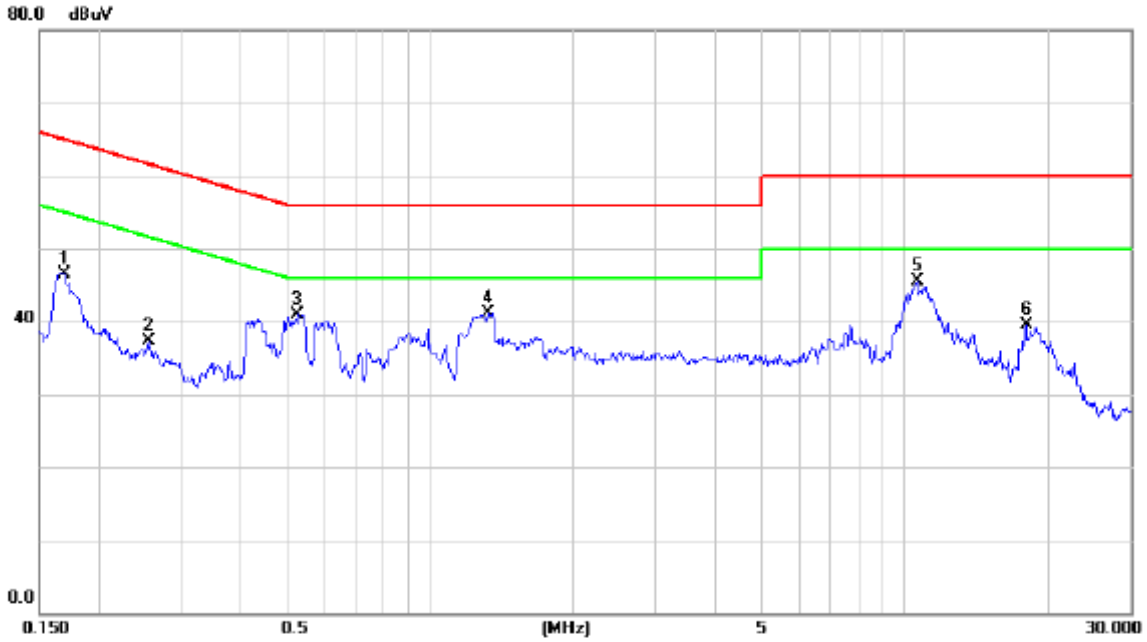
Remark:

(1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz；SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.3 sec./MHz。Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=10KHz,VBW=10KHz, Swp. Time =0.3 sec./MHz。

(2) All readings are QP Mode value unless otherwise stated AVG in column of『Note』. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform。In this case, a " * " marked in AVG Mode column of Interference Voltage Measured。

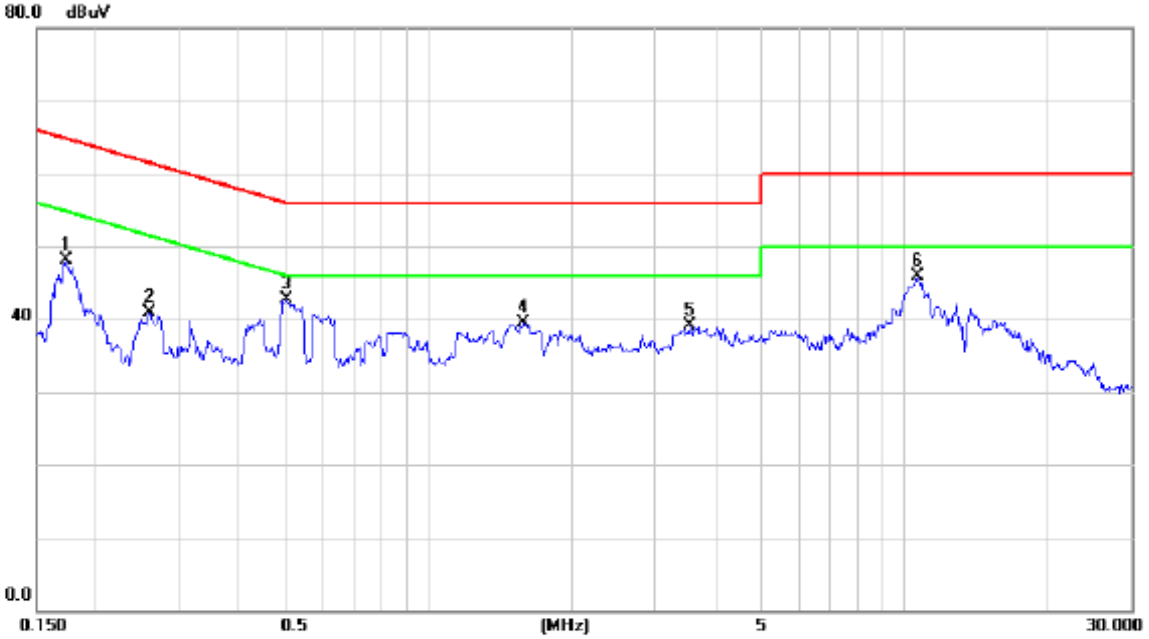
(3) Measuring frequency range from 150KHz to 30MHz。

| | | | |
|---|---|---|---|
| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
| Temperature : | 21° C | Relative Humidity : | 51 % |
| Pressure : | 1008 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | Phase : | Line |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1695 | 37.01 | 9.53 | 46.54 | 64.98 | -18.44 | peak | |
| 2 | | 0.2553 | 27.77 | 9.55 | 37.32 | 61.58 | -24.26 | peak | |
| 3 | | 0.5262 | 31.41 | 9.59 | 41.00 | 56.00 | -15.00 | peak | |
| 4 | | 1.3290 | 31.53 | 9.66 | 41.19 | 56.00 | -14.81 | peak | |
| 5 | * | 10.6364 | 35.36 | 10.13 | 45.49 | 60.00 | -14.51 | peak | |
| 6 | | 18.0393 | 29.17 | 10.37 | 39.54 | 60.00 | -20.46 | peak | |

| | | | |
|---|---|---|---|
| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
| Temperature : | 21° C | Relative Humidity : | 51 % |
| Pressure : | 1008 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | Phase : | Neutral |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector | Comment |
| 1 | | 0.1733 | 38.55 | 9.52 | 48.07 | 64.80 | -16.73 | peak | |
| 2 | | 0.2590 | 31.37 | 9.54 | 40.91 | 61.46 | -20.55 | peak | |
| 3 | * | 0.5020 | 33.17 | 9.58 | 42.75 | 56.00 | -13.25 | peak | |
| 4 | | 1.5850 | 29.90 | 9.67 | 39.57 | 56.00 | -16.43 | peak | |
| 5 | | 3.5278 | 29.23 | 9.79 | 39.02 | 56.00 | -16.98 | peak | |
| 6 | | 10.6990 | 35.66 | 10.21 | 45.87 | 60.00 | -14.13 | peak | |

## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Below 1 GHz

| 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: CISPR 22.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

(4) The test result calculated as following:
Measurement Value = Reading Level + Correct Factor
Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)
Margin Level = Measurement Value - Limit Value

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 1.705 | 30 |
| 1.705 - 108 | 1000 |
| 108 - 500 | 2000 |
| 500 - 1000 | 5000 |

### 4.2.2 MEASUREMENT INSTRUMENTS LIST

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Antenna | EMCO | 3142C | 00066462 | Mar. 28, 2016 |
| 2 | Antenna | EMCO | 3142C | 00066464 | Mar. 28, 2016 |
| 3 | Amplifier | Agilent | 8447D | 2944A11203 | Nov. 02, 2015 |
| 4 | Amplifier | Agilent | 8447D | 2944A11204 | Nov. 02, 2015 |
| 5 | Spectrum Analyzer | Agilent | E4443A | MY48250370 | Nov. 02, 2015 |
| 6 | RF Pre-selector | Agilent | N9039A | MY46520201 | Nov. 02, 2015 |
| 7 | Test Cable | N/A | Cable_5m_8m_15m | N/A | Jan. 04, 2016 |
| 8 | Test Cable | N/A | Cable_5m_11m_15m | N/A | Jan. 04, 2016 |
| 9 | Spectrum Analyzer | Agilent | E4447A | MY48250208 | Nov. 02, 2015 |
| 10 | RF Pre-selector | Agilent | N9039A | MY46520214 | Nov. 02, 2015 |
| 11 | Multi-Device Controller | ETS-Lindgren | 2090 | N/A | N/A |
| 12 | Measurement Software | Farad | EZ-EMC Ver.BTL-2ANT-1 | N/A | N/A |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

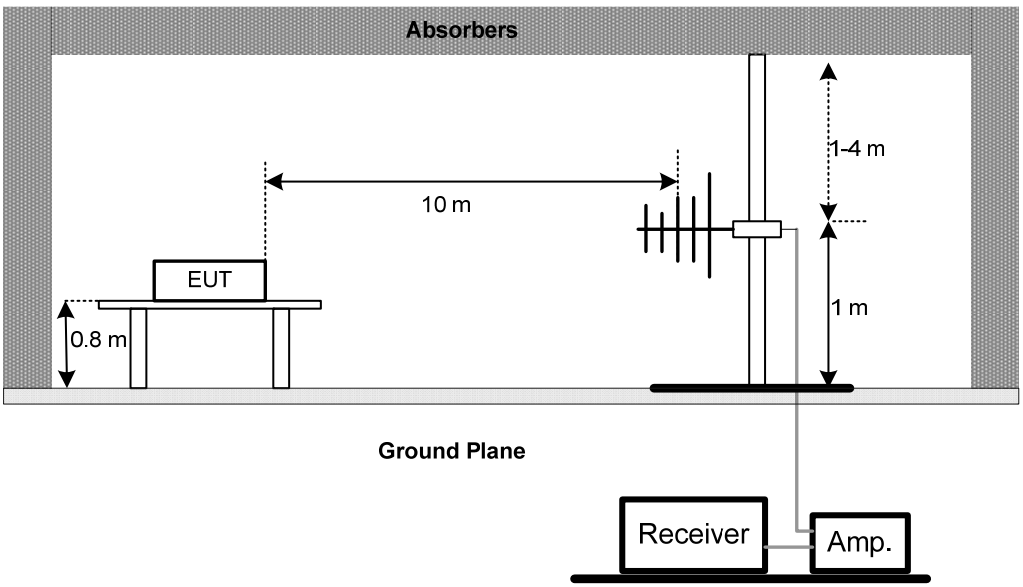
### 4.2.3 TEST PROCEDURE

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. 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.
c. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
d. If the Peak Mode measured value 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.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.5 TEST SETUP- BELOW 1 GHZ




### 4.2.6 EUT USB CONDITIONS

The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.

### 4.2.7 TEST RESULTS-BETWEEN 30MHZ AND 1000MHZ

Remark:

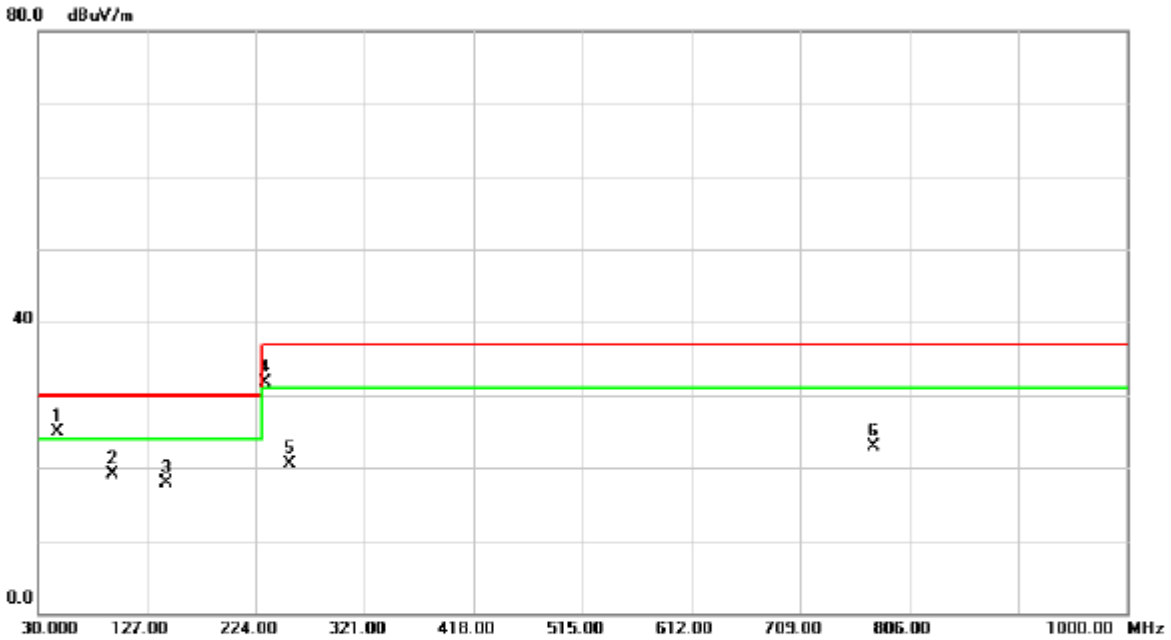
(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz ◦

(2) All readings are Peak unless otherwise stated QP in column of 『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform ◦

(3) Measuring frequency range from 30MHz to 1000MHz ◦

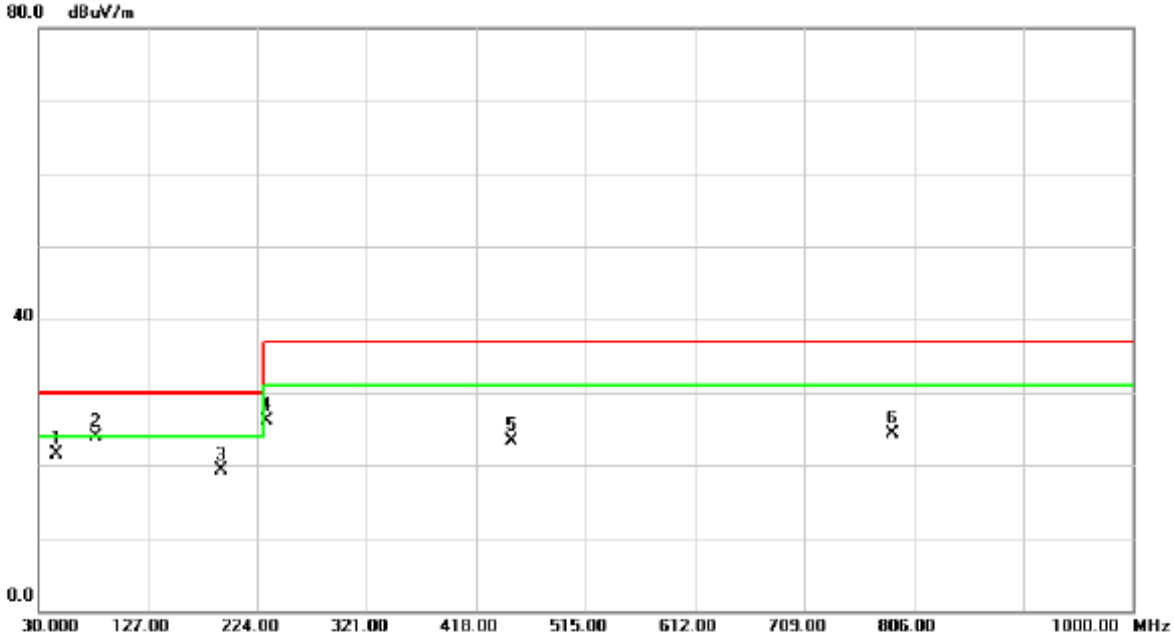
(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table ◦

| | | | |
|---|---|---|---|
| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1008 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | Polarization : | Vertical |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 47.4600 | 42.75 | -17.83 | 24.92 | 30.00 | -5.08 | peak | |
| 2 | | 95.9600 | 37.93 | -18.84 | 19.09 | 30.00 | -10.91 | peak | |
| 3 | | 144.4600 | 36.00 | -18.14 | 17.86 | 30.00 | -12.14 | peak | |
| 4 | ! | 232.7300 | 45.25 | -13.62 | 31.63 | 37.00 | -5.37 | peak | |
| 5 | | 254.0700 | 33.06 | -12.59 | 20.47 | 37.00 | -16.53 | peak | |
| 6 | | 773.9900 | 23.99 | -1.13 | 22.86 | 37.00 | -14.14 | peak | |

| | | | |
|---|---|---|---|
| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1008 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | Polarization : | Horizontal |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 45.5200 | 38.80 | -17.25 | 21.55 | 30.00 | -8.45 | peak | |
| 2 | * | 81.4100 | 44.27 | -20.38 | 23.89 | 30.00 | -6.11 | peak | |
| 3 | | 191.9900 | 34.95 | -15.71 | 19.24 | 30.00 | -10.76 | peak | |
| 4 | | 232.7300 | 39.75 | -13.62 | 26.13 | 37.00 | -10.87 | peak | |
| 5 | | 450.0100 | 30.87 | -7.55 | 23.32 | 37.00 | -13.68 | peak | |
| 6 | | 786.6000 | 25.48 | -1.13 | 24.35 | 37.00 | -12.65 | peak | |

## 5. EMC IMMUNITY TEST

### 5.1 STANDARD COMPLIANCE/SEVERITY LEVEL/CRITERIA

| Tests<br>Standard No. | TEST SPECIFICATION<br>Level | Test Mode<br>Test Ports | Criteria |
|---|---|---|---|
| 1. ESD<br>IEC/EN 61000-4-2 | ±8kV air discharge<br>±4kV contact discharge | Direct Mode | B |
| | ±4kV HCP discharge<br>±4kV VCP discharge | Indirect Mode | B |
| 2. RS<br>IEC/EN 61000-4-3 | 80 MHz to 1000 MHz<br>3V/m(rms), 1 KHz, 80%,<br>AM modulated | Enclosure | A |
| 3. EFT/Burst<br>IEC/EN 61000-4-4 | ±1.0kV(peak)<br>5/50ns Tr/Th<br>5KHz Repetition Freq. | Power Supply Port | B |
| | ±0.5 kV(peak)<br>5/50ns Tr/Th<br>5KHz Repetition Freq. | CTL/Signal Data Line Port | B |
| 4. Surges<br>IEC/EN 61000-4-5 | ±1 kV(5P/5N)<br>1.2/50(8/20) Tr/Th us | L-N | B |
| | ±2 kV(5P/5N)<br>1.2/50(8/20) Tr/Th us | L-PE<br>N-PE | B |
| 5 Injected Current<br>IEC/EN 61000-4-6 | 0.15 MHz to 80 MHz<br>3V(rms), 1KHz 80%,<br>AM Modulated<br>150Ω source impedance | CTL/Signal Port | A |
| | 0.15 MHz to 80 MHz<br>3V(rms), 1KHz 80%,<br>AM Modulated<br>150Ω source impedance | AC Power Port | A |
| | 0.15 MHz to 80 MHz<br>3V(rms), 1KHz 80%,<br>AM Modulated<br>150Ω source impedance | DC Power Port | A |
| 6. Power Frequency Magnetic Field<br>IEC/EN 61000-4-8 | 50 Hz/60Hz, 1A/m | Enclosure | A |
| 7. Volt. Interruptions<br>Volt. Dips<br>IEC/EN 61000-4-11 | Voltage dip＞95%<br>Voltage dip 30%<br>Interruption＞95% | AC Power Port | B<br>C<br>C |

## 5.2 GENERAL PERFORMANCE CRITERIA

According to **EN55024** standard, the general performance criteria as following:

| | |
|---|---|
| **Criterion A** | The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.<br>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 by what the user product description and documentation, and by what the user may reasonably expect from the equipment if used as intended. |
| **Criterion B** | After the test, the equipment shall continue to operate as intended without operator<br>Intervention. No degradation of performance or loss of function is allowed, after the application of the phenomenon below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.<br>During the test, degradation of performance is allowed. However, no change of operating state if stored data allowed to persist after the test. 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 by what the user may reasonably expect from the equipment if used as intended. |
| **Criterion C** | Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.<br>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost. |

## 5.3 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.

## 5.4 ESD TESTING

### 5.4.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-2 |
| Discharge Impedance: | 330 ohm / 150 pF |
| Required Performance | B |
| Discharge Voltage: | Air Discharge: ±2kV/±4kV/±8kV (Direct)<br>Contact Discharge: ±2kV/±4kV (Direct/Indirect) |
| Polarity: | Positive & Negative |
| Number of Discharge: | Air Discharge: min. 20 times at each test point<br>Contact Discharge: min. 200 times in total |
| Discharge Mode: | Single Discharge |
| Discharge Period: | 1 second minimum |

### 5.4.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | ESD Generator | TESEQ AG | NSG 437 | 450 | Jul. 10, 2015 |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.4.3 TEST PROCEDURE

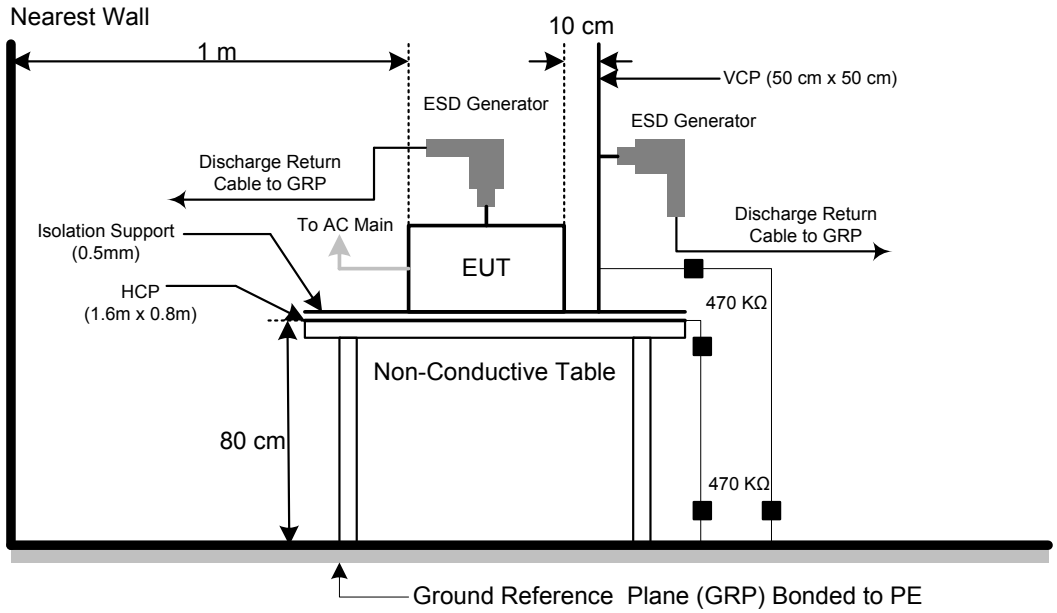
The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Contact discharge was applied to conductive surfaces and coupling planes of the EUT.
   During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second. 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.
   Vertical Coupling Plane (VCP):
   The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
   Horizontal Coupling Plane (HCP):
   The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
b. Air discharges at insulation surfaces of the EUT.
   It was at least ten single discharges with positive and negative at the same selected point.
c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.4.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.4.5 TEST SETUP




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 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 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/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters 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

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

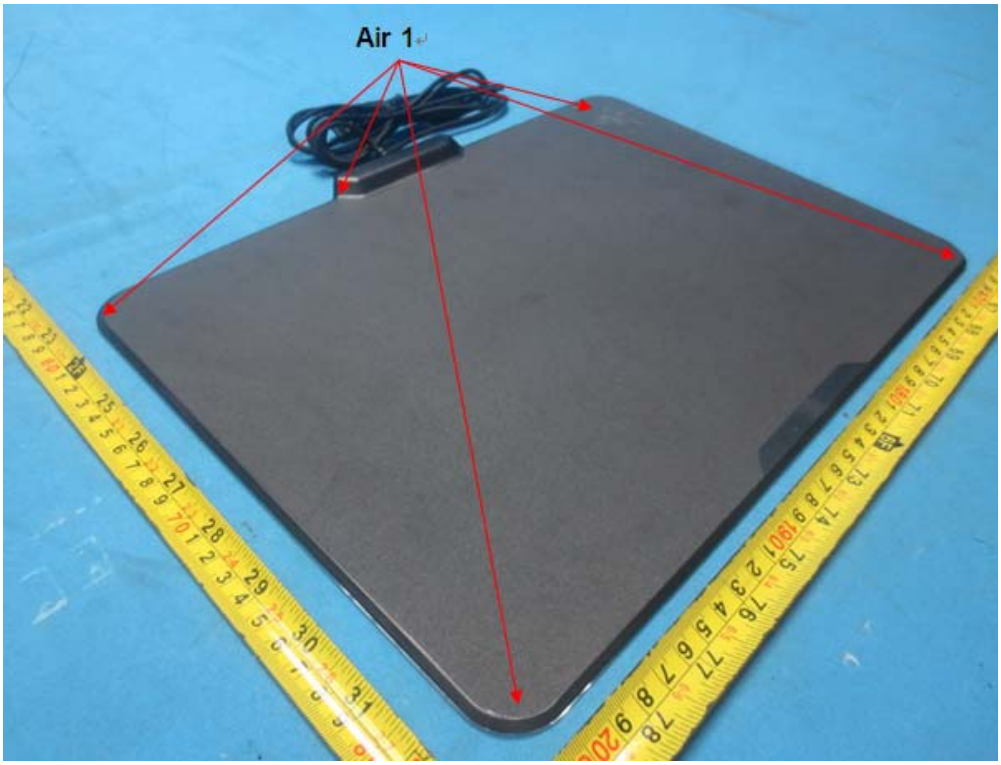
| Mode | Air Discharge | | | | | | | | Contact Discharge | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2kV | | 4kV | | 8kV | | - kV | | 2kV | | 4kV | | - kV | | - kV | |
| Location | P | N | P | N | P | N | P | N | P | N | P | N | P | N | P | N |
| 1 | A | A | A | A | A | A | - | - | A | A | A | A | - | - | - | - |
| 2 | A | A | A | A | A | A | - | - | - | - | - | - | - | - | - | - |
| 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Criteria | **B** | | | | | | - | | **B** | | | | - | | - | |
| Result | **A** | | | | | | - | | **A** | | | | - | | - | |
| Judgment | **PASS** | | | | | | - | | **PASS** | | | | - | | - | |

| Mode | HCP Discharge | | | | | | | | VCP Discharge | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2kV | | 4kV | | - kV | | - kV | | 2kV | | 4kV | | - kV | | - kV | |
| Location | P | N | P | N | P | N | P | N | P | N | P | N | P | N | P | N |
| 1 | A | A | A | A | - | - | - | - | A | A | A | A | - | - | - | - |
| 2 | A | A | A | A | - | - | - | - | A | A | A | A | - | - | - | - |
| 3 | A | A | A | A | - | - | - | - | A | A | A | A | - | - | - | - |
| 4 | A | A | A | A | - | - | - | - | A | A | A | A | - | - | - | - |
| Criteria | **B** | | | | - | | - | | **B** | | | | - | | - | |
| Result | **A** | | | | - | | - | | **A** | | | | - | | - | |
| Judgment | **PASS** | | | | - | | - | | **PASS** | | | | - | | - | |

Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) Test condition:
   Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
3) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s)
4) The Indirect (HCP/VCP) discharges description of test point as following:
   1.left side 2.right side 3.front side 4.rear side
5) N/A - denotes test is not applicable to this device
6) Criteria A: No observation of any performance degradation.
7) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
8) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

### 5.4.7 PHOTO(S) SHOWN THE LOCATION(S) OF ESD EVALUATED




## 5.5 RS TESTING

### 5.5.1 TEST SPECIFICATION

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

### 5.5.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Digital Signal Generator | HP | ESG-D3000A | US36260188 | Mar. 28, 2016 |
| 2 | Antenna | ETS | 3142C | 00047662 | Mar. 28, 2016 |
| 3 | Power amplifier | MILMEGA | 80RF1000-250 | N/A | Nov. 02, 2015 |
| 4 | Amplifier | AR | 50S1G4A | 326720 | Mar. 28, 2016 |
| 5 | Measurement Software | TOYO | IM5/R Ver 3.8.050 | N/A | N /A |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.5.3 TEST PROCEDURE

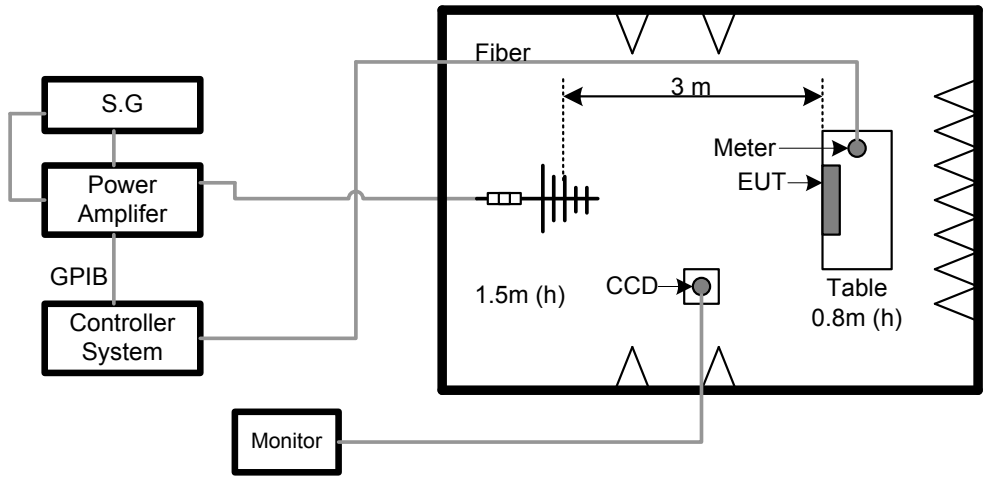
The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.
The testing distance from antenna to the EUT was 3 meters.
The other condition as following manner:

a. The field strength level was 3V/m.
b. The frequency range is swept from 80 MHz to 1000 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
c. Sweep Frequency 900 MHz, with the Duty Cycle:1/8 and Modulation: Pulse 217 Hz(if applicable)
d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5.5 TEST SETUP




Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 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/EN 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.

### 5.5.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

| Frequency Range (MHz) | RF Field Position | R.F. Field Strength | Azimuth | Criteria | Results | Judgment |
|---|---|---|---|---|---|---|
| 80 - 1000 | H / V | 3 V/m (rms) AM Modulated 1000Hz, 80% | 0 | **A** | **A** | **PASS** |
| | | | 90 | | | |
| | | | 180 | | | |
| | | | 270 | | | |

Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) N/A - denotes test is not applicable to this device.
3) Criteria A: No observation of any performance degradation.
4) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
5) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 5.6 EFT/BURST TESTING

### 5.6.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-4 |
| Required Performance | B |
| Test Voltage: | Power Line: ±1 kV<br>Signal/Control Line: ±0.5 kV |
| Polarity: | Positive & Negative |
| Impulse Frequency: | 5 kHz |
| Impulse Wave shape : | 5/50 ns |
| Burst Duration: | 15 ms |
| Burst Period: | 300 ms |
| Test Duration: | Not less than 1 min. |

### 5.6.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | THE MODULAR SOLUTION FOR 6 KV APPLICATIONS | Teseq | NSG 3060 | 1423 | Aug. 29, 2015 |
| 2 | Measurement Software | Teseq | Win 3000 Version 1.2.0 | N/A | N /A |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.6.3 TEST PROCEDURE

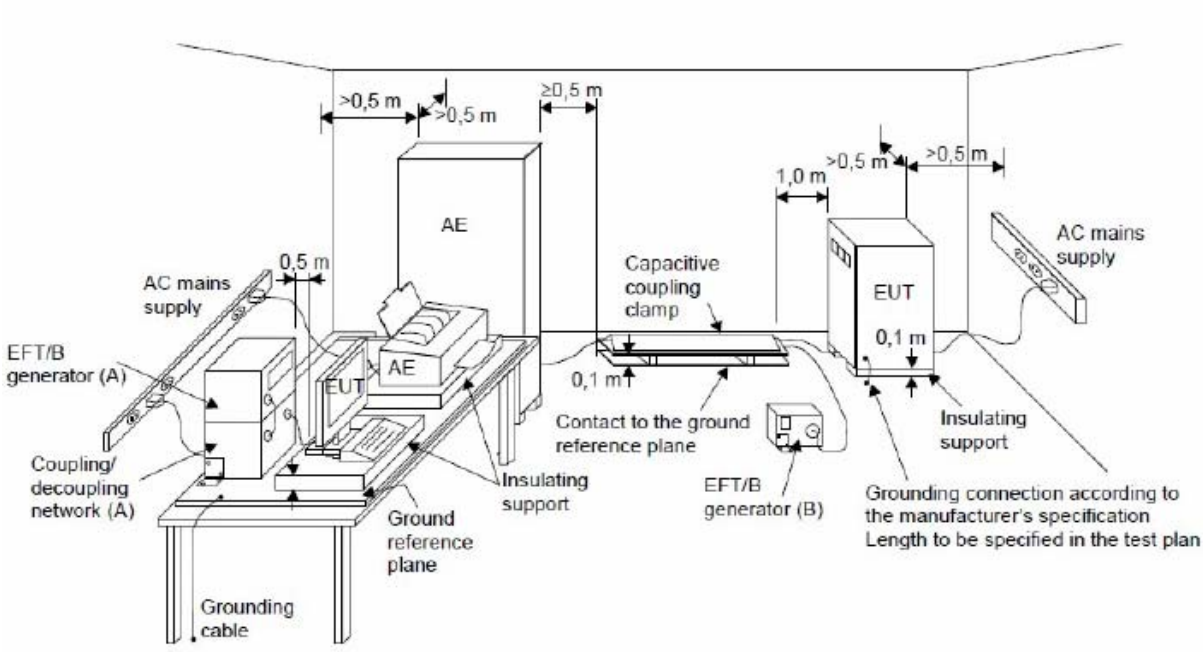
The EUT and support equipment(s) are placed on a table that is 0.8 meter high above a metal ground plane and should be located 0.1m+/-0.01m high above the Ground Reference Plane (1m*1m min. and 0.65mm thick min).
The other condition as following manner:

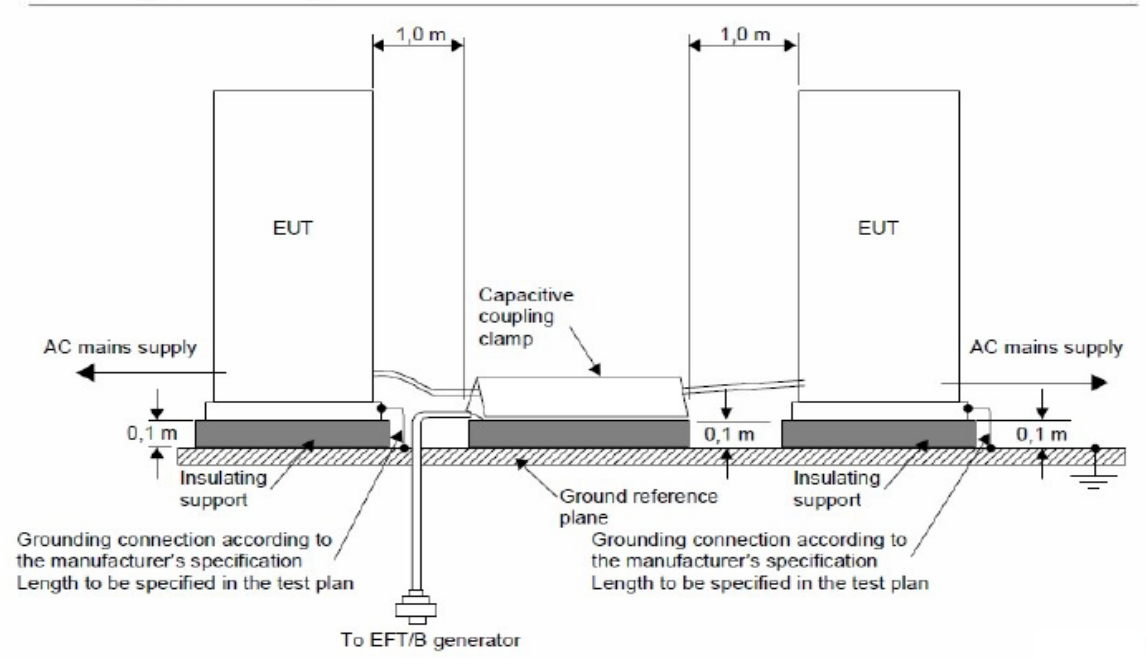
a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
b. Both positive and negative polarity discharges were applied.
c. The duration time of each test sequential was 1 minute
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.6.5 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables, were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

### 5.6.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

| Mode | ( **V** ) AC Power Line | | ( ) DC Power Line | | ( ) Signal/Control Line | |
|---|---|---|---|---|---|---|
| Test Level | 1kV | | 0.5kV | | 0.5kV | |
| Port(s) | Polarity | Results | Polarity | Results | Polarity | Results |
| Line (L) | P | A | P | - | P | - |
| | N | A | N | - | N | - |
| Neutral (N) | P | A | P | - | P | - |
| | N | A | N | - | N | - |
| Ground (PE) | P | A | P | - | P | - |
| | N | A | N | - | N | - |
| Signal/Control Line | P | - | P | - | P | - |
| | N | - | N | - | N | - |
| Criteria | **B** | | **B** | | **B** | |
| Result | **A** | | **N/A** | | **N/A** | |
| Judgment | **PASS** | | **N/A** | | **N/A** | |

Note:

1) P/N denotes the Positive/Negative polarity of the output voltage.
2) N/A - denotes test is not applicable to this device
3) Criterion A: No observation of any performance degradation.
4) Criterion B: Some degradation of performance is observed but the equipment continues to operate as intended.
5) Criterion C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 5.7 SURGE TESTING

### 5.7.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-5 |
| Required Performance | B |
| Wave-Shape: | Combination Wave<br>1.2/50 us Open Circuit Voltage<br>8 /20 us Short Circuit Current |
| Test Voltage : | Power Line: ±0.5 kV, ±1 kV, ±2 kV |
| Surge Input/Output: | L1-L2, L1-PE, L2-PE |
| Generator Source: | 2 ohm between networks |
| Impedance: | 12 ohm 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 |

### 5.7.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | THE MODULAR SOLUTION FOR 6 KV APPLICATIONS | Teseq | NSG 3060 | 1423 | Aug. 29, 2015 |
| 2 | Measurement Software | Teseq | Win 3000 Version 1.2.0 | N/A | N /A |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.7.3 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:

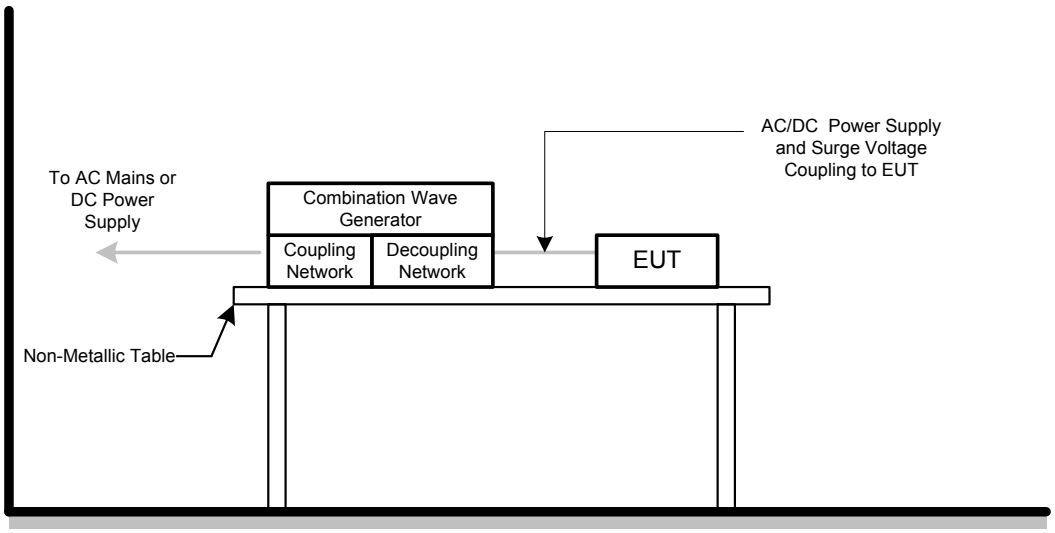
The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.7.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.7.5 TEST SETUP



### 5.7.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

| Wave Form<br>EUT Ports<br>Tested | 1.2/50(8/20)Ti/Th us | | | | | | Criteria | Result | Judgment |
|---|---|---|---|---|---|---|---|---|---|
| | Polarity | Phase | Voltage | | | | | | |
| | | | 0.5 kV | 1kV | 1.5kV | 2kV | | | |
| L - N | +/- | 0° | A | A | - | - | **B** | **A** | **PASS** |
| | +/- | 90° | A | A | - | - | | | |
| | +/- | 180° | A | A | - | - | | | |
| | +/- | 270° | A | A | - | - | | | |
| L - PE | +/- | 0° | A | A | A | A | **B** | **A** | **PASS** |
| | +/- | 90° | A | A | A | A | | | |
| | +/- | 180° | A | A | A | A | | | |
| | +/- | 270° | A | A | A | A | | | |
| N - PE | +/- | 0° | A | A | A | A | **B** | **A** | **PASS** |
| | +/- | 90° | A | A | A | A | | | |
| | +/- | 180° | A | A | A | A | | | |
| | +/- | 270° | A | A | A | A | | | |
| Signal Line<br>(N/A) | +/- | N/A | - | - | - | - | **B** | **N/A** | **N/A** |

Note:

1) Polarity and Numbers of Impulses: 5 Pst / Ngt at each tested mode
2) N/A - denotes test is not applicable to this device
3) Criteria A: No observation of any performance degradation.
4) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
5) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 5.8 INJECTION CURRENT TESTING

### 5.8.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-6 |
| Required Performance | A |
| Frequency Range: | 0.15 MHz - 80 MHz |
| Field Strength: | 3 Vr.m.s. |
| Modulation: | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency Step: | 1% of fundamental |
| Dwell Time: | at least 3 seconds |

### 5.8.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Signal Generator | HP | 8648A | 3636A02964 | Mar. 28, 2016 |
| 2 | Power Amplifier | Teseq | CBA230M-080 | T43748 | Mar. 28, 2016 |
| 3 | Power CDN | FCC | FCC-801-M2/M3-16A | 100270 | Mar. 28, 2016 |
| 4 | Power CDN | FCC | FCC-801-M2/M3-16A | 100271 | Mar. 28, 2016 |
| 5 | Measurement Software | TOYO | IM5/C Ver 3.7.028 | N/A | N/A |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.8.3 TEST PROCEDURE

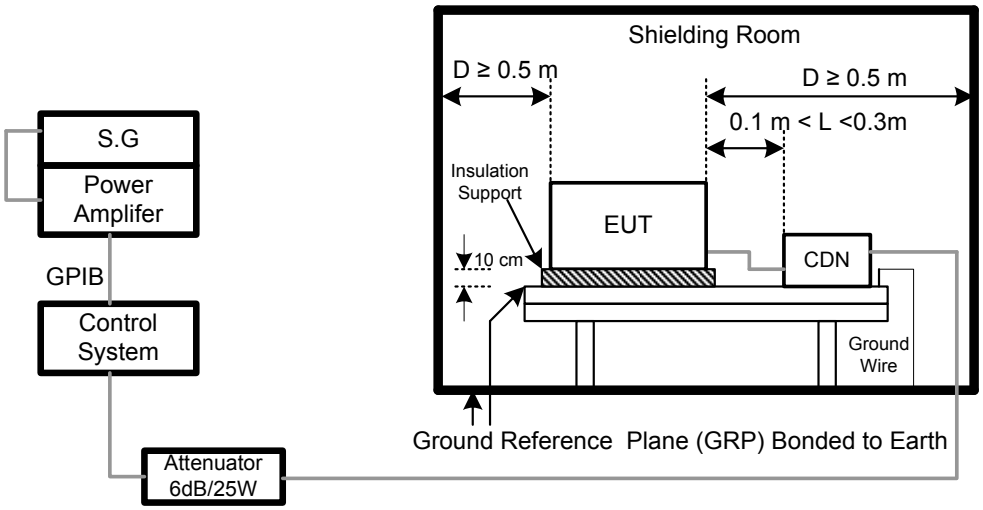
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.
The other condition as following manner:

a. The field strength level was 3V.
b. The frequency range is swept from 150 KHz to 80 MHz, with the signal 80% amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 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 –EUT Test Photos.

NOTE:

FLOOR-STANDING EQUIPMENT

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.

### 5.8.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

| Test Ports (Mode) | Freq. Range (MHz) | Field Strength | Criteria | Results | Judgment |
|---|---|---|---|---|---|
| Input/ Output AC. Power Port | 0.15 ---80 | 3V(rms) AM Modulated 1000Hz, 80% | **A** | **A** | **PASS** |
| Input/ Output DC. Power Port | 0.15 --- 80 | | **A** | **N/A** | **N/A** |
| Signal Line (N/A) | 0.15 --- 80 | | **A** | **N/A** | **N/A** |

Note:

1) N/A - denotes test is not applicable to this device.
2) Criteria A: No observation of any performance degradation.
3) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
4) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 5.9 POWER FREQUENCY MAGNETIC FIELD TESTING

### 5.9.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-8 |
| Required Performance | A |
| Frequency Range: | 50Hz/60Hz |
| Field Strength: | 1 A/m |
| Observation Time: | 1 minute |
| Inductance Coil: | Rectangular type, 1mx1m |

### 5.9.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | Magnetic Field Test Generator | FCC | F-1000-4-8-G-125A | 04032 | Mar. 28, 2016 |
| 2 | Magnetic Field immunity loop | Thermo KeyTek | F-1000-4-8/9/10-L-1M | 04024 | Mar. 28, 2016 |

Remark: " N/A" denotes no model name, serial no. and no calibration specified.

### 5.9.3 TEST PROCEDURE

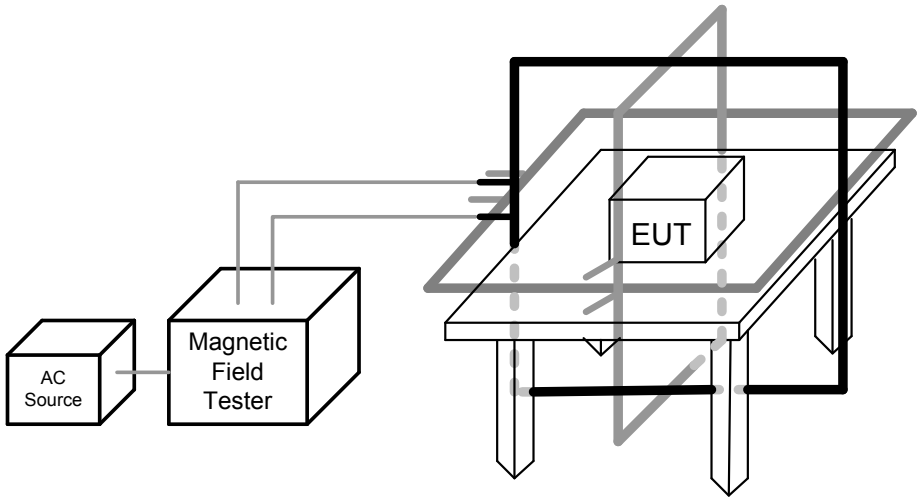
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.
The other condition as following manner:

a. The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
b. 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.
c. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.9.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.9.5 TEST SETUP




Note:

TABLE-TOP 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.

### 5.9.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1026 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

50Hz

| Test Mode | Test Level | Antenna aspect | Duration (s) | Criteria | Results | Judgment |
|---|---|---|---|---|---|---|
| Enclosure | 1 A/m | X | 60 s | **A** | **A** | **PASS** |
| Enclosure | 1 A/m | Y | 60 s | **A** | **A** | **PASS** |
| Enclosure | 1 A/m | Z | 60 s | **A** | **A** | **PASS** |

60Hz

| Test Mode | Test Level | Antenna aspect | Duration (s) | Criteria | Results | Judgment |
|---|---|---|---|---|---|---|
| Enclosure | 1 A/m | X | 60 s | **A** | **A** | **PASS** |
| Enclosure | 1 A/m | Y | 60 s | **A** | **A** | **PASS** |
| Enclosure | 1 A/m | Z | 60 s | **A** | **A** | **PASS** |

Note:

1) N/A - denotes test is not applicable to this device
2) Criteria A: No observation of any performance degradation.
3) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
4) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 5.10 VOLTAGE INTERRUPTION/DIPS TESTING

### 5.10.1 TEST SPECIFICATION

| | |
|---|---|
| Basic Standard: | IEC/EN 61000-4-11 |
| Required Performance | B (For >95% Voltage Dips)<br>C (For 30% Voltage Dips)<br>C (For >95% 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 |

### 5.10.2 MEASUREMENT INSTRUMENTS

| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
|---|---|---|---|---|---|
| 1 | THE MODULAR SOLUTION FOR 6 KV APPLICATIONS | Teseq | NSG 3060 | 1423 | Aug. 29, 2015 |
| 2 | Measurement Software | Teseq | Win 3000 Version 1.2.0 | N/A | N /A |

Remark: “ N/A” denotes no model name, serial no. and no calibration specified.

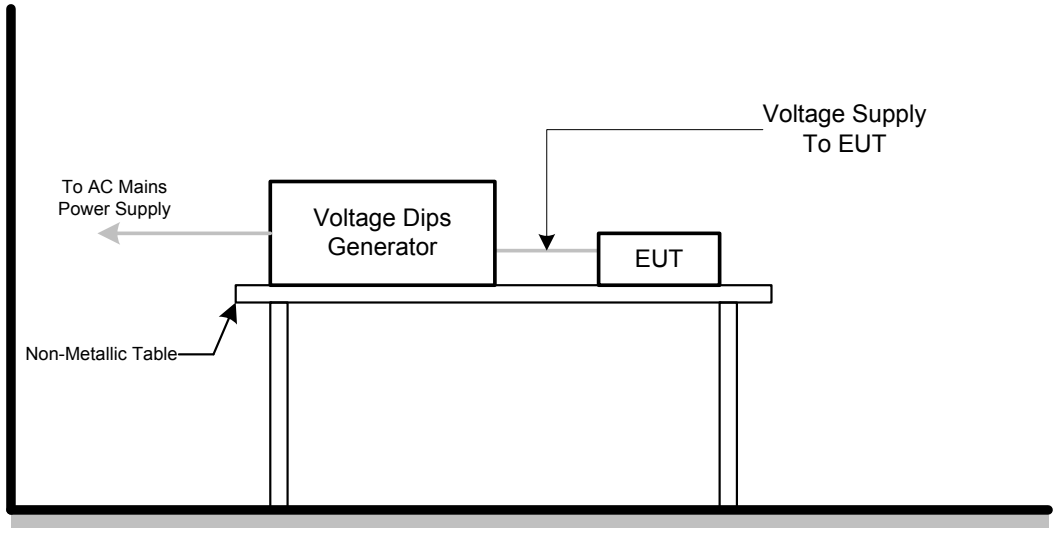
### 5.10.3 TEST PROCEDURE

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.

### 5.10.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.10.5 TEST SETUP




For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.10.6 TEST RESULTS

| E.U.T : | Gaming Mouse Mat | Model Name : | RZ02-0135 |
|---|---|---|---|
| Temperature : | 25° C | Relative Humidity : | 60 % |
| Pressure : | 1002 hPa | Test Voltage : | AC 230V/50Hz |
| Test Mode : | USB | | |

| AC 230V/50Hz | | | | |
|---|---|---|---|---|
| Voltage Reduction | Periods | Criteria | Results | Judgment |
| Voltage dip ＞95% | 0.5 | **B** | **A** | **PASS** |
| Voltage dip 30% | 25 | **C** | **A** | **PASS** |
| Interruption＞95% | 250 | **C** | **C** | **PASS** |

| AC 100V/50Hz | | | | |
|---|---|---|---|---|
| Voltage Reduction | Periods | Criteria | Results | Judgment |
| Voltage dip ＞95% | 0.5 | **B** | **A** | **PASS** |
| Voltage dip 30% | 25 | **C** | **C** | **PASS** |
| Interruption＞95% | 250 | **C** | **C** | **PASS** |

| AC 240V/50Hz | | | | |
|---|---|---|---|---|
| Voltage Reduction | Periods | Criteria | Results | Judgment |
| Voltage dip ＞95% | 0.5 | **B** | **A** | **PASS** |
| Voltage dip 30% | 25 | **C** | **A** | **PASS** |
| Interruption＞95% | 250 | **C** | **C** | **PASS** |

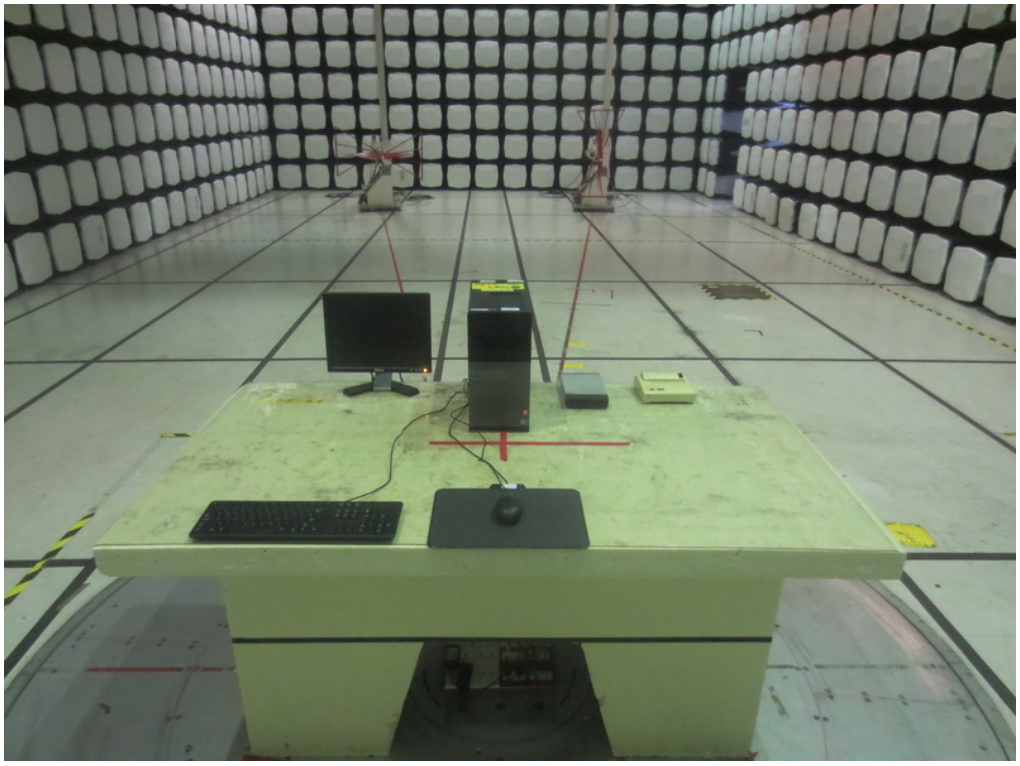
Note:

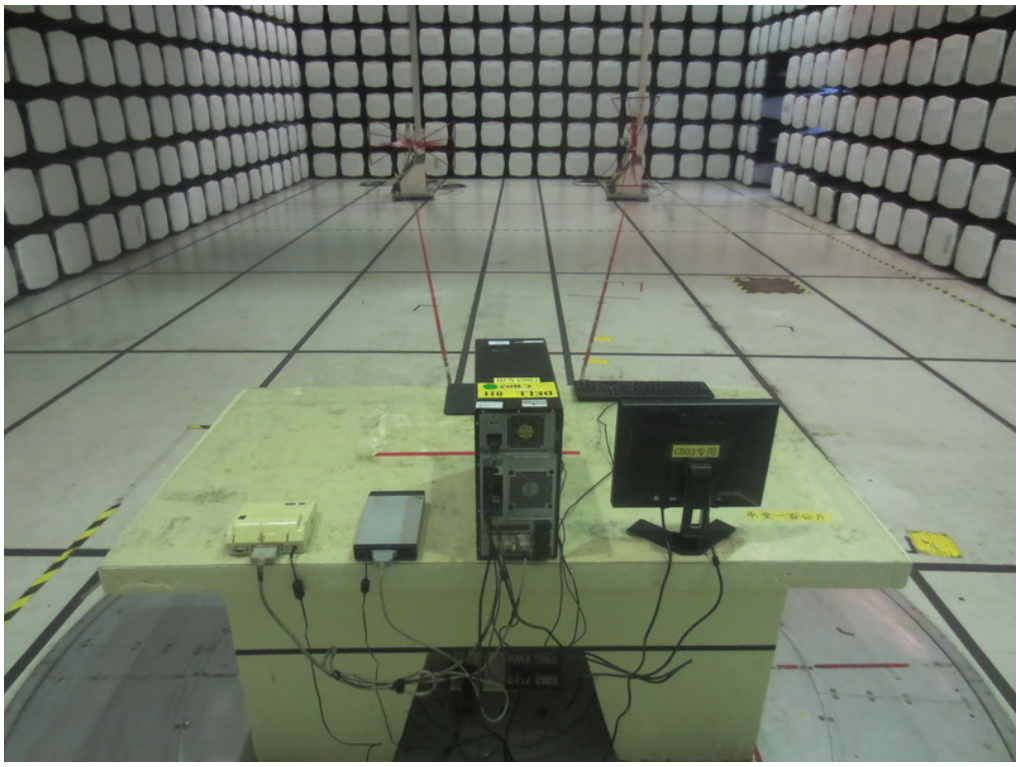
1) N/A - denotes test is not applicable to this device.
2) Criteria A: No observation of any performance degradation.
3) Criteria B: Some degradation of performance is observed but the equipment continues to operate as intended.
4) Criteria C: Loss of functionality, but self-recoverable by user, without loss of information or settings.

## 6. EUT TEST PHOTO

### Conducted Measurement Photos

## Radiated Measurement Photos(BETWEEN 30MHZ AND 1000MHZ)





**ESD**

**RS**

**EFT+ Surge+ Dip**

**CS**

**PMF**