

TEST REPORT

of

FCC MPE REQUIREMENT

Product : Semiconductor RFID

Brand Name: Brilliant


Model: MF Reader

Model Difference: N/A

Applicant: Brilliant Network & Automation Integrated System Co.,Ltd

Address: No. 41, Keyi St., Zhunan Township, Miaoli County 350402, Taiwan

Test Performed by:

 **International Standards Laboratory Corp. LT Lab.**
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Report No.: **ISL-23LR0063FMPE**
Issue Date :**2023/05/17**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

VERIFICATION OF COMPLIANCE

Applicant: Brilliant Network & Automation Integrated System Co.,Ltd
Product Description: Semiconductor RFID
Brand Name: Brilliant
Model No.: MF Reader
Model Difference: N/A
Date of test: 2023/05/15 ~ 2023/05/17
Date of EUT Received: 2022/05/15

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:



Date:

2023/05/17

Barry Lee / Senior Engineer

Prepared By:



Date:

2023/05/17

Gigi Yeh / Senior Engineer

Approved By:



Date:

2023/05/17

Jerry Liu / Technical Manager

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1. Description of Equipment under Test (EUT)

General:

| | |
|-------------------|--------------------|
| Product Name: | Semiconductor RFID |
| Brand Name: | Brilliant |
| Model Name: | MF Reader |
| Model Difference: | N/A |
| Power Supply: | 24Vdc |
| Frequency Range: | 134kHz |
| Modulation Type | FSK |

| | Antenna Type | Brand | Model | Frequency Range | Connector Type |
|---|----------------|-----------|----------|-----------------|----------------|
| 1 | Dipole Antenna | Brilliant | SLC-1500 | 134kHz | PH |

2. Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was tested with a test program to fix the TX/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

2.3 Measurement Equipment Used:

| Equipment Name | Brand | Model | S/N | Last Cal. Date | Next Cal. Date |
|----------------------|-------------|-------|----------|----------------|----------------|
| Magnetic Field probe | WAVECONTROL | SMP2 | 20SN1339 | 02/09/2022 | 08/09/2023 |

2.4 Configuration of Tested System

Radiated Emission

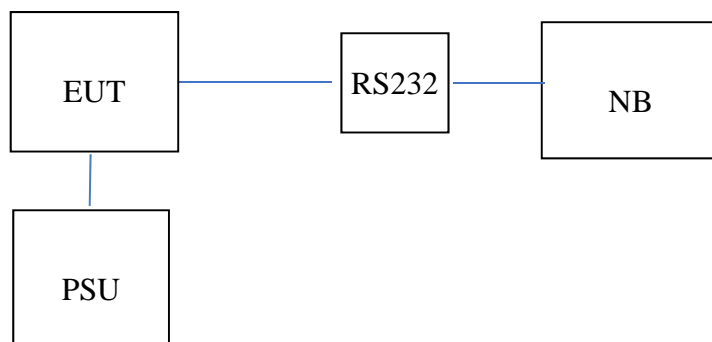


Table 1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/ Type No. | Series No. | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|-------------------------|------------|------------|
| 1 | NB | Dell | X02-00 | 20201014 10193 | 15cm | N/A |
| 2 | PSU | ABM | 8185D | N/A | N/A | 30cm |
| 3 | RS232 | ATEN | UC-232A | Z3F7- 076BP- 1698 | 185 | N/A |

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

2.5 Description of Test Modes

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel 134kHz with each modulation were chosen for full testing.

Maximum Permissible Exposure (MPE)

2.6 Test Procedure

2.6.1 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The Probe shall be placed near EUT 10cm, Test Six Plane to measure the position of maximum emission level.

3. Summary of Test Results

| FCC Rules | Description Of Test | Result |
|----------------------------------|--|-----------|
| §1.1310 (IEEE Std C95.1-2019) | Radiofrequency radiation exposure limits. | Compliant |

4. Standard Applicable

According to §1.1310, Cause by EUT working frequency below 300KHz , The part MPE exposure limits refer ANSI in Section 4.1 of “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” ANSI/IEEE Std C95.1, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

Limits for Maximum Permissive Exposure (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Averaging Time (minute) |
|---|----------------------------------|----------------------------------|--|----------------------------|
| Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f ²) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | F/1500 | 30 |
| 1500-15000 | / | / | 1.0 | 30 |

F = frequency in MHz

* = Plane-wave equipment power density

IEEE Std C95.1-2019

ERLs for whole-body exposure of persons in unrestricted environments (100 kHz to 300 GHz)
[see Figure 3 for graphical representation]

| Frequency Range | Electric field strength (E)a,b,c (V/m) | Magnetic field strength (H)a,b,c (A/m) | Power density (S) a,b,c (W/m2) | | Averaging Time |
|---|--|---|----------------------------------|---|----------------|
| | | | SE | SH | (minute) |
| Limits for General Population/Uncontrolled Exposure | | | | | |
| 0.1-1.34 | 614 | 16.3 / f _M | 1000 | 10000/f _M ² | 30 |
| 1.34-30 | 823.8 / f _M | 16.3 / f _M | 1800/f _M ² | 10000/f _M ² | 30 |
| 30-100 | 27.5 | 158.3 / f _M ^{1.668} | 2 | 9400000/f _M ^{3.336} | 30 |
| 100-400 | 27.5 | 0.07279 | 2 | | 30 |
| 400-2000 | / | / | f _M /200 | | 30 |
| 2000-300000 | / | / | 10 | | 30 |
| NOTE—SE and SH are plane-wave-equivalent power density values, based on electric or magnetic field strength respectively, and are commonly used as a convenient comparison with ERLs at higher frequencies and are sometimes displayed on commonly used instruments | | | | | |

1. For exposures that are uniform over the dimensions of the body, such as certain far-field plane-wave exposures, the exposure field strengths and power densities are compared with the ERLs in Table 7. For more typical nonuniform exposures, the mean values of the exposure fields, as obtained by spatially averaging the plane-wave-equivalent power densities or the squares of the field strengths, are compared with the ERLs in Table 7. (See notes to Table 7 through Table 11 in 4.3.5.)
2. f_M is the frequency in MHz.
3. The E, H, and S values are those rms values unperturbed by the presence of the body

5. Evaluation Result:

| Test side | Distance to DUT (cm) | Frequency (MHz) | Measured E-Field (V/m) | Limit (V/m) |
|-----------|----------------------|-----------------|------------------------|-------------|
| Front | 10 | 0.134 | 45 | 614 |
| Back | 10 | 0.134 | 48 | 614 |
| Left | 10 | 0.134 | 35 | 614 |
| Right | 10 | 0.134 | 37 | 614 |
| Upper | 10 | 0.134 | 40 | 614 |
| Bottom | 10 | 0.134 | 46 | 614 |

| Test side | Distance to DUT (cm) | Frequency (MHz) | Measured H-Field (A/m) | Limit (A/m) |
|-----------|----------------------|-----------------|------------------------|-------------|
| Front | 10 | 0.134 | 0.58 | 121.6 |
| Back | 10 | 0.134 | 0.57 | 121.6 |
| Left | 10 | 0.134 | 0.66 | 121.6 |
| Right | 10 | 0.134 | 0.68 | 121.6 |
| Upper | 10 | 0.134 | 0.65 | 121.6 |
| Bottom | 10 | 0.134 | 0.64 | 121.6 |

APPENDIX 1

PHOTOGRAPHS OF SET UP

Test Set up Photos

