



## RF EXPOSURE EVALUATION REPORT

**Application No.:** GZCR2206000724AT  
**Applicant:** Winegard Company  
**Address of Applicant:** 3000 Kirkwood Street, Burlington, Iowa 52601, United States  
**Manufacturer:** Winegard Company  
**Address of Manufacturer:** 3000 Kirkwood Street, Burlington, Iowa 52601, United States  
**Factory:** 1. Aztech Communication Device (DG) Ltd  
2. IOT Manufacturing SDN.BHD.  
1. Jiu Jiang Shui Village, Chang Ping Town, Dong Guan City, Guang Dong Province, China  
**Address of Factory:** 2. No. 8 & 10, Setia Business Park, Jalan Laman Setia 7/4, Taman Laman Setia, 81550 Gelang Patah, Johor Bahru, Malaysia

### Equipment Under Test (EUT):

**EUT Name:** Gateway PRO 2x2  
**Model No.:** WF2-5G1, GW-5G01 ♣  
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.  
**Trade Mark:** Winegard  
47 CFR Part 2.1091  
**Standard(s) :** 47 CFR Part 1.1310  
47 CFR Part 1.1307  
**Date of Receipt:** 2022-05-17  
**Date of Evaluation:** 2022-05-18 to 2022-06-13  
**Date of Issue:** 2022-06-16

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

\* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian  
EMC Laboratory Manager



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.  
Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)

| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2022-06-16 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

|                          |  |                                                                                     |  |  |
|--------------------------|--|-------------------------------------------------------------------------------------|--|--|
| Authorized for issue by: |  |                                                                                     |  |  |
|                          |  |  |  |  |
|                          |  | Curry Wu/Project Engineer                                                           |  |  |
|                          |  |  |  |  |
|                          |  | Ricky Liu/Reviewer                                                                  |  |  |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report and certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)

## 2 Evaluation Summary

| Radio Spectrum Technical Requirement |                                                                |                    |                    |        |
|--------------------------------------|----------------------------------------------------------------|--------------------|--------------------|--------|
| Item                                 | Standard                                                       | Requirement        | Method             | Result |
| RF Exposure                          | 47 CFR Part 2.1091<br>47 CFR Part 1.1310<br>47 CFR Part 1.1307 | 47 CFR Part 1.1310 | 47 CFR Part 1.1310 | PASS   |

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

### 3 Contents

|       |                                              |    |
|-------|----------------------------------------------|----|
| 1     | Covers Page .....                            | 1  |
| 2     | Evaluation Summary .....                     | 3  |
| 3     | Contents .....                               | 4  |
| 4     | General Information .....                    | 5  |
| 4.1   | Details of E.U.T.....                        | 5  |
| 4.2   | Details of 5G Sub-6 GHz M.2 Module*.....     | 6  |
| 4.3   | Test Location .....                          | 7  |
| 4.4   | Test Facility.....                           | 8  |
| 4.5   | Deviation from Standards .....               | 9  |
| 4.6   | Abnormalities from Standard Conditions ..... | 9  |
| 5     | Radio Spectrum Technical Requirement .....   | 10 |
| 5.1   | RF Exposure .....                            | 10 |
| 5.1.1 | Requirement .....                            | 10 |
| 5.1.2 | Method .....                                 | 11 |
| 5.1.3 | Conclusion for WF2-5G1 .....                 | 11 |
| 5.1.4 | Conclusion for GW-5G01.....                  | 12 |
| 5.2   | EUT Constructional Details.....              | 14 |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

## 4 General Information

### 4.1 Details of E.U.T.

|                         |                                                                                                                                       |                          |                      |                    |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------|--------------------|
| Power supply:           | DC 12V                                                                                                                                |                          |                      |                    |
| Internal source:        | More than 108MHz                                                                                                                      |                          |                      |                    |
| For 2.4G                |                                                                                                                                       |                          |                      |                    |
| Type of Modulation:     | 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>802.11n (HT20/HT40): OFDM (64QAM, 16QAM, QPSK, BPSK) |                          |                      |                    |
| Operating Frequency:    | 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>802.11n(HT40): 2422MHz to 2452MHz                                                            |                          |                      |                    |
| Channel Number:         | 802.11b/g/11n(HT20): 11 Channels<br>802.11n(HT40): 7 Channels                                                                         |                          |                      |                    |
| Channels Step:          | Channels with 5MHz step                                                                                                               |                          |                      |                    |
| Sample Type:            | Fixed devices                                                                                                                         |                          |                      |                    |
| WF2-5G1's Antenna Type: | PCB antenna                                                                                                                           |                          |                      |                    |
| WF2-5G1's Antenna Gain: | Antenna1/Antenna2: 3.2dBi<br>Note: MIMO for 802.11n.                                                                                  |                          |                      |                    |
| GW-5G01's Antenna Type: | PCB antenna                                                                                                                           |                          |                      |                    |
| GW-5G01's Antenna Gain: | Antenna1: 3.2dBi, Antenna2:3.0dBi<br>Note: MIMO for 802.11n.                                                                          |                          |                      |                    |
| For 5G                  |                                                                                                                                       |                          |                      |                    |
| Operation Frequency:    | Band                                                                                                                                  | Mode                     | Frequency Range(MHz) | Number of channels |
|                         | UNII<br>Band I                                                                                                                        | 802.11a/n(HT20)/ac(HT20) | 5180-5240            | 4                  |
|                         |                                                                                                                                       | 802.11n(HT40)/ac(HT40)   | 5190-5230            | 2                  |
|                         |                                                                                                                                       | 802.11ac(HT80)           | 5210                 | 1                  |
|                         | UNII<br>Band II-A                                                                                                                     | 802.11a/n(HT20)/ac(HT20) | 5260-5320            | 4                  |
|                         |                                                                                                                                       | 802.11n(HT40)/ac(HT40)   | 5270-5310            | 2                  |
|                         |                                                                                                                                       | 802.11ac(HT80)           | 5290                 | 1                  |
|                         | UNII<br>Band II-                                                                                                                      | 802.11a/n(HT20)/ac(HT20) | 5500-5700            | 11                 |
|                         |                                                                                                                                       | 802.11n(HT40)/ac(HT40)   | 5510-5670            | 5                  |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
SGS-CSTC Standards Technical Services Co., Ltd. No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
Guangzhou Branch of SGS-CSTC Standards Technical Services Co., Ltd. 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

|                         |                                                                                                                                          |                          |           |   |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------|---|
|                         | C                                                                                                                                        | 802.11ac(HT80)           | 5530,5610 | 2 |
|                         | UNII                                                                                                                                     | 802.11a/n(HT20)/ac(HT20) | 5745-5825 | 5 |
|                         | Band III                                                                                                                                 | 802.11n(HT40)/ac(HT40)   | 5755-5795 | 2 |
|                         |                                                                                                                                          | 802.11ac(HT80)           | 5775      | 1 |
|                         | * The 5600-5650MHz cannot be used.                                                                                                       |                          |           |   |
| Modulation Type:        | 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) |                          |           |   |
| DFS Function:           | Master                                                                                                                                   |                          |           |   |
| TPC Function:           | Support                                                                                                                                  |                          |           |   |
| Sample Type:            | Fixed devices                                                                                                                            |                          |           |   |
| WF2-5G1's Antenna Type: | PCB antenna                                                                                                                              |                          |           |   |
| WF2-5G1's Antenna Gain: | Antenna1/Antenna2: 4.6dBi<br>Note: MIMO for 802.11n/ac.                                                                                  |                          |           |   |
| GW-5G01's Antenna Type: | PCB antenna                                                                                                                              |                          |           |   |
| GW-5G01's Antenna Gain: | Antenna1: 4.6dBi, Antenna2:4.0dBi<br>Note: MIMO for 802.11n/ac.                                                                          |                          |           |   |

#### 4.2 Details of 5G Sub-6 GHz M.2 Module\*:

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation Frequency Band: | WCDMA Band II, IV, V.<br>E-UTRA in Bands 2/4/5/7/12/13/14/17/25/26/30/38/41/48/66/71.<br>E-UTRA with CA uplink in Bands 2/5/7/38/41/66.<br>5G NR protocol contains SA and NSA(EN-DC) features in the Bands n2/n5/n7/n12/n25/n41/n66/n71, with some bandwidths according to 3GPP applicable standards.<br>5G NR Band n77 supports SA only, with some bandwidths according to 3GPP applicable standards and is only applicable in the range of 3450-3650 MHz. |
| Modulation Type:          | WCDMA: QPSK<br>LTE: QPSK, 16QAM                                                                                                                                                                                                                                                                                                                                                                                                                             |
| HSDPA UE Category:        | 24                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| HSUPA UE Category:        | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nizhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

|                  |                                  |
|------------------|----------------------------------|
| LTE Category:    | 18                               |
| HPUE Band:       | n41, n77(SA & UL MIMO)           |
| SCS for NR cell: | FDD Band: 15KHz; TDD Band: 30KHz |
| Antenna Type:    | PCB Antenna                      |
| Antenna Gain:    | Max 8dBi                         |

\*: The 5G Sub-6 GHz M.2 module approval by TCB(FCC:C3D-2020RM502QAE), Grant at 06/13/2022.

### 4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,  
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,  
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
SGS-CSTC Standards Technical Services Co., Ltd. No.198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
Guangzhou Branch EMC Laboratory 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

#### 4.4 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

- **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
SGS-CSTC Standards Technical Services Co., Ltd. No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
Guangzhou Branch of SGS-CSTC Standards Technical Services Co., Ltd. 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

#### 4.5 Deviation from Standards

None

#### 4.6 Abnormalities from Standard Conditions

None



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)

## 5 Radio Spectrum Technical Requirement

### 5.1 RF Exposure

#### 5.1.1 Requirement

In accordance with 47 CFR FCC Part 2.1091, this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

According to 47 CFR FCC Part 1310, the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in Part1.1307(b).

**TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

| Frequency range (MHz)                                           | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|-----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(i) Limits for Occupational/Controlled Exposure</b>          |                               |                               |                                     |                          |
| 3-3.0                                                           | 614                           | 1.63                          | *(100)                              | ≤6                       |
| 3.0-30                                                          | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | <6                       |
| 30-300                                                          | 61.4                          | 0.163                         | 1.0                                 | <6                       |
| 300-1,500                                                       |                               |                               | f/300                               | <6                       |
| 1,500-100,000                                                   |                               |                               | 5                                   | <6                       |
| <b>(ii) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                        | 614                           | 1.63                          | *(100)                              | <30                      |
| 1.34-30                                                         | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | <30                      |
| 30-300                                                          | 27.5                          | 0.073                         | 0.2                                 | <30                      |
| 300-1,500                                                       |                               |                               | f/1500                              | <30                      |
| 1,500-100,000                                                   |                               |                               | 1.0                                 | <30                      |

f = frequency in MHz. \* = Plane-wave equivalent power density



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

### 5.1.2 Method

According to IEEE C95.3:2002 section 5.5.1.1, the power density  $S$  at a point on the axis at a distance  $d$  from a transmitting antenna is given by the Friis free-space transmission formula:

$$S = \frac{PG}{4\pi d^2}$$

$S$  = power density (mW/cm<sup>2</sup>)

$P$  = the net power delivered to the antenna (mW)

$G$  = gain of the antenna in linear scale

$d$  = distance between observation point and center of the radiator (cm)

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit stated in above table, the minimum distance between the antenna and human body will be calculated.

### 5.1.3 Conclusion for WF2-5G1

#### For 2.4G WiFi

1. According to the test report GZCR220600072401, the tested maximum conducted power is 22.45dBm = 0.1758W = 175.8mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 3.2dBi for single antenna, the Directional gain is 6.21dBi.
3. The limit of Power Density (S)(mW/cm<sup>2</sup>) = 1mW/cm<sup>2</sup>

| Maximum Antenna Gain (Numeric) | Total conducted power (mW) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | MPE Ratios |
|--------------------------------|----------------------------|--------------------------------------------------|-----------------------------------------------|------------|
| 2.09                           | 175.79                     | 0.0731                                           | 1.0000                                        | 0.0731     |

#### For 5G WiFi

1. According to the test report GZCR220600072402, the tested maximum conducted power is 21.71dBm = 0.14825W = 148.25mW.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 4.6dBi for single antenna, the Directional gain is 7.61dBi.
3. The limit of Power Density (S)(mW/cm<sup>2</sup>) = 1mW/cm<sup>2</sup>

| Maximum Antenna Gain (Numeric) | Total conducted power (mW) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | MPE Ratios |
|--------------------------------|----------------------------|--------------------------------------------------|-----------------------------------------------|------------|
| 5.77                           | 148.25                     | 0.1701                                           | 1.0000                                        | 0.1701     |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

#### 5.1.4 Conclusion for GW-5G01

##### For 2.4G WiFi

1. According to the the test report GZCR220600072401, the tested maximum conducted power is 22.45dBm = 0.1758W = 175.8mW.
2. According to the declaration from the applicant, the best case gain of the Antenna1 is 3.2dBi, Antenna2 is 3.0dBi for single antenna, the Directional gain is 6.11dBi.
3. The limit of Power Density (S)(mW/cm<sup>2</sup>) = 1mW/cm<sup>2</sup>

| Maximum Antenna Gain (Numeric) | Total conducted power (mW) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | MPE Ratios |
|--------------------------------|----------------------------|--------------------------------------------------|-----------------------------------------------|------------|
| 2.09                           | 175.79                     | 0.0731                                           | 1.0000                                        | 0.0731     |

##### For 5G WiFi

1. According to the the test report GZCR220600072402, the tested maximum conducted power is 21.71dBm = 0.14825W = 148.25mW.
2. According to the declaration from the applicant, the best case gain of the Antenna1 is 4.6dBi, Antenna2 is 4.0dBi for single antenna, the Directional gain is 7.32dBi.
3. The limit of Power Density (S)(mW/cm<sup>2</sup>) = 1mW/cm<sup>2</sup>

| Maximum Antenna Gain (Numeric) | Total conducted power (mW) | Limit of Power Density (S) (mW/cm <sup>2</sup> ) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | MPE Ratios |
|--------------------------------|----------------------------|--------------------------------------------------|-----------------------------------------------|------------|
| 5.40                           | 148.25                     | 0.1591                                           | 1.0000                                        | 0.1591     |

#### For 5G Sub-6 GHz M.2 module:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

| Type     | Test Freq. (MHz) | Max Antenna Gain (dBi) | Max Antenna Gain (Numeric) | Max tune-up tolerance power (dBm) | Max tune-up Tolerance power to Antenna (mW) | Power Density at R=20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | MPE Ratios | Result |
|----------|------------------|------------------------|----------------------------|-----------------------------------|---------------------------------------------|-----------------------------------------------|-----------------------------|------------|--------|
| WCDMA B2 | 1852.4           | 0.98                   | 1.25                       | 25                                | 316.2278                                    | 0.0788                                        | 1.0000                      | 0.0788     | PASS   |
| WCDMA B4 | 1712.4           | 1.23                   | 1.33                       | 25                                | 316.2278                                    | 0.0835                                        | 1.0000                      | 0.0835     | PASS   |
| WCDMA B5 | 826.4            | 0.51                   | 1.12                       | 25                                | 316.2278                                    | 0.0708                                        | 0.5509                      | 0.1284     | PASS   |
| LTE B2   | 1850.7           | 0.98                   | 1.25                       | 25                                | 316.2278                                    | 0.0788                                        | 1.0000                      | 0.0788     | PASS   |
| LTE B4   | 1710.7           | 1.23                   | 1.33                       | 25                                | 316.2278                                    | 0.0835                                        | 1.0000                      | 0.0835     | PASS   |



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

EMC-TRF-03 Rev 1.0

|         |        |       |      |    |          |               |               |               |      |
|---------|--------|-------|------|----|----------|---------------|---------------|---------------|------|
| LTE B5  | 824.7  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.5498        | 0.1287        | PASS |
| LTE B7  | 2502.5 | 1.19  | 1.32 | 25 | 316.2278 | 0.0827        | 1.0000        | 0.0827        | PASS |
| LTE B12 | 699.7  | 2.18  | 1.65 | 25 | 316.2278 | 0.1039        | 0.4665        | 0.2228        | PASS |
| LTE B13 | 779.5  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.5197        | 0.1361        | PASS |
| LTE B14 | 790.5  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.5270        | 0.1343        | PASS |
| LTE B17 | 706.5  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.4710        | 0.1502        | PASS |
| LTE B25 | 1850.7 | 0.98  | 1.25 | 25 | 316.2278 | 0.0788        | 1.0000        | 0.0788        | PASS |
| LTE B26 | 814.7  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.5431        | 0.1303        | PASS |
| LTE B30 | 2307.5 | -0.46 | 0.90 | 25 | 316.2278 | 0.0566        | 1.0000        | 0.0566        | PASS |
| LTE B38 | 2572.5 | 1.19  | 1.32 | 28 | 630.9573 | 0.1651        | 1.0000        | 0.1651        | PASS |
| LTE B41 | 2498.5 | 1.19  | 1.32 | 28 | 630.9573 | 0.1651        | 1.0000        | 0.1651        | PASS |
| LTE B48 | 3552.5 | 0.23  | 1.05 | 25 | 316.2278 | 0.0663        | 1.0000        | 0.0663        | PASS |
| LTE B66 | 1710.7 | 1.23  | 1.33 | 25 | 316.2278 | 0.0835        | 1.0000        | 0.0835        | PASS |
| LTE B71 | 665.0  | 2.18  | 1.65 | 25 | 316.2278 | 0.1039        | 0.4433        | 0.2344        | PASS |
| n2      | 1852.5 | 0.98  | 1.25 | 25 | 316.2278 | 0.0788        | 1.0000        | 0.0788        | PASS |
| n5      | 826.6  | 0.51  | 1.12 | 25 | 316.2278 | 0.0708        | 0.5511        | 0.1284        | PASS |
| n7      | 2502.5 | 1.19  | 1.32 | 25 | 316.2278 | 0.0827        | 1.0000        | 0.0827        | PASS |
| n12     | 701.5  | 2.18  | 1.65 | 25 | 316.2278 | 0.1039        | 0.4677        | 0.2222        | PASS |
| n25     | 1852.5 | 0.98  | 1.25 | 25 | 316.2278 | 0.0788        | 1.0000        | 0.0788        | PASS |
| n41     | 2506.0 | 1.19  | 1.32 | 28 | 630.9573 | 0.1651        | 1.0000        | 0.1651        | PASS |
| n66     | 1712.5 | 1.23  | 1.33 | 25 | 316.2278 | 0.0835        | 1.0000        | 0.0835        | PASS |
| n71     | 619.5  | 2.18  | 1.65 | 25 | 316.2278 | <b>0.1039</b> | <b>0.4130</b> | <b>0.2516</b> | PASS |
| n77     | 3750   | -0.19 | 0.96 | 27 | 501.1872 | 0.0954        | 1.0000        | 0.0954        | PASS |

Note: Refer to report No. 2010RSU005 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

The MPE limit of 300MHz to 1500MHz is  $f/1500$  mW/cm<sup>2</sup>, the MPE limit of 1500MHz to 100000MHz is 1.0 mW/cm<sup>2</sup>.



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)  
 No.196 Nianhu Road, Science Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075058 www.sgs.com.cn  
 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

Note: the 2.4G antenna and 5G WiFi antenna cannot synchronous transmission at the same time.

The simultaneous transmission result between of WiFi and 5G Sub-6 GHz M.2 module:

The SAR Exclusion Threshold Level:

$$= \text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2}$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= (0.1701/1) + (0.1039/0.4130) = 0.4217 < 1$$

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

## 5.2 EUT Constructional Details

Refer to Appendix - external and internal photos for GZCR220600724AT.

**- End of the Report -**



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing/inspection report & certificate, please contact us at telephone: (86-755) 8307-1443, or email: [CN.Doccheck@sgs.com](mailto:CN.Doccheck@sgs.com)