



FCC RADIO EXPOSURE TEST REPORT

FCC ID : RAXG3100
Equipment : Fios Home Router, Fios Business Route
Brand Name : Verizon
Model Name : G3100
Applicant : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Manufacturer : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Standard : 47 CFR Part 2.1091

The product was received on Apr. 01, 2019, and testing was started from Apr. 02, 2019 and completed on Jun. 04, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

| Report No. | Version | Description | Issued Date |
|-------------|---------|-------------------------|---------------|
| FA932731-01 | 01 | Initial issue of report | Jul. 18, 2019 |
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Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|---------------|-----------------|---------------------|--------------------|--------|
| 2 | - | Exposure evaluation | PASS | - |

Note: Reference to Sporton Project No.: 932731

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Sam Chen**

Report Producer: **Emily Chen**



1 General Description

1.1 EUT General Information

| RF General Information | | | |
|------------------------|--|--|--|
| Evaluation Mode | Frequency Range (MHz) | Operating Frequency (MHz) | Modulation Type |
| 2.4GHz WLAN | 2400-2483.5 | 2412-2462 | 802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |
| 5GHz WLAN | 5150-5250 5250-5350 5470-5725 5725-5850 | 5180-5250 5250-5320 5500-5720 5745-5825 | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |
| Bluetooth | 2400-2483.5 | 2402-2480 | LE: GFSK |
| Zigbee | 2400-2483.5 | 2405-2480 | DSSS-OQPSK: 250kbps |
| Z-wave | 902-928 | 908.42, 908.40, 916.00 | 908.42 MHz, 908.40MHz: 2FSK 916.00 MHz: 2GFSK |

1.2 Table for Multiple Listing

The equipment names in the following table are all refer to the identical product.

| Equipment Name | Model Name | Description |
|----------------------|------------|---|
| Fios Home Router | G3100 | All the equipments are identical, the difference equipment name served as marketing strategy. |
| Fios Business Router | | |

1.3 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA932731

Below is the table for the change of the product with respect to the original one.

| Modifications | Performance Checking |
|--|------------------------------|
| 1. Adding 5GHz band 2 and band 3 (5250~5350 MHz, 5470~5725 MHz) for this device. 2. Adding 802.11ac160MHz and 802.11ax 160MHz Mode. | Maximum Permissible Exposure |

Note: Other test results were based on the original report.



1.4 Testing Location

| Testing Location | | |
|-------------------------------------|--------|--|
| <input type="checkbox"/> | HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973 |
| <input checked="" type="checkbox"/> | JHUBEI | ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085 |

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086B with Industry Canada.



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|--|--|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842 / f | 4.89 / f | (900 / f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | F/300 | 6 |
| 1500-100,000 | | | 5 | 6 |

(B) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm ²) | Averaging Time E ² , H ² or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|--|--|
| 0.3-1.34 | 614 | 1.63 | (100)* | 30 |
| 1.34-30 | 824/f | 2.19/f | (180/f)* | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | | | F/1500 | 30 |
| 1500-100,000 | | | 1.0 | 30 |

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 32 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

| Mode | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm ²) | S Limit (mW/cm ²) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;D1D | 7.73 | 28.24 | 35.97 | 0.02 | 35.99 | 3.97192 | 32 | 0.30866 | 1.00000 |
| 5.2G;D1D | 7.30 | 28.64 | 35.94 | 0.05 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 |
| 5.3G;D1D | 7.30 | 22.67 | 29.97 | 0.02 | 29.99 | 0.99770 | 32 | 0.07753 | 1.00000 |
| 5.6G;D1D | 7.03 | 22.93 | 29.96 | 0.03 | 29.99 | 0.99770 | 32 | 0.07753 | 1.00000 |
| 5.8G;D1D | 7.03 | 28.93 | 35.96 | 0.03 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 |
| BT | -0.85 | 11.83 | 10.98 | 0.50 | 11.48 | 0.01406 | 32 | 0.00109 | 1.00000 |
| Zigbee | 4.40 | 19.50 | 23.90 | 0.50 | 24.40 | 0.27542 | 32 | 0.02140 | 1.00000 |

Conducted Power for Z-wave: -12.78 dBm

| OBW (MHz) | Conducted power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Distance (m) | Factor (dB) | Max. Field Strength (dBuV/m) |
|-----------|-----------------------|--------------------|------------|--------------|-------------|------------------------------|
| 0.08 | -12.78 | 0.7 | -12.08 | 3 | 95.2 | 93.88 |

| Distance (cm) | Test Freq. (MHz) | Antenna Gain (dBi) | Antenna Gain (numeric) | Average Output Power | Tolerance (dB) | Tune-up EIRP | | Power Density (S) (mW/cm ²) | Limit of Power Density (S) (mW/cm ²) | Test Result |
|---------------|------------------|--------------------|------------------------|----------------------|----------------|--------------|--------|---|--|-------------|
| | | | | (dBm) | | (dBm) | (mW) | | | |
| 32 | 908.4 | 0.70 | 1.1749 | -12.78 | 0.50 | -12.28 | 0.0592 | 0.0000054 | 0.6056133 | PASS |

Note: The above antenna gain was declared by manufacturer.



Simultaneous Transmission Analysis Mode:

1. WLAN 2.4GHz + WLAN 5GHz Band 1, 2 + WLAN 5GHz Band 3, 4 + Bluetooth + Z-wave

| Mode | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm ²) | S Limit (mW/cm ²) | Ratio (S/Limit) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D | 7.73 | 28.24 | 35.97 | 0.02 | 35.99 | 3.97192 | 32 | 0.30866 | 1.00000 | 0.30866 |
| 5.2G;D1D | 7.30 | 28.64 | 35.94 | 0.05 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 | 0.30866 |
| 5.8G;D1D | 7.03 | 28.93 | 35.96 | 0.03 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 | 0.30866 |
| BT | -0.85 | 11.83 | 10.98 | 0.50 | 11.48 | 0.01406 | 32 | 0.00109 | 1.00000 | 0.00109 |
| Z-wave | 0.70 | -12.78 | -12.08 | 0.50 | -11.58 | 0.00007 | 32 | 0.00001 | 0.60561 | 0.00002 |
| | | | | | | | | | Sum Ratio | 0.92709 |
| | | | | | | | | | Ratio Limit | 1 |

2. WLAN 2.4GHz + WLAN 5GHz Band 1, 2 + WLAN 5GHz Band 3, 4 + Zigbee + Z-wave

| Mode | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm ²) | S Limit (mW/cm ²) | Ratio (S/Limit) |
|----------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D | 7.73 | 28.24 | 35.97 | 0.02 | 35.99 | 3.97192 | 32 | 0.30866 | 1.00000 | 0.30866 |
| 5.2G;D1D | 7.30 | 28.64 | 35.94 | 0.05 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 | 0.30866 |
| 5.8G;D1D | 7.03 | 28.93 | 35.96 | 0.03 | 35.99 | 3.97192 | 32 | 0.30867 | 1.00000 | 0.30866 |
| Zigbee | 4.40 | 19.50 | 23.90 | 0.50 | 24.40 | 0.27542 | 32 | 0.02140 | 1.00000 | 0.02140 |
| Z-wave | 0.70 | -12.78 | -12.08 | 0.50 | -11.58 | 0.00007 | 32 | 0.00001 | 0.60561 | 0.00002 |
| | | | | | | | | | Sum Ratio | 0.94740 |
| | | | | | | | | | Ratio Limit | 1 |

Note: The above antenna gain was declared by manufacturer.