# RF Exposure Report

# (Spot Check)

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|---|---|
| **Report No.:** | SA180611E01D |
| **FCC ID:** | 2ABLK-GS2020 |
| **Original FCC ID:** | 2ABLK-GS2026 |
| **Test Model:** | GS2020E |
| **Received Date:** | Oct. 30, 2018 |
| **Test Date:** | Dec. 03 to 10, 2018 |
| **Issued Date:** | Mar. 19, 2019 |
| **Applicant:** | Calix Inc. |
| **Address:** | 1035 N. McDowell Blvd. Petaluma, CA 94954 U.S.A. |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory |
| **Lab Address:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **Test Location:** | E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C. |
| **FCC Registration / Designation Number:** | 723255 / TW2022 |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| SA180611E01D | Original release. | Mar. 19, 2019 |

## 1 Certificate of Conformity

| | |
|---|---|
| **Product:** | GigaSpire |
| **Brand:** | Calix |
| **Test Model:** | GS2020E |
| **Sample Status:** | MASS-PRODUCTION |
| **Applicant:** | Calix Inc. |
| **Test Date:** | Dec. 03 to 10, 2018 |
| **Standards:** | FCC Part 2 (Section 2.1091)<br>KDB 447498 D01 General RF Exposure Guidance v06<br>IEEE C95.1-1992 |

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Phoenix Huang , **Date:** Mar. 19, 2019

Phoenix Huang / Specialist

**Approved by :** , **Date:** Mar. 19, 2019

May Chen / Manager

## 2 RF Exposure

### 2.1 Limits for Maximum Permissible Exposure (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density ($mW/cm^2$) | Average Time (minutes) |
|---|---|---|---|---|
| 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 |
| 1500-100,000 | … | … | 1.0 | 30 |

f = Frequency in MHz; *Plane-wave equivalent power density

### 2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in $mW/cm^2$

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 27cm away from the body of the user. So, this device is classified as **Mobile Device**.

### 2.4 Antenna Gain

| Frequency range (GHz) | Directional Antenna Gain (dBi) | Antenna Type | Antenna Connector |
|---|---|---|---|
| 2.4 ~ 2.4835 | 7.41 | Dipole | i-pex(MHF) |
| 5.18 ~ 5.24 | 9.7 | | |
| 5.26 ~ 5.32 | 9.9 | | |
| 5.50 ~ 5.70 | 9.83 | | |
| 5.745 ~ 5.825 | 10.27 | | |
| Note: More detailed information, please refer to operating description. | | | |

2.5 Calculation Result

| Operation Mode | Evaluation Frequency (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|
| WLAN 2.4GHz | 2437 | 773.819 | 7.41 | 27 | 0.46527 | 1 |
| WLAN 5GHz (UNII-1) | 5240 | 419.096 | 9.70 | 27 | 0.42695 | 1 |
| WLAN 5GHz (UNII-2A) | 5270 | 99.27 | 9.90 | 27 | 0.10590 | 1 |
| WLAN 5GHz (UNII-2C) | 5530 | 103.136 | 9.83 | 27 | 0.11980 | 1 |
| WLAN 5GHz (UNII-3) | 5785 | 366.45 | 10.27 | 27 | 0.42567 | 1 |

Note:
2.4GHz: Directional gain = 7.41dBi
5GHz:
UNII-1: Directional gain = 9.70dBi
UNII-2A: Directional gain = 9.90dBi
UNII-2C: Directional gain = 9.83dBi
UNII-3: Directional gain = 10.27dBi

**Conclusion:**

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz = 0.46527 / 1 + 0.42695 / 1 = 0.89222

**Therefore the maximum calculations of above situations are less than the "1" limit.**

**--- END ---**