

## RF Exposure Report

**Report No.:** SA180717E02

**FCC ID:** 2ABLK-GM1020

**Test Model:** GM1020

**Received Date:** July 18, 2018

**Test Date:** Aug. 16 to 20, 2018

**Issued Date:** Sep. 06, 2018

**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   |
|-------------|-------------------|---------------|
| SA180717E02 | Original release. | Sep. 06, 2018 |

## 1 Certificate of Conformity

**Product:** LCK1

**Brand:** Calix

**Test Model:** GM1020

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Calix Inc.

**Test Date:** Aug. 16 to 20, 2018

**Standards:** FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

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:** Sep. 06, 2018  
Phoenix Huang / Specialist

**Approved by :** May Chen , **Date:** Sep. 06, 2018  
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 <sup>2</sup> ) | 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 <sup>2</sup> )*              | 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<sup>2</sup>

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 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

### 2.4 Antenna Gain

| Antenna No. | Antenna Net Gain (dBi) | Frequency range (GHz) | Antenna Type | Antenna Connector | Cable Length (mm) |
|-------------|------------------------|-----------------------|--------------|-------------------|-------------------|
| 1           | 2.02                   | 2.4 ~ 2.4835          | PIFA         | None              | -                 |
|             | 2.48                   | 5.15 ~ 5.85           |              |                   |                   |
| 2           | 3.94                   | 2.4 ~ 2.4835          | PIFA         | i-pex(MHF)        | 53                |
|             | 5.01                   | 5.15 ~ 5.85           |              |                   |                   |

## 2.5 Calculation Result of Maximum Conducted Power

| Operation Mode | Evaluation Frequency (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------|----------------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| WLAN 2.4GHz    | 2437                       | 487.203        | 6.04               | 20            | 0.38944                             | 1                           |
| WLAN 5GHz      | 5745                       | 450.343        | 6.85               | 20            | 0.43378                             | 1                           |

Note:

2.4GHz: Directional gain =  $10 \log[(10^{G_0/20} + 10^{G_1/20})^2 / 2] = 6.04\text{dBi}$

5GHz: Directional gain =  $10 \log[(10^{G_0/20} + 10^{G_1/20})^2 / 2] = 6.85\text{dBi}$

### Conclusion:

The formula of calculated the MPE is:

$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \dots\text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 2.4GHz + WLAN\ 5GHz = 0.38944 / 1 + 0.43378 / 1 = 0.82322$

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

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