

## RF Exposure Report

**Report No.:** SA180611E01C

**FCC ID:** 2ABLK-GS2026

**Test Model:** GS2026E

**Received Date:** Oct. 30, 2018

**Test Date:** Dec. 03 to 10, 2018

**Issued Date:** Mar. 14, 2019

**Applicant:** Calix Inc.

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
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**Test Location:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
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**FCC Registration /  
Designation Number:** 723255 / TW2022

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### Release Control Record

Issue No.	Description	Date Issued
SA180611E01C	Original release.	Mar. 14, 2019

## 1 Certificate of Conformity

**Product:** GigaSpire  
**Brand:** Calix  
**Test Model:** GS2026E  
**Sample Status:** MASS-PRODUCTION  
**Applicant:** Calix Inc.  
**Test Date:** Dec. 03 to 10, 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 :** Mary Ko , **Date:** Mar. 14, 2019  
Mary Ko / Specialist

**Approved by :** May Chen , **Date:** Mar. 14, 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 <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 27cm away from the body of the user.

So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

<b>WLAN Directional gain table</b>			
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		
<b>Bluetooth antenna spec.</b>			
Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector
3.04	2.4~2.5	PIFA	None
<b>Zigbee antenna spec.</b>			
Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector
3.29	2.4~2.5	MONOPOLE	None
<b>Z-wave antenna spec.</b>			
Antenna Net Gain (dBi)	Frequency range (MHz)	Antenna Type	Antenna Connector
2.76	850~920	PIFA	None
Note: More detailed information, please refer to operating description.			

## 2.5 Calculation Result

For Bluetooth, Zigbee and Z-wave data was copied from the original test report (Report No.: SA180611E01)

### Z-Wave Field Strength Conversion:

Frequency (MHz)	Field Strength of Fundamental (dBuV/m) @3m	EIRP (dBm)	EIRP (mW)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
908.4	93.9	-1.33	0.7362	27	0.00008	0.6056

Note: 1. Pout EIRP (dBm) = Field Strength of Fundamental (dBuV/m) - 95.23 (dB)

2. Power Density Limit = F/1500

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	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
BT-EDR	2441	8.472	3.04	27	0.00186	1
BT-LE	2440	7.534	3.04	27	0.00166	1
Zigbee	2440	61.66	3.29	27	0.01436	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:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 2.4GHz + WLAN\ 5GHz + Bluetooth + Zigbee + Z-wave = 0.46527 / 1 + 0.42695 / 1 + 0.00186 / 1 + 0.01436 / 1 + 0.00008 / 0.6056 = 0.90857$

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

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