

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.

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
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 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/cm²

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

WLAN Directional gain table			
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		
Bluetooth antenna spec.			
Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector
3.04	2.4~2.5	PIFA	None
Zigbee antenna spec.			
Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector
3.29	2.4~2.5	MONOPOLE	None
Z-wave antenna spec.			
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 ²)	Limit (mW/cm ²)
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 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
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 +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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