

Report No.:1911RSU033-U6Report Version:V01Issue Date:02-02-2020

RF Exposure Evaluation Declaration

- FCC ID: 2ABLK-GS4227E
- **APPLICANT:** Calix Inc.
- Application Type: Certification

Product: GigaSpire, GigaSpire BLAST^{u6.1}

Model No.: GS4227E, GS4220E

Brand Name:

C Calix

FCC Classification:

Unlicensed National Information Infrastructure (NII)

Digital Transmission System (DTS)

Test Procedure(s):

Test Date:

January 07, 2020

KDB 447498 D01v06

Reviewed By:

Approved By:





The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.



Revision History

Report No.	Version	Description	Issue Date	Note
1911RSU033-U6	Rev. 01	Initial report	02-02-2020	Valid



1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	GigaSpire, GigaSpire BLAST ^{u6.1}
Model No.:	GS4227E, GS4220E
Brand Name:	C Calix
Wi-Fi Specification:	802.11a/b/g/n/ac/ax

Note 1: There are the same hardware design, PCB layout between product names and models, except the data rate of the white RJ45 port. For this port, GS4227E supports 2.5Gbps, but GS4220E supports 1Gbps only.

Note 2: The difference addressed as above doesn't affect the RF test result, so we selected GS4227E (product name: GigaSpire) for all RF testing.

Antenna Type	Frequency Band	T _x Paths	Directional Gain (dBi)	
	(MHz)		Non Beam-Forming	Beam-Forming
			Mode	Mode
PCB Antenna	2412 ~ 2462	2	2.62	5.52
	5150 ~ 5250	4	1.89	6.90
	5250 ~ 5350	4	1.89	6.90
	5470 ~ 5725	4	2.03	7.44
	5725 ~ 5850	4	1.20	6.34

1.2. Description of Available Antennas

Note:

- The EUT supports Beam Forming technology, and the Beam Forming mode support 802.11ac/ax, not include 802.11a/b/g. Its transmit signals are correlated, then Directional gain = 10 log [(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})²/N_{ANT}] dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.
- The EUT also support Non Beam-Forming technology, and Non Beam-Forming mode support 802.11a/b/g/n/ac/ax, its transmit signals are uncorrelated, then Directional gain = 10 log[(10^{G1/10}+ 10^{G2/10}+ ... + 10^{GN/10})/N_{ANT}] dBi



1.3. Description of Antenna RF Port





2. **RF Exposure Evaluation**

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency Range	Electric Field	Magnetic Field	Power Density	Average Time		
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm ²)	(Minutes)		
(A) Limits for Occupational/ Control Exposures						
300-1500			f/300	6		
1500-100,000			5	6		
(B) Limits for General Population/ Uncontrolled Exposures						
300-1500			f/1500	6		
1500-100,000			1	30		

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

f= Frequency in MHz

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

Pd is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



2.2. Test Result of RF Exposure Evaluation

Product	GigaSpire	
Test Item	RF Exposure Evaluation	

Antenna Gain: Refer to clause 1.2.

Test Mode	Frequency	Maximum	Safety	Power Density	Limit of Power
	Band	EIRP	Distance	(mW/cm ²)	Density
	(MHz)	(dBm)	(cm)		(mW/cm ²)
802.11b/g/n/ax	2412 ~ 2462	34.14	27	0.2832	1
802.11 a/n/ac/ax	5180 ~ 5240	35.81	27		
	5260 ~ 5320			0.4160	1
	5500 ~ 5720				
	5745 ~ 5825				

CONCLUSION:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously.

The max Power Density at R (27 cm) = 0.2832mW/cm² + 0.4160mW/cm² = 0.6992mW/cm² < 1mW/cm².

So the safety distance is 27cm for device installed without any other radio equipment.



Appendix A - EUT Photograph

Refer to "191RSU033-UE" file.