

RF Exposure Evaluation Declaration

FCC ID: 2ABLK-BLASTU4X

Applicant: Calix Inc.

Application Type: CLASS II PERMISSIVE CHANGE

Product: GigaSpire BLAST u4, GigaSpire Mesh BLAST u4m


Model No.: GigaSpire BLAST u4, GigaSpire Mesh BLAST u4m

Brand Name: 

FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)

Test Procedure(s): KDB 447498 D01v06

Test Date: August 21, 2020

Reviewed By: 
(Kevin Guo)

Approved By: 
(Robin Wu)



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
2006RSU066-U7	Rev. 01	Initial report	09-17-2020	Valid

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General Information

Applicant:	Calix Inc.
Applicant Address:	1035 N. McDowell Blvd Petaluma, CA94954 U.S.A
Manufacturer:	Calix Inc.
Manufacturer Address:	1035 N. McDowell Blvd Petaluma, CA94954 U.S.A
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is an FCC accredited testing laboratory (MRT Designation No. CN1166) on the FCC website.
- MRT facility is an ISED recognized testing laboratory (MRT Reg. No. CN0001) on the ISED website.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the A2LA under the A2LA Program (Cert. No. 3628.01) and CNAS under the CNAS Program (Cert. No. L10551) in EMC, Safety, Radio, Telecommunications and SAR testing.

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.


1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	GigaSpire BLAST u4, GigaSpire Mesh BLAST u4m
Model No.:	GigaSpire BLAST u4, GigaSpire Mesh BLAST u4m
Brand Name:	
Wi-Fi Specification:	802.11a/b/g/n/ac/ax/VHT
Serial No.:	262007039756 (Radiated Emission & AC Line Conducted Emission) 262007039695 (Conducted)
Accessory	
Switching Mode Power Adapter:	MODEL: F24L9-120200SPAU INPUT: 100-240V~50/60Hz 0.6A OUTPUT: 12V=2A

Note: Between the models, there are the same schematics design, same PCB layout and the same RF parameters except the difference as below (Section 2.2), and GigaSpire BLAST u4 was selected for all RF test.

2.2. Models Difference

Model name	Difference
GigaSpire BLAST u4	2 LAN ports, 1 WAN port, 1 USB, 2.4G/5G Wi-Fi, external PSU
GigaSpire Mesh BLAST u4m	1 WAN port, 2.4G/5G Wi-Fi, external PSU

2.3. Description of Available Antennas

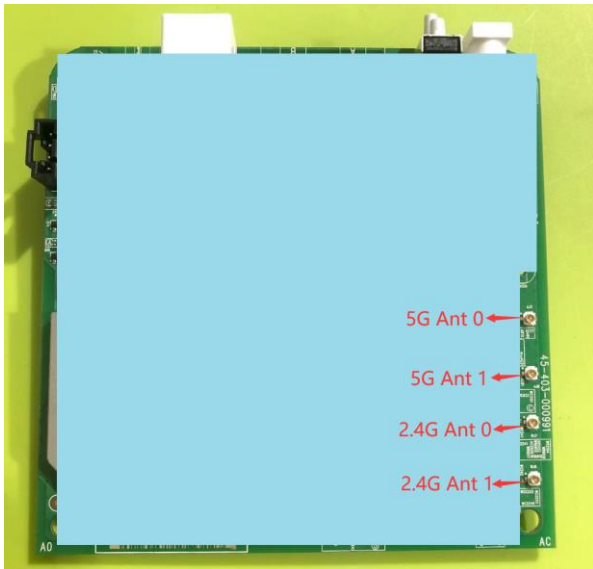
Model name	Manufacturer	Tx Port	Frequency Band (MHz)	Cable length (mm)
2.4G-2_PCB-LY70FC1	CHANGSHU HONGBO TELECOMMUNICATION TECHNOLOGY CO., LTD.	2.4G Ant 0	2412~2462	70
2.4G-1_PCB-LE160FC3		2.4G Ant 1	2412~2462	160
RFPCA252302IM5B301	WALSIN TECHNOLOGY CORPORATION	5G Ant 0	5150~5850	30
RFPCA252312IM5B301		5G Ant 1	5150~5850	125

Antenna Type	Frequency Band (MHz)	Tx Paths	Directional Gain (dBi)
			CDD & Beamforming
PCB Antenna	2412 ~ 2462	2	5.84
	5150 ~ 5350	2	5.81
	5470 ~ 5725	2	5.93
	5725 ~ 5850	2	5.95

Note 1: The EUT supports Cyclic Delay Diversity (CDD) and Beamforming technology, and the Beamforming mode support 802.11ac/ax, not include 802.11a/b/g. It transmits signals that are correlated, then Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ 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.

Note 2: All the messages as above are provided by manufacturer.

2.4. Description of Antenna RF Port

Antenna RF Port				
Software Control Port	2.4GHz RF Port		5GHz RF Port	
	Ant 0	Ant 1	Ant 0	Ant 1
				

3. RF Exposure Evaluation

3.1. 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)

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)
(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

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d 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.

3.2. Test Result of RF Exposure Evaluation

Product	GigaSpire BLAST u4
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 2.3.

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Safety Distance (cm)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
802.11b/g/n/ax/VHT	2412 ~ 2462	35.73	27	0.4084	1
802.11a/n/ac/ax	5180 ~ 5240 5260 ~ 5320 5500 ~ 5720 5745 ~ 5825	34.35	27	0.2972	1

Note: Based on the original report 2006RSU066-U3 to add U-NII-2a/-2c bands in this report.

CONCLUSION:

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

The max Power Density at R (27 cm) = $0.4084\text{mW/cm}^2 + 0.2972\text{mW/cm}^2 = 0.7056\text{mW/cm}^2 < 1\text{mW/cm}^2$.

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

_____ The End _____

Appendix A - EUT Photograph

Refer to "2006RSU066-UE" file.