SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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RF Exposure Evaluation Report

Application No.:	SZEM1706006801CR
Applicant:	Creative Labs Inc.
Address of Applicant:	31 International Business Park #03-01 CREATIVE RESOURCE SINGAPORE 609921
Manufacturer:	Creative Labs Pte. Ltd.
Address of Manufacturer:	31 International Business Park #03-01 CREATIVE RESOURCE SINGAPORE 609921
Equipment Under Test (EUT):	
Product Name:	Creative X-Fi Sonic Carrier
Model No.(EUT):	MF8235
FCC ID:	IBAMF8235
Trade mark:	CREATIVE
Standards:	47 CFR Part 1.1307 (2016) 47 CFR Part 1.1310 (2016)
Date of Receipt:	2017-07-03
Date of Test:	2017-07-11 to 2017-07-18
Date of Issue:	2017-07-21
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-07-21		Original

Authorized for issue by:				
		Vincent Chen		
		Vincent Chen /Project Engineer		
		Eric Fu		
		Eric Fu /Reviewer		

3 Contents

4 General Information

4.1 General Description of EUT

Product Name:	Creative X-Fi Sonic Carrier
Model No.:	MF8235
Trade mark:	CREATIVE
Power supply:	AC 120V/60Hz
Cable:	AC cable for MF8235: 162cm unshielded with on ferrite core
For BLE:	
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V 4.0 Dual mode +EDR (CDW-B18821A-00)
	This report is for BLE
Modulation Type:	GFSK
Number of Channel:	40
Antenna Type:	PIFA*1
Antenna Gain:	3.0dBi
For BT:	
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V 4.1 single mode +EDR (BM880) V 4.0 Dual mode +EDR (CDW-B18821A-00)
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Antenna Type:	PIFA
Antenna Gain:	3dBi
For 2.4G proprietry (DWAM83):	
Operation Frequency:	2402MHz~2483.5MHz
Modulation Type:	DSSS
Number of Channel:	3
Channel Separation:	26MHz
Sample Type:	Fixed production
Antenna Type:	Internal*2
Antenna Gain:	2.0dBi
For 5.8G proprietry (DWAM83):	
Frequency range	5736 MHz -5814 MHz

Modulation Type:	DSSS
Number of Channel:	3
Antenna type:	internal
Antenna gain:	3dBi
For 2.4G wifi:	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type:	PIFA
Antenna Gain:	3.0dBi
For 5G wifi: (LS9-AC11DBT, CDW-B18821A-00)	
Operation Frequency:	Band / Mode / Frequency Range(MHz) / Number of channels UNII Band I / IEEE 802.11a / 5180-5240 / 4 UNII Band I / IEEE 802.11n/ac 20MHz / 5180-5240 / 4 UNII Band I / IEEE 802.11n/ac 40MHz / 5190-5230 / 2 UNII Band I / IEEE 802.11ac 80MHz / 5210 / 1 UNII Band III / IEEE 802.11a / 5745-5825 / 5 UNII Band III / IEEE 802.11n/ac 20MHz / 5745-5825 / 5 UNII Band III / IEEE 802.11n/ac 40MHz / 5755-5795 / 2 UNII Band III / IEEE 802.11ac 80MHz / 5775 / 1
	* The 5600-5650MHz can not be used.
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)
Antenna type:	PIFA
Antenna gain:	4dBi

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 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)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) 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

Friis Formula

Friis transmission 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

Pd id the limit of MPE, 1 mW/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.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure

For BLE / BT (CDW-B18821A-00)

Antenna Gain: 3.00dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.00 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
Middle	2441MHz	3.69	2.34	0.0009	1.0	0.0009	PASS

Note: Refer to report No. SZEM170200069901 and SZEM170200069902 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BT (DM880)

Antenna Gain: 3.00dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.00 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
High	2480MHz	3.97	2.49	0.001	1.0	0.001	PASS

Note: Refer to report No. SZEM170200069902 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G proprietry (DWAM83)

Antenna Gain: 2.00dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
Lowest	2412MHz	16.31	42.76	0.013	1.0	0.013	PASS

Note: Refer to report No. SZEM170200069903 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G WIFI (CDW-B18821A-00)

Antenna Gain: 3.00dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.00 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
High	2462MHz	18.78	75.51	0.030	1.0	0.030	PASS

Note: Refer to report No. SZEM170200069904 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G WIFI (LS9-AC11DBT)

Antenna Gain: 3.00dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.00 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
Lowest	2422MHz	19.55	90.16	0.036	1.0	0.036	PASS

Note: Refer to report No. SZEM170200069904 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5GHz (CDW-B18821A-00)

Antenna Gain: 4.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.51 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Band I

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
48	5230 MHz	13.56	22.70	0.011	1.0	0.011	PASS

Note: Refer to report No. SZEM170200069905 for EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

Band III

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
165	5825 MHz	12.01	15.89	0.008	1.0	0.008	PASS

Note: Refer to report No. SZEM170200069905 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5GHz (LS9-AC11DBT)

Antenna Gain: 4.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.51 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Band I

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
48	5230 MHz	17.19	52.36	0.026	1.0	0.026	PASS

Note: Refer to report No. SZEM170200069905 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

Band III

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	MPE Ratios	Result
153	5755 MHz	17.58	57.28	0.029	1.0	0.029	PASS

Note: Refer to report No. SZEM170200069905 for EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5.8GHz (Model:MF8235)

Antenna Gain: 3.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.00 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
5736	8.49	7.06	0.003	1.0	PASS

Note: Refer to report No. SZEM170600680102 EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

1）. exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test is not required, because the Max. sum of the MPE ratios for BT/BLE, 2.4G proprietry, 2.4G WIFI, 5G WIFI and 5.8G proprietry is

0.0009+0.001+0.013+0.030+0.036+0.011+0.029+0.003=0.123＜1.