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RF Exposure Evaluation Report

Application No.:SZEM1707007782CRApplicant:Creative Labs Inc.Manufacturer:Creative Labs Pte. Ltd.Product Name:Creative X-Fi Sonic Carrier

Model No.(EUT): MF8235 FCC ID: IBAMF8235

Standards: 47 CFR Part 1.1307 (2016) 47 CFR Part 1.1310 (2016)

Date of Receipt: 2017-07-31

Date of Test: 2017-08-09 to 2017-08-28

Date of Issue: 2017-08-29

Test Result : PASS*

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



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.

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2 Version

	Revision Record								
Version	Chapter	Date	Modifier	Remark					
01		2017-08-29		Original					

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



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4 General Information

4.1 Client Information

Applicant:	Creative Labs Inc.				
Address of Applicant:	1901 McCarthy Blvd., Milpitas, California United States				
Manufacturer:	Creative Labs Pte. Ltd.				
Address of Manufacturer:	31 International Business Park #03-01 CREATIVE RESOURCE SINGAPORE 609921				

4.2 General Description of EUT

Product Name:	Creative X-Fi Sonic Carrier
Model No.:	MF8235
Trade mark:	CREATIVE
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:	2412MHz~2464MHz
Modulation Type:	DSSS
Number of Channel:	3
Channel Separation:	26MHz
Sample Type:	Fixed production
Antenna Type:	Internal*2

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Antenna Gain:	2.0dBi							
For 2.4G wifi:								
(LS9-AC11DBT, CDW- B18821A-00)								
Operation Frequency:	IEEE 802.1	1b/g/n(HT20): 2412MHz to 24	162MHz					
	IEEE 802.1	1n(HT40): 2422MHz to 2452M	ИНz					
Channel Numbers:		1b/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)							
		02.11g : OFDM(64QAM, 16QA						
)2.11n(HT20 and HT40) : OF[DM (64QAM, 16QA	λM,				
	QPSK,BPS	SK)						
Antenna Type:	PIFA							
Antenna Gain:	3.0dBi							
For 5G wifi:								
(LS9-AC11DBT, CDW- B18821A-00)								
·	Band	Mode	Frequency Range(MHz)	Number of channels				
	UNII	IEEE 802.11a	5180-5240	4				
	Band I	IEEE 802.11n/ac 20MHz	5180-5240	4				
Operation Frequency:		IEEE 802.11n/ac 40MHz	5190-5230	2				
·		IEEE 802.11ac 80MHz	5210	1				
	UNII	IEEE 802.11a	5745-5825	5				
	Band III	IEEE 802.11n/ac 20MHz	5745-5825	5				
		IEEE 802.11n/ac 40MHz	5755-5795	2				
		IEEE 802.11ac 80MHz	5775	1				
Type of Modulation:		1a: OFDM(BPSK/QPSK/16Q/	•					
		1n: OFDM(BPSK/QPSK/16Q/	,	> A P 4)				
A		1ac: OFDM (BPSK/QPSK/16	QAM/64QAM/2560	QAM)				
Antenna type:	PIFA							
Antenna gain:	4dBi							
For Define 5.8GHz (DWAM83):								
Frequency range	5736 MHz -	-5814 MHz						
Channel Numbers:	Define 5.80	GHz						
Modulation Type	DSSS							
Sample Type:	Fixed produ	uction						
Antenna type:	internal							

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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.

VCC

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 –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• 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.



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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 Magnetic field strength strength (V/m) (A/m)		Power density (mW/cm²)	Averaging time (minutes)					
(A) Limits for Occupational/Controlled Exposures									
0.3–3.0 3.0–30 30–300 300–1500 1500–100,000	614 1842/f 61.4	1.63 4.89/f 0.163	*(100) *(900/f²) 1.0 f/300 5	6 6 6 6					
(B) Limits	for General Populati	on/Uncontrolled Exp	oosure						
0.3–1.34 1.34–30 30–300 300–1500 1500–100,000	614 824/f 27.5	1.63 2.19/f 0.073	*(100) *(180/f²) 0.2 f/1500 1.0	30 30 30 30 30					

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R²)

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.



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4.1.3 EUT RF Exposure Evaluation

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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
			(,	(,			

Note: Refer to report No. SZEM170700778201 and SZEM170700778202 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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
High	2480MHz	4.0	2.51	0.001	1.0	0.001	PASS

Note: Refer to report No. SZEM170700778201 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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
Lowest	2412MHz	17.0	50.10	0.016	1.0	0.016	PASS

Note: Refer to report No. SZEM170700778204 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.

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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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
High	2462MHz	18.0	63.10	0.025	1.0	0.025	PASS

Note: Refer to report No. SZEM170700778203 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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
High	2452MHz	20.0	100.00	0.040	1.0	0.040	PASS

Note: Refer to report No. SZEM170700778203 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	Max Conducted	Output Power	ower Power Density		MPE	Result
(MHz)	Peak Output	to Antenna at R = 20 cm			Ratios	
	Power (dBm)	(mW)	(mW/cm ²)			
5736	5.0	3.16	0.001	1.0	0.001	PASS

Note: Refer to report No. SZEM170700778207 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.



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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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output Power (dBm)	to Antenna (mW)	at R = 20 cm (mW/cm ²)		Ratios	
48	5230 MHz	14.0	25.1	0.013	1.0	0.013	PASS

Note: Refer to report No. SZEM170700778205 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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm ²)			
165	5825 MHz	12.0	14.8	0.008	1.0	0.008	PASS

Note: Refer to report No. SZEM170700778205 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	Max Conducted	Output Power	Power Density	Limit	MPE	Result
	(MHz)	Peak Output	to Antenna	at R = 20 cm		Ratios	
		Power (dBm)	(mW)	(mW/cm²)			
48	5230 MHz	18.0	63.1	0.032	1.0	0.032	PASS

Note: Refer to report No. SZEM170700778205 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.



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Band III

Channel	Frequency (MHz)	Max Conducted Peak Output	Output Power to Antenna	Power Density at R = 20 cm	Limit	MPE Ratios	Result
		Power (dBm)	(mW)	(mW/cm²)			
153	5755 MHz	18.0	63.1	0.032	1.0	0.032	PASS

Note: Refer to report No. SZEM170700778205 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.

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 and 5G WIFI is 0.001+0.001+0.016+0.040+0.025+0.001+0.013+0.032=0.129<1