Shanghai MXCHIP Information Technology Co.,Ltd

Embedded WiFi module
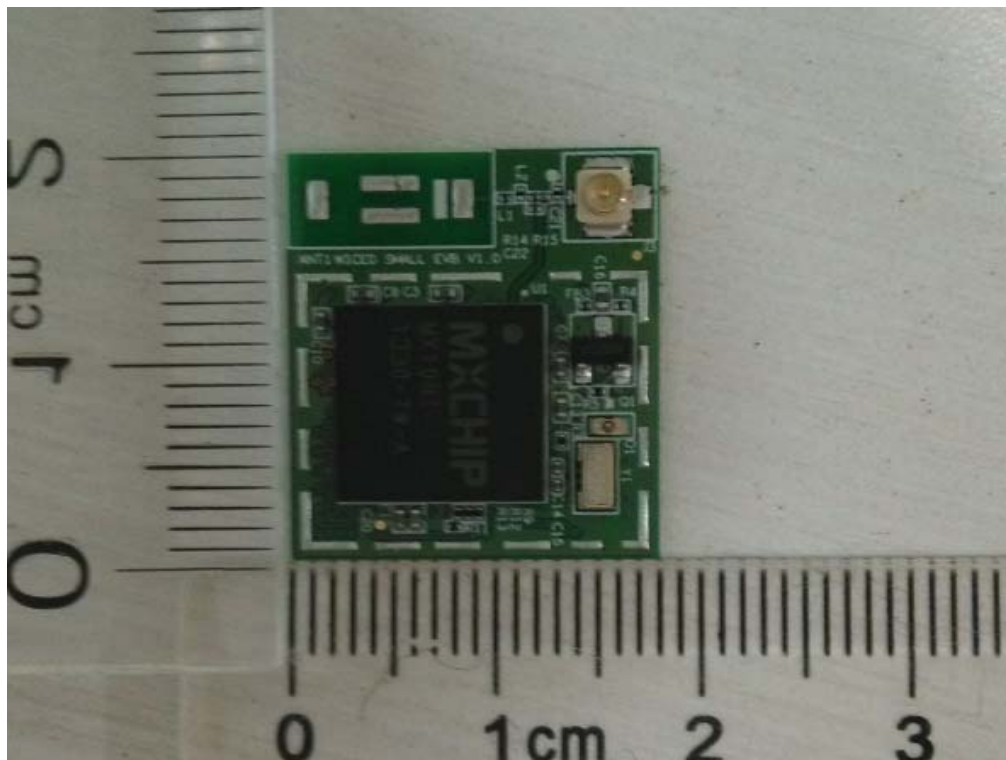
Main Model: EMW3161
Serial Model: EMW3161-E,EMW3161-C

December 20, 2013
Report No.: 13020739-FCC-H1-V2
(This report supersedes NONE)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:

William Long	*Alex.Liu*	
William Long	**Alex Liu**	
Compliance Engineer	**Technical Manager**	

This test report may be reproduced in full only.
Test result presented in this test report is applicable to the representative sample only.

RF Exposure Evalution Report

To: FCC 2.1091: 2013

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Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management through out a project. Our extensive experience with China, Asia Pacific, North America, European, and international compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC , RF/Wireless , Telecom
Canada	EMC, RF/Wireless , Telecom
Taiwan	EMC, RF, Telecom , Safety
Hong Kong	RF/Wireless ,Telecom
Australia	EMC, RF, Telecom , Safety
Korea	EMI, EMS, RF , Telecom, Safety
Japan	EMI, RF/Wireless, Telecom
Singapore	EMC , RF , Telecom
Europe	EMC, RF, Telecom , Safety

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1. EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the Shanghai MXCHIP Information Technology Co.,Ltd, Embedded WiFi module and model: EMW3161against the current Stipulated Standards. The Embedded WiFi module has demonstrated compliance with the FCC 2.1091: 2013.

EUT Information	
EUT Description :	**Embedded WiFi module**
Main Model :	**EMW3161**
Serial Model	**EMW3161-E,EMW3161-C**
Antenna Gain :	**PCB Antenna: 2dBi** **IPEX antenna: 2dBi**
Input Power :	**Voltage Range: 3.0 ~ 3.6V DC**
Maximum Conducted Peak Power to Antenna :	**802.11b:15.29 dBm** **802.11g:12.33 dBm** **802.11n:11.82 dBm**
Classification Per Stipulated Test Standard :	**FCC 2.1091: 2013**

Note: the EMW3161 Serial included two Models（EMW3161-E and EMW3161-C. All models have the same constructions, circuit diagram and PCB layout.EMW3161-E used external antenna, EMW3161-P used PCB antenna, like all the other.

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2. TECHNICAL DETAILS

Purpose	Compliance testing of Embedded WiFi module with stipulated standard
Applicant / Client	Shanghai MXCHIP Information Technology Co.,Ltd Room811,Tongpu Building,No.1220,Tongpu Road,Shanghai,China
Manufacturer	Shanghai MXCHIP Information Technology Co.,Ltd Room811,Tongpu Building,No.1220,Tongpu Road,Shanghai,China
Laboratory performing the tests	SIEMIC (Nanjing-China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel: +86(25)86730128/86730129 Fax: +86(25)86730127 Email: China@siemic.com.cn
Test report reference number	13020739-FCC-H1-V2
Date EUT received	September 11, 2013
Standard applied	FCC 2.1091: 2013
Dates of test	October 19 to December 20, 2013
No of Units	#1
Equipment Category	DTS
Trade Name	MXCHIP
RF Operating Frequency (ies)	WIFI: 802.11b/g/n: 2412-2462 MHz
Number of Channels	802.11b/g /n: 11CH
Modulation	CCK/OFDM
FCC ID	P53-EMW3161

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3. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FCC §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	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

Test Data

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S = power density (in appropriate units, e.g. mW/cm2)
    P = power input to the antenna (in appropriate units, e.g., mW).
    G = power gain of the antenna in the direction of interest relative to an isotropic radiator,
        the power gain factor, is normally numeric gain.
    R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

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Note: base on different type antenna and their gain, the bellow result is the worst case.

802.11b:

Maximum peak output power at antenna input terminal: 15.29 (dBm)
Maximum peak output power at antenna input terminal: 33.81 (mW)

Prediction distance: >20 (cm)
Predication frequency: 2412 (MHz)
Antenna Gain (typical): 2 (dBi)
Antenna Gain (typical): 1.585 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.011 (mW/cm2)
MPE limit for general population exposure at prediction frequency: 1.0 (mW/cm2)

0.011(mW/cm2) < 1.0(mW/cm2)

802.11g:

Maximum peak output power at antenna input terminal: 12.33 (dBm)
Maximum peak output power at antenna input terminal: 17.10 (mW)

Prediction distance: >20 (cm)
Predication frequency: 2412 (MHz)
Antenna Gain (typical):2 (dBi)
Antenna Gain (typical): 1.585 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.005 (mW/cm2)
MPE limit for general population exposure at prediction frequency:1.0 (mW/cm2)

0.005(mW/cm2) < 1.0(mW/cm2)

802.11n:

Maximum peak output power at antenna input terminal: 11.82 (dBm)
Maximum peak output power at antenna input terminal: 15.21(mW)

Prediction distance: >20 (cm)
Predication frequency: 2412 (MHz)
Antenna Gain (typical):2 (dBi)
Antenna Gain (typical): 1.585 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.005 (mW/cm2)
MPE limit for general population exposure at prediction frequency: 1.0 (mW/cm2)

0.005(mW/cm2) < 1.0(mW/cm2)

Result: Pass