



RF Exposure evaluation

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FCC ID..... : 2AGYM-M7

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Applicant's name.....: SHENZHEN MEIDI ELECTRONIC CO.,LTD.

Address.....: 12th Floor, Building C3, i Park, No.1001 Xueyuan Road, Xi Li Town, Nanshan District, Shenzhen, China

Test specification :

47CFR §1.1310

Standard: **47CFR §2.1091**

KDB447498 v05r02

TRF Originator.....: Shenzhen CTA Testing Technology Co., Ltd.

Master TRF.....: Dated 2014-12

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Test item description: Intelligent projector

Trade Mark: MDI

Manufacturer: **SHENZHEN MEIDI ELECTRONIC CO.,LTD.**

Model/Type reference.....: M7

Listed Models: M1

support.....: WIFI,BT4.0

Operation Frequency.....: From 2402MHz to 2480MHz

Exposure category.....: General population/uncontrolled environment

Rating: DC3.7V

Result.....: **PASS**

TEST REPORT

Test Report No. : CTA151200103	Dec 17, 2015
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Equipment under Test : Intelligent projector

Model /Type : M7

Listed Models : M1

Applicant : **SHENZHEN MEIDI ELECTRONIC CO.,LTD.**

Address : 12th Floor,Building C3,i Park,No.1001 Xueyuan Road,Xi Li Town,Nanshan District,Shenzhen,China

Manufacturer : **SHENZHEN MEIDI ELECTRONIC CO.,LTD.**

Address : 12th Floor,Building C3,i Park,No.1001 Xueyuan Road,Xi Li Town,Nanshan District,Shenzhen,China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY

1.1. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
<input type="radio"/>		Shield :	/
<input type="radio"/>		Detachable :	/

2. TEST ENVIRONMENT

2.1. Address of the test laboratory

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055, P. R. China.

2.2. Test Facility

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

FCC-Registration information:

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. 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 406086, valid time is until October 28, 2017.

2.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

2.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. Method of measurement

3.1. 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.

KDB447498 v05r02: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

3.2. Requirement

Systems operating under the provisions of FCC 47 CFR 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.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3.3. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

*=Plane-wave equivalent power density

3.4. Conducted Power Results

WiFi

Mode	Channel	Frequency (MHz)	Worst case Data rate	Conducted Output Power (dBm)	
				Peak	Average
802.11b	1	2412	1Mbps	16.53	13.09
	6	2437	1Mbps	16.87	13.34
	11	2462	1Mbps	15.74	12.27
802.11g	1	2412	6Mbps	16.53	11.47
	6	2437	6Mbps	16.81	11.85
	11	2462	6Mbps	15.74	10.74
802.11n HT20	1	2412	6.5 Mbps	15.64	10.61
	6	2437	6.5 Mbps	15.82	10.74
	11	2462	6.5 Mbps	15.43	10.39

BT4.0

Mode	Channel	Frequency (MHz)	Data rate	Conducted Output Power (dBm)	
				Peak	Average
GFSK-LE	0	2402	1 Mbps	-6.66	-8.18
	19	2440	1 Mbps	-7.98	-9.43
	39	2480	1 Mbps	-6.54	-8.07

Manufacturing tolerance

WiFi

IEEE 802.11b (Average)			
Frequency	2412	2437	2462
Target (dBm)	13.0	13.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11g (Average)			
Frequency	2412	2437	2462
Target (dBm)	11.0	11.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Frequency	2412	2437	2462
Target (dBm)	10.0	10.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0

BT

GFSK-LE (Average)			
Frequency	2402	2440	2480
Target (dBm)	-9.0	-9.0	-9.0
Tolerance ±(dB)	1.0	1.0	1.0

3.5. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

As declared by the Applicant, the EUT transmits with the maximum source-based Duty Cycle of 100%-see the User manual, and the EUT is a wireless device used in a mobile application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum mobile separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna is 0.3dBi for WLAN and BT, and the power drift from Turn-up Procedure provide by manufacturer as following states, the RF power density can be obtained.

4. Test Result

3.4.1 Standalone MPE

For 802.11b

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	14.00	25.1189	1.0715	0.0054	1.0000	PASS
2437	20.00	14.00	25.1189	1.0715	0.0054	1.0000	PASS
2462	20.00	14.00	25.1189	1.0715	0.0054	1.0000	PASS

For 802.11g

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	12.00	15.8489	1.0715	0.0034	1.0000	PASS
2437	20.00	12.00	15.8489	1.0715	0.0034	1.0000	PASS
2462	20.00	12.00	15.8489	1.0715	0.0034	1.0000	PASS

For 802.11n HT20

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	11.00	12.5893	1.0715	0.0027	1.0000	PASS
2437	20.00	11.00	12.5893	1.0715	0.0027	1.0000	PASS
2462	20.00	11.00	12.5893	1.0715	0.0027	1.0000	PASS

For GFSK-LE

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2402	20.00	-8.00	0.1585	1.0715	0.00003	1.0000	PASS
2440	20.00	-8.00	0.1585	1.0715	0.00003	1.0000	PASS
2480	20.00	-8.00	0.1585	1.0715	0.00003	1.0000	PASS

3.4.2 Simultaneous transmission MPE Considerations

According to KDB447498 :For mobile exposure host platform to qualify for simultaneous transmission MPE test exclusion, all transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1. Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

$$\sum \text{ of MPE ratios } \leq 1.0$$

The WiFi and BT modular share same antenna, without any simultaneous transmission, so not need consider simultaneous transmission.

5. Conclusion

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

.....End of Report.....