



TEST REPORT

No. I18D00012-SAR01

For

Client : Shanghai BroadMobi Communication

Technology Co., Ltd.

Production : LTE Wireless Module

Model Name : BM817C

FCC ID: 2AON8-BM817C

Hardware Version: P700A_MB_V1.0

Software Version: M1.0.3_E1.0.0_A1.0.2

Issued date: 2018-03-08

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

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Revision Version

Report Number	Revision	Date	Memo
I18D00012-SAR01	00	2018-02-11	Initial creation of test report
I18D00012-SAR01	01	2018-03-08	Second creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Project Data

Project Leader:	Ning Kang
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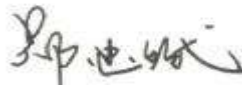
1.3. Signature



Yan Hang
(Prepared this test report)



Fu Erliang
(Reviewed this test report)



Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Shanghai BroadMobi Communication Technology Co., Ltd.
Address /Post: 15F,Building9,No99.Tianzhou Rd.,Xuhui District,Shanghai,P.R.China
Telephone: 021-60913308-816

2.2. Manufacturer Information

Company Name: Huizhou Dubon Industrial Co.,Ltd
Address /Post: North of Lian Fa Rd Tong Hu Economic Zone, Huizhou City,
Guangdong Province ,P.R. China
Telephone: N/A

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	LTE Wireless Module
Model name	BM817C
GSM Frequency Band	GSM850/1900
WCDMA Frequency Band	WCDMA Band 2/4/5
LTE Frequency Band	LTE Band2/4/5/12/17
Antenna Type	External Antenna
FCC ID:	2AON8-BM817C

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version:	Date of receipt
N01	N/A	P700A_MB_V1.0	M1.0.3_E1.0.0_A1.0.2	2018.01.25

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
N/A	N/A	N/A	N/A	N/A

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Applicable Standards

The MPE report was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2.1091.

The limits standard is based on the Council Recommendation 1999/519/EC.

FCC CFR 47, Part 2, FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

Section 1.1310 Radiofrequency radiation exposure limits

4.2. Test Limits

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

Limits for Occupational / Controlled Exposure

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm ²]	Averaging Times E ² , H ² or S [minutes]
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1824/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	--	--	F/300	6
1500 - 100000	--	--	5	6

Limits for General Population / Uncontrolled Exposure

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm ²]	Averaging Times E ² , H ² or S [minutes]
0.3 – 1.34	614	1.63	(100)*	30
1.34 – 30	824/f	2.19/f	(180/f)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	--	--	F/1500	30
1500 - 100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

For the DUT, the limits for General Population / Uncontrolled Exposure are applicable.

5. Test Results

5.1. RF Power Output

Frequency Band	Max power(dBm)	Highest Frame-Averaged Output Power (dBm)	Antenna Gain(dBi)
GSM850	32.0	22.97	1.32
GSM1900	28.0	18.97	-1.95
WCDMA Band II	24.0	24.0	-1.95
WCDMA Band IV	23.0	23.0	-0.52
WCDMA Band V	24.0	24.0	1.32
LTE Bnad2	23.0	23.0	-1.95
LTE Bnad4	23.0	23.0	-0.52
LTE Bnad5	23.0	23.0	1.32
LTE Bnad12	23.0	23.0	1.54
LTE Bnad17	23.0	23.0	1.54

5.2. Duty cycle

Mode	Duty Cycle
GSM	1:8.3
WCDMA	1:1
LTE	1:1

5.3. Calculation Information

For conservative evaluation consideration, only maximum power of each frequency band based on the tighter limits respectively are used to calculate the boundary power density.

Based on the FCC KDB 447498 D01 and 47 CFR §2.1091, the DUT is evaluated as a mobile device.

$$\text{Given } S = \frac{P \times G}{4\pi d^2}$$

Equation 1

Where

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

5.4. Result of GSM850

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 824.2-848.8MHz; as per the original test report the highest power is 198.15mW,. The maximum gain is 1.32dBi(numeric gain 1.355).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 198.15 * 1.355 / (4 * \pi * 20^2) = 0.053 \text{mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = F / 1500 = 824.2 / 1500 = 0.549 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.5. Result of GSM1900

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1850.2-1909.8MHz; as per the original test report the highest power is 78.89mW,. The maximum gain is -1.95dBi(numeric gain 0.638).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 78.89 * 0.638 / (4 * \pi * 20^2) = 0.01 \text{mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.6. Result of WCDMA Band II

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1852.4-1907.6 MHz; as per the original test report the highest power is 251.19mW,. The maximum gain is -1.95dBi(numeric gain 0.638).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 251.19 * 0.638 / (4 * \pi * 20^2) = 0.032 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.7. Result of WCDMA Band IV

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1710-1755 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is -0.52dBi(numeric gain 0.887).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 199.53 * 0.887 / (4 * \pi * 20^2) = 0.035 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.8. Result of WCDMA Band V

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 826.4-846.6MHz; as per the original test report the highest power is 251.19mW,. The maximum gain is 1.32dBi(numeric gain 1.355).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 251.19 * 1.355 / (4 * \pi * 20^2) = 0.068 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = F / 1500 = 826.4 / 1500 = 0.551 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.9. Result of LTE Band2

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1850 – 1910 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is -1.95dBi(numeric gain 0.638).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 199.53 * 0.638 / (4 * \pi * 20^2) = 0.025 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.10. Result of LTE Band4

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 1710 – 1755 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is -0.52dBi(numeric gain 0.887).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 199.53 * 0.887 / (4 * \pi * 20^2) = 0.035 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = 1 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.11. Result of LTE Band5

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 824 – 849 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is 1.32dBi(numeric gain 1.355).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P * G / (4 * \pi * R^2) = 199.53 * 1.355 / (4 * \pi * 20^2) = 0.054 \text{ mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = F / 1500 = 824 / 1500 = 0.549 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.12. Result of LTE Band12

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 698 – 716 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is 1.54dBi(numeric gain 1.426).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P \cdot G / (4 \pi R^2) = 199.53 \cdot 1.426 / (4 \cdot \pi \cdot 20^2) = 0.057 \text{mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = F/1500 = 698/1500 = 0.465 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

5.13. Result of LTE Band17

Test Results: MPE Limit Calculation: the EUT's operating frequencies @ 704 – 716 MHz; as per the original test report the highest power is 199.53mW,. The maximum gain is 1.54dBi(numeric gain 1.426).The resulted power density at a distance of 20cm can be deducted as follows:

$$\text{Power Density} = P \cdot G / (4 \pi R^2) = 199.53 \cdot 1.426 / (4 \cdot \pi \cdot 20^2) = 0.057 \text{mW/cm}^2$$

The MPE limit for Occupational/Controlled Exposure is shown in the FCC KDB 447498 D01 and 47 CFR §2.1091, can be calculated as follows:

$$\text{MPE limit} = F/1500 = 704/1500 = 0.469 \text{mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore the DUT in this band is compliant with the FCC rules on RF exposure.

Note: $\pi=3.1416$

So the product is under the MPE limits. All is pass.

*****END OF REPORT*****