

TEST REPORT

of

FCC/IC MPE REQUIREMENT

Product : Bluetooth 5.2 Module

Brand Name: Fanstel

Model: BM840; BM840P

Model Difference: Antenna difference

Applicant: Fanstel Corporation, Taipei

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Test Performed by:

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Report No.: **ISL-22LR0022FMPE**
Issue Date :**2022/02/09**



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification.

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VERIFICATION OF COMPLIANCE

Applicant: Fanstel Corporation, Taipei
Product Description: Bluetooth 5.2 Module
Brand Name: Fanstel
Model No.: BM840; BM840P
Model Difference: Antenna difference
Date of test: 2022/01/18 ~ 2022/02/08
Date of EUT Received: 2022/01/18

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:

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Date:

2022/02/09

Weitin Chen / Senior Engineer

Prepared By:

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Date:

2022/02/09

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1. Description of Equipment under Test (EUT)

General:

Product Name:	Bluetooth 5.2 Module
Brand Name:	Fanstel
Model Name:	BM840; BM840P
Model Difference:	Antenna difference
Power Supply:	5Vdc from USB (JIG)
USB port	one (JIG)

Model Summaries:

module	BM840	BM840P
Flash/RAM	1MB/256KB	1MB/256KB
Size	10.2x15x1.9mm	10.2x15x1.9mm
GPIO	32	32
Antenna	PCB Trace	Pads for external
Availability	Sample	Sample

Frequency Range	2402 – 2480MHz
Bluetooth Version	V5.2
Channel Number	40 channels, 2MHz step
Modulation Type	GFSK
Tune-up Power	7.969 dBm
Power Tolerance	+/- 2 dBm
Dwell Time	N/A
Antenna Designation:	BM840 : PCB Antenna, 1.54 dBi BM840P : Dipole Antenna, 6 dBi

2. Maximum Permissible Exposure (MPE)

2.1 Standard Applicable

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

This is a Mobile device, the MPE is required.

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

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 (minute)
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
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

According to RSS 102 issue 5.

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

3. Evaluation Result:

FCC:

20 cm

Model	Frequency band	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (mW/cm ²)	LIMIT (mW/cm ²)
BM840	2402-2480 BLE	7.969	1.54	2	11.509	0.00281598	1
BM840P	2402-2480 BLE	7.969	6	2	15.969	0.00786376	1

$$\text{Max Power(mW)} = 10^{((\text{Max Power(dBm)} + \text{Tune-up tolerance(dB)}) / 10)}$$

$$\text{Result} = \text{Max Power (mW)} / \text{min. distance(mm)} * \sqrt{f(\text{GHz})}$$

IC EIRP level:

20 cm

Model	Frequency band	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (W/m ²)	LIMIT (W/m ²)
BM840	2402-2480 BLE	7.969	1.54	2	11.509	0.028	5.35
BM840P	2402-2480 BLE	7.969	6	2	15.969	0.079	5.35

~ End ~