TEST REPORT

of

FCC/IC MPE REQUIREMENT

Product :	**Bluetooth 5.0 Module**
Brand Name:	**Fanstel**
Model:	**BT840XEE**
Model Difference:	**N/A**
Applicant:	**Fanstel Corporation, Taipei**
Address:	**10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan**

Test Performed by:

International Standards Laboratory Corp. LT Lab.
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No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

Report No.: **ISL-22LR0177FMPE**
Issue Date :**2022/11/21**

VERIFICATION OF COMPLIANCE

Applicant:	Fanstel Corporation, Taipei
Product Description:	Bluetooth 5.0 Module
Brand Name:	Fanstel
Model No.:	BT840XEE
Model Difference:	N/A
Date of test:	2022/09/28 ~ 2022/11/18
Date of EUT Received:	2022/09/28

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:	Weitin Chen	***Date:***	2022/11/21
	Weitin Chen / Senior Engineer		
Prepared By:	Gigi yeh	***Date:***	2022/11/21
	Gigi Yeh / Senior Engineer		
Approved By:	Jerry Liu	***Date:***	2022/11/21
	Jerry Liu / Technical Manager		

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1. Description of Equipment under Test (EUT)

General:

Product Name:	Bluetooth 5.0 Module
Brand Name:	Fanstel
Model Name:	BT840XEE
Model Difference:	N/A
Power Supply:	5Vdc from USB (JIG)
USB port	one (JIG)

Model Summaries:

module	BT840XEE
SoC	nRF52840-QIAA
Size	15x28.0x1.9mm
BT Antenna	PA+u.FL+MCX
Max TX, radiated	
32.768 sleep crystal	Integrated
BT range,1 Mbps, LMPI	>1170 meters
BT range, 1Mbps, 1.52m	>1170 meters
BT range, 125 Kbps, LMPI.	>4500 meters
BT range, 125 kBps, 1.52m	>1920 meters
Availability	Production

Frequency Range	2402 – 2480MHz
Bluetooth Version	V5.0
Channel Number	40 channels, 2MHz step
Modulation Type	GFSK
Tune-up Power	20.457 dBm
Power Tolerance	+/- 2 dBm
Dwell Time	N/A
Antenna Designation:	Dipole Antenna: 6 dBi PIFA Antenna: 2 dBi Helix Antenna: 2.5dBi

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 Permissive 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:

Port 1 with Dipole Ant.

Frequency Band (MHz)	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (mW/cm^2)	LIMIT (mW/cm^2)
2400 - 2480	19.55	6	2	27.550	0.11316969	1

Port 2 with Helix Ant.

Frequency Band (MHz)	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (mW/cm^2)	LIMIT (mW/cm^2)
2400 - 2480	20.457	2.5	2	24.957	0.06229169	1

Max Power(mW) =10^((Max Power(dBm) + Tune-up tolerance(dB))/10)

Result = Max Power (mW) / min. distance(mm) * √f(GHz)

IC EIRP level:

Port 1 with Dipole Ant.

Frequency Band (MHz)	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (W/m^2)	LIMIT (W/m^2)
2400 - 2480	19.55	6	2	27.550	1.132	5.366

Port 2 with Helix Ant.

Frequency Band (MHz)	Conducted power (dBm)	Antenna gain (dBi)	Tune-Up Tolerance (dB)	EIRP (dBm)	MPE (W/m^2)	LIMIT (W/m^2)
2400 - 2480	20.457	2.5	2	24.957	0.623	5.366

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