

EMF TEST REPORT

Test Report No. : OT-243-RWD-038
Reception No. : 2312004422
Applicant : Firstsilicon
Address : 25, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea
Manufacturer : Firstsilicon
Address : 25, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea
Type of Equipment : Power optimizer
FCC ID. : 2BE2I-FS600B
Model Name : FS600B
Multiple Model Name : N/A
Serial number : N/A
Total page of Report : 7 pages (including this page)
Date of Incoming : January 31, 2024
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SUMMARY

The equipment complies with the regulation; **FCC CFR 47 PART 1.1310**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.





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CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	4
2. GENERAL INFORMATION	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....	5
3. EUT MODIFICATIONS.....	5
4. MAXIMUM PERMISSIBLE EXPOSURE	6
4.1 RF EXPOSURE CALCULATION	6
4.2 EUT DESCRIPTION.....	6
4.3 CALCULATED MPE SAFE DISTANCE.....	7

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-243-RWD-038	March 18, 2024	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : Firstsilicon
Address : 25, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea
Contact Person : Jung ho, Hyun / Certification test personnel
Telephone No. : +82-2-3402-7479
FCC ID : 2BE2I-FS600B
Model Name : FS600B
Brand Name : SolpoMax
Serial Number : N/A
Date : March 18, 2024

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Power optimizer
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	KDB 447498 D01 General RF Exposure Guidance v06
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
Modifications on the Equipment to Achieve Compliance	None

- . The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The Firstsilicon, Model FS600B (referred to as the EUT in this report) is a Power optimizer. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Power optimizer
OPERATING FREQUENCY	2 405 MHz ~ 2 480 MHz
MODULATION TYPE	DSSS
RF OUTPUT POWER	-13.95 dBm
ANTENNA TYPE	PCB Pattern Antenna
ANTENNA GAIN	-3.37 dBi
List of each Osc. or crystal Freq.(Freq. \geq 1 MHz)	12 MHz
RATED SUPPLY VOLTAGE	DC 8.0 V ~ 60.0 V (Normal DC 46.0 V)

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are $f/1500$ mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G)} / d, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

4.2 EUT Description

Kind of EUT	Power optimizer
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input checked="" type="checkbox"/> Mobile (> 20 cm separation) <input type="checkbox"/> Others
Exposure Evaluation Applied	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR <input type="checkbox"/> N/A

4.3 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
2 440	802.15.4	-13.95 ± 1.0	-12.95	0.05	-3.37	0.46	0.04	0.000 005	1.00
2 480		-24.34 ± 1.0	-23.34	0.005	-3.37	0.46	0.04	0.000 000 4	1.00

According to above table, for 2 400 ~ 2 483.5 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(0.05 * 0.46)/1.00} = 0.04 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 0.05 * 0.46 / (4 * 3.14 * 20^2) = 0.000 005$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna