

EMF TEST REPORT

Test Report No. : OT-251-RWD-046

Reception No. : 2411004246

Applicant : LS ELECTRIC

Address : 68, Wolmyeong-ro #201, heung deok-gu, Cheongju-si, 28437, South Korea

Manufacturer : LS ELECTRIC

Address : (Cheongju 2 Factory) 68, Wolmyeong-ro 201beon-gil, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Republic of Korea

Type of Equipment : Molded-case circuit-breaker

FCC ID. : 2AYQX-UTS400-250-3P

Model Name : UTS400LTi ETLi 250A 3P

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 7 pages (including this page)

Date of Incoming : December 04, 2024

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SUMMARY

The equipment complies with the regulation; *FCC CFR 47 PART 2.1091*

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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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-251-RWD-046	January 14, 2025	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LS ELECTRIC
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Telephone No. : +82-10-9417-8103
FCC ID : 2AYQX-UTS400-250-3P
Model Name : UTS400LTi ETLi 250A 3P
Brand Name : -
Serial Number : N/A
Date : January 14, 2025

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Molded-case circuit-breaker
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 LS ELECTRIC, Model UTS400LTi ETLi 250A 3P (referred to as the EUT in this report) is a Molded-case circuit-breaker. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Molded-case circuit-breaker		
Temperature Range	-5 °C ~ +40 °C		
Operating Frequency	2 402 MHz ~ 2 480 MHz		
MAX. RF OUTPUT POWER	Bluetooth LE	1 Mbps	-4.19 dBm
Number of Channel	Bluetooth LE	40 Channels	
Modulation Type	Bluetooth LE	GFSK	
Antenna Type	Chip Antenna		
Antenna Gain	1.90 dBi		
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	48 MHz		
Rated Supply Voltage	DC 24.0 V		

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

-. None

3. EUT MODIFICATIONS

-. None

4. RF EXPOSURE EVALUATION

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	Molded-case circuit-breaker
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 Exclusion <input type="checkbox"/> N/A

4.3 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. (MHz)	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			
2 402	-4.19 ± 1.0	-3.19	0.48	1.90	1.55	0.24	0.000 148	1.00

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

$$D = 0.282 * \sqrt{(0.48 * 1.55)/1.00} = 0.24 \text{ cm}$$

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

$$S = P * G / (4\pi * R^2) = 0.48 * 1.55 / (4 * 3.14 * 20^2) = 0.000 148$$

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