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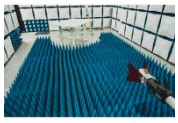

TEST REPORT
Maximal Permissible Exposure [MPE] REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
01/03/2023 – 02/15/2023
Test Site/Location:
Element Lab., Suwon,
Yongin-si, Gyeonggi-do, Korea
Test Report Serial No.:
8K22121601-01-R2.A3L

FCC ID:	**A3LSOG2201**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SOG2201-G30
EUT Type:	Smallcell (SOG2201)
FCC Classification:	Citizens Band Category B Devices (CBD)
FCC Rule Part(s):	FCC Part 1 (§1.1310) and Part 2 (§2.1091)
Test Procedure(s):	KDB 447498 D01

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

ACCREDITED
CERT #2041.04

Prepared by Jonathan Jang
Test Engineer

Reviewed by Charles.Shin
Technical Manager

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1.0 REVISION RECORD

Issue Number	Issued Date	Revision History
8K22121601-01.A3L	02/16/2023	Initial Issue
8K22121601-01-R1.A3L	02/24/2023	Revision due to updated Antenna gain information
8K22121601-01-R2.A3L	05/10/2024	Revision due to updated unit of MPE limit

2.0 INTRODUCTION

2.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

2.2 Element Test Location

These measurement tests were conducted at the Element Materials Technology Suwon. Ltd. facility located at (#1407) 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do 16954, Korea.

2.3 Test Facility / Accreditation

Measurements were performed at Element Materials Technology Suwon Lab located in Yongin-si, Gyeonggi, Korea.

- Element Materials Technology Suwon is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation(A2LA) with Certificate number 2041.04 for Specific Absorption Rate (SAR), where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Materials Technology Suwon facility is accredited, designated, and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.

  - Designation Number / CABID: KR0169
  - Test Firm Registration Number of FCC: 417945
  - Test Firm Registration Number of IC: 26168

3.0 PRODUCT INFORMATION

3.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung MSO (SOG2201) FCC ID: A3LSOG2201.**
Per FCC Part 96, this device is evaluated under Citizens Band Category B Devices (CBD).

3.2 Device Capabilities

This device supports the following conditional features and filter information:

EUT Type:	Smallcell (SOG2201)
Model Name:	SOG2201-G30
Test Device Serial No:	SFG-AEU09V01CM
Device Capabilities:	5G NR
Operating Band/Frequency Range:	Band / Tx (Downlink) / Rx (Uplink) n48: 3550 MHz to 3700 MHz / 3550 MHz to 3700 MHz
Supported Modulation:	QPSK, 16QAM, 64QAM, 256QAM
Supported Number of Carriers and Channel Bandwidth:	NR: 10, 20, 30 and 40MHz bandwidth modes for 5G NR Band n48 with up to 2CC aggregated of Max. Bandwidth 80 MHz.
Supported Configurations:	Single carrier, Multi-carrier
Maximum Output Power:	2.5 W/unit
Antenna Configuration:	2 Sectors (4 Zones)
RF Chain:	2T2R, 4T4R, 8T8R
Number of Antenna ports:	8
Antenna Gain:	Max 12 dBi
Input Voltage:	44 - 90 VAC (HFC)

4.0 RF EXPOSURE EVALUATION - MPE

4.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

Table 4-1. Limits for Maximum Permissible Exposure (MPE)

4.2 MPE Requirements Overview

Three different categories of transmitters are defined by the FCC KDB 447498 D01. These categories are fixed installation, mobile and portable and are defined as follows:

- **Fixed Installations:** fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.

- **Mobile Devices:** a mobile device is defined as a transmitting designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 46 CFR §2.1091.

- **Portable Devices:** a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR §2.1093).

The FCC also categorizes the use of the device as based upon the user's awareness and ability to exercise control over his or her exposure. The two categories defined are Occupational/ Controlled Exposure and General Population/Uncontrolled Exposure. These two categories are defined as follows:

- **Occupational/Controlled Exposure:** In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.

- **General Population/Uncontrolled Exposure:** The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

The **Samsung Smallcell (SOG2201) FCC ID: A3LSOG2201** is professionally installed on poles or walls in fixed locations. The device is a fixed mounted base station and MPE is evaluated to the General Population/Uncontrolled Exposure limits per 1.1310.

4.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each operating mode used in this product was initially measured with a spectrum analyzer and powers were recored. Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated for the safe distance which must be maintained during installation based on maximum power and antenna gain.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out}*G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm^2) $\pi = 3.1416$
P_{out} = output power to antenna (mW) r = distance between observation point and center of the radiator (cm)
G = gain of antenna in linear scale

4.4 Results of Maximum Permissible Exposure

Maximum Permissible Exposure			Result
Frequency (MHz)	3550 – 3700	MHz	Pass
MPE Limit (mW/cm^2)	1.00	mW/cm^2	
Distance (R)	200	cm	
Total MIMO Max measured Output power	31.51	dBm	
Total MIMO Rated conducted power	31.00	dBm	
Tune-up tolerance	± 2	dBm	
Total MIMO Max Output Power (P) (The Output Power scaled to maximum tune-up tolerance)	32.00	dBm	
Antenna Gain (G) Typical	12.00	dBi	
Power density (S)	0.05	mW/cm^2	

Table 4-2. Calculated Max MPE Data for n48_2T

Maximum Permissible Exposure			Result
Frequency (MHz)	3550 – 3700	MHz	Pass
MPE Limit (mW/cm^2)	1.00	mW/cm^2	
Distance (R)	200	cm	
Total MIMO Max measured Output power	34.80	dBm	
Total MIMO Rated conducted power	34.00	dBm	
Tune-up tolerance	± 1	dBm	
Total MIMO Max Output Power (P) (The Output Power scaled to maximum tune-up tolerance)	35.00	dBm	
Antenna Gain (G) Typical	11.00	dBi	
Power density (S)	0.079	mW/cm^2	

Table 4-3. Calculated Max MPE Data for n48_4T

Maximum Permissible Exposure			Result
Frequency (MHz)	3550 – 3700	MHz	Pass
MPE Limit (mW/cm^2)	1.00	mW/cm^2	
Distance (R)	200	cm	
Total MIMO Max measured Output power	34.48	dBm	
Total MIMO Rated conducted power	34.00	dBm	
Tune-up tolerance	± 1	dBm	
Total MIMO Max Output Power (P) (The Output Power scaled to maximum tune-up tolerance)	35.00	dBm	
Antenna Gain (G) Typical	8.00	dBi	
Power density (S)	0.04	mW/cm^2	

Table 4-4. Calculated Max MPE Data for n48_8T

5.0 CONCLUSION

Samsung Electronics Co., Ltd. CBSD FCC ID: A3LSOG2201 meets the MPE Compliance requirements as specified in §2.1091 of the FCC Rules and Regulations with minimum safe distance of 200 cm for operation.

An appropriate RF exposure compliance statement will be placed in the user's manual.