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FCC RF Exposure

Project No. : NK-24-R-077
Applicant : Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea, Republic of

Dates of receipt : February 20, 2024
Dates of Issue : May 22, 2024
Test Site :
Nemko Korea Co., Ltd.

FCC ID :	**A3LSMQ503**
Applicant :	**Samsung Electronics Co., Ltd.**
Brand Name :	**SAMSUNG**
Model:	**SM-Q503**
Additional Model(s):	**SM-Q505, SM-Q506, SM-Q507, SM-Q508, SM-Q509, SM-Q500, SM-Q501, SM-Q502**
EUT Type:	**Galaxy Ring**
Classification:	**FCC Part 15 Digital Transmission System (DTS)**
Date of Test:	**April 19, 2024 ~ May 8, 2024**
Applied Standard:	**FCC 47 CFR Part 1.1307**

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1. INTRODUCTION

1.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**
The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

1.2 Accreditation and listing

Accreditation type		Accreditation number
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
Industry Canada	Canada IC Registered site	Site No. 29506
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	TL124
	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications

EUT Type	Galaxy Ring
Model Name	SM-Q503
Frequency of Operation	2 402 MHz ~ 2 480 MHz
Peak Output Power (Conducted)	3.33 dBm
Number of Channels	40 CH
Modulations	GFSK (Bluetooth LE 1Mbps & 2Mbps)
Antenna Gain (peak)	-12.53 dBi
Antenna Setup	1TX / 1RX
EUT Rated Voltage	DC 3.80 V
EUT Test Voltage	DC 3.80 V
Remarks	-

2.2 Operation During Test

The EUT is the transceiver which is Bluetooth v5.4 supporting Bluetooth LE mode(1 Mbps & 2 Mbps).
The Laptop PC was used to control the EUT to transmit the wanted TX channel continuously (duty cycle > 98%) by the testing program (Direct test mode).
The operating voltage of EUT was 3.8 Vdc supplied from jig board connected to USB port on Laptop PC.

2.2.1 Table of Test power setting

Frequency	Mode	Modulation	Power setting Level
2 402 MHz ~ 2 480 MHz	BLE 1Mbps	GFSK	0
2 402 MHz ~ 2 480 MHz	BLE 2Mbps	GFSK	0

2.2.2 Table of Test frequency

Frequency band	Modulation	Test Channel (CH)	Frequency (MHz)
2.4 GHz	GFSK	0	2 402
		19	2 440
		39	2 480

2.2.3 Average Output Power

Mode	Frequency	Average Output Power (dBm)	Antenna Gain (dBi)	e.i.r.p (dBm)
Bluetooth LE 1Mbps	2 402	3.16	-12.53	-9.37
	2 440	2.96		-9.57
	2 480	2.80		-9.73
Bluetooth LE 2Mbps	2 402	3.00	-12.53	-9.53
	2 440	2.80		-9.73
	2 480	2.64		-9.89

2.2.4 Antenna Information

Frequency band	Modulation	Antenna TX mode	Support CDD	Support MIMO
2.4 GHz	GFSK	■ 1TX, □ 2TX	□ Yes, ■ No	□ Yes, ■ No

2.2.5 Additional model covered by this report

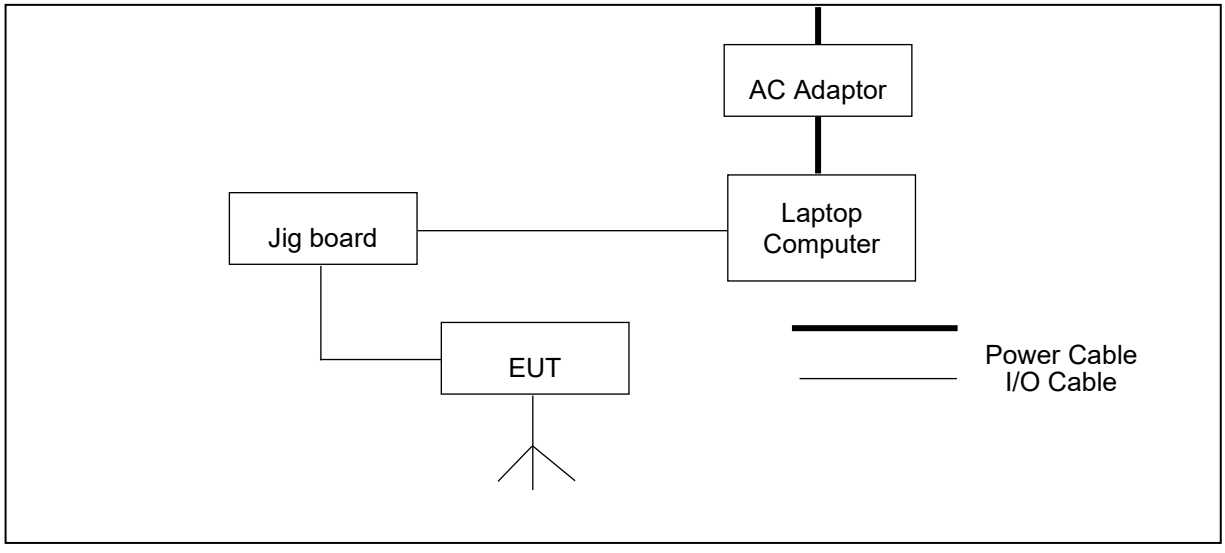
- The variant models shell use materials and electric circuits that are the same as the basic model.
- The difference between basic and variant models are as below table.

Variant model name	Description
SM-Q505	Ring size: 5, Battery capacity(rated): 17.0 mAh
SM-Q506	Ring size: 6, Battery capacity(rated): 17.0 mAh
SM-Q507	Ring size: 7, Battery capacity(rated): 17.0 mAh
SM-Q508	Ring size: 8, Battery capacity(rated): 18.5 mAh
SM-Q509	Ring size: 9, Battery capacity(rated): 18.5 mAh
SM-Q500	Ring size: 10, Battery capacity(rated): 18.5 mAh
SM-Q501	Ring size: 11, Battery capacity(rated): 18.5 mAh
SM-Q502	Ring size: 12, Battery capacity(rated): 22.5 mAh

2.3 Support Equipment

EUT	Samsung Electronics Co., Ltd. Model : SM-Q503	S/N: N/A Identical Proto-type
Laptop Computer	LG Model : LG15Z90N	FCC DOC S/N : 003NZSJ038878
AC Adapter	APD Shenzhen DK Inc. Model : WA-48B19FS	FCC DOC S/N : AKDS764889301B539

2.4 Setup Drawing



3. RF Exposure Test Exemptions

Exemptions for Single RF Sources

- Bluetooth LE - (Galaxy Ring: A3LSMQ503)

  Power Thresholds (mW) = **2.79 mW**

  Maximum Average power (mW) = **2.6 mW** (Exempted under § 1.1307(b)(3)(i)(C))

- 13.56 MHz - Companion device (Cradle: A3LEPQQ503)

  Power Thresholds (mW) = **1 mW**

  Maximum Field strength Level : 53.5 dBμV/m @ 3 m

  EIRP = 10log((Distance x $10^{((53.5\ dB\mu V/m[Maximum\ Field\ strength\ Level]-120)/20))}$^{2} /30)/$10^{-3}$)

  = -41.73 dBm (**0.00007 mW**) (Exempted under § 1.1307(b)(3)(i)(A))

RF Exposure Test Exemptions for Simultaneous Transmission Sources

Simultaneous Transmission Limit

According to KDB 447498 D04, This case is described in detail in § 1.1307(b)(3)(ii)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously will be considered an RF exempt device if the condition of Formula (1) is satisfied.

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Simultaneous Transmission Configuration

No	Scenario
1	Bluetooth LE(Galaxy Ring: A3LSMQ503) + 13.56 MHz(Cradle: A3LEPQQ503)

Simultaneous Transmission result

- Ratio Summation

  Bluetooth LE ratio (2.6 / 2.79= 0.93) + 13.56 MHz ratio (0.00007 / 1 = 0.00007) = **0.93**

- When the sum of ratios of simultaneously transmitting antennas in an operating mode and exposure condition combination is within the 1.0 the additional equipment approval is not required.