






TEST REPORT

 KCTL Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR24-SRF0139-A Page (1) of (11)		
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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2024-07-01

2. Use of Report : Certification

3. Name of Product / Model : Wi-Fi/BLE combo module / ACAU710R

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Korea

5. FCC ID : A3LACAU710R

6. IC Certificate No. : 649E-ACAU710R

7. Date of Test : 2024-07-12 to 2024-10-02

8. Location of Test : Permanent Testing Lab On Site Testing
 (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

9. Test method used : 47 CRF Part 1.1310
 RSS-102 Issue 6 December 2023

10. Test Result : Refer to the test result in the test report
 This laboratory is not accredited for the test results marked. *

Affirmation	Tested by Name : Sehwan Park (Signature) 	Technical Manager Name : Heesu Ahn (Signature) 
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The above testing certificate is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024-10-16

Accredited by KOLAS, Republic of KOREA **Eurofins KCTL Co.,Ltd.**

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-10-11	Originally issued	-
2024-10-16	Updated	1

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Note. The report No. KR24-SRF0139 is superseded by the report No. KR24-SRF0139-A.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

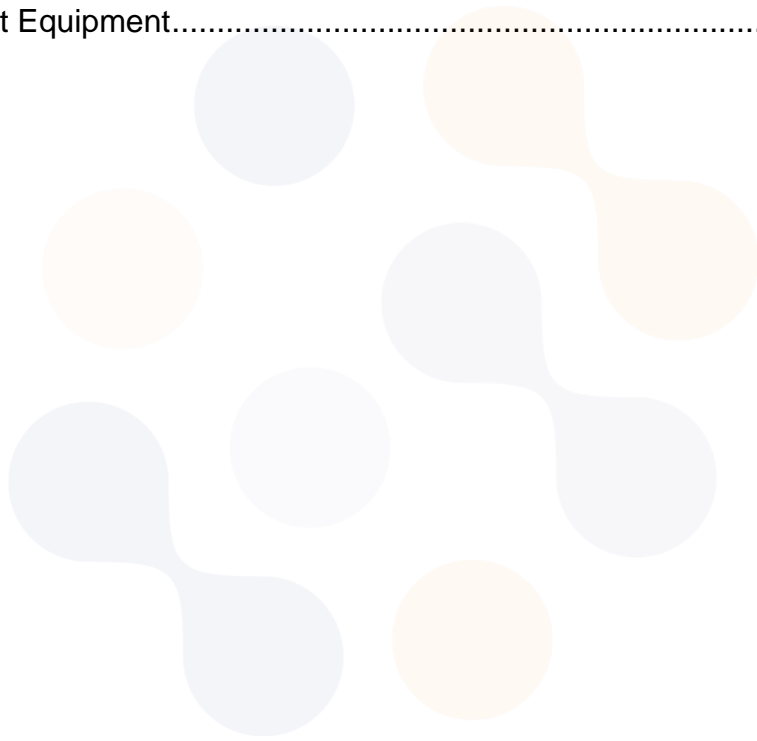
Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

Statement not required by the standard or client used for type testing



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1. General information

Client	: Samsung Electronics Co., Ltd.
Address	: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	: Samsung Electronics Co., Ltd.
Address	: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	: Chengdu Xuguang Technology Co.,Ltd
Address	: No.86 2nd Section, Park Road, Longquanyi District, Chengdu City, Sichuan Province, P.R. China
Laboratory	: Eurofins KCTL Co.,Ltd.
Address	: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	: FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	: Wi-Fi/BLE combo module
Model	: ACAU710R
Modulation technique	: Bluetooth(BDR/EDR) : GFSK, $\pi/4$ DQPSK, 8DPSK Bluetooth(BLE) : GFSK WIFI(802.11a/b/g/n/ac/ax) : DSSS, OFDM, OFDMA
Number of channels	: Bluetooth : 79 ch BLE : 40 ch 2.4 GHz WLAN : 11 ch (20 MHz) UNII 1 : 4 ch (20 MHz) UNII 2A : 4 ch (20 MHz) UNII 2C : 12 ch (20 MHz) UNII 3 : 5 ch (20 MHz)
Power source	: DC 5 V, 12 V
Antenna specification	: Chip antenna
Antenna gain	: BT/BLE/2.4 GHz WLAN : -0.10 dBi UNII 1 : 0.90 dBi UNII 2A : 0.20 dBi UNII 2C : -0.40 dBi UNII 3 : -0.70 dBi
Frequency range	: Bluetooth : 2 402 MHz ~ 2 480 MHz (BDR/EDR/BLE) 2.4 GHz WALN : 2 412 MHz ~ 2 462 MHz (802.11b/g/n/ax_HT20/HE20) UNII-1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-2A : 5 260 MHz ~ 5 320 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-2C : 5 500 MHz ~ 5 720 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20) UNII-3 : 5 745 MHz ~ 5 825 MHz (802.11a/n/ac/ax_HT20/VHT20/HE20)
Software version	: v1.0
Hardware version	: v1.0
Test device serial No.	: Conducted : 9C443D587C84 Radiated : C8A6ER364B08
Operation temperature	: -20 °C ~ 85 °C

2.1. Frequency/channel operations

This device contains the following capabilities:

WLAN (11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE)

Ch.	Frequency (MHz)
00	2 402
39	2 441
78	2 480

Table 2.1.1. Bluetooth(BDR/EDR)

Ch.	Frequency (MHz)
00	2 402
.	
19	2 440
.	
39	2 480

Table 2.1.1. Bluetooth Low Energy

Ch.	Frequency (MHz)
01	2 412
06	2 437
11	2 462

Table 2.1.1. 802.11b/g/n(HT20)/ax(HE20) mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5 180	52	5 260	100	5 500	149	5 745
40	5 200	56	5 280	120	5 600	157	5 785
48	5 240	64	5 320	140	5 700	165	5 825
				144	5 720		

Table 2.1.1. 802.11a/n/ac HT20/VHT20/axHE20 mode

3. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (\pm)
Conducted RF power	0.9 dB

4. RF Exposure

FCC

Regulation

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).

Table 1 – Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Averaging Time [minute]
(A) Limits for Occupational / Controlled Exposure				
0.3 ~ 3.0	614	1.63	*100	6
3.0 ~ 30	1842/f	4.89/f	*900/f ²	6
30 ~ 300	61.4	0.163	1.0	6
300 ~ 1 500	/	/	f/300	6
1 500 ~ 15 000	/	/	5	6
(B) 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 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

f=frequency in MHz, *=*plane-wave equivalent power density*

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100 kHz

IC

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

According to RSS-102 Issue 5, Paragraph "4. Exposure Limits", Industry of Canada has adopted the RF field strength limits established in Healths Canada's RF exposure guideline, Safety code 6:

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
<u>300-6000</u>	<u>3.142 <i>f</i>^{0.3417}</u>	<u>0.008335 <i>f</i>^{0.3417}</u>	<u>0.02619<i>f</i>^{0.6834}</u>	<u>6</u>
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}
Note: <i>f</i> is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Exemption Limits for Routine Evaluation – RF Exposure Evaluation

According to RSS-102 Issue 5 section 2.5.2, 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 1W (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.

4.1. Test results

FCC

MPE (Maximum Permissible Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW/cm²]

P = Power input to antenna [mW]

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna [cm]

IC

RF Exposure evaluation

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;

Calculation Result of RF exposure (FCC)

Maximum tune-up tolerance (Worst Case)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Ant Gain [dBi]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
BT, BLE	2 480	7.00	-0.10	0.000 97	1.00
2.4G_802.11b	2 437	18.50	-0.10	0.013 76	1.00
5G_U-NII-1_802.11a	5 180	17.00	0.90	0.012 27	1.00
5G_U-NII-2a_802.11a	5 320	17.00	0.20	0.010 44	1.00
5G_U-NII-2c_802.11a	5 700	17.00	-0.80	0.008 29	1.00
5G_U-NII-3_802.11a	5 745	12.00	-0.40	0.002 88	1.00

Calculation Results of RF exposure (IC)

Maximum tune-up tolerance (Worst Case)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Ant Gain [dBi]	E.I.R.P		Limit [mW]
				[dBm]	[mW]	
BT, BLE	2 480	7.00	-0.10	6.90	4.90	2 735.52
2.4G_802.11b	2 437	18.50	-0.10	18.40	69.18	2 703.01
5G_U-NII-1_802.11a	5 180	17.00	0.90	14.40	27.54	4 525.27
5G_U-NII-2a_802.11a	5 320	17.00	0.20	17.20	52.48	4 608.50
5G_U-NII-2c_802.11a	5 700	17.00	-0.80	16.20	41.69	4 830.99
5G_U-NII-3_802.11a	5 745	12.00	-0.40	11.60	14.45	4 857.02



5. Measurement Equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Power Sensor	R&S	NRP-Z81	1137.9009.02-106224-tg	25.07.01
Attenuator	R&S	DNF	0008	25.01.18

End of test report

