



TEST REPORT

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-SRF0157-A Page (1) of (12)							
1. Client - Name : Samsung Electronics Co., Ltd. - Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea - Date of Receipt : 2024-10-17 2. Use of Report : Certification 3. Name of Product / Model : Wi-Fi/BT Transceiver / WCF733R 4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Korea, Vietnam, China 5. FCC ID : A3LWCF733R 6. IC Certificate No. : 649E-WCF733R 7. Date of Test : 2024-10-18 to 2024-11-06 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. *								
<table border="1"> <tr> <td data-bbox="197 1431 357 1615" rowspan="2">Affirmation</td> <td data-bbox="362 1431 874 1563">Tested by</td> <td data-bbox="879 1431 1399 1563">Technical Manager</td> </tr> <tr> <td data-bbox="362 1563 874 1615">Name : Minki Kim (Signature)</td> <td data-bbox="879 1563 1399 1615">Name : Heesu Ahn (Signature)</td> </tr> </table>				Affirmation	Tested by	Technical Manager	Name : Minki Kim (Signature)	Name : Heesu Ahn (Signature)
Affirmation	Tested by	Technical Manager						
	Name : Minki Kim (Signature)	Name : Heesu Ahn (Signature)						
The above testing certificate is the accredited test result by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA. 2024-11-12 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.								

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REPORT REVISION HISTORY

Date	Revision	Page No
2024-11-07	Originally issued	-
2024-11-12	Updated	11

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Note. The report No. KR24-SRF0157 is superseded by the report No. KR24-SRF0157-A.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:

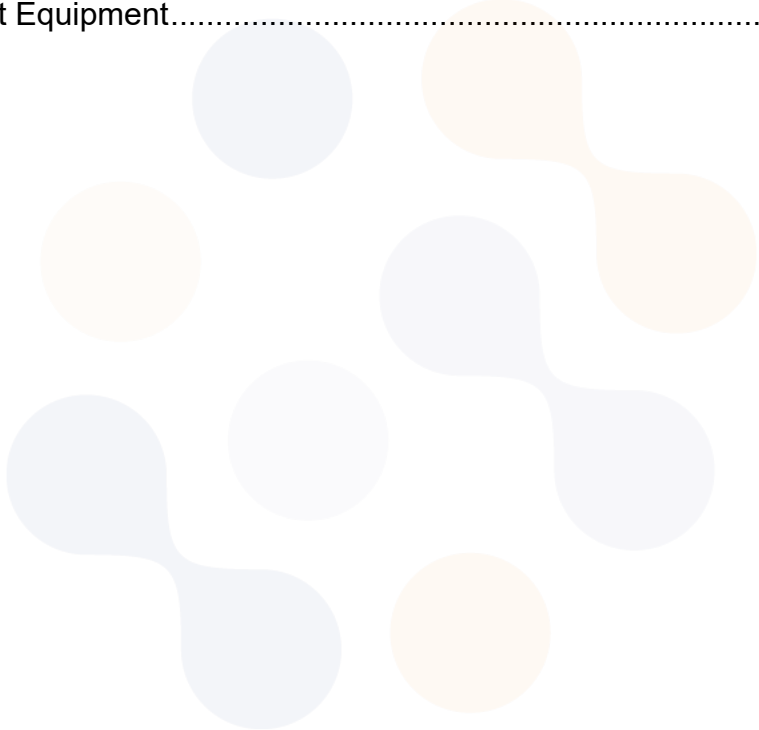
Procedure number, issue date and title:

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 1	: CHEMTRONICS CO., LTD.
Address 1	: 35, Buk-ri, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
Factory 2	: CHEMTROVINA COMPANY LIMITED
Address 2	: Nhon Trach 2-Loc Khang IZ, Hiep Phuoc Town, Nhon Trach District,, Dong Nai Province, Vietnam
Factory 3	: SJIT CO., LTD.
Address 3	: #54-11, Dongtanhana 1gil, Hwaseong-si, Gyeonggi-do, Korea
Factory 4	: SJIT VINA Co., Ltd
Address 4	: Lot X2, Ho Nai Industrial Zone, Ho Nai 3 Commune, Trang Bom District, Dong Nai Province, Vietnam
Factory 5	: Chengdu Xuguang Technology Co., Ltd.
Address 5	: No.86 2nd Section, Park Road, Longquanyi District, Chengdu City, Sichuan Province, P.R.China
Factory 6	: XUGUANG TECHNOLOGY (VIETNAM) COMPANY LIMITED
Address 6	: Factory No.4, Lot CN1, An Duong Industrial Park, Hong Phong Commune, An Duong District, Hai Phong City, Vietnam
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/BT Transceiver
Model	: WCF733R
Modulation technique	: Bluetooth(BDR/EDR)_GFSK, $\pi/4$ DQPSK, 8DPSK Bluetooth(BLE)_GFSK WLAN(802.11b/g/n/a/ac)_DSSS, OFDM, OFDMA
Number of channels	: BT/LE : 79 ch(BDR/EDR), 40 ch(BLE) 2.400 GHz band : 11 ch (20 MHz) 5 GHz band UNII-1 : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz) UNII-2A : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz) UNII-2C : 12 ch (20 MHz), 6 ch (40 MHz), 3 ch (80 MHz) UNII-3 : 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
Power source	: DC 5 V
Antenna type	: BT/LE : PCB antenna WLAN : Metal antenna
Antenna gain	: BT/LE : -4.06 dBi Antenna 1 : -1.51 dBi Antenna 2 : -0.71 dBi 2.400 GHz band : -1.51 dBi 5 GHz band UNII-1 : 1.11 dBi UNII-2A : 1.31 dBi UNII-2C : 1.23 dBi UNII-3 : 1.43 dBi 0.66 dBi 0.77 dBi 0.34 dBi -0.53 dBi
Frequency range	: 2.400 GHz band : 2 402 MHz ~ 2 480 MHz (Bluetooth/BLE) 2 412 MHz ~ 2 472 MHz (802.11b/g/n_HT20) 5 GHz band UNII-1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac_HT20/VHT20) 5 190 MHz ~ 5 230 MHz (802.11n/ac_HT40/VHT40) 5 210 MHz (802.11ac_VHT80)



UNII-2A	:	5 260 MHz ~ 5 320 MHz	(802.11a/n/ac_HT20/VHT20)
	:	5 270 MHz ~ 5 310 MHz	(802.11n/ac_HT40/VHT40)
	:	5 290 MHz	(802.11ac_VHT80)
UNII-2C	:	5 500 MHz ~ 5 720 MHz	(802.11a/n/ac_HT20/VHT20)
	:	5 510 MHz ~ 5 710 MHz	(802.11n/ac_HT40/VHT40)
	:	5 530 MHz ~ 5 690 MHz	(802.11ac_VHT80)
UNII-3	:	5 745 MHz ~ 5 825 MHz	(802.11a/n/ac_HT20/VHT20)
	:	5 755 MHz ~ 5 795 MHz	(802.11n/ac_HT40/VHT40)
	:	5 775 MHz	(802.11ac_VHT80)
Software version	:	v **.0.* (0 is related to RF and the * is not related to RF.)	
Hardware version	:	WCF733R	
Test device serial No.	:	Conducted : 6C70CBEF66F6 Radiated : 6C70CBEF6708	
Operation temperature	:	-10 °C ~ 50 °C	



2.1. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BDR, EDR), Bluetooth Low Energy(1 Mbps, 2 Mbps, 125 kbps, 500 kbps),
 WLAN 2.4 GHz_802.11b/g/n(HT20), WLAN 5 GHz_802.11a/n(HT20/40)/ac(VHT20/40/80)

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 2.1.2. Bluetooth Low Energy
(1 Mbps/2 Mbps/125 kbps/500 kbps)

Ch.	Frequency (MHz)
01	2 412
⋮	⋮
06	2 437
⋮	⋮
11	2 462
12	2 467
13	2 472

Table 2.1.3. 802.11b/g/n HT20 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 2.1.4. WLAN 5 GHz(802.11a/n/ac HT20/VHT20)

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
38	5 190	54	5 270	102	5 510	151	5 755
46	5 230	62	5 310	118	5 590	159	5 795
				134	5 670		
				142	5 710		

Table 2.1.5. WLAN 5 GHz(802.11n/ac HT40/VHT40)

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
42	5 210	58	5 290	106	5 530	155	5 775
				122	5 610		
				138	5 690		

Table 2.1.6. WLAN 5 GHz(802.11ac_VHT80)

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 and power density limits for devices used by the general public (uncontrolled environment)

Frequency Range (MHz)	Electric Field (V _{RMS} /m rms)	Magnetic Field (A _{RMS} /m)	Power Density (W/m ²)	Reference Period (minutes)
10-20	27.46	0.072 8	2	6
20-48	58.07 / $f^{0.25}$	0.154 0 / $f^{0.25}$	8.944 / $f^{0.5}$	6
48-300	22.06	0.058 52	1.291	6
300-6 000	3.142 $f^{0.341\ 7}$	0.008 335 $f^{0.341\ 7}$	0.026 19 $f^{0.683\ 4}$	6
6 000-15 000	61.4	0.163	10	6
15 000-150 000	61.4	0.163	10	616 000/ $f^{1.2}$
150 000-300 000	0.158 $f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	616 000/ $f^{1.2}$

Note: f is frequency in MHz.

RF field strength and power density limits for controlled-use devices (controlled environment)

Frequency Range (MHz)	Electric Field (V _{RMS} /m rms)	Magnetic Field (A _{RMS} /m)	Power Density (W/m ²)	Reference Period (minutes)
10-20	61.4	0.163	10	6
20-48	129.8 / $f^{0.25}$	0.344 4 / $f^{0.25}$	44.72 / $f^{0.5}$	6
48-100	49.33	0.130 9	6.455	6
100-6 000	15.60 $f^{0.25}$	0.041 38 $f^{0.25}$	0.645 5 $f^{0.5}$	6
6 000-15 000	137	0.364	50	6
15 000-150 000	137	0.364	50	616 000/ $f^{1.2}$
150 000-300 000	0.354 $f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	616 000/ $f^{1.2}$

Note: f is frequency in MHz.

For both table 7 and table 8, refer to Health Canada's Safety Code 6 for relevant notes and additional information.

Field reference level exposure exemption limits

Field reference level (FRL) 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 (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP 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 EIRP 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 EIRP 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 EIRP 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 EIRP 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]	Max Tune-up Power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Bluetooth	2 441	13.00	19.95	-4.06	0.39	0.001 56	1.00
Bluetooth Low Energy	2 440	13.00	19.95	-4.06	0.39	0.001 56	1.00
2.4G_802.11g	2 462	17.00	50.12	-0.71	0.85	0.008 47	1.00
5G_U-NII-1_802.11a SISO ANT 1	5 240	17.00	50.12	1.11	1.29	0.012 87	1.00
5G_U-NII-2A_802.11a SISO ANT 1	5 280	17.00	50.12	1.31	1.35	0.013 48	1.00
5G_U-NII-2C_802.11n HT20_SISO ANT 2	5 510	17.00	50.12	1.23	1.33	0.013 24	1.00
5G_U-NII-3_802.11a SISO ANT 2	5 745	16.00	39.81	-0.53	0.89	0.007 01	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]	
Bluetooth	2 441	13.00	-4.06	8.9	7.83	2 706.05
Bluetooth Low Energy	2 440	13.00	-4.06	8.9	7.83	2 705.29
2.4G_802.11g	2 462	17.00	-0.71	16.3	42.56	2 721.93
5G_U-NII-1_802.11a SISO ANT 1	5 240	17.00	1.11	18.1	64.71	4 561.02
5G_U-NII-2A_802.11a SISO ANT 1	5 280	17.00	1.31	18.3	67.76	4 584.79
5G_U-NII-2C_802.11n HT20 SISO ANT 2	5 510	17.00	1.23	18.2	66.53	4 720.35
5G_U-NII-3_802.11a SISO ANT 2	5 745	16.00	-0.53	15.5	35.24	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

