



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.: KR25-SRF0111 Page (1) of (12)	KCTL
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1. Client

- Name : SAM JIN CO., LTD.
- Address : 81, Anyangcheonseo-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2025-03-14

2. Use of Report : Certification

3. Name of Product / Model : V4 HUB / GP-AEOHUBV4US

4. Manufacturer / Country of Origin : SAM JIN CO., LTD. / Indonesia

5. FCC ID : 2AF4SGP-AEOHUBV4US

6. IC Certificate No. : 20753-GPAEOHUBV4

7. Date of Test : 2025-05-14 to 2025-05-22

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

Affirmation	Tested by Name : Hosung Lee (Signature)	Technical Manager Name : Harim Lee (Signature)
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2025-06-12

Eurofins KCTL Co.,Ltd.

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REPORT REVISION HISTORY

Date	Revision	Page No
2025-06-12	Originally issued	-

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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	: SAM JIN CO., LTD.
Address	: 81, Anyangcheonseo-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea
Manufacturer	: SAM JIN CO., LTD.
Address	: 81, Anyangcheonseo-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea
Factory	: PT.SAMJIN
Address	: Bekasi International Industrial Estate, Jl. Inti Raya II Block C2 No. 10, Desa Sukaresmi, Kec, Cikarang Selatan Bekasi 17550
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

2. Device information

Equipment under test	: V4 HUB
Model	: GP-AEOHUBV4US
Derivative Model for FCC	: IM6001-V4P01, IM6001-V4P02, IM6001-V4P03, IM6001-V4P04, IM6001-V4P05, IM6001-V4P06, IM6001-V4P07, IM6001-V4P08, IM6001-V4P09, IM6001-V4P10, GP-AEOHUBV4EU, GP-AEOHUBV4EU1, GP-AEOHUBV4EU2, GP-AEOHUBV4EU3, GP-AEOHUBV4EU4, GP-AEOHUBV4EU5, GP-AEOHUBV4EU6, GP-AEOHUBV4EU7, GP-AEOHUBV4EU8, GP-AEOHUBV4EU9, GP-AEOHUBV4EU10, GP-AEOHUBV4US1, GP-AEOHUBV4US2, GP-AEOHUBV4US3, GP-AEOHUBV4US4, GP-AEOHUBV4US5, GP-AEOHUBV4US6, GP-AEOHUBV4US7, GP-AEOHUBV4US8, GP-AEOHUBV4US9, GP-AEOHUBV4US10, GP-AEOHUBV4AN, GP-AEOHUBV4CN
Modulation technique	: Bluetooth(BLE) : GFSK WIFI(802.11a/b/g/n/ac) : DSSS, OFDM Zigbee, Thread : QPSK
Number of channels	: Bluetooth(BLE) : 40 ch 2.4 GHz WALN : 11 ch (20 MHz), 7 ch (40 MHz) UNII 1 : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz) UNII 3 : 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz) Zigbee, Thread : 16 ch
Power source	: DC 5 V
Antenna specification	: SMD Antenna
Antenna gain	: BLE/2.4 GHz band : 3.77 dBi UNII 1 : 4.39 dBi UNII 3 : 3.73 dBi Zigbee, Thread : 2.90 dBi

Frequency range : Bluetooth : 2 402 MHz ~ 2 480 MHz (BLE_1Mbps)
 2.4 GHz WALN : 2 412 MHz ~ 2 462 MHz (802.11b/g/n_HT20)
 2 422 MHz ~ 2 252 MHz (802.11n_HT40)
 UNII 1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac_HT20/VHT20)
 UNII 1 : 5 190 MHz ~ 5 230 MHz (802.11n/ac_HT40/VHT40)
 UNII 1 : 5 210 MHz (802.11ac_VHT80)
 UNII 3 : 5 745 MHz ~ 5 825 MHz (802.11a/n/ac_HT20/VHT20)
 UNII 3 : 5 755 MHz ~ 5 795 MHz (802.11n/ac_HT40/VHT40)
 UNII 3 : 5 775 MHz (802.11ac_VHT80)
 Zigbee, Thread : 2 405 MHz ~ 2 480 MHz

Software version : V1.0
 Hardware version : V1.0
 Test device serial No. : Conducted : 503200012
 Radiated : 503200014
 Operation temperature : 0 °C ~ 40 °C

2.1. Information about derivative model

The difference between basic model and alternative model is as below.

	Derivative Model Name	Information
FCC	IM6001-V4P01, IM6001-V4P02, IM6001-V4P03, IM6001-V4P04, IM6001-V4P05, IM6001-V4P06, IM6001-V4P07, IM6001-V4P08, IM6001-V4P09, IM6001-V4P10, GP-AEOHUBV4EU, GP-AEOHUBV4EU1, GP-AEOHUBV4EU2, GP-AEOHUBV4EU3, GP-AEOHUBV4EU4, GP-AEOHUBV4EU5, GP-AEOHUBV4EU6, GP-AEOHUBV4EU7, GP-AEOHUBV4EU8, GP-AEOHUBV4EU9, GP-AEOHUBV4EU10, GP-AEOHUBV4US1, GP-AEOHUBV4US2, GP-AEOHUBV4US3, GP-AEOHUBV4US4, GP-AEOHUBV4US5, GP-AEOHUBV4US6, GP-AEOHUBV4US7, GP-AEOHUBV4US8, GP-AEOHUBV4US9, GP-AEOHUBV4US10, GP-AEOHUBV4AN, GP-AEOHUBV4CN	Marketing and External casing difference

2.2 Frequency/channel operations

This device contains the following capabilities:

Bluetooth Low Energy, WLAN 2.4 GHz_802.11b/g/n(HT20/40),

WLAN 5 GHz_802.11a/n(HT20/40)/ac(VHT20/40/80), Zigbee, Thread

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

Table 2.2-1. Bluetooth Low Energy_1 Mbps

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

Table 2.2-2. WLAN 2.4 GHz(802.11b/g/n HT20)

Ch.	Frequency (MHz)
03	2 422
.	.
07	2 437
.	.
09	2 452

Table 2.2-3. WLAN 2.4 GHz(802.11n HT40)

UNII 1

Ch.	Frequency (MHz)
36	5 180
40	5 200
48	5 240

Table 2.2-4. 802.11a/n/ac HT20/VHT20 mode

UNII 3

Ch.	Frequency (MHz)
149	5 745
157	5 785
165	5 825

UNII 1

Ch.	Frequency (MHz)
38	5 190
46	5 230

Table 2.2-5. 802.11n/ac HT40/VHT40 mode

UNII 3

Ch.	Frequency (MHz)
151	5 755
159	5 795

UNII 1

Ch.	Frequency (MHz)
42	5 210

UNII 3

Ch.	Frequency (MHz)
155	5 775

Table 2.2-6. 802.11ac VHT80 mode

Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
11	2 405	19	2 445
12	2 410	20	2 450
13	2 415	21	2 455
14	2 420	22	2 460
15	2 425	23	2 465
16	2 430	24	2 470
17	2 435	25	2 475
18	2 440	26	2 480

Table 2.2-7. Zigbee, Thread mode

3. RF Exposure

Regulation

KDB 447498 D01 v06

FCC

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

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 $f^{0.683\ 4}$	<u>6</u>
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 $f^{0.5}$	<u>6</u>
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.

3.1. 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;

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.)

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]	Power density at 20 cm [mW/cm ²]	Limit [mW/cm ²]
Zigbee	2 405	20.00	100.00	2.90	0.038 79	1.00
Thread	2 405	20.00	100.00	2.90	0.038 79	1.00
Bluetooth Low Energy	2 480	7.00	5.01	3.77	0.002 38	1.00
2.4G_802.11b	2 462	18.00	63.10	3.77	0.029 90	1.00
5G_U-NII-1_802.11a	5 200	19.00	79.43	4.39	0.043 42	1.00
5G_U-NII-3_802.11a	5 755	19.00	79.43	3.73	0.037 30	1.00

Simultaneous Transmission (Worst configuration)

Mode	Sum of the MPE ratios	Limit
Zigbee + WLAN 5 GHz (802.11a)	0.082 21	1.0

Note.

- Simultaneous Transmission scenario : Zigbee + WLAN 5 GHz (802.11a)
- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission Formula is far below the limit of 1 mW/cm².
- Simultaneous transmission of RF Exposure test exclusion for worst case configuration.
 - Zigbee : the ratio is 0.038 79 / 1
 - 5G WLAN : the ratio is 0.043 42 / 1
 - Zigbee + WLAN 5 GHz (802.11a) : ((0.038 79 / 1) + (0.043 42 / 1) = 0.082 21

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]	
Zigbee	2 405	20.00	2.90	22.9	194.98	2 678.71
Thread	2 405	20.00	2.90	22.9	194.98	2 678.71
Bluetooth Low Energy	2 480	7.00	3.77	10.8	11.94	2 735.52
2.4G_802.11b	2 462	18.00	3.77	21.8	150.31	2 721.93
5G_U-NII-1_802.11a	5 200	19.00	4.39	23.4	218.27	4 537.20
5G_U-NII-3_802.11a	5 755	19.00	3.73	22.7	187.50	4 862.80

Simultaneous Transmission (Worst configuration)

Mode	Frequency [MHz]	Max Tune-up Power [dBm]	Ant Gain [dBi]	Sum of the MPE ratios	Limit
Zigbee + WLAN 5 GHz (802.11a)				0.120 90	1.0

Note.

1. Simultaneous Transmission scenario : Zigbee + WLAN 5 GHz (802.11a)
2. The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission
Formula is far below the limit of 1 mW/cm².
3. Simultaneous transmission of RF Exposure test exclusion for worst case configuration.
 - Zigbee : the ratio is 194.984 46 / 2678.71
 - 5G WLAN : the ratio is 218.272 99 / 4537.20
 - Zigbee + WLAN 5 GHz (802.11a) : ((194.984 46 / 2678.71) + (218.272 99 / 4537.20) = 0.120 90

End of test report