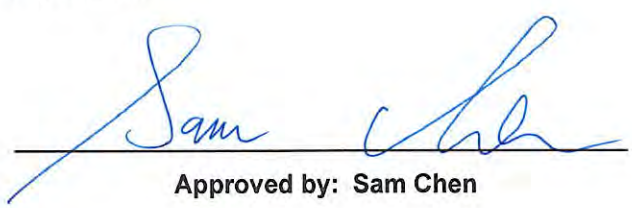
Testing Laboratory 3787

RADIO EXPOSURE TEST REPORT

FCC ID	:	XHG-CG770
Equipment	:	CPE
Brand Name	:	Jextream
Model Name	:	CG770
Applicant	:	Franklin Technology Inc. 906 JEI Platz, 186, Gasan digital 1-ro, Gumcheon-Gu, Seoul, South Korea, 08502
Manufacturer	:	Franklin Technology Inc. 906 JEI Platz, 186, Gasan digital 1-ro, Gumcheon-Gu, Seoul, South Korea, 08502
Standard	:	47 CFR Part 2.1091

The product was received on Mar. 18, 2022, and testing was started from Apr. 02, 2022 and completed on Jun. 30, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FA222221	01	Initial issue of report	Jul. 04, 2022
FA222221	02	Modifying the tune-up power.	Jul. 05, 2022

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:
1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results. 2. The measurement uncertainty please refer to report "Measurement Uncertainty".
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Wendy Pan

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	**Frequency Range (MHz)**	**Operating Frequency (MHz)**	**Modulation Type**
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

RF General Information			
Evaluation Mode	**Uplink (MHz)**	**Downlink (MHz)**	**Modulation Type**
WCDMA Band 2	1850 ~ 1910	1930 ~ 1990	WCDMA: QPSK / 16QAM HSDPA: QPSK / 16QAM HSUPA: QPSK / 16QAM
WCDMA Band 4	1710 ~ 1755	2110 ~ 2155	
WCDMA Band 5	824 ~ 849	869 ~ 894	
LTE Band 4	1710 ~ 1755	2110 ~ 2155	QPSK / 16QAM
LTE Band 5	824 ~ 849	869 ~ 894	
LTE Band 12	699 ~ 716	729 ~ 746	
LTE Band 41	2496 ~ 2690	2496 ~ 2690	
LTE Band 48	3550 ~ 3700	3550 ~ 3700	
LTE Band 66	1710 ~ 1780	2110 ~ 2200	
5G NR n48	3550 ~ 3700	3550 ~ 3700	DFT-s-OFDM (PI/2 BPSK / QPSK / 16QAM / 64QAM / 256QAM) CP-OFDM (QPSK / 16QAM / 64QAM / 256QAM)
5G NR n66	1710 ~ 1780	2110 ~ 2200	

1.2 Antenna Information

For WWAN Function

Ant.	Brand	Model Name	Antenna Type	Connector	TX/RX Function	Gain (dBi)
1	Partron	APCMA1CG770	PCB Antenna	I-PEX	TX/RX	Note1
2	Partron	APCMA2CG770	PCB Antenna	I-PEX	RX	
3	Partron	APCMA3CG770	PCB Antenna	I-PEX	RX	
4	Partron	APCMA4CG770	PCB Antenna	I-PEX	TX/RX	
5	Partron	APCSB1CG770	PCB Antenna	I-PEX	RX	
6	Partron	APCSB2CG770	PCB Antenna	I-PEX	RX	

Note1:

Band	Uplink(UL) Frequency Range (MHz)	Downlink(DL) Frequency Range (MHz)	Ant. 1 Gain (dBi)	Ant. 2 Gain (dBi)	Ant. 3 Gain (dBi)	Ant. 4 Gain (dBi)	Ant. 5 Gain (dBi)	Ant. 6 Gain (dBi)
WCDMA Band 2	1850-1910	1930-1990	-4.68	-	-5.07	-	-	-
WCDMA Band 4	1710-1755	2110-2155	-2.09	-	-2.33	-	-	-
WCDMA Band 5	824-849	869-894	-2.51	-	-2.49	-	-	-
LTE Band 4	1710-1755	2110-2155	-2.09	-2.22	-2.33	-2.78	-	-
LTE Band 5	824-849	869-894	-2.51	-	-2.49	-	-	-
LTE Band 12	699-716	729-746	-	-3.94	-	-3.22	-	-
LTE Band 41	2496-2690		-2.77	-3.41	-3.33	-2.94	-	-
LTE Band 48 and 5G NR n48	3550-3700		-3.99	-4.44	-5.16	-4.55	-	-
LTE Band 66 and 5G NR n66	1710-1780	2110-2200	-2.09	-2.22	-2.33	-2.78	-	-

Note2: The above information was declared by manufacturer.
Note3:
For 1TX/2RX (WCDMA Band 2, 4 and 5 / 4G Band 5):
Only Ant. 1 can be used as transmitting functions.
Ant. 1 and Ant. 3 could receive simultaneously.
For 1TX/2RX (4G Band 12):
Only Ant. 4 can be used as transmitting functions.
Ant. 2 and Ant. 4 could receive simultaneously
For 1TX/4RX (4G Band 41 and 48 / 5G Band n48,n66):
Only Ant. 1 can be used as transmitting functions.
Ant. 1, 2, 3 and Ant. 4 could receive simultaneously.
For 1TX/4RX (4G Band 4, 66):
The EUT supports the Ant. 1 and Ant. 4 with TX diversity function.
At once time there is only one antenna port can transmitting RF signal
Ant. 1, 2, 3 and Ant. 4 could receive simultaneously.

For WLAN Function

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
7	1	Partron	APCBWCG770	PCB Antenna	I-PEX	Note1
8	2	Partron	APCBWCG770	PCB Antenna	I-PEX	

Note1:

Band	Ant. 7 Gain (dBi)	Ant. 8 Gain (dBi)
WLAN-2.4GHz	-2.2	-4.08
WLAN-5GHz	-4.28	-3.0

Note2: The above information was declared by manufacturer.
Note3:
For 2.4GHz function:
For IEEE 802.11b/g/n/ax mode (2TX/2RX):
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.
For 5GHz function:
For IEEE 802.11n/ac/ax mode (2TX/2RX):
Port 1 and Port 2 can be used as transmitting/receiving antenna.
Port 1 and Port 2 could transmit/receive simultaneously.

Note4: Directional gain information

Type	Maximum Output Power	Power Spectral Density
Non-BF	Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4	$Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$

Ex.

Directional Gain (NSS1) formula : $Directiona\ lGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$

NSS1(g1,1) = $10^{G1/20}$; NSS1(g1,2)= $10^{G2/20}$; NSS1(g1,2)= $10^{G3/20}$; NSS1(g1,2)= $10^{G4/20}$

gj,k =$(Nss1(g1,1) + Nss1(g1,2) + Nss1(g1,3) + Nss1(g1,4))^2$

DG = 10 log$[(Nss1(g1,1) + Nss1(g1,2) + Nss1(g1,3) + Nss1(g1,4))^2 / N_{ANT}]$ => 10 log$[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$

Where ;

2.4G = G1 = -2.2 ; G2 = -4.08

5G = G1 = -4.28 ; G2 = -3

2.4G DG = -0.08 dBi

5 GHz U-NII-1 DG = -0.61 dBi

5 GHz U-NII-3 DG = -0.61 dBi

1.3 Accessories

Accessories			
Equipment Name	**Brand Name**	**Model Name**	**Rating**
Adapter	Franklin	APS-M024120200W-G	INPUT: 100-240V~50-60Hz, 0.6A Max. OUTPUT: 12V, 2.0A
Lithium Ion Polymer(LIP) battery	AE- Tech.	941-A05053-011	3.8V, 15.01Wh, 3950m4Ah

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2.1091
- KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- 47 CFR Part 1.1307
- 47 CFR Part 1.1310

1.5 Testing Location

Testing Location Information		
Test Lab.：Sporton International Inc. Hsinchu Laboratory		
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)	
(TAF: 3787)	TEL: 886-3-656-9065	FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.	
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd $= \frac{30 \times P \times G}{377 \times d^2}$

2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= Pth.

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\,cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance R between the person and the antenna / radiating structure, where R > λ / 2 π.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	**Threshold ERP (watts)**
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.
Note: R is in meters, f is in MHz.	

2.4 Maximum RF average output power among production units

Mode	Maximum Average Power (dBm)
WLAN 2.4GHz	22
WLAN 5GHz UNII 1	17
WLAN 5GHz UNII 3	17
WCDMA Band 2	23.5
WCDMA Band 4	24
WCDMA Band 5	24
LTE Band 4	23.5
LTE Band 5	24
LTE Band 12	24
LTE Band 41	23
LTE Band 48	23.5
LTE Band 66	23.5
LTE CA_4A_12A	25
LTE CA_12A_66A	25
LTE CA_5A_66A	25
LTE CA_4A_5A	25
5G NR n48	23
5G NR n66	24
5G NR ENDC 5A_n48A	23.5
5G NR ENDC 12A_n66A	23.5

Note: The above information was declared by manufacturer.

2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Mode	DG (dBi)	Tune-up (dBm)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
WLAN 2.4GHz	-2.20	22.00	19.80	0.09550	20	0.01900	1.000
WLAN 5GHz UNII 1	-3.00	17.00	14.00	0.02512	20	0.00500	1.000
WLAN 5GHz UNII 3	-3.00	17.00	14.00	0.02512	20	0.00500	1.000
WCDMA Band 2	-2.78	23.50	20.72	0.11803	20	0.02348	1.000
WCDMA Band 4	-2.09	24.00	21.91	0.15524	20	0.03088	1.000
WCDMA Band 5	-2.51	24.00	21.49	0.14093	20	0.02804	0.557
LTE Band 4	-2.09	23.50	21.41	0.13836	20	0.02752	1.000
LTE Band 5	-2.51	24.00	21.49	0.14093	20	0.02804	0.551
LTE Band 12	-3.22	24.00	20.78	0.11967	20	0.02381	0.476
LTE Band 41	-2.77	23.00	20.23	0.10544	20	0.02098	1.000
LTE Band 48	-3.99	23.50	19.51	0.08933	20	0.01777	1.000
LTE Band 66	-2.09	23.50	21.41	0.13836	20	0.02752	1.000
LTE CA_4A_12A	-3.22	25.00	21.78	0.15066	20	0.02997	0.469
LTE CA_12A_66A	-3.22	25.00	21.78	0.15066	20	0.02997	0.474
LTE CA_5A_66A	-2.51	25.00	22.49	0.17742	20	0.03530	0.558
LTE CA_4A_5A	-2.09	25.00	22.91	0.19543	20	0.03888	1.000
5G NR n48	-3.99	23.00	19.01	0.07962	20	0.01584	1.000
5G NR n66	-2.09	24.00	21.91	0.15524	20	0.03088	1.000
5G NR ENDC 5A_n48A	-3.99	25.00	21.01	0.12618	20	0.01425	1.000
5G NR ENDC 12A_n66A	-2.09	23.50	21.41	0.13836	20	0.02752	1.000

Note: The above antenna gain was declared by manufacturer.

MPE Exemption Option B							
Mode	**Frequency (MHz)**	**R (m)**	**Tune-up EIRP (dBm)**	**Tune-up ERP (dBm)**	**Tune-up ERP (W)**	**ERP Threshold (W)**	**MPE Exemption**
WLAN 2.4GHz	2412	0.2	19.80	17.65	0.058	3.060	Complies
WLAN 5GHz UNII 3	5745		14.00	11.85	0.015	3.060	Complies
WCDMA Band 2	1880		20.72	18.57	0.072	3.060	Complies
WCDMA Band 4	1752.6		21.91	19.76	0.095	3.060	Complies
WCDMA Band 5	835		21.49	19.34	0.086	1.703	Complies
LTE Band 4	1732.5		21.41	19.26	0.084	3.060	Complies
LTE Band 5	826.5		21.49	19.34	0.086	1.686	Complies
LTE Band 12	713.5		20.78	18.63	0.073	1.456	Complies
LTE Band 41	2593		20.23	18.08	0.064	3.060	Complies
LTE Band 48	3560		19.51	17.36	0.054	3.060	Complies
LTE Band 66	1745		21.41	19.26	0.084	3.060	Complies
LTE CA_4A_12A	704		21.78	19.63	0.092	1.436	Complies
LTE CA_12A_66A	711		21.78	19.63	0.092	1.450	Complies
LTE CA_5A_66A	836.5		22.49	20.34	0.108	1.706	Complies
LTE CA_4A_5A	1717.5		22.91	20.76	0.119	3.060	Complies
5G NR n48	3570		19.01	16.86	0.049	3.060	Complies
5G NR n66	1720		21.91	19.76	0.095	3.060	Complies
5G NR ENDC 5A_n48A	3679.98		21.01	18.86	0.077	3.060	Complies
5G NR ENDC 12A_n66A	1720		21.41	19.26	0.084	3.060	Complies

Simultaneous Transmission Analysis / Test Mode 1: WLAN 2.4GHz+WLAN 5GHz+WWAN 3G

Simultaneous Transmissions Option B							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2412	0.2	19.80	17.65	0.058	3.060	0.07	<= 1
5745		14.00	11.85	0.015	3.060		
835		21.49	19.34	0.086	1.703		

Simultaneous Transmission Analysis / Test Mode 2: WLAN 2.4GHz+WLAN 5GHz+WWAN 4G

Simultaneous Transmissions Option B							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2412	0.2	19.80	17.65	0.058	3.060	0.09	<= 1
5745		14.00	11.85	0.015	3.060		
704		21.78	19.63	0.092	1.436		

Simultaneous Transmission Analysis / Test Mode 3: WLAN 2.4GHz+WLAN 5GHz+WWAN 5G

Simultaneous Transmissions Option B							
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	Simultaneous Transmissions	Simultaneous Transmissions Limit
2412	0.2	19.80	17.65	0.058	3.060	0.05	<= 1
5745		14.00	11.85	0.015	3.060		
1720		21.91	19.76	0.095	3.060		

THE END