

RF Exposure Test Report

Report No.: SABEOA-WTW-P21030189

FCC ID: BYG-PHC18

Test Model: PHC 18

Received Date: Mar. 5, 2021

Test Date: Jul. 26 to Oct. 4, 2021

Issued Date: Oct. 4, 2021

Applicant: Sangean Electronics Inc.

Address: No. 18, Lane 7, Li-De Street, Chung Ho District, New Taipei City, 235, Taiwan

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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**FCC Registration /
Designation Number:** 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
SABEOA-WTW-P21030189	Original release	Oct. 4, 2021

1 Certificate of Conformity

Product: Phone Charger

Brand: FESTOOL

Test Model: PHC 18

Sample Status: Engineering sample

Applicant: Sangean Electronics Inc.

Test Date: Jul. 26 to Oct. 4, 2021

Standards: FCC Part 2 (Section 2.1091)

References Test Guidance: KDB 680106 D01 RF Exposure Wireless Charging v03r01

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :

Annie Chang

Date: Oct. 4, 2021

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date: Oct. 4, 2021

Rex Lai / Associate Technical Manager

2 General Information

2.1 General Description of EUT

Product	Phone Charger
Brand	FESTOOL
Test Model	PHC 18
Sample Status	Engineering sample
Power Supply Rating	I/P rating: 18Vdc from battery O/P rating: 9W
Modulation Type	ASK
Operating Frequency	111-140kHz
Antenna Type	Coil antenna
Field Strength	4.32dBuV/m (@300m) (AV)
Dimensions	96.75cm ² (Length = 125mm, Width = 77.4mm)
Accessory Device	N/A
Data Cable Supplied	N/A
Maximum Power Output from the Charging Coil	9W

Note:

1. The EUT is a Phone Charger with Qi charging function.
2. The EUT consumes power from the following battery. (For support unit only)

Battery	
Battery 1	FESTOOL, BP 18 Li 6,2 ASI (18Vdc, 6.2Ah, with Bluetooth function)
Battery 2	FESTOOL, BP 18 Li 5,2 ASI (18Vdc, 5.2Ah, with Bluetooth function)
Battery 3	FESTOOL, BP 18 Li 4,0 HPC-ASI (18Vdc, 4.0Ah, with Bluetooth function)
Battery 4	FESTOOL, BP 18 Li 3,1 CI (18Vdc, 3.1Ah, with Bluetooth function)
Battery 5	FESTOOL, BP BP 18 Li 6,2 AS (18Vdc, 6.2Ah)
Battery 6	FESTOOL, BP 18 Li 5,2 AS (18Vdc, 5.2Ah)
Battery 7	FESTOOL, BP 18 Li 4,0 HPC-AS (18Vdc, 4.0Ah)
Battery 8	FESTOOL, BP 18 Li 3,1 C (18Vdc, 3.1Ah)

The above batteries were pre-tested and **Battery 1** was the worst case for final test.

3. The emission of the simultaneous operation (BT from battery [FCC ID: 2AL2E-BPLI] and Qi) has been evaluated and no non-compliance was found.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 RF Exposure

3.1 Description of Support Units

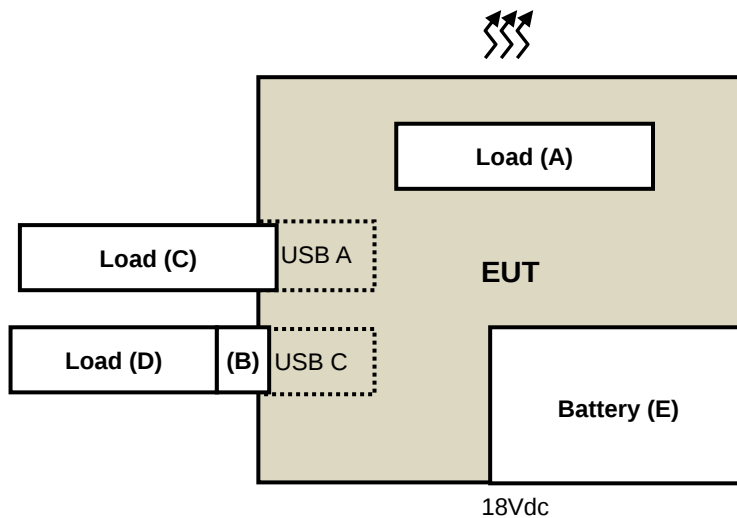
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Load	N/A	N/A	N/A	N/A	Supplied by client
B.	USB Type C to A adapter	i-gota	N/A	N/A	N/A	Provided by Lab
C.	Load	N/A	N/A	N/A	N/A	Provided by Lab
D.	Load	N/A	N/A	N/A	N/A	Provided by Lab
E.	Battery	FESTOOL	BP 18 Li 6,2 ASI	N/A	N/A	Supplied by client

3.1.1 Configuration of System Under Test

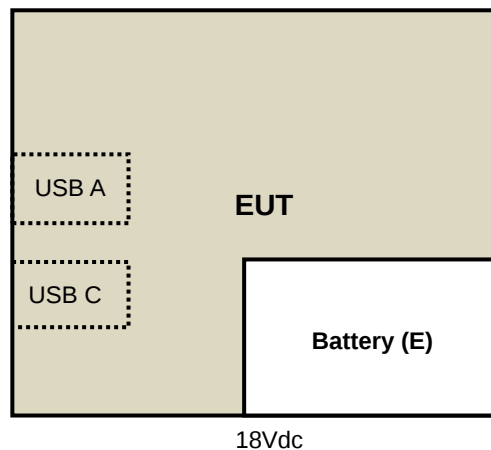
Charging Mode:

Test Mode A

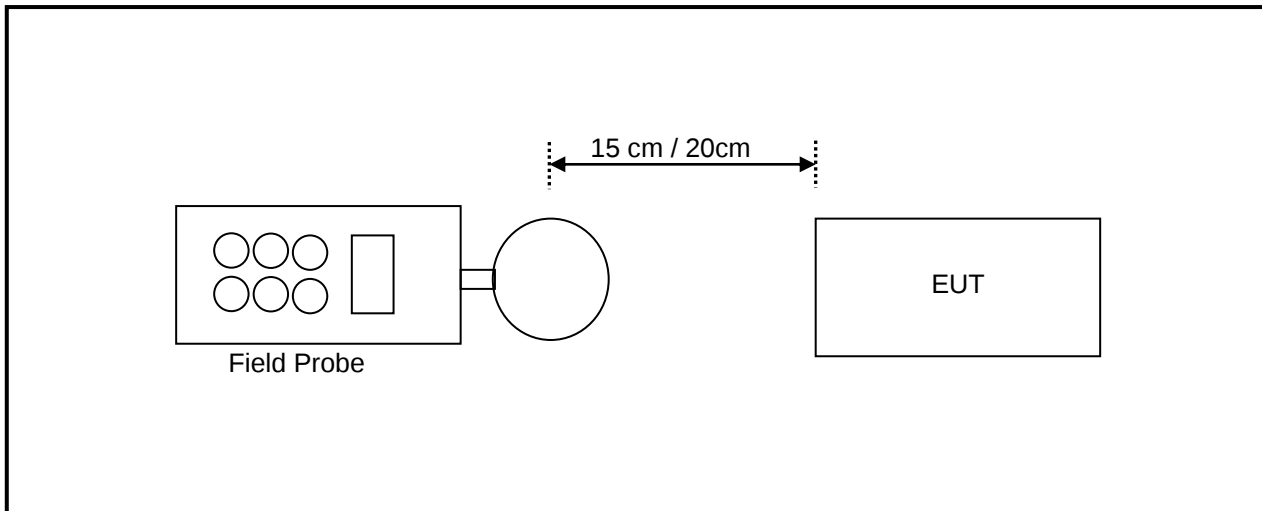


Standby Mode:

Test Mode B



3.2 Test Setup



Note: Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm or 20 cm measured from the center of the probe(s) to the edge of the device.

3.3 Test Instruments

Description	Brand	Model No.	Frequency Range	Calibrated Date	Calibrated Until
Broadband Field Meter	NARDA	NBM-550	-	Mar. 25, 2020	Mar. 24, 2022
Magnetic Field Meter	NARDA	ELT-400	1Hz – 400MHz	Apr. 17, 2020	Apr. 16, 2022
Magnetic Probe	NARDA	HF-3061	300kHz – 30MHz	Apr. 16, 2020	Apr. 15, 2022
Magnetic Probe	NARDA	HF-0191	27 – 1000MHz	Apr. 21, 2020	Apr. 20, 2022
Broadband Field Meter	NARDA	NBM-550	-	Mar. 25, 2020	Mar. 24, 2022
Electric Field Meter	COMBINOVA	EFM 200	5Hz – 400kHz	Dec. 6, 2019	Dec. 5, 2021
E-Field Probe	NARDA	EF-0391	100kHz – 3GHz	Mar. 25, 2020	Mar. 24, 2022
E-Field Probe	NARDA	EF-6091	100MHz – 60GHz	Mar. 25, 2020	Mar. 24, 2022

NOTE: 1. The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Chia Pau RF Chamber
3. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

3.4 Limits for Maximum Permissible Exposure (MPE)

§ 1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency(RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter.

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 (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
300–1500			f/300	6
1500–100,000			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
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

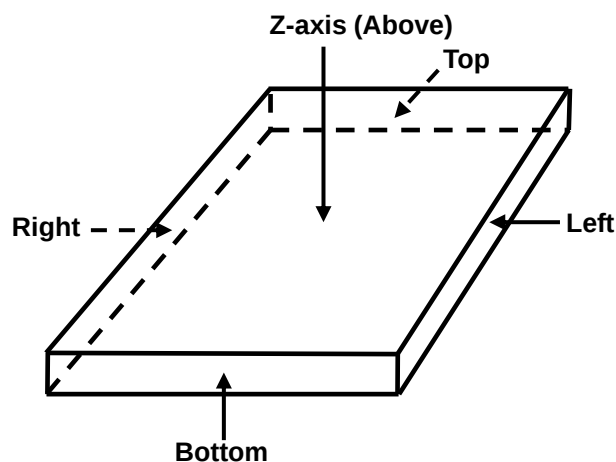
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.

3.5 Test Point Description



4 Measurement Result

Charging Mode

Charging Mode with 10 % Load

E-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.3000	0.3400	0.3400	0.1100	0.5200
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.7000	-613.6600	-613.6600	-613.8900	-613.4800
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.7000	-306.6600	-306.6600	-306.8900	-306.4800

E-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.1700	0.1700	0.1800	0.0900	0.2600
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.8300	-613.8300	-613.8200	-613.9100	-613.7400
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.8300	-306.8300	-306.8200	-306.9100	-306.7400

H-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0940	0.0870	0.0810	0.0870	0.1010
Max H-field (A/m)	0.0752	0.0696	0.0648	0.0696	0.0808
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5548	-1.5604	-1.5652	-1.5604	-1.5492
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7398	-0.7454	-0.7502	-0.7454	-0.7342

H-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0820	0.0780	0.0790	0.0810	0.0870
Max H-field (A/m)	0.0656	0.0624	0.0632	0.0648	0.0696
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5644	-1.5676	-1.5668	-1.5652	-1.5604
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7494	-0.7526	-0.7518	-0.7502	-0.7454

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm or 20 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Charging Mode with 50 % Load

E-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.3400	0.3900	0.3800	0.1800	0.5700
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.6600	-613.6100	-613.6200	-613.8200	-613.4300
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.6600	-306.6100	-306.6200	-306.8200	-306.4300

E-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.2100	0.2000	0.2100	0.1200	0.3100
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.7900	-613.8000	-613.7900	-613.8800	-613.6900
50 % Limit (V/m)	307	307	307	307	307.0000
50 % Margin (V/m)	-306.7900	-306.8000	-306.7900	-306.8800	-306.6900

H-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0980	0.0910	0.0870	0.0980	0.1080
Max H-field (A/m)	0.0784	0.0728	0.0696	0.0784	0.0864
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5516	-1.5572	-1.5604	-1.5516	-1.5436
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7366	-0.7422	-0.7454	-0.7366	-0.7286

H-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0870	0.0820	0.0840	0.0890	0.0910
Max H-field (A/m)	0.0696	0.0656	0.0672	0.0712	0.0728
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5604	-1.5644	-1.5628	-1.5588	-1.5572
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7454	-0.7494	-0.7478	-0.7438	-0.7422

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm or 20 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Charging Mode with Max Load

E-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.3900	0.4300	0.4100	0.2100	0.6300
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.6100	-613.5700	-613.5900	-613.7900	-613.3700
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.6100	-306.5700	-306.5900	-306.7900	-306.3700

E-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.2500	0.2500	0.2500	0.1900	0.3700
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.7500	-613.7500	-613.7500	-613.8100	-613.6300
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.7500	-306.7500	-306.7500	-306.8100	-306.6300

H-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.1030	0.0960	0.0930	0.1060	0.1140
Max H-field (A/m)	0.0824	0.0768	0.0744	0.0848	0.0912
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5476	-1.5532	-1.5556	-1.5452	-1.5388
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7326	-0.7382	-0.7406	-0.7302	-0.7238

H-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0910	0.0880	0.0880	0.0930	0.0960
Max H-field (A/m)	0.0728	0.0704	0.0704	0.0744	0.0768
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5572	-1.5596	-1.5596	-1.5556	-1.5532
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7422	-0.7446	-0.7446	-0.7406	-0.7382

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm or 20 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Standby Mode

E-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.2100	0.2700	0.2200	0.1400	0.3000
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.7900	-613.7300	-613.7800	-613.8600	-613.7000
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.7900	-306.7300	-306.7800	-306.8600	-306.7000

E-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max E-field (V/m)	0.2400	0.2300	0.2100	0.1100	0.2800
Limit (V/m)	614	614	614	614	614
Margin (V/m)	-613.7600	-613.7700	-613.7900	-613.8900	-613.7200
50 % Limit (V/m)	307	307	307	307	307
50 % Margin (V/m)	-306.7600	-306.7700	-306.7900	-306.8900	-306.7200

H-Field Measurement					
Distance	15cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0890	0.0710	0.0690	0.0640	0.0980
Max H-field (A/m)	0.0712	0.0568	0.0552	0.0512	0.0784
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5588	-1.5732	-1.5748	-1.5788	-1.5516
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7438	-0.7582	-0.7598	-0.7638	-0.7366

H-Field Measurement					
Distance	20cm				
EUT Side	Left	Right	Top	Bottom	Z-axis
Max H-field (uT)	0.0630	0.0510	0.0520	0.0550	0.0730
Max H-field (A/m)	0.0504	0.0408	0.0416	0.0440	0.0584
Limit (A/m)	1.63	1.63	1.63	1.63	1.63
Margin (A/m)	-1.5796	-1.5892	-1.5884	-1.5860	-1.5716
50 % Limit (A/m)	0.815	0.815	0.815	0.815	0.815
50 % Margin (A/m)	-0.7646	-0.7742	-0.7734	-0.7710	-0.7566

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm or 20 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

5 Photographs of the Test Configuration

Please refer to the attached file (Test Setup Photo).

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