



TEST REPORT

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Report No.:
KR20-SRF0288-A

Page (1) of (12)

KCTL

1. Client

- Name : Smart Guardians Inc.
- Address : #B-1425, 344, Yangcheon-ro, Gangseo-gu, Seoul 07791
South Korea
- Date of Receipt : 2020-10-20

2. Use of Report : Certification

3. Name of Product / Model : BeraShield Battery / BB02AI01

4. Manufacturer / Country of Origin : SHENZHEN UNIL ELECTRONICS
TECHNOLOGY CO LTD / China

5. FCC ID : 2AXTGBB02AI01

6. Date of Test : 2020-11-02 to 2020-11-10

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address: Address of testing location)

8. Test method used : FCC Part 15 Subpart C, 15.209

9. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Sumin Kim  (Signature)	 Name : Heesu Ahn (Signature)

2020-11-26

KCTL Inc.

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 KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-11-18	Originally issued	-
2020-11-26	Updated	4, 6, 11

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Note. The report No. KR20-SRF0288 is superseded by the report No. KR20-SRF0288-A.

General remarks for test reports

Nothing significant to report.

CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Accessory information	4
2.2.	Frequency/channel operations.....	4
3.	Antenna requirement	5
4.	Summary of tests	6
5.	Measurement uncertainty	6
6.	Test results	7
6.1.	Field Strength of Fundamental and Spurious Emission	7
6.2.	20dB Bandwidth.....	10
7.	Measurement equipment	12

1. General information

Client : Smart Guardians Inc.
 Address : #B-1425, 344, Yangcheon-ro, Gangseo-gu, Seoul 07791 South Korea
 Manufacturer : SHENZHEN UNIL ELECTRONICS TECHNOLOGY CO LTD
 Address : 2/F, B2 Building Huaxiayuan Industrial Zone, Fuping Road, Pingdi Town, Longgang District, Shenzhen City, China
 Laboratory : KCTL Inc.
 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
 Industry Canada Registration No. : 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : BeraShield Battery
 Model : BB02AI01
 Frequency range : WPT_111 kHz ~ 239 kHz
 Modulation technique : WPT_AM
 Number of channels : 1 ch
 Power source : DC 9 V
 Antenna specification : Coil Antenna
 Software version : Rev 1.0
 Hardware version : Rev 1.0
 Operation temperature : -20 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Test JIG (Load module)	-	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:
 WPT

Frequency (kHz)
111 ~ 239

Table 2.2.1 WPT

3. Antenna requirement

Requirement of FCC part section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- The transmitter has permanently attached Coil antenna (Internal antenna) on board.

4. Summary of tests

FCC Part section(s)	Parameter	Test results
15.209(a)	Field Strength of Fundamental and Spurious Emission	Pass
2.1049	20dB Bandwidth	Pass
15.203	Antenna requirement	Pass
15.207(a)	Conducted Emission	N/A ^(Note 2)

Notes:

- The test results shown in the following sections represent the worst case emissions.
- This test is not applicable because the EUT only uses battery.
- These tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.
- The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
- The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.
- The radiated test was performed with and without passive tag. The test results shown in the following sections represent the worst case emissions.
Worst Case : With Test JIG(load module)

5. 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.

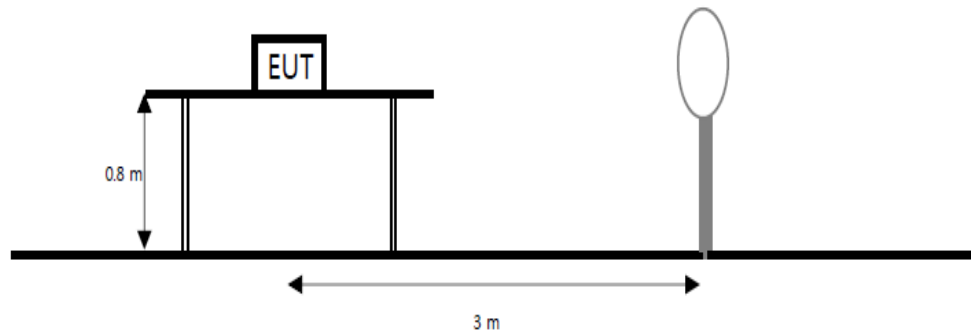
Parameter	Expanded uncertainty ($\pm$)	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.3 dB
Conducted emissions	9 kHz ~ 150 kHz	3.7 dB
	150 kHz ~ 30 MHz	3.3 dB

6. Test results

6.1. Field Strength of Fundamental and Spurious Emission

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



Limit

According to section 15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	$2\,400/F(\text{kHz})$	300
0.490 - 1.705	$24\,000/F(\text{kHz})$	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

Test procedure

ANSI C63.10-2013

Test settings

Test Procedures for emission from 9 kHz to 30 MHz

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode.
- Below 30 MHz frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
 - Face-on = Parallel, Face-off = Perpendicular

Notes:

- $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 Where:
 - F_d = Distance factor in dB
 - D_m = Measurement distance in meters
 - D_s = Specification distance in meters
- The test measurement distance is 3 meter
- Limit (dB(μ V/m)) =

For 0.009 MHz - 0.490 MHz,	$20 \cdot \log(2400/F(\text{kHz}))$ dB(μ V/m)
For 0.490 MHz - 1.705 MHz,	$20 \cdot \log(24000/F(\text{kHz}))$ dB(μ V/m)
For 1.705 MHz - 30 MHz,	$20 \cdot \log(30) = 29.54$ dB(μ V/m)

Test results

Radiated Emissions Fundamental & 9 kHz to 30 MHz

[Face-on]

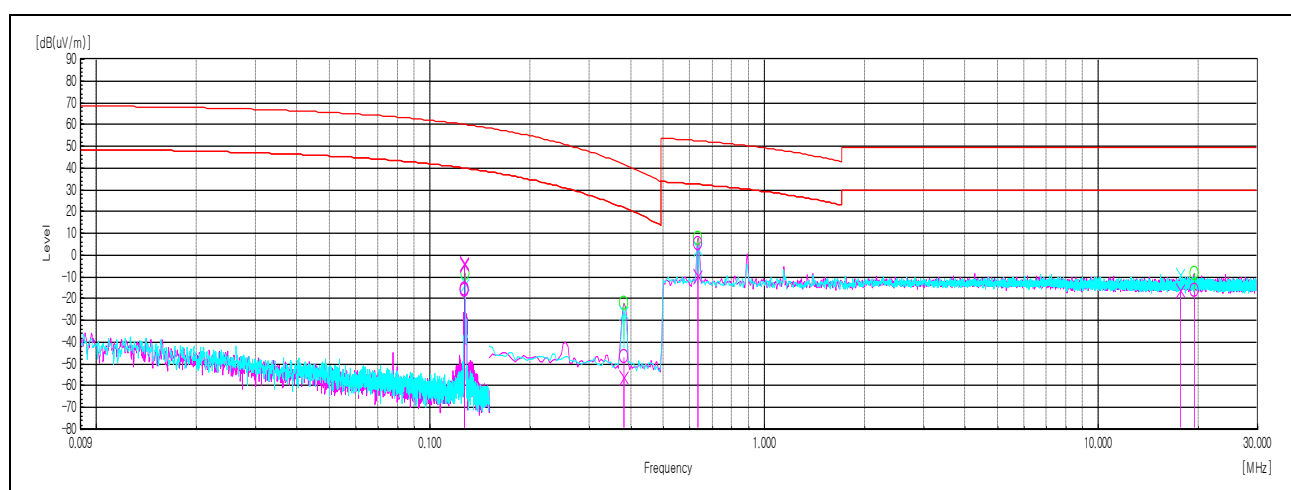
Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.127	76.5	AV	19.9	-32.4	-80.0	-92.5	-16.0	41.1	57.1
0.127	76.9	PK	19.9	-32.4	-80.0	-92.5	-15.6	61.1	76.7
0.381	46.1	AV	19.9	-32.4	-80.0	-92.5	-46.4	24.8	71.2
0.635	57.5	QP	19.9	-32.3	-40.0	-52.4	5.1	33.2	28.1
19.344	34.5	QP	20.6	-31.0	-40.0	-50.5	-16.0	29.5	45.5

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance factor	Factor	Result	Limit	Margin
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
0.127	88.3	AV	19.9	-32.4	-80.0	-92.5	-4.2	41.1	45.3
0.127	88.6	PK	19.9	-32.4	-80.0	-92.5	-3.9	61.1	65.0
0.381	36.3	AV	19.9	-32.4	-80.0	-92.5	-56.2	24.8	81.0
0.635	42.9	QP	19.9	-32.3	-40.0	-52.4	-9.5	33.2	42.7
17.590	34.8	QP	20.4	-31.2	-40.0	-50.7	-15.9	29.5	45.4

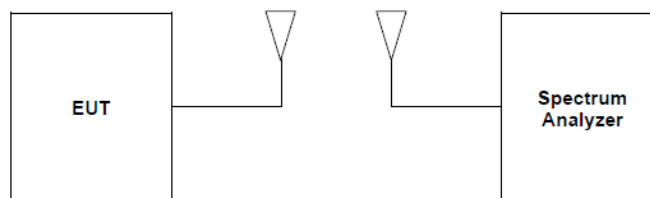
Note:

- 1) Factor(dB) = Antenna Factor + Amp. Gain + Cable Loss + distance factor(dB)
- 2) -80 is distance factor = $40 \cdot \log(3/300)$, -40 is distance factor = $40 \cdot \log(3/30)$



6.2. 20dB Bandwidth

Test setup



Limit

For reporting purpose only

Test settings

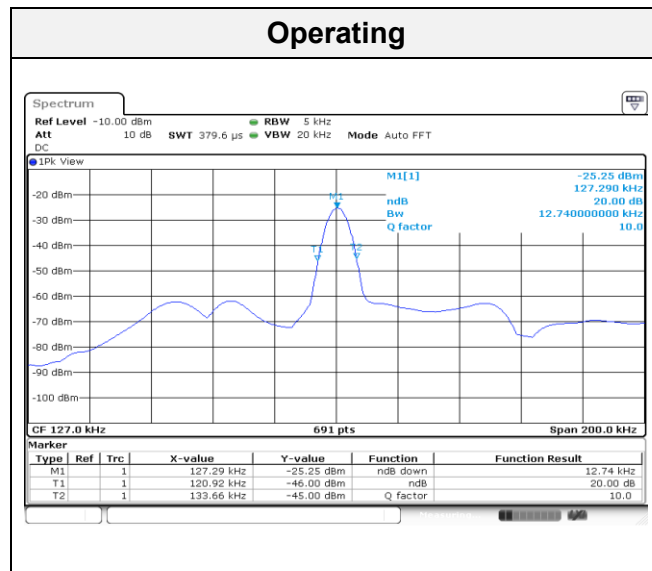
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

The trace data points are recovered and are directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded.

Test results**20dB Bandwidth**

Frequency (kHz)	Mode	20dB Bandwidth (kHz)	Limit
127	Operating	12.74	Reporting purpose only

Test Plots**Note:**

Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
Signal Generator	R&S	SMB100A	176206	21.01.21
Spectrum Analyzer	R&S	FSV40	100988	21.01.10
Amplifier	L-3 Narda-MITEQ	AFS5-00101800-25-S-5	2054570	21.05.22
EMI TEST RECIEVER	R&S	ESCI7	100732	21.03.04
Loop Antenna	R&S	HFH2-Z2	100355	22.08.21
Attenuator	AGILENT	8491B-006	MY37270292	21.05.15
Amplifier	SONOMA	310N	284608	21.08.20
Antenna Mast	Innco Systems	MA4000-EP	303	N/A
Turn Table	Innco Systems	DT2000	79	N/A

End of test report