TEST REPORT



KCTL KCTL Inc.

65. Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr

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Report No.:



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 Charger / BC03Al01

4. Manufacturer / Country of Origin

SHENZHEN UNIL ELECTRONICS TECHNOLOGY CO LTD / China

5. FCC ID

: 2AXTGBC03AI01

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

Tested by

Technical Manager

Affirmation

Name: Sumin Kim

Name: Heesu Ahn

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.

KCTL-TIR001-003/3 KP20-05594

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REPORT REVISION HISTORY

Date	Revision	Page No
2020-11-18	Originally issued	-
2020-11-26	Updated	5, 7, 8, 10-13

Report No.:

KR20-SRF0290-A

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Note. The report No. KR20-SRF0290 is superseded by the report No. KR20-SRF0290-A.

General remarks for test reports

Nothing significant to report.

KCTL-TIR001-003/3 KP20-05594

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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 Charger

Model : BC03AI01

Frequency range 111 kHz ~ 129 kHz

Modulation technique : AM
Number of channels : 1 ch

 $\begin{tabular}{lll} Power source & : & DC 5 \ V, \ DC 9 \ V \\ Antenna & specification & : & Coil Antenna \\ \end{tabular}$

Software version : Rev 1.0 Hardware version : Rev 1.0

Operation temperature : -20 °C ~ 50 °C

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2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
AC Adaptor	Dongguan Samsung Electro-mechanics Co., Ltd.	EP-TA20KWK	R37G2V66K91SE3	INPUT : AC 100-240V 50-60 Hz OUTPUT : DC 9.0V 1.67A or DC 5.0V 2.0A
C-type cable	-	-	-	-
Test JIG (Load module)	-	-	-	-
Wireless Charger	SHENZHEN UNIL ELECTRONICS TECHNOLOGY CO LTD	BC02AI01	-	-

2.2. Frequency/channel operations

This device contains the following capabilities: WPT

Frequency (kHz)
111 ~ 129

Table 2.2.1 WPT

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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.

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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	Pass ^(Note 1)

Notes:

- 1. For the AC line conducted test, all test case was performed with the AC adaptor connected.
- 2. 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.
- 3. 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.
- 4. The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
- 5. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.
- 6. The radiated test was performed with and without test jig(load module). The test results shown in the following sections represent the worst case emissions.

Worst Case: With test jig(load module)

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 of 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		
Conducted emissions	150 kHz ~ 30 MHz	3.3 dB		

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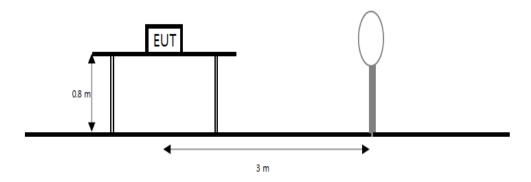


6. Test results

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 (Mb)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(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 Mb, 76–88 Mb, 174–216 Mb or 470–806 Mb. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

Test cases

Test case	Description
1	Input voltage : DC 5V, with Test JIG
2	Input voltage : DC 9V, with Test JIG
3	Input voltage : DC 5V, with BC02Al01
4	Input voltage : DC 9V, with BC02AI01

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Test procedure

ANSI C63.10-2013

Test settings

Test Procedures for emission from 9 № to 30 №

- a. 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.
- b. 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.
- c. 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.
- d. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode.
- e. Below 30 Mb 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:

1. f < 30 MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40log(D_m/Ds)$ Where:

 F_d = Distance factor in dB

D_m = Measurement distance in meters

D_s = Specification distance in meters

2. The test measurement distance is 3 meter

3. Limit ($dB(\mu V/m)$) = For 0.009 Mb - 0.490 Mb, 20*log(2 400/F(kb)) $dB(\mu V/m)$

For 0.490 Mb - 1.705 Mb, $20*log(24\ 000/F(klbz))\ dB(\mu V/m)$ For 1.705 Mb - 30 Mb, $20*log(30) = 29.54\ dB(\mu V/m)$

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Test results

Radiated Emissions Fundamental & 9 址 to 30 飐_Test case 1

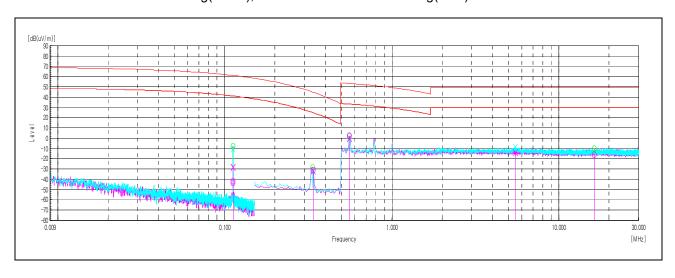
[Face-on]

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)
0.112	48.8	AV	19.9	-32.4	-80.0	-92.5	-43.7	41.1	84.8
0.112	50.7	PK	19.9	-32.4	-80.0	-92.5	-41.8	61.1	102.9
0.337	61.7	AV	19.9	-32.4	-80.0	-92.5	-30.8	24.8	55.6
0.557	55.0	QP	19.9	-32.4	-40.0	-52.5	2.6	33.2	30.7
16.310	34.6	QP	20.3	-31.2	-40.0	-50.9	-16.3	29.5	45.8

[Face-off]

i acc on	ace-onj								
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)
0.112	64.2	AV	19.9	-32.4	-80.0	-92.5	-28.3	41.1	69.4
0.112	64.6	PK	19.9	-32.4	-80.0	-92.5	-27.9	61.1	89.0
0.337	60.7	AV	19.9	-32.4	-80.0	-92.5	-31.8	24.8	56.6
0.557	52.7	QP	19.9	-32.4	-40.0	-52.5	0.3	33.2	33.0
5.478	38.2	QP	20.3	-31.2	-40.0	-50.9	-12.7	29.5	42.2

 $^{^{2)}}$ -80 is distance factor = $40*\log(3/300)$, -40 is distance factor = $40*\log(3/30)$



¹⁾ Factor(dB) = Antenna Factor + Amp. Gain + Cable Loss + distance factor(dB)

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Radiated Emissions Fundamental & 9 \ to 30 \ m_ Test case 2

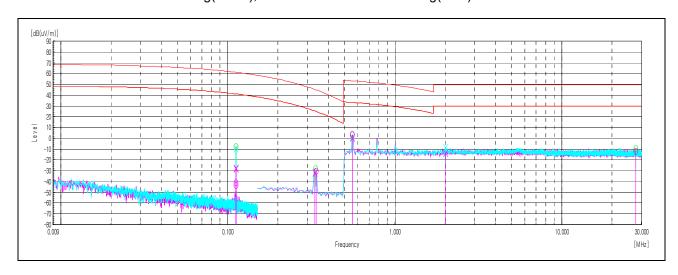
[Face-on]

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)
0.112	48.9	AV	19.9	-32.4	-80.0	-92.5	-43.6	41.1	84.7
0.112	51.3	PK	19.9	-32.4	-80.0	-92.5	-41.2	61.1	102.3
0.337	62.0	AV	19.9	-32.4	-80.0	-92.5	-30.5	24.8	55.3
0.557	56.1	QP	19.9	-32.4	-40.0	-52.5	3.7	33.2	29.6
27.687	38.4	QP	20.4	-30.9	-40.0	-50.5	-12.1	29.5	41.6

[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)
0.112	64.3	AV	19.9	-32.4	-80.0	-92.5	-28.2	41.1	69.3
0.112	64.8	PK	19.9	-32.4	-80.0	-92.5	-27.7	61.1	88.8
0.333	60.9	AV	19.9	-32.4	-80.0	-92.5	-31.6	24.8	56.4
0.557	53.2	QP	19.9	-32.4	-40.0	-52.5	0.8	33.2	32.5
2.008	38.5	QP	20.0	-32.1	-40.0	-52.1	-13.6	29.5	43.1

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



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Radiated Emissions Fundamental & 9 \ to 30 \ m_ Test case 3

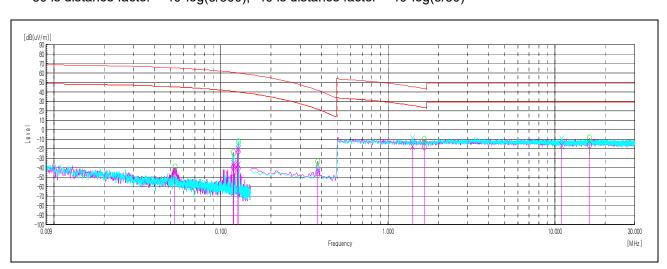
[Face-on]

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)
0.053	49.1	AV	20.1	-32.4	-80	-92.3	-43.2	45.3	88.5
0.119	47.1	AV	19.9	-32.4	-80	-92.5	-45.4	40.6	86.0
0.119	51.8	PK	19.9	-32.4	-80	-92.5	-40.7	60.6	101.3
0.127	51.8	AV	19.9	-32.4	-80	-92.5	-40.7	40.0	80.7
0.381	47.2	AV	19.9	-32.4	-80	-92.5	-45.3	21.7	67.0
1.650	34.5	QP	20.0	-32.2	-40	-52.2	-17.7	23.5	41.2
16.049	34.9	QP	20.3	-31.2	-40	-51.0	-16.1	29.5	45.6

[Face-off]

Frequency	Reading	Detector	Ant. Factor	Amp. + Cable	Distance	Factor	Result	Limit	Margin	
. requestey	rtouumg	20100101	7	7 impr + Gubio	factor	1 40101	rtoount		3	
(MHz)	(dB(μV))	Mode	(dB)	(dB)	(dB)	(dB)	(dB(μV/ m))	(dB(μV/m))	(dB)	
0.119	54.5	AV	19.9	-32.4	-80	-92.5	-38.0	40.6	78.6	
0.119	57.5	PK	19.9	-32.4	-80	-92.5	-35.0	60.6	95.6	
0.127	56.0	AV	19.9	-32.4	-80	-92.5	-36.5	40.0	76.5	
0.381	48.3	AV	19.9	-32.4	-80	-92.5	-44.2	21.7	65.9	
1.400	34.9	QP	19.9	-32.2	-40	-52.2	-17.3	25.7	43.0	
10.967	35.0	QP	20.2	-31.5	-40	-51.3	-16.3	29.5	45.8	

 $^{^{2)}}$ -80 is distance factor = $40*\log(3/300)$, -40 is distance factor = $40*\log(3/30)$



¹⁾ Factor(dB) = Antenna Factor + Amp. Gain + Cable Loss + distance factor(dB)

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Radiated Emissions Fundamental & 9 \ to 30 \ m_ Test case 4

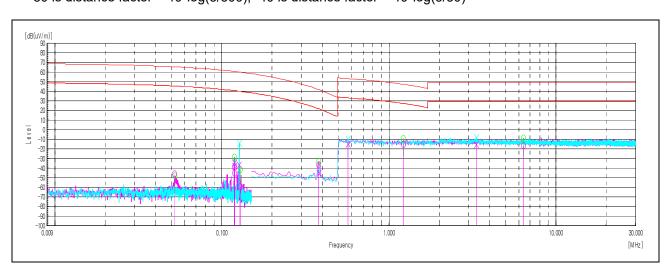
[Face-on]

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)
0.052	46.0	AV	20.1	-32.4	-80	-92.3	-46.3	45.3	91.6
0.119	47.1	AV	19.9	-32.4	-80	-92.5	-45.4	40.6	86.0
0.119	53.8	PK	19.9	-32.4	-80	-92.5	-38.7	60.6	99.3
0.129	33.5	AV	19.9	-32.4	-80	-92.5	-59.0	39.9	98.9
0.381	55.6	AV	19.9	-32.4	-80	-92.5	-36.9	21.7	58.6
1.221	36.7	QP	19.9	-32.2	-40	-52.3	-15.6	27.3	42.9
6.400	35.1	QP	20.1	-31.8	-40	-51.6	-16.5	29.5	46.0

[Face-off]

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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)
0.119	54.5	AV	19.9	-32.4	-80	-92.5	-38.0	40.6	78.6
0.119	57.6	PK	19.9	-32.4	-80	-92.5	-34.9	60.6	95.5
0.127	56.0	AV	19.9	-32.4	-80	-92.5	-36.5	40.0	76.5
0.381	47.4	AV	19.9	-32.4	-80	-92.5	-45.1	21.7	66.8
0.568	37.7	QP	19.9	-32.4	-40	-52.5	-14.8	33.1	47.9
3.333	36.4	QP	20.1	-32.0	-40	-51.9	-15.5	29.5	45.0

 $^{^{2)}}$ -80 is distance factor = $40*\log(3/300)$, -40 is distance factor = $40*\log(3/30)$



¹⁾ Factor(dB) = Antenna Factor + Amp. Gain + Cable Loss + distance factor(dB)

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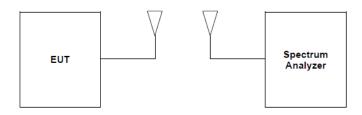
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6.2. 20dB Bandwidth

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.

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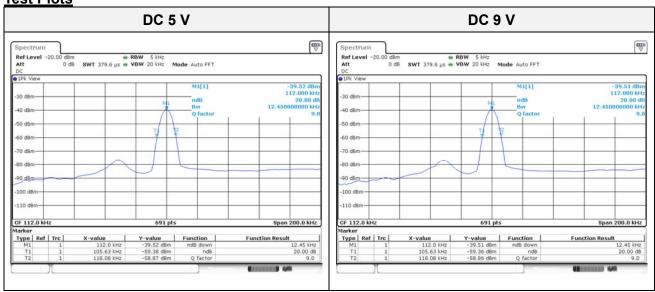


Test results

20dB Bandwidth

Frequency (klb) Mode		20dB Bandwidth (地)	Limit		
440	DC 5 V	12.45	Reporting purpose only		
112	DC 9 V	12.45	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.

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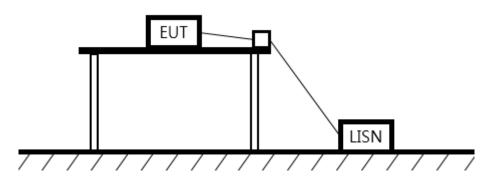
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6.3. AC Conducted emission

Test setup



Limit

According to 15.207(a), For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Eraguanay of Emissian (Mk)	Conducted limit (dBμV/m)					
Frequency of Emission (咃)	Quasi-peak	Average				
0.15 – 0.50	66 - 56*	56 - 46*				
0.50 - 5.00	56	46				
5.00 – 30.0	60	50				

Measurement procedure

- 1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
- 2. Each current-carrying conductor of the EUT power cord was individually connected through a $50\Omega/50\mu H$ LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
- 3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
- 4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
- 5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

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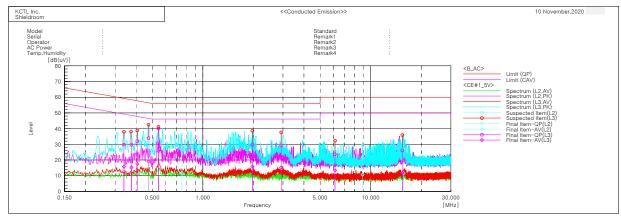
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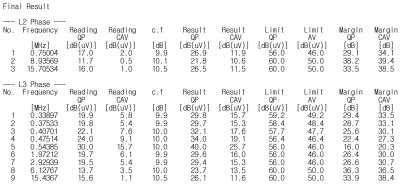
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Test results [DC 5 V]





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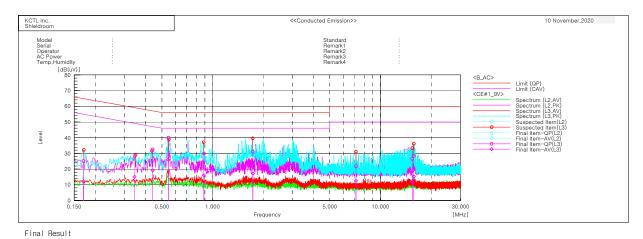
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[DC 9 V]



Margin QP [dB] 39.4 22.8 32.8 Margin CAV [dB] 40.7 27.3 35.3

--- L2 Phase --No. Frequency Reading QP CAV
[MHz] [dB(uV)] [dB(uV)]
1 0.171 15.3 4.0
2 0.71562 23.3 8.8
3 15.74701 16.7 4.2

 ding Reading CAV
 C.f
 Result QP
 Result CAV
 Limit QP
 A
 A
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	L3 Priase	_								
No.	Frequency	Reading OP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margir CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.17028	14.9	2.0	10.2	25.1	12.2	64.9	54.9	39.8	42.7
2	0.34361	18.6	5.2	9.9	28.5	15.1	59.1	49.1	30.6	34.0
3	0.43988	22.6	9.1	10.0	32.6	19.1	57.1	47.1	24.5	28.0
4	0.5454	29.9	15.9	10.0	39.9	25.9	56.0	46.0	16.1	20.1
5	0.88782	19.9	6.2	9.9	29.8	16.1	56.0	46.0	26.2	29.9
6	1.74008	21.2	7.2	9.9	31.1	17.1	56.0	46.0	24.9	28.9
7	7.14591	11.8	2.5	10.0	21.8	12.5	60.0	50.0	38.2	37.5
8	15.47009	16.0	1.5	10.5	26.5	12.0	60.0	50.0	33.5	38.0
9	15.81067	17.8	4.8	10.5	28.3	15.3	60.0	50.0	31.7	34.7

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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
TWO-LINE V - NETWORK	R&S	ENV216	101584	21.04.06
EMI TEST RECEIVER	R&S	ESCI	101408	21.08.20
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