



中国认可
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检测
TESTING
CNAS L5313



DEKRA

RF Exposure Evaluation Declaration

Product Name : Cassia Bluetooth Router
Model No. : S1000、S1000-10、S1000-20、S1000-30、S1100、
S1100-10、S1100-20、S1100-30
FCC ID : 2ALGLS1000

Applicant : CASSIA NETWORKS , INC
Address : 1840 Majestic Way, San Jose, CA 95132, USA

Date of Receipt : Mar. 03rd, 2017
Test Date : Mar. 03rd, 2017~ May. 31th, 2017
Issued Date : Jul. 24th, 2017
Report No. : 1732001R-RF- US- P20V01
Report Version : V1.3

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, CNAS or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.

Test Report Certification

Issued Date : Jul. 24th, 2017

Report No. : 1732001R-RF-US-P20V01



Product Name : Cassia Bluetooth Router
Applicant : CASSIA NETWORKS , INC
Address : 1840 Majestic Way, San Jose, CA 95132 , USA
Manufacturer : CASSIA NETWORKS , INC
Address : 1840 Majestic Way, San Jose, CA 95132 , USA
Model No. : S1000, S1000-10, S1000-20, S1000-30, S1100, S1100-10, S1100-20, S1100-30
FCC ID : 2ALGLS1000
EUT Voltage : S1000, S1000-10, S1000-20, S1000-30: DC 5V/2A
S1100, S1100-10, S1100-20, S1100-30: DC 5V/2A or 57Vdc , 350mA (PoE)
Test Voltage : AC 120V/60Hz
Applicable Standard : KDB 447498D01V06
FCC Part1.1310
Test Result : Complied
Performed Location : DEKRA Testing & Certification (Suzhou) Co., Ltd.
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: 800392

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Approved By : Harry Zhao
(Engineering Manager: Harry Zhao)

1. RF Exposure Evaluation

1.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

According to KDB 447498 D01v06, Transmitters used in mobile device exposure conditions for simultaneous transmission operations should be calculate as follow:

For *mobile exposure host* platform devices to qualify for simultaneous transmission MPE test exclusion, all transmitters and antennas in the host must either be evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in 7.1. When modular transmitters are used, the minimum *test separation distance* required for each simultaneously transmitting antenna installed in the host device must satisfy MPE compliance for both standalone and simultaneous transmission operations. When simultaneous transmission MPE test exclusion applies, transmitter modules may be incorporated in host devices according to Class I permissive change requirements to document the test exclusion conditions.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum *test separation distance* required by the operating configurations and

exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency.⁶⁹ Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging should not be applied when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum *test separation distances* required for all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

When one of the following test exclusion conditions is satisfied for all combinations of simultaneous transmission configurations, further equipment approval is not required to incorporate transmitter modules in host devices that operate in the *mixed mobile and portable host* platform exposure conditions.

The grantee is responsible for documenting this according to Class I permissive change requirements.

Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone SAR to determine simultaneous transmission test exclusion.

a) The $[\sum \text{ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg} + [\sum \text{ of MPE ratios}]]$ is ≤ 1.0 .

b) The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04 , and the $[\sum \text{ of MPE ratios}]$ is ≤ 1.0 .

When RF exposure test exclusion does not apply, simultaneous transmission evaluation is required for mixed mobile device and portable device exposure conditions. For each simultaneous transmission configuration, the sum of the MPE ratios for the simultaneously transmitting antennas operating in mobile device exposure conditions must be determined according to the calculated/estimated, numerically modeled or measured field strengths or power density. For each simultaneous transmission configuration, the enlarged zoom scan measurement and volume scan post-processing procedures in KDB Publication 865664 D01 must be applied to test the simultaneously transmitting antennas operating in portable device exposure conditions. The $[(\text{highest measured simultaneous transmission SAR, adjusted for maximum tune-up tolerance}) / 1.6 \text{ W/kg}] + [\sum \text{ of MPE ratios}]$ must be ≤ 1.0 for each simultaneous transmission configuration; otherwise, a PAG is required for the FCC to determine compliance on a case-by-case basis, with respect to antenna-to-antenna and antenna-to-user separation, device form factor, operating

requirements and exposure conditions, etc.

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18 and 78% RH.

1.3. Test Result of RF Exposure Evaluation

Product	:	Cassia Bluetooth Router
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

Antenna Information:

BLE:

Antenna manufacturer	N/A		
Antenna Delivery	<input checked="" type="checkbox"/> 1*TX+1*RX	<input type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX
Antenna technology	<input checked="" type="checkbox"/> SISO		
	<input type="checkbox"/> MIMO	<input type="checkbox"/> Basic	
		<input type="checkbox"/> CDD	
		<input type="checkbox"/> Beam-forming	
Antenna Type	<input type="checkbox"/> External	<input type="checkbox"/> Dipole	
	<input checked="" type="checkbox"/> Internal	<input type="checkbox"/> PIFA	
		<input type="checkbox"/> PCB	
		<input type="checkbox"/> Ceramic Chip Antenna	
		<input checked="" type="checkbox"/> Metal plate type F antenna	
Antenna Gain	5dBi		

2.4G Wifi:

Antenna manufacturer	N/A		
Antenna Delivery	<input checked="" type="checkbox"/> 1*TX+1*RX	<input type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX
Antenna technology	<input checked="" type="checkbox"/> SISO		
	<input type="checkbox"/> MIMO	<input type="checkbox"/> Basic	
		<input type="checkbox"/> CDD	
		<input type="checkbox"/> Beam-forming	
Antenna Type	<input type="checkbox"/> External	<input type="checkbox"/> Dipole	
	<input checked="" type="checkbox"/> Internal	<input checked="" type="checkbox"/> PIFA	
		<input type="checkbox"/> PCB	
		<input type="checkbox"/> Ceramic Chip Antenna	
		<input type="checkbox"/> Metal plate type F antenna	
Antenna Gain	3.2dBi		

RF Exposure Measurement Results:

SISO (r=20cm):

Operation Mode	Frequency Range (MHz)	Maximum EIRP (dBm)	Limit of Power Density S(mW/cm ²)	Power Density S(mW/cm ²)	Estimated MPE radio
BLE	2400 – 2483.5 MHz	14.168	1	0.005	0.005
802.11b/g/n(20MHz)	2400 – 2483.5 MHz	21.88	1	0.031	0.031
802.11n(40MHz)	2400 – 2483.5 MHz	17.72	1	0.012	0.012
Operation Mode	Frequency Range (MHz)	Maximum tune-up SAR (W/Kg)	Estimated SAR radio		
GSM/GPRS 850/1900 WCDMA Band II/V	850/1900 MHz	1.2	0.75		

Note1: The EUT can transmit simultaneous with 2G/3G dongle, the general SAR value is 1.2W/kg for USB dongle.

2: The Estimated for USB dongle can be calculated by the ratio of general SAR and the SAR limit. So for USB dongle, the Estimated MPE radio is 0.75.

Simultaneous transmission (r=20cm):

Operation Mode	Frequency Range (MHz)	Estimated MPE/SAR radio	Simultaneous transmission
BLE	2400 - 2483.5 MHz	0.005	0.786
802.11b/g/n(20MHz)	2400 - 2483.5 MHz	0.031	
GSM/GPRS 850/1900 WCDMA Band II/V	850/1900 MHz	0.75	

Note: So the simultaneous MPE/SAR radio is 0.786 for Cassia Bluetooth Router installed with 2G/3G dongle but without any other radio equipment, which satisfied the MPE exclusion compliance.

_____ The End _____