

RF Exposure Report

Report No.: SA160726C12

FCC ID: HDCBSAP304X

Test Model: BSAP-3045

Series Model: BSAP-3040

Received Date: Jul. 26, 2016

Test Date: Jul. 29 ~ Sep. 09, 2016

Issued Date: Nov. 04, 2016

Applicant: Adtran

Address: 901 Explorer Boulevard Huntsville Alabama United States

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

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Release Control Record

Issue No.	Description	Date Issued
SA160726C12	Original release	Nov. 04, 2016

1 Certificate of Conformity

Product: Wireless 802.11abgn/ac Access Point

Brand: Adtran

Test Model: BSAP-3045

Series Model: BSAP-3040

Sample Status: Engineering sample

Applicant: Adtran

Test Date: Jul. 29 ~ Sep. 09, 2016

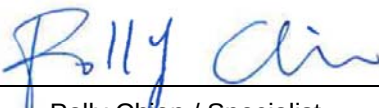
Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1

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 EMC characteristics under the conditions specified in this report.

Prepared by :


Polly Chien / Specialist

Date:

Nov. 04, 2016

Approved by :


Ken Liu / Senior Manager

Date:

Nov. 04, 2016

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

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

2.3 Classification

The antenna of this product, under normal use condition, is at least 28cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Calculation Result of Maximum Conducted Power

Internal antenna

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1					
WLAN: CDD mode					
2412-2462	24.99	9.78	28	0.304	1
WLAN: Beamforming mode					
2412-2462	18.77	9.78	28	0.073	1
Radio 2					
WLAN: CDD mode					
5180-5240	24.28	11.73	28	0.405	1
5745-5825	25.46	11.73	28	0.531	1
WLAN: Beamforming mode					
5180-5240	18.26	11.73	28	0.101	1
5745-5825	19.44	11.73	28	0.133	1
Radio 3					
WLAN: CDD mode					
2412-2462	13.03	2.9	28	0.004	1
Radio 4					
BT LE					
2402-2480	0.11	3.93	28	0.0003	1

Note:

Radio 1: 2.4GHz Band: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.78\text{dBi}$

Radio 2: 5GHz Band: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 11.73\text{dBi}$

Radio 3: 2.4GHz Band: Directional gain = 2.9dBi

External antenna

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1					
WLAN: CDD mode					
2412-2462	24.99	10.68	28	0.375	1
WLAN: Beamforming mode					
2412-2462	18.77	10.68	28	0.089	1
Radio 2					
WLAN: CDD mode					
5180-5240	24.28	10.69	28	0.319	1
5745-5825	25.46	10.69	28	0.418	1
WLAN: Beamforming mode					
5180-5240	18.26	10.69	28	0.080	1
5745-5825	19.44	10.69	28	0.105	1
Radio 3					
WLAN: CDD mode					
2412-2462	13.03	2.9	28	0.004	1
Radio 4					
BT LE					
2402-2480	0.11	3.81	28	0.0003	1

Note:

Radio 1: 2.4GHz Band: Directional gain = 4.66dBi + 10log(4) = 10.68dBi

Radio 2: 5GHz Band: Directional gain = 4.67dBi + 10log(4) = 10.69dBi

Radio 3: 2.4GHz Band: Directional gain = 2.9dBi

Conclusion:

Both of the WLAN 2.4G & WLAN 5G & BT LE can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	WLAN 2.4GHz		BT EDR		
	Radio 1	Radio 3	Radio 4		
2.4GHz	24.99	13.03	0.11	25.27	30

Internal antenna:

$$\text{Radio 1} + \text{Radio 2} + \text{Radio 3 (2.4G)} + \text{Radio 4} \\ = 0.304 + 0.531 + 0.004 + 0.0003 = 0.839$$

External antenna:

$$\text{Radio 1} + \text{Radio 2} + \text{Radio 3 (2.4G)} + \text{Radio 4} \\ = 0.375 + 0.418 + 0.004 + 0.0003 = 0.797$$

Therefore the maximum calculations of above situations are less than the "1" limit.

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