

## 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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**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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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 :**  , **Date:** Nov. 04, 2016  
Polly Chien / Specialist

**Approved by :**  , **Date:** Nov. 04, 2016  
Ken Liu / Senior Manager

## 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 <sup>2</sup> ) | 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

$$Pd = (Pout * G) / (4 * pi * r^2)$$

where

Pd = power density in mW/cm<sup>2</sup>

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|------------------------|-----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 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 =  $4.66\text{dBi} + 10\log(4) = 10.68\text{dBi}$

Radio 2: 5GHz Band: Directional gain =  $4.67\text{dBi} + 10\log(4) = 10.69\text{dBi}$

Radio 3: 2.4GHz Band: Directional gain =  $2.9\text{dBi}$

**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.

---END---