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## 1. Radio Frequency Exposure

### RESULT:

Pass

Test standard : FCC Part 2: Section 2.1091  
RSS-102 Issue 5  
KDB 447498 D01 General RF Exposure Guidance v06

### 1.1 Product Technical Information

The EUT is a Digital media receiver which supports Bluetooth, Bluetooth BLE and 2.4GHz/5GHz Wi-Fi protocols, refer below for detail information.

| Technical Specification               | Value                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name                          | Digital media receiver                                                                                                                                                                                                                                                                                                  |
| Model                                 | B7W644                                                                                                                                                                                                                                                                                                                  |
| FCC ID                                | 2ALXK-2768                                                                                                                                                                                                                                                                                                              |
| IC                                    | 25980-2768                                                                                                                                                                                                                                                                                                              |
| HVIN                                  | B7W644                                                                                                                                                                                                                                                                                                                  |
| Frequency Bands                       | 2400-2483.5MHz<br>5150-5350MHz<br>5470-5725MHz<br>5725-5850MHz                                                                                                                                                                                                                                                          |
| Operating Frequency/Channels/Protocol | Bluetooth:<br>2402-2480MHz, 79CHs<br>Bluetooth BLE:<br>2402-2480MHz, 40CHs<br>2.4GHz Wi-Fi:<br>2412-2472MHz, 13CHs, 802.11b/g/n20<br>5GHz Wi-Fi:<br>5180-5320MHz, 14CHs, 802.11 a/n20/n40/ac20/ac40/ac80<br>5500-5700MHz, 21CHs, 802.11 a/n20/n40/ac20/ac40/ac80<br>5745-5825MHz, 8CHs, 802.11 a/n20/n40/ac20/ac40/ac80 |
| Type of Product                       | Client Device without Radar Detection                                                                                                                                                                                                                                                                                   |
| TX Power Control (TPC)                | Not Supported                                                                                                                                                                                                                                                                                                           |
| Modulation                            | DSSS (DBPSK, DQPSK, CCK)<br>OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>GFSK, pi/4-DQPSK, 8-DPSK                                                                                                                                                                                                                                 |
| Antenna Number                        | Bluetooth: 1<br>2.4GHz Wi-Fi: 1<br>5GHz Wi-Fi: 1                                                                                                                                                                                                                                                                        |
| Antenna Type                          | Integral antenna                                                                                                                                                                                                                                                                                                        |
| Antenna Gain                          | Bluetooth: 2.0dBi max.<br>2.4GHz Wi-Fi: 3.0dBi max.<br>5GHz Wi-Fi: 6.0dBi max.                                                                                                                                                                                                                                          |
| Operation Voltage                     | Powered by AC/DC adapter                                                                                                                                                                                                                                                                                                |

### 1.2 Product Classification

This device defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

### 1.3 Radio Frequency Exposure Limit

For FCC:

| Frequency range (MHz) | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) |
|-----------------------|-------------------------------|-------------------------------|-------------------------------------|
| 300-1,500             | --                            | --                            | f/1500                              |
| 1,500-100,000         | --                            | --                            | 1.0                                 |

For IC:

| Frequency Range (MHz)                                                                                                       | Electric Field (V/m rms)  | Magnetic Field (A/m rms)                 | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------|-----------------------------------|----------------------------|
| 0.003-10 <sup>21</sup>                                                                                                      | 83                        | 90                                       | -                                 | Instantaneous*             |
| 0.1-10                                                                                                                      | -                         | 0.73/ f                                  | -                                 | 6**                        |
| 1.1-10                                                                                                                      | 87/ f <sup>0.5</sup>      | -                                        | -                                 | 6**                        |
| 10-20                                                                                                                       | 27.46                     | 0.0728                                   | 2                                 | 6                          |
| 20-48                                                                                                                       | 58.07/ f <sup>0.25</sup>  | 0.1540/ f <sup>0.25</sup>                | 8.944/ f <sup>0.5</sup>           | 6                          |
| 48-300                                                                                                                      | 22.06                     | 0.05852                                  | 1.291                             | 6                          |
| 300-6000                                                                                                                    | 3.142 f <sup>0.3417</sup> | 0.008335 f <sup>0.3417</sup>             | 0.02619 f <sup>0.6834</sup>       | 6                          |
| 6000-15000                                                                                                                  | 61.4                      | 0.163                                    | 10                                | 6                          |
| 15000-150000                                                                                                                | 61.4                      | 0.163                                    | 10                                | 616000/ f <sup>1.2</sup>   |
| 150000-300000                                                                                                               | 0.158 f <sup>0.5</sup>    | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000/ f <sup>1.2</sup>   |
| <p>Note: f is frequency in MHz.<br/> *Based on nerve stimulation (NS).<br/> ** Based on specific absorption rate (SAR).</p> |                           |                                          |                                   |                            |

### 1.4 Radio Frequency Exposure Calculation Formula

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)  
P = power input to the antenna (in appropriate units, e.g., mW)  
G = power gain of the antenna in the direction of interest relative to an isotropic radiator  
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or:

$$S = \frac{EIRP}{4\pi R^2}$$

where: EIRP = equivalent (or effective) isotropically radiated power

## 1.5 Calculation Result

### 1.5.1 Stand-alone transmission MPE

| Mode       | *Measured RF Output Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | IC Limit (mW/cm <sup>2</sup> ) |
|------------|--------------------------------|--------------------|---------------|-------------------------------------|---------------------------------|--------------------------------|
| Bluetooth  | 12.11                          | 2                  | 20            | 0.0048                              | 1.0                             | 5.35                           |
| 2.4G Wi-Fi | 21.87                          | 3                  | 20            | 0.0131                              | 1.0                             | 5.37                           |
| 5G Wi-Fi   | 17.93                          | 6                  | 20            | 0.0214                              | 1.0                             | 9.05                           |

Note:

1. \*Bluetooth RF Output Power: Refer to 60391936 001 Appendix B&C
2. \*2.4GHz Band RF Output Power: Refer 60391936 002 Appendix B
3. \*5GHz Bands RF Output Power: Refer 60391936 003 Appendix B

### 1.5.2 Simultaneous transmission MPE

Per KDB 447498 D01 v06, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is  $\leq 1.0$ .

#### Simultaneous transmission Scenarios

| No. | Simultaneous transmission Scenarios |
|-----|-------------------------------------|
| 1   | Bluetooth + 2.4GHz Wi-Fi            |
| 2   | Bluetooth + 5GHz Wi-Fi              |

#### 1) For Bluetooth + 2.4GHz Wi-Fi:

The MPE ratio for Bluetooth can be calculated as follow:

=The power density at 20cm distance/MPE limit  
 $=0.0048 \text{ mW/cm}^2 / 1 \text{ mW/cm}^2$   
 $=0.0048$

The MPE ratio for 2.4GHz WiFi can be calculated as follow:

=The power density at 20cm distance/MPE limit  
 $=0.0131 \text{ mW/cm}^2 / 1 \text{ mW/cm}^2$   
 $=0.0131$

The sum of the MPE ratios for all simultaneous transmitting antennas:

$=0.0048+0.0131$   
 $=0.0179 < 1.0$

As the sum of MPE ratios for all simultaneous transmitting antennas is  $\leq 1.0$ , simultaneous transmission MPE test exclusion will be applied.

#### 2) For Bluetooth + 5GHz Wi-Fi:

The MPE ratio for Bluetooth can be calculated as follow:

=The power density at 20cm distance/MPE limit  
 $=0.0048 \text{ mW/cm}^2 / 1 \text{ mW/cm}^2$   
 $=0.0048$

The MPE ratio for 5GHz WiFi can be calculated as follow:

=The power density at 20cm distance/MPE limit  
 $=0.0214 \text{ mW/cm}^2 / 1 \text{ mW/cm}^2$   
 $=0.0214$

The sum of the MPE ratios for all simultaneous transmitting antennas:  
 $= 0.0048 + 0.0214$   
 $= 0.0262 < 1.0$

As the sum of MPE ratios for all simultaneous transmitting antennas is  $\leq 1.0$ , simultaneous transmission MPE test exclusion will be applied.

### 1.5.3 Conclusion

Therefore the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.