

## RF EXPOSURE EVALUATION

### MPE-Based Exemption

#### Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 v01 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

| RF Source frequency (MHz) | Threshold ERP (watts) |
|---------------------------|-----------------------|
| 0.3-1.34                  | $1,920 R^2$ .         |
| 1.34-30                   | $3,450 R^2/f^2$ .     |
| 30-300                    | $3.83 R^2$ .          |
| 300-1,500                 | $0.0128 R^2 f$ .      |
| 1,500-100,000             | $19.2 R^2$ .          |

R is the minimum separation distance in meters

f = frequency in MHz

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

**Result**

| Mode               | Frequency (MHz) | Tune up conducted power <sup>#</sup> (dBm) | Antenna Gain <sup>#</sup> |       | ERP   |        | Evaluation Distance (m) | ERP Limit (mW) |
|--------------------|-----------------|--------------------------------------------|---------------------------|-------|-------|--------|-------------------------|----------------|
|                    |                 |                                            | (dBi)                     | (dBd) | (dBm) | (mW)   |                         |                |
| For module YL43752 |                 |                                            |                           |       |       |        |                         |                |
| BLE                | 2402-2480       | 5.0                                        | 3.18                      | 1.03  | 6.03  | 4.01   | 0.2                     | 768            |
| 2.4G Wi-Fi         | 2412-2462       | 23.0                                       | 3.18                      | 1.03  | 24.03 | 252.93 | 0.2                     | 768            |
| 5.2G Wi-Fi         | 5180-5240       | 11.0                                       | 5.57                      | 3.42  | 14.42 | 27.67  | 0.2                     | 768            |
| 5.3G Wi-Fi         | 5260-5320       | 10.5                                       | 5.57                      | 3.42  | 13.92 | 24.66  | 0.2                     | 768            |
| 5.6G Wi-Fi         | 5500-5720       | 11.0                                       | 5.57                      | 3.42  | 14.42 | 27.67  | 0.2                     | 768            |
| 5.8G Wi-Fi         | 5745-5825       | 11.5                                       | 5.57                      | 3.42  | 14.92 | 31.05  | 0.2                     | 768            |
| For module YL7981  |                 |                                            |                           |       |       |        |                         |                |
| 5.2G Wi-Fi         | 5180-5240       | 12.0                                       | 5.57                      | 3.42  | 15.42 | 34.83  | 0.2                     | 768            |
| 5.8G Wi-Fi         | 5745-5825       | 11.0                                       | 5.57                      | 3.42  | 14.42 | 27.67  | 0.2                     | 768            |

- Note: 1. The tune up conducted power and antenna gain was declared by the applicant.  
 2. 0dBd=2.15dBi  
 3. The BLE and Wi-Fi can transmit at same time, the 2.4G and 5G Wi-Fi cannot transmit at same time.  
 4. The two Wi-Fi modules can transmit as same time.

Simultaneous transmitting consideration (worst case):

$$\text{The ratio} = \text{ERP}_{\text{BLE}} / \text{limit} + \text{ERP}_{\text{2.4G Wi-Fi}} / \text{limit} + \text{ERP}_{\text{5G}} / \text{limit} = 4.01/768 + 252.93/768 + 34.83/768 = 0.38 < 1.0$$

So simultaneous exposure is compliant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

**Result: Compliant**