



## RF Exposure Evaluation

|                                |                                    |
|--------------------------------|------------------------------------|
| <b>FCC ID</b>                  | 2AYNHTL-AGBCC2541                  |
| <b>IC</b>                      | 3449A-TLAGBCC2541                  |
| <b>Model No.</b>               | AG-052C, AG-052B, AG-052A, AG-0529 |
| <b>Bluetooth Specification</b> | V4.0 LE                            |
| <b>Frequency Range</b>         | 2402~2480MHz                       |

According to FCC KDB 447498 Section 4.3 - General SAR test exclusion guidance

### 1. Standalone SAR test exclusion considerations

#### **FCC :**

For 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR,}$$

where

- (1).  $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- (2). Power and distance are rounded to the nearest mW and mm before calculation<sup>31</sup>
- (3). The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.



## IC :

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

| Frequency (MHz) | Exemption Limits (mW)           |                                 |                                 |                                 |                                  |
|-----------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
|                 | At separation distance of ≤5 mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm  |
| 300             | 71 mW                           | 101 mW                          | 132 mW                          | 162 mW                          | 193 mW                           |
| 450             | 52 mW                           | 70 mW                           | 88 mW                           | 106 mW                          | 123 mW                           |
| 835             | 17 mW                           | 30 mW                           | 42 mW                           | 55 mW                           | 67 mW                            |
| 1900            | 7 mW                            | 10 mW                           | 18 mW                           | 34 mW                           | 60 mW                            |
| 2450            | 4 mW                            | 7 mW                            | 15 mW                           | 30 mW                           | 52 mW                            |
| 3500            | 2 mW                            | 6 mW                            | 16 mW                           | 32 mW                           | 55 mW                            |
| 5800            | 1 mW                            | 6 mW                            | 15 mW                           | 27 mW                           | 41 mW                            |
| Frequency (MHz) | At separation distance of 30 mm | At separation distance of 35 mm | At separation distance of 40 mm | At separation distance of 45 mm | At separation distance of ≥50 mm |
| ≤300            | 223 mW                          | 254 mW                          | 284 mW                          | 315 mW                          | 345 mW                           |
| 450             | 141 mW                          | 159 mW                          | 177 mW                          | 195 mW                          | 213 mW                           |
| 835             | 80 mW                           | 92 mW                           | 105 mW                          | 117 mW                          | 130 mW                           |
| 1900            | 99 mW                           | 153 mW                          | 225 mW                          | 316 mW                          | 431 mW                           |
| 2450            | 83 mW                           | 123 mW                          | 173 mW                          | 235 mW                          | 309 mW                           |
| 3500            | 86 mW                           | 124 mW                          | 170 mW                          | 225 mW                          | 290 mW                           |
| 5800            | 56 mW                           | 71 mW                           | 85 mW                           | 97 mW                           | 106 mW                           |

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance.

## 2. Simultaneous transmission SAR test exclusion considerations

When an antenna qualifies for the standalone SAR test exclusion of above and also transmits simultaneously with other antennas, the standalone SAR value must be estimated according to the following to determine the simultaneous transmission SAR test exclusion criteria:

- 1)  $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}/x]$  W/kg, for test separation distances  $\leq 50$  mm; where  $x = 7.5$  for 1-g SAR and  $x = 18.75$  for 10-g SAR.
- 2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distance is  $> 50$  mm.



### 3. Calculation Result:

#### 1) Standalone SAR test exclusion Calculation

FCC

| Mode             | Frequency Band (MHz) | Output Power (dBm) | Output Power (mW) | Threshold Result @5mm | SAR Test Exclusion Limit |                     |
|------------------|----------------------|--------------------|-------------------|-----------------------|--------------------------|---------------------|
|                  |                      |                    |                   |                       | mW                       | Exclusion Threshold |
| BT (Upper Board) | 2402 ~ 2480          | 0                  | 1                 | 0.31                  | 7                        | 3.0                 |
| BT (Lower Board) | 2402 ~ 2480          | 0                  | 1                 | 0.31                  | 7                        | 3.0                 |

IC

| Mode             | Frequency Band (MHz) | Output Power (dBm) | Output Power (mW) | Antenna Gain (dBi) | EIRP (mW) | IC SAR Test Exclusion Threshold (mW) |
|------------------|----------------------|--------------------|-------------------|--------------------|-----------|--------------------------------------|
| BT (Upper Board) | 2402~2480            | 0                  | 1                 | 3.3                | 2.14      | 4                                    |
| BT (Lower Board) | 2402~2480            | 0                  | 1                 | 3.3                | 2.14      | 4                                    |

#### 2) Simultaneous transmission SAR test exclusion Calculation

| Mode             | Frequency Band (MHz) | Output Power (dBm) | Output Power (mW) | SAR Result (W/Kg) @5mm | Simultaneous transmission SAR (W/Kg) | SAR Limit (W/Kg) |
|------------------|----------------------|--------------------|-------------------|------------------------|--------------------------------------|------------------|
| BT (Upper Board) | 2402 ~ 2480          | 0                  | 1                 | 0.04                   | 0.08                                 | 1.6              |
| BT (Lower Board) | 2402 ~ 2480          | 0                  | 1                 | 0.04                   |                                      |                  |

So, this device can complies the SAR test exclusion.