

## FCCID: 2AGF2X-116

### RF Exposure evaluation

According to 447498 D01 General RF Exposure Guidance v06

#### 4.3. General SAR test exclusion guidance

##### 4.3.1. Standalone SAR test exclusion considerations

- a) 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:  $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR, and  $\leq 7.5$  for 10-g extremity SAR,<sup>30</sup> where
- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
  - Power and distance are rounded to the nearest mW and mm before calculation<sup>31</sup>
  - The result is rounded to one decimal place for comparison
  - The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below
- 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.

<sup>30</sup> This is equivalent to the formula written as:  $[(\text{max. power of channel, including tune-up tolerance, mW}) / (60 / \sqrt{f(\text{GHz})} \text{ mW})] \cdot [20 \text{ mm} / (\text{min. test separation distance, mm})] \leq 1.0$  for 1-g SAR; also see Appendix A for approximate exclusion threshold numerical values at selected frequencies and distances.

$$\text{eirp} = \text{pt} \times \text{gt} = (\text{EXd})^2 / 30$$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, ---  $10^{[(\text{dBuV/m})/20]}/10^6$

d = measurement distance in meters (m)---3m

$$\text{So pt} = (\text{EXd})^2 / 30 \times \text{gt}$$

**RF Exposure evaluation**

Copied from the FCC test report:

**Radiated spurious emissions:**

| 470.200 MHz, Horizontal           |                  |                 |                     |                            |                  |            |            |
|-----------------------------------|------------------|-----------------|---------------------|----------------------------|------------------|------------|------------|
| Spurious Emission Frequency (MHz) | Read value (dBm) | Cable Loss (dB) | Antenna Factor (dB) | 1-18GHz Pre-amplifier (dB) | Ture value (dBm) | Limit/ dBm | Margin(dB) |
| Fundamental: 470.2                | -19.6            | 2.7             | 18.0                | 0                          | 1.1              | 24         | -22.9      |
| 940.4                             | -45.1            | 4.0             | 23.6                | 0                          | -17.5            | -13        | -4.5       |
| 1410.6                            | -29.6            | 4.2             | 24.5                | 30                         | -30.9            | -13        | -17.9      |
| 3291.4                            | -44.1            | 6.0             | 31.0                | 30                         | -37.1            | -13        | -24.1      |
| 470.200 MHz, Vertical             |                  |                 |                     |                            |                  |            |            |
| Fundamental: 470.2                | -24.9            | 2.7             | 18.0                | 0                          | -4.2             | 24         | -28.2      |
| 940.4                             | -44.3            | 4.0             | 23.6                | 0                          | -16.7            | -13        | -3.7       |
| 1410.6                            | -28.0            | 4.2             | 24.5                | 30                         | -29.3            | -13        | -16.3      |
| 3291.4                            | -44.6            | 6.0             | 31.0                | 30                         | -37.6            | -13        | -24.6      |
| 486.976, Horizontal               |                  |                 |                     |                            |                  |            |            |
| Fundamental: 487.0                | -19.6            | 2.7             | 18.1                | 0                          | 1.2              | 24         | -22.8      |
| 974.0                             | -44.9            | 4.0             | 23.7                | 0                          | -17.2            | -13        | -4.2       |
| 1460.9                            | -29.2            | 4.2             | 24.5                | 30                         | -30.5            | -13        | -17.5      |
| 3408.8                            | -44.2            | 6.1             | 31.1                | 30                         | -37.0            | -13        | -24.0      |
| 486.976, Vertical                 |                  |                 |                     |                            |                  |            |            |
| Fundamental: 487.0                | -24.8            | 2.7             | 18.1                | 0                          | -4.0             | 24         | -28.0      |
| 974.0                             | -44.3            | 4.0             | 23.7                | 0                          | -16.6            | -13        | -3.6       |
| 1460.9                            | -28.3            | 4.2             | 24.5                | 30                         | -29.6            | -13        | -16.6      |
| 3408.8                            | -44.4            | 6.1             | 31.1                | 30                         | -37.2            | -13        | -24.2      |

|                         |       |     |      |    |       |     |       |
|-------------------------|-------|-----|------|----|-------|-----|-------|
| 607.800 MHz, Horizontal |       |     |      |    |       |     |       |
| Fundamental:<br>607.8   | -21.6 | 2.9 | 19.9 | 0  | 1.2   | 24  | -22.8 |
| 1015.6                  | -16.8 | 4.0 | 25.5 | 30 | -17.3 | -13 | -4.3  |
| 1523.4                  | -28.2 | 4.3 | 23.8 | 30 | -30.1 | -13 | -17.1 |
| 3554.6                  | -45.3 | 6.2 | 31.6 | 30 | -37.5 | -13 | -24.5 |
| 607.800 MHz, Vertical   |       |     |      |    |       |     |       |
| Fundamental:<br>607.8   | -27.1 | 2.9 | 19.9 | 0  | -4.3  | 24  | -28.3 |
| 1015.6                  | -16.4 | 4.0 | 25.5 | 30 | -16.9 | -13 | -3.9  |
| 1523.4                  | -27.7 | 4.3 | 23.8 | 30 | -29.6 | -13 | -16.6 |
| 3554.6                  | -45.1 | 6.2 | 31.6 | 30 | -37.3 | -13 | -24.3 |

tune-up tolerance= $\pm 1$ dB,

min. test separation distance = 5 mm, since the min distance from the antenna to the outer = 3 mm

The max Field strength = 1.2 dBm in 486.976 MHz or 607.800 MHz

Max. power of channel after included tune-up tolerance

Field strength = 2.2 dBm= 1.66 mW in 643.000 MHz

So ( 1.66 mW )/5.0mm)x  $\sqrt{0.486976 \text{ GHz}}$  = 0.23 <3

So ( 1.66 mW )/5.0mm)x  $\sqrt{0.607800 \text{ GHz}}$  = 0.26 <3

Then SAR evaluation is not required