

# Maximum Permissible Exposure

|                     |          |                                                                          |
|---------------------|----------|--------------------------------------------------------------------------|
| <b>Equipment</b>    | <b>:</b> | <b>RF Module</b>                                                         |
| <b>Brand Name</b>   | <b>:</b> | <b>Chicony</b>                                                           |
| <b>Model No.</b>    | <b>:</b> | <b>AR5B22</b>                                                            |
| <b>FCC ID</b>       | <b>:</b> | <b>E8H-AR5B22</b>                                                        |
| <b>Standard</b>     | <b>:</b> | <b>ANSI/IEEE C95.1</b>                                                   |
| <b>Applicant</b>    | <b>:</b> | <b>Chicony Electronics Co., Ltd.</b>                                     |
| <b>Manufacturer</b> |          | No.25,Wugong 6th RD.,Wugu Dist.,<br>New Taipei City 248 , Taiwan (R.O.C) |

The product sample received on Jun. 16, 2015 and completely tested on Jul. 21, 2015. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI/IEEE C95.1 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

  
**Vic Hsiao / Supervisor**



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## Revision History

[illegible]

# 1 Human Exposure Assessment

## 1.1 Maximum Permissible Exposure

### 1.1.1 Limit of Maximum Permissible Exposure

| Limits for Occupational / Controlled Exposure                       |                                   |                                   |                                          |                                                                  |
|---------------------------------------------------------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| Frequency Range (MHz)                                               | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
| 0.3-3.0                                                             | 614                               | 1.63                              | (100)*                                   | 6                                                                |
| 3.0-30                                                              | 1842 / f                          | 4.89 / f                          | (900 / f <sup>2</sup> )*                 | 6                                                                |
| 30-300                                                              | 61.4                              | 0.163                             | 1.0                                      | 6                                                                |
| 300-1500                                                            | -                                 | -                                 | F/300                                    | 6                                                                |
| 1500-100,000                                                        | -                                 | -                                 | 5                                        | 6                                                                |
| Limits for General Population / Uncontrolled Exposure               |                                   |                                   |                                          |                                                                  |
| Frequency Range (MHz)                                               | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
| 0.3-1.34                                                            | 614                               | 1.63                              | (100)*                                   | 30                                                               |
| 1.34-30                                                             | 824/f                             | 2.19/f                            | (180/f <sup>2</sup> )*                   | 30                                                               |
| 30-300                                                              | 27.5                              | 0.073                             | 0.2                                      | 30                                                               |
| 300-1500                                                            | -                                 | -                                 | F/1500                                   | 30                                                               |
| 1500-100,000                                                        | -                                 | -                                 | 1.0                                      | 30                                                               |
| Note 1: f = frequency in MHz ; *Plane-wave equivalent power density |                                   |                                   |                                          |                                                                  |
| Note 2: For the applicable limit, see FCC 1.1310                    |                                   |                                   |                                          |                                                                  |

### 1.1.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

**E** = Electric field (V/m)

**G** = EUT Antenna numeric gain (numeric)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**P** = RF output power (W)

**d** = Separation distance between radiator and human body (m)

**1.1.3 Result of Maximum Permissible Exposure (2.4G)**

| RF General Information                                                           |                           |                     |                |                                              |                       |
|----------------------------------------------------------------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------|
| Frequency Range (MHz)                                                            | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 2400-2483.5                                                                      | b                         | 2412-2462           | 1-11 [11]      | 1                                            | 16.70                 |
| 2400-2483.5                                                                      | b                         | 2412-2462           | 1-11 [11]      | 2                                            | 19.14                 |
| 2400-2483.5                                                                      | g                         | 2412-2462           | 1-11 [11]      | 1                                            | 20.43                 |
| 2400-2483.5                                                                      | g                         | 2412-2462           | 1-11 [11]      | 2                                            | 21.07                 |
| 2400-2483.5                                                                      | n (HT20)                  | 2412-2462           | 1-11 [11]      | 2                                            | 20.93                 |
| 2400-2483.5                                                                      | n (HT40)                  | 2422-2452           | 3-9 [7]        | 2                                            | 16.98                 |
| Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. |                           |                     |                |                                              |                       |

| Worst Maximum RF Output Power Result                     |                 |                                            |              |           |          |            |                              |
|----------------------------------------------------------|-----------------|--------------------------------------------|--------------|-----------|----------|------------|------------------------------|
| Exposure Environment                                     |                 | General Population / Uncontrolled Exposure |              |           |          |            |                              |
| Separation Distance (cm)                                 |                 | 20                                         |              |           |          |            |                              |
| Condition                                                |                 | RF Output Power (dBm)                      |              |           |          |            |                              |
| Modulation Mode                                          | N <sub>TX</sub> | Chain-Port 1                               | Chain-Port 2 | Sum Chain | DG (dBi) | EIRP Power | PD (S) (mW/cm <sup>2</sup> ) |
| g                                                        | 2               | 17.94                                      | 18.17        | 21.07     | 1.79     | 22.86      | 0.038455                     |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                 |                                            |              |           |          |            | 1                            |
| Note 1: N <sub>TX</sub> = Number of Transmit Chains      |                 |                                            |              |           |          |            |                              |

**1.1.4 Result of Maximum Permissible Exposure (Bluetooth)**

| RF General Information                                                           |                           |                     |                |                                              |                       |
|----------------------------------------------------------------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------|
| Frequency Range (MHz)                                                            | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 2400-2483.5                                                                      | BR / EDR                  | 2402-2480           | 0-78 [79]      | 1                                            | 3.83                  |
| 2400-2483.5                                                                      | v4.0 LE                   | 2402-2480           | 0-39 [40]      | 1                                            | 3.53                  |
| Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. |                           |                     |                |                                              |                       |

| Worst Maximum RF Output Power Result                     |                                            |                    |            |                              |
|----------------------------------------------------------|--------------------------------------------|--------------------|------------|------------------------------|
| Exposure Environment                                     | General Population / Uncontrolled Exposure |                    |            |                              |
| Separation Distance (cm)                                 | 20                                         |                    |            |                              |
| Condition                                                | RF Output Power (dBm)                      |                    |            |                              |
| Modulation Mode                                          | RF Output Power                            | Antenna Gain (dBi) | EIRP Power | PD (S) (mW/cm <sup>2</sup> ) |
| BR / EDR                                                 | 3.83                                       | 1.79               | 5.62       | 0.000726                     |
| v4.0 LE                                                  | 3.53                                       | 1.79               | 5.32       | 0.000678                     |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                                            |                    |            | 1                            |

**1.1.5 Result of Maximum Permissible Exposure (5.2G)**

| RF General Information |                           |                     |                |                                              |                       |
|------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------|
| Frequency Range (MHz)  | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 5150-5250              | a                         | 5180-5240           | 36-48 [4]      | 1                                            | 14.63                 |
| 5150-5250              | a                         | 5180-5240           | 36-48 [4]      | 2                                            | 14.34                 |
| 5150-5250              | n (HT20)                  | 5180-5240           | 36-48 [4]      | 2                                            | 14.19                 |
| 5150-5250              | n (HT40)                  | 5190-5230           | 38-46 [2]      | 2                                            | 16.45                 |

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

| Worst Maximum RF Output Power Result                     |                 |                                            |              |           |          |            |                              |
|----------------------------------------------------------|-----------------|--------------------------------------------|--------------|-----------|----------|------------|------------------------------|
| Exposure Environment                                     |                 | General Population / Uncontrolled Exposure |              |           |          |            |                              |
| Separation Distance (cm)                                 |                 | 20                                         |              |           |          |            |                              |
| Condition                                                |                 | RF Output Power (dBm)                      |              |           |          |            |                              |
| Modulation Mode                                          | N <sub>TX</sub> | Chain-Port 1                               | Chain-Port 2 | Sum Chain | DG (dBi) | EIRP Power | PD (S) (mW/cm <sup>2</sup> ) |
| n (HT40)                                                 | 2               | 14.26                                      | 12.45        | 16.45     | 3.01     | 19.46      | 0.017577                     |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                 |                                            |              |           |          |            | 1                            |

Note 1: N<sub>TX</sub> = Number of Transmit Chains

**1.1.6 Result of Maximum Permissible Exposure (5.3G)**

| RF General Information                                                            |                           |                     |                |                                              |                       |
|-----------------------------------------------------------------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------|
| Frequency Range (MHz)                                                             | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 5250-5350                                                                         | a                         | 5260-5320           | 52-64 [4]      | 1                                            | 17.29                 |
| 5250-5350                                                                         | a                         | 5260-5320           | 52-64 [4]      | 2                                            | 18.59                 |
| 5250-5350                                                                         | n (HT20)                  | 5260-5320           | 52-64 [4]      | 2                                            | 17.42                 |
| 5250-5350                                                                         | n (HT40)                  | 5270-5310           | 54-62 [2]      | 2                                            | 17.91                 |
| Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.. |                           |                     |                |                                              |                       |

| Worst Maximum RF Output Power Result                     |                 |                                            |              |           |          |            |                              |
|----------------------------------------------------------|-----------------|--------------------------------------------|--------------|-----------|----------|------------|------------------------------|
| Exposure Environment                                     |                 | General Population / Uncontrolled Exposure |              |           |          |            |                              |
| Separation Distance (cm)                                 |                 | 20                                         |              |           |          |            |                              |
| Condition                                                |                 | RF Output Power (dBm)                      |              |           |          |            |                              |
| Modulation Mode                                          | N <sub>TX</sub> | Chain-Port 1                               | Chain-Port 2 | Sum Chain | DG (dBi) | EIRP Power | PD (S) (mW/cm <sup>2</sup> ) |
| a                                                        | 2               | 16.32                                      | 14.68        | 18.59     | 3.01     | 21.60      | 0.028771                     |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                 |                                            |              |           |          |            | 1                            |
| Note 1: N <sub>TX</sub> = Number of Transmit Chains      |                 |                                            |              |           |          |            |                              |

**1.1.7 Result of Maximum Permissible Exposure (5.6G)**

| RF General Information                                                            |                           |                     |                |                                              |                       |
|-----------------------------------------------------------------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------|
| Frequency Range (MHz)                                                             | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) |
| 5470-5725                                                                         | a                         | 5500-5700           | 100-140 [8]    | 1                                            | 16.46                 |
| 5470-5725                                                                         | a                         | 5500-5700           | 100-140 [8]    | 2                                            | 14.02                 |
| 5470-5725                                                                         | n (HT20)                  | 5500-5700           | 100-140 [8]    | 2                                            | 14.31                 |
| 5470-5725                                                                         | n (HT40)                  | 5510-5670           | 102-134 [3]    | 2                                            | 15.33                 |
| Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.. |                           |                     |                |                                              |                       |

| Worst Maximum RF Output Power Result                     |                 |                                            |          |            |                                 |
|----------------------------------------------------------|-----------------|--------------------------------------------|----------|------------|---------------------------------|
| Exposure Environment                                     |                 | General Population / Uncontrolled Exposure |          |            |                                 |
| Separation Distance (cm)                                 |                 | 20                                         |          |            |                                 |
| Condition                                                |                 | RF Output Power (dBm)                      |          |            |                                 |
| Modulation Mode                                          | N <sub>TX</sub> | RF Output Power                            | DG (dBi) | EIRP Power | PD (S)<br>(mW/cm <sup>2</sup> ) |
| a                                                        | 1               | 16.46                                      | 3.01     | 19.47      | 0.017618                        |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                 |                                            |          |            | 1                               |
| Note 1: N <sub>TX</sub> = Number of Transmit Chains      |                 |                                            |          |            |                                 |

**1.1.8 Result of Maximum Permissible Exposure (5.8G)**

| RF General Information                                                           |                           |                     |                |                                              |                                   |
|----------------------------------------------------------------------------------|---------------------------|---------------------|----------------|----------------------------------------------|-----------------------------------|
| Frequency Range (MHz)                                                            | IEEE Std. 802.11 Protocol | Ch. Frequency (MHz) | Channel Number | Number of Transmit Chains (N <sub>TX</sub> ) | RF Output Power (dBm) Co-location |
| 5725-5850                                                                        | a                         | 5745-5825           | 149-165 [5]    | 1                                            | 15.41                             |
| 5725-5850                                                                        | a                         | 5745-5825           | 149-165 [5]    | 2                                            | 13.93                             |
| 5725-5850                                                                        | n (HT20)                  | 5745-5825           | 149-165 [5]    | 2                                            | 13.85                             |
| 5725-5850                                                                        | n (HT40)                  | 5755-5795           | 151-159 [2]    | 2                                            | 15.04                             |
| Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. |                           |                     |                |                                              |                                   |

| Worst Maximum RF Output Power Result                     |                 |                                            |          |            |                                 |
|----------------------------------------------------------|-----------------|--------------------------------------------|----------|------------|---------------------------------|
| Exposure Environment                                     |                 | General Population / Uncontrolled Exposure |          |            |                                 |
| Separation Distance (cm)                                 |                 | 20                                         |          |            |                                 |
| Condition                                                |                 | RF Output Power (dBm)                      |          |            |                                 |
| Modulation Mode                                          | N <sub>TX</sub> | RF Output Power                            | DG (dBi) | EIRP Power | PD (S)<br>(mW/cm <sup>2</sup> ) |
| a                                                        | 1               | 15.41                                      | 3.01     | 18.42      | 0.013834                        |
| Maximum Permissible Exposure Limit (mW/cm <sup>2</sup> ) |                 |                                            |          |            | 1                               |
| Note 1: N <sub>TX</sub> = Number of Transmit Chains      |                 |                                            |          |            |                                 |

| Worst Maximum RF Output Power Result                          |                       |                                            |                     |                  |                 |                   |                                       |
|---------------------------------------------------------------|-----------------------|--------------------------------------------|---------------------|------------------|-----------------|-------------------|---------------------------------------|
| <b>Exposure Environment</b>                                   |                       | General Population / Uncontrolled Exposure |                     |                  |                 |                   |                                       |
| <b>Separation Distance (cm)</b>                               |                       | 20                                         |                     |                  |                 |                   |                                       |
| <b>Condition</b>                                              |                       | <b>RF Output Power (dBm)</b>               |                     |                  |                 |                   |                                       |
| <b>Modulation Mode</b>                                        | <b>N<sub>TX</sub></b> | <b>Chain-Port 1</b>                        | <b>Chain-Port 2</b> | <b>Sum Chain</b> | <b>DG (dBi)</b> | <b>EIRP Power</b> | <b>PD (S)<br/>(mW/cm<sup>2</sup>)</b> |
| g                                                             | 2                     | 17.94                                      | 18.17               | 21.07            | 1.79            | 22.86             | 0.038455                              |
| a                                                             | 2                     | 16.32                                      | 14.68               | 18.59            | 3.01            | 21.60             | 0.028771                              |
| <b>Co-location Total</b>                                      |                       |                                            |                     |                  |                 |                   | 0.067226                              |
| <b>Maximum Permissible Exposure Limit (mW/cm<sup>2</sup>)</b> |                       |                                            |                     |                  |                 |                   | 1                                     |
| Note 1: N <sub>TX</sub> = Number of Transmit Chains           |                       |                                            |                     |                  |                 |                   |                                       |