# 1. FCC SAR TEST EXCLUSION CALCULATIONS

**FCC ID: VC7120-0141**
**Model number: AURA29BLE**
Based on guidance from KDB 447498

1.1 SAR TEST EXCLUSION CALCULATION FOR 915MHz BAND OPERATION

| Time averaged conducted power | | |
|---|---|---|
| Nominal power output | -5dBm | Set by Firmware |
| Production tolerance | +0.5dB | IC tolerance over temperature and supply |
| max conducted power | -4.5dBm (0.35mW) | "tune up tolerance" |
| Max theoretical duty cycle in normal operation | 0.14% | 25ms every 17.6s |
| Max average conducted power | 0.00049 mW | |
| Rounded up to nearest mW | 1 mW | (clause 4.3.1) |

| Minimum test Separation Distance | |
|---|---|
| Minimum 5mm is used (clause 4.1.5) | It is conceivable that a user might touch the electronic shelf label display while it is transmitting. Antenna is 4mm from the surface of the display. |

| **Minimum frequency** | 902.5 MHz |
|---|---|
| **Maximum frequency** | 927.5 MHz |

SAR test exclusion threshold calculation (clause 4.3.1)

*Calculation = Power of channel (mW) / min test separation(mm) * [sqrt freq (GHz)]. result rounded to 1 decimal place*

Min channel : 1 / 5 * [sqrt 0.9025] = 0.2
Max channel: 1 / 5 * [sqrt 0.9275] = 0.2

This is below the limits for 1-g SAR (3.0) and 10-g SAR (7.5) and so the product meets the thresholds for SAR test exclusion.

## 1.2 SAR TEST EXCLUSION CALCULATION FOR BLE BAND OPERATION

| Time averaged conducted power | | |
|---|---|---|
| Nominal power output | -1dBm | Set by Firmware and HW RF chain |
| Production tolerance | +0.5dB | IC tolerance over temperature and supply |
| max conducted power | -0.5dBm (0.89mW) | "tune up tolerance" |
| Max theoretical duty cycle in normal operation | 0.54% | 2.7ms every 500ms |
| Max average conducted power | 0.0048 mW | |
| Rounded up to nearest mW | 1 mW | (clause 4.3.1) |

| Minimum test Separation Distance | |
|---|---|
| Minimum 5mm is used (clause 4.1.5) | It is conceivable that a user might touch the electronic shelf label display while it is transmitting. Antenna is 4mm from the surface of the display. |

| **Minimum frequency** | 2402 MHz |
|---|---|
| **Maximum frequency** | 2480 MHz |

SAR test exclusion threshold calculation (clause 4.3.1)

*Calculation = Power of channel (mW) / min test separation(mm) * [sqrt freq (GHz)]. result rounded to 1decimal place*

Min channel : 1 / 5 * [sqrt 2.402] = 0.3
Max channel: 1 / 5 * [sqrt 2.480] = 0.3

This is below the limits for 1-g SAR (3.0) and 10-g SAR (7.5) and so the product meets the thresholds for SAR test exclusion.

# 2. MPE CALCULATION AND RADIATION EXPOSURE RISK ASSESSMENT

**FCC ID: VC7120-0141**
**IC ID: 8910A-1200141**
**Model: AURA29BLE**

## 2.1 MPE CALCULATION AND EXPOSURE RISK FOR 915MHz BAND OPERATION

Following guidelines in KDB 447498 D03 supplement C Cross-reference v01

Prediction of MPE limit at a given distance

$$S = \frac{1.64 ERP}{4\pi R^2} \text{ re - arranged } R = \sqrt{\frac{1.64 ERP}{S4\pi}}$$

where:

S = power density
R = distance to the centre of radiation of the antenna
ERP = EUT Maximum power

With the maximum test case 100% duty cycle the MPE calculation result based on radiated field measurements from AURA29BLE test report 15R352 FR (Max Result @ 902.5MHz = 86.1dBuV @ 3m = 0.07mW ERP)

| Prediction frequency (MHz) | Max ERP (mW) | Power density limit (S) (mW/cm2) | Distance R cm required to be less than 0.6mW/cm2 |
|---|---|---|---|
| 902.5MHz | 0.07 | 0.6 | 0.12 |

Exposure risk in normal operation in 915MHZ band operation

The maximum theoretical transmitter duty cycle in operation is 25ms every 17.6s, (0.14%), which reduces the average ERP to 0.0001mW
In practice, it is impossible to reach the power density limit of 0.6mW/cm2 with average ERP, because the required distance R=0.005cm is smaller than the distance from the antenna to the outside surface of the device enclosure.

AURA29BLE is a fixed installation. In a retail shelf edge context it is possible human body will contact the device, but with only momentary exposure.

## 2.2 MPE CALCULATION AND EXPOSURE RISK FOR BLE BAND OPERATION

Following guidelines in KDB 447498 D03 supplement C Cross-reference v01

Prediction of MPE limit at a given distance

$$S = \frac{1.64 ERP}{4\pi R^2} \quad \text{re-arranged} \quad R = \sqrt{\frac{1.64 ERP}{S4\pi}}$$

where:

S = power density
R = distance to the centre of radiation of the antenna
ERP = EUT Maximum power

With the maximum test case 100% duty cycle the MPE calculation result based on radiated field measurements from AURA29BLE test report 15R352 FR (Max Result @ 2402MHz = 89.1dBuV @ 3m = 0.07mW ERP)

| Prediction frequency (MHz) | Max ERP (mW) | Power density limit (S) (mW/cm2) | Distance R cm required to be less than 0.6mW/cm2 |
|---|---|---|---|
| 902.5MHz | 0.14 | 0.6 | 0.17 |

Exposure risk in normal operation in BLE band operation

The BLE transmitter duty cycle in operation is 2.7ms every 500ms, (0.54%), which brings average ERP to 0.00007mW.
In practice, it is impossible to reach the power density limit of 0.6mW/cm2 with average ERP, because the required distance R=0.012cm is smaller than the distance from the antenna to the outside surface of the device enclosure.

AURA29BLE is a fixed installation. In a retail shelf edge context it is possible human body will contact the device, but with only momentary exposure.

# 3. INDUSTRY CANADA RSS-102 exemption requirements

**IC ID: 8910A-1200141**

Installation of the device when in service could be <20cm from any part of the user.
Therefore the electronic shelf label AURA29BLE falls under RSS-102 issue 5, section 2.5.1
To meet the requirement for exemption from routine evaluation the maximum EIRP must then be less than 200mW.

From AURA29BLE test report 15R352FR:-

Maximum TX power = 89.1dBuV @ 3m @ 2402MHz = 0.24mW EIRP   (0.14mW ERP)


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