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IC RF Exposure Technical Brief

Product Name: Active Antenna Unit

Product Model: AAU3940

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To whom it may concern,

As to the product(s) involved in this document, we declare that they comply with the following standards(s):

- IC RSS-102 (Issue 5, March 2015)

The compliance is demonstrated based on the following calculation model assessment:

1. The power density according to far-field model is:

$$S = \frac{P \times G_{(\theta, \phi)}}{4 \times \pi \times R^2}$$

Where:

- P = input power of the antenna.
- G = antenna gain relative to an isotropic antenna.
- θ, ϕ = elevation and azimuth angles.
- R = distance from the antenna to the point of investigation.

2. For single or multiple RF sources, the calculated power density should comply with following:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Where:

- S_i = the power density when the f is i .
- $S_{Limit,i}$ = the reference level requirement for power density when f is i .
- f = operating frequency.

3. The calculation of the power density or safe distance is:

NOTE 1: The RF exposure evaluation is base on the far-field and the radiation exposure is over-estimated.

NOTE 2: The maximum output power level is taken into account as a worst case for the purpose of the calculation of power density or safe distance.

NOTE 3: The minimum antenna feed cable loss (assumed no cable loss) is taken into account as a worst case for the purpose of the calculation of power density or safe distance.

NOTE 4: The maximum antenna radiation exposure orientation and maximum antenna gain is taken into account as a worst case for the purpose of the calculation of power density or safe distance.

RF Source	Calculation for Individual Source	
RF Source #1 (MSR UL system)	f	= 1930 to 1990 MHz
	$S_{Limit,i}$	= $0.02619 * f^{0.6834} = 4.6$ W/m ² (for General Public Use)
	$P, G_{(\theta, \phi)}$	<input type="checkbox"/> $EIRP (= P \times G_{(\theta, \phi)})$: $EIRP^{(*)} =$ _____ W (= _____ dBm, all ports)

		<input checked="" type="checkbox"/> $P \times G_{(\theta,\phi)}$: $P^{(*)}$ = <u>50.12</u> W (=46+1=47 dBm, per port) <u>100.24</u> W (calculated, two ports) $G_{(\theta,\phi)}$ = <u>25.12</u> (=14 dBi)
		(*): The value is from: <input type="checkbox"/> measured max (See relevant RF report), <input checked="" type="checkbox"/> rated + declared tolerance, <input type="checkbox"/> max allowed by RF standard. And, the transmission duty cycle is: <input checked="" type="checkbox"/> ignored, <input type="checkbox"/> used, that is: _____ % (for mode: _____).
	θ, ϕ	= The worst condition is considered, i.e. the max G is used.
	S_i	= $\frac{P \times G_{(\theta,\phi)}}{4 \times \pi} / R^2 = \underline{200.37} / R^2$ W/m ²
	$\frac{S_i}{S_{Limit,i}}$	= <u>43.49</u> / R^2
RF Source #2 (LTE system)	f	= <u>2110</u> to <u>2155</u> MHz
	$S_{Limit,i}$	= <u>0.02619</u> * $f^{0.6834} = \underline{4.9}$ W/m ² (for General Public Use)
		<input type="checkbox"/> $EIRP(=P \times G_{(\theta,\phi)})$: $EIRP^{(*)}$ = _____ W (=_____ dBm, all ports)
		<input checked="" type="checkbox"/> $P \times G_{(\theta,\phi)}$: $P^{(*)}$ = <u>50.12</u> W (=46+1=47 dBm, per port) <u>100.24</u> W (calculated, two ports)
	$P, G_{(\theta,\phi)}$	= $G_{(\theta,\phi)}$ = <u>28.18</u> (=14.5 dBi)
		(*): The value is from: <input type="checkbox"/> measured max (See relevant RF report), <input checked="" type="checkbox"/> rated + declared tolerance, <input type="checkbox"/> max allowed by RF standard. And, the transmission duty cycle is: <input checked="" type="checkbox"/> ignored, <input type="checkbox"/> used, that is: _____ % (for mode: _____).
		θ, ϕ
	S_i	= $\frac{P \times G_{(\theta,\phi)}}{4 \times \pi} / R^2 = \underline{224.82} / R^2$ W/m ²
	$\frac{S_i}{S_{Limit,i}}$	= <u>45.91</u> / R^2
RF Sources	Calculation for Simultaneous Transmission Sources	



RF Source #1 + RF Source #2	$\sum_i \frac{S_i}{S_{Limit,i}} = \underline{89.4} / R^2$
Whole Product	Calculation for Whole Product
Whole Product	$\frac{S}{S_{Limit}} = \underline{89.4} / R^2 \leq 1$
	$R \geq \underline{9.46} \text{ m (the minimum Safe Distance)}$
	NOTE: The result is the worst case of each individual source and simultaneous transmission sources (if applicable).

Consequently, beyond the calculated safe distance showed above:

Considering the lower RF field exposure levels and relevant research results collected to date by international organizations, there is no convincing scientific evidence that the RF signals from this product cause adverse effects on human health.

END