RF EXPOSURE CALCULATIONS FOR NOKIA FCC ID: ORE-C021

From FCC 1.1310 table 1A, the maximum permissible RF exposure for an uncontrolled environment is $1mW/cm^{2.}$ The Electric field generated for a $1mW/cm^2$ exposure (S) is calculated as follows:

$S = E^2/Z$

where:
S = Power density
E = Electric field
Z = Impedance.

$1mW/cm^2 = 10\ W/m^2$

The impedance of free space is 337 Ohms, where Electric (E) and magnetic (H) fields are perpendicular.

Thus:

$E = \sqrt{10 \times 377} = 61.4$ V/m which is equivalent to $1mW/cm^2$

Using the relationship between Electric field (E), Power in watts (P), and distance in meters (d), the corresponding Antenna numeric gain (G) and the transmitter output power (P) and solving for (d),

$$d = \sqrt{\frac{P_{eak} \times 30 \times G}{E}}$$

For a 5"Stub antenna with gain = 2.0 dBi;

The Numeric gain G of the antenna specified in dBi is determined by:

$G = \text{Log}^{-1}(\text{dB gain}/10)$

$G = \text{Log}^{-1} 2.15 = 1.58$

Solve for (d) using the above equation. The exposure distance using a worst case channel output power of (P) = 0.08mW

d = 2 cm

Notice in Installation Manual:
The user must maintain a minimum distance of 20 cm from the antenna.

The table below identifies the distances where the 1mW/cm^2 exposure limits may be exceeded during continuous transmission using the external stub or internal antenna

Antenna Type	Gain (dBi)	Gain Numeric	Peak output Power (mW)	Distance calculated	Minimum RF Exposure Separation Distance (cm)
5"Stub antenna	2.0	1.58	0.08	2cm	20
Patch antenna	0	1.0	0.08	2cm	20