Application Note No. 5

Magnetic Flux & Field of an Antenna

In some applications, it is required to determine the ***Magnetic Flux Density*** or the ***Magnetic Field Strength*** of an antenna for safety and/or regulatory issues. The following application note describes a procedure which can be utilized to determine the ***Magnetic Flux Density*** and/or the ***Magnetic Field Strength*** of an antenna at any specific distance.

Step 1: Calculate the power density in watts / m^2 of the antenna at the desired distance by applying the isotropic radiator power density formula;

$$p = \frac{W}{4\pi r^2}$$

where:

p	-	Power density (watts / m^2)
W	-	EIRP of the radiator (watts)
r	-	Distance from radiating centre (meters)

Step 2: To determine the ***Magnetic Flux Density*** of the antenna, convert the power density calculated in step 1 to flux density using the following formula:

$$B = \sqrt{\frac{p}{h}}$$

To determine the ***Magnetic Field Strength*** of the antenna, convert the power density calculated in step 1 to magnetic field strength using following formula:

$$H = \sqrt{\frac{p}{h}}$$

where:

B	-	Magnetic Flux density (webers / m^2 (tesla))
H	-	Magnetic Field Strength (amp / meter)
μ	-	Permeability of free space (4B X 10^{-7} henry / meter)
p	-	Power density (watts / m^2)
0	-	Characteristic impedance of free space (377 ohms)

Step 3: If it is required to determine the ***Magnetic Flux Density*** in gauss, simply multiply the result obtained in webers / m^2 (tesla) by 10^4 to obtain the result in gauss.