ABSTRACT

This Chebyshev Omnidirectional Three-ivory Antenna is designed in two purposes:

1. To supply a wideband omnidirectional antenna prototype that can be used by some operators at once to economize the load of tower and its field.
2. To prove the hypothetic of first advisor which is told that antenna is a device that used as a transformers between free space and transmission lines.

The spesifications that must be fulfilled are : working frequency 0.3 GHz – 3.0 GHz in VSWR $\leq$ 1.5:1 at 50 Ω unbalance; gain $\geq$ 2.14 dBi; omnidirectional pattern and linear polarization. This antenna should be constructed with two strip rows, based on Chebyshev transformer which is used in air or vacuum; using a monoconic as balun to deliver a wideband antenna without a toroida.

Based on twin rows strips theory, the construction is obtained (with the materials and size), they are : N = 5,098 ≈ 6 levels, ε_{r1} = 3,78 (glass l_1 = 23,3 mm), ε_{r2} = 2,96 (asturo paper l_2 = 26,4 mm), ε_{r3} = 2,25 (puzzle carpet l_3 = 30,3 mm), ε_{r4} = 1,96 (STT date paper l_4 = 32,4 mm), ε_{r5} = 1,49 (newspaper l_5 = 37,2 mm), ε_{r6} = 1,16 (styrofoam l_6 = 42,1 mm); using brass strip with width (w) 3,44 mm x length (l) 220 mm x space (s) 20 mm (choosen). Monoconic balun was built by 90° brass pieces, 20 mm in height, terminal 50 Ω unbalance.

By measurement of these spesification in IT Telkom's garden, the results are : in VSWR $\leq$ 1,5 the working frequency 0,95 GHz – 3,0 GHz at terminal 50 Ω unbalance, gain = 8,381 at 1,8 GHz and gain = 7,059 at 2,4 GHz, omnidirectional pattern, and ellips polarization.

From the results of the spesification measurement above, it can be seen that most of the spesification from this antenna was fulfilled, only the lower frequency and the polarization is out of plan. To make the working frequency 0,3 GHz – 3,0 GHz, it suggest to make the space (s) = 20 mm become 50 mm and change the monoconic become monotriangular and coupling between the strip and the monoconic should become coupling-capasitive, not conductive. To fix the results that fulfill the spesification, it suggest that IT Telkom shoul make an anechoic chamber because the good measurement should be done in an anechoic chamber.

Keywords : Tricula Antenna, Chebyshev Transformer, Two Strip Rows