ABSTRACT

This Chebyshev Unidirectional Caturcula Antenna (SN.MT 0924-CCU-0709) is designed and implemented with two purposes:

1. To make very wideband unidirectional antenna available, in order can be used by several operators jointly to economize tower and area.
2. To prove the hypothesis from first advisor's which is told antenna is matching device between propagation space and radio transmission lines.

Specification that must be fulfilled is: working frequency 0.3 GHz – 3.0 GHz in VSWR $\leq$ 1.5 with 50Ω unbalance; gain $\geq$ 2.14 dBi, unidirectional pattern, and with linear polarization. This antenna must be built with parallel twin conductor, and with chebyshev transformator to be used in air or vacuum; use England triangular type balun to produce wideband frequency.

With parallel twin strip principle, constructions—material composition and each dimension—are obtained, they are: N = 3.574 ≈ 4 grade, ε_{r1} = 2.217 (puzzle rubber) l_1 = 30.52 mm, ε_{r2} = 1.908 (ITT calendar) l_2 = 32.90 mm, ε_{r3} = 1.643 (cardboard) l_3 = 35.45 mm, ε_{r4} = 1.025 (Styrofoam and air) l_4 = 44.88 mm. Use parallel copper strip with width (w) 3.44mm x length (l) 170mm, space (s) 20mm (chosen). Triangle monopole balun is built from copper with 90^o angle, height (s) = 20mm, and with 50Ω unbalance terminal impedance.

From measurement of these specification in IT Telkom yard, some results are obtained, they are: VSWR $\leq$ 1.5:1 with operation frequency from 901.2 MHz - 2476.2 MHz and at VSWR $\leq$ 2:1 with operation frequency from 664.4 MHz – 2893.5 MHz at unbalance 50Ω terminal, gain = 7.85 dBi at 1650 MHz and gain = 8.03 dBi at 2082 MHz, with unidirectional radiation pattern, and ellipse polarization.

To set the operational frequency from 0.3 GHz – 3.0 GHz at VSWR $\leq$ 1.5:1 is suggested to make the space h ≈ s = (λ_{min} / 2) = 5 cm or between strip and its monotriangular also be matched to be capacitive coupling.

Keyword: Antenna, Chebyshev transformer, unidirectional