

Important Transmission Line & Antenna Theory Formulas PDF



Formulas Examples with Units

List of 15 Important Transmission Line & Antenna Theory Formulas

1) Beamwidth of Reflector Formula ↻

Formula

$$\psi = \frac{70 \cdot \lambda}{D}$$

Example with Units

$$10427.8319^\circ = \frac{70 \cdot 7.8_m}{3_m}$$

Evaluate Formula ↻

2) Current Maxima Formula ↻

Formula

$$i_{\max} = i_{\text{id}} + I_r$$

Example with Units

$$5.6_A = 4.25_A + 1.35_A$$

Evaluate Formula ↻

3) Current Minima Formula ↻

Formula

$$i_{\min} = i_{\text{id}} - I_r$$

Example with Units

$$2.9_A = 4.25_A - 1.35_A$$

Evaluate Formula ↻

4) Cutoff Wavenumber in TM and TE Mode Formula ↻

Formula

$$k_c = \frac{m \cdot \pi}{d}$$

Example with Units

$$9666.4389_{\text{Diopter}} = \frac{4 \cdot 3.1416}{0.0013_m}$$

Evaluate Formula ↻

5) Focal Length of Reflector Formula ↻

Formula

$$f_{\text{ref}} = \left(\frac{D^2}{16 \cdot c} \right)$$

Example with Units

$$0.0469_m = \left(\frac{3_m^2}{16 \cdot 12_m} \right)$$

Evaluate Formula ↻

6) Gain of Parabolic Reflector Antenna Formula ↻

Formula

$$G_{\text{pr}} = 10 \cdot \log_{10} \left(k \cdot \left(\pi \cdot \frac{D}{\lambda} \right)^2 \right)$$

Example with Units

$$0.3941_{\text{dB}} = 10 \cdot \log_{10} \left(0.75 \cdot \left(3.1416 \cdot \frac{3_m}{7.8_m} \right)^2 \right)$$

Evaluate Formula ↻



7) Minimum Distance from Antenna Formula ↻

Formula

$$r_{\min} = \frac{2 \cdot D^2}{\lambda}$$

Example with Units

$$2.3077 \text{ m} = \frac{2 \cdot 3 \text{ m}^2}{7.8 \text{ m}}$$

Evaluate Formula ↻

8) Parallel Waveguide Distance from Cutoff Wavenumber Formula ↻

Formula

$$d = \frac{m \cdot \pi}{k_c}$$

Example with Units

$$0.0013 \text{ m} = \frac{4 \cdot 3.1416}{9666.43 \text{ Diopter}}$$

Evaluate Formula ↻

9) Phase Constant in Telephone Cable Formula ↻

Formula

$$\Phi = \sqrt{\frac{\omega \cdot R \cdot C}{2}}$$

Example with Units

$$0.4071 \text{ rad/s} = \sqrt{\frac{2000 \text{ rad/s} \cdot 12.75 \Omega \cdot 13 \mu\text{F}}{2}}$$

Evaluate Formula ↻

10) Polarization Mismatch Loss Formula ↻

Formula

$$M_L = -20 \cdot \log_{10}(\cos(\theta))$$

Example with Units

$$1.2494 \text{ dB} = -20 \cdot \log_{10}(\cos(30^\circ))$$

Evaluate Formula ↻

11) Return Loss(dB) Formula ↻

Formula

$$P_{\text{ret}} = 20 \cdot \log_{10}\left(\frac{P_i}{P_{\text{ref}}}\right)$$

Example with Units

$$5.368 \text{ dB} = 20 \cdot \log_{10}\left(\frac{15.25 \text{ W}}{8.22 \text{ W}}\right)$$

Evaluate Formula ↻

12) Velocity Factor Formula ↻

Formula

$$V_f = \frac{1}{\sqrt{K}}$$

Example

$$0.6131 = \frac{1}{\sqrt{2.66}}$$

Evaluate Formula ↻

13) Velocity of Propagation in Telephonic Cable Formula ↻

Formula

$$V_P = \sqrt{\frac{2 \cdot \omega}{R \cdot C}}$$

Example with Units

$$4912.5075 \text{ m/s} = \sqrt{\frac{2 \cdot 2000 \text{ rad/s}}{12.75 \Omega \cdot 13 \mu\text{F}}}$$

Evaluate Formula ↻



14) Voltage Maxima Formula

Formula

$$V_{\max} = V_i + V_r$$

Example with Units

$$10.5\text{v} = 6\text{v} + 4.5\text{v}$$

Evaluate Formula 

15) Voltage Minima Formula

Formula

$$V_{\min} = V_i - V_r$$

Example with Units

$$1.5\text{v} = 6\text{v} - 4.5\text{v}$$

Evaluate Formula 



Variables used in list of Transmission Line & Antenna Theory Formulas above

- **c** Depth of Parabola (Meter)
- **C** Capacitance (Microfarad)
- **d** Parallel Waveguide Distance (Meter)
- **D** Parabolic Reflector Diameter (Meter)
- **f_{ref}** Focal Length of Reflector (Meter)
- **G_{pr}** Gain of Parabolic Reflector Antenna (Decibel)
- **i_{id}** Incident Current (Ampere)
- **i_{max}** Current Maxima (Ampere)
- **i_{min}** Current Minima (Ampere)
- **I_r** Reflected Current (Ampere)
- **k** Efficiency Factor of Parabolic Reflector
- **K** Dielectric Constant
- **k_c** Cutoff Wavenumber (Diopter)
- **m** Mode Index
- **M_L** Polarization Mismatch Loss (Decibel)
- **P_i** Incident Power Fed into Antenna (Watt)
- **P_{ref}** Reflected Power by Antenna (Watt)
- **P_{ret}** Return Loss (Decibel)
- **R** Resistance (Ohm)
- **r_{min}** Minimum Distance from Antenna (Meter)
- **V_f** Velocity Factor
- **V_i** Incident Voltage (Volt)
- **V_{max}** Voltage Maxima (Volt)
- **V_{min}** Voltage Minima (Volt)
- **V_p** Velocity of Propagation in Telephonic Cable (Meter per Second)
- **V_r** Reflected Voltage (Volt)
- **θ** Theta (Degree)
- **λ** Wavelength (Meter)
- **Φ** Phase Constant (Radian per Second)
- **ψ** Beamwidth (Degree)

Constants, Functions, Measurements used in list of Transmission Line & Antenna Theory Formulas above

- **constant(s):** pi, 3.14159265358979323846264338327950288
Archimedes' constant
- **Functions:** **cos**, cos(Angle)
Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- **Functions:** **log10**, log10(Number)
The common logarithm, also known as the base-10 logarithm or the decimal logarithm, is a mathematical function that is the inverse of the exponential function.
- **Functions:** **sqr**t, sqrt(Number)
A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Electric Current** in Ampere (A)
Electric Current Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement:** **Power** in Watt (W)
Power Unit Conversion 
- **Measurement:** **Angle** in Degree (°)
Angle Unit Conversion 
- **Measurement:** **Noise** in Decibel (dB)
Noise Unit Conversion 
- **Measurement:** **Capacitance** in Microfarad (μF)
Capacitance Unit Conversion 
- **Measurement:** **Electric Resistance** in Ohm (Ω)
Electric Resistance Unit Conversion 
- **Measurement:** **Wavelength** in Meter (m)
Wavelength Unit Conversion 
- **Measurement:** **Electric Potential** in Volt (V)
Electric Potential Unit Conversion 
- **Measurement:** **Angular Velocity** in Radian per Second (rad/s)
Angular Velocity Unit Conversion 



- ω Angular Velocity (*Radian per Second*)

- **Measurement: Wave Number** in Diopter (Diopter)
Wave Number Unit Conversion 



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