

DC CIRCUITS

OHM'S LAW: V = IR

RESISTORS table with color bands and formulas like I = Q/t = C/s, V = W/Q = J/C, G = 1/R = 1/Ω, A = d² = CM, R = ρ * l / CM, CM = Circular Mil, P = W/t = J/s, P = IV, P = I²R = V²/R

Table with columns: ELECTRICAL, MEASURE, Sym, unit, PREFIX, Sym, 1.0EN. Includes rows for CAPACITANCE, CHARGE, CONDUCTANCE, CURRENT, ENERGY, FREQUENCY, IMPEDANCE, INDUCTANCE, POWER, REACTANCE, RESISTANCE, TIME, VOLTAGE, RESISTIVITY, MAGNETIC, FLUX DENSITY, MAGNETIC FLUX, MAGNETIZING FORCE, MAGNETOMOTIVE FORCE, PERMEABILITY, RELUCTANCE.

SERIES CIRCUITS: Vx = I * Rx, Px = I² * Rx, VOLTAGE DIVIDER: Vx = Vs * (Rx / Rt), PARALLEL CIRCUITS: Rt = 1/GT, Rt = 1/Σ(1/RN), Rt = R1R2 / (R1 + R2), Rt = R1/n, Rt = RA*RT / (RA - RT), ROPEL = 1 / (GTALCAL - GTMEAS), CURRENT DIVIDERS: Ix = It * (Rt / Rx), I1 = I2 * (R2 / (R1 + R2)), I2 = I1 * (R1 / (R1 + R2)), SOURCE CONVERSION: Is = Vs / Rs, IL = Vs / (Rs + RL), THEVENIN PROCEDURE: 1. Remove RL, 2. Calc VAB, 3. Short VS, 4. Calc RTH

AC CIRCUITS

FREQUENCY: T = Period, f = 1/T = Cycles/Sec, 1 Hz = 1 Cycle/Sec, TABLE: T, f, s, Hz, ms, KHz, μs, MHz, VOLTAGE: VRMS = 0.707 * VP, VP = 1.414 * VRMS, VAVG = (2/π) * VP, VAVG = 0.637 * VP, VI = VP * sin(θ), POWER: PAC = V²RMS/R, VAR = Unit of Reactive P, ANGULAR CONVERSION: rad = (π/180) * θ°, deg = (180/π) * θ°, θ = (B/A) * 360°, VARIANCE: C: I leads VC by 90°, L: I lags VL by 90°, C: Hz+ = I+, XC-, L: Hz+ = I-, XL+

CAPACITORS

Q = V * C, Q = Coulombs C, C = Farads F, Force = kQ1Q2 / d², W = C V² / 2, SERIES CAPACITORS ARE LIKE PARALLEL RESISTORS, CAP VOLTAGE IN SERIES: Vx = VT * (CT / CX), CAPACITORS AND TIME: τ = RC, v = VF + (V1 - VF) * e^(-t/RC), v = VF(1 - e^(-t/RC)), t = -RC * ln(1 - v/VF), v = VI * e^(-t/RC), t = -RC * ln(v/VI), INSTANT CAP CURRENT: i = C(dv/dt) = (dq/dt), CAP. REACTANCE XC Ω: XC = 1 / (2πfC), P: VRMS = IRMS, PR = VRMS * IRMS, PR = V²RMS / XL, PR = I²RMS * XL, PTRUE = I²RMS * RW, QUALITY FACTOR = XL / RW, VOUT = VIN * X / (R² + X²)¹/²

INDUCTORS

L = Henry H, vIND = L(dI/dt), W = L I² / 2, L = N² μA / l, → A = m², μ = H/m, I = m, SERIES INDUCTORS ARE LIKE SERIES RESISTORS, FARADAY'S LAW: VIND = N(dφ/dt), INDUCTORS AND TIME: τ = L/R, v = VF + (V1 - VF) * e^(-t/L/R), i = IF + (I1 - IF) * e^(-t/R/L), i = IF(1 - e^(-Rt/L)), i = I1 * e^(-Rt/L), IND. REACTANCE XL Ω: XL = 2πfL, INSTANT CAP CURRENT: i = C(dv/dt) = (dq/dt), CAP. REACTANCE XC Ω: XC = 1 / (2πfC), P: VRMS = IRMS, PR = VRMS * IRMS, PR = V²RMS / XL, PR = I²RMS * XL, PTRUE = I²RMS * RW, QUALITY FACTOR = XL / RW, VOUT = VIN * X / (R² + X²)¹/²

RC SERIES CIRCUITS

Z = Impedance Ω, V = I * Z, Z = R - jXC, Z = R² + XC²¹/², θ = -ATAN(XC/R), Low Pass Filter VOUT = VC, High Pass Filter VOUT = VR, fc = 1 / (2πRC), RL SERIES CIRCUITS: Z = R + jXL, Z = (R² + XL²)¹/², θ = +ATAN(XL/R), Low Pass Filter VOUT = VR, High Pass Filter VOUT = VL, fc = Cutoff Frequency, fc = 1 / (2π(L/R)), @fc: VOUT = VMAX * 0.707, RLC SERIES CIRCUITS: ZTOT = XL - XC, Z = R + jXTOT, Z = (R² + XTOT²)¹/², θ = +ATAN(XTOT/R), Band Pass Filter VOUT = VR, fc = 1 / (2π(LC)¹/²), Q = (1/R) * (L/C)¹/², BW = fR / Q, @fR: Z = R

VARIANCE

f+, fr, f-, Xc-, Xc-, XL+, XL+, VL = VC, XT-, XT+, Z-, Z+, Z = R, I+, I-, IMAX

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VARIANCE

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