Analysis of a Common Collector Circuit

These measurements were taken with a Fluke 85 multimeter on a Wisher-108 breadboard, the transistor used is a T2N3705 (2N3705) manufactured by Multicomp.

Initial Setup

The supply voltage (V_{CC}) is 5.22V DC with 2.4mV of 50Hz AC ripple.
R1 is a 1kΩ potentiometer set to 962Ω.
R2 is a 4.7kΩ potentiometer set to 131.6Ω.

Current Measurements

I_B = 0.29mA approximately.
I_E = 34.6mA approximately.
I_C = 36.35mA approximately.

This give a total current gain (β) of 119.31 or 41.53 dB.

Voltage Measurements

V_{CC} / V_{BB} = 5.22V
V_B = 4.95V
V_E = 4.19V
V_{BE} = 0.746V
V_{CE} = 1.024V

The gives a total voltage gain (A_V) of 0.8464 or -1.4475 dB.

Derived Measurements

V_{R1} = 278.98mV
R_E = 0.75144Ω (This is the internal emitter resistance)
Z_{in} = 89.654Ω
Z_{out} = 0.75068Ω

Equations

$\beta = I_E / I_B$ or 20log for dB
$A_V = V_E / V_B$ or 20log for dB
$I_E = \beta * I_B$
$I_B = I_E / \beta$
$V_{R1} = I_B * R1$
$V_B = V_{BB} - V_{R1}$
$R_E = 26mV / I_E$
$Z_{in} = \beta * R_E$
$Z_{out} = Z_{in} / \beta$