# Learning the Art of Electronics Labs - 4L.2 Emitter Follower Lab

Diagram

Description automatically generated

|  |  |  |
| --- | --- | --- |
| Setting | Value | Comment |
| Frequency | 120 Hz |  |
| DC Offset | OFF |  |
| Amplitude | 1.52 Vp-p |  |
| IClollector | 44.6 µA |  |
| Ibase | 0.1 µA |  |
| Iemitter | 38.8 µA |  |

## Workaround for Negative Side Clipping Vsource / Vinput

The negative side of the input signal is causing the Vbe to go negative and turn off the transistor.

Chart

Description automatically generated

Clipping stops when DC Offset shifts the entire signal above +0.62 Vdc.

A picture containing chart

Description automatically generated

## Measuring Input Impedance

*Beginning with the initial configuration Rbase equal to 33 KΩ*

|  |  |  |
| --- | --- | --- |
| **Setting** | **Value** | **Comment** |
| Frequency | 120 Hz |  |
| DC Offset | OFF |  |
| Amplitude | 4.64 Vp-p |  |
| Vsource | 2.66 V (Y2) | CH1 : Yellow |
| Voutput | 2.22 V (Y1) | Ch3 : Blue |
| Vinput | phase shift ≈ 0 ° | Ch4: Green |
| **Attenuation** | **16.5%** | ΔY / Y2 (0.44/2.66) |
| **Rbase** | **33 KΩ** |  |

A picture containing graphical user interface

Description automatically generated

*Low Amplitude Readings put Zin ≈ 3 MΩ*

|  |  |  |
| --- | --- | --- |
| **Setting** | **Value** | **Comment** |
| Frequency | 120 Hz |  |
| DC Offset | OFF |  |
| Amplitude | 1.56Vp-p | Wave Gen’s Min. Amplitude value |
| Vsource | 1.08 V (Y2) | CH1 : Yellow |
| Voutput | .060 V (Y1) | Ch3 : Blue |
| Vinput | phase shift ≈ 0 ° | Ch4: Green |
| **Attenuation** | **44%** | ΔY / Y2 (0.48 / 1.08) |
| **Rbase** | **3 MΩ** |  |

A picture containing graphical user interface

Description automatically generated

*Higher Amplitude Readings put Zin ≈ 0.5 MΩ*

|  |  |  |
| --- | --- | --- |
| **Setting** | **Value** | **Comment** |
| Frequency | 120 Hz |  |
| DC Offset | OFF |  |
| Amplitude | 11.84 Vp-p | Wave Gen’s Amplitude ≈ 30% max value |
| Vsource | 6.24 V (Y2) | CH1 : Yellow |
| Voutput | 3.48 V (Y1) | Ch3 : Blue |
| Vinput | phase shift ≈ 0 ° | Ch4: Green |
| **Attenuation** | **43%** | ΔY / Y2 (0.48 / 1.08) |
| **Rbase** | **0.5 MΩ** |  |

Graphical user interface

Description automatically generated with low confidence

## Measuring Output Impedance

Attenuated Output Signal w/ the 1 KΩ output load.

|  |  |  |
| --- | --- | --- |
| **Setting** | **Value** | **Comment** |
| Frequency | 11.8 KHz |  |
| DC Offset | OFF |  |
| Amplitude | 3.36 V p-p | Min Amplitude for the signal to stabilize trigger |
| Vsource | 6.48 V (Y2) | CH1 : Yellow |
| Voutput | 2.56 V (Y1) | Ch3 : Blue |
| Vinput | phase shift ≈ 0 ° | Ch4: Green |
| **RLoad** | **1 KΩ** |  |
| **I emitter** | **875 µA** | Load Resistor + Zout |
|  |  |  |

Graphical user interface

Description automatically generated with medium confidence

Unloaded Output

|  |  |  |
| --- | --- | --- |
| **Setting** | **Value** | **Comment** |
| Frequency | 11.8 KHz |  |
| DC Offset | OFF |  |
| Amplitude | 3.36 V p-p | Min Amplitude for the signal to stabilize trigger |
| Vsource | 6.48 V (Y2) | CH1 : Yellow |
| Voutput | 4.16 V (Y1) | Ch3 : Blue |
| Vinput | phase shift ≈ 0 ° | Ch4: Green |
| **RLoad** | **0 KΩ** |  |
| **I emitter** | **505 µA** | Zout |
|  |  |  |

Graphical user interface

Description automatically generated

Oscilloscope Observations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Frequency** | **DC Offset** | **Rbase** | **Ch1 : Input Voltage (Vb)** | **Ch3 : Output Voltage (Ve)** |  |  |
| 20 Hz |  |  |  |  |  |  |
| 2 KHz | 0v (off) | 33KΩ | Chart  Description automatically generated | Chart  Description automatically generated |  |  |
| 20 KHz |  |  |  |  |  |  |
| 200 KHz | Off | 33KΩ |  |  |  |  |
|  |  |  |  |  |  |  |