|  |  |  |  |
| --- | --- | --- | --- |
| **PROTOCOL**  for lab-exercise  **Current & Voltage sources** | | |  |
|  | | | |
| Group / Class | Script writer | Signature | |
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|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| Measurement of the Dynamic output resistance  Of some current sources | | | |
| USED DEVICES | | | |
|  | | | |
| Cover Sheet E2014 v3 | | | |

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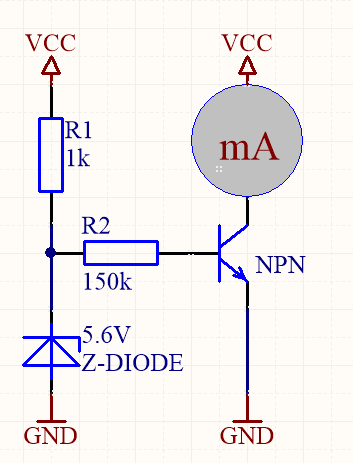
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**Task**

In this laboratory exercise some current sources were build up and had to be measured. The components were calculated with a current of 10mA. The supply voltage had to be changed from 10 Volts to 30 Volts. The change of the current flow had to be measured and put into a diagram. The dynamic output resistance had to be calculated. To calculate it, the supply voltage had to be increased in 2V steps. By measuring the difference of the lowest and highest current & voltage, it is able to calculate the dynamic output resistance.

**Measurement A with a Z-Diode**

**Circuit**



**Calculations**

I = 10mA

**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 10 | 10.77 |
| 12 | 11.24 |
| 14 | 11.77 |
| 16 | 12.25 |
| 18 | 12.72 |
| 20 | 13.27 |
| 22 | 13.81 |
| 24 | 14.3 |
| 26 | 14.81 |
| 28 | 15.44 |
| 30 | 16 |
|  |  |

**Dynamic output resistance**

**Measurement A with a voltage source**

**Circuit**



**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 10 | 10.34 |
| 12 | 10.59 |
| 14 | 10.76 |
| 16 | 11 |
| 18 | 11.36 |
| 20 | 11.62 |
| 22 | 11.97 |
| 24 | 12.31 |
| 26 | 12.61 |
| 28 | 12.91 |
| 30 | 13.22 |
|  |  |

**Dynamic output resistance**

**Measurement B with 1.2V**

**Circuit**



**Calculations**

**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 10 | 10.08 |
| 12 | 10.18 |
| 14 | 10.24 |
| 16 | 10.35 |
| 18 | 10.48 |
| 20 | 10.58 |
| 22 | 10.78 |
| 24 | 10.91 |
| 26 | 11.09 |
| 28 | 11.17 |
| 30 | 11.3 |

Dynamic output resistance

**Measurement B with 5V voltage source**

**Circuit**



**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 10 | 10.06 |
| 12 | 10.08 |
| 14 | 10.11 |
| 16 | 10.13 |
| 18 | 10.15 |
| 20 | 10.16 |
| 22 | 10.18 |
| 24 | 10.2 |
| 26 | 10.22 |
| 28 | 10.24 |
| 30 | 10.27 |

**Dynamic output resistance**

**Measurement C**

**Circuit**



**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 10 | 10.01 |
| 12 | 10 |
| 14 | 9.99 |
| 16 | 9.97 |
| 18 | 9.96 |
| 20 | 9.95 |
| 22 | 9.93 |
| 24 | 9.9 |
| 26 | 9.89 |
| 28 | 9.88 |
| 30 | 9.87 |

**Dynamic output resistance**

**Measurement D.) The current mirror**

**Circuit**



**Measurements**

|  |  |
| --- | --- |
| Vcc[V] | Ic[mA] |
| 5 | 1 |
| 6 | 1 |
| 8 | 1.01 |
| 10 | 1.02 |
| 12 | 1.03 |
| 14 | 1.04 |
| 16 | 1.05 |
| 18 | 1.06 |
| 20 | 1.07 |
| 22 | 1.08 |
| 24 | 1.09 |
| 26 | 1.1 |
| 28 | 1.11 |
| 30 | 1.12 |

**Dynamic output resistance**