# **ENPH 253**

# **Electrical Impedance Raw data**

## Devices

Multimeter: BK Precision 2831E 4(1/2) Digit Multimeter Serial number: U4-1999

* Used to measure voltage and resistance

Frequency Generator: BK Precision 4011A 5MHz Function Generator Serial: U4-2018

U-L0946

* Used to measure current

Wavetech CR50 multimeter which has an uncertainty of 0.5%1digit

* used to measure capacitance

## Part 1a: Inductor

Table 1: Measured current and voltage for an Inductor at different frequencies.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency [Hz]** | **Current [mA]** | **Current error [±mA]** | **Voltage [V]** | **Voltage error [±V]** |
| 209 | 93.3 |  | 2.699 |  |
| 485 | 87.4 |  | 3.496 |  |
| 659 | 84.4 |  | 4.114 |  |
| 797 | 80.5 |  | 4.529 |  |
| 921 | 76.9 |  | 4.867 |  |
| 1026 | 73.9 |  | 5.124 |  |
| 1120 | 71.3 |  | 5.336 |  |
| 1204 | 69.0 |  | 5.505 |  |

## Part 1b: Capacitor

Table 2: Measured current and voltage for a capacitor at different frequencies.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency [Hz]** | **Current [mA]** | **Current error [±mA]** | **Voltage [V]** | **Voltage error [±V]** |
| 203 | 4.7 |  | 7.555 |  |
| 221 | 5.1 |  | 7.551 |  |
| 237 | 5.4 |  | 7.746 |  |
| 255 | 5.9 |  | 7.538 |  |
| 284 | 6.5 |  | 7.528 |  |
| 308 | 7.1 |  | 7.521 |  |
| 349 | 8.0 |  | 7.506 |  |
| 420 | 9.7 |  | 7.843 |  |
| 560 | 12.9 |  | 7.555 |  |
| 1200 | 27.2 |  | 7.435 |  |

## Part 1c:

Measured resistance of the inductor (Ohmmeter):

Capacitor:

Wavetech CR50 multimeter which has an uncertainty of 0.5%1digit used to measure capacitance

## Part 2a: Inductor and Capacitor connected in Parallel

Table 3: Measured current across a parallel circuit of an inductor and a capacitor at 1201 Hz

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage [V]** | **Voltage error [±V]** | **Current [mA]** | **Current error [±mA]** |
| 0.5126 |  | 4.7 |  |
| 1.0142 |  | 9.3 |  |
| 1.5160 |  | 14.0 |  |
| 2.0072 |  | 18.6 |  |
| 2.604 |  | 23.1 |  |
| 2.991 |  | 27.7 |  |
| 3.508 |  | 32.4 |  |
| 4.016 |  | 37.1 |  |
| 4.509 |  | 41.7 |  |
| 5.016 |  | 46.4 |  |
| 5.503 |  | 50.9 |  |
| 5.826 |  | 53.9 |  |

Current through inductor alone (in parallel) 72.5 mA

Current through capacitor alone (in parallel) 20.6 mA

## Part 2b: Inductor and Capacitor connected in series

Table 4: Measured current across a series circuit of an inductor and a capacitor at 1201 Hz

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage [V]** | **Voltage error [±V]** | **Current [mA]** | **Current error [±mA]** |
| 0.6172 |  | 2.9 |  |
| 1.0157 |  | 4.8 |  |
| 1.5258 |  | 7.4 |  |
| 2.0048 |  | 9.7 |  |
| 2.492 |  | 12.1 |  |
| 3.035 |  | 14.8 |  |
| 3.499 |  | 17.1 |  |
| 4.028 |  | 19.7 |  |
| 4.490 |  | 22.0 |  |
| 5.011 |  | 24.6 |  |
| 5.510 |  | 27.0 |  |
| 6.006 |  | 29.5 |  |
| 6.517 |  | 32.0 |  |
| 7.080 |  | 34.8 |  |

* Voltage across capacitor (series) 9.599 V
* Voltage across inductor (series) 2.76 V