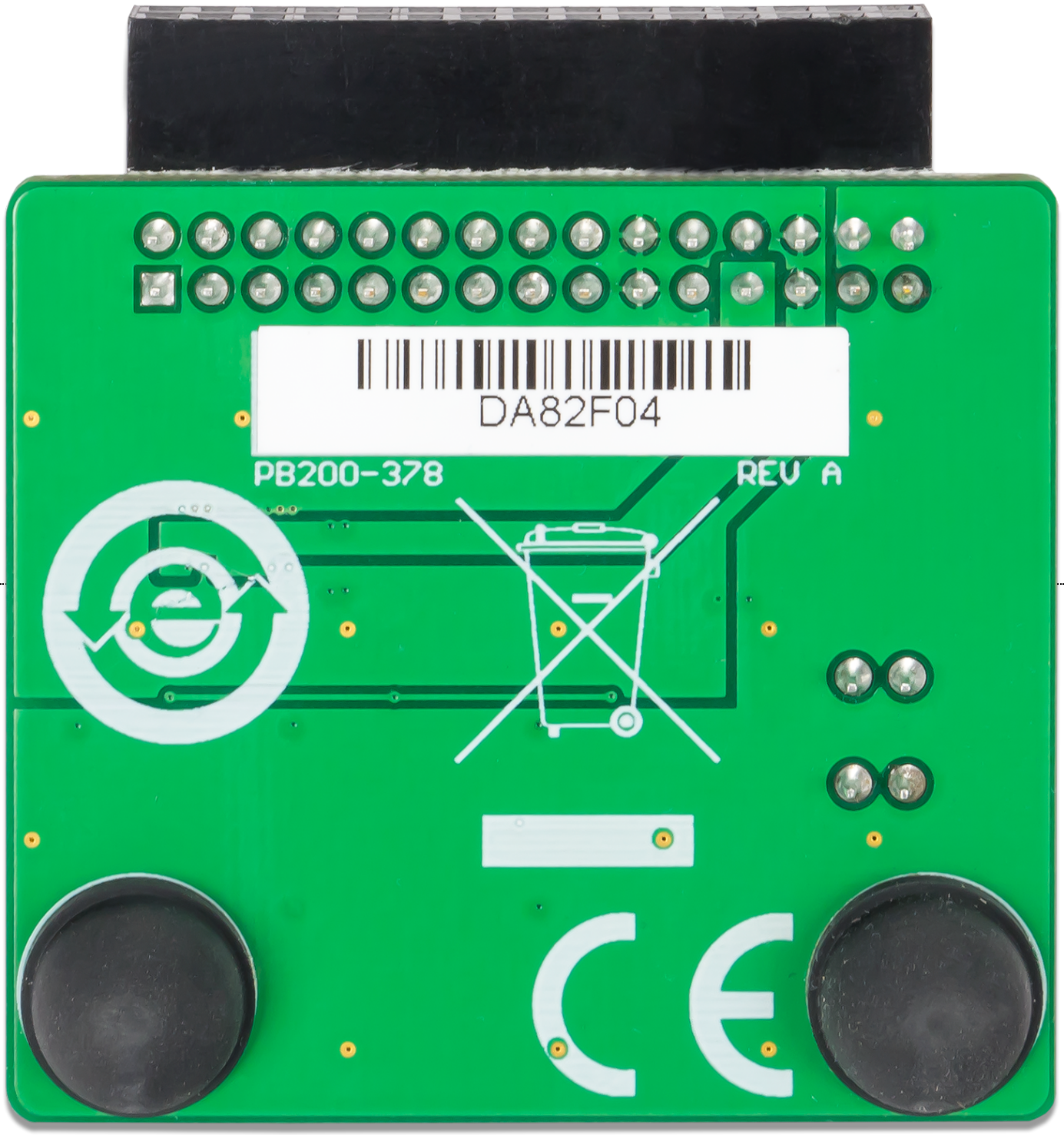
Analog Discovery Impedance Analyzer Reference Manual

The Impedance Analyzer Instrument in WaveForms is made easier to use by the reference resistors and relays that come pre-loaded on the Impedance Analyzer board. The Analog Discovery can automatically select the most appropriate component for the job that it needs to do. The Impedance Analyzer is equipped with the 2×15 Analog Discovery connector, which makes it compatible with Analog Discovery Legacy and Analog Discovery 2.

Note: Use of the Impedance Analyzer requires WaveForms version 3.8.2 or later.



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IC2
IC3
IC4
IC5
R1
R3
R6
C1
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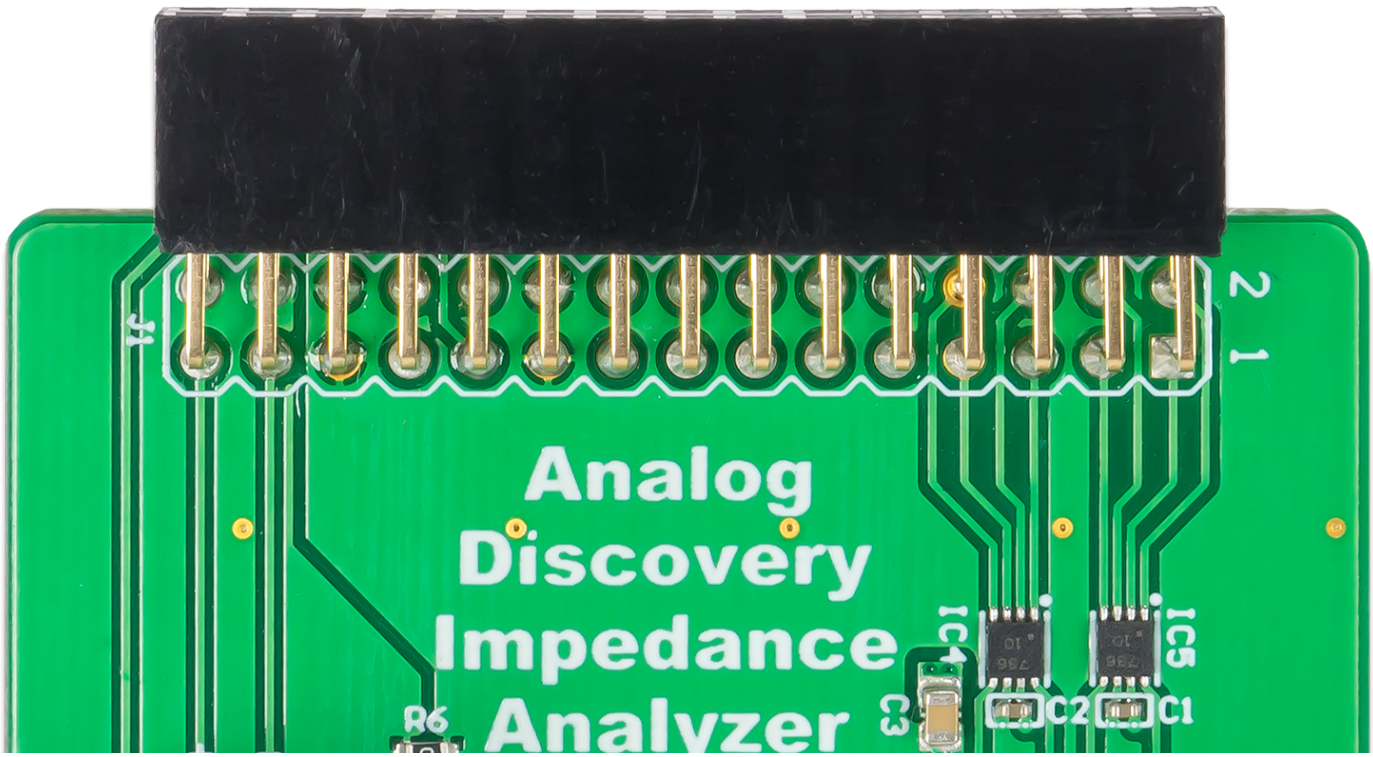
C3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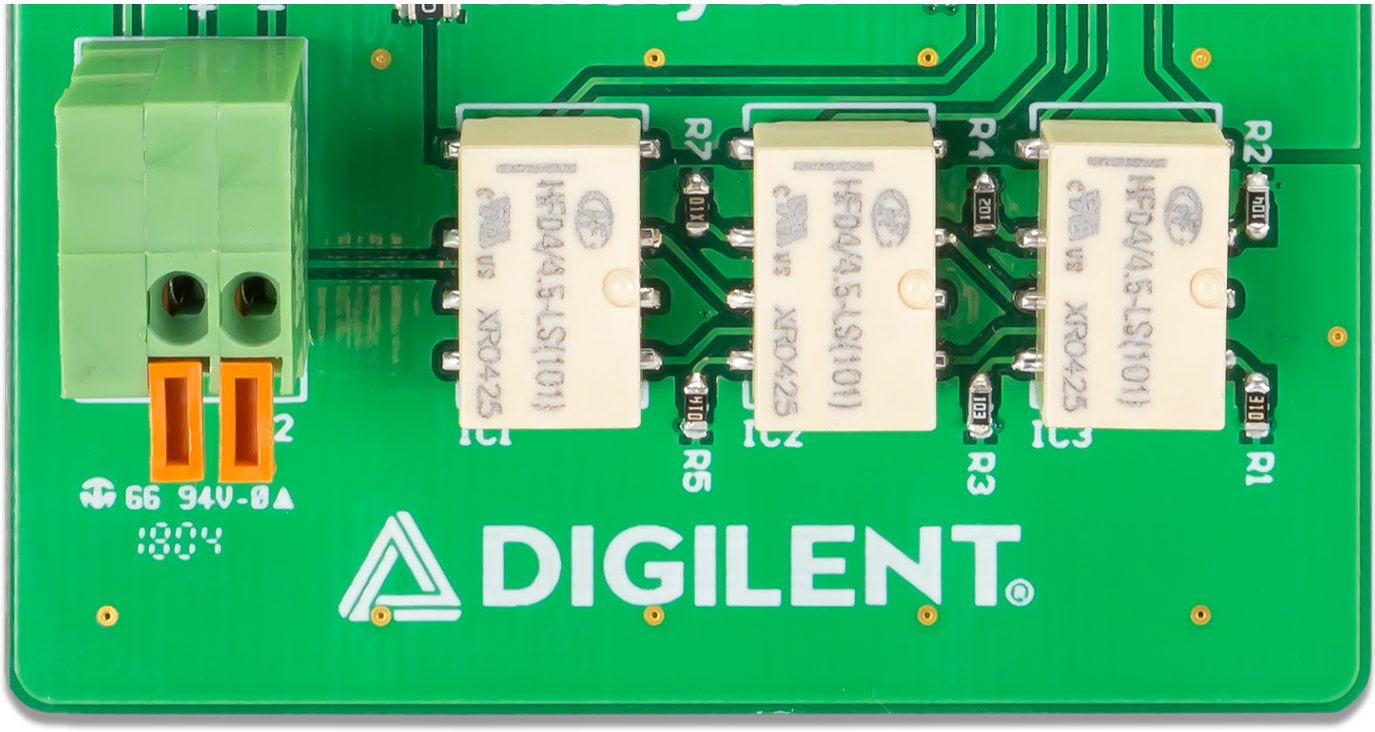
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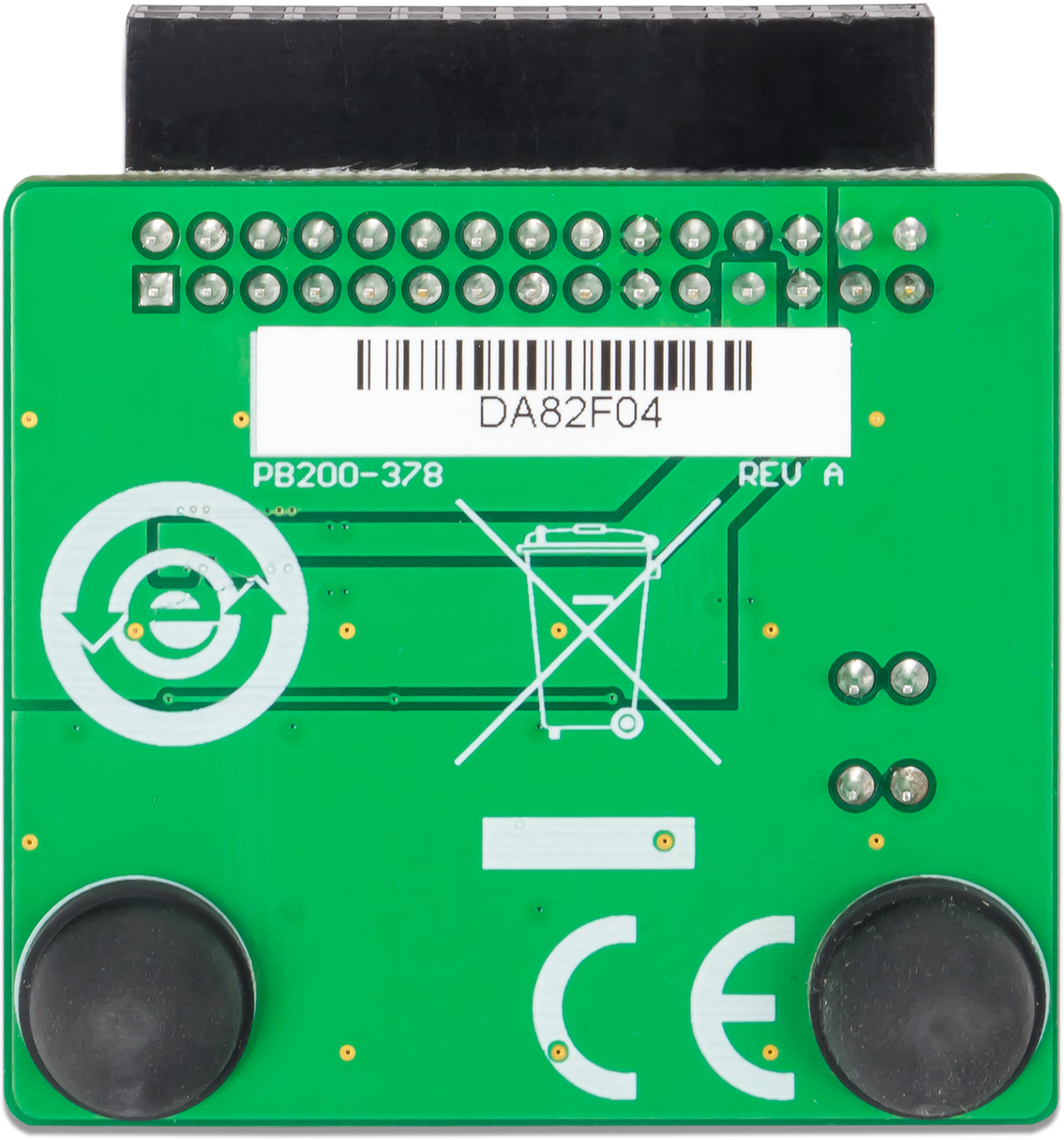


Overview

Features

- Equipped with automatically selectable reference resistances
- Compatible with the Analog Discovery 2 and Analog Discovery (Legacy)
- Allows auto-scaling

Compatible Products

The *Analog Discovery Impedance Analyzer* is compatible with the following:

- Analog Discovery Legacy
- Analog Discovery 2

About this Document

This reference manual applies to Revision A of the *Analog Discovery Impedance Analyzer*.

Functional Description

Connectors and Jumpers

J1 - 2×15 Analog Discovery connector - Interfaces the Impedance Analyzer with the Analog Discovery

J2 - 1×2 Terminal Bloc - Used for connecting in circuit the unknown impedance

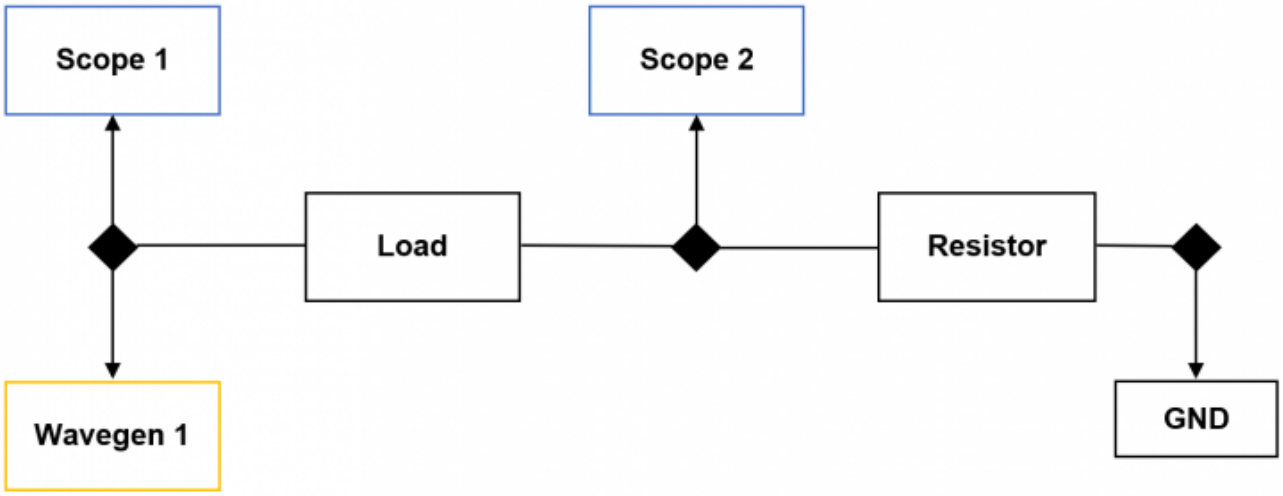
Digital Pins used for configuration

The Analog Discovery's digital I/O pins are used to control the relays in order to select the needed value for the reference impedance. Each relay driver uses two I/Os to control one relay.

Measuring the impedance

The *Analog Discovery Impedance Analyzer* is used to analyze capacitive and inductive elements. It uses the WaveGen 1, Oscilloscope device instruments, and a reference resistor.

The impedance analyzer circuit is constructed as in the circuit below. **Load** represents the inductive or capacitive item to be analyzed and **Resistor** is the reference resistor that is already loaded on the board. The resistor value depends on the load value and frequency.



(https://reference.digilentinc.com/_media/reference/add-ons/impedance-analyzer/circuit1.png)

The approximate resistor needed for different loads are the following:

Capacitance	Ref Resistor	Inductance
100 pF	1 MΩ	
1 nF	100 kΩ	
10 nF	10 kΩ	

Capacitance	Ref Resistor	Inductance
100 nF	1 kΩ	1 uH
1 uF	1 kΩ	10 uH
10 uF	100 Ω	100 uH
100 uF	10 Ω	1 mH

Power

The device is powered through the 5V user power supply from the Analog Discovery. It requires approximately 25mA

Software Support

The *Analog Discovery Impedance Analyzer* is controlled with the Analog Discovery through the use of WaveForms' Impedance Analyzer instrument. When the instrument is started, the Scope and WaveGen are stopped and their status shows **"Busy"**. The Impedance Analyzer takes control over these instruments while running.

When using the *Analog Discovery Impedance Analyzer* module, select "**Adapter**" in the interface, after the resistor field. The application will use the power supplies and digital I/Os to control the module to switch between the resistor values: 10R, 100R, 1k, 10k, 100k, 1M.

Additional Information

- WaveForms can be downloaded from the WaveForms Resource Center (https://reference.digilentinc.com/reference/software/waveforms/waveforms-3/start).
- Documentation and installation instructions can be found in the WaveForms Reference Manual (https://reference.digilentinc.com/reference/software/waveforms/waveforms-3/reference-manual).
- The Analog Discovery Impedance Analyzer Schematic can be found here (https://reference.digilentinc.com/learn/documentation/schematics/impedance_analyzer_schematic).

doc (https://reference.digilentinc.com/tag/doc?do=showtag&tag=doc), rm (https://reference.digilentinc.com/tag/rm?do=showtag&tag=rm), ia (https://reference.digilentinc.com/tag/ia?do=showtag&tag=ia)