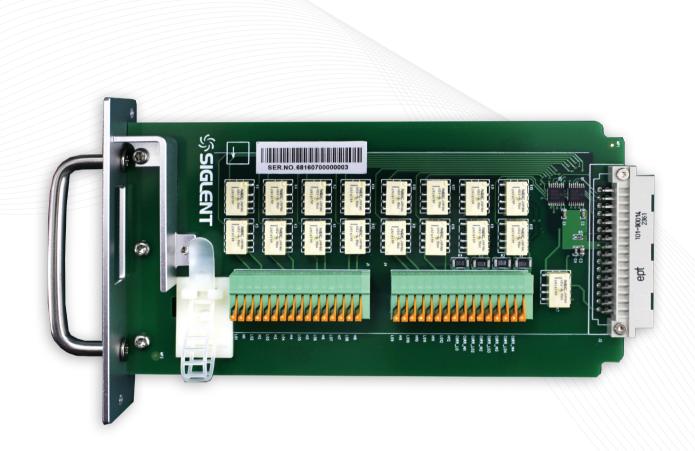
# SC1016 User's Guide



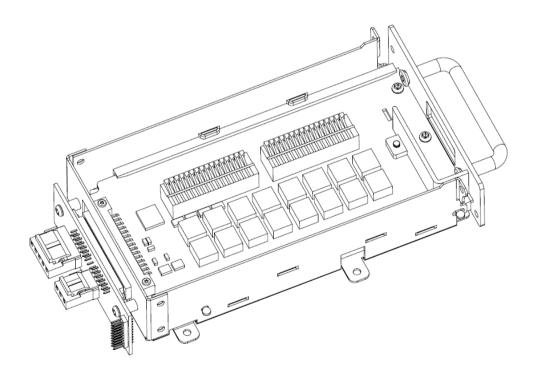


**SIGLENT TECHNOLOGIES CO.,LTD** Distribuido por: Hameg Instruments, S.L. www.hameg.es

# SIGLENT Digital Multimeter SC1016 User's Guide

# **Product Overview**

The SIGLENT SC1016 is a multiplexer that provides multi-point measurement capabilities to the SDM3000 series of digital multimeters. The scanner features 12 multi-purpose + 4 current channels and supports the following measurement functions: DCV, ACV, DCI, ACI, 2WR, 4WR, CAP, FREQ, DIODE, CONT and TEMP (RTD and Thermocouple). It provides a convenient and versatile solution for test applications that require multiple measurement points or signals and is an ideal tool for R&D burn-in and production testing.



# Safety

SIGLENT thanks you for purchasing the SC1016 module. To achieve the best performance from the product, please read this guide carefully. To avoid electrical shock and personal injury, please don't use the product to measure signals that exceed the published specification.

# **Specifications**

| Max AC Voltage               | 125V rms or 175V peak, 100kHz,  |  |  |  |  |  |  |  |
|------------------------------|---|--|--|--|--|--|--|--|
| Max AC Voltage               | 0.3 A switched, 125VA (resistive load)  |  |  |  |  |  |  |  |
| Maximum DC Voltage           | 110V, 1A switched, 30VDC (resistive load)   |  |  |  |  |  |  |  |
| Contact Life                 | > 100000 operations, at 1A 30VDC(at 0.5 Hz)   |  |  |  |  |  |  |  |
| Contact Life                 | > 100000 operations, at 0.3A 125VDC (at 0.5 Hz)                                     |  |  |  |  |  |  |  |
| Contact Resistance           | 75 m $\Omega$ (maximum at 6VDC, 1A)   |  |  |  |  |  |  |  |
| Actuation Time               | 5ms maximum on/off  |  |  |  |  |  |  |  |
| Maximum switching<br>voltage | 250 VAC, 220 VDC  |  |  |  |  |  |  |  |
| Maximum switching power      | 62.5VA / 30W  |  |  |  |  |  |  |  |
| Insulation Resistance        | Minimum 1G ohm (500VDC)   |  |  |  |  |  |  |  |
| Connector Type               | Clamp terminal, #24 AWG wire size   |  |  |  |  |  |  |  |
| Duanations To sucid buscling | the product places do not pull it away from multimeter when measurement is executed |  |  |  |  |  |  |  |

Prenotion: To avoid breaking the product, please do not pull it away from multimeter when measurement is executed.

# **Channel Capabilities**

| Item                             | No. of wires                         | No. of channels  |
|----------------------------------|--------------------------------------|--|
| DCV, ACV <sup>[1]</sup>          | 2 wires (H, L)                       | 12 (CH1~CH12)  |
| DCI, ACI <sup>[2]</sup>          | 2 wires (H, L)                       | 4 (CH13~CH16)<br>(2A Range)                            |
| 2W Resistance                    | 2 wires (H, L)                       | 12 (CH1~CH12)  |
| 4W Resistance                    | 4 wires (Input H, L<br>+ sense H, L) | 6 pairs (CH1 [input]<br>& CH7 [sense], 2&8, •••, 6&12) |
| Capacitance                      | 2 wires (H, L)                       | 12 (CH1~ CH12)   |
| Diode/Continuity                 | 2 wires (H, L)                       | 12 (CH1~ CH12)   |
| Period/Frequency                 | 2 wires (H, L)                       | 12 (CH1~ CH12)   |
| Temp(Thermocouple)<br>Temp (RTD) | 2 wires (H, L)<br>2 wires (H, L)     | 12 (CH1~ CH12)<br>12 (CH1~ CH12)                       |

Remarks:

[1]Voltage range : <125VAC, 110VDC

[2] For continuous current < 2.2A, Accuracy  $\pm$  (% 3 (reading) + 0.02% (range)).

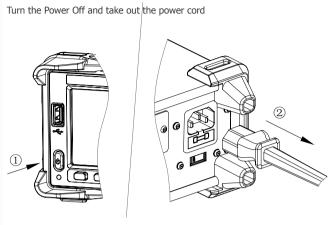
# Steps

# 1.Operations

# WARNING

The SC1016 is not designed to be "hot swappable". Remove power from all inputs and turn the instrument power off before installation or removal of the scanner card. Hot swapping the card could cause damage and is not covered under the warranty.

# 1.Power Off

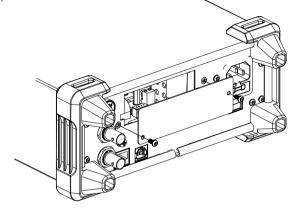


#### 3.Connection

Turn the clamp and insert the wire.

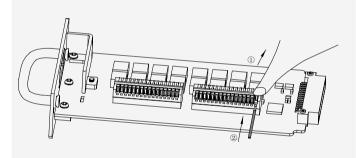
# 2.Open the SDM rear panel slot

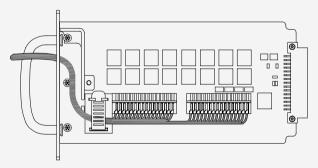
Take off the two screws on the slot corners to remove the optional slot cover. Keep the screws for later reuse



#### 4. Tighten cable

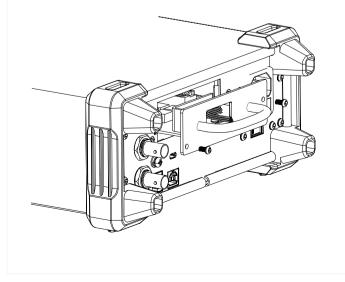
Route wiring through strain relief and Cable tie rap Wrap





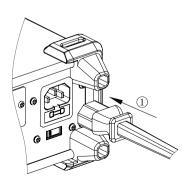
## 5.Insert the SC1016

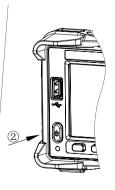
Insert the SC1016 bottom-side-up. Close the cover by tightening the screws.



# 6.Power On

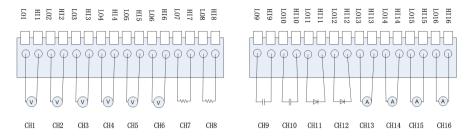
Connect the power cord and turn On the power





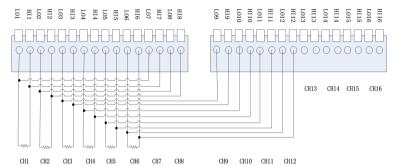
## 2.Application of 16 Channels

(1) 2-Wired Application <sup>[1]</sup>(DCV/ DCI/ ACV/ ACI 2WR/ 4WR/ CAP/ FREQ/ DIODE/ CONT / TEMP)



Remarks: [1] CH1 to CH12 can be used to measure DCV /ACV/ 2WR/ 4WR/ CAP/ FREQ/ DIODE/ CONT / TEMP. CH13 to CH16 can only be used for current measurements, less-than 2.4A

(2) 4-Wire Resistance Applications<sup>[1]</sup>



Remarks: [1] To minimize voltage errors, the remote sense connections (CH7,CH8 etc..) should be made as close to the device-under-test (DUT) as possible.

#### **3.Front Panel operations**

Press shift and to enter the operating menu of Utility function, as the following diagram shows.



Table 1. Scanner Function Menu Description

| Function Menu | Settings     | Description  |
|---------------|--------------|--|
| Mode          | Scan/Step    | Set the operation mode   |
| Time          | 0ms~999.999s | Sets the duration between each scan loop (Scan mode) or between each scanned channel (Step mode) |
| Cycles        | Auto/Man     | Sets the number of scan operations   |
| Channel Setup |              | Sets the scanned channel range, measurement function, and measurement parameters                 |
| Start         | On/Off       | Start or stop scan operation   |
| Exit          |              | Exit the scanner function  |

#### 1.Operation mode setup

•Scan: Measures all specified channel ranges (Channel MIN~MAX) for each trigger event. Time settings are applied between each scan for the whole channel range. •Step: Measures a single channel in the specified range (Channel MIN~MAX) at each trigger event. Time settings are applied for each channel.

#### 2.Time setup

Use the direction keys to set the duration between each scan loop (Scan mode) or between each scanned channel (Step mode)

#### 3.Cycles

•Auto: The instrument will scan specified channel circularly after the scan operation start and you should stop the operation manually.

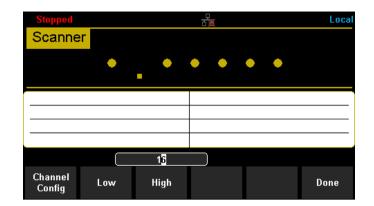
•Manual: Sets the number of scan operations by direction keys. The range of the setting is from 1 to 999. After starting the scan operation the instrument will not stop scanning until reaches cycle number.

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## 4.Channel setup

Press the [Channel Setup] to enter the setup interface.



#### Table 2. Scanner Function Menu Description

| Description   |
|---|
| Open/close the channel and set the measurement function, measurement parameters of specified channel. |
| Set the low value of scanned channel range.   |
| Set the high value of scanned channel range.  |
|   |

Press the [Channel Setup] to enter the channel configuration interface and set the channel switch, function, range and speed...

| Scanner | Channel Con | figure : |       |       |
|---------|-------------|----------|-------|-------|
| Channel | Switch      | Function | Range | Speed |
| 1       | Open        | DCV      | Auto  | Slow  |
| 2       | Open        | DCV      | Auto  | Slow  |
| 3       | Open        | Open DCV |       | Slow  |
| 4       | Open        | DCV      | Auto  | Slow  |
| 5       | Open        | DCV      | Auto  | Slow  |
| 6       | Open        | DCV      | Auto  | Slow  |
| 7       | Open        | DCV      | Auto  | Slow  |
|         |             |          |       | Done  |

The range setting is applicable for the following functions: DC/AC Voltage (DCV/ACV), 2/4 Wire Resistance (2W/4W), Capacitance (CAP), Frequency (FRQ).

Table 3. Available Range for different measurement function

| Measurement Function | Available Range  |
|----------------------|--|
| DCV/ACV/ FRQ         | Auto, 200mV, 2V, 20V, 200V   |
| DCI/ACI              | 2A (fixed)   |
| 2W/4W                | Auto, 200 $\Omega$ , 2k $\Omega$ , 20k $\Omega$ , 200k $\Omega$ , 2M $\Omega$ (1M $\Omega$ for SDM3065X), 10M $\Omega$ , 100M $\Omega$ |
| САР                  | Auto, 2nF, 20nF, 200nF, 2μF, 20μF, 200μF,<br>10000μF (2mF, 20mF, 100mF for SDM3065X)   |

The scanner function provides two measurement speeds: Fast (50 reading/s) and Slow (5 reading/s). (Fast: 1PLC, Slow: 10 PLC for SDM3065X) The speed setting is applicable for the following functions: DC/AC Voltage (DCV/ACV), 2/4 Wire Resistance (2W/4W)

#### **Operating instructions:**

• Move the cursor to choose the wanted parameter by direction keys and the background color of cursor's position turns to gray.

• Select the current item by pressing "OK" key and the background color of the selected item turns to green.

- Set the parameter by up and down direction keys.
- Press "OK" key again to store the setting of the selected item of which the background turns back to gray. Move the cursor and repeat the prior steps to set the next parameter.
- Press [Done] to save the current settings and return to the higher level menu.

#### 5.Channel range setting

Select [High] or [Low] and then input numerical value by direction keys. Note: The upper limit value should be always bigger than the lower limit value.

#### 6.Start scan operation

Set the [Start] to on to start the scan operation

| • Auto Trig                |       |              |                | Local |
|----------------------------|-------|--------------|----------------|-------|
| Frequency<br>Auto<br>200mV | +50.0 | 035          |                | Hz    |
| CH1: -000.669              | mVDC  | CH5: +0.193  | nF             |       |
| CH2: +019.383              | mVAC  | CH6: +50.035 | Hz             |       |
| CH3: overload              | Ω     | CH7: open    | Ω              |       |
| CH4: overload              | ΙΩ    | CH8: +10.167 | Ċ              |       |
|                            |       |              |                |       |
|                            |       | 0            | Start<br>n Off | Exit  |

The upper part of the interface displays the function, range, and result of the current channel. The table below records the measurement result of each channel.

## 7.Enter trend chart and statistics mode (optional operation)

Press shift and Math to open trend chart and statistics function.

| Auto Trig    | +099. | .298mVI            | DC) 윰 <sub>교</sub> |             | Local |
|--------------|-------|--------------------|--------------------|-------------|-------|
| +200m        |       |                    | + ‡                | + + +       |       |
| 0            |       |                    |                    |             |       |
|              |       |                    |                    |             |       |
| -200m 🛓      |       |                    | + <u>‡</u>         |             |       |
|              |       | Elapse             | ed Time: 1m        | 30s         |       |
| Min: +98.817 | m     | Average:           | +99.298m           | Max: +99.98 | 2m    |
| Span: +1.164 | m     | Std dev:           | +0.1127m           | Samples: 90 | 3     |
|              |       | 1                  |                    |             |       |
|              |       | Inquire<br>Channel |                    |             | Done  |

Set the [Inquire Channel] by direction keys and the interface displays the minimum, average, maximum, span, standard deviation, samples and trend chart of measurement results of the setting channel during the scan operation.

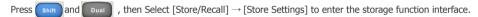
Press [Done] to return to higher level menu.

#### 8.Stop scan operation

Set the [Start] to off to stop the scan operation.

If the [Cycles] is set to manual, then the instrument will stop scan when it reaches the cycle number

## 9.Store measurement data (optional operation)



| Current P | Path: /intern | al           |                   |               |      |
|-----------|---------------|--------------|-------------------|---------------|------|
| File Nam  | e: csv_da     | nta_1        |                   |               |      |
|           |               |              |                   |               |      |
|           |               |              |                   |               |      |
|           | Browse        | File<br>Name | Type<br>.xml .csv | Store<br>Data | Done |

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Table 4. Storage Function Menu Description

| Function Menu | Settings    | Description   |
|---------------|-------------|---|
| Browse        |             | Choose the location that file will be saved.  |
| File Name     |             | Input a file name.  |
| Туре          | .xml / .csv | Choose the type that the file is saved.<br>.xml: configuration of scan function<br>.csv: measurement data |
| Store Data    |             | Save the file with the file name input to the current selected location.                                  |
| Done          |             | Return to the higher level menu.  |

#### **Remote operations**

The SDM3000 series can be controlled remotely by using the SIGLENT EasyDMM software. It allows users to easily select the measurement function and range for each channel and start acquiring measurement data. With a rich online help system, the user is able to create a virtual instrument on the PC for data collection and instrument control. During the scanning period, the measurement data can be viewed directly on the screen or viewed graphically using trend chart, bar and histogram graph types. The data can then be automatically or manually saved to a database or exported as a CSV files

## **Channel Configuration**

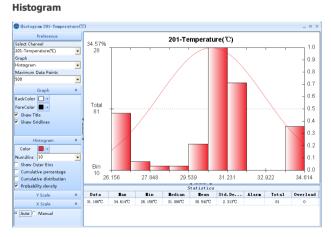
|             |                      |          |            |              |                | EasyD             |           |          |      |          |         |       |      |         |      | -   |
|-------------|----------------------|----------|------------|--------------|----------------|-------------------|-----------|----------|------|----------|---------|-------|------|---------|------|-----|
| Digit       | tal Multimeter Scan  |          |            |              |                |                   |           |          |      |          |         |       |      |         | Ab   | out |
|             |                      |          |            |              |                |                   |           |          |      |          |         |       |      |         |      |     |
| New Open    | Save Import Export ( | Device 1 | Manager )  | 2 Trend 0    | Chart (Z Bar ) | 2 Histogram       |           |          |      |          |         |       |      |         |      |     |
|             |                      |          |            |              |                |                   |           |          |      |          |         |       |      |         |      |     |
|             | Configuration-1      |          |            |              | Graph          |                   |           |          |      |          |         |       |      |         |      |     |
| DMM Explore | w 4                  | Mea      | sure Cont  | figure Ch    | annels Sca     | in Data Scan Trer | d Chart   | Scan Bar | Scar | Hist     | ogram   |       |      |         |      |     |
| Name        | Status Mode          |          | Instr      |              | e Channel      |                   | azurement |          |      | 5        | caling( | KX+B) | A    | arn Lin | it   |     |
| SDM3055X    | Alive Scan           | .⊿       | Channel    | Scan         | Name           | Function          | Range     | Speed    | Lore |          | Gain(K) | 0ffs  | Node | Low     | High |     |
|             |                      |          | ⊟ samaoesa |              |                |                   |           |          |      |          |         |       |      |         |      |     |
|             |                      |          |            | hanzel Sci   | state:         |                   |           |          |      |          |         |       |      |         |      |     |
|             |                      |          | 101        | 2            |                | Temperature       |           | Sler     |      | 11       | 1       | 0     | 110  | 0       | 0    |     |
|             | SEM3065X             |          | 102        | 2            |                | 4 Wire Besistance | kute      | Slew     |      | <u>E</u> | 1       | 0     | 0ff  | 0       | 0    |     |
|             | Alive                |          | 103        | 2            |                | Temperature       |           | Slew     |      | П        | 1       | 0     | 0ff  | 0       | 0    |     |
|             | USBTMC               |          | 104        |              |                | 2 Nire Resistance | kute      | Slow     |      |          | 1       | 0     | Off  | 0       | 0    |     |
|             | 1030::0xF4BC::0xEE3  |          | 105        | 2            |                | AC Voltage        | kute      | Slev     |      | 1        | 1       | 0     | 110  | 0       | 0    |     |
|             | SEM362A3160003       |          | 106        | N.           |                | Capacitance       | Auto      | Slew     |      | 圓        | 1       | 0     | 0££  | 0       | 0    |     |
|             | 3.01.01.02           |          | 107        | 2            |                | DC Voltage        | kuto      | Slew     |      | Щ        | 1       | 0     | Off  | 0       | 0    |     |
|             | Sena.                | •        | 108        |              | 102            | 4 Wire Besistance | kute      | Sler     |      |          | 1       | 0     | Off  | 0       | 0    |     |
| Module      | 16 Channel Scanner   |          | 109        | 2            |                | Frequency         | kute      | Slev     |      | 0        | 1       | 0     | 130  | 0       | 0    |     |
|             |                      |          | 110        | 2            |                | Pariod            | kute      | Slew     |      | 1        | 1       | 0     | 0ff  | 0       | 0    |     |
|             |                      |          | 111        | [ <b>X</b> ] |                | Centinuity        |           | Slew     |      | п        | 1       | 0     | Off  | 0       | 0    |     |
|             |                      | _        | 112        | 2            |                | Diode             |           | Sler     |      | 1        | 1       | 0     | 110  | 0       | 0    |     |
|             |                      |          | 113        | 2            |                | AC Current        | 2A        | Slew     |      | <u>E</u> | 1       | 0     | 0ff  | 0       | 0    |     |
|             |                      |          | 114        | 2            |                | DC Current        | 2A        | Slew     |      | 1        | 1       | 0     | Off  | 0       | 0    |     |
|             |                      |          | 115        | 2            |                | AC Current        | 2A        | Sler     |      | 1        | 1       | 0     | Off  | 0       | 0    |     |
|             |                      |          | 116        | 2            |                | DC Current        | 2A        | Slev     |      | 10       | 1       | 0     | 110  | 0       | 0    |     |

#### **Trend Chart**



Data Acquisition

|           |                      |       |           |                 | Es             | ayli      |         |               |           |          |          |             |         |
|-----------|----------------------|-------|-----------|-----------------|----------------|-----------|---------|---------------|-----------|----------|----------|-------------|---------|
| Digi      | tal Multimeter Scan  |       |           |                 |                |           |         |               |           |          |          |             | About H |
|           |                      |       |           |                 |                |           |         |               |           |          |          |             |         |
| New Open  | Save Import Export D | evice | Manager   | 2 Trend Chart 2 | Bar 📝 Histogra | m         |         |               |           |          |          |             |         |
|           | Configuration-1      |       |           | Gr              | aph            |           |         |               |           |          |          |             |         |
| MMExplore | er Q                 | Mer   | isure Con | figure Channels | Scan Data      | Scan Tren | d Chart | Scan Bar Scan | Histogram |          |          |             |         |
| Name      | Status Mode          |       |           |                 | Scan Contro    | <b>1</b>  |         | Data Control  |           |          | Scan Sta | itus        |         |
| SDM9065×  | Alive Scan           | In    | strument  | Start           | Interval       | :         | Stop    | Save Data     | start/    | • Status |          | Elspzed Ti  | a e     |
|           |                      | 5     | 3#3065%   | Innediately     | ls .           | -         | User    | Yeas          | 08        | Scanning | 1        | 00:00:32.03 |         |
|           | 2010/00/22           |       | Instru    | ent Chann       | el Heavore     | nent      | Data    | Result        | In        | Average  | Total    | Alara       |         |
|           | Alive                |       | Instru    | ent Chann       | el Measure     | ment      | Data    | Hin           | Laz       | Average  | Total    | Alara       |         |
|           | ISETW:               | ۰ ۱   | SIMGOOM   | 53 101          | Temperatu      | re(°C) 8. | 97a     | 8.974         | 8.97u     | 8.97u    | 1        |             |         |
|           | INRO DARARC DARRS    | 1     | SIMBOR    | 5% 102          | 4 Wire Bas     | ist 0     |         | 0             | 0         | 0        | 1        |             |         |
|           | 53836743160003       | 2     | SIM3068   | 54 103          | Temperatu      | re(°C) 31 | .968    | 31.968        | 31.968    | 31.988   | 1        |             |         |
|           | 3.01.01.02           | 3     | SIMBOR    | 52 104          | 2 Tire See     | ist 6.    | 804k    | 6.804k        | 6. 804k   | 6. 804k  | 1        |             |         |
|           | Scan                 | 4     | SIM3088   | 52 105          | AC Volta       | p+(V) 8.  | 767a    | 8.757s        | 8.78Ta    | 8.78Ta   | 1        |             |         |
| Module    | 16 Channel Scanner   | 5     | SIMBOR    | 52 106          | Capacitar      | ~* (Y) 10 | .2046   | 10.2046       | 10.2046   | 10.20%   | 1        |             |         |
| income.   |                      | 6     | SIMOOR    | 53 107          | DC Volta       | pe (V) 1. | 10a     | 1.18a         | 1.18a     | 1.18n    | 1        |             |         |
|           |                      | 7     | SIMOOR    | 535 109         | Frequency      | y (10) 0  |         | 0             | 0         | 0        | 1        |             |         |
|           |                      | 8     | SIMOON    | 53 110          | Teriod         | (5) 1.    | 513e    | 847. 399u     | 1.603e    | 1.327e   | 53       |             |         |
|           |                      | 9     | SIM306    | 53 111          | Continuit      | y(Ω) 8.   | 79C ti  | 8.5534        | 8.984%    | 9.136u   | 53       |             |         |
|           |                      | 10    | SIM306    | 53 112          | Diode          | V) 1.     | 197e    | 1.165e        | 1.681m    | 1.353e   | 53       |             |         |
|           |                      | 11    | SIMBOB    | 53 113          | AC Curre       | at (A) 96 | .858u   | 88.811 u      | 100. T32u | 94.100 s | 53       |             |         |
|           |                      | 12    | SIMBOR    | 52 114          | DC Curre       | at (A) 90 | . 599 u | 87.917s       | 96.858 s  | 91.6T9s  | 53       |             |         |
|           |                      | 13    | SIM306    | 51 115          | AC Durre       | at (A) 90 | .003u   | 87.023s       | 96.865 s  | 91.69a   | 53       |             |         |
|           |                      | 14    | SIMOOS    | 53 116          | DC Curre       |           |         | 86.725s       | 95.963s   | 91.493s  | 53       |             |         |



#### The latest version of EasyDMM can be downloaded for free from the SDM3000 series of digital multimeter. Take a look at www.siglent.com for more information.

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