**Solar Electric Technician (Level 2)**

**Module 3: Measurement of electrical and solar parameter**

**E7: Assignment-Testing diodes**

|  |  |
| --- | --- |
| **E7: ASSIGNMENT MEMO** | |
| **Date** | …. |
| **To** | Participants |
| **From** | Trainers |
| **Subject** | Testing diodes |
| **What** | Learn how to test diodes to check its functionality. |
| **Why** | The objective of this assignment is to help you understand how diode works and how to identify the faulty ones. |
| **How** | 1. Group work of 2 or 4. 2. Gather the required tools and equipment. 3. Read and carefully follow the instructions for each given task carefully and perform the task. 4. Some tasks include notes to assist participants for tallying the measured value or results. 5. Record the findings, measured values, and any observations during the test. 6. After completing the assigned tasks, discuss your results with the class and answer any related questions. |
| **Time** | 60’ |

**Task 1: Testing a blocking diode in solar panel.**

1. **Required tools/equipment**

* Solar panels with blocking diode
* Multimeter

1. **Instructions**

* Set multimeter to diode test mode.
* Identify the blocking diode near the output of solar panel (within junction box). The diode will have two terminals: anode (positive) and cathode (negative).
* Test forward bias (normal operation).
* Connect the positive (red) probe of the multimeter to the anode of the diode.
* Connect the negative (black) probe of the multimeter to the cathode.
* Test reverse bias (blocking current).
* Connect the positive (red) probe of the multimeter to the cathode of the diode.
* Connect the negative (black) probe of the multimeter to the anode.
* Note down the value.

1. **Measured value**

* Forward bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Volt
* Reverse bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (OL)

1. **Notes**

* A functioning diode will show a voltage drop in forward bias and no current flow in reverse bias.
* Forward bias:
* The multimeter should display a low voltage drop (typically between 0.5V and 0.7V for silicon diodes).
* If the value is within this range, the diode is functioning correctly in the forward direction.
* Reverse bias:
* The multimeter should display OL (overload or no current flow), indicating the diode is blocking current in the reverse direction.
* If the multimeter shows a reading in reverse bias, the diode is faulty.

**Task 2: Test a Bypass diode in solar panel.**

1. **Required tools/equipment**

* Solar panels (with bypass diode)
* Multimeter

1. **Instructions**

* Set multimeter to diode test mode.
* Identify the bypass diode located within junction box of solar panel. They are connected across individual strings of solar cells.
* Test forward bias (normal operation).
* Disconnect the solar panel or isolate bypass diode from the circuit.
* Connect the positive (red) probe to the anode of the diode and negative (black) probe to the cathode.
* Test reverse bias (blocking current).
* Connect the positive (red) probe to the cathode of the diode.
* Connect the negative (black) probe to the anode.
* Testing with power applied:
* Reconnect the solar panel to a source of sunlight or a simulator and check if the bypass diode activates when part of the panel is shaded. The diode should allow current to flow around the shaded area, preventing hot spots.
* Measure the voltage drop across the diode to confirm functionality when a string is shaded.
* Note down the value.

1. **Measured value**

* Forward bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Volt
* Reverse bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (OL)

1. **Notes**

* A working bypass diode will show a small voltage drop in forward bias and no current flow in reverse bias. If it shows a short in reverse bias or no voltage drop in forward bias, it is defective.
* The multimeter should display a low voltage drop (usually between 0.5V and 0.7V for silicon diodes).
* The multimeter should display OL (overload or no current flow), indicating the diode is blocking current in reverse.

**Task 3: Testing a diode in solar charge controller, which prevents reverse current from flowing from the battery back into solar panels.**

1. **Required tools/equipment**

* Solar panels (disconnected from power)
* Multimeter
* Wires and tools

1. **Instructions**

* Disconnect the solar charge controller from both the solar panels and the battery to avoid electric shock or damage to the controller.
* Turn the multimeter dial to the diode test setting.
* Locate the Diodes in the Charge Controller.
* Test forward bias (normal operation).
* Connect the positive (red) probe to the anode of the diode and negative (black) probe to the cathode.
* Test reverse bias (blocking current).
* Connect the positive (red) probe to the cathode of the diode and the negative (black) probe to the anode.
* Note down the value.

1. **Measured value**

* Forward bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Volt
* Reverse bias voltage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (OL)

1. **Notes**

* The diodes in the charge controller should block reverse current effectively, protecting the battery.
* The multimeter should display a low voltage drop (usually between 0.5V and 0.7V for silicon diodes).
* The multimeter should display OL (overload or no current flow), indicating no current flow in reverse.