Laboratory Test Plan for SiP32431DN OR-ing Configuration

Objective

This test plan aims to verify the correct operation of the **SiP32431DN-based OR-ing circuit**. The focus is on ensuring proper power source selection, preventing reverse current flow, and identifying potential oscillation issues. Additional tests will evaluate response time, efficiency, and behavior at low supply voltages.

1 Test Procedures

1.1 Normal Operation

1.1.1 Power Source Selection

Objective: Verify that the highest voltage source supplies power to $VOUT$.
Procedure:

1. Apply **Source 1 = 3.3V** and **Source 2 = 3.0V**.
2. Measure $VOUT$ (should be 3.3 V).
3. Swap input voltages (Source 1 = 3.0V, Source 2 = 3.3V).
4. Measure $VOUT$ (should now be 3.3 V).

Expected Result: $VOUT$ always follows the highest input voltage.

1.1.2 Reverse Current Blocking

Objective: Ensure that no current flows back from $VOUT$ to the lower-voltage input.
Procedure:

1. Apply **Source 1 = 3.3V** and **Source 2 = 2.8V**.
2. Connect a 10 mA load to Source 2 and measure current.

Expected Result: No current should flow into the lower voltage source.

1.2 Special Case Tests

1.2.1 Oscillation Risk

Objective: Check for unwanted switching oscillations.
Procedure:

1. Set **Source 1 = 3.3V** and **Source 2 = 3.2V**.
2. Increase Source 2 in small steps (3.21V, 3.22V, 3.23V, ...).
3. Monitor $VOUT$ using an oscilloscope.

Expected Result: Smooth switching without rapid oscillations.

1.2.2 Fast Switching Response

Objective: Test the reaction time when a power source is suddenly removed.
Procedure:

1. Apply **Source 1 = 3.3V** and **Source 2 = 2.8V**.
2. Turn off Source 1 and measure the $VOUT$ response time.

Expected Result: Quick transition to Source 2 without a significant voltage drop.

1.2.3 Minimum Supply Voltage Behavior

Objective: Determine if the circuit operates correctly at low voltages.
Procedure:

1. Reduce **Source 1** voltage incrementally from 3.3 V down to 1.4 V.
2. Observe when the SiP32431DN stops switching correctly.

Expected Result: The circuit should function properly down to its minimum operating voltage without failure.

1.3 Additional Tests

1.3.1 Efficiency Measurement

Objective: Measure power losses due to switch resistance.
Procedure:

1. Apply **Source 1 = 3.3V, Source 2 = 3.0V**.
2. Connect loads of 10 mA, 100 mA, and 500 mA.
3. Measure voltage drop across the switch.

Expected Result: Minimal voltage drop across the SiP32431DN.

Conclusion

After running these tests, we will determine:

- If the highest voltage source always powers $VOUT$.
- Whether oscillations occur in near-equal voltage conditions.
- How the circuit handles different loads.
- The minimum operating voltage and overall efficiency.