Freescale Semiconductor
Application Note

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i.MX31 PDK 1.5 Power Measurements

Application Note

This document describes the current measurement capabilities of the 3-Stack board and explains how to obtain these measurements from the Debug board.

Contents

1 Overview....2
1.1 Maxim MAX4071 Modules....2
1.2 Debug Board Connector for Measurements....3
2 Measuring the Current....5

1 Overview

The 3-Stack board provides the functionality for measuring voltage and current. Checking these measurements enables you to determine the overall product efficiency.

1.1 Maxim MAX4071 Modules

The CPU and Personality boards contain seven Maxim MAX4071 modules, which reduce power supply noise and improve the accuracy of the readings. Figure 1 illustrates the MAX4031 module layout.

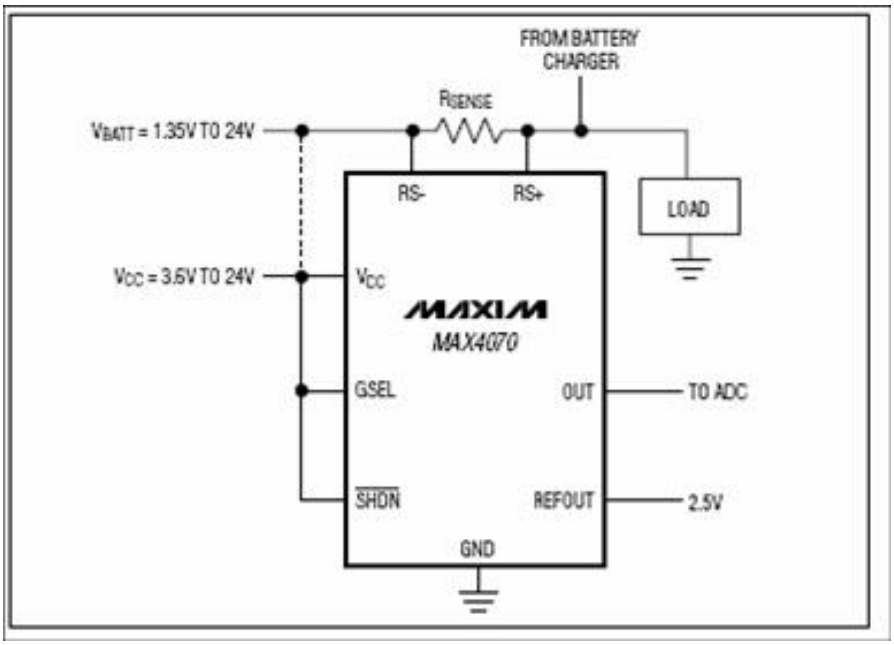

Figure 1 MAX4071 Connection Diagram

The power measurement system provides a way to easily test the system, using four output voltages and seven amplified currents.

Table 1 describes the voltage and current outputs.

Table 1 Voltage and Current Outputs

Identifier	Category	Description
Voltage	NA	VMAIN
Voltage	NA	5V from Wall power supply
Voltage	NA	Battery Voltage
Voltage	NA	1.8V peripheral voltage
Current	CPU	Atlas SW1: MX31 ARM Core and L2
Current	CPU	Atlas SW2: 1.8V combined to MX31, mDDR and NAND
Current	CPU	VMAIN: Combined Battery and/or Wall Supply
Current	Personality	1.8V combined to peripherals
Current	Personality	Lithium Prismatic Battery
Current	Personality	5V Wall Power Supply (power jack on Personality board)
Current	Personality	3.3V to Hard Drive

1.2 Debug Board Connector for Measurements

Figure 2 identifies the connector on the Debug board that is used to obtain measurements. Figure 3 provides an enlarged view of the connector.

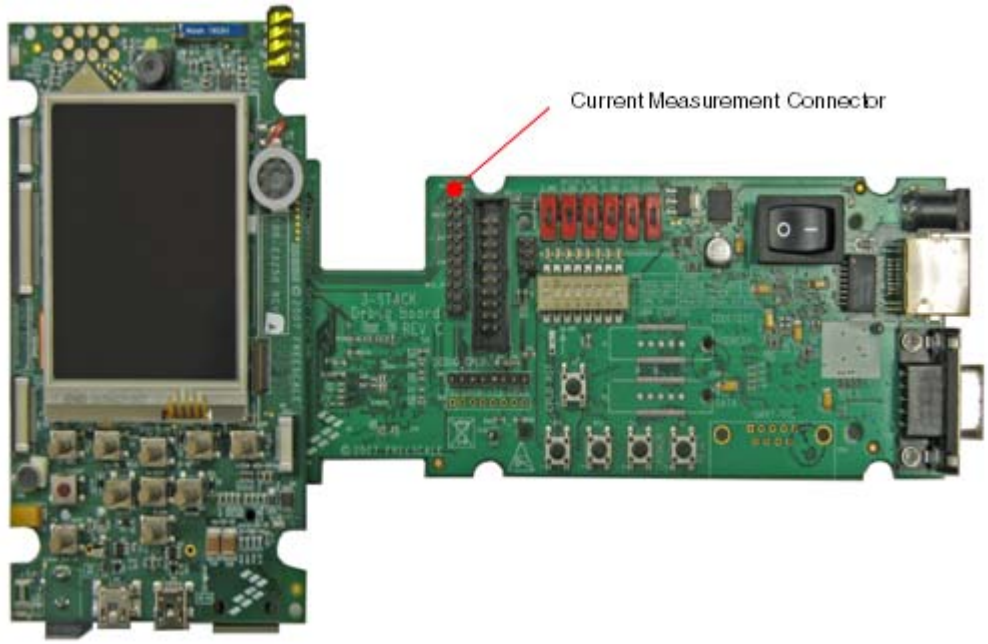

Figure 2 Current Measurement Connector

Figure 3 provides a detailed view of the connector. Table 2 describes the pin-out.

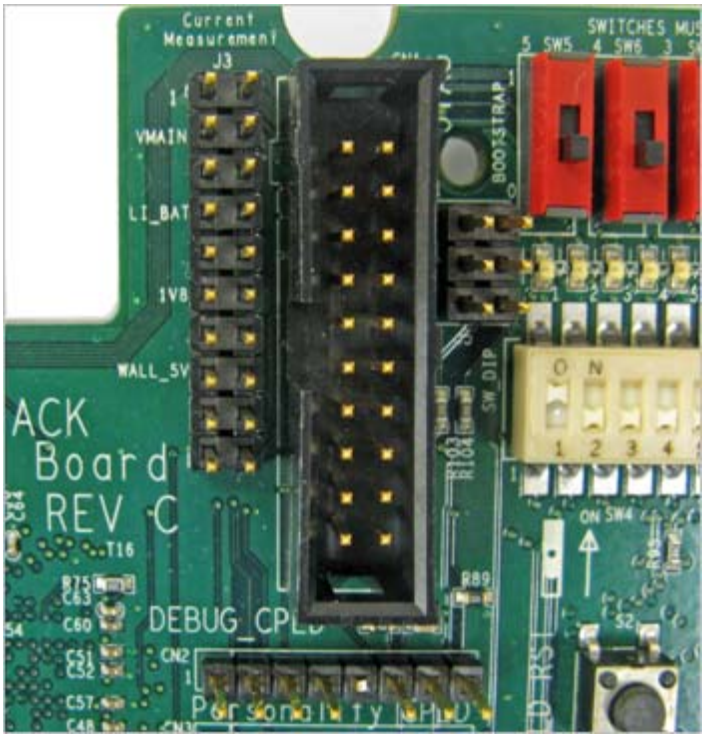

Figure 3 Detail View of the Current Measurement Connector

Table 2 Current Measurement Connector Pin-out

Pin Number	Description
1	Ground
2	SW1 Core and L2 current (1V2_1V6_SW1)
3	VMAIN voltage
4	1.8V Memories (1V8_SW2A)
5	Ground
6	VMAIN current
7	LI_BATTERY voltage
8	Reserved
9	Ground
10	Reserved
11	1.8V voltage
12	1.8V peripherals (EXT_1V8)
13	Ground
14	3.3V to HDD (HDD_3V3)
15	WALL_5V_IN
16	Wall Supply 5V (WALL_5V_IN)
17	Ground
18	Lithium Battery (LI_BATTERY)
19	Ground
20	Reserved

2 Measuring the Current

To measure the current, use these steps:

1. Measure the voltage value using a multimeter on the desired pin (current pin ex. PIN6 VMAIN current).

   The value reflected in the pin is the voltage reading from the MAX4071 chip.

2. To obtain the current value, subtract 1.5 from the voltage measured.
3. Multiple the results by 500.
4. The current value is expressed in mA.

Formula

The formula for obtaining the current consumption from the MAX4071 readings is:

```
I = (V-1.5) x 500
```

Where: *V* is the reading from the connector pin.

Example

Table 3 provides an example of the current consumption values for a given voltage on the pin.

Table 3 Example Current Consumption

Voltage	Current (mA)
3.5 V	1000 mA
2.5 V	500 mA
1.5 V	0 mA
0.5 V	- 500 mA

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