

Quad Voltage Monitor and Sequencer Evaluation Kit

FEATURES

- Evaluation kit for the **ADM1185** quad voltage monitor and sequencer
- 6 LEDs indicate power supply status, providing a clear visual indication of the power-up sequence
- Dedicated power and enable/disable switches
- On-board test points allow examination of the **ADM1185's** operation

EVALUATION KIT CONTENTS

- ADM1185** main evaluation board
- ADM1185** data sheet
- EVAL-ADM1185EBZ** evaluation kit data sheet
- 2 **ADM1185** samples

GENERAL DESCRIPTION

The **EVAL-ADM1185EBZ** evaluation kit demonstrates how the **ADM1185** can provide quad voltage monitoring and sequencing in multiple supply systems.

The **ADM1185** monitors four separate voltage rails, turns on three regulators in a predefined sequence, and generates a power-good signal when all supplies are operating and stable.

LEDs provide a visual indication of the status of the main supply voltage, each of the four inputs, and the system power-good signal (**PWRGD**).

Four on-board rotary switches allow the user to investigate the result of altering each of the monitored input voltages. The user can simulate fault conditions during power-up and while the **ADM1185** is in the power-good state.

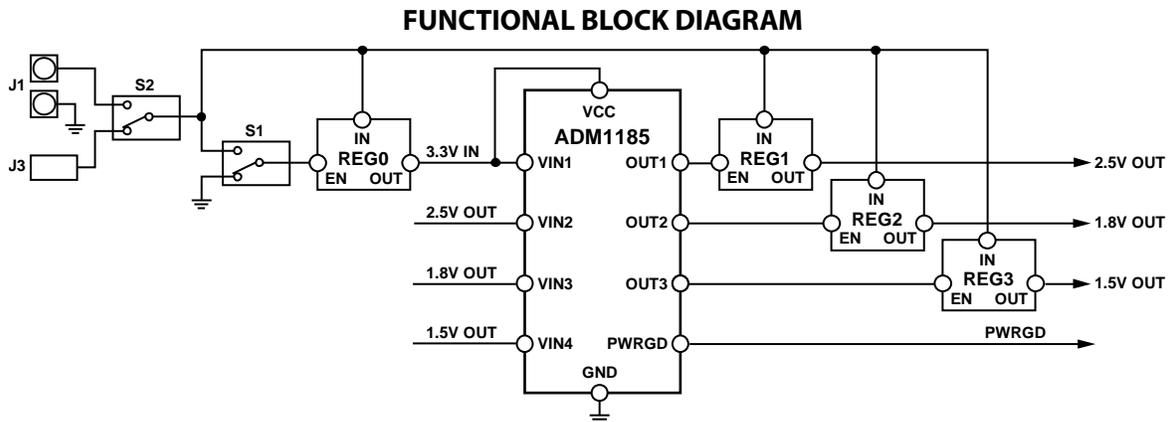


Figure 1.

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REVISION HISTORY

6/11—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

CONNECTOR, SWITCH, JUMPER, LED, AND TEST POINT FUNCTIONS

Table 1. Connector Functions

| Pin | Name | Function |
|-----|-----------------|--|
| J1 | Power connector | J1-1: connects the positive terminal of the bench power supply to the board J1-2: connects the ground terminal of the bench power supply to the board |
| J3 | Terminal block | J3-1: connects a 9 V power supply to the evaluation board J3-2: connects a 9 V power supply to ground |
| J9 | 6W_MINIMOLEX | Connects to the next board when interconnecting ADM1185 evaluation boards |
| J10 | 6W_MINIMOLEX | Connects to the previous board when interconnecting ADM1185 evaluation boards |

Table 2. Switch Functions

| Switch | Description | Position | Function |
|--------|---|------------------------|---|
| S1 | Switch for powering on and off the board | Switched to 5 V supply | Connects the 5 V rail to the enable input of Regulator 0 |
| | | Switched to ground | Grounds the enable input of Regulator 0 |
| S2 | Switch for choosing which power supply to connect to the evaluation board | Switched to J1 | Connects a 9 V power supply to the evaluation board |
| | | Switched to J3 | Connects the bench power supply to the evaluation board |
| S3 | Sets the time delay associated with the 3.3 V input | S3-1 connected to S3-8 | Connects C2 (10 nF) between the VIN1 pin and ground |
| | | S3-2 connected to S3-7 | Connects C7 (0.1 μ F) between the VIN1 pin and ground |
| | | S3-3 connected to S3-6 | Connects C8 (1 μ F) between the VIN1 pin and ground |
| | | S3-4 connected to S3-5 | Connects C5 and C9 (user defined) between the VIN1 pin and ground |
| S4 | Sets the time delay associated with the 2.5 V input | S4-1 connected to S4-8 | Connects C12 (10 nF) between the VIN2 pin and ground |
| | | S4-2 connected to S4-7 | Connects C15 (0.1 μ F) between the VIN2 pin and ground |
| | | S4-3 connected to S4-6 | Connects C17 (1 μ F) between the VIN2 pin and ground |
| | | S4-4 connected to S4-5 | Connects C14 and C21 (user defined) between the VIN2 pin and ground |
| S5 | Sets the time delay associated with the 1.8 V input | S5-1 connected to S5-8 | Connects C23 (10 nF) between the VIN3 pin and ground |
| | | S5-2 connected to S5-7 | Connects C25 (0.1 μ F) between the VIN3 pin and ground |
| | | S5-3 connected to S5-6 | Connects C27 (1 μ F) between the VIN3 pin and ground |
| | | S5-4 connected to S5-5 | Connects C24 and C35 (user defined) between the VIN3 pin and ground |
| S6 | Sets the time delay associated with the 1.5 V input | S6-1 connected to S6-8 | Connects C28 (10 nF) between the VIN4 pin and ground |
| | | S6-2 connected to S6-7 | Connects C29 (0.1 μ F) between the VIN4 pin and ground |
| | | S6-3 connected to S6-6 | Connects C30 (1 μ F) between the VIN4 pin and ground |
| | | S6-4 connected to S6-5 | Connects C31 and C36 (user defined) between the VIN4 pin and ground |
| VR1 | Rotary switch | N/A | Reduces the 3.3 V supply level when the switch is turned clockwise |
| VR2 | Rotary switch | N/A | Reduces the 2.5 V supply level when the switch is turned clockwise |
| VR3 | Rotary switch | N/A | Reduces the 1.8 V supply level when the switch is turned clockwise |
| VR4 | Rotary switch | N/A | Reduces the 1.5 V supply level when the switch is turned clockwise |

Table 3. Jumper Functions

| Jumper | Description | Default |
|--------|---|-------------------------------------|
| J2 | Connects J1-1 to J3-1 | Input |
| J4 | J4-A: connects the VCC pin to 3.3V J4-B: connects the VCC pin to 5V J4-C: connects the VCC pin to VCC_P J4-D: connects the VCC pin to VCC_N | Input Output Output Output |
| J5 | Connects VR2 to the feedback pin of Regulator U1 | Input |
| J6 | Connects VR3 to the feedback pin of Regulator U2 | Input |
| J7 | Connects VR4 to the feedback pin of Regulator U3 | Input |
| J8 | Connects VR1 to the feedback pin of Regulator U23 | Input |
| J11 | J11-A: connects the VIN1 pin to OUT3_P J11-B: connects the VIN1 pin to PWRGD_P J11-C: connects the VIN1 pin to VCC | Output Output Output |
| J12 | J12-A: connects the PWRGD pin to the PWRGD LED circuitry J12-B: connects the PWRGD pin to PWRGD_P and is useful when interconnecting evaluation boards | Input Output |

Table 4. LED Functions

| LED | Name | Function |
|-----|-------|---|
| D1 | 3.3V | Yellow LED indicates the status of the 3.3V supply voltage. |
| D2 | 2.5V | Yellow LED indicates the status of the 2.5V supply voltage. |
| D3 | 1.8V | Yellow LED indicates the status of the 1.8V supply voltage. |
| D4 | 1.5V | Yellow LED indicates the status of the 1.5V supply voltage. |
| D5 | PWRGD | Green LED indicates when the PWRGD output is asserted. |
| D6 | VCC | Red LED indicates that the board is powered on. |

Table 5. Test Points

| Test Point | Function |
|------------|---|
| VCC | Monitors the voltage at the positive supply input pin |
| VIN1 | Monitors the voltage at Pin VIN1 |
| VIN2 | Monitors the voltage at Pin VIN2 |
| VIN3 | Monitors the voltage at Pin VIN3 |
| VIN4 | Monitors the voltage at Pin VIN4 |
| GND | Monitors the chip ground pin |
| OUT1 | Monitors the voltage at Pin OUT1 |
| OUT2 | Monitors the voltage at Pin OUT2 |
| OUT3 | Monitors the voltage at Pin OUT3 |
| PWRGD | Monitors the voltage at the PWRGD output |
| REG1FB | Monitors the feedback pin of Regulator U23 |
| REG1IN | Monitors the input pin of Regulator U23 |
| REG1SD | Monitors the shutdown control pin of Regulator U23 |
| REG2FB | Monitors the feedback pin of Regulator U1 |
| REG2IN | Monitors the input pin of Regulator U1 |
| REG2SD | Monitors the shutdown control pin of Regulator U1 |
| REG3FB | Monitors the feedback pin of Regulator U2 |
| REG3IN | Monitors the input pin of Regulator U2 |
| REG3SD | Monitors the shutdown control pin of Regulator U2 |
| REG4FB | Monitors the feedback pin of Regulator U3 |
| REG4IN | Monitors the input pin of Regulator U3 |
| REG4SD | Monitors the shutdown control pin of Regulator U3 |

EVALUATION BOARD OPERATION

ADM1185 SAMPLES

Two loose ADM1185 samples have been included in the evaluation kit. Place a single sample in the socket before powering on the evaluation board.

POWERING THE EVALUATION BOARD

There are two methods of powering the EVAL-ADM1185EBZ, either by connecting a 9 V power supply through J3 or by connecting a bench supply through J1 (the 9 V and ground leads must be connected separately). When using a 9 V power supply, make sure to switch S2 to the 9 V position; alternatively, when using a bench supply, switch S2 to the VCC position.

SETTING VOLTAGE-DETECTION LEVELS

Each of the ADM1185's input pins, VIN1 to VIN4, monitors one of four supply voltages. The VIN1 pin monitors the 3.3 V rail. An external resistor divider scales this voltage down for monitoring at the VIN1 pin. The resistor ratio has been chosen so that the VIN1 voltage is 0.6 V when the main voltage rises to the preferred level at startup. For example, if R1 is 130 k Ω and R2 is 33 k Ω , a voltage level of 2.97 V corresponds to 0.6 V at the VIN1 pin, as shown in Figure 2.

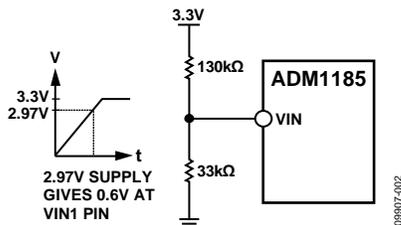


Figure 2. Use of an External Resistor Divider to Scale the Input Voltage to the Appropriate Level

Similar external resistor divider networks are also implemented on VIN2 to VIN4.

THEORY OF OPERATION

OUT1 is an open-drain, active high output and is connected to the enable pin of Regulator U1. Before the voltage on VIN1 reaches 0.6 V, OUT1 is switched to ground, disabling the regulator. When

the voltage on pin, VIN1, reaches 0.6 V, OUT1 asserts after a 190 ms delay. When this occurs, the open-drain output switches high, and the external pull-up resistor pulls the voltage on the regulator enable pin above its turn-on threshold, turning on the output of the regulator.

The 2.5 V output of this regulator begins to rise. This is detected by Input VIN2. When VIN2 sees the 2.5 V rail rise above its threshold point, it asserts OUT2, turning on Regulator U2. The same scheme is, in turn, implemented on the other input and output pins.

After the final supply, 1.5 V, turns on, the outputs (OUT1 to OUT3) are logically AND'ed together to generate a system power-good signal (PWRGD). There is an internal 190 ms delay associated with the assertion of the PWRGD output.

SIMULATING A POWER-UP SEQUENCE

Each of the monitored inputs is adjustable using one of the four rotary switches, VR1 to VR4. By turning each rotary switch clockwise, the associated input voltage is reduced. LEDs provide a visual indication of the status of each of the four inputs and the system PWRGD signal.

Before switching on the power supply, only the red LED, D6, lights up, indicating that a power supply is connected to the board. Begin with all four rotary switches turned fully anticlockwise. Switch the power supply on using Switch S1. Because all four rotary switches are in the anticlockwise position, all four yellow input LEDs, D1 to D4, light up. After a delay of 190 ms, the green PWRG signal LED, D5, also lights up to indicate that the ADM1185 is in the power-good state.

OBSERVING FAULT CONDITIONS DURING POWER-ON

During power-up, the LEDs provide the user with a clear visual indication of each of the four supplies. If one or more of the supply voltages are below their associated threshold voltages, the power-good state is not asserted, and the green PWRGD LED is not turned on.

OBSERVING FAULT CONDITIONS FOLLOWING POWER-ON

If all four supply voltages are above their associated threshold, PWRGD asserts and the logical core latches into a different mode of operation. If the 3.3 V supply monitored by VIN1 faults while the device is in the power-good state, the PWRGD output is deasserted and all of the outputs are immediately turned off. If a supply monitored by VIN2 to VIN4 fails, the PWRGD output is deasserted, but the other outputs are not deasserted.

Fault conditions can be investigated by using the four rotary switches, VR1 to VR4. By turning a rotary switch clockwise, the associated input voltage is reduced.

Rotary Switch VR1 controls the voltage at Input VIN1. As VR1 is turned clockwise, this voltage is reduced. When the voltage at Input Pin VIN1 drops below 0.6 V, OUT1 is switched to ground, disabling Regulator U1. In addition, VIN2 can no longer detect the 2.5 V supply and, in turn, OUT2 and OUT3 are deasserted. As a result, the PWRGD output is also deasserted. The LEDs clearly indicate the status of the four voltage supplies and PWRGD.

Similarly, if PWRGD has been asserted and one of the rotary switches, VR2 to VR4, is turned clockwise, reducing the voltage at the associated input pin to below 0.6 V, the PWRGD output is deasserted, but the other outputs are not deasserted. The LEDs provide a clear indication of the status of each of the inputs and PWRGD.

ADDITIONAL DELAYS

It is possible to introduce additional delays by connecting a capacitor to the input pins, VIN1 to VIN4. For example if a capacitor is placed on the VIN2 pin, the rise of the voltage on that pin slows, effectively setting a time delay between the 2.5 V rail powering up and the next regulator becoming enabled. The S3, S4, S5, and S6 switches conveniently allow the user to introduce time delays to each of the four inputs.

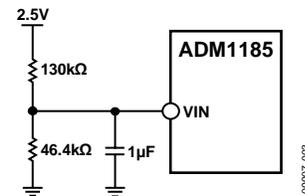


Figure 3. Introduction of Additional Delay

EVALUATION BOARD SCHEMATICS

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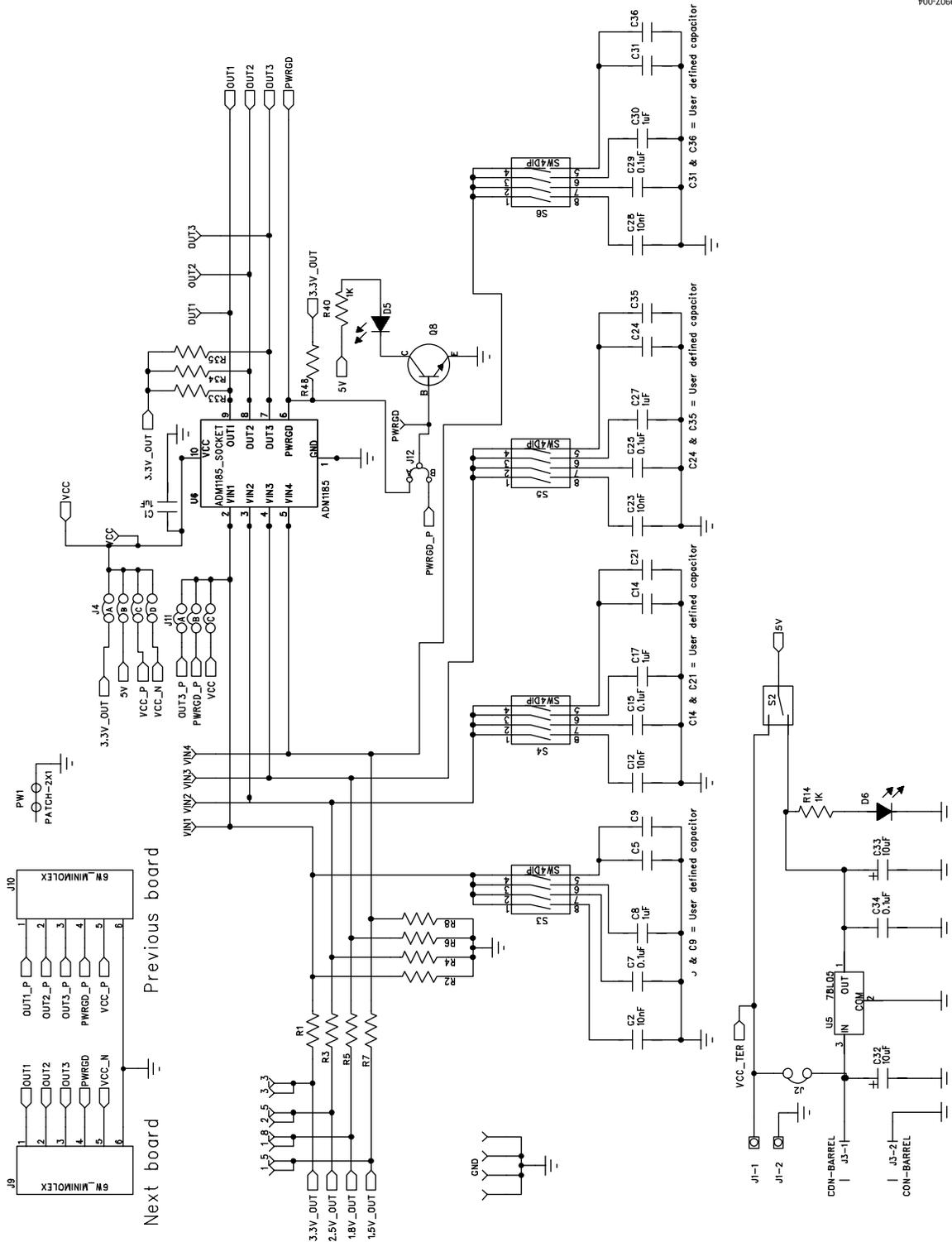


Figure 4. ADM1185 Evaluation Board Schematic, Page 1

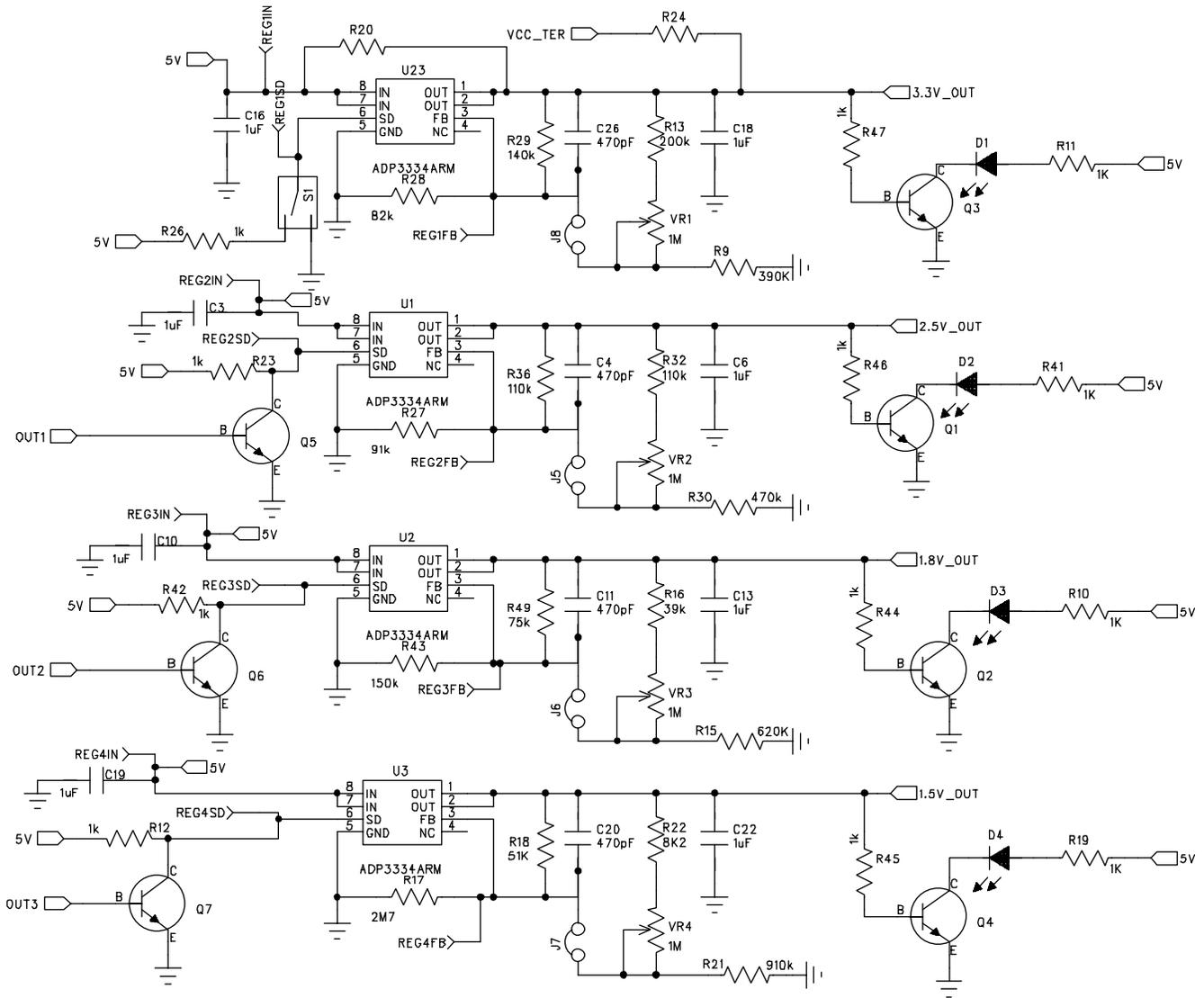


Figure 5. ADM1185 Evaluation Board Schematic, Page 2

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ORDERING INFORMATION

BILL OF MATERIALS

Table 6.

| Qty | Reference Designator | Part Type | Value | Part Decal | Part No. |
|-----|---|--------------------------|-----------------|-----------------|---|
| 13 | C1, C3, C6, C8, C10, C13, C16, C17, C18, C19, C22, C27, C30 | Capacitor | 1 μ F | 603 | FEC 9402080 |
| 4 | C2, C12, C23, C28 | Capacitor | 10 nF | 603 | FEC 753622 |
| 3 | C4, C11, C26 | Capacitor | 470 pF | 402 | FEC 3019366 |
| 4 | C5, C14, C24, C31 | Capacitor | User defined | 805 | Not Inserted |
| 5 | C7, C15, C25, C29, C34 | Capacitor | 0.1 μ F | 603 | FEC 9402047 |
| 4 | C9, C21, C35, C36 | Capacitor | User defined | CAP\MR04 | Insert low profile sockets |
| 1 | C20 | Capacitor | 1 μ F | 402 | FEC 3019366 |
| 1 | C32 | Capacitor+ | 10 μ F | RTAJ_B | FEC 9753893 |
| 1 | C33 | Capacitor+ | 10 μ F | RTAJ_B | FEC 197-014 |
| 4 | R1, R3, R5, R7 | Resistor, dual footprint | 130 k Ω | 0805_thru-hole | FEC 1140363 |
| 1 | R2 | Resistor, dual footprint | 33 k Ω | 0805_thru-hole | FEC 1108904 |
| 1 | R4 | Resistor, dual footprint | 46.4 k Ω | 0805_thru-hole | FEC 1160246 |
| 1 | R6 | Resistor, dual footprint | 76.8 k Ω | 0805_thru-hole | FEC 1141007 |
| 1 | R8 | Resistor, dual footprint | 105 k Ω | 0805_thru-hole | FEC 1140352 |
| 1 | R9 | Resistor | 390 k Ω | 805 | FEC 9333185 |
| 18 | R10, R11, R12, R14, R19, R23, R26, R33 to R35, R40 to R42, R44 to R48 | Resistor | 1 k Ω | 805 | FEC 9332383 |
| 1 | R13 | Resistor | 200 k Ω | 805 | FEC 9332782 |
| 1 | R15 | Resistor | 620 k Ω | 805 | FEC 9333444 |
| 1 | R16 | Resistor | 39 k Ω | 805 | FEC 9333177 |
| 1 | R17 | Resistor | 220 k Ω | 805 | FEC 9332839 |
| 1 | R18 | Resistor | 62 k Ω | 805 | FEC 9333436 |
| 2 | R20, R24 | Resistor 1210 | N/A | 1210 | N/A |
| 1 | R21 | Resistor | 910 k Ω | 805 | FEC 9333657 |
| 1 | R22 | Resistor | 1.8 k Ω | 805 | FEC 9332715 |
| 1 | R27 | Resistor | 100 k Ω | 805 | FEC 9332405 |
| 1 | R28 | Resistor | 76.8 k Ω | 805 | FEC 1141007 |
| 2 | R29, R43 | Resistor | 140 k Ω | 805 | FEC 1160268 |
| 1 | R30 | Resistor | 470 k Ω | 805 | FEC 9333282 |
| 2 | R32, R36 | Resistor | 110 k Ω | 805 | FEC 9332464 |
| 1 | R49 | Resistor | 75 k Ω | 805 | FEC 9333541 |
| 4 | D1, D2, D3, D4 | LED yellow | | LED-0805 | FEC 1021303 |
| 1 | D5 | LED green | | LED-0805 | FEC 5790852 |
| 1 | D6 | LED red | | LED-0805 | FEC1058373 |
| 1 | S1 | SW-SPDT-SLIDE | | SW-SPDT-SLIDE | FEC 1123875 |
| 1 | S2 | SW-SPDT-SLIDE | | SW-SPDT-SLIDE | FEC 1123876 |
| 4 | S3, S4, S5, S6 | SW\4DIP | | DIP8_SMD | FEC 9901868 |
| 1 | J1 | CON\power | | CON\power | FEC 151785 |
| 2 | J2, J12 | Jumper | | SIP-2P | FEC 1022247 and 150411 |
| 1 | J3 | CON\barrel | | CON\barrel | FEC 224959 |
| 1 | J4 | Jumper-4 | | Jumper_4_ABCD | FEC 102-2244 (36-pin strip) and 150-411 |
| 4 | J5, J6, J7, J8 | Jumper | | SIP-2P | FEC 1022247 and 150411 |
| 2 | J9, J10 | 6W_MINIMOLEX | | MOLEX53398-0690 | FEC 1125368 |

| Qty | Reference Designator | Part Type | Value | Part Decal | Part No. |
|-----|--|----------------|-------|-------------|---|
| 1 | J11 | Jumper-3 | | Jumper_3 | FEC 102-2244 (36-pin strip) and 150-411 |
| 8 | Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8 | BC850B | | SOT23 | FEC 1081239 |
| 4 | U1, U2, U3, U23 | ADP3334ARMZ | | MSO8 | ADP3334ARMZ |
| 1 | U4 | ADM1185ARMZ | | MSO10 | ADM1185ARMZ |
| 1 | U5 | MC78L05ACZ | | TO-92 | FEC 9489444 |
| 1 | U6 | ADM1185 socket | | MSO10-SKT | Abrel Products 6560102211 |
| 4 | VR1, VR2, VR3, VR4 | VRES_rotary | | VRES_rotary | FEC 9608290 |
| 4 | GND, GND1, GND2, GND3 | Test point | | Test point | FEC 8731128 |
| 29 | OUT1, OUT2, OUT3, PWRGD, VCC, VIN1, VIN2, VIN3, VIN4, REG1FB, REG1IN, REG1SD, REG2FB, REG2IN, REG2SD, REG3FB, REG3IN, REG3SD, REG4FB, REG4IN, REG4SD, 1_1, 1_2, 1_3, 1_4, 1_5, 1_8, 2_5, 3_3 | Test point | | Test point | FEC 8731144 |

NOTES

NOTES

**ESD Caution**

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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