LM26484

Application Note 1858 LM26484 Power Management Unit Evaluation Board

Application Note



Literature Number: SNVA350A

LM26484 Power Management Unit Evaluation Board Application Note

Application Manual

INTRODUCTION

The LM26484 evaluation board is a working demonstration of two step-down DC-DC converters and an LDO controller. This application note helps the user of the evaluation board make the best use of the LM26484 with their application. For more specific information about how the LM26484 device works as it relates to its electrical characteristics, please refer to the LM26484 datasheet.

The evaluation board comes with the regulators pre-configured to have VOUT Buck1 set to 1.8V, VOUT Buck2 set to 1.0V, and VOUT LDO set to 1.0V.

Because the LM26484 is externally configurable and has many voltage options, it is possible to change the feedback network to get a different regulator output voltage. Details are included in this document. National Semiconductor Application Note 1858 John Woodward November 4, 2009



GENERAL DESCRIPTION

The LM26484 is a multi-function, configurable Power Management Unit. This device integrates two highly efficient 2.0A step-down DC/DC converters, one LDO Controller, a POR (Power On Reset) circuit, and thermal overload protection circuitry. All regulator output voltages are externally adjustable. The LDO controller is a low voltage NMOS voltage regulator. The LM26484 is offered in a 5 x 4 x 0.8 mm 24- pin LLP package.



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Package Drawing of LM26484



Pin Descriptions

| Pin # | Name | I/O | Туре | Description | |
|-------|----------|-----|------|--|--|
| 1 | VIN1 | I | PWR | Power in DC source Buck1 PMOS | |
| 2 | ENSW1 | I | D | Enable for Buck1 switcher, a logic HIGH enables Buck1 | |
| 3 | FB1 | I | А | Buck1 feedback terminal | |
| 4 | AVIN | I | PWR | Analog power for internal circuits | |
| 5 | FB2 | I | А | Buck2 feedback terminal | |
| 6 | ENSW2 | I | D | Enable for Buck2 switcher, a logic HIGH enables Buck2 | |
| 7 | VIN2 | I | PWR | Power in DC source Buck2 PMOS | |
| 8 | VIN2 | I | PWR | Power in DC source Buck2 PMOS | |
| 9 | SW2 | 0 | А | Buck2 switcher output | |
| 10 | SW2 | 0 | А | Buck2 switcher output | |
| 11 | PGND_SW2 | G | G | Buck2 NMOS Power Ground | |
| 12 | PGND_SW2 | G | G | Buck2 NMOS Power Ground | |
| 13 | ENLDO | I | D | Enable for LDO, a logic HIGH enables LDO | |
| 14 | LDOGATE | 0 | А | LDO Controller output to NMOS power transistor Gate | |
| 15 | LDOFB | I | А | LDO Controller input to feedback terminal | |
| 16 | AGND | G | G | Analog GND | |
| 17 | GND | G | G | Ground | |
| 18 | nPOR | 0 | D | nPOR Active low Reset output. nPOR remains LOW while the input supply is below threshold, and goes HIGH after the threshold is reached and timed delay | |
| 19 | AVDD | I | PWR | Analog Power Pin | |
| 20 | PGND_SW1 | G | G | Buck1 NMOS Power Ground | |
| 21 | PGND_SW1 | G | G | Buck1 NMOS Power Ground | |
| 22 | SW1 | 0 | А | Buck1 switcher output | |
| 23 | SW1 | 0 | А | Buck1 switcher output | |
| 24 | VIN1 | I | PWR | Power in DC source Buck1 PMOS | |
| DAP | DAP | GND | GND | Connection isn't necessary for electrical performance, but it is recommended for better thermal dissipation. | |

A: Analog Pin D: Digital Pin G: Ground Pin

PWR: Power Pin

Evaluation Board Description

From a common input voltage the user has access to two DC-DC step-down converters and one LDO controller. The output voltages of the two converters are configured via the feedback network which is external to the LM26484. From *Table 1*, select the feedback network components that correlate to the desired output voltage and solder to the board. It is very important to clean the board after assembly of the feedback network. The FB pin is a high impedance node, and any leakage caused by the flux remaining on the board could cause errors in the output voltage.

| Target | Ideal Resistor Values | | Common R Values | Common R Values | | Actual V _{OUT} Delta from Target (V) | Feedback Capacitors | |
|----------------------|-----------------------|------------|--------------------|--------------------|-------|---|---------------------|------------|
| V _{OUT} (V) | R1/R3 (KΩ) | R2/R4 (KΩ) | R1/R3 (KΩ) | R2/R4 (KΩ) | (V) | (V) | C3/C6 (pF) | C4/C8 (pF) |
| 0.8 | 120 | 200 | 121 | 200 | 0.803 | 0.002 | 15 | none |
| 0.9 | 160 | 200 | 162 | 200 | 0.905 | 0.005 | 15 | none |
| 1 | 200 | 200 | 200 | 200 | 1 | 0 | 15 | none |
| 1.1 | 240 | 200 | 240 | 200 | 1.1 | 0 | 15 | none |
| 1.2 | 280 | 200 | 280 | 200 | 1.2 | 0 | 12 | none |
| 1.3 | 320 | 200 | 324 | 200 | 1.31 | 0.01 | 12 | none |
| 1.4 | 360 | 200 | 357 | 200 | 1.393 | -0.008 | 10 | none |
| 1.5 | 400 | 200 | 402 | 200 | 1.505 | 0.005 | 10 | none |
| 1.6 | 440 | 200 | 442 | 200 | 1.605 | 0.005 | 8.2 | none |
| 1.7 | 427 | 178 | 432 | 178 | 1.713 | 0.013 | 8.2 | none |
| 1.8 | 463 | 178 | 464 | 178 | 1.803 | 0.003 | 8.2 | none |
| 1.9 | 498 | 178 | 499 | 178 | 1.902 | 0.002 | 8.2 | none |
| 2 | 450 | 150 | 453 | 150 | 2.01 | 0.01 | 8.2 | none |
| 2.1 | 480 | 150 | 475 | 150 | 2.083 | -0.017 | 8.2 | none |
| 2.2 | 422 | 124 | 422 | 124 | 2.202 | 0.002 | 8.2 | none |
| 2.3 | 446 | 124 | 442 | 124 | 2.282 | -0.018 | 8.2 | none |
| 2.4 | 471 | 124 | 475 | 124 | 2.415 | 0.015 | 8.2 | none |
| 2.5 | 400 | 100 | 402 | 100 | 2.51 | 0.01 | 8.2 | none |
| 2.6 | 420 | 100 | 422 | 100 | 2.61 | 0.01 | 8.2 | none |
| 2.7 | 440 | 100 | 442 | 100 | 2.71 | 0.01 | 8.2 | 33 |
| 2.8 | 460 | 100 | 464 | 100 | 2.82 | 0.02 | 8.2 | 33 |
| 2.9 | 480 | 100 | 475 | 100 | 2.875 | -0.025 | 8.2 | 33 |
| 3 | 500 | 100 | 499 | 100 | 2.995 | -0.005 | 6.8 | 33 |
| 3.1 | 520 | 100 | 523 | 100 | 3.115 | 0.015 | 6.8 | 33 |
| 3.2 | 540 | 100 | 536 | 100 | 3.18 | -0.02 | 6.8 | 33 |
| 3.3 | 560 | 100 | 562 | 100 | 3.31 | 0.01 | 6.8 | 33 |
| 3.4 | 580 | 100 | 576 | 100 | 3.38 | -0.02 | 6.8 | 33 |
| 3.5 | 600 | 100 | 604 | 100 | 3.52 | 0.02 | 6.8 | 33 |

TABLE 1. Buck1/2 Configuration and Component Selection Guide

LDO Controller

The LDO controller must have its feedback network assembled before proper operation as well. Select the components

from *Table 2* that correspond to the desired output voltage. Make sure to clean the board after soldering the feedback network for reasons described above.

| Target | Ideal Resistor Values | | Common | R Values | Actual V _{OUT} with | Feedback Capacitor |
|----------------------|-----------------------|---------|---------|----------|------------------------------|-----------------------|
| V _{OUT} (V) | R5 (KΩ) | R6 (KΩ) | R5 (KΩ) | R6 (KΩ) | Com R (V) | C11 (pF) |
| 0.8 | 120 | 200 | 120 | 200 | 0.8 | 15 |
| 0.9 | 160 | 200 | 162 | 200 | 0.905 | 15 |
| 1 | 200 | 200 | 200 | 200 | 1 | 15 |
| 1.1 | 240 | 200 | 240 | 200 | 1.1 | 15 |
| 1.2 | 280 | 200 | 280 | 200 | 1.2 | 12 |
| 1.3 | 320 | 200 | 324 | 200 | 1.31 | 12 |
| 1.4 | 360 | 200 | 357 | 200 | 1.393 | 10 |
| 1.5 | 400 | 200 | 402 | 200 | 1.505 | 10 |

TABLE 2. LDO Configuration and Component Selection Guide

Jumper Settings

In order for the board to function properly there are certain jumpers that must be in place. Please refer to for jumper descriptions.

TABLE 3. Jumper Descriptions

| JP1 | Must be in place | Connects Vin1 to board power |
|------|------------------|---|
| JP2 | Must be in place | Connects Vin2 to board power |
| JP3 | Must be in place | Connects AVDD to board power |
| JP4 | Must be in place | Connects AVIN to board power |
| JP5 | Must be in place | This alternates between GND and board power to enable Buck2 |
| JP6 | Must be in place | This alternates between GND and board power to enable Buck1 |
| JP7 | Must be in place | This alternates between GND and board power to enable the LDO |
| JP9 | Must be in place | Connects GND to board GND |
| JP10 | Optional | Changes the output voltage of Buck2 |
| JP11 | Optional | Changes the output voltage of the LDO |
| JP12 | Optional | Changes the output voltage of Buck1 |
| JP14 | Must be in place | Alternates the FET Drain voltage between Buck 2 and board power |

Using Evaluation Board to Supply Power

It is important to connect the LM26484 Buck and LDO using proper ground returns. This will enable the output voltage to

be as clean as possible. As seen below, connect each $V_{\rm OUT}$ and its corresponding ground to the input and ground on the application board. Each LM26484 Buck output has a ground associated with it, and its ground needs to be connected for proper ground current flow.



Bill of Materials

| Item | Designator | Vendor | Part Number | Qty. | Comp. Type | Value |
|------|---|-------------|--------------------|------|---|-----------|
| 1 | | NSC | 551600140-001 | 1 | LM26484SQ Eval Board PCB, Rev A | |
| 2 | U1 | NSC | LM26484SQ | 1 | | |
| 3 | C1, C1A, C2, C5, C5A, C7, C12, C17 | Taiyo Yuden | JMK316B7226ML-T | 8 | CAP CER 22 µF 6.3V X7R 1206 | 22 µF |
| 4 | C9, C10, C11, C14 | Murata | GRM21BR71A106KE51L | 4 | CAP CER 10 µF 10V X7R 0805 | 10 µF |
| 5 | C3 | Murata | ERB21B5C2E8R2CDX1L | 1 | CAP CER 8.2F 250V 0805 | 8.2 pF |
| 6 | C6,C15 | Murata | ERB21B5C2E150JDX1L | 2 | CAP CER 15F 250V 0805 | 15 pF |
| 7 | C4, C8 | NO LOAD | NO LOAD | 5 | NO LOAD | |
| 8 | C16 | Murata | GRM32ER61A476KE20L | 1 | CAP CER 47 µF 10V X5R 1210 | 47 µF |
| 9 | L2, L3 | Coilcraft | LPS4414-501MLB | 2 | LPS4414 Series Low Profile Shielded Power Inductors | 0.5 µH |
| 10 | Q1 | Vishay | SI1450DH | 1 | MOSFET N-CH 20V 1.6A SOT-363 | 20V, 1.6A |
| 11 | R2 | Panasonic | ERJ-3EKF1783V | 1 | RES 178 kΩ 1/10W 1% 0603 SMD | 178K |
| 12 | R1 | Panasonic | ERJ-3EKF4643V | 1 | RES 464 kΩ 1/10W 1% 0603 SMD | 464K |
| 13 | R3, R4, R5, R6 | Panasonic | ERJ-3EKF2003V | 4 | RES 200 kΩ 1/10W 1% 0603 SMD | 200K |
| 14 | R11, R13, R15 | NO LOAD | NO LOAD | 9 | NO LOAD | |
| 15 | R7 | Panasonic | ERJ-3EKF1003V | 1 | RES 100 kΩ 1/10W 1% 0603 SMD | 100K |
| 16 | JP1, JP2, JP3, JP4, JP9 | Tyco/AMP | 9-146285-0-02 | 5 | 2-pin header 100 mil pitch | |
| 17 | JP10, JP11, JP12 | NO LOAD | NO LOAD | 3 | NO LOAD | |
| 18 | JP5, JP6, JP7, JP14 | Tyco/AMP | 9-146285-0-03 | 4 | 3-pin header 100 mil pitch | |
| 19 | AVIN, BUCK1_SENSE, BUCK2_SENSE, ENLDO, ENSW1, ENSW2, GND, GND1, GND2, GND3, GND_SW1, GND_SW1, GND_SW2, LDOGATE, NPOR, VBUCK1, VBUCK2, VDD_M, VDD_M1, VIN1, VIN2, VLDO | Keystone | 1573-2 | 21 | silver plated turret 70 mil drill | |
| 20 | JP1_SH, JP2_SH, JP3_SH, JP4_SH, JP5_SH, JP6_SH, JP7_SH, JP9_SH, JP14_SH | Tyco/AMP | 881545-2 | 9 | Jumper Shunt, 0.100" 30 uin AU (with handle) | |

LM26484 Board Layout



Silkscreen Top



Signal Plane Ground



Signal 4 Bottom



Signal Top Layer



Signal Plan VDD_M (Board Power)

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Notes

| Pro | oducts | Design Support | | |
|--------------------------------|------------------------------|---------------------------------|--------------------------------|--|
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