

AN-1858 LM26484 Power Management Unit Evaluation Board

1 Introduction

The LM26484 evaluation board is a working demonstration of two step-down DC-DC converters and an LDO controller. This user's guide helps you make the best use of the LM26484 with your application. For more specific information about how the LM26484 device works as it relates to its electrical characteristics, please refer to *LM26484 Power Management Unit* ([SNVS573](#)).

The evaluation board ([Figure 1](#)) 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.

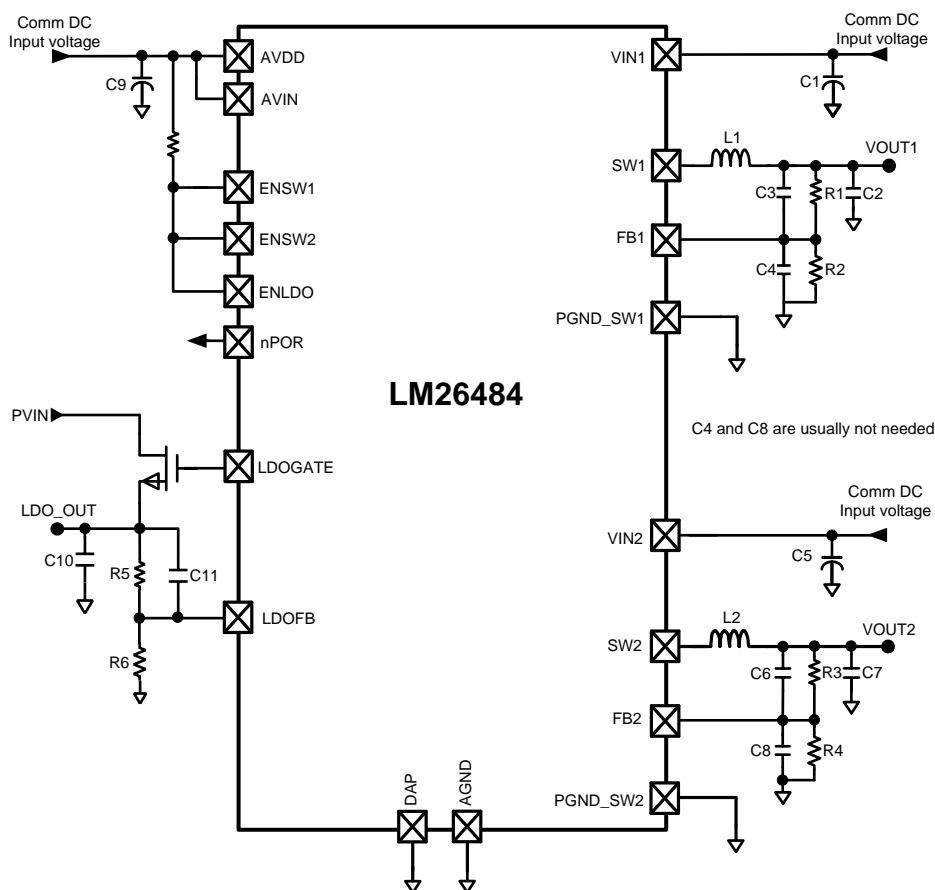


Figure 1. LM26484 Evaluation Board

2 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 × 4 × 0.8 mm 24-pin WQFN package (see [Figure 2](#)).

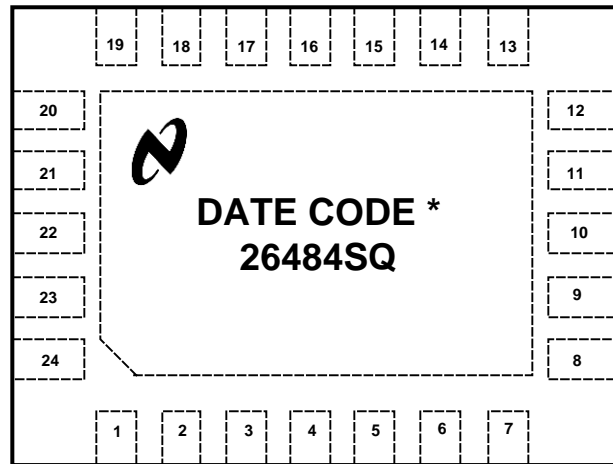


Figure 2. Package Drawing of LM26484

Table 1. Pin Descriptions

Pin #	Name	I/O	Type ⁽¹⁾	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	A	Buck1 feedback terminal
4	AVIN	I	PWR	Analog power for internal circuits
5	FB2	I	A	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	O	A	Buck2 switcher output
10	SW2	O	A	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	O	A	LDO Controller output to NMOS power transistor Gate
15	LDOFB	I	A	LDO Controller input to feedback terminal
16	AGND	G	G	Analog GND
17	GND	G	G	Ground
18	nPOR	O	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	O	A	Buck1 switcher output
23	SW1	O	A	Buck1 switcher output
24	VIN1	I	PWR	Power in DC source Buck1 PMOS

⁽¹⁾ **A:** Analog Pin, **D:** Digital Pin, **G:** Ground Pin, **PWR:** Power Pin

Table 1. Pin Descriptions (continued)

Pin #	Name	I/O	Type ⁽¹⁾	Description
DAP	DAP	GND	GND	Connection isn't necessary for electrical performance, but it is recommended for better thermal dissipation.

3 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 2](#), 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.

Table 2. Buck1/2 Configuration and Component Selection Guide

Target $V_{OUT}(V)$	Ideal Resistor Values (K Ω)		Common R Values (K Ω)		Actual V_{OUT} with Com/R (V)	Actual V_{OUT} Delta from Target (V)	Feedback Capacitors	
	R1/R3	R2/R4	R1/R3	R2/R4			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

4 LDO Controller

The LDO controller must have its feedback network assembled before proper operation as well. Select the components from [Table 3](#) that correspond to the desired output voltage. Make sure to clean the board after soldering the feedback network for reasons previously described.

Table 3. LDO Configuration and Component Selection Guide

Target	Ideal Resistor Values		Common R Values		Actual V_{OUT} with Com R (V)	Feedback Capacitor
V_{OUT} (V)	R5 (K Ω)	R6 (K Ω)	R5 (K Ω)	R6 (K Ω)		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

5 Jumper Settings

In order for the board to function properly there are certain jumpers that must be in place, see [Table 4](#).

Table 4. 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

6 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 in [Figure 3](#), connect each V_{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.

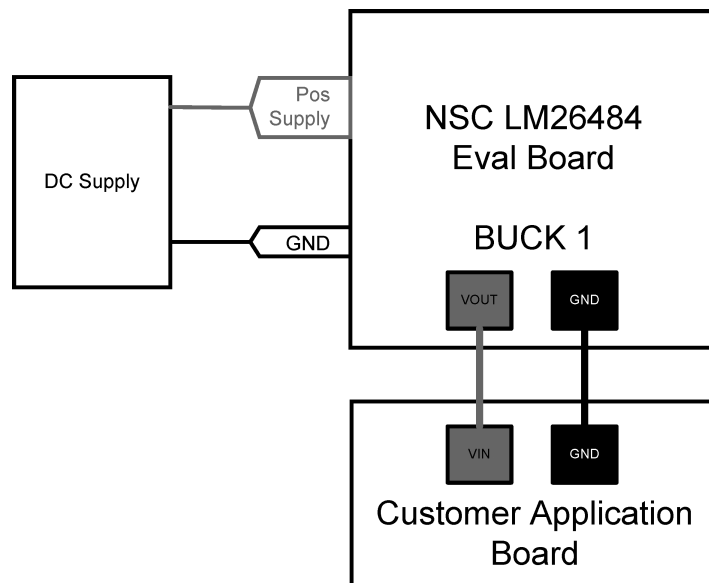


Figure 3. Ground Connections

7 Bill of Materials

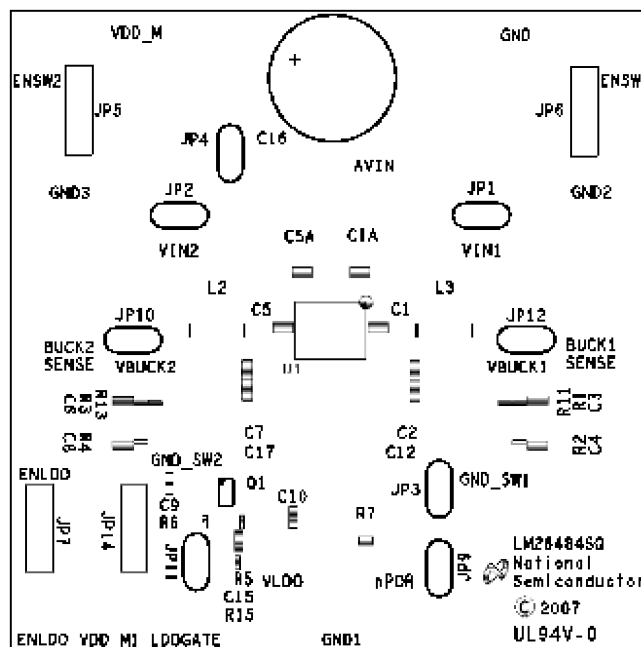
Table 5. Bill of Materials

Item	Designator	Vendor	Part Number	Qty.	Comp. Type	Value
1		Texas Instruments	LM26484	1	LM26484 Eval Board PCB, Rev A	
2	U1	Texas Instruments	WQFN	1		
3	C1, C1A, C2, C5, C5A, C7, C12, C17	Taiyo Yuden	JMK316B7226ML-T	8	CAP CER 22 μ F 6.3V X7R 1206	22 μ F
4	C9, C10, C11, C14	Murata	GRM21BR71A106KE51L	4	CAP CER 10 μ F 10V X7R 0805	10 μ F
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 μ F 10V X5R 1210	47 μ F
9	L2, L3	Coilcraft	LPS4414-501MLB	2	LPS4414 Series Low Profile Shielded Power Inductors	0.5 μ H
10	Q1	Vishay	SI1450DH	1	MOSFET N-CH 20V 1.6A SOT-363	20V, 1.6A
11	R2	Panasonic	ERJ-3EKF1783V	1	RES 178 k Ω 1/10W 1% 0603 SMD	178K
12	R1	Panasonic	ERJ-3EKF4643V	1	RES 464 k Ω 1/10W 1% 0603 SMD	464K

Table 5. Bill of Materials (continued)

Item	Designator	Vendor	Part Number	Qty.	Comp. Type	Value
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_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)	

8 LM26484 Board Layout


Figure 4. Silkscreen Top

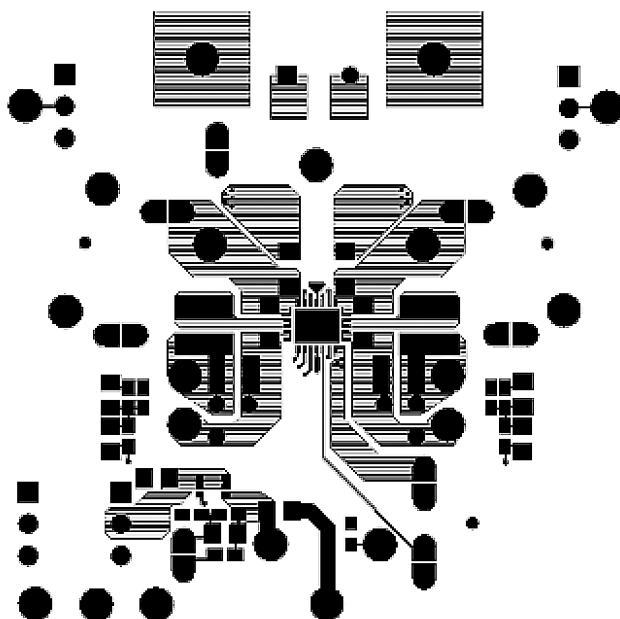


Figure 5. Signal Top Layer

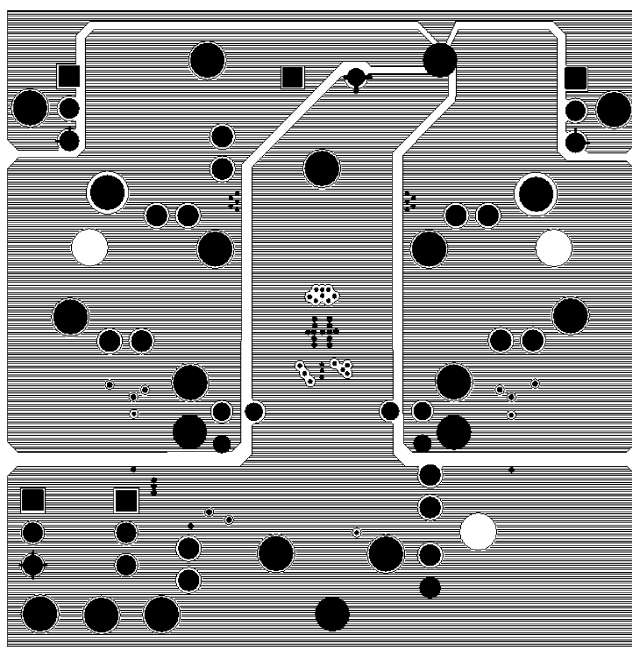


Figure 6. Signal Plane Ground

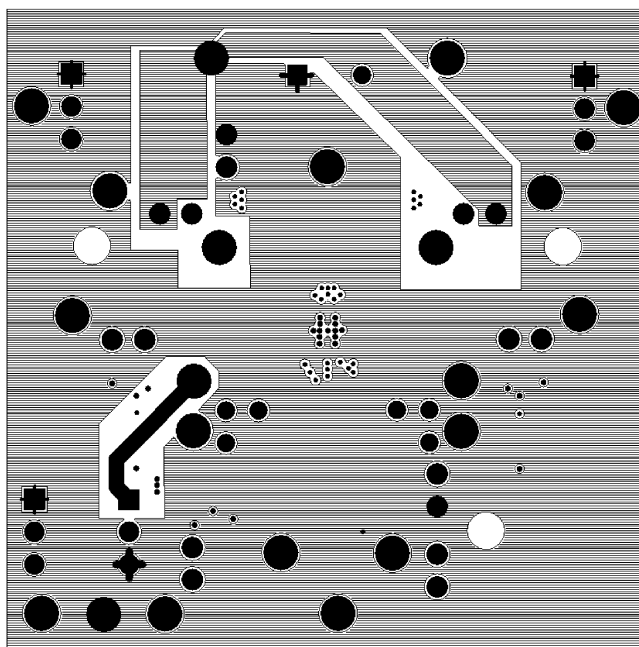


Figure 7. Signal Plan VDD_M (Board Power)

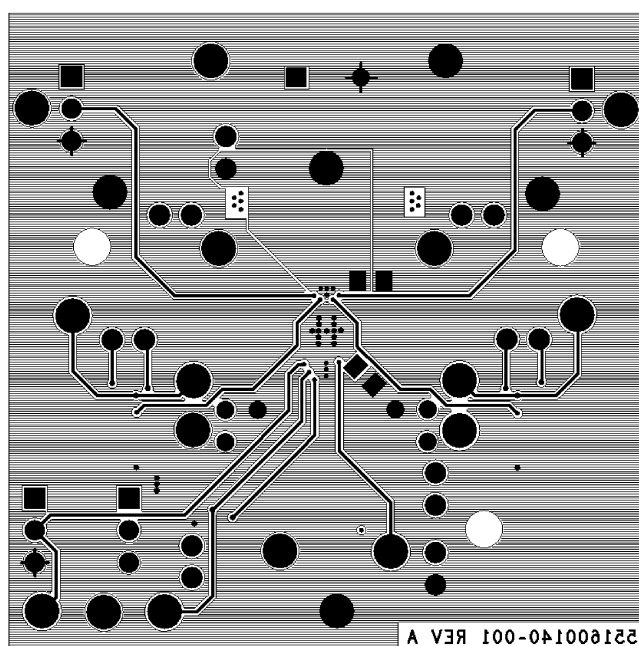


Figure 8. Signal 4 Bottom

9 LM26484 Board Schematic

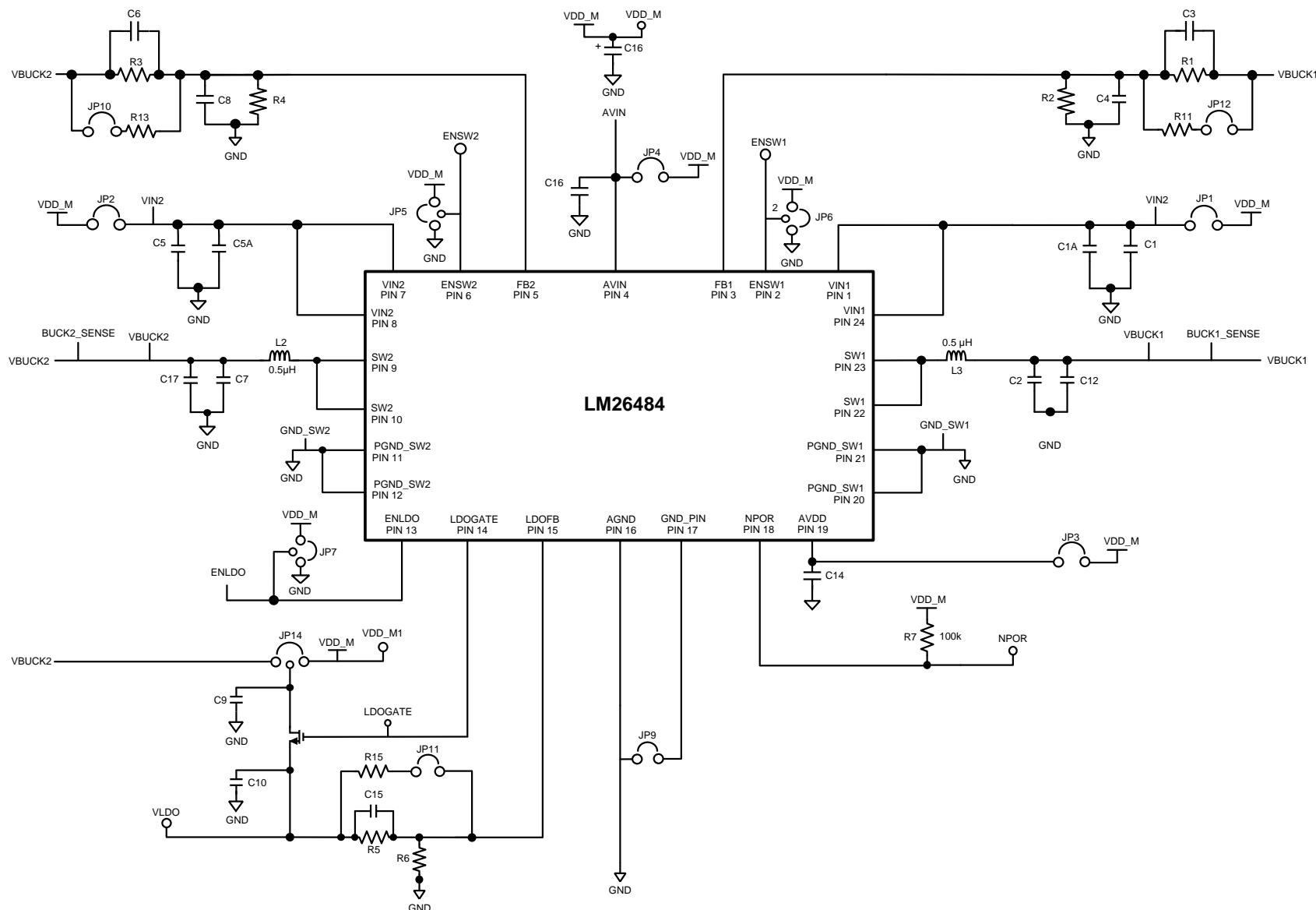


Figure 9. LM26484 Board Schematic

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.