AN–1239 LM2642 Evaluation Board

1 Introduction

The LM2642 evaluation board has been developed to aid in the design and evaluation of dc/dc converters based on the LM2642 controller IC. As shown in Figure 1, the evaluation board is configured to provide two outputs of 2.5 V/2A and 1.8 V/2A from an input range of 4.5 V to 20 V. The corresponding bill of materials is given in Table 1. Figure 2 and Figure 3 show the evaluation board layout.

2 Optional Components

The evaluation board provides several optional component pads for flexibility in changing components.

For more information regarding device operation and component selection, see the *LM26420/LM26420Q Dual 2.0A, High Frequency Synchronous Step-Down DC-DC Regulator Data Sheet* (SNVS579).

In switching power supplies, the rapid increase of drain current in the top FET coupled with parasitic inductance generates unwanted LΔi/Δt noise spikes at the source node of the FET (SWx node) and also at the V_{IN} node.

The resistor in series with the SWx pin (**R6**, **R11**) slows down the gate drive (HDRVx), thus slowing the rise and fall time of the top FET, yielding a longer drain current transition time and reducing switch node ringing. Top FET switching losses will increase with higher resistance values. Small resistors (1-5 Ω) can also be placed in series with the CBOOTx pin (**R7**, **R12**). A CBOOT resistor will slow the rise time of the FET, to reduce switch node ringing.

To maintain stable regulation, the FBx pins should remain free of noise. The LM2642 evaluation board has components **C15** and **C22** installed to suppress noise that may be picked up by the FBx traces. Notice that both of these capacitors are placed physically close to the FBx nodes. Pads **C17** and **C23** are provided for additional output capacitors.

3 Powering Up

Before powering up the LM2642 evaluation board, all external connections should be verified. The power supply input must be turned off and connected with proper polarity to the VIN post, also marked as **P1**. The channel 1 and channel 2 loads should be connected at the V_{OUT} posts, marked as **P2** and **P3**. Any type of load is acceptable up to 2A. The load can be on or off at startup. Output voltage can be monitored with a DVM or oscilloscope by connecting probes to the V_{OUT} posts, P2 and P3. The GND posts are provided primarily for scope probe ground connections. The PGOOD signal can be monitored with a scope probe or DVM at the **PGOOD** test pin.

Once all connections have been verified, input power can be applied. The input voltage must be set between 4.5 V and 20 V. The enable switches for each channel, **ON1** and **ON2**, can be used to turn on the evaluation board once the input power is on. Each channel may be enabled or disabled independently. The switches may also be left on for enabling the evaluation board directly from the power supply input.

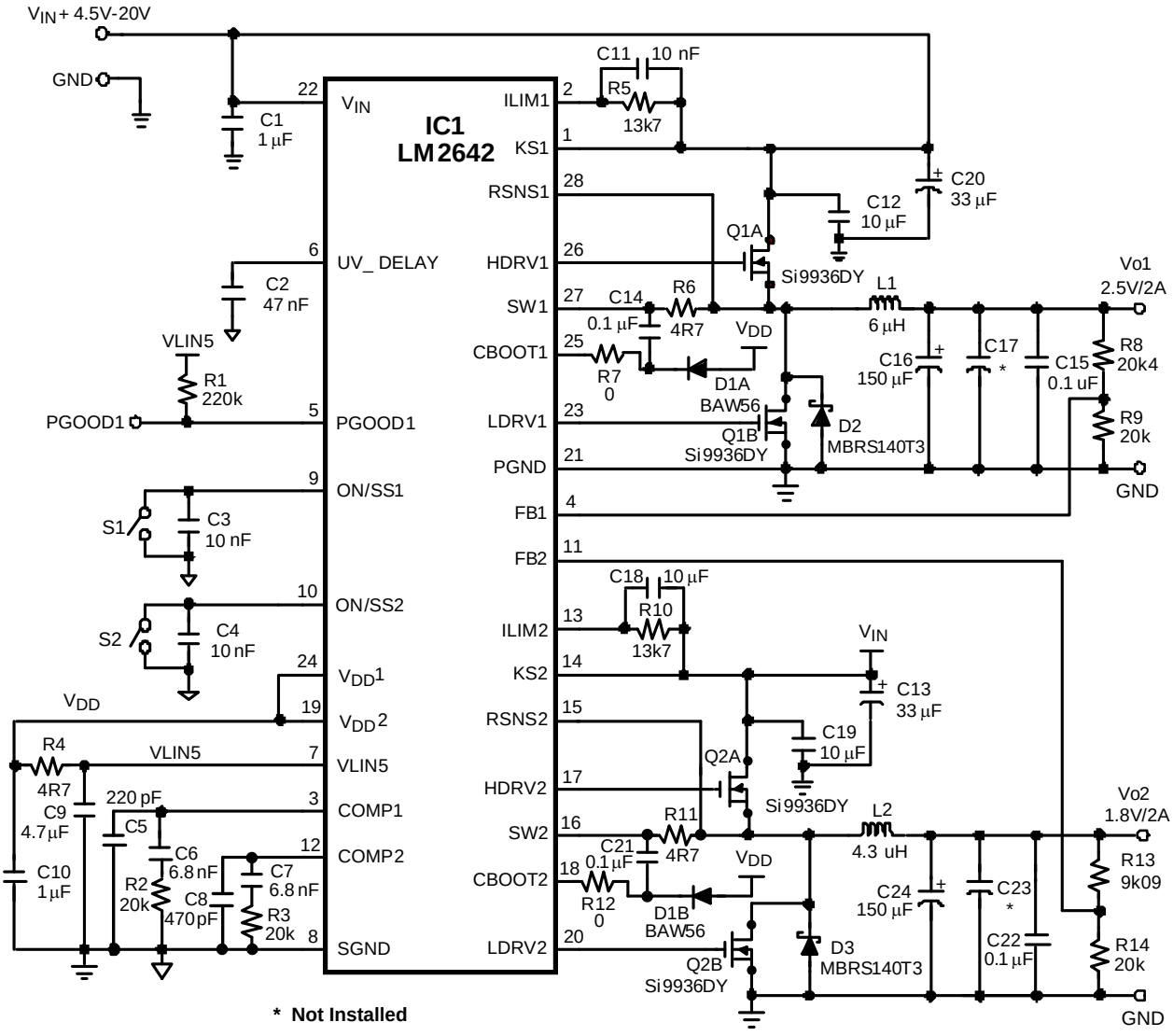

Figure 1. Complete Evaluation Board Schematic

Table 1. Bill of Materials

Part #	Value	Supplier
C1	Cer Cap 1F 50 V Y5V 0805	Taiyo Yuden UMK212F105ZG
C2	Cer Cap 47 nF 50 V 10% 0805	Vishay VJ0805Y473KXA
C3	Cer Cap 10 nF 50 V 10% 0805	Vishay VJ0805Y103KXA
C4	Cer Cap 10 nF 50 V 10% 0805	Vishay VJ0805Y103KXA
C5	Cer Cap 220 pF 25 V 10% 0805	Vishay VJ0805Y221KXA
C6	Cer Cap 6.8 nF 50 V 10% 0805	Vishay VJ0805Y682KXA
C7	Cer Cap 6.8 nF 50 V 10% 0805	Vishay VJ0805Y682KXA
C8	Cer Cap 470 pF 25 V 10% 0805	Vishay VJ0805Y471KXA
C9	Cer Cap 4.7 µF 10 V X7R 1206	Taiyo Yuden LMK316BJ475ML
C10	Cer Cap 1 µF 10 V X7R 0805	Taiyo Yuden LMK212BJ105ZG
C11	Cer Cap 10 nF 50 V 10% 0805	Vishay VJ0805Y103KXA
C12	Cer Cap 10 µF 35 V Y5V 1210	Taiyo Yuden GMK325F106ZH
C13	Electro Cap 33 µF 50 V	Panasonic EEU-FC1H330

Table 1. Bill of Materials (continued)

Part #	Value	Supplier
C14	Cer Cap 0.1 µF 50 V 10% 0805	Vishay VJ0805Y104KXA
C15	Cer Cap 0.1 µF 50 V 10% 0805	Vishay VJ0805Y104KXA
C16	Cap-SP 150 µF 6.3 V 20%	Panasonic EEFUEOJ151R
C17	Not Installed	
C18	Cer Cap 10 nF 50 V 10% 0805	Vishay VJ0805Y103KXA
C19	Cer Cap 10 µF 35 V Y5V 1210	Taiyo Yuden GMK325F106ZH
C20	Electro Cap 33 µF 50 V	Panasonic EEU-FC1H330
C21	Cer Cap 0.1 µF 50 V 10% 0805	Vishay VJ0805Y104KXA
C22	Cer Cap 0.1 µF 50 V 10% 0805	Vishay VJ0805Y104KXA
C23	Not Installed	
C24	Cap-SP 150 µF 6.3 V 20%	Panasonic EEFUEOJ151R
D1	Switching Diode-Dual 70 V 200 mA BAW56F	Fairchild BAW56F
D2	Schottky Diode 40 V 1A	On Semiconductor MBRS140T31A
D3	Schottky Diode 40 V 1A	On Semiconductor MBRS140T31A
L1	Inductor 6 µH	Sumida CEP125-6R0MC
L2	Inductor 4.3 µH	Sumida CEP125-4R3MC
Q1	Si9936DY	Vishay
Q2	Si9936DY	Vishay
R1	Res 220 kΩ 0.1W 5% 0805	Vishay CRCW0805224J
R2	Res 20 kΩ 0.1W 5% 0805	Vishay CRCW0805203J
R3	Res 20 kΩ 0.1W 5% 0805	Vishay CRCW0805203J
R4	Res 4.7 Ω 0.1W 5% 0805	Vishay CRCW08054R7J
R5	Res 13.7 kΩ 0.1W 1% 0805	Vishay CRCW08051372F
R6	Res 4.7 Ω 0.1W 5% 0805	Vishay CRCW08054R7J
R7	Res 0 Ω 0.1W 5% 0805	Vishay CRCW08050RJ
R8	Res 20.5 kΩ 0.1W 1% 0805	Vishay CRCW08052052F
R9	Res 20 kΩ 0.1W 1% 0805	Vishay CRCW08052002F
R10	Res 13.7 kΩ 0.1W 1% 0805	Vishay CRCW08051372F
R11	Res 4.7 Ω 0.1W 5% 0805	Vishay CRCW08054R7J
R12	Res 0 Ω 0.1W 5% 0805	Vishay CRCW08050RJ
R13	Res 9.09 kΩ 0.1W 1% 0805	Vishay CRCW08059092F
R14	Res 20 kΩ 0.1W 1% 0805	Vishay CRCW08052002F
S1	Switch SPST 0.4VA 28 V AC/DC A12AB	NKK A12AB
S2	Switch SPST 0.4VA 28 V AC/DC A12AB	NKK A12AB

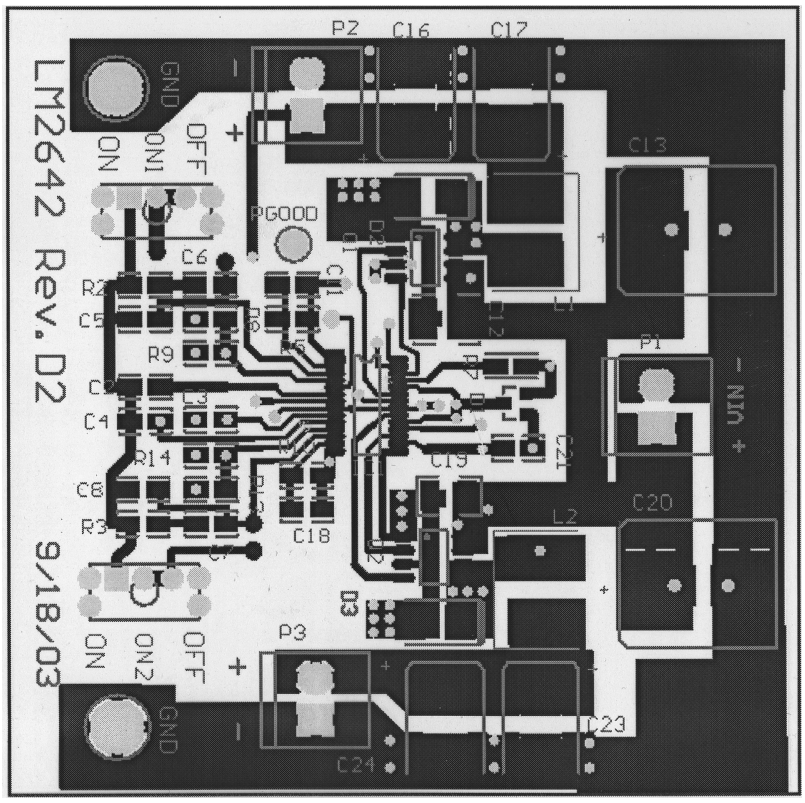

Figure 2. Top Layer

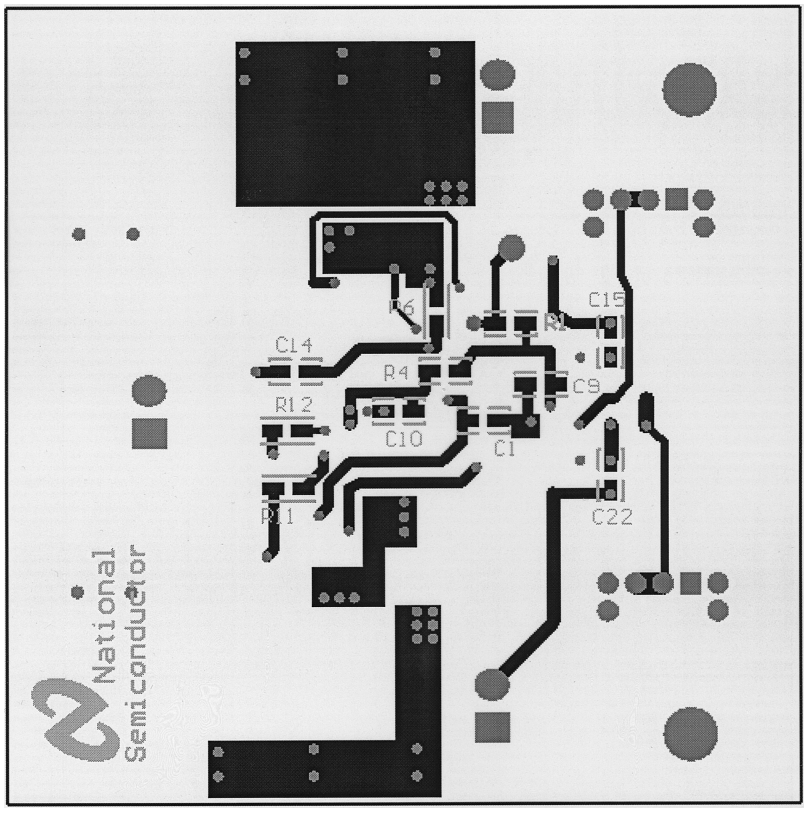

Figure 3. Bottom Layer

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