

AN-1884 LM26003 Evaluation Board

1 Introduction

The LM26003 evaluation board is designed to demonstrate the capabilities of the LM26003 switching regulator. The LM26003 board schematic, shown in Figure 1, is configured to provide an output of 3.3V at up to 3A from an input range of 4V to 38V. The nominal operating frequency is 300 kHz and can be synchronized from +30% to -20% of nominal using the SYNC connection post. The evaluation board is designed to operate at ambient temperatures up to 75°C. Typical evaluation board waveforms and performance curves are shown in Section 6. The PCB trace layout is shown in Section 7. To aid in the design and evaluation of dc/dc buck converters based on the LM26003 regulator, the evaluation board can be re-configured for different output voltages and operating frequencies. Test points are also provided to enable easy connection and monitoring of critical signals. For more information about device function and circuit design, refer to *LM26003/LM26003Q 3A Switching Regulator with High Efficiency Sleep Mode (SNVS576)*.

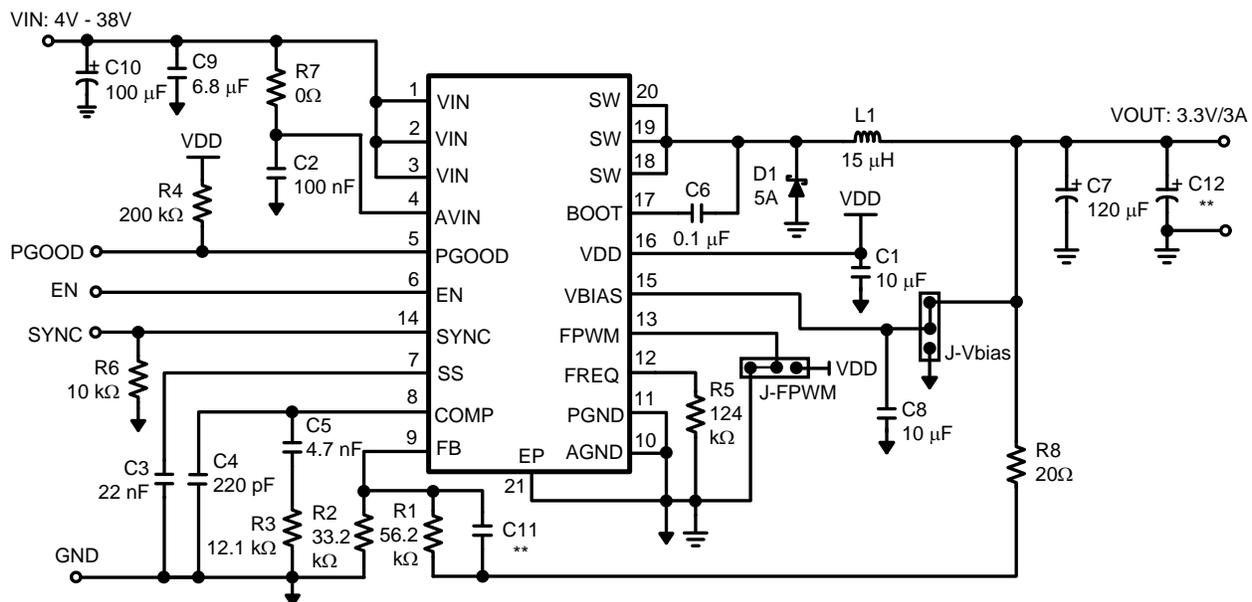


Figure 1. Evaluation Board Schematic

2 Jumper Settings

The FPWM jumper is used to disable the sleep mode function. For normal operation, select 'off' which connects FPWM to GND. For FPWM operation (sleep mode disabled), select 'on'. The Vbias jumper connects the VBIAS pin to Vout. When Vout is greater than 3V, the VBIAS function will be activated for improved efficiency. To disable VBIAS, or if Vout is set to less than 3V, set the jumper to 'GND'.

3 Optional Components

Before changing the default components, please refer to the product datasheet for information regarding component selection. Output voltage and frequency are easily adjustable with single resistors R2 and R5, respectively. However, large changes to the default settings may require other changes to the inductor, output capacitor and compensation network.

Several optional component pads have been provided for application flexibility.

The C8 pad is provided for an additional ceramic output capacitor. This capacitor is used to filter noise on the output line to prevent noise from coupling into the Vbias line when the IC is supplied by Vout. If the Vbias function is not used, C8 is not necessary.

C11 is a phase lead capacitor which can be installed to increase phase and gain margin. See the compensation section of the datasheet for more detailed information. The resistor R8 can be used as an injection point for a loop stability measurement.

R7 is populated with a 0Ω resistor. A higher resistor value can be used on this location to build an RC filter in combination with C2 bypass capacitor.

4 Powering Up

Before powering up the LM26003 evaluation board, all external connections should be verified. The power supply input must be turned off and connected with proper polarity to the VIN and GND posts. The load should be connected between the VOUT post and GND post. Both the VIN and VOUT connections should use the GND post closest to VIN or VOUT. Output voltage can be monitored with a DVM or oscilloscope at the VOUT post.

Once all connections have been verified, input power can be applied. The load can be on or off at startup. If the EN post is left open, the output voltage will ramp up when VIN is applied.

5 Bill of Materials

Table 1. LM26003 Bill of Materials

Ref #	Value	Footprint	Supplier	Part Number
C1	10 μ F 10V ceramic	1206 (inch)	TDK	C3216X5R1A106M
C2	100 nF 50V ceramic	0603 (inch)	TDK	C1608X7R1H104K
C3	22 nF 10V ceramic	0603 (inch)	TDK	C1608SL1A223J
C4	220 pF 10V ceramic	0603 (inch)	TDK	VJ0603A221JXQCW1BC
C5	4.7 nF 10V ceramic	0603 (inch)	TDK	VJ0603Y472JXQCW1BC
C6	100 nF 50V ceramic	0603 (inch)	TDK	C1608X7R1H104K
C7	120 μ F 6.3V 24 m Ω ESR	5.3 \times 5.3mm	Nippon Chemi-Con	APXE6R3ARA121ME61G
C8	10 μ F 10V ceramic	1206 (inch)	TDK	C3216X5R1A106M
C9	6.8 μ F 50V ceramic	1812 (inch)	TDK	C4532X7R1H685M
C10	100 μ F 63V	10.3x10.3mm	Panasonic	EEE-FK1J101P
C11	Not installed		-	-
C12	Not installed		-	-
D1	40V 5A Schottky	SMC	Central Semiconductor	CMSH 5-40
L1	15 μ H 5.0A WE-PD XL	12x12mm	Würth	744770115
R1	56.2 k Ω	0603 (inch)	-	CRCW060356K2FKEA
R2	33.2 k Ω	0603 (inch)	-	CRCW060333K2FKEA
R3	12.1 k Ω	0603 (inch)	-	CRCW060312K1FKEA
R4	200 k Ω	0603 (inch)	-	CRCW0603200KJNEA
R5	124 k Ω	0603 (inch)	-	CRCW0603124KFKEA
R6	10 k Ω	0603 (inch)	-	CRCW060310K0JNEA
R7	0 Ω	0603 (inch)	-	CRCW06030000Z0EA
R8	20 Ω	0603 (inch)	-	CRCW060320R0JNEA
U1	LM26003	TSSOP-20	Texas Instruments	LM26003

6 Performance Characteristics

Unless otherwise specified, $V_{IN} = 12V$, $T_A = 25^\circ C$

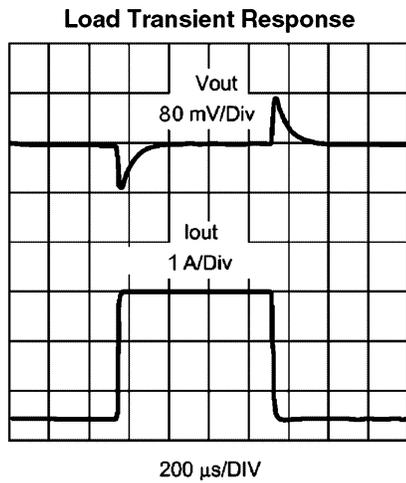


Figure 2. Load Transient Response ($I_{OUT} = 0.4A$ to $3A$ step)

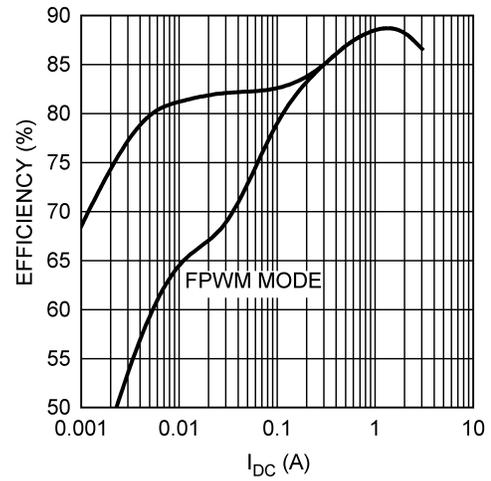


Figure 3. Efficiency vs I_{OUT} ($V_{BIAS} = V_{OUT}$)

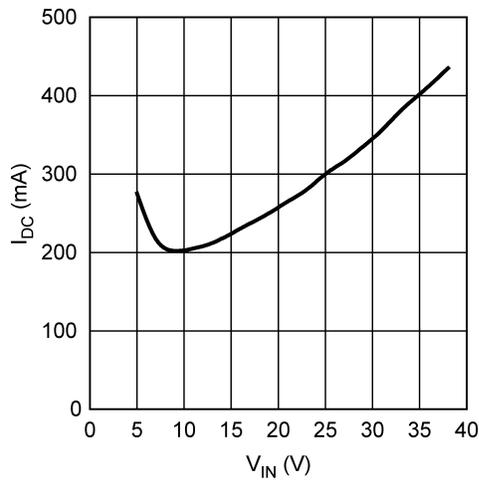


Figure 4. Sleep Mode Threshold Load Current vs Input Voltage

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