LM26003

Application Note 1884 LM26003 Evaluation Board



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LM26003 Evaluation Board

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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 Figure 2 through Figure 4. Figure 5 and Figure 6 show the pcb trace layout. 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 the LM26003 datasheet.

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'.

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.

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.



TABLE 1. LM26003 Bill of Materials for V _{OUT} = 3.3V, 3A, 300 kHz						
Ref #	Value	Footprint	Supplier	Part Number		
C1	10 µF 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 μF 6.3V 24 mΩ ESR	5.3x5.3mm	Nippon Chemi-Con	APXE6R3ARA121ME61G		
C8	10 µF 10V ceramic	1206 (inch)	TDK	C3216X5R1A106M		
C9	6.8 µF 50V ceramic	1812 (inch)	TDK	C4532X7R1H685M		
C10	100 µF 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 µH 5.0A WE-PD XL	12x12mm	Wurth	744770115		
R1	56.2 kΩ	0603 (inch)	-	CRCW060356K2FKEA		
R2	33.2 kΩ	0603 (inch)	-	CRCW060333K2FKEA		
R3	12.1 kΩ	0603 (inch)	-	CRCW060312K1FKEA		
R4	200 kΩ	0603 (inch)	-	CRCW0603200KJNEA		
R5	124 kΩ	0603 (inch)	-	CRCW0603124KFKEA		
R6	10 kΩ	0603 (inch)	-	CRCW060310K0JNEA		
R7	ΟΩ	0603 (inch)	-	CRCW06030000Z0EA		
R8	20Ω	0603 (inch)	-	CRCW060320R0JNEA		
U1	LM26003	TSSOP-20	National Semiconductor	LM26003MH		

Performance Characteristics



FIGURE 4. Sleep Mode Threshold Load Current vs Input Voltage

PC Board Layout



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FIGURE 5. Top Side Layout



FIGURE 6. Bottom Side Layout

Notes

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