User's Guide

LMZ21700 and LMZ21701 Power Module Evaluation Module User's Guide

Table of Contents

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1 Introduction

The LMZ21701 and LMZ21700 SIMPLE SWITCHER® nano modules are easy-to-use DC-DC solutions optimized for space constrained applications. The LMZ21701 is capable of driving up to 1-A load with excellent power conversion efficiency, output voltage accuracy, line and load regulation, and load transient response. The LMZ21700 is a 650-mA load current version module, pin-to-pin compatible with the LMZ21701. The evaluation board is configured for 3.3-V output voltage from 5-V to 17-V input. The resistor voltage dividers, R_{FBT} and R_{FBB}, set the output voltage. The external capacitor C_{SS} sets the soft-start time for V_{OUT}. See the *LMZ21701 1-A Nano Module With 17-V Maximum Input Voltage* or *LMZ21700 650-mA Nano Module With 17-V Maximum Input Voltage* data sheets for component selection and device details. The board features turret terminals for easy connection to input supply, load, EN input, as well as soft start voltage and power-good flag monitoring.

2 Board Specifications

- V_{IN} = 5 V to 17 V
- V_{OUT} = 3.3 V
- 1-A max load (LMZ21701)
- 650-mA max load (LMZ21700)
- 4-layer PCB
- 4.2-cm × 4.2-cm PCB size

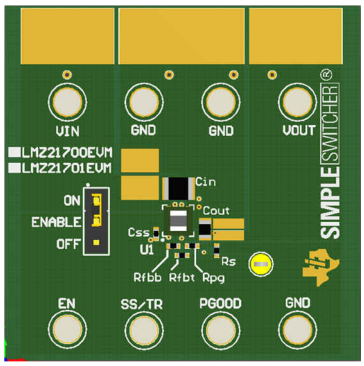

Figure 2-1. Board Top View

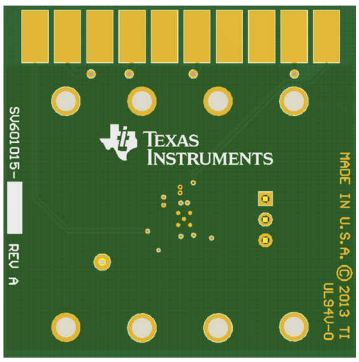

Figure 2-2. Board Top View

3 Schematic, Bill of Materials, and PCB Layout

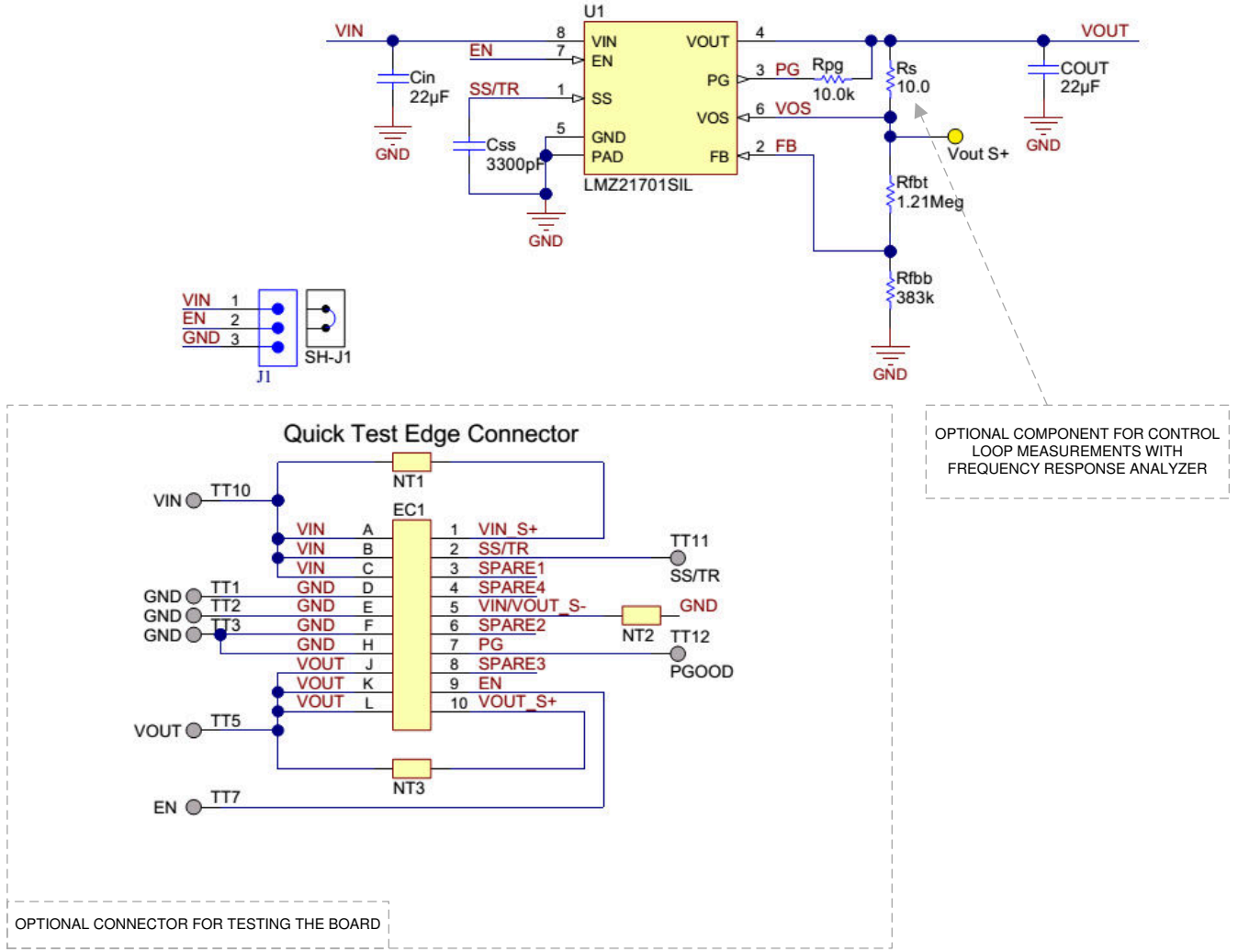

Figure 3-1. Evaluation Board Schematic

Table 3-1. Bill of Materials, V_{IN} = 5 V to 17 V, V_{OUT} = 3.3 V, $I_{OUT\ (MAX)}$ = 1000 mA (LMZ21701), 650 mA (LMZ21700)

Designator	Description	Case Size	Manufacturer	Manufacturer P/N	Quantity
U1	SIMPLE SWITCHER Nano Module	SIL0008E	Texas Instruments	LMZ21701SIL / LMZ21700SIL	1

Table 3-1. Bill of Materials, V_{IN} = 5 V to 17 V, V_{OUT} = 3.3 V, $I_{OUT\ (MAX)}$ = 1000 mA (LMZ21701), 650 mA (LMZ21700) (continued)

Designator	Description	Case Size	Manufacturer	Manufacturer P/N	Quantity
C_{IN}	CAP, CERM, 22 µF, 25 V, ±10%, X7R	1210	MuRata	GRM32ER71E226KE15L	1
C_{OUT}	CAP, CERM, 22 µF, 10 V, ±20%, X5R	0805	Taiyo Yuden	LMK212BJ226MG-T	1
C_{SS}	CAP, CERM, 3300 pF, 50 V, ±10%, X7R	0402	MuRata	GRM155R71H332KA01D	1
J1	Header, TH, 100 mil, 1x3, Gold plated		Samtec, Inc	TSW-103-07-G-S	1
Rfbb	RES, 383 kΩ, 1%, 0.063 W	0402	Vishay-Dale	CRCW0402383KFKED	1
Rfbt	RES, 1.21 MΩ, 1%, 0.063 W	0402	Vishay-Dale	CRCW04021M21FKED	1
Rpg	RES, 10.0 kΩ, 1%, 0.063 W	0402	Vishay-Dale	CRCW040210K0FKED	1
Rs	RES, 10.0 Ω, 1%, 0.063 W	0402	Vishay-Dale	CRCW040210R0FKED	1
SH-J1	Shunt, 100 mil, Gold plated, Black		Samtec, Inc	SNT-100-BK-G	1
TT1-12	Terminal, Turret, TH, Double		Keystone Electronics	1502-2	8
Vout S+	Test Point, TH, Miniature, Yellow		Keystone Electronics	5004	1

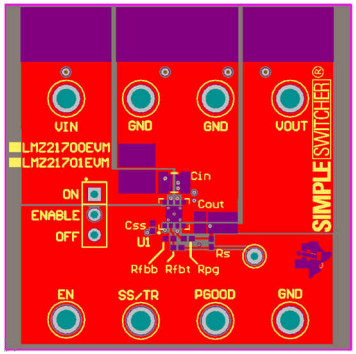

Figure 3-2. Evaluation Board Top Layer

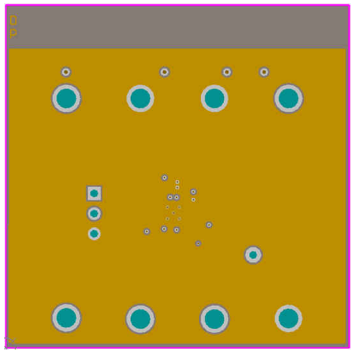

Figure 3-3. Evaluation Board Mid Layer 1

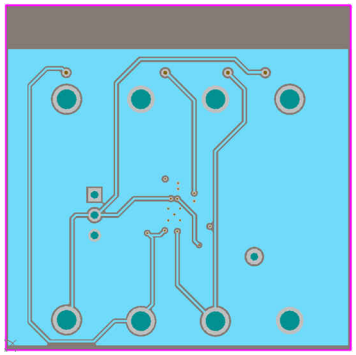

Figure 3-4. Evaluation Board Mid Layer 2

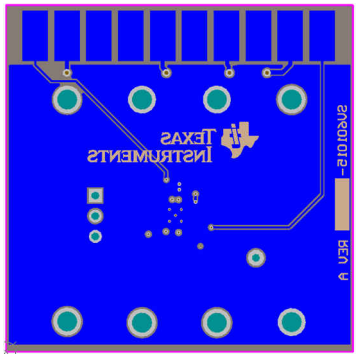

Figure 3-5. Evaluation Board Bottom Layer

4 Typical Performance

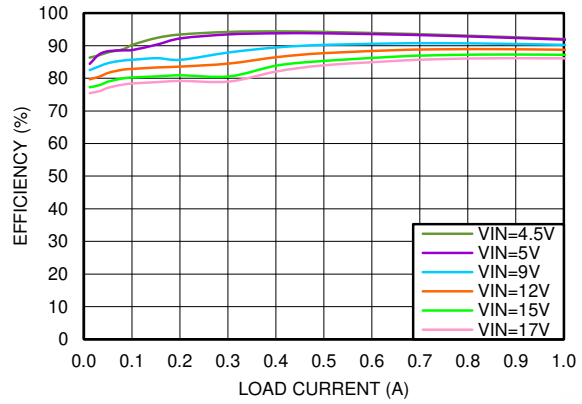

Figure 4-1. Efficiency

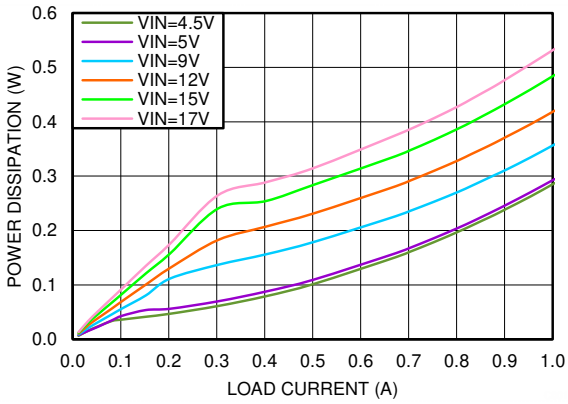

Figure 4-2. Power Dissipation

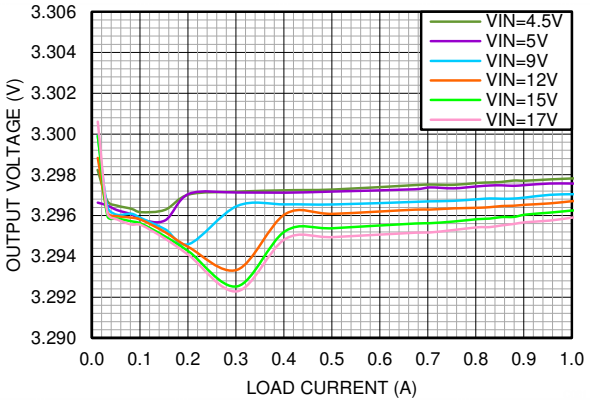

Figure 4-3. Line and Load Regulation

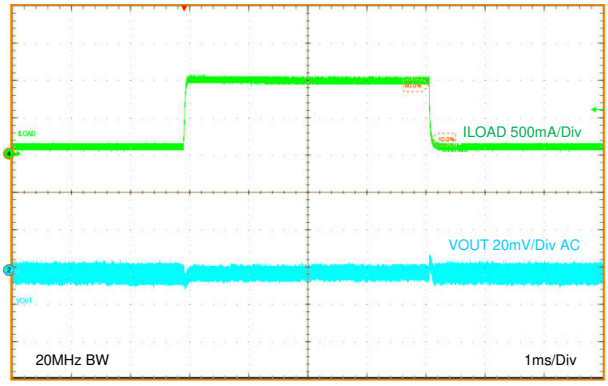

Figure 4-4. Load Transient

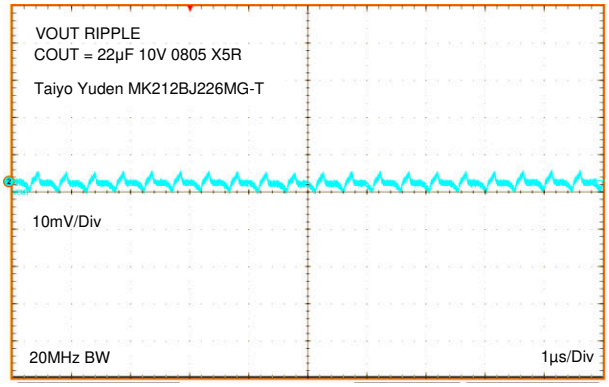

Figure 4-5. Output Voltage Ripple (20-MHz Scope BW)

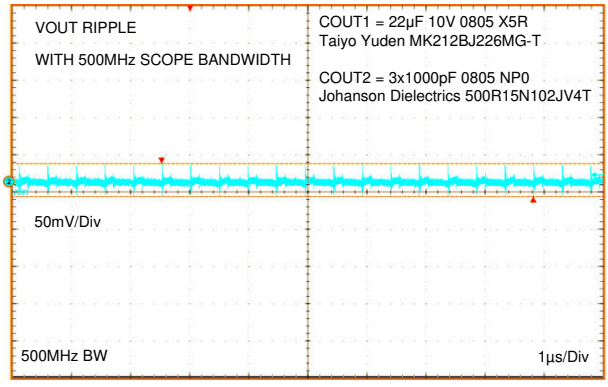

Figure 4-6. Output Voltage Ripple and HF Noise (500-MHz Scope BW)

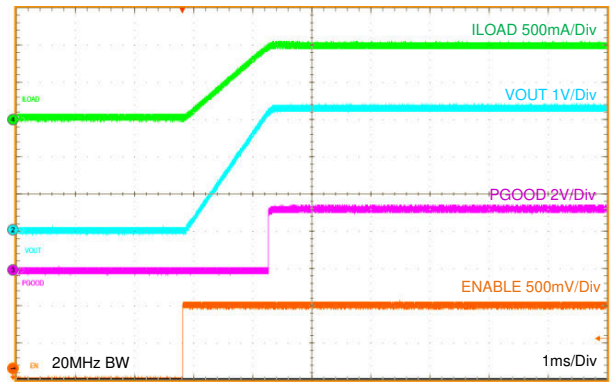

Figure 4-7. Start-Up

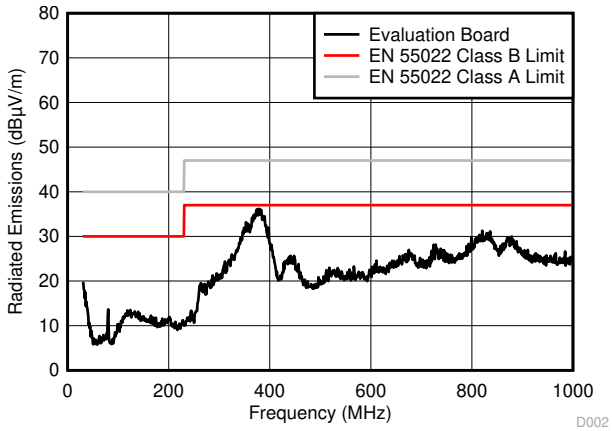

Figure 4-8. LMZ21700 Radiated EMI (Default BOM), V_{IN} = 12 V, V_{OUT} = 3.3 V, I_{OUT} = 650 mA

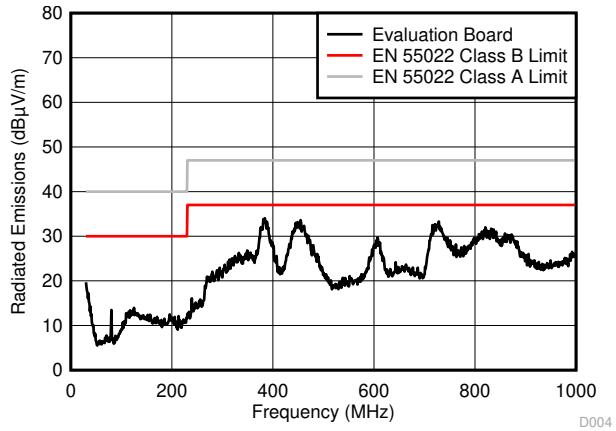

Figure 4-9. LMZ21701 Radiated EMI (Default BOM), V_{IN} = 12 V, V_{OUT} = 3.3 V, I_{OUT} = 1000 mA

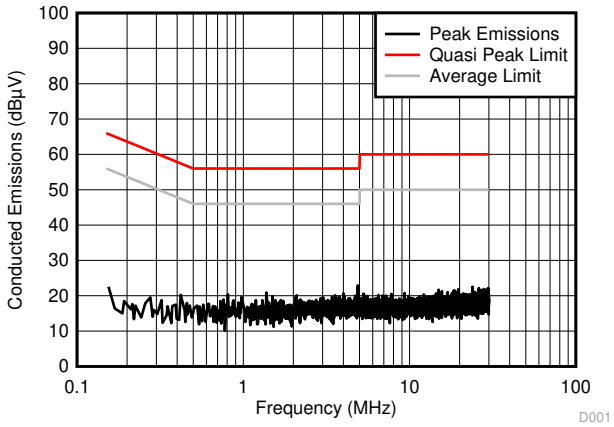

Figure 4-10. LMZ21700 Conducted EMI (1 µF, 2.2 µH Input Filter), V_{IN} = 12 V, V_{OUT} = 3.3 V, I_{OUT} = 650 mA

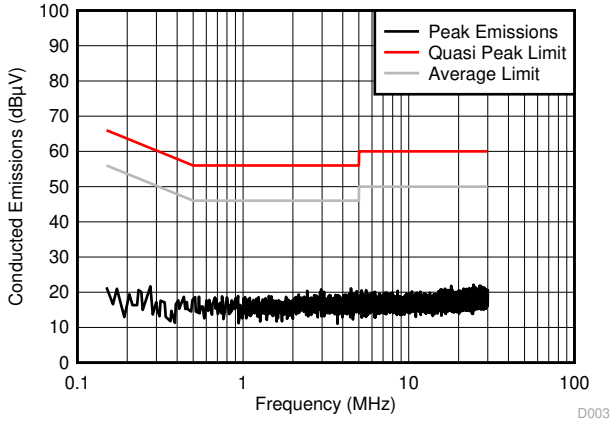

Figure 4-11. LMZ21701 Conducted EMI (1 µF, 2.2 µH Additional Input Filter), V_{IN} = 12 V, V_{OUT} = 3.3 V, I_{OUT} = 1000 mA

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision A (October 2014) to Revision B (January 2022)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document.	2
• Updated the user's guide title	2

Changes from Revision * (April 2014) to Revision A (October 2014)	Page
• Added SVA cleanup and editing	6

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