

LMZ21701 and LMZ21700 SIMPLE SWITCHER® Nano Module Evaluation Board

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 1A 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 3.3V output voltage from 5V to 17V input. The resistor voltage divider R_{FBT} and R_{FBB} set the output voltage. The external capacitor C_{SS} sets the softstart time for V_{OUT} . See the datasheet for component selection and device details. The board features turret terminals for easy connection to input supply, load, EN input, as well as softstart voltage and Power Good flag monitoring.

Board Specifications

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

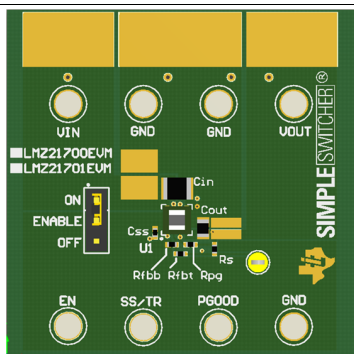


Figure 1. Board Top View

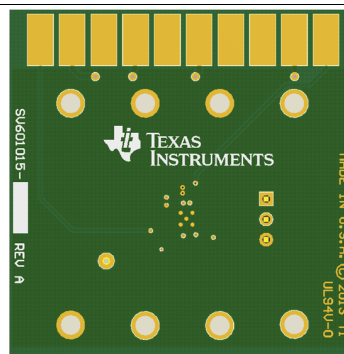


Figure 2. Board Top View

1 Schematic, Bill of Materials, and PCB Layout

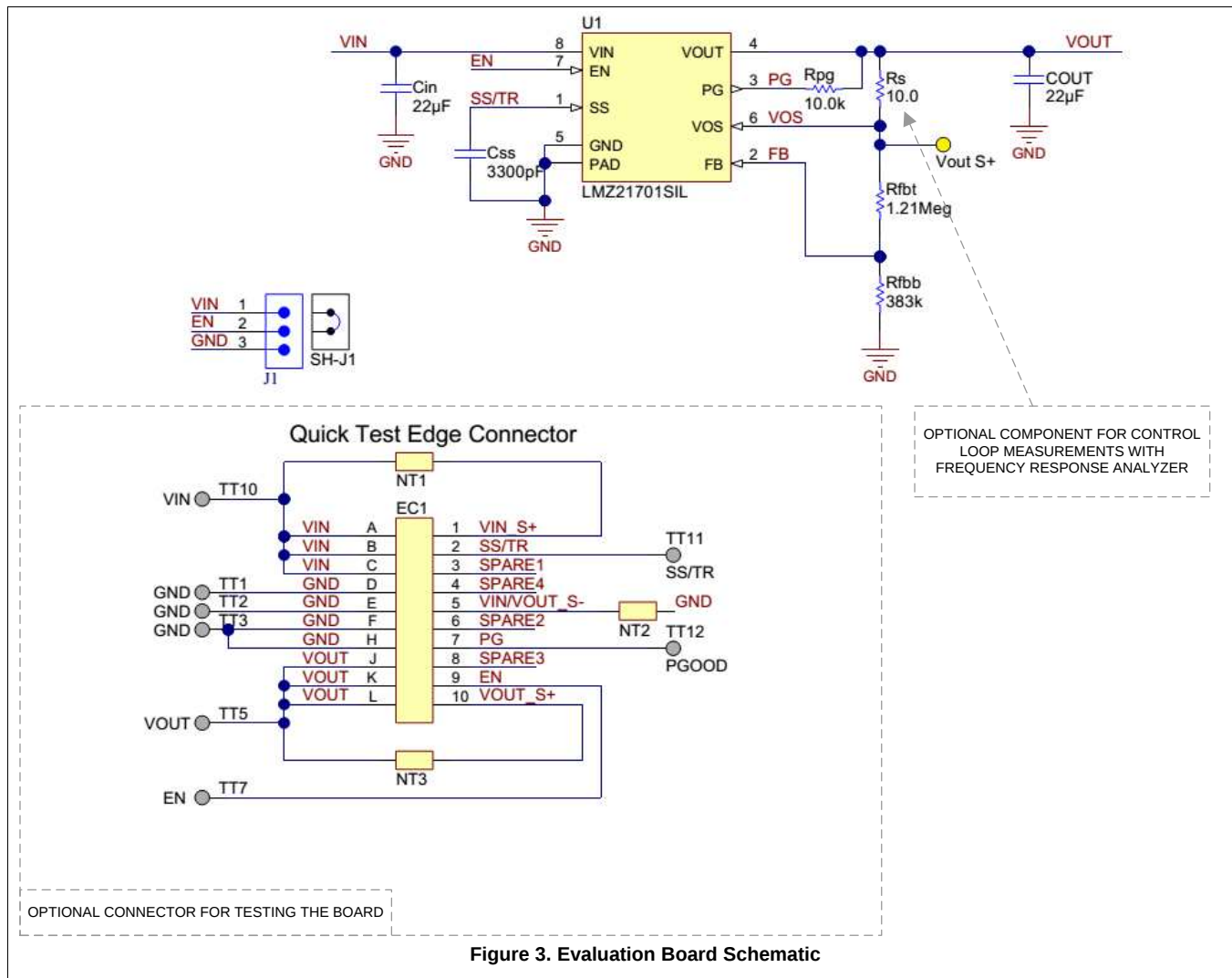


Figure 3. Evaluation Board Schematic

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

Designator	Description	Case Size	Manufacturer	Manufacturer P/N	Quantity
U1	SIMPLE SWITCHER® Nano Module	SIL0008E	Texas Instruments	LMZ21701SIL / LMZ21700SIL	1
C _{IN}	CAP, CERM, 22 µF, 25V, +/-10%, X7R	1210	MuRata	GRM32ER71E226KE15L	1
C _{OUT}	CAP, CERM, 22 µF, 10V, +/-20%, X5R	0805	Taiyo Yuden	LMK212BJ226MG-T	1
C _{SS}	CAP, CERM, 3300 pF, 50V, +/-10%, X7R	0402	MuRata	GRM155R71H332KA01D	1
J1	Header, TH, 100 mil, 1x3, Gold plated		Samtec, Inc	TSW-103-07-G-S	1
Rfbb	RES, 383k ohm, 1%, 0.063W	0402	Vishay-Dale	CRCW0402383KFKED	1
Rfbb	RES, 1.21Meg ohm, 1%, 0.063W	0402	Vishay-Dale	CRCW04021M21FKED	1
Rpg	RES, 10.0k ohm, 1%, 0.063W	0402	Vishay-Dale	CRCW040210K0FKED	1

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

Designator	Description	Case Size	Manufacturer	Manufacturer P/N	Quantity
Rs	RES, 10.0 ohm, 1%, 0.063W	0402	Vishay-Dale	CRCW040210R0FKED	1
SH-J1	Shunt, 100mil, 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

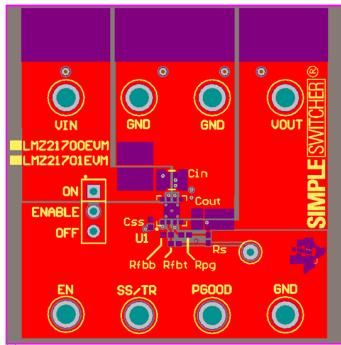


Figure 4. Evaluation Board Top Layer

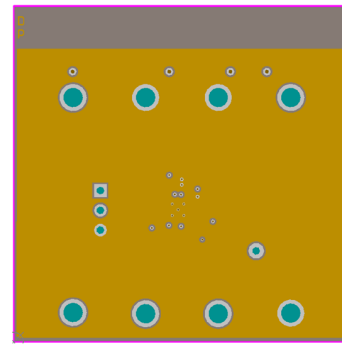


Figure 5. Evaluation Board Mid Layer 1

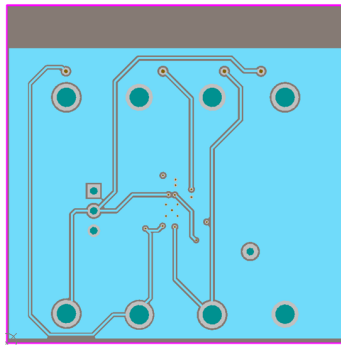


Figure 6. Evaluation Board Mid Layer 2

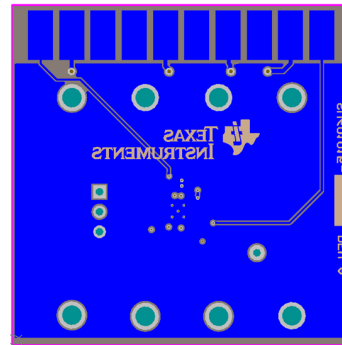


Figure 7. Evaluation Board Bottom Layer

2 Typical Performance

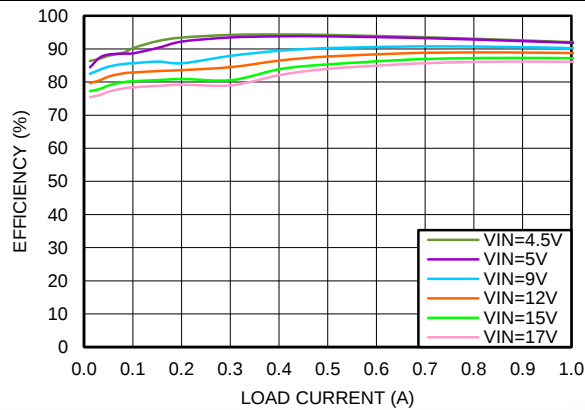


Figure 8. Efficiency

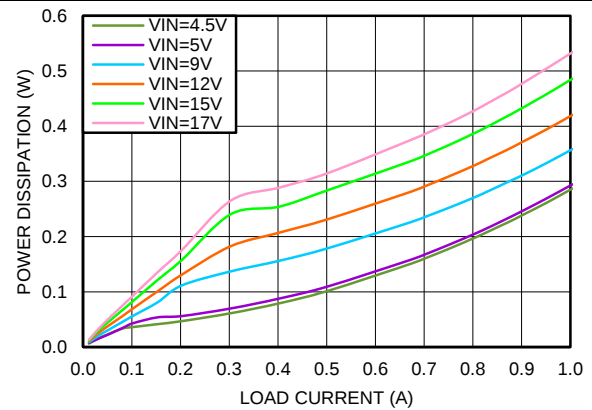


Figure 9. Power Dissipation

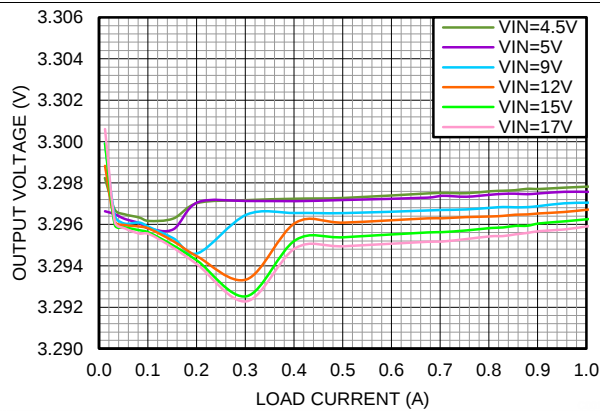


Figure 10. Line and Load Regulation



Figure 11. Load Transient

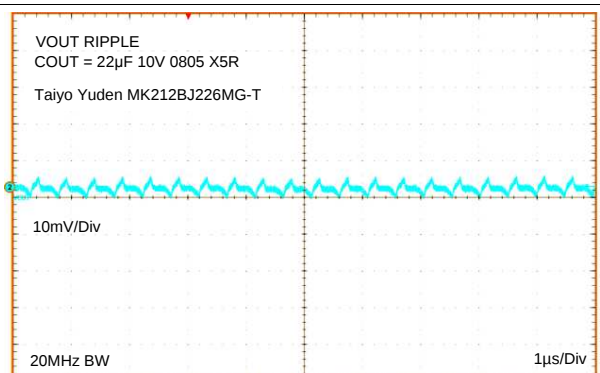


Figure 12. Output Voltage Ripple (20 MHz Scope BW)

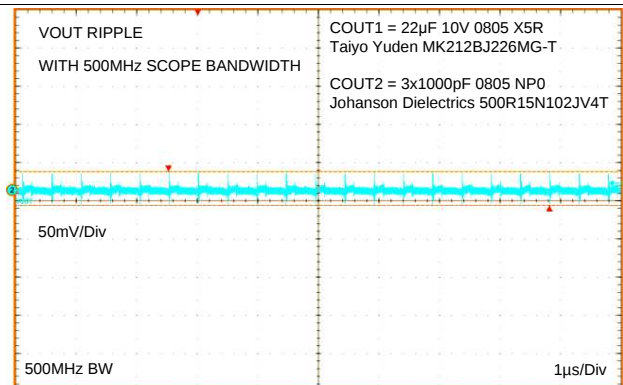


Figure 13. Output Voltage Ripple and HF Noise (500 MHz Scope BW)

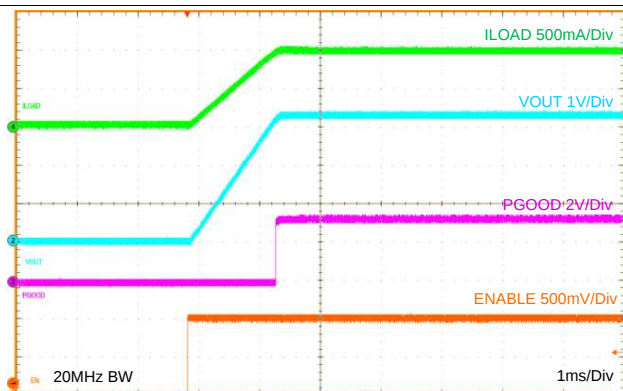


Figure 14. Startup

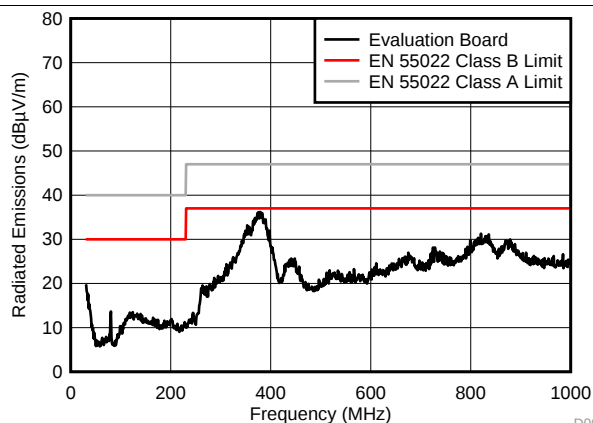


Figure 15. LMZ21700 Radiated EMI (Default BOM), VIN = 12 V, VOUT = 3.3 V, IOUT = 650 mA

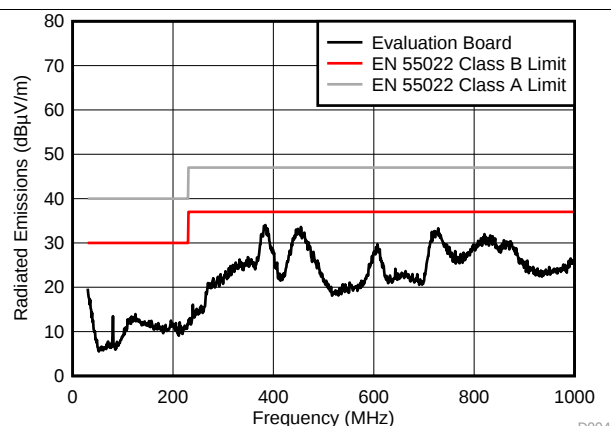


Figure 16. LMZ21701 Radiated EMI (Default BOM), VIN = 12 V, VOUT = 3.3 V, IOUT = 1000 mA

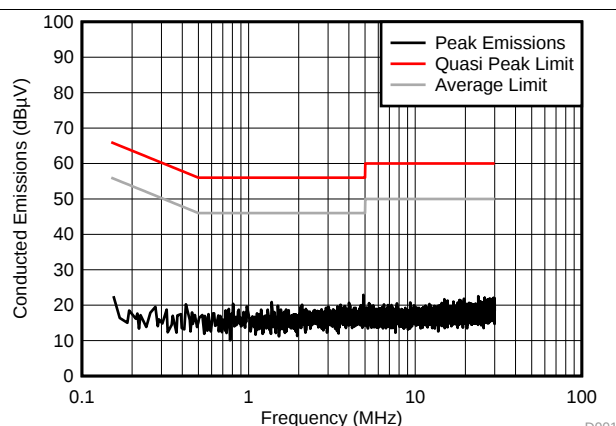


Figure 17. LMZ21700 Conducted EMI (1 μF, 2.2 μH input filter), VIN = 12V, VOUT = 3.3V, IOUT = 650 mA

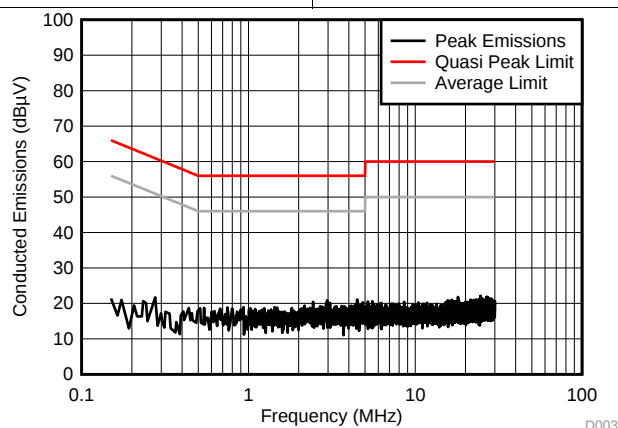


Figure 18. LMZ21701 Conducted EMI (1 μF, 2.2 μH additional input filter), VIN = 12V, VOUT = 3.3 V, IOUT = 1000 mA

Revision History

Changes from Original (April 2014) to A Revision	Page
• Added SVA cleanup and editing.....	5

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

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