ANALOG DEVICES

Evaluation Board User Guide
UG-263

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Evaluating the ADM1275 and ADM1276

FEATURES

Full functions support evaluation kit for the ADM1275 and the ADM1276
Supports LFCSP device package
Populated and tested with 12 V, 60 A, 4.7 mF design
Capable of evaluating high current designs for over 100 A
Special NMOSFET footprint suits different packages
Supports up to 3 sense resistors in parallel
Supports up to 6 FETs in parallel
LED indicated status outputs
Wild input voltage range of up to 20 V
Allows separate V_{CC} and V_{IN} for low voltage sensing
6 on-board ADT75 accurate temperature sensors
Supports cascade setup for multiple boards
Toggle and push-button switch for easy input control
PMBus communication support

PACKAGE CONTENTS

EVAL-ADM127xEBZ evaluation boards
8-way, 150 mm Micro-MaTch ribbon cable
Device samples

HARDWARE REQUIREMENT

USB-to-I²C dongle USB-SMBUS-CABLEZ (USB-SMBUS-CABLEZ is not included in the evaluation kit and should be ordered separately. Only one dongle is required in multi-board cascade setup.)

SOFTWARE REQUIREMENT

Analog Devices, Inc., hot-swap and power monitoring evaluation software

GENERAL DESCRIPTION

The EVAL-ADM127xEBZ is a compact full feature evaluation board for the ADM1275-1ACPZ, ADM1275-3ACPZ, and ADM1276-3ACPZ devices. The elaborated layout gives users a clear visual of all the peripheral components and the hot-swap power path. The layout also maximizes the board's ability to dissipate heat for some of the key components on the power path, allowing the evaluation of very high current hot-swap setups.

Three sense-resistor slots and six multipackage FET slots give users great flexibility and allow them to simulate a wide range of application setups.

Multiple test points allow easy access to all critical points/pins. Six LEDs give users direct visual indication on variations in the board status, such as supply input, output, IC power good output, latch output, and GPO outputs. Six ADT75 digital temperature sensors on the back of the board allow users to obtain the board's thermal data through an I²C bus in real time.

The kit supports I²C communication, allowing users to communicate with the ADM1275/ADM1276 and the ADT75. The evaluation kit also supports cascade setup so multiple evaluation boards can be connected together and share the same I²C bus.

The boards are fully compatible with the ADM1275/ADM1276 evaluation software tool, which can be downloaded at: www.analog.com/hotswap_powermonitor.

Note that users may need the USB-to-I²C dongle, USB-SMBUS-CABLEZ, to use the evaluation software tools.

The standard evaluation kit is prepopulated and tested with a 12 V, 60 A hot-swap design capable of working with a 4.7 mF output capacitor.

Complete specifications for the ADM1275 and the ADM1276 are available in the ADM1275 and the ADM1276 data sheets available from Analog Devices and should be consulted in conjunction with this user guide when using the evaluation boards.

PLEASE SEE THE LAST PAGE FOR AN IMPORTANT WARNING AND LEGAL TERMS AND CONDITIONS.

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REVISION HISTORY

9/11—Rev. 0 to Rev. A

Added Hardware Requirement Section and Software Requirement Section 1
Changes to Evaluation Board Overview Section 4
Added Test Plot Section 6
Changes to Evaluation Board Schematics and Artwork Section 7
Changes to Ordering Information Section 11

4/11—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

SWITCH, JUMPER, AND LED FUNCTIONS

Table 1. Connector Functions

Connector	Description
Vin1, Vin2, Vin3	Hot-swap line voltage input, which also powers the board. Input voltage is 4 V to 20 V. For low voltage operations, provide auxiliary power input through Connector TP1.
Vout1, Vout2, Vout3	Hot-swap line voltage output.
GND	Board common ground.
TP1	Auxiliary power input, only needed if V_{IN} is below 4 V. May need to modify R34, R35, and Rvcc.
TP15	I^2C/PMBUS communication dongle connector. From top down: GND, SDA, SCL.
SK1	Bottom cascade connector; connect with the Micro-MaTch ribbon cable to link with other EVAL-ADM1275EBZ/ EVAL-ADM1276EBZ boards.
SK2	Top cascade connector; connect with the Micro-MaTch ribbon cable to link with other EVAL-ADM1275EBZ/ EVAL-ADM1276EBZ boards.

Table 2. Switch Functions

Switch	Description
SW1	Toggle switch that can be used to connect the UV pin or the GPIO1 pin to ground.
S1	Push-button switch that can be used to connect the UV pin or the GPIO1 pin to ground.

Table 3. LED Functions

LED	Description
D4	GPIO1, active high; blue
D5	GPIO2, active high; blue
D6	Power good, active high; green
D3	LATCH, active low; red
D7	Board input power; green
D8	Board output power; green

Table 4. On-Board ICs

IC	Description
U0	ADM1275/ADM1276 main IC
U1	ADP1720ARMZ-3.3, 4 V to 28 V input, 3.3 V, 50 mA output LDO; powering EEPROM and temperature sensors
U2	64 Kb I^2C EEPROM
UT1 to UT6	±1°C accurate, 12-bit digital temperature sensor, sensing temperature on the MOSFETs

EVALUATION BOARD OVERVIEW

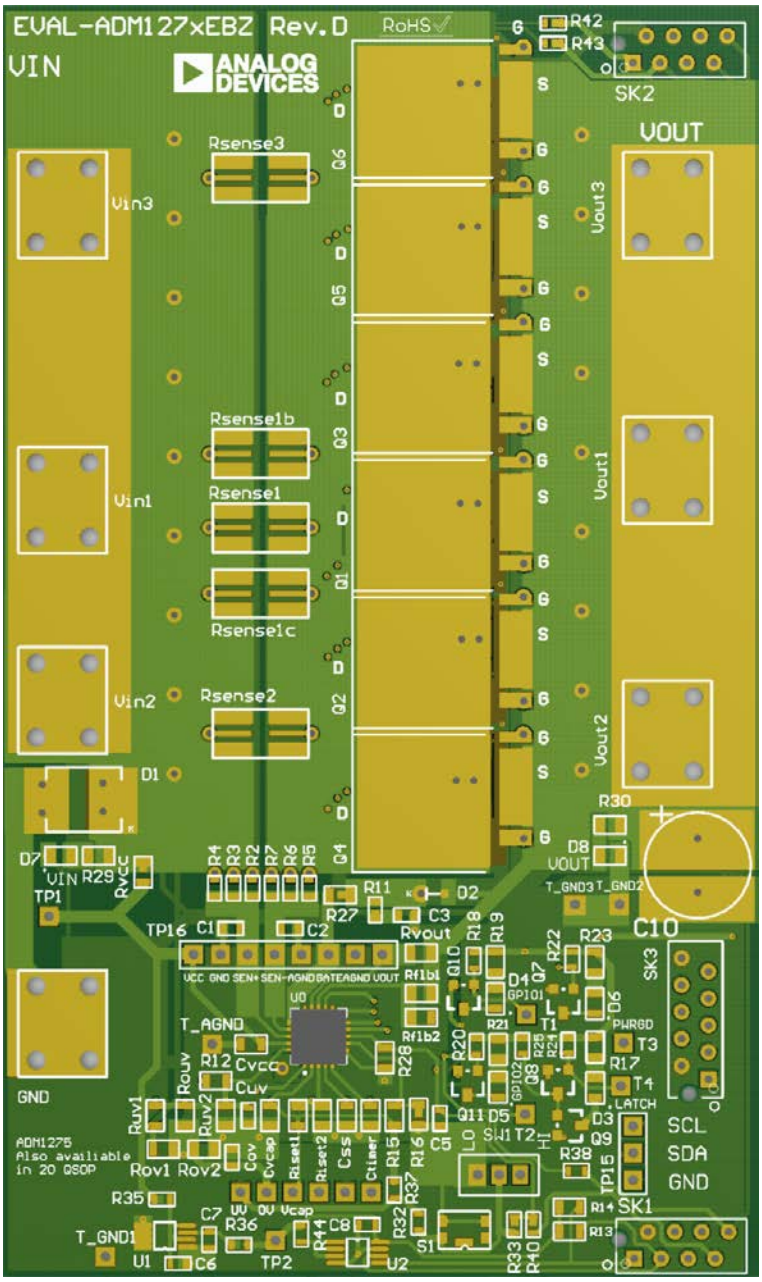


Figure 1. Evaluation Board Overview

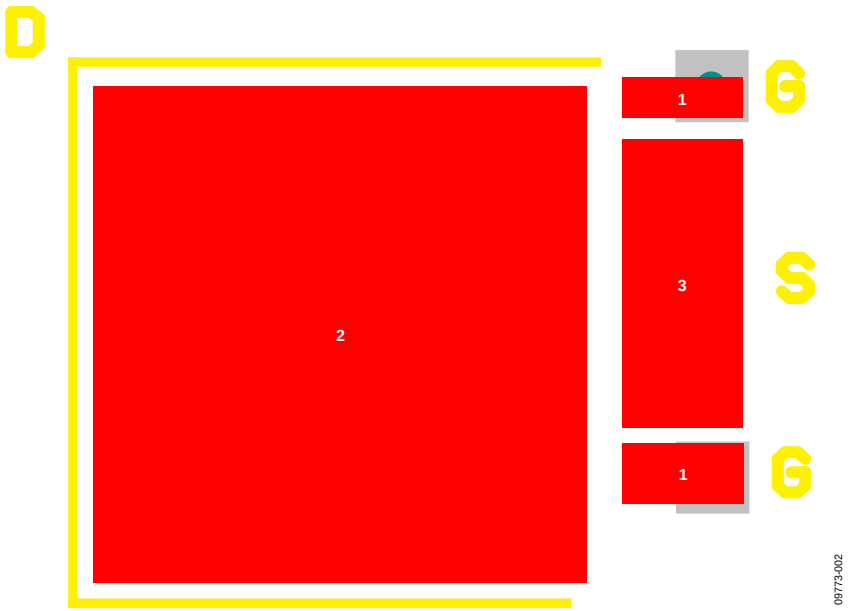


Figure 2. Multipackage N-MOSFET Footprint

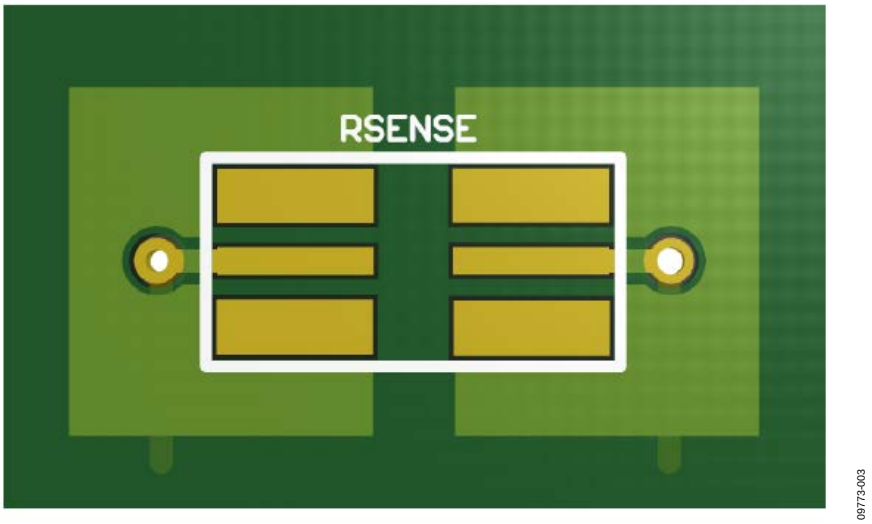


Figure 3. Recommended Sense Resistor Footprint

For the best current sensing accuracy with the footprint shown in Figure 3, chip resistors without a nickel barrier layer (usually in green color) are recommended. The data in this user guide may not be applicable to all resistors and results may vary depending on resistor composition and size. Alternative resistors should be tested independently. It is the responsibility of the user to ensure the layout dimensions and structure of the footprint comply with individual SMT manufacturing requirements. Analog Devices does not accept responsibility for any issues that may arise as a result of using this footprint.

TEST PLOTS

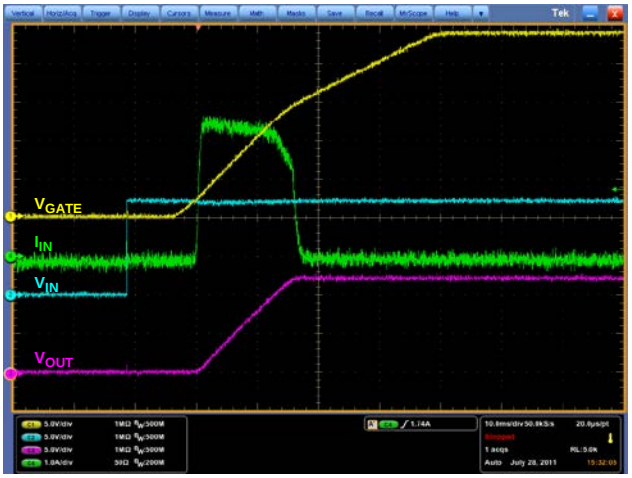


Figure 4. Power Up with 4.7 mF Load Capacitor and No DC Load

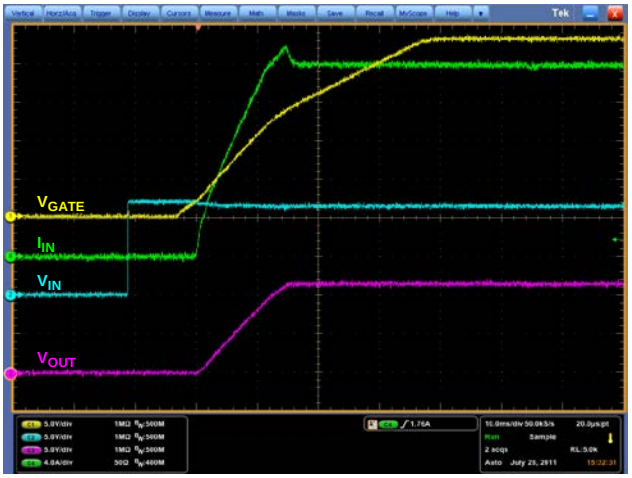


Figure 7. Power Up with 4.7 mF Load Capacitor and 0.6 Ω Load

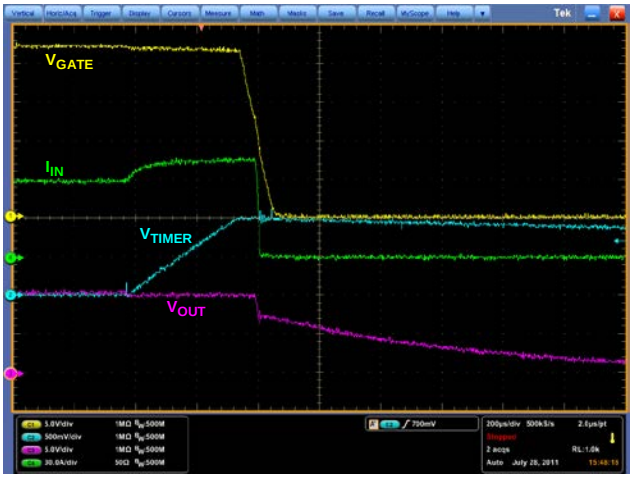


Figure 5. Over Current Shutdown

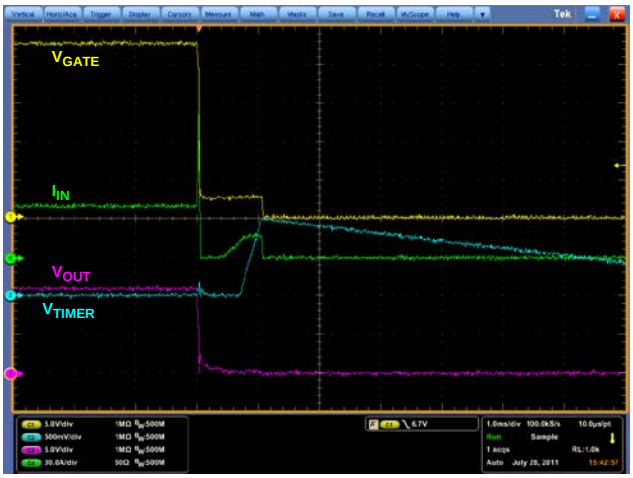


Figure 8. Output Short Circuit

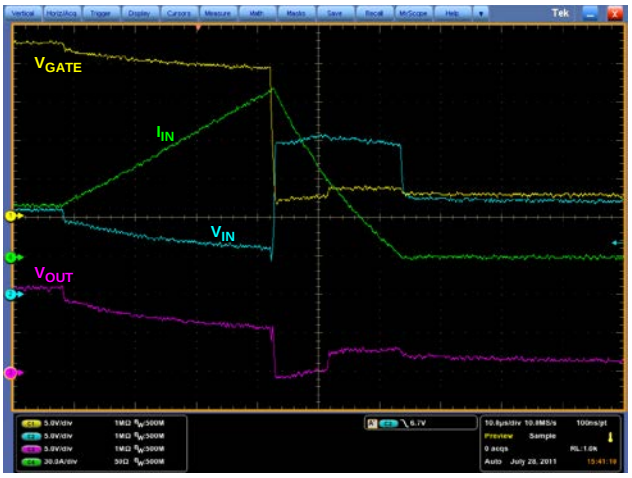


Figure 6. Output Short Circuit Zoom In

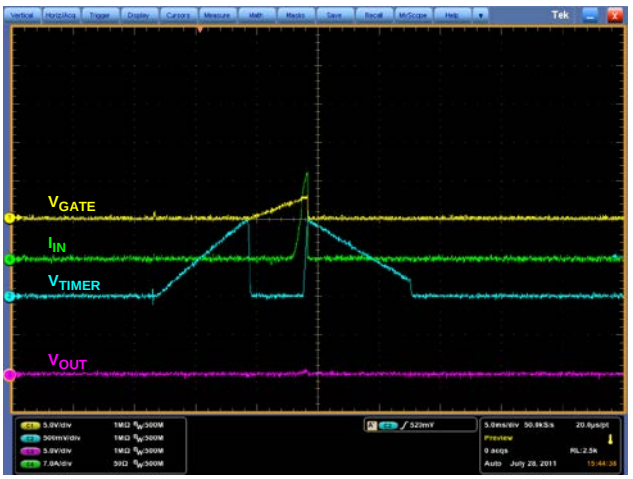


Figure 9. Power Up into Short Circuit

EVALUATION BOARD SCHEMATICS AND ARTWORK

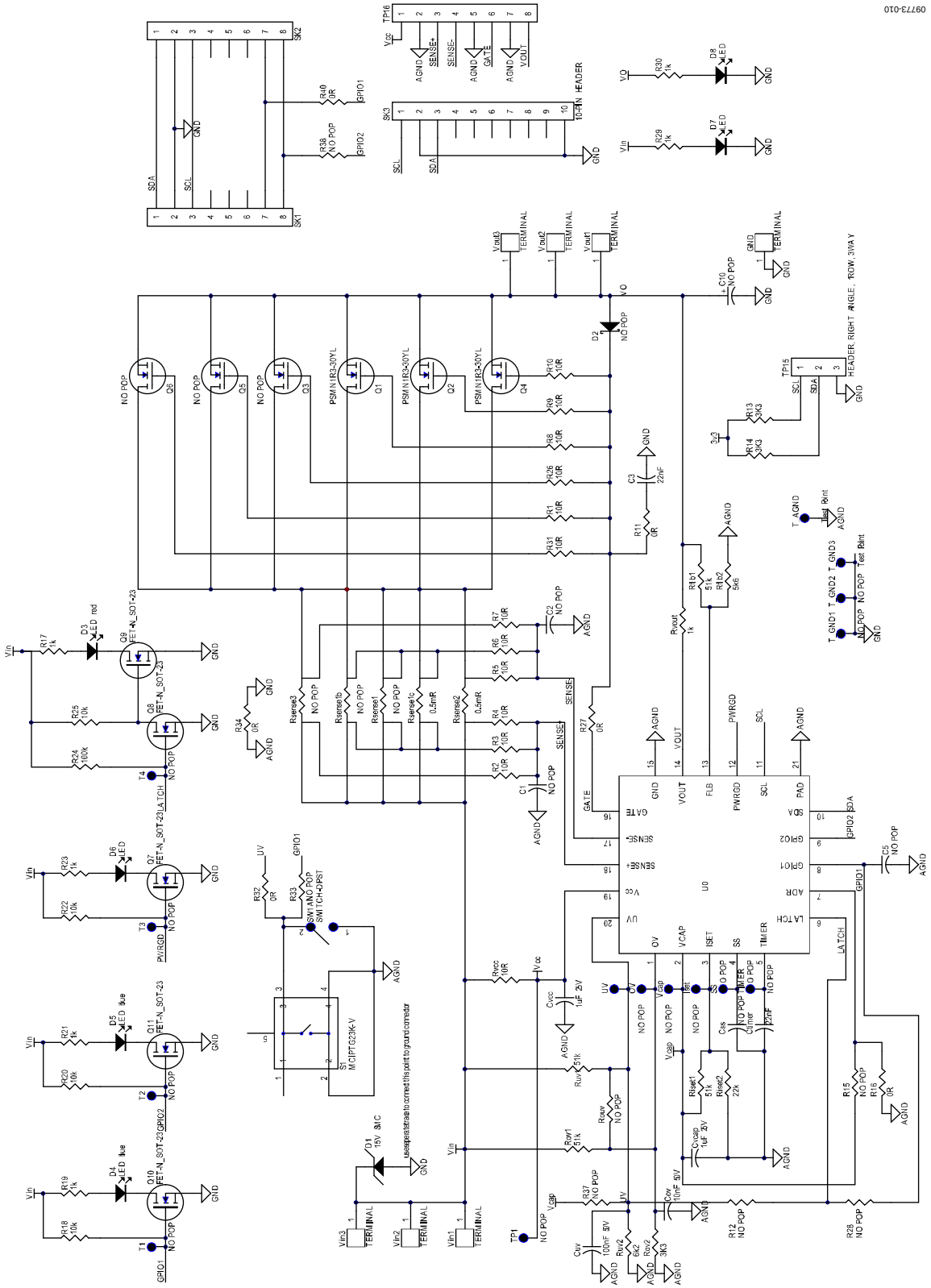


Figure 10. Evaluation Board Schematic 1

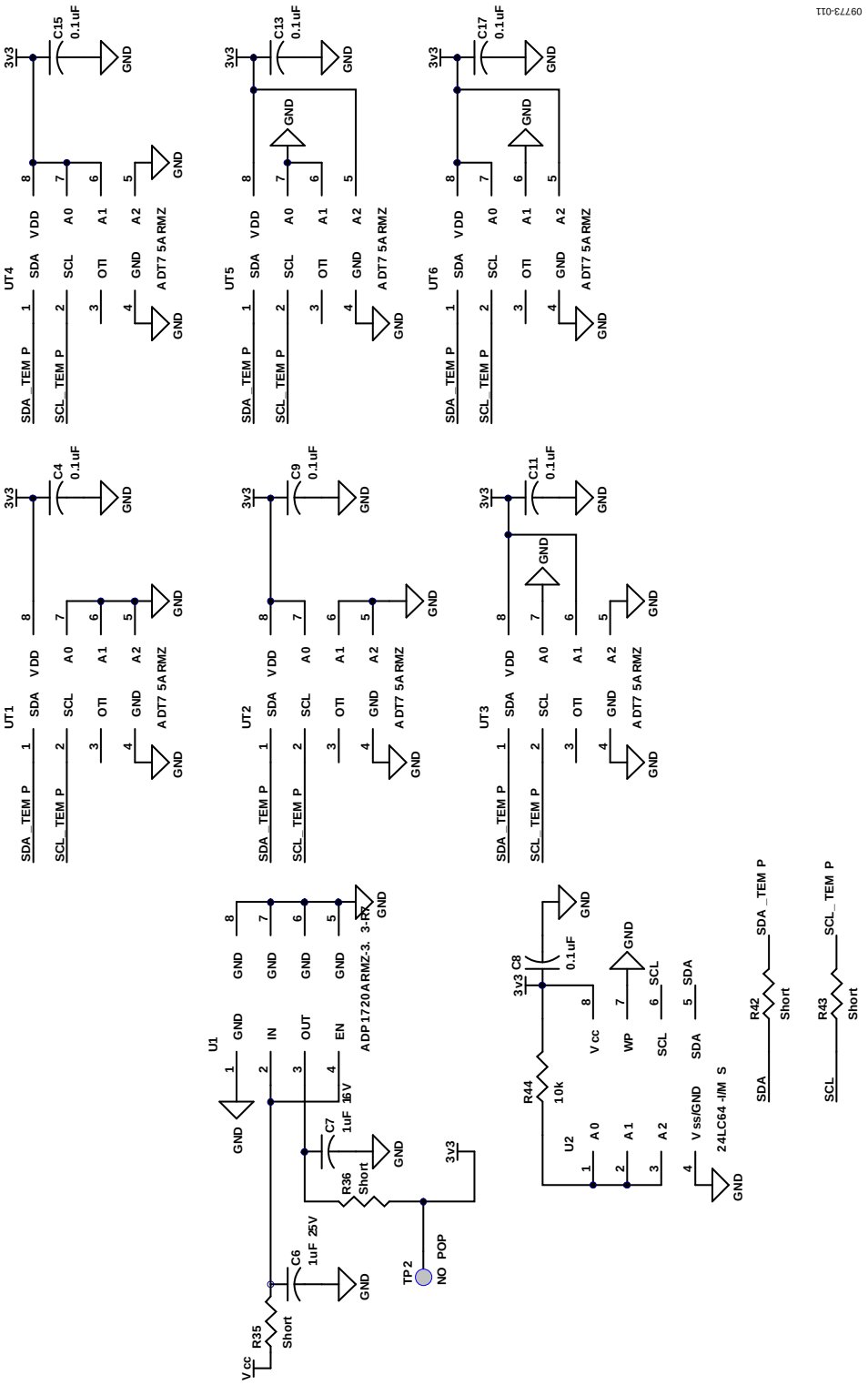


Figure 11. Evaluation Board Schematic 2

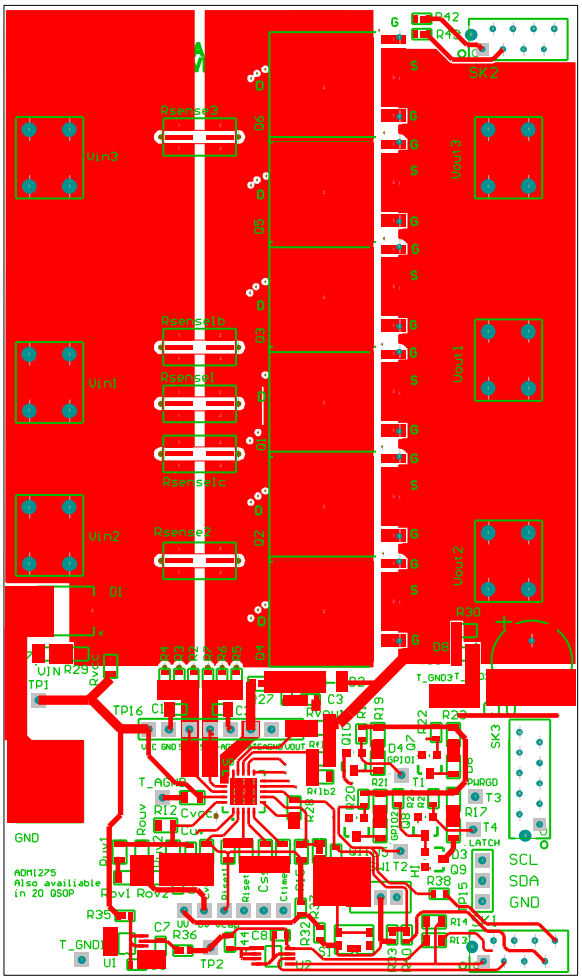


Figure 12. Top Layer

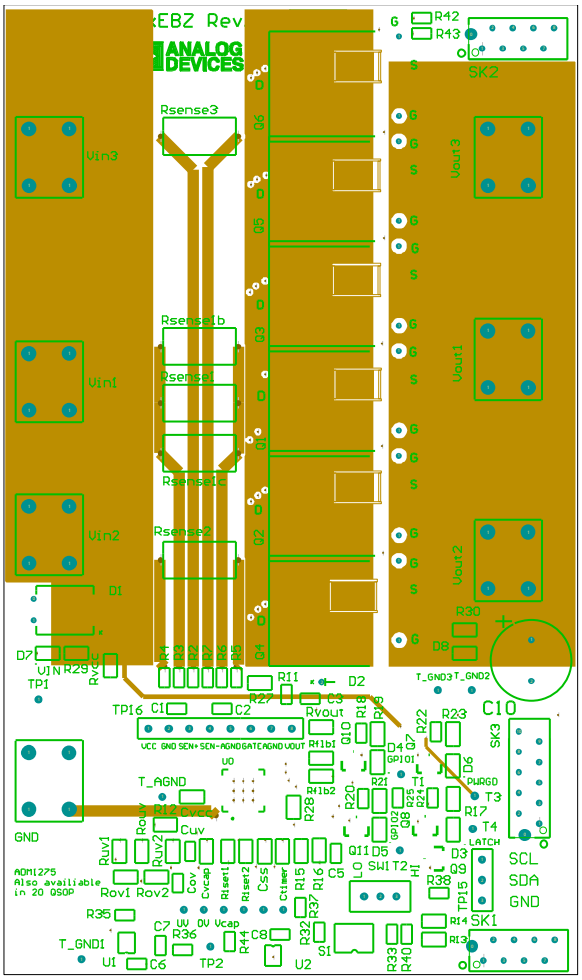


Figure 13. Middle Layer 1

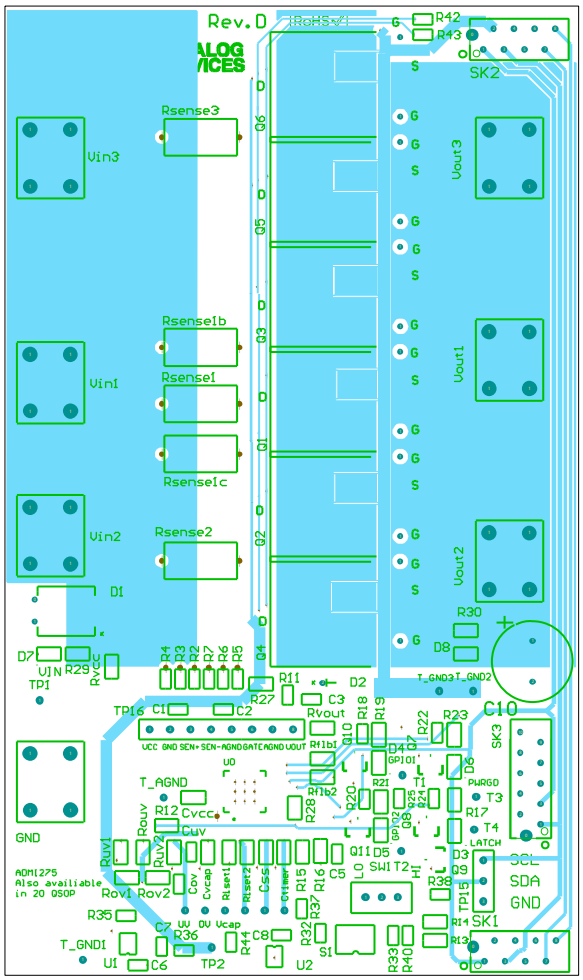


Figure 14. Middle Layer 2

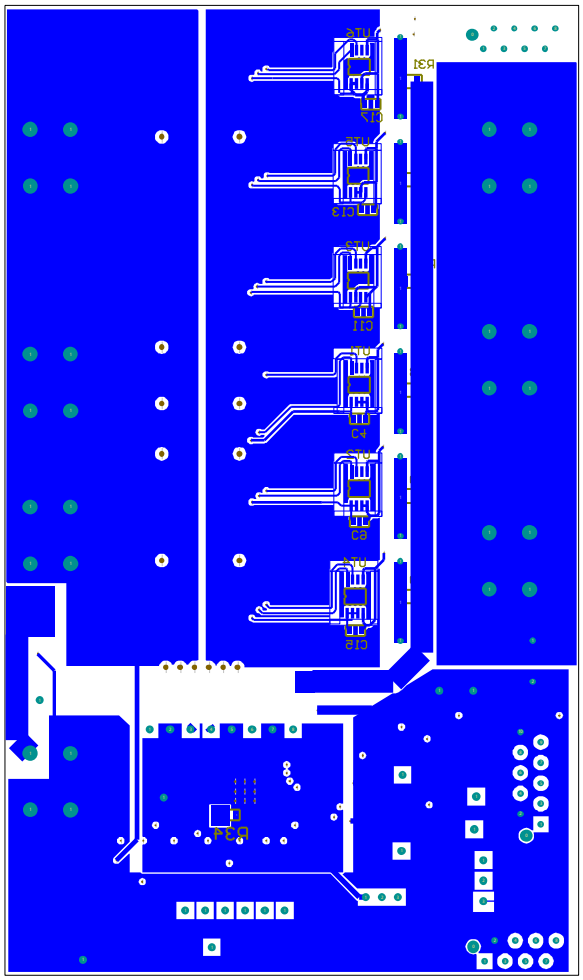


Figure 15. Bottom Layer

ORDERING INFORMATION

BILL OF MATERIALS

Table 5.

Quantity	Designator	Description	Digi-Key	Farnell (FNC)
3	C1, C2, C5	Not populated		
1	C3	22 nF capacitor, 0603		3019755
7	C4, C8, C9, C11, C13, C15, C17	0.1 µF capacitor, 0603		1288255
1	C6	1 µF capacitor, 0603, 25 V	587-1248-1-ND	
1	C7	1 µF capacitor, 0603, 16 V		1611954
1	C10	Not populated		
1	Cov	10 nF capacitor, 0603, 50 V		1414609
1	Css	Not populated		
1	Ctimer	22 nF capacitor, 0805		3019755
1	Cuv	100 nF capacitor, 0603, 50 V		1692286
2	Cvcap, Cvcc	1 µF capacitor, 25 V, 0805		1637035
1	D1	15 V SMC		9551140
1	D2	Not populated		
1	D3	LED red, 0805		1318244
2	D4, D5	LED blue, 0805		8529876
3	D6, D7, D8	LED, 0805		1318243
7	GND, Vin1, Vin2, Vin3, Vout1, Vout2, Vout3	Terminal	7691K-ND	
15	Iset, OV, SS, T1, T2, T3, T4, T_AGND, T_GND1, T_GND2, T_GND3, TIMER, TP1, TP2, UV, Vcap	Test point		
3	Q1, Q2, Q4	PSMN1R3-30YL, FET_Mix	568-4908-1-ND	
3	Q3, Q5, Q6	Not populated		
5	Q7, Q8, Q9, Q10, Q11	FET-N_SOT-23		1713823
7	R1, R8, R9, R10, R26, R31, Rvcc	10 Ω resistor, 0805		1469859
6	R2, R3, R4, R5, R6, R7	10 Ω resistor, 0603		1469751
4	R11, R32, R34, R40	0 Ω resistor, 0603		
4	R12, R15, R28, Rouv	Not populated		
3	R13, R14, Rov2	3.3 kΩ resistor, 0805		1738911
2	R16, R27	0 Ω resistor, 0805		
7	R17, R19, R21, R23, R29, R30, Rvout	1 kΩ resistor, 0805		9333711
6	R18, R20, R22, R25, R39, R44	10 kΩ resistor, 0603		1738918
1	R24	100 kΩ resistor, 0603		1469649
3	R33, R37, R38	Not populated		
3	R35, R42, R43	Short, resistor, 0603		
4	Rflb1, Riset1, Rov1, Ruv1	51 kΩ resistor, 0805		9333339
1	Rflb2	5.6 kΩ resistor, 0805		1469941
1	Riset2	22 kΩ resistor, 0805		1469896
3	Rsense1, Rsense1b, Rsense3	Not populated		
2	Rsense1c, Rsense2	0.5 mΩ, Rsense_2512_3W		9403159
1	Ruv2	6.2 kΩ resistor, 0805		9333428
1	S1	MCIPTG23K-V, switch push button		1605470
2	SK1, SK2	8-way Micro-MaTch		148593
1	SK3	10-way Micro-MaTch		148600
1	SW1	3-pin switch, SWITCH-DPST		1123875
1	TP15	3-pin header, right angle, 1 row, 3 way		9733450
1	TP16	Not populated		
1	U0	ADM1275 or ADM1276, 20-lead LFCSP		
1	U1	ADP1720ARMZ-3.3-R7, 8-lead MSOP		
1	U2	24LC64-I/MS, MSOP-8		1331335
6	UT1, UT2, UT3, UT4, UT5, UT6	ADT75ARMZ, 8-lead MSOP		

RELATED LINKS

Resource	Description
ADM1275	Hot-swap controller and digital power monitor with PMBus interface
ADM1276	Hot-swap controller and digital power and energy monitoring with PMBus interface

I²C refers to a communications protocol originally developed by Philips Semiconductors (now NXP Semiconductors).

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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