

# ISL85033EVAL2Z (Small Form) Wide VIN Dual Standard Buck Regulator With 3A/3A Output Current - Long Form

## Description

The ISL85033EVAL2Z kit demonstrates performance of the ISL85033 switching regulator IC. An input range of 4.5V to 28V and 3A output per channel (connect in parallel to 6A) allows the ISL85033 to meet a wide variety of POL requirements.

The ISL85033 is offered in a 4mmx4mm 28 Ld TQFN package with 1mm maximum height. The complete converter occupies 6.25cm<sup>2</sup> area.

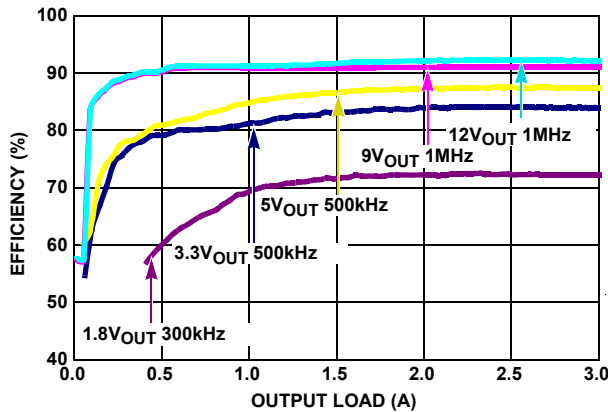


FIGURE 1. EFFICIENCY vs LOAD, T<sub>A</sub> = +25°C, V<sub>IN</sub> = 28V

## Key Features

- Wide Input Voltage Range from 4.5V to 28V
- Adjustable Output Voltage with Continuous Output Current up to 3A per channel
- Current Mode Control
- Adjustable Switching Frequency from 300kHz to 2MHz
- Independent Power-Good Detection
- Selectable In-Phase or Out-of-Phase PWMs Switching Operation
- Independent, Sequential, Ratiometric or Absolute Tracking Between Outputs
- Internal 2ms Soft-start Time
- Overcurrent and Hiccup Mode Short Circuit Protection, Thermal Overload Protection, UVLO
- Boot Undervoltage Detection
- Channels are Out-of-phase, Reducing Voltage Ripple and Component Size

## Quick Setup Guide

1. Ensure correct board connection to the supply (“+” to VIN1 and “-” to GND2) and loads prior to applying power, then turn on the power supply.
2. Verify the output voltage is 5V for V<sub>OUT1</sub> and 3.3V for V<sub>OUT2</sub>.

## Frequency Control

ISL85033 has an FS pin that controls the frequency of operation. Programmable frequency allows for optimization between efficiency and external component size. ISL85033EVAL2Z has the switching frequency set to 500kHz (FS is tied to VCC).

## SYNC Control

The ISL85033 has a SI pin for external synchronization. Default board configuration has R8 = 0 to GND, which defaults to the internally selected switching frequency. Removing R8 allows the synchronization to be external between 600kHz to 4MHz. Do not leave this pin floating.

## Output Voltage Selection

ISL85033EVAL2Z board has V<sub>OUT1</sub> set to 5V and V<sub>OUT2</sub> set to 3.3V. The output voltage programming resistor, R<sub>3</sub> (R<sub>10</sub> respectively), will depend on the value chosen for the feedback resistor, R<sub>2</sub> (R<sub>12</sub> respectively), and the desired output voltage, V<sub>OUT</sub>, see Equation 1. The value for R<sub>2</sub> is typically between 1k and 10k.

$$R_3 = (V_{OUT1} - V_{FB}) \cdot R_2 / 0.8 \tag{EQ. 1}$$

$$R_{10} = (V_{OUT2} - V_{FB}) \cdot R_{12} / 0.8$$

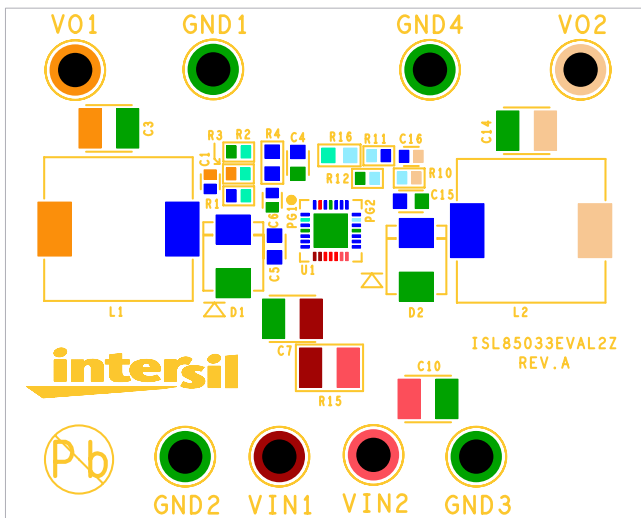


FIGURE 2. ISL85033EVAL2Z TOP SILK SCREEN

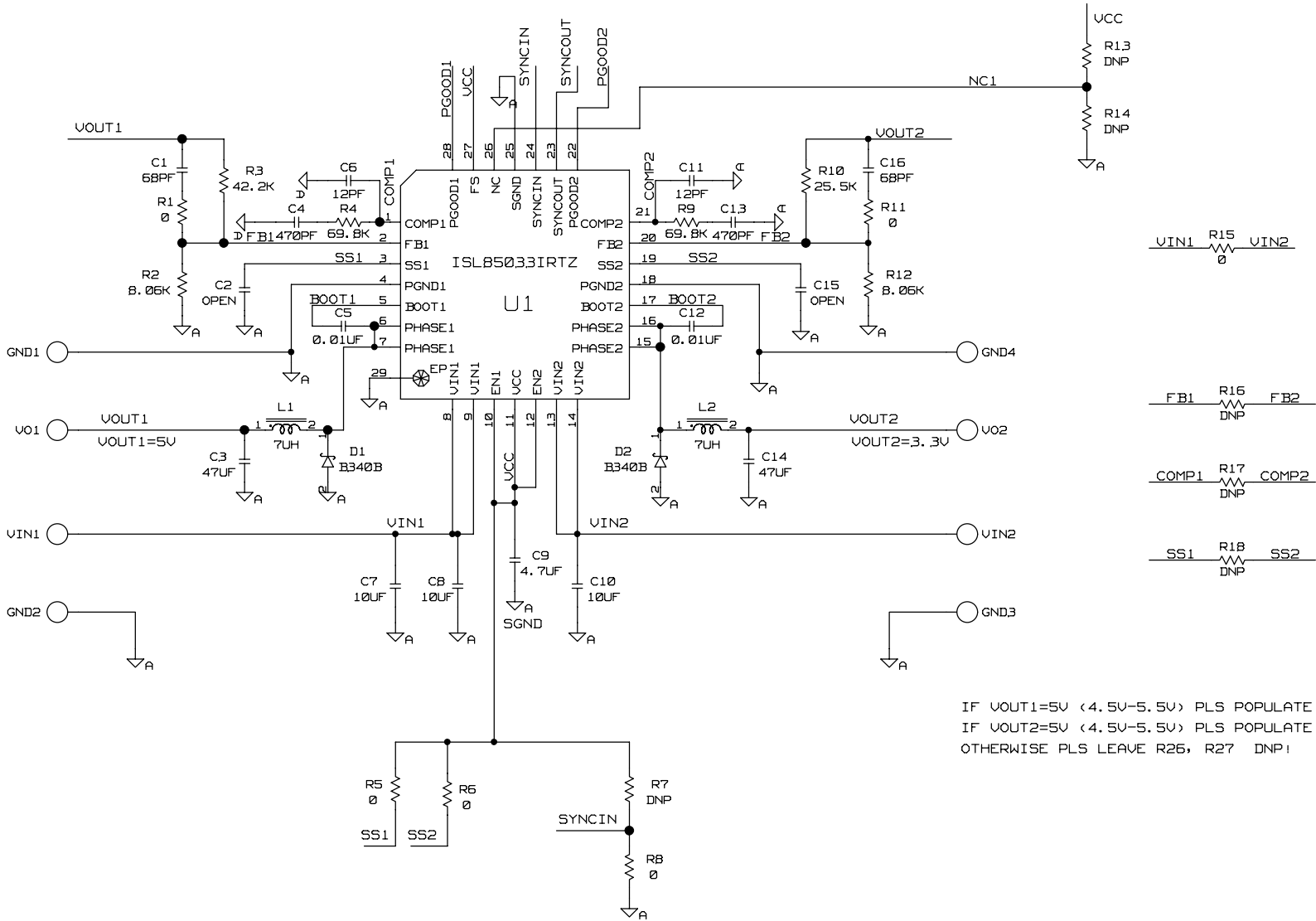
Please note that if  $V_{OUT}$  is less than 2.5V, switching frequency and compensation must be changed for 300kHz operation due to minimum on-time limitation. Please refer to data sheet [FN6676](#) for further information.

### Current Sharing Option

The ISL85033EVAL2Z board has the option to be configured for current sharing operation. The following changes will allow a default output voltage of 5V. The output maximum operating current will be 6A.

1. Remove R5, R6, R9, R10, R11, R12, C11, C13.
2. Add a short (0 $\Omega$  0603 resistor) to the place holder of R16, R17.
3. Connect a wire from VOUT1 to VOUT2.
4. Place C2 = 22nF (50V/0603). Place C15 = 22nF
5. Change the value of C4 to 1nF (50V, 0603).
6. Change the value of R4 to 34k (0603).

# ISL85033EVAL2Z Schematic



IF VOUT1=5V (4.5V-5.5V) PLS POPULATE R26 ONLY  
 IF VOUT2=5V (4.5V-5.5V) PLS POPULATE R27 ONLY  
 OTHERWISE PLS LEAVE R26, R27 DNP!

# Application Note 1584

**TABLE 1. BILL OF MATERIALS**

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
ISL85033EVAL2ZREVAPCB	1	ea		PWB-PCB, ISL85033EVAL2Z, REVA, ROHS	IMAGINEERING INC	ISL85033EVAL2ZREVAPCB
GMK325BJ106KN-T	2	ea	C8, C10	CAP, SMD, 1210, 10µF, 35V, 10%, X5R, ROHS	TAIYO YUDEN	GMK325BJ106KN-T
H1044-00120-50V5-T	2	ea	C6, C11	CAP, SMD, 0402, 12pF, 50V, 5%, NPO, ROHS	AVX	04025C120JAT
					VENKEL	C0402C0G500-120JNE
H1044-00680-50V5-T	2	ea	C1, C16	CAP, SMD, 0402, 68pF, 50V, 5%, NPO, ROHS	MURATA	GRM36COG680J050AQ
					PANASONIC	ECJ-OEC1H680J
					VENKEL	C0402C0G500-680JNE
H1045-00103-50V10-T	2	ea	C5, C12	CAP, SMD, 0603, 0.01µF, 50V, 10%, X7R, ROHS	MURATA	GRM39X7R103K050
					AVX	06035C103KAT2A
					VENKEL	C0603X74500-103KNE
H1045-00471-50V5-T	2	ea	C4, C13	CAP, SMD, 0603, 470pF, 50V, 5%, NPO, ROHS	PANASONIC	ECJ-1VC1H471J
					VENKEL	C0603C0G500-471JNE
H1045-00475-6R3V10-T	1	ea	C9	CAP, SMD, 0603, 4.7µF, 6.3V, 10%, X5R, ROHS	VENKEL	C0603X5R6R3-475KNE
					TDK	C1608X5R0J475K
					PANASONIC	ECJ-1VB0J475K
					MURATA	GRM188R60J475KE19D
					KEMET	C0603C475K9PACTU
					TAIYO YUDEN	JMK107BJ475KA-T
H1045-DNP	0	ea	C2, C15	CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS		
H1082-00106-50V10-T	1	ea	C7	CAP, SMD, 1210, 10µF, 50V, 10%, X5R, ROHS	TAIYO YUDEN	UMK325BJ106KM-T
H1082-00476-16V20-T	2	ea	C3, C14	CAP, SMD, 1210, 47µF, 16V, 20%, X5R, ROHS	TDK	C3225X5R1C476M
					PANASONIC	ECJ-4YB1C476M
					MURATA	GRM32ER61C476ME15L
					TAIYO YUDEN	EMK325BJ476MM-T
					KEMET	C1210C476M4PACTU
					VENKEL	C1210X5R160-476MNE
SQL004	2	ea	L1, L2	COIL-PWR INDUCTOR, SMD, 10mm, 7µH, 25%, 4.8A, ROHS	FALCO	SQL004
1514-2	8	ea	VO1,VO2, GND1-GND4, VIN1, VIN2	CONN-TURRET, TERMINAL POST, TH, ROHS	KEYSTONE	1514-2
B340B-13-F-T	2	ea	D1, D2	DIODE-SCHOTTKY, SMD, SMB, 2P, 40V, 3A, ROHS	DIODES INC.	B340B-13-F
ISL85033IRTZ	1	ea	U1	IC-3A DUAL STD REGULATOR, 28P, TQFN, 4x4, ROHS	INTERSIL	ISL85033IRTZ
H2505-DNP	0	ea	R7, R13, R14, R16-R18	RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER		

# Application Note 1584

**TABLE 1. BILL OF MATERIALS (Continued)**

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
H2510-00R00-1/16W-T	2	ea	R1, R11	RES, SMD, 0402, 0Ω, 1/16W, 5%, TF, ROHS	VENKEL	CR0402-16W-00T
					PANASONIC	ERJ-2GE0JR00
H2510-02552-1/16W1-T	1	ea	R10	RES, SMD, 0402, 25.5k, 1/16W, 1%, TF, ROHS	VENKEL	CR0402-16W-2552FT
					PANASONIC	ERJ-2RKF2552X
					VISHAY/DALE	CRCW040225K5FKED
H2510-04222-1/16W1-T	1	ea	R3	RES, SMD, 0402, 42.2k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF4222X
					VENKEL	CR0402-16W-4222FT
H2510-08061-1/16W1-T	2	ea	R2, R12	RES, SMD, 0402, 8.06k, 1/16W, 1%, TF, ROHS	VENKEL	CR0402-16W-8061FT
					PANASONIC	ERJ-2RKF8061X
					ROHM	MCR01MZPF8061
					YAGEO	RC0402FR-078K06L
					VISHAY/DALE	CRCW04028K06FKED
H2511-00R00-1/10W-T	3	ea	R5, R6, R8	RES, SMD, 0603, 0Ω, 1/10W, TF, ROHS	VENKEL	CR0603-10W-000T
					ROHM	MCR03EZPJ000
					PANASONIC	ERJ-3GEY0R00V
					YAGEO	RC0603JR-070RL
					VISHAY/DALE	CRCW06030000Z0EA
H2511-06982-1/10W1-T	2	ea	R4, R9	RES, SMD, 0603, 69.8k, 1/10W, 1%, TF, ROHS	VENKEL	CR0603-10W-6982FT
					YAGEO	RC0603FR-0769K8L
					VISHAY/DALE	CRCW060369K8FKEA
					KOA	RK73H1JTTD6982F
H2514-00R00-1/4W-T	1	ea	R15	RES, SMD, 1210, 0Ω, 1/4W, TF, ROHS	VENKEL	CR1210-4W-000
SJ-5003-BLACK	2	ea		BUMPONS, 0.44" W x 0.20" H, DOMETOP, BLACK	3M	SJ-5003SPBL
3X5-STATIC-BAG	1	ea		BAG, STATIC, 3 X 5, ZIP LOC	INTERSIL COMMON STOCK	D810 (212403-012)
LABEL-SERIAL NUMBER	1	ea		LABEL-FOR SERIAL NUMBER AND BOM REV #	INTERSIL	LABEL-SERIAL NUMBER

# ISL85033EVAL2Z Board Layout

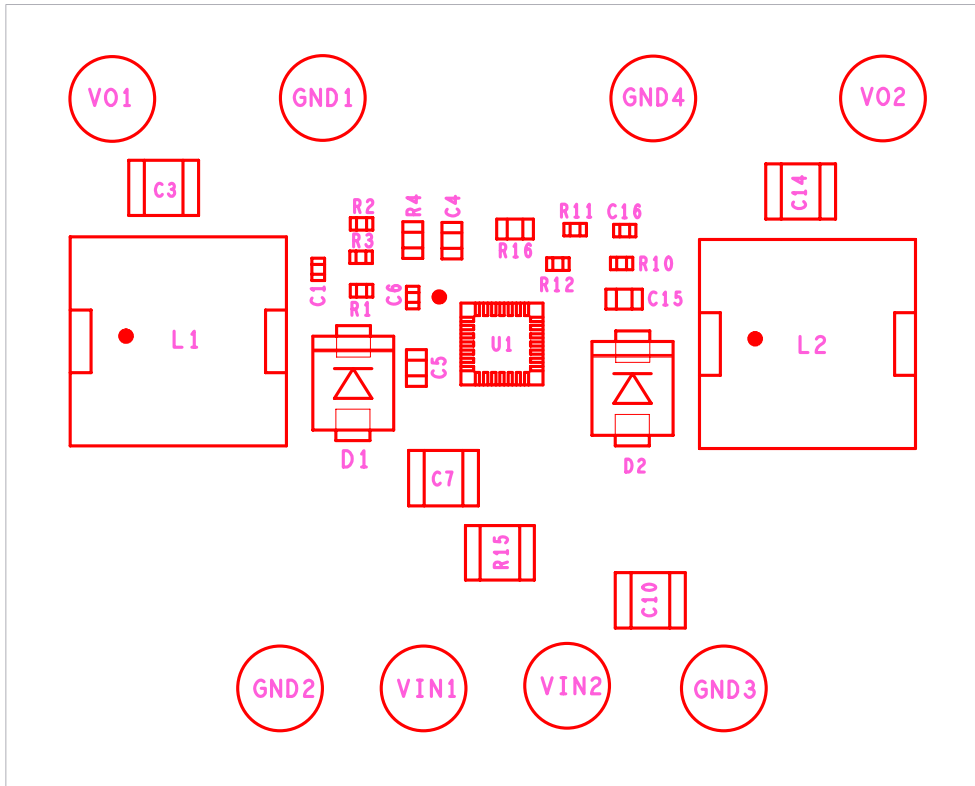


FIGURE 3. TOP ASSEMBLY

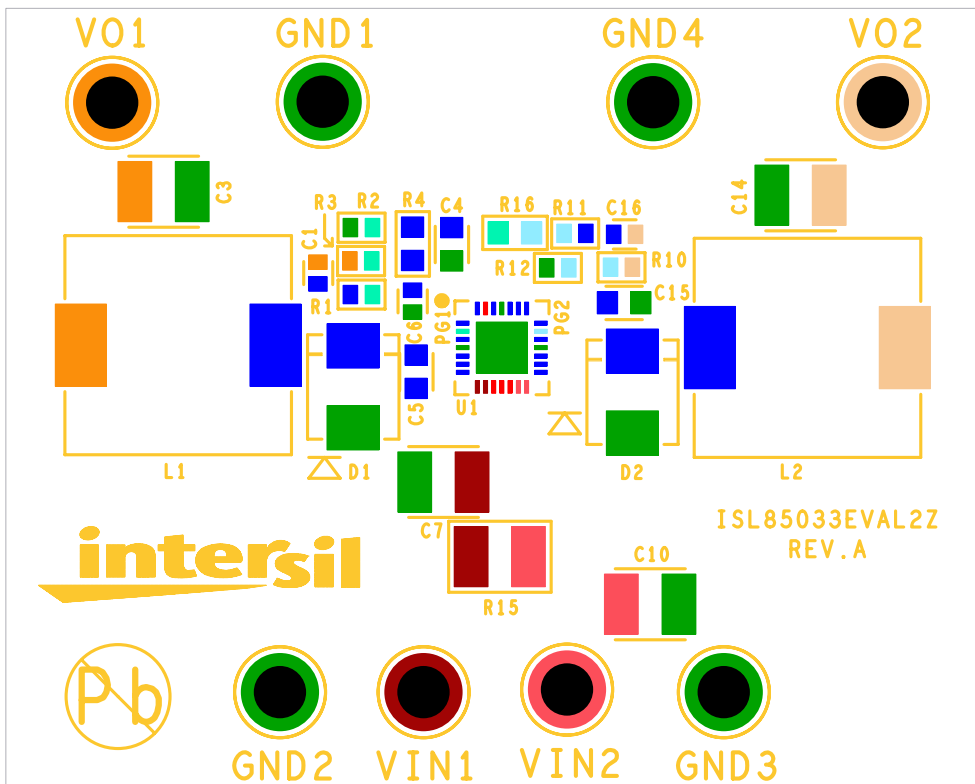


FIGURE 4. TOP SILK SCREEN

ISL85033EVAL2Z Board Layout (Continued)

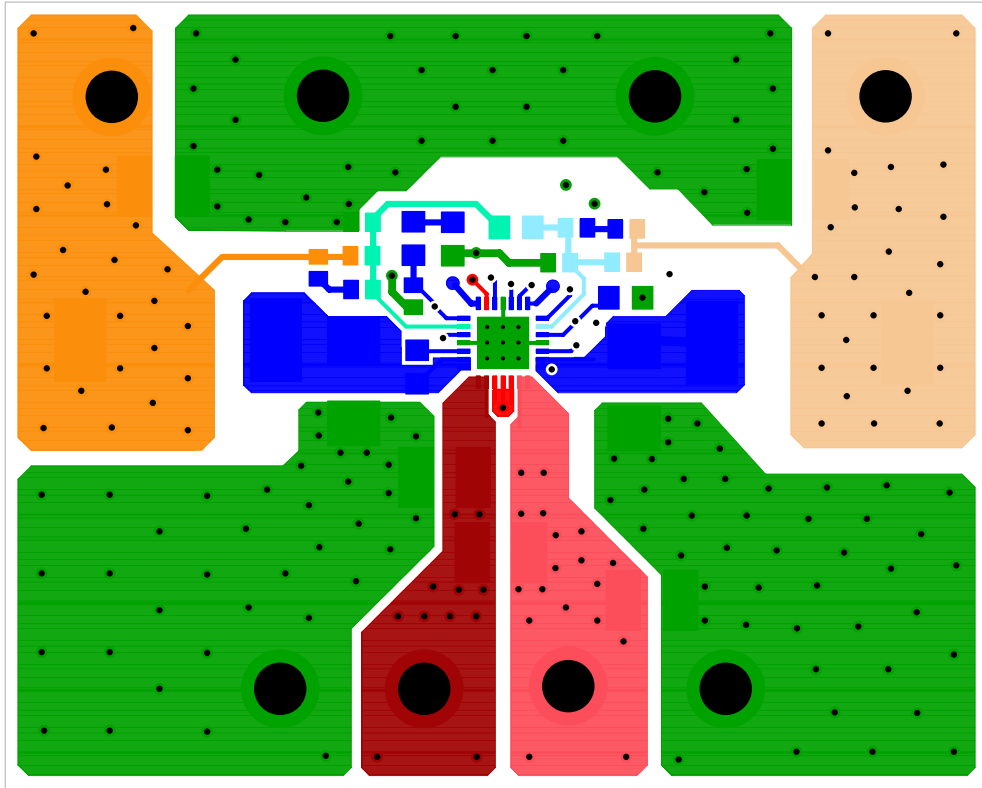


FIGURE 5. TOP LAYER COMPONENT SIDE

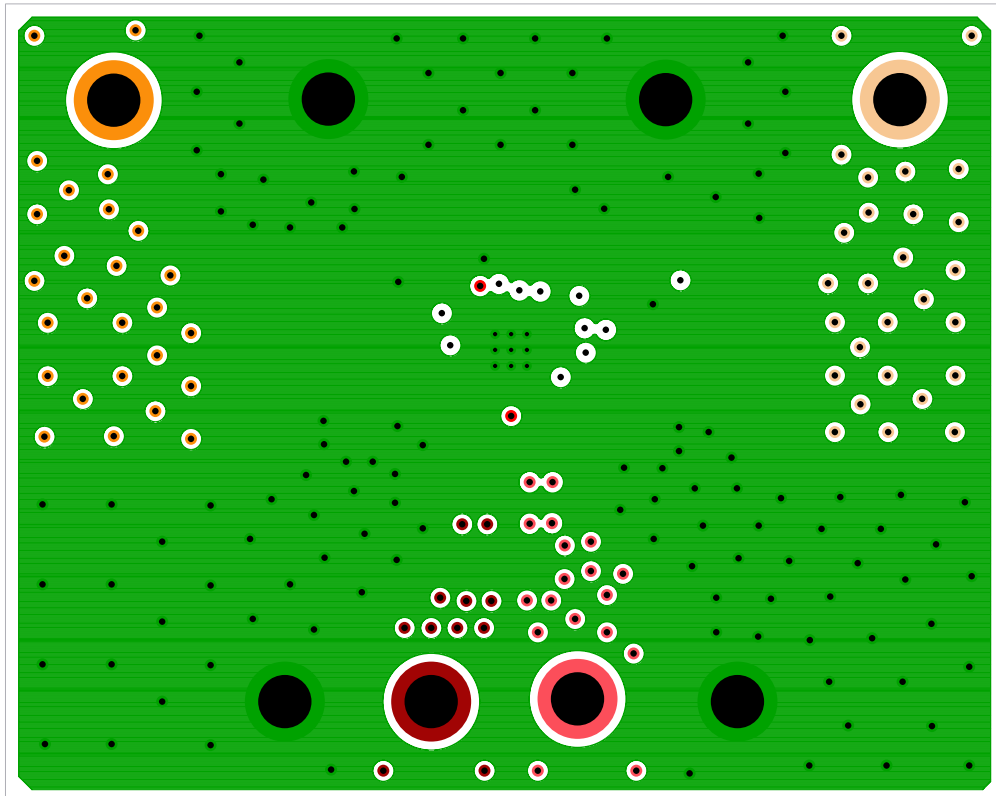


FIGURE 6. LAYER 2

ISL85033EVAL2Z Board Layout (Continued)

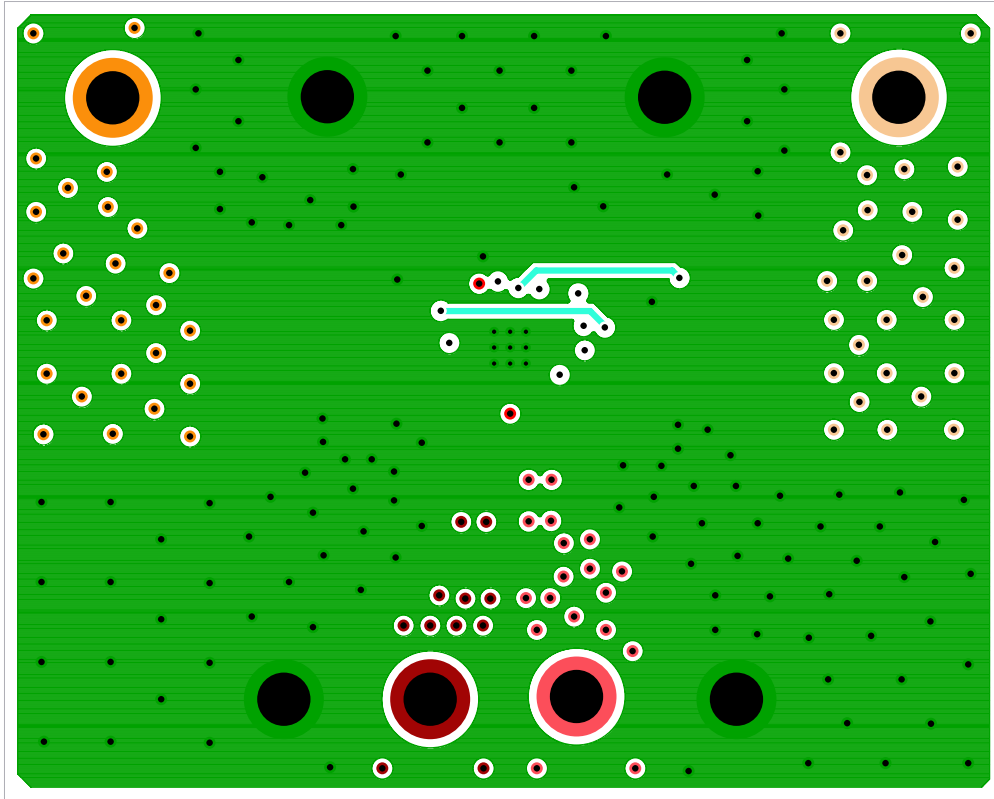


FIGURE 7. LAYER 3

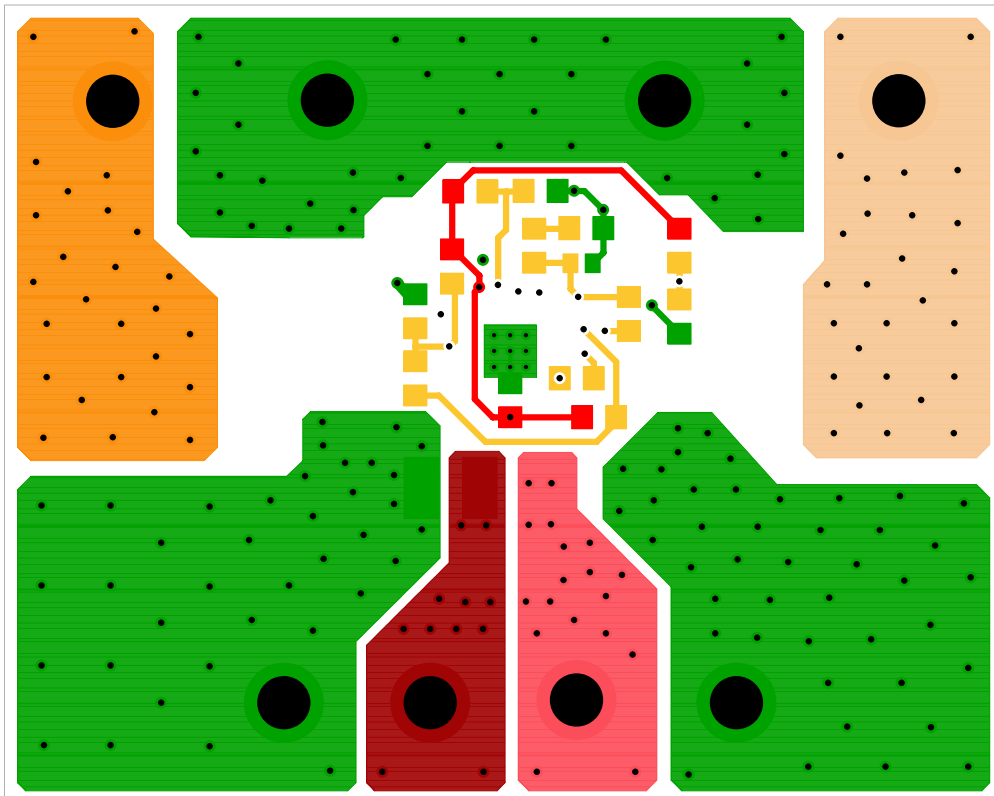


FIGURE 8. BOTTOM LAYER SOLDER SIDE



ISL85033EVAL2Z Board Layout (Continued)

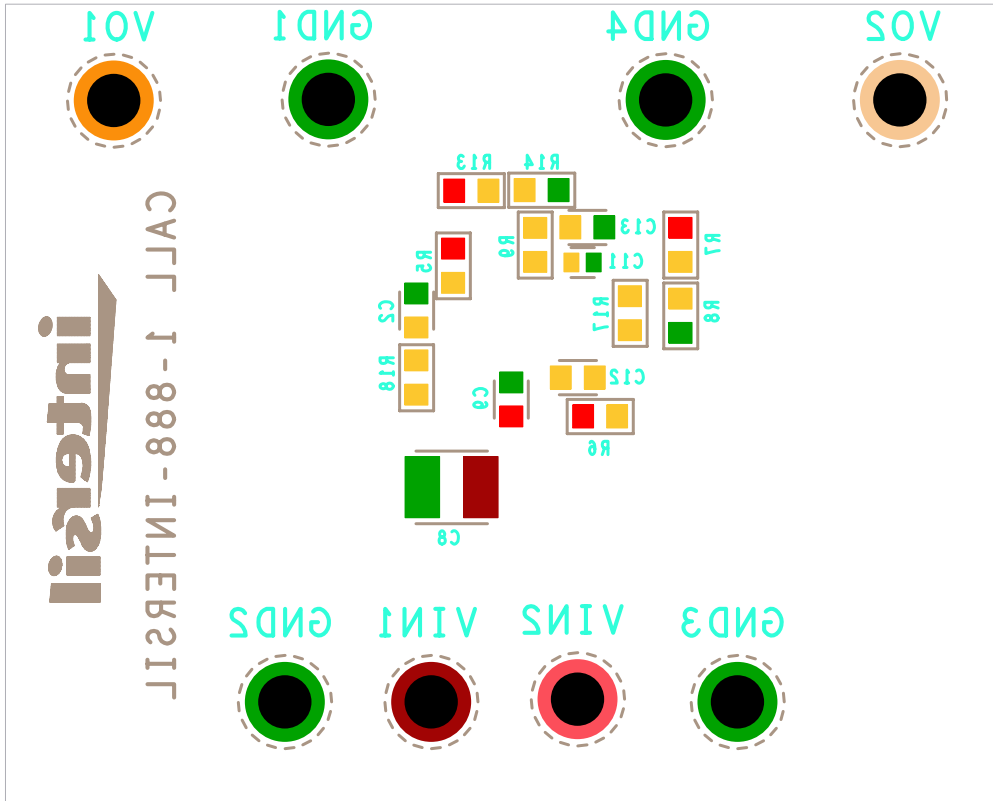


FIGURE 9. BOTTOM SILK SCREEN

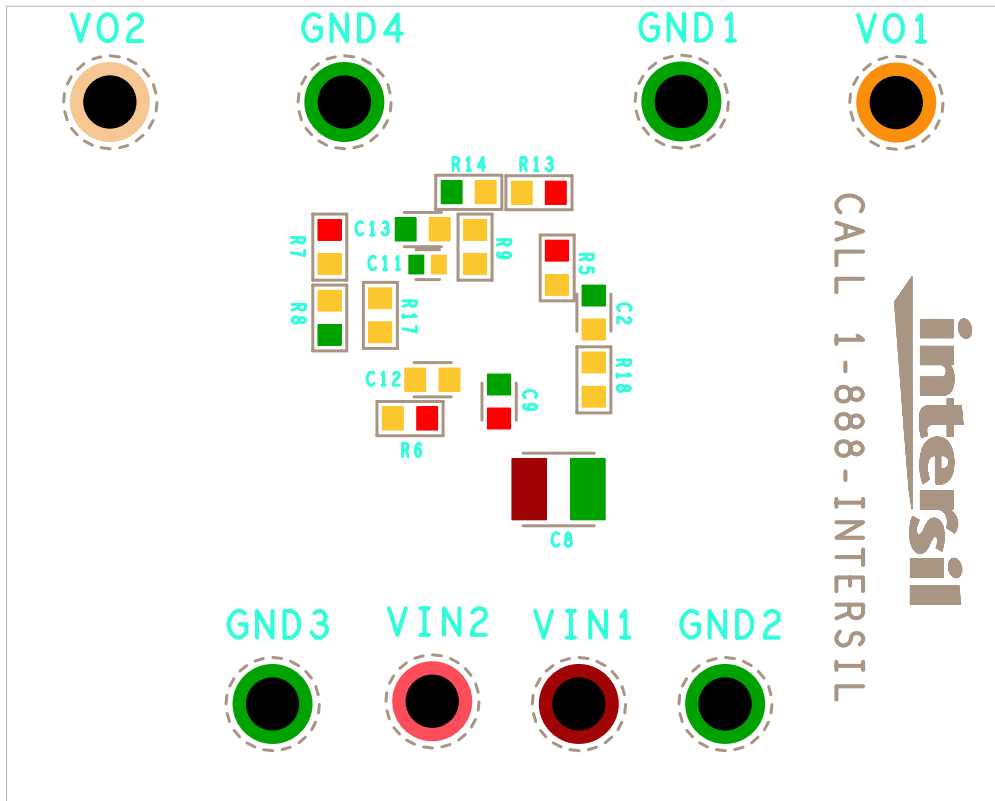
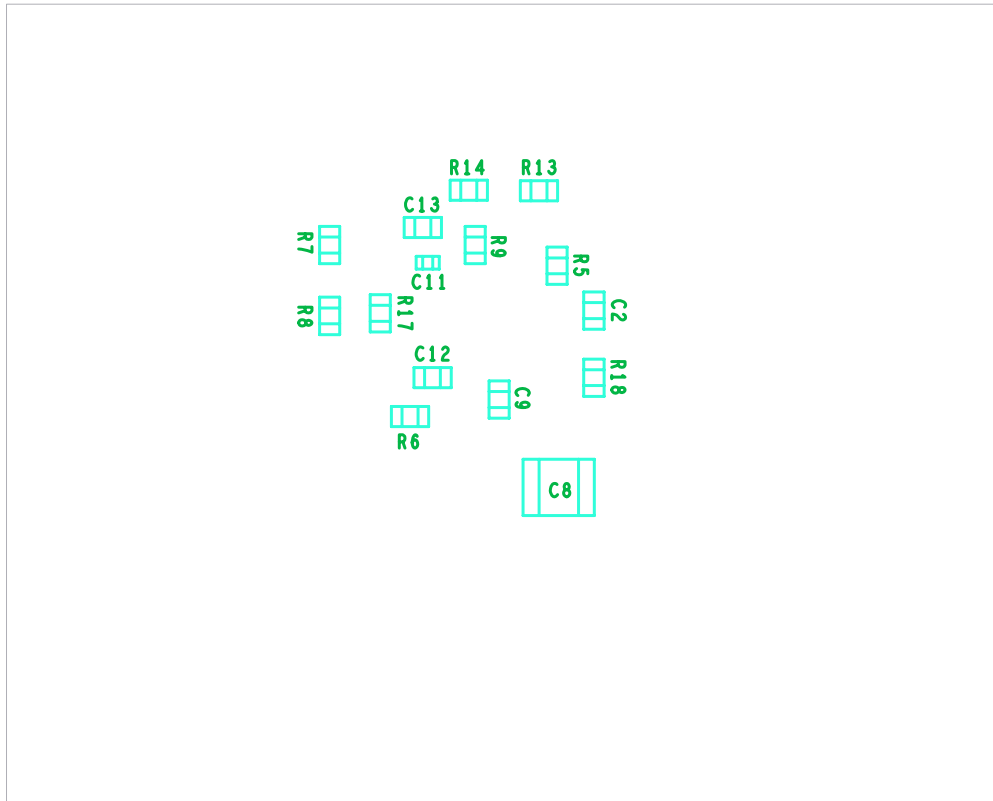


FIGURE 10. BOTTOM SILK SCREEN

**ISL85033EVAL2Z Board Layout** (Continued)



**FIGURE 11. BOTTOM ASSEMBLY**

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