

# ISL6445 Evaluation Board User Guide

## Hardware Description

The ISL6445EVAL3Z evaluation board is designed to demonstrate the performance of the ISL6445.

The ISL6445 is a high-performance, dual-output PWM controller optimized for converting wall adapter, battery or network intermediate bus DC input supplies into the system supply voltages required for a wide variety of applications. Each output is adjustable down to 0.8V. The two PWMs are synchronized 180° out-of-phase reducing the RMS input current and ripple voltage.

## ISL6445 Reference Design

The ISL6445 evaluation board illustrates the operation of the IC. The design criteria is listed in Table 1.

TABLE 1. DESIGN CRITERIA

| PARAMETERS                    | PACKAGE |
|-------------------------------|---------|
| Output voltage ( $V_{OUT1}$ ) | 3.3V    |
| Output current ( $I_{OUT1}$ ) | 3A      |
| Output voltage ( $V_{OUT2}$ ) | 2.5V    |
| Output current ( $I_{OUT2}$ ) | 3A      |

### Power and Load Connections

If using an input supply ranging from 5.6V to 24V, connect the supply to  $V_{IN}$  (P1) and GND (P2) posts as shown in Figure 1. ISL6445 has an internal +5V linear regulator which can be used to bias the IC.

When using a  $5V \pm 10\%$  input supply, connect the negative polarity to GND (P2) post and connect the positive polarity of the power supply to both  $V_{IN}$  (P1) post and the VCC5 (TP1) post. This will disable the internal LDO and the chip will be powered by the input power supply (see Figure 2).

**CAUTION:** Ensure that the +5V terminal is not connected to when applying voltages > 7V. This can damage the IC.

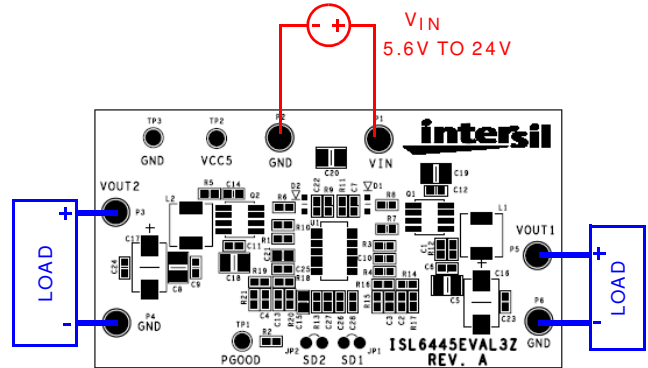


FIGURE 1. POWER AND LOAD CONNECTIONS FOR 5.6V TO 24V INPUT VOLTAGE

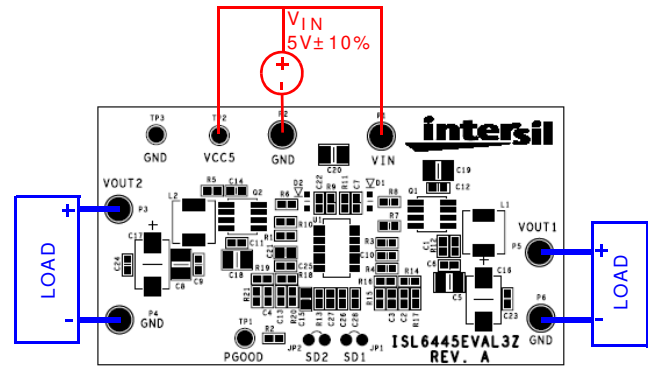


FIGURE 2. POWER AND LOAD CONNECTIONS FOR  $5V \pm 10\%$  INPUT VOLTAGE

### Test-point and Terminals Descriptions

TABLE 2. ISL6445EVAL3Z TEST POINT DESCRIPTION

| TEST POINTS AND TERMINALS | SIGNALS    |
|---------------------------|------------|
| TP1                       | PGOOD      |
| TP2                       | VCC5       |
| TP3                       | GND        |
| P1                        | $V_{IN}$   |
| P2                        | GND        |
| P3                        | $V_{OUT2}$ |
| P4                        | GND        |
| P5                        | $V_{OUT1}$ |
| P6                        | GND        |

## Typical Performance Curves

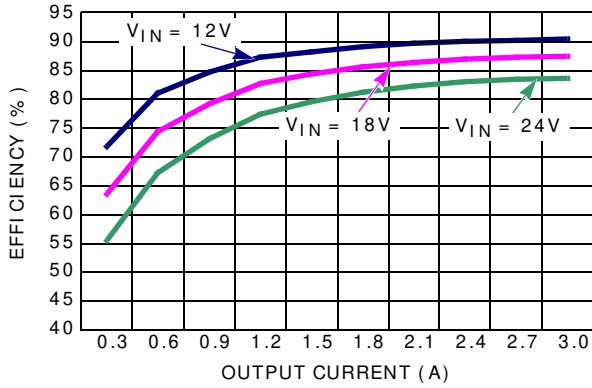


FIGURE 3. EFFICIENCY FOR  $V_{OUT1}$  ( $V_{OUT2}$  IS DISABLED)

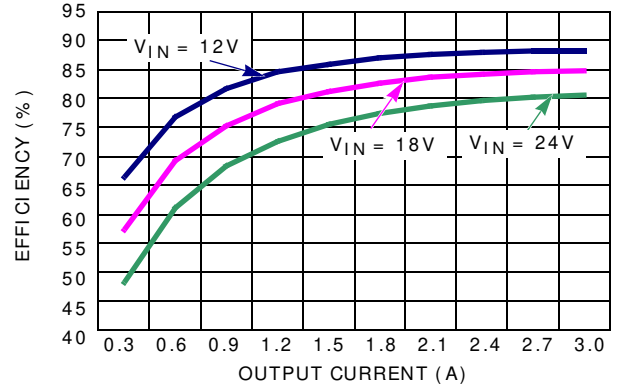


FIGURE 4. EFFICIENCY FOR  $V_{OUT2}$  ( $V_{OUT1}$  IS DISABLED)

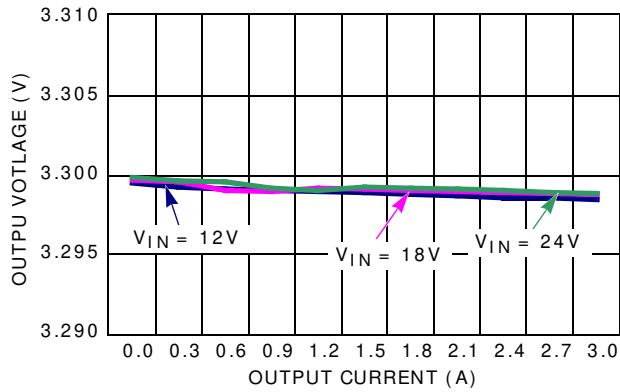


FIGURE 5.  $V_{OUT1}$  (3.3V) REGULATION

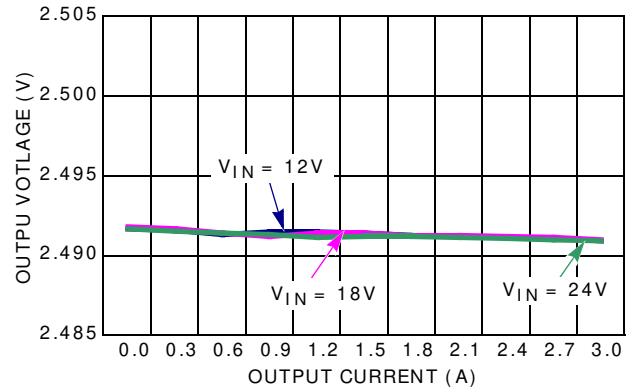


FIGURE 6.  $V_{OUT2}$  (2.5V) REGULATION

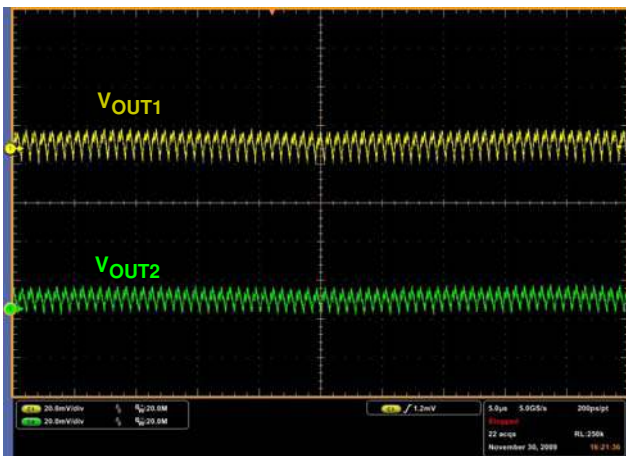


FIGURE 7. OUTPUT RIPPLES AT FULL LOAD (20BW); INPUT VOLTAGE = 12V



FIGURE 8. SOFT-START WAVEFORMS

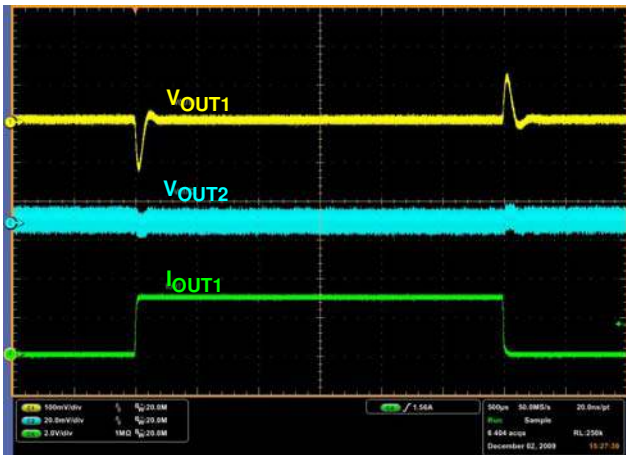


FIGURE 9. LOAD TRANSIENT:  
 INPUT VOLTAGE = 12V,  
 $I_{OUT1} = 0A \leftrightarrow 3A$ ,  $I_{OUT2} = 3A$

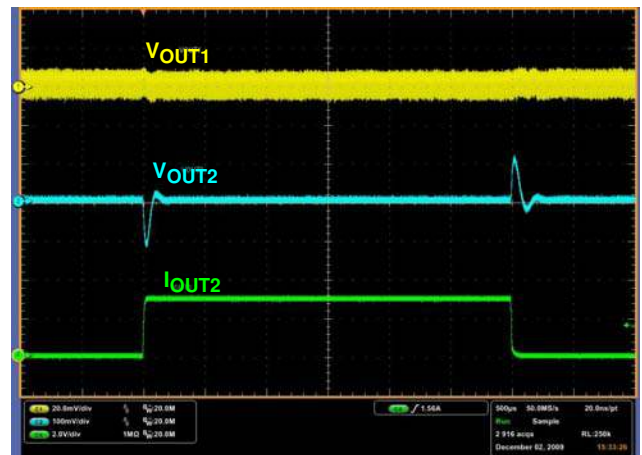


FIGURE 10. LOAD TRANSIENT:  
 INPUT VOLTAGE = 12V,  
 $I_{OUT1} = 3A$ ,  $I_{OUT2} = 0A \leftrightarrow 3A$

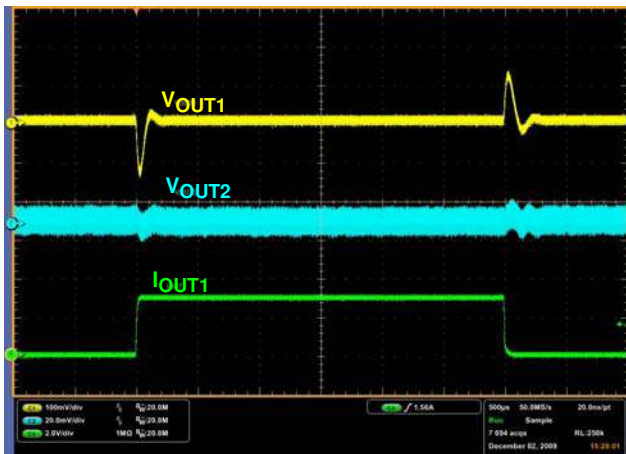


FIGURE 11. LOAD TRANSIENT:  
 INPUT VOLTAGE = 18V,  
 $I_{OUT1} = 0A \leftrightarrow 3A$ ,  $I_{OUT2} = 3A$

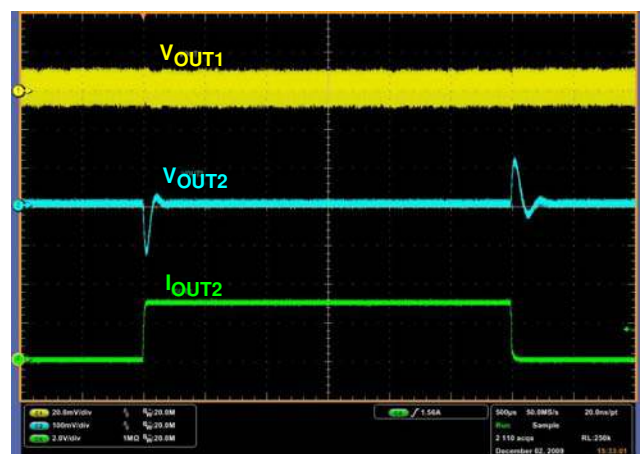


FIGURE 12. LOAD TRANSIENT:  
 INPUT VOLTAGE = 18V,  $I_{OUT1} = 3A$ ,  
 $I_{OUT2} = 0A \leftrightarrow 3A$

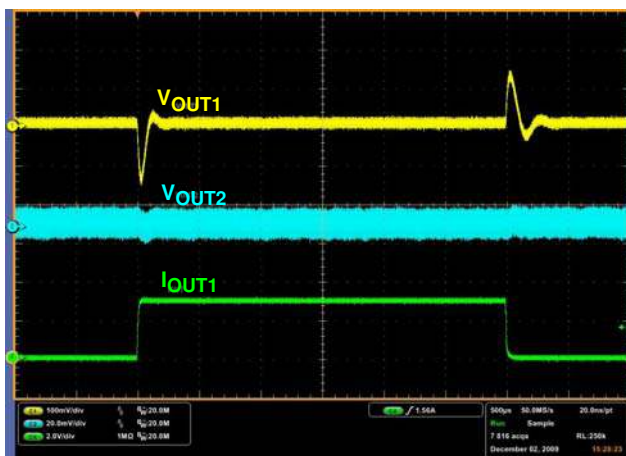


FIGURE 13. LOAD TRANSIENT:  
 INPUT VOLTAGE = 24V,  
 $I_{OUT1} = 0A \leftrightarrow 3A$ ,  $I_{OUT2} = 3A$

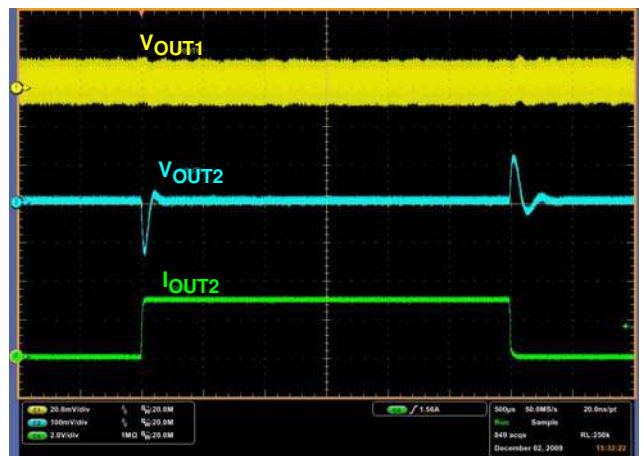
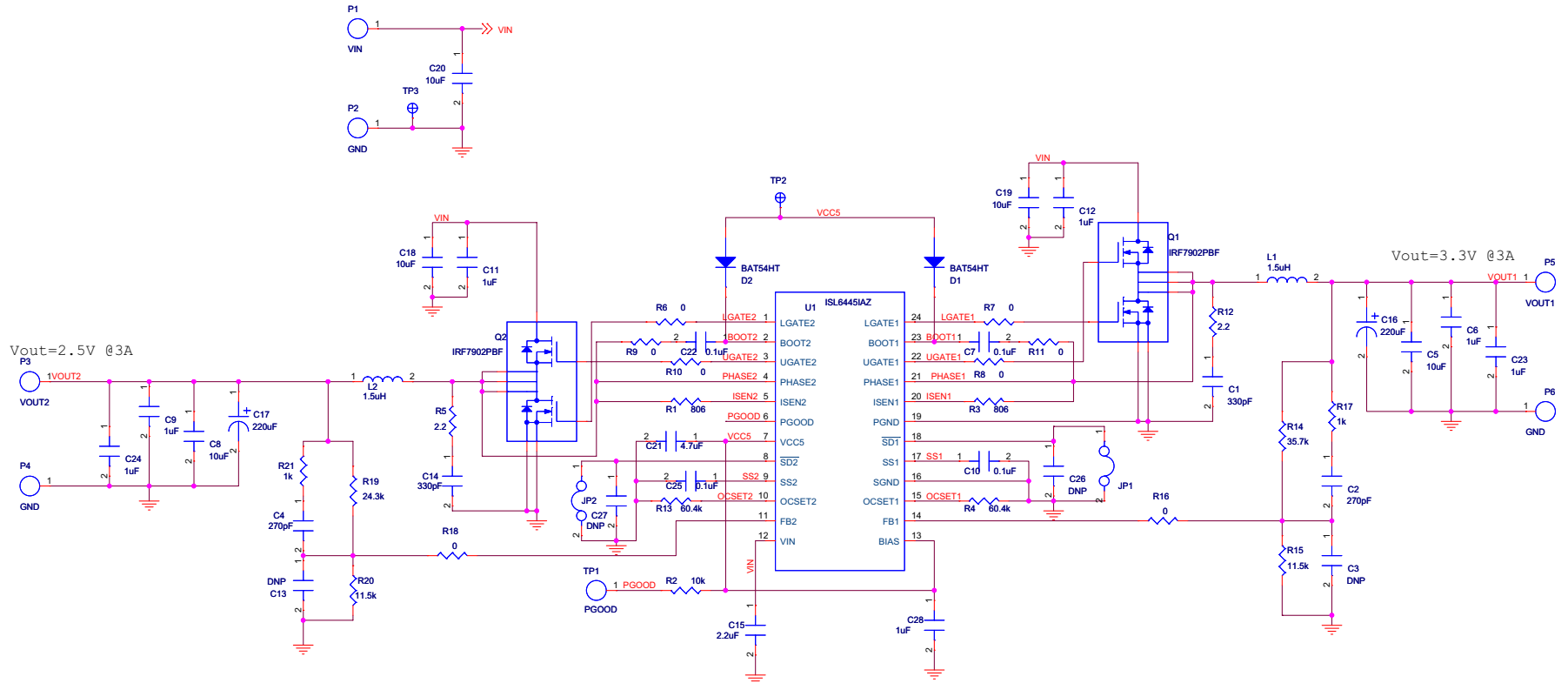


FIGURE 14. LOAD TRANSIENT:  
 INPUT VOLTAGE = 24V,  
 $I_{OUT1} = 3A$ ,  $I_{OUT2} = 0A \leftrightarrow 3A$

# ISL6445EVAL3Z Schematic



ISL6445EVAL3Z Rev. A Bill of Materials

| ID         | REFERENCE                          | QTY | PART NUMBER   | PART TYPE                  | DESCRIPTION                           | PACKAGE    | VENDOR                  |
|------------|------------------------------------|-----|---------------|----------------------------|---------------------------------------|------------|-------------------------|
| 1          | U1                                 | 1   | ISL6445IAZ    | Dual PWM Controller        | IC, Dual PWM Controller               | 24 Ld QSOP | Intersil                |
| 2          | Q1, Q2                             | 2   | IRF7902PBF    | MOSFET, Dual               | Dual 30V N-channel MOSFET             | SO-8       | International Rectifier |
| 3          | D1, D2                             | 2   | BAT54HT1G-T   | Diode, Schottky            | 30V, 200mA                            | SOD-323    | On Semi                 |
| 4          | L1, L2                             | 2   | FP3-1R5-R     | Inductor                   | 1.5μH, 20%, 6.2A                      | SMD        | Coiltronics             |
| CAPACITORS |                                    |     |               |                            |                                       |            |                         |
| 5          | C1, C14                            | 2   |               | Capacitor, Ceramic, X7R    | 330pF, 10%, 50V                       | SM_0603    | Various                 |
| 6          | C2, C4                             | 2   |               | Capacitor, Ceramic, X7R    | 270pF, 10%, 50V                       | SM_0603    | Various                 |
| 7          | C5, C8                             | 2   |               | Capacitor, Ceramic, X5R    | 10μF, 10%, 16V                        | SM_1206    | Various                 |
| 8          | C6, C9, C11, C12, C23, C24, C28    | 7   |               | Capacitor, Ceramic, X5R    | 1μF, 10%, 25V                         | SM_0603    | Various                 |
| 9          | C7, C10, C22, C25                  | 4   |               | Capacitor, Ceramic, X7R    | 0.1μF, 10%, 50V                       | SM_0603    | Various                 |
| 10         | C15                                | 1   |               | Capacitor, Ceramic, X5R    | 2.2μF, 20%, 25V                       | SM_805     | Various                 |
| 11         | C16, C17                           | 2   | 6TPE220MI     | Capacitor, POSCAP          | 220μF, 20%, 6.3V, 0.018Ω              | Case D2E   | SANYO                   |
| 12         | C18, C19, C20                      | 3   |               | Capacitor, Ceramic, X7R    | 10μF, 10%, 25V                        | SM_1210    | Various                 |
| 13         | C21                                | 1   |               | Capacitor, Ceramic, X5R    | 4.7μF, 10%, 16V                       | SM_0805    | Various                 |
| 14         | C3, C13, C26, C27                  |     |               | Do not populate            |                                       |            |                         |
| RESISTORS  |                                    |     |               |                            |                                       |            |                         |
| 15         | R1, R3                             | 2   |               | Resistor, Film             | 806Ω, 1%, 1/10W                       | SM_0603    | Panasonic/Generic       |
| 16         | R2                                 | 1   |               | Resistor, Film             | 10kΩ, 1%, 1/10W                       | SM_0603    | Panasonic/Generic       |
| 17         | R4, R13                            | 2   |               | Resistor, Film             | 60.4kΩ, 1%, 1/16W                     | SM_0603    | Panasonic/Generic       |
| 18         | R5, R12                            | 2   |               | Resistor, Film             | 2.2Ω, 1%, 1/10W                       | SM_0603    | Panasonic/Generic       |
| 19         | R6, R7, R8, R9, R10, R11, R16, R18 | 8   |               | Resistor, Film             | 0Ω, 1/10W                             | SM_0603    | Panasonic/Generic       |
| 20         | R14                                | 1   |               | Resistor, Film             | 35.7kΩ, 1%, 1/10W                     | SM_0603    | Panasonic/Generic       |
| 21         | R15, R20                           | 2   |               | Resistor, Film             | 11.5kΩ, 1%, 1/10W                     | SM_0603    | Panasonic/Generic       |
| 22         | R17, R21                           | 2   |               | Resistor, Film             | 1kΩ, 1%, 1/10W                        | SM_0603    | Panasonic/Generic       |
| 23         | R19                                | 1   |               | Resistor, Film             | 24.3kΩ, 1%, 1/10W                     | SM_0603    | Panasonic/Generic       |
| OTHERS     |                                    |     |               |                            |                                       |            |                         |
| 23         | P1 - P6                            | 6   | 1514-2        | Turrett Post               | Terminal post, through hole, 1/4 inch | PTH        | Keystone                |
| 24         | TP1, TP2, TP3                      | 3   | 5002          | TEST POINT vertical, white | PC test jack                          | PTH        | Keystone                |
| 25         | JP1, JP2                           | 2   | 68000-236-1X2 | Header                     | 1X2 Break Strip GOLD                  |            |                         |

## ISL6445EVAL3Z Printed Circuit Board Layers

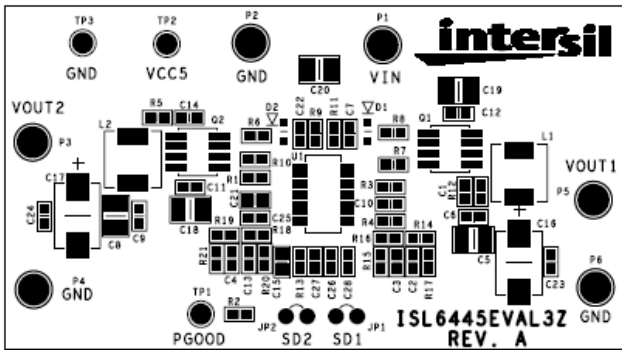


FIGURE 15. ISL6445EVAL3Z - TOP LAYER (SILKSCREEN)

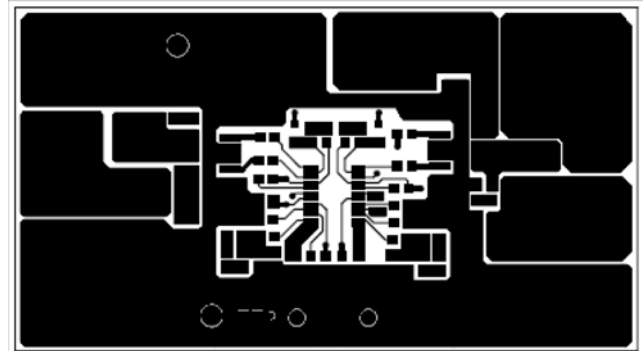


FIGURE 16. ISL6445EVAL3Z - TOP LAYER (COMPONENT SIDE)

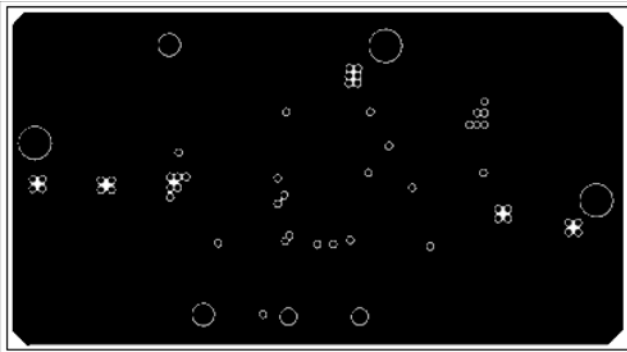


FIGURE 17. ISL6445EVAL3Z - LAYER 2

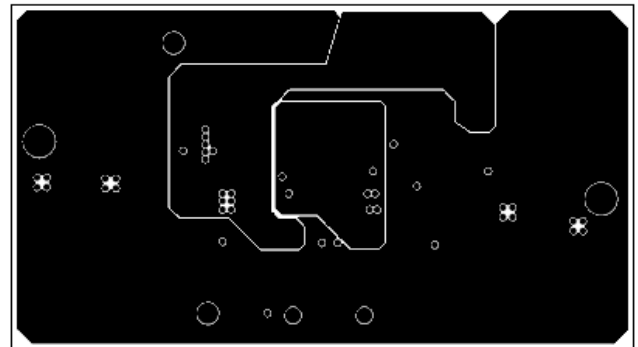


FIGURE 18. ISL6445EVAL3Z - LAYER 3

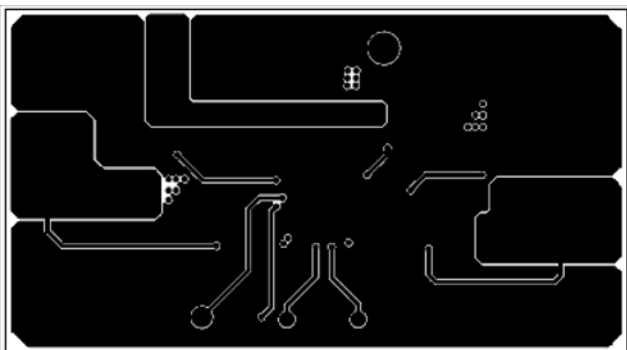


FIGURE 19. ISL6445EVAL3Z - BOTTOM LAYER (SOLDER SIDE)



FIGURE 20. ISL6445EVAL3Z - BOTTOM LAYER (SILKSCREEN)

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