

ISL6236EVAL2

Evaluation Kit – Chipset Application

AN1272
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This application note describes the ISL6236 evaluation board intended for applications in notebook computers and other battery-powered devices.

Description

As notebook computer and battery-powered equipment complexity increases, higher levels of power management integration are required to meet market demands. To respond to the dynamic needs of its customers, Intersil introduces the quad outputs, multi-function power supply controller ISL6236. Its two fully programmable switch-mode power supplies (SPMS), one programmable and one fixed LDO outputs provide a robust power management solution for an extremely wide range of applications. For more information on the detailed workings of the ISL6236, please consult the ISL6236 Data Sheet on the Intersil Company website:

<http://www.intersil.com>

What's Inside

The Evaluation Board Kit contains the following materials:

- ISL6236 EVAL2 REV A Board
- ISL6236 Data Sheet
- ISL6236 Application Note (this document)

What's Needed

The following materials will be needed to perform testing:

- +25V, 20A Power Supply
- +5.0V, 750mA Power Supply
- Electronic Load up to 15A
- Precision Digital Multimeter
- 4-Channel Oscilloscope

Note: Amperage rating of power supplies are determined by maximum expected loading plus a percentage margin of error.

Quick Setup Guide

1. Set the +25V power supply to +7V and place in the "STANDBY" or "OFF" position. Connect the positive terminal (+) of the supply to the +VIN terminal P1 and the negative terminal (-) of the supply to GND P2.
2. Connect the positive terminal (+) of the electronic load to the VOUT1 terminal P5. Connect the negative terminal (-) of the electronic load to the GND terminal P6. Make sure the electronic load is set to the 0A condition.
3. Check to ensure all switches are in their default positions prior to application of power (refer to "Detailed Description of Switch Settings" on page 2).
4. Set all power supplies to the "ON" position. Check both 5V and 25V power supply outputs with a DMM to ensure correct voltage levels. Adjust if necessary.
5. Measure the default output voltages using DMM across the test points.
 - VOUT1: P7(+) to P8(-), it should read 1.5V
 - VOUT2: P5(+) to P6(-), It should read 1.05V
 - LDO: P3(+) to P4(-), It should read 3.3V
 - VREF3: P14(+) to P8(-), It should read 3.3V

At this point, the board has been properly powered up. Normal testing can begin.

Summary

The ISL6236EVAL2 is an adaptable evaluation tool which showcases the performance of the ISL6236 chipset designed to meet the power management requirements of personal notebook computers or portable devices.

The following pages provide jumper settings, pinout, schematic of the board, bill of materials and layout drawings to support implementation of this solution.

The Intersil's total power management portfolio continues to expand with new selections to better fit our customer's needs. Refer to our web site for updated information:

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For technical assistance or other assistance please call 1-888-INTERSIL (468-3774).

How to Change Output Settings

Use following tables to change the adjustable outputs.

TABLE 1.

| V _{OUT1} | FUNCTION |
|-------------------|------------------------------------|
| 5V | FB1 = GND, Default |
| 1.5V | FB1 = VCC |
| 0.7V to 5.5V | VFB*(1 + R11/R12) where VFB = 0.7V |

TABLE 2.

| V _{OUT2} | FUNCTION |
|-------------------|--|
| 3.3V | REFIN2 = VCC, Default |
| 1.05V | REFIN2 = V _{REF3} |
| 0.5V to 2.5V | V _{REFIN2} , where V _{REFIN2} = 0.5V to 2.5V |

TABLE 3.

| LDO | FUNCTION |
|--------------|---|
| 5V | LDOREFIN = GND, Default |
| 3.3V | LDOREFIN = VCC |
| 0.7V to 4.5V | 2xVLDOREFIN, where VLDOREFIN = 0.35V to 2.25V |

Detailed Description of Switch Settings

TABLE 4.

| SW1 | EN2 | FUNCTION |
|-----|------|---|
| 1 | GND | V _{OUT2} shut down |
| 2 | VCC* | V _{OUT2} Active |
| 3 | REF | V _{OUT2} sequence to V _{OUT1} |

TABLE 5.

| SW2 | SKIP | FUNCTION |
|-----|------|--|
| 1 | GND | Normal operational mode, automatic switch over to Pulse Skipping at light load |
| 2 | VCC* | Low Noise, fixed-frequency PWM |
| 3 | REF | Normal Operation Mode with Ultrasonic Pulse-skipping, 20kHz min. |

TABLE 6.

| SW3 | EN_LDO | FUNCTION |
|-----|--------|---------------|
| 1 | GND | LDO shut down |
| 2 | VCC* | LDO Active |
| 3 | N/C | No Connect |

TABLE 7.

| SW4 | BYP | FUNCTION |
|-----|---------------------|---|
| 1 | GND | Set BYP to 0V, No LDO switchover |
| 2 | V _{OUT1} * | Bypasses LDO Voltage with V _{OUT1} |
| 3 | V _{OUT2} | Bypasses LDO Voltage with V _{OUT2} |

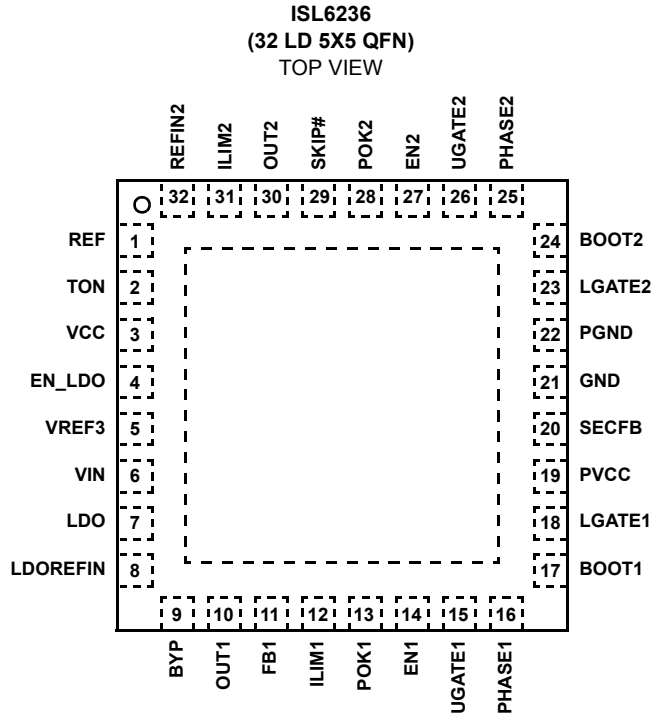
TABLE 8.

| SW5 | EN1 | FUNCTION |
|-----|------|---|
| 1 | GND | V _{OUT1} Shutdown |
| 2 | VCC* | V _{OUT1} Active |
| 3 | REF | V _{OUT1} sequence to V _{OUT2} |

NOTE: * Indicates default settings.

For all switches, only toggle one position at a time and use break-before-make sequencing to avoid shorting VCC to GND.

Pinout



ISL6236 Evaluation Board Top and Bottom View

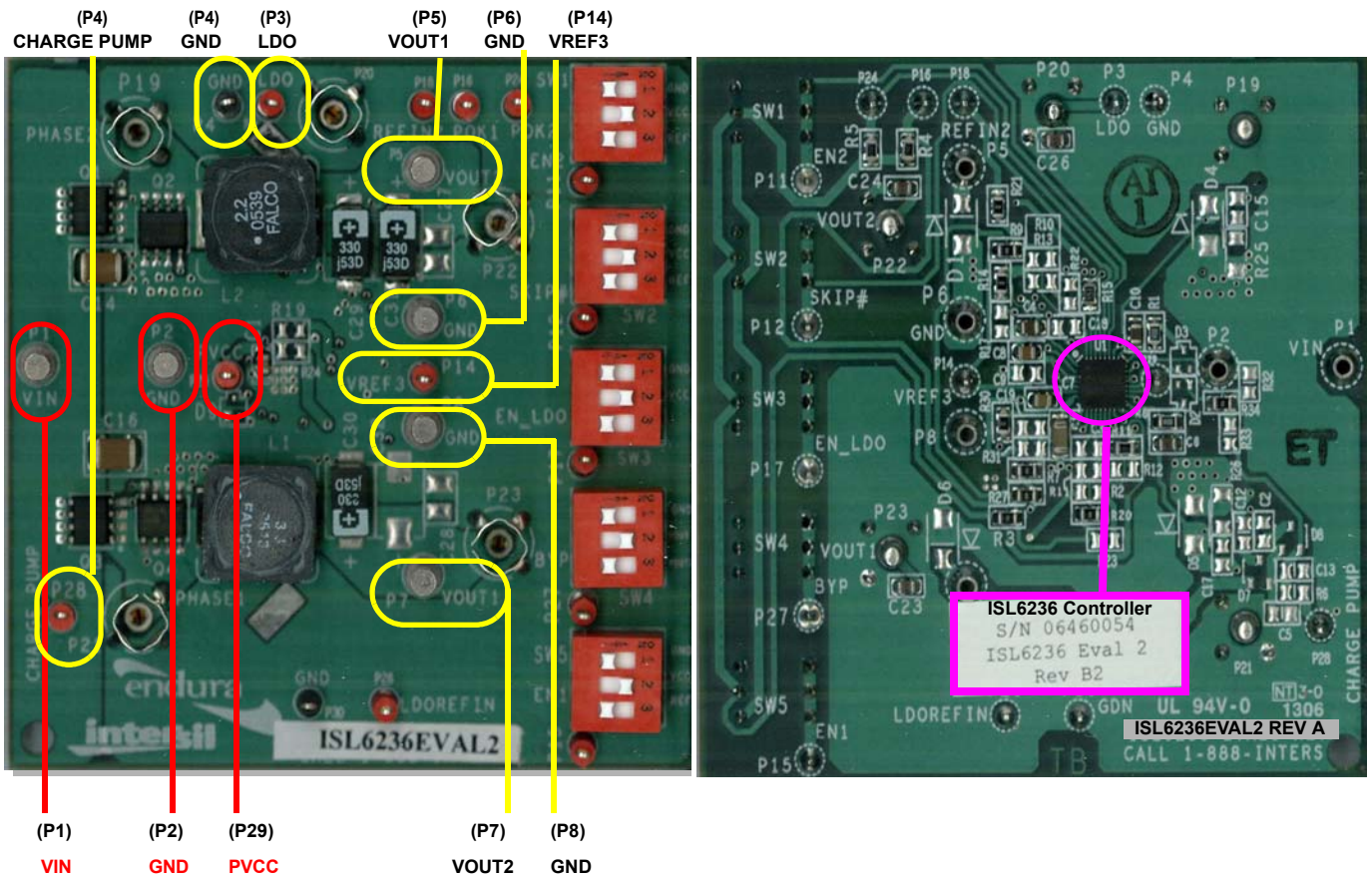
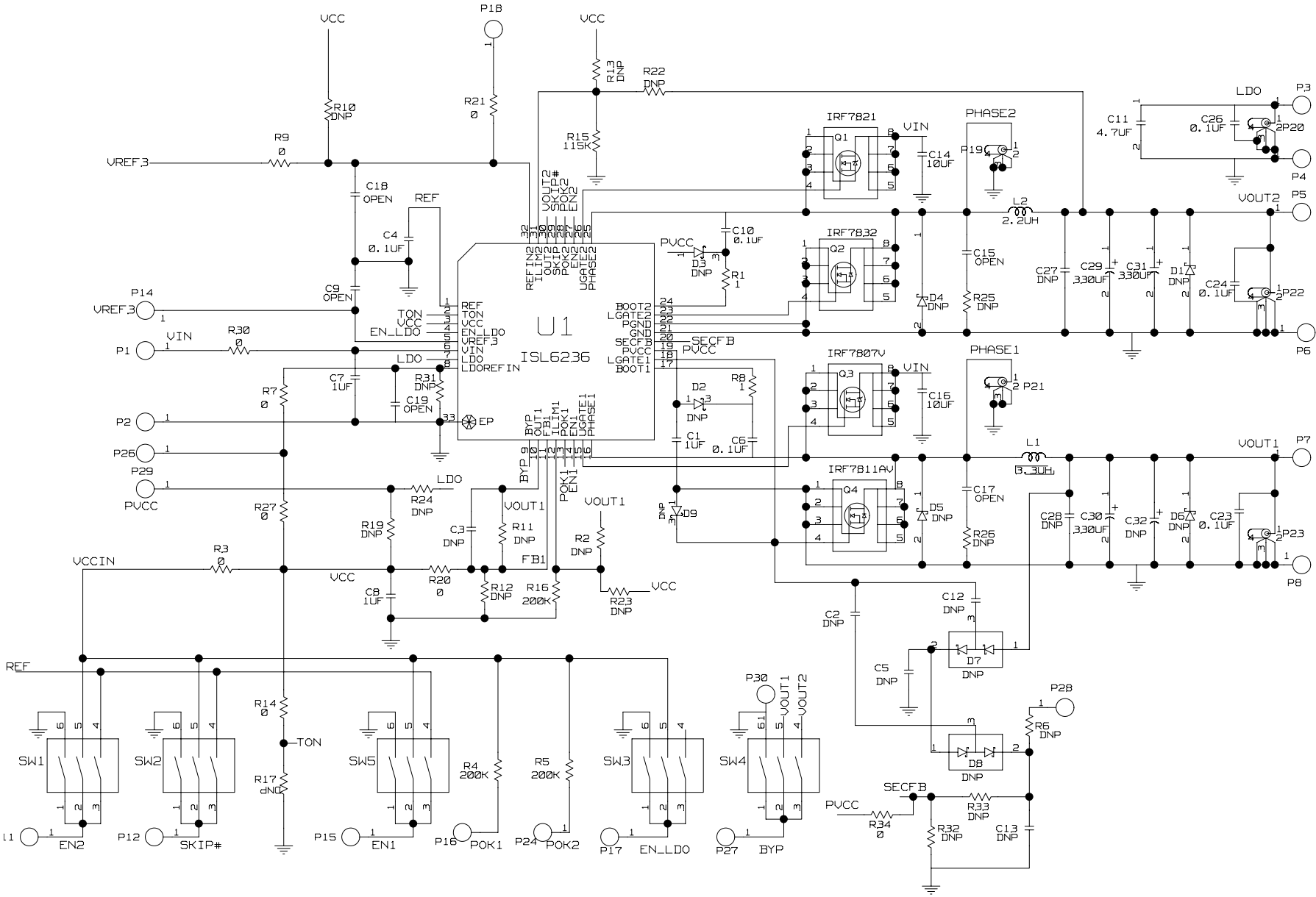


FIGURE 1. ISL6236EVAL2 REV B EVALUATION BOARD TOP AND BOTTOM VIEW

ISL6236EVAL2-Kit Schematic



Components List

| REF DES | PART NUMBER | QTY | MANUFACTURER | DESCRIPTION |
|--|--------------------|-----|--------------|---|
| C1, C7, C8 | 08053D105KAT2A | 3 | AVX | 1 μ F, 25V, X7R, 0805 |
| C11 | H1065-00475-10V10 | 1 | GENERIC | 4.7 μ F, 10V X5R 1206 |
| C14, C16 | TMK432BJ106KM | 2 | TAIYO-YUDEN | 10 μ F, 25V X5R 1210 |
| C2, C4, C5, C6, C10, C12, C13, C23, C24, C26 | H1046-00104-50V10 | 10 | GENERIC | 0.1 μ F, 50V, X7R, 0805 |
| C27, C28 | OPEN | 0 | | |
| C29, C30 | 6TPD330M | 2 | POSCAP SANYO | 330 μ F, 6.3V, POS CAP 9m Ω , D size |
| C3, C9, C15, C17, C18, C19 | OPEN | 0 | | |
| C31, C32 | OPEN | 0 | POSCAP | |
| D1, D4 to D6 | OPEN | 0 | DIODES-INC | |
| D2, D3 | OPEN | 0 | ON-SEMI | |
| D7, D8 | OPEN | 0 | DIODES | 0.2A, 30V, Schottky SOT23 |
| D9 | Open | 0 | ON-SEMI | 2A, 30V, Schottky SOT23 |
| L1 | SD1009 | 1 | FALCO | 3.3 μ H, 6m Ω , 12.5mmx12.5mm Shielded |
| L2 | SD1004 | 1 | FALCO | 2.2 μ H, 5m Ω , 12.5mmx12.5mm Shielded |
| P1, P2, P5 to P8 | 1514-2 | 6 | KEYSTONE | Test Point Turret 0.150 Pad 0.100 Thole |
| P19 to P23 | 131-4353-00 | 5 | TEKTRONIX | Scope Probe Test Point PCB Mount |
| P3, P11, P12, P14 to P18, P24, P26 to P29 | 5000 | 13 | KEYSTONE | Miniature Red Test Point 0.100 Pad 0.040 Thole |
| P4, P30 | 5001 | 2 | KEYSTONE | Miniature Black Test Point 0.100 Pad 0.040 Thole |
| Q1 | IRF7821 | 1 | IR | 30V 13.6A HEXFET Power MOSFET |
| Q2 | IRF7832 | 1 | IR | 30V 20A HEXFET Power MOSFET |
| Q3 | IRF7807V | 1 | IR | 30V 8.3A N-Channel Power MOSFET |
| Q4 | IRF7811AV | 1 | IR | 30V 10.8A N-Channel Power MOSFET |
| R1, R8 | H2512-00010-1/8W | 2 | GENERIC | 1 Ω , 1%, 0805 |
| R15 | H2512-01153-1/8W1 | 1 | GENERIC | 150k Ω , 1%, 0805 |
| R2, R7, R9, R11, R13, R14, R18, R19, R20, R22, R23, R27, R34 | OPEN | 0 | | |
| R25, R26 | OPEN | 0 | | |
| R3, R10, R12, R17, R21, R24, R30, R31 | H2512-00R00-1/10W | 8 | GENERIC | 0 Ω , 1%, 0805 |
| R32 | H2512-03922-1/10W1 | 1 | GENERIC | 39.2k Ω , 1%, 0805 |
| R4, R5, R16, R33 | H2512-02003-1/10W1 | 4 | GENERIC | 200k Ω , 1%, 0805 |
| R6 | H2512-025R5-1/8W1 | 1 | GENERIC | 25.5 Ω , 1%, 0805 |
| SW1 to SW5 | 78B03S | 5 | GRAYHILL | Dip Switch SPST (Raised Slide) |
| U1 | ISL6236IRZA | 1 | INTERSIL | High-Efficiency, Quad Output Controller |

Layout

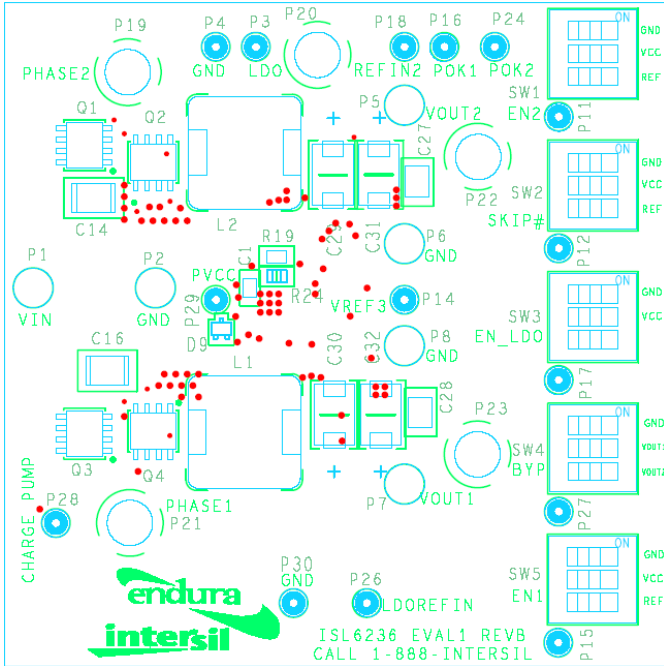


FIGURE 2. TOP COMPONENTS

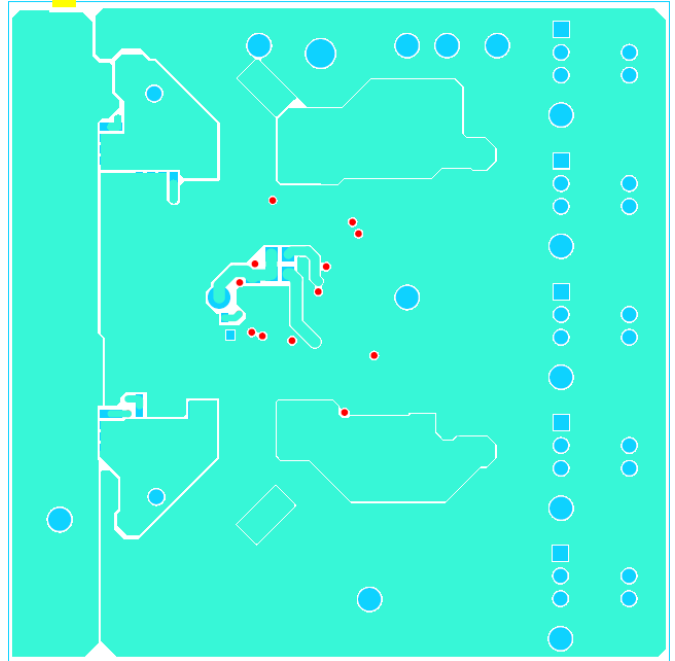


FIGURE 3. TOP ETCH

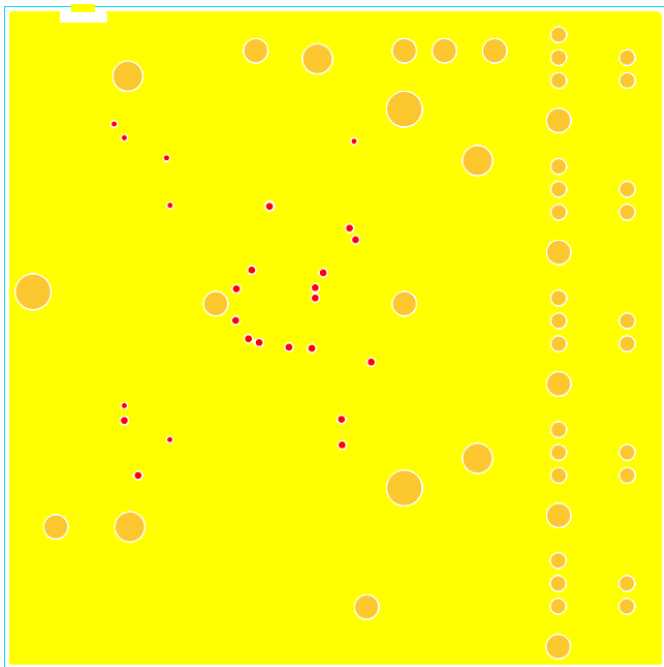


FIGURE 4. 2nd LAYER

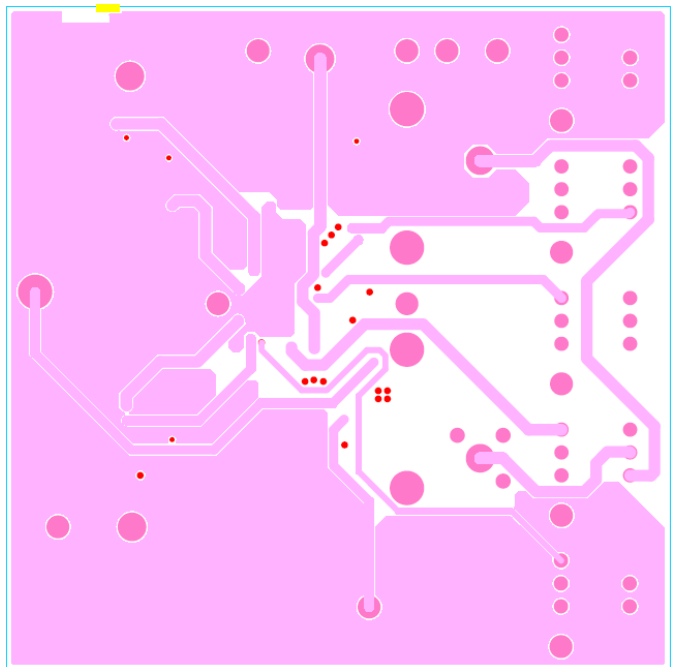


FIGURE 5. 3rd LAYER

Layout (Continued)

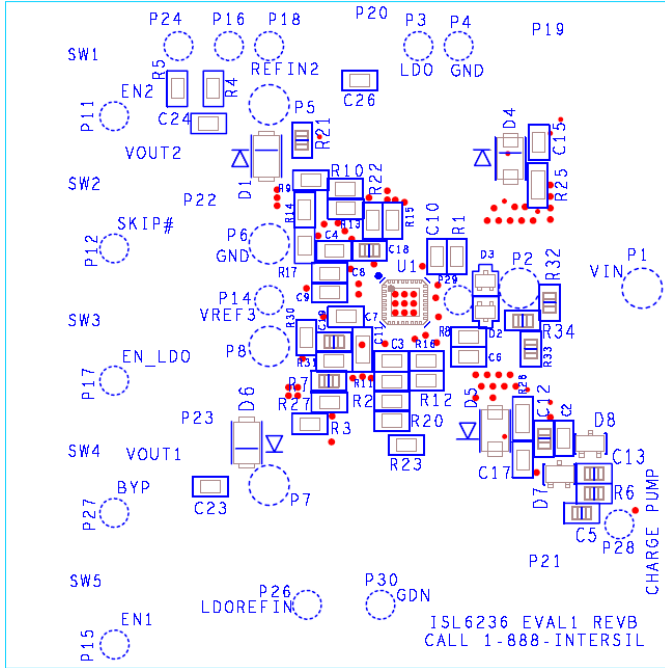


FIGURE 6. BOTTOM COMPONENTS (MIRRORED)

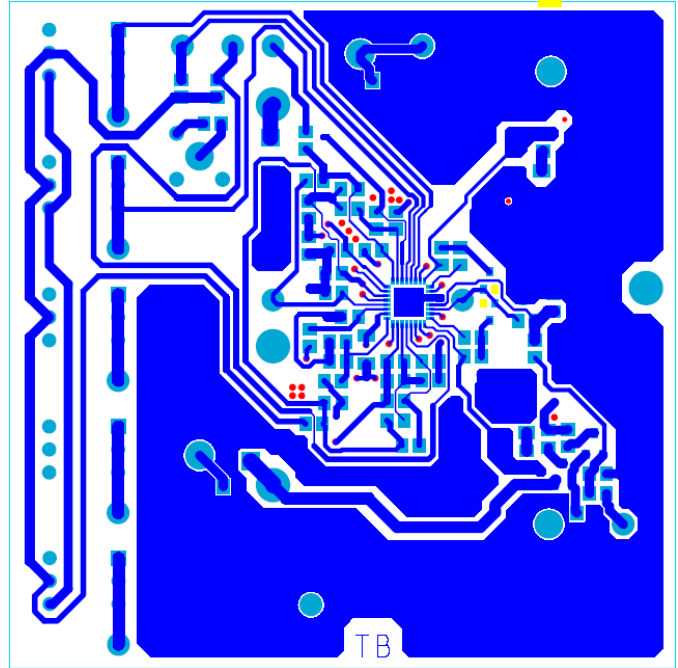


FIGURE 7. BOTTOM ETCH (MIRRORED)

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