Description

The ISL8002, ISL8002A and ISL80019, ISL80019A kits are intended for use by individuals with requirements for point-of-load applications sourcing from 2.7V to 5.5V. The ISL8002, ISL8002A and ISL80019, ISL80019A evaluation boards are used to demonstrate the performance of the ISL8002 and ISL80019, low quiescent current high efficiency synchronous buck regulator. The ISL8002, ISL8002A and ISL80019, ISL80019A are offered in a 2mmx2mm 8 Ld μTDFN package with 1mm maximum height. The complete area that the converter occupies can be as small as 0.10in².

Quick Setup Guide

1. Ensure that the circuit is correctly connected to the supply and loads prior to applying any power.
2. Connect the bias supply to VIN, the plus terminal to VIN (P4) and the negative return to PGND (P5).
3. Connect the output load to V0, the plus terminal to V0 (P7) and the negative return to PGND (P8).
4. Verify that the position is PWM or PFM for SW2.
5. Verify that the position is ON for SW1.
6. Turn on the power supply.
7. Verify the output voltage is 1.8V for V0.

Recommended Equipment

The following materials are recommended to perform testing:
- 0V to 10V power supply with at least 10A source current capability or 5V battery
- Electronic loads capable of sinking current up to 7A
- Digital multimeters (DMMs)
- 100MHz quad-trace oscilloscope
- Signal generator

Key Features

- High efficiency synchronous buck regulator with up to 95% efficiency
- 0.8% reference accuracy over-temperature/load/line
- Start-up with pre-biased output
- Internal soft-start - 1ms
- Soft-stop output discharge during disable
- 1MHz, 2MHz default frequency
- Negative OC protection

Evaluating the Other Output Voltage

The ISL8002, ISL8002A and ISL80019, ISL80019A kits outputs are preset to 1.8V for V0, however, the output voltages can be adjusted from 0.6V to 5V. The output voltage programming resistor, R₁, will depend on the desired output voltage of the regulator. The value for the feedback resistor is typically between 0Ω and 200kΩ, as shown in Equation 1.

\[
R_1 = R_2 \left( \frac{V_0}{V_{FB}} - 1 \right) 
\]  

If the output voltage desired is 0.6V, then R₂ is left unpopulated and R₁ is shorted. For faster response performance, add 10pF to 47pF in parallel to R₁. Check bode plot to insure optimum performance.

Switch Control

The ISL8002, ISL8002A and ISL80019, ISL80019A evaluation board contains SW1 and SW2 for various controls of the ISL8002, ISL8002A and ISL80019, ISL80019A circuitries. Table 2 details this function.

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>I(MAX)</th>
<th>FSW</th>
<th>VIN</th>
<th>VOUT</th>
<th>PART SIZE</th>
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<tbody>
<tr>
<td>ISL80019</td>
<td>1.5</td>
<td>1</td>
<td>2.7</td>
<td>0.6</td>
<td>2x2</td>
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<tr>
<td>ISL80019A</td>
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<td>2</td>
<td>2.7</td>
<td>0.6</td>
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<td>ISL8002</td>
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<td>2</td>
<td>0.6</td>
<td>2x2</td>
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<tr>
<td>ISL8002A</td>
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<td>2</td>
<td>2</td>
<td>0.6</td>
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<table>
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<tr>
<th>SW1 ENABLE</th>
<th>FUNCTION</th>
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<tr>
<td>1</td>
<td>OFF</td>
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<tr>
<td>3</td>
<td>ON</td>
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<table>
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<th>SW2 MODE</th>
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<tr>
<td>1</td>
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<tr>
<td>3</td>
<td>PWM</td>
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**TABLE 3. BILL OF MATERIALS**

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<thead>
<tr>
<th>PART NUMBER</th>
<th>QTY</th>
<th>UNITS</th>
<th>REFERENCE DESIGNATOR</th>
<th>DESCRIPTION</th>
<th>MANUFACTURER</th>
<th>MANUFACTURER PART</th>
</tr>
</thead>
<tbody>
<tr>
<td>10TPB220M</td>
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<td>ea</td>
<td>C1</td>
<td>CAP-POSCAP, SMD, D4, 220µF, 10V, 20%, ROHS</td>
<td>SANYO</td>
<td>10TPB220M</td>
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<tr>
<td>H1045-00220-50V5-T</td>
<td>1</td>
<td>ea</td>
<td>C4</td>
<td>CAP, SMD, 0603, 22pF, 50V, 5%, COG, ROHS</td>
<td>VENKEL, KEMET, TDK</td>
<td>MURATA, ROHM, CO603CG0500-220JNE, CO603C220J5GACTU, C1608CG1H220J, GRM1885C1H220J001D, MCH185A220JK</td>
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<tr>
<td>H1045-00221-50V10-T</td>
<td>1</td>
<td>ea</td>
<td>C7</td>
<td>CAP, SMD, 0603, 220pF, 50V, 10%, X7R, ROHS</td>
<td>VENKEL, AVX, TDK, YAGEO, ROHM, KEMET</td>
<td>GRM188R71H221KA01D, CO603X7R500-221KNE, 06035C221KAAT2A, C1608X7R1H221K, MCH185CN221KK, CC603XR79B8221, CO603C221K5RACTU</td>
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<tr>
<td>H1045-DNP</td>
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<td>ea</td>
<td>C8</td>
<td>CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS</td>
<td>PANASONIC, TAIYO</td>
<td>ECJ-DV50J226M, JMK316B226ML, C3216X5RJ226M, 12066D226MAT2A</td>
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<tr>
<td>VLCF-4028T-1R2N2R7-2</td>
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<td>ea</td>
<td>L1 for ISL8002A, ISL80019A, 2MHz</td>
<td>COIL-PWR INDUCTOR, WW, SMD, 4mm, 1.2µH, 30%, 2.7A, ROHS</td>
<td>TDK</td>
<td>VLCF4028T-1R2N2R7-2</td>
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<td>74437324022</td>
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<td>ea</td>
<td>L1 for ISL8002, ISL80019, 1MHz</td>
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<td>Wurth Electronics</td>
<td>74437324022</td>
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<tr>
<td>LTST-C170CKT</td>
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<td>ea</td>
<td>D1</td>
<td>LED-GaAs RED, SMD, 2x1.25mm, 100mW, 40mA, 10mcd, ROHS</td>
<td>LITEON/ VISHAY, ROHM, STANLEY ELECTRIC</td>
<td>LTST-C170CKT, SML-210LTT86, BR112H-TR</td>
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<tr>
<td>ISL8002AIRZ</td>
<td>1</td>
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<td>U1</td>
<td>IC-2A BUCK REGULATOR, 8P, µTDFN, 2x2, ROHS</td>
<td>INTERSIL</td>
<td>ISL8002AIRZ</td>
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<td>2N7002-7-F-T</td>
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<td>Q1</td>
<td>TRANSISTOR, N-CHANNEL, 3 LD, SOT-23, 60V, 115mA, ROHS</td>
<td>DIODES, INC. ON SEMICONDUCTOR</td>
<td>2N7002-7-F, 2N7002LT1G</td>
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<td>H2511-00200-1/10W1-T</td>
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<td>PANASONIC, YAGEO, VENKEL</td>
<td>ERJ-3EKF20R0V, CR0603FR-0720RL, CR0603-10W-20R0FT</td>
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<tr>
<td>H2511-01003-1/10W1-T</td>
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<td>R2, R14</td>
<td>RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS</td>
<td>VENKEL, PANASONIC, ROHM, YAGEO, STACKPOLE, VISHAY/DALE</td>
<td>CR0603-10W-1003FT, ERJ-3EKF1003V, MCR03EFPX1003, CR0603FR-071020K, RMC110K 1% R, CRCW0603100KFEA</td>
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<td>R5</td>
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<td>KOA, VENKEL</td>
<td>RK73H1JT0D200LF, CR0603-10W-2001FT</td>
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<td>PART NUMBER</td>
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<td>UNITS</td>
<td>REFERENCE DESIGNATOR</td>
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<td>MANUFACTURER PART</td>
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<tr>
<td>GT11MSCBE-T</td>
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<td>ea</td>
<td>SW1, SW2</td>
<td>SWITCH-TOGGLE, SMD, 6 PIN, SPDT, 2 POS, ON-ON, ROHS</td>
<td>ITT INDUSTRIES/C&amp;K DIVISION</td>
<td>GT11MSCBE</td>
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FIGURE 1. TOP LAYER COMPONENTS

FIGURE 2. SILKSCREEN TOP
FIGURE 3. TOP LAYER ETCH

FIGURE 4. SECOND LAYER ETCH
FIGURE 7. BOTTOM LAYER COMPONENTS
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