ISL73849MEVAL2Z4

4-Phase ISL73849M Board

Description

The ISL73849MEVAL2Z4 evaluation board benchmarks the performance of two ISL73849M dual-phase buck controllers, four ISL71441M GaN half-bridge drivers, and sixteen ISL70020SEH 40V GaN FETs in a 4-phase, 150A configuration. It is designed for the VERSAL VC1902 VCCINT core rail. The evaluation board is designed to work with a 12V PVIN power rail and an auxiliary VDD supply for the controller/driver VDD and ISL74420M clock.

Input and output connections, test points, and jumper settings on the board provide customers an easy-to-use evaluation platform for point-of-load power applications.

Contents

- USB 2.0, Type A Male to Type C Male

Features

- ISL74420 clock generator for synchronization
- On-board 87A transient load current generator
- Load-line DROOP regulation
- Differential remote feedback voltage sensing
- Differential current sensing
- ISL73849 SALRTb, MCU and ISL74420 READY LED indicators
- ISL71590SEH temperature sensors for temperature telemetry
- On-board MCU that pairs with provided software

Specifications

- Buck power supply input (PVIN): 12V, ±10%
- Analog supply input (VDD): 5V to 13.2V
- Output voltage (no-load): 0.804V
- Preset switching frequency: 375kHz
- Maximum output current: 150A (37.5A/phase)
- Preset 1.2% DROOP regulation
- Number of board layers: 8
- PCB Thickness: 2oz outer, 1oz inner

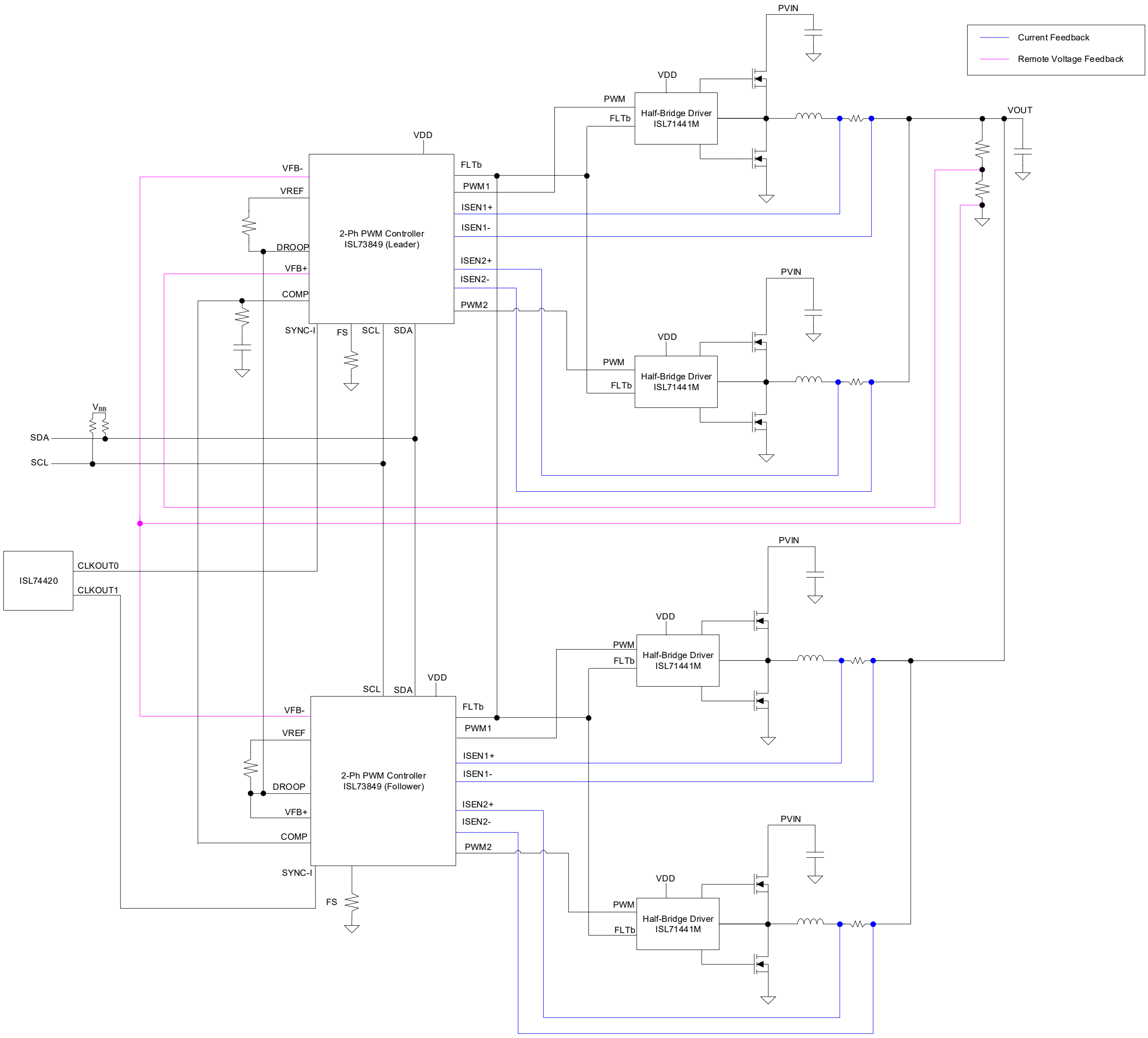

Figure 1. Block Diagram

Contents

1. Functional Description

The ISL73849M is a dual-phase PWM Controller that interfaces with the ISL71441M GaN half-bridge drivers to control the ISL70020SEH GaN FETs for point-of-load buck regulation in low-voltage, high-current applications such as FPGA core rails. Each ISL73849M controller operates its two phases at 180° phase shift. Using two 750kHz clocks, 180° phase shifted apart from the ISL74420 and connecting them to the SYNC-I pins of the ISL73849M provides the 90° phase shifted 375kHz PWMs required for 4-phase operation. Each phase delivers 37.5A RMS for a total 150A solution.

1.1 Operating Range

The ISL73849MEVAL2Z4 evaluation board requires two supply rails to operate properly. One for the two ISL73849M controllers’ analog supply input, the four ISL71441M GaN half-bridge drivers, and the ISL74420 clock generator (VDD). The other rail is for the buck power supply input (PVIN).

The PVIN is designed for 12V but can be set from 5V to 13.2V. The VDD rail accepts an input range of 5V to 13.2V or it can be tied directly to the PVIN rail for single-supply operation. The VDD voltage is limited to a maximum of 13.2V because of the ISL71441M GaN drivers. The output voltage is set by default to 0.794V (VREF is 0.592V by default). It can be increased to 0.804V by programming both controller's reference voltage to 0.6V using PMBus. This converter is capable of providing 150A of output current.

1.2 4-Phase Configuration

The ISL73849M is a stand-alone PWM Controller, but with proper configuration it can be connected together to provide multiphase operation to deliver higher load current and reduce output ripple voltage. The configuration diagram for connecting two controllers together is shown in Figure 2.

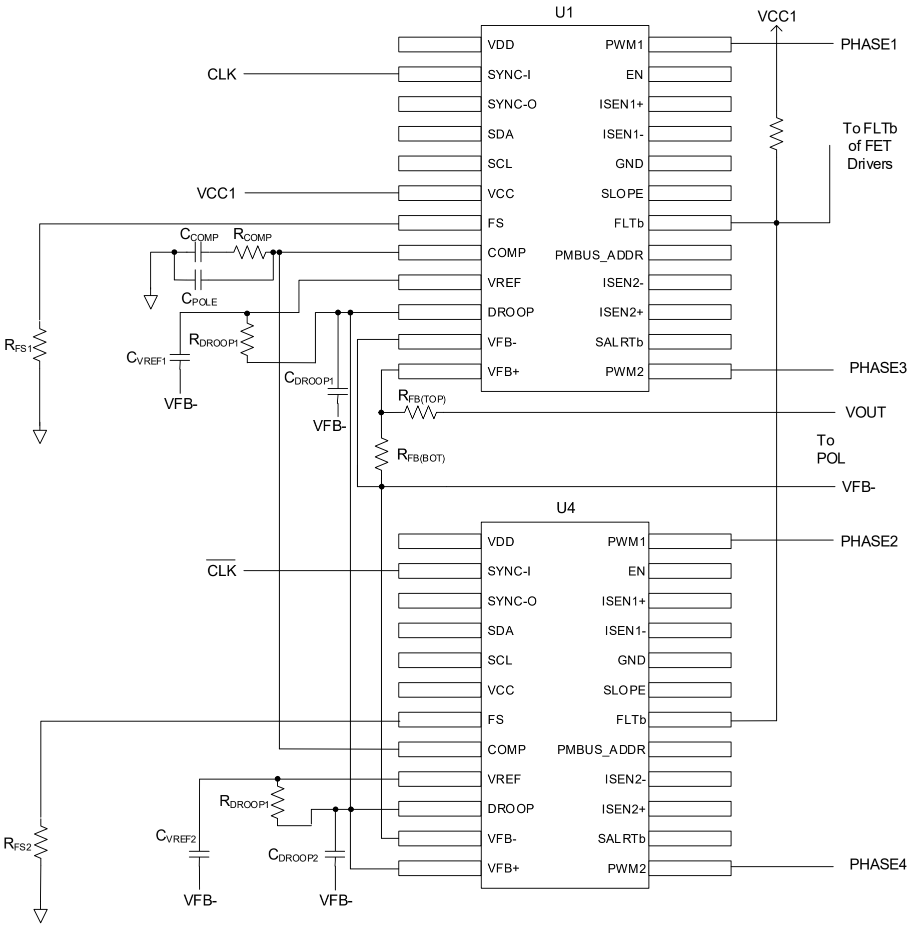

Figure 2. 4-Phase Configuration

To connect two ISL73849M controllers for a 4-phase configuration, use the following connections.

- For 90° phase shifted operation in a 4-phase Buck, an external Clock at twice the switching frequency with 50% duty cycle and its complementary is required. A recommended option is using the ISL74420. See ISL74420 for Synchronization on generating the clock and complementary signal for this evaluation board.
- The error amplifier of the second controller (U4) is disabled by tying its DROOP (EA+) and VFB+ (EA-) pins together so it outputs zero current. This allows the first controller's (U1) COMP signal to drive the U4 controller in addition to its own PWM comparator.
- RCOMP, CCOMP, and CPOLE are connected to the first controller's (U1) COMP pin. Depopulate the RCOMP, CCOMP, and CPOLE of the second controller (U4) and tie its COMP pin to the first controller's COMP pin.
- When using droop regulation, determine the amount of droop resistance required on each controller by referring to the *ISL73849M Datasheet* or by using the *ISL73849 Design Calculator*.
- Connect the DROOP pins of the two controllers together. The VREF of each controller supplies the droop current required into the DROOP pins and the voltage on DROOP includes the average of the VREF voltage on the two controllers.
- Connect the VFB- pins of the two controllers together so they have a common reference voltage.
- Connect the FLTb pins of the two controllers and four ISL73041SEH drivers together to a single pull-up resistor. The resistor can connect to VCC of either controller.
- Because the ISL73849M controller has 180° phase shift between its own two phases and a 4-phase system has 90° phase shift, the phases are interleaved between the two controllers. For example, U1 controller is Phase 1/Phase 3 and U4 controller is Phase 2/Phase 4.

1.3 Quick-Start Guide

1. Ensure JP4, JP5, JP12, and JP13 are connected to position 2-3.
2. Ensure JP1 is connected.
3. Ensure JP15, JP16 are connected in either position 1-2 or 2-3.
4. Ensure JP7 and JP8 are connected to position 2-3.
5. Flip all the switches down on SW1 except 6.
6. Flip all the switches down on SW2 except 5.

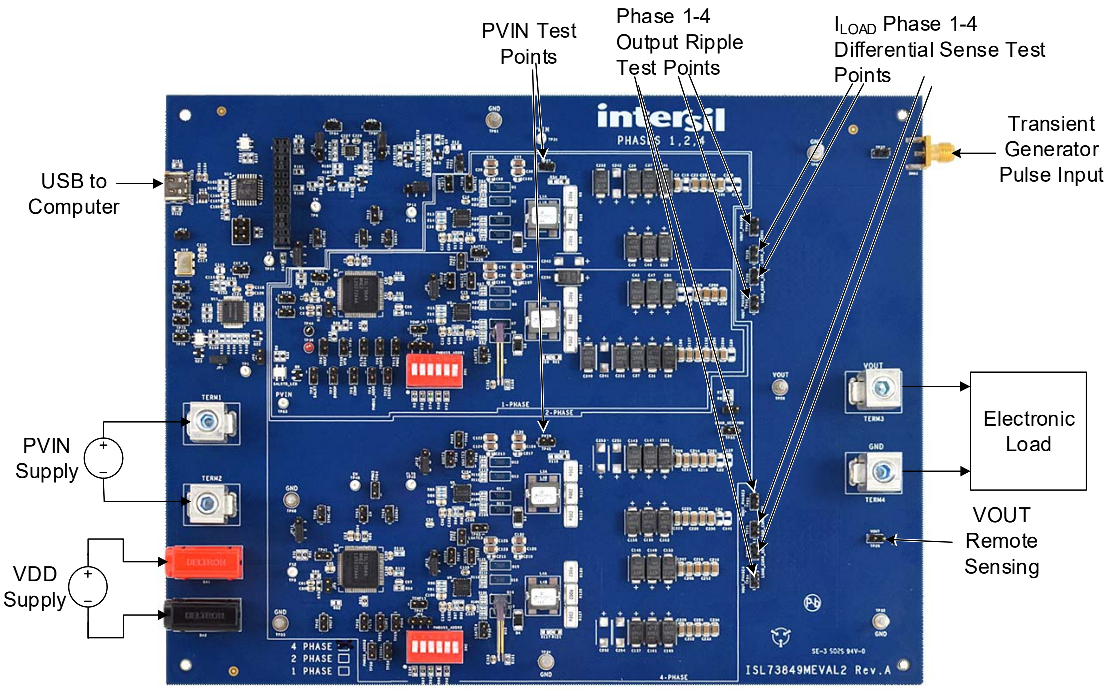

Figure 3. ISL73849MEVAL2Z4 Board Setup

7. Connect the provided USB to the computer and the board as shown in Figure 3.
8. Apply a 12V voltage supply to the PVIN metal banana plug connectors as shown in Figure 3. To monitor PVIN on the board, use TP27 or TP45. TP27 is closer to Phase 1 and 3, TP45 is closer to Phase 2 and 4.
9. Apply a voltage between 5V and 13.2V to the VDD banana connectors as shown in Figure 3.
10. If required, a resistor or electronic load can be connected to the VOUT metal banana plug connectors as shown in Figure 3. The output voltage regulation point can be monitored using the TP29 test jumper.
11. Open the iRADNavigator software.
12. Double click on **PMBus Devices** in the **Available Hardware** window as shown in Figure 4.
13. Click on **ISL73849_Eval** as shown in Figure 4.

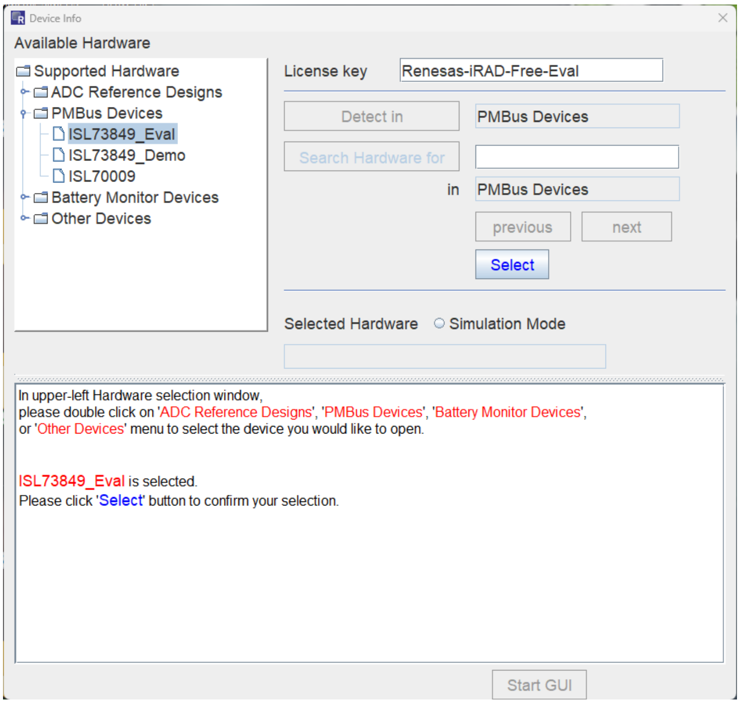

Figure 4. ISL73849_Eval Selection

14. Click the **Select** button.The **DevParaPanel** window opens as shown in Figure 5.
15. Select the checkbox for the 4-Phase System as shown in Figure 5.
16. Set the Leader and Follower PMBUS address to match the selection on the board by using the **Leader Addr** and **Follower Addr** selection boxes as shown in Figure 5.

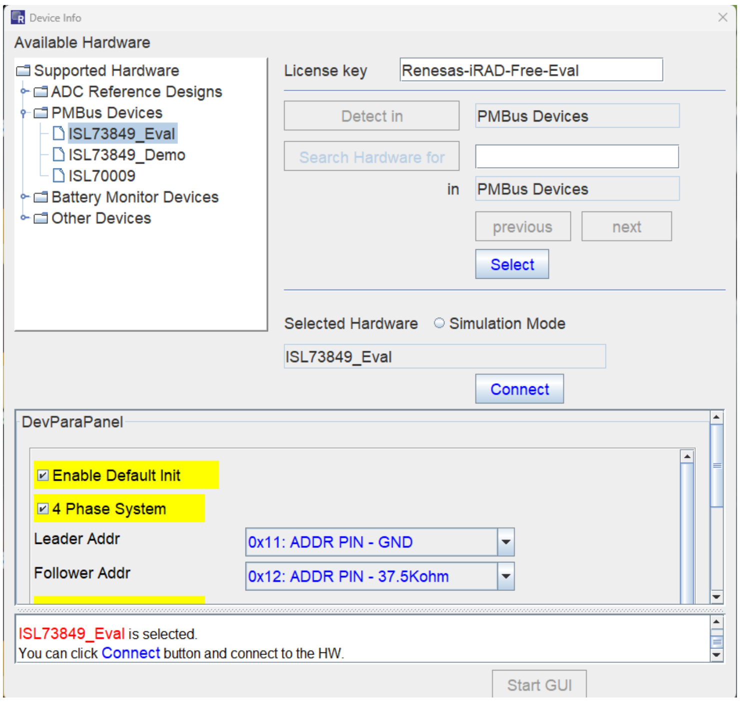

Figure 5. ISL73849_Eval 4-phase setup

17. Scroll to the bottom of the **DevParaPanel** window and in the Package drop-down list click **Plastic** as shown in Figure 6.

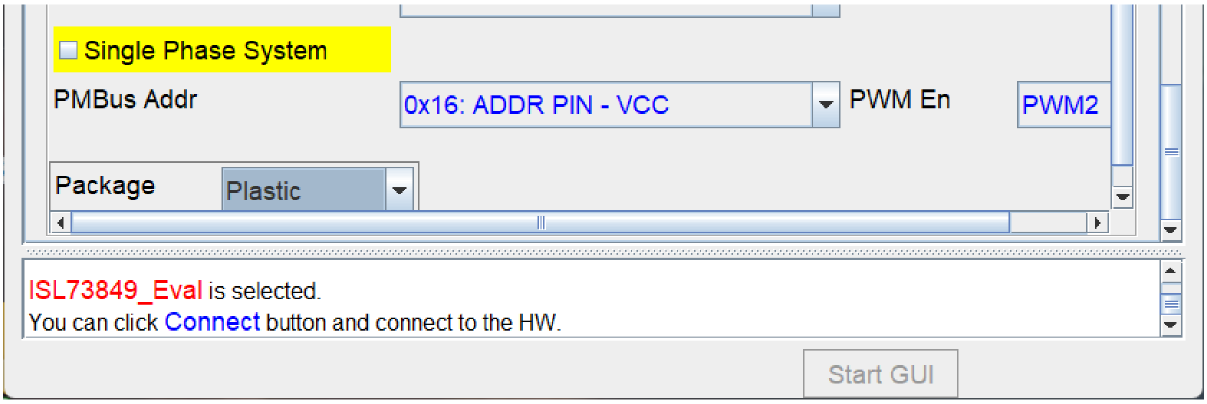

Figure 6. Package Selection

18. To connect to the board click **Connect**. This programs the VOUT_COMMAND registers to 0.6V, the OC_TH registers to 37.5mV for both devices. The SET_FOLLOWER register is also set to 0x01h for the Follower device turning it into a true follower.
19. If successfully connected, the window at bottom reads "*Board init is successful! Please click **Start GUI** button to start GUI*".
20. Click **Start GUI**.
21. The 4-Phase GUI opens as shown in Figure 7. By default, the **Feature Control** tab is selected. The OPERATION, FAULT_RESPONSE, FAULT_MASK, SALERT_MASK_OVERRIDE, VOUT_OV_LIMIT, VOUT_UV_LIMIT, EN_PWM_PH, SS_CONFIG, OC_TH, VOUT_TRANSITION_RATE, VOUT_COMMAND, and SET_FOLLOWER Leader registers are all available for programming in this window. To view the corresponding registers for the Follower, open the drop-down and select **Follower:Eval Config**.

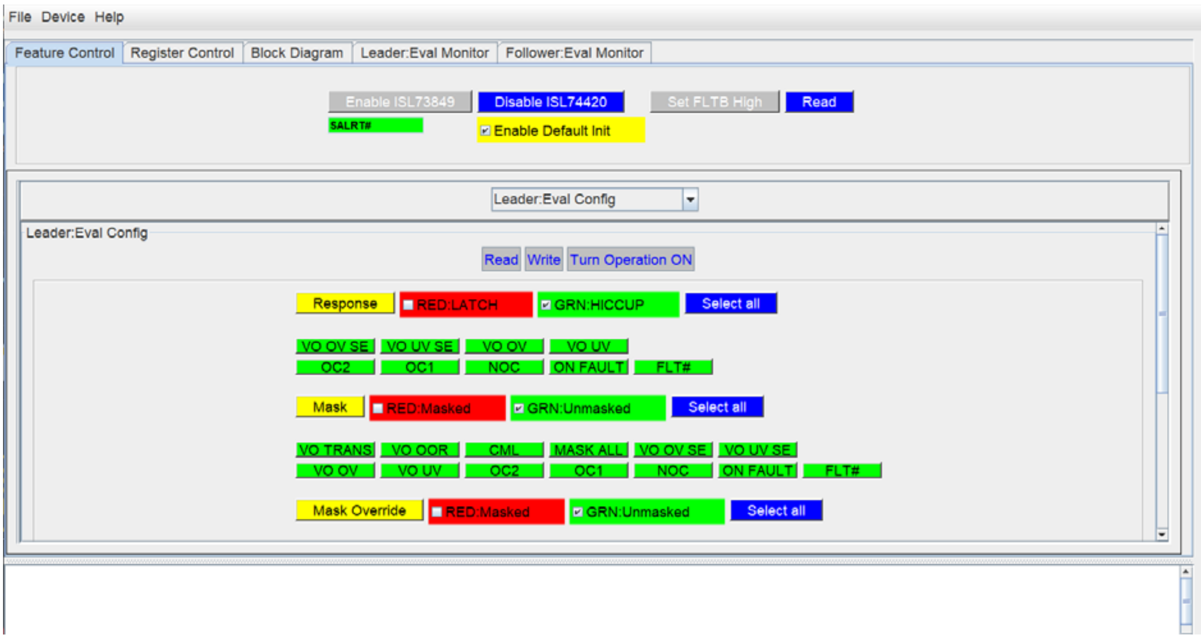

Figure 7. ISL73849MEVAL2Z4 4-Phase GUI

22. To enable the board first, click the **Enable ISL73849** button.

23. As mentioned in Enabling/Disabling, the MCU holds FLTb low to prevent switching before programming the PMBUS registers to new values. The software has already programmed the PMBUS registers in Step 18. To enable switching, click the **Set FLTB High** button.

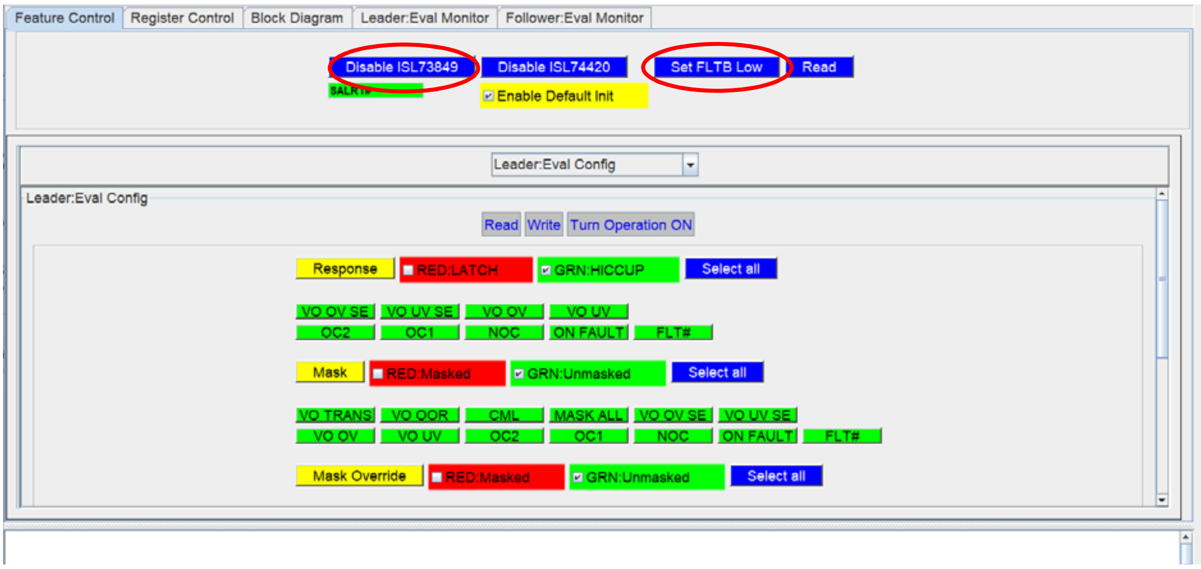

Figure 8. Enable Switching

1.4 Hardware Controls

The **Feature Control** Tab includes buttons that control some GPIOs on the MCU. Clicking the **Disable ISL73849** button sets the EN pin low on both ISL73849 devices. The button label then changes to **Enable ISL73849**.

To re-enable the ISL73849 devices:

1. Click the **Enable ISL73849** button.
2. If the **Enable Default Init** checkbox is selected when the button is clicked, the software automatically programs **VOUT_COMMAND** to 0.6V and **OC_TH** to 37.5mV before driving the EN pins high.

To enable the devices without automatic PMBUS programming:

1. Clear the **Enable Default Init** checkbox.
2. Click the **Enable ISL73849** button.

If the **Enable Default Init** checkbox is cleared and the **Enable ISL73849** button is selected, a warning dialog box appears indicating that a short-circuit with a higher OC threshold could damage the board, and asks whether to continue.

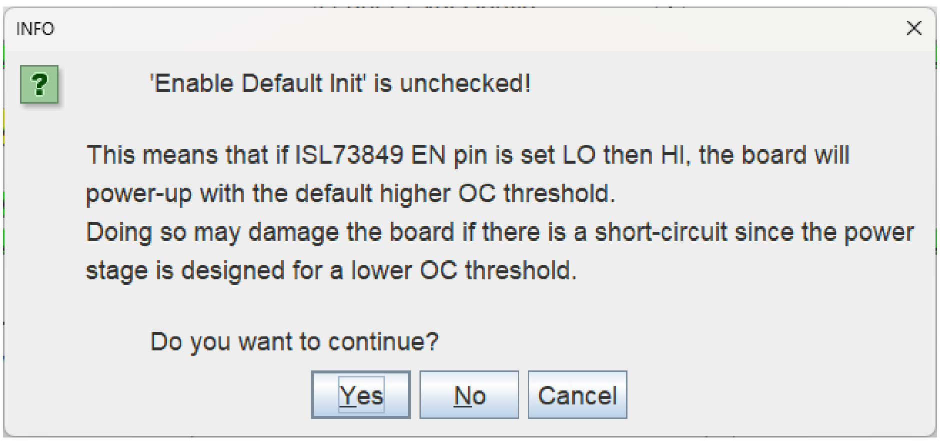

Figure 9. Enable Default Init Warning box

Clicking the **Disable ISL74420** button drives the OUTEN and READY pins of the ISL74420 low, which disables the clocks and turns the READY LED indicator red. The button label then changes to **Enable ISL74420**.

When the ISL73849 devices lose the ISL74420 synchronization clocks, they seamlessly revert to their internal oscillators and continue switching; however, the system becomes unsynchronized.

To re-enable the clocks and synchronize the system again, click the **Enable ISL74420** button.

The **Read** button reads the status of the SALRTb net of the ISL73849 devices.

1.5 Reading Telemetry

To look at ISL73849 Telemetry for the Leader click on the **Leader:Eval Monitor** tab as shown in Figure 10. On this tab, all the available telemetry are displayed.

Select the box next to any telemetry of interest, then click the **Read** button to initiate a TELEMETRY_REQ for the selected signal and read back the corresponding data. Each time the **Read** button is pressed, the displayed values are updated.

The same operation can be performed on the **Follower:Eval Monitor** tab to read the telemetry signals from the Follower.

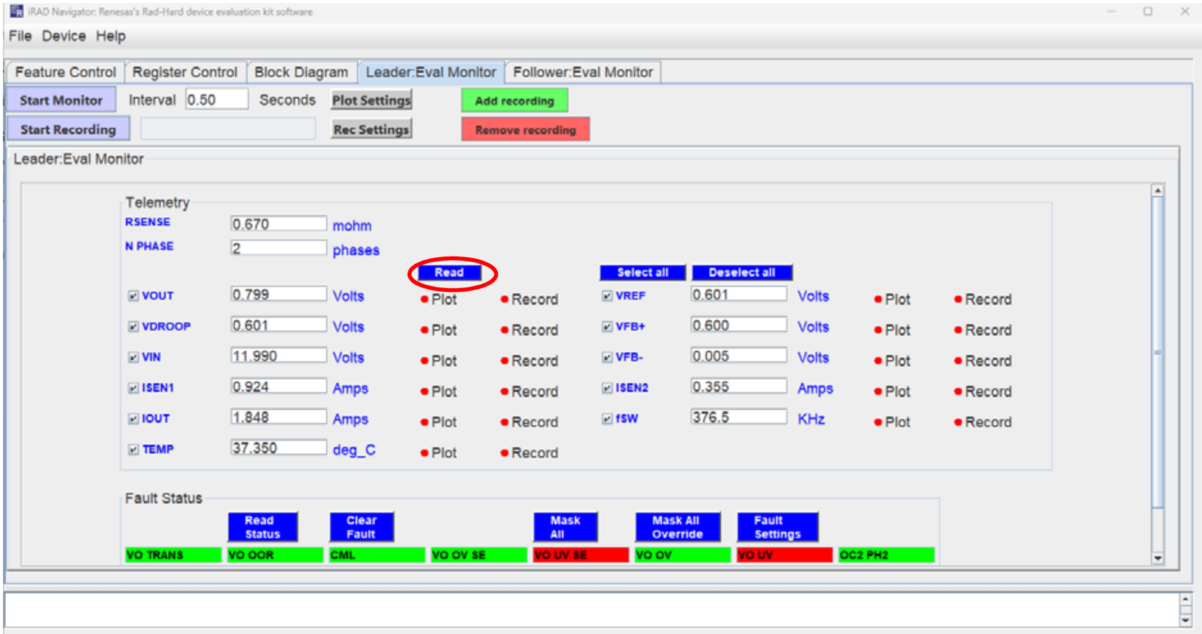

Figure 10. Leader:Eval Monitor

When the telemetry signals of interest are selected, the measurements can be plotted in the **Leader:Monitor** Panel by clicking on the **Start Monitor** button. The **Monitor** Panel supports plotting all eleven telemetry signals simultaneously. The same procedure can be performed in the **Follower:Eval Monitor** tab to monitor and plot Follower telemetry signals. All eleven leader and eleven follower telemetry signals can be monitored and plotted simultaneously.

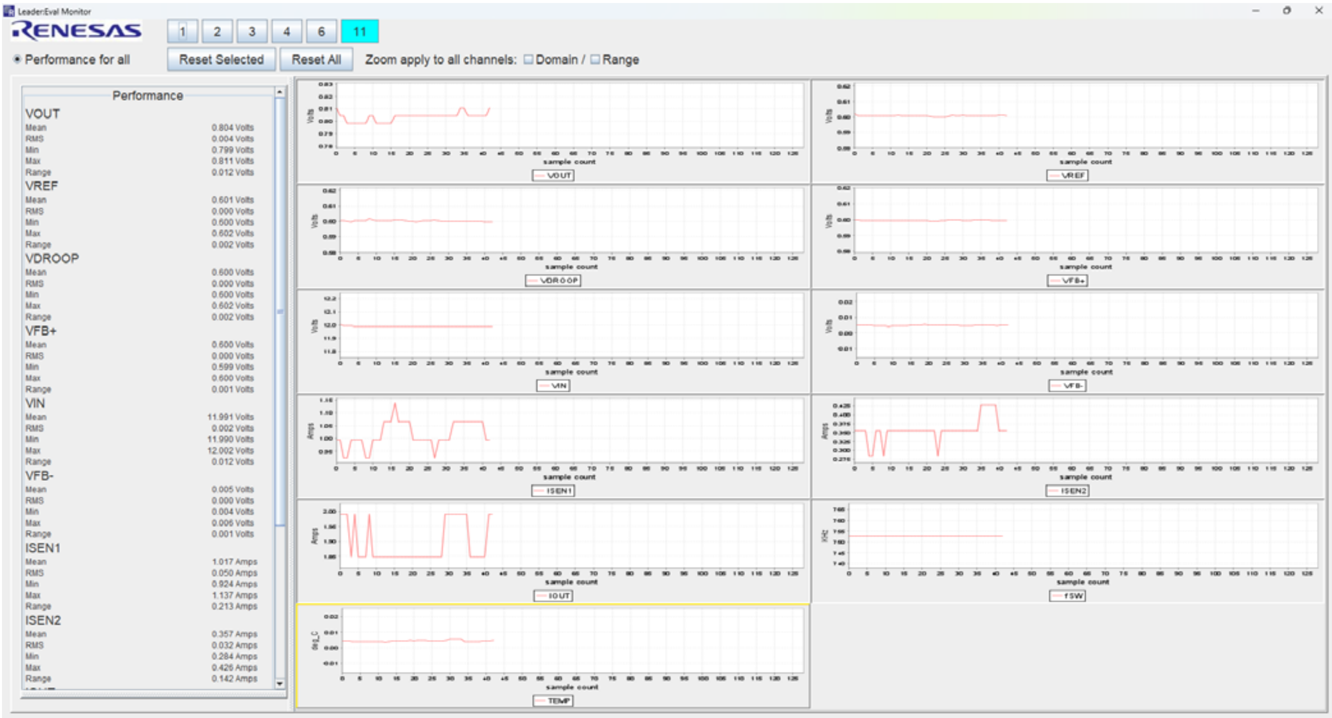

Figure 11. iRADNavigator all 11 Leader Telemetry Values Plotted

1.6 Faults Monitoring

In the **Leader:Eval Monitor** tab, under the telemetry section, faults can also be read as shown in Figure 12. The SALRTb pin is also monitored through an MCU GPIO and shown in the GUI.

Click the **Read Status** button to read the FAULT_STATUS register.

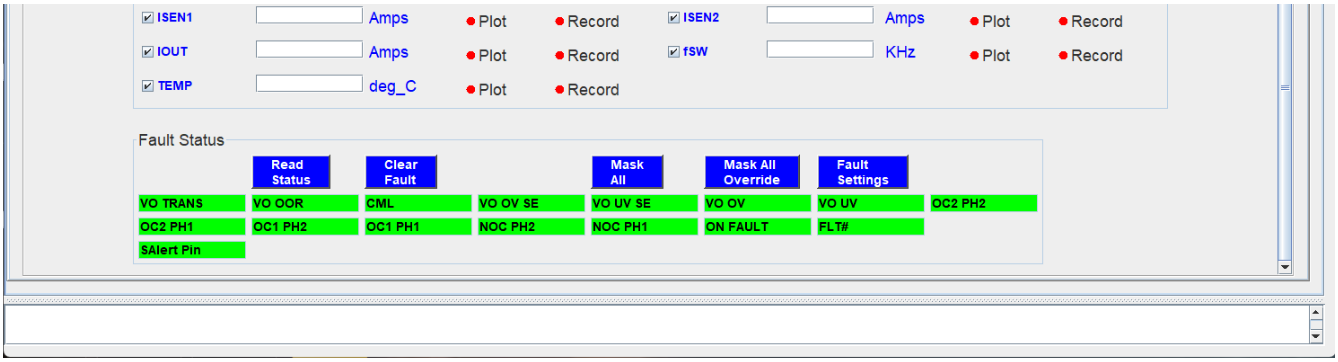

Figure 12. Leader:Eval Monitor Fault Status Section

If a fault is detected, the corresponding bit and the SALRTb Pin indicator turn red as shown in Figure 13 when the PVIN supply is disabled.

To clear the FAULT_STATUS register, click the **Clear Fault** button. The faults on the follower must also be cleared in the **Follower: Eval Monitor** tab to clear the SALRTb pin, since a fault detected on one device triggers a fault on the other device.

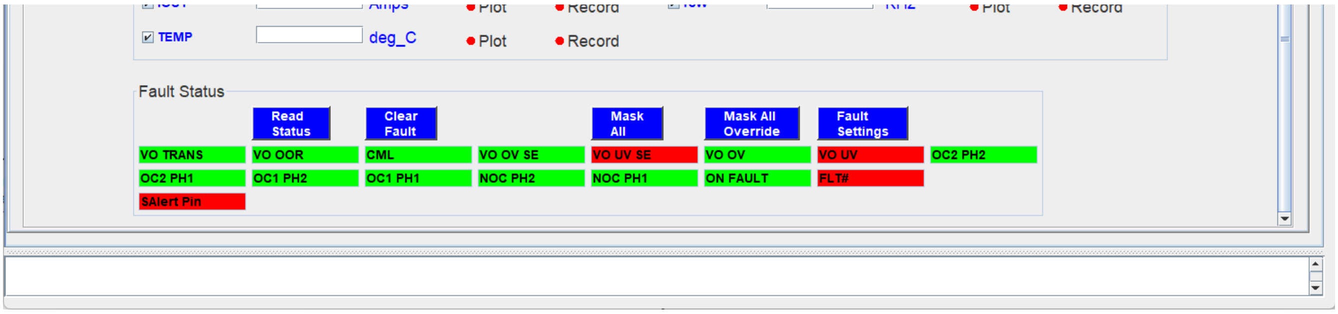

Figure 13. Faults Detected when the PVIN Supply is Disabled

When the **Start Monitor** button is clicked, the Fault Status is continuously read and cleared. The same applies when the **Start Monitor** button is clicked in the **Follower:Eval Monitor** tab for the Follower.

The Fault Status section includes other useful features to program different fault options.

- The **Fault Mask** button masks all the faults for a device.
- The **Mask Override** button unmasks the SALERT response for all the faults.
- The FAULT_RESPONSE, FAULT_MASK and SALERT_MASK_OVERRIDE registers can be viewed by clicking the **Fault Settings** button. This opens a separate **Fault Config** window as shown in Figure 14.

Figure 14. Fault Config window

1.7 iRADNavigator Block Diagram

The **Block Diagram** tab shows the full ISL73849MEVAL2Z4 block diagram. The telemetry that are being actively monitored is continuously updated on this diagram as they are read and processed by the GUI.

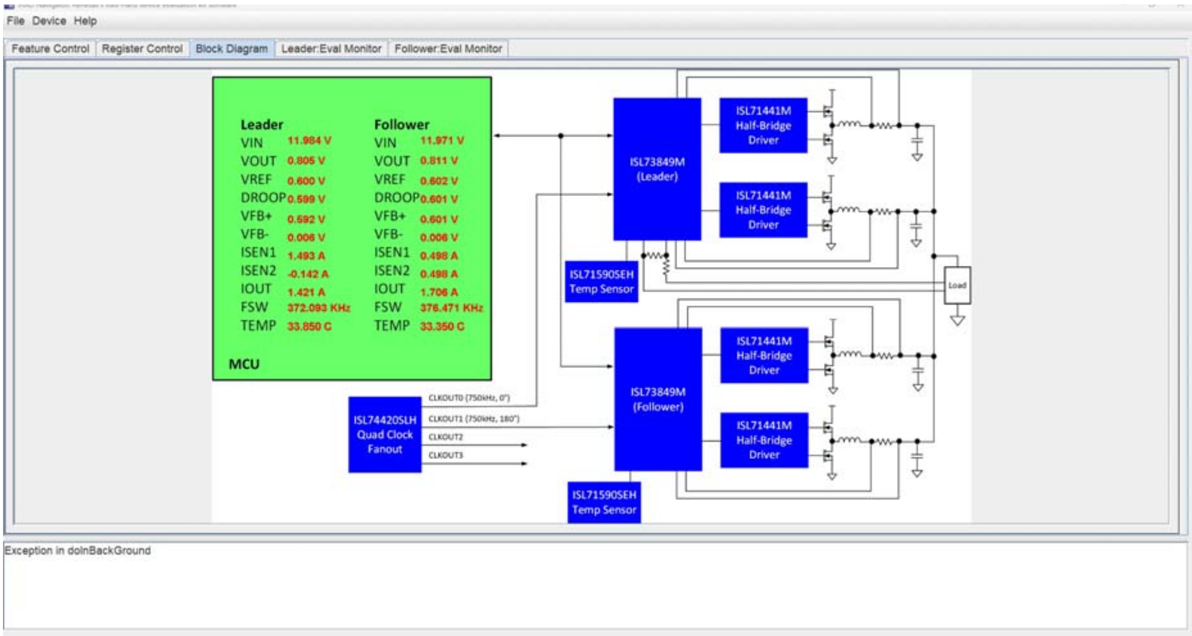

Figure 15. Block Diagram Tab

1.8 Register Control

The **Register Control** tab provides full write and read control of all the PMBUS registers available on the ISL73849M as shown in Figure 16.

The **Device Address** section allows switching between different PMBUS addresses. A drop-down menu is provided to select the number base (decimal, binary, or hexadecimal). An adjacent drop-down menu enables quick switching between Leader and Follower PMBUS registers, based on the selection made when the GUI was initially launched.

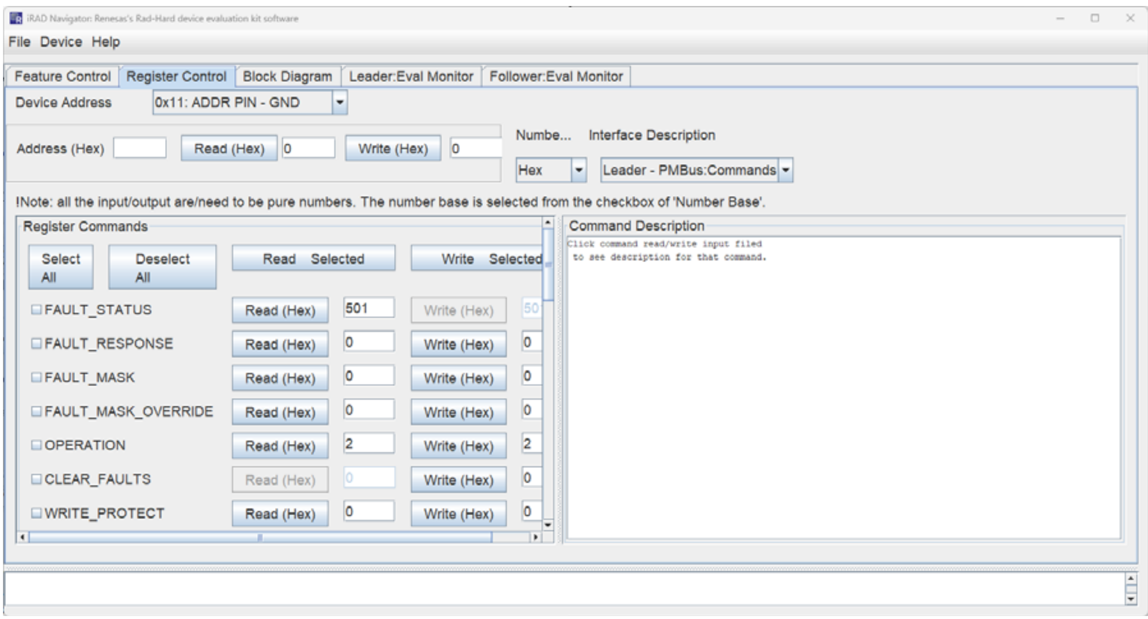

Figure 16. Register Control Tab

1.9 Enabling/Disabling

By default, the ISL73849M powers up with VREF set to 0.592V and a current-sense overcurrent (OC) limit of 75mV. However, the voltage feedback circuit is designed for a VREF of 0.6V, and the power-stage is designed for an OC limit of 37.5mV.

If the device is powered up with default PMBUS registers, the output voltage may fall outside the acceptable DC regulation window. In addition, if the output is shorted, the power stage may be damaged due to excessive output current. To prevent this, an FLTB circuit is connected between the MCU P1.2 GPIO and the FLTB net. This circuit pulls FLTb low, preventing switching during startup. As a result, the ISL73849MEVAL2Z4 does not begin switching when PVIN and VDD are applied, allowing time to program the PMBus registers to the required non-default values.

After programming is complete, the FLTB signal can be released by toggling the MCU GPIO. This process is handled automatically when using the iRADNavigator GUI software (see Quick-Start Guide). To start up the ISL73849MEVAL2Z4 without using the MCU, move the 0Ω from R174 to R177.

1.10 On-Board Load Transient Generator

The ISL73849MEVAL2Z4 includes an on-board transient load generator that uses two ISL71040M GaN FET drivers to control four ISL70020SEH N-Channel GaN FET load switches. The load consists of six 200mΩ resistors per phase.

The transient load generator simulates an 87A load step on the 0.804V rail when the FETs are turned on. For smaller load steps, some of the load resistors may be unpopulated. For larger load steps, two additional locations per phase are available for 2512 chip resistors.

Note: Care must be taken to ensure that the power dissipation ratings of the resistors are not exceeded when adding or removing resistors.

The slew rate of the load transient step is set to ~200A/µs by the 229Ω and 316Ω ISL70020SEH gate resistors.

To use the on-board transient generator, install a shunt to JP2 to power the two ISL71040M devices from the VDD supply. To power the transient load circuit from an external supply, apply the supply at TP35 and ensure JP2 is open.

Connect a pulse generator or function generator to the TRAN_IN SMA1 connector. Renesas recommends operating the transient load generator at a low duty cycle to prevent thermal failure of the resistors. Based on the bandwidth of the converter, a load transient of 500µs is sufficient to observe the converter transient response. Keep the period of the transient load low (for example, for 1% duty cycle use 50ms). A 0V to 5V logic signal is sufficient to drive the ISL71040M. To monitor or trigger from the pulse generator signal, use the TP37 test jumper.

1.11 ISL74420 for Synchronization

The ISL73849MEVAL2Z4 is designed for a 375kHz switching frequency. For a proper 4-phase operation with 90° phase shifting, the ISL74420 clock generator is configured to provide two 750kHz (2×375kHz) clock outputs with 180° phase shift from CLKOUT0 and CLKOUT1.

The ISL74420 is configured as a Follower by tying its MASTER pin to GND. This configuration disables the internal 48MHz oscillator and enables operation with an external oscillator source.

The XLH736006.000000I is a 6MHz external oscillator connected to the CLKIN of the ISL74420. To internally divide the 6MHz clock and obtain the 750kHz clocks, the CH0 and CH1 FREQ[0-2] pins are configured as Float/GND/GND.

The CH0 PH[0-2] pins are connected to ground and the CH1 PH[0-2] pins are configured as GND/Float/Float to achieve 180° phase shift. CLKOUT2 and CLKOUT3 from the ISL74420 are configured for 375kHz operation with a 180° phase shift.

1.12 Droop Regulation

The ISL73849MEVAL2Z4 is configured to use DROOP regulation to minimize peak-to-peak transient response excursions. This is implemented by connecting a 392Ω resistor between VREF and DROOP pin of each controller (R_1 and R_{78}). If DROOP regulation is not required, short out the DROOP resistors with JP9 and JP10. For more information about the droop regulation, refer to the *ISL73849M Datasheet*.

1.13 TEMP Telemetry

The ISL73849MEVAL2Z4 supports temperature telemetry using the TEMP pin available on the ISL73849M devices and two ISL71590SEH temperature sensors (U9 and U12). The temperature sensors are thermally coupled to the low-side FETs of Phases 2 and 4.

The Leader ISL73849M TEMP pin is connected to the output of U9, while the Follower ISL73849M TEMP pin is connected to U12.

TEMP telemetry can be read in the GUI, as described in the Reading Telemetry section. Use Equation 1 to convert from decimal to temperature.

(EQ. 1) $$\text{Temperature} = \text{COMMAND} \times 0.5\frac{\text{mV}}{\text{LSB}} \times \frac{1\text{K}}{1\text{mV}} - 273.15\text{K}$$

where:

- Temperature is the sensor temperature in °Celsius.
- COMMAND is the READ_TEMP register value in decimal LSB.

The TEMP pin can also be used for general purpose ADC reads of other external signals. Before connecting the TEMP pin(s) to other external signals, disconnect them from the temperature sensors by moving JP7 and JP8 to position 2-3.

1.14 Planned Fixes for Next Revision

The following issues have been identified in the current board revision and are documented for resolution in the next hardware revision.

- By default, the ISL74420 outputs clocks when the VDD supply is enabled. This is also indicated by the ISL74420 READY LED indicator turning green. When a PC is connected to the board through USB, the clocks momentarily turn off and then resume operation, as indicated by the LED briefly toggling from red to green. To disable clock output by default, connect a 10kΩ pull-up resistor between +3.3V to ISL74420_EN. This connection can be implemented by installing a through-hole resistor at J3.
- JP6 is not functional, as one side is left floating. It was originally intended to provide a convenient method to disconnect VCC from the SALERT LED circuit; however, in its current configuration, it has no effect. To disconnect VCC from the SALERT LED circuit, the 680Ω pull-up resistors (R9 and R33) must be removed.

2. Board Design

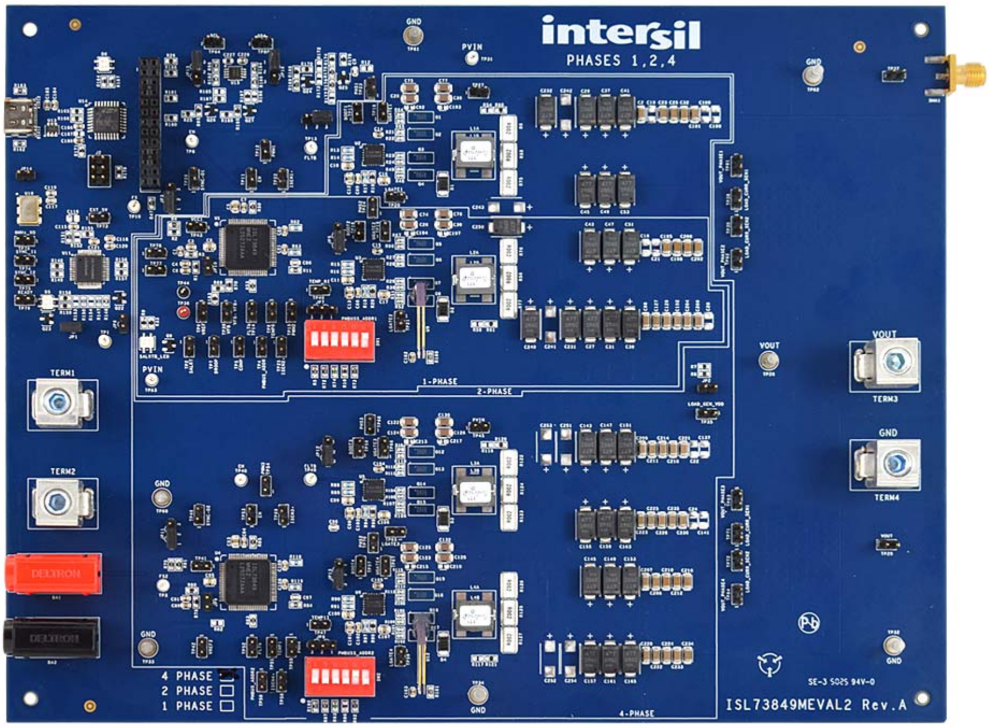

Figure 17. ISL73849MEVAL2Z4 Evaluation Board (Top)

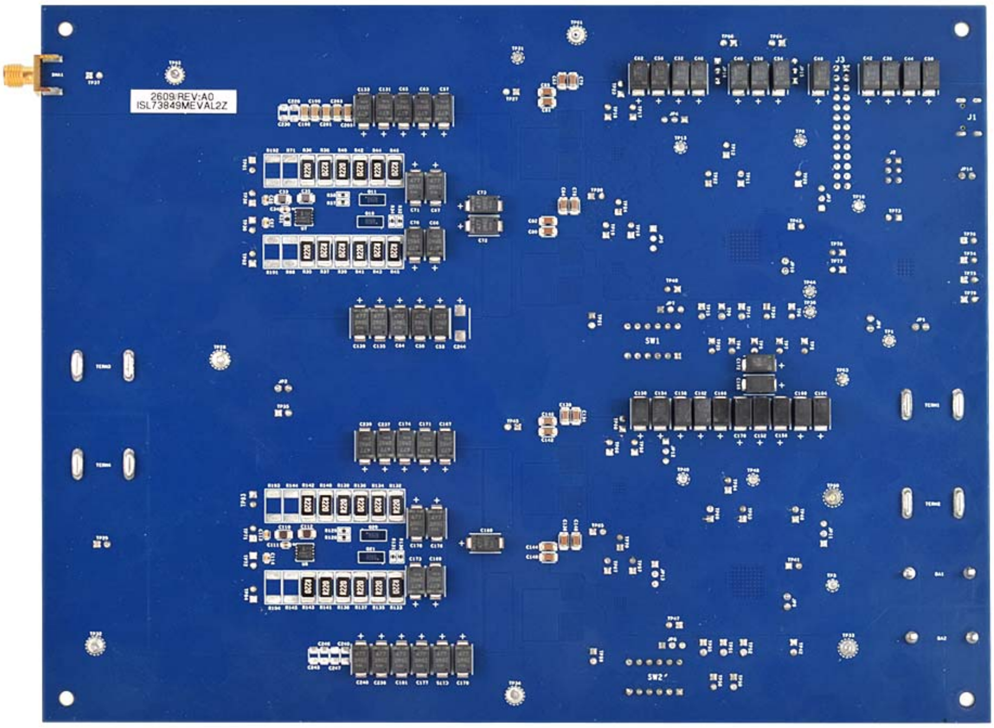

Figure 18. ISL73849MEVAL2Z4 Evaluation Board (Bottom)

2.1 Schematic Diagrams

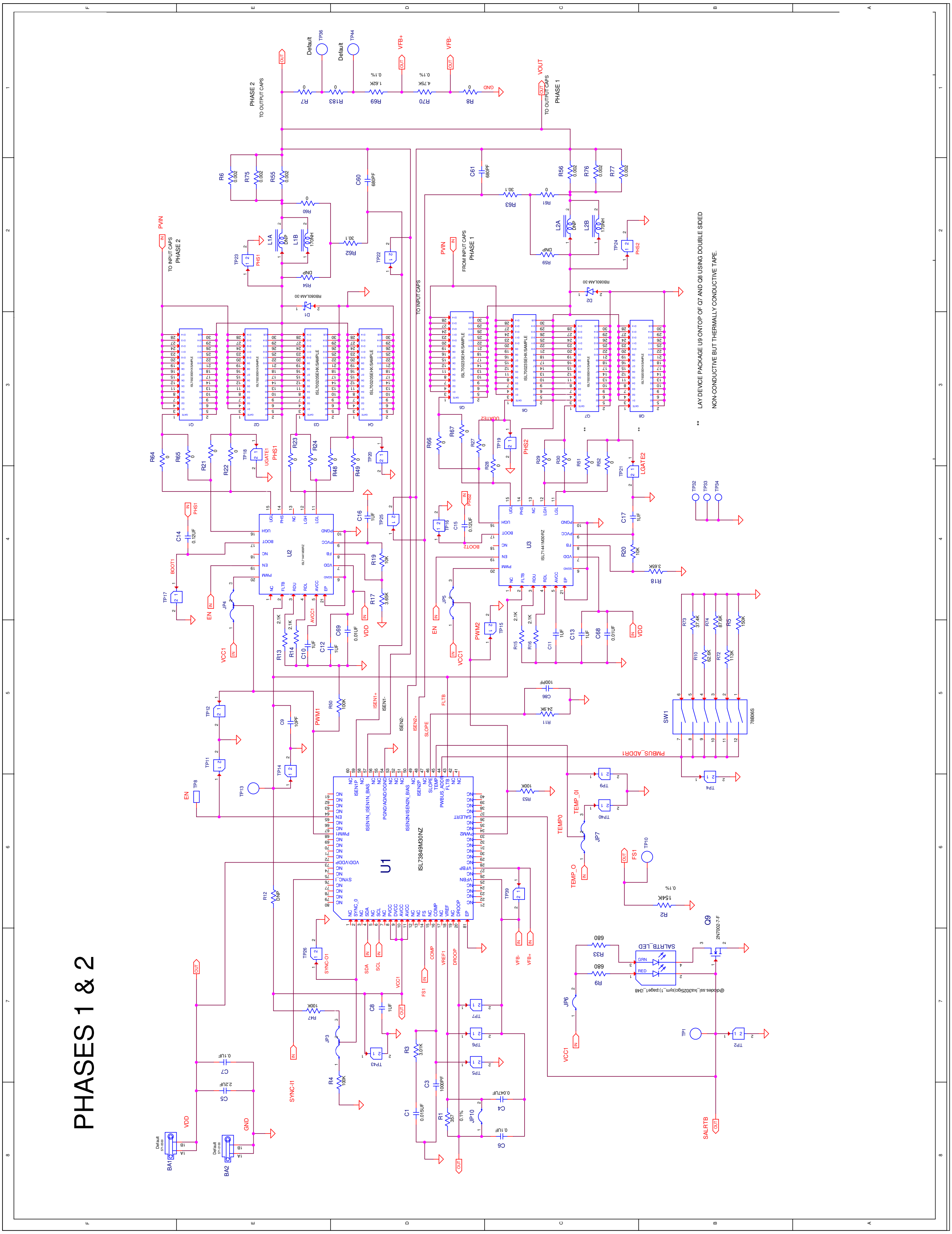

Figure 19. ISL73849MEVAL2Z4 Schematic (Phases 1 & 2)

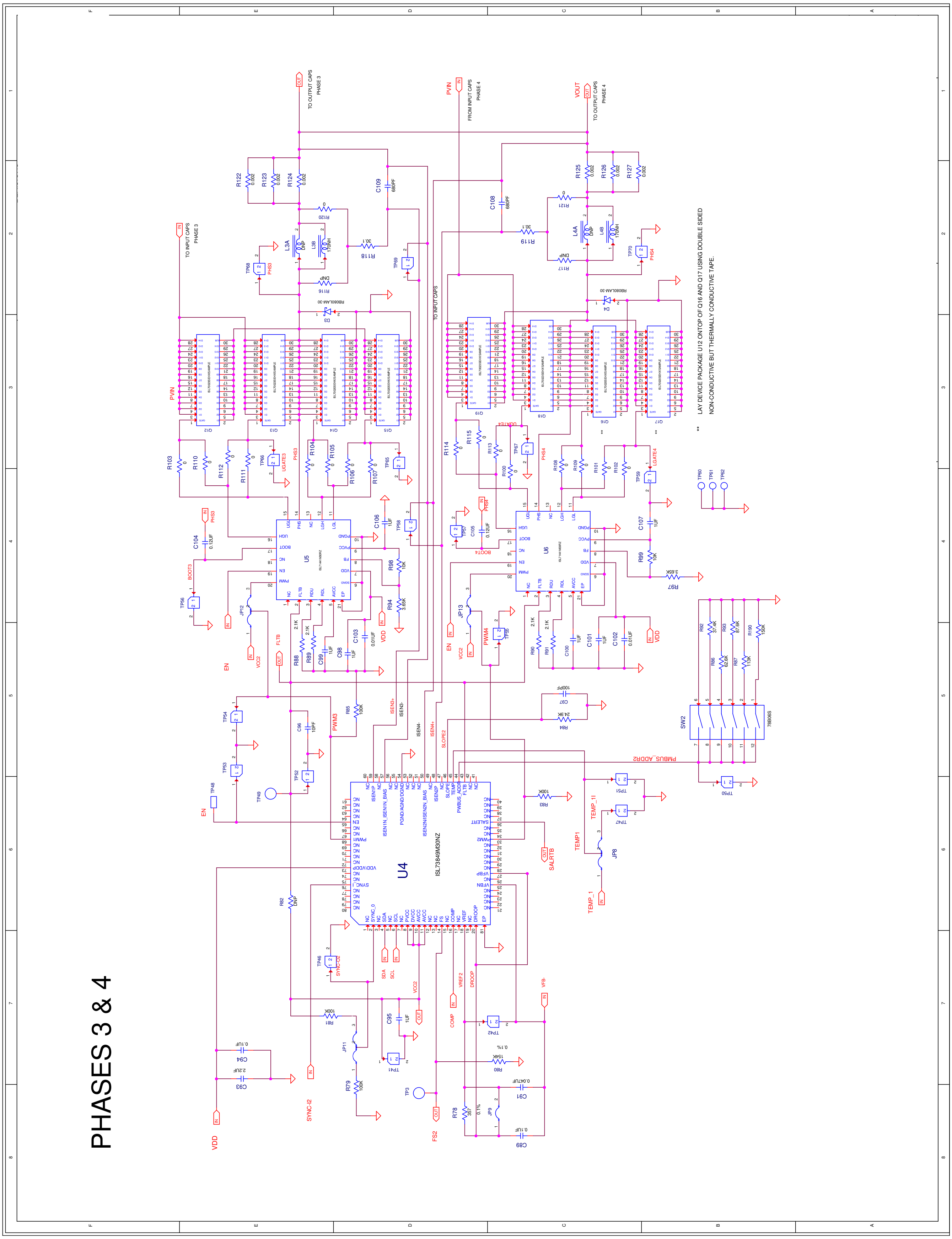

Figure 20. ISL73849MEVAL2Z4 Schematic (Phases 3 & 4)

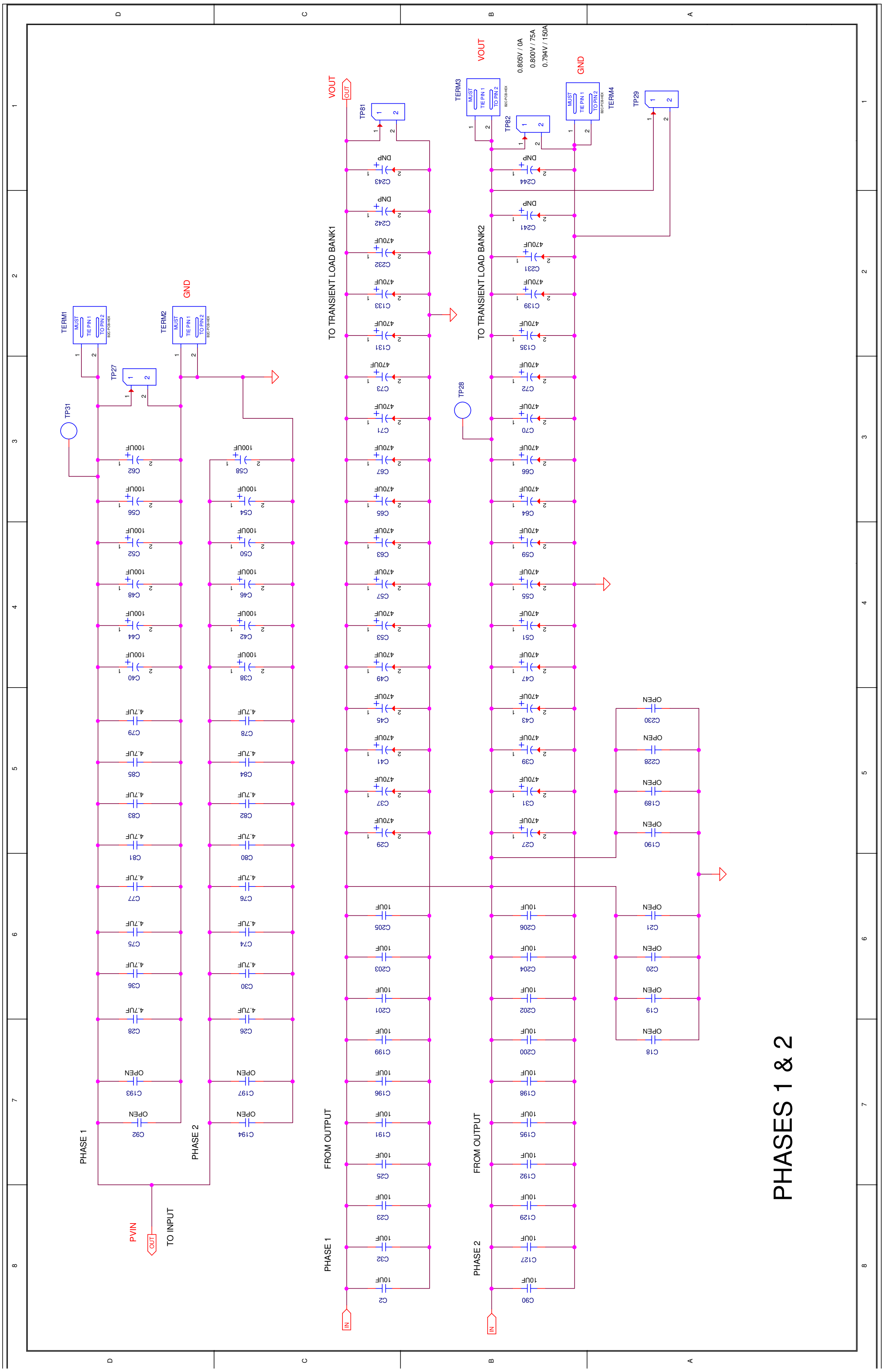

Figure 21. ISL73849MEVAL2Z4 Schematic (Phases 1 & 2 C_{IN} and C_{OUT})

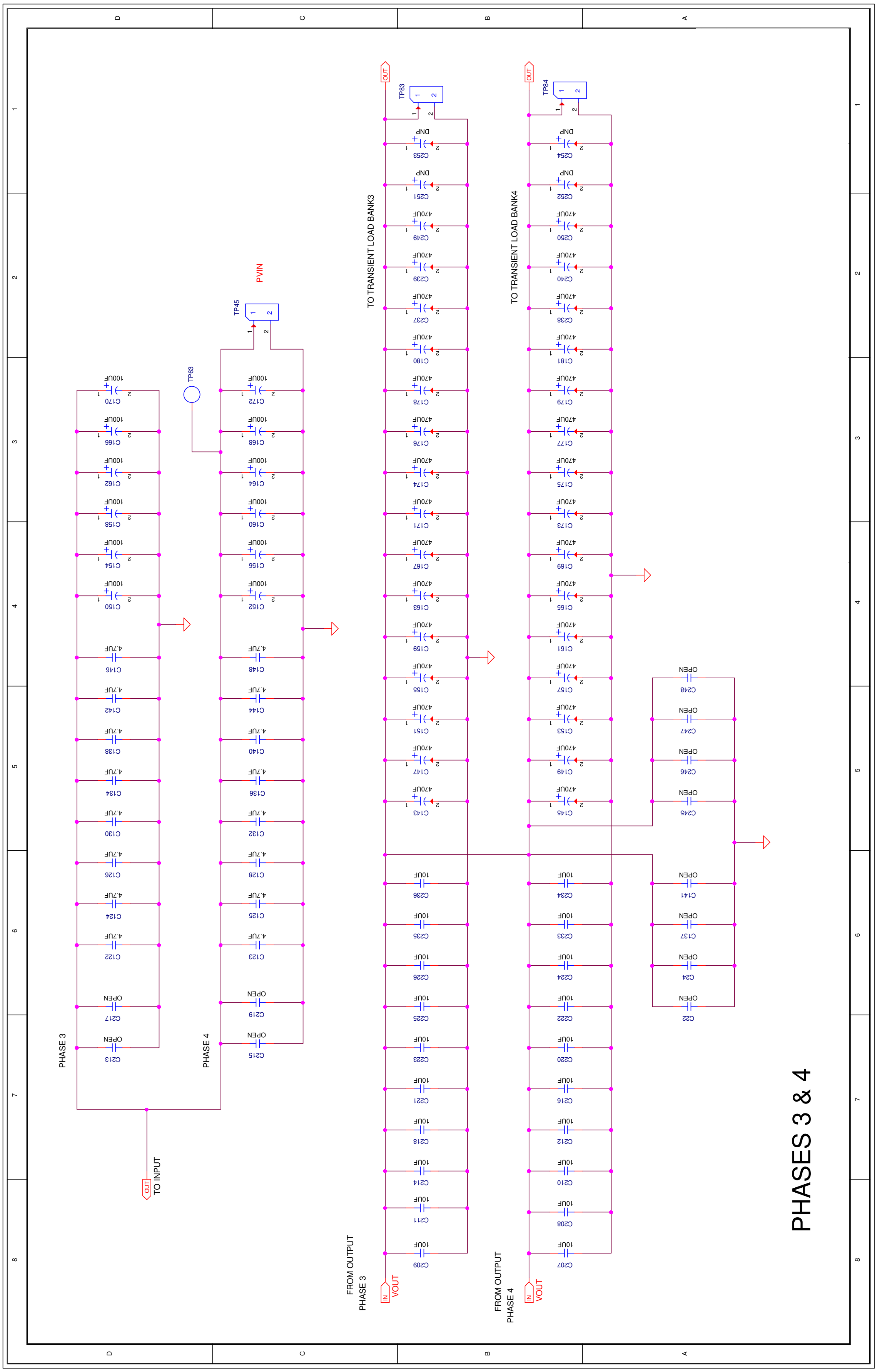

Figure 22. ISL73849MEVAL2Z4 Schematic (Phases 3 & 4 - C_{IN} and C_{OUT})

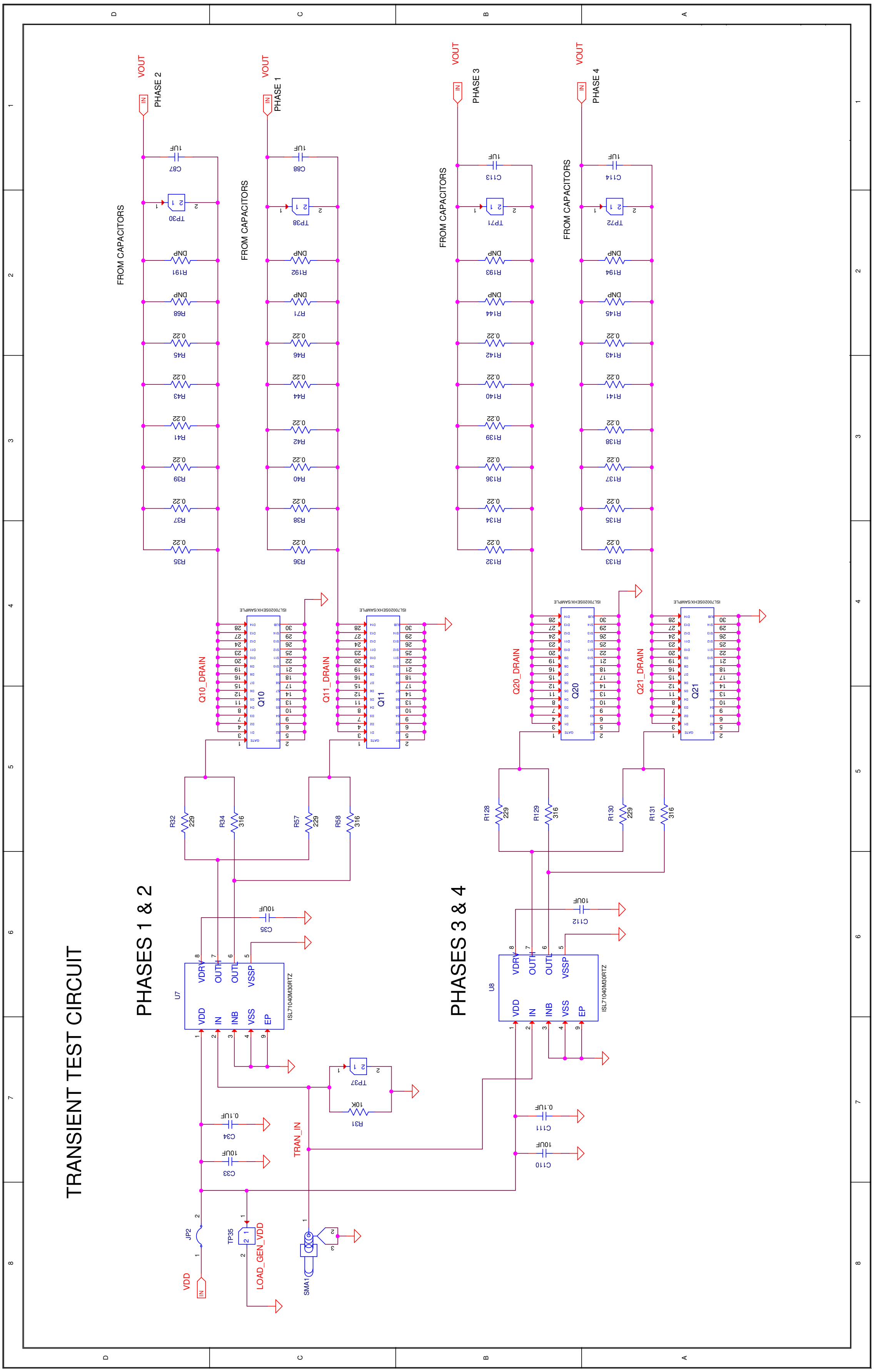

Figure 23. ISL73849MEVAL2Z4 Schematic (Transient Test Circuits)

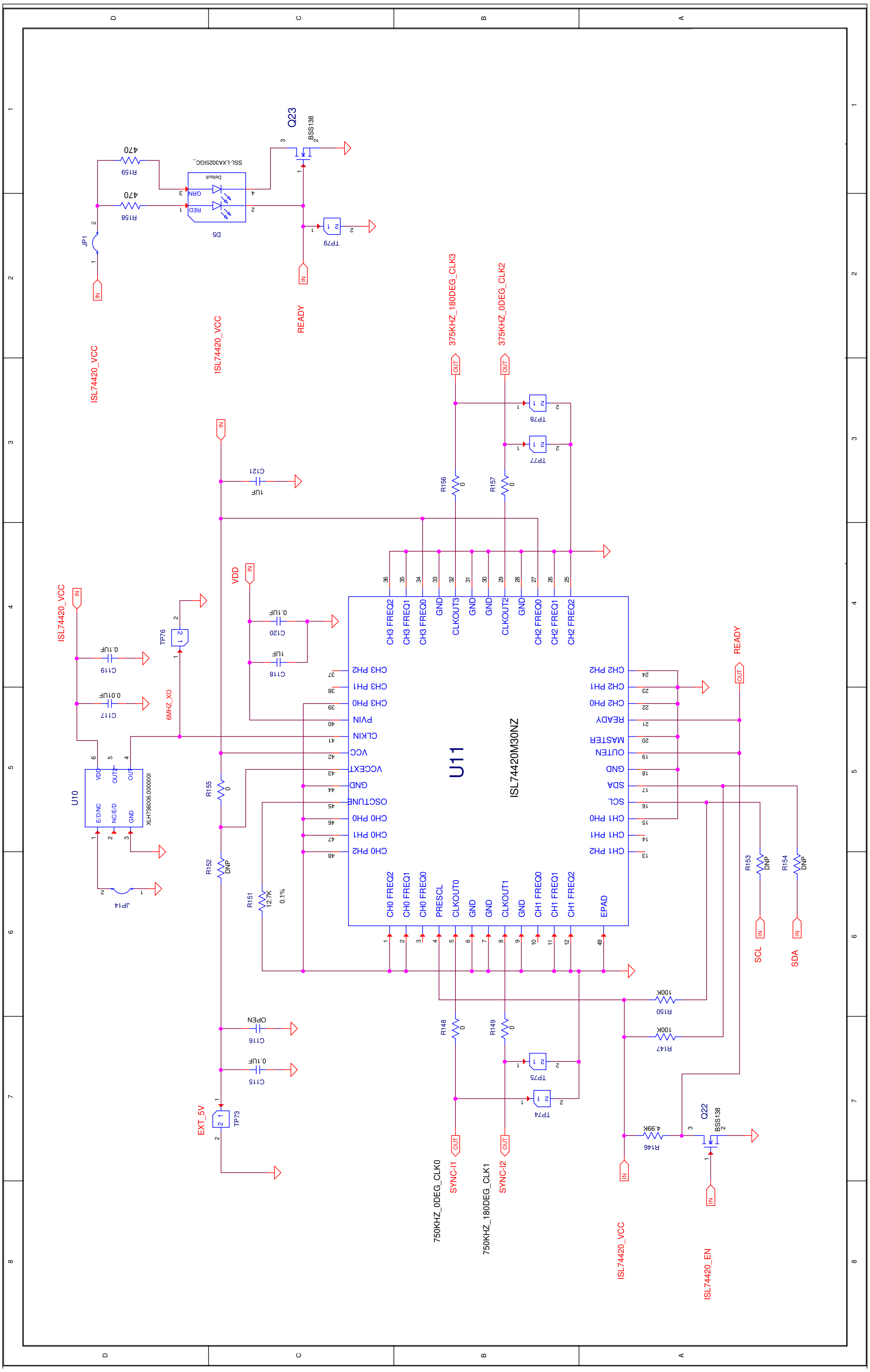

Figure 24. ISL73849MEVAL2Z4 Schematic (Clock Synchronization Circuit)

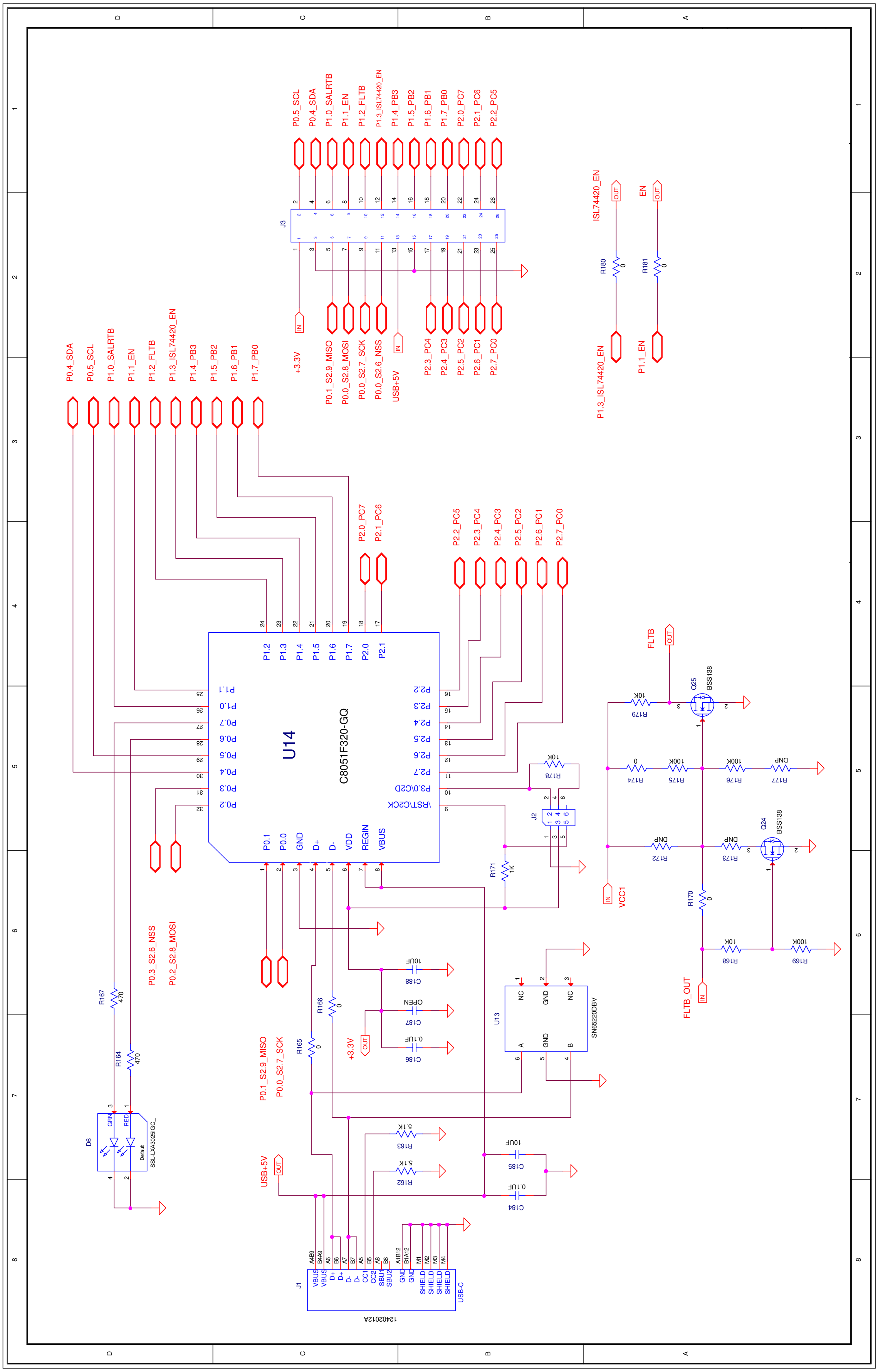

Figure 25. ISL73849MEVAL2Z4 Schematic - MCU Circuit

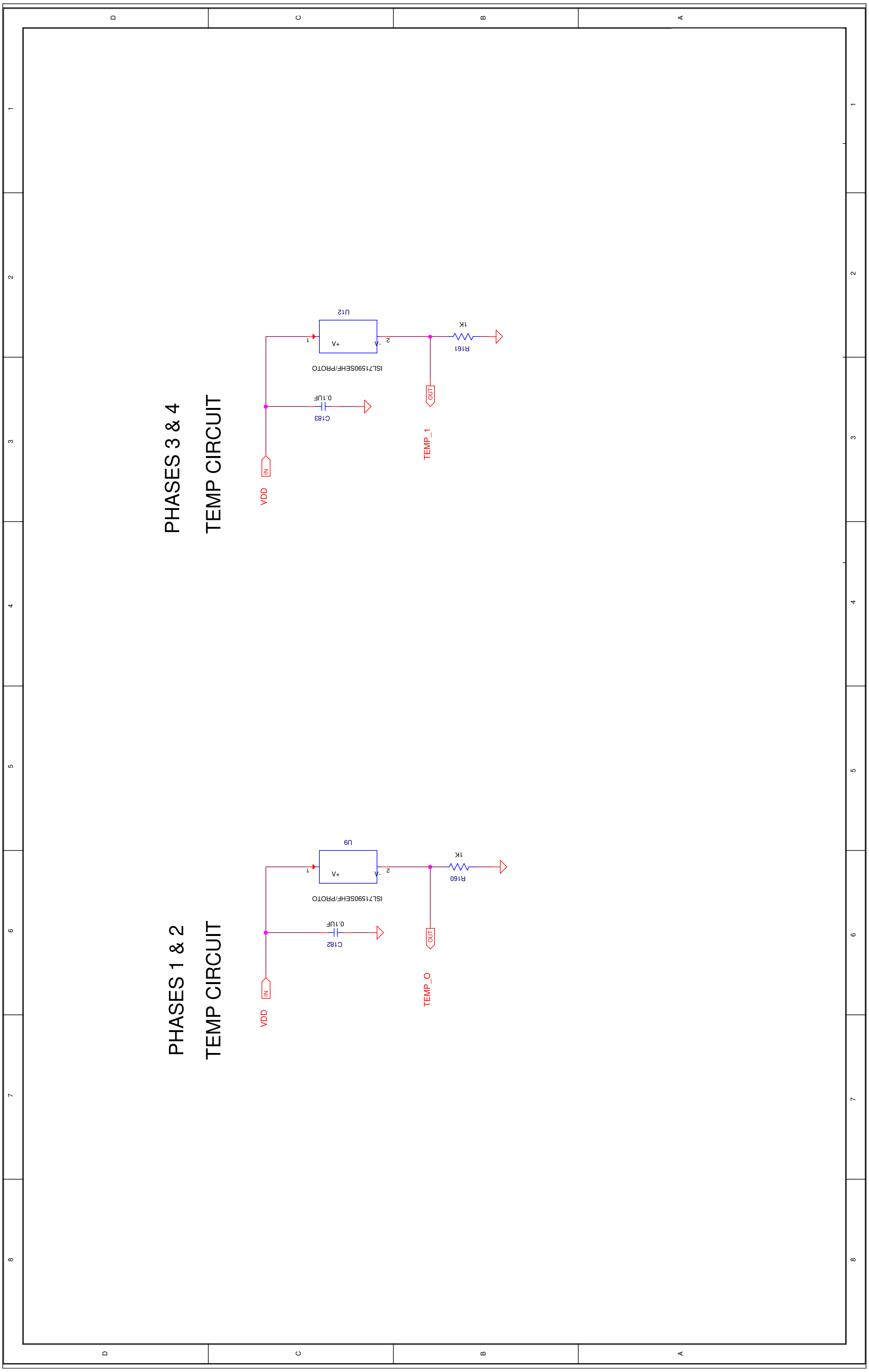

Figure 26. ISL73849MEVAL2Z4 Schematic- TEMP Circuit

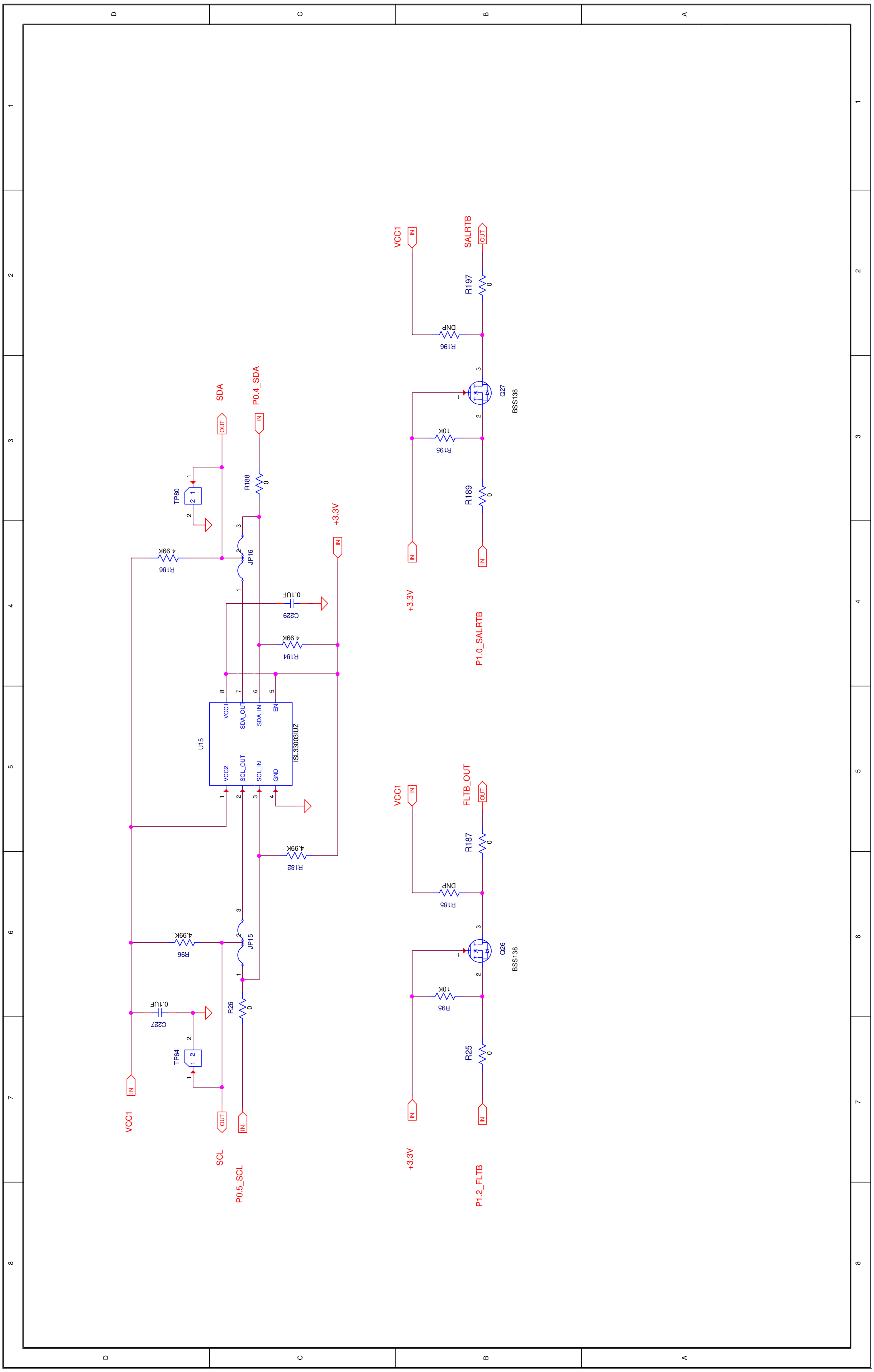

Figure 27. ISL73849MEVAL2Z4 Schematic - Level Translators

2.2 Bill of Materials

Qty	Ref Des	Description	Manufacturer	Part Number
1	PCB	PWB-PCB, ISL73849MEVAL2Z REVA, ROHS	IMAGINEERING	ISL73849MEVAL2ZREVAPCB
1	PLACE BOARD IN BAG	BAG, STATIC, 10×12, ZIP LOC, ROHS	ULINE	10X12-STATIC-BAG
1	C1	CAP, SMD, 0603, 0.015µF, 25V, 10%, X7R, ROHS	AVX	KGM15AR71E153KT-T
5	C68, C69, C102, C103, C117	CAP, SMD, 0603, 0.01µF, 25V, 10%, X7R, ROHS	KEMET	C0603C103K3RAC7411-T
2	C4, C91	CAP, SMD, 0603, 0.047µF, 25V, 10%, X7R, ROHS	AVX	06033C473KAT2A-T
4	C14, C15, C104, C105	CAP, SMD, 0603, 0.12µF, 50V, 10%, X7R, ROHS	KEMET	C0603C124K5RAC7867-T
13	C7, C34, C94, C111, C115, C119, C120, C182-C184, C186, C227, C229	CAP, SMD, 0603, 0.1µF, 25V, 10%, X7R, ROHS	Kemet	C0603X104K3RAC7867-T
1	C3	CAP, SMD, 0603, 1000FP, 25V, 5%, X7R, ROHS	AVX	KGM15AR71E102JT-T
2	C86, C97	CAP, SMD, 0603, 100pF, 50V, 10%, X7R, ROHS	Yageo	CC0603KPX7R9BB101-T
2	C9, C96	CAP, SMD, 0603, 10pF, 25V, 10%, C0G/NP0, ROHS	Kemet	C0603C100K3GAC7867-T
2	C185, C188	CAP, SMD, 0603, 10µF, 10V, 10%, X7R, ROHS	Murata	GRM188Z71A106KA73D-T
4	C60, C61, C108, C109	CAP, SMD, 0603, 680pF, 50V, 10%, X7R, ROHS	AVX	CC0603KRX7R9BB681-T
14	C8, C10-C13, C16, C17, C95, C98-C101, C106, C107	CAP, SMD, 0805, 1µF, 25V, 10%, X7R, ROHS	AVX	08053C105KAT2A-T
2	C5, C93	CAP, SMD, 0805, 2.2µF, 25V, 10%, X7R, ROHS	Murata	08053C225KAT2A-T
4	C33, C35, C110, C112	CAP, SMD, 1206, 10µF, 25V, 10%, X7R, ROHS	TDK	C1206C106K3RACTU-T
32	C26, C28, C30, C36, C74-C85, C122-C126, C128, C130, C132, C134, C136, C138, C140, C142, C144, C146, C148	CAP, SMD, 1206, 4.7µF, 25V, 10%, X7R, ROHS	TDK	C3216X7R1E475K160AE-T
40	C2, C23, C25, C32, C90, C127, C129, C191, C192, C195, C196, C198-C212, C214, C216, C218, C220-C226, C233-C236	CAP-AEC-Q200, 1206, 10µF, 10V, 10%, X7R, ROHS	Murata	GCJ31CR71A106KA13L-T
2	C6, C89	CAP-AEC-Q200, SMD, 0603, 0.1µF, 50V, 10%, X7R, ROHS	Murata	GCJ188R71H104KA12D-T
2	C118, C121	CAP-AEC-Q200, SMD, 0603, 1µF, 25V, 10%, X7R, ROHS	Murata	GCM188R71E105KA64D-T
4	C87, C88, C113, C114	CAP-AEC-Q200, SMD, 0603, 1µF, 25V, 10%, X7R, ROHS	Murata	GCJ188R71E105KA01D-T
60	C27, C29, C31, C37, C39, C41, C43, C45, C47, C49, C51, C53, C55, C57, C59, C63-C67, C70-C73, C131, C133, C135, C139, C143, C145, C147, C149, C151, C153, C155, C157, C159, C161, C163, C165, C167, C169, C171, C173-C181, C231, C232, C237-C240, C249, C250	CAP-TANT, SMD, 2917, 470µF, 2.5V, 20%, ROHS	Kemet	T530D477M2R5ATE005-T

Qty	Ref Des	Description	Manufacturer	Part Number
24	C38, C40, C42, C44, C46, C48, C50, C52, C54, C56, C58, C62, C150, C152, C154, C156, C158, C160, C162, C164, C166, C168, C170, C172	CAP-TANT, SMD, 7.3×4.3mm, 100µF, 25V, 20%, ROHS	KEMET	T521X107M025ATE030-T
4	L1B-L4B	COIL-PWR INDUCTOR, SMD, 10.4x8mm, 170nH, 10%, ROHS	CoilCraft	SLR1070-171KE-T
66	TP2, TP4-TP7, TP9, TP11, TP12, TP14-TP27, TP29, TP30, TP35, TP37-TP43, TP45-TP47, TP50-TP59, TP64-TP84	CONN-HEADER, 1x2, BRKAWY 1×36, 2.54mm, ROHS	FCI	68000-236HLF-1X2
6	JP1, JP2, JP6, JP9, JP10, JP14	CONN-HEADER, 1×2, RETENTIVE, 2.54mm, ROHS	Various	Generic
10	JP3-JP5, JP7, JP8, JP11-JP13, JP15, JP16	CONN-HEADER, 1×3, BREAKAWY 1×36, 2.54mm, ROHS	Various	Generic
1	J2	CONN-HEADER, TH, 2×3, 2.54mm, GOLD, ROHS	Samtec	TSW-103-07-G-D
9	TP1, TP3, TP8, TP10, TP13, TP31, TP48, TP49, TP63	CONN-MINI TEST POINT, VERTICAL, WHITE, ROHS	Keystone	5002
1	TP44	CONN-MINI TEST PT, VERTICAL, BLK, ROHS	Keystone	5001
1	TP36	CONN-MINI TEST PT, VERTICAL, RED, ROHS	Keystone	5000
1	BA2	CONN-PLUG, TH, 4mm INSUL.SOCKET, BLK, R/A, ROHS	Deltron	571-0100
1	BA1	CONN-PLUG, TH, 4mm INSUL.SOCKET, RED, R/A, ROHS	Deltron	571-0500
1	J1	CONN-RCP, SMD, USB C, 24P, ROHS	Amphenol	12402012E212A-T
1	J3	CONN-RECEPTACLE, BRD-BRD, TH, 26P, VERTICAL, ROHS	Molex	901512126
1	SMA1	CONN-RF, SMA JACK, 50Ω, 18GHz, TAB-END LAUNCH, ROHS	Amphenol	132357-11
7	TP28, TP32-TP34, TP60-TP62	CONN-TURRET, TERMINAL POST, TH, ROHS	KEYSTONE	1514-2
4	D1-D4	DIODE SCHOTTKY, 100V, 1A, SOD123FL, ROHS	ROHM	RB080LAM-30-T
0	C116	DO NOT POPULATE OR PURCHASE	-	-
0	C18-C22, C24, C137, C141, C189	DO NOT POPULATE OR PURCHASE	-	-
0	C190, C228, C230, C245-C248	DO NOT POPULATE OR PURCHASE	-	-
0	C241-C244, C251-C254	DO NOT POPULATE OR PURCHASE	-	-
0	C92, C187, C193, C194, C197	DO NOT POPULATE OR PURCHASE	-	-
0	C213, C215, C217, C219	DO NOT POPULATE OR PURCHASE	-	-
0	L1A-L4A	DO NOT POPULATE OR PURCHASE	-	-
0	R12, R54, R59, R82, R116, R117, R152-R154	DO NOT POPULATE OR PURCHASE	-	-
0	R172, R173, R177, R185	DO NOT POPULATE OR PURCHASE	-	-

Qty	Ref Des	Description	Manufacturer	Part Number
0	R68, R71, R144, R145, R191-R194	DO NOT POPULATE OR PURCHASE	-	-
4	TERM1-TERM4	HDWARE-SINGLE WIRE LUG, TH, 11.8×10.3mm, HEX SCREW, ROHS	IHI Connectors	B2C-PCB-HEX
4	U2, U3, U5, U6	IC-GAN FET DRIVER, HALF-BRIDGE, 20P, QFN, 30K RLAT, ROHS	Renesas	ISL71441M30RZ
2	U7, U8	IC-GAN FET, RAD TOLERANT DRIVER, TDFN8, ROHS	Renesas	ISL71040M30RTZ
1	U15	IC-I2C 2-WIRE BUS BUFFER, 8P, MSOP, 3×3, ROHS	Renesas	ISL33003IUZ
2	U1, U4	IC-RAD HARD SINGLE/DUAL PHASE, CONTROLLER, TQFP80, ROHS	Renesas	ISL73849M30NZ
1	U11	IC-RAD TOL, BUFFER, LDR TO 30Krad, 48TQFP, QUAD OUTPUT CLOCK, ROHS	Renesas	ISL74420M30NZ
8	Q1, Q2, Q5, Q6, Q12, Q13, Q18, Q19	IC-SAMPLE DIE, RAD HARD, 100V GAN FET, ROHS	Renesas	ISL70023SEHX/SAMPLE
12	Q3, Q4, Q7, Q8, Q10, Q11, Q14-Q17, Q20, Q21	IC-SAMPLE DIE, RAD HARD, 40V GAN FET, ROHS	Renesas	ISL70020SEHX/SAMPLE
1	U13	IC-SINGLE USB PORT TVS, SMD, 6P, SOT-23-6, ROHS	TI	SN65220DBVR-T
2	U9, U12	IC-TEMPERATURE TRANSDUCER, 2P, FLATPACK, ROHS	Renesas	ISL71590SEHF/PROTO
1	U14	IC-USB uCONTROLLER, 32P, LQFP, HID-REV2.4, ROHS	Silicon Labs	C8051F320-GQ/HID-REV2.4
1	AFFIX TO BACK OF PCB	LABEL-DATE CODE=LINE 1:YRWK-REV#, LINE 2:BOM NAME	Assembly House	LABEL-DATE CODE
2	D5, D6	LED, 565nm, 2.2V GREEN, 2V RED, 20mA, ROHS	Lumex	SSL-LXA3025IGC-TR-T
1	SALRTB_LED	LED, 565nm, 2.2V GREEN, 2V RED, 20mA, ROHS	Lumex	SSL-LXA3025IGC-TR-T
1	U10	OSC-CRYSTAL, 6MHz, HCMOS, 3.3V, 25ppm, SMD, 6P, ROHS	Renesas	XLH736006.000000I-T
32	R21-R24, R27-R30, R48, R49, R51	RES, SMD, 0402, 0Ω, 1/16W, 1%, TNF, ROHS	Vishay	MCS04020Z0000ZE000-T
0	R52, R64-R67, R100-R115	RES, SMD, 0402, 0Ω, 1/16W, 1%, TNF, ROHS	Vishay	MCS04020Z0000ZE000-T
24	R7, R8, R25, R26, R60, R61, R120, R121, R148, R149, R155-R157, R165, R166, R170, R174, R180, R181, R183, R187-R189, R197	RES, SMD, 0603, 0Ω, 1/4W, TF, ROHS	Vishay	RCS06030000Z0EA-T
2	R72, R87	RES, SMD, 0603, 113K, 1/10W, 0.1%, TNF, ROHS	Yageo	RT0603BRD07113KL-T
1	R151	RES, SMD, 0603, 12.7K, 1/10W, 0.1%, TNF, ROHS	Yageo	RT0603BRD0712K7L-T
2	R73, R92	RES, SMD, 0603, 37.4K, 1/10W, 0.1%, TNF, ROHS	Yageo	RT0603BRE0737K4L-T
5	R96, R146, R182, R184, R186	RES, SMD, 0603, 4.99K, 1/10W, 1%, TKF, ROHS	Yageo	RC0603FR-074K99L-T

Qty	Ref Des	Description	Manufacturer	Part Number
1	R69	RES-AEC-Q200, SMD, 0603, 1.62K, 0.1%, 1/10W, ROHS	Panasonic	ERA-3AEB1621V-T
2	R147, R150	RES-AEC-Q200, SMD, 0603, 100K, 1/10W, 1%, TF, ROHS	KOA	RK73H1JTTD1003F-T
11	R4, R47, R50, R53, R79, R81, R83, R85, R169, R175, R176	RES-AEC-Q200, SMD, 0603, 100K, 1/10W, 1%, TKF, ROHS	Stackpole	RMCF0603FT100K-T
10	R19, R20, R31, R95, R98, R99, R168, R178, R179, R195	RES-AEC-Q200, SMD, 0603, 10K, 1/10W, 1%, TKF, ROHS	Vishay	CRCW060310K0FKEB-T
2	R5, R190	RES-AEC-Q200, SMD, 0603, 150K, 1/10W, 1%, TKF, ROHS	Stackpole	RMCF0603FT150K-T
2	R2, R80	RES-AEC-Q200, SMD, 0603, 154K, 1/10W, 0.1%, TKF, ROHS	Panasonic	ERA-3AEB1543V-T
2	R160, R161	RES-AEC-Q200, SMD, 0603, 1K, 1/10W, 0.1%, TNF, ROHS	State of the Art	ERA-3AEB102V-T
1	R171	RES-AEC-Q200, SMD, 0603, 1K, 1/10W, 1%, TKF, ROHS	ROHM	MCR03EZPFX1001-T
8	R13-R16, R88-R91	RES-AEC-Q200, SMD, 0603, 2.1K, 1/10W, 1%, TKF, ROHS	KOA	RK73H1JTTD2101F-T
4	R32, R57, R128, R130	RES-AEC-Q200, SMD, 0603, 229Ω, 1%, 1/10W, ROHS	KOA Speer	RN73H1JTTD2290F25-T
2	R11, R84	RES-AEC-Q200, SMD, 0603, 24.9K, 1/10W, 1%, TKF, ROHS	Stackpole	RMCF0603FT24K9-T
1	R3	RES-AEC-Q200, SMD, 0603, 3.01K, 1%, 1/10W, ROHS	Stackpole	RMCF0603FT3K01-T
4	R17, R18, R94, R97	RES-AEC-Q200, SMD, 0603, 3.65K, 1/10W, 1%, ROHS	KOA	RK73H1JTTD3651F-T
4	R62, R63, R118, R119	RES-AEC-Q200, SMD, 0603, 30.1Ω, 1/8W, 1%, TKF, ROHS	KOA	RK73H1JTTD30R1F-T
4	R34, R58, R129, R131	RES-AEC-Q200, SMD, 0603, 316Ω, 1%, 1/10W, ROHS	Panasonic	ERJ-3EKF3160V-T
2	R1, R78	RES-AEC-Q200, SMD, 0603, 357Ω, 0.1%, 1/10W, ROHS	Panasonic	ERA-3AEB3570V-T
1	R70	RES-AEC-Q200, SMD, 0603, 4.75K, 0.1%, 1/10W, ROHS	Panasonic	ERA-3AEB4751V-T
2	R158, R159	RES-AEC-Q200, SMD, 0603, 470Ω, 1/10W, 1%, ROHS	Vishay	CRCW0603470RFKEA-T
2	R164, R167	RES-AEC-Q200, SMD, 0603, 470Ω, 1/10W, 1%, TF, ROHS	Panasonic	ERJ-3EKF4700V-T
2	R162, R163	RES-AEC-Q200, SMD, 0603, 5.1K, 1/10W, 1%, TF, ROHS	Stackpole	RMCF0603FT5K10-T
2	R10, R86	RES-AEC-Q200, SMD, 0603, 62.6K, 1/10W, 0.1%, MF, ROHS	KOA Speer	RN73H1JTTD6262B25-T
2	R9, R33	RES-AEC-Q200, SMD, 0603, 680Ω, 1/10W, 1%, TKF, ROHS	Vishay	CRCW0603680RFKEA-T
2	R74, R93	RES-AEC-Q200, SMD, 0603, 87.6K, 1/10W, 0.1%, ROHS	Vishay	TNPW060387K6BEEA-T
12	R6, R55, R56, R75-R77, R122-R127	RES-AEC-Q200, SMD, 2512W, 0.002Ω, 3W, 2%, MF, ROHS	SSM	KRL6432E-M-R002-G-T1-T
24	R35-R46, R132-R143	RES-CURR.SENSE, SMD, 2512, 0.22Ω, 2W, 1%, TF, ROHS	Bourns	CRM2512-FX-R220ELF-T
1	R196	RES-AEC-Q200, SMD, 0603, 10K, 1/10W, 1%, TKF, ROHS		CRCW060310K0FKEB-T
4	4 CORNERS (BOTTOM)	SCREW, 4-40X1/4in, PHILLIPS, PANHEAD, SS, ROHS	Keystone	4-40X1/4-SCREW-SS

Qty	Ref Des	Description	Manufacturer	Part Number
4	4 CORNERS (BOTTOM)	STANDOFF, 4-40X3/4in, F/F, HEX, ALUMINUM, ROHS	Keystone	4-40X3/4-STANDOFF-METAL
2	SW1, SW2	SWITCH-DIP, TH, 6POS, SLIDE, SPST, SEALED, ROHS	Grayhill	78B06ST
1	Q9	TRANSISTOR, N-CHANNEL, SOT-23, 60V, 115mA, ROHS	Fairchild	2N7002-7-F-T
6	Q22-Q27	TRANSISTOR-MOS, N-CHANL, SMD, SOT-323-3, 50V, ROHS	Diodes-inc	BSS138W-7-F-T
1	BAG AND SHIP	CABLE-USB 2.0, TYPE A MALE/TYPE MINI-B MALE, ROHS		3021009-06
11	JP3, JP7, JP8, JP11, JP15, JP16 – Position 1-2 JP4, JP5, JP12, JP13 – Position 2-3 JP1 – Populated	CONN-JUMPER, SHUNT, 2P, 2.54mmPITCH, BLK, 6mm, ROHS		SPC02SYAN

2.3 Board Layout

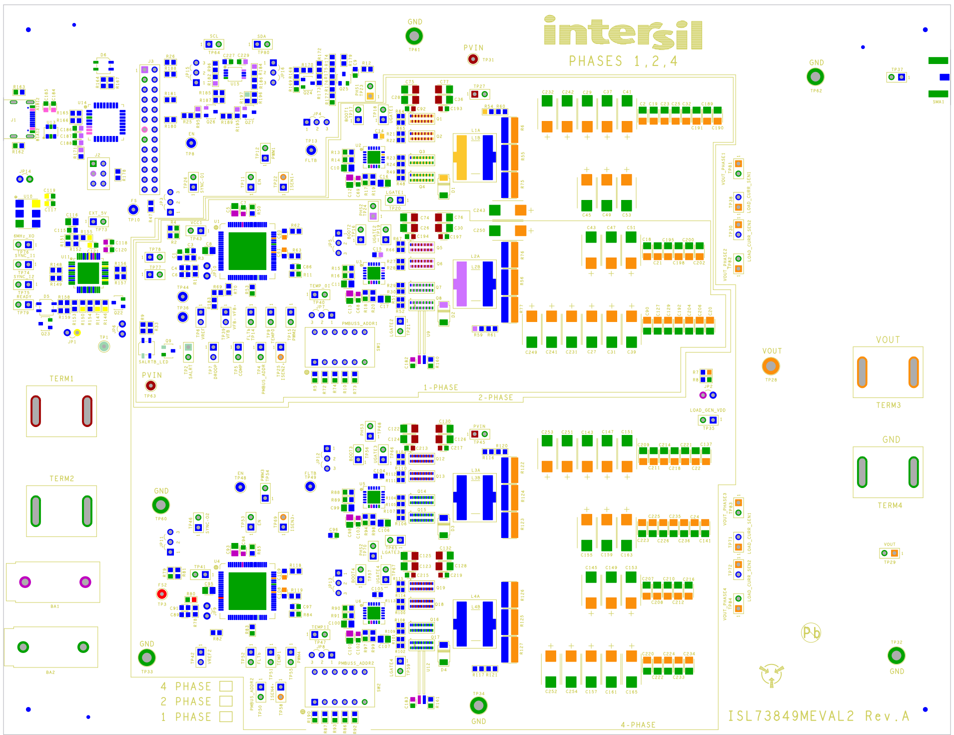

Figure 28. Silkscreen Top Layer

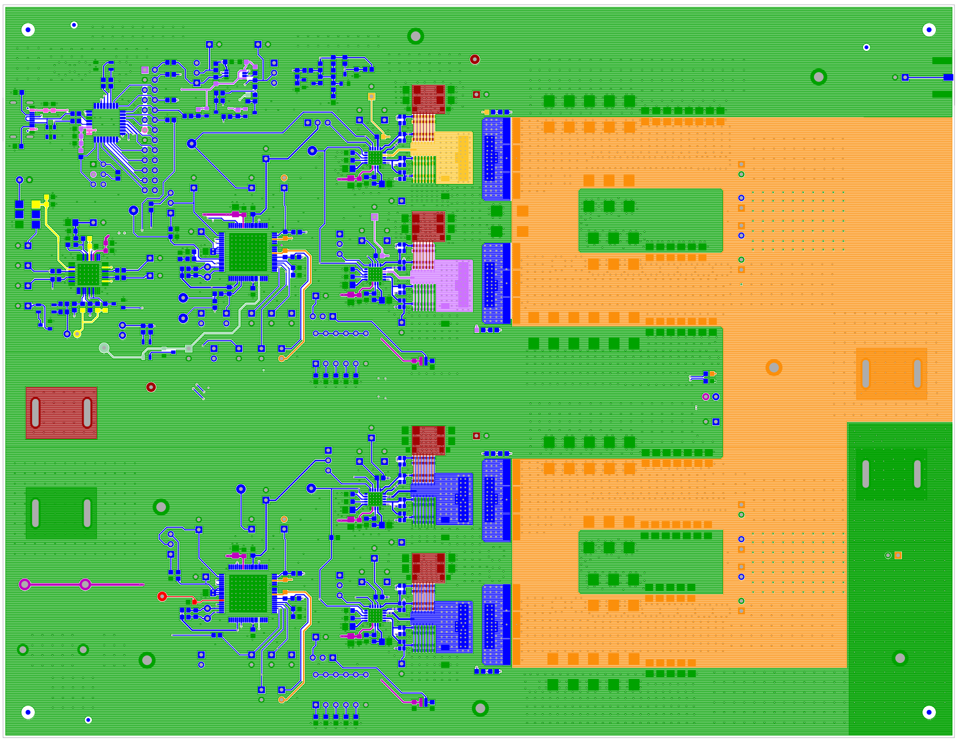

Figure 29. Top Layer

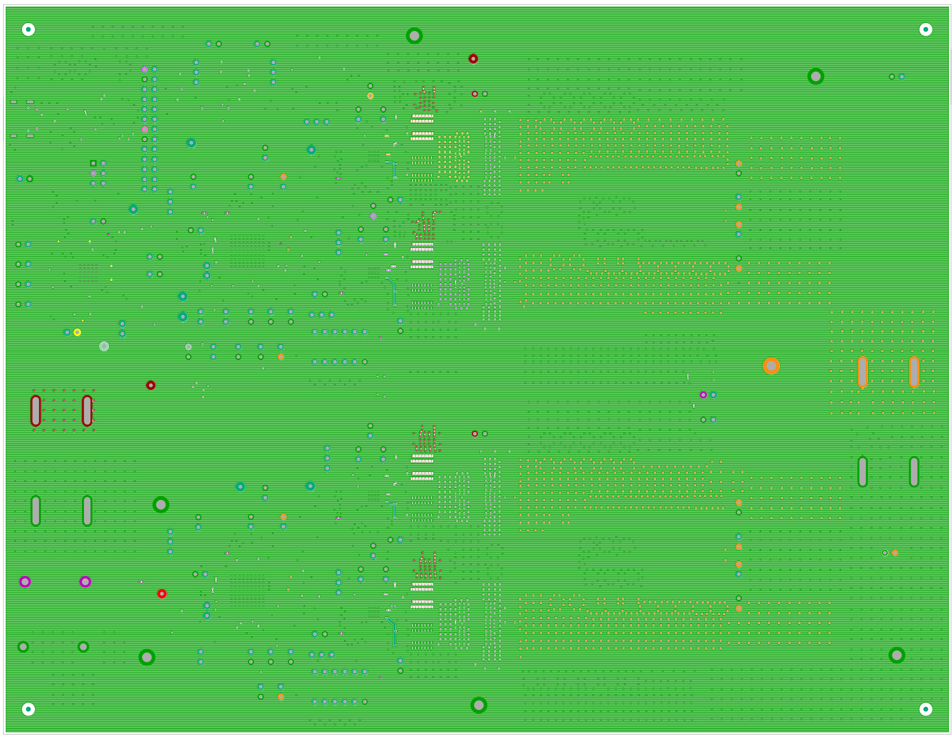

Figure 30. Layer 2

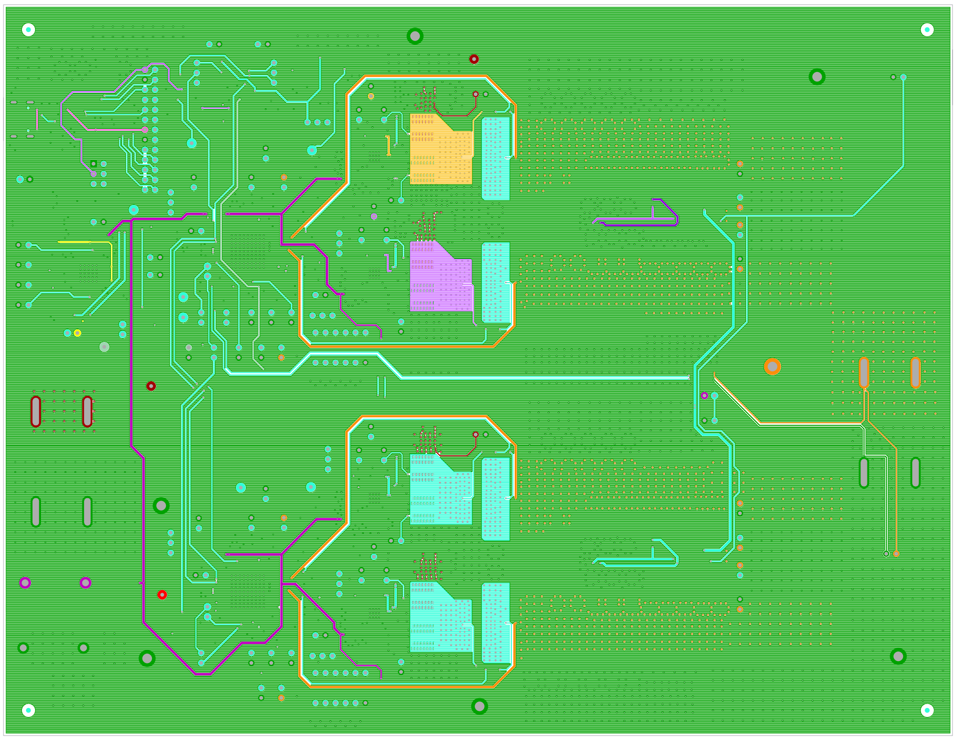

Figure 31. Layer 3

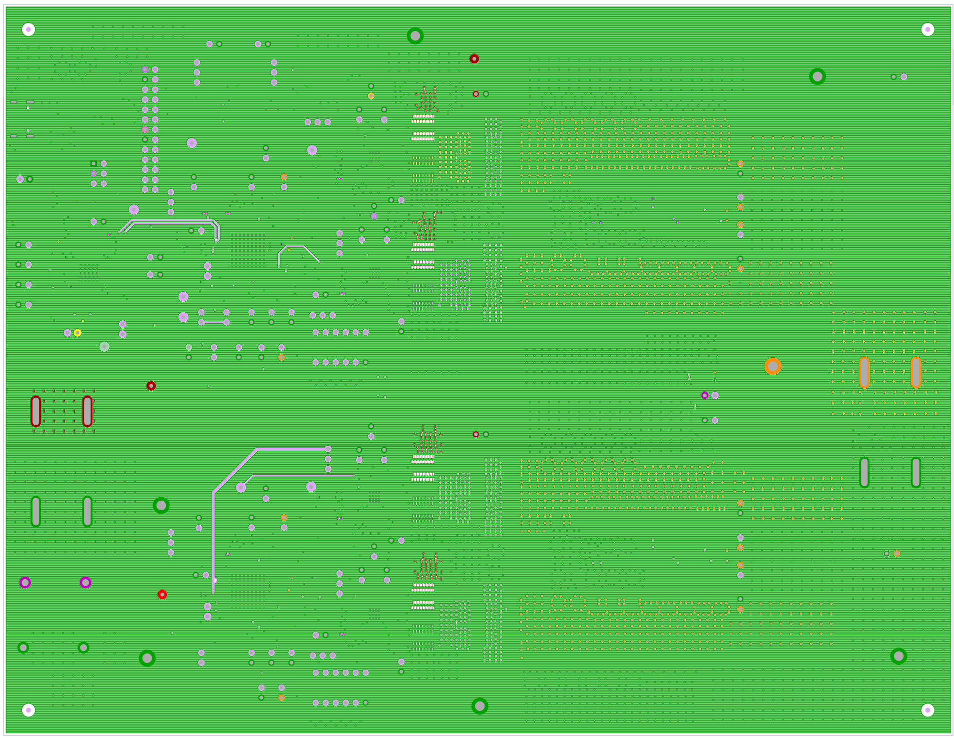

Figure 32. Layer 4

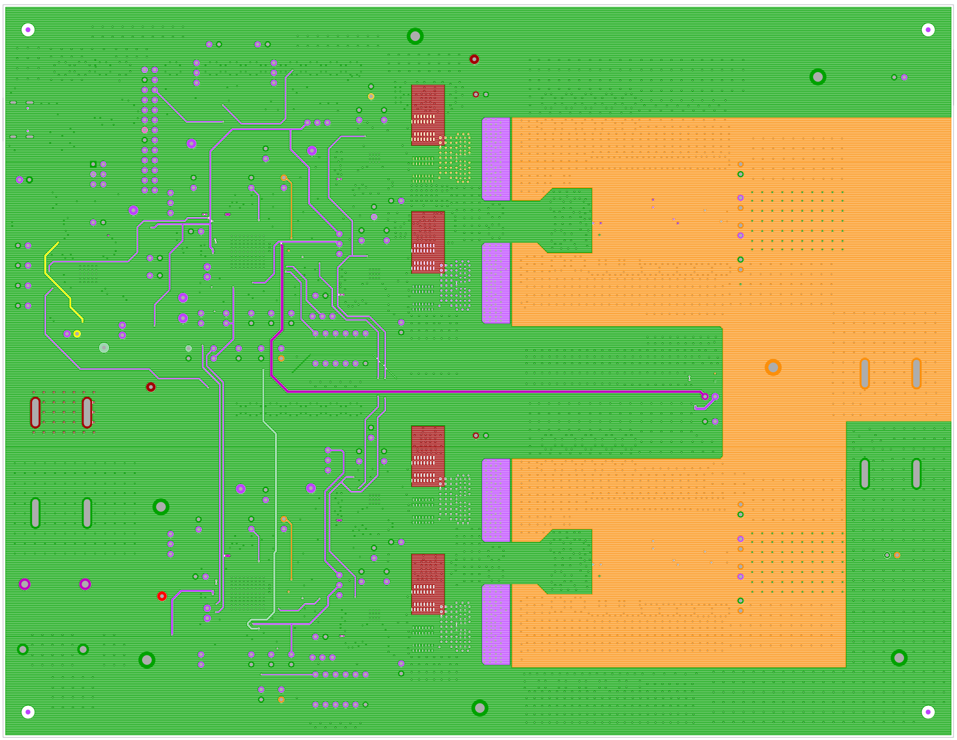

Figure 33. Layer 5

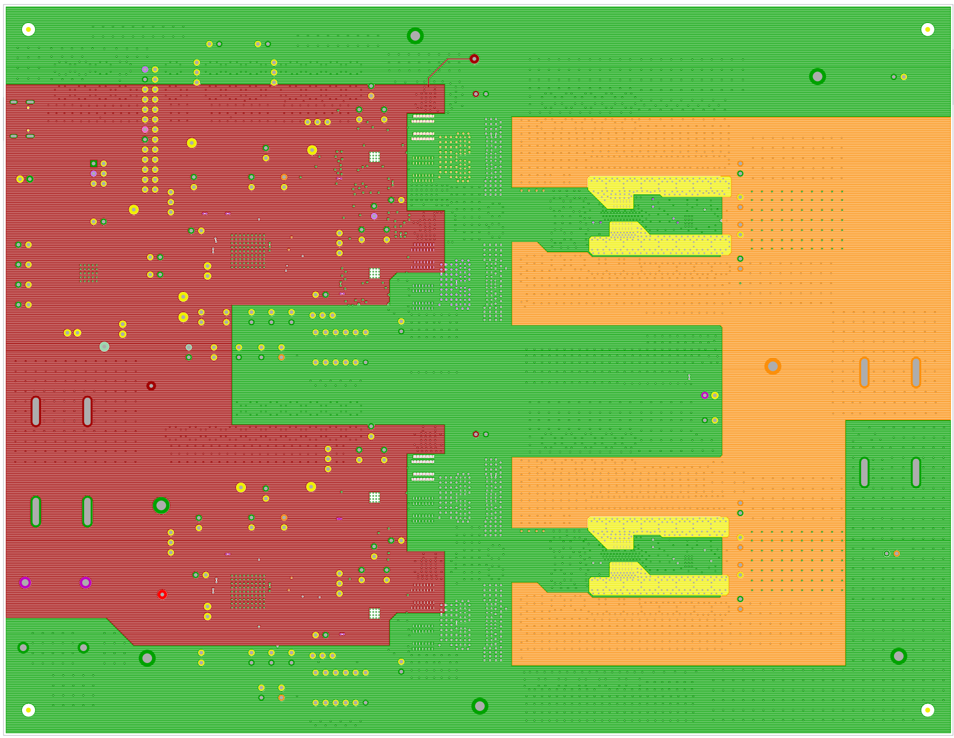

Figure 34. Layer 6

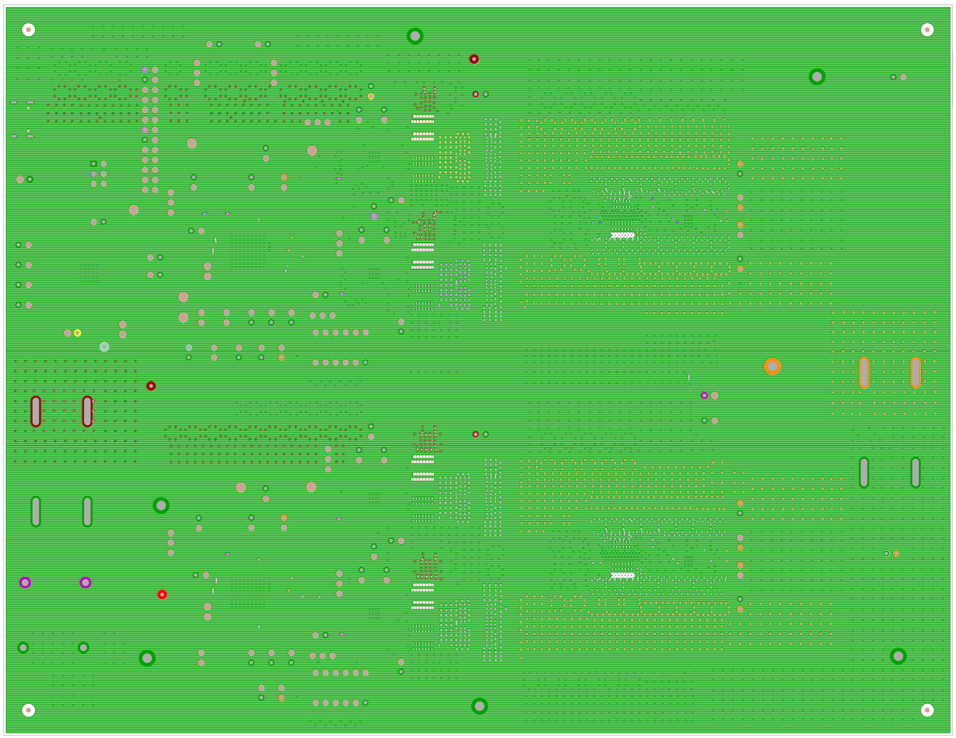

Figure 35. Layer 7

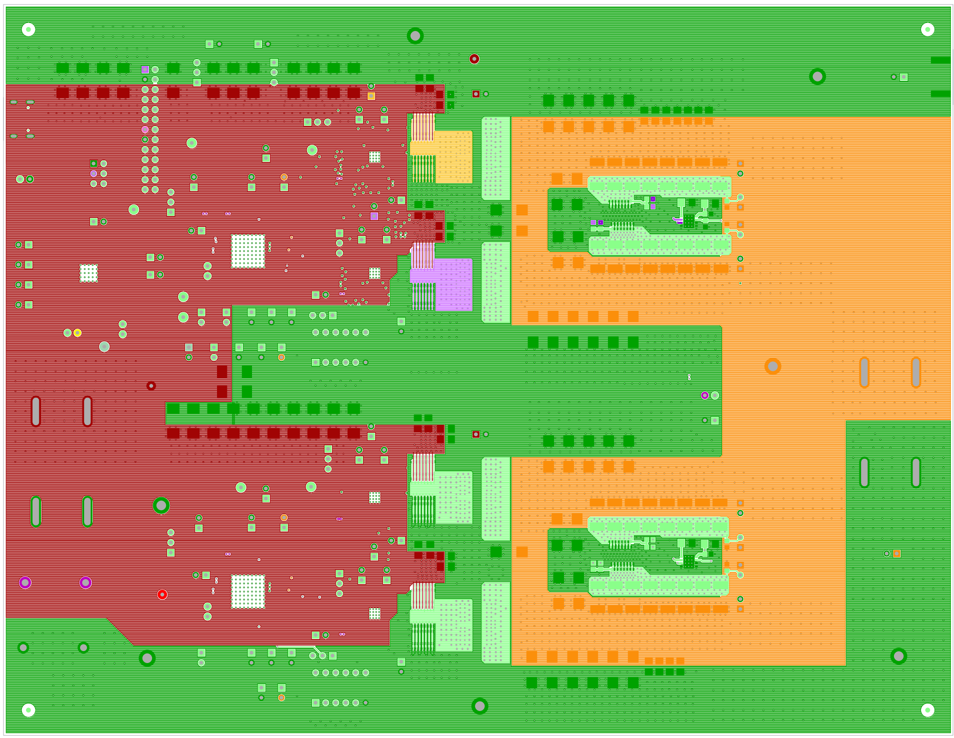

Figure 36. Bottom Layer

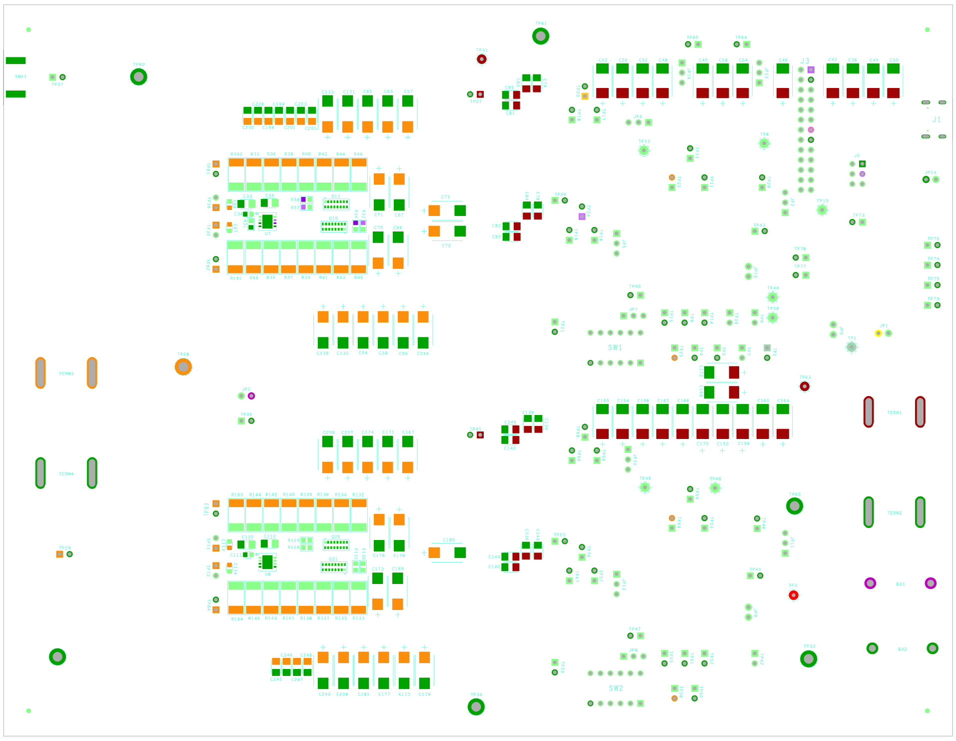

Figure 37. Silkscreen Bottom Layer

3. Typical Performance Graphs

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C

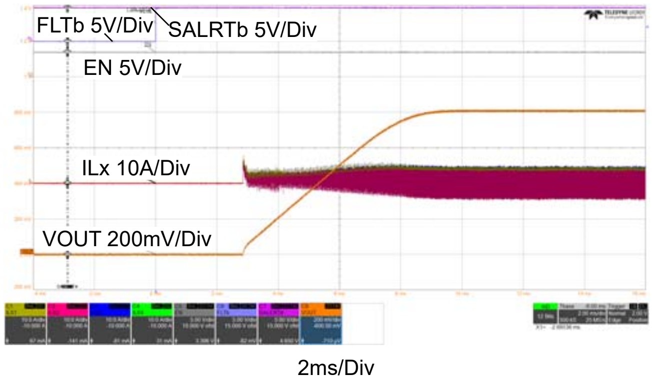

Figure 38. Soft-Start with the FLTb pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, VOUT_COMMAND = 0.6V)

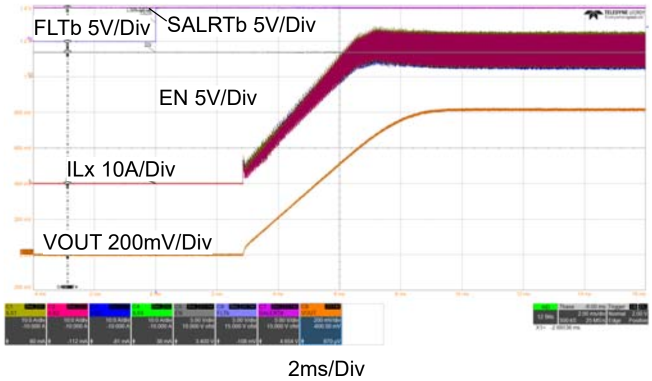

Figure 39. Soft-Start with the FLTb pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A, VOUT_COMMAND = 0.6V)

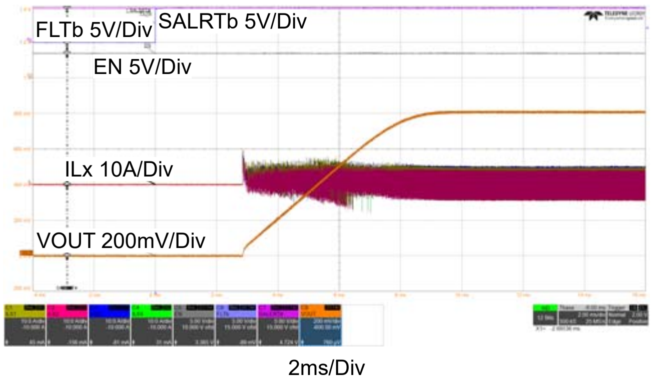

Figure 40. Soft-Start with the FLTb pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, VOUT_COMMAND = 0.6V)

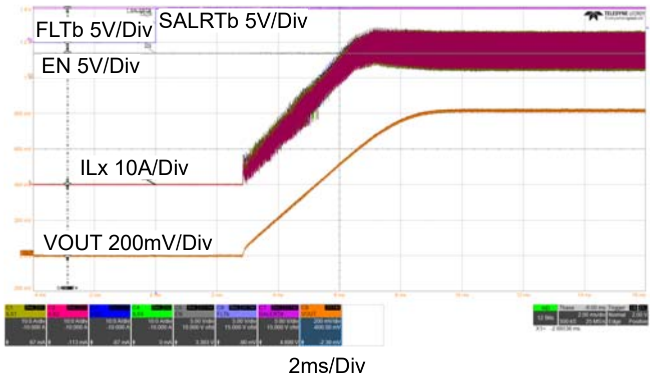

Figure 41. Soft-Start with the FLTb pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A, VOUT_COMMAND = 0.6V)

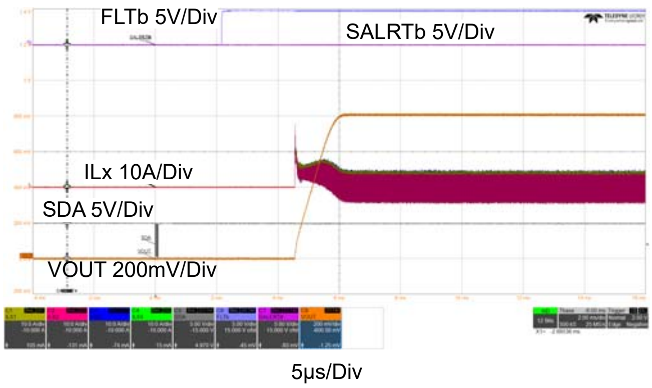

Figure 42. Soft-Start with the OPERATION Bit (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, OPERATION = 0x00 to 0x80, VOUT_COMMAND = 0.6V, SS_CONFIG = 2ms)

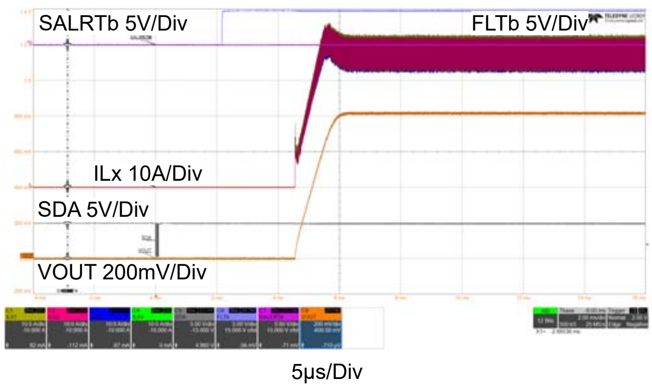

Figure 43. Soft-Start with the OPERATION Bit (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A, OPERATION = 0x00 to 0x80, VOUT_COMMAND = 0.6V, SS_CONFIG = 2ms)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

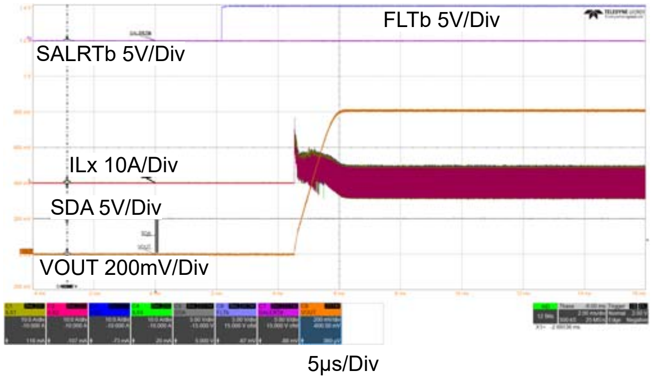

Figure 44. Soft-Start with the OPERATION Bit (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, OPERATION = 0x00 to 0x80, VOUT_COMMAND = 0.6V, SS_CONFIG = 2ms)

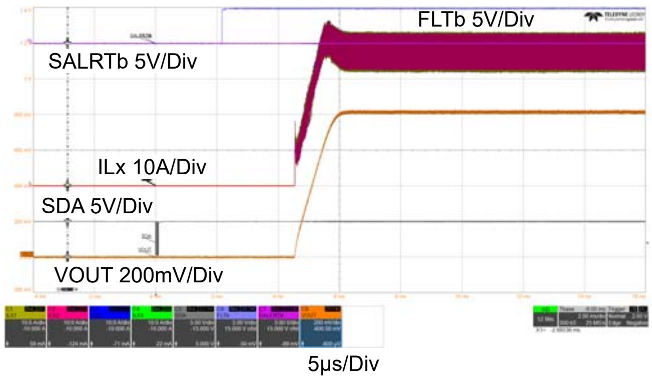

Figure 45. Soft-Start with the OPERATION Bit (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A, OPERATION = 0x00 to 0x80, VOUT_COMMAND = 0.6V, SS_CONFIG = 2ms)

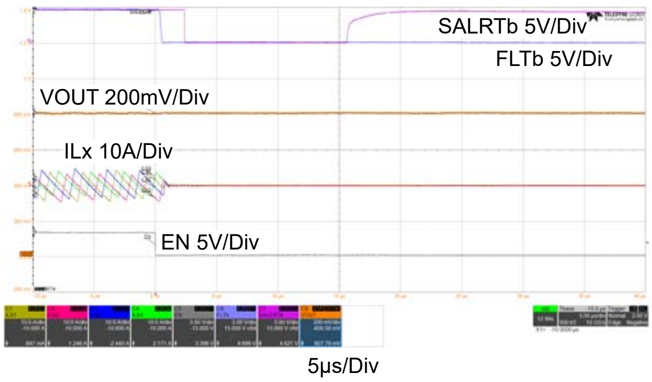

Figure 46. Shutdown with the EN Pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

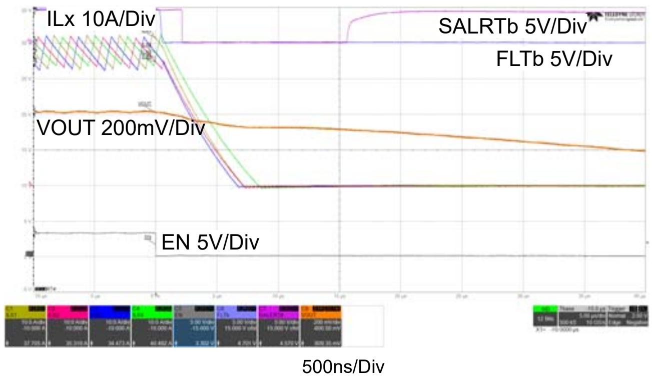

Figure 47. Shutdown with the EN Pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A)

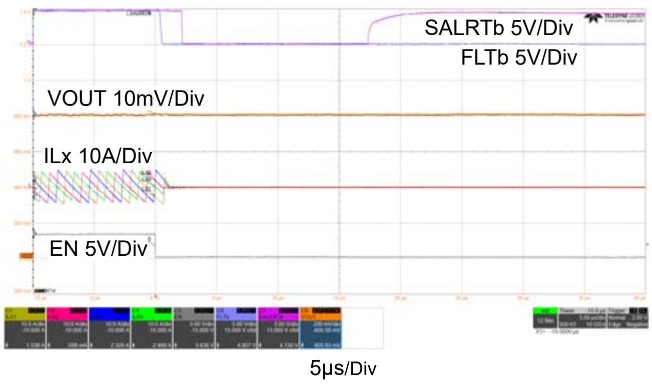

Figure 48. Shutdown with the EN Pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

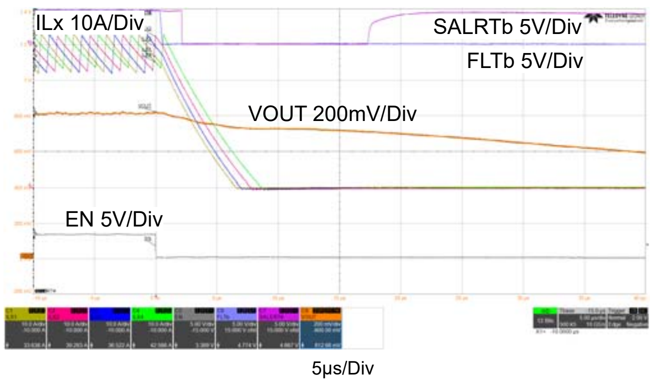

Figure 49. Shutdown with the EN Pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

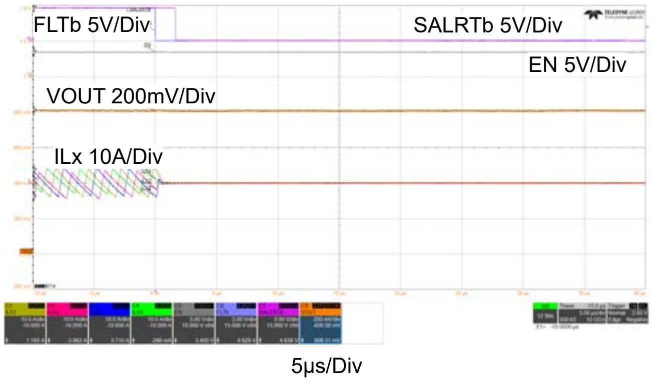

Figure 50. Shutdown with the FLTb Pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

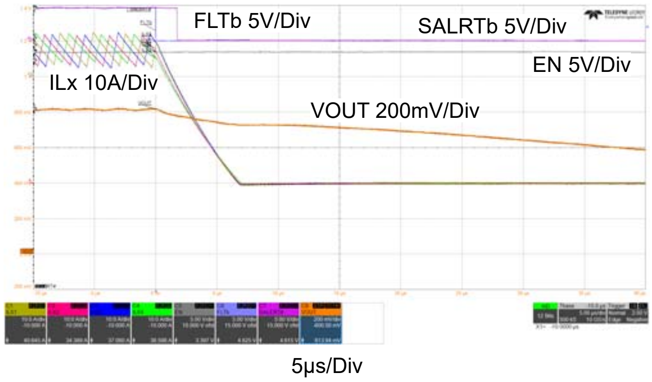

Figure 51. Shutdown with the FLTb Pin (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A)

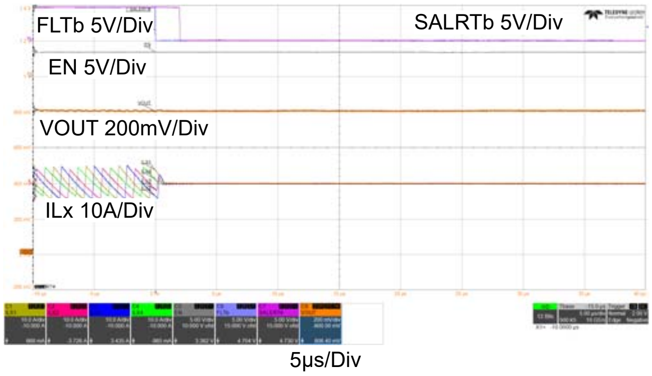

Figure 52. Shutdown with the FLTb Pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

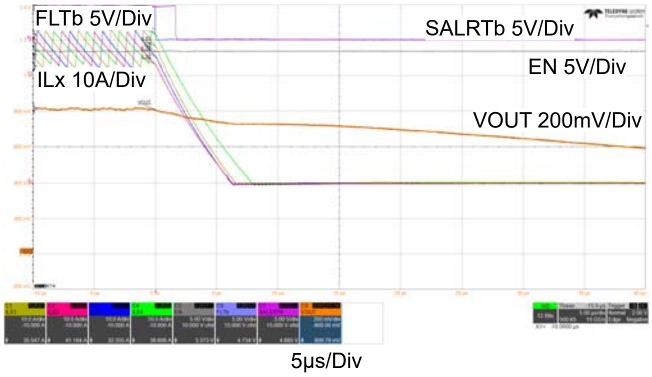

Figure 53. Shutdown with the FLTb Pin (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A)

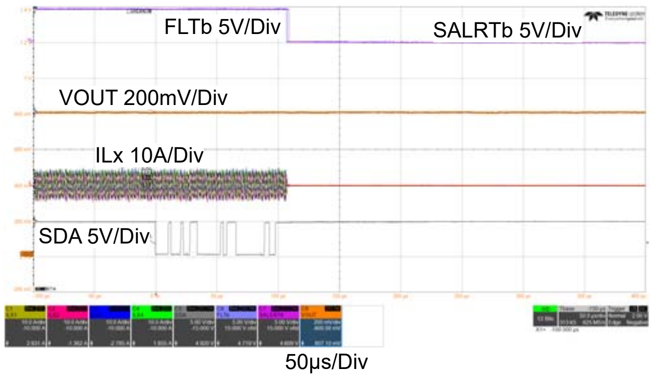

Figure 54. Shutdown with the OPERATION Bit (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, OPERATION = 0x80 to 0x00)

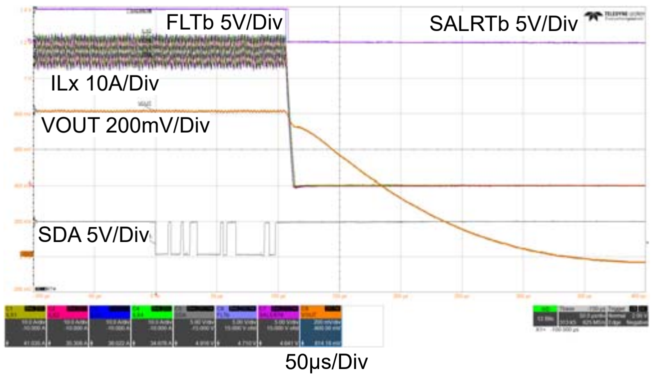

Figure 55. Shutdown with the OPERATION Bit (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A, OPERATION = 0x80 to 0x00)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

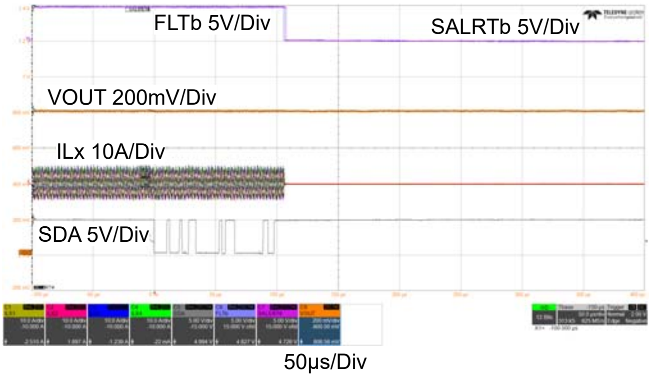

Figure 56. Shutdown with the OPERATION Bit (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, OPERATION = 0x80 to 0x00)

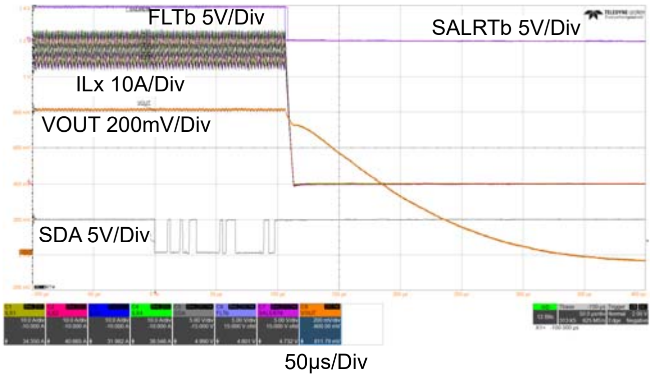

Figure 57. Shutdown with the OPERATION Bit (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A, OPERATION = 0x80 to 0x00)

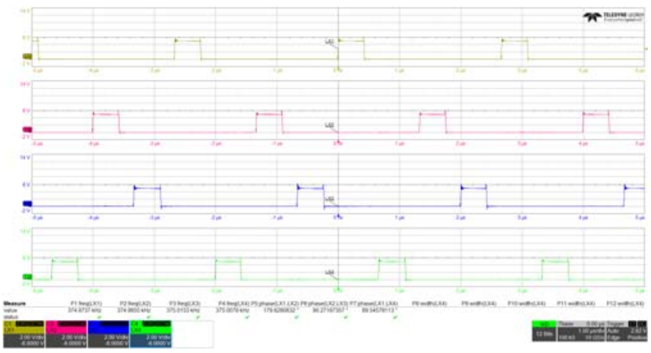

Figure 58. Phase Shifting (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

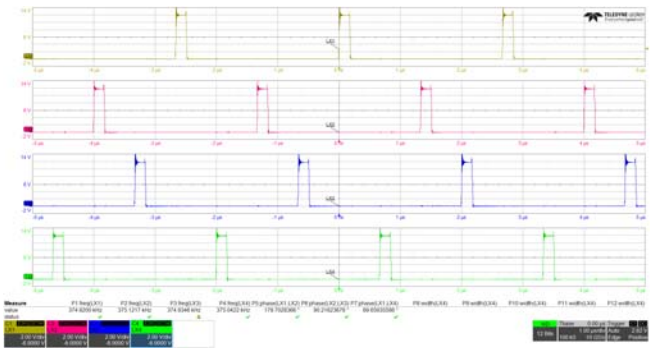

Figure 59. Phase Shifting (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

Figure 60. Phase Node Steady-State Jitter (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

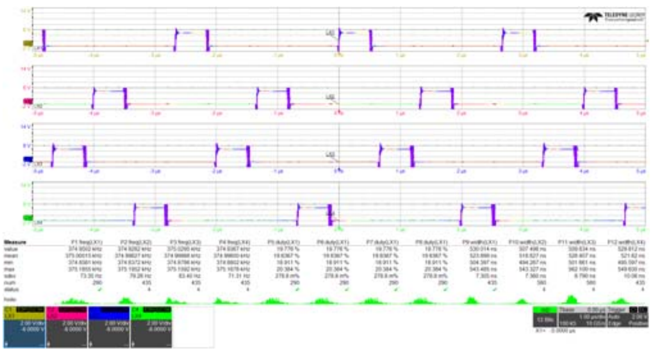

Figure 61. Phase Node Steady-State Jitter (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

Figure 62. Phase Node Steady State Jitter (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

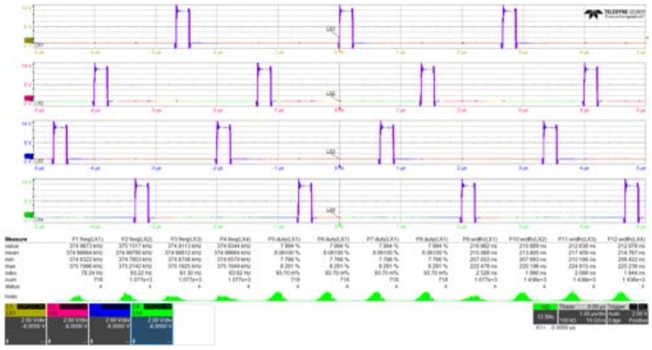

Figure 63. Phase Node Steady State Jitter (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A)

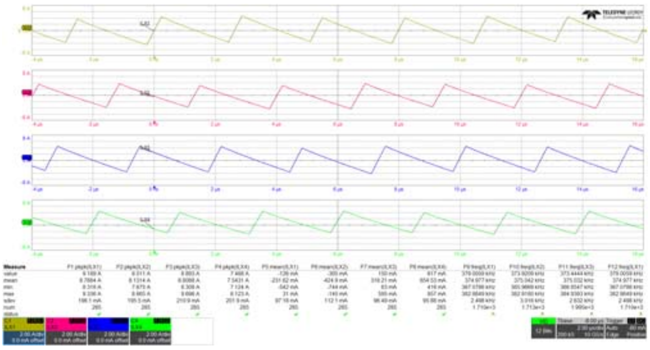

Figure 64. 4-Phase Current Sharing (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

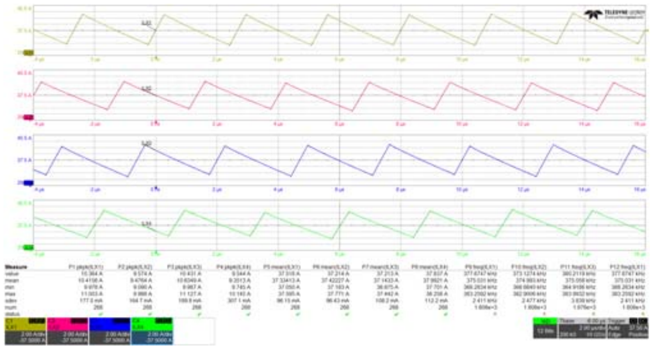

Figure 65. 4-Phase Current Sharing (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A)

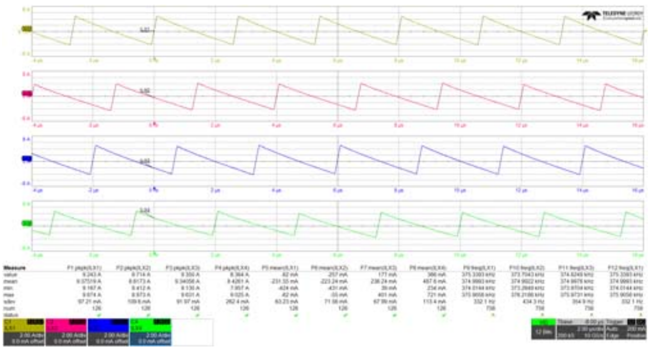

Figure 66. 4-Phase Current Sharing (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

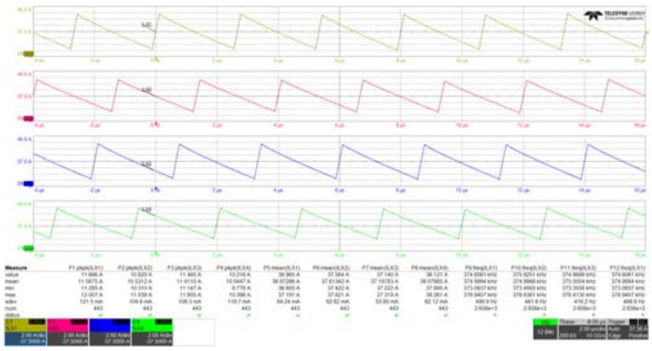

Figure 67. 4-Phase Current Sharing (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

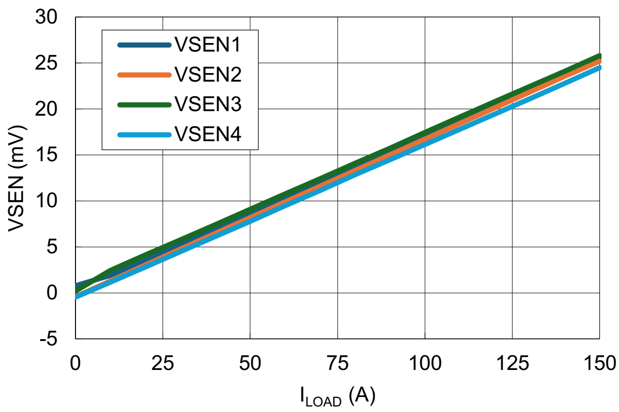

Figure 68. ISEN1-4 DC Current Sharing (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A)

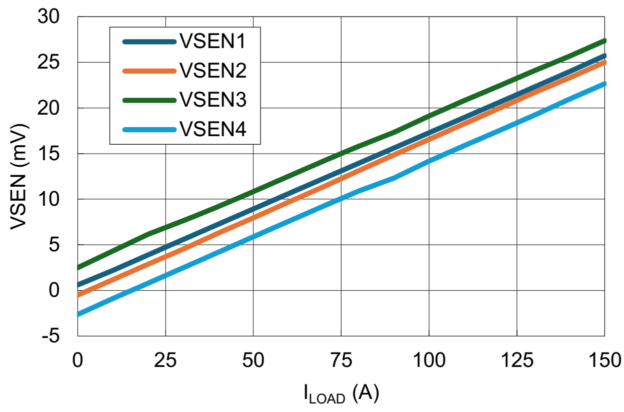

Figure 69. ISEN1-4 DC Current Sharing (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A)

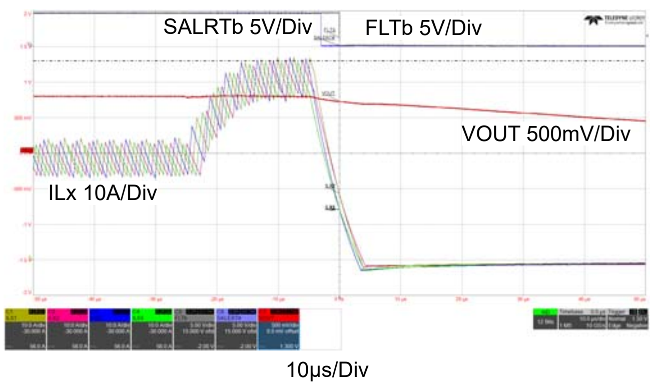

Figure 70. Overcurrent Protection (VDD = 5V, PVIN = 5V, OC_TH = 37.5mV)

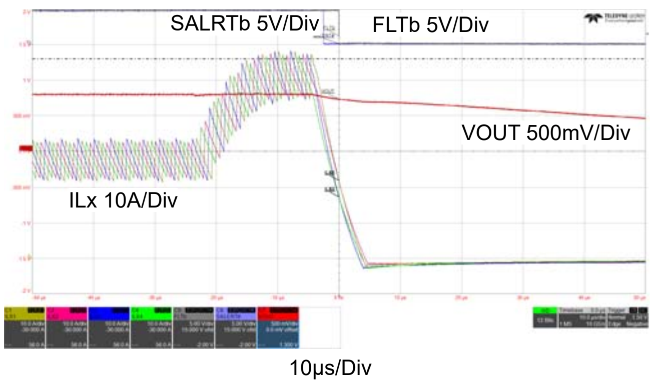

Figure 71. Overcurrent Protection (VDD = 12V, PVIN = 12V, OC_TH = 37.5mV)

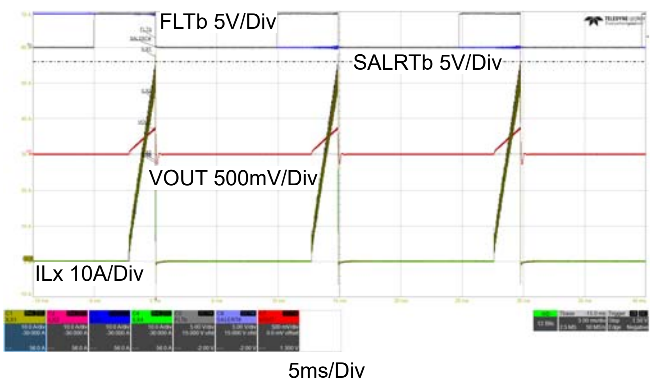

Figure 72. Overcurrent Protection on FLTb Startup (VDD = 5V, PVIN = 5V, OC_TH = 37.5mV)

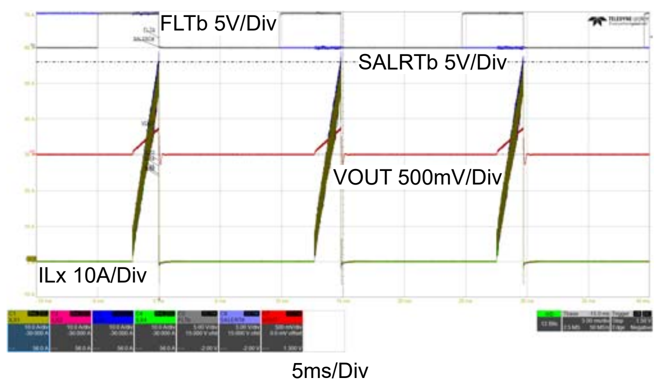

Figure 73. Overcurrent Protection on FLTb Startup (VDD = 12V, PVIN = 12V, OC_TH = 37.5mV)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

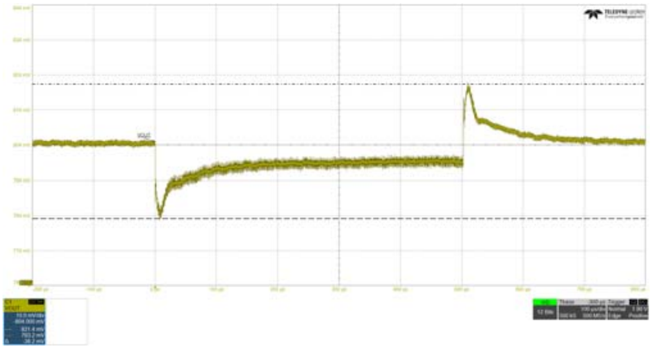

Figure 74. Load Transient Response (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A→75A→0A, Slew = 200A/µs)

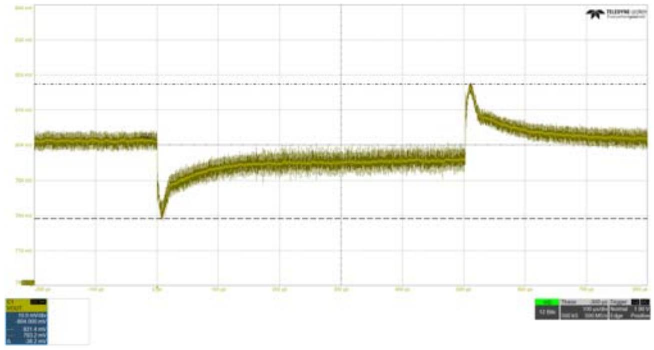

Figure 75. Load Transient Response (VDD = 5V, PVIN = 5V, I_{LOAD} = 75A→150A→75A, Slew = 200A/µs)

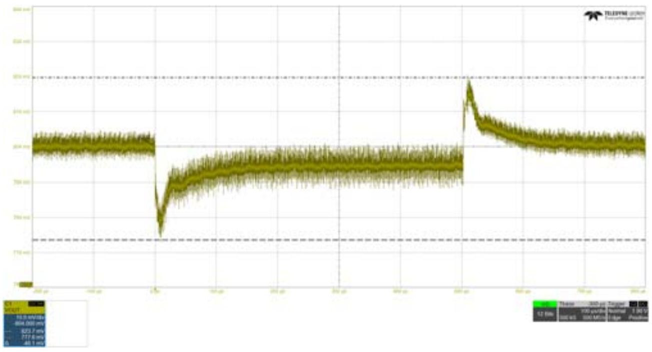

Figure 76. Load Transient Response (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A→75A→0A, Slew = 200A/µs)

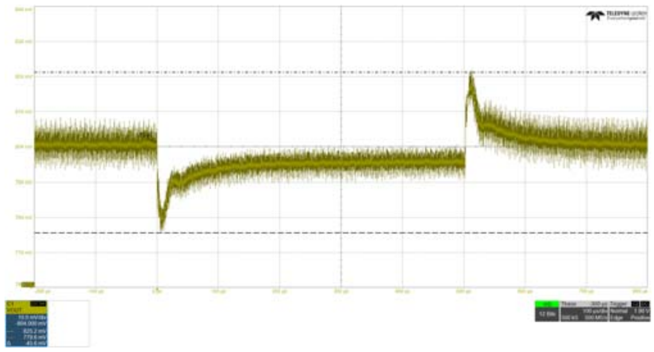

Figure 77. Load Transient Response (VDD = 12V, PVIN = 12V, I_{LOAD} = 75A→150A→75A, Slew = 200A/µs)

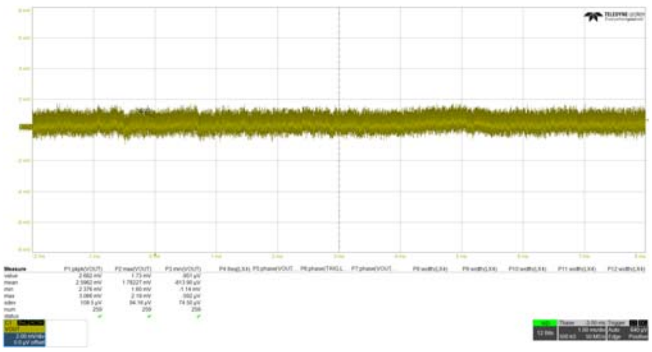

Figure 78. VOUT Ripple measured at TP83 PH3 Output (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, VOUT_COMMAND = 0.6V, 20MHz BW filter, AC-Coupled)

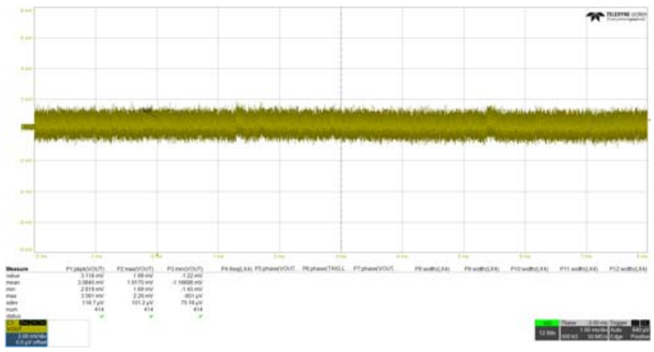

Figure 79. VOUT Ripple measured at TP83 PH3 Output (VDD = 5V, PVIN = 5V, I_{LOAD} = 150A, VOUT_COMMAND = 0.6V, 20MHZ BW filter, AC-Coupled)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

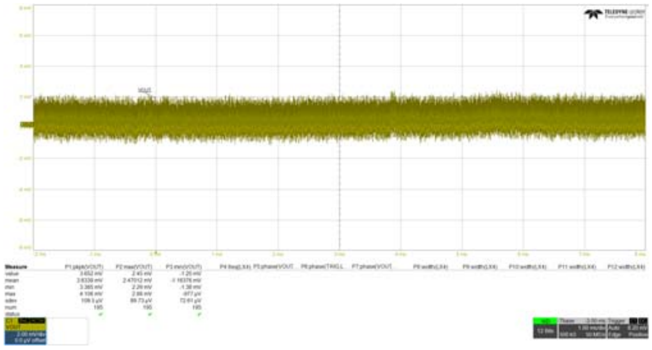

Figure 80. VOUT Ripple measured at TP83 PH3 Output (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, VOUT_COMMAND = 0.6V, 20MHZ BW filter, AC-Coupled)

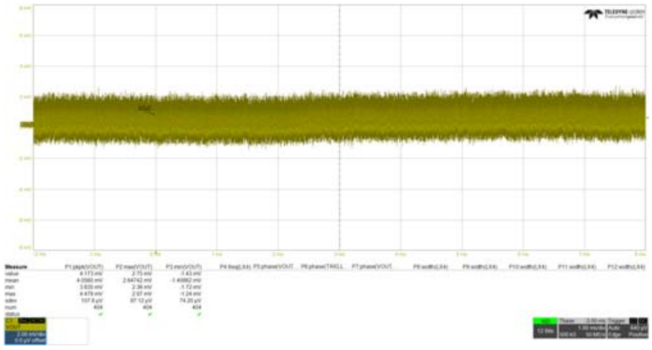

Figure 81. VOUT Ripple measured at TP83 PH3 Output (VDD = 12V, PVIN = 12V, I_{LOAD} = 150A, VOUT_COMMAND = 0.6V, 20MHZ BW filter, AC-Coupled)

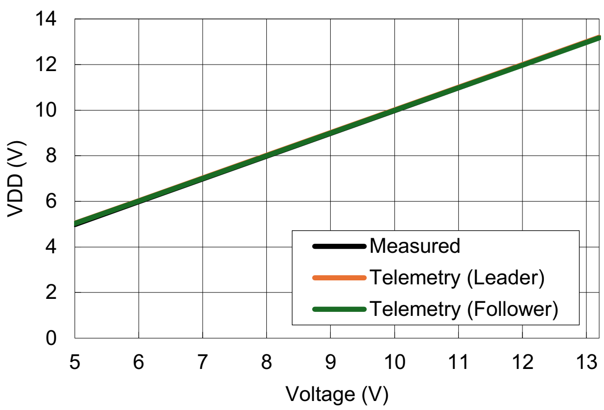

Figure 82. VDD Telemetry (I_{LOAD} = 0A, 50 Averages)

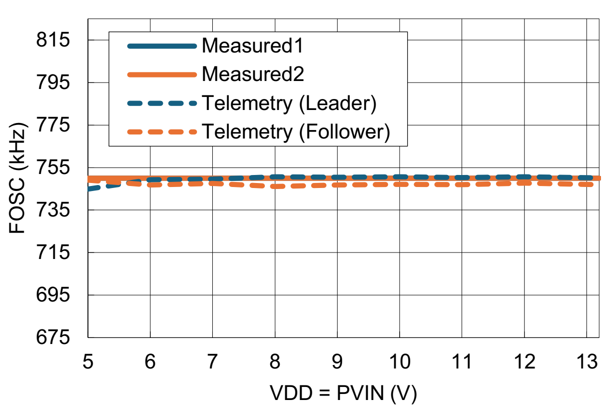

Figure 83. FOSC Telemetry (I_{LOAD} = 0A, 50 Averages)

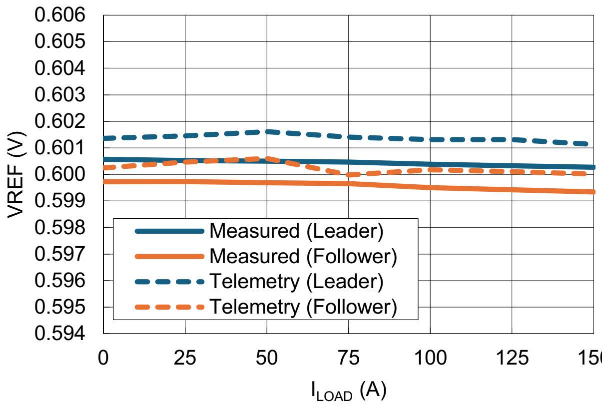

Figure 84. VREF Telemetry (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, 50 Averages)

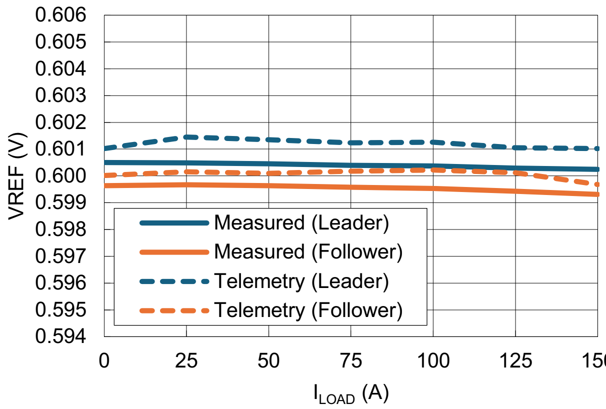

Figure 85. VREF Telemetry (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, 50 Averages)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

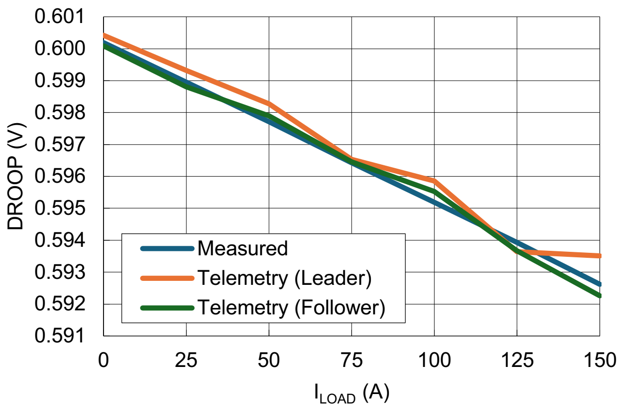

Figure 86. DROOP Telemetry (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, 50 Averages)

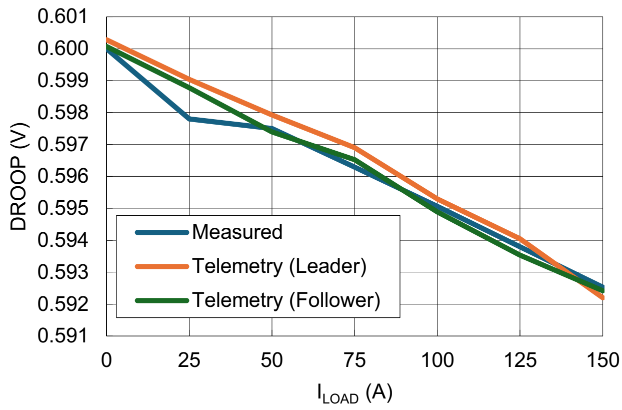

Figure 87. DROOP Telemetry (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, 50 Averages)

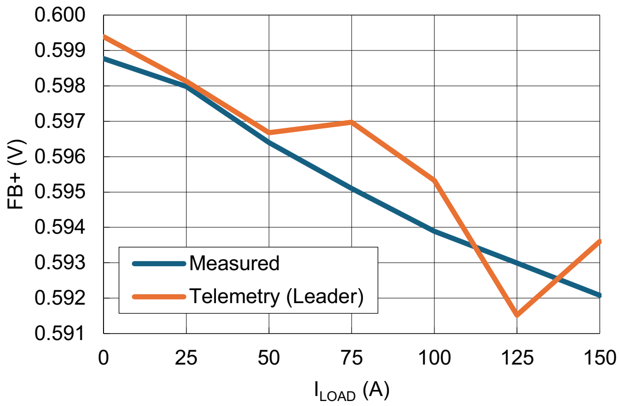

Figure 88. FB+ Telemetry (VDD = 5V, PVIN = 5V, I_{LOAD} = 0A, 50 Averages)

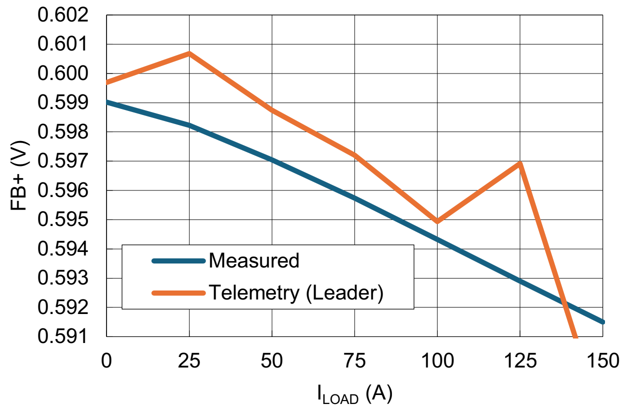

Figure 89. FB+ Telemetry (VDD = 12V, PVIN = 12V, I_{LOAD} = 0A, 50 Averages)

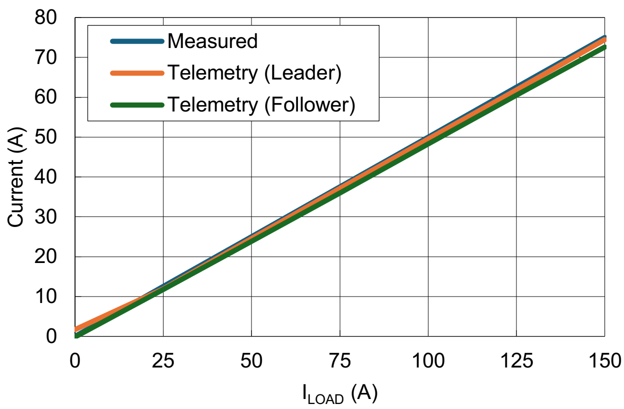

Figure 90. IOUT Telemetry (VDD = 5V, PVIN = 5V, 50 Averages)

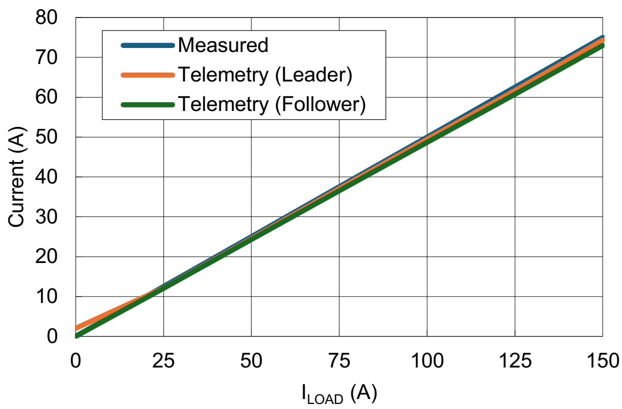

Figure 91. IOUT Telemetry (VDD = 12V, PVIN = 12V, 50 Averages)

Unless otherwise noted: VREF = 0.6V, f_{SW} = 375kHz; L_{OUT} = 170nH per phase, C_{OUT} = 7.05mF per phase, C_{DROOP} = 100nF, C_{VREF} = 47nF, R_{DROOP} = 357Ω, R_{FS} = 154kΩ, C_{COMP} = 15nF, R_{COMP} = 3.01kΩ, C_{POLE} = 1nF, C_{VCC} = 1µF, R_{SLOPE} = 24.9kΩ, C_{SLOPE} = 100pF, T_A = +25°C (Cont.)

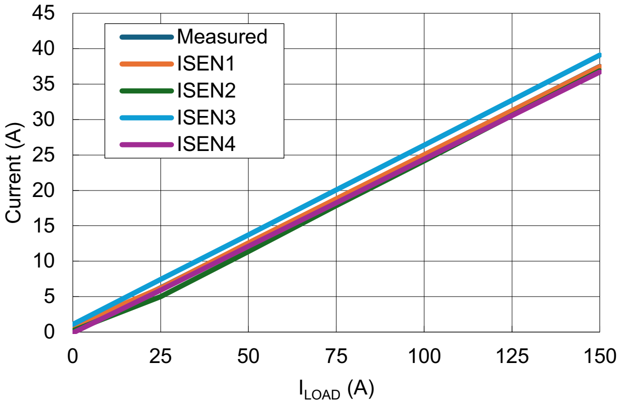

Figure 92. ISEN Telemetry (VDD = 5V, PVIN = 5V, 50 Averages)

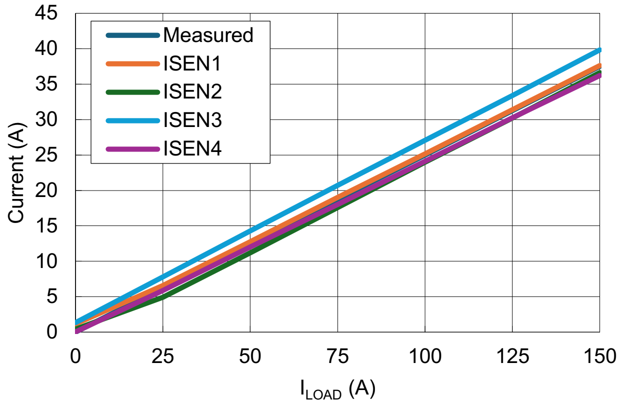

Figure 93. ISEN Telemetry (VDD = 12V, PVIN = 12V, 50 Averages)

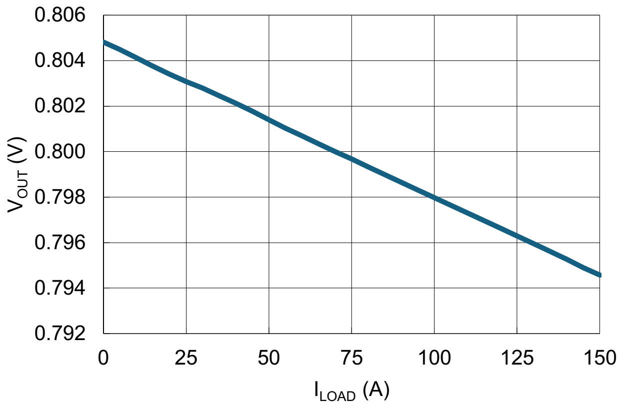

Figure 94. DROOP Regulation (VDD = 5V, PVIN = 5V)

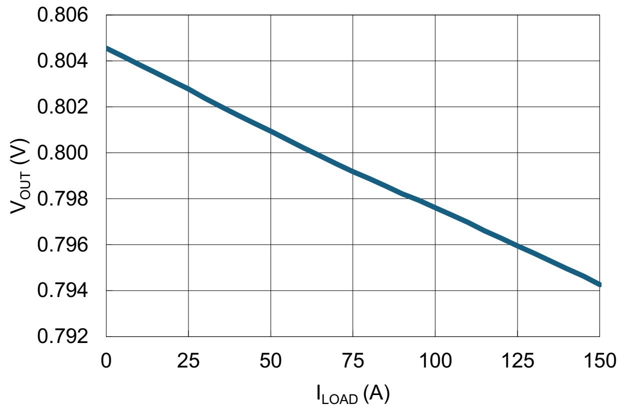

Figure 95. DROOP Regulation (VDD = 12V, PVIN = 12V)

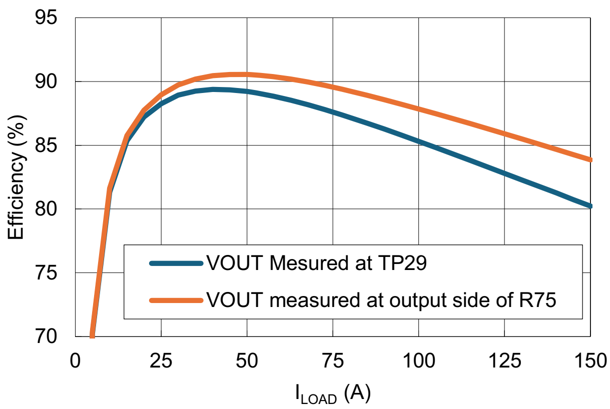

Figure 96. Efficiency (VDD = 5V, PVIN = 5V)

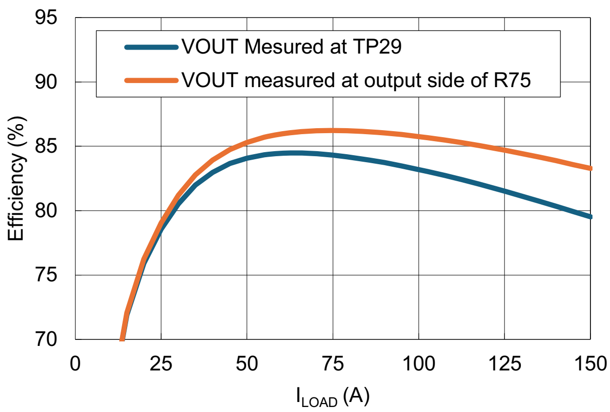

Figure 97. Efficiency (VDD = 12V, PVIN = 12V)

4. Ordering Information

Part Number	Description
ISL73849MEVAL2Z4	4-Phase ISL73849M Board

5. Revision History

Revision	Date	Description
1.01	Aug 13, 2026	▪ Updated Quick-Start Guide section. ▪ Updated the board part number throughout.
1.00	Jun 23, 2026	Initial release.

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