ISL8272MEVAL2Z
Evaluation Board User Guide

Description

The ISL8272M is a 50A step-down DC/DC power supply module with an integrated digital PWM controller, dual-phase synchronous power switches, inductors and passives. Only input, output capacitors and minimal passives are needed to finish the design. 50A of continuous output current can be delivered without a need of airflow or heatsink. The ISL8272M uses ChargeMode™ control (ASCR) architecture, which responds to a transient load within a single switching cycle.

The ISL8272MEVAL2Z evaluation board has three ISL8272M modules connected in a current sharing configuration to deliver 150A continuous output current. This evaluation board comes with placeholders for pin-strap resistor to adjust output voltage, soft-start timing, input UVLO threshold, control loop response, current sharing configurations, and device PMBus™ address. More configurations, such as Digital-DC™ (DDC) bus configuration and fault limits can be easily programmed or changed via PMBus compliant serial bus interface.

ZLUSBEVAL3Z (USB to PMBus adapter) is provided with this evaluation kit, which connects the evaluation board to a PC to activate the PMBus communication interface. The PMBus command set is accessed by using the PowerNavigator™ evaluation software from a PC running Microsoft Windows.

References

[ISL8272M](#) datasheet

Key Features

- V_{IN} range of 4.5V to 14V, V_{OUT} adjustable from 0.6V to 5V
- Programmable V_{OUT}, V_{OUT} droop, margining, input and output UVP/OVP, I_{OUT} limit, OTP/UTP, soft-start, sequencing, and external synchronization
- Monitor: V_{IN}, V_{OUT}, I_{OUT}, temperature, duty cycle, switching frequency and faults
- ChargeMode™ control tunable with PMBus
- Output FETs for load transient response evaluation
- Mechanical switch for enable and power-good LED indicator

Specifications

This board has been configured for the following operating conditions by default:

- V_{IN} = 5V TO 12V
- V_{OUT} = 1.2V
- I_{MAX} = 150A
- f_{SW} = 421kHz
- 3-module current sharing with 0.1mV/A V_{OUT} droop
- Output ripple: <5mV$_{P-P}$
- ASCR gain = 200, ASCR residual = 90
- Soft-start delay = 5ms; soft-start ramp time = 4ms

Ordering Information

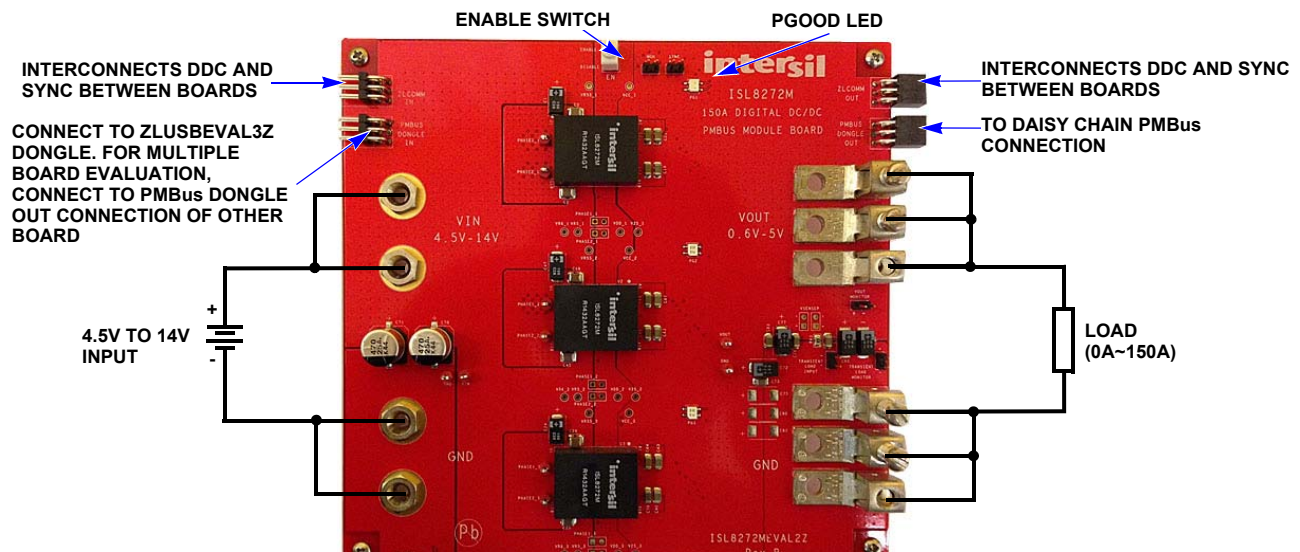| PART NUMBER	DESCRIPTION
ISL8272MEVAL2Z	ISL8272M Kit (Evaluation Board, ZLUSBEVAL3Z Adapter, USB Cable)

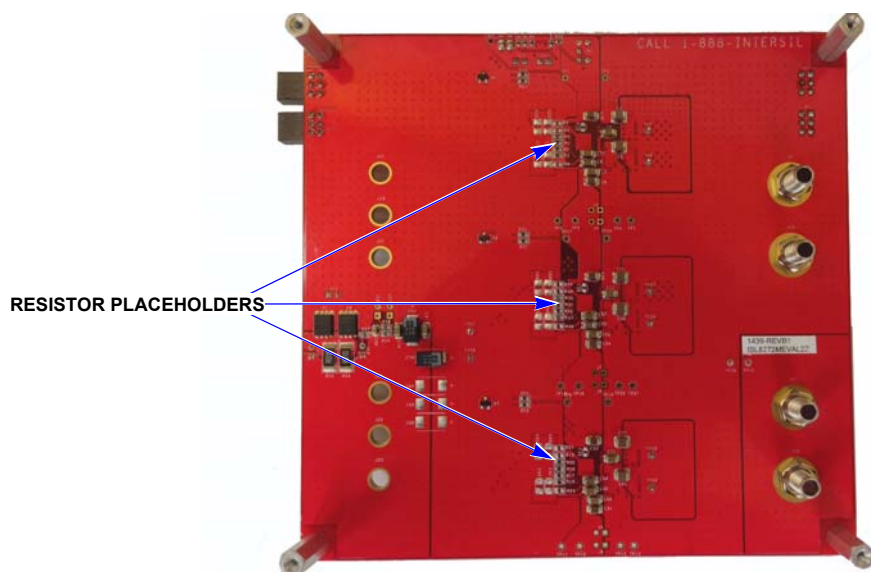FIGURE 1. TOP VIEW - ISL8272MEVAL2Z EVALUATION BOARD

FIGURE 2. BOTTOM VIEW - ISL8272MEVAL2Z EVALUATION BOARD

Recommended Equipment

- DC power supply with minimum 15V/40A sourcing capacity
- Electronic load capable of sinking current up to 150A
- Digital multimeters (DMMs)
- Oscilloscope with bandwidth higher than 100MHz

Functional Description

The ISL8272MEVAL2Z provides all circuitry required to evaluate the current sharing features of the ISL8272M. A majority of the features of the ISL8272M, such as compensation-free ChargeMode™ control, soft-start delay and ramp times and voltage margining are available on this evaluation board. For DDC communication evaluation, the board can be connected to any Intersil digital module evaluation board that supports the DDC bus.

Figures 1 and 2 show the board images of the ISL8272MEVAL2Z evaluation board.

Quick Start Guide

Pin-Strap Option

ISL8272MEVAL2Z can be configured in pin-strap mode with standard 1% 0603 resistors. PMBus interface is not required to evaluate ISL8272M in pin-strap mode. Output voltage (V_{OUT}), soft-start timing, input undervoltage protection (UVLO) threshold, ASCR gain and residual, current sharing configuration and device PMBus address can be changed by populating recommended resistors at placeholders provided in the evaluation board. By default, the evaluation board operates in pin-strap mode and regulates at V_{OUT} = 1.2V, f_{SW} = 421kHz, soft-start delay time = 5ms, soft-start ramp time = 4ms, UVLO = 4.5V, ASCR gain = 200, ASCR residual = 90 and PMBus address = 2Ah, 2Bh, 2Ch. In addition, the three modules are pin strapped for current sharing, with a V_{OUT} droop of 0.1mV/A. Follow these steps to evaluate ISL8272M in pin-strap mode.

1. Set ENABLE switch to "DISABLE".
2. Connect Load to VOUT lug connectors (J19, J21, J23 and J20, J22, J25).
3. Connect power supply to VIN connectors (J9, J10 and J11, J12). Make sure power supply is not enabled when making connection.
4. Turn power supply on.
5. Set ENABLE switch to "ENABLE".
6. Measure 1.2V VOUT at probe point labeled "VOUT MONITOR" (J24).
7. Observe switching frequency of 421kHz and phase spreading at probe points labeled "PHASE1_1" (TP7), "PHASE2_1" (TP8), "PHASE1_2" (TP23), "PHASE2_2" (TP24), "PHASE1_3" (TP15), "PHASE2_3" (TP16).
8. To measure the board efficiency, connect the multimeter voltage probes at probe points labeled "VIN" (TP26), "GND" (TP25) and "VOUT" (TP27), "GND" (TP28).
9. To change VOUT, disconnect board from the setup and populate 1% standard 0603 resistors at R4, R34 and R19 placeholder locations on the bottom layer. Refer to the "Output Voltage Resistor Settings" table in the ISL8272M datasheet for recommended values. By default, VOUT_MAX is set to 110% of VOUT set by pin-strap resistor. Keep in mind that modules in the same current sharing group must have identical VSET pin-strap resistors. For higher output voltage setting, VOUT droop must be increased proportionally to ensure good current sharing.
10. To change soft-start delay and ramp time, disconnect board from the setup and populate 1% standard 0603 resistors at R6, R36 and R21 placeholder locations on the bottom layer. Refer to the "Soft Start/Stop Resistor Settings" table in the ISL8272M datasheet for recommended values. Notice that only immediate off is supported in current sharing configuration.
11. To change UVLO, disconnect board from the setup and populate standard 0603 resistors at R6, R36 and R21

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placeholder locations on the bottom layer. Refer to the "UVLO Resistor Settings" table in the ISL8272M datasheet for recommended values. Notice that the UVLO programming shares the same pin with soft-start/stop programming.

12. To change ASCR gain and residual, disconnect board from the setup and populate 1% standard 0603 resistors at R8, R38 and R23 placeholder locations on the bottom layer. Refer to the "ASCR Resistor Settings" table and the design guide matrix in the ISL8272M datasheet for recommended values. Modules in the same current sharing group must have identical ASCR gain and residuals.

13. To change current sharing configuration, disconnect board from the setup and replace with 1% standard 0603 resistors at R5, R35 and R20 on the bottom layer. Refer to the "Current Sharing Resistor Settings" table in the ISL8272M datasheet for recommended values. For example, using 12.1k for R5, 13.3k for R35 and OPEN for R20 will configure two modules for current sharing (with a VOUT droop of 0.15mV/A) and the third module as stand alone.

PMBus Option

ISL8272MEVAL2Z can be evaluated for all features particularly in the current sharing configuration using the provided ZLUSBEVAL3Z dongle and PowerNavigator™ evaluation software. Follow these steps to evaluate ISL8272M with PMBus option.

1. Install the PowerNavigator™ evaluation software from the following Intersil website: www.intersil.com/powernavigator

2. Set ENABLE switch to "DISABLE".

3. Connect Load to VOUT lug connectors (J19, J21, J23 and J20, J22, J25).

4. Connect power supply to VIN connectors (J9, J10 and J11, J12). Make sure power supply is not enabled when making connection.

5. Turn power supply on.

6. Connect ZLUSBEVAL3Z dongle (USB to PMBus™ adapter) to ISL8272MEVAL2Z board to the 6-pin male connector labeled as "PMBus DONGLE IN".

7. Connect supplied USB cable from computer USB to ZLUSBEVAL3Z dongle.

8. Launch PowerNavigator™ software.

9. It is optional to load a predefined setup from three separate configuration files using the PowerNavigator™ software. The three ISL8272M devices on the board operate in pin-strap mode from factory default, but the user may modify the operating parameters through the evaluation software or by loading a predefined setup from configuration files. A sample set of the "Configuration File" beginning on page 11 is provided and can be copied to a notepad editor to make desired changes. The default pin-strap configurations will be overwritten if user-defined configuration files are loaded.

10. Set ENABLE switch to "ENABLE". Alternately, the PMBus commands ON_OFF_CONFIG and OPERATION may be used from the PowerNavigator™ software to allow PMBus Enable.

11. Monitor and configure the ISL8272MEVAL2Z board using the PMBus commands in the evaluation software. To store the configuration changes, disable the module and use the command STORE_USER_ALL. To restore factory default settings, disable the module and use the command RESTORE_FACTORY and STORE_USER_ALL.

12. PowerNavigator™ tutorial videos are available at Intersil website. www.intersil.com/powernavigator

13. To evaluate multiple Intersil digital power products using a single ZLUSBEVAL3Z dongle, ISL8272M can be daisy chained with other digital power evaluation boards. PMBus address can be changed by replacing with 1% standard 0603 resistors at R3, R33 and R18 locations on the bottom layer. Refer to the "SMBus Address Resistor Selection" table in the ISL8272M datasheet for recommended values.

Evaluation Board Information

The evaluation board size is 5.8in x 6.1in. It is a 6-layer board, containing 2-ounce copper on all layers. The board can be used as a 150A reference design. Refer to the "ISL8272MEVAL2Z Evaluation Board Layout" beginning on page 13. The board is made of FR4 material and all components, including the solder attachment, are lead-free.

VOUT Transient Response Measurement

The ISL8272MEVAL2Z board has a built-in transient load test circuitry (see the schematic in Figure 3). Two 100A N-Channel MOSFETs (Manufacturer PN: BSC010NE2LS) are connected in parallel across VOUT and PGND next to the remote voltage sensing location (C98). Two 10mΩ current sense resistors connected in parallel are placed for monitoring the drain-to-source current of the MOSFETs. For a transient load test, inject the gate driver pulse signal at J16, which is labeled as "TRANSIENT LOAD INPUT." The load current can be monitored through J15, which is labeled as "TRANSIENT LOAD MONITOR." Because the two MOSFETs will operate in the saturation region instead of linear region when the gate turn-on signal is applied, the pulse width and duty cycle of the gate signal must be sufficiently small to avoid MOSFETs overheating (recommended duty cycle should be less than 2% to 3%). The amplitude of the gate driver pulse voltage can be adjusted to obtain a desired transient load current step size.
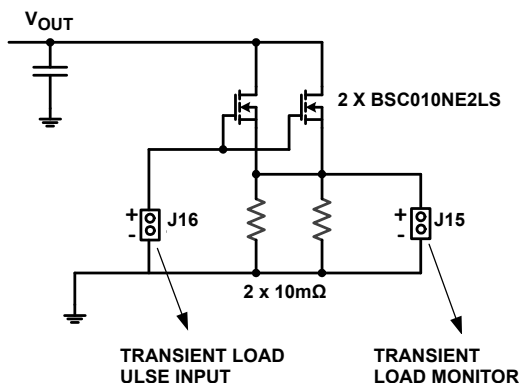

FIGURE 3. SCHEMATIC FOR TRANSIENT LOAD MEASUREMENT

Control Loop Bode Plot Measurement

To measure the bode plot of the voltage control loop, the first step is to break the loop such that a small signal with variable frequency can be injected at a certain point. On this ISL8272MEVAL2Z evaluation board, the 0Ω resistor R58 placed in the VOUT remote sense line can be replaced by a 5Ω ~10Ω resistor. The placeholders J17 and J18 can be used to inject the frequency-sweep signal across R58 from a network analyzer. Connect the network analyzer input (Channel A) at J17 and output (Channel B) at J18 to measure the voltage loop transfer function and frequency responses. See the configuration diagram in Figure 4.
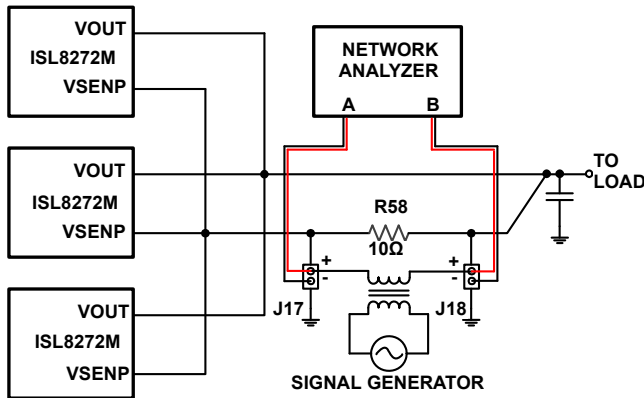

FIGURE 4. CONFIGURATION FOR VOLTAGE LOOP BODE PLOT MEASUREMENT

## Thermal Considerations and Current Derating

Board layout is very critical in order to make the module operate safely and deliver maximum allowable power. To work in the high temperature environments and carry large currents, the board layout needs to be carefully designed to maximize thermal performance. To achieve this, select enough trace width, copper weight and the proper connectors.

The ISL8272MEVAL2Z evaluation board is designed for running 150A at room temperature under default configurations without additional cooling. However, if the output voltage is increased or the board is operated at elevated temperatures, then the available output current is derated. Typically, the module temperatures is higher on the current sharing board compared to the single-module board under the same operating conditions due to the limited PCB copper planes for heat sink. For single-module operation, refer to the derated current curves in the ISL8272M datasheet to determine the maximum output current the module can supply. θ_{JA} is measured by inserting a thermocouple inside the module to measure peak junction temperature.

For layout of current sharing designs using the ISL8272M, the thermal performance can be improved by adhering to the following design tips:

1. Use the top and bottom layers to carry the large current. One or more inner layers can also be used to carry the large current if available. VOUT, PGND and VIN pads should have large, solid planes. Place enough thermal vias to connect the power planes in different layers under and around the modules.

2. SW1 and SW2 pads are switching nodes that generate switching noises. Keep these pads under the module. For noise-sensitive applications, it is recommended to keep switching node pads only on the top and inner layers of the PCB; do not place switching node pads exposed to the outside on the bottom layer of the PCB. To improve the thermal performance, the switching node pads can be extended in the inner layer (Layer 3 on this board), as shown on the "ISL8272MEVAL2Z Evaluation Board Layout" beginning on page 13. Make sure that Layer 2 and Layer 4 have the GND planes to cover the extended areas of the switching node pads at Layer 3 to avoid noise coupling.

3. To create a low impedance path for the high frequency inductor ripple current, output ceramic capacitors must be placed very close to the center of the module VOUT pads. Therefore, multiple vias must be applied to ground these ceramic capacitors to the PGND planes in the inner layers. Make sure these vias can sufficiently handle the inductor ripple current.

4. Place the modules evenly on the board and leave enough space between modules. If the board space is limited, try to put the modules with low power loss closly (e.g., low VOUT or IOUT) while still separating the module with high power loss.

5. If the ambient temperature is high or the board space is limited, airflow is needed to dissipate more heat from the modules. A heatsink can also be applied to the top side of the module to further improve the thermal performance.
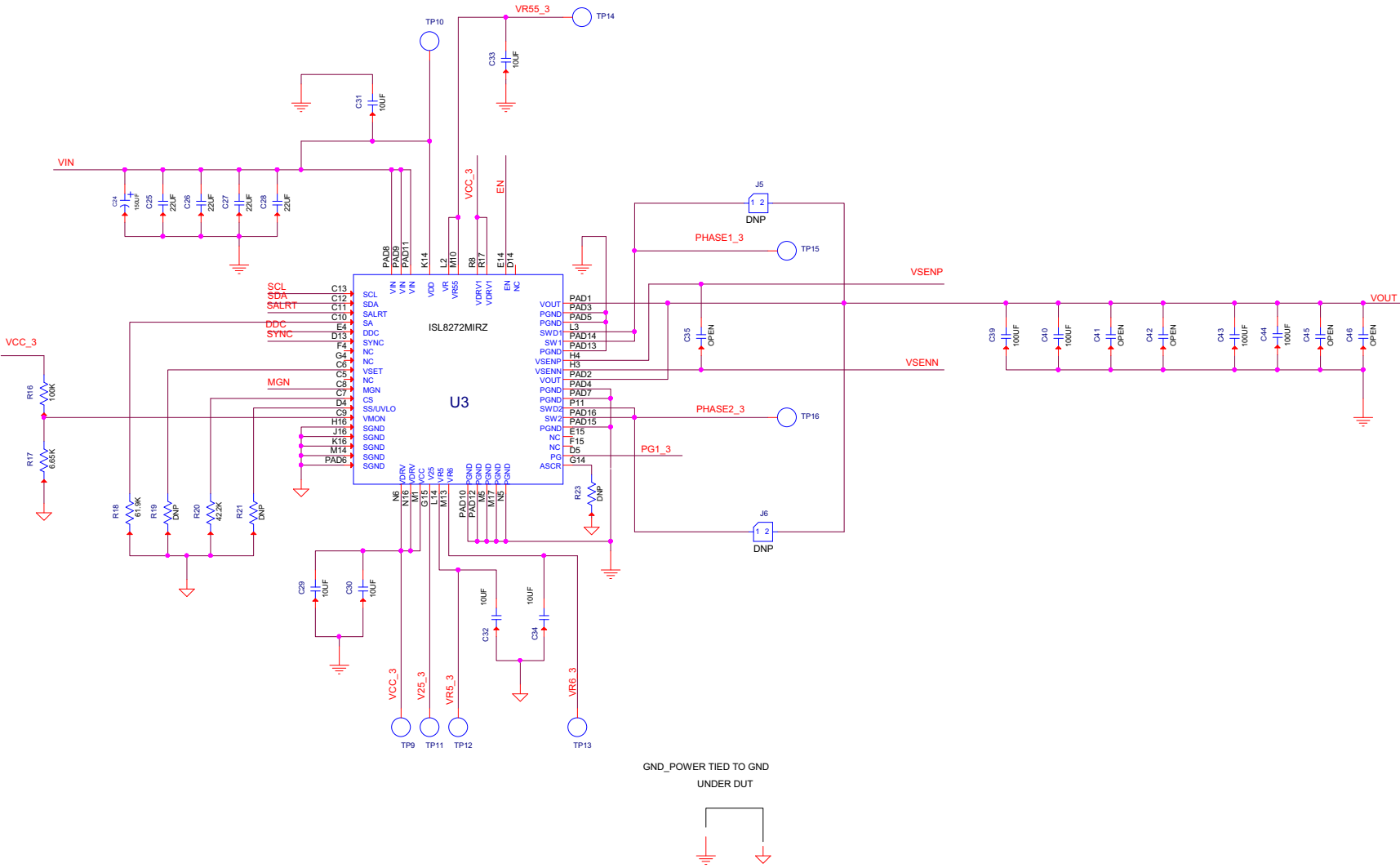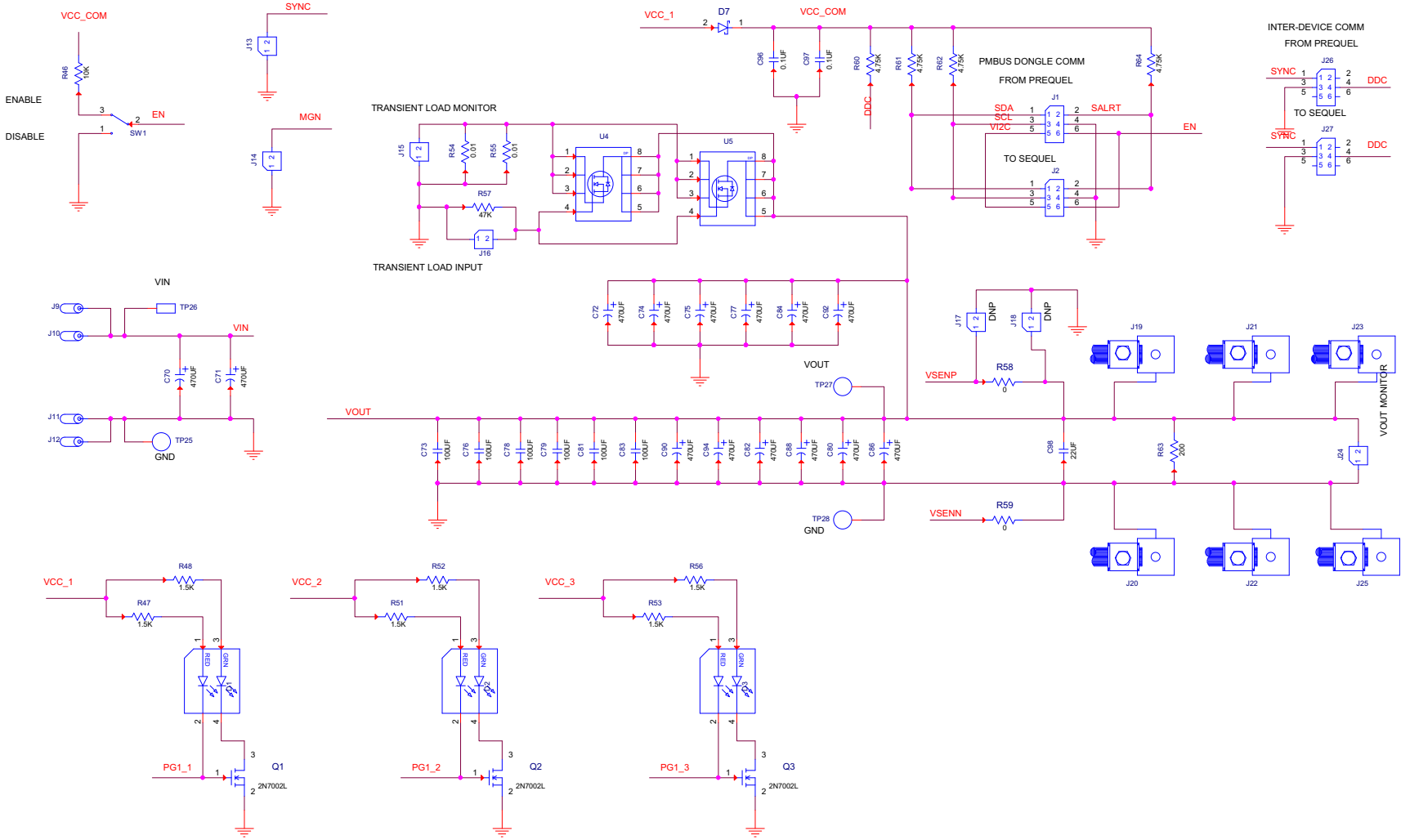
ISL8272MEVAL2Z Schematics
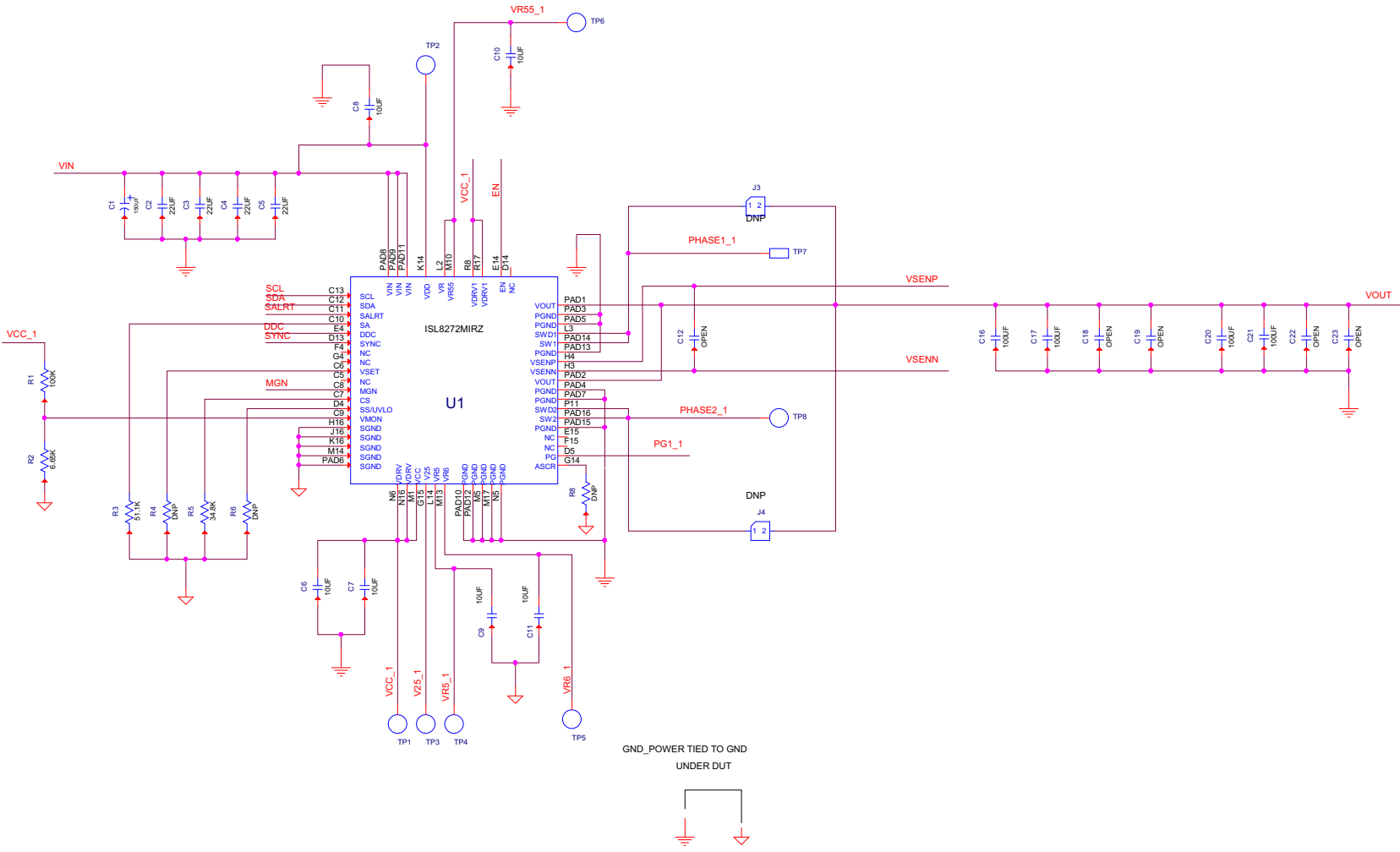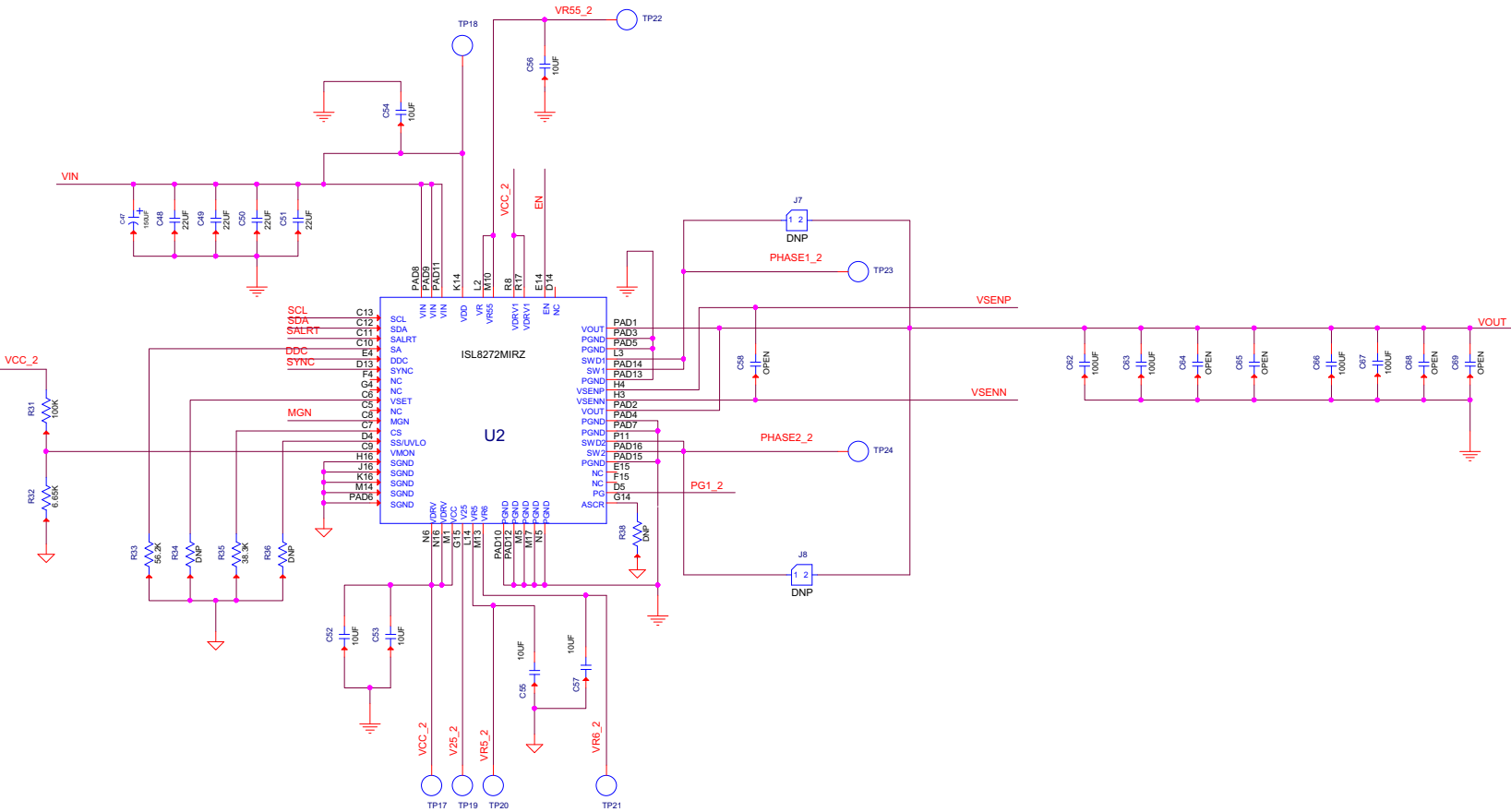
GND_POWER TIED TO GND
UNDER DUT

ISL8272MEVAL2Z Schematics (Continued)

GND_POWER TIED TO GND
UNDER DUT

ISL8272MEVAL2Z Schematics (Continued)

GND_POWER TIED TO GND
UNDER DUT

ISL8272MEVAL2Z Schematics (Continued)

Bill of Materials

REFERENCE DESIGNATORS	QTY	MANUFACTURER	MANUFACTURER PART	DESCRIPTION
C12, C35, C58	0			CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS
C96, C97	2	PANASONIC	ECJ-2VB1E104K	CAP, SMD, 0805, 0.1µF, 25V, 10%, X7R, ROHS
C98	1	TDK	C2012X5R0J226M	CAP, SMD, 0805, 22µF, 6.3V, 20%, X5R, ROHS
C6, C7, C9, C11, C29, C30, C32, C34, C52, C53, C55, C57	12	VENKEL	C1206X7R100-106KNE	CAP, SMD, 1206, 10µF, 10V, 10%, X7R, ROHS
C8, C10, C31, C33, C54, C56	6	VENKEL	C1206X7R250-106KNE	CAP, SMD, 1206, 10µF, 25V, 10%, X7R, ROHS
C16, C17, C20, C21, C39, C40, C43, C44, C62, C63, C66, C67, C73, C76, C78, C79, C81, C83	18	MURATA	GRM31CR60J107ME39L	CAP, SMD, 1206, 100µF, 6.3V, 20%, X5R, ROHS
C18, C19, C22, C23, C41, C42, C45, C46, C64, C65, C68, C69	0			CAP, SMD, 1206, DNP-PLACE HOLDER, ROHS
C2, C3, C4, C5, C25, C26, C27, C28, C48, C49, C50, C51	12	MURATA	GRM32ER71C226KE18L	CAP, SMD, 1210, 22µF, 16V, 10%, X7R, ROHS
C1, C24, C47	3	SANYO/PANASONIC	16TQC150MYF	CAP-POSCAP, SMD, 7.3x4.3, 150µF, 16V, 20%, 50mΩ, ROHS
C72, C74, C77, C90, C92, C94	6	SANYO	6TPE470MI	CAP-POSCAP, LOW ESR, SMD, D4, 470µF, 6.3V, 20%, 18mΩ, ROHS
C70, C71	2	PANASONIC	EEE-1EA471P	CAP, SMD, 10mm, 470µF, 25V, 20%, ALUM.ELEC., 380mA, ROHS
J9, J10, J11, J12	4	JOHNSON COMPONENTS	108-0740-001	CONN-JACK, BANANA-SS-SDRLESS, VERTICAL, ROHS
TP7, TP8, TP15, TP16, TP23, TP24, TP25-TP28	10	KEYSTONE	5005	CONN-COMPACT TEST PT, VERTICAL, RED, ROHS
J13, J14, J15, J16, J24	5	BERG/FCI	69190-202HLF	CONN-HEADER, 1x2, RETENTIVE, 2.54mm, 0.230 x 0.120, ROHS"
J2, J27	2	SAMTEC	SSQ-103-02-T-D-RA	CONN-SOCKET STRIP, TH, 2x3, 2.54mm, TIN, R/A, ROHS
J1, J26	2	SAMTEC	TSW-103-08-T-D-RA	CONN-HEADER, 2x3, BRKAWY, 2.54mm, TIN, R/A, ROHS
D7	1	ON SEMICONDUCTOR	BAT54XV2T1G	DIODE-SCHOTTKY, SMD, 2P, SOD523, 30V, 200mA, ROHS
D1, D2, D3	3	LUMEX	SSL-LXA3025IGC-TR	LED, SMD, 3x2.5mm, 4P, RED/GREEN, 12/20MCD, 2V
U1, U2, U3	3	INTERSIL	ISL8272MAIRZ	IC-50A DIGITAL DC/DC MODULE, 42P, HDA, ROHS
Q1, Q2, Q3	3	ON SEMICONDUCTOR	2N7002LT1G	TRANSISTOR-MOS, N-CHANNEL, SMD, SOT23, 60V, 115mA, ROHS
U4, U5	2	INFINEON TECHNOLOGY	BSC010NE2LS	TRANSIST-MOS, N-CHANNEL, 8P, PG-TDSON-8, 25V, 100A, ROHS

Bill of Materials (Continued)

REFERENCE DESIGNATORS	QTY	MANUFACTURER	MANUFACTURER PART	DESCRIPTION
R4, R6, R8, R19, R21, R23, R34, R36, R38	0			RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER
R46	1	PANASONIC	ERJ-2RKF1002X	RES, SMD, 0402, 10k, 1/16W, 1%, TF, ROHS
R60, R61, R62, R64	4	PANASONIC	ERJ-2RKF4751X	RES, SMD, 0402, 4.75k, 1/16W, 1%, TF, ROHS
R58, R59	2	VENKEL	CR0603-10W-000T	RES, SMD, 0603, 0Ω, 1/10W, TF, ROHS
R1, R16, R31	3	VENKEL	CR0603-10W-1003FT	RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS
R47, R48, R51-R53, R56	6	VENKEL	CR0603-10W-1501FT	RES, SMD, 0603, 1.5k, 1/10W, 1%, TF, ROHS
R5	1	VENKEL	CR0603-10W-3482FT	RES, SMD, 0603, 34.8k, 1/10W, 1%, TF, ROHS
R35	1	PANASONIC	ERJ-3EKF3832V	RES, SMD, 0603, 38.3k, 1/10W, 1%,TF, ROHS
R20	1	ROHM	TRR03EZPF4222	RES, SMD, 0603, 42.2k, 1/10W, 1%, TF, ROHS
R57	1	YAGEO	RC0603FR-0747KL	RES, SMD, 0603, 47k, 1/10W, 1%, TF, ROHS
R3	1	VENKEL	CR0603-10W-5112FT	RES, SMD, 0603, 51.1k, 1/10W, 1%, TF, ROHS
R33	1	VENKEL	CR0603-10W-5622FT	RES, SMD, 0603, 56.2k, 1/10W, 1%, TF, ROHS
R18	1	PANASONIC	ERJ-3EKF6192V	RES, SMD, 0603, 61.9k, 1/10W, 1%, TF, ROHS
R2, R17, R32	3	YAGEO	RC0603FR-076K65L	RES, SMD, 0603, 6.65k, 1/10W, 1%, TF, ROHS
R63	1	PANASONIC	ERJ-6ENF2000V	RES, SMD, 0805, 200Ω, 1/8W, 1%, TF, ROHS
R54, R55	2	VISHAY/DALE	WSL2512R0100FEA	RES, SMD, 2512, 0.01Ω, 1W, 1%, TF, ROHS
SW1	1	C&K COMPONENTS	GT13MCBE	SWITCH-TOGGLE, THRU-HOLE, 5PIN, SPDT, 3POS, ON-OFF-ON, ROHS
J19, J20, J21, J22, J23, J25	6	BERG/FCI	KPA8CTP	HDWARE, MTG, CABLE TERMINAL, 6-14AWG, LUG&SCREW, ROHS
C75, C80, C82, C84, C86, C88	0			CAP-POSCAP, DNP-PLACE HOLDER
J3, J4, J5, J6, J7, J8, J17, J18	0			CONN-HEADER, 1x2, 2.54mm, DNP-PLACE HOLDER
TP1-TP6, TP9-TP14, TP17-TP22	0			CONN-COMPACT TEST PT, DNP-PLACE HOLDER

Configuration File   Sample Configuration Files for ISL8272M Module Current Sharing. For each device, copy and paste the corresponding lines (from RESTORE_FACTORY to ### End User Store) to a notepad and save it as Confile_file_device_number.txt. The # symbol is used for a comment line. Some of the following settings are already loaded to ISL8272M module as factory defaults.

```
# Device #1
RESTORE_FACTORY                                                      # Reset device to the factory setting
STORE_USER_ALL                                                       # Clears user memory space
# VOUT Related
VOUT_COMMAND                          0x2666                         # 1.2 V
VOUT_MAX                              0x2a3c                         # 1.32 V
VOUT_MARGIN_HIGH                      0x2851                         # 1.26 V
VOUT_MARGIN_LOW                       0x247a                         # 1.14 V
VOUT_OV_FAULT_LIMIT                   0x2c28                         # 1.38 V
VOUT_OV_FAULT_RESPONSE                0x80                           # Disable and no retry
VOUT_OV_WARN_LIMIT                    0x2a3c                         # 1.32 V
VOUT_UV_WARN_LIMIT                    0x228f                         # 1.08 V
VOUT_UV_FAULT_LIMIT                   0x20a3                         # 1.02 V
VOUT_UV_FAULT_RESPONSE                0x80                           # Disable and no retry
POWER_GOOD_ON                         0x228f                         # 1.08 V
VOUT_TRANSITION_RATE                  0xba00                         # 1 mV/us
VOUT_DROOP                            0xb066                         # 0.1 mV/A
VOUT_CAL_OFFSET                       0x0000                         # 0 mV/A
#Enable and Timing Related
ON_OFF_CONFIG                         0x17                           # Pin Enable, Immediate Off
FREQUENCY_SWITCH                      0x0215                         # 533 kHz
SYNC_CONFIG                           0x02                           # Output internal clock
# Advanced Settings
USER_CONFIG                           0x00                           # ASCR off for Start, Open Drain PG
DDC_CONFIG                            0x0605                         # DDC rail ID = 6, Position 1, 6-phase
DDC_GROUP                             0x00202020                     # All Broadcast enabled
# Loop Compensation
ASCR_CONFIG                           0x15a00c8                      # ASCR gain = 200, Residual = 90
STORE_USER_ALL                                                       # Store all above settings to NVRAM
### End User Store


# Device #2
RESTORE_FACTORY                                                      # Reset device to the factory setting
STORE_USER_ALL                                                       # Clears user memory space
# VOUT Related
VOUT_COMMAND                          0x2666                         # 1.2 V
VOUT_MAX                              0x2a3c                         # 1.32 V
VOUT_MARGIN_HIGH                      0x2851                         # 1.26 V
VOUT_MARGIN_LOW                       0x247a                         # 1.14 V
VOUT_OV_FAULT_LIMIT                   0x2c28                         # 1.38 V
VOUT_OV_FAULT_RESPONSE                0x80                           # Disable and no retry
VOUT_OV_WARN_LIMIT                    0x2a3c                         # 1.32 V
VOUT_UV_WARN_LIMIT                    0x228f                         # 1.08 V
VOUT_UV_FAULT_LIMIT                   0x20a3                         # 1.02 V
VOUT_UV_FAULT_RESPONSE                0x80                           # Disable and no retry
POWER_GOOD_ON                         0x228f                         # 1.08 V
VOUT_TRANSITION_RATE                  0xba00                         # 1 mV/us
VOUT_DROOP                            0xb066                         # 0.1 mV/A
VOUT_CAL_OFFSET                       0x0000                         # 0 mV/A
#Enable and Timing Related
ON_OFF_CONFIG                         0x17                           # Pin Enable, Immediate Off
FREQUENCY_SWITCH                      0x0215                         # 533 kHz
SYNC_CONFIG                           0x04                           # Use external clock
# Advanced Settings
USER_CONFIG                           0x00                           # ASCR off for Start, Open Drain PG
DDC_CONFIG                            0x2605                         # DDC rail ID = 6, Position 2, 6-phase
DDC_GROUP                             0x00202020                     # All Broadcast enabled
# Loop Compensation
ASCR_CONFIG                           0x15a00c8                      # ASCR gain = 200, Residual = 90
STORE_USER_ALL                                                       # Store all above settings to NVRAM
### End User Store
```

Configuration File   Sample Configuration Files for ISL8272M Module Current Sharing. For each device, copy and paste the corresponding lines (from RESTORE_FACTORY to ### End User Store) to a notepad and save it as Confile_file_device_number.txt. The # symbol is used for a comment line. Some of the following settings are already loaded to ISL8272M module as factory defaults. (Continued)

```
# Device #3
RESTORE_FACTORY                              # Reset device to the factory setting
STORE_USER_ALL                               # Clears user memory space
# VOUT Related
VOUT_COMMAND                    0x2666       # 1.2 V
VOUT_MAX                        0x2a3c       # 1.32 V
VOUT_MARGIN_HIGH                0x2851       # 1.26 V
VOUT_MARGIN_LOW                 0x247a       # 1.14 V
VOUT_OV_FAULT_LIMIT             0x2c28       # 1.38 V
VOUT_OV_FAULT_RESPONSE          0x80         # Disable and no retry
VOUT_OV_WARN_LIMIT              0x2a3c       # 1.32 V
VOUT_UV_WARN_LIMIT              0x228f       # 1.08 V
VOUT_UV_FAULT_LIMIT             0x20a3       # 1.02 V
VOUT_UV_FAULT_RESPONSE          0x80         # Disable and no retry
POWER_GOOD_ON                   0x228f       # 1.08 V
VOUT_TRANSITION_RATE            0xba00       # 1 mV/us
VOUT_DROOP                      0xb066       # 0.1 mV/A
VOUT_CAL_OFFSET                 0x0000       # 0 mV/A
#Enable and Timing Related
ON_OFF_CONFIG                   0x17         # Pin Enable, Immediate Off
FREQUENCY_SWITCH                0x0215       # 533 kHz
SYNC_CONFIG                     0x04         # Use external clock
# Advanced Settings
USER_CONFIG                     0x00         # ASCR off for Start, Open Drain PG
DDC_CONFIG                      0x4605       # DDC rail ID = 6, Position 3, 6-phase
DDC_GROUP                       0x00202020   # All Broadcast enabled
# Loop Compensation
ASCR_CONFIG                     0x15a00c8    # ASCR gain = 200, Residual = 90
STORE_USER_ALL                               # Store all above settings to NVRAM
### End User Store
```

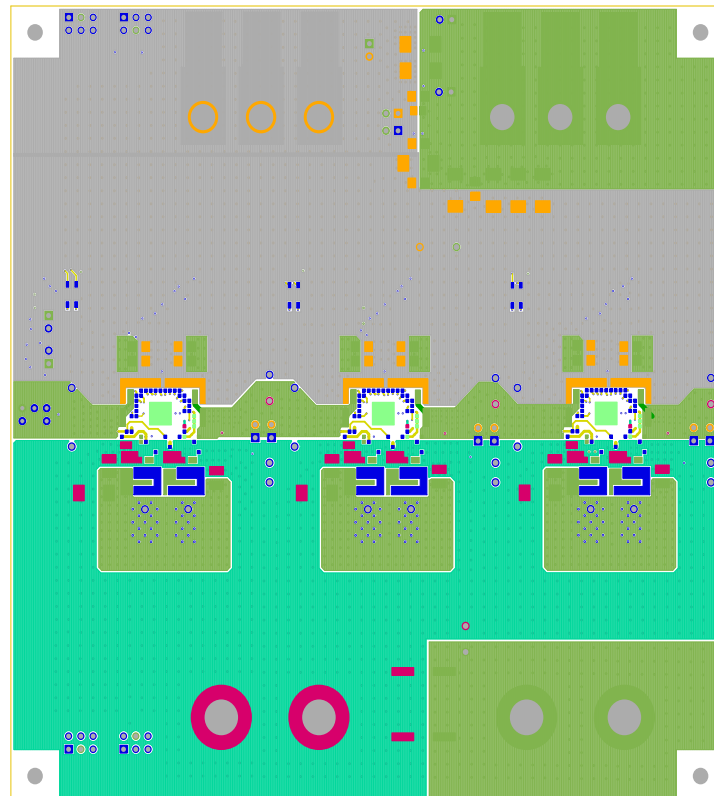# ISL8272MEVAL2Z Evaluation Board Layout
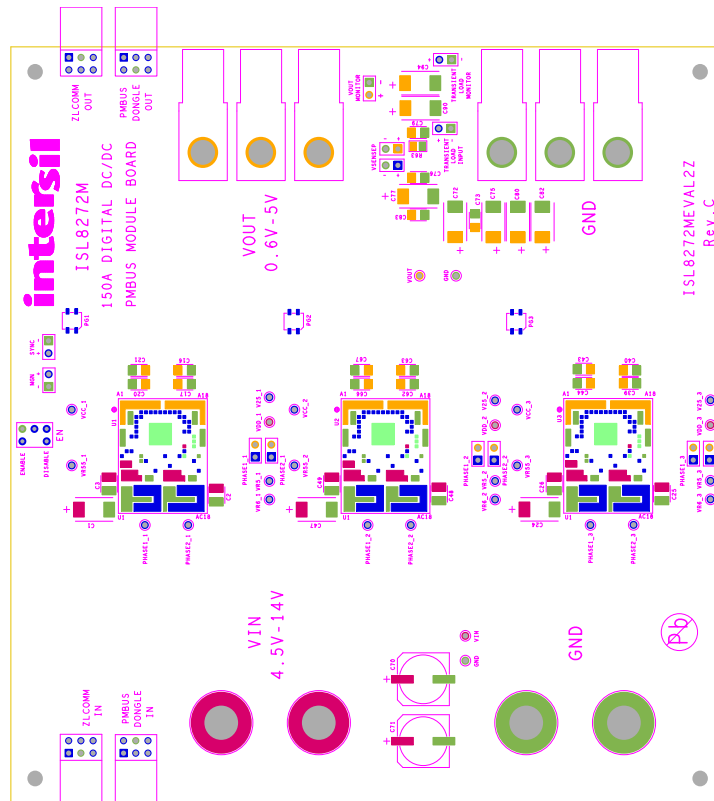
FIGURE 5. SILKSCREEN TOP

FIGURE 6. TOP LAYER COMPONENT SIDE
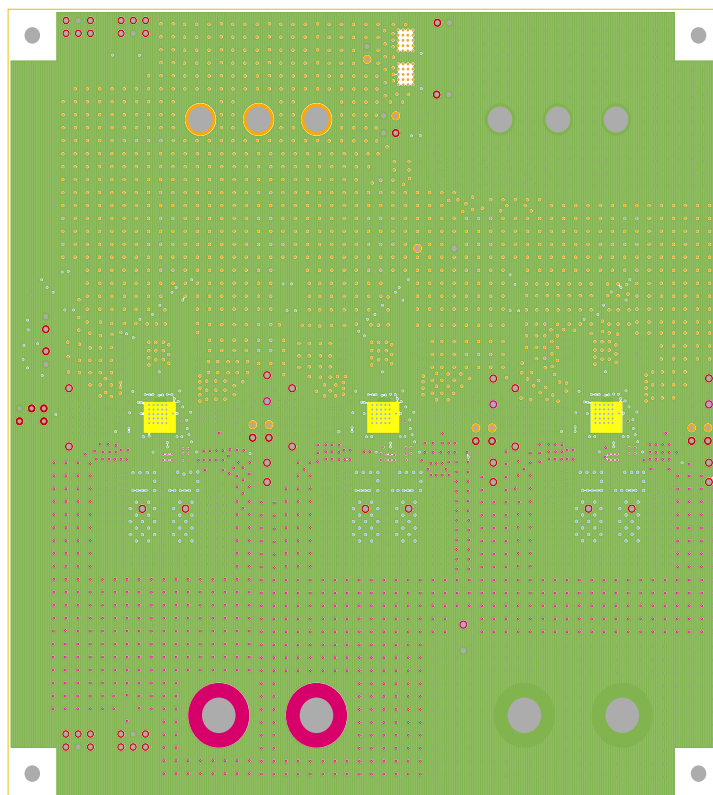
ISL8272MEVAL2Z Evaluation Board Layout (Continued)
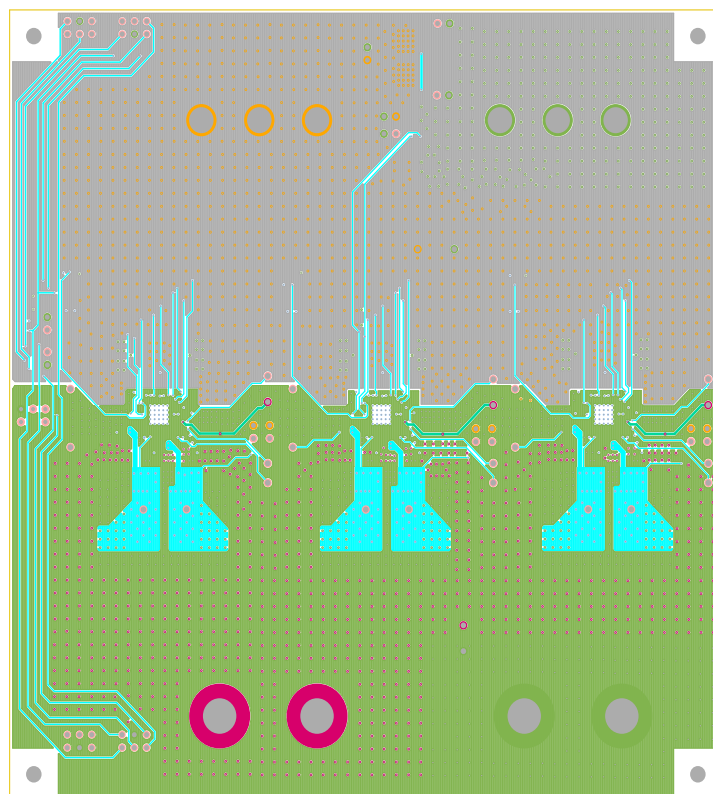

FIGURE 7. LAYER 2

FIGURE 8. LAYER 3

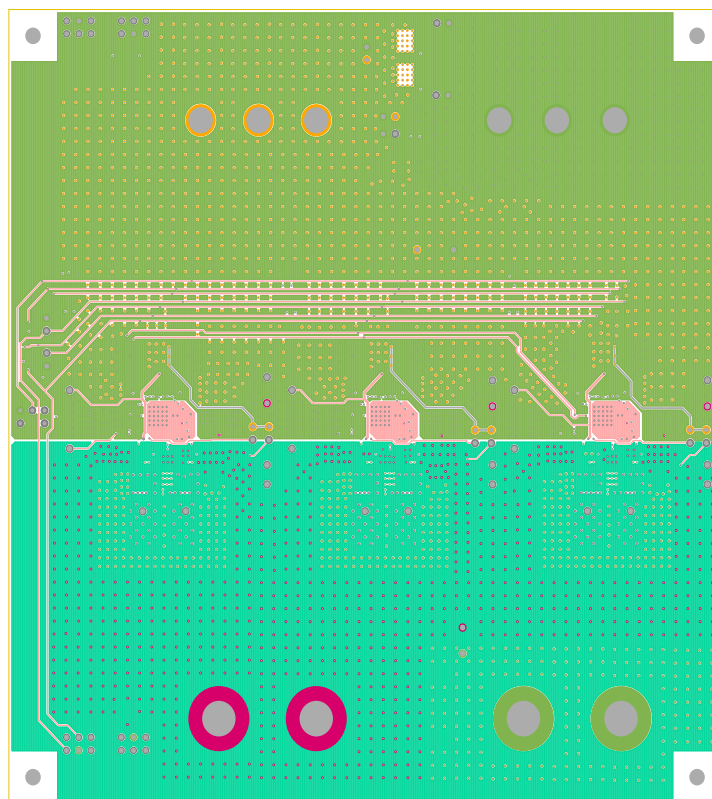# ISL8272MEVAL2Z Evaluation Board Layout (Continued)
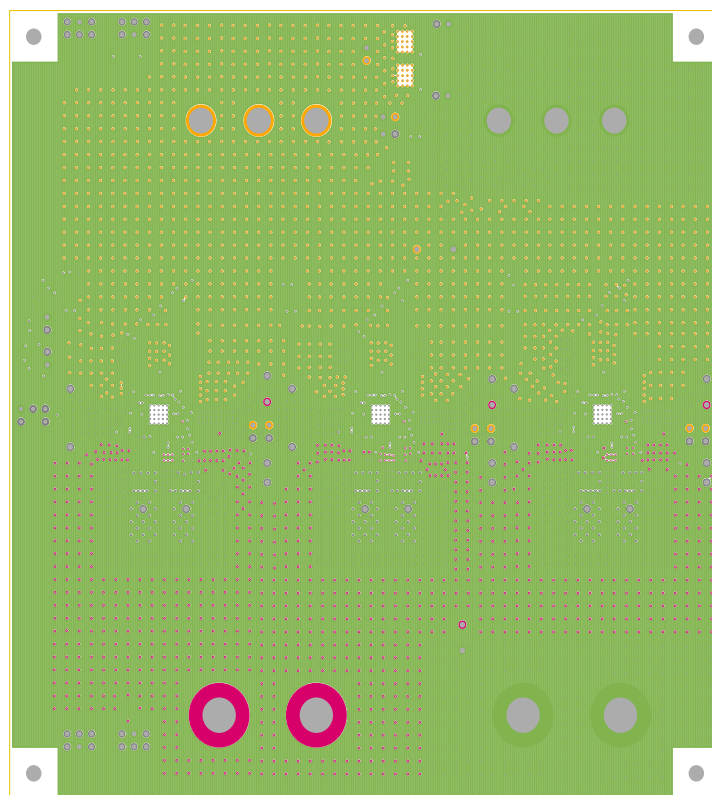

FIGURE 9. LAYER 4

FIGURE 10. LAYER 5
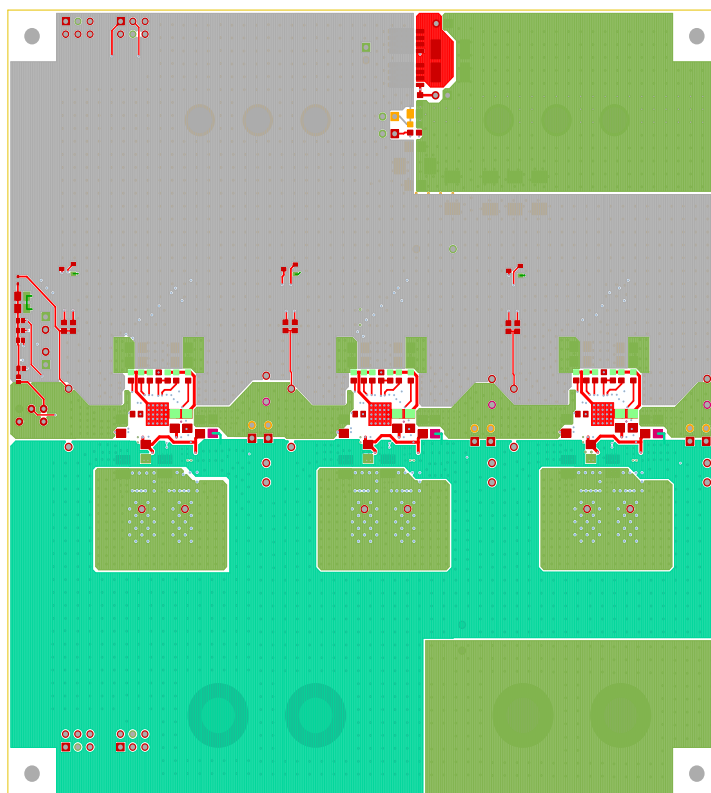
ISL8272MEVAL2Z Evaluation Board Layout (Continued)
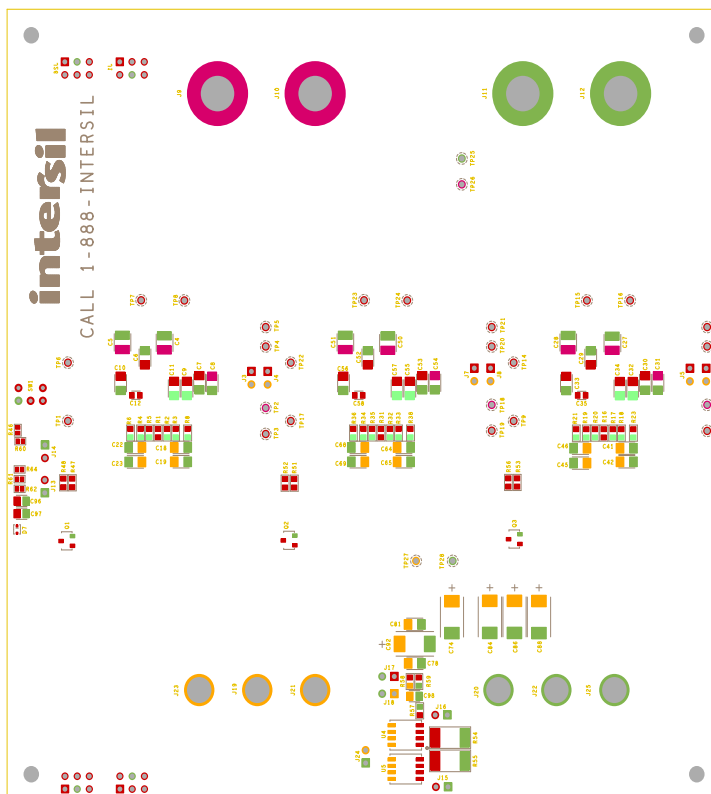

FIGURE 11. BOTTOM LAYER SOLDER SIDE

FIGURE 12. SILKSCREEN BOTTOM

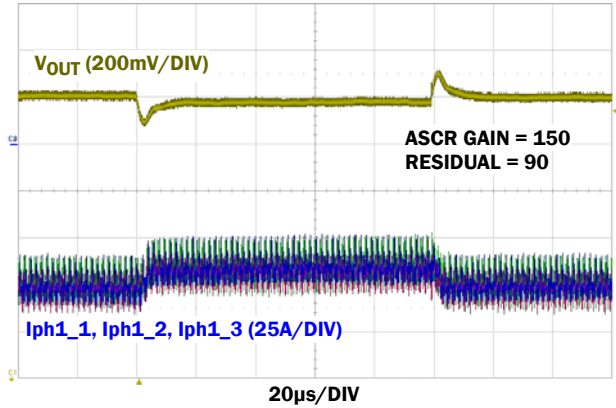# Measured Data   The following data was acquired using a ISL8272MEVAL2Z evaluation board.
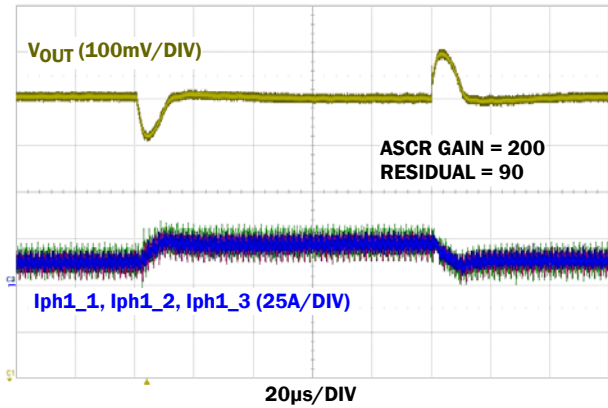
FIGURE 13. LOAD TRANSIENT RESPONSE AT V_{IN} = 12V, V_{OUT} = 1V, I_{OUT} = 50A TO 125A (>100A/μs), V_{OUT} DROOP = 0.1mV/A, f_{SW} = 533kHz, C_{OUT} = 18 x100μF CERAMIC + 6 x 470μF POSCAP

FIGURE 14. LOAD TRANSIENT RESPONSE AT V_{IN} = 12V, V_{OUT} = 3.3V, I_{OUT} = 30A TO 105A (>100A/μs), V_{OUT} DROOP = 0.2mV/A, f_{SW} = 533kHz, C_{OUT} = 18 x100μF CERAMIC + 6 x 470μF POSCAP
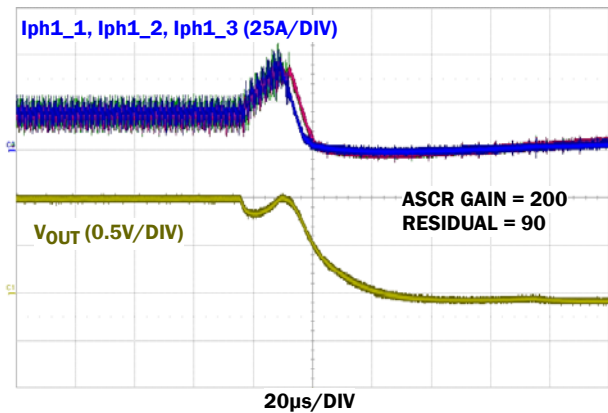

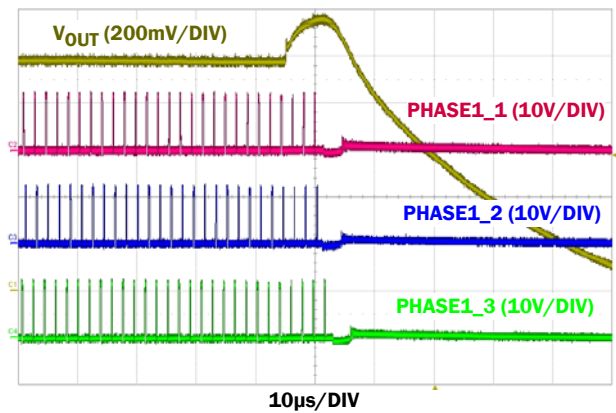**FIGURE 15.** OUTPUT SHORT CIRCUIT PROTECTION AT V_{IN} = 12V, V_{OUT} = 1V, f_{SW} = 533kHz

FIGURE 16. OUTPUT OVERVOLTAGE PROTECTION AT V_{IN} = 12V, V_{OUT} = 1V, f_{SW} = 533kHz, VOUT_OV_FAULT_LIMIT = 1.15V
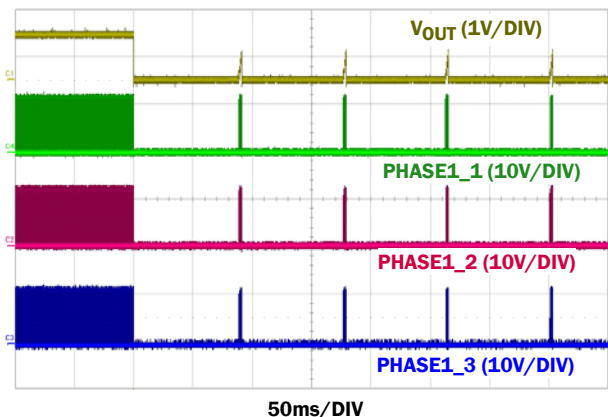

FIGURE 17. OUTPUT SHORT CIRCUIT PROTECTION WITH CONTINUOUS RETRY ENABLED (HICCUP MODE), V_{IN} = 12V, V_{OUT} = 1V
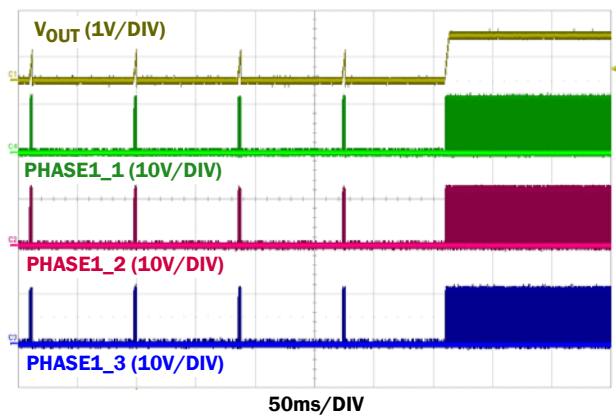

FIGURE 18. OUTPUT SHORT CIRCUIT RECOVERY FROM CONTINUOUS RETRY (HICCUP MODE), V_{IN} = 12V, V_{OUT} = 1V

Measured Data
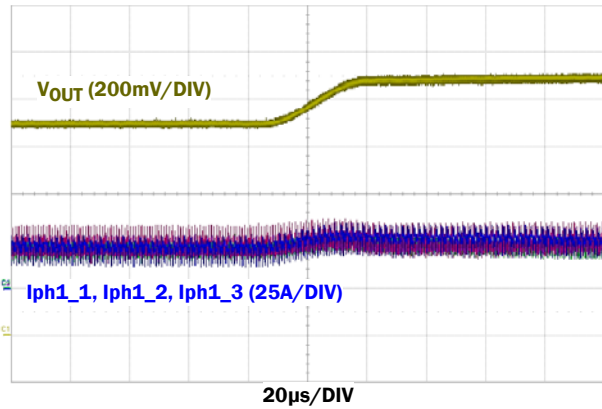The following data was acquired using a ISL8272MEVAL2Z evaluation board. **(Continued)**

FIGURE 19. DYNAMIC VOLTAGE SCALING WITH VOUT CHANGE FROM 0.9V TO 1.1V, V_{IN} = 12V, V_{OUT} _TRANSITION_RATE = 1mV/µs
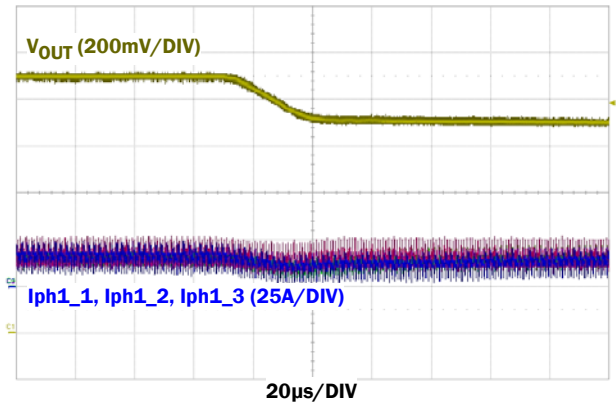

FIGURE 20. DYNAMIC VOLTAGE SCALING WITH VOUT CHANGE FROM 1.1V TO 0.9V, V_{IN} = 12V, V_{OUT} _TRANSITION_RATE = 1mV/µs

FIGURE 21. STATIC CURRENT SHARING MONITORED FROM THE POWERNAVIGATOR SOFTWARE, V_{IN} = 12V, V_{OUT} = 1V, I_{OUT} = 150A, f_{SW} = 421kHz
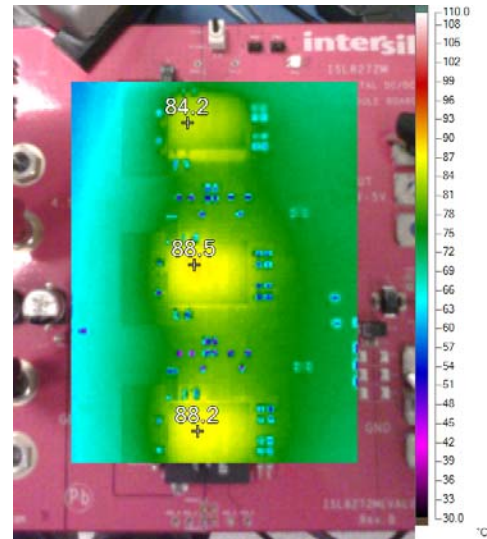

FIGURE 22. THERMAL IMAGE AT V_{IN} = 12V, V_{OUT} = 1V, I_{OUT} = 150A, f_{SW} = 421kHz. T_A = +25°C, NO AIRFLOW

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