User's Manual

ISL7457SRHEVAL2Z

User's Manual: Evaluation Board

High Reliability

Rev 0.00 Dec 2017

ISL7457SRHEVAL2Z

Evaluation Board

UG152
Rev.0.00
Dec 1, 2017

1. Overview

The ISL7457SRHEVAL2Z provides access to the IC pins along with a minimum of external passives to provide decoupling with open positions for additional capacitive or resistive loading and jumpers for unloading unused outputs.

1.1 Key Features

- Easy to interface with test equipment
- Customizable

1.2 Specifications

This board provides for the following operating conditions:

- Nominal V_{IN} = 5V to 15V
- Default load capacitance = 1nF
- Default 10kΩ pull down resistors on the inputs

1.3 Ordering Information

Part Number	Description
ISL7457SRHEVAL2Z	ISL7457SRH Evaluation Board

1.4 Related Literature

- For a full list of related documents please visit our website
  - ISL7457SRH product page

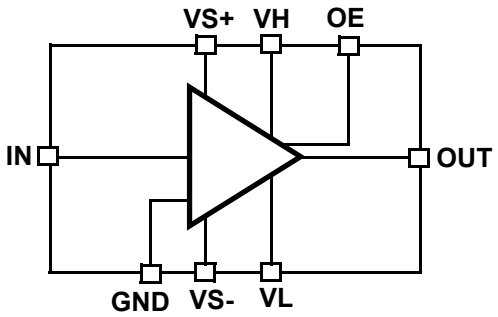

Figure 1. Block Diagram (1 of 4 drivers shown)

2. Functional Description

The ISL7457SRHEVAL2Z evaluation board provides an easy to use platform to characterize and evaluate the drivers for a variety of operating and component conditions.

The ISL7457SRHEVAL2Z is shown in Figures 2 through 4 in photographic and schematic forms.

2.1 Operating Range

The ISL7457SRHEVAL2Z is configured for operating conditions of 5V to 15V, with the inputs resistively pulled low if not signaled.

2.2 Default Configuration Settings

All functional and performance configuration settings for this evaluation board will be set by the circuit design requirements. However, a default set of components have been placed for building familiarity with its function before customization.

The default configuration is set as follows:

- The inputs all have 10kΩ pull down resistors dividers to ensure the individual driver is off if not signaled
- The outputs all have 1nF capacitors in place
- The Output Enable (OE) input has a jumper for the enable or disable function and is enabled by default

2.3 Quick Start Guide

With the default or user intended configuration components in place, ensure that the board is properly connected to the appropriate supplies and loads before applying any power.

(1) Connect the appropriate bias supply voltages to VS+, VS-, VH, VL, and GND.
(2) Connect the appropriate signal to any or all inputs, either in phase or out of phase.
(3) Use oscilloscopes and DVMs to monitor signals and voltages.
(4) Turn power supplies on.
(5) Signal the input(s).
(6) Observe the output(s) switching in response to the input(s) signaling.

3. Application Considerations

3.1 Power Dissipation and Junction Temperature

The ISL7457SRH operates over a wide voltage and frequency range, and with one to four drivers being active, the power dissipated in each IC can range considerably. When switching at high speeds or driving heavy loads, the ISL7457SRH drive capability is limited by the rise in die temperature caused by internal power dissipation. For reliable operation, the die temperature must be kept below T_{JMAX} (+150°C).

Power dissipation can be calculated as shown in (EQ. 1):

$$P_D = (V_S \times I_S) + \sum_{1}^{4}[(C_{INT} \times V_S^2 \times f) + (C_L \times V_{OUT}^2 \times f)] \quad \text{(EQ. 1)}$$

where:

- P_D is the power dissipated in the device
- V_S is the total power supply to the ISL7457SRH (from V_S+ to V_S-)
- I_S is the quiescent supply current
- C_{INT} is the internal load capacitance (150pF)
- f is the operating frequency
- C_L is the load capacitance
- V_{OUT} is the swing on the output (V_H - V_L)

After the power dissipation for the application is determined, the maximum junction temperature can be calculated as shown in (EQ. 2):

$$T_{JMAX} = T_{SMAX} + (\theta_{JC} + \theta_{CS}) \times P_D \quad \text{(EQ. 2)}$$

where:

- T_{JMAX} is the maximum operating junction temperature (+150°C)
- T_{SMAX} is the maximum operating sink temperature of the PCB
- θ_{JC} is the thermal resistance, junction-to-case, of the package (refer to the ISL7457SRH datasheet)
- $\theta_{CS}$is the thermal resistance, case-to-sink, of the PCB (refer to the ISL7457SRH datasheet)
- P_D is the power dissipation calculated in (EQ. 1).

4. PCB Layout Guidelines

The ISL7457SRHEVAL2Z Printed Circuit Board (PCB) layout has been optimized for ease of use.

It has the following key features:

• Connection posts allow for quick connections for evaluation

• SMD components provide easy handling and customization

4.1 ISL7457SRHEVAL2Z Evaluation Board

Figure 2. Top of Board

Figure 3. Bottom of Board

4.2 ISL7457SRHEVAL2Z Schematic Diagram

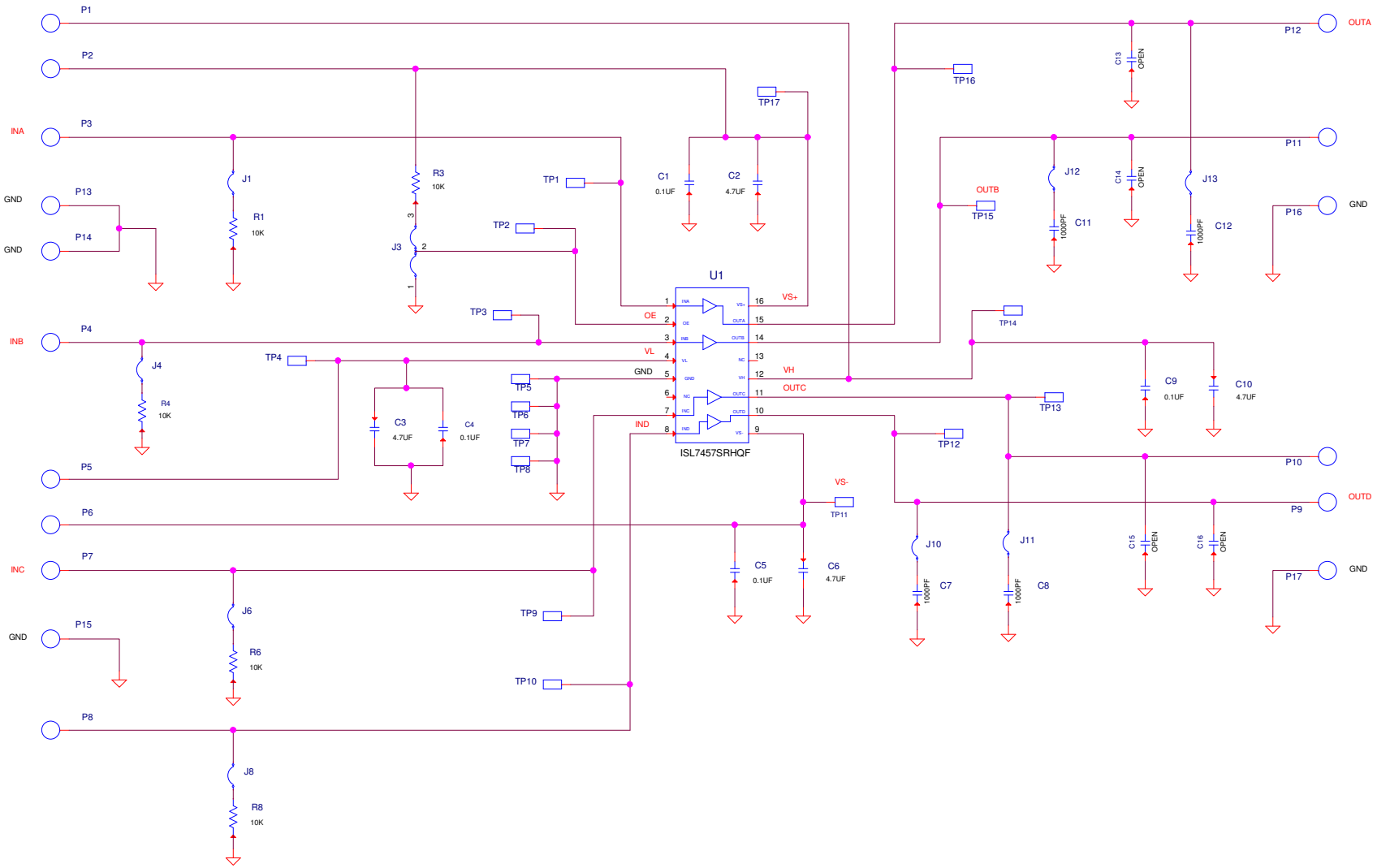

Figure 4. ISL7457SRHEVAL2Z Schematic

4.3 Bill of Materials

Item	Qty	Reference Designator	Value	Tol (%)	Rating	Type	PCB Footprint	Manufacturer	Manufacturer Part Number
1	1	U1						Intersil	ISL7457SRH/PROTO
2	4	C2, C3, C6, C10	4.7µF	10	25V	X7R	SM0603	Various	Generic
3	4	C7, C8, C11,C12	1000pF	10	25V	CHIP	SM0402	Various	Generic
4	4	C1, C4, C5, C9	0.1µF	10	25V	CHIP	SM0402	Various	Generic
5	5	R1, R3, R4, R6, R8	10kΩ	10	1/10W	CHIP	SM0402	Various	Generic

4.4 Board Layout

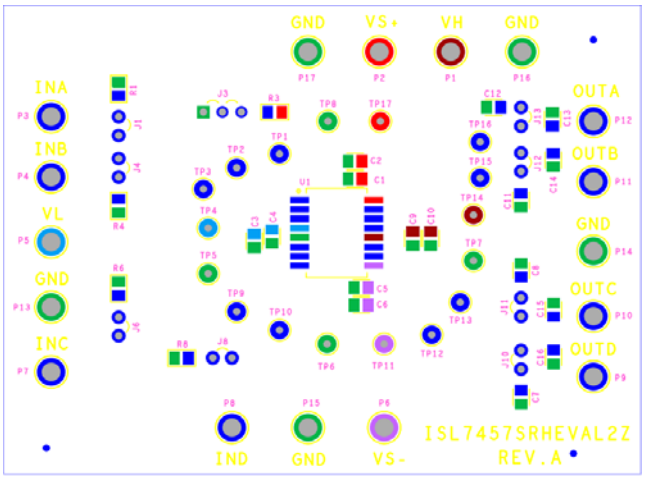

Figure 5. Top Silkscreen

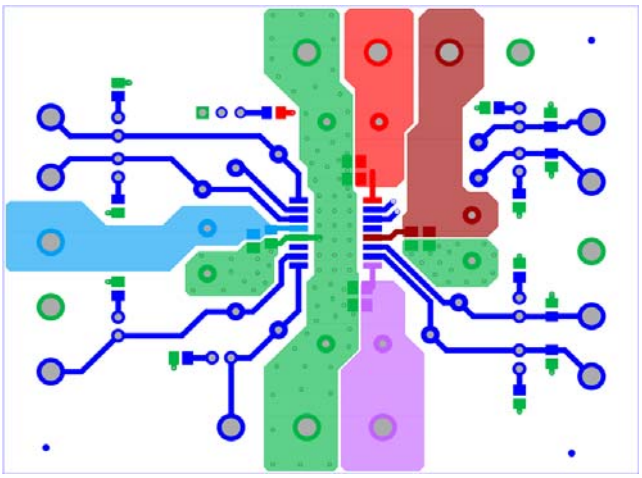

Figure 6. Top Layer

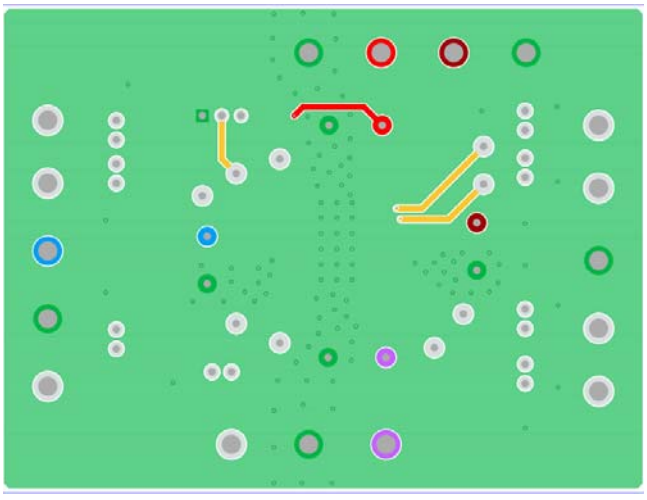

Figure 7. Bottom Trace Layer

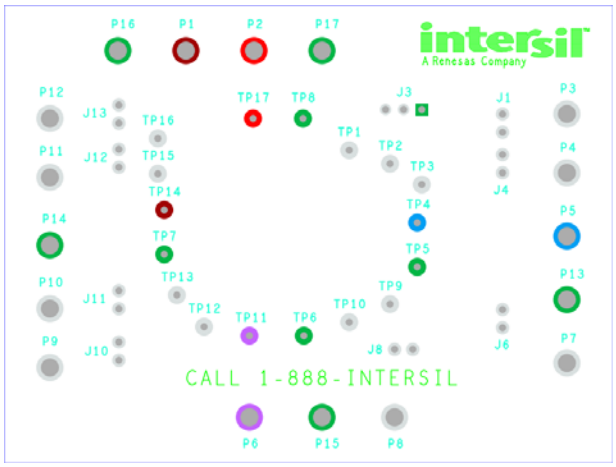

Figure 8. Bottom Silkscreen

5. Typical Performance Curves

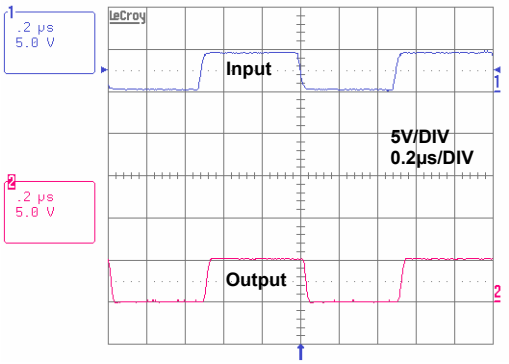

Figure 9. VH = VS+ = 5V, 1MHz

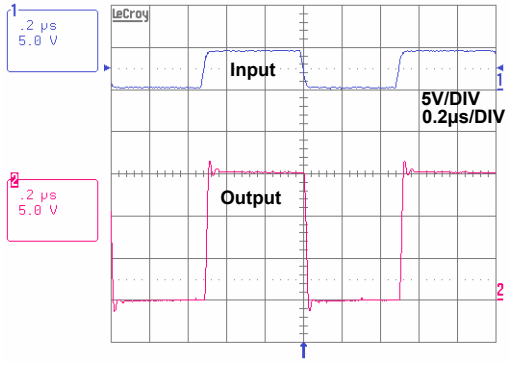

Figure 10. VH = VS+ = 15V, 1MHz

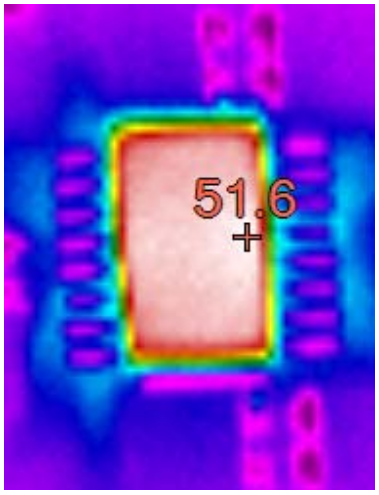

Figure 11. Case Temperature VH = VS+ = 15V, 1MHz, 4 Channels, T_A = +25C

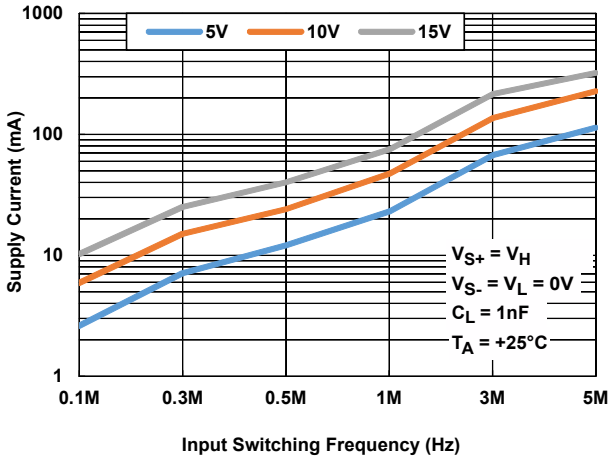

Figure 12. Supply Current for 4 Channels vs Voltage and Switching Frequency

6. Revision History

Rev.	Date	Description
0.00	Dec 1, 2017	Initial release

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