

**User's Guide Latching Current Limiter (LCL)
ZES723LCL EVM (40V)**

Abstract

The User's Guide describes the operation of the Latching Current Limiter (LCL) ZES723LCL EVM evaluation module 'ZES723LCLGEV-EP'. It provides the detail how to set-up, configure the Latching Current Limiter as designed to monitor the supply current into an electronics system, the LCL disconnects the power to the electronics system when the supply current exceeds a preconfigured threshold. This document applies only to the ZES723LCL EVM.

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1. Introduction

ZES723LCL EVM, Latching Current Limiter (LCL) is designed based on ECSS-E-ST-20-20C, offering in current limiter switching of the power supply lines to COTS devices with operating input voltage of 4V to 40V with integrated power transistors that withstand up to 4A of output current, with very low quiescent current at 2mA.

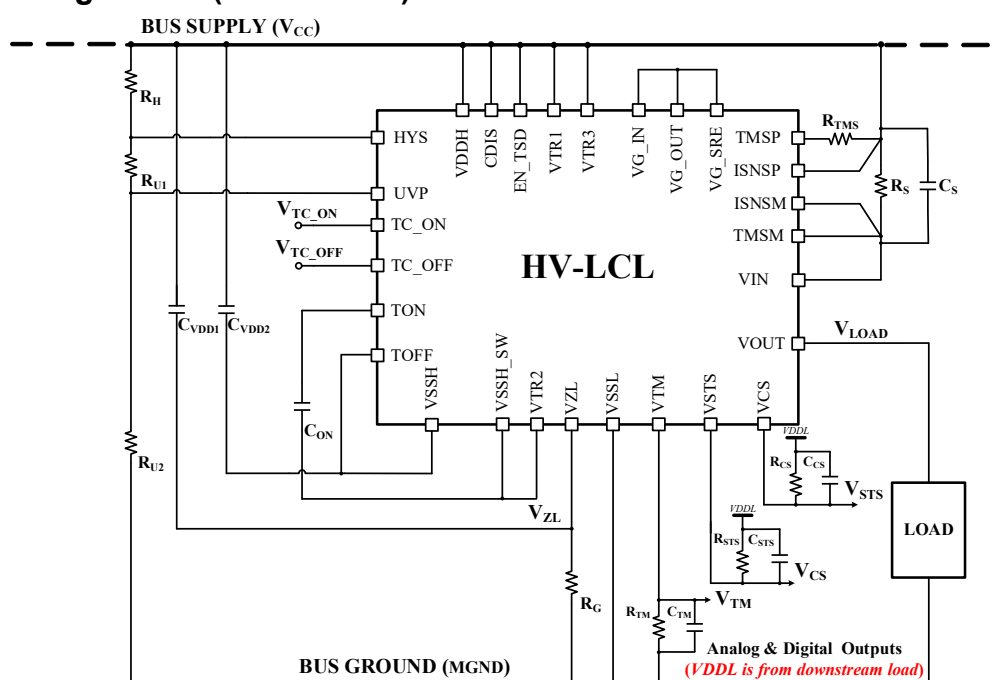
The control system embodies a unique Smart-monitor with two types of operations: Latched or Re-triggerable, with built-in Smart current limitation for repetitive overloads, with Embedded current sense and Digital status for system monitoring.

The ZES723LCL EVM is equipped with the following featured,

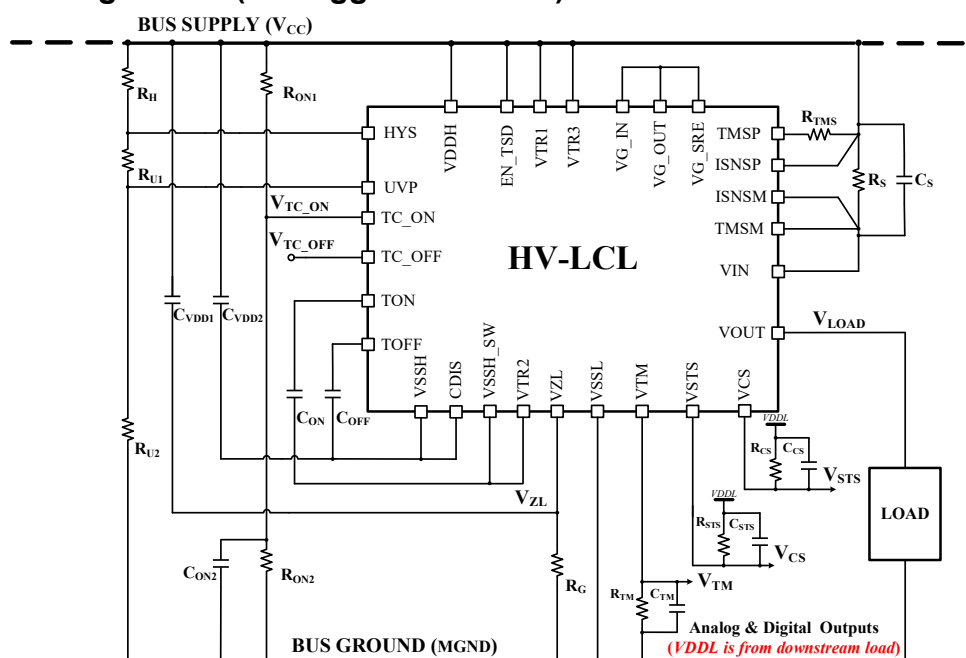
- Configurable trip-off and recovery times
- Configurable undervoltage protection
- Floating ground

2. Typical Application Circuit

2.1 LCL Configuration (Latch Mode)



2.2 RLCL Configuration (Re-triggerable Mode)



3. ZES723LCL EVM Operational Range, T_A = 25°C

Specification	Test Conditions	Min	Typ.	Max	Unit
Power Input Voltage (V _{CC})		4		40	V
Input Voltage control circuit (V _{DD5V})			4.5	5	V
Output Voltage (V _{OUT})		4		40	V
Output current (I _{OUT})				4	A

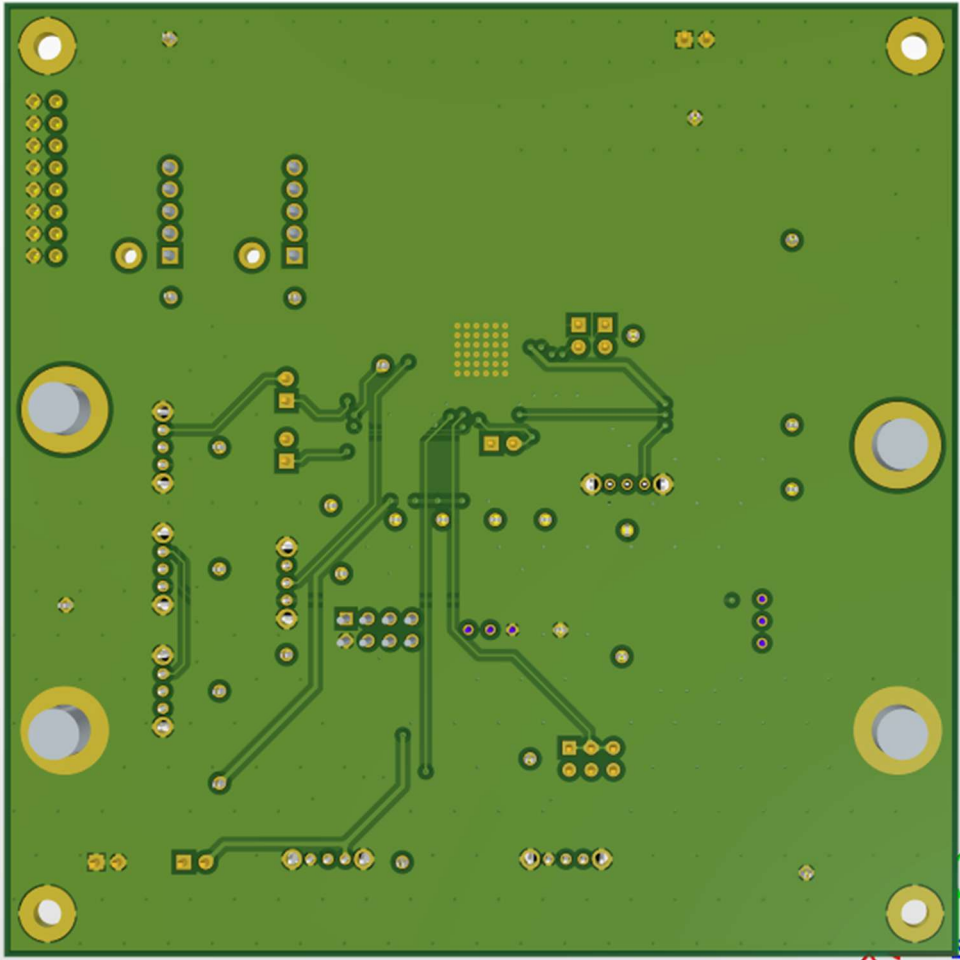
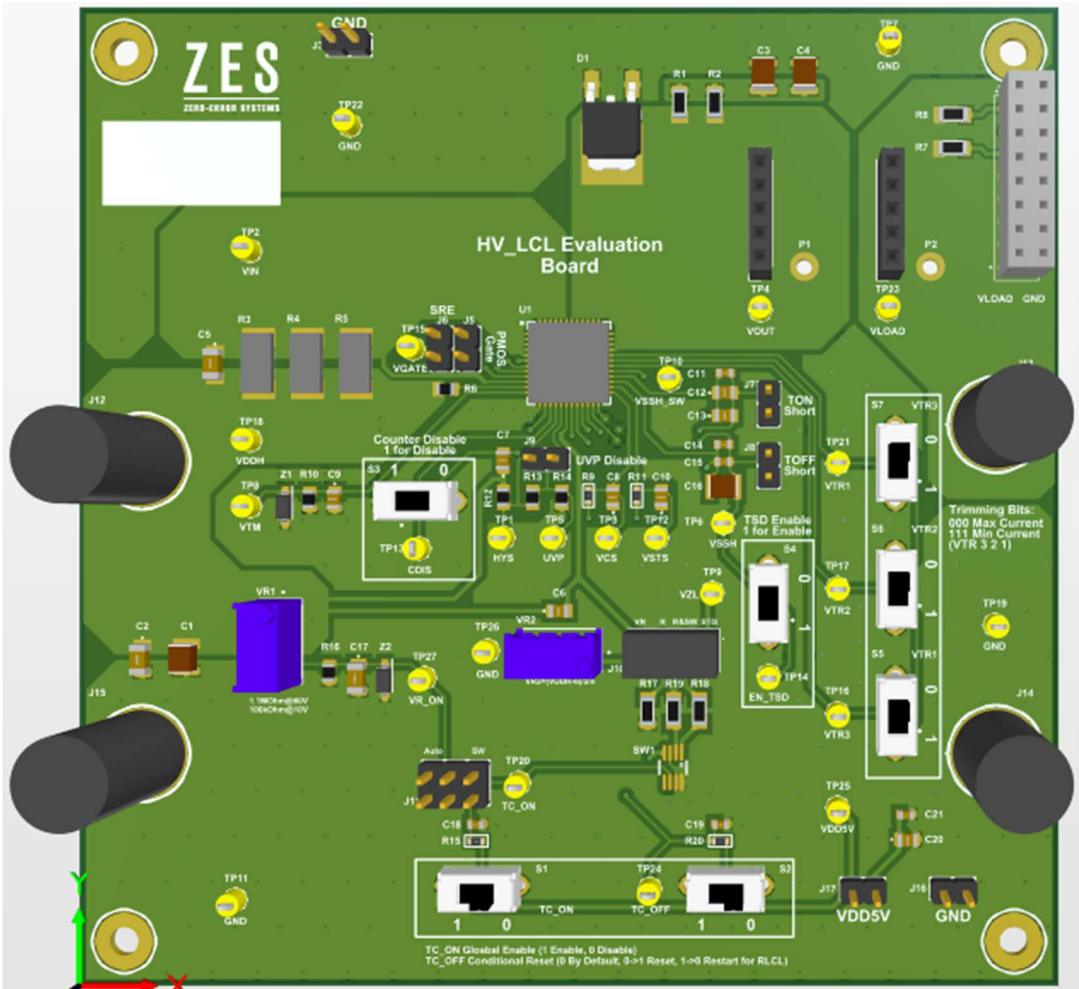
Limitation Current (Trip Current) is defined by R_s with the following equation.

$$I_{limitation\ (Trip)} = \frac{100 \times 10^{-3}\ V}{R_S}\ A$$

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4. ZES723LCL EVM Board (Top side and bottom side)



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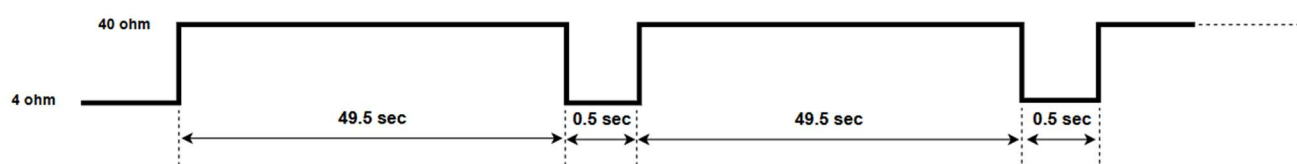
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5. List of items Required

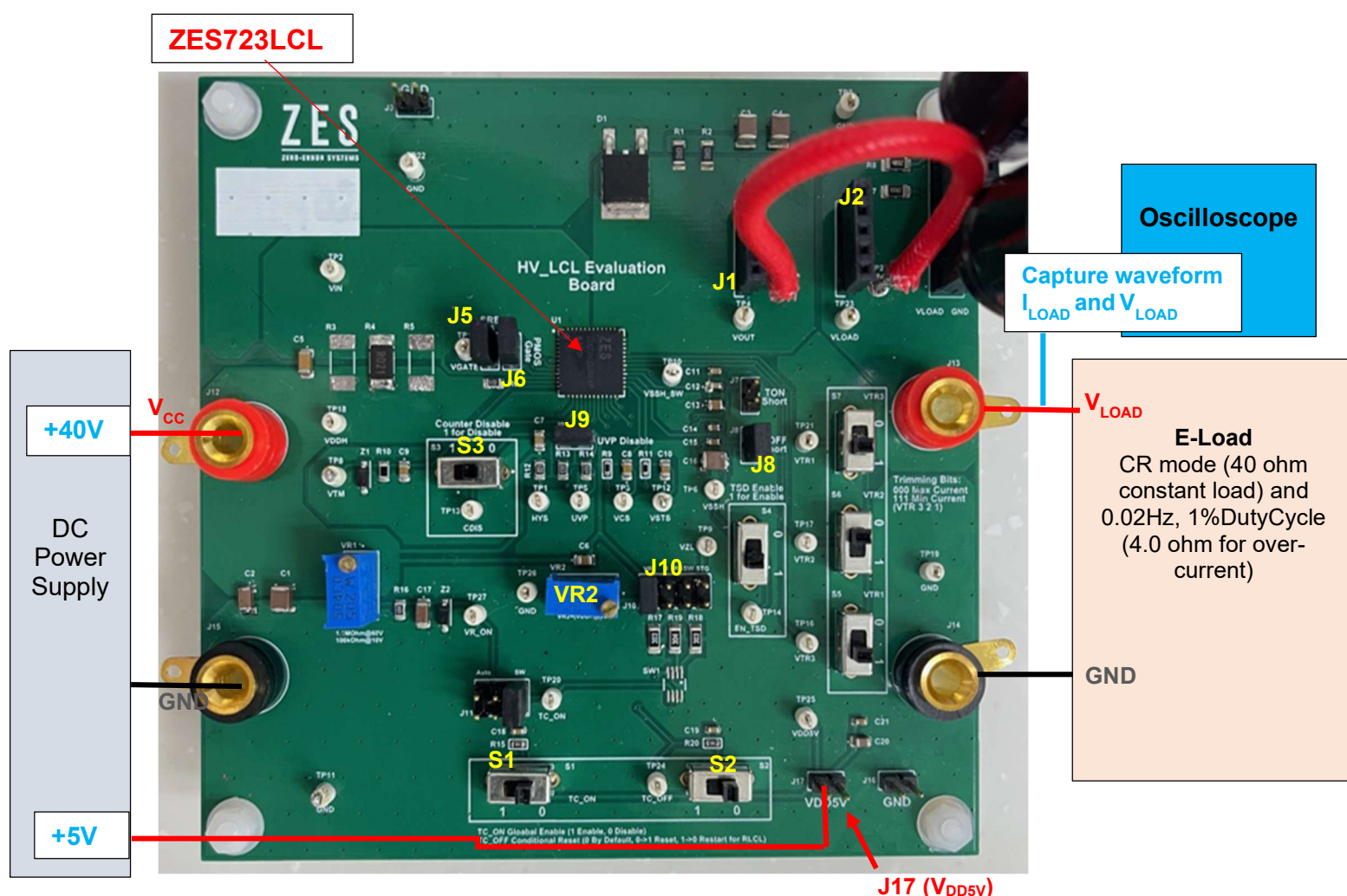
- DC Power supply
- Variable “constant resistance” Electronics-load(E-load)
- Banana plugs cables
- Oscilloscope
- Current probe

6. ZES723LCL EVM (strictly for $V_{CC} = 40V$ only) Set-up connections

- Ensure VR2 to 16.9k ohm for $V_{CC} = 40V$ only.
- Ensure there is shunt across J5, J6, J9, **J10 at VR** position.
- Selection of J8: Shunt is Latch mode/ J8 shunt removed is Re-triggerable mode.
- Set switch S3 (CS_Disable Switch); S3=1 for Latch mode/ S3=0 for Re-triggerable mode
- Ensure switch S1 (TC_ON) and S2 (TC_OFF) are at "0" position before turn-on DC supply 40V to V_{CC} and 5V to V_{DD5V} .
- Connect banana cable from DC Power Supply to ZES723LCL EVM V_{CC} and V_{DD5V} header-pin (J17).
- Connect J1 and J2 with a thick wire or inductor as per require.
- Connect banana cable from ZES723LCL EVM V_{LOAD} connector to Electronics load(E-load) constant resistance mode.
- E-Load to configure to CR mode (40 ohm) at 0.02Hz, 1% (4 ohm) duty cycle as per below:



- j. After turn on V_{CC} and V_{DD5V} then set switch S1 (TC ON) to “1” position.



7. Set-up Procedure

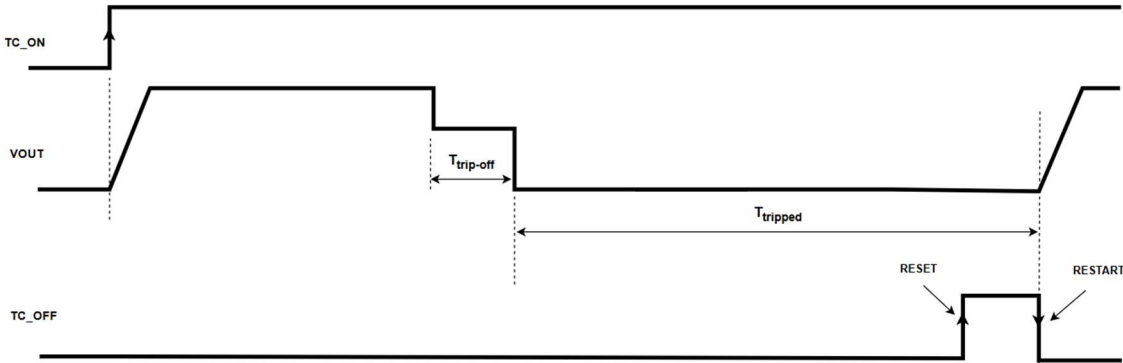
- k. With above set-up connections, power on the DC Power supply 40V and 5V to ZES723LCL EVM **V_{CC}** and **V_{DD5V}**.
- l. Connect oscilloscope and E-load to **V_{LOAD}**, connector and monitor the output.

8. LCL Input Telecommands Scheme (Latch Mode)

TC_ON/TC_OFF	TC_ON = 0	*TC_ON = 1
TC_OFF = 0	OFF	ON
TC_OFF = 1	OFF	When LCL is not tripped , TC_OFF = 1 is blocked. When LCL is tripped , TC_OFF = 1 will reset all internal latches and keeps LCL in tripped state and later when switch TC_OFF = 0 will release LCL from trip and turn on VOUT.

*Notes: In Latch mode, when TC_ON=1, set CS_Disable Switch (S3) = 1, otherwise TC_OFF will be blocked.

8.1 LCL Input Telecommands Timing diagram

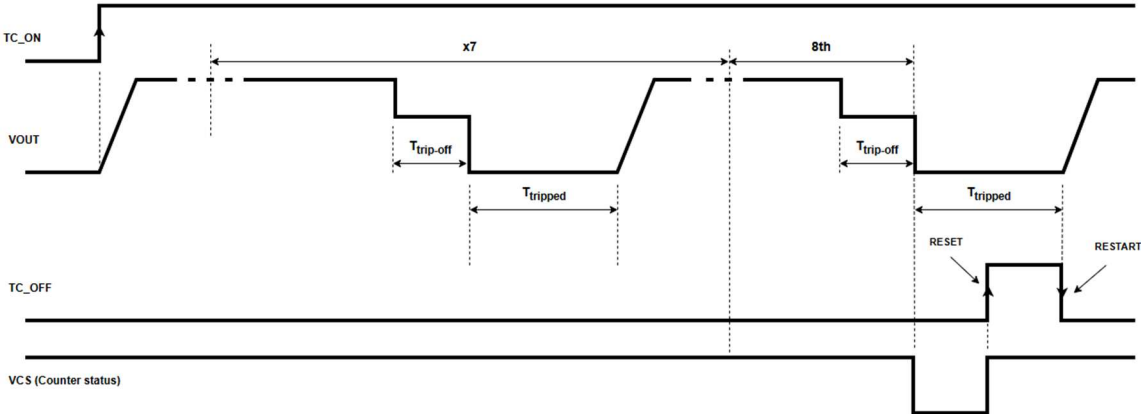


9. RLCL Input Telecommands Scheme (Re-triggerable Mode)

TC_ON/TC_OFF	TC_ON = 0	**TC_ON = 1
TC_OFF = 0	OFF	ON
TC_OFF = 1	OFF	When LCL is not tripped or counter counts < 8 times , TC_OFF = 1 is blocked. When LCL is tripped and counter counts ≥ 8 times , TC_OFF = 1 will resets all internal latches and keeps LCL in tripped state and stops the retriggering. If later switch TC_OFF = 0 will release LCL from trip and turn on VOUT.

**Notes: In Re-Triggerable mode, when TC_ON=1, set CS_Disable Switch (S3) = 0, otherwise Counter status invalid.

9.1 RLCL Input Telecommands Timing diagram



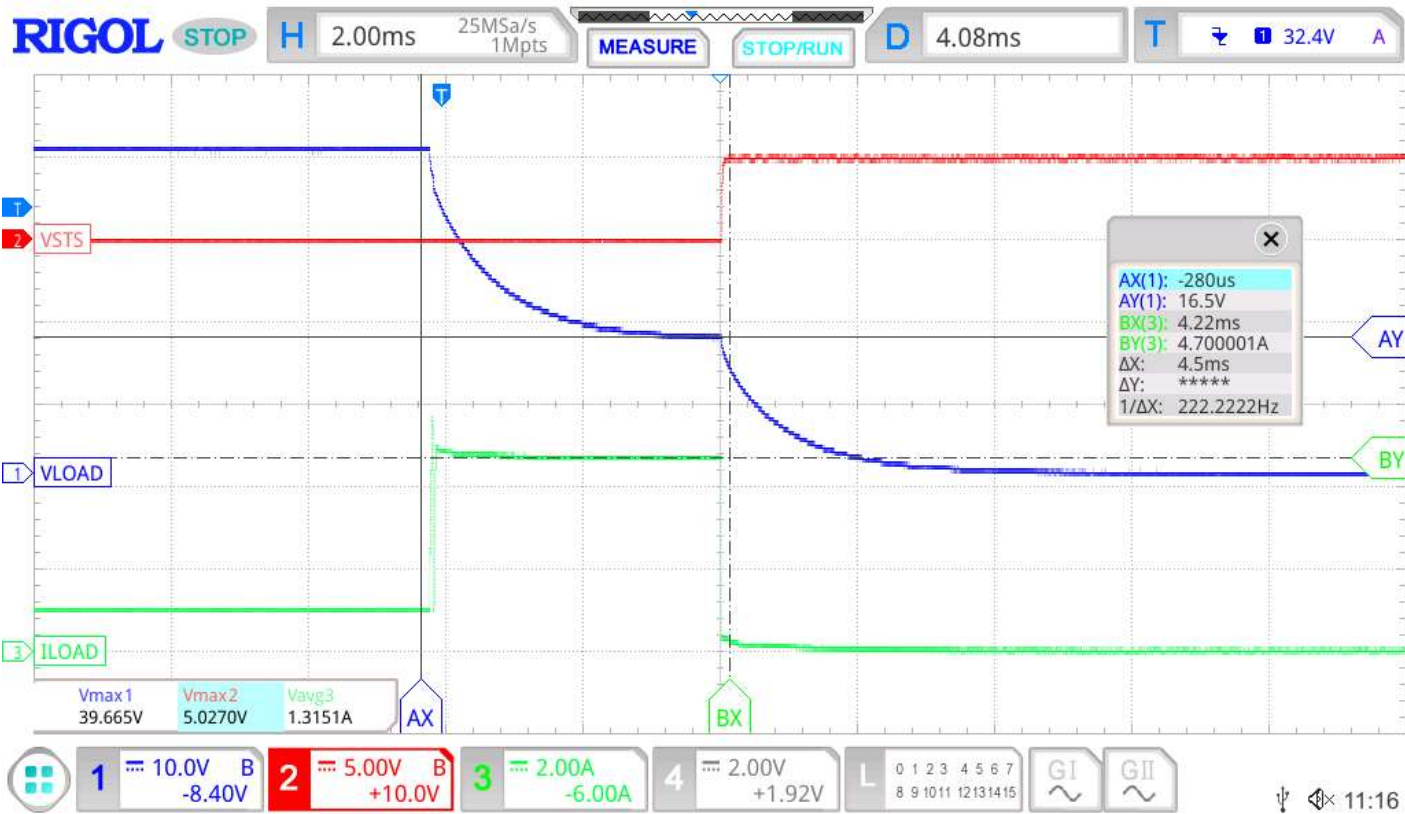
10. Measuring Output when Over-current (Re-Triggerable mode)
- a. ZES723LCL EVM rev1.0 of the output waveforms below with oscilloscope V_{LOAD} (Blue), I_{LOAD} (Green) and V_{STS} (Red).

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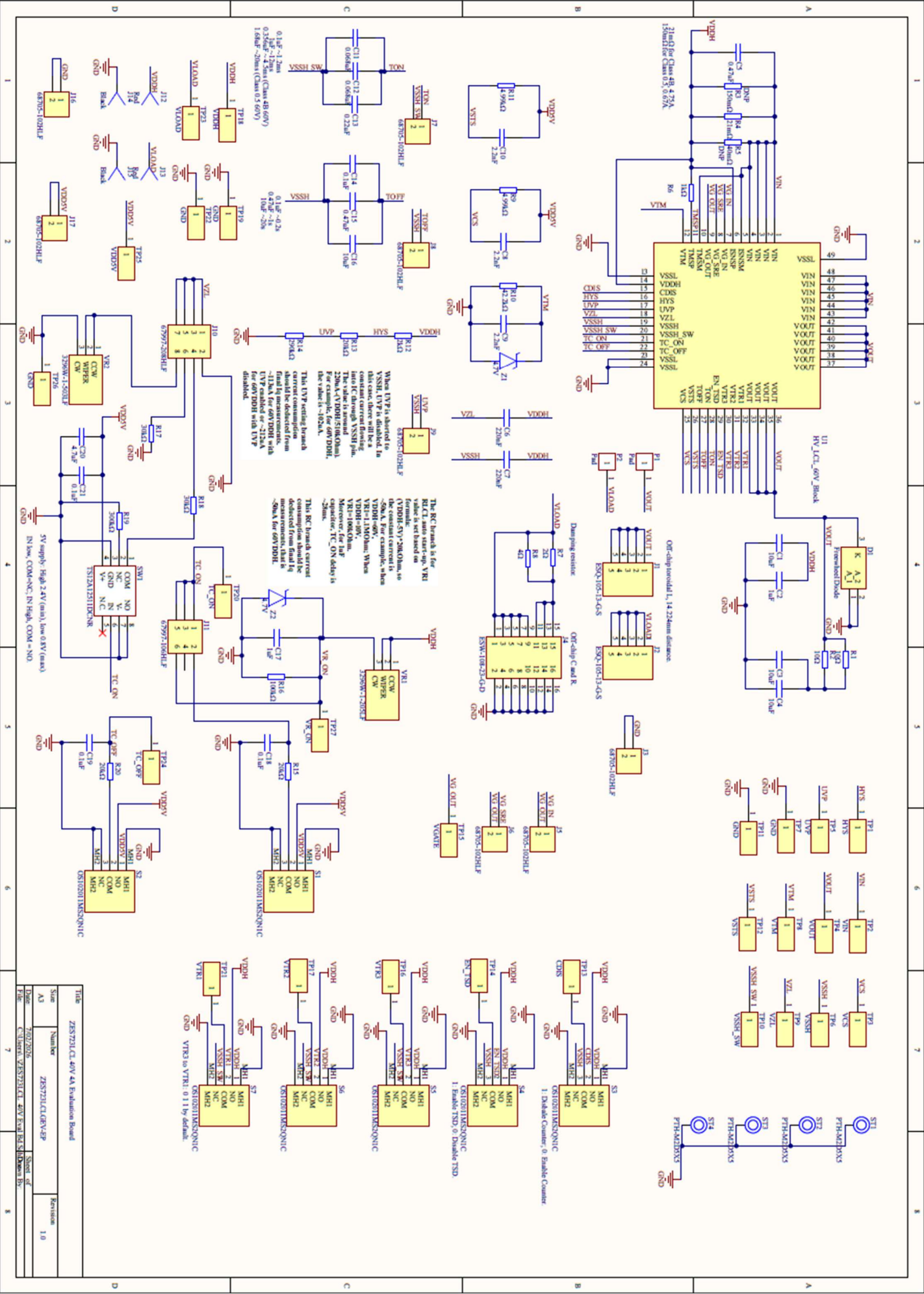


Zoom-in waveform when Trip:

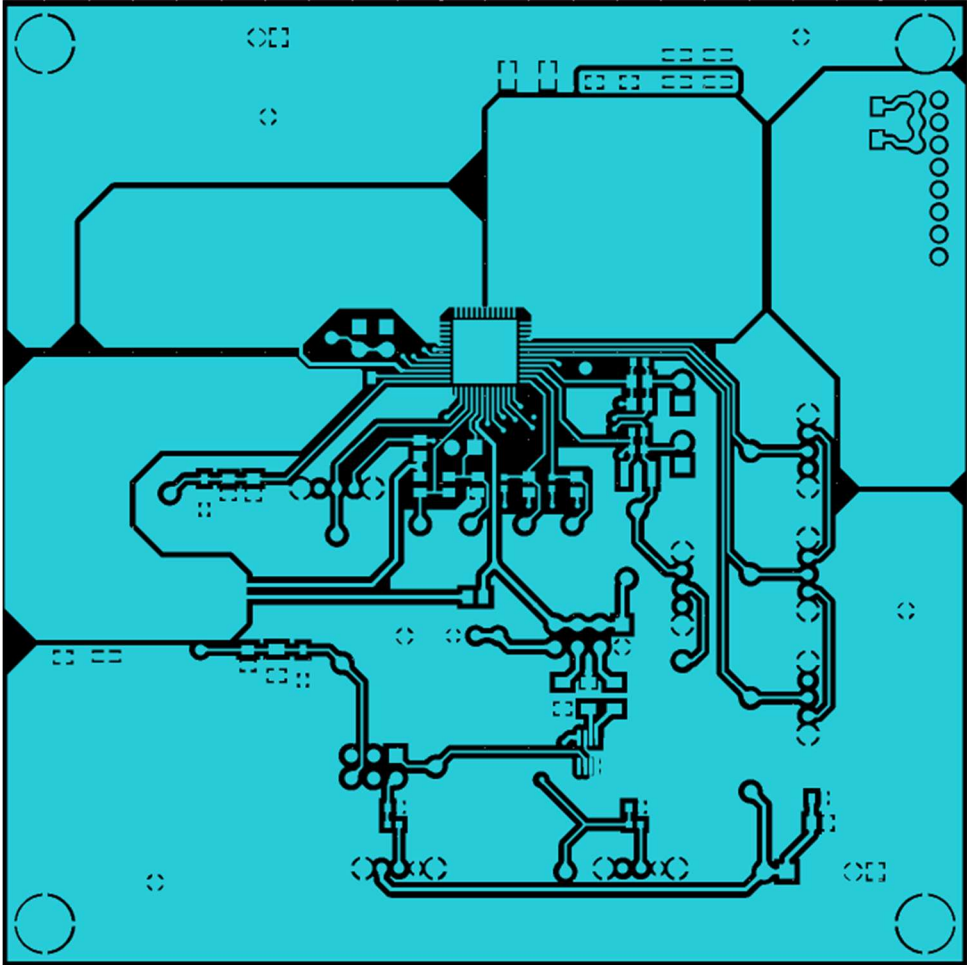
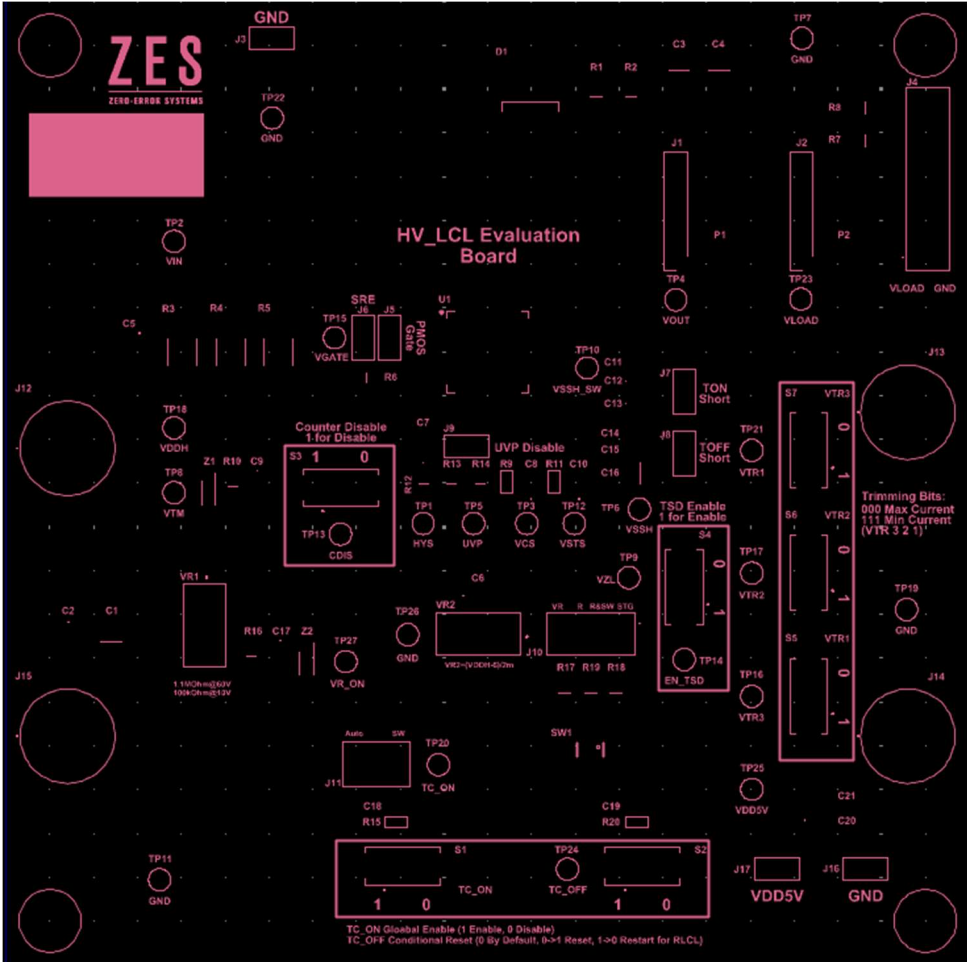
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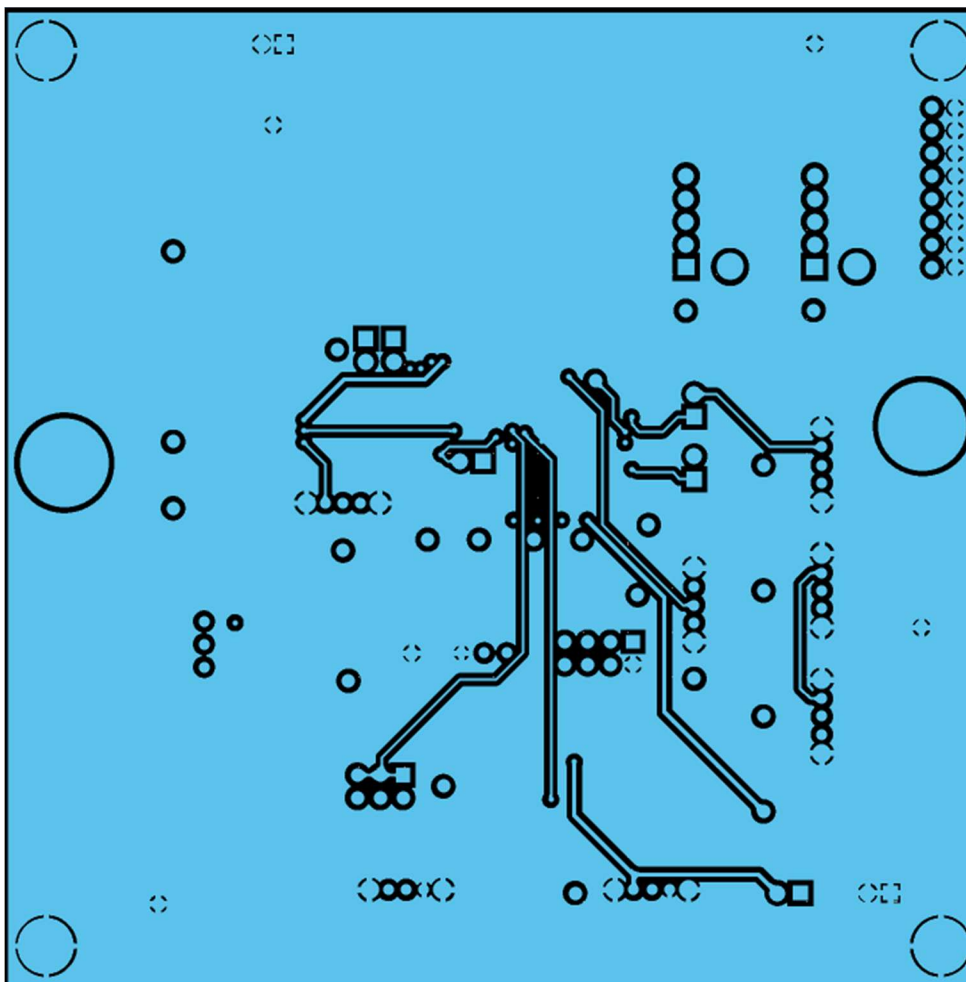
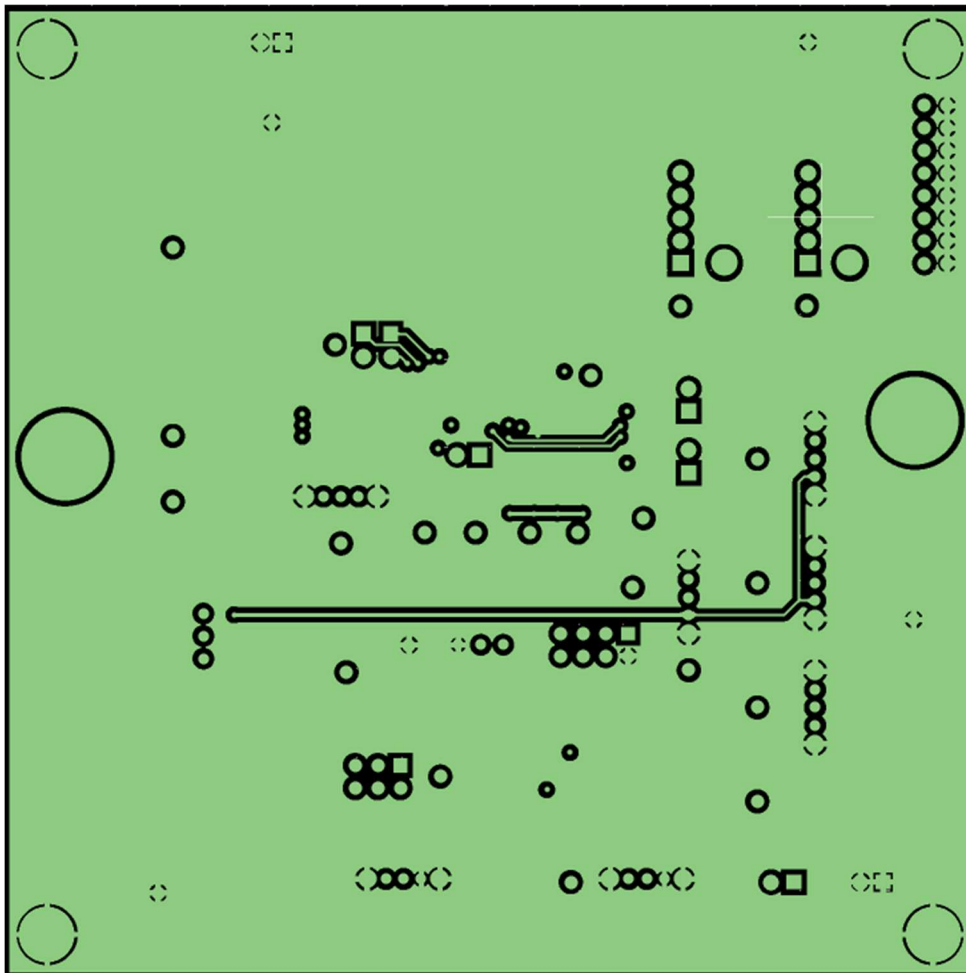


11. ZES723LCL EVM Schematic



S723LCL EVM PCB layout





Revision History

Revision No.	Notes	Date
Rev 1.0	Preliminary version	Feb, 2026
Rev 2.0	Increase Vin to 40V from 28V	June,2026

For price, delivery, and ordering information please contact sales@zero-errorsystems.com

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