

# FPD-Link Margin Analysis Program (MAP) user's guide

This document covers how to use the FPD-Link Margin Analysis Program (MAP) to evaluate link health. The MAP tool is integrated into the FPD-Link software GUI, Analog LaunchPad™ (ALP) Development Kit.

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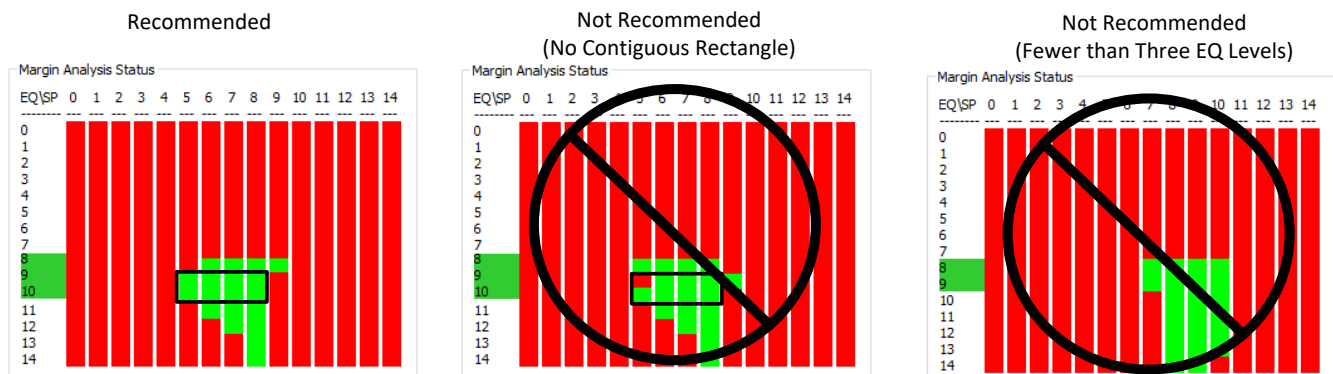
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## 1 Introduction

The Margin Analysis Program (MAP) included in [Analog LaunchPad](#) development kit creates diagrams showing which EQ level and strobe position combinations show no errors or loss of lock. These diagrams may be used to diagnose the condition of the eye, with a larger number of passing (green) squares to show a larger eye opening. In normal operation, the EQ level and strobe position are set automatically as part of the Adaptive Equalization (AEQ) process, but are set manually when running MAP. MAP is included in the ALP profiles for the DS90UB954-Q1, DS90UB934-Q1, DS90UB960-Q1, DS90UB964-Q1, DS90Ux948-Q1, DS90Ux940-Q1, DS90Ux928-Q1, DS90Ux926-Q1, and DS90Ux924-Q1. For detailed information on margin analysis for the DS90UB954-Q1 and DS90UB960-Q1, see [Strobe Positions and Margin Analysis Program \(MAP\) With the DS90UB954-Q1](#) (SNLA301).

## 2 Margin Analysis Program Overview

An EQ level is considered recommended if it has at least four passing strobe positions. Recommended EQ levels are indicated by highlighting the EQ level label in green. For example, the left plot in [Figure 1](#) shows that EQ levels 8 to 10 are considered recommended settings. In general, TI recommends having a margin of at least three EQ levels with four passing strobe positions, including a contiguous rectangle of passing states that measures two EQ levels by four strobe positions.



**Figure 1. Margin Guidelines**

The tool uses Manual Adaption Mode checks each EQ level and strobe position combination for a variety of errors. The 964, 960, 954, and 934 have Strobe Positions from 0 to 14 and the 948, 940, 928, 926, and 924 have strobe positions from 0 to 9.

For ADAS devices (964, 960, 954, and 934), 0x4D[5:2] and 0x4E[5] are checked:

- BCC\_CRC\_ERROR: Forward channel CRC error detected
- LOCK\_STS\_CHG: Lock status has changed since the last time this register was read
- BCC\_SEQ\_ERROR: Forward channel sequence error detected
- PARITY\_ERROR: Number of parity errors detected has exceed the programmed threshold (set to one error by the Margin Analysis Tool)
- FPD3\_ENCODING\_ERROR: Forward channel encoding error

For IVI devices (948, 940, 928, 926, and 924), only lock is monitored, but the LINK ERROR COUNT ENABLE (0x41[4]) is disabled so loss of lock is triggered by any error on the DCA, Clock0, or Clock1 bits.

### 3 How to Use the Margin Analysis Program

For basic instructions on using Analog LaunchPad development kit, refer to the device EVM user guide. To access the MAP tool, download both the latest version of the ALP base program (ALP) and the latest profile updates (ALP-PROFILE-UPDATE) from [the ALP page](#). To use the margin analysis tool, perform the following steps:

1. Open the device profile in the Analog LaunchPad development kit and confirm that the deserializer and serializer are locked.
2. Click on the Margin Analysis Tool tab.

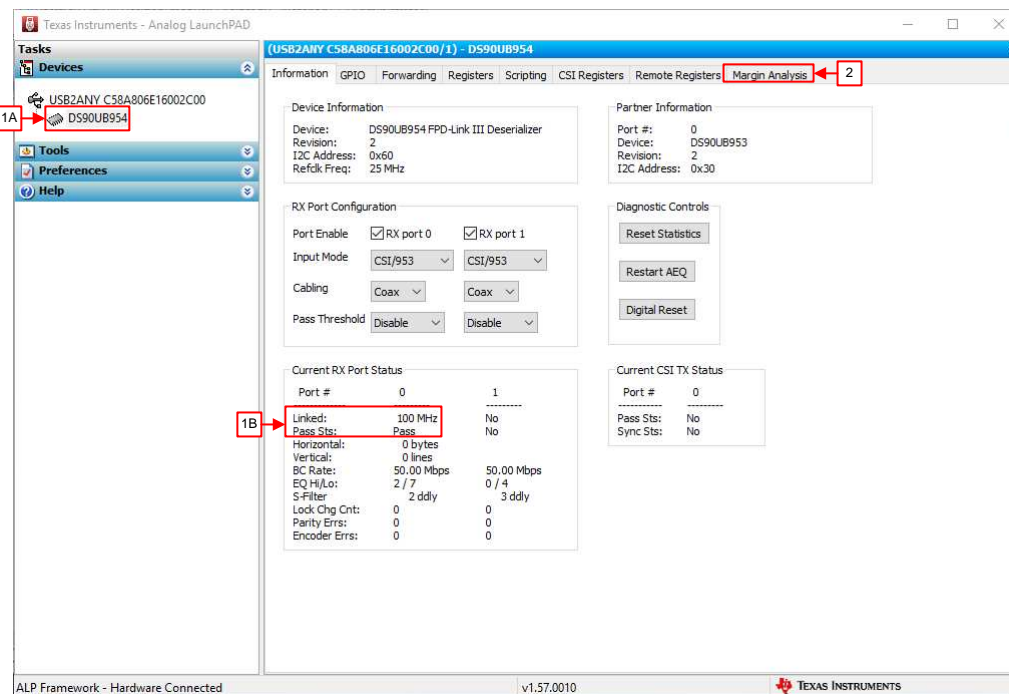


Figure 2. Open ALP

3. Select the RX port, EQ level range, and strobe position range to be analyzed.

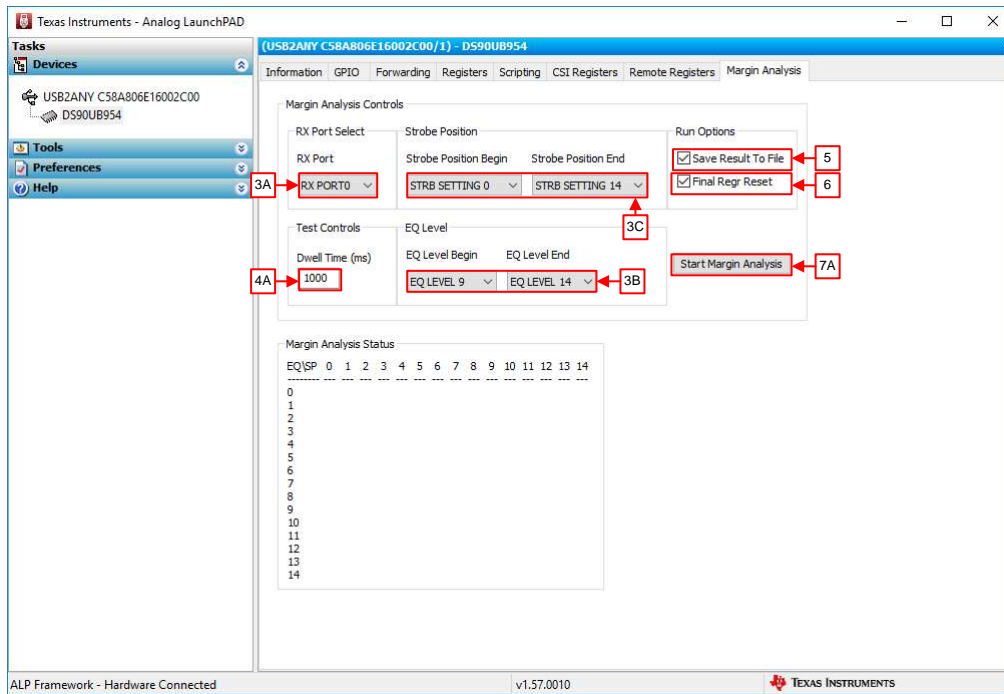


Figure 3. Analysis Settings

4. Remember that the dwell time by default is 1 s, but may be increased to provide greater confidence in the results by typing the new dwell time in ms and hitting enter. Valid dwell times are between 500 ms and 1 minute (60,000 ms).

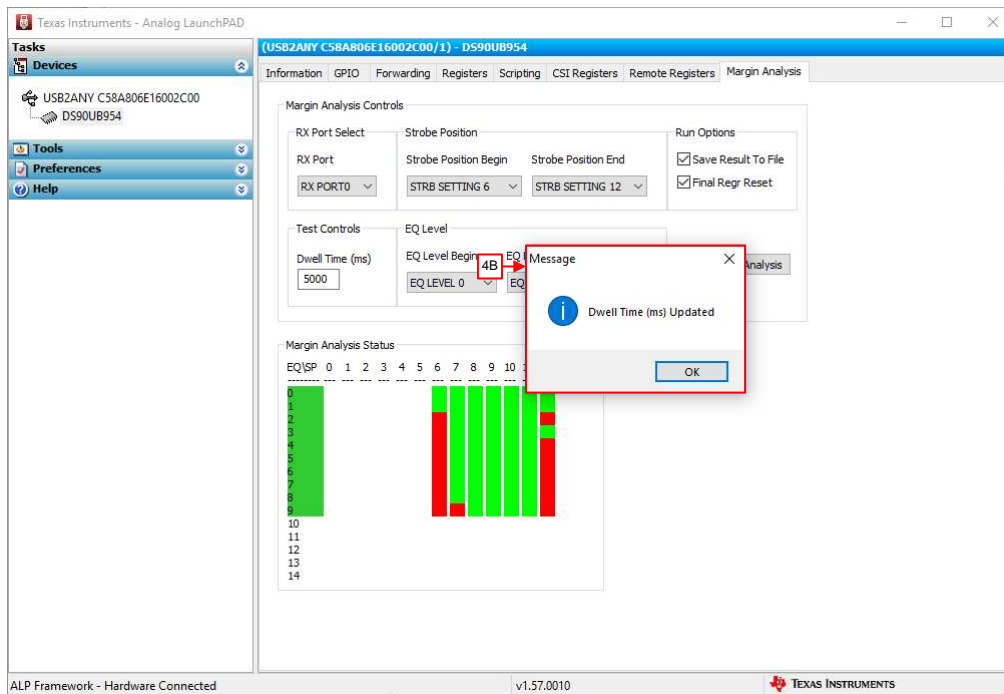


Figure 4. Configure Dwell Time

5. To save the results to a file, check the "Save Result to File" box.
6. To perform a Digital Reset 1 (includes register reset) after the margin analysis is completed, check the

"Final Repr Reset" box. If this box is not checked, TI recommends to perform a Digital Reset 0 (excludes registers after margin analysis is complete. Note that the EQ levels and strobe positions will be left in manual mode if this box is unchecked).

7. Click "Start Margin Analysis".
  - If saving to a file, select any .csv file on the computer.

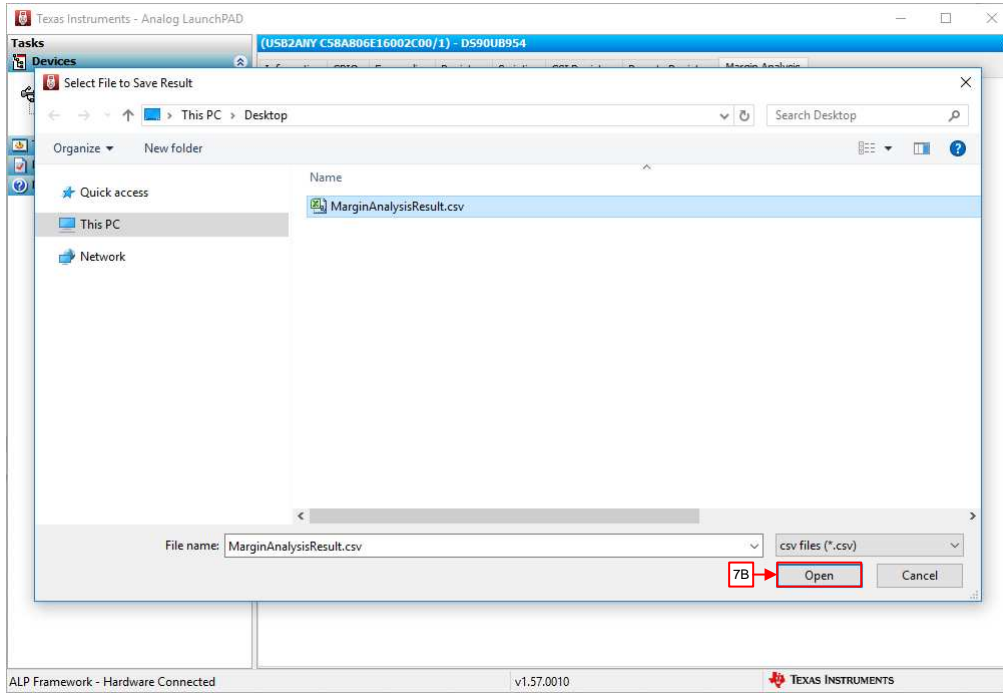


Figure 5. Save to File

8. Wait for analysis to complete. The remaining time is shown in the pop-up window and the test may be ended at any time by pressing cancel.

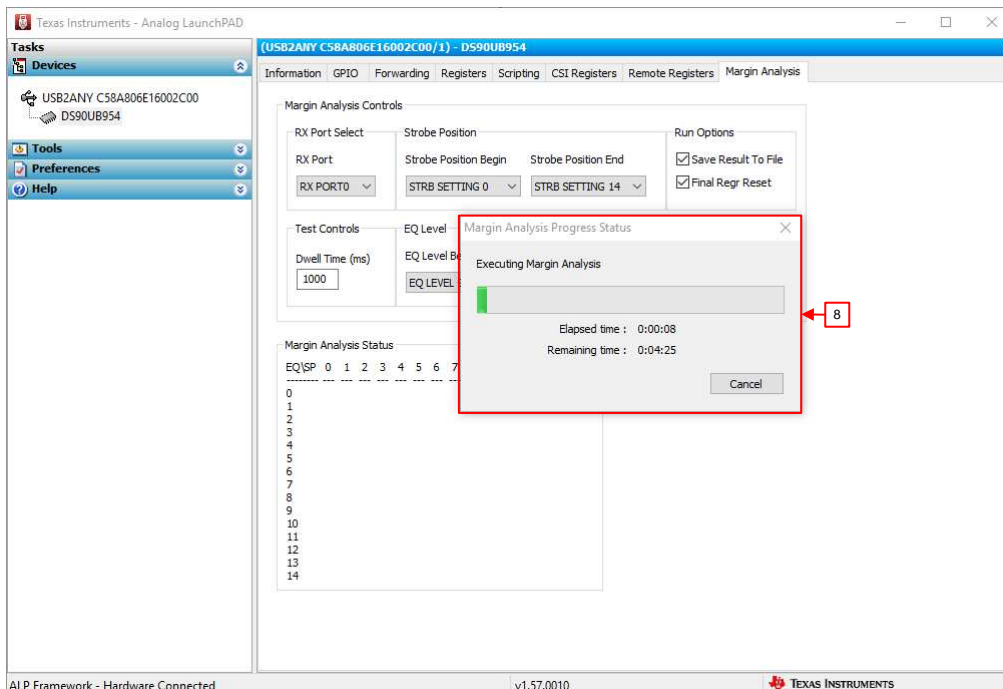


Figure 6. Test in Progress

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