

DPLL R and DPLL FB Divide By 2 Debug - DPLLs

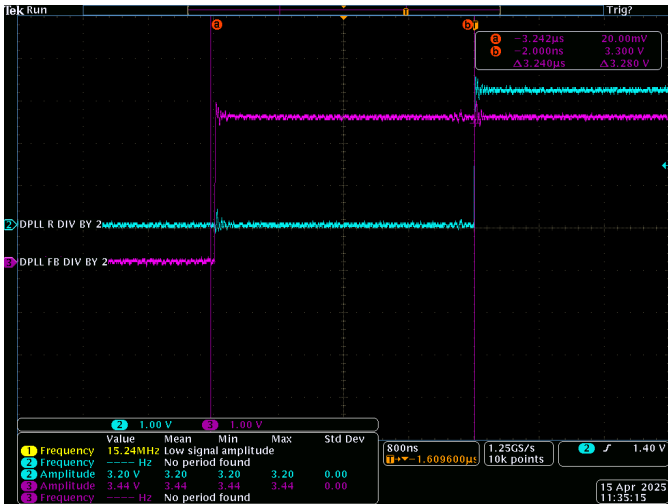
Use the DPLL R and DPLL FB Divide by 2 status signals (on STATUSx or GPIOx) to view the inputs to the TDC.

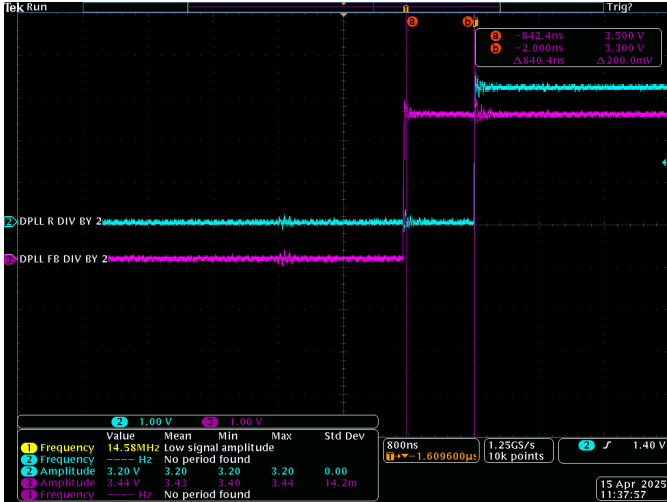
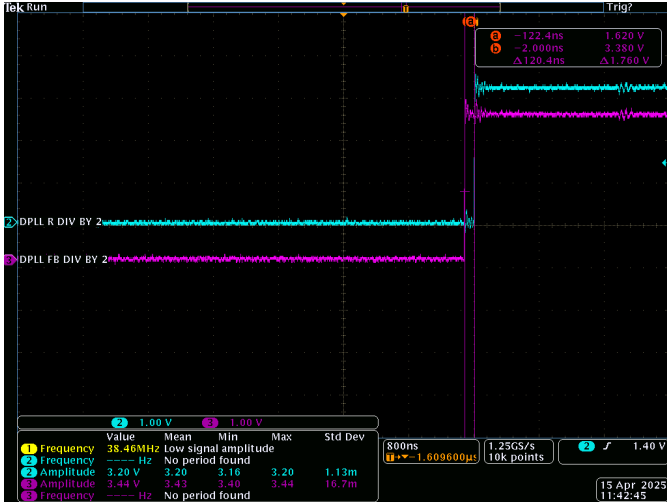
When the DPLL is locked, the two status signals are phase aligned and the scope can trigger.

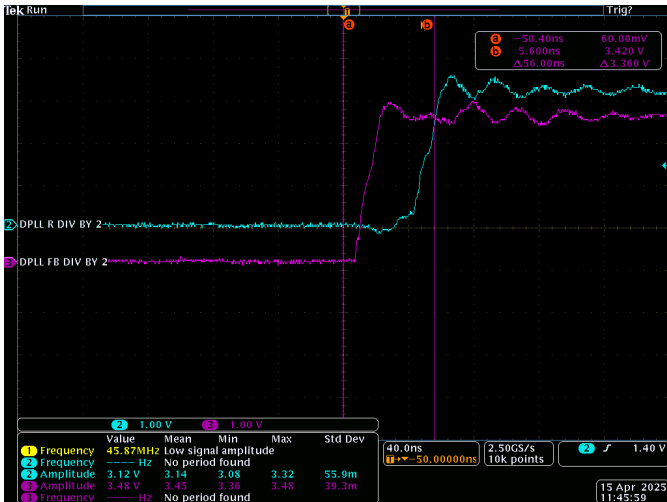
If the DPLL is unlocked, the two status signals are drifting from each other and the scope cannot trigger.

Example:

- LMK05318B
- PRIREF = 1PPS
- XO = 24 MHz +/- 2.5 ppm
- DPLL LBW = 0.1 Hz

Timestamp	Error between DPLL R and DPLL FB DIV BY 2 Status	Behavior / Scope Shot
0 s	-	Toggle SWRST
10 s	-	HLDOVER = 0 LOFL = 1 LOPL = 1
25 s	-	HLDOVER = 0 LOFL = 0 LOPL = 1
45 s	3000 ns	

Timestamp	Error between DPLL R and DPLL FB DIV BY 2 Status	Behavior / Scope Shot																																																				
3 min 30 sec	840 ns	 <p>Measurement data from the scope shot:</p> <table><thead><tr><th>Measurement</th><th>Value</th><th>Mean</th><th>Min</th><th>Max</th><th>Std Dev</th></tr></thead><tbody><tr><td>Frequency</td><td>14.58MHz</td><td>Low signal amplitude</td><td></td><td></td><td></td></tr><tr><td>Frequency</td><td>3.20 Hz</td><td>No period found</td><td></td><td></td><td></td></tr><tr><td>Amplitude</td><td>3.20 V</td><td>3.20</td><td>3.20</td><td>3.20</td><td>0.00</td></tr><tr><td>Amplitude</td><td>3.44 V</td><td>3.43</td><td>3.40</td><td>3.44</td><td>14.2m</td></tr><tr><td>Frequency</td><td>Hz</td><td>No period found</td><td></td><td></td><td></td></tr></tbody></table> <p>Trigger event measurements:</p> <table><thead><tr><th>Measurement</th><th>Value</th></tr></thead><tbody><tr><td>Time</td><td>-842.4ns</td></tr><tr><td>Time</td><td>-2.000ns</td></tr><tr><td>Time</td><td>840.4ns</td></tr><tr><td>Voltage</td><td>3.500 V</td></tr><tr><td>Voltage</td><td>3.300 V</td></tr><tr><td>Voltage</td><td>Δ200.0mV</td></tr></tbody></table>	Measurement	Value	Mean	Min	Max	Std Dev	Frequency	14.58MHz	Low signal amplitude				Frequency	3.20 Hz	No period found				Amplitude	3.20 V	3.20	3.20	3.20	0.00	Amplitude	3.44 V	3.43	3.40	3.44	14.2m	Frequency	Hz	No period found				Measurement	Value	Time	-842.4ns	Time	-2.000ns	Time	840.4ns	Voltage	3.500 V	Voltage	3.300 V	Voltage	Δ200.0mV		
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8 min 30 s	120 ns	 <p>Measurement data from the scope shot:</p> <table><thead><tr><th>Measurement</th><th>Value</th><th>Mean</th><th>Min</th><th>Max</th><th>Std Dev</th></tr></thead><tbody><tr><td>Frequency</td><td>38.46MHz</td><td>Low signal amplitude</td><td></td><td></td><td></td></tr><tr><td>Frequency</td><td>Hz</td><td>No period found</td><td></td><td></td><td></td></tr><tr><td>Amplitude</td><td>3.20 V</td><td>3.20</td><td>3.16</td><td>3.20</td><td>1.13m</td></tr><tr><td>Amplitude</td><td>3.44 V</td><td>3.43</td><td>3.40</td><td>3.44</td><td>16.7m</td></tr><tr><td>Frequency</td><td>Hz</td><td>No period found</td><td></td><td></td><td></td></tr></tbody></table> <p>Trigger event measurements:</p> <table><thead><tr><th>Measurement</th><th>Value</th></tr></thead><tbody><tr><td>Time</td><td>-122.4ns</td></tr><tr><td>Time</td><td>-2.000ns</td></tr><tr><td>Time</td><td>120.4ns</td></tr><tr><td>Voltage</td><td>1.620 V</td></tr><tr><td>Voltage</td><td>3.380 V</td></tr><tr><td>Voltage</td><td>Δ120.4ns</td></tr><tr><td>Voltage</td><td>Δ1.760 V</td></tr></tbody></table>	Measurement	Value	Mean	Min	Max	Std Dev	Frequency	38.46MHz	Low signal amplitude				Frequency	Hz	No period found				Amplitude	3.20 V	3.20	3.16	3.20	1.13m	Amplitude	3.44 V	3.43	3.40	3.44	16.7m	Frequency	Hz	No period found				Measurement	Value	Time	-122.4ns	Time	-2.000ns	Time	120.4ns	Voltage	1.620 V	Voltage	3.380 V	Voltage	Δ120.4ns	Voltage	Δ1.760 V
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10 min	56 ns	<p>Zoom in, change in time scale</p> <p>DPLL FB fluctuates as the DPLL tracks the REF phase and makes corrections to the DPLL numerator. DPLL FB stays around the same phase (the difference in phase between two signal stays about the same)</p> <p>DPLL is near 0ppm error from REF.</p>  <p>The oscilloscope screenshot displays two waveforms: DPLL R DIV BY 2 (blue) and DPLL FB DIV BY 2 (magenta). The blue waveform is a high-frequency sine wave, and the magenta waveform is a lower-frequency, slightly irregular sine wave. The scope is set to 2.50Gs/s and 10k points. A zoomed-in view of the signals is shown in the top right corner. The bottom status bar shows the following data:</p> <table><thead><tr><th></th><th>Value</th><th>Mean</th><th>Min</th><th>Max</th><th>Std Dev</th></tr></thead><tbody><tr><td>Frequency</td><td>45.87MHz</td><td>---</td><td>---</td><td>---</td><td>---</td></tr><tr><td>Amplitude</td><td>3.12 V</td><td>3.14</td><td>3.08</td><td>3.22</td><td>55.9m</td></tr><tr><td>Amplitude</td><td>3.48 V</td><td>3.45</td><td>3.36</td><td>3.48</td><td>39.3m</td></tr><tr><td>Frequency</td><td>---</td><td>---</td><td>---</td><td>---</td><td>---</td></tr></tbody></table>		Value	Mean	Min	Max	Std Dev	Frequency	45.87MHz	---	---	---	---	Amplitude	3.12 V	3.14	3.08	3.22	55.9m	Amplitude	3.48 V	3.45	3.36	3.48	39.3m	Frequency	---	---	---	---	---
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