

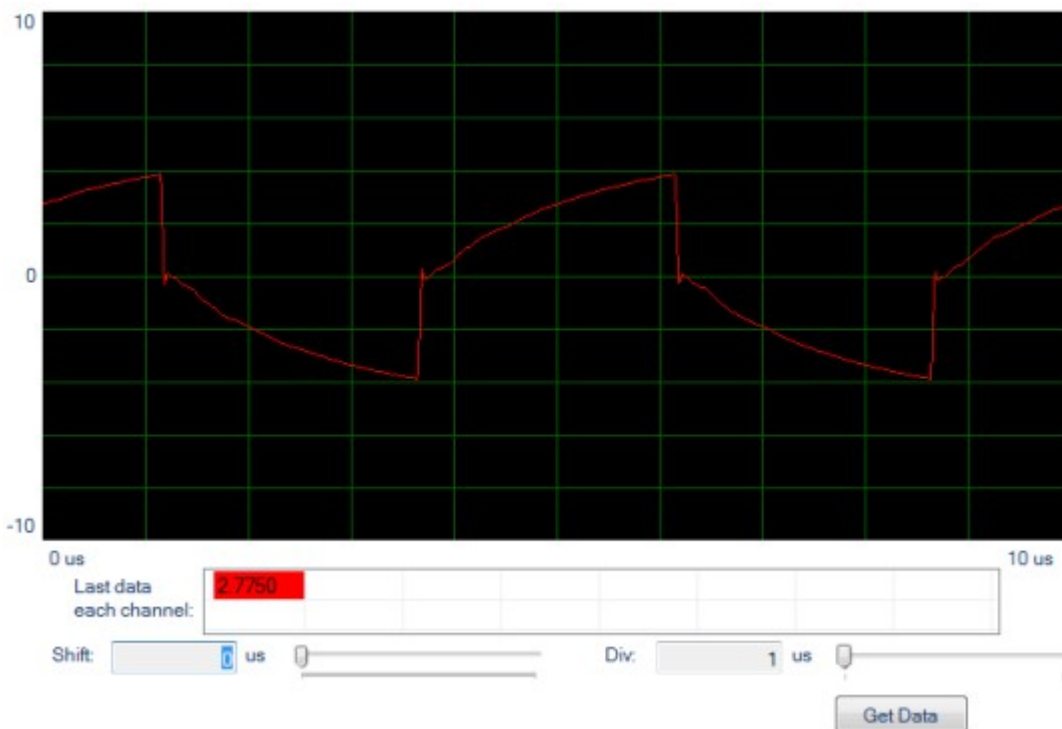
# Advantech AE Technical Share Document

<b>Date</b>	2021 / 06 / 10	<b>Related Product</b>	PCIE-1840, PCIE-1840L	
<b>Category</b>	<input checked="" type="checkbox"/> FAQ <input type="checkbox"/> SOP			
<b>Abstract</b>	Distortion of square wave measurement			
<b>Keyword</b>	DAQ, PCIE-1840,PCIE-1840L,square wave, probe			
<b>SR#</b>	1-4594761871			
Revision History				
Date	Version	Author	Reviewer	Description
2021 / 06 / 10	V1.0	Watson.Liu	Owen.Chang	OS: Windows Utility: C++/C#

■ **Problem Description & Architecture:**

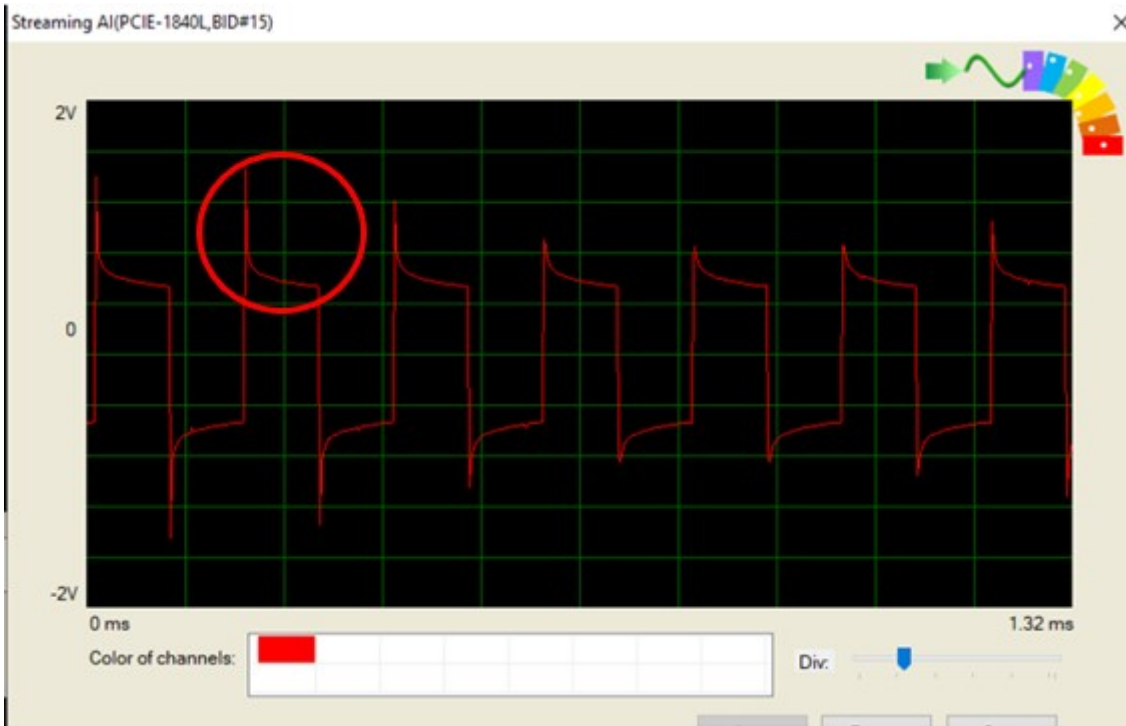
The behavior of a perfect square wave is the response time should be quite short and this will be need an enough bandwidth if user want to measure this kind of waveform. Usually, user will get a ripple or distortion when they measure a square wave due to the frequency of the edge when state change between high and low.

So, the waveform measured result might like below,



■ **Brief Solution - Step by Step:**

Case story is a user want measure square wave use a probe connect with PCIE-1840 and the waveform we reproduced is like below,



Here's the test condition,

- a. Use waveform generator (KEYSIGHT 33500B) to output a square wave with 5 kHz and 10 Vpp. (Output impedance: High-Z)
- b. Device setting of PCIE-1840, Sampling rate: 1MHz, SectionLength:10000, Impedance: 1Mohm.
- c. The probe is HP2950 and select 10:1 mode.

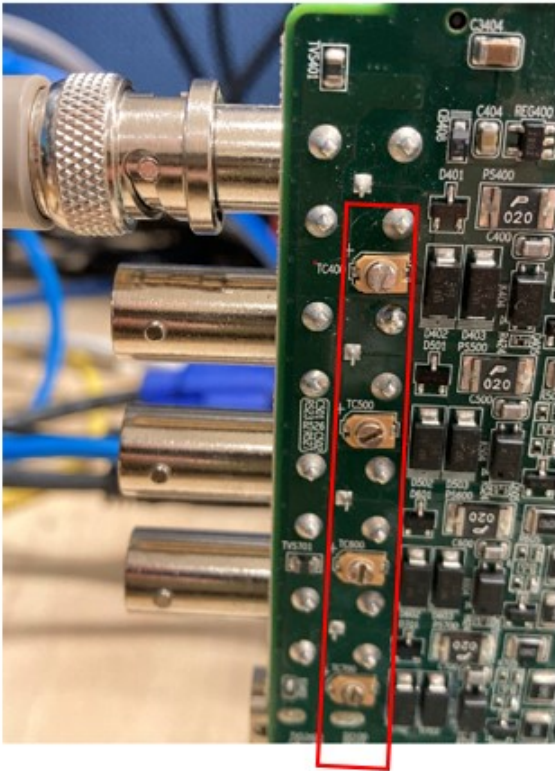
Then, user can modify the capacitance of the probe and the capacitance on PCIE-1840 if they want to reduce this phenomenon.

Notice, to try modify capacitance of the probe first following instruction below or modify the one on PCIE-1840 if necessary.

1. To modify the capacitance on the probe, here's the example about HP2950.  
Notice: try using non-metal screwdriver to modify.

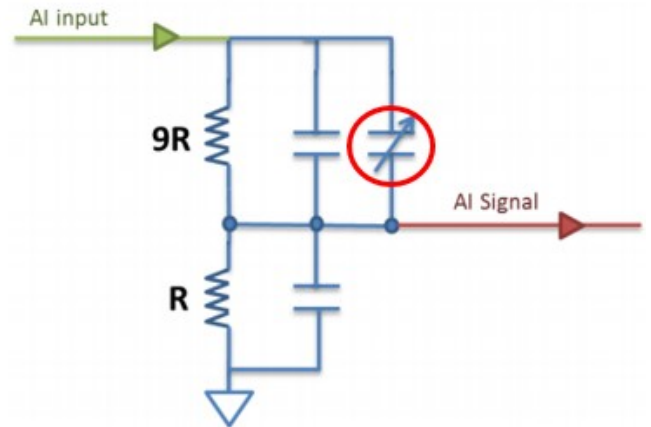


2. To modify the parasitic capacitance on PCIE-1840 as below point out.

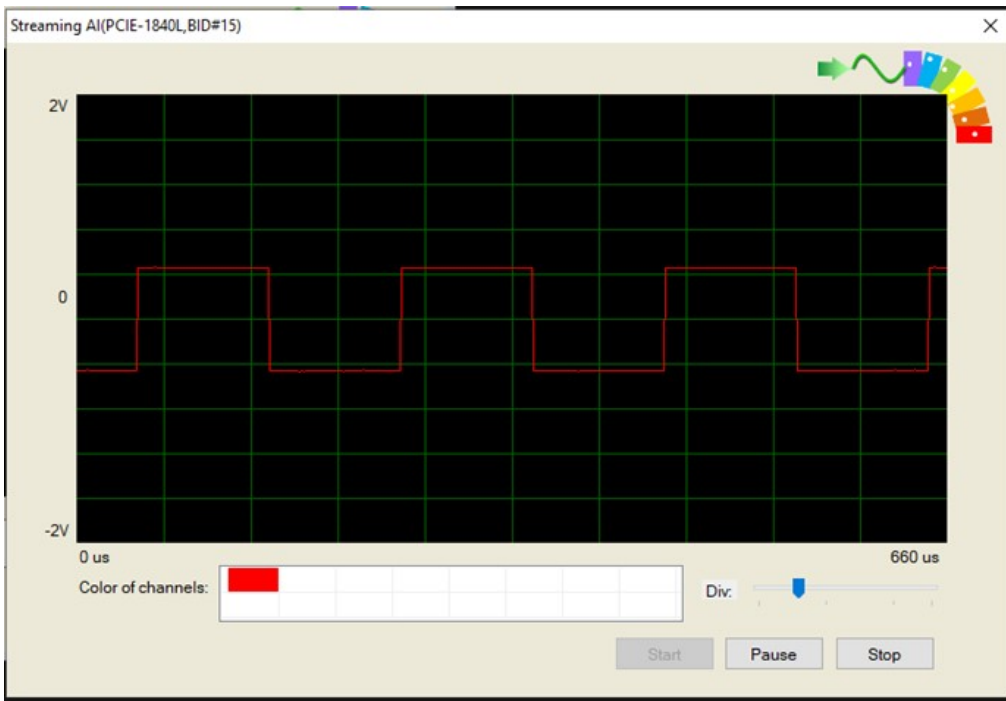


Trim. Capacitor	Function (1M input impedance only)
TC400	Analog input channel 0 bandwidth compensation*
TC500	Analog input channel 1 bandwidth compensation*
TC600	Analog input channel 2 bandwidth compensation*
TC700	Analog input channel 3 bandwidth compensation*

\*Only workable in 20 Vpp, 10 Vpp, 4 Vpp input range.



The measure waveform will be smooth after tuning the both capacitance mentioned above.



- **Reference:**
  1. DAQNav