

General:

Many of the automatic semiconductor test system today employ automatic timing calibration capability to ensure its timing accuracies. The calibration circuit measures electrical distance to the end of the cable. The calibration relay matrix and cable needs to have enough quality and bandwidth performance to transmit waveform with less than 1nS rise time. Also new device technology such as LVDS, Channel Link, Gigabit ether net, etc., boosted operating frequency into GHz region. These new devices often requires tightly controlled interconnects (such as less than 50 pS of timing skew) in order to obtain its full performance. CJP series Tpd matched cable is developed to fulfill these requirements.

Speed and Distance

The speed of light in vacuum	300,000 Km/sec or 0.3 / pS alternatively 3.3 pS / mm
The speed of electric signal is inverse proportion of square root of dielectric constant (Es).	
Speed on ceramic substrate	0.095 mm / pS or 10.5 pS / mm (Es = 10.0)
Speed on grass epoxy PCB	0.138 mm / pS or 7.2 pS / mm (Es = 4.70)
Speed of CJP series Cable	0.250 mm / pS or 4.0 pS / mm (Es = 1.45)

Guarantee of 50pS Timing Skew

Based on above table that describes relationship between time and distance, guarantee of 50pS of timing skew implies that coaxial cable length should not vary more than 12mm, which is 2.4% of 500mm cable. Cable manufacturer normally quote cable Tpd variation to $\pm 100\text{pS/m}$. This means even if the cable length are exactly correct, there can be as much as 100pS of skew for 500mm long cable. To guarantee 50pS of timing skew as a kit, it is mandatory to test them.

On the left is an accumulated TDT test result of 50 pieces CJP jumper cables using storage mode of oscilloscope with TDR sampling head. It is measured using in-house build scanner and test adapter. The test result includes skews of test setup.

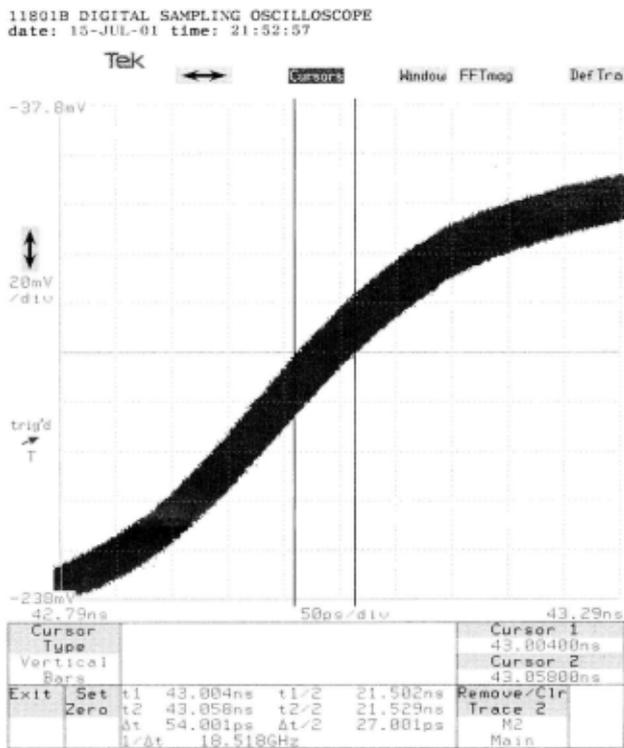


Figure 1 Sample of test result Timing Skew = 54pS

Automatic scanner for TDT test

NIF developed 64-channel scanner for differential TDT/TDR testing with less than 20pS of timing skew. The test adapter has 50 pairs of connectors plus one for reference cable. TDT test can be done with single scan with oscilloscope storage mode. The scanner and test adapter is essential tool to test CJP cables accurately as well as economically.