

An Introduction to High Value Teledyne Test Tools (T3)

Complementing the **Teledyne LeCroy** product portfolio with a broad range of best-in-class solutions to address your needs – from a partner you can trust



What is High Value Teledyne Test Tools (T3) ?

- Teledyne Test Tools is a new Teledyne LeCroy brand that is designed to offer products that are complementary to our traditional core Teledyne LeCroy offer.
- The high value T3 products are positioned to address the needs of design or lab engineers focused on automotive, aero-space and semiconductor market segments enabling to rapidly validate/design product and reduce time-to market.
- The GoToMarket strategy used for the high-end Teledyne LeCroy products will be used for the High Value Teledyne Test Tools products.



T3SP-Series

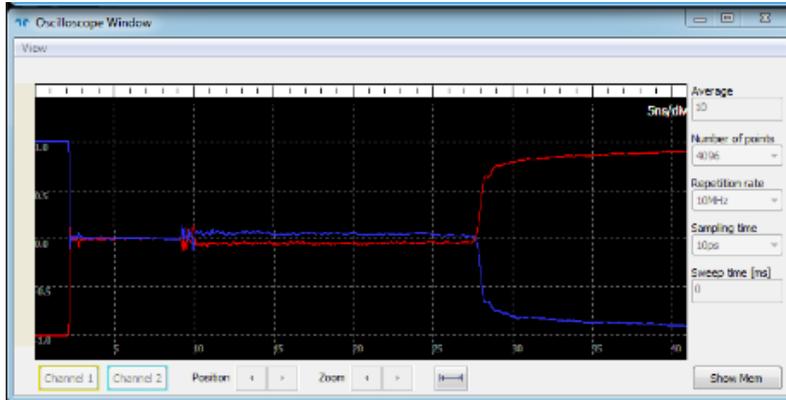
High Resolution True Differential TDR (Time Domain Reflectometer) - Signal Integrity Analyzer

Public Release – September 4th



What's New at Teledyne Test Tools High Value Solutions ?

- **Signal Integrity Analyzer**
- High Resolutions True Differential TDR (Time Domain Reflectometer)



- Small Form Factor
- Battery Powered
- Attractive Price



T3SP-series :
T3SP10D and T3SP15D

What's New at Teledyne Test Tools High Value Solutions ?



Front panel of the SP15D

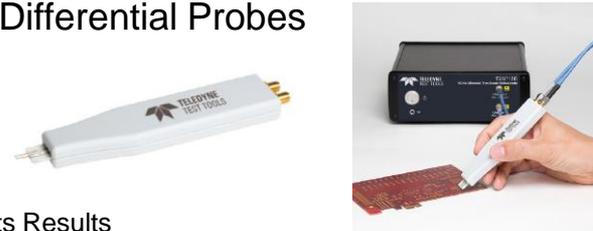
T3SP-series : T3SP10D and T3SP15D

■ Signal Integrity Analyzer

- High Resolutions True Differential TDR (Time Domain Reflectometer)

Specifications

- Bandwidth 10 GHz / 15 GHz
- Rise Time up to 35 ps
- Memory Length up to 50.000 points
- TDR Repetition Rate from 1 MHz to 10 MHz
- TDR Differential Probes



Measurements Results

- TDR Impedance Trace
- Return Loss Measurement
- S11- Frequency Domain Analysis
- Smith Chart

What's New at Teledyne Test Tools : T3SP10D and T3SP15D

- Key Specifications :

Model	T3SP10D	T3SP15D
Frequency	10 GHz	15GHz
Measurements	TDR, DTDR, S-Parameter, Smith Chart	
Rise Time	50 ps	35 ps
Memory	Up to 50,000 points	
Battery Operated (option)	Yes	
Dimensions	220 x 210 x 82.5 mm	

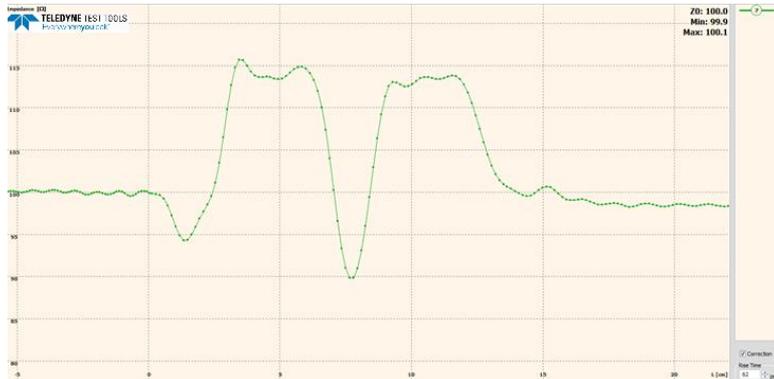
- Key Applications :

- Interconnect Test Analysis
- Communication Channel Testing (including UTP up to 40 m.)
- Transmission Line ,Cable and Connector Characterization
- Measure and Analyse everywhere (lab, testing floor , field and manufacturing)

Whats different between T3SP10D and T3SP15D?

■ T3SP10D

- S-paramter (S11) up to 10GHz
- Rise time after calibration: 50ps
- Connector: SMA
- Cable Callibration kit: SMA
- Resolution (FR4): < 4.2mm



■ T3SP15D

- S-paramter (S11) up to 15GHz
- Rise time after calibration: 35ps
- Connector: 2.92mm
- Cable & Callibration kit: 3.5mm
- Resolution (FR4): <3 mm



T3SP-Series Target Applications/Industries and Use

“There are 2 kinds of engineers, those with signal integrity problems and those that will have them”

-- from a whiteboard at a major company*

*From Signal Integrity, Simplified, by Eric Bogatin

T3SP-Series is a Signal Integrity Analyzer, True Differential and Single-End TDR (Time Domain Reflectometer), affordable, to be used in Service and Field Test, Lab and Manufacturing

T3SP-Series Target Applications/Industries and Use



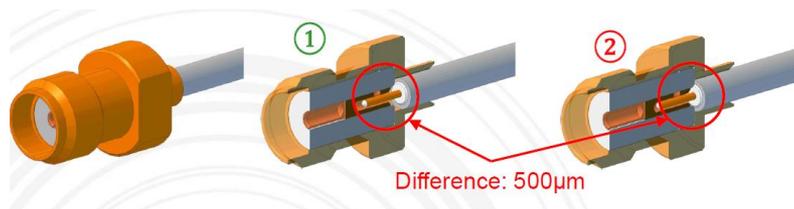
Automotive Market

- ✓ Testing, Debugging, Verification of new boards ECU (electronic Control Unit) .

- ✓ Troubleshooting, Pre-Compliance of Unshielded twisted pair (UTP) cables for Automotive Ethernet:
 - HDBaseT
 - 1000BASE-T1
 - BraoadR-Reach

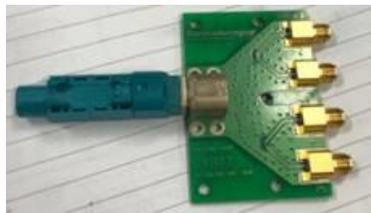
T3SP-Series application : Interconnect Test Analysis

Impedance of Connectors (SMA)



RG405 Coax Cable

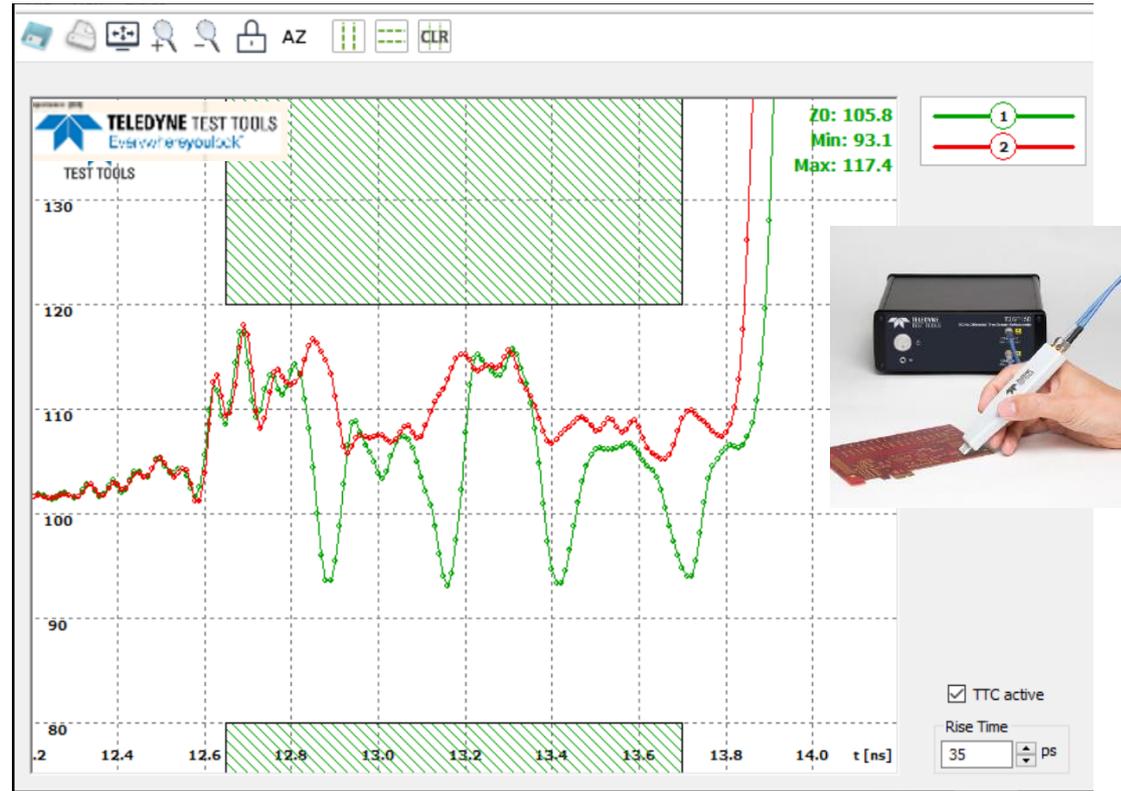
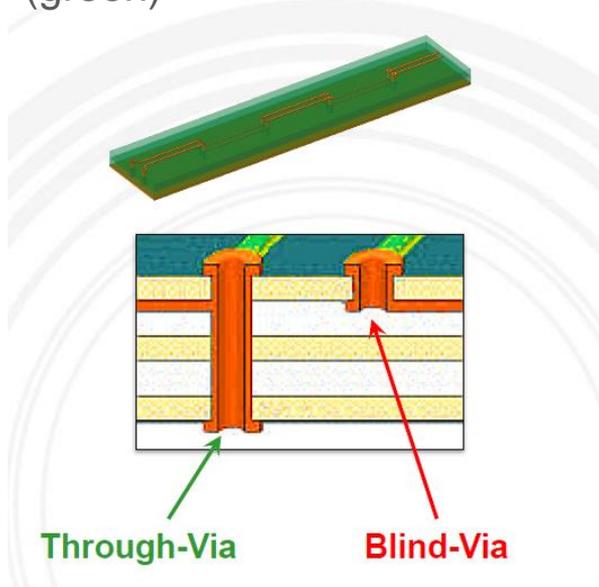
- correctly assembled connector on front (green)
- badly assembled connector on front (red)
- Impedance out of spec ($50\Omega \pm 1\Omega$)



T3SP-Series application: Interconnect Analysis

Effect of Vias on Impedance Trace

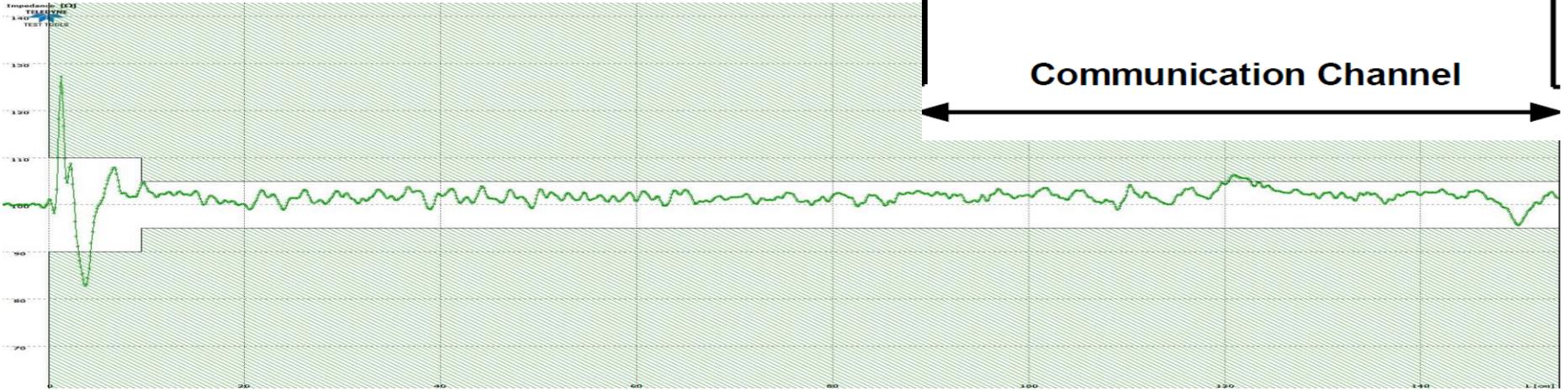
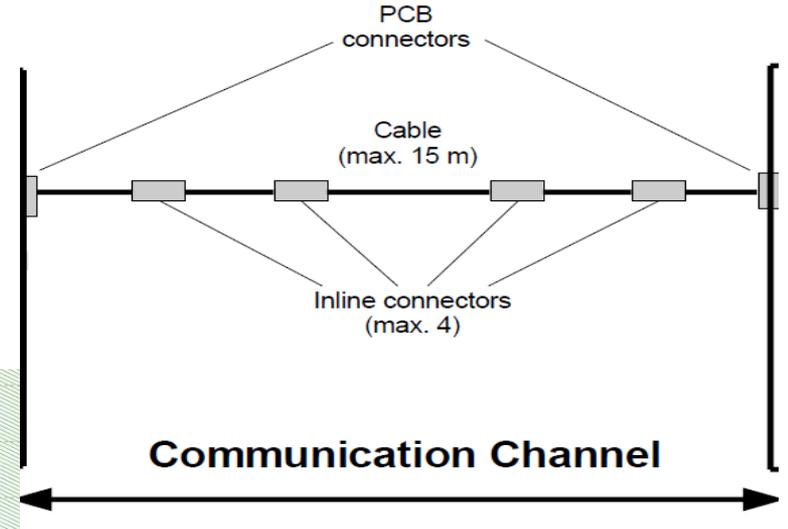
- Less than 3 mm resolution on FR4
- SP-Series can measure the effect of blind vias (red) vs. true vias (green)



T3SP-Series application: Unshielded Twisted Pair (UTP)

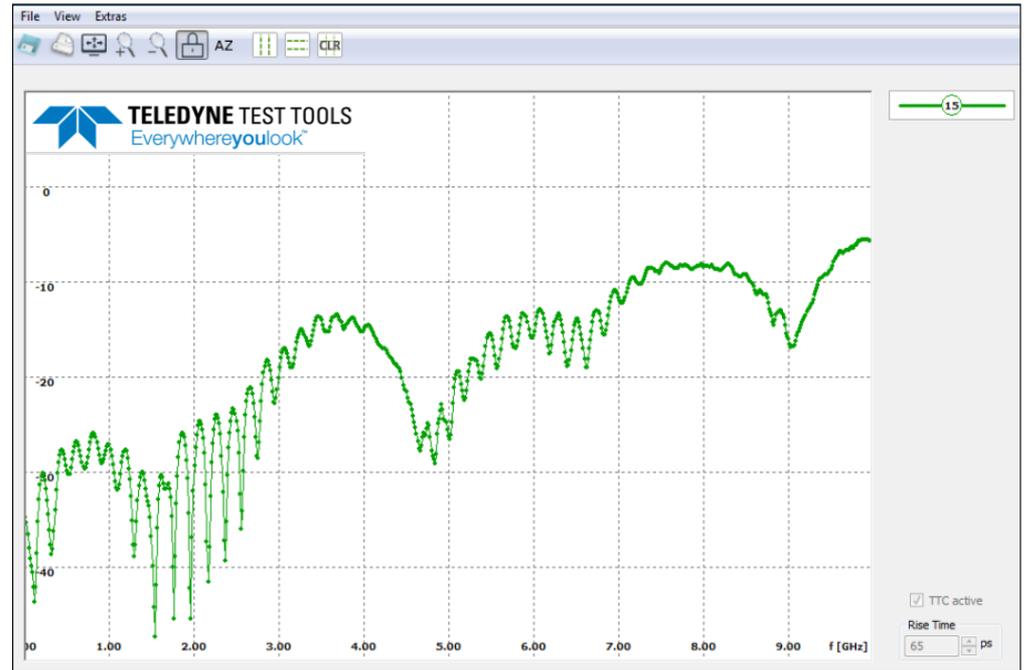
Automotive Ethernet

- ✓ Electronics in a car are getting more complicated
- ✓ More sensors and controls, higher bandwidth interfaces
- ✓ Different computers and domains in the car need to increasingly communicate with one another.
- ✓ Unshielded twisted pair (UTP) cable to deliver suitable data along with smaller and more compact connectors can reduce connectivity cost and cabling weight



T3SP-Series application : S-Parameter – S11 Measurements

- T3SP-series : S11 S-Parameter Return Loss Measurement
- Analyze transmission lines, cables, connectors and adaptors in the frequency domain.
- ✓ Precisely and rapidly identify any frequency related signal integrity impairments.



T3SP-Series Competitive Landscape

	Keysight DCA with 54754A	Tek DSA8300 with 80E04	PicoScope 9311-20 and PG900** Pulse Generator (external)	Teledyne Test Tools T3SP15D	
					
Bandwidth	18 GHz	20 GHz	20 GHz	15 GHz	
TDR risetime	EU customers: no longer available due to lack of compliance with EU RoHS directive 2011/65/EU	23 ps (10%-90%)	40ps**	35 ps (20%-80%)	
Record Length (Kpoints)		16	16	50	
Sampling rate (TDR mode)		300 kS/s	1MS/s	1-10MHz Repetition Rate	
ESD Protection		Ext. Module required (80A02)	No	Yes, built-in	
OSL Calibration		I-Connect required (normalization)	No	Yes	
S-Parameter		I-Connect required	No	Yes	
Battery Option		No	No	No	Yes
Price (K\$)		48 (incl. Cal Kit)	51 (incl. Cal Kit)	27 (w/out cal Kit)	24 (incl. Cables and Cal Kit)

T3SP-Series Key specs, benefits and positioning

Specs	Benefit	Unique
True Differential TDR up to 15 GHZ	Ideal for emerging Automotive Serial Data Standards, Best for Unshielded Twisted Pair (UTP) Ground connection NOT required	
Small Form Factor, Battery Operated	Measure and Analyze everywhere you go without an AC requirements	✓
Up to 35 ps Rise Time	Precisely locate and identify signal integrity issues (3mm fault resolution)	
Fast TDR Repetition Rate up to 10 MHZ	300 times faster as conventional TDR based on Sampling Oscilloscope Increase accuracy using average	✓
TDR Repetition Rate to 1 MHz and 50,000 points memory length	Characterize up to 40m long cables (Communication Channel Analysis)	✓
ESD (Electrostatic Discharge) Protection	RF input circuit is protected - avoid/mitigate damage caused by ESD - operate with safety	✓
Open Short Load (OSL) Calibration	Best Accuracy for impedance measurements in time and frequency	✓