

Time Domain Network Analysis (TDNA)

A new way to analyze RF & μ wave
transmission channels.

Results provided in :- frequency domain
- time domain

Time Domain Network Analysis (TDNA)

- Provides Frequency Domain and Time (Distance) Domain results from data measured with a VNA.
- Immediate fault location analysis from real time data.
- Time domain analysis capabilities including Windowing and Gating.

Time Domain Network Analysis (TDNA)

- Vector Network Analyzers (VNA) are used to measure the transmission channel performance in the frequency domain.
- VNAs provide the frequency spectrum of the transmission channel. Each sine wave is a component of the total signal.
- Provide one-port response or two port response.

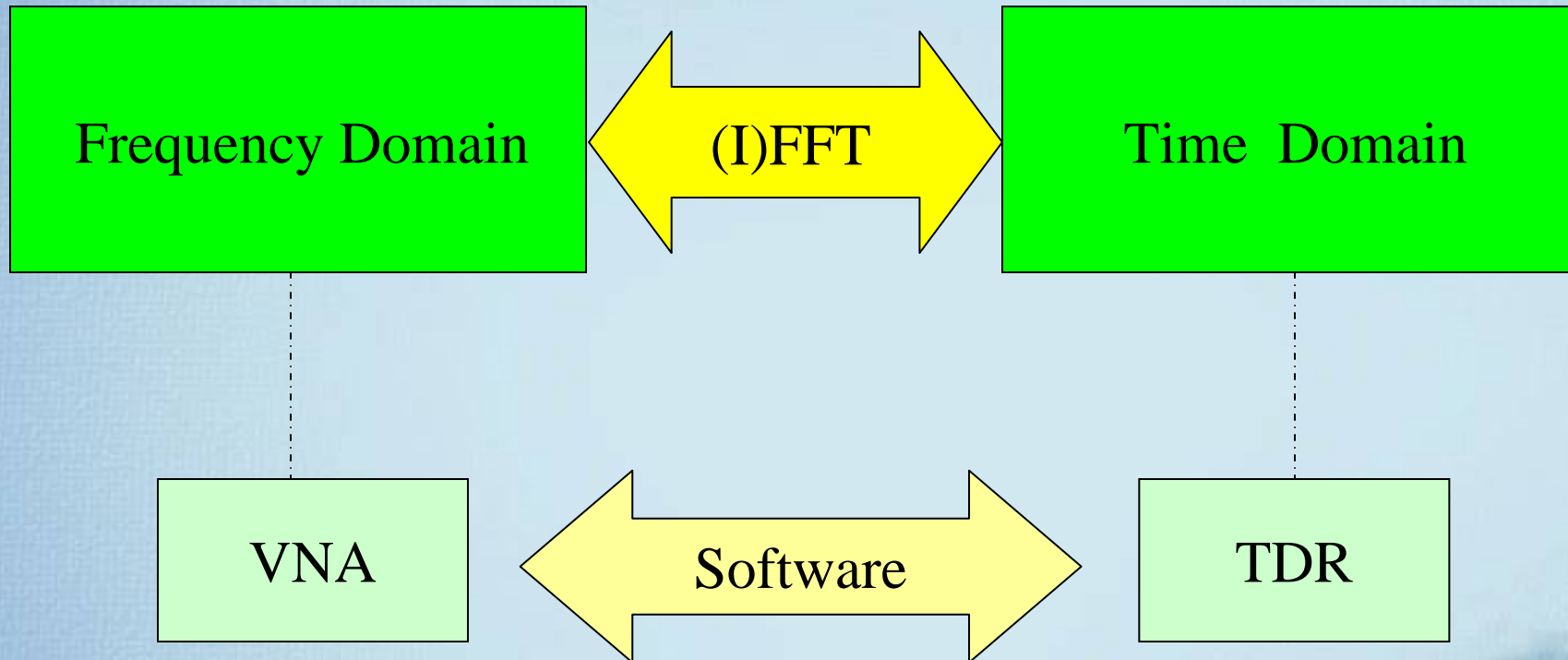
Time Domain Network Analysis (TDNA)

- Frequency response measurements results provided by VNA.
- VNA results in magnitude/phase format
- Converts a VNA into a TDR.
- DIFFT provides the Frequency domain to time domain conversion.
- Digital Signal Processing (DSP) tools provide Windowing and Gating capabilities.

Frequency Domain Reflectometry (FDR)

- This is a transmission line fault isolation method which precisely identifies signal path degradation.
- Uses a swept RF signal and IFFT to provide distance to fault information.
- Provide tools to perform fault analysis.

How does TDNA work?



Who Benefits?

- Coaxial cable assembly manufacturers
- Coaxial cable assembly installations
- Coaxial cable manufacturers
- LAN cable manufacturers
- LAN cable installers

Test and Fault Finding

	Test Information
	Data Archiving
	Data Analysis
	Fault Location Analysis
	Test Requirement
	System Setup
	Exit Application



www.rftaconsultants.com

Email: sales@rftaconsultants.com

Phone: 510-438-0238

Fax: 510-438-0222



Test Set Up

The screenshot shows the TDNA software interface with a 'Test Information' dialog box open. The dialog box contains the following fields and sections:

- Cable Serial Number:** SN1111
- Batch Number:** BN-17102005
- Machine Number:** 28
- Factory Number:** FN-CA002
- Order Number:** NTL-568
- Operator:** RFTA
- Cable VDP (%):** 79.00
- Data Selection:** Import File Data
- Termination:** Load
- Date/Time:** 10/27/2005 10:01:58 AM
- Cable Harness Information:**
 - Length Unit: Feet Meters
 - Table:

1	0.620
2	1.200
 - Buttons: Add, Delete, Move Up, Move Down
- Test Requirement File:** C:\TDNALimit\ThreeGHz.TRF (Browse button)
- Import Data File:** C:\TDNAData\S11_Load_1.82m_1.s2p (Browse button)
- Buttons: Help, Start, Cancel

A green arrow labeled 'Test Limits' points to the 'Test Requirement File' field.

Frequency Domain Report

ID Label 3	Input 3	Data Selection Option	911 Load_1.82m_1.42p
ID Label 4	Input 4	Operator	Tester
ID Label 5	Input 5	Test Data/Time	07/22/2005 15:56:18
Cable VOP In %	70.00	Termination	LOAD

Cable Harness Information (Meters)

Segment	Total	1	2							
Length	1.82	0.62	1.20							

Frequency Domain Report

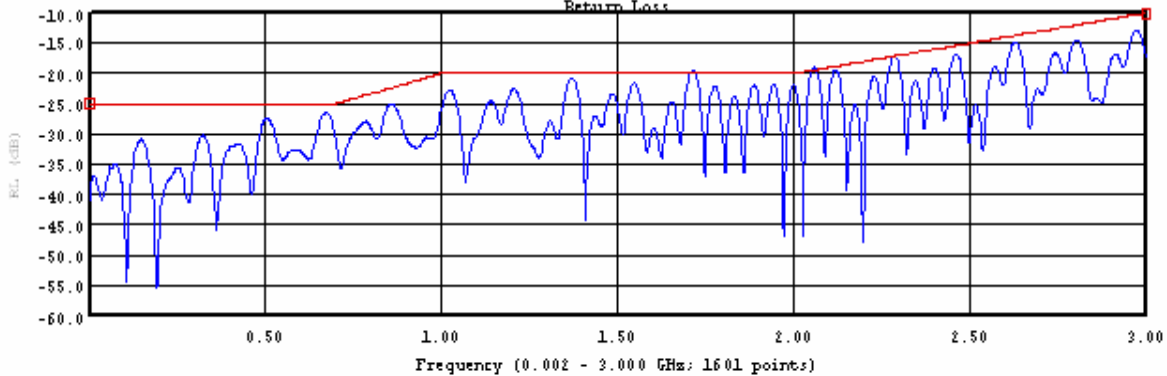
Frequency Cable Summary

Result based on Discrete Frequency Points

Test Parameter	Limit	Measured	Difference	@ Freq (GHz)	Result
Return Loss (dB)	25.00	40.86	15.86	0.0020	PASS
Voltage Standing Wave Ratio	1.50	1.02	0.48	0.2000	PASS

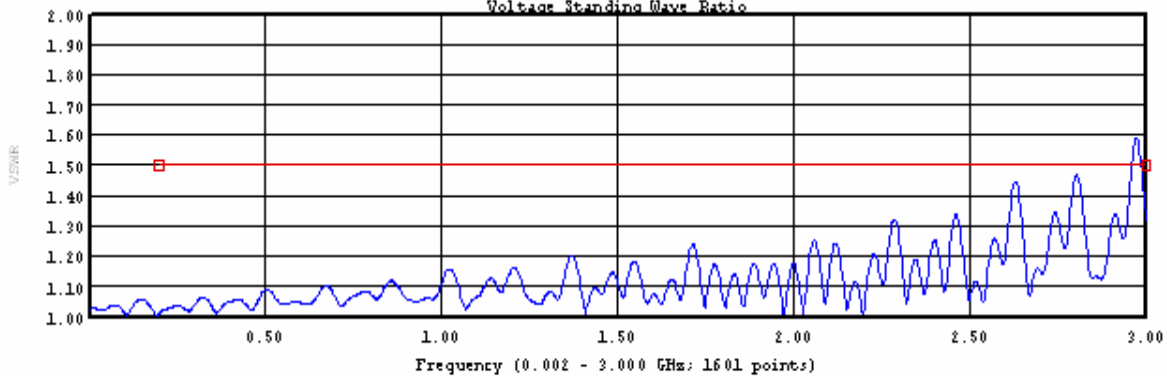
Frequency Domain Graph

Return Loss



Frequency Domain Graph

Voltage Standing Wave Ratio

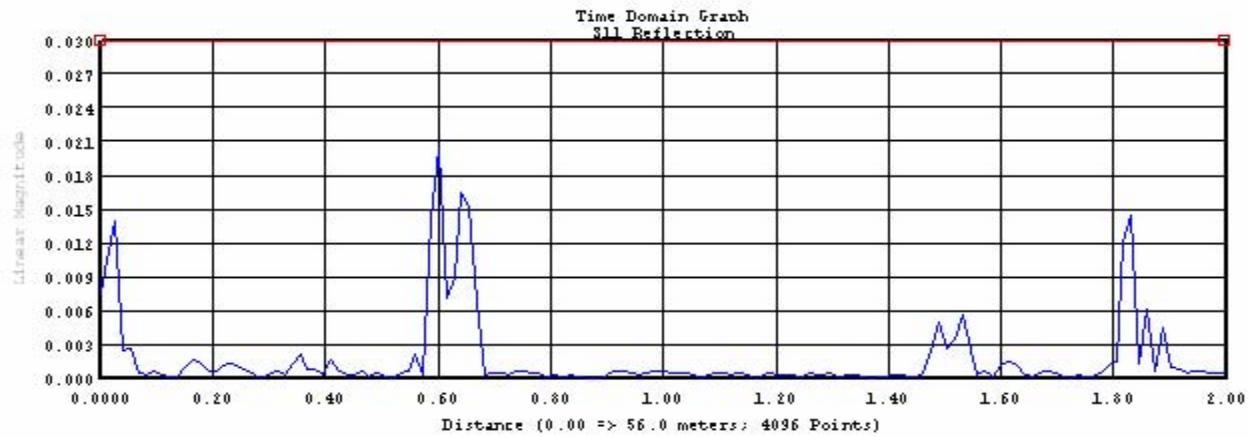


Fault Location Report

Measured	1.02	1.02	1.02	1.02					
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Time Domain Report

Segment	Cable Limit	Worst Data	Cable Difference	Cable Location(Mt)	Adapter Limit	Worst Data	Adapter Difference	Adapter Location(Mt)
All	10.0000	0.0057	9.9943	1.53	-999.0000	0.0204	-999.0204	0.60
1	10.0000	0.0026	9.9974	0.05	-999.0000	0.0204	-999.0204	0.60
2	10.0000	0.0057	9.9943	1.53	-999.0000	0.0164	-999.0164	0.64



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	Test Information
	Data Archiving
	Data Analysis
	Fault Location Analysis
	Test Requirement
	System Setup
	Exit Application



Time Domain Analysis

Email: sales@rftaconsultants.com

Phone: 510-438-0238

Fax: 510-438-0222

Test Information

Fault Location Analysis

Test Requirement File:

C:\TDNALimit\Sample.TRF

Browse

Sweep Settings: 0.0037 - 3.000 GHz; 801 scan points

Cable Length

Length: 10.00

Feet

Meters

Cable VOP (%): 80.00

Window Shape Type: Hamming

Termination: Load

Data Selection: Import File Data

Import Data File

C:\TDNAData\S11_Load_10m.s1p

Browse

Sweep Settings: 0.0037 - 3.000 GHz; 801 scan points

Error Coefficients Correction (Calibration)

Skip Calibration

Calibrate Again

Help

Start

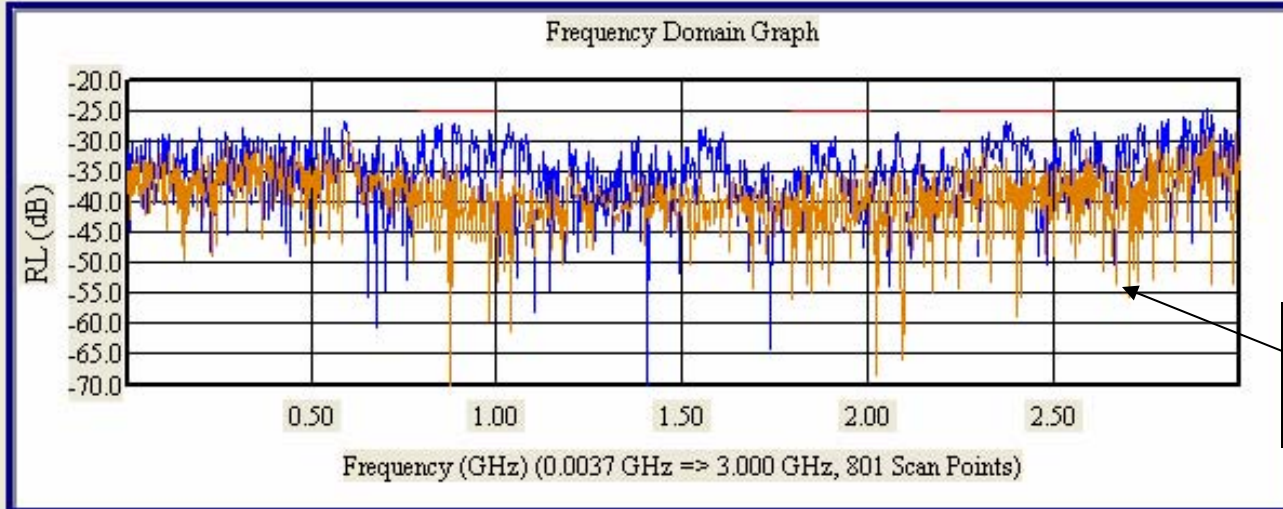
Cancel

Exit Application

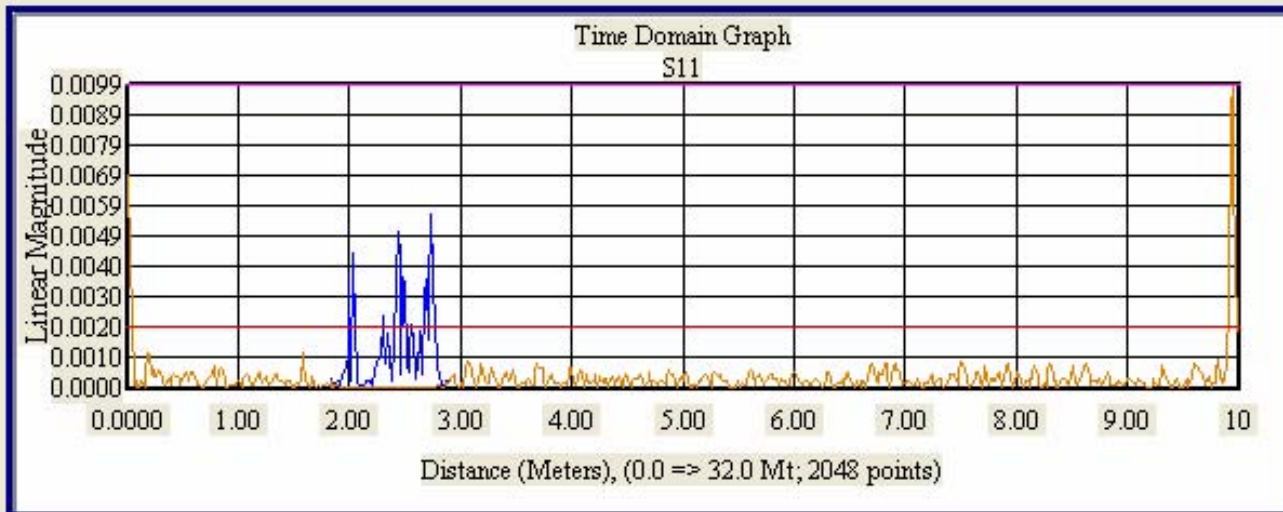
Digital Filter

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Fault Location Analysis Graphs



After Filter



Filter:

Start:

Stop:

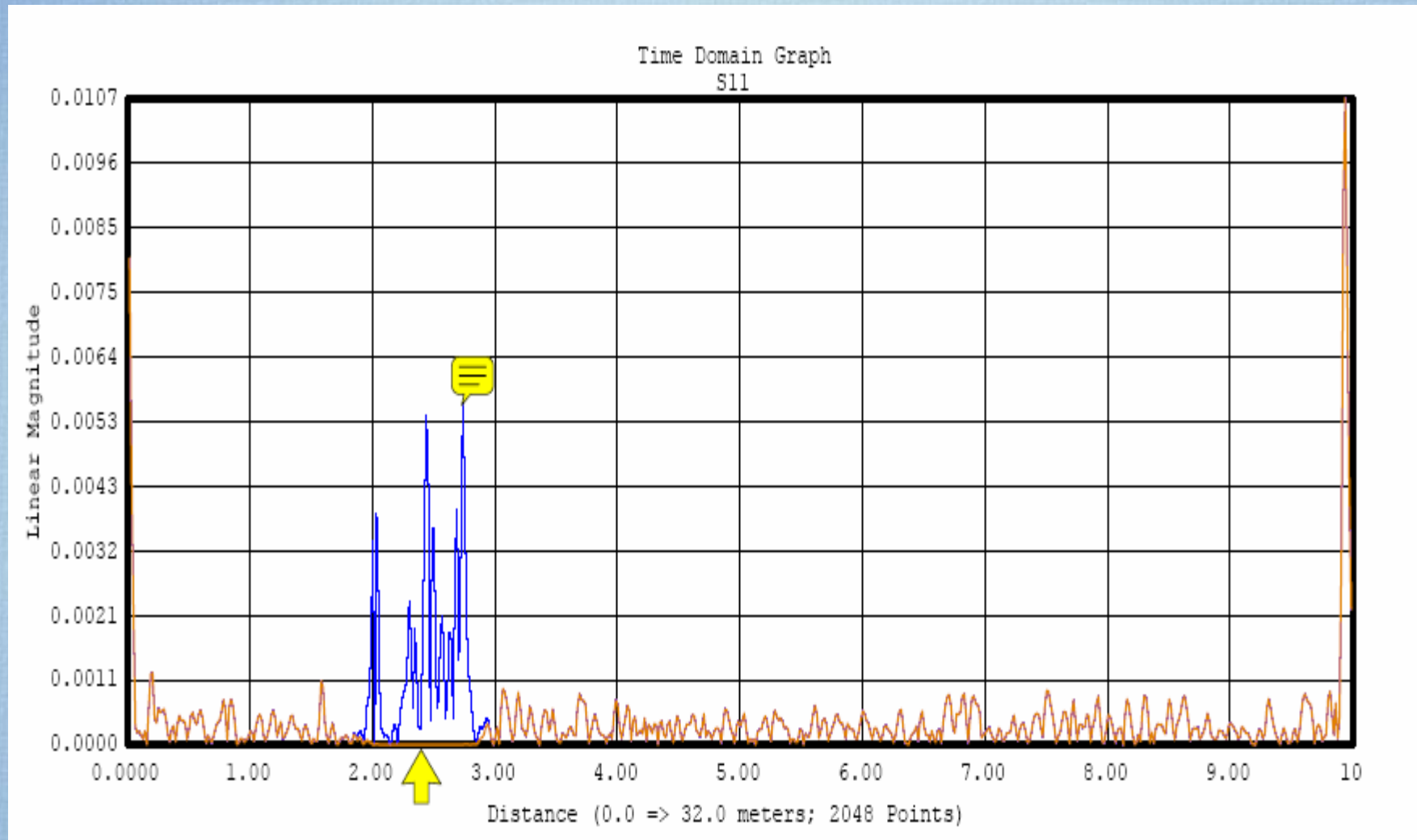
Case Study

Cellular Antenna Cable

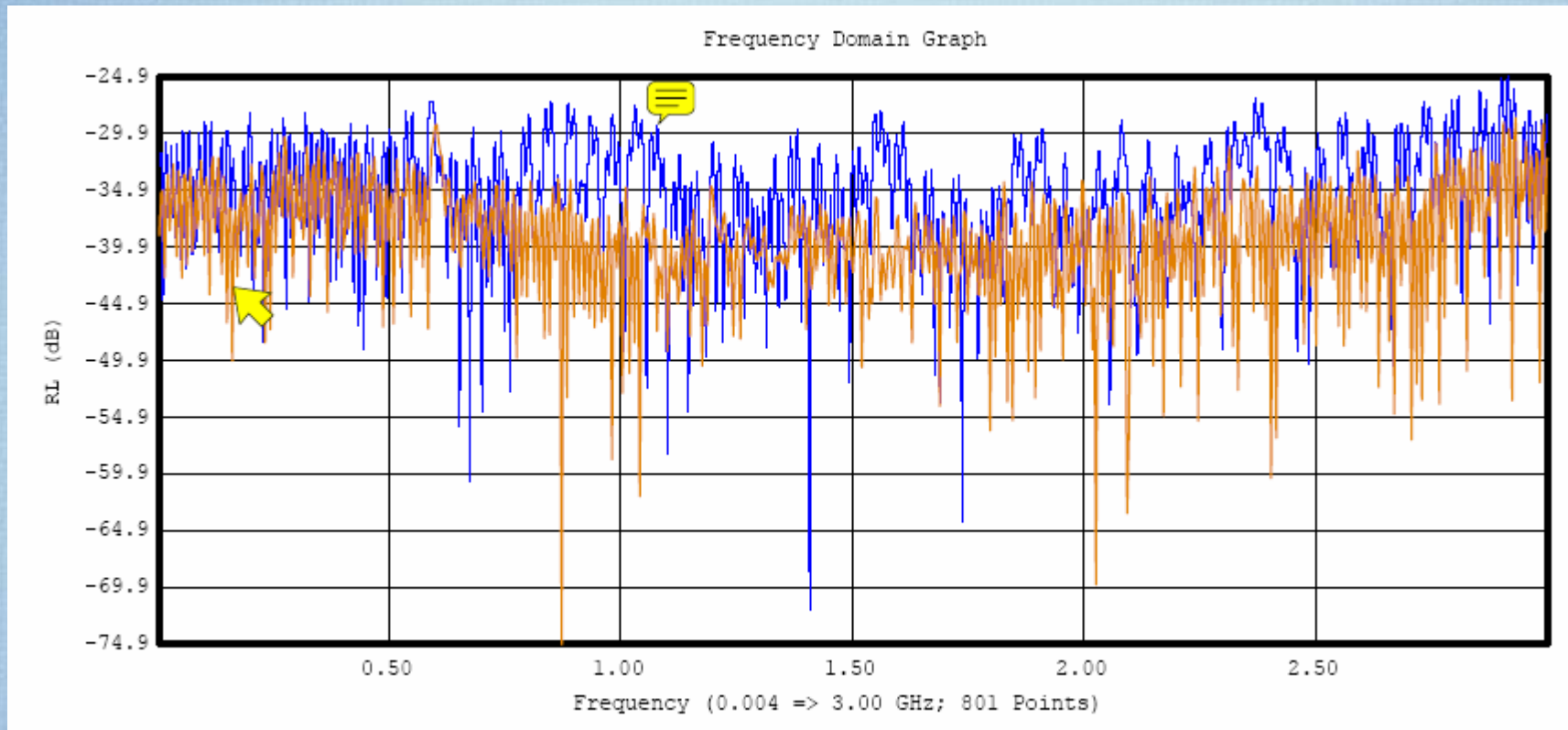
Missing Jacket



Distance to Fault



RL Report



TDNA Benefits

- Time saving ease of use over conventional TDR instrumentation
- Compatible with most VNAs
- No FFT knowledge required
- Immediate distance domain results for locating faults
- Fast interactive gating for process improvement analysis over conventional TDR instrumentation
- Cost effective to reduce material scrap and rejections