Time Domain Network Analysis (TDNA)

A new way to analyze RF & μwave transmission channels.

Results provided in :- frequency domain

- time domain

RFTA CONSULTANTS

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.

RFTA CONSULTANTS

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.

RFTA CONSULTANTS

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.

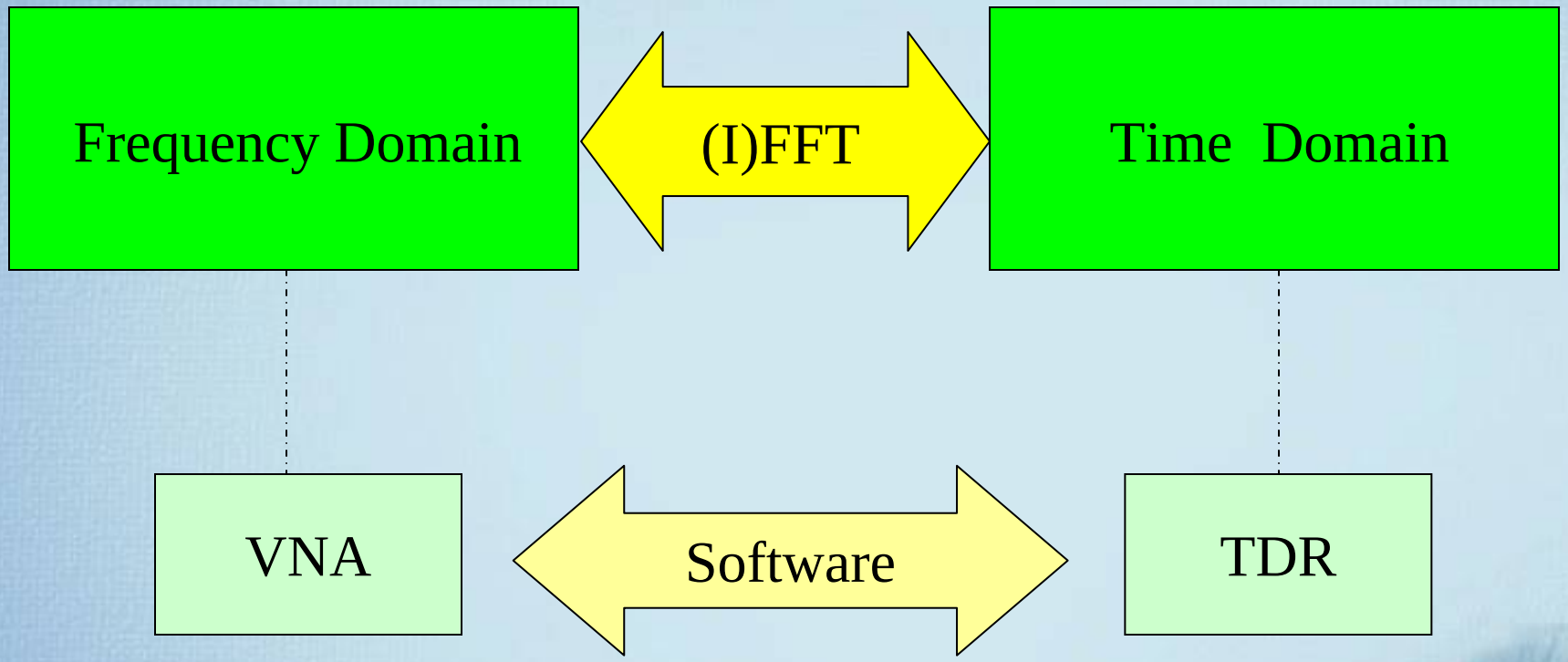
RFTA CONSULTANTS

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.

RFTA CONSULTANTS

How does TDNA work?



RL, VSWR, IL Tests
plus
Fault Location

RFTA CONSULTANTS

Who Benefits?

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

RFTA CONSULTANTS

TDNA Structure

Real Time Data

Archived Data

Limit Evaluation

Fault Location

TD Analysis

Reports

Archiving

RFTA CONSULTANTS

Test Information

Data Archiving

Data Analysis

Fault Location Analysis

Test Requirement

System Setup

Exit Application

Test and Fault Finding

RFTA CONSULTANTS

www.rftaconsultants.com

Email: sales@rftaconsultants.com

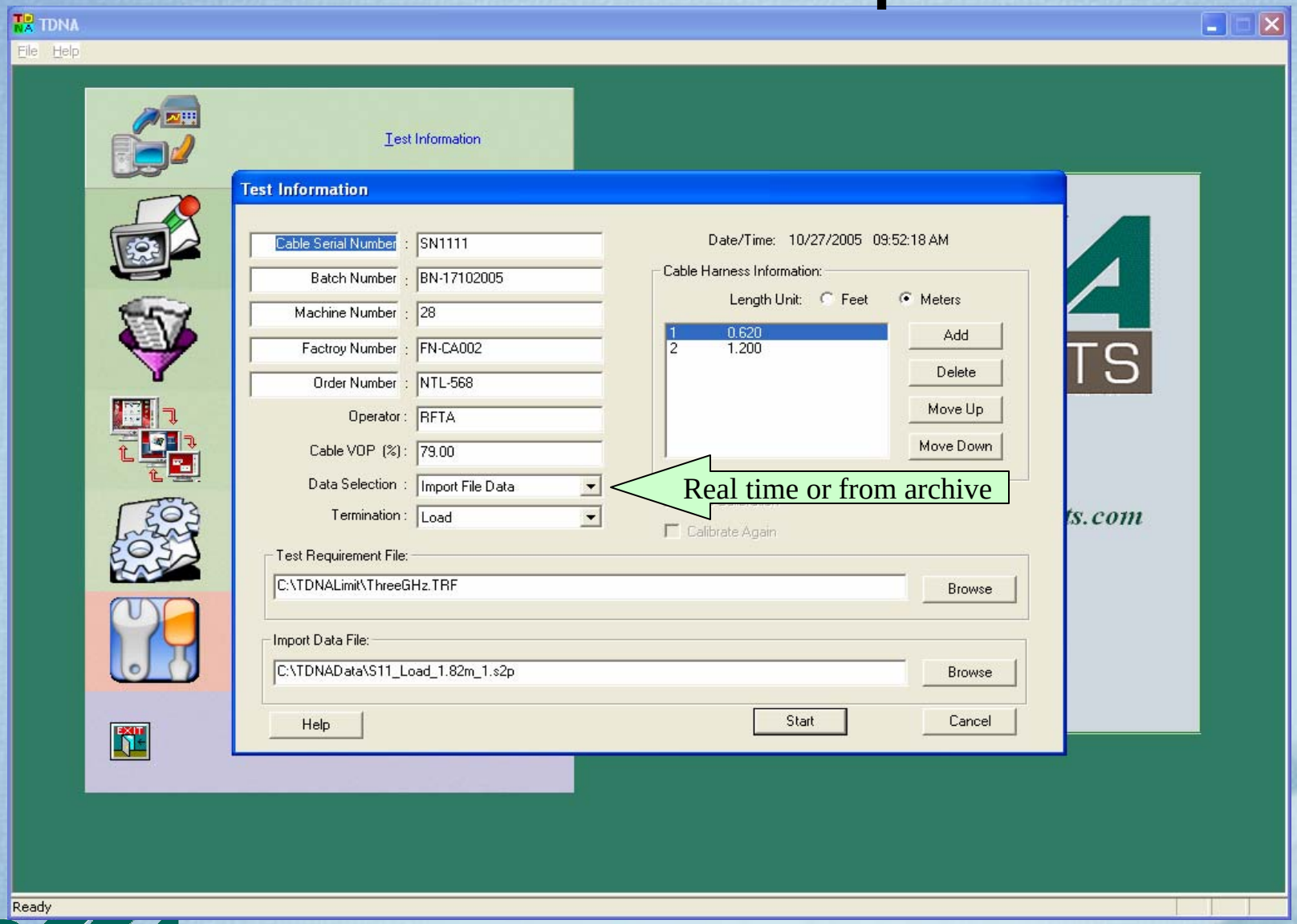
Phone: 510-438-0238

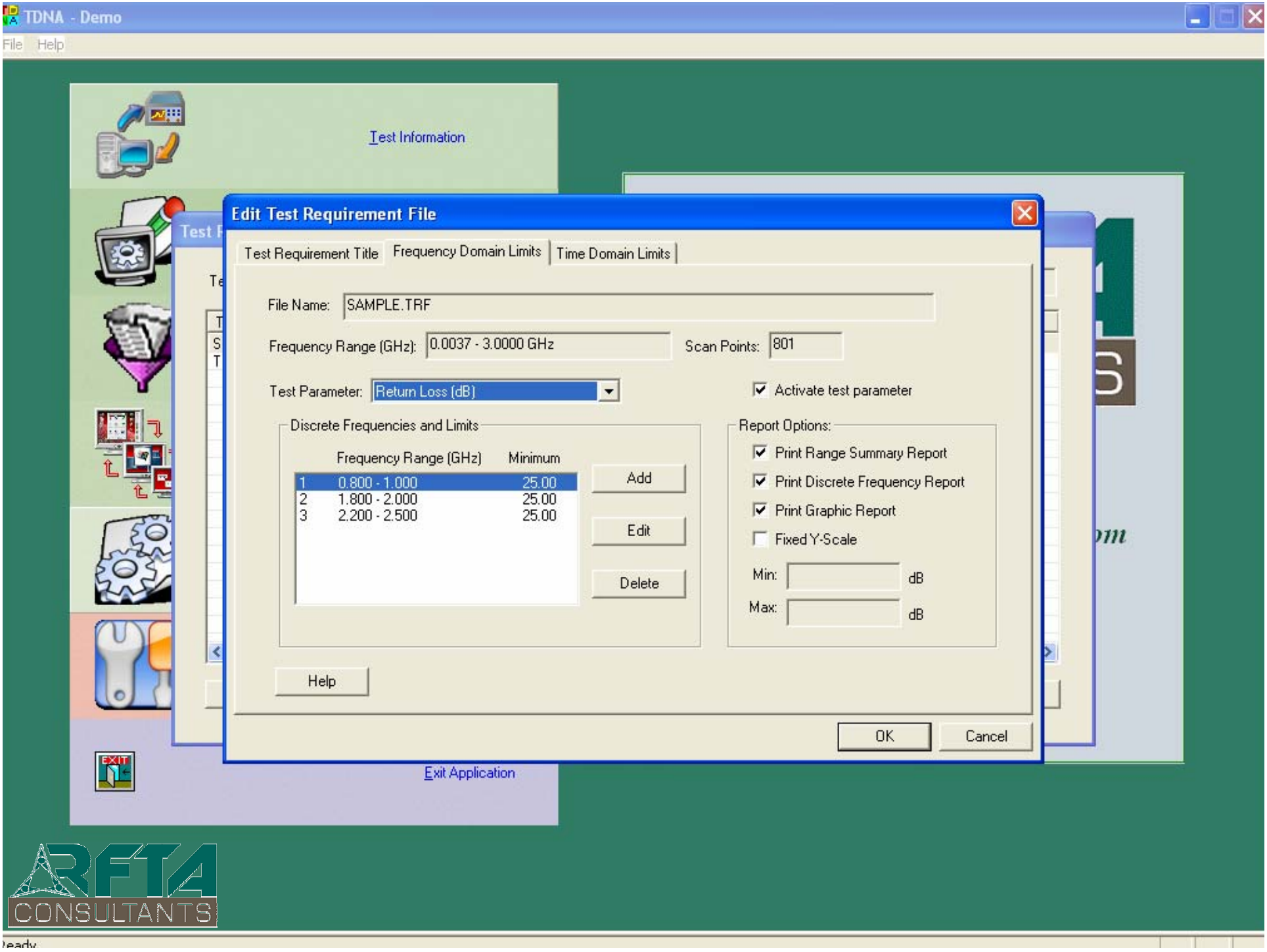
Fax: 510-438-0222

RFTA CONSULTANTS

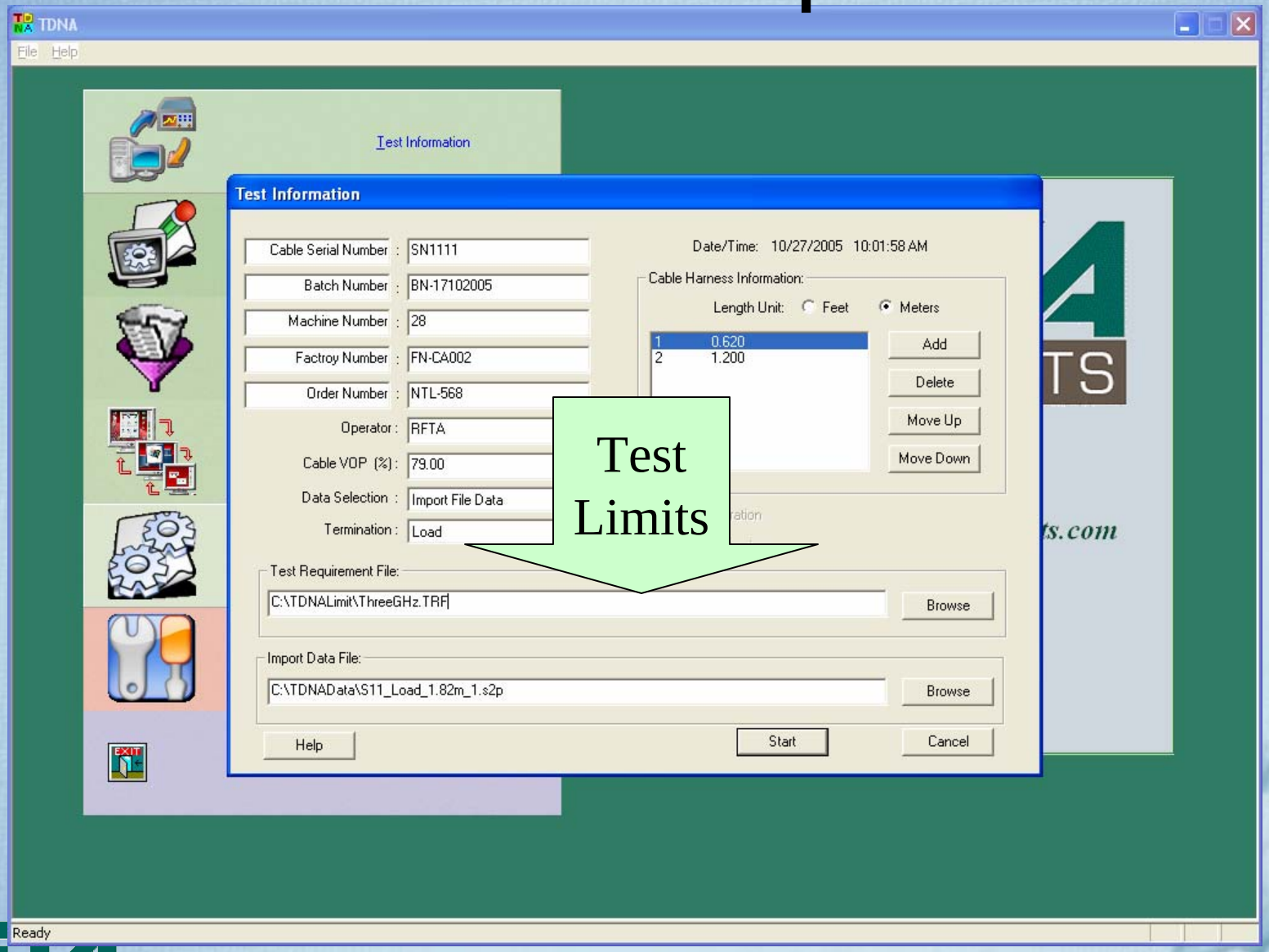
Real Time Data
or
Archived Data

Test Set Up


TDNA
File Help
Test Information
Test Information
Cable Serial Number : SN1111
Batch Number : BN-17102005
Machine Number : 28
Factroy Number : FN-CA002
Order Number : NTL-568
Operator : RFTA
Cable VOP (%) : 79.00
Data Selection : Import File Data
Termination : Load
Date/Time: 10/27/2005 09:52:18 AM
Cable Harness Information:
Length Unit: Feet Meters
1 0.620
2 1.200
Add
Delete
Move Up
Move Down
Real time or from archive
Calibrate Again
Test Requirement File:
C:\TDNALimit\ThreeGHz.TRF
Browse
Import Data File:
C:\TDNAData\S11_Load_1.82m_1.s2p
Browse
Help
Start
Cancel
Ready


TDNA - Demo
File Help
Test Information
Edit Test Requirement File
Test Requirement Title
Frequency Domain Limits
Time Domain Limits
File Name: SAMPLE.TRF
Frequency Range (GHz): 0.0037 - 3.0000 GHz
Scan Points: 801
Test Parameter: Return Loss (dB)
Activate test parameter
Discrete Frequencies and Limits
Frequency Range (GHz) Minimum
1 0.800 - 1.000 25.00
2 1.800 - 2.000 25.00
3 2.200 - 2.500 25.00
Add
Edit
Delete
Report Options:
Print Range Summary Report
Print Discrete Frequency Report
Print Graphic Report
Fixed Y-Scale
Min: dB
Max: dB
Help
OK
Cancel
Exit Application
RFTA CONSULTANTS

Test Set Up


TDNA
File Help
Test Information
Test Information
Cable Serial Number : SN1111
Batch Number : BN-17102005
Machine Number : 28
Factroy Number : FN-CA002
Order Number : NTL-568
Operator : RFTA
Cable VOP (%) : 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
1 0.620
2 1.200
Add
Delete
Move Up
Move Down
Test Limits
Test Requirement File:
C:\TDNALimit\ThreeGHz.TRF
Browse
Import Data File:
C:\TDNAData\S11_Load_1.82m_1.s2p
Browse
Help
Start
Cancel
Ready

Frequency Domain Report

RFTA CONSULTANTS

ID Label 3	Input 3	Data Selection Option	S11_Load_1.82m_1.s2p
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								

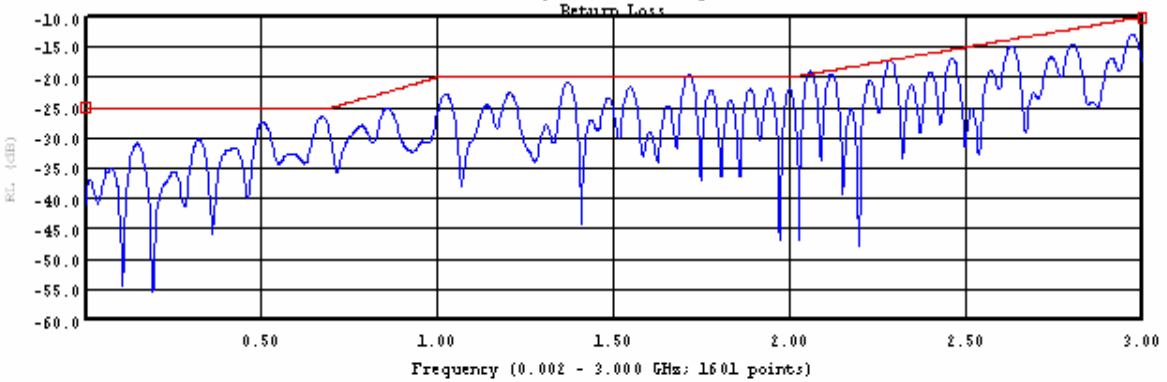
Frequency Domain Report

Frequency Cable Summary

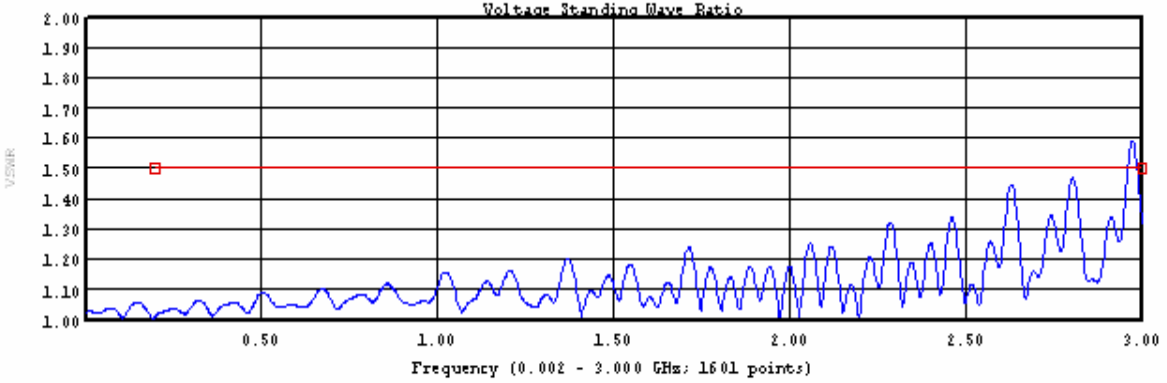
Result based on Discrete Frequency Points

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



Printed on 07/22/2005 at 03:56:20 PM

Fault Location Report

RFTA CONSULTANTS

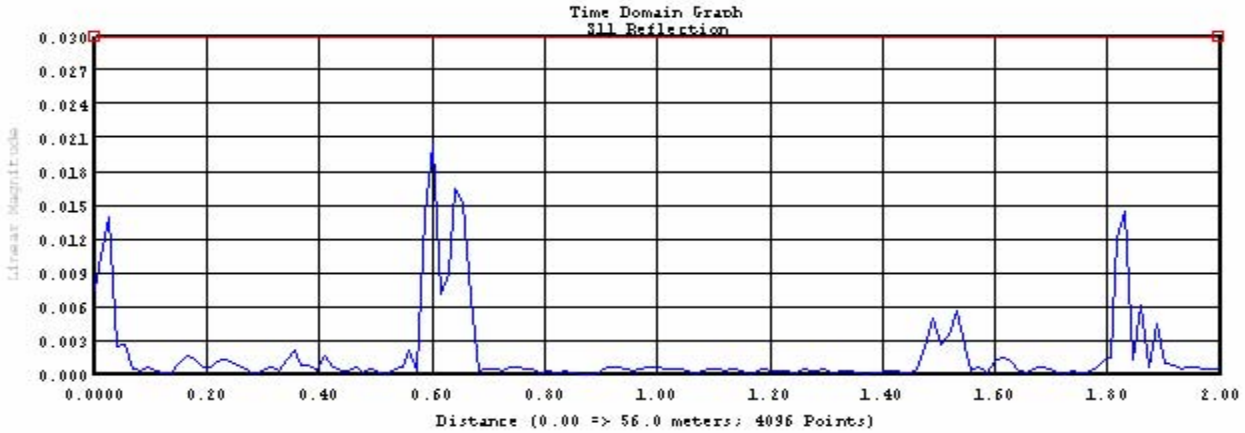
TDNA

Print... | Next Page | Prev Page | Two Page | Zoom In | Zoom Out | Close

Measured	1.02	1.02	1.02	1.02						

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



Printed on 07/22/2005 at 04:00:54 PM
Prinited with Version 1.00.00

RFTA CONSULTANTS

Page 2

Time Domain Analysis

RFTA CONSULTANTS

Help

Test Information

Data Archiving

Data Analysis

Fault Location Analysis

Test Requirement

System Setup

Exit Application

RFTA CONSULTANTS

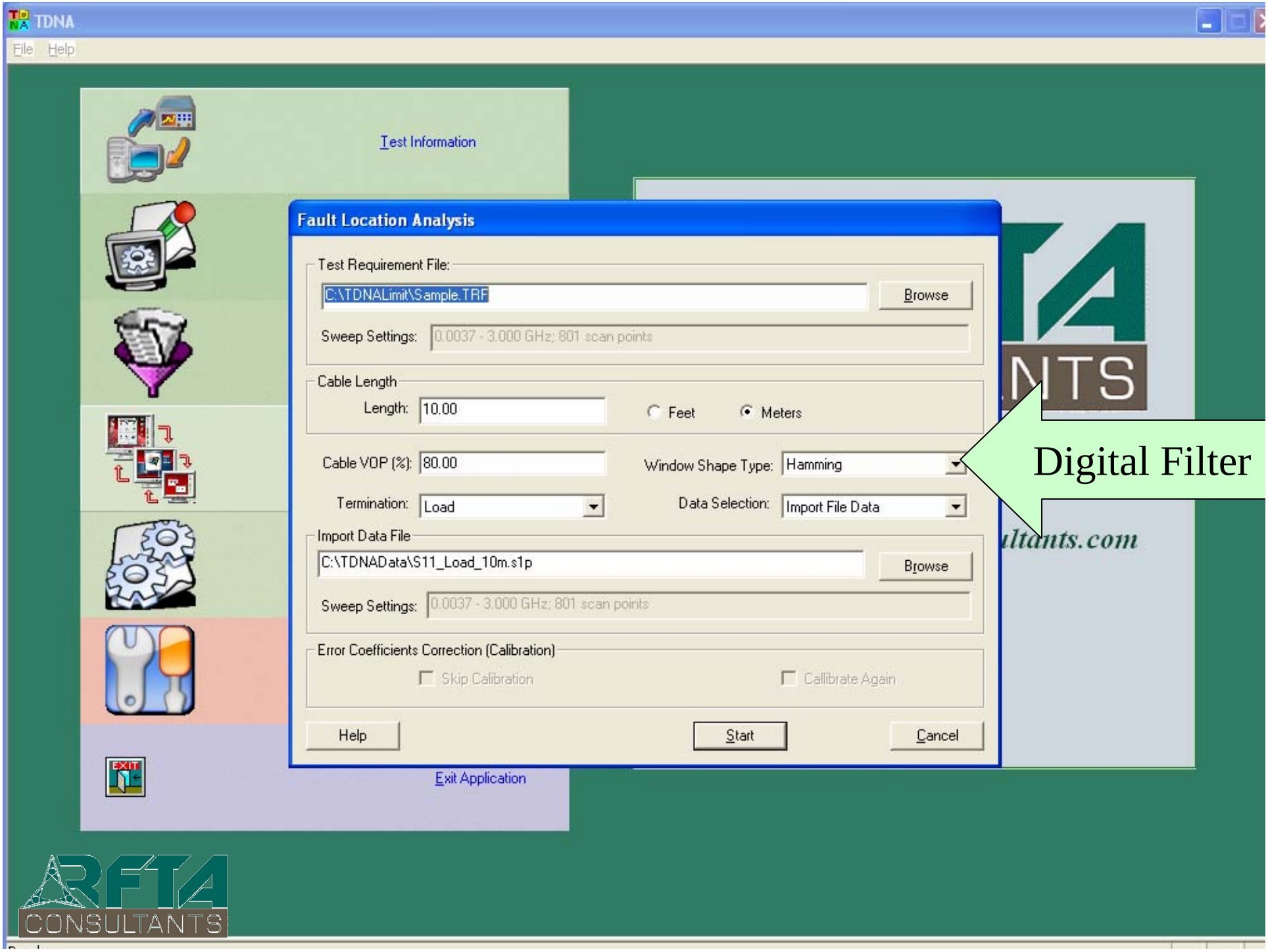
Time Domain Analysis

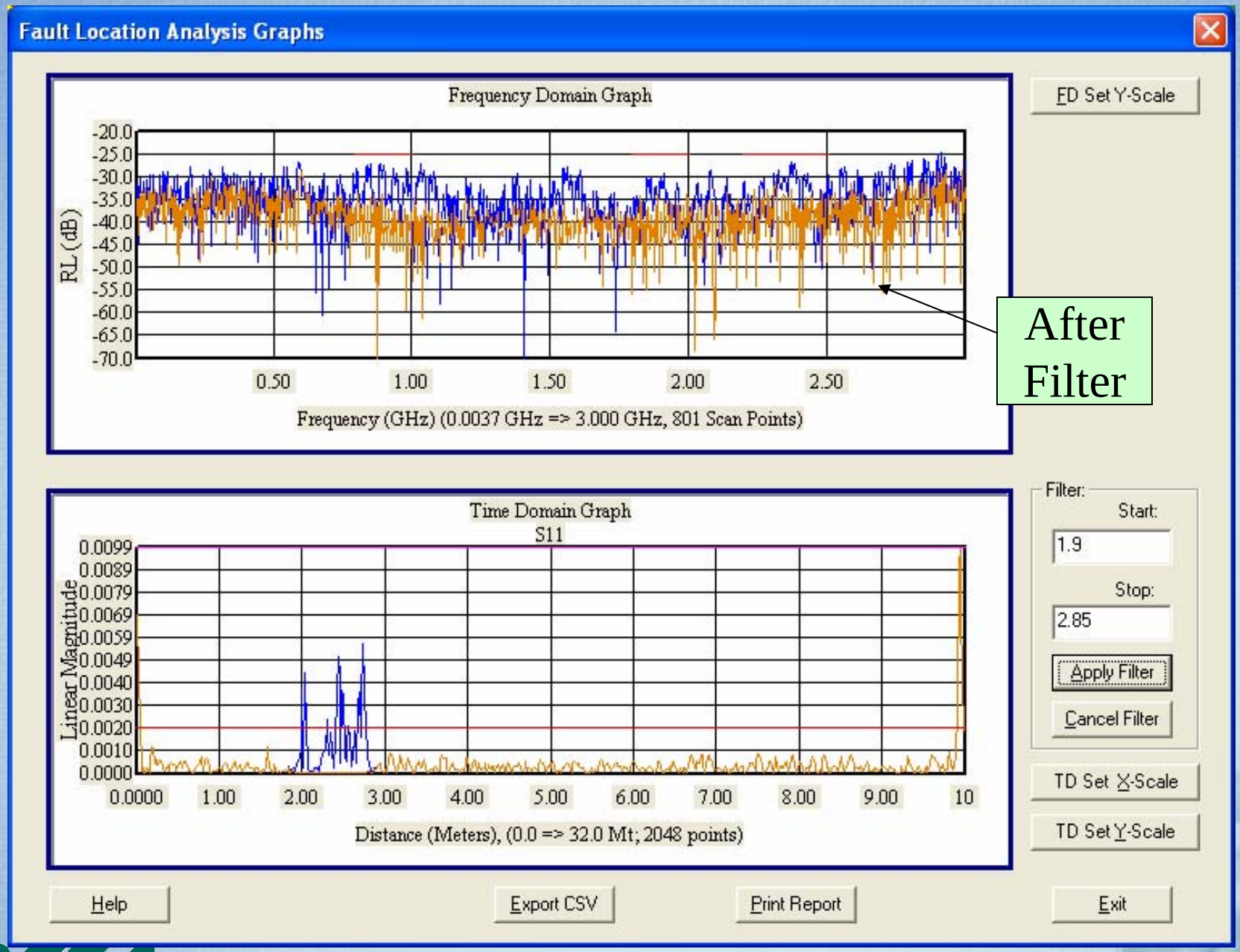
Email: sales@rftaconsultants.com

Phone: 510-438-0238

Fax: 510-438-0222

RFTA CONSULTANTS


TDNA
File Help
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
RFTA CONSULTANTS


Fault Location Analysis Graphs
Frequency Domain Graph
RL (dB)
-20.0
-25.0
-30.0
-35.0
-40.0
-45.0
-50.0
-55.0
-60.0
-65.0
-70.0
0.50
1.00
1.50
2.00
2.50
Frequency (GHz) (0.0037 GHz => 3.000 GHz, 801 Scan Points)
FD Set Y-Scale
After Filter
Time Domain Graph
S11
Linear Magnitude
0.0099
0.0089
0.0079
0.0069
0.0059
0.0049
0.0040
0.0030
0.0020
0.0010
0.0000
0.0000
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10
Distance (Meters), (0.0 => 32.0 Mt; 2048 points)
Filter:
Start:
1.9
Stop:
2.85
Apply Filter
Cancel Filter
TD Set X-Scale
TD Set Y-Scale
Help
Export CSV
Print Report
Exit

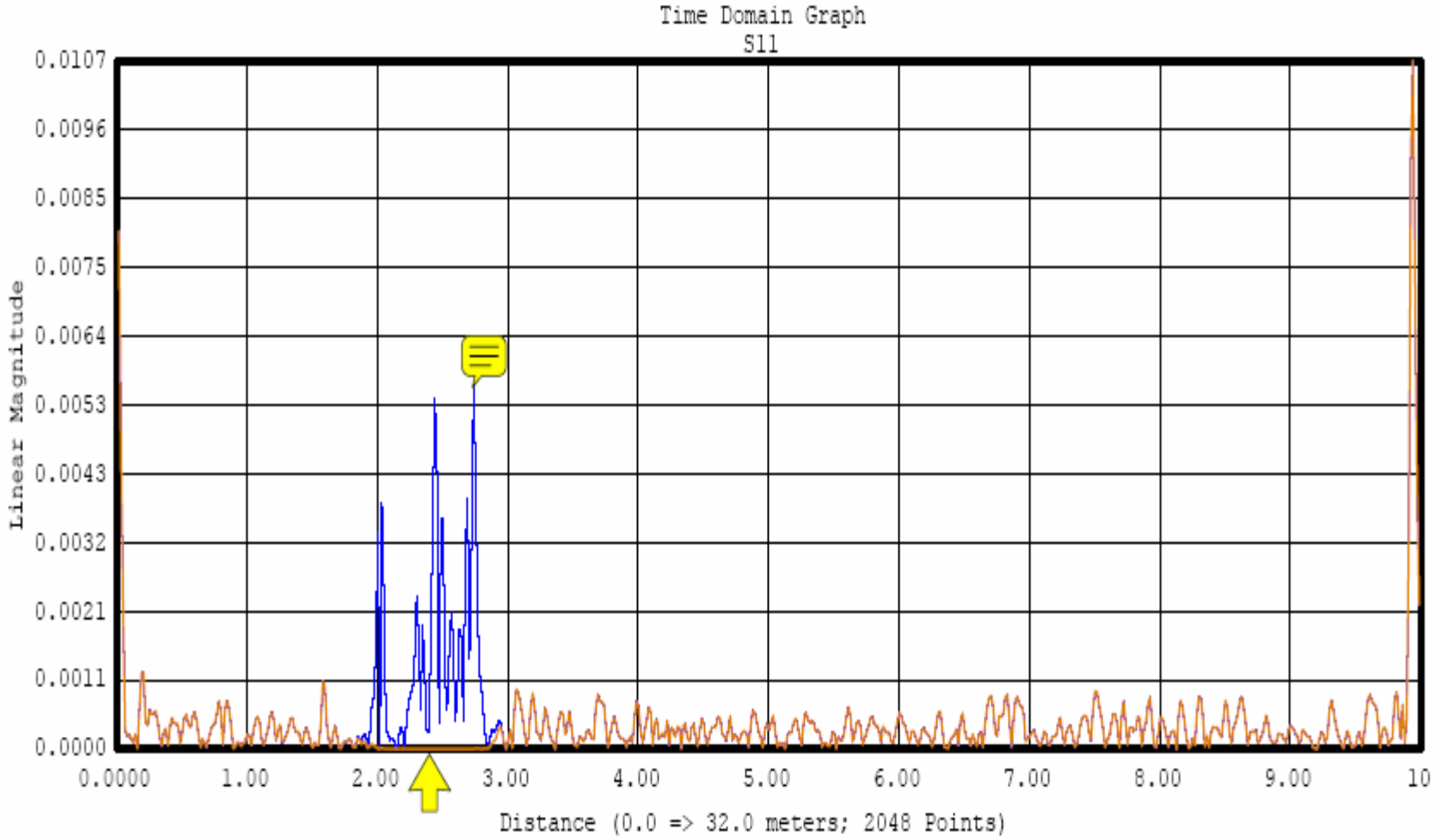
Case Study

Cellular Antenna Cable

RFTA CONSULTANTS

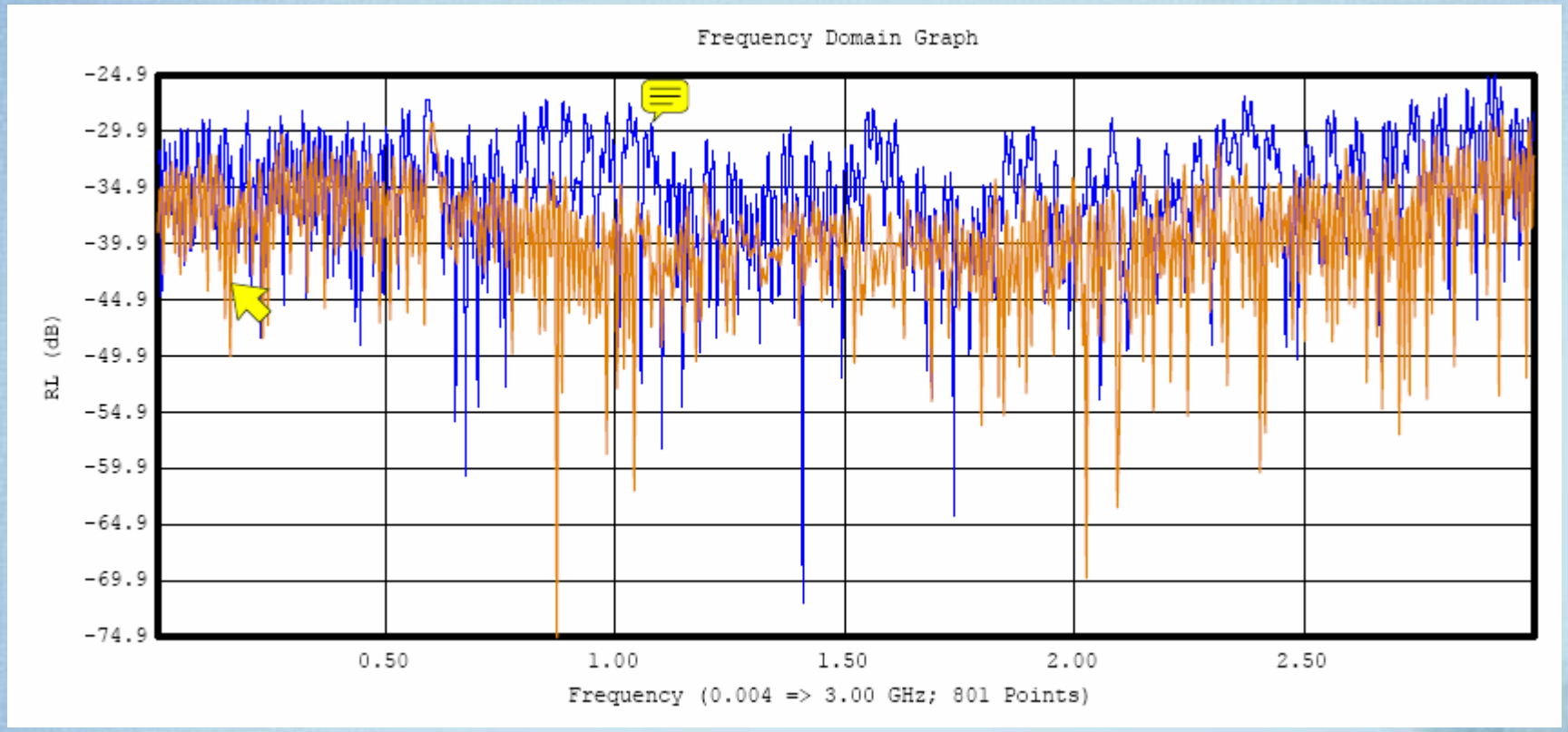
Missing Jacket

Distance to Fault



RFTA CONSULTANTS

RL Report


Frequency Domain Graph
-24.9
-29.9
-34.9
-39.9
-44.9
-49.9
-54.9
-59.9
-64.9
-69.9
-74.9
RL (dB)
0.50
1.00
1.50
2.00
2.50
Frequency (0.004 => 3.00 GHz; 801 Points)

Data Archives

File Help

Test Information

Data Archiving

Data File Directory: C:\TDNADATA\

Data File	Test Date	Test Requirem...	Operator	Cable Serial N...	Batch Number	Machine Num...	Factroy Number	Order Number
TDNA0002	10/17/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0003	10/20/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0004	10/20/2005 1...	ThreeGHz	RFTA	SN333	CN9873	PV9836	FN S098-374	ON-9376
TDNA0005	10/20/2005 1...	Sample	RFTA	SN333	CN9873	PV9836	FN S098-374	ON-9376
TDNA0006	10/20/2005 1...	Sample	RFTA	SN333	CN9873	PV9836	FN S098-374	ON-9376
TDNA0008	10/20/2005 1...	Sample	RFTA	SN333	CN9873	PV9836	FN S098-374	ON-9376
TDNA0009	10/25/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0010	10/25/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0011	10/25/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0012	10/25/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0026	10/26/2005 0...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0027	10/26/2005 0...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0028	10/26/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0029	10/26/2005 1...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0030	10/27/2005 0...	ThreeGHz	RFTA	SN1111	BN-17102005	28	FN-CA002	NTL-568
TDNA0200	09/08/2005 1...	Volex	RFTA	VLX-1041	NTL-0097	MN-3A	FMCA-98	ABC97F
TDNA0201	09/08/2005 1...	Sample	RFTA	SN67	CN9873	PV9836	FN S098-374	ON-9376
TDNA0202	09/08/2005 1...	Sample	RFTA	SN67-02	CN9873	PV9836	FN S098-374	ON-9376
TDNA0203	09/08/2005 1...	Sample	RFTA	SN67-03	CN9873	PV9836	FN S098-374	ON-9376

Help | View Report | Export Data | Export List | Delete | Exit

RFTA CONSULTANTS

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

RFTA CONSULTANTS