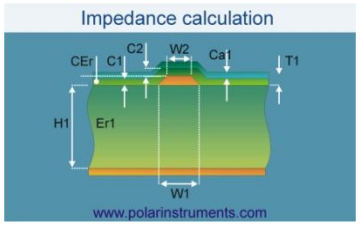
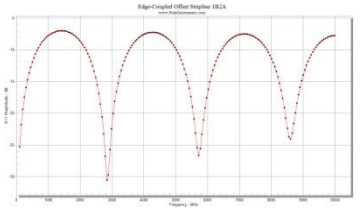
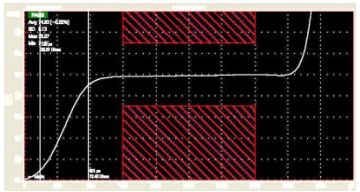
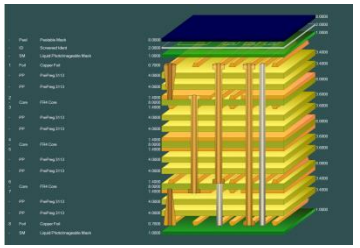
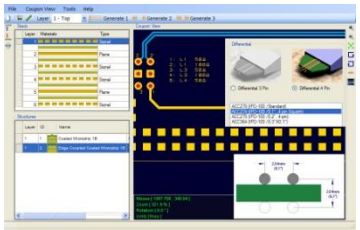




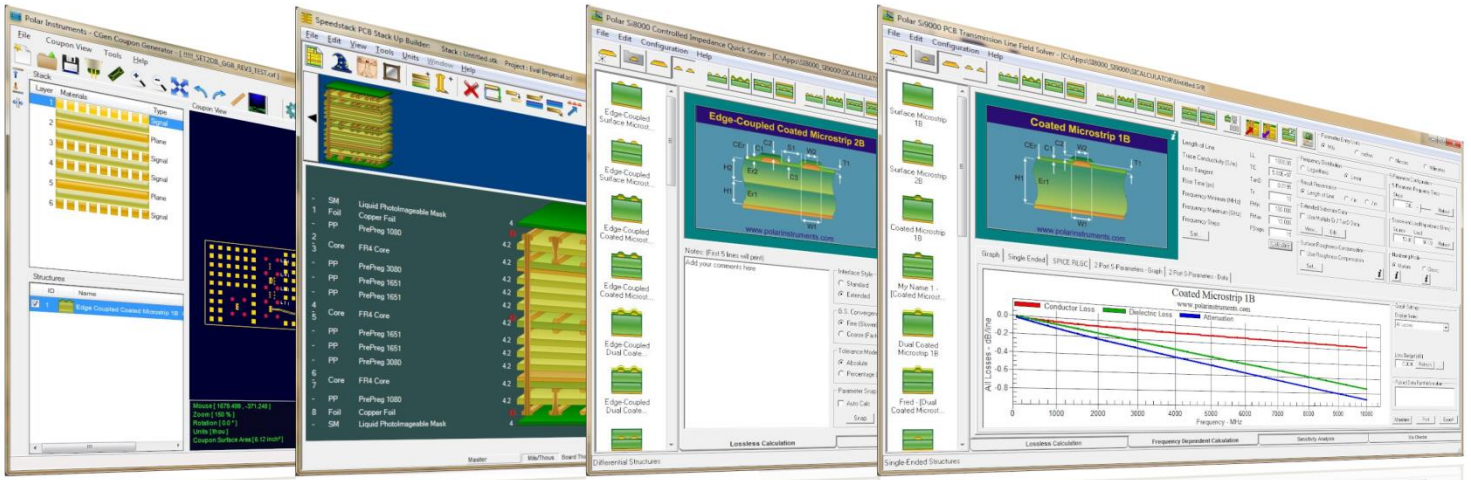






Si9000e Importing Insertion Loss Measurement Data - Preview

Richard Attrill – September 2016 (Rev 3)



Overview

The Polar Si9000e Transmission Line Field Solver allows the user to quickly calculate impedance, insertion loss, RLGC and S-Parameters for a wide range of transmission line structures. Version 16.07 provides the capability to import insertion loss measurement data (S21 / SDD21), allowing for the easy comparison of modelled and measured results. It is possible to:

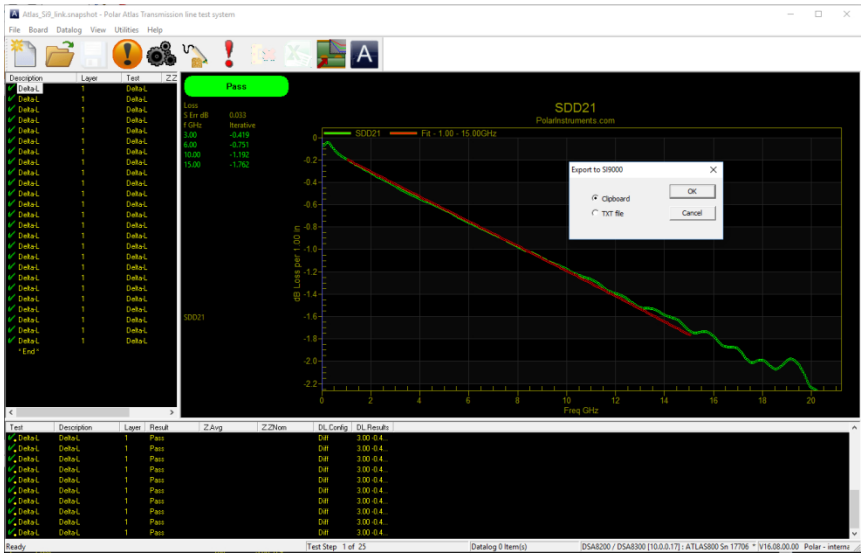
a. Import measurement data directly from the Polar Atlas Transmission Line Test System that supports Delta-L, SPP and SET2DIL test methodologies.

b. Overlay the modelled / measured data for comprehensive analysis

c. Check and adjust modelling parameters based on the measured results

Workflow

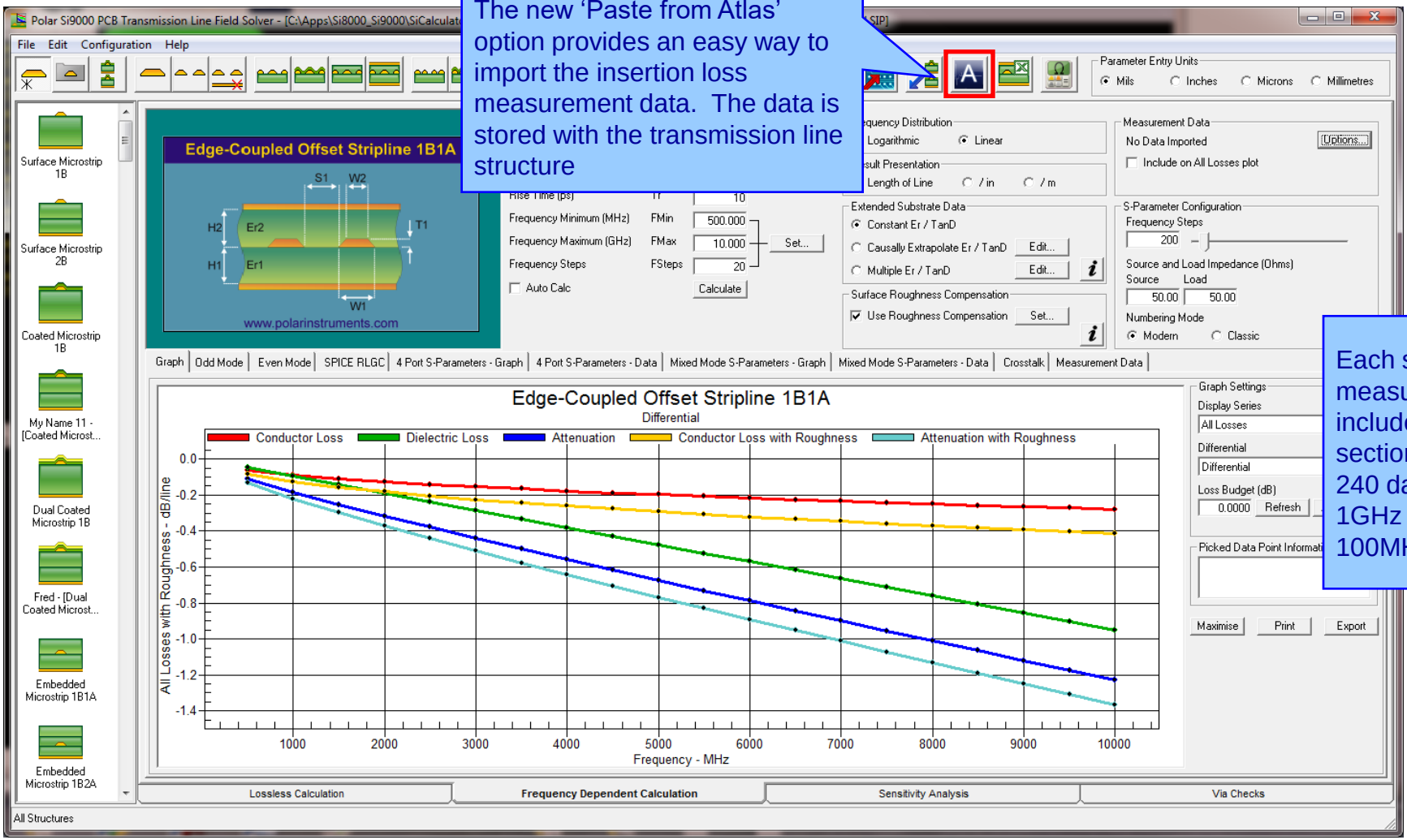
Insertion loss data is transferred from Atlas to the Si9000e using a simple Copy & Paste function



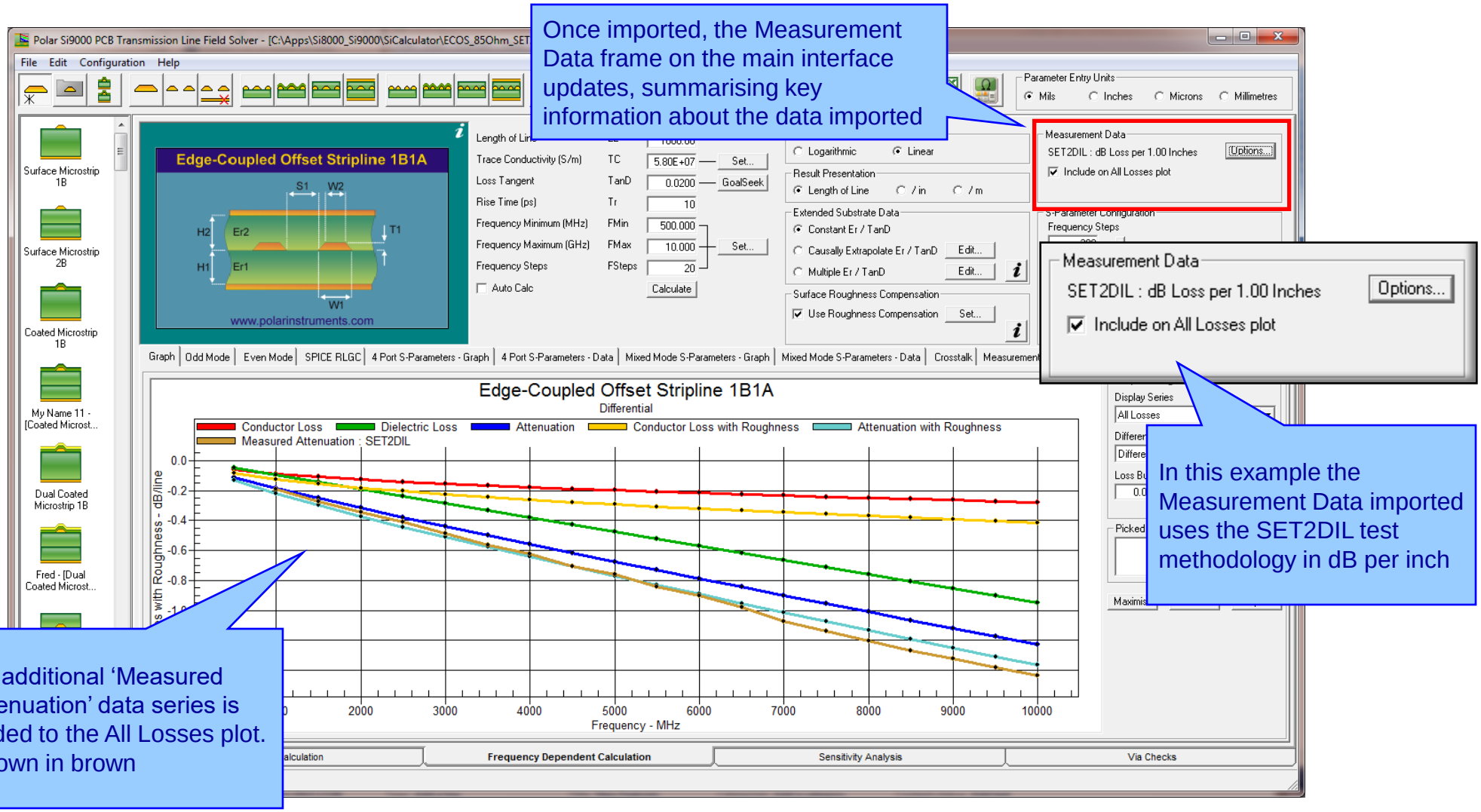
Polar Atlas Transmission Line Test System

Polar Si9000e Transmission Line Field Solver

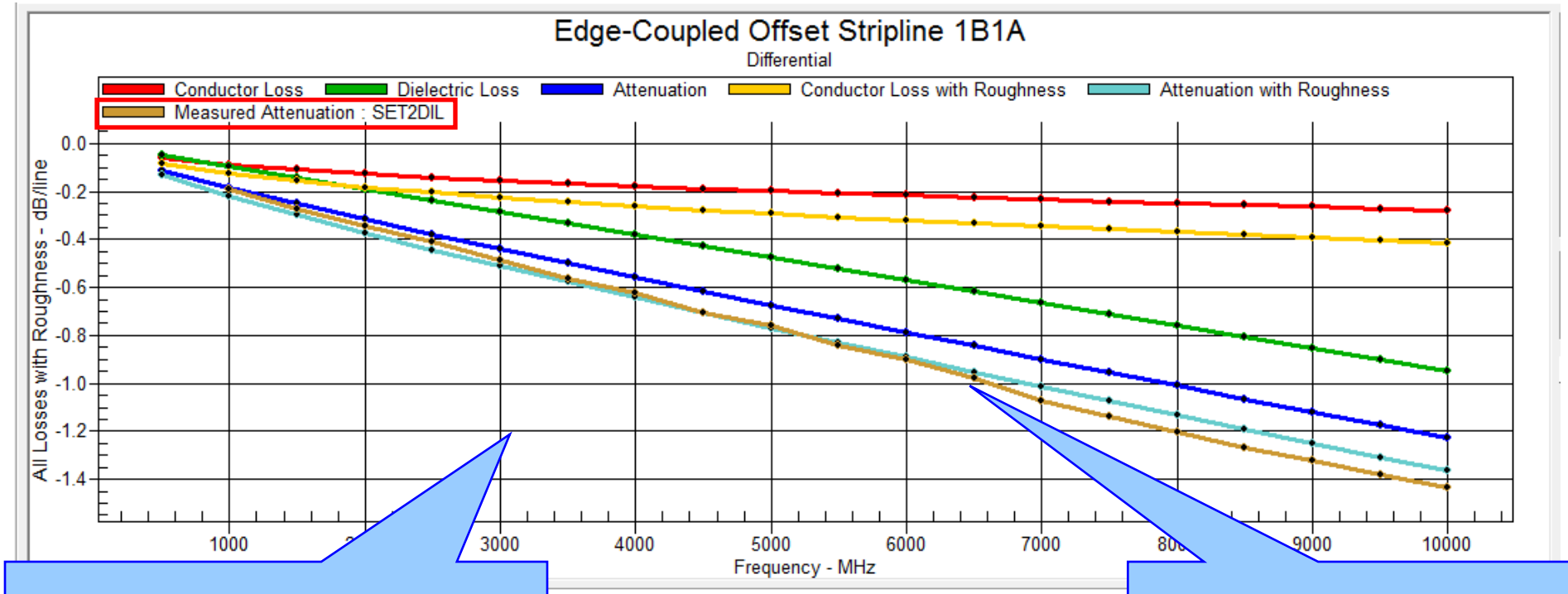
Importing the measurement data into the Si9000e



Importing the measurement data into the Si9000e



Measured Attenuation added to the All Losses plot : 1GHz to 10GHz



The new 'Measured Attenuation' data series is added to the All Losses plot (brown). It is shown alongside the modelled Conductor Loss, Dielectric Loss and Attenuation with Roughness.

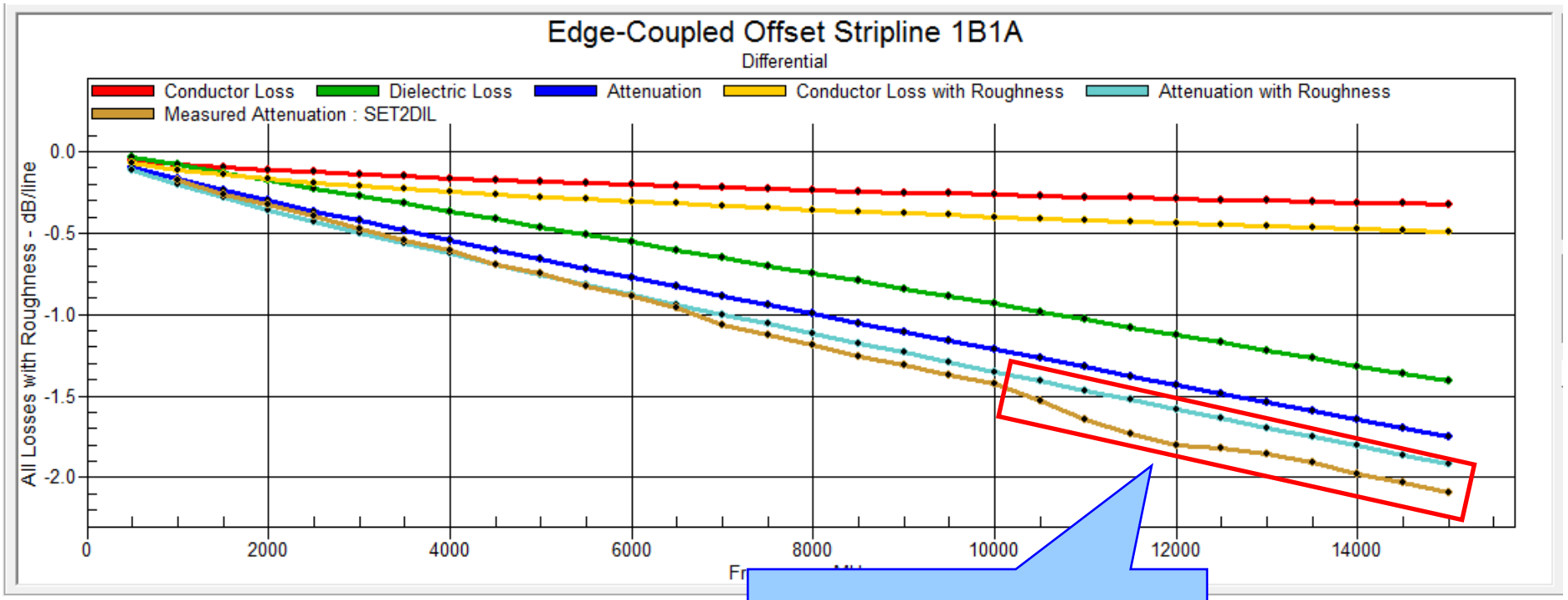
Comparing the Attenuation with Roughness (cyan) with the Measured Attenuation (brown) indicates there is good correlation

Measured Attenuation added to the All Losses plot : 1GHz to 15GHz

Frequency Minimum (MHz)	FMin	500.000
Frequency Maximum (GHz)	FMax	15.000
Frequency Steps	FSteps	30

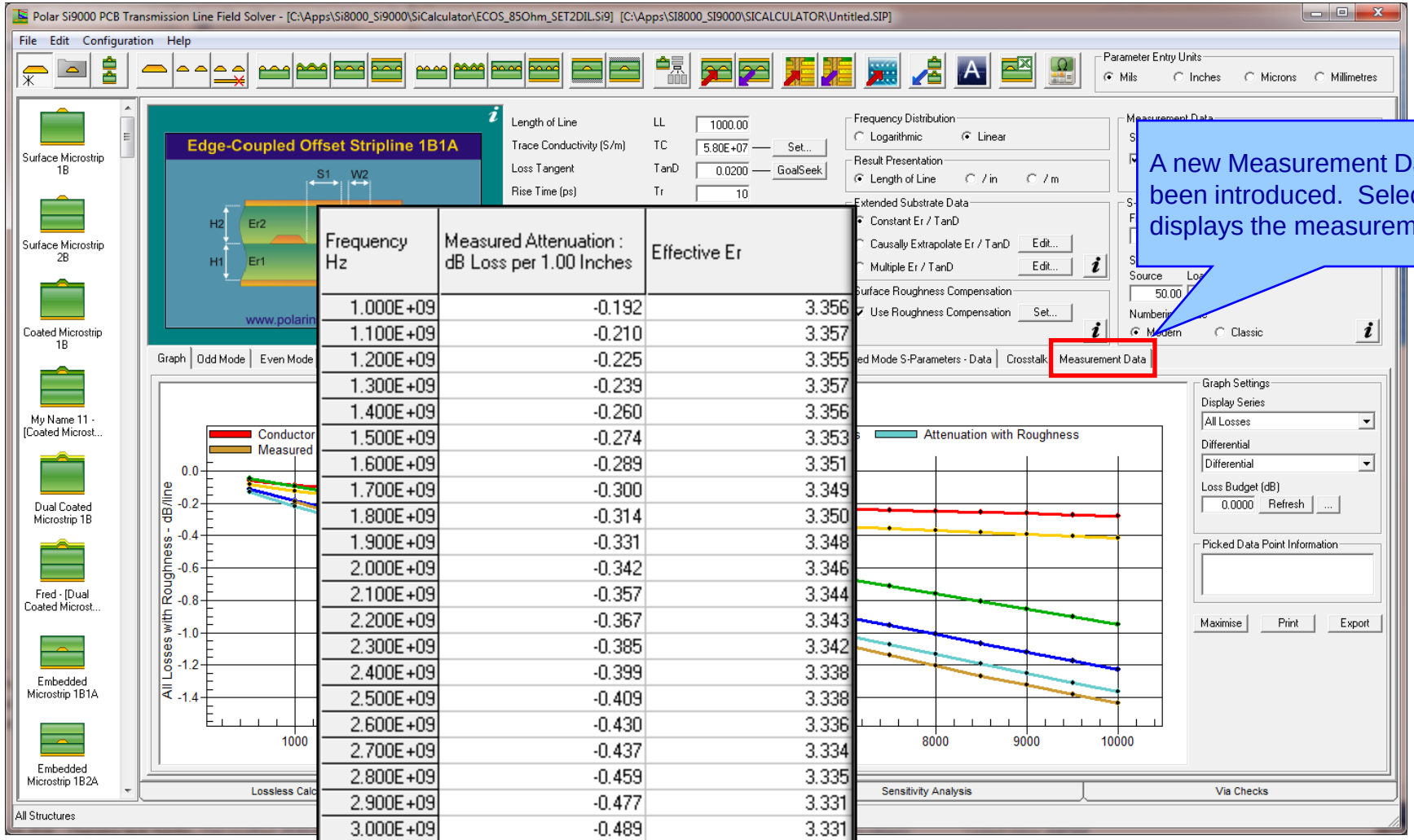
Set...

By altering Frequency Minimum / Maximum for the structure it is possible to extend the model out to 15GHz



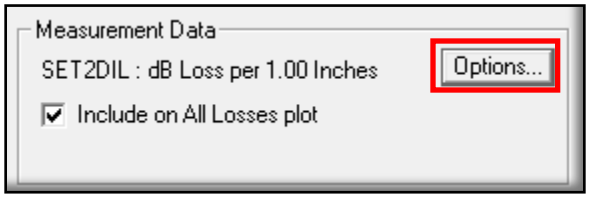
Notice how the modelled / measured results diverge, possibly due to a measurement artefact

Viewing the measurement data in table form

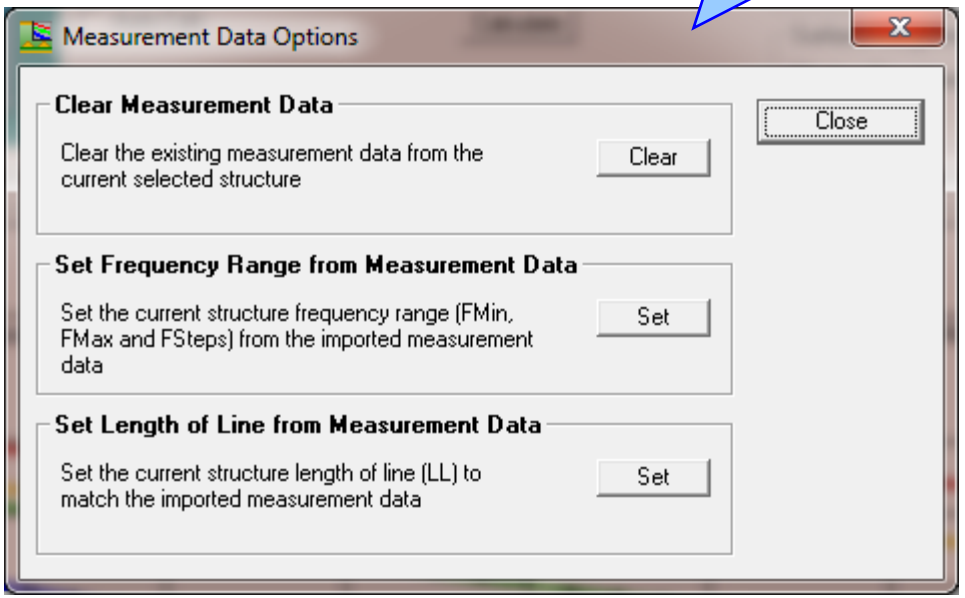


Frequency Hz	Measured Attenuation : dB Loss per 1.00 Inches	Effective Er
1.000E+09	-0.192	3.356
1.100E+09	-0.210	3.357
1.200E+09	-0.225	3.355
1.300E+09	-0.239	3.357
1.400E+09	-0.260	3.356
1.500E+09	-0.274	3.353
1.600E+09	-0.289	3.351
1.700E+09	-0.300	3.349
1.800E+09	-0.314	3.350
1.900E+09	-0.331	3.348
2.000E+09	-0.342	3.346
2.100E+09	-0.357	3.344
2.200E+09	-0.367	3.343
2.300E+09	-0.385	3.342
2.400E+09	-0.399	3.338
2.500E+09	-0.409	3.338
2.600E+09	-0.430	3.336
2.700E+09	-0.437	3.334
2.800E+09	-0.459	3.335
2.900E+09	-0.477	3.331
3.000E+09	-0.489	3.331
3.100E+09	-0.516	3.329

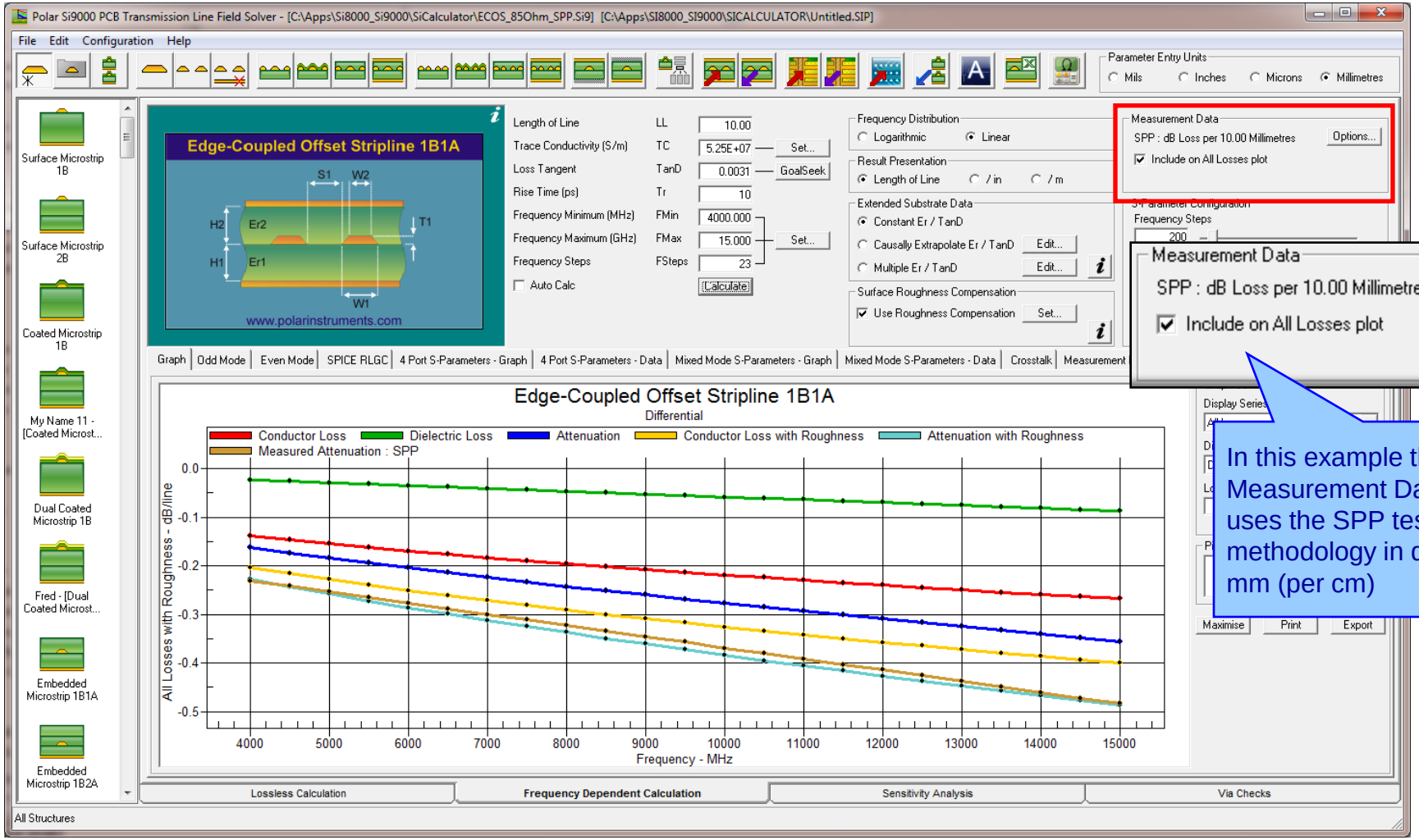
Measurement Data options



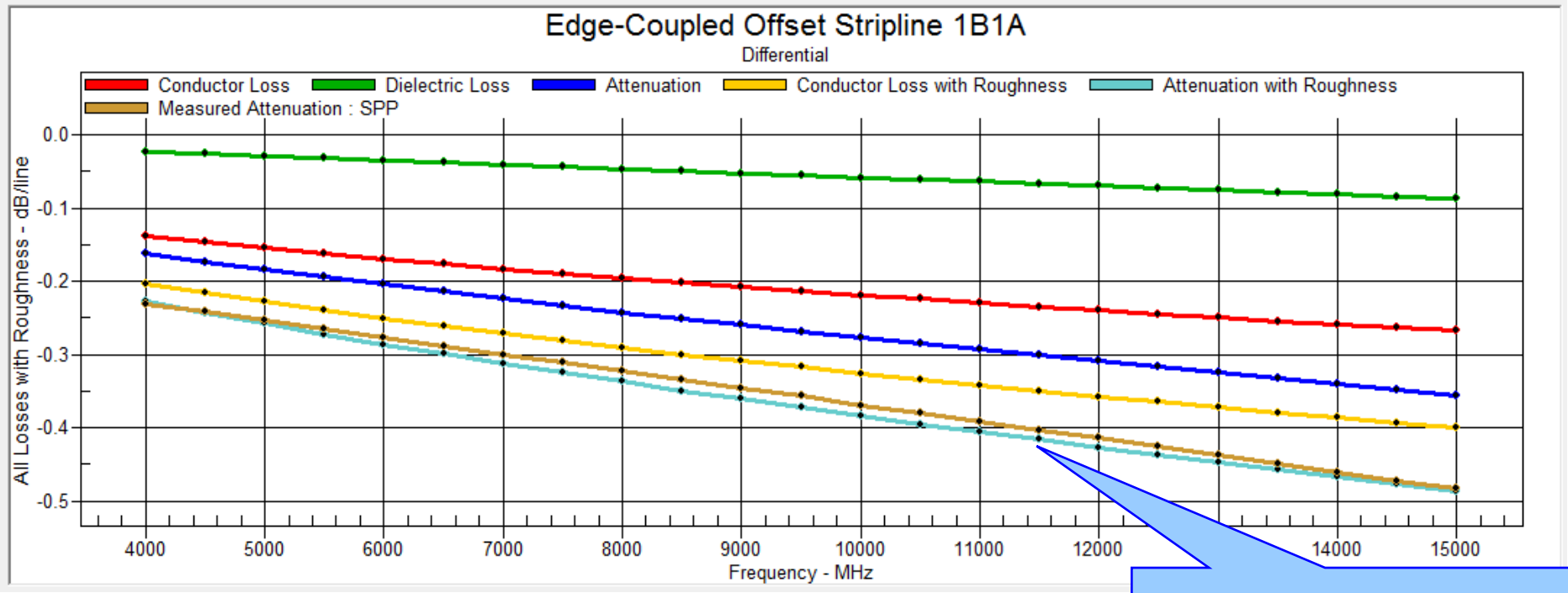
The Measurement Data Options dialog provides a method to clear the previously imported measurement data from the structure. It is also possible to auto-set the current structure frequency range and length of line to match the data imported.



Importing the measurement data – another example



Measured Attenuation added to the All Losses plot : 4GHz to 15GHz



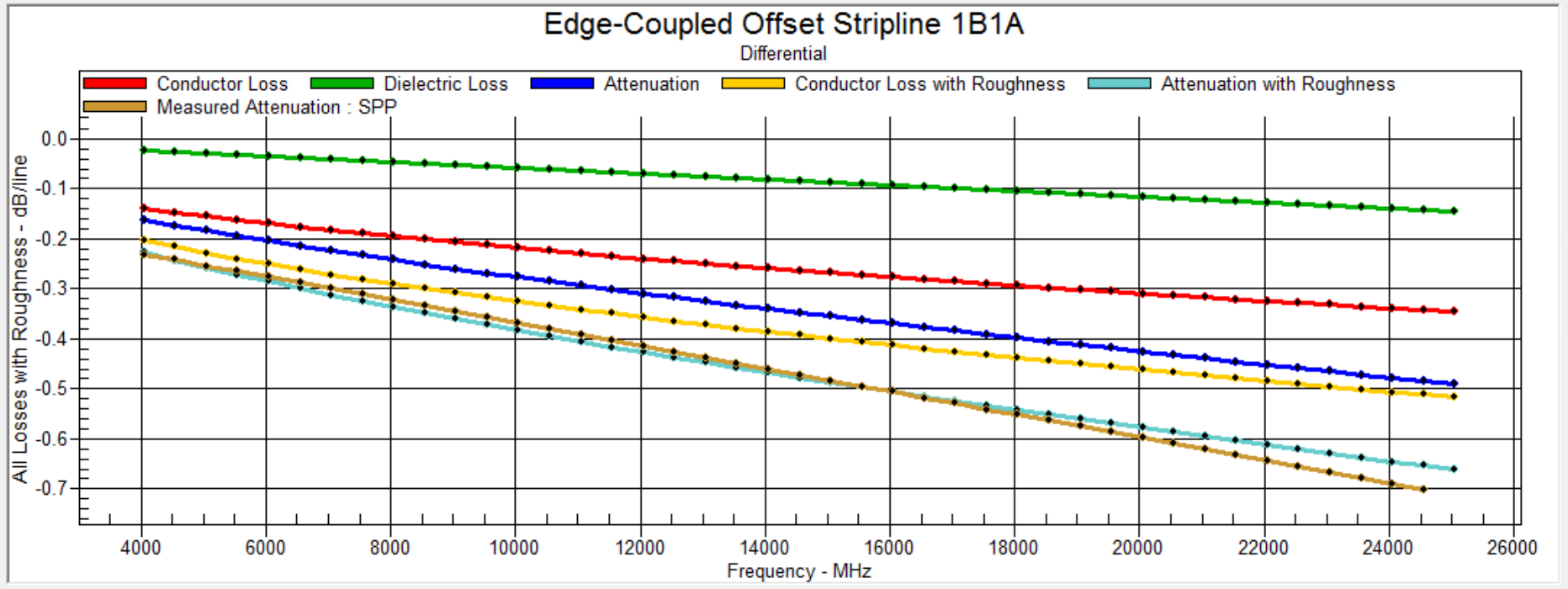
Comparing the Attenuation with Roughness (cyan) with the Measured Attenuation (brown) indicates there is good correlation

Measured Attenuation added to the All Losses plot : 4GHz to 25GHz

Frequency Minimum (MHz)	FMin	4000.000
Frequency Maximum (GHz)	FMax	25.000
Frequency Steps	FSteps	43

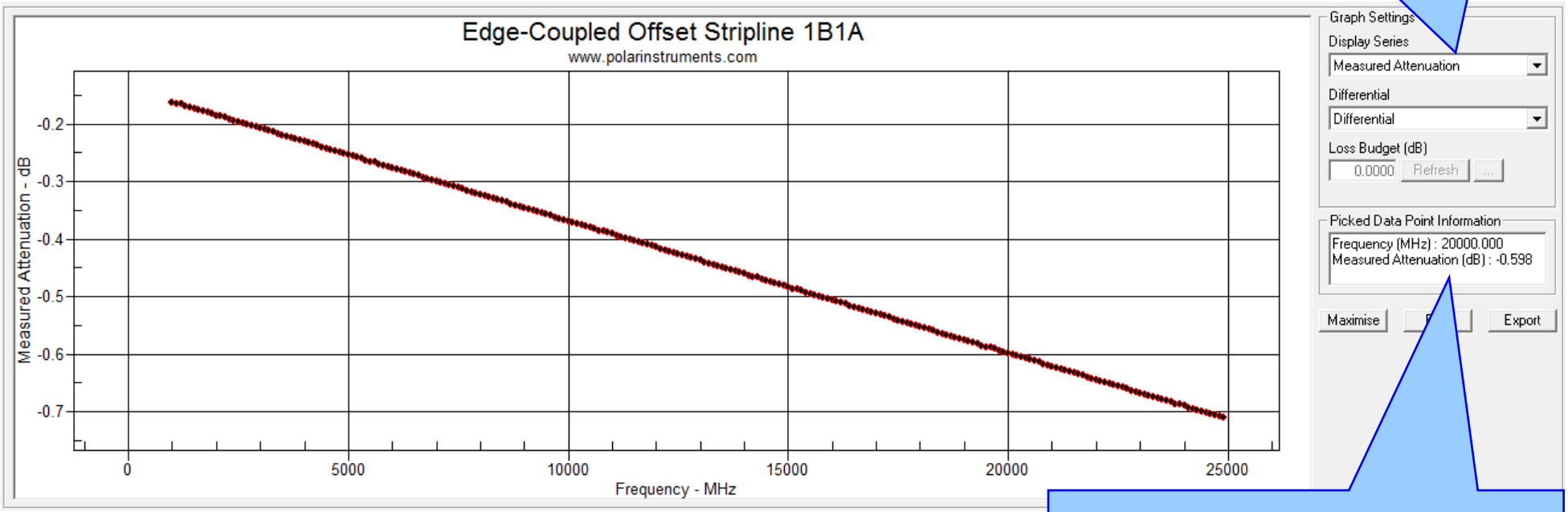
Set...

By altering Frequency Minimum / Maximum for the structure it is possible to extend the model out to 25GHz



Measured Attenuation plot : 1GHz to 25GHz

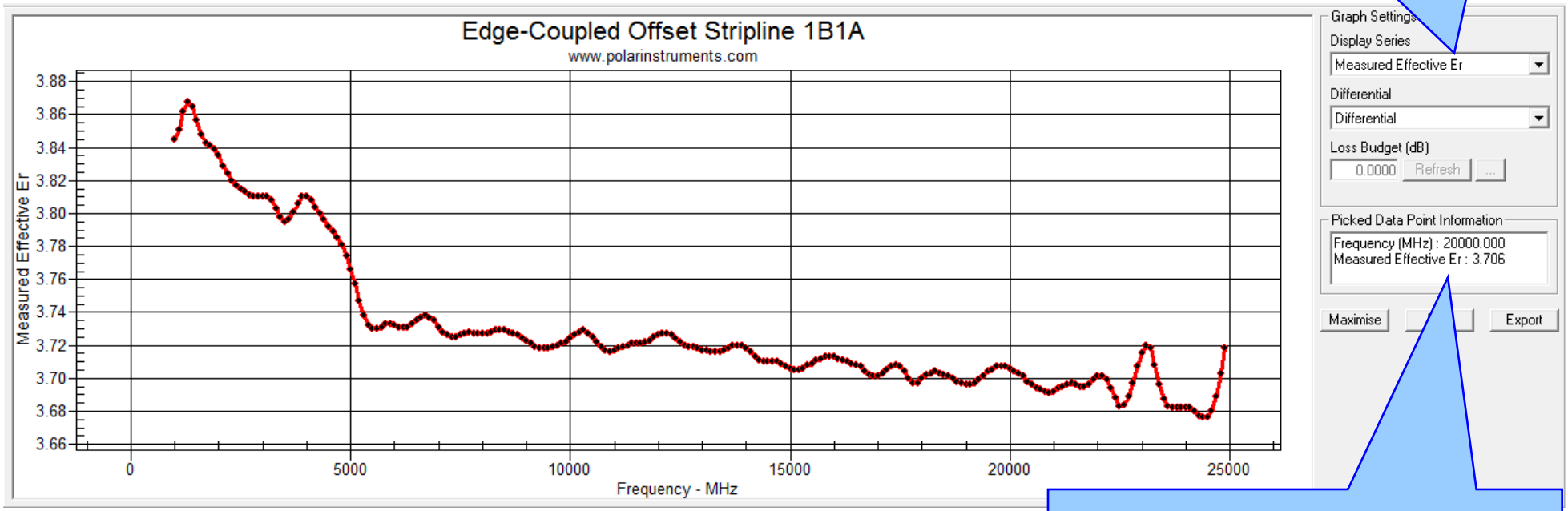
Selecting the Measured Attenuation display series allows the measurement data to be plotted without the modelling data.
Notice that a line fit algorithm has been applied to the raw measurement data



By clicking on a plotted data point it is possible to query the attenuation at a frequency. In this example, at 20 GHz the attenuation is -0.598 dB per 10 mm

Measured Effective Er plot : 1GHz to 25GHz

Selecting the Measured Effective Er display series allows the measurement data to be plotted without the modelling data.



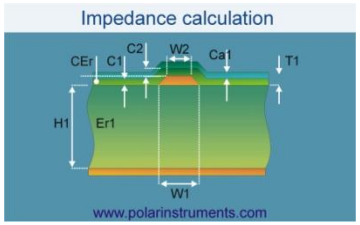
By clicking on a plotted data point it is possible to query the Effective Er at a frequency. In this example, at 20 GHz the Effective Er is 3.706

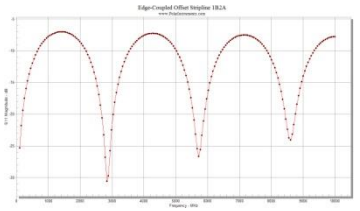
Summary

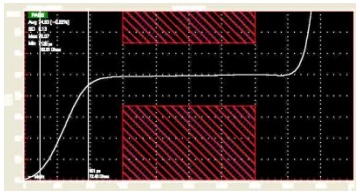
The Polar Si9000e functionality has been extended to import Delta-L, SPP and SET2DIL insertion loss measurement data from the Polar Atlas Transmission Line Test System.

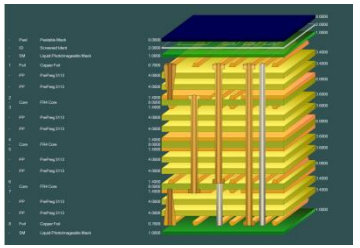
This allows the user to quickly overlay the modelled / measured data for comprehensive comparison and analysis

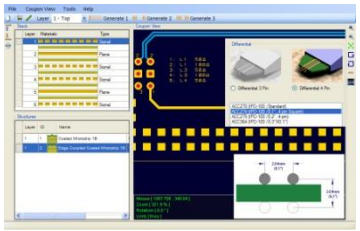
Using the powerful modelling capability of the Si9000e it is possible to fine tune the structure parameters based on the reality of measurement data. For instance, adjust the substrate height and trace width / separation geometries, goal seek the loss tangent and model the affect of surface roughness on the conductor layers.



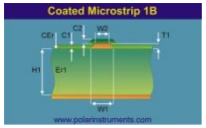


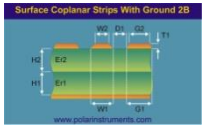


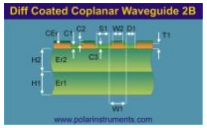


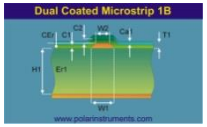


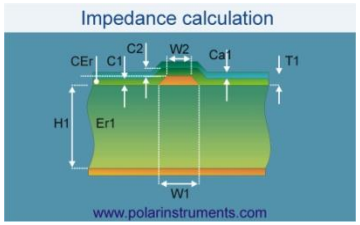
Thank you

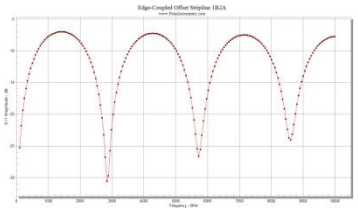


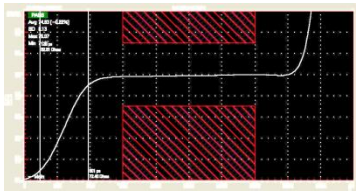


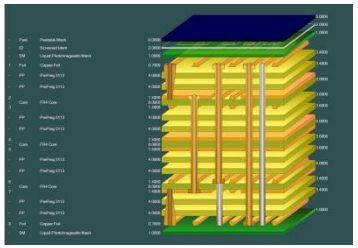


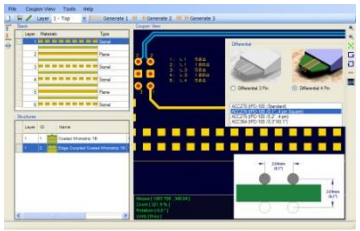












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