

Si9000e Version History



Si9000e Key product milestones

(Detailed change history on following page)

- 2019** New Launch LA9000 S-Parameter Loss Analysis options
New Monte Carlo Analysis option
Updated bi-directional copy / paste interface between Speedstack and Si9000e now with improved support for loss tangent (Ref TanD)
Causal modeling extended to copper losses
- 2018** New Cannonball-Huray method added to Surface Roughness Compensation options
Improved support for retina-style screen resolutions
Copy / Paste Structure data now supports frequency dependent parameters
- 2017** Imports Polar CITS (Controlled Impedance Test System) impedance log files for analysis, comparing modelled with real production data
Addition of Grosse and Huray roughness compensation
- 2016** Import insertion loss data / back calculate loss tangent / broadside over prepreg structures / groundless differential structures for Gigabit Ethernet
- 2015** Save groups of structures as a project and import projects from Speedstack / Windows 10 / Touchscreen compatibility
- 2014** Enhanced causal modeling and options for Er behaviour / Compatibility for users of SPP insertion loss test.
- 2013** Process window capability / Enhanced calculation of low frequency resistance / Eight additional coplanar structures
- 2012** Traffic signal via check enhanced / New graph style for presentations / copy paste mesh planes to and from Speedstack
- 2011** Copper roughness compensation now caters for drum and shiny side copper / Hatched planes support hatch - solid plane on alternate layers
- 2010** Enhanced accuracy mode added / Initial support for crosshatch (mesh) planes / Touchstone™ import capability
- 2009** My structures – rename structures using in house conventions / Loss budget – display loss budget on insertion loss graph / Causality forced when using extended substrate data. BEM engine fixes for coated structures. Fixes for unit conversion of skin depth. LF support – calc engine now solves down to low (KHz) frequencies

Si9000e Changes v19.05 (2019)

New Launch LA9000 S-Parameter Loss Analysis toolbar and file menu options

File | Export Touchstone Format improvements

File | Export W-Element Format improvements

File | Export S-Parameter Data improvements

Si Project .SIP file association now added to auto-launch the application from the Si Project filename

CalcEngine. Causal surface roughness calculation improvements

Help | Latest Versions option added to display web pages detailing the latest Polar product versions

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (19.04) / PSec.DLL (15.12)

PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)

TRC.EXE (14.07)

Si9000e Changes v19.03 (2019)

New Monte Carlo Analysis option

Updated .Si8, .Si9 and .SIP file formats to store Monte Carlo Analysis parameters

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (19.01) / PSec.DLL (15.12)

PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)

TRC.EXE (14.07)

Si9000e Changes v19.01 (2019)

Impedance and Insertion Loss Calculations - new calculation engine supported. These improvements may slightly alter the calculation results:

1. Modifications implemented to support causal surface roughness. When surface roughness is used the following results are now modified : dInductance,dConductorLoss, ImpedanceStruct, dImpedanceMagnitude, dModalPhaseVelocity, dAlpha, dBeta, dConductorLossWithRoughness, dAttenuationWithRoughness
2. Goal Seeker algorithm improvements - code rewritten to support new method
3. Differential Offset CoplanarStrips 2B2A - substrate three (H3) and four (H4) calculation corrected - 001-00-000756

Updated .Si8, .Si9 and .SIP file formats. Updated to support the Configuration | Solver Accuracy setting - 001-00-000761

Updated bi-directional copy / paste interface between Speedstack and Si9000e now with improved support for loss tangent (Ref TanD)

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (19.01) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v18.09 (2018)

Import CITS Data Log File option. Now supports data log files (.CLF) generated by CITS880s v18.05

Fixes:

1. Import CITS Log File problem when Windows Regional Settings has comma nominated as the decimal symbol. Now resolved (001-00-000745)
2. If the Causally Extrapolate Er / TanD mode is enabled and a Ref Frequency point of 0 Hz is entered / pasted from Speedstack an exception error is sometimes thrown when a frequency dependent calculation is selected. Validation check and suitable error now displayed. Resolved (001-00-000749)
3. Sensitivity Analysis, the CS_{nn} parameters are now correctly copied to the Windows clipboard when the context menu Copy Results to the Clipboard (for Excel) option is selected (438-03-000609)

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (18.02) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v18.05 (2018)

Frequency Dependent Calculations. New Cannonball-Huray method added to Surface Roughness Compensation options. This requires the entry of Matte and Drum side Rz values

Updated bi-directional copy / paste interface between Speedstack and Si9000e allows for quick transfer of structure parameters between products - Cannonball-Huray parameters now supported

Updated .Si8, .Si9 and .SIP file formats, to support the new Cannonball-Huray method / parameters

Fixes:

When the same structure is duplicated more than once in a Project an exception was caused if the first duplicated structure was not renamed. This is now resolved (470-02-000003)

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (18.02) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v18.03 (2018)

Import CITS Data Log File option. Now supports data log files (.CLF) generated by CITS880s v17.10

Decimal precision of parameter entries now change based upon the units selected. This improves the readability of parameter entries and improves accuracy when switching units

License feature change. The new 2018-style license features support additional data such as Polarcare Contract information. Please note, 2018 features will not support pre-v18.x versions of our products

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (18.02) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v18.01 (2018)

New layout of the main dialog that reduces the horizontal pixel size requirement to address truncation problems identified when 200% scaling is applied to retina-style resolutions.

Copy / Paste Structure data between Si8000m / Si9000m and Speedstack now supports frequency dependent parameters when used in conjunction with Speedstack v18.01

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (17.06) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v17.07 (2017)

New Import CITS Data Log File option:

1. Import impedance measurement data from the Polar CITS (Controlled Impedance Test System) and compare against modelled structures
2. A series of graphing and analysis options are available that present the modelled / measurement data
3. Quickly gauge modelled to measured impedance correlation between manufacturing batches
4. Supports data log files (.CLF) produced by Polar CITS500s, CITS800s, CITS900s and CITS880s instruments

Import CITS, Atlas and Touchstone options now grouped together on the main toolbar

Graphing. Enhanced graphing library that supports larger data sets

User Interface. A number of user interface enhancements / improvements have been included in this release

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (17.03) / PSec.DLL (15.12)
PolarGraphDLL (17.06) / PEGRP32F.DLL (8.0.0.62)
TRC.EXE (14.07)

Si9000e Changes v17.04 (2017)

Surface Roughness Compensation enhancements:

1. Huray calculation method improved for stripline structures

FlexNet Publisher / FLEXIm v11.13.1.2 supported

CalcEngineBEMDLL (17.03) / PSec.DLL (15.12)
PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
TRC.EXE (14.07)

Si9000e Changes v17.03 (2017)

Surface Roughness Compensation enhancements:

1. New Grosse and Huray calculation methods have been introduced
2. It is now possible to nominate one of the four methods available: Smooth, Hammerstad, Grosse and Huray
3. The Huray method allows for the following parameters to be specified: Ratio of Areas, Effective Ball Radius, Area of Ball Count and Number of Balls in Area
4. All Losses plot will update to reflect the Surface Roughness Compensation method selected

'More' calculation enhancements:

1. The 'More' calculation option has been enhanced when differential structures are selected
2. Near-End Crosstalk (NEXT) and Coupling Percentage results are now calculated and displayed

Updated .Si8, .Si9 and .SIP file formats:

1. File formats updated to support new Surface Roughness Compensation methods / parameters

Fixes:

1. The Measurement Data tab has now been included in the multilingual translation resources (001-00-000663)
2. When the locale uses a comma as decimal symbol, deleting a frequency entry from an extended substrate data table caused an error. This is now resolved. (438-03-000451)
3. A more meaningful error message is displayed when an extended substrate table (.EST) is exported with an invalid filename (438-03-000449)

FlexNet Publisher / FLEXIm v11.13.1.2 supported
CalcEngineBEMDLL (17.01) / PSec.DLL (15.12)
PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
TRC.EXE (14.07)

Si9000e Changes v16.07 (2016)

Features

1. Import measurement data directly from the Polar Atlas Transmission Line Test System:
2. Import measurement data acquired using Delta-L, SPP and SET2DIL test methodologies
3. Data may be imported from the clipboard of text file
4. Once imported measurement data may be overlaid onto modelled data for comprehensive analysis - measured data shown as an additional data set on the All Losses plot
5. New Measured Attenuation and Measured Effective Er display series have been adding to the graphing display series options
6. New Measurement Data tab shows imported data in table form
7. Measurement data table can be exported to clipboard for further analysis using other tools
8. New Measurement Data Options provides tools to auto-adjust the current structure to match the frequency range and length of line of the imported measurement data
9. Loss Tangent Goal Seek enhancements:

- a. New functionality to set the total attenuation field from the picked data point on the All Losses graph. This is especially useful when importing measurement data
- b. New option to update the current structure with the calculated Loss Tangent

FlexNet Publisher / FLEXIm v11.13.1.2 supported
CalcEngineBEMDLL (16.04) / PSec.DLL (15.12)
PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
TRC.EXE (14.07)

Si9000e Changes v16.05 (2016)

Features

1. New Loss Tangent Goal Seek option:
2. New option introduced to back calculate the loss tangent for a structure from the insertion loss measurement data. The measurements are generated using the Polar Atlas system or others that are capable of measuring insertion loss

Workflow is as follows:

1. Enter the total attenuation (S21 / SDD21) at a given frequency from the insertion loss measurement data
2. Calculate the conductor loss for the frequency entered from the current structure parameters. Subtracting this calculated conductor loss from the total attenuation will leave the dielectric loss
3. Use the Si9000 Goal Seek algorithm to vary the loss tangent until it matches the required value to achieve the dielectric loss as calculated in Step 2

Fixes:

1. When the Trace Thickness (T1) is greater than the Substrate Height (Hn) the CalcEngine sometimes threw an exception error rather than displaying an appropriate warning. This has now been resolved; the eight structures identified as having the error are as follows:
 - a. Offset Coplanar Strips 1B2A,
 - b. Offset Coplanar Strips 2B2A,
 - c. Offset Coplanar Waveguide 1B2A,
 - d. Offset Coplanar Waveguide 2B2A
 - e. Diff Offset Coplanar Strips 1B2A,
 - f. Diff Offset Coplanar Strips 2B2A,
 - g. Diff Offset Coplanar Waveguide 1B2A,
 - h. Diff Offset Coplanar Waveguide 2B2A

FlexNet Publisher / FLEXIm v11.13.1.2 supported
CalcEngineBEMDLL (16.04) / PSec.DLL (15.12)
PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54) / TRC.EXE (14.07)

Si9000e Changes v16.03 (2016)

Features

1. New Structures. Ten new structures have been added:
2. Two new Broadside structures:
 - a. BroadsideStripline1E2S,
 - b. BroadsideStripline1E3S - 'Broadside over prepreg' style structures for stack ups where the two signal traces of the broadside are on separate core materials
3. Eight new Differential Without Ground structures:
 - a. EdgeCoupledSurfaceWithoutGnd1B,
 - b. EdgeCoupledSurfaceWithoutGnd2B,

- c. EdgeCoupledCoatedWithoutGnd1B,
 - d. EdgeCoupledCoatedWithoutGnd2B,
 - e. EdgeCoupledEmbeddedWithoutGnd1B1A,
 - f. EdgeCoupledEmbeddedWithoutGnd1B2A,
 - g. EdgeCoupledEmbeddedWithoutGnd2B1A,
 - h. BroadsideWithoutGnd2S - Aimed at low layer count stack ups commonly used in the flex market, to be used only when no reference planes exist within stack up. These structure do not return even / common mode so will work differently to the other differential structures
4. Extended Substrate Data. Three different modes are now selectable from the main dialog:
 - a. Constant Er / TanD
 - b. Causally Extrapolate Er / TanD
 - c. Multiple Er / TanD
 5. New Causally Extrapolate Substrate Data options:
 6. It is now possible to specify the substrate causal extrapolation reference points (Frequency vs Er / TanD) per structure substrate region
 7. Substrate causal extrapolation reference points are now stored per structure allowing different structures to have different reference points
 8. Frequency vs Er / TanD graphing shows the extrapolated data for the frequency min / max range specified
 9. Updated .Si8, .Si9 and .SIP file formats:
 10. File format changed to support new structures
 11. New Extended Substrate Data modes now saved
 12. New causal extrapolation reference points now saved
 13. User Interface:

A number of user interface enhancements / improvements have been included in this release

FlexNet Publisher / FLEXIm v11.13.1.2 now supported
 CalcEngineBEMDLL (16.02) / PSec.DLL (15.12)
 PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (14.07)

Si9000e Changes v15.10 (2015)

Features

1. Application configuration files now moved to the Windows-compliant folders
 - a. Windows Vista, 7, 8, 10: \Users\\AppData\Roaming\Polar
 - b. Windows XP: \Documents and Settings\\Application Data\Polar
2. Support for Windows 10
3. FlexNet Publisher / FLEXIm v11.13 now supported

CalcEngineBEMDLL (12.11) / PSec.DLL (15.07)
 PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (14.07)

Si9000e Changes v15.07 (2015)

Features

1. Projects - New options introduced to group design related structures into a single Project
2. Options are available to add, delete, rename, move up / down and duplicate structures within the Project

3. New toolbar options and right-click menu allows the management of structures within the Project
4. The structure graphic has been enhanced
 - a. Standard structures display with a teal background
 - b. Project structures display with a grey background within the caption bar displaying the Project structure name
5. A new Si Project file format (.SIP) has been introduced, the File menu now contains Open Project and Save Project options
6. The Projects feature is protected with a separate licence feature (SI_PROJECTS)
7. Paste from Speedstack to Si8000m / Si9000e Project
 - a. A new toolbar option has been introduced to paste / import a group of structures from Speedstack directly into the Project group
8. Structure Data Storage
 - a. Previously global parameters (Frequency Distribution, Result Presentation, Surface Roughness, S-Parameter Configuration, Hatch Parameters etc) now moved to being structure-based allowing each structure to have their own complete set of parameters
 - b. Updated .Si8 file format to support new structure-based parameters
 - c. Updated .Si9 file format to support new structure-based parameters
9. Copy / Paste Structure data between Si8000m / Si9000m and Speedstack
 - a. The existing copy / paste structure clipboard format used with Speedstack has been updated to accommodate new data
 - b. The copy / paste structure functionality also works with CGen, a new 'Copy to CGen' toolbar options has been introduced
10. Copy / Paste Structure Parameters
 - a. Copy all structure parameters (lossless and frequency dependent) and paste to another structure. This saves considerable time when comparing calculation results between two similar structures
 - b. New toolbar options have been introduced for Copy Structure Parameters and Paste Structure Parameters
11. Printing
 - a. The File | Print option has been enhanced to support Project based structures
12. Update ListView Structure Selection Component
 - a. Migrate from Microsoft Windows Common Control 5.00 to Windows Common Controls 6.00.
 - b. This move was required due to a problem with the ListView component in WCC 5.00 that sometimes caused the application to crash on Windows 8 / 8.1 / 10 devices with touch screens enabled.
13. User Interface
 - a. On the Lossless Calculation tab the Impedance / Differential Impedance result is now highlighted
 - b. A number of other user interface enhancements / improvements have been included in this release

CalcEngineBEMDLL (12.11) / PSec.DLL (9.03)
PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54)
TRC.EXE (14.07)

Si9000e Changes v14.07 (2014)

1. Enhancements to the More Results option:
 - a. Calculate and display Effective Er (EEr) for the structure
 - b. Calculate and display Velocity of Propagation (Vp) for the structure – useful for Test Editor | Vp entry within Polar CITS test editor

2. Trace conductivity units:
 - a. New option to enter conductivity or resistivity of conductor
3. Track Resistance Calculator enhancements (TRC):
 - a. New option to enter conductivity or resistivity of material
 - b. Resistivity parameter value will now automatically pass to the TRC alongside other structures parameters (W1, W2, T1, LL etc)
 - c. New electro-deposited copper material added to the TRC material library - Copper (Electro Deposited) 2.20E-08 Ohm m
4. Extended Substrate Data (Frequency vs Er / TanD):
5. Three different modes are now included:
 - a. Single value for all frequencies – straight line capacitance (extended substrate data not selected)
 - b. Multi frequency points in extended substrate table (extended substrate data selected with multiple frequency points)
 - c. A single frequency point in table - Svensson-Djordjevic method to enforce causal modelling (extended substrate data selected with single frequency point)
6. New import / export options to extended substrate data dialog have been added so that individual tables can be easily exchanged between other Si9 users. New extended substrate table file format (.est).
7. Enhancements for users of the Short Pulse Propagation (SPP) test method
 - a. New Alpha dB column added to frequency dependent results
 - b. New display series option to plot Alpha
 - c. New display series option to plot Beta
8. Printing
 - a. Effective Er added to results section of print option
 - b. Velocity of Propagation added to results section of print option
 - c. Right justify parameter values and results to improve clarity of report
9. Right-click menu
 - a. A new right-click menu on all result data grids containing 'Copy Results to Clipboard (Excel)' option to export displayed result data
10. Via Checks tab
 - a. The Via Checks tab is now enabled for both Si8000m and Si9000e users
11. Update .Si8 and .Si9 file formats
 - a. Enhance formats to support new features
12. User Interface:

A number of user interface enhancements / improvements have been included in this release

CalcEngineBEMDLL (12.11) / PSec.DLL (9.03)

PolarGraphDLL (13.03) / PEGRPCS.DLL (5.0.0.54) / TRC.EXE (14.07)

Si9000e Changes v13.02 (2013)

Features

1. New Process Window option:
 - a. New feature to specify target impedance with tolerance and then calculate the Minimum, Nominal and Maximum parameter values to meet the Minimum, Nominal and Maximum impedances
 - b. New toolbar option to launch Process Window mode
2. New Structures. Eight new coplanar structures have been added:
3. Four new Single-Ended Offset Coplanar structures:
 - a. OffsetCoplanarStrips1B2A,

- b. OffsetCoplanarStrips2B2A,
 - c. OffsetCoplanarWaveguide1B2A,
 - d. OffsetCoplanarWaveguide2B2A
4. Four new Differential Offset Coplanar structures:
 - a. DiffOffsetCoplanarStrips1B2A,
 - b. DiffOffsetCoplanarStrips2B2A,
 - c. DiffOffsetCoplanarWaveguide1B2A,
 - d. DiffOffsetCoplanarWaveguide2B2A
 5. New Sensitivity Analysis option to plot crosstalk results (NEXT / FEXT):
 - a. New option for differential structures
 - b. New graph display series for NEXT, FEXT and NEXT / FEXT on same graph
 - c. New Sensitivity Analysis feature to calculate and plot Zodd / Zeven / Zdiff / Zcommon when using the Constant Impedance vs Changing Parameters feature:
 - d. Useful to users who are designing serial buses that require both the Zdiff and Zcommon to be controlled. e.g. USB specs
 6. Frequency Dependent Calculation tab enhancements:
 - a. Increased result grid precision - scientific notation increased to 3 decimal places
 - b. Increase precision of clipboard formats for Conductor Loss with Roughness and Attenuation with Roughness columns
 7. Calculation Engine enhancements:
 - a. Improved calculation of low frequency resistance
 - b. Update .Si8 and .Si9 file formats:
 - c. File format changed to support eight new coplanar structures
 - d. Extended Substrate Data checkbox status now saved
 - e. Surface Roughness Compensation checkbox status now saved
 8. User Interface:

A number of user interface enhancements / improvements have been included in this release

CalcEngineBEMDLL (12.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (11.01)

Si9000e Changes v12.05 (2012)

Features

1. Closing Application
 - a. An option has been introduced to Cancel the application close event

Fixes:

1. Changing goal seek convergence value under the Configuration | Parameters option does not always work correctly - now resolved. 001-00-000242.
2. Copy / Paste structure data can sometimes causes an exception error - now resolved. 001-00-000243.
3. DiffDualCoatedCoplanarWaveguideWithLowerGND1B and 2B in SiExcel, changing CSEr does not affect the impedance result - now resolved. 001-00-000250.

CalcEngineBEMDLL (10.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (11.01)

Si9000e Changes v12.01 (2012)

1. Enhance copy / paste structure exchange format (clipboard) to support hatch profile

- a. Hatch Pitch, Hatch Width, Lower and Upper Hatch Plane flags are now transferred between Si8000m / Si9000e and Speedstack
- 2. Via Check
 - a. A new via check mode has been introduced, with selectable options for Stub and Via
- 3. Extended Substrate Data description change
 - a. Multiple Er / TanD Data is a more appropriate description for this feature
- 4. Via Pad / Anti-Pad Calculation graphic title change
 - a. Add Coaxial to the name to indicate the calc technique used and reduce confusion
- 5. Introduce warning if TRC or Si Excel Interface files are not found
 - a. In previous versions of the Si8000m / Si9000e, if the path to the file was incorrect selecting the Toolbar icon resulted in nothing happening. Now an error message / guidance text will be displayed
- 6. New Graph Style option introduced to allow the selection of a colour scheme for graphs that is more appropriate for screen grabs and projectors
 - a. Option available from Configuration menu
 - b. Support for frequency dependant, sensitivity analysis and s-parameter graph options
 - c. Fixes:
- 7. Unable to edit items in the Extended Substrate Data tables when using German Windows XP - now resolved

CalcEngineBEMDLL (10.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (11.01)

Si9000e Changes v11.04 (2011)

Features

- 1. Surface Roughness Compensation enhancements:
 - a. Support for multiple surface roughness parameters, the number of parameters being dependent upon the number of conductor surfaces on the structure chosen
 - b. The "All Losses with Roughness" graph has been removed. The "All Losses" graph will now include the With Roughness data if the Use Roughness Compensation checkbox is selected

CalcEngineBEMDLL (10.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (11.01)

Si9000e Changes v11.01 (2011)

- 1. Track Resistance Calculator (TRC):
 - a. New add-on available for the Si8000m / Si9000e to calculate DC resistance of a track
 - b. Current structure W1, W2, T1 and LL parameters automatically passed from current selected structure to the TRC
 - c. The Track Resistance Calculator is protected with a separate licence feature (SI_TRC)
 - d. The Licence Options facility has been enhanced to enable / disable this feature
 - e. More details available in the following application note:
<http://www.polarinstruments.com/support/cits/AP144.html>
- 2. Startup Mode:
 - a. A new Configuration | Startup Mode option has been introduced to specify which tab is displayed when the application is opened
- 3. Hatch Plane Support (XFE) Enhancements:

- a. For stripline structures hatch mode now supports solid plane / hatched plane combinations
- b. New toolbar icons to enable hatch mode independently for lower and upper planes
4. Sensitivity Analysis - Process Window option:
 - a. Constant Impedance vs Changing Parameters facility now has an option to calculate the minimum and maximum impedance (process window), in addition to the existing nominal target impedance.
 - b. When this option is enabled the sensitivity analysis graphing and results tables are updated to present the three resulting data sets
5. Via Pad / Anti-Pad Calculation (Via Checks tab):
 - a. Calculates the impedance for the specified via pad / anti-pad sizes as the transmission line passes through the reference plane
 - b. The calculation will determine the effect of the via pad size in relation to the anti-pad size
 - c. More details available in the following application note:
<http://www.polarinstruments.com/support/si/AP8178.html>
6. Calculate the effect of Surface Roughness through to the frequency dependent RLGC / S-Parameter data:
 - a. The BEM CalcEngine has now been enhanced to include this feature
7. User Interface:

A number of user interface enhancements / improvements have been included in this release

Fixes:

1. CalcEngine: A problem with the Differential Embedded Coplanar 2B1A structure has been resolved
2. Goal Seek: When using differential structures with the Constant Pitch option an error sometimes occurred when goal seeking parameters other than W2. This has been resolved.
3. Frequency Dependent Calculation: Setting the Frequency Minimum (FMin) and Frequency Maximum (FMax) to the same value sometimes caused an error. This has been resolved.

CalcEngineBEMDLL (10.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)
 TRC.EXE (11.01)

Si9000e Changes v10.07 (2010)

Features

1. New Si Excel Interface:
 - a. Now licensed to work with Si8000m or Si9000e
 - b. Delivered with the Si8000m and Si9000e installer
 - c. Requires new SI_EXCEL licence feature
 - d. New toolbar option to launch Si Excel Interface

CalcEngineBEMDLL (9.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v10.06 (2010)

Features

1. Hatch Plane Support (XFE) Feature:
 - a. Adjust Lossless Calculation / Sensitivity Analysis results to compensate for the effect of Hatch Planes

- b. New Hatch Configuration option provides facilities to define hatch pattern
 - c. Hatch Plane mode is protected with a separate licence feature (SI_XFE)
 - d. New Licence Options facility to enable / disable licence features
2. Parameter Up / Down Options:
- a. On the Lossless Calculation tab, when using the up / down arrows the software now only updates W2 when W1 is altered. W2 parameter worked independently.
 - b. The value in the Lower Trace Width Etch Factor, found under the Configuration | Parameters dialog, is used when calculating the difference between W1 / W2 and G1 / G2
3. Flexible Beta Structures removed:
- a. FlexiCoatedMicrostrip1B
 - b. FlexiEmbeddedMicrostrip1B2A
 - c. FlexiOffsetStripline1B2A

CalcEngineBEMDLL (9.11) / PSec.DLL (9.03)
 PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v10.01 (2010)

1. Interactive Graphs:
- a. It is now possible to pick a data point on a Sensitivity Analysis and Frequency Dependent graphs and the resultant point info is displayed.
 - b. A grabber hand icon will be displayed when the mouse hovers over a data point. On picking the data point the Picked Data Point Information will update with the appropriate information.
2. Parameter Up / Down Options:
- a. On the Lossless Calculation tab, when using the up / down arrows the software now updates W1 / W2 or G1 / G2 simultaneously. Previous the parameters worked independently.
 - b. The value in the Lower Trace Width Etch Factor, found under the Configuration | Parameters dialog, is used when calculating the difference between W1 / W2 and G1 / G2
3. Frequency Entry:
- a. A new Frequency Entry option now exists where it is possible to specify the start and end frequency and an increment. The software then calculates the necessary frequency steps so that each calculation point falls exactly on the frequency increment. eg. every 100 MHz.
 - b. This new feature is accessible by using the Set... option on the Frequency Dependent tab
4. Solver Accuracy Mode:
- a. A new option has been added to the Configuration menu to switch the solver accuracy between Default and Enhanced modes.
 - b. The Enhanced Mode is especially useful when calculating fine Trace Thickness geometries.
 - c. Enhanced Mode will increase calculation times
5. Import Touchstone Format:
- a. This new option is accessible by using the File | Import Touchstone Format menu selection.
 - b. It is possible to import a Touchstone file containing S-Parameter data, with options to display just the Touchstone data or combine this data with the current selected structures S-Parameter data.
 - c. A Touchstone file may be exported from the Si9000e using the File | Export Touchstone Format option, and this makes it possible to compare two sets of modelled data on the same graph.

- d. When overlaying the two sets of data the software will automatically check that the frequency range of the calculated data matches that of the Touchstone data, and if this isn't the case an option will be displayed offering an adjust and recalculate function.

CalcEngineBEMDLL (9.11) / PSec.DLL (9.03)
PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)

Fixes:

1. CalcEngine Fix: A problem relating to the Edge Coupled Offset Stripline 2B1A1R structure has been resolved

Si9000e Changes v9.07 (2009)

Features

1. My Structures:
 - a. A new My Structures user-definable structure group has been introduced to the main toolbar
 - b. The new Structure Configuration option allows the nomination of structures to be included in the My Structures group
2. Structure Name Alias:
 - a. Facilities have been provided to allow the structure names to be replaced. The new alias name is used within the structure list, structure image and graphs
 - b. The new Structure Configuration option provides facilities to add structure name aliases for each structure
3. Loss Budget Selector:
 - a. A new a feature to allow for the selection of a Loss Budget from a user-definable table has been added. The selected Loss Budget is then plotted on the All Losses graphs
 - b. The new Loss Budget Configuration option provides facilities to add up to 100 different entries within the Loss Budget table
4. Extended Substrate Data Enhancement:
 - a. Within the CalcEngine there have been enhancements to the extrapolation code, to improve the causality of our field solver.

CalcEngineBEMDLL (9.03) / PSec.DLL (9.03)
PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v9.04 (2009)

1. 3 Flexible Structures introduced:
 - a. FlexiCoatedMicrostrip1B
 - b. FlexiEmbeddedMicrostrip1B2A
 - c. FlexiOffsetStripline1B2A
 - d. These structures are protected with a separate licence (Si-flexible). Frequency dependent calculation not current supported on flexible structures.
2. Sensitivity Analysis:
 - a. Plot sensitivity against 2 variables
 - b. 3D graphing functionality
3. Export to Clipboard Enhancements:
 - a. Add Surface Roughness value to clipboard header
 - b. Add S-Parameter source and load termination values to clipboard header
4. Si8000m / Si9000e Database Format (.Si8 / .Si9)
 - a. Alter Si8000m / Si9000e Database formats to support the new Flexible Structures

Fixes:

1. CalcEngine Fix: Problem related to the ratio of value of C1, C2 and T1. Differential Coated Coplanar Waveguide with Ground 1B & Differential Coated Coplanar Waveguide with Ground 2B
2. CalcEngine Fix: Problem related to Broadside goal seek.
3. Fix: On some differential structures, when using the frequency dependent calculation, the software crashed with an overflow error if the calculation was terminated using the Stop button on the Even Mode (2nd pass) calculation.
4. Fix: Skin Depth result, when presented in inches, was wrong due to a metric / imperial conversion error.
5. Fix: TouchStone renamed to Touchstone. Incorrect capitalisation.

CalcEngineBEMDLL (9.03) / PSec.DLL (9.03)
PolarGraphDLL (9.02) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v9.02 (2009)

Features

1. Low Frequency Support
 - a. Updated Calculation Engine now supports lower frequencies
2. New Via Stub Check tab. Three modes supported:
 - a. Stub Length, Effective Er and Bit Rate Frequency
 - b. Stub Length, Effective Er and Single Frequency
 - c. Stub Length, Effective Er and Rise Time
3. S-Parameters: New S-Parameter User Interface Options
 - a. New graphing tabs for 2 Port, 4 Port and Mixed Mode
 - b. New data tabs for 2 Port, 4 Port and Mixed Mode
 - c. New 2 Port 2 x 2 graphing matrix option (Graph All)
 - d. New 4 port 4 x 4 graphing matrix option (Graph All)
 - e. New mixed mode 4 x 4 graphing matrix option (Graph All)
 - f. S-Parameter Frequency Steps moved from frequency dependent parameter list into its own position within the S-Parameter Configuration
4. S-Parameters: New Specifiable Source and Load Impedance options
5. S-Parameters: New Mixed Mode S-Parameters tabs
 - a. Option introduced to present 4 port S-Parameters as mixed mode
6. S-Parameters: New Numbering Mode
 - a. Option introduced to switch 4 port S-Parameter numbering mode between Modern and Classic
7. Export: New / Updated export options
 - a. New Export S-Parameter Data option. Provides options to export S-Parameter data into multiple formats
 - b. Export TouchStone Format updated
 - c. Export W-Element Format updated
8. Application Information
 - a. New "i" buttons introduced to explain option usage which includes a graphic and link to web-based application note
9. Si8000m / Si9000e Database Format (.Si8 / .Si9)
 - a. Alter Si8000m / Si9000e Database formats to support the new S-Parameter Configuration options
10. Licence Change
 - a. Update licensing to use FLEXIm v10.8.7

CalcEngineBEMDLL (8.10) / PSec.DLL (8.09)

Si9000e Changes v9.01 (2008)

Features

1. 12 new dual coated structures introduced:
 - a. Dual Coated Microstrip 1B
 - b. Dual Coated Microstrip 2B
 - c. Edge Coupled Dual Coated Microstrip 1B
 - d. Edge Coupled Dual Coated Microstrip 2B
 - e. Dual Coated Coplanar Strips With Lower Ground 1B
 - f. Dual Coated Coplanar Strips With Lower Ground 2B
 - g. Dual Coated Coplanar Waveguide With Lower Ground 1B
 - h. Dual Coated Coplanar Waveguide With Lower Ground 2B
 - i. Differential Dual Coated Coplanar Strips With Lower Ground 1B
 - j. Differential Dual Coated Coplanar Strips With Lower Ground 2B
 - k. Differential Dual Coated Coplanar Waveguide With Lower Ground 1B
 - l. Differential Dual Coated Coplanar Waveguide With Lower Ground 2B
2. Surface Roughness Compensation:
 - a. The frequency dependent tab has the new option that allows a Root Mean Square value to be entered for roughness in the current selected units.
 - b. Two additional columns in the Single Ended / Odd Mode / Even Mode tabs for "Conductor Loss with Roughness" and "Attenuation with Roughness".
 - c. A new All Losses with Roughness graph has also been introduced.
3. S-Parameters.
 - a. More informative columns headings for S-Parameters. A "Click here for info" option has also been introduced to provide a graphic and link to a web-based application note.
4. Application Information
 - a. New "i" buttons introduced to explain option usage which includes a graphic and link to web-based application note
5. Clipboard Copy / Paste to SB200 / Speedstack: (Speedstack v3.2 and above)
 - a. Improved link with both applications automatically switching to the correct matching units when using the Copy / Paste functions
6. Si8000m / Si9000e Database Format (.Si8 / .Si9):
 - a. Alter Si8000m / Si9000e Database formats to support the new dual coated structures
7. General Application Enhancements / Fixes:
 - a. 4 port S-Parameter calculation correction
 - b. Improvements to existing coated structure calculations
 - c. Japanese language pack correction for the +/- symbol
 - d. New layout for Configuration screen to support dual coated parameters (CS1, CS2, CS3, CSEr)

CalcEngineBEMDLL (8.05) / PSec.DLL (1.90)

PolarGraphDLL (1.50) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v9.00 (2008)

Features

1. Sensitivity Analysis:
 - a. Add new Constant Impedance vs Changing X / Y Axis Parameters option
 - b. Rename existing functionality to Impedance vs Changing X Axis Parameter to distinguish the two methods
2. Lossless Calculation Tab:

- a. Add Tolerance Mode option to switch between absolute and percentage tolerance
 - b. Add Parameter Snap facilities to round parameter values by the Snap Value
 - c. Add UpDown buttons to adjust the parameter values by the Snap Value
 - d. Introduce the Snap Value for each parameter in the Configuration dialog
3. Si8000m / Si9000e Database Format (.Si8 / .Si9):
 - a. Alter Si8000m / Si9000e Database formats to support the Snap Value Configuration and Tolerance Mode
 - b. Alter the Open Database code to overcome the issue caused when exchanging files between users who have different language packs installed
 4. Clipboard Copy / Paste to SB200 / Speedstack:
 - a. Add support for an extended Speedstack clipboard format to accept new adjustment factor fields
 5. Goal Seeker:
 - a. Goal Seek Constant Pitch option now has improved support for Differential Coated Structures. "Mask is flooding space between signal traces" warning is now less likely to occur
 6. Licence Change:
 - a. New User Interface Licence introduced
 7. General Application Enhancements:

A number of other user interface enhancements have been introduced

CalcEngineBEMDLL (3.30) / PSec.DLL (1.80)
 PolarGraphDLL (1.50) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v8.00

Features

1. New Sensitivity Analysis tab:
 - a. Provides options to calculate and plot impedance against a specified structure parameter
 - b. Allows Target Impedance to be specified
 - c. When calculating differential structures multiple impedances may be plotted on same graph
 - d. Result data calculated may be exported to clipboard in an Excel compatible format using the Edit - Copy Current Result Tab to Clipboard option
 - e. Graphs produced may be maximised, printed or exported to jpeg format
2. Frequency Dependent tab:
 - a. New option to specify a Loss Budget value and plot on the All Losses graph
3. General Application Enhancements:
 - a. File associations are now correctly supported for Si9000 Database (.Si9) files
 - b. Graph axis and data series text colour has been changed for improved readability
 - c. Quick Solver 12 toolbar option removed
 - d. Edit - Copy Current Input Parameters To Clipboard option introduced to Si9000. Takes the structure input parameters and formats them suitably for the Si8000 Excel interface
 - e. Other minor user interface changes

CalcEngineBEMDLL (3.30) / PSec.DLL (1.80)
 PolarGraphDLL (1.30) / PEGRPCS.DLL (5.0.0.54)

Si9000e Changes v7.10

Features

1. Export W-Element HSPICE Format

2. Increase 3 decimal point precision on scientific notation for Copy to Clipboard functions
3. Change default S-Parameter Steps to 200
4. Add Glossary to Help menu
5. Append /line to column headers, graph axis and Copy to Clipboard format when Result Presentation is /Length of Line
6. Following feedback regarding our Kf / FEXT result, make code changes to calculation function
7. Add units to Kf on Crosstalk tab
8. FEXT has a maximum limit value $V_f=0.5V_{in}$
9. Correct Copy to Clipboard functions: to work correctly with Singled Ended SPICE RLGC and Differential Even Mode tabs
10. Correct Touchstone output format
11. Alter graph source data when using Differential mode for Inductance, Resistance, Capacitance and Conductance
12. Suppress differential mode graph option when plotting S-Parameter data
13. Correct Edge Coupled Embedded Microstrip 1E1B2A structure
14. Correct Goal Seeker for W1 / W2 (etch factor orientation) when using 1E structures
15. $Er=1$ sometimes results in infinity errors. Alter Calc Engine error handler

Si9000e Changes v7.00

Features

1. Near end and far end crosstalk coefficients, Kb, Kf and FEXT now displayed within interface on separate tab for differential structures (symmetrical / 2 trace structures)
2. Interpolate S-Parameters to speed calculation times. Separate S-Parameter Frequency Steps parameter entry provides this functionality
3. Line Length now matches units of lossless parameters
4. New Results Presentation options allows the display of results / graph per Line Length, per inch or per Metre.
5. Four new structures introduced. Edge Coupled Offset Stripline 1B2A1R, Edge Coupled Embedded Microstrip 1B2A1R, Embedded Microstrip 1E1B1A and Edge Coupled Embedded Microstrip 1E1B1A
6. New Goal Seek Constant Pitch option. When Goal Seeking on Width with differential structures a dialog now appears to maintain the Constant Pitch. This will then adjust the S1 parameter automatically as W1 / W2 changes to maintain the trace separation.
7. On the Frequency Dependent tab the structure parameters are now displayed in a tool tip that appears when the mouse is over the Information icon (i)
8. New Save Current Settings as Defaults. Retain configuration parameters, units and interface style etc. between sessions.
9. New Graph. S11 / S21 on Smith Chart
10. New Graph. S-Parameter S11 - Magnitude (dB)
11. New Graph. S-Parameter S11 - Phase
12. New Graph. S-Parameter S21 - Magnitude (dB)
13. New Graph. S-Parameter S21 - Phase
14. Additional validation checks for S-Parameter Steps and Rise Time entry fields
15. Improved data export capabilities - formatting of RLGC / S-Parameters
16. New Import Si8000 Database option
17. Fix. Print Setup problem that occurs when File - Open has previously been used
18. Fix. Korean printing problem as reported by Calvin, Mr Bae
19. Fix. Minor user interface issues such as parameter hot spot positions (red box on structure graphics) and trends
20. Fix. "Divide by 0" error under the Frequency Dependent calculation when $T1 = 0$

Si9000e Changes v6.10

1. New Frequency Distribution option
2. New File - Export TouchStone Format option
3. Frequency Steps limit increased from 200 to 2000
4. Display new Magnitude and Phase tabs
5. Increase graphing data point limits
6. Insertion Loss renamed to Attenuation
7. Improved multilingual support
8. Online help now supports multilingual
9. New Trace Conductivity validation check
10. Corrections of broadside coupled 3S structure results
11. Improve users ability to stop differential calculations
12. Improve indication of progress during differential calculations
13. Provide more support information on About screen
14. Many other minor enhancements

Si9000e Changes v6.00

1. First release of Si9000e