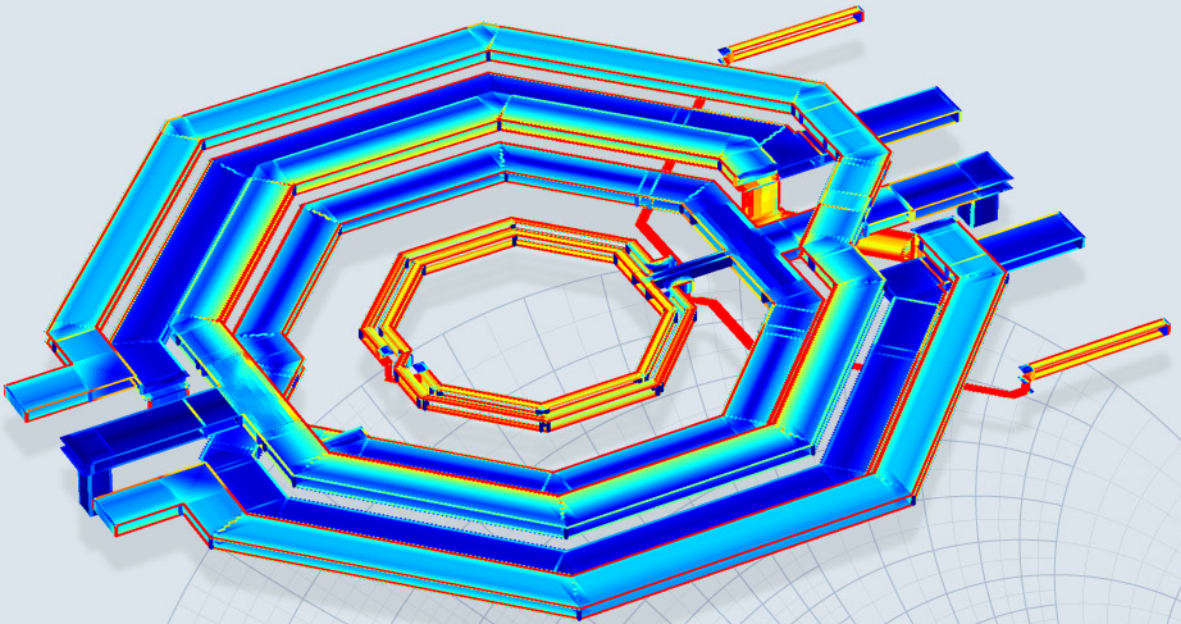


High Frequency Electromagnetic Software

SONNET[®] 13

Suites



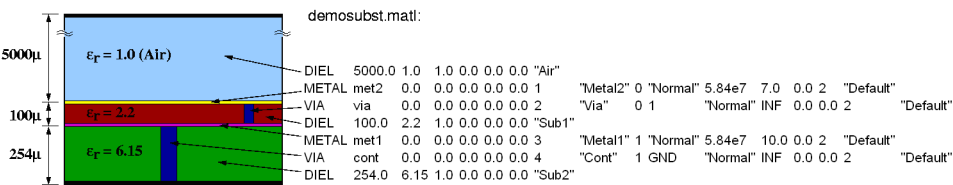
SONNET[®]

Translators

Appendix I .matl File Format

This document details the format of the .matl file used for both Sonnet’s Cadence Virtuoso and Agilent ADS Interfaces. This version of the format is compatible with Sonnet Cadence Virtuoso Interface 13.51 and above and compatible with Sonnet Agilent ADS Interface 13.51 and above

An example of a .matl file is shown below.



The keyword entries and their formats are defined below.

DIEL This entry defines your dielectric levels.

Syntax

```
DIEL Thickness Erel Mrel TanE TanM DielCond DielName
```

There is a DIEL entry for each dielectric layer in your project. The numbering of the dielectric layers is implicitly defined by the position of the DIEL statement in the .matl file. The first DIEL layer represents the highest dielectric layer in your project. The next DIEL statement represents the dielectric layer below that one and so on. The fields are defined in the table below.

Field	Definition
< Thickness>	A non-zero positive floating point number which defines the thickness of the dielectric number in microns.
< Erel>	A positive floating point number which defines the relative permittivity of the dielectric.
< Mrel>	A positive floating point number which defines the relative permeability of the dielectric.
< TanE>	A positive floating point number which defines the dielectric loss tangent of the dielectric.
< TanM>	A positive floating point number which defines the magnetic loss tangent of the dielectric.
< DielCond>	A positive floating point number which defines the conductivity of the dielectric in S/m.
< DielName>	A character string used to identify dielectric. This entry should appear in quotes.

METAL

This entry defines a metal used in your project.

Syntax

```
METAL LayerName Growth Rdc Rrf Xdc Ls Color MetalName SonLevel  
SonMetalType MetalCond MetalThick CurrentRatio NumSheets  
FillType XMin XMax YMin YMax UseEdgeMesh CrossSection  
TopRoughness BottomRoughness
```

There is a METAL entry for each type of metal defined in your project. The metal statement is for metal which appears on the metal level attached to the dielectric layer whose entry proceeds it. Note that in Sonnet, the metal level is attached to the dielectric layer ABOVE it.

When specifying the metal type for metals, vias, etc., you should fill in all values for Rdc, Rrf, Xdc, Ls, MetalCond, MetalThick, CurrentRatio and NumSheets. For example, if you set the SonMetalType to Normal, you would set MetalCond, MetalThick and CurrentRatio to the values desired and set the other values to a default value of zero for Rdc, Rrf, Xdc, Ls and two for NumSheets.

The fields are defined in the table below.

Field	Definition
< Layername>	A character string which is the name of the layer in the Virtuoso or ADS layout containing the objects which are being mapped to this Sonnet layer. Only the layer name is required, the Virtuoso purpose name is not presently used. The character string should appear in quotes.
< Growth>	This field is not currently implemented but is reserved for future use. A floating point number which represents the oversize factor per edge. If this value is not necessary, the default value of 0.0 should be used.
< Rdc>	A floating point number which provides the sheet resistivity of the metal in ohms/square.
< Rrf>	A floating point number which provides the skin effect coefficient of the metal in ohms/square.
< Xdc>	A floating point number which provides the surface reactance of the metal.
< Ls>	A floating point number which provides the kinetic inductance of the metal.
< Color>	An integer value which represents the Color/Pattern for this metal type. The value range is 0-54 with zero always representing the default lossless metal type.
< MetalName>	A character string which is the name of the Sonnet metal type. The character string should be placed in quotes.
< SonLevel>	A positive integer value which is the Sonnet level where the metal is located. The character string GND is used for ground.
< SonMetalType>	A character string which identifies the Sonnet metal model used for this metal. Possible values are General, Normal, ThickMetalModel, SenseMetal, Resistor, or Rdc/Rrf. The character string should be placed in quotes.

Field	Definition
< MetalCond>	A positive floating point number which provides the conductivity of the metal in S/m. This value may also be set to the character string INF for infinite.
< MetalThick>	A positive non-zero floating point number which provides the metal thickness in microns.
< CurrentRatio>	A positive floating point number which provides the current ratio for the metal. This field is only used if < SonMetalType> is set to Normal.
< NumSheets>	An integer value greater than or equal to 2 which defines the number of sheets used to model the metal. This field is only used in < SonMetalType> is set to ThickMetalModel.
< FillType>	A character string which identifies the Sonnet fill type used for this metal. Possible values are Default, Staircase, Diagonal, or Conformal. The character string should be placed in quotes.
< XMin>	A integer value greater than or equal to 1 which defines the minium number of cells in a subsection in the X direction. The default value is 1. Must be less than XMax.
< XMax>	A integer value greater than or equal to XMin which defines the maximum number of cells in a subsection in the X direction. The default value is 100.
< Ymin>	A integer value greater than or equal to 1 which defines the minium number of cells in a subsection in the Y direction. The default value is 1. Must be less than YMax.
< YMax>	A integer value greater than or equal to YMin which defines the maximum number of cells in a subsection in the Y direction. The default value is 100.
< UseEdgeMesh>	A character string which identifies whether the edge mesh option is on. Possible values are EdgeMeshOn or EdgeMeshOff.

Field	Definition
< CrossSection>	A character string which identifies how a Rough Metal type is being modeled. Possible values are Thin or Thick.
< TopRoughness>	A positive floating string number which provides the the top surface roughness in RMS microns.
< BottomRoughness>	A positive floating string number which provides the the top surface roughness in RMS microns.

VIA This entry defines a via.

Syntax VIA LayerName Growth Rdc Rrf Xdc Ls Color MetalName SonLevel SonToLevel SonMetalType MetalCond MetalThick CurrentRatio NumSheets FillType Pads FillFactor VolType

When specifying the metal type for metals, vias, etc., you should fill in all values for Rdc, Rrf, Xdc, Ls, MetalCond, MetalThick, CurrentRatio and NumSheets. For example, if you set the SonMetalType to Normal, you would set MetalCond, MetalThick and CurrentRatio to the values desired and set the other values to a default value of zero for Rdc, Rrf, Xdc, Ls and two for NumSheets.

There is a VIA entry for each via in your project. The fields are defined in the table below.

Field	Definition
< Layername>	A character string which is the name of the layer in the Virtuoso or ADS layout containing the objects which are being mapped to this Sonnet layer. Only the layer name is required, the Virtuoso purpose name is not presently used. The character string should appear in quotes.
< Growth>	This field is not currently implemented but is reserved for future use. A floating point number which represents the oversize factor per edge. If this value is not necessary, the default value of 0.0 should be used.
< Rdc>	A floating point number which provides the sheet resistivity of the via metal in ohms/square.
< Rrf>	A floating point number which provides the skin effect coefficient of the via metal in ohms/square.

Field	Definition
< Xdc>	A floating point number which provides the surface reactance of the via metal.
< Ls>	A floating point number which provides the kinetic inductance of the via metal.
< Color>	An integer value which represents the Color/Pattern for this metal type. The value range is 0-54 with zero always representing the default lossless metal type.
< MetalName>	A character string which is the name of the Sonnet metal type. The character string should be placed in quotes.
< SonLevel>	A positive integer value, or the string GND for ground, which is the Sonnet level where the via starts; this is always the lower end of the via.
< SonToLevel>	A positive integer value, or the string GND for ground or TOP for box top, which is the Sonnet Level where the via ends; this is always the top of the via.
< SonMetal-Type>	A character string which identifies the Sonnet metal model used for this via metal. Possible values are General, Normal, ThickMetalModel, SenseMetal, RoughMetal, Resistor or Rdc/Rrf, Volume, Surface, and Array. The character string should be placed in quotes.
< MetalCond>	A positive floating point number which provides the conductivity of the metal in S/m. This value may also be set to the character string INF for infinite.
< MetalThick>	A positive non-zero floating point number which provides the metal thickness in microns. This value is used in modeling loss and is not a physical thickness.
< CurrentRatio>	A positive floating point number which provides the current ratio for the via metal. This field is only used if < SonMetalType> is set to Normal.
< NumSheets>	An integer value greater than or equal to 2 which defines the number of sheets used to model the via metal. This field is only used in < SonMetalType> is set to ThickMetalModel.

Field	Definition
< FillType>	A character string which identifies the Sonnet fill type used for this metal. Possible values are Default, Ring, Vertices, Center or Full. The character string should be placed in quotes.
< Pads >	A character string which determines whether via pads are added to the top and bottom of the via. If no via pads are used this field should be set to "PadsOn" and if via pads are not to be added this field should be set to "PadsOff." Default value is "PadsOff."
FillFactor	A positive floating point number which defines the fill factor for the Array model. Default value is 100.
Voltype	A character string which identifies the type of Volume loss model used for this via metal. Possible values are Wall, Solid, or N/A. The character string should be placed in quotes. Default value is Wall.

VMATERIAL This entry defines a Sonnet via metal type which is unused in the circuit.

Syntax

```
VMATERIAL MetalName Rdc Rrf Xdc Ls Color SonMetalType
MetalCond MetalThick FillFactor Voltype
```

There is a VMATERIAL entry for each additional unused via metal type you wish to define for your project. Please see ["METAL" on page 424](#) for an explanation of the fields.

MATERIAL This entry defines a Sonnet metal type you wish to define to use elsewhere in your project, such as the box top or bottom.

Syntax

```
MATERIAL MetalName Rdc Rrf Xdc Ls Color SonMetalType MetalCond
MetalThick CurrentRatio NumSheets CrossSection TopRoughness
BottomRoughness
```

There is a MATERIAL entry for each additional metal type you wish to define for your project. Please see ["METAL" on page 424](#) for an explanation of the fields.

