# General Syntax Rules and Guidelines

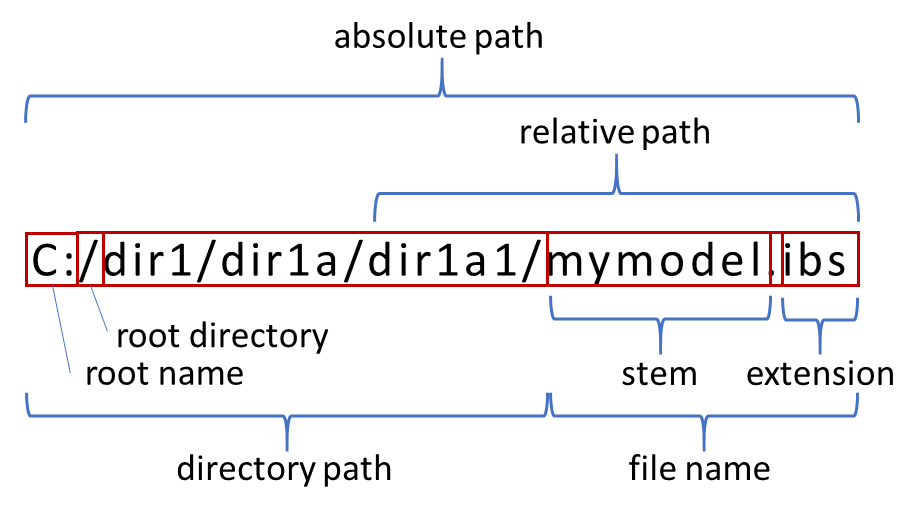
This section contains general syntax rules and guidelines for ASCII .ibs files.

## FILE NAMING DEFINITIONS

The following terms related to file naming are defined here:

* **file name**: The name of a file without its location.
* **stem**: The portion of a file name before the last dot, or the full file name if no dot.
* **extension**: The portion of a file name after the last dot, if any.
* **path**: A sequence of root directory (optional), directory elements and file name that identify the location of a file. A path may be absolute or relative.
* **absolute path**: A path that unambiguously identifies the location of a file without reference to an additional starting location.
* **relative path**: A path that is not absolute, and so only unambiguously identifies the location of a file when resolved relative to an implied starting location.
* **root name**: For operating systems supporting multiple filesystem roots, a name to identify the filesystem.
* **root directory**: A standard designation for the root of a filesystem.

Figure 1 shows an example of a file path with its parts delineated.



1. - Example of file naming definitions

## SYNTAX RULES

1. The content of the files is case sensitive, except for reserved words and keywords.
2. The following words are reserved words and must not be used for any other purposes in the document:

POWER - reserved model name, used with power supply pins

GND - reserved model name, used with ground pins

NC - reserved model name, used with no-connect pins

NA - used where data not available,

CIRCUITCALL - used for circuit call references in Section 6.3

1. To facilitate portability between operating systems, file names used in a .ibs file must only have lower case characters. File names should have a basename of no more than forty (40) characters followed by a period (“.”), followed by a file name extension of no more than three characters. The file name and extension must use characters from the set (space, “ ”, 0x20 is not included):

a b c d e f g h i j k l m n o p q r s t u v w x y z

0 1 2 3 4 5 6 7 8 9 \_ ^ $ ~ ! # % & - { } ) ( @ ‘ `

The file name and extension are recommended to be lower case on systems that support such names.

1. A line of the file may have at most 120 characters, followed by a line termination sequence. The line termination sequence must be one of the following two sequences: a linefeed character or a carriage return followed by linefeed character.
2. Anything following the comment character is ignored and considered a comment on that line. The default “|” (pipe) character can be changed by the keyword [Comment Char] to any other character. The [Comment Char] keyword can be used anywhere in the file as desired.
3. Keywords must be enclosed in square brackets, “[]”, and must start in column 1 of the line. No space or tab is allowed immediately after the opening bracket “[” or immediately before the closing bracket “]”. If used, only one space (“ ”) or underscore (“\_”) character separates the parts of a multi-word keyword.
4. Underscores and spaces are equivalent in keywords. Spaces are not allowed in subparameter names.
5. Valid scaling factors are:

T = tera k = kilo n = nano

G = giga m = milli p = pico

M = mega u = micro f = femto

When no scaling factors are specified, the appropriate base units are assumed. (These are volts, amperes, ohms, farads, henries, and seconds.) The parser looks at only one alphabetic character after a numerical entry, therefore it is enough to use only the prefixes to scale the parameters. However, for clarity, it is allowed to use full abbreviations for the units, (e.g., pF, nH, mA, mOhm). In addition, scientific notation IS allowed (e.g., 1.2345e-12).

1. The I-V data tables should use enough data points around sharply curved areas of the I-V curves to describe the curvature accurately. In linear regions there is no need to define unnecessary data points.
2. The use of tab characters is legal, but they should be avoided as much as possible. This is to eliminate possible complications that might arise in situations when tab characters are automatically converted to multiple spaces by text editing, file transferring and similar software. In cases like that, lines might become longer than 120 characters, which is illegal in .ibs files.
3. Currents are considered positive when their direction is into the component.
4. All temperatures are represented in degrees Celsius.
5. Important supplemental information is contained in Section 9, “NOTES ON DATA DERIVATION METHOD”, concerning how data values are derived.
6. Only ASCII characters, as defined in ANSI Standard X3.4-1986, may be used in IBIS file types. This includes files with file extensions .ibs, .pkg, .ebd, .ami and any other files used for passing parameter values. The use of characters with codes greater than hexadecimal 07E is not allowed. Also, ASCII control characters (those numerically less than hexadecimal 20) are not allowed, except for tabs or in a line termination sequence. As mentioned in item 10 above, the use of tab characters is discouraged.

## Keyword Hierarchy

.ibs FILE

├── File Header Section

│ ├── **[IBIS Ver]**

│ ├── **[Comment Char]**

│ ├── **[File Name]**

│ ├── **[File Rev]**

│ ├── **[Date]**

│ ├── **[Source]**

│ ├── **[Notes]**

│ ├── **[Disclaimer]**

│ └── **[Copyright]**

│

├── **[Component]** Si\_location, Timing\_location

│ ├── **[Manufacturer]**

│ ├── **[Package]** R\_pkg, L\_pkg, C\_pkg

│ ├── **[Pin]** signal\_name, model\_name, R\_pin,

│ │ L\_pin, C\_pin

│ ├── **[Package Model]**

│ │ └── **[Alternate Package Models]**

│ │ └── **[End Alternate Package Models]**

│ │

│ ├── **[Pin Mapping]** pulldown\_ref, pullup\_ref,

│ │ gnd\_clamp\_ref, power\_clamp\_ref,

│ │ ext\_ref

│ ├── **[Diff Pin]** inv\_pin, vdiff, tdelay\_typ,

│ │ tdelay\_min, tdelay\_max

│ ├── **[Repeater Pin]** tx\_non\_inv\_pin

│ ├── **[Series Pin Mapping]** pin\_2, model\_name,

│ │ function\_table\_group

│ ├── **[Series Switch Groups]** On, Off

│ │

│ ├── **[Node Declarations]**

│ │ └── **[End Node Declarations]**

│ │

│ ├── **[Circuit Call]** Signal\_pin, Diff\_signal\_pins,

│ │ │ Series\_pins, Port\_map

│ │ └── **[End Circuit Call]**

│ │

│ └── **[Begin EMI Component]** Domain, Cpd, C\_Heatsink\_gnd,

│ │ C\_Heatsink\_float

│ ├── **[Pin EMI]** domain\_name, clock\_div

│ ├── **[Pin Domain EMI]** percentage

│ └── **[End EMI Component]**

│

├── **[Model Selector]**

│

├── **[Model]** Model\_type, Polarity, Enable,

│ │ Vinl, Vinh, C\_comp, C\_comp\_pullup,

│ │ C\_comp\_pulldown,

│ │ C\_comp\_power\_clamp,

│ │ C\_comp\_gnd\_clamp

│ │ Vmeas, Cref, Rref, Vref

│ │ Rref\_diff, Cref\_diff

│ │

│ ├── **[Model Spec]** Vinh, Vinl, Vinh+, Vinh-, Vinl+,

│ │ Vinl-, S\_overshoot\_high,

│ │ S\_overshoot\_low, D\_overshoot\_high,

│ │ D\_overshoot\_low, D\_overshoot\_time,

│ │ D\_overshoot\_area\_h,

│ │ D\_overshoot\_area\_l,

│ │ D\_overshoot\_ampl\_h,

│ │ D\_overshoot\_ampl\_l,

│ │ Pulse\_high, Pulse\_low, Pulse\_time,

│ │ Vmeas, Cref, Rref, Vref, Cref\_rising,

│ │ Cref\_falling, Rref\_rising,

│ │ Rref\_falling, Vref\_rising,

│ │ Vref\_falling, Vmeas\_rising,

│ │ Vmeas\_falling,

│ │ Rref\_diff, Cref\_diff,

│ │ Weak\_R, Weak\_I, Weak\_V

│ ├── **[Receiver Thresholds]** Vth, Vth\_min, Vth\_max, Vinh\_ac,

│ │ Vinh\_dc, Vinl\_ac, Vinl\_dc,

│ │ Threshold\_sensitivity,

│ │ Reference\_supply, Vcross\_low,

│ │ Vcross\_high, Vdiff\_ac, Vdiff\_dc,

│ │ Tslew\_ac, Tdiffslew\_ac

│ ├── **[Add Submodel]**

│ ├── **[Driver Schedule]**

│ ├── **[Temperature Range]**

│ ├── **[Voltage Range]**

│ ├── **[Pullup Reference]**

│ ├── **[Pulldown Reference]**

│ ├── **[POWER Clamp Reference]**

│ ├── **[GND Clamp Reference]**

│ ├── **[External Reference]**

│ ├── **[C Comp Corner]** C\_comp, C\_comp\_pullup,

│ │ C\_comp\_pulldown,

│ │ C\_comp\_power\_clamp,

│ │ C\_comp\_gnd\_clamp

│ ├── **[TTgnd]**

│ ├── **[TTpower]**

│ ├── **[Pulldown]**

│ ├── **[Pullup]**

│ ├── **[GND Clamp]**

│ ├── **[POWER Clamp]**

│ ├── **[ISSO PU]**

│ ├── **[ISSO PD]**

│ ├── **[Rgnd]**

│ ├── **[Rpower]**

│ ├── **[Rac]**

│ ├── **[Cac]**

│ ├── **[On]**

│ ├── **[Off]**

│ ├── **[R Series]**

│ ├── **[L Series]**

│ ├── **[Rl Series]**

│ ├── **[C Series]**

│ ├── **[Lc Series]**

│ ├── **[Rc Series]**

│ ├── **[Series Current]**

│ ├── **[Series MOSFET]** Vds

│ ├── [**Ramp]** dV/dt\_r, dV/dt\_f,

│ │ R\_load

│ ├── **[Rising Waveform]** R\_fixture, V\_fixture,

│ │ │ V\_fixture\_min, V\_fixture\_max,

│ │ │ C\_fixture, L\_fixture, R\_dut,

│ │ │ L\_dut, C\_dut

│ │ └── **[Composite Current]**

│ │

│ ├── **[Falling Waveform]** R\_fixture, V\_fixture,

│ │ │ V\_fixture\_min, V\_fixture\_max,

│ │ │ C\_fixture, L\_fixture, R\_dut,

│ │ │ L\_dut, C\_dut

│ │ └── **[Composite Current]**

│ │

│ ├── **[Initial Delay]** V-T, I-T

│ │

│ ├── **[External Model]** Language, Corner, Parameters,

│ │ │ Converter\_Parameters, Ports, D\_to\_A,

│ │ │ A\_to\_D

│ │ └── **[End External Model]**

│ │

│ ├── **[Algorithmic Model]** Executable, Executable\_Rx,

│ │ │ Executable\_Tx

│ │ └── **[End Algorithmic Model]**

│ │

│ └── **[Begin EMI Model]** Model\_emi\_type, Model\_Domain

│ └── **[End EMI Model]**

│

├── **[Submodel]** Submodel\_type

│ ├── **[Submodel Spec]** V\_trigger\_r, V\_trigger\_f,

│ │ Off\_delay

│ ├── **[POWER Pulse Table]**

│ ├── **[GND Pulse Table]**

│ ├── **[Pulldown]**

│ ├── **[Pullup]**

│ ├── **[GND Clamp]**

│ ├── **[POWER Clamp]**

│ ├── **[Ramp]** dV/dt\_r, dV/dt\_f, R\_load

│ ├── **[Rising Waveform]** R\_fixture, V\_fixture,

│ │ V\_fixture\_min, V\_fixture\_max,

│ │ C\_fixture, L\_fixture, R\_dut, L\_dut,

│ │ C\_dut

│ ├── **[Falling Waveform]** R\_fixture, V\_fixture,

│ │ V\_fixture\_min, V\_fixture\_max,

│ │ C\_fixture, L\_fixture, R\_dut, L\_dut,

│ │ C\_dut

│ └── **[Initial Delay]** V-T, I-T

│

├── **[External Circuit]** Language, Corner, Parameters,

│ │ Converter\_Parameters, Ports, D\_to\_A,

│ │ A\_to\_D

│ └── **[End External Circuit]**

│

├── **[Test Data]** Test\_data\_type, Driver\_model,

│ │ Driver\_model\_inv, Test\_load

│ ├── **[Rising Waveform Near]**

│ ├── **[Falling Waveform Near]**

│ ├── **[Rising Waveform Far]**

│ ├── **[Falling Waveform Far]**

│ ├── **[Diff Rising Waveform Near]**

│ ├── **[Diff Falling Waveform Near]**

│ ├── **[Diff Rising Waveform Far]**

│ └── **[Diff Falling Waveform Far]**

│

├── **[Test Load]** Test\_load\_type, C1\_near, Rs\_near,

│ Ls\_near, C2\_near, Rp1\_near,

│ Rp2\_near, Td, Zo, Rp1\_far,

│ Rp2\_far, C2\_far, Ls\_far, Rs\_far,

│ C1\_far, V\_term1, V\_term2,

│ Receiver\_model,

│ Receiver\_model\_inv, R\_diff\_near,

│ R\_diff\_far

│

├── **[Define Package Model]**

│ ├── **[Manufacturer]**

│ ├── **[OEM]**

│ ├── **[Description]**

│ ├── **[Number Of Sections]**

│ ├── **[Number Of Pins]**

│ ├── **[Pin Numbers]** Len, L, R, C, Fork, Endfork

│ ├── **[Merged Pins]**

│ ├── **[Model Data]**

│ │ ├── **[Resistance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ ├── **[Inductance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ ├── **[Capacitance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ └── **[End Model Data]**

│ │

│ └── **[End Package Model]**

│

└── **[End]**

.pkg FILE

├── File Header Section

│ ├── **[IBIS Ver]**

│ ├── **[Comment Char]**

│ ├── **[File Name]**

│ ├── **[File Rev]**

│ ├── **[Date]**

│ ├── **[Source]**

│ ├── **[Notes]**

│ ├── **[Disclaimer]**

│ └── **[Copyright]**

│

├── **[Define Package Model]**

│ ├── **[Manufacturer]**

│ ├── **[OEM]**

│ ├── **[Description]**

│ ├── **[Number Of Sections]**

│ ├── **[Number Of Pins]**

│ ├── **[Pin Numbers]** Len, L, R, C, Fork, Endfork

│ ├── **[Merged Pins]**

│ ├── **[Model Data]**

│ │ ├── **[Resistance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ ├── **[Inductance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ ├── **[Capacitance Matrix]** Banded\_matrix, Sparse\_matrix,

│ │ │ │ Full\_matrix

│ │ │ ├── **[Bandwidth]**

│ │ │ └── **[Row]**

│ │ │

│ │ └── **[End Model Data]**

│ │

│ └── **[End Package Model]**

│

└── **[End]**

.ebd FILE

├── File Header Section

│ ├── **[IBIS Ver]**

│ ├── **[Comment Char]**

│ ├── **[File Name]**

│ ├── **[File Rev]**

│ ├── **[Date]**

│ ├── **[Source]**

│ ├── **[Notes]**

│ ├── **[Disclaimer]**

│ └── **[Copyright]**

│

├── **[Begin Board Description]**

│ ├── **[Manufacturer]**

│ ├── **[Number of Pins]**

│ ├── **[Pin List]** signal\_name

│ ├── **[Path Description]** Len, L, R, C, Fork, Endfork, Pin,

│ │ Node

│ ├── **[Reference Designator Map]**

│ └── **[End Board Description]**

│

└── **[End]**