

**IBIS EVOLUTION**  
**(IBIS, PACKAGE, ELECTRICAL BOARD DESCRIPTION, EMI, SSO, ALGORITHMIC MODELING INTERFACE)**  
**Bob Ross, July 25, 2006, updated September 14, 2007, September 8, 2013, April 20, 2014, July 31, 2015, July 21, 2016, July, 19, 2018, March 15, 2019, December 21, 2021, September 20, 2022**

**HEADER SECTION (.ibs, .pkg, .ebd, .ims, .emd, .ems)**

| Version 1.1                                        | Version 2.1 (.ibs, .pkg) | Version 3.2 (.ebd) | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0 (.ims) | Version 7.1 (.emd, .ems), 7.2 |
|----------------------------------------------------|--------------------------|--------------------|-------------|-------------|------------------|--------------------|-------------------------------|
| [IBIS Ver]                                         | [Copyright]              |                    |             |             |                  |                    |                               |
| [Comment Char]<br>(re-defined anywhere<br>in file) |                          |                    |             |             |                  |                    |                               |
| [File Name]                                        |                          |                    |             |             |                  |                    |                               |
| [File Rev]                                         |                          |                    |             |             |                  |                    |                               |
| [Date]                                             |                          |                    |             |             |                  |                    |                               |
| [Source]                                           |                          |                    |             |             |                  |                    |                               |
| [Notes]                                            |                          |                    |             |             |                  |                    |                               |
| [Disclaimer]                                       |                          |                    |             |             |                  |                    |                               |

**TOP-LEVEL KEYWORDS (with END Keywords)**

| Version 1.1  | Version 2.1                         | Version 3.2                      | Version 4.2            | Version 5.1                                       | Version 6.0/6.1* | Version 7.0                         | Version 7.1, 7.2     |
|--------------|-------------------------------------|----------------------------------|------------------------|---------------------------------------------------|------------------|-------------------------------------|----------------------|
| [Component]  | [Define Package Model] (.ibs, .pkg) | [Model Selector]                 | [External Circuit]     | [Test Load]<br>(defined under [Model] in 4.2)     |                  | [Interconnect Model Set] (.ims)     | [Begin EMD] (.emd)   |
| [Model]      | [End Package Model] (.ibs, .pkg)    | [Submodel]                       | [End External Circuit] | [Test Data]<br>(defined under [Test Load] in 4.2) |                  | [End Interconnect Model Set] (.ims) | [End EMD] (.emd)     |
| [End] (.ibs) | [End] (.pkg)                        | [Begin Board Description] (.ebd) |                        |                                                   |                  | [End] (.ims)                        | [End] (.emd)         |
|              |                                     | [End Board Description] (.ebd)   |                        |                                                   |                  |                                     | [EMD Set] (.ems).    |
|              |                                     | [End] (.ebd)                     |                        |                                                   |                  |                                     | [End EMD Set] (.ems) |
|              |                                     |                                  |                        |                                                   |                  |                                     | [End] (.ems)         |

**[Component] PINOUT AND PACKAGE SECTION**

| Version 1.1    | Version 2.1     | Version 3.2            | Version 4.2                    | Version 5.1           | Version 6.0/6.1* | Version 7.0                | Version 7.1, 7.2 |
|----------------|-----------------|------------------------|--------------------------------|-----------------------|------------------|----------------------------|------------------|
| [Component]    | [Pin Mapping]   | [Series Pin Mapping]   | [Alternate Package Models]     | [Begin EMI Component] | [Repeater Pin]   | [Interconnect Model Group] | [Clock Pins]     |
| [Manufacturer] | [Diff Pin]      | [Series Switch Groups] | [End Alternate Package Models] | [End EMI Component]   |                  | [Bus Label]                | [PDN Domain]     |
| [Package]      | [Package Model] |                        | [Node Declarations]            |                       |                  | [Die Supply Pads]          | [End PDN Domain] |
| [Pin]          |                 |                        | [End Node Declarations]        |                       |                  |                            | [PDN Model]      |
|                |                 |                        | [Circuit Call]                 |                       |                  |                            | [End PDN Model]  |
|                |                 |                        | [End Circuit Call]             |                       |                  |                            |                  |

**[Model] SECTION**

| Version 1.1 | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2 |
|-------------|-------------|-------------|-------------|-------------|------------------|-------------|------------------|
|-------------|-------------|-------------|-------------|-------------|------------------|-------------|------------------|

|                 |                         |                   |                              |                                               |                  |  |                    |
|-----------------|-------------------------|-------------------|------------------------------|-----------------------------------------------|------------------|--|--------------------|
| [Model]         | [Temperature Range]     | [Model Spec]      | [Receiver Thresholds]        | [Begin EMI Model]                             | [Initial Delay]* |  | [C Comp Model]     |
| [Voltage Range] | [Pullup Reference]      | [Driver Schedule] | [External Reference]         | [End EMI Model]                               |                  |  | [End C Comp Model] |
| [Pulldown]      | [Pulldown Reference]    | [TTgnd]           | [Test Data]                  | [Algorithmic Model]                           |                  |  |                    |
| [Pullup]        | [POWER Clamp Reference] | [TTpower]         | [Rising Waveform Near]       | [End Algorithmic Model]                       |                  |  |                    |
| [GND Clamp]     | [GND Clamp Reference]   | [On]              | [Falling Waveform Near]      | [ISSO PU]                                     |                  |  |                    |
| [POWER Clamp]   | [Rgnd]                  | [Off]             | [Rising Waveform Far]        | [ISSO PD]                                     |                  |  |                    |
| [Ramp]          | [Rpower]                | [R Series]        | [Falling Waveform Far]       | [Composite Current] (under [Rising Waveform]) |                  |  |                    |
|                 | [Rac]                   | [L Series]        | [Diff Rising Waveform Near]  | [Composite Current] (under Falling Waveform)  |                  |  |                    |
|                 | [Cac]                   | [RI Series]       | [Diff Falling Waveform Near] | [C Comp Corner]                               |                  |  |                    |
|                 | [Rising Waveform]       | [C Series]        | [Diff Rising Waveform Far]   |                                               |                  |  |                    |
|                 | [Falling Waveform]      | [Lc Series]       | [Diff Falling Waveform Far]  |                                               |                  |  |                    |
|                 |                         | [Rc Series]       | [Test Load]                  |                                               |                  |  |                    |
|                 |                         | [Series Current]  | [External Model]             |                                               |                  |  |                    |
|                 |                         | [Series MOSFET]   | [End External Model]         |                                               |                  |  |                    |
|                 |                         | [Add Submodel]    |                              |                                               |                  |  |                    |

**[Submodel] SECTION**

| Version 1.1 | Version 2.1 | Version 3.2              | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2 |
|-------------|-------------|--------------------------|-------------|-------------|------------------|-------------|------------------|
|             |             | [Submodel]               |             |             | [Initial Delay]* |             |                  |
|             |             | [Pullup] (1.1)           |             |             |                  |             |                  |
|             |             | [Pulldown] (1.1)         |             |             |                  |             |                  |
|             |             | [GND Clamp] (1.1)        |             |             |                  |             |                  |
|             |             | [POWER Clamp] (1.1)      |             |             |                  |             |                  |
|             |             | [Ramp] (1.1)             |             |             |                  |             |                  |
|             |             | [Rising Waveform] (2.1)  |             |             |                  |             |                  |
|             |             | [Falling Waveform] (2.1) |             |             |                  |             |                  |
|             |             | [Submodel Spec]          |             |             |                  |             |                  |
|             |             | [GND Pulse Table]        |             |             |                  |             |                  |
|             |             | [POWER Pulse Table]      |             |             |                  |             |                  |

**PACKAGE MODEL DEFINITION (within .ibs or as .pkg)**

| Version 1.1 | Version 2.1            | Version 3.2          | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2 |
|-------------|------------------------|----------------------|-------------|-------------|------------------|-------------|------------------|
|             | [Define Package Model] | [Number Of Sections] |             |             | [Merged Pins]*   |             |                  |
|             | [Manufacturer] (1.1)   |                      |             |             |                  |             |                  |
|             | [OEM]                  |                      |             |             |                  |             |                  |
|             | [Description]          |                      |             |             |                  |             |                  |
|             | [Number Of Pins]       |                      |             |             |                  |             |                  |
|             | [Pin Numbers]          |                      |             |             |                  |             |                  |

|                                                     |                      |                            |                    |             |                  |                          |                  |
|-----------------------------------------------------|----------------------|----------------------------|--------------------|-------------|------------------|--------------------------|------------------|
|                                                     | [Model Data]         |                            |                    |             |                  |                          |                  |
|                                                     | [End Model Data]     |                            |                    |             |                  |                          |                  |
|                                                     | [Resistance Matrix]  |                            |                    |             |                  |                          |                  |
|                                                     | [Inductance Matrix]  |                            |                    |             |                  |                          |                  |
|                                                     | [Capacitance Matrix] |                            |                    |             |                  |                          |                  |
|                                                     | [Row]                |                            |                    |             |                  |                          |                  |
|                                                     | [Bandwidth]          |                            |                    |             |                  |                          |                  |
|                                                     | [End Package Model]  |                            |                    |             |                  |                          |                  |
| <b>ELECTRICAL BOARD DESCRIPTION (.ebd)</b>          |                      |                            |                    |             |                  |                          |                  |
| Version 1.1                                         | Version 2.1          | Version 3.2                | Version 4.2        | Version 5.1 | Version 6.0/6.1* | Version 7.0              | Version 7.1, 7.2 |
|                                                     |                      | [Begin Board Description]  |                    |             |                  |                          |                  |
|                                                     |                      | [Manufacturer] (1.1)       |                    |             |                  |                          |                  |
|                                                     |                      | [Number Of Pins] (1.1)     |                    |             |                  |                          |                  |
|                                                     |                      | [Pin List]                 |                    |             |                  |                          |                  |
|                                                     |                      | [Path Description]         |                    |             |                  |                          |                  |
|                                                     |                      | [Reference Designator Map] |                    |             |                  |                          |                  |
|                                                     |                      | [End Board Description]    |                    |             |                  |                          |                  |
| <b>INTERCONNECT MODEL SET (within .ibs or .ims)</b> |                      |                            |                    |             |                  |                          |                  |
|                                                     |                      |                            |                    |             |                  | [Interconnect Model Set] |                  |
|                                                     |                      |                            |                    |             |                  | [Manufacturer] (1.1)     |                  |
|                                                     |                      |                            |                    |             |                  | [Description] (2.1)      |                  |
|                                                     |                      |                            |                    |             |                  | [Interconnect Model]     |                  |
|                                                     |                      |                            |                    |             |                  | [End Interconnect Model] |                  |
|                                                     |                      |                            |                    |             |                  | [End Interconnect Set]   |                  |
| <b>[Model] SUBPARAMETERS</b>                        |                      |                            |                    |             |                  |                          |                  |
| Version 1.1                                         | Version 2.1          | Version 3.2                | Version 4.2        | Version 5.1 | Version 6.0/6.1* | Version 7.0              | Version 7.1, 7.2 |
| Polarity                                            | Cref                 |                            | C_comp_pullup      |             |                  |                          |                  |
| Enable                                              | Rref                 |                            | C_comp_pulldown    |             |                  |                          |                  |
| Model_type                                          | Vref                 |                            | C_comp_power_clamp |             |                  |                          |                  |
| C_comp                                              | Vmeas                |                            | C_comp_gnd_clamp   |             |                  |                          |                  |
| Vinh                                                |                      |                            | Rref_diff          |             |                  |                          |                  |
| Vinl                                                |                      |                            | Cref_diff          |             |                  |                          |                  |
| <b>Model_type SELECTIONS</b>                        |                      |                            |                    |             |                  |                          |                  |
| Version 1.1                                         | Version 2.1          | Version 3.2                | Version 4.2        | Version 5.1 | Version 6.0/6.1* | Version 7.0              | Version 7.1, 7.2 |
| Input                                               | Open_sink            | 3-state_ECL                | Input_diff         |             |                  |                          |                  |
| Output                                              | Open_source          | Series                     | Output_diff        |             |                  |                          |                  |
| 3-state                                             | I/O_open_drain       | Series_switch              | 3-state_diff       |             |                  |                          |                  |
| Open_drain                                          | I/O_open_sink        |                            | I/O_diff           |             |                  |                          |                  |
| I/O                                                 | I/O_open_source      |                            |                    |             |                  |                          |                  |
|                                                     | Input_ECL            |                            |                    |             |                  |                          |                  |
|                                                     | Output_ECL           |                            |                    |             |                  |                          |                  |

|                                           |             |                  |               |                    |                  |             |                           |
|-------------------------------------------|-------------|------------------|---------------|--------------------|------------------|-------------|---------------------------|
|                                           | I/O_ECL     |                  |               |                    |                  |             |                           |
|                                           | Terminator  |                  |               |                    |                  |             |                           |
| <b>[Model Spec] SUBPARAMETERS</b>         |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |
|                                           |             | Vinh             | Cref          | Weak_R             |                  |             |                           |
|                                           |             | Vinl             | Rref          | Weak_I             |                  |             |                           |
|                                           |             | Vinh+            | Vref          | Weak_V             |                  |             |                           |
|                                           |             | Vinh-            | Cref_rising   | D_overshoot_area_h |                  |             |                           |
|                                           |             | Vinl+            | Cref_falling  | D_overshoot_area_l |                  |             |                           |
|                                           |             | Vinl-            | Rref_rising   | D_overshoot_ampl_h |                  |             |                           |
|                                           |             | S_overshoot_high | Rref_falling  | D_overshoot_ampl_l |                  |             |                           |
|                                           |             | S_overshoot_low  | Vref_rising   |                    |                  |             |                           |
|                                           |             | D_overshoot_high | Vref_falling  |                    |                  |             |                           |
|                                           |             | D_overshoot_low  | Vmeas_rising  |                    |                  |             |                           |
|                                           |             | D_overshoot_time | Vmeas_falling |                    |                  |             |                           |
|                                           |             | Pulse_high       | Rref_diff     |                    |                  |             |                           |
|                                           |             | Pulse_low        | Cref_diff     |                    |                  |             |                           |
|                                           |             | Pulse_time       |               |                    |                  |             |                           |
|                                           |             | V_meas           |               |                    |                  |             |                           |
| <b>[Submodel] SUBPARAMETER</b>            |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |
|                                           |             | Submodel_type    |               |                    |                  |             |                           |
| <b>Submodel_type SELECTIONS</b>           |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |
|                                           |             | Dynamic_clamp    | Fall_back     |                    |                  |             |                           |
|                                           |             | Bus_hold         |               |                    |                  |             |                           |
| <b>[Submodel Spec] SUBPARAMETERS</b>      |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |
|                                           |             | V_trigger_r      |               |                    |                  |             |                           |
|                                           |             | V_trigger_f      |               |                    |                  |             |                           |
|                                           |             | Off_delay        |               |                    |                  |             |                           |
| <b>[C Comp Model] SUBPARAMETERS</b>       |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |
|                                           |             |                  |               |                    |                  |             | C_comp_model_mode         |
|                                           |             |                  |               |                    |                  |             | Param                     |
|                                           |             |                  |               |                    |                  |             | File_TS                   |
|                                           |             |                  |               |                    |                  |             | File_IBIS-ISS             |
|                                           |             |                  |               |                    |                  |             | Number_of_terminals (7.0) |
| <b>[Interconnect Model] SUBPARAMETERS</b> |             |                  |               |                    |                  |             |                           |
| Version 1.1                               | Version 2.1 | Version 3.2      | Version 4.2   | Version 5.1        | Version 6.0/6.1* | Version 7.0 | Version 7.1, 7.2          |

|                                                                |             |             |             |             |                  |                         |                       |
|----------------------------------------------------------------|-------------|-------------|-------------|-------------|------------------|-------------------------|-----------------------|
|                                                                |             |             |             |             |                  | Param                   |                       |
|                                                                |             |             |             |             |                  | File_TS                 |                       |
|                                                                |             |             |             |             |                  | File_IBIS-ISS           |                       |
|                                                                |             |             |             |             |                  | Unused_port_termination |                       |
|                                                                |             |             |             |             |                  | Number_of_terminals     |                       |
| [Interconnect Model] Unused_port_termination SELECTIONS        |             |             |             |             |                  |                         |                       |
| Version 1.1                                                    | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0             | Version 7.1, 7.2      |
|                                                                |             |             |             |             |                  | Reference               |                       |
|                                                                |             |             |             |             |                  | Open                    |                       |
|                                                                |             |             |             |             |                  | Resistance              |                       |
| [C Comp Model] Terminal_type COLUMN SELECTIONS                 |             |             |             |             |                  |                         |                       |
| Version 1.1                                                    | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0             | Version 7.1, 7.2      |
|                                                                |             |             |             |             |                  |                         | Buffer_I/O (7.0)      |
|                                                                |             |             |             |             |                  |                         | Buffer_I              |
|                                                                |             |             |             |             |                  |                         | Pullup_ref (7.0)      |
|                                                                |             |             |             |             |                  |                         | Pulldown_ref (7.0)    |
|                                                                |             |             |             |             |                  |                         | Power_clamp_ref (7.0) |
|                                                                |             |             |             |             |                  |                         | Gnd_clamp_ref (7.0)   |
|                                                                |             |             |             |             |                  |                         | Ext_ref (7.0)         |
|                                                                |             |             |             |             |                  |                         | A_gnd (7.0)           |
| [interconnect Model] Terminal_type COLUMN SELECTIONS           |             |             |             |             |                  |                         |                       |
| Version 1.1                                                    | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0             | Version 7.1, 7.2      |
|                                                                |             |             |             |             |                  | Pin_I/O                 |                       |
|                                                                |             |             |             |             |                  | Pad_I/O                 |                       |
|                                                                |             |             |             |             |                  | Buffer_I/O              |                       |
|                                                                |             |             |             |             |                  | Pin_Rail                |                       |
|                                                                |             |             |             |             |                  | Pad_Rail                |                       |
|                                                                |             |             |             |             |                  | Buffer_Rail             |                       |
|                                                                |             |             |             |             |                  | Pullup_ref              |                       |
|                                                                |             |             |             |             |                  | Pulldown_ref            |                       |
|                                                                |             |             |             |             |                  | Power_clamp_ref         |                       |
|                                                                |             |             |             |             |                  | Gnd_clamp_ref           |                       |
|                                                                |             |             |             |             |                  | Ext_ref                 |                       |
|                                                                |             |             |             |             |                  | A_gnd                   |                       |
| [EMD Model] Terminal_type COLUMN SELECTIONS                    |             |             |             |             |                  |                         |                       |
| Version 1.1                                                    | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0             | Version 7.1, 7.2      |
|                                                                |             |             |             |             |                  |                         | Pin_I/O (7.0)         |
|                                                                |             |             |             |             |                  |                         | Pin_Rail (7.0)        |
|                                                                |             |             |             |             |                  |                         | A_gnd (7.0)           |
| [Interconnect Model] Terminal_type_qualifiers COLUMN SELECTION |             |             |             |             |                  |                         |                       |
| Version 1.1                                                    | Version 2.1 | Version 3.2 | Version 4.2 | Version 5.1 | Version 6.0/6.1* | Version 7.0             | Version 7.1, 7.2      |
|                                                                |             |             |             |             |                  | pin_name                |                       |

|                                                               |             |                                                  |              |                                                                                |                                                                      |                |                                                |
|---------------------------------------------------------------|-------------|--------------------------------------------------|--------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------|------------------------------------------------|
|                                                               |             |                                                  |              |                                                                                |                                                                      | signal_name    |                                                |
|                                                               |             |                                                  |              |                                                                                |                                                                      | bus_label      |                                                |
|                                                               |             |                                                  |              |                                                                                |                                                                      | pad_name       |                                                |
| <b>[EMD Model] Terminal_type_qualifiers COLUMN SELECTION</b>  |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  |              |                                                                                |                                                                      |                | pin_name (7.0)                                 |
|                                                               |             |                                                  |              |                                                                                |                                                                      |                | signal_name (7.0)                              |
|                                                               |             |                                                  |              |                                                                                |                                                                      |                | bus_label (7.0)                                |
| <b>[Interconnect Model] Aggressor_Only COLUMN SELECTION</b>   |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  |              |                                                                                |                                                                      | Aggressor_Only |                                                |
| <b>[EMD Model] Aggressor_Only COLUMN SELECTION</b>            |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  |              |                                                                                |                                                                      |                | Aggressor_Only (7.0)                           |
| <b>Test_data_type and Test_load_type SELECTIONS</b>           |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  | Single_ended |                                                                                |                                                                      |                |                                                |
|                                                               |             |                                                  | Differential |                                                                                |                                                                      |                |                                                |
| <b>[Begin EMI Component] KEYWORDS</b>                         |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  |              | [Pin EMI]                                                                      |                                                                      |                |                                                |
|                                                               |             |                                                  |              | [Pin Domain EMI]                                                               |                                                                      |                |                                                |
| <b>Model_emi_type SELECTIONS</b>                              |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
|                                                               |             |                                                  |              | Ferrite                                                                        |                                                                      |                |                                                |
|                                                               |             |                                                  |              | Not_a_Ferrite                                                                  |                                                                      |                |                                                |
| <b>(SUBPARAMETERS) FOR OTHER KEYWORDS</b>                     |             |                                                  |              |                                                                                |                                                                      |                |                                                |
| Version 1.1                                                   | Version 2.1 | Version 3.2                                      | Version 4.2  | Version 5.1                                                                    | Version 6.0/6.1*                                                     | Version 7.0    | Version 7.1, 7.2                               |
| [Component]                                                   |             | [Component]<br>(Si_location,<br>Timing_location) |              | [Begin EMI Component]<br>(Domain, Cpd,<br>C_Heatsink_gnd,<br>C_Heatsink_float) | [Repeater Pin]<br>(tx_non_inv_pin)<br>[Initial Delay] (V-T,<br>I-T)* |                | [Clocked Pins] (clocked_pins,<br>relationship) |
| [Package]<br>(R_pkg, L_pkg,<br>C_pkg)                         |             |                                                  |              | [Pin EMI] (domain_name,<br>clock_div)                                          |                                                                      |                | [PDN Domain] (Bus_label,<br>Signal_name)       |
| [Pin]<br>(signal_name,<br>model_name, R_pin,<br>L_pin, C_pin) |             |                                                  |              | [Pin Domain EMI]<br>(percentage)                                               |                                                                      |                | [PDN Model] (R_pdn, C_pdn,<br>R_leak)          |

|                              |                                                                                                                                   |                                                                      |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------|--|
|                              | [Pin Mapping]<br>(pulldown_ref,<br>pullup_ref,<br>gnd_clamp_ref,<br>power_clamp_ref)                                              |                                                                      | [Pin Mapping]<br>(ext_ref)                                                                                                                                                                                                       | [Begin EMI Model]<br>(Model_emi_type,<br>Model_Domain)                                                     |                                                               | [Bus Label] (signal_pin)                                              |  |
|                              |                                                                                                                                   |                                                                      |                                                                                                                                                                                                                                  |                                                                                                            |                                                               | [Die Supply Pads]<br>(signal_pin, bus_label)                          |  |
|                              | [Diff Pin]<br>(inv_pin, vdiff,<br>t_delay, tdelay_min,<br>tdelay_max)                                                             |                                                                      |                                                                                                                                                                                                                                  | [Algorithmic Model]<br>(Executable)                                                                        | [Algorithmic<br>Model]<br>(Executable_Rx*,<br>Executable_Tx*) |                                                                       |  |
|                              |                                                                                                                                   | [Series Pin Mapping]<br>(pin_2, model_name,<br>function_table_group) |                                                                                                                                                                                                                                  | [C Comp Corner]<br>(C_comp, C_comp_pullup,<br>C_comp_pulldown,<br>C_comp_power_clamp,<br>C_comp_gnd_clamp) |                                                               |                                                                       |  |
|                              |                                                                                                                                   | [Series Switch<br>Groups]<br>(On, Off)                               |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
|                              |                                                                                                                                   |                                                                      | [Circuit Call]<br>(Signal_pin,<br>Diff_signal_pins,<br>Series_pins, Port_map)                                                                                                                                                    |                                                                                                            |                                                               | [Circuit Call] (Parameters)<br>(4.2), (Converter_Parameters)<br>(6.0) |  |
|                              |                                                                                                                                   |                                                                      | [Receiver Thresholds]<br>(Vth, Vth_min,<br>Vth_max,<br>Vinh_ac,Vinh_dc,<br>Vinl_ac, Vinl_dc,<br>Threshold_sensitivity,<br>Reference_supply,<br>Vcross_low,<br>V_cross_high,<br>Vdiff_ac, Vdiff_dc,<br>Tslew_ac,<br>Tdiffslew_ac) |                                                                                                            |                                                               |                                                                       |  |
|                              |                                                                                                                                   | [Series MOSFET]<br>(Vds)                                             |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
| [Ramp]<br>(dV/dt_r, dV/dt_f) | [Ramp]<br>(R_load)                                                                                                                |                                                                      |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
|                              | [Rising Waveform]<br>(R_fixture, V_fixture,<br>V_fixture_min,<br>V_fixture_max,<br>C_fixture, L_fixture,<br>R_dut, L_dut, C_dut)  |                                                                      |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
|                              | [Falling Waveform]<br>(R_fixture, V_fixture,<br>V_fixture_min,<br>V_fixture_max,<br>C_fixture, L_fixture,<br>R_dut, L_dut, C_dut) |                                                                      |                                                                                                                                                                                                                                  |                                                                                                            |                                                               |                                                                       |  |
|                              |                                                                                                                                   |                                                                      | [Test Data]<br>(Test_data_type,<br>Driver_model,                                                                                                                                                                                 |                                                                                                            |                                                               |                                                                       |  |

|  |               |                                                                             |                                                                                                                                                                                                                                                                                             |  |                                              |  |  |
|--|---------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------|--|--|
|  |               |                                                                             | Driver_model_inv,<br>Test_load)<br>(moved to top-level in<br>5.1)                                                                                                                                                                                                                           |  |                                              |  |  |
|  |               |                                                                             | [Test Load]<br>(Test_load_type,<br>C1_near, Rs_near,<br>Ls_near, C2_near,<br>Rpl_near, Rp2_near,<br>Td, Zo, Rpl_far,<br>Rp2_far, C1_far,<br>Ls_far, Rs_far,<br>V_term1, V_term2,<br>Receiver_model,<br>Receiver_model_inv,<br>R_diff_near,<br>R_diff_far)<br>(moved to top-level in<br>5.1) |  |                                              |  |  |
|  |               |                                                                             | [External Model]<br>(Language, Corner,<br>Parameters, Ports,<br>D_to_A, A_to_D)                                                                                                                                                                                                             |  | [External Model]<br>(Converter_Parameters)   |  |  |
|  |               |                                                                             | [External Circuit]<br>(Language, Corner,<br>Parameters, Ports,<br>D_to_A, A_to_D)                                                                                                                                                                                                           |  | [External Circuit]<br>(Converter_Parameters) |  |  |
|  | [Pin Numbers] | [Pin Numbers]<br>(Len, L, C, R, Fork,<br>Endfork)                           |                                                                                                                                                                                                                                                                                             |  |                                              |  |  |
|  |               | [Pin List]<br>(signal_name)                                                 |                                                                                                                                                                                                                                                                                             |  |                                              |  |  |
|  |               | [Begin Board<br>Description]<br>(Len, L, C, R, Fork,<br>Endfork, Node, Pin) |                                                                                                                                                                                                                                                                                             |  |                                              |  |  |

#### OTHER NOTABLE CHANGES

| Version 1.1                              | Version 2.1                                            | Version 3.2                  | Version 4.2                                             | Version 5.1 | Version 6.0/6.1* | Version 7.0                                        | Version 7.1, 7.2 |
|------------------------------------------|--------------------------------------------------------|------------------------------|---------------------------------------------------------|-------------|------------------|----------------------------------------------------|------------------|
| File width = 80                          |                                                        |                              | File width = 120                                        |             |                  | File width = 1024                                  |                  |
| Filename length = 8                      |                                                        | Filename length = 20         | Filename length = 40                                    |             |                  | Filename length = 60,<br>filename case-insensitive |                  |
|                                          |                                                        |                              |                                                         |             |                  | File_reference linkage<br>includes subdirectories  |                  |
| Model name<br>length = 20                |                                                        |                              | Model name length =<br>40                               |             |                  |                                                    |                  |
|                                          |                                                        | Submodel name<br>length = 20 | Submodel name length<br>= 40                            |             |                  |                                                    |                  |
|                                          | [Rising Waveform],<br>[Falling Waveform]<br>rows = 100 |                              | [Rising Waveform],<br>[Falling Waveform]<br>rows = 1000 |             |                  |                                                    |                  |
| Vinh, Vinl optional<br>for Input and I/O | Vinh, Vinl required for<br>Input and I/O               |                              |                                                         |             |                  |                                                    |                  |



|                                                   |                                                 |                       |                                    |                                                                                                               |                                                  |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------|-------------------------------------------------|-----------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reserved words NC<br>POWER, GND, NA               |                                                 |                       | Added reserved word<br>CIRCUITCALL |                                                                                                               |                                                  |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                 |
| Fixed keyword space<br>and underbar<br>convention | Space and underbar<br>equivalent in<br>keywords |                       |                                    |                                                                                                               |                                                  |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                 |
| Original comment<br>characters                    | +, - removed as<br>comment characters           |                       |                                    |                                                                                                               |                                                  |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                 |
| Multipliers M, k, m, u,<br>n, p                   | Multipliers T, G and f<br>added                 |                       |                                    |                                                                                                               |                                                  |                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                 |
| Buffers by extraction                             |                                                 | By construction added | By language linkage<br>added       | EMI, SSO, and<br>Algorithmic Modeling<br>Interface added, [Test<br>Load] and [Test Data]<br>hierarchy changed | PAM4 mapping and<br>other IBIS-AMI<br>parameters | Interconnect Modeling,<br>linkage to IBIS-ISS, and<br>Touchstone; Files references<br>with paths; Backchannel<br>(BCI);, more IBIS-AMI<br>parameters, linkage to 4-port<br>Touchstone | Electrical Module Description<br>and EMD Set files added,<br>[Clocked Pins], [C Comp<br>Model], [PDN Domain] added<br><br>Version 7.2 adds some syntax<br>clarifications and more IBIS-<br>AMI parameters including<br>PAMn, Redriver reference<br>flow changes and root name<br>clarifications |