|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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] |  | x |  |  |  |  |
| [Comment Char]  (re-defined anywhere 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]  (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]  (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] | [Rl 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] |  |  |  |  | |  |  |
| **ELECTRICAL BOARD DESCRIPTION (.ebd)** | | | | | | | | |
| 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] |  |  |  | |  |  |
| **INTERCONNECT MODEL SET (within .ibs or .ims)** | | | | | | | | |
|  |  |  |  |  |  | | [Interconnect Model Set] |  |
|  |  |  |  |  |  | | [Manufacturer] (1.1) |  |
|  |  |  |  |  |  | | [Description] (2.1) |  |
|  |  |  |  |  |  | | [Interconnect Model] |  |
|  |  |  |  |  |  | | [End Interconnect Model] |  |
|  |  |  |  |  |  | | [End Interconnect Set] |  |
| **[Model] SUBPARAMETERS** | | | | | | | | |
| 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 |  |  | |  |  |
| **Model\_type 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 |
| 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 |  |  |  |  | |  |  |
| **[Model Spec] SUBPARAMETERS** | | | | | | | | |
| 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 |  |  |  | |  |  |
| **[Submodel] SUBPARAMETER** | | | | | | | | |
| 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 |  |  |  | |  |  |
| **Submodel\_type 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 |
|  |  | Dynamic\_clamp | Fall\_back |  |  | |  |  |
|  |  | Bus\_hold |  |  |  | |  |  |
| **[Submodel Spec] SUBPARAMETERS** | | | | | | | | |
| 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 |  |  |  | |  |  |
| **[C Comp Model] SUBPARAMETERS** | | | | | | | | |
| 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) |
| **[Interconnect Model] SUBPARAMETERS** | | | | | | | | |
| 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 |  |
| **[EMD 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 (7.0) |
|  |  |  |  |  |  | |  | signal\_name (7.0) |
|  |  |  |  |  |  | |  | bus\_label (7.0) |
| **[Interconnect Model] Aggressor\_Only 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 |
|  |  |  |  |  |  | | Aggressor\_Only |  |
| **[EMD Model] Aggressor\_Only 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 |
|  |  |  |  |  |  | |  | Aggressor\_Only (7.0) |
| **Test\_data\_type and Test\_load\_type 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 |
|  |  |  | Single\_ended |  |  | |  |  |
|  |  |  | Differential |  |  | |  |  |
| **[Begin EMI Component] 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 |
|  |  |  |  | [Pin EMI] |  | |  |  |
|  |  |  |  | [Pin Domain EMI] |  | |  |  |
| **Model\_emi\_type 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 |
|  |  |  |  | Ferrite |  | |  |  |
|  |  |  |  | Not\_a\_Ferrite |  | |  |  |
| **(SUBPARAMETERS) FOR OTHER 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] |  | [Component]  (Si\_location,  Timing\_location) |  | [Begin EMI Component]  (Domain, Cpd, C\_Heatsink\_gnd, C\_Heatsink\_float) | | [Repeater Pin] (tx\_non\_inv\_pin)  [Intial Delay] (V-T, I-T)\* |  | [Clocked Pins] (clocked\_pins, relationship) |
| [Package]  (R\_pkg, L\_pkg, C\_pkg) |  |  |  | [Pin EMI] (domain\_name, clock\_div) | |  |  | [PDN Domain] (Bus\_label, Signal\_name) |
| [Pin]  (signal\_name,  model\_name, R\_pin, L\_pin, C\_pin) |  |  |  | [Pin Domain EMI} (percentage) | |  |  | [PDN Model] (R\_pdn, C\_pdn, R\_leak) |
|  | [Pin Mapping]  (pulldown\_ref,  pullup\_ref,  gnd\_clamp\_ref,  power\_clamp\_ref) |  | [Pin Mapping]  (ext\_ref) | [Begin EMI Model] (Model\_emi\_type, Model\_Domain) | |  | [Bus Label] (signal\_pin) |  |
|  |  |  |  |  | |  | [Die Supply Pads] (signal\_pin, bus\_label) |  |
|  | [Diff Pin]  (inv\_pin, vdiff, t\_delay, tdelay\_min,  tdelay\_max) |  |  | [Algorithmic Model] (Executable) | | [Algorithmic Model] (Executable\_Rx\*, Executable\_Tx\*) |  |  |
|  |  | [Series Pin Mapping]  (pin\_2, model\_name,  function\_table\_group) |  | [C Comp Corner] (C\_comp, C\_comp\_pullup, C\_comp\_pulldown, C\_comp\_power\_clamp, C\_comp\_gnd\_clamp | |  |  |  |
|  |  | [Series Switch  Groups]  (On, Off) |  |  | |  |  |  |
|  |  |  | [Circuit Call]  (Signal\_pin,  Diff\_signal\_pins,  Series\_pins, Port\_map) |  | |  | [Circuit Call] (Parameters) (4.2), (Converter\_Parameters) (6.0) |  |
|  |  |  | [Receiver Thresholds]  (Vth, Vth\_min, Vth\_max, Vinh\_ac,Vinh\_dc, Vinl\_ac, Vinl\_dc,  Threshold\_sensitivity,  Reference\_supply, Vcross\_low, V\_cross\_high,  Vdiff\_ac, Vdiff\_dc,  Tslew\_ac, Tdiffslew\_ac) |  | |  |  |  |
|  |  | [Series MOSFET]  (Vds) |  |  | |  |  |  |
| [Ramp]  (dV/dt\_r, dV/dt\_f) | [Ramp]  (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) |  |  |  | |  |  |  |
|  |  |  | [Test Data]  (Test\_data\_type, Driver\_model,  Driver\_model\_inv, Test\_load)  (moved to top-level in 5.1) |  | |  |  |  |
|  |  |  | [Test Load]  (Test\_load\_type, C1\_near, Rs\_near, Ls\_near, C2\_near,  Rpl\_near, Rp2\_near, Td, Zo, Rpl\_far, Rp2\_far, C1\_far, Ls\_far, Rs\_far, V\_term1, V\_term2, Receiver\_model,  Receiver\_model\_inv,  R\_diff\_near, R\_diff\_far)  (moved to top-level in 5.1) |  | |  |  |  |
|  |  |  | [External Model]  (Language, Corner, Parameters, Ports, D\_to\_A, A\_to\_D) |  | | [External Model] (Converter\_Parameters) |  |  |
|  |  |  | [External Circuit]  (Language, Corner, Parameters, Ports, D\_to\_A, A\_to\_D) |  | | [External Circuit] (Converter\_Parameters) |  |  |
|  | [Pin Numbers] | [Pin Numbers]  (Len, L, C, R, Fork,  Endfork) |  |  | |  |  |  |
|  |  | [Pin List]  (signal\_name) |  |  | |  |  |  |
|  |  | [Begin Board  Description]  (Len, L, C, R, Fork,  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, filename case-insensitive |  |
|  |  |  |  |  |  | | File\_reference linkage includes subdirectories |  |
| Model name  length = 20 |  |  | Model name length = 40 |  |  | |  |  |
|  |  | Submodel name  length = 20 | Submodel name length = 40 |  |  | |  |  |
|  | [Rising Waveform],  [Falling Waveform]  rows = 100 |  | [Rising Waveform],  [Falling Waveform]  rows = 1000 |  |  | |  |  |
| Vinh, Vinl optional  for Input and I/O | Vinh, Vinl required for Input and I/O |  |  |  |  | |  |  |
| Reserved words NC  POWER, GND, NA |  |  | Added reserved word  CIRCUITCALL |  |  | |  |  |
| Fixed keyword space and underbar convention | Space and underbar  equivalent in  keywords |  |  |  |  | |  |  |
| Original comment characters | +, - removed as comment characters |  |  |  |  | |  |  |
| Multipliers M, k, m, u, n, p | Multipliers T, G and f added |  |  |  |  | |  |  |
| Buffers by extraction |  | By construction added | By language linkage added | EMI, SSO, and Algorithmic Modeling Interface added, [Test Load] and [Test Data] hierarchy changed | PAM4 mapping and other IBIS-AMI parameters | | Interconnect Modeling, linkage to IBIS-ISS, and Touchstone; Files references with paths; Backchannel (BCI);, more IBIS-AMI parameters, linkage to 4-port Touchstone | Electrical Module Description and EMD Set files added, [Clocked Pins], [C Comp Model], [PDN Domain] added  Version 7.2 adds some syntax clarifications and more IBIS-AMI parameters including PAMn, Redriver reference flow changes and root name clarifications |