**USB electrical Characteristics**

|  |  |  |
| --- | --- | --- |
| **Power Supply** | **Ball Name** | **Value** |
| High-voltage power supply | USB\_VDD3V3 | 3.3 V (+ 10%, - 7%) at the macro pins with respect to gd (ground) |
| High-voltage power supply | USB\_VDDH3V3 | 3.3 V (+ 10%, - 7%) at the macro pins with respect to gd (ground) |
| Low-voltage supply | USB\_DVDD0V9 | 0.90 V (+ 10%, - 7%) at the macro pins with respect to gd (ground) |
| Low-voltage supply | USB\_VP0V9 | 0.90 V (+ 10%, - 7%) at the macro pins with respect to gd (ground) |

**3.0 Transmitter Normative Electrical Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Symbol** | **Parameter** | **5.0 GT/s** | **Units** | **Comments** |
| UI | Unit Interval | 199.94 (min)  200.06 (max) | ps | The specified UI is equivalent to a tolerance of ±300 ppm for each device. Period does not account for SSC induced variations |
| VTX-DIFF-PP | Differential p-p Tx voltage swing | 0.8 (min)  1.2 (max) | V | Nominal is 1 V p-p |
| VTX-DE-RATIO | Tx de-emphasis | 3.0 (min)  4.0 (max) | dB | Nominal is 3.5 dB |
| RTX-DIFF-DC | DC differential impedance | 72 (min)  120 (max) | Ω |  |
| VTX-RCV-DETECT | The amount of voltage change allowed during Receiver Detection | 0.6 (max) | V | Detect voltage transition should be an increase in voltage on the pin looking at the detect signal to avoid a high impedance requirement when an “off” receiver’s input goes below ground. See Section 1.2.5.6 and Note 9 for details |
| CAC-COUPLING | AC Coupling Capacitor | 75 (min) 200 (max) | nF | All Transmitters shall be AC coupled. The AC coupling is required either within the media or within the transmitting component itself. |
| TCDR\_SLEW\_MAX | Max slew rate | 10 | ms/sec | See the jitter white paper for details on this measurement. |
| TMIN-PULSE-Dj | Deterministic min pulse | 0.96 | UI | Tx pulse width variation that is deterministic. |
| TMIN-PULSE-Tj | Tx min pulse | 0.90 | UI | Min Tx pulse at 10-12 including Dj and Rj. |
| TTX-EYE | Transmitter Eye | 0.625 (min) | UI | Includes all jitter sources |
| TTX—DJ-DD | Tx deterministic jitter | 0.19 (max) | UI | Deterministic jitter only assuming the Dual Dirac distribution |
| CTX-PARASITIC | Tx input capacitance for return loss | 1.25 (max) | pf | Parasitic capacitance to ground |
| RTX-DC | Transmitter DC common mode impedance | 18 (min)  30 (max) | Ω | DC impedance limits to guarantee Receiver detect behavior. Measured with respect to AC ground over a voltage of 0-500mV. |
| ITX-SHORT | Transmitter shortcircuit current limit | 60 (max) | mA | The total current Transmitter can supply when shorted to ground. |
| VTX-DC-CM | Transmitter DC common-mode voltage | 0 (min) 2.2 (max) | V | The instantaneous allowed DC common-mode voltages at the connector side of the AC coupling capacitors. |
| VTX-CM-ACPP\_ACTIVE | Tx AC common mode voltage active | 100 mv | mVPP | Max mismatch from D+ D- for both time and amplitude. While signaling. |
| VTX-CM-DC-ACTIVEIDLE-DELTA | Absolute Common Mode Voltage between *U1* and *U0* | 200 (max) | mV | peak |
| VTX-IDLE-DIFF-AC-pp | Electrical Idle Differential Peak – Peak Output Voltage | 0 (min)  10 (max) | mV |  |
| VTX-IDLE-DIFF-DC | DC Electrical Idle Differential Output Voltage | 0 (min)  10 (max) | mV | Voltage must be low pass filtered to remove any AC component. This limits the common mode error when resuming U1 to U0 |

**3.0 Receiver Electrical Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Symbol** | **Parameter** | **5.0 GT/s** | **Units** | **Comments** |
| UI | Unit Interval | 199.94 (min)  200.06 (max) | ps | UI does not account for SSC caused variations. |
| VRX-DIFF-PP-POST-EQ | Differential Rx peakpeak voltage | *30* (min) | mV | Measured after the Rx EQ function |
| TRX-TJ | Max Rx inherent timing error | *0.45* (max) | UI | Measured after the Rx EQ  function |
| TRX-DJ-DD | Max Rx inherent deterministic timing error | *0.3* (max) | UI | Max Rx inherent deterministic timing error |
| CRX-PARASITIC | Rx input capacitance for return loss | 1.1 (max) | pf |  |
| RRX-DC | Receiver DC common mode impedance | 18 (min)  30 (max) | Ω | DC impedance limits are needed to guarantee Receiver detect. Measured with respect to ground over a voltage of 500 mV max*.* |
| RRX-DIFF-DC | DC differential impedance | 72 (min)  120 (max) | Ω |  |
| VRX-CM-AC-P | Rx AC common mode voltage | 150 (max) | mV Peak | Measured at Rx pins into a pair of 50 Ω terminations into ground. Includes Tx and channel conversion, AC range up to 5 GHz |
| VRX-CM-DC-ACTIVEIDLE-DELTA\_P | Rx AC common mode voltage during the U1 to U0 transition | 200 (max) | mV Peak | Measured at Rx pins into a pair of 50 Ω terminations into ground. Includes Tx and channel conversion, AC range up to 5 GHz |
| ZRX-HIGH-IMP-DC-POS | DC Input CM Input Impedance for V>0 during Reset or power down | 25 k (min) | Ω | Rx DC CM impedance with the Rx terminations not powered, measured over the range 0 – 500 mV with respect to ground. |
| VRX-LFPS-DET-DIFFp-p | LFPS Detect Threshold | 100 (min)  300 (max) | mV | Below the min is noise Must wake up above the max. |