M1 WAVEFORM TOOLS™
by ASA Corp.

LPDDR2 Compliance Test

Data Sheet

1 Description

The LPDDR2 Compliance Test for M1 Waveform Tools™ will test timing and voltage parameters from the specification.

For each test section, M1 will provide a results screen containing every parameter tested and its pass/fail status, as well as the condition or value the parameter was tested against and the margin of pass or fail. Upon completion of all tests, M1 will produce a final results window summarizing the result information for every test performed. Results can be notated as needed, saved directly to a text or MS Excel format, and/or directly printed in a readable format.

If any parameter does not meet the specification, M1 will allow the user to cancel testing and bring up the measurement containing the statistic that failed to allow immediate debug and analysis.

2 General Comments

Historically, compliance specifications will contain ambiguous or contradictory statements that require a test developer to make assumptions and interpret what the spec is trying to accomplish. It is frequently the case that solution implementation decisions must be made at a level of specificity that far exceeds that which is specified, creating the possibility that different test implementers will create solutions that are all valid implementations but which all can result in different results. We have discovered errors and significant ambiguities in most of the specifications we have implemented. Where it is felt that an assumption may have a significant bearing on the process, that assumption will be called out in this document and/or within the TestScript itself during execution.

3 System Requirements

3.1 Hardware and OS

Your hardware and Windows® Operating System (OS) should meet the requirements specified on the M1 OT website.

3.2 M1 Version

You must have **M1 WT™**, **v6.06.0** or higher to run this compliance test.

3.3 Oscilloscope Requirements

Please ensure you use an oscilloscope that has adequate technical specifications to perform the measurements required.

4 Installation

After downloading the .zip file containing the compliance test, extract the files in the **.zip** file to your M1 installation directory. If you are using Windows XP, this will be the **Shared Documents/My M1 OT/TestScripts** directory.

5 Instructions

Start M1, and turn on your scope. In M1, make sure all views are closed, then select the **Measurement Tools** menu. Click on **Compliance/TestScript**. Browse to select the LPDDR2.xml TestScript, then click on **Play**. You will be prompted as to what probes to use, and what signals to probe, as the test progresses.

6 Included Measurements

The compliance test will check the following measurements from the JESD209-2E specification. Supported data rates are 200 Mbps, 266 Mbps, 333 Mbps, 400 Mbps, 466 Mbps, 533 Mbps, 667 Mbps, 800 Mbps, 933 Mbps, and 1066 Mbps. All values are tested for each data rate except as noted.

All table numbers refer to the tables in the specification.

6.1 Table 75 — Single-Ended AC and DC Input Levels for CKE

- V_{IHCKE} min, max
- V_{ILCKE} min, max

6.2 Table 78 — Allowed time before ringback (tDVAC) for CK_t-CK_c and DQS_t-DQS_c

- tDVAC min, max

6.3 Table 80 — Crosspoint voltage for differential input signals (CK, DQS)

- V_{IXCA} min, max
- V_{IXDQ} min, max

6.4 Table 85 — Output Slew Rate (single-ended)

- SRQse min, max

6.5 Table 87 — Differential Output Slew Rate

- SRQdiff min, max

6.6 Table 88 — AC Overshoot/Undershoot specification

- Maximum peak amplitude allowed for overshoot area
- Maximum peak amplitude allowed for undershoot area
- Maximum overshoot area above VDD
- Maximum undershoot area below VSS

6.7 Table 103 — LPDDR2 AC Timing Table

- t_{CK}(avg) min, max
- t_{CH}(avg) min, max
- t_{CL}(avg) min, max
- t_{CK}(abs) min
- t_{CH}(abs), allowed min, max
- t_{CL}(avg), allowed min, max
- t_{JIT}(per), allowed min, max
- t_{JIT}(CC), allowed max
- t_{JIT}(duty), allowed min, max
- t_{ERR}(2per) min, max
- t_{ERR}(3per) min, max
- t_{ERR}(4per) min, max
- t_{ERR}(5per) through t_{ERR}(50per) min, max
- t_{DQSQ} max
- t_{QSH} min
- t_{QSL} min
- t_{QHP} min
- t_{QH} min
- t_{RPRE} min
- t_{RPST} min
- $t_{LZ(DQS)}$ min
- $t_{LZ(DQ)}$ min
- $t_{HZ(DQS)}$ min
- $t_{HZ(DQ)}$ min
- t_{DH} min
- t_{DS} min
- t_{DIPW} min
- t_{DQSS} min, max
- t_{DQSH} min
- t_{DQSL} min
- t_{WPRE} min
- t_{WPST} min
- t_{IS} min
- t_{IH} min
- t_{IPW} min

6.8 Table 107 — Required time t_{VAC} above VIH(ac) {below VIH(ac)} for valid transition

- t_{VAC} min, max

6.9 Table 111 — Required time t_{VAC} above VIH(ac) {below VIH(ac)} for valid transition

- t_{VAC} min, max

7 Required Equipment

You will need four single-ended probes and two differential probes.

Additional equipment, such as compliance test boards, signal generators, probes, etc. may be required to perform the compliance test, as described in the relevant specification. ASA does not supply this equipment.

8 Revision History

Revision	Date	Description
1.0	13 August 2012	Initial version

9 References

Document #	Date	Title	Author
JESD209-2E	April 2010	Low Power Double Data Rate 2 (LPDDR2)	JEDEC Solid State Technology Association: http://www.jedec.org

10 Additional Resources

To download the User's Manual for the LPDDR2 Compliance Test:
http://www.M1OT.com/pdf/LPDDR2-Users-Manual.pdf.

To download the LPDDR2 TestScript for use with M1 Waveform Tools, please visit:
http://www.M1OT.com/lpddr2.htm

For a tutorial video on performing a compliance test with M1 Waveform Tools, please visit:
http://www.M1OT.com/compliance-test-video.htm

To see what other compliance TestScripts ASA has provided for M1 users, please visit:
http://www.M1OT.com/compliance

To learn more about M1 Waveform Tools, please visit:
http://www.M1OT.com