



DDR3 Compliance Test

Data Sheet

1	Description.....	2
2	General Comments.....	2
3	System Requirements	2
3.1	Hardware and OS.....	2
3.2	M1 Version	2
3.3	Oscilloscope Requirements	2
4	Installation.....	2
5	Instructions	3
6	Included Measurements	3
6.1	Table 24 — Single-Ended AC and DC Input Levels for Command and Address	3
6.2	Table 25 — Single-Ended AC and DC Input Levels for DQ and DM	3
6.3	Table 27 — Allowed time before ringback (tDVAC) for CK - CK# and DQS - DQS#.....	3
6.4	Table 28 — Single-ended levels for CK, DQS, DQSL, DQSU, CK#, DQS#, DQSL# or DQSU#	3
6.5	Table 29 — Cross point voltage for differential input signals (CK, DQS).....	3
6.6	Table 34 — Output Slew Rate (single-ended)	3
6.7	Table 36 — Differential Output Slew Rate	4
6.8	Table 37 — AC Overshoot/Undershoot Specification for Address and Control Pins.....	4
6.9	Table 38 — AC Overshoot/Undershoot Specification for Clock, Data, Strobe and Mask	4
6.10	Table 65 — Timing Parameters by Speed Bin.....	4
6.10.1	Clock Timing.....	4
6.10.2	Data Timing	4
6.10.3	Data Strobe Timing.....	4
6.10.4	Clock and Address Timing.....	4
7	Required Equipment	5
8	Revision History	5
9	References	5
10	Additional Resources	5

1 Description

The DDR3 Compliance Test for M1 Oscilloscope 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 OT™ Standard** or **M1 OT™ Ultimate, v6.02.2** or higher to run this compliance test. Version **6.05.3** is recommended.

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.

Some compliance tests require special measurements that are not part of M1. If there are any files with a .dll extension in the .zip file, copy those files into the **User_Defined** directory (**Shared Documents/M1 M1 OT/User_Defined**).

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 **DDR3.xml**, then click on **Play**. Note that you should click on the button that corresponds with your system's data rate (800 Mbps, 1066 Mbps, 1333 Mbps, 1600 Mbps, 1866 Mbps, or 2133 Mbps). You will be prompted as to what probes to use, and what signals to probe, as the test progresses. For further information, please see the [DDR3 Compliance Test User's Manual](#).

6 Included Measurements

The compliance test will check the following measurements from the JESD79-3D specification. Supported data rates are 800 Mbps, 1066 Mbps, 1333 Mbps, 1600 Mbps, 1866 Mbps, and 2133 Mbps. Not all values are tested for each data rate, as the JESD specification does not provide test values for all parameters at all speeds.

All table numbers refer to the tables in the specification.

6.1 **Table 24 — Single-Ended AC and DC Input Levels for Command and Address**

- VIH.CA(AC) min, max
- VIL.CA(AC) min, max

6.2 **Table 25 — Single-Ended AC and DC Input Levels for DQ and DM**

- VIH.DQ(AC) min, max
- VIL.DQ(AC) min, max

6.3 **Table 27 — Allowed time before ringback (tDVAC) for CK - CK# and DQS - DQS#**

6.4 **Table 28 — Single-ended levels for CK, DQS, DQSL, DQSU, CK#, DQS#, DQSL# or DQSU#**

- VSEH min
- VSEL max

6.5 **Table 29 — Cross point voltage for differential input signals (CK, DQS)**

- VIX min, max

6.6 **Table 34 — Output Slew Rate (single-ended)**

- SRQse min, max (min TBD for 1600 Mbps)

6.7 Table 36 — Differential Output Slew Rate

- SRQdiff min, max (min TBD for 1600 Mbps)

6.8 Table 37 — AC Overshoot/Undershoot Specification for Address and Control Pins

6.9 Table 38 — AC Overshoot/Undershoot Specification for Clock, Data, Strobe and Mask

6.10 Table 65 — Timing Parameters by Speed Bin

6.10.1 Clock Timing

- tCK min
- tCK(abs) min, max
- tJIT(cc) min, max
- tCK(avg) min, max
- tCH(abs) min
- tERR(2per, 3per, ... 50per) min, max
- tCH(avg) min, max
- tCL(abs) min
- tCL(avg) min, max
- tJIT(per) min, max

6.10.2 Data Timing

- tDQSQ max
- tHZ(DQ) max
- tDIPW min
- tQH min
- tDS(base) min
- tLZ(DQ) min, max
- tDH(base) min
-

6.10.3 Data Strobe Timing

- tRPRE min
- tWPST min
- tDQSH min, max
- tRPST min
- tDQSCK min, max
- tDQSS min, max
- tQSH min
- tLZ(DQS) min, max
- tDSS min
- tQSL min
- tHZ(DQS) max
- tDSH min
- tWPRE min
- tDQSL min, max

6.10.4 Clock and Address Timing

- tIS(base) min
- tIH(base) min
- tIPW min

7 Required Equipment

You will need two differential probes and two single-ended 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	11 March 2009	Updated version of test originally released with M1 OT v4
1.1	13 March 2009	Revised to use updated DLLS
1.2	17 March 2009	Updated to newest version (JESD79-3C) of specification
1.2	18 March 2009	Revised Overshoot/Undershoot area tests
1.5	18 June 2009	Revised to use Compliance Breakout, M1 OT v6.03.0
1.7	22 June 2010	Improved to reduce the number of times probes need to be used, and added graphics to show desired probe placement, upgraded to include new speeds in JESD79-3D.

9 References

Document #	Date	Title	Author
JESD79-3D	November 2008	DDR3 SDRAM Specification	JEDEC Solid State Technology Association: http://www.jedec.org

10 Additional Resources

To download the DDR3 Compliance Test User's Manual:

<http://www.M1OT.com/pdf/DDR3-Users-Manual.pdf>

To download the DDR3 TestScript for use with M1 Oscilloscope Tools, please visit:

www.M1OT.com/ddr3.htm

For a tutorial video on performing a compliance test with M1 Oscilloscope Tools, please visit:

www.M1OT.com/compliance-test-video.htm

To see what other compliance TestScripts ASA has provided for M1 users, please visit:

www.M1OT.com/compliance

To learn more about M1 Oscilloscope Tools, please visit:

www.M1OT.com