



DDR2 Compliance Test

Data Sheet

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1 Description

The DDR2 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, v6.03.1** 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.

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 the desired TestScript that implements your compliance test, then click on **Play**. Note that you should select the TestScript that corresponds with your system's data rate (400 Mbps, 533 Mbps, 667 Mbps, or 800 Mbps). 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 JESD79-2E specification. Supported data rates are 400 Mbps, 533 Mbps, 667 Mbps, and 800 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 20 — Input AC logic level

- $V_{IH(ac)}$ min, max
- $V_{IL(ac)}$ min, max

6.2 Table 21 — AC input test conditions

- $V_{SWING(MAX)}$
- SLEW min

6.3 Table 22 — Differential input AC logic level

- $V_{ID(ac)}$ min, max
- $V_{IX(ac)}$ min, max

6.4 Table 23 — Differential AC output parameters

- $V_{OX(ac)}$ min, max

6.5 Table 24 — AC overshoot/undershoot specification for address and control pins

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

6.6 **Table 25 — AC overshoot/undershoot specification for clock, data, strobe, and mask pins**

- Maximum peak amplitude allowed for overshoot area
- Maximum peak amplitude allowed for undershoot area
- Maximum overshoot area above VDDQ
- Maximum undershoot area below VSSQ

6.7 **Table 41 — Timing parameters by speed grade (DDR2-400 and DDR2-533)**

- tCK min, max
- tCH min, max
- tCL min, max
- tDQSS min, max
- tDSS min
- tDSH min
- tDQSH min
- tDQSL min
- tWPRE min
- tWPST min, max
- tIS(base) min
- tIH(base) min
- tIPW min
- tDS(base) min
- tDH(base) min
- tDS1(base) min
- tDH1(base) min
- tDIPW min
- tAC min, max
- tDQSCK min, max
- tHZ max
- tLZ(DQS) min, max
- tLZ(DQ) min, max
- tDQSQ max
- tHP min
- tQH min
- tRPRE min, max
- tRPST min, max

6.8 **Table 42 — Timing parameters by speed grade (DDR2-667 and DDR2-800)**

- tCK min, max
- tCH min, max
- tCL min, max
- tDQSS min, max
- tDSS min
- tDSH min
- tDQSH min
- tDQSL min
- tWPRE min
- tWPST min, max
- tIS(base) min
- tIH(base) min
- tIPW min
- tDS(base) min
- tDH(base) min
- tDIPW min
- tAC min, max
- tDQSCK min, max

- tHZ max
- tLZ(DQS) min, max
- tLZ(DQ) min, max
- tDQSQ max
- tHP min
- tQH min
- tRPRE min, max
- tRPST min, max

6.9 Input Clock Jitter Spec Parameter, p. 104, for 667 Mbps and 800 Mbps

- tJIT(per) min, max
- tERR(2per, 3per, ... 50per) min, max
- tJIT(duty)
- tJIT(cc) min, max

6.10 Absolute Clock Values, p. 106, for 667 Mbps and 800 Mbps

- tCK(abs) min, max
- tCH(abs) min, max
- tCL(abs) min, max

7 Required Equipment

You will need two single-ended probes. If you have a differential Data Strobe, you will also need two differential probes; otherwise, you will need one differential probe.

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
1.1	17 March 2009	Updated version of test originally released with M1 OT v4
1.2	18 June 2009	Revised for use with Compliance Breakout, M1 OT v6.03.0
1.4	30 June 2009	Changes in signal usage; used new DLLs; fixed a problem with the tIPW measurement; requires M1 OT 6.03.1
1.7	10 June 2010	Improved to reduce the number of times probes need to be used, and added graphics to show desired probe placement

9 References

Document #	Date	Title	Author
JESD79-2E	April 2008	DDR2 SDRAM Specification	JEDEC Solid State Technology Association: http://www.jedec.org

10 Additional Resources

To download the User's Manual for the DDR2 Compliance Test:
<http://www.M1OT.com/pdf/DDR2-Users-Manual.pdf>.

To download the DDR2 TestScript for use with M1 Oscilloscope Tools, please visit:
<http://www.M1OT.com/ddr2.htm>

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

<http://www.M1OT.com>