JEDEC STANDARD

Universal Flash Storage (UFS) Test

Version 1.1

JESD224A

(Revision of JESD224, March 2013)

JULY 2017

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

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(From JEDEC Board Ballot JCB-13-18, formulated under the cognizance of the JC-64.5 Subcommittee on UFS Measurement.)

1 Scope

The primary objective of this test standard is to specify the test cases for UFS device protocol conformance testing. This test standard provides test cases for checking the functions defined in the following target standard:

JESD220, Universal Flash Storage (UFS) Standard version 1.1A

MIPI M-PHY and MIPI UniPro test cases are not in the scope of this document.

2 Normative Reference

[UFS] JESD220C, Universal Flash Storage (UFS) version 2.1
[UFS Card] JESD220-2, Universal Flash Storage (UFS) Card Extension version 1.0
[UFSHCI] JESD223C, Universal Flash Storage (UFS) Host Controller Interface version 2.1
[SAM] SCSI Architecture Model-5(SAM-5) Revision05, 19 May 2010
[SPC] T10 Specification: SCSI Primary Commands – 4(SPC- 4) Revision 27, 11 October 2010
[SBC] T10 Specification: SCSI Block Commands – 3(SBC -3) Revision 24, 05 August 2010

3 Terms, Definitions, Acronyms, and Symbols

may: Indicates flexibility of choice with no implied recommendation or requirement.

shall: Indicates a mandatory requirement. Designers shall implement such mandatory requirements to ensure interchangeability and to claim conformance with the specification.

should: Indicates a strong recommendation but not a mandatory requirement. Designers should give strong consideration to such recommendations, but there is still a choice in implementation.

3.1 Acronyms

ATTRVALUE	Attribute Value
GROUPNUM	Group Number
LBA	Logical Block Address
LUN	Logical Unit Number
MIPI	Mobile Industry Processor Interface
PCODE	Page Code
RPMB	Replay Protected Memory Block
SPCODE	Sub Page Code
TSF	Transaction Specific Fields
UFS	Universal Flash Storage
UPIU	UFS Protocol Information Unit
UniPro	Unified Protocol
ASYNC	Out of order execution support

3.2 Naming Conventions

Some terms are capitalized to distinguish their definition from their common English meaning. Words not capitalized retain their common English meaning.

3.3 Numbers and Number Bases

Hexadecimal numbers are written with a lower case "h" suffix, e.g., FFFFh and 80h.

Binary numbers are written with a lower case "b" suffix (e.g., 10b).

Binary numbers larger than four digits are written with a space dividing each group of four digits, as in 1000 0101 0010b.

All other numbers are decimal.

3.4 Symbols

Dash (-) not applicable (n/a)

4 Introduction

Universal Flash Storage (UFS) is a simple, high performance, mass storage device with a serial Interface. It is primarily for use in mobile systems, between host processing and mass storage memory devices. The following is the summary of the UFS functional features,

- Similar functional features as eMMC
- Boot Operation Mode
- Device enumeration & discovery
- Supports Multiple partitions (LUNs) with partition Management
- Supports Multiple User Data Partition with Enhanced User Data Area options
- Support for boot partitions and RPMB partition
- Reliable write operation
- Background operations
- Secure operations, Purge and Erase to enhance data security
- Write Protection options, including Permanent & Power-On Write Protection
- Signed access to a Replay Protected Memory Block
- HW Reset Signals
- Task management operations
- Power management operations

4.1 Test specification Guiding Principles

1) Consistency – The principal is based on the need to generate a consistent result for all test items regardless of the testing implementation. The goal of this principal is to prevent a situation in which test implementations of a test item have different results due to a wide definition of the test item. According to this principal each test item provides detailed description for: commands, command sequence, specific command input parameters and specific expected output. Specific values are assigned to parameters, ranges are not used.

5 Test Case Specifications Format

The test case specification contains following fields,

- **Ref. specs Section**

  This field indicates the corresponding sections in the referenced document.

- **Test Purpose**

  This field briefs about the intention of the test case.

- **Test Procedure**

  This field contains test case execution procedure to be followed,

  [Precondition]

  The steps mentioned under this block shall be executed before main test case execution. The test steps mentioned in the **[Main]** block has dependency on these conditions. The output of test case may vary if precondition is not met.

  [Main]

  The test case execution procedure is mentioned in this section.

  [Clean up]

  Wherever mentioned, these steps to be followed after the test case execution to bring back the test environment to normal condition. These clean-up steps are needed to reset the test environment.

- **Input parameter values**

  The applicable values for the parameters used in the test case.

- **Expected Output**

  This field contains the expected result of the test case execution.