

JEDEC STANDARD

Universal Flash Storage (UFS)

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Foreword

This standard has been prepared by JEDEC. The purpose of this standard is definition of an UFS Universal Flash Storage electrical interface and an UFS memory device. This standard defines a unique UFS feature set and includes the feature set of eMMC Specification as a subset. This standard references also several other standard specifications by MIPI (M-PHY and UniPro Specifications) and INCITS T10 (SBC, SPC and SAM Specifications) organizations.

Introduction

The UFS electrical interface is a universal serial communication bus which can be utilized for different type of applications. It's based on MIPI M-PHY standard as physical layer for optimized performance and power. Architectural model references the INCITS T10 SAM model for ease of adoption.

The UFS device is a universal data storage and communication media. It is designed to cover a wide area of applications as smart phones, cameras, organizers, PDAs, digital recorders, MP3 players, internet tablets, electronic toys, etc.

UNIVERSAL FLASH STORAGE (UFS)

(From JEDEC Board Ballot JCB-11-13, formulated under the cognizance of the JC-64.1 Committee on Electrical Specifications and Command Protocols.)

1 SCOPE

This standard specifies the characteristics of the UFS electrical interface and the memory device. Such characteristics include (among others) low power consumption, high data throughput, low electromagnetic interference and optimization for mass memory subsystem efficiency. The UFS electrical interface is based on an advanced differential interface by MIPI M-PHY standard which together with the MIPI UniPro standard forms the interconnect of the UFS interface. The architectural model is referencing the INCITS T10 SAM standard and the command protocol is based on INCITS T10 (SCSI) SPC and SBC standards.

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 features.

1.1 General Features

- Target Performance
 - UFS version 1.0: 1.25Gbps (Gear1) is mandatory, Support for ~3Gbps (Gear2) is optional ~5.8Gbps max per lane, future UFS revision
- Target Host Applications
 - Mobile phone, UMPC, DSC, PMP, MP3 and any other applications require mass storage, bootable mass storage, and external card
- Target Device Types
 - External Card
 - Micro size for mobile and portable devices
 - Full size or adaptor for DSC and large devices
 - Embedded Packages
 - Mass Storage and Bootable Mass Storage
 - Future expansion of device class types
 - I/O devices, camera, wireless ... etc
- Topology: One device per UFS port. A topology to support multiple devices on a single interface is planned to future revision
- UFS Command Set Layer: Simplified SCSI command set based on SBC and SPC. UFS will not modify these SBC and SPC Compliant commands. Option for defining UFS Native command and future extension exist. UFS Transport Protocol Layer: Jedec to define the supported protocol layer, i.e. UTP for SCSI. This does not exclude the support of other protocol in UFS Transport Protocol Layer.
- UFS Interconnect Layer:
 - MIPI M-PhySM [MIPI M-Phy]
 - MIPI UniProSM [MIPI UniPro]