JEDEC STANDARD

MultiMediaCard (MMC) Card Mechanical Standard

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Foreword

The MultiMediaCard® Mechanical Standard has been prepared by the MultiMediaCard Association, hereafter referred to as MMCA. The MMCA exists to promote adoption of a global standard for a compact, robust, affordable storage and retrieval device, the MultiMediaCard. Consumers worldwide will benefit from this standard, allowing them to carry with them, information and entertainment that fits their needs, wherever they are, whenever they wish.

JEDEC has taken the basic MMCA specification and adopted it for embedded applications, calling it "eMMC." In addition to the packaging differences, eMMC devices use a reduced-voltage interface. These specifications are detailed in the JEDEC JC-64 "JEDEC MMC Electrical Interface Specification."

The purpose of the specification is the definition of the MMC, its environment and handling. It provides guidelines for systems designers. The specification also defines a tool box (a set of macro functions and algorithms) that contributes to reducing design-in costs.

This standard submission is intended to entirely supplant previously submitted MMC mechanical specifications.

Introduction

The MultiMediaCard is an universal low-cost 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, pagers, electronic toys, etc. Targeted features are high mobility and high performance at a low cost price. These features include low power consumption and high data throughput at the memory card interface.

MultiMediaCard communication is based on an advanced 13-pin bus. The communication protocol is defined as a part of this standard and referred to as the MultiMediaCard mode. To ensure compatibility with existing controllers, the cards may offer, in addition to the MultiMediaCard mode, an alternate communication protocol which is based on the SPI standard.

To provide for the forecasted migration of CMOS power (VDD) requirements and for compatibility and integrity of MultiMediaCard systems, two types of MultiMediaCards are defined in this standard specification, which differ only in the valid range of system VDD. These two card types are referred to as High Voltage MultiMediaCard and Dual Voltage MultiMediaCard.

MultiMediaCard (MMC) Card Mechanical Standard

(From JEDEC Board Ballot JCB-YY-XXX, formulated under the cognizance of the JC-XX Committee on ….)

1 Scope

This standard describes the mechanical and electromechanical features of the MultiMediaCard, as well as the minimum requirements of the MultiMediaCard connector. All technical drafts follow DIN ISO standard.

2 Normative reference

The following normative documents contain provisions that, through reference in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply:

MMC: MultiMediaCard

ESC: External signal contacts

4 General description

The MultiMediaCard Card Mechanical Specification describes the mechanical attributes of the MMC.

This document is presented in several sections. The MultiMediaCard Product Standard is described in Section 5.

References to other applicable JEDEC standards and publications are provided in Section 6 on page 6.

Annex A on page 7 contains additional information that is informative in nature and not considered a constituent part of this specification. These application notes contain useful tips for circuit and system designers, helping simplify the design process.

NOTE: As used in this document, “shall” or “will” denotes a mandatory provision of the standard. “Should” denotes a provision that is recommended but not mandatory. “May” denotes a feature whose presence does not preclude compliance, that may or may not be present at the option of the implementor.

5 Product standard

This product standard establishes the MMC interface pin configuration, form factors, mechanical description, card package characteristics, signal contacts, and its design and format. It also establishes reliability, durability, and quality-assurance standards.

The system card and connections are mentioned relative to “hot” card insertion, inverse insertion, and card orientation; full discussion of these topics is not provided, as this would exceed the scope of this document.

5.1 MMC interface pin configuration

The card is connected directly to the signals of the MultiMediaCard bus. See Table 1 for card contact definitions.

See applicable JEDEC and MMCA standards for electrical specifications.

Table 1 — MMC pin interface configuration

Pin No.	Name	Type[1]	Description
1	DAT3	I/O/PP	Data
2	CMD	I/O/PP/OD	Command/Response
3	V_{SSI}	S	Supply voltage ground
4	V_{DD}	S	Supply voltage
5	CLK	I	Clock
6	V_{SS2}	S	Supply voltage ground
7	DAT0[2]	I/O/PP	Data
8	DAT1	I/O/PP	Data
9	DAT2	I/O/PP	Data
10	DAT4	I/O/PP	Data
11	DAT5	I/O/PP	Data
12	DAT6	I/O/PP	Data
13	DAT7	I/O/PP	Data

NOTE 1 S: power supply; I: input; O: output; PP: push-pull; OD: open-drain; NC: Not connected (or logical high)
NOTE 2 The DAT0-DAT7 lines for read-only cards are output only

5.2 Form factors

The MMC has two possible form factors. The normal-size form factor is 24mm x 32mm x 1.4mm. The reduced-size form factor is 24mm x 18mm x 1.4mm. To use a reduced-size MMC in a normal-size MMC socket, a special adaptor has to be used. Figure 1 shows the two form factors. The mechanical and electrical interface is identical in both form factors.

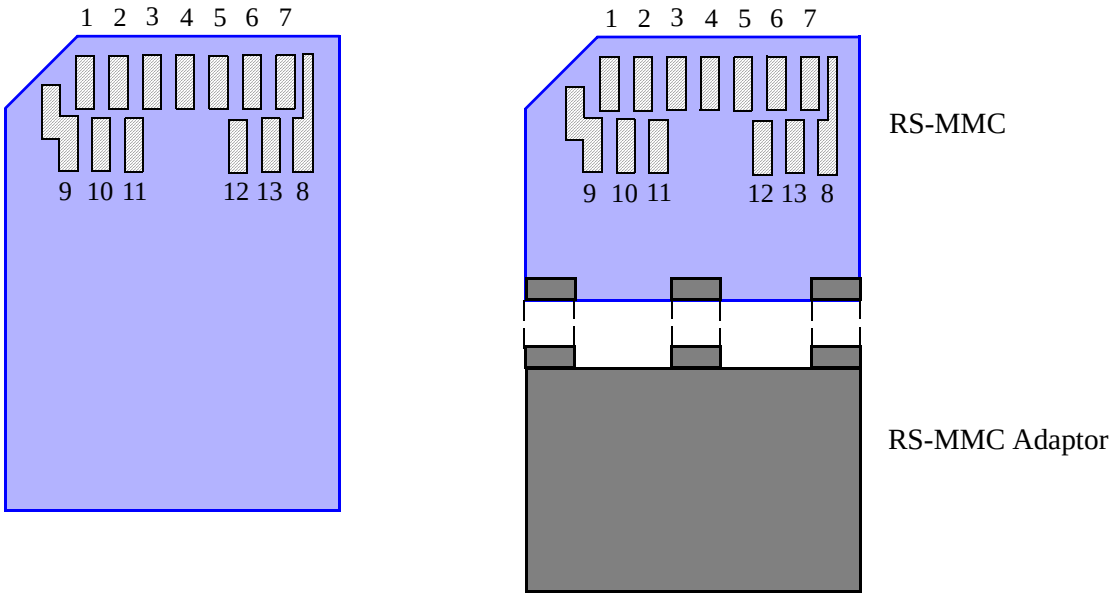

Figure 1 — MMC form factors, bottom view

5.3 Mechanical description

The functions of the card package are:

- Protecting the chip(s)
- Easy handling for the end user
- Reliable electrical interconnection
- Bearing textual information and image
- Appealing appearance

The functions of the connector are:

- Attaching and fixing the card
- Electrical interconnection of the card to the system board
- Optional: switch on/off power supply
- Protection against card inverse insertion

5.4 Card package

Every card package shall have the characteristics described in the following sections.

5.4.1 External signal contacts (ESC)

Refer to JEDEC MMC outline drawings MO-277 and MO-278.

5.4.2 Design and format

Dimensions of a normal-size MultiMediaCard (MMCplus™): Refer to MO-277.

Dimensions of a reduced-size MultiMediaCard (MMCmobile™): Refer to MO-278.

Table 2 — Design and format features

Item	Description
Number of ESC	13
Distance from front edge	C1, C2, C5, C6, C7: 1.6mm max.
ESC grid	2.5mm
Contact dimensions	C1, C2, C5, C6: 1.3mm x 3.7mm C3: 1.5 mm x 4.0mm C4: 1.7mm x 4.0mm C7: 1.2mm x 3.7mm C8: 1.2/1.625mm x 9.0mm C9: 1.3mm x 6.7mm C10–C13: 1.3mm x 3.6mm
Location of Via holes (on the contacts)	Not allowed on a 0.5mm stripe centered along the center line of the contact pad.
Electrical resistance	30 mOhm (worst case: 100 mOhm)
Micro interrupts	<0.1 µSec
Card package dimensions	Normal size: 24mm x 32mm; (min. 23.9mm x 31.9mm; max.24.1mm x 32.1mm); for other dimensions, see MO-277. Testing according to MIL STD 883, Method 2016
	Reduced size: 24mm x 18mm; (min. 23.9mm x 17.9mm; max.24.1mm x 18.1mm); for other dimensions, see MO-278.Testing according to MIL STD 883, Method 2016
Thickness	1.4mm ±0.1mm
Restrictions on package-material usage	Some areas of the external surface of the card edge may not contain conductive materials (refer to the applicable MO drawing).
Label or printable area	Whole card, except contact area.
Surface	Plain (except contact area)
Edges	Smooth edges; see applicable MO drawing
Inverse insertion	Protection on right corner (top view); see applicable MO drawing
Position of ESC contacts	Along middle of shorter edge; -0.625mm offset
Card-holding notches	Half-depth notches on sides of card top

5.4.3 Reliability and durability

Table 3 — Reliability and durability requirements

Test Method	Test Procedure	Condition and Duration
Operation temperature	TBD	-25°C to +85°C +95°C maximum junction temperature
High-temperature storage	JEDEC JESD22-A103C Test Condition G	+85°C 500 hours
Low-temperature storage	JEDEC JESD22-A119 Test Condition A	-40°C 168 hours
Temperature/humidity	TBD	Operation: +25°C to +95% RH Stress: +40°C to 93% RH 500 hours
Moisture/corrosion	JEDEC JESD22-A107A Test Condition A	3% NaCl at +35°C 24 hours

Table 3 — Reliability and durability requirements (continued)

Test Method	Test Procedure	Condition and Duration
ESD protection	ANSI EOS/ESDS5.1-1998 IEC61000-4-2	Contact pads: ±4kV, human body model. Non-contact pads area: ±8kV (coupling-plane discharge) ±15kV (air discharge)
Durability	TBD	10,000 insertions
Bending	TBD	TBD
Torque	TBD	TBD
Drop Test	TBD	1.5m free-fall
ESC friction coefficient	TBD	Static friction coefficient of pads surface: Equal to or less than 0.8
		Test Condition: 0.4N ±0.02N and movement speed is 1.0mm/minute. The friction coefficient value represents the maximum applicable value when moving a distance of 1mm starting at the center of any pad.
		Environmental Condition: 20°C to 25°C and maximum 30% humidity.
ESC friction coefficient (continued)	TBD (continued)	Probe Condition: Nose of probe has a radius of 0.5mm (±0.1mm), and a mirror-finished surface (Ra = 0.2), 1 to 5 micron-m Ni of underplating, and a top layer of hard gold plating 0.3 to 1.0 micron-m.
UV light exposure	ISO 7816-1	UV: 200nm, 15Ws/cm2
External visual inspection shape and form	TBD	No warpage; no mold skin; complete form; no cavities, and surface smoothness within contour; no cracks, no pollution (oil, dust, etc.).

5.4.4 Quality assurance

The product traceability shall be ensured by an individual card identification number.

5.5 System: Card and connector

Describing the connector, especially a multi-card connector, is beyond the scope of this document. However, minimal requirements to the connector comprise the ability to guarantee hot insertion and removal of the card, and to prevent inverse insertion. An example for such a connector is described in Annex A on page 7.

5.5.1 “Hot” Card Insertion

To guarantee a reliable initialization during hot insertion, some measures shall be taken on the host side. For instance, a special hot-insertion capable card connector may be used to guarantee the proper sequence of card pin connection. As another method, a switch could ensure that the power is switched on only after all card pads are contacted. Of course, any other similar mechanism is allowed. A possible connector realization is described in section Annex A .

5.5.2 Inverse Insertion

The reclining corners of the card and the connector prevent inverse insertion (see Figure 2 on page 6).

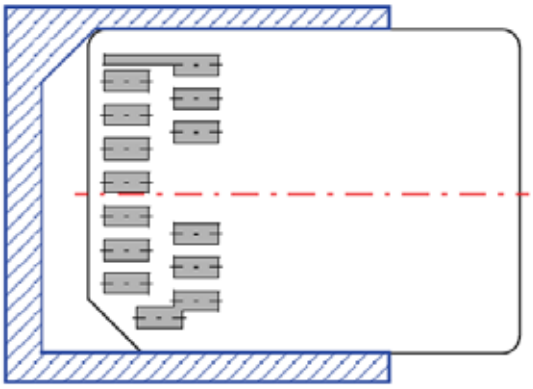

Figure 2 — Inverse insertion

5.5.3 Card Orientation

For the benefit of unified terminology when discussing the three-dimensional orientation of a card (e.g., for connector definition), the non-contact-pads surface is defined as the TOP side of the card.

6 References other applicable JEDEC standards and publications

Documents referred to in this document are shown in Table 4.

Table 4 — Referenced documents

Document Number	Document Subject or Title
MO-277	13-pin full-size MultiMediaCard (MMC)—MMC*plus*
MO-278	13-pin reduced-size MultiMediaCard (MMC)—MMC*mobile*
JEDEC standard no. JESD84-B42	JEDEC MMC Electrical Standard, High Capacity, Version 4.2

Annex A: Application Notes

A.1 Connector

The connector described in this chapter serves as an example and is subject to further changes.

A.1.1 General Information

The connector housing that accommodates the card is formed of plastic Inside are seven contact springs for contacting the pads of the inserted card. Testing procedures are performed according to DIN IEC 68: Pay-load Block Length and ECC Types Handling.

A.1.2 Card Insertion and Removal

Insertion of the MultiMediaCard is only possible when the contact area of the card and the contact area of the connector are in the correct positions relative to each other. This is ensured by the reclining corners of the card and the connector, respectively.

To guarantee a reliable initialization during hot insertion, some measures must be taken on the host side. A possible solution is shown in Figure A.1 on page 8. This solution is based on the idea of a defined sequence for card-contact connection during the card insertion process. The card contacts are contacted in two steps:

Step 1. Ground V_{SS1} (pin 3) and supply voltage V_{DD} (pin 4).

Step 2. Others: CLK, CMD, DAT, V_{SS2}, and RSV.

Pins 3 and 4 should make first contact when the card is inserted, and release last when the card is extracted.

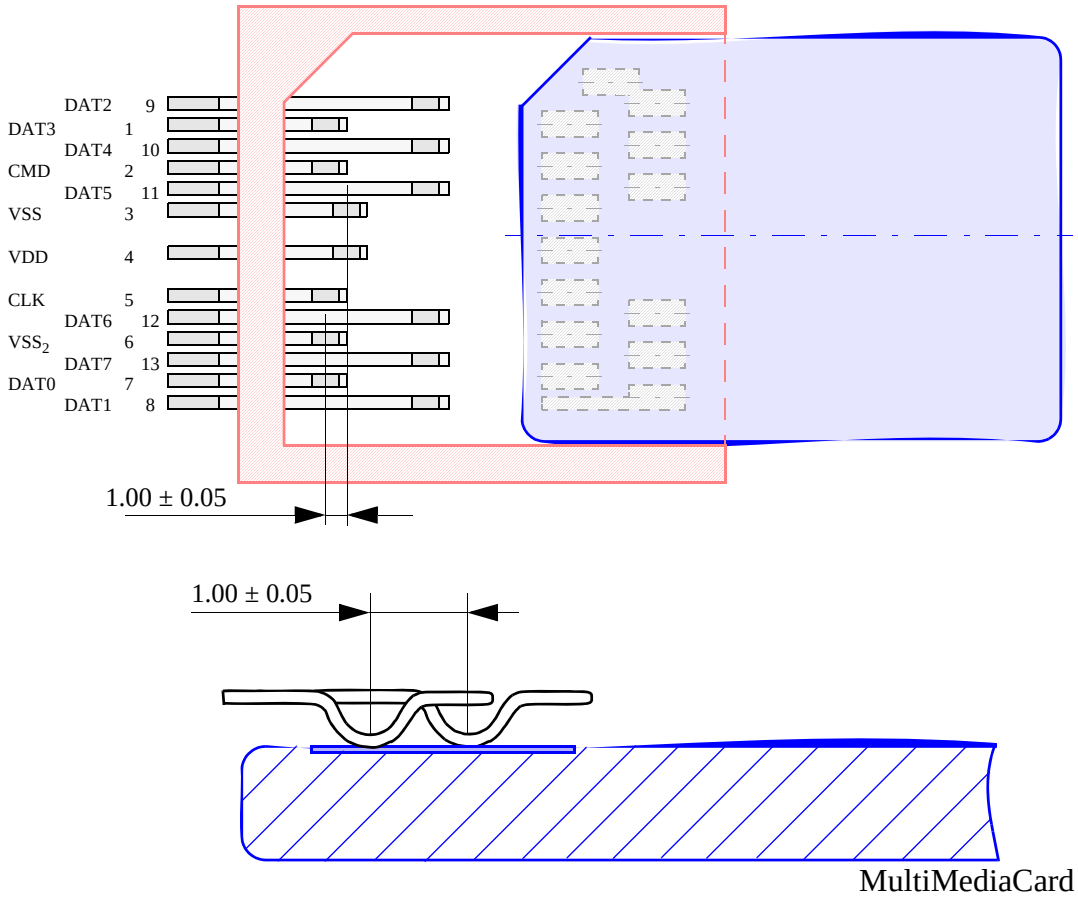

Figure A.1 — MultiMediaCard connector modified for hot insertion

A.1.3 Characteristics

The features described in the following sectionsmust be considered when designing a MultiMediaCard connector. The given values are typical examples.

Table A.1 — Mechanical characteristics

Characteristic			
Max. number of mating operations		> 10000	
Contact force		0.2…0.6 N	
Total pulling force		Min.2 N	DIN IEC 512 part 7
Total insertion force		Max. 40 N	DIN IEC 512 part 7
Vibration and High Frequency			
	Mechanical frequency range	10…2000 Hz	DIN IEC 512 part 2 and 4
	Acceleration	2g	
Shock			
	Acceleration	5g	

Table A.2 — Electrical characteristics

DIN IEC 512	Value
Contact resistance	100 mOhm
Current-carrying capacity at 25°C	0.5A
Insulation resistance	> 1000 MOhm, > MOhm after test
Operating voltage	3.3V
Testing voltage	500V
Operating current	100mA max

Table A.3 — Climatic characteristics

DIN IEC 512 part 6–9	Value
Operating temperature	-25°C…90°C
Storage temperature	-40°C…90°C
Humidity	95% max, non-condensing

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