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You can read the recommendations in the user guide, the technical guide or the installation guide for TRANSCEND TS16GSDHC10. You'll find the answers to all your questions on the TRANSCEND TS16GSDHC10 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual TRANSCEND TS16GSDHC10
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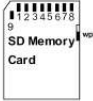

Rev. 1.0

SDHC10 Card series

Description

Transcend High Capacity SD Card series are specifically designed to meet the High Capacity, High Definition Audio and Video requirement for the latest Digital Cameras, DV Recorders, GPS, etc. The new defined Speed Class 10 enables the host to support AV applications to perform real time recording to the SD memory card.

Placement

Front
Back

4-32GB High Capacity Secure Digital Card

Features

- RoHS compliant product.
- Card Lid material: PC + ABS
- Operating Voltage: 2.7 ~ 3.6V
- Operating Temperature: -25 ~ 85°C
- Durability: 10,000 insertion/removal cycles
- Compatible with SD Specification Ver. 3.0
- Mechanical Write Protection Switch
- Supports Speed Class Specification up to Class 10
- Supports Copy Protection for Recorded Media (CPRM) for SD-Audio
- Form Factor: 24mm x 32mm x 2.1mm

Pin Definition

Pin No.	SD Mode			SPI Mode		
	Name	Type	Description	Name	Type	Description
1	CD/DAT	I/O/PP	Card Detect/Data Line [Bit3]	CS	I	Chip Select (neg true)
2	CMD	PP	Command/Response	DI	I	Data In
3	V _{SS1}	S	Supply voltage ground	VSS	S	Supply voltage ground
4	V _{DD}	S	Supply voltage	VDD	S	Supply voltage
5	CLK	I	Clock	SCLK	I	Clock
6	V _{SS2}	S	Supply voltage ground	VSS2	S	Supply voltage ground
7	DAT0	I/O/PP	Data Line [Bit0]	DO	O/PP	Data Out
8	DAT1	I/O/PP	Data Line [Bit1]	RSV		
9	DAT2	I/O/PP	Data Line [Bit2]	RSV		

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Manual abstract:

1.0 SDHC10 Card series Description Transcend High Capacity SD Card series are specifically designed to meet the High Capacity, High Definition Audio and Video requirement for the latest Digital Cameras, DV Recorders, GPS, etc. The new defined Speed Class 10 enables the host to support AV applications to perform real time recording to the SD memory card. 4~32GB High Capacity Secure Digital Card Features RoHS compliant product. Card Lid material: PC + ABS Operating Voltage: 2.7 ~ 3.6V Operating Temperature: -25 ~ 85° C Durability: 10,000 insertion/removal cycles Compatible with SD Specification Ver. 3.0 Mechanical Write Protection Switch Supports Speed Class Specification up to Class 10 Supports Copy Protection for Recorded Media (CPRM) for SD-Audio · Form Factor: 24mm x 32mm x 2.1mm Placement · Front Back Pin Definition Pin No.

1 2 3 4 5 6 7 8 9 Name Type SD Mode Description Name CS DI VSS VDD SCLK VSS2 DO RSV RSV Type I I S S I S O/PP SPI Mode Description Chip Select (neg true) Data In Supply voltage ground Supply voltage Clock Supply voltage ground Data Out CD/DAT I/O/PP3 Card Detect/Data Line [Bit3] CMD VSS1 VDD CLK VSS2 DAT0 DAT1 DAT2 PP S S I S Command/Response Supply voltage ground Supply voltage Clock Supply voltage ground I/O/PP Data Line [Bit0] I/O/PP Data Line [Bit1] I/O/PP Data Line [Bit2] Transcend Information Inc. 1 Rev. 1.0 SDHC10 Card series Architecture 4~32GB High Capacity Secure Digital Card Transcend Information Inc. 2 Rev.

1.0 SDHC10 Card series Bus Operating Conditions · General Parameter Peak voltage on all lines All Inputs Input Leakage Current All Outputs Output Leakage Current -10 -10 4~32GB High Capacity Secure Digital Card Symbol Min. -0.3 Max. VDD+0.

3 10 10 Unit V μ A μ A Remark · Power Supply Voltage Parameter Supply voltage Output High Voltage Output Low Voltage Input High Voltage Input Low Voltage Power up time Symbol VDD VOH VOL VIH VIL Min. 2.7 0.75* VDD Max. 3.6 0.125* VDD Unit V V V V V ms Remark IOH=-100uA@VDD Min. IOL=100uA@VDD Min. 0.625* VDD VDD+0.

3 VSS-0.3 0.25* VDD 250 From 0v to VDD Min. · Current Consumption The current consumption is measured by averaging over 1 second. · Before first command: Maximum 15 mA · During initialization: Maximum 100 mA · Operation in Default Mode: Maximum 100 mA · Operation in High Speed Mode: Maximum 200 mA · Operation with other functions: Maximum 500 mA. · Bus Signal Line Load The total capacitance CL the CLK line of the SD Memory Card bus is the sum of the bus master capacitance CHOST, the bus capacitance CBUS itself and the capacitance CCARD of each card connected to this line: CL = CHOST + CBUS + *CCARD Where N is the number of connected cards. Parameter Pull-up resistance Bus signal line capacitance Symbol RCMD RDAT CL Min. 10 Max. 100 40 Unit k pF Remark To prevent bus floating 1 card CHOST+CBUS shall not exceed 30 pF Transcend Information Inc. 3 Rev.

@@@ @@@@ @@@@ 1.0 SDHC10 Card series · Bus Signal Levels 4~32GB High Capacity Secure Digital Card As the bus can be supplied with a variable supply voltage, all signal levels are related to the supply voltage. To meet the requirements of the JEDEC specification JESD8-1A and JESD8-7, the card input and output voltages shall be within the following specified ranges for any VDD of the allowed voltage range: Parameter Output HIGH voltage Output LOW voltage Input HIGH voltage Input LOW voltage Symbol VOH VOL VIH VIL Min. 0.75* VDD Max. 0.125* VDD Unit V V V V Remark IOH = -100 μ A @VDD min IOL = -100 μ A @VDD min 0.625* VDD VSS 0.3 VDD + 0.3 0.

25* VDD Transcend Information Inc. 5 Rev. 1.0 SDHC10 Card series · Bus Timing 4~32GB High Capacity Secure Digital Card Parameter Clock frequency Data Transfer Mode Clock frequency Identification Mode Clock low time Clock high time Clock rise time Clock fall time Inputs CMD, DAT (referenced to CLK) Input set-up time Input hold time Symbol fPP fOD tWL tWH tTLH tTHL tISU tIH 6 Min 0 0(1)/100 10 10 Max. 25 400 Unit MHz KHz ns ns Remark CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) Clock CLK (All values are referred to min (VIH) and max (VIL) 10 10 5 5 ns ns ns ns Transcend Information Inc. Rev. 1.0 SDHC10 Card series Outputs CMD, DAT (referenced to CLK) Output Delay time during Data Transfer Mode tODLY 0 4~32GB High Capacity Secure Digital Card 14 ns CL 40 pF, (1 card) CL 40 pF, (1 card) Output Delay time during Identification Mode tODLY 0 50 ns (1) 0 Hz means to stop the clock. The given minimum frequency range is for cases where continuous clock is required Transcend Information Inc. 7 Rev.

1.0 SDHC10 Card series · Bus Timing (High Speed Mode) 4~32GB High Capacity Secure Digital Card Parameter Clock frequency Data Transfer Mode Clock low time Clock high time Clock rise time Clock fall time Inputs CMD, DAT (referenced to CLK) Input set-up time Input hold time Outputs CMD, DAT (referenced to CLK) Symbol fPP tWL tWH tTLH tTHL tISU tIH Min 0 7 7 Max. 50 Unit MHz ns ns Remark CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) CCARD 10 pF, (1 card) Clock CLK (All values are referred to min (VIH) and max (VIL) 3 3 6 2 ns ns ns ns ns Transcend Information Inc. 8 Rev. 1.0 SDHC10 Card series Output Delay time during Data Transfer Mode Output Hold time 1 4~32GB High Capacity Secure Digital Card tODLY tOH 2.5 40 14 ns ns pF CL 40 pF, (1 card) CL 40 pF, (1 card) (1 card) Total System capacitance for each line CL 1) In order to satisfy severe timing, host shall drive only one card. Transcend Information Inc. 9 Rev. 1.

0 SDHC10 Card series Reliability and Durability Temperature Operation: -25° / 85° C C 4~32GB High Capacity Secure Digital Card Storage: -40° (168h) / 85° (500h) C C Junction temperature: max. 95° C Moisture and corrosion Operation: 25° / 95% rel. humidity C Storage: 40° / 93% rel. hum./500h C Salt Water Spray: 3% NaCl/35C; 24h acc.

MIL STD Method 1009 Durability Bending Torque Drop test Visual inspection Shape and form WP Switch cycles 10,000 mating cycles 10N 0.15N.m or +/-2.5 deg 1.

5m free fall No warp page; no mold skin; complete form; no cavities surface smoothness <= -0.1 mm/cm² within contour; no cracks; no pollution (fat, oil dust, etc.) minimum 1000 Cycles(@Slide force 0.4N to 5N) Minimum moving force of WP switch 40gf (Ensures that the WP switch will not slide while it is inserted to the connector.



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Transcend Information Inc. 10 Rev. 1.0 SDHC10 Card series Register Information 4~32GB High Capacity Secure Digital Card Within the card interface six registers are defined: OCR, CID, CSD, RCA, DSR and SCR. These can be accessed only by corresponding commands. The OCR, CID, CSD and SCR registers carry the card/content specific information, while the RCA and DSR registers are configuration registers storing actual configuration parameters.

1. OCR register The 32-bit operation conditions register stores the VDD voltage profile of the card. Additionally, this register includes status information bits. One status bit is set if the card power up procedure has been finished. This register includes another status bit indicating the card capacity status after set power up status bit. The OCR register shall be implemented by the cards. The 32-bit operation conditions register stores the VDD voltage profile of the card. Bit 7 of OCR is newly defined for Dual Voltage Card and set to 0 in default. If a Dual Voltage Card does not receive CMD8, OCR bit 7 in the response indicates 0, and the Dual Voltage Card which received CMD8, sets this bit to 1. Additionally, this register includes 2 more status information bits.

Bit 31 - Card power up status bit, this status bit is set if the card power up procedure has been finished. Bit 30 - Card Capacity Status bit, 0 indicates that the card is SDSC. 1 indicates that the card is SDHC or SDXC. The Card Capacity Status bit is valid after the card power up procedure is completed and the card power up status The OCR register shall be implemented by the cards. OCR Register Definition Transcend Information Inc.

11 Rev. 1.0 SDHC10 Card series 4~32GB High Capacity Secure Digital Card 1) This bit is valid only when the card power up status bit is set. 2) This bit is set to LOW if the card has not finished the power up routine. 3) Only UHS-I card supports this bit.

A voltage range is not supported if the corresponding bit value is set to LOW. As long as the card is busy, the corresponding bit (31) is set to LOW. 2. CID Register The Card Identification (CID) register is 128 bits wide. It contains the card identification information used during the card identification phase.

Every individual flash card shall have a unique identification number. The structure of the CID register is defined in the following paragraphs: Name Manufacturer ID OEM/Application ID Product name Product revision Product serial number reserved Manufacturing date CRC7 checksum not used, always 1 Field MID OID PNM PRV PSN -MDT CRC Width 8 16 40 8 32 4 12 7 1 CID-slice [127:120] [119:104] [103:64] [63:56] [55:24] [23:20] [19:8] [7:1] [0:0] The CID Fields · MID An 8-bit binary number that identifies the card manufacturer. @@@@The "m" field [11:8] is the month code. 1 = January. The "y" field [19:12] is the year code.

0 = 2000. @.0 SDHC10 Card series 3. @The following sections describe the CSD fields and the relevant data types fl Card Note that for current SD Memory Cards that field must be always 0_0110_010b (032h) which is equal to 25MHz - the mandatory maximum operating frequency of SD Memory Card.

@@@CCC bit 0 1

@@@This value is not related to erase operation. @SDHC and SDXC Cards do not support write protected groups. ·

WP_GRP_ENABLE This field is fixed to 0. SDHC and SDXC Cards do not support write protected groups. · R2W_FACTOR This field is fixed to 2h, which indicates 4 multiples.

Write timeout can be calculated by multiplying the read access time and R2W_FACTOR. However, the host should not use this factor and should use 250 ms for write timeout · WRITE_BL_LEN This field is fixed to 9h, which indicates WRITE_BL_LEN=512 Byte Transcend Information Inc. 18 Rev. 1.0 SDHC10 Card series · WRITE_BL_PARTIAL 4~32GB High Capacity Secure Digital Card This field is fixed to 0, which indicates partial block read is inhibited and only unit of block access is allowed.

· FILE_FORMAT_GRP This field is set to 0. Host should not use this field. · COPY Defines whether the contents is original (=0) or has been copied (=1). Setting this bit to 1 indicates that the card content is a copy. The COPY bit is a one time programmable bit except ROM card. · PERM_WRITE_PROTECT Permanently protects the whole card content against overwriting or erasing (all write and erase commands for this card are permanently disabled). The default value is '0', i.e. not permanently write protected. · TMP_WRITE_PROTECT Temporarily protects the whole card content from being overwritten or erased (all write and erase commands for this card are temporarily disabled).

This bit can be set and reset. The default value is '0', i.e. not write protected. · FILE_FORMAT This field is set to 0. Host should not use this field. · CRC The CRC field carries the check sum for the CSD contents. The checksum has to be recalculated by the host for any CSD modification. The default corresponds to the initial CSD contents. The following table lists the correspondence between the CSD entries and the command classes.

A ' ' entry indicates that the CSD field affects the commands of the related command class. 4. RCA Register The writable 16-bit relative card address register carries the card address that is published by the card during the card identification. This address is used for the addressed host-card communication after the card identification procedure. The default value of the RCA register is 0x0000.

The value 0x0000 is reserved to set all cards into the Stand-by State with CMD7. Transcend Information Inc. 19 Rev. 1.0 SDHC10 Card series 5.

DSR Register (Optional) 4~32GB High Capacity Secure Digital Card The 16-bit driver stage register can be optionally used to improve the bus performance for extended operating conditions (depending on parameters like bus length, transfer rate or number of cards). The CSD register carries the information about the DSR register usage. The default value of the DSR register is 0x404. 6. SCR Register In addition to the CSD register there is another configuration register that named - SD CARD Configuration Register (SCR). SCR provides information on SD Memory Card's special features that were configured into the given card. The size of SCR register is 64 bit. This register shall be set in the factory by the SD Memory Card manufacturer. The following table describes the SCR register content. Description SCR Structure SD Memory Card - Spec.

Version data_status_after erases CPRM Security Support DAT Bus widths supported Spec. Version 3.00 or higher Extended Security Support Reserved Command Support bits reserved for manufacturer usage CMD_SUPPORT Field SCR_STRUCTURE SD_SPEC DATA_STAT_AFTER_ERASE SD_SECURITY SD_BUS_WIDTHS SD_SPEC3 EX_SECURITY Width 4 4 1 3 4 1 4 9 14 32 Cell Type R R R R R R R R R SCR Slice [63:60] [59:56] [55:52] [54:52] [51:48] [47] [46:43] [42:34] [33:32] [31:0] The SCR Fields · SCR_STRUCTURE Version number of the related SCR structure in the SD Memory Card Physical Layer Specification.



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SCR_STRUCTURE SCR structure version 0 1-15 SCR version 1.0 reserved SD Physical Layer Specification Version Version 1.01-3.00 SCR Register Structure Version Transcend Information Inc. 20 Rev. 1.0 SDHC10 Card series · SD_SPEC 4~32GB High Capacity Secure Digital Card Describes the SD Memory Card Physical Layer Specification version supported by this card.

@@All conditions shall be satisfied for each version. @@@@SDXC Card sets this field to 4 (Version 3.xx). 4~32GB High Capacity Secure Digital Card Note that it is mandatory for a regular writable SD Memory Card to support Security Protocol. · SD_BUS_WIDTHS Describes all the DAT bus widths that are supported by this card.

SD_BUS_WIDTHS Bit 0 Bit 1 Bit 2 Bit 3 Supported Bus Widths 1 bit (DAT0) reserved 4 bit (DAT0-3) reserved SD Memory Card Supported Bus Widths Since SD Memory Card shall support at least the two bus modes 1bit or 4bit width then any SD Card shall set at least bits 0 and 2 (SD_BUS_WIDTH="0101"). Transcend Information Inc. 22 Rev. 1.0 SDHC10 Card series Mechanical Dimension 4~32GB High Capacity Secure Digital Card Transcend Information Inc. 23 Rev. 1.0 SDHC10 Card series 4~32GB High Capacity Secure Digital Card Transcend Information Inc. 24 Rev. 1.0 SDHC10 Card series 4~32GB High Capacity Secure Digital Card Transcend Information Inc. 25 .



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