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You can read the recommendations in the user guide, the technical guide or the installation guide for TRANSCEND TS1GDOM40V-S. You'll find the answers to all your questions on the TRANSCEND TS1GDOM40V-S in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

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Transcend 40-Pin IDE Flash Module TS128M ~ 16GDOM40V-S



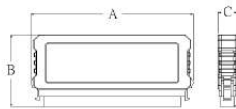
Description

With an IDE interface and strong data retention ability, 40-Pin IDE Flash Modules are ideal for use in the harsh environments where Industrial PCs, Set-Top Boxes, etc. are used.

Features

- RoHS compliant products
- Storage Capacity: 128MB ~ 16GB
- Operating Voltage: 3.3V ±5% or 5V ±10%
- Operating Temperature: 0°C ~ 70°C
- Operating Humidity (Non condensation): 0% to 95%
- Storage Humidity (Non condensation): 0% to 95%
- Endurance: 2,000,000 Program/Erase cycles
- MTBF: 1,000,000 hours
- Durability of Connector: 10,000 times
- Fully compatible with devices and OS that support the IDE standard (pitch = 2.54mm)
- Built-in ECC function assures high reliability of data transfer
- Supports up to Ultra DMA Mode 4
- Supports PIO Mode 6
- Support Wear-Leveling to extend product life

Placement



Dimensions

Side	Millimeters	Inches
A	61.00 ± 0.40	2.402 ± 0.016
B	27.10 ± 0.50	1.067 ± 0.020
C	7.10 ± 0.20	0.280 ± 0.008



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Manual abstract:

Name No. HD3 HD12 HD2 HD13 HD1 HD14 HD0 HD15 GND VCC Pin Name Pin No. @@@@If Pin 20 of the IDE connector is defined as VCC, then the 40-Pin IDE Flash Module can get necessary power without use of the power cord. 01 -RESET 11 02 GND 12 03 04 05 06 07 08 09 10 HD7 HD8 HD6 HD9 HD5 HD10 HD4 HD11 13 14 15 16 17 18 19 20 21 DMARQ 31 22 GND 32 23 24 25 26 27 28 30 IOWB GND IORB GND IORDY NC GND 33 34 35 36 37 38 40 29 -DMACK 39 Pin Definition Symbol HD0 ~ HD15 HA0 ~ HA2 -RESET IORB IOWB IOIS16B CE1B, CE2B PDIAGB DASP B DMARQ DMACK IREQ

NC GND VCC Pin Layout Function Pin1 Data Bus (Bi-directional) Address Bus (Input) Device Reset (Input) Device I/O Read (Input) Device I/O Write (Input) Transfer Type 8/16 bit (Output) Chip Select (Input) Pass Diagnostic (Bi-directional) Disk Active/Slave Present (Bi-directional) DMA request DMA acknowledge Interrupt Request (Output) No Connection Ground Vcc Power Input Bulge Pin39 Pin2 Pin40 Transcend Information Inc. 2 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Block Diagram With 1 pcs of Flash Memory: With 2 pcs of Flash Memory: Transcend Information Inc. 3 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Ratings Absolute Maximum Ratings Symbol VDD-VSS Ta Tst Parameter DC Power Supply Operating Temperature Storage Temperature Min -0.6 0 -40 Max +6 +70 +85 Unit V °C °C Recommended Operating Conditions Symbol VDD VIN Ta Parameter Power supply Input voltage Operating Temperature Min 3.0 0 0 Max 5.

5 VDD+0.3 +70 Units V V °C DC Characteristics (Ta=0 C to +70 C, Vcc = 5.0V ±10%) Parameter Supply Voltage High level output voltage Low level output voltage High level input voltage Low level input voltage o o o o Symbol VCC VOH VOL VIH VIL Min 4.5 VCC-0.8 -4. 0 2.92 --- Max 5.5 -0.8 --0.8 1.

70 Unit V V V V V V V Remark Non-schmitt trigger Schmitt trigger Schmitt trigger 1 Non-schmitt trigger 1 (Ta=0 C to +70 C, Vcc = 3.3V ±5%) Parameter Supply Voltage High level output voltage Low level output voltage High level input voltage Low level input voltage Symbol VCC VOH VOL VIH VIL Min 3.135 VCC-0.8 -2.4 2.05 --- Max 3.465 -0.8 --0.6 1.25 Unit V V V V V V V Remark Non-schmitt trigger Schmitt trigger Schmitt trigger 1 Non-schmitt trigger 1 Transcend Information Inc.

4 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Transcend Information Inc. 5 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S True IDE PIO Mode Read/Write Timing Mode Mode Mode Mode Mode Mode Mode 0 1 2 3 4 5 6 1 t0 Cycle time (min) 600 383 240 180 120 100 80 t1 Address Valid to -IORD/-IOWR setup (min) 70 50 30 30 25 15 10 1 t2 -IORD/-IOWR (min) 165 125 100 80 70 65 55 t2 -IORD/-IOWR (min) Register (8 bit) 290 290 290 80 70 65 55 t2i -IORD/-IOWR recovery time (min) ---70 25 25 20 t3 -IOWR data setup (min) 60 45 30 30 20 20 15 t4 -IOWR data hold (min) 30 20 15 10 10 5 5 t5 -IORD data setup (min) 50 35 20 20 20 15 10 t6 -IORD data hold (min) 5 5 5 5 5 5 2 t6Z -IORD data tristate (max) 30 30 30 30 20 20 4 t7 Address valid to IOCS16 assertion (max) 90 50 40 N/A N/A N/A N/A 4 t8 Address valid to IOCS16 released (max) 60 45 30 N/A N/A N/A t9 -IORD/-IOWR to address valid hold 20 15 10 10 10 10 10 tRD Read Data Valid to IORDY active (min), if 0 0 0 0 0 0 IORDY initially low after tA 5 5 tA IORDY Setup time 3 35 35 35 35 35 N/A N/A 5 5 tB IORDY Pulse Width (max) 1250 1250 1250 1250 1250 N/A N/A 5 5 tC IORDY assertion to release (max) 5 5 5 5 5 N/A N/A Notes: All timings are in nanoseconds. The maximum load on -IOCS16 is 1 LSTTL with a 50 pF (40pF below 120nsec Cycle Time) total load. All times are in nanoseconds. Minimum time from -IORDY high to -IORD high is 0 nsec, but minimum -IORD width shall still be met. Item (1) t0 is the minimum total cycle time, t2 is the minimum command active time, and t2i is the minimum command recovery time or command inactive time. @@@The three timing requirements of t0, t2, and t2i shall be met. @@@@ (3) The delay from the activation of -IORD or -IOWR until the state of IORDY is first sampled.

If IORDY is inactive then the host shall wait until IORDY is active before the PIO cycle can be completed. If the device is not driving IORDY negated at tA after the activation of -IORD or -IOWR, then t5 shall be met and tRD is not applicable. If the device is driving IORDY negated at the time tA after the activation of -IORD or -IOWR, then tRD shall be met and t5 is not applicable. (4) t7 and t8 apply only to modes 0, 1 and 2. For other modes, this signal is not valid.

(5) IORDY is not supported in this mode. Transcend Information Inc. 6 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S True IDE PIO Mode Timing Diagram Figure 1: True IDE PIO Mode Timing Diagram Notes: (1) Device address consists of -CS0, -CS1, and A[02::00] (2) Data consists of D[15::00] (16-bit) or D[07::00] (8 bit) (3) -IOCS16 is shown for PIO modes 0, 1 and 2. For other modes, this signal is ignored.

(4) The negation of IORDY by the device is used to extend the PIO cycle. The determination of whether the cycle is to be extended is made by the host after tA from the assertion of -IORD or -IOWR. The assertion and negation of IORDY is described in the following three cases: (4-1) Device never negates IORDY: No wait is generated. (4-2) Device starts to drive IORDY low before tA, but causes IORDY to be asserted before tA: No wait generated. (4-3) Device drives IORDY low before tA: wait generated. The cycle completes after IORDY is reasserted. For cycles where a wait is generated and -IORD is asserted, the device shall place read data on D15-D00 for tRD before causing IORDY to be asserted. Transcend Information Inc. 7 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S True IDE Multiword DMA Mode Read/Write Timing Specification Item Mode 0 (ns) 480 1 Mode 1 (ns) 150 80 60 5 30 15 0 5 50 50 40 40 30 10 25 Mode 2 (ns) 120 70 50 5 20 10 0 5 25 25 35 35 25 10 25 Mode 3 (ns) 100 65 50 5 15 5 0 5 25 25 35 35 10 10 25 Mode 4 (ns) 80 55 45 5 10 5 0 5 20 20 35 35 5 10 25 tD tE tF tG tH tI tJ tKR tKW tLR tLW tM tN tZ

Notes: Cycle time (min) 1 -IORD / -IOWR asserted width(min) -IORD data access (max) -IORD data hold (min) -IORD/-IOWR data setup (min) -IOWR data hold (min) DMACK to IORD/-IOWR setup (min) -IORD / -IOWR to -DMACK hold (min) -IORD negated width (min) 1 1 215 150 5 100 20 0 20 50 215 120 40 50 15 20 -IOWR negated width (min) -IORD to DMARQ delay (max) -IOWR to DMARQ delay (max) CS(1:0) valid to IORD / -IOWR CS(1:0) hold -DMACK (1) t0 is the minimum total cycle time and tD is the minimum command active time, while tKR and tKW are the minimum command recovery time or command inactive time for input and output cycles respectively.



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@@The three timing requirements of t0, tD, tKR, and tKW shall be met. The minimum total cycle time requirement is greater than the sum of tD and tKR or tKW for input and output cycles respectively. This means a host implementation can lengthen either or both of tD and either of tKR, and tKW as needed to ensure that t0 is equal to or greater than the value reported in the device's identify device data. Transcend Information Inc. 8 Ver 1.2 Transcend 40-PiIn IIDE Flash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S True IDE Multiword DMA Mode Read/Write Timing Diagram Figure 2: True IDE Multiword DMA Mode Read/Write Timing Diagram Notes: (1) If the Card cannot sustain continuous, minimum cycle time DMA transfers, it may negate DMARQ within the time specified from the start of a DMA transfer cycle to suspend the DMA transfers in progress and reassert the signal at a later time to continue the DMA operation. (2) This signal may be negated by the host to suspend the DMA transfer in progress.

Transcend Information Inc. 9 Ver 1.

2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Ultra DMA Mode Read/Write Timing Specification Ultra DMA is an optional data transfer protocol used with the READ DMA, and WRITE DMA, commands. When this protocol is enabled, the Ultra DMA protocol shall be used instead of the Multiword DMA protocol when these commands are issued by the host. This protocol applies to the Ultra DMA data burst only. When this protocol is used there are no changes to other elements of the ATA protocol. TRUE IDE MODE UDMA DMARQ -DMACK STOP1 1,2 -HDMARDY 1,3,4 HSTROBE(W) -DDMARDY(W)1,3 1,2,4 DSTROBE(R) D[15:00] A[02:00]5 -CSEL INTRQ -CS0 -CS1 UDMA Signal DMARQ DMACK STOP HDMARDY(R) HSTROBE(W) DDMARDY(W) DSTROBE(R) DATA ADDRESS CSEL INTRQ Card Select Type Output Input Input Input Output Bidir Input input Output Input Notes: 1) The UDMA interpretation of this signal is valid only during an Ultra DMA data burst.

2) The UDMA interpretation of this signal is valid only during and Ultra DMA data burst during a DMA Read command. 3) The UDMA interpretation of this signal is valid only during an Ultra DMA data burst during a DMA Write command. 4) The HSTROBE and DSTROBE signals are active on both the rising and the falling edge. 5) Address lines 03 through 10 are not used in True IDE mode. Several signal lines are redefined to provide different functions during an Ultra DMA data burst.

These lines assume their UDMA definitions when: 1. an Ultra DMA mode is selected, and 2. a host issues a READ DMA, or a WRITE DMA command requiring data transfer, and 3. the device asserts (-)DMARQ, and 4. the host asserts (-)DMACK. These signal lines revert back to the definitions used for non-Ultra DMA transfers upon the negation of -DMACK by the host at the termination of an Ultra DMA data burst. With the Ultra DMA protocol, the STROBE signal that latches data from D[15:00] is generated by the Transcend Information Inc. 10 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S same agent (either host or device) that drives the data onto thn column. For example, in the case of tRFS, both STROBE and -DMARDY transitions are measured at the sender connector.

(3) The parameter tCYC shall be measured at the recipient's connector farthest from the sender. (4) The parameter tLI shall be measured at the connector of the sender or recipient that is responding to an incoming transition from the recipient or sender respectively. Both the incoming signal and the outgoing response shall be measured at the same connector. (5) The parameter tAZ shall be measured at the connector of the sender or recipient that is driving the bus but must release the bus to allow for a bus turnaround. (6) See Page 14 the AC Timing requirements in Ultra DMA AC Signal Requirements. Transcend Information Inc. 12 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Ultra DMA Data Burst Timing Descriptions Name t2CYCTYP tCYC t2CYC tDS tDH tDVS tDVH tCS tCH tCVS tCVH tZFS tDZFS tFS tLI tMLI tUI tAZ tZAH tZAD tENV tRFS tRP tIORDYZ tZIORDY tACK tSS Comment Notes Typical sustained average two cycle time Cycle time allowing for asymmetry and clock variations (from STROBE edge to STROBE edge) Two cycle time allowing for clock variations (from rising edge to next rising edge or from falling edge to next falling edge of STROBE) Data setup time at recipient (from data valid until STROBE edge) 2, Data hold time at recipient (from STROBE edge until data may become invalid) 2, Data valid setup time at sender (from data valid until STROBE edge) 3 Data valid hold time at sender (from STROBE edge until data may become invalid) 3 CRC word setup time at device 2 CRC word hold time device 2 CRC word valid setup time at host (from CRC valid until -DMACK nwhile driving an 18 inch long, 80 conductor cable with PVC insulation material. The signal under test shall be cut at a test point so that it has not trace, cable or recipient loading after the test point. All other signals should remain connected through to the recipient.

The test point may be located at any point between the sender's series termination resistor and one half inch or less of conductor exiting the connector. If the test point is on a cable conductor rather than the PCB, an adjacent ground conductor shall also be cut within one half inch of the connector. The test load and test points should then be soldered directly to the exposed source side connectors. The test loads consist of a 15 pF or a 40 pF, 5%, 0.08 inch by 0.05 inch surface mount or smaller size capacitor from the test point to ground. Slew rates shall be met for both capacitor values. Measurements shall be taken at the test point using a <1 pF, >100 Kohm, 1 Ghz or faster probe and a 500 MHz or faster oscilloscope. The average rate shall be measured from 20% to 80% of the settled VOH level with data transitions at least 120 nsec apart. The settled VOH level shall be measured as the average output Transcend Information Inc.

14 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S high level under the defined testing conditions from 100 nsec after 80% of a rising edge until 20% of the subsequent falling edge. Transcend Information Inc. 15 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Initiating an Ultra DMA Data-In Burst (a) An Ultra DMA Data-In burst is initiated by following the steps lettered below. The timing diagram is shown in below: Ultra DMA Data-In Burst Initiation Timing. The associated timing parameters are specified in Page 12: Ultra DMA Data Burst Timing Requirements and are described in Page 13: Ultra DMA Data Burst Timing Descriptions.



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(b) The following steps shall occur in the order they are listed unless otherwise specifically allowed: (c) The host shall keep -DMACK in the negated state before an Ultra DMA data burst is initiated. (d) The device shall assert DMARQ to initiate an Ultra DMA data burst. After assertion of DMARQ the device shall not negate DMARQ until after the first negation of DSTROBE.

(e) Steps (c), (d), and (e) may occur in any order or at the same time. The host shall assert STOP. (f) The host shall negate -HDMARDY. (g) In True IDE mode, the host shall not assert -CS0, -CS1 and A[02:00]. (h) Steps (c), (d), and (e) shall have occurred at least tACK before the host asserts -DMACK. The host shall keep -DMACK asserted until the end of an Ultra DMA data burst. (i) The host shall release D[15:00] within tAZ after asserting -DMACK. (j) The device may assert DSTROBE tZORDY after the host has asserted -DMACK. While operating in True IDE mode, once the device has driven DSTROBE, the device shall not release DSTROBE until after the host has negated -DMACK at the end of an Ultra DMA data burst. (k) The host shall negate STOP and assert -HDMARDY within tENV after asserting -DMACK.

After negating STOP and asserting -HDMARDY, the host shall not change the state of either signal until after receiving the first transition of DSTROBE from the device (i.e., after the first data word has been received). (l) The device shall drive D[15:00] no sooner than tZAD after the host has asserted -DMACK, negated STOP, and asserted -HDMARDY. (m) The device shall drive the first word of the data transfer onto D[15:00].

This step may occur when the device first drives D[15:00] in step (j). (n) To transfer the first word of data the device shall negate DSTROBE within tFS after the host has negated STOP and asserted -HDMARDY. The device shall negate DSTROBE no sooner than tDVS after driving the first word of data onto D[15:00]. Transcend Information Inc. 16 Ver 1.

2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S ALL WAVEFORMS IN THIS DIAGRAM ARE SHOWN WITH THE ASSERTED STATE HIGH. Notes: The definitions for the IORDY:-DDMARDY:DSTROBE, -IORD:-HDMARDY:HSTROBE, and -IOWR:STOP signal lines are not in effect until DMARQ and -DMACK are asserted.

@@@The device shall stop generating DSTROBE edges within tRFS of the host negating -HDMARDY. (d) While operating in Ultra DMA modes 2, 1, or 0 the host shall be prepared to receive zero, one or two additional data words after negating -HDMARDY. @@@(e) The host shall resume an Ultra DMA data burst by asserting -HDMARDY. ALL WAVEFORMS IN THIS DIAGRAM ARE SHOWN WITH THE ASSERTED STATE HIGH. @@Notes: (1) The host may assert STOP to request termination of the Ultra DMA data burst no sooner than tRP after -HDMARDY is negated. (2) After negating -HDMARDY, the host may receive zero, one, two, or three more data words from the device. (3) The bus polarity of the (-) DMARQ and (-)DMACK signals is dependent on the active interface mode. Transcend Information Inc.

19 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Device Terminating an Ultra DMA Data-In Burst The device terminates an Ultra DMA Data-In burst by following the steps lettered below. The timing diagram is shown in below: Ultra DMA Data-In Burst Device Termination Timing. @@The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The device shall not pause an Ultra DMA data burst until at least one data word of an Ultra DMA data burst has been transferred. (b) The device shall pause an Ultra DMA data burst by not generating DSTROBE edges. (c) NOTE - The host shall not immediately assert STOP to initiate Ultra DMA data burst termination when the device stops generating STROBE edges.

@@@No data shall be transferred during this assertion. The host shall ignore this transition on DSTROBE. @@@(j) If the host has not placed the result of its CRC calculation on D[15:00] since first driving D[15:00] during (9), the host shall place the result of its CRC calculation on D[15:00] (see ATA specification Ultra DMA CRC Calculation). (k) The host shall negate -DMACK no sooner than tMLI after the device has asserted DSTROBE and negated DMARQ and the host has asserted STOP and negated -HDMARDY, and no sooner than tDVS after the host places the result of its CRC calculation on D[15:00].

(l) The device shall latch the host's CRC data from D[15:00] on the negating edge of -DMACK. (m) The device shall compare the CRC data received from the host with the results of its own CRC calculation. If a miscompare error occurs during one or more Ultra DMA data burst for any one command, at the end of the command, the device shall report the first error that occurred (see ATA specification Ultra DMA CRC Calculation) (n) While operating in True IDE mode, the device shall release DSTROBE within tIORDYZ after the host negates -DMACK. (o) The host shall neither negate STOP nor assert -HDMARDY until at least tACK after the host has negated -DMACK. Transcend Information Inc.

21 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S (p) In True IDE mode, the host shall not assert -IORD, -CS0, -CS1, nor A[02:00] until at least tACK after negating DMACK. ALL WAVEFORMS IN THIS DIAGRAM ARE SHOWN WITH THE ASSERTED STATE HIGH. @@@@A[02:00], -CS0 & -CS1 are True IDE mode signal definitions. Transcend Information Inc.

22 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Initiating an Ultra DMA Data-Out Burst An Ultra DMA Data-out burst is initiated by following the steps lettered below. The timing diagram is shown in below: Ultra DMA Data-Out Burst Initiation Timing. The timing parameters are specified in Page 12: Ultra DMA Data Burst Timing Requirements and are described in Page 13:Ultra DMA Data Burst Timing Descriptions. The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The host shall keep -DMACK in the negated state before an Ultra DMA data burst is initiated. (b) The device shall assert DMARQ to initiate an Ultra DMA data burst. @@The host shall assert STOP. (d) The host shall assert HSTROBE. @@@@@@(h) The host shall negate STOP within tENV after asserting -DMACK. @@@@@@@This step may occur any time during Ultra DMA data burst initiation.

@@@Note: The definitions for the STOP, DDMARDY, and HSTROBE signal lines are not in effect until DMARQ and DMACK are asserted. A[02:00], -CS0 & -CS1 are True IDE mode signal definitions. Transcend Information Inc. 24 Ver 1.2 Transcend 40-PiIn IIDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Sustaining an Ultra DMA Data-Out Burst An Ultra DMA Data-Out burst is sustained by following the steps lettered below.



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The timing diagram is shown in below: Sustained Ultra DMA Data-Out Burst Timing. The associated timing parameters are specified in Page 12: Ultra DMA Data Burst Timing Requirements and are described in Page 13: Ultra DMA Data Burst Timing Descriptions. The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The host shall drive a data word onto D[15:00]. (b) The host shall generate an HSTROBE edge to latch the new word no sooner than tDVS after changing the state of D[15:00]. The host shall generate an HSTROBE edge no more frequently than tCYC for the selected Ultra DMA mode.

The host shall not generate two rising or falling HSTROBE edges more frequently than 2tcyc for the selected Ultra DMA mode. (c) The host shall not change the state of D[15:00] until at least tDVH after generating an HSTROBE edge to latch the data. (d) The host shall repeat steps (a), (b), and (c) until the data transfer is complete or an Ultra DMA data burst is paused, whichever occurs first. Note: Data (D[15:00]) and HSTROBE signals are shown at both the device and the host to emphasize that cable settling time as well as cable propagation delay shall not allow the data signals to be considered stable at the device until some time after they are driven by the host. Transcend Information Inc.

25 Ver 1.2 Transcend 40-PiIn IDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Device Pausing an Ultra DMA Data-Out Burst The device pauses an Ultra DMA Data-Out burst by following the steps lettered below. The timing diagram is shown in below: Ultra DMA Data-Out Burst Device Pause Timing. @@The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The device shall not pause an Ultra DMA data burst until at least one data word of an Ultra DMA data burst has been transferred. (b) The device shall pause an Ultra DMA data burst by negating -DDMARDY.

(c) The host shall stop generating HSTROBE edges within tRFS of the device negating -DDMARDY. (d) While operating in Ultra DMA modes 2, 1, or 0 the device shall be prepared to receive zero, one or two additional data words after negating -HDMARDY. While operating in Ultra DMA modes 4 or 3 the device shall be prepared to receive zero, one, two or three additional data words. @@(e) The device shall resume an Ultra DMA data burst by asserting -DDMARDY. ALL WAVEFORMS IN THIS DIAGRAM ARE SHOWN WITH THE ASSERTED STATE HIGH. @@Notes: (1) The device may negate DMARQ to request termination of the Ultra DMA data burst no sooner than tRP after -DDMARDY is negated. (2) After negating -DDMARDY, the device may receive zero, one, two, or three more data words from the host. Transcend Information Inc. 26 Ver 1.2 Transcend 40-PiIn IDE Fllash Modulle Transcend 40-P n DE F ash Modu e TS128M ~ 16GDOM40V-S TS128M ~ 16GDOM40V-S Device Terminating an Ultra DMA Data-Out Burst The device terminates an Ultra DMA Data-Out burst by following the steps lettered below.

The timing diagram for the operation is shown in below: Ultra DMA Data-Out Burst Device Termination Timing. @@The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The device shall not initiate Ultra DMA data burst termination until at least one data word of an Ultra DMA data burst has been transferred. (b) The device shall initiate Ultra DMA data burst termination by negating -DDMARDY. (c) The host shall stop generating an HSTROBE edges within tRFS of the device negating -DDMARDY. (d) While operating in Ultra DMA modes 2, 1, or 0 the device shall be prepared to receive zero, one or two additional data words after negating -HDMARDY. While operating in Ultra DMA modes 4 or 3 the device shall be prepared to receive zero, one, two or three additional data words. @@(e) The device shall negate DMARQ no sooner than tRP after negating -DDMARDY. @@(f) The host shall assert STOP within tLI after the device has negated DMARQ. @@(g) If HSTROBE is negated, the host shall assert HSTROBE within tLI after the device has negated DMARQ. No data shall be transferred during this assertion.

The device shall ignore this transition of HSTROBE. @@(h) The host shall place the result of its CRC calculation on D[15:00] (see ATA specification Ultra DMA CRC Calculation). (i) The host shall negate -DMACK no sooner than tMLI after the host has asserted HSTROBE and STOP and the device has negated DMARQ and -DDMARDY, and no sooner than tDVS after placing the result of its CRC calculation on D[15:00]. (j) The device shall latch the host's CRC data from D[15:00] on the negating edge of -DMACK. (k) The device shall compare the CRC data received from the host with the results of its own CRC calculation.

If a miscompare error occurs during one or more Ultra DMA data bursts for any one command, the device shall report the first error that occurred (see ATA specification Ultra DMA CRC Calculation). (l) While operating in True IDE mode, the device shall release DSTROBE within tIORDYZ after the host negates -DMACK. @@@@The following steps shall occur in the order they are listed unless otherwise specifically allowed: (a) The host shall initiate termination of an Ultra DMA data burst by not generating HSTROBE edges. (b) The host shall assert STOP no sooner than tSS after it last generated an HSTROBE edge. (c) The device shall negate DMARQ within tLI after the host asserts STOP.

@@(d) The device shall negate -DDMARDY within tLI after the host has negated STOP. The device shall not assert -DDMARDY again until after the Ultra DMA data burst termination is complete. @@No data shall be transferred during this assertion. The device shall ignore this transition on HSTROBE. @@@@The device shall latch the host's CRC data from D[15:00] on the negating edge of -DMACK. (i) The device shall compare the CRC data received from the host with the results of its own CRC calculation. If a miscompare error occurs during one or more Ultra DMA data bursts for any one command, at the end of the command, the device shall report the first error that occurred (see ATA specification Ultra DMA CRC Calculation). (j) While operating in True IDE mode, the device shall release -DDMARDY within tIORDYZ after the host has negated -DMACK. (k) The host shall neither negate STOP nor negate HSTROBE until at least tACK after negating -DMACK. (l) In True IDE mode, the host shall not assert -IOWR, -CS0, -CS1, nor A[02:00] until at least tACK after negating DMACK.

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