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Subject: Slow DT Timing Revision Proposal for SPI-3

Several meetings ago the question was raised as to whether or not the Double Transition (DT) timing specifications in SPI-3 for transfer modes slower than Fast 80 were correct. To answer this question I presented at the last two working group meetings analysis of the timing specifications.

The analysis and the working group discussions concluded that the slower DT timing would work but the specifications were inconsistent with the Fast 80 methodology and should be revised to be more consistent with this methodology. The present SPI-3 slower DT timing is adopted from Single Transition (ST) timing while the last presentation I made and the working group conclusion was to start with the Fast 80 specifications and double the allotments as the transfer rate is halved. The bulk of the working group concluded the printed circuit allocation should be constant but an influential member of the working group requested that the printed circuit allocation be increased with the lower transfer rates. I have decided in the attached proposal to accommodate the influential member. Finally the last working group agreed that the analysis should be converted to a proposal.

The ATN and CRC receive times have been adjusted for the slow categories to account for the above revision of the Signal Skew Timing values.

Based upon the working group conclusions I have generated the following proposed replacements in SPI-3:

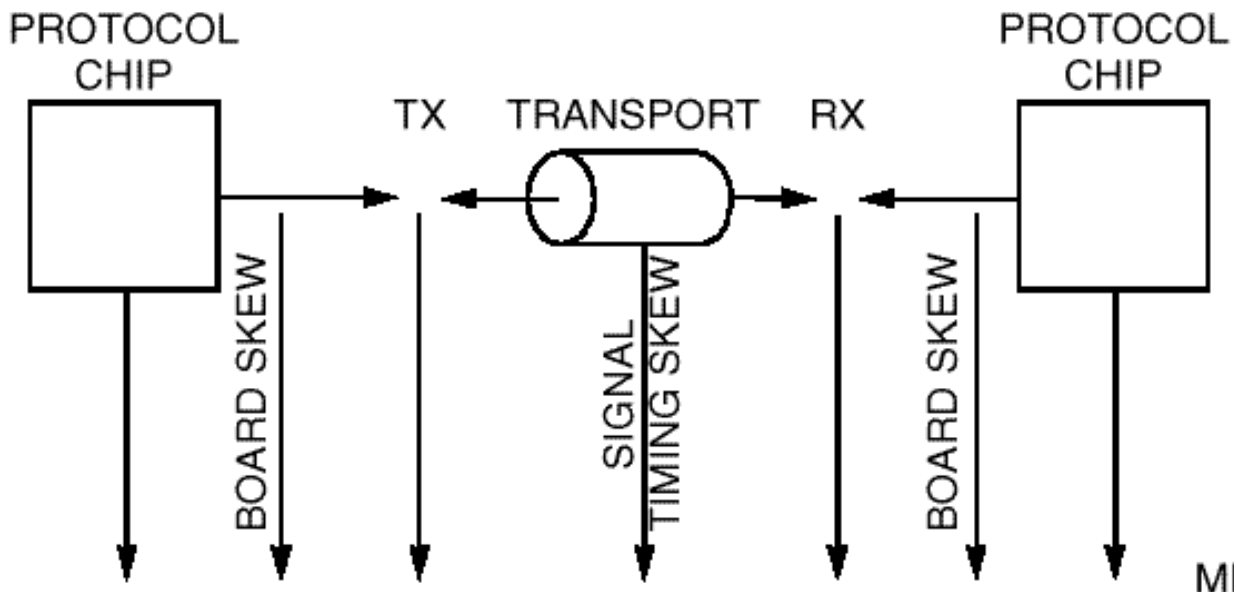
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**Table 1 - SCSI bus data & information phase Double Transition timing values**

Timing description	Timing Values (note 5)			
	Fast-10	Fast-20	Fast-40	Fast-80
ATN Transmit Setup Time	47 ns	28,5 ns	19,25 ns	14,8 ns
ATN Receive Setup Time	12,2 ns	7,1 ns	4,55 ns	3,45 ns
Cable Skew (note 1)	4 ns	3 ns	2.5 ns	2.5 ns
CRC Receive Hold Time	10,2 ns	5,1 ns	2,55 ns	1,45 ns
CRC Receive Setup Time	20,2 ns	15,1 ns	12,55 ns	11,45 ns
CRC Transmit Hold Time	37 ns	18,5 ns	9,25 ns	4,8 ns
CRC Transmit Setup Time	47 ns	28,5 ns	19,25 ns	14,8 ns
Receive Assertion Period (note 2)	80 ns	40 ns	20 ns	10 ns
Receive Hold Time (note 2 and note 3)	11,6 ns	5,8 ns	2,9 ns	1,45 ns
Receive Negation Period (note 2)	80 ns	40 ns	20 ns	10 ns
Receive Setup Time (note 2 and note 3)	11,6 ns	5,8 ns	2,9 ns	1,45 ns
Receive REQ (ACK) Period Tolerance	0,7 ns	0,7 ns	0,7 ns	0,7 ns
Signal Timing Skew	26,8 ns	13,4 ns	6,7 ns	3,35 ns
REQ (ACK) Period during Synchronous Data Transfer Phases (note 4)	200 ns	100 ns	50 ns	25 ns
Transmit Assertion Period (note 2)	90 ns	45 ns	22,5 ns	11,5 ns
Transmit Hold Time (note 2 and note 3)	38,4 ns	19,2 ns	9,6 ns	4,8 ns
Transmit Negation Period (note 2)	90 ns	45 ns	22,5 ns	11,5 ns
Transmit Setup Time (note 2 and note 3)	38,4 ns	19,2 ns	9,6 ns	4,8 ns
Transmit REQ (ACK) Period Tolerance	0,6 ns	0,6 ns	0,6 ns	0,6 ns
Notes: 1 Cable Skew is measured at each device connection with the transmitted skew subtracted from the received skew. 2 See 9.3 for measurement points for the timing specifications. 3 See 9.4 for examples of how to calculate setup and hold timing. 4 The REQ (ACK) period is measured from an assertion edge of the REQ (ACK) signal to the next assertion edge of the signal. The nominal data transfer period is half that of the transfer period since data is qualified on both the assertion and negotiation edges of the REQ (ACK) signal. 5 SCSI bus timing values specified by the maximum transfer rate for the given range shall apply even if a slower transfer rate within the given range is negotiated.				

## DT SETUP AND HOLD TIMINGS FOR DT DATA TRANSFER

(ALL TIMES IN ns)



Timing Mode \_\_\_\_\_ Minimum

Fast 80

(6,25 IDEAL) 5,0 \_ 0,2 \_\_\_\_\_ 4,8 \_\_\_\_\_ 3,35 \_\_\_\_\_ 1,45 \_ 0,2 \_ 1,25 \_ Setup

(6,25 IDEAL) 5,0 \_ 0,2 \_\_\_\_\_ 4,8 \_\_\_\_\_ 3,35 \_\_\_\_\_ 1,45 \_ 0,2 \_ 1,25 \_ Hold

Fast 40

(12,5 IDEAL) 10,0\_ 0,4 \_\_\_\_\_ 9,6 \_\_\_\_\_ 6,7 \_\_\_\_\_ 2,9 \_\_\_ 0,4 \_ 2,5 \_ Setup

(12,5 IDEAL) 10,0\_ 0,4 \_\_\_\_\_ 9,6 \_\_\_\_\_ 6,7 \_\_\_\_\_ 2,9 \_\_\_ 0,4 \_ 2,5 \_ Hold

Fast 20

(25 IDEAL) \_ 20,0\_ 0,8 \_\_\_\_\_ 19,2 \_\_\_\_\_ 13,4 \_\_\_\_\_ 5,8 \_\_\_ 0,8 \_ 5,0 \_ Setup

(25 IDEAL) \_ 20,0\_ 0,8 \_\_\_\_\_ 19,2 \_\_\_\_\_ 13,4 \_\_\_\_\_ 5,8 \_\_\_ 0,8 \_ 5,0 \_ Hold

Fast 10

(50 IDEAL) \_ 40,0\_ 1,6 \_\_\_\_\_ 38,4 \_\_\_\_\_ 26,8 \_\_\_\_\_ 11,6 \_\_\_ 1,6 \_ 10,0 \_ Setup

(50 IDEAL) \_ 40,0\_ 1,6 \_\_\_\_\_ 38,4 \_\_\_\_\_ 26,8 \_\_\_\_\_ 11,6 \_\_\_ 1,6 \_ 10,0 \_ Hold