LVD HOT PLUGGING TEST RESULTS

OVERVIEW

PRELIMINARY HOT PLUGGING TEST RESULTS HAVE BEEN ACQUIRED ON AN LVD INTERFACE

ONE SAMPLE OF ONE TYPE OF LVD RECEIVER WAS TESTED USING SPECIAL LABORATORY TECHNIQUES

THIS IS CLEARLY NOT SUFFICIENT DATA TO MAKE ANY CHANGES IN THE CASE 4 STATEMENTS FOR LVD

THE MAGNITUDE OF THE HOT PLUGGING GLITCHES HAS BEEN ESTABLISHED FOR FOUR SETS OF CONDITIONS

THESE RESULTS INDICATE THAT CASE 4 HOT PLUGGING MAY BE POSSIBLE UNDER CERTAIN CONDITIONS
LVD HOT PLUGGING TEST RESULTS

RECEIVER SUMMARY

WHEN STARTING FROM A RELATIVELY HIGH DIFFERENTIAL SIGNAL LEVEL LARGE HOT PLUGGING GLITCHES WILL NOT BE DETECTED

WHEN STARTING NEAR THE SWITCHING POINT VERY SMALL GLITCHES GET THROUGH

LONGER INPUT GLITCHES REQUIRE LOWER AMPLITUDE THAN SHORT GLITCHES TO BE DETECTED

WIRED-OR LINES WILL NEED TO ACCOMMODATE DETECTED GLITCHES OF A FEW ns DURATION

THE D. C. INPUT SWITCHING LEVELS MAY NEED TO BE RE-EXAMINED (HOT-PLUGGING OR NOT)
LVD HOT PLUGGING TEST RESULTS

INPUT GLITCH LEVELS

FOUR CASES WERE EXAMINED:
25 pF HOT PLUGGING LOADS
(\text{+ SIGNAL/GND}) AT NOMINAL 0 COMMON MODE IN ALL CASES
RIBBON CABLE
ROUND CABLE
AT MATING CONNECTOR
AT 8" AND 36" AWAY FROM MATING CONNECTOR

THE HOT PLUGGING GLITCHES ARE SIMILAR TO THOSE SHOWN FOR SINGLE ENDED BACK IN 1991 (FEW HUNDRED mV FOR A FEW ns)

EFFECTS OF THE NUMBER OF DEVICES ON THE BUS SEGMENT WERE SHOWN TO BE NEGLIGIBLE
LVD HOT PLUGGING TEST RESULTS

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<table>
<thead>
<tr>
<th>D. C. INPUT / OUTPUT LEVELS</th>
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<tbody>
<tr>
<td>INPUT SIGNAL AT 1.13V (10 mV BELOW THRESHOLD AT 1.14V)</td>
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Input:
- 100 mV / DIV

Output:
- 1 V / DIV

Input Signal:
- 1.20 V
- 1.14 V

Output Signal:
- Logic Low: 0.0 V
- Logic High: 3.2 V

Logic Low: 0.0 V
Logic High: 3.2 V
LVD HOT PLUGGING TEST RESULTS

INPUT
100 mV / DIV

RECEIVER

LOGIC STAGES

OUTPUT SIGNAL

1.20 V

INPUT SIGNAL

D. C. INPUT / OUTPUT LEVELS

INPUT SIGNAL AT 1.145V (5 mV ABOVE THRESHOLD AT 1.14V)

LOGIC HIGH
3.2V

LOGIC LOW
0.0V

OUTPUT
1 V / DIV

1.20 V

1.14 V

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997

LVDREC03
LVD HOT PLUGGING TEST RESULTS

Input signal at 1.04V to 1.23V (SET) starts 100 mV below threshold and overshoots 130 mV above threshold.

Bill Ham    Digital Equipment      SPI-2 Working Group    March 10, 1997
LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.04V TO 1.24V (SET)
STARTS 100 mV BELOW THRESHOLD AND OVERSHOOTS
140 mV ABOVE THRESHOLD

BILL HAM    DIGITAL EQUIPMENT      SPI-2 WORKING GROUP    MARCH 10, 1997
INPUT SIGNAL AT 1.04V TO 1.25V (SET) STARTS 100 mV BELOW THRESHOLD AND OVERSHOOTS 150 mV ABOVE THRESHOLD

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997
LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.04V TO 1.26V (SET)
STARTS 100 mV BELOW THRESHOLD AND OVERSHOOTS
160 mV ABOVE THRESHOLD

BILL HAM    DIGITAL EQUIPMENT    SPI-2 WORKING GROUP    MARCH 10, 1997
LVD HOT PLUGGING TEST RESULTS

- **INPUT SIGNAL AT 1.24V TO 1.08V (SET)
  STARTS 100 mV ABOVE THRESHOLD AND OVERSHOOTS 90 mV BELOW THRESHOLD**

- **LOGIC HIGH 3.2V**
- **LOGIC LOW 0.0V**

**Diagram:**
- Receiver
- Logic stages
- Input signal (1.20 V) starts 100 mV above threshold and overshoots 90 mV below threshold.
- Output signal (1 V / DIV) is observed.

**Inset:**
- 5 ns input pulse
- Graph showing input signal from 1.20 V to 1.14 V.
LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.24V TO 1.07V (SET)
STARTS 100 mV ABOVE THRESHOLD AND OVERSHOOTS
100 mV BELOW THRESHOLD

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LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.24V TO 1.06V (SET) STARTS 100 mV ABOVE THRESHOLD AND OVERSHOOTS 110 mV BELOW THRESHOLD

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LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.24V TO 1.05V (SET) STARTS 100 mV ABOVE THRESHOLD AND OVERSHOOTS 120 mV BELOW THRESHOLD

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LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.04V TO 1.14V (SET) STARTS 100 mV BELOW THRESHOLD AND OVERSHOOTS ONLY SLIGHTLY ABOVE THRESHOLD
LVD HOT PLUGGING TEST RESULTS

INPUT SIGNAL AT 1.04V TO 1.15V (SET) STARTS 100 mV BELOW THRESHOLD AND OVERSHOOTS 30 mV ABOVE THRESHOLD

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997
HOT PLUGGING GLITCHES

SOME ADDITIONAL DATA ON THE EFFECTS OF STARTING VOLTAGE LEVELS:

STARTING 150 mV BELOW THRESHOLD REQUIRES 240 mV ABOVE FOR 5 ns OR 10 mv ABOVE FOR 10 ns

STARTING 200 mV BELOW THRESHOLD REQUIRES 800 mV ABOVE FOR 5 ns OR 20 mV ABOVE FOR 10 ns

STARTING 300 mV BELOW THRESHOLD REQUIRES 1500 mV ABOVE FOR 5 ns OR 40 mV ABOVE FOR 10 ns

THE THRESHOLD PULSE WIDTH SEEMS TO BE AROUND 7 ns WIDTH
HOT PLUGGING GLITCHES
(RAPID TRANSIENT - WORST CASE)

TERM

BUS SEGMENT

TERM

REMOTE SCOPE PROBE

HOT PLUGGED CONNECTOR

~25pF

SCOPE PROBE NEAR NOT PLUGGED CONNECTOR

SCOPE PROBE USED FOR TRIGGER

HOT PLUGGED DEVICE

LOCAL GROUND

BUS SIGNAL NEAR CONNECTOR

HOT PLUGGED DEVICE SIGNAL

RIBBON CABLE

LVDHOT03

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997
HOT PLUGGING GLITCHES

TERM

BUS SEGMENT

TERM

REMOTE SCOPE PROBE

HOT PLUGGED CONNECTOR

~25pF

SCOPE PROBE NEAR NOT PLUGGED CONNECTOR

SCOPE PROBE USED FOR TRIGGER

HOT PLUGGED DEVICE

LOCAL GROUND

BUS SIGNAL 8" FROM CONNECTOR

HOT PLUGGED DEVICE SIGNAL

RIBBON CABLE

LVDHOT06

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997
HOT PLUGGING GLITCHES
(SEMI GRADUAL TRANSIENT)

TERM

BUS SEGMENT

TERM

REMOTE SCOPE PROBE

HOT PLUGGED CONNECTOR

~25pF

SCOPE PROBE USED FOR TRIGGER

SCOPE PROBE NEAR NOT PLUGGED CONNECTOR

HOT PLUGGED DEVICE

LOCAL GROUND

BUS SIGNAL 8" FROM CONNECTOR

HOT PLUGGED DEVICE SIGNAL

RIBBON CABLE
LVDHOT07
HOT PLUGGING GLITCHES (RAPID TRANSIENT)

TERM | BUS SEGMENT | TERM
--- | --- | ---
REMOTE SCOPE PROBE | SCOPE PROBE NEAR NOT PLUGGED CONNECTOR | HOT PLUGGED DEVICE
HOT PLUGGED CONNECTOR | SCOPE PROBE USED FOR TRIGGER | HOT PLUGGED DEVICE
~25pF | LOCAL GROUND | 
BUS SIGNAL NEAR CONNECTOR | HOT PLUGGED DEVICE SIGNAL | 

ROUND CABLE

BILL HAM DIGITAL EQUIPMENT SPI-2 WORKING GROUP MARCH 10, 1997
HOT PLUGGING GLITCHES (RAPID TRANSIENT)

TERM

BUS SEGMENT

TERM

REMOTE SCOPE PROBE

HOT PLUGGED CONNECTOR 

~25pF

SCOPE PROBE NEAR NOT PLUGGED CONNECTOR

SCOPE PROBE USED FOR TRIGGER

HOT PLUGGED DEVICE

LOCAL GROUND

BUS SIGNAL 1 METER FROM CONNECTOR

HOT PLUGGED DEVICE SIGNAL

ROUND CABLE

BILL HAM    DIGITAL EQUIPMENT      SPI-2 WORKING GROUP    MARCH 10, 1997
LVD HOT PLUGGING TEST RESULTS

NEAR TERM FUTURE WORK PLANNED

MORE SAMPLES OF LVD RECEIVER

BACKPLANE GLITCH MAGNITUDES

MORE DIFFERENT STARTING (BEFORE THE MATING EVENT) DIFFERENTIAL VOLTAGE LEVELS