FAST SINGLE ENDED SCSI TERMINATOR CONCEPT

ACTIVE NEGATION EMULATOR

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UNITRODE INTEGRATED CIRCUITS
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FAST SINGLE ENDED SCSI

THE PROBLEM

MID DRIVING/RECEIVING (BOULAY)

NEGATED LINES USUALLY EXHIBITS A STEP FOR 1 CABLE TIME DELAY

The Step Function for a Boulay Terminator is given by:

\[
V_{\text{step, Mid}} = \frac{V_{\text{REG}} - V_{\text{O}}}{R_{\text{t}}} \cdot Z_0 + V_{\text{O}}
\]

\[
V_{\text{step, Mid}} = I_{\text{O}} \cdot Z_0 + V_{\text{O}}
\]

REQ AND ACK LINES ARE EDGE TRIGGERED AND NEED TO EXCEED 2V

> 85 OHM CABLE IS REQUIRED

END DRIVING/RECEIVING (BOULAY)

NEGATED LINES EXHIBIT A STEP FOR 2 CABLE TIME DELAYS

The Step Function for a Boulay Terminator is given by:

\[
V_{\text{step, End}} = \frac{2 \cdot V_{\text{REG}} \cdot Z_0 + V_{\text{O}} (R_{\text{t}} - Z_0)}{R_{\text{t}} + Z_0}
\]

> 85 OHM CABLE IS REQUIRED TO EXCEED 2.5V
FAST SINGLE ENDED SCSI

FAST SCSI TERMINATOR OBJECTIVE

* BACKWARDS COMPATIBLE WITH SCSI AND SCSI-2

* ELIMINATE THE NEGATION STEP FROM DRIVING CABLE END

* DRIVE REQ AND ACK LINES FOR CABLES IMPEDANCES AS LOW AS 60 OHMS

* SUPPLY ONLY 48mA OF STATIC CURRENT

* > 10MHZ OPERATION

* 3.75V OPERATION

* CLAMPED VOLTAGE LEVELS

* MINIMAL EXTERNAL COMPONENTS
BOULAY TERMINAL: DRIVING 20 FEET OF 50 ohm CABLE - 2MHz
Date/Time run: 01/07/92 10:12:14
Temperature: 27.0
BOULAY TERMINATOR (110 ohms to 2.85V) at Both Ends
25 Feet of 50 Line, ~75 ohm Cable
1 MHZ

-652.300 ns

338.000 ns

1.33800 us

BOULAY TERMINATOR (110 ohms to 2.85V) at Both Ends
25 Feet of 50 Line, ~75 ohm Cable
5 MHZ

-200.000 ns

50.000 ns

300.000 ns
FAST SINGLE ENDED SCSI TERMINATOR

INTERRUPTED CIRCUITS

UNITRODE

3.0V

Low Impedance High Clamp

2.5V

Intermediate Impedance High Clamp

100

2.5V

Intermediate Impedance Low Clamp

0.5V

Low Impedance Low Clamp

100

1.5V

DISCONNECT

INTERNAL BIAS AND CURRENT SOURCES

TO OTHER CHANNELS

TERMINATION CHANNEL

Switches shown in the logical HIGH state

Mark Jordan
12/23/91
CURRENT SOURCE TERMINATOR DRIVING 20 FEET OF 50 OHM CABLE - 2MHZ
Date/Time run: 01/07/92 14:51:30
Temperature: 27.0
CURRENT SOURCE TERMINATOR at Both Ends
25 Feet of 50 Line, ~75 ohm Cable 1 MHZ

CURRENT SOURCE TERMINATOR at Both Ends
25 Feet of 50 Line, ~75 ohm Cable 5 MHZ
ACTIVE NEGATION EMULATOR

3.0V
Low Impedance High Clamp

2.5V
Intermediate Impedance High Clamp

1.5V
DISCONNECT

OUTPUT

Mark Jordan
12/23/01
BOULAY TERMINATOR DRIVING 20 FEET OF 75OHM CABLE- MIDPOINT

Date/Time run: 01/08/92 12:00:00

Temperature: 27.0

Mid Cable Driver

Cable Ends

0V

0.5V

1.0V

1.5V

2.0V

2.5V

3.0V

1.20us

1.25us

1.30us

1.35us

1.40us

Time

ds v(12) o v(2) △ v(22)
CURRENT BOOST CIRCUIT - 20 FEET OF 75 OHM CABLE - DRIVING MID-CABLE
Date/Time run: 01/08/92 13:06:15

Temperature: 27.0
FAST SINGLE ENDED SCSI

CONCLUSION

A CURRENT SOURCE CLAMPED TERMINATOR ELIMINATES THE END ASSERTION STEP FOR CABLES AS LOW AS 60 OHMS, WHILE MAINTAINING A MAXIMUM CURRENT OF 48 mA

THE MID CABLE GLITCH OBSERVED NEEDS TO BE RESOLVED. PRELIMINARY INVESTIGATION SHOWS A MODIFICATION OF THE ASSERTION ENERGY TRANSFER REDUCES THE PROBLEM DRAMATICALLY

AN ACTIVE NEGATION EMULATOR WOULD MAINTAIN BACKWARDS COMPATIBILITY WHILE DECREASING THE SUSCEPTIBILITY TO RINGING

A SOPHISTICATED NON-LINEAR SOLUTION IS REQUIRED TO INCREASE DATA RATES WHILE MAINTAINING BACKWARDS COMPATIBILITY AND ALLOW A WIDE RANGE OF CABLE IMPEDANCES