LVD SCSI SIGNALS

SIGNALS AT FAR TERMINATOR (NON-BIASING)
(27 METERS POINT TO POINT)

NO SOURCE END TERMINATION

SOURCE AND FAR END TERMINATION
LVD SCSI BIASING TERMINATOR USED FOR TESTS

VT HI ~ 1.5V

330

- SIGNAL

150

+ SIGNAL

330

VT LO ~ 0.9 V

NOMINAL BIAS IS ~ 112 mV

DEVICE LEAKAGE HAS A SIGNIFICANT EFFECT ON THE ACTUAL BIAS VALUE:

DRIVER LEAKAGE REDUCES BIAS VALUE TO ~ 82 mV (SHOWN BELOW)

BIAS LEVEL CAN BE CHANGED BY ADJUSTING VT HI AND VT LO

BIAS LEVEL ON SAME SCALE AS WAVEFORM PLOTS

200 mV / DIV

1.25 V

+200 mV

0

-200 mV

50 NS/DIV

BIASING TERMINATORS ONLY DRIVING LINE
LVD SCSI WITH ~ 82 mV BIAS FROM TERMINATORS
SINGLE CURRENT MODE DRIVER
9 METERS POINT TO POINT

NEAR DRIVER  FAST 40

NEAR FAR TERMINATOR
EFFECT OF DIFFERENT TERMINATOR BIAS LEVELS

NOTE THAT LOWERING THE BIAS DRAMATICALLY INCREASES THE NOISE MARGIN FOR DRIVEN SIGNALS (NOT DESIRABLE FOR UNDRIVEN SIGNALS)

SINGLE STRENGTH DRIVERS; AT FAR END OF 9 METER BUS
EFFECTS OF INCREASING DRIVER STRENGTH
DOUBLE DRIVERS USED

NOTE GOOD NOISE MARGIN EVEN WITH STRONG BIAS

9 METER POINT TO POINT; 125 mV TERMINATOR BIAS

BILL HAM  DIGITAL EQUIPMENT SPI-2 WORKING GROUP JANUARY 29, 1996
DOUBLE STRENGTH DRIVERS ON 27 METER CABLES

FAST 20 "CLOCK-LIKE" SIGNALS (100 NS/DIV)

FAST 40 "CLOCK-LIKE" SIGNALS (50 NS/DIV)

POINT TO POINT; 111 mV BIAS; NEAR FAR TERMINATOR
DOUBLE DRIVERS ON HEAVILY LOADED 27 METER BUS

DATA AT FAR TERMINATOR; BIAS 111 mV; 13 HPDF LOADS NEAR FAR TERMINATOR

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FAST 80 ON HEAVILY LOADED 27 METER BUS

THIS CONDITION CANNOT WORK AT THIS LENGTH UNDER ANY TERMINATOR BIAS CONDITIONS UNLESS “CLOCK” IS MUCH MORE REGULAR

NEAR DRIVER

NEAR FAR END TERMINATOR

DOUBLE DRIVERS; 111 mV BIAS; 13 LOADS NEAR FAR TERMINATOR
EFFECTS OF TRANSITIONING FROM DRIVEN TO UNDRIVEN AND VICE VERSA: NEGATION TO HI Z

DOUBLE DRIVER; 111 mV BIAS; DATA NEAR DRIVER; 27 METERS HEAVILY LOADED NEAR FAR TERMINATOR

REFLECTION CAUSES FALSE ASSERTION

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TRANSITIONS RELATED TO HI Z STATES

DOUBLE DRIVERS; 27 METERS LOADED BUS; 111 mV BIAS; NEAR DRIVER; SLOW SPEED DATA
MORE TRANSITIONS RELATED TO HI Z STATES

200 NS/DIV

200 mV / DIV

1.25 V

+200 mV

0

-200 mV

DIFFERENTIAL SIGNAL

+ SIGNAL

- SIGNAL

HI Z TO NEGATION

SHORT NEGATION TO HI Z

100 NS/DIV

LONG NEGATION TO HI Z

DOUBLE DRIVERS; 27 METERS LOADED BUS; 111 mV BIAS; NEAR DRIVER; SLOW SPEED DATA
CONCLUSIONS??

• BIAS TERMINATION REQUIRES EITHER A SIGNIFICANT SIGNAL INCREASE OVER THE TIA LVDS LEVELS OR ASYMMETRICAL DRIVERS TO MAKE EVEN 9 METERS

• WHEN USED WITH BIAS TERMINATORS ASYMMETRICAL DRIVERS OFFER A LARGE INCREASE IN NOISE MARGIN AND A SUBSTANTIAL REDUCTION IN POWER FOR EQUIVALENT CONFIGURATIONS

• THE DIFFERENCE BETWEEN CURRENT MODE AND VOLTAGE MODE DRIVERS NEEDS TO BE CAREFULLY CONSIDERED IN DEVELOPING THE SPECIFICATIONS

• REFLECTIONS AND UNPREDICTABLE BEHAVIOR AFTER NEGATION TO HI Z TRANSITIONS REQUIRE A BUS SETTLE DELAY -- WE SHOULD NOT TRY TO ELIMINATE THE GLITCHES

• IT APPEARS LIKELY THAT FAST 80 WILL BE LIMITED TO LESS THAN 25 METERS UNLESS WE CAN MAKE THE “CLOCKS” MORE REGULAR