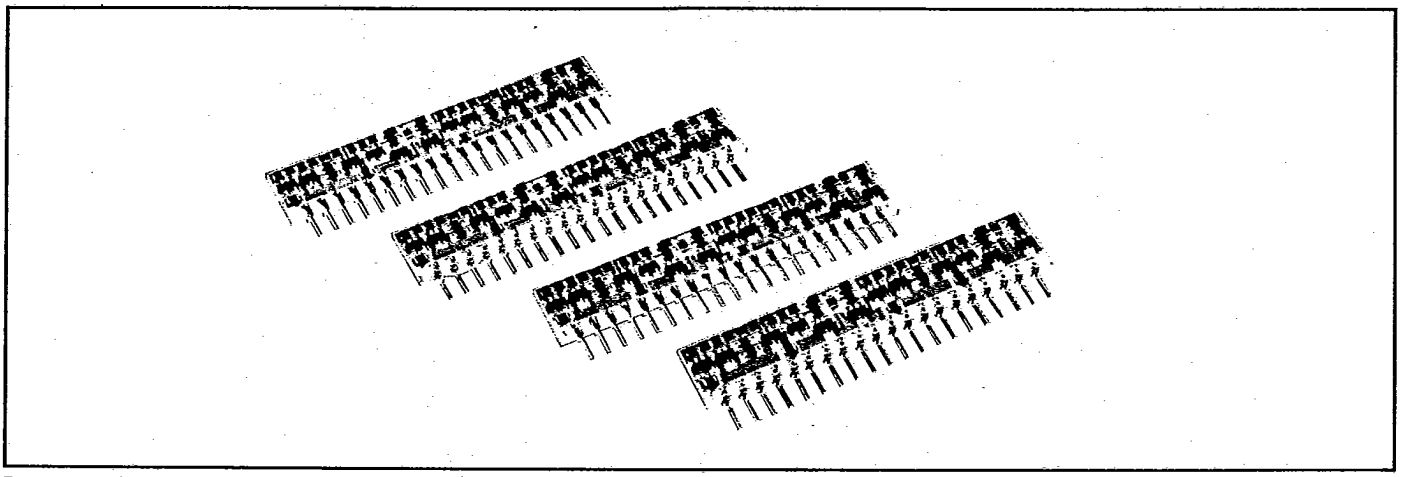
Engineering Bulletin

QUAD FASTBUS LINE DRIVER

SPECTRUM CONTROL, INC.

Bulletin 27-0027-73 Rev. 0



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INTRODUCTION

The Spectrum "QUAD FASTBUS LINE DRIVER" is designed for high speed driving of a differential multidrop bus.

In using the advantage of extreme package density of hybrid technology, Spectrum developed a very small size and included the best possible electrical performance available today.

This hybrid circuit contains four line drivers with differential outputs. Each driver has a data input. The differential outputs are taken from collectors of PNP and NPN transistors operating as a switch current mirror. Each driver accepts 10k ECL input signals. The wired "or" function can be performed on the bus over some distance.

Standard switching signals are:

$$t_{rise} = 2 \text{ ns typ; } t_{fall} = 2.5 \text{ ns typ.}$$

Overall max. dimensions are: length 54.6 mm, height 10.8 mm, thickness 3.5 mm.

The Spectrum QUAD Fastbus Line Driver meets the requirements of the international fastbus standard.

APPLICATION INFORMATION

The Quad FASTBUS Cable Segment Driver is designed for high speed driving of a differential multidrop bus, powerful enough to drive a twisted pair of wires over some distance. Figures 1a and 1b illustrate the operation of the device.

In the "quiescent" state the driver does not influence the bus, the voltage levels on the bus lines are determined by the voltage V_{term} and the current I_P . V_{term} pulls the bus lines to the center of the common mode range to obtain rejection. In order to obtain logic "0" at the receiver output for the quiescent state the receiver inputs are biased by the voltage drop of I_P across the terminating resistors.

In the "ON" state the driver sources the current I_S into "1" line and sinks the current I_S from the "0" line.

The device uses current source line driving, thus the Wired-OR function can be performed on the bus without the glitches associated with conventional voltage driving. The drivers of a unit connected to the bus will not influence the bus in case of a power failure. However, if more than one device becomes active simultaneously current stacking will occur. In this case care has to be taken that the resulting voltage does not exceed the operational limits of the receivers. Up to 32 drivers may be activated simultaneously (their number depends on the line receiver type).

The driver meets the requirements of the international FASTBUS standard (Documents: US NIM Committee, Nov. 1982 IEEE P460, ESONE/FB/01).

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DESIGN DATA

This hybrid circuit contains four line drivers with differential outputs. Each driver has a data input. The differential outputs are taken from collectors of PNP and NPN transistors operating as a switched current mirror. Each driver accepts 10k ECL input signals and provides a nominal swing of 200 mV across a 500 Ohm load between the two outputs, when the input signal is "high." The circuit is designed for a differential multidrop bus allowing the Wired-OR function to be performed over some distance.

ELECTRICAL SPECIFICATIONS
(for one channel)

1. INPUTS

standard ECL levels

$I_{in\text{-}high} < +\ 0.2$ mA

$I_{in\text{-}low} < -\ 0.2$ mA

2. OUTPUTS

differential current outputs

$|I_{out\text{-}high}| = |I_{\overline{out\text{-}high}}| = 4$ mA $\pm$ 0.2 mA max.

$|I_{out\text{-}low}| = |I_{\overline{out\text{-}low}}| = 0.1\ \mu$A max.

Common Mode range = $\pm$ 3V min.

3. POWER

$V_{cc} = +\ 5.0V \pm 2\%$

$V_{ee} = -\ 5.2V \pm 2\%$

$V_{bb} = -\ 1.3V \pm 5\%$

$|I_{cc\text{-}high}| = |I_{ee\text{-}high}| = 23$ mA

$I_{bb\text{-}high} > -\ 0.2$ mA ($-$ 0.8 mA for the full hybrid)

$|I_{cc\text{-}low}| = |I_{ee\text{-}low}| = 19$ mA

$I_{bb\text{-}low} > +0.2$ mA ($+$ 0.8 mA for the full hybrid)

4. SWITCHING TIMES (for differential signal):

$t_{rise} = 2.0$ ns typ

$t_{fall} = 2.5$ ns typ

$tpd_{off/on} = 6.0$ ns typ

$tpd_{on/off} = 2.0$ ns typ

5. TEMPERATURE RANGE

$T_{min} = 0\ ^oC$ $T_{max} = +\ 70\ ^oC$

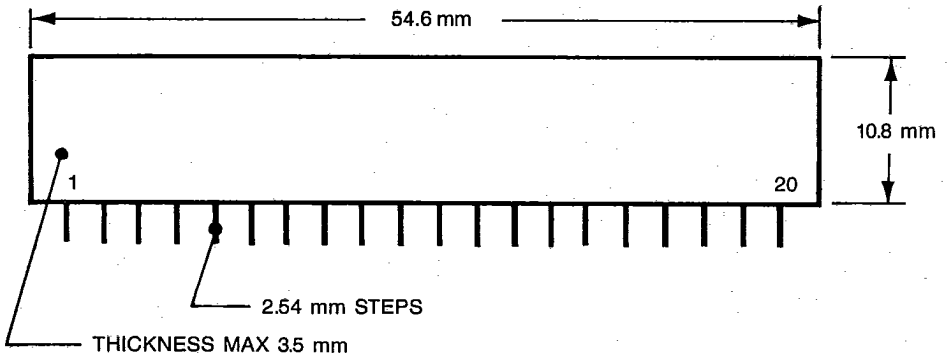
$|I_{out\text{-}high}|$ and $|I_{\overline{out\text{-}high}}|$ term. drift = $+\ 1\ \mu$ A/^{o}C typ

6. POWER SUPPLY NOISE REJECTION:

$N_{out}/PS_{noise} < -\ 30$ db

PIN CONFIGURATION AND PACKAGE DIMENSIONS

PART NO. 55-00063-03



Pin	Connection	Pin	Connection
1	OUT 1	11	+ 5V
2	IN 1	12	OUT 3
3	$\overline{\text{OUT 1}}$	13	IN 3
4	GND	14	$\overline{\text{OUT 3}}$
5	−5.2V	15	GND
6	GND	16	−5.2V
7	$\overline{\text{OUT 2}}$	17	GND
8	IN 2	18	$\overline{\text{OUT 4}}$
9	OUT 2	19	IN 4
10	−1.3V	20	OUT 4

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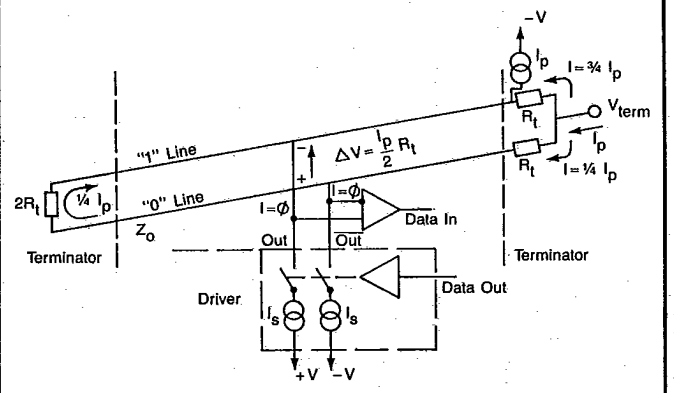
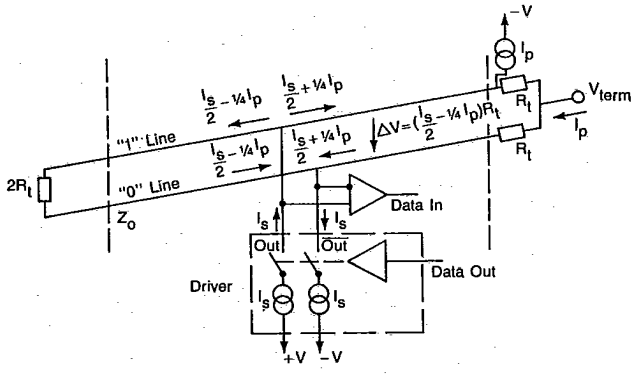
Fig. 1a: QUIESCENT STATE



Driver/Receiver - each device

Fig. 1b: ON STATE



Driver/Receiver - each device

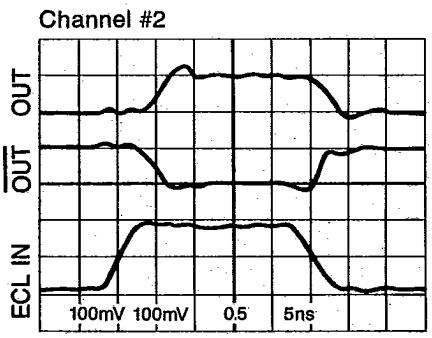
V_{term} termination voltage for receiving (e.g. −1.2V for ECL)

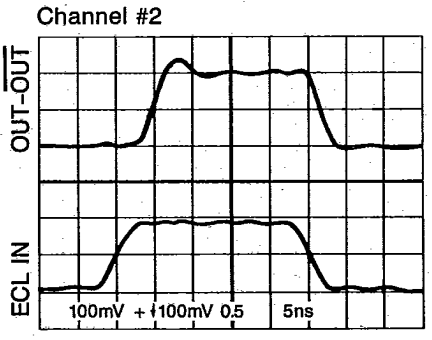
I_p polarization current to bias the receiver inputs in the quiescent state

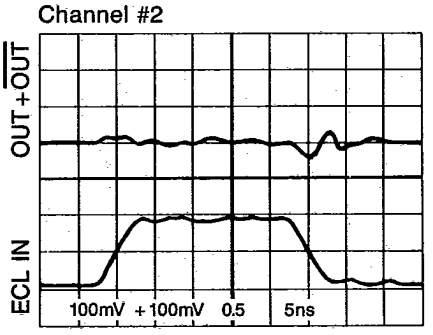
I_s source current, sink current

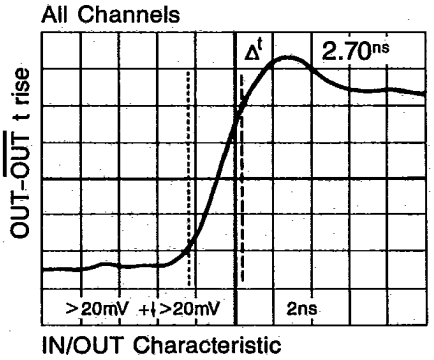
R_c termination resistor equal to ½ Z_o

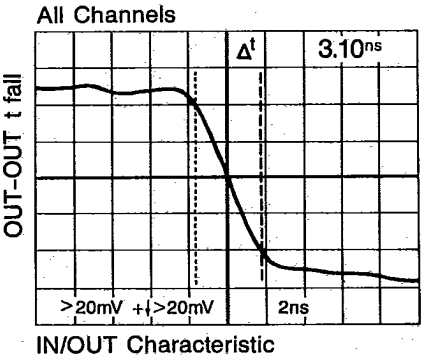
DYNAMIC CHARACTERISTICS



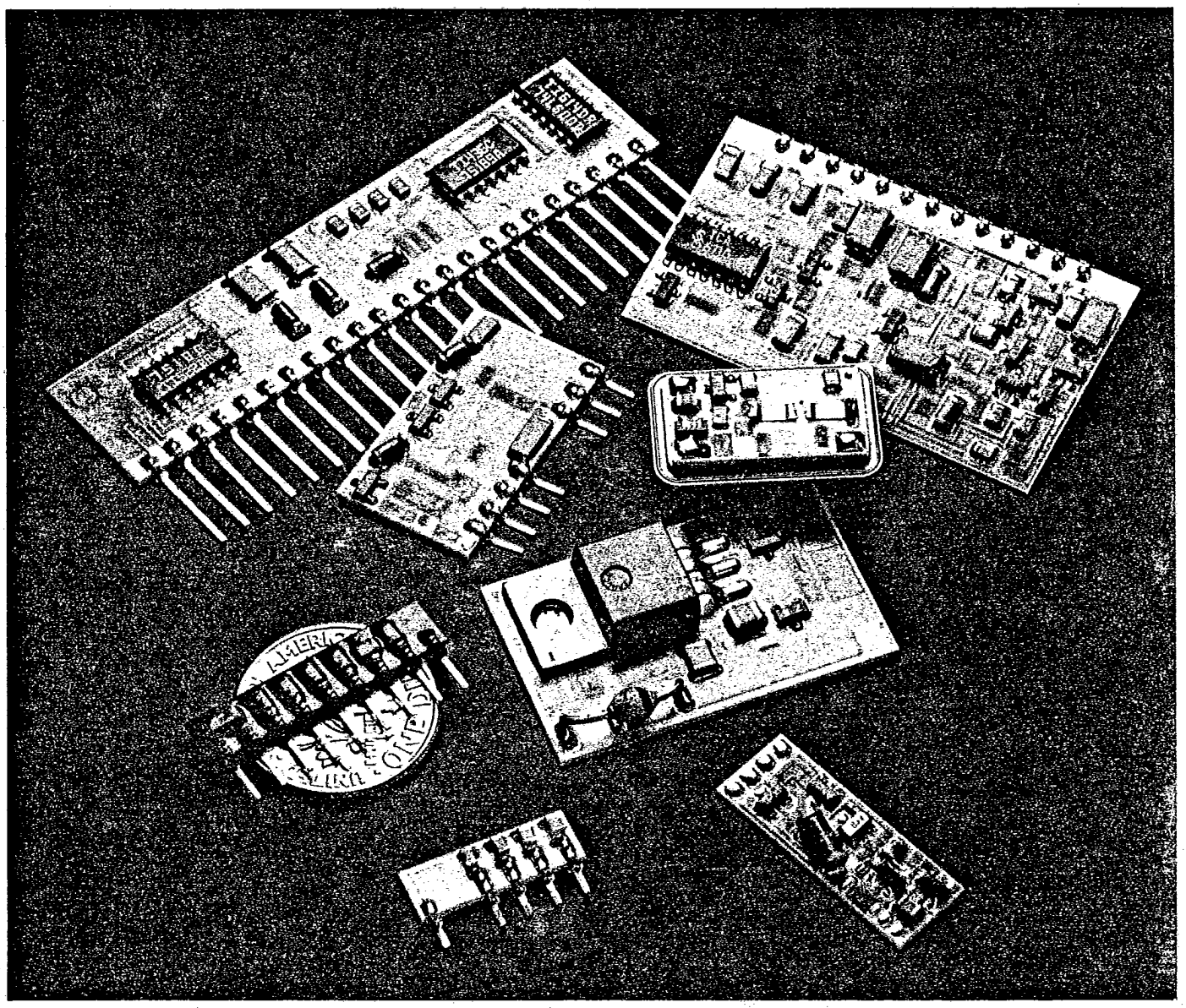








SPECTRUM CONTROL DESIGNS, DEVELOPS AND MANUFACTURERS A FULL LINE OF STANDARD AND CUSTOM HYBRID INTEGRATED CIRCUITS



SPECTRUM'S COMPLETE HYBRID INTEGRATED CIRCUIT PRODUCT LINE

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