9614

DUAL DIFFERENTIAL LINE DRIVER

FAIRCHILD LINEAR INTEGRATED CIRCUIT

GENERAL DESCRIPTION – The 9614 is a TTL compatible Dual Differential Line Driver. It is designed to drive transmission lines either differentially or single-ended, back-matched or terminated. The outputs are similar to TTL, with the active pull-up and the pull-down split and brought out to adjacent pins. This allows multiplex operation (Wired-OR) at the driving site in either the single-ended mode via the uncommitted collector, or in the differential mode by use of the active pull-ups on one side and the uncommitted collectors on the other (See Fig. 2). The active pull-up is short circuit protected and offers a low output impedance to allow back-matching. The two pairs of outputs are complementary providing NAND and AND functions of the inputs, adding greater flexibility. The input and output levels are TTL compatible with clamp diodes provided at both input and output to handle line transients.

- **SINGLE 5 VOLT SUPPLY**
- **TTL COMPATIBLE INPUTS**
- **OUTPUT SHORT CIRCUIT PROTECTION**
- **INPUT CLAMP DIODES**
- **OUTPUT CLAMP DIODES FOR TERMINATION OF LINE TRANSIENTS**
- **COMPLEMENTARY OUTPUTS FOR NAND, AND OPERATION**
- **UNCOMMITTED COLLECTOR OUTPUTS FOR WIRED-OR APPLICATION**
- **MILITARY TEMPERATURE RANGE**

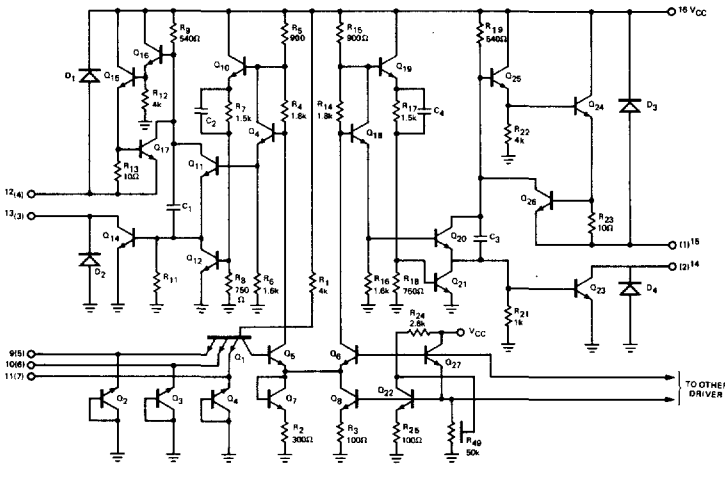
ABSOLUTE MAXIMUM RATINGS (above which the useful life may be imparied)

Storage Temperature Range	−65°C to +150°C
V_{CC} Pin Potential to Ground Pin	−0.7 V to +7.0 V
Input Voltage	−0.5 V to +5.5 V
Voltage Supplied to Outputs (Open Collector)	−0.5 V to +12 V
Lead Temperature (Soldering, 60 seconds)	300°C
Internal Power Dissipation (Note 1)	
DIP	670 mW
Flatpak	570 mW
Operating Temperature Range	
Military (9614)	−55°C to +125°C
Commercial (9614C)	0°C to +75°C

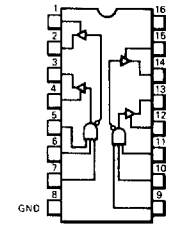
NOTE:

1. Rating applies to ambient temperatures up to 70°C. Above 70°C derate linearly at 8.3 mW/°C for the DIP and 7.1 mW/°C for the Flatpak.

EQUIVALENT CIRCUIT (1/2 9614)



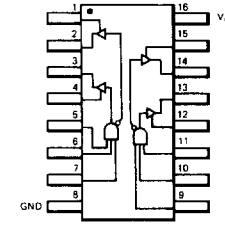
CONNECTION DIAGRAM
16-LEAD DIP
(TOP VIEW)
PACKAGE OUTLINE 6B



ORDER INFORMATION

TYPE	PART NO.
9614	9614DM
9614C	9614DC

16-LEAD FLATPAK
(TOP VIEW)
PACKAGE OUTLINE 4L



ORDER INFORMATION

TYPE	PART NO.
9614	9614FM

6

9614

ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 V ± 10%)

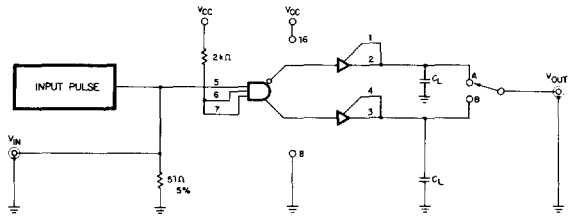
SYMBOL	CHARACTERISTIC	LIMITS							UNITS	CONDITIONS	
		-55°C		+25°C			+125°C				
		MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.			
V_{OL}	Output LOW Voltage		400		200	400		400	mV	I_{OL} = 40 mA	V_{CC} = 4.5 V
V_{OH}	Output HIGH Voltage	2.4		2.4	3.2		2.4		V	I_{OH} = -10 mA	V_{CC} = 4.5 V
		2.0		2.0	2.6		2.0		V	I_{OH} = -40 mA	
I_{SC}	Output Short-Circuit Current			-40	-90	-120			mA	V_{OUT} = 0.0 V	V_{CC} = 5.5 V
I_{CEX}	Output Leakage Current				10	100		200	μA	V_{CEX} = 12.0 V	V_{CC} = 5.5 V
I_F	Input Forward Current		-1.60		-1.10	-1.60		-1.60	mA	V_F = 0.4 V	V_{CC} = 5.5 V
I_R	Input Reverse Current				35	60		100	μA	V_R = 4.5 V	V_{CC} = 5.5 V
V_{IL}	Input LOW Voltage		0.8		1.3	0.8		0.8	V	V_{CC} = 5.5 V	
V_{IH}	Input HIGH Voltage	2.0		2.0	1.5		2.0		V	V_{CC} = 4.5 V	
V_{OLC}	Clamped Output LOW Voltage				-0.8	-1.5			V	I_{OLC} = -40 mA	V_{CC} = 5.5 V
I_{CC}	Supply Current				34	50			mA	Inputs = 0 V	V_{CC} = 5.5 V
I_{max}	Supply Current				46	65			mA	Inputs = 0 V	V_{max} = 7.0 V
t_{PLH}	Turn-Off Time				14	20			ns	C_L = 30 pF	V_{CC} = 5.0 V
t_{PHL}	Turn-On Time				18	20			ns	See Fig. 1	V_M = 1.5 V
V_{CD}	Input Clamp Diode Voltage				-1.0	-1.5			V	V_{CC} = 4.5 V	I_{IC} = -12 mA

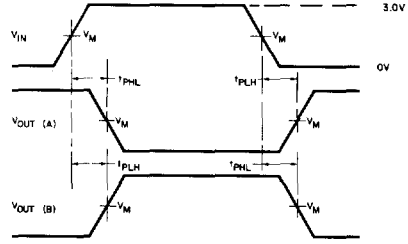
9614C

ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 V ± 5%)

SYMBOL	CHARACTERISTIC	LIMITS							UNITS	CONDITIONS	
		0°C		+25°C			+75°C				
		MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.			
V_{OL}	Output LOW Voltage		450		200	450		450	mV	I_{OL} = 40 mA	V_{CC} = 4.75 V
V_{OH}	Output HIGH Voltage	2.4		2.4	3.2		2.4		V	I_{OH} = -40 mA	V_{CC} = 4.75 V
I_{SC}	Output Short-Circuit Current			-40	-90	-120			mA	V_{OUT} = 0.0 V	V_{CC} = 5.25 V
I_{CEX}	Output Leakage Current				10	100		200	μA	V_{CEX} = 5.25 V	V_{CC} = 5.25 V
I_F	Input Forward Current		-1.60		-1.10	-1.60		-1.60	mA	V_F = 0.45 V	V_{CC} = 5.25 V
I_R	Input Reverse Current				35	60		100	μA	V_R = 4.5 V	V_{CC} = 5.25 V
V_{IL}	Input LOW Voltage		0.8		1.3	0.8		0.8	V	V_{CC} = 5.25 V	
V_{IH}	Input HIGH Voltage	2.0		2.0	1.5		2.0		V	V_{CC} = 4.75 V	
V_{OLC}	Clamped Output LOW Voltage				-0.8	-1.5			V	I_{OLC} = -40 mA	V_{CC} = 5.25 V
I_{CC}	Supply Current				33	50			mA	Inputs = 0 V	V_{CC} = 5.25
I_{max}	Supply Current				46	70			mA	Inputs = 0 V	V_{max} = 7.0 V
t_{PLH}	Turn-Off Time				14	30			ns	C_L = 30 pF	V_{CC} = 5.0 V
t_{PHL}	Turn-On Time				18	30			ns	See Fig. 1	V_M = 1.5 V
V_{CD}	Input Clamp Diode Voltage				-1.0	-1.5			V	V_{CC} = 4.75 V	I_{IC} = -12 mA

SWITCHING CIRCUIT AND WAVEFORMS



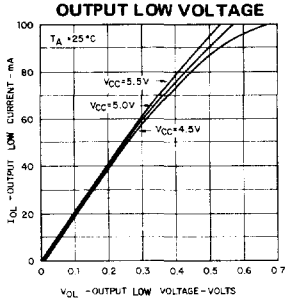


INPUT PULSE
Frequency = 500 kHz
Amplitude = 3.0 ±0.1 V
Pulse Width = 110 ±10 ns
$t_r = t_f \leq 5.0$ ns

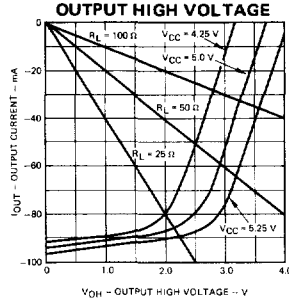
Fig. 1

TYPICAL ELECTRICAL CHARACTERISTICS

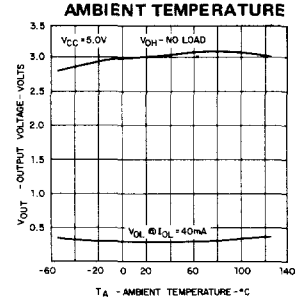
ACTIVE PULL-DOWN OUTPUT LOW CURRENT AS A FUNCTION OF OUTPUT LOW VOLTAGE



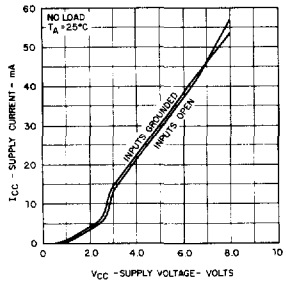
ACTIVE PULL-UP OUTPUT HIGH CURRENT AS A FUNCTION OF OUTPUT HIGH VOLTAGE



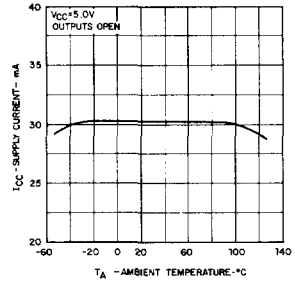
LOGIC LEVELS AS A FUNCTION OF AMBIENT TEMPERATURE



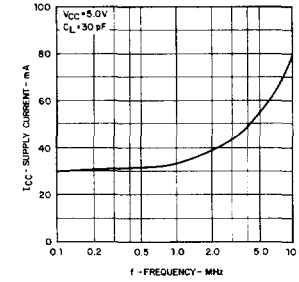
SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



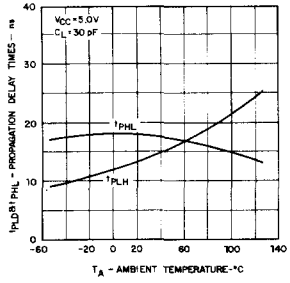
SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE



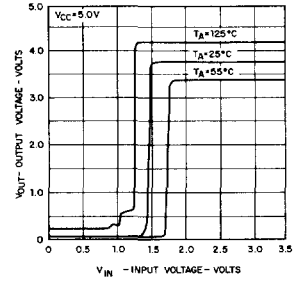
SUPPLY CURRENT AS A FUNCTION OF OPERATING FREQUENCY



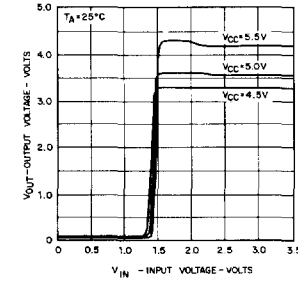
PROPAGATION DELAY TIME AS A FUNCTION OF TEMPERATURE



TRANSFER CHARACTERISTICS AS A FUNCTION OF TEMPERATURE



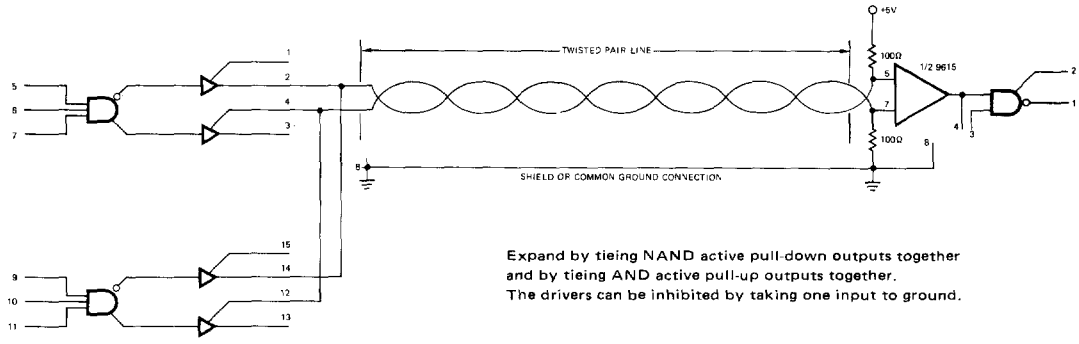
TRANSFER CHARACTERISTICS AS A FUNCTION OF SUPPLY VOLTAGE



6

APPLICATIONS

DIFFERENTIAL MODE EXPANSION
MULTIPLEX OPERATION

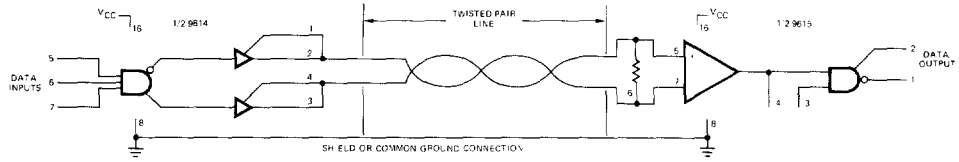


Expand by tieing NAND active pull-down outputs together and by tieing AND active pull-up outputs together. The drivers can be inhibited by taking one input to ground.

Fig. 2

Note: Only 1 Driver is Enabled At One Time

SIMPLEX DIFFERENTIAL OPERATION



See 9615 Data Sheet for operation of 9615.

Fig. 3

TYPICAL REFLECTION DIAGRAM

NOTE–SEE 9621 DATA SHEET FOR USAGE OF REFLECTION DIAGRAM

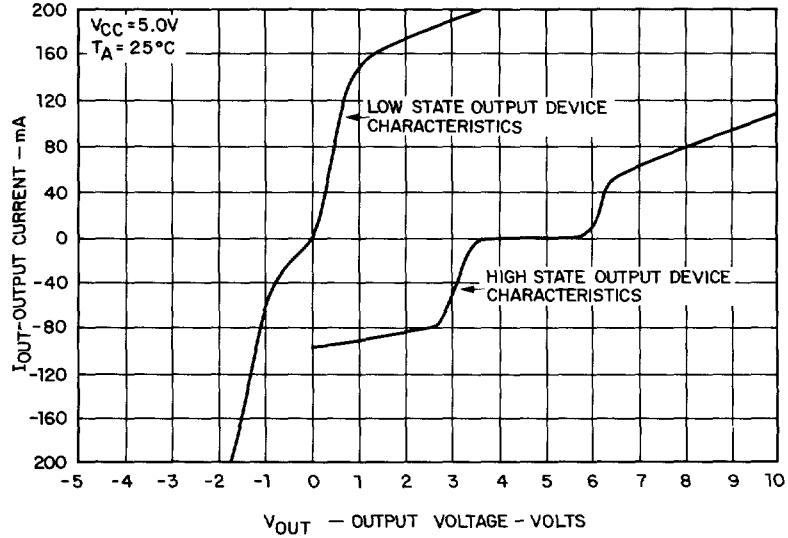


Fig. 4