FAIRCHILD
A Schlumberger Company

μA9614
Dual Differential Line Driver

Linear Division Interface Products

Description

The μA9614 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 leads. 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 Applications). 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 and 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 5.0 V 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**
- **Extended Temperature Range**

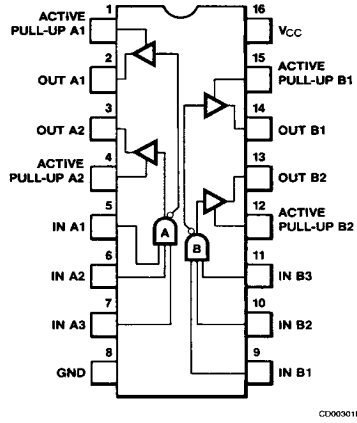
Absolute Maximum Ratings

Storage Temperature Range	
Ceramic DIP	−65°C to +175°C
Molded DIP	−65°C to +150°C
Operating Temperature Range	
Extended (μA9614M)	−55°C to +125°C
Commercial (μA9614C)	0°C to +70°C
Lead Temperature	
Ceramic DIP (soldering, 60 s)	300°C
Molded DIP (soldering, 10 s)	265°C
Internal Power Dissipation[1,2]	
16L-Ceramic DIP	1.50 W
16L-Molded DIP	1.04 W
V_{CC} Lead Potential to Ground Lead	−0.7 V to +7.0 V
Input Voltage	−0.5 V to +5.5 V
Voltage Supplied to Outputs	
(Open Collectors)	−0.5 V to +12 V

Note

1. $T_{J\ Max}$ = 175°C for the Ceramic DIP, and 150°C for the Molded DIP.
2. Ratings apply to ambient temperature at 25°C. Above this temperature, derate the 16L-Ceramic DIP at 10 mW/°C, and 16L-Molded DIP at 8.3 mW/°C.

Connection Diagram
16-Lead DIP
(Top View)



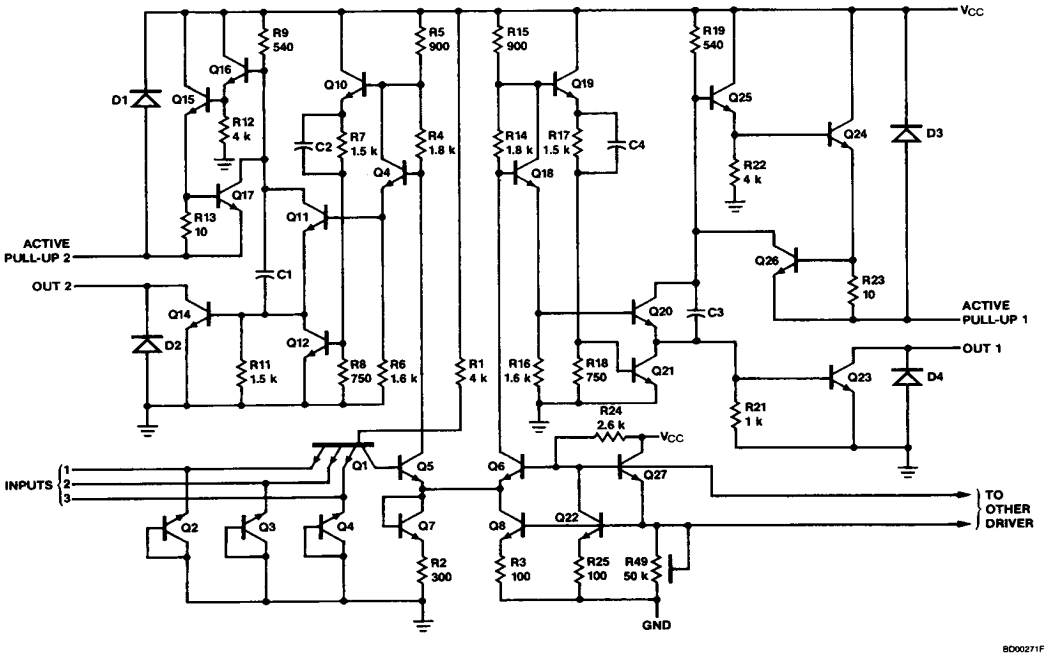
Order Information

Device Code	Package Code	Package Description
μA9614DM	6B	Ceramic DIP
μA9614DC	6B	Ceramic DIP
μA9614PC	9B	Molded DIP

Truth Table

INPUTS			OUTPUTS	
3	2	1	1	2
L	L	L	H	L
L	L	H	H	L
L	H	L	H	L
L	H	H	H	L
H	L	L	H	L
H	L	H	H	L
H	H	L	H	L
H	H	H	L	H

Equivalent Circuit (1/2 of circuit)



Note
All resistor values in ohms.

μA9614
Electrical Characteristics V_{CC} = 5.0 V ± 10%, T_A = −55°C to +125°C, unless otherwise specified.

Symbol	Characteristic	Condition	−55°C		+25°C			+125°C		Unit
			Min	Max	Min	Typ	Max	Min	Max	
V_{OL}	Output Voltage LOW	I_{OL} = 40 mA V_{CC} = 4.5 V		400		200	400		400	mV
V_{OH1}	Output Voltage HIGH	I_{OH} = −10 mA, V_{CC} = 4.5 V	2.4		2.4	3.2		2.4		V
V_{OH2}		I_{OH} = −20 mA, V_{CC} = 4.5 V	2.0		2.0	2.6		2.0		V
I_{OS}	Output Short Circuit Current	V_O = 0 V V_{CC} = 5.5 V			−40	−90	−120			mA
I_{CEX}	Output Leakage Current	V_{CEX} = 12.0 V V_{CC} = 5.5 V				10	100		200	μA
I_{IL}	Input Current LOW	V_I = 0.4 V V_{CC} = 5.5 V		−1.60		−1.10	−1.60		−1.60	mA
I_{IH}	Input Current HIGH	V_I = 4.5 V V_{CC} = 5.5 V				35	60		100	μA
V_{IL}	Input Voltage LOW	V_{CC} = 5.5 V		0.8		1.3	0.8		0.8	V
V_{IH}	Input Voltage HIGH	V_{CC} = 4.5 V	2.0		2.0	1.5		2.0		V
V_{OC}	Clamp Output Voltage LOW	I_{OC} = −40 mA V_{CC} = 5.5 V				−0.8	−1.5			V
I_{CC}	Supply Current	Inputs = 0 V V_{CC} = 5.5 V				34	50			mA
I_{Max}	Supply Current	Inputs = 0 V V_{Max} = 7.0 V				46	65			mA
t_{PLH}	Turn-Off Time	C_L = 30 pF V_{CC} = 5.0 V (See AC Circuit) V_M = 1.5 V				14	20			ns
t_{PHL}	Turn-On Time					18	20			ns
V_{IC}	Input Clamp Diode Voltage	V_{CC} = 4.5 V I_{IC} = −12 mA				−1.0	−1.5			V

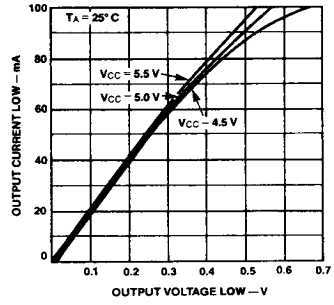
μA9614C
Electrical Characteristics V_{CC} = 5.0 V ± 5%, T_A = 0°C to 70°C, unless otherwise specified.

Symbol	Characteristic	Condition	0°C		25°C			70°C		Unit
			Min	Max	Min	Typ	Max	Min	Max	
V_{OL}	Output Voltage LOW	I_{OL} = 40 mA V_{CC} = 4.75 V		450		200	450		450	mV
V_{OH1}	Output Voltage HIGH	I_{OH} = −10 mA, V_{CC} = 4.75 V	2.4		2.4	3.2		2.4		V
V_{OH2}		I_{OH} = −40 mA, V_{CC} = 4.75 V	2.0		2.0	2.6		2.0		V
I_{OS}	Output Short Circuit Current	V_O = 0 V V_{CC} = 5.25 V			−40	−90	−120			mA
I_{CEX}	Output Leakage Current	V_{CEX} = 5.25 V V_{CC} = 5.25 V				10	100		200	μA
I_{IL}	Input Current LOW	V_I = 0.45 V V_{CC} = 5.25 V		−1.60		−1.10	−1.60		−1.60	mA
I_{IH}	Input Current HIGH	V_I = 4.5 V V_{CC} = 5.25 V				35	60		100	μA
V_{IL}	Input Voltage LOW	V_{CC} = 5.25 V		0.8		1.3	0.8		0.8	V
V_{IH}	Input Voltage HIGH	V_{CC} = 4.75 V	2.0		2.0	1.5		2.0		V
V_{OC}	Clamp Output Voltage LOW	I_{OC} = −40 mA V_{CC} = 5.25 V				−0.8	−1.5			V
I_{CC}	Supply Current	Inputs = 0 V V_{CC} = 5.25 V				33	50			mA
I_{Max}	Supply Current	Inputs = 0 V V_{Max} = 7.0 V				46	70			mA
t_{PLH}	Turn-Off Time	C_L = 30 pF V_{CC} = 5.0 V (See AC Circuit) V_M = 1.5 V				14	30			ns
t_{PHL}	Turn-On Time					18	30			ns
V_{IC}	Input Clamp Diode Voltage	V_{CC} = 4.75 V I_{IC} = −12 mA				−1.0	−1.5			V

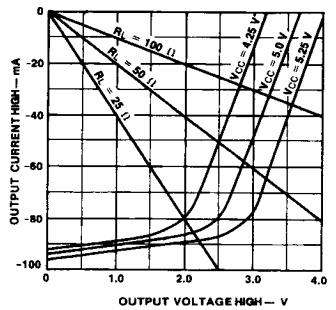
9

Typical Performance Curves

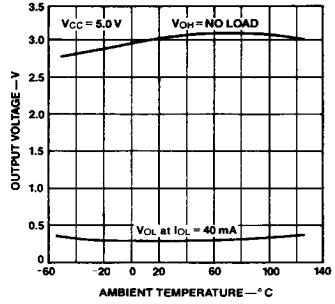
Active Pull-Down Output Current LOW vs Output Voltage LOW



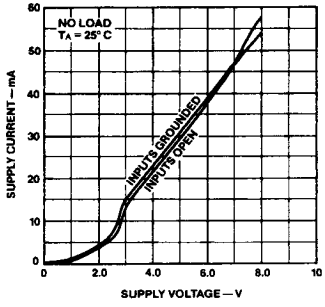
Active Pull-Up Output Current HIGH vs Output Voltage HIGH



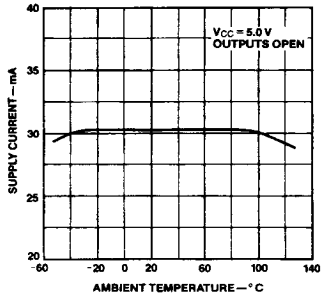
Logic Levels vs Ambient Temperature



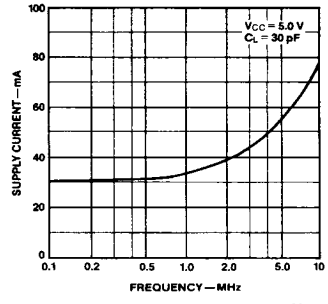
Supply Current vs Supply Voltage



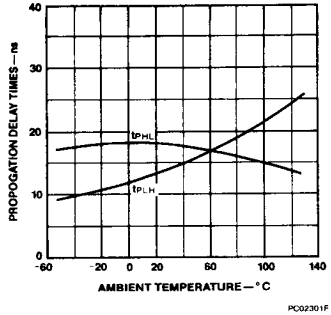
Supply Current vs Temperature



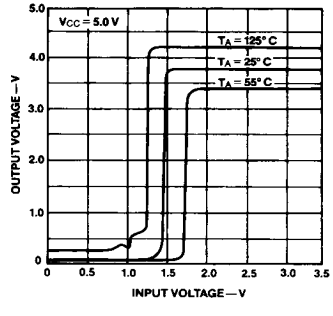
Supply Current vs Operating Frequency



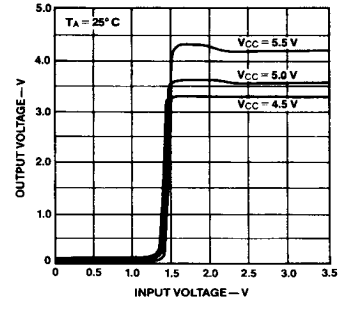
Propagation Delay Time vs Temperature



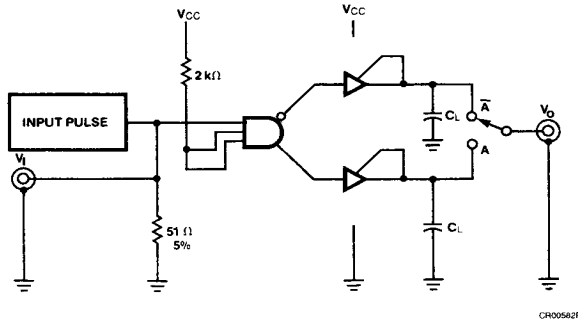
Transfer Characteristics vs Temperature

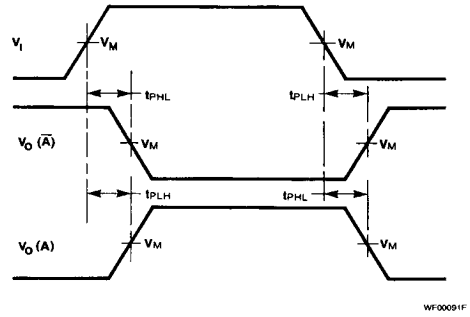


Transfer Characteristics vs Supply Voltage



AC Test Circuit and Waveforms



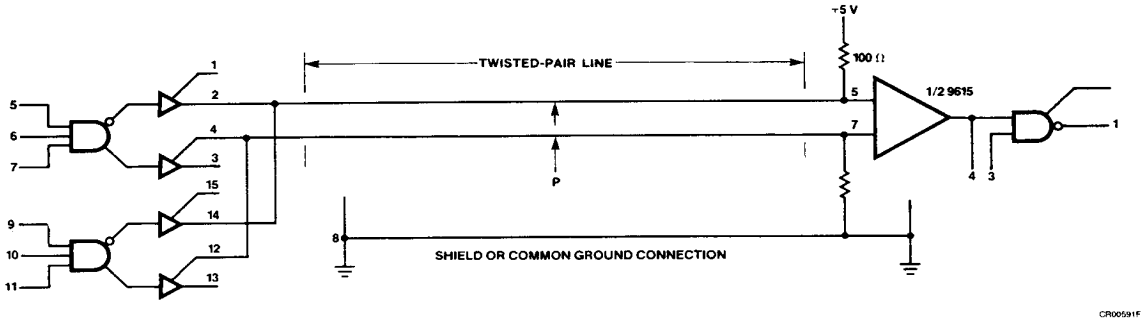


Input Pulse
Frequency = 500 kHz
Amplitude = 3.0 ± 0.1 V
Pulse Width = 110 ± 10 ns
$t_r = t_f \leqslant 5.0$ ns

9

Typical Applications

Differential Mode Expansion Multiplex Operation

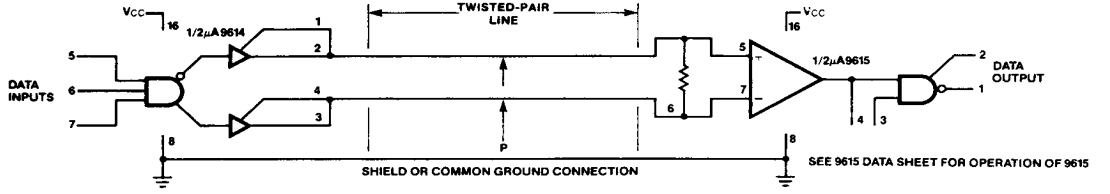


Only one driver is enabled at one time

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

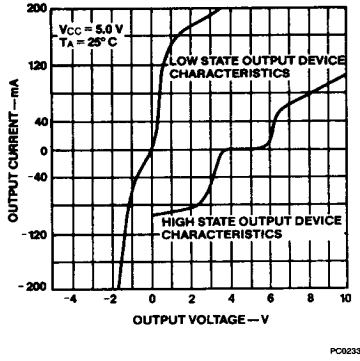
Typical Applications (Cont.)

Simplex — Differential Operation



See μA9615 data sheet for operation of μA9615

Typical Reflection Diagram



See μA9621 data sheet for usage of reflection diagram