9612 · 9612E

DUAL DIFFERENTIAL LINE DRIVERS

FAIRCHILD LINEAR INTEGRATED CIRCUITS

GENERAL DESCRIPTION – The 9612 Dual Differential Line Driver is designed specifically to drive single ended or differential, back matched or terminated transmission lines. The outputs are similar to totem pole TTL outputs, with active pull-up and pull-down, for use in simplex or simplex distribution bus systems. The devices feature a short circuit protected active pull-up. The inputs and outputs have clamp diodes to minimize the effect of line transients. The active pull-up output offers low output impedance allowing back matching or parallel termination of the line. The 9612E and 9612A are specified to drive 50 Ω transmission line at high speed while guaranteeing a maximum skew between outputs of less than 3.5 ns for application requiring high performance line drivers. (9613 is the functional complement).

9612A/9612/9612E

- **SINGLE 5 V SUPPLY**
- **TTL COMPATIBLE INPUTS**
- **OUTPUT SHORT CIRCUIT PROTECTION**
- **INPUT CLAMP DIODES**
- **OUTPUT CLAMP DIODES FOR TERMINATION OF LINE TRANSIENTS**
- **COMPLEMENTARY OUTPUTS**

9612A/9612E

- **GUARANTEED MAXIMUM OUTPUT SKEW**
- **HIGH OUTPUT DRIVE CAPABILITY FOR 50 Ω TRANSMISSION LINES**

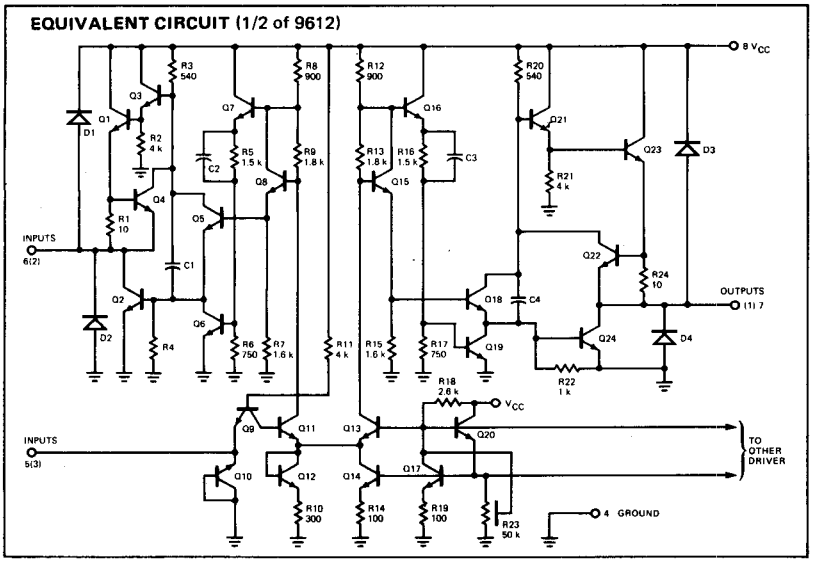
ABSOLUTE MAXIMUM RATINGS

Storage Temperature	−65°C to +150°C
Operating Temperature	
9612A	−55°C to +125°C
9612, 9612E	0°C to +70°C
V_{CC}	+7.0 V
V_{IN}	−0.5 V to +5.5 V
Internal Power Dissipation (Note 1)	800 mW
Lead Temperature (Soldering, 10 s)	
Metal Can, Hermetic Mini DIP (Soldering, 60 s)	300°C
Molded Mini DIP (Soldering, 10 s)	260°C

NOTE:

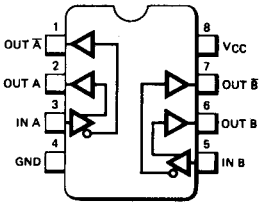
1. For the Hermetic Mini DIP and Molded Mini DIP derate above 30°C at 6.7 mW/°C. For the Metal Can derate above 70°C at 6.3 mW/°C; the rating for Metal Can requires a heat sink that provides a thermal resistance from case to free air, $R_{\theta CA}$, of not more than 95°C/W.

EQUIVALENT CIRCUIT (1/2 of 9612)



CONNECTION DIAGRAM
8-LEAD MINIDIP
(TOP VIEW)

PACKAGE OUTLINE 9T 6T
PACKAGE CODE T R

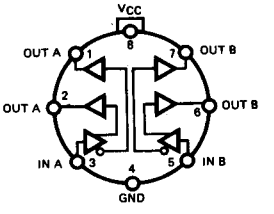


ORDER INFORMATION

TYPE	PART NO.
9612	9612TC
9612E	9612ETC
9612A	9612ARM
9612	9612RC
9612E	9612ERC

8-LEAD METAL CAN
(TOP VIEW)

PACKAGE OUTLINE 5B
PACKAGE CODE H



ORDER INFORMATION

TYPE	PART NO.
9612A	9612AHM
9612	9612HC
9612E	9612EHC

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ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 V ±10%, T_A = −55°C to +125°C, unless otherwise specified)

SYMBOL	PARAMETER	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
V_{OL}	Output LOW Voltage	I_{OL} = 40 mA		200	400	mV
V_{OLC}	Clamped Output LOW Voltage	I_{OLC} = −40 mA	−1.5	−0.8		V
V_{OH}	Output HIGH Voltage	I_{OH} = −40 mA	2.0	2.75		V
I_{SC}	Output Short Circuit Current	V_{OUT} = 0V	−140	−77	−42	mA
V_{IL}	Input LOW Voltage				0.8	V
V_{IH}	Input HIGH Voltage		2.0			V
I_{IL}	Input LOW Current	V_{IL} = 0.4 V	−1.6			mA
I_{IH}	Input HIGH Current	V_{IH} = 2.4 V			40	μA
I_R	Input Reverse Current	V_R = 4.5 V			1.0	mA
V_{CD}	Input Clamp Diode Voltage	V_{CC} = 4.75 V, I_{IC} = −12 mA, T = 25°C	−1.5	−0.8		V
I_{CC}	Supply Current	Inputs = 0 V, T = 25°C		42	50	mA
I_{max}	Max. Supply Current	Inputs = 0 V, V_{max} = 7.0 V, T = 25°C		59	70	mA

ELECTRICAL CHARACTERISTICS (V_{CC} = 5.0 V ±5%, T_A = 0°C to 70°C, unless otherwise specified)

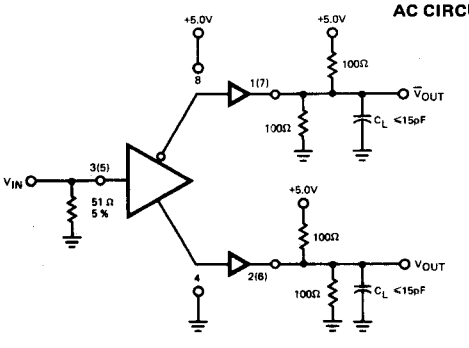
SYMBOL	PARAMETER	CONDITIONS	LIMITS						UNITS
			9612			9612E			
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OL}	Output LOW Voltage	I_{OL} = 40 mA		200	400		200	400	mV
		I_{OL} = 50 mA (9612E only)					250	400	mV
V_{OLC}	Clamped Output LOW Voltage	I_{OLC} = −40 mA	−1.5	−0.8		−1.5	−0.8		V
		I_{OLC} = −50 mA (9612E only)				−1.5	−0.9		V
V_{OH}	Output HIGH Voltage	I_{OH} = −40 mA	2.4	2.75		2.4	2.75		V
		I_{OH} = −50 mA (9612E only)				2.4	2.60		V
I_{SC}	Output Short Circuit Current	V_{OUT} = 0V	−140	−77	−42	−140	−77	−55	mA
V_{IL}	Input LOW Voltage				0.8			0.8	V
V_{IH}	Input HIGH Voltage		2.0			2.0			V
I_{IL}	Input LOW Current	V_{IL} = 0.4 V	−1.6			−1.6			mA
I_{IH}	Input HIGH Current	V_{IH} = 2.4 V			40			40	μA
I_R	Input Reverse Current	V_R = 4.5 V			1.0			1.0	mA
V_{CD}	Input Clamp Diode Voltage	V_{CC} = 4.75 V, I_{IC} = −12 mA	−1.5	−0.8		−1.5	−0.8		V
I_{CC}	Supply Current	Inputs = 0 V		42	50		42	50	mA
I_{max}	Max. Supply Current	Inputs = 0 V, V_{max} = 7.0 V		59	70		59	70	mA

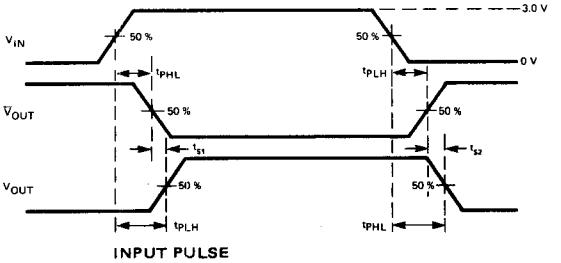
AC CHARACTERISTICS: T_A = 25°C, V_{CC} = 5.0 V, R_L = 100 Ω (Note 1)

SYMBOL	PARAMETER	CONDITIONS	LIMITS						UNITS
			9612			9612A/9612E			
			MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Turn Off Time	R_L = 100 Ω (Note 1)			30			20	ns
t_{PHL}	Turn On Time	$C_L \leq$ 15 pF			30			20	ns
t_s	Output Skew	See Fig. 1				−3.5		+3.5	ns

NOTE: 1. R_L must be noninductive.

AC CIRCUIT AND WAVEFORMS



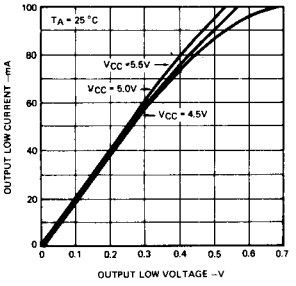


INPUT PULSE
Frequency = 2 MHz Pulse Width = 250 ±10 ns
Amplitude = 3.0 ± 0.1 V $t_r = t_f \leq$ 5.0 ns

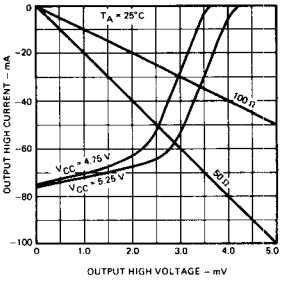
Fig. 1

TYPICAL PERFORMANCE CURVES

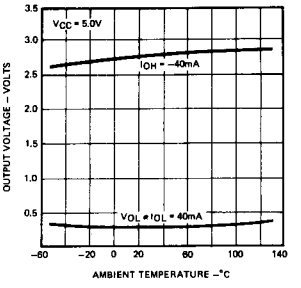
OUTPUT LOW CURRENT AS A FUNCTION OF OUTPUT LOW VOLTAGE



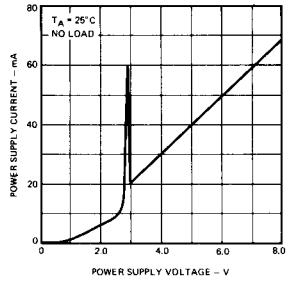
OUTPUT HIGH CURRENT AS A FUNCTION OF OUTPUT HIGH VOLTAGE



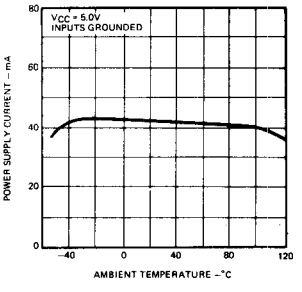
OUTPUT VOLTAGE AS A FUNCTION OF AMBIENT TEMPERATURE



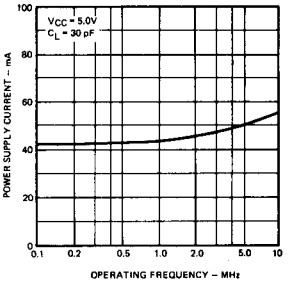
SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



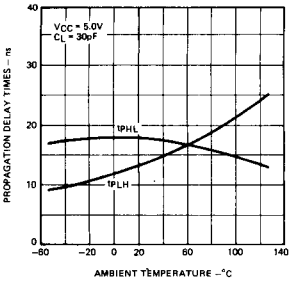
SUPPLY CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



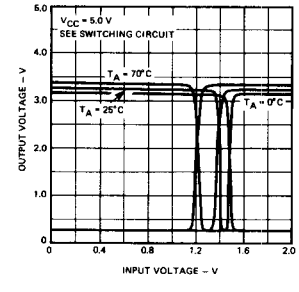
SUPPLY CURRENT AS A FUNCTION OF OPERATING FREQUENCY



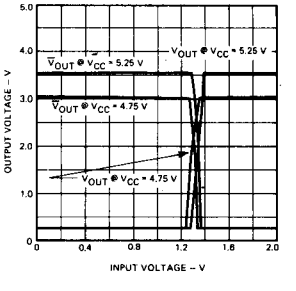
PROPAGATION DELAY TIME AS A FUNCTION OF AMBIENT TEMPERATURE



TRANSFER CHARACTERISTICS AS A FUNCTION OF AMBIENT TEMPERATURE



TRANSFER CHARACTERISTICS AS A FUNCTION OF SUPPLY VOLTAGE



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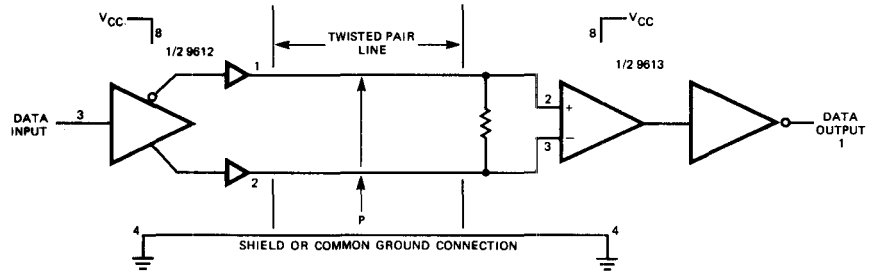
TYPICAL APPLICATIONS

SIMPLEX BALANCED DIFFERENTIAL OPERATION



TYPICAL REFLECTION DIAGRAM