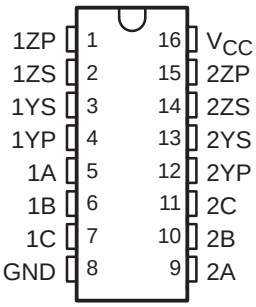
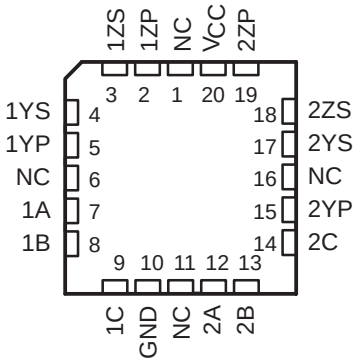
- **Choice of Open-Collector, Open-Emitter, or Totem-Pole Outputs**
- **Single-Ended or Differential AND/NAND Outputs**
- **Single 5-V Supply**
- **Dual-Channel Operation**
- **TTL Compatible**
- **Short-Circuit Protection**
- **High-Current Outputs**
- **Triple inputs**
- **Clamp Diodes at Inputs and Outputs**
- **Designed for Use With SN55115 and SN75115 Differential Line Receivers**
- **Designed to Be Interchangeable With National DS9614 Line Driver**

SN55114 . . . J OR W PACKAGE
SN75114 . . . D OR N PACKAGE
(TOP VIEW)



SN55114 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The SN55114 and SN75114 dual differential line drivers are designed to provide differential output signals with the high-current capability for driving balanced lines, such as twisted pair, at normal line impedances without high power dissipation. The output stages are similar to TTL totem-pole outputs, but with the sink outputs, YS and ZS, and the corresponding active pullup terminals, YP and ZP, available on adjacent package pins. Since the output stages provide TTL-compatible output levels, these devices can also be used as TTL expanders or phase splitters.

The SN55114 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN75114 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

INPUTS			OUTPUTS	
A	**B**	**C**	**Y**	**Z**
H	H	H	H	L
All other input combinations			L	H

H = high level, L = low level

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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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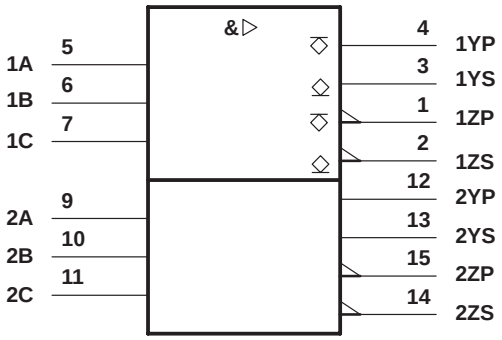
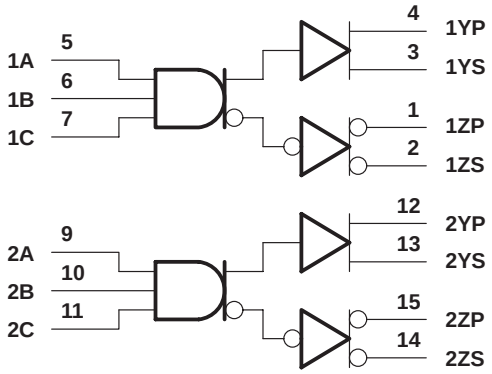
logic symbol†

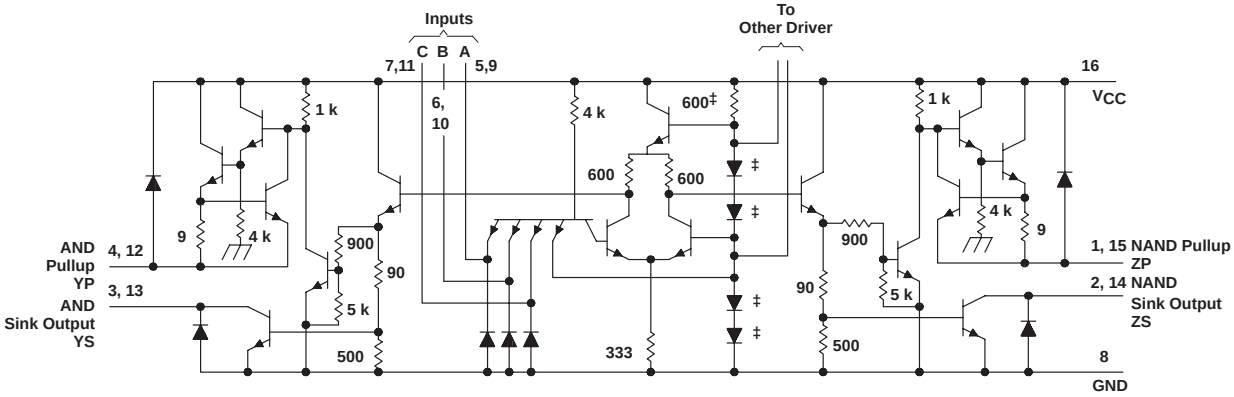


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, J, N, and W packages.

logic diagram (positive logic)



schematic (each driver)



‡ These components are common to both drivers. Resistor values shown are nominal and in ohms.
Pin numbers shown are for the D, J, N, and W packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage, V_I . . . . . 5.5 V
Off-state voltage applied to open-collector outputs . . . . . 12 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Case temperature for 60 seconds, T_C: FK package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package . . . . . 300°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or N package . . . . . 260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. All voltage values are with respect to the network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	950 mW	7.6 mW/°C	608 mW	—
FK‡	1375 mW	11.0 mW/°C	880 mW	275 mW
J‡	1375 mW	11.0 mW/°C	880 mW	275 mW
N	1150 mW	9.2 mW/°C	736 mW	—
W‡	1000 mW	8.0 mW/°C	640 mW	200 mW

‡ In the FK, J, and W packages, SN55114 chips are either silver glass or alloy mounted.

recommended operating conditions (unless otherwise noted)

	SN55114			SN75114			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			2			V
Low-level input voltage, V_{IL}			0.8			0.8	V
High-level output current, I_{OH}			–40			–40	mA
Low-level output current, I_{OL}			40			40	mA
Operating free-air temperature, T_A	–55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

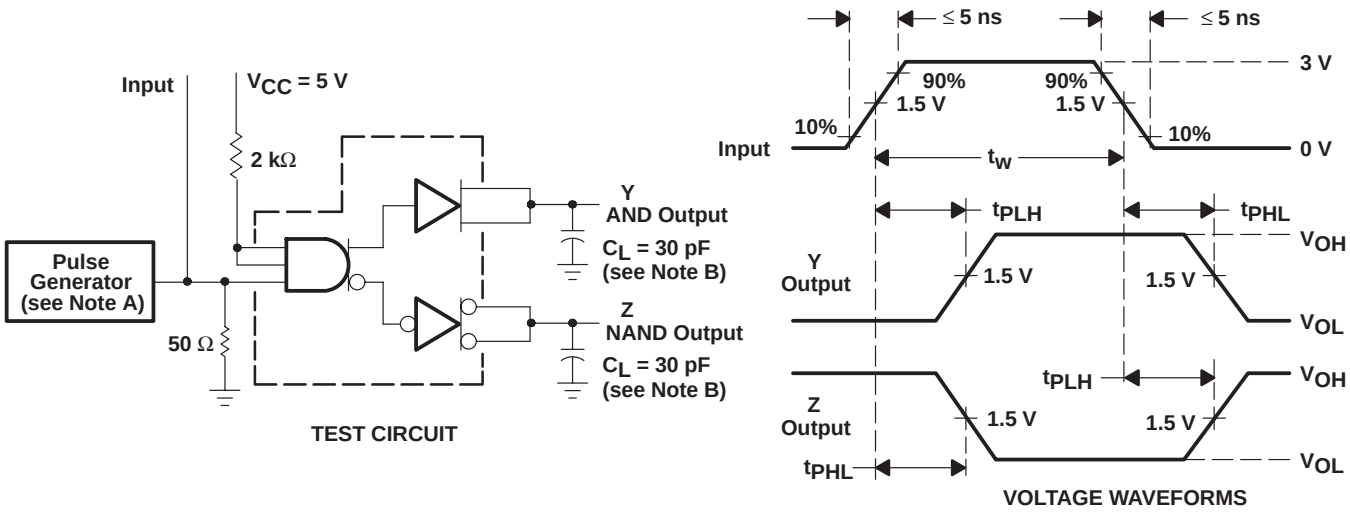
PARAMETER		TEST CONDITIONS†			SN55114			SN75114			UNIT
					MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = –12 mA				–0.9	–1.5		–0.9	–1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IL} = 0.8 V, V_{IH} = 2 V,		I_{OH} = –10 mA	2.4	3.4		2.4	3.4		V
				I_{OH} = – 40 mA	2	3		2	3		
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 40 mA				0.2	0.4		0.2	0.45	V
V_{OK}	Output clamp voltage	V_{CC} = 5 V, I_O = 40 mA,		T_A = 25°C		6.1	6.5		6.1	6.5	V
		V_{CC} = MAX, I_O = –40 mA,		T_A = 25°C		–1.1	–1.5		–1.1	–1.5	
$I_{O(off)}$	Off-state open collector output current	V_{CC} = MAX	V_{OH} = 12 V	T_A = 25°C		1	100				µA
				T_A = 125°C			200				
			V_{OH} = 5.25 V	T_A = 25°C					1	100	
				T_A = 70°C						200	
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V					1			1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.4 V					40			40	µA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V				–1.1	–1.6		–1.1	–1.6	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX, V_O = 0,		T_A = 25°C	–40	–90	–120	–40	–90	–120	mA
I_{CC}	Supply current (both drivers)	All inputs at 0 V, No load, T_A = 25°C		V_{CC} = MAX		37	50		37	50	mA
				V_{CC} = 7 V		47	65		47	70	

† All parameters, with the exception of off-state open-collector output current, are measured with the active pullup connected to the sink output. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at T_A = 25°C and V_{CC} = 5 V, with the exception of I_{CC} at 7 V.
§ Only one output should be shorted at a time, and duration of the short circuit should not exceed one second.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	SN55114			SN75114			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low- to high-level output	C_L = 30 pF, See Figure 1		15	20		15	30	ns
t_{PHL}	Propagation delay time, high- to low-level output			11	20		11	30	ns

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: Z_O = 500 Ω, PRR ≤ 500 kHz, t_W ≤ 100 ns.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS†

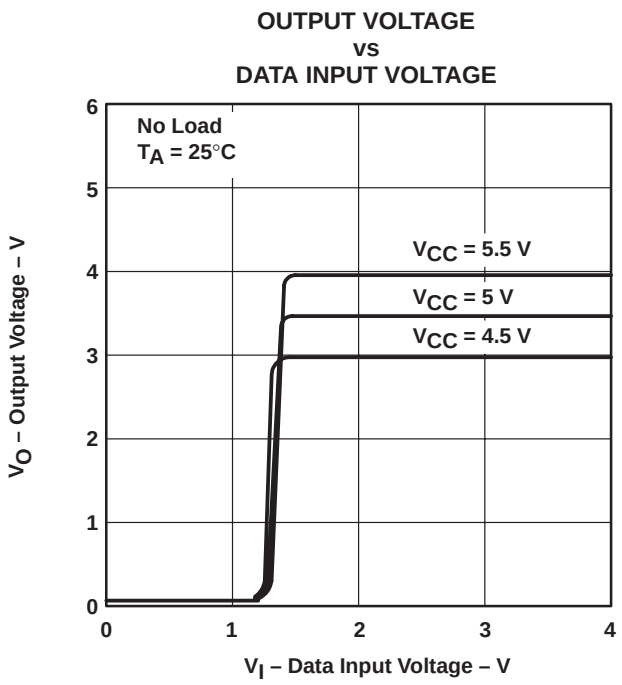


Figure 2

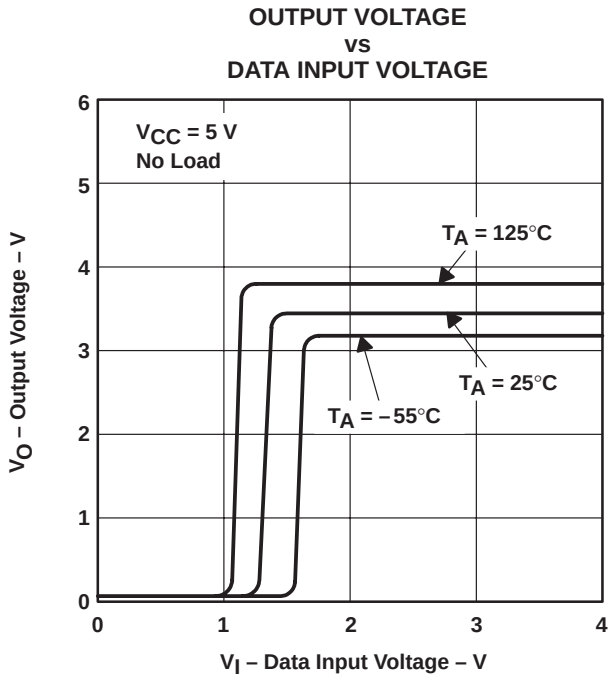


Figure 3

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

TYPICAL CHARACTERISTICS†

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

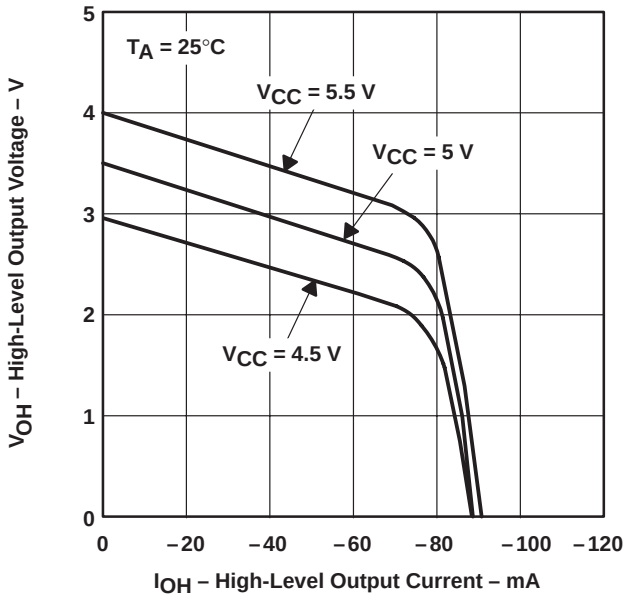


Figure 4

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

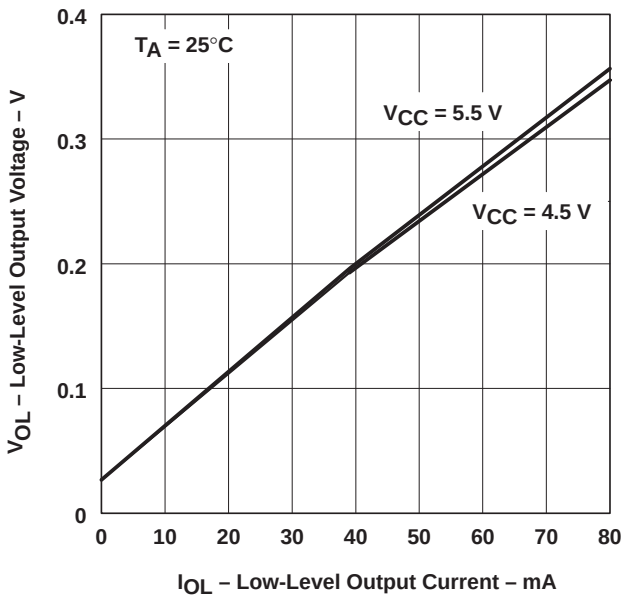


Figure 5

OUTPUT VOLTAGE
vs
FREE-AIR TEMPERATURE

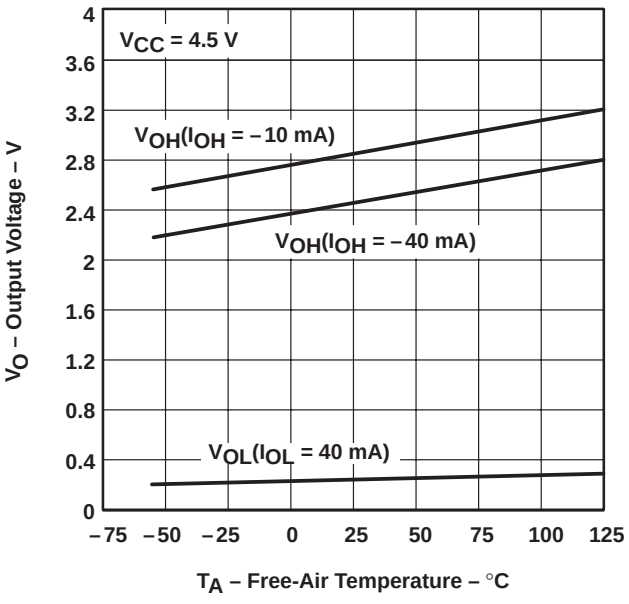


Figure 6

PROPAGATION DELAY TIMES
vs
FREE-AIR TEMPERATURE

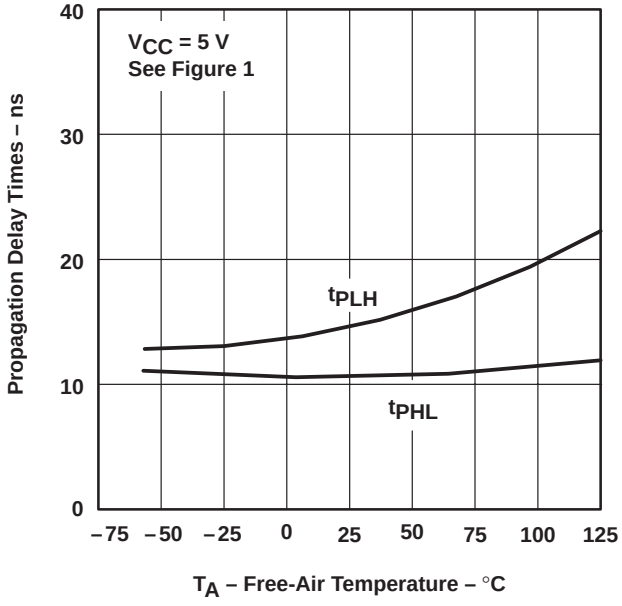


Figure 7

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

TYPICAL CHARACTERISTICS†

SUPPLY CURRENT (BOTH DRIVERS) vs SUPPLY VOLTAGE

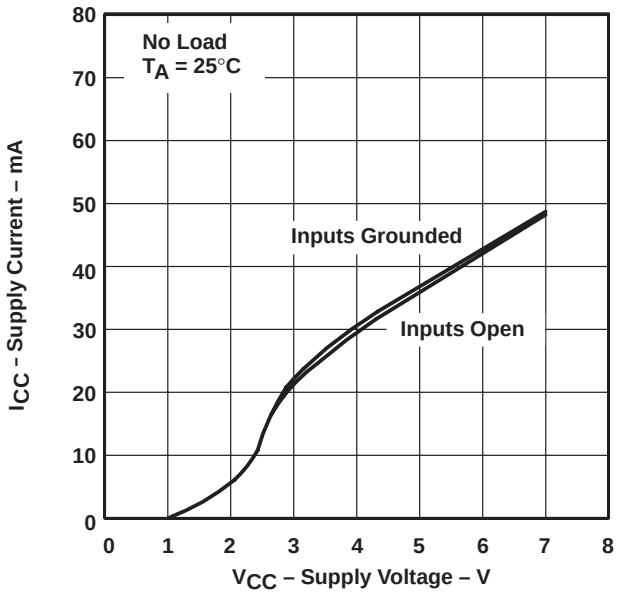


Figure 8

SUPPLY CURRENT (BOTH DRIVERS) vs FREE-AIR TEMPERATURE

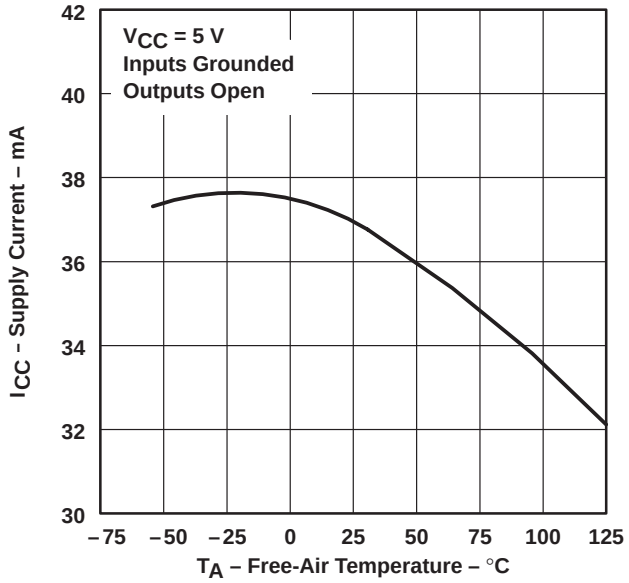


Figure 9

SUPPLY CURRENT (BOTH DRIVERS) vs FREQUENCY

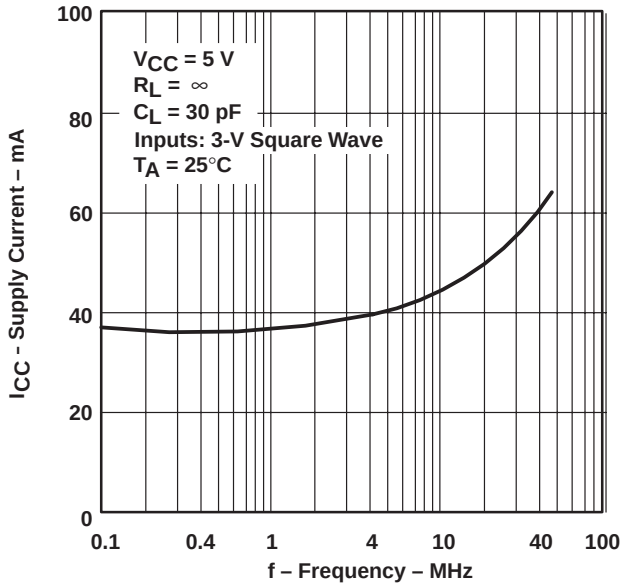
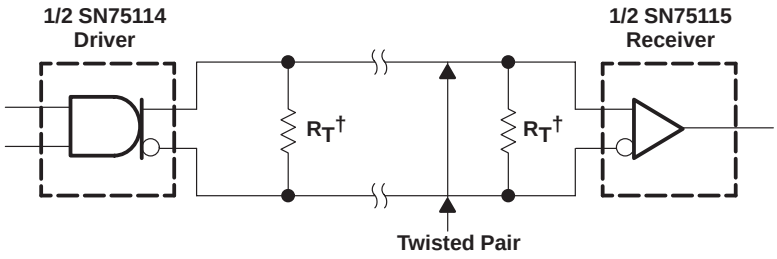


Figure 10

† Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. These parameters were measured with the active pullup connected to the sink output.

APPLICATION INFORMATION



† $R_T = Z_O$. A capacitor can be connected in series with R_T to reduce power dissipation.

Figure 11. Basic Party-Line or Data-Bus Differential Data Transmission

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