

SN55114, SN75114 DUAL DIFFERENTIAL LINE DRIVERS

SLLS071C – SEPTEMBER 1973 – REVISED SEPTEMBER 1998

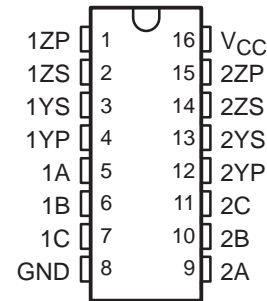
- Choice of Open-Collector, Open-Emitter, or Totem-Pole Outputs
- Single-Ended or Differential AND/NAND Outputs
- Single 5-V Supply
- Dual-Channel Operation
- TTL Compatible
- Short-Circuit Protection
- High-Current Outputs
- Triple inputs
- Clamp Diodes at Inputs and Outputs
- Designed for Use With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

description

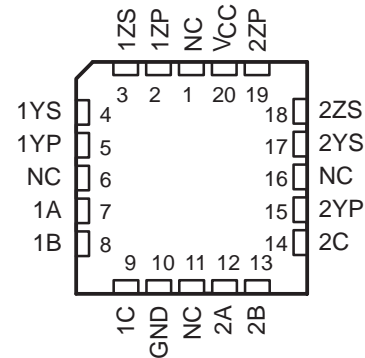
The SN55114 and SN75114 dual differential line drivers are designed to provide differential output signals with the high-current capability for driving balanced lines, such as twisted pair, at normal line impedances without high power dissipation. The output stages are similar to TTL totem-pole outputs, 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 .

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



SN55114 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

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



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

**TEXAS
INSTRUMENTS**

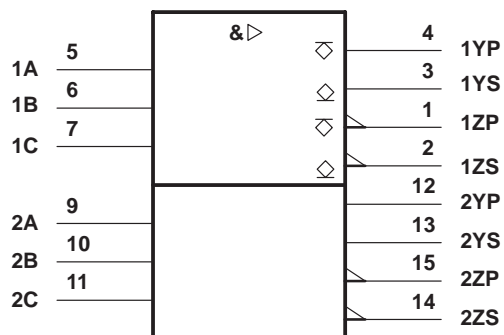
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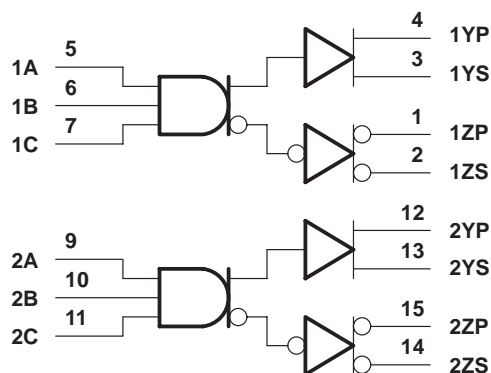
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logic symbol†



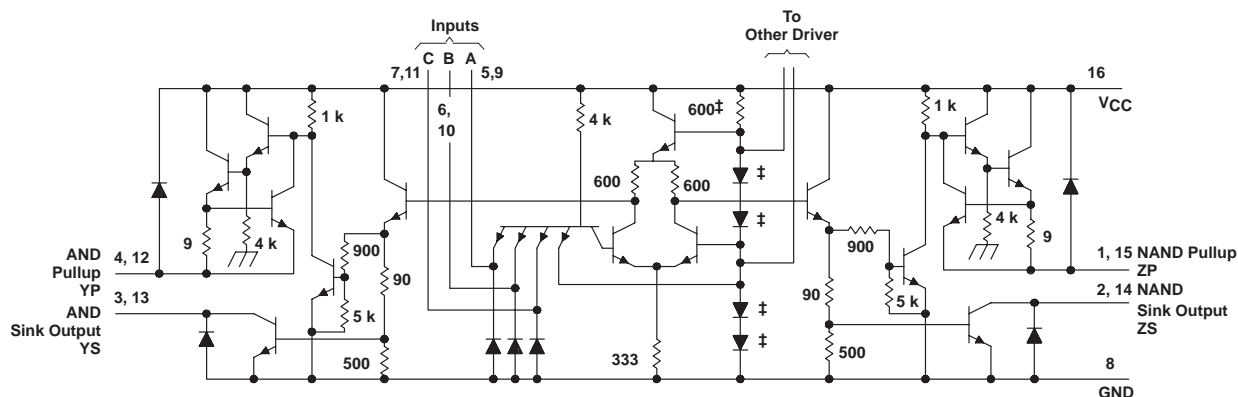
logic diagram (positive logic)



† 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.

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.

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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	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ 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



SN55114, SN75114

DUAL DIFFERENTIAL LINE DRIVERS

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

PARAMETER		TEST CONDITIONST		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 _{IH} = 2 V, V _{IL} = 0.8 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 $T_A = 25^\circ\text{C}$ and $V_{CC} = 5 \text{ V}$, 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.

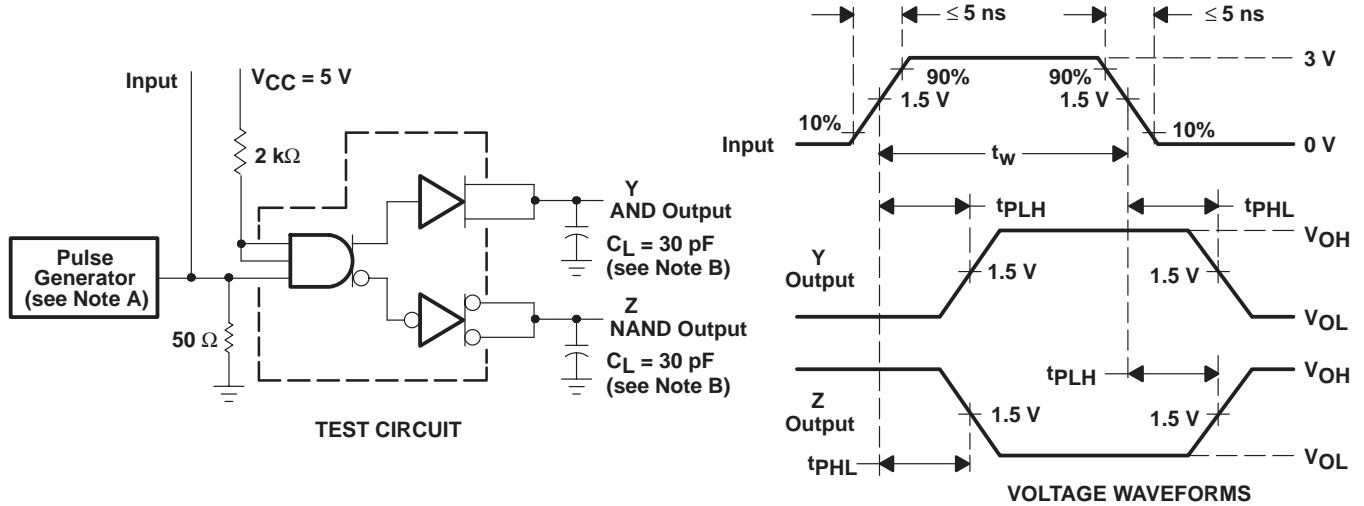
switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$

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



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PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: $Z_O = 500\text{ }\Omega$, $PRR \leq 500\text{ kHz}$, $t_w \leq 100\text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS†

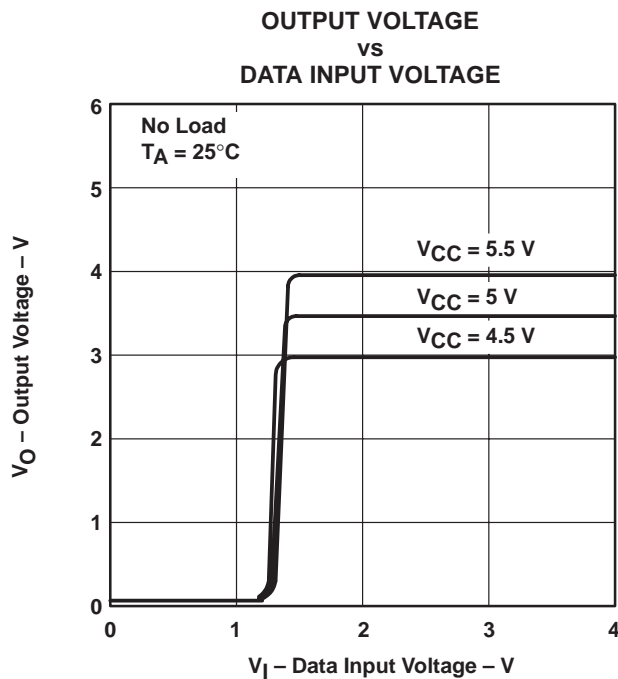


Figure 2

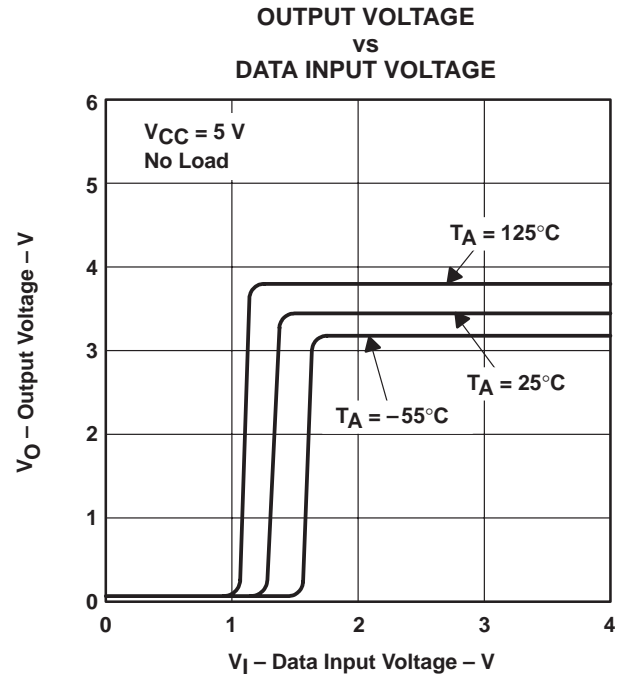


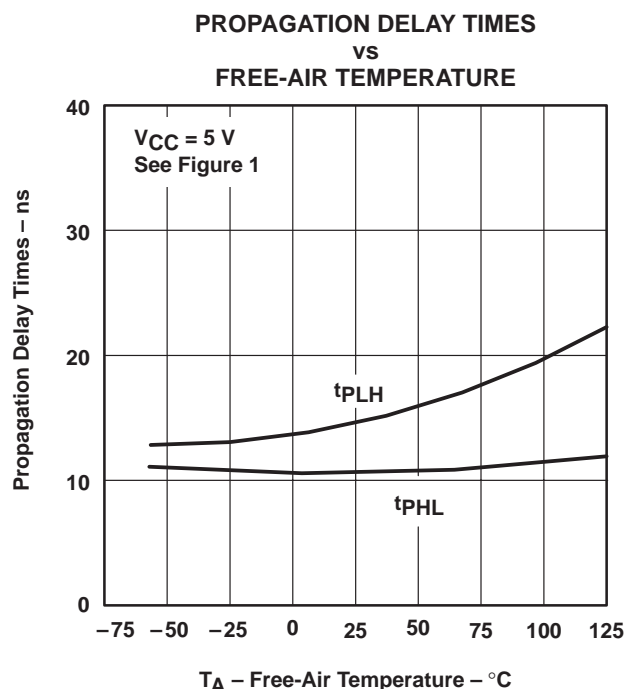
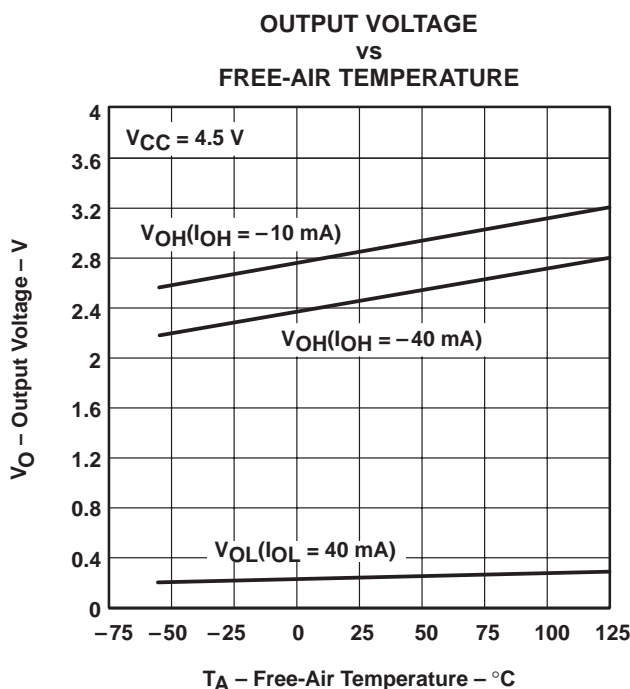
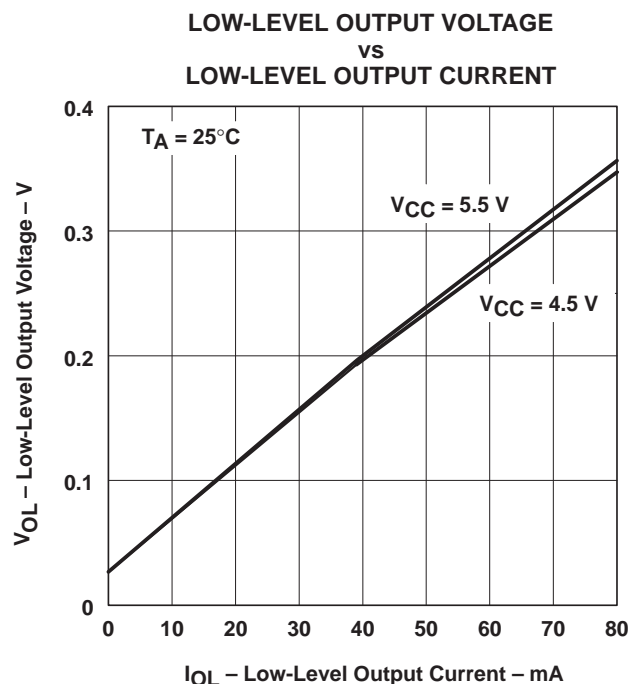
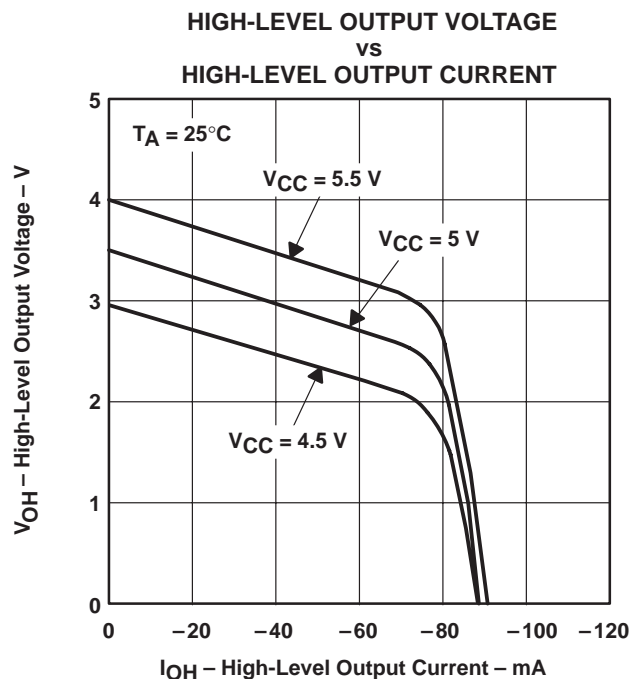
Figure 3

† 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.

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TYPICAL CHARACTERISTICS†



† 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†

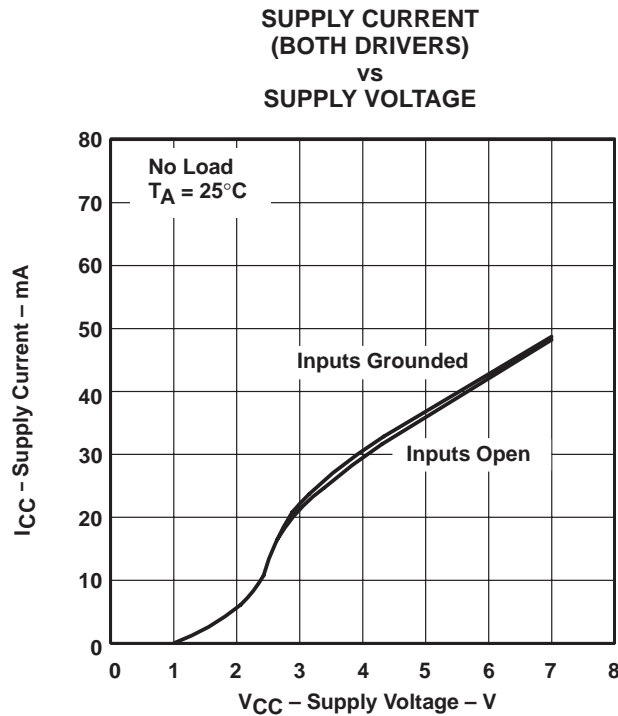


Figure 8

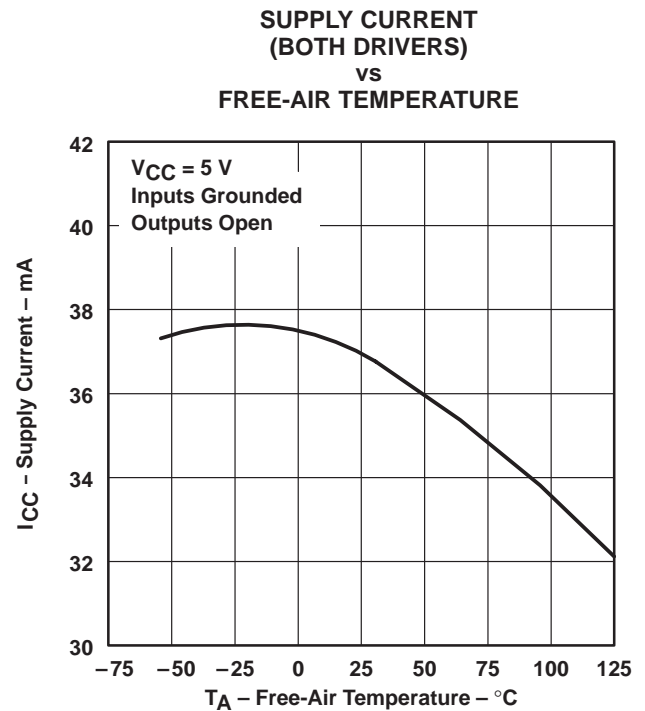


Figure 9

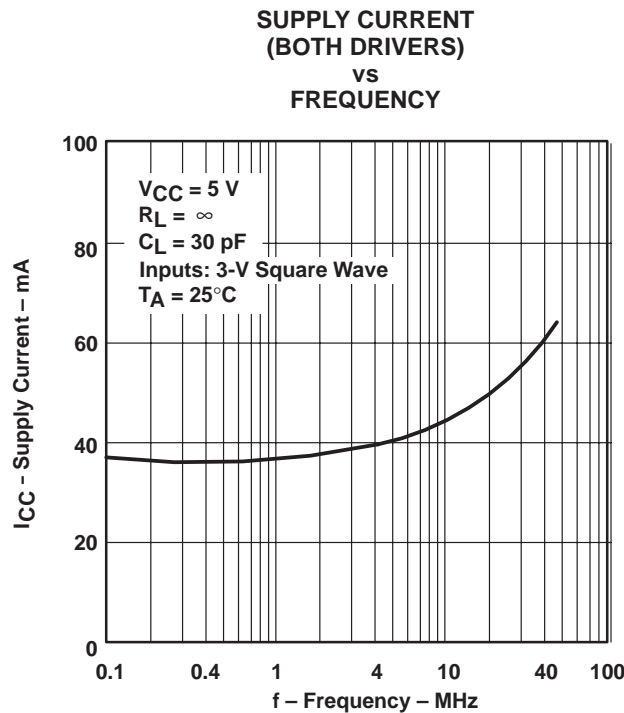


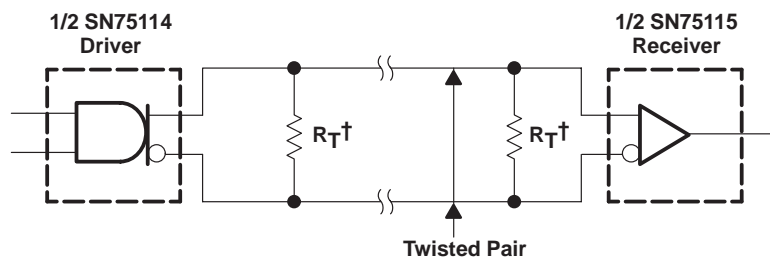
Figure 10

† 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.

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APPLICATION INFORMATION



$^\dagger R_T = Z_O$. 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

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
5962-88744022A	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 88744022A SNJ55 114FK
5962-8874402EA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8874402EA SNJ55114J
5962-8874402FA	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8874402FA SNJ55114W
JM38510/10403BEA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510 /10403BEA
SN55114J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN55114J
SN75114D	Active	Production	SOIC (D) 16	40 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75114 9614CD
SN75114N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN75114N
SNJ55114FK	Active	Production	LCCC (FK) 20	55 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 88744022A SNJ55 114FK
SNJ55114J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8874402EA SNJ55114J
SNJ55114W	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8874402FA SNJ55114W

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF SN55114, SN75114 :

- Catalog : [SN75114](#)
- Military : [SN55114](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-88744022A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-8874402FA	W	CFP	16	25	506.98	26.16	6220	NA
SN75114D	D	SOIC	16	40	507	8	3940	4.32
SN75114DG4	D	SOIC	16	40	507	8	3940	4.32
SN75114N	N	PDIP	16	25	506	13.97	11230	4.32
SNJ55114FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ55114W	W	CFP	16	25	506.98	26.16	6220	NA

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within MIL STD 1835 GDFP2-F16

GENERIC PACKAGE VIEW

FK 20

LCCC - 2.03 mm max height

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4229370VA\

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



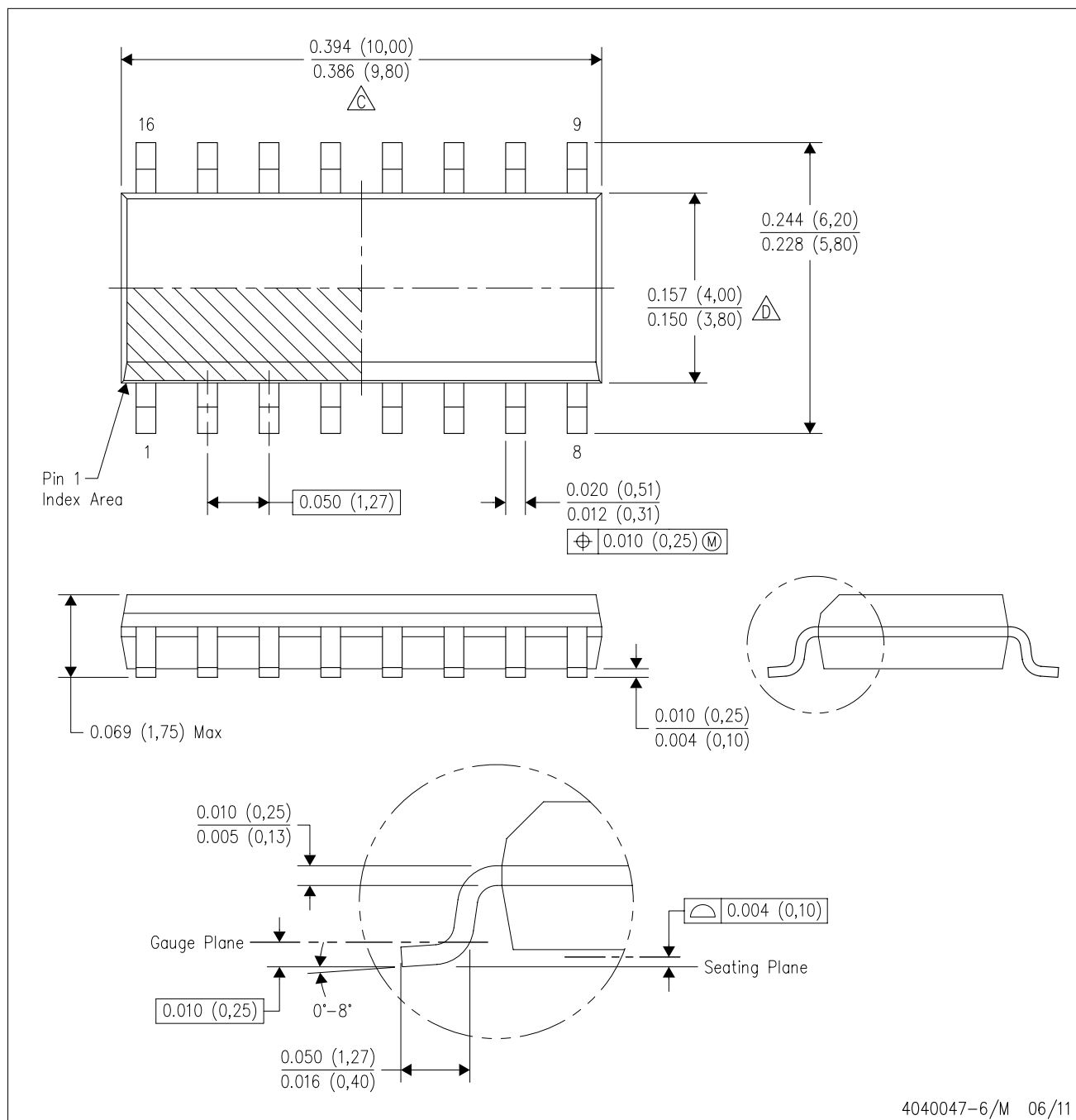
4040049/E 12/2002

NOTES:

- A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
-  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - $\triangle C$ Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
 - $\triangle D$ Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
 - E. Reference JEDEC MS-012 variation AC.

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