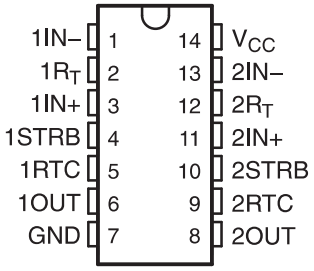
RAD-TOLERANT CLASS V, DUAL DIFFERENTIAL LINE RECEIVER

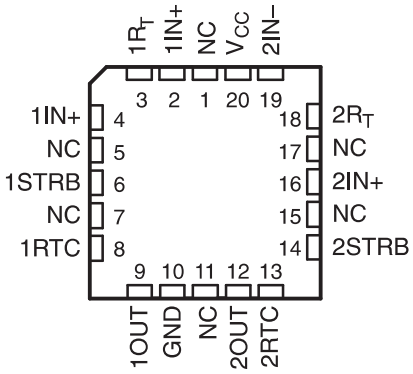
FEATURES

- **Single 5-V Supply**
- **Differential Line Operation**
- **Dual Channels**
- **TTL Compatibility**
- **±15-V Common-Mode Input Voltage Range**
- **±15-V Differential Input Voltage Range**
- **Individual Channel Strobes**
- **Built-In Optional Line-Termination Resistor**
- **Individual Frequency Response Controls**
- **Designed for Use With Dual Differential Drivers SN55183 and SN75183**
- **Designed to Be Interchangeable With National Semiconductor DS7820A and DS8820A**
- **Rad-Tolerant: >40 kRad (Si) ELDRS**
- **QML-V Qualified, SMD 5962-79008**

SN55182 . . . J OR W PACKAGE
SN75182 . . . N PACKAGE
(TOP VIEW)



SN55182 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

DESCRIPTION/ORDERING INFORMATION

The SN55182 dual differential line receiver is designed to sense small differential signals in the presence of large common-mode noise. This device gives TTL-compatible output signals as a function of the polarity of the differential input voltage. The frequency response of each channel can be easily controlled by a single external capacitor to provide immunity to differential noise spikes. The output goes to a high level when the inputs are open circuited. A strobe input (STRB) is provided that, when in the low level, disables the receiver and forces the output to a high level.

The receiver is of monolithic single-chip construction, and both halves of the dual circuits use common power-supply and ground terminals.

The SN55182 is characterized for operation over the full military temperature range of –55°C to 125°C.

PACKAGING/ORDERING INFORMATION(1)

TEMPERATURE	PACKAGED DEVICES	
	CERAMIC FLATPACK W (14)(2)	SYMBOL
–55°C to 125°C	5962-7900801VDA	5962-7900801VDA

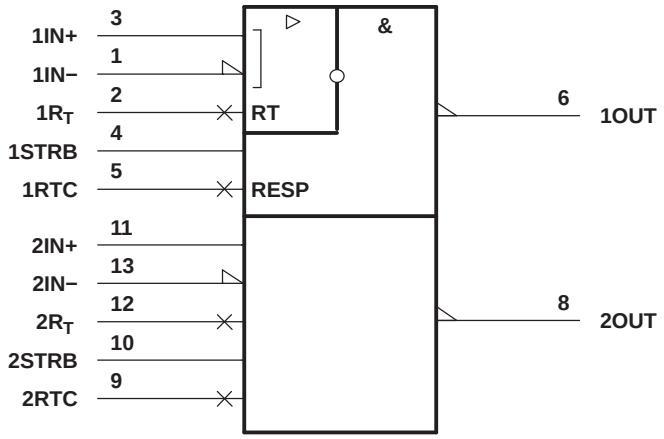
(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.
(2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

FUNCTION TABLE(1)

INPUTS		OUTPUT OUT
STRB	V_{ID}	
L	X	H
H	H	H
H	L	L

(1) H = $V_I \geq V_{IH}$ min or V_{ID} more positive than V_{TH} max
L = VI ≤ V_{IL} max or VI_D more negative than V_{TL} max
X = irrelevant

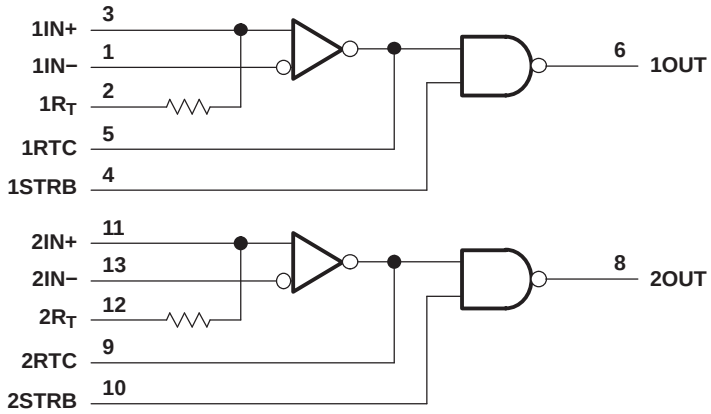
LOGIC SYMBOL



This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

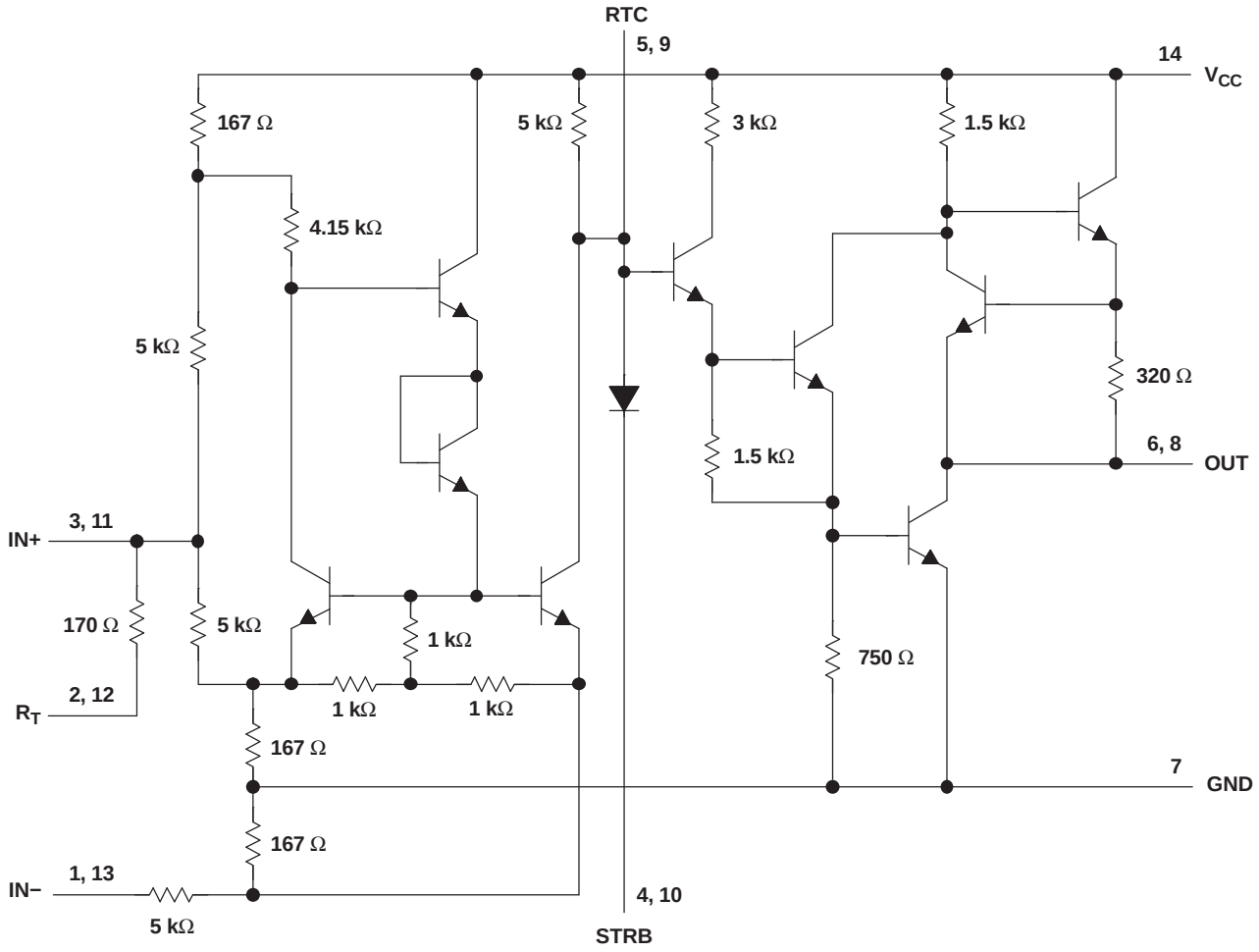
Pin numbers shown are for the J, N, and W packages.

LOGIC DIAGRAM (POSITIVE LOGIC)



Pin numbers shown are for the J, N, and W packages.

SCHEMATIC (EACH RECEIVER)



Resistor values shown are nominal.
Pin numbers shown are for the J, N, and W packages.

ABSOLUTE MAXIMUM RATINGS(1)

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

		UNIT
V_{CC}	Supply voltage(2)	8 V
V_{IC}	Common-mode input voltage	±20 V
V_{ID}	Differential input voltage(3)	±20 V
$V_{I(STRB)}$	Strobe input voltage	8 V
I_O	Output sink current	50 mA
	Continuous total power dissipation	See Dissipation Rating Table
T_{stg}	Storage temperature range	–65°C to 150°C
	Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package	300°C

(1) The absolute maximum ratings under any condition are limited by the constraints of the silicon process. Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.
(2) All voltage values, except differential voltages, are with respect to network ground terminal.
(3) Differential voltage values are at the noninverting terminal with respect to the inverting 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
W(1)	1000 mW	8.0 mW/°C	640 mW	200 mW

(1) In the FK, J, and W packages, SN55182 chips are alloy mounted.

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IC}	Common-mode input voltage			±15	V
$V_{IH(STRB)}$	High-level strobe input voltage	2.1		5.5	V
$V_{IL(STRB)}$	Low-level strobe input voltage	0		0.9	V
I_{OH}	High-level output current			–400	μA
I_{OL}	Low-level output current			16	mA
T_A	Operating free-air temperature	–55		125	°C

ELECTRICAL CHARACTERISTICS

over recommended ranges of V_{CC}, V_{IC}, and operating free-air temperature (unless otherwise noted)

PARAMETER			TEST CONDITIONS[1]		MIN	TYP[2]	MAX	UNIT
V_{IT+}	Positive-going input threshold voltage		V_O = 2.5 V, I_{OH} = –400 µA	V_{IC} = –3 V to 3 V			0.5	V
				V_{IC} = –15 V to 15 V			1	
$V_{IT–}$	Negative-going input threshold voltage		V_O = 0.4 V, I_{OL} = 16 mA	V_{IC} = –3 V to 3 V			–0.5	V
				V_{IC} = –15 V to 15 V			–1	
V_{OH}	High-level output voltage		V_{ID} = 1 V, $V_{(STRB)}$ = 2.1 V, I_{OH} = –400 µA		2.5	4.2	5.5	V
			V_{ID} = 1 V, $V_{(STRB)}$ = 0.4 V, I_{OH} = –400 µA		2.5	4.2	5.5	
V_{OL}	Low-level output voltage		V_{ID} = –1 V, $V_{(STRB)}$ = 2.1 V, I_{OL} = 16 mA			0.25	0.4	V
I_I	Input current	Inverting input	V_{IC} = 15 V			3	4.2	mA
			V_{IC} = 0			0	–0.5	
			V_{IC} = –15 V			–3	–4.2	
		Noninverting input	V_{IC} = 15 V			5	7	
			V_{IC} = 0			–1	–1.4	
			V_{IC} = –15 V			–7	–9.8	
$I_{IH(STRB)}$	High-level strobe input current		$V_{(STRB)}$ = 5.5 V				5	µA
$I_{IL(STRB)}$	Low-level strobe input current		$V_{(STRB)}$ = 0			–1	–1.4	mA
r_I	Input resistance	Inverting input			3.6	5		kΩ
		Noninverting input			1.8	2.5		
	Line-terminating resistance		T_A = 25°C		120	170	250	Ω
I_{OS}	Short-circuit output current		V_{CC} = 5.5 V,	V_O = 0	–2.8	–4.5	-6.7	mA
I_{CC}	Supply current (average per receiver)		V_{IC} = 15 V,	V_{ID} = –1 V		4.2	6	mA
			V_{IC} = 0,	V_{ID} = –0.5 V		6.8	10.2	
			V_{IC} = –15 V,	V_{ID} = –1 V		9.4	14	

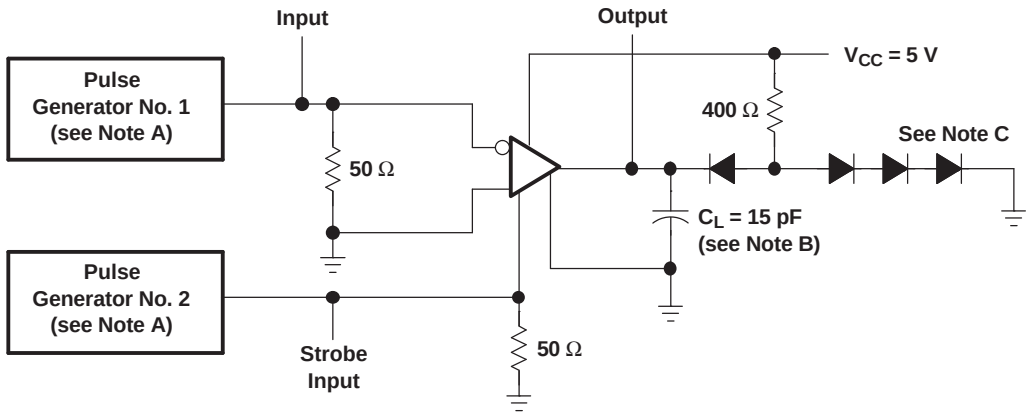
(1) Unless otherwise noted, $V_{(STRB)} \geq 2.1$ V or open.
(2) All typical values are at V_{CC} = 5 V, V_{IC} = 0, and T_A = 25°C.

SWITCHING CHARACTERISTICS

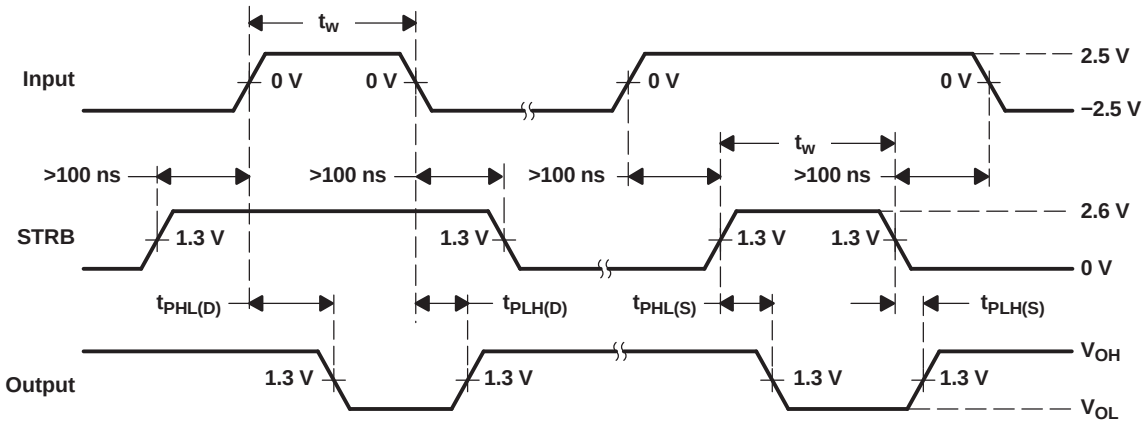
V_{CC} = 5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH(D)}$	Propagation delay time, low- to high-level output from differential input	R_L = 400 Ω, C_L = 15 pF, See Figure 1		18	40	ns
$t_{PHL(D)}$	Propagation delay time, high- to low-level output from differential input	R_L = 400 Ω, C_L = 15 pF, See Figure 1		31	45	ns
$t_{PLH(S)}$	Propagation delay time, low- to high-level output from STRB input	R_L = 400 Ω, C_L = 15 pF, See Figure 1		9	30	ns
$t_{PHL(S)}$	Propagation delay time, high- to low-level output from STRB input	R_L = 400 Ω, C_L = 15 pF, See Figure 1		15	25	ns

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT



VOLTAGE WAVEFORMS

A. The pulse generators have the following characteristics: Z_O = 50 Ω, t_r ≤ 10 ns, t_f ≤ 10 ns, t_w = 0.5 ±0.1 µs, PRR ≤ 1 MHz.

B. C_L includes probe and jig capacitance.

C. All diodes are 1N3064 or equivalent.

Figure 1. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS(1)

DIFFERENTIAL INPUT THRESHOLD VOLTAGE
vs
SUPPLY VOLTAGE

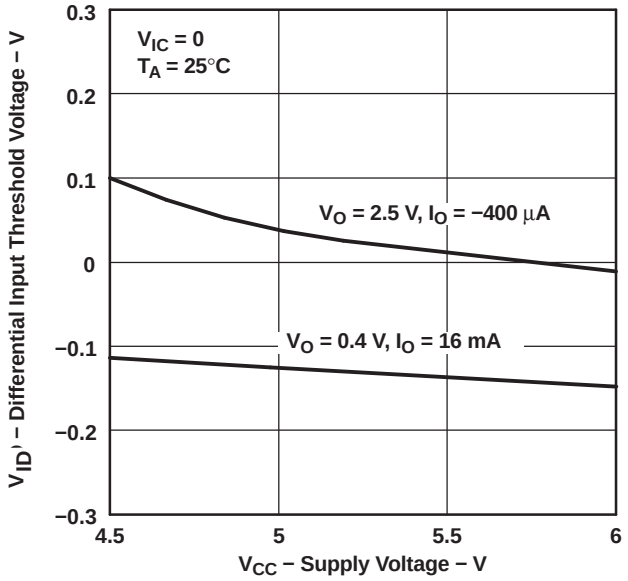


Figure 2.

DIFFERENTIAL INPUT THRESHOLD VOLTAGE
vs
COMMON-MODE INPUT VOLTAGE

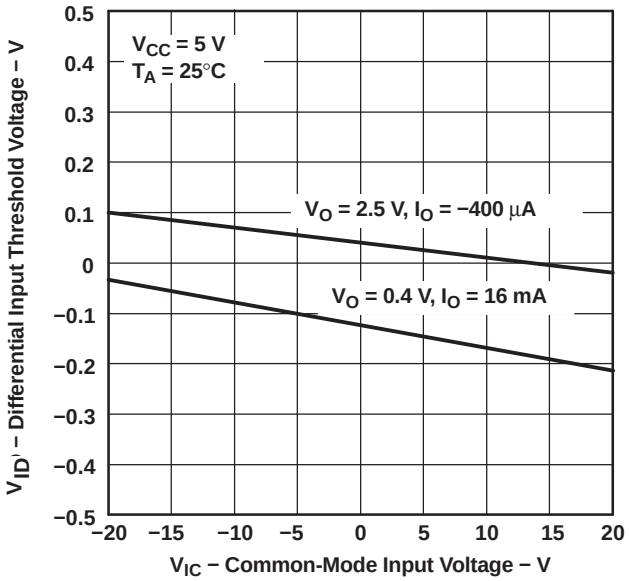


Figure 3.

DIFFERENTIAL INPUT THRESHOLD VOLTAGE
vs
FREE-AIR TEMPERATURE

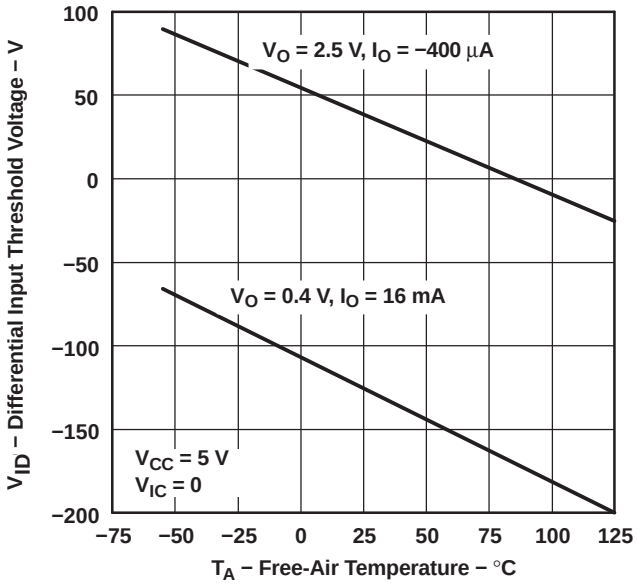


Figure 4.

(1) Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.

TYPICAL CHARACTERISTICS(1)

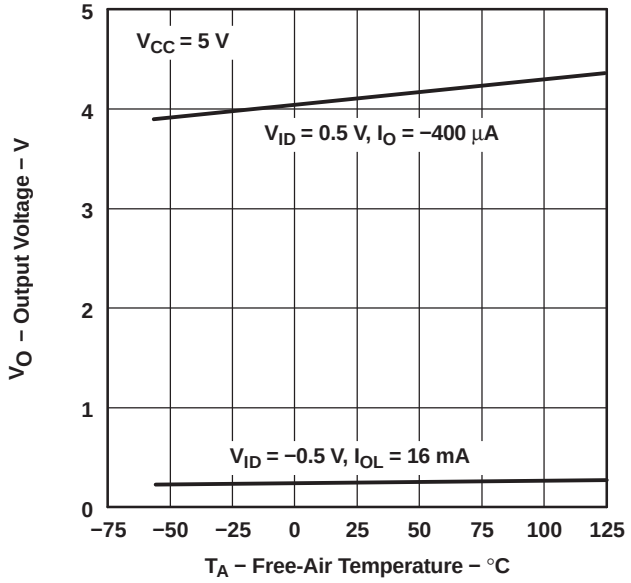


Figure 5.

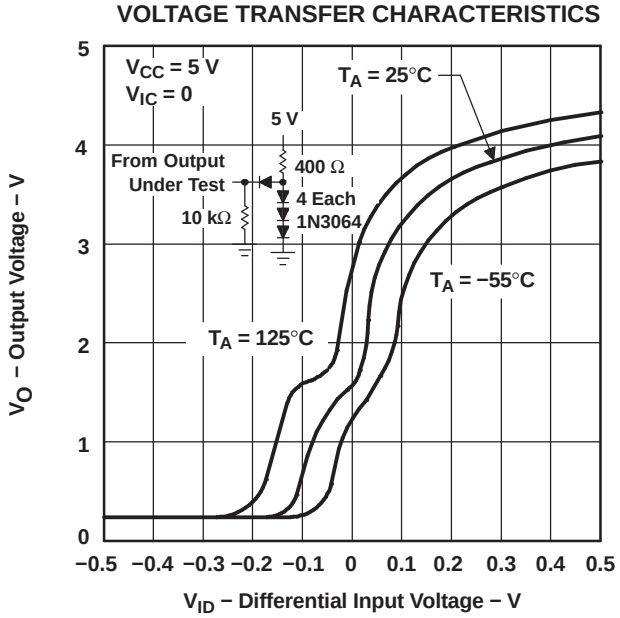


Figure 6.

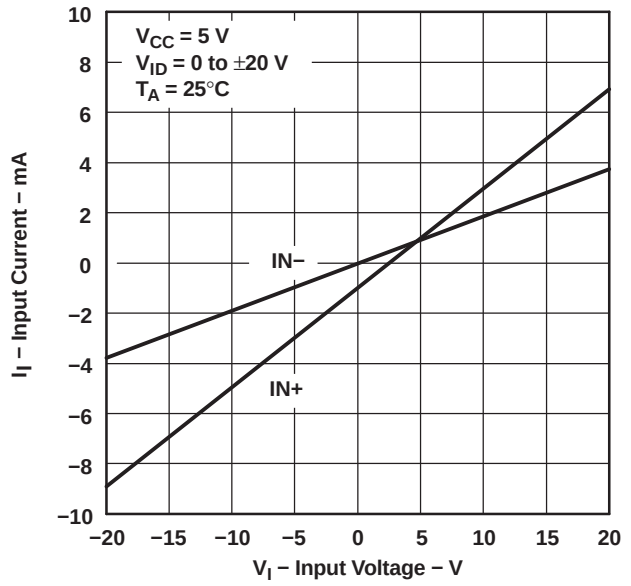


Figure 7.

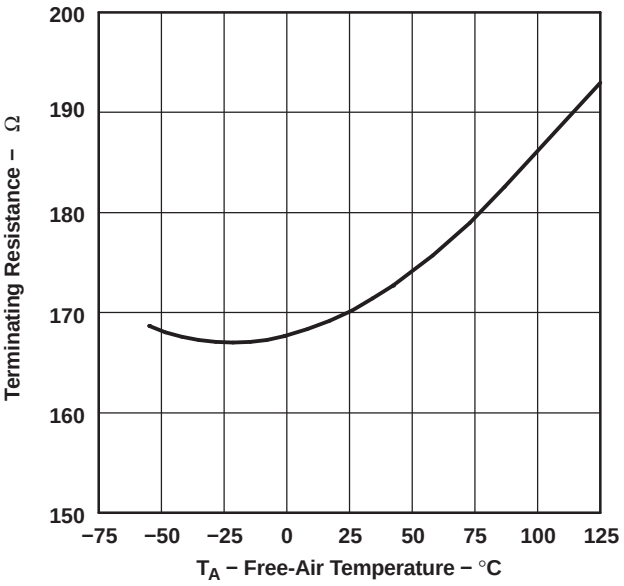


Figure 8.

(1) Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.

TYPICAL CHARACTERISTICS(1)

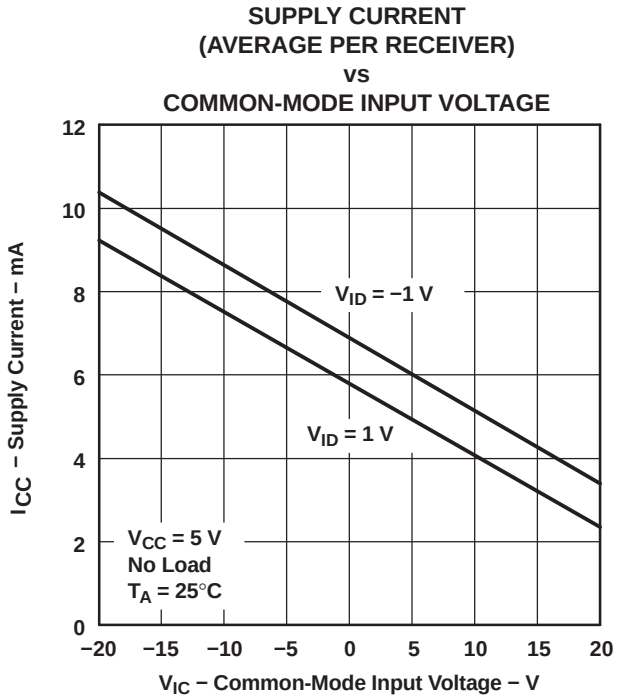


Figure 9.

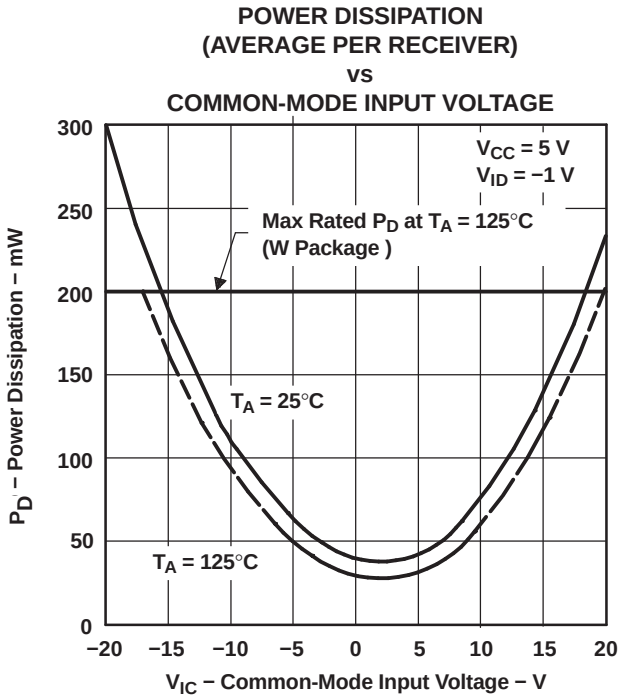
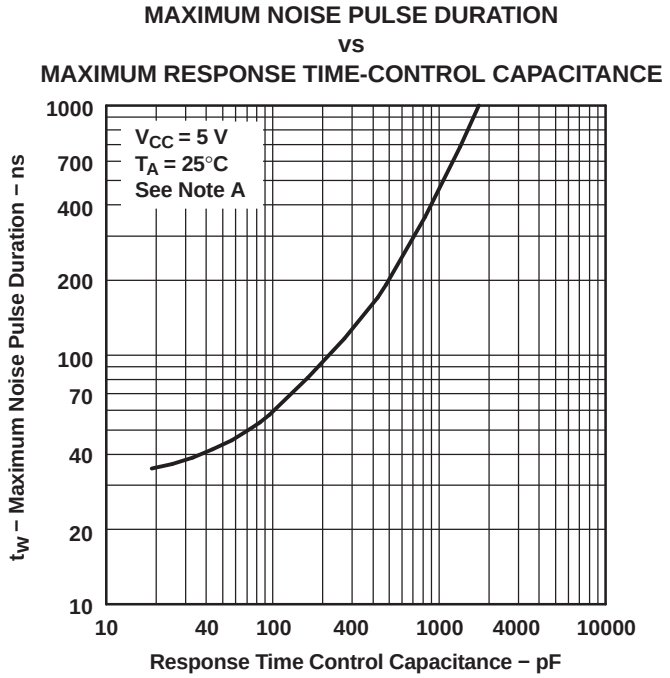
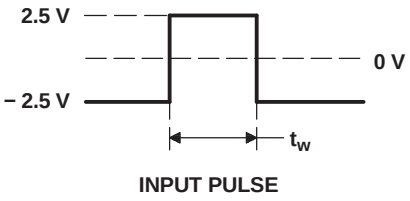


Figure 10.





A. Figure 11 shows the maximum duration of the illustrated pulse that can be applied differently without the output changing from the low to high level.

Figure 11.

(1) Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.

TYPICAL CHARACTERISTICS(1)

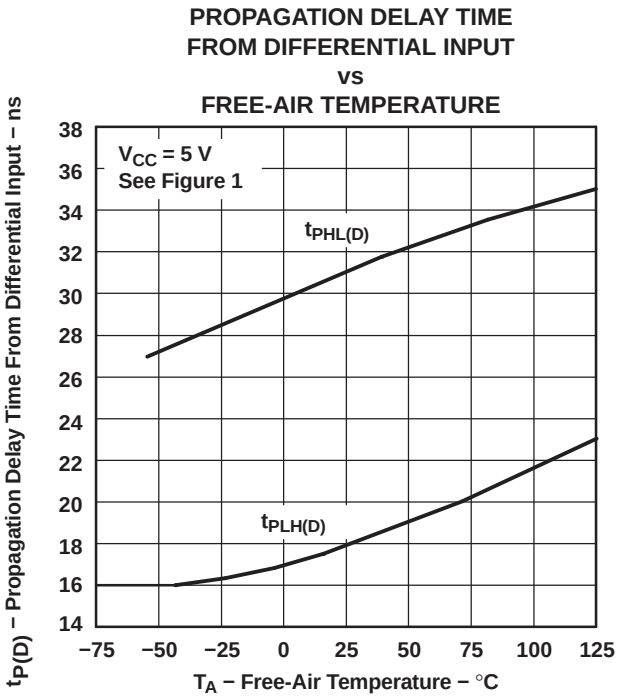


Figure 12.

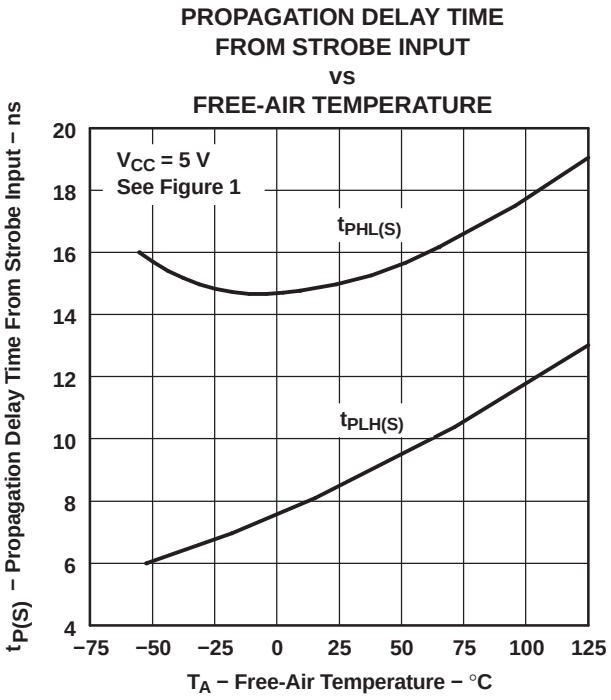
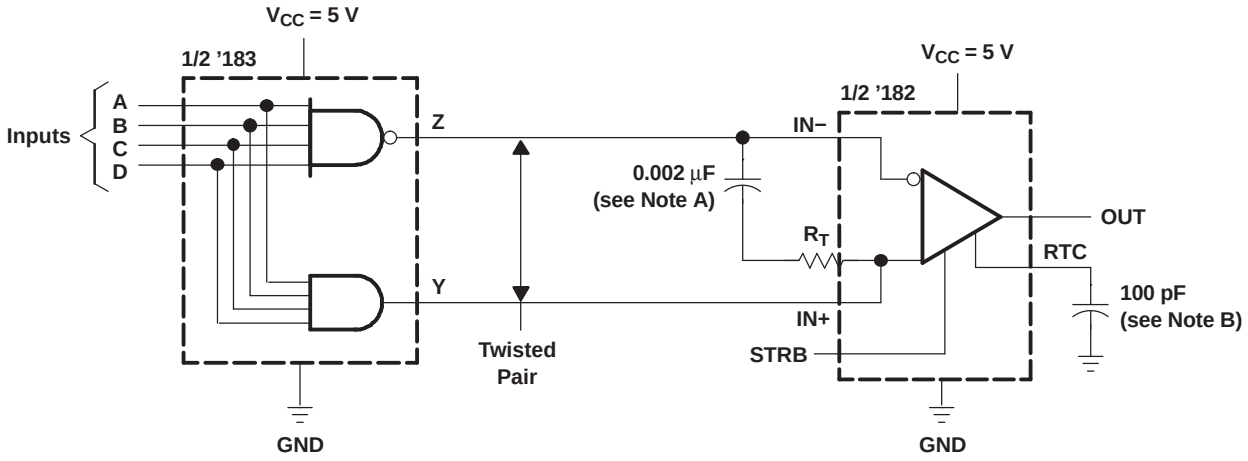


Figure 13.

(1) Operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied.

APPLICATION INFORMATION



NOTES: A. When the inputs are open circuited, the output is high. A capacitor may be used for dc isolation of the line-terminating resistor. At the frequency of operation, the impedance of the capacitor should be relatively small.

Example: let f = 5 MHz
C = 0.002 μF

$$Z_{(C)} = \frac{1}{2\pi fC} = \frac{1}{2\pi(5 \times 10^{6})(0.002 \times 10^{-6})}$$

$$Z_{(C)} \approx 16\Omega$$

B. Use of a capacitor to control response time is optional.

Figure 14. Transmission of Digital Data Over Twisted-Pair Line

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
5962-7900801VCA	ACTIVE	CDIP	J	14	1	TBD	A42	N / A for Pkg Type
5962-7900801VDA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type

[1] The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

[2] Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

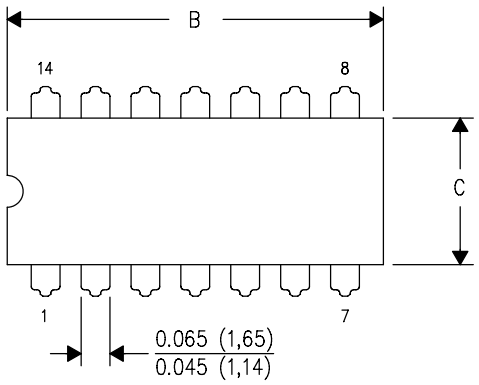
OTHER QUALIFIED VERSIONS OF SN55182-SP :
- Catalog: SN55182

NOTE: Qualified Version Definitions:
- Catalog - TI's standard catalog product

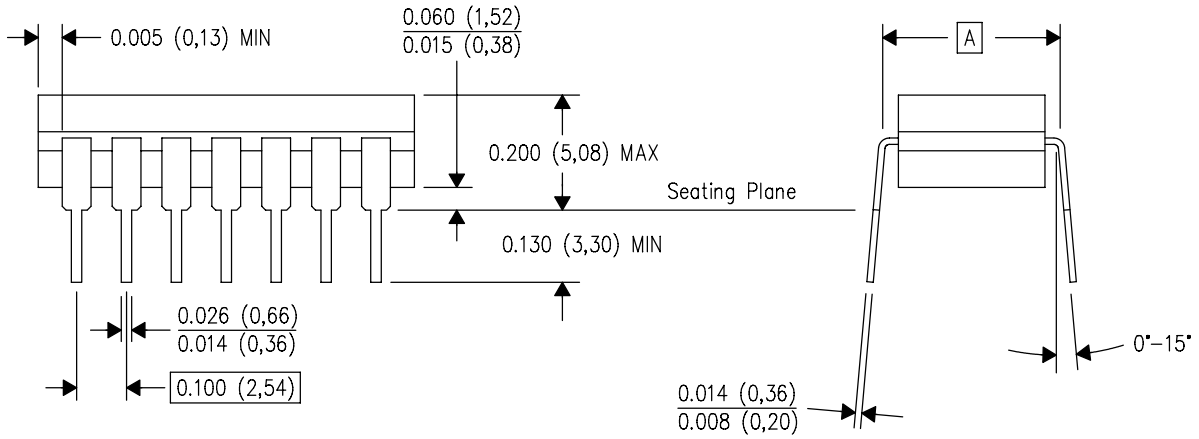
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



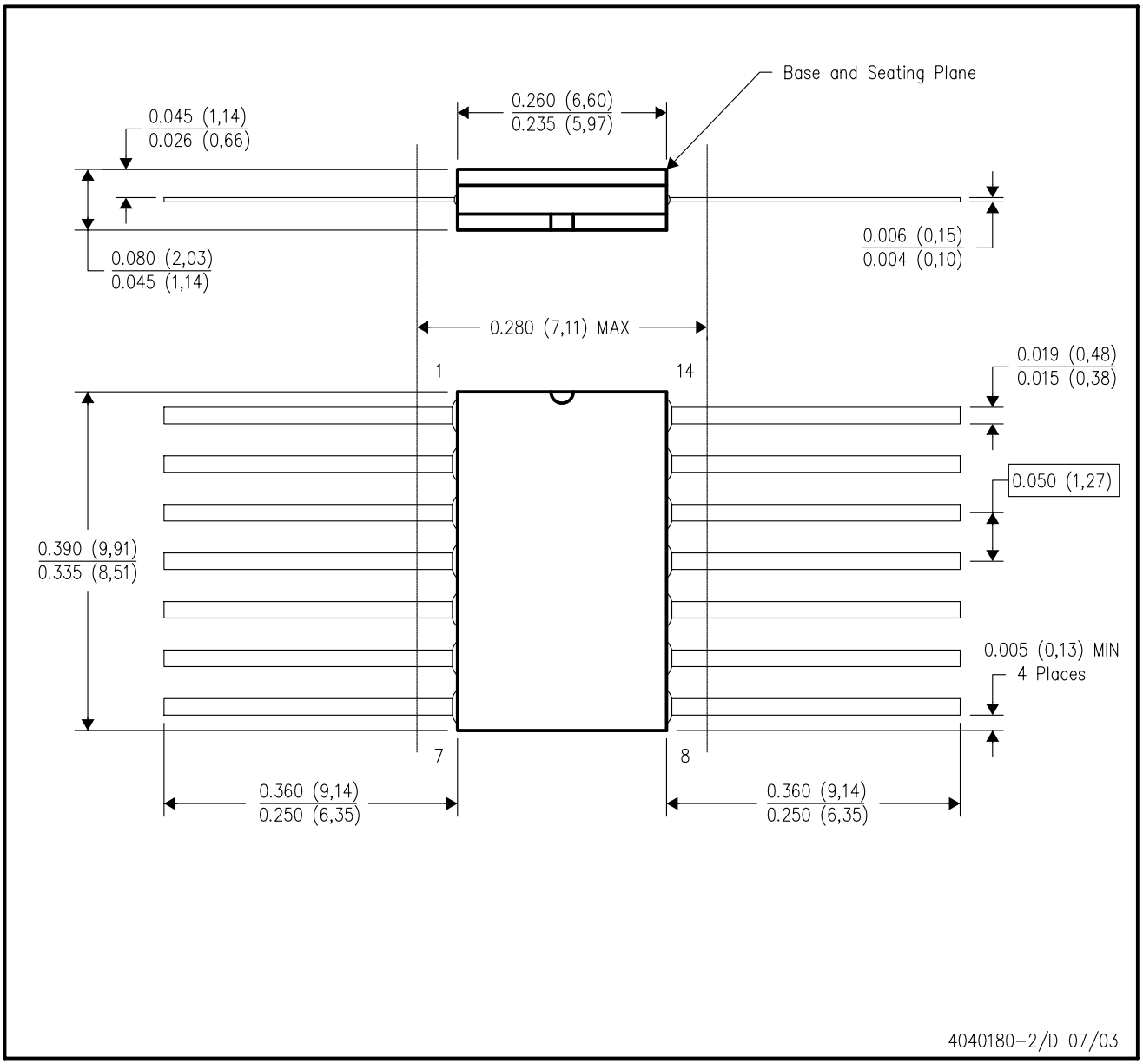
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



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.

W (R–GDFP–F14) CERAMIC DUAL FLATPACK



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within MIL STD 1835 GDFP1–F14 and JEDEC MO–092AB

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- ### Sales :

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  Email amall@ameya360.com

  QQ 800077892

  Skype ameyasales1 ameyasales2

- ### Customer Service :

  Email service@ameya360.com

- ### Partnership :

  Tel +86 (21) 64016692-8333

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