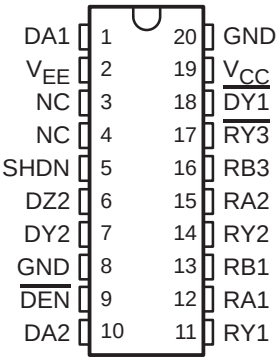
- **Supports a 9-Pin GeoPort™ Host Interface Standard for the Intelligent Network Port**
- **Designed to Operate up to 4-Mbit/s Full Duplex**
- **±5 V Supply Operation**
- **Provides 6 kV ESD Protection**
- **Has Driver Short-Circuit Protection**
- **Includes Failsafe Mechanism for Open Inputs**
- **Is Backward Compatible with AppleTalk™ and LocalTalk™**
- **Combines Multiple Components into a Single Chip Solution**
- **Complements the SN75LBC772 9-Pin GeoPort Peripheral (DCE) Interface Device**
- **Uses LinBiCMOS™ Process Technology**

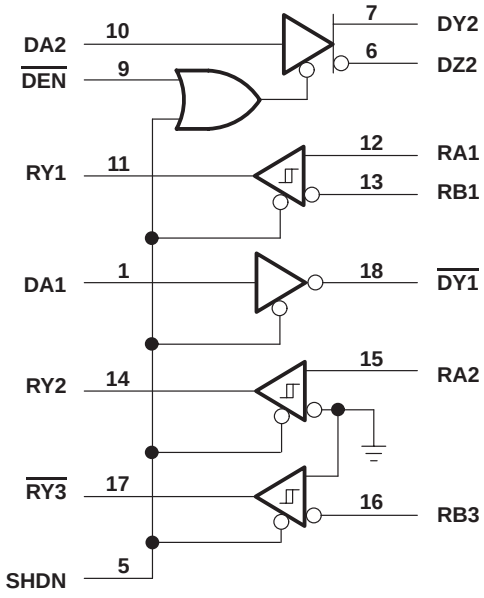
DW PACKAGE
(TOP VIEW)



description

The SN75LBC771 is a low-power LinBiCMOS™ device that incorporates the drivers and receivers for a 9-pin GeoPort host interface. GeoPort combines hybrid EIA/TIA-422-B and EIA/TIA-423-B drivers and receivers to transmit data up to four-Mbit/s full duplex. GeoPort is a serial communications standard that is intended to replace the RS-232, AppleTalk, and printer ports all in one connector in addition to providing real-time data transfer capability. The SN75LBC771 provides point-to-point connections between GeoPort-compatible devices with data transmission rates up to 4-Mbit/s full duplex featuring a hot-plug capability. Applications include connection to telephone, ISDN, digital sound and imaging, fax-data modems, and other traditional serial and parallel connections. The GeoPort is backwardly compatible to both LocalTalk and AppleTalk.

logic diagram (positive logic)



While the SN75LBC771 is powered off (V_{CC} and V_{EE} = 0), the outputs are in a high-impedance state. Also, when the shutdown (SHDN) terminal is high, all outputs go into a high-impedance state. A logic high on the driver enable ($\overline{DEN}$) terminal places the outputs of the differential driver into a high-impedance state. All drivers and receivers have fail-safe mechanisms that ensure a high output state when the inputs are left open.

The SN75LBC771 is characterized for operation over the 0°C to 70°C temperature range.

FUNCTION TABLES†

SINGLE-ENDED DRIVER		
INPUT (DA1)	**ENABLE (SHDN)**	**OUTPUT ($\overline{DY1}$)**
H	L	L
L	L	H
OPEN	L	L
X	H	Z
X	OPEN	Z

DIFFERENTIAL DRIVER				
INPUT (DA2)	**ENABLE**		**OUTPUT**	
	(SHDN)	**($\overline{DEN}$)**	**(DY2)**	**(DZ2)**
H	L	L	H	L
L	L	L	L	H
OPEN	L	L	H	L
X	H	X	Z	Z
X	OPEN	X	Z	Z
X	X	H	Z	Z
X	X	OPEN	Z	Z

SINGLED-ENDED RECEIVER			
INPUT (RA2, RA3)	**ENABLE (SHDN)**	**OUTPUT (RY2)**	**(RY3)**
H	L	H	L
L	L	L	H
OPEN	L	H	H
SHORT‡	L	?	?
X	H	Z	Z
X	OPEN	Z	Z

DIFFERENTIAL RECEIVER			
INPUT (RA1)	**(RB1)**	**ENABLE (SHDN)**	**OUTPUT (RY1)**
H	L	L	H
L	H	L	L
OPEN		L	H
SHORT‡		L	?
X	X	H	Z
X	X	OPEN	Z

† H = high level, L = low level, X = irrelevant, ? = indeterminate, Z = high impedance (off)
‡ $-0.2\ V < V_{ID} < 0.2\ V$

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

Positive supply voltage range, V_{CC} (see Note 1) . . . . . –0.5 to 7 V
Negative supply voltage range, V_{EE} (see Note 1) . . . . . –7 to 0.5 V
Receiver input voltage range (RA, RB) . . . . . –15 V to 15 V
Receiver differential input voltage range, V_{ID} . . . . . –12 V to 12 V
Receiver output voltage range (RY) . . . . . –0.5 V to 5.5 V
Driver output voltage range (Power Off) ($\overline{DY1}$, DY2, DZ2) . . . . . –15 V to 15 V
Driver output voltage range (Power On) ($\overline{DY1}$, DY2, DZ2) . . . . . –11 V to 11 V
Driver input voltage range (DA, SHDN, $\overline{DEN}$) . . . . . –0.5 V to V_{CC} +0.4 V
Electrostatic Discharge (see Note 2)
(All pins) Class 3, A . . . . . 6 kV
(All pins) Class 3, B . . . . . 500 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 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 network ground terminal unless otherwise noted.
2. This rating is per MIL-STD-883C, Method 3015.7.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
DW	1125 mW	9.0 mW/°C	720 mW

recommended operating conditions

	MIN	NOM	MAX	UNIT
Positive supply voltage, V_{CC}	4.75	5	5.25	V
Negative supply voltage, V_{EE}	–5.25	–5	–4.75	V
High-level input voltage, V_{IH} (DA, SHDN, $\overline{DEN}$)	2			V
Low-level input voltage, V_{IL} (DA, SHDN, $\overline{DEN}$)			0.8	V
Receiver common-mode input voltage, V_{IC}	–7		7	V
Receiver differential input voltage, V_{ID}	–12		12	V
Operating free-air temperature, T_A	0		70	°C

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

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	Single-ended, See Figure 1	R_L = 12 kΩ		3.6	4.5		V
			R_L = 120 Ω		2	3.6		V
V_{OL}	Low-level output voltage		R_L = 12 kΩ			–4.5	–3.6	V
			R_L = 120 Ω			–3.6	–2	V
$\lvert V_{OD}\rvert$	Magnitude of differential output voltage $\lvert V_{DY} - V_{DZ}\rvert$		R_L = 120 Ω,	See Figure 2	4			V
$\Delta\lvert V_{OD}\rvert$	Change in differential voltage magnitude						250	mV
V_{OC}	Common-mode output voltage		See Figure 3		–2		2	V
$\lvert\Delta V_{OC(SS)}\rvert$	Magnitude of change, common-mode steady-state output voltage						200	mV
$\lvert\Delta V_{OC(PP)}\rvert$	Magnitude of change, common-mode peak-to-peak output voltage					700		mV
I_{CC}	Positive supply current		SHDN = $\overline{DEN}$ = 0 V,	No Load		4	10	mA
I_{EE}	Negative supply current					–2	–5	mA
I_{CC}	Positive supply current		SHDN = $\overline{DEN}$ = 5 V,	No Load			100	μA
I_{EE}	Negative supply current						–100	μA
I_{OZ}	High-impedance output current		V_{CC} = 0 or 5 V,	$-10 \le V_O \le 10$ V			±100	μA
I_{OS}	Short-circuit output current		V_{CC} = 5.25 V, See Note 3	-5 V $\le V_O \le 5$ V,		±170	±450	mA

NOTE 3: Not more than one output should be shorted at one time.

driver switching characteristics over operating free-air temperature range

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay time, high-to-low level output		Single ended, See Figure 4		42	75	ns
t_{PLH}	Propagation delay time, low-to-high level output				41	75	ns
t_{PZL}	Driver output enable time to low-level output	SHDN			25	100	µs
t_{PZH}	Driver output enable time to high-level output	SHDN			25	100	µs
t_{PLZ}	Driver output disable time from low-level output	SHDN			28	100	ns
t_{PHZ}	Driver output disable time from high-level output	SHDN			37	100	ns
t_r	Rise time			10	25	75	ns
t_f	Fall time			10	23	75	ns
t_{PHL}	Propagation delay time, high-to-low level output		Differential, See Figure 5		40	75	ns
t_{PLH}	Propagation delay time, low-to-high level output				42	75	ns
t_{PZL}	Driver output enable time to low-level output	SHDN			25	100	µs
		$\overline{DEN}$			29	150	ns
t_{PZH}	Driver output enable time to high-level output	SHDN			25	100	µs
		$\overline{DEN}$			35	150	ns
t_{PLZ}	Driver output disable time from low-level output	SHDN			28	100	ns
		$\overline{DEN}$			34	100	ns
t_{PHZ}	Driver output disable time from high-level output	SHDN			37	100	ns
		$\overline{DEN}$			34	100	ns
t_r	Rise time			10	27	75	ns
t_f	Fall time			10	26	75	ns
$t_{SK(p)}$	Pulse skew, $\lvert t_{PLH} - t_{PHL} \rvert$					22	ns

receiver electrical characteristics over recommended operating conditions (unless otherwise noted)

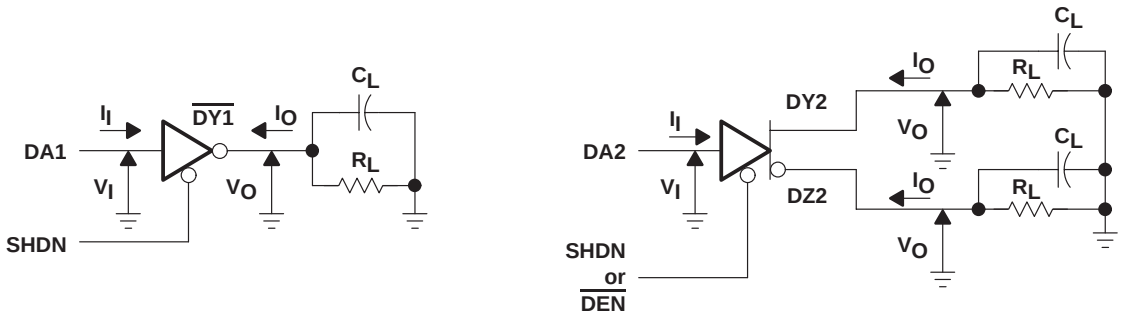
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IT+}	Positive-going input threshold voltage	See Figure 6			200	mV
V_{IT-}	Negative-going input threshold voltage		–200			mV
V_{hys}	Differential input voltage hysteresis ($V_{IT+} - V_{IT-}$)			50		mV
V_{OH}	High-level output voltage (see Note 4)	V_{IC} = 0, I_{OH} = –2 mA, See Figure 6	2	4.5		V
V_{OL}	Low-level output voltage	V_{IC} = 0, I_{OL} = 2 mA, See Figure 6		0.4	0.8	V
I_{OS}	Short-circuit output current	V_O = 0		–45	–85	mA
		V_O = 5.25 V		45	85	mA
R_{IN}	Input resistance	V_{CC} = 0 or 5.25 V, –12 V ≤ V_I ≤ 12 V	6	30		kΩ

NOTE 4: If the inputs are left unconnected, receivers one and two interpret this as a high-level input and receiver three interprets this as a low-level input so that all outputs are at the high level.

receiver switching characteristics over recommended conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay time, high-to-low level output		R_L = 2 kΩ, C_L = 15 pF, See Figure 6		30	75	ns
t_{PLH}	Propagation delay time, low-to-high level output				30	75	ns
t_r	Rise time				15	30	ns
t_f	Fall time				15	30	ns
$t_{SK(P)}$	Pulse skew $\lvert t_{PLH}-t_{PHL}\rvert$					20	ns
t_{PZL}	Receiver output enable time to low-level output	Differential	C_L = 50 pF, See Figure 7		35	100	ns
t_{PZH}	Receiver output enable time to high-level output				35	100	ns
t_{PLZ}	Receiver output disable time from low-level output				20	100	ns
t_{PHZ}	Receiver output disable time from high-level output				20	100	ns
t_{PZL}	Receiver output enable time to low-level output	Single-ended			12	25	ns
t_{PZH}	Receiver output enable time to high-level output				12	25	µs
t_{PLZ}	Receiver output disable time from low-level output				25	100	µs
t_{PHZ}	Receiver output disable time from high-level output				125	400	ns

PARAMETER MEASUREMENT INFORMATION



NOTE A: C_L = 50 pF

Figure 1. Single-Ended Driver DC Parameter Test Circuits

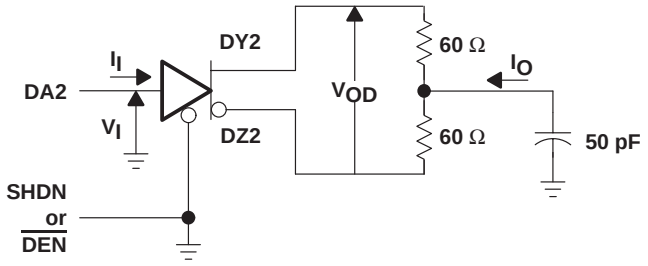
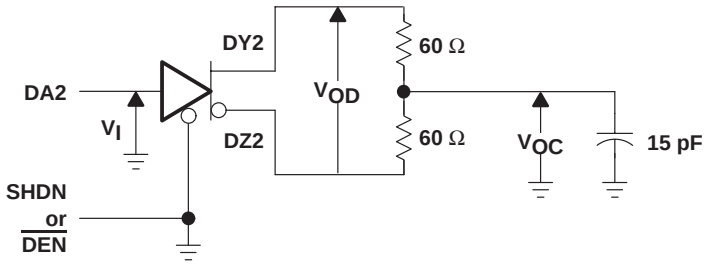
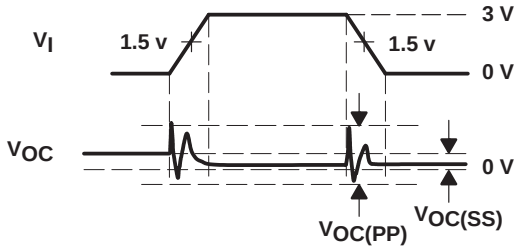


Figure 2. Differential Driver DC Parameter Test Circuit



TEST CIRCUIT

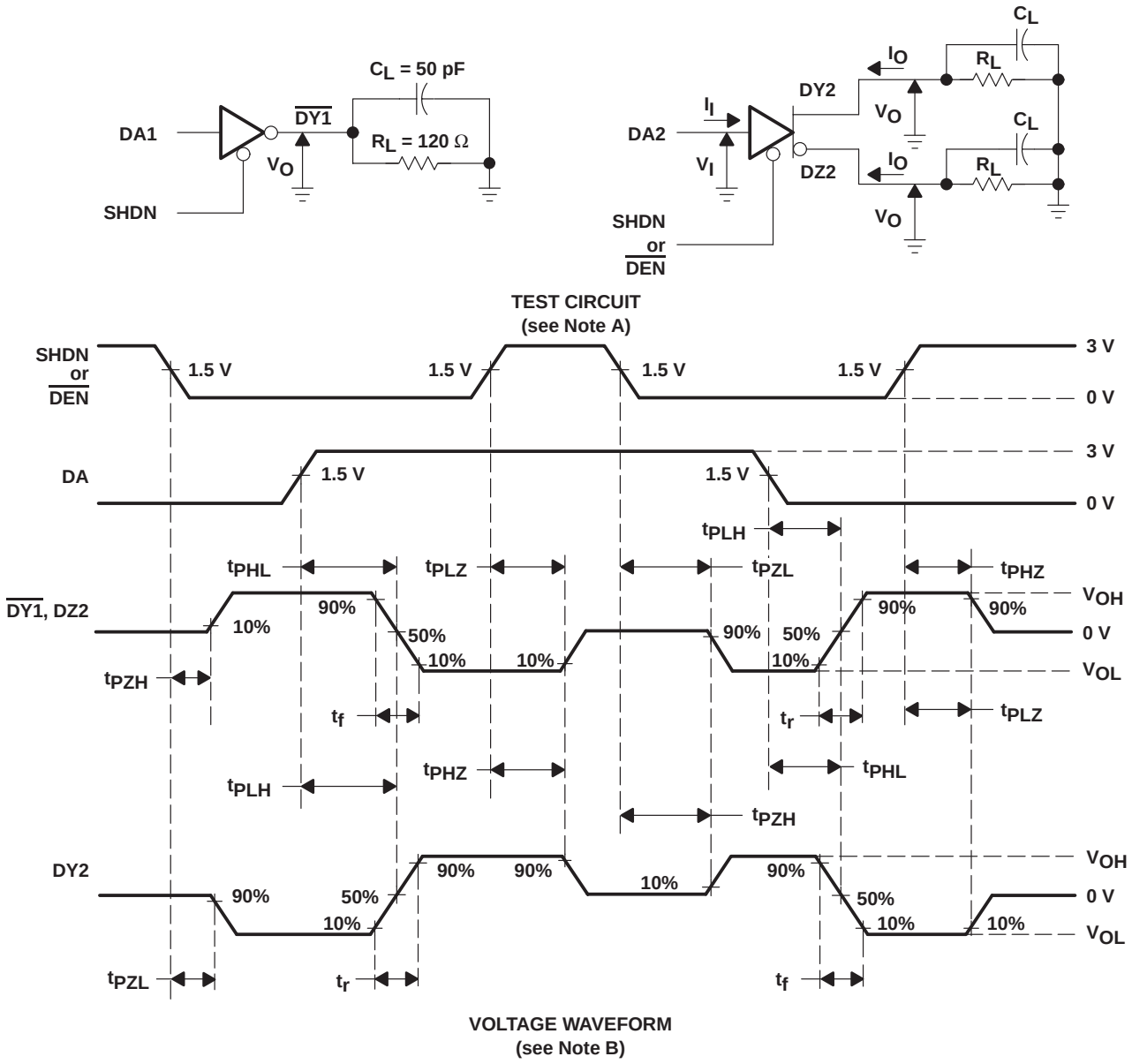


VOLTAGE WAVEFORM

NOTE A: Measured 3dB Bandwidth = 300 MHz

Figure 3. Differential Driver Common-Mode Output Voltage Test Circuit

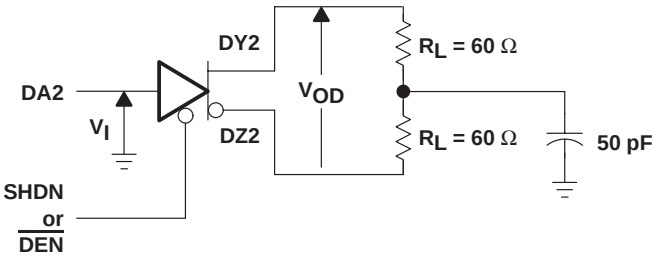
PARAMETER MEASUREMENT INFORMATION



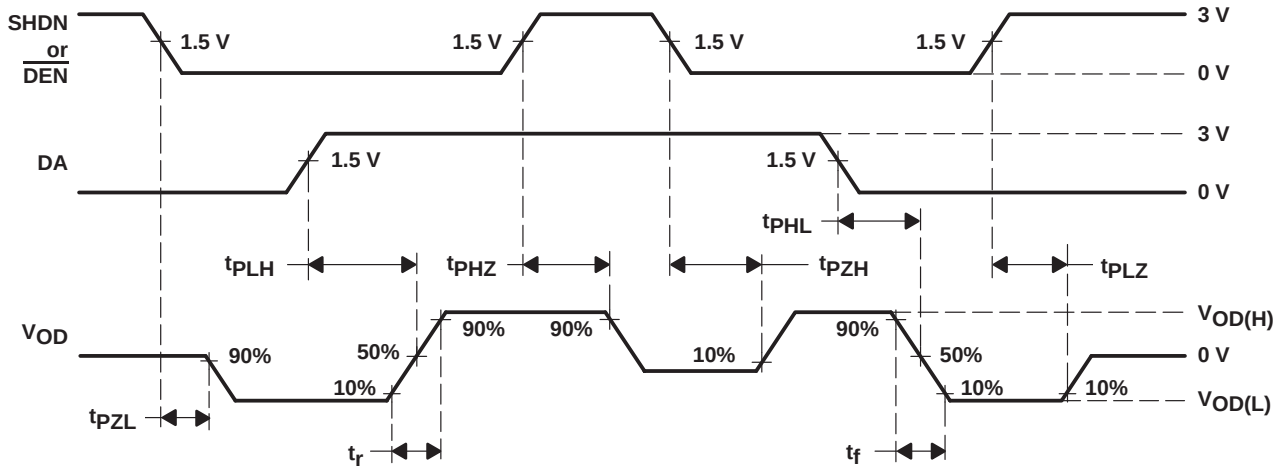
NOTES: A. C_L = 50 pF, R_L = 120 Ω
B. The input waveform t_r, t_f ≤ 10 ns.

Figure 4. Single-Ended Driver Propagation and Transition Times Test Circuits and Waveform

PARAMETER MEASUREMENT INFORMATION



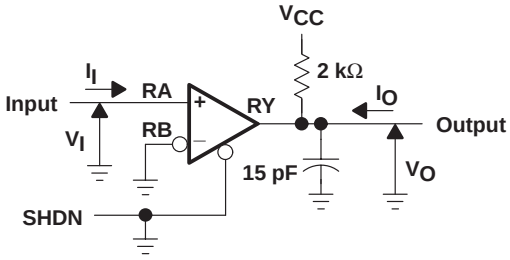
TEST CIRCUIT



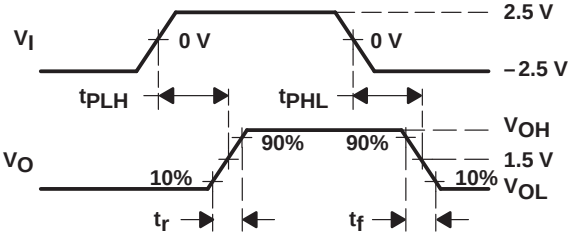
VOLTAGE WAVEFORM
(see Note A)

NOTE A: For the input waveform t_r, t_f < = 10 ns

Figure 5. Differential Driver Propagation and Transition Times Test Circuit and Waveforms



TEST CIRCUIT

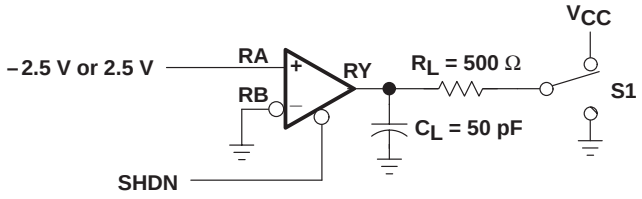


VOLTAGE WAVEFORM
(see Note A)

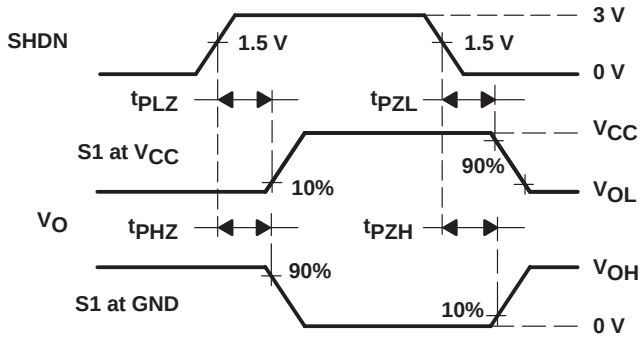
NOTE A: For the input waveform t_r, t_f < = 10 ns

Figure 6. Receiver Propagation and Transition Times Test Circuit and Waveform

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

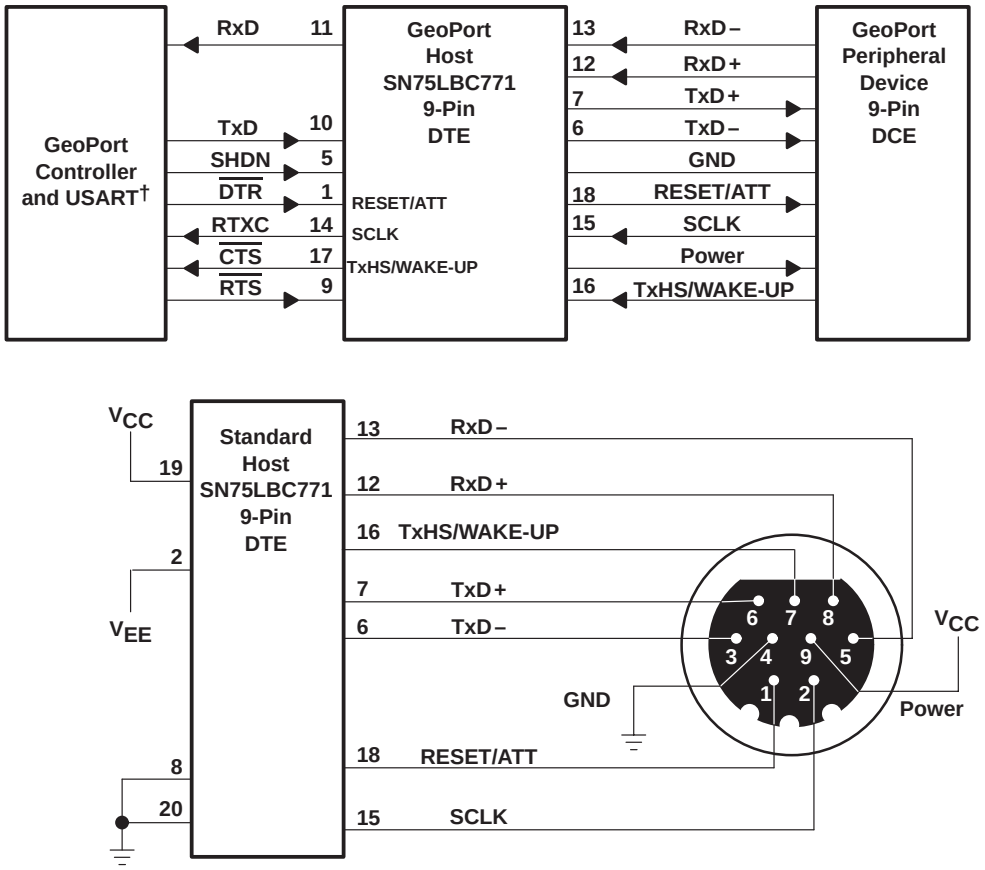


VOLTAGE WAVEFORM
(see Note A)

NOTE A: For the input waveform t_r, t_f < = 10 ns

Figure 7. Receiver Enable and Disable Test Circuit and Waveforms

APPLICATION INFORMATION



† USART = universal synchronous asynchronous receiver transmitter

Figure 8. GeoPort 9-Pin DTE Connection Application

generator characteristics

PARAMETER		TEST CONDITIONS	232/V.28		423/V.10		562		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
$\|V_O\|$	Output voltage magnitude	Open circuit		25	4	6		13.2	V
		3 kΩ ≤ R_L ≤ 7 kΩ	5	15	NA		3.7		V
		R_L = 450 Ω	NA		3.6		NA		V
I_{OS}	Short-circuit output current	V_O = 0		100		150		60	mA
$R_{(OFF)}$	Power-off source resistance	V_{CC} = 0, $\|V_O\|$ < 2 V	300		NA		300		Ω
$I_{O(OFF)}$	Power-off output current	V_{CC} = 0, $\|V_O\|$ < 6 V	NA			±100	NA		µA
SR	Output voltage slew rate			30	NA		4	30	V/µs
t_t	Output transition time	±3.3 V to ±3.3 V	NA		NA		0.22	2.1	µs
		±3 V to ±3 V		0.04	NA		NA		ui‡
		10% to 90%	NA			0.3	NA		ui‡
$V_{O(RING)}$	Output voltage ring		NA			10%		5%	

‡ ui is the unit interval and is the inverse of the signaling rate (bit time).

APPLICATION INFORMATION

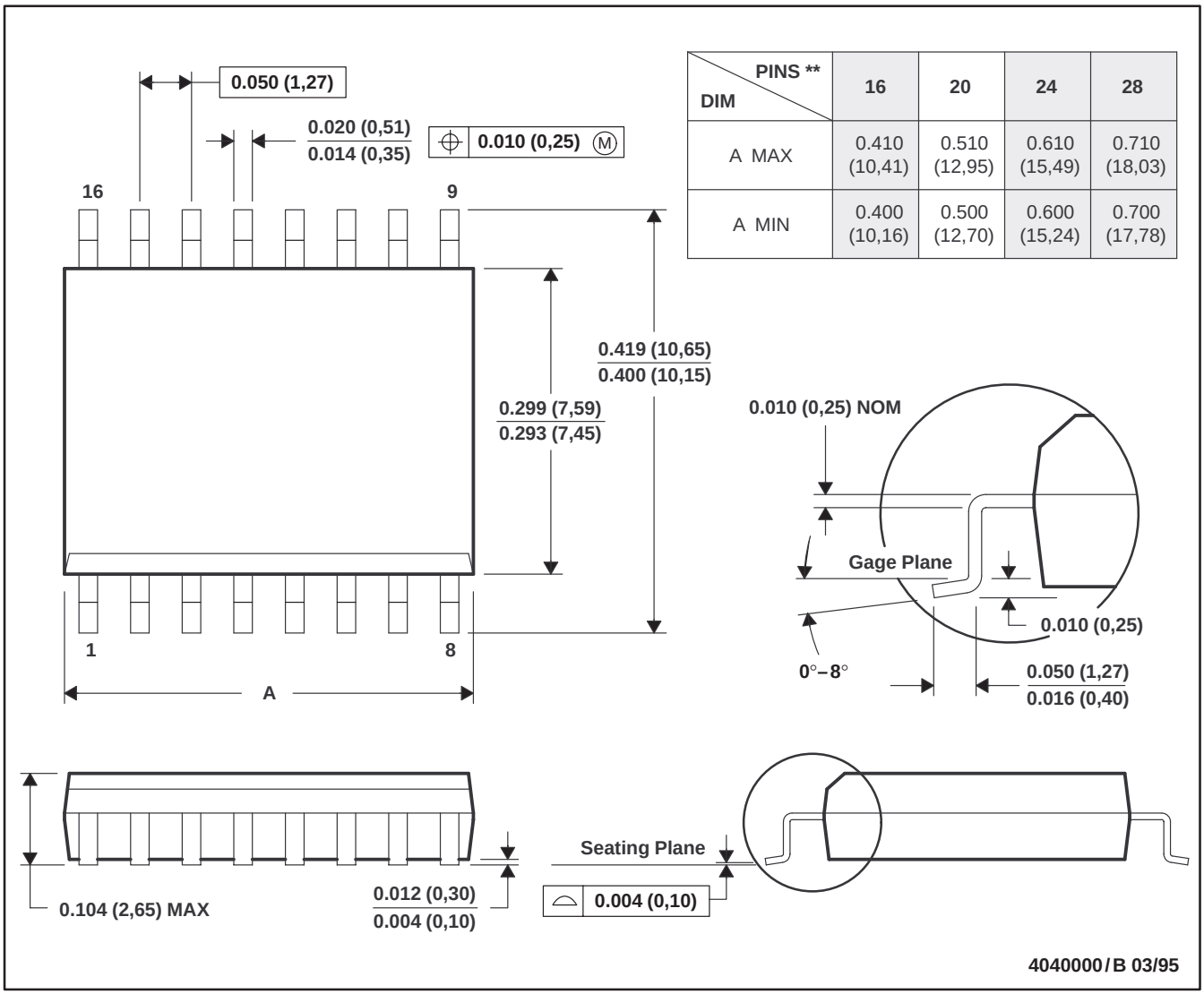
receiver characteristics

PARAMETER		TEST CONDITIONS	232/V.28		423/V.10		562		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
$\|V_I\|$	Input voltage			25		10		25	V
V_{IT}	Input voltage threshold	$\|V_I\| < 15$ V	–3	3	NA		–3	3	V
		$\|V_I\| < 10$ V	NA		–0.2	0.2	NA		V
R_I	Input resistance	3 V < $\|V_I\|$ < 15 V	3	7	NA		3	7	kΩ
		$\|V_I\| < 10$ V	NA		4		NA		kΩ

MECHANICAL INFORMATION

DW (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

16 PIN SHOWN



DIM \ PINS **	16	20	24	28
A MAX	0.410 (10,41)	0.510 (12,95)	0.610 (15,49)	0.710 (18,03)
A MIN	0.400 (10,16)	0.500 (12,70)	0.600 (15,24)	0.700 (17,78)

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS-013

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
SN75LBC771DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75LBC771DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

(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.

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