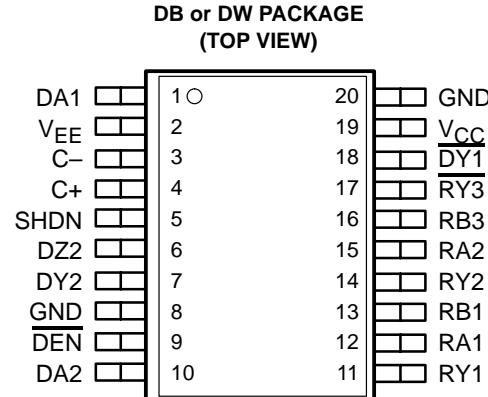


- Single-Chip Interface Solution for the 9-terminal GeoPort™ Host (DTE)
- Designed to Operate up to 4 Mbit/s Full Duplex
- Single 5-V Supply Operation
- 6-kV ESD Protection on All Terminals
- Backward compatible With AppleTalk™ and LocalTalk™
- Combines Multiple Components into a Single-chip Solution
- Complements the SN75LBC777 9-Terminal GeoPort Peripheral (DCE) Interface Device
- LinBiCMOS™ Process Technology



description

The SN75LBC776 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 megabits per second (Mbit/s) full duplex. GeoPort is a serial communications standard that is intended to replace the RS-232, Appletalk, and LocalTalk printer ports all in one connector in addition to providing real-time data transfer capability. It provides point-to-point connections between GeoPort-compatible devices with data transmission rates up to 4 Mbit/s full duplex and a hot-plug feature. Applications include connection to telephony, integrated services digital network (ISDN), digital sound and imaging, fax-data modems, and other serial and parallel connections. The GeoPort is backwardly compatible to both LocalTalk and AppleTalk.

While the SN75LBC776 is powered-off ($V_{CC} = 0$) the outputs are in a high-impedance state. When the shutdown (SHDN) terminal is high, the charge pump is powered down and the outputs are in a high-impedance state. The driver enable (DEN) terminal sends the outputs of the differential driver into a high-impedance state with a high input signal. All drivers and receivers have fail-safe mechanisms to ensure a high output state when the inputs are left open.

A switched-capacitor voltage converter generates the negative voltage required from a single 5-V supply using four $0.1\text{-}\mu\text{F}$ capacitors, two capacitors between the C+ and C- terminals and two capacitors between VEE and ground.

The SN75LBC776 is characterized for operation over the 0°C to 70°C temperature range.



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Products conform to specifications per the terms of Texas Instruments
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SN75LBC776 SINGLE-CHIP GeoPort™ TRANSCEIVER

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DRIVER FUNCTION TABLE†

INPUT DA1	INPUT DA2	ENABLE SHDN	ENABLE DEN	OUTPUT DY1	OUTPUT DY2	OUTPUT DZ2
H	X	L	X	L	X	X
L	X	L	X	H	X	X
X	H	L	L	X	H	L
X	L	L	L	X	L	H
OPEN	OPEN	L	L	L	H	L
X	X	H	X	Z	Z	Z
X	X	X	H	X	Z	Z
X	X	OPEN	OPEN	Z	Z	Z

† H = high level L = low level X = irrelevant ? = indeterminate Z = high impedance (off)

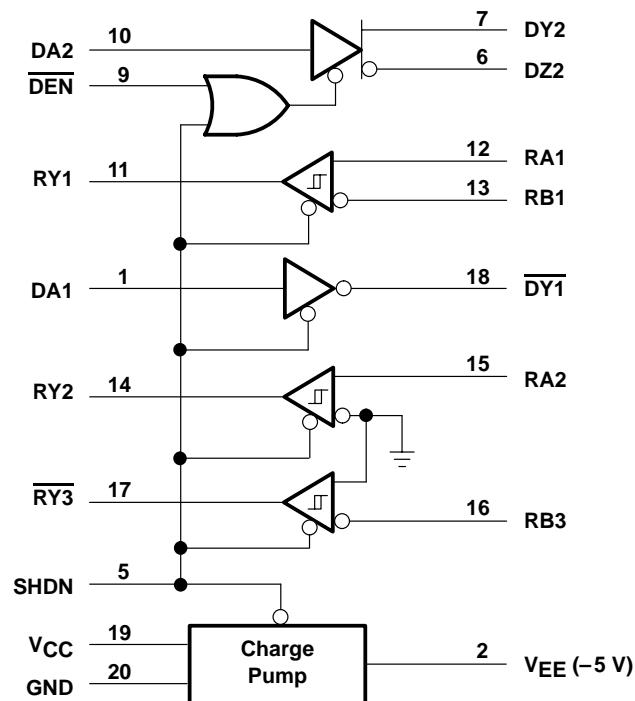
RECEIVER FUNCTION TABLE†

INPUT RA1 RB1	INPUT RA2 & RB3	ENABLE SHDN	OUTPUT RY1	OUTPUT RY2	OUTPUT RY3
H L	H	L	H	H	L
L H	L	L	L	L	H
OPEN	OPEN	L	H	H	H
SHORT‡	SHORT‡	L	?	?	?
X X	X	H	Z	Z	Z
X X	X	OPEN	Z	Z	Z

† H = high level L = low level X = irrelevant ? = indeterminate Z = high impedance (off)

‡ $-0.2 \text{ V} < \text{VID} < 0.2 \text{ V}$

function logic diagram (positive logic)



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

† 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 parameter is measured in accordance with MIL-STD-883C, Method 3015.7

DISSIPATION RATING TABLE

DISSIPATION RATING TABLE			
PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	OPERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
DB	1035 mW	8.3 mW/ $^\circ\text{C}$	660 mW
DW	1125 mW	9.0 mW/ $^\circ\text{C}$	720 mW

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recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}		4.75	5	5.25	V
High-level input voltage, V_{IH}	DA, SHDN, \overline{DEN}	2		5.25	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
Voltage-converter filter capacitance		0.2			μ F
Voltage-converter filter-capacitor equivalent series resistance (ESR)			0.2		Ω
Operating free-air temperature, T_A		0	70		$^{\circ}$ C

driver electrical characteristics over 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	$R_L = 12 \text{ k}\Omega$	3.6	4.53	V	
V_{OL} Low-level output voltage		$R_L = 120 \Omega$	2	3.63	V	
$ \Delta V_{ODI} $ Magnitude of differential output voltage $ (V_{(DY)} - V_{(DZ)}) $	$R_L = 120 \Omega$, See Figure 2	$R_L = 12 \text{ k}\Omega$	-4.53	-3.6	V	
$\Delta \Delta V_{ODI} $ Change in differential voltage magnitude		$R_L = 120 \Omega$	-2.7	-1.8	V	
V_{OC} Common-mode output voltage	See Figure 3	4			V	
$ \Delta V_{OC(SS)} $ Magnitude of change, common-mode steady state output voltage			250		mV	
$ \Delta V_{OC(PP)} $ Magnitude of change, common-mode peak-to-peak output voltage			700		mV	
I_{CC} Supply current	SHDN = $\overline{DEN} = 0 \text{ V}$, No load	7	15		mA	
	SHDN = $\overline{DEN} = 5 \text{ V}$, No load		100		μ A	
I_{OZ} High-impedance output current	$V_O = -10 \text{ V to } 10 \text{ V}$, $V_{CC} = 0 \text{ or } 5 \text{ V}$			± 100	μ A	
I_{OS} Short-circuit output current (see Note 3)	$V_O = -5 \text{ V to } 5 \text{ V}$			± 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 (unless otherwise noted)

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			25	100	μs
t _{PZH}	Driver output enable time to high-level output			25	100	μs
t _{PLZ}	Driver output disable time from low-level output			28	100	ns
t _{PHZ}	Driver output disable time from high-level output			37	100	ns
t _r	Rise time			10	25	75
t _f	Fall time			10	23	75
t _{PHL}	Propagation delay time, high-to-low level output			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 DEN SHDN DEN SHDN DEN SHDN DEN		25	100	μs
t _{PZH}	Driver output enable time to high-level output			29	150	ns
t _{PLZ}	Driver output disable time from low-level output			25	100	μs
t _{PHZ}	Driver output disable time from high-level output			35	150	ns
t _r	Rise time			28	100	ns
t _f	Fall time			34	100	ns
t _{SK(p)}	Pulse skew, t _{PLH} – t _{PHL}			37	100	ns
				34	100	ns
				10	27	75
				10	26	75
					22	ns

receiver electrical characteristics over operating free-air temperature range (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	
V _{hys}	Differential input voltage hysteresis (V _{IT+} – V _{IT-})				50	
V _{OH}	High-level output voltage (see Note 4)	V _{IC} = 0, I _{OH} = -2 mA, See Figure 6	2	4.9		V
V _{OL}	Low-level output voltage	V _{IC} = 0, I _{OL} = 2 mA, See Figure 6	0.2	0.8		V
I _{OS}	Short-circuit output current	V _O = 0	-85	-45		mA
		V _O = V _{CC}	47	+85		
R _I	Input resistance	V _{CC} = 0 or 5.25 V, V _I = -12 V to 12 V	6	30		kΩ

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

SN75LBC776

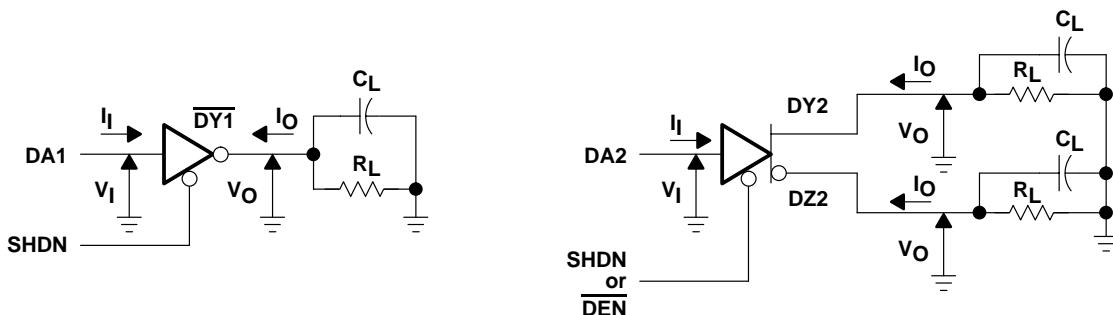
SINGLE-CHIP GeoPort™ TRANSCEIVER

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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	$R_L = 2 \text{ k}\Omega$, See Figure 6		31	75	ns
t_{PLH}			30	75	ns
t_r			15	30	ns
t_f			15	30	ns
$t_{SK(P)}$	Pulse skew $ t_{PLH} - t_{PHL} $			20	ns
t_{PZL}	Differential, See Figure 7		35	100	ns
t_{PZH}			32	100	ns
t_{PLZ}			21	100	ns
t_{PHZ}			21	100	ns
t_{PZL}	Single ended, See Figure 7		12	25	μs
t_{PZH}			12	25	μs
t_{PLZ}			25	100	ns
t_{PHZ}			125	400	ns

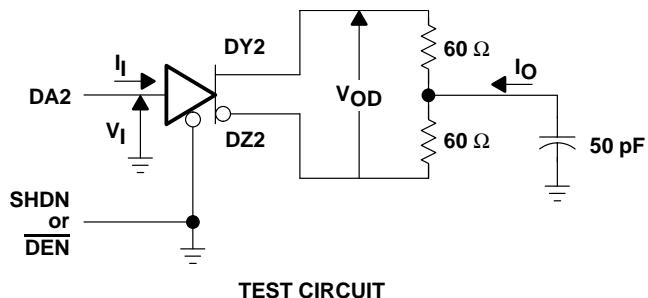
PARAMETER MEASUREMENT INFORMATION



NOTE A: $C_L = 50 \text{ pF}$

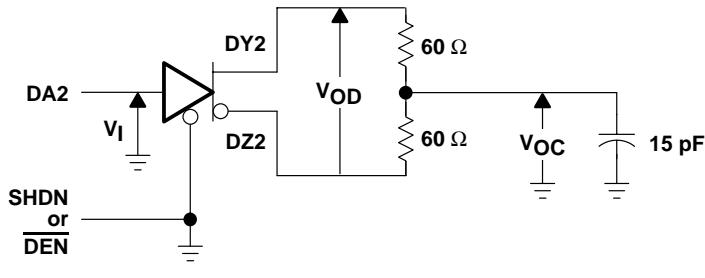
TEST CIRCUIT

Figure 1. Single-Ended Driver DC Parameter Test

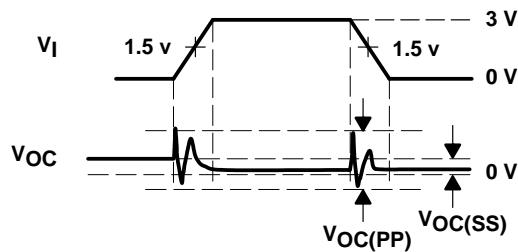


TEST CIRCUIT

Figure 2. Differential Driver DC Parameter Test



TEST CIRCUIT (see Note A)



VOLTAGE WAVEFORM

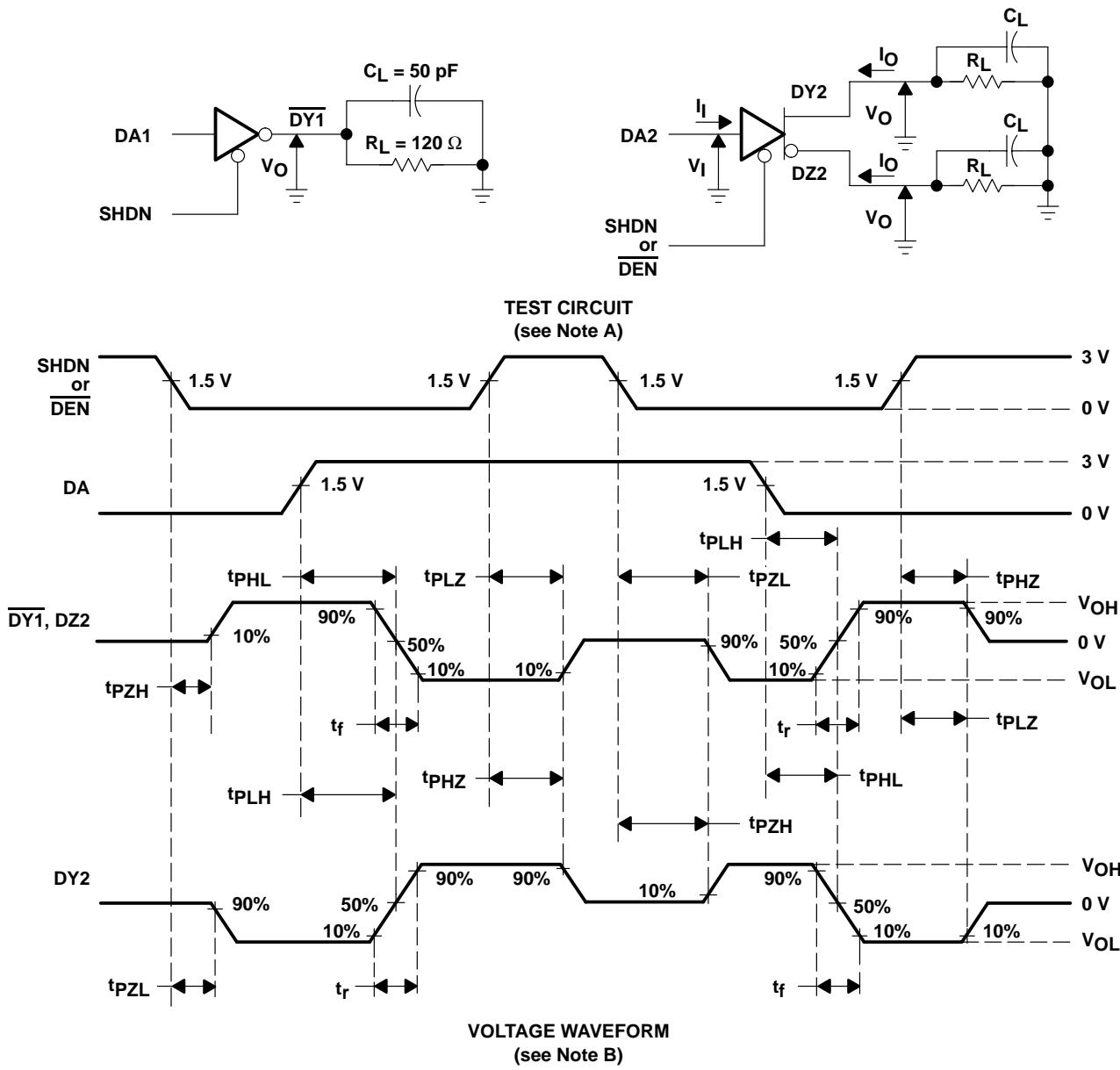
NOTE A: Measured 3dB bandwidth = 300 MHz

Figure 3. Differential-Driver Common-Mode Output Voltage Tests

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PARAMETER MEASUREMENT INFORMATION



NOTES: A. $C_L = 50 \text{ pF}$, $R_L = 120 \Omega$
 B. The input waveform $t_r, t_f \leq 10 \text{ ns}$.

Figure 4. Single-Ended Driver Propagation and Transition Times

PARAMETER MEASUREMENT INFORMATION

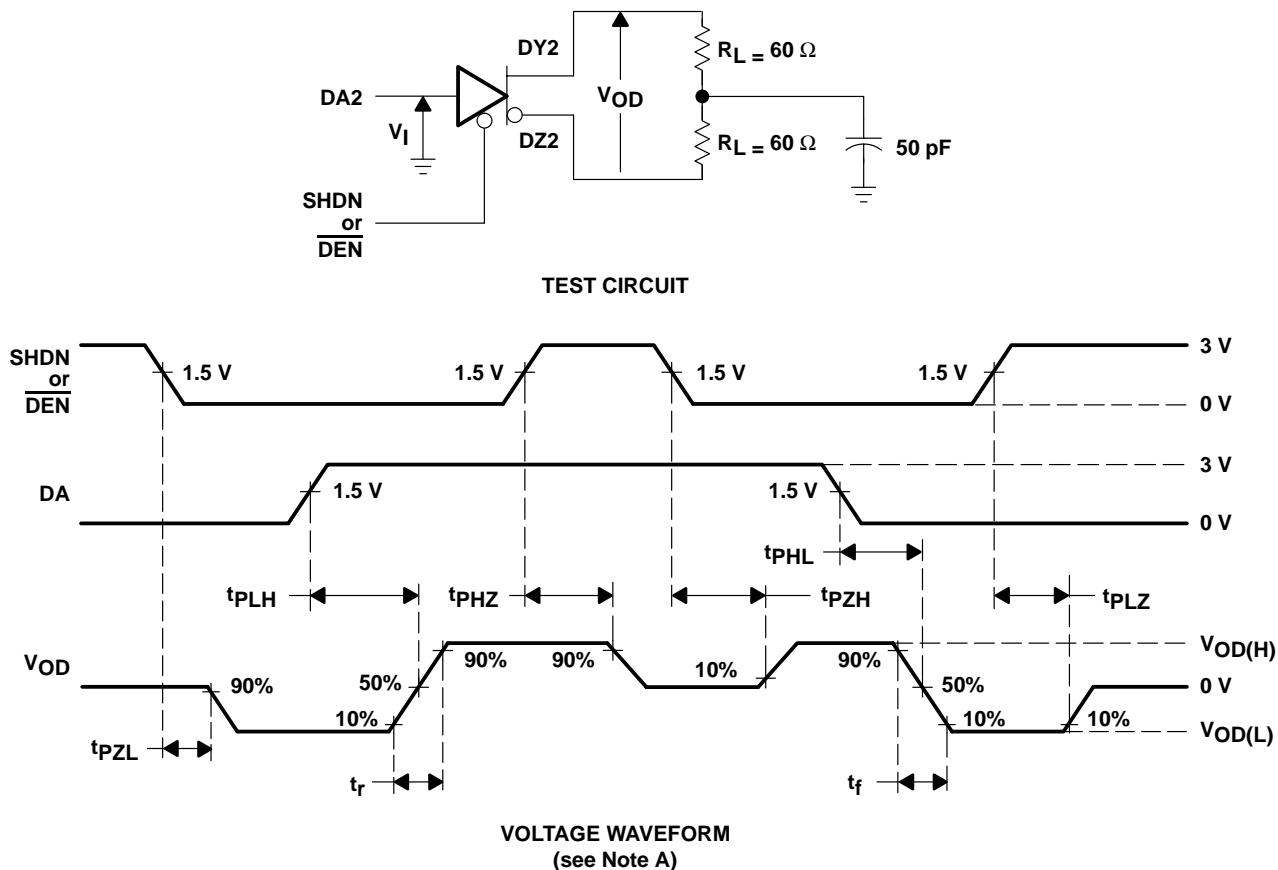


Figure 5. Differential Driver Propagation and Transition Times

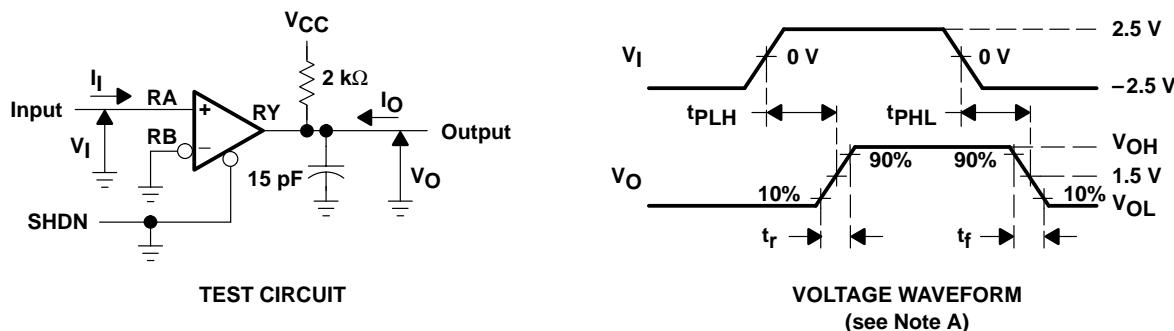


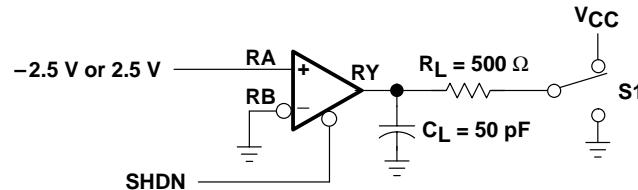
Figure 6. Receiver Propagation and Transition Times

NOTE A: The input waveform $t_r, t_f \leq 10$ ns.

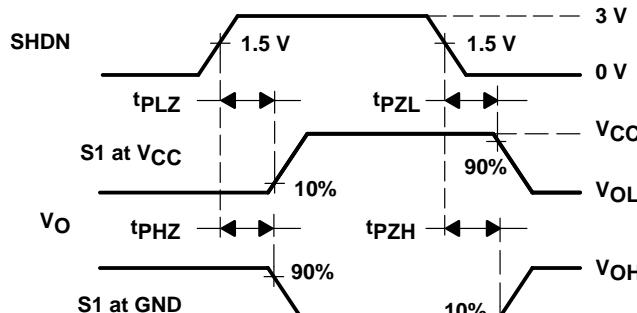
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PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

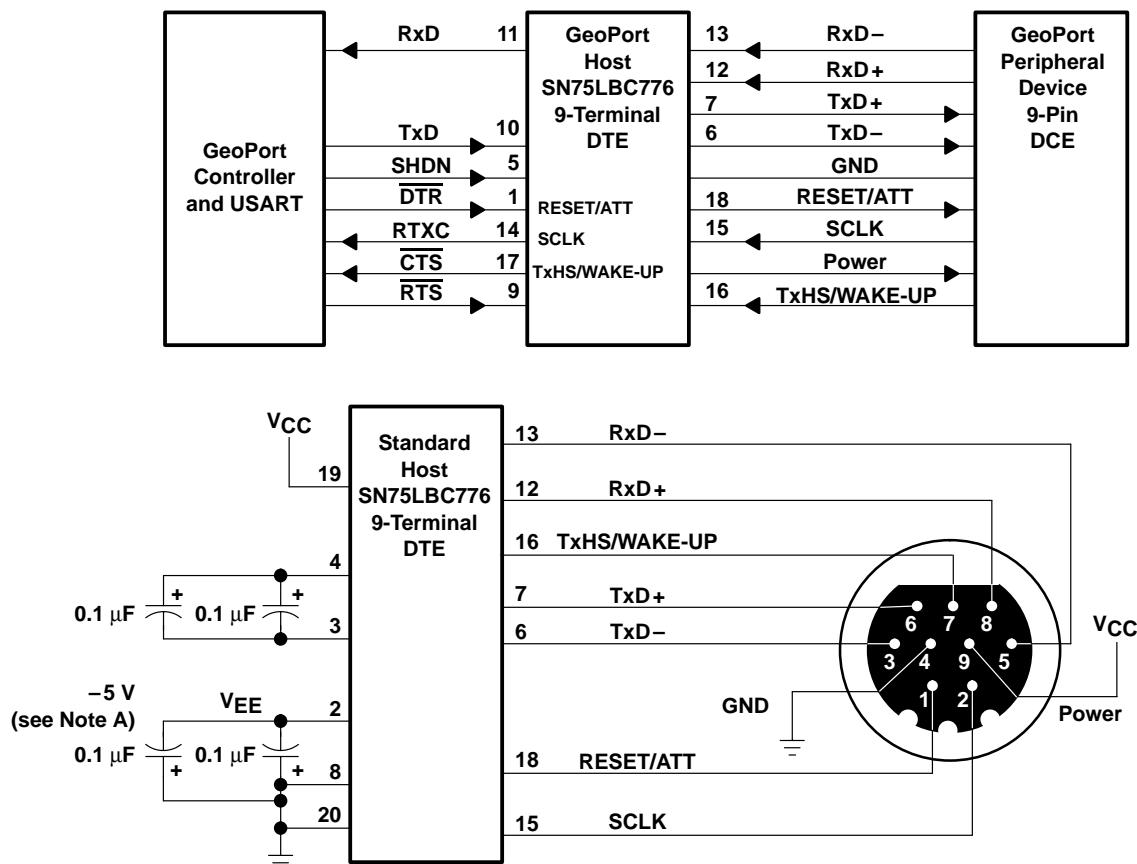


VOLTAGE WAVEFORM
(see Note A)

NOTE A: The input waveform t_r , $t_f \leq 10$ ns.

Figure 7. Receiver Enable and Disable Test Circuit and Waveforms

APPLICATION INFORMATION



NOTE A: The AVX 0603YC104MATXA or equivalent is one of the possible capacitors that can be used as the charge pump capacitor.

Figure 8. GeoPort 9-Terminal DTE Connection Application

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APPLICATION INFORMATION

generator characteristics

PARAMETER	TEST CONDITIONS	EIA/TIA-232/V.28		EIA/TIA-423/V.10		562		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
V _O	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
V _{O(RING)}	Output voltage ringing		NA		10%		5%	
I _{OS}	Short-circuit output current	V _O = 0		100		150		mA
I _{O(OFF)}	V _{CC} = 0, V _O < 2 V	300		NA		300		Ω
	V _{CC} = 0, V _O < 6 V	NA		±100		NA		μA
SR	Output voltage slew rate		30	NA		4	30	V/μs
t _t	±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	NA		ui†

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

receiver characteristics

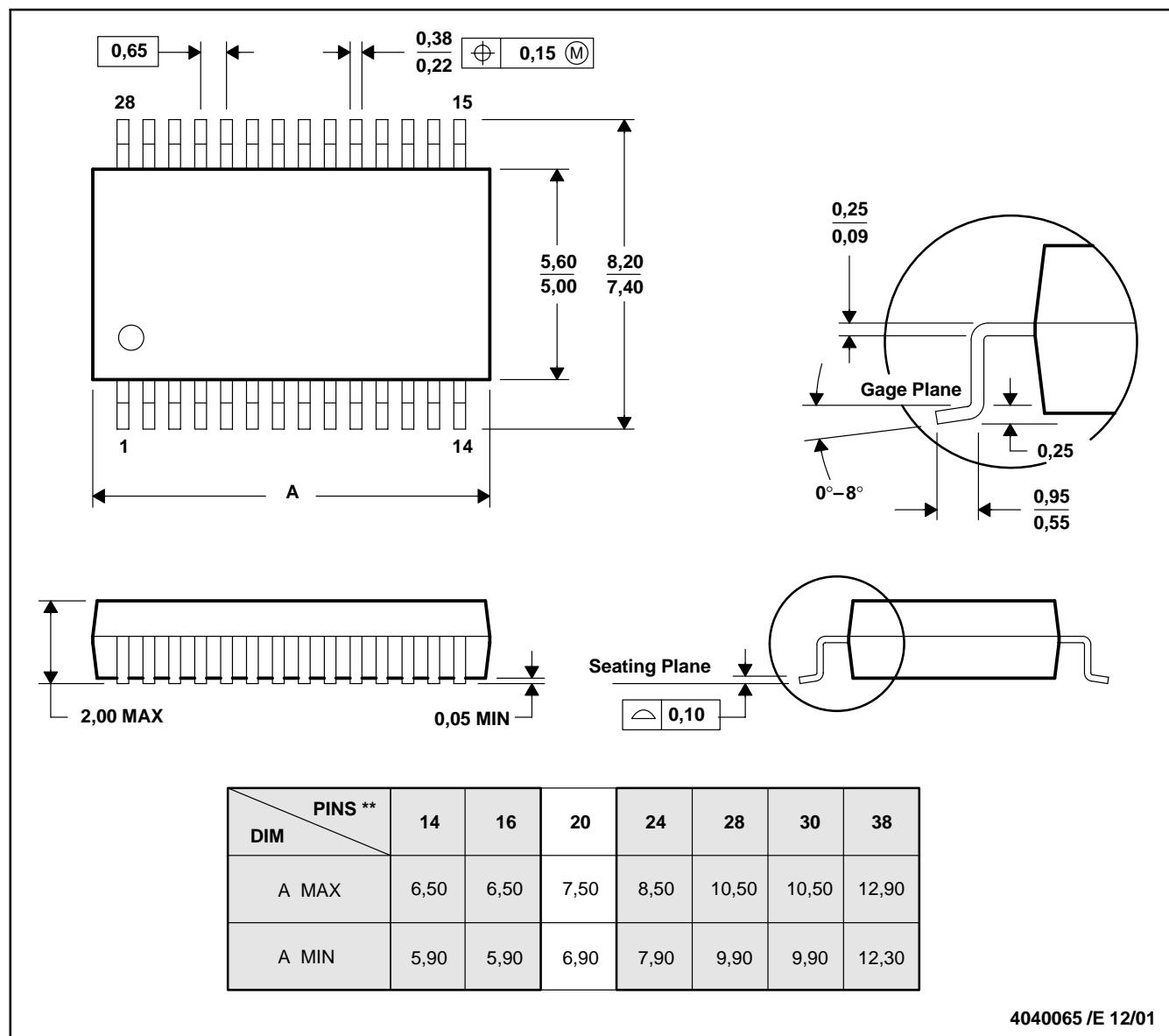
PARAMETER	TEST CONDITIONS	EIA/TIA-232/V.28		EIA/TIA-423/V.10		562		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
V _I	Input voltage magnitude		25		10		25	V
V _{IT}	V _I < 15 V	-3	3	NA		-3	3	V
	V _I < 10 V	NA		-0.2	0.2	NA		
R _I	3 V < V _I < 15 V	3	7	NA		3	7	kΩ
	V _I < 10 V	NA		4		NA		kΩ

MECHANICAL INFORMATION

DB (R-PDSO-G**)

28 PINS SHOWN

PLASTIC SMALL-OUTLINE



NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0.15.
 D. Falls within JEDEC MO-150

MECHANICAL DATA

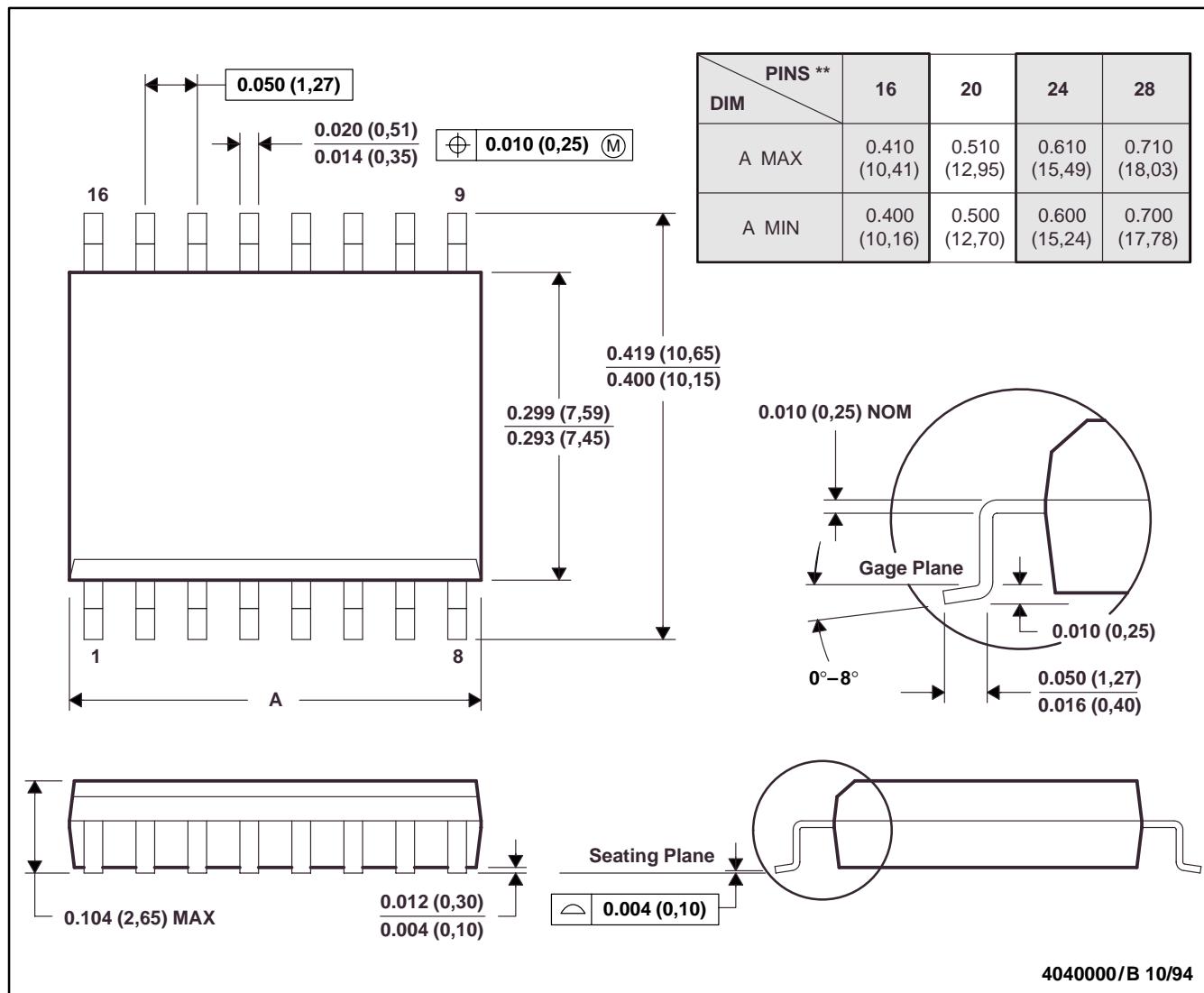
MSSO002E – JANUARY 1995 – REVISED DECEMBER 2001

MECHANICAL INFORMATION

DW (R-PDSO-G**)

16 PIN SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



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

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