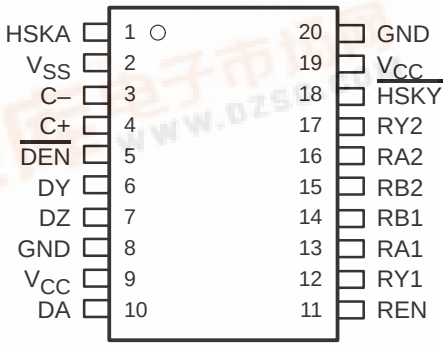
SN75LBC775
SINGLE-CHIP APPLETALK™ AND LOCALTALK™ TRANSCEIVER

SLLS216A – MAY 1995 – REVISED JANUARY 1996

- **Single-Chip Interface Solution for AppleTalk™ and LocalTalk™**
- **Designed to Operate Up To 1 Mbps In AppleTalk and LocalTalk**
- **Switched-Capacitor Voltage Converter Allows for Single 5-V Operation**
- **4-kV ESD Protection on Bus Terminals**
- **Combines Multiple Components into a Single Chip Solution**
- **LinBiCMOS™ Process Technology**

DW PACKAGE
(TOP VIEW)



description

The SN75LBC775 is a low-power LinBiCMOS™ device that incorporates the drivers and receivers for an AppleTalk or a LocalTalk interface and a switched-capacitor voltage converter for a single 5-V supply operation. LocalTalk uses a hybrid of RS-422 with the transceiver connected to the network through a small isolation transformer. The AppleTalk mode provides point-to-point communications and uses the same differential driver and receiver as LocalTalk with the addition of a hybrid RS-423, single-ended handshake driver (HSK) and receiver. In the AppleTalk mode, the port connects directly to the receiver with no isolation transformer.

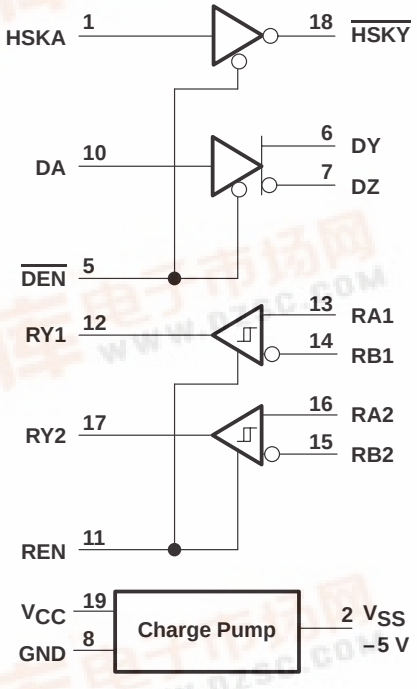
While the device power is turned off (V_{CC} = 0) or disabled in the LocalTalk mode, the outputs are in a high-impedance state. When the driver enable ($\overline{DEN}$) terminal is high, both the differential and serial driver outputs are in a high-impedance state.

The receiver output can be disabled and becomes a high impedance when the REN terminal is low.

A switched-capacitor voltage converter generates the negative voltage required from a single 5-V supply using two 22-µF capacitors. One capacitor is between the C+ and C– terminals and the second is between V_{SS} and ground.

The SN75LBC775 is characterized for operating over the temperature range of 0°C to 70°C.

functional diagram



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TEXAS INSTRUMENTS

DRIVER FUNCTION TABLE

INPUT		ENABLE	OUTPUT		
DA	HSKA	$\overline{\text{DEN}}$	A	B	$\overline{\text{HSKY}}$
H	X	L	H	L	X
L	X	L	L	H	X
X	H	L	X	X	L
X	L	L	X	X	H
OPEN	OPEN	L	H	L	L
X	X	H	Z	Z	Z
X	X	OPEN	Z	Z	Z

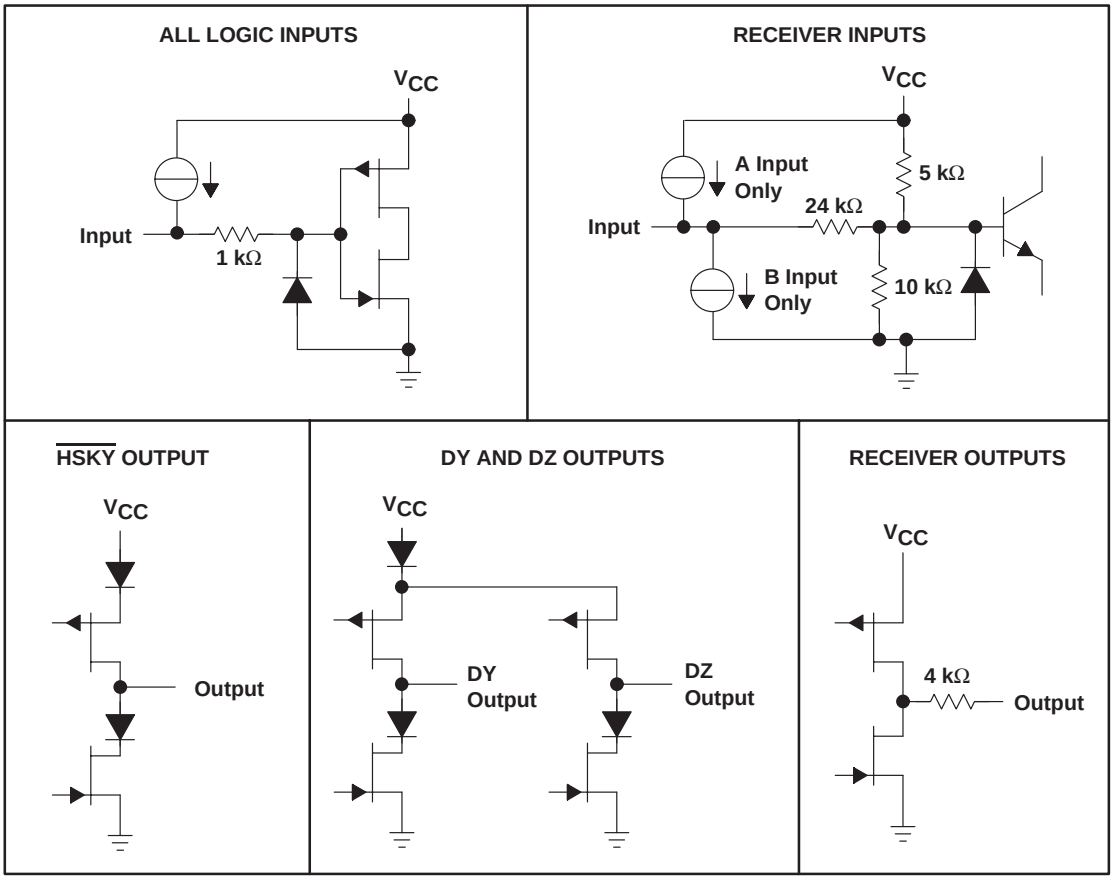
RECEIVER FUNCTION TABLE

INPUT		ENABLE	OUTPUT
RA	RB	REN	RY
H	L	H	H
L	H	H	L
OPEN		H	H
SHORT†		H	?
X		L	Z

† $-0.2\ V < V_{ID} < 0.2\ V$

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

schematics of inputs and outputs



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

Supply voltage range, V_{CC} (see Note 1) . . . . . –0.5 to 7 V
Supply voltage range, V_{SS} . . . . . –7 to 0.5 V
Receiver input voltage range, V_I (RA) . . . . . –15 V to 15 V
Receiver differential input voltage range, V_{ID} . . . . . –12 V to 12 V
Receiver output voltage range, V_O (RY) . . . . . –0.5 V to 5.5 V
Driver output voltage range, V_O (Power Off) (DY, DZ, $\overline{\text{HSKY}}$) . . . . . –15 V to 15 V
(Power On) (DY, DZ, $\overline{\text{HSKY}}$) . . . . . –11 V to 11 V
Driver input voltage range, V_I (DA, HSKA, $\overline{\text{DEN}}$, REN) . . . . . –0.5 V to V_{CC} + 0.4 V
Electrostatic discharge (see Note 2) Class 3, A: Bus terminals . . . . . 4 kV
All other terminals . . . . . 2 kV
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . 0°C to 70°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 maximum rating is tested according to MIL-STD-883C, Method 3015.7.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 85°C$ POWER RATING
DW	1125 mW	9.0 mW/°C	585 mW

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}		4.75	5	5.25	V
High-level input voltage, V_{IH}	DA, HSKA, $\overline{\text{DEN}}$, REN	2			V
Low-level input voltage, V_{IL}	DA, HSKA, $\overline{\text{DEN}}$, REN			0.8	V
Receiver input common-mode voltage range, V_{ICR}‡		–7		7	V
Differential input voltage, V_{ID}‡		–12		12	V
Voltage-converter filter capacitance		22			µF
Voltage-converter filter-capacitor equivalent series resistance (ESR)				2	Ω
Operating free-air temperature, T_A		0		70	°C

‡ The algebraic convention, in which the less-positive (more negative) limit is designated minimum, is used in this data sheet.

DRIVER

electrical characteristics over recommend operating characteristics (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{OH}	High-level output voltage	Single ended	R_L = 3 kΩ, See Figure 1	3.7			V
V_{OL}	Low-level output voltage					–3.7	V
$\|V_{OD}\|$	Magnitude of differential output voltage ($V_{DY} – V_{DZ}$)		See Figure 2	4.0	5.6		V
$\Delta\|V_{OD}\|$	Change in differential voltage magnitude		See Figure 2		10	250	mV
V_{OC}	Common-mode output voltage‡		See Figure 3	–1		3	V
$\Delta V_{OC(SS)}$	Change in steady-state common-mode output voltage		See Figure 3			±200	mV
I_{OZ}	High-impedance output current		V_{CC} = 0, –10 V ≤ V_O ≤ 10 V			±100	µA
I_{OS}	Short-circuit output current		–5 V ≤ V_O ≤ 5 V			450	mA
I_{CC}	Supply current		$\overline{DEN}$ at 0 V, REN at 5 V, No load		5	10	mA
I_{IH}	High-level input current		V_I = 5 V			200	µA
I_{IL}	low-level input current	All terminals except REN	V_I = 0		–100	–200	µA
		REN			–300	–455	µA

† All typical values are at V_{CC} = 5 V and T_A = 25°C.
‡ The algebraic convention, in which the less positive (more negative) limit is designated minimum, is used in this data sheet.

switching characteristics over recommend operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	Propagation delay time, high- to low-level	Single ended	See Figures 1 and 2		155	300	ns
		Differential			115	180	ns
t_{PLH}	Propagation delay time, low- to high-level	Single ended			140	300	ns
		Differential			115	180	ns
t_{PZL}	Propagation delay time, high-impedance to low-level output				100	250	ns
t_{PZH}	Propagation delay time, high-impedance to high-level output				100	250	ns
tPLZ	Propagation delay time, low-level to high-impedance output				100	250	ns
tPHZ	Propagation delay time, high-level to high-impedance output				100	250	ns
t_r	Rise time	Single ended			135	300	ns
		Differential			90	180	ns
t_f	Fall time	Single ended			145	300	ns
		Differential			95	180	ns
$t_{sk(p)}$	Pulse skew, $\|t_{PLH}-t_{PHL}\|$	Single ended			15	50	ns
		Differential			2	22	ns

RECEIVER

electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IT+}	Positive-going differential input voltage threshold	I_{OH} = 2 mA, I_{OL} = −2mA, See Figure 4			200	mV
V_{IT-}	Negative-going differential input voltage threshold‡		−200			mV
V_{hys}	Input voltage hysteresis ($V_{IT+} - V_{IT-}$)			30		mV
V_{OH}	High-level output voltage		2	4.5		V
V_{OL}	Low-level output voltage				0.8	V
I_{OS}	Short-circuit output current‡	V_O = 0	8	50	85	mA
		$V_O = V_{CC}$	−85	−50	−8	mA
r_i	Input resistance	V_{CC} = 0 or 5.25 V, −12 V ≤ V_I ≤ 12 V	6			kΩ

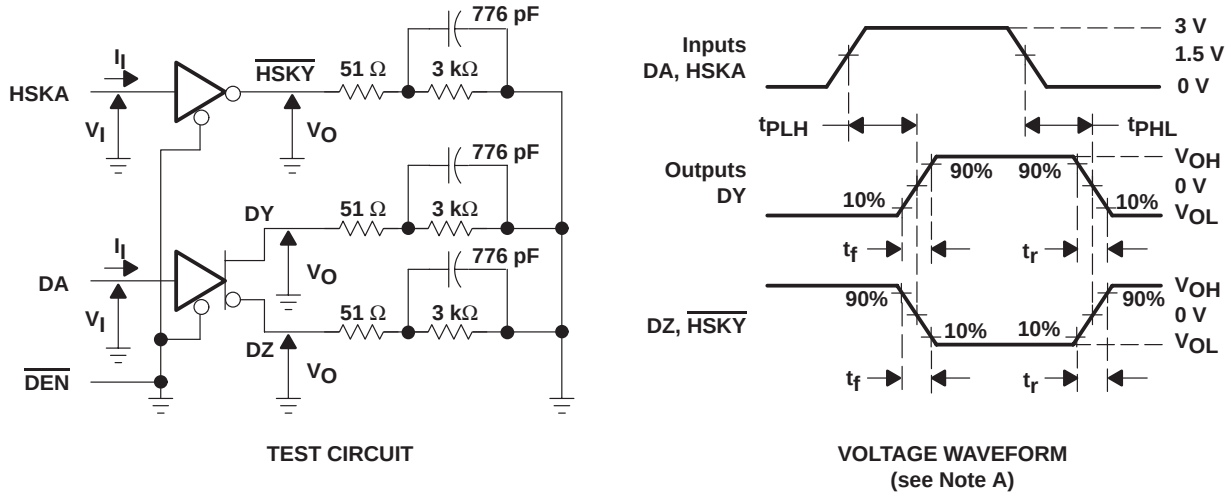
† All typical values are at V_{CC} = 5 V and T_A = 25°C.
‡ The algebraic convention, in which the less positive (more negative) limit is designated minimum, is used in this data sheet.

switching characteristics over recommended operating 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 4		25	60	ns
t_{PLH}	Propagation delay time, low- to high-level output			22	60	ns
t_r	Rise time			8	25	ns
t_f	Fall time			7	25	ns
$t_{SK(P)}$	Pulse skew, $\lvert t_{PLH} - t_{PHL} \rvert$			3	20	ns
t_{PZL}	Receiver output enable time to low-level output	C_L = 80 pF, See Figure 5		50		ns
t_{PZH}	Receiver output enable time to high-level output			50		ns
t_{PLZ}	Receiver output disable time to low-level output			50		ns
t_{PHZ}	Receiver output disable time to high-level output			50		ns

† All typical values are at V_{CC} = 5 V and T_A = 25°C.

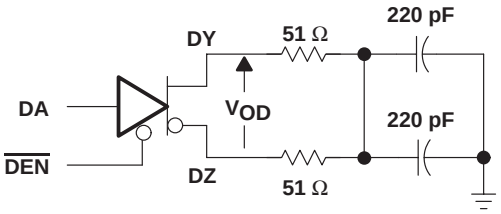
PARAMETER MEASUREMENT INFORMATION



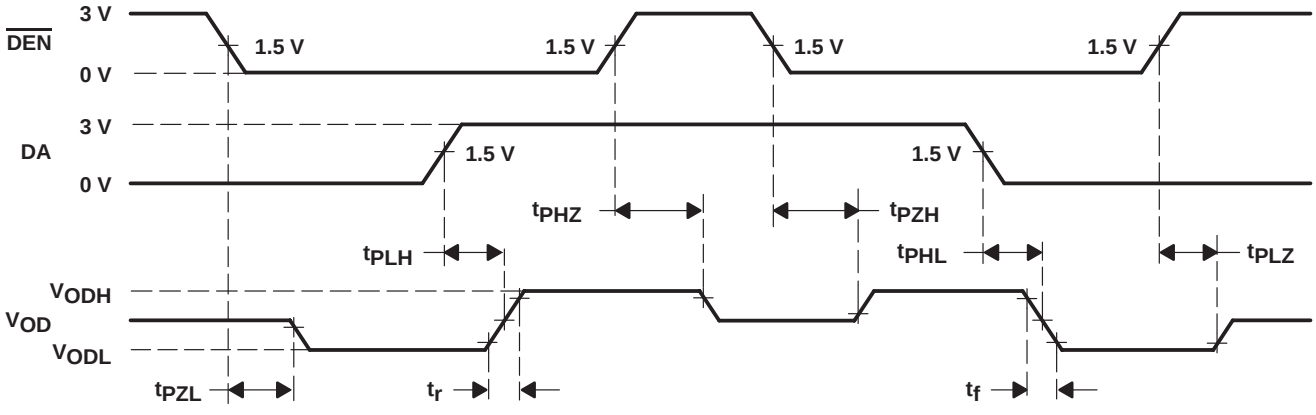
TEST CIRCUIT

VOLTAGE WAVEFORM
(see Note A)

Figure 1. Driver Propagation and Transition Times for AppleTalk



TEST CIRCUIT



VOLTAGE WAVEFORM
(see Note A)

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

Figure 2. Driver Propagation and Transition Times for LocalTalk

PARAMETER MEASUREMENT INFORMATION

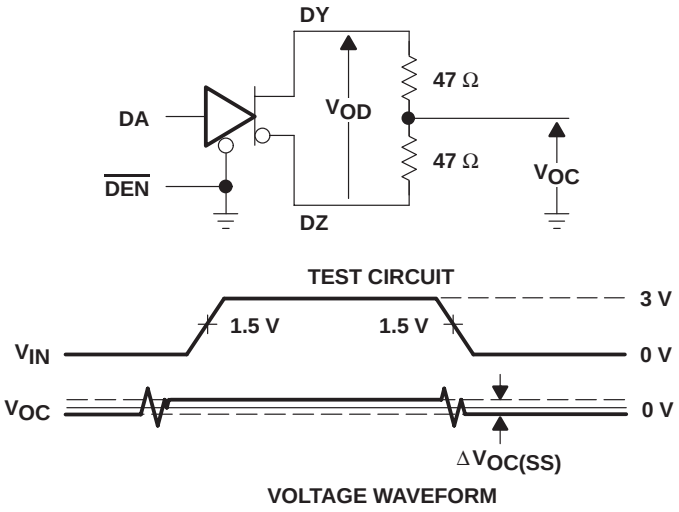
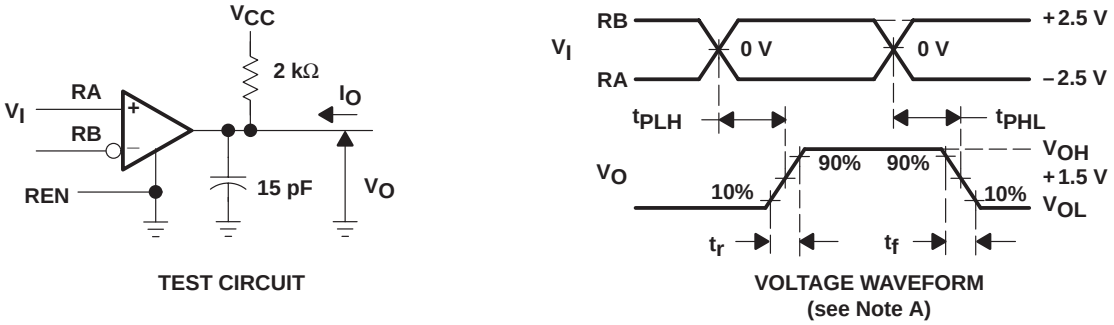


Figure 3. Differential Driver Common Mode Output Voltage Tests



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

Figure 4. Receiver Propagation and Transition Times

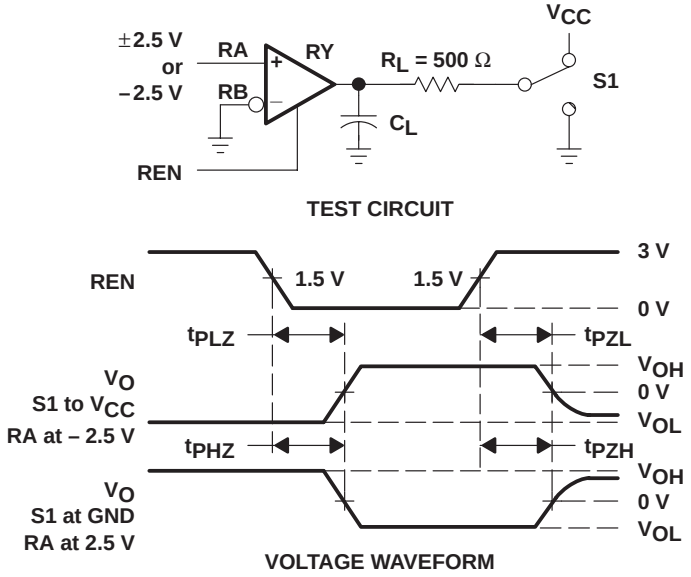


Figure 5. Receiver Enable and Disable Test Circuit and Waveform

TYPICAL CHARACTERISTICS

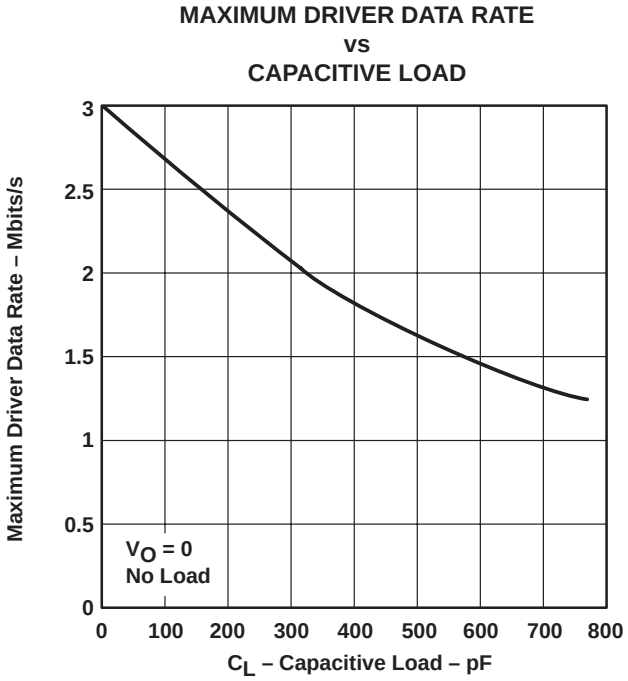


Figure 6

APPLICATION INFORMATION

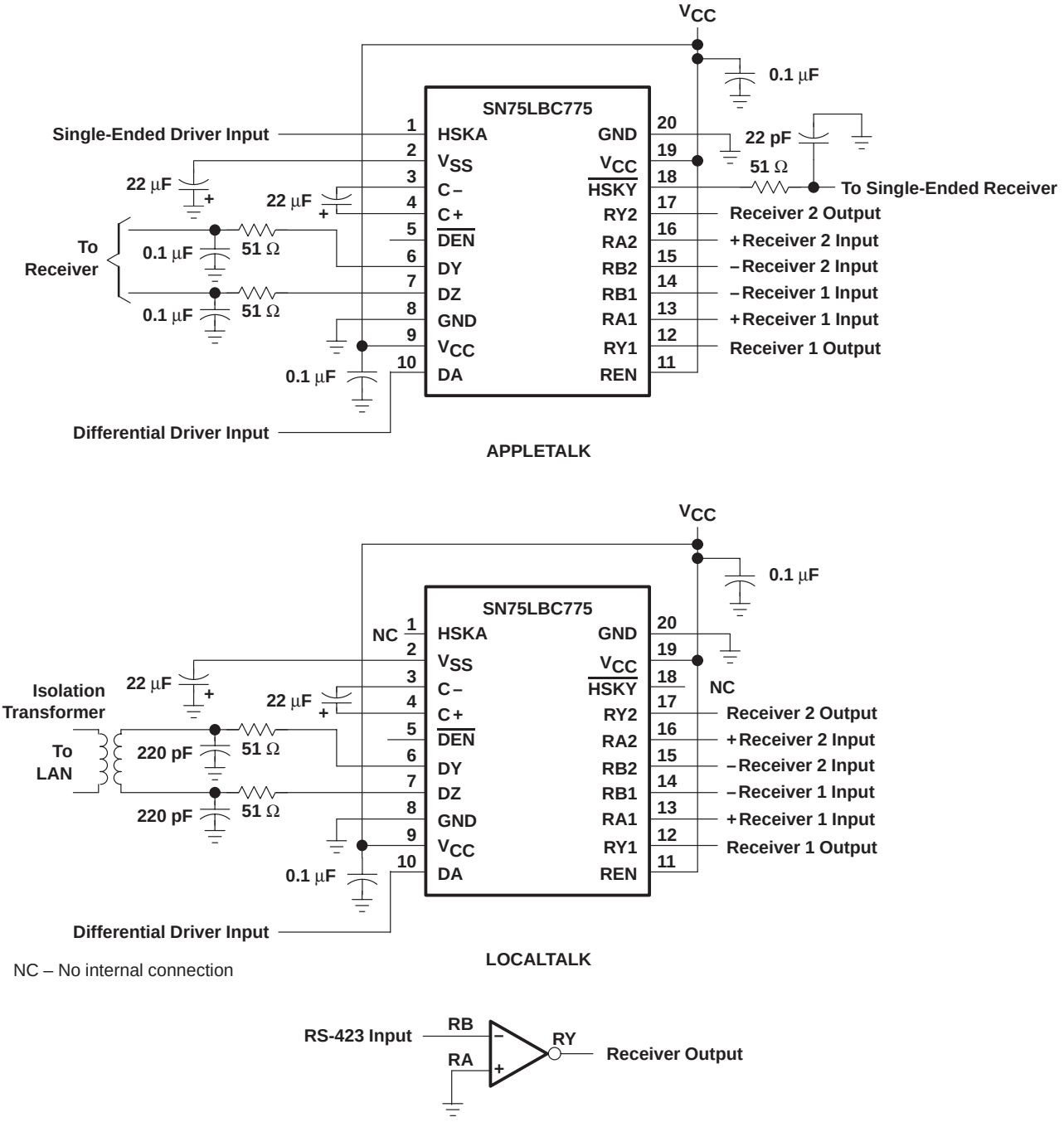
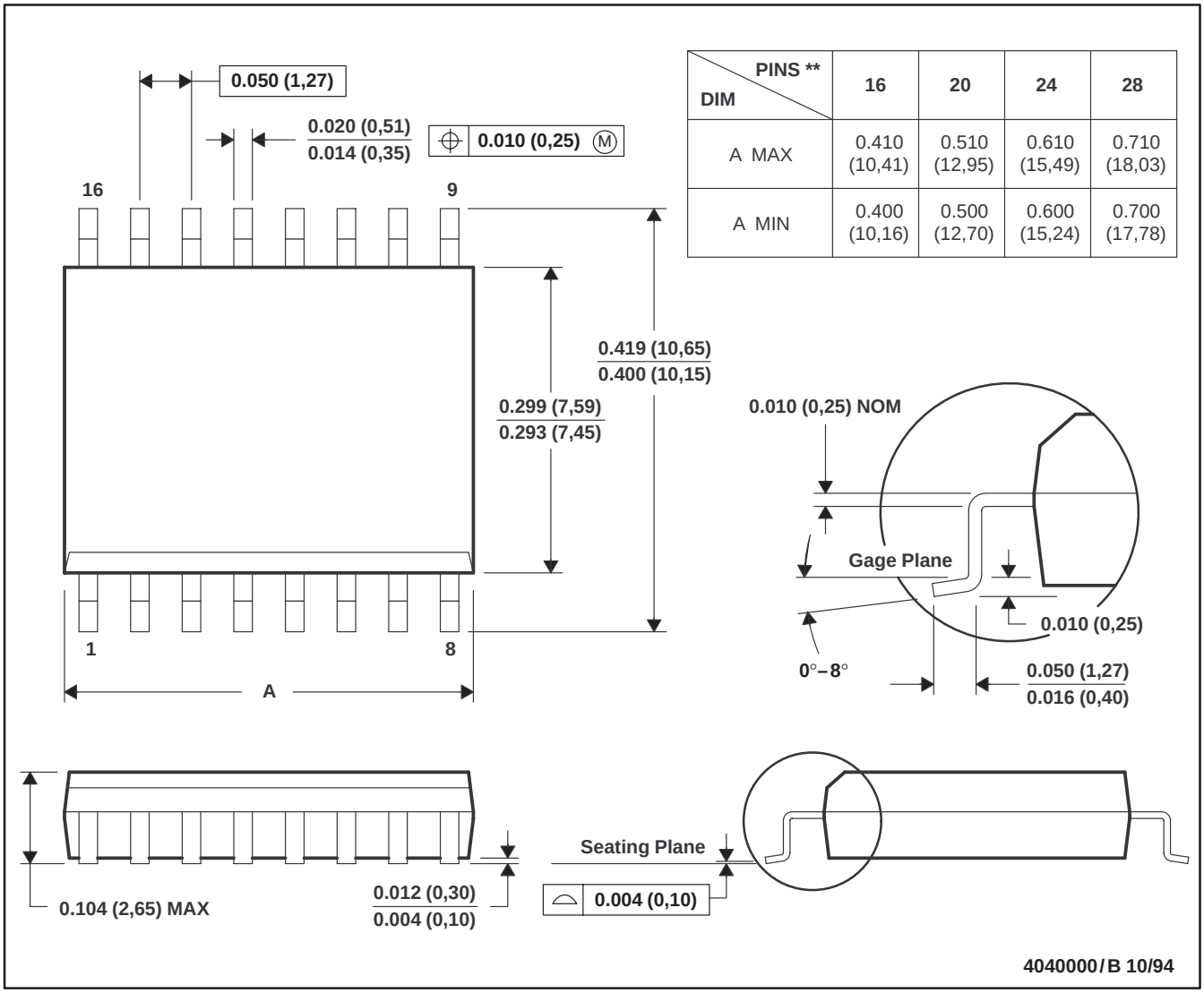


Figure 7. Receiving RS-423 Signals With a Differential Receiver

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

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