![Texas Instruments logo] **TEXAS INSTRUMENTS**

CD4041UB Types

CMOS Quad True/Complement Buffer

High Voltage Types (20-Volt Rating)

■ CD4041UB types are quad true/complement buffers consisting of n- and p-channel units having low channel resistance and high current (sourcing and sinking) capability. The CD4041UB is intended for use as a buffer, line driver, or CMOS-to-TTL driver, It can be used as an ultra-low power resistor-network driver for A/D and D/A conversion, as a transmission-line driver, and in other applications where high noise immunity and low power dissipation are primary design requirements.

The CD4041UB types are supplied in 14-lead hermetic dual-in-line ceramic packages (D and F suffixes), 14-lead dual-in-line plastic packages (E suffix), 14-lead ceramic flat packages (K suffix), and in chip form (H suffix).

Features:

■ Balanced sink and source current; approximately 4 times standard "B" drive
■ Equalized delay to true and complement outputs
■ 100% tested for quiescent current at 20 V
■ Maximum input current of 1 μA at 18 V over full package temperature range; 100 nA at 18 V and 25°C
■ 5-V, 10-V, and 15-V parametric ratings
■ Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"

Applications:

■ High current source/sink driver
■ CMOS-to-DTL/TTL Converter Buffer
■ Display driver
■ MOS clock driver
■ Resistor network driver (Ladder or weighted R)
■ Buffer
■ Transmission line driver

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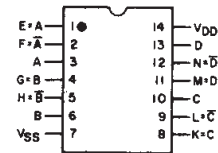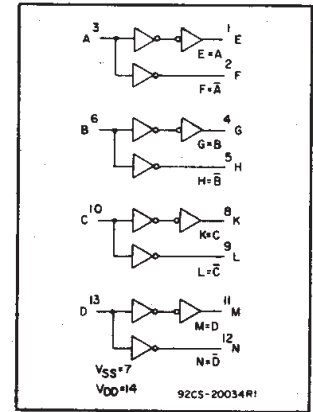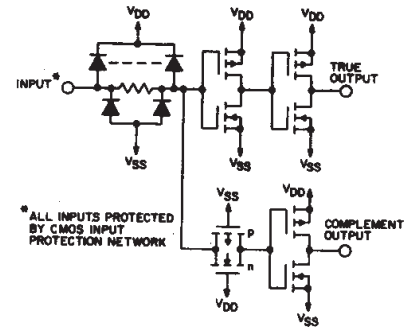

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TOP VIEW
TERMINAL ASSIGNMENT

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (V_{DD})
  Voltages referenced to V_{SS} Terminal) .... −0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS .... −0.5V to V_{DD} +0.5V
DC INPUT CURRENT, ANY ONE INPUT .... ±10mA
POWER DISSIPATION PER PACKAGE (P_D):
  For T_A = −55°C to +100°C 500mW
  For T_A = +100°C to +125°C................................... Derate Linearity at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
  FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW
OPERATING-TEMPERATURE RANGE (T_A) .... −55°C to +125°C
STORAGE TEMPERATURE RANGE (T_{stg}) .... −65°C to +150°C
LEAD TEMPERATURE (DURING SOLDERING):
  At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max .... +265°C

RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following range:

CHARACTERISTIC	LIMITS		UNITS
	Min.	Max.	
Supply-Voltage Range (For T_A=Full Package-Temperature Range)	3	18	V

*ALL INPUTS PROTECTED BY CMOS INPUT PROTECTION NETWORK

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Fig.1 − Schematic diagram 1 of 4 buffers.

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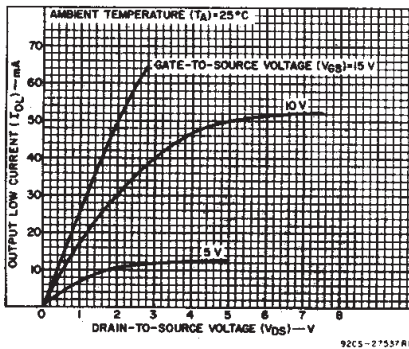
Fig.2 − Typical output low (sink) current characteristics.

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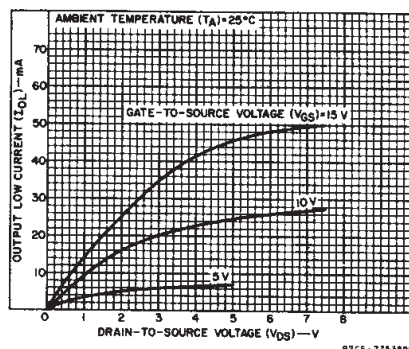
Fig.3 − Minimum low (sink) current characteristics.

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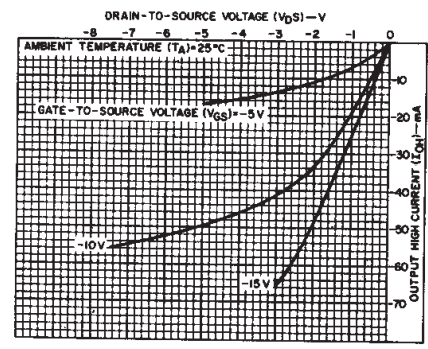
Fig.4 − Typical output high (source) current characteristics.

STATIC ELECTRICAL CHARACTERISTICS

CHARAC-TERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	V_O (V)	V_{IN} (V)	V_{DD} (V)	−55	−40	+85	+125	+25 Min.	+25 Typ.	+25 Max.	
Quiescent Device Current I_{DD} Max.	–	0.5	5	1	1	30	30	–	0.02	1	µA
	–	0.10	10	2	2	60	60	–	0.02	2	
	–	0.15	15	4	4	120	120	–	0.02	4	
	–	0.20	20	20	20	600	600	–	0.04	20	
Output Low (Sink) Current, I_{OL} Min.	0.4	0.5	5	2.1	1.8	1.3	1.2	1.6	3.2	–	mA
	0.5	0.10	10	6.25	5.6	4	3.5	5	10	–	
	1.5	0.15	15	24	23	15.5	13	19	38	–	
Output High (Source) Current, I_{OH} Min.	4.6	0.5	5	−2.1	−1.8	−1.3	−1.2	−1.6	−3.2	–	
	2.5	0.5	5	−8.4	−6.7	−5.3	−4.6	−6.4	−12.8	–	
	9.5	0.10	10	−6.25	−5.6	−4	−3.5	−5	−10	–	
	13.5	0.15	15	−24	−23	−15.5	−13	−19	−38	–	
Output Voltage: Low-Level, V_{OL} Max.	–	0.5	5	0.05				–	0	0.05	V
	–	0.10	10	0.05				–	0	0.05	
	–	0.15	15	0.05				–	0	0.05	
Output Voltage: High-Level, V_{OH} Min.	–	0.5	5	4.95				4.95	5	–	
	–	0.10	10	9.95				9.95	10	–	
	–	0.15	15	14.95				14.95	15	–	
Input Low Voltage, V_{IL} Max.	0.5,4.5	–	5	1				–	–	1	V
	1,9	–	10	2				–	–	2	
	1.5,13.5	–	15	2.5				–	–	2.5	
Input High Voltage, V_{IH} Min.	0.5,4.5	–	5	4				4	–	–	
	1,9	–	10	8				8	–	–	
	1.5,13.5	–	15	12.5				12.5	–	–	
Input Current, I_{IN} Max.	–	0.18	18	±0.1	±0.1	±1	±1	–	$±10^{-5}$	±0.1	µA

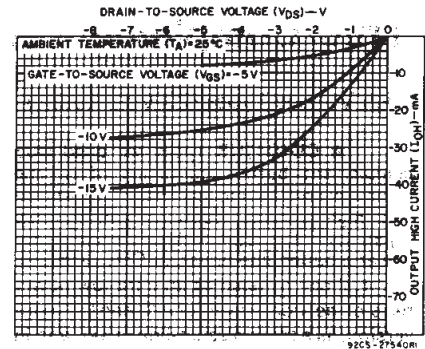Fig.5 — Minimum output high (source) current characteristics.
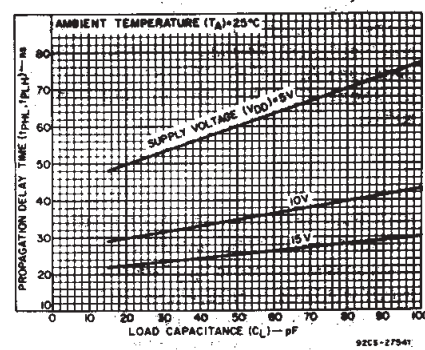

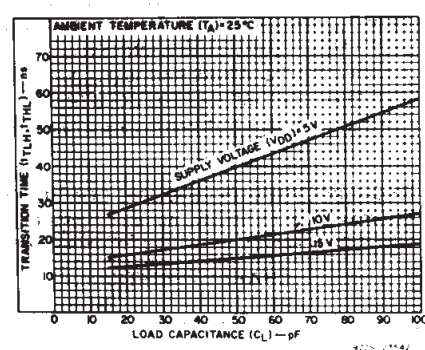Fig.6 — Typical propagation delay time vs. load capacitance.

Fig.7 — Typical transition time vs. load capacitance.

Fig.8 — Minimum and maximum transfer characteristics — true output.

DYNAMIC ELECTRICAL CHARACTERISTICS at T_A = 25°C, Input t_r,t_f = 20 ns, C_L = 50 pF, R_L = 200 kΩ

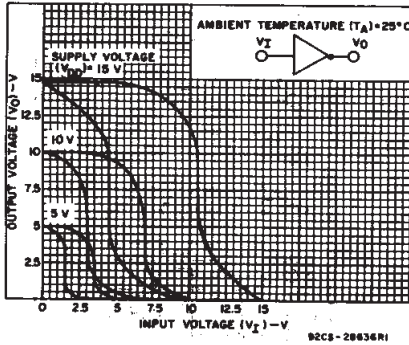| CHARACTERISTIC	CONDITIONS	LIMITS		UNITS
	V_{DD} Volts	Typ.	Max.	
Propagation Delay Time: t_{PHL}, t_{PLH}	5	60	120	ns
	10	35	70	
	15	25	50	
Transition Time t_{THL}, t_{TLH}	5	40	80	ns
	10	20	40	
	15	15	30	
Input Capacitance C_{IN}	Any Input	15	22.5	pF

Fig.9 — Minimum and maximum transfer
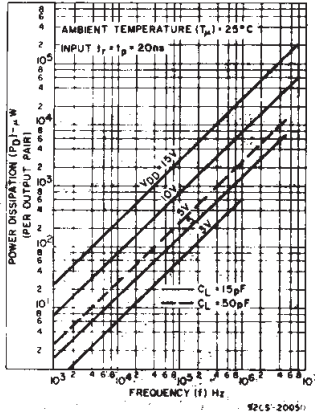characteristics — complement output.

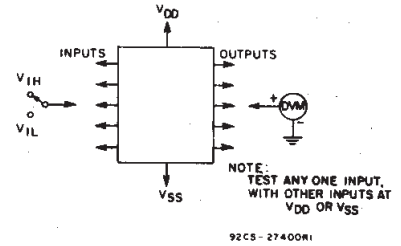Fig.11 — Typical power dissipation vs
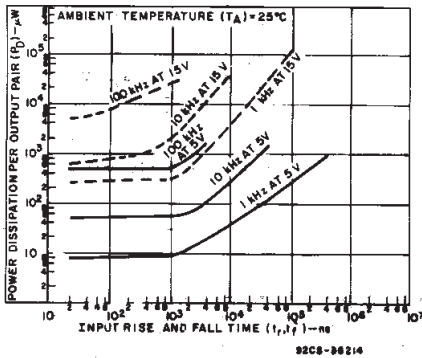frequency per output pair.

Fig.13 — Input voltage test circuit.

Fig.10 — Typical power dissipation vs. input
rise & fall time per output pair.
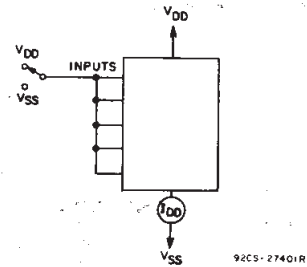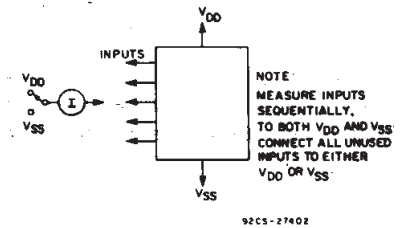

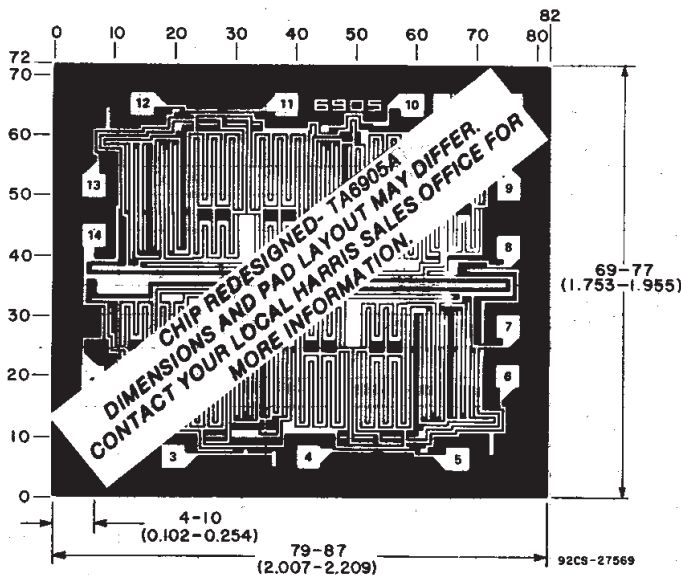
Fig.12 — Quiescent device current test circuit.

Fig.14 — Input-leakage-current test circuit.

Dimensions and pad layout for the CD4041UBH

Dimensions in parentheses are in millimeters and are
derived from the basic inch dimensions as indicated
Grid graduations are in mils (10^{-3} inch).

Commercial CMOS HIGH VOLTAGE ICs 3

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