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ECL Products	

10123
Bus Driver

Triple 4-3-3-Input Bus Driver

FEATURES

- **Typical propagation delay: 3.0ns**
- **Typical supply current ($-I_{EE}$): 71mA**

DESCRIPTION

The 10123 consists of three NOR Gates for use as Drivers. Each can drive a bus with characteristic impedance of not less than 25Ω, such as the case of a bus terminated at both ends in 50Ω. When the output is Low it presents a high impedance to the bus so that its characteristic impedance is not reduced. All unused inputs can be left open due to integrated pull-down resistors which avoid the need for a supply voltage.

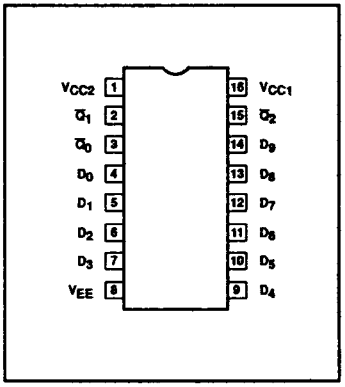
ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16–Pin Plastic DIP	10123N
16–Pin Ceramic DIP	10123F

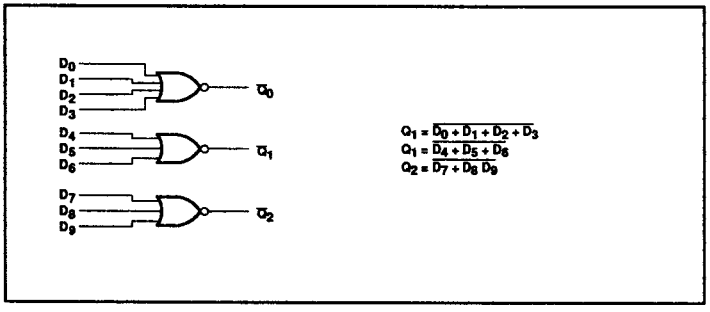
PIN DESCRIPTION

PINS	DESCRIPTION
$D_0 - D_9$	Data Inputs
$\overline{Q}_0 - \overline{Q}_2$	Data Outputs

PIN CONFIGURATION



LOGIC DIAGRAM



$Q_0 = \overline{D_0 + D_1 + D_2 + D_3}$
$Q_1 = \overline{D_4 + D_5 + D_6}$
$Q_2 = \overline{D_7 + D_8 D_9}$

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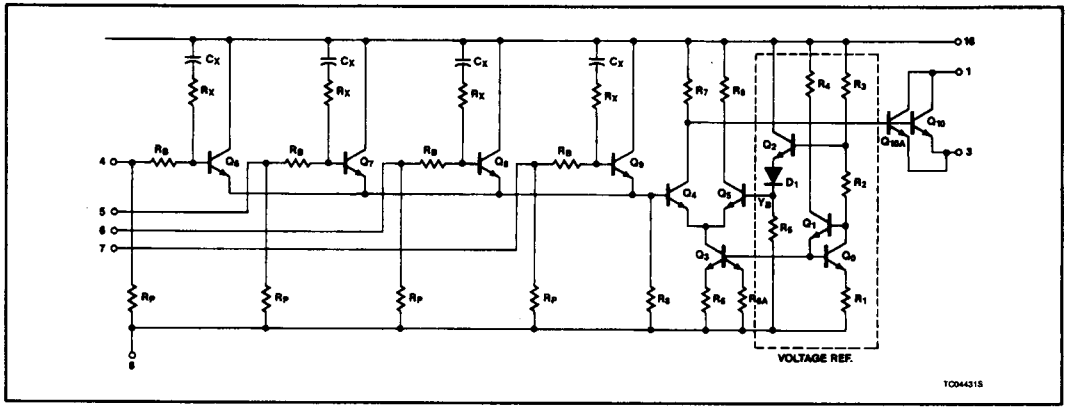
SIMPLIFIED SCHEMATIC



ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER		LIMITS	UNIT
V_{EE}	Supply voltage		–8.0	V
V_{IN}	Input voltage (V_{IN} should never be more negative than V_{EE})		0 to V_{EE}	V
I_O	Output source current (continuous)		–50	mA
T_S	Storage temperature range		–55 to +150	°C
T_J	Maximum junction temperature	Ceramic Package	+165	°C
		Plastic Package	+150	°C

NOTE:
Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted, these limits are specified over the operating ambient temperature range.

DC OPERATING CONDITIONS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN.	NOM.	MAX.	
V_{CC1}, V_{CC2}	Circuit ground		0	0	0	V
V_{EE}	Supply voltage (negative)			–5.2		V
V_{IH}	High level input voltage	T_A = –30°C			–890	mV
		T_A = +25°C			–810	mV
		T_A = +85°C			–700	mV
V_{IHT}	High level input threshold voltage	T_A = –30°C	–1205			mV
		T_A = +25°C	–1105			mV
		T_A = +85°C	–1035			mV
V_{ILT}	Low level input threshold voltage	T_A = –30°C			–1500	mV
		T_A = +25°C			–1475	mV
		T_A = +85°C			–1440	mV
V_{IL}	Low level input voltage	T_A = –30°C	–1890			mV
		T_A = +25°C	–1850			mV
		T_A = +85°C	–1825			mV
T_A	Operating ambient temperature range		–30	+25	+85	°C

NOTE:
When operating at other than the specified V_{EE} voltage (–5.2V), the DC and AC Electrical Characteristics will vary slightly from specified values.

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DC ELECTRICAL CHARACTERISTICS

$V_{CC1} = V_{CC2}$ = ground, V_{EE} = –5.2V ± 0.010V, T_A = –30°C to +85°C output loading with 25Ω to –2.1V ± 0.010V unless otherwise specified[1,3]

SYMBOL	PARAMETER	TEST CONDITIONS[2]		LIMITS MIN.	LIMITS TYP.	LIMITS MAX.	UNIT
V_{OH}	High level output voltage	T_A = –30°C	Apply V_{ILMIN} to all inputs.	–1060		–890	mV
		T_A = +25°C		–960		–810	mV
		T_A = +85°C		–890		–700	mV
V_{OHT}	High level output threshold voltage	T_A = –30°C	Apply V_{ILT} to one input of each	–1080			mV
		T_A = +25°C	gate, one at a time, with V_{ILMIN}	–980			mV
		T_A = +85°C	applied to all other inputs.	–910			mV
V_{OLT}	Low level output threshold voltage	T_A = –30°C	Apply V_{ILT} to one input of each			–2010	mV
		T_A = +25°C	gate, one at a time, with V_{ILMIN}			–2010	mV
		T_A = +85°C	applied to all other inputs.			–2010	mV
V_{OL}	Low level output voltage	T_A = –30°C	Apply V_{IHMAX} to all inputs.	–2100		–2030	mV
		T_A = +25°C		–2100		–2030	mV
		T_A = +85°C		–2100		–2030	mV
I_{IH}	High level input current	T_A = –30°C	Apply V_{IHMAX} to each input under			350	µA
		T_A = +25°C	test, one at a time, with V_{ILMIN}			220	µA
		T_A = +85°C	applied to all other inputs.			220	µA
I_{IL}	Low level input current	T_A = –30°C	Apply V_{IHMAX} to each input under	0.5			µA
		T_A = +25°C	test, one at a time, with V_{IHMAX}	0.5			µA
		T_A = +85°C	applied to all other inputs.	0.3			µA
$-I_{EE}$	V_{EE} supply current	T_A = –30°C	Apply V_{IHMAX} to all inputs.			82	mA
		T_A = +25°C			71	75	mA
		T_A = +85°C				82	mA
$\frac{\Delta V_{OH}}{\Delta V_{EE}}$	High level output voltage compensation	T_A = +25°C			0.016		V/V
$\frac{\Delta V_{OL}}{\Delta V_{EE}}$	Low level output voltage compensation				0.250		V/V
$\frac{\Delta V_{BB}}{\Delta V_{EE}}$	Reference bias voltage compensation				0.148		V/V

NOTES:

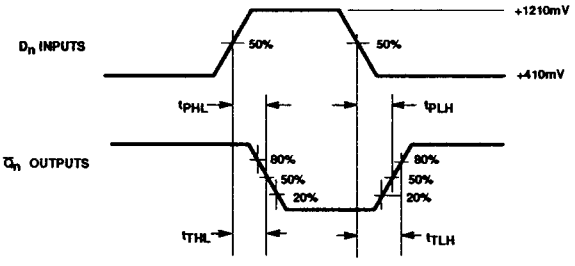
1. The specified limits represent the worst case values for the parameter. Since these worst case values normally occur at the supply voltage and temperature extremes, additional noise immunity can be achieved by decreasing the allowable operating condition ranges.
2. Conditions for testing shown in the tables are not necessarily worst case. For worst case testing guidelines, refer to DC Testing, Chapter 1, Section 3.
3. The specified limits shown in the DC Electrical Characteristics table can be met only after thermal equilibrium has been established. Thermal equilibrium is established by applying power for at least 2 minutes, while maintaining transverse airflow of 2.5 meters/sec (500 linear feet/min) over the device, mounted either in a test socket or on a printed circuit board. Test voltage values are given in the DC Operating Conditions table.

AC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2} = \text{ground}, V_{EE} = -5.2V \pm 0.010V$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS							UNIT
			$T_A = -30°C$		$T_A = +25°C$			$T_A = +85°C$		
			MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
t_{PLH} t_{PHL}	Propagation delay D_n to $\overline{O}_n$	Waveform 1	1.20 1.20	4.60 4.60	1.20 1.20	3.00 3.00	4.40 4.40	1.20 1.20	4.80 4.80	ns ns
t_{TLH} t_{THL}	Transition time 20% to 80%, 80% to 20%	Waveform 1	1.00 1.00	3.70 3.70	1.00 1.00	2.50 2.50	3.50 3.50	1.00 1.00	3.90 3.90	ns ns

NOTE:
For AC test setup information, see AC Testing, Chapter 2, Section 3.

AC WAVEFORMS



Waveform 1. Propagation Delay and Transition Times

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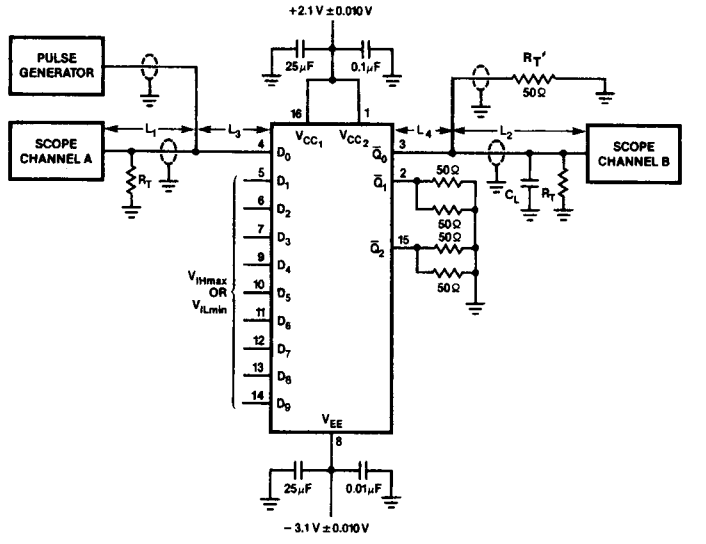
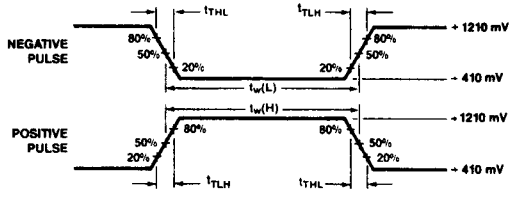
AC TEST CIRCUIT



NOTES:

1. $V_{CC1} = V_{CC2} = +2.1V \pm 0.010V$, $V_{EE} = -3.1V \pm 0.010V$
2. Decoupling 0.1μF and 25μF from GND to V_{CC}. 0.01μF and 25μF from GND to V_{EE}. (0.01 and 0.1μF capacitors should be NPO Ceramic or MLC type). Decoupling capacitors should be placed as close as physically possible to the DUT and lead length should be kept to less than 1/4 inch (6mm).
3. All unused inputs should be connected to either HIGH or LOW state consistent with the LOGIC function required.
4. All unused outputs are loaded with 25Ω to GND.
5. L_1 and L_2 are equal length 50Ω impedance lines. L_3 and L_4, the distance from the DUT input and output pins to the junction of their respective interconnecting cables, should not exceed 1/4 inch (6mm).
6. $R_T = 50\Omega$ terminator internal to Scope. $R_T' = 50\Omega$ termination resistor at the end of a 50Ω impedance line, the length of which is irrelevant but should be kept as short as possible to reduce stray capacitance.
7. The unmatched wire stub between coaxial cable and pins under test must be less than 1/4 inch (6mm) long for proper test.
8. C_L = Fixture and stray capacitance $\leq$ 3pF.
9. Any unterminated stubs connected anywhere along the transmission line between the Pulse Generator and the DUT or between the DUT and the Scope should not exceed 1/4 inch (6mm) in length (refer to section on AC setup procedure).
10. All 50Ω resistors should have tolerance of ±1% or better.

INPUT PULSE DEFINITION



INPUT PULSE REQUIREMENTS $V_{CC1} = V_{CC2} = +2.1V \pm 0.010V$, $V_{EE} = -3.1V \pm 0.010V$, V_T = GND (0V)					
Family	**Amplitude**	**Rep Rate**	**Pulse Width**	**t_{TLH}**	**t_{THL}**
10K ECL	800mVp-p	1MHz	500ns	2.0 ±0.2ns	2.0 ±0.2ns