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ECL Products	

10164
Multiplexer

8-Input Multiplexer with Enable Input

FEATURES
- Typical propagation delay: 3.0ns
- Typical supply current ($-I_{EE}$): 60mA

DESCRIPTION
The 10164 performs 8-input multiplexing with enable input. The output goes LOW when not enabled, thus permitting expansion of multiplexers by wire-ORing. All unused inputs can be left open due to integrated pull-down resistors which avoid the need for a supply voltage.
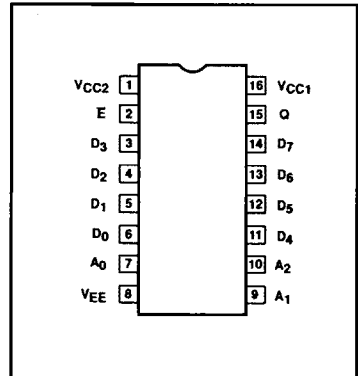
ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16–Pin Plastic DIP	10164N
16–Pin Ceramic DIP	10164F
16–Pin SO	10164D

PIN DESCRIPTION

PINS	DESCRIPTION
$D_0 - D_7$	Data Inputs
$A_0 - A_2$	Address Inputs
E	Enable Input
Q	Data Output

PIN CONFIGURATION

	Pin		Pin	
V_{CC2}	1		16	V_{CC1}
E	2		15	Q
D_3	3		14	D_7
D_2	4		13	D_6
D_1	5		12	D_5
D_0	6		11	D_4
A_0	7		10	A_2
V_{EE}	8		9	A_1

LOGIC DIAGRAM

A_0 to A_2 = address inputs; D_0 to D_7 = data inputs; E = enable input
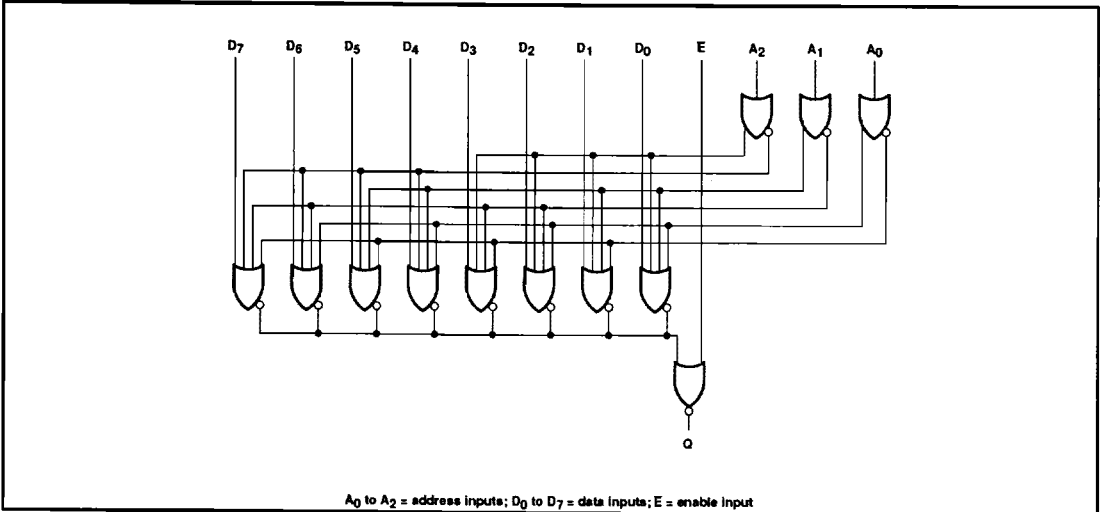
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FUNCTION TABLE

INPUTS												OUTPUT
A_0	A_1	A_2	E	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	Q
L	L	L	L	L	X	X	X	X	X	X	X	L
L	L	L	L	H	X	X	X	X	X	X	X	H
H	L	L	L	X	L	X	X	X	X	X	X	L
H	L	L	L	X	H	X	X	X	X	X	X	H
L	H	L	L	X	X	L	X	X	X	X	X	L
L	H	L	L	X	X	H	X	X	X	X	X	H
H	H	L	L	X	X	X	L	X	X	X	X	L
H	H	L	L	X	X	X	H	X	X	X	X	H
L	L	H	L	X	X	X	X	L	X	X	X	L
L	L	H	L	X	X	X	X	H	X	X	X	H
H	L	H	L	X	X	X	X	X	L	X	X	L
H	L	H	L	X	X	X	X	X	H	X	X	H
L	H	H	L	X	X	X	X	X	X	L	X	L
L	H	H	L	X	X	X	X	X	X	H	X	H
H	H	H	L	X	X	X	X	X	X	X	L	L
H	H	H	L	X	X	X	X	X	X	X	H	H
X	X	X	H	X	X	X	X	X	X	X	X	L

H = High Voltage Level
L = Low Voltage Level
X = Don't Care

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 50Ω to –2.0V ± 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	Using V_{IHMAX} and V_{ILMIN}, apply a functional	–1060		–890	mV
		T_A = +25°C	pattern as indicated in the Function Table	–960		–810	mV
		T_A = +85°C	and measure V_{OH} on the output.	–890		–700	mV
V_{OHT}	High level output threshold voltage	T_A = –30°C	Apply V_{ILT} to $\overline{E}$ input and apply a functional	–1080			mV
		T_A = +25°C	pattern using V_{IHMAX} and V_{ILMIN} as indicated in the Function Table and	–980			mV
		T_A = +85°C	measure V_{OHT} on the output.	–910			mV
V_{OLT}	Low level output threshold voltage	T_A = –30°C	Apply V_{IHT} to $\overline{E}$ input			–1655	mV
		T_A = +25°C	with V_{IHMAX} applied			–1630	mV
		T_A = +85°C	to all other inputs.			–1595	mV
V_{OL}	Low level output voltage	T_A = –30°C	Apply V_{IHMAX} to all inputs. Apply	–1890		–1675	mV
		T_A = +25°C	V_{IHMAX} to $\overline{E}$ input. with V_{ILMIN}	–1850		–1650	mV
		T_A = +85°C	applied to all other inputs.	–1825		–1615	mV
I_{IH}	High level input current	T_A = –30°C	Apply V_{IMAX} to each input under			425	μA
		T_A = +25°C	test, one at a time, with V_{ILMIN}			265	μA
		T_A = +85°C	applied to all other inputs.			265	μA
I_{IL}	Low level input current	T_A = –30°C	Apply V_{ILMIN} 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				83	mA
		T_A = +25°C			60	75	mA
		T_A = +85°C				83	mA
$\dfrac{\Delta V_{OH}}{\Delta V_{EE}}$	High level output voltage compensation				0.016		V/V
$\dfrac{\Delta V_{OL}}{\Delta V_{EE}}$	Low level output voltage compensation	T_A = +25°C			0.250		V/V
$\dfrac{\Delta V_{BB}}{\Delta V_{EE}}$	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.

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AC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2}$ = ground, V_{EE} = −5.2V ± 0.010V

SYMBOL	PARAMETER	TEST CONDITIONS	$T_A = -30°C$		$T_A = +25°C$			$T_A = +85°C$		UNIT
			MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
t_{PLH}	Propagation delay		1.50	4.70	1.50	3.00	4.50	1.60	4.80	ns
t_{PHL}	D_n to Q		1.50	4.70	1.50	3.00	4.50	1.60	4.80	ns
t_{PLH}	Propagation delay		1.90	6.30	2.00	4.00	6.00	2.20	6.50	ns
t_{PHL}	A_n to Q	Waveform 1	1.90	6.30	2.00	4.00	6.00	2.20	6.50	ns
t_{PLH}	Propagation delay		0.90	3.30	1.00	2.00	2.90	1.00	3.10	ns
t_{PHL}	E to Q		0.90	3.30	1.00	2.00	2.90	1.00	3.10	ns
t_{TLH}	Transition time		0.90	3.30	1.10	2.00	3.30	1.20	3.60	ns
t_{THL}	20% to 80%, 80% to 20%		0.90	3.30	1.10	2.00	3.30	1.20	3.60	ns

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

AC WAVEFORMS
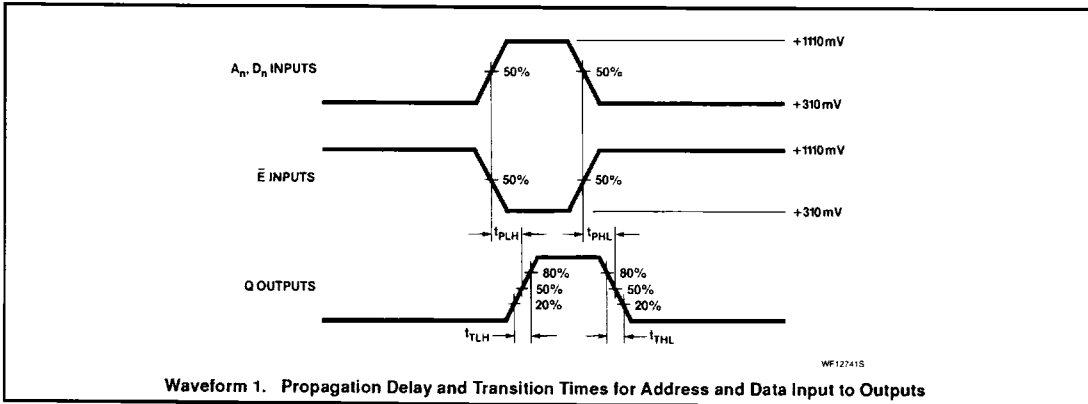
Waveform 1.   Propagation Delay and Transition Times for Address and Data Input to Outputs