

Philips Components

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ECL Products	

10108
Gate

Dual 4-Input AND/NAND Gate

FEATURES

- Typical propagation delay: 2.3ns for AND output, 2.8ns for NAND output
- Typical supply current ($-I_{EE}$): 28mA

DESCRIPTION

The 10108 is a Dual AND/NAND Gate. All unused inputs can be left open due to integrated pull-down resistors which avoid the need for a supply voltage.

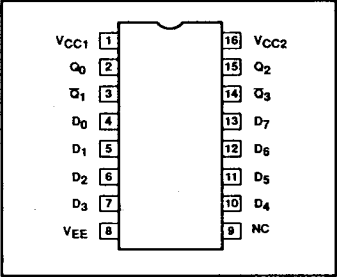
ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16-Pin Plastic DIP	10108N
16-Pin Ceramic DIP	10108F

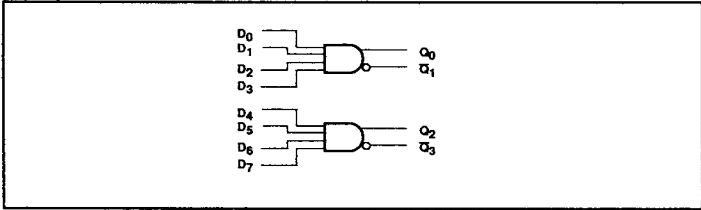
PIN DESCRIPTION

PINS	DESCRIPTION
$D_0 - D_7$	Data Inputs
Q_0, Q_2	Data Outputs (AND)
$\bar{Q}_1, \bar{Q}_3$	Data Outputs (NAND)

PIN CONFIGURATION



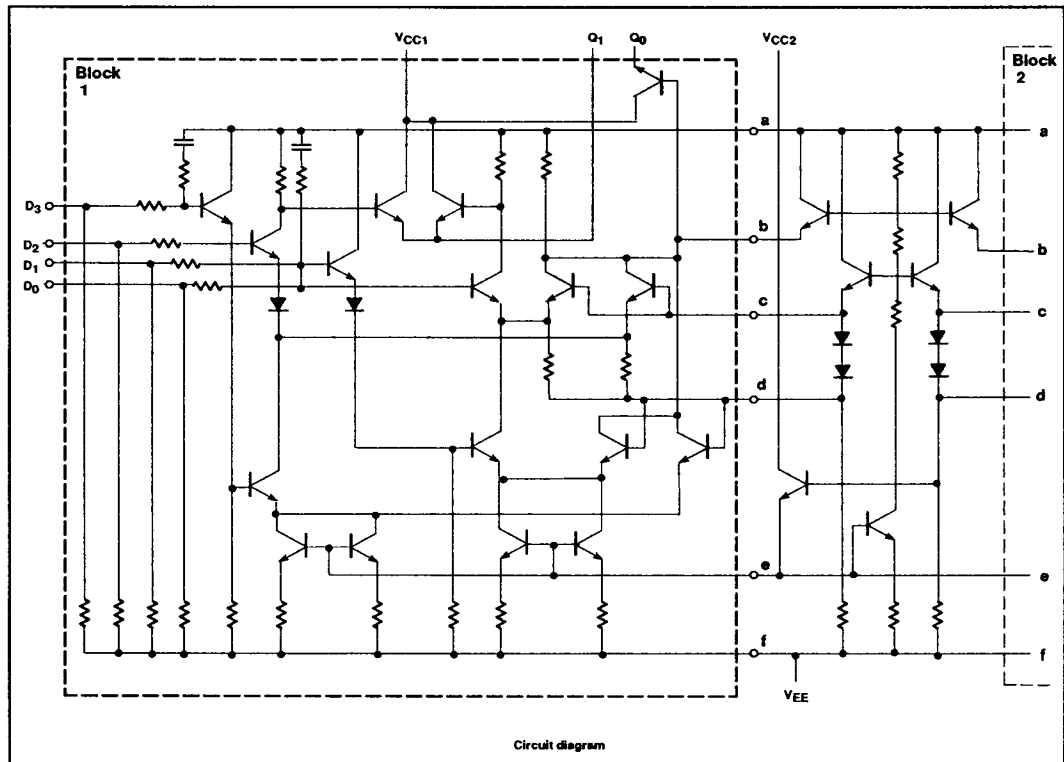
LOGIC DIAGRAM



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SIMPLIFIED SCHEMATIC



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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	$T_A = -30^\circ\text{C}$			-890	mV
		$T_A = +25^\circ\text{C}$			-810	mV
		$T_A = +85^\circ\text{C}$			-700	mV
V_{IHT}	High level input threshold voltage	$T_A = -30^\circ\text{C}$	-1205			mV
		$T_A = +25^\circ\text{C}$	-1105			mV
		$T_A = +85^\circ\text{C}$	-1035			mV
V_{ILT}	Low level input threshold voltage	$T_A = -30^\circ\text{C}$			-1500	mV
		$T_A = +25^\circ\text{C}$			-1475	mV
		$T_A = +85^\circ\text{C}$			-1440	mV
V_{IL}	Low level input voltage	$T_A = -30^\circ\text{C}$	-1890			mV
		$T_A = +25^\circ\text{C}$	-1850			mV
		$T_A = +85^\circ\text{C}$	-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 $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -5.2V \pm 0.010V$, $T_A = -30^\circ\text{C}$ to $+85^\circ\text{C}$ output loading 50Ω to $-2.0V \pm 0.010V$ unless otherwise specified^{1,3}

SYMBOL	PARAMETER	TEST CONDITIONS ²		LIMITS			UNIT
				MIN.	TYP.	MAX.	
V_{OH}	High level output voltage	$T_A = -30^\circ\text{C}$	For Q_n outputs, apply V_{IHMAX} to	-1060		-890	mV
		$T_A = +25^\circ\text{C}$	all inputs. For $\bar{Q}_n$ outputs, apply	-960		-810	mV
		$T_A = +85^\circ\text{C}$	V_{ILMIN} to all inputs.	-890		-700	mV
V_{OHT}	High level output threshold voltage	$T_A = -30^\circ\text{C}$	For Q_n outputs, apply V_{IHT} to each input,	-1080			mV
		$T_A = +25^\circ\text{C}$	one at a time, w/ V_{IHMAX} applied to all other inputs. For $\bar{Q}_n$ outputs, apply V_{ILT} to each	-980			mV
		$T_A = +85^\circ\text{C}$	input w/ V_{IHMAX} applied to all other inputs.	-910			mV
V_{OLT}	Low level output threshold voltage	$T_A = -30^\circ\text{C}$	For Q_n outputs, apply V_{ILT} to each input,			-1655	mV
		$T_A = +25^\circ\text{C}$	one at a time, w/ V_{IHMAX} applied to all other inputs. For $\bar{Q}_n$ outputs, apply V_{IHT} to each			-1630	mV
		$T_A = +85^\circ\text{C}$	input w/ V_{IHMAX} applied to all other inputs.			-1595	mV
V_{OL}	Low level output voltage	$T_A = -30^\circ\text{C}$	For Q_n outputs, apply V_{ILMIN} to	-1890		-1675	mV
		$T_A = +25^\circ\text{C}$	all inputs. For $\bar{Q}_n$ outputs, apply	-1850		-1650	mV
		$T_A = +85^\circ\text{C}$	V_{IHMAX} to all inputs.	-1825		-1615	mV
I_{IH}	High level input current	$T_A = -30^\circ\text{C}$	Apply V_{IHMAX} to each input under			425	μA
		$T_A = +25^\circ\text{C}$	test, one at a time, with V_{ILMIN}			265	μA
		$T_A = +85^\circ\text{C}$	applied to all other inputs.			265	μA
I_{IL}	Low level input current	$T_A = -30^\circ\text{C}$	Apply V_{ILMIN} to each input under	0.5			μA
		$T_A = +25^\circ\text{C}$	test, one at a time, with V_{IHMAX}	0.5			μA
		$T_A = +85^\circ\text{C}$	applied to all other inputs.	0.3			μA
$-I_{EE}$	V_{EE} supply current	$T_A = -30^\circ\text{C}$				40	mA
		$T_A = +25^\circ\text{C}$			28	36	mA
		$T_A = +85^\circ\text{C}$				40	mA
$\frac{\Delta V_{OH}}{\Delta V_{EE}}$	High level output voltage compensation	$T_A = +25^\circ\text{C}$			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.

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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 Q _n , Q̄ _n	Waveform 1	1.40 1.40	4.10 4.10	1.40 1.40	2.30 2.30	3.70 3.70	1.40 1.40	4.10 4.10	ns ns	
t _{TLH} t _{THL}	Transition time 20% to 80%, 80% to 20%	Waveform 1	1.10 1.10	4.50 4.50	1.10 1.10	2.80 2.80	4.00 4.00	1.10 1.10	4.50 4.50	ns ns	

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

AC WAVEFORMS

