

Philips Components—Signetics

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ECL Products	

10102

Gate

Quad 2-Input NOR (2 NOR and 1 OR/NOR) Gate

FEATURES

- Typical propagation delay: 2.0ns
- Typical supply current ($-I_{EE}$): 20mA

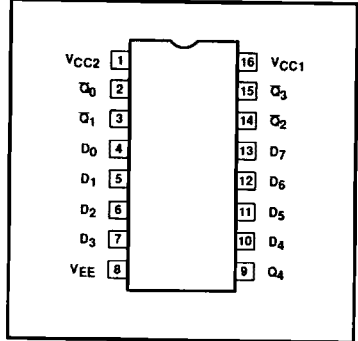
DESCRIPTION

The 10102 is a Quad 2-Input NOR 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	10102N
16-Pin Ceramic DIP	10102F
16-Pin SO	10102D

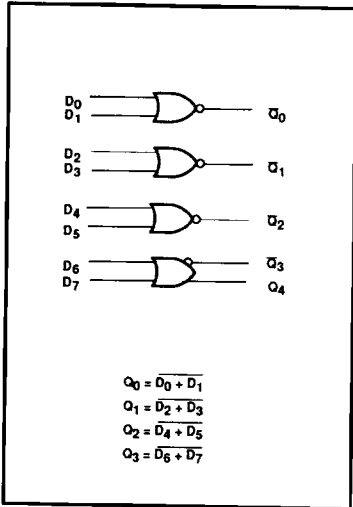
PIN CONFIGURATION



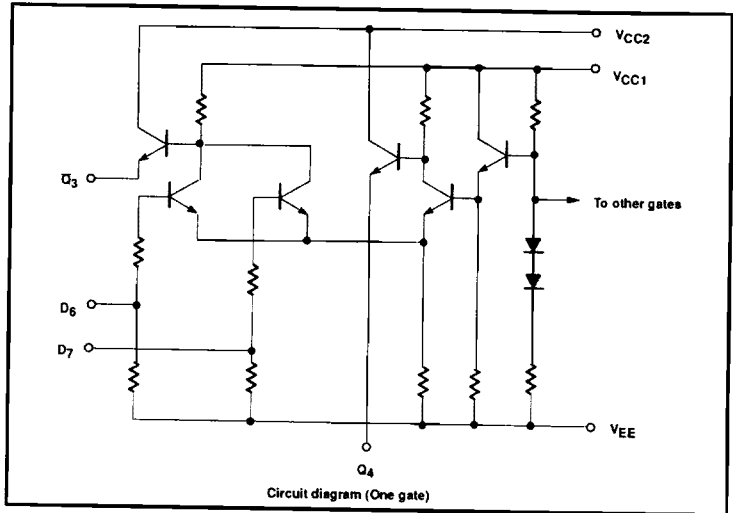
PIN DESCRIPTION

PINS	DESCRIPTION
$D_0 - D_7$	Data Inputs
Q_4	Data Output (OR)
$\bar{Q}_0 - \bar{Q}_3$	Data Outputs (NOR)

LOGIC DIAGRAM



SIMPLIFIED SCHEMATIC



Gate

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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 \bar{Q}_n outputs, apply V_{ILMIN} to	-1060		-890	mV
		$T_A = +25^\circ\text{C}$	all inputs. For Q_4 output, apply	-960		-810	mV
		$T_A = +85^\circ\text{C}$	V_{IHMAX} to all inputs.	-890		-700	mV
V_{OHT}	High level output threshold voltage	$T_A = -30^\circ\text{C}$	For \bar{Q}_n outputs, apply V_{ILT} to one gate input	-1080			mV
		$T_A = +25^\circ\text{C}$	with V_{ILMIN} applied to the other gate input. For Q_4 outputs, apply V_{IHT} to one gate input	-980			mV
		$T_A = +85^\circ\text{C}$	with V_{ILMIN} applied to the other gate input.	-910			mV
V_{OLT}	Low level output threshold voltage	$T_A = -30^\circ\text{C}$	For \bar{Q}_n outputs, apply V_{IHT} to one gate input			-1655	mV
		$T_A = +25^\circ\text{C}$	with V_{ILMIN} applied to the other gate input. For Q_4 output, apply V_{ILT} to one gate input			-1630	mV
		$T_A = +85^\circ\text{C}$	with V_{ILMIN} applied to the other gate input.			-1595	mV
V_{OL}	Low level output voltage	$T_A = -30^\circ\text{C}$	For \bar{Q}_n outputs, apply V_{IHMAX} to	-1890		-1675	mV
		$T_A = +25^\circ\text{C}$	all inputs. For Q_4 output, apply	-1850		-1650	mV
		$T_A = +85^\circ\text{C}$	V_{ILMIN} 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 test.			425	μA
		$T_A = +25^\circ\text{C}$	one at a time, with V_{ILMIN} applied to			265	μA
		$T_A = +85^\circ\text{C}$	all other inputs.			265	μA
I_{IL}	Low level input current	$T_A = -30^\circ\text{C}$	Apply V_{ILMIN} to each input under test,	0.5			μA
		$T_A = +25^\circ\text{C}$	one at a time, with V_{IHMAX} applied to	0.5			μA
		$T_A = +85^\circ\text{C}$	all other inputs.	0.3			μA
$-I_{EE}$	V_{EE} supply current	$T_A = -30^\circ\text{C}$				29	mA
		$T_A = +25^\circ\text{C}$		20	26		mA
		$T_A = +85^\circ\text{C}$				29	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:

- 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.
- 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.
- 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	
			$T_A = -30^\circ\text{C}$		$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$		
			MIN.	MAX.	MIN.	TYP.	MAX.	MIN.		MAX.
t_{PLH} t_{PHL}	Propagation delay D_n to Q_n , Q_4	Waveform 1	1.00 1.00	3.10 3.10	1.00 1.00	2.00 2.00	2.90 2.90	1.00 1.00	3.30 3.30	ns ns
t_{TLH} t_{THL}	Transition time 20% to 80%, 80% to 20%	Waveform 1	1.10 1.10	3.60 3.60	1.10 1.10	2.00 2.00	3.30 3.30	1.10 1.10	3.70 3.70	ns ns

NOTE:

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

AC WAVEFORMS

