

## Philips Components

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# 10165

## Priority Encoder/Latch

### 8-Input Priority Encoder

#### FEATURES

- Typical propagation delay: 4.5ns
- Typical supply current ( $-I_{EE}$ ): 105mA

#### DESCRIPTION

The 10165 is able to encode eight inputs to binary coded outputs. Each output is stored in a D-type latch which allows synchronous operation. When the clock input is Low the outputs follow the inputs and latch when the clock goes High. The output code is that of the highest order input so that any input of lower priority is ignored.

The input is active when High (e.g., the three binary outputs are Low when input  $D_0$  is High). Output  $Q_3$  is High when any input is High, which allows direct extension into another priority encoder when more than 8 inputs are used.

The device can be used in many applications, such as testing systems and checking system status in control processors processors and peripheral controllers. It can also be used to generate binary codes from random logic inputs, for addressing ROMs, RAMs, or for multiplexing data.

All unused inputs must be tied Low to  $V_{IL}$  or  $V_{EE}$ .

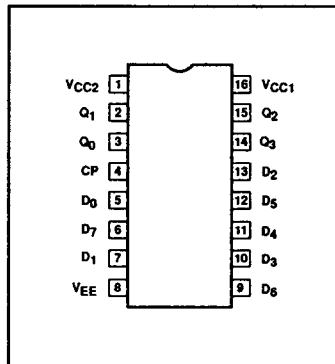
#### ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16-Pin Plastic DIP	10165N
16-Pin Ceramic DIP	10165F

#### PIN DESCRIPTION

PINS	DESCRIPTION
$D_0 - D_7$	Data Inputs
CP	Clock Input
$Q_0 - Q_3$	Data Outputs

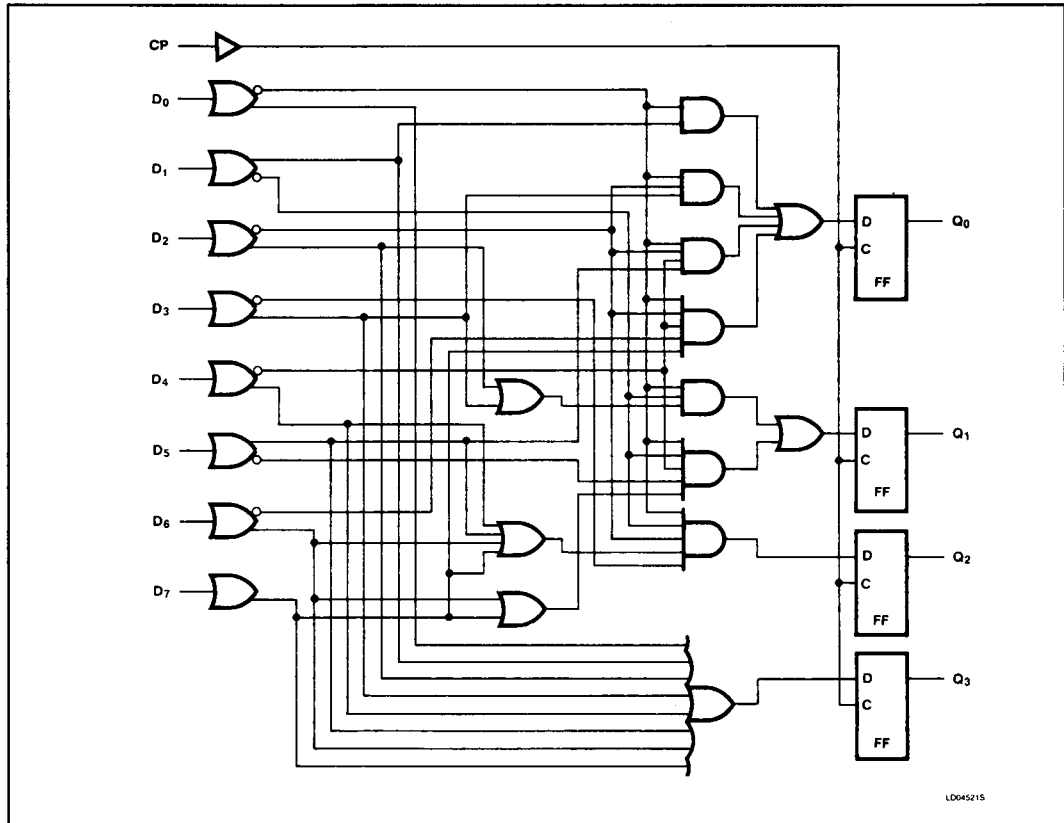
#### PIN CONFIGURATION



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## LOGIC DIAGRAM



## FUNCTION TABLE

INPUTS								OUTPUTS			
D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	D <sub>7</sub>	Q <sub>3</sub>	Q <sub>2</sub>	Q <sub>1</sub>	Q <sub>0</sub>
H	X	X	X	X	X	X	X	H	L	L	L
L	H	X	X	X	X	X	X	H	L	L	H
L	L	H	X	X	X	X	X	H	L	H	L
L	L	L	H	X	X	X	X	H	L	H	H
L	L	L	L	H	X	X	X	H	H	L	L
L	L	L	L	L	H	X	X	H	H	L	H
L	L	L	L	L	L	H	X	H	H	H	L
L	L	L	L	L	L	L	H	H	H	H	H
L	L	L	L	L	L	L	L	L	L	L	L

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

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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  $50\Omega$  to  $-2.0V \pm 0.010V$  unless otherwise specified<sup>1,3</sup>

SYMBOL	PARAMETER		TEST CONDITIONS <sup>2</sup>	LIMITS			UNIT
				MIN.	TYP.	MAX.	
$V_{OH}$	High level output voltage		$T_A = -30^\circ\text{C}$ Apply $V_{IHMAX}$ to $D_7$ input with $V_{ILMIN}$ applied to all other inputs.	-1060		-890	mV
			$T_A = +25^\circ\text{C}$	-960		-810	mV
			$T_A = +85^\circ\text{C}$	-890		-700	mV
$V_{OHT}$	High level output threshold voltage		$T_A = -30^\circ\text{C}$ Apply $V_{IHT}$ to $D_7$ input with $V_{ILMIN}$ applied to all other inputs.	-1080			mV
			$T_A = +25^\circ\text{C}$	-980			mV
			$T_A = +85^\circ\text{C}$	-910			mV
$V_{OLT}$	Low level output threshold voltage		$T_A = -30^\circ\text{C}$ Apply $V_{ILT}$ to CP input with $V_{ILMIN}$ applied to all other inputs.			-1655	mV
			$T_A = +25^\circ\text{C}$			-1630	mV
			$T_A = +85^\circ\text{C}$			-1595	mV
$V_{OL}$	Low level output voltage		$T_A = -30^\circ\text{C}$ Apply $V_{ILMIN}$ to all inputs.	-1890		-1675	mV
			$T_A = +25^\circ\text{C}$	-1850		-1650	mV
			$T_A = +85^\circ\text{C}$	-1825		-1615	mV
$I_{IH}$	High level input current	CP Input	$T_A = -30^\circ\text{C}$ Apply $V_{IHMAX}$ to CP input with $V_{ILMIN}$ applied to all other inputs.			390	$\mu\text{A}$
			$T_A = +25^\circ\text{C}$			245	$\mu\text{A}$
			$T_A = +85^\circ\text{C}$			245	$\mu\text{A}$
		Other Inputs	$T_A = -30^\circ\text{C}$ Apply $V_{IHMAX}$ to each input under test, one at a time, with $V_{ILMIN}$ applied to all other inputs.			350	$\mu\text{A}$
			$T_A = +25^\circ\text{C}$			220	$\mu\text{A}$
			$T_A = +85^\circ\text{C}$			220	$\mu\text{A}$
$I_{IL}$	Low level input current		$T_A = -30^\circ\text{C}$ Apply $V_{ILMIN}$ to each input under test, one at a time, with $V_{IHMAX}$ applied to all other inputs.	0.5			$\mu\text{A}$
			$T_A = +25^\circ\text{C}$	0.5			$\mu\text{A}$
			$T_A = +85^\circ\text{C}$	0.3			$\mu\text{A}$
$-I_{EE}$	$V_{EE}$ supply current		$T_A = -30^\circ\text{C}$			144	mA
			$T_A = +25^\circ\text{C}$		105	131	mA
			$T_A = +85^\circ\text{C}$			144	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 CONDITIONS	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 $Q_n$	Waveform 1	2.00	7.00	3.00	4.50	7.00	2.00	8.00	ns
			2.00	7.00	3.00	4.50	7.00	2.00	8.00	ns
$t_{PLH}$ $t_{PHL}$	Propagation delay CP to $Q_n$	Waveform 1	1.50	4.50	2.00	4.50	4.00	1.50	4.50	ns
			1.50	4.50	2.00	4.50	4.00	1.50	4.50	ns
$t_s(H)$ $t_s(L)$	Setup time $D_n$ to CP	Waveform 2	6.00		6.00	3.40		6.00		ns
			6.00		6.00	3.00		6.00		ns
$t_h(H)$ $t_h(L)$	Hold time $D_n$ to CP	Waveform 2	1.00		1.00	-2.30		1.00		ns
			1.00		1.00	-2.70		1.00		ns
$t_{TLH}$ $t_{THL}$	Transition time 20% to 80%, 80% to 20%	Waveform 1	1.10	3.50	1.10	2.00	3.30	1.10	3.50	ns
			1.10	3.50	1.10	2.00	3.30	1.10	3.50	ns

**NOTE:**

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

### AC WAVEFORMS

