

Philips Components

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Status	Product Specification
ECL Products	

100170

Demultiplexer/Decoder

FEATURES

- Typical propagation delay: 1.8ns
- Typical supply current ($-I_{EE}$): 110mA

DESCRIPTION

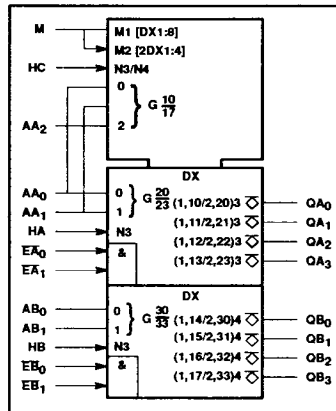
The 100170 operates as a Dual 1-of-4 Decoder, or as a Single 1-of-8 Decoder; the operating mode is fixed by the Mode Control input (M). The inputs HA, HB, HC determine whether the outputs are active Low or High. In the 1-of-8 mode, the two pairs of active Low Enables can be tied together (EA_0 to EB_0 , EA_1 to EB_1), to provide two active Low Enables (E_0 and E_1 , respectively).

All unused inputs can be left open due to integrated pull-down resistors.

PIN DESCRIPTION

PINS	DESCRIPTION
$AA_0 - AA_2$	Address Inputs
AB_0, AB_1	Address Inputs
EA_0, EA_1	Enable Inputs
EB_0, EB_1	Enable Inputs
M	Mode Control Input
HA, HB	Polarity Select Inputs
HC	Common Polarity Select Input
$QA_0 - QA_3$	Data Outputs
$QB_0 - QB_3$	Data Outputs

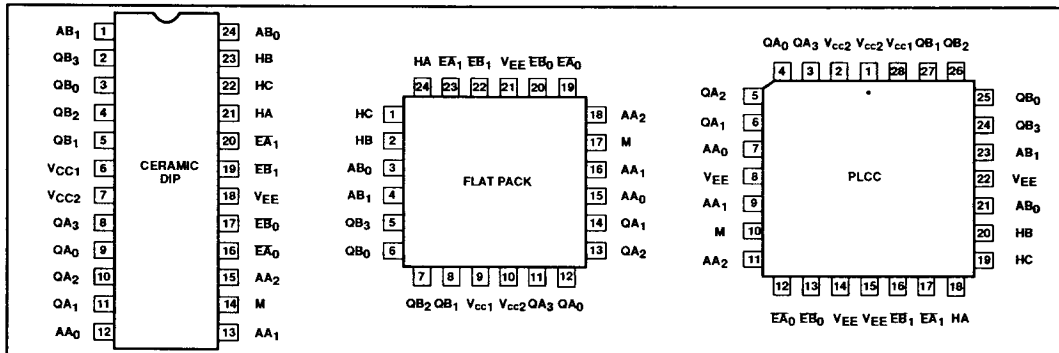
IEC/IEEE SYMBOL



ORDERING INFORMATION

DESCRIPTION	ORDER CODE
24-Pin Ceramic DIP (400 mils wide)	100170F
24-Pin Ceramic Flat Pack	100170Y
28-Pin PLCC	100170A

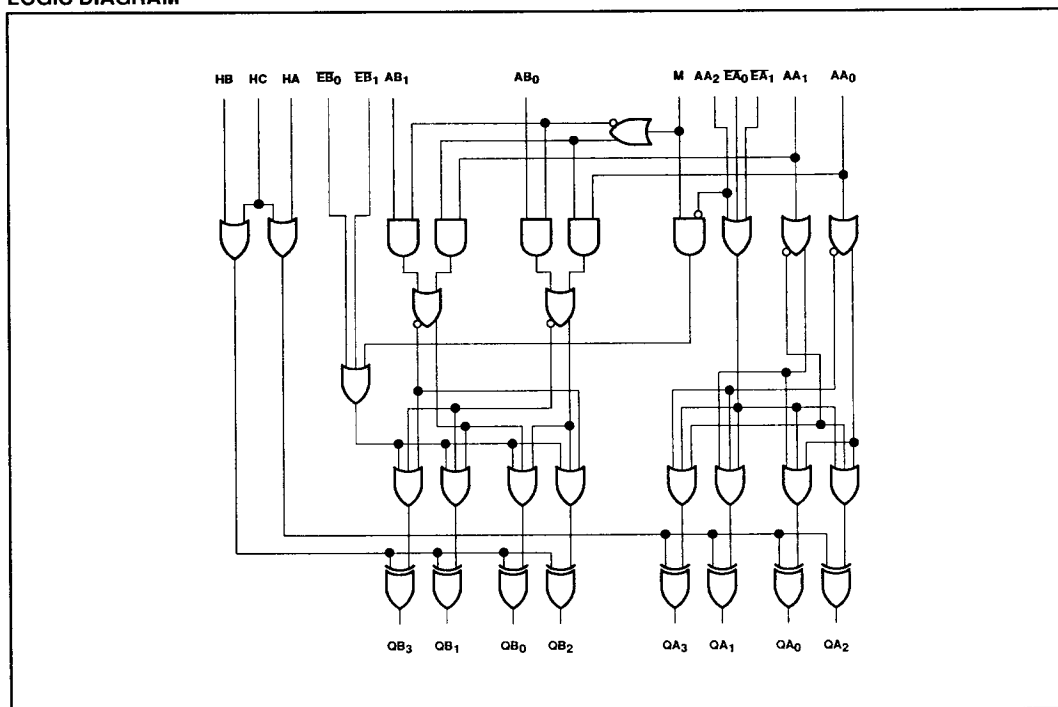
PIN CONFIGURATIONS



Demultiplexer/Decoder

100170

LOGIC DIAGRAM

FUNCTION TABLE (Dual 1-of-4 Mode) $M = AA_2 = HC = \text{Low}$

INPUTS				OUTPUTS							
				HA = HB = High				HA = HB = Low			
EA ₀ EB ₀	EA ₁ EB ₁	AA ₁ AB ₁	AA ₀ AB ₀	QA ₀ QB ₀	QA ₁ QB ₁	QA ₂ QB ₂	QA ₃ QB ₃	QA ₀ QB ₀	QA ₁ QB ₁	QA ₂ QB ₂	QA ₃ QB ₃
H X	X H	X X	X X	L L	L L	L L	L L	H H	H H	H H	H H
L	L	L	L	H	L	L	L	L	H	H	H
L	L	L	H	L	H	L	L	H	L	H	H
L	L	H	L	L	L	H	L	H	H	L	H
L	L	H	H	L	L	L	H	H	H	H	L

NOTES:

H = High voltage level

L = Low voltage level

X = Don't care

Demultiplexer/Decoder

100170

FUNCTION TABLE (Single 1-of-8 Mode) M = High, HA = HB = Low, AB₀ and AB₁ are "don't care".

INPUTS					OUTPUTS															
					HC = High								HC = Low							
E ₀	E ₁	AA ₀	AA ₁	AA ₂	QA ₀	QA ₁	QA ₂	QA ₃	QB ₀	QB ₁	QB ₂	QB ₃	QA ₀	QA ₁	QA ₂	QA ₃	QB ₀	QB ₁	QB ₂	QB ₃
H	X	X	X	X	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
X	H	X	X	X	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
L	L	L	L	L	H	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
L	L	L	L	L	L	H	L	L	L	L	L	L	H	L	H	H	H	H	H	H
L	L	L	H	L	L	L	H	L	L	L	L	L	H	H	L	H	H	H	H	H
L	L	L	H	L	L	L	L	H	L	L	L	L	H	H	H	L	H	H	H	H
L	L	L	H	L	L	L	L	L	H	L	L	L	H	H	H	H	L	H	H	H
L	L	L	H	L	L	L	L	L	L	H	L	L	H	H	H	H	H	L	H	H
L	L	L	H	L	L	L	L	L	L	L	H	L	H	H	H	H	H	H	L	H
L	L	L	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L

NOTES:

H = High voltage level

L = Low voltage level

X = Don't care

E₀ = EA₀ and EB₀ wired together.E₁ = EA₁ and EB₁ wired together.**ABSOLUTE MAXIMUM RATINGS** V_{CC1} = V_{CC2} = ground, T_A = 0°C to +85°C unless otherwise specified.

SYMBOL	PARAMETER	LIMITS	UNIT
V _{EE}	Supply voltage range	-7.0 to +0.5	V
V _{IN}	Input voltage (V _{IN} should never be more negative than V _{EE})	V _{EE} to +0.5	V
I _O	Output source current (continuous)	-55	mA
T _S	Storage temperature range	-65 to +150	°C
T _J	Maximum junction temperature	+150	°C

NOTE:

Operation beyond the limits set forth in this table may impair the useful life of the device.

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		-4.8	-4.5	-4.2	V
V _{EE}	Supply voltage when operating with the 10K or the 10KH ECL family		-5.7			V
V _{IH}	High level input voltage	V _{EE} = -4.2V	-1150			mV
		V _{EE} = -4.5V	-1165		-880	
		V _{EE} = -4.8V	-1165			
V _{IL}	Low level input voltage	V _{EE} = -4.2V			-1475	mV
		V _{EE} = -4.5V	-1810		-1475	mV
		V _{EE} = -4.8V			-1490	mV
T _A	Operating ambient temperature range		0	+25	+85	°C

NOTE:When operating at other than the specified V_{EE} voltages (-4.2V, -4.5V, -4.8V), the DC and AC electrical characteristics will vary slightly from their specified values.

Demultiplexer/Decoder

100170

DC ELECTRICAL CHARACTERISTICS $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8\text{V}$ to -4.2V , $T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$ unless otherwise specified^{1,3,4}

SYMBOL	PARAMETER	TEST CONDITIONS ²			LIMITS			UNIT	
					MIN.	TYP.	MAX.		
V _{OH}	High level output voltage	Outputs loaded with 50Ω to -2.0V ±0.010V	Inputs at V _{IHMAX} or V _{ILMIN}	V _{EE} = -4.2V	-1020		-870	mV	
				V _{EE} = -4.5V	-1025	-955	-880	mV	
				V _{EE} = -4.8V	-1035		-880	mV	
V _{OHT}	High level output threshold voltage		Apply V _{IHMIN} or V _{ILMAX} to one input at a time. Other inputs at V _{IHMAX} or V _{ILMIN} .	V _{EE} = -4.2V	-1030			mV	
				V _{EE} = -4.5V	-1035			mV	
				V _{EE} = -4.8V	-1045			mV	
V _{OLT}	Low level output threshold voltage		Apply V _{IHMIN} or V _{ILMAX} to one input at a time. Other inputs at V _{IHMAX} or V _{ILMIN} .	V _{EE} = -4.2V			-1595	mV	
				V _{EE} = -4.5V			-1610	mV	
				V _{EE} = -4.8V			-1610	mV	
V _{OL}	Low level output voltage		Inputs at V _{IHMAX} or V _{ILMIN} .	V _{EE} = -4.2V	-1810		-1605	mV	
				V _{EE} = -4.5V	-1810	-1705	-1620	mV	
				V _{EE} = -4.8V	-1830		-1620	mV	
I _{IH}	High level input current	HC, AA _n	One input under test at V _{IHMAX} . Other inputs at V _{ILMIN} .					310	μA
		All others						250	μA
I _{IL}	Low level input current	One input under test at V _{ILMIN} . Other inputs at V _{IHMAX} .			0.5			μA	
-I _{EE}	V _{EE} supply current	All inputs at V _{IHMAX} .			76	110	153	mA	

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.
- The device can function down to $V_{EE} = -5.7\text{V}$, allowing operation with either the 10K or the 10KH family. Correction factors can be used to calculate new DC limits for the extended V_{EE} range. For more information, see Chapters 5 and 10, Section 4.

AC ELECTRICAL CHARACTERISTICSCeramic DIP $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8\text{V}$ to -4.2V

Ceramic DIP			V _{CC1} = V _{CC2} = ground, V _{EE} = -4.5 V to -4.2 V						
SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			T _A = 0°C		T _A = +25°C		T _A = +85°C		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} t _{PHL}	Propagation delay EA _n to QA _n , EB _n to QB _n	Waveform 1	0.80	2.30	0.80	2.20	0.80	2.30	ns
			0.80	2.30	0.80	2.20	0.80	2.30	ns
t _{PLH} t _{PHL}	Propagation delay AB _n to QB _n , AA _n to QA _n and QB _n		0.95	2.80	0.95	2.70	1.00	2.90	ns
			0.95	2.80	1.00	2.70	1.00	2.90	ns
t _{PLH} t _{PHL}	Propagation delay HA to QA _n , HB to QB _n , HC to QA _n and QB _n		1.00	3.00	1.00	2.90	1.00	3.00	ns
			1.00	3.00	1.00	2.90	1.00	3.00	ns
t _{PLH} t _{PHL}	Propagation delay M to QB _n		1.50	3.90	1.60	3.80	1.60	3.90	ns
			1.50	3.90	1.60	3.80	1.60	3.90	ns
t _{TLH} t _{THL}	Transition time QA _n , QB _n		0.45	1.60	0.45	1.60	0.45	1.60	ns
			0.45	1.60	0.45	1.60	0.45	1.60	ns

NOTE:

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

Demultiplexer/Decoder

100170

AC ELECTRICAL CHARACTERISTICS

Ceramic DIP $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -5.2V \pm 5\%$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			T _A = 0°C		T _A = +25°C		T _A = +85°C		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} t _{PHL}	Propagation delay EA _n to QA _n , EB _n to QB _n	Waveform 1	0.80 0.80	2.30 2.30	0.80 0.80	2.20 2.20	0.80 0.80	2.30 2.30	ns ns
t _{PLH} t _{PHL}	Propagation delay AB _n to QB _n , AA _n to QA _n and QB _n		0.95 1.00	2.80 2.80	0.95 1.00	2.70 2.70	1.00 1.00	2.90 2.90	ns ns
t _{PLH} t _{PHL}	Propagation delay HA to QA _n , HB to QB _n , HC to QA _n and QB _n		1.00 1.00	3.00 3.00	1.00 1.00	2.90 2.90	1.00 1.00	3.00 3.00	ns ns
t _{PLH} t _{PHL}	Propagation delay M to QB _n		1.50 1.50	3.90 3.90	1.60 1.60	3.80 3.80	1.60 1.60	3.90 3.90	ns ns
t _{TLH} t _{THL}	Transition time QA _n , QB _n		0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	ns ns

NOTE:

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

AC ELECTRICAL CHARACTERISTICS

Flat Pack and PLCC $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -4.8V$ to $-4.2V$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			T _A = 0°C		T _A = +25°C		T _A = +85°C		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} t _{PHL}	Propagation delay EA _n to QA _n , EB _n to QB _n	Waveform 1	0.80 0.80	2.10 2.10	0.80 0.80	2.00 2.00	0.80 0.80	2.10 2.10	ns ns
t _{PLH} t _{PHL}	Propagation delay AB _n to QB _n , AA _n to QA _n and QB _n		0.95 0.95	2.60 2.60	0.95 1.00	2.50 2.50	1.00 1.00	2.70 2.70	ns ns
t _{PLH} t _{PHL}	Propagation delay HA to QA _n , HB to QB _n , HC to QA _n and QB _n		1.00 1.00	2.80 2.80	1.00 1.00	2.70 2.70	1.00 1.00	2.80 2.80	ns ns
t _{PLH} t _{PHL}	Propagation delay M to QB _n		1.50 1.50	3.70 3.70	1.60 1.60	3.60 3.60	1.60 1.60	3.70 3.70	ns ns
t _{TLH} t _{THL}	Transition time QA _n , QB _n		0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	ns ns

NOTE:

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

Demultiplexer/Decoder

100170

AC ELECTRICAL CHARACTERISTICS

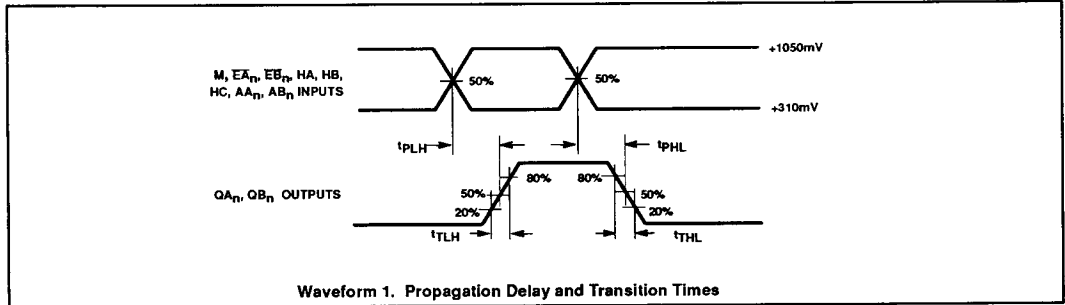
Flat Pack and PLCC $V_{CC1} = V_{CC2} = \text{ground}$, $V_{EE} = -5.2V \pm 5\%$

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			T _A = 0°C		T _A = +25°C		T _A = +85°C		
			MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} t _{PHL}	Propagation delay EA _n to QA _n , EB _n to QB _n	Waveform 1	0.80 0.80	2.10 2.10	0.80 0.80	2.00 2.00	0.80 0.80	2.10 2.10	ns ns
t _{PLH} t _{PHL}	Propagation delay AB _n to QB _n , AA _n to QA _n and QB _n		0.95 0.95	2.60 2.60	0.95 1.00	2.50 2.50	1.00 1.00	2.70 2.70	ns ns
t _{PLH} t _{PHL}	Propagation delay HA to QA _n , HB to QB _n , HC to QA _n and QB _n		1.00 1.00	2.80 2.80	1.00 1.00	2.70 2.70	1.00 1.00	2.80 2.80	ns ns
t _{PLH} t _{PHL}	Propagation delay M to QB _n		1.50 1.50	3.70 3.70	1.60 1.60	3.60 3.60	1.60 1.60	3.70 3.70	ns ns
t _{TLH} t _{THL}	Transition time QA _n , QB _n		0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	0.45 0.45	1.60 1.60	ns ns

NOTE:

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

AC WAVEFORMS



NOTE:

All power and signal voltages shifted up 2.0V for AC bench test purposes.