

## DUAL BINARY TO 1 OF 4 DECODER/DEMULTIPLEXERS

### 4555B OUTPUTS HIGH ON SELECT

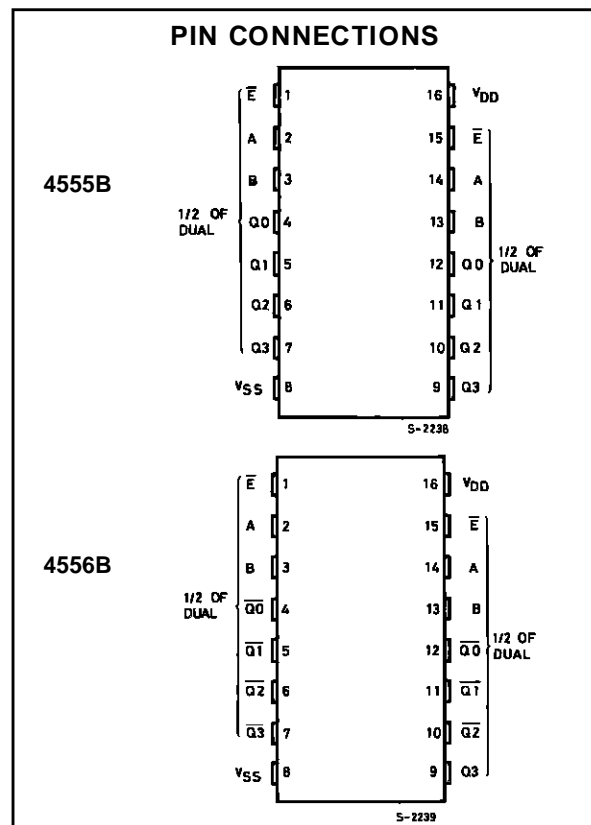
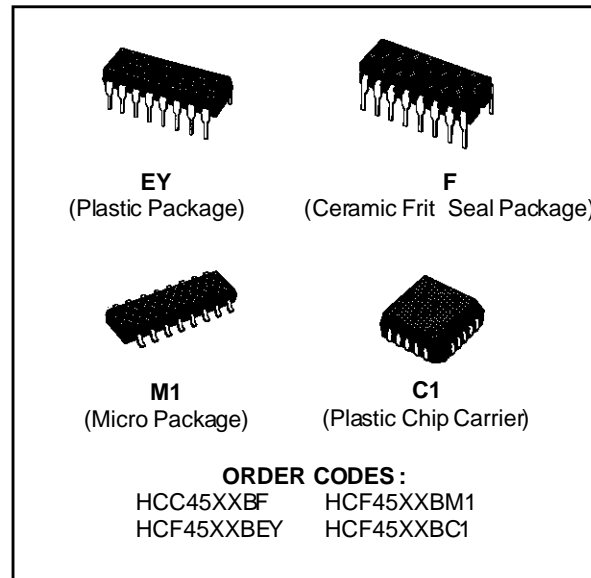
### 4556B OUTPUTS LOW ON SELECT

- EXPANDABLE WITH MULTIPLE PACKAGES
- STANDARD, SYMMETRICAL OUTPUT CHARACTERISTICS
- QUIESCENT CURRENT SPECIFIED TO 20V FOR HCC DEVICE
- 5V, 10V, AND 15V PARAMETRIC RATINGS
- INPUT CURRENT OF 100nA AT 18V AND 25°C FOR HCC DEVICE
- 100% TESTED FOR QUIESCENT CURRENT
- MEETS ALL REQUIREMENTS OF JEDEC TENTATIVE STANDARD N<sup>o</sup>. 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"

### DESCRIPTION

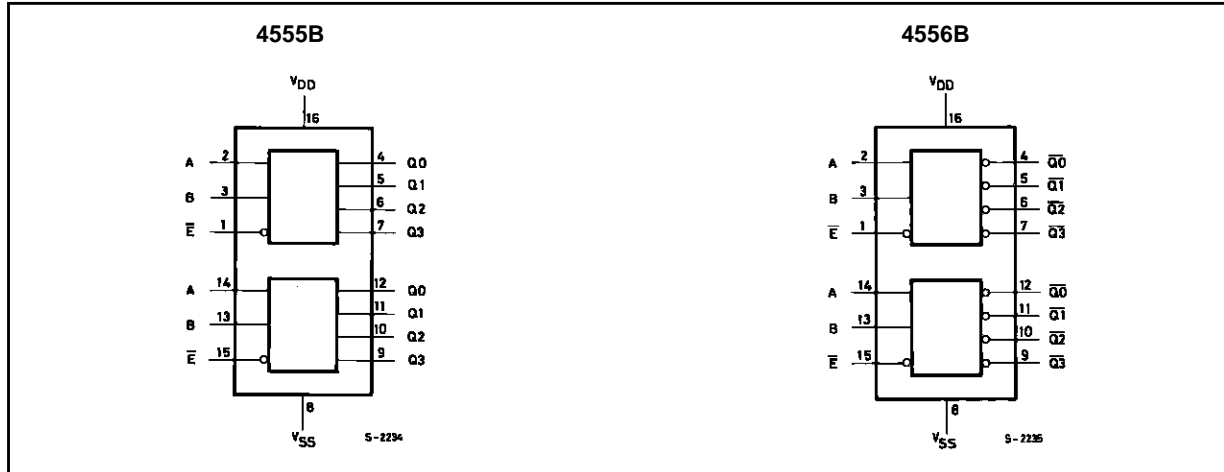
The **HCC4555B**, **HCC4556B** (extended temperature range) and the **HCF4555B**, **HCF4556B** (intermediate temperature range) are monolithic integrated circuits available in 16-lead dual in-line plastic or ceramic package and plastic micropackage.

The **HCC/HCF4555B** and **HCC/HCF4556B** are dual one-of-four decoders/demultiplexers. Each decoder has two select inputs (A and B), an Enable input ( $\bar{E}$ ), and four mutually exclusive outputs. On the **HCC/HCF4555B** the outputs are high on select; on the **HCC/HCF4556B** the outputs are low on select. When the Enable input is high, the outputs of the **HCC/HCF4555B** remain low and the outputs of the **HCC/HCF4556B** remain high regardless of the state of the select inputs A and B.



# HCC/HCF4555B/4556B

## FUNCTIONAL DIAGRAMS



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DD</sub> *	Supply Voltage : <b>HCC</b> Types <b>HCF</b> Types	- 0.5 to + 20 - 0.5 to + 18	V V
V <sub>i</sub>	Input Voltage	- 0.5 to V <sub>DD</sub> + 0.5	V
I <sub>I</sub>	DC Input Current (any one input)	± 10	mA
P <sub>tot</sub>	Total Power Dissipation (per package) Dissipation per Output Transistor for T <sub>op</sub> = Full Package-temperature Range	200 100	mW mW
T <sub>op</sub>	Operating Temperature : <b>HCC</b> Types <b>HCF</b> Types	- 55 to + 125 - 40 to + 85	°C °C
T <sub>stg</sub>	Storage Temperature	- 65 to + 150	°C

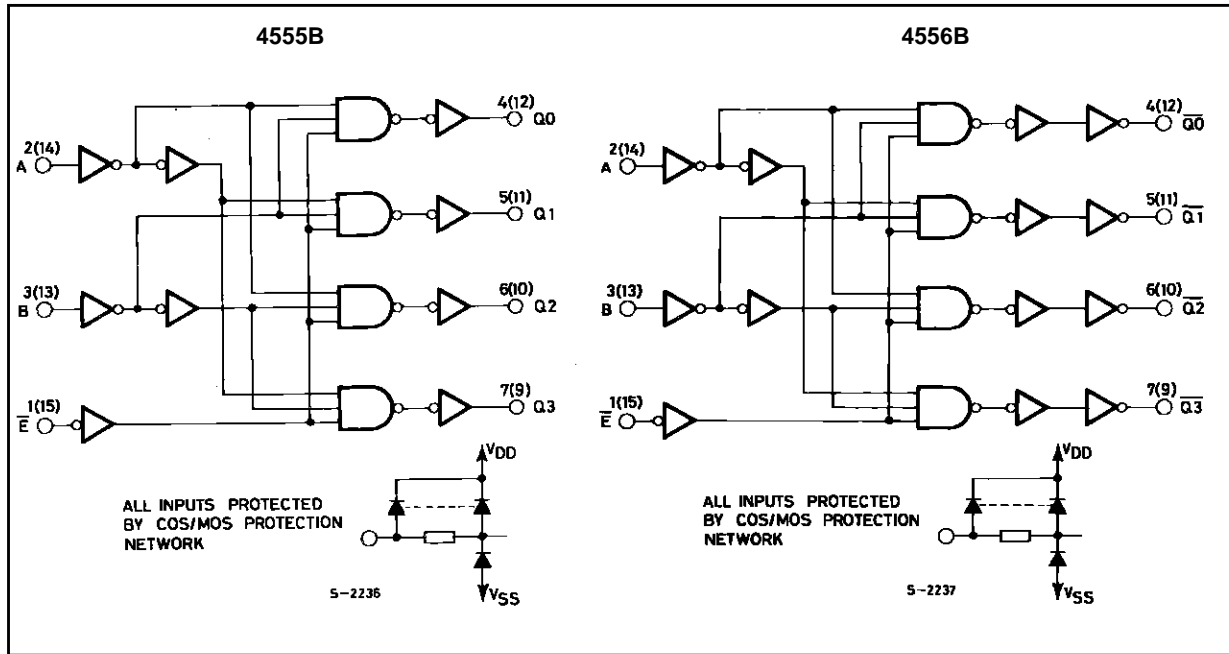
Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for external periods may affect device reliability.

\* All voltages values are referred to V<sub>SS</sub> pin voltage.

## RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>DD</sub>	Supply Voltage : <b>HCC</b> Types <b>HCF</b> Types	3 to 18 3 to 15	V V
V <sub>I</sub>	Input Voltage	0 to V <sub>DD</sub>	V
T <sub>op</sub>	Operating Temperature : <b>HCC</b> Types <b>HCF</b> Types	- 55 to + 125 - 40 to + 85	°C °C

LOGIC DIAGRAMS



TRUTH TABLE

Inputs Enable Select			Outputs 4555B				Outputs 4556B			
$\bar{E}$	B	A	Q3	Q2	Q1	Q0	$\bar{Q3}$	$\bar{Q2}$	$\bar{Q1}$	$\bar{Q0}$
0	0	0	0	0	0	1	1	1	1	0
0	0	1	0	0	1	0	1	1	0	1
0	1	0	0	1	0	0	1	0	1	1
0	1	1	1	0	0	0	0	1	1	1
1	X	X	0	0	0	0	1	1	1	1

X = DON'T CARE, LOGIC 1 = HIGH, LOGIC 0 = LOW.

# HCC/HCF4555B/4556B

## STATIC ELECTRICAL CHARACTERISTICS (over recommended operating conditions)

Symbol	Parameter		Test Conditions				Value						Unit	
			V <sub>I</sub> (V)	V <sub>O</sub> (V)	I <sub>O</sub>   ( $\mu$ A)	V <sub>DD</sub> (V)	T <sub>Low</sub> *		25°C			T <sub>High</sub> *		
							Min.	Max.	Min.	Typ.	Max.	Min.		Max.
I <sub>L</sub>	Quiescent Current	HCC Types	0/ 5			5		5		0.04	5		150	$\mu$ A
			0/10			10		10		0.04	10		300	
			0/15			15		20		0.04	20		600	
			0/20			20		100		0.08	100		3000	
		HCF Types	0/ 5			5		20		0.04	20		150	
			0/10			10		40		0.04	40		300	
V <sub>OH</sub>	Output High Voltage		0/ 5		< 1	5		4.95		4.95		4.95	V	
			0/10		< 1	10		9.95		9.95		9.95		
			0/15		< 1	15		14.95		14.95		14.95		
V <sub>OL</sub>	Output Low Voltage		5/0		< 1	5		0.05		0.05		0.05	V	
			10/0		< 1	10		0.05		0.05		0.05		
			15/0		< 1	15		0.05		0.05		0.05		
V <sub>IH</sub>	Input High Voltage			0.5/4.5	< 1	5	3.5		3.5		3.5		V	
				1/9	< 1	10	7		7		7			
				1.5/13.5	< 1	15	11		11		11			
V <sub>IL</sub>	Input Low Voltage			4.5/0.5	< 1	5		1.5		1.5		1.5	V	
				9/1	< 1	10		3		3		3		
				13.5/1.5	< 1	15		4		4		4		
I <sub>OH</sub>	Output Drive Current	HCC Types	0/ 5	2.5		5	- 2		- 1.6	- 3.2		- 1.15	mA	
			0/ 5	4.6		5	- 0.64		- 0.51	- 1		- 0.36		
			0/10	9.5		10	- 1.6		- 1.3	- 2.6		- 0.9		
			0/15	13.5		15	- 4.2		- 3.4	- 6.8		- 2.4		
		HCF Types	0/ 5	2.5		5	- 1.53		- 1.36	- 3.2		- 1.1		
			0/ 5	4.6		5	- 0.52		- 0.44	- 1		- 0.36		
I <sub>OL</sub>	Output Sink Current	HCC Types	0/ 5	0.4		5	0.64		0.51	1		0.36	mA	
			0/10	0.5		10	1.6		1.3	2.6		0.9		
			0/15	1.5		15	4.2		3.4	6.8		2.4		
		HCF Types	0/ 5	0.4		5	0.52		0.44	1		0.36		
			0/10	0.5		10	1.3		1.1	2.6		0.9		
			0/15	1.5		15	3.6		3.0	6.8		2.4		
I <sub>IH</sub> , I <sub>IL</sub>	Input Leakage Current	HCC Types	0/18	Any Input		18		$\pm$ 0.1		$\pm$ 10 <sup>-5</sup>	$\pm$ 0.1		$\pm$ 1	$\mu$ A
		HCF Types	0/15			15		$\pm$ 0.3		$\pm$ 10 <sup>-5</sup>	$\pm$ 0.3		$\pm$ 1	
C <sub>I</sub>	Input Capacitance			Any Input					5	7.5			pF	

(\*) T<sub>LOW</sub> = - 55°C for HCC device : - 40°C for HCF device.

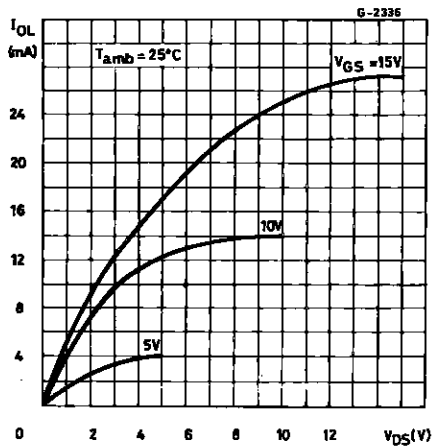
(\*) T<sub>HIGH</sub> = + 125°C for HCC device : + 85°C for HCF device.

The Noise Margin for both "1" and "0" level is : 1V min. with V<sub>DD</sub> = 5V, 2V min. with V<sub>DD</sub> = 10V, 2.5V min. with V<sub>DD</sub> = 15V.

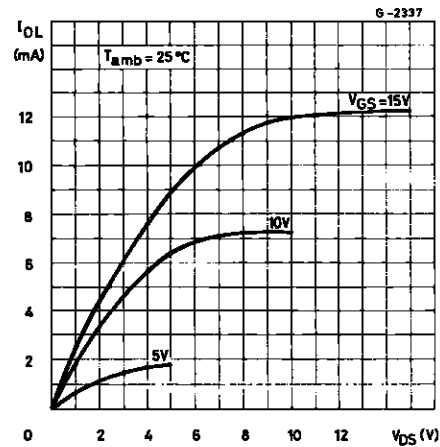
**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ ,  $C_L = 50\text{pF}$ ,  $R_L = 200\text{k}\Omega$ , typical temperature coefficient for all  $V_{DD}$  values is  $0.3\%/^{\circ}\text{C}$ , all input rise and fall times = 20ns)

Symbol	Parameter	Test Conditions		Value			Unit
			$V_{DD}$ (V)	Min.	Typ.	Max.	
$t_{PLH}$ , $t_{PHL}$	Propagation Delay Time (A or B input to any output)		5		220	440	ns
			10		95	190	
			15		70	140	
	Propagation Delay Time ( $\bar{E}$ input to any output)		5		200	400	ns
			10		85	170	
			15		65	130	
$t_{TLH}$ , $t_{THL}$	Transition Time		5		100	200	ns
			10		50	100	
			15		40	80	

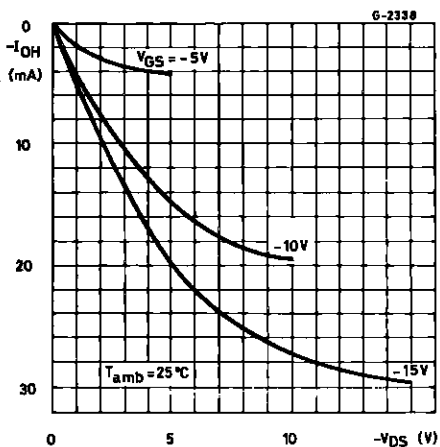
Typical Output Low (sink) Current Characteristics.



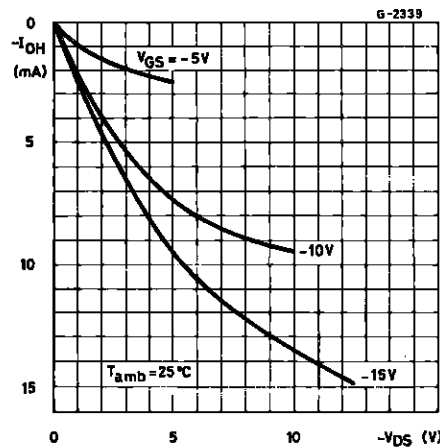
Minimum Output Low (sink) Current Characteristics.



Typical Output High (source) Current Characteristics.

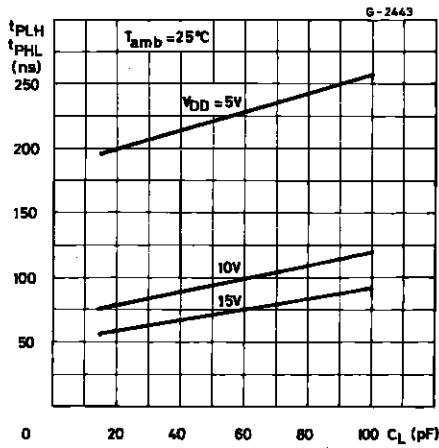


Minimum Output High (source) Current Characteristics.

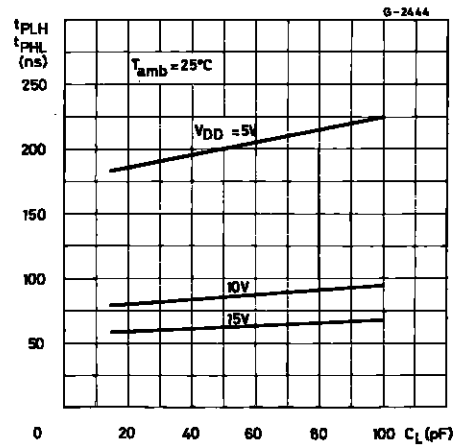


# HCC/HCF4555B/4556B

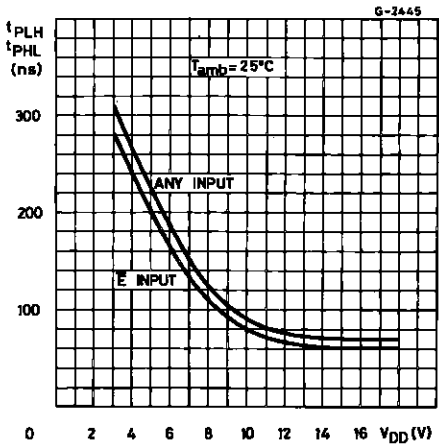
Typical Propagation Delay Time vs. Load Capacitance (A or B input to any output).



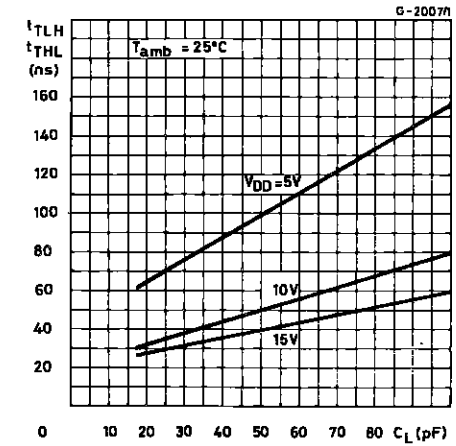
Typical Propagation Delay Time vs. Load Capacitance ( $\bar{E}$  input to any input).



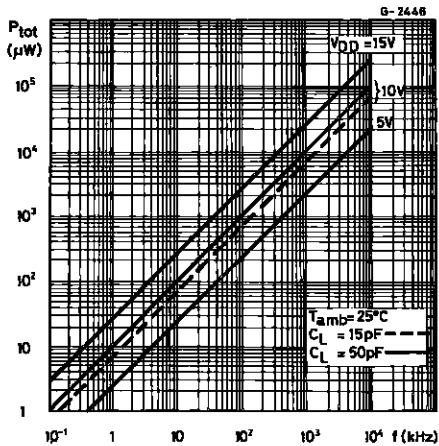
Typical Propagation Delay Time vs. Supply Voltage.



Typical Transition Time vs. Load Capacitance.

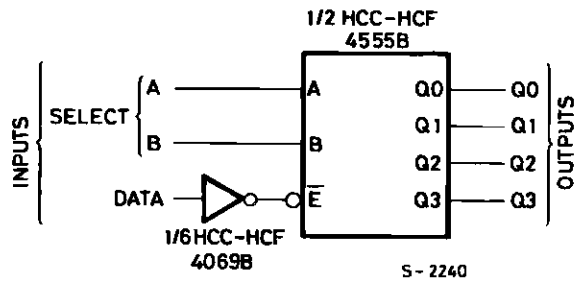


Typical Dynamic Power Dissipation/per Device vs. Frequency.



APPLICATIONS

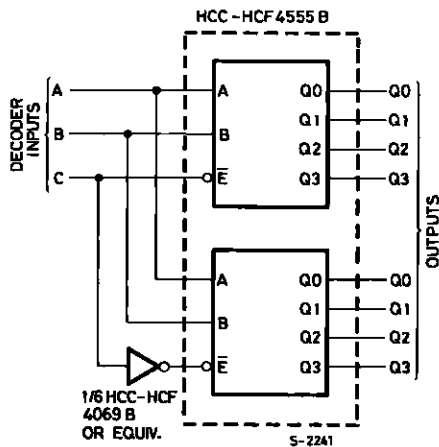
1 of 4 Line Data Demultiplexer using HCC/HCF4555B



TRUTH TABLE

Select Inputs		Outputs			
B	A	Q 0	Q 1	Q 2	Q 3
0	0	DATA	0	0	0
0	1	0	DATA	0	0
1	0	0	0	DATA	0
1	1	0	0	0	DATA

1 of 8 Decoder using HCC/HCF 4555B



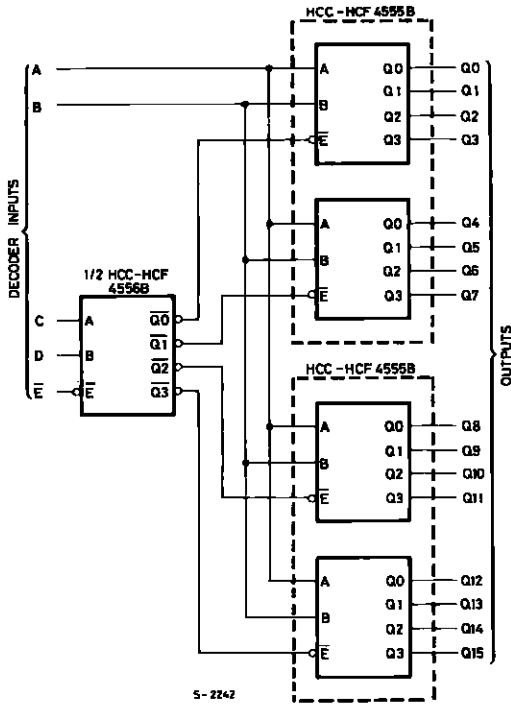
TRUTH TABLE

Inputs			Q Outputs							
C	B	A	0	1	2	3	4	5	6	7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	0	0	0	1

# HCC/HCF4555B/4556B

## APPLICATIONS (continued)

1 of 16 Decoder using HCC/HCF4555B and HCC/HCF4556B

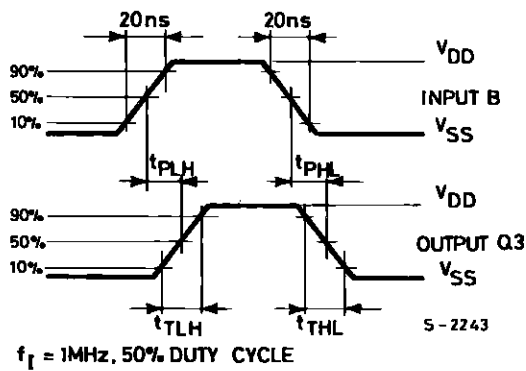


TRUTH TABLE

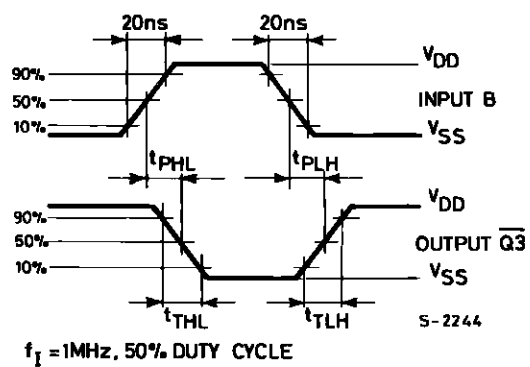
Inputs					Q Outputs																
E	D	C	B	A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
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0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

X = Don't care.

HCC/HCF4555B Input to Q3 Output Dynamic Signal Waveforms



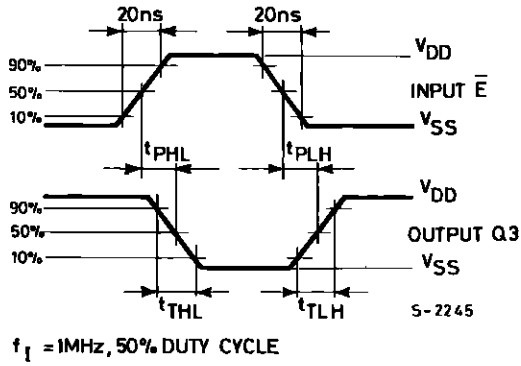
HCC/HCF4556B Input to  $\overline{Q3}$  Output Dynamic Signal Waveforms



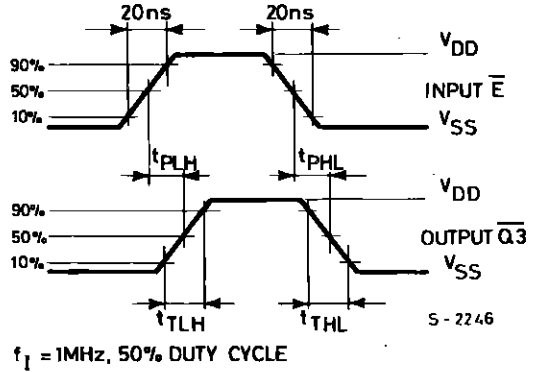


APPLICATIONS (continued)

HCC/HCF4555B  $\bar{E}$  Input to Q3 Output Dynamic Signal Waveforms

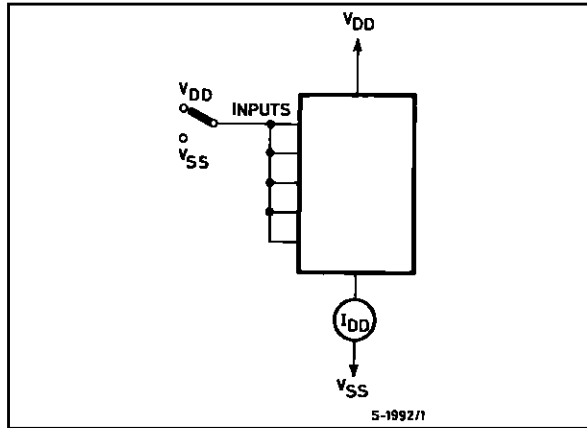


HCC/HCF4556B  $\bar{E}$  Input to  $\bar{Q}3$  Output Dynamic Signal Waveforms

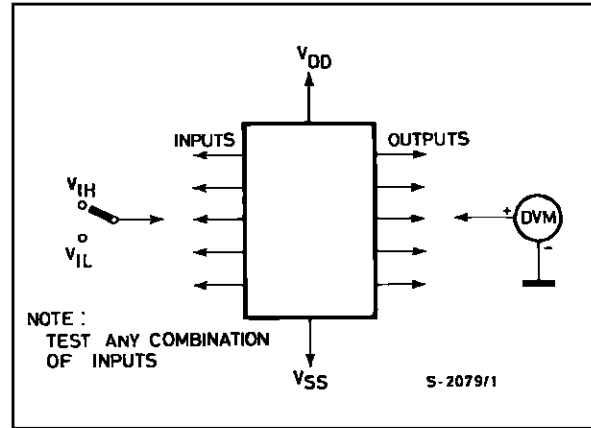


TEST CIRCUITS

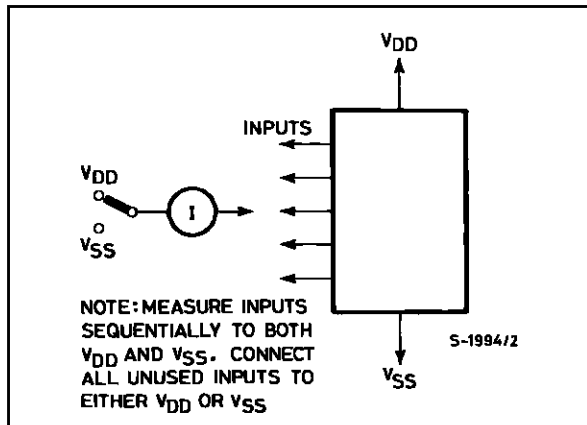
Quiescent Device Current.



Noise Immunity.



Input Leakage Current.



**Plastic DIP16 (0.25) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

**Ceramic DIP16/1 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		17.78			0.700	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
H	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200



**SO16 (Narrow) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



P013H

**PLCC20 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	9.78		10.03	0.385		0.395
B	8.89		9.04	0.350		0.356
D	4.2		4.57	0.165		0.180
d1		2.54			0.100	
d2		0.56			0.022	
E	7.37		8.38	0.290		0.330
e		1.27			0.050	
e3		5.08			0.200	
F		0.38			0.015	
G			0.101			0.004
M		1.27			0.050	
M1		1.14			0.045	



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