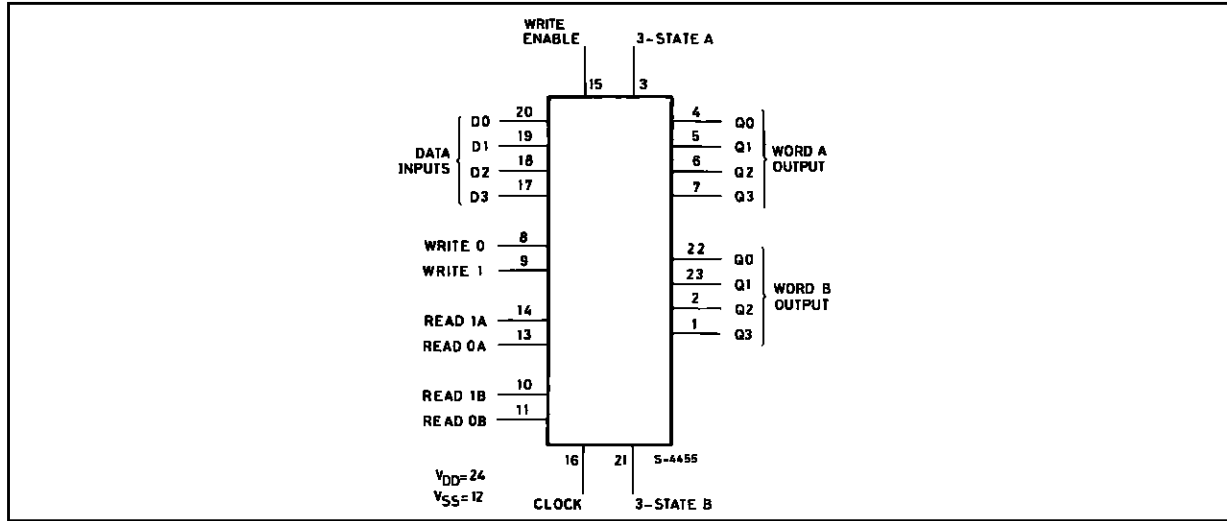




FUNCTIONAL DIAGRAM



ABSOLUTE MAXIMUM RATINGS

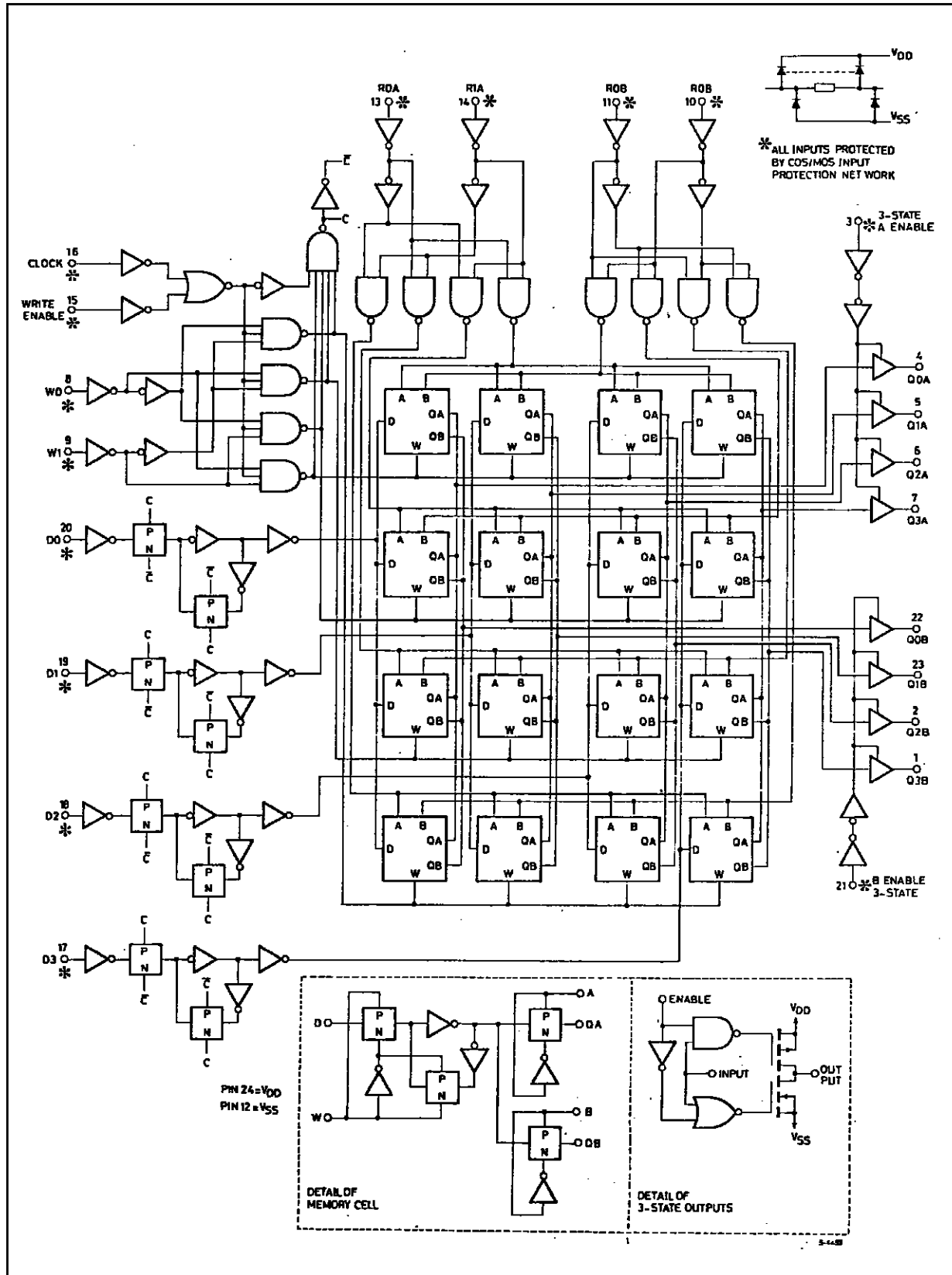
Symbol	Parameter	Value	Unit
$V_{DD}^*$	Supply Voltage : HCC Types HCF Types	- 0.5 to + 20	V
		- 0.5 to + 18	V
$V_i$	Input Voltage	- 0.5 to $V_{DD} + 0.5$	V
$I_i$	DC Input Current (any one input)	$\pm 10$	mA
$P_{tot}$	Total Power Dissipation (per package) Dissipation per Output Transistor for $T_{op}$ = Full Package-temperature Range	200	mW
		100	mW
$T_{op}$	Operating Temperature : HCC Types HCF Types	- 55 to + 125	$^{\circ}C$
		- 40 to + 85	$^{\circ}C$
$T_{stg}$	Storage Temperature	- 65 to + 150	$^{\circ}C$

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 are with respect to  $V_{SS}$  (GND).

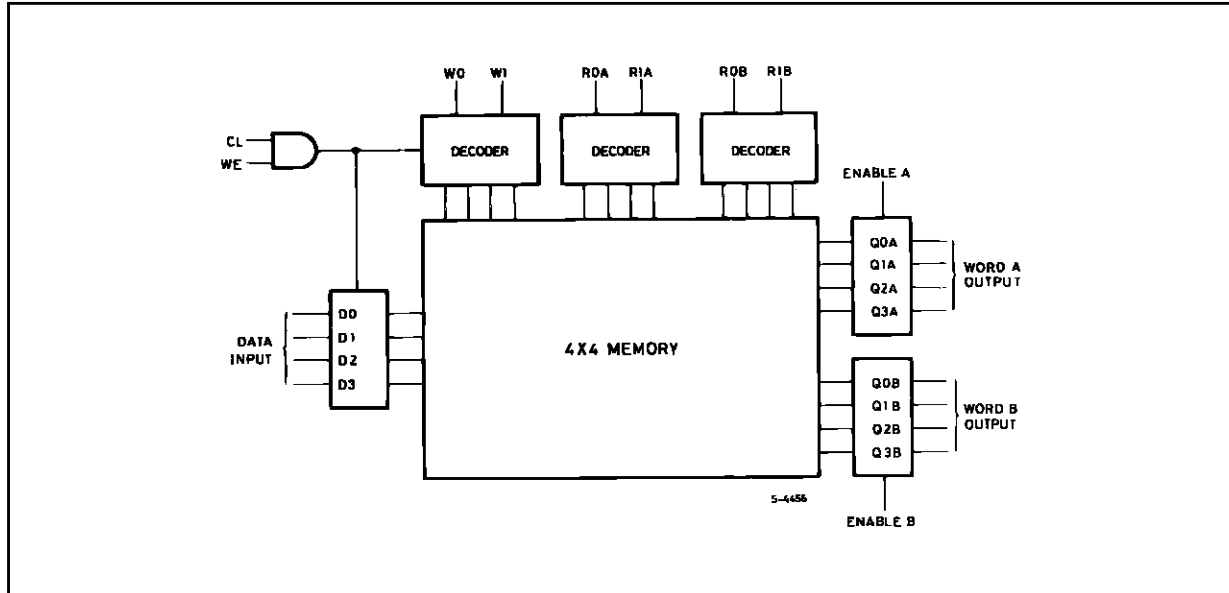
RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
$V_{DD}$	Supply Voltage : HCC Types HCF Types	3 to 18	V
		3 to 15	V
$V_i$	Input Voltage	0 to $V_{DD}$	V
$T_{op}$	Operating Temperature : HCC Types HCF Types	- 55 to + 125	$^{\circ}C$
		- 40 to + 85	$^{\circ}C$

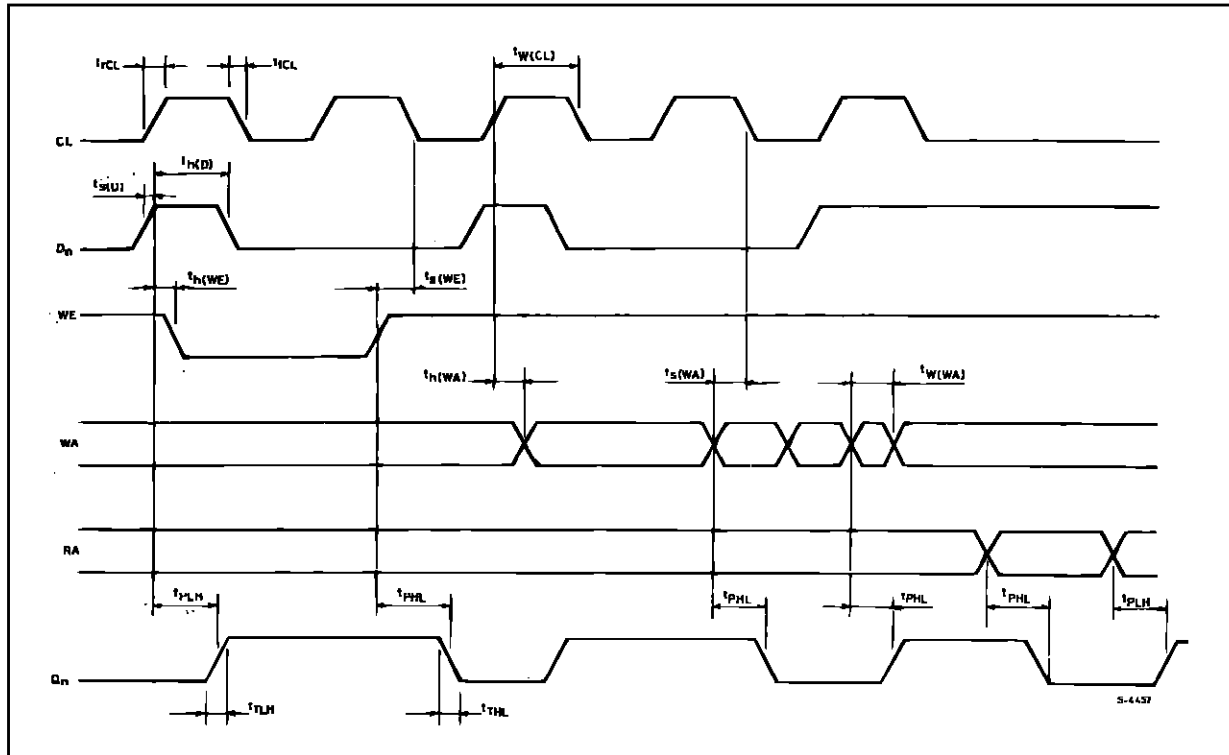
SCHEMATIC DIAGRAM



LOGIC DIAGRAM



TIMING DIAGRAM



TRUTH TABLE

Clock	Write Enable	Write 1	Write 0	Read 1A	Read 0A	Read 1B	Read 0B	Enable A	Enable B	D <sub>n</sub>	Q <sub>nA</sub>	Q <sub>nB</sub>
	1	S1	S2	S1	S2	S1	S2	1	1	1	1	1
	1	S1	S2	S1	S2	S1	S2	1	1	0	0	0
X	X	X	X	X	X	X	X	0	0	X	Z	Z
	1	0	0	0	1	1	0	1	1	D <sub>n</sub> to Word 0	Word 1 Out	Word 2 Out
	0	0	0	0	1	1	0	1	1	Word 0 Not Altered	Word 1 Out	Word 2 Out
X	X	X	X	1	0	0	1	1	1	X	Word 2 Out	Word 1 Out
	X	X	X	X	X	X	X	1	1	X	NC	NC

1 = HIGH LEVEL, 0 = LOW LEVEL, X = DON'T CARE, Z = HIGH IMPEDANCE.  
S1 and S2 refer to input states of either 1 or 0.

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>   (μA)	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				5	5		0.04	5	150		μA					
						HCC Types	0/10	10	10	0.04	10		300				
							0/15	15	20	0.04	20		600				
						HCF Types	0/20	20	100	0.08	100		3000				
							0/5	5	20	0.04	20		150				
							0/10	10	40	0.04	40		300				
0/15	15	80	0.04	80	600												
V <sub>OH</sub>	Output High Voltage		< 1	5	4.95	4.95				4.95		V					
					0/10	10	9.95	9.95		9.95							
					0/15	15	14.95	14.95		14.95							
V <sub>OL</sub>	Output Low Voltage		< 1	5	0.05	0.05				0.05		V					
					10/0	10	0.05	0.05		0.05							
					15/0	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				5	- 2	- 1.6	- 3.2			- 1.15		mA				
									HCC Types	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
									HCF Types	0/15	13.5	15		- 4.2	- 3.4	- 6.8	- 2.4
										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
										0/10	9.5	10		- 1.3	- 1.1	- 2.6	- 0.9
										0/15	13.5	15		- 3.6	- 3.0	- 6.8	- 2.4

\* 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.  
\*\* Forced output disable.

STATIC ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter		Test Conditions				Value						Unit	
			V <sub>I</sub> (V)	V <sub>O</sub> (V)	I <sub>O</sub>   (μA)	V <sub>DD</sub> (V)	T <sub>Low</sub> *		25°C			T <sub>High</sub> *		
							Min.	Max.	Min.	Typ.	Max.	Min.		Max.
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		± 0.1		±10 <sup>-5</sup>	± 0.1		± 1	μA
		HCF Types	0/15			15		± 0.3		±10 <sup>-5</sup>	± 0.3		± 1	
I <sub>OH</sub> , I <sub>OL</sub> **	3-State Output Leakage Current	HCC Types	0/18	0/18		18		± 0.4		±10 <sup>-4</sup>	± 0.4		± 12	μA
		HCF Types	0/15	0/15		15		± 1.0		±10 <sup>-4</sup>	± 1.0		± 7.5	
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.

\*\* Forced output disable.

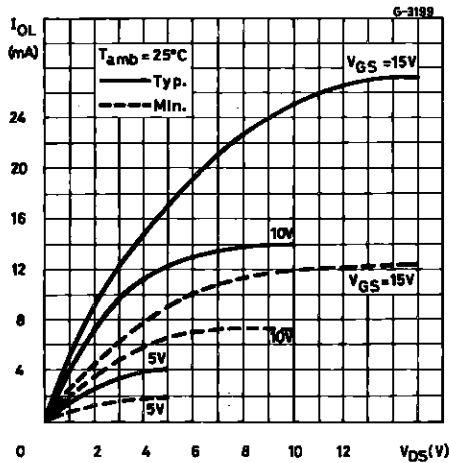
DYNAMIC ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C, C<sub>L</sub> = 50pF, R<sub>L</sub> = 200kΩ, typical temperature coefficient for all V<sub>DD</sub> values is 0.3%/°C, all input rise and fall time = 20ns)

Symbol	Parameter	Test Conditions	Value			Unit	
			V <sub>DD</sub> (V)	Min.	Typ.		Max.
t <sub>PHL</sub> , t <sub>PLH</sub>	Propagation Delay Time : Clock to Write Enable to Q		5		360	720	ns
			10		140	280	
			15		100	200	
	Read or Write Address to Q		5		300	600	ns
			10		120	240	
			15		85	170	
t <sub>PZH</sub> , t <sub>PHZ</sub>	3-state Disable Delay Time	5		100	200	ns	
		10		50	100		
		15		40	80		
t <sub>PZL</sub> , t <sub>PLZ</sub>	3-State Disable Delay time	5		130	260	ns	
		10		60	120		
		15		50	100		
t <sub>THL</sub> , t <sub>TLH</sub>	Output Transition Time	5		100	200	ns	
		10		50	100		
		15		40	80		
t <sub>setup</sub>	Setup Time Data to Clock t <sub>s(D)</sub>	5	0	- 95		ns	
		10	0	- 35			
		15	0	- 20			
	Write Enable to $\overline{\text{Clock}}$ t <sub>s(WE)</sub>	5	250	125		ns	
		10	100	50			
		15	70	35			
	Write Address to $\overline{\text{Clock}}$ t <sub>s(WA)</sub>	5	250	125		ns	
		10	100	50			
		15	70	35			

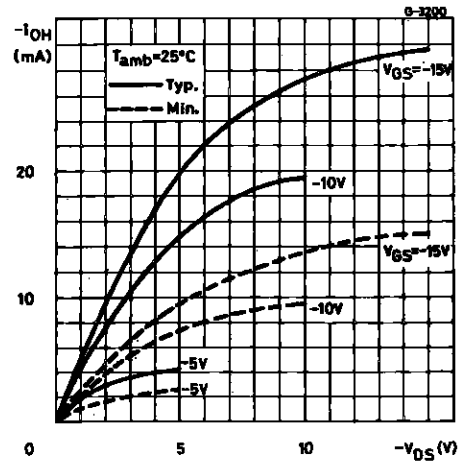
**DYNAMIC ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Parameter	Test Conditions	Value			Unit		
			V <sub>DD</sub> (V)	Min.	Typ.		Max.	
t <sub>r</sub> , t <sub>f</sub>	Clock Rise and Fall Time		5			15	μs	
			10			5		
			15			5		
t <sub>hold</sub>	Hold Time Data to Clock t <sub>h(D)</sub>		5	220	110		ns	
			10	100	50			
			15	80	40			
	Write Enable to Clock t <sub>h(WE)</sub>			5	270	135		ns
				10	130	65		
				15	80	40		
Write Address to Clock t <sub>s(WA)</sub>			5	330	165			
			10	140	70			
			15	90	45			
t <sub>w</sub>	Clock Pulse Width Clock or Write Enable t <sub>w(CL)</sub>		5	350	175		ns	
			10	130	65			
			15	90	45			
	Write Address t <sub>w(WA)</sub>			5	300	150		ns
				10	150	75		
				15	90	45		
f <sub>CL</sub>	Maximum Clock Input Frequency		5	1.5	3		MHz	
			10	3.5	7			
			15	4.5	9			

Output Low (sink) Current Characteristics.

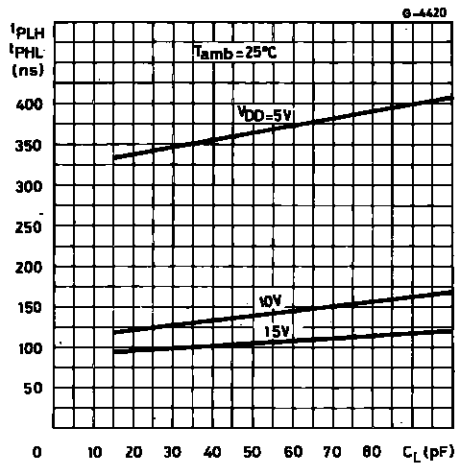


Output High (source) Current Characteristics.

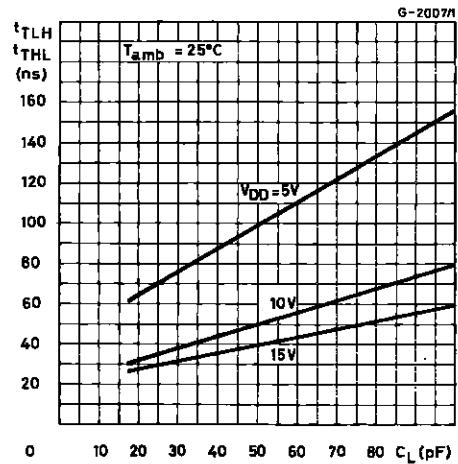


# HCC/HCF40208B

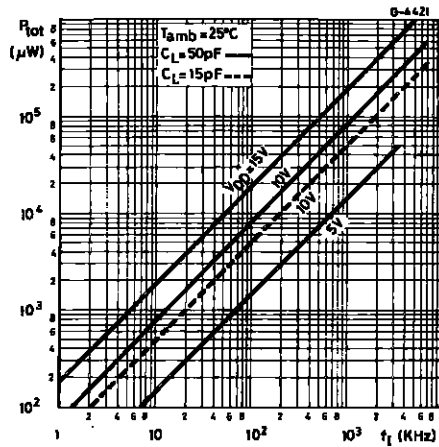
Typical Propagation Delay Time vs. Load Capacitance (CL or WE to Q).



Typical Transition Time vs. Load Capacitance.

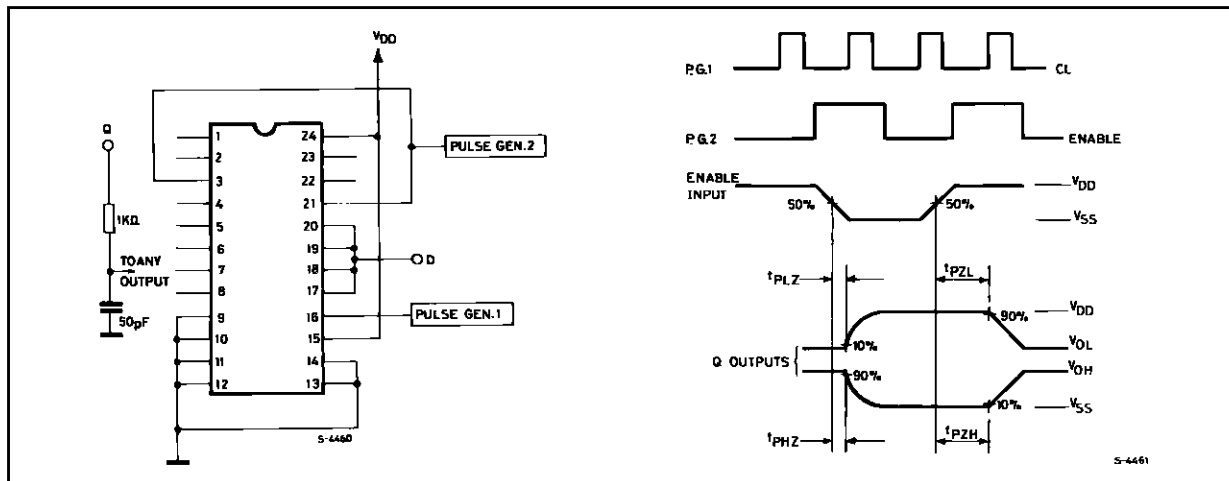


Typical Dynamic Power Dissipation vs. Input Frequency.

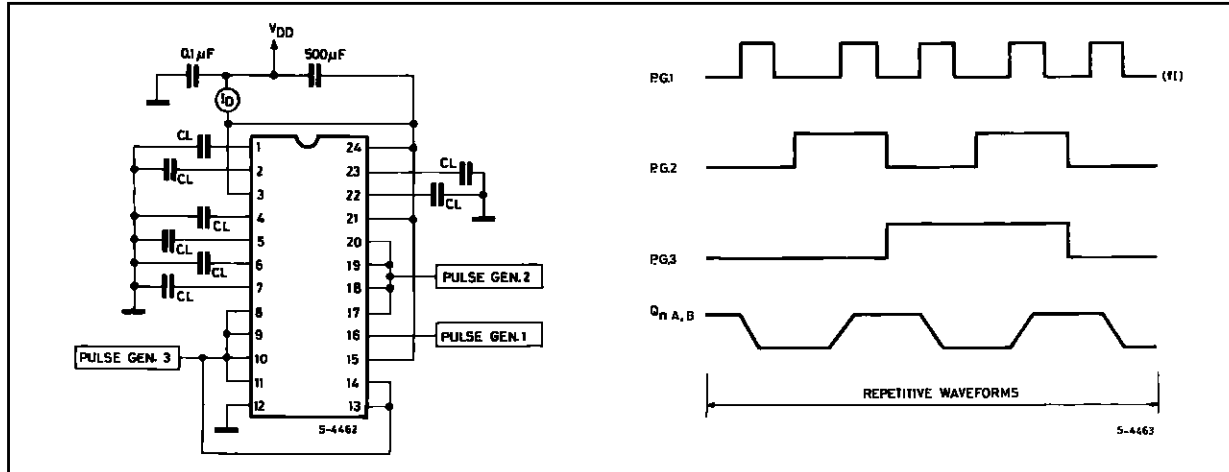


## TEST CIRCUITS

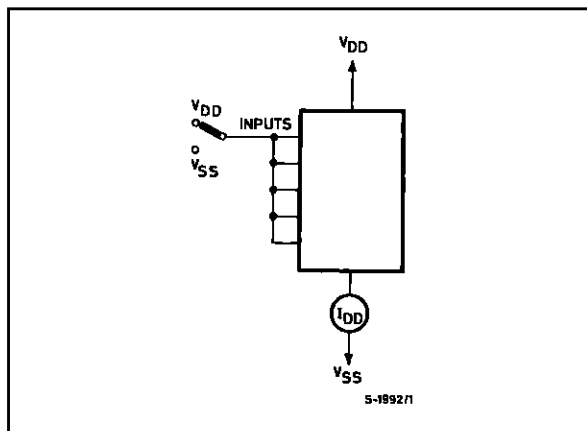
Output-enable-delay-times and Waveforms.



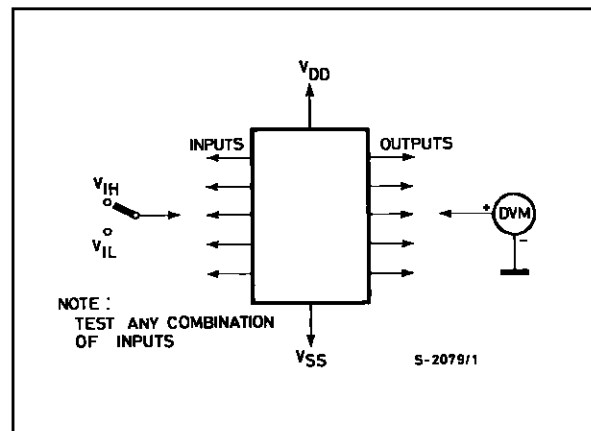
Power-dissipation and Waveforms.



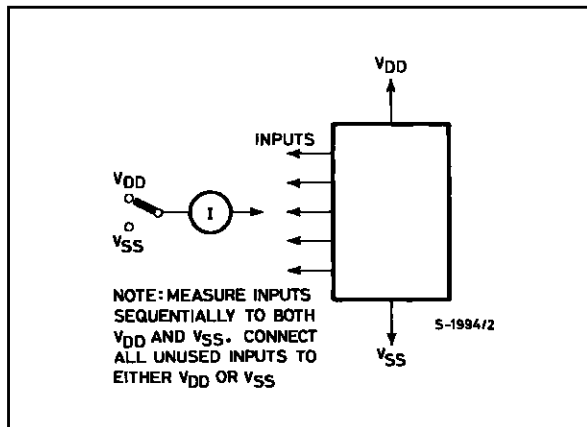
Quiescent Device Current



Input Voltage

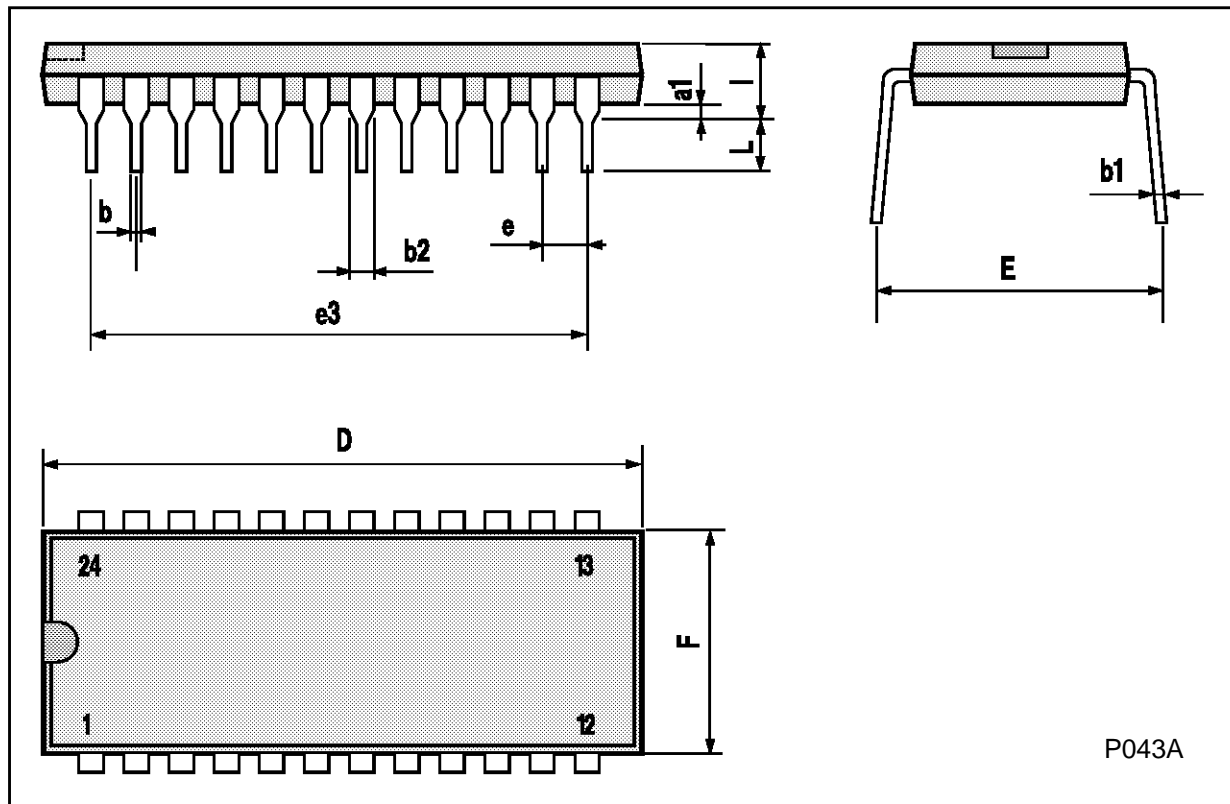


Input Current



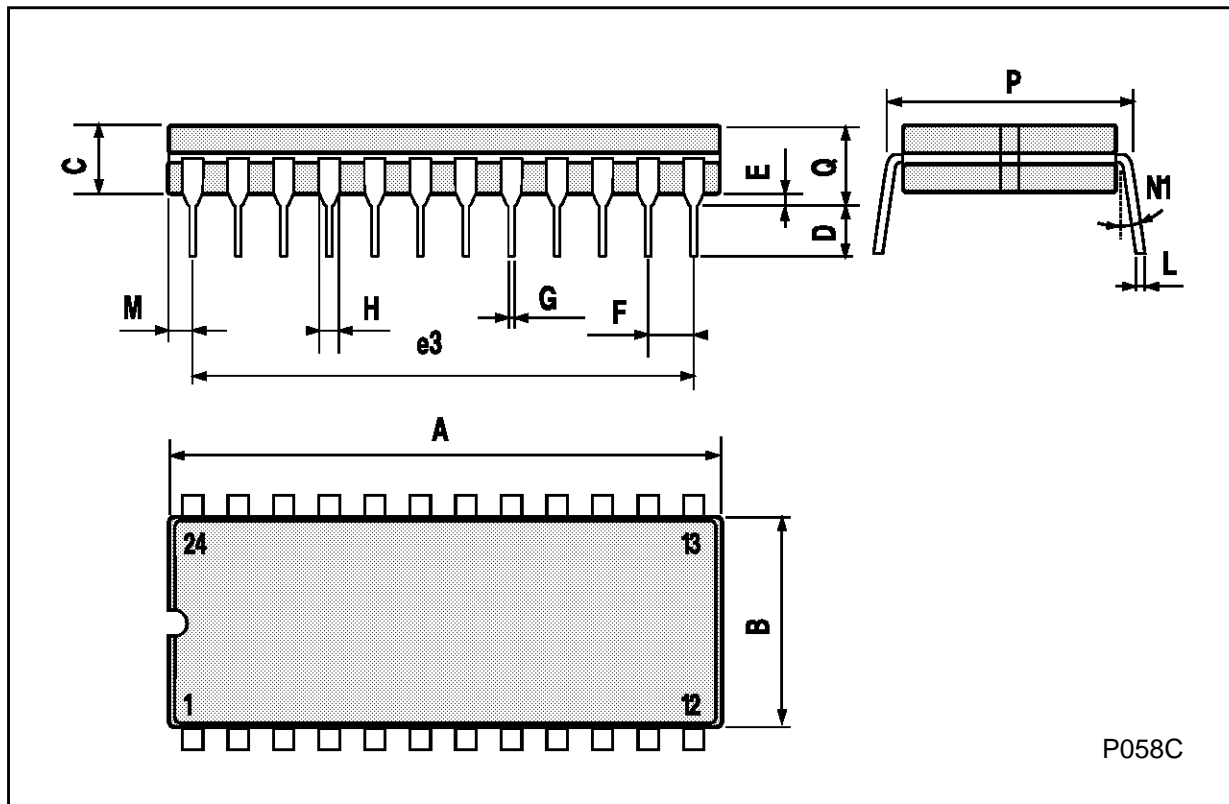
**Plastic DIP24 (0.25) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1		0.63			0.025	
b		0.45			0.018	
b1	0.23		0.31	0.009		0.012
b2		1.27			0.050	
D			32.2			1.268
E	15.2		16.68	0.598		0.657
e		2.54			0.100	
e3		27.94			1.100	
F			14.1			0.555
l		4.445			0.175	
L		3.3			0.130	



**Ceramic DIP24 MECHANICAL DATA**

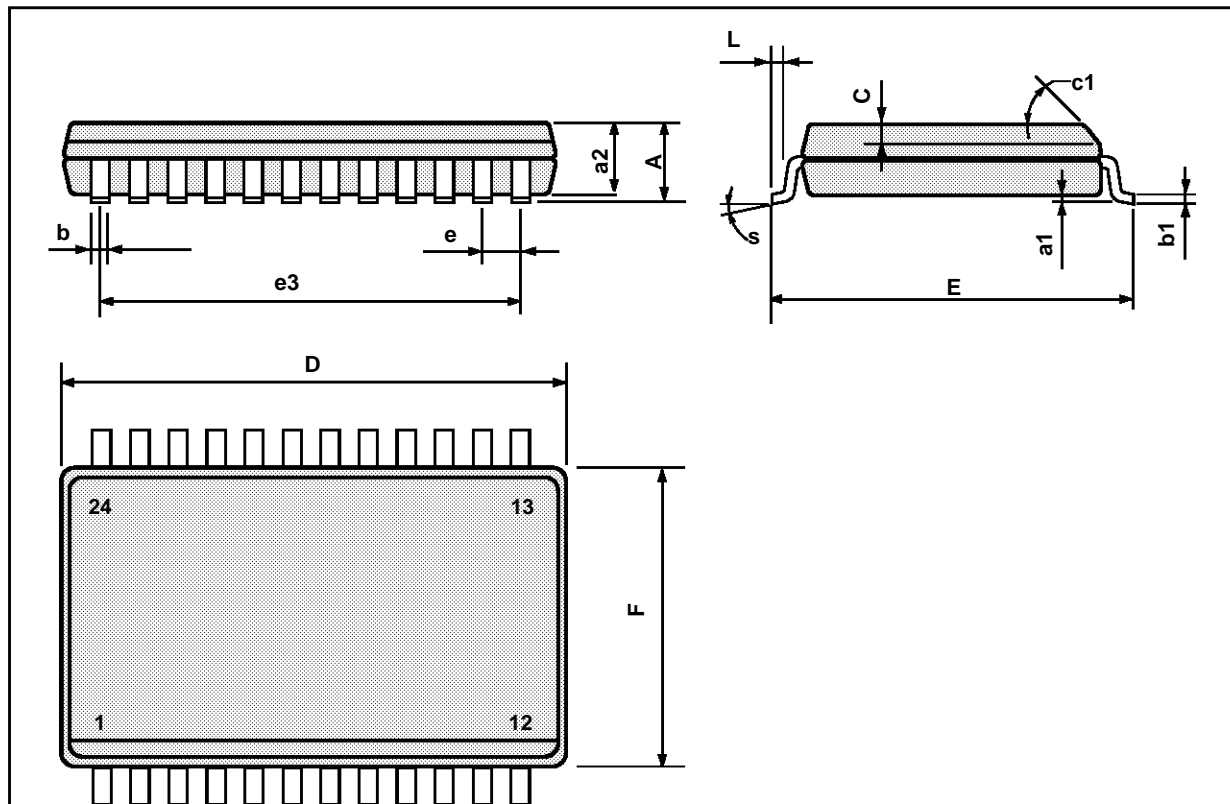
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			32.3			1.272
B	13.05		13.36	0.514		0.526
C	3.9		5.08	0.154		0.200
D	3			0.118		
E	0.5		1.78	0.020		0.070
e3		27.94			1.100	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
I	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	1.52		2.49	0.060		0.098
N1	4° (min.), 15° (max.)					
P	15.4		15.8	0.606		0.622
Q			5.71			0.225



P058C

SO24 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.10		0.20	0.004		0.007
a2			2.45			0.096
b	0.35		0.49	0.013		0.019
b1	0.23		0.32	0.009		0.012
C		0.50			0.020	
c1	45° (typ.)					
D	15.20		15.60	0.598		0.614
E	10.00		10.65	0.393		0.420
e		1.27			0.05	
e3		13.97			0.55	
F	7.40		7.60	0.291		0.299
L	0.50		1.27	0.19		0.050
S	8° (max.)					



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