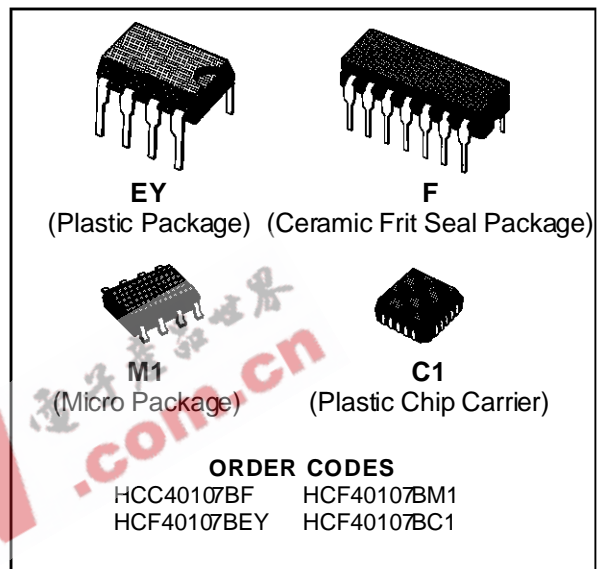


## DUAL 2-INPUT NAND BUFFER/DRIVER

- 32 TIMES STANDARD B-SERIES OUTPUT CURRENT DRIVE SINKING CAPABILITY  
– 136mA TYP. @  $V_{DD} = 10V$ ,  $V_{DS} = 1V$
- QUIESCENT CURRENT SPECIFIED AT 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°. 13A, "STANDARD SPECIFICATIONS FOR DESCRIPTION OF "B" SERIES CMOS DEVICES"

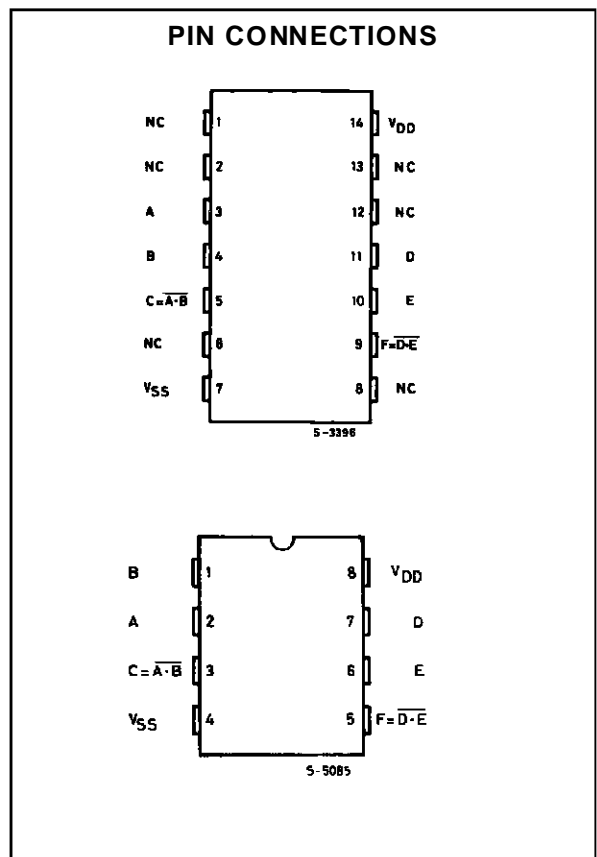


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### DESCRIPTION

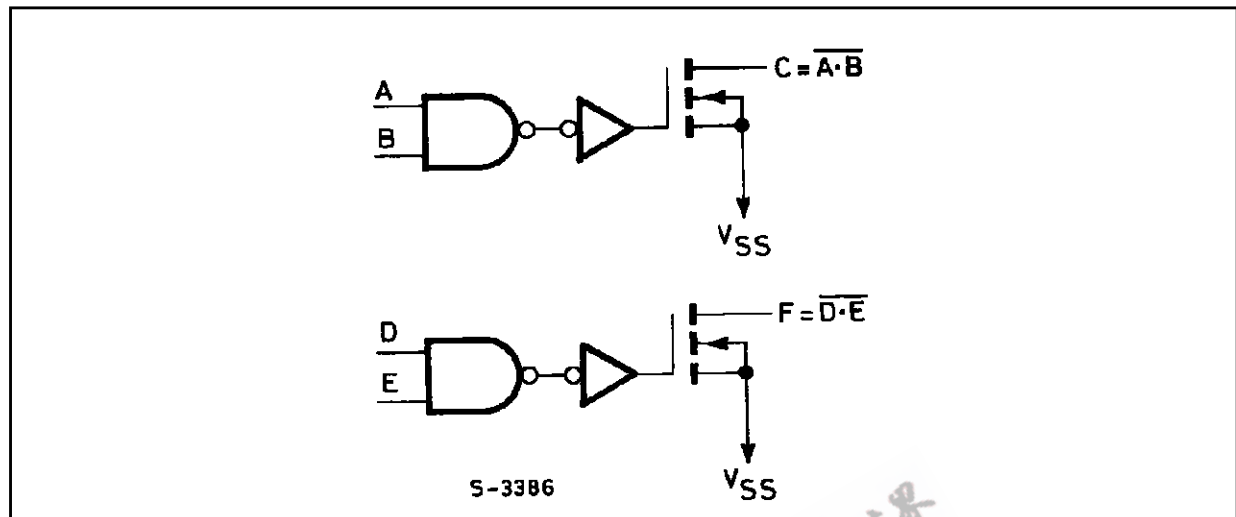
The **HCC40107B** (extended temperature range) and **HCF40107B** (intermediate temperature range) are monolithic integrated circuits, available in 14-lead dual in-line ceramic package 8-lead minidip plastic package and 8-lead plastic micropackage.

The **HCC/HCF40107B** is a dual 2-input NAND buffer/driver containing two independent 2-input NAND buffers with open-drain single n-channel transistor outputs. This device features a wired-OR capability and high output sink current capability (136mA typ. at  $V_{DD} = 10V$ ,  $V_{DS} = 1V$ ).



## HCC/HCF40107B

### FUNCTIONAL DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{DD}^*$	Supply Voltage : HCC types HCF types	- 0.5 to + 20 - 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)	200	mW
	Dissipation per Output Transistor for $T_{op}$ = full package-temperature Range	100	
$T_{op}$	Operating Temperature : HCC types HCF types	- 55 to + 125 - 40 to + 85	$^{\circ}C$
$T_{stg}$	Storage Temperature	- 65 to + 150	$^{\circ}C$

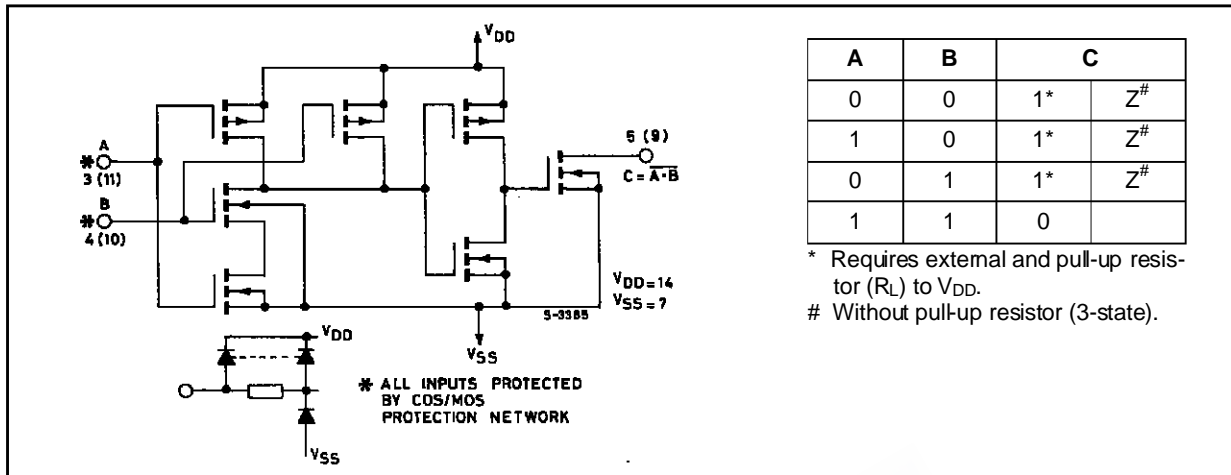
Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure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

\* All voltages values are referred to  $V_{SS}$  pin voltage.

### 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 AND TRUTH TABLE**



**STATIC ELECTRICAL CHARACTERISTICS** (over recommended operating conditions)

Symbol	Parameter	Test Conditions				Value						Unit								
		$V_I$ (V)	$V_O$ (V)	$ I_O $ ( $\mu A$ )	$V_{DD}$ (V)	$T_{Low}^*$		25°C			$T_{High}^*$									
						Min.	Max.	Min.	Typ.	Max.	Min.		Max.							
$I_L$	Quiescent Current				5			0.02			30		$\mu A$							
														HCC Types	0/5	10	2	0.02	2	60
															0/10	15	4	0.02	4	120
															0/20	20	20	0.04	20	600
														HCF Types	0/5	5	4	0.02	4	30
															0/10	10	8	0.02	8	60
															0/15	15	16	0.02	16	120
$V_{IH}^{**}$	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											
$V_{IL}^{**}$	Input Low Voltage		4.5	< 1	5	1.5		1.5		1.5	V									
			9	< 1	10	3	3	3												
			13.5	< 1	15	4	4	4												

\*  $T_{Low} = -55^\circ C$  for HCC device ;  $-40^\circ C$  for HCF device.  
 \*  $T_{High} = +125^\circ C$  for HCC device ;  $+85^\circ C$  for HCF device.  
 The Noise Margin, full package temperature range,  $R_L$  to  $V_{DD} = 10k\Omega$  : 1V min with  $V_{DD} = 5V$ , 2V min with  $V_{DD} = 10V$ , 2.5V min with  $V_{DD} = 15V$ .  
 \*\* Measured with external pull-up resistor,  $R_L = 10k\Omega$  to  $V_{DD}$ .  
 \*\*\* Forced output disabled.

## HCC/HCF40107B

### STATIC ELECTRICAL CHARACTERISTICS (continued)

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>OL</sub>	Output Sink Current	HCC Types	5	0.4		5	21		16	32		12		mA
			5	1		5	44		30	68		25		
			10	0.5		10	49		37	74		28		
			10	1		10	89		68	136		51		
			15	0.5		15	66		50	100		38		
		HCF Types	5	0.4		5	17		13.6	32		12		
			5	1		5	35.7		25.5	68		22		
			10	0.5		10	39.1		31.4	74		27		
			10	1		10	72.2		57.8	136		51		
			15	0.5		15	53.5		42.5	100		37		
I <sub>OH</sub>	Output Drive Current	No Internal Pull-up Device										mA		
I <sub>IH</sub> , I <sub>IL</sub>	Input Leakage Current	HCC Types	0/18	Any Input	18	$\pm 0.1$	$\pm 10^{-5}$	$\pm 0.1$			$\pm 1$	$\mu$ A		
		HCF Types	0/15		15	$\pm 0.3$	$\pm 10^{-5}$	$\pm 0.3$		$\pm 1$				
I <sub>OH</sub> , I <sub>OL</sub> ***	3-State Output Leakage Current	HCC Types	0/18	18	18	2		$\pm 10^{-4}$	2		20	$\mu$ A		
		HCF Types	0/15	15	15	2		$\pm 10^{-4}$	2		20			
C <sub>I</sub>	Input Capacitance	Any Input						5	7.5			pF		
C <sub>O</sub>	Output Capacitance	Any Output						30				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, full package temperature range, R<sub>L</sub> to V<sub>DD</sub> = 10k $\Omega$  : 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.

\*\* Measured with external pull-up resistor, R<sub>L</sub> = 10k $\Omega$  to V<sub>DD</sub>.

\*\*\* Forced output disabled.

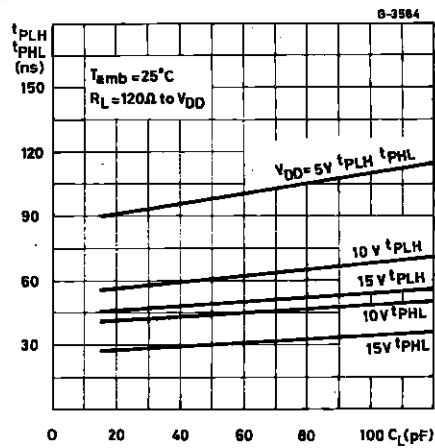
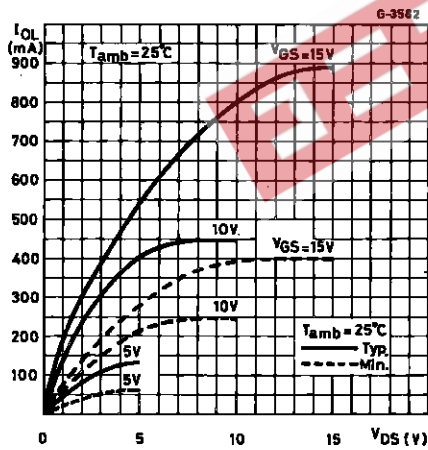
**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ ,  $C_L = 50\text{pF}$ , typical temperature coefficient for all  $V_{DD}$  values is  $0.3\%/^{\circ}\text{C}$ , all input rise and fall time = 20ns)

Symbol	Parameter	Test Conditions	Value			Unit	
			$V_{DD}$ (V)	Min.	Typ.		Max.
$t_{PHL}$ , $t_{PLH}$	Propagation Delay Time High to Low	$R_L^* = 120\Omega$	5		100	200	ns
			10		45	90	
			15		30	60	
	Low to High	$R_L^* = 120\Omega$	5		100	200	ns
			10		60	120	
			15		50	100	
$t_{THL}$ , $t_{TLH}$	Transition Time High to Low	$R_L^* = 120\Omega$	5		50	100	ns
			10		20	40	
			15		10	20	
	Low to High	$R_L^* = 120\Omega$	5		50	100	ns
			10		35	70	
			15		25	50	

\*  $R_L$  is external pull-up resistor to  $V_{DD}$ .

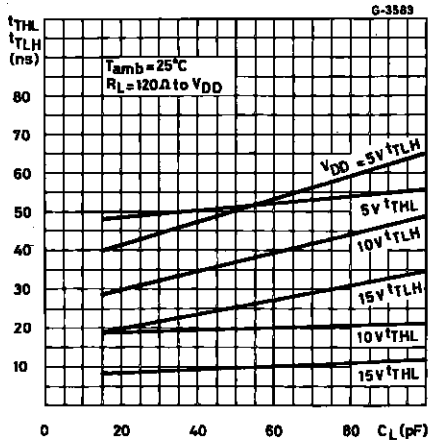
Output Low (sink) Current Characteristics.

Typical Propagation Delay Time vs. Load Capacitance.

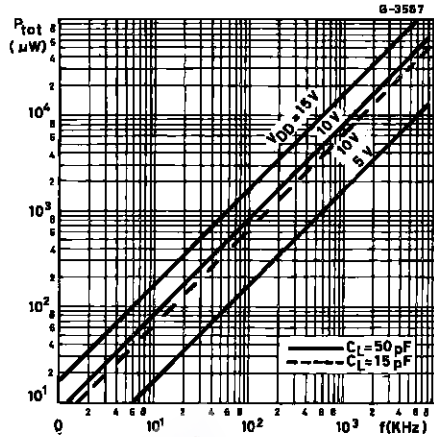


# HCC/HCF40107B

Typical Transition Time vs. Load Capacitance.



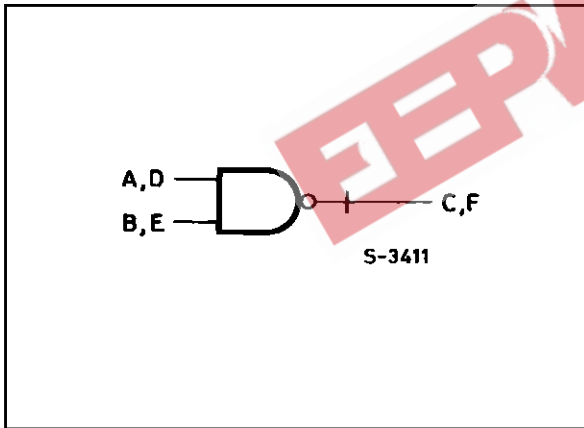
Typical Dynamic Power Dissipation vs. Input Frequency.



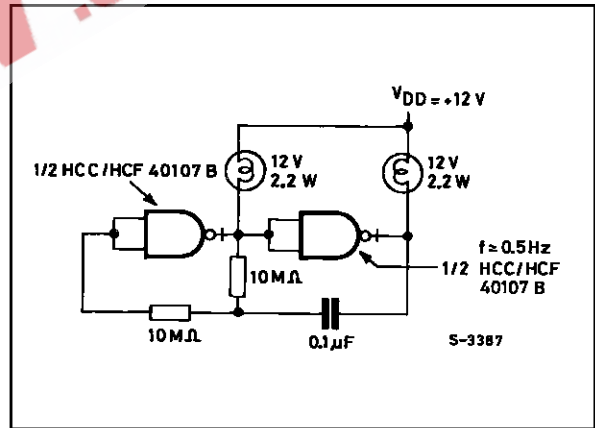
## TYPICAL APPLICATIONS

The bar on the output line of this logic diagram indicates that the output is open drain as is shown in the previous schematic diagram and truth table.

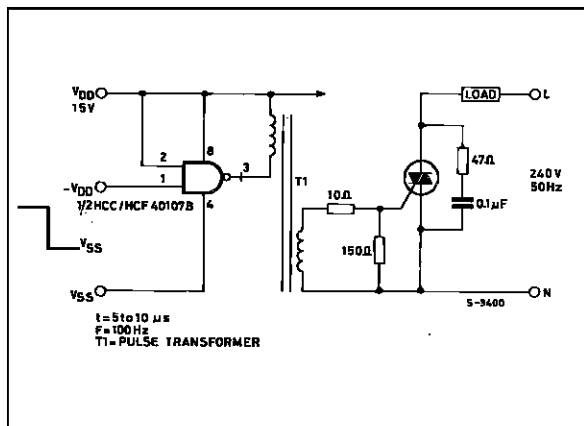
Logic Diagram of The HCC/HCF40107B nand Buffer.



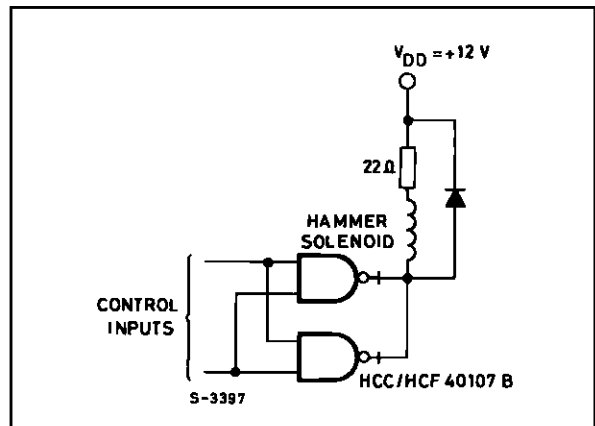
A 2.2-watt Incandescent Lamp-driver Circuit.



Interface of 40107B with Triac, with COS/MOS Component and Triac isolated.

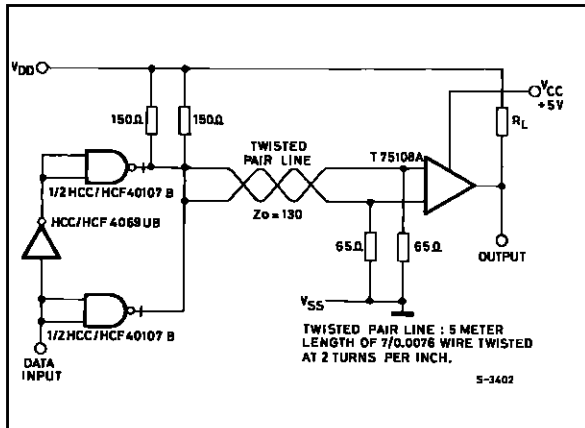


Solenoid Driver Circuit.

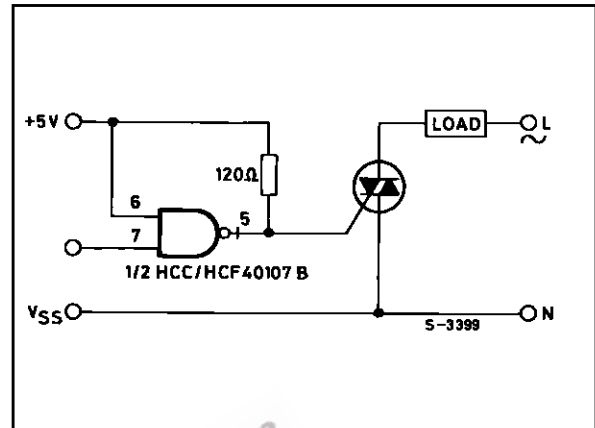


TYPICAL APPLICATIONS (continued)

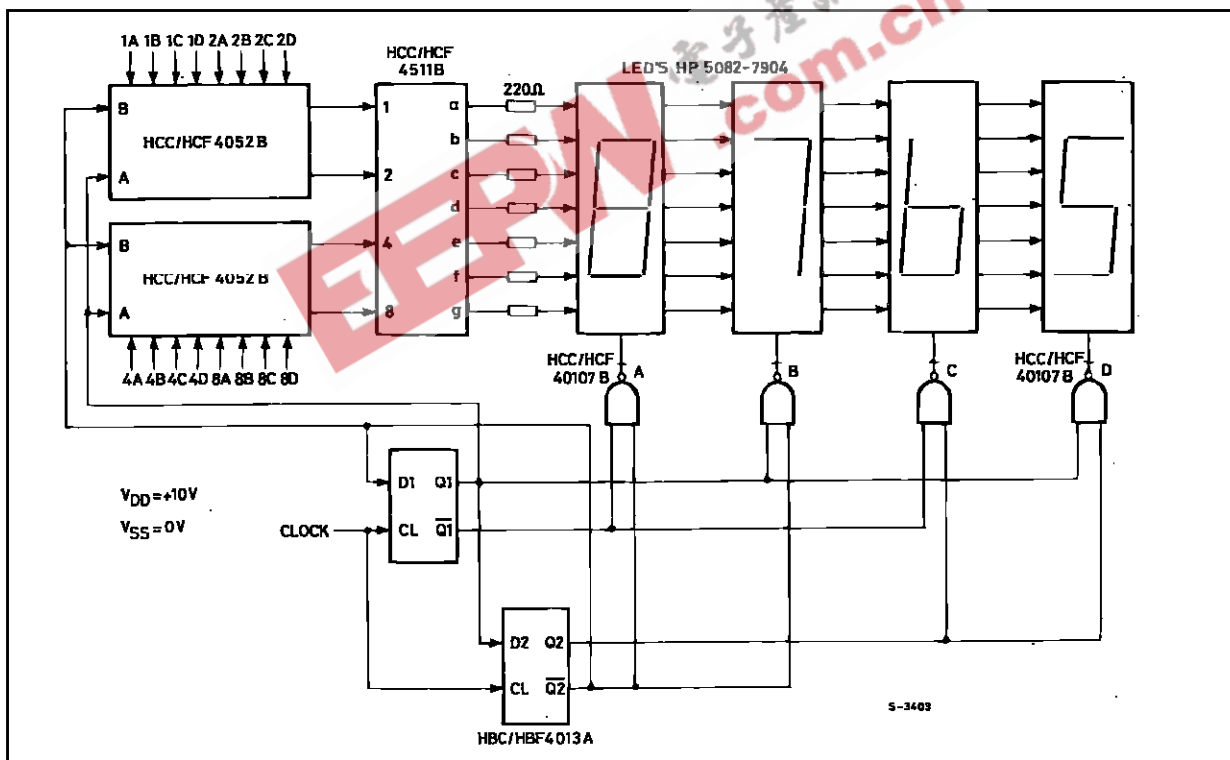
Line-driver Circuit.



Direct Dc Driver Interface of 40107B with a Triac.



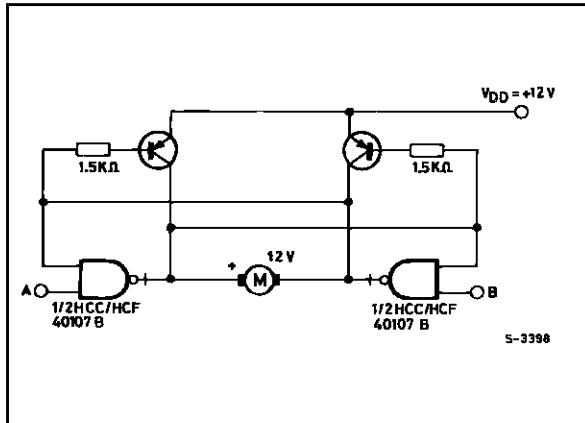
Multiplexed Led Circuit.



# HCC/HCF40107B

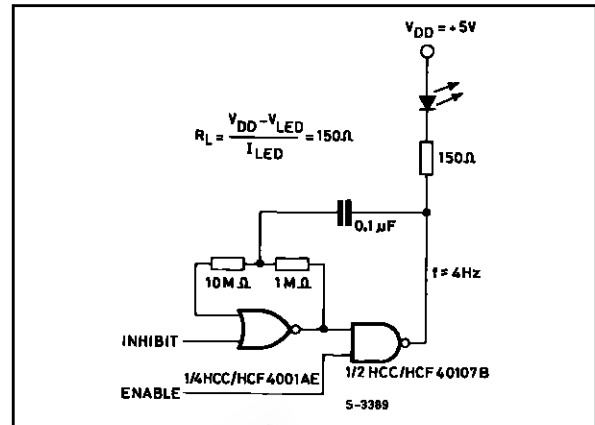
## TYPICAL APPLICATIONS (continued)

Motor-controller Circuit.



A	B	Motor Function
0	0	OFF
1	0	COUNTER CLOCKWISE
1	1	AS PREVIOUS STATE
0	1	CLOCKWISE
1	1	AS PREVIOUS STATE

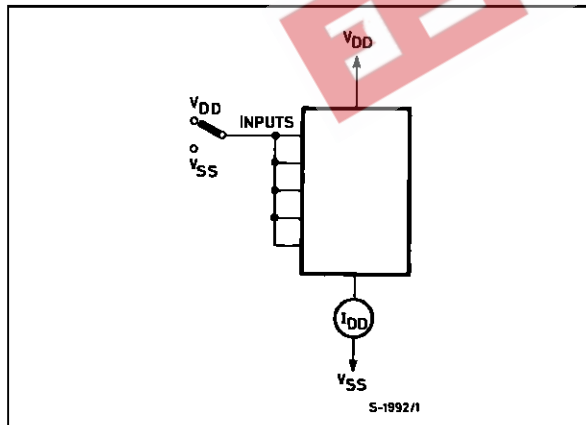
Led Driver Circuit.



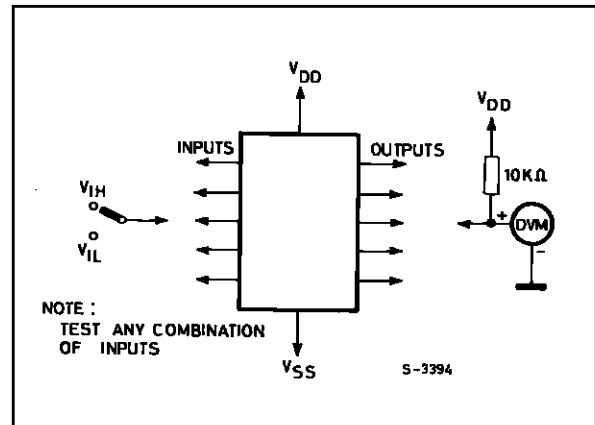
INHIBIT	ENABLE	OUTPUT
0	0	OFF
1	0	OFF
0	1	OFF
0	1	ON

## TEST CIRCUITS

Quiescent Device Current.



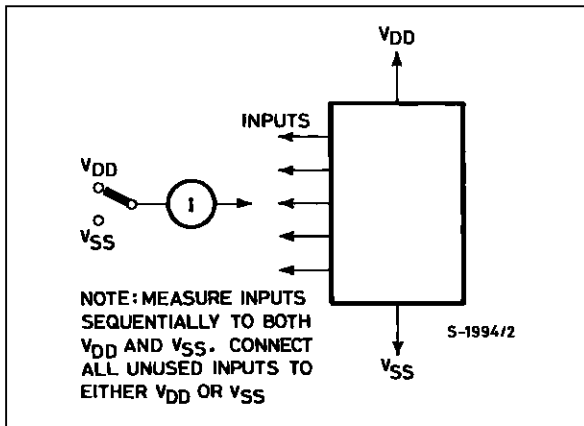
Input Voltage.



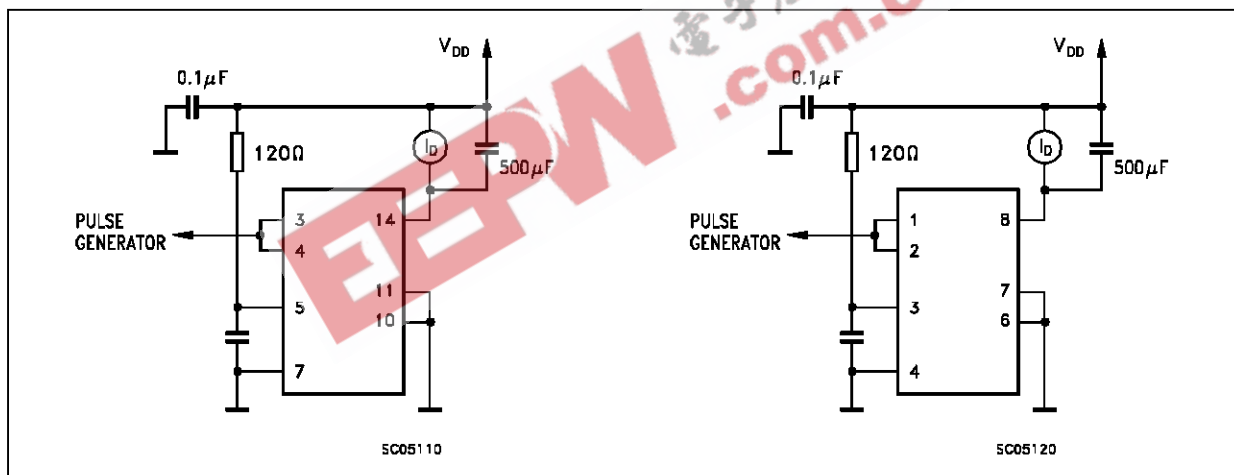


**TEST CIRCUITS** (continued)

Dynamic Power Dissipation.

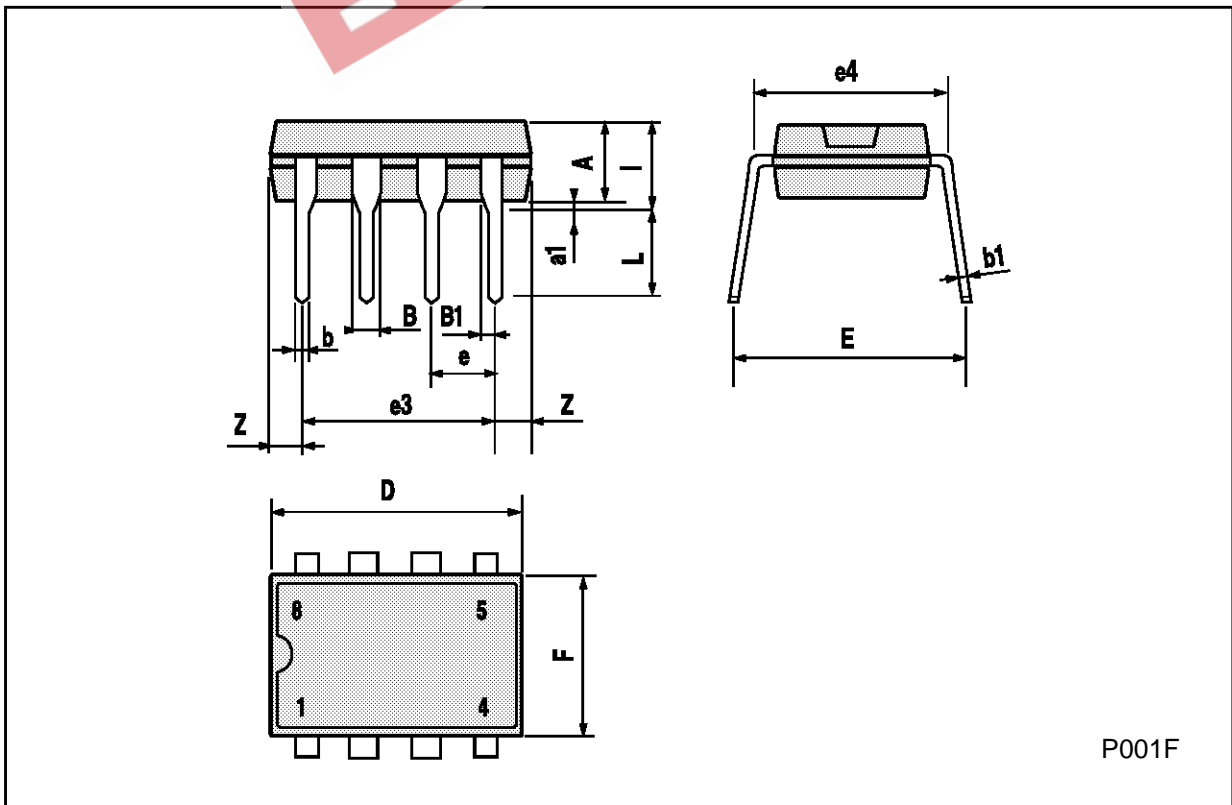


Dynamic Power Dissipation.



**Minidip (0.4) MECHANICAL DATA**

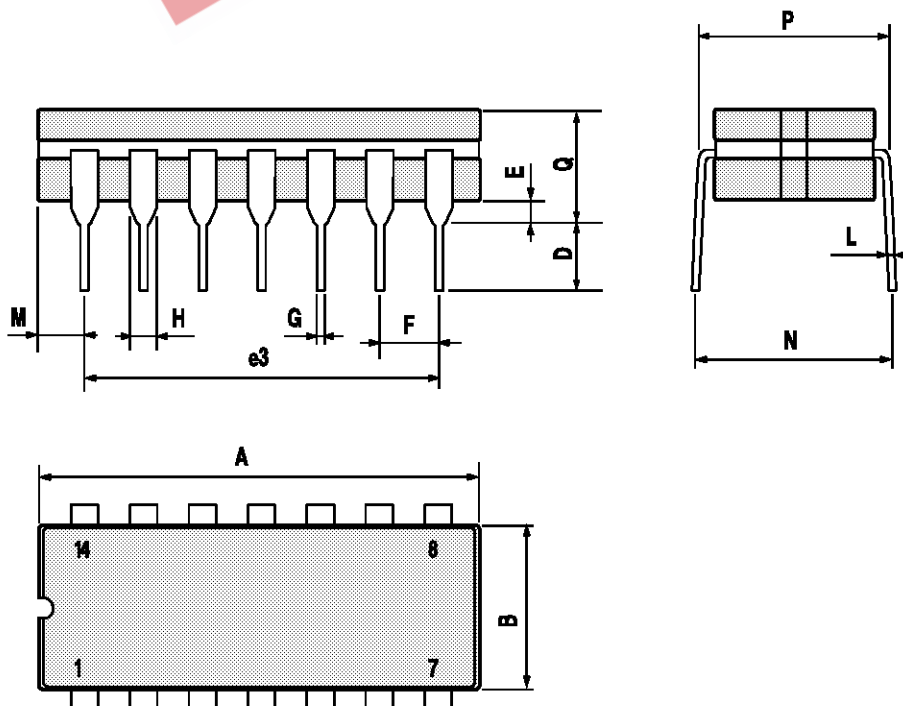
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063



P001F

## Ceramic DIP14/1 MECHANICAL DATA

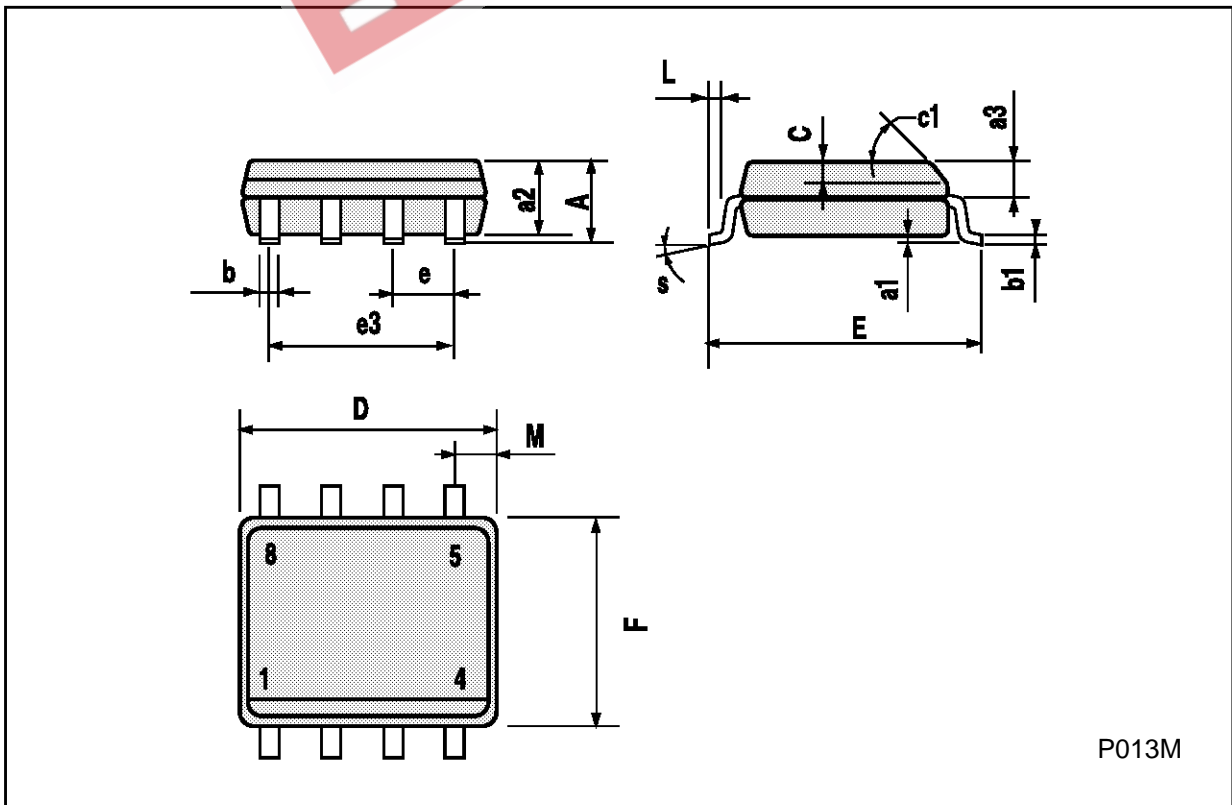
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7.0			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		15.24			0.600	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
H	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	1.52		2.54	0.060		0.100
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200



P053C

**SO8 MECHANICAL DATA**

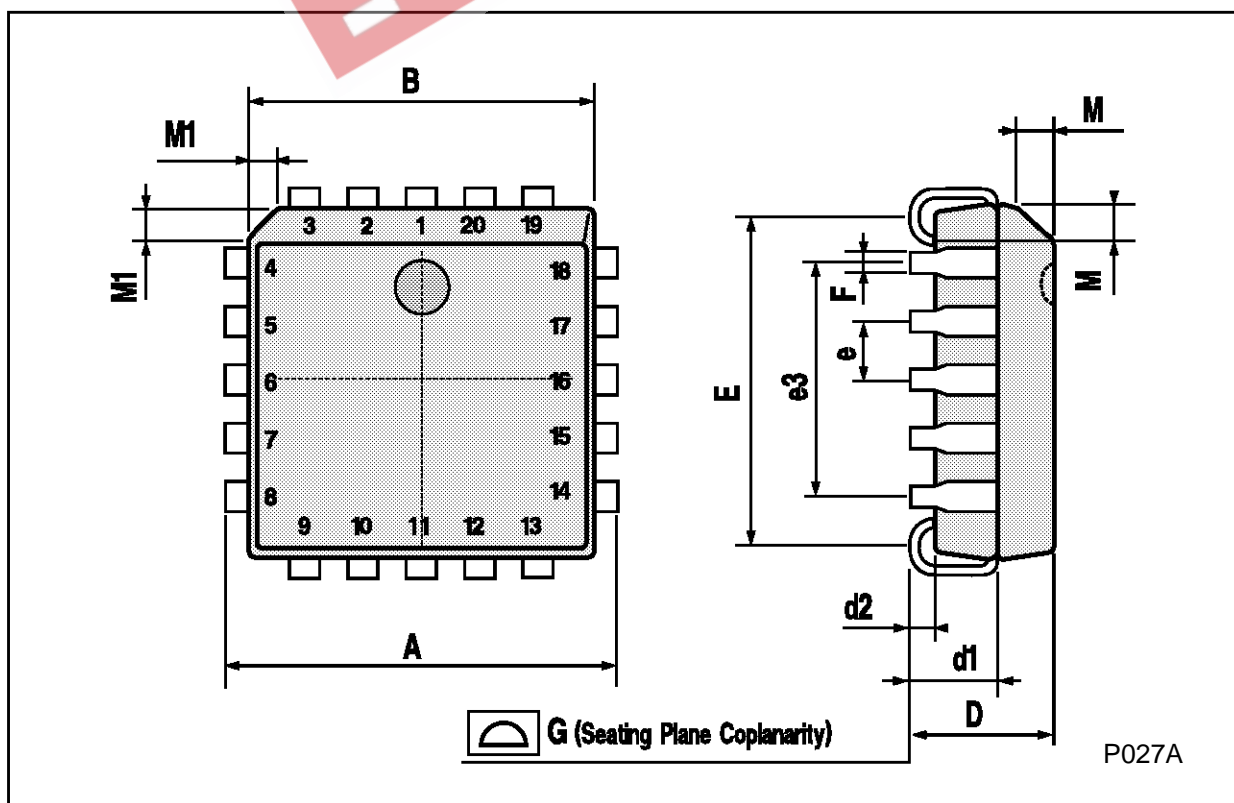
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45° (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8° (max.)					



P013M

## 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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