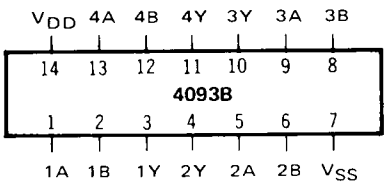
CMOS QUAD SCHMITT TRIGGER

FEATURES

- **Schmitt Trigger Action on each Input with no External Components**
- **Quad 2-Input NAND Configuration**
- **Noise Immunity Greater than 50%**
- **No Limit on Input Rise and Fall Times**

CONNECTION DIAGRAM
(all packages)



DESCRIPTION

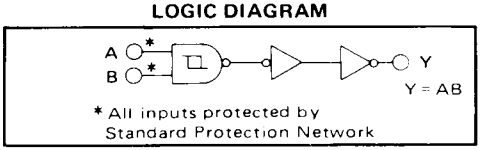
The 4093B consists of four Schmitt trigger circuits. Each circuit functions as a 2-input NAND gate with Schmitt trigger action on both inputs. The gate switches at different points for positive- and negative-going signals. The difference between the positive voltage (V_P) and the negative voltage (V_N) is defined as the hysteresis voltage (V_H). This device is useful in high-noise environments and in wave and pulse shapers and multivibrators.

RECOMMENDED OPERATING CONDITIONS

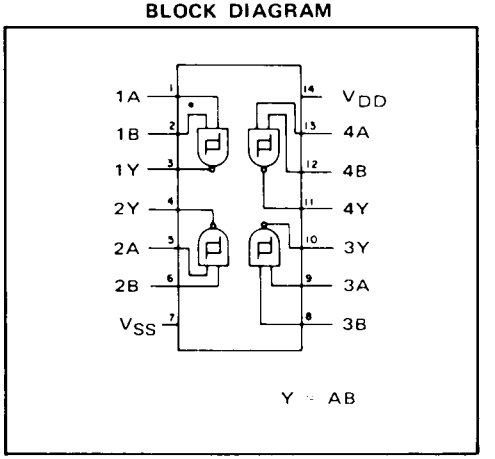
For maximum reliability:

DC Supply Voltage	$V_{DD} - V_{SS}$	3 to 15	Vdc
Operating Temperature	T_A		
C, D, F, H Device		-55 to +125	°C
E Device		-40 to +85	°C

LOGIC DIAGRAM



BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS

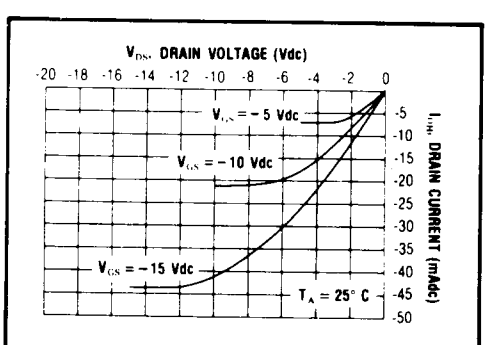
STATIC CHARACTERISTICS [1]

PARAMETER		V_{DD} (Vdc)	CONDITIONS	T_{LOW} [2] Min.	T_{LOW} [2] Max.	+25°C Min.	+25°C Typ.	+25°C Max.	T_{HIGH} [2] Min.	T_{HIGH} [2] Max.	Units
QUIESCENT DEVICE CURRENT	I_{DD}	5	$V_{IN}=V_{SS}$ or V_{DD}	–	1.0	–	0.0005	1.0	–	30	μAdc
		10	All valid input	–	2.0	–	0.001	2.0	–	60	
		15	combinations	–	4.0	–	0.002	4.0	–	120	
POSITIVE TRIGGER THRESHOLD VOLTAGE	V_P (V_{IL})	5		3 typ		2.3	2.9	3.5	2.9 typ		Vdc
		10		5.9 typ		4.5	5.9	7.0	5.9 typ		
		15		8.9 typ		6.8	8.9	11	8.9 typ		
NEGATIVE TRIGGER THRESHOLD VOLTAGE	V_N (V_{IH})	5		2.6 typ		1.5	2.3	2.7	2.1 typ		Vdc
		10		4 typ		3.0	3.9	5.5	3.8 typ		
		15		5.5 typ		4.0	5.4	8.2	5.3 typ		
HYSTERESIS VOLTAGE	V_H	5		.4	2.0	.4	.75	2.0	.4	2.0	V_{dc}
		10		.7	3.0	.7	.95	3.0	.7	3.0	
		15		.85	4.0	.85	1.20	4.0	.85	4.0	

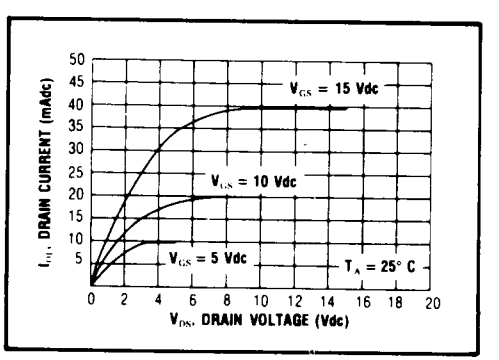
NOTES: [1] Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".
[2] T_{LOW} = -55°C for C, D, F, H device.
= -40°C for E device.
T_{HIGH} = +125°C for C, D, F, H device.
= + 85°C for E device.

DYNAMIC CHARACTERISTICS (C_L = 50pF, T_A = 25°C)

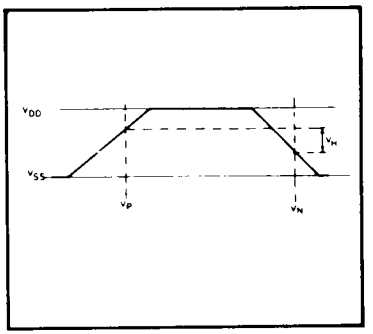
PARAMETER		V_{DD} (Vdc)	Min.	Typ.	Max.	Units
PROPAGATION DELAY TIME	t_{PLH}, t_{PHL}	5	–	190	380	ns
		10	–	90	180	
		15	–	65	130	
OUTPUT TRANSITION TIME	t_{TLH}, t_{THL}	5	–	100	200	ns
		10	–	50	100	
		15	–	40	80	



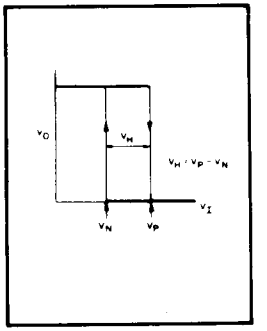
Typical P-Channel
Source Current Characteristics



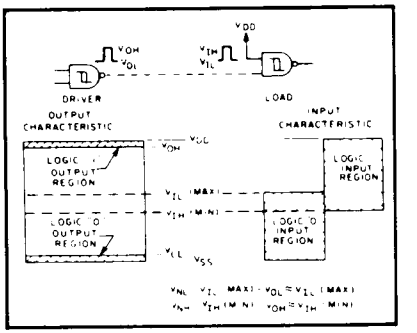
Typical N-Channel
Sink Current Characteristics



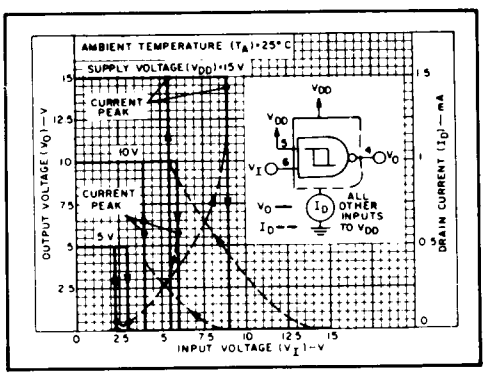
Definition of V_P, V_N and V_H.



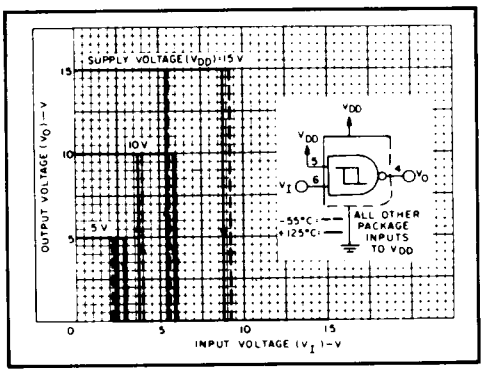
Transfer characteristic of 1 of 4 gates.



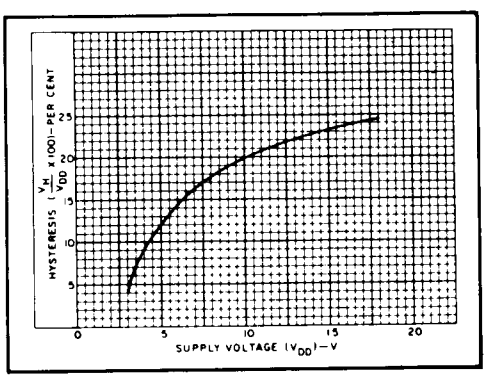
Input and output characteristics.



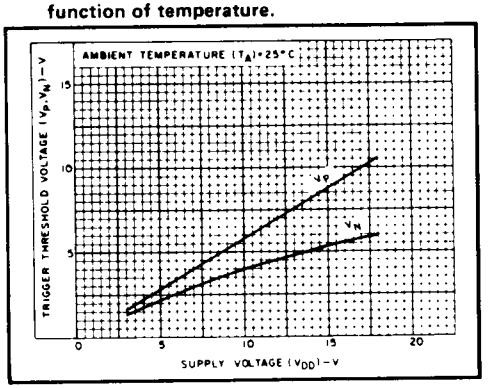
Typical current and voltage transfer characteristics.



Typical voltage transfer characteristics as a function of temperature.

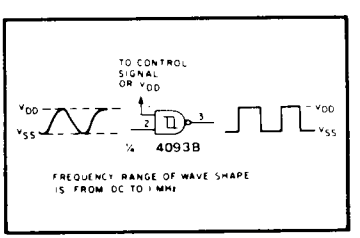


Typical trigger threshold voltage vs. V_{DD}.

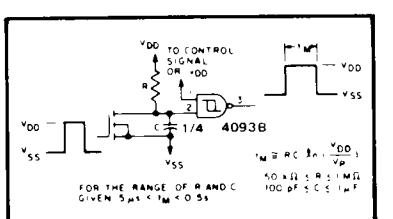


Typical per cent hysteresis vs. supply voltage.

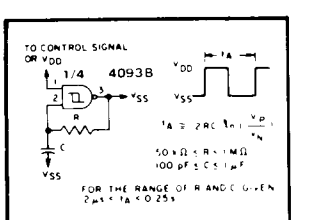
APPLICATIONS INFORMATION



Wave shaper.



Monostable multivibrator.



Astable multivibrator.