CD40106B

CMOS Hex Schmitt Triggers

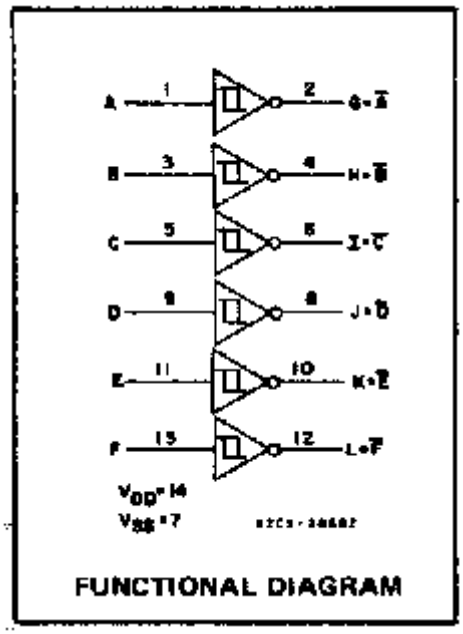
High-Voltage Types (20-Volt Rating)

CD40106B consists of six Schmitt trigger circuits. Each circuit functions as an inverter with Schmitt trigger action on the input. The trigger switches at different points for positive and negative-going signals. The difference between the positive-going voltage (V_P) and the negative-going voltage(V_N)is defined as hysteresis voltage(V_H) (see Fig.2).

The CD40106B types are supplied in 14 lead hermetic dual-in-line ceramic packages (D and F suffixes),14-lead dual-in-line plastic package(E suffix), and in chip form (H suffix).

Features:

- Schmitt-trigger action with no external components
- Hysteresis voltage(typ.) 0.9V at V_{DD}=5V, 2.3V at V_{DD}=10V, and 3.5V at V_{DD}=15V
- Noise immunity greater than 50%
- No limit on input rise and fall times
- Standardized, symmetrical output characteristics
- 100% tested for quiescent current at 20V
- Maximum input current of 1μA at 18V over full package-temperature range;100nA at 18V and 25℃
- Low V_{DD} to V_{SS} current during slow input ramp
- 5V, 10V, and 15V parametric ratings
- Meets all requlrements of JEDEC Tentative Standard No. 13B, "Standard Speclfications for Description of 'B' Series CMOS Devices"



FUNCTIONAL DIAGRAM

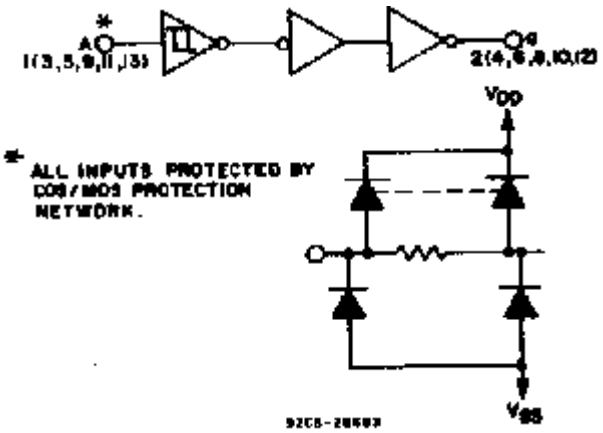


Fig.1-Logic diagram (1 of 6 Schmitt triggers)

Applications:

- Wave and pulse shapers
- High-noise-environment systems
- Monostable multivibrators
- Astable multivibrators

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (V_{DD})
Voltage referenced to V_{SS} Terminal –0.5V to +20V
INPUT VOLTAGE RANGE, ALL INPUTS –0.5V to V_{DD} +0.5V
DC INPUT CURRENT, ANY ONE INPUT ±10mA
POWER DISSIPATION PER PACKAGE (P_D):
For T_A= -55℃ to +100℃ 500mW
For T_A= +100℃ to +125℃ Derate Linearity at 12mW/℃ to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
FOR T_A=FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW
OPERATING-TEMPERATURE RANGE (T_A) –55℃ to +125℃
STORAGE TEMPERATURE RANGE (T_{stg}) –65℃ to +150℃
LEAD TEMPERATURE (DURING SOLDERING):
At distance 1/16±1/32 inch (1.59±0.79mm) from case for 10s max +265℃

RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For T_A Full Package-Temperature Range)	3	18	V

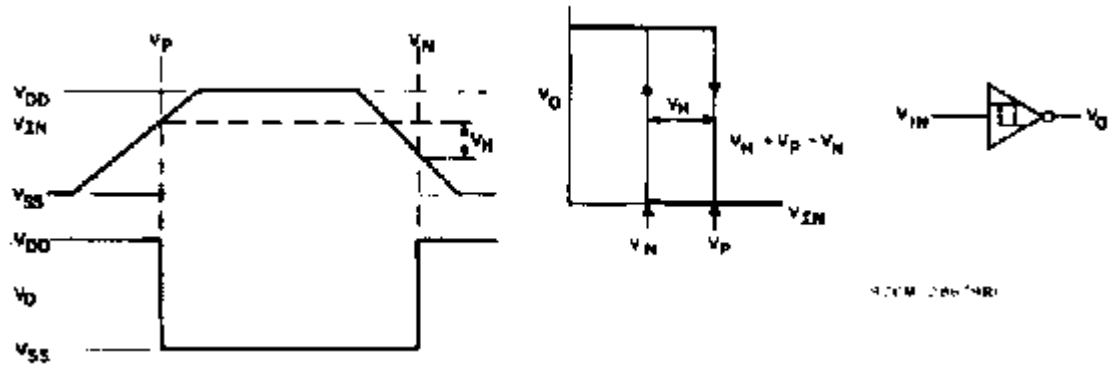
DYNAMIC ELECTRICAL CHARACTERITICS

At T_A=25°C, Input t_r, t_f=20ns, C_L=50pF, R_L=200kΩ

CHARACTERISTIC	TEST CONDITIONS	LIMITS			UNITS
		V_{DD} (V)	TYP	MAX.	
Propagation Delay Time:		5	140	280	
t_{PHL},		10	70	140	ns
t_{PLH}		15	60	120	
Transition Time:		5	100	200	
t_{THL},		10	50	100	ns
t_{TLH}		15	40	80	
Input Capacitance, C_{IN}	Any Input		5	7.5	pF

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
								+25			
	V_O (V)	V_{IN} (V)	V_{DD} (V)	−55	−40	+85	+125	Min.	Typ.	Max.	
Quiescent Device Current, I_{DD} Max.	–	0,5	5	1	1	30	30	–	0.02	1	µA
	–	0,10	10	2	2	60	60	–	0.02	2	
	–	0,15	15	4	4	120	120	–	0.02	4	
	–	0,20	20	20	20	600	600	–	0.04	20	
Positive Trigger Threshold Voltage V_P Min.	–	–	5	2.2	2.2	2.2	2.2	2.2	2.9	–	V
	–	–	10	4.6	4.6	4.6	4.6	4.6	5.9	–	
	–	–	15	6.8	6.8	6.8	6.8	6.8	8.8		
V_P Max.	–	–	5	3.6	3.6	3.6	3.6	–	2.9	3.6	
	–	–	10	7.1	7.1	7.1	7.1	–	5.9	7.1	
	–	–	15	10.8	10.8	10.8	10.8	–	8.8	10.8	
Negative Trigger Threshold Voltage V_N Min.	–	–	5	0.9	0.9	0.9	0.9	0.9	1.9	–	V
	–	–	10	2.5	2.5	2.5	2.5	2.5	3.9	–	
	–	–	15	4	4	4	4	4	5.8	–	
V_N Max.	–	–	5	2.8	2.8	2.8	2.8	–	1.9	2.8	
	–	–	10	5.2	5.2	5.2	5.2	–	3.9	5.2	
	–	–	15	7.4	7.4	7.4	7.4	–	5.8	7.4	
Hysteresis Voltage V_H Min.	–	–	5	0.3	0.3	0.3	0.3	0.3	0.9	–	V
	–	–	10	1.2	1.2	1.2	1.2	1.2	2.3	–	
	–	–	15	1.6	1.6	1.6	1.6	1.6	3.5	–	
V_H Max.	–	–	5	1.6	1.6	1.6	1.6	–	0.9	1.6	
	–	–	10	3.4	3.4	3.4	3.4	–	2.3	3.4	
	–	–	15	5	5	5	5	–	3.5	5	
Output Low (Sink) Current, I_{OL} Min.	0.4	0,5	5	0.64	0.61	0.42	0.36	0.51	1	–	mA
	0.5	0,10	10	1.6	1.5	1.1	0.9	1.3	2.6	–	
	1.5	0,15	15	4.2	4	2.8	2.4	3.4	6.8	–	
Output High (Source) Current, I_{OH} Min.	4.6	0,5	5	−0.64	−0.61	−0.42	−0.36	−0.51	−1	–	
	2.5	0.5	5	−2	−1.8	−1.3	−1.15	−1.6	−3.2	–	
	9.5	0,10	10	−1.6	−1.5	−1.1	−0.9	−1.3	−2.6	–	
	13.5	0,15	15	−4.2	−4	−2.8	−2.4	−3.4	−6.8	–	
Output Voltage Low-Level, V_{OL} Max.	–	5	5	0.05				–	0	0.05	V
	–	10	10	0.05				–	0	0.05	
	–	15	15	0.05				–	0	0.05	
Output Voltage High Level, V_{OH} Min.	–	0	5	4.95				4.95	5	–	
	–	0	10	9.95				9.95	10	–	
	–	0	15	14.95				14.95	15	–	
Input Current, I_{IN} Max.	–	0,18	18	±0.1	±0.1	±1	±1	–	$\pm 10^{-5}$	±0.1	µA



a) Definition of Vp, V_N, V_H b) Transfer characteristics of 1 of 6 gates

Fig.2-Hysteresis definition, characteristics, and test set-up

APPLICATIONS

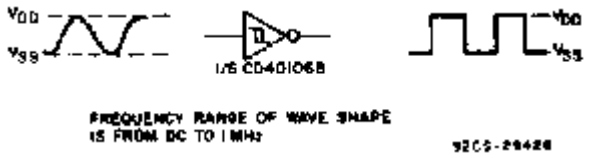


Fig.3-Wave shaper

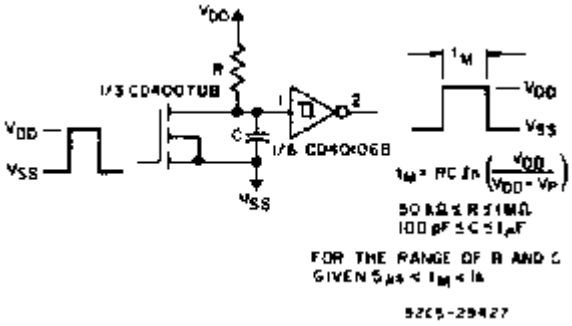


Fig.4-Monostable multivibrator

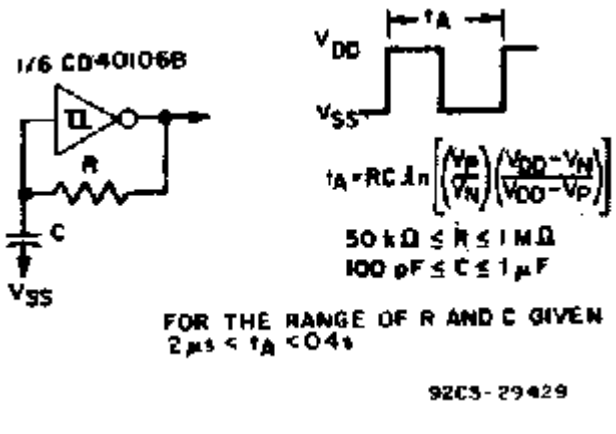


Fig.5-Astable multivibrator

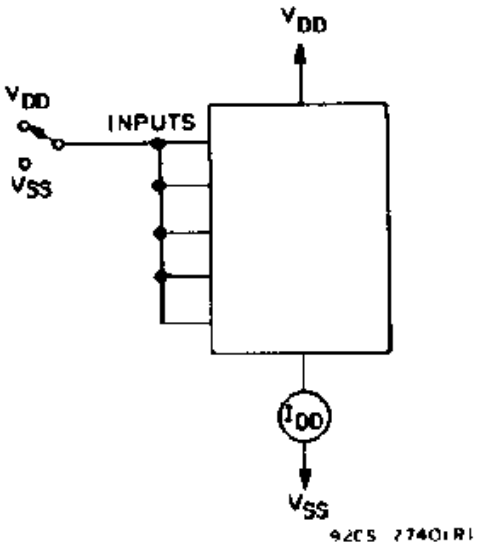


Fig.6-Ouiescent device current test circuit

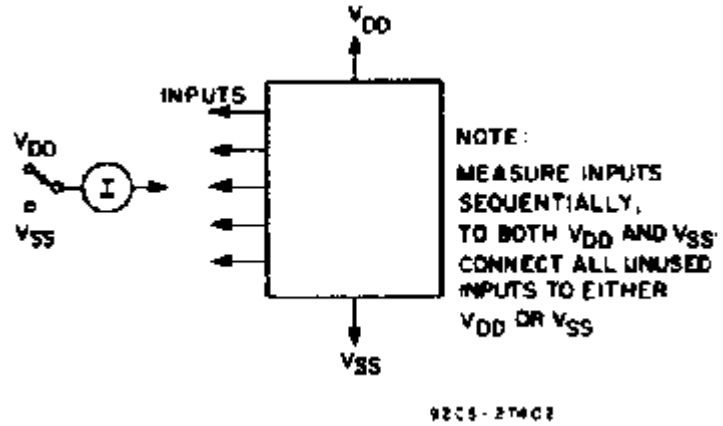


Fig.7-Input current test circuit

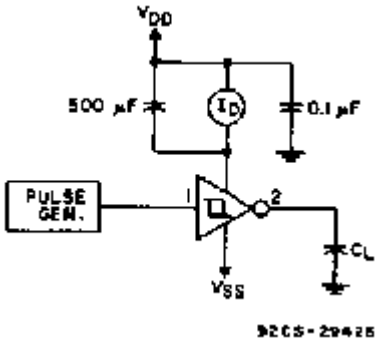
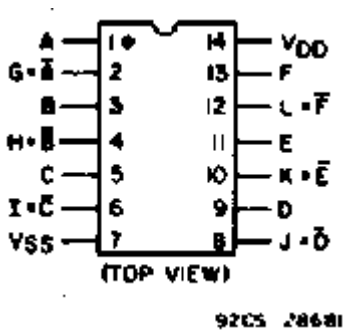


Fig.8-Dynamic power dissipation test circuit



TERMINAL ASSIGNMENT