UNISONIC TECHNOLOGIES CO., LTD

HEX SCHMITT TRIGGERS

SOP-14

■   **DESCRIPTION**

    The **CD40106** is a high speed Si-gate CMOS device which contains six independent Schmitt-trigger inverters and they perform the function $Y=\overline{A}$.
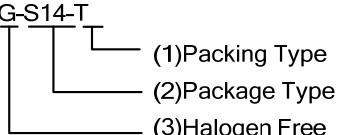
    The device have different input threshold levels for positive-going (V_{T+}) and negative-going (V_{T-}) signals because of the Schmitt-trigger action in the input.
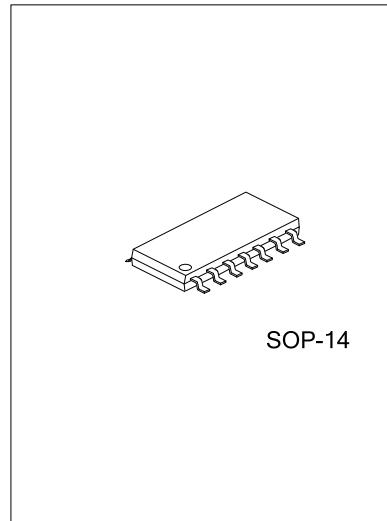
■   **FEATURES**
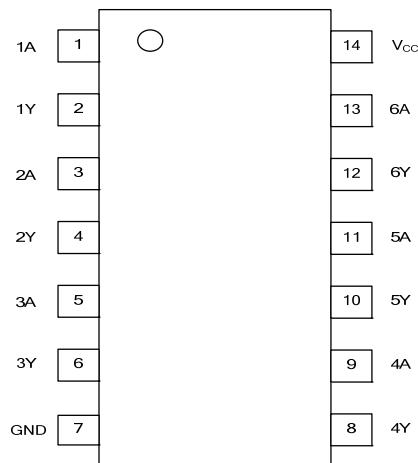
* High voltage type (20V rating)
* All inputs have Schmitt-trigger action
* Hysteresis Voltage(TYP):   0.9V at V_{CC}=5V
                              2.3V at V_{CC}=10V
                              3.5V at V_{CC}=15V
* Wide supply voltage range from 3V to 18V
* Inputs are TTL-Voltage compatible
* Noise immunity greater than 50%

■   **ORDERING INFORMATION**

Ordering Number		Package	Packing
Lead Free	Halogen Free		
CD40106L-S14-R	CD40106G-S14-R	SOP-14	Tape Reel
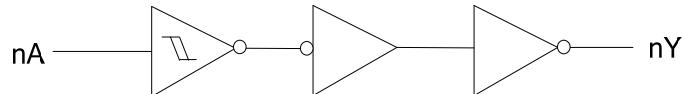
CD40106G-S14-T	
(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) S14: SOP-14
(3)Halogen Free	(3) L: Lead Free, G: Halogen Free

■ **PIN CONFIGURATION**

```
        1A  [ 1        ○        14 ]  Vcc
        1Y  [ 2                 13 ]  6A
        2A  [ 3                 12 ]  6Y
        2Y  [ 4                 11 ]  5A
        3A  [ 5                 10 ]  5Y
        3Y  [ 6                  9 ]  4A
       GND  [ 7                  8 ]  4Y
```

■ **FUNCTION TABLE** (each gate)

INPUT	OUTPUT
A	Y
L	H
H	L

Note: H: HIGH voltage level; L: LOW voltage level

■ **LOGIC DIAGRAM** (positive logic)

nA ———▷○——○▷——▷○——— nY

ABSOLUTE MAXIMUM RATING (T_A =25°C, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 20	V
Input Voltage	V_{IN}	-0.5~ V_{CC}+0.5	V
DC Input Current, Any One Input	I_{IN}	±10	mA
Power Dissipation	P_D	500	mW
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	3		18	V
Input Voltage	V_{IN}		0		V_{CC}	V
Operating Temperature	T_{OPR}		-40		+85	°C

■ STATIC CHARACTERISTICS (T_A =25°C , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	V_{T+}	V_{CC}=5V	2.2	2.9	3.6	V
		V_{CC}=10V	4.6	5.9	7.1	
		V_{CC}=15V	6.6	8.8	10.8	
Negative-Going Input Threshold Voltage	V_{T-}	V_{CC}=5V	0.9	1.9	2.8	V
		V_{CC}=10V	2.5	3.9	5.2	
		V_{CC}=15V	4.0.	5.8	7.4	
Hysteresis Voltage (V_{T+}-V_{T-}) (see figure 3)	ΔV_T	V_{CC}=5V	0.3	0.9	1.6	V
		V_{CC}=10V	1.2	2.3	3.6	
		V_{CC}=15V	1.6	3.5	5.0	
High-Level Output Voltage	V_{OH}	V_{CC}=5V, $/I_O/$<1uA	4.95	5		V
		V_{CC}=10V, $/I_O/$<1uA	9.95	10		
		V_{CC}=15V, $/I_O/$<1uA	15.95	15		
Low-Level Output Voltage	V_{OL}	V_{CC}=5V, $/I_O/$<1uA		0	0.05	V
		V_{CC}=10V, $/I_O/$<1uA		0	0.05	
		V_{CC}=15V, $/I_O/$<1uA		0	0.05	
High-level Output Current	I_{OH}	V_{CC}=5V, V_O=4.6V	-0.51	-1		mA
		V_{CC}=5V, V_O=2.5V	-1.6	-3.2		
		V_{CC}=10V, V_O=9.5V	-1.3	-2.6		
		V_{CC}=15V, V_O=13.5V	-3.4	-6.8		
Low-level Output Current	I_{OL}	V_{CC}=5V, V_O=0.4V	0.51	1.0		mA
		V_{CC}=10V, V_O=0.5V	1.3	2.6		
		V_{CC}=15V, V_O=1.5V	3.4	6.8		
Input Leakage Current	$I_{I(LEAK)}$	V_{CC}=18V, V_{IN}=V_{CC} or GND		±0.01	±100	nA
Quiescent Supply Current	I_{DD}	V_{CC}=5V, V_{IN}= V_{CC} or GND, I_{OUT}=0		0.02	1	uA
		V_{CC}=10V, V_{IN}= V_{CC} or GND, I_{OUT}=0		0.02	2	
		V_{CC}=15V, V_{IN}= V_{CC} or GND, I_{OUT}=0		0.02	4	
		V_{CC}=20V, V_{IN}= V_{CC} or GND, I_{OUT}=0		0.04	20	

■ **DYNAMIC CHARACTERISTICS** (T_A =25°C, unless otherwise specified; Input: t_R, t_F=20ns)
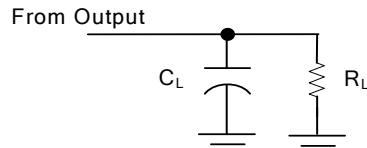
See Fig. 1 and Fig. 2 for test circuit and waveforms.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	t_{PLH}/t_{PHL}	V_{CC}=5V, C_L=50Pf, R_L=200KΩ		140	280	ns
		V_{CC}=10V, C_L=50Pf, R_L=200KΩ		70	140	
		V_{CC}=15V, C_L=50Pf, R_L=200KΩ		60	120	
Output Transition Time	t_{TLH}/t_{THL}	V_{CC}=5V, C_L=50Pf, R_L=200KΩ		100	200	ns
		V_{CC}=10V, C_L=50Pf, R_L=200KΩ		50	100	
		V_{CC}=15V, C_L=50Pf, R_L=200KΩ		40	80	

■ **OPERATING CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Average Input Capacitance	C_{IN}	Any Input		5	7.5	pF
Power Dissipation Capacitance	Cpd	Any Gate		14		pF

■ **TEST CIRCUIT AND WAVEFORMS**

From Output

C_L R_L
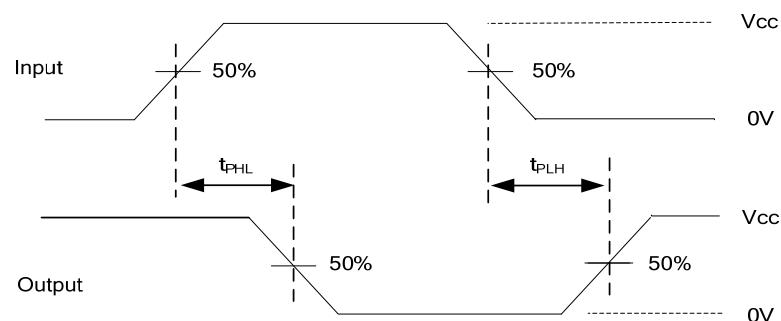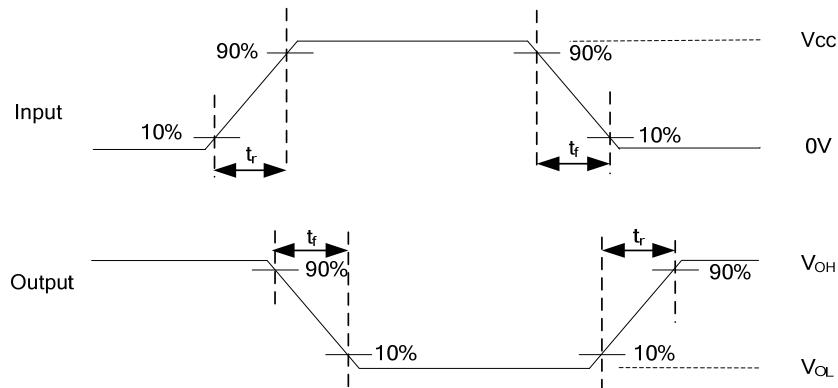
TEST CIRCUIT

Note: C_L includes probe and jig capacitance.

Fig. 1 Load circuitry for switching times.

Input   50%   50%   Vcc   0V

t_{PHL} t_{PLH}

Output   50%   50%   Vcc   0V

PROPAGATION DELAY TIMES

Input   90%   90%   Vcc   10%   10%   0V t_r t_f

Output t_f 90% t_r 90% V_{OH} 10%   10% V_{OL}

Output Transition Time

Fig. 2 Propagation delay from input(A) to output(Y) and Output transition time.

■ **TEST CIRCUIT AND WAVEFORMS(Cont.)**

$\Delta V_T = V_{T+} - V_{T-}$
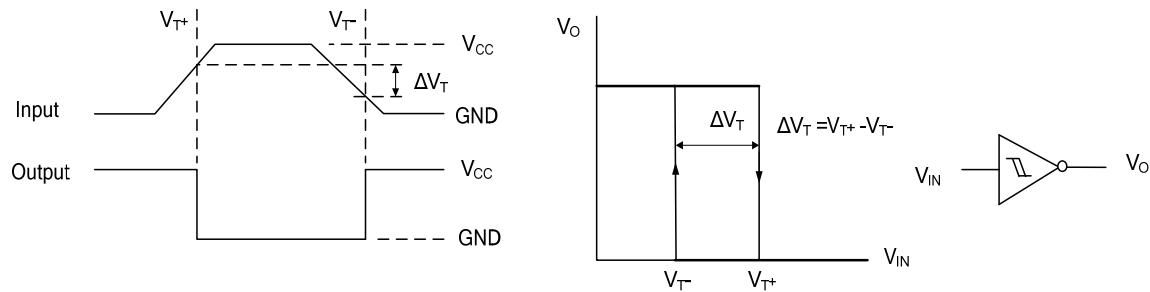
Fig. 3 Hysteresis definition, characteristics, and test setup