Hex inverter/buffer drivers (open-collector)

74F06, 74F06A, 74F07, 74F07A

FEATURES OF 74F06, 74F07

- Open Collector output drive 64mA
- High speed
- 12V output termination voltage
- Symmetrical propagation delays

FEATURES OF 74F06A, 74F07A

- Open Collector output drive 48mA
- High speed
- 30V output termination voltage
- Replaces 7406 and 7407
- Improved performance upgrade for 7406 and 7407
- Reduced I_{OH} leakage @ 30V

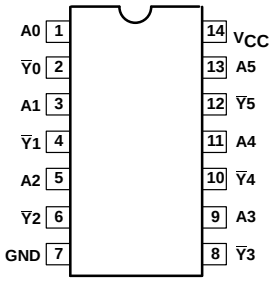
TYPE	TYPICAL PROP-AGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F06	3.5ns	30mA
74F06A	9.0ns	30mA
74F07	4.5ns	32mA
74F07A	10.0ns	32mA

ORDERING INFORMATION

DESCRIPTION	COMMERCIAL RANGE V_{CC} = 5V ±10%, T_{amb} = 0°C to +70°C	DRAWING NUMBER
14–pin plastic Dual In-line Package	N74F06N, N74F06AN	0405B
14–pin plastic Small Outline	N74F07D, N74F07AD	175D

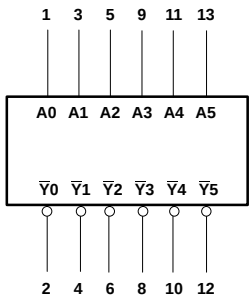
PIN CONFIGURATION

74F06/74F06A



LOGIC SYMBOL

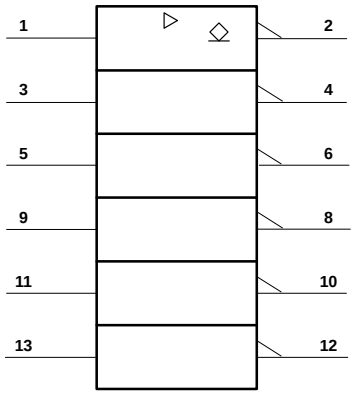
74F06/74F06A



V_{CC} = Pin 14
GND = Pin 7

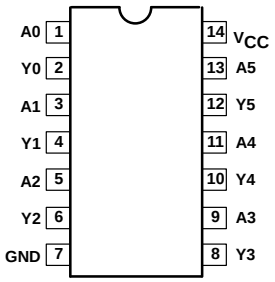
IEC/IEEE SYMBOL

74F06/74F06A



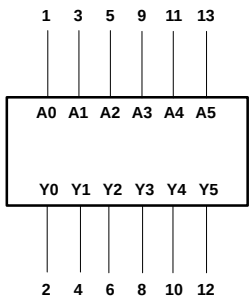
PIN CONFIGURATION

74F07/74F07A



LOGIC SYMBOL

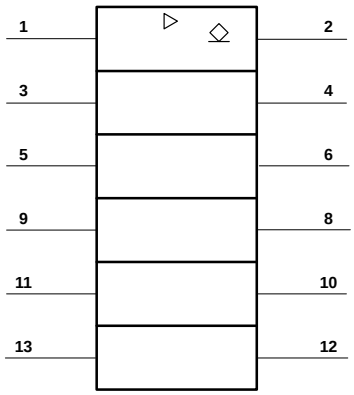
74F07/74F07A



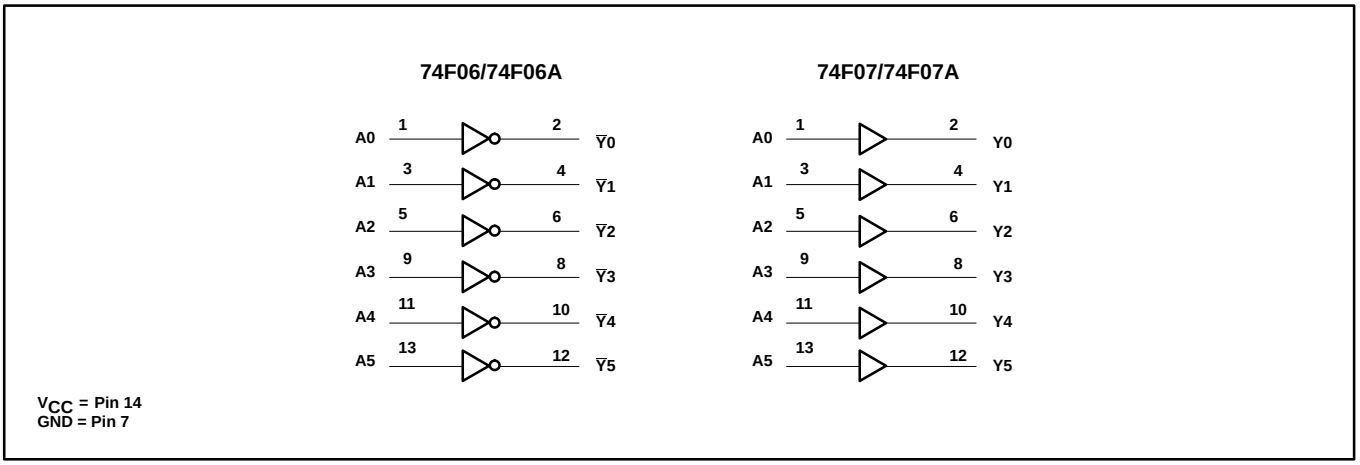
V_{CC} = Pin 14
GND = Pin 7

IEC/IEEE SYMBOL

74F07/74F07A



LOGIC DIAGRAMS



INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/ LOW
An	Data inputs (’F06, ’F07)	1.0/1.0	20μA/0.6mA
An	Data inputs (’F06A, ’F07A)	1.0/0.7	20μA/0.4mA
$\overline{Y}$n	Data outputs (’F06)	OC/106.7	OC/64mA
$\overline{Y}$n	Data outputs (’F06A)	OC/80	OC/48mA
Yn	Data outputs (’F07)	OC/106.7	OC/64mA
Yn	Data outputs (’F07A)	OC/80	OC/48mA

NOTES:
1. One (1.0) FAST unit load is defined as: 20μA in the High state and 0.6mA in the Low state.
2. OC = Open Collector

FUNCTION TABLE

INPUTS	OUTPUTS	
	’F06, ’F06A	’F07, ’F07A
An	**$\overline{Y}$n**	**Yn**
L	H	L
H	L	H

NOTES:
1. H = High voltage level
2. L = Low voltage level

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free air temperature range.)

SYMBOL	PARAMETER		RATING	UNIT
V_{CC}	Supply voltage		–0.5 to +7.0	V
V_{IN}	Input voltage		–0.5 to +7.0	V
I_{IN}	Input current		–30 to +5	mA
V_{OUT}	Voltage applied to output in High output state	’F06, ’F07	–0.5 to 12	V
		’F06A, ’F07A	–0.5 to 30	V
I_{OUT}	Current applied to output in Low output state	’F06, ’F07	128	mA
		’F06A, ’F07A	96	mA
T_{amb}	Operating free air temperature range		0 to +70	°C
T_{stg}	Storage temperature range		–65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER		LIMITS			UNIT
			MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5.0	5.5	V
V_{IH}	High–level input voltage		2.0			V
V_{IL}	Low–level input voltage				0.8	V
I_{Ik}	Input clamp current				–18	mA
V_{OH}	High–level output voltage	’F06, ’F07			12	V
		’F06A, ’F07A			30	V
I_{OL}	Low–level output current	’F06, ’F07			64	mA
		’F06A, ’F07A			48	mA
T_{amb}	Operating free air temperature range		0		+70	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER		TEST CONDITIONS[1]			LIMITS			UNIT
						MIN	TYP[2]	MAX	
I_{OH}	High–level output current	’F06, ’F07	V_{CC} = MIN, V_{IL} = MAX, V_{OH} = MAX,					250	µA
		’F06A, ’F07A	V_{IH} = MIN					100	µA
V_{OL}	Low–level output voltage		V_{CC} = MIN, V_{IL} = MAX,	I_{OL} = MAX	±10% V_{CC}		0.30	0.50	V
			V_{IH} = MIN		±5% V_{CC}		0.30	0.50	V
V_{IK}	Input clamp voltage		V_{CC} = MIN, I_I = I_{IK}				–0.73	–1.2	V
I_I	Input current at maximum input voltage		V_{CC} = MAX, V_I = 7.0V					100	µA
I_{IH}	High–level input current		V_{CC} = MAX, V_I = 2.7V					20	µA
I_{IL}	Low–level input current	’F06, ’F07	V_{CC} = MAX, V_I = 0.5V					–0.6	mA
		’F06A, ’F07A						–0.4	mA
I_{CC}	Supply current (total)	74F06,	I_{CCH}	V_{CC} = MAX			5.0	8.0	mA
		74F06A	I_{CCL}				30	43	mA
		74F07,	I_{CCH}				10	14	mA
		74F07A	I_{CCL}				32	45	mA

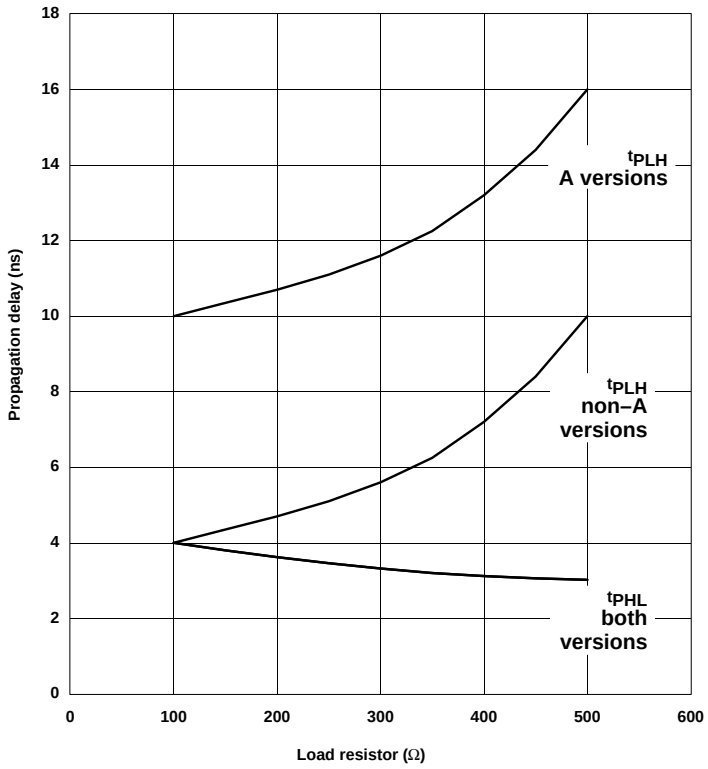
NOTES:

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
3. Not more than one output should be shorted at a time. For testing I_{OS}, the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

AC ELECTRICAL CHARACTERISTICS

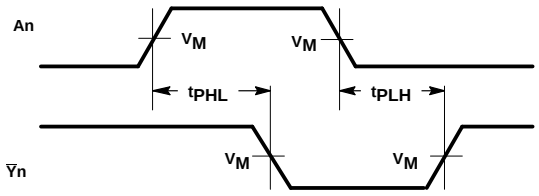
SYMBOL	PARAMETER		TEST CONDITION	LIMITS					UNIT
				T_{amb} = +25°C, V_{CC} = +5.0V, C_L = 50pF, R_L = 100Ω			T_{amb} = 0°C to +70°C, V_{CC} = +5.0V ± 10%, C_L = 50pF, R_L = 100Ω		
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay An to $\overline{Y}$n	’F06	Waveform 1	2.0 1.5	3.5 3.0	6.0 5.5	1.5 1.0	6.5 6.0	ns
t_{PLH} t_{PHL}	Propagation delay An to $\overline{Y}$n	’F06A	Waveform 1	5.0 2.0	9.0 4.0	11.0 6.0	4.0 2.0	15.0 8.0	ns
t_{PLH} t_{PHL}	Propagation delay An to Yn	’F07	Waveform 2	2.0 3.0	4.0 5.0	6.0 7.0	2.0 2.5	6.5 7.5	ns
t_{PLH} t_{PHL}	Propagation delay An to Yn	’F07A	Waveform 2	6.0 5.0	10.5 7.5	13.0 10.0	5.0 4.0	17.0 13.0	ns

TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS

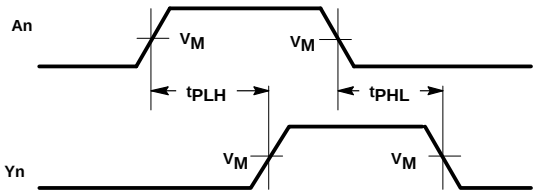


NOTE:
When using Open–Collector parts, the value of the pull–up resistor greatly affects the value of the t_{PLH}. For example, changing the specified pull–up resistor value from 500Ω to 100Ω will improve the t_{PLH} up to 50% with only a slight increase in the t_{PHL}. However, if the value of the pull–up resistor is changed, the user must make certain that the total I_{OL} current through the resistor and the total I_{IL}'s of the receivers does not exceed the I_{OL} maximum specification.

AC WAVEFORMS



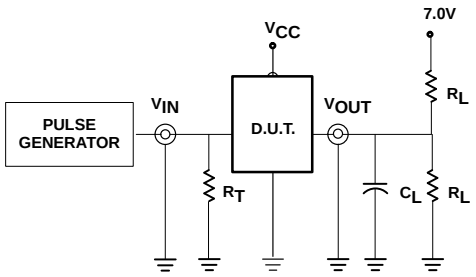
Waveform 1. Propagation delay for inverting outputs



Waveform 2. Propagation delay for non–inverting outputs

NOTE: For all waveforms, V_M = 1.5V.

TEST CIRCUIT AND WAVEFORMS



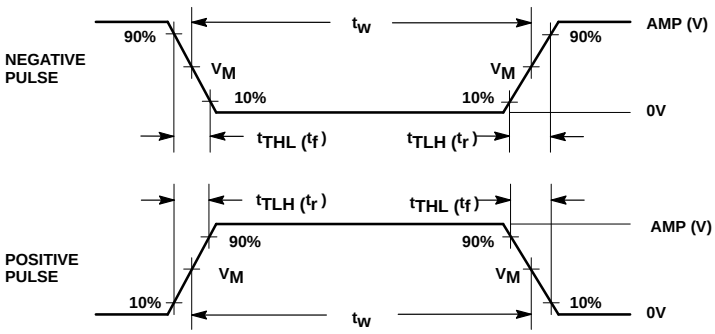
Test circuit for Open Collector outputs

DEFINITIONS:

R_L = Load resistor; see AC electrical characteristics for value.

C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.



Input pulse definition

family	INPUT PULSE REQUIREMENTS					
	amplitude	V_M	rep. rate	t_W	t_{TLH}	t_{THL}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns