Hex inverter Schmitt trigger | 54F14

DESCRIPTION

The 54F14 contains six logic inverters which accept standard TTL input signals and provide standard TTL output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have greater noise margin than conventional inverters.

Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem-pole output. The Schmitt trigger uses positive feedback to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800mV) is determined internally by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

FUNCTION TABLE

INPUT	OUTPUT
A	$\overline{Y}$
0	1
1	0

ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
14-Pin Ceramic DIP	54F14/BCA	GDIP1-T14
14-Pin Ceramic Flat Pack	54F14/BDA	GDFP1-F14
20-Pin Ceramic LLCC	54F14/B2A	CQCC2-N20

* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	54F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A	Inputs	1.0/1.0	20μA/0.6mA
$\overline{Y}$	Outputs	50/33	1.0mA/20mA

NOTE: One (1.0) FAST Unit Load is defined as: 20μA in the High state and 0.6mA in the Low state.

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits 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 range	-0.5 to +7.0	V
V_I	Input voltage range	-0.5 to +7.0	V
I_I	Input current range	-30 to +5	mA
V_O	Voltage applied to output in High output state range	-0.5 to V_{CC}	V
I_O	Current applied to output in Low output state	40	mA
T_{STG}	Storage temperature range	-65 to +150	°C

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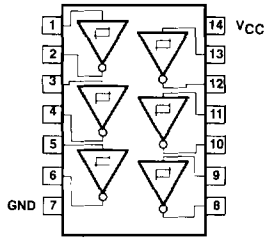
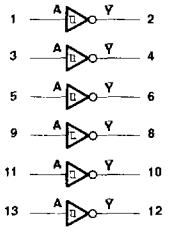
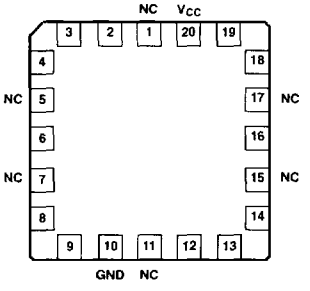
PIN CONFIGURATION



LOGIC SYMBOL



LLCC LEAD CONFIGURATION



RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5.0	5.5	V
I_{IK}	Input clamp current			-18	mA
I_{OH}	High-level output current			-1	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature range	-55		+125	°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	
V_{T+}	Positive-going threshold		V_{CC} = 5.0V		1.4	1.7	2.0	V
V_{T-}	Negative-going threshold		V_{CC} = 5.0V		0.7	0.9	1.1	V
ΔV_T	Hysteresis (V_{T+} - V_{T-})		V_{CC} = 5.0V		0.4	0.8		V
V_{OH}	High-level output voltage		V_{CC} = Min, V_I = V_{T-MIN}, I_{OH} = Max		2.5			V
V_{OL}	Low-level output voltage		V_{CC} = Min, V_I = T_{T+MAX}, I_{OL} = Max			.35	.50	V
V_{IK}	Input clamp voltage		V_{CC} = Min, I_I = I_{IK}			-0.73	-1.2	V
I_{T+}	Input current at positive-going threshold		V_{CC} = 5.0V, V_I = V_{T+}			0.0		µA
I_{T-}	Input current at negative-going threshold		V_{CC} = 5.0V, V_I = V_{T-}			175		µA
I_{IH2}	Input current at maximum input voltage		V_{CC} = Max, V_I = 7.0V			5	100	µA
I_{IH1}	High-level input current		V_{CC} = Max, V_I = 2.7V			1	20	µA
I_{IL}	Low-level input current		V_{CC} = Max, V_I = 0.5V			-0.2	-0.6	mA
I_{OS}	Short-circuit output current[3]		V_{CC} = Max		-60	-135	-150	mA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = Max	V_{IN} = GND		13	22	mA
		I_{CCL}		V_{IN} = 4.5V		23	32	mA

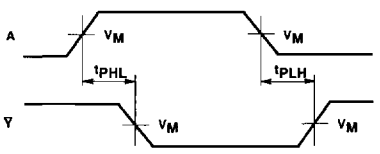
AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T_A = +25°C V_{CC} = +5.0V C_L = 50pF, R_L = 500Ω			T_A = -55°C to +125°C V_{CC} = +5.0V ± 10% C_L = 50pF, R_L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay A to $\overline{Y}$	Waveform 1	4.0 3.5	6.5 5.0	8.5 6.5	3.0 3.5	12.0 9.0	ns ns

NOTES:

1. For conditions shown as Min or Max, use the appropriate value specified under recommended operating conditions for the applicable type and function table for operating mode.
2. All typical values are at V_{CC} = 5V, T_A = 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.

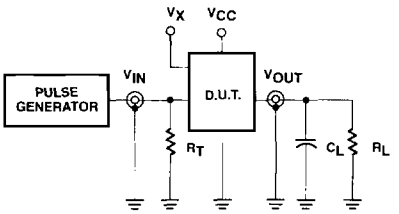
AC WAVEFORM



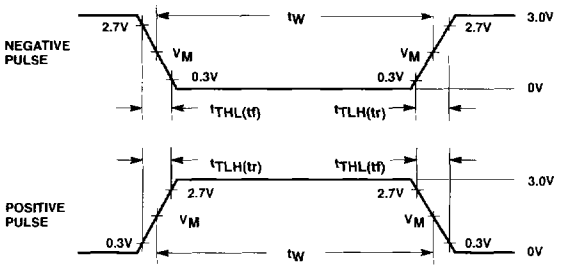
NOTE: For all waveforms, V_M = 1.5V

Waveform 1. For Inverting Outputs

TEST CIRCUIT AND WAVEFORM



Test Circuit for Totem-Pole Outputs



V_M = 1.5V

Input Pulse Definition

DEFINITIONS:

R_L = Load Resistor; see AC Characteristics for value.
C_L = Load capacitance includes jig and probe capacitance; see AC Characteristics for value.
R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.
V_X = Unclocked pins must be held at: ≤0.8V, ≥2.7V or open per FunctionTable.

INPUT PULSE CHARACTERISTICS				
Family	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
54F	1MHz	500ns	≤2.5ns	≤2.5ns