MOTOROLA

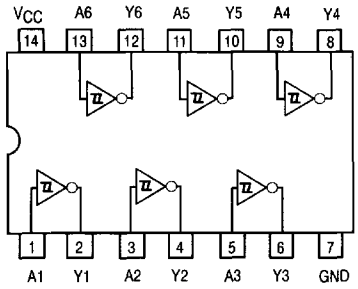
Hex Schmitt-Trigger Inverter Gate

ELECTRICALLY TESTED PER:
MIL-M-38510/31302

The 54LS14 contains logic gates which accept standard TTL input signals and provide standard TTL output levels. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. Additionally, it has greater noise margin than conventional inverters.

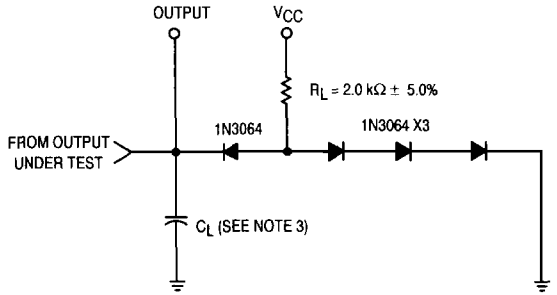
Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem pole output. The Schmitt trigger uses positive feedback to effectively speed-up slow input transitions, and provide different input threshold voltages for positive and negative-going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

LOGIC DIAGRAM

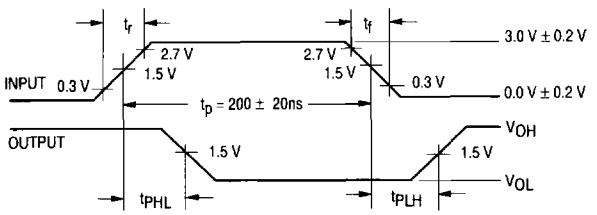


AC TEST CIRCUIT

(LOAD FOR OUTPUT UNDER TEST)



WAVEFORMS



Military 54LS14

AVAILABLE AS:

1) JAN: JM38510/31302BXA
2) SMD: N/A
3) 883: 54LS14/BXAJC

X = CASE OUTLINE AS FOLLOWS:
PACKAGE: CERDIP: C
CERFLAT: D
LCC: 2

THE LETTER "M" APPEARS BEFORE THE / ON LCC.

PIN ASSIGNMENTS

FUNCT.	DIL 632-08	FLATS 717-04	LCC 756A-02	BURN-IN (COND. A)
A1	1	1	2	GND
Y1	2	2	3	V_{CC}
A2	3	3	4	GND
Y2	4	4	6	V_{CC}
A3	5	5	8	GND
Y3	6	6	9	V_{CC}
GND	7	7	10	GND
Y4	8	8	12	V_{CC}
A4	9	9	13	GND
Y5	10	10	14	V_{CC}
A5	11	11	16	GND
Y6	12	12	18	V_{CC}
A6	13	13	19	GND
V_{CC}	14	14	20	V_{CC}

BURN-IN CONDITIONS:
V_{CC} = 5.0 V MIN/6.0 V MAX

NOTES:

1. Pulse generator has the following characteristics: $t_r \leq 15$ ns, $t_f \leq 6.0$ ns, PRR ≤ 1.0 MHz and $Z_{OUT} \approx 50\ \Omega$.
2. Terminal conditions (pins not designated may be high ≥ 1.4 V, low ≤ 1.0 V, or open).
3. C_L = 50 pF ± 10%, including scope probe, and jig capacitance.
4. R_L = 2.0 kΩ ± 5.0%.
5. Voltage measurements are to be made with respect to network ground terminal.

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Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
	Static Parameters:	+ 25°C		+ 125°C		− 55°C			
		Subgroup 1		Subgroup 2		Subgroup 3			
		Min	Max	Min	Max	Min	Max		
V_{OH1}	Logical "1" Output Voltage	2.5		2.5		2.5		V	V_{CC} = 4.5 V, I_{OH} = − 0.4 mA, V_{IL} = 0.5 V.
V_{OL1}	Logical "0" Output Voltage		0.4		0.4		0.4	V	V_{CC} = 4.5 V, I_{OL} = 4.0 mA, V_{IH} = 1.9 V.
V_{OH2}	Logical "1" Output Voltage	2.5		2.5		2.5		V	V_{CC} = 5.0 V, I_{OH} = − 0.4 V, V_{IL} = (See Note 2).
V_{OL2}	Logical "0" Output Voltage		0.4		0.4		0.4	V	V_{CC} = 5.0 V, I_{OL} = 4.0 mA, V_{IN} = (See Note 3).
V_{IC}	Input Clamping Voltage		-1.5					V	V_{CC} = 4.5 V, I_{IN} = −18 mA.
I_{IH1}	Logical "1" Input Current		20		20		20	µA	V_{CC} = 5.5 V, V_{IN} = 2.7 V.
I_{IH2}	Logical "1" Input Current		100		100		100	µA	V_{CC} = 5.5 V, V_{IN} = 5.5 V.
I_{IL}	Logical "0" Input Current	− 0.12	− 0.36	− 0.12	− 0.36	− 0.12	− 0.36	mA	V_{CC} = 5.5 V, V_{IN} = 0.4 V.
I_{OS}	Output Short Circuit Current	− 15	− 100	− 15	− 100	− 15	− 100	mA	V_{CC} = 5.5 V, V_{IN} = 0 V, V_{OUT} = 0 V.
I_{CCH}	Power Supply Current		16		16		16	mA	V_{CC} = 5.5 V, V_{IN} = 0 V.
I_{CCL}	Power Supply Current		21		21		21	mA	V_{CC} = 5.5 V, V_{IN} = 5.5 V.
V_{IH}	Logical "1" Input Voltage	1.9		1.9		1.9		V	V_{CC} = 4.5 V.
V_{IL}	Logical "0" Input Voltage		0.5		0.5		0.5	V	V_{CC} = 4.5 V.
	Functional Tests	Subgroup 7		Subgroup 8A		Subgroup 8B			per Truth Table with V_{CC} = 5.0 V, V_{INL} = 0.5 V, and V_{INH} = 2.5 V.

Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
	Switching Parameters:	+ 25°C		+ 125°C		− 55°C			
		Subgroup 9		Subgroup 10		Subgroup 11			
		Min	Max	Min	Max	Min	Max		
t_{PHL} t_{PHL}	Propagation Delay /Data-Output Output High-Low	5.0 —	32 22	5.0 —	52 47	5.0 —	52 47	ns	V_{CC} = 5.0 V, C_L = 50 pF, R_L = 2.0 kΩ. V_{CC} = 5.0 V, C_L = 15 pF, R_L = 2.0 kΩ.
t_{PLH} t_{PLH}	Propagation Delay /Data-Output Output Low-High	5.0 —	32 22	5.0 —	52 47	5.0 —	52 47	ns	V_{CC} = 5.0 V, C_L = 50 pF, R_L = 2.0 kΩ. V_{CC} = 5.0 V, C_L = 15 pF, R_L = 2.0 kΩ.

NOTES:
1. The limits specified for C_L = 15 pF are guaranteed but not tested.
2. Momentary 0.5 V, then 1.4 V without overshoot during test.
3. Momentary 1.9 V, then 1.0 V (all inputs) without undershoot during test.