SGS-THOMSON MICROELECTRONICS

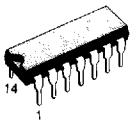
S G S-THOMSON

M54HC132
M74HC132

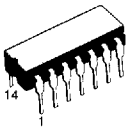
T-43-21

QUAD 2-INPUT SCHMITT NAND GATE

- HIGH SPEED
  t_{PD} = 21 ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION
  I_{CC} = 1 μA (MAX.) at T_A = 25°C
- OUTPUT DRIVE CAPABILITY
  10 LSTTL LOADS
- HIGH NOISE IMMUNITY
  $V_{H\ (TYP.)}$ = 0.9V at V_{CC} = 5
- BALANCED PROPAGATION DELAYS
  t_{PLH} = t_{PHL}
- WIDE OPERATING VOLTAGE RANGE
  V_{CC} (OPR) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE
  WITH 54/74LS132



B1
Plastic Package



F1
Ceramic Frit Seal Package

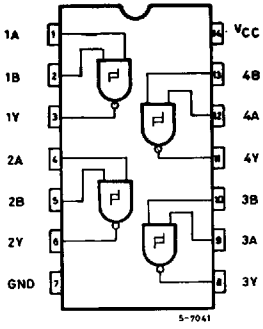
M1
Micro Package

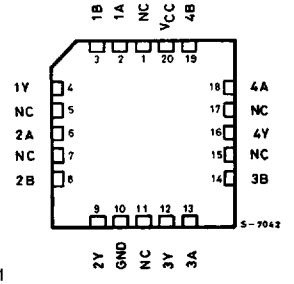
C1
Plastic Chip Carrier

ORDERING NUMBERS:

M54HC132 F1
M74HC132 B1N
M74HC132 F1
M74HC132 C1
M74HC132 M1

PIN CONNECTIONS (top view)





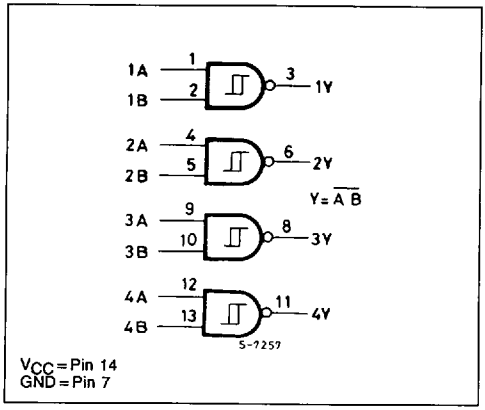
NC = No Internal Connection

DESCRIPTION

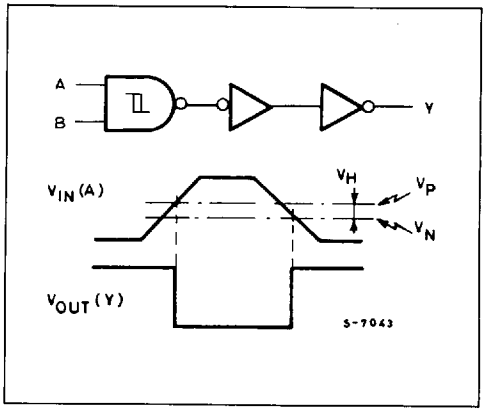
The M54/74HC132 is a high speed CMOS QUAD 2-INPUT SCHMITT NAND GATE fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption. Pin configuration and function are identical to those of the M54/74HC00.

The hysterisis characteristics (around 20% V_{CC}) of all inputs allow slowly changing input signals to be transformed into sharply defined jitter-free output signals. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

BLOCK DIAGRAM



LOGIC DIAGRAM/WAVEFORM



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	−0.5 to 7	V
V_I	DC Input Voltage	−0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output current per pin	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	−65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(*) 500 mW = derate to 10 mW/°C from 65°C to 85°C for plastic package
(*) 500 mW = derate to 12 mW/°C from 100 to 125°C for frit-seal package

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2 to 6	V
V_I	DC Input Voltage	0 to V_{CC}	V
V_O	DC Output Voltage	0 to V_{CC}	V
T_A	Operating Temperature 74HC Series 54HC Series	−40 to 85 −55 to 125	°C
t_r/t_f	Input Rise fall times	NO LIMITS	ns

DC SPECIFICATIONS

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Symbol	Parameter	V_{CC}	Test Condition		$T_A = 25°C$ 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_P	High Level Threshold Voltage	2.0 4.5 6.0			0.8 2.25 3.0	1.25 2.7 3.6	1.5 3.15 4.2	0.8 2.25 3.0	1.5 3.15 4.2	0.8 2.25 3.0	1.5 3.15 4.2	— V
V_N	Low Level Threshold Voltage	2.0 4.5 6.0			0.4 1.35 1.8	0.75 1.9 2.6	1.0 2.25 3.0	0.4 1.35 1.8	1.0 2.25 3.0	0.4 1.35 1.8	1.0 2.25 3.0	V
V_H	Hysteresis Voltage	2.0 4.5 6.0			0.20 0.4 0.6	0.5 0.8 1.0	1.0 1.4 1.7	0.20 0.4 0.6	1.0 1.4 1.7	0.20 0.4 0.6	1.0 1.4 1.7	V
V_{OH}	High Level Output Voltage	2.0 4.5 6.0	V_I V_{IH} or V_{IL}	I_O −20 μA	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	— — —	1.9 4.4 5.9	— — —	V
		4.5 6.0		−4.0 mA −5.2 mA	4.18 5.68	4.31 5.8	— —	4.13 5.63	— —	4.10 5.60	— —	
V_{OL}	Low Level Output Voltage	2.0 4.5 6.0	V_{IH} or V_{IL}	20 μA	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
		4.5 6.0		4.0 mA 5.2 mA	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	— —	0.40 0.40	
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND		—	—	±0.1	—	±1.0	—	±1.0	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND		—	—	1	—	10	—	20	μA

AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5V$, $T_A = 25°C$, $C_L = 15pF$, Input $t_r = t_f = 6ns$)

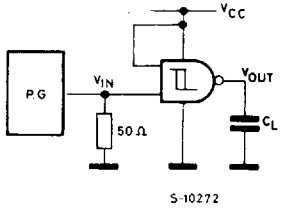
Symbol	Parameter	54HC and 74HC			Unit
		Min.	Typ.	Max.	
t_{TLH} t_{THL}	Output Transition Time		4	8	ns
t_{PLH} t_{PHL}	Propagation Delay Time		13	21	ns

AC ELECTRICAL CHARACTERISTICS (C_L = 50pF, Input $t_r = t_f$ = 6ns)

Symbol	Parameter	V_{CC}	Test Condition	T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{THL}	Output Transition Time	2.0		—	30	75	—	95	—	110	ns
		4.5		—	8	15	—	19	—	22	
		6.0		—	7	13	—	16	—	19	
t_{PLH} t_{PHL}	Propagation Delay Time	2.0		—	64	125	—	155	—	190	ns
		4.5		—	16	25	—	31	—	38	
		6.0		—	14	21	—	26	—	32	
C_{IN}	Input Capacitance			—	5	10	—	10	—	10	pF
C_{PD} (*)	Power Dissipation Capacitance			—	34	—	—	—	—	—	pF

Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load.
Average operating current is: I_{CC} (Opr.) = $C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4$ (per gate)

SWITCHING CHARACTERISTICS TEST CIRCUIT



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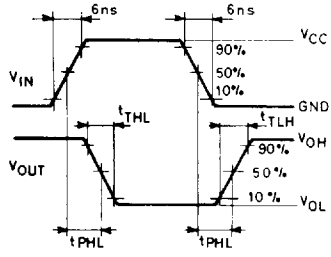

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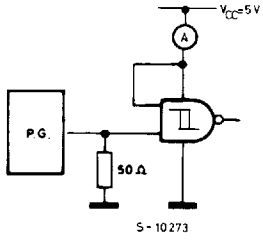
TEST CIRCUIT I_{CC} (Opr.)



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INPUT WAVEFORM IS THE SAME AS THAT IN CASE OF SWITCHING CHARACTERISTICS TEST