74V1GU04

SINGLE INVERTER (SINGLE STAGE)

PRELIMINARY DATA

- HIGH SPEED: t_{PD} = 3.5 ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION:
  I_{CC} = 1 µA (MAX.) at T_A = 25 °C
- HIGH NOISE IMMUNITY:
  $V_{NIH} = V_{NIL}$ = 10% V_{CC} (MIN.)
- POWER DOWN PROTECTION ON INPUT
- SYMMETRICAL OUTPUT IMPEDANCE:
  $|I_{OH}| = I_{OL}$ = 8 mA (MIN)
- BALANCED PROPAGATION DELAYS:
  $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:
  V_{CC} (OPR) = 2V to 5.5V
- IMPROVED LATCH-UP IMMUNITY

S
(SOT23-5L)

ORDER CODE:
74V1GU04S

DESCRIPTION

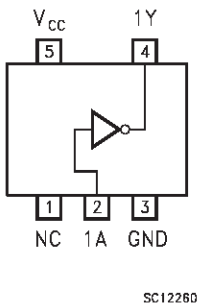
The 74V1GU04 is an advanced high-speed CMOS SINGLE INVERTER fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It has similar high speed performance of equivalent Bipolar Schottky TTL combined with true CMOS low power dissipation.

As the internal circuit is composed of a single stage inverter, it can be used in analog application such a crystal oscillator.

Power down protection is provided on input and 0 to 7V can be accepted on input with no regard to the supply voltage. This device can be used to interface 5V to 3V.

Input and output are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



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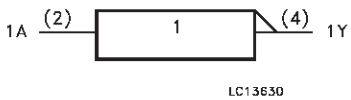

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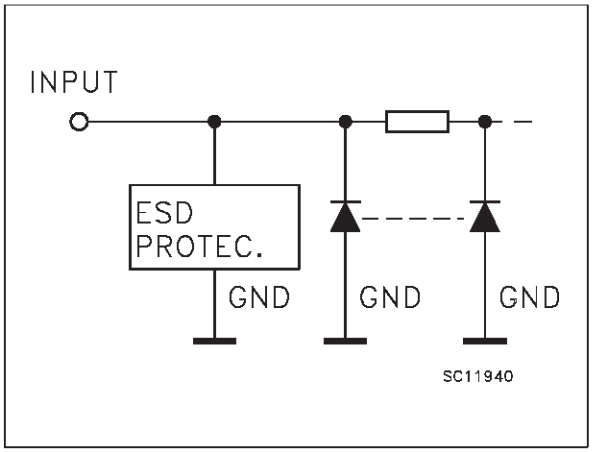
INPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	N.C.	Not Connected
2	1A	Data Input
4	1Y	Data Output
3	GND	Ground (0V)
5	V_{CC}	Positive Supply Voltage

TRUTH TABLE

A	Y
L	H
H	L

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7.0	V
V_I	DC Input Voltage	-0.5 to +7.0	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	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	Lead Temperature (10 sec)	260	°C

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

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2.0 to 5.5	V
V_I	Input Voltage	0 to 5.5	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature	-40 to +85	°C

DC SPECIFICATIONS

Symbol	Parameter	Test Conditions			Value					Unit
		V_{CC} (V)			T_A = 25 °C			-40 to 85 °C		
					Min.	Typ.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0			1.7			1.7		V
		3.0 to 5.5			0.8V_{CC}			0.8V_{CC}		
V_{IL}	Low Level Input Voltage	2.0					0.3		0.3	V
		3.0 to 5.5					0.2V_{CC}		0.2V_{CC}	
V_{OH}	High Level Output Voltage	2.0	V_I = V_{IL}	I_O=-50 µA	1.8	2.0		1.8		V
		3.0		I_O=-50 µA	2.7	3.0		2.7		
		4.5		I_O=-50 µA	4.0	4.5		4.0		
		3.0		I_O=-4 mA	2.58			2.48		
		4.5		I_O=-8 mA	3.94			3.8		
V_{OL}	Low Level Output Voltage	2.0	V_I = V_{IH}	I_O=50 µA		0.0	0.2		0.2	V
		3.0		I_O=50 µA		0.0	0.3		0.3	
		4.5		I_O=50 µA		0.0	0.5		0.5	
		3.0		I_O=4 mA			0.36		0.44	
		4.5		I_O=8 mA			0.36		0.44	
I_I	Input Leakage Current	0 to 5.5	V_I = 5.5V or GND				±0.1		±1.0	µA
I_{CC}	Quiescent Supply Current	5.5	V_I = V_{CC} or GND				1		10	µA

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f$ =3 ns)

Symbol	Parameter	Test Condition		Value					Unit
		V_{CC} (V)		T_A = 25 °C			-40 to 85 °C		
				Min.	Typ.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time	3.3(*)	C_L = 15 pF		5.0	8.9	1.0	10.5	ns
		3.3(*)	C_L = 50 pF		7.5	11.4	1.0	13.0	
		5.0(**)	C_L = 15 pF		3.5	5.5	1.0	6.5	
		5.0(**)	C_L = 50 pF		5.0	7.0	1.0	8.0	

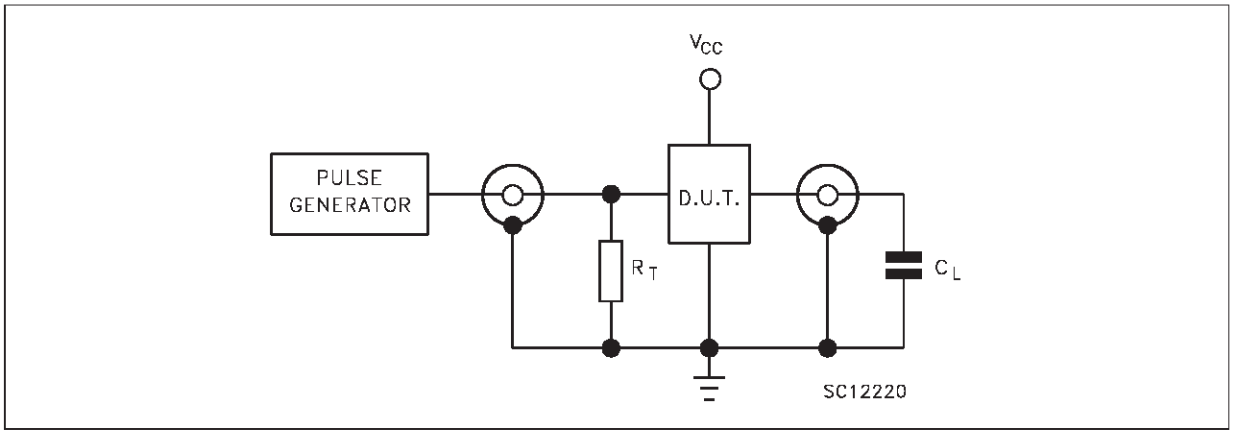
(*) Voltage range is 3.3V ± 0.3V
(**) Voltage range is 5V ± 0.5V

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions	Value					Unit
			T_A = 25 °C			-40 to 85 °C		
			Min.	Typ.	Max.	Min.	Max.	
C_{IN}	Input Capacitance			5	10		10	pF
C_{PD}	Power Dissipation Capacitance (note 1)			9				pF

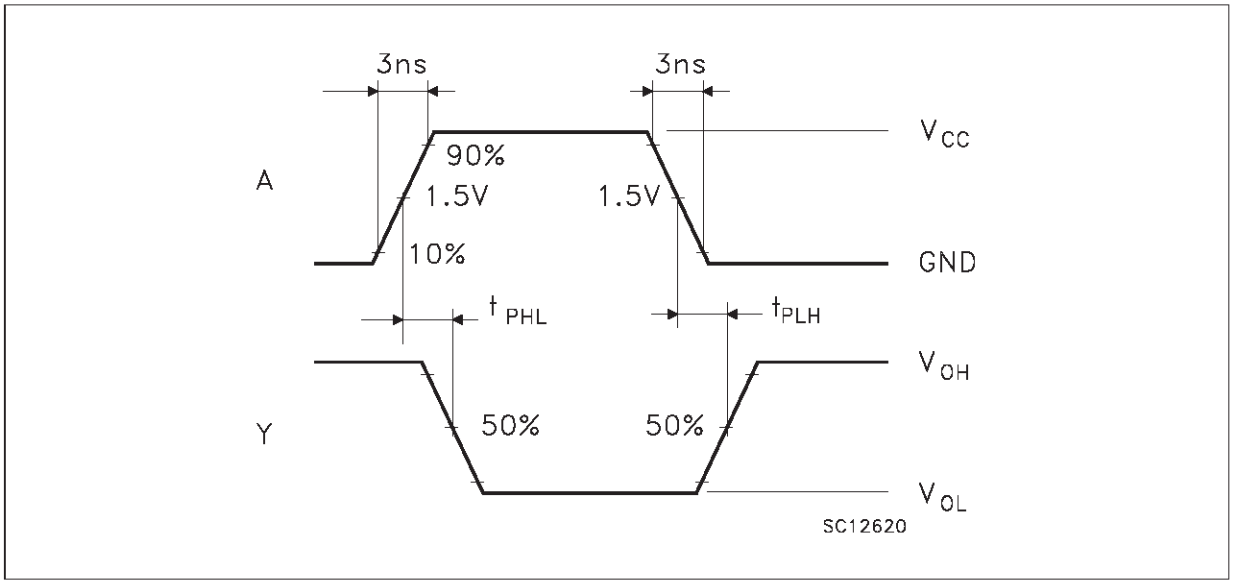
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}$

TEST CIRCUIT



C_L = 15/50 pF or equivalent (includes jig and probe capacitance)
R_T = Z_{OUT} of pulse generator (typically 50Ω)

WAVEFORM: PROPAGATION DELAYS (f=1MHz; 50% duty cycle)



SOT23-5L MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.0		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
L	0.35		0.55	13.7		21.6
e		0.95			37.4	
e1		1.9			74.8