



# SINGLE SCHMITT INVERTER

#### PRELIMINARY DATA

- HIGH SPEED: tpp = 5.5 ns (TYP.) at Vcc = 5V
- LOW POWER DISSIPATION:  $I_{CC} = 1 \mu A \text{ (MAX.)}$  at  $T_A = 25 \, ^{\circ}\text{C}$
- HIGH NOISE IMMUNITY: V<sub>NIH</sub> = V<sub>NIL</sub> = 28% V<sub>CC</sub> (MIN.)
- POWER DOWN PROTECTION ON INPUTS
- SYMMETRICAL OUTPUT IMPEDANCE: |I<sub>OH</sub>| = I<sub>OL</sub> = 8 mA (MIN)
- BALANCED PROPAGATION DELAYS: tplh ≅ tphl
- OPERATING VOLTAGE RANGE: V<sub>CC</sub> (OPR) = 2V to 5.5V
- IMPROVED LATCH-UP IMMUNITY

#### **DESCRIPTION**

The 74V1G14 is an advanced high-speed CMOS SINGLE SCHMITT INVERTER fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology. It has similar high speed performance of equivalent Bipolar Schottky TTL combined with true CMOS low power dissipation.

The internal circuit is composed of 3 stages including buffer output, which provide high noise immunity and stable output.



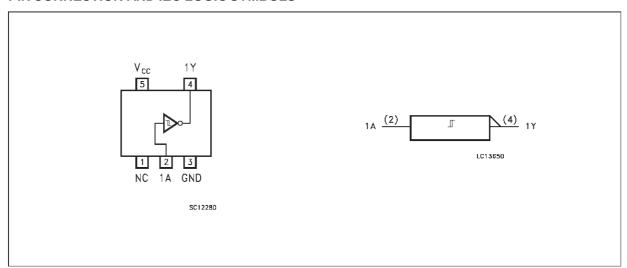
Power down protection is provided on all inputs and 0 to 7V can be accepted on inputs with no regard to the supply voltage. This device can be used to interface 5V to 3V.

Pin configuration and function are the same as those of the V1G04 but the V1G14 has hysteresis.

This together with its schmitt trigger function allows it to be used on line receivers with slow rise/fall input signals.

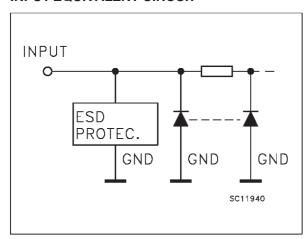
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

#### PIN CONNECTION AND IEC LOGIC SYMBOLS



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# 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	Vcc	Positive Supply Voltage

#### **TRUTH TABLE**

Α	Υ
L	Н
Н	L

### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
Vcc	Supply Voltage	-0.5 to +7.0	V
Vı	DC Input Voltage	-0.5 to +7.0	V
Vo	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	- 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
lo	DC Output Current	± 25	mA
Icc or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 50	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
TL	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
Vcc	Supply Voltage	2.0 to 5.5	V
VI	Input Voltage	0 to 5.5	V
Vo	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-40 to +85	°C
dt/dv	Input Rise and Fall Time (see note 1) ( $V_{CC} = 3.3 \pm 0.3V$ ) ( $V_{CC} = 5.0 \pm 0.5V$ )	0 to 100 0 to 20	ns/V ns/V

<sup>1)</sup> V<sub>IN</sub> from 30% to 70% of V<sub>CC</sub>

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#### **DC SPECIFICATIONS**

Symbol	Parameter	Tes	t Condi	tions			Value			Unit
		V <sub>CC</sub>			T,	A = 25 °	,C	-40 to	85 °C	
		(V)			Min.	Тур.	Max.	Min.	Max.	
V <sub>t+</sub>	High Level Input	3.0			2.2			2.2		
	Voltage	4.5	]		3.15			3.15		V
		5.5			3.85			3.85		
$V_{t-}$	Low Level Input	3.0					0.9		0.9	
	Voltage	4.5					1.35		1.35	V
		5.5					1.65		1.65	
$V_h$	Hysteresis Voltage	3.0			0.3		1.2	0.3	1.2	
		4.5			0.4		1.4	0.4	1.4	V
		5.5			0.5		1.6	0.5	1.6	
$V_{OH}$	High Level Output Voltage	2.0	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	Ιο=-50 μΑ	1.9	2.0		1.9		V
		3.0		I <sub>O</sub> =-50 μA	2.9	3.0		2.9		
		4.5		Ιο=-50 μΑ	4.4	4.5		4.4		
		3.0		I <sub>O</sub> =-4 mA	2.58			2.48		
		4.5		I <sub>O</sub> =-8 mA	3.94			3.8		
$V_{OL}$	Low Level Output	2.0		I <sub>0</sub> =50 μA		0.0	0.1		0.1	
	Voltage	3.0	V <sub>1</sub> =	I <sub>O</sub> =50 μA		0.0	0.1		0.1	V
		4.5	V <sub>IH</sub> or V <sub>IL</sub>	I <sub>O</sub> =50 μA		0.0	0.1		0.1	
		3.0	VIL	I <sub>O</sub> =4 mA			0.36		0.44	
		4.5		I <sub>O</sub> =8 mA			0.36		0.44	
l <sub>l</sub>	Input Leakage Current	0 to 5.5	$V_1 = 5$ .	5V or GND			±0.1		±1.0	μΑ
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>I</sub> = V	<sub>CC</sub> or GND			1		10	μА

### AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3 \text{ ns}$ )

Symbol	Parameter	Tes	st Condition	Value				Unit	
		Vcc		T <sub>A</sub> = 25 °C		-40 to 85 °C			
		(V)		Min.	Тур.	Max.	Min.	Max.	
t <sub>PLH</sub>	Propagation Delay	3.3 <sup>(*)</sup>	$C_L = 15 pF$		8.3	12.5	1.0	15.0	
t <sub>PHL</sub>	Time	3.3 <sup>(*)</sup>	$C_L = 50 pF$		10.8	16.0	1.0	18.5	ns
		5.0 <sup>(**)</sup>	$C_L = 15 pF$		5.5	8.6	1.0	10.0	
		5.0 <sup>(**)</sup>	$C_L = 50 \text{ pF}$		7.0	10.5	1.0	12.0	

### **CAPACITIVE CHARACTERISTICS**

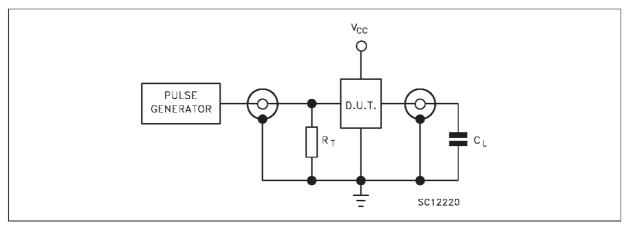
Symbol	Parameter	Test Conditions	Value					Unit
			T <sub>A</sub> = 25 °C		-40 to 85 °C			
			Min.	Тур.	Max.	Min.	Max.	
C <sub>IN</sub>	Input Capacitance			4	10		10	pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)			21				pF

<sup>1)</sup>  $C_{PD}$  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.  $I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}$ 



<sup>(\*)</sup> Voltage range is 3.3V ± 0.3V (\*\*) Voltage range is 5V ± 0.5V

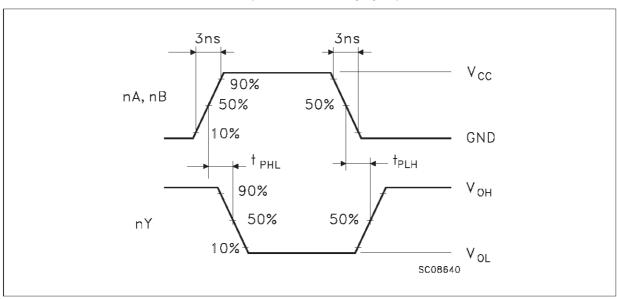
#### **TEST CIRCUIT**



 $C_L = 15/50 \ pF$  or equivalent (includes jig and probe capacitance)

 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

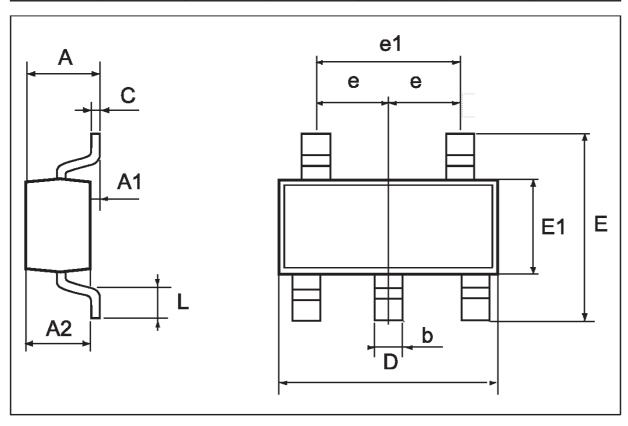
## WAVEFORM: PROPAGATION DELAYS (f=1MHz; 50% duty cycle)



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# **SOT23-5L MECHANICAL DATA**

DIM.	mm			mils			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А	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	
С	0.09		0.20	3.5		7.8	
D	2.80		3.00	110.2		118.1	
Е	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	
е		0.95			37.4		
e1		1.9			74.8		



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