



### DESCRIPTION

The AL1G14 Single Schmitt-trigger inverter is designed for 1.65V to 5.5V V<sub>CC</sub> operation.

The AL1G14 contains one inverter and performs the Boolean function  $Y = \overline{A}$ .

The AL1G14 functions as an independent inverter with Schmitt-trigger inputs, so the device has different input threshold levels for positive-going (V<sub>T+</sub>) and negative going (V<sub>T-</sub>) signals to provide hysteresis(ΔV<sub>T</sub>) which makes the device tolerant to slow or noisy input signals.

This AL1G14 is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The AL1G14 is available in SOT-25 and SC70-5 packages and operates over an ambient temperature range of -40°C to +125°C.

### FEATURES

- Operating Voltage Range:1.65V to 5.5V
- Inputs Accept voltage to 5.5V
- Low Power Consumption:1μA (Max)
- Operating Temperature Range: -40°C to +125°C
- High Output Drive: ±24mA at V<sub>CC</sub>=3.0V
- I<sub>off</sub> Supports Partial-Power-Down Mode Operation

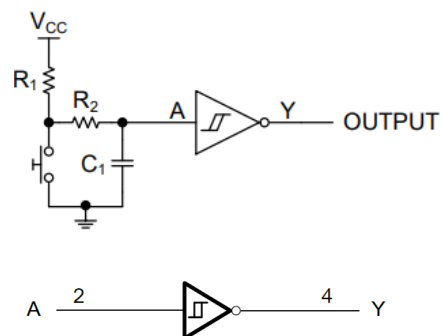
### APPLICATION

- AC Receiver
- Audio Dock: Portable
- Blu0ray Player and Home Theater
- Embedded PC
- Portable Media Player/Recorder (Portable Audio)
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD/Digital and High-Definition (HDTB)
- Tablet: Enterprise
- Video Analytics: Server
- Wireless Headset, Keyboard, and Mouse
- Digital Video Cameras (DVC)
- Mobile Phones
- Personal Navigation Device (GPS)

### ORDERING INFORMATION

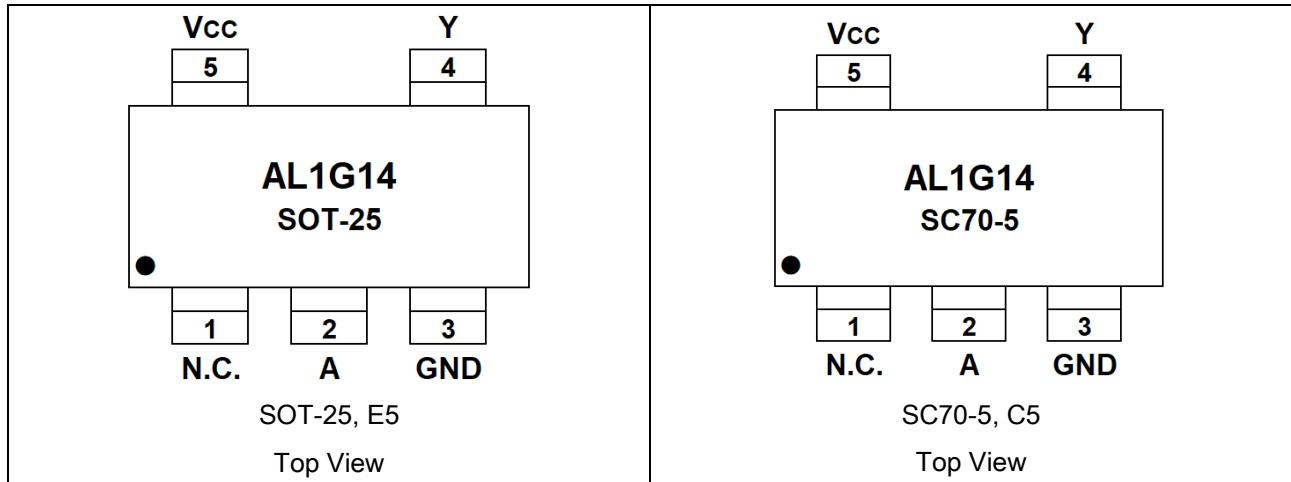
Package Type	Part Number	
SOT-25 SPQ: 3,000pcs/Reel	E5	AL1G14E5R
		AL1G14E5VR
SC70-5 SPQ: 3,000pcs/Reel	C5	AL1G14C5R
		AL1G14C5VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

### FUNCTIONAL BLOCK DIAGRAM





**PIN DESCRIPTION**



Pin #		Symbol	I/O	Function
SOT-25	SC70-5			
1	1	N.C.	-	Not connected
2	2	A	I	Input
3	2	GND	P	Ground
4	4	Y	O	Output
5	5	V <sub>cc</sub>	P	Power Pin

**FUNCTION TABLE**

Input	Output
A	Y
H	L
L	H

Y= $\bar{A}$

H=High Voltage Level

L=Low Voltage Level



## ABSOLUTE MAXIMUM RATINGS

T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

V <sub>CC</sub> , Supply Voltage Range		-0.5V ~ +6.5V
V <sub>I</sub> , Input Voltage Range <sup>(1)</sup>		-0.5V ~ +6.5V
V <sub>O</sub> , Voltage range applied to any output in the high-impedance or power-off state <sup>(1)</sup>		-0.5V ~ +6.5V
V <sub>O</sub> , Voltage range applied to any output in the high or low state <sup>(1)(2)</sup>		-0.5V ~ V <sub>CC</sub> +0.5V
I <sub>IK</sub> , Input Clamp Current	V <sub>I</sub> <0	-50mA
I <sub>OK</sub> , Output Clamp Current	V <sub>O</sub> <0	-50mA
I <sub>O</sub> , Continuous Output Current		±50mA
Continuous Current Through V <sub>CC</sub> or GND		±100mA
T <sub>J</sub> , Junction Temperature		150°C
T <sub>STG</sub> , Storage Temperature		-65°C ~ +150°C
<b>ESD Ratings</b>		
V <sub>(ESD)</sub> , Electrostatic Discharge	Human-Body Model (HBM)	±8000V
	Machine Model (MM)	±500V
<b>Thermal Information</b>		
R <sub>θJA</sub> , Junction-to-Ambient Thermal Resistance	SOT-25	273.8°C/W
	SC70-5	214.7°C/W
R <sub>θJC (top)</sub> , Junction-to-Case(top) Thermal Resistance	SOT-25	126.8°C/W
	SC70-5	127.1°C/W

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(2) The value of V<sub>CC</sub> is provided in the Recommended Operating Conditions table.



**RECOMMENDED OPERATING CONDITIONS**

T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V <sub>CC</sub>	Operating	1.65	-	5.5	V
		Data retention only	1.5	-	-	
Input Voltage	V <sub>I</sub>		0	-	5.5	V
Output Voltage	V <sub>O</sub>		0	-	V <sub>CC</sub>	V
Operating Temperature	T <sub>A</sub>		-40	-	+125	°C

**AC ELECTRICAL CHARACTERISTICS**

T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Propagation Delay	t <sub>pd</sub>	V <sub>CC</sub> =1.8V±0.15V	C <sub>L</sub> =30pF, R <sub>L</sub> =500Ω	-	7.5	-	ns
		V <sub>CC</sub> =2.5V±0.2V	C <sub>L</sub> =30pF, R <sub>L</sub> =500Ω	-	3.6	-	
		V <sub>CC</sub> =3.3V±0.3V	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	-	3.1	-	
		V <sub>CC</sub> =5V±0.5V	C <sub>L</sub> =50pF, R <sub>L</sub> =500Ω	-	2.7	-	
Input Capacitance	C <sub>i</sub>	V <sub>CC</sub> =3.3V	V <sub>I</sub> =V <sub>CC</sub> or GND	-	4	-	pF
Power Dissipation Capacitance	C <sub>pd</sub>	V <sub>CC</sub> =1.8V	f=10MHz	-	20	-	pF
		V <sub>CC</sub> =2.5V		-	21	-	
		V <sub>CC</sub> =3.3V		-	22	-	
		V <sub>CC</sub> =5V		-	25	-	

(1) All unused inputs of the device must be held at VCC or GND to ensure proper device operation.



**DC ELECTRICAL CHARACTERISTICS**

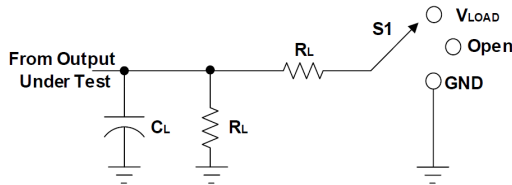
T<sub>A</sub> = +25°C, unless otherwise noted. <sup>(1)</sup>

Parameter		Conditions		Min.	Typ.	Max.	Unit
V <sub>T+</sub>	Positive Going Input Threshold Voltage	V <sub>CC</sub> =1.65V, T <sub>A</sub> =-40°C to +125°C		0.75	-	1.05	V
		V <sub>CC</sub> =2.3V, T <sub>A</sub> =-40°C to +125°C		1.25	-	1.55	
		V <sub>CC</sub> =3V, T <sub>A</sub> =-40°C to +125°C		1.5	-	2.1	
		V <sub>CC</sub> =4.5V, T <sub>A</sub> =-40°C to +125°C		2.3	-	3.0	
		V <sub>CC</sub> =5.5V, T <sub>A</sub> =-40°C to +125°C		2.8	-	3.4	
V <sub>T-</sub>	Negative Going Input Threshold Voltage	V <sub>CC</sub> =1.65V, T <sub>A</sub> =-40°C to +125°C		0.3	-	0.6	V
		V <sub>CC</sub> =2.3V, T <sub>A</sub> =-40°C to +125°C		0.35	-	0.65	
		V <sub>CC</sub> =3V, T <sub>A</sub> =-40°C to +125°C		0.45	-	0.75	
		V <sub>CC</sub> =4.5V, T <sub>A</sub> =-40°C to +125°C		0.7	-	1.0	
		V <sub>CC</sub> =5.5V, T <sub>A</sub> =-40°C to +125°C		0.85	-	1.15	
ΔV <sub>T</sub>	Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> )	V <sub>CC</sub> =1.65V, T <sub>A</sub> =-40°C to +125°C		0.35	-	0.6	V
		V <sub>CC</sub> =2.3V, T <sub>A</sub> =-40°C to +125°C		0.6	-	1.2	
		V <sub>CC</sub> =3V, T <sub>A</sub> =-40°C to +125°C		1.05	-	1.65	
		V <sub>CC</sub> =4.5V, T <sub>A</sub> =-40°C to +125°C		1.6	-	2.0	
		V <sub>CC</sub> =5.5V, T <sub>A</sub> =-40°C to +125°C		1.95	-	2.25	
V <sub>OH</sub> T <sub>A</sub> =-40°C to +125°C	I <sub>OH</sub> = -100μA, V <sub>CC</sub> =1.65V to 5.5V		V <sub>CC</sub> - 0.1	-	-	V	
	I <sub>OH</sub> =-4mA, V <sub>CC</sub> =1.65V		1.2	-	-		
	I <sub>OH</sub> =-8mA, V <sub>CC</sub> =2.3V		1.9	-	-		
	I <sub>OH</sub> =-16mA, V <sub>CC</sub> =3V		2.4	-	-		
	I <sub>OH</sub> =-24mA, V <sub>CC</sub> =3V		2.3	-	-		
	I <sub>OH</sub> =-32mA, V <sub>CC</sub> =4.5V		3.8	-	-		
V <sub>OL</sub> T <sub>A</sub> =-40°C to +125°C	I <sub>OL</sub> =100μA, V <sub>CC</sub> =1.65V to 5.5V		-	-	0.1	V	
	I <sub>OL</sub> =4mA, V <sub>CC</sub> =1.65V		-	-	0.45		
	I <sub>OL</sub> =8mA, V <sub>CC</sub> =2.3V		-	-	0.3		
	I <sub>OL</sub> =16mA, V <sub>CC</sub> =3V		-	-	0.4		
	I <sub>OL</sub> =24mA, V <sub>CC</sub> =3V		-	-	0.55		
	I <sub>OL</sub> =32mA, V <sub>CC</sub> =4.5V		-	-	0.55		
I <sub>I</sub>	A input	V <sub>I</sub> =5.5V or GND	T <sub>A</sub> =-25°C	-	±0.1	±1	μA
		V <sub>CC</sub> = 0V to 5.5V	T <sub>A</sub> =-40°C to +125°C	-	-	±5	
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> =5.5V	T <sub>A</sub> =-25°C		±0.1	±1	μA
		V <sub>CC</sub> =0V	T <sub>A</sub> =-40°C to +125°C			±10	
I <sub>CC</sub>		V <sub>I</sub> =5.5V or GND I <sub>O</sub> =0,	T <sub>A</sub> =-25°C	-	0.1	1	μA
		V <sub>CC</sub> =1.65V to 5.5V	T <sub>A</sub> =-40°C to +125°C	-	-	10	
ΔI <sub>CC</sub> T <sub>A</sub> =-40°C to +125°C	One input at V <sub>CC</sub> - 0.6V, Other inputs at V <sub>CC</sub> or GND V <sub>CC</sub> =3V to 5.5V			-	-	500	μA



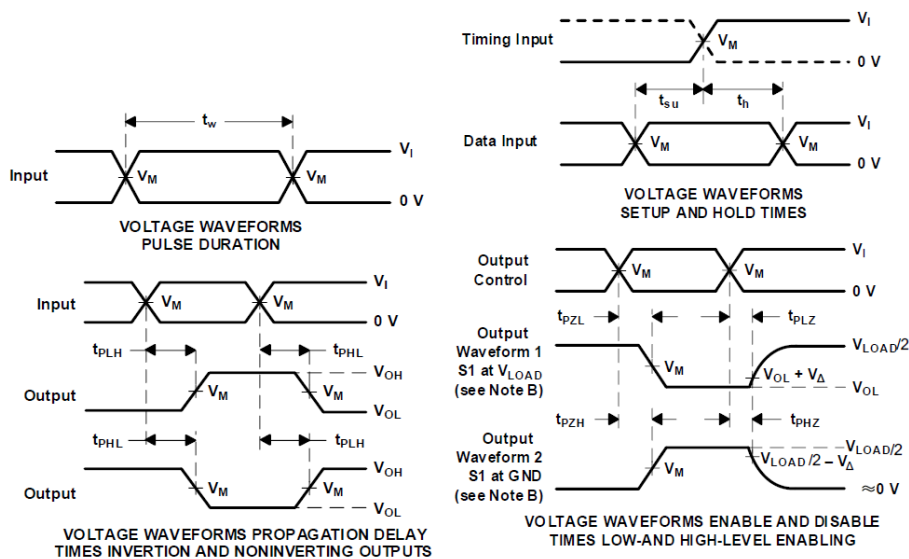
## DETAILED INFORMATION

### Parameter Measurement Information



TEST	S1
$t_{PZL}$ (see E and F)	$V_{LOAD}$
$t_{PLZ}$ (see E and G)	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	$V_{LOAD}$

$V_{CC}$	Inputs		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1k $\Omega$	0.15V
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 $\Omega$	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 $\Omega$	0.3V
$5V \pm 0.5V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 $\Omega$	0.3V



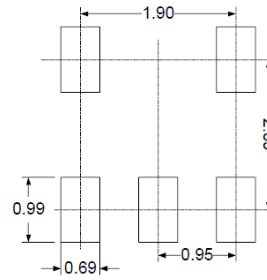
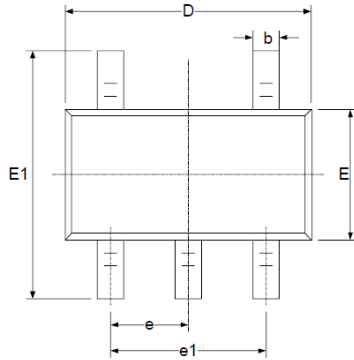
**Figure 1. Load Circuit and Voltage Waveforms**

- (A)  $C_L$  includes probe and jig capacitance.
- (B) Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.  
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- (C) All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10$  MHz,  $Z_0 = 50 \Omega$ .
- (D) The outputs are measured one at a time, with one transition per measurement.
- (E) Since this device has open-drain outputs,  $t_{PLZ}$  and  $t_{PZL}$  are the same as  $t_{pd}$ .
- (F)  $t_{PZL}$  is measured at  $V_M$ .
- (G)  $t_{PLZ}$  is measured at  $V_{OL} + V_{\Delta}$ .
- (H) All parameters and waveforms are not applicable to all devices.

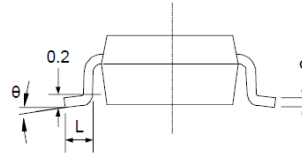
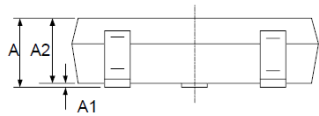


## PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)



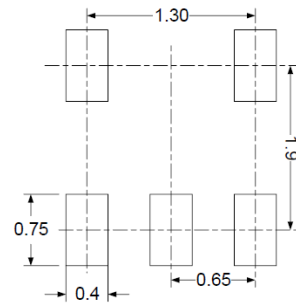
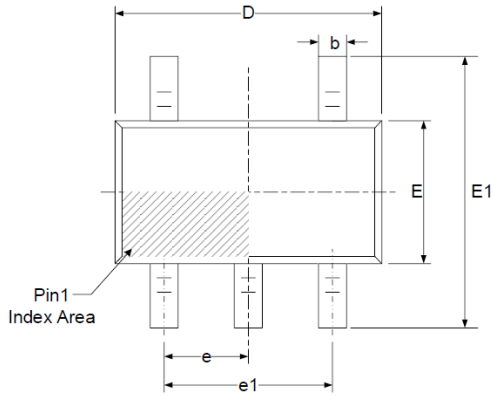
**RECOMMENDED LAND PATTERN**



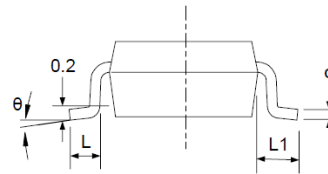
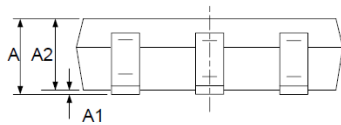
Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC	
e1	1.800	2.000
L	0.300	0.600
$\theta$	0°	8°



Dimension in SC70-5 (Unit: mm)



**RECOMMENDED LAND PATTERN**



Symbol	Millimeters	
	Min	Max
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 BSC	
e1	1.300 BSC	
L	0.260	0.460
L1	0.525	
θ	0°	8°





## IMPORTANT NOTICE

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