DESCRIPTION

The AL1G11 is a single 3-input positive AND gate, designed for 1.65V to 5.5V Vcc operation.

The AL1G11 contains three AND gates and performs the Boolean function $Y = A \cdot B \cdot C$ or $Y = \overline{\overline{A} + \overline{B} + \overline{C}}$ in positive logic.

The AL1G11 is fully specified for partial power down applications using IOFF. The IOFF circuitry disables the outputs, preventing damaging current backflow when the device is powered down.

The AL1G11 operates over an ambient temperature range of -40°C to +125°C.

The AL1G11 is available in SOT-26 and SC70-6 Packages.

ORDERING INFORMATION

Package Type		Part Number
SOT-26 SPQ: 3,000pcs/Reel	E6	AL1G11E6R
		AL1G11E6VR
SC70-6 SPQ:3,000pcs/Reel	C6	AL1G11C6R
		AL1G11C6VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

FEATURES

- Operating Voltage Range: 1.65V to 5.5V
- Low Power Consumption: 1µA (Max).
- Operating Temperature Range: -40°C to +125°C
- Inputs Accept Voltage to 5.5V
- High Output Drive: ±24mA at V_{CC}=3.0V
- Available in SOT-26 and SC70-6 Packages

APPLICATION

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- PCs, Networking, Notebooks, PDAs
- Computer Peripherals, Hard Drives
- TV, DVD DVR Set Top Box
- Cell Phones, Personal Navigation / GPS
- MP3 players, Cameras, Video Recorders
- Active Noise Elimination
- Bar Code Scanner
- Blood Pressure Monitor
- CPAP Machine
- Fingerprint Identification
- Network Attached Storage (NAS)

SIMPLIFIELD SCHEMATIC

PIN DESCRIPTION

SOT-26, E6

Top View

SC70-6, C6

Top View
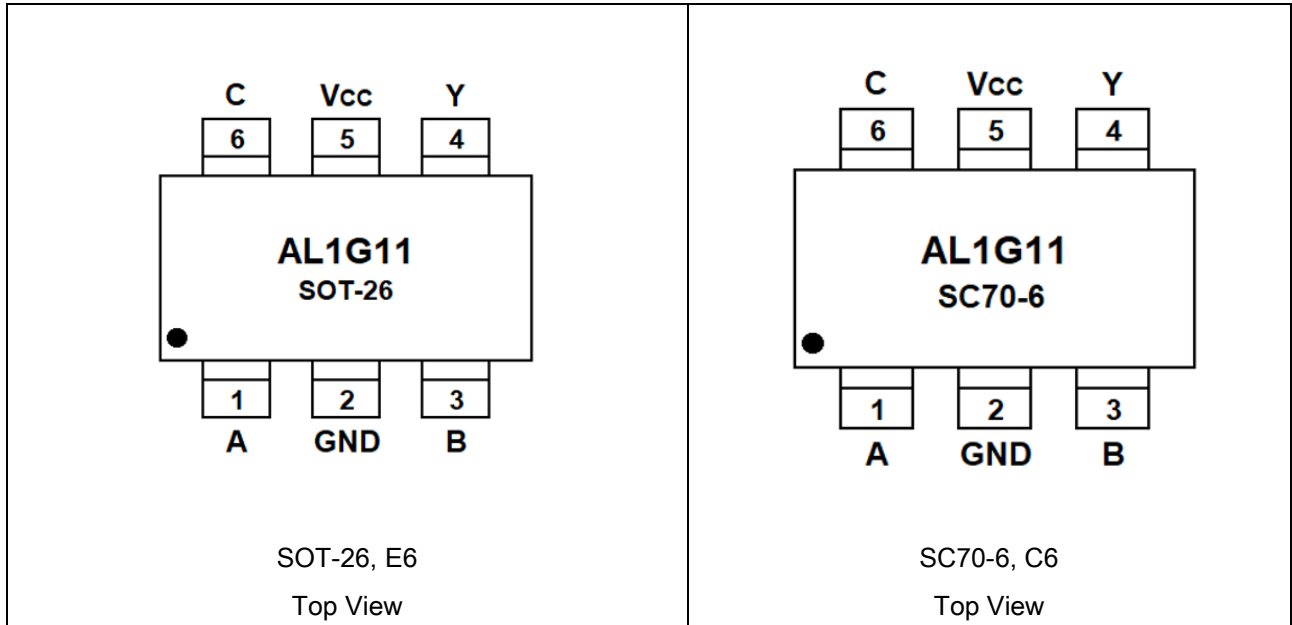
PIN#		Symbol	I/O	Function
SOT-26	SC70-6			
1	1	A	I	A Input
2	2	GND	P	Ground
3	3	B	I	B Input
4	4	Y	O	Output
5	5	V_{CC}	P	Supply Power
6	6	C	I	C Input

I=input, O=output, P=Power

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted) [1]

V_{CC}, Supply Voltage Range		-0.5V ~ + 6.5V
V_I, Input Voltage Range [1]		-0.5V ~ + 6.5V
V_O, Voltage Range Applied to any Output in the High-Impedance or Power-Off State [1]		-0.5V ~ + 6.5V
V_O, Voltage Range Applied to any Output in the High or Low State [1] [2]		-0.5V ~ V_{CC} + 6.5V
I_{IK}, Input Clamp Current	$V_I < 0$	-50mA
I_{OK}, Output Clamp Current	$V_O < 0$	-50mA
I_O, Continuous Output Current		±50mA
I_O, Continuous Current through V_{CC} or GND		±100mA
θ_{JA}, Package Thermal Impedance [3]	SOT-26	230°C/W
	SC70-6	265°C/W
T_J, Junction Temperature [4]		-65℃ ~ +150℃
T_{STG}, Storage Temperature		-65℃ ~ +150℃

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_{CC} is provided in the Recommended Operating Conditions table.

(3) The package thermal impedance is calculated in accordance with JESD-51.

(4) The maximum power dissipation is a function of TJ(MAX), $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

ESD RATINGS

Parameter	Symbol	Min	Unit
Human-Body Model (HBM), per ANSI/ESDA/JEDEC JS-001 [1]	$V_{(ESD)}$	±4000	
Charged-Device Model (CDM), per ANSI/ESDA/JEDEC JS-002 [2]	Electrostatic	±1500	V
Machine Model (MM)	Discharge	±200	

(1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250 V CDM allows safe manufacturing with a standard ESD control process.

RECOMMENDED OPERATING CONFITIONS

T_A=25°C, unless otherwise noted.*

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.65	-	5.5	V
		Data Retention only	1.50	-	-	
High-Level Input Voltage	V_{IH}	V_{CC} = 1.65 V ~1.95 V	0.65x V_{CC}	-		V
		V_{CC} = 2.3V ~2.7 V	1.70	-		
		V_{CC} = 3 V ~3.6 V	2	-		
		V_{CC} = 4.5 V ~5.5 V	0.70x V_{CC}	-		
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.65 V ~1.95 V	-	-	0.35x V_{CC}	V
		V_{CC} = 2.3V ~2.7 V	-		0.70	
		V_{CC} = 3 V ~3.6 V	-		0.80	
		V_{CC} = 4.5 V ~5.5 V	-		0.30x V_{CC}	
Input Voltage	V_I	-	0	-	5.50	V
Output Voltage	V_O	-	0	-	V_{CC}	V
Input Transition Rise or Fall	$\Delta t/\Delta v$	V_{CC} = 1.8 V± 0.15 V, 2.5 V ± 0.2 V	-	-	20	ns/V
		V_{CC} = 3.30 V ± 0.3 V	-	-	10	
		V_{CC} = 5 V ± 0.5V	-	-	5	
Operating Temperature	T_A	-	-40	-	+125	°C

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

DC CHARACTERISTICS

Parameter		Conditions		Min	Typ.	Max	Unit
V_{OH}		I_{OH} = -100 µA, V_{CC}=1.65~5.5V	-40℃ ~ +125℃	V_{CC}-0.1	-	-	V
		I_{OH} = -4mA, V_{CC}=1.65V		1.20	-	-	
		I_{OH} = -8mA, V_{CC}=2.3V		1.9	-	-	
		I_{OH} = -16mA, V_{CC}=3V		2.4	-	-	
		I_{OH} = -24mA, V_{CC}=3V		2.3	-	-	
		I_{OH}= -32mA, V_{CC}=4.5V		3.8	-	-	
V_{OL}		I_{OL} = 100 µA, V_{CC}=1.65~5.5V	-40℃ ~ +125℃	-	-	0.10	V
		I_{OL} = 4mA, V_{CC}=1.65V		-	-	0.45	
		I_{OL} = 8mA, V_{CC}=2.3V		-	-	0.30	
		I_{OL} = 16mA, V_{CC}=3V		-	-	0.40	
		I_{OL} = 24mA, V_{CC}=3V		-	-	0.55	
		I_{OL}= 32mA, V_{CC}=4.5V		-	-	0.55	
I_I	All Inputs	V_I = 5.5V or GND, V_{CC}=0V~5.5V	+25℃	-	±0.1	±1	µA
			-40℃ ~ +125℃	-	-	±5	
I_{off}		V_I or V_O = 5.5V, V_{CC}=0V	+25℃	-	±0.1	±1	µA
			-40℃ ~ +125℃	-	-	±10	
I_{CC}		V_I = 5.5V or GND, I_O=0, V_{CC}=1.65V~5.5V	+25℃	-	0.1	1	µA
			-40℃ ~ +125℃	-	-	10	
ΔI_{CC}		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND, V_{CC}=3V~5.5V	-40℃ ~ +125℃	-	-	500	µA
C_i (Input Capacitance)		V_I = V_{CC} or GND, V_{CC}=3.3V	+25℃	-	4	-	pF

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

AC CHARACTERISTICS

Parameter	Symbol	Conditions		Min	Typ.	Max	Unit
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1KΩ	-	13.60	-	ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω	-	5.50	-	
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω	-	4.20	-	
		V_{CC}=5V±0.5V	C_L=50pF, R_L=500Ω	-	3.70	-	
Power Dissipation Capacitance	C_{pd}	V_{CC}=1.8V	f=10MHz	-	16	-	pF
		V_{CC}=2.5V		-	18	-	
		V_{CC}=3.3V		-	18	-	
		V_{CC}=5V		-	20	-	

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

PARAMETER MEASUREMENT INFORMATION
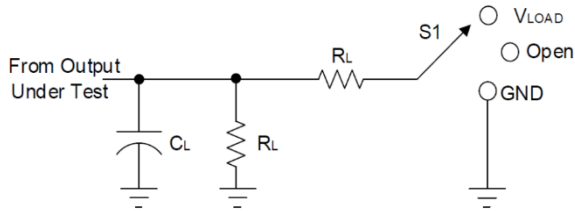
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PIZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

| V_{CC}	Inputs		VM	V_{LOAD}	C_L	R_L	$V\Delta$
	VI	tr/tf					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	30pF	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	30pF	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	50pF	500Ω	0.3V
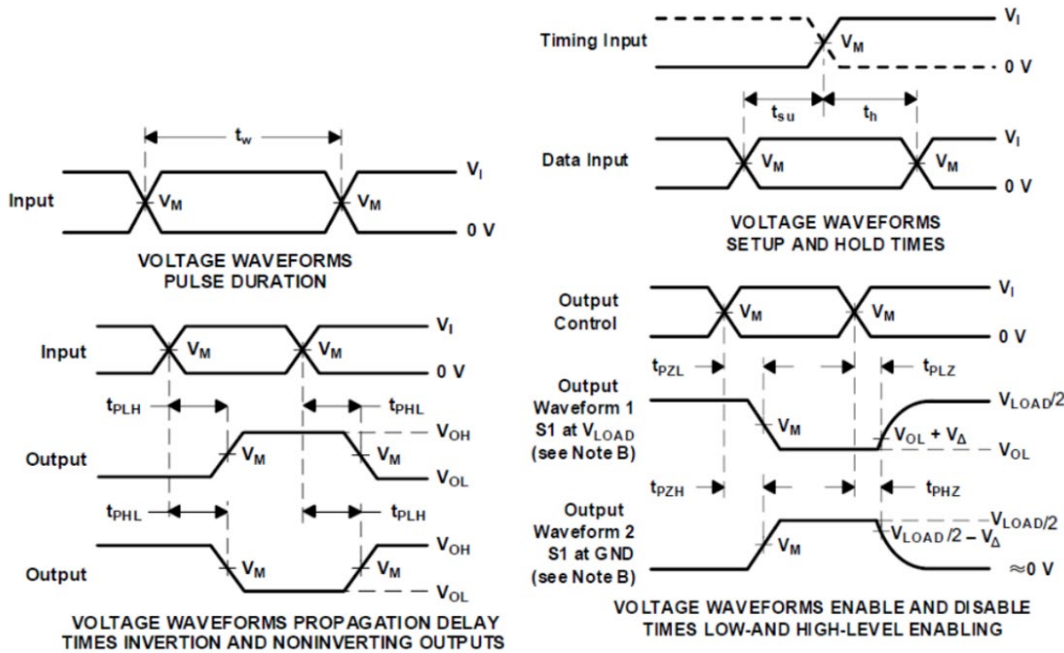
Fig 1. Load Circuit and Voltage Waveforms

(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 ≤ 10 MHz, Z_O = 50 Ω.

(D) The outputs are measured one at a time, with one transition per measurement.

(E) t_{PLZ} and t_{PHZ} are the same as t_{dis}.

(F) t_{LPZ} and t_{PZH} are the same as t_{en}.

(G) t_{PLH} and t_{PHL} are the same as t_{pd}

(H) All parameters and waveforms are not applicable to all devices.
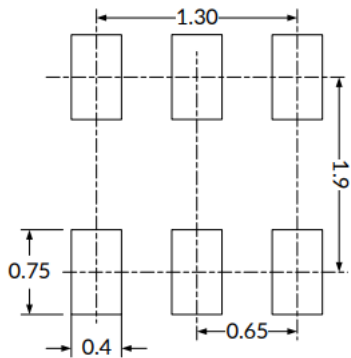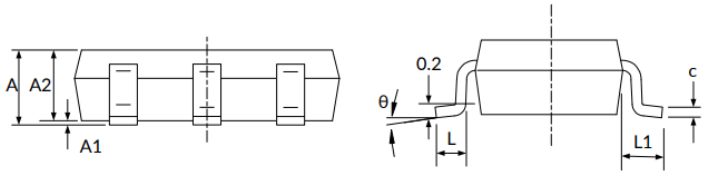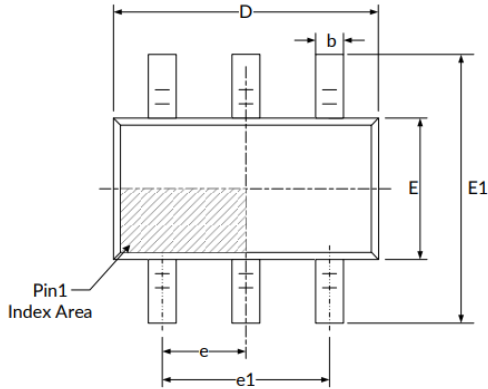
PACKAGE INFORMATION

Dimension in SOT-26 (Unit: mm)
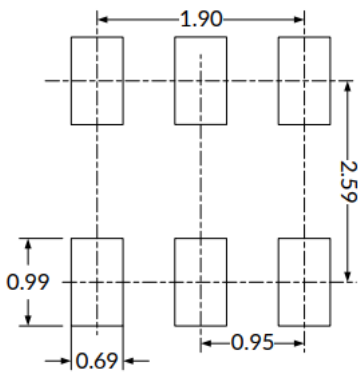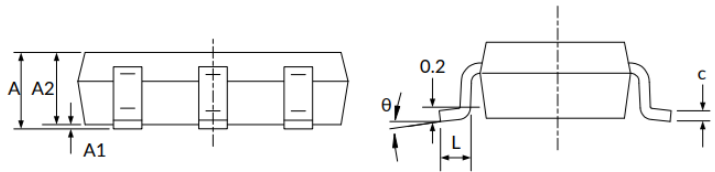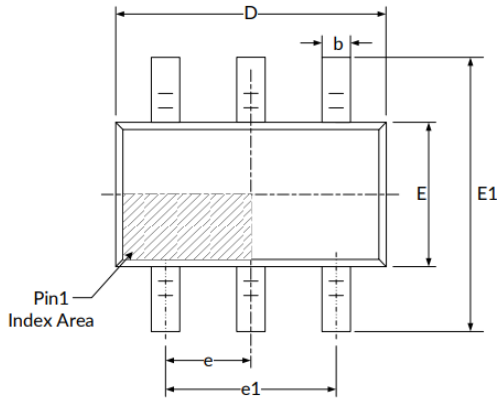
Recommended Land Pattern (Unit: mm)

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	0.950 BSC	
e1	1.800	2.000
E	1.500	1.700
E1	2.650	2.950
L	0.300	0.600
θ	0°	8°

Dimension in SC70-6(Unit: mm)

Recommended Land Pattern (Unit: mm)

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
H	0.525 TYP	
θ	0°	8°

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