DESCRIPTION

The quadruple buffer is designed for 1.65V to 5.5V V_{CC} operation.

The AL4G125 features independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable ($\overline{OE}$) input is high.

To ensure the high-impedance state during power up or power down, $\overline{OE}$ should be tied to V_{CC} through a pullup resistor, the minimum value of the resistor is determined by the current-sinking capability of the driver.

The AL4G125 operates over an ambient temperature range of -40°C to +125°C.

The AL4G125 is available in SOP14 and TSSOP14 packages.

ORDERING INFORMATION

Package Type	Part Number	
SOP14 SPQ: 4,000/Reel	M14	AL4G125M14R
		AL4G125M14VR
TSSOP14 SPQ: 4,000/Reel	TMX14	AL4G125TMX14R
		AL4G125TMX14VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

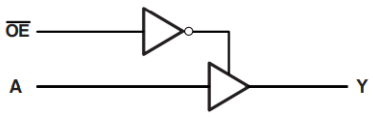
FEATURES

- 3-State outputs
- Separate ($\overline{OE}$) for all 4 buffers
- Operating from 1.65V to 5.5V
- Low Power Consumption:1μA (Max)
- Operating Temperature: -40°C to +125°C
- Inputs Accept Voltage to 5.5V
- ±24mA Output Drive at V_{CC}=3.0V
- Latch-up Performance Exceeds 100mA

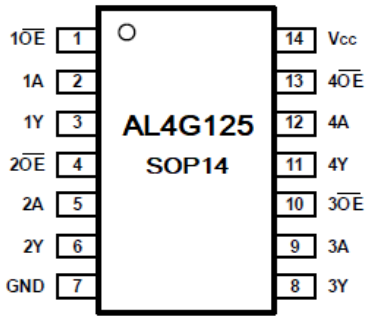
APPLICATION

- Cable modem termination systems
- Personal Navigation Device (GPS)
- Digital Picture Frame (DPF)
- IP phones: wired and wireless
- Optical modules
- Optical networking:
  -EPON or video over fiber
- Point-to-point microwave backhaul
- Power: telecom DC/DC modules:
  -Analog or Digital
- Private branch exchanges (PBX)
- TETRA base stations
- Telecom base band units
- Telecom shelters
  -Filter units
  -Power distribution unit (PDU)
  -Power monitoring units (PMU)
  -Wireless battery monitoring
  -Remote radio units (RRU)
  -Tower mounted amplifiers (TMA)
- Vector signal analyzers and generators
- Video conferencing: IP-based HD
- WiMAX & wireless infrastructure equipment
- Wireless communications testers
- xDSL modems and DSLAM

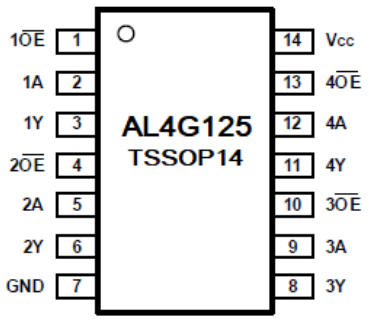
LOGIC SYMBOL



PIN DESCRIPTION



SOP14, M14
Top View



TSSOP14, TMX14
Top View

Pin #		Symbol	Type	Function
SOP14	TSSOP14			
1	1	1$\overline{OE}$	I	Output Enable for buffer 1
2	2	1A	I	Input of buffer 1
3	3	1Y	O	Output of buffer 1
4	4	2$\overline{OE}$	I	Output Enable for buffer 2
5	5	2A	I	Input of buffer 2
6	6	2Y	O	Output of buffer 2
7	7	GND	-	Ground
8	8	3Y	O	Output of buffer 3
9	9	3A	I	Input of buffer 3
10	10	3$\overline{OE}$	I	Output Enable for buffer 3
11	11	4Y	O	Output of buffer 4
12	12	4A	I	Input of buffer 4
13	13	4$\overline{OE}$	I	Output Enable for buffer 4
14	14	V_{CC}	-	Power Supply

FUNCTION TABLE

Inputs		Output
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

H=HIGH Logic Level
L =LOW Logic Level
X=Don't Care
Z=High-impedance OFF-state

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range, unless otherwise noted*

Parameter		Symbol	Min.	Max.	Unit
Supply voltage range		V_{CC}	-0.5	6.5	V
Input voltage range (2)		V_I	-0.5	6.5	V
Voltage range applied to any output in the high-impedance or power-off state (2)		Vo	-0.5	6.5	V
Voltage range applied to any output in the high or low state (2) (3)		Vo	-0.5	V_{CC}+0.5	V
Input clamp current	V_I<0	I_{IK}		-50	mA
Output clamp current	V_O<0	I_{OK}		-50	mA
Continuous output current		I_O		±50	mA
Continuous current through V_{CC} or GND				±100	mA
Junction temperature		T_J	-65	150	°C
Storage temperature		T_{stg}	-65	150	°C
Electrostatic discharge	Human-body model (HBM)	$V_{(ESD)}$		±8000	V
	Machine Model (MM)			±500	
Junction-to-ambient thermal resistance	SOP	$R_{\theta JA}$		122.2	°C/W
	TSSOP14			141.2	

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 is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

*The value of Vcc is provided in the Recommended Operating Conditions table.

RECOMMENDED OPERATING CONDITIONS

over recommended operating free-air temperature range (TYP values are at TA = +25°C, unless otherwise noted.) (1)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Supply voltage	V_{CC}	Operating	1.65	5.5	V
		Data retention only	1.5	5.5	
High-level input voltage	V_{IH}	V_{CC}=1.65V to 1.95V	0.65xV_{CC}		V
		V_{CC}=2.3V to 2.7V	1.7		
		V_{CC}=3V to 3.6V	2.2		
		V_{CC}=4.5V to 5.5V	0.7xV_{CC}		
Low-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		0.15xV_{CC}	V
		V_{CC}=2.3V to 2.7V		0.3	
		V_{CC}=3V to 3.6V		0.4	
		V_{CC}=4.5V to 5.5V		0.15xV_{CC}	
Input voltage	V_I		0	5.5	V
Output voltage	V_O		0	V_{CC}	V
Input transition rise or fall	t_r, t_f	V_{CC}=1.8V± 0.15V,2.5V ± 0.2V		20	ns/V
		V_{CC}=3.3V± 0.3V		10	
		V_{CC}=5V± 0.5V		5	
Operating temperature	T_A		-40	+125	°C

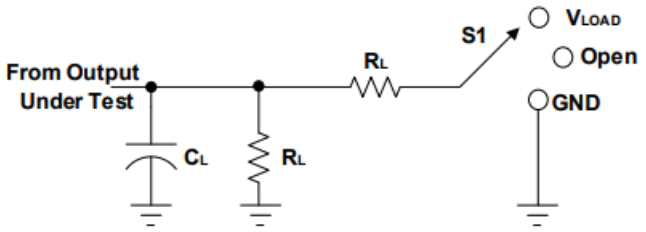
ELECTRICAL CHARACTERISTICS

T_A = +25°C, unless otherwise noted.

Parameter	Conditions	Vcc	Temp	Min	Typ	Max	Unit
DC ELECTRICAL CHARACTERISTICS							
V_{OH}	I_{OH} = -100μA	1.65V to 5.5V	-40°C To +125°C	V_{CC}-0.1			V
	I_{OH} = -4mA	1.65V		1.2			
	I_{OH} = -8mA	2.3V		1.9			
	I_{OH} = -16mA	3V		2.4			
	I_{OH} = -24mA			2.3			
	I_{OH} = -32mA	4.5V		3.8			
V_{OL}	I_{OL} = 100μA	1.65V to 5.5V	-40°C To +125°C			0.1	V
	I_{OL} = 4mA	1.65V				0.45	
	I_{OL} = 8mA	2.3V				0.3	
	I_{OL} = 16mA	3V				0.4	
	I_{OL} = 24mA					0.55	
	I_{OL} = 32mA	4.5V				0.55	
I_I	V_I=5.5V or GND A or $\overline{OE}$ inputs	0V to 5.5V	+25°C		±0.1	±1	μA
			-40°C To +125°C			±5	
I_{off}	V_I or V_O=5.5V	0V	+25°C		±0.1	±1	μA
			-40°C To +125°C			±10	
I_{OZ}	V_O=0V to 5.5V	3.6V				10	μA
I_{CC}	V_I=5.5V or GND, I_O=0	1.65V to 5.5V	+25°C			1	μA
			-40°C To +125°C		0.1	10	
ΔI_{CC}	One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND	3V to 5.5V				500	μA

Parameter	From (Input)	To (Output)	Vcc=1.8V ±0.15V	Vcc=2.5V ±0.2V	Vcc=3.3V ±0.3V	Vcc=5V ±0.5V	Unit
			Typ	Typ	Typ	Typ	
SWITCHING CHARACTERISTICS							
CL=15pF							
t_{pd}	A	Y	6.1	3.7	3.9	2.1	ns
CL=30pF or 50pF							
tpd	A	Y	8.6	5.3	4.0	2.9	ns
ten	$\overline{OE}$	Y	9.5	5.8	5.0	3.3	ns
tdis	$\overline{OE}$	Y	7.4	4.3	4.4	3.0	ns
OPERATING CHARACTERISTICS							
C_{pd}	Power Dissipation Capacitance						
Output enabled		f=10MHz	18	18	19	21	pF
Output disabled			2	2	2	4	

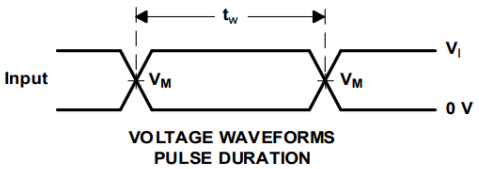
PARAMETER MEASUREMENT INFORMATION



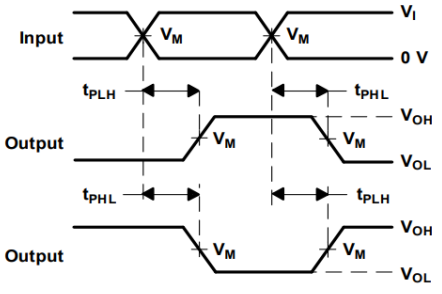
LOAD CIRCUIT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

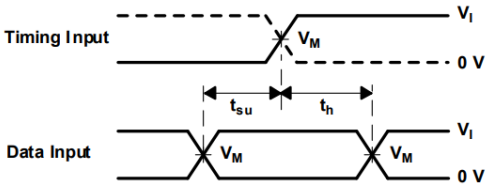
V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	1MΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	1MΩ	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	1MΩ	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15pF	1MΩ	0.3V



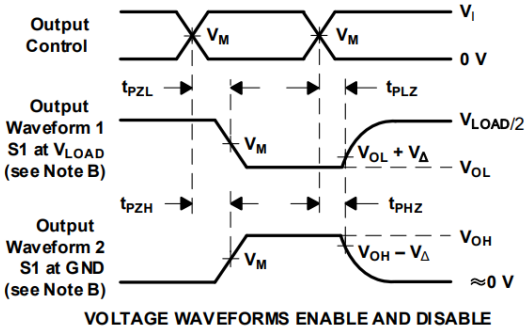
VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS PROPAGATION DELAY
TIMES INVERTION AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



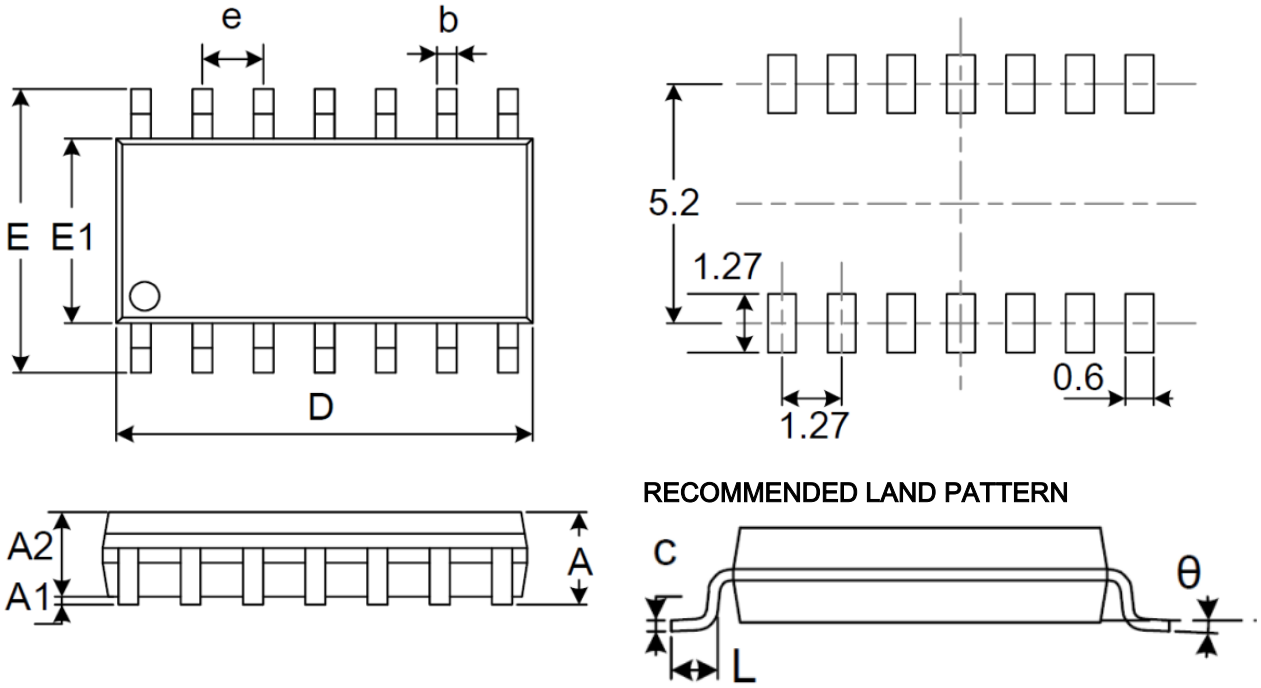
VOLTAGE WAVEFORMS ENABLE AND DISABLE
TIMES LOW-AND HIGH-LEVEL ENABLING

Note: A. CL 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, ZO = 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_{PZL} and t_{PZH} are the same as ten.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

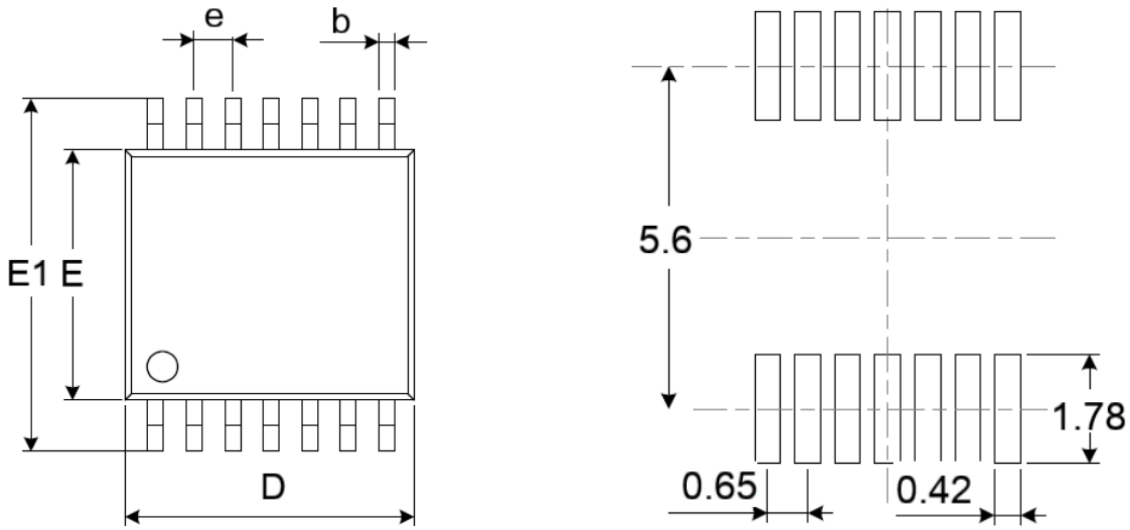
PACKAGE INFORMATION

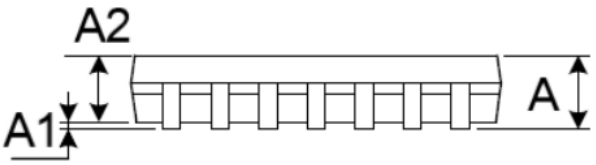
Dimension in SOP14 (Unit: mm)



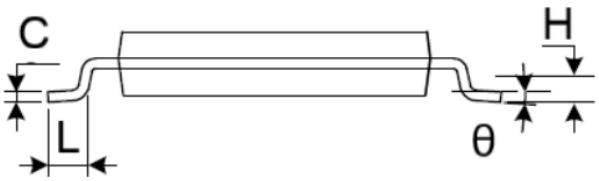
Symbol	Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.310	0.510
c	0.100	0.250
D	8.450	8.850
e	1.270 BCS	
E	5.800	6.200
E1	3.800	4.000
L	0.400	1.270
θ	0°	8°

Dimension in TSSOP14 (Unit: mm)





RECOMMENDED LAND PATTERN



Symbol	Millimeters	
	Min	Max
A		1.200
A1	0.050	0.150
A2	0.800	1.050
b	0.190	0.300
c	0.090	0.200
D	4.860	5.100
E	4.300	4.500
E1	6.250	6.550
e	0.650 BSC	
L	0.500	0.700
H	0.25 TYP	
θ	1°	7°

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