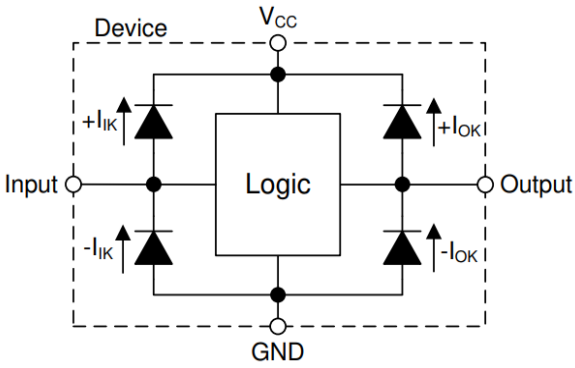
MC74L1G80 Single 2-input Positive-AND Gate

1 Features

- Operating Voltage Range:1.65V to 5.5V
- Low Power Consumption:10μA (Max)
- Operating Temperature Range: -40°C to +125°C
- Inputs Accept Voltage to 5.5V
- High Output Drive: ±24mA at VCC=3.0V
- Micro Size Packages: SOT23-5, SC70-5
- Positive-negative input clamp diode



2 Applications

- Active Noise Elimination
- Bar Code Scanner
- Blood Pressure Monitor
- CPAP Machine
- Fingerprint identification
- Network attached storage (NAS)

3 Description

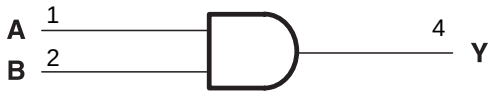
The MC74L1G80 single 2-input positive-AND gate is designed for 1.65V to 5.5V V_{CC} operation. The MC74L1G80 device performs the Boolean function $Y=\overline{A}\cdot\overline{B}$ or Y=A+B positive logic. The device is fully specified for partial-power-down applications using I_{off} .The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. The MC74L1G80 is available in Green SOT23-5 and SC70- 5 packages. It operates over an ambient temperature range of -40°C to +125°C.

FunctionTable

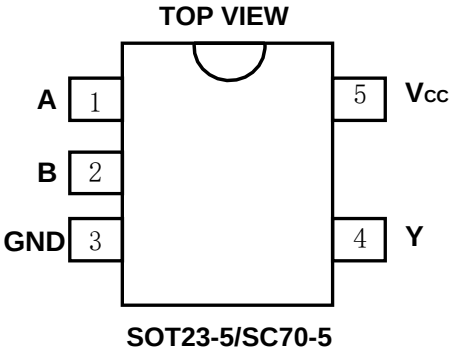
INPUTS		OUTPUT
A	**B**	**Y**
H	H	H
L	H	L
H	L	L
L	L	L

Y=AB H=HIGH Logic Level L=LOW Logic Level

Logic Symbol



5 Pin Configuration and Functions



Pin Functions

PIN		I/O TYPE	DESCRIPTION
NAME	SOT23-5/SC70-5		
A	1	I	Input
B	2	I	Input
GND	3	P	Ground
Y	4	O	Output
V_{CC}	5	P	Power pin

6 Specifications

6.1 Absolute Maximum Ratings(1)

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		–0.5	6.5	V
V_I	Input voltage range(2)		–0.5	V_{CC} + 0.5	V
V_O	Voltage range applied to any output in the high-impedance or power-off state(2)		–0.5	6.5	V
V_O	Voltage range applied to any output in the high or low state(2)(3)		–0.5	V_{CC} + 0.5	V
I_{IK}	Input clamp current	V_I < 0		–50	mA
I_{OK}	Output clamp current	V_O < 0		–50	mA
I_O	Continuous output current			±50	mA
	Continuous current through V_{CC} or GND			±100	mA
T_J	Junction temperature		–65	150	°C
T_{stg}	Storage temperature		–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* 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 under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
(3) The value of V_{CC} is provided in the *Recommended Operating Conditions* table.

6.2 ESD Ratings

			MAX	UNIT
Electrostatic discharge	$I_{(ESD)}$	Latch up current	350	mA
	$V_{(ESD)}$	Human body model (HBM)	±5500	V
		Charged device model (CDM)	±2000	

6.3 Thermal Information

THERMAL METRIC		MC74L1G80		UNIT
		SOT23-5	SC70-5	
$R_{\Theta JA}$	Junction-to-ambient thermal resistance	223.8	214.7	°C/W
$R_{\Theta JC(top)}$	Junction-to-case(top) thermal resistance	134.8	126.1	°C/W
$R_{\Theta JB}$	Junction-to-board thermal resistance	82.9	59.0	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	11.8	31.4	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	84.9	56.4	°C/W
$R_{\Theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	N/A	N/A	°C/W

6.3 Electrical Characteristics

over recommended operating free-air temperature range (TYP value sare at T_A =+25,unless other wise noted.)(1)

6.3.1Recommended Operating Conditions

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	MAX	UNITS
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	0.5xV_{CC}		V
		V_{CC}=2.3V to 2.7V	1.1		
		V_{CC}=3V to 3.6V	1.3		
		V_{CC}=4.5V to 5.5V	0.4xV_{CC}		
Low-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		0.3xV_{CC}	V
		V_{CC}=2.3V to 2.7V		0.55	
		V_{CC}=3V to 3.6V		0.75	
		V_{CC}=4.5V to 5.5V		0.2xV_{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

6.3.2 DC Characteristics

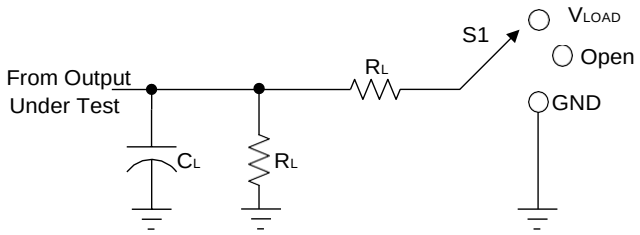
PARAMETER		TEST CONDITIONS	V_{CC}	TEMP	MIN	TYP	MAX	UNITS
V_{OH}		I_{OH} = –100μA	1.65V to 5.5V	Full	V_{CC}-0.1			V
		I_{OH} = –4mA	1.65V		1.2			
		I_{OH} = –8mA	2.3V		1.7			
		I_{OH} = –16mA	3V		2.2			
		I_{OH} = –24mA			2.1			
		I_{OH} = –32mA	4.5V		3.3			
V_{OL}		I_{OL} = 100μA	1.65V to 5.5V	Full			0.1	V
		I_{OL} = 4mA	1.65V				0.15	
		I_{OL} = 8mA	2.3V				0.25	
		I_{OL} = 16mA	3V				0.4	
		I_{OL} = 24mA					0.55	
		I_{OL} = 32mA	4.5V				0.55	
I_I	A or B inputs	V_I=5.5V or GND	5.5V	+25 C		±0.1	±1	μA
				Full			±5	
I_{off}		V_O=5.5V	0	+25 C		±0.1	±1	μA
				Full			±10	
I_{CC}		V_I=V_{CC} or GND, I_O=0	1.65V to 5.5V	+25 C		0.1	1	μA
				Full			10	
ΔI_{CC}		One input at V_{CC}-0.6V, Other inputs at V_{CC} or GND	3V to 5.5V	Full			500	μA

6.3.3 AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Propagation Delay	t_{pd}	V_{CC}=1.8V±0.15V	C_L=30pF, R_L=1kΩ		8.8		ns
		V_{CC}=2.5V±0.2V	C_L=30pF, R_L=500Ω		5		
		V_{CC}=3.3V±0.3V	C_L=50pF, R_L=500Ω		3.8		
		V_{CC}=5V±0.5 V	C_L=50pF, R_L=500Ω		3.5		
Input Capacitance	C_i	V_{CC}=0V			4		pF
Power dissipation capacitance	C_{pd}	V_{CC}=3.3V	f=10MHz		26		pF
		V_{CC}=5V			31		

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

7 Parameter Measurement Information



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	30pF	1MΩ	1kΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	2 x V_{CC}	15pF	30pF	1MΩ	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	50pF	1MΩ	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	2 x V_{CC}	15pF	50pF	1MΩ	500Ω	0.3V

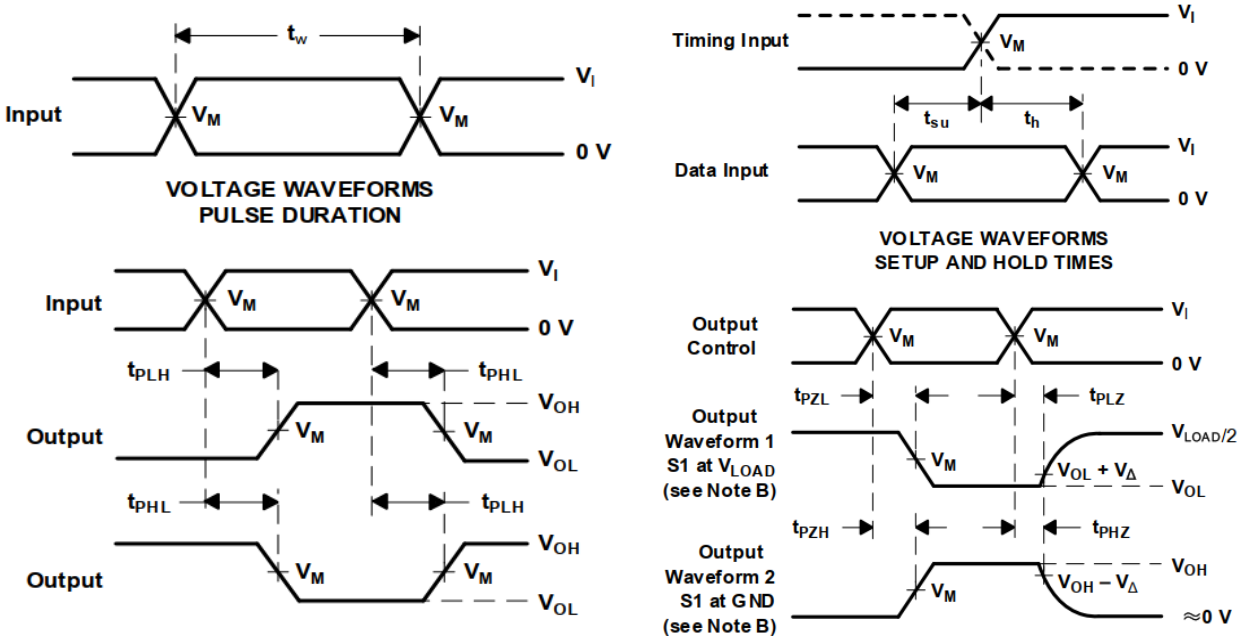
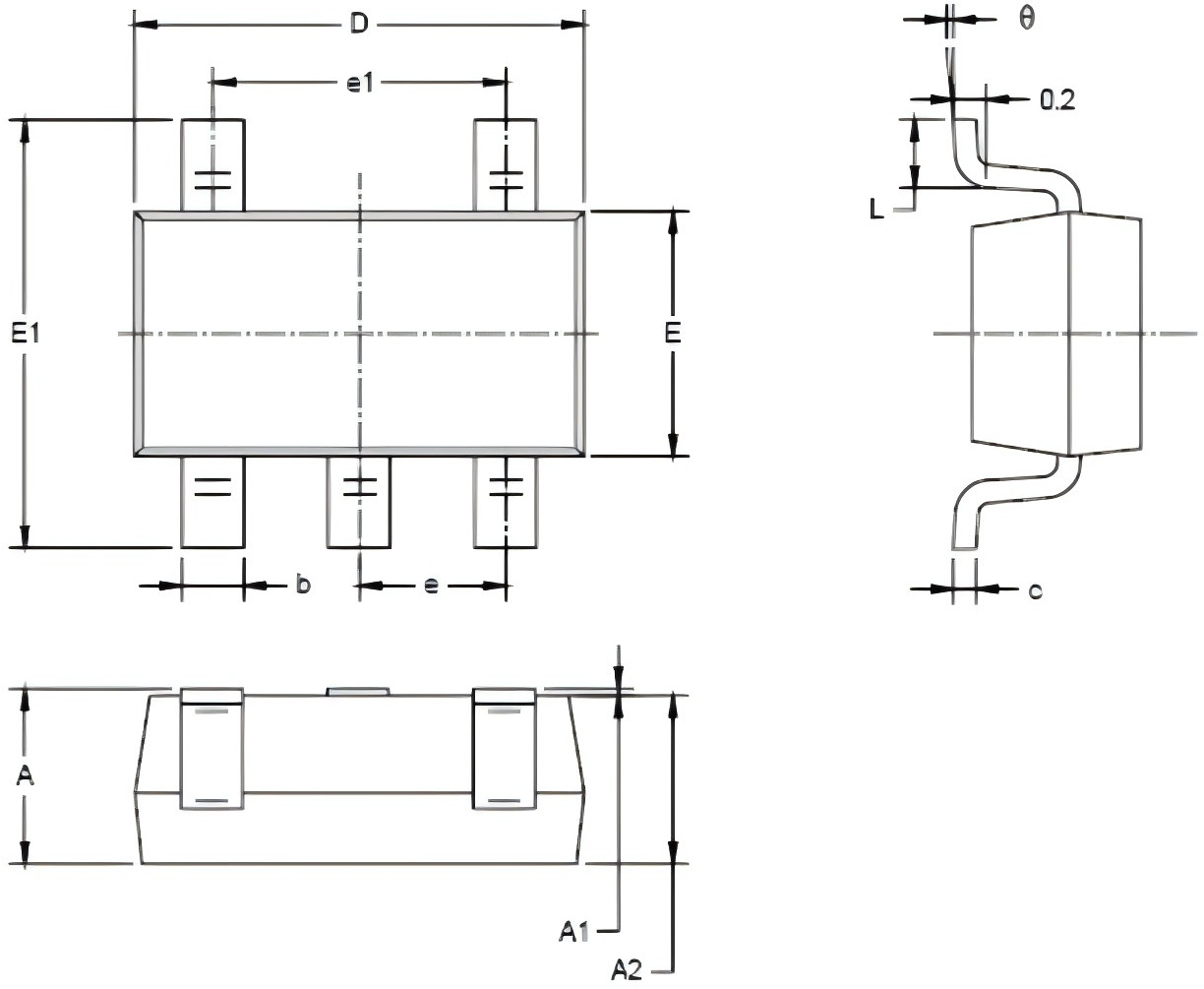


Figure 1. Load Circuit and Voltage Waveforms

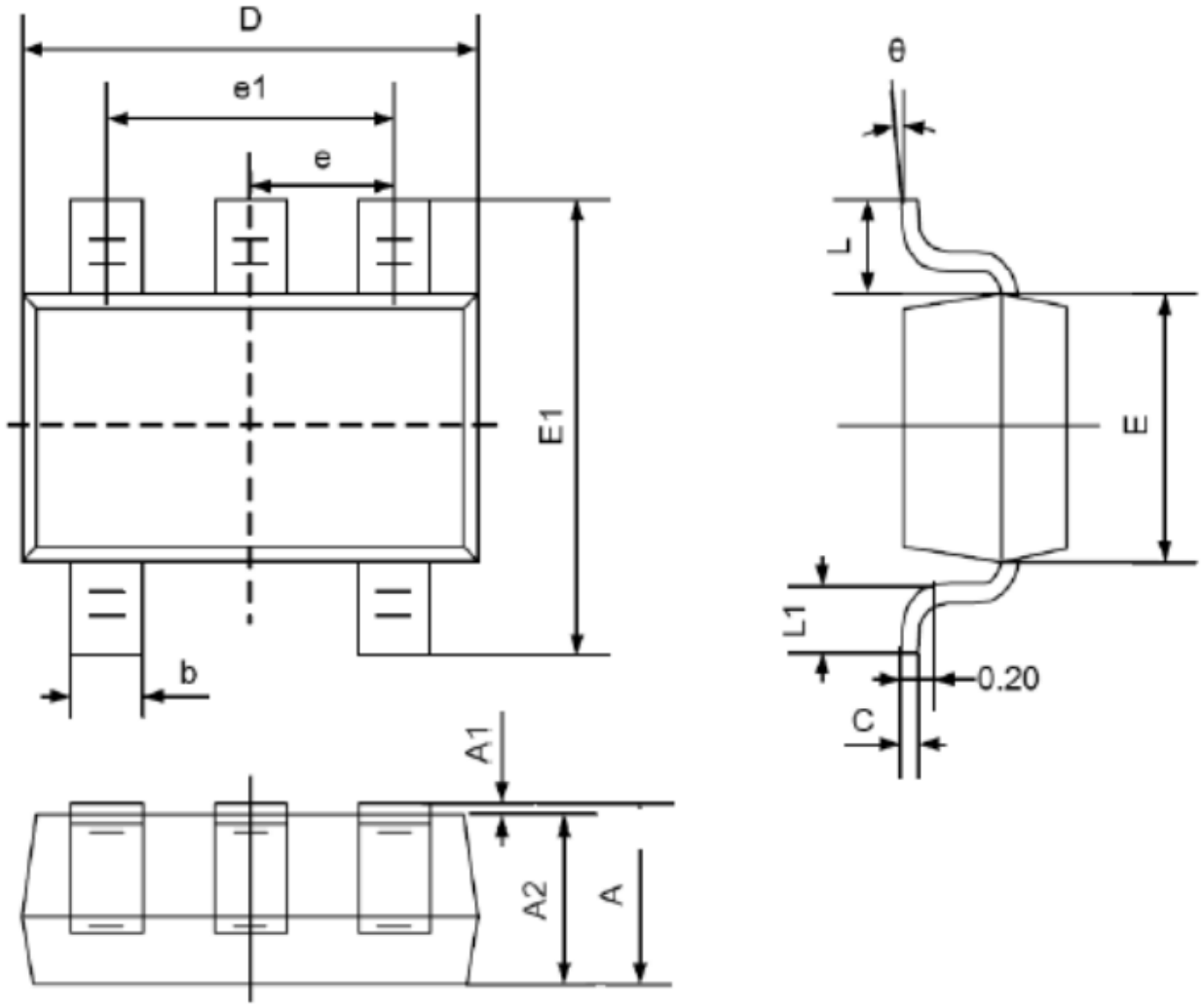
NOTES:
A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
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_{PZL} 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/ORDERING INFORMATION

PRODUCT	ORDER NUMBER	PACKAGE DESCRIPITION	PACKAGE OPTION	MARKING INFORMATION
MC74L1G80	MC74L1G80-TR	SOT23-5	Tape and Reel,3000	1G08
	MC74L1G80-CR	SC70-5	Tape and Reel,3000	1G08



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	0.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°