

Product Specification

XBLW SN74AHC1G08

Single 2-input AND Gate

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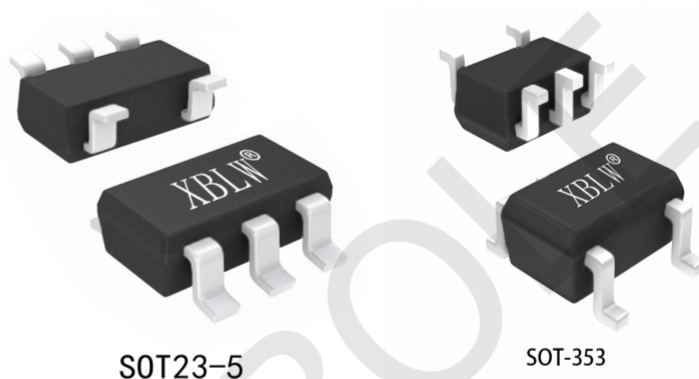
Description

The SN74AHC1G08 is a single 2-input AND gate. Inputs are overvoltage tolerant.

This feature allows the use of these devices as translators in mixed voltage environments.

Features

- Balanced propagation delays
- Low power dissipation
- Specified from -40°C to +125 °C
- Symmetrical output impedance
- Packaging information: SOT23-5/SOT353
- CMOS low power dissipation
- Wide supply voltage range from 2.0 V to 5.5 V



Applications

- Barcode Scanners
- Cable Solutions
- E-Books
- Embedded PCs
- Field Transmitter: Temperature or Pressure Sensors
- Fingerprint Biometrics
- HVAC: Heating, Ventilating, and Air Conditioning
- Network-Attached Storage (NAS)
- Server Motherboard and PSU
- Software Defined Radios (SDR)
- TV: High Definition (HDTV), LCD, and Digital
- Video Communications Systems
- Wireless Data Access Cards, Headsets, Keyboards, Mice, and LAN Cards

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74AHC1G08T235	SOT-23-5	CLXX	Tape	3000Pcs/Reel
XBLW SN74AHC1G08T353	SOT-353	CLXX	Tape	3000Pcs/Reel

Block Diagram

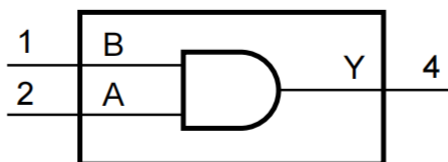


Figure 1. Logic symbol

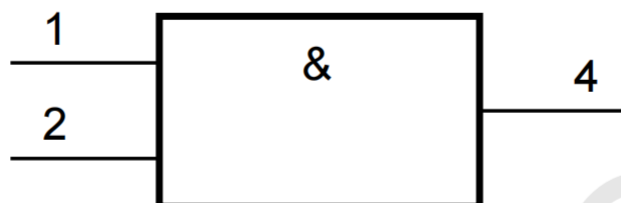


Figure 2. IEC logic symbol

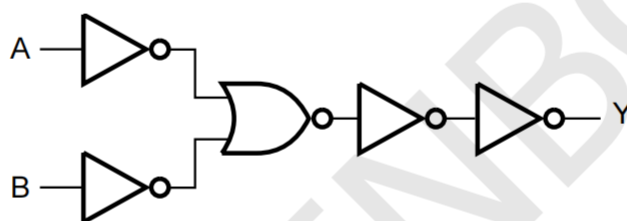
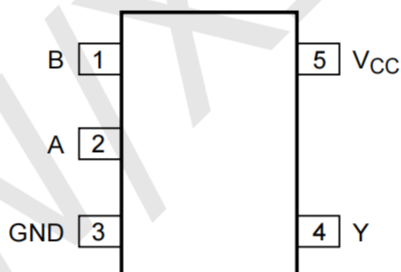


Figure 3. Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	B	data input
2	A	data input
3	GND	ground (OV)
4	Y	data output
5	Vcc	supply voltage

Function Table

Input		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

Note: H=HIGH voltage level; L=LOW voltage level.

Electrical Parameter

Absolute Maximum Ratings

(Tamb=25°C, All voltage referenced to GND, unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V _{CC}	-	-0.5	+7.0	V
input voltage	V _I	-	-0.5	+7.0	V
input clamping current	I _{IK}	V _I < -0.5V	-20	-	mA
output clamping current	I _{OK}	V _O < -0.5V or V _O > V _{CC} + 0.5V	-	±20	mA
output current	I _O	-0.5V < V _O < V _{CC} + 0.5V	-	±25	mA
supply current	I _{CC}	-	-	75	mA
ground current	I _{GND}	-	-75	-	mA
storage temperature	T _{stg}	-	-65	+150	°C
total power dissipation	P _{tot}	-	-	250	mW
soldering temperature	T _L	10s	-	260	°C

Recommended Operating Conditions

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V _{CC}	-	2.0	5.0	5.5	V
input voltage	V _I	-	0		5.5	v
output voltage	V _O	-	0		V _{CC}	v
ambient temperature	T _{amb}	-	-40		+125	°C
input transition rise and fall rate	Δt/ΔV	V _{CC} =3.3V±0.3V	-		100	ns/V
		V _{CC} =5.0V±0.5V	-		20	ns/V

ESD Ratings

Parameter	Defintion	Vaue	Unit
V _(ESD) Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins ⁽¹⁾	±2000	V
	Charged device model (CDM), per JEDEC specification JESD22-C101, all pins ⁽²⁾	±1000	

(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.

DC Characteristics

(T_{amb}=25°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V _{IH}	V _{CC} =2.0V	1.5		-	V
		V _{CC} =3.0V	2.1		-	V
		V _{CC} =5.5V	3.85		-	V
LOW-level input voltage	V _{IL}	V _{CC} =2.0V	-		0.5	V
		V _{CC} =3.0V	-		0.9	V
		V _{CC} =5.5V	-		1.65	V
HIGH-level output voltage	V _{OH}	V _I = V _{IH} or V _{IL}	I _O =-50μA; V _{CC} =2.0V	1.9		V
			I _O =-50μA; V _{CC} =3.0V	2.9		V
			I _O =-50μA; V _{CC} =4.5V	4.4		V
			I _O =-4mA; V _{CC} =3.0V	2.4		V
			I _O =-8mA; V _{CC} =4.5V	3.7		V
LOW-level output voltage	V _{OL}	V _I = V _{IH} or V _{IL}	I _O =50μA; V _{CC} =2.0V		0.1	V
			I _O =50μA; V _{CC} =3.0V		0.1	V
			I _O =50μA; V _{CC} =4.5V		0.1	V
			I _O =4mA; V _{CC} =3.0V		0.55	V
			I _O =8mA; V _{CC} =4.5V		0.55	V
input leakage current	I _I	V _I =5.5V or GND; V _{CC} =0V to 5.5V	-	-	2.0	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =5.5V	-	-	40	μA
input capacitance	C _I	-	-	-	10	pF

DC Characteristics 2

(T_{amb}=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V _{IH}	V _{CC} =2.0V	1.5		-	V
		V _{CC} =3.0V	2.1		-	V
		V _{CC} =5.5V	3.85		-	V
LOW-level input voltage	V _{IL}	V _{CC} =2.0V	-		0.5	V
		V _{CC} =3.0V	-		0.9	V
		V _{CC} =5.5V	-		1.65	V
HIGH-level output voltage	V _{OH}	V _I = V _{IH} or V _{IL}	I _O =-50μA; V _{CC} =2.0V	1.9		V
			I _O =-50μA; V _{CC} =3.0V	2.9		V
			I _O =-50μA; V _{CC} =4.5V	4.4		V
			I _O =-4mA; V _{CC} =3.0V	2.48		V
			I _O =-8mA; V _{CC} =4.5V	3.8		V
LOW-level output voltage	V _{OL}	V _I = V _{IH} or V _{IL}	I _O =50μA; V _{CC} =2.0V		0.1	V
			I _O =50μA; V _{CC} =3.0V		0.1	V
			I _O =50μA; V _{CC} =4.5V		0.1	V
			I _O =4mA; V _{CC} =3.0V		0.44	V
			I _O =8mA; V _{CC} =4.5V		0.44	V
input leakage current	I _I	V _I =5.5V or GND; V _{CC} =0V to 5.5V	-	-	1.0	μA
supply current	I _{CC}	V _I =V _{CC} or GND; I _O =0A; V _{CC} =5.5V	-	-	10	μA
input capacitance	C _I	-	-	-	10	pF

DC Characteristics 3

(T_{amb}=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V _{IH}	V _{CC} =2.0V	1.5		-	V
		V _{CC} =3.0V	2.1		-	V
		V _{CC} =5.5V	3.85		-	V
LOW-level input voltage	V _{IL}	V _{CC} =2.0V	-		0.5	V
		V _{CC} =3.0V	-		0.9	V
		V _{CC} =5.5V	-		1.65	V
HIGH-level output voltage	V _{OH}	V _i = V _{ih} or V _{il}	I _o =-50uA; V _{CC} =2.0V	1.9		V
			I _o =-50uA; V _{CC} =3.0V	2.9		V
			I _o =-50uA; V _{CC} =4.5V	4.4		V
			I _o =-4mA; V _{CC} =3.0V	2.4		V
			I _o =-8mA; V _{CC} =4.5V	3.7		V
LOW-level output voltage	V _{OL}	V _i = V _{ih} or V _{il}	I _o =50uA; V _{CC} =2.0V		0.1	V
			I _o =50uA; V _{CC} =3.0V		0.1	V
			I _o =50uA; V _{CC} =4.5V		0.1	V
			I _o =4mA; V _{CC} =3.0V		0.55	V
			I _o =8mA; V _{CC} =4.5V		0.55	V
input leakage current	I _I	V _i =5.5V or GND; V _{CC} =0V to 5.5V	-	-	2.0	uA
supply current	I _{CC}	V _i =V _{CC} or GND; I _o =0A; V _{CC} =5.5V	-	-	40	uA
input capacitance	C _I	-	-	-	10	pF

AC Characteristics 1

(T_{amb}=25°C, GND=0V, tr=tf=W3.0ns, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
propagation delay	t _{pd}	A and B to Y; see Figure 5 ^[1]	V _{CC} =3.0V to 3.6V ^[2]				
			G=15pF	-	4.6	8.8	ns
			C _L =50pF	-	6.5	12.3	ns
			V _{CC} =4.5V to 5.5V ^[3]				
			C _L =15pF	-	3.2	5.9	ns
		C _L =50pF	-	4.6	7.9	ns	
Power dissipation capacitance	CPD	per buffer; C _L =50pF ; f=1MHz; V _I = GND to V _{CC} ^[4]	-	17	-	pF	

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] Typical values are measured at V_{CC}=3.3V.

[3] Typical values are measured at V_{CC}=5.0V.

[4] C_{PD} is used to determine the dynamic power dissipation (PD in uW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

f_i=input frequency in MHz;

f_o=output frequency in MHz;

C_L =output load capacitance in pF;

V_{CC}=supply voltage in Volts.

AC Characteristics 2

(T_{amb}=-40°C to +85°C, GND=0V, tr=tf=<3.0ns, unless otherwise specked.)

Parameter	Symbol	Conditions	Min. Typ.		Max.	Unit	
propagation delay	t _{pd}	A and B to Y; see Figure 5 ^[1]	V _{cc} =3.0V to 3.6V ^[2]				
			G=15pF	1.0	-	10.5	ns
			CL=50pF	1.0	-	14.0	ns
			V _{cc} =4.5V to 5.5V ^[3]				
			G=15pF	1.0	-	7.0	ns
			CL=50pF	1.0	-	9.0	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] Typical values are measured at V_{cc}=3.3V.

[3] Typical values are measured at V_{cc}=5V.

AC Characteristics 3

(T_{amb}=-40°C to +125°C, GND=0V, tr=tf=<3.0ns, unless otherwise specified.)

Parameter	Symbol	Conditions	Min. Typ.		Max.	Unit	
propagation delay	t _{pd}	A and B to Y; see Figure 5(1)	V _{cc} =3.0V to 3.6V ^[2]				
			G=15pF	1.0	-	12.0	ns
			CL=50pF	1.0	-	16.0	ns
			V _{cc} =4.5V to 5.5V ^[3]				
			G=15pF	1.0	-	8.0	ns
			CL=50pF	1.0	-	10.5	ns

Note:

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] Typical values are measured at V_{cc}=3.3V.

[3] Typical values are measured at V_{cc}=5V

Testing Circuit

AC Testing Circuit

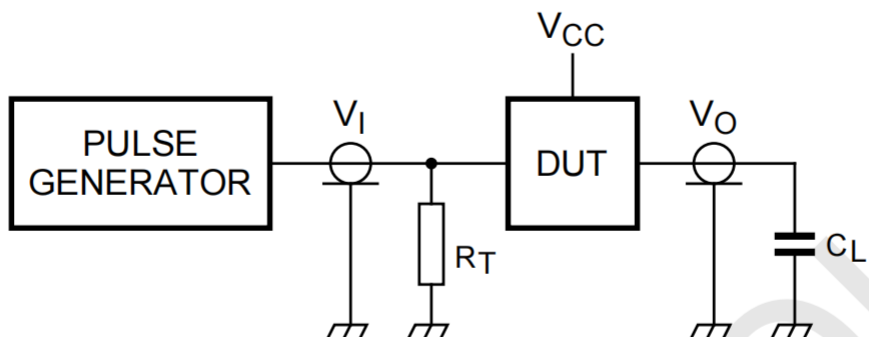


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

C_L =Load capacitance including jig and probe capacitance.

R_T =Termination resistance should be equal to output impedance Z_o of the pulse generator.

AC Testing Waveforms

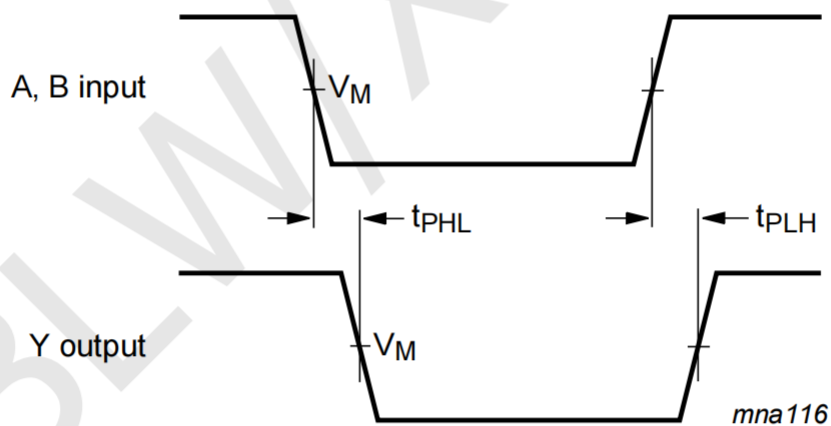


Figure 5. Input (A and B) to output (Y) propagation delays

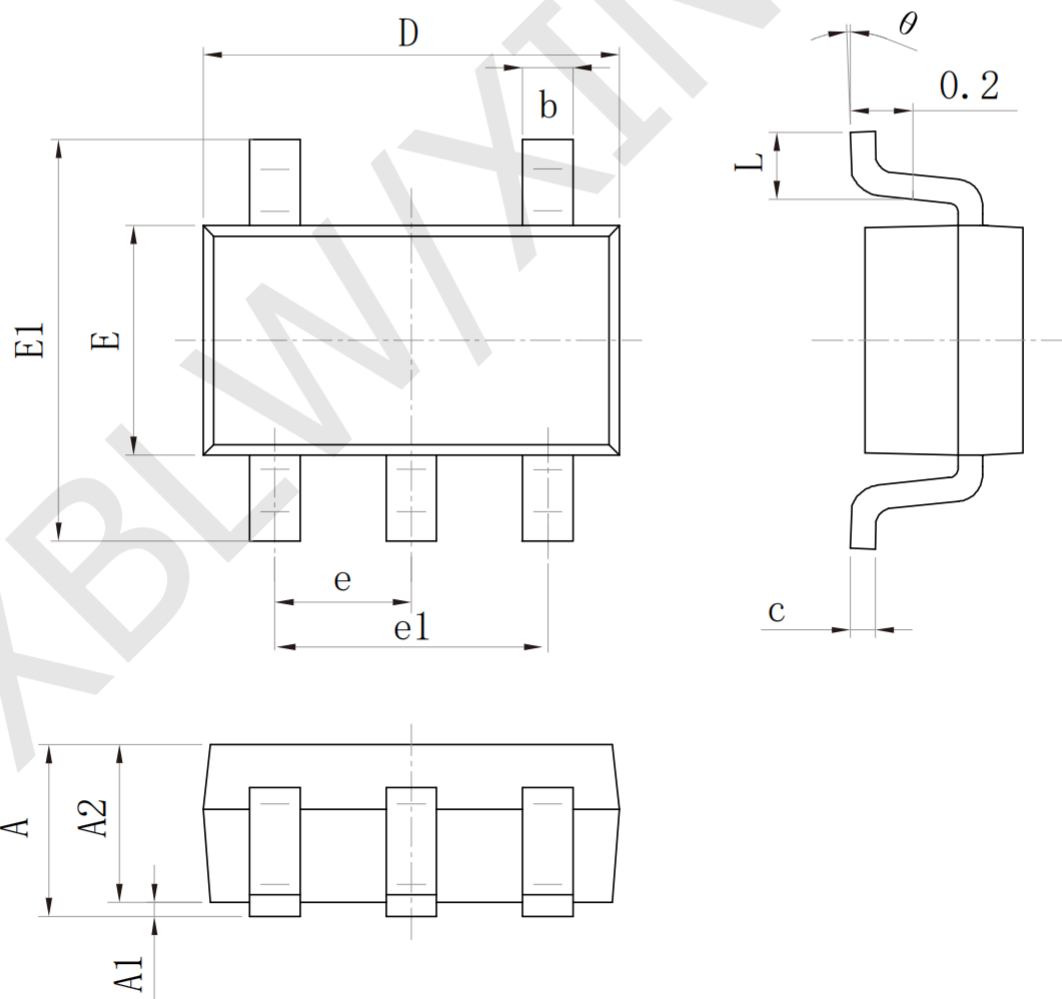
Measurement Points

Type	Input		Output
	V_I	V_M	V_M
SN74AHC1G08	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

Package Information

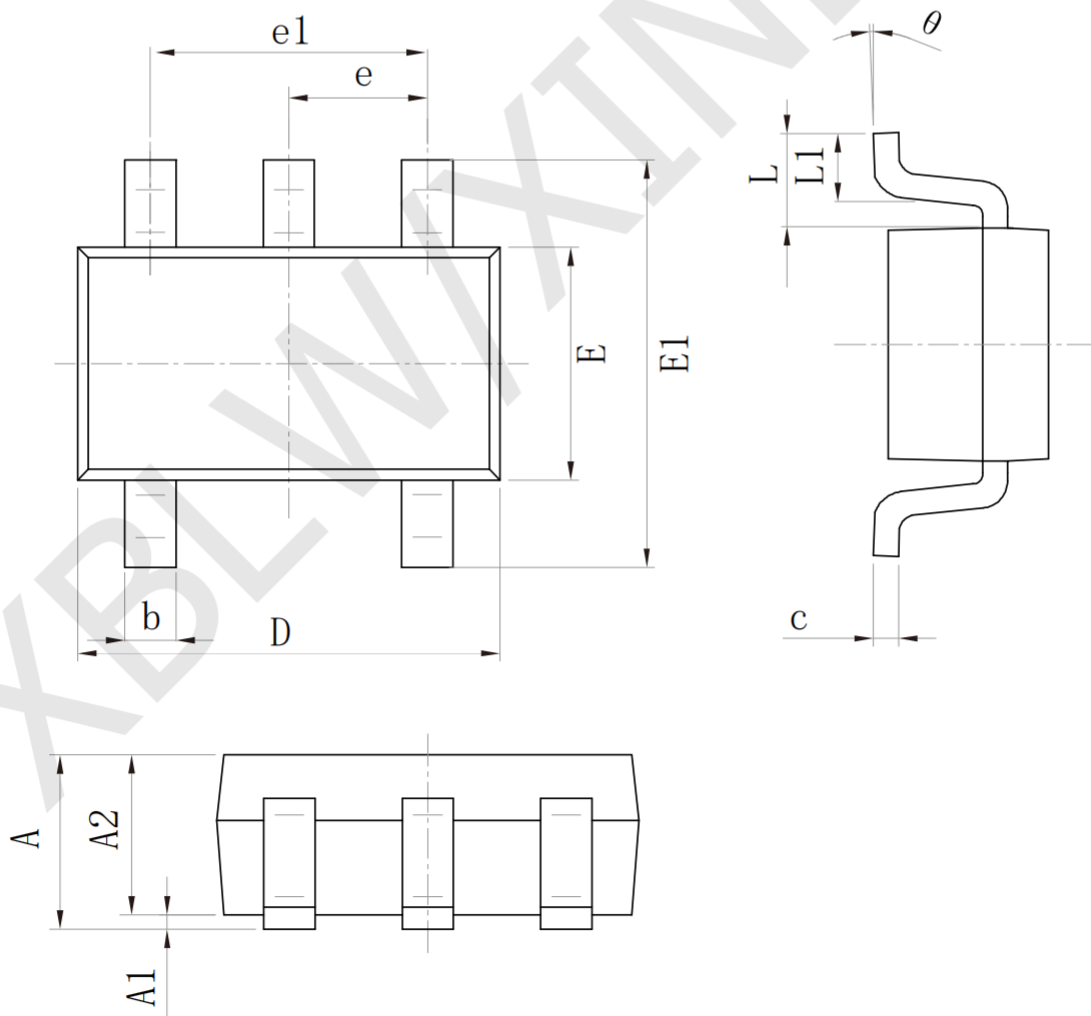
• SOT23-5

SIZE SYMBOL	Dimensions In Millimeters		SIZE SYMBOL	Dimensions In Inches	
	MIN (mm)	MAX (mm)		MIN (in)	MAX (in)
A	1.050	1.250	A	0.041	0.049
A1	0.000	0.100	A1	0.000	0.004
A2	1.050	1.150	A2	0.041	0.045
b	0.300	0.500	b	0.012	0.020
c	0.100	0.200	c	0.004	0.008
D	2.820	3.020	D	0.111	0.119
E	1.500	1.700	E	0.059	0.067
E1	2.650	2.950	E1	0.104	0.116
e	0.95 (BSC)		e	0.037 (BSC)	
e1	1.800	2.000	e1	0.071	0.079
L	0.300	0.600	L	0.012	0.024
θ	0°	8°	θ	0°	8°



• SOT-353

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



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