芯伯乐®
XINBOLE

Product Specification

XBLW SN74AHC1G08

Single 2-input AND Gate

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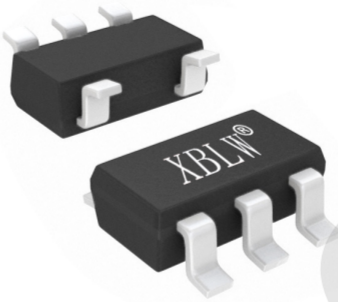
Description

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

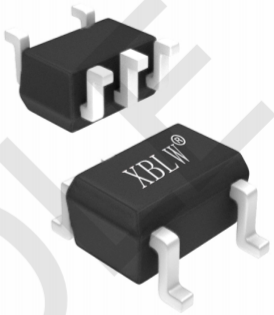
This feature allows the use of these devices as translators in mixed voltage environments.

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



SOT23-5



SOT-353

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

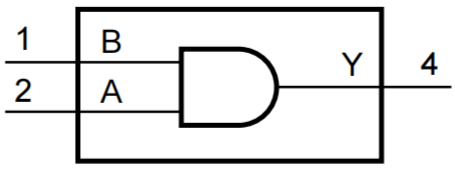


Figure 1. Logic symbol

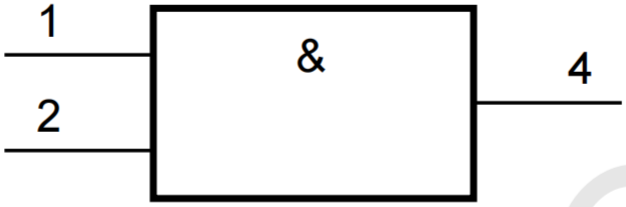


Figure 2. IEC logic symbol

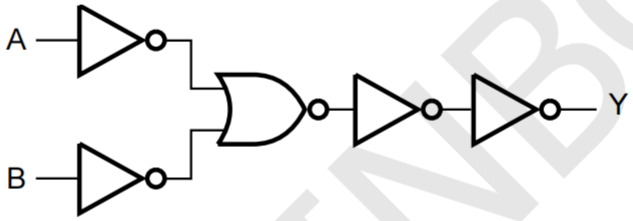
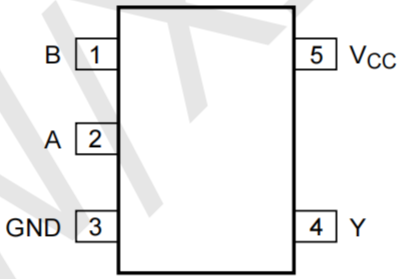


Figure 3. Logic diagram

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	Tstg	-	-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}	Vcc=2.0V		1.5		-	V
		Vcc=3.0V		2.1		-	V
		Vcc=5.5V		3.85		-	V
LOW-level input voltage	V_{IL}	Vcc=2.0V		-		0.5	V
		Vcc=3.0V		-		0.9	V
		Vcc=5.5V		-		1.65	V
HIGH-level output voltage	V_{OH}	V_I = V_{Ih} or V_{Il}	Io=-50uA; Vcc=2.0V	1.9			V
			Io=-50uA; Vcc=3.0V	2.9			V
			Io=-50uA; Vcc=4.5V	4.4			V
			Io=-4mA; Vcc=3.0V	2.4			V
			Io=-8mA; Vcc=4.5V	3.7			V
LOW-level output voltage	V_{OL}	V_I = V_{Ih} or V_{Il}	Io=50uA; Vcc=2.0V			0.1	V
			Io=50uA; Vcc=3.0V			0.1	V
			Io=50uA; Vcc=4.5V			0.1	V
			Io=4mA; Vcc=3.0V			0.55	V
			Io=8mA; Vcc=4.5V			0.55	V
input leakage current	I_I	V_i=5.5V or GND; Vcc=0V to 5.5V		-	-	2.0	uA
supply current	I_{CC}	V_i=Vcc or GND; Io=0A; Vcc=5.5V		-	-	40	uA
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}	Vcc=2.0V		1.5		-	V
		Vcc=3.0V		2.1		-	V
		Vcc=5.5V		3.85		-	V
LOW-level input voltage	V_{IL}	Vcc=2.0V		-		0.5	V
		Vcc=3.0V		-		0.9	V
		Vcc=5.5V		-		1.65	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}	Io=-50UA; Vcc=2.0V	1.9			V
			Io=-50UA; Vcc=3.0V	2.9			V
			Io=-50UA; Vcc=4.5V	4.4			V
			Io=-4mA; Vcc=3.0V	2.48			V
			Io=-8mA; Vcc=4.5V	3.8			V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}	Io=50UA; Vcc=2.0V			0.1	V
			Io=50UA; Vcc=3.0V			0.1	V
			Io=50UA; Vcc=4.5V			0.1	V
			Io=4mA; Vcc=3.0V			0.44	V
			Io=8mA; Vcc=4.5V			0.44	V
input leakage current	I_I	V_I=5.5V or GND; Vcc=0V to 5.5V		-	-	1.0	uA
supply current	I_{CC}	V_I=Vcc or GND; Io=0A; Vcc=5.5V		-	-	10	UA
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}	Vcc=2.0V		1.5		-	V
		Vcc=3.0V		2.1		-	V
		Vcc=5.5V		3.85		-	V
LOW-level input voltage	V_{IL}	Vcc=2.0V		-		0.5	V
		Vcc=3.0V		-		0.9	V
		Vcc=5.5V		-		1.65	V
HIGH-level output voltage	V_{OH}	Vi = Vih or Vil	Io=-50uA; Vcc=2.0V	1.9			V
			Io=-50uA; Vcc=3.0V	2.9			V
			Io=-50uA; Vcc=4.5V	4.4			V
			Io=-4mA; Vcc=3.0V	2.4			V
			Io=-8mA; Vcc=4.5V	3.7			V
LOW-level output voltage	V_{OL}	Vi = Vih or Vil	Io=50uA; Vcc=2.0V			0.1	V
			Io=50uA; Vcc=3.0V			0.1	V
			Io=50uA; Vcc=4.5V			0.1	V
			Io=4mA; Vcc=3.0V			0.55	V
			Io=8mA; Vcc=4.5V			0.55	V
input leakage current	I_I	Vi=5.5V or GND; Vcc=0V to 5.5V		-	-	2.0	uA
supply current	I_{CC}	Vi=Vcc or GND; Io=0A; Vcc=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]	Vcc=3.0V to 3.6V[2]				
			G=15pF	-	4.6	8.8	ns
			C_L=50pF	-	6.5	12.3	ns
			Vcc=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 Vcc[4]		-	17	-	pF

Note:

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

[2] Typical values are measured at Vcc=3.3V.

[3] Typical values are measured at Vcc=5.0V.

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

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

fi=input frequency in MHz;

fo=output frequency in MHz;

C_L =output load capacitance in pF;

Vcc=supply voltage in Volts.

AC Characteristics 2

($T_a$mb=-40℃ to +85℃, 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]	Vcc=3.0V to 3.6V[2]				
			G=15pF	1.0	-	10.5	ns
			CL=50pF	1.0	-	14.0	ns
			Vcc=4.5V to 5.5V[3]				
			G=15pF	1.0	-	7.0	ns
			CL=50pF	1.0	-	9.0	ns

Note:

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

[2] Typical values are measured at Vcc=3.3V.

[3] Typical values are measured at Vcc=5V.

AC Characteristics 3

(Tamb=-40℃ to +125℃, 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)	Vcc=3.0V to 3.6V[2]				
			G=15pF	1.0	-	12.0	ns
			CL=50pF	1.0	-	16.0	ns
			Vcc=4.5V to 5.5V[3]				
			G=15pF	1.0	-	8.0	ns
			CL=50pF	1.0	-	10.5	ns

Note:

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

[2] Typical values are measured at Vcc=3.3V.

[3] Typical values are measured at Vcc=5V

Testing Circuit

AC Testing Circuit

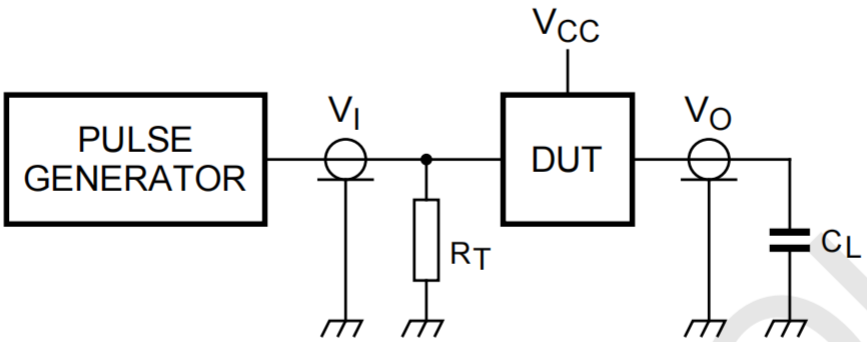


Figure 4. Test circuit for measuring switching times

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

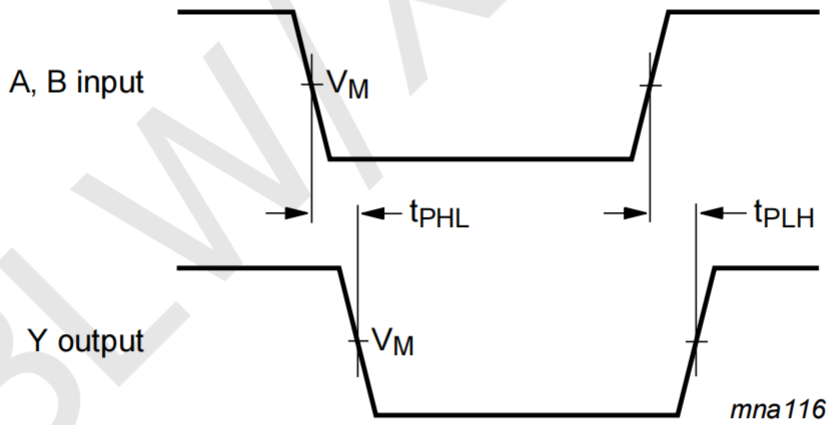


Figure 5. Input (A and B) to output (Y) propagation delays

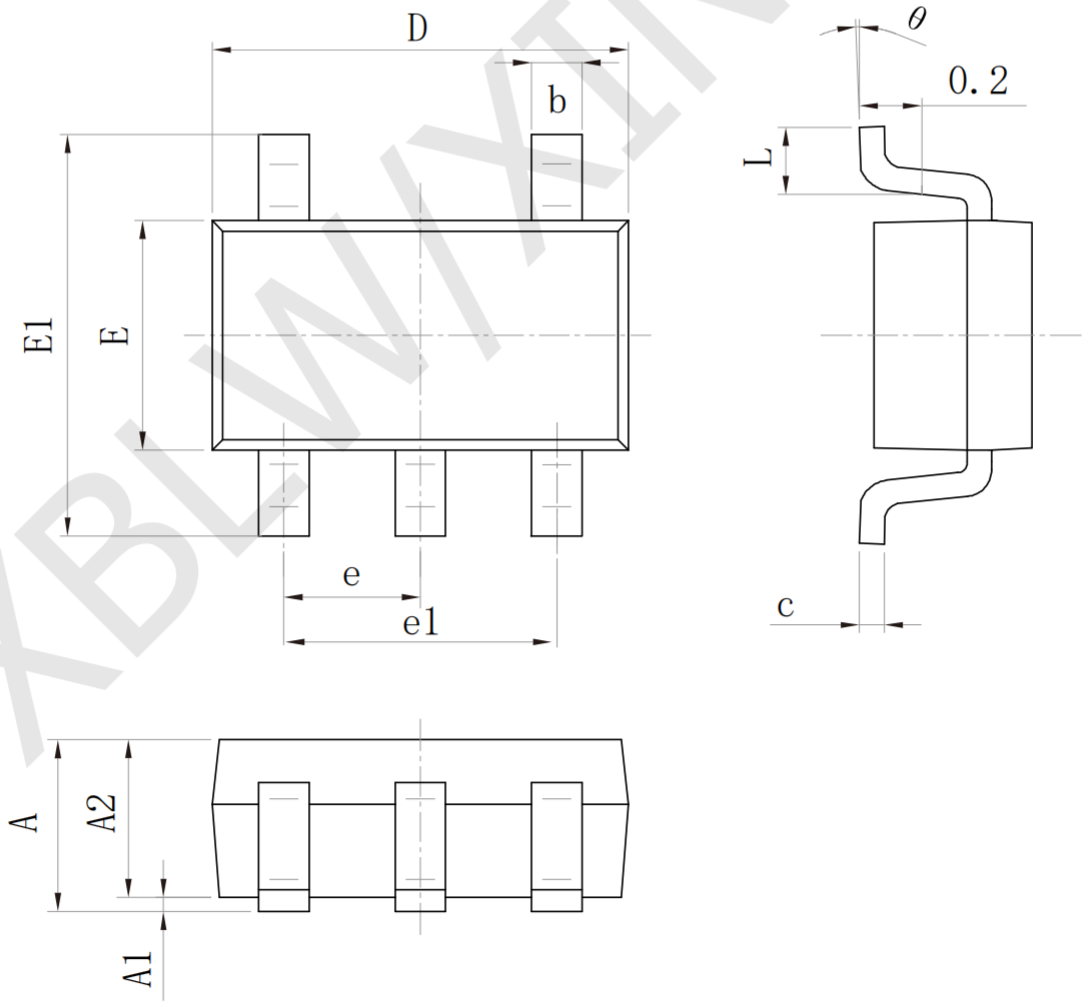
Measurement Points

Type	Input		Output
	V_I	V_M	V_M
SN74AHC1G08	GND to V_{CC}	0.5xV_{CC}	0.5xV_{CC}

Package Information

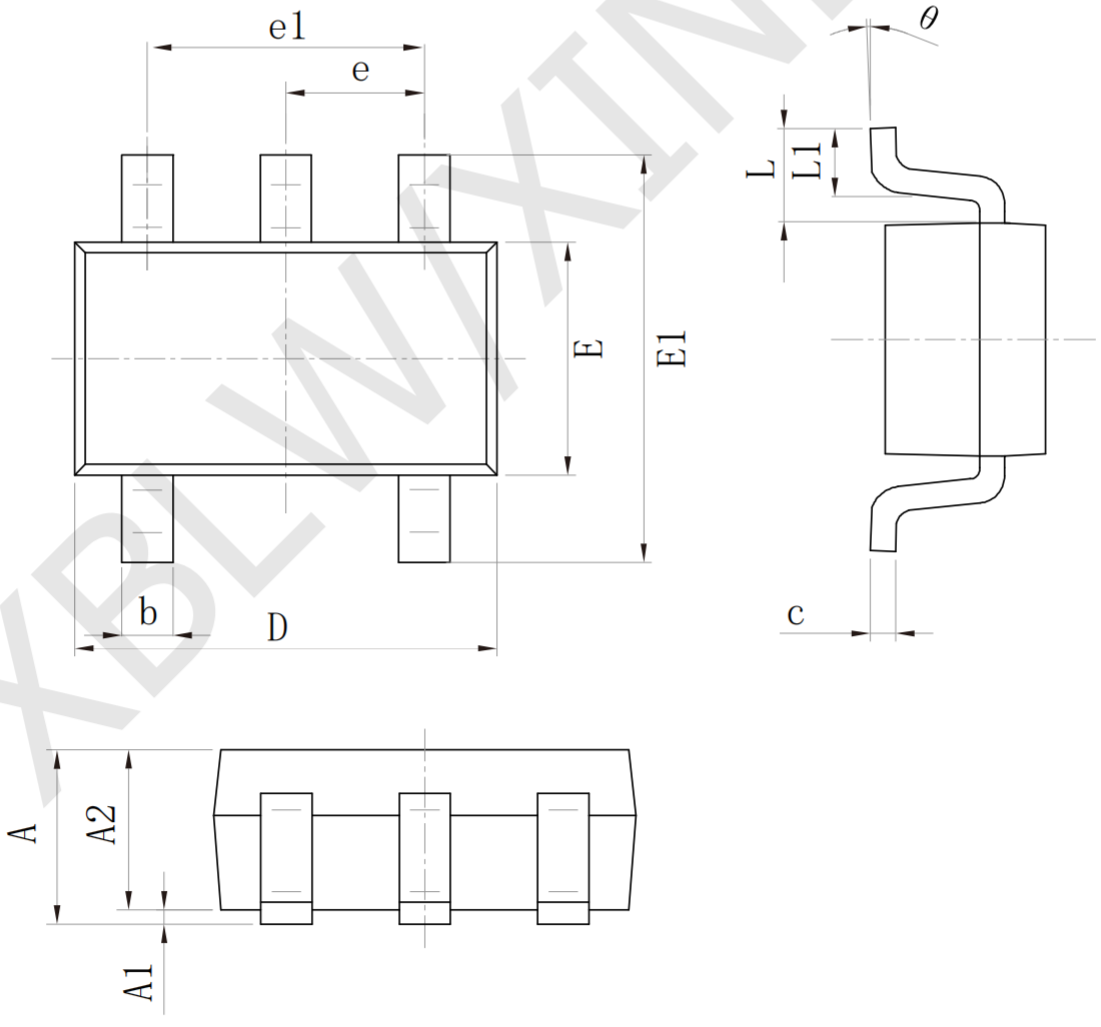
- SOT23-5

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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