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XINBOLE

Product Specification

XBLW SN74AHC1G08

Single 2-input AND Gate

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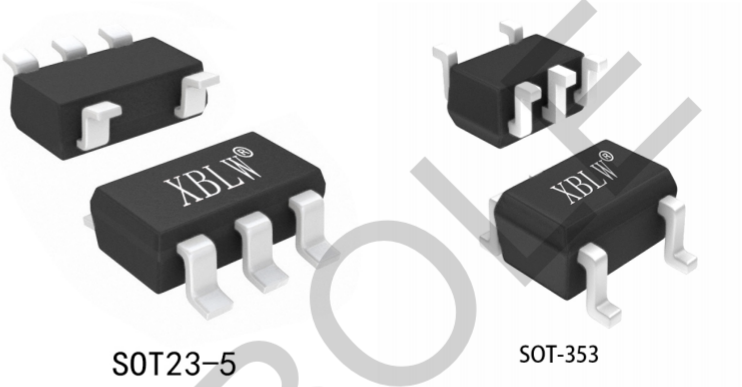
Description

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

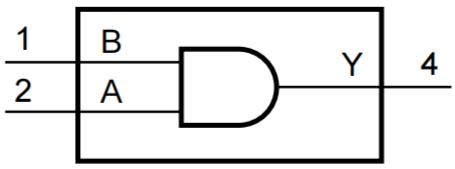


Figure 1. Logic symbol

Figure 2. IEC logic symbol

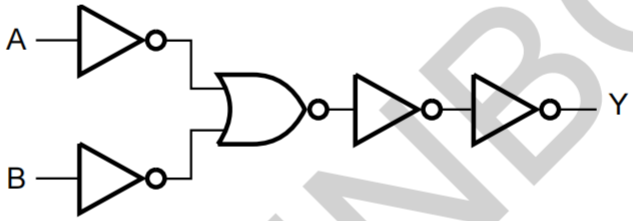
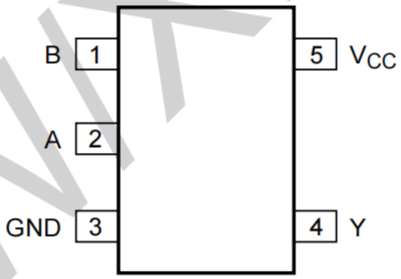


Figure 3. Logic diagram

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°Cto +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°Cto +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] tpd is the same as tPLH and tPHL.

[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°Cto +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]	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°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)	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

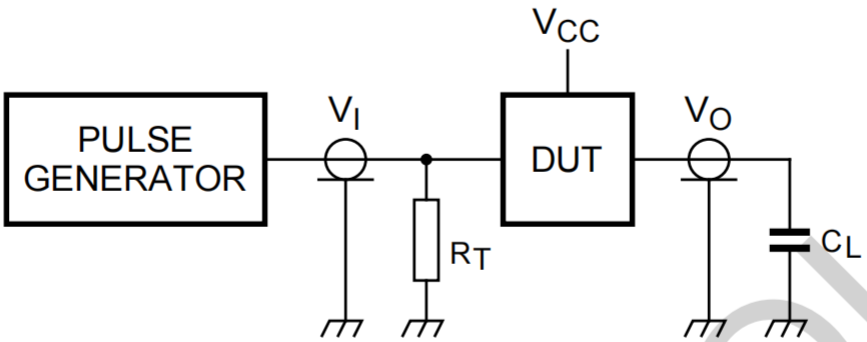


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

C_L=Load capacitance including jig and probe capacitance.

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

AC Testing Waveforms

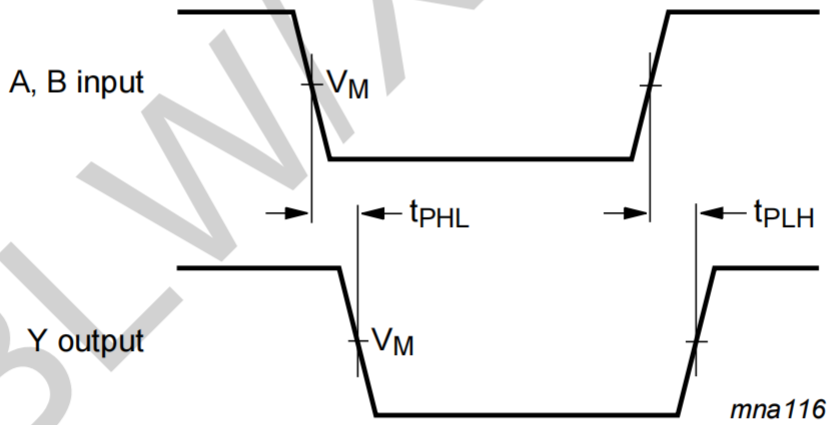


Figure 5. Input (A and B) to output (Y) propagation delays

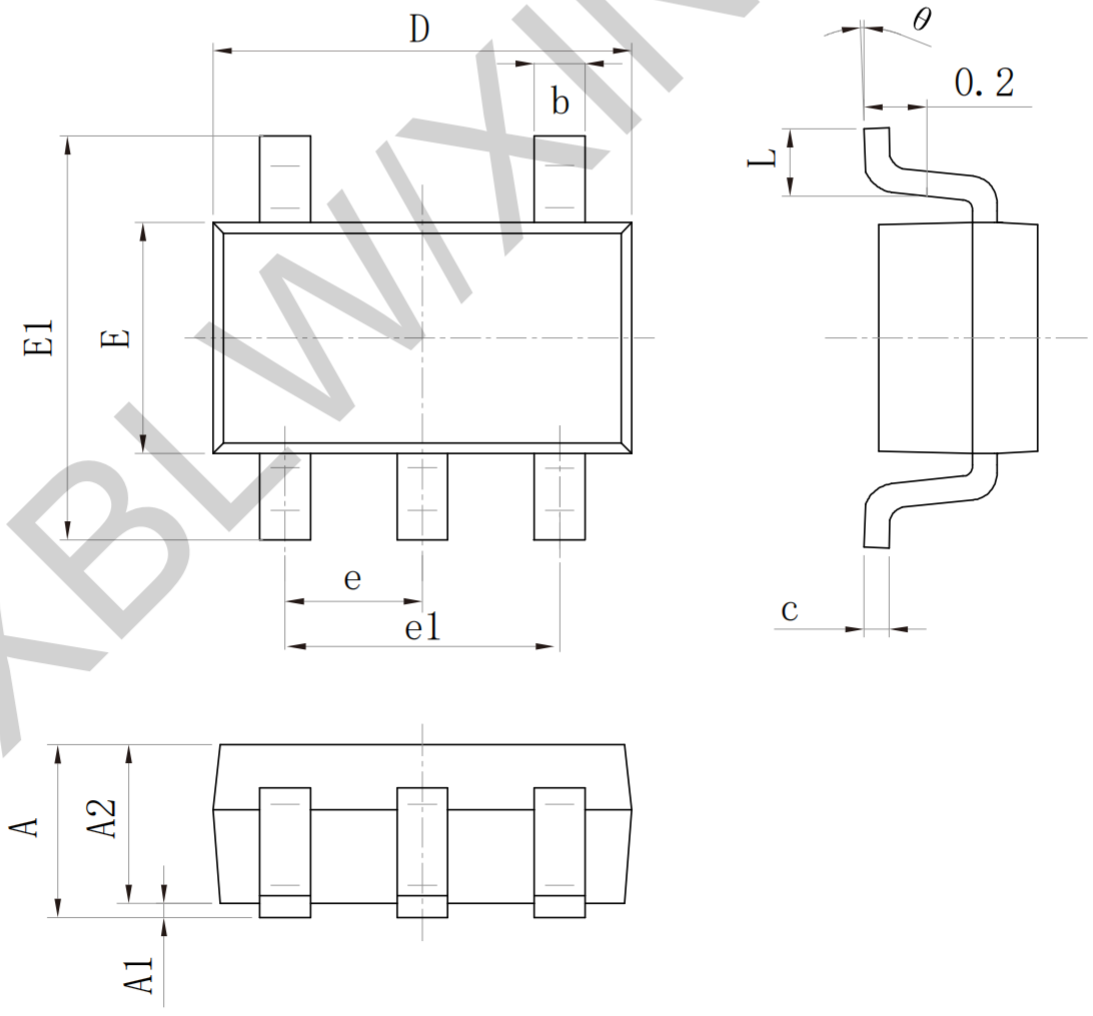
Measurement Points

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	D1	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°



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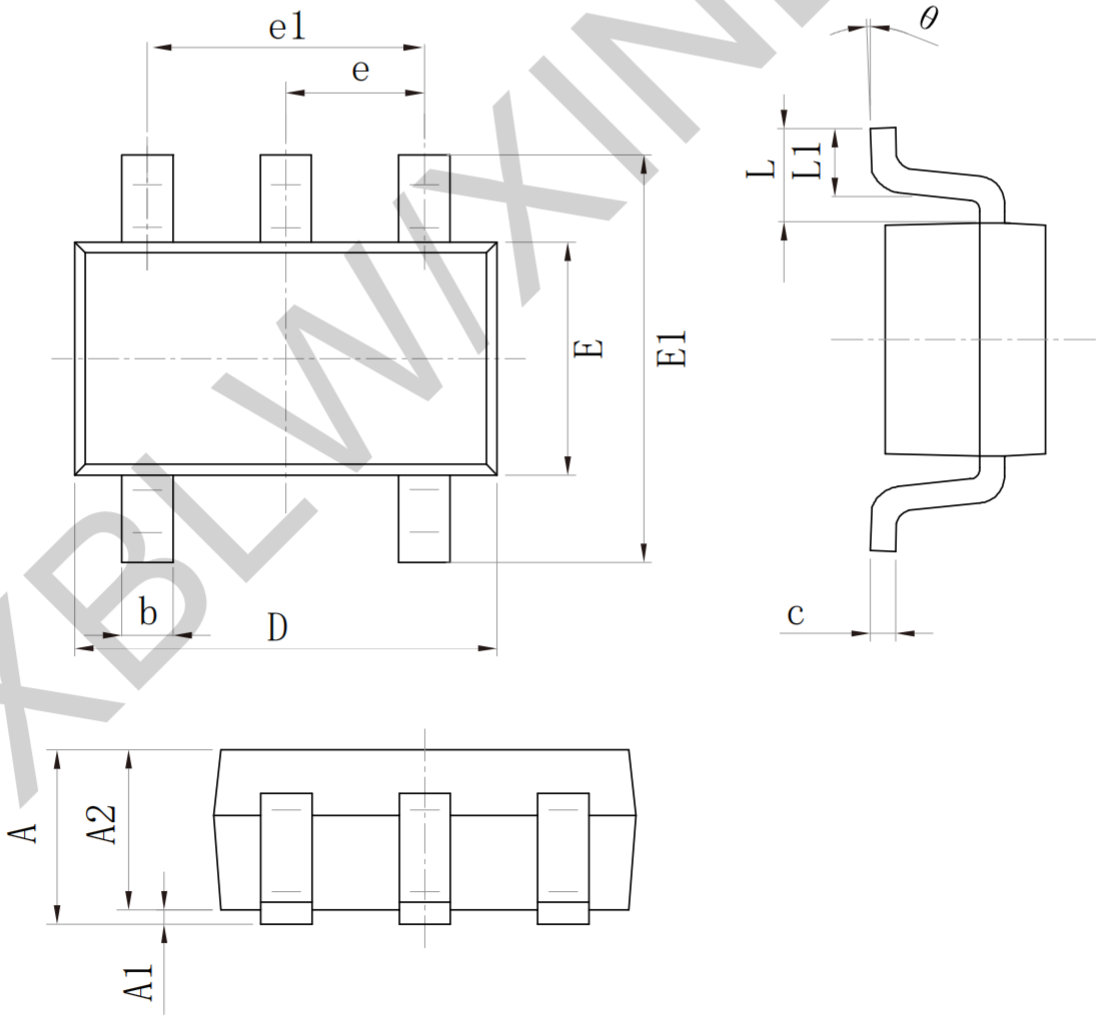
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	0.900	1.100	A	0.035	0.043
A1	0.000	0.100	A1	0.000	0.004
A2	0.900	1.000	A2	0.035	0.039
b	0.150	0.350	b	0.006	0.014
c	0.080	0.150	C	0.003	0.006
D	2.000	2.200	D	0.079	0.087
E	1.150	1.350	E	0.045	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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