



Product Specification

XBLW SN74AHC1G04

Single Inverter

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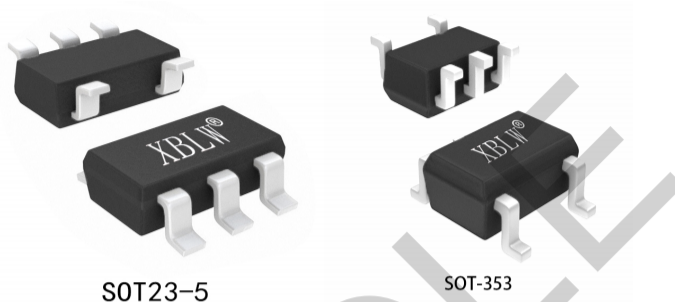


Description

The SN74AHC1G04 is a high-speed Si-gate CMOS devices. Provide a inverting buffer.

Feature

- Specified from -40°C to +125°C
- Packaging information: SOT-23-5/SOT-353
- Low power consumption
- Operating range 2 V to 5.5 V



Applications

- Cameras
- E-Meters
- Infotainment
- Ethernet Switches

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74AHC1G04T235	SOT-23-5	CBXX	Tape	3000Pcs/Reel
XBLW SN74AHC1G04T353	SOT-353	CBXX	Tape	3000Pcs/Reel

Block Diagram

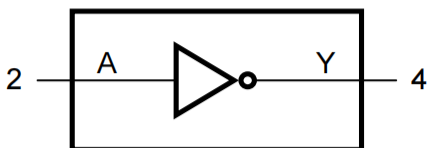


Figure 1. Logic symbol

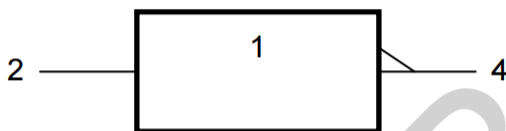
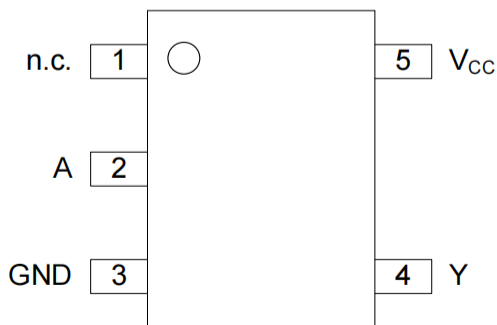


Figure 2.ICE Logic symbol



Figure 3.ICE Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	n.c.	not connected
2	A	data input
3	GND	ground (0V)
4	Y	data output
5	V _{cc}	supply voltage

Function Table

Input	Output
A	Y
L	H
H	L

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

Electrical Parameter

Absolute Maximum Ratings

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

Parameter	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

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	$\Delta t/\Delta V$	$V_{CC}=3.0V$ to $3.6V$	-	-	100	ns/V
		$V_{CC}=4.5V$ to $5.5V$	-	-	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.

Electrical Characteristics

DC Characteristics 1

($T_{amb}=25^{\circ}C$, 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	2.0		V
			I _o =-50uA; V _{cc} =3.0V	2.9	3.0		V
			I _o =-50uA; V _{cc} =4.5V	4.4	4.5		V
			I _o =-4mA; V _{cc} =3.0V	2.58	-		V
			I _o =-8mA; V _{cc} =4.5V	3.94	-		V
LOW-level output voltage	V _{OL}	V _I = V _{IH} or V _{IL}	I _o =50uA; V _{cc} =2.0V		0	0.1	V
			I _o =50uA; V _{cc} =3.0V		0	0.1	V
			I _o =50uA; V _{cc} =4.5V		0	0.1	V
			I _o =4mA; V _{cc} =3.0V		-	0.36	V
			I _o =8mA; V _{cc} =4.5V		-	0.36	V
input leakage current	I _I	V _I =5.5V or GND; V _{cc} =0V to 5.5V		-	-	1.0	uA
supply current	I _{CC}	V _i =V _{cc} or GND; I _o =0A; V _{cc} = 5.5V		-	-	1.0	uA
input capacitance	C _I	-		-	1.5	10	pF

DC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5		-	V
		$V_{CC}=3.0\text{V}$	2.1		-	V
		$V_{CC}=5.5\text{V}$	3.85		-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-		0.5	V
		$V_{CC}=3.0\text{V}$	-		0.9	V
		$V_{CC}=5.5\text{V}$	-		1.65	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -50\mu\text{A}; V_{CC}=2.0\text{V}$	1.9		V
			$I_O = -50\mu\text{A}; V_{CC}=3.0\text{V}$	2.9		V
			$I_O = -50\mu\text{A}; V_{CC}=4.5\text{V}$	4.4		V
			$I_O = -4\text{mA}; V_{CC}=3.0\text{V}$	2.48		V
			$I_O = -8\text{mA}; V_{CC}=4.5\text{V}$	3.8		V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 50\mu\text{A}; V_{CC}=2.0\text{V}$		0.1	V
			$I_O = 50\mu\text{A}; V_{CC}=3.0\text{V}$		0.1	V
			$I_O = 50\mu\text{A}; V_{CC}=4.5\text{V}$		0.1	V
			$I_O = 4\text{mA}; V_{CC}=3.0\text{V}$		0.44	V
			$I_O = 8\text{mA}; V_{CC}=4.5\text{V}$		0.44	V
input leakage current	I_I	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 0\text{V}$ to 5.5V	-	-	1.0	μA
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$; $V_{CC} = 5.5\text{V}$	-	-	10	μA
input capacitance	C_I		-	-	10	pF

DC Characteristics 3

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	$V_{CC}=2.0\text{V}$	1.5		-	V
		$V_{CC}=3.0\text{V}$	2.1		-	V
		$V_{CC}=5.5\text{V}$	3.85		-	V
LOW-level input voltage	V_{IL}	$V_{CC}=2.0\text{V}$	-		0.5	V
		$V_{CC}=3.0\text{V}$	-		0.9	V
		$V_{CC}=5.5\text{V}$	-		1.65	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -50\mu\text{A}; V_{CC}=2.0\text{V}$	1.9		V
			$I_O = -50\mu\text{A}; V_{CC}=3.0\text{V}$	2.9		V
			$I_O = -50\mu\text{A}; V_{CC}=4.5\text{V}$	4.4		V
			$I_O = -4\text{mA}; V_{CC}=3.0\text{V}$	2.4		V
			$I_O = -8\text{mA}; V_{CC}=4.5\text{V}$	3.7		V
LOW-level output voltage	V_{OL}	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 50\mu\text{A}; V_{CC}=2.0\text{V}$		0.1	V
			$I_O = 50\mu\text{A}; V_{CC}=3.0\text{V}$		0.1	V
			$I_O = 50\mu\text{A}; V_{CC}=4.5\text{V}$		0.1	V
			$I_O = 4\text{mA}; V_{CC}=3.0\text{V}$		0.55	V
			$I_O = 8\text{mA}; V_{CC}=4.5\text{V}$		0.55	V
input leakage current	I_I	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 0\text{V}$ to 5.5V	-	-	2.0	μA
supply current	I_{CC}	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$; $V_{CC} = 5.5\text{V}$	-	-	40	μA
input capacitance	C_I		-	-	10	pF

AC Characteristics 1

($T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{pd}	see Figure 5	$V_{CC}=3.0\text{V to }3.6\text{V}$			
			$G=15\text{pF}$			
			-	4.3	7.1	ns
			$CL=50\text{pF}$			
			-	6.1	10.6	ns
			$V_{CC}=4.5\text{V to }5.5\text{V}$			
	C_{PD}	$C_L=50\text{pF}; f_i=1\text{MHz}; V_i=\text{GND} \sim V_{CC}$	$G=15\text{pF}$			
			-	3.1	5.5	ns
			$CL=50\text{pF}$			
Power dissipation capacitance			-	4.5	7.5	ns
			-	15	-	pF

Note:

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

[2] Typical values are measured at $V_{CC}=3.3\text{V or }5\text{V}$.

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

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

$\sum (C_L \times V_{CC}^2 \times f_o)$ =sum of outputs.

AC Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{pd}	see Figure 5	$V_{CC}=3.0\text{V to }3.6\text{V}$			
			$G=15\text{pF}$			
			1.0	-	8.5	ns
			$CL=50\text{pF}$			
			1.0	-	12	ns
			$V_{CC}=4.5\text{V to }5.5\text{V}$			
	$C_L=15\text{pF}$		1.0	-	6.5	ns
			1.0	-	8.5	ns
			1.0	-	8.5	ns

Note:

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

[2] Typical values are measured at $V_{CC}=3.3\text{V or }5\text{V}$.

AC Characteristics 3

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{pd}	see Figure 5	$V_{CC}=3.0\text{V to }3.6\text{V}$			
			$CL=15\text{pF}$			
			1.0	-	11	ns
			$CL=50\text{pF}$			
			1.0	-	14.5	ns
			$V_{CC}=4.5\text{V to }5.5\text{V}$			
	$CL=15\text{pF}$		1.0	-	7.0	ns
			1.0	-	9.5	ns
			1.0	-	9.5	ns

Note:

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

[2] Typical values are measured at $V_{CC}=3.3\text{V or }5\text{V}$.

Testing Circuit

AC Testing Circuit

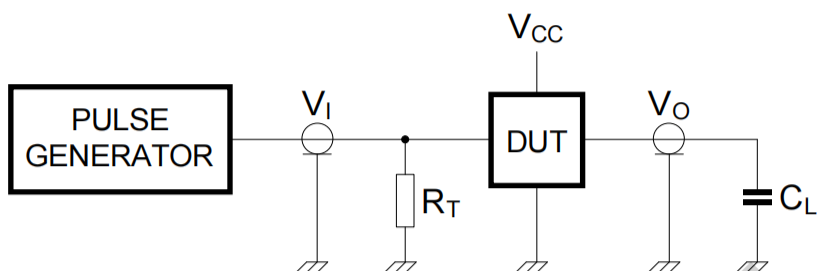


Figure 4. Load circuitry for switching times

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

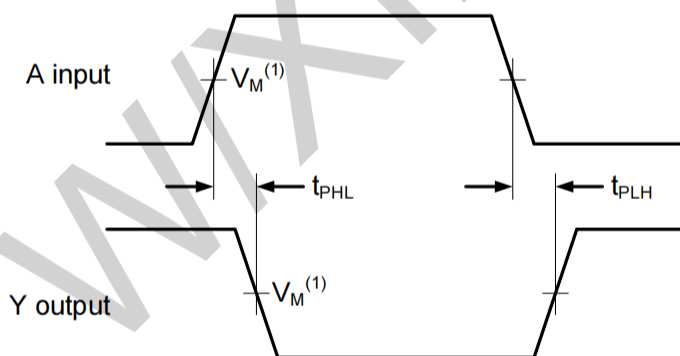


Figure 5. The input (A) to output (Y) propagation delay times

Measurement Points

Type	Input		Output
	V_I	V_M	V_M
SN74AHC1G04	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

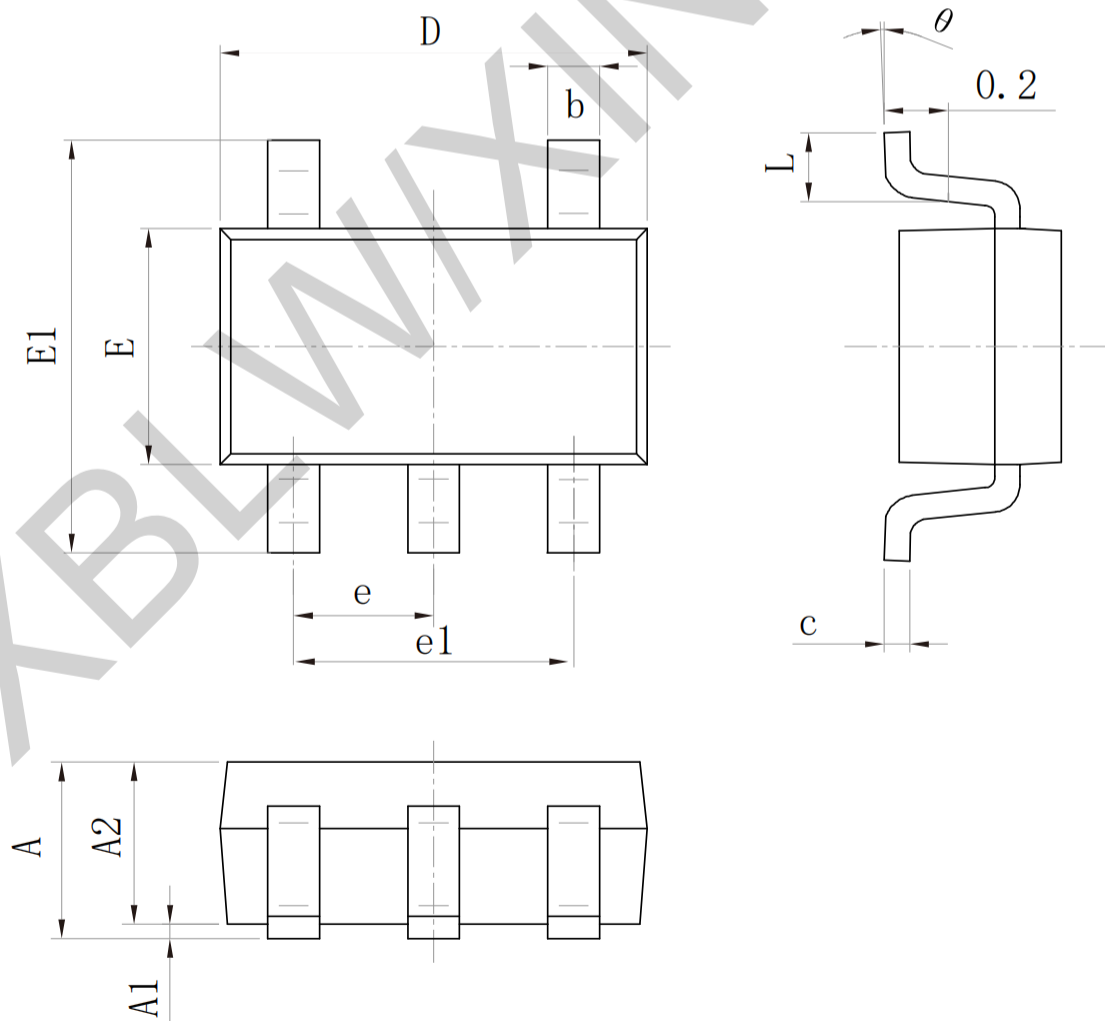
Test Data

Input		Load
V_I	t_r, t_f	C_L
GND to V_{CC}	$< 3.0\text{ns}$	15pF
GND to V_{CC}	$< 3.0\text{ns}$	50pF

Package Information

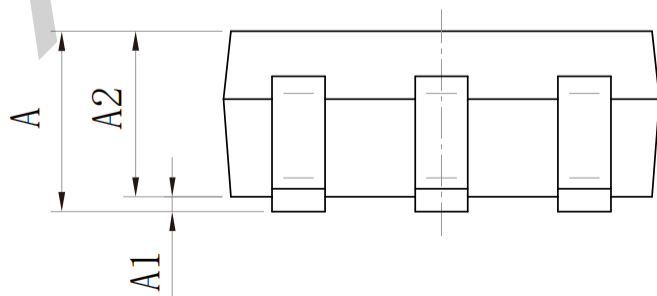
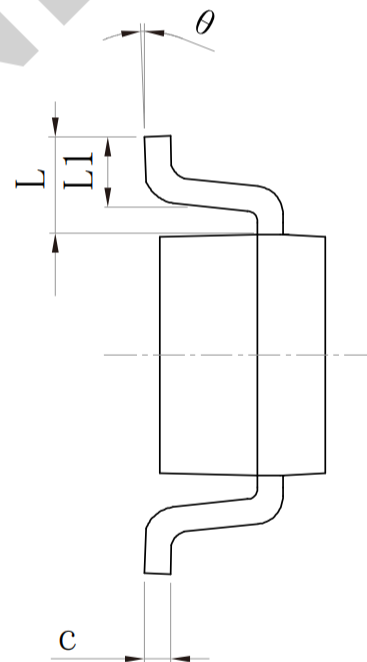
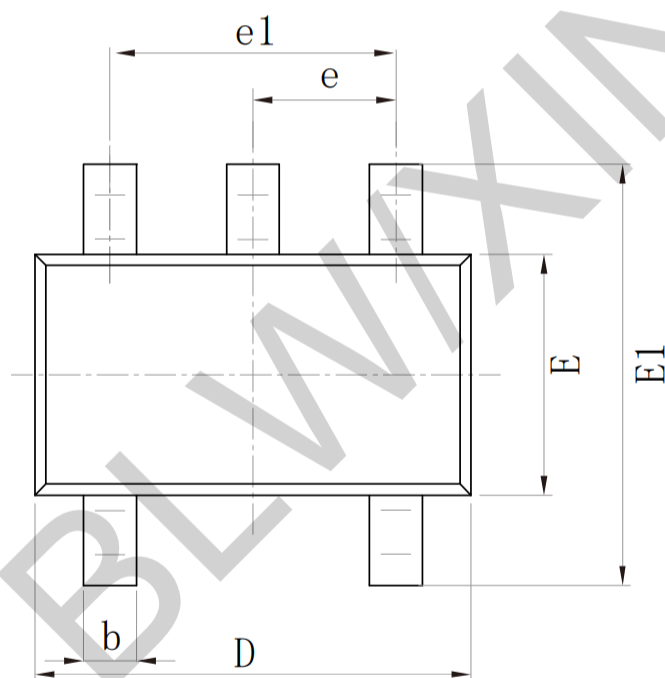
• SOT23-5

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°



• 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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