

Single Inverter

CJ74AHC/AHCT1G04 Logic

1 Introduction

CJ74AHC1G04 and CJ74AHCT1G04 are high-speed Si-gate CMOS devices. They provide an inverting buffer.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

2 Available Packages

PART NUMBER	PACKAGE
CJ74AHC1G04	SOT-23-5L
	SOT-353
CJ74AHCT1G04	SOT-23-5L
	SOT-353

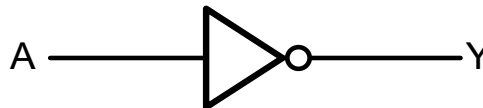
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Low power consumption
- Specified from -40°C to +125°C

4 Applications

- Cameras
- E-Meters
- Ethernet Switches
- Infotainment



Simplified schematic

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74AHC1G04M5N	SOT-23-5L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74AHCT1G04M5N	SOT-23-5L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74AHC1G04R5N	SOT-353	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74AHCT1G04R5N	SOT-353	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active

Note:

ECO PLAN: For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

MSL: Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

SORT: Specifically defined as follows:

Active: Recommended for new products;

Customized: Products manufactured to meet the specific needs of customers;

Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;

NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;

Obsolete: The device has been discontinued.

6 Pin Configuration and Marking Information

6.1 Pin Configuration

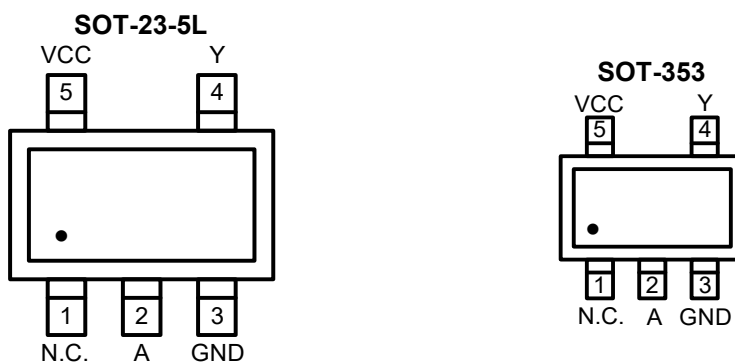


Figure 6-1 Pin configuration

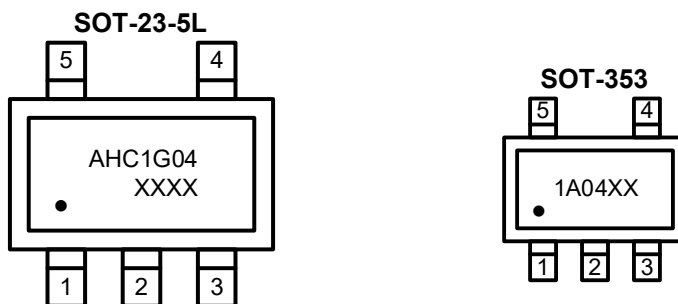
6.2 Pin Function

PIN		I/O ⁽¹⁾	DESCRIPTION
No.	NAME		
1	N.C.	-	Not connected
2	A	I	Data input
3	GND	G	Ground (0V)
4	Y	O	Data output
5	VCC	P	Supply voltage

(1) I-Input, O-Output, P-Power, G-Ground

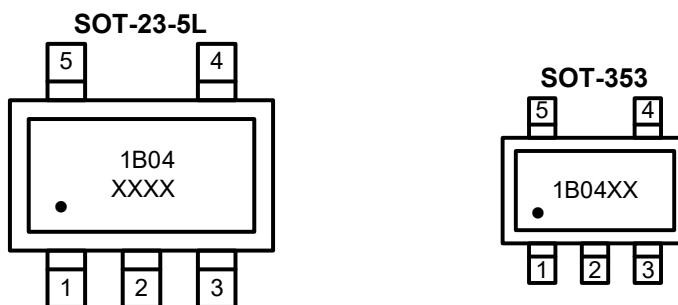
6.3 Marking Information

6.3.1 CJ74AHC1G04



XXXX or XX: Code, indicates weekly record information.

6.3.2 CJ74AHCT1G04



XXXX or XX: Code, indicates weekly record information.

7 Specifications

7.1 Absolute Maximum Ratings

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{CC}	Supply voltage	-	-0.5	+7.0	V
V _I	Input voltage	-	-0.5	+7.0	V
I _{IK}	Input clamping current	V _I <-0.5V	-20	-	mA
I _{OK}	Output clamping current	V _O <-0.5V or V _O >V _{CC} +0.5V	-	±20	mA
I _O	Output current	-0.5V<V _O <V _{CC} +0.5V	-	±25	mA
I _{CC}	Supply current	-	-	75	mA
I _{GND}	Ground current	-	-75	-	mA
T _{stg}	Storage temperature	-	-65	+150	°C
P _{tot}	Total power dissipation	-	-	250	mW
T _L	Soldering temperature	10s	-	260	°C

Note: Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
CJ74AHC1G04						
V _{CC}	Supply voltage	-	2.0	5.0	5.5	V
V _I	Input voltage	-	0	-	5.5	V
V _O	Output voltage	-	0	-	V _{CC}	V
T _{amb}	Ambient temperature	-	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	V _{CC} =3.0V to 3.6V	-	-	100	ns/V
		V _{CC} =4.5V to 5.5V	-	-	20	ns/V
CJ74AHCT1G04						
V _{CC}	Supply voltage	-	4.5	5.0	5.5	V
V _I	Input voltage	-	0	-	5.5	V
V _O	Output voltage	-	0	-	V _{CC}	V
T _{amb}	Ambient temperature	-	-40	-	+125	°C
Δt/ΔV	Input transition rise and fall rate	V _{CC} =4.5V to 5.5V	-	-	20	ns/V

7.3 Electrical Characteristics
7.3.1 DC Characteristics 1
 $T_{amb}=25^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
CJ74AHC1G04							
V_{IH}	HIGH-level input voltage	$V_{CC}=2.0\text{V}$	1.5	-	-	V	
		$V_{CC}=3.0\text{V}$	2.1	-	-	V	
		$V_{CC}=5.5\text{V}$	3.85	-	-	V	
V_{IL}	LOW-level input voltage	$V_{CC}=2.0\text{V}$	-	-	0.5	V	
		$V_{CC}=3.0\text{V}$	-	-	0.9	V	
		$V_{CC}=5.5\text{V}$	-	-	1.65	V	
V_{OH}	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-50\mu\text{A}; V_{CC}=2.0\text{V}$	1.9	2.0	-	V
			$I_O=-50\mu\text{A}; V_{CC}=3.0\text{V}$	2.9	3.0	-	V
			$I_O=-50\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_O=-4\text{mA}; V_{CC}=3.0\text{V}$	2.58	-	-	V
			$I_O=-8\text{mA}; V_{CC}=4.5\text{V}$	3.94	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=50\mu\text{A}; V_{CC}=2.0\text{V}$	-	0	0.1	V
			$I_O=50\mu\text{A}; V_{CC}=3.0\text{V}$	-	0	0.1	V
			$I_O=50\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_O=4\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.36	V
			$I_O=8\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.36	V
I_I	Input leakage current	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to 5.5V	-	-	1.0	μA	
I_{CC}	Supply current	$V_I=V_{CC}$ or GND; $I_O=0\text{A}$; $V_{CC}=5.5\text{V}$	-	-	1.0	μA	
C_I	Input capacitance	-	-	1.5	10	pF	
CJ74AHCT1G04							
V_{IH}	HIGH-level input voltage	$V_{CC}=4.5\text{V}$ to 5.5V	2.0	-	-	V	
V_{IL}	LOW-level input voltage	$V_{CC}=4.5\text{V}$ to 5.5V	-	-	0.8	V	
V_{OH}	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=-50\mu\text{A}; V_{CC}=4.5\text{V}$	4.4	4.5	-	V
			$I_O=-8\text{mA}; V_{CC}=4.5\text{V}$	3.94	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O=50\mu\text{A}; V_{CC}=4.5\text{V}$	-	0	0.1	V
			$I_O=8\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.36	V
I_I	Input leakage current	$V_I=5.5\text{V}$ or GND; $V_{CC}=0\text{V}$ to 5.5V	-	-	1.0	μA	
I_{CC}	Supply current	$V_I=V_{CC}$ or GND; $I_O=0\text{A}$; $V_{CC}=5.5\text{V}$	-	-	1.0	μA	
ΔI_{CC}	Additional supply current	Per input pin; $V_I=3.4\text{V}$; Other inputs at V_{CC} or GND; $I_O=0\text{A}$; $V_{CC}=5.5\text{V}$	-	-	1.35	mA	
C_I	Input capacitance	-	-	1.5	10	pF	

7.3.2 DC Characteristics 2
 $T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
CJ74AHC1G04							
V_{IH}	HIGH-level input voltage	$V_{CC}=2.0\text{V}$		1.5	-	-	V
		$V_{CC}=3.0\text{V}$		2.1	-	-	V
		$V_{CC}=5.5\text{V}$		3.85	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC}=2.0\text{V}$		-	-	0.5	V
		$V_{CC}=3.0\text{V}$		-	-	0.9	V
		$V_{CC}=5.5\text{V}$		-	-	1.65	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ 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
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ 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
I_I	Input leakage current	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 0\text{V}$ to 5.5V		-	-	1.0	μA
I_{CC}	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$; $V_{CC} = 5.5\text{V}$		-	-	10	μA
C_I	Input capacitance	-		-	-	10	pF
CJ74AHCT1G04							
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5\text{V}$ to 5.5V		2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5\text{V}$ to 5.5V		-	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}	$I_O = -50\mu\text{A}; V_{CC} = 4.5\text{V}$	4.4	-	-	V
			$I_O = -8\text{mA}; V_{CC} = 4.5\text{V}$	3.8	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}	$I_O = 50\mu\text{A}; V_{CC} = 4.5\text{V}$	-	-	0.1	V
			$I_O = 8\text{mA}; V_{CC} = 4.5\text{V}$	-	-	0.44	V
I_I	Input leakage current	$V_I = 5.5\text{V}$ or GND; $V_{CC} = 0\text{V}$ to 5.5V		-	-	1.0	μA
I_{CC}	Supply current	$V_I = V_{CC}$ or GND; $I_O = 0\text{A}$; $V_{CC} = 5.5\text{V}$		-	-	1.0	μA
ΔI_{CC}	Additional supply current	Per input pin; $V_I = 3.4\text{V}$; Other inputs at V_{CC} or GND; $I_O = 0\text{A}$; $V_{CC} = 5.5\text{V}$		-	-	1.5	mA
C_I	Input capacitance	-		-	-	10	pF

7.3.3 DC Characteristics 3

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
CJ74AHC1G04							
V _{IH}	HIGH-level input voltage	V _{CC} =2.0V	1.5	-	-	V	
		V _{CC} =3.0V	2.1	-	-	V	
		V _{CC} =5.5V	3.85	-	-	V	
V _{IL}	LOW-level input voltage	V _{CC} =2.0V	-	-	0.5	V	
		V _{CC} =3.0V	-	-	0.9	V	
		V _{CC} =5.5V	-	-	1.65	V	
V _{OH}	HIGH-level output voltage	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
V _{OL}	LOW-level output voltage	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
I _I	Input leakage current	V _I =5.5V or GND; V _{CC} =0V to 5.5V	-	-	2.0	uA	
I _{CC}	Supply current	V _I =V _{CC} or GND; I _o =0A; V _{CC} = 5.5V	-	-	40	uA	
C _I	Input capacitance	-	-	-	10	pF	
CJ74AHCT1G04							
V _{IH}	HIGH-level input voltage	V _{CC} =4.5V to 5.5V	2.0	-	-	V	
V _{IL}	LOW-level input voltage	V _{CC} =4.5V to 5.5V	-	-	0.8	V	
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}	I _o =-50uA; V _{CC} =4.5V	4.4	-	-	V
			I _o =-8mA; V _{CC} =4.5V	3.7	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}	I _o =50uA; V _{CC} =4.5V	-	-	0.1	V
			I _o =8mA; V _{CC} =4.5V	-	-	0.55	V
I _I	Input leakage current	V _I =5.5V or GND; V _{CC} =0V to 5.5V	-	-	2.0	uA	
I _{CC}	Supply current	V _I =V _{CC} or GND; I _o =0A; V _{CC} = 5.5V	-	-	40	uA	
ΔI _{CC}	Additional supply current	Per input pin; V _I =3.4V; Other inputs at V _{CC} or GND; I _o =0A; V _{CC} =5.5V	-	-	1.5	mA	
C _I	Input capacitance	-	-	-	10	pF	

7.3.4 AC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
CJ74AHC1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =3.0V to 3.6V	-	4.3	7.1	ns
			C _L =50pF; V _{CC} =3.0V to 3.6V	-	6.1	10.6	ns
			C _L =15pF; V _{CC} =4.5V to 5.5V	-	3.1	5.5	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	-	4.5	7.5	ns
C _{PD}	Power dissipation capacitance	C _L =50pF; f _i =1MHz; V _I = GND to V _{CC}	-	15	-	pF	
CJ74AHCT1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =4.5V to 5.5V	-	3.4	6.7	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	-	4.9	7.7	ns
C _{PD}	Power dissipation capacitance	C _L =50pF; f _i =1MHz; V _I = GND to V _{CC}	-	16	-	pF	

Note:

- (1) t_{pd} is the same as t_{PHL} and t_{PLH}.
- (2) Typical values are measured at V_{CC}=3.3V or 5V.
- (3) C_{PD} is used to determine the dynamic power dissipation (P_D 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 V;

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

7.3.5 AC Characteristics 2

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
CJ74AHC1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =3.0V to 3.6V	1.0	-	8.5	ns
			C _L =50pF; V _{CC} =3.0V to 3.6V	1.0	-	12	ns
			C _L =15pF; V _{CC} =4.5V to 5.5V	1.0	-	6.5	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	1.0	-	8.5	ns
CJ74AHCT1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =4.5V to 5.5V	1.0	-	7.5	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	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}=3.3V or 5V.

7.3.6 AC Characteristics 3

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT	
CJ74AHC1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =3.0V to 3.6V	1.0	-	11	ns
			C _L =50pF; V _{CC} =3.0V to 3.6V	1.0	-	14.5	ns
			C _L =15pF; V _{CC} =4.5V to 5.5V	1.0	-	7.0	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	1.0	-	9.5	ns
CJ74AHCT1G04							
t _{pd}	A to Y propagation delay	See Figure 8-5	C _L =15pF; V _{CC} =4.5V to 5.5V	1.0	-	8.5	ns
			C _L =50pF; V _{CC} =4.5V to 5.5V	1.0	-	10.0	ns

Note:

- (1) t_{pd} is the same as t_{PHL} and t_{PLH}.
- (2) Typical values are measured at V_{CC}=3.3V or 5V.

8 Detailed Description

8.1 Overview

CJ74AHC1G04 and CJ74AHCT1G04 are high-speed Si-gate CMOS devices. They provide an inverting buffer.

The AHC device has CMOS input switching levels and supply voltage range 2 V to 5.5 V.

The AHCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

8.2 Functional Block Diagram

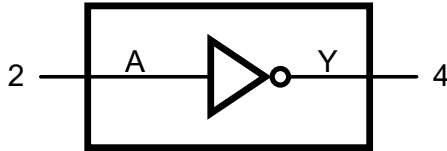


Figure 8-1 Logic symbol

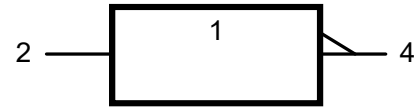


Figure 8-2 IEC logic symbol

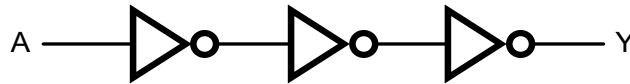


Figure 8-3 Logic diagram

8.3 Function Table

INPUT	OUTPUT
A	Y
L	H
H	L

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

8.4 Testing Circuit

8.4.1 AC Testing Circuit

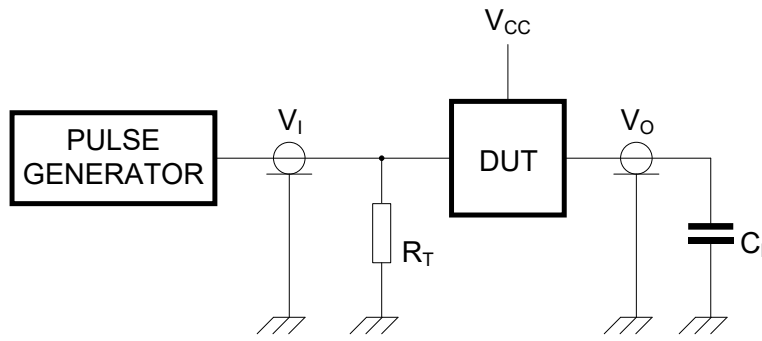


Figure 8-4 Load circuitry for switching times

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.

8.4.2 AC Testing Waveforms

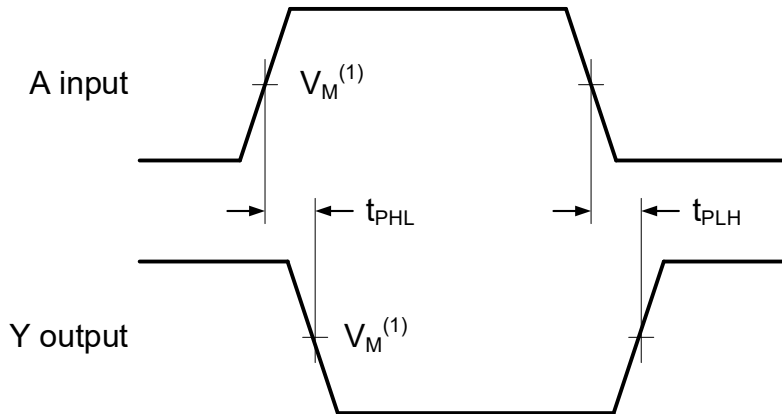


Figure 8-5 The input (A) to output (Y) propagation delay times

8.4.3 Measurement Points

TYPE	INPUT		OUTPUT
	V_I	V_M	V_M
CJ74AHC1G04	GND to V_{CC}	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
CJ74AHCT1G04	GND to 3.0V	1.5V	$0.5 \times V_{CC}$

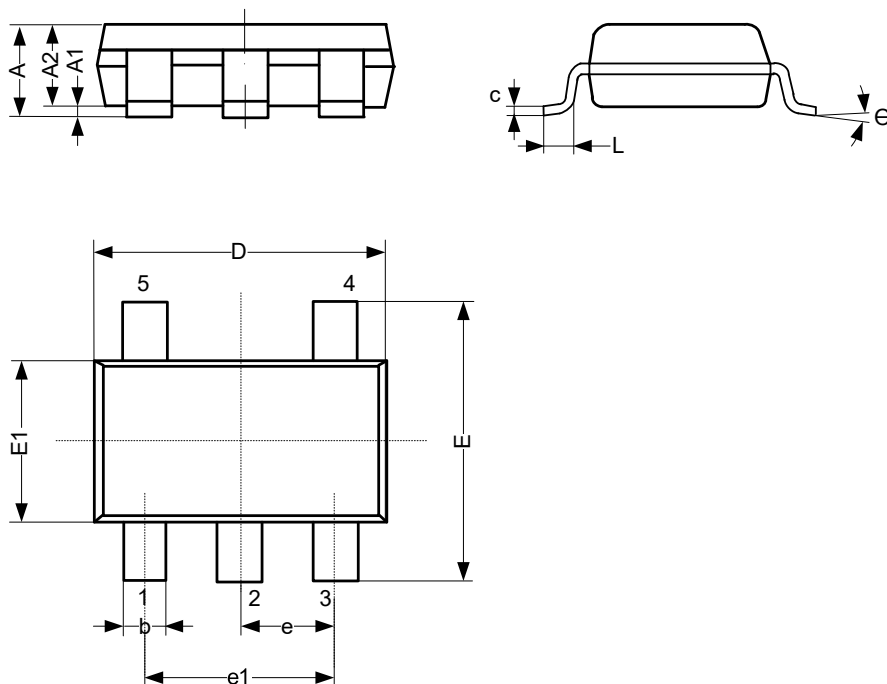
8.4.4 Test Data

INPUT		LOAD
V_I	t_r, t_f	C_L
GND to V_{CC}	$\leq 3.0ns$	15pF
GND to V_{CC}	$\leq 3.0ns$	50pF

9 Mechanical Information

9.1 SOT-23-5L Mechanical Information

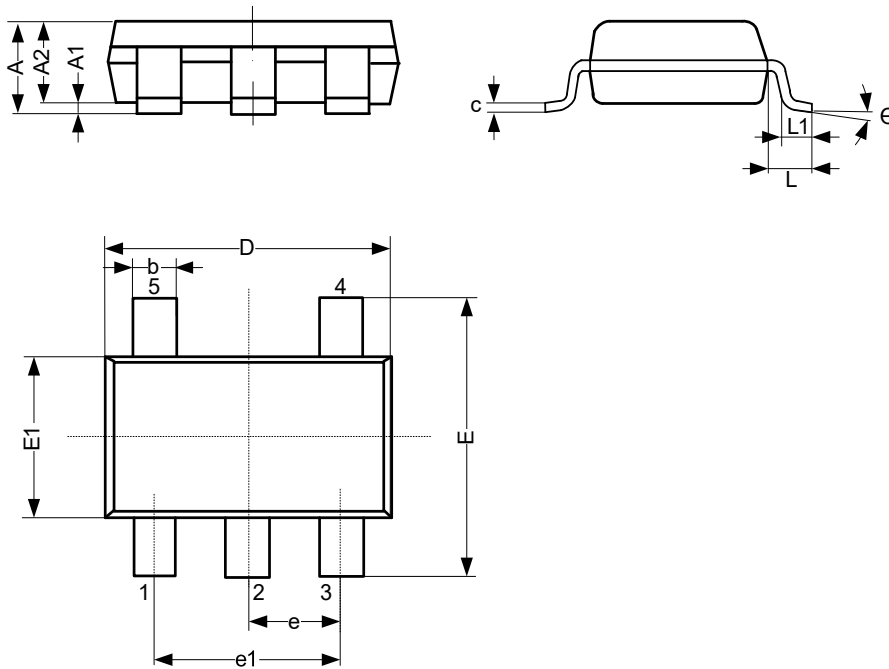
9.1.1 SOT-23-5L Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.26
A1	0.00	-	0.12
A2	1.00	-	1.20
b	0.30	-	0.50
c	0.10	-	0.20
D	2.82	-	3.02
E	2.60	-	3.00
E1	1.50	-	1.70
e	0.95 BSC		
e1	1.80	-	2.00
L	0.30	-	0.60
Θ	0°	-	8°
Unit: mm			

9.2 SOT-353 Mechanical Information

9.2.1 SOT-353 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.90	-	1.10
A1	0.00	-	0.10
A2	0.90	-	1.00
b	0.15	-	0.35
c	0.11	-	0.175
D	2.00	-	2.20
E	2.15	-	2.45
E1	1.15	-	1.35
e	0.65 BSC		
e1	1.20	-	1.40
L	-	0.525	-
L1	0.26	-	0.46
θ	0°	-	8°
Unit: mm			

10 Notes and Revision History

10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- <https://www.jscj-elec.com> for more details.

10.2 Notes

Electrostatic Discharge Caution



This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

DISCLAIMER

IMPORTANT NOTICE, PLEASE READ CAREFULLY

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

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