

**Single D-type Flip-flop with Set and Reset: Positive Edge Trigger****CJ74LVC1G74 Logic****1 Introduction**

The CJ74LVC1G74 is a single positive edge triggered D-type flip-flop with individual data (D) inputs, clock (CP) inputs, set ($\overline{SD}$) and reset ($\overline{RD}$) inputs, and complementary Q and $\overline{Q}$ outputs.

The set and reset are asynchronous active LOW inputs and operate independently of the clock input. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D inputs must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

2 Available Packages

PART NUMBER	PACKAGE
CJ74LVC1G74	TSSOP8
	VSSOP8
	SOP8
	DFN1.35x1-8L

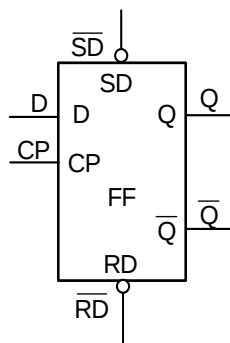
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide supply voltage range from 1.65V to 5.5V
- 5V tolerant outputs for interfacing with 5V logic
- $\pm 24\text{mA}$ output drive ($V_{CC} = 3.0\text{V}$)
- CMOS low power consumption
- Input accepts voltages up to 5V
- Specified from -40°C to $+125^{\circ}\text{C}$

4 Applications

- Servers
- LED displays
- Network switch
- Telecom infrastructure
- Motor drivers
- I/O expanders



Logic symbol

5 Orderable Information

DEVICE	PACKAGE	OP TEMP	ECO PLAN	MSL	PACKING OPTION	SORT
CJ74LVC1G74BAN	TSSOP8	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G74VAN	VSSOP8	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 3000 Units / Reel	Active
CJ74LVC1G74AAN	SOP8	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 4000 Units / Reel	Active
CJ74LVC1G74DMN	DFN1.35x1-8L	-40~125°C	RoHS & Green	Level 3 168HR	Tape and Reel 5000 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

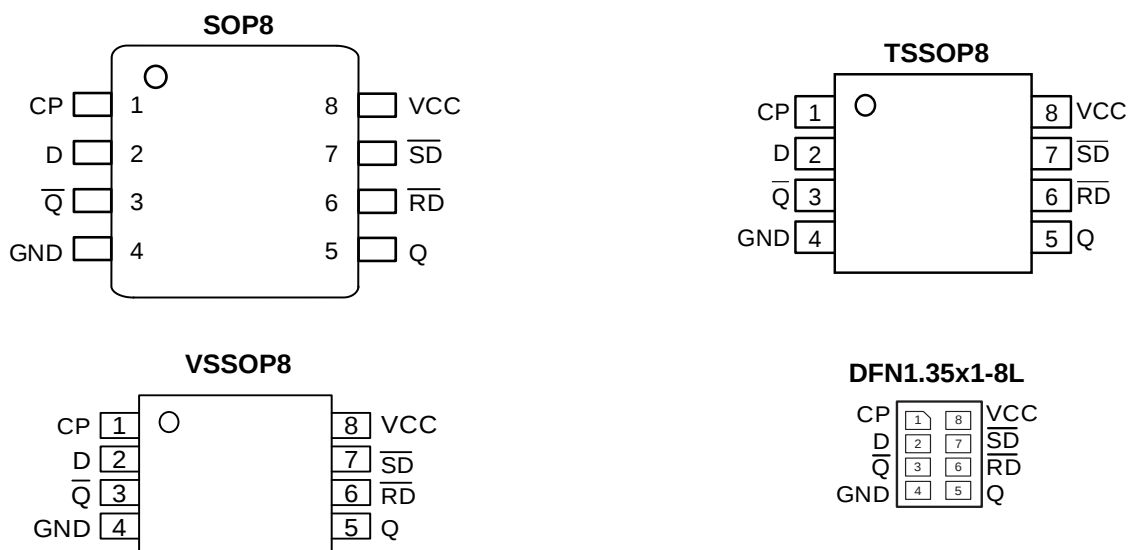


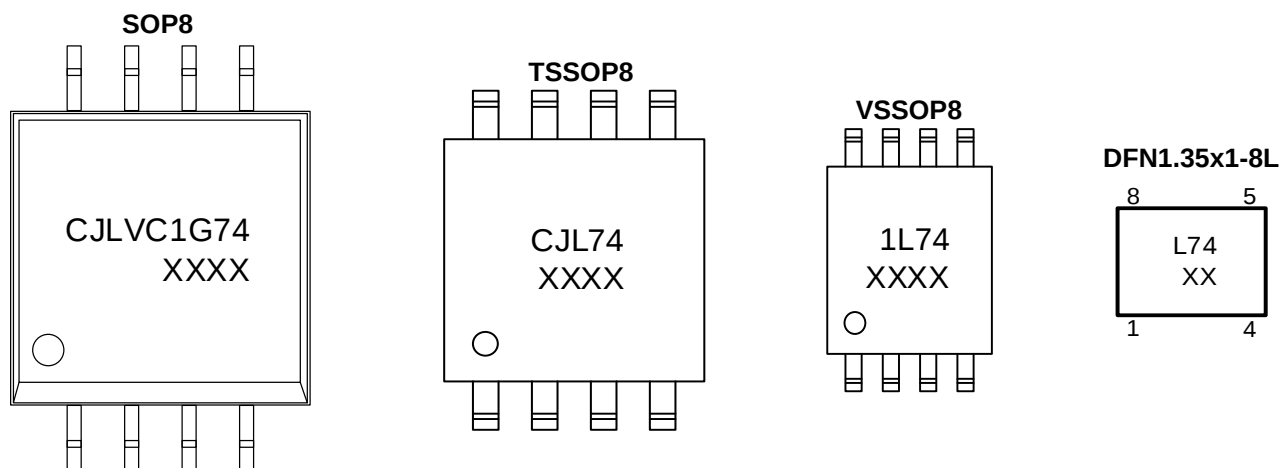
Figure 6-1 Pin configuration

6.2 Pin Function

PIN		I/O ⁽¹⁾	DESCRIPTION
No.	NAME		
1	CP	I	Clock input (LOW-to-HIGH, edge-triggered)
2	D	I	Data input
3	$\bar{Q}$	O	Complement output
4	GND	G	Ground (0V)
5	Q	O	True output
6	$\bar{RD}$	I	Asynchronous reset-direct input (active LOW)
7	$\bar{SD}$	I	Asynchronous set-direct input (active LOW)
8	VCC	P	Supply voltage

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

6.3 Marking Information



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	+6.5	V
V _I	Input voltage	-	-0.5	+6.5	V
V _O	Output voltage	Active mode	-0.5	V _{CC} +0.5	V
		Power-down mode	-0.5	+6.5	V
I _{IK}	Input clamping current	V _I <0V	-50	-	mA
I _{OK}	Output clamping current	V _O >V _{CC} or V _O <0V	-	±50	mA
I _O	Output current	V _O =0V to V _{CC}	-	±50	mA
I _{CC}	Supply current	-	-	100	mA
I _{GND}	Ground current	-	-100	-	mA
T _{stg}	Storage temperature	-	-65	+150	°C
P _{tot}	Total power dissipation	-	-	300	mW
T _L	Soldering temperature	10s	260		°C

Note: When V_{CC}=0V (Power-down mode), the output voltage can be 5.5V in normal operation.

7.2 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{CC}	Supply voltage	-	1.65	-	5.5	V
V _I	Input voltage	-	0	-	5.5	V
V _O	Output voltage	Active mode	0	-	V _{CC}	V
		Power-down mode; V _{CC} =0V	0	-	5.5	V
T _{amb}	Ambient temperature	-	-40	-	+125	°C

7.3 ESD Ratings

SYMBOL	ESD RATINGS		VALUE	UNIT
V _{ESD-HBM}	Electrostatic discharge	Human body model (HBM) ⁽¹⁾	±2000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

7.4 Electrical Characteristics

7.4.1 DC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP. ⁽¹⁾	MAX.	UNIT
V_{IH}	HIGH-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V}$ to 2.7V		1.7	-	-	V
		$V_{CC}=2.7\text{V}$ to 3.6V		2.0	-	-	V
		$V_{CC}=4.5\text{V}$ to 5.5V		$0.7 \times V_{CC}$	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC}=1.65\text{V}$ to 1.95V		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V}$ to 2.7V		-	-	0.7	V
		$V_{CC}=2.7\text{V}$ to 3.6V		-	-	0.8	V
		$V_{CC}=4.5\text{V}$ to 5.5V		-	-	$0.3 \times V_{CC}$	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}	$I_O = -100\mu\text{A}$; $V_{CC}=1.65\text{V}$ to 5.5V	$V_{CC}-0.1$	-	-	V
			$I_O = -4\text{mA}$; $V_{CC}=1.65\text{V}$	1.2	1.54	-	V
			$I_O = -8\text{mA}$; $V_{CC}=2.3\text{V}$	1.9	2.15	-	V
			$I_O = -12\text{mA}$; $V_{CC}=2.7\text{V}$	2.2	2.50	-	V
			$I_O = -24\text{mA}$; $V_{CC}=3.0\text{V}$	2.3	2.62	-	V
			$I_O = -32\text{mA}$; $V_{CC}=4.5\text{V}$	3.8	4.11	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}	$I_O = 100\mu\text{A}$; $V_{CC}=1.65\text{V}$ to 5.5V	-	-	0.1	V
			$I_O = 4\text{mA}$; $V_{CC}=1.65\text{V}$	-	0.07	0.45	V
			$I_O = 8\text{mA}$; $V_{CC}=2.3\text{V}$	-	0.12	0.3	V
			$I_O = 12\text{mA}$; $V_{CC}=2.7\text{V}$	-	0.17	0.4	V
			$I_O = 24\text{mA}$; $V_{CC}=3.0\text{V}$	-	0.33	0.55	V
			$I_O = 32\text{mA}$; $V_{CC}=4.5\text{V}$	-	0.39	0.55	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_{OFF}	Power-off leakage current	V_I or $V_O=5.5\text{V}$; $V_{CC}=0\text{V}$		-	-	± 2.0	μA
I_{CC}	Supply current	$V_I=5.5\text{V}$ or GND; $I_O=0\text{A}$; $V_{CC}=1.65\text{V}$ to 5.5V		-	-	4.0	μA
ΔI_{CC}	Additional supply current	Per pin; $V_I=V_{CC}-0.6\text{V}$; $I_O=0\text{A}$; $V_{CC}=2.3\text{V}$ to 5.5V		-	-	500	μA
C_i	Input capacitance	-		-	4.0	-	pF

(1) All typical values are measured at $T_{amb}=25^{\circ}\text{C}$.

7.4.2 DC Characteristics 2

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
V_{IH}	HIGH-level input voltage	$V_{CC}=1.65\text{V to }1.95\text{V}$		$0.65 \times V_{CC}$	-	-	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		1.7	-	-	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		2.0	-	-	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		$0.7 \times V_{CC}$	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC}=1.65\text{V to }1.95\text{V}$		-	-	$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$		-	-	0.7	V
		$V_{CC}=2.7\text{V to }3.6\text{V}$		-	-	0.8	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$		-	-	$0.3 \times V_{CC}$	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = -100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	$V_{CC}-0.1$	-	-	V
			$I_O = -4\text{mA}; V_{CC}=1.65\text{V}$	0.95	-	-	V
			$I_O = -8\text{mA}; V_{CC}=2.3\text{V}$	1.7	-	-	V
			$I_O = -12\text{mA}; V_{CC}=2.7\text{V}$	1.9	-	-	V
			$I_O = -24\text{mA}; V_{CC}=3.0\text{V}$	2.0	-	-	V
			$I_O = -32\text{mA}; V_{CC}=4.5\text{V}$	3.4	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$	$I_O = 100\mu\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$	-	-	0.1	V
			$I_O = 4\text{mA}; V_{CC}=1.65\text{V}$	-	-	0.7	V
			$I_O = 8\text{mA}; V_{CC}=2.3\text{V}$	-	-	0.45	V
			$I_O = 12\text{mA}; V_{CC}=2.7\text{V}$	-	-	0.6	V
			$I_O = 24\text{mA}; V_{CC}=3.0\text{V}$	-	-	0.8	V
			$I_O = 32\text{mA}; V_{CC}=4.5\text{V}$	-	-	0.8	V
I_I	Input leakage current	$V_I=5.5\text{V or GND}; V_{CC}=0\text{V to }5.5\text{V}$		-	-	± 1.0	μA
I_{OFF}	Power-off leakage current	$V_I \text{ or } V_O=5.5\text{V}; V_{CC}=0\text{V}$		-	-	± 2.0	μA
I_{CC}	Supply current	$V_I=5.5\text{V or GND}; I_O=0\text{A}; V_{CC}=1.65\text{V to }5.5\text{V}$		-	-	4.0	μA
ΔI_{CC}	Additional supply current	Per pin; $V_I=V_{CC}-0.6\text{V}; I_O=0\text{A}; V_{CC}=2.3\text{V to }5.5\text{V}$		-	-	500	μA

7.4.3 AC Characteristics 1

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP. ⁽¹⁾	MAX.	UNIT
t _{PHL}	Propagation delay	CP to Q, $\bar{Q}$; See Figure 8-5	V _{CC} =1.65V to 1.95V	-	12.5	18.8	ns
			V _{CC} =2.3V to 2.7V	-	10.5	15.8	ns
			V _{CC} =2.7V	-	10	15	ns
			V _{CC} =3.0V to 3.6V	-	9.5	14.3	ns
			V _{CC} =4.5V to 5.5V	-	9	13.5	ns
		$\bar{SD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	12.5	18.8	ns
			V _{CC} =2.3V to 2.7V	-	10.5	15.8	ns
			V _{CC} =2.7V	-	10	15	ns
			V _{CC} =3.0V to 3.6V	-	9.5	14.3	ns
			V _{CC} =4.5V to 5.5V	-	9	13.5	ns
		$\bar{RD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	12.5	18.8	ns
			V _{CC} =2.3V to 2.7V	-	10.5	15.8	ns
			V _{CC} =2.7V	-	10	15	ns
			V _{CC} =3.0V to 3.6V	-	9.5	14.3	ns
			V _{CC} =4.5V to 5.5V	-	9	13.5	ns
t _{PLH}	Propagation delay	CP to Q, $\bar{Q}$; See Figure 8-5	V _{CC} =1.65V to 1.95V	-	14	21	ns
			V _{CC} =2.3V to 2.7V	-	10	15	ns
			V _{CC} =2.7V	-	9.5	14.3	ns
			V _{CC} =3.0V to 3.6V	-	8.5	12.8	ns
			V _{CC} =4.5V to 5.5V	-	7.5	11.3	ns
		$\bar{SD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	14	21	ns
			V _{CC} =2.3V to 2.7V	-	10	15	ns
			V _{CC} =2.7V	-	9.5	14.3	ns
			V _{CC} =3.0V to 3.6V	-	8.5	12.8	ns
			V _{CC} =4.5V to 5.5V	-	7.5	11.3	ns
		$\bar{RD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	14	21	ns
			V _{CC} =2.3V to 2.7V	-	10	15	ns
			V _{CC} =2.7V	-	9.5	14.3	ns
			V _{CC} =3.0V to 3.6V	-	8.5	12.8	ns
			V _{CC} =4.5V to 5.5V	-	7.5	11.3	ns
t _w	Pulse width	CP HIGH or LOW; See Figure 8-5	V _{CC} =1.65V to 1.95V	6.2	-	-	ns
			V _{CC} =2.3V to 2.7V	2.7	-	-	ns
			V _{CC} =2.7V	2.7	-	-	ns
			V _{CC} =3.0V to 3.6V	2.7	-	-	ns
			V _{CC} =4.5V to 5.5V	2.0	-	-	ns

		$\overline{\text{SD}}$ and $\overline{\text{RD}}$ LOW; See Figure 8-6	$V_{\text{CC}}=1.65\text{V to }1.95\text{V}$	6.2	-	-	ns
			$V_{\text{CC}}=2.3\text{V to }2.7\text{V}$	2.7	-	-	ns
			$V_{\text{CC}}=2.7\text{V}$	2.7	-	-	ns
			$V_{\text{CC}}=3.0\text{V to }3.6\text{V}$	2.7	-	-	ns
			$V_{\text{CC}}=4.5\text{V to }5.5\text{V}$	2.0	-	-	ns
t_{rec}	Recovery time	$\overline{\text{SD}}$ or $\overline{\text{RD}}$; See Figure 8-6	$V_{\text{CC}}=1.65\text{V to }1.95\text{V}$	1.9	-	-	ns
			$V_{\text{CC}}=2.3\text{V to }2.7\text{V}$	1.4	-	-	ns
			$V_{\text{CC}}=2.7\text{V}$	1.3	-	-	ns
			$V_{\text{CC}}=3.0\text{V to }3.6\text{V}$	+1.2	-	-	ns
			$V_{\text{CC}}=4.5\text{V to }5.5\text{V}$	1.0	-	-	ns
t_{su}	Set-up time	D to CP; See Figure 8-5	$V_{\text{CC}}=1.65\text{V to }1.95\text{V}$	2.9	-	-	ns
			$V_{\text{CC}}=2.3\text{V to }2.7\text{V}$	1.7	-	-	ns
			$V_{\text{CC}}=2.7\text{V}$	1.7	-	-	ns
			$V_{\text{CC}}=3.0\text{V to }3.6\text{V}$	1.3	-	-	ns
			$V_{\text{CC}}=4.5\text{V to }5.5\text{V}$	1.1	-	-	ns
t_{h}	Hold time	D to CP; See Figure 8-5	$V_{\text{CC}}=1.65\text{V to }1.95\text{V}$	1.5	-	-	ns
			$V_{\text{CC}}=2.3\text{V to }2.7\text{V}$	1.0	-	-	ns
			$V_{\text{CC}}=2.7\text{V}$	1.0	-	-	ns
			$V_{\text{CC}}=3.0\text{V to }3.6\text{V}$	1.0	-	-	ns
			$V_{\text{CC}}=4.5\text{V to }5.5\text{V}$	1.0	-	-	ns
f_{max}	Maximum frequency	CP; See Figure 8-5	$V_{\text{CC}}=1.65\text{V to }1.95\text{V}$	80	-	-	MHz
			$V_{\text{CC}}=2.3\text{V to }2.7\text{V}$	175	-	-	MHz
			$V_{\text{CC}}=2.7\text{V}$	175	-	-	MHz
			$V_{\text{CC}}=3.0\text{V to }3.6\text{V}$	175	280	-	MHz
			$V_{\text{CC}}=4.5\text{V to }5.5\text{V}$	200	-	-	MHz

(1) Typical values are measured at $T_{\text{amb}}=25^{\circ}\text{C}$ and $V_{\text{CC}}=1.8\text{V}$, 2.5V , 2.7V , 3.3V and 5.0V respectively.

7.4.4 AC Characteristics 2

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

SYMBOL	PARAMETER	CONDITIONS		MIN.	TYP.	MAX.	UNIT
t _{PHL}	Propagation delay	CP to Q, $\bar{Q}$; See Figure 8-5	V _{CC} =1.65V to 1.95V	-	-	20.8	ns
			V _{CC} =2.3V to 2.7V	-	-	17.8	ns
			V _{CC} =2.7V	-	-	17	ns
			V _{CC} =3.0V to 3.6V	-	-	16.3	ns
			V _{CC} =4.5V to 5.5V	-	-	15.5	ns
		$\bar{SD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	-	20.8	ns
			V _{CC} =2.3V to 2.7V	-	-	17.8	ns
			V _{CC} =2.7V	-	-	17	ns
			V _{CC} =3.0V to 3.6V	-	-	16.3	ns
			V _{CC} =4.5V to 5.5V	-	-	15.5	ns
		$\bar{RD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	-	20.8	ns
			V _{CC} =2.3V to 2.7V	-	-	17.8	ns
			V _{CC} =2.7V	-	-	17	ns
			V _{CC} =3.0V to 3.6V	-	-	16.3	ns
			V _{CC} =4.5V to 5.5V	-	-	15.5	ns
t _{PLH}	Propagation delay	CP to Q, $\bar{Q}$; See Figure 8-5	V _{CC} =1.65V to 1.95V	-	-	23	ns
			V _{CC} =2.3V to 2.7V	-	-	17	ns
			V _{CC} =2.7V	-	-	16.3	ns
			V _{CC} =3.0V to 3.6V	-	-	14.8	ns
			V _{CC} =4.5V to 5.5V	-	-	13.3	ns
		$\bar{SD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	-	23	ns
			V _{CC} =2.3V to 2.7V	-	-	17	ns
			V _{CC} =2.7V	-	-	16.3	ns
			V _{CC} =3.0V to 3.6V	-	-	14.8	ns
			V _{CC} =4.5V to 5.5V	-	-	13.3	ns
		$\bar{RD}$ to Q, $\bar{Q}$; See Figure 8-6	V _{CC} =1.65V to 1.95V	-	-	23	ns
			V _{CC} =2.3V to 2.7V	-	-	17	ns
			V _{CC} =2.7V	-	-	16.3	ns
			V _{CC} =3.0V to 3.6V	-	-	14.8	ns
			V _{CC} =4.5V to 5.5V	-	-	13.3	ns
t _w	Pulse width	CP HIGH or LOW; See Figure 8-5	V _{CC} =1.65V to 1.95V	6.2	-	-	ns
			V _{CC} =2.3V to 2.7V	2.7	-	-	ns
			V _{CC} =2.7V	2.7	-	-	ns
			V _{CC} =3.0V to 3.6V	2.7	-	-	ns
			V _{CC} =4.5V to 5.5V	2.0	-	-	ns

		$\overline{SD}$ and $\overline{RD}$ LOW; See Figure 8-6	$V_{CC}=1.65V$ to $1.95V$	6.2	-	-	ns
			$V_{CC}=2.3V$ to $2.7V$	2.7	-	-	ns
			$V_{CC}=2.7V$	2.7	-	-	ns
			$V_{CC}=3.0V$ to $3.6V$	2.7	-	-	ns
			$V_{CC}=4.5V$ to $5.5V$	2.0	-	-	ns
t_{rec}	Recovery time	$\overline{SD}$ or $\overline{RD}$ See Figure 8-6	$V_{CC}=1.65V$ to $1.95V$	1.9	-	-	ns
			$V_{CC}=2.3V$ to $2.7V$	1.4	-	-	ns
			$V_{CC}=2.7V$	1.3	-	-	ns
			$V_{CC}=3.0V$ to $3.6V$	+1.2	-	-	ns
			$V_{CC}=4.5V$ to $5.5V$	1.0	-	-	ns
t_{su}	Set-up time	D to CP; See Figure 8-5	$V_{CC}=1.65V$ to $1.95V$	2.9	-	-	ns
			$V_{CC}=2.3V$ to $2.7V$	1.7	-	-	ns
			$V_{CC}=2.7V$	1.7	-	-	ns
			$V_{CC}=3.0V$ to $3.6V$	1.3	-	-	ns
			$V_{CC}=4.5V$ to $5.5V$	1.1	-	-	ns
t_h	Hold time	D to CP; See Figure 8-5	$V_{CC}=1.65V$ to $1.95V$	1.5	-	-	ns
			$V_{CC}=2.3V$ to $2.7V$	1.0	-	-	ns
			$V_{CC}=2.7V$	1.0	-	-	ns
			$V_{CC}=3.0V$ to $3.6V$	1.0	-	-	ns
			$V_{CC}=4.5V$ to $5.5V$	1.0	-	-	ns
f_{max}	Maximum frequency	CP; See Figure 8-5	$V_{CC}=1.65V$ to $1.95V$	80	-	-	MHz
			$V_{CC}=2.3V$ to $2.7V$	175	-	-	MHz
			$V_{CC}=2.7V$	175	-	-	MHz
			$V_{CC}=3.0V$ to $3.6V$	175	-	-	MHz
			$V_{CC}=4.5V$ to $5.5V$	200	-	-	MHz

8 Detailed Description

8.1 Overview

The CJ74LVC1G74 is a single positive edge triggered D-type flip-flop with individual data (D) inputs, clock (CP) inputs, set (/SD) and reset (/RD) inputs, and complementary Q and /Q outputs.

The set and reset are asynchronous active LOW inputs and operate independently of the clock input. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D inputs must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

8.2 Functional Block Diagram

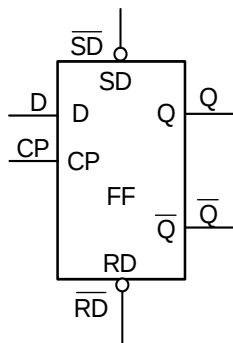


Figure 8-1 Logic symbol

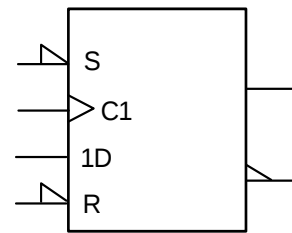


Figure 8-2 IEC logic symbol

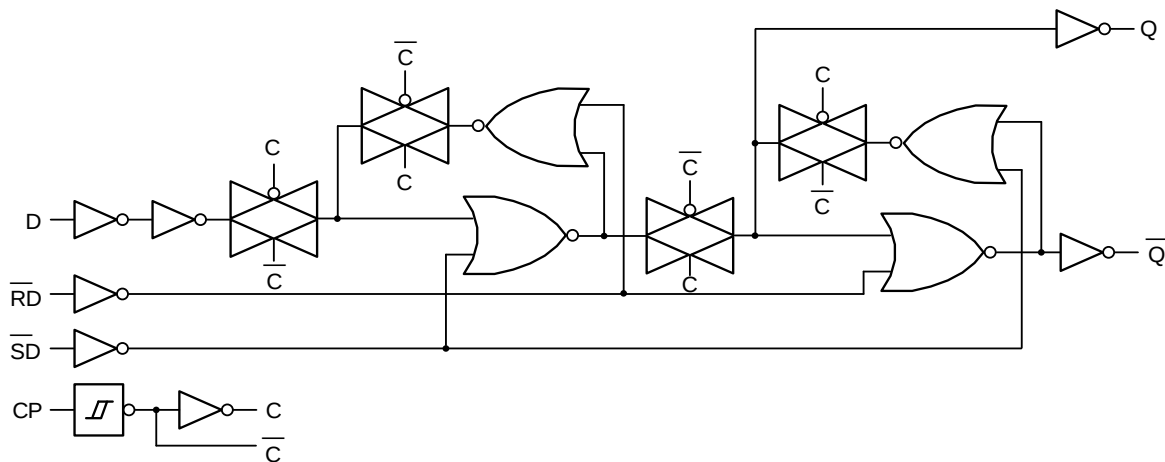


Figure 8-3 Logic diagram

8.3 Function Table

8.3.1 Function Table for Asynchronous Operation⁽¹⁾

INPUT				OUTPUT	
$\overline{\text{SD}}$	$\overline{\text{RD}}$	CP	D	Q	$\overline{\text{Q}}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H	H

(1) H=HIGH voltage level; L=LOW voltage level; X=don't care.

8.3.2 Function Table for Synchronous Operation⁽¹⁾

INPUT				OUTPUT	
$\overline{\text{SD}}$	$\overline{\text{RD}}$	CP	D	Q_{n+1}	$\overline{Q}_{n+1}$
H	H	↑	L	L	H
H	H	↑	H	H	L

(1) H=HIGH voltage level; L=LOW voltage level; ↑ =LOW-to-HIGH transition; Q_{n+1} =state after the LOW-to-HIGH CP transition.

8.4 Testing Circuit

8.4.1 AC Testing Circuit

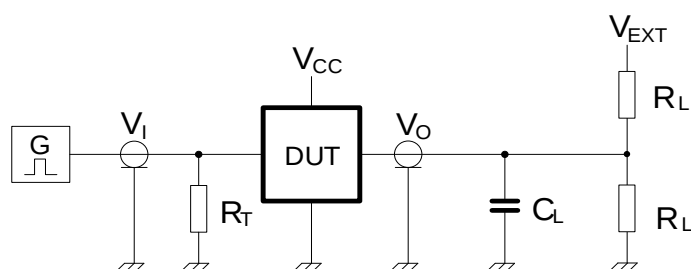


Figure 8-4 Test circuit for measuring switching times

Definitions for test circuit:

R_L =Load resistance.

C_L =Load capacitance including jig and probe capacitance.

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

V_{EXT} =External voltage for measuring switching times.

8.4.2 AC Testing Waveforms

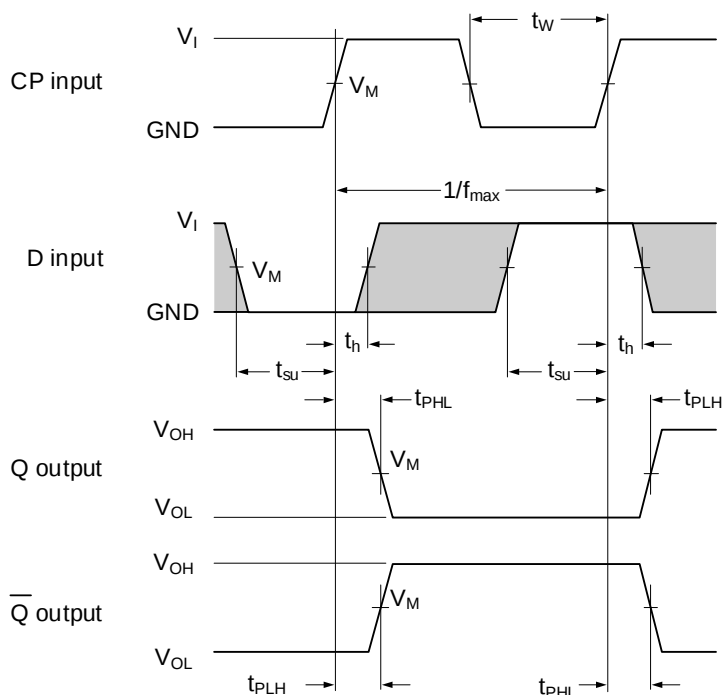


Figure 8-5 The clock input (CP) to output (Q, $\bar{Q}$) propagation delays, the clock pulse width, the D to CP set-up, the CP to D hold times and the maximum frequency

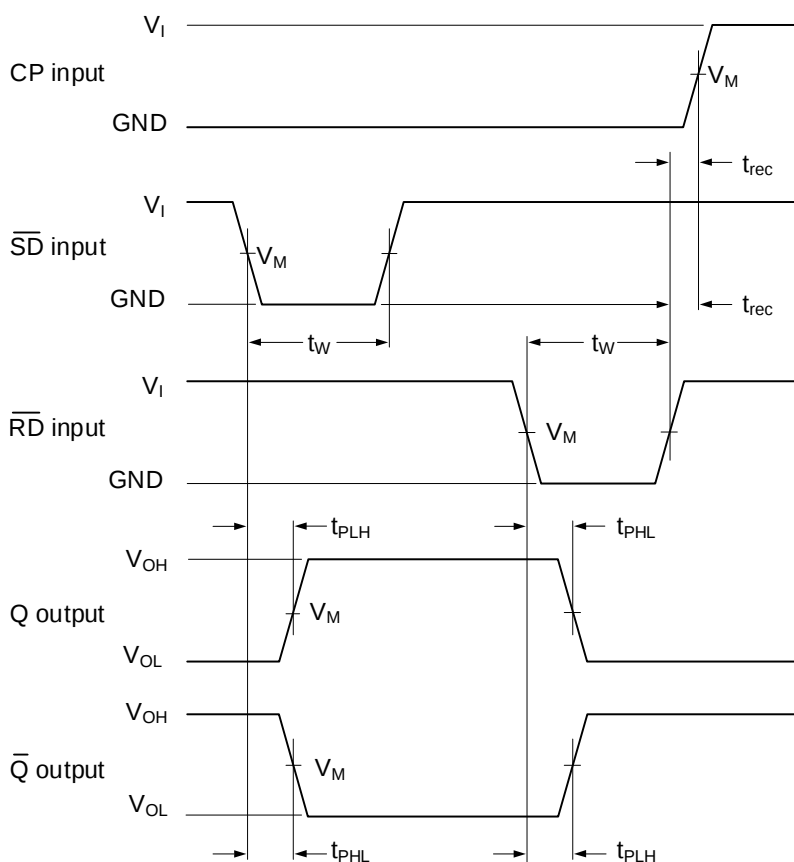


Figure 8-6 The set ($\bar{SD}$) and reset ($\bar{RD}$) input to output (Q, $\bar{Q}$) propagation delays, the set and reset pulse widths and the $\bar{RD}$ to CP recovery time

8.4.3 Measurement Points

SUPPLY VOLTAGE	INPUT	OUTPUT
V_{CC}	V_M	V_M
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

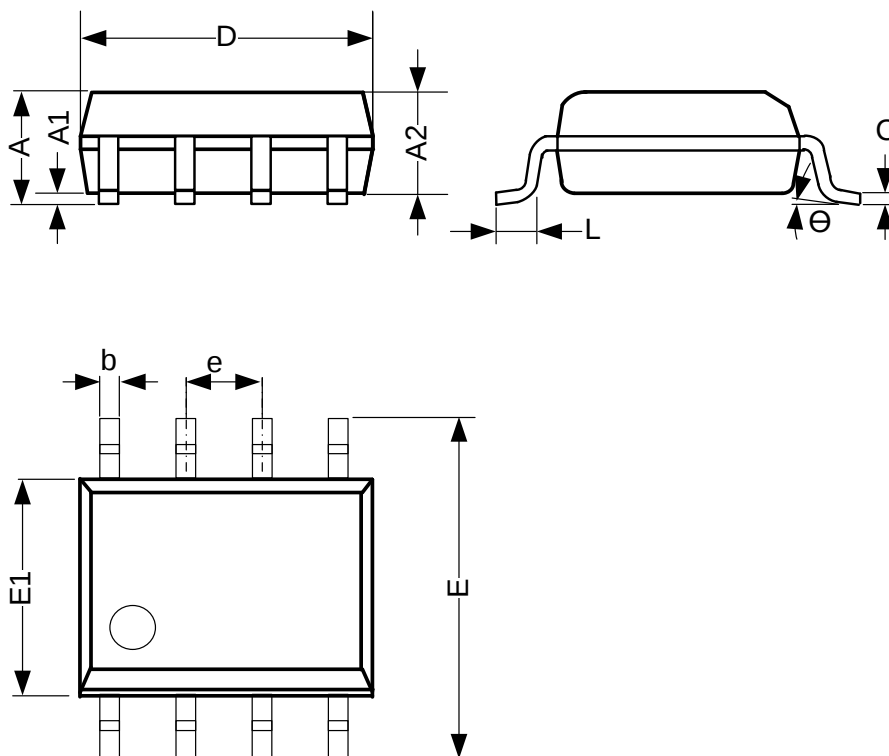
8.4.4 Test Data

SUPPLY VOLTAGE	INPUT		LOAD		V_{EXT}		
V_{CC}	V_I	$t_r=t_f$	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.65V to 1.95V	V_{CC}	$\leq 3ns$	30pF	1k Ω	Open	GND	$2 \times V_{CC}$
2.3V to 2.7V	V_{CC}	$\leq 3ns$	30pF	500 Ω	Open	GND	$2 \times V_{CC}$
2.7V	2.7V	$\leq 3ns$	50pF	500 Ω	Open	GND	6V
3.0V to 3.6V	2.7V	$\leq 3ns$	50pF	500 Ω	Open	GND	6V
4.5V to 5.5V	V_{CC}	$\leq 3ns$	50pF	500 Ω	Open	GND	$2 \times V_{CC}$

9 Mechanical Information

9.1 SOP8 Mechanical Information

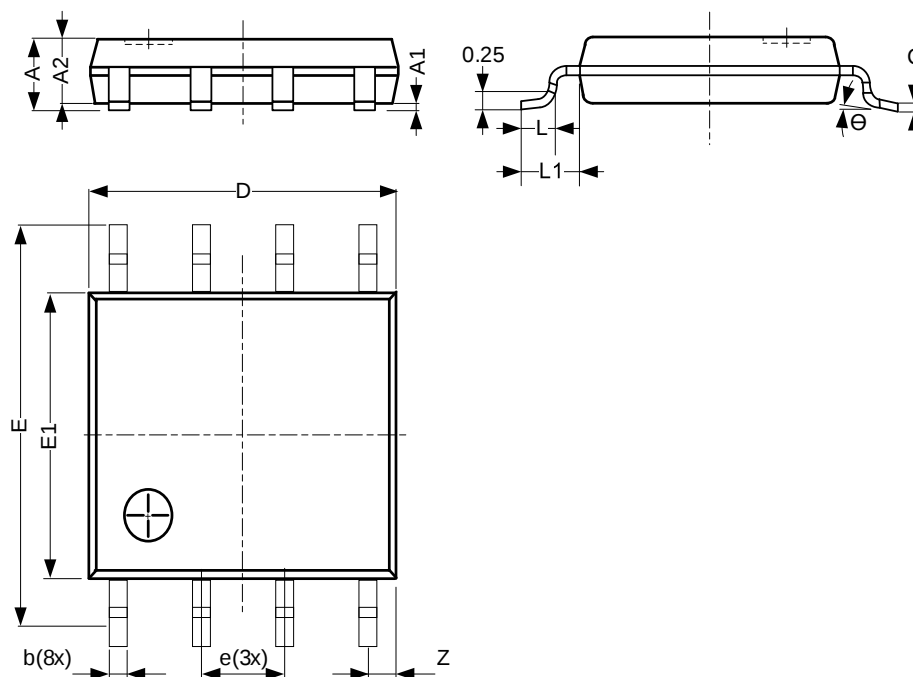
9.1.1 SOP8 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.35	-	1.80
A1	0.05	-	0.25
A2	1.25	-	1.55
b	0.306	-	0.51
c	0.19	-	0.25
D	4.70	-	5.10
E	5.80	-	6.30
E1	3.70	-	4.10
L	0.40	-	0.89
Θ	0°	-	8°
e	1.27 BSC		
Unit: mm			

9.2 TSSOP8 Mechanical Information

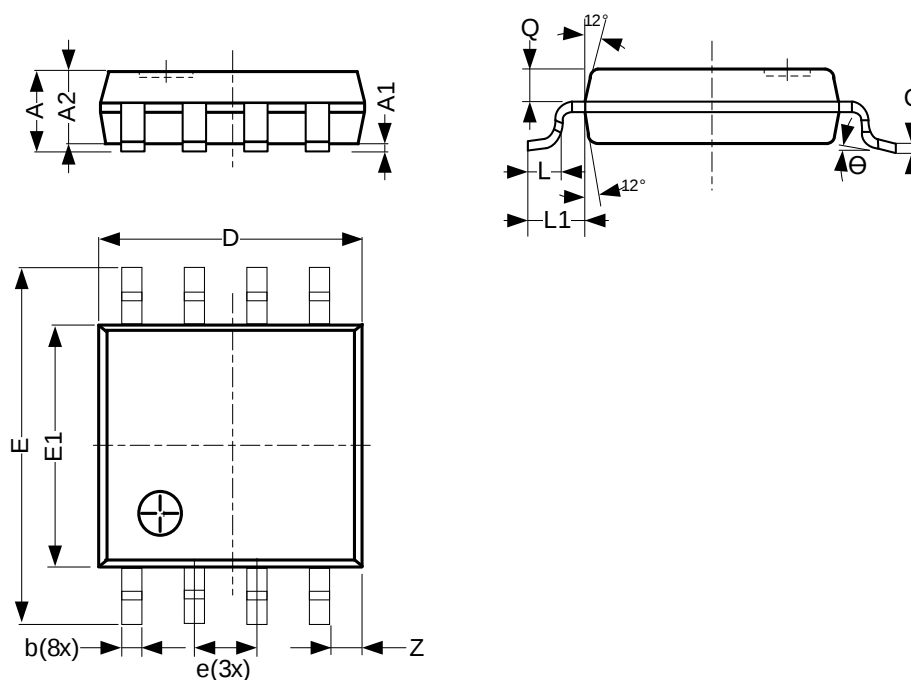
9.2.1 TSSOP8 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.10
A1	0	-	0.15
A2	0.75	-	0.95
b	0.22	-	0.38
c	0.08	-	0.18
D	2.90	-	3.10
E	3.90	-	4.10
E1	2.90	-	3.10
e	0.65 BSC		
L	0.33	-	0.47
L1	-	0.50	-
Z	0.35	-	0.70
θ	0°	-	8°
Unit: mm			

9.3 VSSOP8 Mechanical Information

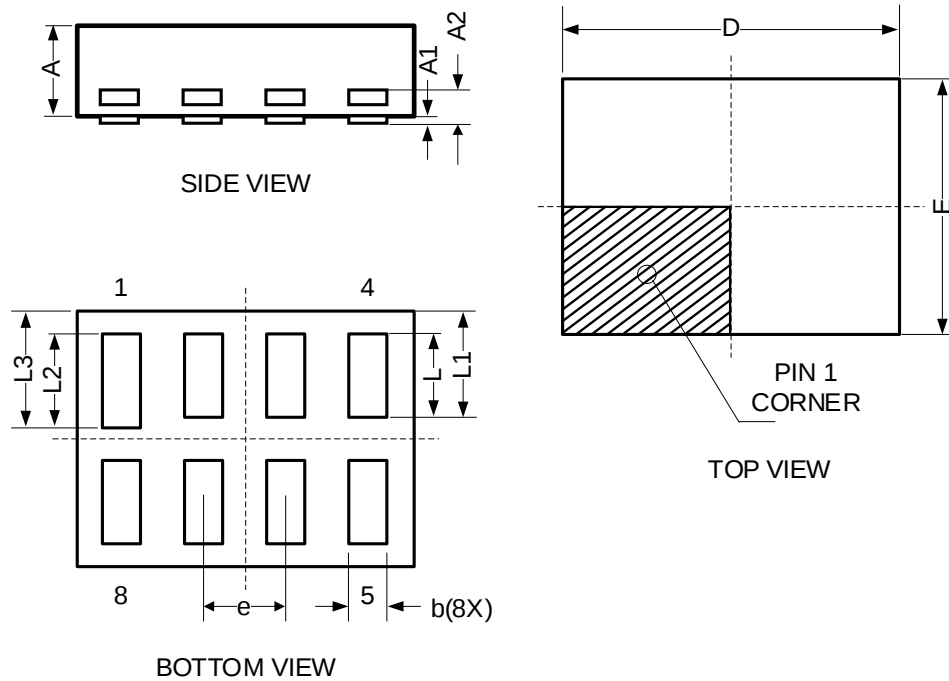
9.3.1 VSSOP8 Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	-	-	1.00
A1	0	-	0.15
A2	0.60	-	0.85
Q	0.19	-	0.21
b	0.17	-	0.27
c	0.08	-	0.23
D	1.90	-	2.10
E	3.00	-	3.20
E1	2.20	-	2.40
e	0.50 BSC		
L	0.15	-	0.40
L1	-	0.40	-
Z	0.10	-	0.40
θ	0°	-	8°
Unit: mm			

9.4 DFN1.35x1-8L Mechanical Information

9.4.1 DFN1.35x1-8L Outline Dimensions



SYMBOL	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.28	-	0.32
A1	0.00	-	0.05
A2	-	0.10	-
D	-	1.35	-
E	-	1.00	-
e	0.35 BSC		
b	0.11	-	0.21
L	0.25	-	0.35
L1	0.275	-	0.475
L2	0.30	-	0.40
L3	0.325	-	0.525
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

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