GT74LVC1G79
Low-Power Single Positive-Edge-Triggered D-Type Flip-Flop

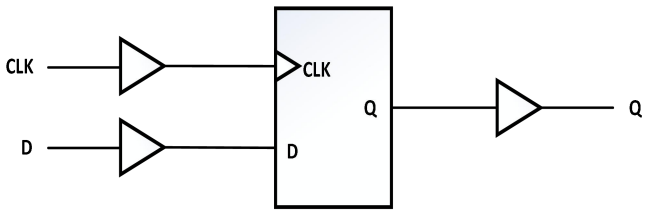
1 Features	2 Application
- Available in the Texas Instruments NanoStar™	- Barcode Scanner
- Low Static-Power Consumption: 1μA Maximum	- Cable Solutions
- Low Dynamic-Power Consumption: Cpd = 2.5 pF Typical at 3.3V	- E-Book
	- Embedded PC
- Optimized for 3.3-V Operation	- Fingerprint Biometrics
- tpd = 6 ns Maximum at 3.6 V	- Server Motherboard and PSU
- Suitable for Point-to-Point Applications	- Software Defined Radio (SDR)
- Wide Operating Vcc Range of 1.65 V to 5.5 V	- Field Transmitter: Temperature Pressure Sensor

3 Description

The GT74LVC1G79 is a single positive-edge-triggered D-type flip-flop. When data at the data (D) input meets the setup-time requirement, the data is transferred to the Q output on the positive-going edge of the clock pulse. Clock triggering occurs at a voltage level and is not directly related to the risetime of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the levels at the outputs.

The GT74LVC1G79 device is fully specified for partial -power-down applications using I_{off}. The I_{off} circuitry disables the outputs when the device is powered down. This inhibits current backflow into the device which prevents damage to the device.

Circuit Diagram



4 Revision History

Revision	Date	Note
Rev. A0.1	2025. 03. 13	Original Version

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

5 Device Summary, Pin and Packages

Table 5-1 Device Summary(1)

Serial Name	Part Name	Package	Body Size (Nom)	Marking(2)	MSL(3)	Package Qty
GT74LVC1G79	GT74LVC1G79S5	SOT23-5	2.9mm×1.6mm×1.1mm	1G79 XXXXX	3	Tape and Reel,3000
GT74LVC1G79	GT74LVC1G79C5	SC70-5	2.1mm×1.2mm×1.0mm	1G79 XXXX	3	Tape and Reel,3000

(1) For all available package, please contact product sales.

(2) There may be addlitieral marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.

5 Device Summary, Pin and Packages(Continued)

Top View

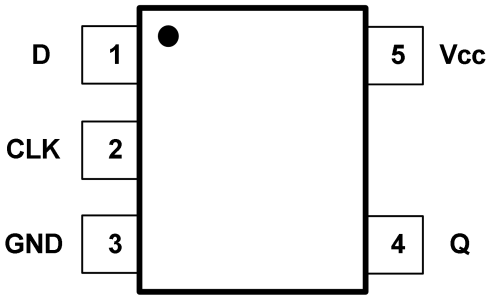


Fig.5-1.GT74LVC1G79:S5(SOT23-5) Package

GT74LVC1G79:C5(SC70-5) Package

Table 5-2 Pin definition

Pin		Type	Description
Name	S5 C5		
D	1	I	Data Input
CLK	2	I	Positive-Edge-Triggered Clock input
GND	3	-	Ground
Q	4	O	Q Output
Vcc	5	-	Positive supply

6 Voltage, Temperature, ESD and Thermal ratings

6.1 Absolute Maximum Ratings(1)

Parameters			Min.	Max.	Unit
Vcc	Supply Voltage		-0.5	6	V
V_I	Input voltage(2)		-0.5	6	V
V_O	Voltage range applied to any output in the high-impedance or power-off state		-0.5	6	V
V_O	Output voltage range in the high or low state		-0.5	Vcc+0.5	V
I_{IK}	Input clamp current	V_I < 0	-65	-50	mA
I_{OK}	Output clamp current	V_O < 0		-50	mA
I_O	Continuous output current			±20	mA
	Continuous current through Vcc or GND			±50	mA
T_J	Maximum junction temperature			150	℃
T_{stg}	Storage temperature		-65	150	℃

(1) Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM)(1)	3.5k	V
		Charged-Device Model (CDM)(2)	2k	V

(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.

6.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Unit
Vcc	Supply Voltage		1.65	5.5	V
V_{IH}	High-level input voltage	Vcc=1.65 V to 1.95 V	0.75×Vcc		V
		Vcc=2.3 V to 2.7 V	1.7		
		Vcc=3 V to 3.6 V	2		
		Vcc=4.5 V to 5.5 V	0.7×Vcc		
V_{IL}	Low-level input voltage	Vcc=1.65 V to 1.95 V		0.25×Vcc	V
		Vcc=2.3 V to 2.7 V		0.7	
		Vcc=3 V to 3.6 V		0.8	
		Vcc=4.5 V to 5.5 V		0.3×Vcc	
V_I	Input voltage		0	5.5	V
V_O	Output voltage		0	Vcc	V
I_{OH}	High-level output current	Vcc=1.65 V		-1.9	mA
		Vcc=2.3 V		-3.1	
		Vcc=3 V		-4	
I_{OL}	Low-level output current	Vcc=1.65 V		1.9	mA
		Vcc=2.3 V		3.1	
		Vcc=3 V		4	
$\Delta t/\Delta v$	Input transition rise or fall rate	Vcc=1.65 V to 5.5 V		200	ns/V
T_A	Operating free-air temperature		-40	125	℃

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT23-5	267	191	°C/W

7 Electrical Specifications

Vcc=1.65V to 5.5V, GND=0V,FULL=–40°C to +125°C.Typical values are at T_A=+25°C. (unless otherwise noted)

Parameter	Conditions	Vcc	Temp	Min	Typ	Max	Units
V_{OH}	IOH=–100μA	1.65V to 5.5V	Full	Vcc-0.1			V
	IOH= –3.1mA	2.3V		2.1			
	IOH=–4mA	3V		2.8			
	IOH=–32mA	4.5V		4.1			
V_{OL}	IOH=100μA	1.65V to 5.5V	Full			0.1	V
	IOH= 3.1mA	2.3V				0.15	
	IOH=4mA	3V				0.15	
	IOH=32mA	4.5V				0.2	
I_I	V_I=GND to 5.5 V	0 V to 5.5 V	Full			1	μA
I_{Off}	V_I or V_O=0 V to 5.5 V	0V	Full			1	μA
ΔI_{off}	V_I or V_O=0 V to 5.5 V	0 V to 0.2 V	Full			1	μA
I_{CC}	V_I=GND or Vcc to 5.5 V, I_O=0	1.65 V to 5.5 V	Full			1	μA
ΔI_{CC}	V_I=Vcc – 0.6 V,I_O=0	5.5V	Full			10	μA
C_i	V_I=GND or Vcc	3.6V	+25°C		5.5		pF
C_{pd}	f=10MHZ	1.8V to 5.5V	+25°C		2.5		pF
t_{pd}	C_L=30pF，R_L=1MΩ	1.8V	+25°C		10	16	ns
			FULL			20	
	C_L=30pF，R_L=1MΩ	2.5V	+25°C		6	8	
			FULL			10	
	C_L=30pF，R_L=1MΩ	3.6V	+25°C		4	5	
			FULL			6	
	C_L=30pF，R_L=1MΩ	5.5V	+25°C		3	4	
			FULL			5	

(1) All unused digital inputs of the device must be held at Vcc or GND to ensure proper device operation.

8 Detailed Description

8.1 Overview

The GT74LVC1G79 is a single positive-edge-triggered D-type flip-flop. Data at the input (D) is transferred to the output (Q) on the positive-going edge of the clock pulse when the setup time requirement is met. Because the clock triggering occurs at a voltage level, it is not directly related to the rise time of the clock pulse. This allows for data at the input to be changed without affecting the level at the output, following the hold-time interval.

8.2 Functional Block Diagram

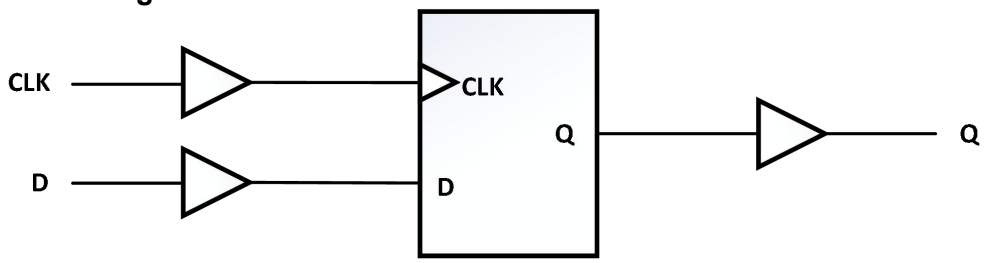


Fig.8-1.Logic Diagram (Positive Logic)

8.3 Feature Description

8.3.1 Partial Power Down (I_{off})

The inputs and outputs for this device enter a high-impedance state when the supply voltage is 0 V. The maximum leakage into or out of any input or output pin on the device is specified by I_{off} in the Electrical Characteristics: T_A = 25°C.

8.4 Device Functional Modes

Table.8-1. lists the functional modes of the GT74LVC1G79 device.

Table.8-1. Function Table

Inputs		Output
CLK	**D**	**Q**
Positive-Edge	H	H
Positive-Edge	L	L
L or H	X	Q_0

9 Application note

9.1 Application Information

A rotary quadrature encoder is a simple, infinitely-turning knob that outputs two out-of-phase square waves as it is turned and is often used in electronics as a method of human interface. One signal will lead the other in phase depending on which direction the knob is turned. The GT74LVC1G79 can be used to determine which direction the knob is being turned without the need for a microcontroller or other complex monitoring system by connecting the outputs of the knob to the D and CLK inputs of the GT74LVC1G79 as shown in Fig.9-1. It is important to note that the CLK input will control when the direction signal changes, as shown in Fig.9-2.

9.2 Typical Application

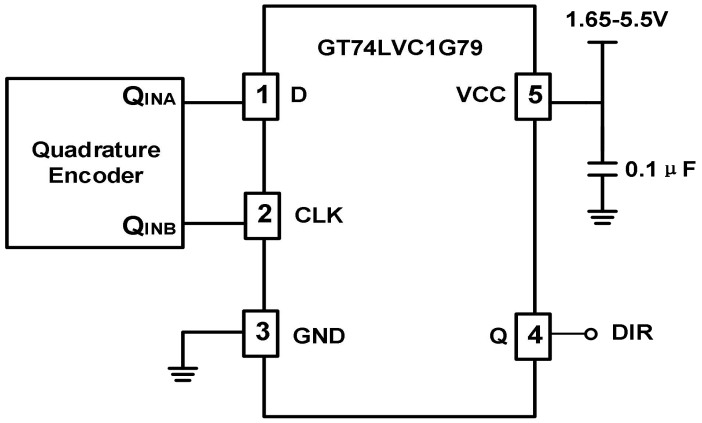


Fig.9-1. Typical Application Diagram

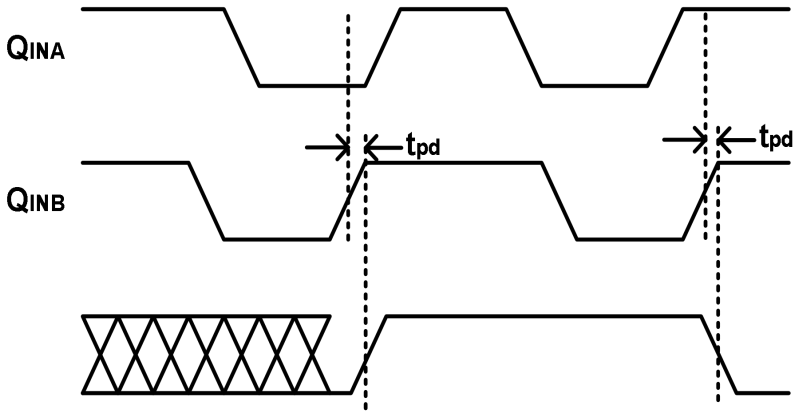
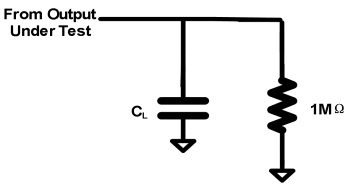


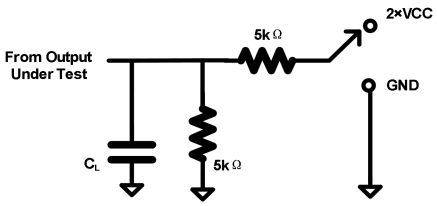
Fig.9-2. Timing Diagram for Quadrature Encoder Application

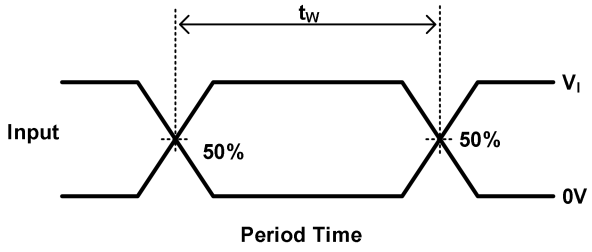
9.2.1 Design Requirements

The GT74LVC1G79 device uses CMOS technology and has balanced output drive. Take care to avoid bus contention because it can drive currents that would exceed maximum limits.

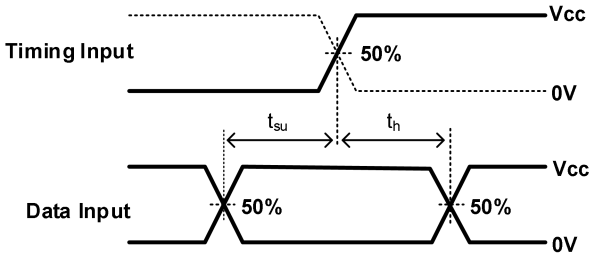
10 Parameter Measurement Information

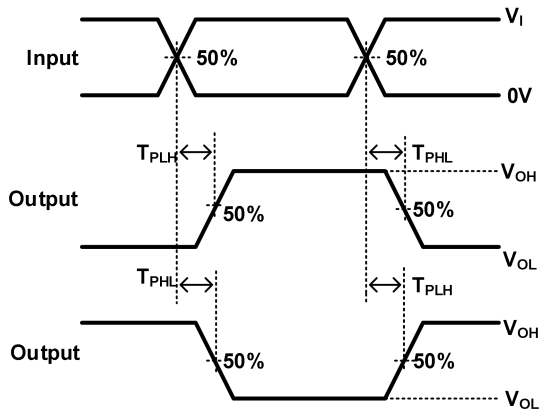




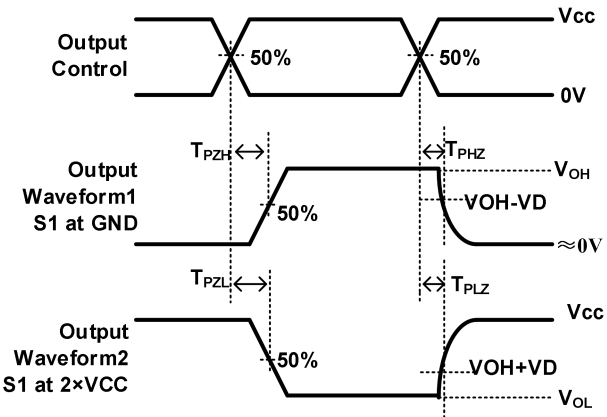


Period Time





Propagation Delay
for Output and Inverted Output

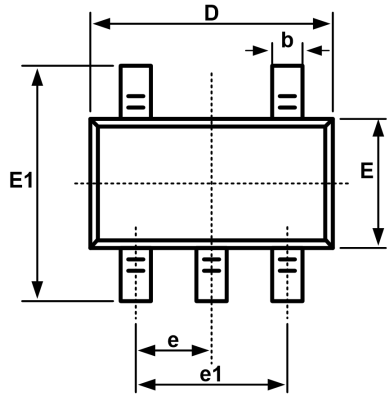


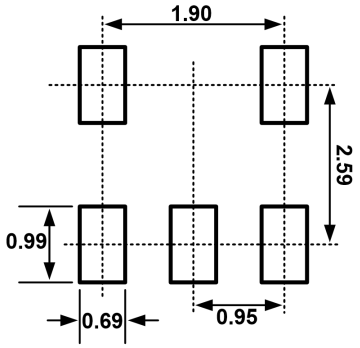
Enable and Disable Times
Low-And High-Level Enabling

Notes: A. C includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR 1 MHz, Z = 50 Ω.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all device.

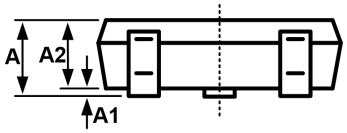
11 Package Outline Dimension

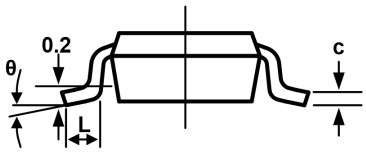
SOT23-5





Recommended Land Pattern (Unit: mm)

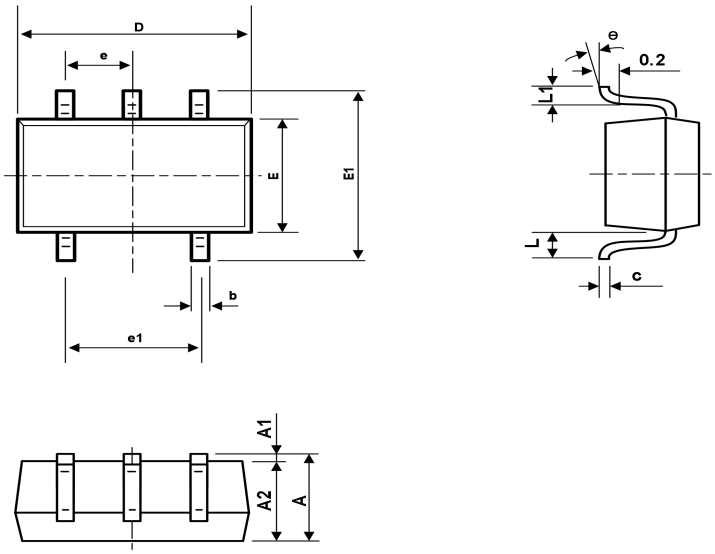




Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

11 Package Outline Dimension(Continued)

SC70-5

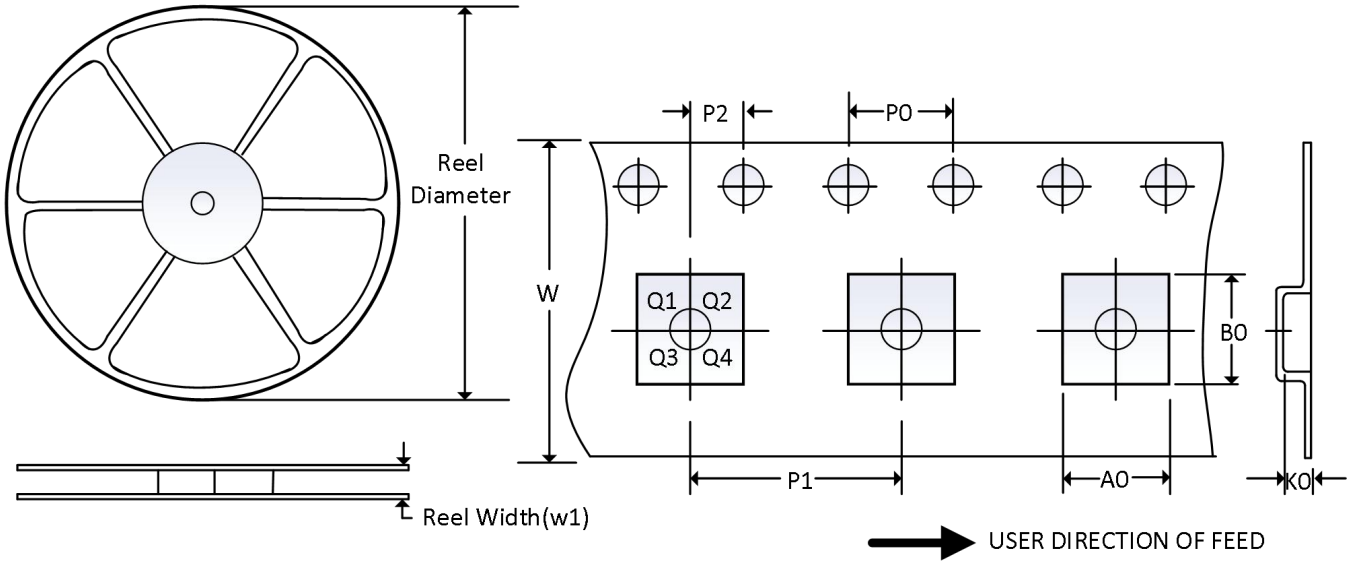


Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

12 Tape And Reel Information

Reel Dimensions

Tape Dimensions



NOTE: The picture is only for reference. Please make the object as the standard.

Key Parameter List Of Tape And Reel

Package Type	Reel Diameter	Reel Width (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOT23-5	7''	9.5	3.2	3.2	1.4	4.0	4.0	2.0	8.0	Q3
SC70-5	7''	9.5	2.25	2.55	1.2	4.0	4.0	2.0	8.0	Q3

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.