

SN74LVC1G79-Q1 Single Positive-Edge-Triggered D-Type Flip-Flop

1 Features

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
 - ± 4000 -V Human-Body Model (HBM) ESD Classification Level 3A
 - ± 1000 -V Charged-Device Model (CDM) ESD Classification Level C5
- Supports 5-V V_{CC} Operation
- Inputs Accept Voltages to 5.5 V
- Supports Down Translation to V_{CC}
- Max t_{pd} of 6 ns at 3.3 V and 50 pF load
- Low Power Consumption, 10- μ A Max I_{CC}
- ± 24 -mA Output Drive at 3.3 V
- I_{off} supports Partial-Power-Down Mode and Back-Drive Protection

2 Applications

- Automotive Infotainment
- Automotive Cluster
- Automotive ADAS
- Automotive Body Electronics
- Automotive HEV/EV Powertrain

3 Description

This automotive AEC-Q100 qualified single positive-edge-triggered D-type flip-flop is designed for 1.65-V to 5.5-V V_{CC} operation.

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 rise time of the clock pulse. Following the hold-time interval, data at the D input can be changed without affecting the level at the output.

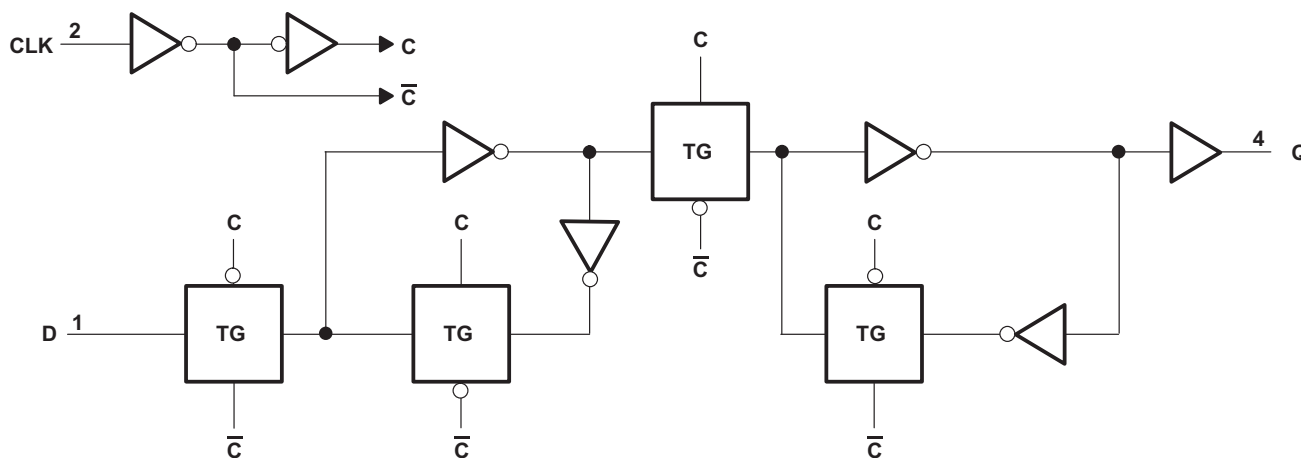
This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

Device Information⁽¹⁾

PART NUMBER	PACKAGE	BODY SIZE
SN74LVC1G79QDCKRQ1	SC70 (5)	2.00 mm x 1.25 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Logic Diagram (Positive Logic)



Copyright © 2017, Texas Instruments Incorporated



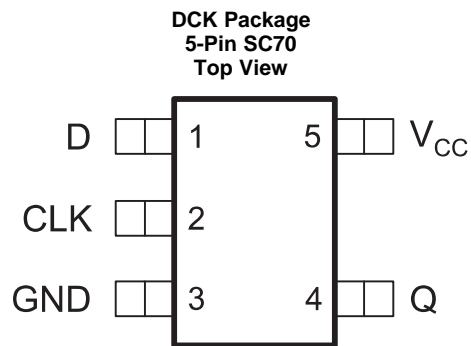
Table of Contents

1 Features	1	8 Detailed Description	11
2 Applications	1	8.1 Overview	11
3 Description	1	8.2 Functional Block Diagram	11
4 Revision History	2	8.3 Feature Description	11
5 Pin Configuration and Functions	3	8.4 Device Functional Modes	12
6 Specifications	4	9 Application and Implementation	13
6.1 Absolute Maximum Ratings	4	9.1 Application Information	13
6.2 ESD Ratings	4	9.2 Typical Application	13
6.3 Recommended Operating Conditions	5	10 Power Supply Recommendations	14
6.4 Thermal Information	5	11 Layout	14
6.5 Electrical Characteristics	6	11.1 Layout Guidelines	14
6.6 Timing Requirements	6	11.2 Layout Example	14
6.7 Timing Requirements	6	12 Device and Documentation Support	15
6.8 Switching Characteristics: $C_L = 15$ pF, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$	7	12.1 Documentation Support	15
6.9 Switching Characteristics: $C_L = 30$ or 50 pF, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$	7	12.2 Receiving Notification of Documentation Updates	15
6.10 Switching Characteristics: $C_L = 30$ pF or 50 pF, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$	7	12.3 Community Resources	15
6.11 Operating Characteristics	7	12.4 Trademarks	15
6.12 Typical Characteristics	8	12.5 Electrostatic Discharge Caution	15
7 Parameter Measurement Information	9	12.6 Glossary	15
		13 Mechanical, Packaging, and Orderable Information	15

4 Revision History

DATE	REVISION	NOTES
March 2017	*	Initial release.

5 Pin Configuration and Functions



See mechanical drawings for dimensions.

Pin Functions

PIN		I/O	DESCRIPTION
NAME	DCK		
D	1	I	Data input
CLK	2	I	Positive-Edge-Triggered Clock input
GND	3	—	Ground
Q	4	O	Non-inverted output
V _{CC}	5	—	Positive Supply

6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT
V _{CC}	Supply voltage	-0.5	6.5	V
V _I	Input voltage ⁽²⁾	-0.5	6.5	V
V _O	Voltage range applied to any output in the high-impedance or power-off state ⁽²⁾	-0.5	6.5	V
V _O	Voltage range applied to any output in the high or low state ⁽²⁾⁽³⁾	-0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V _I < 0	-50	mA
I _{OK}	Output clamp current	V _O < 0	-50	mA
I _O	Continuous output current		±50	mA
	Continuous current through V _{CC} or GND		±100	mA
T _{stg}	Storage temperature	-65	150	°C
T _J	Junction Temperature		150	°C

- (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 negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V_{CC} is provided in the *Recommended Operating Conditions* table.

6.2 ESD Ratings

		VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human-body model (HBM), per AEC Q100-002 ⁽¹⁾	±4000
		Charged-device model (CDM), per AEC Q100-011	±1000

- (1) AEC Q100-002 indicates that HBM stressing shall be in accordance with the ANSI/ESDA/JEDEC JS-001 specification.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		MIN	MAX	UNIT	
V _{CC}	Supply voltage	Operating	1.65	5.5	V
		Data retention only	1.5		
V _{IH}	High-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V	1.7		
		V _{CC} = 3 V to 3.6 V	2		
		V _{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}		
V _{IL}	Low-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.35 × V _{CC}		V
		V _{CC} = 2.3 V to 2.7 V	0.7		
		V _{CC} = 3 V to 3.6 V	0.8		
		V _{CC} = 4.5 V to 5.5 V	0.3 × V _{CC}		
V _I	Input voltage	0	5.5	V	
V _O	Output voltage	0	V _{CC}	V	
I _{OH}	High-level output current	V _{CC} = 1.65 V	-4		mA
		V _{CC} = 2.3 V	-8		
		V _{CC} = 3 V	-16		
			-24		
		V _{CC} = 4.5 V	-32		
I _{OL}	Low-level output current	V _{CC} = 1.65 V	4		mA
		V _{CC} = 2.3 V	8		
		V _{CC} = 3 V	16		
			24		
		V _{CC} = 4.5 V	32		
Δt/Δv	Input transition rise or fall rate	V _{CC} = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V	20		ns/V
		V _{CC} = 3.3 V ± 0.3 V	10		
		V _{CC} = 5 V ± 0.5 V	5		
T _A	Operating free-air temperature	-40	125	°C	

(1) All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. See [Implications of Slow or Floating CMOS Inputs](#), SCBA004.

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74LVC1G79-Q1		UNIT
		DCK		
		5 PINS		
R _{θJA}	Junction-to-ambient thermal resistance	277.6		°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	179.5		°C/W
R _{θJB}	Junction-to-board thermal resistance	75.9		°C/W
Ψ _{JT}	Junction-to-top characterization parameter	49.7		°C/W
Ψ _{JB}	Junction-to-board characterization parameter	75.1		°C/W

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application report.

6.5 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC}	–40°C to +85°C			–40°C to +125°C			UNIT
			MIN	TYP ⁽¹⁾	MAX	MIN	TYP ⁽¹⁾	MAX	
V _{OH}	I _{OH} = –100 µA	1.65 V to 5.5 V	V _{CC} – 0.1			V _{CC} – 0.1			V
	I _{OH} = –4 mA	1.65 V	1.2			1.2			
	I _{OH} = –8 mA	2.3 V	1.9			1.9			
	I _{OH} = –16 mA	3 V	2.4			2.4			
	I _{OH} = –24 mA		2.3			2.3			
	I _{OH} = –32 mA	4.5 V	3.8			3.8			
V _{OL}	I _{OL} = 100 µA	1.65 V to 5.5 V	0.1			0.1			V
	I _{OL} = 4 mA	1.65 V	0.45			0.45			
	I _{OL} = 8 mA	2.3 V	0.3			0.3			
	I _{OL} = 16 mA	3 V	0.4			0.4			
	I _{OL} = 24 mA		0.55			0.55			
	I _{OL} = 32 mA	4.5 V	0.55			0.55			
I _I	All inputs	V _I = 5.5 V or GND	0 to 5.5 V			±10			µA
I _{off}		V _I or V _O = 5.5 V	0			±10			µA
I _{CC}		V _I = 5.5 V or GND, I _O = 0	1.65 V to 5.5 V			10			µA
ΔI _{CC}		One input at V _{CC} – 0.6 V, Other inputs at V _{CC} or GND	3 V to 5.5 V			500			µA
C _i		V _I = V _{CC} or GND	3.3 V			4			pF

 (1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

6.6 Timing Requirements

 over operating free-air temperature range (unless otherwise noted) (see [Figure 3](#))

PARAMETER		–40°C to +85°C								UNIT
		V _{CC} = 1.8 ± 0.15 V		V _{CC} = 2.5 ± 0.2 V		V _{CC} = 3.3 V ± 0.3 V		V _{CC} = 5 V ± 0.5 V		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency	160		160		160		160		MHz
t _w	Pulse duration, CLK high or low	2.5		2.5		2.5		2.5		ns
t _{su}	Setup time before CLK↑	Data high		1.4		1.3		1.2		ns
		Data low		1.4		1.3		1.2		
t _h	Hold time, data after CLK↑	0.3		0.4		1		0.5		ns

6.7 Timing Requirements

 over operating free-air temperature range (unless otherwise noted) (see [Figure 3](#))

PARAMETER		–40°C to +125°C								UNIT
		V _{CC} = 1.8 ± 0.15 V		V _{CC} = 2.5 ± 0.2 V		V _{CC} = 3.3 V ± 0.3 V		V _{CC} = 5 V ± 0.5 V		
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f _{clock}	Clock frequency	160		160		160		160		MHz
t _w	Pulse duration, CLK high or low	2.5		2.5		2.5		2.5		ns
t _{su}	Setup time before CLK↑	Data high		1.4		1.3		1.2		ns
		Data low		1.4		1.3		1.2		
t _h	Hold time, data after CLK↑	0.3		0.4		1		0.5		ns

6.8 Switching Characteristics: $C_L = 15\text{ pF}$, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

over recommended operating free-air temperature range, $C_L = 15\text{ pF}$ (unless otherwise noted) (see [Figure 3](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			160		160		160		160		MHz
t_{pd}	CLK	Q	2.5	9.1	1.2	6	1	4	0.8	3.8	ns

6.9 Switching Characteristics: $C_L = 30$ or 50 pF , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

over recommended operating free-air temperature range, $C_L = 30\text{ pF}$ or 50 pF (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			160		160		160		160		MHz
t_{pd}	CLK	Q	3.9	9.9	2	7	1.7	5	1	4.5	ns

6.10 Switching Characteristics: $C_L = 30\text{ pF}$ or 50 pF , $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$

over recommended operating free-air temperature range, $C_L = 30\text{ pF}$ or 50 pF (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$								UNIT
			$V_{CC} = 1.8\text{ V}$ $\pm 0.15\text{ V}$		$V_{CC} = 2.5\text{ V}$ $\pm 0.2\text{ V}$		$V_{CC} = 3.3\text{ V}$ $\pm 0.3\text{ V}$		$V_{CC} = 5\text{ V}$ $\pm 0.5\text{ V}$		
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
f_{max}			160		160		160		160		MHz
t_{pd}	CLK	Q	3.9	12	2	8.5	1.7	6	1	5	ns

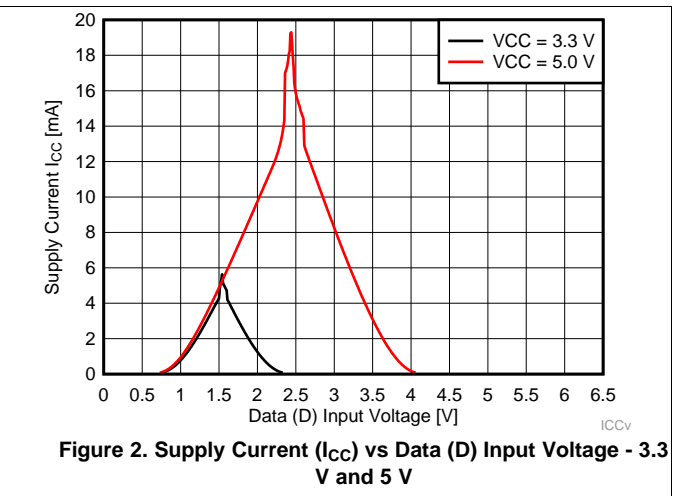
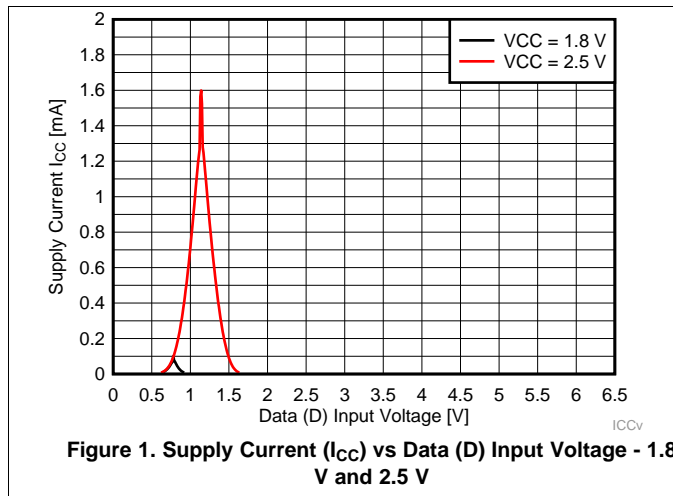
6.11 Operating Characteristics

 $T_A = 25^\circ\text{C}$

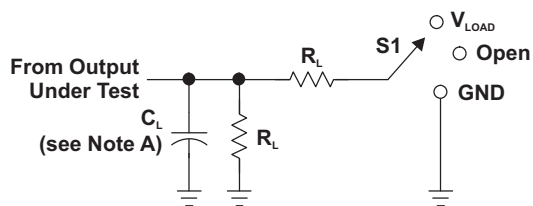
PARAMETER	TEST CONDITIONS	$V_{CC} = 1.8\text{ V}$	$V_{CC} = 2.5\text{ V}$	$V_{CC} = 3.3\text{ V}$	$V_{CC} = 5\text{ V}$	UNIT	
		TYP	TYP	TYP	TYP		
C_{pd}	Power dissipation capacitance	f = 10 MHz	26	26	27	30	pF

6.12 Typical Characteristics

This plot shows the different I_{CC} values for various voltages on the data input (D). Voltage sweep on the input is from 0 V to 6.5 V.



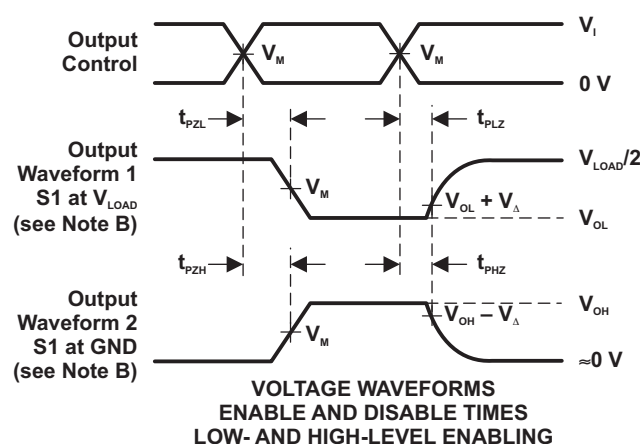
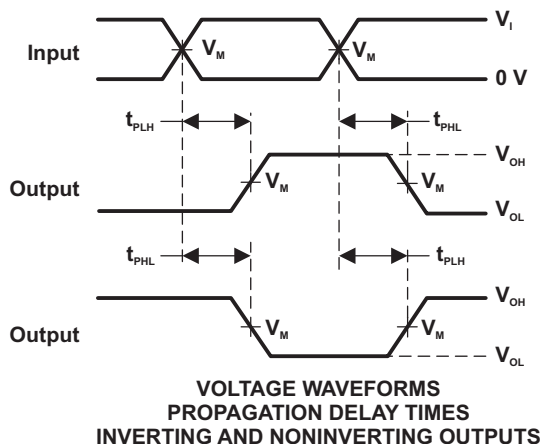
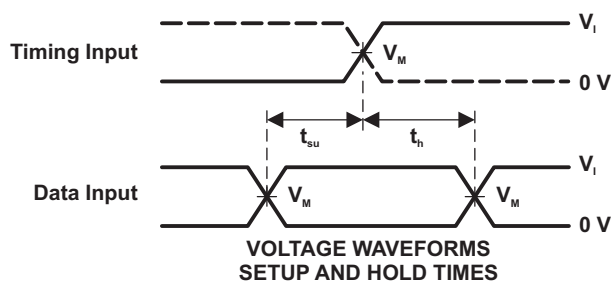
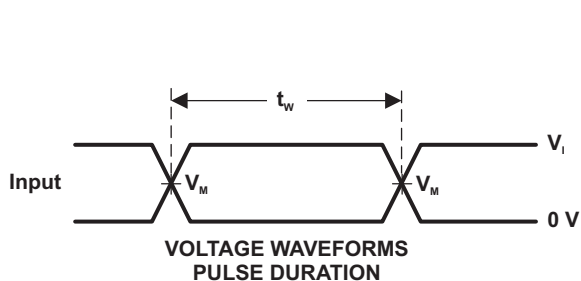
7 Parameter Measurement Information



LOAD CIRCUIT

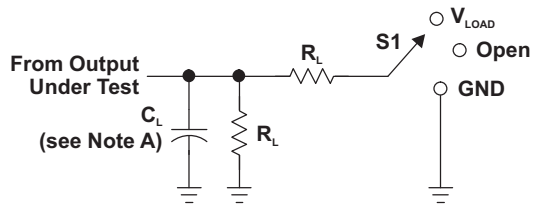
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_i	t_i/t_r					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M Ω	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M Ω	0.15 V
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	15 pF	1 M Ω	0.3 V
$5\text{ V} \pm 0.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	15 pF	1 M Ω	0.3 V



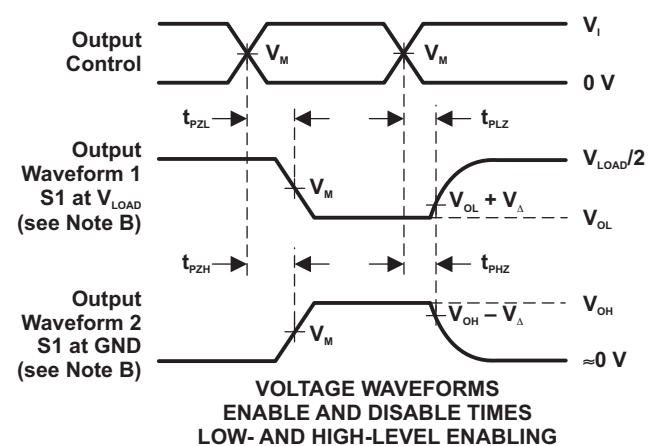
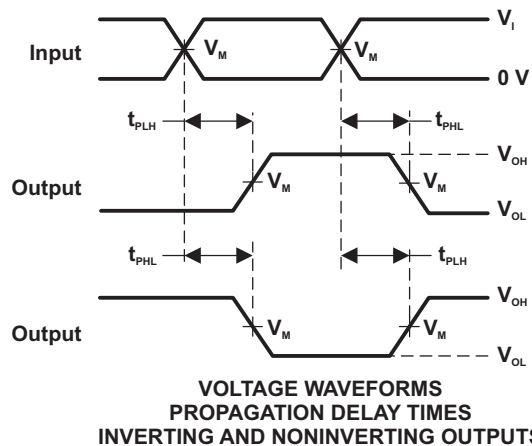
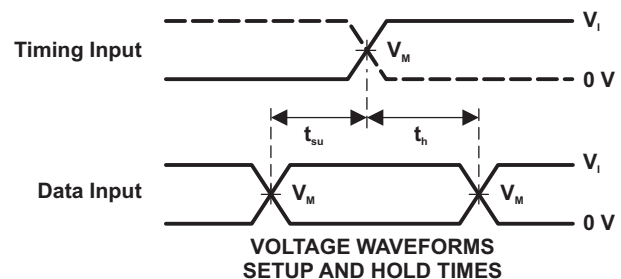
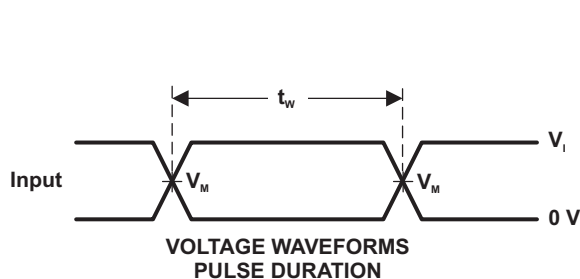
- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 - C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_o = 50\ \Omega$.
 - 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 devices.

Figure 3. Load Circuit and Voltage Waveforms

Parameter Measurement Information (continued)

LOAD CIRCUIT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
$1.8\text{ V} \pm 0.15\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	1 k Ω	0.15 V
$2.5\text{ V} \pm 0.2\text{ V}$	V_{CC}	$\leq 2\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	30 pF	500 Ω	0.15 V
$3.3\text{ V} \pm 0.3\text{ V}$	3 V	$\leq 2.5\text{ ns}$	1.5 V	6 V	50 pF	500 Ω	0.3 V
$5\text{ V} \pm 0.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	$V_{CC}/2$	$2 \times V_{CC}$	50 pF	500 Ω	0.3 V



- NOTES: A. C_L 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: $PRR \leq 10\text{ MHz}$, $Z_o = 50\ \Omega$.
 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_{on} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

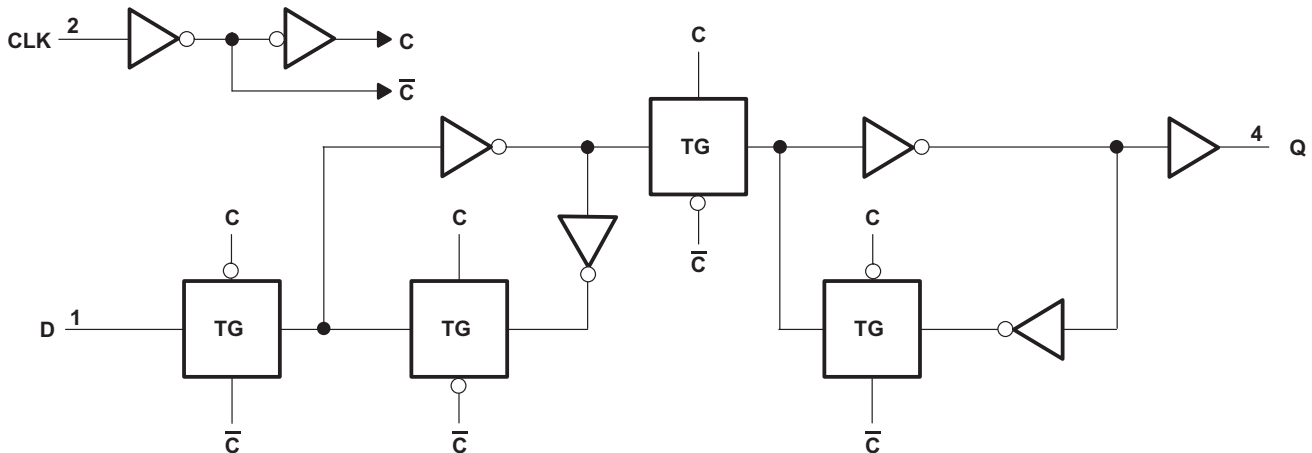
Figure 4. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74LVC1G79-Q1 is a single positive-edge-triggered D-type flip-flop and is AEC-Q100 qualified for automotive applications. 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



Copyright © 2017, Texas Instruments Incorporated

Figure 5. Logic Diagram (Positive Logic)

8.3 Feature Description

8.3.1 Balanced High-Drive CMOS Push-Pull Outputs

A balanced output allows the device to sink and source similar currents. The high drive capability of this device creates fast edges into light loads so routing and load conditions should be considered to prevent ringing. Additionally, the outputs of this device are capable of driving larger currents than the device can sustain without being damaged. It is important for the power output of the device to be limited to avoid thermal runaway and damage due to over-current. The electrical and thermal limits defined in the [Absolute Maximum Ratings](#) must be followed at all times.

8.3.2 Standard CMOS Inputs

Standard CMOS inputs are high impedance and are typically modeled as a resistor in parallel with the input capacitance given in the [Electrical Characteristics](#). The worst case resistance is calculated with the maximum input voltage, given in the [Recommended Operating Conditions](#), and the maximum input leakage current, given in the [Electrical Characteristics](#), using ohm's law ($R = V \div I$).

Signals applied to the inputs need to have fast edge rates, as defined by $\Delta t/\Delta v$ in [Recommended Operating Conditions](#) to avoid excessive currents and oscillations. If tolerance to a slow or noisy input signal is required, a device with a Schmitt-trigger input should be utilized to condition the input signal prior to the standard CMOS input.

Feature Description (continued)

8.3.3 Clamp Diodes

The inputs and outputs to this device have negative clamping diodes.

CAUTION

Voltages beyond the values specified in the [Absolute Maximum Ratings](#) table can cause damage to the device. The input negative-voltage and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

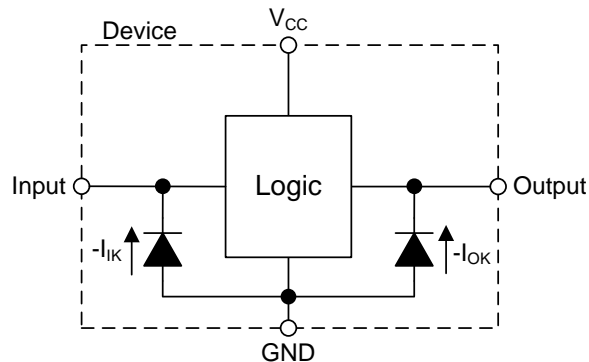


Figure 6. Electrical Placement of Clamping Diodes for Each Input and Output

8.3.4 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](#).

8.3.5 Over-Voltage Tolerant Inputs

Input signals to this device can be driven above the supply voltage so long as they remain below the maximum input voltage value specified in the [Absolute Maximum Ratings](#).

8.4 Device Functional Modes

Table 1 shows the functional modes of SN74LVC1G79-Q1.

Table 1. Function Table

INPUTS		OUTPUT Y
CLK	D	
↑	H	H
↑	L	L
L	X	Q_0

9 Application and Implementation

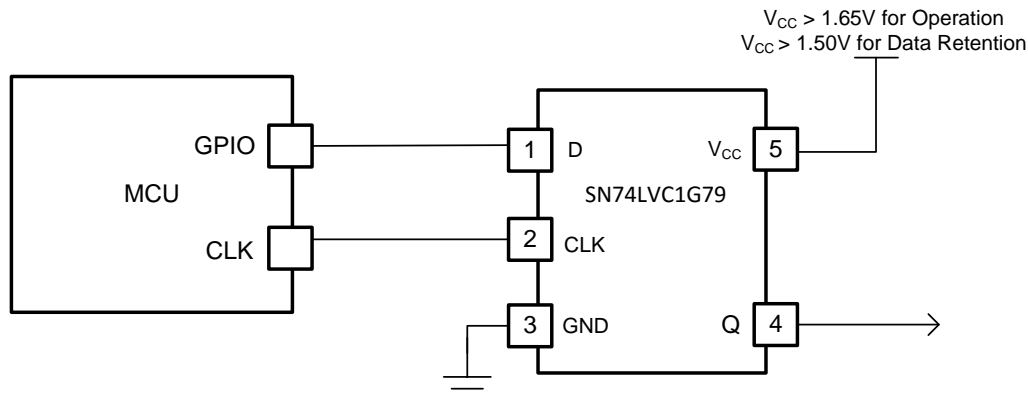
NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

A useful application for the SN74LVC1G79-Q1 is using it as a data latch with low-voltage data retention. This application implements the use of a microcontroller GPIO pin to act as a clock to set the output state and a second GPIO to provide the input data. If the SN74LVC1G79-Q1 is being powered from 1.8V and there is concern that a power glitch could exist as low as 1.5V, the device will retain the state of the Q output. An example of this data retention is shown in Figure 8 where the V_{CC} drops to 1.5V and the Q output maintains the HIGH output state when V_{CC} returns to 1.8V. If the V_{CC} voltage drops below 1.5V, data retention is not guaranteed.

9.2 Typical Application



Copyright © 2017, Texas Instruments Incorporated

Figure 7. Low Voltage Data Retention with SN74LVC1G79-Q1

9.2.1 Design Requirements

The SN74LVC1G79-Q1 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.

9.2.2 Detailed Design Procedure

- Recommended input conditions:
 - For rise time and fall time specifications, see $\Delta t/\Delta v$ in [Recommended Operating Conditions](#).
 - For specified high and low levels, see V_{IH} and V_{IL} in [Recommended Operating Conditions](#).
 - Input voltages are recommended to not go below 0 V and not exceed 5.5 V for any V_{CC} . See [Recommended Operating Conditions](#).
- Recommended output conditions:
 - Load currents should not exceed ± 50 mA. See [Absolute Maximum Ratings](#).
 - Output voltages are recommended to not go below 0 V and not exceed the V_{CC} voltage. See [Recommended Operating Conditions](#).

Typical Application (continued)

9.2.3 Application Curve

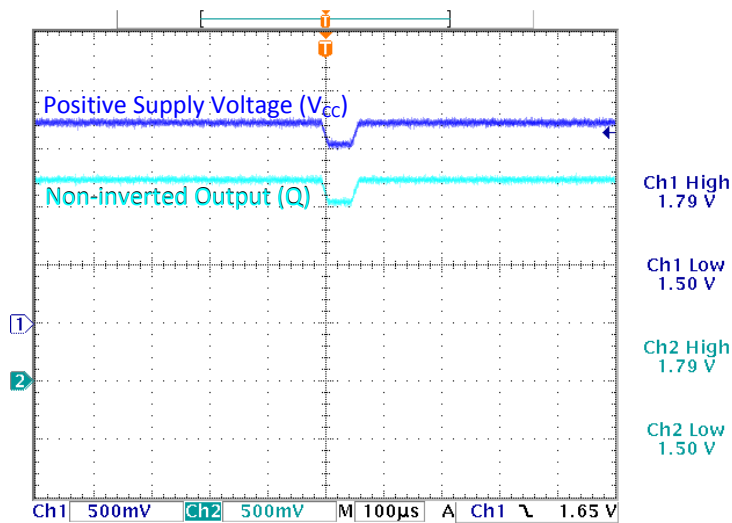


Figure 8. Data Retention with V_{CC} glitch down to 1.5V

10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in [Recommended Operating Conditions](#). A 0.1- μF bypass capacitor is recommended to be connected from the VCC terminal to GND to prevent power disturbance. To reject different frequencies of noise, use multiple bypass capacitors in parallel. Capacitors with values of 0.1 μF and 1 μF are commonly used in parallel. The bypass capacitor must be installed as close to the power terminal as possible for best results.

11 Layout

11.1 Layout Guidelines

When a PCB trace turns a corner at a 90° angle, a reflection can occur. A reflection occurs primarily because of the change of width of the trace. At the apex of the turn, the trace width increases to 1.414 times the width. This increase upsets the transmission-line characteristics, especially the distributed capacitance and self-inductance of the trace which results in the reflection. Not all PCB traces can be straight and therefore some traces must turn corners. [Figure 9](#) shows progressively better techniques of rounding corners. Only the last example (BEST) maintains constant trace width and minimizes reflections.

11.2 Layout Example

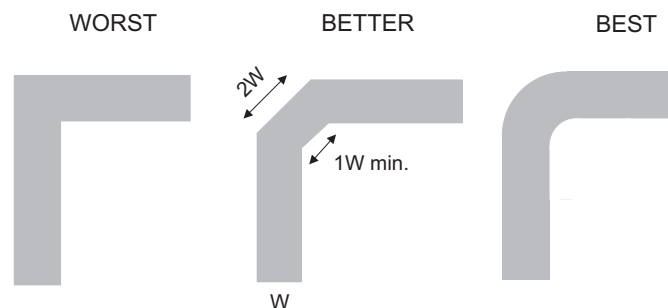


Figure 9. Trace Example

12 Device and Documentation Support

12.1 Documentation Support

12.1.1 Related Documentation

For related documentation see the following:

[Implications of Slow or Floating CMOS Inputs](#), SCBA004

[Understanding and Interpreting Standard Logic Data sheets](#) SZZA036

[Power-up Behavior of Clocked Devices](#) SCHA005A

12.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. In the upper right corner, click on *Alert me* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

12.3 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

TI E2E™ Online Community *TI's Engineer-to-Engineer (E2E) Community*. Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support *TI's Design Support* Quickly find helpful E2E forums along with design support tools and contact information for technical support.

12.4 Trademarks

E2E is a trademark of Texas Instruments.

All other trademarks are the property of their respective owners.

12.5 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

12.6 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 Mechanical, Packaging, and Orderable Information

The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser based versions of this data sheet, refer to the left hand navigation.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74LVC1G79QDCKRQ1	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU SN	Level-2-260C-1 YEAR	-40 to 125	16S	Samples
SN74LVC1G79QDCKTQ1	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU SN	Level-2-260C-1 YEAR	-40 to 125	16S	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN74LVC1G79-Q1 :

- Catalog: [SN74LVC1G79](#)
- Enhanced Product: [SN74LVC1G79-EP](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

TAPE AND REEL INFORMATION



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC1G79QDCKRQ1	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74LVC1G79QDCKTQ1	SC70	DCK	5	250	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G79QDCKRQ1	SC70	DCK	5	3000	180.0	180.0	18.0
SN74LVC1G79QDCKTQ1	SC70	DCK	5	250	180.0	180.0	18.0

DCK (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
 - D. Falls within JEDEC MO-203 variation AA.

DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to TI's Terms of Sale (www.ti.com/legal/termsofsale.html) or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2019, Texas Instruments Incorporated