

目次

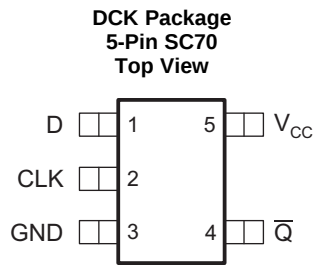
1	特長	1	7	Parameter Measurement Information	9
2	アプリケーション	1	8	Detailed Description	11
3	概要	1	8.1	Overview	11
4	改訂履歴	2	8.2	Functional Block Diagram	11
5	Pin Configuration and Functions	3	8.3	Feature Description	11
6	Specifications	3	8.4	Device Functional Modes	12
6.1	Absolute Maximum Ratings	3	9	Application and Implementation	13
6.2	ESD Ratings	3	9.1	Application Information	13
6.3	Recommended Operating Conditions	4	9.2	Typical Application	13
6.4	Thermal Information	4	10	Power Supply Recommendations	15
6.5	Electrical Characteristics	5	11	Layout	15
6.6	Timing Requirements: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	5	11.1	Layout Guidelines	15
6.7	Timing Requirements: $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	6	11.2	Layout Example	15
6.8	Switching Characteristics: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $C_L = 15\text{ pF}$	6	12	デバイスおよびドキュメントのサポート	16
6.9	Switching Characteristics: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $C_L = 30\text{ pF}$ or 50 pF	6	12.1	ドキュメントのサポート	16
6.10	Switching Characteristics: $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $C_L = 30\text{ pF}$ or 50 pF	7	12.2	ドキュメントの更新通知を受け取る方法	16
6.11	Operating Characteristics	7	12.3	コミュニティ・リソース	16
6.12	Typical Characteristics	8	12.4	商標	16
			12.5	静電気放電に関する注意事項	16
			12.6	Glossary	16
			13	メカニカル、パッケージ、および注文情報	16

4 改訂履歴

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

日付	改訂内容	注
2017年4月	*	初版

5 Pin Configuration and Functions



Pin Functions⁽¹⁾

PIN		I/O	DESCRIPTION
NO.	NAME		
1	D	I	Data input
2	CLK	I	Positive-Edge-Triggered Clock input
3	GND	—	Ground pin
4	$\bar{Q}$	O	Inverted output
5	V _{CC}	—	Positive Supply

(1) See [メカニカル、パッケージ、および注文情報](#) for dimensions

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 applied to any output in the high-impedance or power-off state ⁽²⁾	–0.5	6.5	V
V _O Voltage 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 _J Junction temperature	150		°C
T _{stg} Storage temperature	–65	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 clamp-current ratings are observed.
- (3) The value of V_{CC} is provided in .

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)

		MIN	MAX	UNIT
V _{CC}	Supply voltage	Operating	1.65	5.5
		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	
		V _{CC} = 4.5 V	–24	
I _{OL}	Low-level output current	V _{CC} = 1.65 V	4	mA
		V _{CC} = 2.3 V	8	
		V _{CC} = 3 V	16	
		V _{CC} = 4.5 V	24	
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

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		SN74LVC1G80-Q1	UNIT
		DCK (SC70)	
		5 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	278.9	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	121.3	°C/W
R _{θJB}	Junction-to-board thermal resistance	65.6	°C/W
ψ _{JT}	Junction-to-top characterization parameter	7.5	°C/W
ψ _{JB}	Junction-to-board characterization parameter	64.9	°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}	MIN	TYP ⁽¹⁾	MAX	UNIT
V _{OH}	I _{OH} = −100 μA	1.65 V to 5.5 V	V _{CC} − 0.1			V
	I _{OH} = −4 mA	1.65 V	1.2			
	I _{OH} = −8 mA	2.3 V	1.9			
	I _{OH} = −16 mA	3 V	2.4			
	I _{OH} = −24 mA		2.3			
	I _{OH} = −32 mA	4.5 V	3.8			
V _{OL}	I _{OL} = 100 μA	1.65 V to 5.5 V			0.1	V
	I _{OL} = 4 mA	1.65 V			0.45	
	I _{OL} = 8 mA	2.3 V			0.3	
	I _{OL} = 16 mA	3 V			0.4	
	I _{OL} = 24 mA				0.55	
	I _{OL} = 32 mA	4.5 V			0.55	
I _I CLK or D 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 T _A = −40°C to 85°C	3.3 V	3.5			pF

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

6.6 Timing Requirements: T_A = –40°C to +85°C

over recommended operating free-air temperature range, T_A = –40°C to +85°C (unless otherwise noted) (see [Figure 3](#))

		V _{CC}	MIN	MAX	UNIT
f _{clock} Clock frequency		V _{CC} = 1.8 V ± 0.15 V	160		MHz
		V _{CC} = 2.5 V ± 0.2 V			
		V _{CC} = 3.3 V ± 0.3 V			
		V _{CC} = 5.5 V ± 0.5 V			
t _w Pulse duration, CLK high or low		V _{CC} = 1.8 V ± 0.15 V	2.5		ns
		V _{CC} = 2.5 V ± 0.2 V			
		V _{CC} = 3.3 V ± 0.3 V			
		V _{CC} = 5.5 V ± 0.5 V			
t _{su} Setup time before CLK↑	Data high	V _{CC} = 1.8 V ± 0.15 V	2.3		ns
		V _{CC} = 2.5 V ± 0.2 V	1.5		
		V _{CC} = 3.3 V ± 0.3 V	1.3		
		V _{CC} = 5.5 V ± 0.5 V	1.1		
	Data low	V _{CC} = 1.8 V ± 0.15 V	2.5		
		V _{CC} = 2.5 V ± 0.2 V	1.5		
		V _{CC} = 3.3 V ± 0.3 V	1.3		
		V _{CC} = 5.5 V ± 0.5 V	1.1		
t _h Hold time, data after CLK↑		V _{CC} = 1.8 V ± 0.15 V	0		ns
		V _{CC} = 2.5 V ± 0.2 V	0.2		
		V _{CC} = 3.3 V ± 0.3 V	0.9		
		V _{CC} = 5.5 V ± 0.5 V	0.4		

6.7 Timing Requirements: $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$

over recommended operating free-air temperature range, $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ (unless otherwise noted) (see [Figure 3](#))

		V_{CC}	MIN	MAX	UNIT
f_{clock}	Clock frequency	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	160		MHz
		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			
		$V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$			
t_w	Pulse duration, CLK high or low	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	2.5		ns
		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			
		$V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$			
t_{su}	Data high	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	2.3		ns
		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	1.5		
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	1.3		
		$V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$	1.1		
	Data low	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	2.5		
		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	1.5		
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	1.3		
		$V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$	1.1		
t_h	Hold time, data after CLK $\uparrow$	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	0		ns
		$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	0.2		
		$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	0.9		
		$V_{CC} = 5.5\text{ V} \pm 0.5\text{ V}$	0.4		

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

over recommended operating free-air temperature range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $C_L = 15\text{ pF}$ (unless otherwise noted) (see [Figure 3](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	MIN	MAX	UNIT
f_{max}			$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	160		MHz
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$			
t_{pd}	CLK	$\overline{Q}$	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	3	9.1	ns
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	1.5	6	
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	1.3	4.2	
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	1.1	3.8	

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

over recommended operating free-air temperature range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $C_L = 30\text{ pF}$ or 50 pF (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	MIN	MAX	UNIT
f_{max}			$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	160		MHz
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$			
t_{pd}	CLK	$\overline{Q}$	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	4.4	9.9	ns
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	2.3	7	
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	2	5.2	
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	1.3	4.5	

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

over recommended operating free-air temperature range, $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $C_L = 30\text{ pF}$ or 50 pF (unless otherwise noted) (see [Figure 4](#))

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	MIN	MAX	UNIT
f_{max}			$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	160		MHz
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$			
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$			
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$			
t_{pd}	CLK	$\bar{Q}$	$V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$	4.4	12.5	ns
			$V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$	2.3	8.5	
			$V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$	2	6	
			$V_{CC} = 5\text{ V} \pm 0.5\text{ V}$	1.3	5.5	

6.11 Operating Characteristics

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

PARAMETER	TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd} Power dissipation capacitance	$f = 10\text{ MHz}$	$V_{CC} = 1.8\text{ V}$	24	pF
		$V_{CC} = 2.5\text{ V}$	24	
		$V_{CC} = 3.3\text{ V}$	25	
		$V_{CC} = 5\text{ V}$	27	

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.

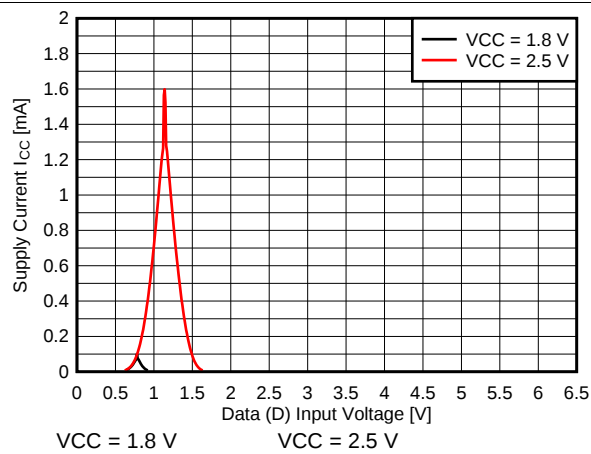


Figure 1. Supply Current (I_{CC}) vs Data (D) Input Voltage

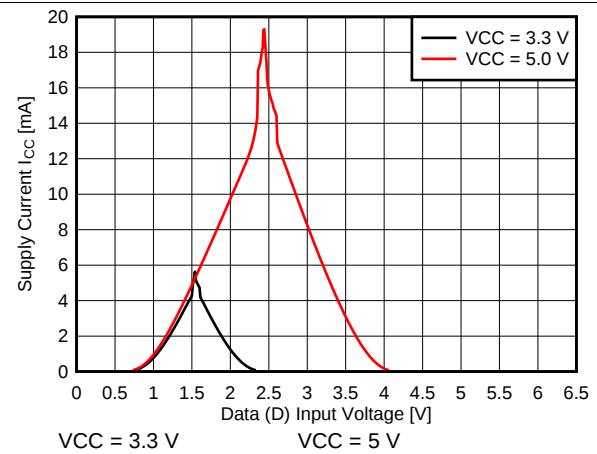
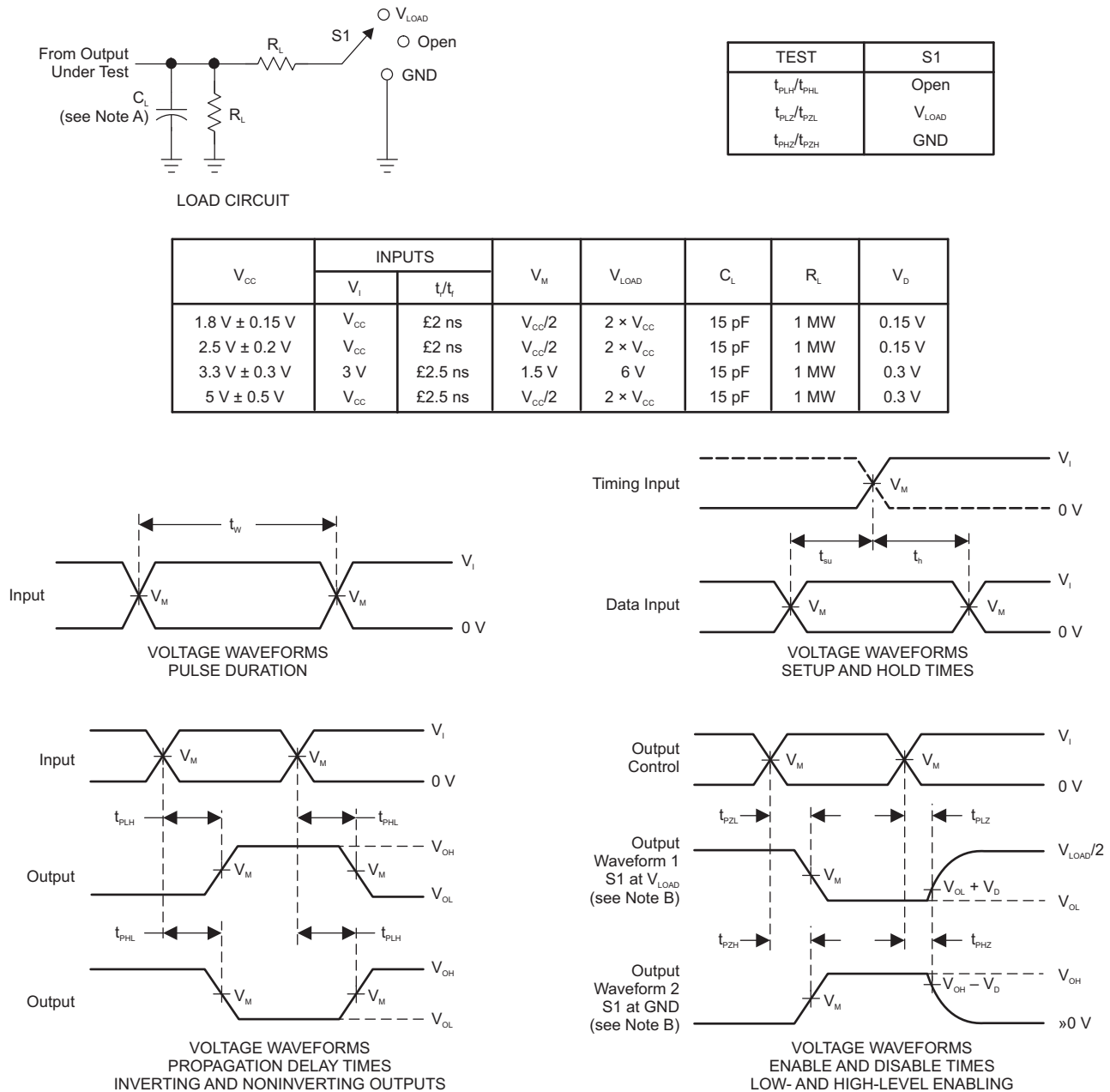


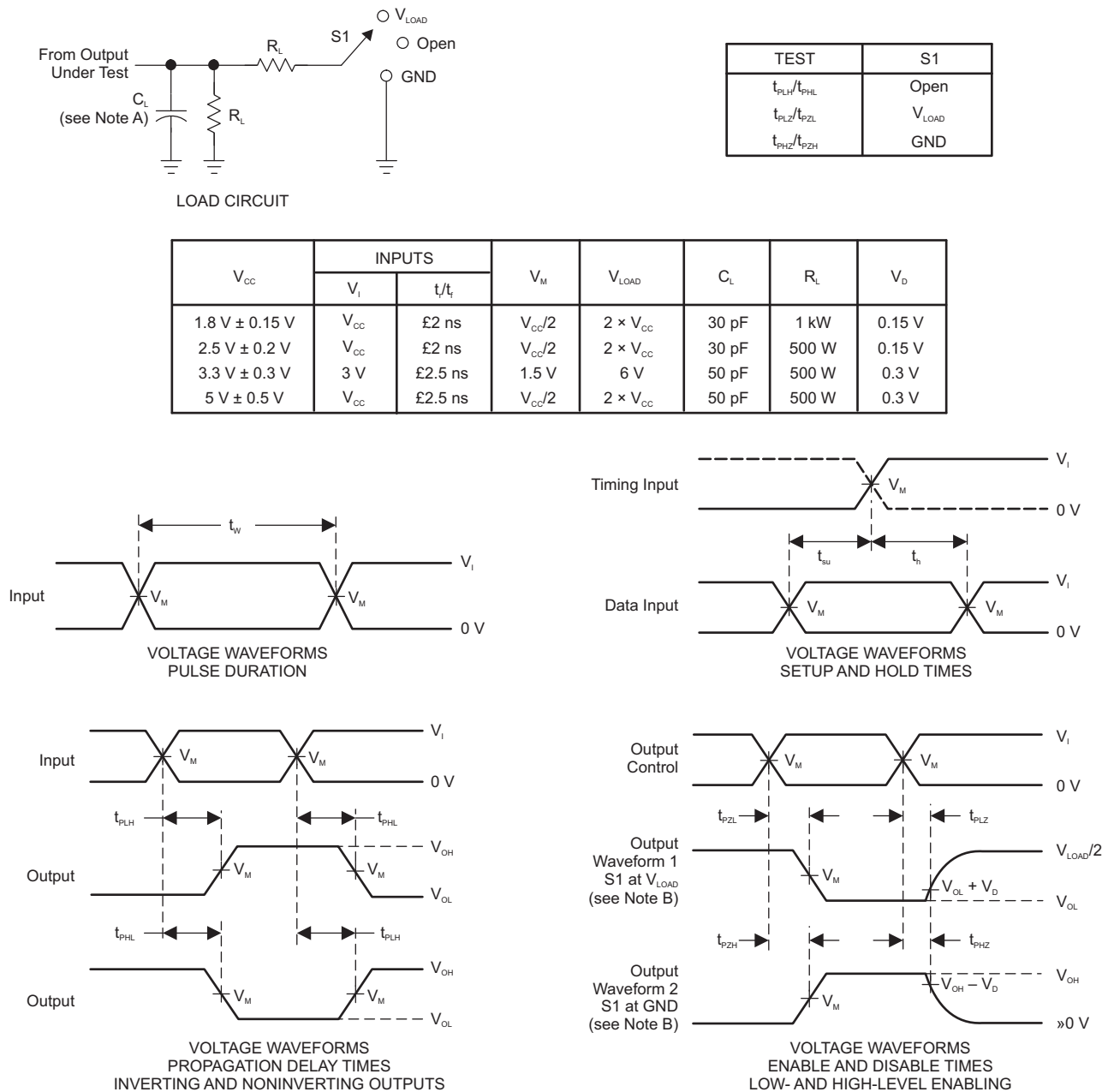
Figure 2. Supply Current (I_{CC}) vs Data (D) Input Voltage

7 Parameter Measurement Information



- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: PRR $\leq 10\text{ MHz}$, $Z_o = 50\text{ }\Omega$.
 - The outputs are measured one at a time, with one transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{PZL} and t_{PZH} are the same as t_{en} .
 - t_{PLH} and t_{PHL} are the same as t_{pd} .
 - All parameters and waveforms are not applicable to all devices.

Figure 3. Load Circuit and Voltage Waveforms

Parameter Measurement Information (continued)


- NOTES:
- C_L includes probe and jig capacitance.
 - 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.
 - All input pulses are supplied by generators having the following characteristics: PRR $\leq 10\text{ MHz}$, $Z_o = 50\text{ }\Omega$.
 - The outputs are measured one at a time, with one transition per measurement.
 - t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - t_{pZL} and t_{pZH} are the same as t_{en} .
 - t_{PLH} and t_{PHL} are the same as t_{pd} .
 - All parameters and waveforms are not applicable to all devices.

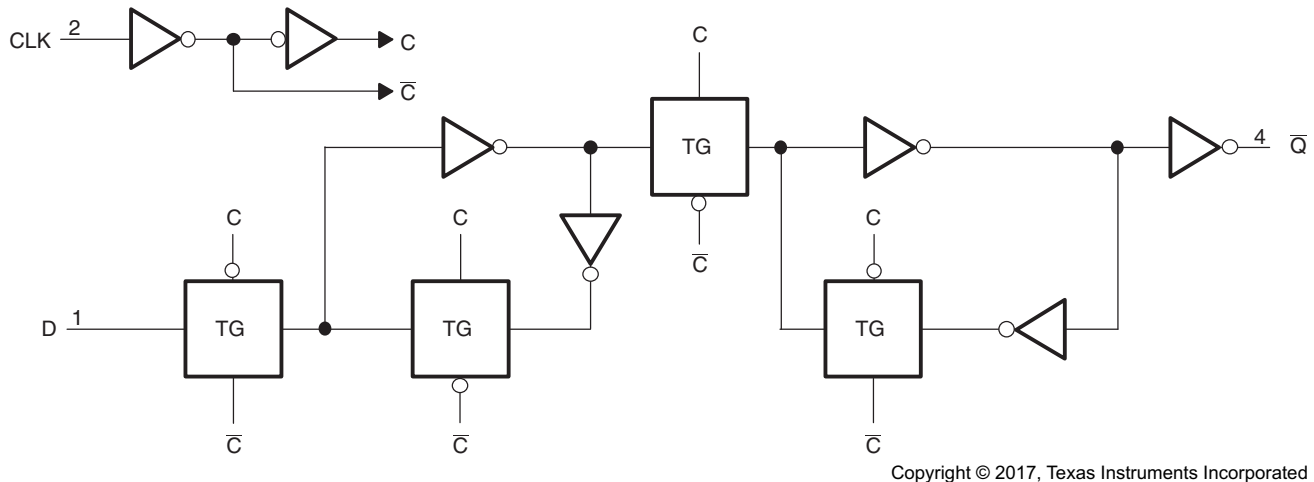
Figure 4. Load Circuit and Voltage Waveforms

8 Detailed Description

8.1 Overview

The SN74LVC1G80-Q1 is a single positive-edge-trigger D-type flip-flop and is AEC-Q100 qualified for automotive applications. Data at the input (D) is transferred to the output ($\bar{Q}$) 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.

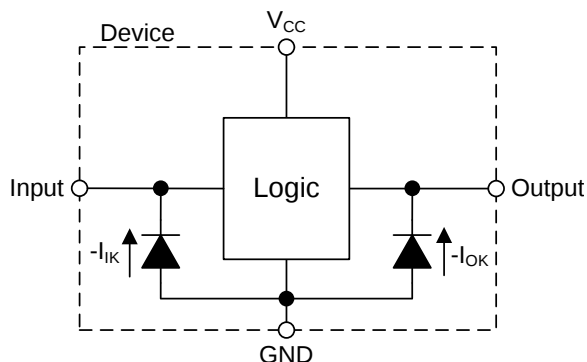


Figure 6. Electrical Placement of Clamping Diodes for Each Input and Output

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](#) lists the functional modes of the SN74LVC1G80-Q1.

Table 1. Function Table

INPUTS		OUTPUT $\bar{Q}$
CLK	D	
↑	H	L
↑	L	H
L	X	Q_0

9 Application and Implementation

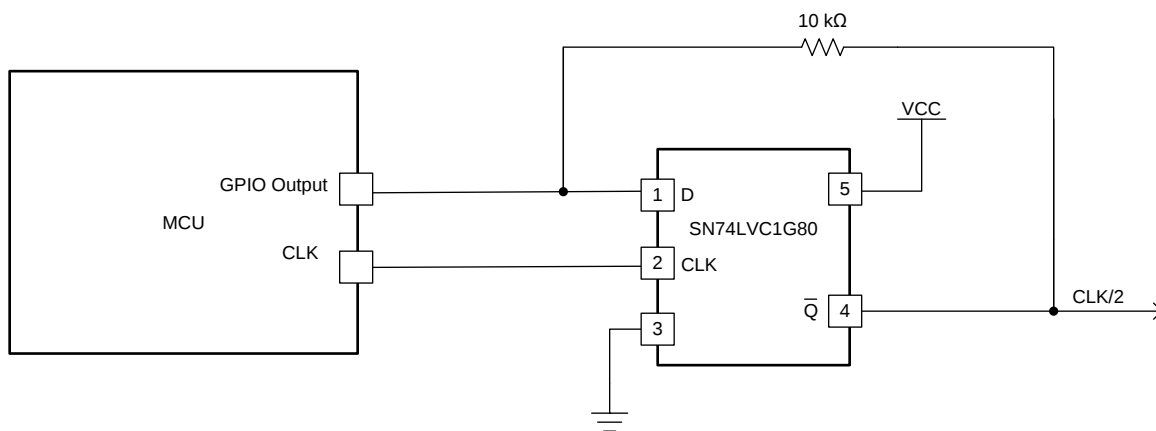
NOTE

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 SN74LVC1G80-Q1 is using it as a frequency divider. By feeding back the output ($\bar{Q}$) to the input (D), the output will toggle on every rising edge of the clock waveform. The output goes HIGH once every two clock cycles so essentially the frequency of the clock signal is divided by a factor of two. The SN74LVC1G80-Q1 does not have preset or clear functions so the initial state of the output is unknown. This application implements the use of a microcontroller GPIO pin to initially set the input HIGH, so the output LOW. Initialization is not needed, but should be kept in mind. Post initialization, the GPIO pin is set to a high impedance mode. Depending on the microcontroller, the GPIO pin could be set to an input and used to monitor the clock division.

9.2 Typical Application



Copyright © 2017, Texas Instruments Incorporated

Figure 7. Clock Frequency Division

9.2.1 Design Requirements

For this application, a resistor needs to be placed on the feedback line in order for the initialization voltage from the microcontroller to overpower the signal coming from the output ($\bar{Q}$). Without it the state at the input would be challenged by the GPIO from the microcontroller and from the output of the SN74LVC1G80-Q1.

The SN74LVC1G80-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.

Typical Application (continued)

9.2.2 Detailed Design Procedure

1. 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](#).
2. 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](#).
3. Feedback resistor:
 - A 10-k Ω resistor is chosen here to bias the input so the microcontroller GPIO output can initialize the input and output. The resistor value is important because a resistance too high, say at 1 M Ω , would cause too much of a voltage drop, causing the output to no longer be able to drive the input. On the other hand, a resistor too low, such as a 1 Ω , would not bias enough and might cause current to flow into the microcontroller, possibly damaging the device.

9.2.3 Application Curve

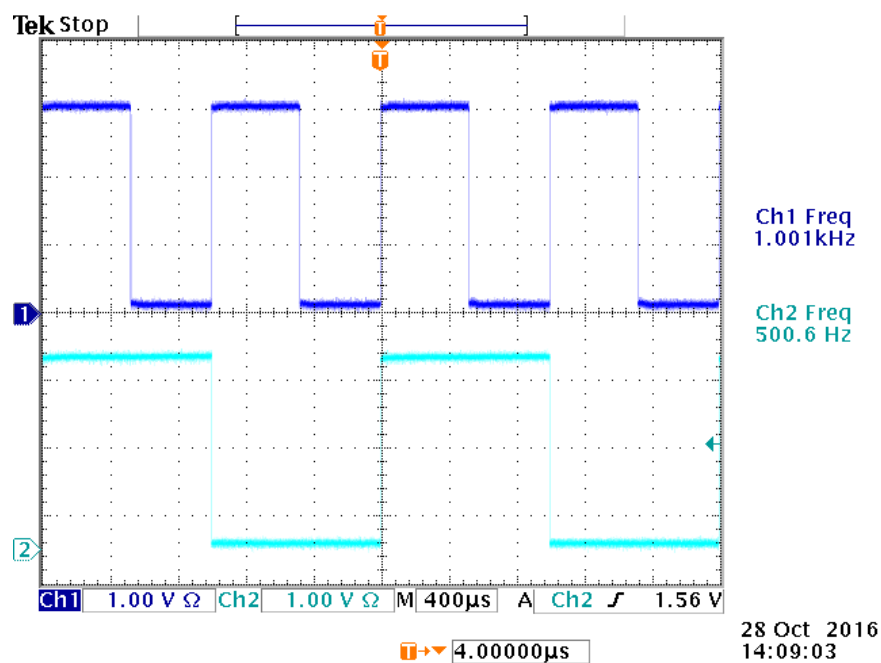


Figure 8. Frequency Division

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- μ F 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 μ F and 1 μ F 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

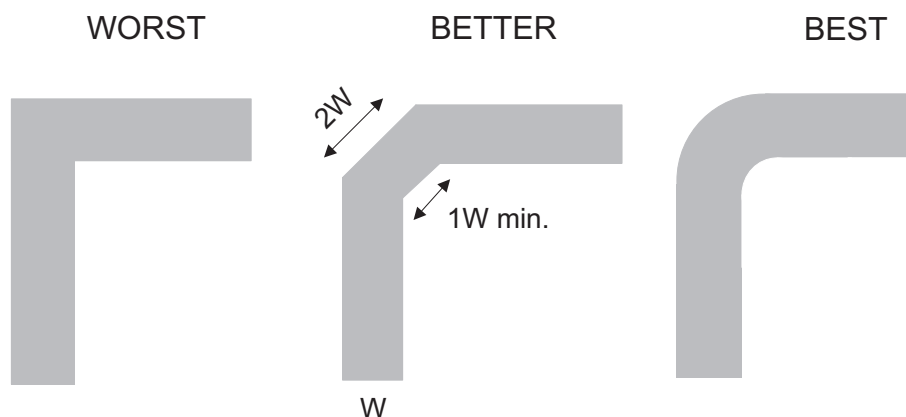


Figure 9. Trace Example

12 デバイスおよびドキュメントのサポート

12.1 ドキュメントのサポート

12.1.1 関連資料

関連資料については、以下を参照してください。

『[低速またはフローティングCMOS入力の影響](#)』, SCBA004

12.2 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、ti.comのデバイス製品フォルダを開いてください。右上の隅にある「通知を受け取る」をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取れます。変更の詳細については、修正されたドキュメントに含まれている改訂履歴をご覧ください。

12.3 コミュニティ・リソース

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™ オンライン・コミュニティ *TIのE2E (Engineer-to-Engineer)* コミュニティ。エンジニア間の共同作業を促進するために開設されたものです。e2e.ti.comでは、他のエンジニアに質問し、知識を共有し、アイデアを検討して、問題解決に役立てることができます。

設計サポート *TIの設計サポート* 役に立つE2Eフォーラムや、設計サポート・ツールをすばやく見つけることができます。技術サポート用の連絡先情報も参照できます。

12.4 商標

E2E is a trademark of Texas Instruments.

All other trademarks are the property of their respective owners.

12.5 静電気放電に関する注意事項



これらのデバイスは、限定的なESD(静電破壊)保護機能を内蔵しています。保存時または取り扱い時は、MOSゲートに対する静電破壊を防止するために、リード線同士をショートさせておくか、デバイスを導電フォームに入れる必要があります。

12.6 Glossary

[SLYZ022](#) — *TI Glossary*.

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

13 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。この情報は、そのデバイスについて利用可能な最新のデータです。このデータは予告なく変更されることがあり、ドキュメントが改訂される場合もあります。本データシートのブラウザ版を使用されている場合は、画面左側の説明をご覧ください。

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74LVC1G80QDCKRQ1	ACTIVE	SC70	DCK	5	3000	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 125	17U	Samples
SN74LVC1G80QDCKTQ1	ACTIVE	SC70	DCK	5	250	RoHS & Green	SN	Level-2-260C-1 YEAR	-40 to 125	17U	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 finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material 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.

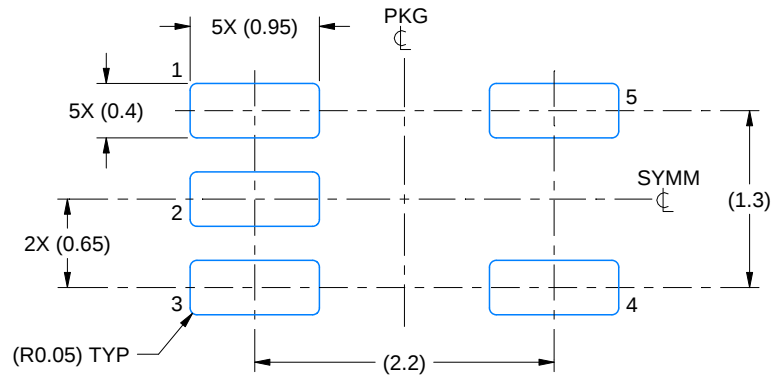
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

EXAMPLE BOARD LAYOUT

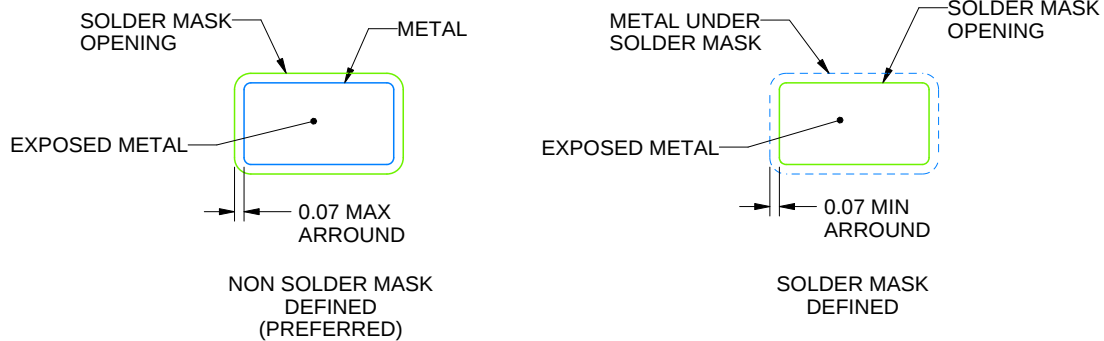
DCK0005A

SOT - 1.1 max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X

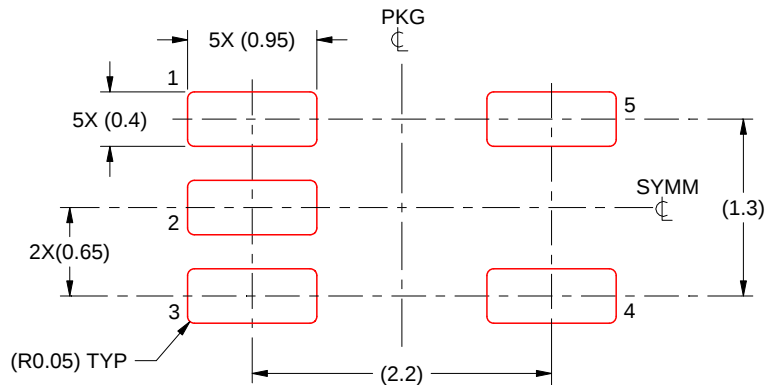


SOLDER MASK DETAILS

4214834/D 07/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
 BASED ON 0.125 THICK STENCIL
 SCALE:18X

4214834/D 07/2023

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

重要なお知らせと免責事項

TI は、技術データと信頼性データ (データシートを含みます)、設計リソース (リファレンス・デザインを含みます)、アプリケーションや設計に関する各種アドバイス、Web ツール、安全性情報、その他のリソースを、欠陥が存在する可能性のある「現状のまま」提供しており、商品性および特定目的に対する適合性の黙示保証、第三者の知的財産権の非侵害保証を含むいかなる保証も、明示的または黙示的にかかわらず拒否します。

これらのリソースは、TI 製品を使用する設計の経験を積んだ開発者への提供を意図したものです。(1) お客様のアプリケーションに適した TI 製品の選定、(2) お客様のアプリケーションの設計、検証、試験、(3) お客様のアプリケーションに該当する各種規格や、その他のあらゆる安全性、セキュリティ、規制、または他の要件への確実な適合に関する責任を、お客様のみが単独で負うものとし、TI は一切の責任を拒否します。

上記の各種リソースは、予告なく変更される可能性があります。これらのリソースは、リソースで説明されている TI 製品を使用するアプリケーションの開発の目的でのみ、TI はその使用をお客様に許諾します。これらのリソースに関して、他の目的で複製することや掲載することは禁止されています。TI や第三者の知的財産権のライセンスが付与されている訳ではありません。お客様は、これらのリソースを自身で使用した結果発生するあらゆる申し立て、損害、費用、損失、責任について、TI およびその代理人を完全に補償するものとし、TI は一切の責任を拒否します。

TI の製品は、[TI の販売条件](#)、または [ti.com](#) やかかる TI 製品の関連資料などのいずれかを通じて提供する適用可能な条項の下で提供されています。TI がこれらのリソースを提供することは、適用される TI の保証または他の保証の放棄の拡大や変更を意味するものではありません。

お客様がいかなる追加条項または代替条項を提案した場合でも、TI はそれらに異議を唱え、拒否します。

郵送先住所：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2024, Texas Instruments Incorporated