SN74LVC1G386B-Q1 Automotive, Single 3-Input, 1.1V to 5.5V XOR (Exclusive OR) Gate

1 Features

- AEC-Q100 qualified for automotive applications:
  - Device temperature grade 1: -40°C to +125°C
  - Device HBM ESD classification level 2
  - Device CDM ESD classification level C4B
- Operating range from 1.1V to 5.5V
- Over-voltage tolerant inputs support up to 5.5V independent of V_{CC}
- Supports partial-power-down with back drive protection (I_{off})
- High push-pull output drive strength:
  - ±32mA at 5V
  - ±24mA at 3.3V
  - ±8mA at 2.5V
  - ±4mA at 1.8V
- Maximum propagation delay of 4.4ns at 5V; 50pF
- Latch-up performance exceeds 100mA per JESD78 and AEC-Q100-004

2 Applications

- Test and measurement
- Enterprise switching
- Telecom infrastructure
- Motor drives

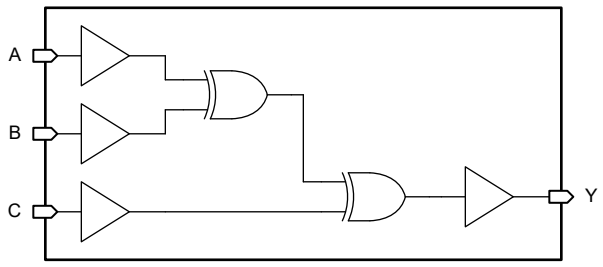
3 Description

The SN74LVC1G386B-Q1 is a single 3-input XOR gate, executing the logic function $Y = A \oplus B \oplus C$ or $Y = ABC + A\overline{B}\overline{C} + \overline{A}B\overline{C} + \overline{A}\overline{B}C$. This function is sometimes referred to as a 3-bit even parity generator.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)	BODY SIZE(3)
SN74LVC1G386B-Q1	DBV (SOT-23, 5)	2.9mm × 2.8mm	2.9mm × 1.6mm
	DCK (SC70, 5)	2mm × 2.1mm	2mm × 1.25mm

(1) For more information, see Mechanical, Packaging, and Orderable Information.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.
(3) The body size (length × width) is a nominal value and does not include pins.



Logic Diagram

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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4 Pin Configuration and Functions

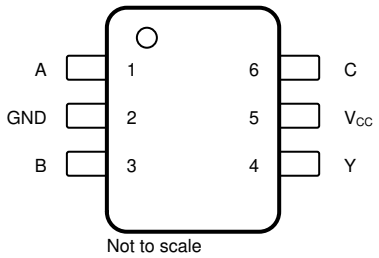


Figure 4-1. DCK or DBV Package, 6-Pin SC-70 or SOT-23(Top View)

Table 4-1. Pin Functions

PIN		TYPE[1]	DESCRIPTION
NAME	NO.		
A	1	I	A Input
B	3	I	B Input
C	6	I	C Input
GND	2	G	Ground
V_{CC}	5	P	Power Supply
Y	4	O	Y Output

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

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5 Specifications

5.1 Absolute Maximum Ratings

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage range		-0.5	6.5	V
V_I	Input voltage range(2)		-0.5	6.5	V
V_O	Output voltage range(2)		-0.5	V_{CC} + 0.5	V
V_O	Output voltage range - High Impedance(2)		-0.5	6.5	V
I_{IK}	Input clamp current	V_I < 0 V		-50	mA
I_{OK}	Output clamp current	V_O < 0 V		-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) Operation outside the *Absolute Maximum Ratings* may cause permanent device damage. Absolute maximum ratings do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. If briefly operating outside the *Recommended Operating Conditions* but within the *Absolute Maximum Ratings*, the device may not sustain damage, but it may not be fully functional. Operating the device in this manner may affect device reliability, functionality, performance, and shorten the device lifetime.
(2) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per AEC Q100-002 HBM ESD Classification Level 2(1)	±2000	V
		Charged device model (CDM), per AEC Q100-011 CDM ESD Classification Level C4B	±1000	

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

5.3 Thermal Information

PACKAGE	PINS	THERMAL METRIC(1)						UNIT
		$R_{\theta JA}$	$R_{\theta JC(top)}$	$R_{\theta JB}$	Ψ_{JT}	Ψ_{JB}	$R_{\theta JC(bot)}$	
DBV (SOT-23, 6)	6	225.5	155.0	138.2	84.2	137.9	-	°C/W
DCK (SOT-SC70, 6)	6	254.1	191.3	158.1	92.5	158.0	-	°C/W

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

5.4 Recommended Operating Conditions

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage		1.1	5.5	V
V_I	Input voltage		0	5.5	V
V_O	Output voltage	High or low state	0	V_{CC}	V

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5.4 Recommended Operating Conditions (continued)

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

			MIN	MAX	UNIT
V_{IH}	High-level input voltage	V_{CC} = 1.2V	0.78		V
		V_{CC} = 1.5V	0.975		
		V_{CC} = 1.8V	1.17		
		V_{CC} = 2.5V	1.7		
		V_{CC} = 3.3V	2		
		V_{CC} = 5V	3.5		
V_{IL}	Low-Level input voltage	V_{CC} = 1.2V		0.42	V
		V_{CC} = 1.5V		0.525	
		V_{CC} = 1.8V		0.63	
		V_{CC} = 2.5V		0.7	
		V_{CC} = 3.3V		0.8	
		V_{CC} = 5V		1.5	
I_{OH}(1)	High-level output current	V_{CC} = 1.2V		–1	mA
		V_{CC} = 1.5V		–4	
		V_{CC} = 1.8V		–6	
		V_{CC} = 2.5V		–16	
		V_{CC} = 3.3V		–32	
		V_{CC} = 5V		–50	
I_{OL}(1)	Low-level output current	V_{CC} = 1.2V		1	mA
		V_{CC} = 1.5V		4	
		V_{CC} = 1.8V		6	
		V_{CC} = 2.5V		16	
		V_{CC} = 3.3V		32	
		V_{CC} = 5V		50	
Δt/Δv	Input transition rise or fall rate	V_{CC} = 1.2V to 2.5V		20	ns/V
		V_{CC} = 3.3V ± 0.3V		10	
		V_{CC} = 5.0V ± 0.5V		5	
T_A	Operating free-air temperature		-40	125	°C

(1) Recommended maximum output current for continuous operation; see *Electrical Characteristics* for test current values to maintain V_{OH} and V_{OL} specifications. Operating with average output current greater than 32mA may impact device reliability and shorten the device lifetime.

5.5 Electrical Characteristics

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

PARAMETER	TEST CONDITIONS	V_{CC}	-40°C to 125°C			UNIT
			MIN	TYP	MAX	
V_{OH}	I_{OH}= –100µA	1.1V to 5.5V	V_{CC} - 0.1			V
	I_{OH}= –4mA	1.65V	1.2			V
	I_{OH}= –8mA	2.3V	1.9			V
	I_{OH}= –12mA	2.7V	2.2			V
	I_{OH}= –16mA	3V	2.4			V
	I_{OH}= –24mA	3V	2.3			V
	I_{OH}= –32mA	4.5V	3.8			V

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5.5 Electrical Characteristics (continued)

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

PARAMETER	TEST CONDITIONS	V_{CC}	-40°C to 125°C			UNIT
			MIN	TYP	MAX	
V_{OL}	I_{OL}= 100µA	1.1V to 5.5V			0.15	V
	I_{OL}= 4mA	1.65V			0.45	V
	I_{OL}= 8mA	2.3V			0.3	V
	I_{OL}= 12mA	2.7V			0.4	V
	I_{OL}= 16mA	3V			0.4	V
	I_{OL}= 24mA	3V			0.55	V
	I_{OL}= 32mA	4.5V			0.55	V
I_I	V_I = V_{CC} or GND	V_{CC} = 0V to 5.5V		±0.01	±5	µA
I_{OFF}	V_I or V_O = V_{CC}	V_{CC} = 0V		±0.1	±10	µA
I_{CC}	V_I = V_{CC} or GND, I_O = 0	V_{CC} = 1.1V to 5.5V		0.01	10	µA
ΔI_{CC}	One input at V_{CC} - 0.6V, other inputs at V_{CC} or GND	3.0V to 5.5V			500	µA
C_I	V_I = V_{CC} or GND	3.3V		3.5		pF
C_O	V_O = V_{CC} or GND	3.3V		6.3		pF

5.6 Switching Characteristics

over operating free-air temperature range; typical values measured at T_A = 25°C (unless otherwise noted). See *Parameter Measurement Information*.

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	V_{CC}	-40°C to 125°C			UNIT
					MIN	TYP	MAX	
t_{pd}	A, B, or C	Y	C_L = 15pF	1.8V ± 0.15V	3.5	6.5	11.1	ns
t_{pd}	A, B, or C	Y	C_L = 15pF	2.5V ± 0.2V	2.4	3.9	6.4	ns
t_{pd}	A, B, or C	Y	C_L = 15pF	3.3 V ± 0.3 V	2	3.1	4.7	ns
t_{pd}	A, B, or C	Y	C_L = 15pF	5.0 V ± 0.5 V	1.2	2.5	3.8	ns
t_{pd}	A, B, or C	Y	C_L = 50pF	1.8V ± 0.15V	3.8	6.8	11.8	ns
t_{pd}	A, B, or C	Y	C_L = 50pF	2.5V ± 0.2V	2.6	4	6.9	ns
t_{pd}	A, B, or C	Y	C_L = 50pF	3.3V ± 0.3V	2.4	3.5	5.5	ns
t_{pd}	A, B, or C	Y	C_L = 50pF	5.0V ± 0.5V	1.7	2.9	4.4	ns
C_{pd}			f = 10MHz	1.8V		16.3		pF
C_{pd}			f = 10MHz	2.5V		17.1		pF
C_{pd}			f = 10MHz	3.3V		17.6		pF
C_{pd}			f = 10MHz	5V		17.8		pF

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5.7 Typical Characteristics

T_A = 25°C (unless otherwise noted)

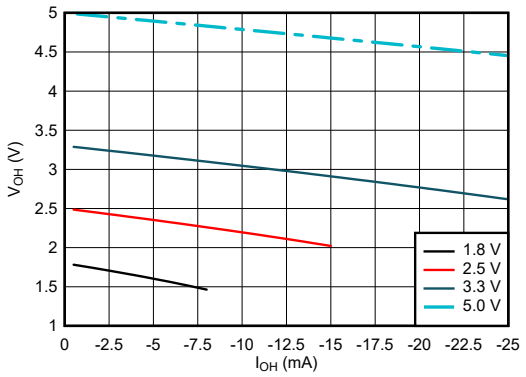


Figure 5-1. Output Voltage vs Current in HIGH State

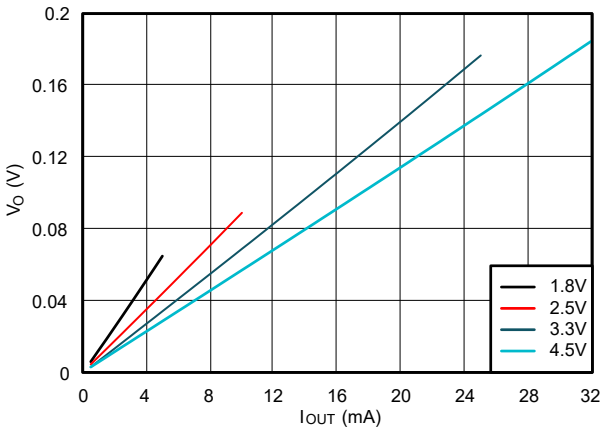


Figure 5-2. Output Voltage vs Current in LOW State

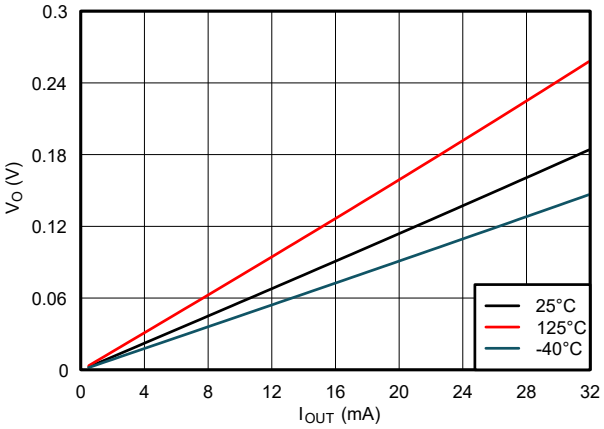


Figure 5-3. Output Voltage vs Current in LOW State; 4.5V Supply

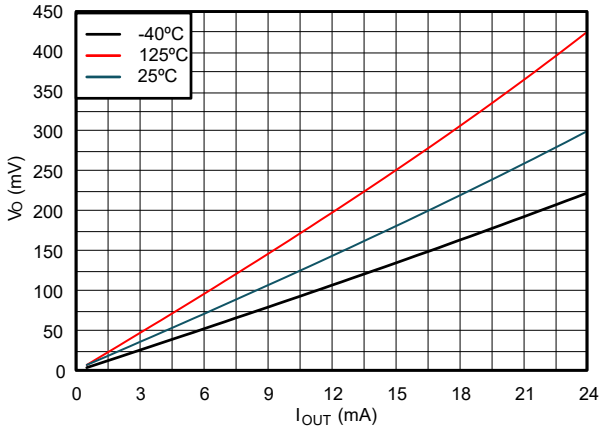


Figure 5-4. Output Voltage vs Current in LOW State; 3V Supply

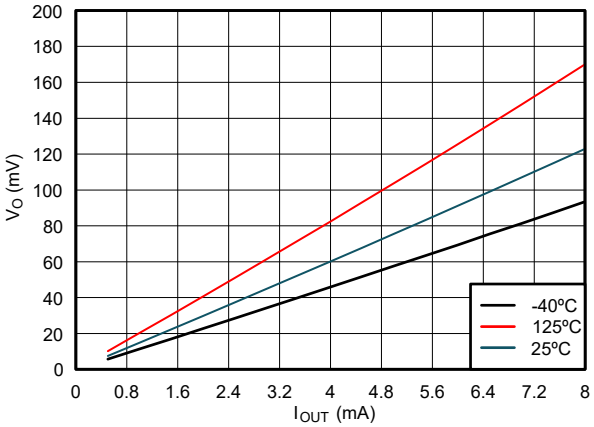


Figure 5-5. Output Voltage vs Current in LOW State; 2.3V Supply

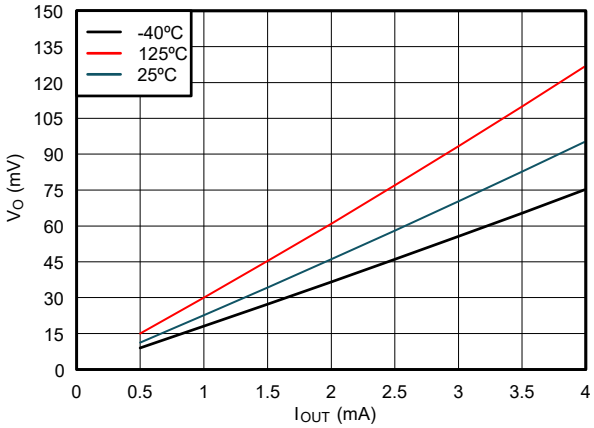


Figure 5-6. Output Voltage vs Current in LOW State; 1.65V Supply

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5.7 Typical Characteristics (continued)

T_A = 25°C (unless otherwise noted)

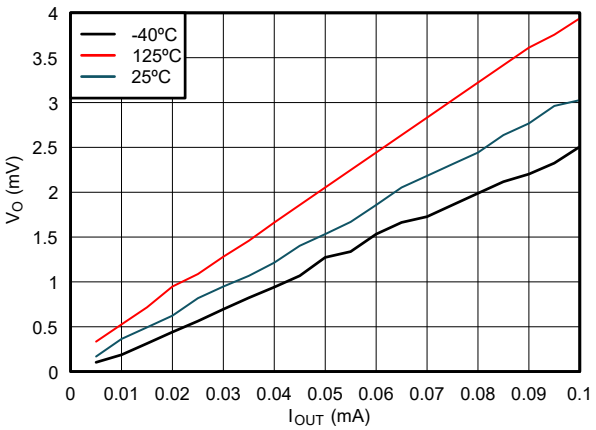


Figure 5-7. Output Voltage vs Current in LOW State; 1.38V Supply

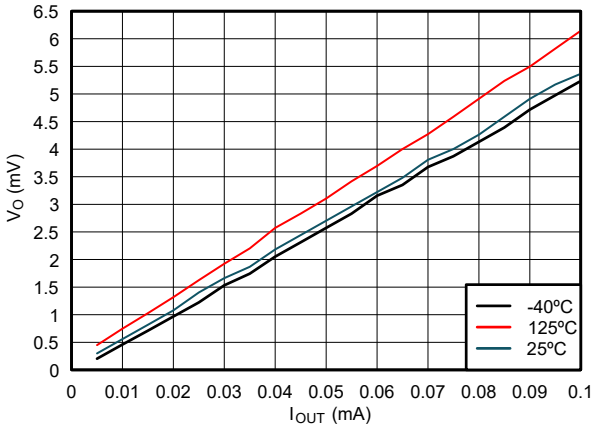


Figure 5-8. Output Voltage vs Current in LOW State; 1.1V Supply

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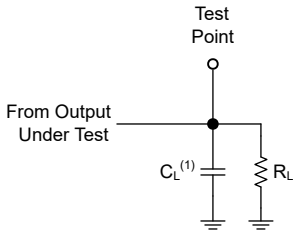
6 Parameter Measurement Information

Phase relationships between waveforms are chosen arbitrarily for the examples listed in the following table. Generators with the following characteristics supply all input pulses : PRR ≤ 1MHz, Z_O = 50Ω, t_t ≤ 2.5ns.

The outputs are measured individually with one input transition per measurement.

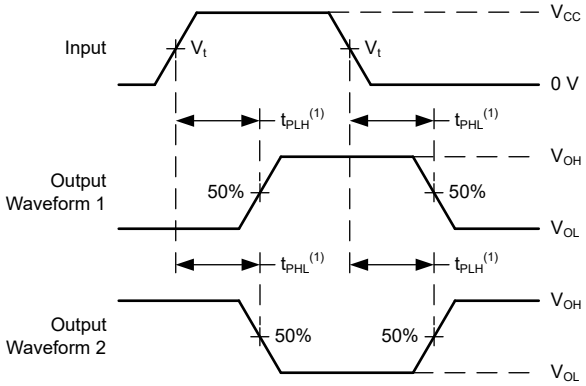
Table 6-1. Push-Pull Outputs

V_{CC}	V_t	R_L	C_L	ΔV
1.2V ± 0.1V	V_{CC}/2	2kΩ	15pF	0.1V
1.5V ± 0.12V	V_{CC}/2	2kΩ	15pF	0.1V
1.8V ± 0.15V	V_{CC}/2	1kΩ	15pF/30pF	0.15V
2.5V ± 0.2V	V_{CC}/2	500Ω	15pF/30pF	0.15V
3.3V ± 0.3V	1.5V	500Ω	15pF/50pF	0.3V
5.0V ± 0.5V	1.5V	500Ω	15pF/50pF	0.3V



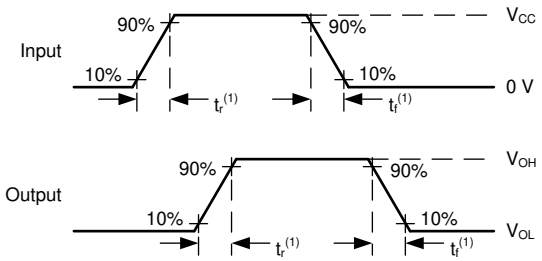
(1) C_L includes probe and test-fixture capacitance.

Figure 6-1. Load Circuit for Push-Pull Outputs



(1) The greater between t_{PLH} and t_{PHL} is the same as t_{pd}.

Figure 6-2. Voltage Waveforms Propagation Delays



(1) The greater between t_r and t_f is the same as t_t.

Figure 6-3. Voltage Waveforms, Input and Output Transition Times

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7 Detailed Description

7.1 Overview

The SN74LVC1G386B-Q1 is a single 3-input XOR gate, executing the logic function Y = A ⊕ B ⊕ C or Y = ABC + $A\overline{BC}$ + $\overline{A}B\overline{C}$ + $\overline{AB}C$. This function is sometimes referred to as a 3-bit even parity generator.

7.2 Functional Block Diagram

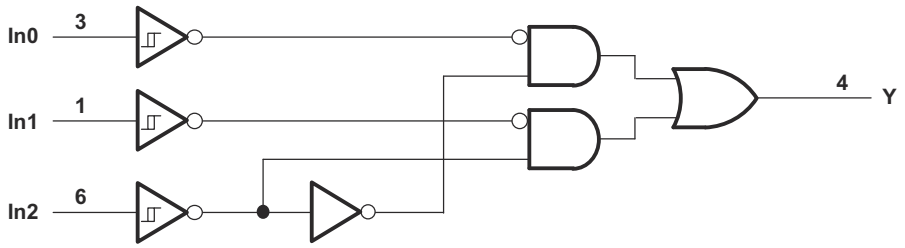


Figure 7-1. Logic Diagram (Positive Logic)

7.3 Feature Description

7.3.1 Balanced CMOS Push-Pull Outputs

This device includes balanced CMOS push-pull outputs. The term *balanced* indicates that the device can sink and source similar currents. The drive capability of this device can create fast edges into light loads, so routing and load conditions must 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. Limit the output power of the device to avoid damage due to overcurrent. The electrical and thermal limits defined in the *Absolute Maximum Ratings* must be followed at all times.

Unused push-pull CMOS outputs must be left disconnected.

7.3.2 Partial Power Down (I_{off})

This device includes circuitry to disable all outputs when the supply pin is held at 0V. When disabled, the outputs neither source nor sink current, regardless of the input voltages. The amount of leakage current at each output is defined by the I_{off} specification in the *Electrical Characteristics* table.

7.3.3 Standard CMOS Inputs

This device includes 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 *Absolute Maximum Ratings*, and the maximum input leakage current, given in the *Electrical Characteristics*, using Ohm's law (R = V ÷ I).

Standard CMOS inputs require that input signals transition between valid logic states quickly, as defined by the input transition time or rate in the *Recommended Operating Conditions* table. Failing to meet this specification results in excessive power consumption and can cause oscillations. See more details in *Implications of Slow or Floating CMOS Inputs*.

Do not leave standard CMOS inputs floating at any time during operation. Terminate unused inputs at V_{CC} or GND. If a system does not always drive an input, consider adding a pull-up or pull-down resistor to provide a valid input voltage. The resistor value depends on multiple factors; a 10kΩ resistor, however, is recommended and typically meets all requirements.

7.4 Device Functional Modes

Table 7-1 lists the functional modes for SN74LVC1G386B-Q1.

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Table 7-1. Function Table

INPUTS(1)			OUTPUT (2)
IN2	IN1	IN0	Y
L	L	L	L
L	L	H	L
L	H	L	H
L	H	H	H
H	L	L	L
H	L	H	H
H	H	L	L
H	H	H	H

(1) H = High Voltage Level, L = Low Voltage Level, X = Don't Care

(2) H = Driving High, L = Driving Low, Z = High Impedance State

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8 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, as well as validating and testing their design implementation to confirm system functionality.

8.1 Application Information

A useful application for the SN74LVC1G386B-Q1 is a 3-bit even parity generator. By feeding in a 3-bit digital signal, the output always provides a fourth bit that sums with the other three to produce an even number of ones.

The parity generator functionality is useful as a simple method for error checking in communication systems. By verifying that the received data always adds to an even value, the original data integrity has a very high likelihood of success. For a 4-bit transmitted word (3 data bits plus 1 parity bit), let p denote the probability that any single bit flips during transmission. An error goes undetected only when an even number of bits flip simultaneously, preserving even parity. Using Bayes' Theorem, the conditional probability of an undetected error given that even parity is received is:

$$P\left(\text{error}\middle|\text{even}\right)=\frac{\left[C\left(4,2\right)p^2(1-p)^2+p^4\right]}{\left[(1-p)^4+C\left(4,2\right)p^2(1-p)^2+p^4\right]} \quad (1)$$

For a typical bit error rate of p = 0.001, this evaluates to approximately 5.99 × 10^{-6}, confirming that the probability of an undetected error is extremely low under normal operating conditions.

8.2 Typical Application

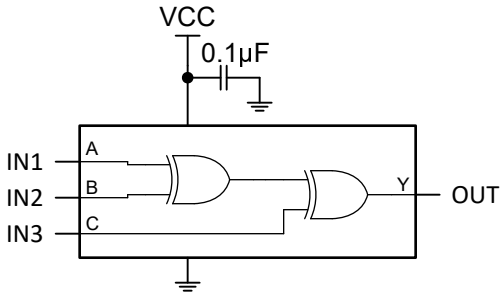


Figure 8-1. Typical Application Schematic

8.2.1 Design Requirements

8.2.1.1 Power Considerations

Verify that the desired supply voltage is within the range specified in the *Electrical Characteristics*. The supply voltage sets the device electrical characteristics, as described in the *Electrical Characteristics* section.

The positive voltage supply must be capable of sourcing current equal to the total current to be sourced by all outputs of the SN74LVC1G386B-Q1 plus the maximum static supply current, I_{CC}, listed in the *Electrical Characteristics*, and any transient current required for switching. The logic device can only source as much current that is provided by the positive supply source. Verify that the maximum total current through V_{CC} listed in the *Absolute Maximum Ratings* is not exceeded.

The ground must be capable of sinking current equal to the total current to be sunk by all outputs of the SN74LVC1G386B-Q1 plus the maximum supply current, I_{CC}, listed in the *Electrical Characteristics*, and any transient current required for switching. The logic device can only sink as much current that can be sunk into the

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ground connection. Verify that the maximum total current through GND listed in the *Absolute Maximum Ratings* is not exceeded.

The SN74LVC1G386B-Q1 can drive a load with a total capacitance less than or equal to 50pF while still meeting all of the data sheet specifications. Larger capacitive loads can be applied; however, TI recommends adding a series resistor between the output and capacitor to prevent excessive current.

The SN74LVC1G386B-Q1 can drive a load with total resistance described by $R_L \geq V_O / I_O$, with the output voltage and current defined in the *Electrical Characteristics* table with V_{OH} and V_{OL}. When outputting in the HIGH state, the output voltage in the equation is defined as the difference between the measured output voltage and the supply voltage at the V_{CC} pin.

Total power consumption can be calculated using the information provided in the *CMOS Power Consumption and Cpd Calculation* application note.

Thermal increase can be calculated using the information provided in the *Thermal Characteristics of Standard Linear and Logic (SLL) Packages and Devices* application note.

CAUTION

The maximum junction temperature, $T_{J(max)}$ listed in the *Absolute Maximum Ratings*, is an additional limitation to prevent damage to the device. Do not violate any values listed in the *Absolute Maximum Ratings*. These limits are provided to prevent damage to the device.

8.2.1.2 Input Considerations

Input signals must cross $V_{IL(max)}$ to be considered a logic LOW, and $V_{IH(min)}$ to be considered a logic HIGH. Do not exceed the maximum input voltage range found in the *Absolute Maximum Ratings*.

Unused inputs must be terminated to either V_{CC} or ground. The unused inputs can be directly terminated if the input is completely unused, or the inputs can be connected with a pullup or pulldown resistor if the input is used sometimes, but not always. A pullup resistor is used for a default state of HIGH, and a pulldown resistor is used for a default state of LOW. The drive current of the controller, leakage current into the SN74LVC1G386B-Q1 (as specified in the *Electrical Characteristics*), and the desired input transition rate limits the resistor size. A 10kΩ resistor value is often used due to these factors.

The SN74LVC1G386B-Q1 has CMOS inputs and thus requires fast input transitions to operate correctly, as defined in the Electrical Characteristics table. Slow input transitions can cause oscillations, additional power consumption, and reduction in device reliability.

Refer to the *Feature Description* for additional information regarding the inputs for this device.

8.2.1.3 Output Considerations

The positive supply voltage is used to produce the output HIGH voltage. Drawing current from the output decreases the output voltage as specified by the V_{OH} specification in the *Electrical Characteristics*. The ground voltage is used to produce the output LOW voltage. Sinking current into the output increases the output voltage as specified by the V_{OL} specification in the *Electrical Characteristics*.

Push-pull outputs that can be in opposite states, even for a very short time period, must never be connected directly together. This can cause excessive current and damage to the device.

Two channels within the same device with the same input signals can be connected in parallel for additional output drive strength.

Unused outputs can be left floating. Do not connect outputs directly to V_{CC} or ground.

Refer to the *Feature Description* section for additional information regarding the outputs for this device.

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8.2.2 Detailed Design Procedure

1. Add a decoupling capacitor from V_{CC} to GND. The capacitor needs to be placed physically close to the device and electrically close to both the V_{CC} and GND pins. An example layout is shown in the *Layout* section.
2. Verify that the capacitive load at the output is ≤ 50pF. Low load capacitance can be accomplished by providing short, appropriately sized traces from the SN74LVC1G386B-Q1 to the receiving device.
3. Verify that the resistive load at the output is larger than (V_{CC} / $I_{O(max)}$)Ω. Never violate the maximum output current from the *Absolute Maximum Ratings*. Most CMOS inputs have a resistive load measured in MΩ; much larger than the minimum calculated previously.
4. Thermal issues are rarely a concern for logic gates; however, the power consumption and thermal increase can be calculated using the steps provided in the *CMOS Power Consumption and Cpd Calculation* application note.

8.2.3 Application Curves

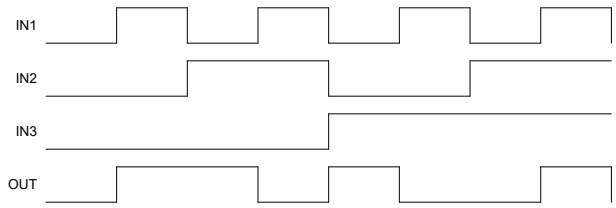


Figure 8-2. Logic timing diagram

8.3 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating listed in the *Recommended Operating Conditions*.

Verify that each V_{CC} terminal has a good bypass capacitor to prevent power disturbance. For the SN74LVC1G386B-Q1, a 0.1µF bypass capacitor is recommended. To reject different frequencies of noise, use multiple bypass capacitors in parallel. Capacitors with values of 0.1µF and 1µF are commonly used in parallel.

8.4 Layout

8.4.1 Layout Guidelines

- Bypass capacitor placement
  - Place near the positive supply terminal of the device
  - Provide an electrically short ground return path
  - Use wide traces to minimize impedance
  - Keep the device, capacitors, and traces on the same side of the board whenever possible
- Signal trace geometry
  - 8mil to 12mil trace width
  - Lengths less than 12cm to minimize transmission line effects
  - Avoid 90° corners for signal traces
  - Use an unbroken ground plane below signal traces
  - Flood fill areas around signal traces with ground
  - Parallel traces must be separated by at least 3x dielectric thickness
  - For traces longer than 12cm
    - Use impedance controlled traces
    - Source-terminate using a series damping resistor near the output
    - Avoid branches; buffer each signal that must branch separately

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8.4.2 Layout Example

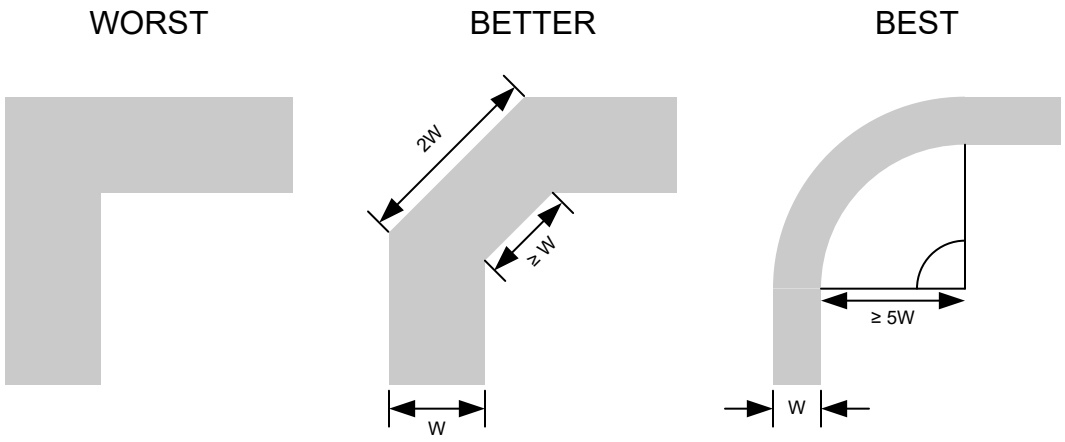


Figure 8-3. Example Trace Corners for Improved Signal Integrity

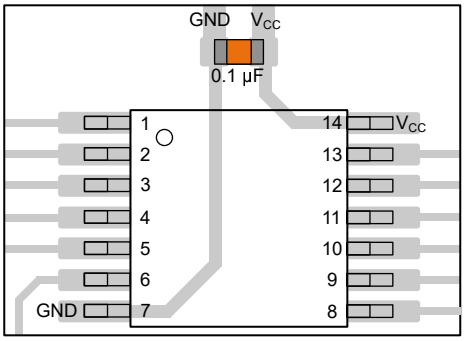


Figure 8-4. Example Bypass Capacitor Placement for TSSOP and Similar Packages

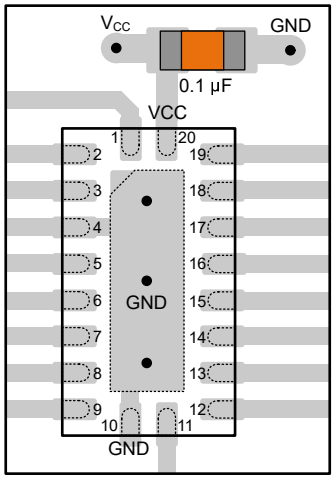


Figure 8-5. Example Bypass Capacitor Placement for WQFN and Similar Packages

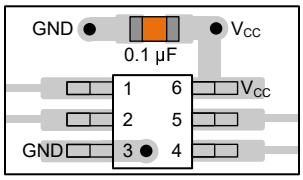


Figure 8-6. Example Bypass Capacitor Placement for SOT, SC70 and Similar Packages

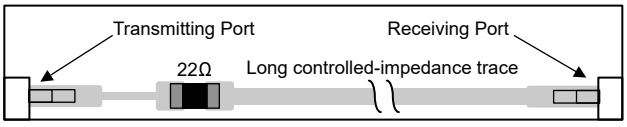


Figure 8-7. Example Damping Resistor Placement for Improved Signal Integrity

9 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, *CMOS Power Consumption and C_{pd} Calculation* application note
- Texas Instruments, *Designing With Logic* application note
- Texas Instruments, *Thermal Characteristics of Standard Linear and Logic (SLL) Packages and Devices* application note

9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* 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.

9.3 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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9.4 Trademarks

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9.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

9.6 Glossary

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

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
September 2026	*	Initial Release

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11 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.

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PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CLVC1G386BDCKRQ1	Active	Production	SC70 (DCK) | 6	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-	25S

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts 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.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

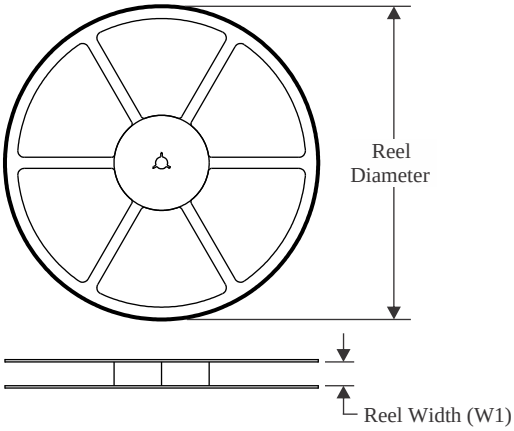
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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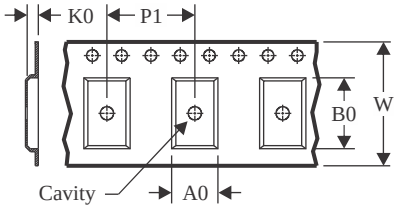
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

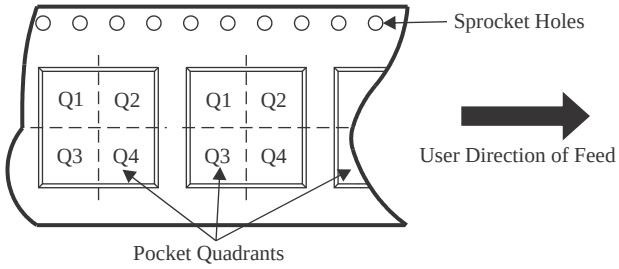


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

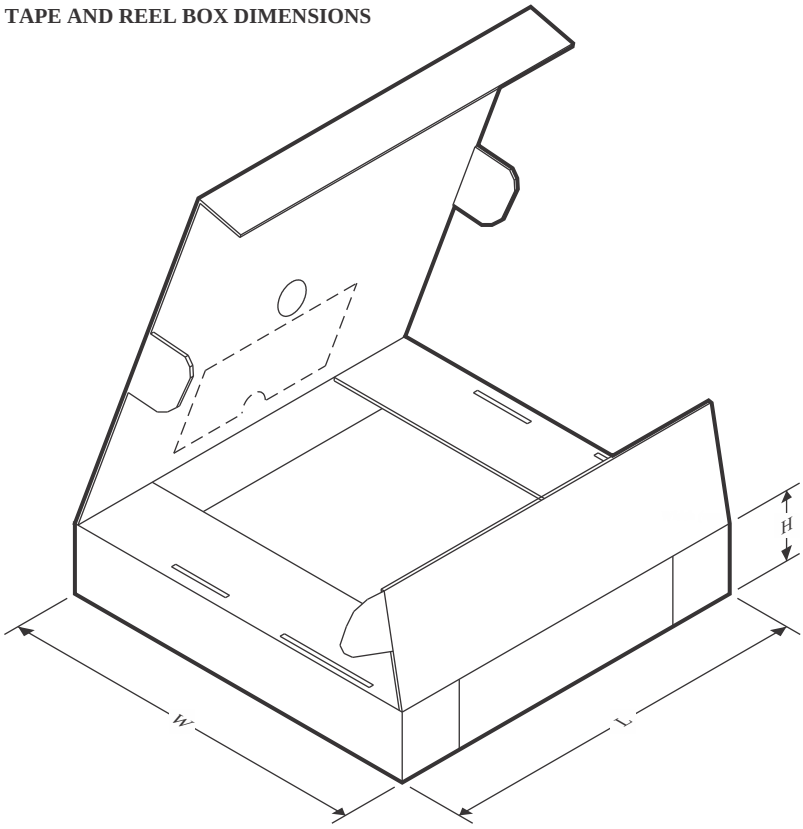
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
CLVC1G386BDCKRQ1	SC70	DCK	6	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

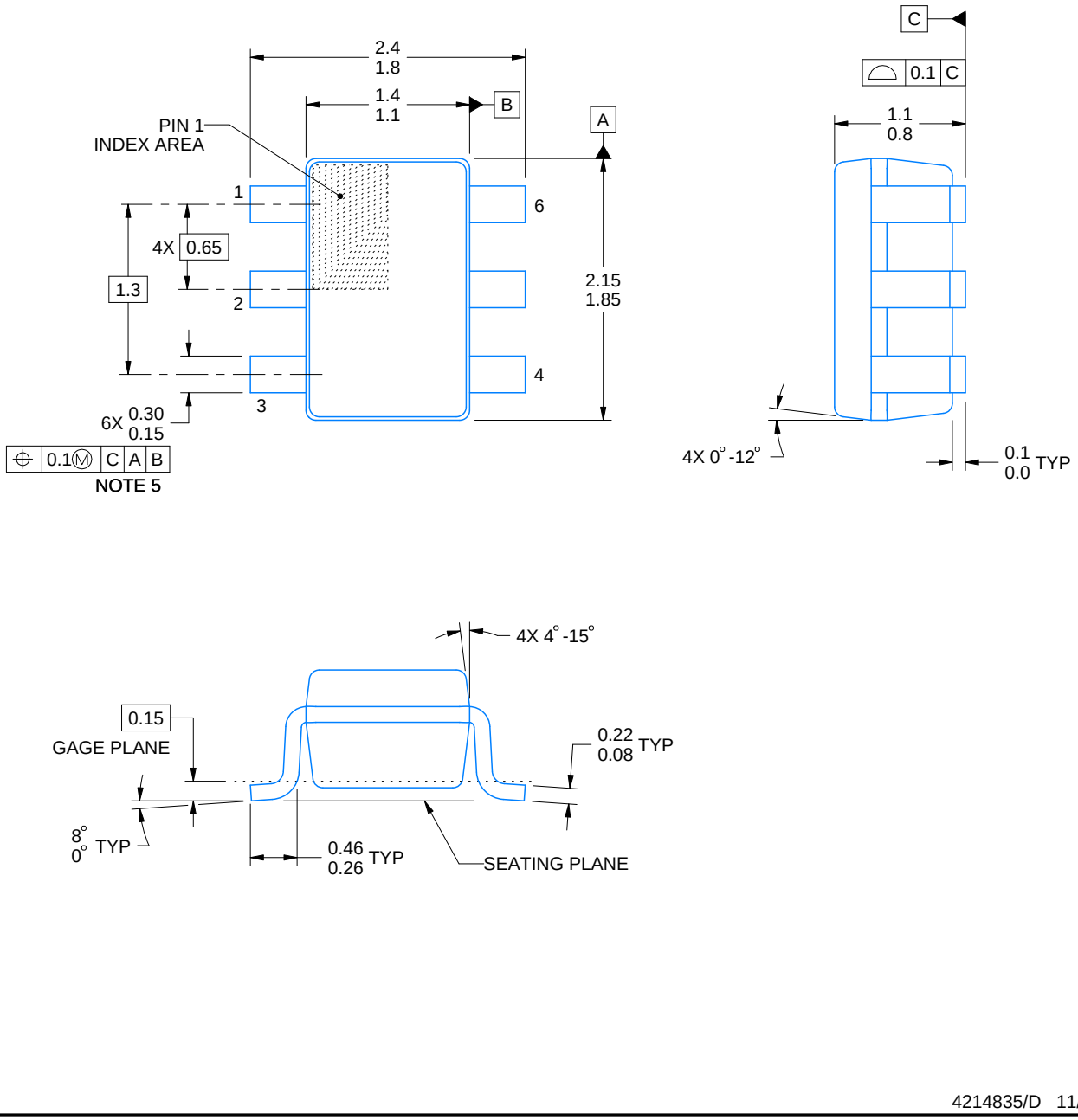
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CLVC1G386BDCKRQ1	SC70	DCK	6	3000	210.0	185.0	35.0

PACKAGE OUTLINE

DCK0006A

SOT - 1.1 max height

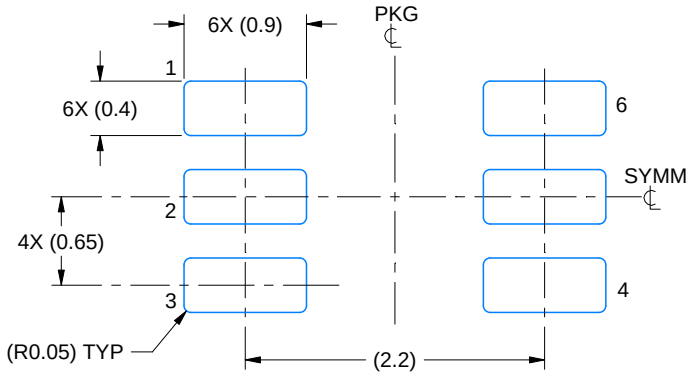
SMALL OUTLINE TRANSISTOR



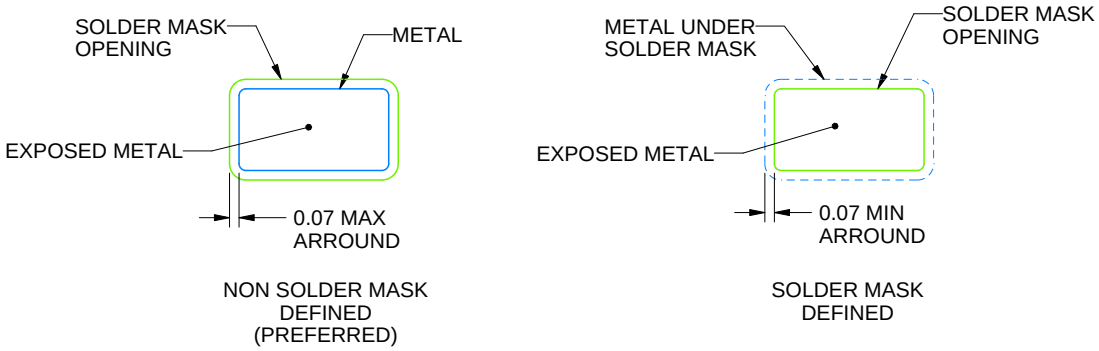
4214835/D 11/2024

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
4. Falls within JEDEC MO-203 variation AB.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X

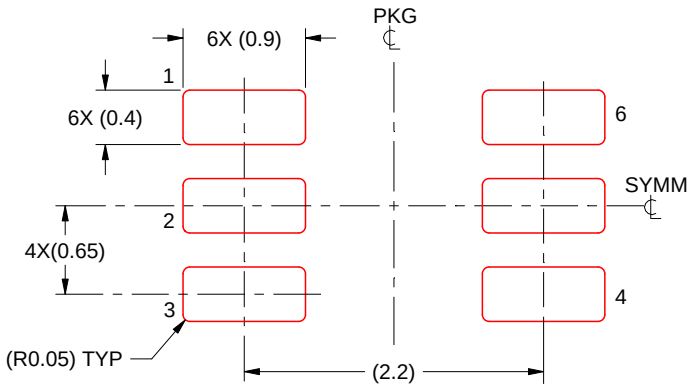


SOLDER MASK DETAILS

4214835/D 11/2024

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. 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

4214835/D 11/2024

NOTES: (continued)

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

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