

CD4069UB CMOS hex inverter

1 Features

- Standardized symmetrical output characteristics
- Medium speed operation: t_{PHL} , $t_{PLH} = 30$ ns at 10 V (Typical)
- 100% Tested for quiescent current at 20 V
- Maximum input current of 1 μ A at 18 V over full package-temperature range, 100 nA at 18 V and 25°C
- Meets all requirements of JEDEC tentative standard No. 13B, *Standard Specifications for Description of B Series CMOS Devices*

2 Applications

- Logic inversion
- Pulse shaping
- Oscillators
- High-input-impedance amplifiers

3 Description

The CD4069UB device consist of six CMOS inverter circuits. These devices are intended for all general-purpose inverter applications where the medium-power TTL-drive and logic-level-conversion capabilities of circuits such as the CD4009 and CD4049 hex inverter and buffers are not required.

Device Information⁽¹⁾

PART NUMBER	PACKAGE (PINS)	BODY SIZE (NOM)
CD4069UBE	PDIP (14)	19.30 mm x 6.35 mm
CD4069UBF	CDIP (14)	19.56 mm x 6.67 mm
CD4069UBM	SOIC (14)	8.65 mm x 3.91 mm
CD4069UBNSR	SO (14)	10.30 mm x 5.30 mm
CD4069UBPW	TSSOP (14)	5.00 mm x 4.40 mm

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

CD4069UB Functional Diagram

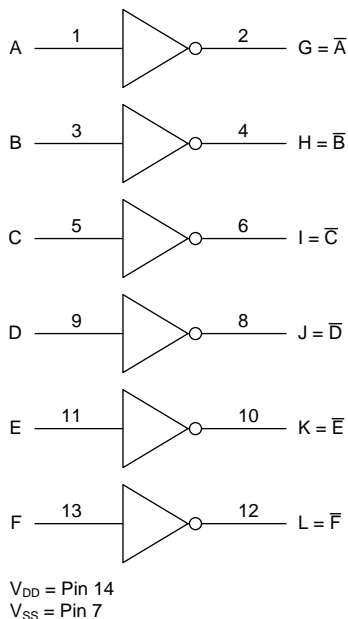


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4 Revision History

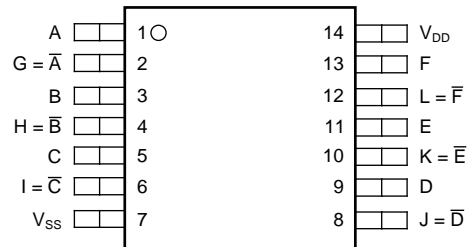
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision D (February 2016) to Revision E	Page
• Removed artifact "-" at t_{PHL} term on the second Features bullet	1
• Corrected V_I spec MIN/MAX values in the Abs Max Ratings table	4
• Corrected parameter I_{DD} max term to I_{DD} in the Elec Characteristics table	5
• Corrected parameter I_{OL} min term to I_{OL} in the Elec Characteristics table	5
• Corrected parameter V_{OL} max term to V_{OL} in the Elec Characteristics table	6
• Corrected parameter V_{IL} max term to V_{IL} in the Elec Characteristics table	6
• Corrected parameter V_{IH} min term to V_{IH} in the Elec Characteristics table	6
• Corrected parameter I_{IN} max term to I_{IN} in the Elec Characteristics table	7
• Added Y-axis label to Figure 1 image object	8
• Changed text string from " $-t_{PHL}$ " to "of t_{PHL} " in the Feature Description paragraph.	13

Changes from Revision C (August 2003) to Revision D	Page
• Added <i>ESD Ratings</i> table, <i>Feature Description</i> section, <i>Device Functional Modes</i> , <i>Application and Implementation</i> section, <i>Power Supply Recommendations</i> section, <i>Layout</i> section, <i>Device and Documentation Support</i> section, and <i>Mechanical, Packaging, and Orderable Information</i> section	1

5 Pin Configuration and Functions

D, J, N, NS, and PW Packages
14-Pin PDIP, CDIP, SOIC, SO, and TSSOP
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
A	1	I	A input
B	3	I	B input
C	5	I	C input
D	9	I	D input
E	11	I	E input
F	13	I	F input
$G = \bar{A}$	2	O	G output
$H = \bar{B}$	4	O	H output
$I = \bar{C}$	6	O	I output
$J = \bar{D}$	8	O	J output
$K = \bar{E}$	10	O	K output
$L = \bar{F}$	12	O	L output
V_{DD}	14	—	Positive supply
V_{SS}	7	—	Negative supply

6 Specifications

6.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT	
V _{DD}	DC supply-voltage (voltages referenced to V _{SS} terminal)	-0.5	20	V	
V _I	Input voltage, all inputs	-0.5	V _{DD} + 0.5	V	
I _{IK}	DC input current, any one input	-10	10	mA	
P _D	Power dissipation per package	-55°C to 100°C		500	
		100°C to 125°C			12
	Device dissipation per output transistor	Full range (all package types)		100	mW
Lead temperature ⁽²⁾				265	°C
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, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) During soldering at distance 1/16 inch ± 1/32 inch (1.59 mm ± 0.79 mm) from case for 10 s maximum

6.2 ESD Ratings

		VALUE	UNIT
V _(ESD)	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±500
		Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±200

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

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

		MIN	MAX	UNIT
V _{DD}	Supply voltage	3	18	V
T _A	Operating temperature	-55	125	°C

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾	CD4069UB					UNIT	
	D (SOIC)	J (CDIP)	N (PDIP)	NS (SO)	PW (TSSOP)		
	14 PINS	14 PINS	14 PINS	14 PINS	14 PINS		
R _{θJA}	Junction-to-ambient thermal resistance	94.9	—	57.9	91.2	122.1	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	56.4	28.5	45.5	48.8	50.8	°C/W
R _{θJB}	Junction-to-board thermal resistance	49.2	—	37.7	50	63.8	°C/W
ψ _{JT}	Junction-to-top characterization parameter	21.1	—	30.6	15	6.3	°C/W
ψ _{JB}	Junction-to-board characterization parameter	48.9	—	37.6	49.6	63.3	°C/W
R _{θJC(bot)}	Junction-to-case (bottom) thermal resistance	N/A	N/A	N/A	N/A	N/A	°C/W

- (1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, [SPRA953](#).

6.5 Electrical Characteristics – Dynamic

 $T_A = 25^\circ\text{C}$; input $t_r, t_f = 20\text{ ns}$; $C_L = 50\text{ pF}$; $R_L = 200\text{ k}\Omega$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL} Propagation delay time	$V_{DD} (V) = 5$		55	110	ns
	$V_{DD} (V) = 10$		30	60	
	$V_{DD} (V) = 15$		25	50	
t_{THL}, t_{TLH} Transition time	$V_{DD} (V) = 5$		100	200	ns
	$V_{DD} (V) = 10$		50	100	
	$V_{DD} (V) = 15$		40	80	
C_{IN} Input capacitance	Any input		10	15	pF

6.6 Electrical Characteristics – Static

 $T_A = 25^\circ\text{C}$; input $t_r, t_f = 20\text{ ns}$; $C_L = 50\text{ pF}$; $R_L = 200\text{ k}\Omega$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
I_{DD} Quiescent device current	$V_{IN} = 0\text{V or } 5\text{ V}, V_{DD} = 5\text{ V}$	$T_A = -55^\circ\text{C}$		0.25	μA	
		$T_A = -40^\circ\text{C}$		0.25		
		$T_A = 25^\circ\text{C}$	0.01	0.25		
		$T_A = 85^\circ\text{C}$		7.5		
		$T_A = 125^\circ\text{C}$		7.5		
	$V_{IN} = 0\text{ or } 10\text{ V}, V_{DD} = 10\text{ V}$	$T_A = -55^\circ\text{C}$				0.5
		$T_A = -40^\circ\text{C}$				0.5
		$T_A = 25^\circ\text{C}$	0.01	0.5		
		$T_A = 85^\circ\text{C}$		15		
		$T_A = 125^\circ\text{C}$		15		
	$V_{IN} = 0\text{ or } 15\text{ V}, V_{DD} = 15\text{ V}$	$T_A = -55^\circ\text{C}$				1
		$T_A = -40^\circ\text{C}$				1
		$T_A = 25^\circ\text{C}$	0.01	1		
		$T_A = 85^\circ\text{C}$		30		
		$T_A = 125^\circ\text{C}$		30		
	$V_{IN} = 0\text{ or } 20\text{ V}, V_{DD} = 20\text{ V}$	$T_A = -55^\circ\text{C}$				5
$T_A = -40^\circ\text{C}$				5		
$T_A = 25^\circ\text{C}$		0.02	5			
$T_A = 85^\circ\text{C}$			150			
$T_A = 125^\circ\text{C}$			150			
I_{OL} Output low (sink) current	$V_O = 0.4\text{ V}, V_{IN} = 5\text{ V}, V_{DD} = 5\text{ V}$	$T_A = -55^\circ\text{C}$	0.64		mA	
		$T_A = -40^\circ\text{C}$	0.61			
		$T_A = 25^\circ\text{C}$	0.51	1		
		$T_A = 85^\circ\text{C}$	0.42			
		$T_A = 125^\circ\text{C}$	0.36			
	$V_O = 0.5\text{ V}, V_{IN} = 10\text{ V}, V_{DD} = 10\text{ V}$	$T_A = -55^\circ\text{C}$	1.6			
		$T_A = -40^\circ\text{C}$	1.5			
		$T_A = 25^\circ\text{C}$	1.3	2.6		
		$T_A = 85^\circ\text{C}$	1.1			
		$T_A = 125^\circ\text{C}$	0.9			
	$V_O = 1.5\text{ V}, V_{IN} = 15\text{ V}, V_{DD} = 15\text{ V}$	$T_A = -55^\circ\text{C}$	4.2			
		$T_A = -40^\circ\text{C}$	4			
		$T_A = 25^\circ\text{C}$	3.4	6.8		
		$T_A = 85^\circ\text{C}$	2.8			
		$T_A = 125^\circ\text{C}$	2.4			

Electrical Characteristics – Static (continued)
 $T_A = 25^\circ\text{C}$; input $t_r, t_f = 20\text{ ns}$; $C_L = 50\text{ pF}$; $R_L = 200\text{ k}\Omega$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
I_{OH}	$V_O = 4.6\text{ V}, V_{IN} = 0\text{ V}, V_{DD} = 5\text{ V}$	$T_A = -55^\circ\text{C}$	-0.64		mA	
		$T_A = -40^\circ\text{C}$	-0.61			
		$T_A = 25^\circ\text{C}$	-0.51	-1		
		$T_A = 85^\circ\text{C}$	-0.42			
		$T_A = 125^\circ\text{C}$	-0.36			
	$V_O = 2.5\text{ V}, V_{IN} = 0\text{ V}, V_{DD} = 5\text{ V}$	$T_A = -55^\circ\text{C}$	-2			-3.2
		$T_A = -40^\circ\text{C}$	-1.8			
		$T_A = 25^\circ\text{C}$	-1.6			
		$T_A = 85^\circ\text{C}$	-1.3			
		$T_A = 125^\circ\text{C}$	-1.15			
	$V_O = 9.5\text{ V}, V_{IN} = 0\text{ V}, V_{DD} = 10\text{ V}$	$T_A = -55^\circ\text{C}$	-1.6			-2.6
		$T_A = -40^\circ\text{C}$	-1.5			
		$T_A = 25^\circ\text{C}$	-1.3			
		$T_A = 85^\circ\text{C}$	-1.1			
		$T_A = 125^\circ\text{C}$	-0.9			
	$V_O = 13.5\text{ V}, V_{IN} = 0\text{ V}, V_{DD} = 15\text{ V}$	$T_A = -55^\circ\text{C}$	-4.2			-6.8
$T_A = -40^\circ\text{C}$		-4				
$T_A = 25^\circ\text{C}$		-3.4				
$T_A = 85^\circ\text{C}$		-2.8				
$T_A = 125^\circ\text{C}$		-2.4				
V_{OL}	$V_{IN} = 5\text{ V}, V_{DD} = 5\text{ V}$	$T_A = 25^\circ\text{C}$	0	0.05	V	
		All other temperatures		0.05		
	$V_{IN} = 10\text{ V}, V_{DD} = 10\text{ V}$	$T_A = 25^\circ\text{C}$	0	0.05		
		All other temperatures		0.05		
	$V_{IN} = 15\text{ V}, V_{DD} = 15\text{ V}$	$T_A = 25^\circ\text{C}$	0	0.05		
		All other temperatures		0.05		
V_{OH}	$V_{IN} = 0\text{ V}, V_{DD} = 5\text{ V}$	$T_A = 25^\circ\text{C}$	4.95	5	V	
		All other temperatures	4.95			
	$V_{IN} = 0\text{ V}, V_{DD} = 10\text{ V}$	$T_A = 25^\circ\text{C}$	9.95	10		
		All other temperatures	9.95			
	$V_{IN} = 0\text{ V}, V_{DD} = 15\text{ V}$	$T_A = 25^\circ\text{C}$	14.95	15		
		All other temperatures	14.95			
V_{IL}	$V_O = 4.5\text{ V}, V_{DD} = 5\text{ V}, \text{all temperatures}$			1	V	
	$V_O = 9\text{ V}, V_{DD} = 10\text{ V}, \text{all temperatures}$			2		
	$V_O = 13.5\text{ V}, V_{DD} = 15\text{ V}, \text{all temperatures}$			2.5		
V_{IH}	$V_O = 0.5\text{ V}, V_{DD} = 5\text{ V}, \text{all temperatures}$	4			V	
	$V_O = 1\text{ V}, V_{DD} = 10\text{ V}, \text{all temperatures}$	8				
	$V_O = 1.5\text{ V}, V_{DD} = 15\text{ V}, \text{all temperatures}$	12.5				

Electrical Characteristics – Static (continued)
 $T_A = 25^\circ\text{C}$; input $t_r, t_f = 20$ ns; $C_L = 50$ pF; $R_L = 200$ k Ω (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
I_{IN} Input current	$V_{IN} = 0$ V to 18 V, $V_{DD} = 18$ V	$T_A = -55^\circ\text{C}$		± 01	μA
		$T_A = -40^\circ\text{C}$		± 01	
		$T_A = 25^\circ\text{C}$		$\pm 10^{-5}$	
		$T_A = 85^\circ\text{C}$		± 1	
		$T_A = 125^\circ\text{C}$		± 1	

6.7 Typical Characteristics

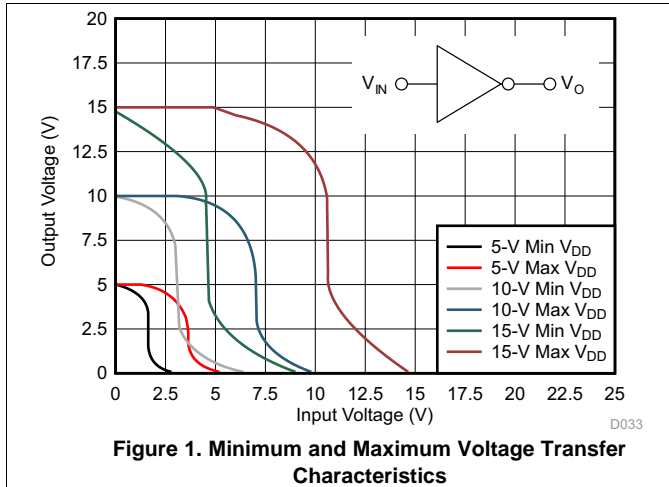


Figure 1. Minimum and Maximum Voltage Transfer Characteristics

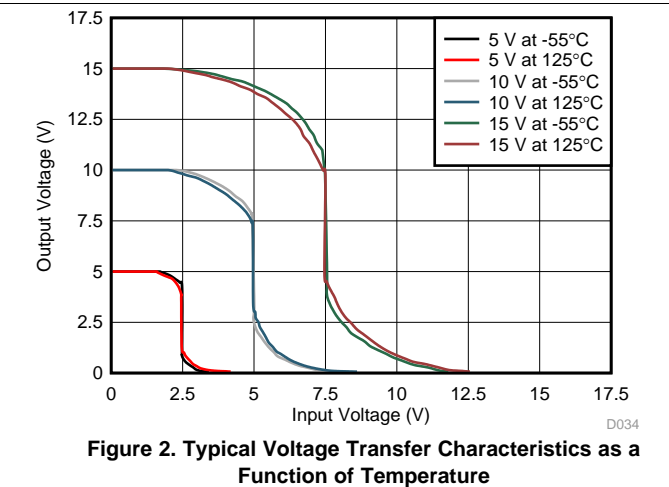


Figure 2. Typical Voltage Transfer Characteristics as a Function of Temperature

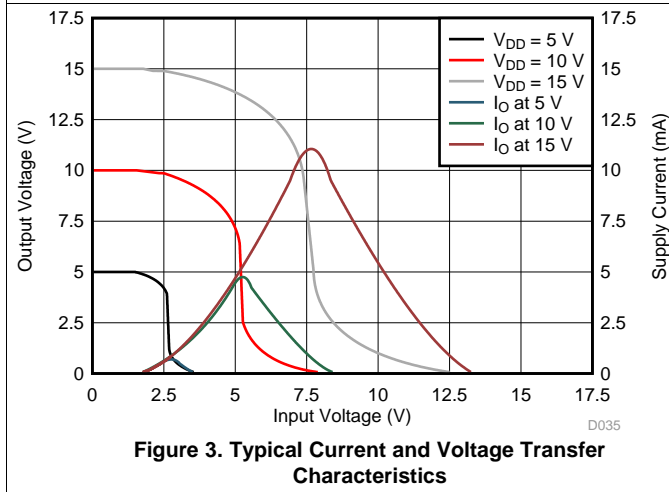


Figure 3. Typical Current and Voltage Transfer Characteristics

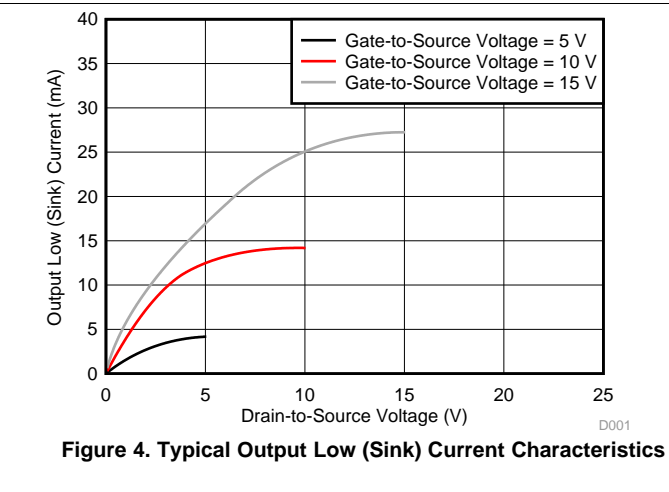


Figure 4. Typical Output Low (Sink) Current Characteristics

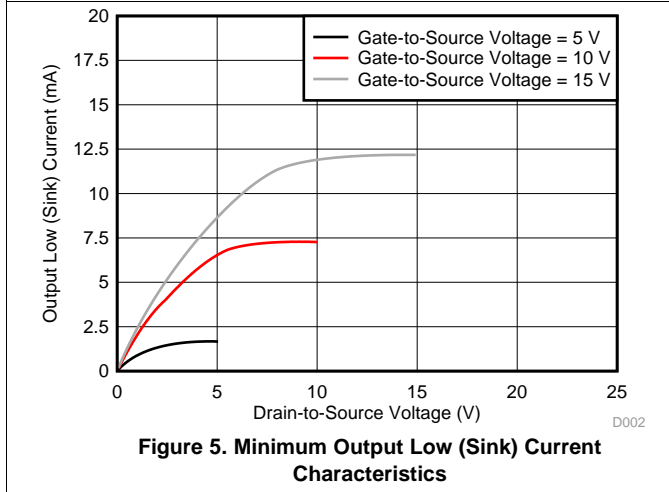


Figure 5. Minimum Output Low (Sink) Current Characteristics

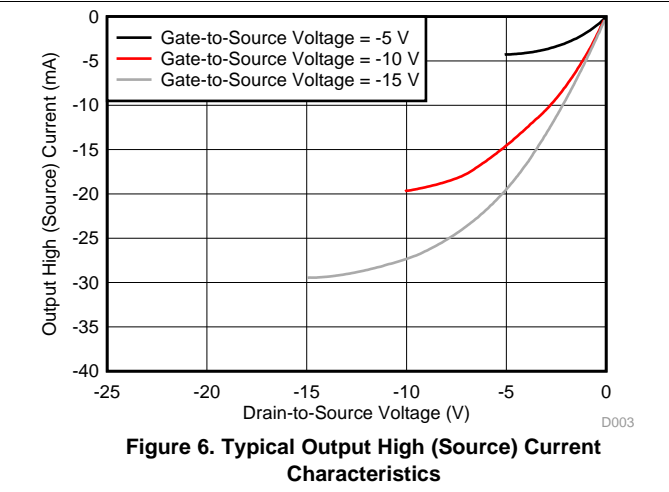
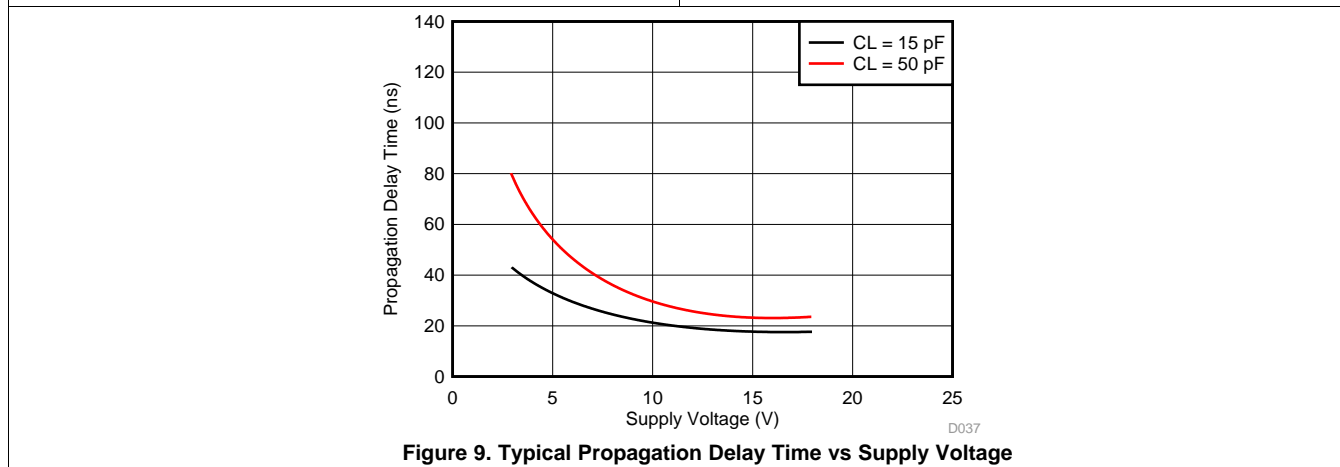
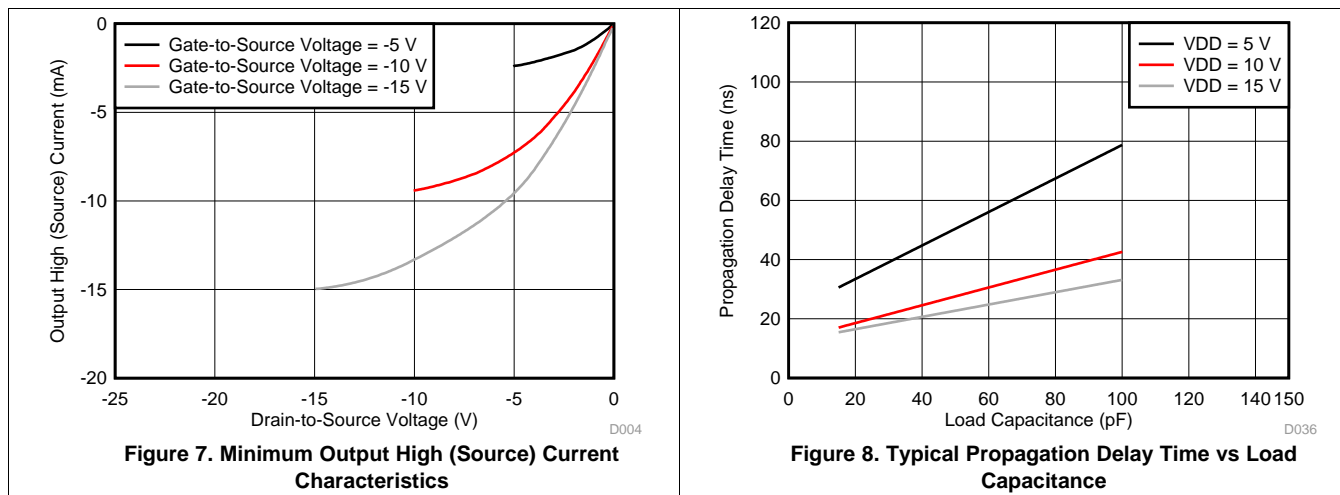


Figure 6. Typical Output High (Source) Current Characteristics

Typical Characteristics (continued)



7 Parameter Measurement Information

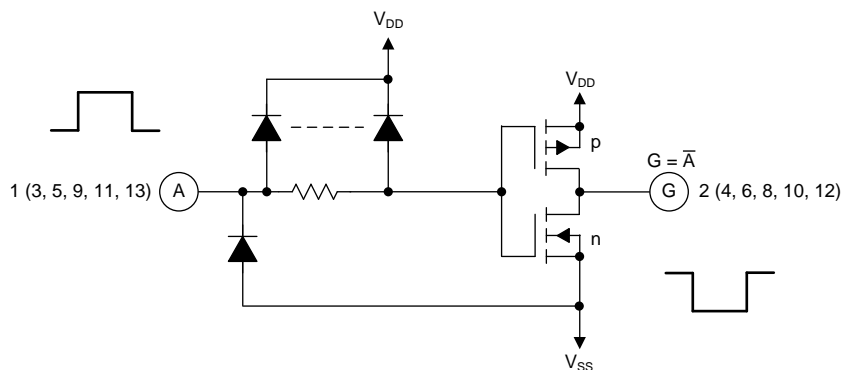


Figure 10. Schematic Diagram of One of Six Identical Inverters

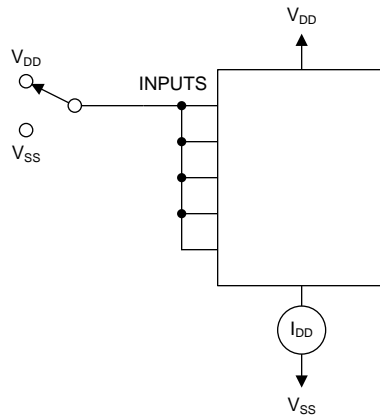


Figure 11. Quiescent Device Current Test Circuit

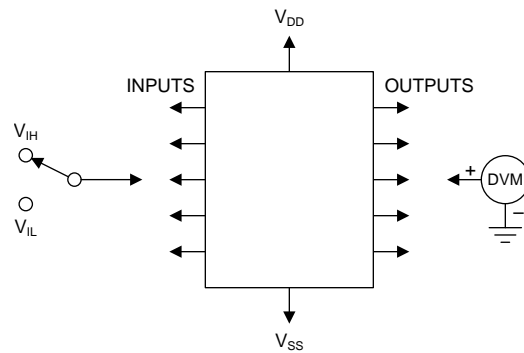


Figure 12. Noise Immunity Test Circuit

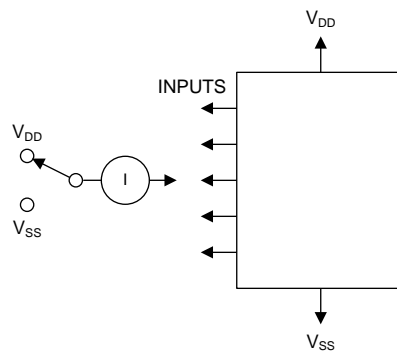


Figure 13. Input Leakage Current Test Circuit

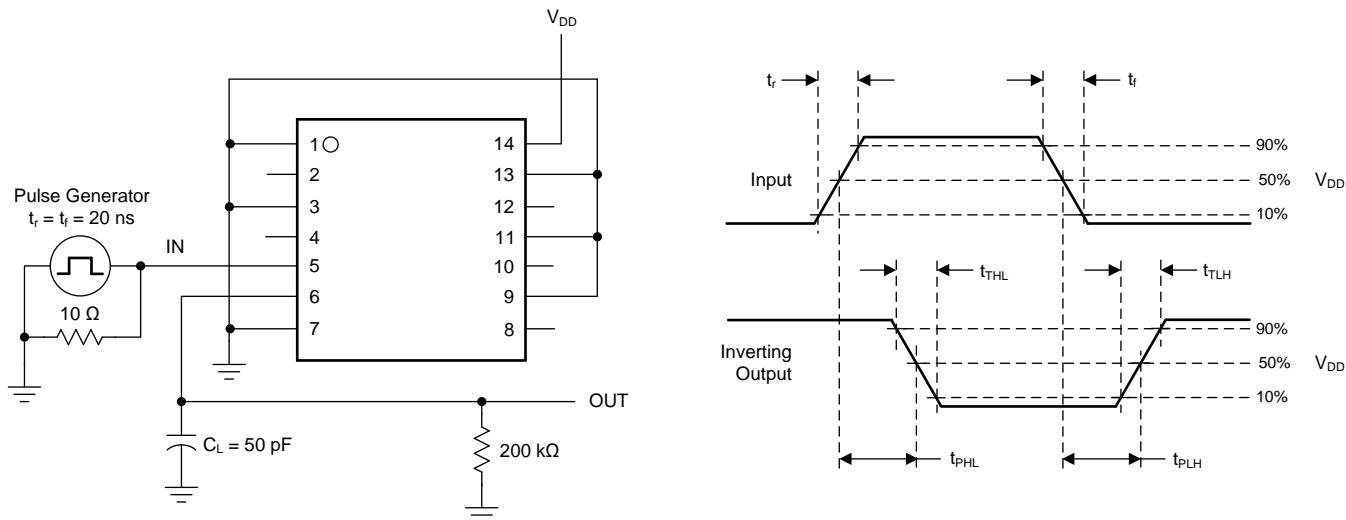


Figure 14. Dynamic Electrical Characteristics Test Circuit and Waveform

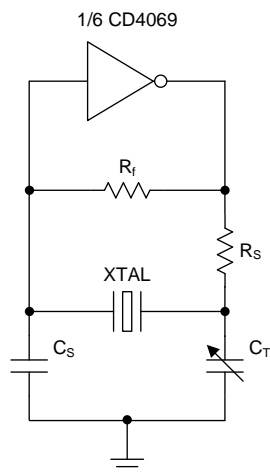


Figure 15. Typical Crystal Oscillator Circuit

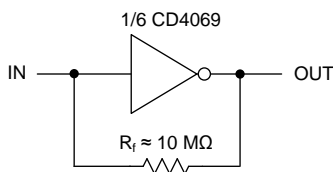


Figure 16. High-Input Impedance Amplifier

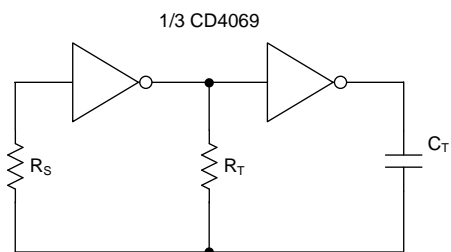
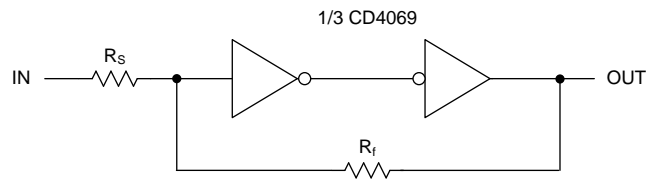


Figure 17. Typical RC Oscillator Circuit



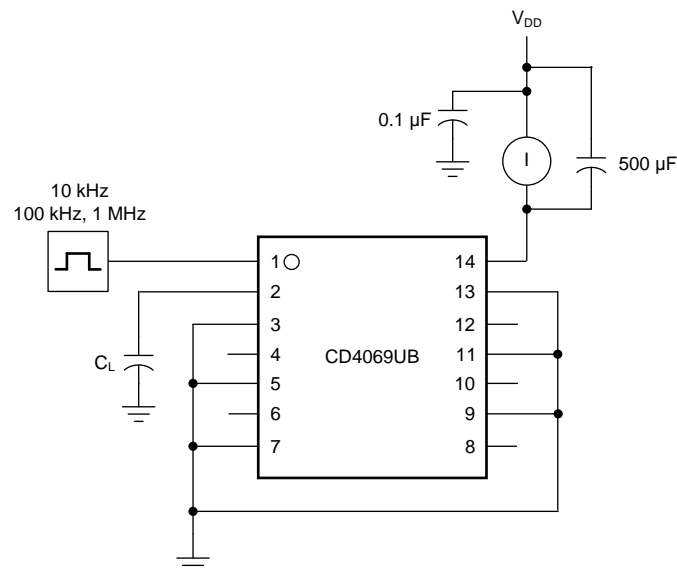
Upper Switching Point :

$$V_P = \frac{R_S + R_f}{R_f} \times \frac{V_{DD}}{2}$$

Lower Switching Point :

$$V_N = \frac{R_f - R_S}{R_f} \times \frac{V_{DD}}{2}$$

$$R_f > R_S$$

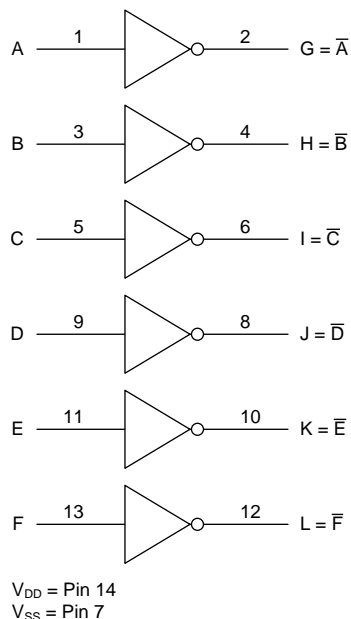
Figure 18. Input Pulse Shaping Circuit

Figure 19. Dynamic Power Dissipation Test Circuit

8 Detailed Description

8.1 Overview

The CD4069UB device has six inverter circuits. The recommended operating range is from 3 V to 18 V. The CD4069UB-series types are supplied in 14-pin hermetic dual-in-line ceramic packages (F3A suffix), 14-pin dual-in-line plastic packages (E suffix), 14-pin small-outline packages (M, MT, M96, and NSR suffixes), and 14-pin thin shrink small-outline packages (PW and PWR suffixes).

8.2 Functional Block Diagram



8.3 Feature Description

CD4069UB has standardized symmetrical output characteristics and a wide operating voltage range from 3 V to 18 V with quiescent current tested at 20 V. This has a medium operation speed of t_{PHL} , $t_{PLH} = 30$ ns (typical) at 10 V. The operating temperature is from -55°C to 125°C . CD4069UB meets all requirements of JEDEC tentative standard No. 13B, *Standard Specifications for Description of B Series CMOS Devices*.

8.4 Device Functional Modes

Table 1 shows the functional modes for CD4069UB.

Table 1. Function Table

INPUT A, B, C, D, E, F	OUTPUT G, H, I, J, K, L
H	L
L	H

9 Application and Implementation

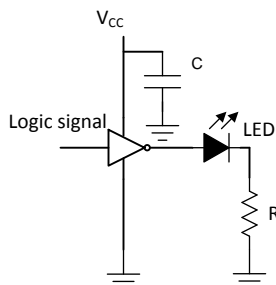
NOTE

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

The CD4069UB device has a low input current of 1 μA at 18 V over full package-temperature range and 100 nA at 18 V, 25°C. This device has a wide operating voltage range from 3 V to 18 V and used in high voltage applications.

9.2 Typical Application



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Figure 20. CD4069UB Application

9.2.1 Design Requirements

The CD4069UB device is the industry's highest logic inverter operating at 18 V under recommended conditions. The lower drive capabilities makes it suitable for driving light loads like LED and greatly reduces chances of overshoots and undershoots.

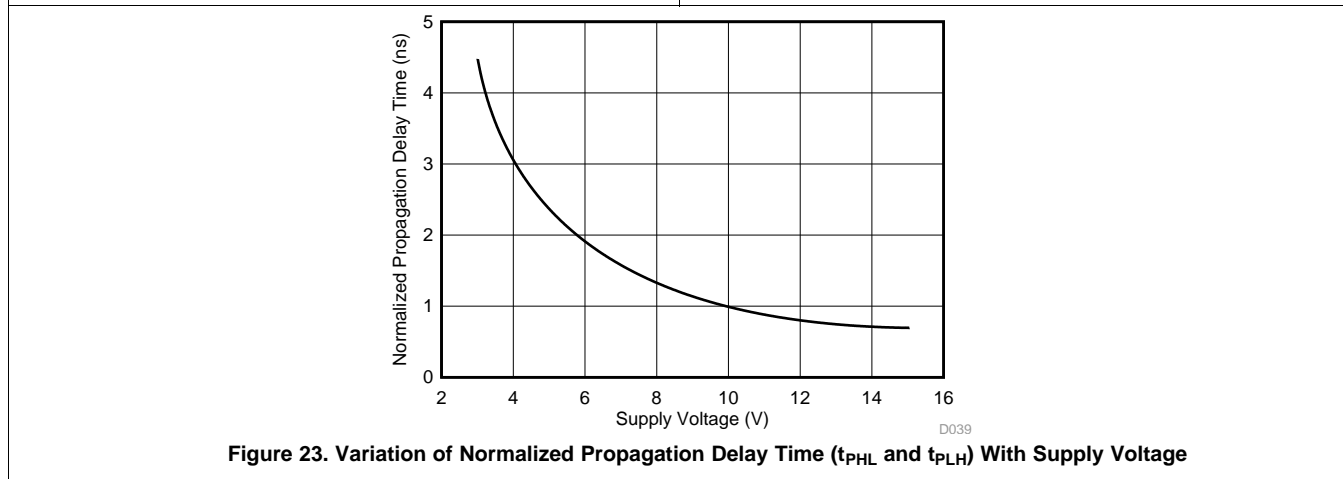
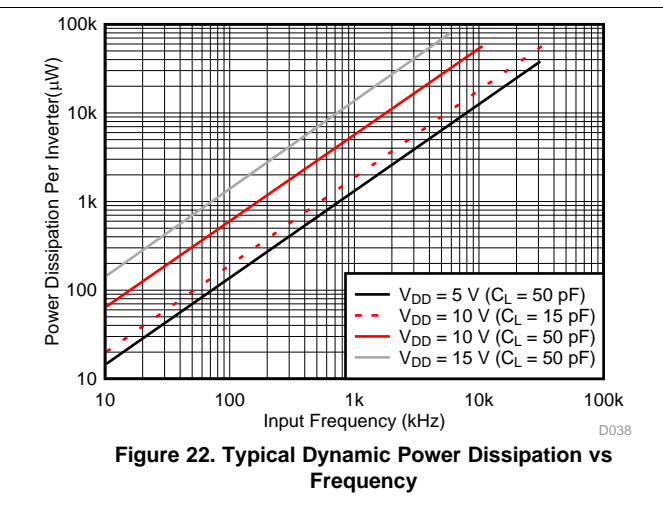
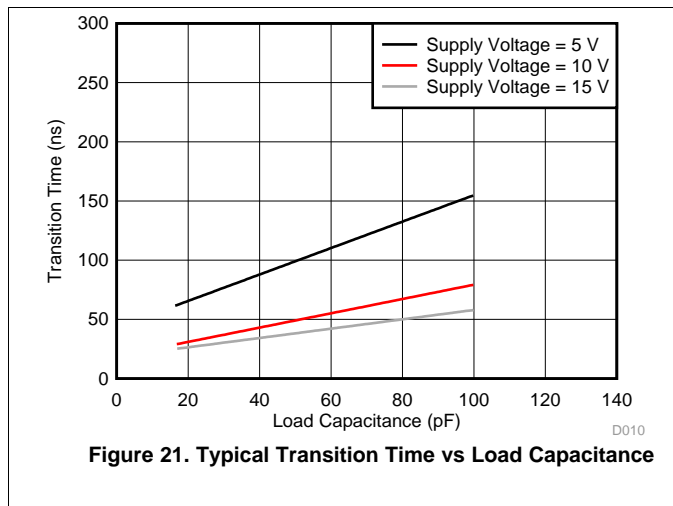
9.2.2 Detailed Design Procedure

The recommended input conditions for [Figure 20](#) includes rise time and fall time specifications (see $\Delta t/\Delta V$ in [Recommended Operating Conditions](#)) and specified high and low levels (see V_{IH} and V_{IL} in [Recommended Operating Conditions](#)). Inputs are not overvoltage tolerant and must be below V_{CC} level because of the presence of input clamp diodes to V_{CC} .

The recommended output condition for the CD4069UB application includes specific load currents. Load currents must be limited so as to not exceed the total power (continuous current through V_{CC} or GND) for the device. These limits are located in the [Absolute Maximum Ratings](#). Outputs must not be pulled above V_{CC} .

Typical Application (continued)

9.2.3 Application Curves



10 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in [Recommended Operating Conditions](#).

Each V_{CC} pin must have a good bypass capacitor to prevent power disturbance. For devices with a single supply, TI recommends a 0.1- μF capacitor. If there are multiple V_{CC} pins, then TI recommends a 0.01- μF or 0.022- μF capacitor for each power pin. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. 0.1- μF and 1- μF capacitors are commonly used in parallel. The bypass capacitor must be installed as close to the power pin as possible for best results.

11 Layout

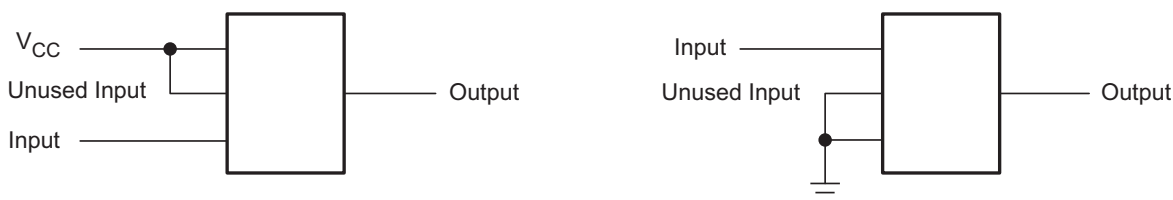
11.1 Layout Guidelines

When using multiple bit logic devices, inputs must never float.

In many cases, digital logic device functions or parts of these functions are unused (for example, when only two inputs of a triple-input and gate are used, or only 3 of the 4 buffer gates are used). Such input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. This rule must be observed under all circumstances specified in the next paragraph.

All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. See the application note, [Implications of Slow or Floating CMOS Inputs \(SCBA004\)](#), for more information on the effects of floating inputs. The logic level must apply to any particular unused input depending on the function of the device. Generally, they are tied to GND or V_{CC} (whichever is convenient).

11.2 Layout Example



12 Device and Documentation Support

12.1 Device Support

12.1.1 Third-Party Products Disclaimer

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12.2 Documentation Support

12.2.1 Related Documentation

For related documentation see the following:

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

12.3 Community Resource

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 finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CD4069UBE	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD4069UBE	Samples
CD4069UBEE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD4069UBE	Samples
CD4069UBF	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD4069UBF	Samples
CD4069UBF3A	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	CD4069UBF3A	Samples
CD4069UBM	ACTIVE	SOIC	D	14	50	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4069UBM	Samples
CD4069UBM96	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	CD4069UBM	Samples
CD4069UBMT	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-55 to 125	CD4069UBM	
CD4069UBNSR	ACTIVE	SOP	NS	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4069UB	Samples
CD4069UBPW	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-55 to 125	CM069UB	
CD4069UBPWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU SN	Level-1-260C-UNLIM	-55 to 125	CM069UB	Samples
JM38510/17401BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 17401BCA	Samples
M38510/17401BCA	ACTIVE	CDIP	J	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	JM38510/ 17401BCA	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.

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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 CD4069UB, CD4069UB-MIL :

- Catalog : [CD4069UB](#)
- Military : [CD4069UB-MIL](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense 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
CD4069UBM96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD4069UBNSR	SOP	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
CD4069UBPWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD4069UBM96	SOIC	D	14	2500	356.0	356.0	35.0
CD4069UBNSR	SOP	NS	14	2000	356.0	356.0	35.0
CD4069UBPWR	TSSOP	PW	14	2000	356.0	356.0	35.0

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD4069UBE	N	PDIP	14	25	506	13.97	11230	4.32
CD4069UBEE4	N	PDIP	14	25	506	13.97	11230	4.32
CD4069UBM	D	SOIC	14	50	506.6	8	3940	4.32

N (R-PDIP-T**)

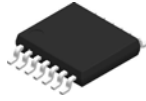
PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

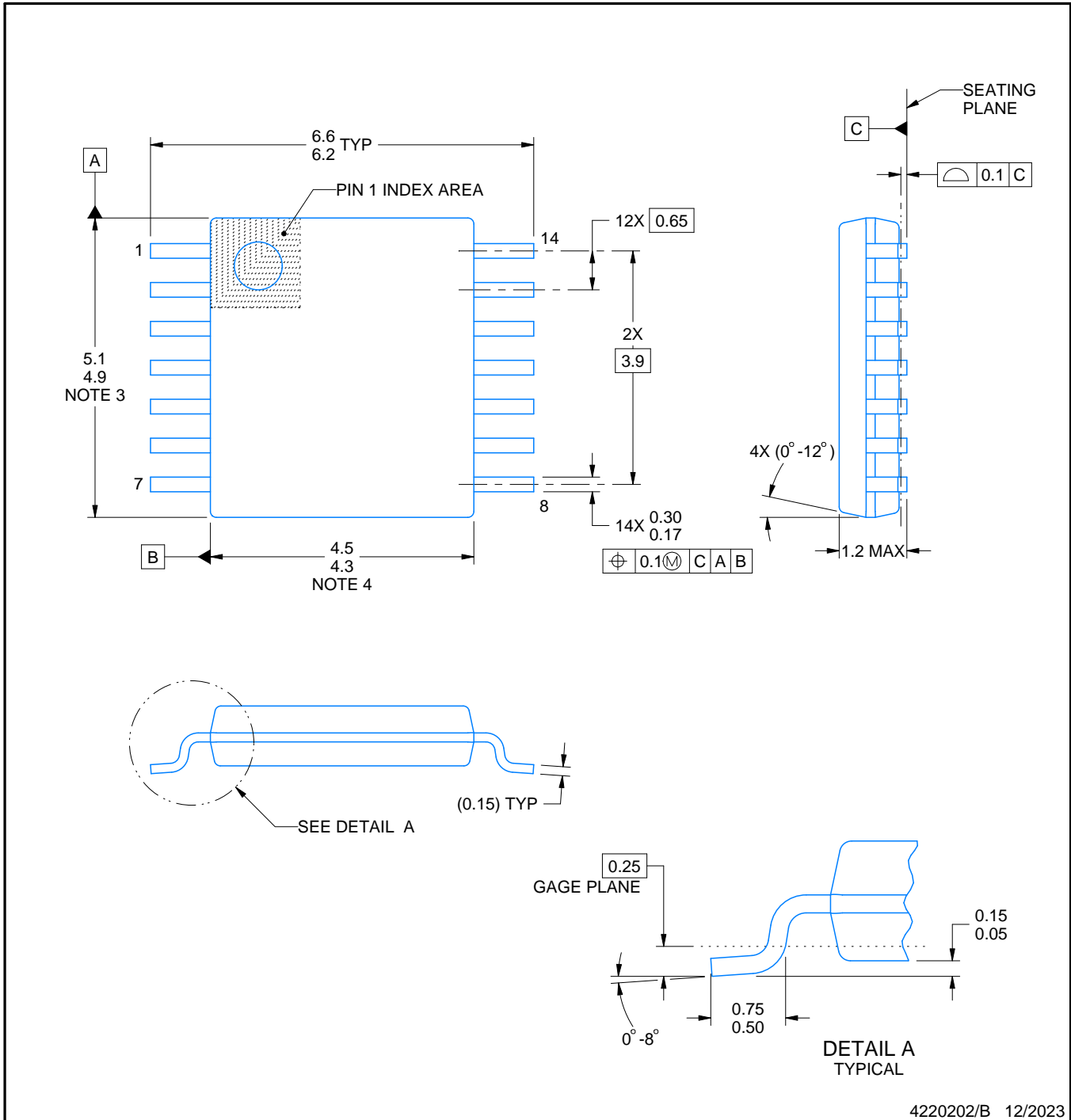
PW0014A



PACKAGE OUTLINE

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



4220202/B 12/2023

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. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.

EXAMPLE BOARD LAYOUT

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X



4220202/B 12/2023

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.

EXAMPLE STENCIL DESIGN

PW0014A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

4220202/B 12/2023

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.



D0014A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

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.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

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.

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- 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, not to exceed 0,15.

J 14

GENERIC PACKAGE VIEW
CDIP - 5.08 mm max height
CERAMIC DUAL IN LINE PACKAGE



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.

4040083-5/G

J0014A



PACKAGE OUTLINE

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



4214771/A 05/2017

NOTES:

1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification only and on press ceramic glass frit seal only.
5. Falls within MIL-STD-1835 and GDIP1-T14.

EXAMPLE BOARD LAYOUT

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE: 5X



4214771/A 05/2017

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